

2014 ACCESSORIES AND EQUIPMENT

Body - Interior & Exterior - Cherokee

WARNING

USE OF HEAT DURING REPAIR

WARNING: Chrysler Group LLC engineering's position on the use of heat during collision repair is as follows:

- Any body panel or frame component damaged which is to be repaired and reused, must be repaired using the "cold straightening" method. No heat may be used during the straightening process.
- During rough straightening prior to panel replacement, damaged panels or frame components may be heated to assist in body/frame realignment. The application of heat must be constrained to the parts which will be replaced and not allowed to affect any other components.

This "no heat" recommendation is due to the extensive use of high strength and advanced high strength steels in Chrysler Group LLC products. High-strength materials can be substantially and negatively affected from heat input which will not be obviously known to the repairer or consumer.

Ignoring these recommendations may lead to serious compromises in the ability to protect occupants in a future collision event, reduce the engineered qualities and attributes, or decrease the durability and reliability of the vehicle.

This statement supersedes any previously released information by the Chrysler Group LLC.

Failure to follow these instructions may result in serious or fatal injury.

WARNINGS

WARNING: Use an Occupational Safety and Health Administration (OSHA) approved breathing filter, when spraying paint or solvents in a confined area. Failure to follow these instructions may result in possible serious or fatal injury.

- avoid prolonged skin contact with petroleum or alcohol based

cleaning solvents.

- do not stand under a hoisted vehicle that is not properly supported on safety stands. Failure to follow these instructions may result in possible serious or fatal injury.

CAUTION: When holes are drilled or punched in an inner body panel, verify the depth of space to the outer body panel, electrical wiring or other components. Damage to the vehicle can result.

- do not weld exterior panels unless combustible material on the interior of vehicle is removed from the repair area. Fire or hazardous conditions, can result.
- always have a fire extinguisher ready for use when welding.
- disconnect the negative (-) cable clamp from the battery when servicing electrical components that are live when the ignition is off. Damage to electrical system can result.
- do not use abrasive chemicals or compounds on painted surfaces. Damage to finish can result.
- do not use harsh alkaline based cleaning solvents on painted or upholstered surfaces. Damage to finish or color can result.
- do not hammer or pound on plastic trim panel when servicing interior trim. Plastic panels can break.

RESTRAINT WARNINGS

WARNING: To avoid potential physical injury, or damage to sensitive electronic circuits and systems, always disconnect and isolate the battery negative (ground) cable and the positive cable, then ground the positive cable to discharge the ORC capacitor before performing any welding operations on the vehicle. Failure to take the proper precautions could result in accidental airbag deployment, possible damage to the Supplemental Restraint System (SRS) circuits and components, and possible damage to other electronic circuits and components. Whenever a welding process is being performed within 30 cm (12 in) of an electronic module/harness, then that module/harness should be relocated out of the way, or disconnected. Always protect against component or vehicle damage from weld spatter by using weld blankets and screens. Failure to follow these instructions may result in serious or fatal injury.

WARNING: To avoid serious or fatal injury on vehicles equipped with the Supplemental Restraint System (SRS), never attempt to repair the electrically conductive circuits or wiring components related to the SRS for which there is no MOPAR wiring repair kit. It is important to use **ONLY** the recommended splicing kit and procedure. For applicable and available

MOPAR wiring repair kits, please visit the MOPAR Connector Web Site at the following address on the internet:
(<http://dto.vftis.com/mopar/disclaimer.asp>). Inappropriate repairs can compromise the conductivity and current carrying capacity of those critical electrical circuits, which may cause SRS components not to deploy when required, or to deploy when not required. Only minor cuts or abrasions of wire and terminal insulation where the conductive material has not been damaged, or connector insulators where the integrity of the latching and locking mechanisms have not been compromised may be repaired using appropriate methods.

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid potential physical injury or damage to sensitive electronic circuits and systems, always disconnect and isolate the battery negative (ground) cable and the positive cable, then ground the positive cable to discharge the Occupant Restraint Controller (ORC) capacitor before performing any welding operations on the vehicle. Failure to take the proper precautions could result in accidental airbag deployment, possible damage to the Supplemental Restraint System (SRS) circuits and components, and possible damage to other electronic circuits and components. Whenever a welding process is being performed within 12 inches (30 centimeters) of an electronic module or wiring harness, then

that module or harness should be relocated out of the way, or disconnected. Always protect against component or vehicle damage from weld spatter by using weld blankets and screens.

WARNING: To avoid serious or fatal injury, do not attempt to dismantle an airbag unit or tamper with its inflator. Do not puncture, incinerate or bring into contact with electricity. Do not store at temperatures exceeding 93° C (200° F). An airbag inflator unit may contain sodium azide and potassium nitrate. These materials are poisonous and extremely flammable. Contact with acid, water, or heavy metals may produce harmful and irritating gases (sodium hydroxide is formed in the presence of moisture) or combustible compounds. An airbag inflator unit may also contain a gas canister pressurized to over 17.24 kPa (2500 psi). Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: To avoid serious or fatal injury when handling a seat belt tensioner retractor. Exercise proper care to keep fingers out from under the retractor cover and away from the seat belt webbing where it exits from the retractor cover. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: To avoid serious or fatal injury, replace all Supplemental Restraint System (SRS) components only with parts specified in the Chrysler Mopar® Parts Catalog. Substitute parts may appear interchangeable, but internal differences may result in inferior occupant protection.

WARNING: To avoid serious or fatal injury, the fasteners, screws, and bolts originally used for the Supplemental Restraint System (SRS) components must never be replaced with any substitutes. These fasteners have special coatings and are specifically designed for the SRS. Anytime a new fastener is needed, replace it with the correct fasteners provided in the service package or specified in the Chrysler Mopar® Parts Catalog.

WARNING: To avoid serious or fatal injury when a steering column has an airbag unit attached, never place the column on the floor or any other surface with the steering wheel or airbag unit face down. Failure to follow these instructions may result in possible serious or fatal injury.

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DIAGNOSIS AND TESTING

GENERAL WATER LEAKS

Water leaks can be caused by poor sealing, improper body component alignment, body seam porosity, missing plugs, or blocked drain holes. Centrifugal and gravitational force can cause water to drip from a location away from the actual leak point, making leak detection difficult. All body sealing points should be water tight in normal wet-driving conditions. Water flowing downward from the front of the vehicle should not enter the passenger or luggage compartment. Moving sealing surfaces will not always seal water tight under all conditions. At times, side glass or door seals will allow water to enter the passenger compartment during high pressure washing or hard driving rain (severe) conditions. Overcompensating on door or glass adjustments to stop a water leak that occurs under severe conditions can cause premature seal wear and excessive closing or latching effort. After completing a repair, water test vehicle to verify leak has stopped before returning vehicle to use.

VISUAL INSPECTION BEFORE WATER LEAK TESTS

Verify that floor and body plugs are in place, body drains are clear, and body components are properly aligned and sealed. If component alignment or sealing is necessary, refer to the appropriate information for proper procedures.

WATER LEAK TESTS

WARNING: Do not use electric shop lights or tools in water test area. Serious or fatal injury can result.

When the conditions causing a water leak have been determined, simulate the conditions as closely as possible.

- If a leak occurs with the vehicle parked in a steady light rain, flood the leak area with an open-ended garden hose.
- If a leak occurs while driving at highway speeds in a steady rain, test the leak area with a reasonable velocity stream or fan spray of water. Direct the spray in a direction comparable to actual conditions.
- If a leak occurs when the vehicle is parked on an incline, hoist the end or side of the vehicle to simulate this condition. This method can be used when the leak occurs when the vehicle accelerates, stops or turns. If the leak occurs on acceleration, hoist the front of the vehicle. If the leak occurs when braking, hoist the back of the vehicle. If the leak occurs on left turns, hoist the left side of the vehicle. If the leak occurs on right turns, hoist the right side of the vehicle. For hoisting recommendations, refer to **HOISTING, STANDARD PROCEDURE** .

WATER LEAK DETECTION

To detect a water leak point-of-entry, do a water test and watch for water tracks or droplets forming on the inside of the vehicle. If necessary, remove interior trim covers or panels to gain visual access to the leak area. If the hose cannot be positioned without being held, have someone help do the water test.

Some water leaks must be tested for a considerable length of time to become apparent. When a leak appears, find the highest point of the water track or drop. The highest point usually will show the point of entry. After leak point has been found, repair the leak and water test to verify that the leak has stopped.

Locating the entry point of water that is leaking into a cavity between panels can be difficult. The trapped water may splash or run from the cavity, often at a distance from the entry point. Most water leaks of this type become apparent after accelerating, stopping, turning, or when on an incline.

MIRROR INSPECTION METHOD

When a leak point area is visually obstructed, use a suitable mirror to gain visual access. A mirror can also be used to deflect light to a limited-access area to assist in locating a leak point.

BRIGHT LIGHT LEAK TEST METHOD

Some water leaks in the luggage compartment can be detected without water testing. Position the vehicle in a brightly lit area. From inside the darkened luggage compartment inspect around seals and body seams. If necessary, have a helper direct a drop light over the suspected leak areas around the luggage compartment. If light is visible through a normally sealed location, water could enter through the opening.

PRESSURIZED LEAK TEST METHOD

When a water leak into the passenger compartment cannot be detected by water testing, pressurize the passenger compartment and soap test exterior of the vehicle. To pressurize the passenger compartment, close all

doors and windows, start engine, and set heater control to high blower in HEAT position. If engine cannot be started, connect a charger to the battery to ensure adequate voltage to the blower. With interior pressurized, apply dish detergent solution to suspected leak area on the exterior of the vehicle. Apply detergent solution with spray device or soft bristle brush. If soap bubbles occur at a body seam, joint, seal or gasket, the leak entry point could be at that location.

TRACING POWDER LEAK TEST METHOD

Tracing powder can be used to help aid in pinpointing the area of the leak. It is available through many aftermarket automotive suppliers. Apply the tracing powder along weatherstrips, body seams and other areas where the water leak is suspected of coming from. Perform a water leak test in the in the suspected area. Refer to **WATER LEAK TESTS**. When the water passes over the tracing powder the leak should be pinpointed by the displacement of the tracing powder. Follow the tracing powder's manufacturer restrictions, guidelines and directions.

WIND NOISE

Wind noise is the result of most air leaks. Air leaks can be caused by poor sealing, improper body component alignment, body seam porosity, or missing plugs in the engine compartment or door hinge pillar areas. All body sealing points should be airtight in normal driving conditions. Moving sealing surfaces will not always seal airtight under all conditions. At times, side glass or door seals will allow wind noise to be noticed in the passenger compartment during high cross winds. Over compensating door or glass adjustments to stop wind noise that occurs under severe conditions can cause premature seal wear and excessive closing or latching effort. After a repair procedure has been performed, test vehicle to verify noise has stopped before returning vehicle to use.

VISUAL INSPECTION BEFORE TESTS

Verify that floor and body plugs are in place and body components are aligned and sealed. If component alignment or sealing is necessary, refer to the appropriate information for proper procedures.

ROAD TESTING WIND NOISE

1. Drive the vehicle to verify the general location of the wind noise.
2. Apply 50 mm (2 in.) masking tape in 150 mm (6 in.) lengths along weatherstrips, weld seams or moldings. After each length is applied, drive the vehicle. If noise goes away after a piece of tape is applied, remove tape, locate, and repair defect.

POSSIBLE CAUSE OF WIND NOISE

- Moldings standing away from body surface can catch wind and whistle.
- Gaps in sealed areas behind overhanging body flanges can cause wind-rushing sounds.
- Misaligned movable components.
- Missing or improperly installed plugs in pillars.
- Weld burn through holes.

STANDARD PROCEDURE

BUZZ, SQUEAKS AND RATTLES

Buzz, Squeaks and Rattles (BSR's) may be caused by any one or more of the following and may be corrected as indicated:

- Loose fasteners should be tightened to specifications.
- Damaged or missing clips should be replaced.
- Damaged trim panels should be replaced.
- Incorrectly installed trim panels should be reinstalled properly.

Many BSR complaints such as loose trim, can be serviced using various tapes or lubricants. Tapes including foam, flock and anti-squeak, can be used to eliminate noises caused by metal, plastic and vinyl components. Long life lubricants and greases can also be used on a variety of components. Refer to the table for materials and usage. Refer to **BUZZ, SQUEAKS AND RATTLES**.

BUZZ, SQUEAKS AND RATTLES

ITEM	FEATURES	APPLICATIONS	SERVICE TEMP
ITCH AND SQUEAK TAPE	An abrasion resistant material thin enough to conform to most irregular surfaces. Stops most itches and squeaks.	Between metal and metal, metal and plastic, metal and vinyl, vinyl and plastic. Interior. Examples: Trim panels and bezels.	-40° to 107° C (-40° to 225° F)
BLACK NYLON FLOCK	Nylon Flock with an aggressive acrylic adhesive. Provides for cushioning and compression fit, also isolates components. Water-resistant.	Between metal and metal, metal and plastic, vinyl and plastic. Examples: Pull cups, bezels, clips, ducts, top cover to glass, cowl panel.	-40° to 82° C (-40° to 180° F)
HIGH DENSITY URETHANE FOAM	Tear resistant, highly resilient and durable.	Between metal and metal, metal and plastic. Water-resistant. Examples: I/P, heavy metal rattles, isolating brackets.	-40° to 82° C (-40° to 180° F)
OPEN CELL FOAM TAPE	Soft foam conforms to irregular surfaces.	Wire harness and connector wrap. Examples: Seals, gasket, wiring, heat ducts.	-40° to 82° C (-40° to 180° F)
CLOSED CELL LOW DENSITY FOAM TAPE	Soft, conformable. Water-resistant.	Wherever bulk is needed. Prevents closing flutters and rattles when applied to door watershield. Examples: Door, I/P.	-40° to 82° C (-40° to 180° F)
NYE® GREASE 880	Long life.	Suspensions. Examples: Strut bushings, sway	-40° to 200° C (-40° to 390° F)

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		bars.	
KRYTOX® OIL	Long life. Will not dry out or harm plastics or rubber.	When access is not possible, oil will migrate to condition. Vinyl, rubber, plastic, metal. Examples: Convertible top bushings, pull cups trim panel inserts.	-34° to 205° C (-30° to 400° F)
KRYTOX® GREASE	Long life. Will not dry out or harm plastics or rubber.	Vinyl, rubber, plastic, metal, glass. Examples: Weather-strips, backlite and windshield moldings.	-34° to 205° C (-30° to 400° F)

HEAT STAKING

1. Remove trim panel.
2. Bend or move the trim panel components at the heat staked joints. Observe the heat staked locations and/or component seams for looseness.
3. Heat stake the components.
 - a. If the heat staked or component seam location is loose, hold the two components tightly together and using a soldering gun with a flat tip, melt the material securing the components together. Do not over heat the affected area, damage to the exterior of the trim panel may occur.
 - b. If the heat staked material is broken or missing, use a hot glue gun to apply new material to the area to be repaired. The panels that are being heat staked must be held together while applying the glue. Once the new material is in place, it may be necessary to use a soldering gun to melt the newly applied material. Do not over heat the affected area, damage to the exterior of the trim panel may occur.
4. Allow the repaired area to cool and verify the repair.
5. Install trim panel.

PLASTIC BODY PANEL REPAIR

There are many different types of plastics used in today's automotive environment. We group plastics in three different categories: Rigid, Semi-Rigid, and Flexible. Any of these plastics may require the use of an adhesion promoter for repair. These types of plastic are used extensively on Chrysler Motors vehicles. Always follow repair material manufacturer's plastic identification and repair procedures.

RIGID PLASTICS:

Examples of rigid plastic use: Fascias, Hoods, Doors, and other Body Panels, which include SMC, ABS, and Polycarbonates.

SEMI-RIGID PLASTICS:

Examples of semi-rigid plastic use: Interior Panels, Under Hood Panels, and other Body Trim Panels.

FLEXIBLE PLASTICS:

Examples of flexible plastic use: Fascias, Body Moldings, and upper and lower Fascia Covers.

REPAIR PROCEDURE:

The repair procedure for all three categories of plastics is basically the same. The one difference is the material used for the repair. The materials must be specific for each substrate, rigid repair material for rigid plastic repair, semi-rigid repair material for semi-rigid plastic repair and flexible repair material for flexible plastic repair.

ADHESION PROMOTER/SURFACE MODIFIER:

Adhesion Promoters/Surface Modifiers are required for certain plastics. All three categories may have plastics that require the use of adhesion promoter/surface modifiers. Always follow repair material manufacturer's plastic identification and repair procedures.

SAFETY PRECAUTION AND WARNINGS

WARNING:

- **Eye protection should be used when servicing components. Personal injury can result.**
- **Use an OSHA approved breathing mask when mixing epoxy, grinding, and spraying paint or solvents in a confined area. Personal injury can result.**
- **Avoid prolonged skin contact with resin, petroleum, or alcohol based solvents. Personal injury can result.**
- **Do not venture under a hoisted vehicle that is not properly supported on safety stands. Personal injury can result.**

NOTE:

- **When holes must be drilled or cut in body panels, verify locations of internal body components and electrical wiring. Damage to vehicle can result.**
- **Do not use abrasive chemicals or compounds on undamaged painted surfaces around repair areas. Damage to finish can result.**

RIGID, SEMI-RIGID, AND FLEXIBLE PLASTIC PARTS TYPES

CODE	FAMILY NAME	COMMON TRADE NAME	TYPICAL APPLICATION
ASA	Acrylonitrile Styrene Acrylite	Lurans	Consoles, Grilles
ABS	Acrylonitrile Butadiene Styrene	Terluran	"A" Pillars, Consoles, Grilles
ABS/PC	ABS/PC Alloy	Pulse, Proloy, Bayblend	Doors, Instrument Panels
ABS/PVC	ABS/PV Alloy	Proloy, Pulse, Lustran,	Door Panels, Grilles, Trim

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		Cyclovin	
BMC	Bulk Molding Compound	BMC	Fender Extensions
EMA	Ehtylene Methyl Acrylate/Ionomer	Surlyn, EMA, Ionomer	Bumper Guards, Pads
METTON	Metton	Metton	Grilles, Kick Panels, Running Boards
MPPO	Modified Polyphenylene Oxide	MPPO	Spoiler Assembly
PA	Polyamid	Zytel, Vydyne, PA, Minlon	Fenders, Quarter Panels
PET	Thermoplastic Polyester	Rynite	Trim
PBT/PPO	PBT/PPO Alloy	Germax	Claddings
PBTP	Polybutylene Therephthalate	PBT, PBTP, Pocan, Valox	Wheel Covers, Fenders, Grilles
PBTP/EEBC	Polybutylene Therephthalate/EEBC Alloy	Bexloy, "M", PBTP/EEBC	Fascias, Rocker Panel, Moldings
PC	Polycarbonate	Lexan, Merlon, Calibre, Makrolon PC	Tail Light Lenses, I/P Trim, Valance Panels
PC/ABS	PC/ABS Alloy	Germax, Bay Blends, Pulse	Doors, Instrument Panels
PPO	Polyphenylene Oxide	Azdel, Hostalen, Marlex, Prfax, Noryl, GTX, PPO	Interior Trim, Door Panels, Splash Shields, Steering Column Shroud
PPO/PA	Polyphenylene/Polyamid	PPO/PA, GTX 910	Fenders, Quarter Panels
PR/FV	Fiberglass Reinforced Plastic	Fiberglass, FV, PR/FV	Body Panels
PS	Polystyrene	Lustrex, Styron, PS	Door Panels, Dash Panels
RTM	Resin Transfer Molding Compound	RTM	Body Panels
SMC	Sheet Molded Compound	SMC	Body Panels
TMC	Transfer Molding Compound	TMC	Grilles
UP	Unsaturated Polyester (Thermosetting)	SMC, BMC, TMC, ZMC, IMC, XSMC, UP	Grille Opening Panel, Liftgates, Flareside Fenders, Fender Extensions
EEBC	Ether/Ester Blocked Co-Polymer	EEBC	Bumpers
EEBC/PBTP	EEBC/Polybutylene Terephthalate	EEBC, PBTP, BEXLOY	Bumper, Rocker Panels
EMPP	Ethylene Modified Polypropylene	EMPP	Bumper Covers
EPDM	Ethylene/Propopylene Diene Monomer	EPDM, Nordel, Vistalon	Bumpers
EPM	Ethylene/Propopylene Co-Polymer	EPM	Fenders
MPU	Foam Polyurethane	MPU	Spoilers
PE	Polyethylene	Alathon, Dylan, Lupolen, Marlex	-

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PP	Polypropylene (Blends)	Noryl, Azdel, Marlox, Dylon, Pravex	Inner Fender, Spoilers, Kick Panels, A-Pillars, Door Panels, B-Pillars, Quarter Panels, Sport Bar Trim, Liftgate Trim, Decklid Trim Scuff Plates, Kick Panels, Consoles
PP/EPDM	PP/EPDM Alloy	PP/EPDM	Spoilers, Grilles
PUR	Polyurethane	Colonels, PUR, PU	Fascias, Bumpers
PUR/PC	PUR/PC Alloy	Texin	Bumpers
PVC	Polyvinyl Chloride	Apex, Geon, Vinylite	Body Moldings, Wire Insulation, Steering Wheels
RIM	Reaction Injected Molded Polyurethane	RIM, Bayflex	Front Fascias, Modular Windows
RRIM	Reinforced Reaction Injected Molded	PUR, RRIM	Fascias, Body Panels, Body Trims
TPE	Thermo Polyethylene	TPE, Hytrel, Bexloy-V	Fascias, Bumpers, Claddings
TPO	Thermopolyolefin	Polytrope, Renflex, Santoprene, Visaflex, ETA, Apex, TPO, Shields, Claddings	Bumpers, End Caps, Telcar, Rubber, Strips, Sight, Interior B-Pillar
TPP	Thermo-Polypropylene	TPP	Bumpers
TPU	Thermopolyurethane, Polyester	TPU, Hytrel, Texin, Estane	Bumpers, Body Side, Moldings, Fenders, Fascias

PANEL SECTIONING

If it is required to section a large panel for a plastic repair, it will be necessary to reinforce the panel. To bond two plastic panels together, a reinforcement must overlap both panels. The panels must be "V'd" at a 20 degree angle. The area to be reinforced should be washed, then sanded. Be sure to wipe off any excess soap and water when finished. Lightly sand or abrade the plastic with an abrasive pad or sandpaper. Blow off any dust with compressed air or wipe with a clean dry rag.

When bonding plastic panels, Follow repair material manufacturers recommendations. Be sure that enough adhesive has been applied to allow squeeze out and to fill the full bond line. Once the pieces have been brought together, do not move them until the adhesive is cured. The assembly can be held together with clamps, rivets, etc. A faster cure can be obtained by heating with a heat lamp or heat gun. After the parts have been bonded and have had time to cure, rough sand the seam and apply the final adhesive filler to the area being repaired. Smooth the filler with a spreader, wooden tongue depressor, or squeegee. For fine texturing, a small amount of water can be applied to the filler surface while smoothing. The cured filler can be sanded as necessary and, as a final step, cleanup can be done with soapy water. Wipe the surface clean with a dry cloth allowing time for the panel to dry before moving on with the repair.

PANEL REINFORCEMENT

Structural repair procedures for rigid panels with large cracks and holes will require a reinforcement backing. Reinforcements can be made with several applications of glass cloth saturated with structural adhesive. Semi-rigid or flexible repair materials should be used for semi-rigid or flexible backing reinforcement. Open meshed fiberglass dry wall tape can be used to form a reinforcement. The dry wall tape allows the resin to penetrate through and make a good bond between the panel and the adhesive. Structurally, the more dry wall tape used, the stronger the repair.

Another kind of repair that can be done to repair large cracks and holes is to use a scrap piece of similar plastic and bond with structural adhesive. The reinforcement should cover the entire break and should have a generous amount of overlap on either side of the cracked or broken area.

When repairing plastic, the damaged area is first "V'd" out, or beveled. Large bonding areas are desirable when repairing plastic because small repairs are less likely to hold permanently. Beveling the area around a crack at a 20 degree angle will increase the bonding surface for a repair. It is recommended that sharp edges be avoided because the joint may show through after the panel is refinished.

- Panel repair for both flexible and rigid panels are basically the same. The primary difference between flexible panel repair and rigid panel repair is in the adhesive materials used.
- The technician should first decide what needs to be done when working on any type of body panel. One should determine if it is possible to return the damage part to its original strength and appearance without exceeding the value of the replacement part.
- When plastic repairs are required, it is recommended that the part be left on the vehicle when ever possible. That will save time, and the panel will remain stationary during the repair. Misalignment can cause stress in the repair areas and can result in future failure.

VISUAL INSPECTION

Composite materials can mask the severity of an accident. Adhesive bond lines, interior structure of the doors, and steel structures need to be inspected carefully to get a true damage assessment. Close inspection may require partial removal of interior trim or inner panels.

Identify the type of repair: Puncture or Crack - Damage that has penetrated completely through the panel. Damage is confined to one general area; a panel section is not required. However, a backer panel, open fiberglass tape, or matted material must be bonded from behind.

PANEL SURFACE PREPARATION

If a body panel has been punctured, cracked, or crushed, the damaged area must be removed from the panel to achieve a successful repair. All spider web cracks leading away from a damaged area must be stopped or removed. To stop a running crack in a panel, drill a 6 mm (0.250 in.) hole at the end of the crack farthest away from the damage. If spider web cracks can not be stopped, the panel would require replacement. The surfaces around the damaged area should be stripped of paint and freed from wax and oil. Scuff surfaces around repair area with 360 grit wet/dry sandpaper, or equivalent, to assure adhesion of repair materials.

PATCHING PANELS

An panel that has extensive puncture type damage can be repaired by cutting out the damaged material. Use a

suitable reciprocating saw or cut off wheel to remove the section of the panel that is damaged. The piece cut out can be used as a template to shape the new patch. It is not necessary to have access to the back of the panel to install a patch. Bevel edges of cutout at 20 degrees to expose a larger bonding area on the outer side. This will allow for an increased reinforcement areas.

PANEL PATCH FABRICATIONS

A patch can be fabricated from any rigid fiberglass panel that has comparable contour with the repair area. Lift gates and fenders can be used to supply patch material. If existing material is not available or compatible, a patch can be constructed with adhesive and reinforcement mesh (dry wall tape). Perform the following operation if required:

1. Cover waxed paper or plastic with adhesive backed nylon mesh (dry wall tape) larger than the patch required.
2. Tape waxed paper or plastic sheet with mesh to a surface that has a compatible contour to the repair area.
3. Apply a liberal coat of adhesive over the reinforcement mesh. If necessary apply a second or third coat of adhesive and mesh after first coat has cured. The thickness of the patch should be the same as the repair area.
4. After patch has cured, peel waxed paper or plastic from the back of the patch.
5. If desired, a thin film coat of adhesive can be applied to the back of the patch to cover mesh for added strength.

PANEL PATCH INSTALLATION

1. Make a paper or cardboard pattern the size and shape of the cutout hole in the panel.
2. Trim 3 mm (0.125 in.) from edges of pattern so patch will have a gap between connecting surfaces.
3. Using the pattern as a guide, cut the patch to size.
4. Cut scrap pieces of patch material into 50 mm (2 in.) squares to use as patch supports to sustain the patch in the cutout.
5. Drill 4 mm (0.160 in.) holes 13 mm (0.5 in.) in from edge of cutout hole.
6. Drill 4 mm (0.160 in.) holes 13 mm (0.5 in.) away from edge of patch across from holes drilled around cutout.
7. Drill 3 mm (0.125 in.) holes in the support squares 13 mm (0.5 in.) from the edge in the center of one side.
8. Scuff the backside of the body panel around the cutout hole with a scuff pad or sandpaper.
9. Mix enough adhesive to cover one side of all support squares.
10. Apply adhesive to cover one side of all support squares.
11. Using number 8 sheet metal screws, secure support squares to back side of body panel with adhesive sandwiched between the panel and squares.
12. Position patch in cutout against support squares and adjust patch until the gap is equal along all sides.
13. Drill 3 mm (0.125 in.) holes in the support squares through the pre-drilled holes in the patch.
14. Apply a coat of adhesive to the exposed ends of the support squares.

2014 Jeep Cherokee Trailhawk

2014 ACCESSORIES AND EQUIPMENT Body - Interior & Exterior - Cherokee

15. Install screws to hold the patch to support squares. Tighten screws until patch surface is flush with panel surface.
16. Allow adhesive to cure, and remove all screws.
17. Using a 125 mm (5 in.) 24 grit disc grinder, grind a 50 mm (2 in.) to 75 mm (3 in.) wide and 2 mm (0.080 in.) deep path across the gaps around the patch. With compressed air, blow dust from around patch.
18. Apply adhesive backed nylon mesh (dry wall tape) over gaps around patch.
19. Mix enough adhesive to cover the entire patch area.
20. Apply adhesive over the mesh around patch, and smooth epoxy with a wide spreader to reduce finish grinding. Use two to three layers of mesh and adhesive to create a stronger repair.

PATCHED PANEL SURFACING

After patch panel is installed, the patch area can be finished using the same methods as finishing other types of body panels. If mesh material is exposed in the patched area, grind surface down, and apply a coat of high quality rigid plastic body filler. Prime, block sand, and paint as required.

SPECIFICATIONS

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Description	N.m	Ft Lbs	In Lbs
Coolant bottle fasteners	10	7	89
Fender to body fasteners	9	7	80
Front door carrier plate fasteners	8	6	71
Front door carrier plate to outside handle fastener	8	6	71
Front door check to A-pillar fastener	30	22	266
Front door exterior handle fastener	2	1	18
Front door glass to regulator fasteners	13	10	115
Front door hinge pivot bolts	24	18	212
Front door hinge to body fasteners	43	32	381
Front door hinge to door fasteners	43	32	381
Front door latch fasteners	8	6	71
Front door striker bolts	30	22	266
Front end module lower bolts	26	19	230
Front end module upper bolts	16	12	142
Front seat mounting bolts	40	30	354
Hood hinge to body bolts	9	7	80
Hood hinge to hood bolts	21	15	186
Hood latch fasteners	9	7	80
Hood striker fasteners	21	15	186
Instrument panel to cowl side bolts *			

2014 Jeep Cherokee Trailhawk

2014 ACCESSORIES AND EQUIPMENT Body - Interior & Exterior - Cherokee

The instrument panel side support bolts need to be rechecked at least five minutes after installation.	27	20	239
Instrument panel to cowl upper bolts	20	15	177
Liftgate hinge bolts	28	21	248
Liftgate hinge to header nut	63	46	558
Liftgate latch bolts	9	7	80
Liftgate striker bolts	28	21	248
Passenger air bag fasteners	9	7	80
Rear door carrier plate fasteners	8	6	71
Rear door carrier plate to outside handle fastener	8	6	71
Rear door check to B-pillar fasteners	30	22	266
Rear door glass to regulator fasteners	13	10	115
Rear door hinge pivot bolts	24	18	212
Rear door hinge to B-pillar fasteners	43	32	381
Rear door hinge to door fasteners	43	32	381
Rear door striker bolts	30	22	266
Rear seat armrest pivot bolt	25	18	221
Rear seat back mounting bolts	25	18	221
Rear seat mounting fasteners	85	63	752
Roof rack fasteners	6	4	53
Spoiler bolts	6	4	53
Sunroof glass fasteners, front glass panel	4.5	3	40
Sunroof glass fasteners, rear glass panel	4.5	3	40
Sunroof motor fasteners	4	3	35
Sunroof mounting bolts	9	7	80
Washer bottle fasteners	7	5	62

BODY LUBRICATION

LUBRICATION REQUIREMENTS

Body mechanisms and linkages should be inspected, cleaned, and lubricated, as required, to maintain ease of operation and to provide protection against rust and wear. When performing other under hood services, the hood latch release mechanism and safety catch should be inspected, cleaned, and lubricated. During the winter season, external door lock cylinders should be lubricated to assure proper operation when exposed to water and ice.

Prior to the application of any lubricant, the parts concerned should be wiped clean to remove dust and grit. If necessary, a suitable solvent can be used to clean the item to be lubricated. After lubricating a component, any excess oil or grease should be removed.

LUBRICANT APPLICATION

DOOR LOCK CYLINDERS

1. Apply a small amount of lubricant directly into the lock cylinder.
2. Apply a small amount of lubricant to the key.
3. Insert key into lock cylinder and cycle the mechanism from the locked to the unlocked position.

NOTE: **Do not add more lubricant.**

4. Cycle the lock cylinder mechanism several times to allow the lubricant to flow throughout the cylinder.
5. Wipe all lubricant from exterior of lock cylinder and key.

ALL OTHER BODY MECHANISMS

1. Clean component as described above.
2. Apply specified lubricant to all pivoting and sliding contact areas of component.

LUBRICANT USAGE**ENGINE OIL**

- Door Hinges - Hinge Pin and Pivot Contact Areas
- Hood Hinges - Pivot Points
- Liftgate Hinges

MOPAR® SPRAY WHITE LUBE OR EQUIVALENT

- Door Check Straps
- Liftgate Latches
- Liftgate Prop Pivots
- Ash Receiver
- Fuel Filler Door Remote Control Latch Mechanism
- Parking Brake Mechanism
- Sliding Seat Tracks
- Liftgate Latch

MOPAR® MULTIPURPOSE GREASE OR EQUIVALENT

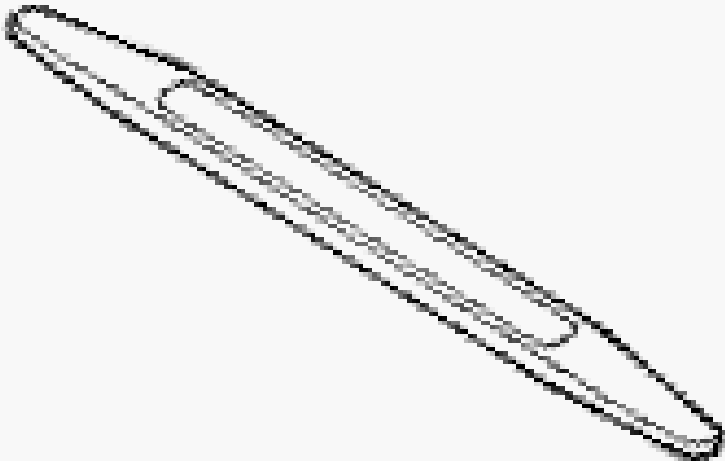
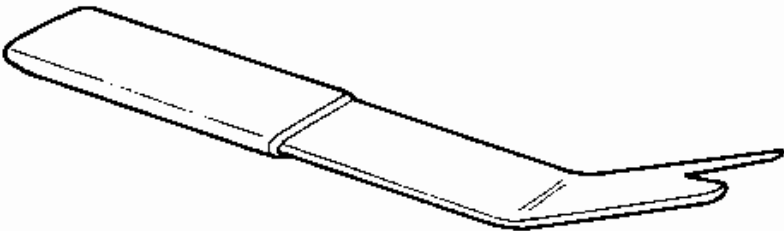
- All Other Hood Mechanisms

MOPAR® LOCK CYLINDER LUBRICANT OR EQUIVALENT

- Door Lock Cylinders
 - Liftgate Lock Cylinder
-

SPECIAL TOOLS

SPECIAL TOOLS

	C-4755 - Trim Stick (Originally Shipped In Kit Number(s) 9299, 9299CC, 9299CC, 9300A-CAN.)
	C-4829A - Remover, Trim

DECKLID/HATCH/LIFTGATE/TAILGATE

HINGE, LIFTGATE

REMOVAL

REMOVAL

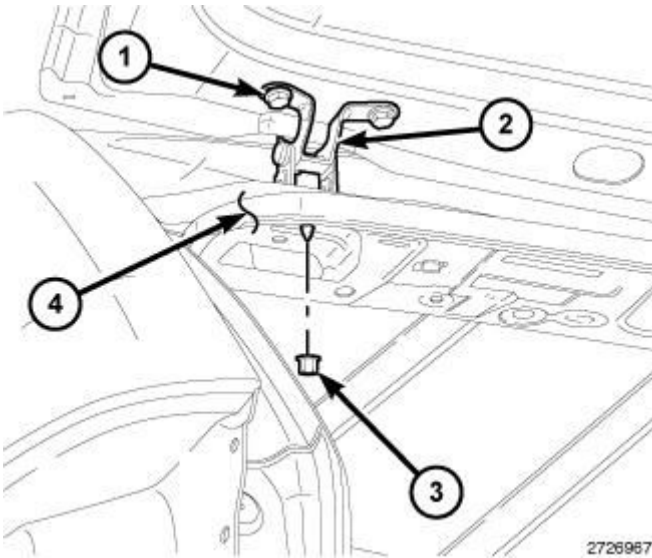


Fig. 1: Nuts, Header, Bolts & Hinges
Courtesy of CHRYSLER GROUP, LLC

1. Remove the spoiler (1). Refer to **SPOILER, REMOVAL**.

NOTE: It is not necessary to remove the liftgate to replace one or both hinges. The hinges can be replaced one at a time.

2. Open and support the liftgate with a suitable prop or block.
3. If the liftgate is being replaced, remove the liftgate support struts (2) at the liftgate. Refer to **PROP ASSEMBLY, POWER, REMOVAL**.
4. Remove the upper quarter trim panels. Refer to **PANEL, QUARTER TRIM, REMOVAL**.
5. Lower the rear of the headliner to gain access to the hinge fasteners.
6. Remove the bolts (1) that secure the hinge to the liftgate.
7. Remove the hinges (2) from the vehicle.

INSTALLATION

INSTALLATION

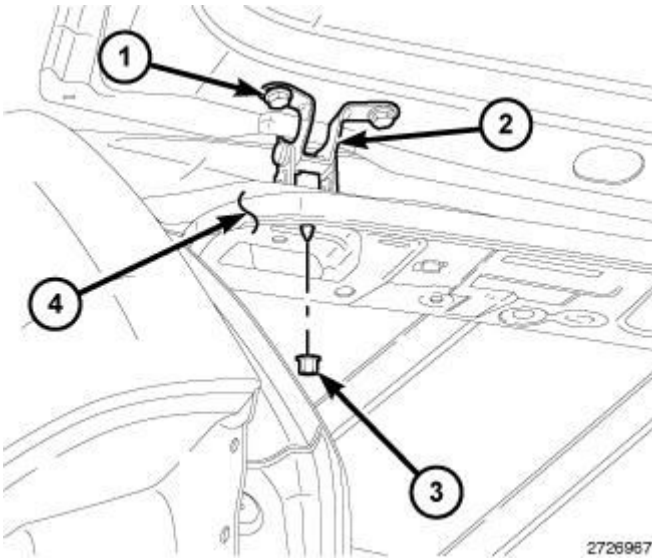


Fig. 2: Nuts, Header, Bolts & Hinges
Courtesy of CHRYSLER GROUP, LLC

1. It is not necessary to remove the liftgate to replace one or both hinges. The hinges can be replaced one at a time.

NOTE: Use a suitable body sealer on the hinge to body mating surfaces prior to installation.

2. Position the liftgate hinge (2) to the upper liftgate opening header (4) on the vehicle.
3. Carefully pull the upper edge of the side panels downward from the header far enough to install and tighten the nut (3) to 63 N.m (46 ft. lbs.).
4. Position the liftgate to the liftgate half of the hinge (1) on the vehicle.
5. Install and tighten the two fasteners (1) that secure the hinge to the liftgate.
6. Tighten the fasteners to 28 N.m (21 ft. lbs.).
7. Install the support struts. Refer to **PROP ASSEMBLY, POWER, INSTALLATION**.
8. Install the spoiler to the liftgate. Refer to **SPOILER, INSTALLATION**.
9. Check the liftgate for proper alignment and operation. Refer to **GAP AND FLUSH, SPECIFICATIONS**.
10. Install the upper quarter trim panels. Refer to **PANEL, QUARTER TRIM, INSTALLATION**.

LATCH, LIFTGATE

REMOVAL

REMOVAL

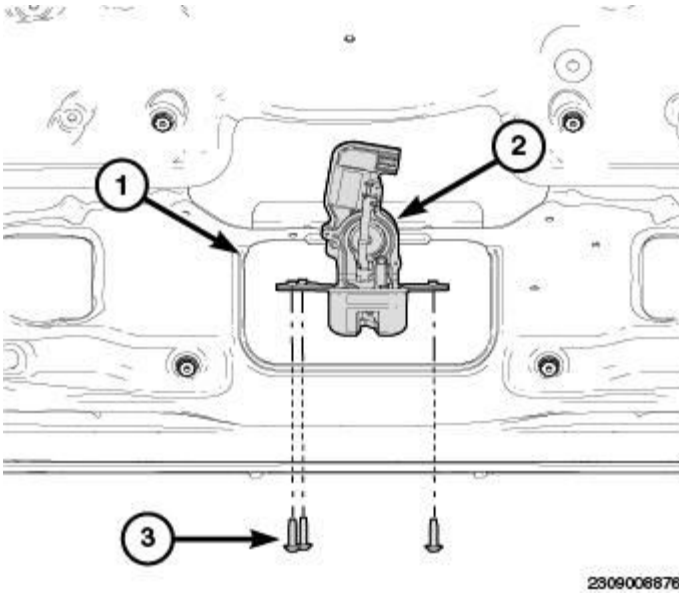


Fig. 3: Identifying Liftgate, Hatch & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Remove the trim panel from the lift gate. Refer to **PANEL, TRIM, REMOVAL**.
2. Remove the three bolts (3) from the lift gate latch (2).
3. Disconnect the electrical connectors.
4. Remove the lift gate latch (2) from the lift gate (1).

INSTALLATION

INSTALLATION

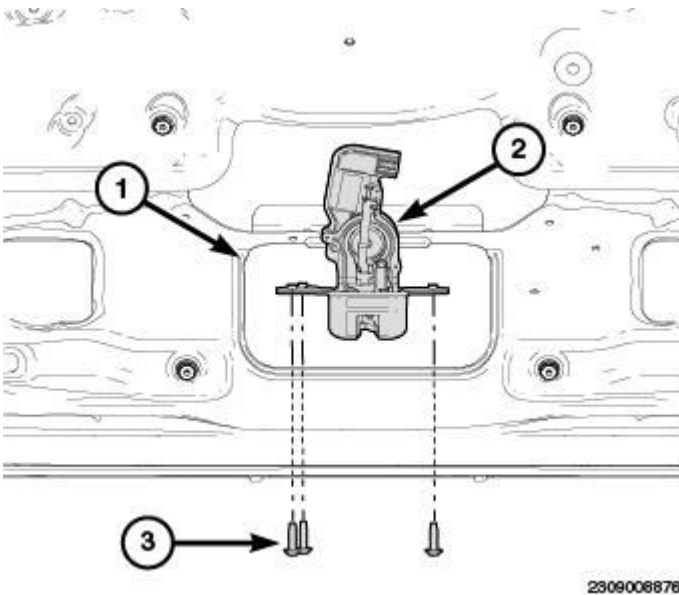


Fig. 4: Identifying Liftgate, Hatch & Bolts

Courtesy of CHRYSLER GROUP, LLC

1. Install the latch (2) to the lift gate (1).
2. Install the three bolts (3) to the lift gate latch (2) and tighten the bolts to 9 N.m (80 in. lbs.).
3. Connect the electrical connectors.
4. Install the liftgate trim panel. Refer to **PANEL, TRIM, INSTALLATION**.

LIFTGATE

ADJUSTMENTS

ADJUSTMENTS

IN/OUT

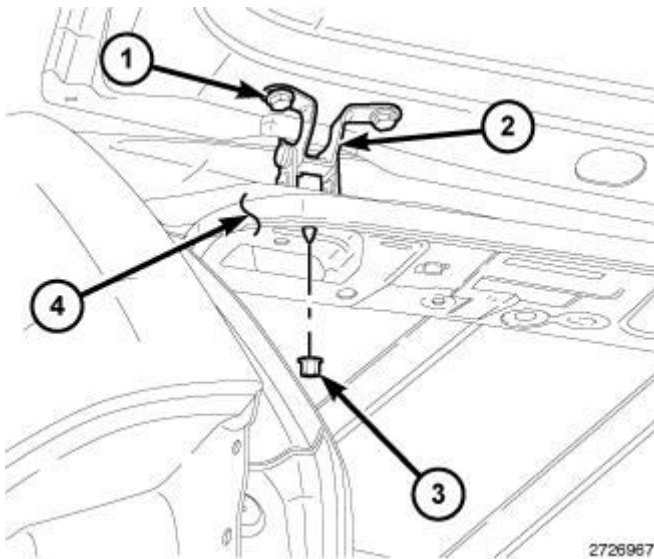


Fig. 5: Nuts, Header, Bolts & Hinges
Courtesy of CHRYSLER GROUP, LLC

NOTE: The position of the lift gate can be adjusted upward or downward by the use of slots in the hinge. An inward or outward adjustment is achieved by use of slots in the body. If an inward or outward adjustment is needed, use a body sealer on the hinge to body mating surface.

1. Remove the upper quarter trim panels and lower the rear of the headliner to access the hinge fasteners. Refer to **PANEL, QUARTER TRIM, REMOVAL**.
2. For the upper lift gate adjustments, loosen the six hinge to header fasteners (2 and 3) and adjust to specifications. Refer to **GAP AND FLUSH, SPECIFICATIONS**.
3. Tighten the hinge bolts to 28 N.m (21 ft. lbs.).

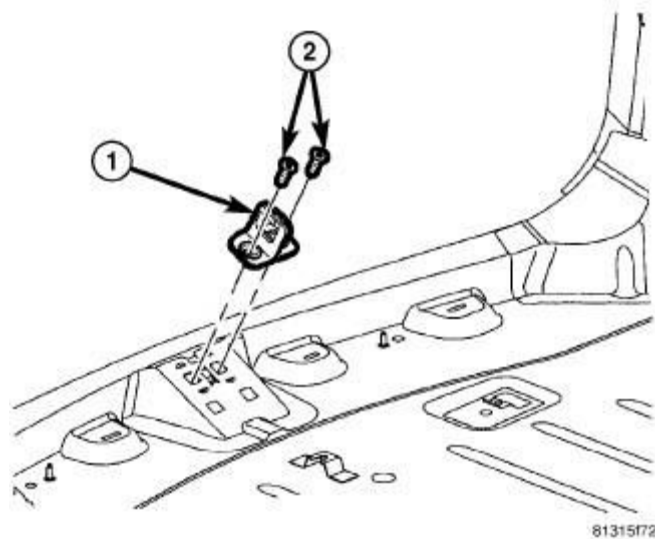


Fig. 6: Identifying Striker & Screws

Courtesy of CHRYSLER GROUP, LLC

4. For the lower lift gate adjustments, remove liftgate scuff trim. Refer to **PLATE, SCUFF, DOOR SILL, INSTALLATION**.
5. Loosen the striker screws (2) and adjust to specifications. Refer to **GAP AND FLUSH, SPECIFICATIONS**.
6. Tighten the striker screws to 28 N.m (21 ft. lbs.).
7. Position the upper rear headliner trim and seat fully.
8. Position liftgate scuff plate trim and seat fully.
9. Install the upper quarter trim panels. Refer to **PANEL, QUARTER TRIM, INSTALLATION**.

UP/DOWN AND LEFT/RIGHT

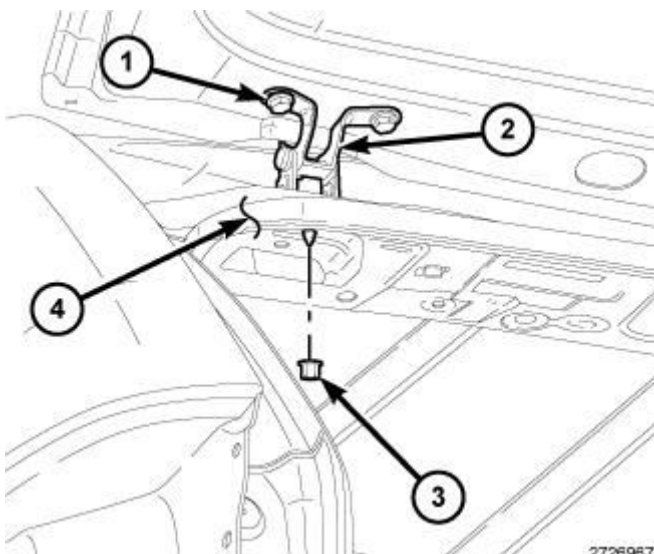


Fig. 7: Nuts, Header, Bolts & Hinges

Courtesy of CHRYSLER GROUP, LLC

1. Remove the upper quarter trim panels and lower the rear of the headliner to access the hinge fasteners. Refer to **PANEL, QUARTER TRIM, REMOVAL**.
2. Remove liftgate scuff trim. Refer to **PLATE, SCUFF, DOOR SILL, REMOVAL**.
3. Loosen the hinge to liftgate bolts (1).

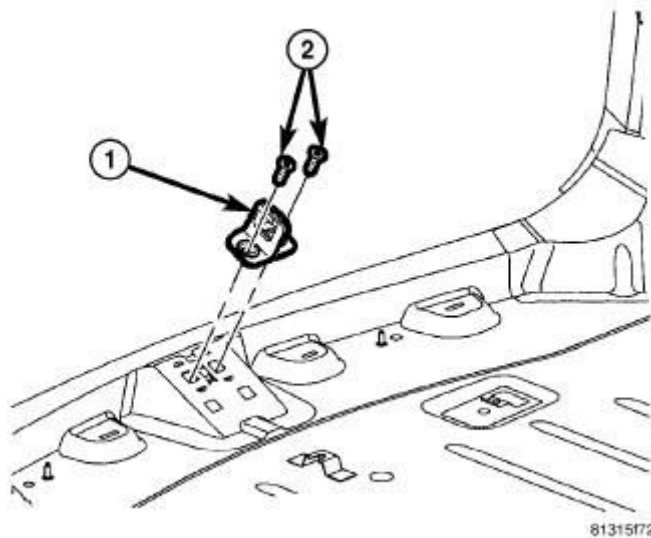


Fig. 8: Identifying Striker & Screws

Courtesy of CHRYSLER GROUP, LLC

4. Loosen the striker screws (1).
5. Adjust the liftgate up/down position and tighten the hinge bolts to 28 N.m (21 ft. lbs.). Refer to **GAP AND FLUSH, SPECIFICATIONS**.
6. Confirm the lower liftgate in/out position and tighten the striker screws to 28 N.m (21 ft. lbs.).
7. Install liftgate scuff plate trim. Refer to **PLATE, SCUFF, DOOR SILL, INSTALLATION**.
8. Install the upper quarter trim panels. Refer to **PANEL, QUARTER TRIM, INSTALLATION**.

REMOVAL

REMOVAL

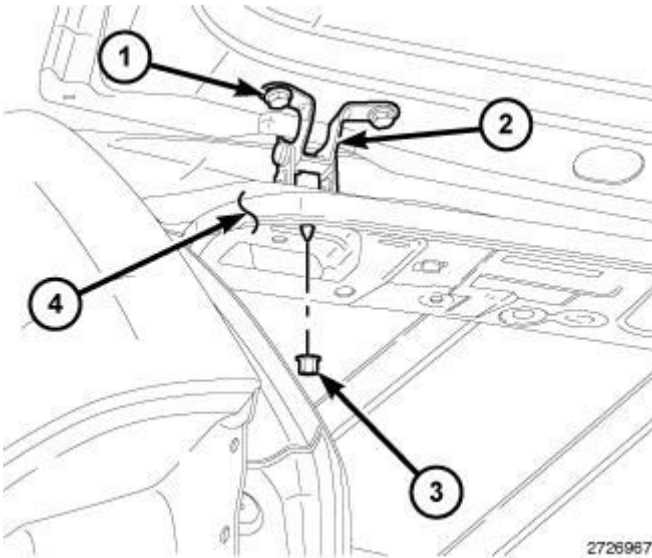


Fig. 9: Nuts, Header, Bolts & Hinges
Courtesy of CHRYSLER GROUP, LLC

1. Remove the upper quarter trim panels and lower the rear of the headliner to access the hinge fasteners. Refer to **PANEL, QUARTER TRIM, REMOVAL**.

WARNING: Do not disconnect the support rod cylinders with the liftgate closed. The support rod pistons are operated by high pressure gas. This pressure could cause damage and/or personal injury if they are removed while the pistons are compressed.

WARNING: Failure to follow these instructions may result in possible serious or fatal injury.

2. Open and support the liftgate.
3. Remove the support struts (2) from the liftgate (1). Refer to **PROP ASSEMBLY, POWER, REMOVAL**.
4. Disconnect the wire harnesses.
5. Using a grease pencil or equivalent, mark the hinge location.
6. Remove the liftgate to body fasteners (3) and remove liftgate from vehicle.

INSTALLATION

INSTALLATION

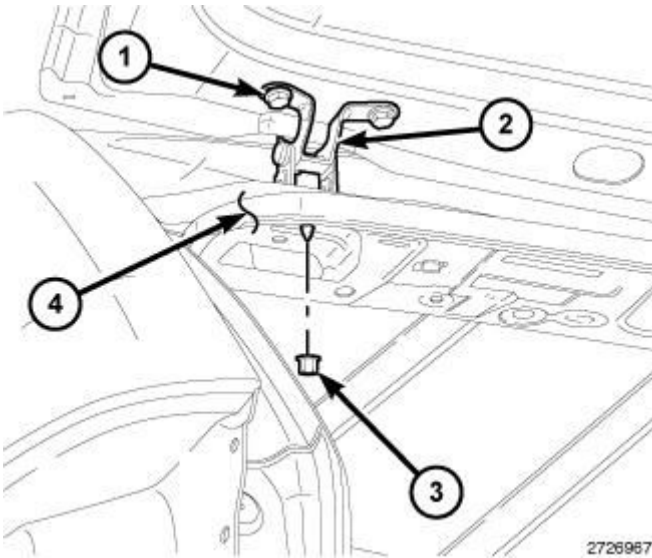


Fig. 10: Nuts, Header, Bolts & Hinges
Courtesy of CHRYSLER GROUP, LLC

NOTE: With assistance, support the lift gate while the hinges are being installed.

NOTE: A suitable body sealant should be used when removing or moving the hinges.

1. Position the liftgate onto the vehicle.
2. Install the four hinge to liftgate bolts (1) and tighten the to 28 N.m (21 ft. lbs.).
3. Install two hinge to header nuts (3) and tighten to 63 N.m (46 in. lbs.).

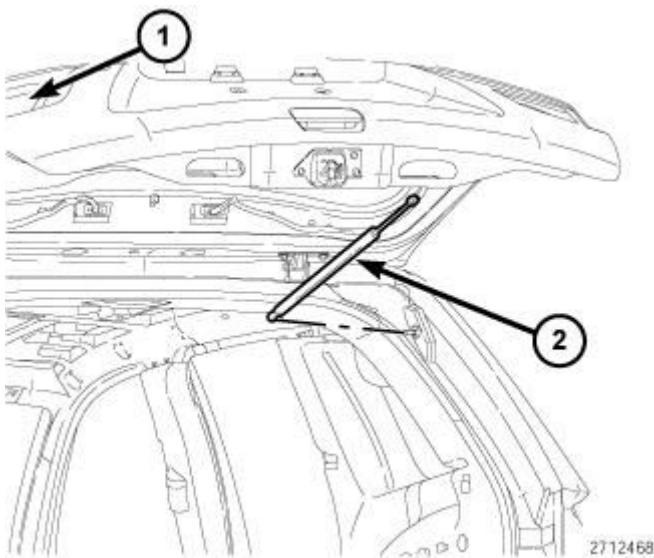


Fig. 11: Liftgate & Support Struts
Courtesy of CHRYSLER GROUP, LLC

4. Install the support struts (2). Refer to **PROP ASSEMBLY, POWER, INSTALLATION**.
5. Connect wiring harnesses and washer hose.
6. Check and adjust the liftgate if necessary. Refer to **LIFTGATE, ADJUSTMENTS**.
7. Install the upper quarter trim panels. Refer to **PANEL, QUARTER TRIM, INSTALLATION**.

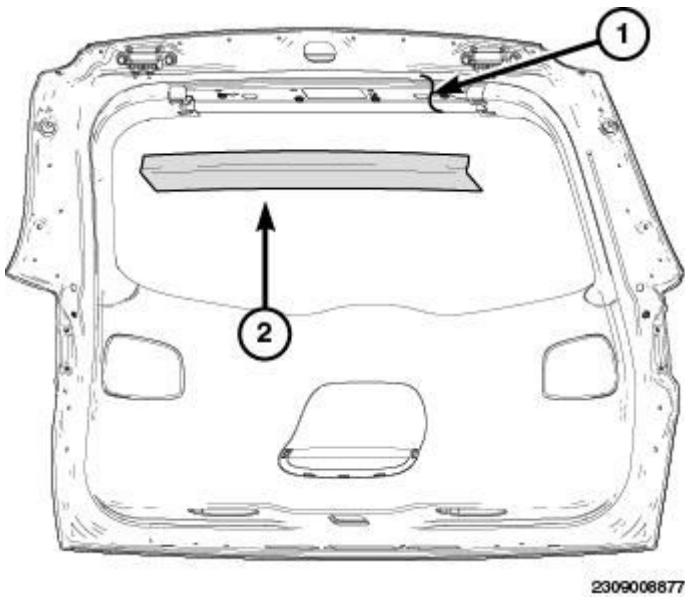
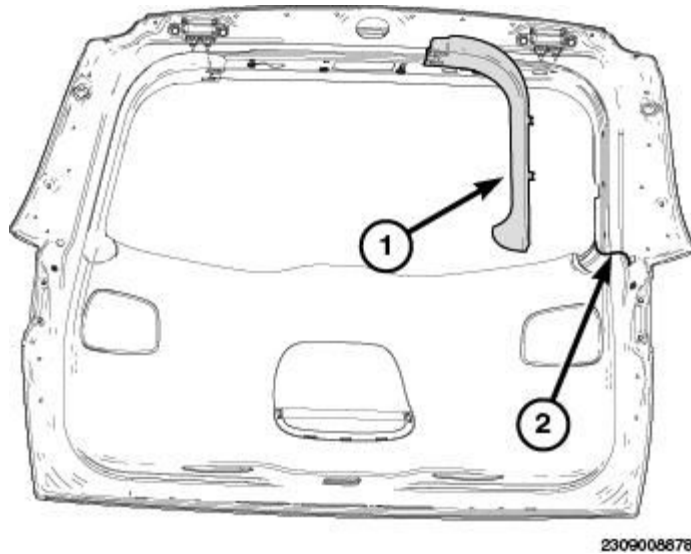
PANEL, TRIM**REMOVAL****REMOVAL**

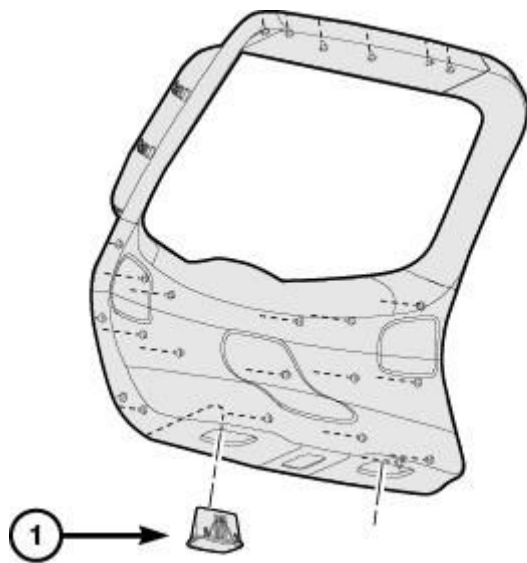
Fig. 12: Identifying Liftgate & Upper Trim Panel
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the upper trim panel (2) using a trim stick or another suitable wide flat-bladed tool, carefully pry the trim panel away from the inside of the liftgate (1) to release the fasteners that secure the panel to the liftgate.

**Fig. 13: Identifying Liftgate & Side Trim Panel**

Courtesy of CHRYSLER GROUP, LLC

3. Remove the side trim panels (1) using a trim stick or another suitable wide flat-bladed tool, carefully pry the trim panel away from the inside of the liftgate (2) to release the fasteners that secure the panel to the liftgate.

**Fig. 14: Identifying Pull Cups**

Courtesy of CHRYSLER GROUP, LLC

4. using a trim stick or another suitable wide flat-bladed tool, remove the pull cups (1)

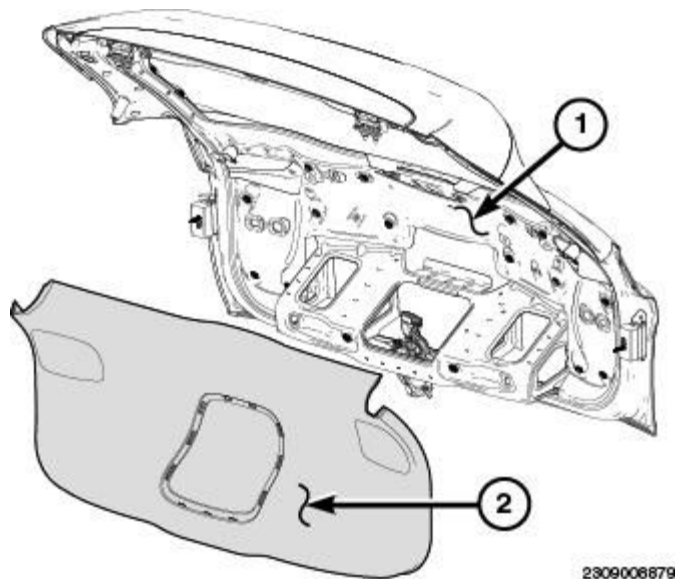


Fig. 15: Identifying Liftgate & Trim Panel
Courtesy of CHRYSLER GROUP, LLC

5. Carefully release the retaining clips and separate the trim panel (2) completely from the liftgate (1).
6. Disconnect the trim panel lighting connectors.
7. Remove the liftgate lower trim panel from the vehicle.

INSTALLATION

INSTALLATION

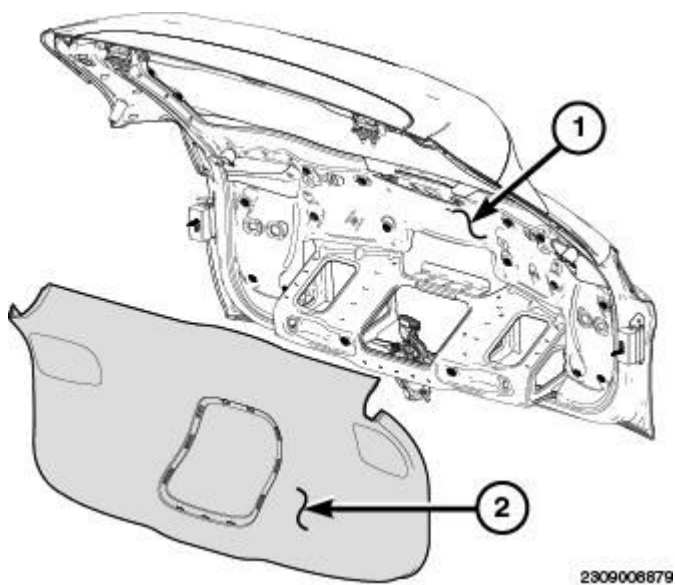


Fig. 16: Identifying Liftgate & Trim Panel
Courtesy of CHRYSLER GROUP, LLC

1. Position the trim panel (2) back onto the liftgate (1) and Using hand pressure, press firmly and evenly on the trim panel over each of the retaining clip locations until the clips are seated fully in the holes on the inside of the liftgate.

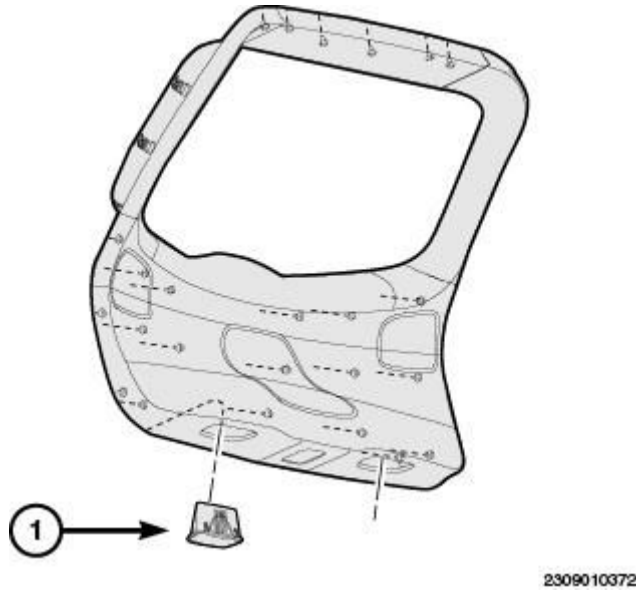


Fig. 17: Identifying Pull Cups
Courtesy of CHRYSLER GROUP, LLC

2. Install the pull cups (1).
3. Secure the trim panel (2) to the inside of the liftgate.

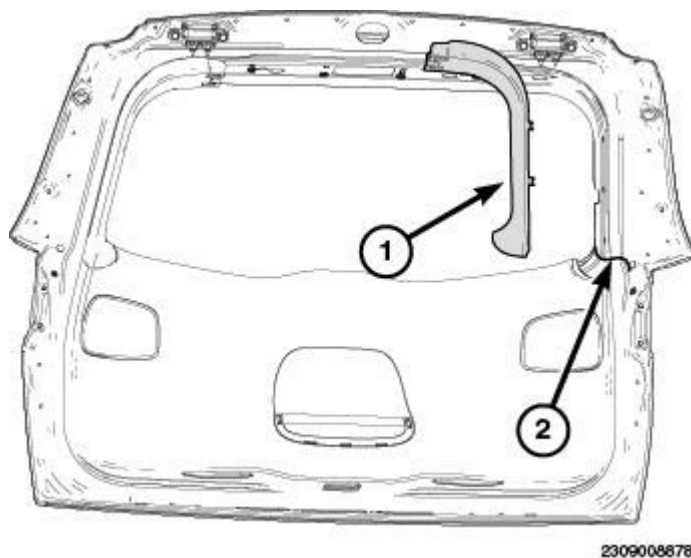


Fig. 18: Identifying Liftgate & Side Trim Panel
Courtesy of CHRYSLER GROUP, LLC

4. Position the trim panel (1) back onto the liftgate (2) and Using hand pressure, press firmly and evenly on

the upper trim panel over each of the fastener locations until the fasteners are fully seated in the holes on the inside of the liftgate.

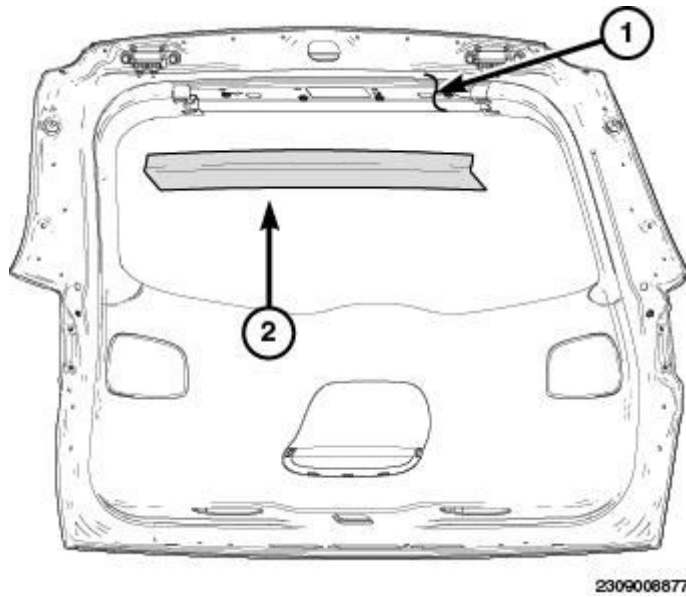


Fig. 19: Identifying Liftgate & Upper Trim Panel
Courtesy of CHRYSLER GROUP, LLC

5. Position the top liftgate trim (2) onto the liftgate and seat the upper retaining clips fully.

PROP ASSEMBLY, POWER

REMOVAL

REMOVAL

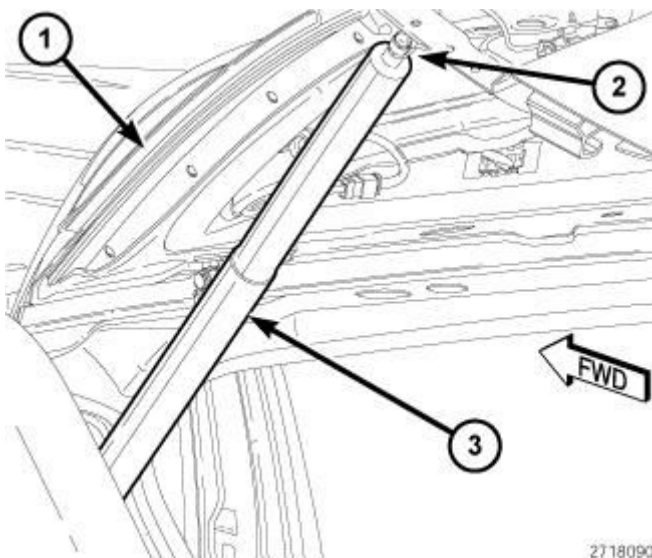
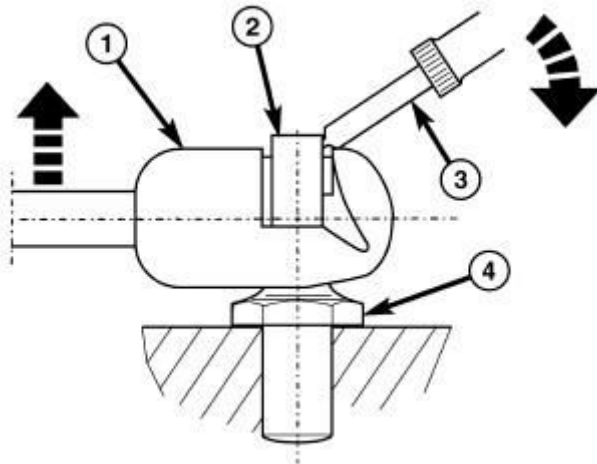


Fig. 20: Mount, Liftgate Strut & Liftgate

Courtesy of CHRYSLER GROUP, LLC

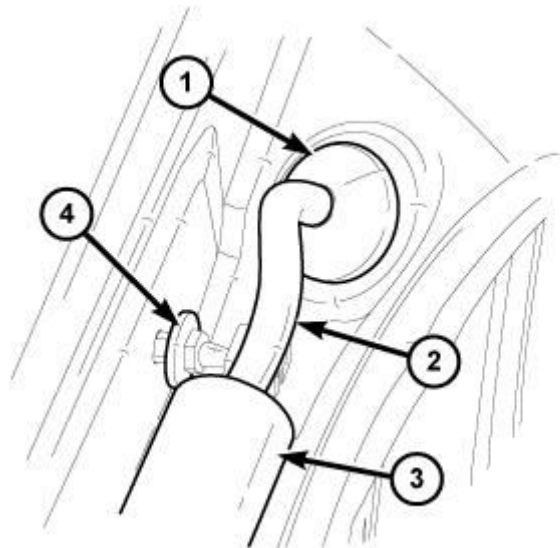
1. Open and support the liftgate with a suitable prop or block.
2. Locate the mount (2) for the liftgate strut (3) on the liftgate (1).



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Fig. 21: Removing Support Cylinder
Courtesy of CHRYSLER GROUP, LLC

3. Using a small flat bladed tool (3), or equivalent, release the retaining clips (2) while pulling the ball socket (1) away from the ball stud (4).



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Fig. 22: Rubber Grommet & Liftgate Strut
Courtesy of CHRYSLER GROUP, LLC

4. Remove the rubber grommet (1) to gain access to the liftgate strut (3) connector.

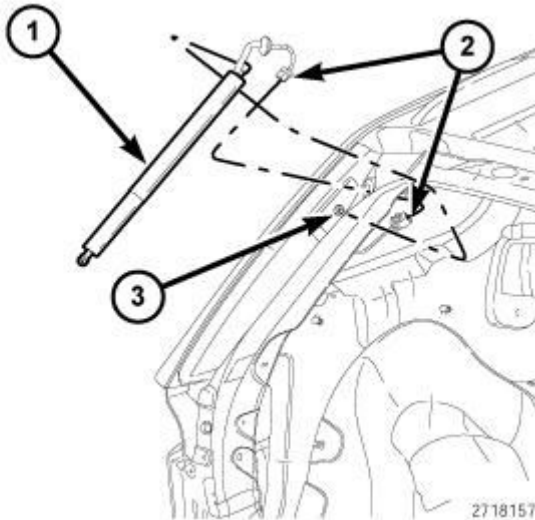


Fig. 23: Connector & Strut
Courtesy of CHRYSLER GROUP, LLC

5. Disconnect the connector (2).
6. Remove the strut (1) from the vehicle.

INSTALLATION

INSTALLATION

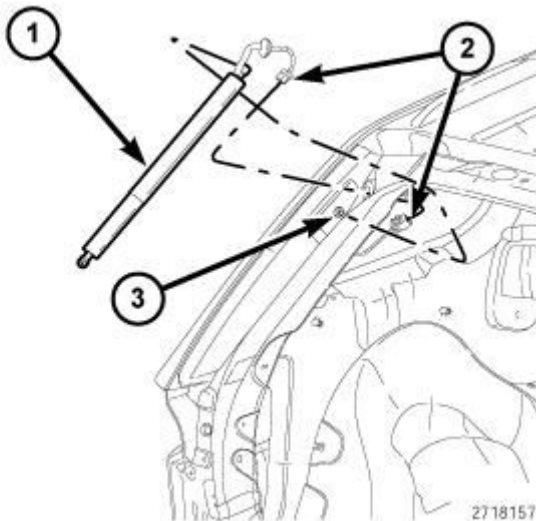


Fig. 24: Connector & Strut
Courtesy of CHRYSLER GROUP, LLC

1. Open and support the liftgate with a suitable prop or block.
2. Locate the ball mount (3) for mounting the strut (1) onto the vehicle.
3. Install the liftgate strut onto the vehicle by pressing into place until clip is seated fully.
4. Route the wiring harness through the access hole on body and connect the connectors (2).

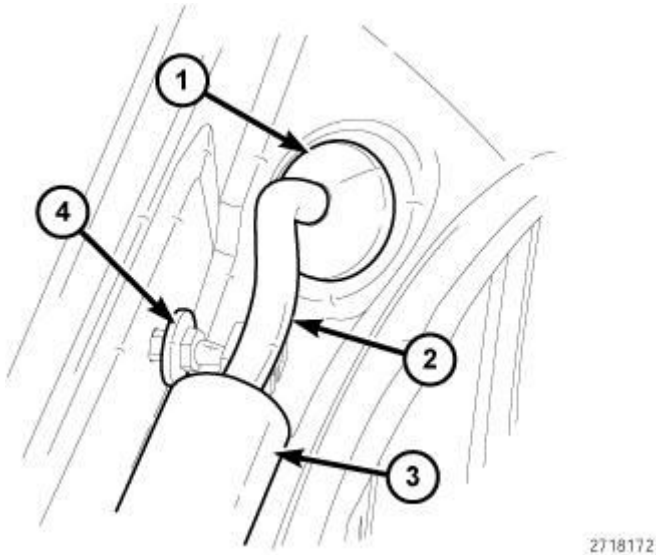


Fig. 25: Rubber Grommet & Liftgate Strut
Courtesy of CHRYSLER GROUP, LLC

5. Install the rubber grommet (1) into the access hole.

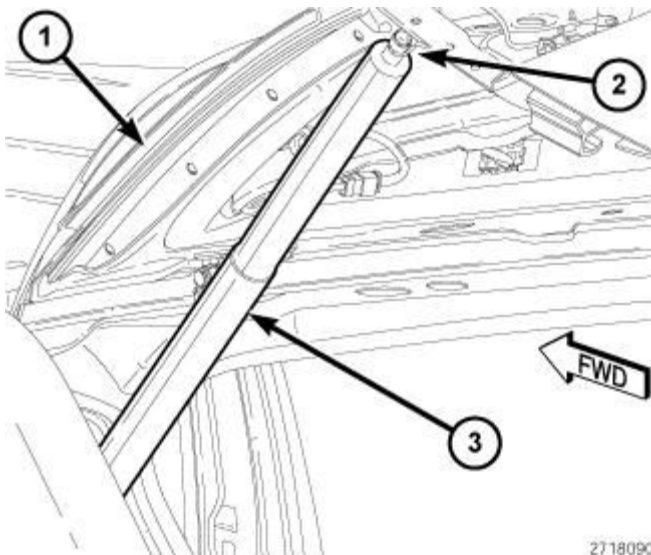
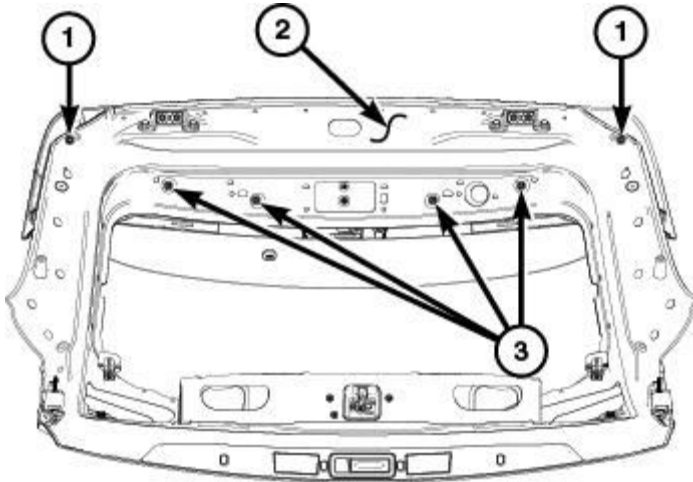


Fig. 26: Mount, Liftgate Strut & Liftgate
Courtesy of CHRYSLER GROUP, LLC

6. Locate the mount (2) on the liftgate, to mount the strut.

7. Install the strut (3) onto the liftgate (1) by applying moderate hand pressure until clip is seated fully.
8. Test strut for proper operation.

SPOILER**REMOVAL****REMOVAL**

2313006590

Fig. 27: Identifying Liftgate, Trim & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Remove liftgate trim as necessary. Refer to **PANEL, TRIM, REMOVAL**.
2. Remove the bolts at each outboard lower attachment (1).
3. Remove the six nuts (3).

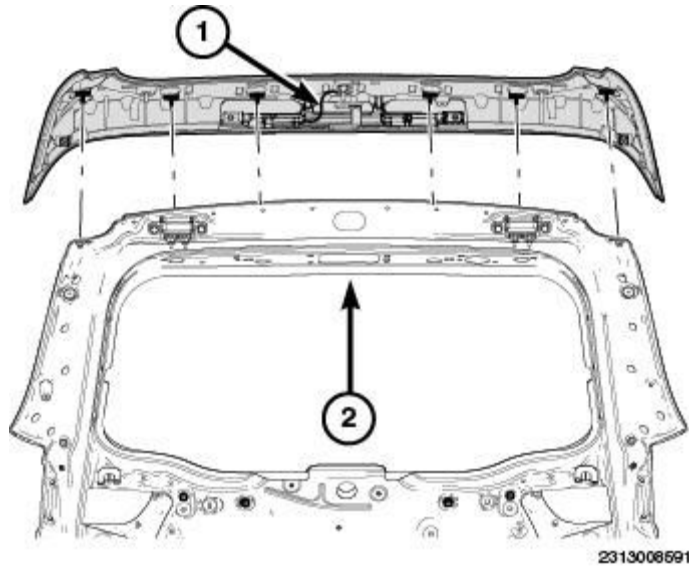


Fig. 28: Identifying Liftgate & Spoiler
Courtesy of CHRYSLER GROUP, LLC

4. Lower the liftgate.
5. Separate the spoiler from the liftgate (2) and pivot the spoiler (1) towards the front of the vehicle.
6. Disconnect the washer hose from the washer nozzle. Disconnect the wiring connector from the CHMSL. Remove wiring clips (2 total).
7. Remove spoiler from vehicle.

INSTALLATION

INSTALLATION

NOTE: When the spoiler is removed for repair or replacement, the gaskets at the spoiler attachment locations should be replaced.

NOTE: The following components are serviceable on the rear spoiler

- CHMSL
- Washer Nozzle
- Spoiler center support bracket
- W-attaching clip and seals
- Seal kit for attaching locations
- Mounting Studs
- Mounting Nuts

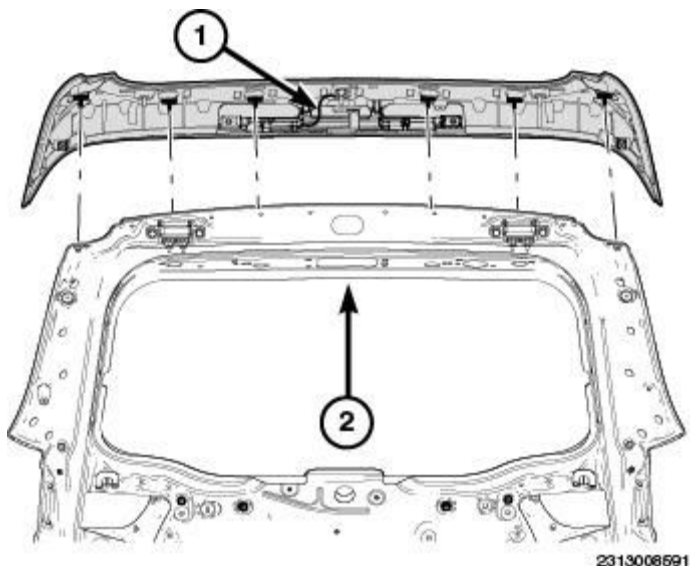


Fig. 29: Identifying Liftgate & Spoiler
Courtesy of CHRYSLER GROUP, LLC

1. Lift spoiler (1) into place and pivot towards the front of the vehicle.
2. Connect the washer hose to the washer nozzle. Connect the wiring connector to the CHMSL. Install wiring clips (2 total).
3. Lower spoiler into position.

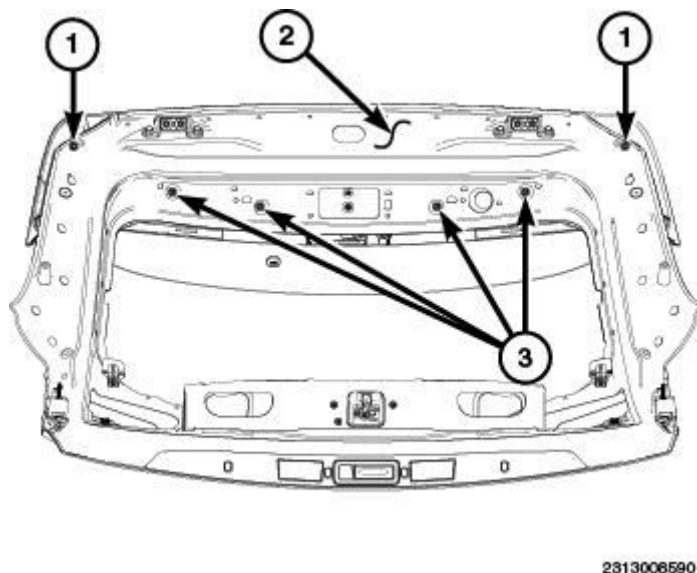


Fig. 30: Identifying Liftgate, Trim & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Install the bolts (1) and tighten 6 N.m (53 in. lbs.).
5. Install the six nuts (3) and tighten 6 N.m (53 in. lbs.). Start in the center and work your way out to the ends when tightening the nuts.

6. Install the liftgate trim panels. Refer to **PANEL, TRIM, INSTALLATION**.

STRIKER, LATCH

ADJUSTMENTS

ADJUSTMENTS

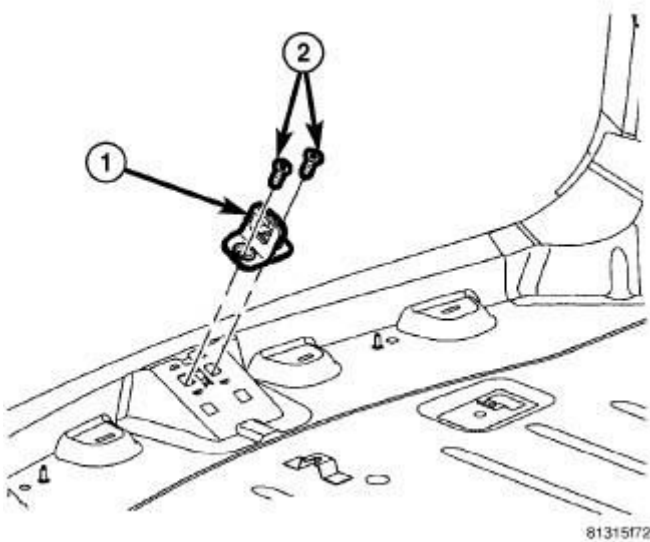


Fig. 31: Identifying Striker & Screws

Courtesy of CHRYSLER GROUP, LLC

1. Remove liftgate scuff trim. Refer to **PLATE, SCUFF, DOOR SILL, REMOVAL**.
2. Using a grease pencil or equivalent, mark the position of the striker (1) to aid in adjustment.
3. Loosen the striker bolts (2).
4. Change the striker position to adjust the lower liftgate gap and flush measurement. Refer to **GAP AND FLUSH, SPECIFICATIONS**.
5. Tighten the bolts to 28 N.m (21 ft. lbs.).

REMOVAL

REMOVAL

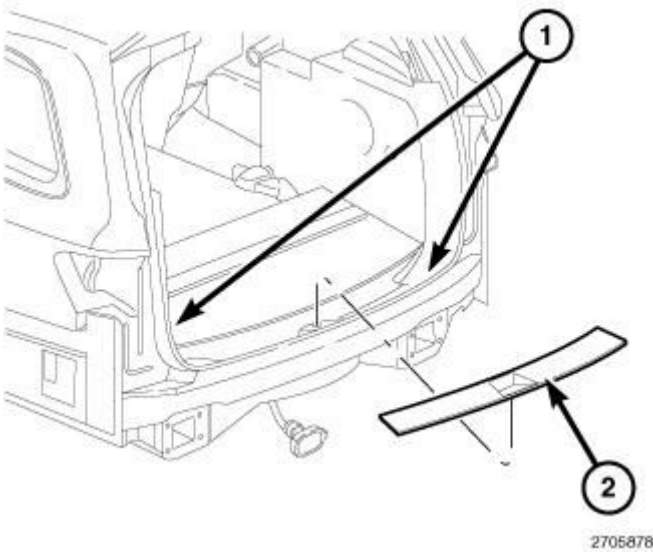


Fig. 32: Scuff Plate Trim Panel

Courtesy of CHRYSLER GROUP, LLC

1. Remove the scuff plate trim panel (2) from the inside of the liftgate opening lower panel. Refer to **PLATE, SCUFF, DOOR SILL, REMOVAL**.

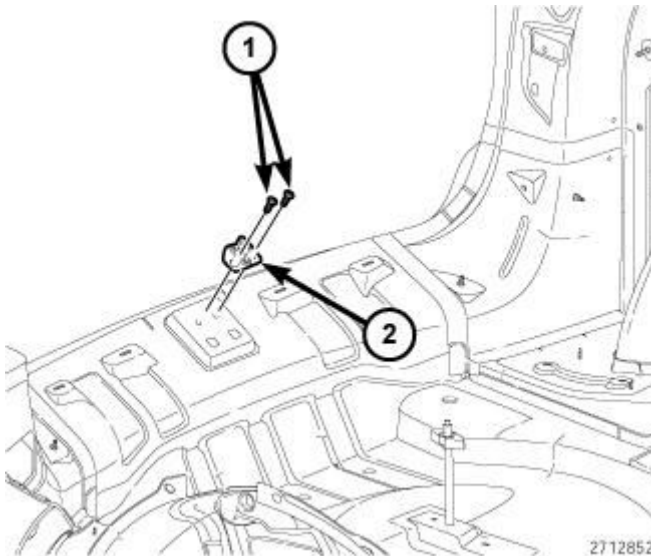


Fig. 33: Liftgate Latch Striker & Two Fasteners

Courtesy of CHRYSLER GROUP, LLC

2. Mark the latch striker (2) location on the inside of the liftgate opening with a grease pencil to aid reinstallation.
3. Remove the two fasteners (1) that secure the latch striker to the inside of the liftgate opening lower panel.
4. Remove the latch striker from the vehicle.

INSTALLATION

INSTALLATION

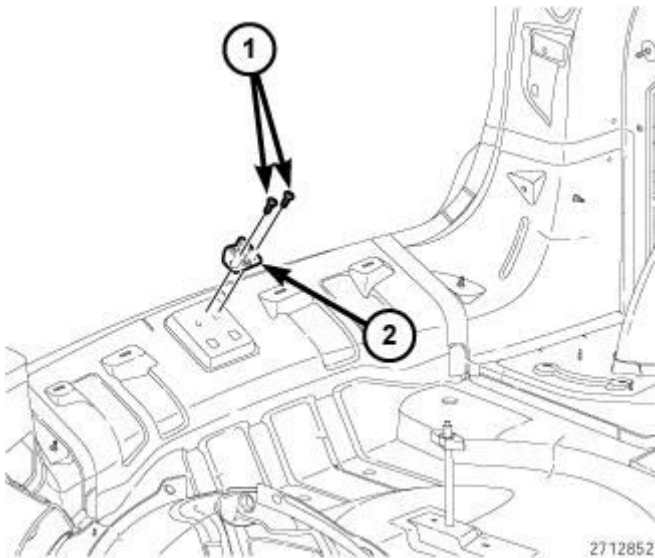


Fig. 34: Liftgate Latch Striker & Two Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Position the liftgate latch striker (2) to the inside of the liftgate opening lower panel and align using the marks made during removal.
2. Install and tighten the two screws (1) that secure the latch striker to the liftgate opening lower panel. Tighten the screws to 28 N.m (21 ft. lbs.).
3. Adjust the latch striker position as necessary to achieve proper liftgate latch operation.

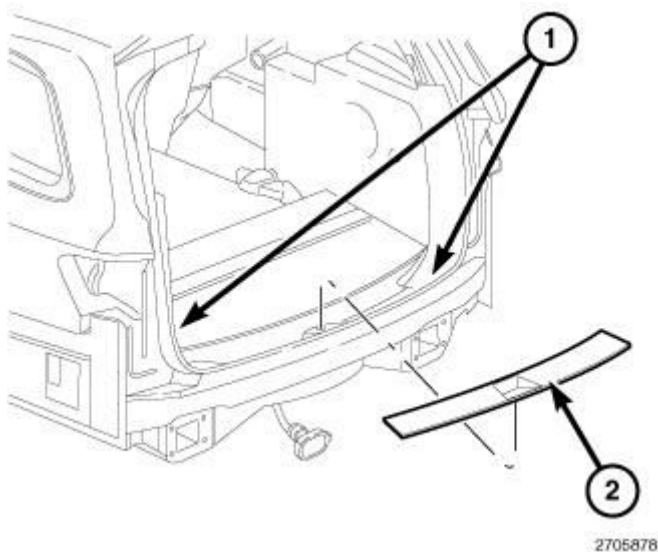


Fig. 35: Scuff Plate Trim Panel
Courtesy of CHRYSLER GROUP, LLC

4. Install the scuff plate (2). Refer to **PLATE, SCUFF, DOOR SILL, INSTALLATION**.

5. Check and adjust the striker if necessary. Refer to **STRIKER, LATCH, ADJUSTMENTS**.

DOOR - FRONT

APPLIQUE

REMOVAL

REMOVAL

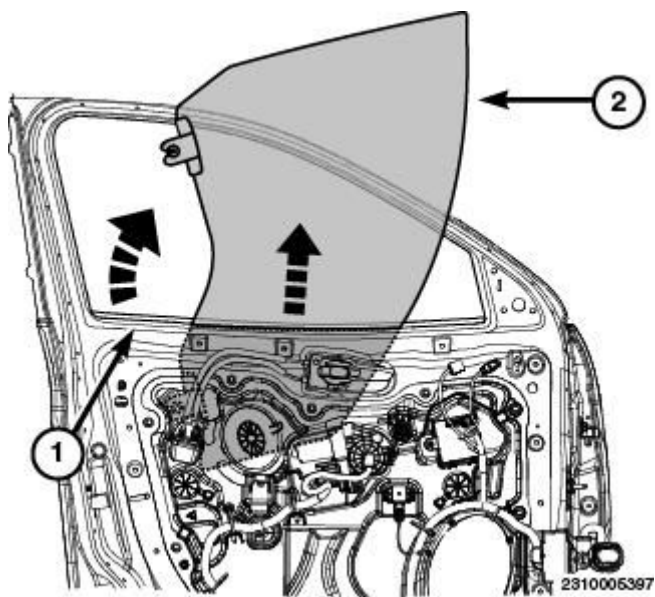


Fig. 36: Removing Door Glass From Door
Courtesy of CHRYSLER GROUP, LLC

1. Remove the door glass (2) from the door (1). Refer to **GLASS, DOOR, REMOVAL**.
2. Remove the outside mirror. Refer to **MIRROR, OUTSIDE REARVIEW, REMOVAL** and **MIRROR, OUTSIDE REARVIEW, GLASS, REMOVAL**.

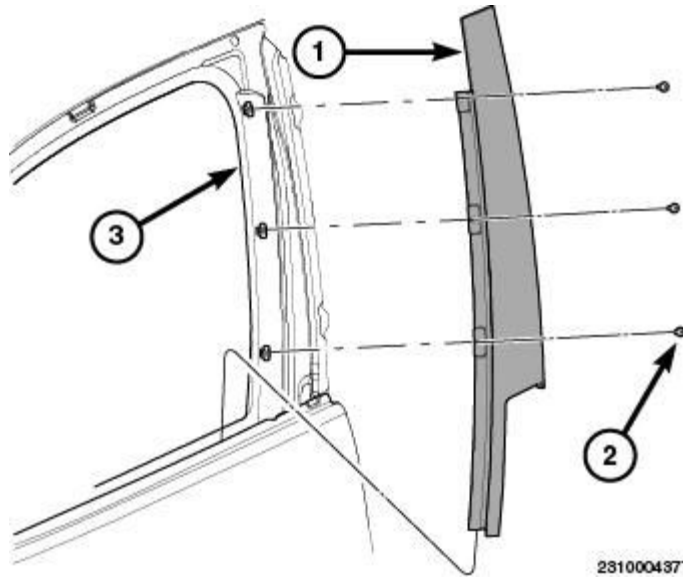


Fig. 37: Identifying Door Glass Run, Door Applique & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

3. Remove the rear portion of the door glass run.
4. Remove the three door applique fasteners (2).
5. Remove the door applique (1).

INSTALLATION

INSTALLATION

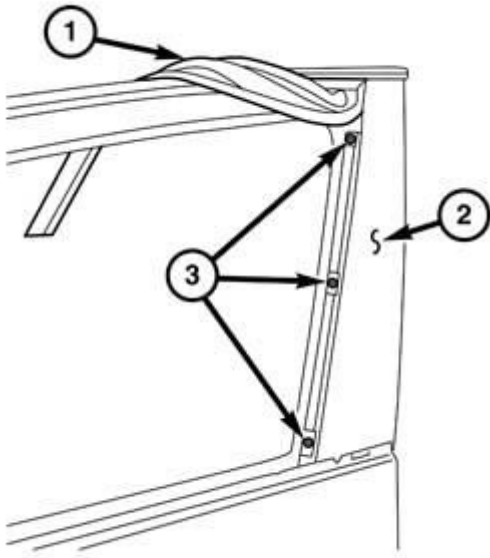
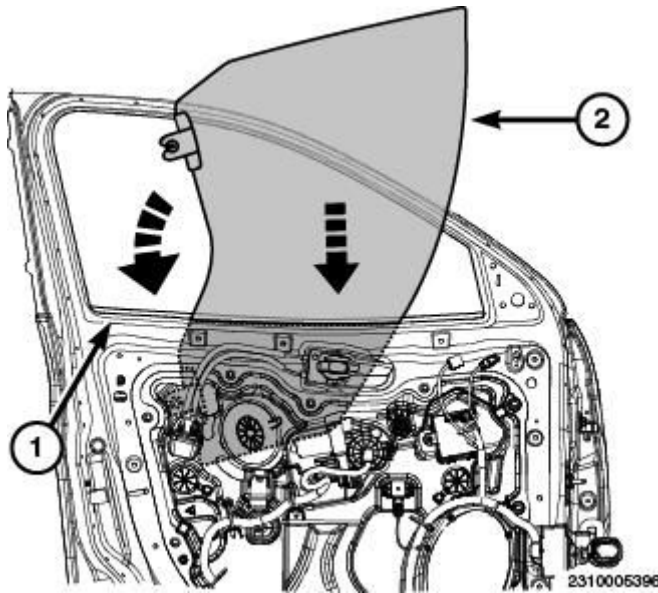


Fig. 38: Door Glass Run, Applique & Fasteners

Courtesy of CHRYSLER GROUP, LLC

1. Position the door applique.
2. Install the three door applique (2) fasteners (3) and tighten securely.
3. Insert the rear portion of the door glass run (1) and verify it is seated fully.

**Fig. 39: Installing Door Glass Into Door**

Courtesy of CHRYSLER GROUP, LLC

4. Install the door glass (2) into the door (1). Refer to **GLASS, DOOR, INSTALLATION**.

DOOR

ADJUSTMENTS

ADJUSTMENTS

NOTE: It is recommended that you adjust the rear door before adjusting the front door. Refer to **DOOR, REAR, ADJUSTMENTS**.

- Door adjustment measurements should be taken from stationary or welded body panels like the roof, rocker or quarter panels.
- During adjustment procedures, it is recommended that all the hinge fasteners be loosened except for the upper most fasteners. Adjustments can be made using the upper bolts to hold the door with final torque of the fasteners occurring after correct door positioning is achieved.
- A suitable body sealant should be used when removing or moving the hinges and striker.

FORE/AFT

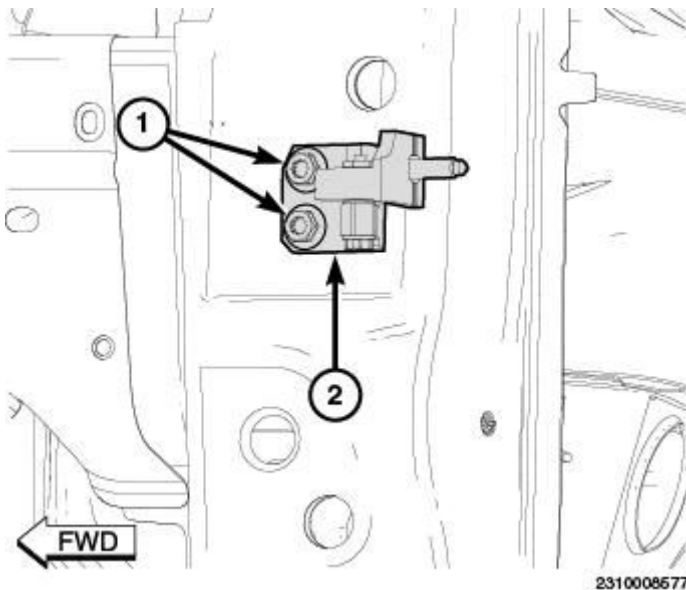


Fig. 40: Identifying Front Door Hinges & Bolts

Courtesy of CHRYSLER GROUP, LLC

NOTE: Fore/aft (lateral) door adjustment is done by loosening the hinge to the body fasteners (1) one hinge at a time and moving the door to the correct position.

1. Support the front door with a suitable lifting device.
2. Loosen the bolts (1) that secure the front door hinges (2) to the A-pillar.
3. Adjust the front door to the correct position. Refer to **GAP AND FLUSH, SPECIFICATIONS.**
4. Tighten the upper bolt of the upper hinge to the A-pillar to 43 N.m (32 ft. lbs.).
5. Tighten the upper bolt of the lower hinge to 43 N.m (32 ft. lbs.).
6. Tighten the remaining hinge bolts to 43 N.m (32 ft. lbs.).

UP/DOWN

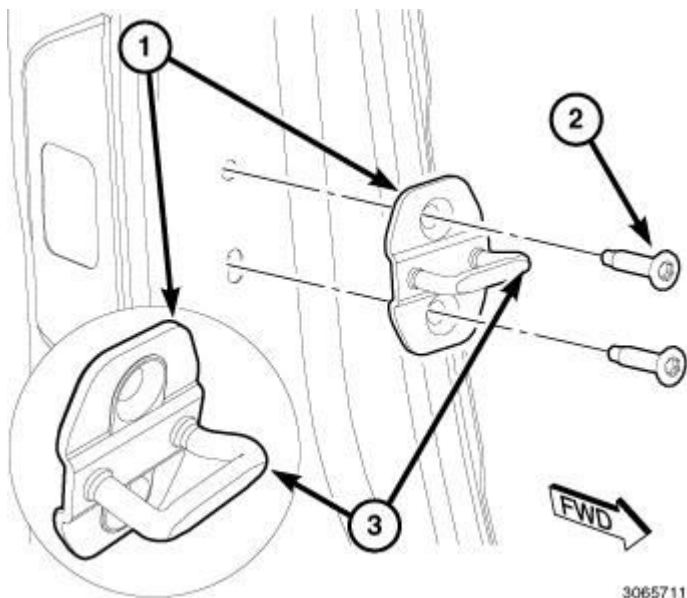


Fig. 41: Two Bolts & Striker

Courtesy of CHRYSLER GROUP, LLC

NOTE: Up/down door adjustment is done by loosening either the hinge to the body fasteners or the hinge to door fasteners and moving the door to the correct position.

1. Support the front door with a suitable lifting device.
2. Loosen the two bolts (2) that secure the striker (1) to the B-pillar.

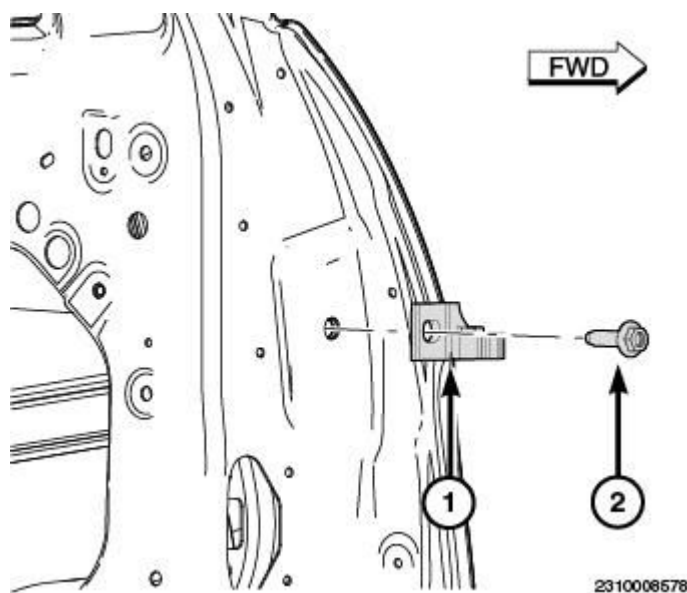


Fig. 42: Identifying Door Hinges & Bolts

Courtesy of CHRYSLER GROUP, LLC

3. If necessary, loosen the bolts (2) that secure the door hinges (1) to the front door.

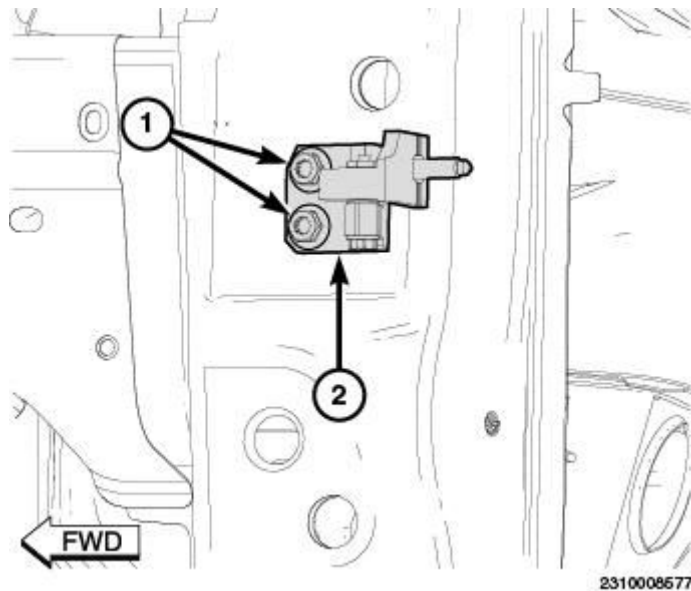


Fig. 43: Identifying Front Door Hinges & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. If necessary, loosen the bolts (1) that secure the front door hinges (2) to the A-pillar.

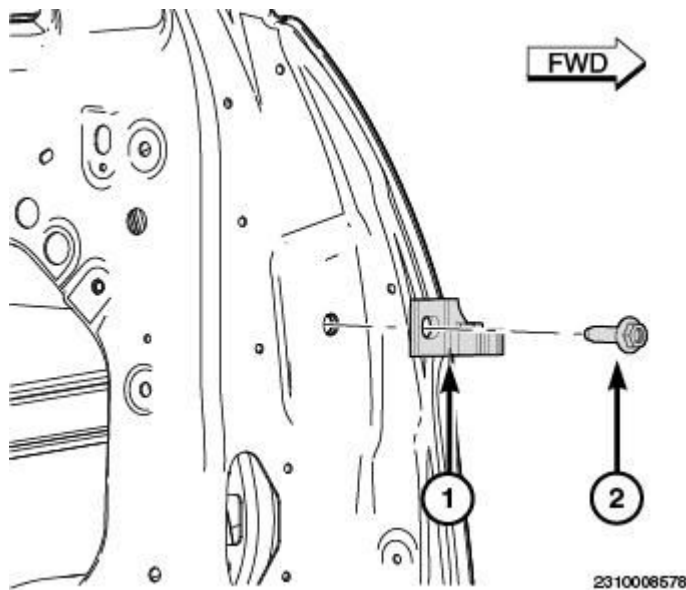


Fig. 44: Identifying Door Hinges & Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Adjust the front door to the correct position. Refer to **GAP AND FLUSH, SPECIFICATIONS.**
6. Tighten the bolts (2) that secure the door hinges (1) to the front door to 43 N.m (32 ft. lbs.).

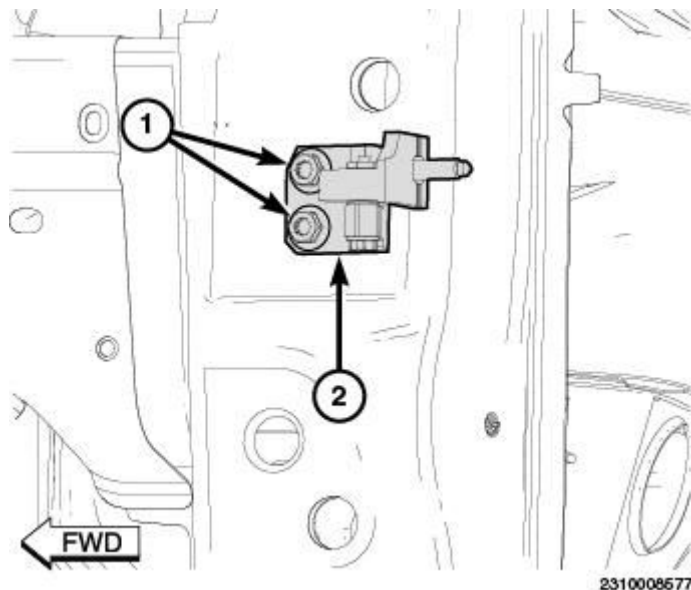


Fig. 45: Identifying Front Door Hinges & Bolts
Courtesy of CHRYSLER GROUP, LLC

7. Tighten the bolts (1) that secure the door hinges (2) to the A-pillar to 43 N.m (32 ft. lbs.) using the following sequence.
 1. Tighten the upper bolt on the upper hinge.
 2. Tighten the lower bolt on the lower hinge.
 3. Tighten the remaining hinge bolts to 43 N.m (32 ft. lbs.).

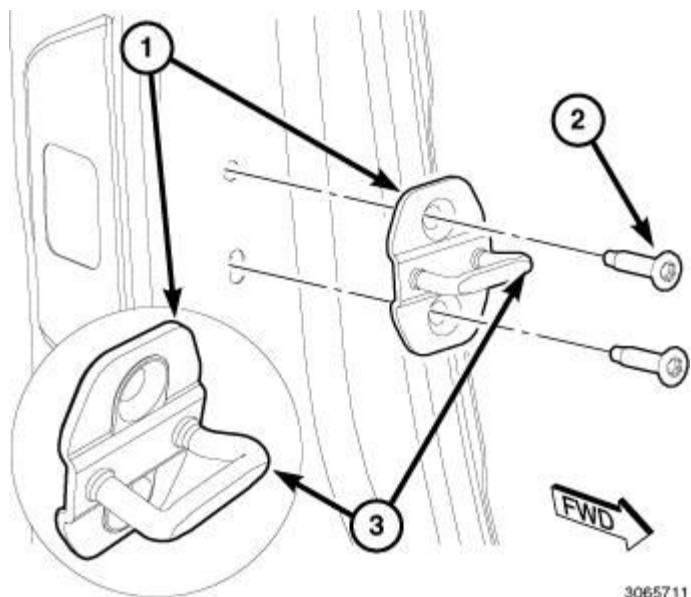


Fig. 46: Two Bolts & Striker
Courtesy of CHRYSLER GROUP, LLC

NOTE: Make sure the protrusion (3) is orientated towards the interior of the

vehicle.

- 8.
9. Tighten the two bolts (2) that secure the striker (1) to the B-pillar to 30 N.m (22 ft. lbs.).

IN/OUT

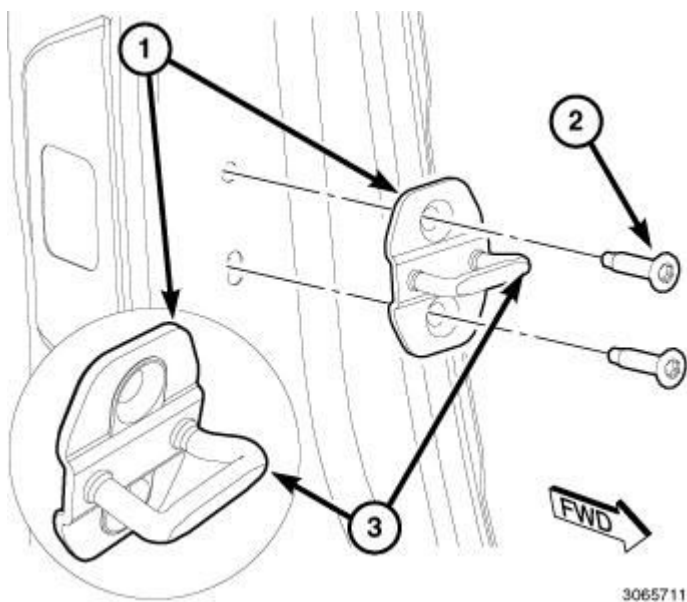


Fig. 47: Two Bolts & Striker
Courtesy of CHRYSLER GROUP, LLC

NOTE: In/out door adjustment is done by loosening the hinge to door fasteners one hinge at a time and moving the door to the correct position.

1. Support the front door with a suitable lifting device.
2. Loosen the two bolts (2) that secure the striker (1) to the B-pillar.

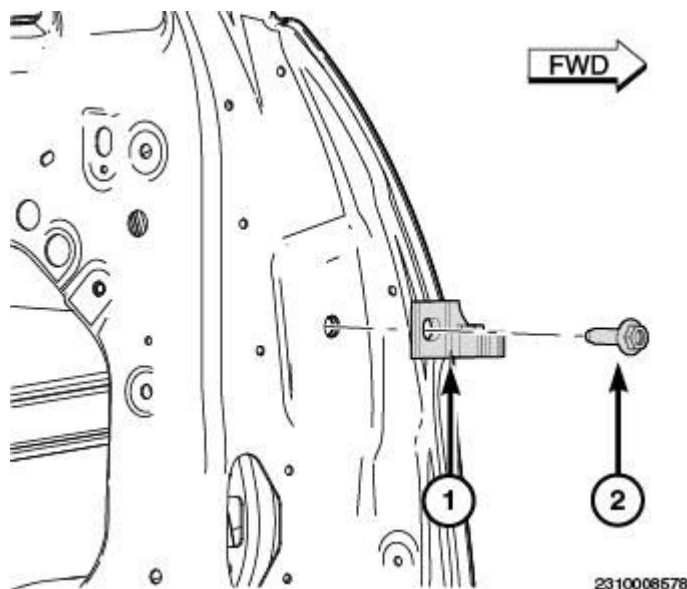


Fig. 48: Identifying Door Hinges & Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Loosen the bolts (2) that secure the door hinges (1) to the front door.
4. Adjust the front door to the correct position. Refer to **GAP AND FLUSH, SPECIFICATIONS.**
5. Tighten the bolts (2) that secure the door hinges (1) to the front door to 43 N.m (32 ft. lbs.).

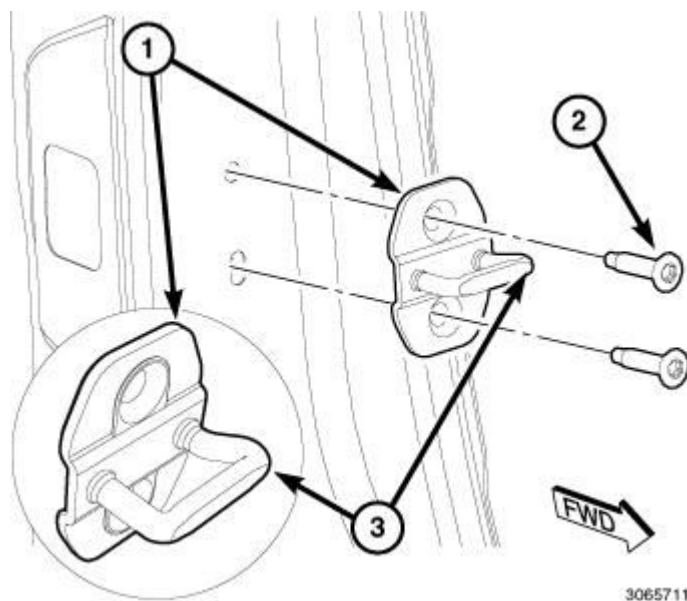


Fig. 49: Two Bolts & Striker
Courtesy of CHRYSLER GROUP, LLC

NOTE: Make sure the protrusion (3) is orientated towards the interior of the vehicle.

6. Tighten the two bolts (2) that secure the striker (1) to the B-pillar to 30 N.m (22 ft. lbs.).

REMOVAL

REMOVAL

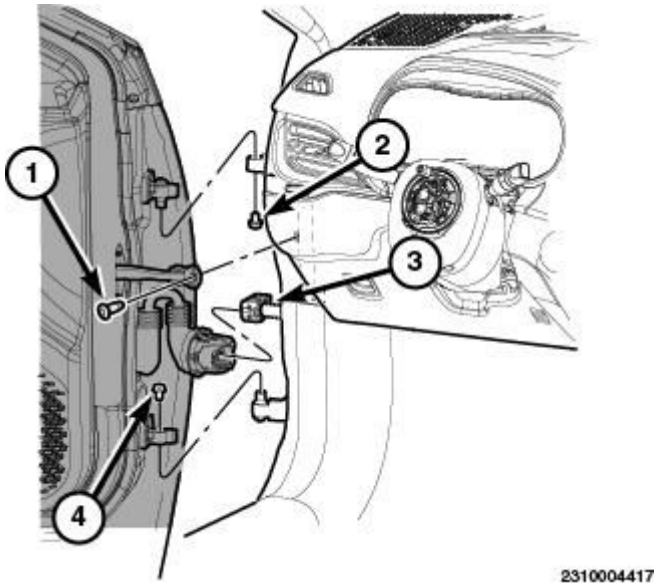


Fig. 50: Identifying Door Check Strap & Fasteners
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not reuse the door half hinge to body side half hinge fasteners (2) and (4), replace with new, readily available through Mopar parts.

NOTE: Driver side door shown, passenger side similar.

1. Open and support the door on a suitable lifting device.
2. Disconnect and isolate the negative battery cable.
3. Remove the fastener securing the door check strap (1).
4. Remove the fastener (2) securing the upper door hinges half to the A-pillar hinge half.
5. Remove the fastener (4) securing the lower door hinge half to the A-pillar half.
6. With the use a suitable lifting device, remove the door from the vehicle.
7. Disconnect the front door harness wire connector (3) from the body harness.

INSTALLATION

INSTALLATION

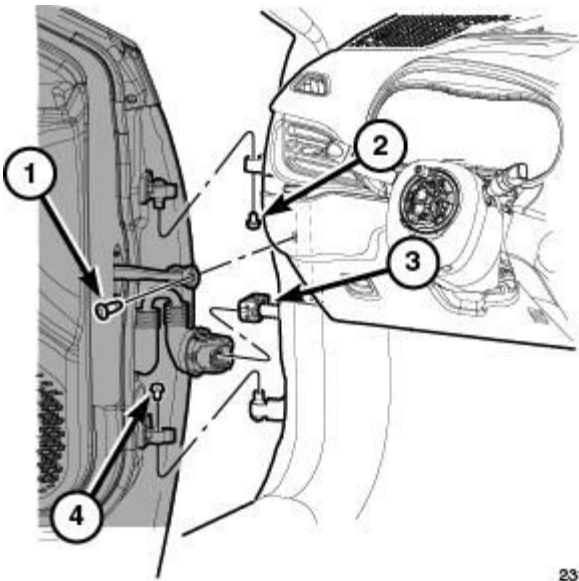


Fig. 51: Identifying Door Check Strap & Fasteners
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not reuse the door half hinge to body side half hinge fasteners (2) and (4), replace with new readily available through Mopar parts.

NOTE: Driver side door shown, passenger side similar.

1. With the use of a suitable lifting device, position the door near the vehicle.
2. Position the door upper hinge half and lower hinge half onto the A-pillar upper hinge half and lower hinge half.
3. Lower and remove the support from the door.
4. Install the new fasteners (2, 4) securing the door hinge halves to the A-pillar hinge halves. Tighten the fasteners to 24 N.m (18 ft. lbs.).
5. Align the door's check strap and install the fastener (1) securing the check strap to the A-pillar. Tighten the fastener to 30 N.m (22 ft. lbs.).
6. Connect the front door harness wire connector (3) to the body harness.
7. Verify door fit and operation. Adjust the door for flushness and parallel gaps as necessary. Refer to **DOOR, ADJUSTMENTS**.
8. Connect the negative battery cable.
9. Perform the Clear/Relearn procedure. Refer to **STANDARD PROCEDURE** .

GLASS, DOOR

REMOVAL

REMOVAL

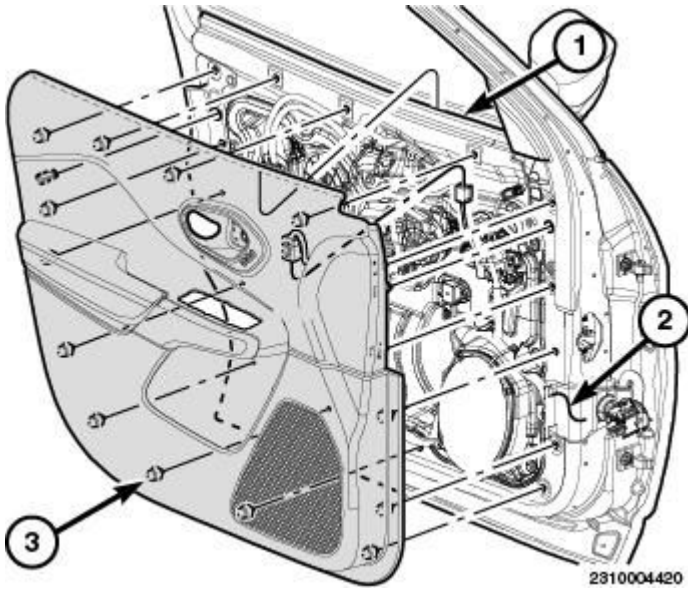


Fig. 52: Identifying Inner Door Belt Weatherstrip, Door Glass & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove the door trim panel. Refer to **PANEL, DOOR TRIM, REMOVAL**.

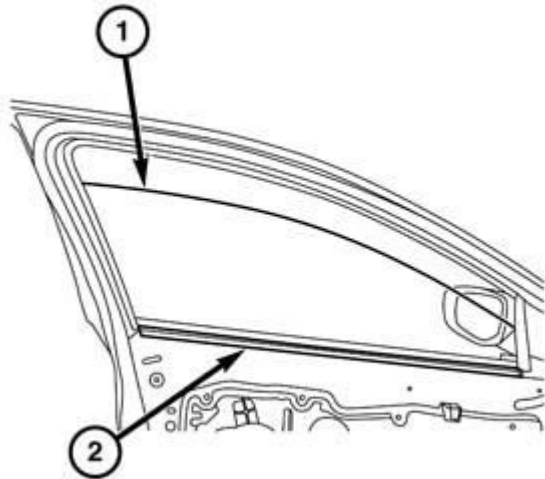


Fig. 53: Front Door Glass & Inner Door Belt Weatherstrip
Courtesy of CHRYSLER GROUP, LLC

3. Using a trim stick or equivalent, pry upward to remove the inner door belt weatherstrip (2) to allow the door glass (1) clearance.

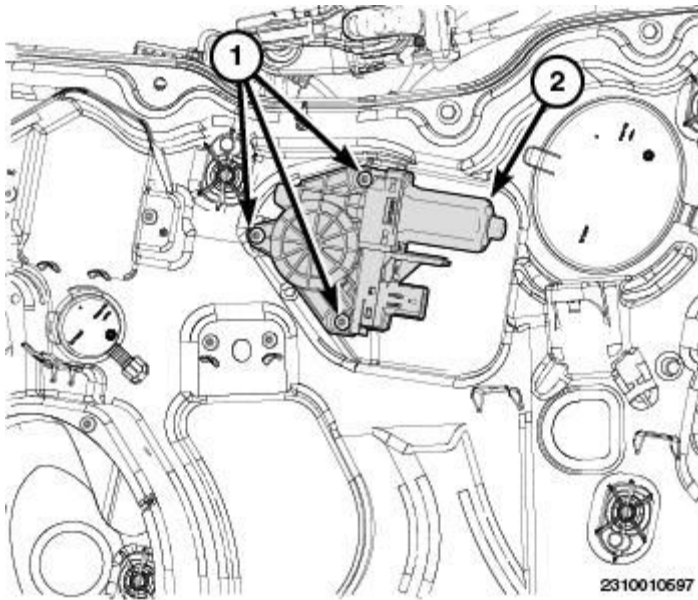


Fig. 54: Identifying Window Motor & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the window motor (2) wiring connector.
5. Remove the three window motor (2) fasteners.
6. Remove the window motor (2) from the carrier plate.

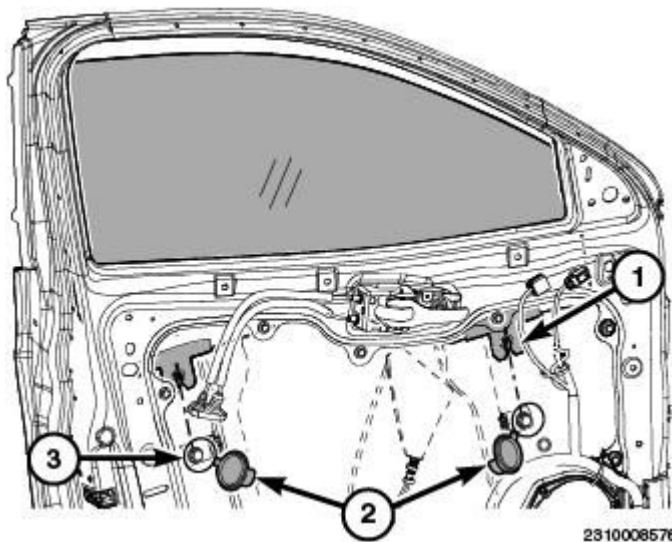


Fig. 55: Identifying Access Plugs & Glass Fasteners
Courtesy of CHRYSLER GROUP, LLC

7. Open the access plugs (2) to expose the glass fasteners (3).
8. Lower the glass by hand until the glass fasteners (3) line up in the access holes.
9. Remove the glass fasteners (1).

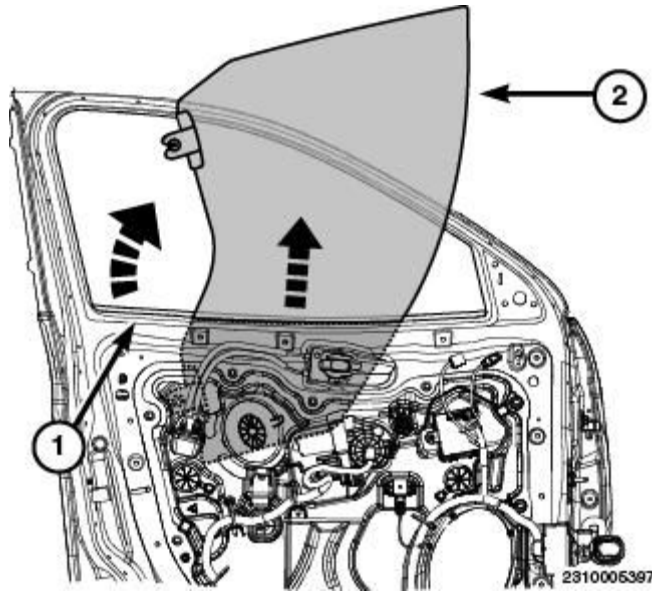


Fig. 56: Removing Door Glass From Door
Courtesy of CHRYSLER GROUP, LLC

10. Lift up on the rear portion of the glass (2) to tilt.
11. Remove the glass (2) from the door (1).

INSTALLATION

INSTALLATION

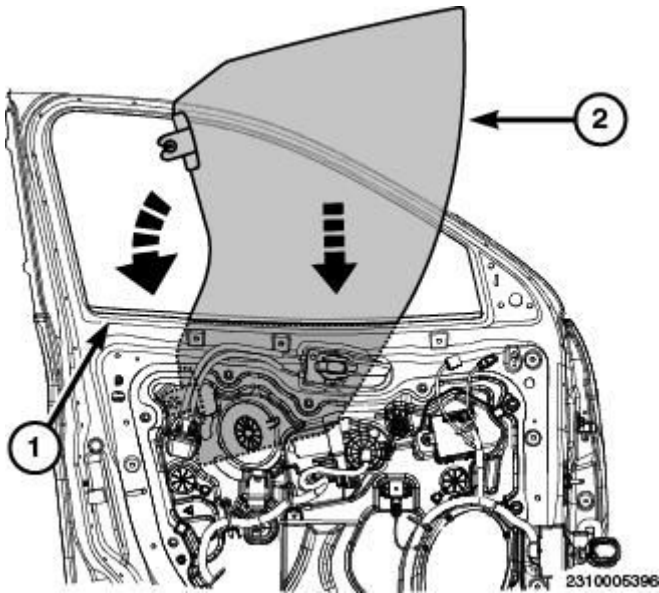


Fig. 57: Installing Door Glass Into Door
Courtesy of CHRYSLER GROUP, LLC

1. Insert the front of the door glass (2) into the door (1).

2. Rotate the rear of the door glass into the door until fully seated into the front and rear run channels.

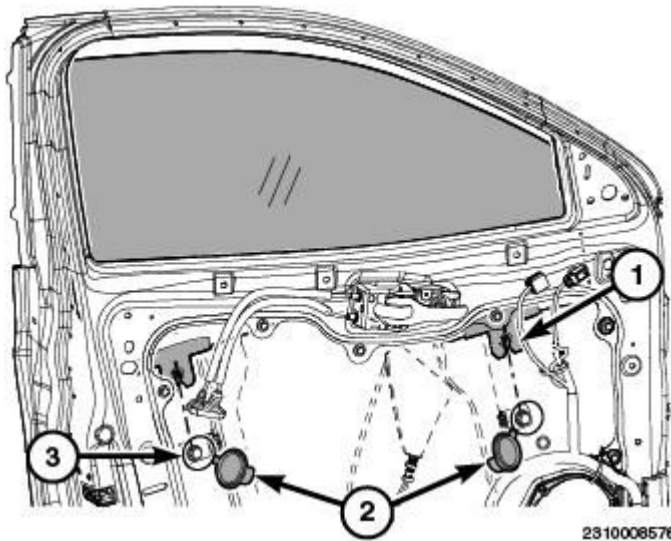


Fig. 58: Identifying Access Plugs & Glass Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Align the door glass mounts to the window regulator within the access holes (1).
4. Apply a medium grade threadlocker adhesive to the glass fastener threads per manufacture recommendations.
5. Install the glass fasteners and tighten to 13 N.m (10 ft. lbs.).
6. Close the access plugs. (2)

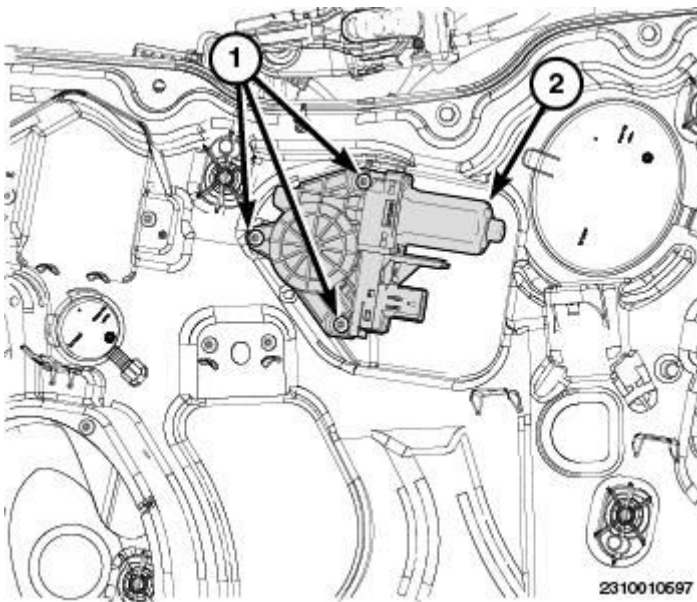
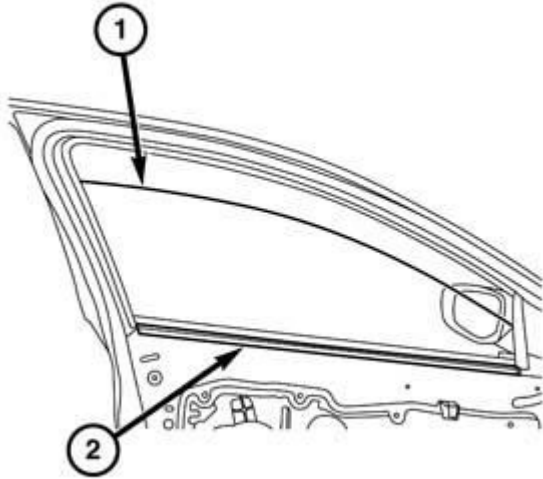


Fig. 59: Identifying Window Motor & Fasteners
Courtesy of CHRYSLER GROUP, LLC

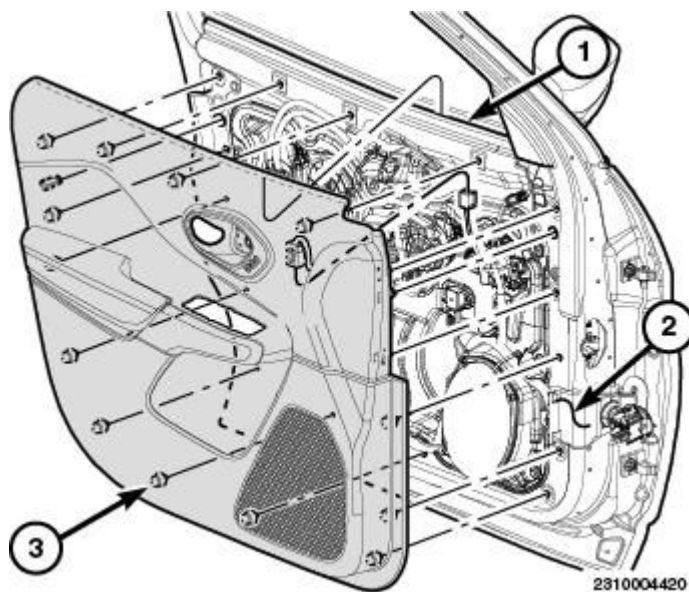
7. Align the window motor (2) onto the carrier plate.
8. Install the window motor (2) fasteners (1) and tighten securely.
9. Connect the window motor (2) wiring connector.



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Fig. 60: Front Door Glass & Inner Door Belt Weatherstrip
Courtesy of CHRYSLER GROUP, LLC

10. Install the inner door belt weatherstrip (2).



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Fig. 61: Identifying Inner Door Belt Weatherstrip, Door Glass & Fasteners

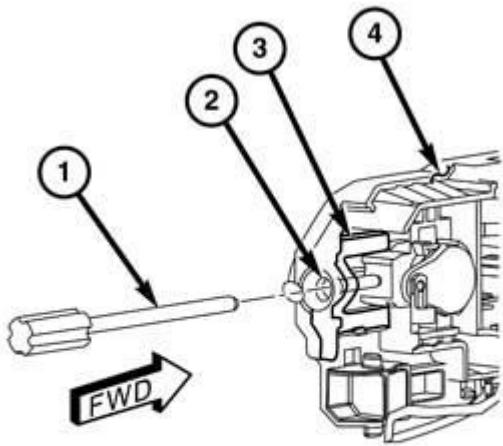
Courtesy of CHRYSLER GROUP, LLC

11. Install the door trim panel (1). Refer to **PANEL, DOOR TRIM, INSTALLATION**.
12. Connect the negative battery cable.
13. Perform the Clear/Relearn procedure. Refer to **STANDARD PROCEDURE** .

HANDLE, EXTERIOR

REMOVAL

REMOVAL



231068506

Fig. 62: Torx Bit, Fastener, Slide Plate & Outside Door Handle Bracket

Courtesy of CHRYSLER GROUP, LLC

NOTE: Passenger side doors not equipped with a lock cylinder. Refer to **HANDLE, EXTERIOR, REMOVAL**.

1. With a small flat bladed tool, remove the outside handle access plug from inner door jamb.
2. Using a T-20 torx bit (1), turn the fastener (2) counter clockwise to move the slide plate (3) rearward in the outside door handle bracket (4).

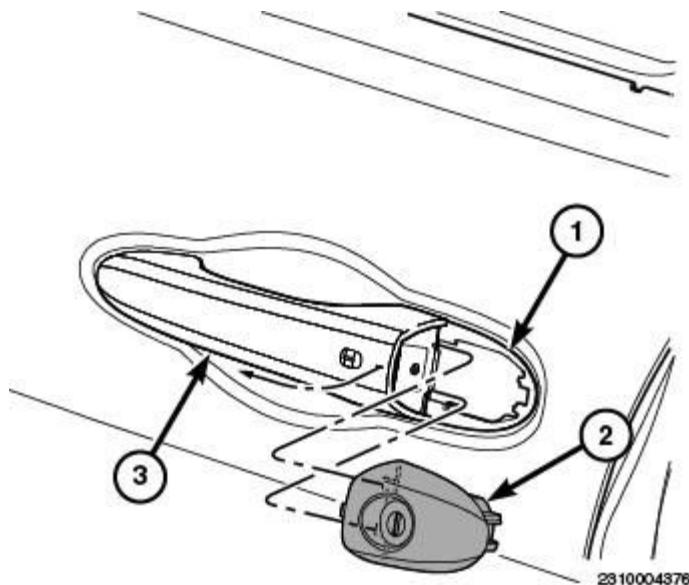


Fig. 63: Identifying Exterior Door Handle, Door Handle Cap & Lock Cylinder
Courtesy of CHRYSLER GROUP, LLC

3. Lift the exterior door handle (3) outward.
4. Continue holding the exterior handle out and remove the door handle cap and lock cylinder (2).

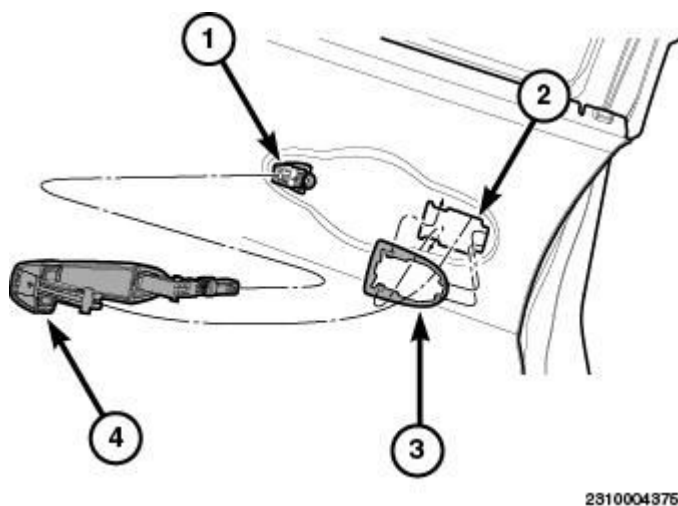


Fig. 64: Sliding Exterior Door Handle Out Of Door
Courtesy of CHRYSLER GROUP, LLC

5. Slide the exterior door handle (1) rearward and rotate out of the door.
6. If so equipped, disconnect the wiring connector.

INSTALLATION

INSTALLATION

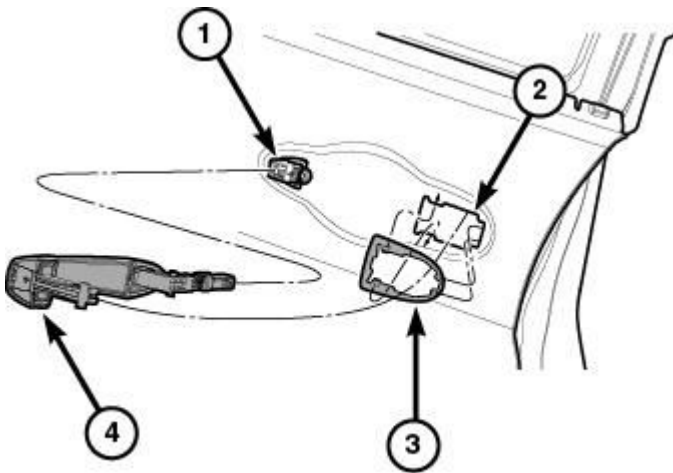


Fig. 65: Sliding Exterior Door Handle Out Of Door
Courtesy of CHRYSLER GROUP, LLC

NOTE: Passenger side doors not equipped with a lock cylinder.

1. If equipped, connect the harness connector to the exterior door handle (1). Refer to **HANDLE, EXTERIOR, INSTALLATION**.
2. Rotate the front of the exterior handle (4) into the door until it is flush with the door.
3. Slide the exterior door handle (1) forward until seated fully.

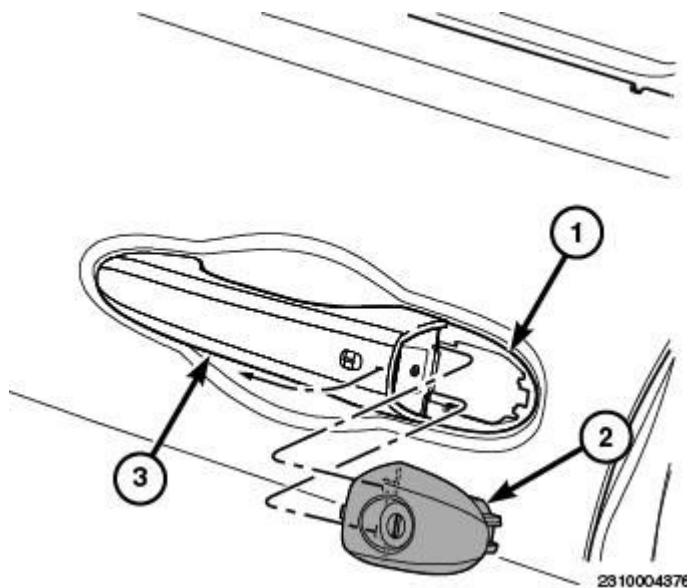
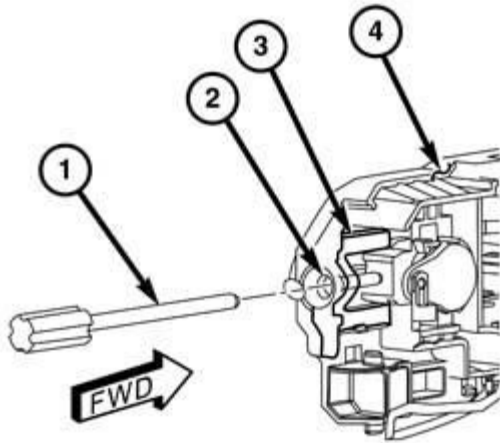


Fig. 66: Identifying Exterior Door Handle, Door Handle Cap & Lock Cylinder
Courtesy of CHRYSLER GROUP, LLC

4. Lift the exterior door handle (3) to the open position.
5. While holding the exterior handle (3) in the open position, insert the door handle cap (2).



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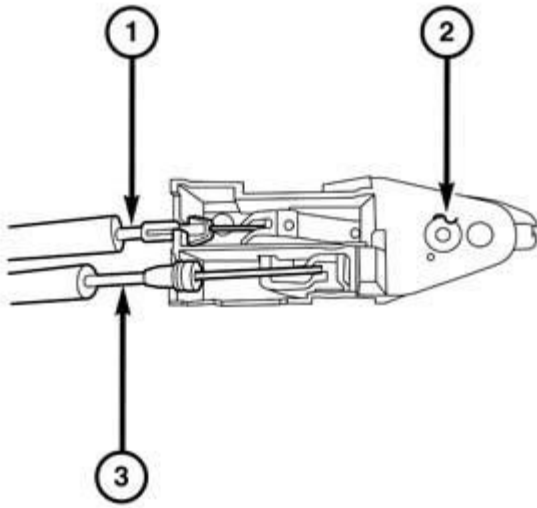
Fig. 67: Torx Bit, Fastener, Slide Plate & Outside Door Handle Bracket
Courtesy of CHRYSLER GROUP, LLC

6. Using a T-20 torx bit (1), turn the fastener (2) clockwise to move the slide plate (3) forward into the outside door handle bracket (4).
7. Tighten the fastener (2) to 2 N.m (18 in. lbs.).

HANDLE, INTERIOR

REMOVAL

REMOVAL



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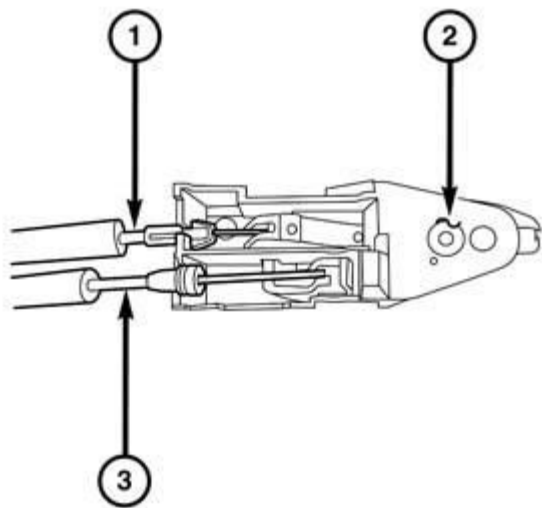
Fig. 68: Inside Release Handle & Cables

Courtesy of CHRYSLER GROUP, LLC

1. Remove rear door trim panel. Refer to **PANEL, DOOR TRIM, REMOVAL**.
2. With the use of a flat bladed tool or equivalent, remove the lock cable from the inside release handle housing (2).
3. Place the lock button in the unlocked position and remove the lock cable (3) barrel end.
4. With the use of pliers or equivalent, depress the tabs on the handle cable (3) and remove from the inside release handle housing (2).
5. Place the pull handle in the open position and remove the handle cable (3) barrel end.
6. Remove the inside handle from the vehicle.

INSTALLATION

INSTALLATION



231068496

Fig. 69: Inside Release Handle & Cables

Courtesy of CHRYSLER GROUP, LLC

1. Place the pull handle in the open position and install the handle cable (3) barrel end.
2. Insert the handle cable (3) into the inside release handle housing (2) and seat tabs fully.
3. Place the lock button in the unlocked position and install the lock cable (3) barrel end.
4. Insert the lock cable (3) into the inside release handle housing (2).
5. Install the rear door trim panel. Refer to **PANEL, DOOR TRIM, INSTALLATION**.

HINGE, DOOR

REMOVAL

REMOVAL

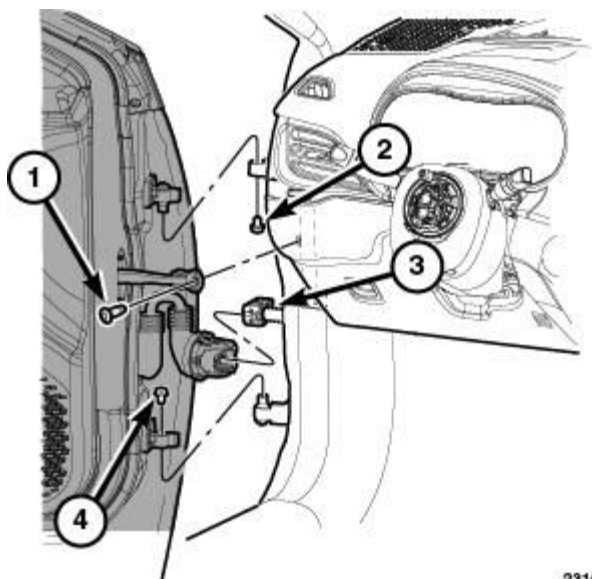


Fig. 70: Identifying Door Check Strap & Fasteners
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not reuse the door half hinge to body side half hinge fasteners (2) and (4), replace with new readily available through Mopar parts.

NOTE: Driver side door shown, passenger side similar.

Remove the door-

1. Disconnect and isolate the negative battery cable.
2. Open and support door on a suitable lifting device.
3. Disconnect wire connector (3).
4. Remove check strap fastener (1) from the body side.
5. Remove fasteners (2) and (4) and discard.
6. Remove the door from the vehicle.
7. Transfer the door to a bench.

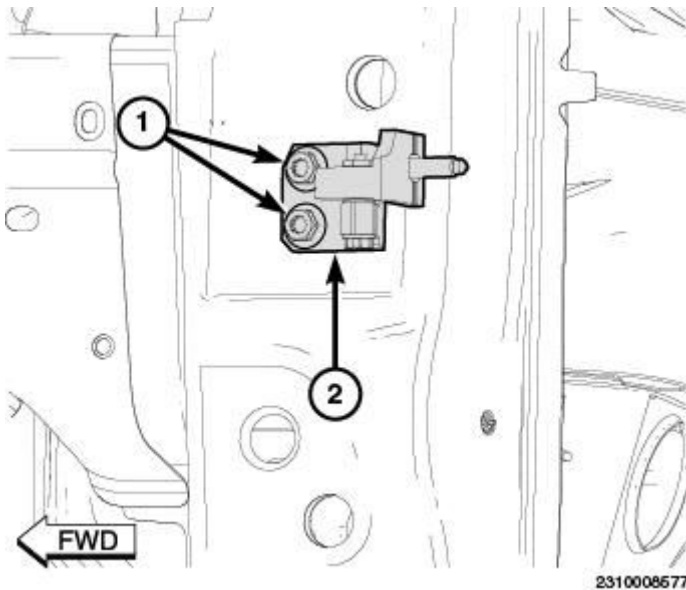


Fig. 71: Identifying Front Door Hinges & Bolts
Courtesy of CHRYSLER GROUP, LLC

Body side hinge half-

NOTE: Upper and lower hinge halves are serviced exactly the same

1. Mark position of the hinge half (2) and/or lower hinge on the upper A-pillar and lower A-pillar with a grease pencil or other suitable device to ease installation.
2. Remove bolts (1) attaching hinge to door the upper A-pillar and/or lower A-pillar frame and remove the hinge.

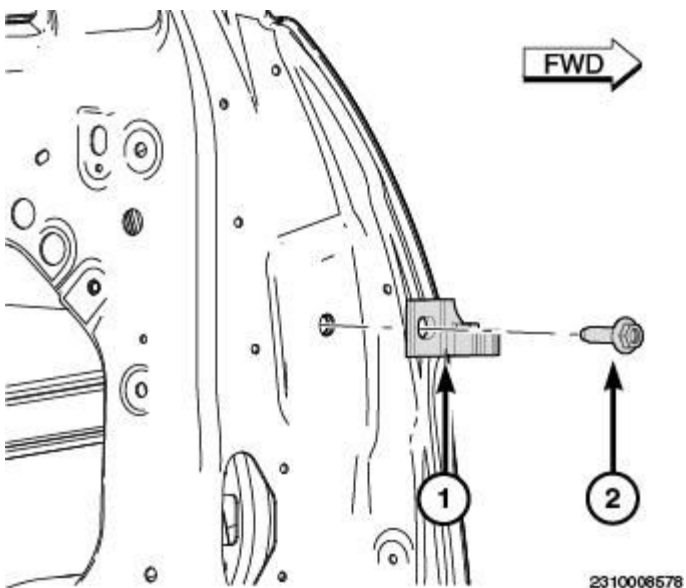


Fig. 72: Identifying Door Hinges & Bolts

Courtesy of CHRYSLER GROUP, LLC

Door side hinge half-

NOTE: Upper and lower hinge halves are serviced exactly the same

1. Mark position of upper hinge (1) and/or lower hinge on the upper door and/or lower door with a grease pencil or other suitable device to ease installation.
2. Remove bolt (2) attaching hinge to the upper door and/or the lower door and remove the hinge.

INSTALLATION

INSTALLATION

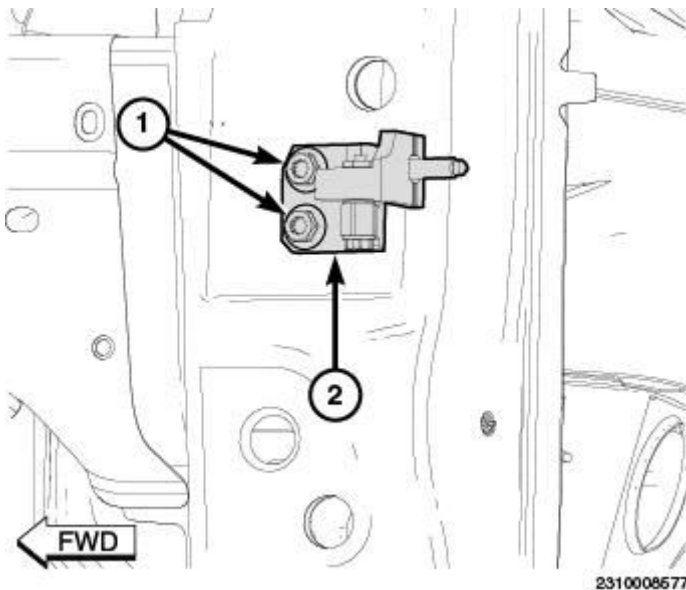


Fig. 73: Identifying Front Door Hinges & Bolts

Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not reuse the door half hinge to body side half hinge fasteners, replace with new readily available through Mopar parts.

NOTE: If necessary, paint new door hinge prior to installation.

NOTE: Left upper shown, all other hinges on this model typical

Body side hinge half-

NOTE: A suitable body sealant should be used when moving or replacing hinges.

NOTE: Upper and lower hinge halves are serviced exactly the same

1. Align the upper hinge and/or the lower hinge to the upper A-pillar and/or the lower A-pillar to the marks previously made.
2. Install bolts (2) attaching the hinge (1) to the upper A-pillar and/or lower A-pillar frame and tighten to 43 N.m (32 ft. lbs.).

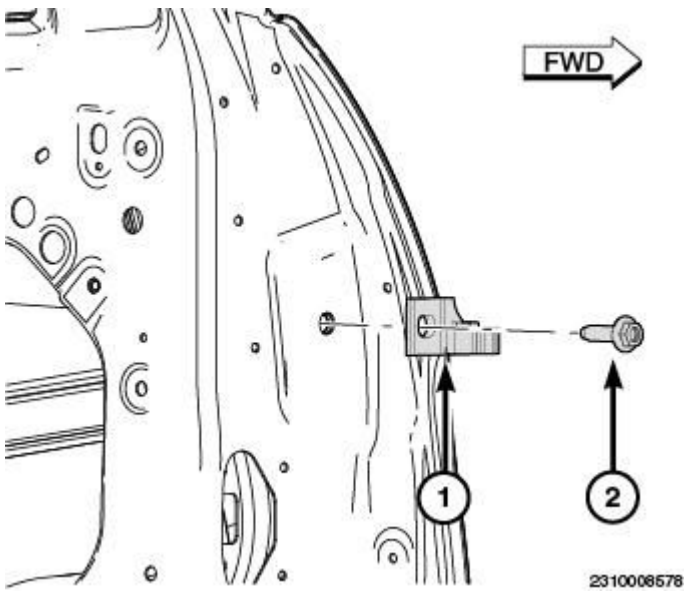


Fig. 74: Identifying Door Hinges & Bolts
Courtesy of CHRYSLER GROUP, LLC

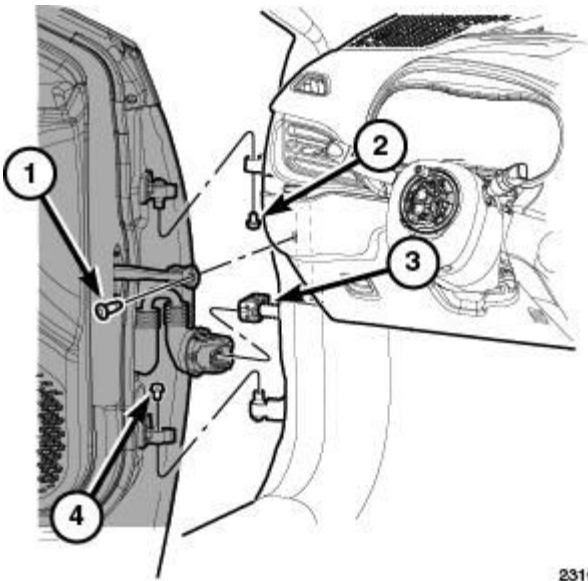
Door side hinge half-

NOTE: A suitable body sealant should be used when moving or replacing hinges.

NOTE: Upper and lower hinge halves are serviced exactly the same

1. Align the upper hinge and/or the lower hinge to the upper door and lower door to the marks previously made.
2. Install bolt (2) attaching the hinge to the door and tighten to 43 N.m (32 ft. lbs.).

Install the door-



2310004417

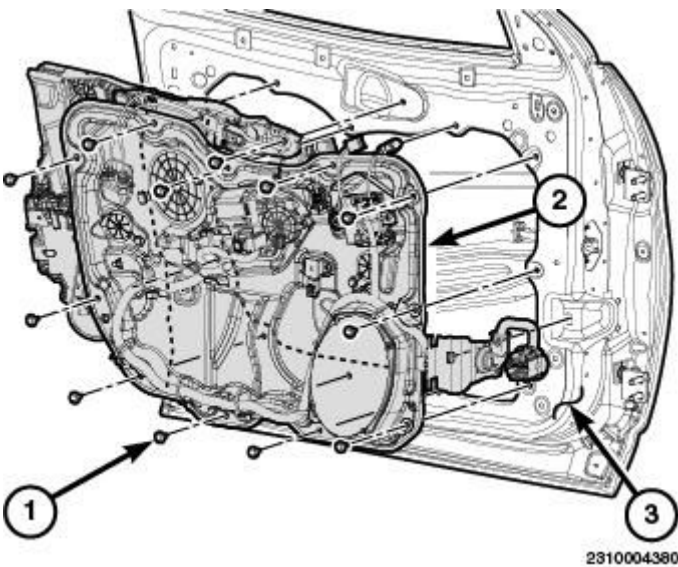
Fig. 75: Identifying Door Check Strap & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Install the door. Refer to **DOOR, INSTALLATION**.

LATCH, DOOR

REMOVAL

REMOVAL



2310004380

Fig. 76: Identifying Latch Door Components
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.

2. Remove the carrier plate. Refer to **PLATE, CARRIER, REMOVAL**.

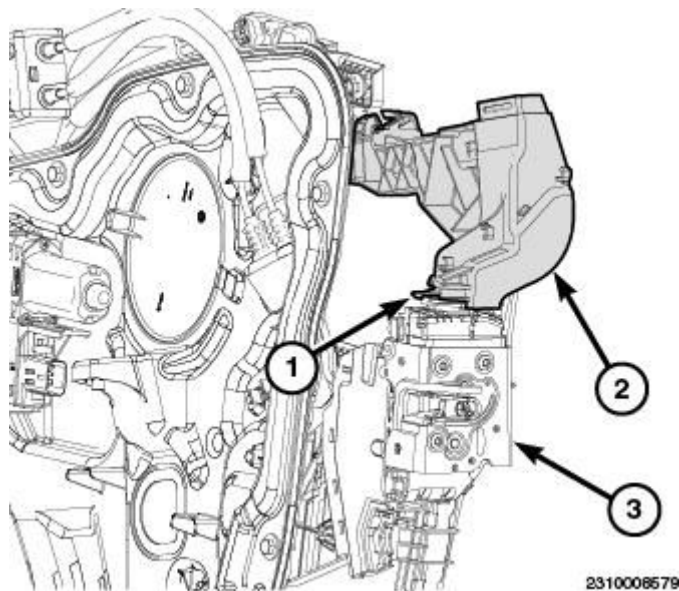


Fig. 77: Identifying Tab, Latch & Presenter Bracket
Courtesy of CHRYSLER GROUP, LLC

3. With the use of a flat bladed tool or equivalent, gently pry up on tab (1) and slide the latch (3) off of the presenter bracket (2).

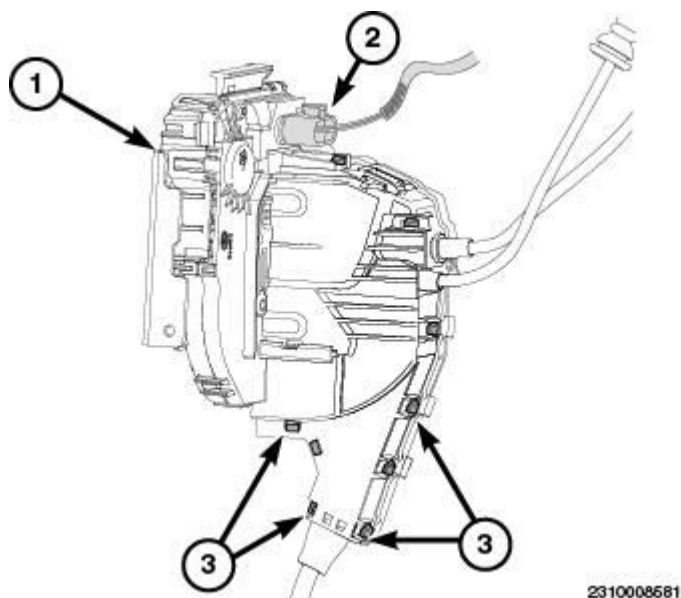


Fig. 78: Identifying Lock Cables, Latch Assembly, Electrical Connector & Cover Tabs
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the electrical connector (2).
5. Release the latch cover tabs (3) and remove the latch cover.

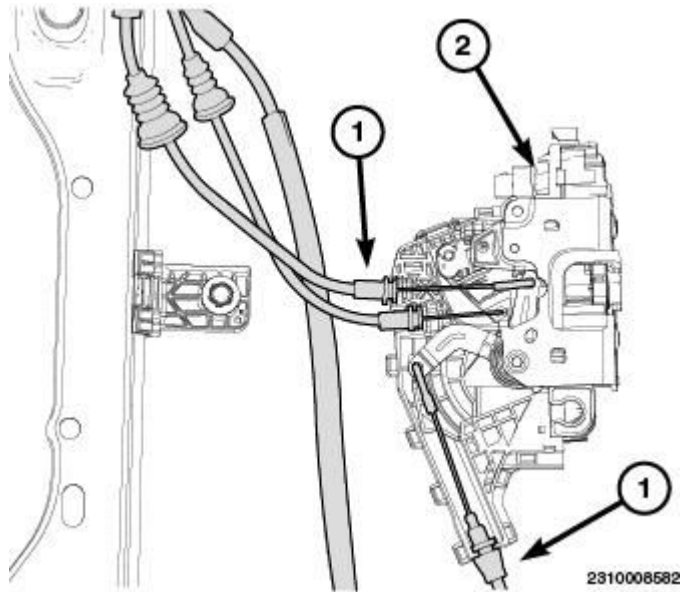


Fig. 79: Identifying Handle/Lock Cables & Latch Assembly
Courtesy of CHRYSLER GROUP, LLC

6. Disconnect handle and lock cables (1) and remove the latch assembly (2).

INSTALLATION

INSTALLATION

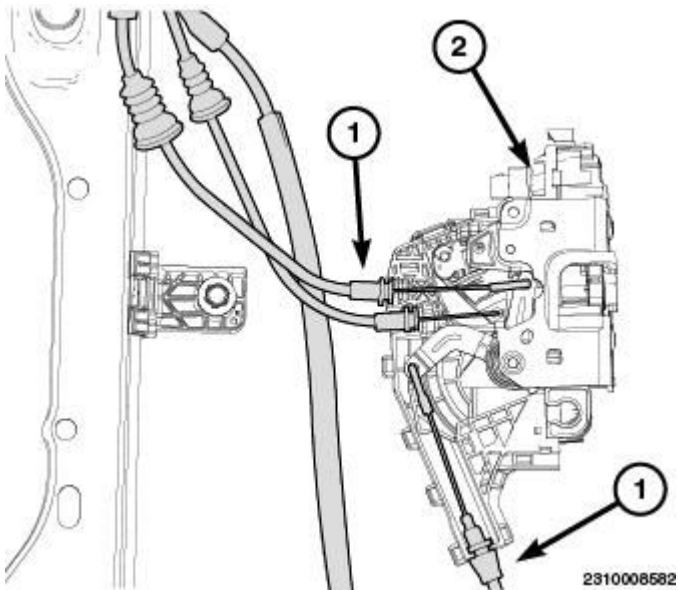


Fig. 80: Identifying Handle/Lock Cables & Latch Assembly
Courtesy of CHRYSLER GROUP, LLC

1. Connect the handle and lock cables (1).

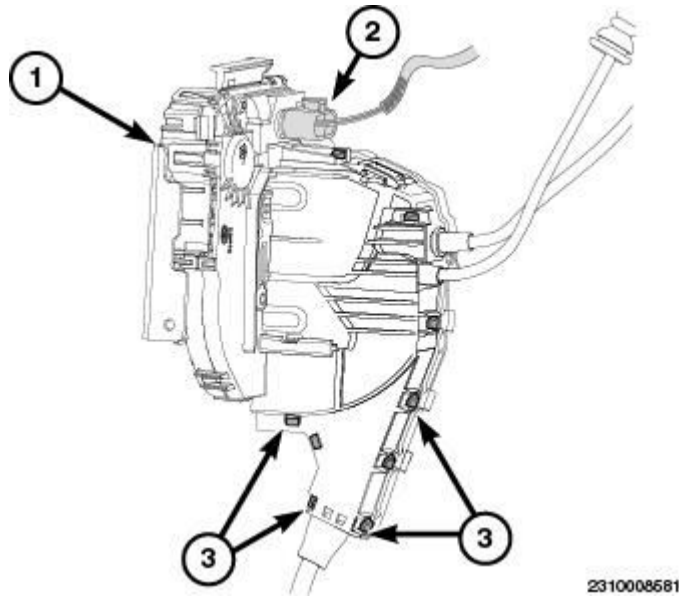


Fig. 81: Identifying Lock Cables, Latch Assembly, Electrical Connector & Cover Tabs
Courtesy of CHRYSLER GROUP, LLC

2. Connect the electrical connector (2) and install the latch cover.
3. Seat the latch cover retaining tabs (3) fully.

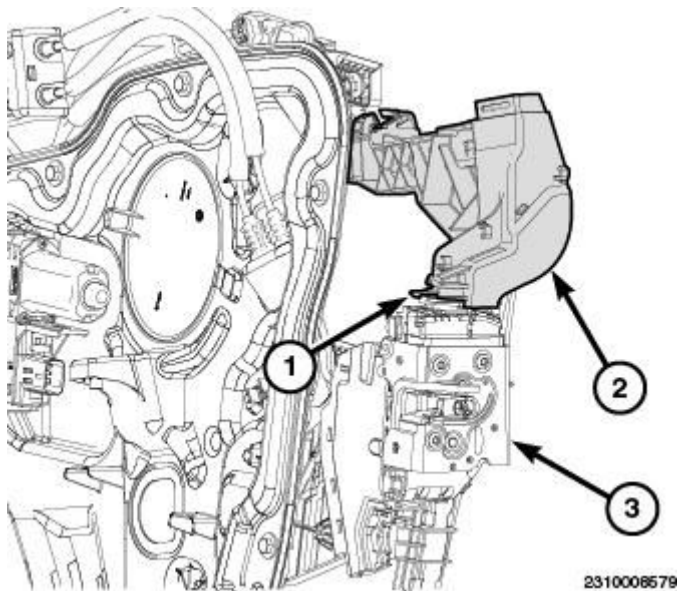


Fig. 82: Identifying Tab, Latch & Presenter Bracket
Courtesy of CHRYSLER GROUP, LLC

4. Install the latch (3) onto the presenter bracket (2) and seat the clip (1) fully.

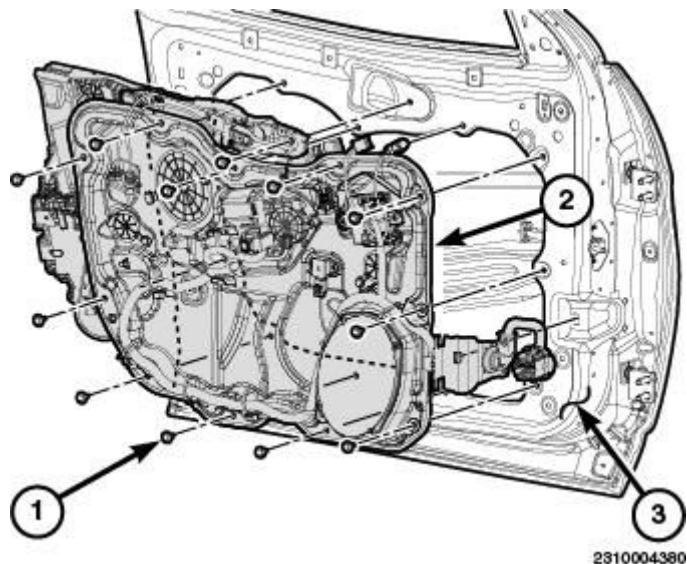


Fig. 83: Identifying Latch Door Components
Courtesy of CHRYSLER GROUP, LLC

5. Install the carrier plate. Refer to **PLATE, CARRIER, INSTALLATION**.
6. Connect the negative battery cable.
7. Perform the Clear/Relearn procedure. Refer to **STANDARD PROCEDURE**.

MOLDING, OUTER BELT

REMOVAL

REMOVAL

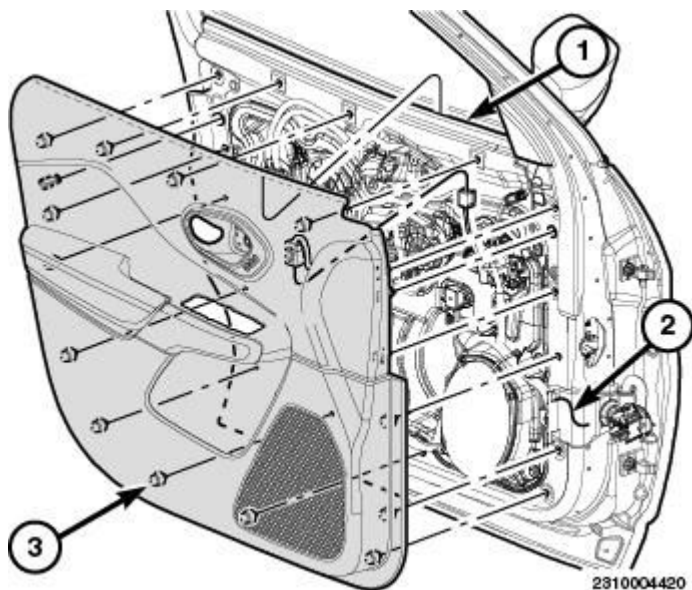


Fig. 84: Identifying Inner Door Belt Weatherstrip, Door Glass & Fasteners

Courtesy of CHRYSLER GROUP, LLC

1. Remove the door trim panel. Refer to **PANEL, DOOR TRIM, REMOVAL**.

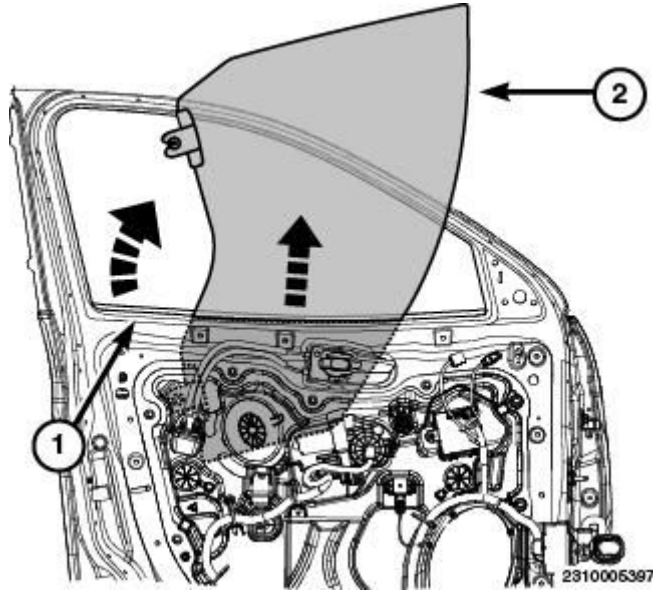


Fig. 85: Removing Door Glass From Door
Courtesy of CHRYSLER GROUP, LLC

2. Remove the door glass (1) from the door (2). Refer to **GLASS, DOOR, REMOVAL**.
3. Remove the outside mirror. Refer to **MIRROR, OUTSIDE REARVIEW, REMOVAL** and **MIRROR, OUTSIDE REARVIEW, GLASS, REMOVAL**.

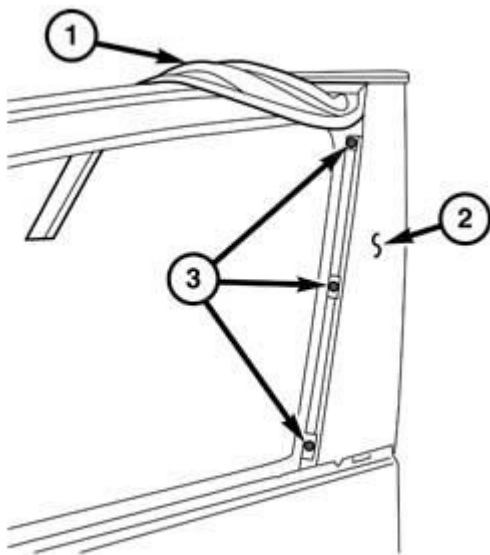
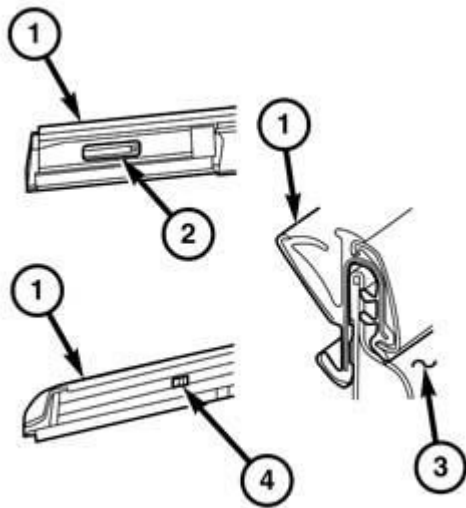


Fig. 86: Door Glass Run, Applique & Fasteners
Courtesy of CHRYSLER GROUP, LLC

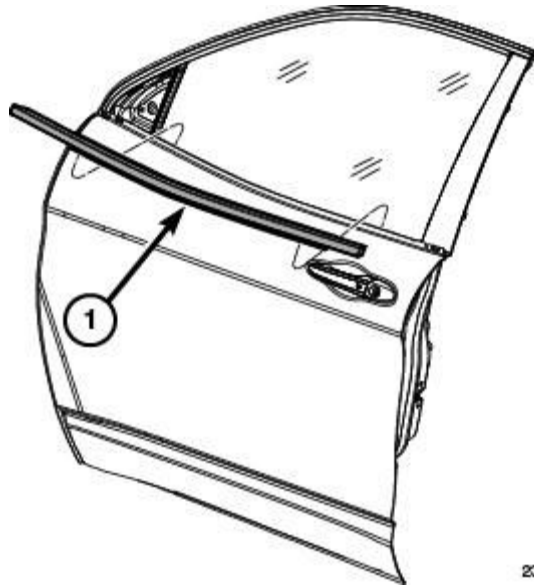
4. Remove the rear portion of the door glass run (1).
5. Remove the three door applique (2) fasteners (3).
6. Remove the door applique (2).



231168795

Fig. 87: Belt Molding, Notch & Door Edge
Courtesy of CHRYSLER GROUP, LLC

7. Locate the notch (1) on the belt molding (1) inner edge B-pillar end.
8. Insert a small flat bladed tool or equivalent, into the notch (2) of the inner side of the belt molding (1).
9. Pry inboard to clear the tab on the door.
10. Continue to hold the notch inboard and using trim stick (special tool #C-4755, Trim Stick) or equivalent, gently pry up on outer belt molding, lifting the belt molding (1) upward approximately 25 mm (1 in.), it will be tight as it is raised over the door edge (3)
11. Lift the belt molding (1) upward 25 mm (1 in.).
12. Locate the notch (1) on the belt molding inner edge outside mirror end.
13. Insert a small flat bladed tool or equivalent, into the notch (2) of the inner side of the belt molding (1).
14. Pry inboard to clear the tab on the door.



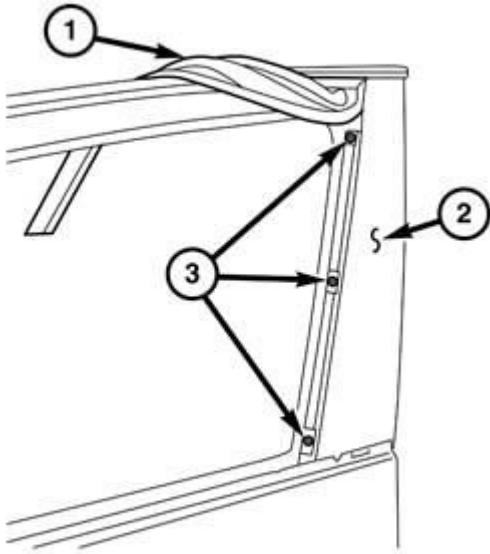
2310004386

Fig. 88: Identifying Belt Molding
Courtesy of CHRYSLER GROUP, LLC

15. Using trim stick or equivalent, gently pry up on outer belt molding
16. Remove the belt molding (1) from the door (2).

INSTALLATION

INSTALLATION



231068501

Fig. 89: Door Glass Run, Applique & Fasteners

Courtesy of CHRYSLER GROUP, LLC

1. Position the door applique.
2. Install the three door applique (2) fasteners (3) and tighten securely.
3. Insert the rear portion of the door glass run (1) and verify it is seated fully.

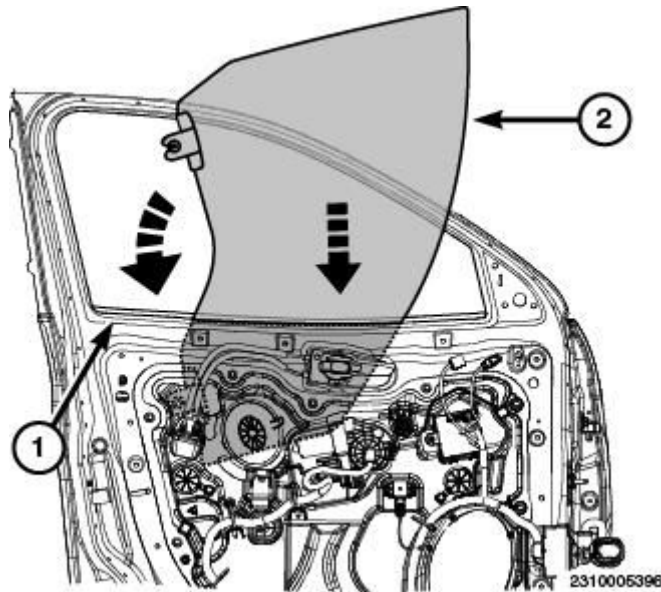
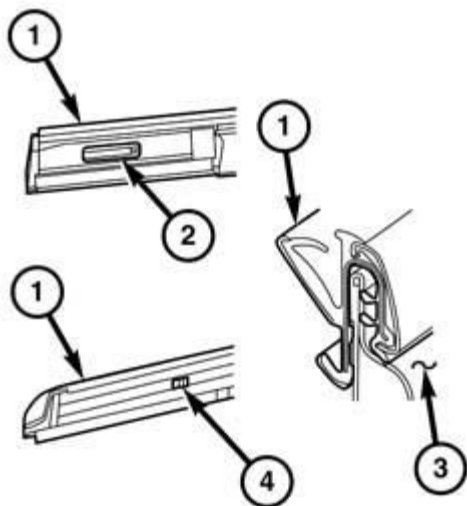


Fig. 90: Installing Door Glass Into Door
Courtesy of CHRYSLER GROUP, LLC

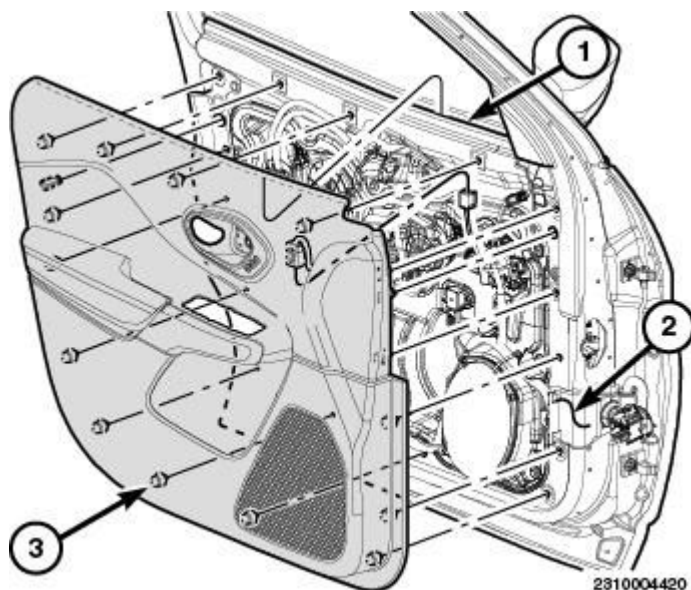
4. Install the door glass (2) into the door (1). Refer to **GLASS, DOOR, INSTALLATION**.



231168795

Fig. 91: Belt Molding, Notch & Door Edge
Courtesy of CHRYSLER GROUP, LLC

5. Align the tab (4) on the inner edge of belt molding (1) to the indentations on the door.
6. With firm hand pressure push down until belt molding (1) has seated fully onto the door (3) and the notches on the ends (2).



2310004420

Fig. 92: Identifying Inner Door Belt Weatherstrip, Door Glass & Fasteners
Courtesy of CHRYSLER GROUP, LLC

7. Install the outside mirror. Refer to **MIRROR, OUTSIDE REARVIEW, INSTALLATION** and

MIRROR, OUTSIDE REARVIEW, GLASS, INSTALLATION.

8. Install the door trim panel. Refer to **PANEL, DOOR TRIM, INSTALLATION.**

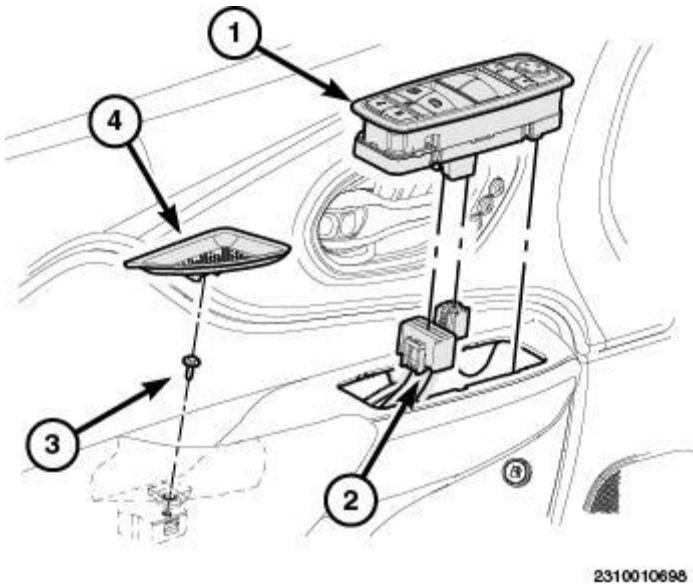
PANEL, DOOR TRIM**REMOVAL****REMOVAL**

Fig. 93: Identifying Window Switch, Liner & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Using (special tool #C-4755, Trim Stick) or equivalent, remove and disconnect the window switch (2) from the door.
3. Using a trim stick or equivalent, remove the liner (4) from the door trim pull handle.
4. Remove the fastener (3) securing the door trim panel to the carrier plate.

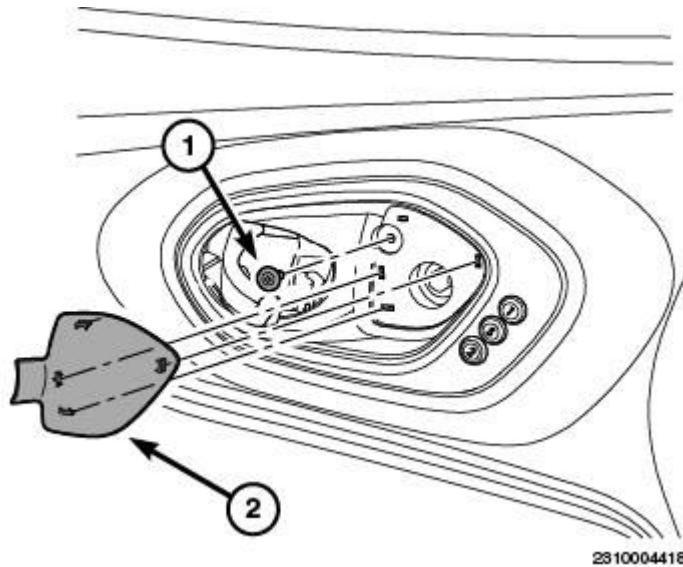


Fig. 94: Identifying Bezel & Fastener
Courtesy of CHRYSLER GROUP, LLC

5. Using a trim stick or equivalent, pull out on the interior door handle and remove the bezel (2) located in the cavity.
6. Remove the fastener (1) and the fastener securing the door trim panel to the carrier plate.

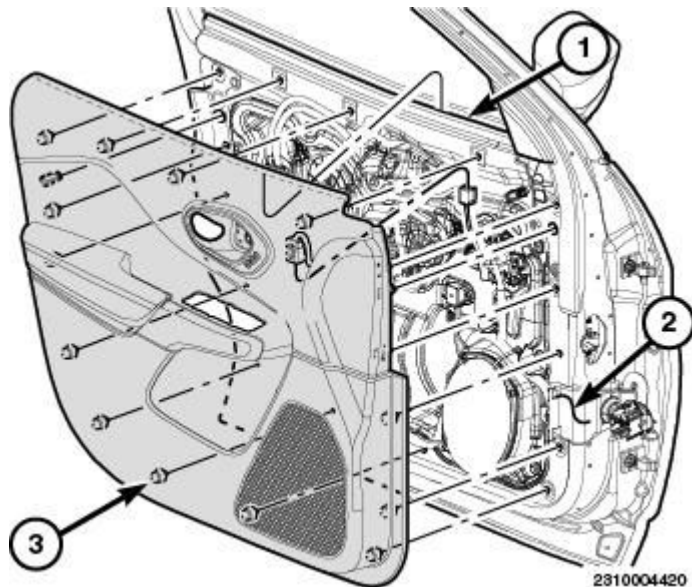
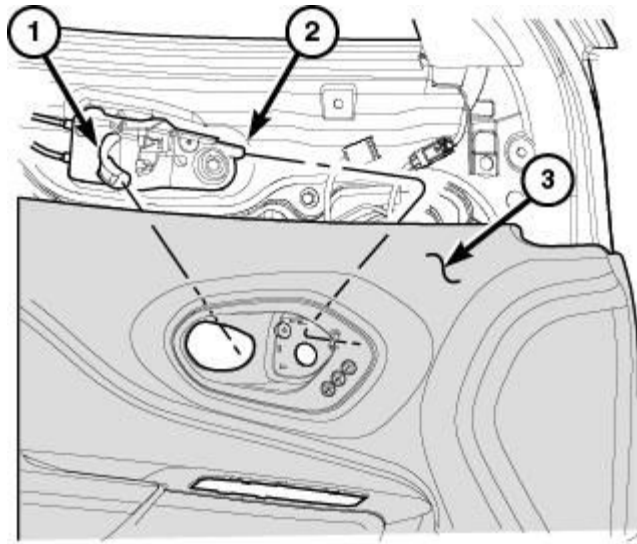


Fig. 95: Identifying Inner Door Belt Weatherstrip, Door Glass & Fasteners
Courtesy of CHRYSLER GROUP, LLC

7. Using a trim stick or equivalent, pry the door trim panel away, starting along the lower edge and working around the perimeter to disengage the retaining clips (3).
8. Lift the door trim panel up and out. **Position the door trim panel slightly away, do not remove.**



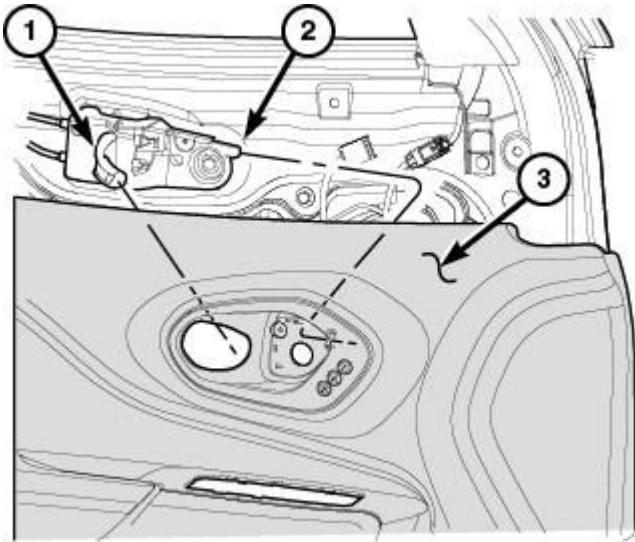
2310004419

Fig. 96: Identifying Interior Handle, Notch & Trim Panel
Courtesy of CHRYSLER GROUP, LLC

9. Pull the interior handle (1) out fully from the notch (2) to detach from the trim panel (3).
10. Disconnect electrical connectors and remove the door trim panel (3).

INSTALLATION

INSTALLATION



2310004419

Fig. 97: Identifying Interior Handle, Notch & Trim Panel
Courtesy of CHRYSLER GROUP, LLC

1. Position the door trim panel (3) near the door.

2. Connect any electrical connectors as necessary except for the window switch. Feed the window switch harness through the cavity in the door trim panel.
3. Raise the trim panel and position the backside of the upper trim edge to be engaged with inner belt molding.
4. Feed the interior door handle (1) and the tab (2) through the back of the door trim panel and clip into place.

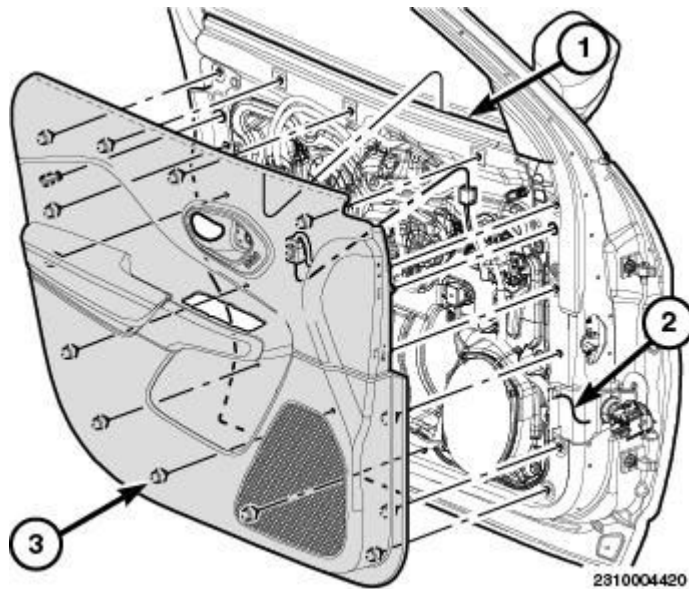


Fig. 98: Identifying Inner Door Belt Weatherstrip, Door Glass & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

5. Align the door trim panel retaining clips (3) to the door.
6. Once aligned, engage the upper trim edge with the inner belt molding (1).
7. Hand tap the door trim panel to secure the retaining clips.

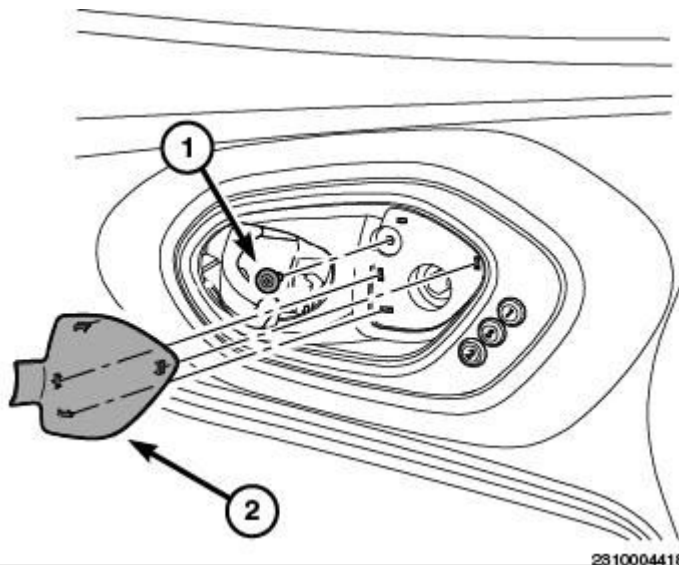


Fig. 99: Identifying Bezel & Fastener
Courtesy of CHRYSLER GROUP, LLC

8. Install the fasteners (1) into the interior door handle pocket, securing the door trim panel to the carrier plate. Tighten the fasteners securely.
9. Install the interior door handle (2) bezel.

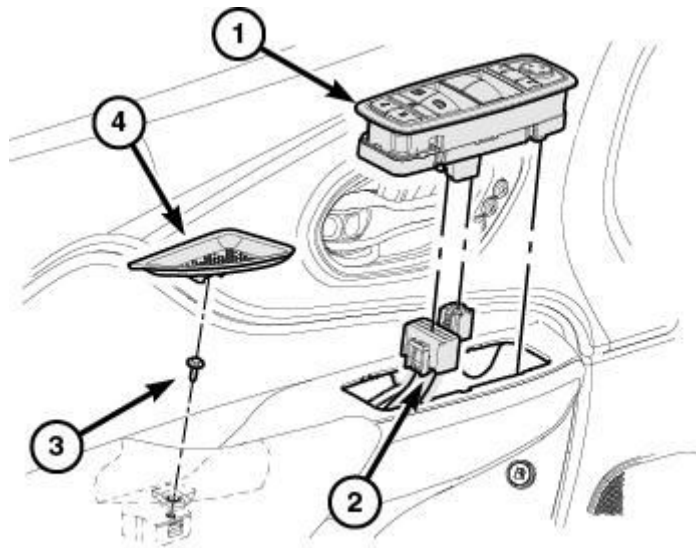


Fig. 100: Identifying Window Switch, Liner & Fasteners
Courtesy of CHRYSLER GROUP, LLC

10. Connect the electrical connector (2) and install the window switch (1) to the door.
11. Install the fastener (3) securing the door trim panel to the carrier plate. Tighten the fastener securely.
12. Install the liner (4) into the door trim pull handle cavity.
13. Connect the negative battery cable.

PLATE, CARRIER

REMOVAL

REMOVAL

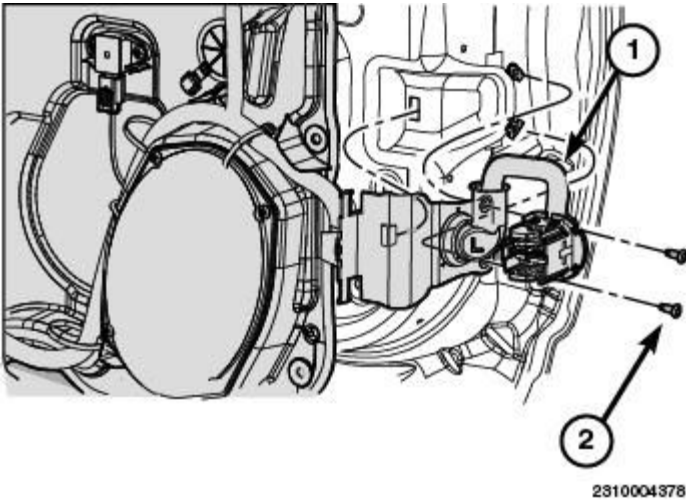


Fig. 101: Identifying Wire Harness & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove trim panel. Refer to **PANEL, DOOR TRIM, REMOVAL**.
3. Remove the fasteners (2) and separate the wire harness (1) from the carrier plate.
4. Disconnect the door glass from the window regulator and secure in the full up position using tape or other suitable tool. Refer to **GLASS, DOOR, REMOVAL**.

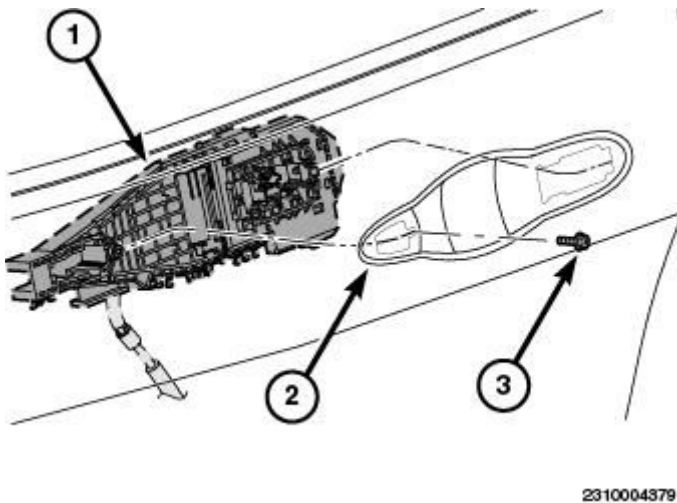


Fig. 102: Identifying Exterior Door Handle & Fastener
 Courtesy of CHRYSLER GROUP, LLC

5. Remove the exterior door handle. Refer to **HANDLE, EXTERIOR, REMOVAL** and **HANDLE, INTERIOR, REMOVAL**.
6. Remove the fastener (3) located beneath the exterior door handle.

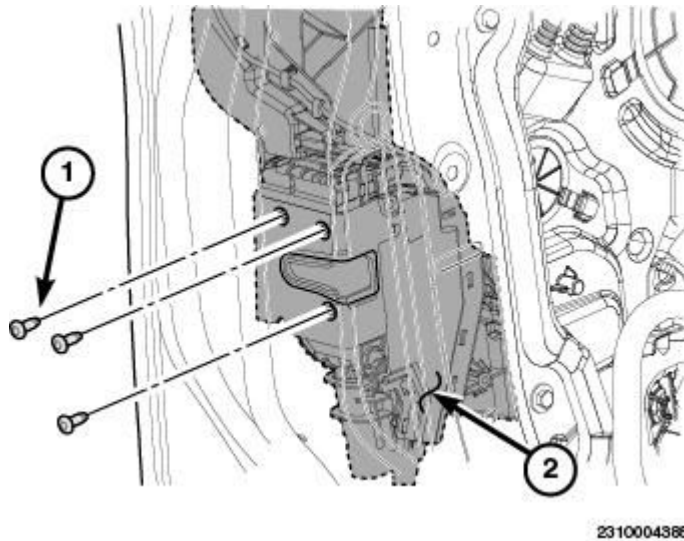


Fig. 103: Identifying Inner Door & Door Latch Fasteners
Courtesy of CHRYSLER GROUP, LLC

7. Remove the door latch fasteners (1) from the inner door (2).

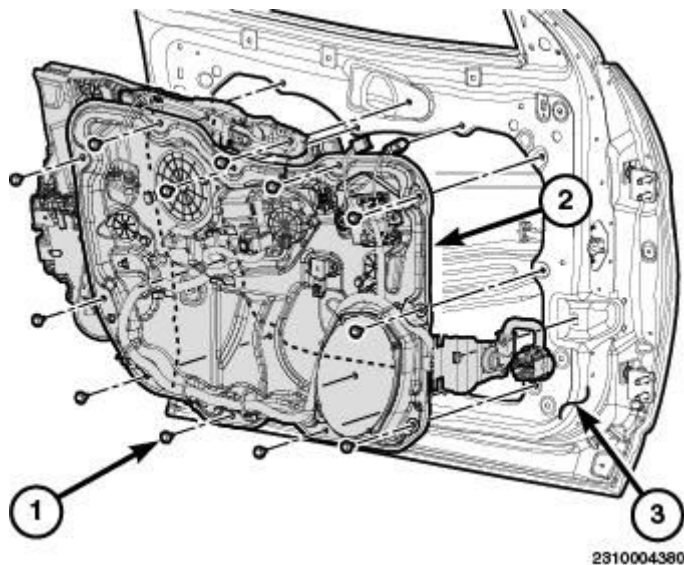


Fig. 104: Identifying Latch Door Components
Courtesy of CHRYSLER GROUP, LLC

8. Disconnect the exterior mirror wiring connector.
9. Separate the wire harness from the carrier plate as necessary to gain enough slack in the harness to remove the carrier plate from the door.
10. Remove the carrier plate fasteners (1).
11. Remove the carrier plate from the door (1).
12. Disconnect and release the remaining harness connectors.

INSTALLATION

INSTALLATION

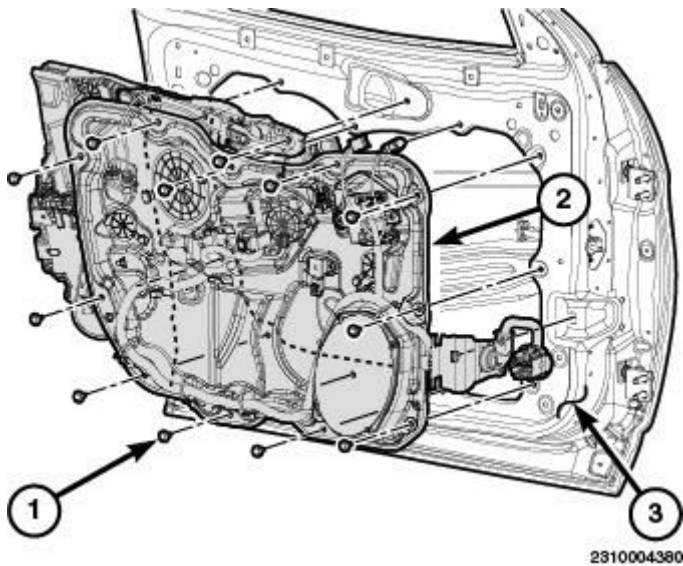


Fig. 105: Identifying Latch Door Components
 Courtesy of CHRYSLER GROUP, LLC

1. Move the carrier plate into the door opening until position allows for routing of the rear door wiring harness.
2. Route and fasten the wiring harness guides into the carrier plate and the latch presenter.
3. Insert latch inside and the outer handle bracket into the inner sheet metal.
4. Move carrier plate into opening until position of module aligns with surrounding sheet metal.
5. Install carrier plate fasteners (1) and tighten to 8 N.m (71 in. lbs.).
6. Connect wire harness to mirror connector.

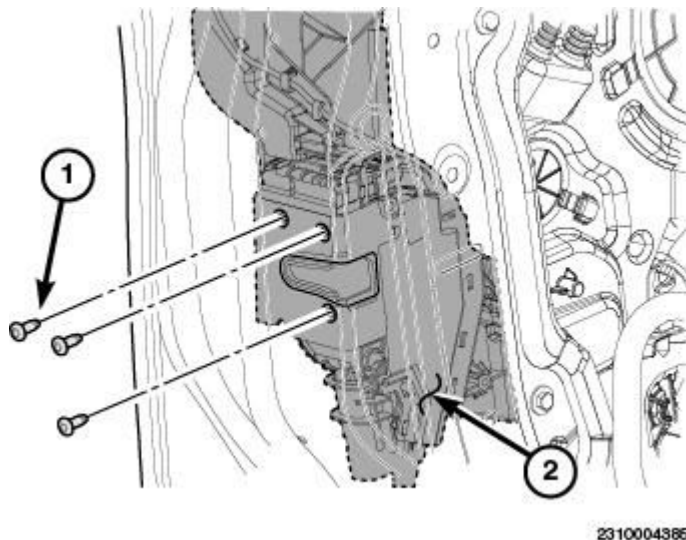
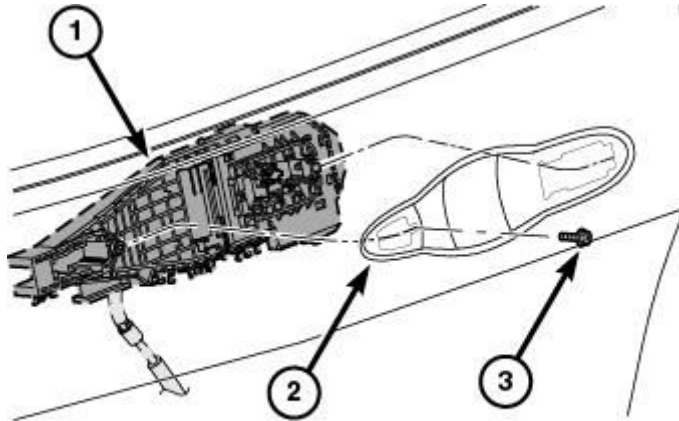


Fig. 106: Identifying Inner Door & Door Latch Fasteners
Courtesy of CHRYSLER GROUP, LLC

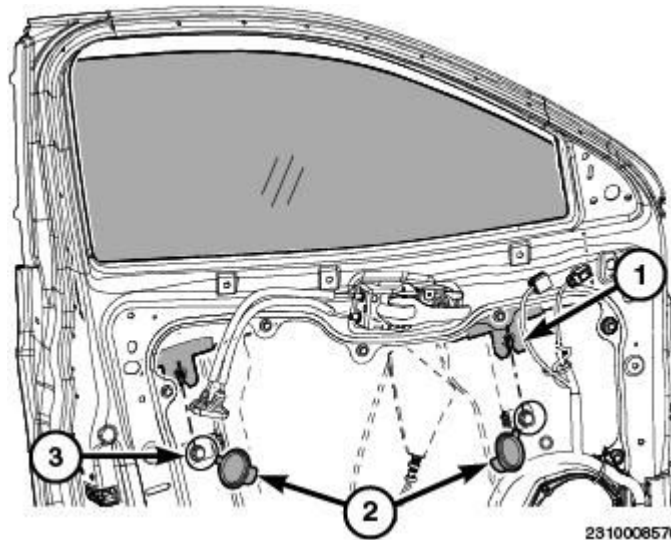
7. Install the door latch fasteners (1) into the inner door (2).
8. Tighten the latch fasteners to 8 N.m (71 in. lbs.).



2310004379

Fig. 107: Identifying Exterior Door Handle & Fastener
Courtesy of CHRYSLER GROUP, LLC

9. Align the outer door handle bracket (1).
10. Install the outer door handle bracket fastener (3) and tighten securely.
11. Install the exterior door handle. Refer to **HANDLE, EXTERIOR, INSTALLATION** and **HANDLE, INTERIOR, INSTALLATION**.



2310008578

Fig. 108: Identifying Access Plugs & Glass Fasteners
Courtesy of CHRYSLER GROUP, LLC

12. Release glass and lower into position onto regulator.
13. Align the door glass mounts (1) to the window regulator within the access holes (3).
14. Apply a medium grade threadlocker adhesive to the glass fastener threads per manufacture recommendations.
15. Install the glass fasteners and tighten to 13 N.m (10 ft. lbs.).

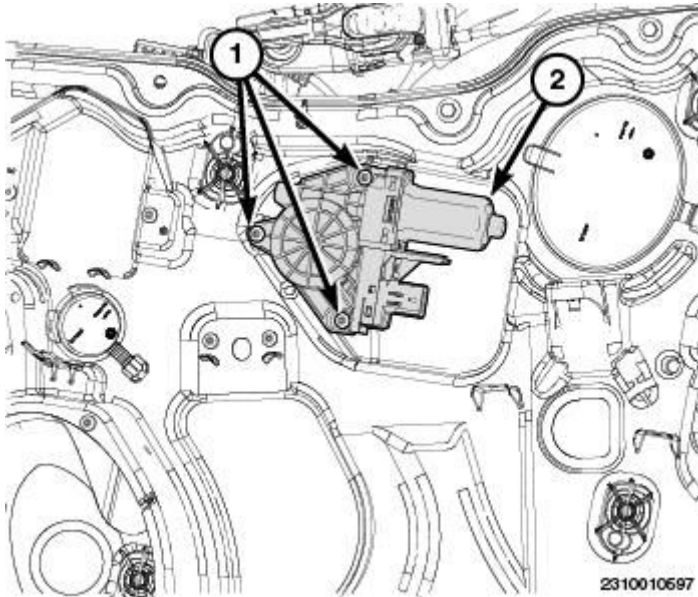


Fig. 109: Identifying Window Motor & Fasteners
Courtesy of CHRYSLER GROUP, LLC

16. Align the window motor (2) onto the carrier plate.
17. Install the window motor fasteners (1) and tighten to and tighten securely.
18. Connect the window motor (2) wiring connector.
19. Close the access plugs.

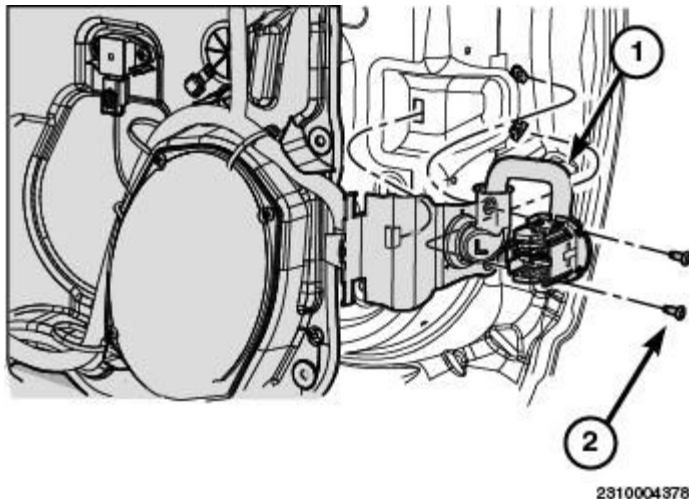


Fig. 110: Identifying Wire Harness & Fasteners

Courtesy of CHRYSLER GROUP, LLC

20. Position the harness (1) back into place and install the screws (2).
21. Install trim panel. Refer to **PANEL, DOOR TRIM, INSTALLATION**.
22. Connect the battery.
23. Perform the Clear/Relearn procedure. Refer to **STANDARD PROCEDURE** .

REGULATOR, WINDOW

REMOVAL

REMOVAL

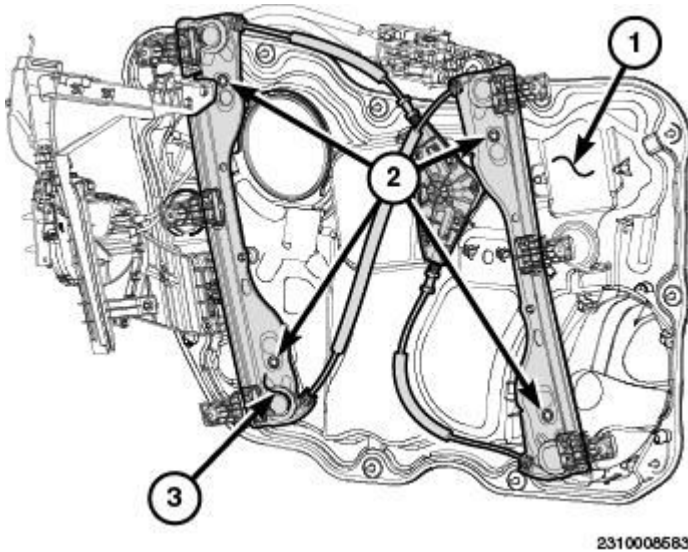


Fig. 111: Identifying Carrier Plate, Window Regulator & Fasteners

Courtesy of CHRYSLER GROUP, LLC

1. Remove the carrier plate (1). Refer to **PLATE, CARRIER, REMOVAL**.
2. Remove fasteners (2) from the window regulator (3).
3. Remove window regulator (3) from the carrier plate (1).

INSTALLATION

INSTALLATION

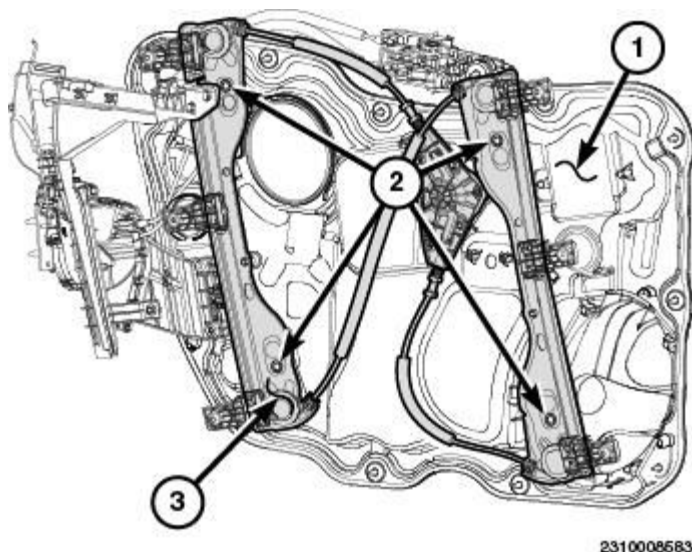


Fig. 112: Identifying Carrier Plate, Window Regulator & Fasteners

Courtesy of CHRYSLER GROUP, LLC

1. Align the window regulator (3) onto the carrier plate (1).
2. Insert the window regulator drive mechanism tabs into the carrier plate until clips engage fully.
3. Install the four window regulator fasteners (2) and tighten securely.
4. Install the carrier plate. Refer to **PLATE, CARRIER, INSTALLATION**.
5. Perform the Clear/Relearn procedure. Refer to **STANDARD PROCEDURE** .

STRIKER, DOOR LATCH

REMOVAL

REMOVAL

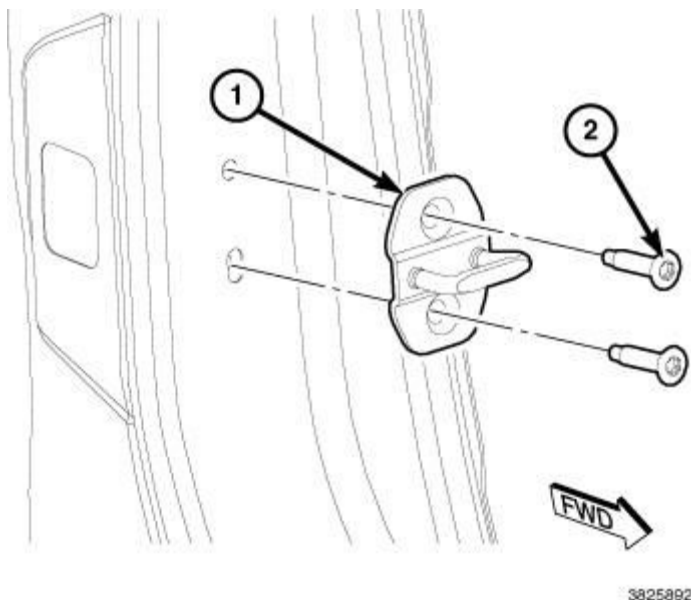


Fig. 113: Door Latch Striker & Screws
Courtesy of CHRYSLER GROUP, LLC

NOTE: Right hand shown, left hand typical.

1. Using a grease pencil or equivalent, mark the location of the door latch striker (1) on the B-pillar.
2. Remove the two bolts (2) that secure the striker to the B-pillar and remove the striker.
3. Be sure to check for any shims between door latch striker and B-pillar. If any shims are found, they must be reinstalled with the new door latch striker to maintain proper door operation.

INSTALLATION

INSTALLATION

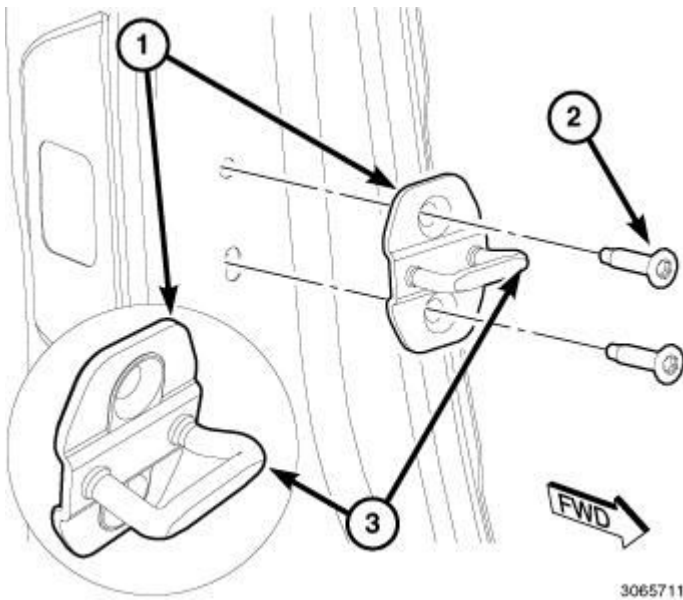


Fig. 114: Two Bolts & Striker

Courtesy of CHRYSLER GROUP, LLC

NOTE: The striker needs to be properly orientated to the B-pillar. The striker loop (3) must be installed to the inboard side of the B-pillar.

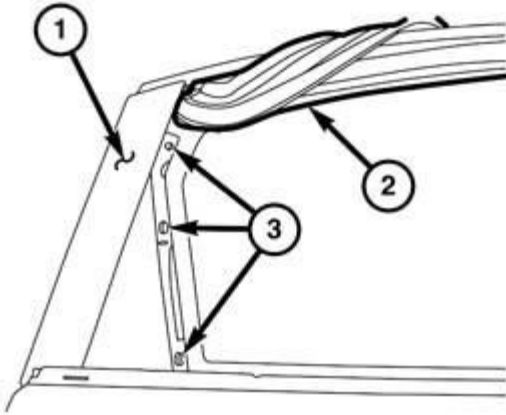
1. Position the door latch striker (1) onto the B-pillar and loosely install the two bolts (2).
2. Align the door latch striker to the B-pillar using the reference marks made during the removal procedure and tighten the bolts to 30 N.m (22 ft. lbs.).

DOORS - REAR

APPLIQUE

REMOVAL

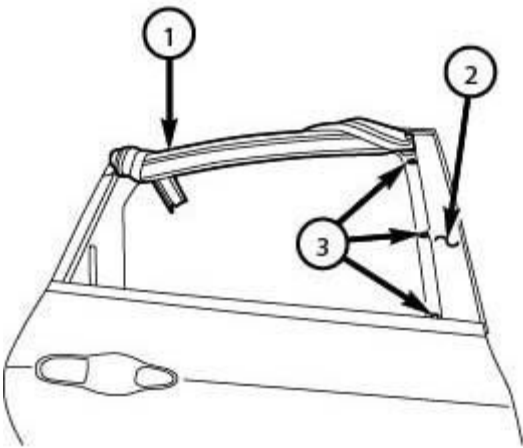
REMOVAL



231168781

Fig. 115: Door Glass Weatherstrip, C-Pillar Applique & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Lower window fully.
2. Remove the door trim panel. Refer to **PANEL, REAR DOOR TRIM, REMOVAL**.
3. Partially remove the rear portion of the door glass weatherstrip (2).
4. Remove the three C-pillar applique (1) fasteners (3).
5. Remove the C-pillar applique (1) from the vehicle.

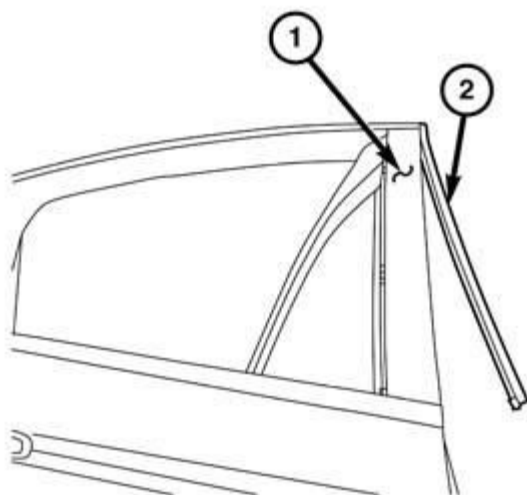


231168784

Fig. 116: Door Glass Weatherstrip, B-Pillar Applique & Fasteners
Courtesy of CHRYSLER GROUP, LLC

B-Pillar Applique-

1. Lower window fully.
2. Remove the door trim panel. Refer to **PANEL, REAR DOOR TRIM, REMOVAL**.
3. Partially remove the front portion of the door glass weatherstrip (1).
4. Remove the three B-pillar applique (2) fasteners (3).



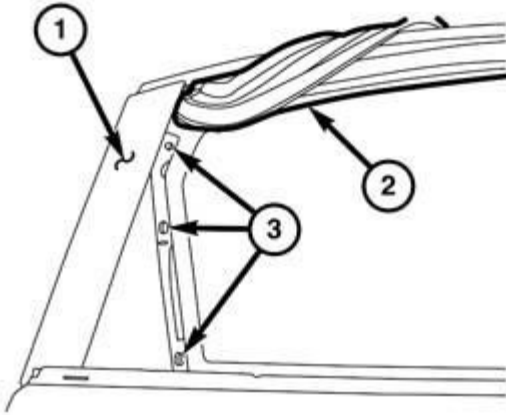
231168785

Fig. 117: B-Pillar Applique & Weatherstrip
Courtesy of CHRYSLER GROUP, LLC

5. Untuck the front edge of the weatherstrip (2) from the applique (1) and the door edge.
6. Remove the B-pillar applique (1) from the vehicle.

INSTALLATION

INSTALLATION

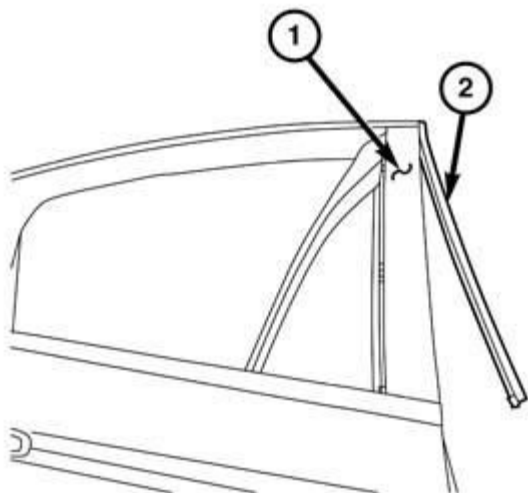


231168781

Fig. 118: Door Glass Weatherstrip, C-Pillar Applique & Fasteners
Courtesy of CHRYSLER GROUP, LLC

C-Pillar Applique-

1. Install the three C-pillar applique (1) fasteners (3) and tighten securely.
2. Insert the rear portion of the door glass weatherstrip (2) into the glass run channel and verify it is seated fully.
3. Install the door trim panel. Refer to **PANEL, REAR DOOR TRIM, INSTALLATION**.
4. Raise the door glass fully.

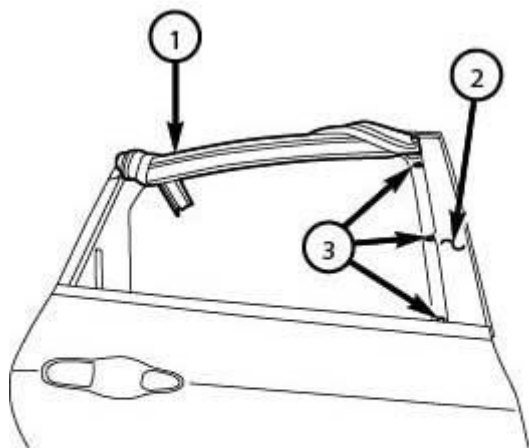


231168785

Fig. 119: B-Pillar Applique & Weatherstrip
Courtesy of CHRYSLER GROUP, LLC

B-Pillar Applique-

1. Align the B-pillar applique (1) onto the door frame.
2. Insert the front edge of the weatherstrip (2) onto the applique (1) and the door edge.



231168784

Fig. 120: Door Glass Weatherstrip, B-Pillar Applique & Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Install the three B-pillar applique (2) fasteners (3) and tighten securely.
4. Insert the front portion of the door glass weatherstrip (1) into the glass run channel) and verify it is seated fully.
5. Install the door trim panel. Refer to **PANEL, REAR DOOR TRIM, INSTALLATION**.
6. Raise the door glass fully.

DOOR, REAR

ADJUSTMENTS

ADJUSTMENTS

NOTE: Door adjustment measurements should be taken from stationary or welded body panels like the roof, rocker or quarter panels.

- During adjustment procedures, it is recommended that all the hinge fasteners be loosened except for the upper most fasteners. Adjustments can be made using the upper bolts to hold the door with final torque of the fasteners occurring after correct door positioning is achieved.
- A suitable body sealant should be used when removing or moving the hinges.

FORE/AFT

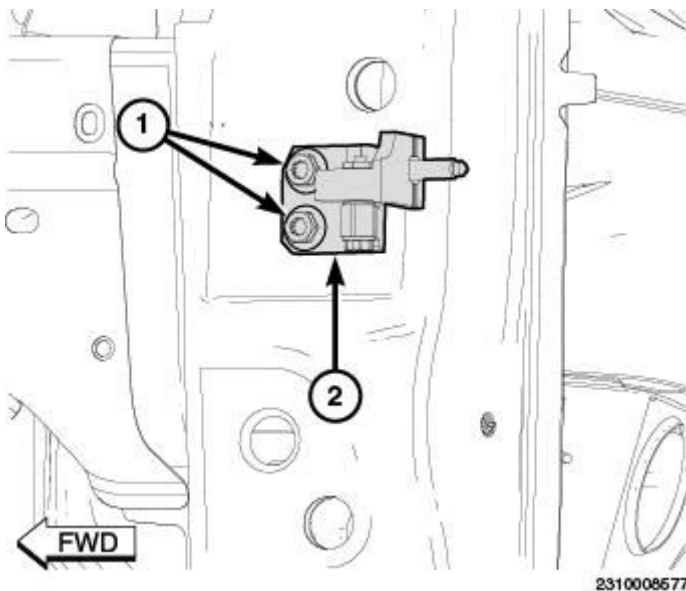


Fig. 121: Identifying Front Door Hinges & Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: Fore/aft (lateral) door adjustment is done by loosening the hinge to the body fasteners (1) one hinge at a time and moving the door to the correct position.

1. Support the rear door with a suitable lifting device.
2. Loosen the bolts (1) that secure the front door hinges (2) to the B-pillar.
3. Adjust the rear door to the correct position. Refer to **GAP AND FLUSH, SPECIFICATIONS**.
4. Tighten the upper bolt of the upper hinge to the B-pillar to 43 N.m (32 ft. lbs.).
5. Tighten the upper bolt of the lower hinge to 43 N.m (32 ft. lbs.).
6. Tighten the remaining hinge bolts to 43 N.m (32 ft. lbs.).

UP/DOWN

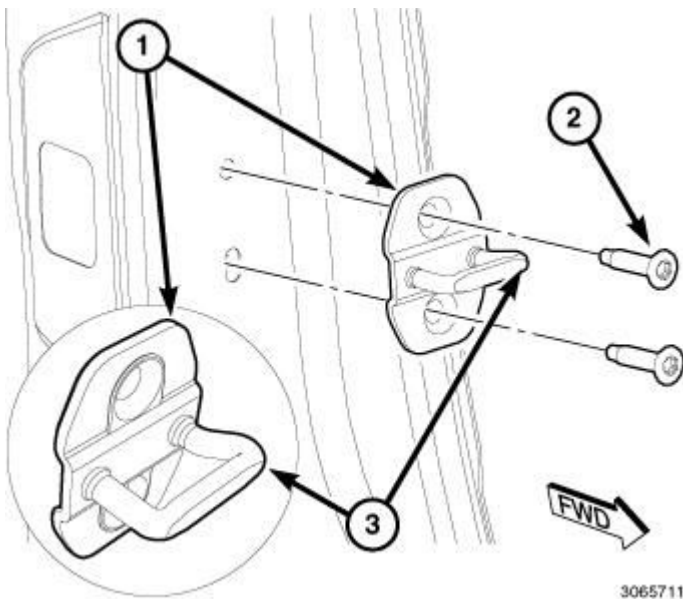


Fig. 122: Two Bolts & Striker
Courtesy of CHRYSLER GROUP, LLC

NOTE: Up/down door adjustment is done by loosening either the hinge to the body fasteners or the hinge to door fasteners and moving the door to the correct position.

1. Support the rear door with a suitable lifting device.
2. Loosen the two bolts (2) that secure the striker (1) to the C-pillar.

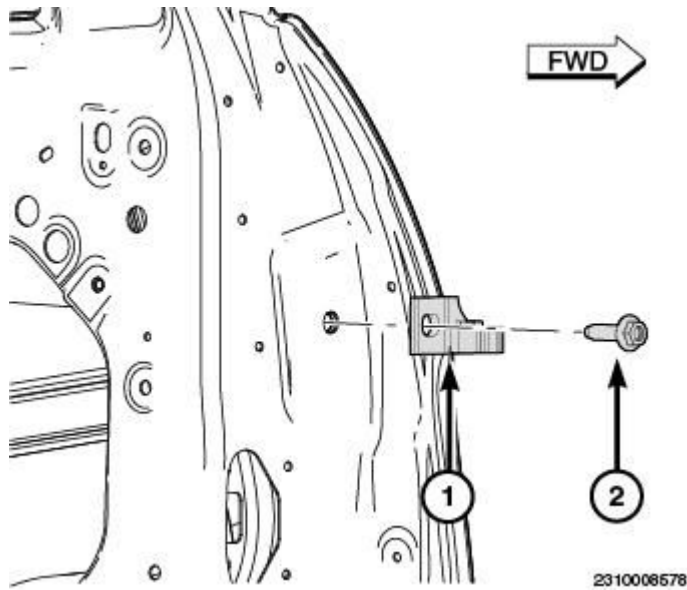


Fig. 123: Identifying Door Hinges & Bolts
Courtesy of CHRYSLER GROUP, LLC

3. If necessary, loosen the bolts (2) that secure the door hinges (1) to the rear door.

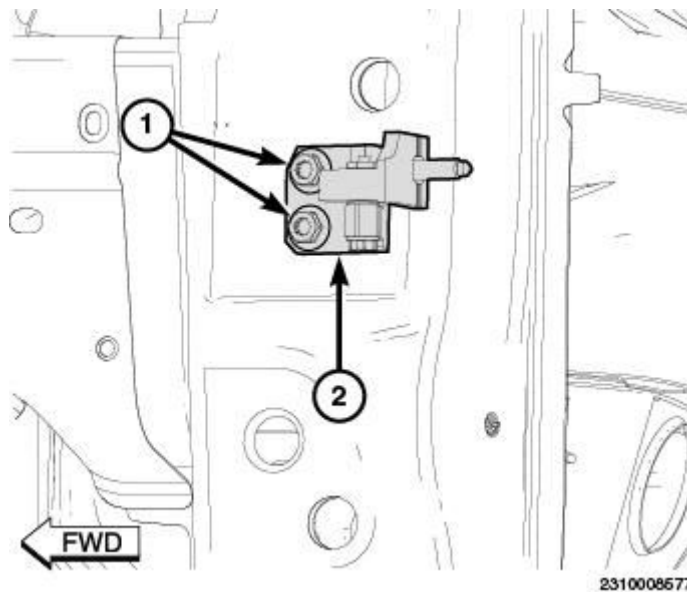


Fig. 124: Identifying Front Door Hinges & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. If necessary, loosen the bolts (1) that secure the front door hinges (2) to the B-pillar.

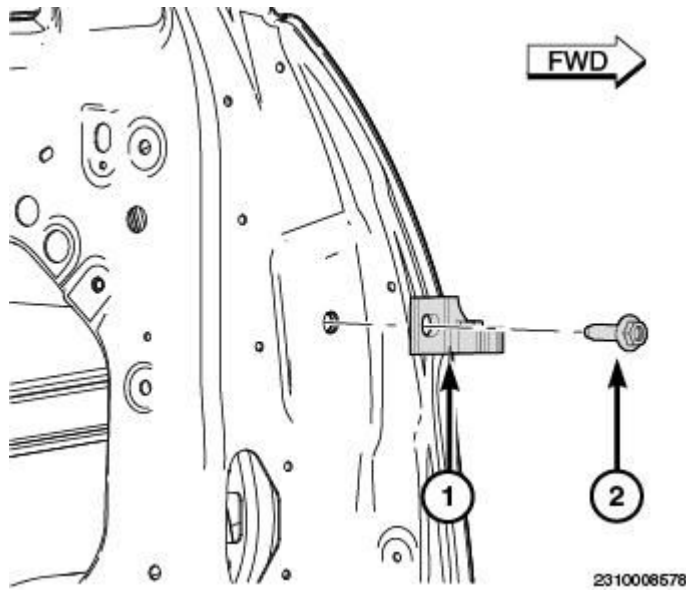


Fig. 125: Identifying Door Hinges & Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Adjust the rear door to the correct position. Refer to **GAP AND FLUSH, SPECIFICATIONS**.
6. Tighten the bolts (2) that secure the door hinges (1) to the rear door to 43 N.m (32 ft. lbs.).

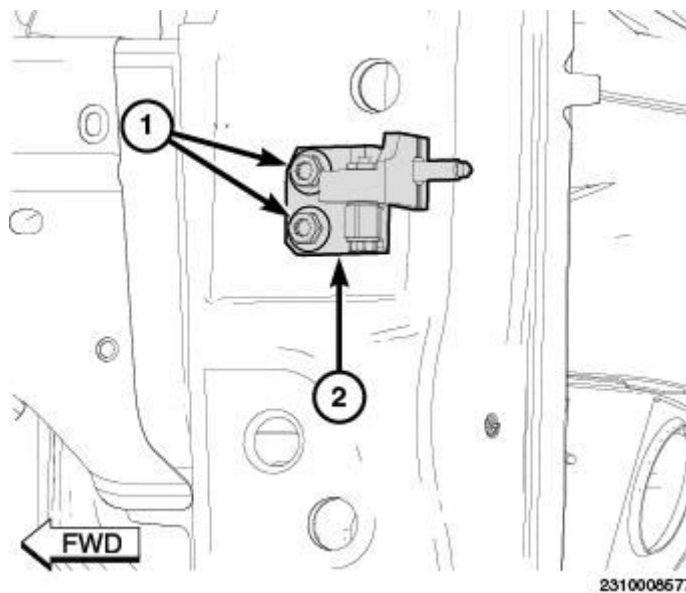


Fig. 126: Identifying Front Door Hinges & Bolts
Courtesy of CHRYSLER GROUP, LLC

7. Tighten the bolts (1) that secure the door hinges (2) to the B-pillar to 43 N.m (32 ft. lbs.) using the following sequence.
 1. Tighten the upper bolt on the upper hinge.
 2. Tighten the lower bolt on the lower hinge.

3. Tighten the remaining hinge bolts to 43 N.m (32 ft. lbs.).

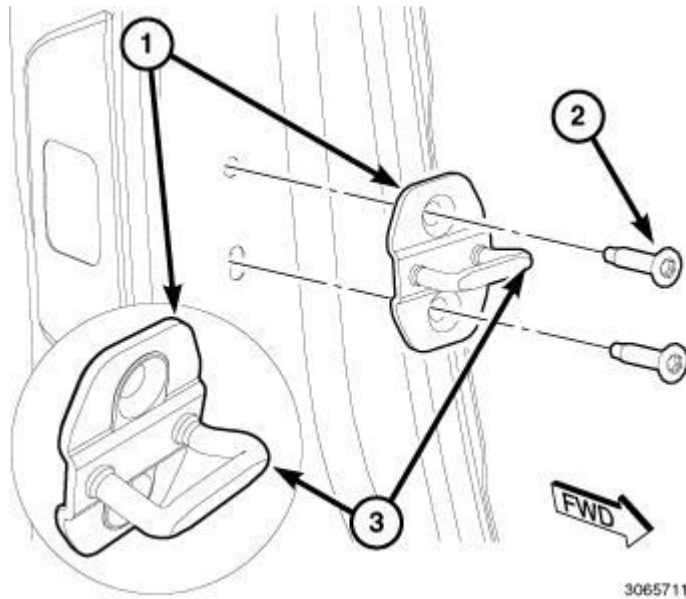


Fig. 127: Two Bolts & Striker
Courtesy of CHRYSLER GROUP, LLC

NOTE: Make sure the protrusion (3) is orientated towards the interior of the vehicle.

- 8.
9. Tighten the two bolts (2) that secure the striker (1) to the C-pillar to 30 N.m (22 ft. lbs.).

IN/OUT

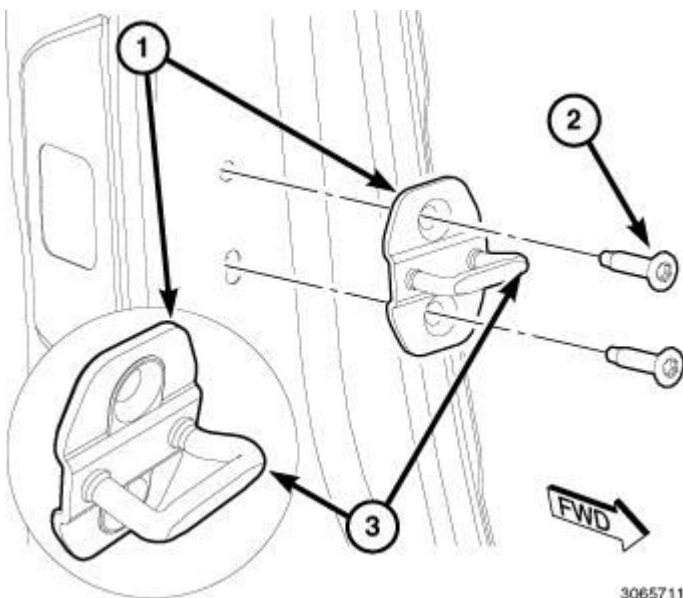
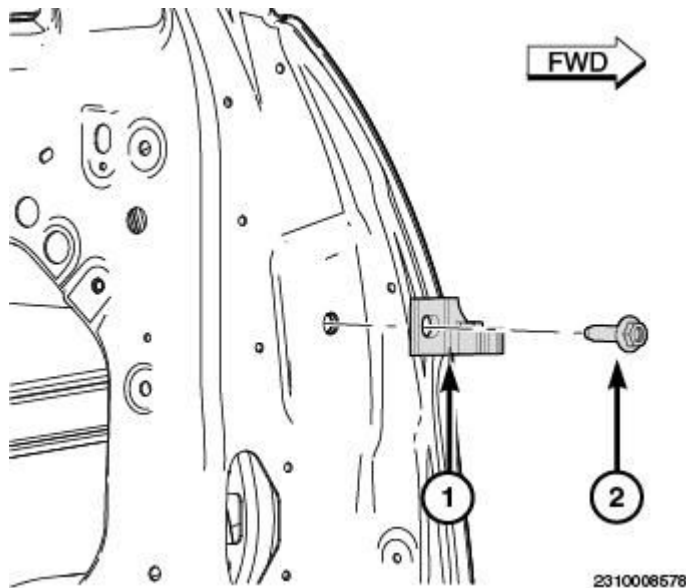


Fig. 128: Two Bolts & Striker

Courtesy of CHRYSLER GROUP, LLC

NOTE: In/out door adjustment is done by loosening the hinge to door fasteners one hinge at a time and moving the door to the correct position.

1. Support the rear door with a suitable lifting device.
2. Loosen the two bolts (2) that secure the striker (1) to the C-pillar.

**Fig. 129: Identifying Door Hinges & Bolts**

Courtesy of CHRYSLER GROUP, LLC

3. Loosen the bolts (2) that secure the door hinges (1) to the rear door.
4. Adjust the rear door to the correct position. Refer to **GAP AND FLUSH, SPECIFICATIONS**.
5. Tighten the bolts (2) that secure the door hinges (1) to the front door to 43 N.m (32 ft. lbs.).

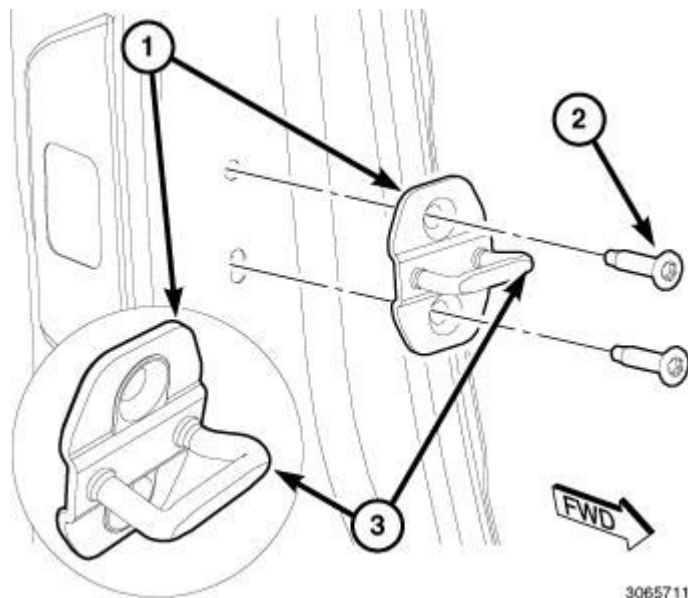


Fig. 130: Two Bolts & Striker
Courtesy of CHRYSLER GROUP, LLC

NOTE: Make sure the protrusion (3) is orientated towards the interior of the vehicle.

6. Tighten the two bolts (2) that secure the striker (1) to the C-pillar to 30 N.m (22 ft. lbs.).

REMOVAL

REMOVAL

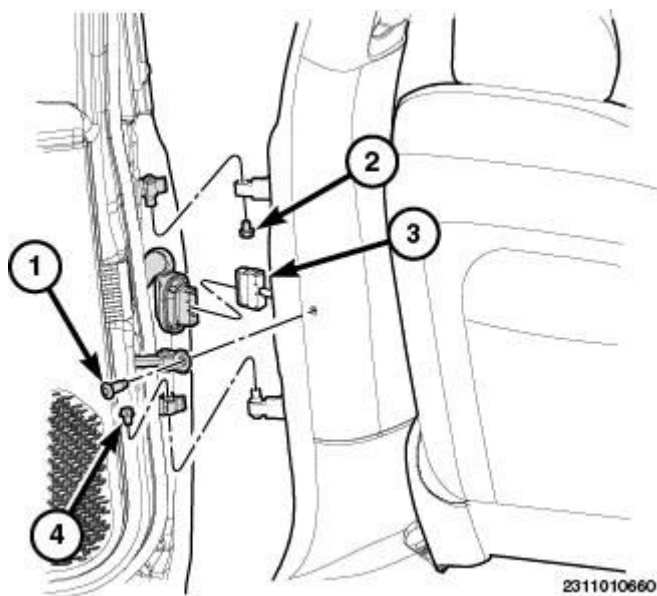


Fig. 131: Identifying Rear Door Wiring Harness Connector & Fasteners
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not reuse the door half hinge to body side half hinge fasteners, replace with new readily available through Mopar parts.

NOTE: Passenger side door shown, drivers side similar.

1. Disconnect and isolate the negative battery cable.
2. Disconnect the rear door wiring harness connector from the body harness (3) located on the B-pillar.
3. With the rear door open, remove the fastener (1) securing the door check strap.
4. On the upper door hinge, remove the fastener (2) that secures the door half hinge to body side half hinge and discard.
5. Repeat on the lower hinge.
6. With the use of a suitable lifting device, remove the door from the vehicle.

INSTALLATION

INSTALLATION

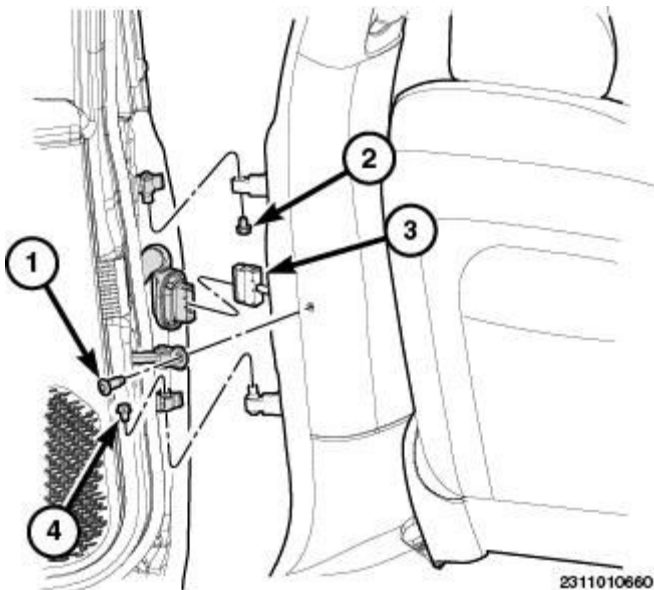


Fig. 132: Identifying Rear Door Wiring Harness Connector & Fasteners
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not reuse the door half hinge to body side half hinge fasteners, replace with new readily available through Mopar parts.

NOTE: Passenger side door shown, drivers side similar.

1. With the use of a suitable lifting device, position the door to the vehicle.
2. Align the door side hinge halves to the B-pillar hinge halves.

3. Insert the door upper half hinge body side upper half hinge and at the same time the lower hinges.
4. Install new fasteners (2, 4) to both the upper and lower hinges and tighten 24 N.m (18 ft. lbs.).
5. With the rear door (2) open, install the fastener (1) securing the door check strap and tighten 30 N.m (22 ft. lbs.).
6. Connect the rear door wiring harness connector (3) to the body harness located on the B-pillar (1).
7. Connect the negative battery cable.
8. Perform the Clear/Relearn procedure. Refer to **STANDARD PROCEDURE** .

GLASS, DOOR

REMOVAL

REMOVAL

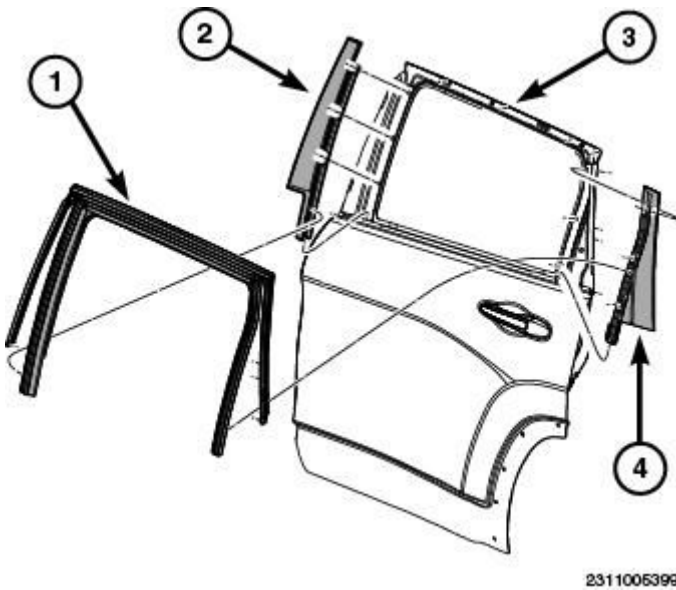
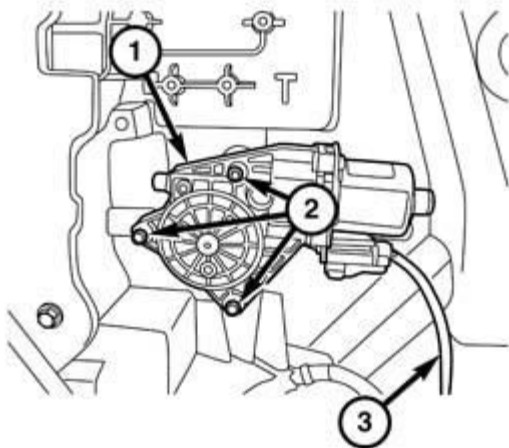


Fig. 133: Identifying Rear Door Trim & C-Pillar Applique
Courtesy of CHRYSLER GROUP, LLC

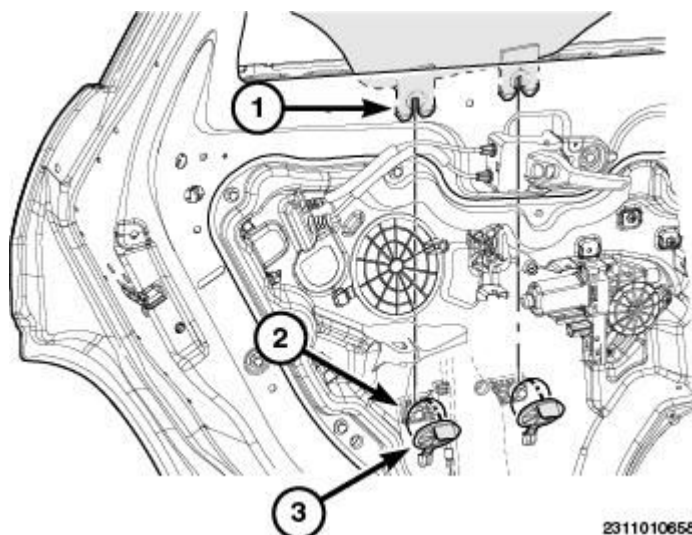
1. Disconnect and isolate the negative battery cable.
2. Remove the trim panel. Refer to **PANEL, REAR DOOR TRIM, REMOVAL**.
3. Remove the C-pillar applique (4). Refer to **APPLIQUE, REMOVAL**.



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Fig. 134: Window Motor, Fasteners & Harness
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the window motor (1) wiring harness (3).
5. Remove the three fasteners (2) from the window motor (1).
6. Remove the window motor (1) from the carrier plate.



2311010658

Fig. 135: Identifying Access Plugs, Carrier Plate & Fasteners
Courtesy of CHRYSLER GROUP, LLC

7. Open the access plugs (3) on the carrier plate.
8. Position the glass by hand until the glass fasteners lines up in the access hole (3).

9. Remove the glass fastener.

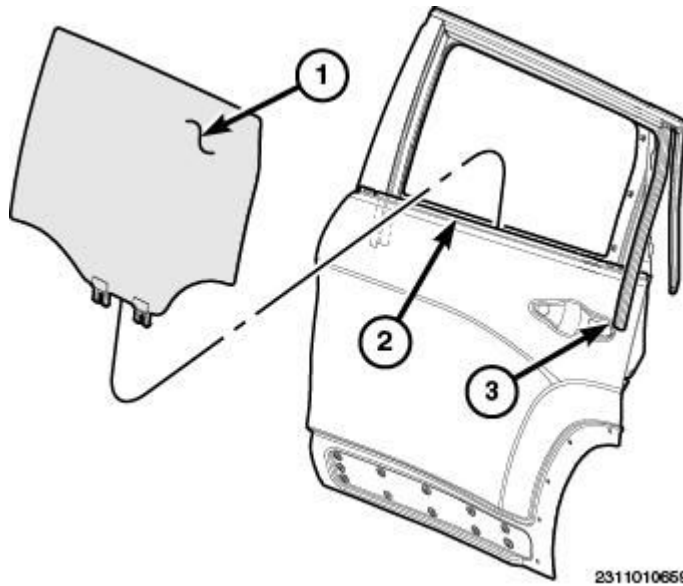


Fig. 136: Removing/Installing Glass From Vehicle
Courtesy of CHRYSLER GROUP, LLC

10. Remove the glass from the vehicle.

INSTALLATION

INSTALLATION

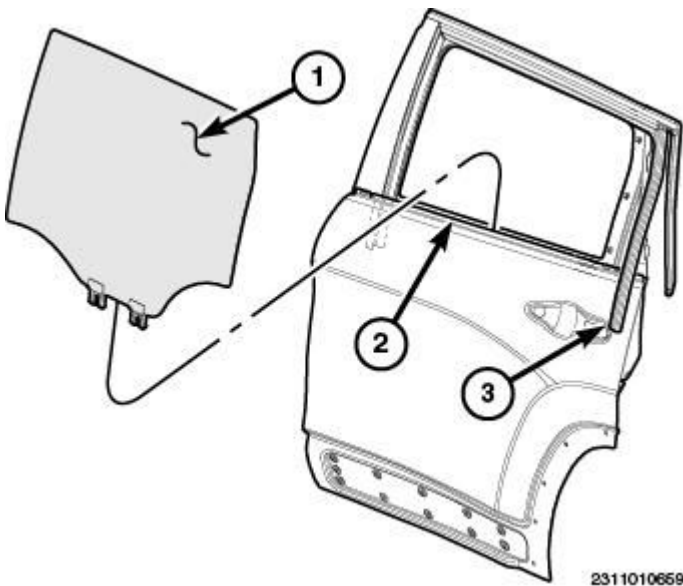


Fig. 137: Removing/Installing Glass From Vehicle
Courtesy of CHRYSLER GROUP, LLC

1. Lower glass (1) down into the opening at top of door (2).

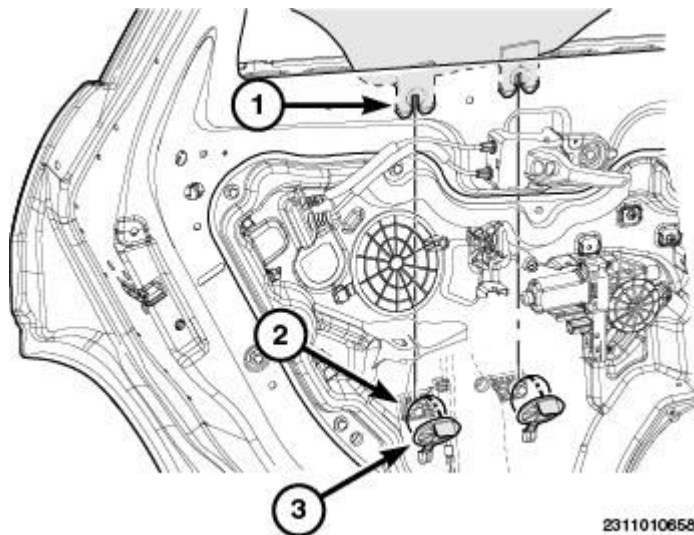


Fig. 138: Identifying Access Plugs, Carrier Plate & Fasteners
Courtesy of CHRYSLER GROUP, LLC

2. Position the glass (1) by hand until the glass fasteners lines up in the access hole (2)
3. Apply a medium grade threadlocker adhesive to the glass fastener threads per manufacture recommendations.
4. Install the glass fastener and tighten to 13 N.m (10 ft. lbs.).
5. Close the access plug on the carrier plate (3).

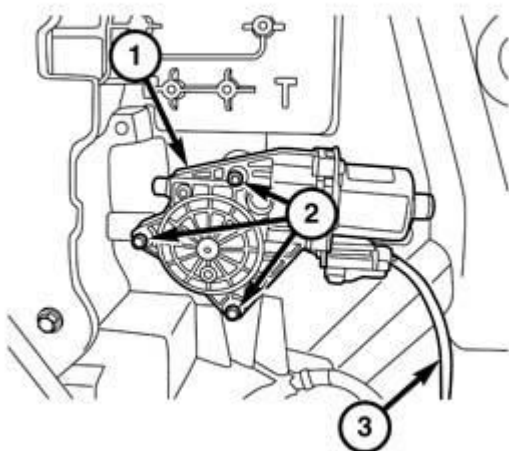
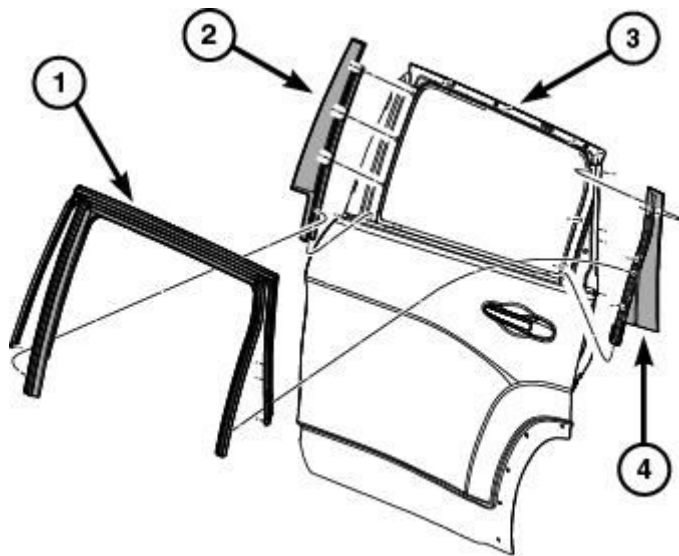


Fig. 139: Window Motor, Fasteners & Harness
Courtesy of CHRYSLER GROUP, LLC

6. Align the window motor (1) onto the carrier plate.
7. Install the three fasteners (2) to the window motor (1) and tighten securely.
8. Connect the window motor (3) wiring harness.



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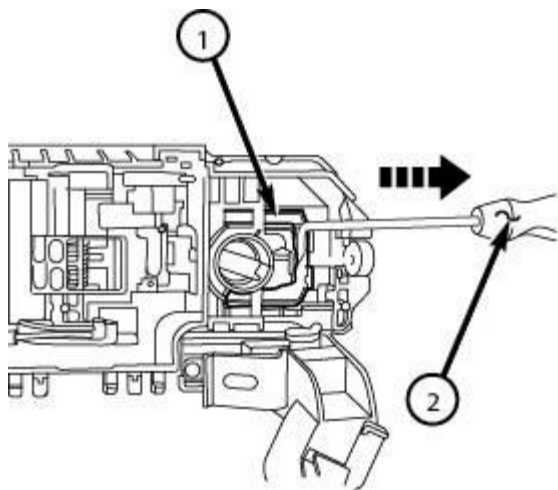
Fig. 140: Identifying Rear Door Trim & C-Pillar Applique
Courtesy of CHRYSLER GROUP, LLC

9. Install the C-pillar applique (4). Refer to **APPLIQUE, INSTALLATION**.
10. Install the trim panel. Refer to **PANEL, REAR DOOR TRIM, INSTALLATION**.
11. Connect the negative battery cable.
12. Perform the Clear/Relearn procedure. Refer to **STANDARD PROCEDURE**.

HANDLE, EXTERIOR

REMOVAL

REMOVAL



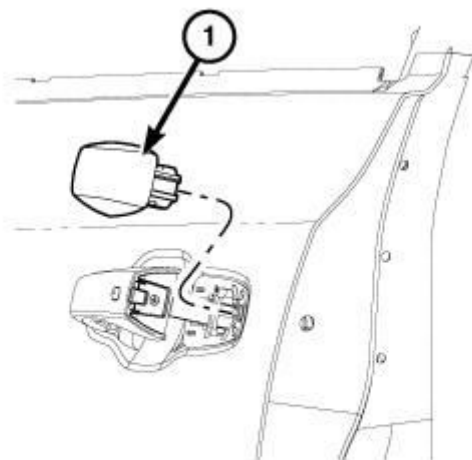
231068508

Fig. 141: Disengaging Slide Plate

Courtesy of CHRYSLER GROUP, LLC

NOTE: Left hand shown, right side typical.

1. With a small flat bladed tool, remove the outside handle access plug from inner door jamb.
2. Using a right angled pick (2) or equivalent, hook the slide plate (1) and pull rearward to disengage.



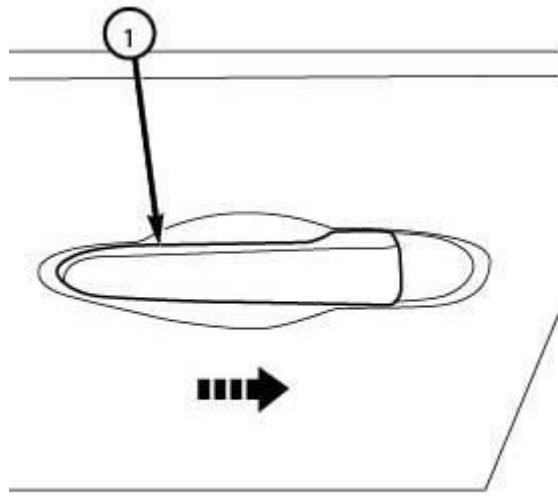
3329280

Fig. 142: Door Handle Cap

Courtesy of CHRYSLER GROUP, LLC

3. Lift the exterior door handle to the open position.

4. Continue holding the exterior handle in the open position and remove the door handle cap (1).



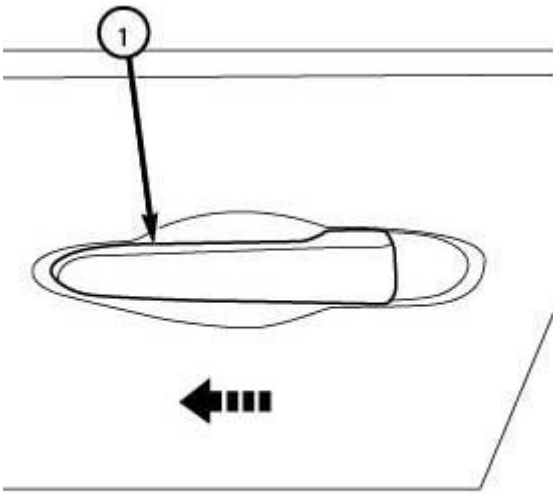
231068510

Fig. 143: Removing Exterior Door Handle
Courtesy of CHRYSLER GROUP, LLC

5. Slide the exterior door handle (1) rearward and rotate out of the door.
6. Remove the handle from the vehicle.

INSTALLATION

INSTALLATION

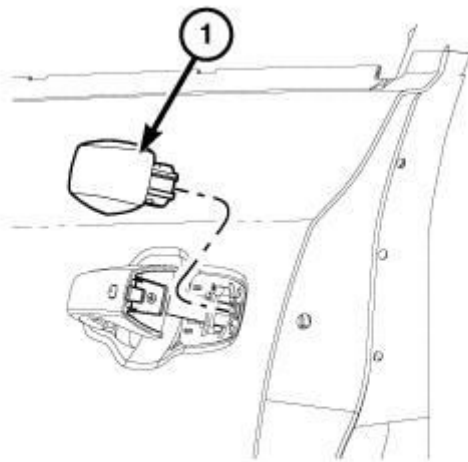


231068511

Fig. 144: Installing Exterior Door Handle
Courtesy of CHRYSLER GROUP, LLC

NOTE: Left hand shown, right side typical.

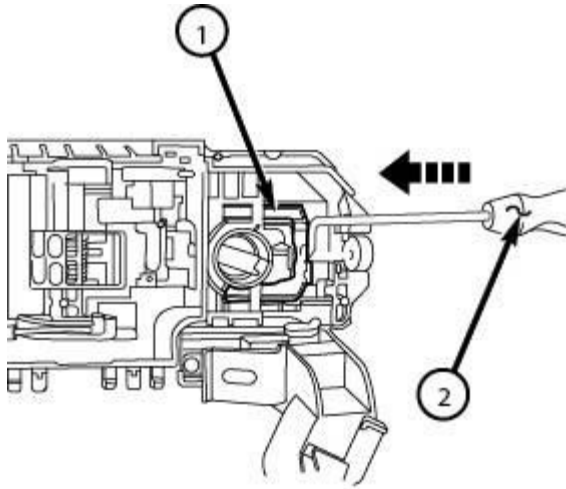
1. Rotate the front of the exterior handle (1) into the door until it is flush with the door.
2. Slide the exterior door handle (1) forward until seated fully.



3329280

Fig. 145: Door Handle Cap
Courtesy of CHRYSLER GROUP, LLC

3. Lift the exterior door handle to the open position.
4. While holding the exterior handle in the open position, insert the door handle cap (1).



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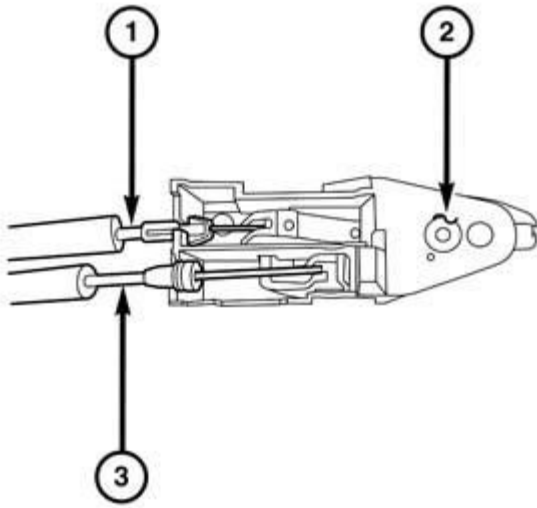
Fig. 146: Engaging Slide Plate
Courtesy of CHRYSLER GROUP, LLC

5. Using a right angled pick (2) or equivalent, push the slide plate (1) forward to engage.
6. Insert the outside handle access plug from inner door jamb.

HANDLE, INTERIOR

REMOVAL

REMOVAL



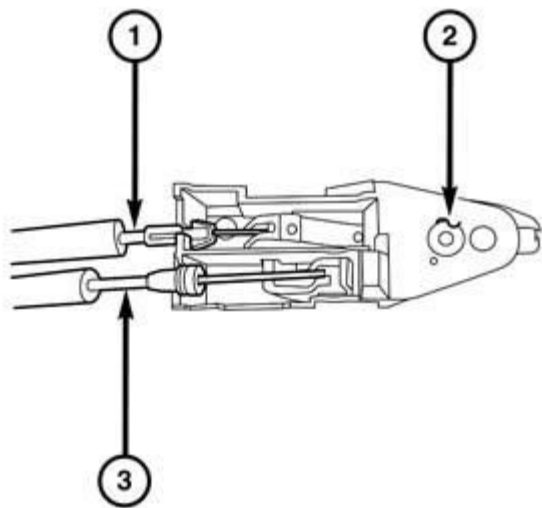
231068496

Fig. 147: Inside Release Handle & Cables
Courtesy of CHRYSLER GROUP, LLC

1. Remove rear door trim panel. Refer to **PANEL, REAR DOOR TRIM, REMOVAL**.
2. With the use of a flat bladed tool or equivalent, remove the lock cable from the inside release handle housing (2).
3. Place the lock button in the unlocked position and remove the lock cable (3) barrel end.
4. With the use of pliers or equivalent, depress the tabs on the handle cable (3) and remove from the inside release handle housing (2).
5. Place the pull handle in the open position and remove the handle cable (3) barrel end.
6. Remove the inside handle from the vehicle.

INSTALLATION

INSTALLATION



231068496

Fig. 148: Inside Release Handle & Cables
 Courtesy of CHRYSLER GROUP, LLC

1. Place the pull handle in the open position and install the handle cable (3) barrel end.
2. Insert the handle cable (3) into the inside release handle housing (2) and seat tabs fully.
3. Place the lock button in the unlocked position and install the lock cable (3) barrel end.
4. Insert the lock cable (3) into the inside release handle housing (2).
5. Install the rear door trim panel. Refer to **PANEL, REAR DOOR TRIM, INSTALLATION**.

HINGE, DOOR

REMOVAL

REMOVAL

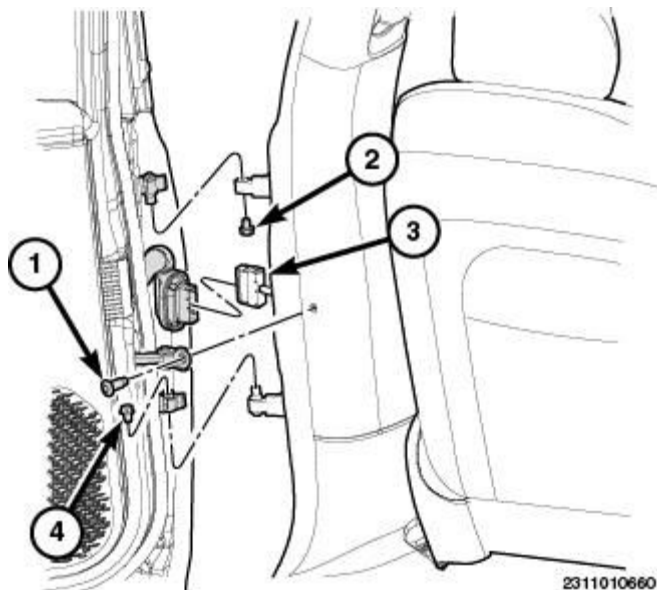


Fig. 149: Identifying Rear Door Wiring Harness Connector & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not reuse the door half hinge to body side half hinge fasteners (2, 4), replace with new readily available through Mopar parts.

NOTE: Left upper shown, all other hinges on this model typical

Remove the door-

1. Remove the door. Refer to **DOOR, REAR, REMOVAL**.
2. Transfer the door to a bench.

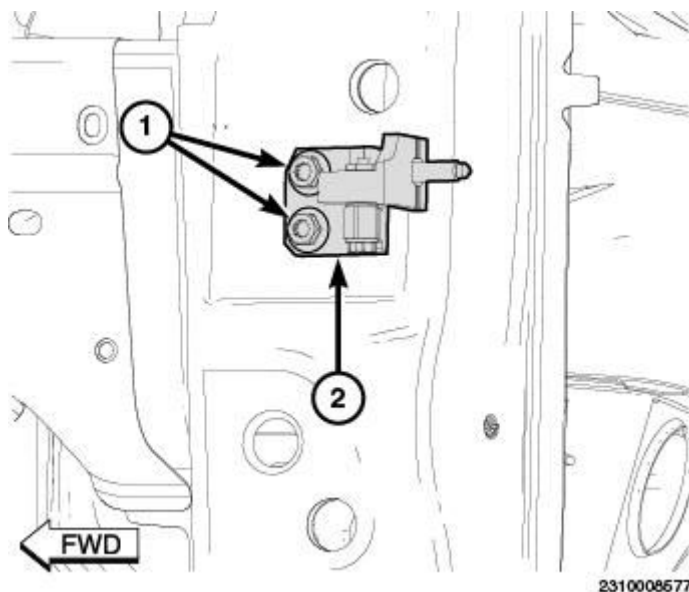
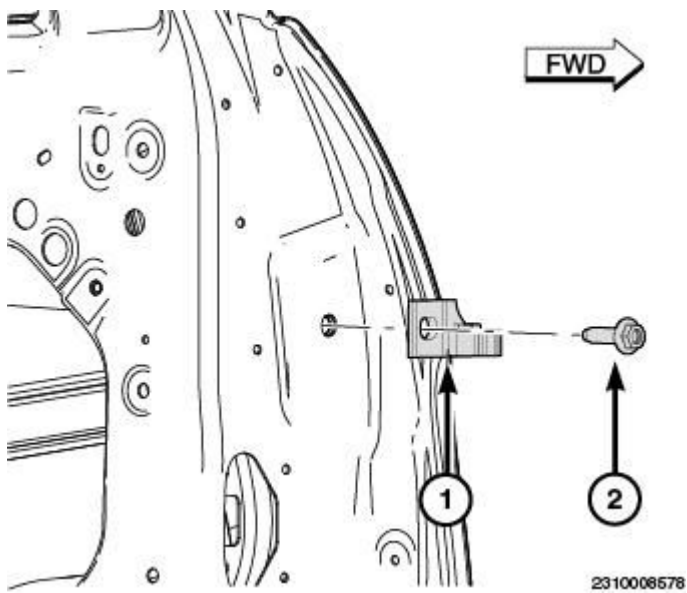


Fig. 150: Identifying Front Door Hinges & Bolts

Courtesy of CHRYSLER GROUP, LLC

Body side hinge half-**NOTE: Upper and lower hinge halves are serviced exactly the same**

1. Mark position of the body side half hinge (2) with a grease pencil or other suitable device to ease installation.
2. Remove the bolts (1) attaching the body side half hinge (2) to the body side.
3. Remove the body side half hinge (2) from the vehicle.

**Fig. 151: Identifying Door Hinges & Bolts**

Courtesy of CHRYSLER GROUP, LLC

Door side hinge half-**NOTE: Upper and lower hinge halves are serviced exactly the same**

1. Mark position of the door side half hinge (1) with a grease pencil or other suitable device to ease installation.
2. Remove the bolt attaching the door side half hinge (1) to the body side.
3. Remove the door side half hinge (1) from the vehicle.

INSTALLATION**INSTALLATION**

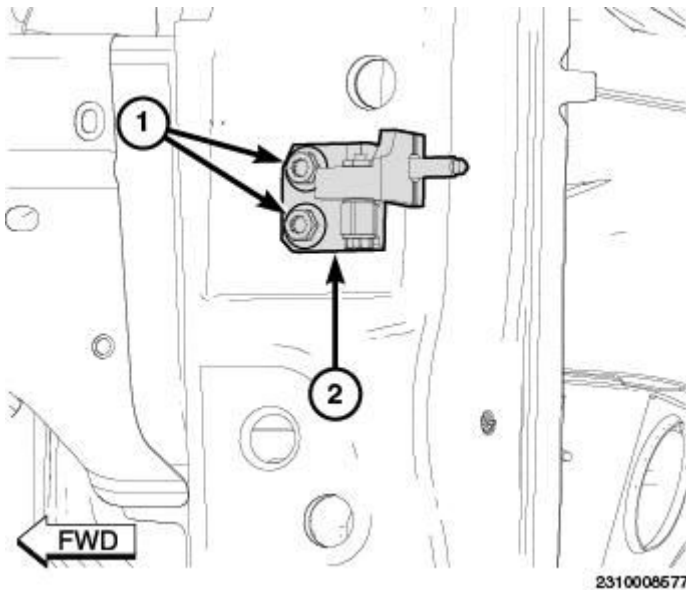


Fig. 152: Identifying Front Door Hinges & Bolts

Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not reuse the door half hinge to body side half hinge fasteners, replace with new readily available through Mopar parts. If necessary, paint new door hinge prior to installation.

NOTE: If necessary, paint new door hinge prior to installation.

NOTE: Left upper shown, all other hinges on this model typical

Body side hinge half-

NOTE: A suitable body sealant should be used when moving or replacing hinges.

NOTE: Upper and lower hinge halves are serviced exactly the same

1. Align the upper hinge and/or the lower hinge to the upper B-pillar and/or the lower B-pillar to the marks previously made.
2. Install bolts (2) attaching the hinge (1) to the upper B-pillar and/or lower B-pillar frame and tighten to 43 N.m (32 ft. lbs.).

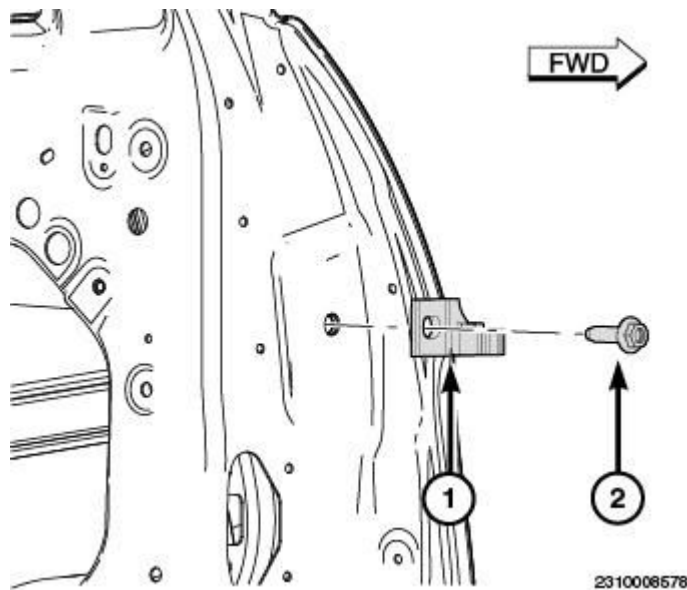


Fig. 153: Identifying Door Hinges & Bolts
Courtesy of CHRYSLER GROUP, LLC

Door side hinge half-

NOTE: A suitable body sealant should be used when moving or replacing hinges.

NOTE: Upper and lower hinge halves are serviced exactly the same

1. Align the upper hinge and/or the lower hinge to the upper door and lower door to the marks previously made.
2. Install bolt (2) attaching the hinge to the door and tighten to 43 N.m (32 ft. lbs.).

Install the door -

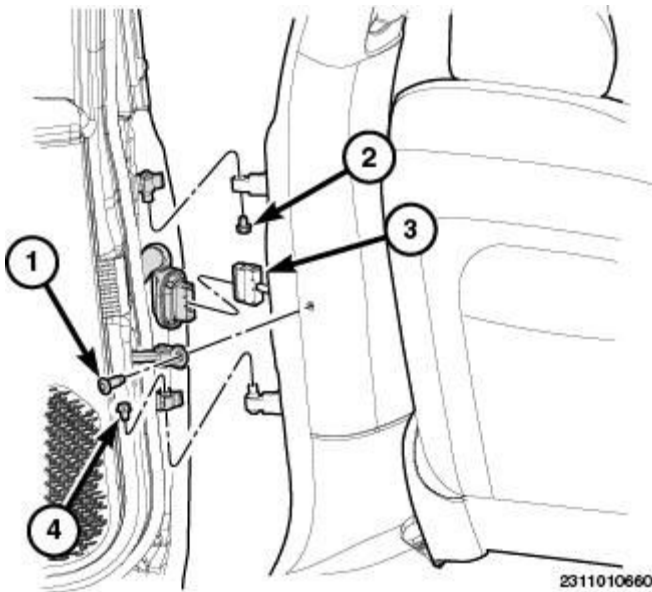


Fig. 154: Identifying Rear Door Wiring Harness Connector & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Install the door. Refer to **DOOR, REAR, INSTALLATION**.

LATCH, DOOR

REMOVAL

REMOVAL

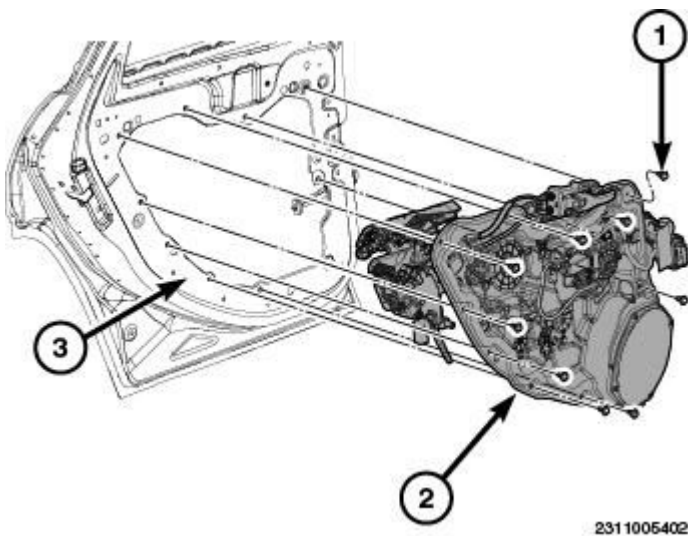


Fig. 155: Identifying Rear Door Carrier Plate & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.

2. Remove the rear door carrier plate (2). Refer to **PLATE, CARRIER, REMOVAL**.

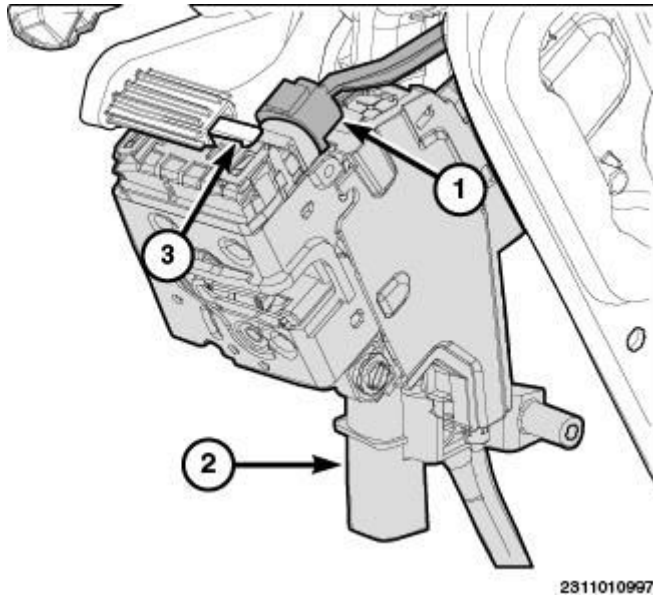


Fig. 156: Identifying Latch, Pry Tab & Electrical Connector
 Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the electrical connector (1).
4. With the use of a small flat bladed tool or equivalent, gently pry tab (3) and slide the latch (2) off of the presenter bracket.

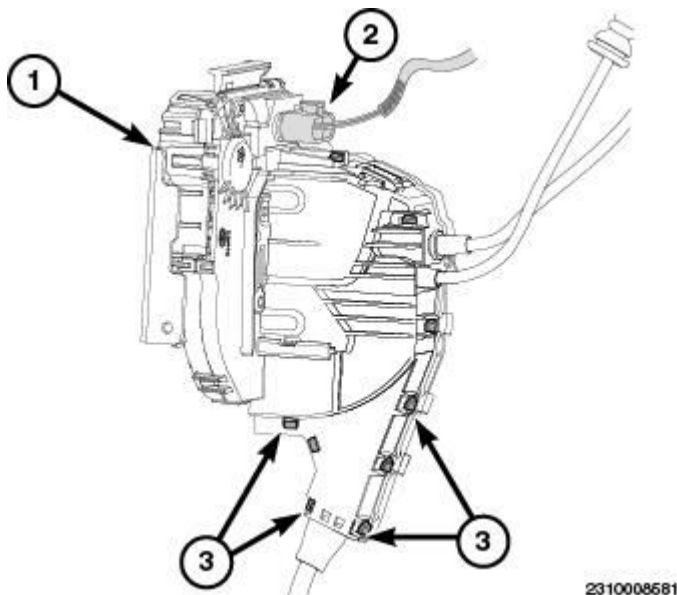


Fig. 157: Identifying Lock Cables, Latch Assembly, Electrical Connector & Cover Tabs
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Front door latch shown, rear door latch similar.

5. Disconnect the electrical connector (2).
6. Release the latch cover tabs (3) and remove the latch cover.

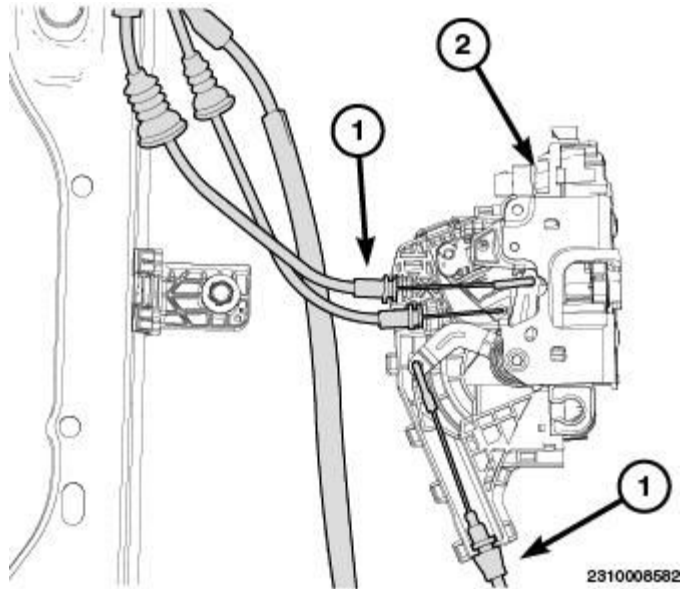


Fig. 158: Identifying Handle/Lock Cables & Latch Assembly
Courtesy of CHRYSLER GROUP, LLC

NOTE: Front door latch shown, rear door latch similar.

7. Disconnect handle and lock cables (1) and remove the latch assembly (2).

INSTALLATION

INSTALLATION

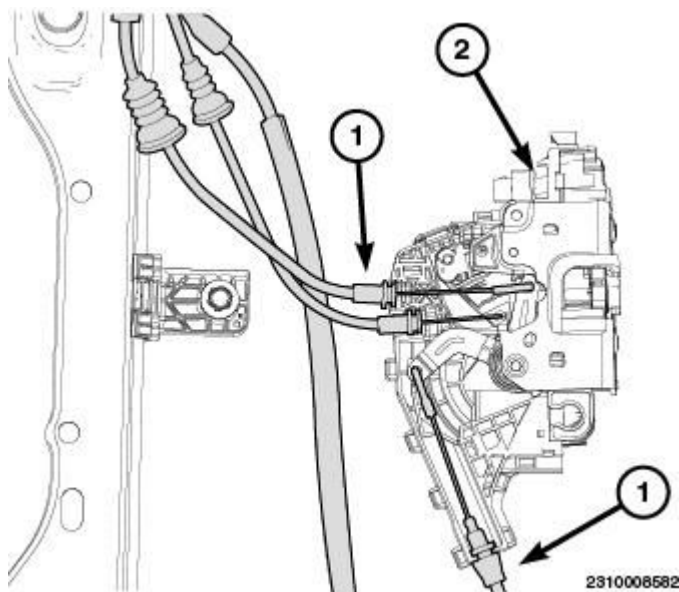


Fig. 159: Identifying Handle/Lock Cables & Latch Assembly
Courtesy of CHRYSLER GROUP, LLC

NOTE: Front door latch shown, rear door latch similar.

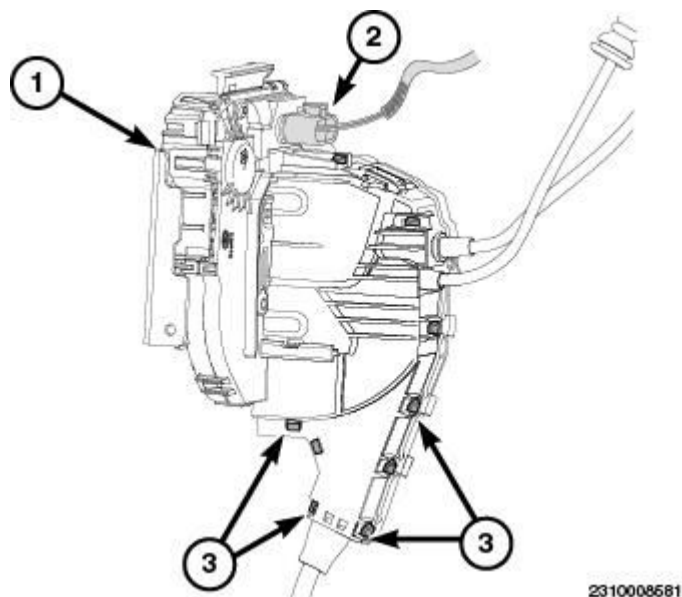
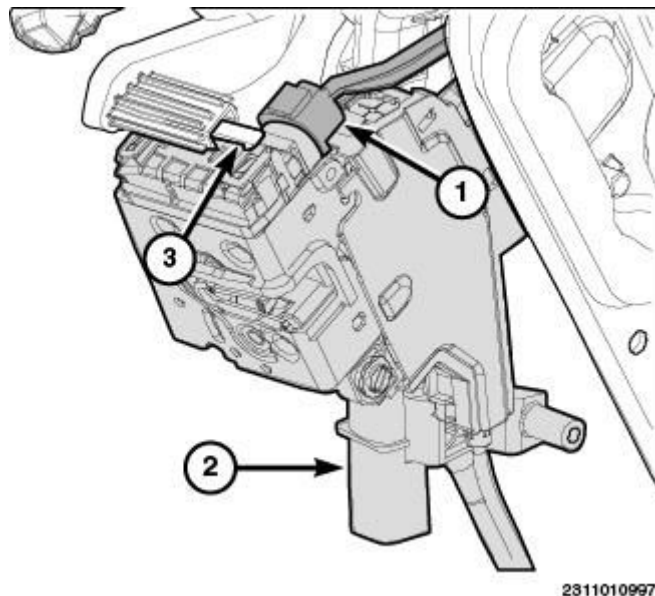


Fig. 160: Identifying Lock Cables, Latch Assembly, Electrical Connector & Cover Tabs
Courtesy of CHRYSLER GROUP, LLC

1. Connect the handle and lock cables (1).

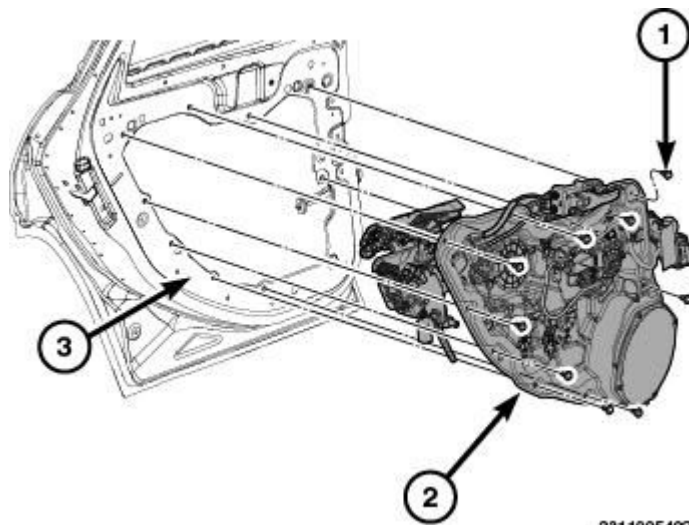
NOTE: Front door latch shown, rear door latch similar.



2311010997

Fig. 161: Identifying Latch, Pry Tab & Electrical Connector
Courtesy of CHRYSLER GROUP, LLC

2. Install the cover and seat the latch cover retaining tabs (3) fully.
3. Install the latch (2) onto the presenter bracket and seat the clip (3) fully.
4. Connect the electrical connector (1).



2311005402

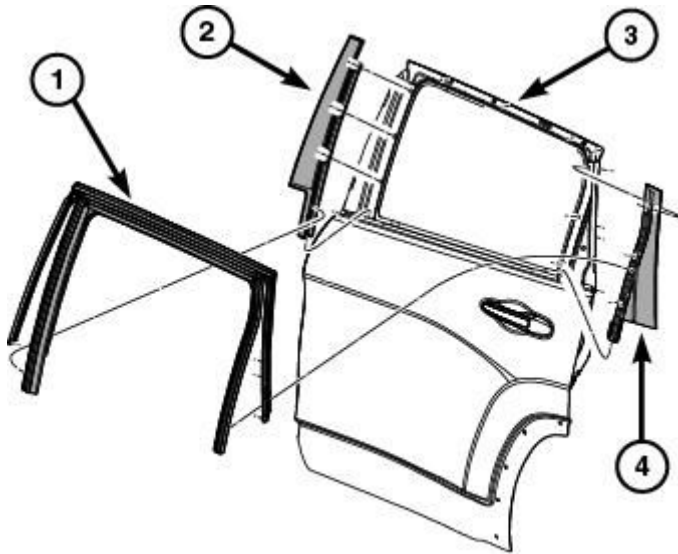
Fig. 162: Identifying Rear Door Carrier Plate & Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. Install the rear door carrier plate (2). Refer to **PLATE, CARRIER, INSTALLATION**.
6. Connect the negative battery cable.
7. Perform the Clear/Relearn procedure. Refer to **STANDARD PROCEDURE**.

MOLDING, REAR DOOR

REMOVAL

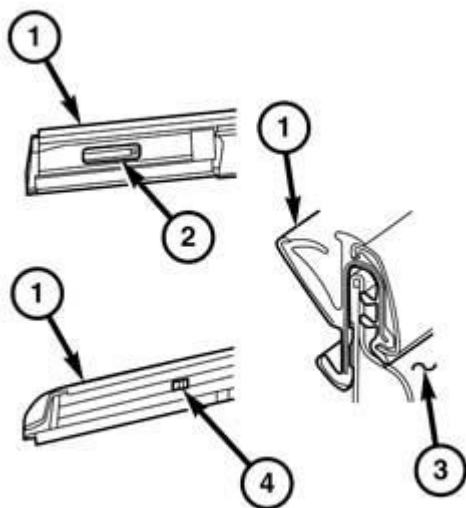
REMOVAL



2311005399

Fig. 163: Identifying Rear Door Trim & C-Pillar Applique
 Courtesy of CHRYSLER GROUP, LLC

1. Remove the B-pillar (2) and C-pillar rear door appliques (4). Refer to **APPLIQUE, REMOVAL**.



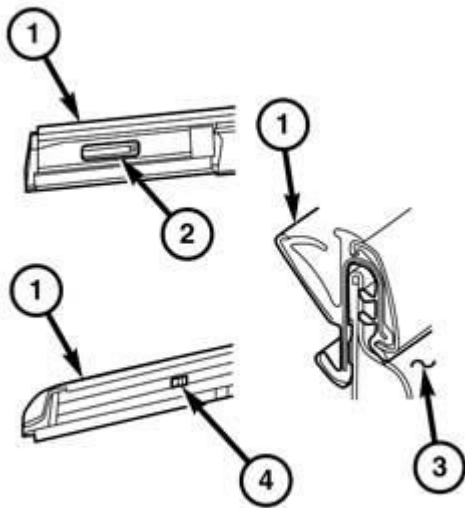
231168795

Fig. 164: Belt Molding, Notch & Door Edge
Courtesy of CHRYSLER GROUP, LLC

2. Locate the notch (2) on the belt molding (1) inner edge on the B-pillar end.
3. Insert a small flat bladed tool or equivalent, into the notch (2) of the inner side of the belt molding (1).
4. Pry inboard to clear the tab on the door sheet metal.
5. Continue to hold the notch (2) inboard and lift the belt molding (1), it will be tight as it is raised over the door edge (3).
6. Using trim stick (special tool #C-4755, Trim Stick) or equivalent, gently pry up on outer belt molding, lifting the belt molding (1) upward approximately 25 mm (1 in.).
7. Locate the notch (1) on the belt molding inner edge of the C-pillar end.
8. Insert a small flat bladed tool or equivalent, into the notch (2) of the inner side of the belt molding (1).
9. Pry inboard to clear the tab on the door sheet metal.
10. Using a trim stick or equivalent, gently pry up on outer belt molding.
11. Remove the belt molding from the door.

INSTALLATION

INSTALLATION

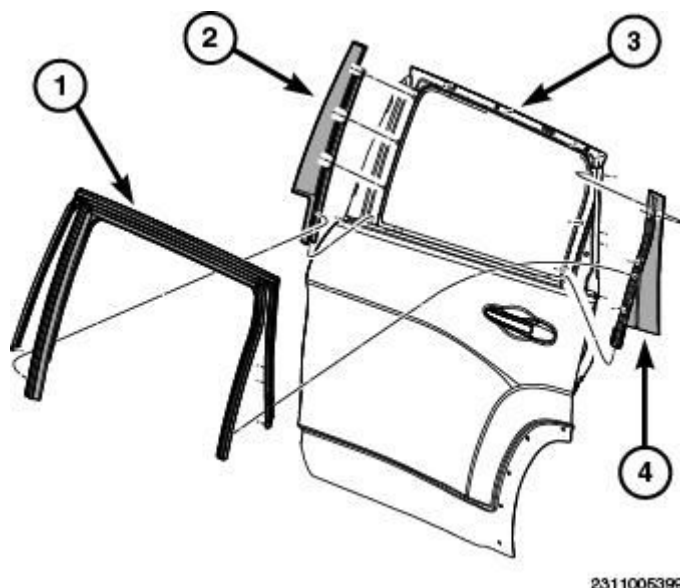


231168795

Fig. 165: Belt Molding, Notch & Door Edge
Courtesy of CHRYSLER GROUP, LLC

1. Align the tab (4) on the inner edge of belt molding (1) to the indentations on the door sheet metal edge.
2. With firm hand pressure push down until belt molding (1) has seated fully onto the door (3) and the

notches on the ends (2).



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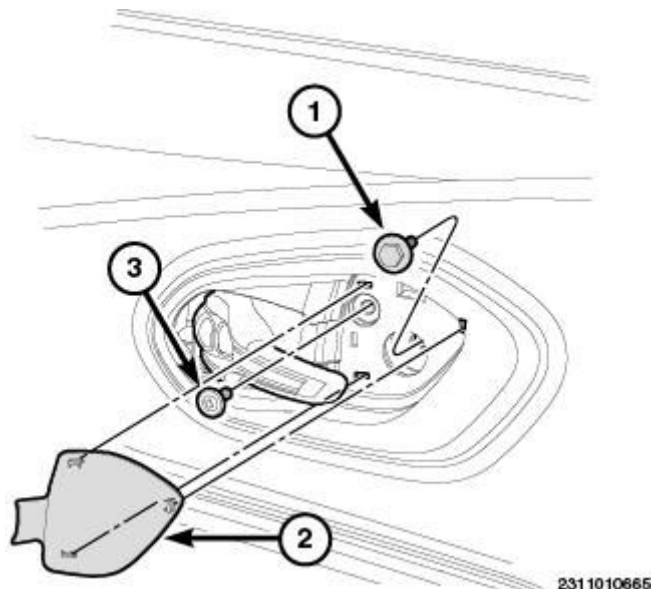
Fig. 166: Identifying Rear Door Trim & C-Pillar Applique
Courtesy of CHRYSLER GROUP, LLC

3. Install the rear door B-pillar (2) and C-pillar appliques (4). Refer to **APPLIQUE, INSTALLATION**.

PANEL, REAR DOOR TRIM

REMOVAL

REMOVAL



2311010665

Fig. 167: Identifying Bezel & Fasteners

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Pull out on the interior door handle (1) and using a (special tool #C-4755, Trim Stick) or equivalent, remove the bezel (2) located in the cavity.
3. Remove the fastener (1) and fastener (3) securing the door trim panel to the carrier plate.

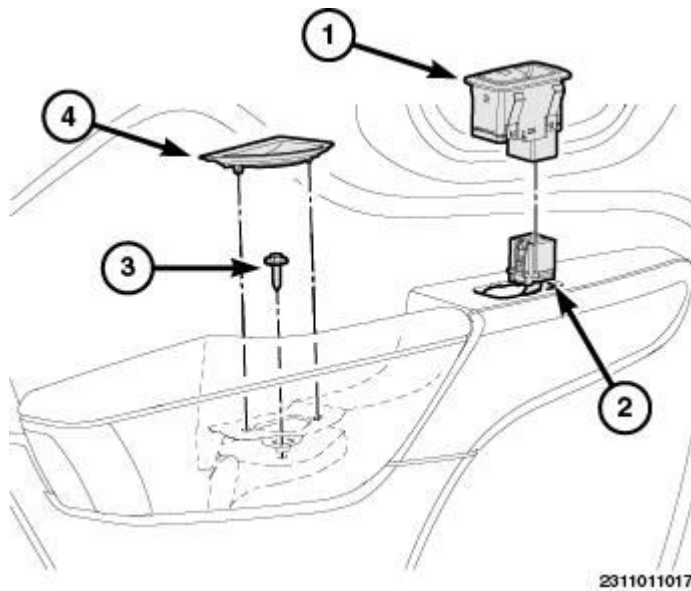


Fig. 168: Identifying Window Switch, Electrical Connector, Liner & Fastener
Courtesy of CHRYSLER GROUP, LLC

4. Using a trim stick or equivalent, remove the window switch (1) from the door and disconnect the electrical connector (2).
5. Using a trim stick or equivalent, remove the liner (4) from the door trim pull handle.
6. Remove the fastener (3) securing the door trim panel to the carrier plate.

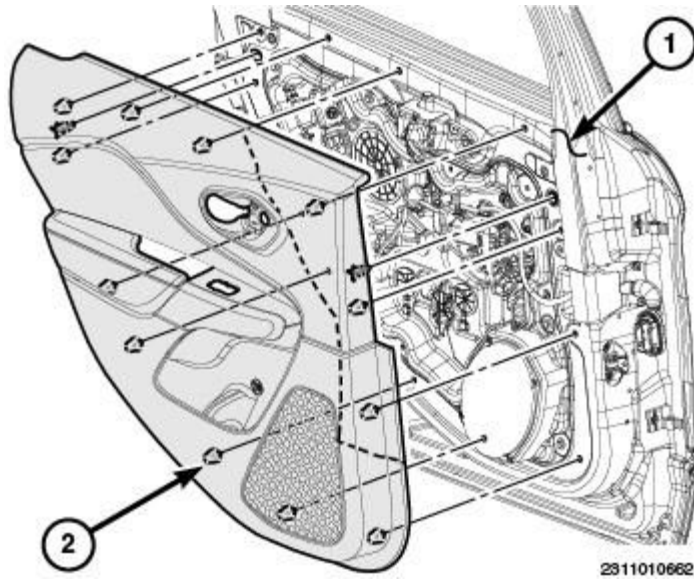


Fig. 169: Identifying Door Trim Panel & Retaining Clips
Courtesy of CHRYSLER GROUP, LLC

7. Using a trim stick or equivalent, pry the door trim panel away from the door (1), starting on the bottom edge and working around the perimeter, to release the retaining clips (2).

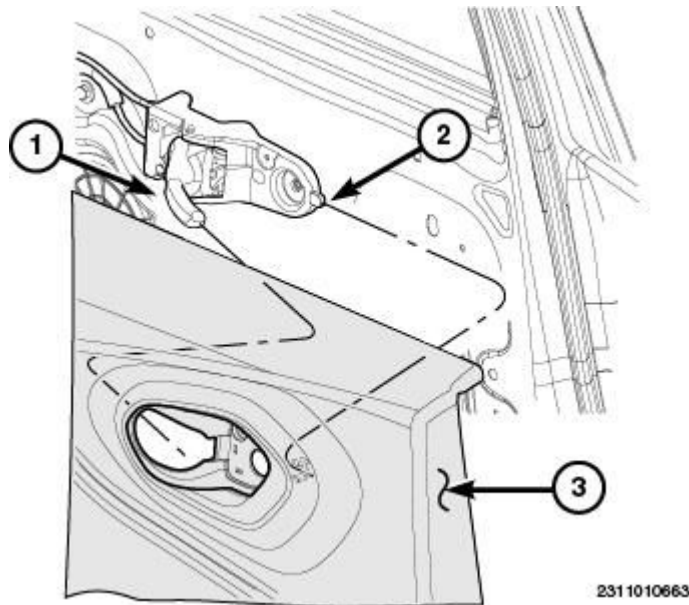


Fig. 170: Identifying Interior Handle, Notch & Trim Panel
Courtesy of CHRYSLER GROUP, LLC

8. Lift the door trim panel (1) up and out.

Position the door trim panel slightly away, do not remove.

9. Pull the interior handle (2) out fully from the notch (3) to detach from the trim panel (1).

10. Remove the door trim panel from the vehicle.

INSTALLATION

INSTALLATION

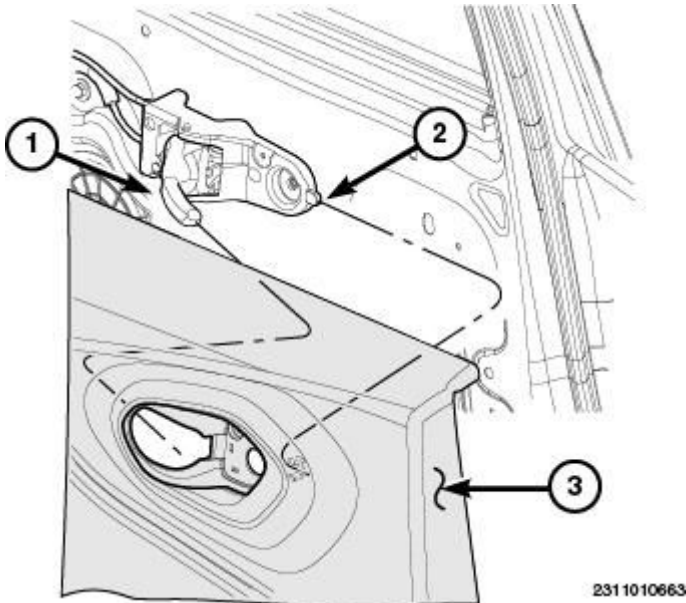


Fig. 171: Identifying Interior Handle, Notch & Trim Panel
 Courtesy of CHRYSLER GROUP, LLC

1. Position the door trim panel (3) near the door.
2. Feed the interior door handle (1) into the notch on the back of the door trim panel (3) and clip into place (2).

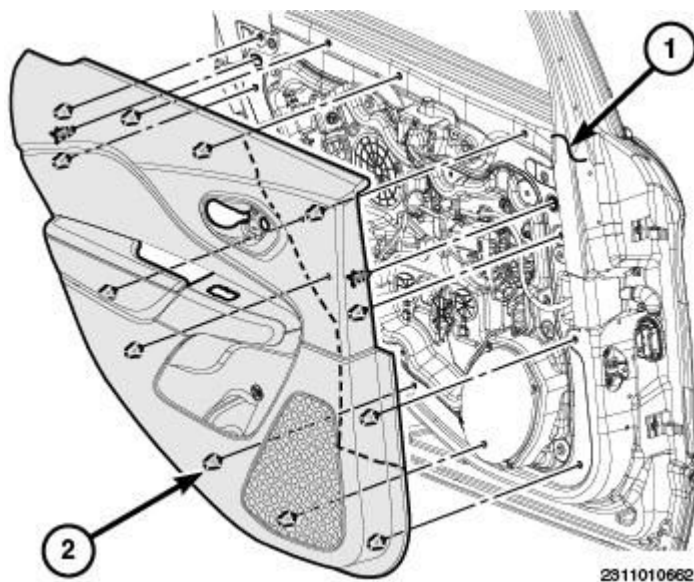


Fig. 172: Identifying Door Trim Panel & Retaining Clips
Courtesy of CHRYSLER GROUP, LLC

3. Feed the window switch harness through the cavity in the door trim panel.
4. Align the door trim panel retaining clips (2) to the door (1).
5. Once aligned, engage the upper trim edge with the inner belt molding.
6. Hand tap the door trim panel to seat the retaining clips fully.

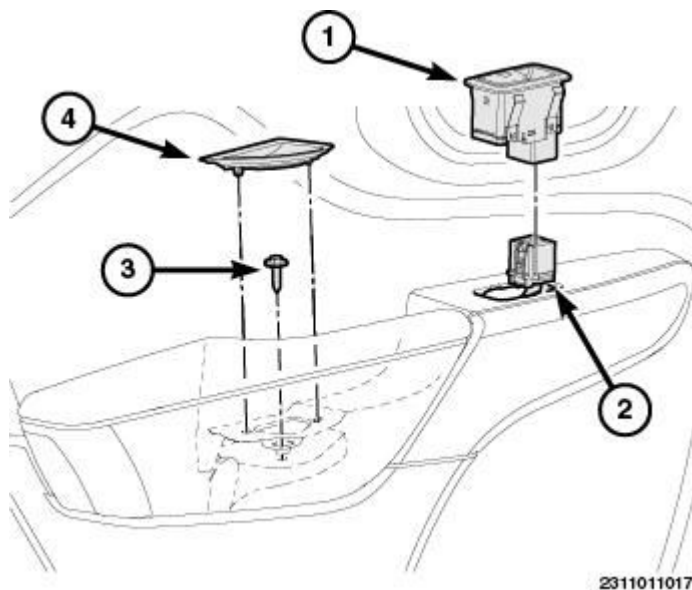


Fig. 173: Identifying Window Switch, Electrical Connector, Liner & Fastener
Courtesy of CHRYSLER GROUP, LLC

7. Install the fastener (3) securing the door trim panel to the carrier plate. Tighten the fastener securely.
8. Install the liner (4) into the door trim pull handle pocket.
9. Connect the window switch wiring connector (2) and install the switch (1) into the door trim panel.

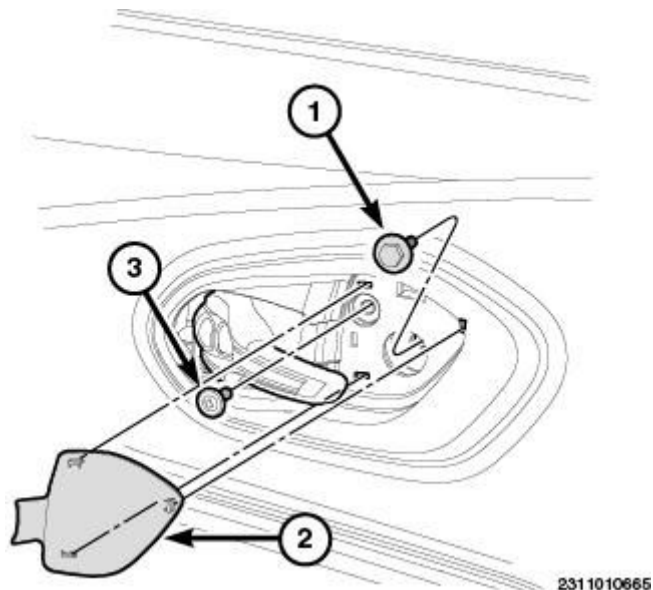


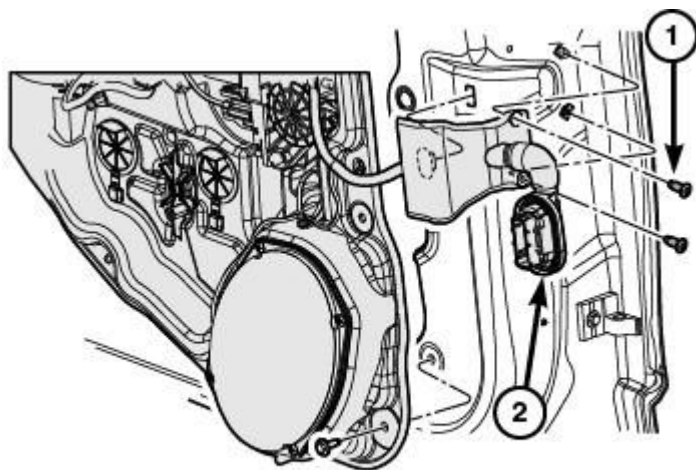
Fig. 174: Identifying Bezel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

10. Install fastener (1) and fastener (3) securing the door trim panel to the carrier plate.
11. Tighten fasteners securely.
12. Install the interior door handle (2) bezel.
13. Connect the negative battery cable.

PLATE, CARRIER

REMOVAL

REMOVAL

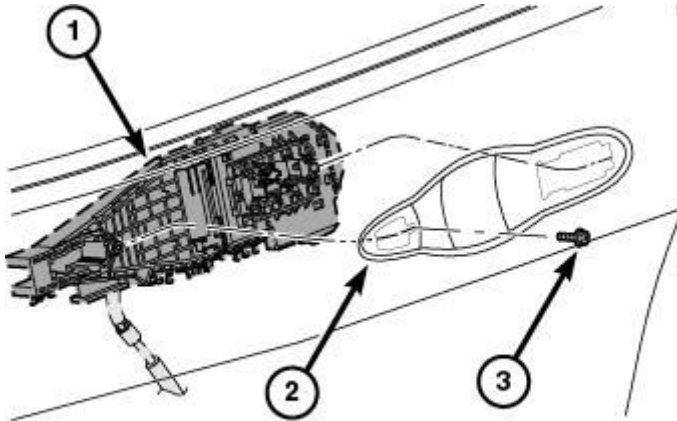


2311005400

Fig. 175: Identifying Wire Harness & Fasteners

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove the door trim panel. Refer to **PANEL, REAR DOOR TRIM, REMOVAL**.
3. Remove the fasteners (1) and separate the wire harness (2) from the carrier plate.
4. Disconnect the door glass from the window regulator and secure in the full up position using tape or other suitable tool. Refer to **GLASS, DOOR, REMOVAL**.



2310004379

Fig. 176: Identifying Exterior Door Handle & Fastener
Courtesy of CHRYSLER GROUP, LLC

NOTE: Front door shown, rear door similar.

5. Remove the exterior door handle. Refer to **HANDLE, EXTERIOR, REMOVAL**.
6. Remove the fastener (3) located beneath the exterior door handle.

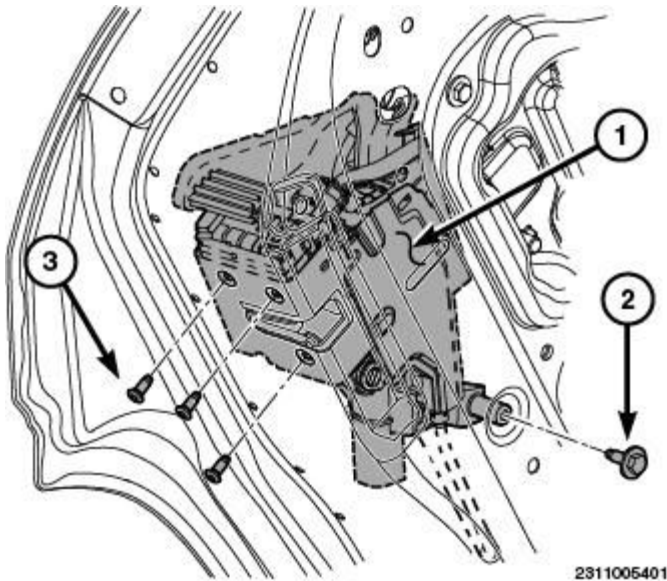


Fig. 177: Identifying Latch & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

7. Remove the latch fasteners (3), located on the inner face of the door and the fastener (2) located on the inner door surface.

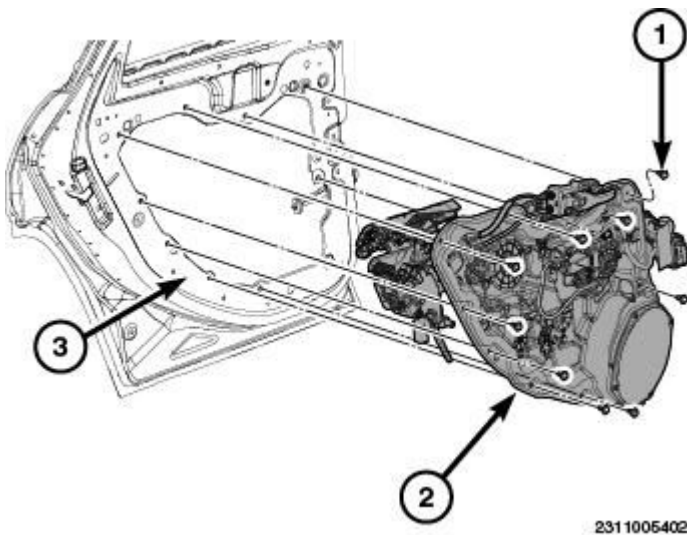


Fig. 178: Identifying Rear Door Carrier Plate & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

8. Separate the wire harness from the carrier plate as necessary to gain enough slack in the harness to remove the carrier plate from the door.
9. Remove the carrier plate fasteners (1).
10. Remove the carrier plate from the door (1).
11. Disconnect the latch wiring connector (3).
12. Disconnect and release the remaining harness connectors.

13. Remove the carrier (1) plate from the vehicle.

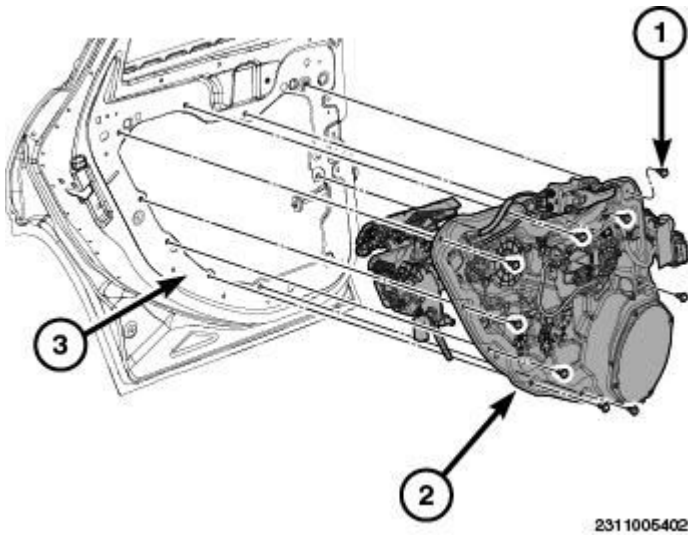
INSTALLATION**INSTALLATION**

Fig. 179: Identifying Rear Door Carrier Plate & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Move the carrier plate into the door opening until position allows for routing of the rear door wiring harness.
2. Route and fasten the wiring harness guides into the carrier plate (1) and the latch presenter.
3. Insert latch inside and the outer handle bracket into the inner sheet metal.
4. Move carrier plate into opening until position of module aligns with surrounding sheet metal.
5. Install the carrier plate fasteners (1) tighten to and 8 N.m (71 in. lbs.).

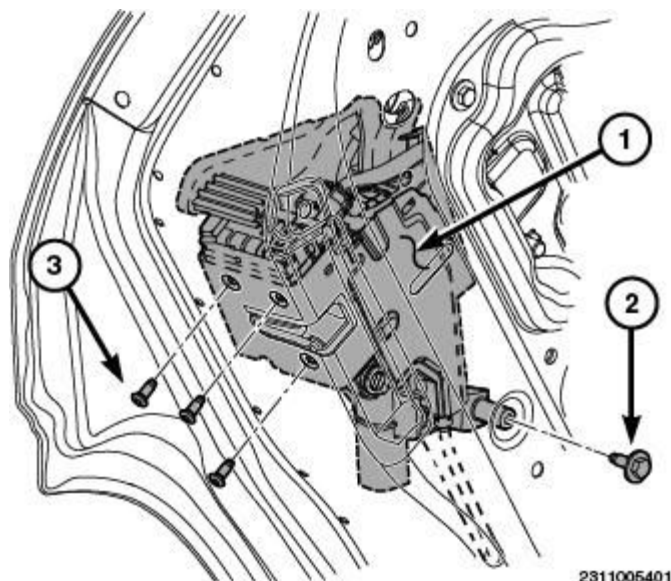


Fig. 180: Identifying Latch & Fasteners
Courtesy of CHRYSLER GROUP, LLC

6. Install the latch fasteners (3), located on the inner face of the door and the fastener (2) located on the inner door surface.
7. Tighten the fasteners (2) to 8 N.m (71 in. lbs.).

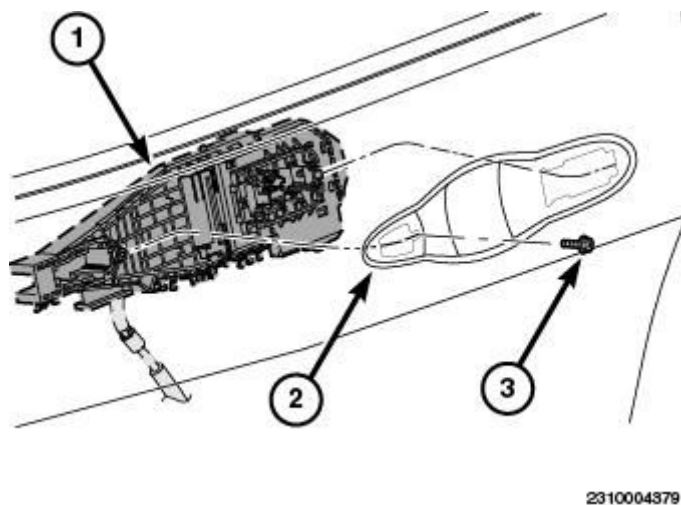


Fig. 181: Identifying Exterior Door Handle & Fastener
Courtesy of CHRYSLER GROUP, LLC

8. Install the outside handle bracket fastener (3) and tighten securely.
9. Install the exterior handle. Refer to **HANDLE, EXTERIOR, INSTALLATION**.

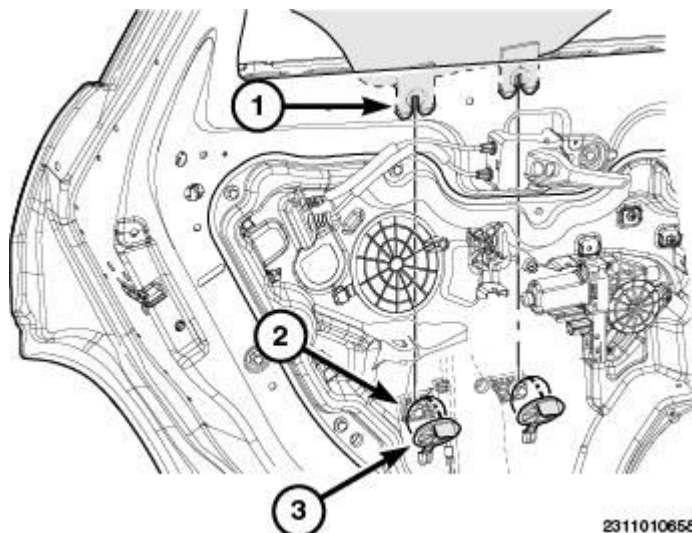


Fig. 182: Identifying Access Plugs, Carrier Plate & Fasteners
Courtesy of CHRYSLER GROUP, LLC

10. Release glass and lower into position onto regulator.
11. Apply a medium grade threadlocker adhesive to the glass fastener threads per manufacture recommendations.
12. Install the glass to regulator fastener (2) and tighten to 13 N.m (10 ft. lbs.).
13. Close the access plug on the carrier plate (3).

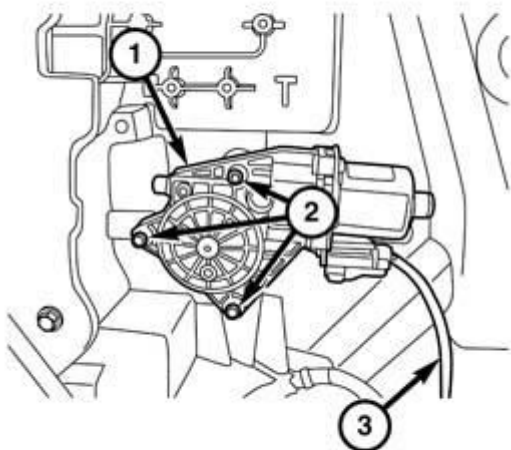
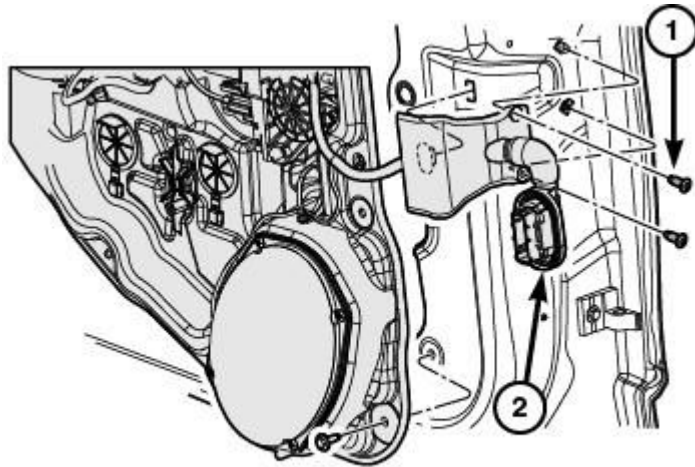


Fig. 183: Window Motor, Fasteners & Harness
Courtesy of CHRYSLER GROUP, LLC

14. Align the window motor (1) onto the carrier plate.
15. Install the three fasteners (2) to the window motor (1) and tighten securely.
16. Connect the window motor (3) wiring connector.



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Fig. 184: Identifying Wire Harness & Fasteners
Courtesy of CHRYSLER GROUP, LLC

17. Position the harness (2) back into place and install the screws (1).
18. Install trim panel. Refer to **PANEL, REAR DOOR TRIM, INSTALLATION**.
19. Connect the battery.
20. Perform the Clear/Relearn procedure. Refer to **STANDARD PROCEDURE** .

REGULATOR, WINDOW

REMOVAL

REMOVAL

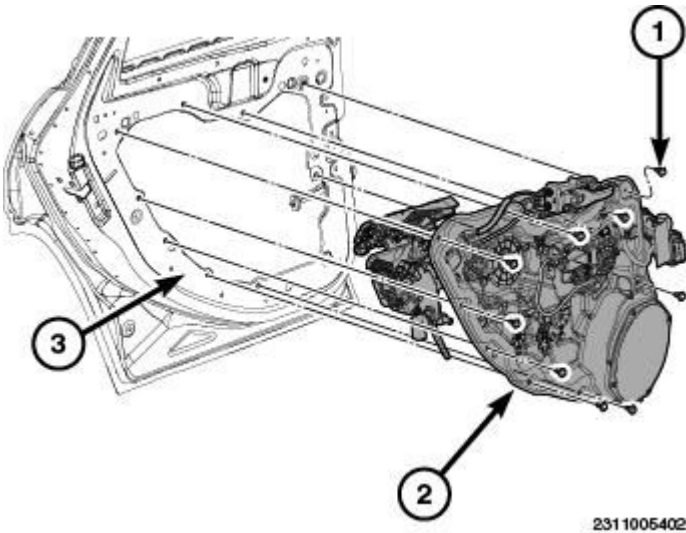


Fig. 185: Identifying Rear Door Carrier Plate & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Remove carrier plate (2) from rear door. Refer to **PLATE, CARRIER, REMOVAL**.

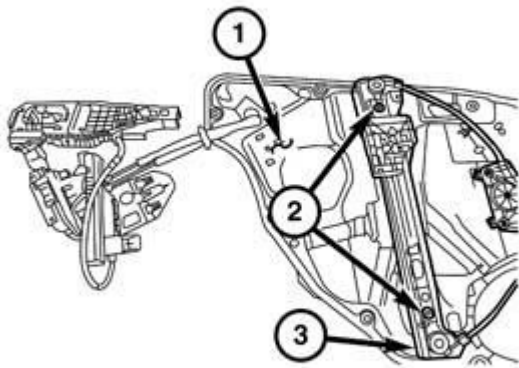
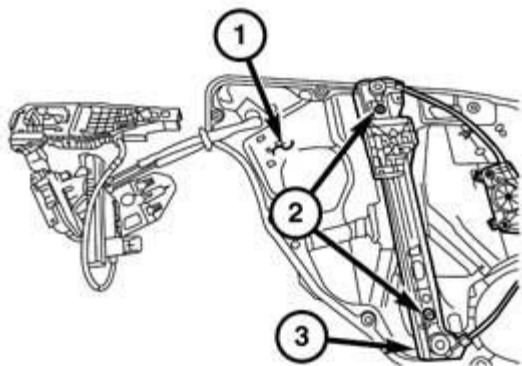


Fig. 186: Carrier Plate, Window Regulator & Fasteners
Courtesy of CHRYSLER GROUP, LLC

2. Remove two window regulator fasteners (2) and remove from the rear of the carrier plate (1).

INSTALLATION

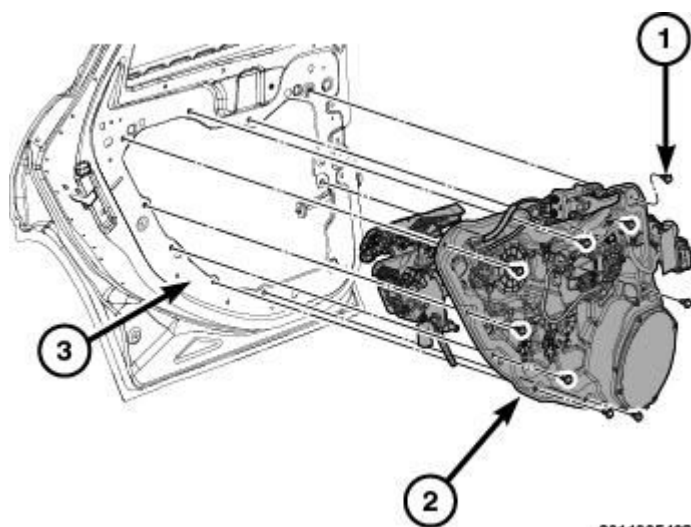
INSTALLATION



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Fig. 187: Carrier Plate, Window Regulator & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Position regulator (3) on carrier plate (1) and install the two fasteners (2) and tighten securely.



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Fig. 188: Identifying Rear Door Carrier Plate & Fasteners
Courtesy of CHRYSLER GROUP, LLC

2. Install the carrier plate in door panel. Refer to **PLATE, CARRIER, INSTALLATION**.
3. Perform the Clear/Relearn procedure. Refer to **STANDARD PROCEDURE**.

STRIKER, DOOR LATCH

REMOVAL

REMOVAL

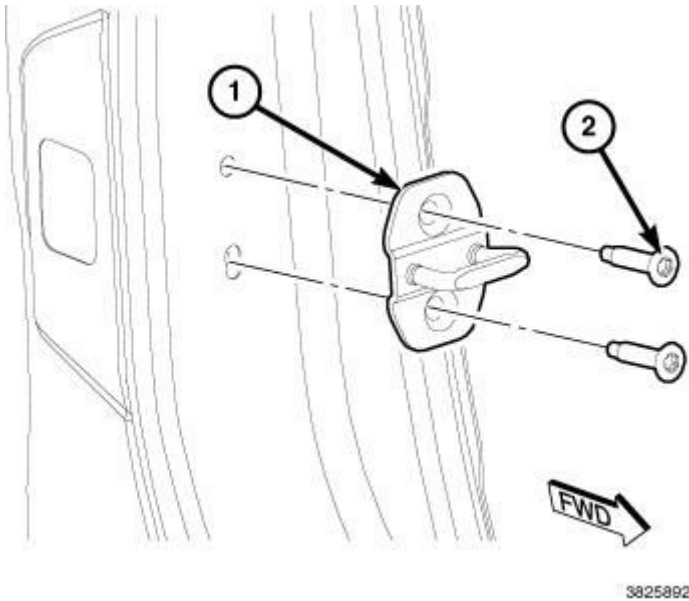


Fig. 189: Door Latch Striker & Screws
Courtesy of CHRYSLER GROUP, LLC

NOTE: Right hand shown, left hand typical.

NOTE: The front and rear door latch strikers are mounted and adjusted the exact same way.

1. Using a china marker or equivalent, mark the outline of the door latch striker (1) on the C-pillar.
2. Remove the bolts (2) attaching the door latch striker to C-pillar.
3. Remove the door latch striker (1) from vehicle.

NOTE: Be sure to check for any shims between door latch striker and C-pillar. If any shims are found, they must be reinstalled with the new door latch striker to maintain proper door operation.

INSTALLATION

INSTALLATION

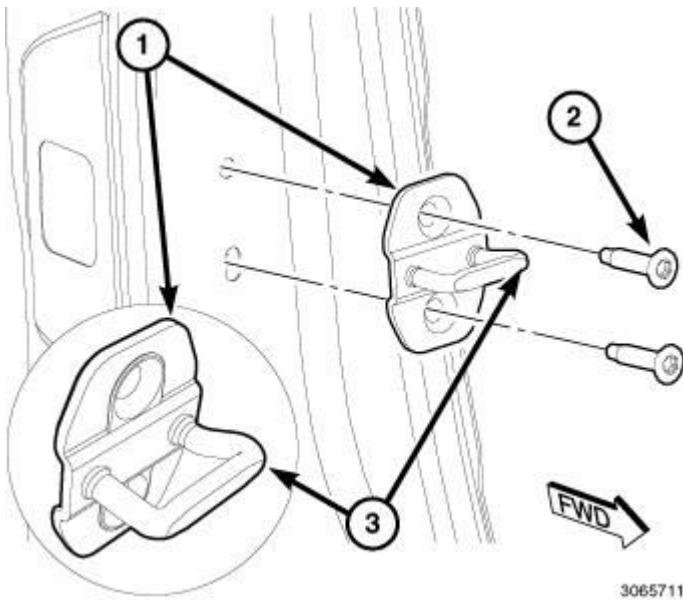


Fig. 190: Two Bolts & Striker
Courtesy of CHRYSLER GROUP, LLC

NOTE: Right hand shown, left hand typical.

NOTE: Front door striker shown, rear door striker similar.

NOTE: The front and rear door latch strikers are mounted and adjusted the exact same way.

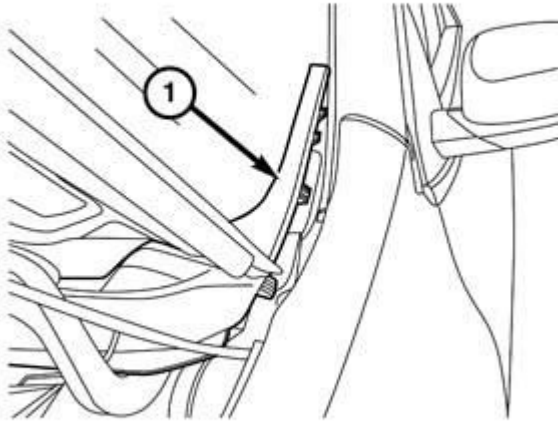
NOTE: Be sure to check for any shims between door latch striker and C-pillar. If any shims are found, they must be reinstalled with the new door latch striker to maintain proper door operation.

NOTE: The striker needs to be properly orientated to the C-pillar. The striker loop (3) must be installed to the inboard side of the C-pillar.

1. Position door latch striker (1) and any shims on vehicle.
2. Loosely install the bolts (2) attaching latch striker to C-pillar.
3. Using the reference marks made during removal, align the latch striker to marks on C-pillar and tighten bolts to 30 N.m (22 ft. lbs.).
4. Verify door fit and operation. Adjust door latch striker as necessary.

EXTERIOR

COVER, COWL PANEL

REMOVAL**REMOVAL**

231374219

Fig. 191: Cowl Mocket**Courtesy of CHRYSLER GROUP, LLC****COWL PANEL COVER**

1. Release hood latch and open hood.
2. Remove the fender to cowl mocket (1) by pulling up at the end of the fender to cowl mocket (1) to cowl panel joint and then pulling the fender to cowl mocket (1) out of the fender.
3. Remove the driver's side wiper cover by pulling up on the cover.
4. Remove windshield wiper arms. Refer to **ARM, WIPER, REMOVAL** .

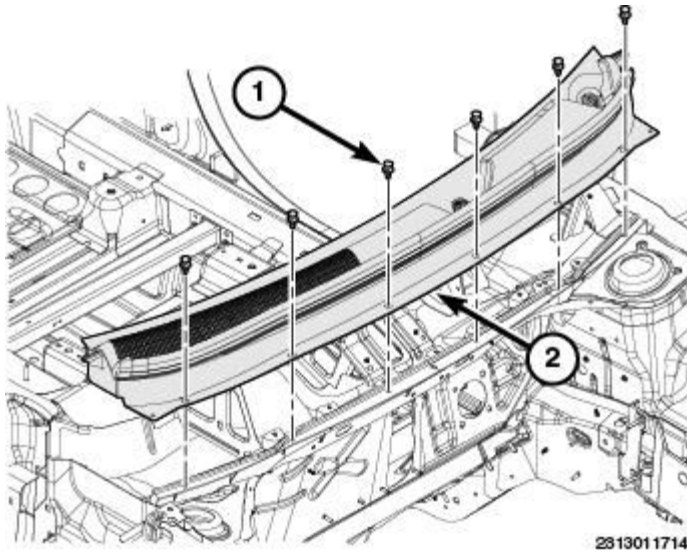


Fig. 192: Identifying Cowl Panel & Push Pins
Courtesy of CHRYSLER GROUP, LLC

5. With the use of (special tool #C-4755, Trim Stick) or equivalent, remove the push pins (1) attaching cowl panel (2) to the cowl plenum extension.

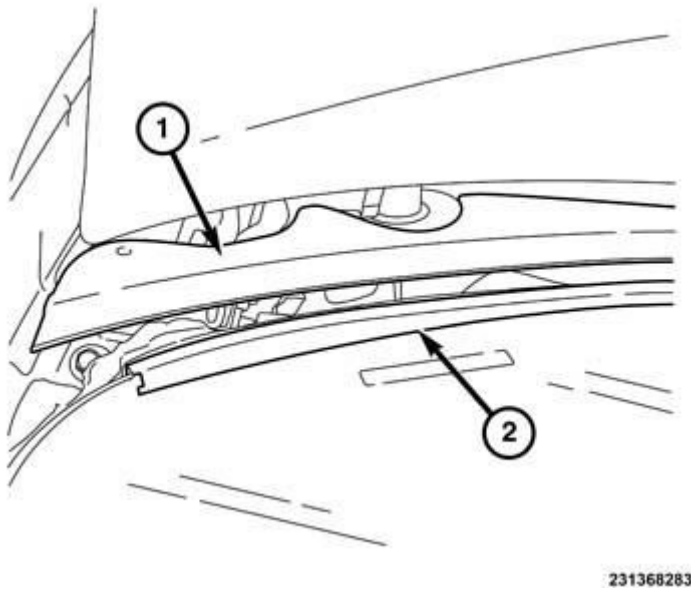


Fig. 193: Cowl Panel & Cowl Cover
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Use care when removing the cowl screen from the retainer on the windshield. If the retainer on the windshield is broken/damaged the windshield will require replacement.

6. Starting at the driver's side pull up on the back edge of the cowl panel (1) and work cross car to release

the tab from the backside of the cowl panel (1) from the groove in the lower windshield channel (2).

7. Remove cowl cover (1) from vehicle.

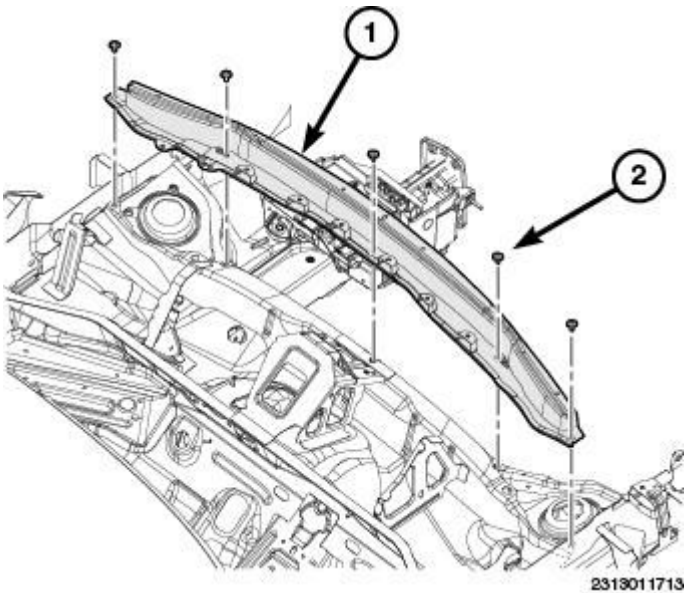


Fig. 194: Installing Cowl Panel

Courtesy of CHRYSLER GROUP, LLC

COWL PLENUM PANEL

1. Remove the screws (2) and remove the panel (1).

INSTALLATION

INSTALLATION

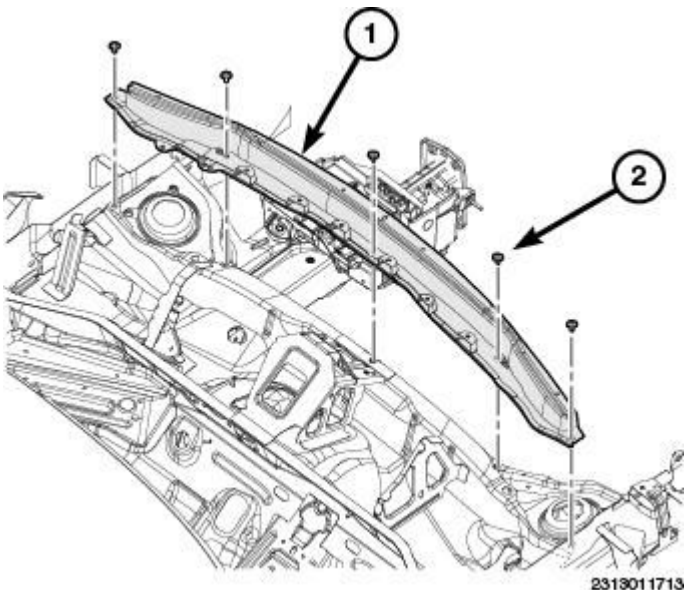
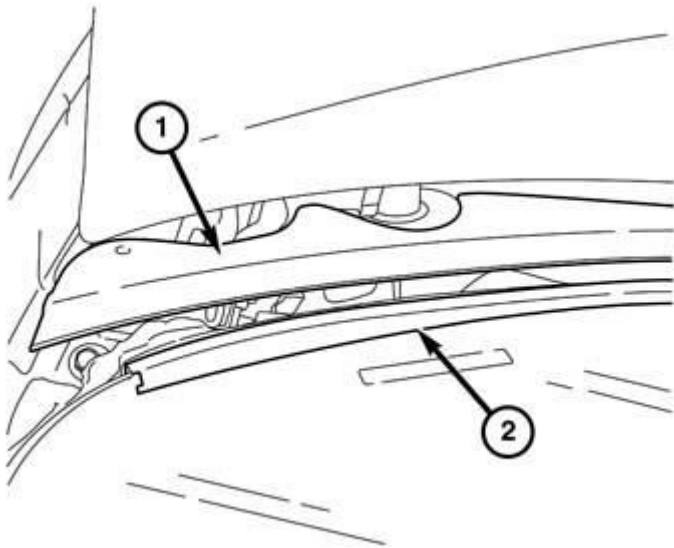


Fig. 195: Installing Cowl Panel

Courtesy of CHRYSLER GROUP, LLC

COWL PLENUM PANEL

1. Install the cowl plenum panel (1) and install the screws (2).



231368283

Fig. 196: Cowl Panel & Cowl Cover

Courtesy of CHRYSLER GROUP, LLC

COWL PANEL COVER

CAUTION: Use care when removing the cowl screen from the retainer on the windshield. If the retainer on the windshield is broken/damaged the windshield will require replacement.

1. Position cowl panel cover (2) to vehicle.
2. Starting in the center of the back edge of the cowl panel (1) and working out to the edges, align the tab on the backside of the cowl panel (1) into the groove in the lower windshield channel (2).

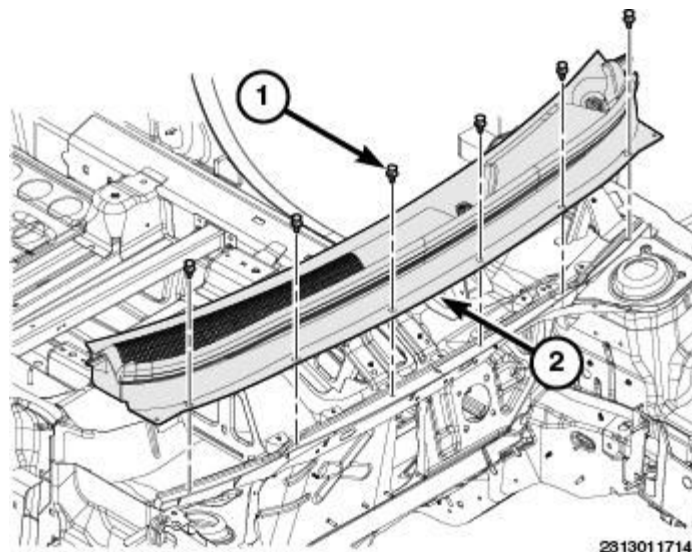


Fig. 197: Identifying Cowl Panel & Push Pins
Courtesy of CHRYSLER GROUP, LLC

3. Using hand pressure fully insert cowl panel tab (1) into windshield insert (2).
4. Install push pins (1) attaching cowl cover to cowl.
5. Install windshield wiper arms. Refer to **ARM, WIPER, INSTALLATION** .
6. Align the clips on the driver's side wiper cover and engage clips with hand pressure.

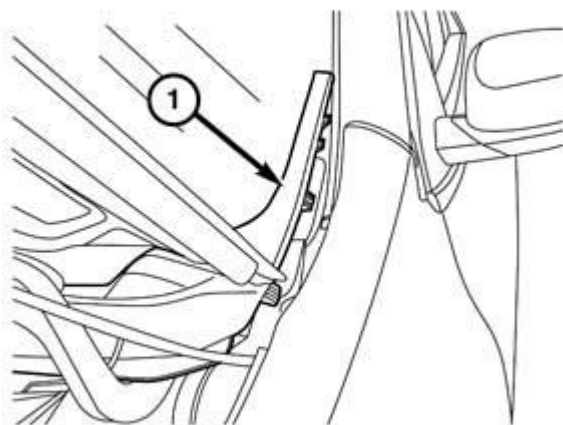
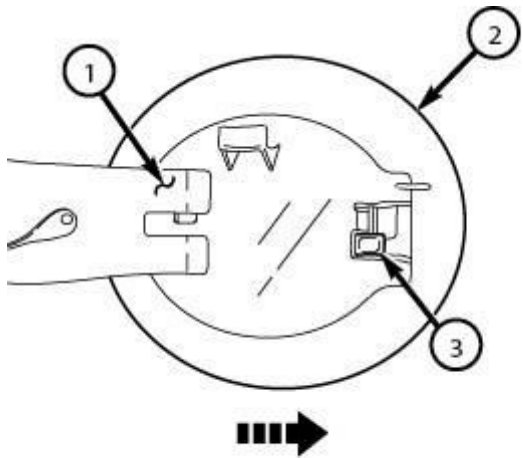


Fig. 198: Cowl Mocket
Courtesy of CHRYSLER GROUP, LLC

7. Align the clips on the right and left fender to cowl mocket (1) and engage with hand pressure.
8. Install the clips attaching cowl plenum under hood to cowl bulb seal to cowl panel.

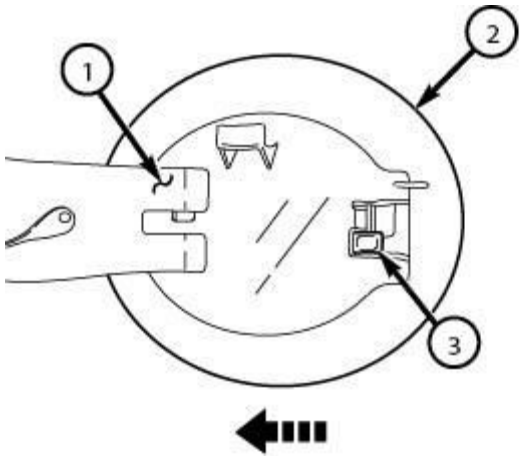
DOOR, FUEL FILL**REMOVAL****REMOVAL**

230970366

Fig. 199: Removing Fuel Fill Door**Courtesy of CHRYSLER GROUP, LLC**

1. Open the fuel fill door (2).
2. Insert a pick or equivalent to lift the fuel door retaining tab (3).
3. Slide the gas door (2) outward to release from fuel filler housing (1).
4. Remove fuel fill door.

INSTALLATION**INSTALLATION**



231368279

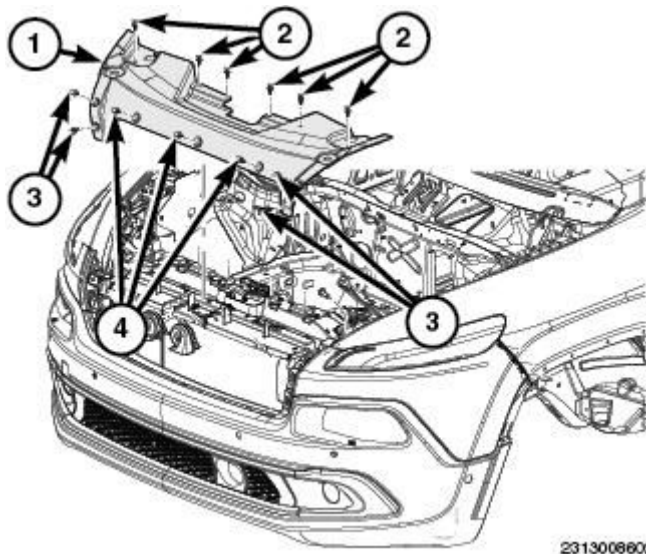
Fig. 200: Installing Fuel Fill Door
Courtesy of CHRYSLER GROUP, LLC

1. Align fuel door (2) onto the fuel filler housing (1).
2. Slide fuel fill door (2) inward until retaining tab (3) is engaged fully.
3. Close the fuel door (2).

FENDER, FRONT

REMOVAL

REMOVAL



2313008602

Fig. 201: Upper Close Out Panel Cover Components
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove the front wheelhouse splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL**.
3. Remove the eight fasteners (2) from the upper fascia closeout panel (1).
4. Remove the upper fascia closeout panel (1) from the vehicle.

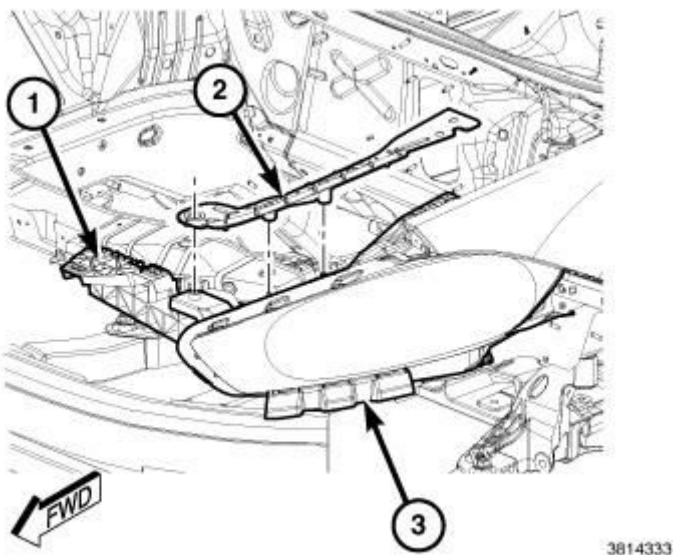


Fig. 202: Front Fascia Support Bracket
 Courtesy of CHRYSLER GROUP, LLC

5. Remove the fasteners from the front fascia support bracket (2).
6. Position the bracket to allow access to the front fender fastener.

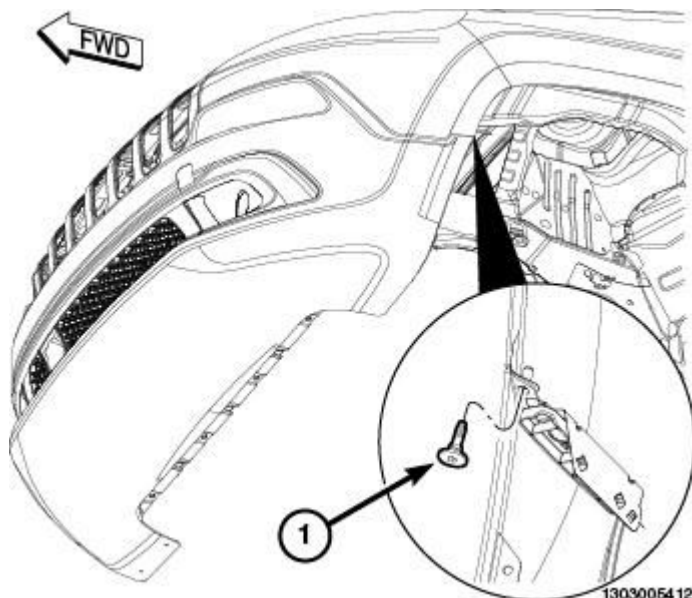
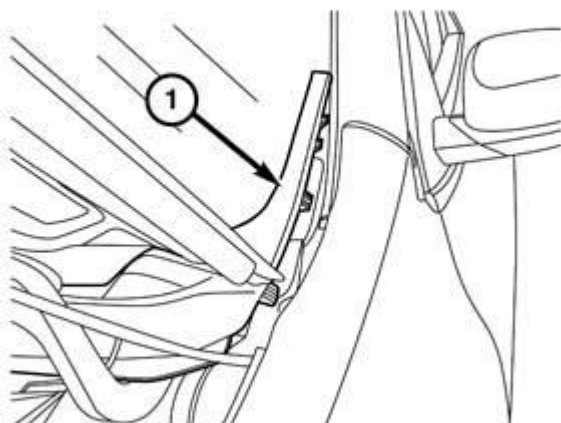


Fig. 203: Identifying Fender To Fascia Fastener
Courtesy of CHRYSLER GROUP, LLC

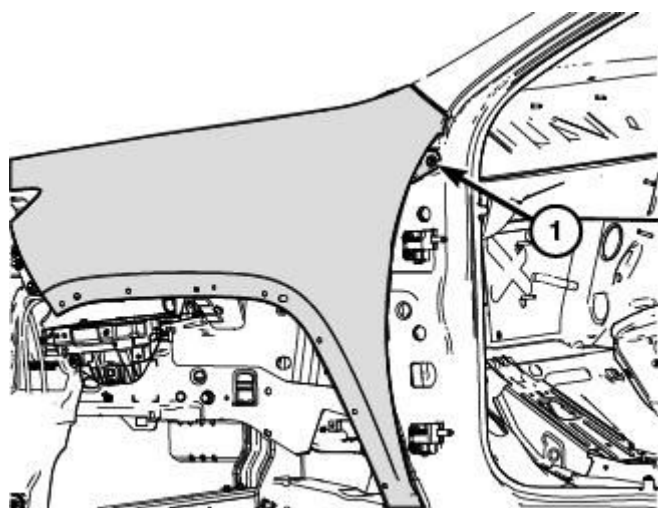
7. Accessing from within the wheelhouse, remove the fascia to fender fastener (1).
8. Carefully pull out on the upper and lower fascia sides to disengage the fascia retaining tabs.



231374219

Fig. 204: Cowl Mocket
Courtesy of CHRYSLER GROUP, LLC

9. Remove the fender to cowl mocket by pulling up at the end of the fender to cowl mocket at the cowl panel joint and then pulling the fender to cowl mocket out of the fender.



2313006657

Fig. 205: Identifying Fender

Courtesy of CHRYSLER GROUP, LLC

10. Remove the fasteners (1) from the fender.

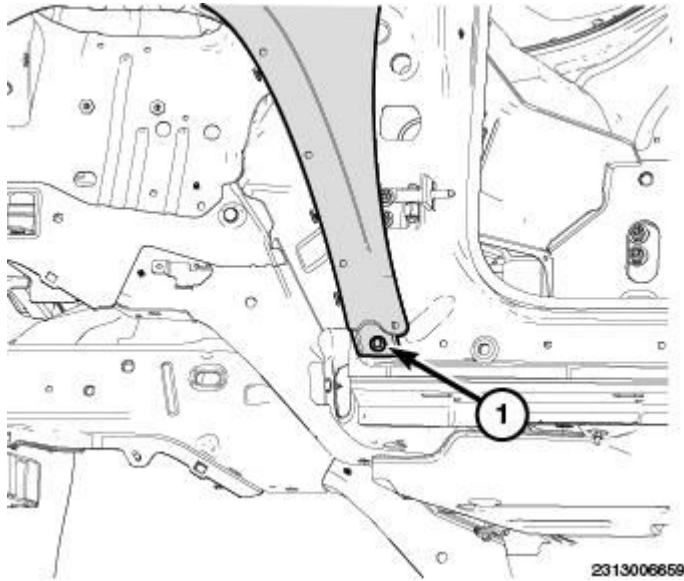


Fig. 206: Identifying Fender Fastener

Courtesy of CHRYSLER GROUP, LLC

11. Remove the fasteners (1) from the fender.

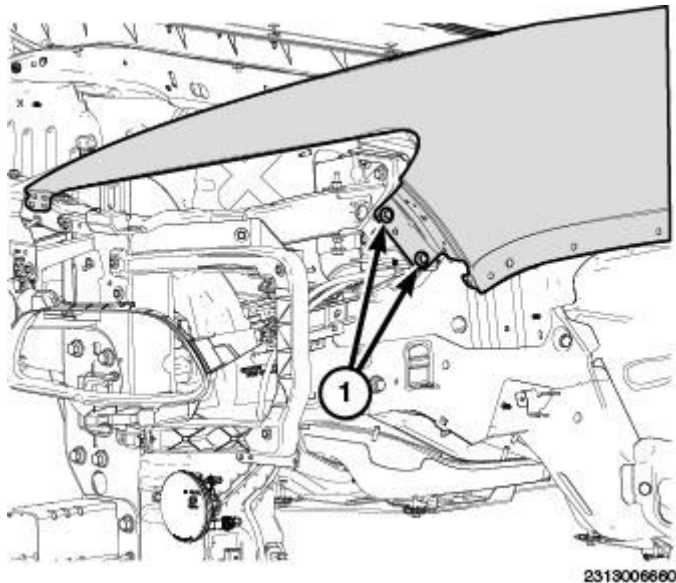
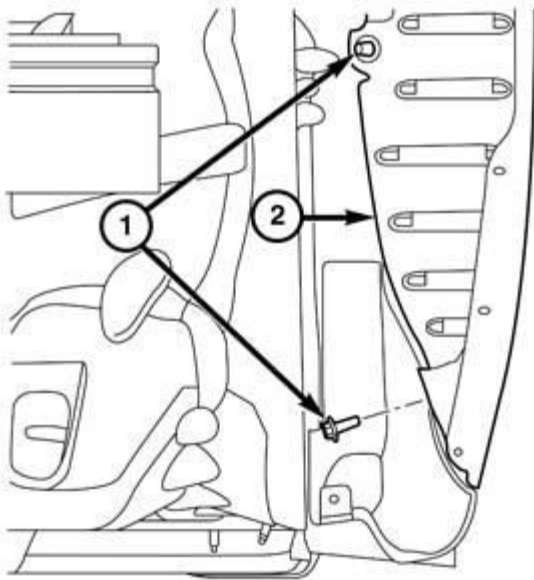


Fig. 207: Identifying Fender Fasteners

Courtesy of CHRYSLER GROUP, LLC

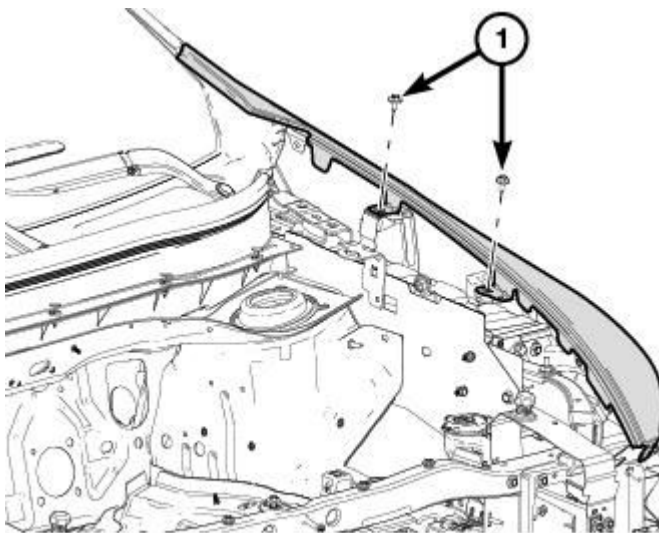
12. Remove the fasteners (1) from the fender.



231368870

Fig. 208: Fender Seal & Fasteners
Courtesy of CHRYSLER GROUP, LLC

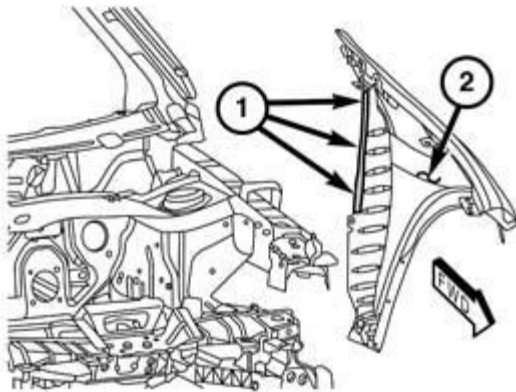
13. From within the rear area of the wheel house, remove the two fasteners (1) from the fender seal (2).



231300662

Fig. 209: Identifying Fender Fasteners
Courtesy of CHRYSLER GROUP, LLC

14. Remove the fasteners (1) securing the fender to the outer load path beam.



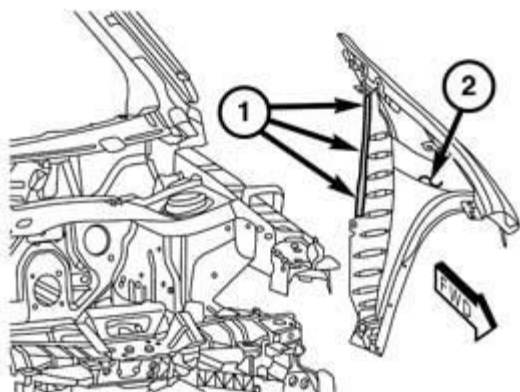
231368871

Fig. 210: Fender & Adhesive
Courtesy of CHRYSLER GROUP, LLC

15. With the use of a plastic putty knife or equivalent, separate the adhesive (1) between the fender (2) and the hinge pillar.
16. Remove the fender (1) from the vehicle.

INSTALLATION

INSTALLATION

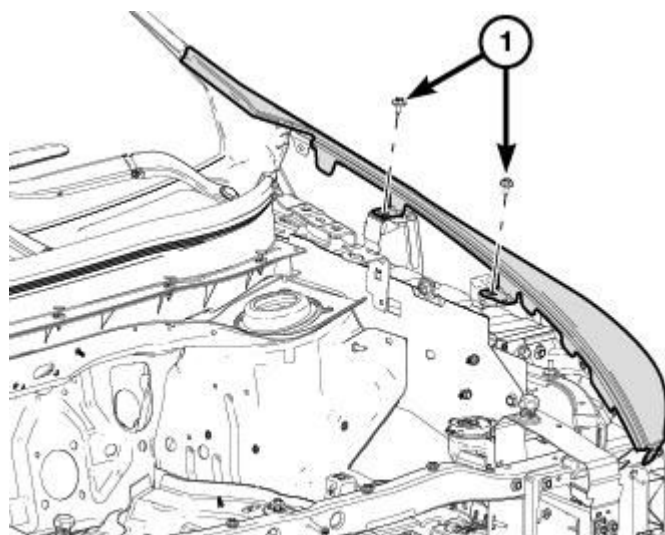


231368871

Fig. 211: Fender & Adhesive

Courtesy of CHRYSLER GROUP, LLC

1. Apply thin bead of seam sealer along the flange (1) of the fender (2).
2. Align the fender to the vehicle.

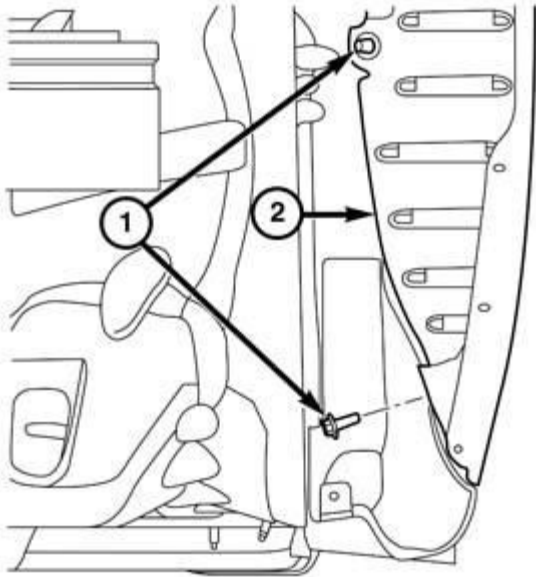


231300662

Fig. 212: Identifying Fender Fasteners

Courtesy of CHRYSLER GROUP, LLC

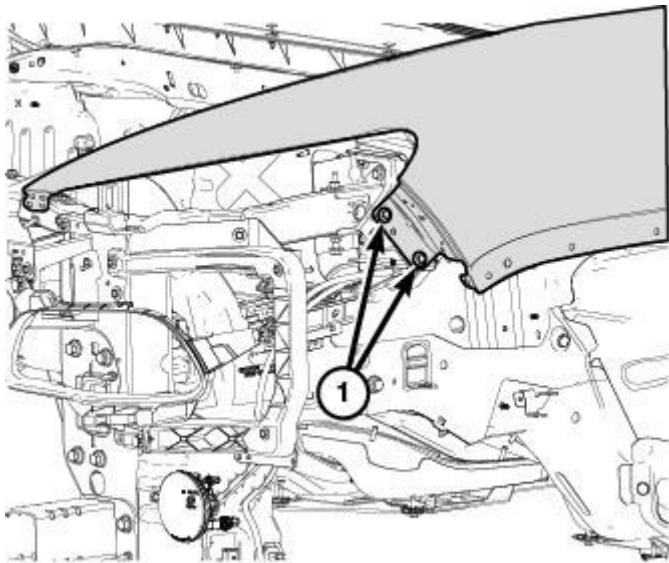
3. Install the fasteners (1) securing the fender to the outer load path beam.
4. Tighten the fasteners to 9 N.m. (80 in. lbs.)



231368870

Fig. 213: Fender Seal & Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. From within the rear area of the wheel house, install the two fasteners (1) into the fender seal (2).
6. Tighten the fasteners to 9 N.m. (80 in. lbs.).



2313006600

Fig. 214: Identifying Fender Fasteners
Courtesy of CHRYSLER GROUP, LLC

7. Install the fasteners (1) into the fender.

8. Tighten the fasteners to 9 N.m. (80 in. lbs.).
9. Align the upper and lower fascia sides and hand tap to engage the fascia retaining tabs.

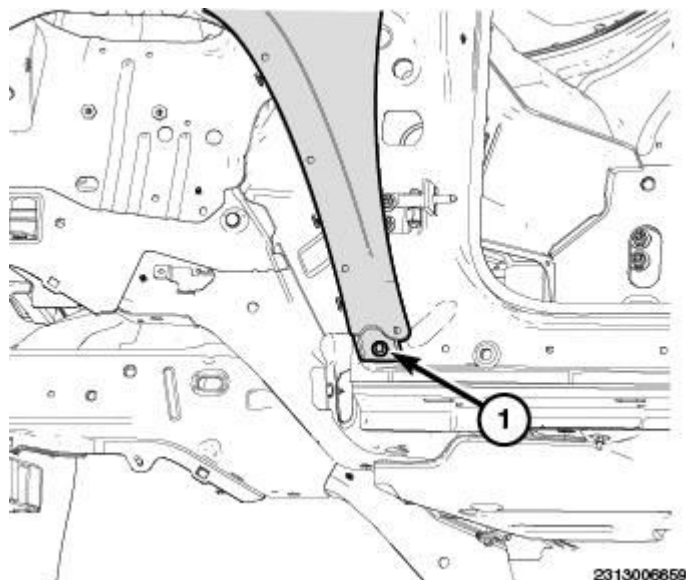


Fig. 215: Identifying Fender Fastener
Courtesy of CHRYSLER GROUP, LLC

10. Install the fastener (1).

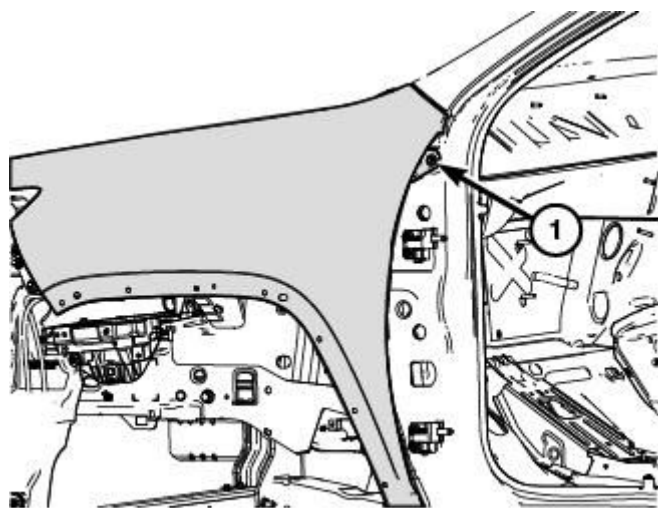


Fig. 216: Identifying Fender
Courtesy of CHRYSLER GROUP, LLC

11. Install the fasteners (1) from the fender.

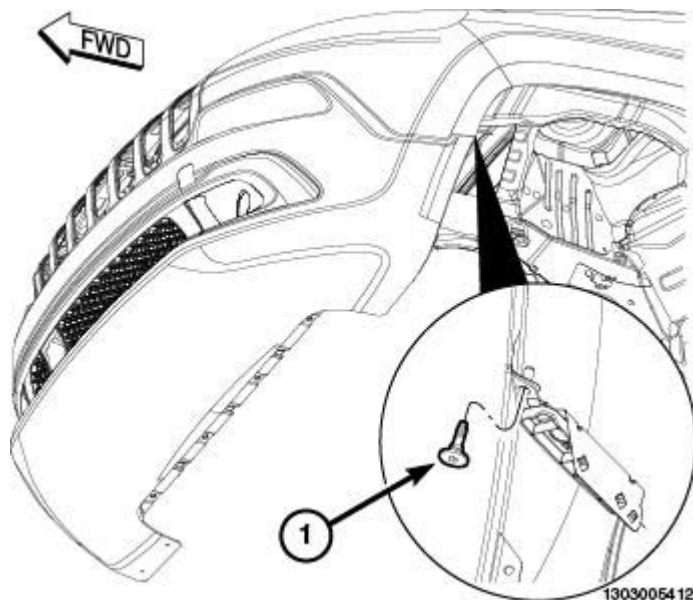


Fig. 217: Identifying Fender To Fascia Fastener
Courtesy of CHRYSLER GROUP, LLC

- 12.
13. Accessing from within the wheelhouse, install the fender to fascia fastener (1). Tighten the fastener securely.

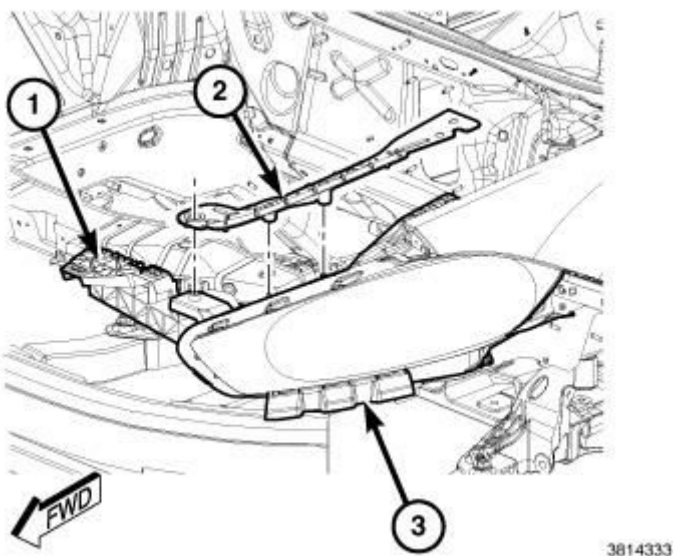
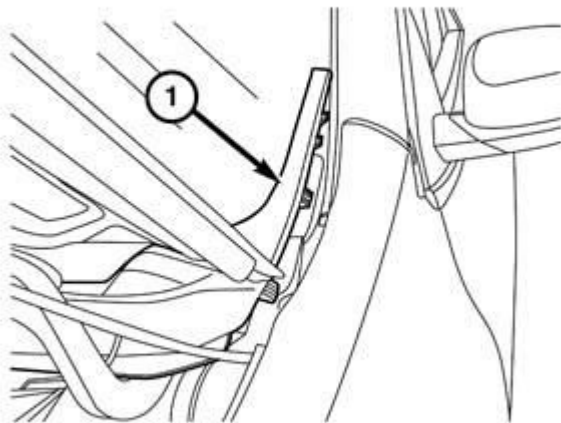


Fig. 218: Front Fascia Support Bracket
Courtesy of CHRYSLER GROUP, LLC

14. Position the front fascia support bracket (2).
15. Install the fasteners into the front fascia support bracket (2) and tighten securely.

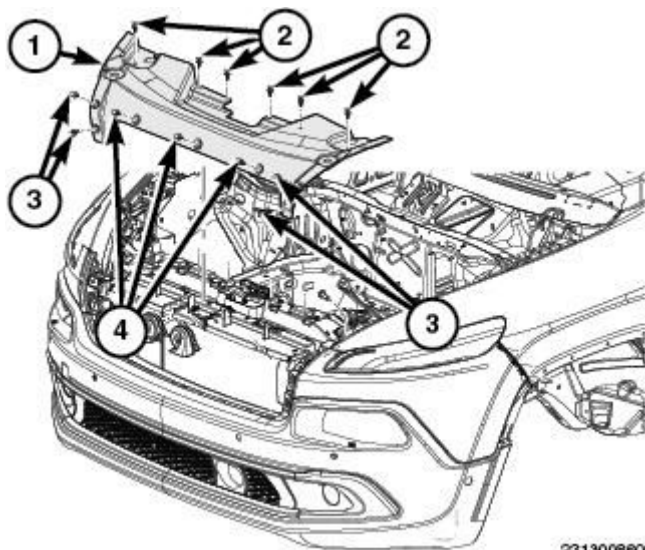
16. Verify proper gap and flush dimension. Refer to **GAP AND FLUSH, SPECIFICATIONS**.
17. Adjust as necessary.
18. Install the front wheel house splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION**.



231374219

Fig. 219: Cowl Mocket
Courtesy of CHRYSLER GROUP, LLC

19. Align the clips on the fender to cowl mocket and engage with hand pressure.



2313008602

Fig. 220: Upper Close Out Panel Cover Components

Courtesy of CHRYSLER GROUP, LLC

20. Position the fascia closeout panel (1).
21. Install the eight push pin fasteners (2).
22. Connect the negative battery cable.

GRILLE

REMOVAL

REMOVAL

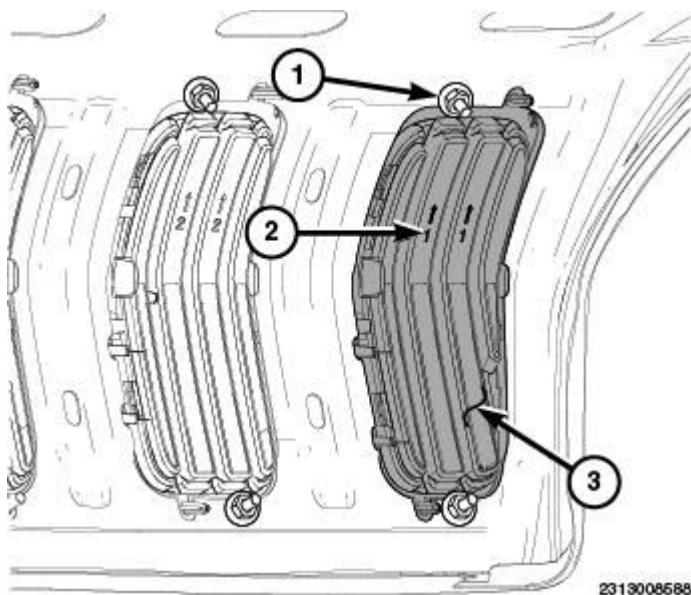


Fig. 221: Identifying Grille Insert & Nuts
Courtesy of CHRYSLER GROUP, LLC

NOTE: Each grille insert (3) is unique to its spot on the hood and is numbered accordingly (2). Make sure the correct grille inserts are installed in the original position.

1. Remove the nuts (1).

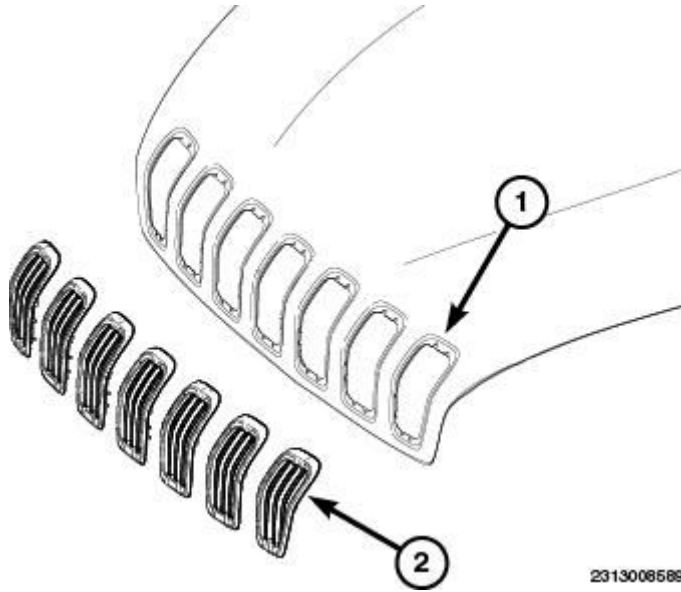


Fig. 222: Identifying Grille Inserts & Hood
Courtesy of CHRYSLER GROUP, LLC

2. Remove the grille inserts (2) from the hood (1) as needed.

INSTALLATION

INSTALLATION

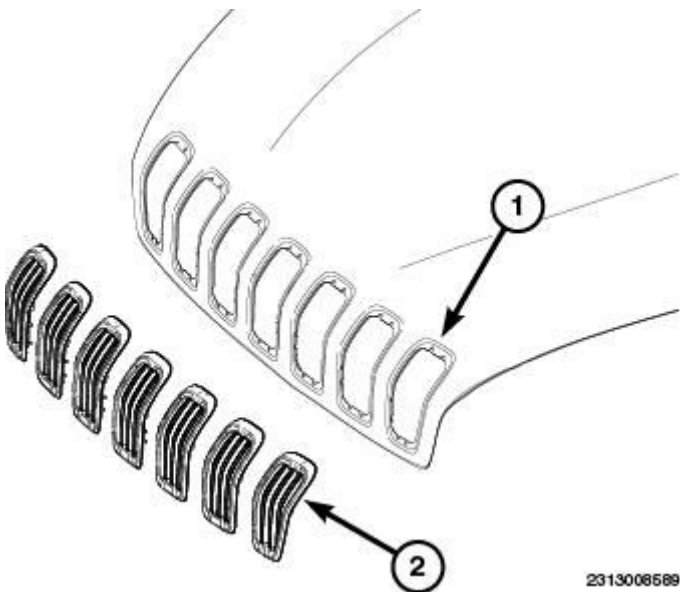


Fig. 223: Identifying Grille Inserts & Hood
Courtesy of CHRYSLER GROUP, LLC

1. Position the grille inserts (2) onto the hood (1).

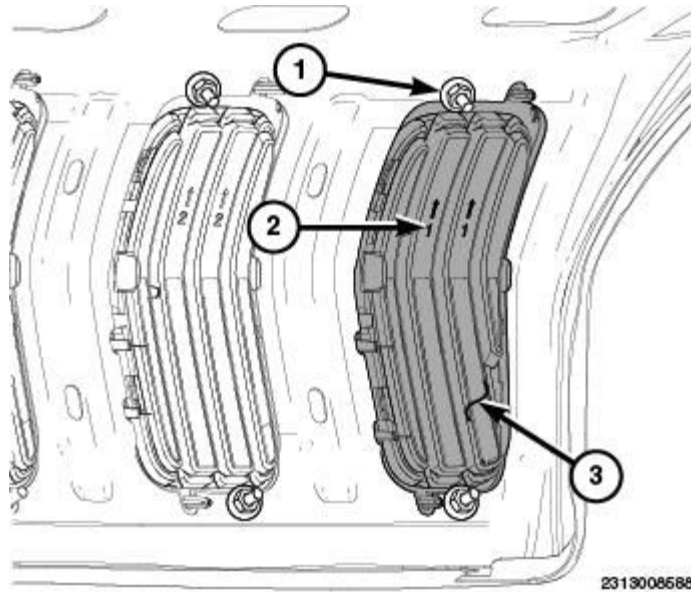


Fig. 224: Identifying Grille Insert & Nuts
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Each grille insert (3) is unique to it's spot on the hood and is numbered accordingly (2). Make sure the correct grille inserts are installed in the original position.

2. Install the nuts (1).

GRILLE, ACTIVE SHUTTER

DESCRIPTION

DESCRIPTION

This vehicle features an Active Grille Shutter (AGS) system. The AGS is located behind the front lower portion of the grill and in front of the radiator.

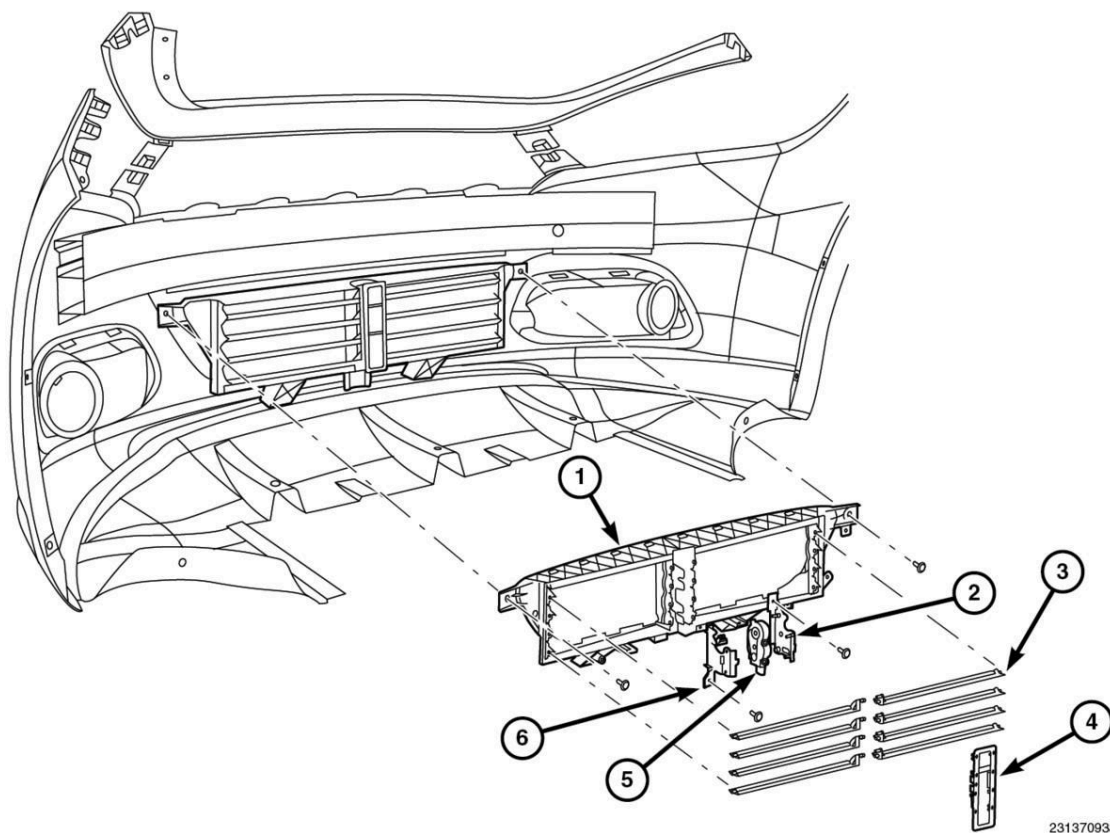


Fig. 225: Active Grille Shutter Components
 Courtesy of CHRYSLER GROUP, LLC

The AGS system consist of an electric motor, shutter vanes, linkage, and seals that are located behind the front grille. The AGS components include:

1. Frame
2. Right Side Actuator Housing
3. Vanes
4. Linkage
5. Actuator
6. Left Side Actuator Housing

Aerodynamics plays an important role in regards to fuel efficiency. Aerodynamic drag increases as vehicle speed increases. With the vehicle traveling at highway speeds, engine power requirements increase in order to overcome wind drag across the front of the vehicle. Reducing the wind drag coefficient across the front of the vehicle is directly proportional to an improvement in fuel efficiency.

OPERATION

OPERATION

The AGS system is controlled by the powertrain control module (PCM) over a dedicated network LIN bus. When the ambient air and engine coolant temperatures are below a specified threshold, airflow across the radiator is not required. When airflow across the radiator is not required and vehicle speeds reach a calibrated threshold, the PCM will command the shutter vanes to close.

Closing the grille shutter vanes creates an improved drag coefficient across the front of the vehicle. If additional cooling is required due to increasing engine coolant temperatures, the PCM commands the grille shutter vanes to open. In cold climates, the active grille shutter system may be used to improve engine coolant warm-up times further increasing fuel economy.

To aid with diagnosis, the grille shutter vanes can be commanded to the open or closed positions with a scan tool. The active grille shutters perform an initialization each time the vehicle is started. The initialization can be used as a quick way to validate the operation of the AGS. To perform the AGS validation, start the engine and observe the grille shutters, the shutters will cycle to the fully open position and then to the fully closed positions to initialize and learn the hard stops on the grille shutter frame for that key cycle.

If the AGS smart module detects the grille shutters are jammed, it will attempt to free them by cycling the shutters from the open to close positions 3 times. If this condition is detected when the ambient air temperature is greater than 4.4° C (40° F) the MIL will illuminate and a diagnostic trouble code (DTC) will set. If the ambient air temperature is below 4.4° C (40° F) and a jammed condition is detected, the smart module will assume the shutters are frozen and will not illuminate the MIL or set a DTC.

The active grille shutter assembly contains an integral smart module, the module receives a command position signal from the PCM to properly position the shutter vanes. The AGS module reports the position to the PCM on the LIN bus. The AGS module four-pin connector also contains a battery voltage, ignition voltage, and a ground circuit.

REMOVAL

REMOVAL

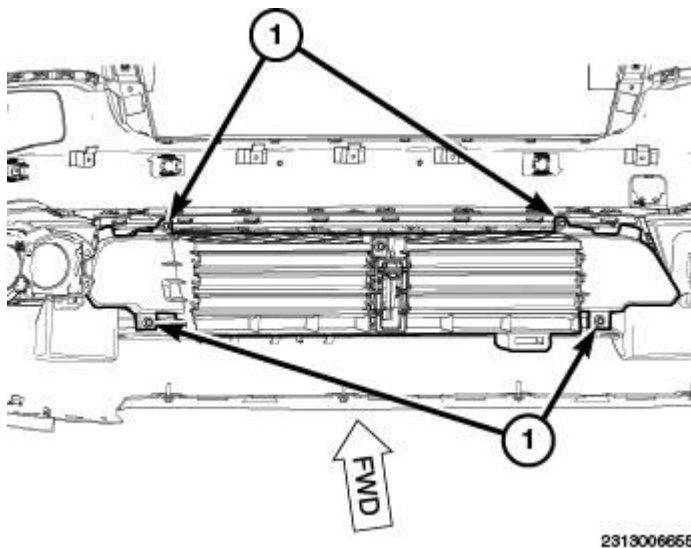


Fig. 226: Identifying Active Grille Shutter Assembly & Fasteners

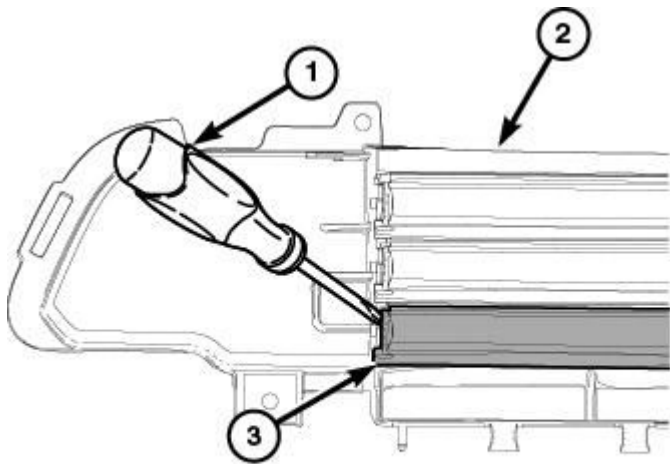
Courtesy of CHRYSLER GROUP, LLC

NOTE: When replacing the active grill shutter assembly or active grill shutter actuator with a service part it will be necessary to perform a counter reset with a scan tool. Follow the scan tool prompts as located under PCM/Misc. Functions/Active Grill Shutter Replace.

1. Remove the front fascia and place on a workbench. Refer to **FASCIA, FRONT, REMOVAL**.
2. Accessing from the rear of the fascia, remove the fasteners (1) securing the active grille shutter to the fascia.
3. Remove the active grille shutter from the fascia.

DISASSEMBLY

DISASSEMBLY

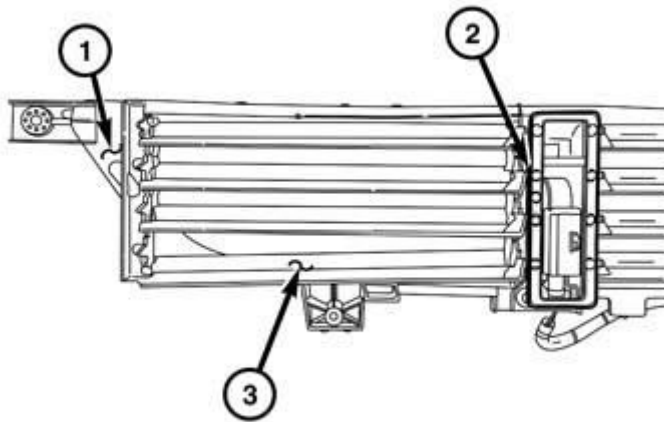


2313006647

Fig. 227: Identifying Flat Bladed Tool, Active Grill Shutter Frame & Vane Outer End
Courtesy of CHRYSLER GROUP, LLC

NOTE: When replacing the active grill shutter assembly or active grill shutter actuator with a service part it will be necessary to perform a counter reset with a scan tool. Follow the scan tool prompts as located under PCM/Misc. Functions/Active Grill Shutter Replace.

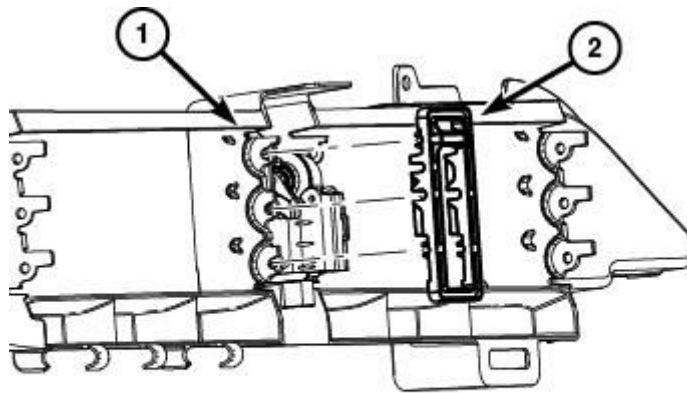
1. Place an appropriate sized flat bladed tool (1), or equivalent between the active grill shutter frame (2) and the vane (3) outer end.
2. Gently pry until the vane (3) tab is released from the frame (2).



231368337

Fig. 228: Identifying Frame, Linkage & Vane
Courtesy of CHRYSLER GROUP, LLC

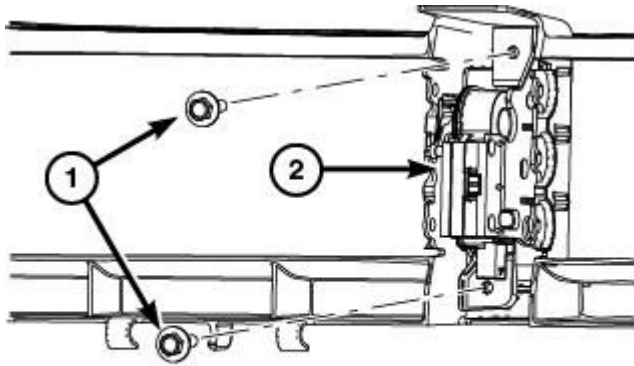
3. Upper and lower vanes will need to be unclipped from the linkage (2), center vanes sit in the slot guides.
4. Move vane outward (3) to release it from the frame (1).



231300648

Fig. 229: Identifying Frame & Linkage
Courtesy of CHRYSLER GROUP, LLC

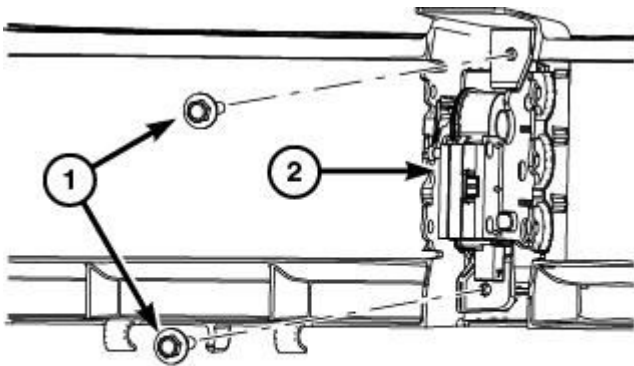
5. Remove the linkage (2).
6. Disconnect the wiring connector for the active grill shutter actuator.



2313006650

Fig. 230: Identifying Active Grill Shutter Actuator & Fasteners
Courtesy of CHRYSLER GROUP, LLC

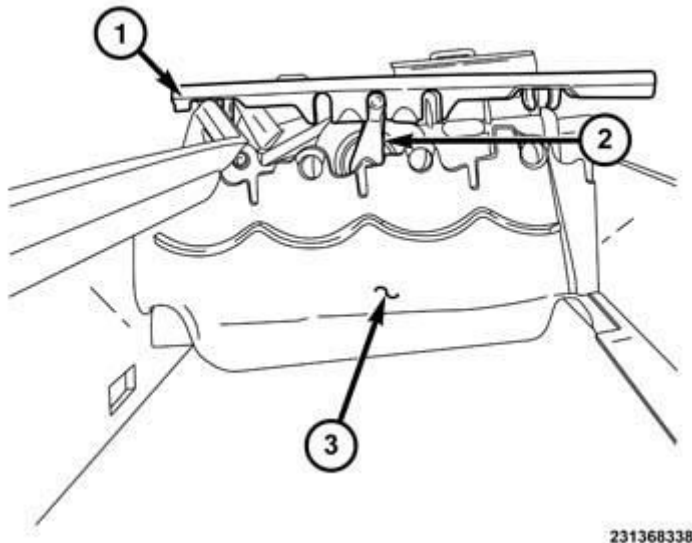
7. Remove the two fasteners (1).
8. Remove the active grill shutter actuator (2) from the active grill shutter frame.

ASSEMBLY**ASSEMBLY**

2313006650

Fig. 231: Identifying Active Grill Shutter Actuator & Fasteners
Courtesy of CHRYSLER GROUP, LLC

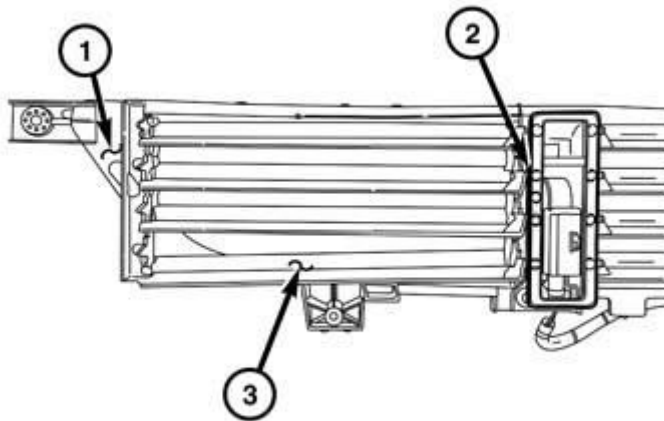
1. Place the active grill shutter actuator (2) into the active grill shutter frame.
2. Install the two actuator fasteners (1) and tighten securely.



231368338

Fig. 232: Linkage, Actuator Arm And Frame
Courtesy of CHRYSLER GROUP, LLC

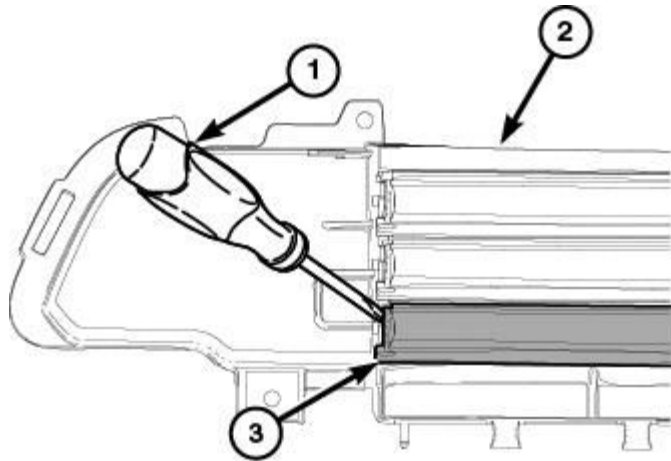
3. Rotate the linkage (1) onto the frame (3).
4. Align the actuator arm (2) to the center notch on the linkage (1).



231368337

Fig. 233: Identifying Frame, Linkage & Vane
Courtesy of CHRYSLER GROUP, LLC

5. The vane (3) has two inner tabs, guide one into the appropriate hole in center of the frame (1).
6. Guide the second inner tab into the appropriate slot on the linkage (2). The linkage (2) will clip onto the vane tab on the upper and lower shutters, center shutters will sit in the center piece slots.



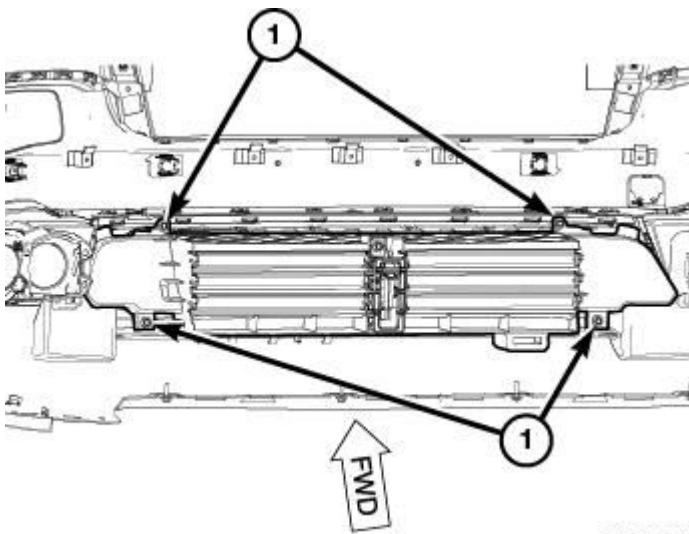
2313006647

Fig. 234: Identifying Flat Bladed Tool, Active Grill Shutter Frame & Vane Outer End
 Courtesy of CHRYSLER GROUP, LLC

7. Place an appropriate sized flat bladed tool (1) or equivalent, between the active grill shutter frame (2) and the vane (3) outer end.
8. Gently pry until the vane (3) tab can be inserted into the appropriate hole in the frame (2).
9. Repeat until all vanes have been placed.
10. When replacing the active grill shutter assembly or active grill shutter actuator with a service part it will be necessary to perform a counter reset with a scan tool. Follow the scan tool prompts as located under PCM/Misc. Functions/Active Grill Shutter Replace.

INSTALLATION

INSTALLATION



2313006655

Fig. 235: Identifying Active Grill Shutter Assembly & Fasteners

Courtesy of CHRYSLER GROUP, LLC

1. Align and position the active grille shutter to the fascia.
2. Accessing from the rear of the fascia, install the fasteners (1) securing the active grille shutter (1) to the fascia. Tighten the fastener securely.
3. Install the front fascia. Refer to **FASCIA, FRONT, INSTALLATION**.
4. When replacing the active grill shutter assembly or active grill shutter actuator with a service part it will be necessary to perform a counter reset with a scan tool. Follow the scan tool prompts as located under PCM/Misc. Functions/Active Grill Shutter Replace.

MIRROR, OUTSIDE REARVIEW

REMOVAL

REMOVAL

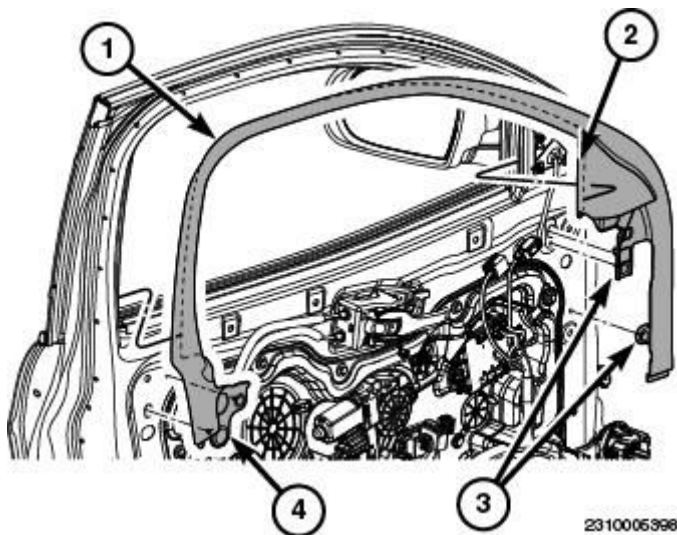


Fig. 236: Identifying Upper Door Trim & Fasteners

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Using a (special tool #C-4755, Trim Stick), remove the upper door trim. Refer to **PANEL, DOOR TRIM, REMOVAL**.

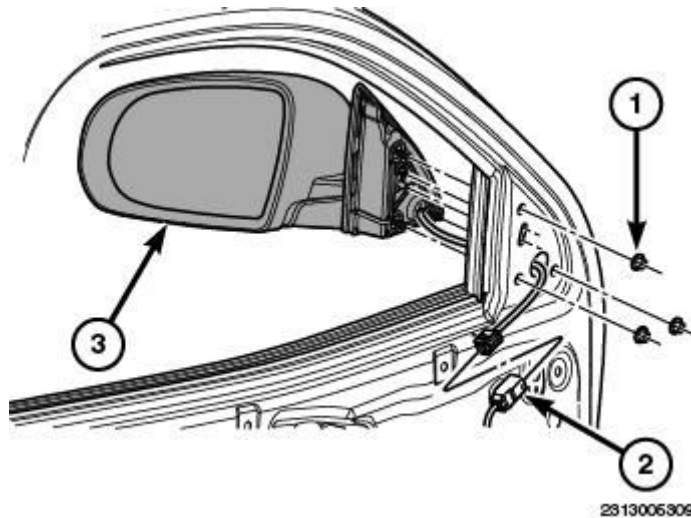


Fig. 237: Identifying Exterior Mirror, Wire Harness & Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. If equipped, disconnect the power mirror accessory wire harness (2).
4. Remove the fasteners (1) securing the exterior mirror (3).
5. If equipped with power mirror accessory features, detach the wire harness grommet located in the mirror flag area.
6. Remove the exterior mirror (3) from vehicle, feed the wire harness (2) and the grommet through the hole in the mirror flag area.

INSTALLATION

INSTALLATION

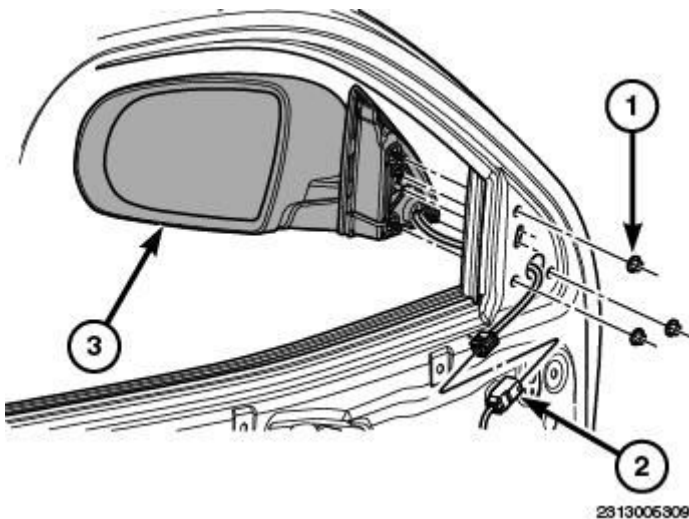


Fig. 238: Identifying Exterior Mirror, Wire Harness & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Position the exterior mirror (3) near the vehicle.
2. If equipped with power mirror accessory features, feed the wire harness (2) through the hole in the mirror flag and seat the grommet. **Do not pull on the wire harness to seat the grommet.**
3. Align and position the exterior mirror (3) into the mirror flag area of the door.
4. Install the fasteners (1) securing the exterior mirror to the door. Tighten the fasteners securely.

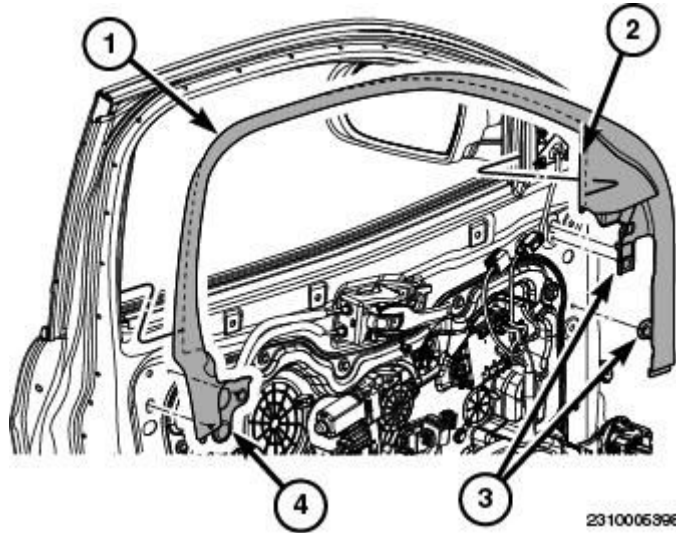


Fig. 239: Identifying Upper Door Trim & Fasteners
Courtesy of CHRYSLER GROUP, LLC

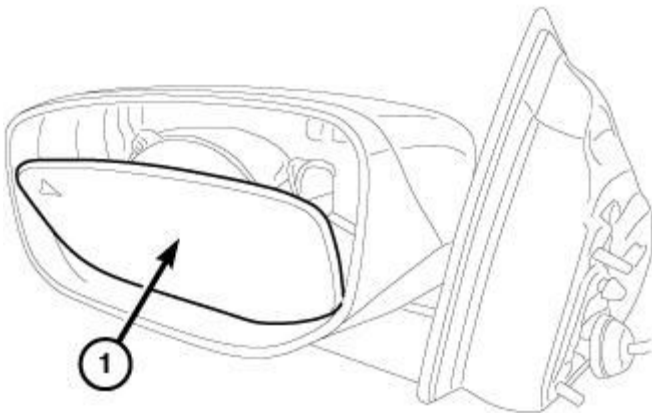
5. Align, position and install the upper trim panel (1). Refer to **PANEL, DOOR TRIM, INSTALLATION**.

MIRROR, OUTSIDE REARVIEW, GLASS

REMOVAL

REMOVAL

GLASS



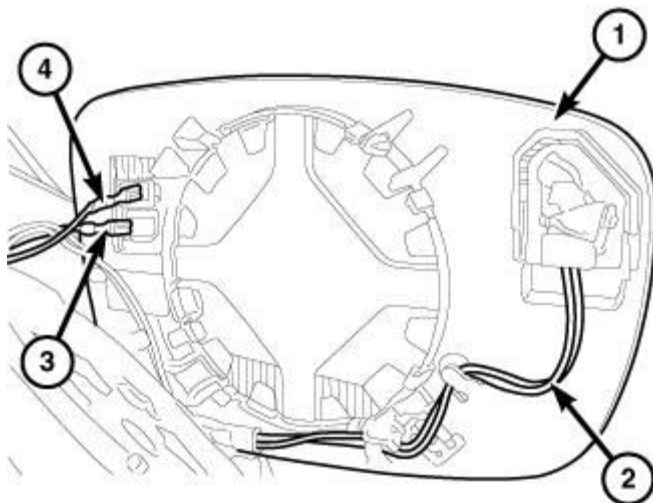
3833105

Fig. 240: Mirror Glass

Courtesy of CHRYSLER GROUP, LLC

WARNING: Always wear eye and hand protection when servicing the mirror assembly. Failure to observe these warnings may result in personal injury from broken glass.

1. Push mirror glass case (2) into full down position
2. Disconnect and isolate the negative battery cable.
3. Place thumbs behind mirror glass case (2) and push out from the mirror assembly (1). This will disengage the mirror glass case's snap attachment feature.

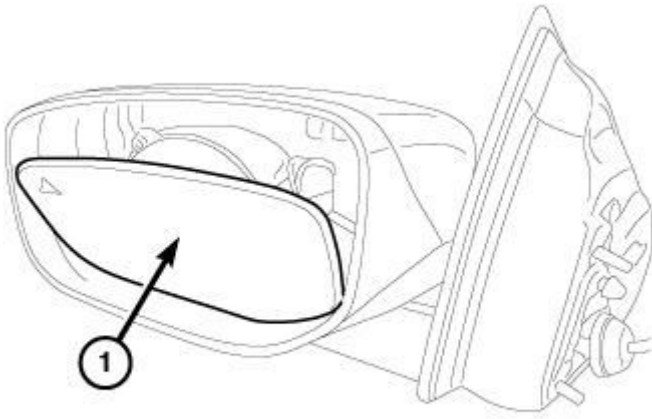


3833147

Fig. 241: Mirror Glass & Electrical Harnesses

Courtesy of CHRYSLER GROUP, LLC

4. If equipped, disconnect any accessory electrical harnesses (2, 3 & 4) from the mirror glass (1).

MIRROR CAP

3833105

Fig. 242: Mirror Glass

Courtesy of CHRYSLER GROUP, LLC

WARNING: Always wear eye and hand protection when servicing the mirror assembly. Failure to observe these warnings may result in personal injury from broken glass.

1. Disconnect and isolate the negative battery cable.
2. Remove the exterior mirror from the vehicle. Refer to **MIRROR, OUTSIDE REARVIEW, REMOVAL** and **MIRROR, OUTSIDE REARVIEW, GLASS, REMOVAL**.
3. Push mirror glass case (2) into full down position
4. Place thumbs behind mirror glass case (2) and push out from the mirror assembly (1). This will disengage the mirror glass case's snap attachment feature.

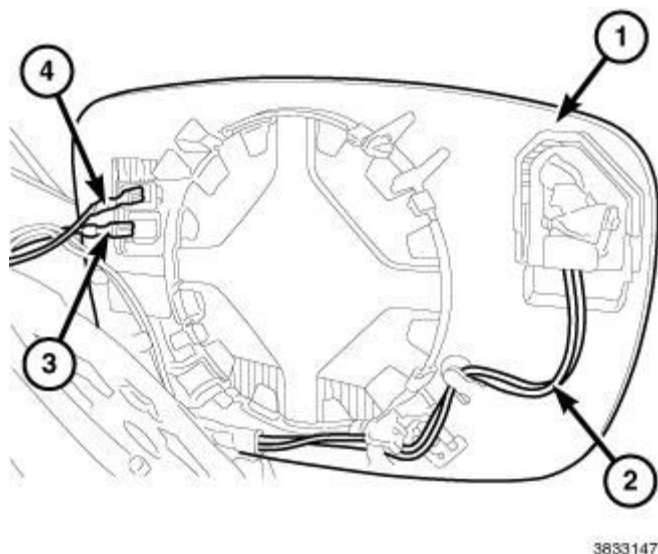


Fig. 243: Mirror Glass & Electrical Harnesses
Courtesy of CHRYSLER GROUP, LLC

5. If equipped, disconnect any accessory electrical harnesses (2, 3 & 4) from the mirror glass (1).
6. Remove the mirror glass (1).

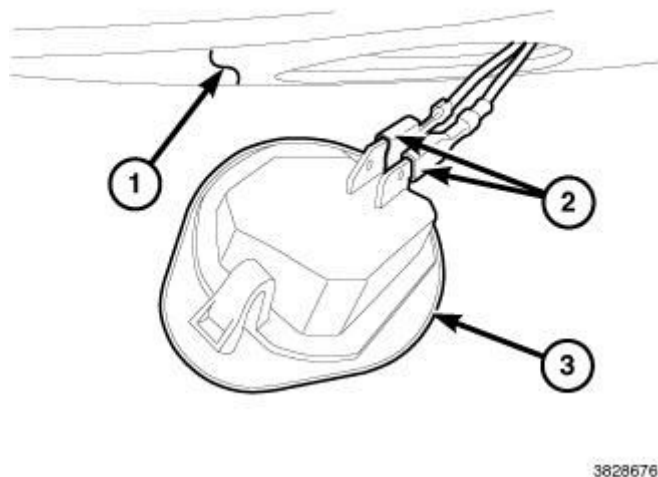


Fig. 244: Puddle Lamp & Connectors
Courtesy of CHRYSLER GROUP, LLC

7. If equipped, remove and disconnect the puddle lamp. Refer to **LAMP, MIRROR, REMOVAL** .

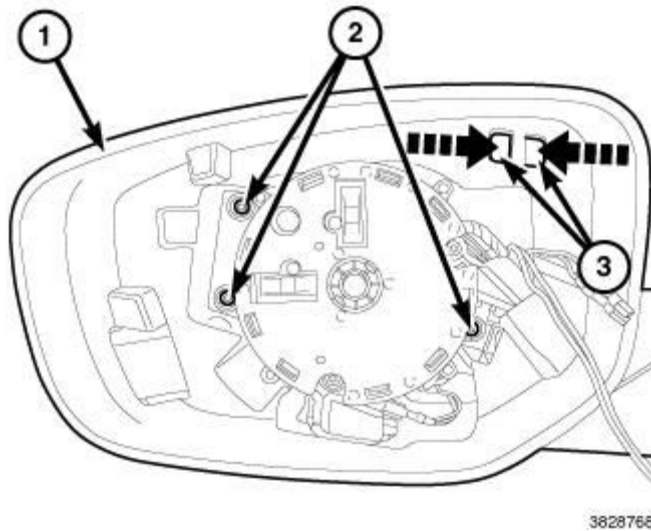


Fig. 245: Mirror Housing, Fasteners & Retaining Tabs
 Courtesy of CHRYSLER GROUP, LLC

8. Remove the fasteners (2) securing the mirror housing bezel (1).
9. Using needle nose pliers, two flat head screwdrivers or equivalent, disengage the retaining tabs (3) located in the upper inboard corner.

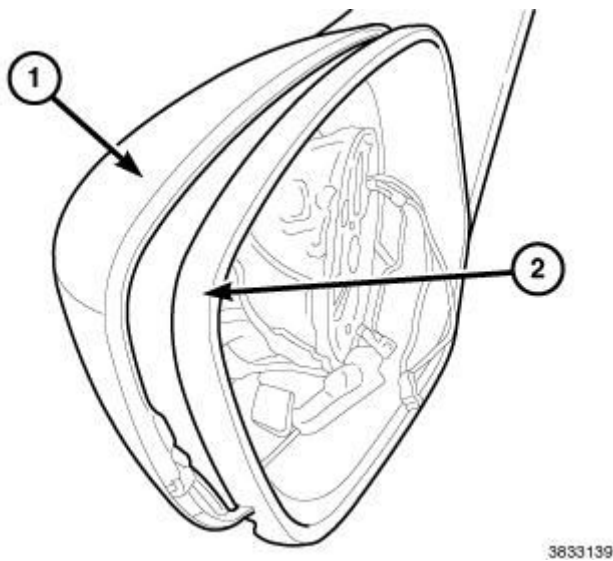
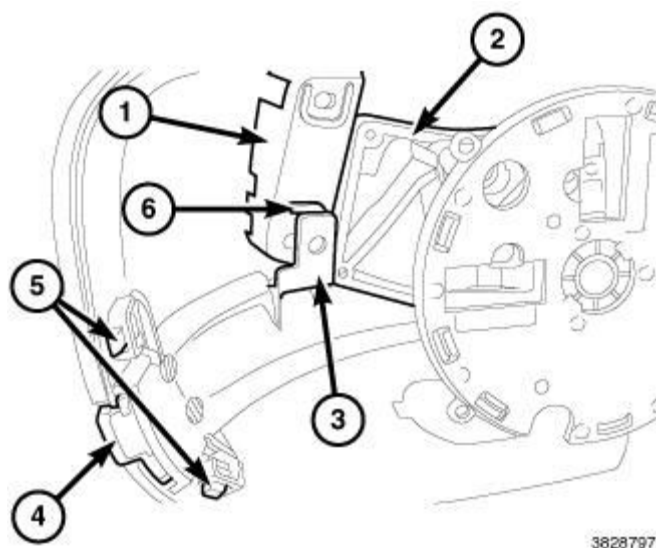


Fig. 246: Mirror Cap/Mirror Assembly & Bezel
 Courtesy of CHRYSLER GROUP, LLC

10. Separate the mirror housing bezel (2) from the mirror cap/mirror assembly (1).
11. If equipped with turn signal, separate the mirror housing bezel (2) from the mirror cap/mirror assembly (1).



3828797

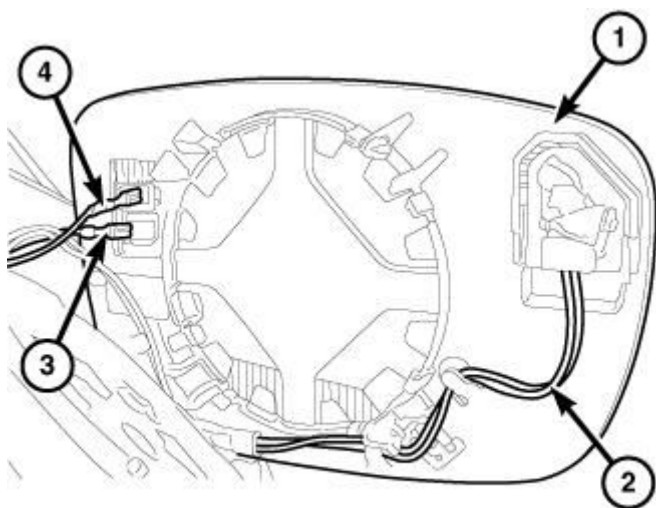
Fig. 247: Turn Signal Retaining Tabs
Courtesy of CHRYSLER GROUP, LLC

12. If equipped with turn signal, disengage the turn signal retaining tabs (3, 4 & 5) and separate the mirror housing bezel from the mirror cap/mirror assembly. Refer to **LAMP, MIRROR, REMOVAL**.

INSTALLATION

INSTALLATION

GLASS



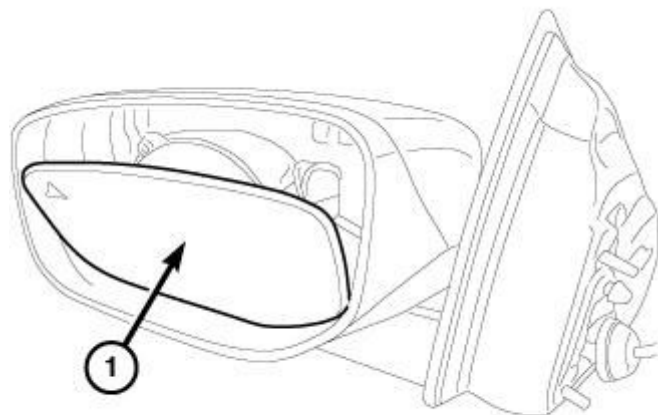
3833147

Fig. 248: Mirror Glass & Electrical Harnesses
Courtesy of CHRYSLER GROUP, LLC

WARNING: Always wear eye and hand protection when servicing the mirror

assembly. Failure to observe these warnings may result in personal injury from broken glass.

1. If equipped, connect any accessory electrical harnesses (2, 3 & 4) to the mirror glass (1).



3833105

Fig. 249: Mirror Glass

Courtesy of CHRYSLER GROUP, LLC

2. Align and position the mirror glass (1) to the mirror motor.
3. Push the glass (1) forward until the glass case snaps are fully seated on motor.

NOTE: An audible snap is normal.

4. Connect the negative battery cable.

MIRROR CAP

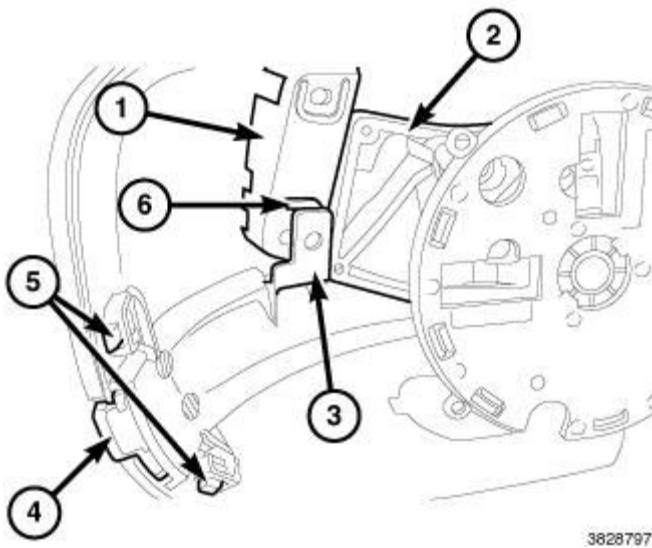


Fig. 250: Turn Signal Retaining Tabs
Courtesy of CHRYSLER GROUP, LLC

WARNING: Always wear eye and hand protection when servicing the mirror assembly. Failure to observe these warnings may result in personal injury from broken glass.

1. If equipped with turn signal, position and engage the turn signal retaining tabs (3, 4 & 5) to the mirror cap/mirror assembly. Refer to **LAMP, MIRROR, INSTALLATION** .

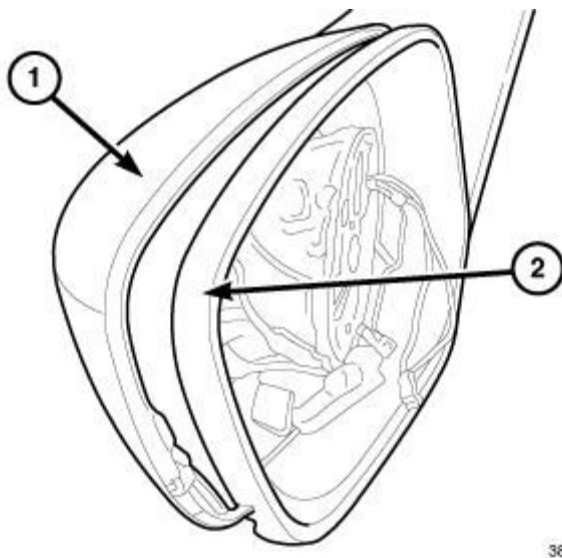


Fig. 251: Mirror Cap/Mirror Assembly & Bezel
Courtesy of CHRYSLER GROUP, LLC

2. Align and position the mirror housing bezel (2) to the mirror cap/mirror assembly (1). Push the mirror housing bezel into the mirror cap to engage the retaining tabs.

NOTE: An audible snap is normal.

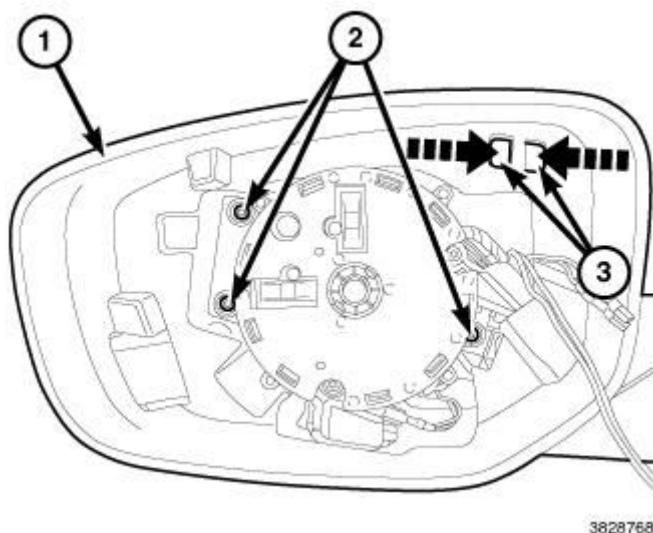


Fig. 252: Mirror Housing, Fasteners & Retaining Tabs
Courtesy of CHRYSLER GROUP, LLC

3. Install the fasteners (2) securing the mirror housing bezel (1). Tighten the fasteners securely.

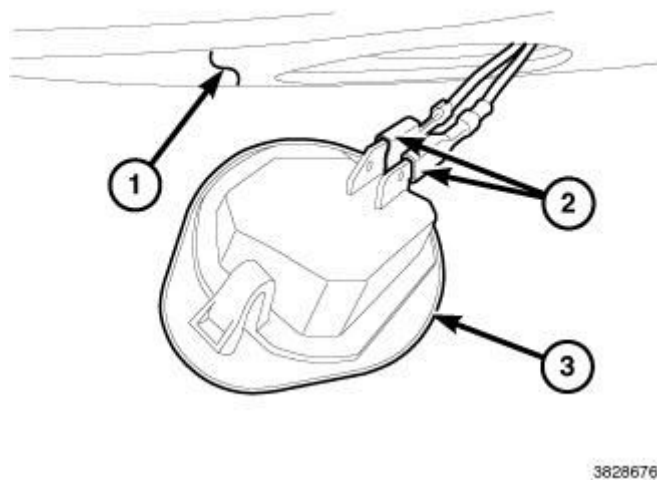


Fig. 253: Puddle Lamp & Connectors
Courtesy of CHRYSLER GROUP, LLC

4. If equipped, connect and install the puddle lamp. Refer to **LAMP, MIRROR, INSTALLATION** .

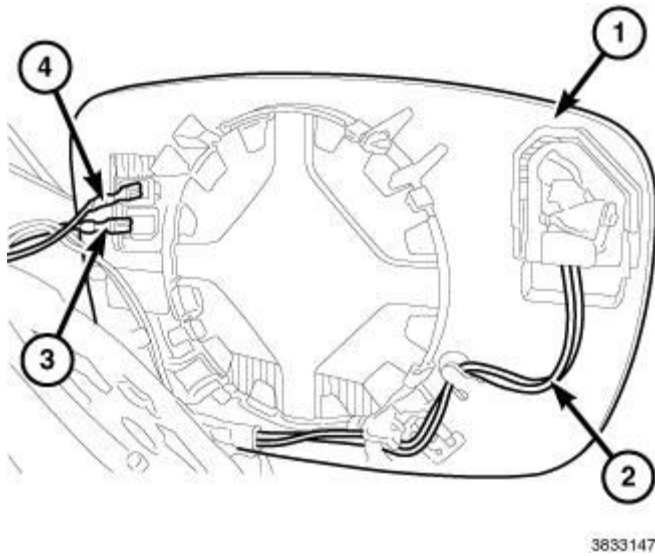


Fig. 254: Mirror Glass & Electrical Harnesses
Courtesy of CHRYSLER GROUP, LLC

5. If equipped, connect any accessory electrical harnesses (2, 3 & 4) to the mirror glass (1).

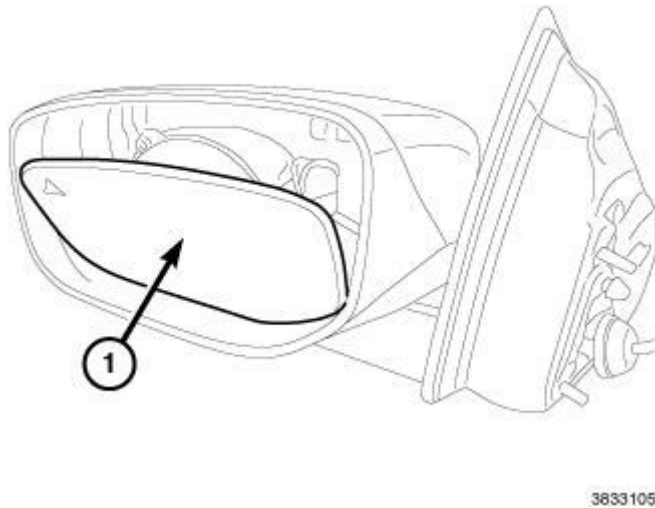


Fig. 255: Mirror Glass
Courtesy of CHRYSLER GROUP, LLC

6. Align and position the mirror glass (1) to the mirror motor.
7. Push the glass (1) forward until the glass case snaps are fully seated on motor.

NOTE: An audible snap is normal.

8. Connect the negative battery cable.

MOLDING, FRONT WHEEL OPENING

REMOVAL

REMOVAL - FRONT FASCIA

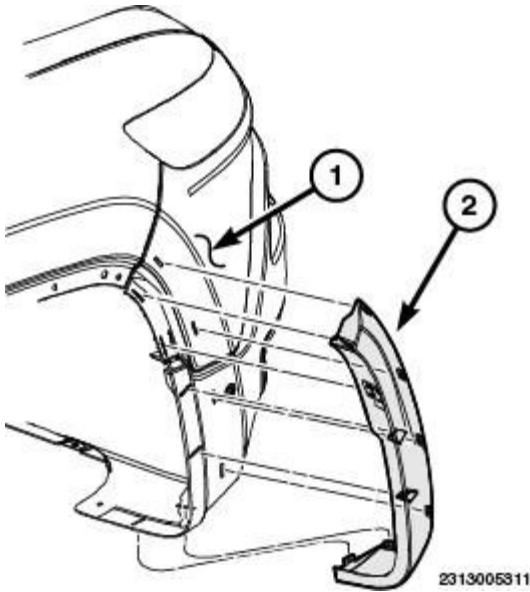


Fig. 256: Identifying Front Wheelhouse Splash Shield, Flare Molding & Clip Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Remove the front wheelhouse splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL**.
2. Release the clip fasteners and remove the flare molding (2).

REMOVAL - FRONT FENDER

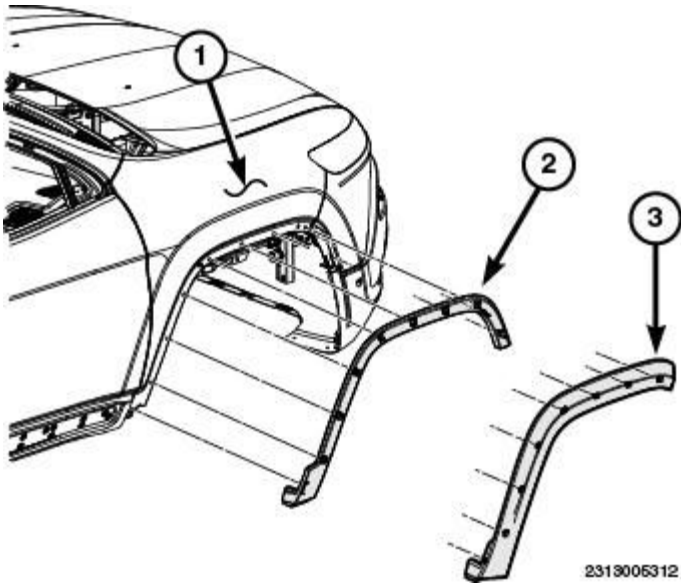


Fig. 257: Identifying Wheel Flare, Fender & Protective Cover
Courtesy of CHRYSLER GROUP, LLC

1. If the wheel flare is to be reused
 - a. Remove two sided tape residue from the flare.
 - b. Clean back of the flare with Mopar® Super Kleen solvent, or equivalent.
 - c. Wipe dry with lint free cloth.
 - d. Apply new two sided adhesive tape to back of flare.
2. Clean the painted surface with Mopar® Super Kleen solvent, or equivalent. Wipe surface dry with lint free cloth.
3. Remove the protective cover (1) from the tape on back of the wheel flare (2).
4. Align the spring retainers on the wheel flare (2) to the appropriate slots on the fender (1) and with the use of hand pressure seat the clips fully.
5. Using a roller tool or equivalent, roll along the wheel flare where the two sided tape is applied with enough force to guarantee adhesion.

INSTALLATION

INSTALLATION - FRONT FASCIA

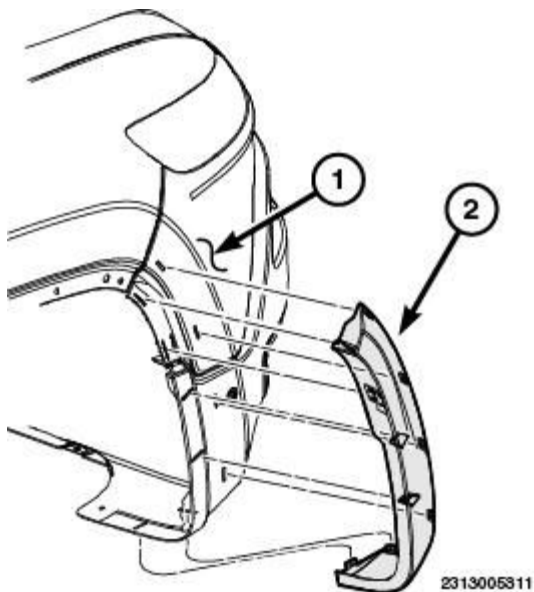
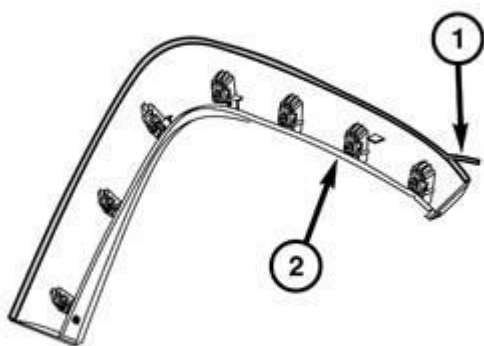


Fig. 258: Identifying Front Wheelhouse Splash Shield, Flare Molding & Clip Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Position the flare molding (2) onto the fascia (1) and seat the clip fasteners fully.
2. Install the front wheelhouse splash shields. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION**.

INSTALLATION - FRONT FENDER



1303002786

Fig. 259: Fender Flare & Spring Clips
Courtesy of CHRYSLER GROUP, LLC

1. If the wheel flare is to be reused
 - a. Remove two sided tape residue from the flare.
 - b. Clean back of the flare with Mopar® Super Kleen solvent, or equivalent.
 - c. Wipe dry with lint free cloth.
 - d. Apply new two sided adhesive tape to back of flare.
2. Clean the painted surface with Mopar® Super Kleen solvent, or equivalent. Wipe surface dry with lint free cloth.
3. Remove the protective cover (1) from the tape on back of the wheel flare (2).

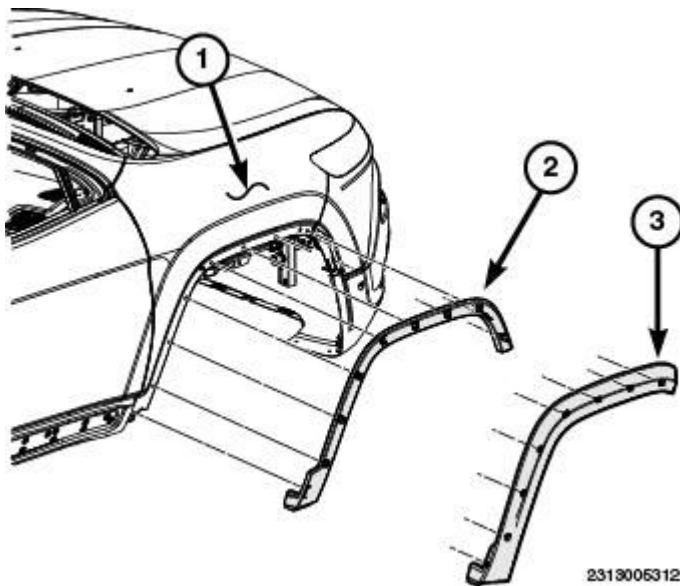


Fig. 260: Identifying Wheel Flare, Fender & Protective Cover
Courtesy of CHRYSLER GROUP, LLC

4. Align the spring retainers on the wheel flare (2) to the appropriate slots on the fender (1) and with the use of hand pressure seat the clips fully.
5. Using a roller tool or equivalent, roll along the wheel flare where the two sided tape is applied with enough force to guarantee adhesion.

MOLDING, REAR WHEEL OPENING

REMOVAL

REMOVAL

REMOVAL - REAR DOOR

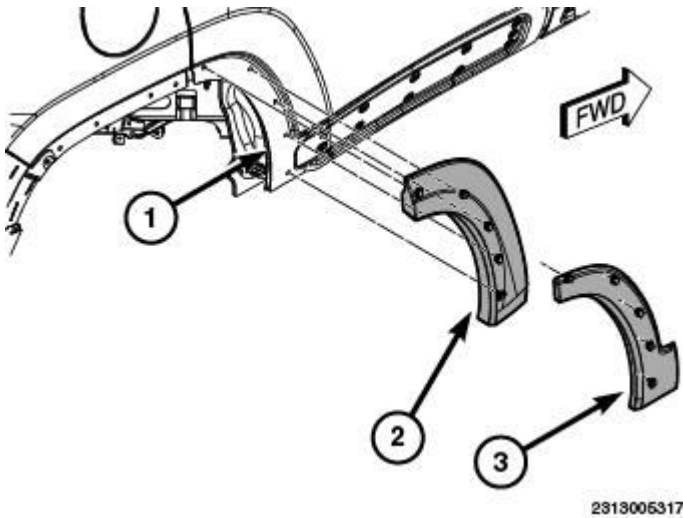


Fig. 261: Identifying Molding & Wheel Flares
Courtesy of CHRYSLER GROUP, LLC

The wheel flares are set with two sided adhesive tape and plastic spring clips. The temperature in the work area and the vehicle should be at least 21° C (70° F) to avoid damaging the flare.

1. Use a plastic putty knife (1) or equivalent, along the edges of the flare (2) to cut the two sided tape.

NOTE: A small socket or pliers should be used to help release the spring retainers from the back side.

2. Use trim tool (special tool #C-4829A, Remover, Trim), or equivalent to release the spring retainers.
3. Remove the flare.
4. Remove adhesive tape residue from painted surface of vehicle. Use a 3M Scotch-Brite™ Molding Adhesive and Stripe Removal Discs, or equivalent, to clean adhesive residue from painted surfaces. The adhesive removal discs are available from automotive paint suppliers. Refer to instructions supplied with the discs for proper usage.

REMOVAL - QUARTER PANEL

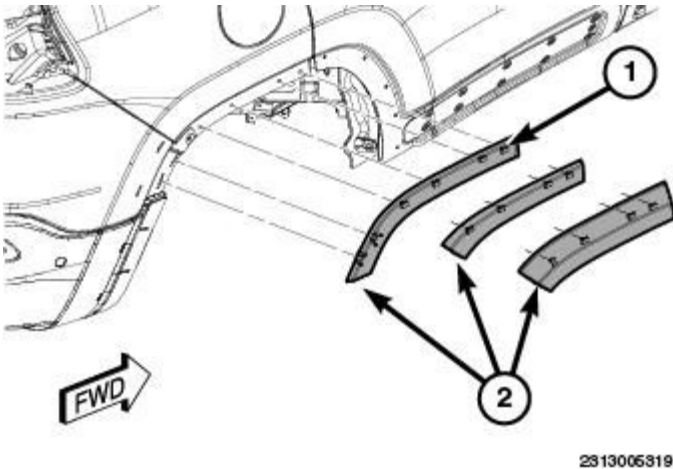


Fig. 262: Identifying Quarter Panel & Flares
 Courtesy of CHRYSLER GROUP, LLC

The wheel flares are set with two sided adhesive tape and plastic spring clips. The temperature in the work area and the vehicle should be at least 21° C (70° F) to avoid damaging the flare.

1. Use a plastic putty knife or equivalent, along the edges of the flare (2) to cut the two sided tape.
2. Use an 8 mm socket to release the spring retainers from the back side.
3. Remove the flare
4. Remove adhesive tape residue from painted surface of vehicle. Use a 3M Scotch-Brite™ Molding Adhesive and Stripe Removal Discs, or equivalent, to clean adhesive residue from painted surfaces. The adhesive removal discs are available from automotive paint suppliers. Refer to instructions supplied with the discs for proper usage.

REMOVAL - FASCIA

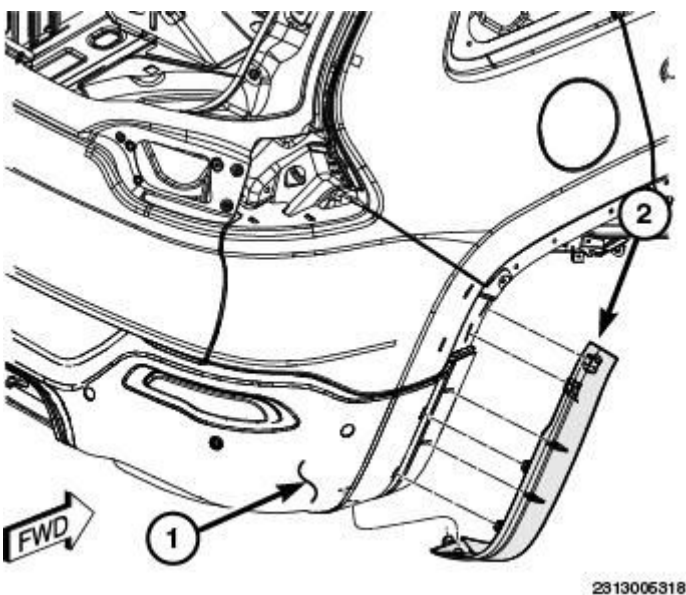


Fig. 263: Identifying Flare & Fasteners

Courtesy of CHRYSLER GROUP, LLC

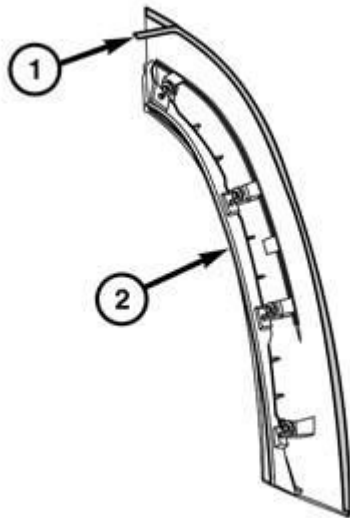
The wheel flares are secured with plastic spring clips. The temperature in the work area and the vehicle should be at least 21° C (70° F) to avoid damaging the flare.

1. Remove the rear wheelhouse splash shield. Refer to **SHIELD, SPLASH, REAR WHEELHOUSE, REMOVAL**.
2. Use trim tool (special tool #C-4829A, Remover, Trim), or equivalent to release the spring retainers.
3. Remove the flare

INSTALLATION

INSTALLATION

INSTALLATION - REAR DOOR



1303002790

Fig. 264: Wheel Flare & Spring Clips
Courtesy of CHRYSLER GROUP, LLC

1. If the wheel flare is to be reused
 - a. Remove two sided tape residue from the flare.
 - b. Clean back of the flare with Mopar® Super Kleen solvent, or equivalent.
 - c. Wipe dry with lint free cloth.
 - d. Apply new two sided adhesive tape to back of flare.
2. Clean the painted surface with Mopar® Super Kleen solvent, or equivalent. Wipe surface dry with lint free cloth.

3. Remove the protective cover (1) from the tape on back of the wheel flare (2).

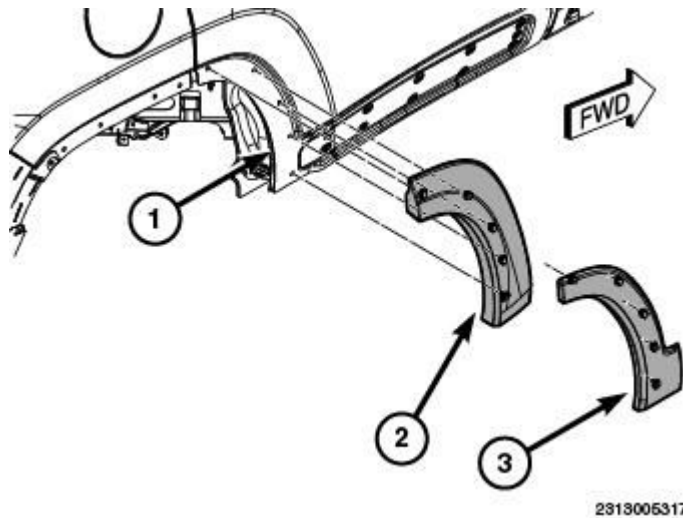


Fig. 265: Identifying Molding & Wheel Flares
 Courtesy of CHRYSLER GROUP, LLC

4. Align the spring retainers on the wheel flare (2) to the appropriate slots on the rear door (1) and with the use of hand pressure seat the clips fully.
5. Using a roller tool or equivalent, roll along the wheel flare where the two sided tape is applied with enough force to guarantee adhesion.

INSTALLATION - QUARTER PANEL

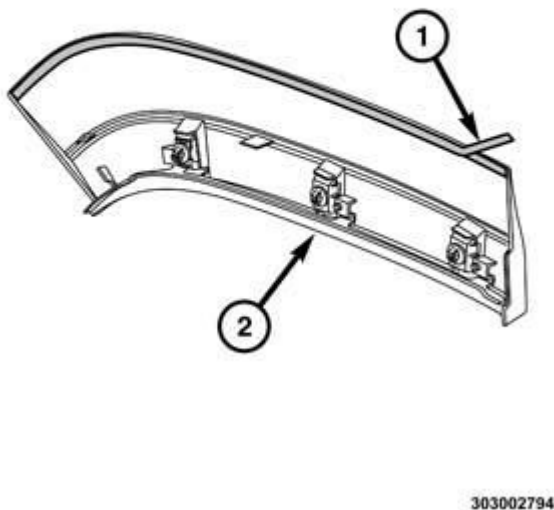
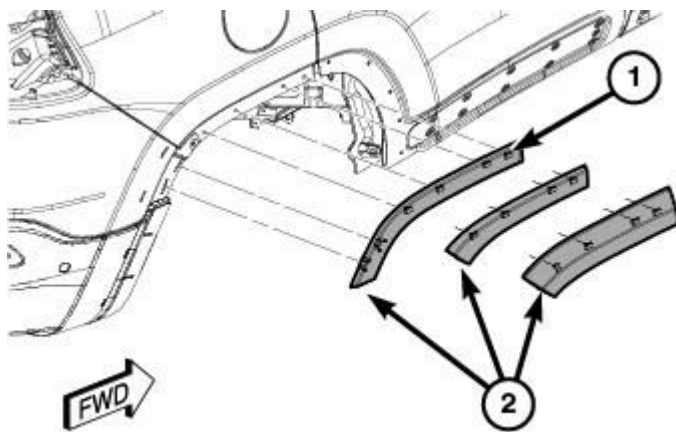


Fig. 266: Wheel Flare & Spring Clips

Courtesy of CHRYSLER GROUP, LLC

1. If the wheel flare is to be reused
 - a. Remove two sided tape residue from the flare.
 - b. Clean back of the flare with Mopar® Super Kleen solvent, or equivalent.
 - c. Wipe dry with lint free cloth.
 - d. Apply new two sided adhesive tape to back of flare.
2. Clean the painted surface with Mopar® Super Kleen solvent, or equivalent. Wipe surface dry with lint free cloth.
3. Remove the protective cover (1) from the tape on back of the wheel flare (2).



2913006319

Fig. 267: Identifying Quarter Panel & Flares

Courtesy of CHRYSLER GROUP, LLC

4. Align the spring retainers on the wheel flare (1) to the appropriate slots on the quarter panel and with the use of hand pressure seat the clips fully.
5. Using a roller tool or equivalent, roll along the wheel flare where the two sided tape is applied with enough force to guarantee adhesion.

INSTALLATION - REAR FASCIA

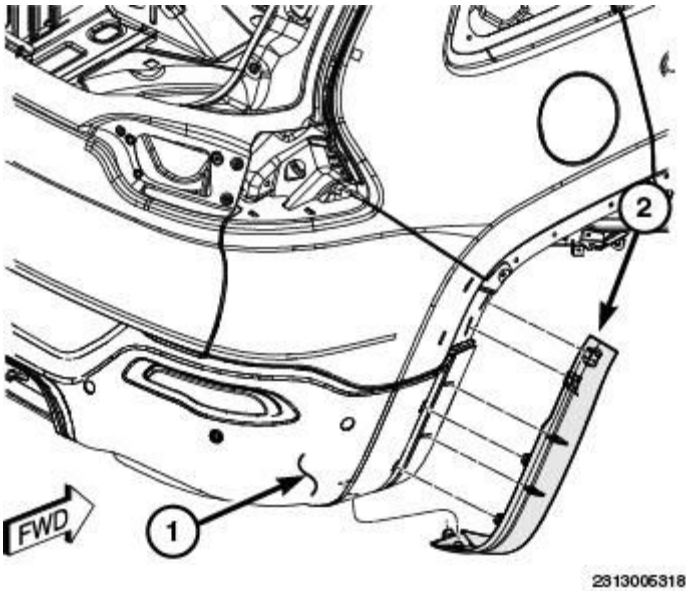


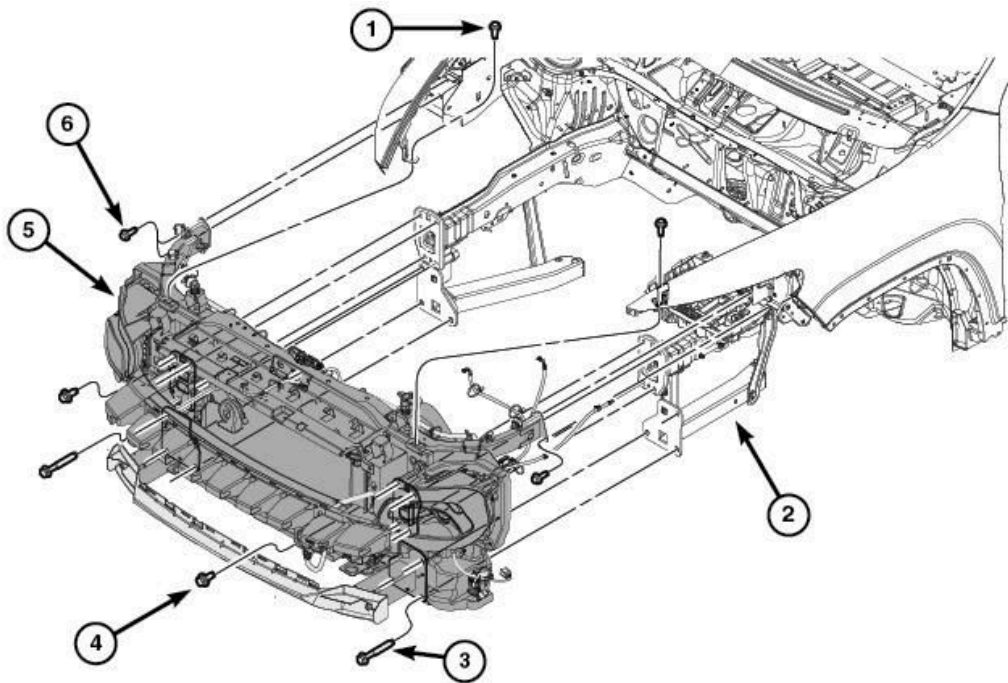
Fig. 268: Identifying Flare & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Align the spring retainers on the wheel flare (2) to the appropriate slots on the fascia (1) and with the use of hand pressure seat the clips fully.
2. Install the wheel house splash shield. Refer to **SHIELD, SPLASH, REAR WHEELHOUSE, INSTALLATION**.

PANEL, CLOSURE, RADIATOR

REMOVAL

REMOVAL



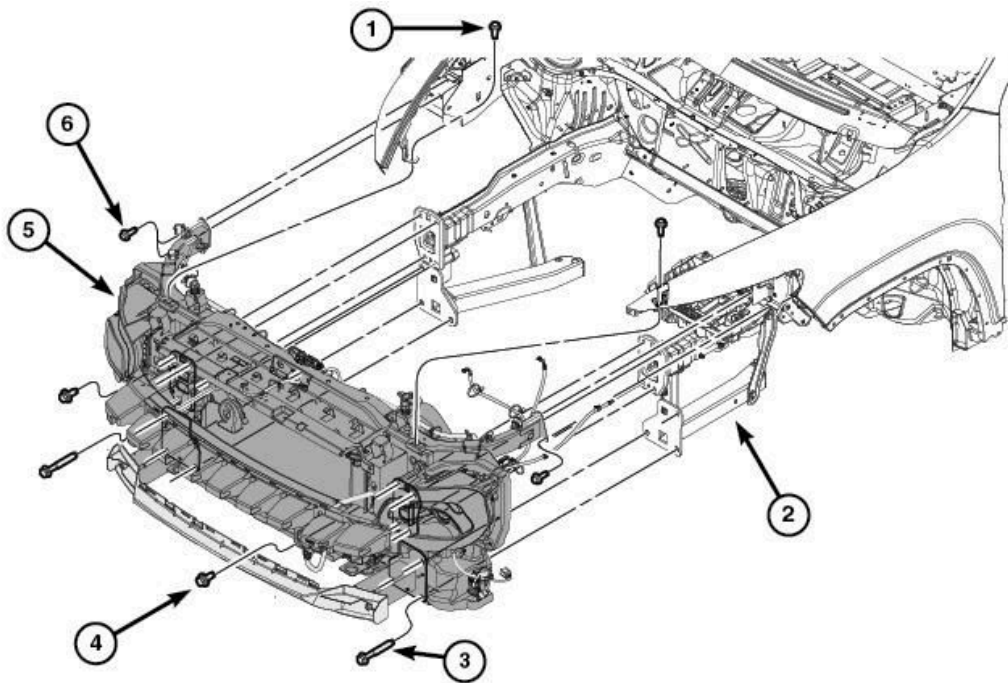
2313005310

Fig. 269: Identifying Radiator, Closure, Panel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate negative battery cable.
2. Remove the bolts securing the hood latch assembly and position the latch aside.
3. Remove the radiator assembly. Refer to **RADIATOR, ENGINE COOLING, REMOVAL** .
4. Remove the charge air cooler, if equipped. Refer to **REMOVAL** .
5. Remove both headlamp assemblies. Refer to **UNIT, FRONT LAMP, REMOVAL** .
6. Remove the washer bottle. Refer to **RESERVOIR, WINDSHIELD WASHER, REMOVAL** .
7. Remove the coolant bottle. Refer to **BOTTLE, PRESSURIZED COOLANT, REMOVAL** .
8. Release the clips to remove the headlamp harness and position the harness aside.
9. Remove the wheel house splash shields. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL** and **SHIELD, SPLASH, REAR WHEELHOUSE, REMOVAL**.
10. Remove the shotgun bracket bolt (2) from both sides.
11. Remove the three bolts (1) on both side securing the radiator closure panel (2) to the fenders and upper body.
12. Remove the lower two lower bolts (1) on both sides that secure the closure panel (2) to the front of the vehicle body.
13. Carefully remove the closure making sure the paint on the front edge of the fenders is protected from damage.

INSTALLATION

INSTALLATION

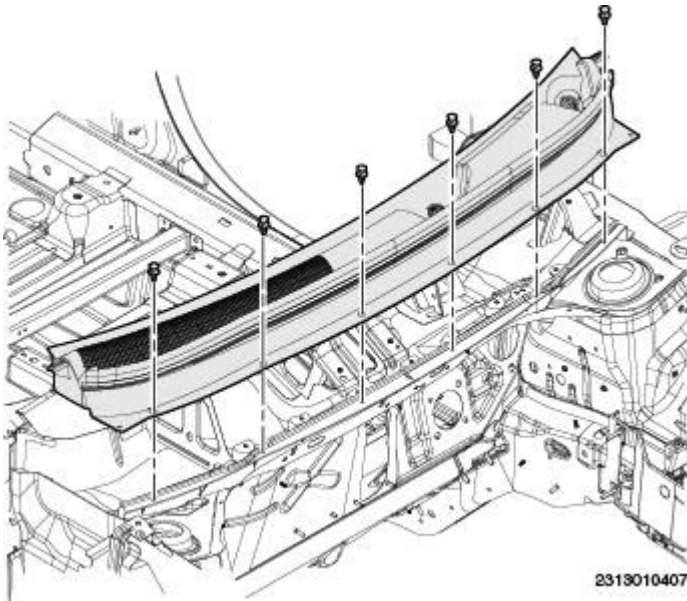


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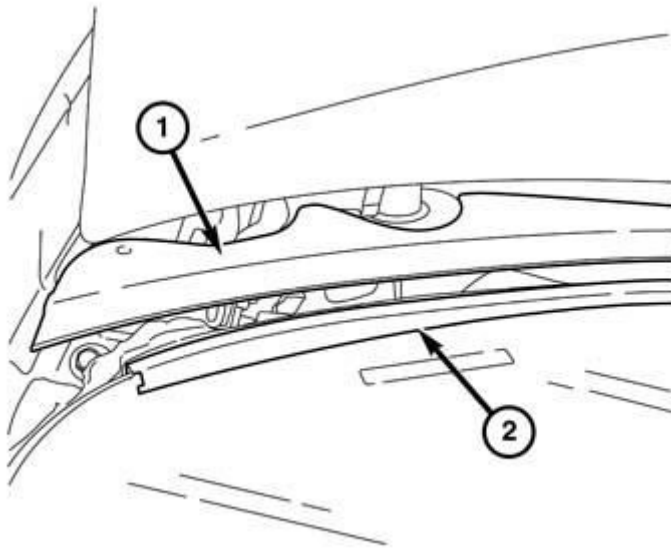
Fig. 270: Identifying Radiator, Closure, Panel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Carefully position the closure assembly up onto the front end sheet metal mounting and avoid damaging the front edges of the fenders.
2. Loosely install the two lower bolts on both sides but do not tighten at this time.
3. Install the three upper bolts on both sides, and tighten to 16 N.m (12 ft. lbs.).
4. Tighten the four lower bolts to 26 N.m (19 ft. lbs.).
5. Install the shotgun bracket bolts from inside the wheel wells and tighten to 16 N.m (12 ft. lbs.).
6. Position wheel liners and install the push-pin type retainers as needed. Install the front bumper beam assembly. Refer to **REINFORCEMENT, BUMPER, FRONT, INSTALLATION**.
7. Route the headlamp harness and secure as needed.
8. Position the coolant bottle, install the three bolts and secure. Tighten the bolts to 10 N.m (89 in. lbs.).
9. Install both the left and right headlamp assemblies. Refer to **UNIT, FRONT LAMP, INSTALLATION**.
10. Position the washer bottle, install the three fasteners and secure. Tighten the bolts to 7 N.m (60 in. lbs.).
11. Position the radiator back and install. Refer to **RADIATOR, ENGINE COOLING, INSTALLATION**.
12. Install the charge air cooler, if equipped. Refer to **INSTALLATION**.
13. Install the hood latch assembly and tighten the bolts to 9 N.m (80 in lbs).
14. Install the grille. Refer to **GRILLE, INSTALLATION**.
15. Connect the negative battery cable.

PANEL, PLENUM

REMOVAL**REMOVAL****Fig. 271: Cowl Panel & Push Pins****Courtesy of CHRYSLER GROUP, LLC**

1. Release hood latch and open hood.
2. Remove the clips attaching the cowl bulb seal to the cowl panel.
3. Remove the cowl panel end caps by pulling up at the end cap to cowl panel joint and then pulling the end cap out of the fender.
4. Remove the driver's side wiper cover by pulling up on the cover.
5. Remove windshield wiper arms. Refer to **ARM, WIPER, REMOVAL** .
6. With the use of (special tool #C-4755, Trim Stick) or equivalent, remove the seven push pins (1) attaching cowl panel (2) to the cowl plenum extension.



231368283

Fig. 272: Cowl Panel & Cowl Cover
Courtesy of CHRYSLER GROUP, LLC

NOTE: It will be necessary to use care when removing the cowl screen from the retainer on the windshield. If the retainer on the windshield is broken/damaged the windshield will require replacement.

7. Starting at the driver's side pull up on the back edge of the cowl panel (1) and work cross car to release the tab from the backside of the cowl panel (1) from the groove in the lower windshield channel (2).
8. Remove cowl cover (1) from vehicle.

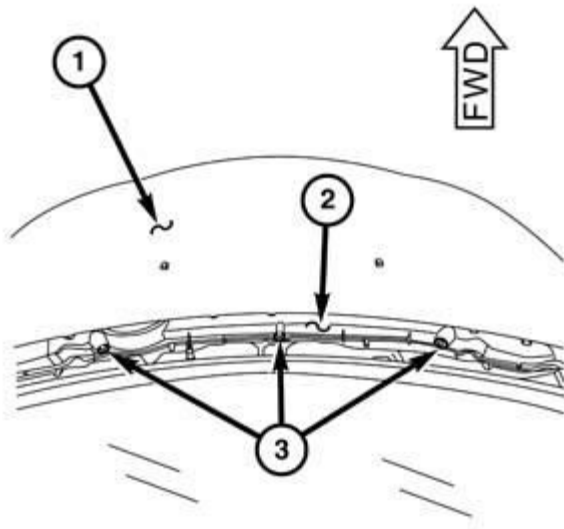
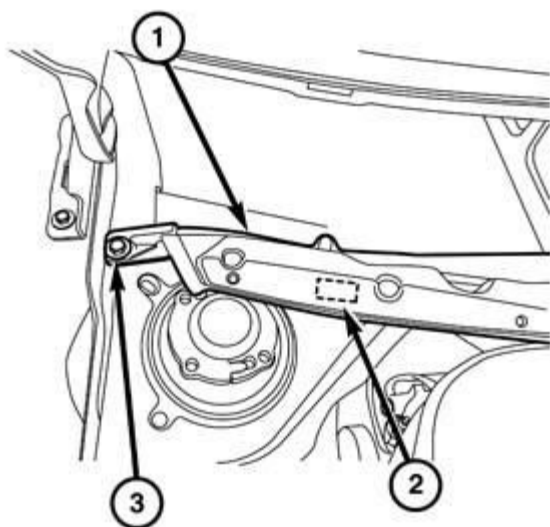


Fig. 273: Hood, Plenum Panel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

NOTE: Shown with hood (1) closed to show fastener location. Access the fasteners (3) with the hood (1) open.

9. Remove the three fasteners (3) from the plenum panel (2).

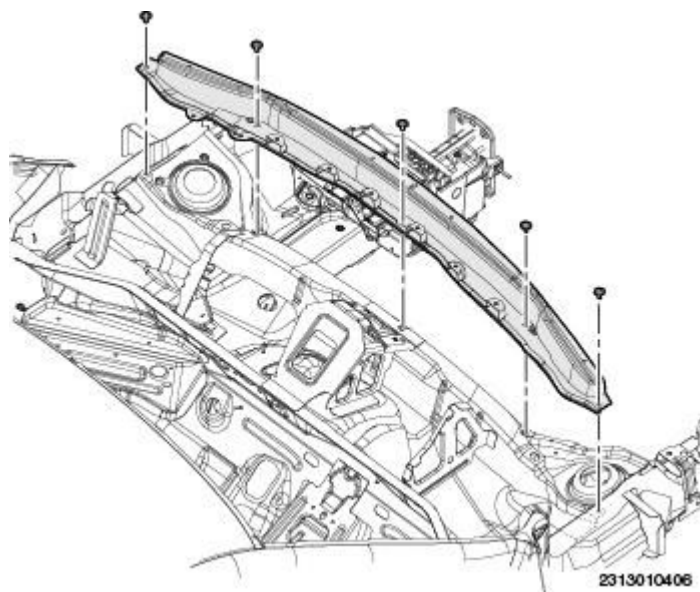


231370995

Fig. 274: Plenum Panel, Alignment Block & Fastener
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Right side shown, left side typical.

10. Remove fasteners (3) from the right and left sides of the plenum panel.
11. Locate the plenum panel (1) alignment block (2) located beneath cowl plenum lower panel.
12. Press the tab on the alignment block and lift up to disengage the tab.
13. Repeat on the opposite side.



2313010406

Fig. 275: Plenum Panel

Courtesy of CHRYSLER GROUP, LLC

14. Remove plenum panel from the vehicle.

INSTALLATION

INSTALLATION

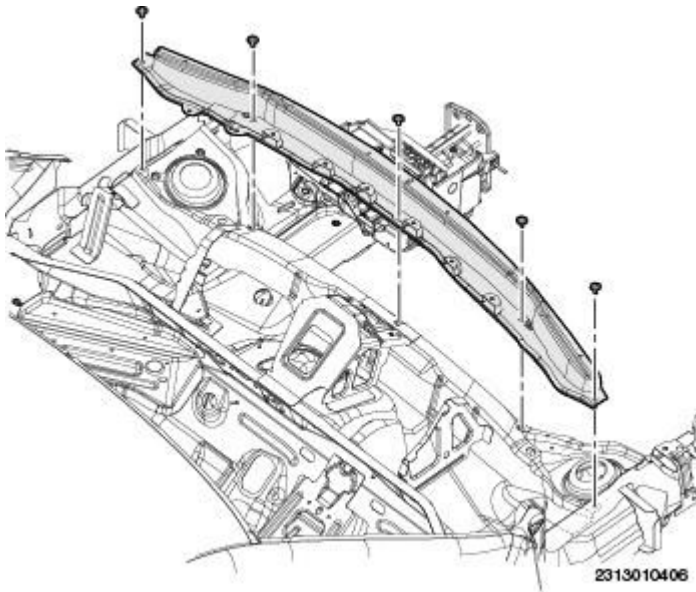
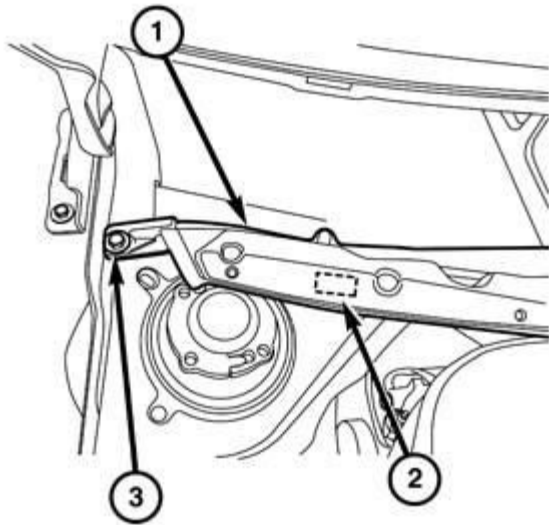


Fig. 276: Plenum Panel

Courtesy of CHRYSLER GROUP, LLC

NOTE: Right side shown, left side typical.

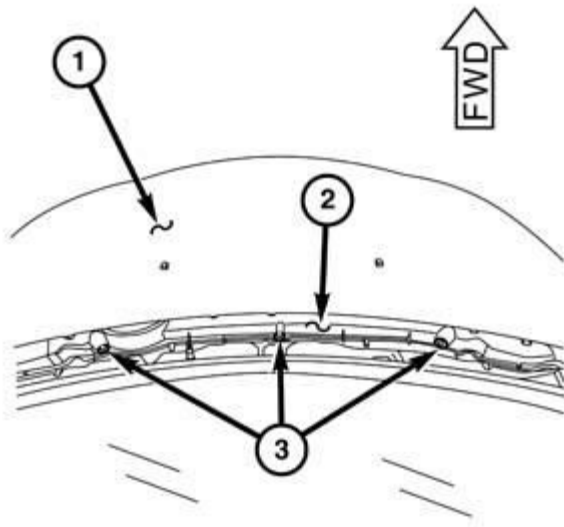
1. Align the plenum panel to the vehicle.



231370995

Fig. 277: Plenum Panel, Alignment Block & Fastener
Courtesy of CHRYSLER GROUP, LLC

2. Insert the plenum panel alignment blocks (2) into the appropriate holes in the cowl plenum lower panel on the right and left sides.
3. Install fasteners (3) on the right and left sides of the plenum panel.
4. Tighten the fasteners (3) securely.

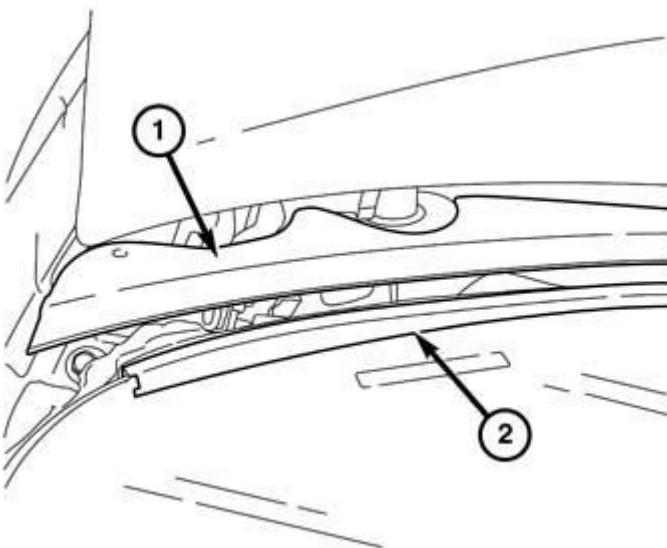


231370994

Fig. 278: Hood, Plenum Panel & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Shown with hood (1) closed to show fasteners (3) locations. Access the fasteners (3) with the hood (1) open.

5. Install the three fasteners (3) into the plenum panel (2).
6. Tighten the fasteners (3) securely.



231368283

Fig. 279: Cowl Panel & Cowl Cover

Courtesy of CHRYSLER GROUP, LLC

7. Position cowl panel cover (2) to vehicle.
8. Starting in the center of the back edge of the cowl panel (1) and working out to the edges, align the tab on the backside of the cowl panel (1) into the groove in the lower windshield channel (2).

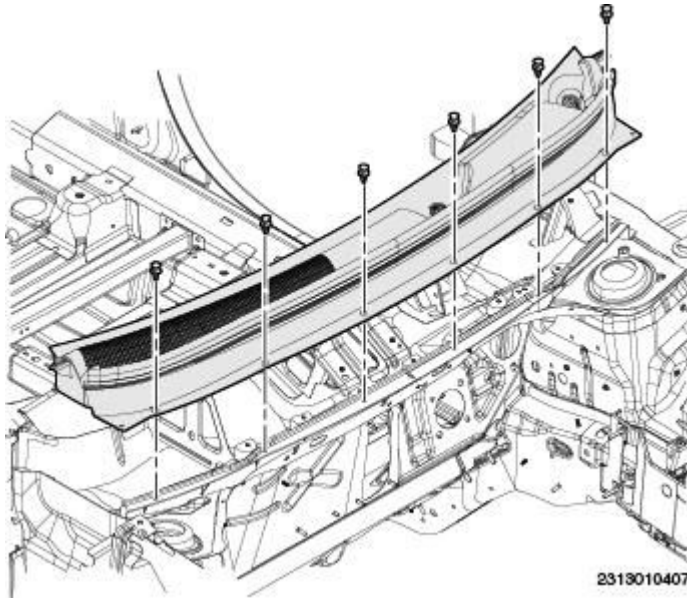


Fig. 280: Cowl Panel & Push Pins
Courtesy of CHRYSLER GROUP, LLC

9. Using hand pressure fully insert cowl panel tab (1) into windshield insert (2).
10. Install push pins (1) attaching cowl cover to cowl.
11. Install windshield wiper arms. Refer to **ARM, WIPER, INSTALLATION** .
12. Align the clips on the driver's side wiper cover and engage clips with hand pressure.
13. Align the clips on the right and left cowl panel end caps and engage with hand pressure.
14. Install the clips attaching cowl plenum under hood to cowl bulb seal to cowl panel.

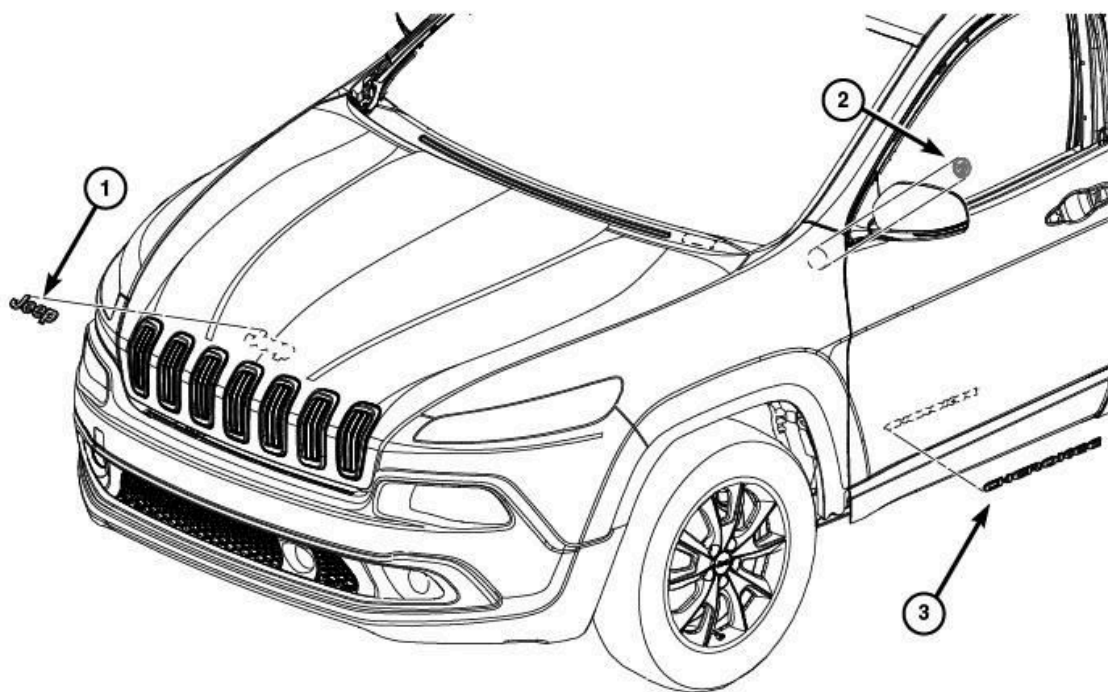
NAMEPLATE

REMOVAL

REMOVAL

2014 Jeep Cherokee Trailhawk

2014 ACCESSORIES AND EQUIPMENT Body - Interior & Exterior - Cherokee



2313005315

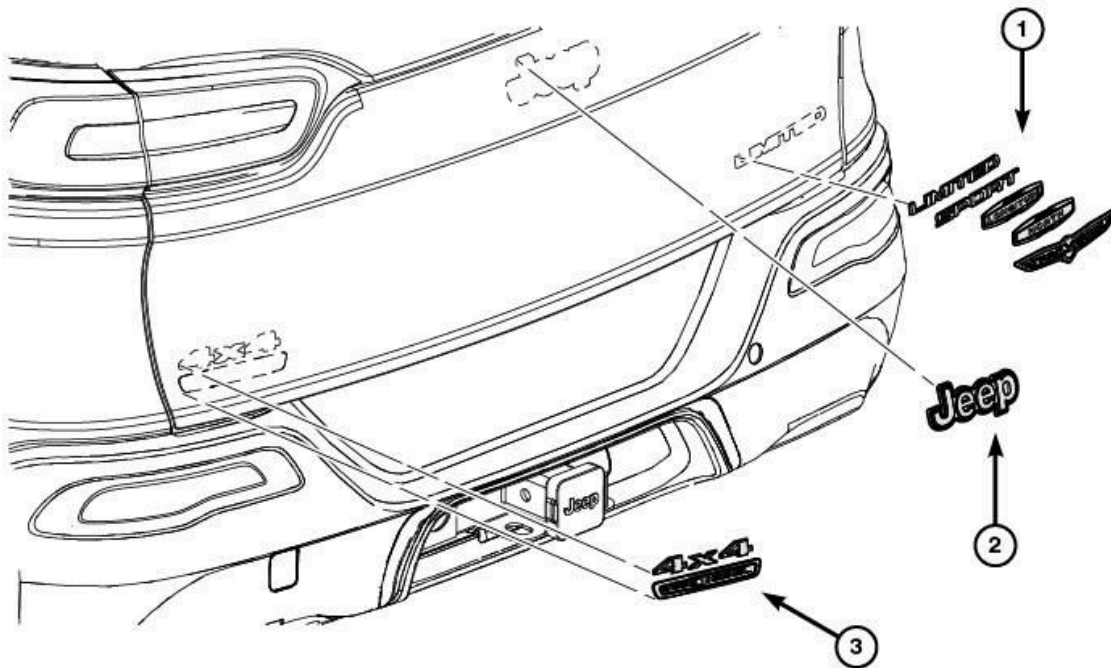
Fig. 281: Identifying Front/Side Nameplates
Courtesy of CHRYSLER GROUP, LLC

FRONT/SIDE NAMEPLATES

1 - JEEP

2 - TRAIL RATED

3 - CHEROKEE



2313005316

Fig. 282: Identifying Rear Nameplates
Courtesy of CHRYSLER GROUP, LLC

REAR NAMEPLATES

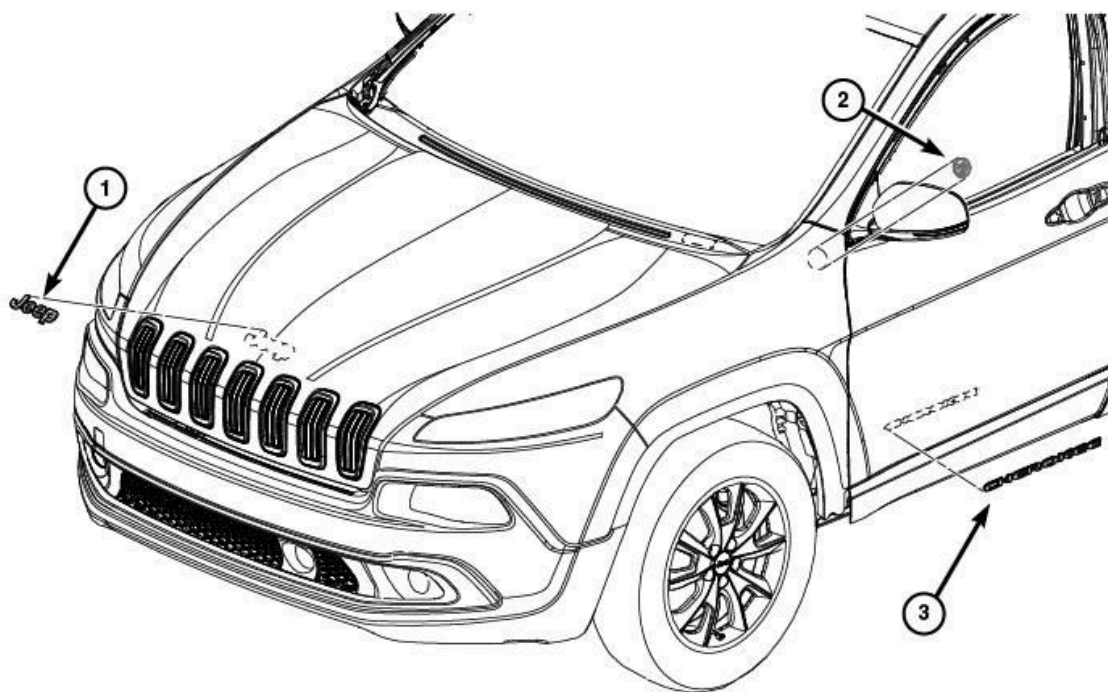
1 - LIMITED, SPORT, LONGITUDE, NORTH, TRAIL HAWK
2 - JEEP
3 - 4x4, ECO DIESEL

NOTE: Exterior nameplates are attached to body panels with adhesive tape.

1. Apply a length of masking tape on the body, parallel to the top edge of the nameplate to use as a guide, if necessary.
2. If temperature is below 21°C (70°F) warm emblem with a heat lamp or gun. Do not exceed 52°C (120°F) when heating emblem.
3. Insert a plastic trim stick or a hard wood wedge behind the emblem to separate the adhesive backing from the body.
4. Clean adhesive residue from body with MOPAR® Super Kleen solvent or equivalent.

INSTALLATION

INSTALLATION

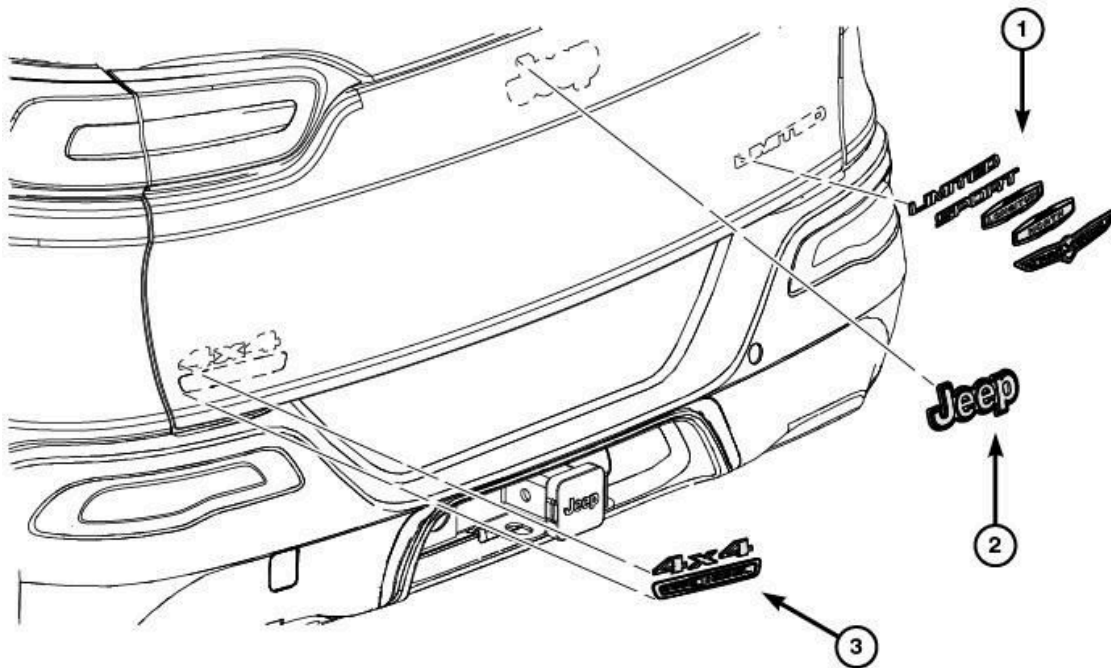


2313005315

Fig. 283: Identifying Front/Side Nameplates
 Courtesy of CHRYSLER GROUP, LLC

FRONT/SIDE NAMEPLATES

1 - JEEP
2 - TRAIL RATED
3 - CHEROKEE



2313005316

Fig. 284: Identifying Rear Nameplates
Courtesy of CHRYSLER GROUP, LLC

REAR NAMEPLATES

1 - LIMITED, SPORT, LONGITUDE, NORTH, TRAIL HAWK
2 - JEEP
3 - 4x4, ECO DIESEL

1. Remove carrier from adhesive tape on back of emblem.
2. Position emblem properly on body.
3. Press emblem firmly to body with palm of hand.
4. If temperature is below 21°C (70°F) warm emblem with a heat lamp or gun to assure adhesion. Do not exceed 52°C (120°F) when heating emblem.

RACK, LUGGAGE

STANDARD PROCEDURE

RIVET NUT PROCEDURE

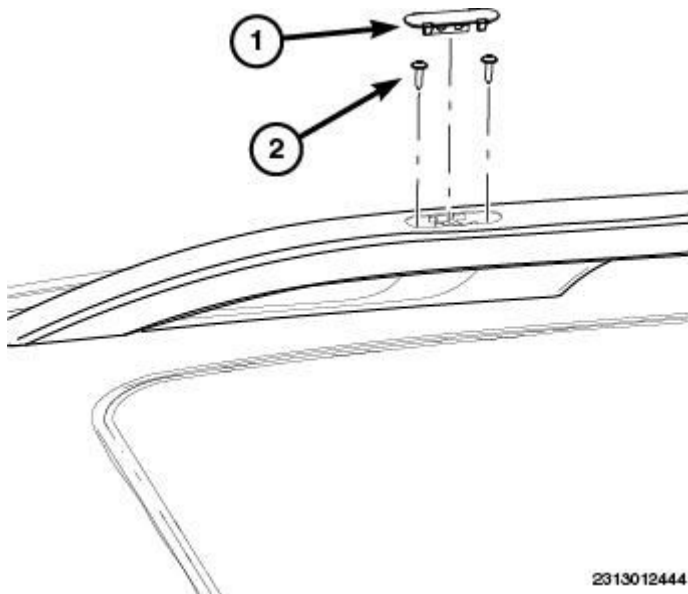
CAUTION: Failure to follow these recommendations could result in damage to the vehicle

Rivet nuts are used on the roof to mount the roof rack. Rivet nuts are used for parts installations, when access to the back mounting area is limited or boxed in. It is important to achieve a full seat on the first attempt due to the lack of accessibility on the back side of the rivet nut. Poor seating of the rivet nut will result in part failure, loose parts and possible water leaks.

The use of a commercially available threaded insert tool will be necessary. There are several styles and types readily available. Examples of multi fit choices are the Matco® 203F and the Snap On® HP650M, or you may select one with equivalent capabilities. If a multi fit option is not chosen, it must be capable of a thread size of **M6 X 1.00** . Follow the tool manufacturer recommended directions for proper installation.

REMOVAL

REMOVAL



2313012444

Fig. 285: Identifying Fastener Covers & Fasteners
Courtesy of CHRYSLER GROUP, LLC

NOTE: If any of the four tabs are broken during removal, the cover must be replaced.

1. Using a small flat bladed tool or equivalent, remove the two fastener covers (1).
2. Remove the two fasteners (2) at the front and rear of the rail.

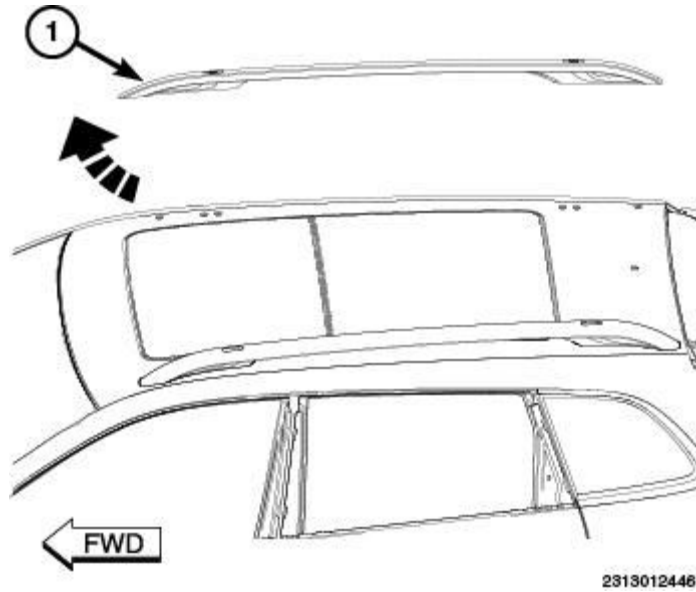


Fig. 286: Removing Roof Rack Rail
Courtesy of CHRYSLER GROUP, LLC

3. Slide the roof rack rail (1) forward and remove.

INSTALLATION

INSTALLATION

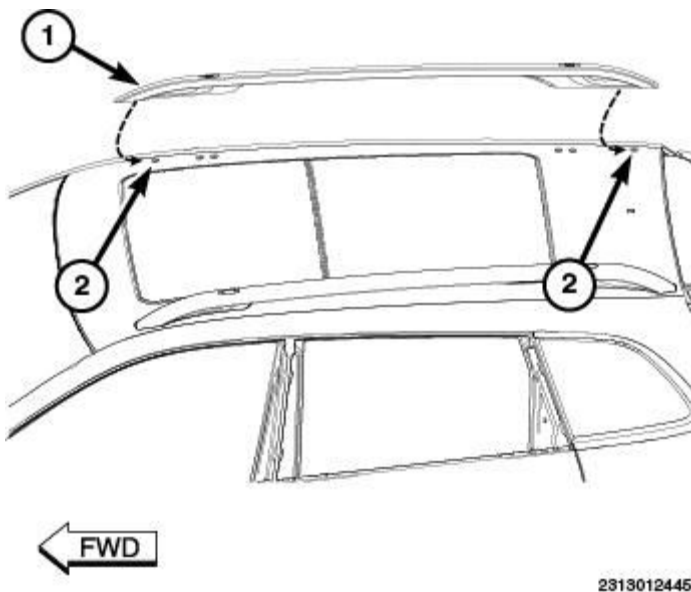


Fig. 287: Identifying Roof Rack Rail & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Place roof rack rail (1) just forward of the rivnut fasteners (2) and slide rearward until fully engaged.

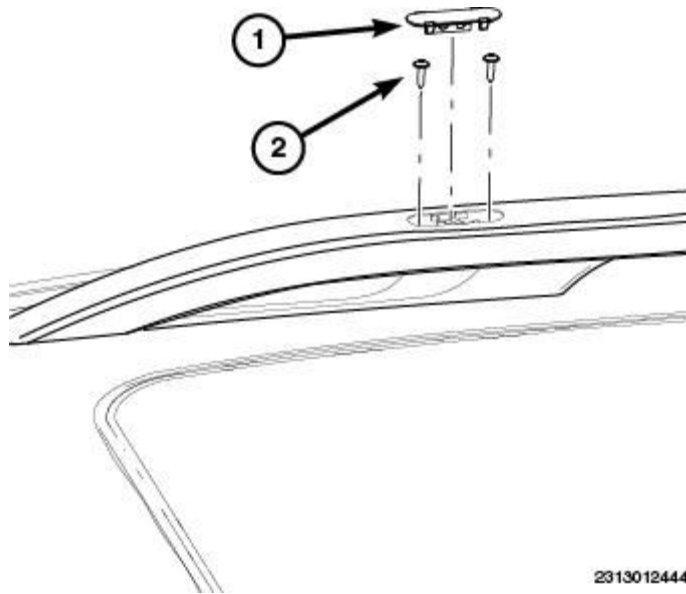


Fig. 288: Identifying Fastener Covers & Fasteners
Courtesy of CHRYSLER GROUP, LLC

2. Install the four fasteners (2) and tighten to 6 N.m (53 in. lbs.)
3. Install the fastener covers (1) and seat fully.

NOTE: Make sure the two retention clips snap fully below the rail. Cover should be flush to the top of the rail.

SHIELD, SPLASH, FRONT WHEELHOUSE

REMOVAL

REMOVAL

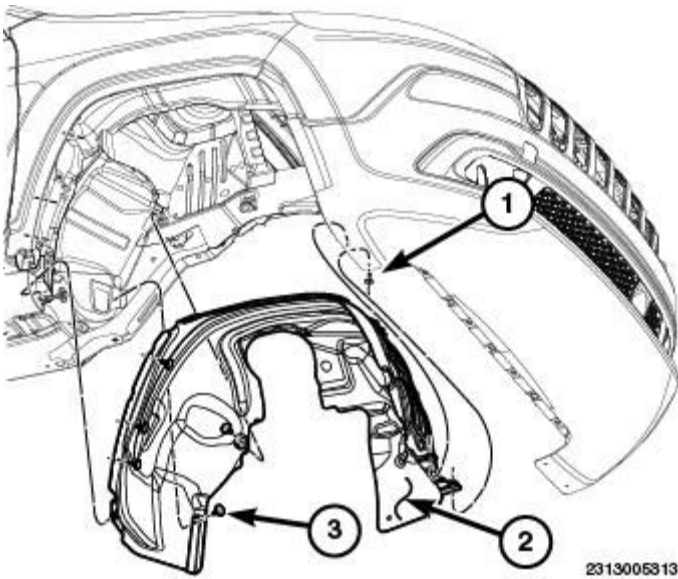


Fig. 289: Identifying Front Wheelhouse Splash Shield & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

1. Raise and support the vehicle.
2. Remove the wheel from the side of the vehicle being serviced. Refer to **REMOVAL** .
3. Remove the five push pins (3) from the rear area of the splash shield (2).

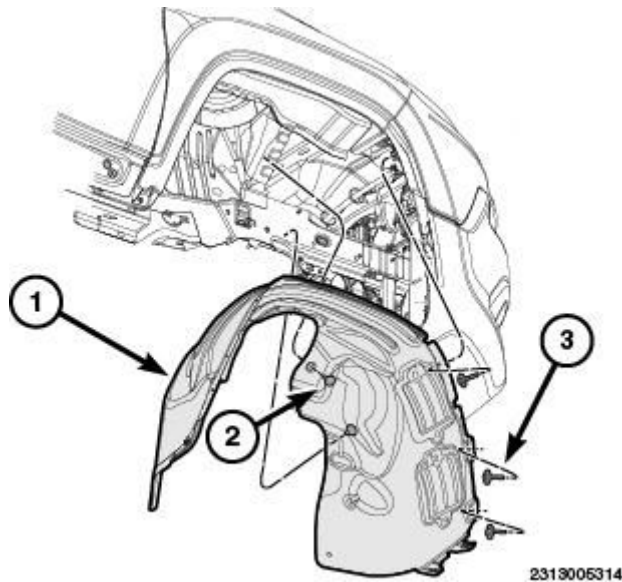


Fig. 290: Identifying Inner Wheel Splash Shield & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

4. Remove the push pin fasteners (2) from the front of the splash shield (1).
5. Remove the fasteners (3) securing the splash shield (1) to the fascia.
6. Release the outboard edge of the splash shield (1) from the fender flange.

7. Remove the splash shield (1) from the vehicle.

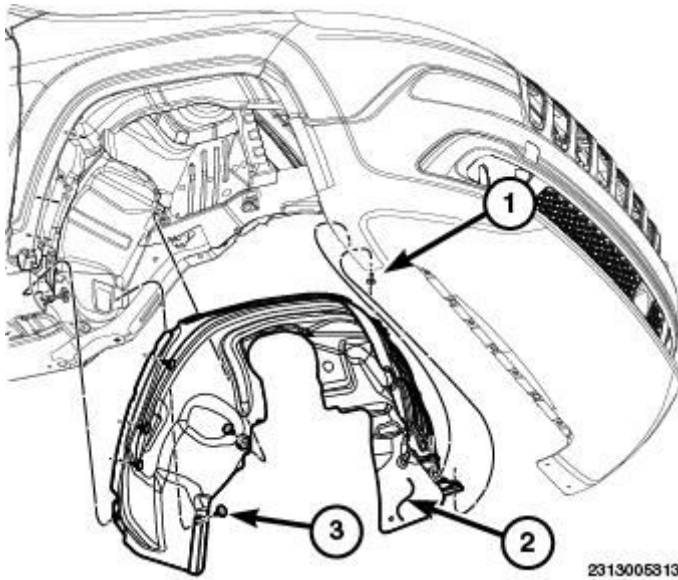
INSTALLATION**INSTALLATION**

Fig. 291: Identifying Front Wheelhouse Splash Shield & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Position the front wheelhouse splash shield (2) into the front fender well.
2. Install the five push pins (3) into the rear area of the splash shield.

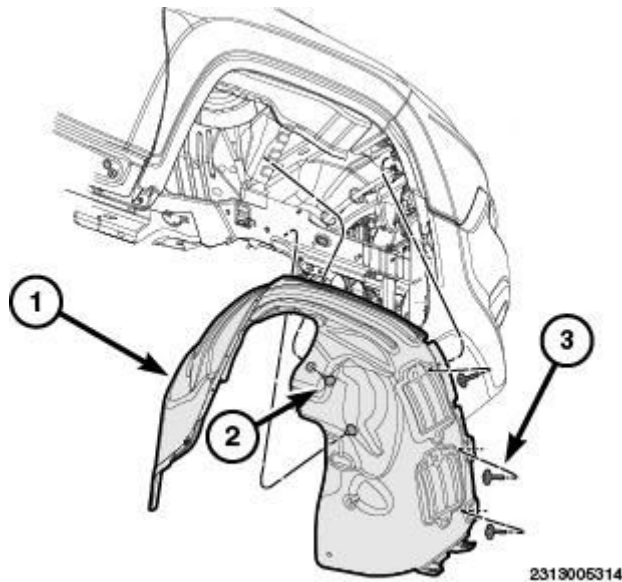


Fig. 292: Identifying Inner Wheel Splash Shield & Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Install the push pin fasteners (2) into the front of the splash shield (1).
4. Install the fasteners (3) securing the shield to the fascia and tighten securely.
5. Install the front wheel to the side of the vehicle being serviced. Refer to **INSTALLATION**.
6. Lower the vehicle.

SHIELD, SPLASH, REAR WHEELHOUSE

REMOVAL

REMOVAL

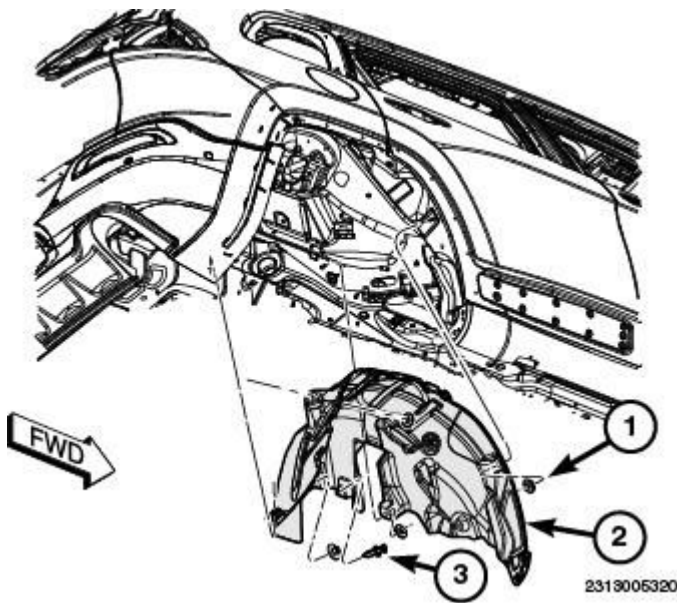


Fig. 293: Identifying Rear Wheelhouse Splash Shield & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Raise and support the vehicle.
2. Remove the wheel from the side of the vehicle being serviced. Refer to **REMOVAL**.
3. Remove the push pins (3) from the splash shield (2).
4. Remove the fasteners (1) securing the splash shield (2) to the fascia and wheelhouse.
5. Release the outboard edge of the splash shield (2) from the body side flange.
6. Remove the splash shield (2) from the vehicle.

INSTALLATION

INSTALLATION

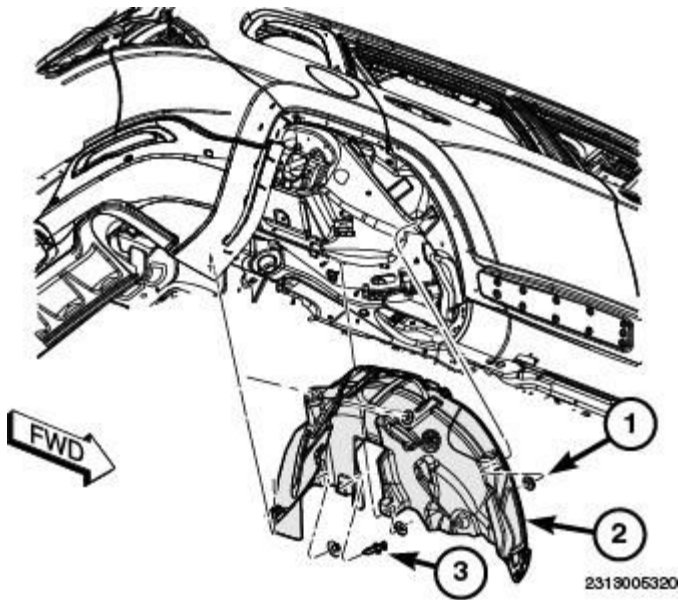


Fig. 294: Identifying Rear Wheelhouse Splash Shield & Fasteners

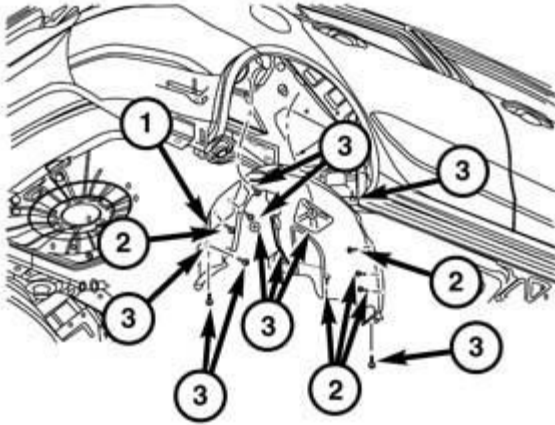
Courtesy of CHRYSLER GROUP, LLC

1. Position the rear wheelhouse splash shield (2) into the rear body side opening.
2. Install the fasteners (1) securing the shield to the fascia and wheelhouse.
3. Tighten the fasteners securely
4. Install the push pin fasteners (3) into the splash shield (1).
5. Install the front wheel to the side of the vehicle being serviced. Refer to **INSTALLATION** .
6. Lower the vehicle.

HOUSING, FUEL FILL

REMOVAL

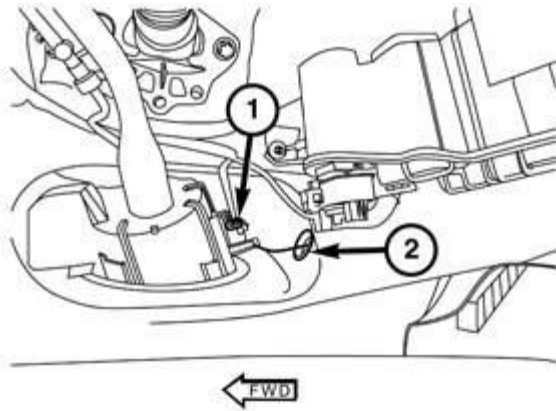
REMOVAL



130569171

Fig. 295: Splash Shield, Push Pins & Fasteners
Courtesy of CHRYSLER GROUP, LLC

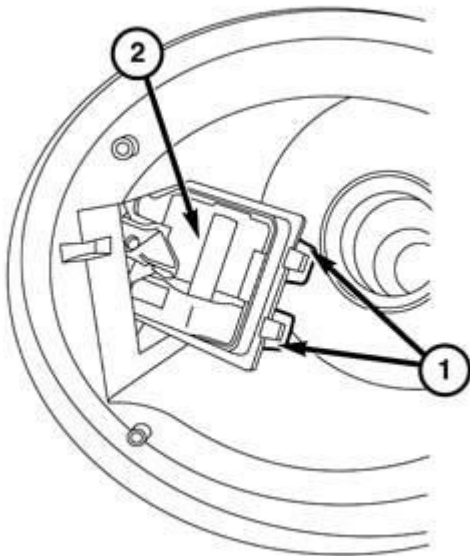
1. Open the fuel filler door.
2. Disconnect and isolate the negative battery cable.
3. Remove right rear wheel. Refer to **REMOVAL** .
4. Remove right rear wheelhouse splash shield. Refer to **SHIELD, SPLASH, REAR WHEELHOUSE, REMOVAL**.



231370985

Fig. 296: Cable Grommet & Actuator Wiring Connector
Courtesy of CHRYSLER GROUP, LLC

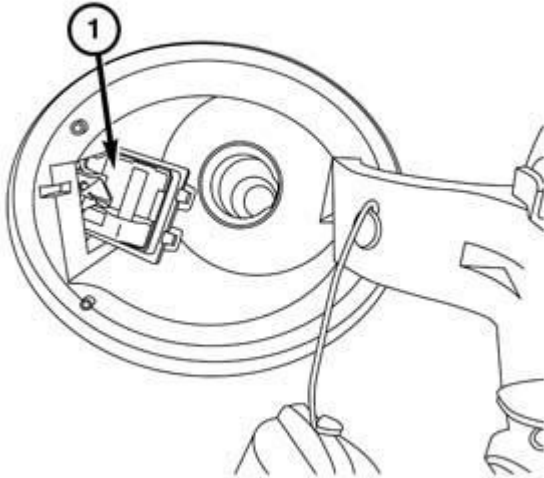
5. From within the wheelhouse, disconnect actuator wiring connector (1).



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Fig. 297: Lock Tabs & Fuel Door Actuator
Courtesy of CHRYSLER GROUP, LLC

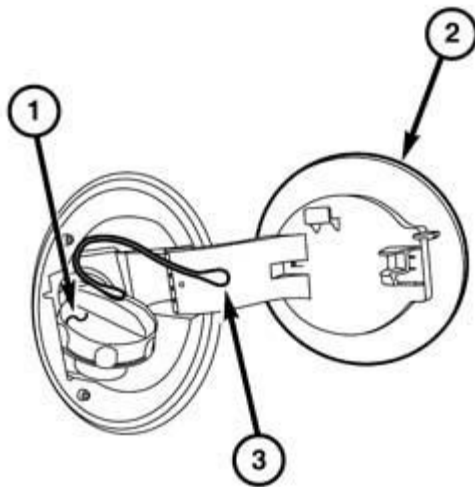
6. With the use of a small flat bladed tool or equivalent, gently pry the two tabs (1) on the outside of the actuator (2) to release the top portion from the fuel filler housing.
7. Move the top of the actuator (1) forward.
8. Lift up slightly to release the bottom of the actuator from the fuel filler housing.



082370949

Fig. 298: Actuator**Courtesy of CHRYSLER GROUP, LLC**

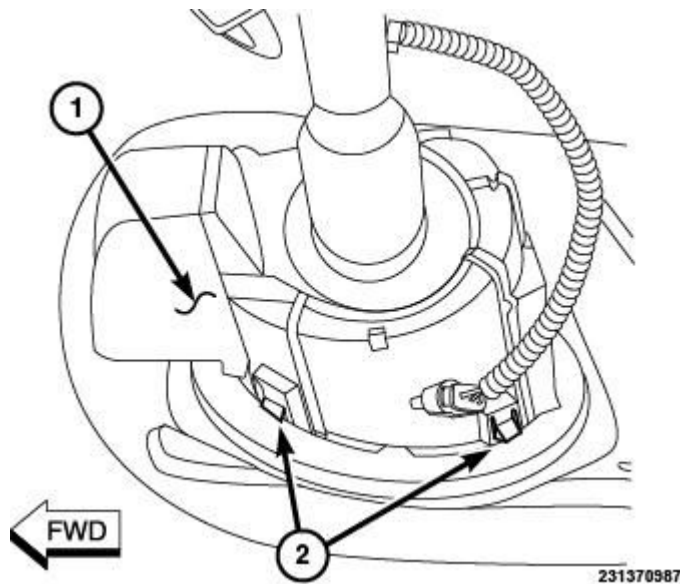
9. Rotate and angle the actuator (1) so that it will fit through the hole in the fuel filler housing.



231370988

Fig. 299: Gas Cap, Fuel Door & Gas Cap Tether
Courtesy of CHRYSLER GROUP, LLC

10. Remove fuel fill door (2). Refer to **DOOR, FUEL FILL, REMOVAL**.
11. With the use of a (special tool #C-4829A, Remover, Trim) remove the gas cap tether (3) from the fuel filler housing.



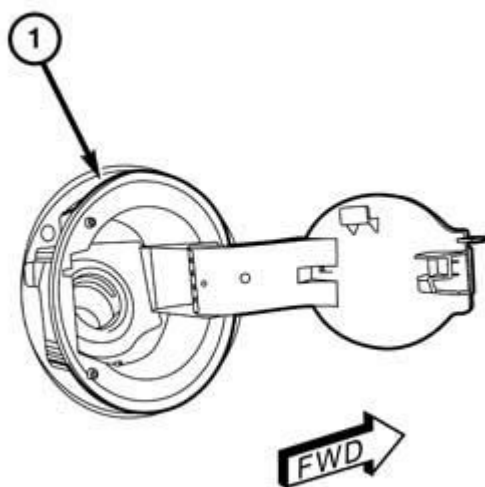
231370987

Fig. 300: Fuel Filler Housing & Mounting Tabs
Courtesy of CHRYSLER GROUP, LLC

12. On the back of the fuel filler housing, use hand pressure to release the rear lower mounting tab (2) and the

rear upper mounting tab located above and move the rear lower portion of the fuel filler housing (1) slightly outward.

13. Press in the rear upper tab to release on the fuel filler housing.



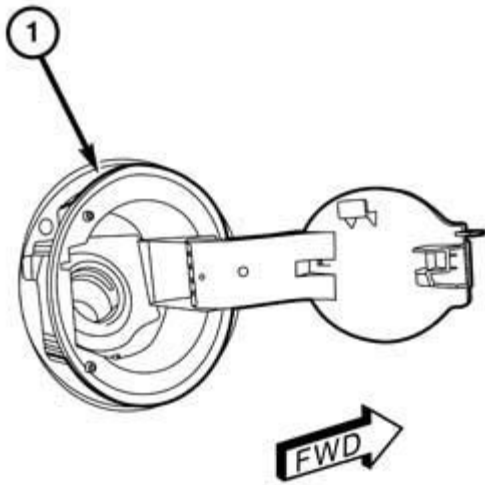
231370989

Fig. 301: Fuel Filler Housing
Courtesy of CHRYSLER GROUP, LLC

14. With the rear portion of the fuel filler housing (1) released from the vehicle, press the upper and lower front tabs on the back of the fuel filler housing.
15. Move the rear portion of the fuel filler out further to get the seal over the fuel filler tube.
16. Remove the fuel filler housing from the vehicle.

INSTALLATION

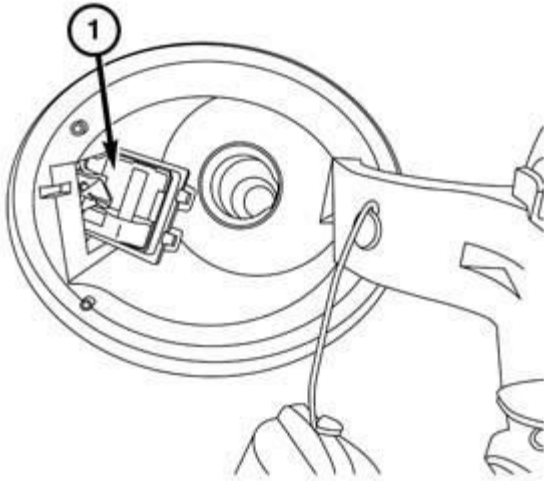
INSTALLATION



231370989

Fig. 302: Fuel Filler Housing**Courtesy of CHRYSLER GROUP, LLC**

1. Position the front portion of the fuel filler housing (1) behind the quarter panel.
2. Insert fuel filler tube through center seal of the fuel filler housing (1).
3. Push inward to seat the four mounting tabs located on the back of the fuel filler housing.
4. Verify the four tabs have seated fully.

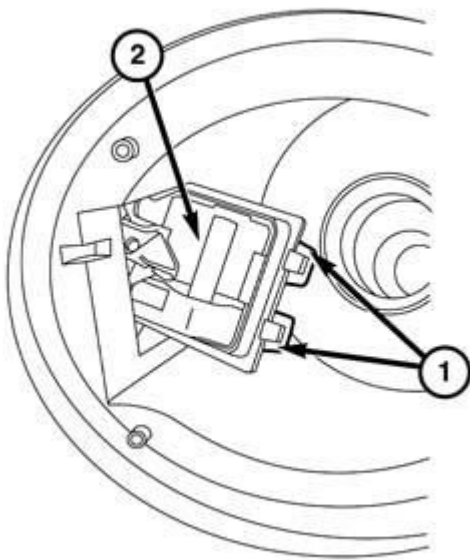


082370949

Fig. 303: Actuator

Courtesy of CHRYSLER GROUP, LLC

5. Angle the fuel door latch actuator (1) so that it fits through the hole in the fuel filler housing and slide the actuator into the fuel filler housing pocket.

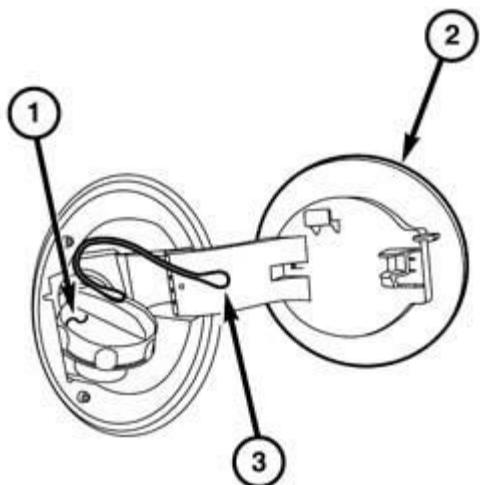


082370948

Fig. 304: Lock Tabs & Fuel Door Actuator

Courtesy of CHRYSLER GROUP, LLC

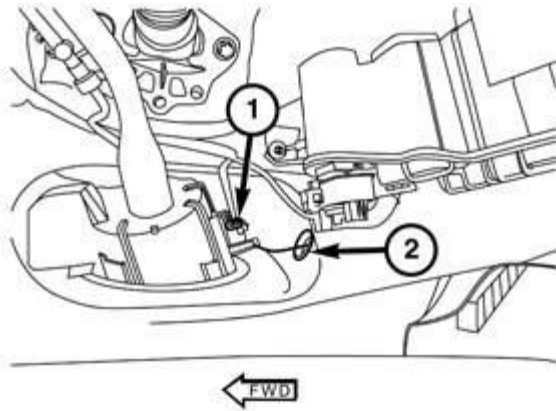
6. Insert the bottom of the fuel door latch actuator (2) into the notch on the bottom of the fuel filler housing.
7. Push the upper portion of the actuator back to engage the two upper tabs (1).



231370988

Fig. 305: Gas Cap, Fuel Door & Gas Cap Tether
Courtesy of CHRYSLER GROUP, LLC

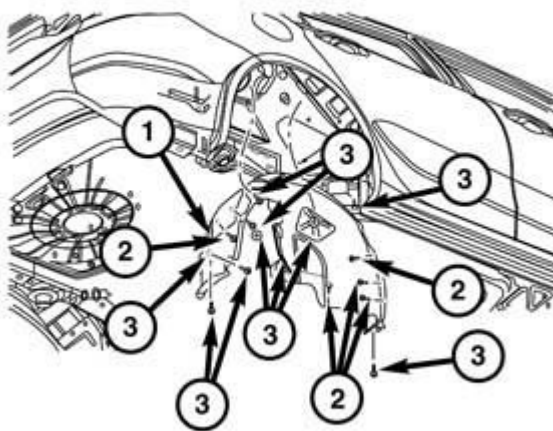
8. Install the gas cap (1).
9. Align the gas cap tether retaining clip (3) into the appropriate hole in the fuel filler housing and insert fully.
10. Install the fuel filler door (2). Refer to **DOOR, FUEL FILL, INSTALLATION**.



231370985

Fig. 306: Cable Grommet & Actuator Wiring Connector
 Courtesy of CHRYSLER GROUP, LLC

11. From within the wheelhouse, connect the wiring connector to the actuator (1).
12. Inspect to be certain the manual release cable grommet (2) is seated properly.
13. If not seated properly, insert into wheel house fully.



130569171

Fig. 307: Splash Shield, Push Pins & Fasteners
Courtesy of CHRYSLER GROUP, LLC

14. Install the rear wheelhouse splash shield (1). Refer to **SHIELD, SPLASH, REAR WHEELHOUSE, INSTALLATION**.
15. Install the wheel. Refer to **INSTALLATION**.
16. Connect the battery negative cable.

HOOD

CABLE, HOOD RELEASE

REMOVAL

REMOVAL

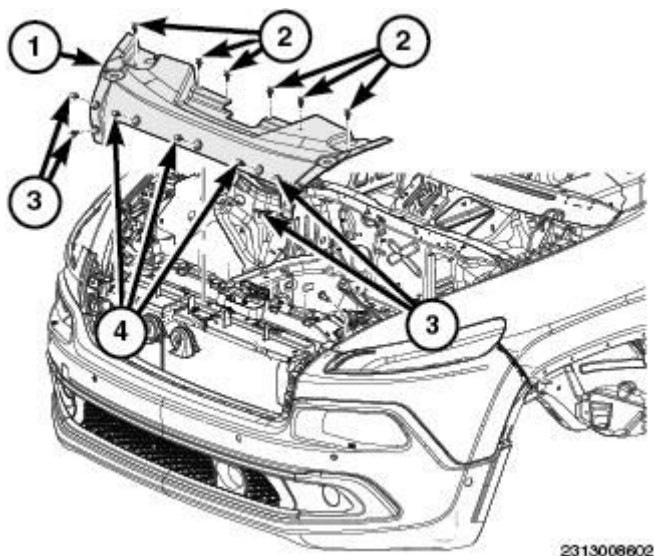


Fig. 308: Upper Close Out Panel Cover Components
Courtesy of CHRYSLER GROUP, LLC

1. Remove the push pins and remove the radiator closeout panel.

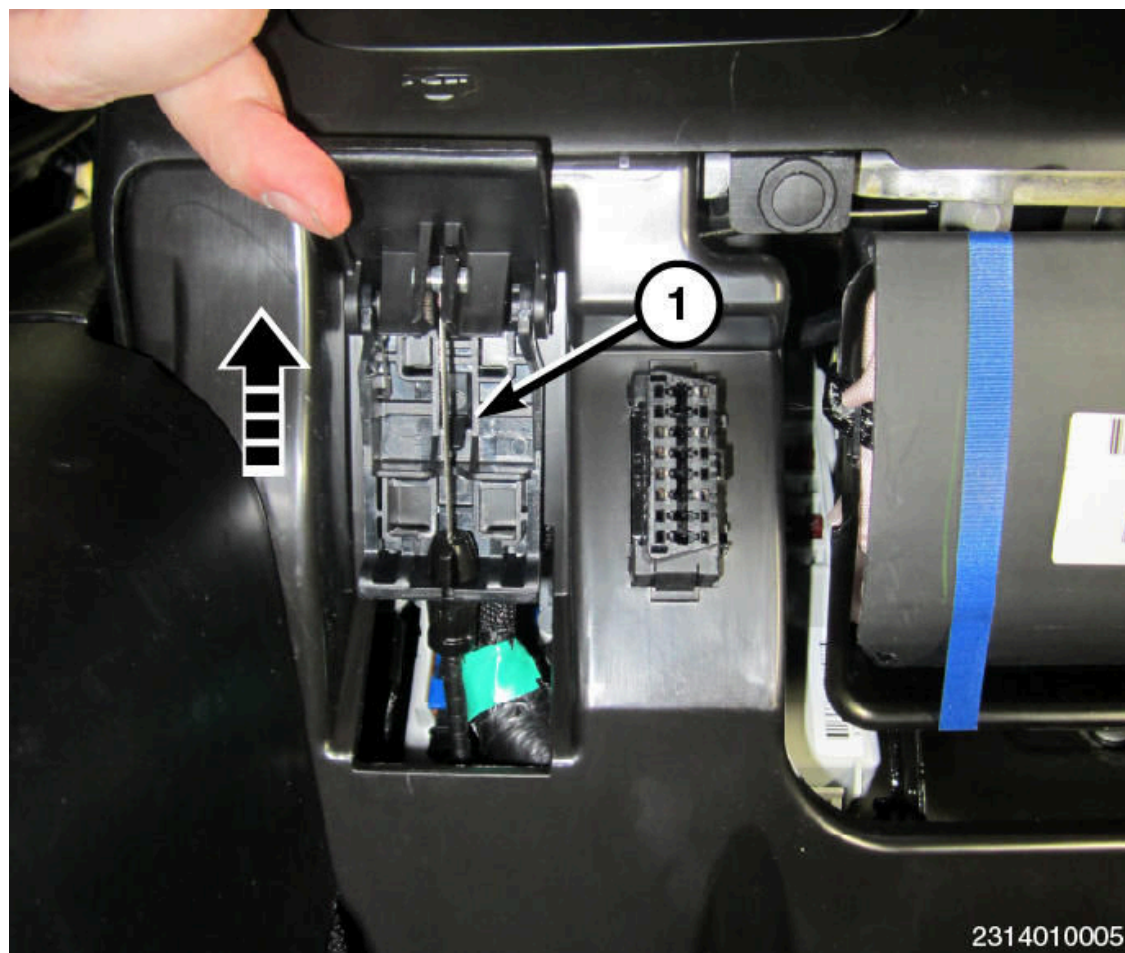
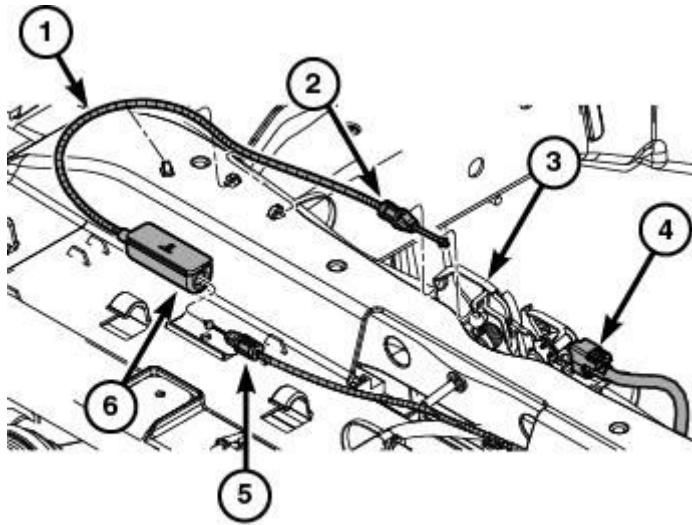


Fig. 309: Removing Hood Release Handle
Courtesy of CHRYSLER GROUP, LLC

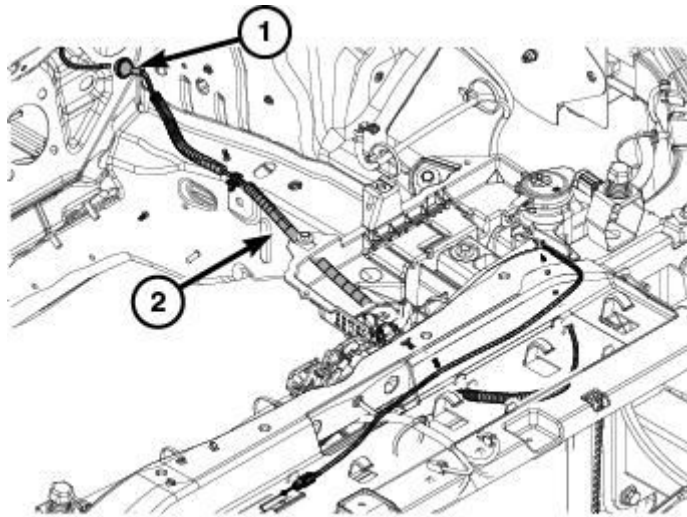
2. Remove the hood release handle by pushing up on the release (1) to disengage and then pulling rearward on the handle.



2314004730

Fig. 310: Identifying Hood Latch Cable & Retaining Clips/Tabs
Courtesy of CHRYSLER GROUP, LLC

3. Disengage the cable (2) from the hood latch (3).



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Fig. 311: Identifying Grommet & Cable
Courtesy of CHRYSLER GROUP, LLC

4. Release retaining clips/tabs attaching the hood release cable (1) to the left inner frame rail.

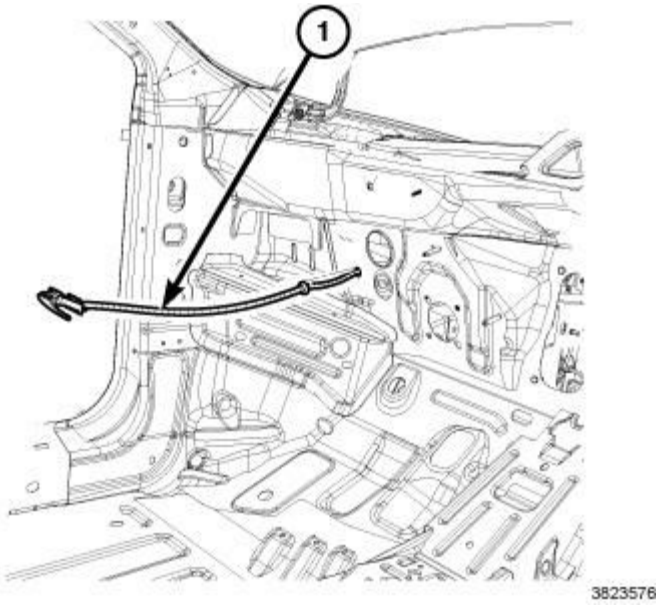


Fig. 312: Hood Release Cable Inside Vehicle
Courtesy of CHRYSLER GROUP, LLC

5. Disengage rubber grommet at lower dash panel.
6. From the vehicle interior pull the cable assembly (1) rearward.
7. Remove the hood release cable (1) from vehicle.

INSTALLATION

INSTALLATION

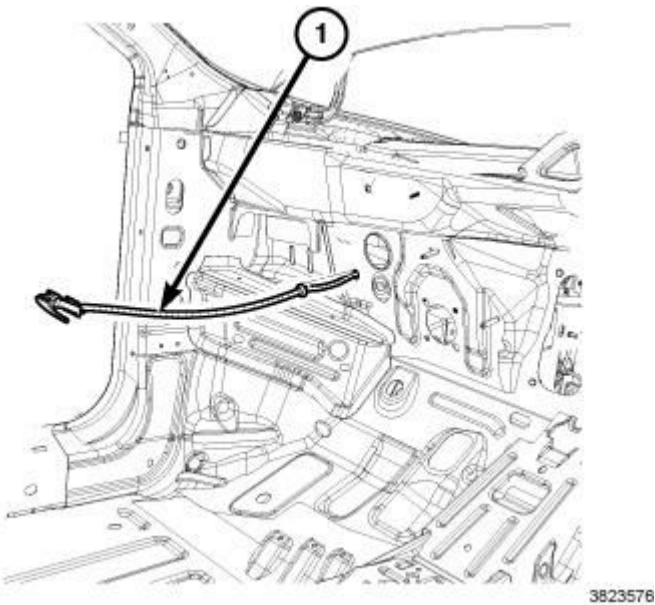
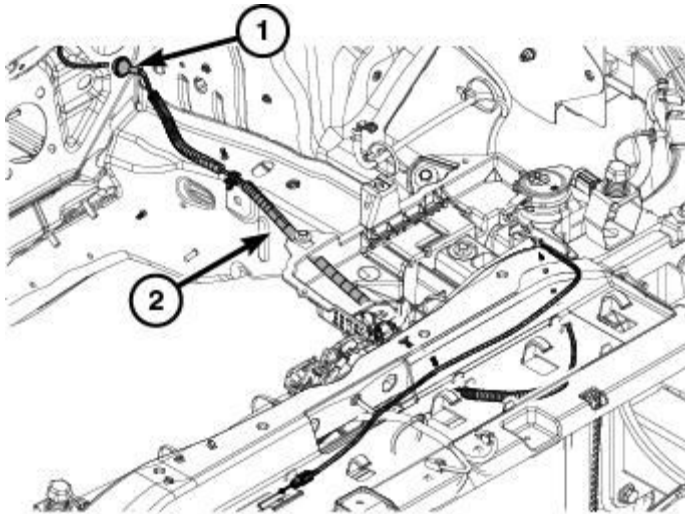


Fig. 313: Hood Release Cable Inside Vehicle
Courtesy of CHRYSLER GROUP, LLC

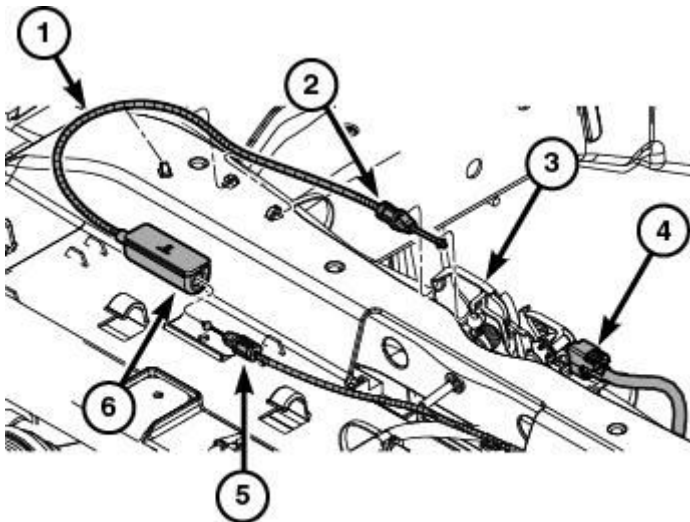
1. Route the hood release cable (1) through the hole located in the lower dash panel.
2. Engage the rubber grommet into the lower dash panel.



2314004731

Fig. 314: Identifying Grommet & Cable
Courtesy of CHRYSLER GROUP, LLC

3. Route the hood latch cable (1) along the inner frame rail.
4. Engage the hood release cable retaining clips/tabs along the inner frame rail.

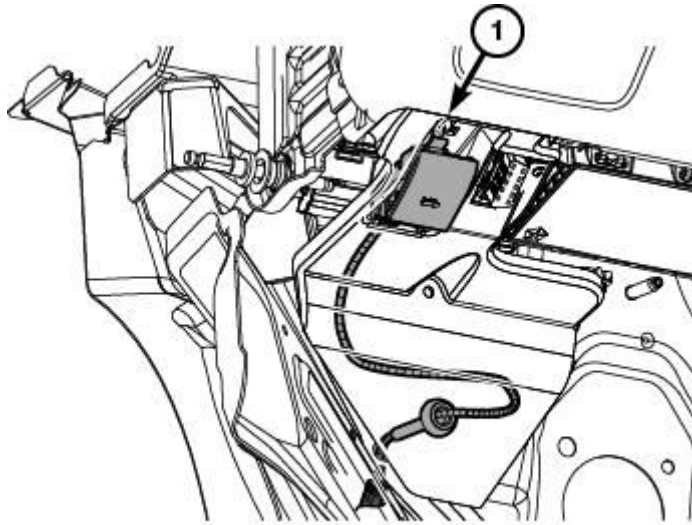


2314004730

Fig. 315: Identifying Hood Latch Cable & Retaining Clips/Tabs
Courtesy of CHRYSLER GROUP, LLC

5. Route the hood latch cable under the headlamp, along the side of the front end module and across the upper radiator support towards the hood latch.

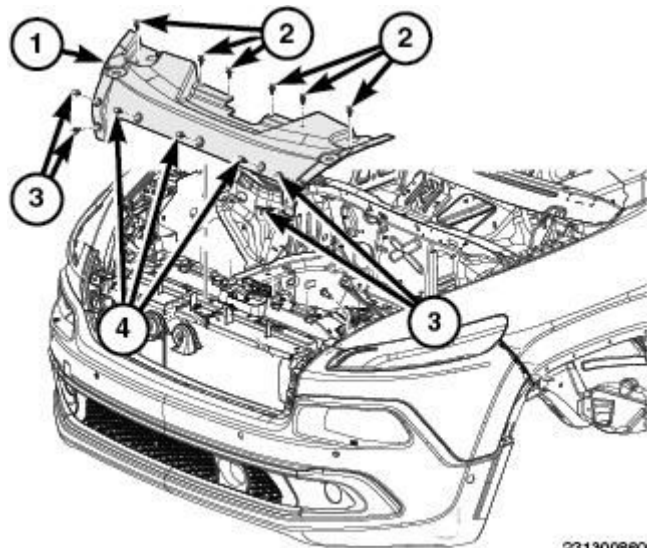
6. Engage the cable (2) to the hood latch (3).



2314004729

Fig. 316: Identifying Steering Column Opening Cover/Knee Blocker Trim
Courtesy of CHRYSLER GROUP, LLC

7. Install the hood release handle (2) to the steering column opening cover/knee blocker trim (1) by aligning, pushing in to engage and then pushing upward on the handle.



2313008602

Fig. 317: Upper Close Out Panel Cover Components
Courtesy of CHRYSLER GROUP, LLC

8. Install the radiator closeout panel (1) and install the push pin fasteners.

HINGE, HOOD

REMOVAL

REMOVAL

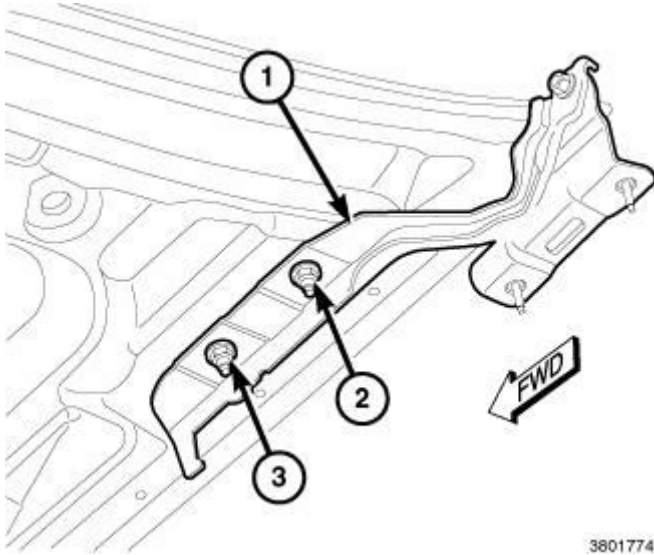


Fig. 318: Hood Hinge & Bolts

Courtesy of CHRYSLER GROUP, LLC

1. Support the hood on the side that requires hinge replacement and disconnect the support cylinder from the upper hinge. Refer to **PROP, GAS, REMOVAL**.
2. Mark the hinge (1) attachment locations at the hood with a grease pencil or other suitable device to aid installation.
3. Remove the cowl cover. Refer to **COVER, COWL PANEL, REMOVAL**.
4. Remove the bolts (2) attaching the hood to the hinge (1).

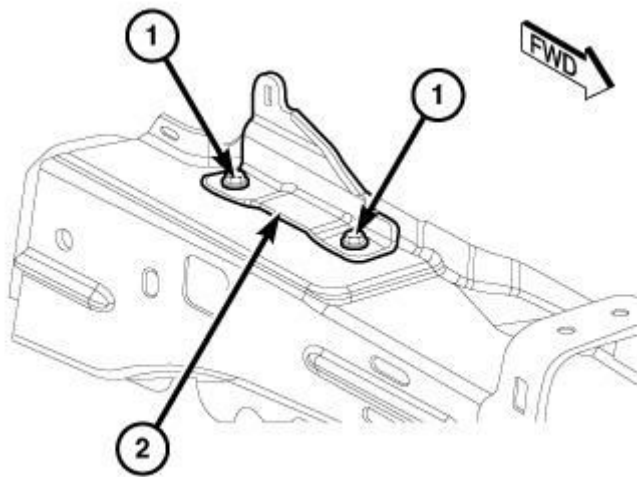


Fig. 319: Hood Hinge & Bolts At Load Beam

Courtesy of CHRYSLER GROUP, LLC

5. Mark the hinge (2) attachment locations at the load beam inner with a grease pencil or other suitable device to aid installation.
6. Remove the bolts (1) attaching the hood hinge (2) to the load beam inner and remove the hinge from vehicle.

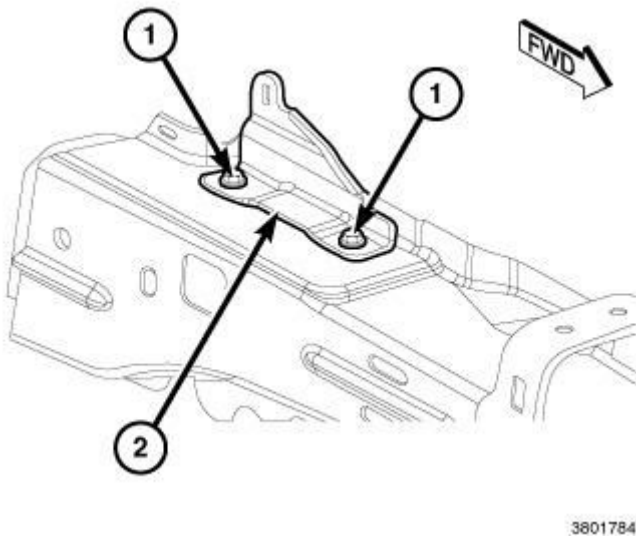
INSTALLATION**INSTALLATION**

Fig. 320: Hood Hinge & Bolts At Load Beam
Courtesy of CHRYSLER GROUP, LLC

1. If necessary, paint the new hinge (2) before installation.
2. Using the reference marks made in removal, align and position the hood hinge (2) on the vehicle.
3. Install the bolts (2) to attach hood hinge to load beam inner. Tighten the bolts to 9 N.m (7 ft. lbs.) torque.

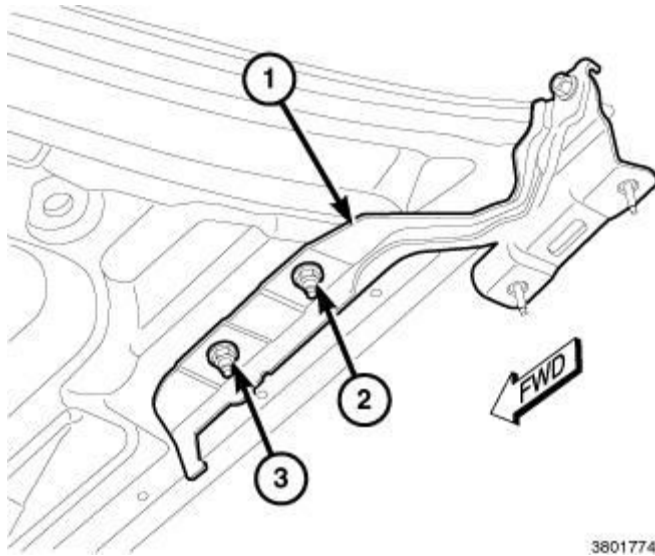


Fig. 321: Hood Hinge & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Align the hood with the reference marks made during removal.
5. Install the bolts (2, 3) to attach the hood to the hinge.
6. Align all marks and secure bolts.
7. Tighten the bolts to 21 N.m (16 ft. lbs.) torque.
8. Install the support cylinder back onto the hinge. Refer to **PROP, GAS, INSTALLATION**.
9. If necessary, adjust the hood hinge positions and the hood adjuster bumpers to achieve proper spacing and operation. Refer to **GAP AND FLUSH, SPECIFICATIONS**. Shims can be added or removed under hood hinge to achieve proper hood height.
10. Install cowl cover. Refer to **COVER, COWL PANEL, INSTALLATION**.
11. Verify hood latch operation. Adjust as necessary.

HOOD

REMOVAL

REMOVAL

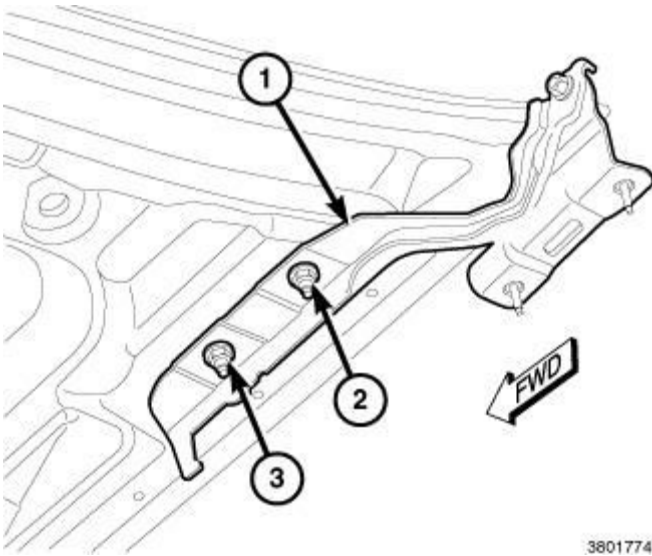


Fig. 322: Hood Hinge & Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: Right hand shown, left hand similar.

1. Open the hood.
2. Mark the outline of the hinges (1) on the inside of hood to aid installation.
3. Disconnect the windshield washer hose from hood.
4. Disconnect the under hood lamp wire connector to the engine compartment wire harness if equipped.
5. Remove the top bolts (3) attaching the hood to the hinge (1) and loosen the bottom bolts (2) until they can be removed by hand.
6. With assistance from a helper at the opposite side of the vehicle to support the hood, remove the bottom bolts (2) attaching the hood to hinge.
7. Remove the hood from the vehicle.
8. Transfer parts as necessary.

INSTALLATION

INSTALLATION

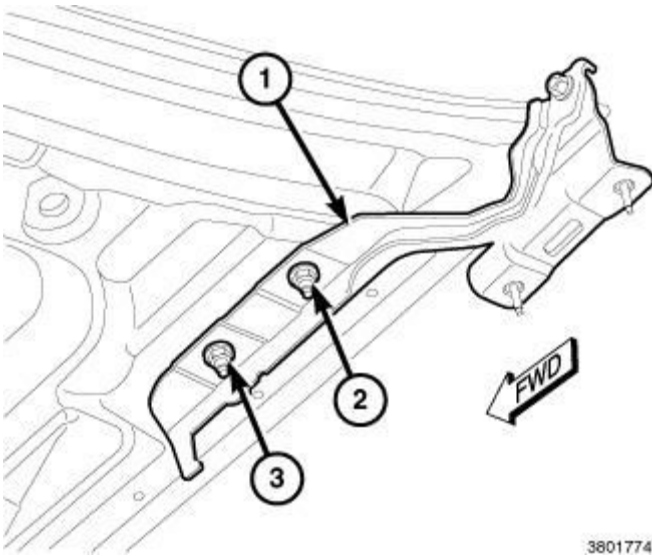


Fig. 323: Hood Hinge & Bolts

Courtesy of CHRYSLER GROUP, LLC

NOTE: The Vehicle Emission Control Information (VECI) label(s) must be in place for the life of the vehicle. When replacing the component in which the VECI label is adhered, a new VECI label must also be adhered to the new component.

NOTE: Right hand shown, left hand similar.

1. With assistance from a helper, place the hood in position on vehicle.
2. Align the hood with the reference mark made during removal.
3. Install the bottom bolts (2) securing the hood to the hinge. Tighten the bolts finger tight.
4. Install the top bolts (3) securing the hood to the hinge. Tighten the bolts finger tight.
5. Position bolts at outline marks and tighten bolts (2, 3) to 21 N.m (16 ft. lbs.).
6. Connect under hood lamp wire connector to engine compartment wire harness, if equipped.
7. Route and connect windshield washer hose to hood.
8. Verify proper hood latch operation and alignment.
9. If necessary, adjust the hood hinge positions and the hood adjuster bumpers to achieve proper spacing and operation. Refer to **GAP AND FLUSH, SPECIFICATIONS**.

LATCH, HOOD

REMOVAL

REMOVAL

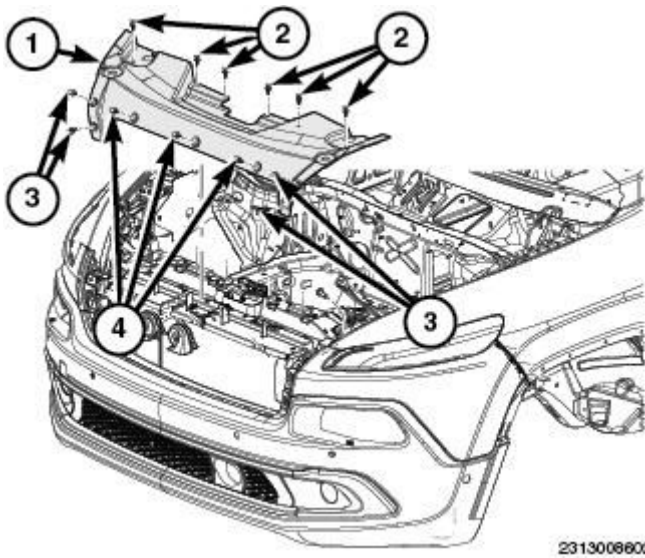


Fig. 324: Upper Close Out Panel Cover Components
Courtesy of CHRYSLER GROUP, LLC

1. Remove the push pins and remove the radiator closeout panel.

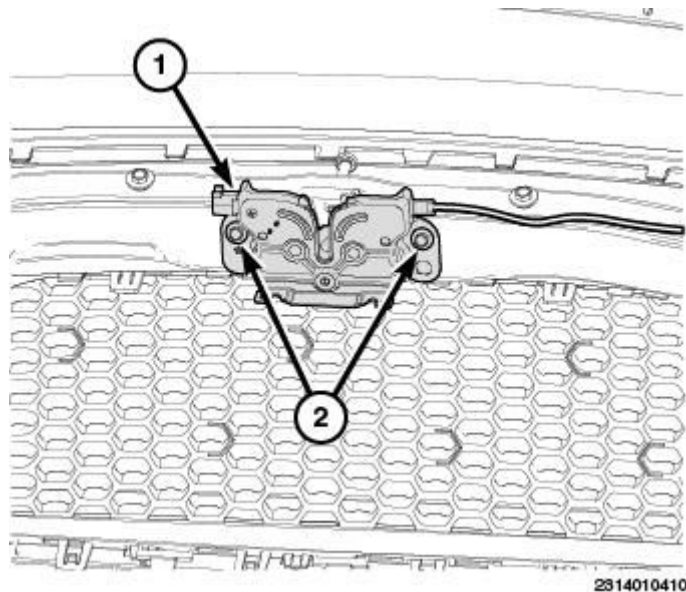
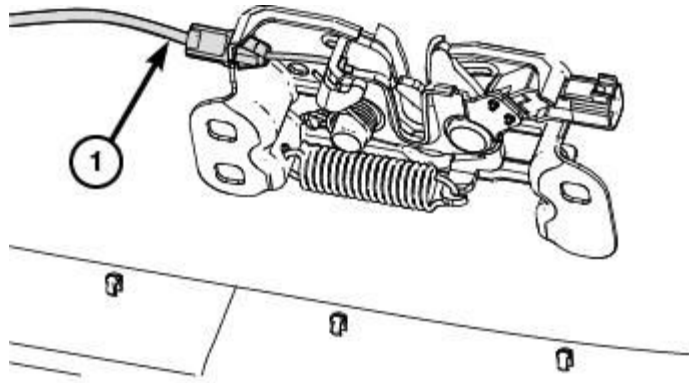


Fig. 325: Identifying Hood Latch & Fasteners
Courtesy of CHRYSLER GROUP, LLC

2. If equipped, disconnect the hood ajar switch harness (1).
3. Mark an outline of the hood latch on radiator support crossmember with a grease pencil or other suitable device to aid installation.
4. Remove the fasteners (2) attaching the hood latch to the upper radiator support crossmember.



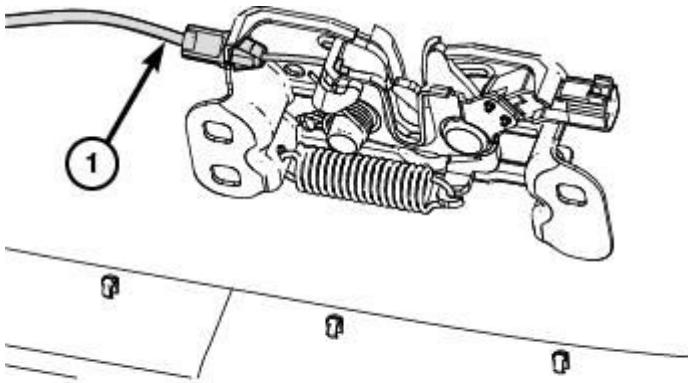
2314010411

Fig. 326: Identifying Hood Latch Release Cable
Courtesy of CHRYSLER GROUP, LLC

5. Position the hood latch away from the from vehicle.
6. Disconnect the release cable (1) from the latch.
7. Remove the latch.

INSTALLATION

INSTALLATION



2314010411

Fig. 327: Identifying Hood Latch Release Cable
Courtesy of CHRYSLER GROUP, LLC

1. Connect the release cable (1) into the hood latch.

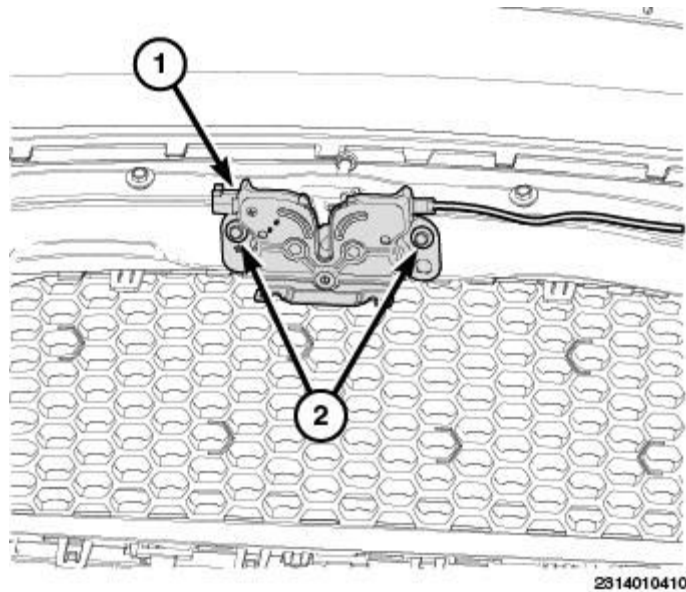


Fig. 328: Identifying Hood Latch & Fasteners
Courtesy of CHRYSLER GROUP, LLC

2. Position the latch on radiator support crossmember and loosely install the fasteners (2).
3. Using the reference marks made during removal, align the hood latch.
4. Tighten the fasteners to 9 N.m (80 in. lbs.).
5. If equipped, connect the electrical connector (1).
6. Close the hood to verify operation. Adjust as necessary.

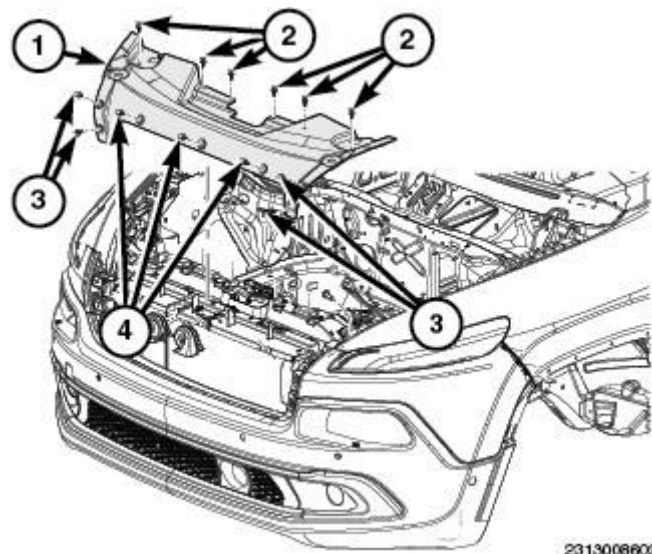


Fig. 329: Upper Close Out Panel Cover Components
Courtesy of CHRYSLER GROUP, LLC

7. Install the radiator closeout panel (1) and install the push pin fasteners.

LATCH, SAFETY

REMOVAL

REMOVAL

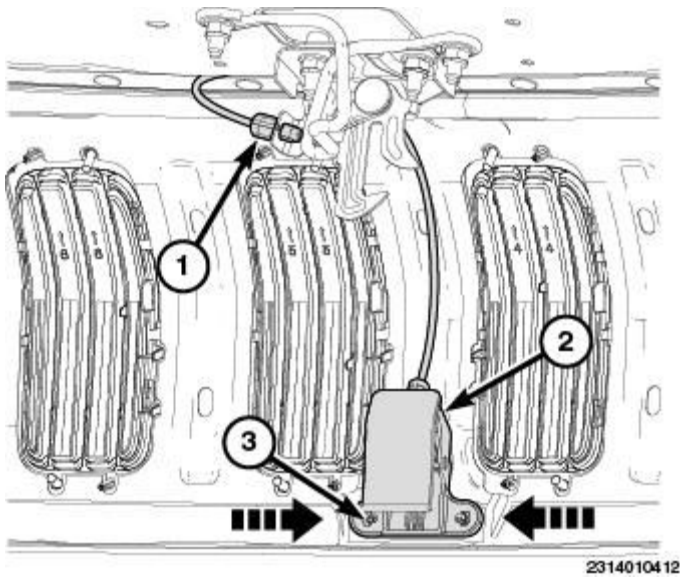


Fig. 330: Identifying Safety Latch, Handle & Nuts
Courtesy of CHRYSLER GROUP, LLC

1. Open the hood squeeze the tabs (3) together and separate the handle (2) from the hood.

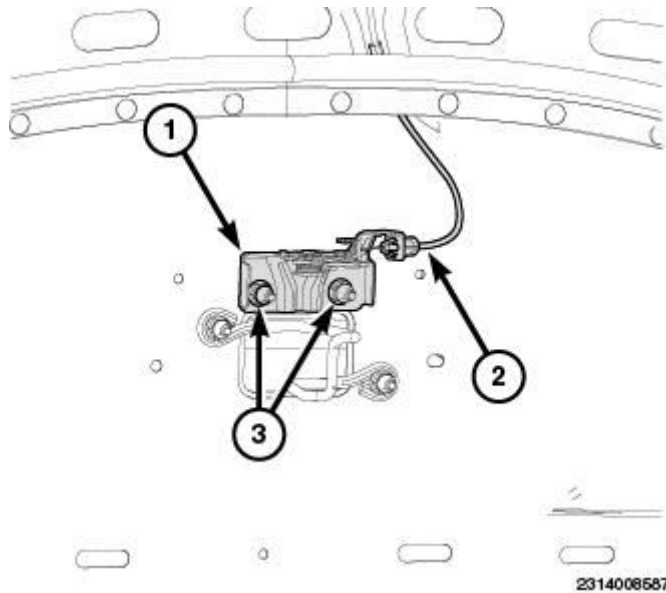


Fig. 331: Identifying Safety Latch, Nuts & Cable
Courtesy of CHRYSLER GROUP, LLC

2. Remove the nuts (3) and remove the safety latch (1).

3. Disconnect the cable (2).

INSTALLATION

INSTALLATION

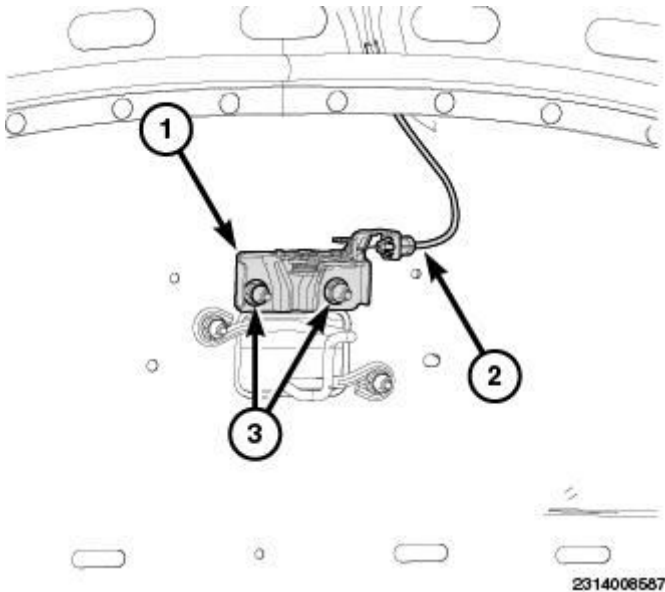


Fig. 332: Identifying Safety Latch, Nuts & Cable
Courtesy of CHRYSLER GROUP, LLC

1. Connect the release cable (2).
2. Install the safety latch (1) and install the nuts (3)

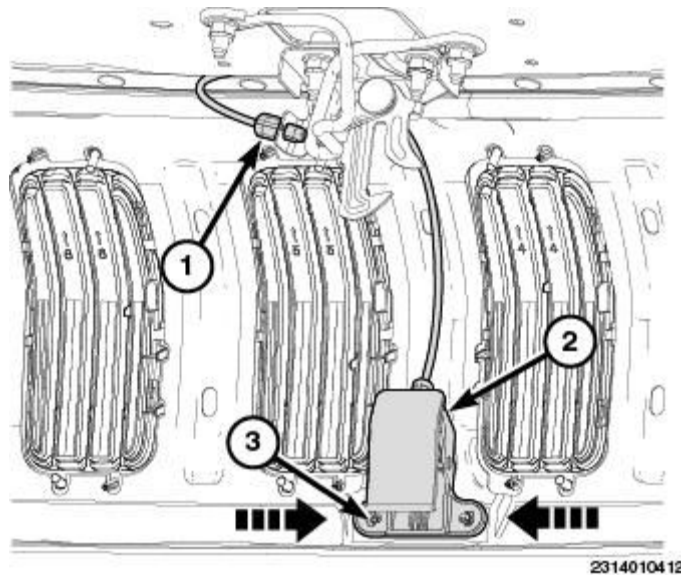


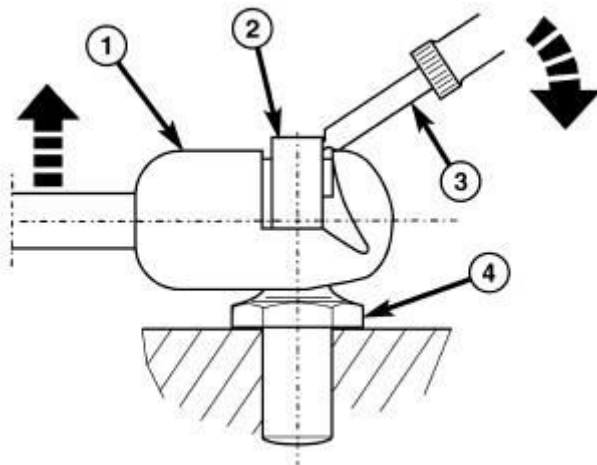
Fig. 333: Identifying Safety Latch, Handle & Nuts
Courtesy of CHRYSLER GROUP, LLC

3. Position the handle assembly (2) onto the hood and seat the clips (3) fully.

PROP, GAS

REMOVAL

REMOVAL



80170308

Fig. 334: Support Cylinder-Ball Socket-Typical
Courtesy of CHRYSLER GROUP, LLC

NOTE: Use a support to hold the hood while working on removing the hood strut.

1. Open and support the hood.

CAUTION: Do not pull on the hood support cylinders at the middle of the support cylinder during removal. Failure to follow this caution can result in damage to the hood support cylinders.

2. Using a small flat bladed tool, or equivalent (3), release the retaining clip (2) at each end of the support cylinder while carefully pulling the ball socket (1) away from the ball stud (4).

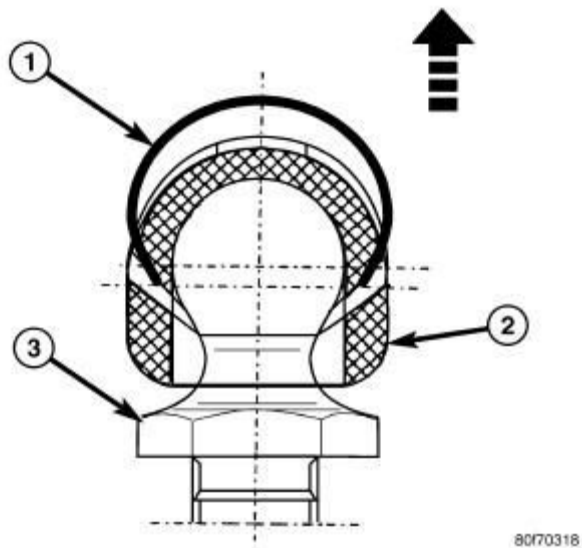


Fig. 335: Support Cylinder Retaining Clip
Courtesy of CHRYSLER GROUP, LLC

- 1 - RETAINING CLIP
- 2 - BALL SOCKET
- 3 - BALL STUD

NOTE: Lift the clips (1) only enough to release the ball studs (3).

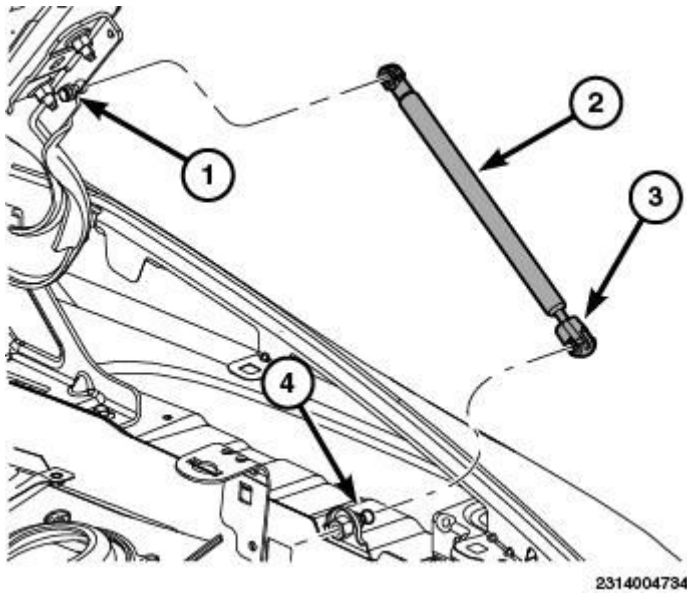


Fig. 336: Identifying Hood Support Cylinder & Ball Studs
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the hood support cylinder (2) from the hood ball stud (1) and the ball stud on the strut tower (4).

INSTALLATION

INSTALLATION

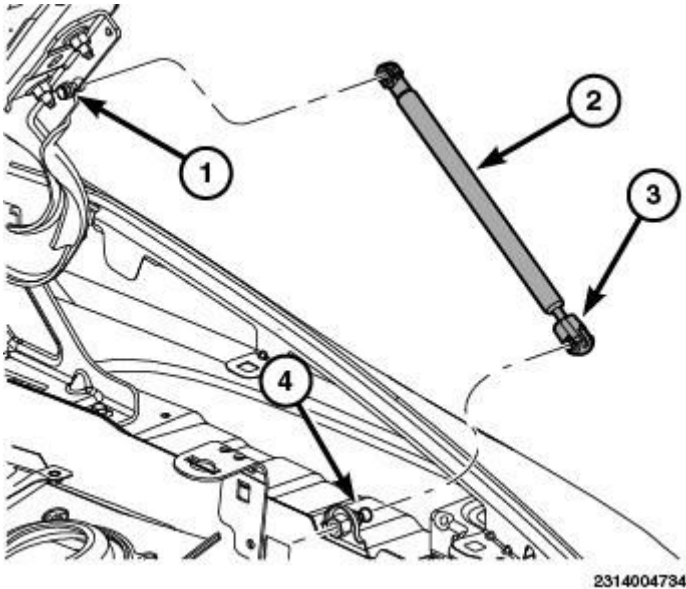


Fig. 337: Identifying Hood Support Cylinder & Ball Studs
Courtesy of CHRYSLER GROUP, LLC

1. If removed, install the upper ball stud (1) onto the hood and the lower ball stud (4) onto the strut tower. Install the ball studs securely.

CAUTION: Do not push on the hood support cylinders at the middle of the support cylinder during installation. Failure to follow this caution can result in damage to the hood support cylinders.

NOTE: Install the hood support cylinders with the cylinder end connected to the hood as shown.

NOTE: If required, only release each retaining clip enough to install the ball socket onto the ball stud.

2. Install the hood support cylinder (2) over the upper (1) and lower ball studs (4) and fully engage the retaining clips.

STRIKER, HOOD

REMOVAL

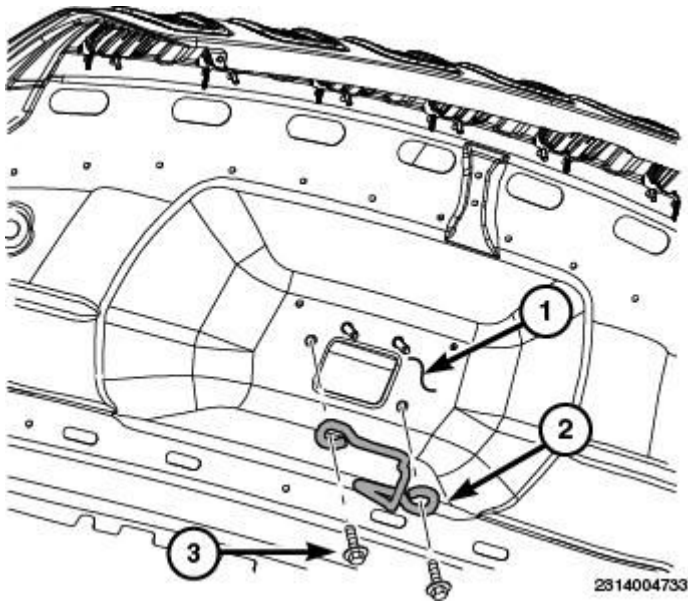
REMOVAL

Fig. 338: Identifying Hood, Striker & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Open the hood.
2. Using a china marker or equivalent, mark the outline of the striker (1) to assist with installation.
3. Remove the fasteners (3) securing the striker (2) to the hood.
4. Remove the striker (2) from the hood.

INSTALLATION**INSTALLATION**

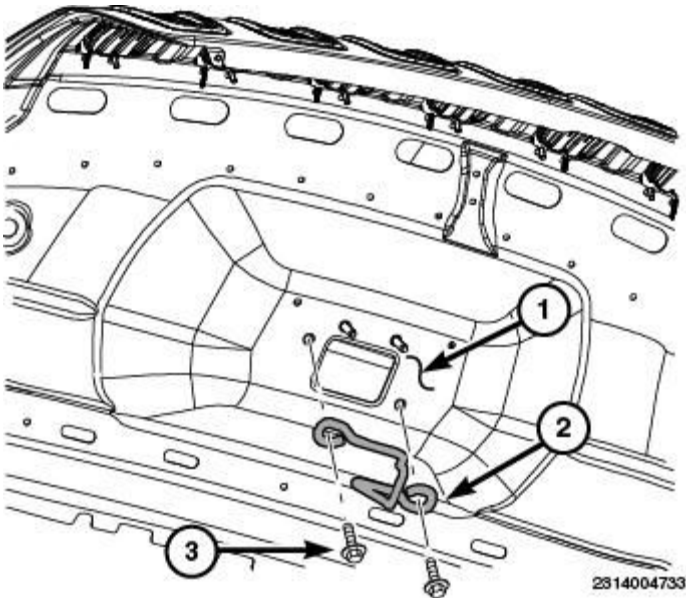


Fig. 339: Identifying Hood, Striker & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Using reference marks made previously, align the striker (2) with holes in hood.
2. Install the fasteners (3) securing the striker (2). Tighten the fasteners to 21 N.m (16 ft. lbs.)
3. Verify fit of the hood striker (1) and operation of the latch. Adjust as necessary.

INSTRUMENT PANEL

WARNING

WARNING

WARNING: To avoid serious or fatal injury on vehicles equipped with the Supplemental Restraint System (SRS), never attempt to repair the electrically conductive circuits or wiring components related to the SRS for which there is no MOPAR wiring repair kit. It is important to use **ONLY** the recommended splicing kit and procedure. For applicable and available MOPAR wiring repair kits, please visit the MOPAR® Connector Web Site at the following address on the internet: (<http://dto.vftis.com/mopar/disclaimer.asp>). Inappropriate repairs can compromise the conductivity and current carrying capacity of those critical electrical circuits, which may cause SRS components not to deploy when required, or to deploy when not required. Only minor cuts or abrasions of wire and terminal insulation where the conductive material has not been damaged, or connector insulators where the integrity of the latching and locking mechanisms have not been compromised may be repaired using appropriate methods.

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid potential physical injury or damage to sensitive electronic circuits and systems, always disconnect and isolate the battery negative (ground) cable and the positive cable, then ground the positive cable to discharge the Occupant Restraint Controller (ORC) capacitor before performing any welding operations on the vehicle. Failure to take the proper precautions could result in accidental airbag deployment, possible damage to the Supplemental Restraint System (SRS) circuits and components, and possible damage to other electronic circuits and components. Whenever a welding process is being performed within 12 inches (30 centimeters) of an electronic module or wiring harness, then that module or harness should be relocated out of the way, or disconnected. Always protect against component or vehicle damage from weld spatter by using weld blankets and screens.

WARNING: To avoid serious or fatal injury, do not attempt to dismantle an airbag unit or tamper with its inflator. Do not puncture, incinerate or bring into contact with electricity. Do not store at temperatures exceeding 93° C (200° F). An airbag inflator unit may contain sodium azide and potassium nitrate. These materials are poisonous and extremely flammable. Contact with acid, water, or heavy metals may produce harmful and irritating gases (sodium hydroxide is formed in the presence of moisture) or

combustible compounds. An airbag inflator unit may also contain a gas canister pressurized to over 17.24 kPa (2500 psi). Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: To avoid serious or fatal injury when handling a seat belt tensioner retractor or buckle, proper care should be exercised to keep fingers out from under the retractor or buckle cover and away from the seat belt webbing or cable where it exits from the retractor or buckle cover.

WARNING: To avoid serious or fatal injury, replace all Supplemental Restraint System (SRS) components only with parts specified in the Chrysler Mopar® Parts Catalog. Substitute parts may appear interchangeable, but internal differences may result in inferior occupant protection.

WARNING: To avoid serious or fatal injury, the fasteners, screws, and bolts originally used for the Supplemental Restraint System (SRS) components must never be replaced with any substitutes. These fasteners have special coatings and are specifically designed for the SRS. Anytime a new fastener is needed, replace it with the correct fasteners provided in the service package or specified in the Chrysler Mopar® Parts Catalog.

WARNING: To avoid serious or fatal injury when a steering column has an airbag unit attached, never place the column on the floor or any other surface with the steering wheel or airbag unit face down. Failure to follow these instructions may result in possible serious or fatal injury.

BEZEL, INSTRUMENT CLUSTER

REMOVAL

REMOVAL

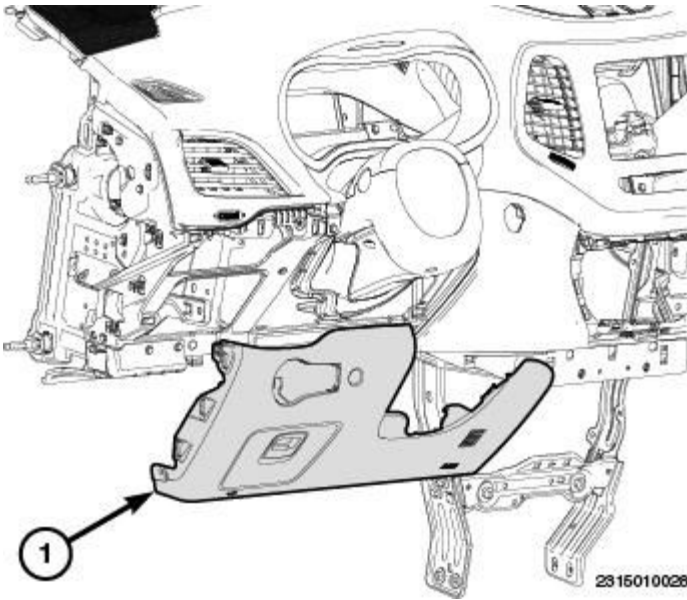


Fig. 340: Identifying Steering Column Opening Cover
Courtesy of CHRYSLER GROUP, LLC

1. Remove the steering column opening cover. Refer to **COVER, STEERING COLUMN OPENING, REMOVAL**.

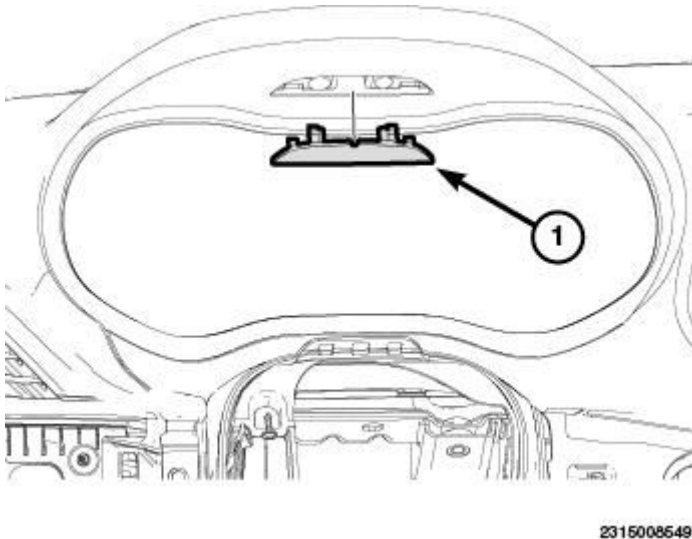


Fig. 341: Identifying Trim Cover
Courtesy of CHRYSLER GROUP, LLC

2. Using a small flat bladed tool, or equivalent, remove the trim cover (1).

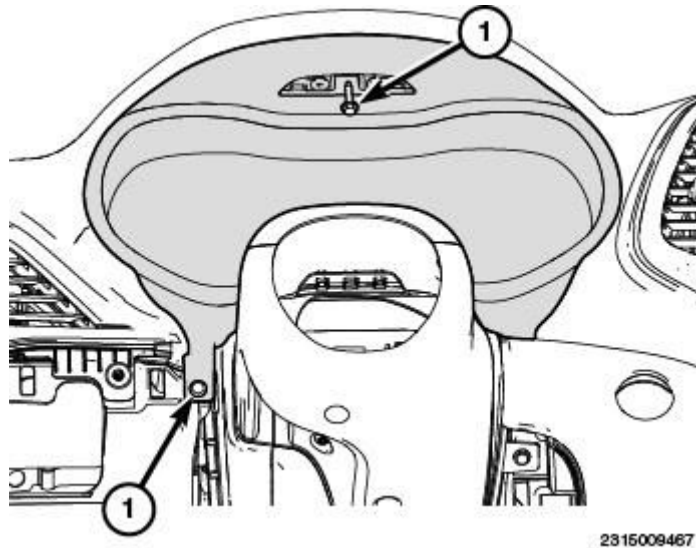


Fig. 342: Identifying Trim Cover Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Remove the fasteners (1).

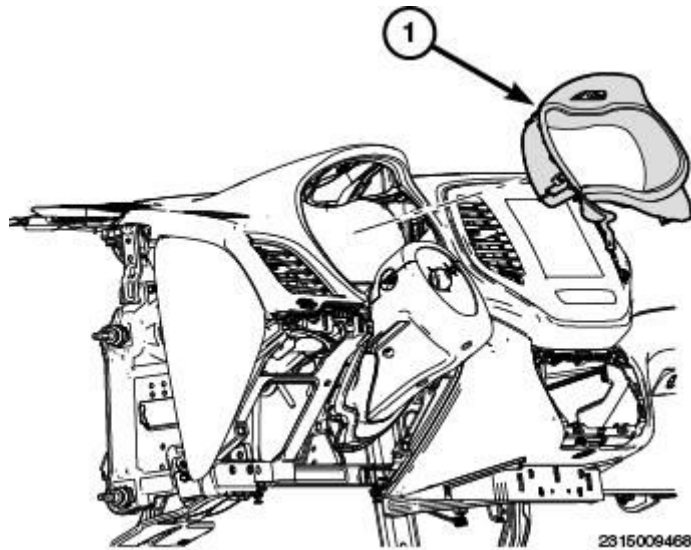


Fig. 343: Identifying Cluster Bezel
Courtesy of CHRYSLER GROUP, LLC

4. Remove the cluster bezel (1) from the vehicle

INSTALLATION

INSTALLATION

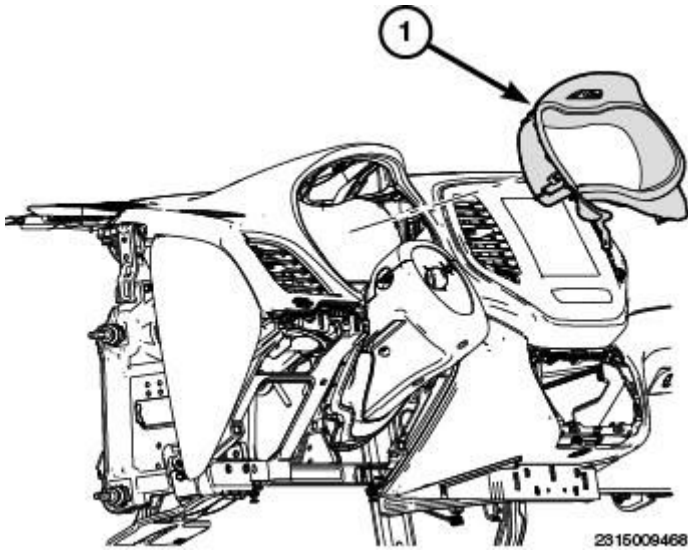


Fig. 344: Identifying Cluster Bezel
Courtesy of CHRYSLER GROUP, LLC

1. Position the bezel (1) over the cluster and seat fully.

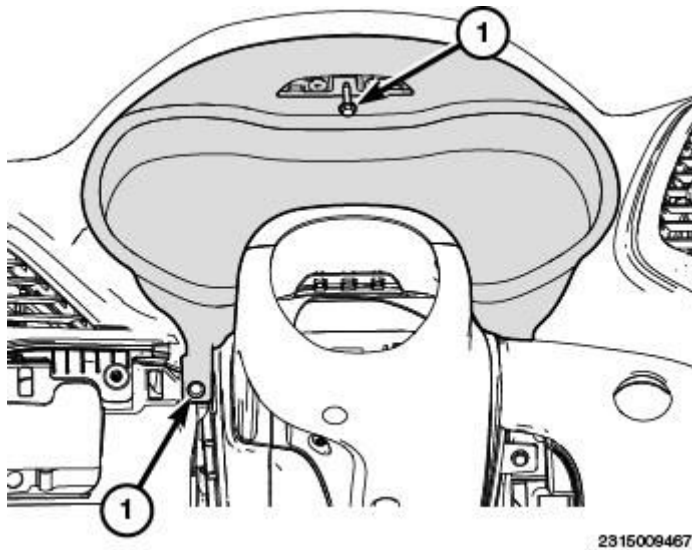
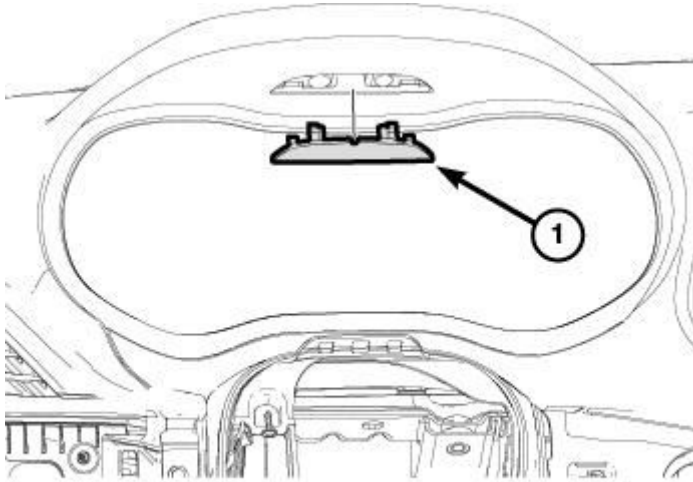


Fig. 345: Identifying Trim Cover Fasteners
Courtesy of CHRYSLER GROUP, LLC

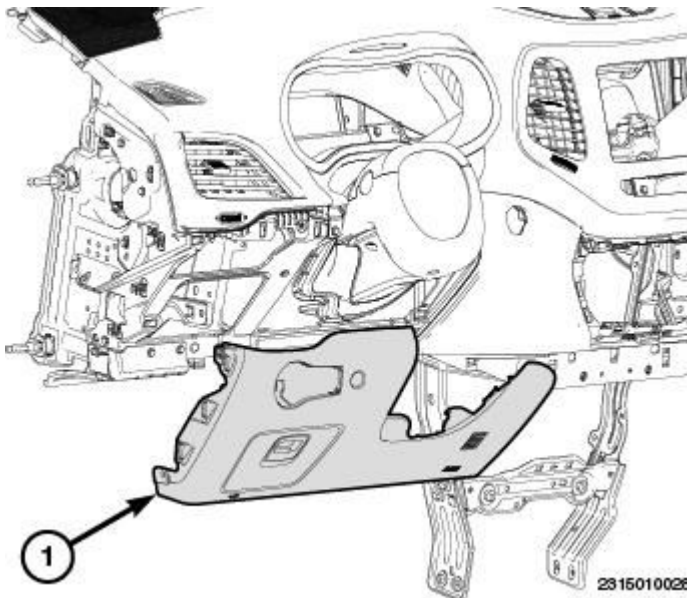
2. Install the fasteners (1).



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Fig. 346: Identifying Trim Cover
Courtesy of CHRYSLER GROUP, LLC

3. Install the trim cover (1).



2315010028

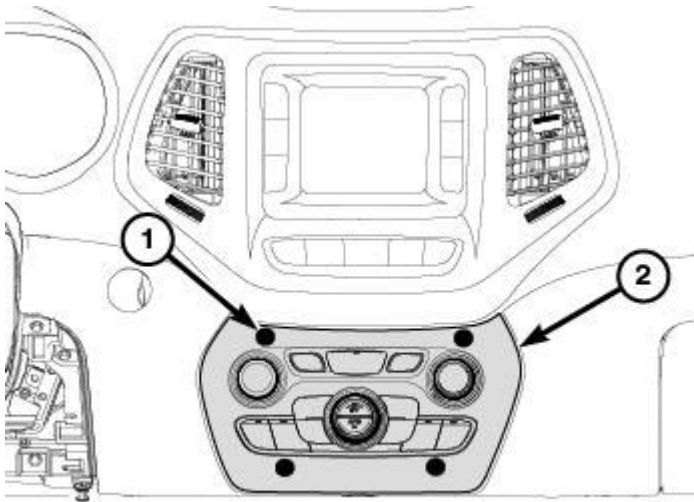
Fig. 347: Identifying Steering Column Opening Cover
Courtesy of CHRYSLER GROUP, LLC

4. Install the steering column opening cover (1). Refer to **COVER, STEERING COLUMN OPENING, INSTALLATION**.

BEZEL, INSTRUMENT PANEL, CENTER

REMOVAL

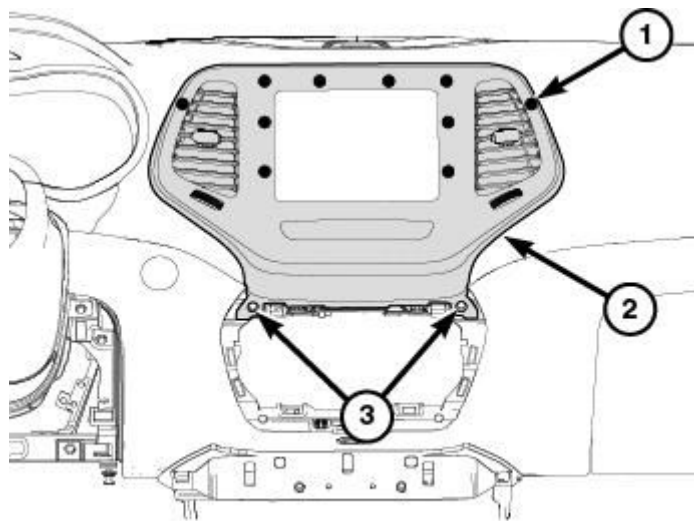
REMOVAL



2315008554

Fig. 348: Identifying HVAC Control Head & Clips
Courtesy of CHRYSLER GROUP, LLC

1. Using a trim stick or equivalent, separate the four clips (1) and remove the HVAC control head (2).
2. Disconnect the control head electrical connector.



2315009466

Fig. 349: Identifying Center Bezel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Remove the fasteners (3).
4. Locate the clips (1) and using a (special tool #C-4755, Trim Stick) or equivalent, release the clips and remove the center bezel (2).
5. Disconnect the electrical connector.

INSTALLATION

INSTALLATION

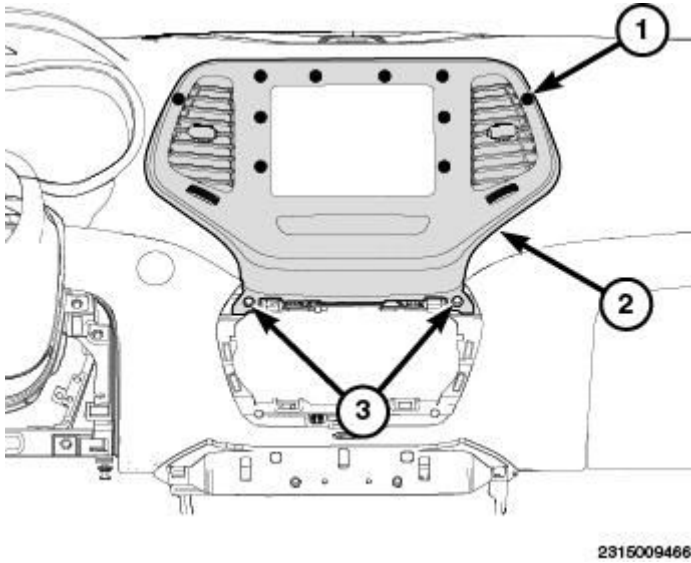


Fig. 350: Identifying Center Bezel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Connect the electrical connector.
2. Install the center bezel (2) and seat the clips (1) fully.
3. Install the fasteners (3).

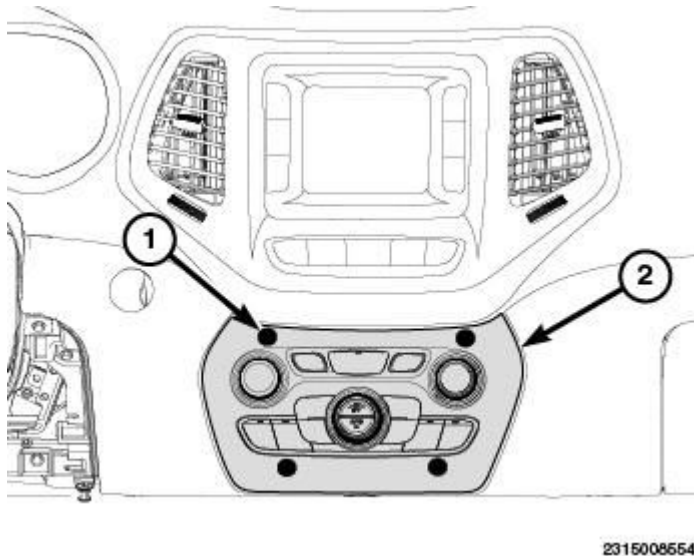


Fig. 351: Identifying HVAC Control Head & Clips
Courtesy of CHRYSLER GROUP, LLC

4. Connect the HVAC control head (2) electrical connectors.

5. Install the control head and seat the clips (1) fully.

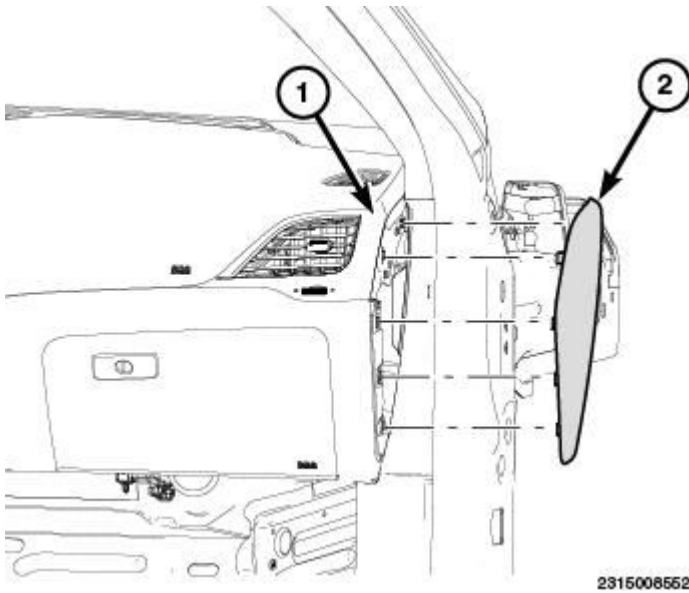
CAP, INSTRUMENT PANEL END**REMOVAL****REMOVAL**

Fig. 352: Identifying Instrument Panel & End Cap
Courtesy of CHRYSLER GROUP, LLC

NOTE: Right side shown, left side similar.

1. Using a (special tool #C-4755, Trim Stick) or equivalent, release the clips holding end cap (2) to instrument panel (1).
2. Remove the end cap (2).

INSTALLATION**INSTALLATION**

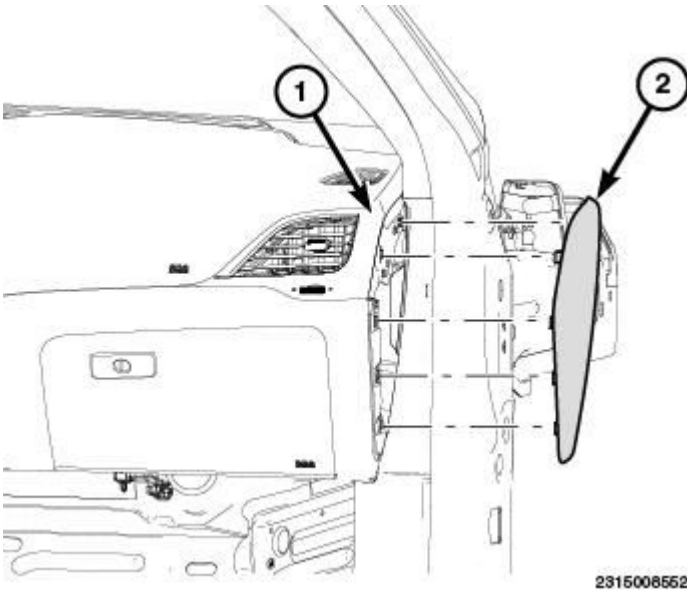


Fig. 353: Identifying Instrument Panel & End Cap
Courtesy of CHRYSLER GROUP, LLC

NOTE: Right side shown, left side similar.

1. Position end cover (2) over retaining slots and firmly snap into place.

COVER, STEERING COLUMN OPENING

REMOVAL

REMOVAL

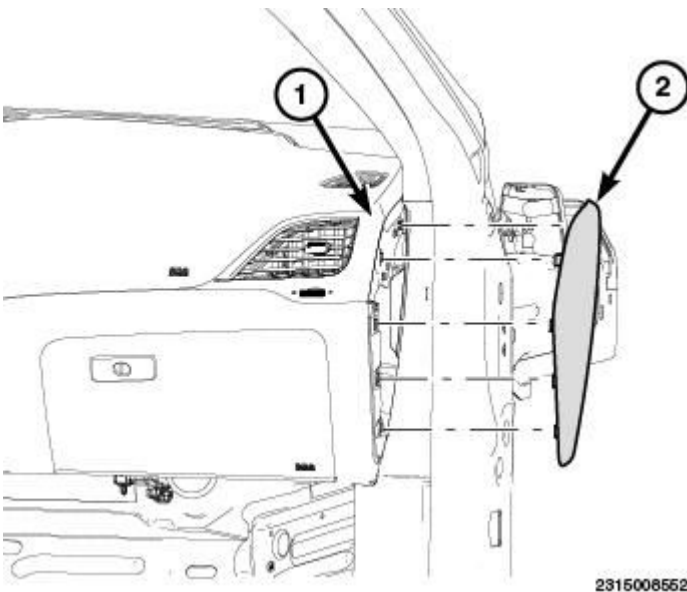


Fig. 354: Identifying Instrument Panel & End Cap

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate battery negative cable.
2. Using a trim stick (special tool #C-4755, Trim Stick) or equivalent, remove the drivers side end cap.

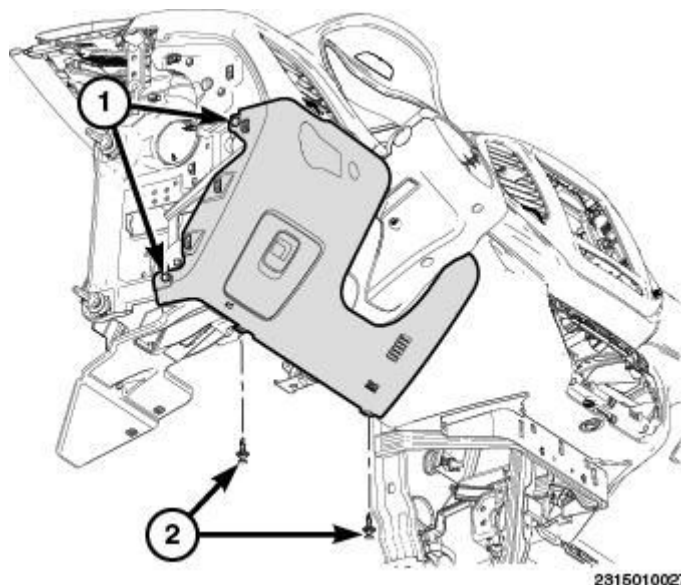


Fig. 355: Identifying Screws & Push Pin Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Remove the screws (1) and push pin fasteners (2).

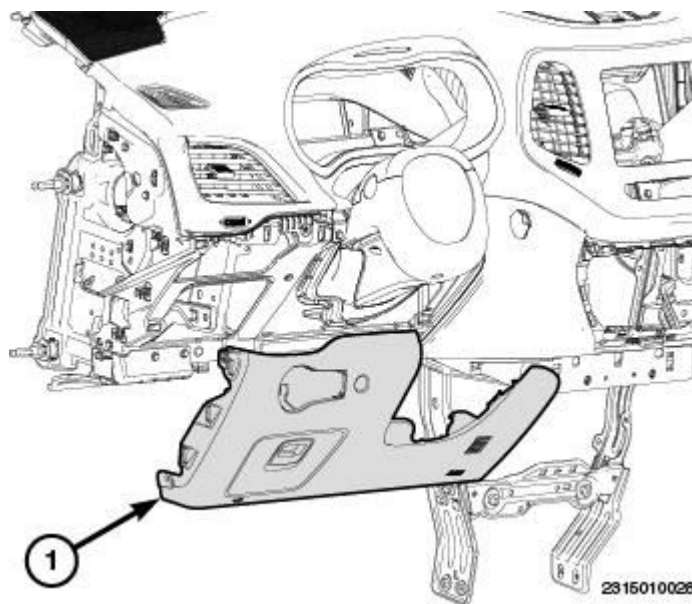


Fig. 356: Identifying Steering Column Opening Cover
Courtesy of CHRYSLER GROUP, LLC

4. Using a trim stick or equivalent, separate the retaining clips and remove the cover (1).
5. Disconnect the headlight electrical connector.

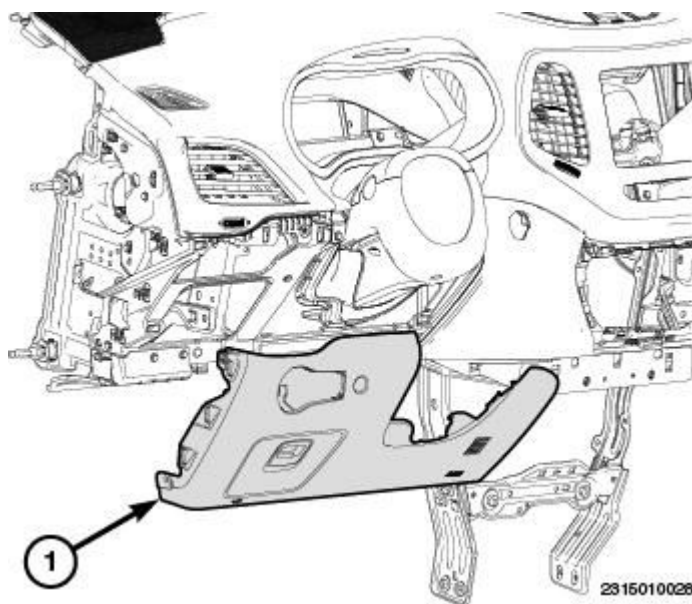
INSTALLATION**INSTALLATION**

Fig. 357: Identifying Steering Column Opening Cover
Courtesy of CHRYSLER GROUP, LLC

1. Connect the headlight electrical connector.
2. Position the steering column opening cover (1) back into place and seat the retaining clips fully.

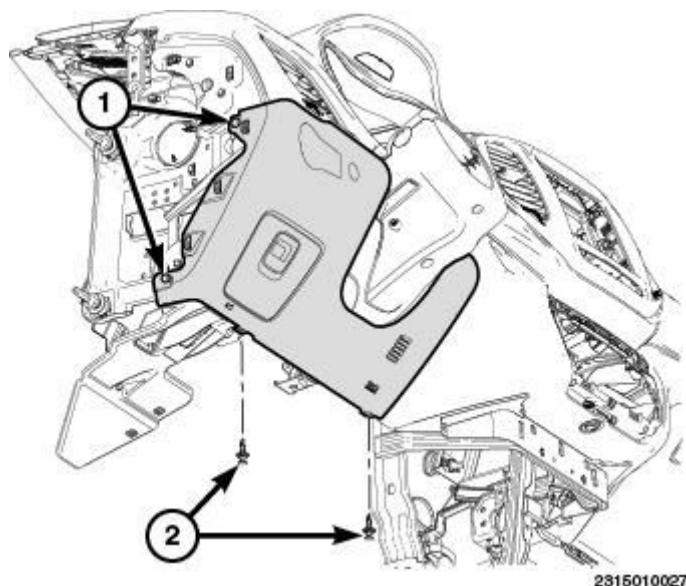


Fig. 358: Identifying Screws & Push Pin Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Install the screws (1) and install the push pin fasteners (2).

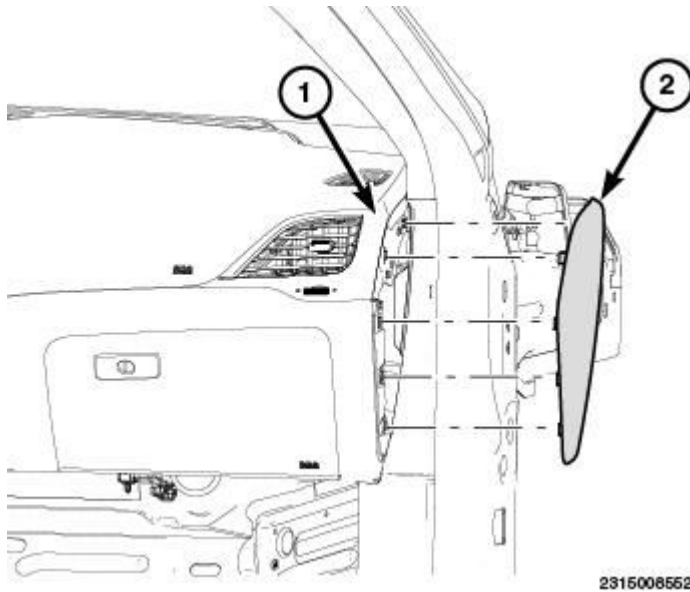


Fig. 359: Identifying Instrument Panel & End Cap
Courtesy of CHRYSLER GROUP, LLC

NOTE: Passenger side end cap shown (2), driver side similar.

4. Install the end cap (2) and seat the retaining clips fully.

GLOVE BOX, INSTRUMENT PANEL

REMOVAL

REMOVAL

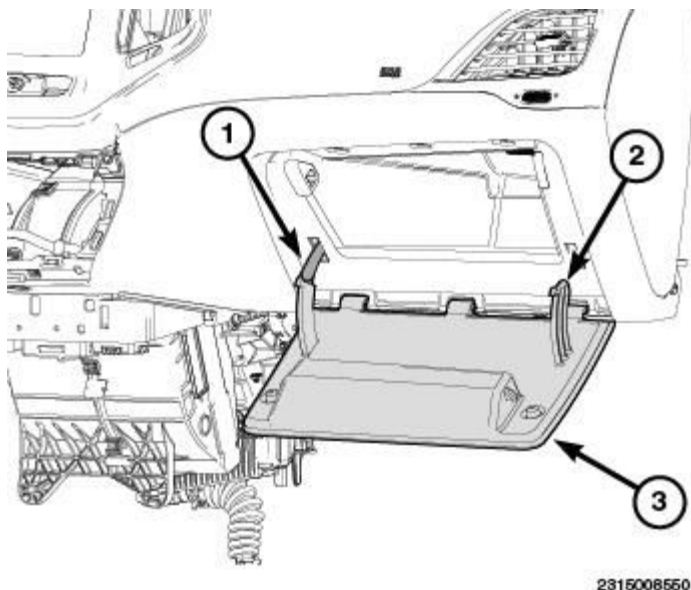


Fig. 360: Identifying Glove Box Doors & Support Arms
Courtesy of CHRYSLER GROUP, LLC

1. Open the glove box door and release the support arms (2) by pressing down and pulling out of the box assembly.
2. Release the damper arm (1) and remove the door.

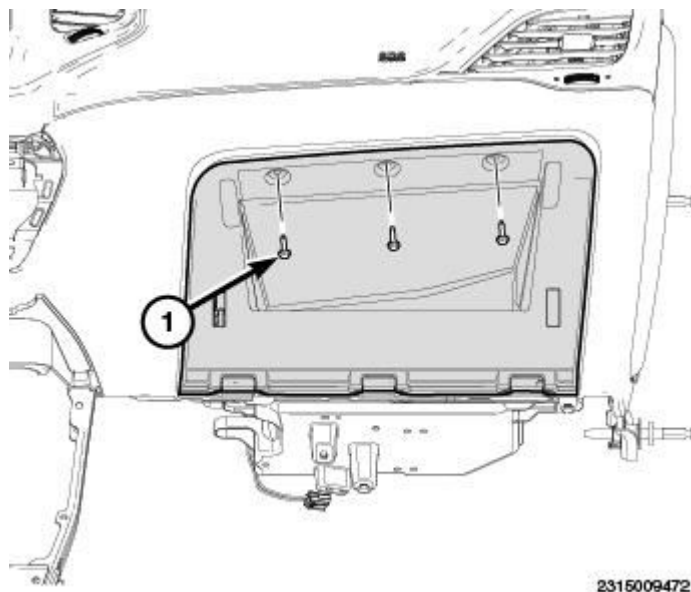


Fig. 361: Identifying Front Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Remove the front fasteners (1) and remove the rear fastener from under the IP and at the front of the box.

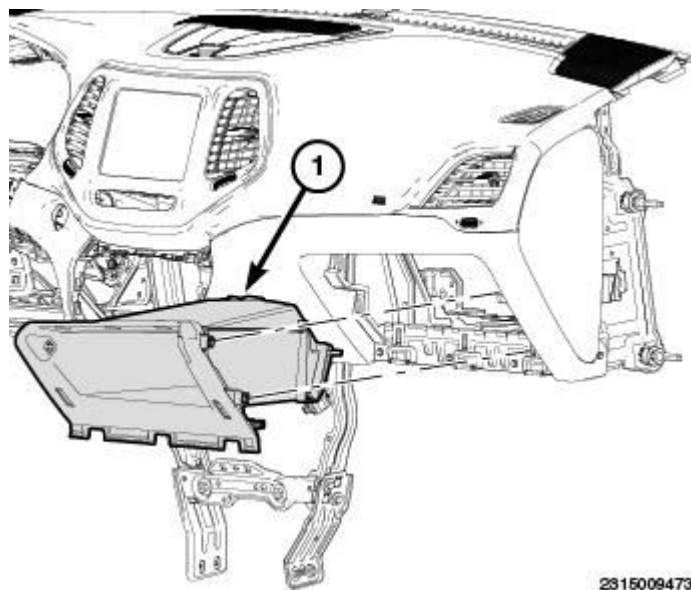


Fig. 362: Identifying Box
Courtesy of CHRYSLER GROUP, LLC

4. Release the side retaining clips and remove the box (1) from the instrument panel.

INSTALLATION

INSTALLATION

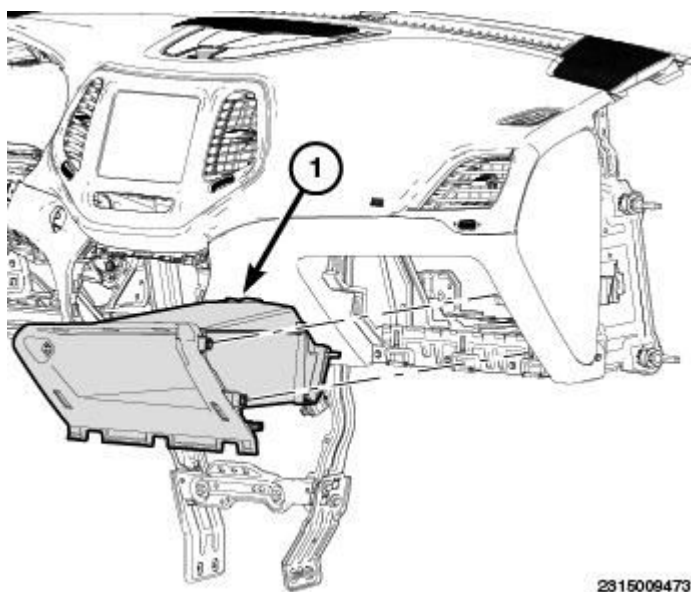


Fig. 363: Identifying Box
Courtesy of CHRYSLER GROUP, LLC

1. Position the glove box assembly (1) back into the instrument panel and seat the retaining clips fully.

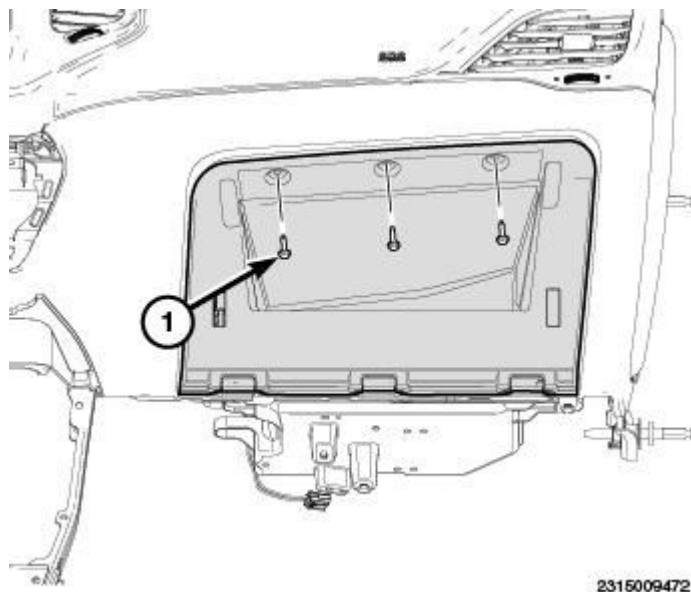


Fig. 364: Identifying Front Fasteners
Courtesy of CHRYSLER GROUP, LLC

2. Install the screws (1) at the front of the box and install the screw at the front of the box from under the instrument panel.

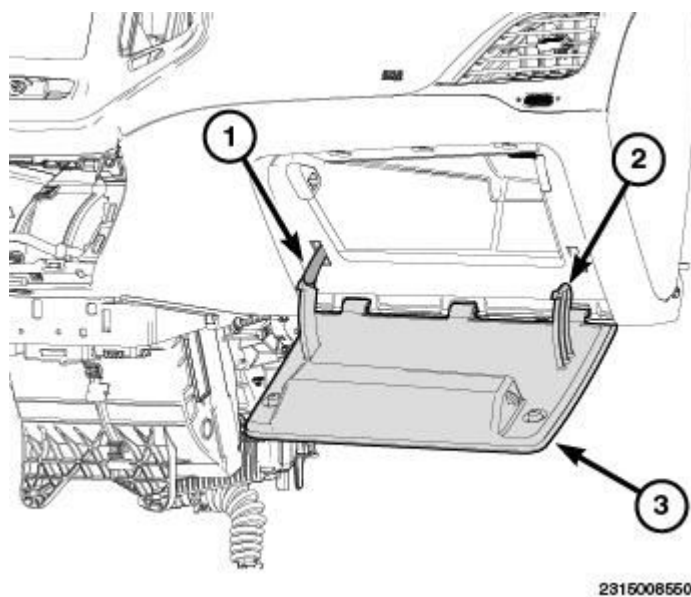


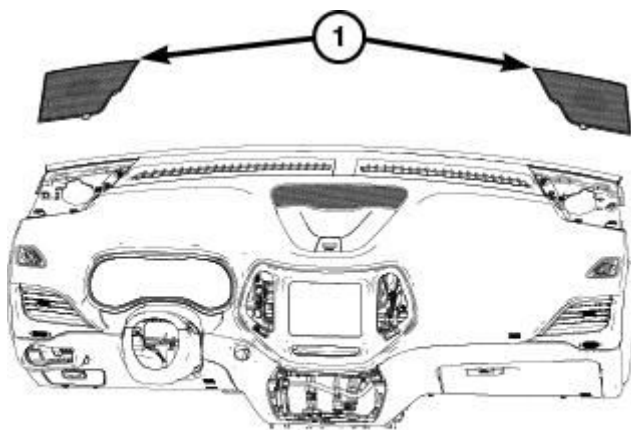
Fig. 365: Identifying Glove Box Doors & Support Arms
Courtesy of CHRYSLER GROUP, LLC

3. Install the glove box door (3) hinges onto the instrument panel and connect the damper arm (1).
4. Insert the support arms (2) into the box slots and check door for operation.

GRILLE, DEFROSTER

REMOVAL

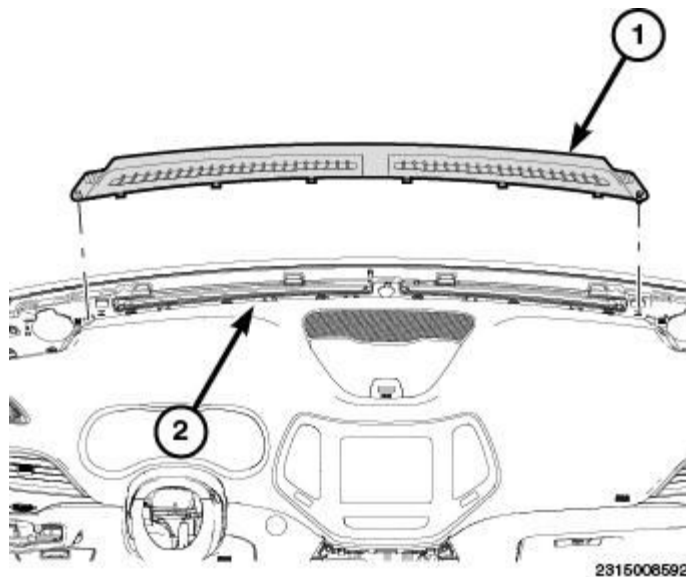
REMOVAL



2315008558

Fig. 366: Identifying Speaker Covers
 Courtesy of CHRYSLER GROUP, LLC

1. Using a (special tool #C-4755, Trim Stick) or equivalent, remove the speaker covers (1).



2315008592

Fig. 367: Identifying Defroster Grille & Sun Sensor Electrical Connector
 Courtesy of CHRYSLER GROUP, LLC

2. Using a trim stick or equivalent, remove the defroster grille (1).
3. Disconnect the sun sensor electrical connector, if equipped.

INSTALLATION

INSTALLATION

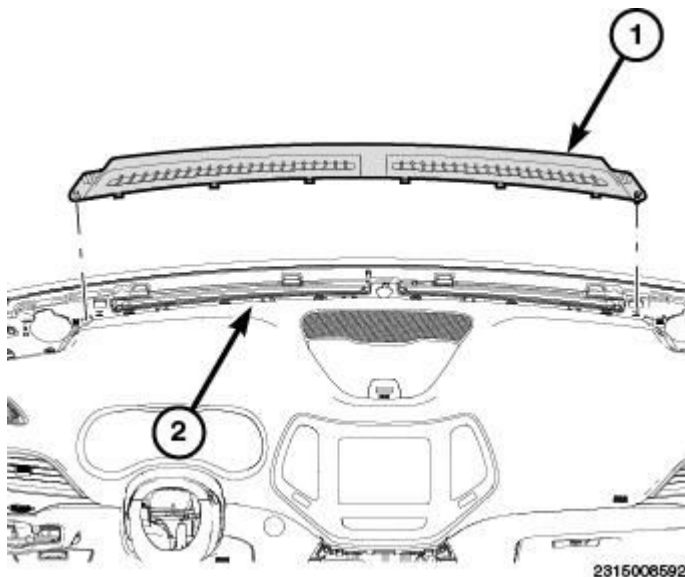


Fig. 368: Identifying Defroster Grille & Sun Sensor Electrical Connector
Courtesy of CHRYSLER GROUP, LLC

1. Position the grille (1) back and connect the sun sensor electrical connector, if equipped.
2. Seat the retaining clips fully.

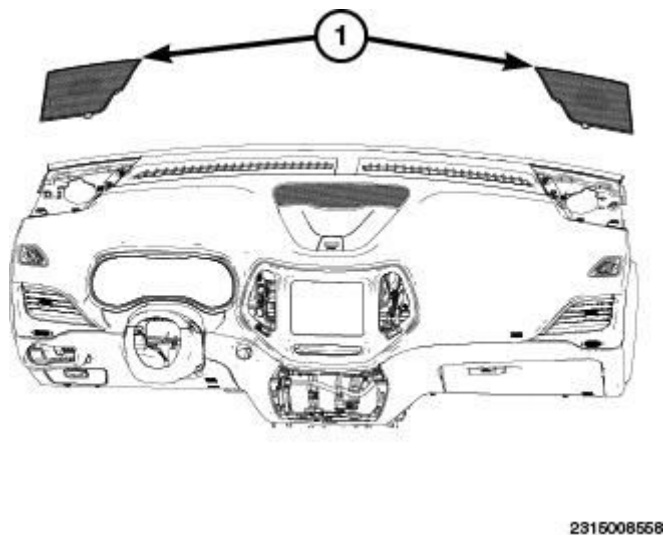


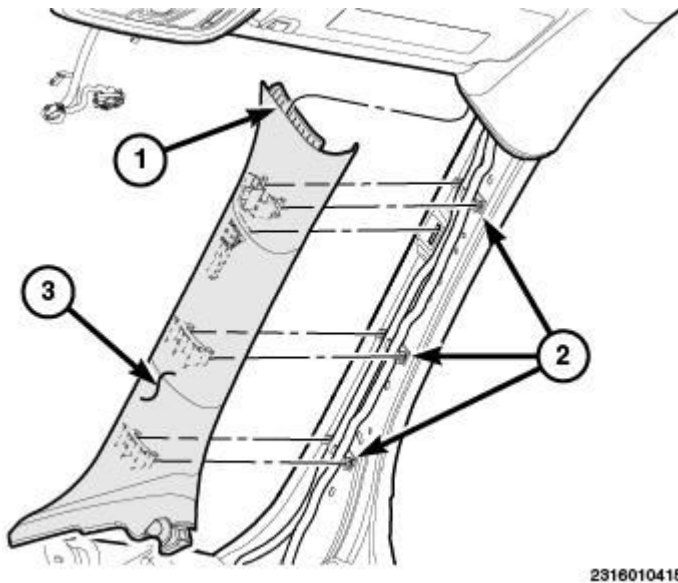
Fig. 369: Identifying Speaker Covers
Courtesy of CHRYSLER GROUP, LLC

3. Position the speaker grilles (1) back into place and seat the retaining clips fully.

PAD, INSTRUMENT PANEL

REMOVAL

REMOVAL



2316010415

Fig. 370: Identifying A-Pillar Trim, Tab & Fasteners
Courtesy of CHRYSLER GROUP, LLC

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury when removing a deployed airbag, rubber gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the airbag unit and other interior surfaces. In large doses, these deposits may cause irritation to the skin and eyes.

1. Disconnect and isolate the negative battery cable.
2. Remove the a-pillar trim (3). Refer to **PANEL, A-PILLAR TRIM, REMOVAL**.

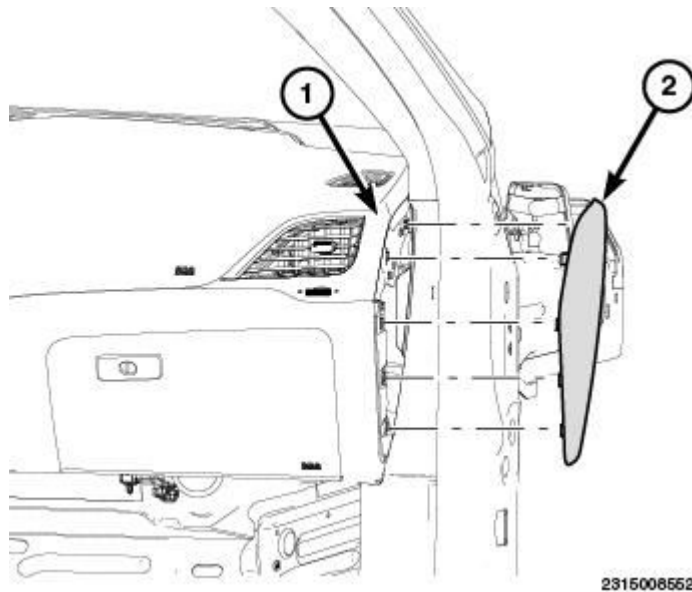


Fig. 371: Identifying Instrument Panel & End Cap
Courtesy of CHRYSLER GROUP, LLC

3. Using a (special tool #C-4755, Trim Stick) or equivalent, remove the end caps (2) from the instrument panel (1). Refer to **CAP, INSTRUMENT PANEL END, REMOVAL**.

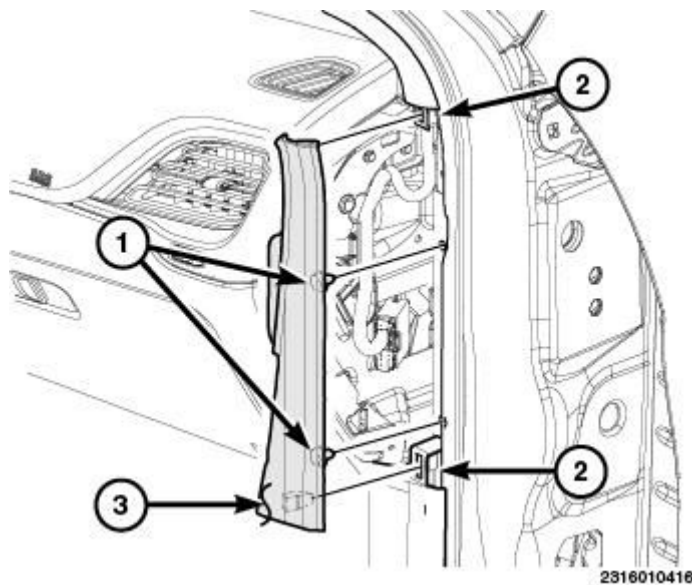


Fig. 372: Identifying Closeout Panel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Using a trim stick or equivalent, release the push pin fasteners (1) and the retaining tabs (2) and remove closeout panel (3) located between the A-pillar trim and the front scuff plate.

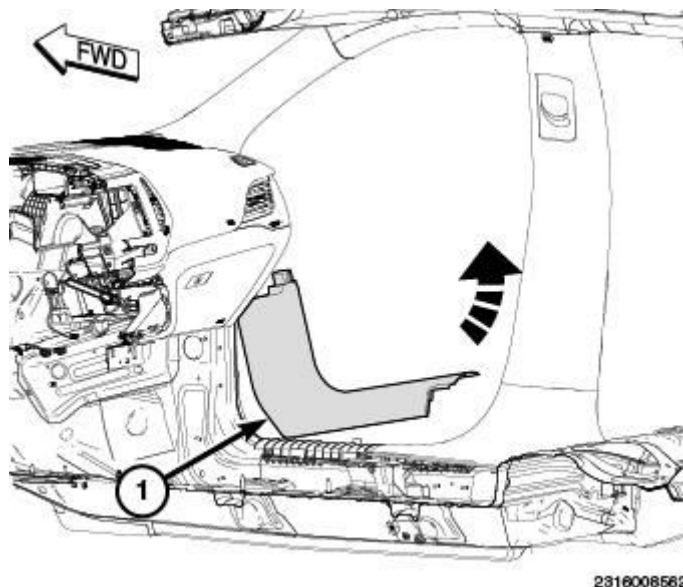


Fig. 373: Removing Front Door Sill Scuff Panel
Courtesy of CHRYSLER GROUP, LLC

5. Using a trim stick or equivalent, disengage the retaining clips securing the front door sill scuff panel (1) to the door sill and lower B-pillar.
6. Remove the front door sill scuff panel (1).

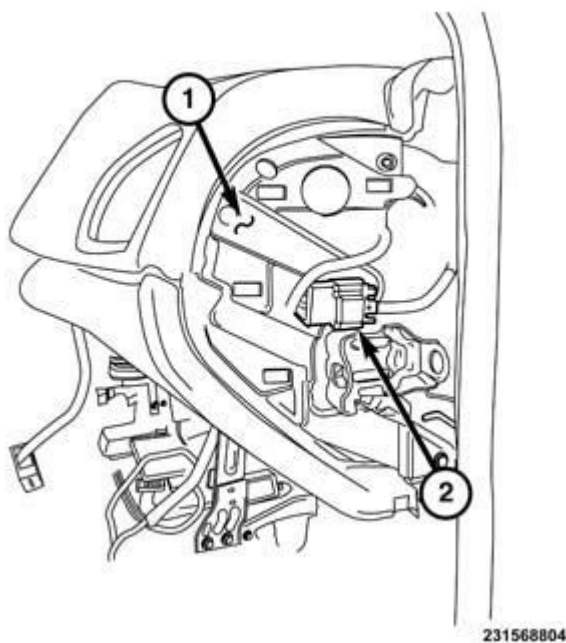
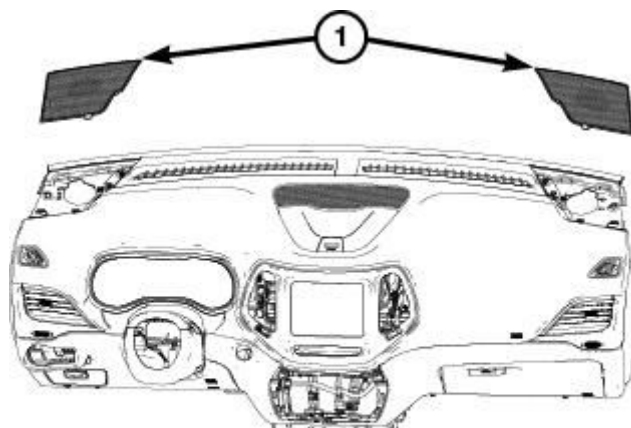


Fig. 374: Dash Side & Connector
Courtesy of CHRYSLER GROUP, LLC

7. Unclip the harness and connector (2) from the dash side (1) on both sides of the vehicle.

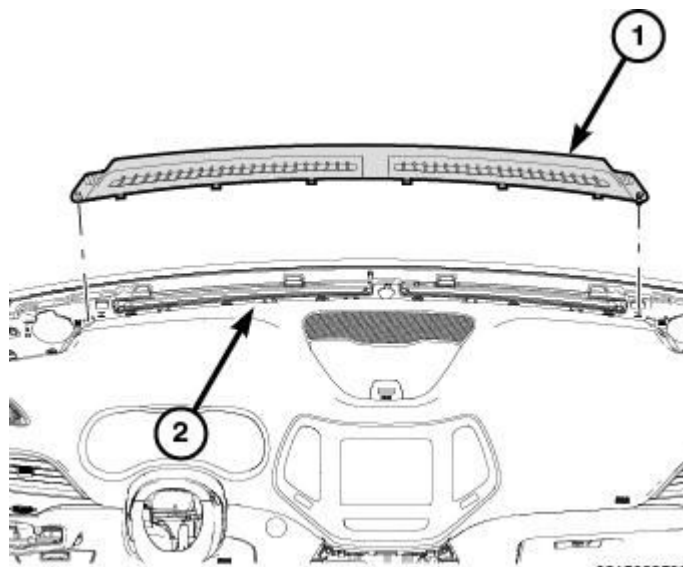
8. Disconnect the a-pillar wiring connectors.
9. Repeat on the opposite side of the vehicle.



2315008558

Fig. 375: Identifying Speaker Covers
Courtesy of CHRYSLER GROUP, LLC

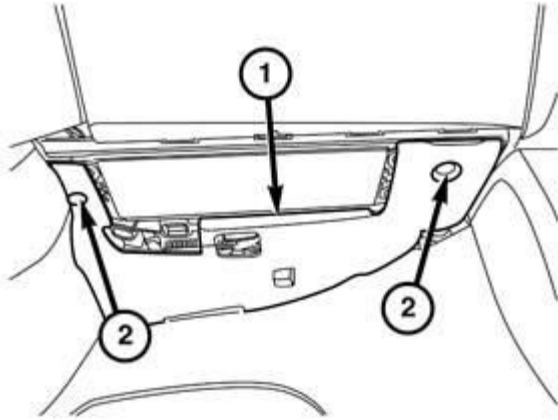
10. Using a trim stick or equivalent, remove the speaker covers (1).



2315008592

Fig. 376: Identifying Defroster Grille & Sun Sensor Electrical Connector
Courtesy of CHRYSLER GROUP, LLC

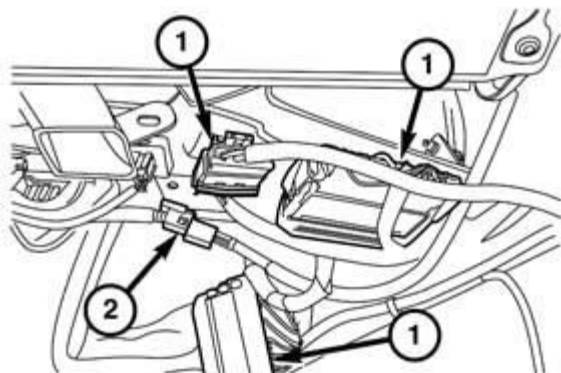
11. Remove defroster grill (1). Refer to **GRILLE, DEFROSTER, REMOVAL**.



231669158

Fig. 377: Hush Panel & Push Pin Fasteners
Courtesy of CHRYSLER GROUP, LLC

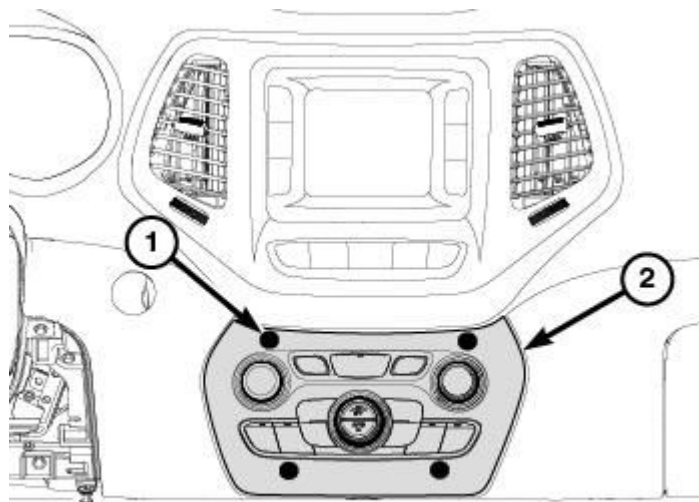
12. Remove push pin fasteners (2) and remove the lower dash silencer panels (1).
13. Remove the floor console. Refer to **CONSOLE, FLOOR, REMOVAL**.
14. Remove the steering column (1). Refer to **COLUMN, REMOVAL**.
15. Remove the cluster (1). Refer to **REMOVAL**.
16. Remove glove box assembly. Refer to **GLOVE BOX, INSTRUMENT PANEL, REMOVAL**.



231568798

Fig. 378: Dash Wiring Harnesses & Coaxial Connector
 Courtesy of CHRYSLER GROUP, LLC

17. Located under the passenger side of dash, disconnect the body to dash wiring harnesses (1).
18. Disconnect the coaxial connectors (2), if so equipped.



2315008554

Fig. 379: Identifying HVAC Control Head & Clips
 Courtesy of CHRYSLER GROUP, LLC

19. Using a trim stick or equivalent, separate the four clips (1) and remove the HVAC control head (2).
20. Disconnect the control head electrical connector.

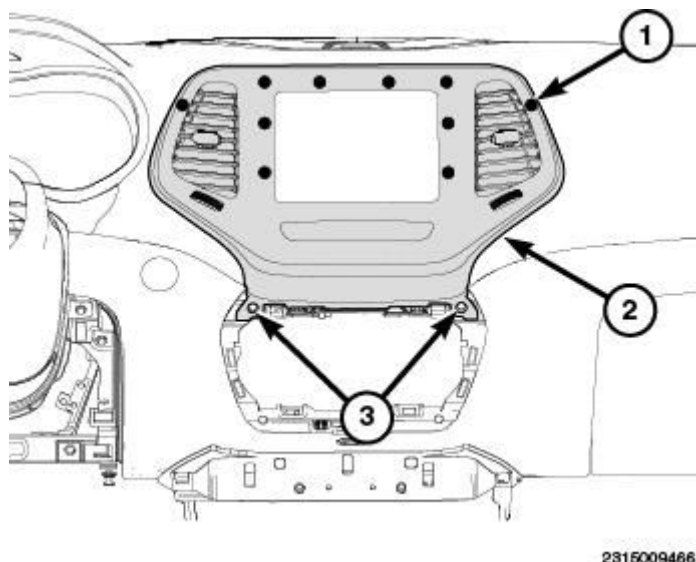


Fig. 380: Identifying Center Bezel & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

21. Remove the center bezel (2). Refer to **BEZEL, INSTRUMENT PANEL, CENTER, REMOVAL**.
22. Remove the radio module. Refer to **RADIO, REMOVAL**.

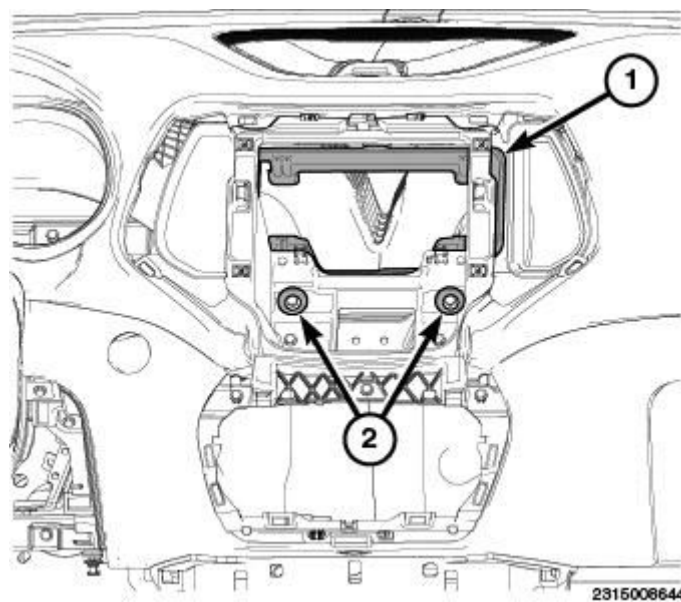
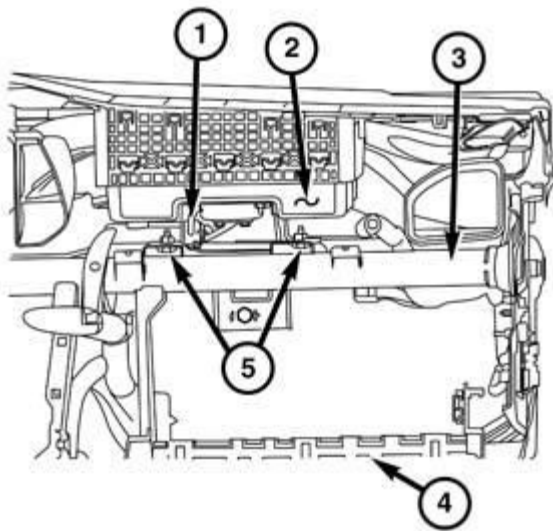


Fig. 381: Identifying Radio Support Bracket & Bolts
 Courtesy of CHRYSLER GROUP, LLC

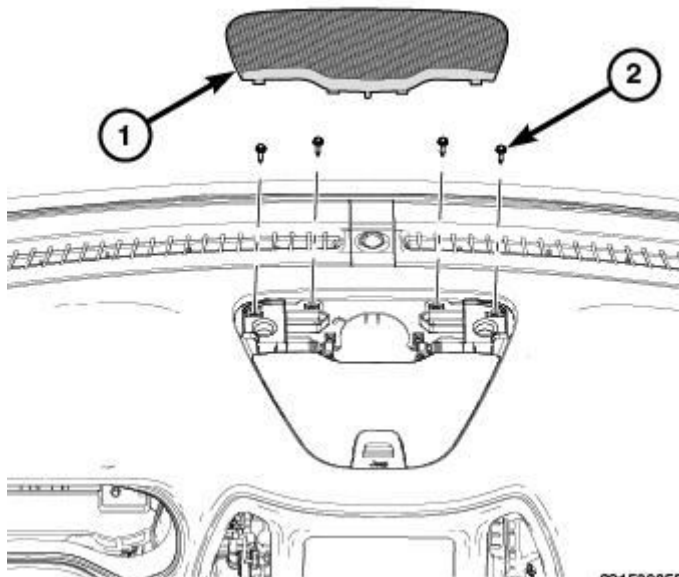
23. Remove the bolts (2) and remove the radio support bracket (1).



1020006267

Fig. 382: Removing/Installing Passenger AirBag (PAB)
Courtesy of CHRYSLER GROUP, LLC

24. Reach through and above the glove box opening (4) of the instrument panel to access and remove the two screws (5) that secure the Passenger AirBag (PAB) (2) lower mounting bracket to the instrument panel structural support (3).
25. Still reaching through the glove box opening, disconnect the instrument panel wire harness connector from the PAB pigtail wire harness connector (1).



2315008559

Fig. 383: Identifying Center Speaker Cover & Screws

Courtesy of CHRYSLER GROUP, LLC

26. Using a trim stick or equivalent, remove the center speaker cover (1).
27. Remove the screws (2).

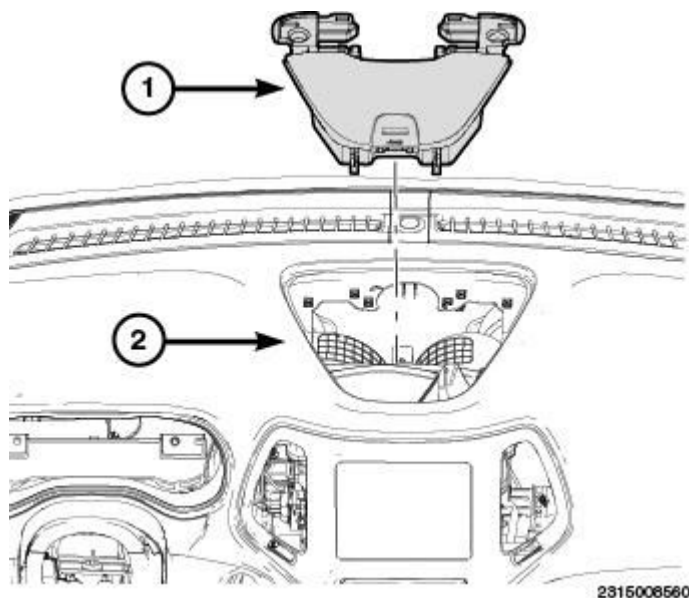


Fig. 384: Identifying Upper Storage Bin & Instrument Panel Top Cover
Courtesy of CHRYSLER GROUP, LLC

28. Remove the upper storage bin (1) from the instrument panel top cover (2).

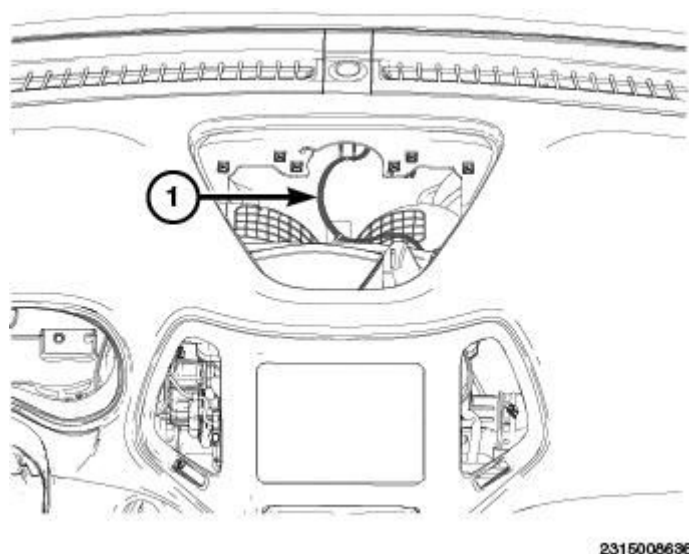


Fig. 385: Identifying Harness
Courtesy of CHRYSLER GROUP, LLC

29. Separate the harness (1), if equipped.

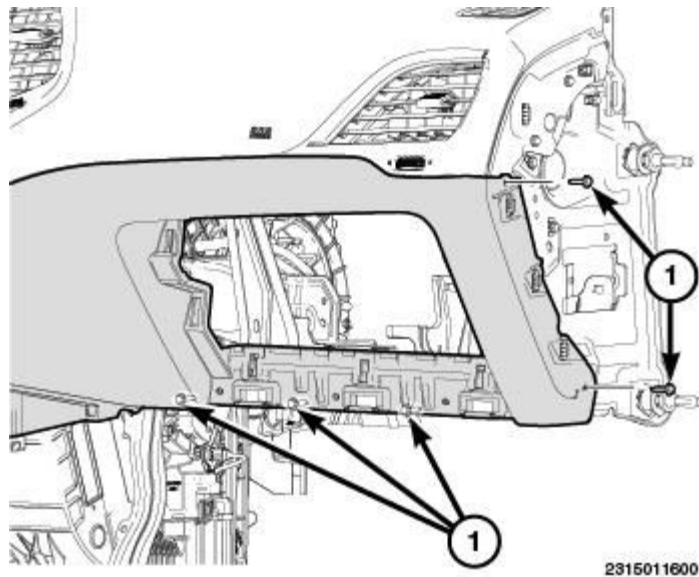


Fig. 386: Identifying Lower Surround Panel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

30. Remove the lower surround panel fasteners (1).

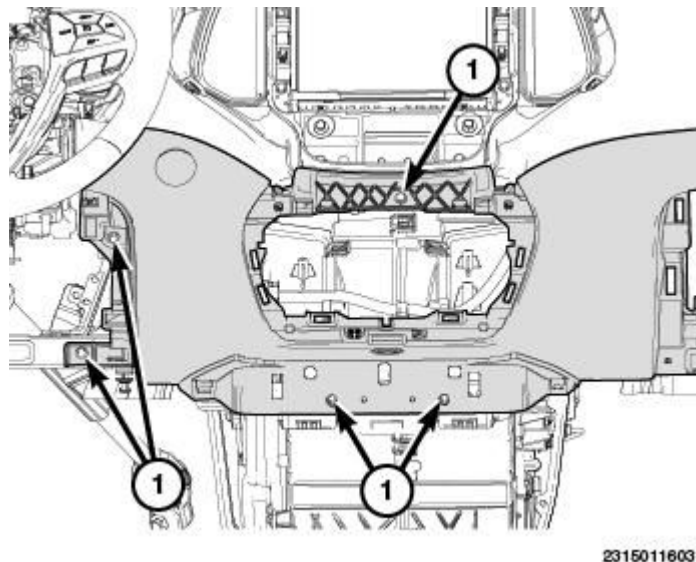
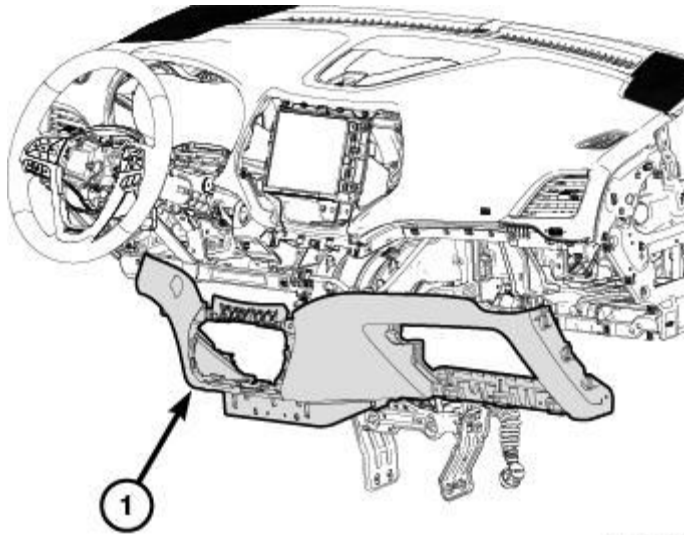


Fig. 387: Identifying Lower Surround Panel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

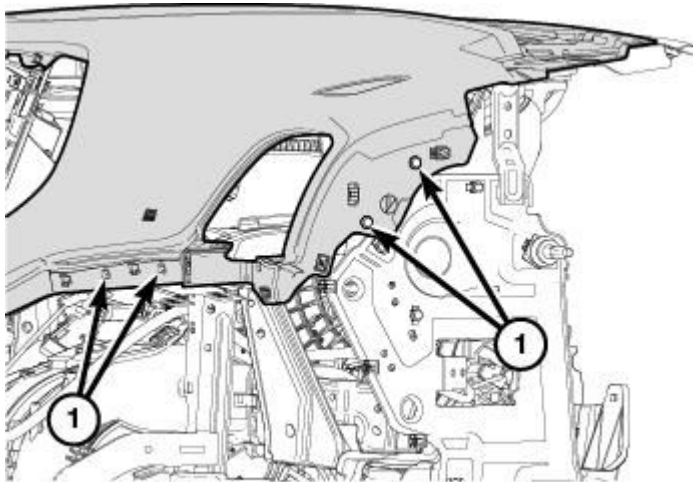
31. Remove the lower surround panel fasteners (1).



2315010025

Fig. 388: Identifying Lower Instrument Panel Surround Panel
Courtesy of CHRYSLER GROUP, LLC

32. Using a trim stick or equivalent, separate the retaining clips and remove the lower instrument panel surround panel (1).



2315011612

Fig. 389: Identifying Trim Fasteners
Courtesy of CHRYSLER GROUP, LLC

33. Remove the fasteners (1).

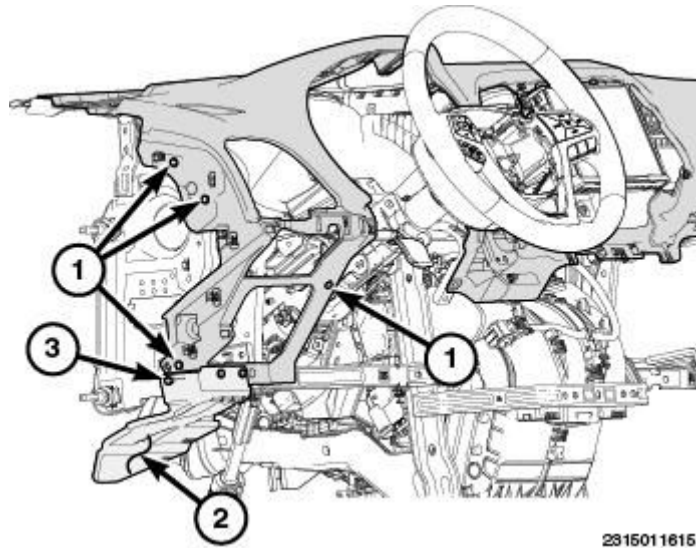


Fig. 390: Identifying Trim Fasteners
Courtesy of CHRYSLER GROUP, LLC

34. Remove the trim fasteners (3) and remove the trim panel (2).
35. Remove the fasteners (1).

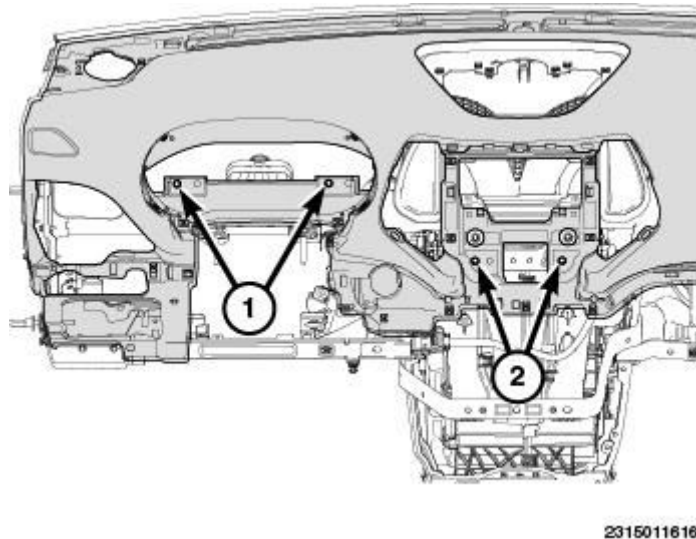


Fig. 391: Identifying Trim Fasteners
Courtesy of CHRYSLER GROUP, LLC

36. Remove the fasteners (1) in the cluster opening and the fasteners (2) from the center opening.

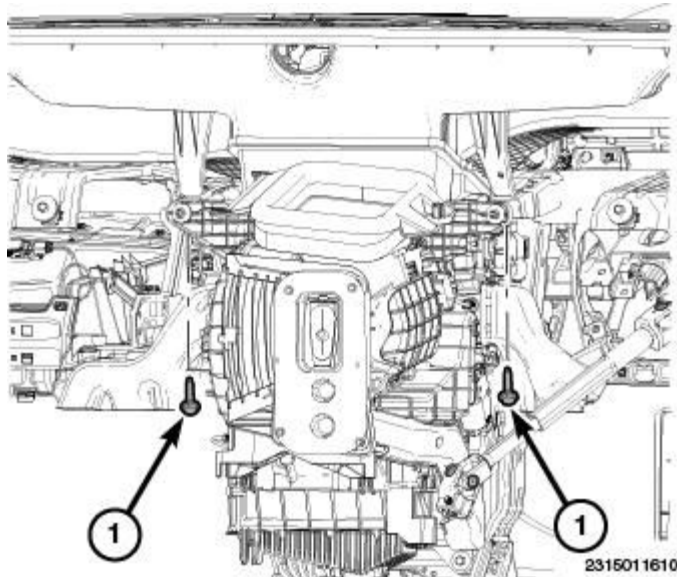


Fig. 392: Identifying HVAC Housing & Fasteners
Courtesy of CHRYSLER GROUP, LLC

37. From under the instrument panel remove the fasteners (1) securing the duct work to the HVAC housing.

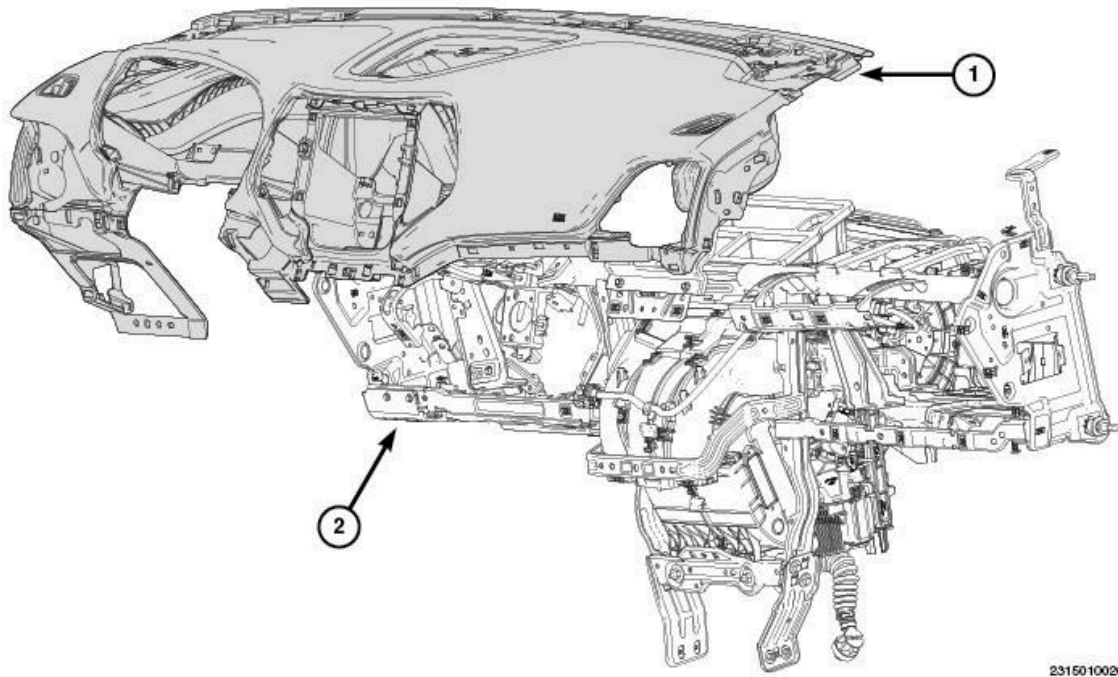
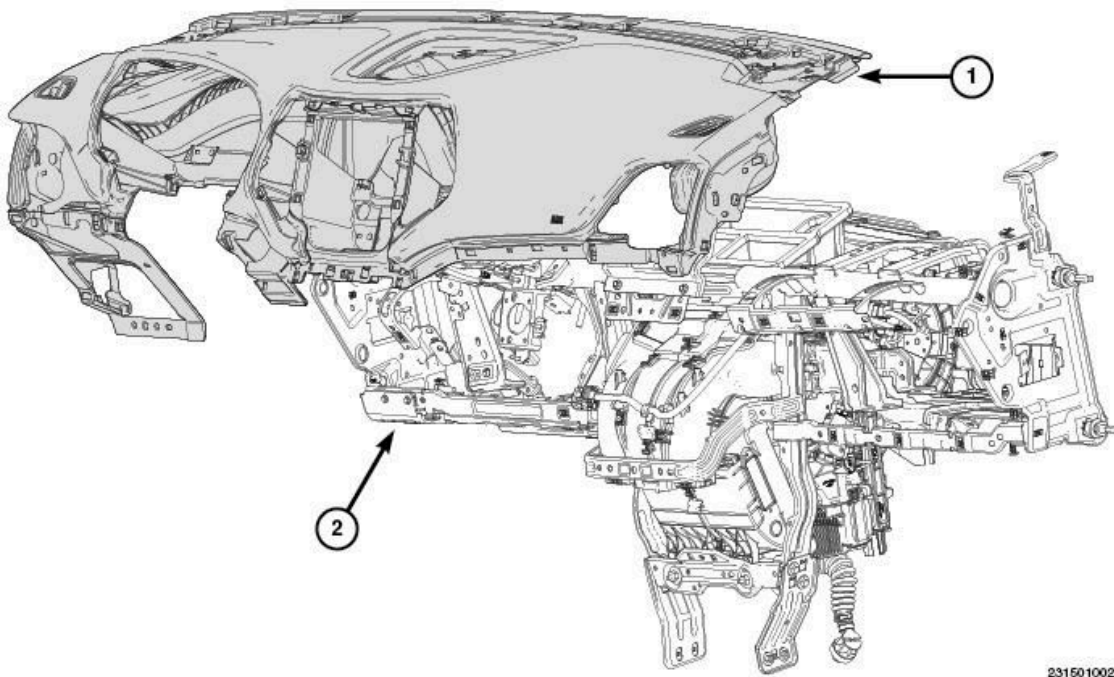


Fig. 393: Identifying Instrument Panel Top Pad Assembly & Support Structure
Courtesy of CHRYSLER GROUP, LLC

38. Remove the instrument panel top pad assembly (1) from the support structure (2).

INSTALLATION

INSTALLATION



2315010026

Fig. 394: Identifying Instrument Panel Top Pad Assembly & Support Structure
Courtesy of CHRYSLER GROUP, LLC

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury when removing a deployed airbag, rubber gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the airbag unit and other interior surfaces. In large doses, these deposits may cause irritation to the skin and eyes.

WARNING: To avoid serious or fatal injury, use extreme care to prevent any foreign material from entering the passenger airbag, or becoming entrapped between the passenger airbag cushion and the instrument panel top pad. Failure to observe this warning could result in occupant injuries upon airbag deployment.

1. Position the dash pad (1) into the vehicle.

2. Connect sun sensor and center stack wiring retainers into the dash pad (1).
3. Position the dash pad onto the dash carrier fully.

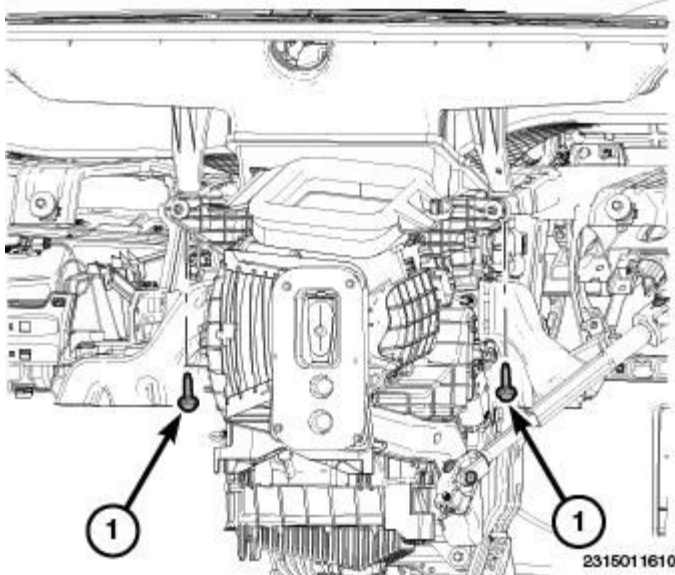


Fig. 395: Identifying HVAC Housing & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. From under the instrument panel install the fasteners (1) securing the duct work to the HVAC housing and tighten securely.

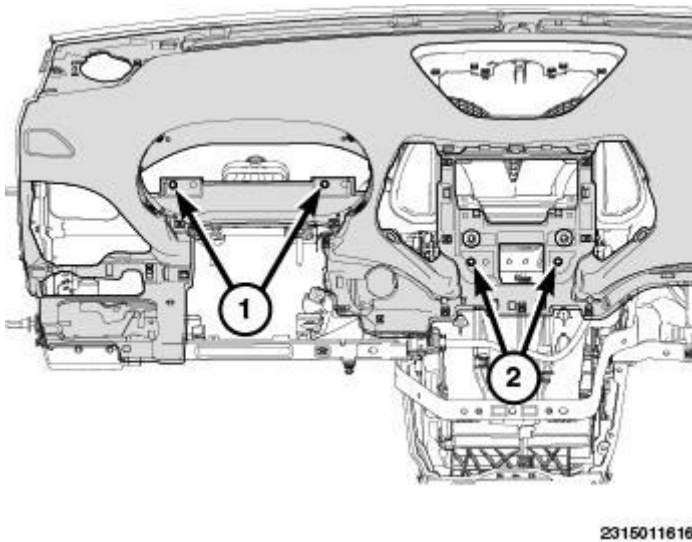


Fig. 396: Identifying Trim Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. Install the fasteners (1) in the cluster opening and the fasteners (2) at the center opening.

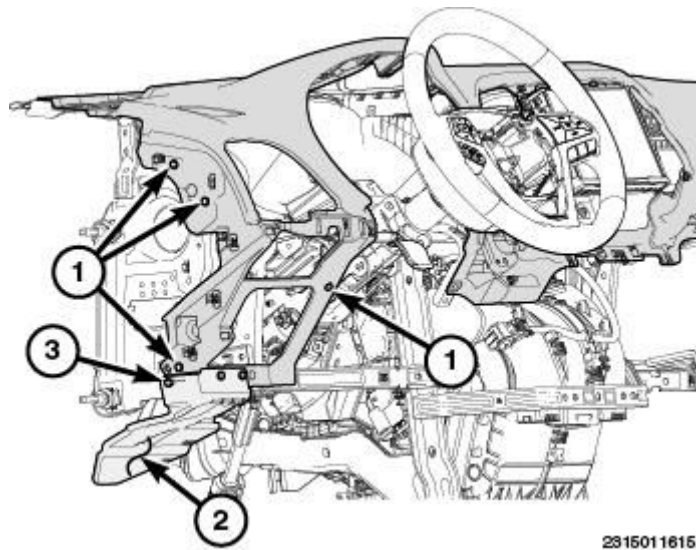


Fig. 397: Identifying Trim Fasteners
Courtesy of CHRYSLER GROUP, LLC

6. Install the fasteners (1).
7. Install the trim panel (2) and trim fasteners (3).

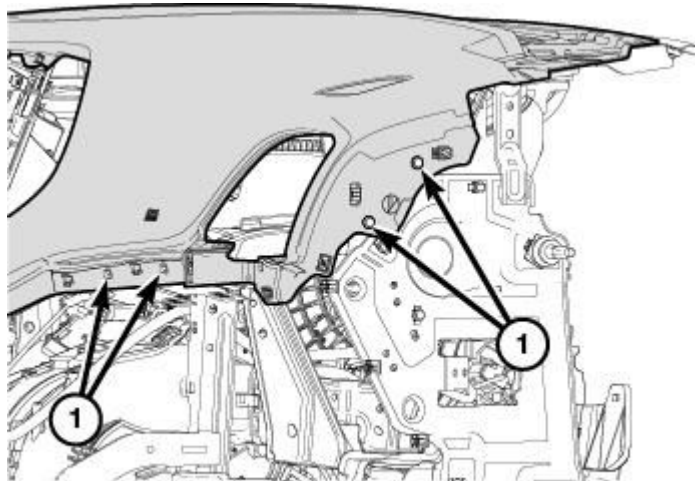
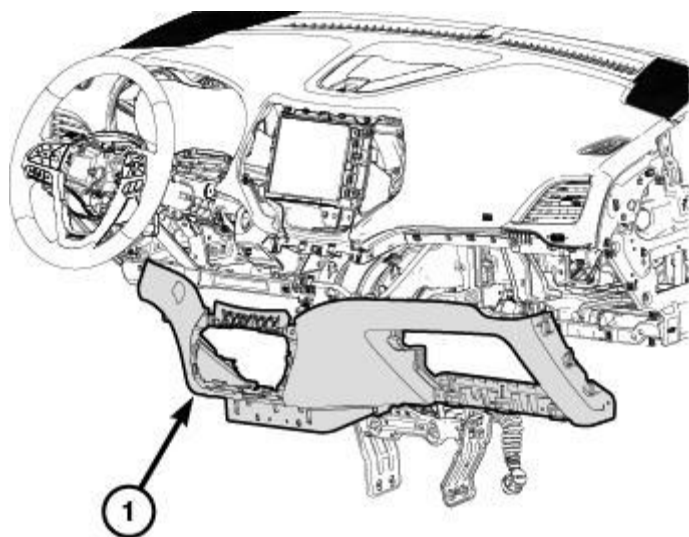


Fig. 398: Identifying Trim Fasteners
Courtesy of CHRYSLER GROUP, LLC

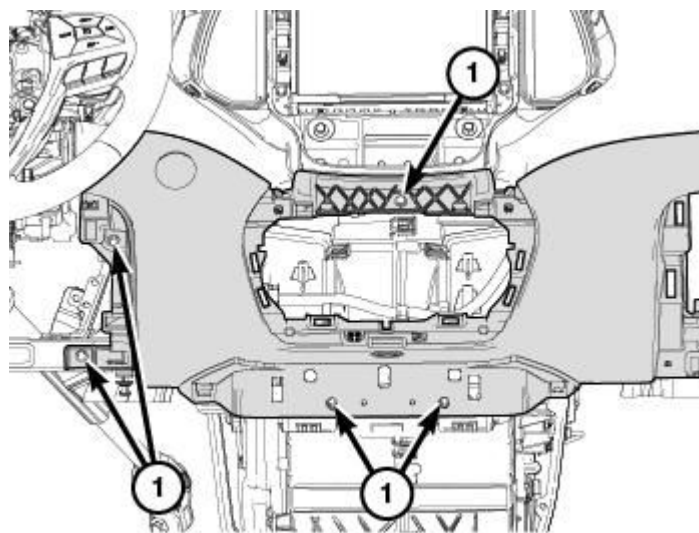
8. Install the fasteners (1).



2315010025

Fig. 399: Identifying Lower Instrument Panel Surround Panel
Courtesy of CHRYSLER GROUP, LLC

9. Position the lower surround panel (1) back into place and seat the retaining clips fully.



2315011603

Fig. 400: Identifying Lower Surround Panel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

10. Install the lower surround panel fasteners (1).

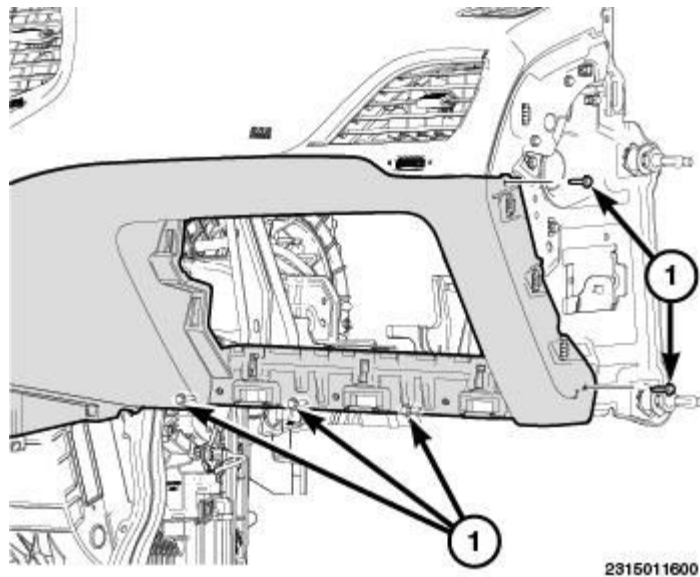


Fig. 401: Identifying Lower Surround Panel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

11. Install the lower surround panel fasteners (1).

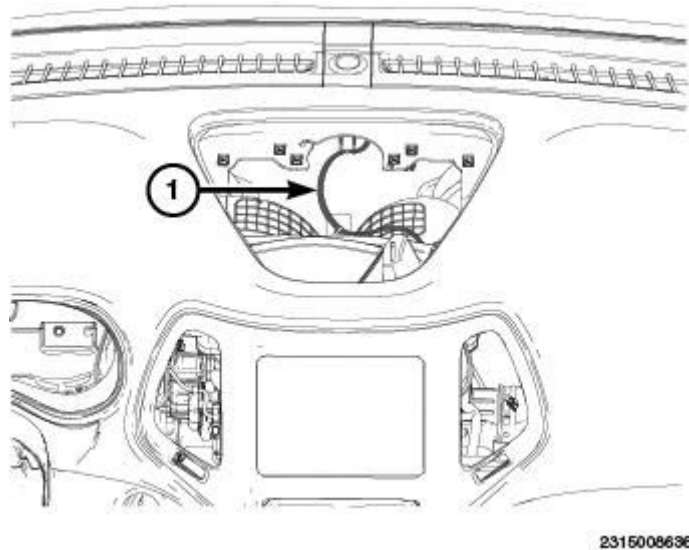


Fig. 402: Identifying Harness
Courtesy of CHRYSLER GROUP, LLC

12. Position the harness (1), if equipped, back and secure fully.

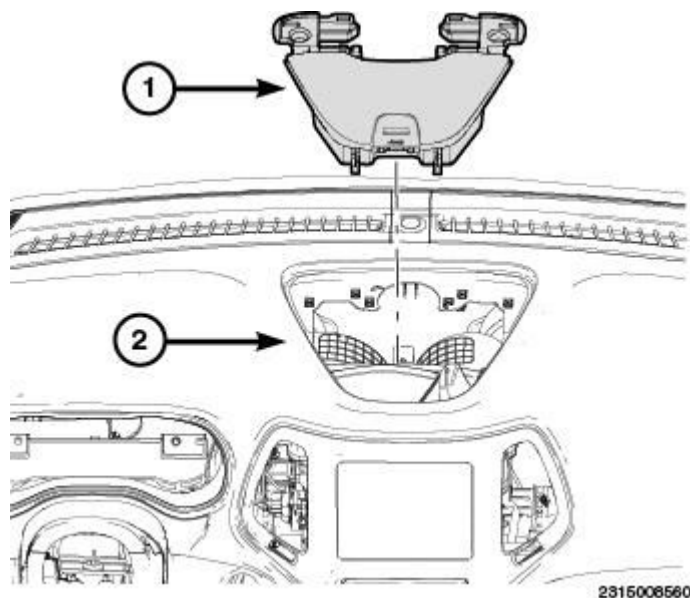


Fig. 403: Identifying Upper Storage Bin & Instrument Panel Top Cover
Courtesy of CHRYSLER GROUP, LLC

13. Position the storage bin (1) back into place onto the instrument panel top cover (2) and seat fully.

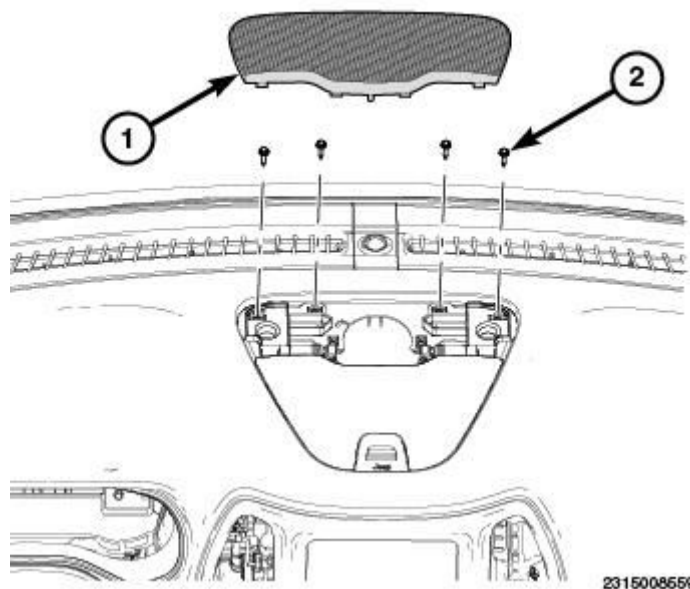
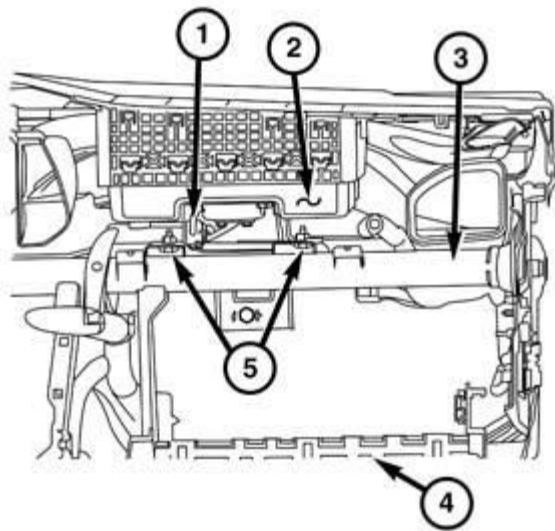


Fig. 404: Identifying Center Speaker Cover & Screws
Courtesy of CHRYSLER GROUP, LLC

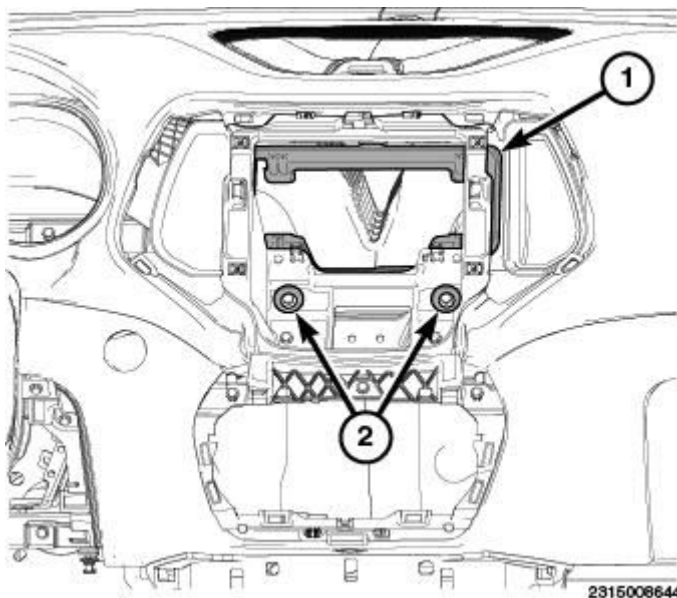
14. Install the fasteners (2).
15. Install the speaker, if equipped.
16. Install center speaker cover (1) and seat fully.



1020006267

Fig. 405: Removing/Installing Passenger AirBag (PAB)
Courtesy of CHRYSLER GROUP, LLC

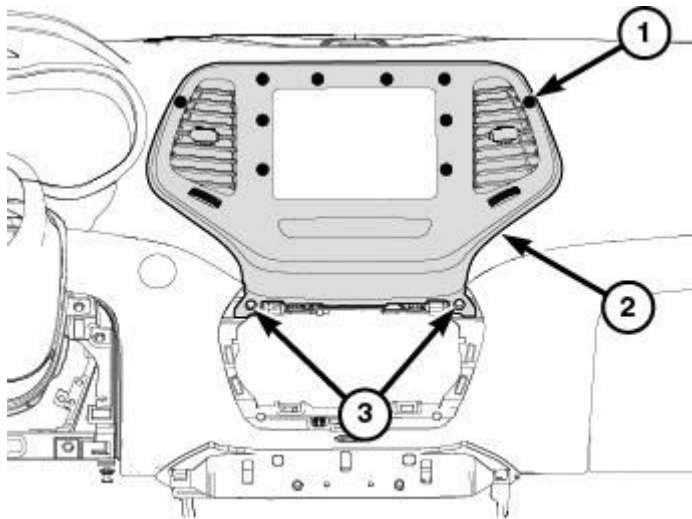
17. Reach through and above the glove box opening (4) of the instrument panel to reconnect the instrument panel wire harness connector to the PAB pigtail wire harness connector (1). Be certain that the connector is fully engaged and locked.
18. Still reaching through the glove box opening, install and tighten the two screws (5) that secure the PAB (2) lower mounting bracket to the instrument panel structural support (3). Tighten the screws to 9 N.m (80 in. lbs.).



2315008644

Fig. 406: Identifying Radio Support Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

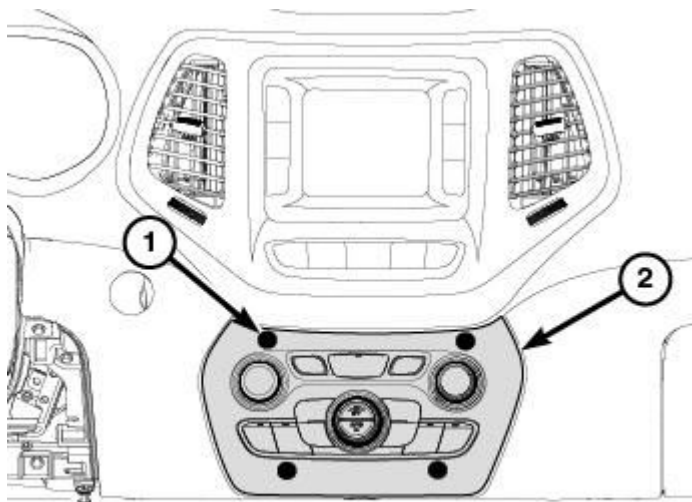
19. Install the radio support bracket (1) and install the bolts (2).



2315009466

Fig. 407: Identifying Center Bezel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

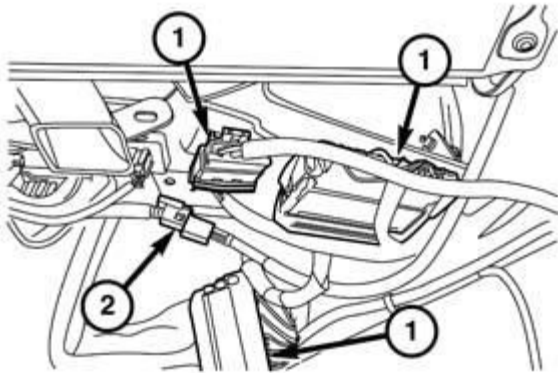
20. Install the radio module. Refer to **RADIO, INSTALLATION** .
21. Connect the electrical connectors and install the center bezel (2).
22. Seat the clips (1) fully.
23. Install the fasteners (3).



2315008554

Fig. 408: Identifying HVAC Control Head & Clips
Courtesy of CHRYSLER GROUP, LLC

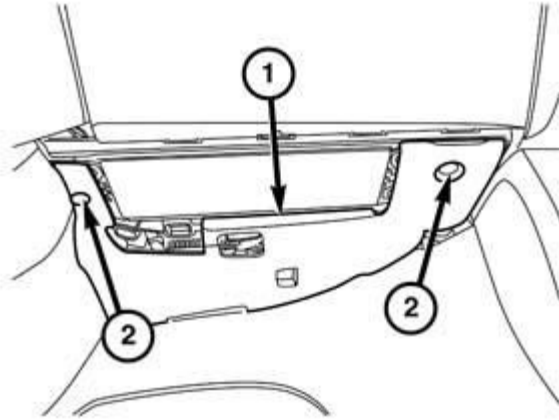
24. Connect the HVAC control head electrical connectors and install the control head (2).
25. Seat the four control head fastener clips (1) fully.



231568798

Fig. 409: Dash Wiring Harnesses & Coaxial Connector
Courtesy of CHRYSLER GROUP, LLC

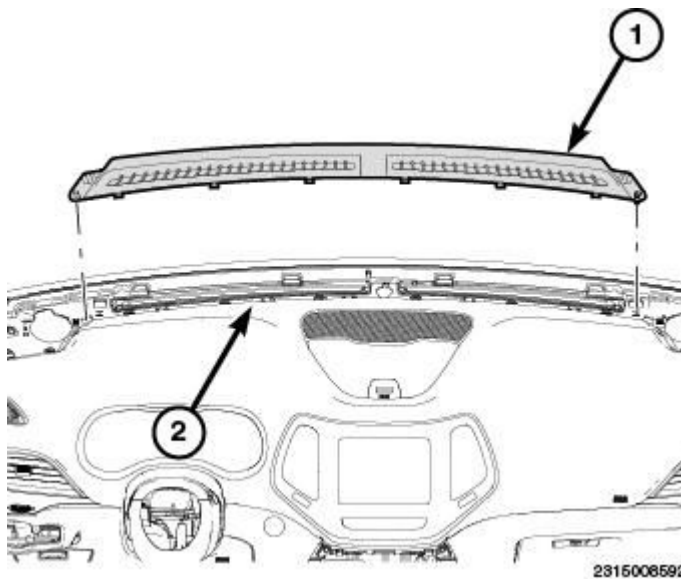
26. Located under the passenger side of dash, connect the body to dash wiring harnesses (1).
27. Connect the coaxial connectors (2), if so equipped.



231669158

Fig. 410: Hush Panel & Push Pin Fasteners
Courtesy of CHRYSLER GROUP, LLC

28. Install the silencer panel (1) and install the push pin fasteners (2).

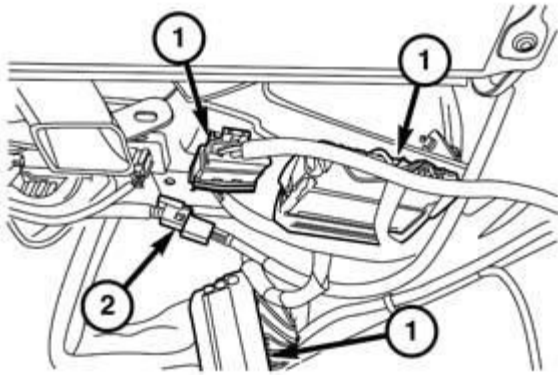


2315008592

Fig. 411: Identifying Defroster Grille & Sun Sensor Electrical Connector
Courtesy of CHRYSLER GROUP, LLC

29. Install the defroster grille (1). Refer to **GRILLE, DEFROSTER, INSTALLATION**.
30. Install the floor console. Refer to **CONSOLE, FLOOR, INSTALLATION**.
31. Install the steering column. Refer to **COLUMN, INSTALLATION**.

32. Install the instrument cluster. Refer to **INSTALLATION** .
33. Install the glove box assembly. Refer to **GLOVE BOX, INSTRUMENT PANEL, INSTALLATION**.



231568798

Fig. 412: Dash Wiring Harnesses & Coaxial Connector
Courtesy of CHRYSLER GROUP, LLC

34. Located under the passenger side of dash, connect the body to dash wiring harnesses (1).
35. Connect the coaxial connectors (2), if so equipped.

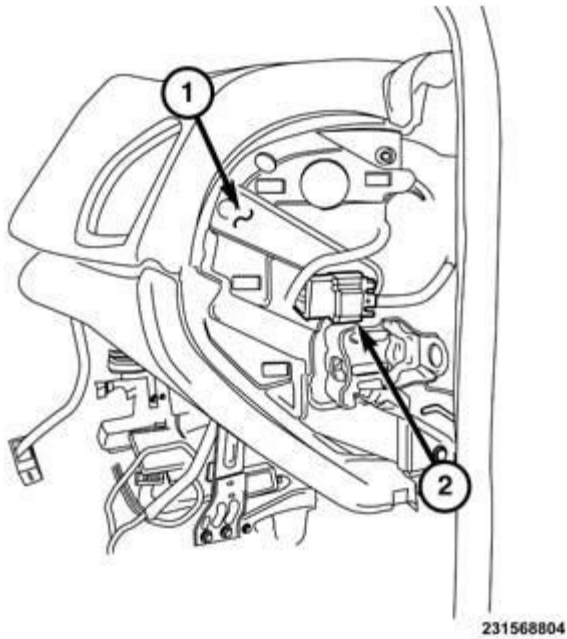


Fig. 413: Dash Side & Connector
Courtesy of CHRYSLER GROUP, LLC

36. Connect the a-pillar wiring connectors.
37. Fasten the harness and connector (2) into the dash side (1) on both sides of the vehicle.

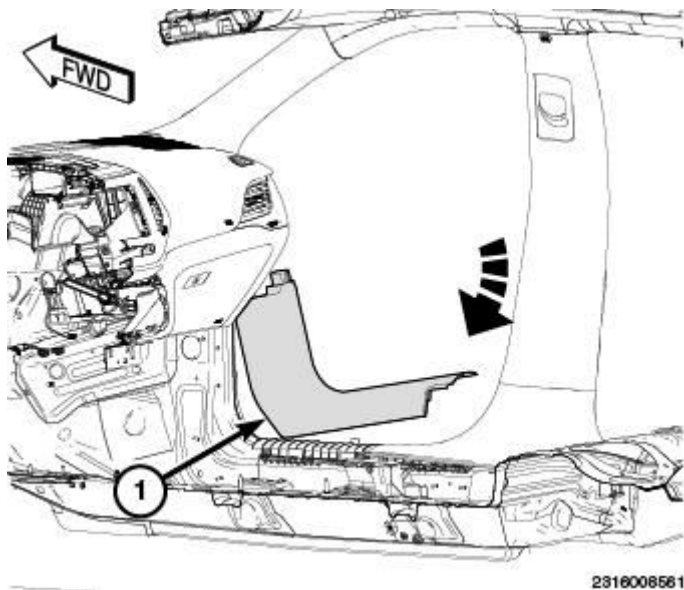


Fig. 414: Installing Front Door Sill Scuff Panel
Courtesy of CHRYSLER GROUP, LLC

38. Position the front door sill scuff panel (1).

39. Hand tap to engage the retaining clips securing the front door sill scuff panel (1) to the door sill and lower B-pillar.

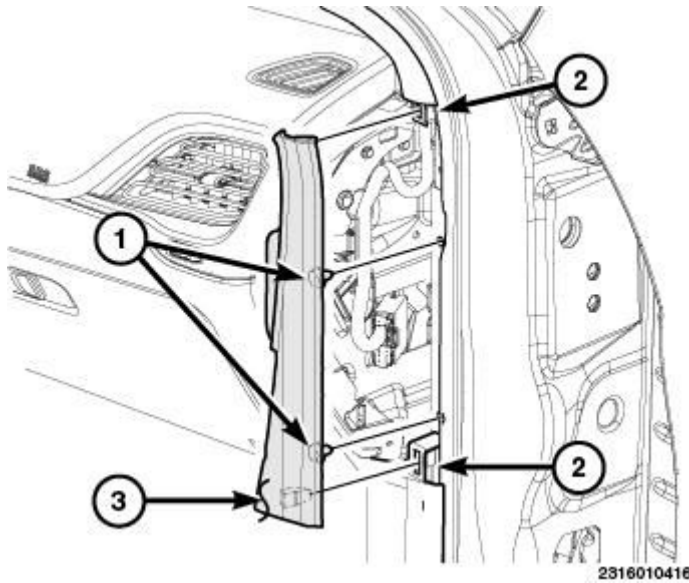


Fig. 415: Identifying Closeout Panel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

40. Position the closeout trim panel (3) located between the A-pillar trim and the front scuff plate.
41. Seat the retaining clips (1 and 2) fully.

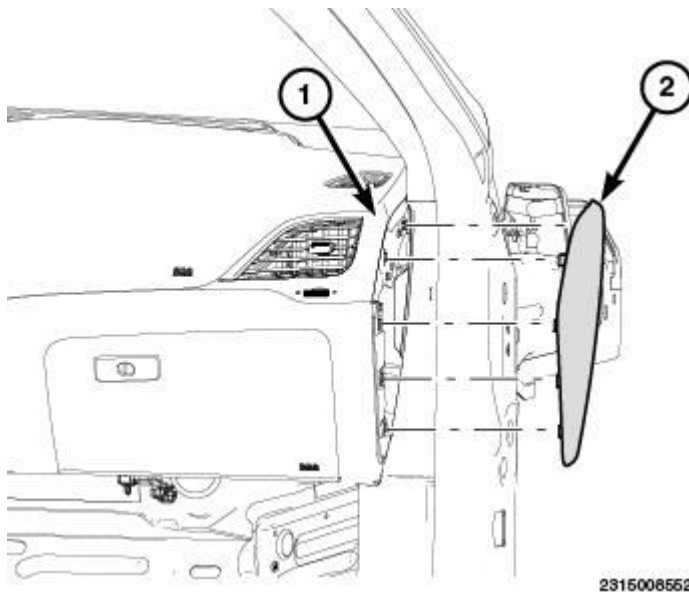
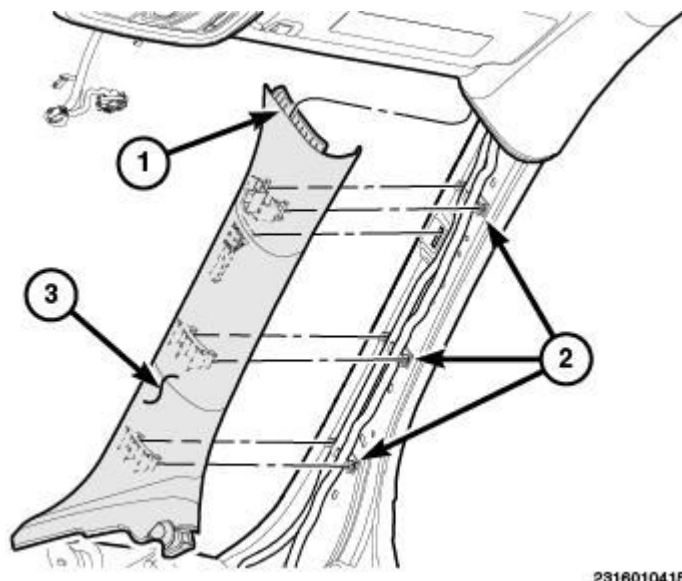


Fig. 416: Identifying Instrument Panel & End Cap
Courtesy of CHRYSLER GROUP, LLC

42. Install the end caps (1). Refer to **CAP, INSTRUMENT PANEL END, INSTALLATION**.



2316010415

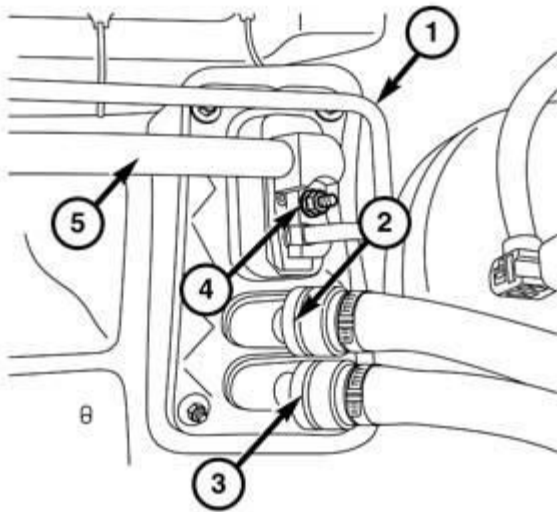
Fig. 417: Identifying A-Pillar Trim, Tab & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

43. Install the A-pillar trim. Refer to **PANEL, A-PILLAR TRIM, INSTALLATION**.
44. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **STANDARD PROCEDURE**.

PANEL, INSTRUMENT

REMOVAL

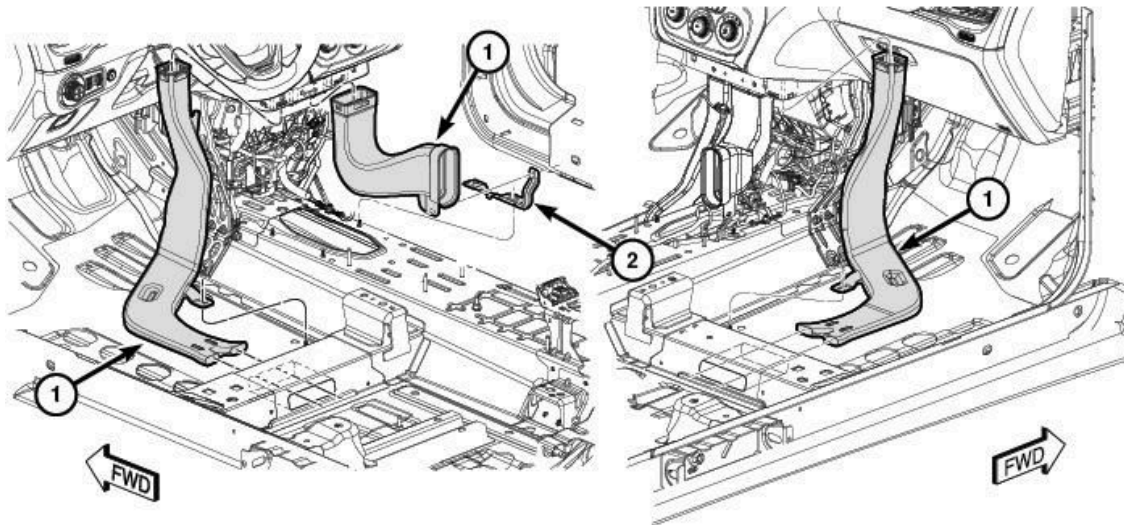
REMOVAL



241070008

Fig. 418: Refrigerant Lines, Heater Core Hoses & Fastener
 Courtesy of CHRYSLER GROUP, LLC

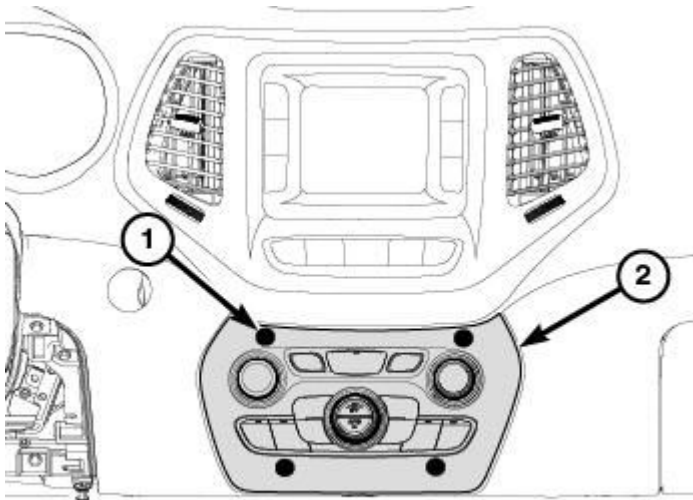
1. Partially drain the cooling system. Refer to **STANDARD PROCEDURE** .
2. Evacuate the air conditioning system. Refer to **STANDARD PROCEDURE** .
3. Disconnect the heater core hoses (2) and (3) to the HVAC housing. Refer to **CORE, HEATER, REMOVAL** .
4. Install plugs in, or tape over the opened heater core tubes to prevent coolant spillage during housing removal.
5. Remove fastener (4) and disconnect the air conditioning refrigerant lines (1) and (5) from the HVAC housing (2).
6. Install plugs in, or tape over the opened refrigerant lines fitting.
7. Remove the front doors (1). Refer to **DOOR, REMOVAL**.
8. Remove the floor console. Refer to **CONSOLE, FLOOR, REMOVAL**.
9. Remove the shifter assembly. Refer to **SHIFTER, FLOOR CONSOLE, REMOVAL** .



2315008634

Fig. 419: Identifying HVAC Floor Ducts, Bracket & Fasteners
Courtesy of CHRYSLER GROUP, LLC

10. Remove the bracket (2) and remove the HVAC floor ducts (1). Refer to **DUCT, FLOOR DISTRIBUTION, REMOVAL** .



2315008554

Fig. 420: Identifying HVAC Control Head & Clips
Courtesy of CHRYSLER GROUP, LLC

11. Using a (special tool #C-4755, Trim Stick) or equivalent, separate the four clips (1) and remove the HVAC control head (2).
12. Disconnect the control head electrical connector.

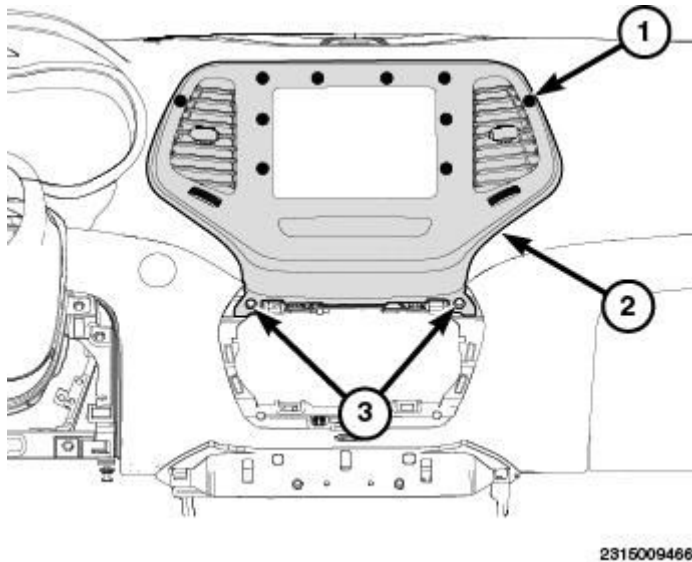


Fig. 421: Identifying Center Bezel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

13. Remove the center bezel (2). Refer to **BEZEL, INSTRUMENT PANEL, CENTER, REMOVAL**.

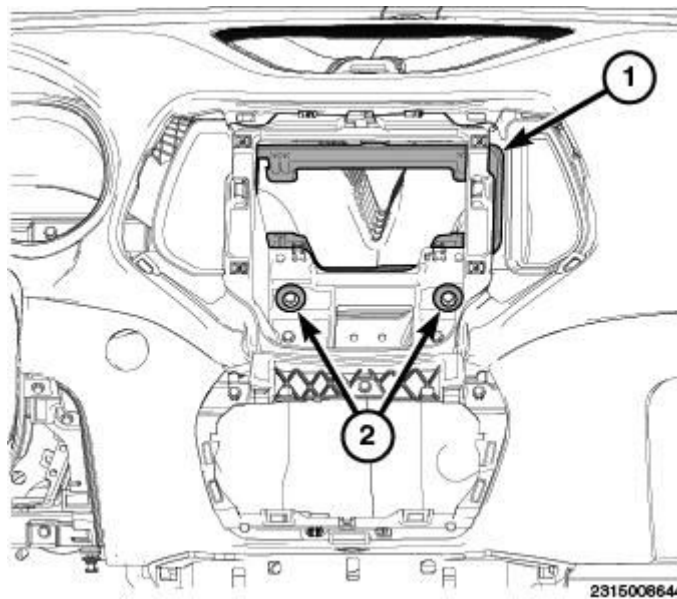


Fig. 422: Identifying Radio Support Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

14. Remove the bolts and remove the radio support bracket.

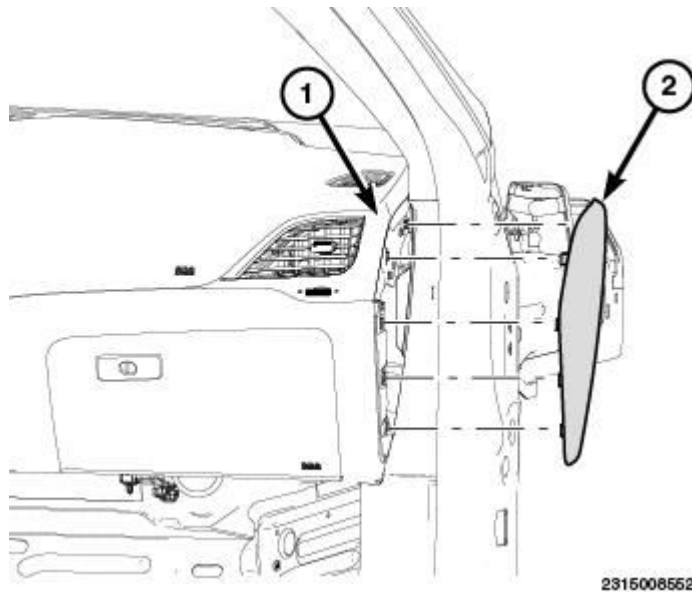


Fig. 423: Identifying Instrument Panel & End Cap
Courtesy of CHRYSLER GROUP, LLC

15. Using a trim stick or equivalent, remove the end caps (2) from the instrument panel (1). Refer to **CAP, INSTRUMENT PANEL END, REMOVAL**.

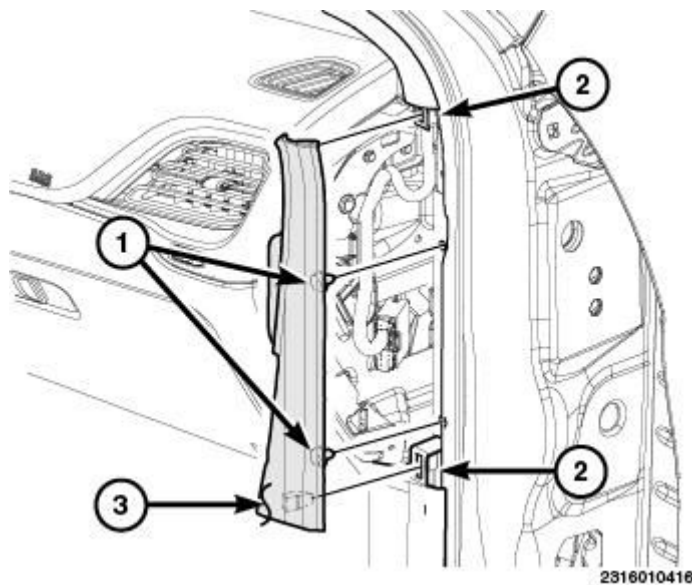


Fig. 424: Identifying Closeout Panel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

16. Using a trim stick or equivalent, release the push pin fasteners (1) and the retaining tabs (2) and remove closeout panel (3) located between the A-pillar trim and the front scuff plate.

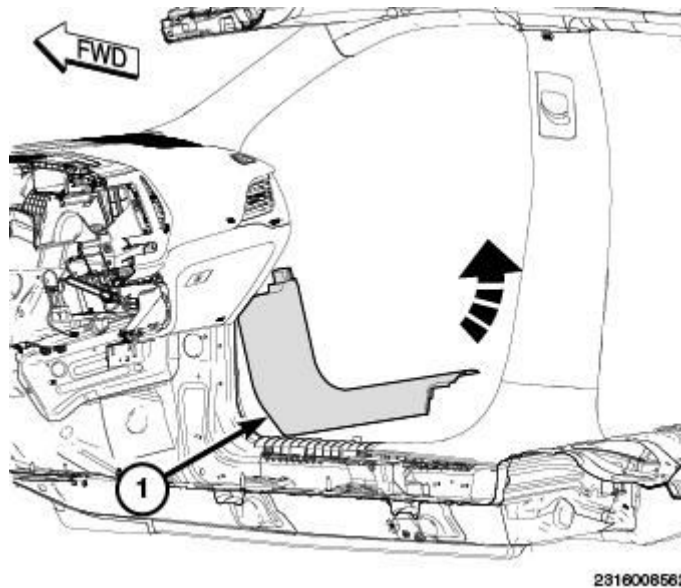


Fig. 425: Removing Front Door Sill Scuff Panel
Courtesy of CHRYSLER GROUP, LLC

17. Using a trim stick or equivalent, disengage the retaining clips securing the front door sill scuff panel (1) to the door sill and lower B-pillar.
18. Remove the front door sill scuff panel (1).

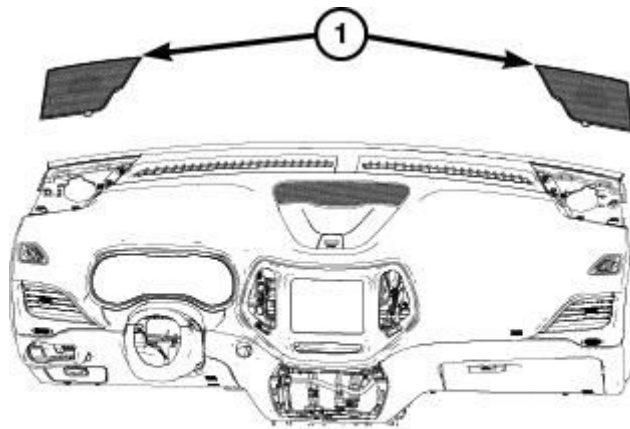


Fig. 426: Identifying Speaker Covers
Courtesy of CHRYSLER GROUP, LLC

19. Using a trim stick or equivalent, remove the speaker covers (1).

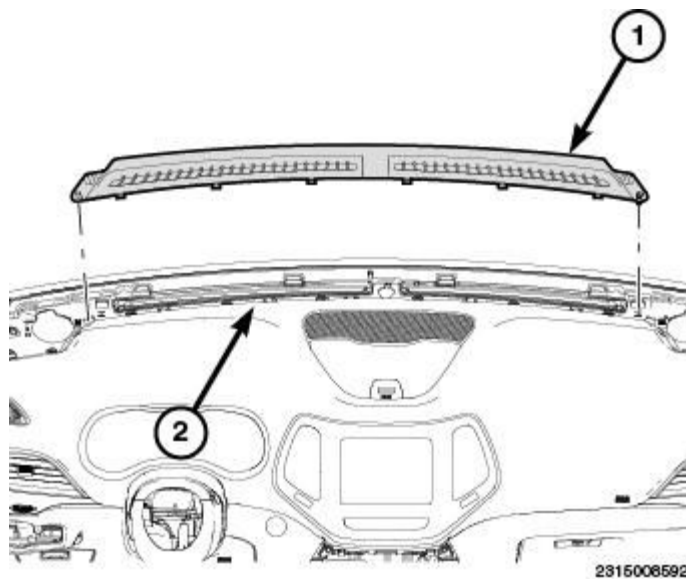


Fig. 427: Identifying Defroster Grille & Sun Sensor Electrical Connector
Courtesy of CHRYSLER GROUP, LLC

20. Remove defroster grill. Refer to **GRILLE, DEFROSTER, REMOVAL**.

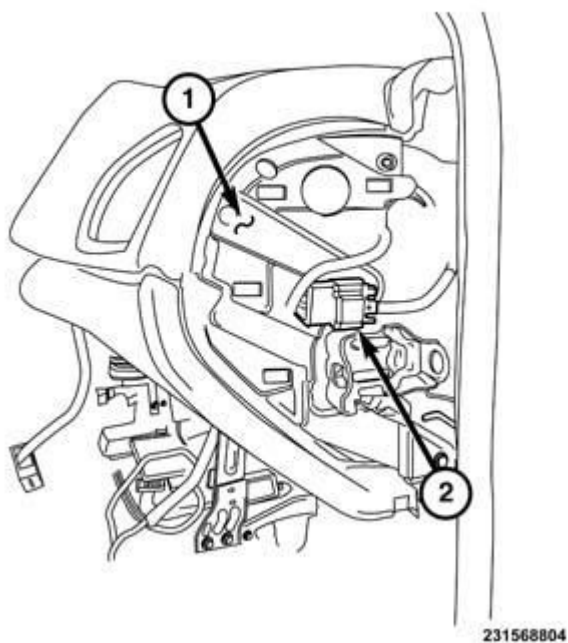
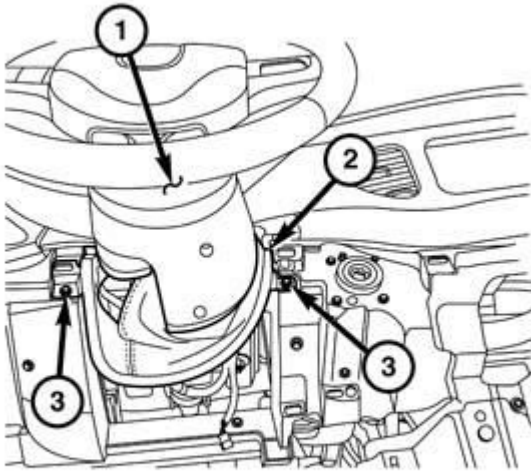


Fig. 428: Dash Side & Connector
Courtesy of CHRYSLER GROUP, LLC

21. Remove the a-pillar trim. Refer to **PANEL, A-PILLAR TRIM, REMOVAL**.
22. Unclip the harness and connector (2) from the dash side (1).
23. Disconnect the A-pillar wiring connector (1).

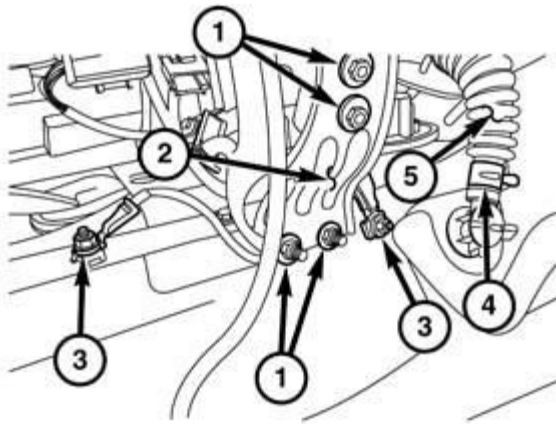
24. Remove lower dash silencer panels. Refer to **PANEL, SILENCER, LOWER, REMOVAL**.



231568800

Fig. 429: Steering Column, Gap Hider & Fasteners
Courtesy of CHRYSLER GROUP, LLC

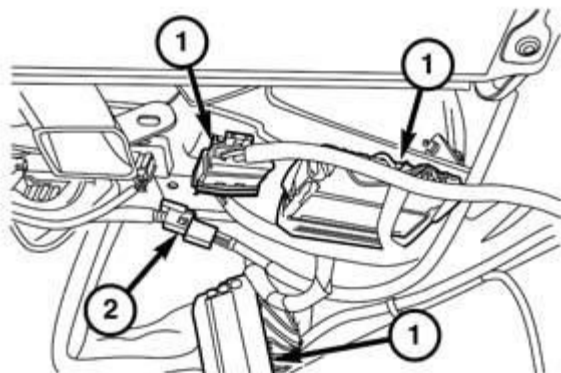
25. Remove steering column opening closeout. Refer to **PANEL, SILENCER, LOWER, REMOVAL**.
26. Remove the steering column gap hider (2) fasteners (3).
27. Remove the steering column (1). Refer to **COLUMN, REMOVAL** .



231568802

Fig. 430: Floor Pan Bracket Fasteners, Ground Wiring, Drain Tube & Clamp
Courtesy of CHRYSLER GROUP, LLC

28. Remove the lower instrument panel to floor pan bracket fasteners (1).
29. Unfasten the ground wiring to the floor (3).
30. Repeat on the opposite side.
31. With the use of pliers or equivalent disconnect the air conditioning drain tube clamp (4).
32. Remove the drain tube from the floor valve.
33. Remove the glove box. Refer to **GLOVE BOX, INSTRUMENT PANEL, REMOVAL**.



231568798

Fig. 431: Dash Wiring Harnesses & Coaxial Connector
Courtesy of CHRYSLER GROUP, LLC

34. From under the passenger side of dash, disconnect the body to dash wiring harnesses (1).
35. Disconnect the coaxial connectors (2), if so equipped.

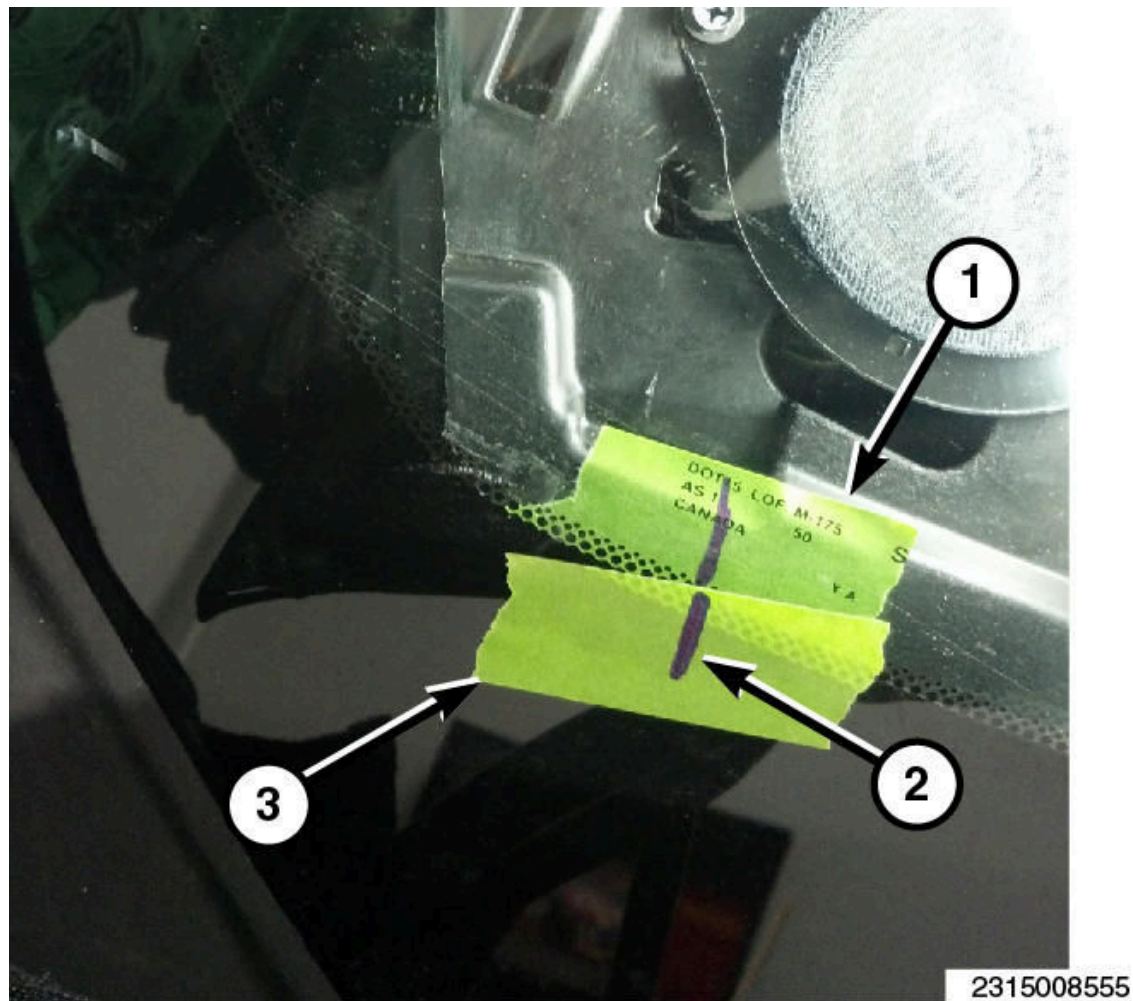


Fig. 432: Identifying Tape On Instrument Panel & Outside Of Windshield
Courtesy of CHRYSLER GROUP, LLC

36. Place tape along the top of the instrument panel (1) and onto the outside of the windshield (3) as indicated and mark with felt tip pen or equivalent (2), to aid during the installation.

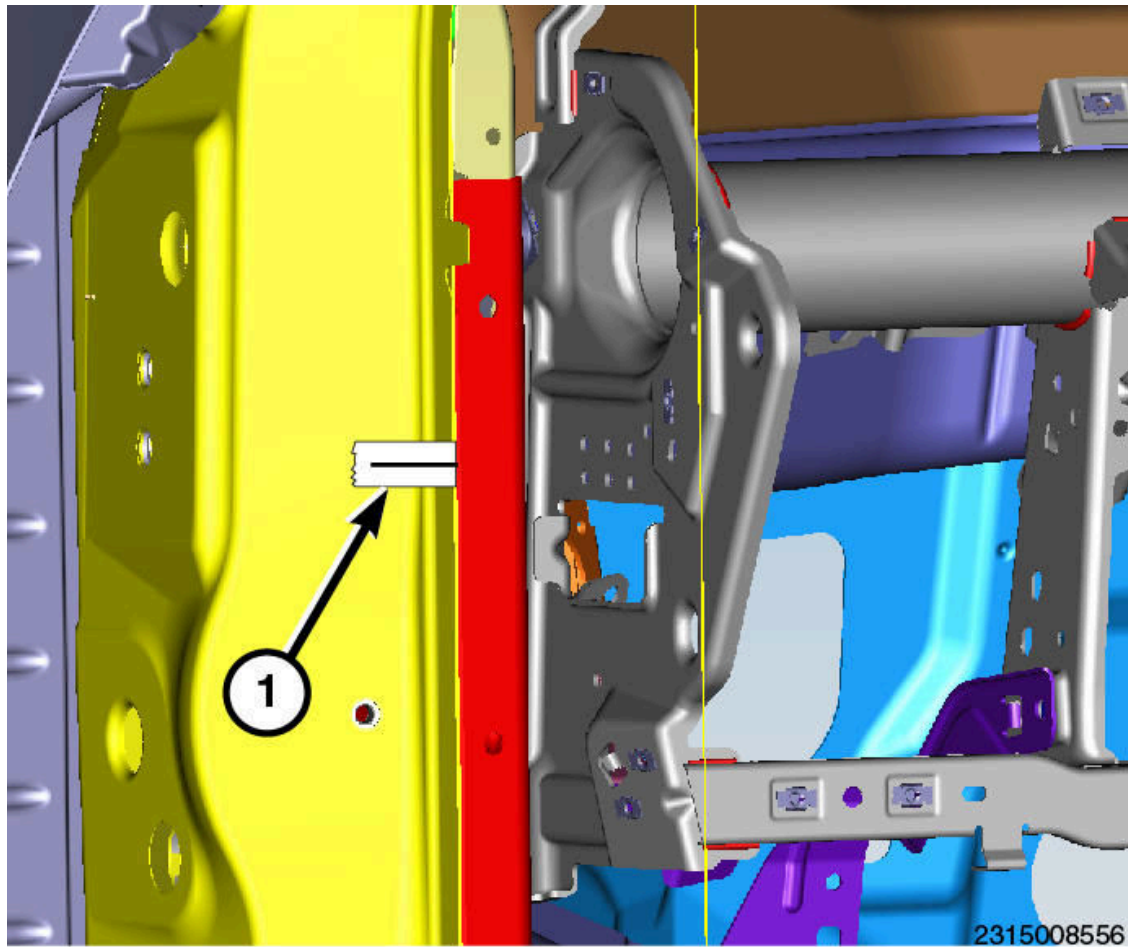


Fig. 433: Identifying Tape On Door Sill Flanges
Courtesy of CHRYSLER GROUP, LLC

37. Place tape along the door sill flanges (1) as indicated and mark with felt tip pen or equivalent (2), to aid during the installation.

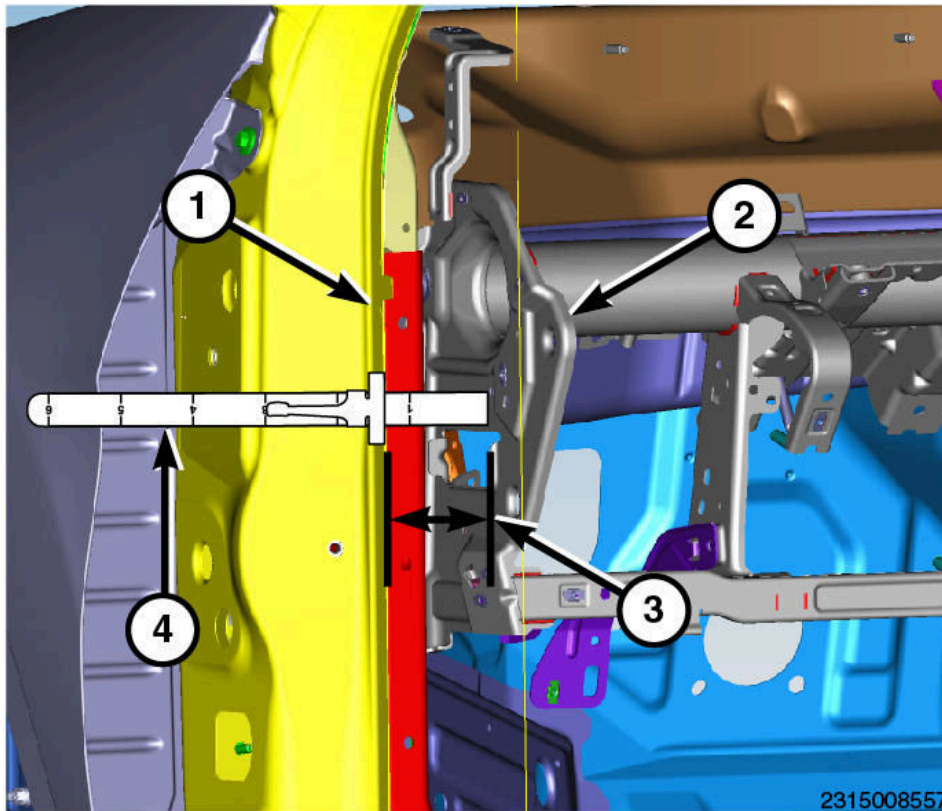


Fig. 434: Identifying Pocket Ruler & Distance Measurements
Courtesy of CHRYSLER GROUP, LLC

38. Using a pocket ruler (4) or equivalent, measure and record the distance (3) from the door sill flanges (1) to the instrument panel support beam (2) on both sides of the instrument panel to aid installation.

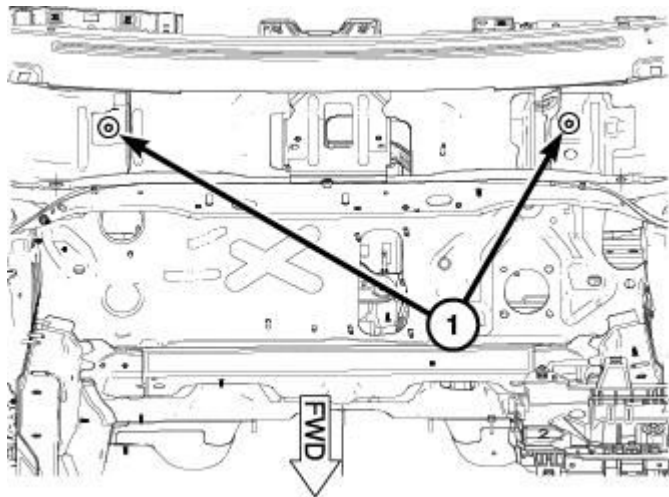
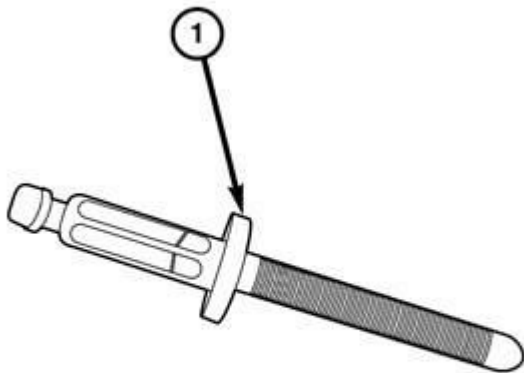


Fig. 435: Identifying Lower Plenum Fasteners
Courtesy of CHRYSLER GROUP, LLC

39. Remove the wiper arms. Refer to **ARM, WIPER, REMOVAL** .
40. Remove the cowl vent panel. Refer to **COVER, COWL PANEL, REMOVAL**.
41. Remove the wiper linkage. Refer to **LINKAGE, WIPER ARM, REMOVAL** .
42. Remove the dash carrier to the lower plenum fasteners (1).



231568797

Fig. 436: Hinge Pillar Fastener

Courtesy of CHRYSLER GROUP, LLC

NOTE: Use a 9 mm deep well socket with a full cut to remove the dash carrier side bolts (1). The carrier bolts design will not allow a partial cut socket to access.

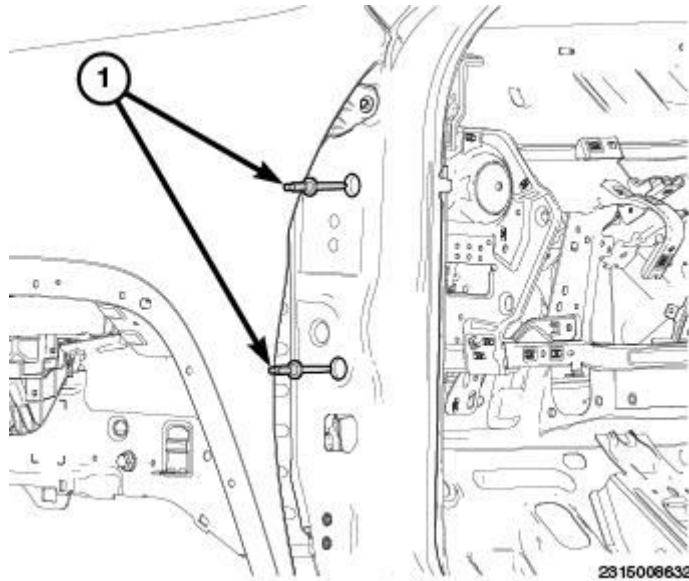


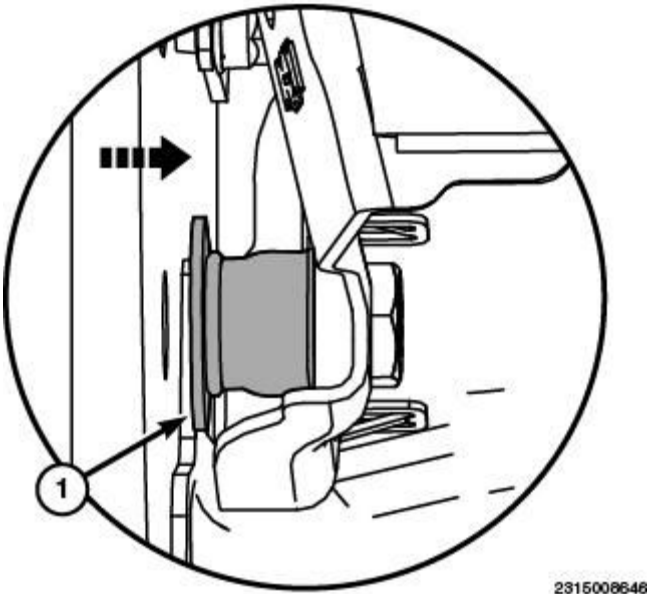
Fig. 437: Identifying Dash Carrier Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: Removal of the dash will require the use of three people. One on each end and one in the middle.

43. Place assistant at the center of the dash to help support and assist with removal.
44. With the use of a small flat bladed tool or equivalent, remove the fastener covers located on the hinge pillar (1) of both sides of the vehicle.
45. Remove the four dash carrier bolts (2), two on each side.
46. Remove the dash from vehicle.

INSTALLATION

INSTALLATION



2315008648

Fig. 438: Identifying Mounting Bushings
Courtesy of CHRYSLER GROUP, LLC

NOTE: Installation of the dash will require the use of three people. One on each end and one in the middle.

1. Verify that the six mounting bushings (1) are fully retracted and rotate freely.

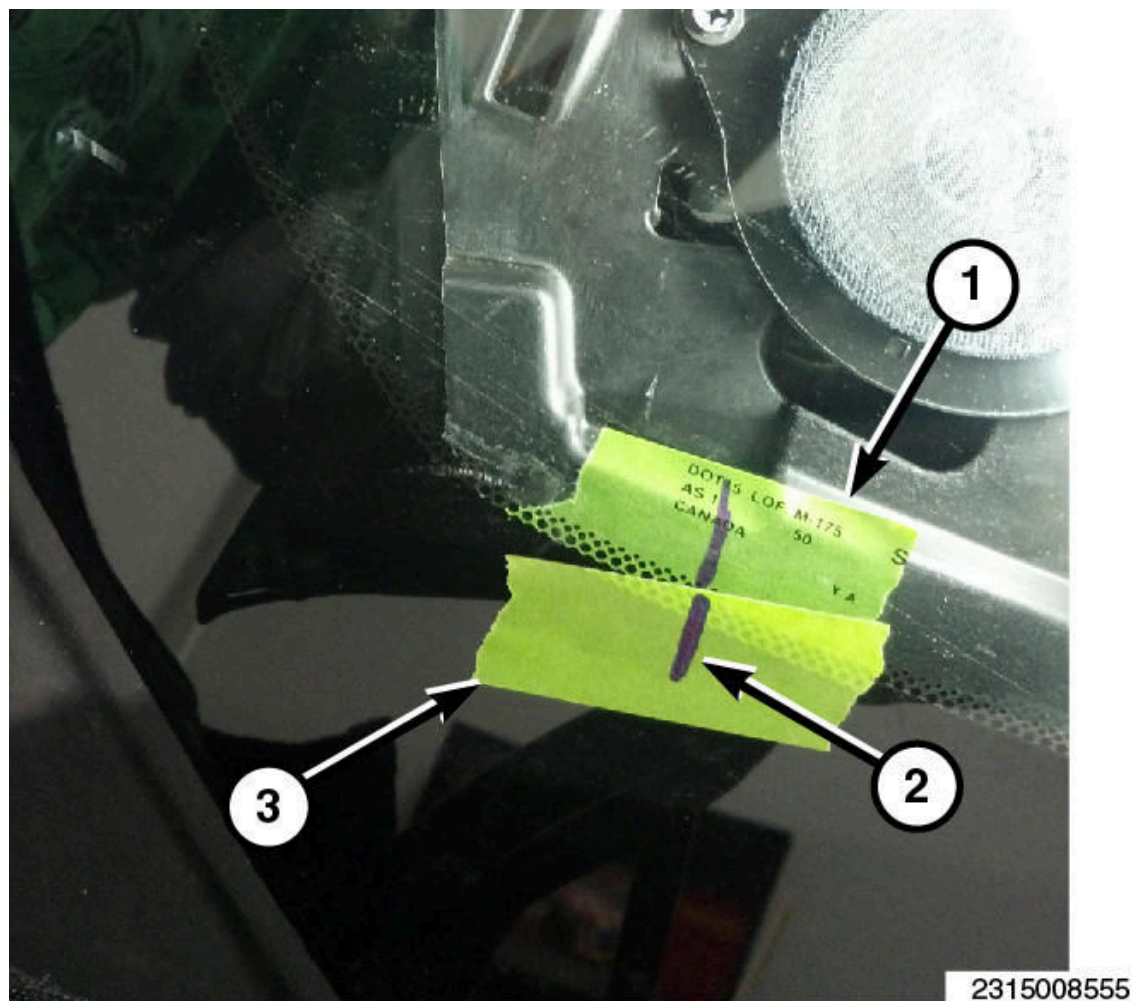
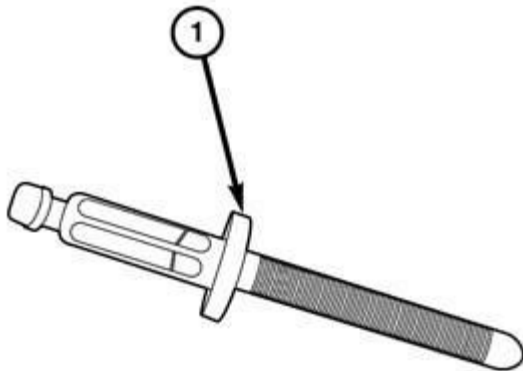


Fig. 439: Identifying Tape On Instrument Panel & Outside Of Windshield
Courtesy of CHRYSLER GROUP, LLC

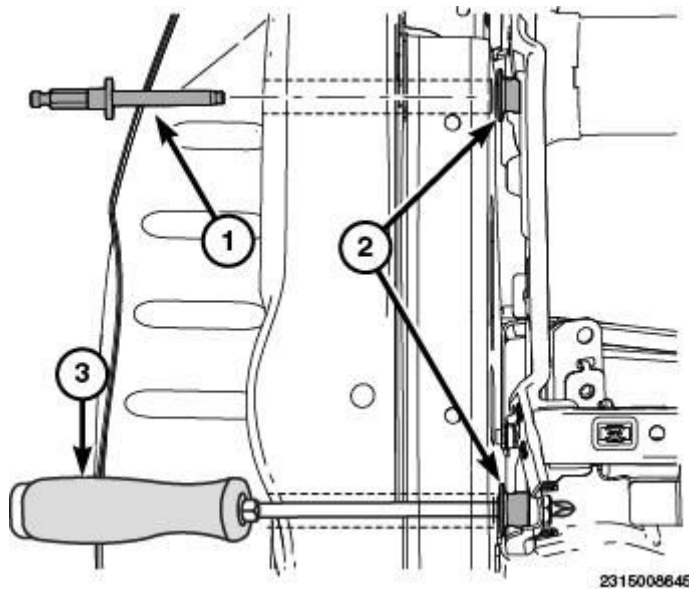
2. Place the instrument panel into the vehicle
3. Line up the marks on the tape made during removal to aid installation.



231568797

Fig. 440: Hinge Pillar Fastener
Courtesy of CHRYSLER GROUP, LLC

NOTE: Use a 9 mm deep well socket with a full cut to install the dash carrier hinge pillar fasteners. The carrier bolts design will not allow a partial cut socket to access.



2315008645

Fig. 441: Identifying Round Bladed Tool & Upper Fastener
Courtesy of CHRYSLER GROUP, LLC

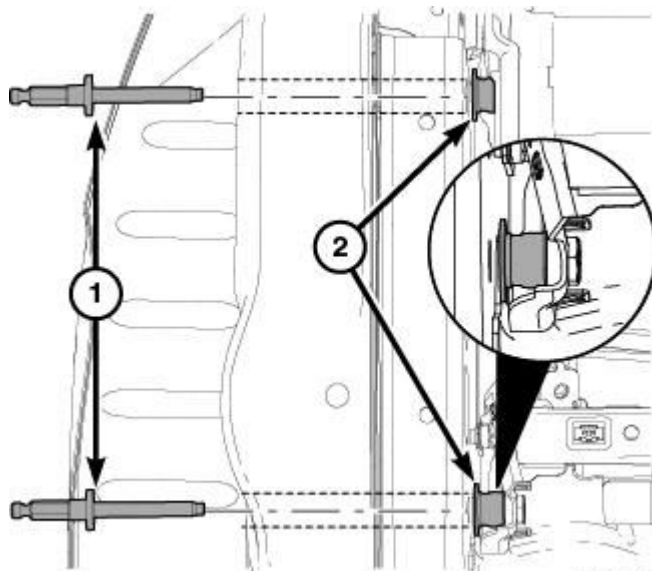
4. Place round bladed tools (3) or equivalent, into the lower dash mounting holes located in the hinge pillar on both sides of the vehicle.
5. Start the upper fastener (1) on both sides of the vehicle.



2315008643

Fig. 442: Identifying HVAC Housing Seal
Courtesy of CHRYSLER GROUP, LLC

6. Have the center person push the dash forward to load the HVAC housing seal (1) against the vehicle steel dash panel. Continue to load the seal until the four dash carrier hinge pillar fasteners and dash carrier to lower plenum fastener has been installed and torqued to specifications.



2315008649

Fig. 443: Identifying Upper Dash Carrier To Hinge Pillar Fasteners
Courtesy of CHRYSLER GROUP, LLC

7. Verify that proper alignment is still being maintained. Adjust as necessary.
8. Install the upper dash carrier to hinge pillar fasteners (1) and tighten to 27 N.m (20 ft lbs).
9. Remove the alignment punch or equivalent, from both sides.

NOTE: It will be necessary to wait at least five minutes and recheck the torque on the side support bolts.

10. Install the lower dash carrier hinge pillar fasteners (1) and tighten to 27 N.m (20 ft lbs).

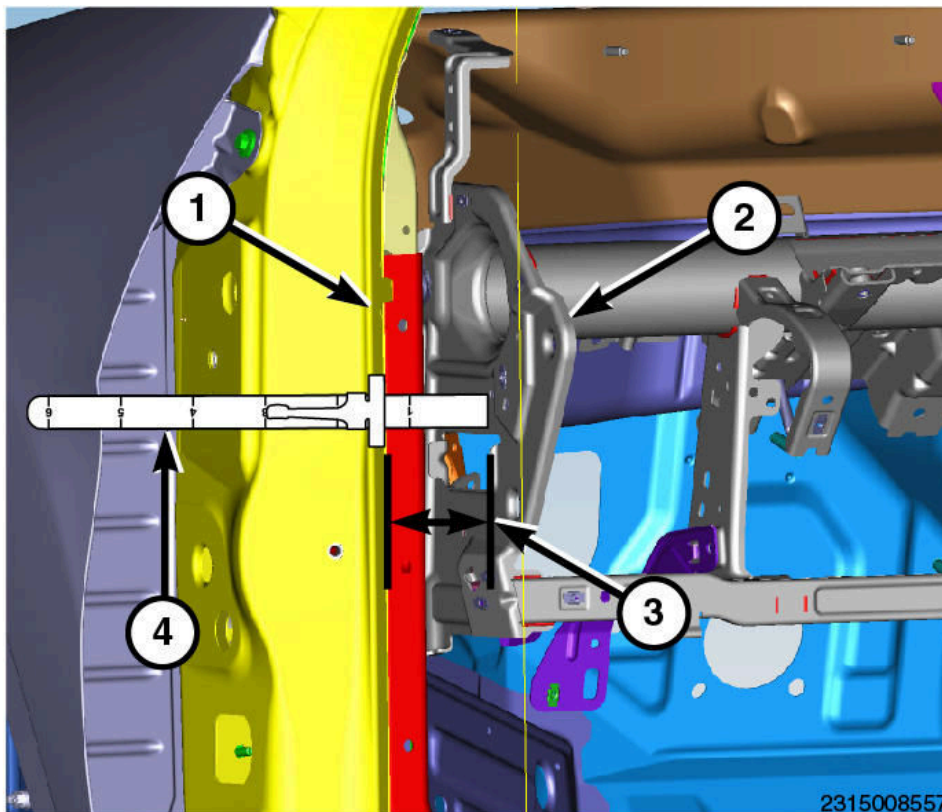
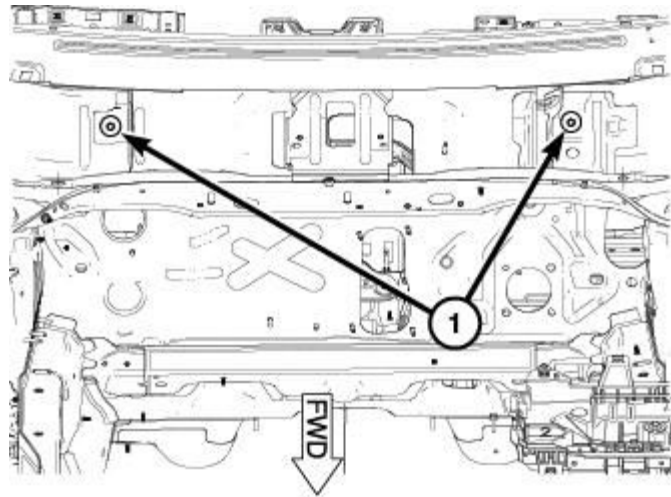


Fig. 444: Identifying Pocket Ruler & Distance Measurements
Courtesy of CHRYSLER GROUP, LLC

11. Using a pocket ruler (4) or equivalent, verify that the side to side instrument panel measurements (3) are the same as during removal.
12. If necessary, loosen the instrument panel side fasteners and repeat steps 6 through 10 until correct instrument panel positioning is maintained.

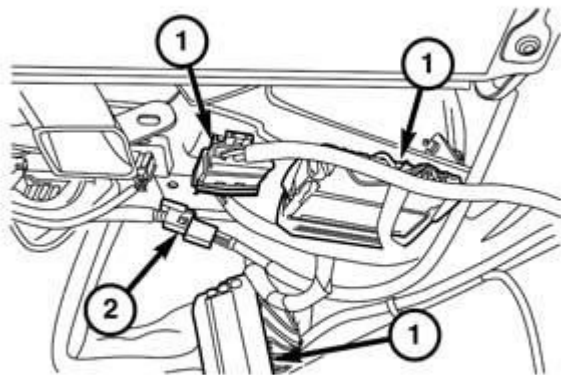
NOTE: If the instrument panel position is incorrect it may interfere with proper door operation.



2315006593

Fig. 445: Identifying Lower Plenum Fasteners
Courtesy of CHRYSLER GROUP, LLC

13. Install the instrument panel to plenum fasteners (1) and tighten to 20 N.m (15 ft lbs).
14. The center assistant may now stop loading the dash forward.
15. Install the access plug covers into the dash carrier to hinge pillar fastener holes.
16. Install the wiper linkage. Refer to **LINKAGE, WIPER ARM, INSTALLATION** .
17. Install the cowl panel cover. Refer to **COVER, COWL PANEL, INSTALLATION**.
18. Install the wiper arms. Refer to **ARM, WIPER, INSTALLATION** .

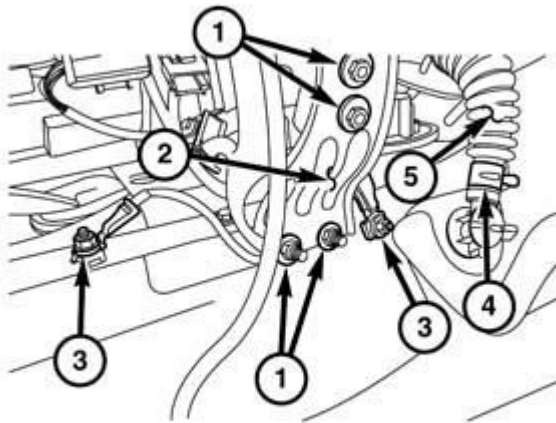


231568798

Fig. 446: Dash Wiring Harnesses & Coaxial Connector

Courtesy of CHRYSLER GROUP, LLC

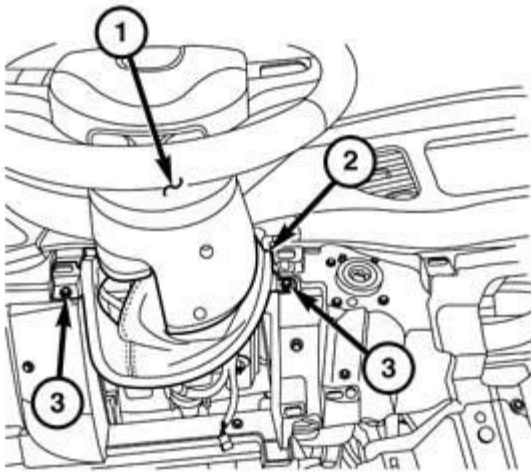
19. From under the passenger side of the dash, connect the body to dash wiring harnesses (1).
20. Connect the coaxial connectors (2), if equipped.
21. Install the glove box. Refer to **GLOVE BOX, INSTRUMENT PANEL, INSTALLATION**.



231568802

Fig. 447: Floor Pan Bracket Fasteners, Ground Wiring, Drain Tube & Clamp
 Courtesy of CHRYSLER GROUP, LLC

22. Insert the air conditioning drain tube onto the floor valve.
23. With the use of pliers or equivalent, connect the air conditioning drain tube clamp (4).
24. Fasten the ground wiring (3) to the floor, and tighten securely.
25. Install the instrument panel to floor bracket fasteners (1) and tighten securely.



231568800

Fig. 448: Steering Column, Gap Hider & Fasteners
Courtesy of CHRYSLER GROUP, LLC

26. Install the steering column (1). Refer to **COLUMN, INSTALLATION** .
27. Install the steering column gap hider (3) fasteners (2), and tighten securely.
28. Install the steering column opening closeout.
29. Install the lower dash silencer panels. Refer to **PANEL, SILENCER, LOWER, INSTALLATION**.

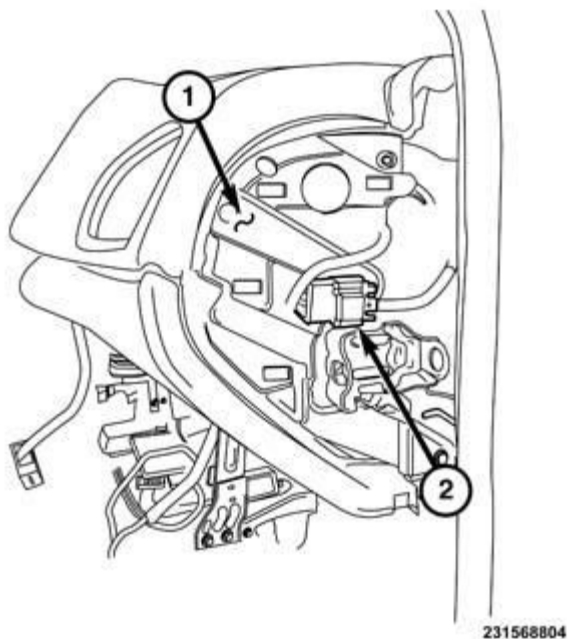


Fig. 449: Dash Side & Connector
Courtesy of CHRYSLER GROUP, LLC

30. Connect the a-pillar wiring connectors (2) on both sides of the vehicle.
31. Clip the wiring connectors (1) to the side of the dash panel (1).

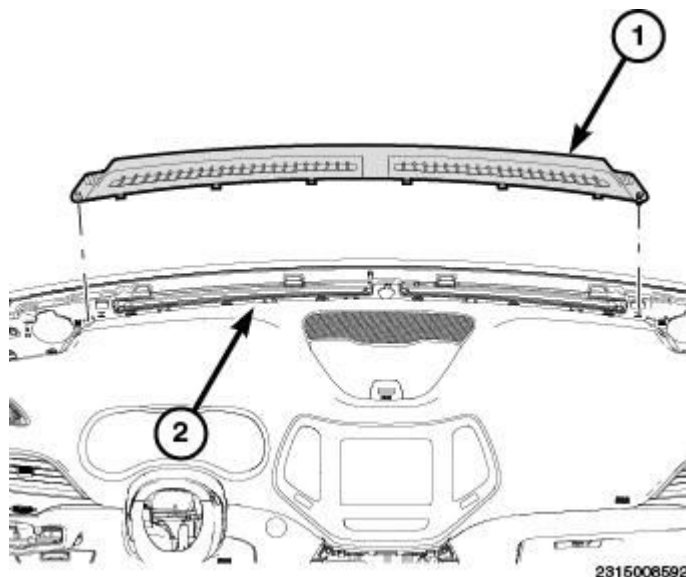
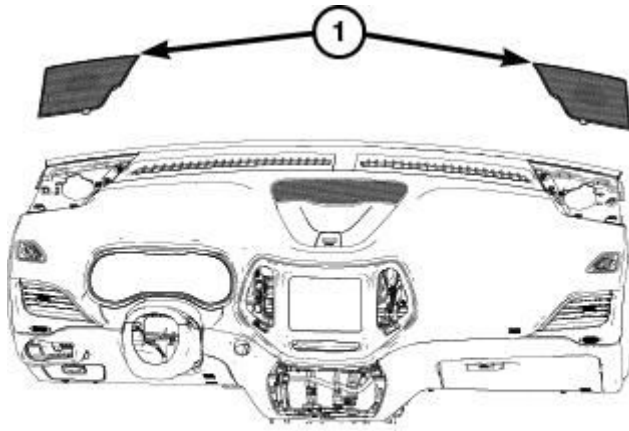


Fig. 450: Identifying Defroster Grille & Sun Sensor Electrical Connector
Courtesy of CHRYSLER GROUP, LLC

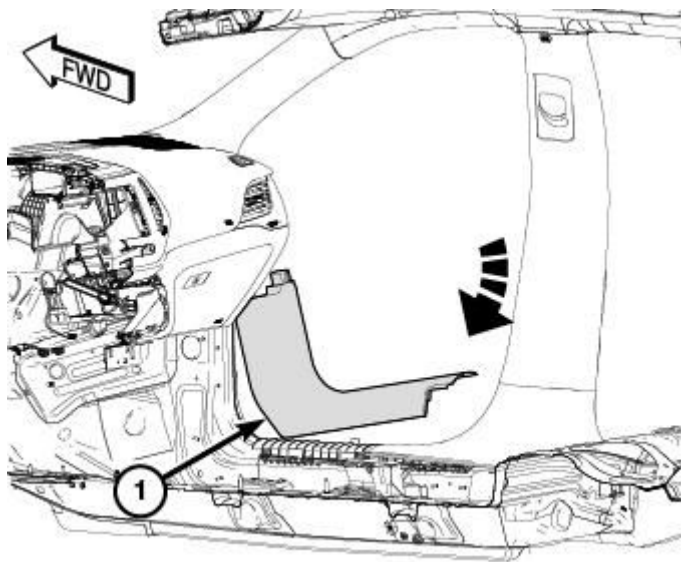
32. Install the a-pillar trim. Refer to **PANEL, A-PILLAR TRIM, INSTALLATION**.
33. Install the defroster grill, and seat fully. Refer to **GRILLE, DEFROSTER, INSTALLATION**.



2316008558

Fig. 451: Identifying Speaker Covers
Courtesy of CHRYSLER GROUP, LLC

34. Position the speaker covers (1) back into place and seat fully.



2316008561

Fig. 452: Installing Front Door Sill Scuff Panel
Courtesy of CHRYSLER GROUP, LLC

35. Position the front door sill scuff panel (1).
36. Hand tap to engage the retaining clips securing the front door sill scuff panel (1) to the door sill and lower B-pillar.

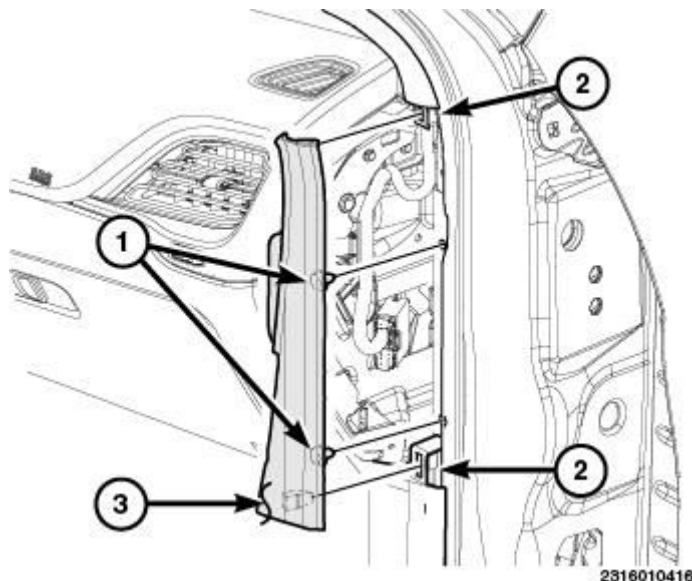


Fig. 453: Identifying Closeout Panel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

37. Position the closeout trim panel (3) located between the A-pillar trim and the front scuff plate.
38. Seat the retaining clips (1 and 2) fully.

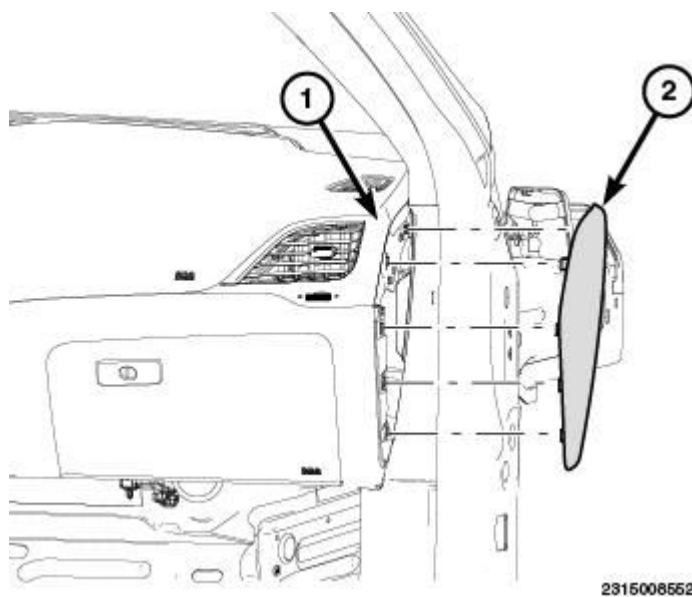


Fig. 454: Identifying Instrument Panel & End Cap
Courtesy of CHRYSLER GROUP, LLC

39. Install the end caps (1). Refer to **CAP, INSTRUMENT PANEL END, INSTALLATION**.

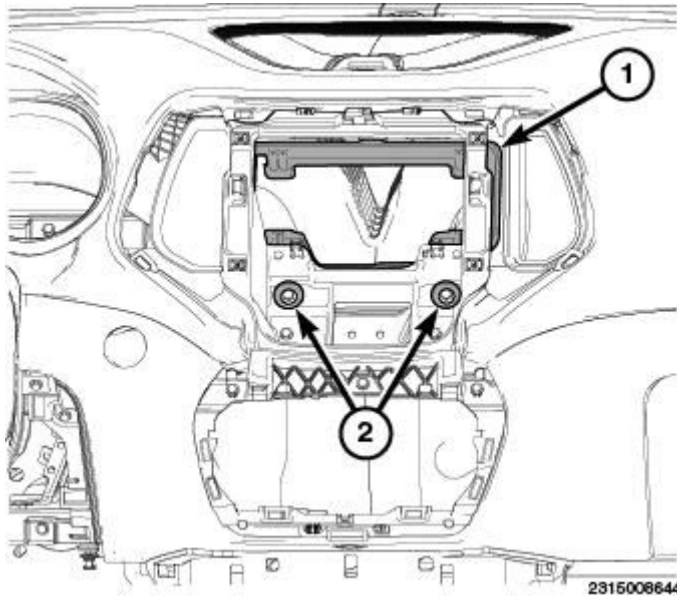


Fig. 455: Identifying Radio Support Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

40. Install the radio support bracket (1) and install the fasteners (2).

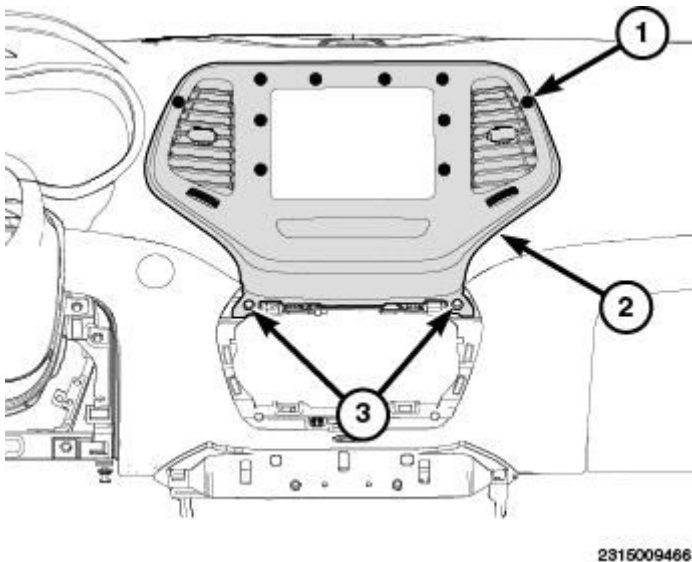
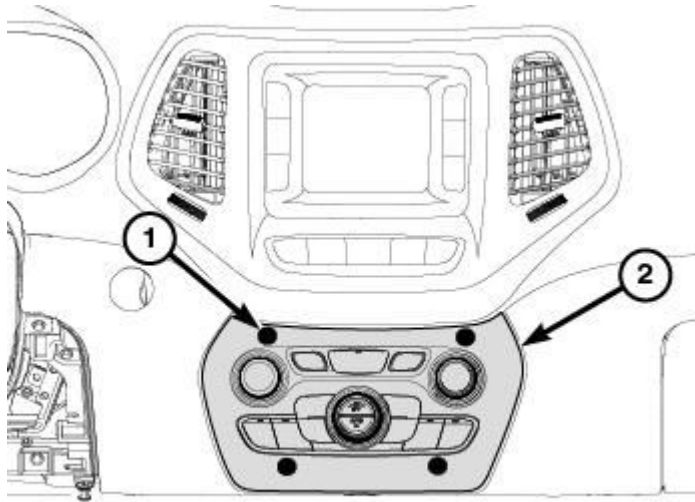


Fig. 456: Identifying Center Bezel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

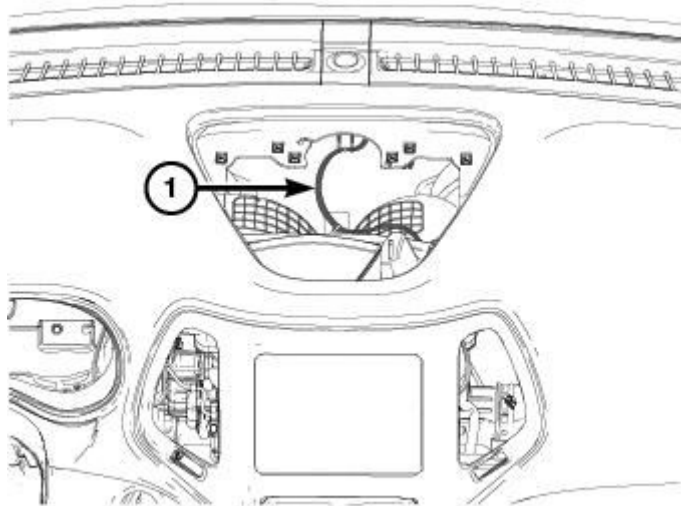
41. Install the center bezel (2) and seat the clips (1) fully.
42. Install the center bezel fasteners (3).



2315008554

Fig. 457: Identifying HVAC Control Head & Clips
Courtesy of CHRYSLER GROUP, LLC

43. Connect the HVAC control head electrical connectors and install the control head (2).
44. Seat the four control head fastener clips (1) fully.



2315008636

Fig. 458: Identifying Harness
Courtesy of CHRYSLER GROUP, LLC

45. Position the harness (1) back into place and seat the retainers fully.

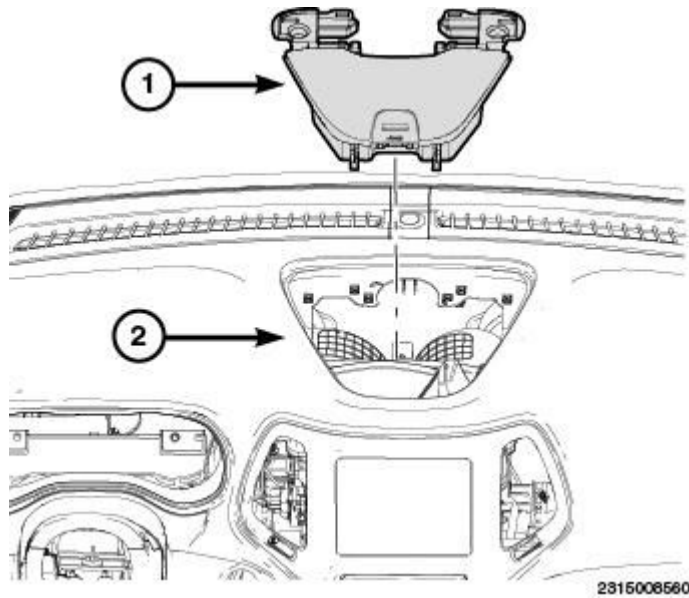


Fig. 459: Identifying Upper Storage Bin & Instrument Panel Top Cover
Courtesy of CHRYSLER GROUP, LLC

46. Position the storage bin (1) back into place onto the instrument panel top cover (2) and seat fully.

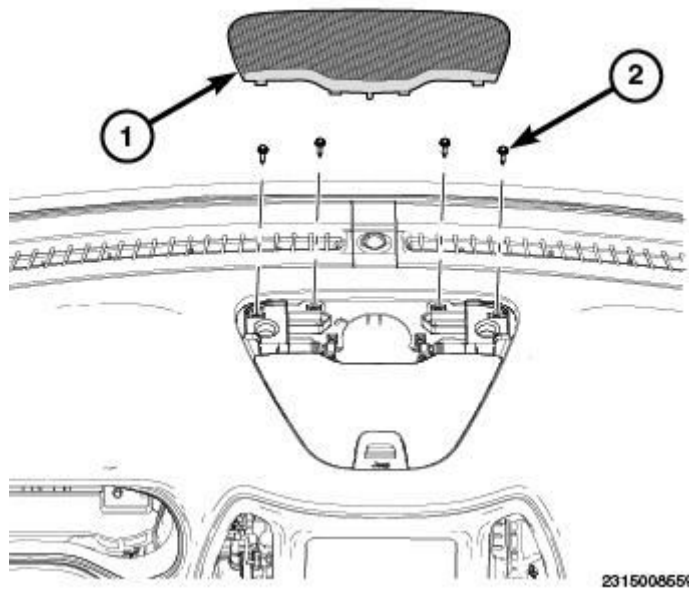


Fig. 460: Identifying Center Speaker Cover & Screws
Courtesy of CHRYSLER GROUP, LLC

47. Install the fasteners (2).
48. Install center speaker cover (1) and seat fully.

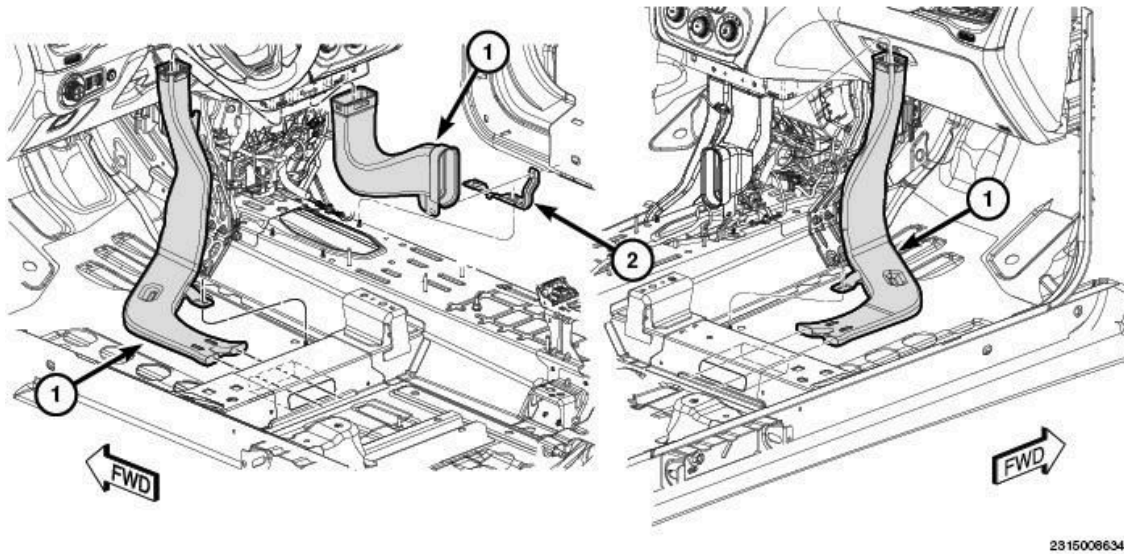


Fig. 461: Identifying HVAC Floor Ducts, Bracket & Fasteners
Courtesy of CHRYSLER GROUP, LLC

49. Install the HVAC floor ducts (1) and install the bracket (2). Refer to **DUCT, FLOOR DISTRIBUTION, INSTALLATION** .
50. Install the transmission shifter. Refer to **SHIFTER, FLOOR CONSOLE, INSTALLATION** .
51. Install the floor console. Refer to **CONSOLE, FLOOR, INSTALLATION**.

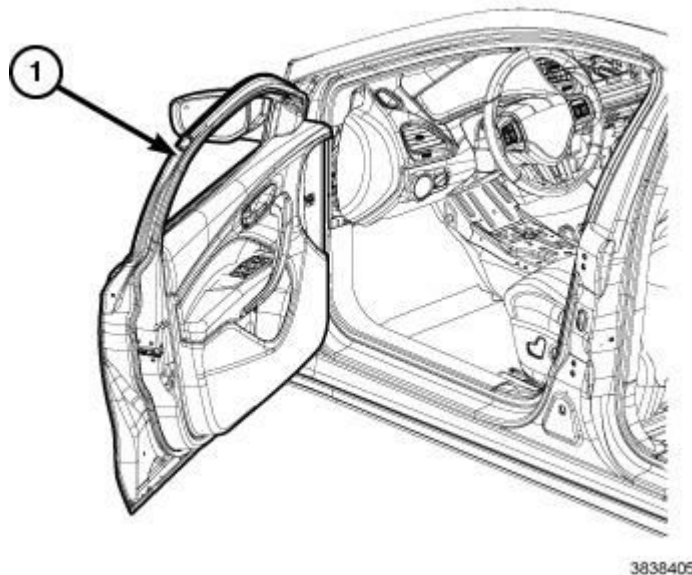
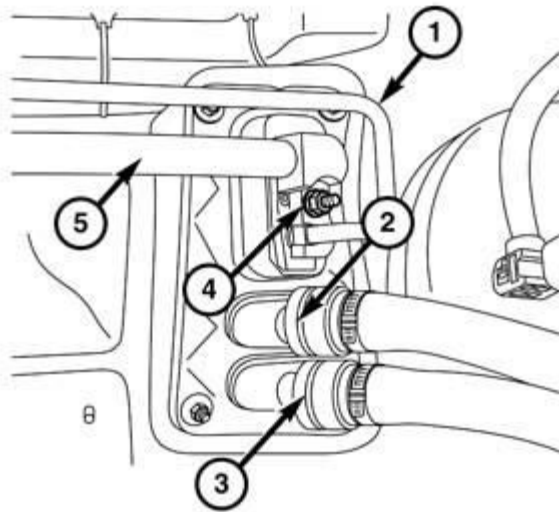


Fig. 462: Front Door
Courtesy of CHRYSLER GROUP, LLC

52. Check the dash carrier hinge pillar fasteners and tighten to 27 N.m (20 ft lbs).
53. Install the front doors (1). Refer to **DOOR, INSTALLATION**.



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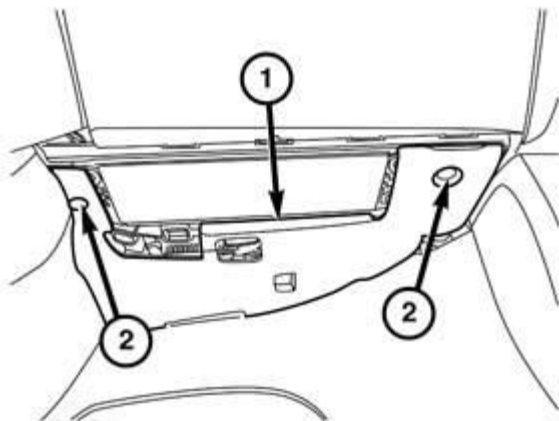
Fig. 463: Refrigerant Lines, Heater Core Hoses & Fastener
 Courtesy of CHRYSLER GROUP, LLC

54. Remove plugs, or tape that was placed over the open refrigerant lines (1) and (5) during removal.
55. Connect the air conditioning refrigerant lines (1) and (5) to the HVAC housing.
56. Install fastener (4) and tighten to 20 N.m (15 ft lbs).
57. Remove the plugs, or tape that was placed over the open heater core tubes to prevent coolant during removal.
58. Connect the heater core hoses (2) and (3) to the HVAC housing.
59. Charge the air conditioning system. Refer to **PLUMBING, STANDARD PROCEDURE** .
60. Fill the cooling system. Refer to **STANDARD PROCEDURE** .

PANEL, SILENCER, LOWER

REMOVAL

REMOVAL

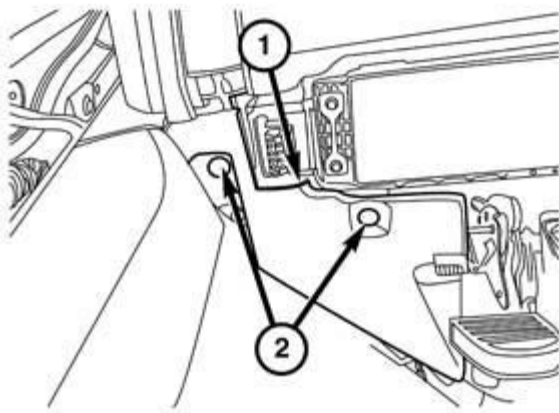


231669158

Fig. 464: Hush Panel & Push Pin Fasteners
Courtesy of CHRYSLER GROUP, LLC

Passenger Side

1. Remove push pin fasteners (2).
2. Disconnect light wiring connector.
3. Remove hush panel (1) from the vehicle.



231669160

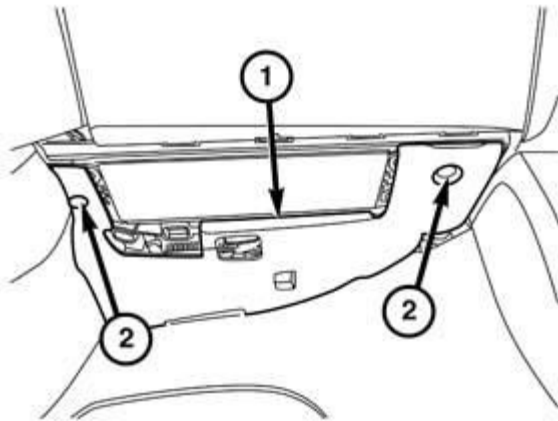
Fig. 465: Hush Panel & Push Pin Fasteners (Drivers)
Courtesy of CHRYSLER GROUP, LLC

Driver side

1. Remove push pin fasteners (2).
2. Remove hush panel (1) from the vehicle

INSTALLATION

INSTALLATION

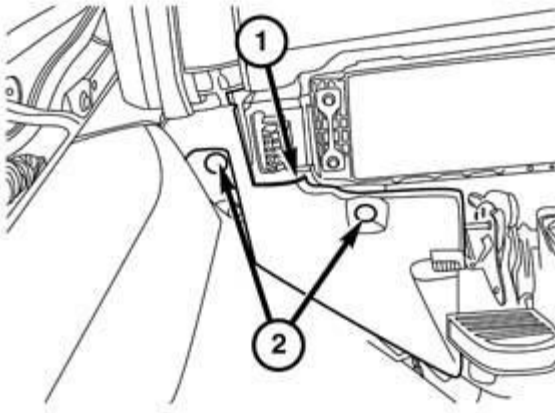


231669158

Fig. 466: Hush Panel & Push Pin Fasteners
Courtesy of CHRYSLER GROUP, LLC

Passenger Side

1. Align passenger side hush panel (1) into the vehicle.
2. Connect wiring connector for the light.
3. Insert the push pins (2), fully.
4. Tuck the edges hush panel (1) under the surrounding components.



231669160

Fig. 467: Hush Panel & Push Pin Fasteners (Drivers)
Courtesy of CHRYSLER GROUP, LLC

Drivers Side

1. Align driver side hush panel (1) into the vehicle.
2. Insert the push pins (2), fully.
3. Tuck the edges of the hush panel (1) under the surrounding component.

INTERIOR

BEZEL, SHIFTER

REMOVAL

REMOVAL

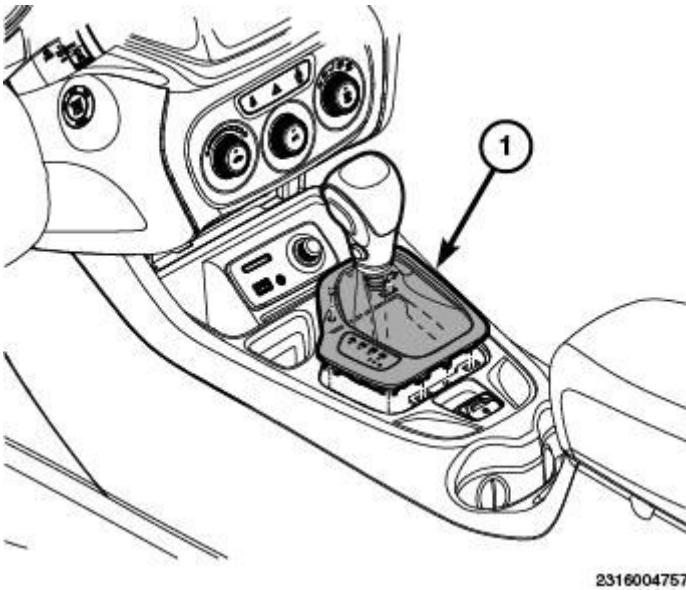


Fig. 468: Shifter Bezel & Console Bezel
Courtesy of CHRYSLER GROUP, LLC

1. Remove the shifter knob.
2. Using trim stick (special tool #C-4755, Trim Stick) or equivalent, pry up on bezel (1) and remove along with the shifter boot.

INSTALLATION

INSTALLATION

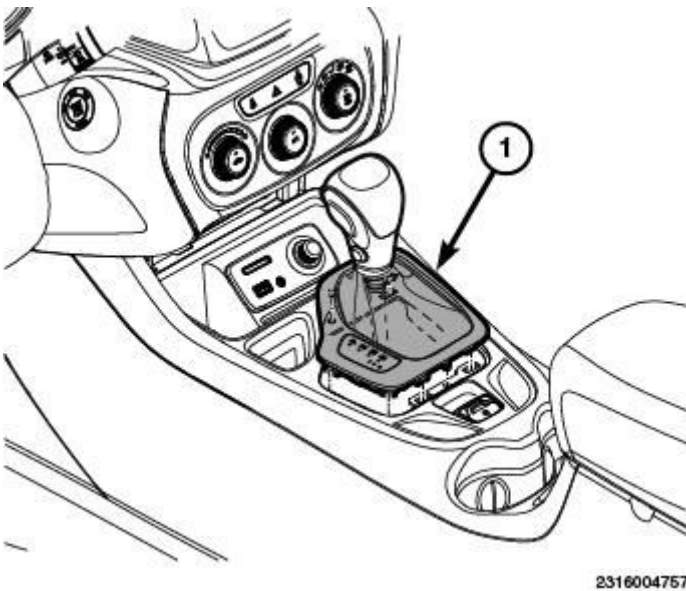


Fig. 469: Shifter Bezel & Console Bezel
Courtesy of CHRYSLER GROUP, LLC

1. Align and position bezel (1) and shifter boot over the shifter shaft.
2. Install by applying hand pressure until the bezel clips are seated.
3. Install the gear shift knob.

CARPET, FLOOR

REMOVAL

REMOVAL

FRONT CARPET

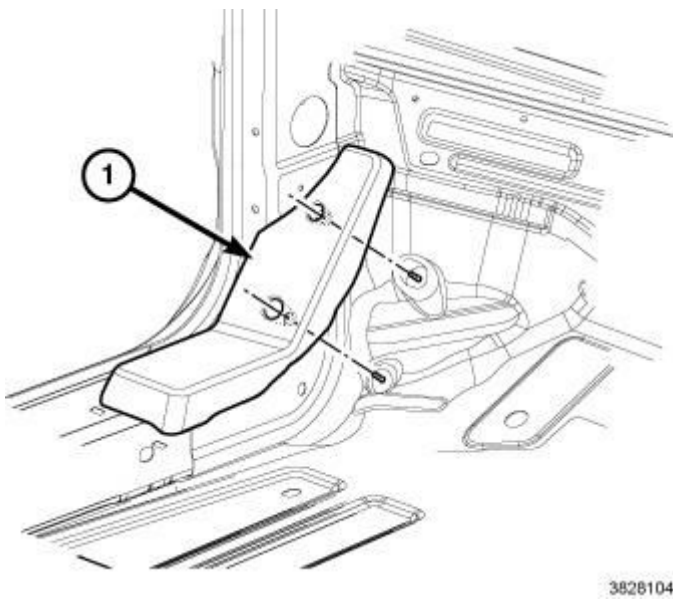


Fig. 470: Driver Side Kick Panel
Courtesy of CHRYSLER GROUP, LLC

NOTE: Procedure is written for removing both sides of the front carpet.

1. Disconnect and isolate the negative battery cable.
2. If equipped, remove both front floor mats.
3. Remove both front seats. Refer to **SEAT, REMOVAL** .
4. Remove the floor console. Refer to **CONSOLE, FLOOR, REMOVAL**.
5. Remove the front door sill/cowl trim panels. Refer to **PLATE, SCUFF, DOOR SILL, REMOVAL**.
6. Remove the lower B-pillar trim panels. Refer to **PANEL, B-PILLAR TRIM, REMOVAL**.
7. Remove the fasteners securing the driver side kick panel (1) and remove the kick panel.

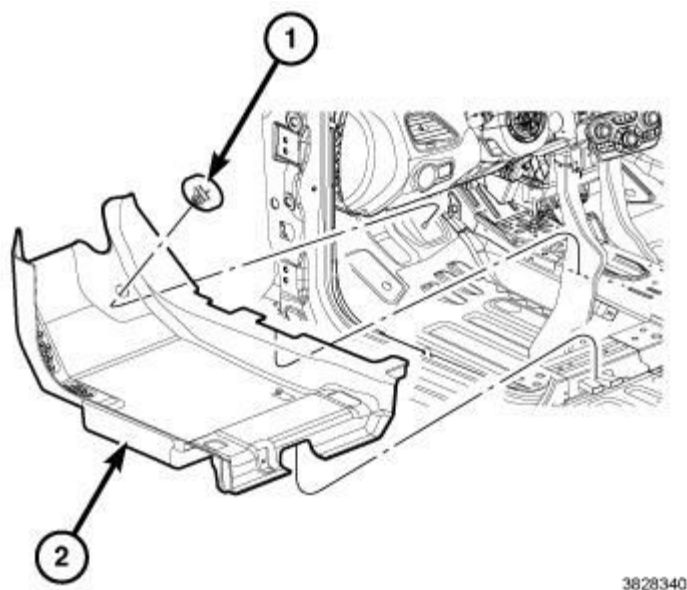


Fig. 471: Front Carpet & Trim Plate
Courtesy of CHRYSLER GROUP, LLC

8. Using (special tool #C-4755, Trim Stick), remove the trim plate (1) located below the accelerator pedal.
9. Pull the driver side carpet from behind the brake pedal, accelerator pedal and HVAC.
10. Remove the carpet (1) from the vehicle through the driver door opening.

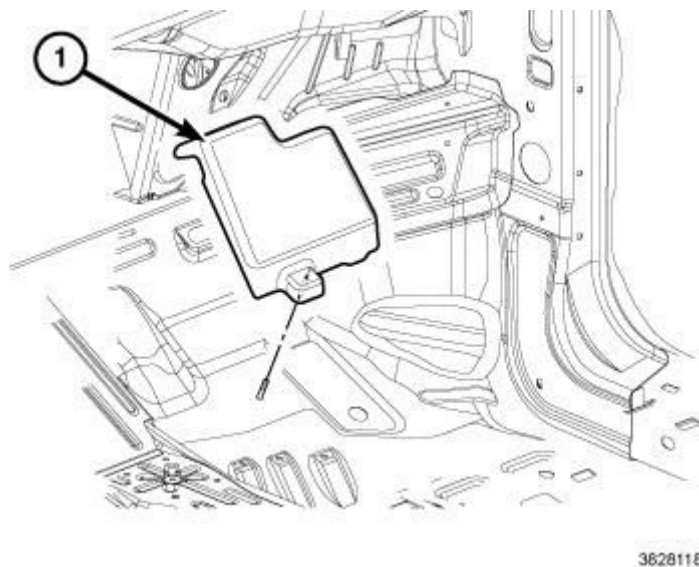
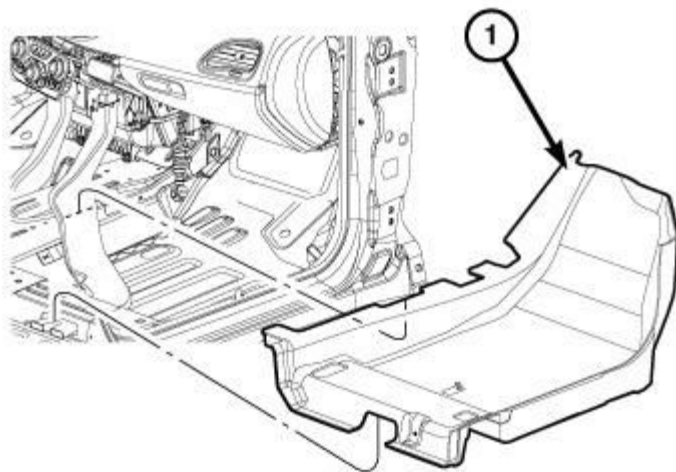


Fig. 472: Passenger Side Kick Panel
Courtesy of CHRYSLER GROUP, LLC

11. Remove the fasteners securing the passenger side kick panel (1) and remove the kick panel.

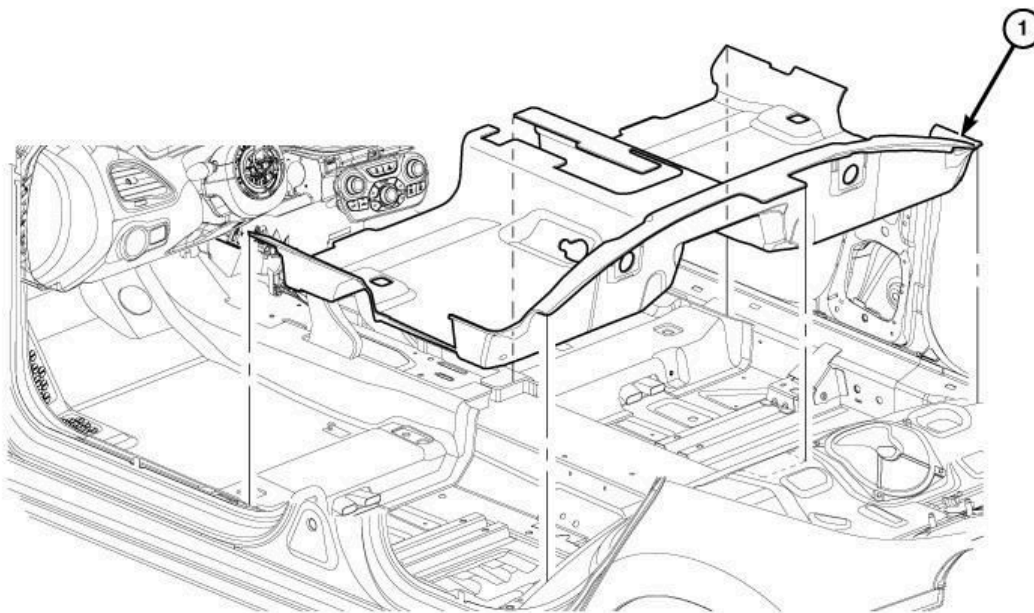


3628383

Fig. 473: Passenger Side Carpet
Courtesy of CHRYSLER GROUP, LLC

12. Pull the passenger side carpet from behind the instrument panel and HVAC.
13. Remove the carpet (1) from the vehicle through the passenger door opening.

REAR CARPET



3628425

Fig. 474: Rear Carpet

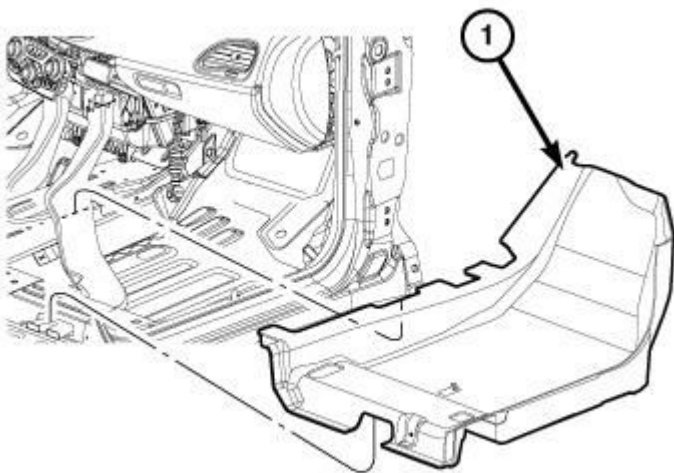
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove both front seats. Refer to **SEAT, REMOVAL** .
3. Remove the rear seat. Refer to **SEAT, REAR, REMOVAL**.
4. Remove the floor console. Refer to **CONSOLE, FLOOR, REMOVAL**.
5. Remove the front and rear door sill/cowl trim panels. Refer to **PLATE, SCUFF, DOOR SILL, REMOVAL**.
6. Remove/reposition the lower B-pillar trim panels. Refer to **PANEL, B-PILLAR TRIM, REMOVAL**.
7. Lift the carpet (1) up and remove.

INSTALLATION

INSTALLATION

FRONT CARPET



3828383

Fig. 475: Passenger Side Carpet
Courtesy of CHRYSLER GROUP, LLC

NOTE: Procedure is written for installing both sides of the front carpet.

1. Position the carpet (1) into the vehicle through the passenger door opening.
2. Tuck the passenger side carpet into position behind the instrument panel and HVAC.

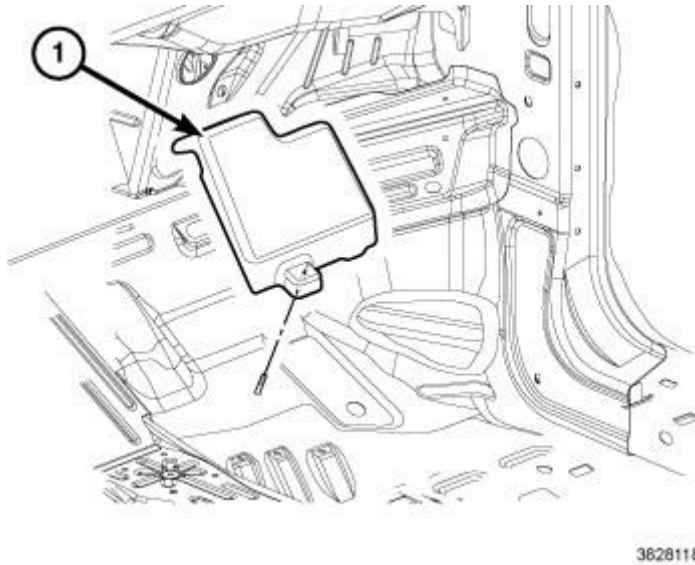


Fig. 476: Passenger Side Kick Panel
Courtesy of CHRYSLER GROUP, LLC

3. Position the passenger side kick panel (1) and install the fasteners securing the passenger side kick panel.

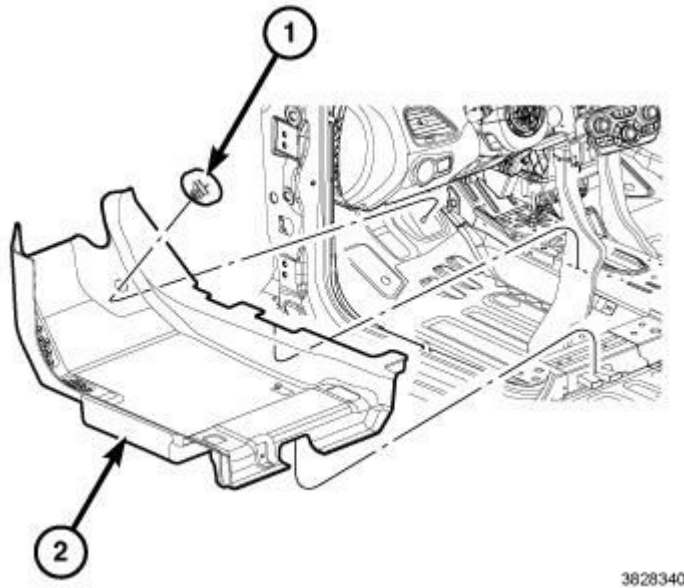


Fig. 477: Front Carpet & Trim Plate
Courtesy of CHRYSLER GROUP, LLC

4. Position the carpet (2) into the vehicle through the driver door opening.
5. Tuck the driver side carpet into position behind the brake pedal, accelerator pedal and HVAC.
6. Install the trim plate (1) located below the accelerator pedal. Hand tap to engage the retaining clip.

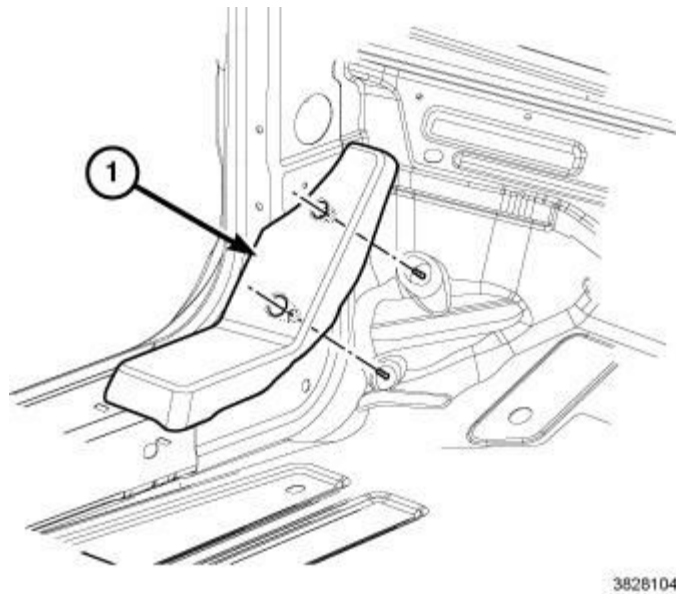
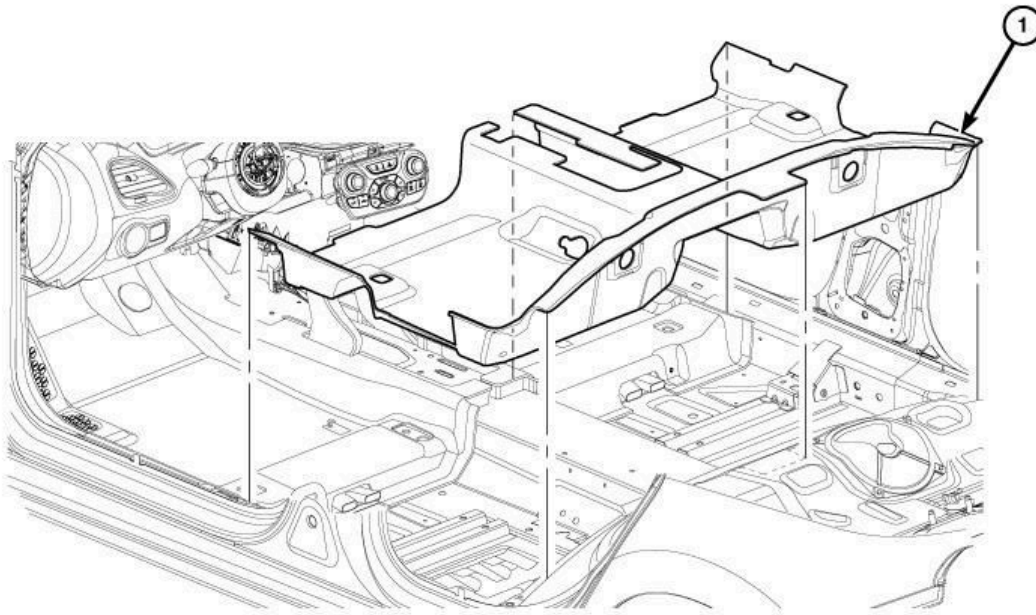


Fig. 478: Driver Side Kick Panel
Courtesy of CHRYSLER GROUP, LLC

7. Position the driver side kick panel (1) and install the fasteners securing the driver side kick panel.
8. Install the lower B-pillar trim panels. Refer to **PANEL, B-PILLAR TRIM, INSTALLATION**.
9. Install the front door sill/cowl trim panels. Refer to **PLATE, SCUFF, DOOR SILL, INSTALLATION**.
10. Install the floor console. Refer to **CONSOLE, FLOOR, INSTALLATION**.
11. Install both front seats. Refer to **SEAT, INSTALLATION** .
12. Connect the negative battery cable.
13. If equipped, install both front floor mats.

REAR CARPET



3828425

Fig. 479: Rear Carpet

Courtesy of CHRYSLER GROUP, LLC

1. Position the carpet (1) back into the vehicle.
2. Install/position the lower B-pillar trim panels. Refer to **PANEL, B-PILLAR TRIM, INSTALLATION**.
3. Install the front and rear door sill/cowl trim panels. Refer to **PLATE, SCUFF, DOOR SILL, INSTALLATION**.
4. Install the floor console. Refer to **CONSOLE, FLOOR, INSTALLATION**.
5. Install both front seats. Refer to **SEAT, INSTALLATION**.
6. Install the rear seat. Refer to **SEAT, REAR, INSTALLATION**.
7. Connect the negative battery cable.

CONSOLE, FLOOR**REMOVAL****REMOVAL**

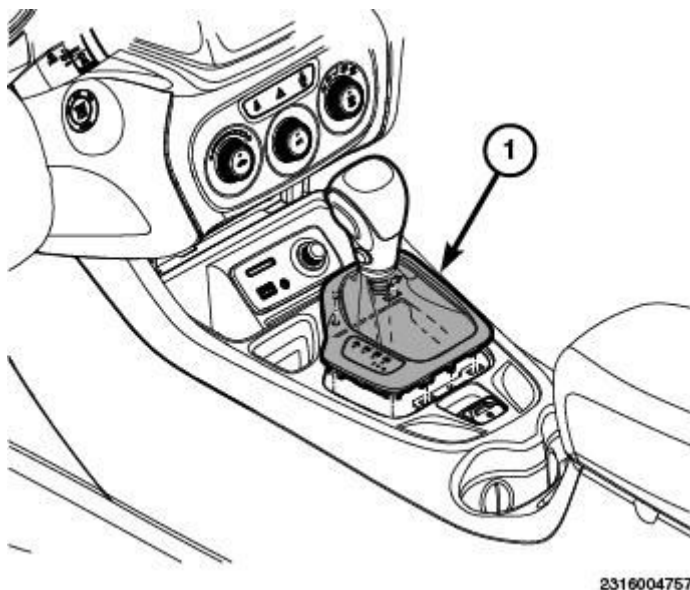


Fig. 480: Shifter Bezel & Console Bezel
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Unclip the shifter bezel (1). Refer to **BEZEL, SHIFTER, REMOVAL**.

NOTE: Do not remove the shifter bezel, as it will fit through the opening once the bezel has been removed.

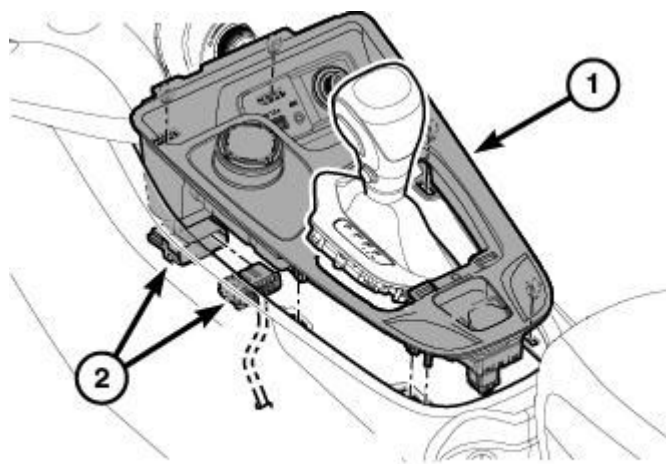


Fig. 481: Shifter Bezel, Console Bezel & Electrical Connectors
Courtesy of CHRYSLER GROUP, LLC

3. Using a (special tool #C-4755, Trim Stick) or equivalent, separate the console bezel (1) and disconnect the electrical connector (2).

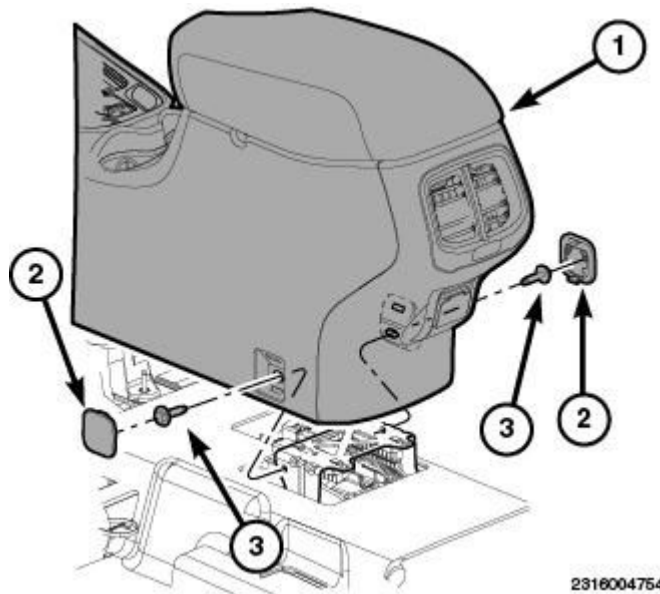


Fig. 482: Identifying Console Bezel, Covers & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

4. Position the seat fully forward.
5. Using a small pick/pry tool or equivalent, remove the fastener covers (2) located near the lower rear of the console. Remove the fasteners (3) behind the covers.
6. Using, disengage the retaining tabs/clips securing the switch pod (2) to the instrument panel.

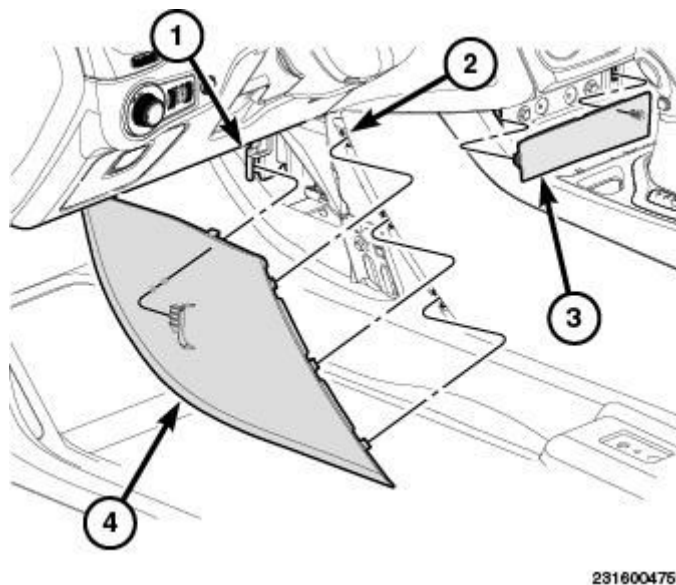


Fig. 483: Console Trim Pieces
 Courtesy of CHRYSLER GROUP, LLC

7. Using a trim stick or equivalent, remove the front trim (3) covering the console fasteners.
8. Accessing from the front of the floor console (1) and using a trim stick, disengage the retaining tabs for

the front gap hidens (2) and remove the gap hidens (4).

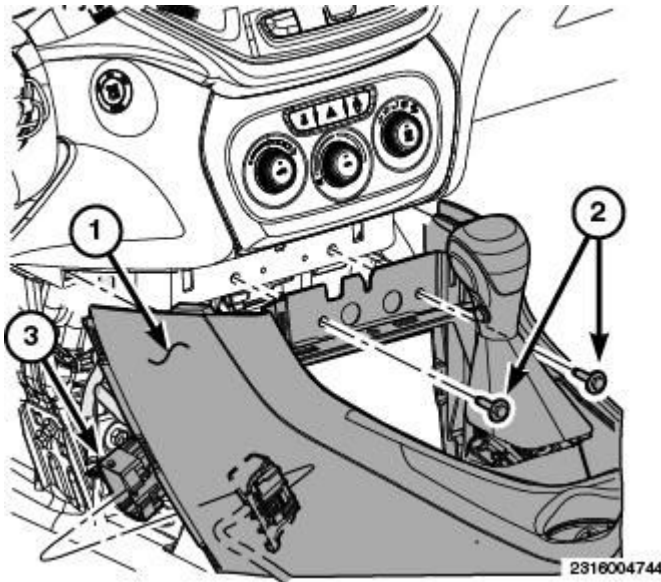


Fig. 484: Identifying Floor Console, Electrical Connectors & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

9. Remove the two fasteners (1) from the floor console (2).
10. Disconnect the electrical connectors (3).

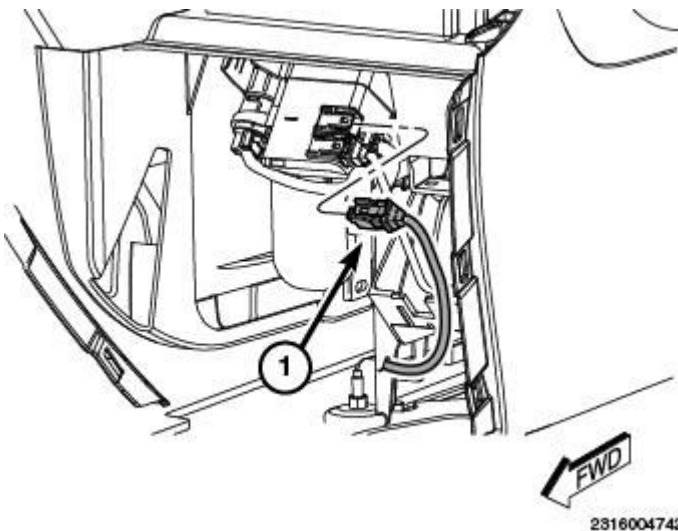


Fig. 485: Identifying Electrical Connectors
 Courtesy of CHRYSLER GROUP, LLC

11. Disconnect the electrical connectors (1).
12. Lift the console up at the rear and remove from the vehicle.

INSTALLATION

INSTALLATION

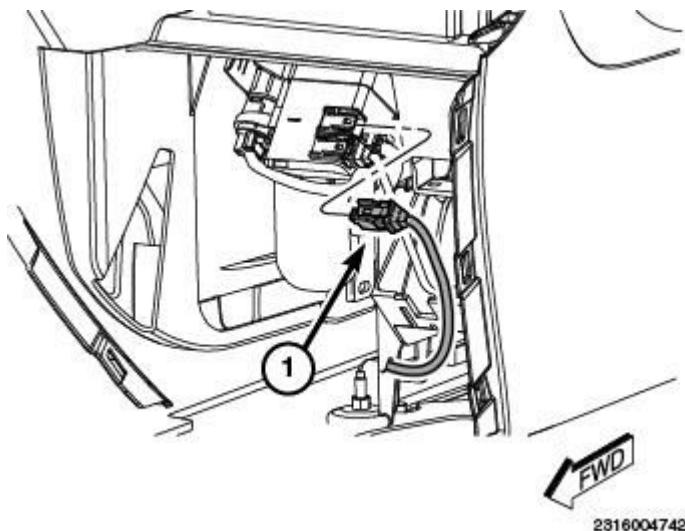


Fig. 486: Identifying Electrical Connectors
Courtesy of CHRYSLER GROUP, LLC

1. Position the console into the vehicle and connect the electrical connectors (1).

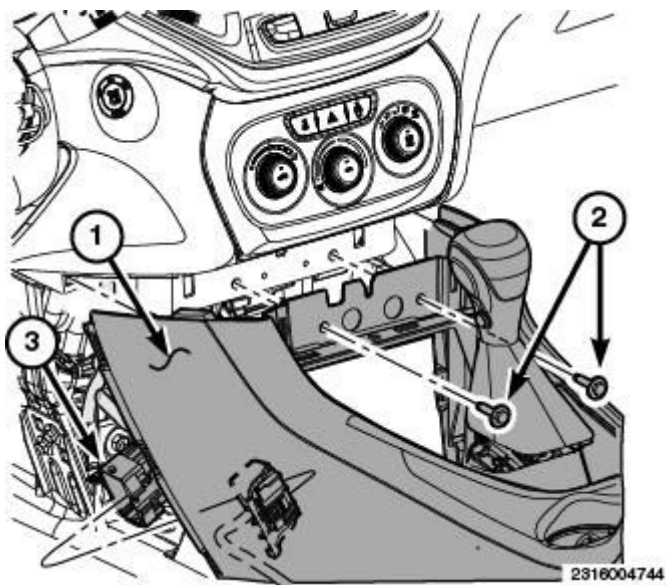
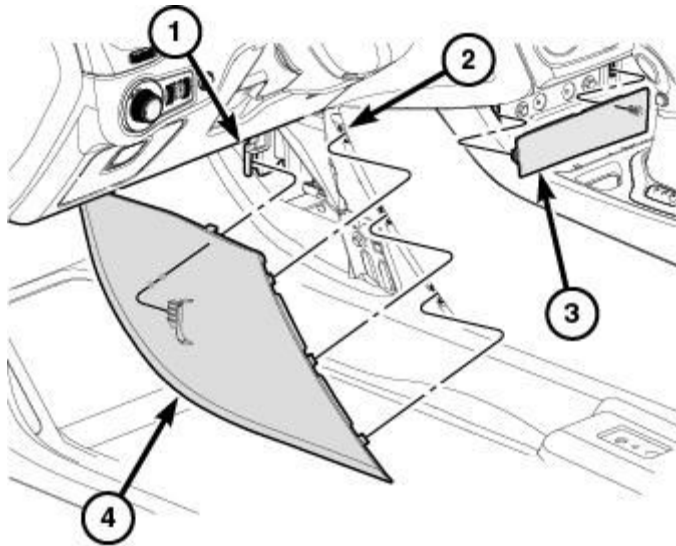


Fig. 487: Identifying Floor Console, Electrical Connectors & Fasteners
Courtesy of CHRYSLER GROUP, LLC

2. Connect the electrical connectors (3).
3. Install the two fasteners (2) into the floor console (1) and tighten securely.

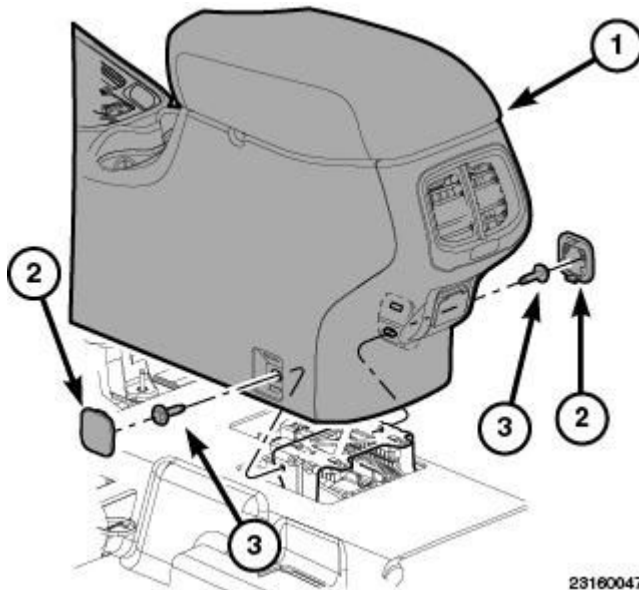


2316004759

Fig. 488: Console Trim Pieces

Courtesy of CHRYSLER GROUP, LLC

4. Position the trim panel (3) back into place over the front console fasteners and seat the clips fully.
5. Accessing from the front of the floor console (1), align and position the gap hiders (2).
6. Hand tap to engage the retaining tabs securing the front gap hiders (4).

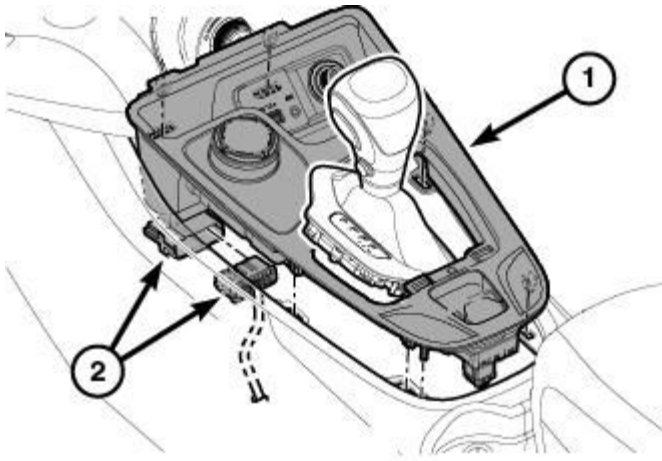


2316004754

Fig. 489: Identifying Console Bezel, Covers & Fasteners

Courtesy of CHRYSLER GROUP, LLC

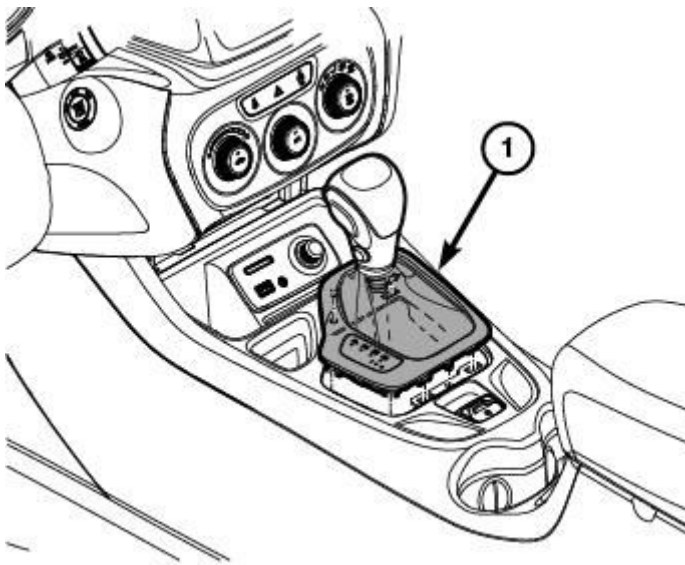
7. Install the rear fasteners (3) securing the console. Tighten the fastener securely. Repeat on the opposite side.
8. Install the fastener cover (2) located near the lower rear of the console. Repeat on the other side.



2316004761

Fig. 490: Shifter Bezel, Console Bezel & Electrical Connectors
Courtesy of CHRYSLER GROUP, LLC

9. Connect the electrical connector (2) and seat the console bezel (1) fully.



2316004757

Fig. 491: Shifter Bezel & Console Bezel
Courtesy of CHRYSLER GROUP, LLC

10. Position the shifter bezel (1) back in place and seat fully.
11. Connect the negative battery cable.

CONSOLE, OVERHEAD, FRONT

DESCRIPTION

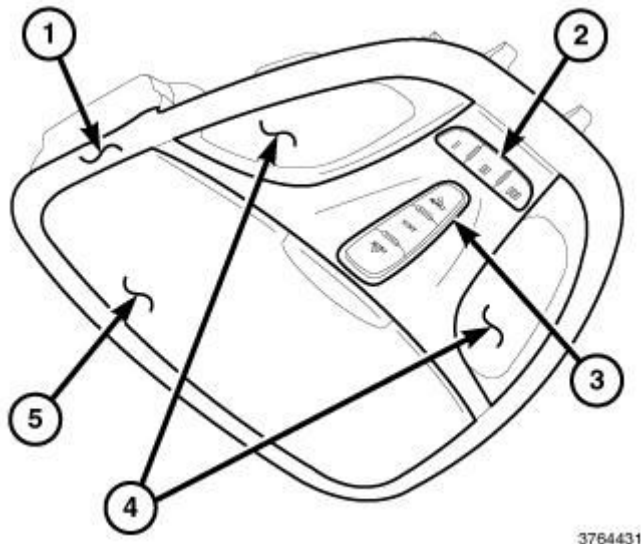
DESCRIPTION

Fig. 492: Overhead Console Components
Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with a power sunroof have a power sunroof switch (3) integral to the overhead console (1) located in the headliner just forward of the sunroof opening. The switch buttons are centered between the two map/reading lamps (4), forward of the sunglasses storage bin (5) and, if equipped, rearward of the universal transmitter (Homelink®) push buttons (2). This switch has three momentary push buttons clearly identified by either text or icons indicating their functions. The three functions are from front-to-back: AUTO (CLOSE), VENT and AUTO (OPEN). The switch push buttons also have instrument panel dimmer controlled Light Emitting Diode (LED) units that provide back lighting for visibility at night.

The power sunroof switch is connected to the vehicle electrical system through the printed circuit board of the overhead console, which is connected to a dedicated take out and connector of the overhead wire harness. If the switch is ineffective or damaged, the entire overhead console must be replaced.

REMOVAL**REMOVAL**

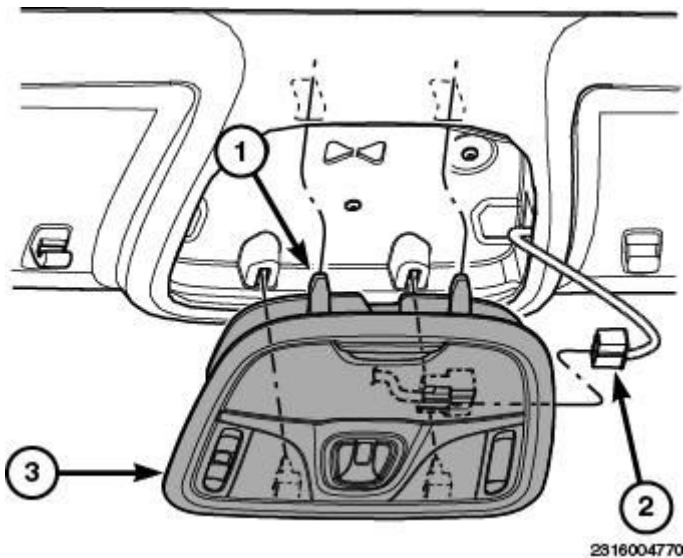


Fig. 493: Identifying Overhead Console, Clips & Wiring Connector
Courtesy of CHRYSLER GROUP, LLC

1. Place a trim stick or equivalent, between the headliner and the overhead console (1) front center.
2. Pry gently until the retaining clips are released.
3. Disconnect the overhead console (1) wiring connector (2).
4. Remove the overhead console (1) from the vehicle.

INSTALLATION

INSTALLATION

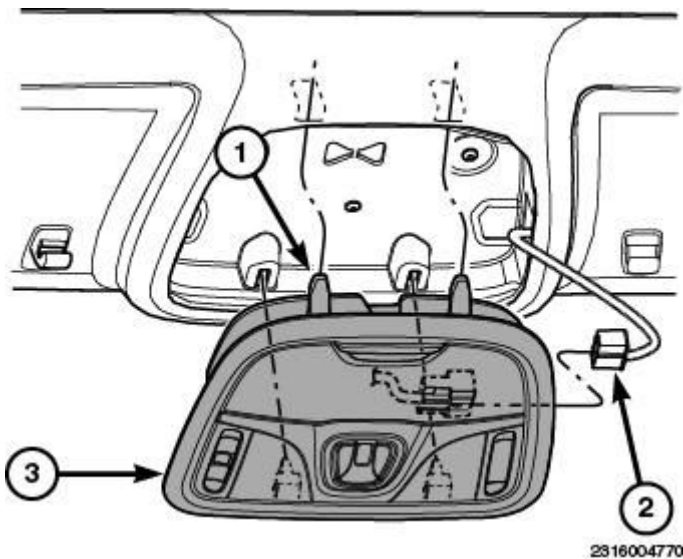
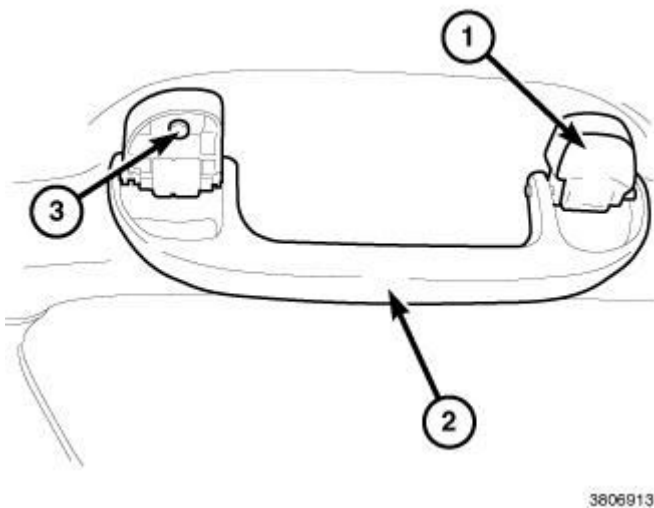


Fig. 494: Identifying Overhead Console, Clips & Wiring Connector
Courtesy of CHRYSLER GROUP, LLC

1. Connect the overhead console (3) wiring connector (2).
2. Align the rear tabs of the overhead console (1) into the retaining bracket.
3. Align the overhead console (1) retaining clips and apply hand pressure to insert fully.
4. Connect the negative battery cable.

HANDLE, GRAB**REMOVAL****REMOVAL**

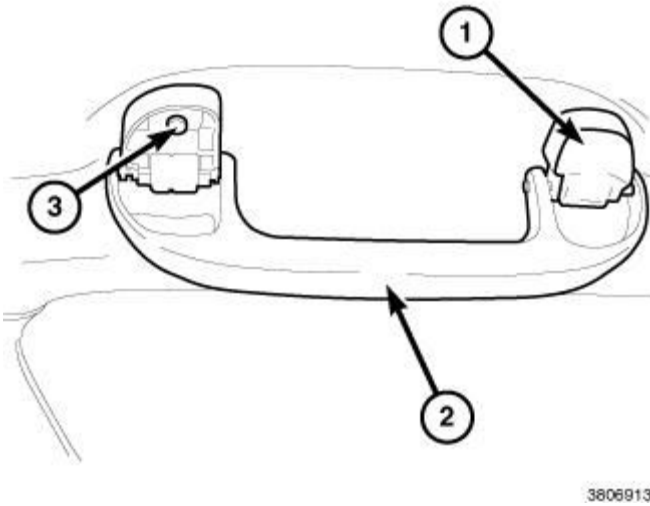
3806913

Fig. 495: Grab Handle, Fastener & Cover
Courtesy of CHRYSLER GROUP, LLC

NOTE: **Rear grab handle shown, front grab handle similar.**

1. Using a small pick/pry tool, remove the grab handle fastener cover (1). Repeat on the other side of the grab handle (2).
2. Remove the fastener (3) securing the grab handle (2). Repeat on the other side of the grab handle (2).
3. Remove the grab handle (2).

INSTALLATION**INSTALLATION**



3806913

Fig. 496: Grab Handle, Fastener & Cover

Courtesy of CHRYSLER GROUP, LLC

NOTE: **Rear grab handle shown, front grab handle similar.**

1. Position the grab handle (2).
2. Install the fastener (3) securing the grab handle (2). Tighten the fastener securely. Repeat on the other side of the grab handle (2).
3. Install the grab handle fastener cover (1). Repeat on the other side of the grab handle (2).

HEADLINER**REMOVAL****REMOVAL**

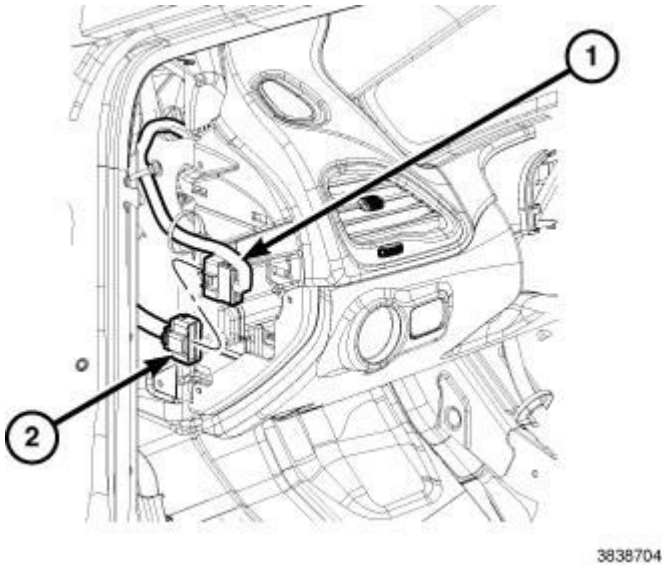


Fig. 497: Headliner Wire Harness & Connector
Courtesy of CHRYSLER GROUP, LLC

NOTE: In the event the headliner is damaged or creased during removal, it will need to be replaced with a new headliner.

NOTE: Please use clean gloves or ensure hands are clean before removing the headliner.

1. Disconnect and isolate the negative battery cable.
2. Support the headliner with a clean and suitable prop.
3. Remove the right and left end caps from the instrument panel. Refer to **CAP, INSTRUMENT PANEL END, REMOVAL**.
4. Disconnect the headliner wire harness (2) from the vehicle harness (1) on both sides.

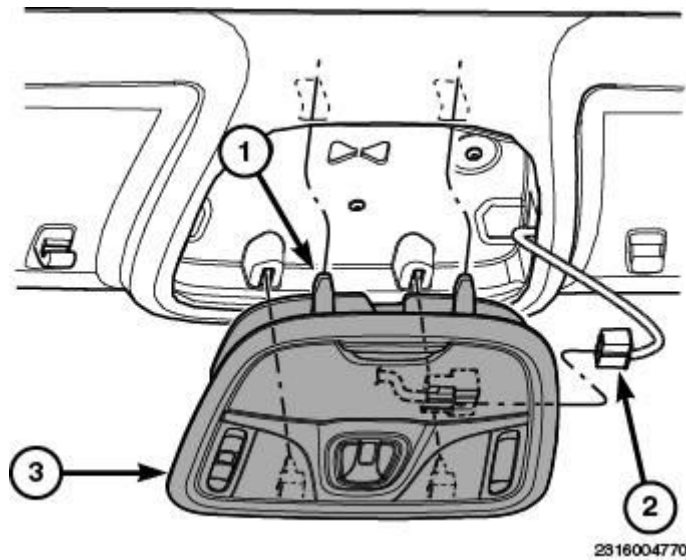


Fig. 498: Identifying Overhead Console, Clips & Wiring Connector
Courtesy of CHRYSLER GROUP, LLC

5. If equipped, remove the overhead console (3). Refer to **CONSOLE, OVERHEAD, FRONT, REMOVAL**.
6. Remove both sided visors and visor supports. Refer to **SUPPORT, VISOR, REMOVAL** and **VISOR, REMOVAL**.

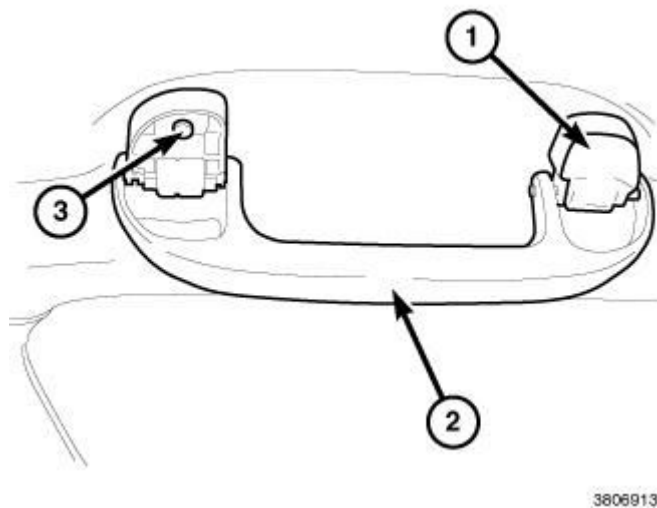


Fig. 499: Grab Handle, Fastener & Cover
Courtesy of CHRYSLER GROUP, LLC

7. Remove the front and rear grab handles. Refer to **HANDLE, GRAB, REMOVAL**.
8. Remove the A-pillar trim panels. Refer to **PANEL, A-PILLAR TRIM, REMOVAL**.

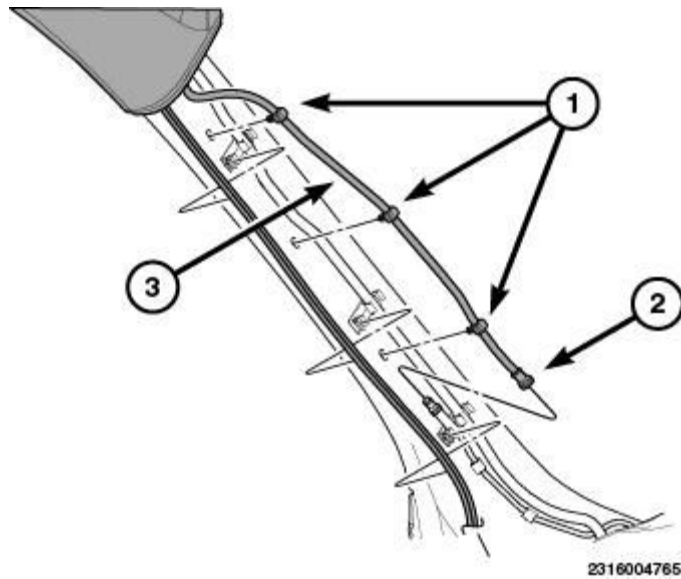


Fig. 500: Identifying Headliner Wire Harness & Rear Washer Hose
Courtesy of CHRYSLER GROUP, LLC

- 9.
10. Detach the headliner wire harness (1) from the A-pillar.
11. Disconnect the rear washer hose (2).
12. Remove the B-pillar trim panels. Refer to **PANEL, B-PILLAR TRIM, REMOVAL**.
13. Remove the upper quarter trim panels. Refer to **PANEL, QUARTER TRIM, REMOVAL**.

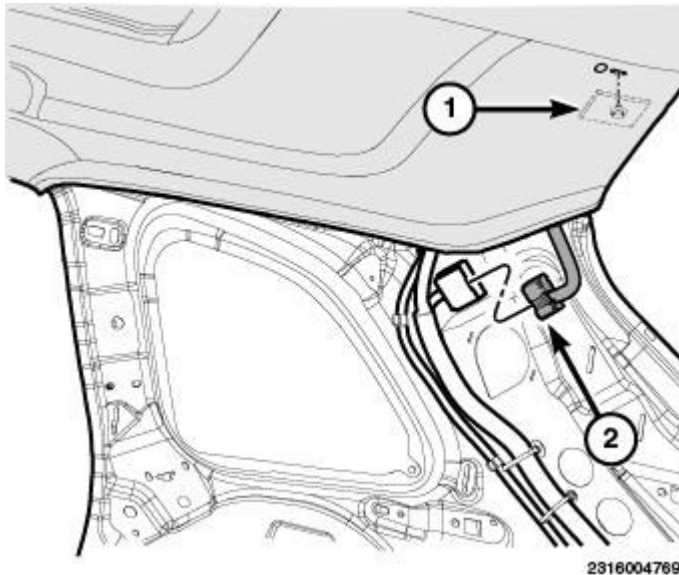
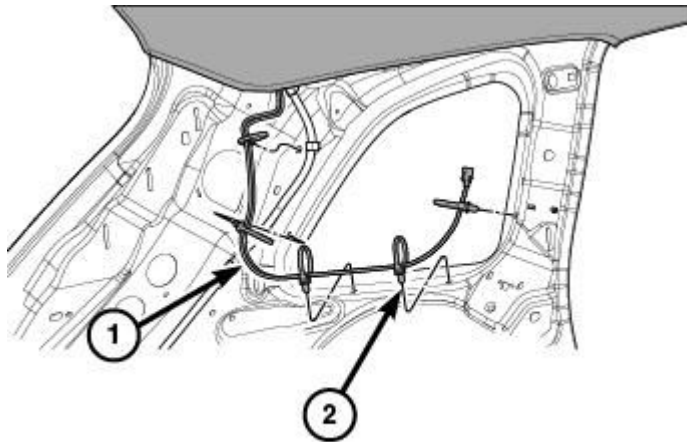


Fig. 501: Identifying Electrical Connector & Clips
Courtesy of CHRYSLER GROUP, LLC

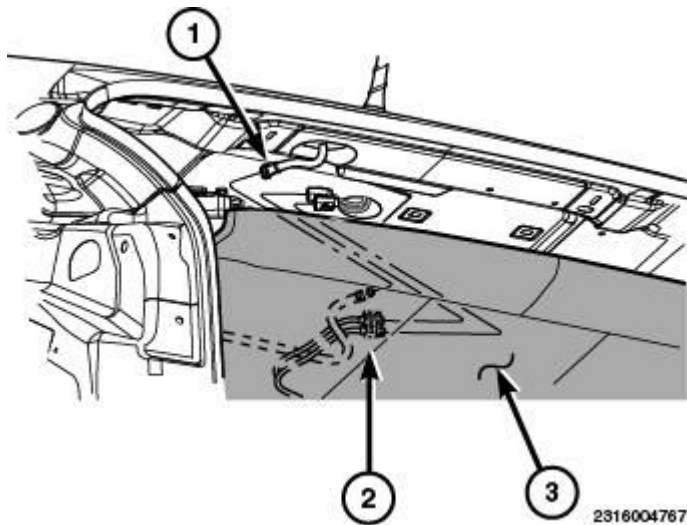
14. Disconnect the electrical connector (2) and separate the rear support clips (1).



2316004768

Fig. 502: Identifying Support Clips & Wire
Courtesy of CHRYSLER GROUP, LLC

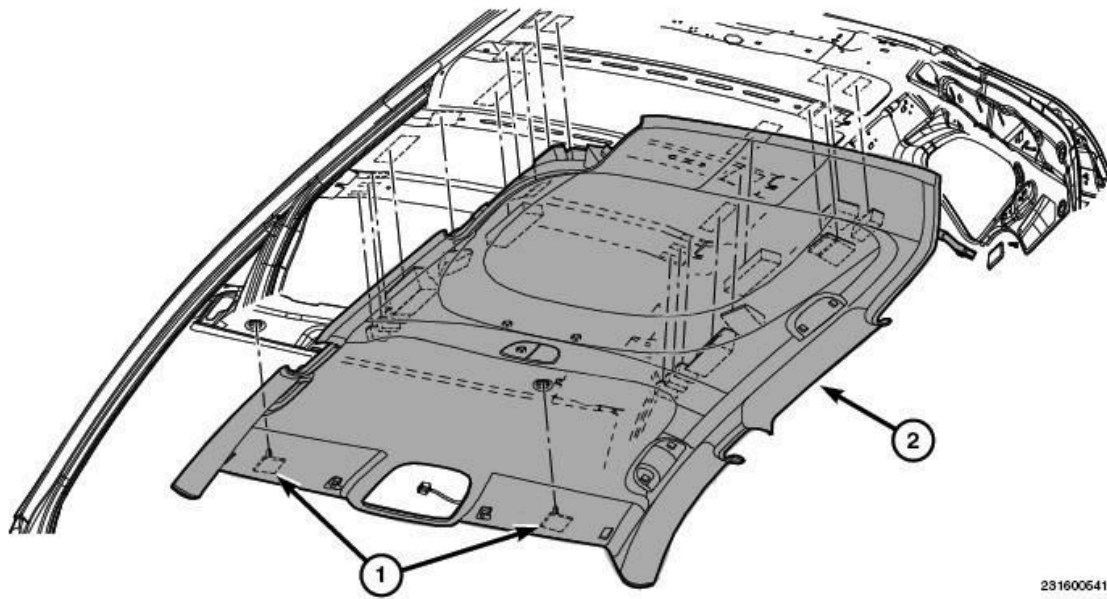
15. Release the support clips (2) and separate the wire (1).



2316004767

Fig. 503: Identifying Rear Washer Hose & Electrical Connectors
Courtesy of CHRYSLER GROUP, LLC

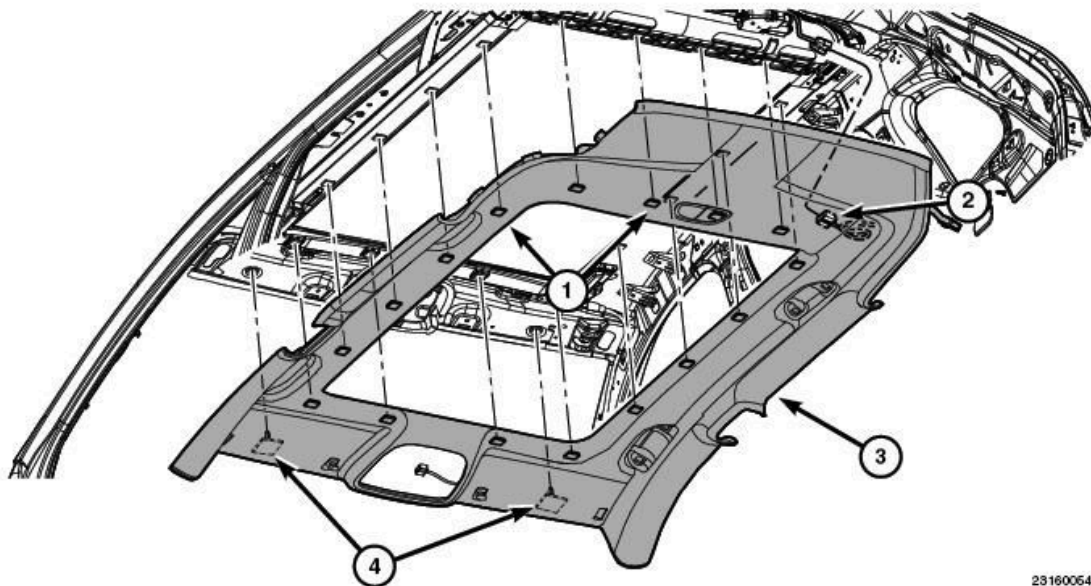
16. Disconnect the rear washer hose (1) and electrical connectors (2).



2316006411

Fig. 504: Identifying Headliner & Front Clips
Courtesy of CHRYSLER GROUP, LLC

17. Release the front clips (1) and with the help of an assistant, remove the headliner (2) through the liftgate door opening.



2316006410

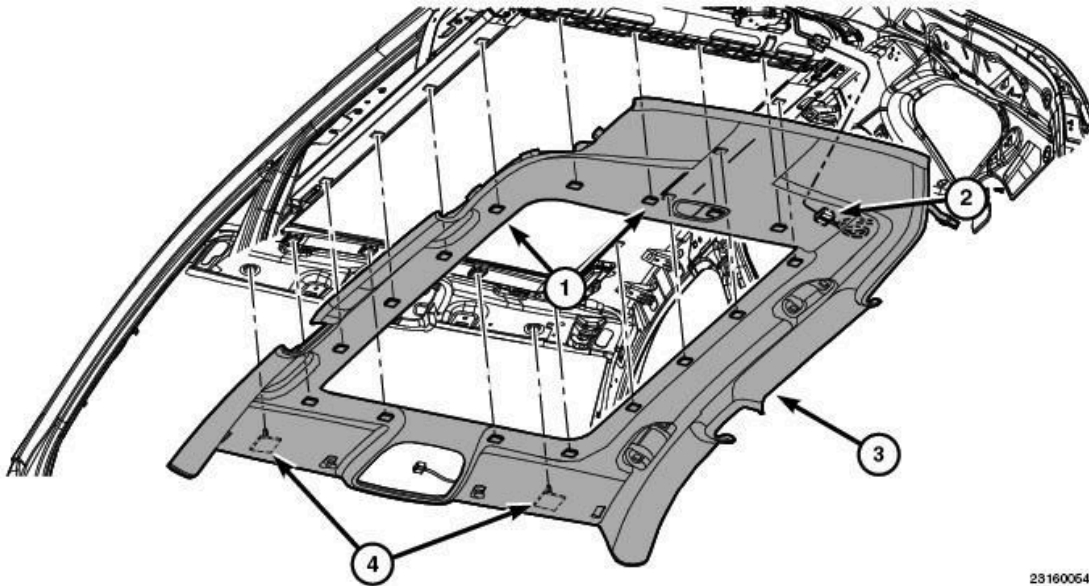
Fig. 505: Identifying Headliner, Front Clips, Dual Lock Fasteners, Sunroof Opening & Electrical Connectors
Courtesy of CHRYSLER GROUP, LLC

18. On sunroof models, release the front clips (4), release the dual lock fasteners (1) around the sunroof opening, and disconnect the electrical connector (2).
19. Remove the headliner (3) through the liftgate door opening.

20. If reinstalling the same headliner, place in a clean area free from dirt and debris.

INSTALLATION

INSTALLATION



2316005410

Fig. 506: Identifying Headliner, Front Clips, Dual Lock Fasteners, Sunroof Opening & Electrical Connectors

Courtesy of CHRYSLER GROUP, LLC

NOTE: In the event the headliner is damaged or creased during removal, it will need to be replaced with a new headliner.

NOTE: Please use clean gloves or ensure hands are clean before installing.

1. With the help of an assistant, align and position the headliner (3) through the liftgate opening.
2. Support the headliner with a clean and suitable prop.
3. Properly align the headliner (3) into position.
4. On sunroof models seat the dual lock fasteners (1) around the sunroof opening fully.
5. Connect the electrical connector (2)
6. Seat the front support clips (4) fully.

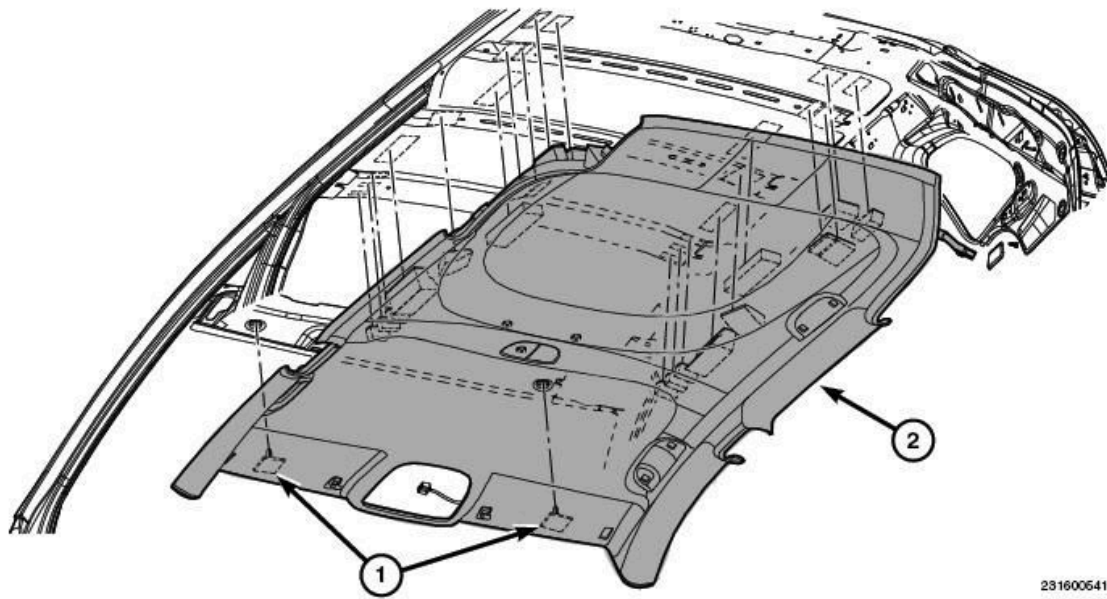


Fig. 507: Identifying Headliner & Front Clips
Courtesy of CHRYSLER GROUP, LLC

7. On non sunroof models position the headliner back and seat the front support clips fully.
8. Support the headliner with a clean and suitable prop.

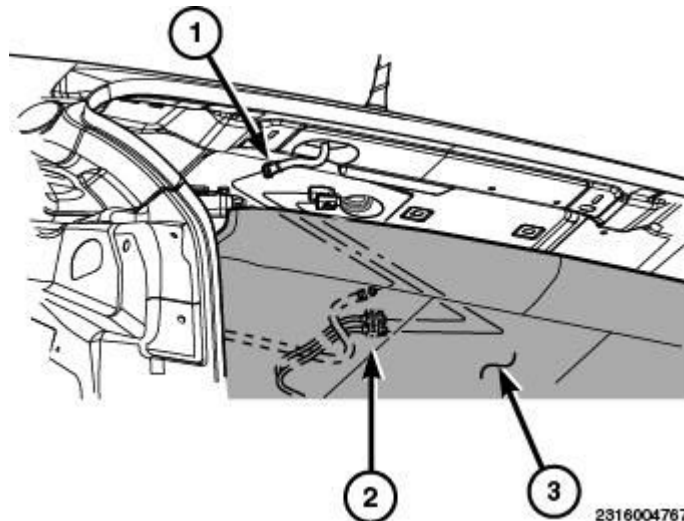
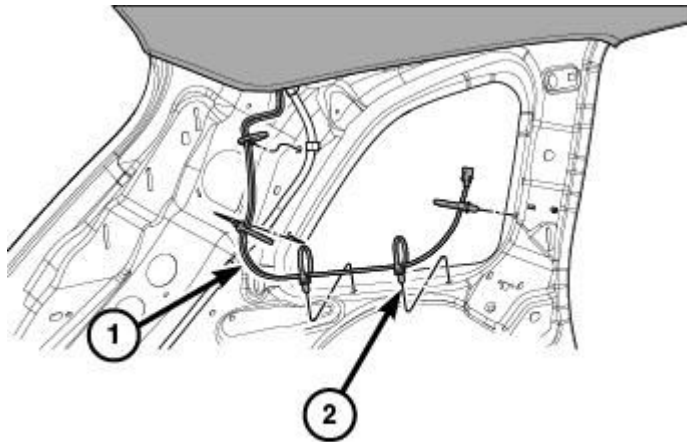


Fig. 508: Identifying Rear Washer Hose & Electrical Connectors
Courtesy of CHRYSLER GROUP, LLC

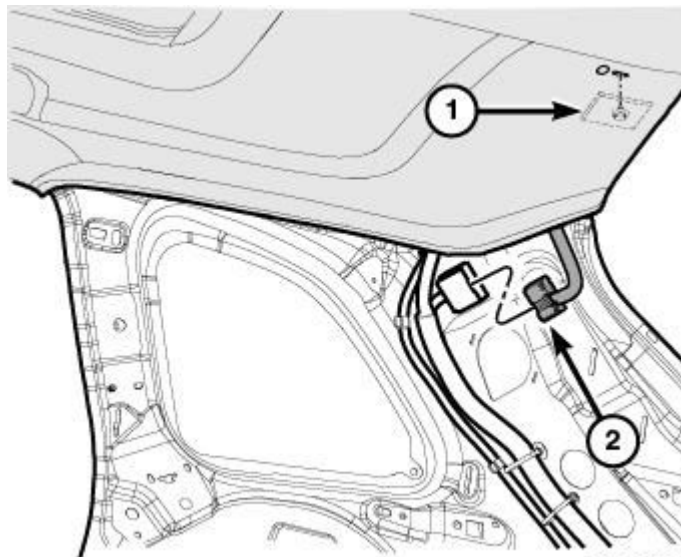
9. Connect the rear electrical connectors (2) and connect the rear washer hose (1).



2316004768

Fig. 509: Identifying Support Clips & Wire
Courtesy of CHRYSLER GROUP, LLC

10. Position the harness (1) back and sear the support clips (2) fully.



2316004769

Fig. 510: Identifying Electrical Connector & Clips
Courtesy of CHRYSLER GROUP, LLC

11. Connect the electrical connector (2) and seat the rear support clips (1) fully.

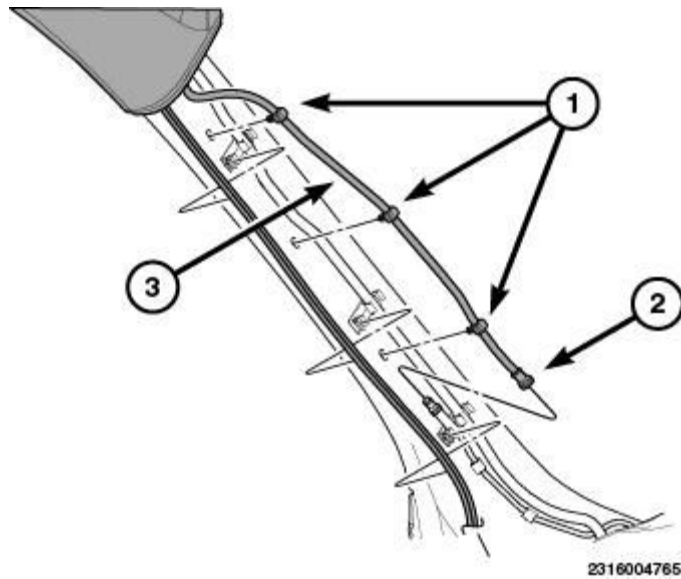


Fig. 511: Identifying Headliner Wire Harness & Rear Washer Hose
Courtesy of CHRYSLER GROUP, LLC

12. Connect the washer hose (3) at the A-pillar.
13. Route and attach the headliner wire harness (1) to the A-pillar.

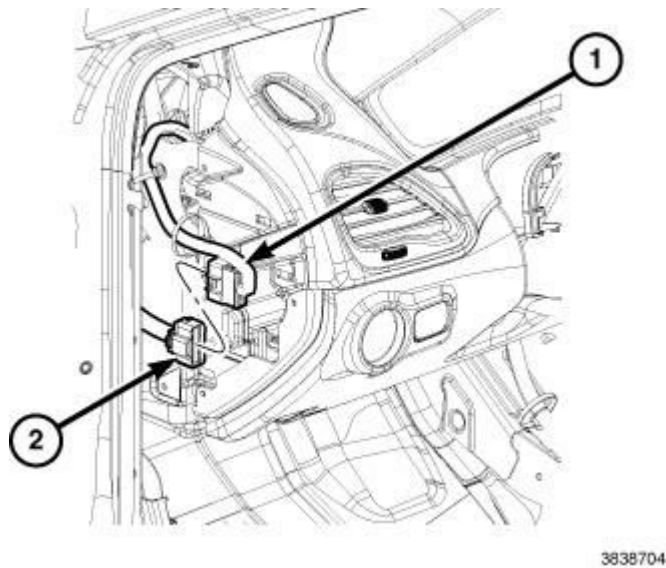


Fig. 512: Headliner Wire Harness & Connector
Courtesy of CHRYSLER GROUP, LLC

14. Connect the right and left headliner wire harness (2) into the vehicle harness (1).

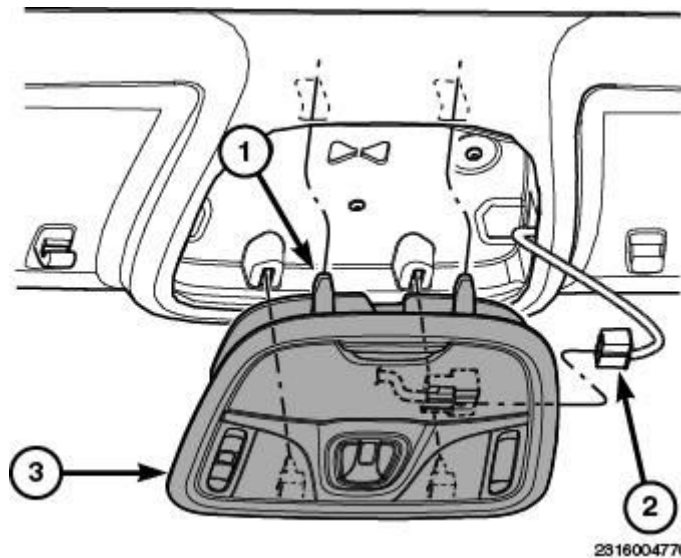


Fig. 513: Identifying Overhead Console, Clips & Wiring Connector
 Courtesy of CHRYSLER GROUP, LLC

15. If equipped, install the overhead console. Refer to **CONSOLE, OVERHEAD, FRONT, INSTALLATION**.
16. Install the upper quarter trim panels. Refer to **PANEL, QUARTER TRIM, INSTALLATION**.
17. Install the B-pillar trim panels. Refer to **PANEL, B-PILLAR TRIM, INSTALLATION**.
18. Install the A-pillar trim panels. Refer to **PANEL, A-PILLAR TRIM, INSTALLATION**.

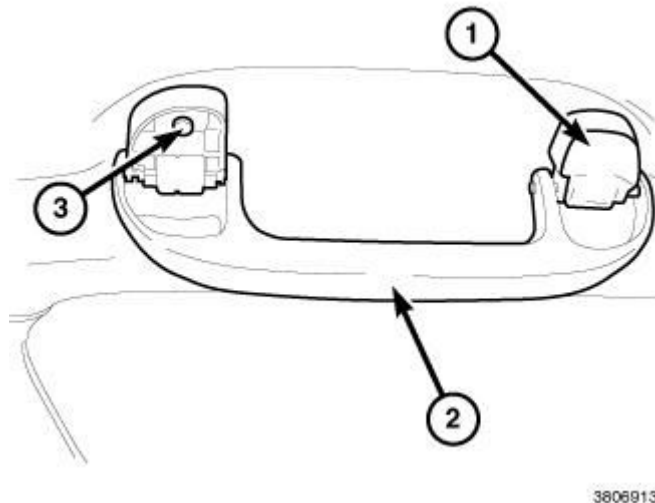


Fig. 514: Grab Handle, Fastener & Cover
 Courtesy of CHRYSLER GROUP, LLC

19. Install the grab handles. Refer to **HANDLE, GRAB, INSTALLATION**.
20. Install both visors and visor supports. Refer to **SUPPORT, VISOR, INSTALLATION** and **VISOR, INSTALLATION**.

21. Install the end caps onto the instrument panel. Refer to **CAP, INSTRUMENT PANEL END, INSTALLATION**.
22. Connect the negative battery cable.

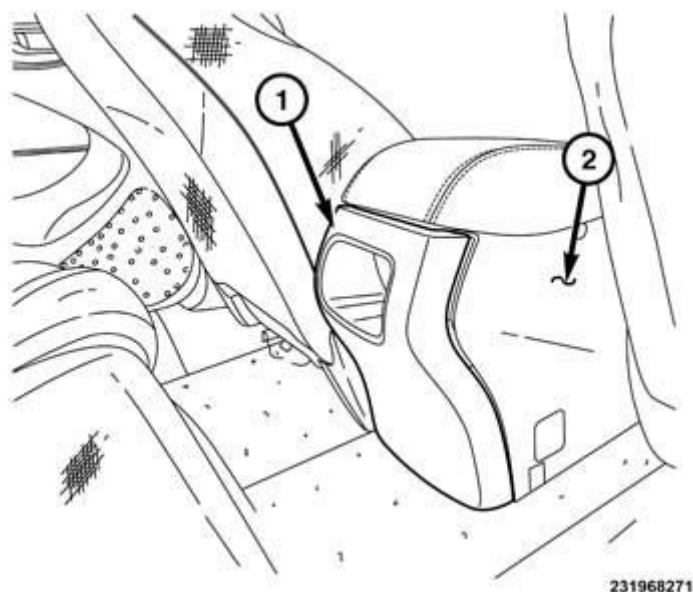
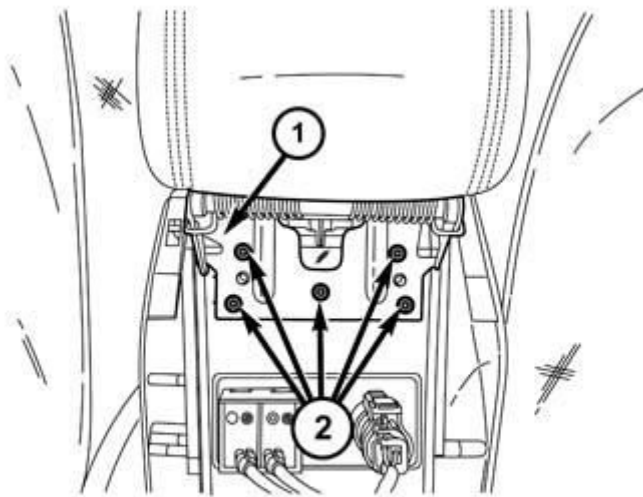
LATCH, CONSOLE LID, FLOOR**REMOVAL****REMOVAL**

Fig. 515: Console & End Cap Bezel
Courtesy of CHRYSLER GROUP, LLC

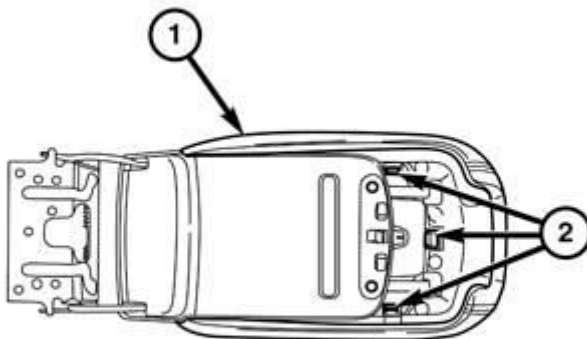
1. With the use of a (special tool #C-4755, Trim Stick) or equivalent, remove the console rear end cap bezel (1) from the console (2).
2. Open the armrest assembly fully.



231968272

Fig. 516: Armrest Hinge & Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Remove the five fasteners (2) from the armrest hinge (1) to the storage bin.
4. Remove armrest assembly.

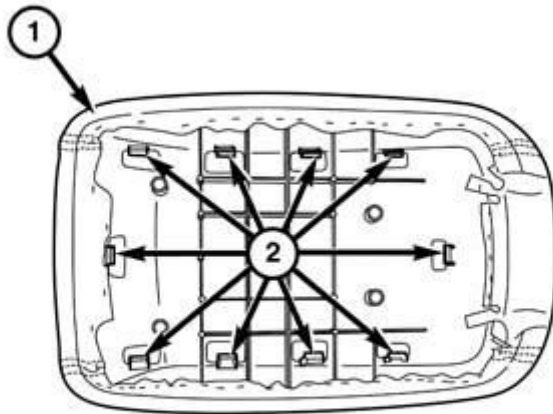


231968273

Fig. 517: Armrest & Retaining Tabs
Courtesy of CHRYSLER GROUP, LLC

5. Slide the armrest (1) forward to expose the front three retainer tabs (2).
6. With a small flat bladed, or equivalent tool gently pry to release the tabs (2).
7. It will be necessary to leave a small flat bladed or equivalent, in place to keep the tab from resetting while

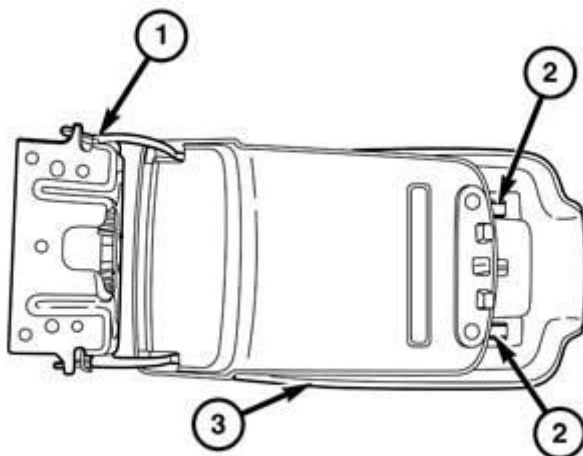
the other two tabs are released.



231968274

Fig. 518: Armrest (1) shown without the closeout to show the tab locations (2).
 Courtesy of CHRYSLER GROUP, LLC

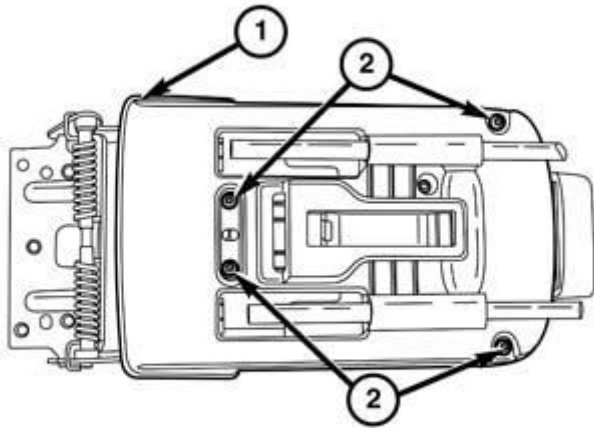
8. Work toward the back, using a pick tool or equivalent, releasing the tabs along the sides.
9. Slide the armrest back to access the rear tab.
10. Unclip the rear tab.
11. Separate the armrest from the sliding closeout.



231968276

Fig. 519: Hinge, Slider Rods & Closeout
 Courtesy of CHRYSLER GROUP, LLC

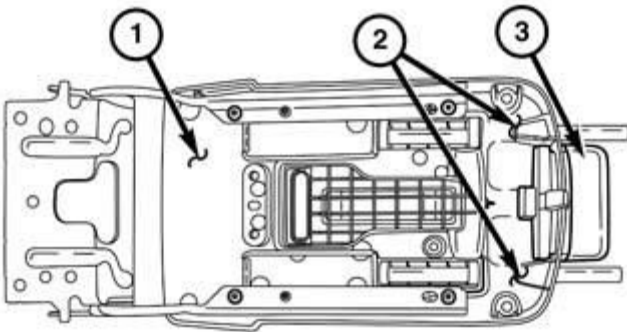
12. Move the slide plate forward.
13. Lift up on the hinge (1) and then pull back to release the slider rods (2) from the closeout (3).
14. Separate the slider plate from the closeout.



231968277

Fig. 520: Upper Slider Plate & Fasteners
Courtesy of CHRYSLER GROUP, LLC

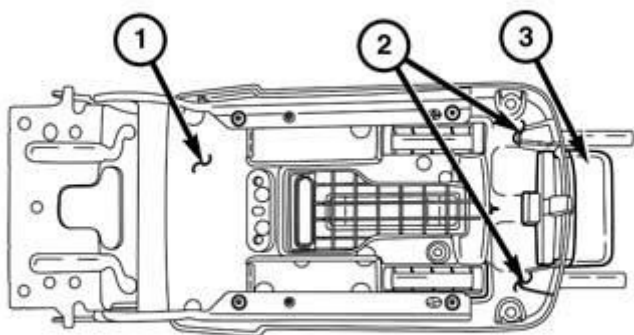
15. Remove the four fasteners (2) from the lower side plate bezel.
16. Separate the upper slider plate (1) from the lower slider plate bezel.



231968278

Fig. 521: Grasp Handle, Lower Bezel & Tabs
Courtesy of CHRYSLER GROUP, LLC

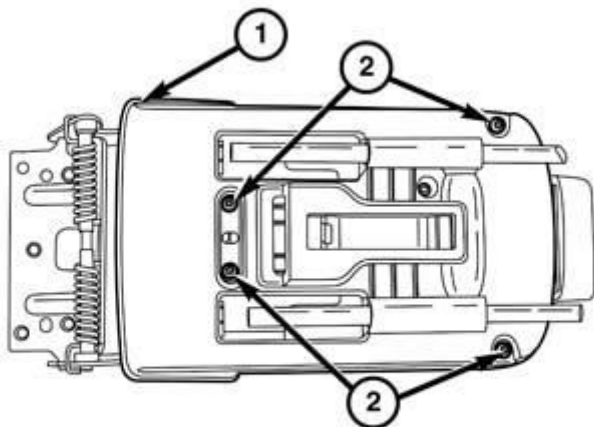
17. Pull the latch grasp handle (3) forward to remove.
18. With a small flat bladed tool, press in tabs (2) on each side of the latch.
19. Remove the latch from slider plate lower bezel (1).

INSTALLATION**INSTALLATION**

231968278

Fig. 522: Grasp Handle, Lower Bezel & Tabs
Courtesy of CHRYSLER GROUP, LLC

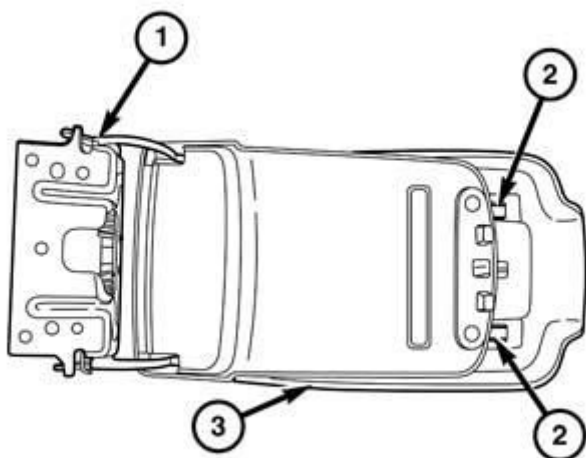
1. With the latch grasp handle (3) removed, place latch in the slider plate lower bezel (1).
2. Slide forward to engage the latch into the side tabs (2).
3. Insert the grab handle (3) onto the latch until the tab engages.



231968277

Fig. 523: Upper Slider Plate & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Place the upper slider plate into the lower slider plate bezel (1).
5. Install the four fasteners (2) into the slider plate bezel and tighten securely.

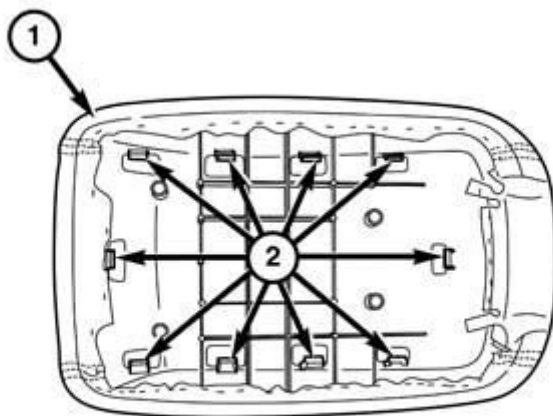


231968276

Fig. 524: Hinge, Slider Rods & Closeout
Courtesy of CHRYSLER GROUP, LLC

6. Insert slider rods (2) into the closeout at an angle.
7. Set the slider plate (3) into the closeout.
8. Slide rearward until the slider plate stop tabs are inserted into the slots on the closeout.

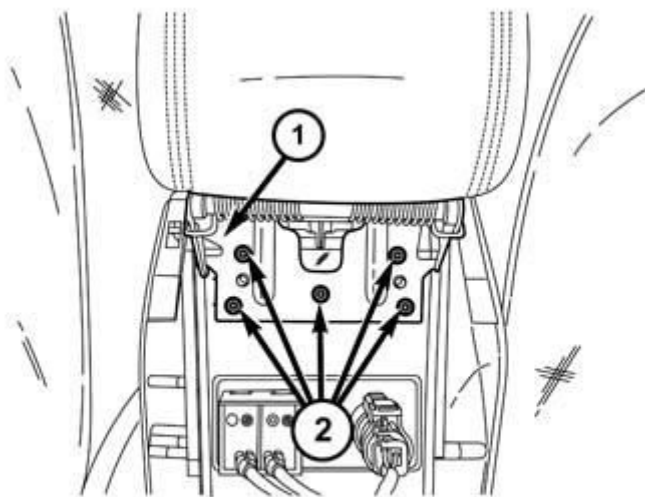
9. Push the slide rods inward until both rest against the stop tabs.
10. Place the sliding closeout assembly into the armrest.



231968274

Fig. 525: Armrest Tab Locations
Courtesy of CHRYSLER GROUP, LLC

11. Verify tabs (2) are aligned.
12. With hand pressure, push the closeout assembly into the armrest (1) until all ten tabs (2) have engaged fully.



231968272

Fig. 526: Armrest Hinge & Fasteners
Courtesy of CHRYSLER GROUP, LLC

13. Align the armrest hinge (1) onto the console storage bin alignment studs.
14. Install the five fasteners (2) and tighten securely.

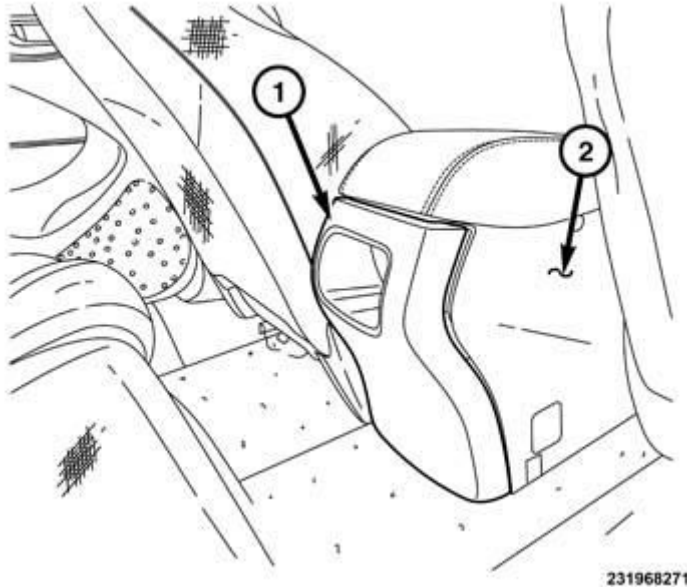


Fig. 527: Console & End Cap Bezel
Courtesy of CHRYSLER GROUP, LLC

15. Align the console rear end cap bezel (1) with the console base (2) and with the use of hand pressure engage the clips.

LOAD FLOOR, CARGO

REMOVAL

REMOVAL

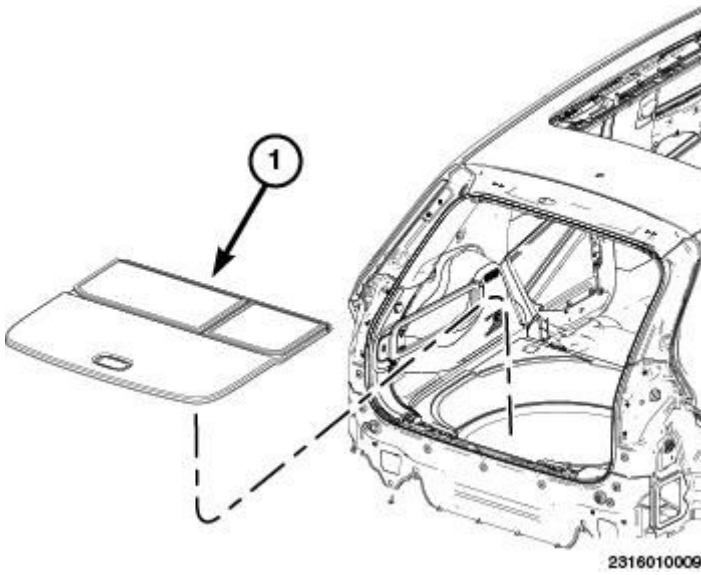


Fig. 528: Identifying Load Floor Lid
Courtesy of CHRYSLER GROUP, LLC

1. Open and remove the load floor lid (1).

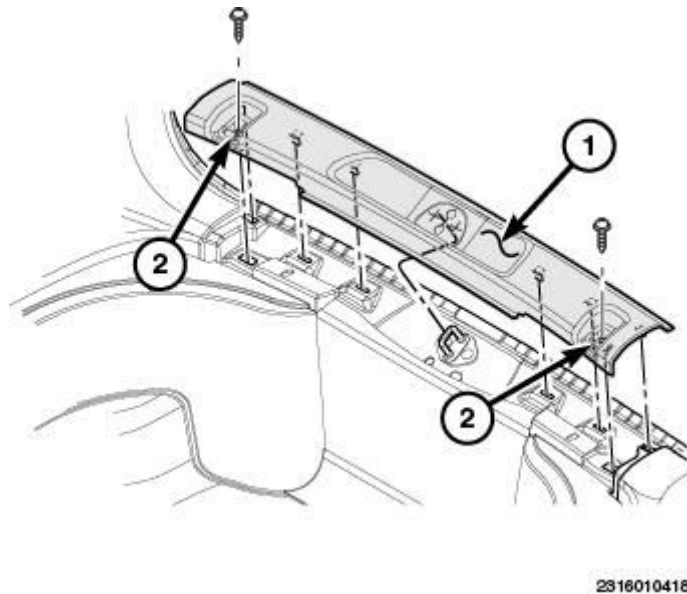


Fig. 529: Identifying Liftgate Scuff Plate & Fasteners
Courtesy of CHRYSLER GROUP, LLC

2. Remove the screws (2).
3. Using trim stick (special tool #C-4755, Trim Stick) or equivalent, separate the retaining clips and remove the liftgate scuff plate (1).

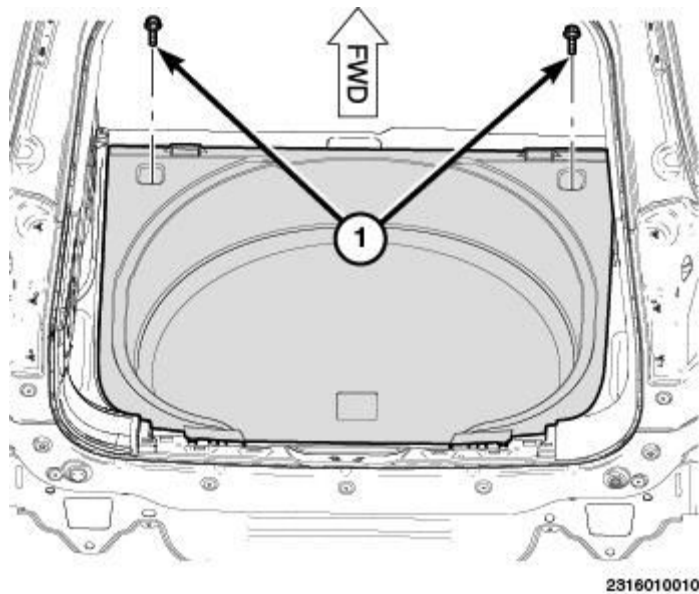


Fig. 530: Identifying Front Screws
Courtesy of CHRYSLER GROUP, LLC

4. Remove the two front screws (1).

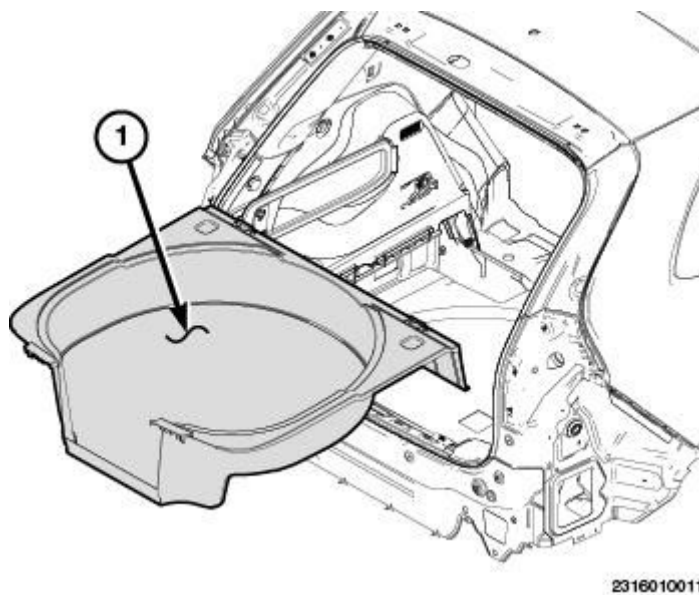
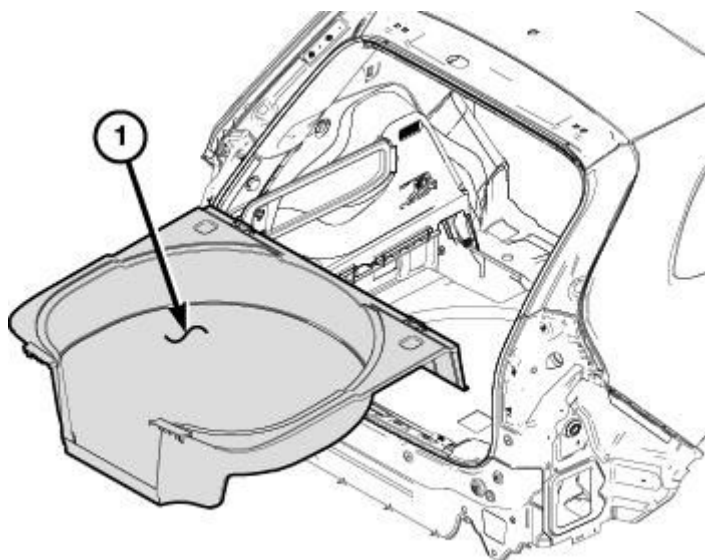


Fig. 531: Identifying Load Floor Bin
Courtesy of CHRYSLER GROUP, LLC

5. Remove the load floor bin (1).

INSTALLATION

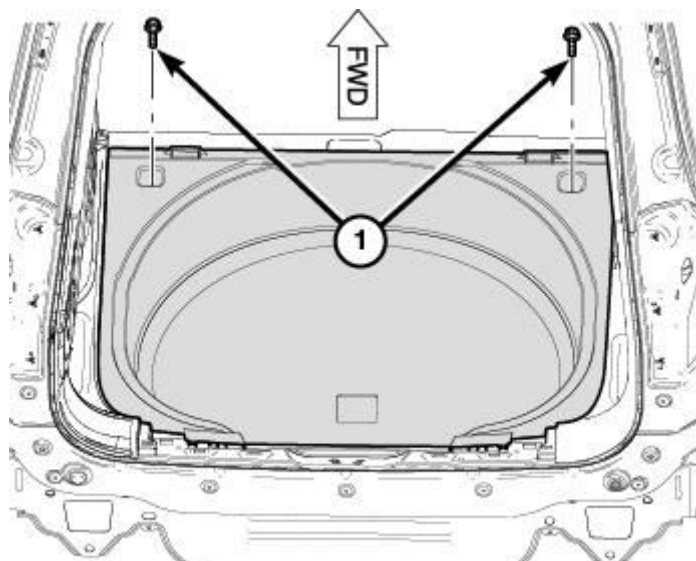
INSTALLATION



2316010011

Fig. 532: Identifying Load Floor Bin
Courtesy of CHRYSLER GROUP, LLC

1. Install the load floor bin (1).



2316010010

Fig. 533: Identifying Front Screws
Courtesy of CHRYSLER GROUP, LLC

2. Install the screws (1).

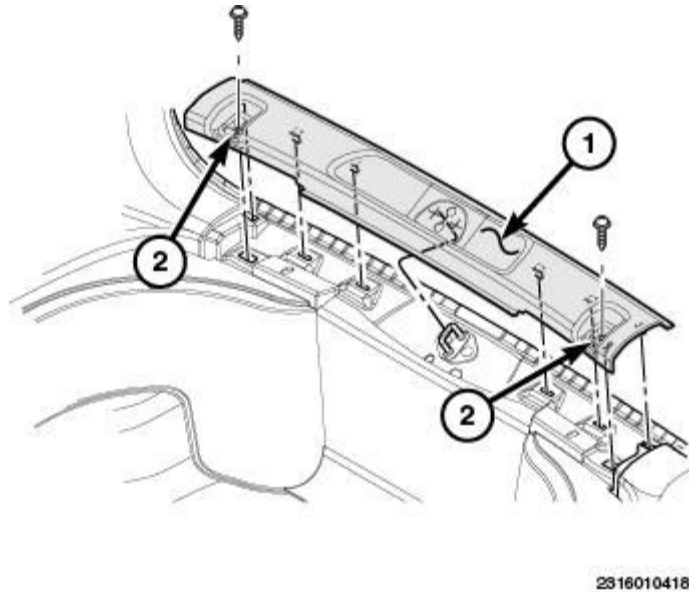


Fig. 534: Identifying Liftgate Scuff Plate & Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Position the liftgate scuff plate (1) back into the vehicle and seat the retaining clips fully.
4. Install the cargo loop screws (2).

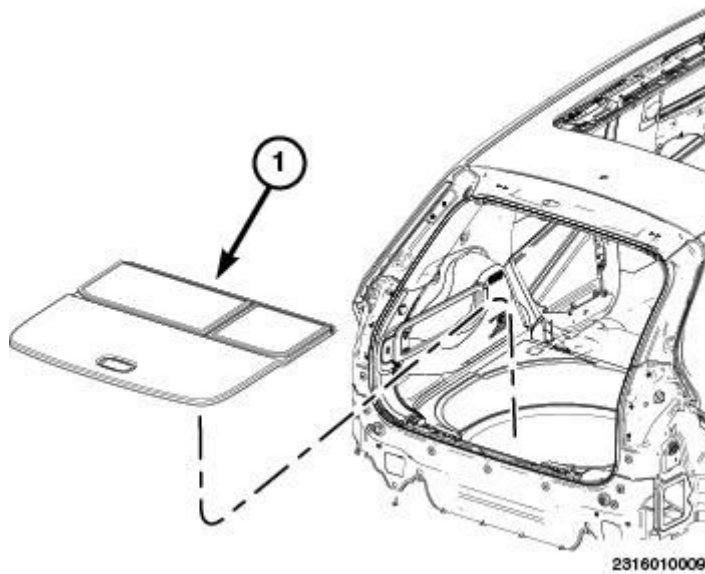


Fig. 535: Identifying Load Floor Lid
Courtesy of CHRYSLER GROUP, LLC

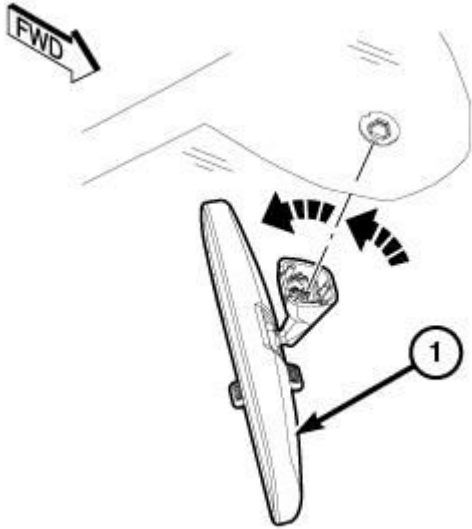
5. Install the load floor lid (1).

MIRROR, REARVIEW

REMOVAL

REMOVAL

PRISMATIC MIRROR



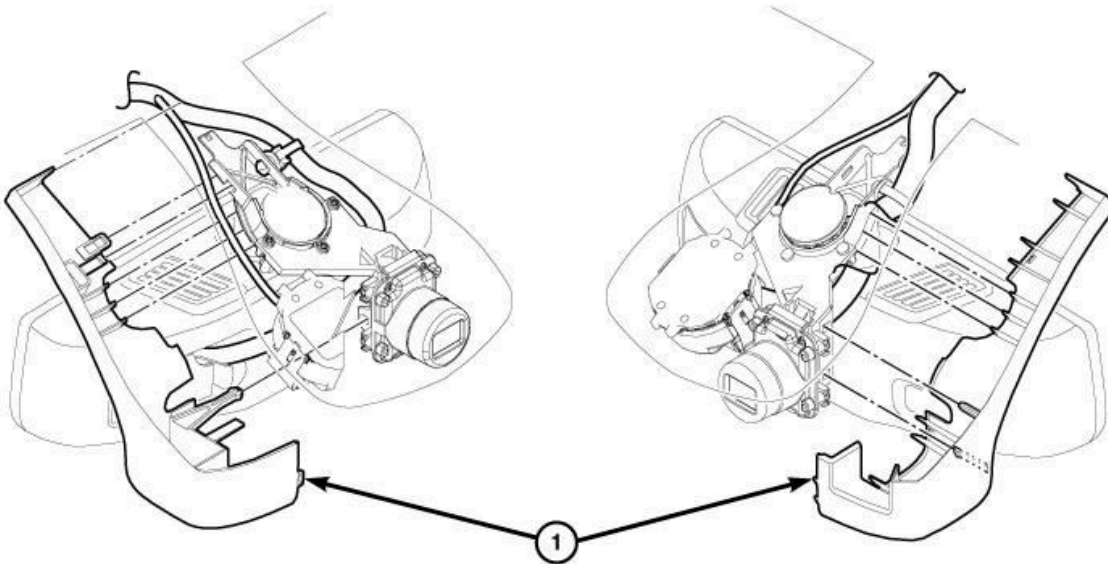
3811431

Fig. 536: Removing Prismatic Mirror
Courtesy of CHRYSLER GROUP, LLC

NOTE: View shown from exterior of the vehicle.

1. Accessing through the vehicle interior, twist the mirror assembly (2) clockwise and release the mirror from the aluminum button attached to the windshield.

TELEMATICS MIRROR



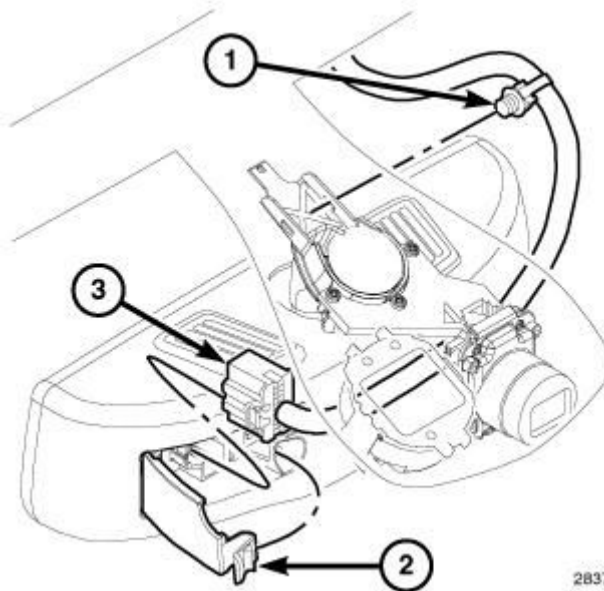
2836551

Fig. 537: Mirror Trim Covers

Courtesy of CHRYSLER GROUP, LLC

NOTE: View shown from exterior of the vehicle.

1. Using a (special tool #C-4755, Trim Stick) or equivalent, separate the mirror trim covers (1) and remove.



2837378

Fig. 538: Access Panel & Mirror Harness Connector

Courtesy of CHRYSLER GROUP, LLC

2. Open the access panel (2) and disconnect the mirror harness connector (3).

3. Release the harness push pin fastener (1) and position the wire harness aside.

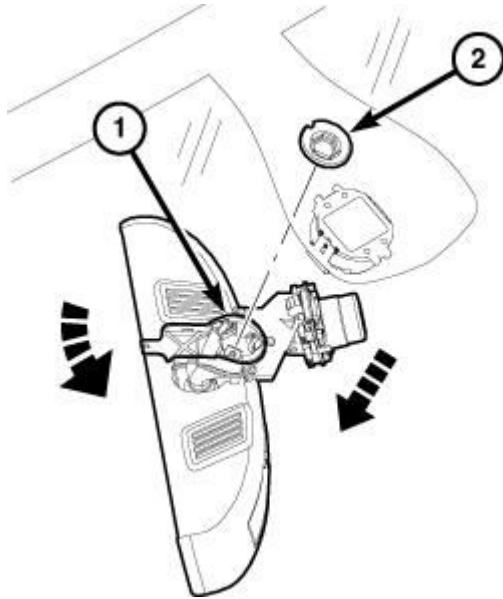


Fig. 539: Mirror Assembly & Aluminum Button
Courtesy of CHRYSLER GROUP, LLC

4. Twist the mirror assembly (1) clockwise and release the mirror from the aluminum button (2) attached to the windshield.

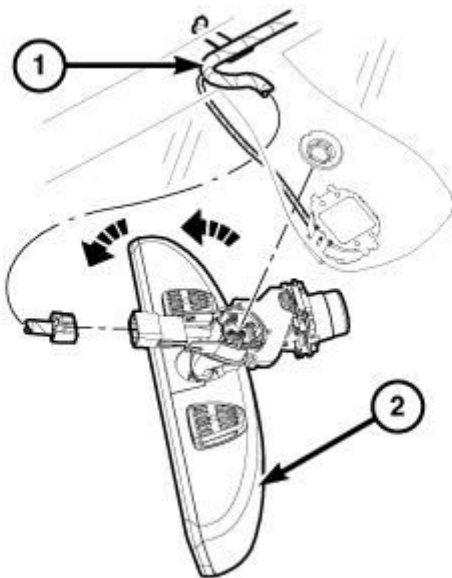
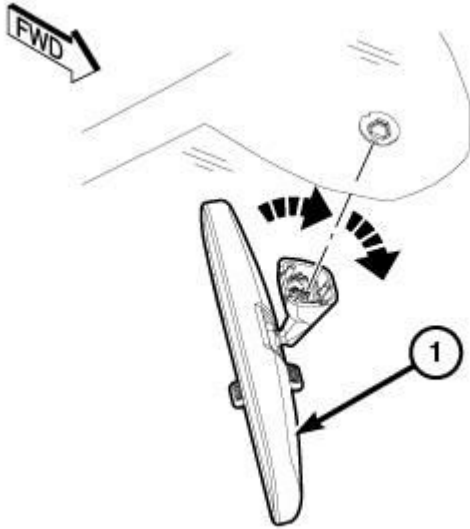


Fig. 540: Removing Telematics Mirror
Courtesy of CHRYSLER GROUP, LLC

INSTALLATION

INSTALLATION

PRISMATIC MIRROR



3811465

Fig. 541: Installing Prismatic Mirror
Courtesy of CHRYSLER GROUP, LLC

NOTE: View shown from exterior of the vehicle.

1. Place the rearview mirror over the aluminum button in the upper center of the windshield.
2. Accessing through the vehicle interior, twist the mirror assembly (2) counter clockwise to install the mirror on the aluminum button attached to the windshield.

NOTE: Mirror must be fully seated or wedged onto the button before rotating.

TELEMATICS MIRROR

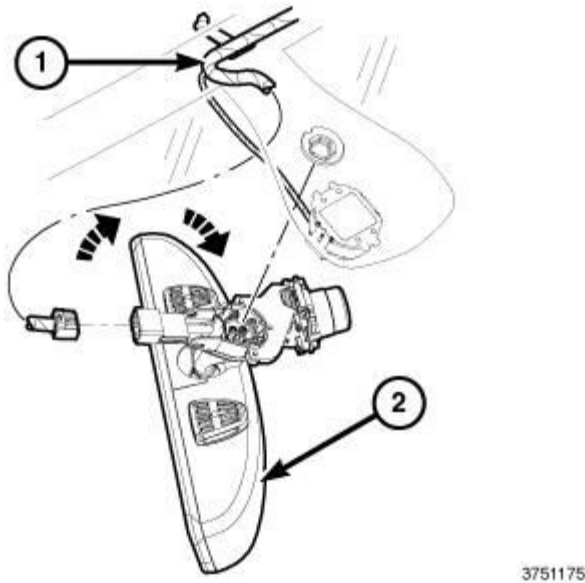


Fig. 542: Mirror Electrical Connector (Telematics)
Courtesy of CHRYSLER GROUP, LLC

1. Place the rearview mirror over the aluminum button in the upper center of the windshield.
2. Twist the mirror base onto the button in a counter clockwise direction to attach the mirror.

NOTE: Mirror must be fully seated or wedged onto the button before rotating.

NOTE: Mirror must be rotated in a counter clockwise direction to prevent the mirror from touching the rain sensor.

3. Position the rain sensor wire harness back into place and secure accordingly.
4. Connect the electrical connector (1) and install the trim cover.

NOTE: Rain sensor connection should be verified prior to install the mirror trim covers.

5. Install the mirror trim and harness trim covers
6. Connect the negative battery cable.

REAR VIEW MIRROR BUTTON

NOTE: The rear view mirror button is permanently bonded to the inside of the windshield glass. If the button should become separated from the glass, it may be re-bonded using the following procedure. This procedure requires the use of a Rear View Mirror Adhesive kit that is available through Mopar® in single application packages that include a two-part adhesive and an accelerant with applicator.

1. Mark the proper position for the mirror button on the outside of the windshield glass with a wax pencil. The residual adhesive on the inside of the glass from the prior mirror button installation can be used as a guide.
2. Clean the button contact area on the inside of the glass. Use a mild powdered cleanser on a cloth saturated with rubbing alcohol. Finally, clean the glass with a paper towel dampened with alcohol.
3. Sand the bonding surface (the smaller side) of the support button with fine grit-sandpaper. Wipe the button surface clean with a paper towel.
4. Apply accelerant to the bonding surface of the button according to the following instructions:
 - Crush the accelerant vial to saturate the felt applicator.
 - Remove the paper sleeve.
 - Apply accelerant to the bonding surface of the button.
 - Allow the accelerant to dry for five minutes.
 - Do not touch the button bonding surface after the accelerant has been applied.
5. Apply adhesive accelerant to the button contact area on the inside of the windshield glass. Allow the accelerant to dry for one minute. Do not touch the button contact area of the glass after the accelerant has been applied.
6. Install the button according to the following instructions:
 - Apply one drop of adhesive at the center of the button contact area on the inside of the windshield glass.
 - Apply an even coat of adhesive to the bonding surface of the button.
 - Align the button with the marked position on the windshield glass.
 - Press and hold the button in place for at least one minute.

NOTE: **Verify that the mirror button is correctly aligned, because the adhesive will cure rapidly.**

7. Allow the adhesive to cure for 8-10 minutes. Remove any excess adhesive with an alcohol-dampened cloth.
8. Allow the adhesive to cure for an additional 8-10 minutes before reinstalling the mirror.

PANEL, A-PILLAR TRIM

REMOVAL

REMOVAL

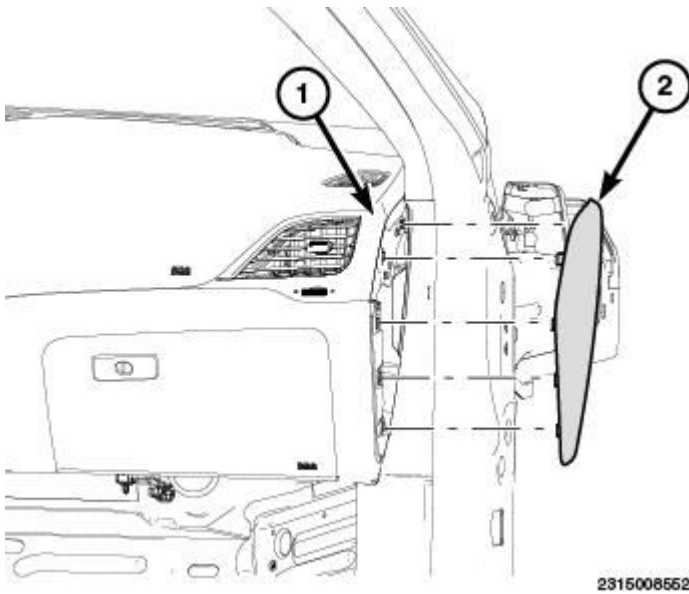


Fig. 543: Identifying Instrument Panel & End Cap
Courtesy of CHRYSLER GROUP, LLC

1. Apply protective tape to lower a-pillar trim and to defroster grill, to prevent scaring of either surfaces.
2. Remove instrument panel end cap by using a (special tool #C-4755, Trim Stick) or equivalent, to disengage clips holding end cover (1) to instrument panel.

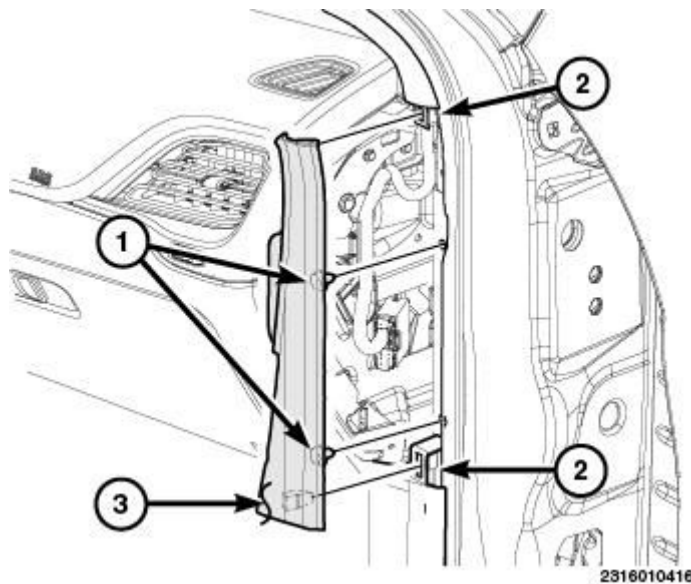
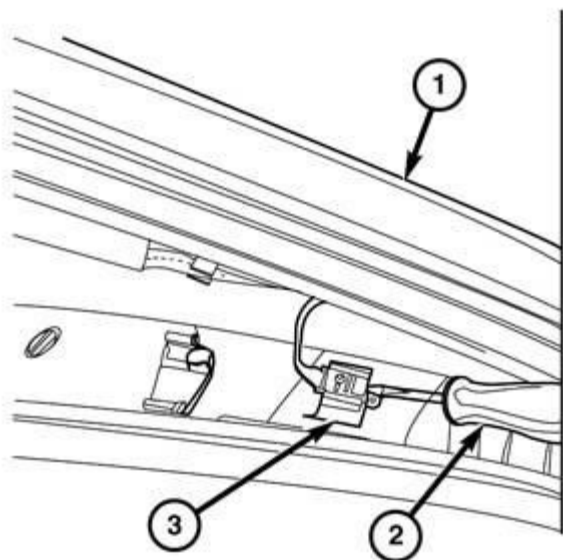


Fig. 544: Identifying Closeout Panel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

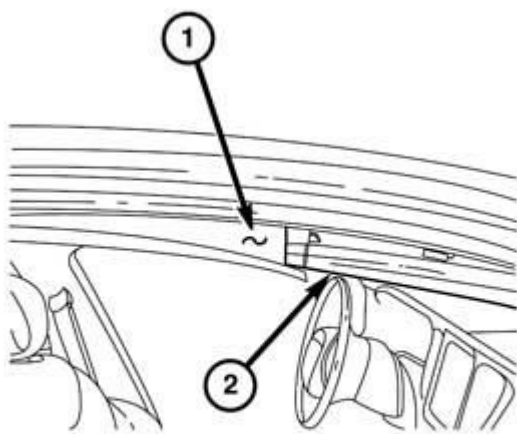
3. Using a trim stick or equivalent, release the push pin fasteners (1) and the retaining tabs (2) and remove closeout panel (3) located between the A-pillar trim and the front scuff plate.



231669161

Fig. 545: Disengaging Tether Clip From Housing
 Courtesy of CHRYSLER GROUP, LLC

4. Using a trim stick or equivalent, starting at the bottom and working up, pry the A-pillar trim pane retaining clips out from the vehicle A-pillar (1). **Do not remove the A-pillar trim.**
5. Using a screwdriver (2) or equivalent, press downward disengaging tether clip and slide from housing (3).



231669164

Fig. 546: A-Pillar Trim & Headliner
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Be careful not to crease the headliner.

- 6.
7. Lower the top of the A-pillar trim (2) to release the headliner (1) from the pocket of the A-pillar trim.

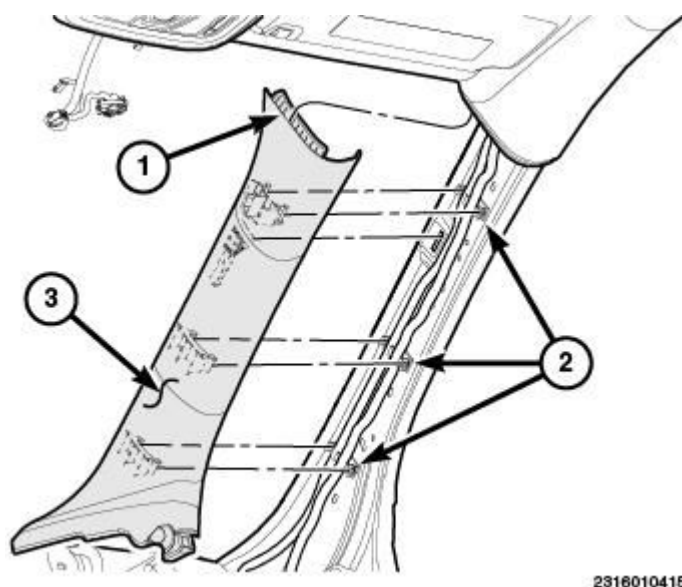
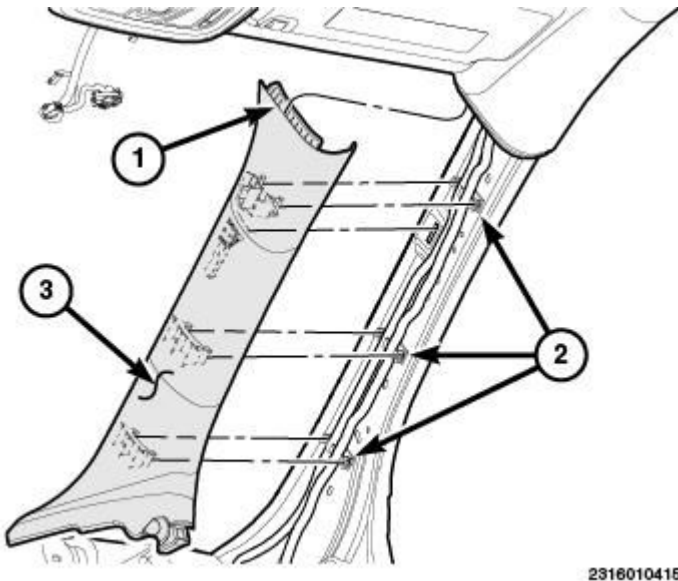


Fig. 547: Identifying A-Pillar Trim, Tab & Fasteners
Courtesy of CHRYSLER GROUP, LLC

8. Remove the A-pillar trim (3) from vehicle.

INSTALLATION

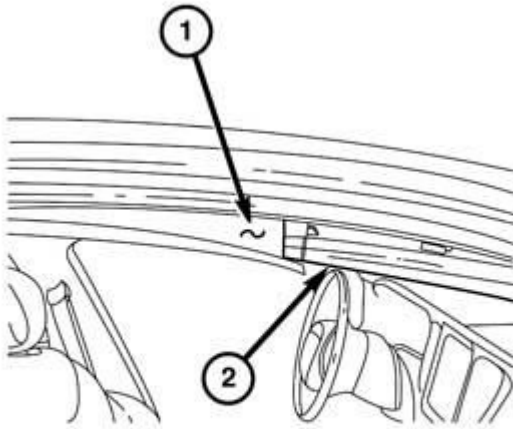
INSTALLATION



2316010415

Fig. 548: Identifying A-Pillar Trim, Tab & Fasteners
Courtesy of CHRYSLER GROUP, LLC

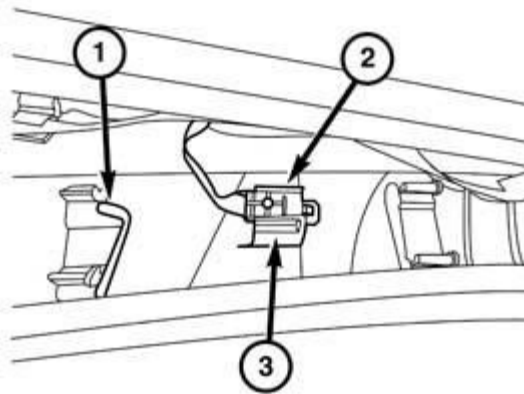
1. Position the A-pillar trim near the A-pillar.



231669164

Fig. 549: A-Pillar Trim & Headliner
Courtesy of CHRYSLER GROUP, LLC

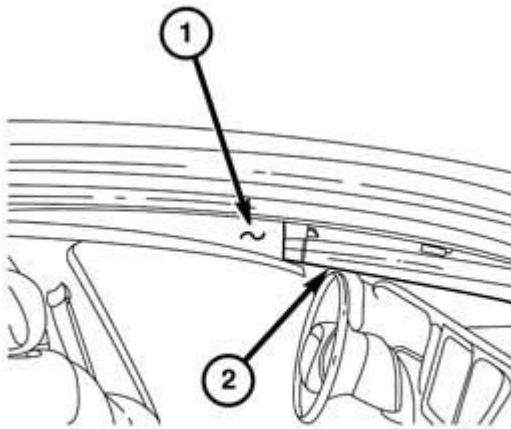
2. Position the top of the A-pillar trim (2) behind the headliner (1).
3. Insert the lower portion of the A-pillar trim (2) into the dash pocket.



231669162

Fig. 550: A-Pillar Trim Tether
Courtesy of CHRYSLER GROUP, LLC

4. Slide the A-pillar trim tether (2) into the tether pocket (3), and clip into place.
5. Verify the A-pillar trim tether (2) is clipped in fully.

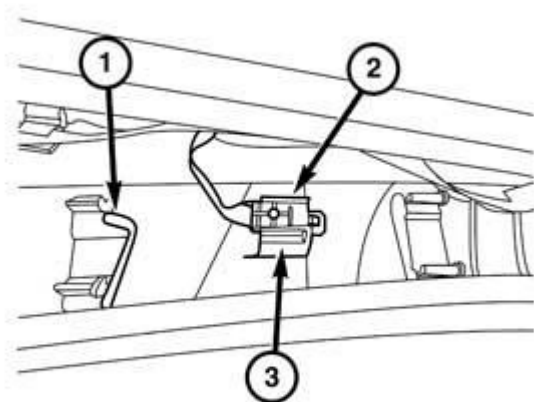


231669164

Fig. 551: A-Pillar Trim & Headliner

Courtesy of CHRYSLER GROUP, LLC

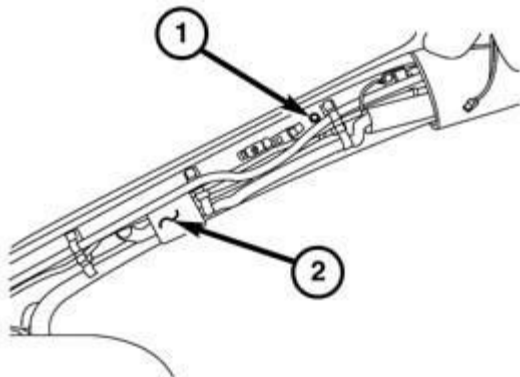
6. Move the top of the A-pillar trim (2) down just far enough to insert the headliner (1) into the A-pillar trim (2) pocket.
7. It may be necessary to use a (special tool #C-4755, Trim Stick) or equivalent, to inset the headliner into the A-pillar trim channel.



231669162

Fig. 552: A-Pillar Trim Tether**Courtesy of CHRYSLER GROUP, LLC**

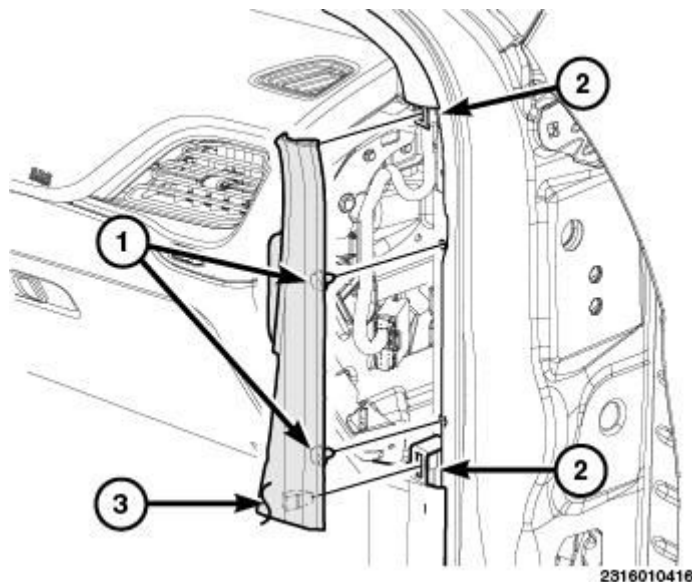
8. Locate the four way locator pin (1) on the A-pillar trim.



231669163

Fig. 553: Alignment Hole & A-Pillar
Courtesy of CHRYSLER GROUP, LLC

9. Verify, if so equipped, all drain tubes, wiring and tethers are routed properly and clipped fully.
10. Align the A-pillar four way locator pin to the alignment hole (1) on the A-pillar (2).
11. Guide the locator pin into the locator hole (1).
12. Firmly seat the lower portion of the A-pillar trim into position and hand tap to engage the retaining clips.



2316010416

Fig. 554: Identifying Closeout Panel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

13. Position the closeout trim panel (3) located between the A-pillar trim and the front scuff plate.
14. Seat the retaining clips (1 and 2) fully.

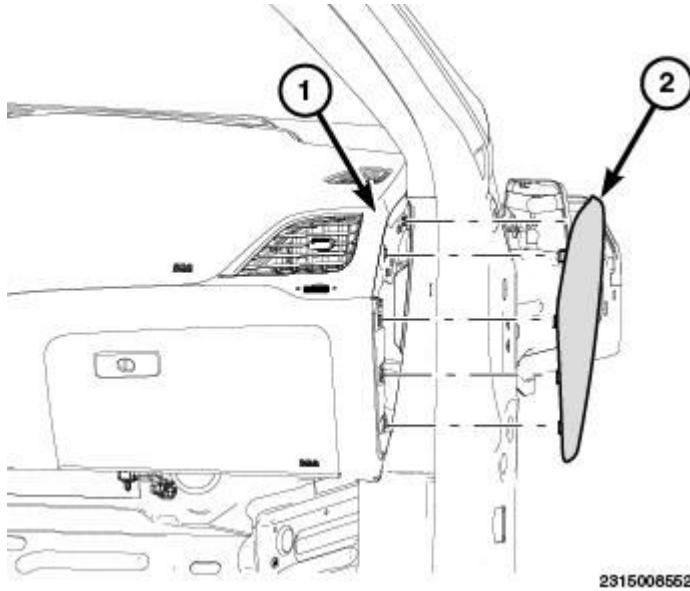


Fig. 555: Identifying Instrument Panel & End Cap
Courtesy of CHRYSLER GROUP, LLC

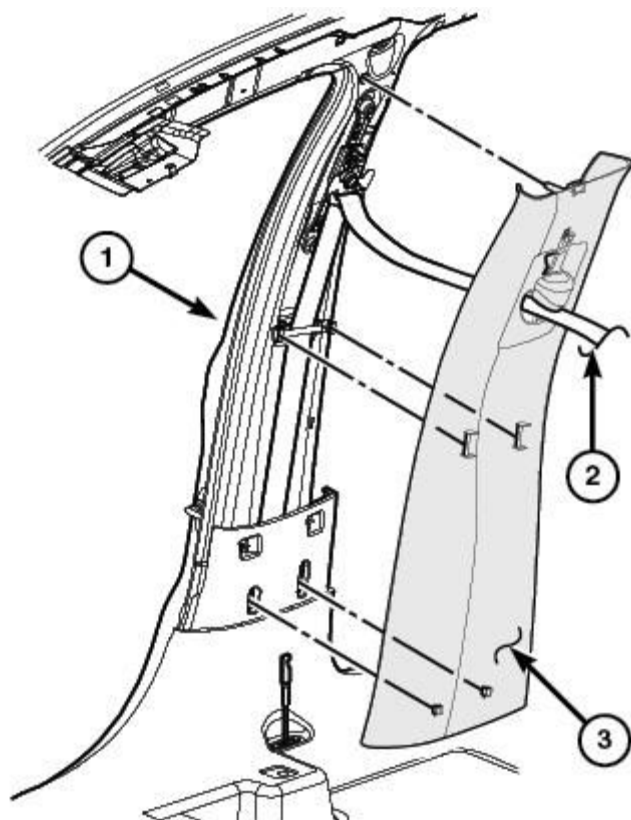
15. Position end cover (2) over retaining slots and firmly snap into place.

PANEL, B-PILLAR TRIM

REMOVAL

REMOVAL

UPPER

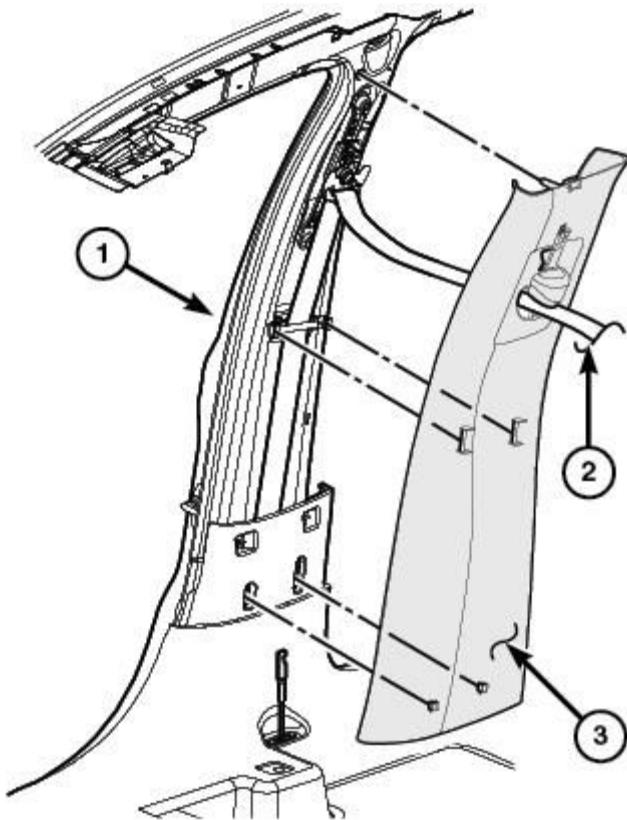


2316010007

Fig. 556: Identifying B-Pillar Trim, Upper B-Pillar Trim & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Release the front seat belt anchor. Refer to **BUCKLE, SEAT BELT, REMOVAL** .
3. Using (special tool #C-4755, Trim Stick), pry the lower portion of the B-pillar trim (1) to disengage the retaining clips and route seat belt through B-pillar trim.
4. Remove the upper B-pillar trim (1).

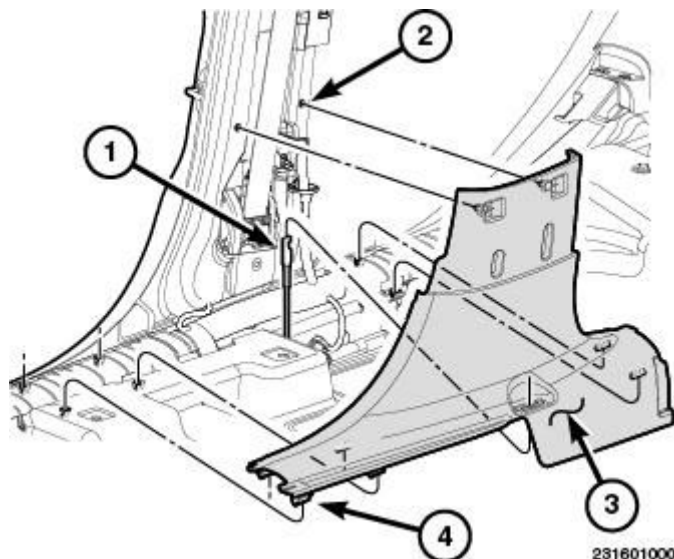
LOWER



2316010007

Fig. 557: Identifying B-Pillar Trim, Upper B-Pillar Trim & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove sill trim panel, Refer to **PLATE, SCUFF, DOOR SILL, REMOVAL**.
3. Remove the upper B-pillar trim (1).



2316010008

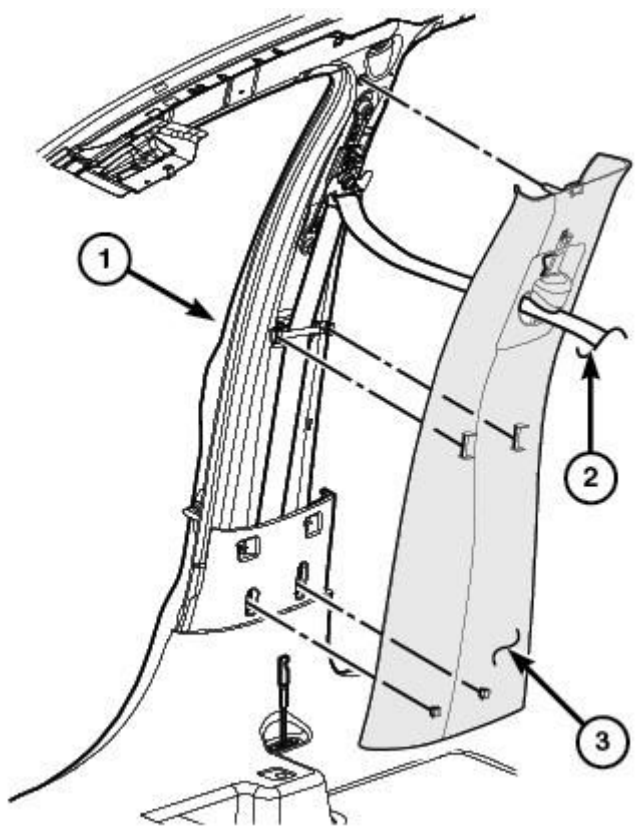
Fig. 558: Identifying Lower B-Pillar Trim & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Using (special tool #C-4755, Trim Stick), pry the upper portion of the lower B-pillar trim (1) to disengage the retaining clips.
5. Using trim stick, pry up on the lower portion of the B-pillar trim (1) and remove from the vehicle.

INSTALLATION

INSTALLATION

UPPER



2316010007

Fig. 559: Identifying B-Pillar Trim, Upper B-Pillar Trim & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Position the upper portion of the upper B-pillar trim (1) into the retaining clips located in the bodyside.
2. Route the seat belt through B-pillar trim.
3. Position the lower portion of the upper B-pillar trim (1) and hand tap to engage the retaining clips.
4. Install the seat belt buckle anchor. Refer to **BUCKLE, SEAT BELT, INSTALLATION**.
5. Connect the negative battery cable.

LOWER

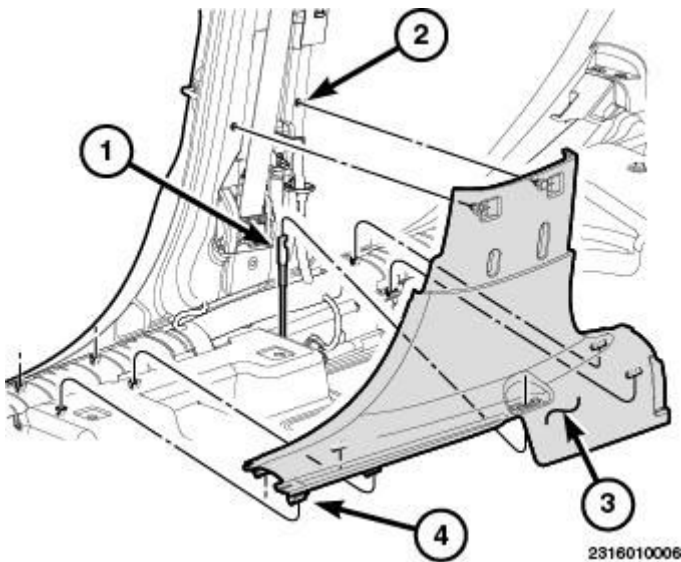


Fig. 560: Identifying Lower B-Pillar Trim & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

1. Align and position the lower B-pillar trim (1), hand tap to engage the retaining clips.

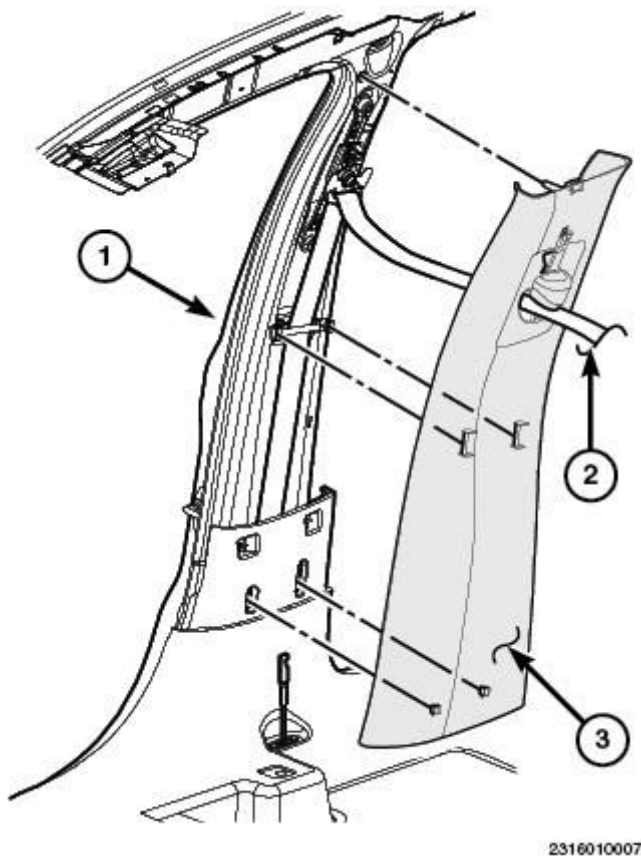


Fig. 561: Identifying B-Pillar Trim, Upper B-Pillar Trim & Fasteners

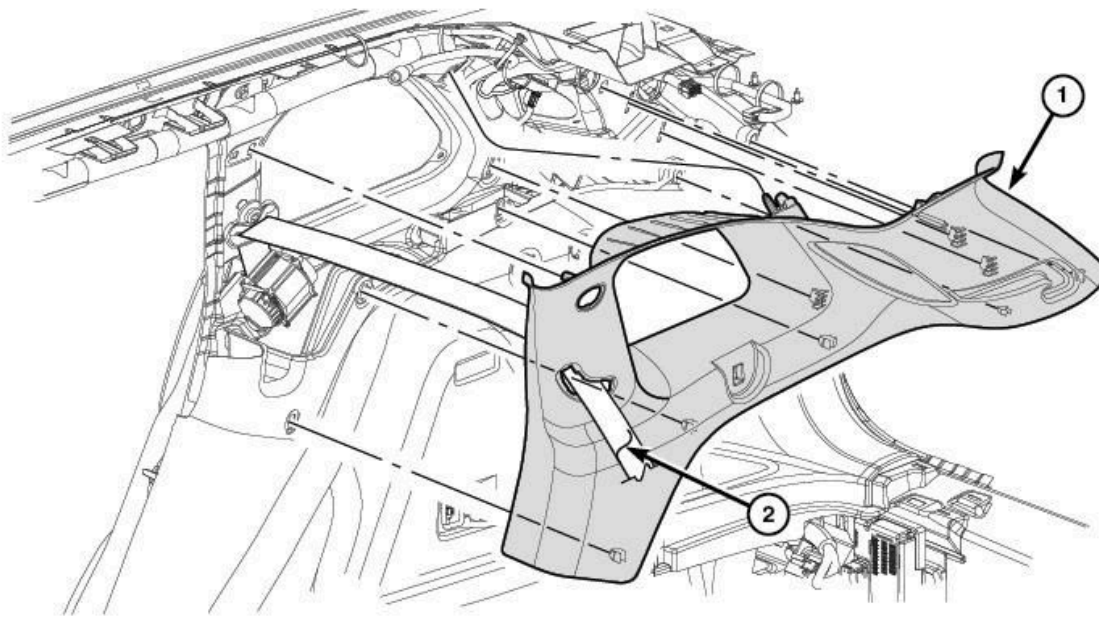
Courtesy of CHRYSLER GROUP, LLC

2. Install the upper B-pillar trim (1).
3. Install the sill/scuff trim panel. Refer to **PLATE, SCUFF, DOOR SILL, INSTALLATION**.
4. Connect the negative battery cable.

PANEL, QUARTER TRIM

REMOVAL

REMOVAL



2316010012

Fig. 562: Identifying Quarter Trim Panel & Seat Belt Anchor
Courtesy of CHRYSLER GROUP, LLC

UPPER

1. Separate the seat belt anchor (2). Refer to **BUCKLE, SEAT BELT, REMOVAL**.
2. Position the door seal aside.
3. Using a trim stick (special tool #C-4755, Trim Stick) or equivalent, disengage the retaining fasteners (3) that secure the quarter trim panel to the quarter panel.
4. Pull the quarter trim panel away from the quarter panel.
5. If equipped, disconnect the power outlet wire harness connector (1).
6. Remove the quarter trim panel (1).

LOWER

1. Remove the load floor. Refer to **LOAD FLOOR, CARGO, REMOVAL**.
2. Remove the upper quarter trim. Refer to **PANEL, QUARTER TRIM, REMOVAL**.
3. Remove the rear door scuff plate. Refer to **PLATE, SCUFF, DOOR SILL, REMOVAL**.
4. Position the door seal (1) aside.

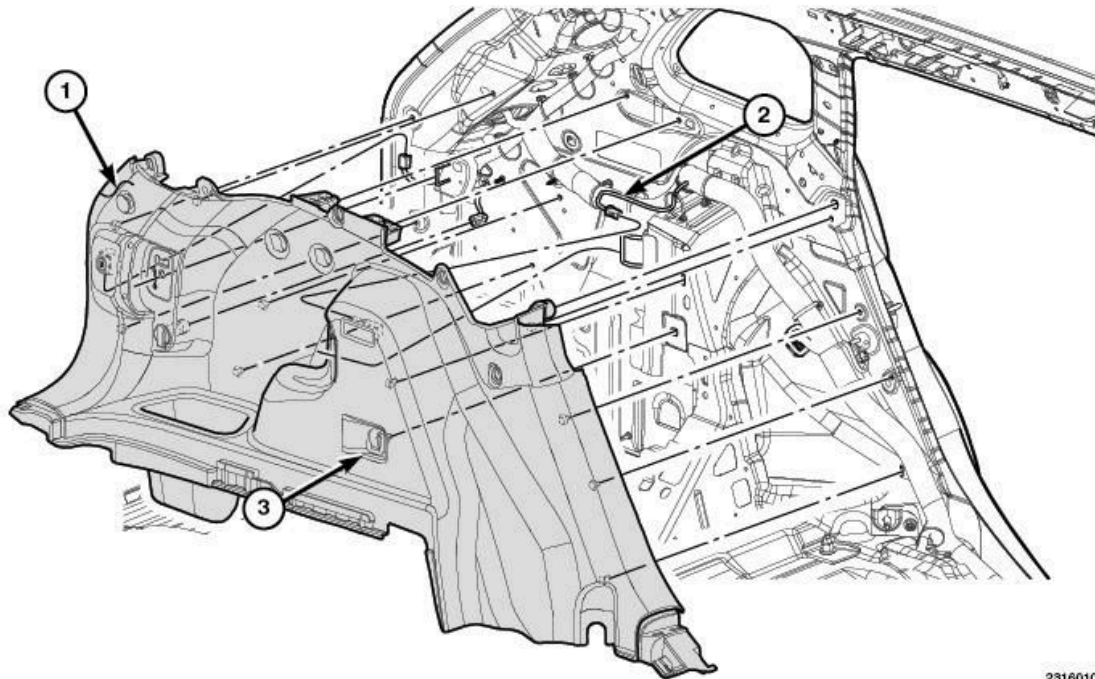
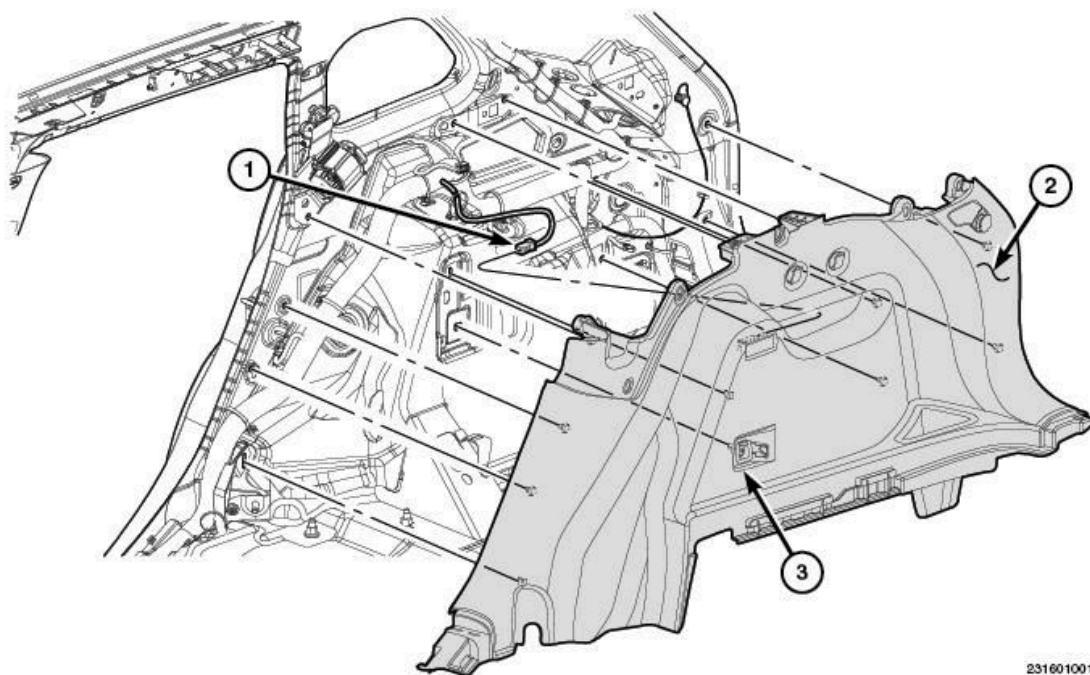


Fig. 563: Identifying Quarter Trim Panel, Electrical Connectors & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

5. Remove the screws (3).
6. Using a trim stick (special tool #C-4755, Trim Stick) or equivalent, disengage the retaining fasteners that secure the quarter trim panel to the quarter panel.
7. Pull the quarter trim panel away from the quarter panel.
8. If equipped, disconnect the electrical connectors (2).
9. Remove the quarter trim panel (1).



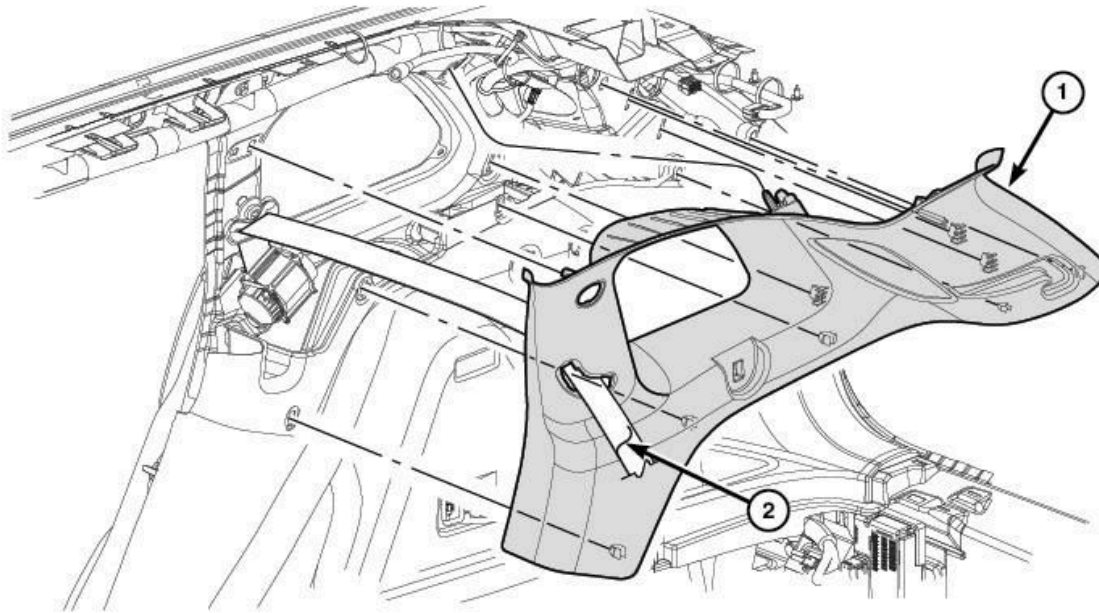
2316010014

Fig. 564: Identifying Quarter Trim Panel, Electrical Connectors & Fasteners
Courtesy of CHRYSLER GROUP, LLC

10. Remove the screws (3).
11. Using a trim stick or equivalent, disengage the retaining fasteners that secure the quarter trim panel to the quarter panel.
12. Pull the quarter trim panel away from the quarter panel.
13. If equipped, disconnect the electrical connectors (1).
14. Remove the quarter trim panel (2).

INSTALLATION

INSTALLATION



2316010012

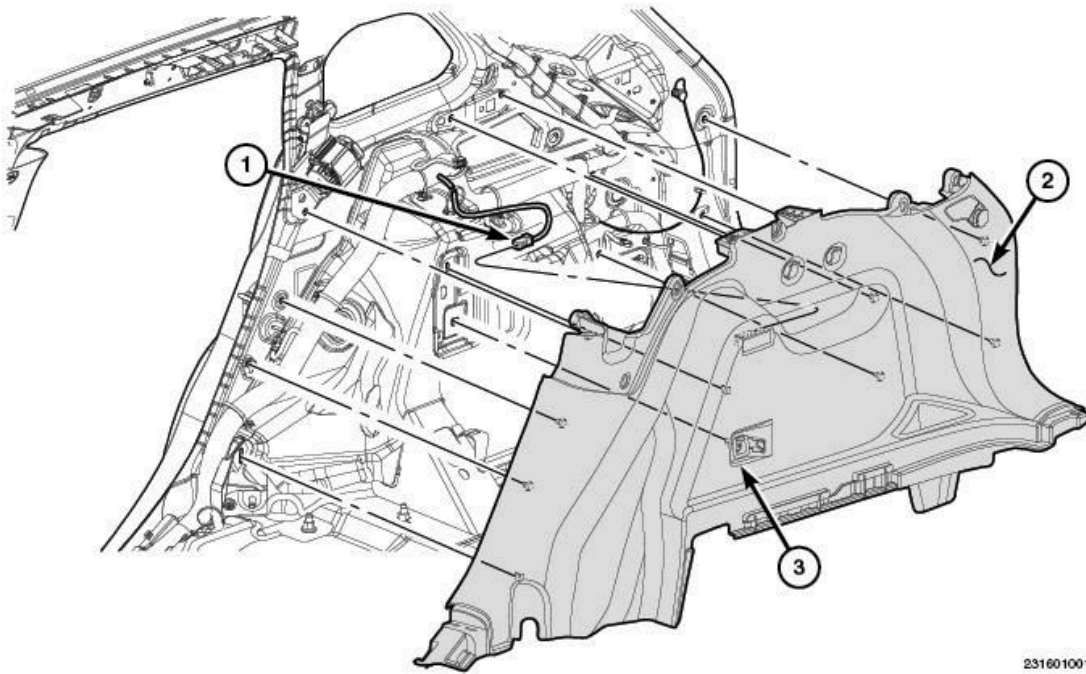
Fig. 565: Identifying Quarter Trim Panel & Seat Belt Anchor
Courtesy of CHRYSLER GROUP, LLC

NOTE: Right side shown, left side similar.

UPPER

1. Position the seat belt (2) through the trim (1).
2. Position the trim back in place and seat the retaining clips fully.
3. Install the seat belt anchor. Refer to **BUCKLE, SEAT BELT, INSTALLATION**.

LOWER



2316010014

Fig. 566: Identifying Quarter Trim Panel, Electrical Connectors & Fasteners
Courtesy of CHRYSLER GROUP, LLC

NOTE: Right side shown, left side similar.

1. Position the quarter trim panel (2) back into the vehicle.
2. Position the front locating pin into the body and seat the push pin near the location pin fully.
3. Seat the clip at the top of the trim panel into the C-pillar first.
4. For the right side, seat the three front push pins.
5. For the left side, seat the two front push pins.
6. Seat the push pin at the rear of the quarter glass.
7. For the right side, connect the power outlet electrical connector (1).
8. For the left side, connect the flash light electrical connector and the power liftgate switch, if equipped.
9. Position the rear locating pin into the body and seat the remaining push pins.
10. Install the screw (3).
11. Position the door weatherstrip (1) back and seat fully.
12. Install the rear door scuff plate. Refer to **PLATE, SCUFF, DOOR SILL, INSTALLATION**.
13. Install the upper quarter trim. Refer to **PANEL, QUARTER TRIM, INSTALLATION**.
14. Install the load floor. Refer to **LOAD FLOOR, CARGO, INSTALLATION**.

PLATE, SCUFF, DOOR SILL

REMOVAL

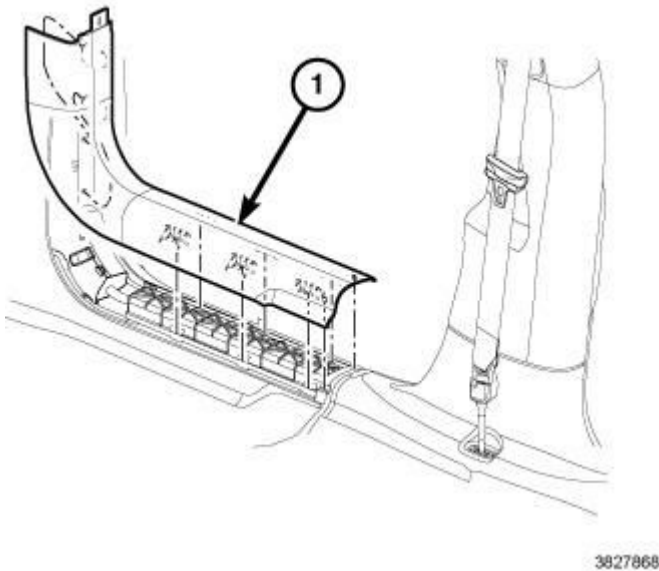
REMOVAL

Fig. 567: Front Door Sill Scuff Panel
Courtesy of CHRYSLER GROUP, LLC

1. Using (special tool #C-4755, Trim Stick), disengage the retaining clips securing the front door sill scuff panel (1) to the door sill and lower B-pillar.
2. Remove the front door sill scuff panel (1).

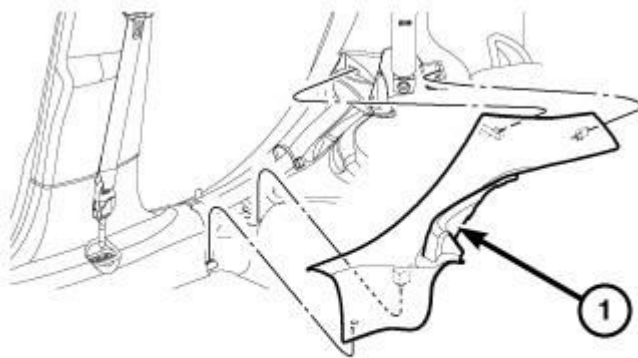


Fig. 568: Rear Door Sill Scuff Panel
Courtesy of CHRYSLER GROUP, LLC

3. Using (special tool #C-4755, Trim Stick), disengage the retaining clips securing the door sill scuff panel (1) to the door sill, lower B-pillar and lower C-pillar.
4. Remove the rear door sill scuff panel (1).

INSTALLATION

INSTALLATION

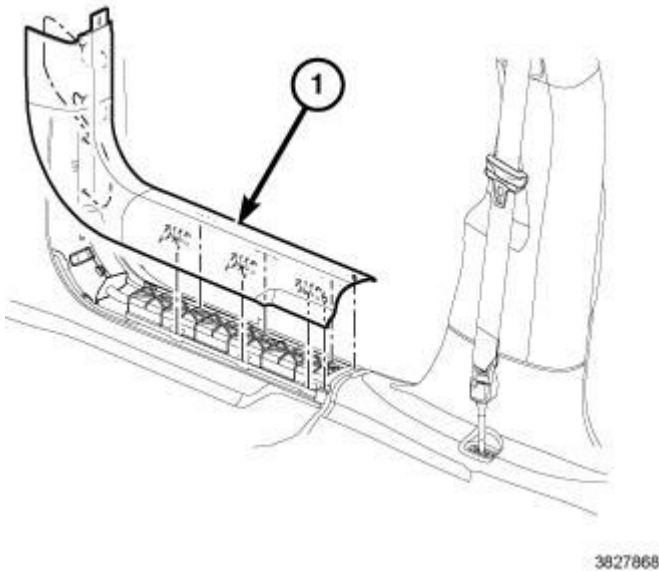


Fig. 569: Front Door Sill Scuff Panel
Courtesy of CHRYSLER GROUP, LLC

1. Position the front door sill scuff panel (1).
2. Hand tap to engage the retaining clips securing the front door sill scuff panel (1) to the door sill and lower B-pillar.

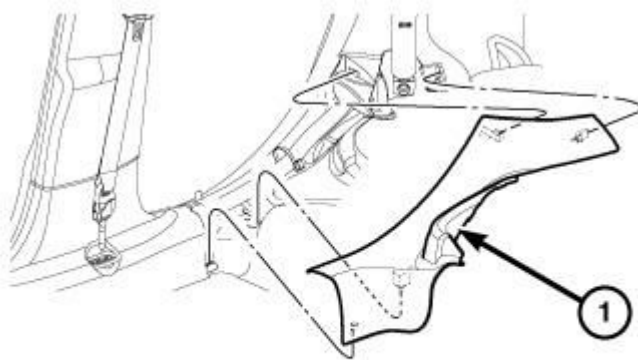


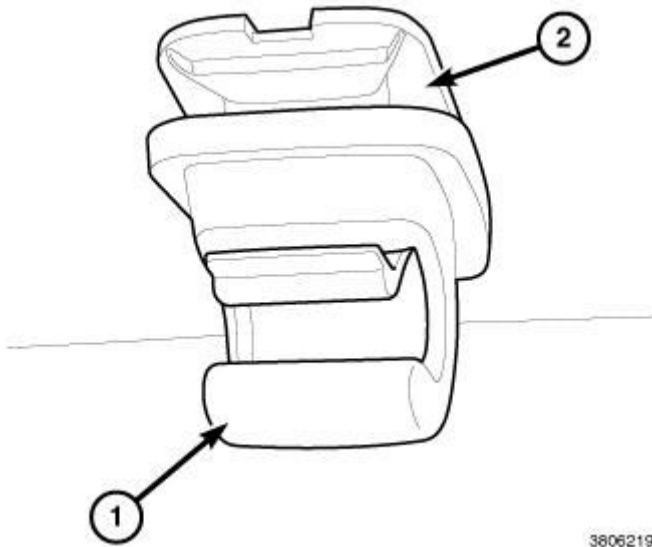
Fig. 570: Rear Door Sill Scuff Panel
Courtesy of CHRYSLER GROUP, LLC

3. Position the rear door sill scuff panel (1).
4. Hand tap to engage the retaining clips securing the front door sill scuff panel (1) to the door sill, lower B-pillar and lower C-pillar.

SUPPORT, VISOR

REMOVAL

REMOVAL



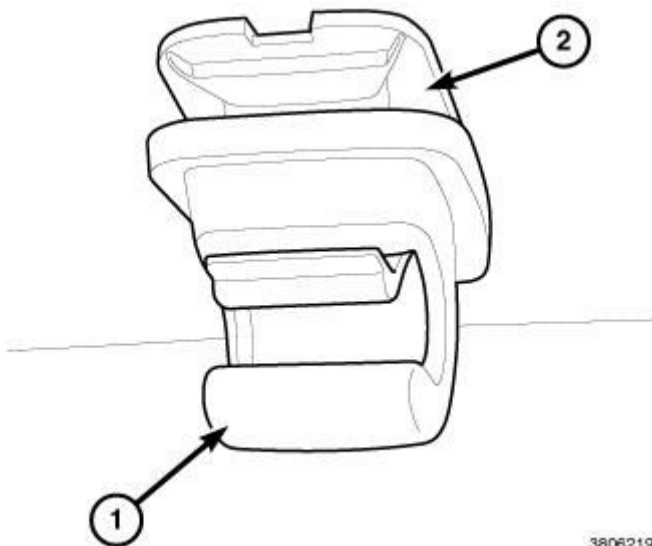
3806219

Fig. 571: Sun Visor Support & Cover
 Courtesy of CHRYSLER GROUP, LLC

1. Disengage the sun visor from the sun visor support (1).
2. Using a small pick/pry too, remove the cover (1) from the sun visor support (2).
3. Remove the screw that secures the support (2) to the roof panel and remove the support from the headliner.

INSTALLATION

INSTALLATION



3806219

Fig. 572: Sun Visor Support & Cover

Courtesy of CHRYSLER GROUP, LLC

1. Position the sun visor support (2) on the headliner and install the screw that secures the support to the roof panel. Tighten the screw securely.
2. Install the cover (1) to the sun visor support (2).
3. Engage the sun visor to sun visor support (2).

VISOR

REMOVAL

REMOVAL

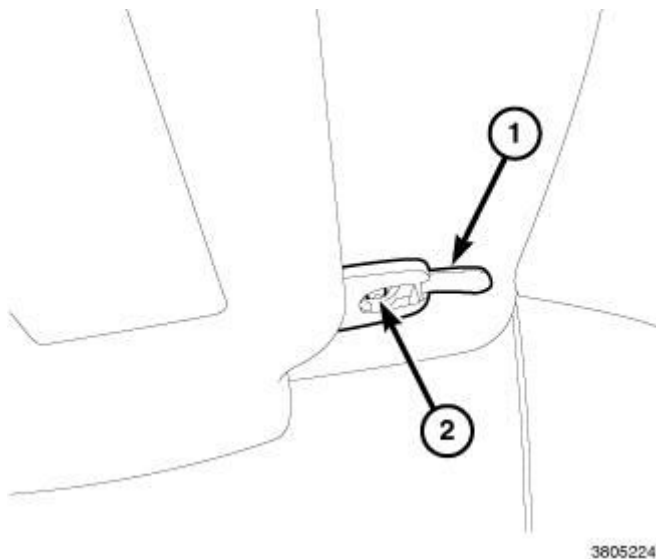
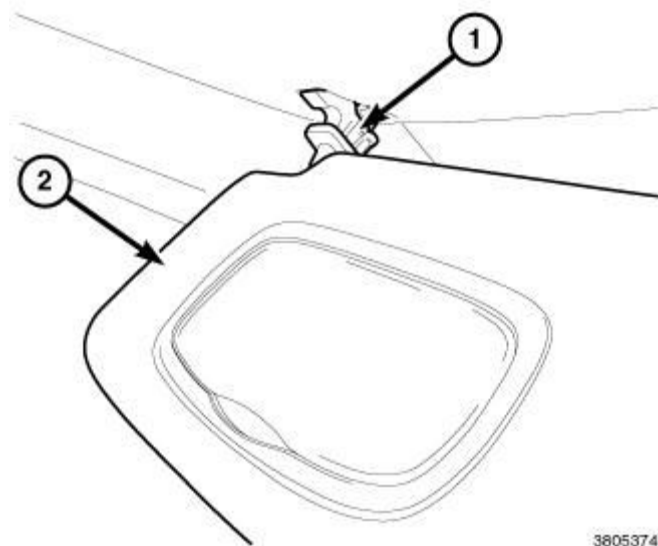


Fig. 573: Sun Visor Base Bracket Cover & Fastener

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Disengage the sun visor from the sun visor support.
3. Open the sun visor base bracket cover (1). If necessary, use a small pick/pry tool to open the cover.
4. Remove the fastener (2) that secures the sun visor bracket to the roof panel.



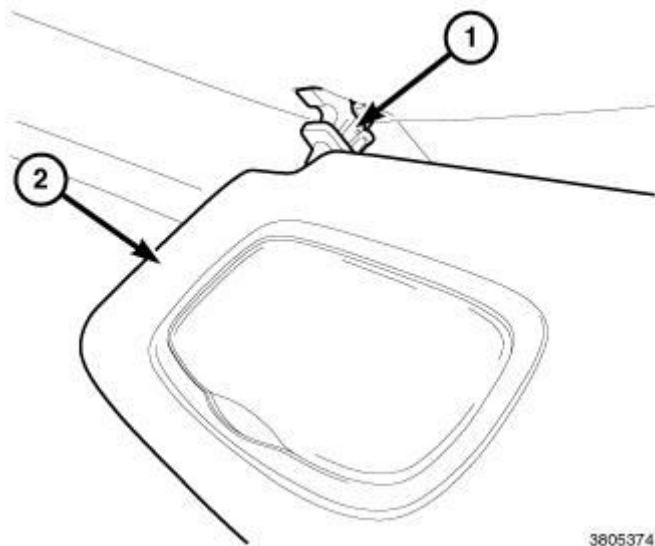
3805374

Fig. 574: Visor & Base Bracket
Courtesy of CHRYSLER GROUP, LLC

5. Simultaneously pull the visor (2) down and forward to disengage the base bracket (1) hook feature.
6. Position the visor (2) away from the headliner.
7. If equipped, disconnect the illuminated vanity mirror wire harness connector.
8. Remove the visor (2) from the vehicle.

INSTALLATION

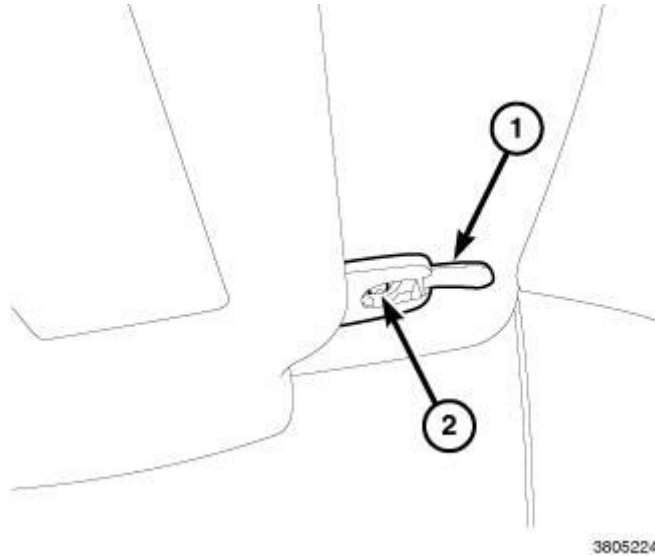
INSTALLATION



3805374

Fig. 575: Visor & Base Bracket
Courtesy of CHRYSLER GROUP, LLC

1. If equipped, connect the illuminated vanity mirror wire harness connector.
2. Position the sun visor (2) on the headliner and seat the sun visor bracket (1) into the cavity by pushing up and rearward.



3805224

Fig. 576: Sun Visor Base Bracket Cover & Fastener
 Courtesy of CHRYSLER GROUP, LLC

3. Install the fastener (2) that secures the sun visor to the roof panel. Tighten the fastener securely.
4. Close the sun visor base bracket cover (1).
5. Engage the sun visor to the sun visor support.
6. Connect the negative battery cable.

PAINT

SPECIFICATIONS

SPECIFICATIONS

NOTE: Because of late model changes to the available paint colors for each vehicle the current color codes can be found on the Vehicle Certification Label. Refer to VEHICLE CERTIFICATION LABEL, DESCRIPTION .

EXTERIOR COLORS

EXTERIOR COLOR	CHRYSLER CODE
Brilliant Black Pearl Coat	AXR
Bright White	GW7
Mango Tango/Toxic Orange Pearl Coat	HVG
Sage Brush/Eco Green Pearl Coat	JGX

2014 Jeep Cherokee Trailhawk

2014 ACCESSORIES AND EQUIPMENT Body - Interior & Exterior - Cherokee

Deep Cherry Red Crystal Pearl Coat	JRP
Billet Silver Met. Clear Coat	JSC
True Blue Pearl Coat	KBU
Western Brown/Deep Auburn Pearl Coat	KEP
Cashmere/Sandstone Pearl Coat	KFS
Granite Crystal Clear Coat	LAU
Anvil Clear Coat	LDS
Hydro Blue Pearl Coat	MBJ
Flame Red Clear Coat	PR4

INTERIOR COLORS

INTERIOR COLOR	CHRYSLER CODE
Black/Iceland Gray	A9
Indigo/Jeep Brown	UC
Jeep Brown	U5
Black	X9

SEATS, FRONT

WARNING

WARNING

WARNING: To avoid serious or fatal injury on vehicles equipped with the Supplemental Restraint System (SRS), never attempt to repair the electrically conductive circuits or wiring components related to the SRS for which there is no MOPAR wiring repair kit. It is important to use ONLY the recommended splicing kit and procedure. For applicable and available MOPAR wiring repair kits, please visit the MOPAR® Connector Web Site at the following address on the internet: (<http://dto.vftis.com/mopar/disclaimer.asp>). Inappropriate repairs can compromise the conductivity and current carrying capacity of those critical electrical circuits, which may cause SRS components not to deploy when required, or to deploy when not required. Only minor cuts or abrasions of wire and terminal insulation where the conductive material has not been damaged, or connector insulators where the integrity of the latching and locking mechanisms have not been compromised may be repaired using appropriate methods.

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners.

Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid potential physical injury or damage to sensitive electronic circuits and systems, always disconnect and isolate the battery negative (ground) cable and the positive cable, then ground the positive cable to discharge the Occupant Restraint Controller (ORC) capacitor before performing any welding operations on the vehicle. Failure to take the proper precautions could result in accidental airbag deployment, possible damage to the Supplemental Restraint System (SRS) circuits and components, and possible damage to other electronic circuits and components. Whenever a welding process is being performed within 12 inches (30 centimeters) of an electronic module or wiring harness, then that module or harness should be relocated out of the way, or disconnected. Always protect against component or vehicle damage from weld spatter by using weld blankets and screens.

WARNING: To avoid serious or fatal injury, do not attempt to dismantle an airbag unit or tamper with its inflator. Do not puncture, incinerate or bring into contact with electricity. Do not store at temperatures exceeding 93° C (200° F). An airbag inflator unit may contain sodium azide and potassium nitrate. These materials are poisonous and extremely flammable. Contact with acid, water, or heavy metals may produce harmful and irritating gases (sodium hydroxide is formed in the presence of moisture) or combustible compounds. An airbag inflator unit may also contain a gas canister pressurized to over 17.24 kPa (2500 psi). Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: To avoid serious or fatal injury when handling a seat belt tensioner retractor or buckle, proper care should be exercised to keep fingers out from under the retractor or buckle cover and away from the seat belt webbing or cable where it exits from the retractor or buckle cover.

WARNING: To avoid serious or fatal injury, replace all Supplemental Restraint System (SRS) components only with parts specified in the Chrysler Mopar® Parts Catalog. Substitute parts may appear interchangeable, but internal differences may result in inferior occupant protection.

WARNING: To avoid serious or fatal injury, the fasteners, screws, and bolts originally used for the Supplemental Restraint System (SRS) components must never be replaced with any substitutes. These fasteners have special coatings and are specifically designed for the SRS. Anytime a new fastener is needed, replace it with the correct fasteners provided in the service package or specified in the Chrysler Mopar® Parts Catalog.

WARNING: To avoid serious or fatal injury when a steering column has an airbag unit attached, never place the column on the floor or any other surface with the steering wheel or airbag unit face down. Failure to follow these instructions may result in possible serious or fatal injury.

BIN, UNDER SEAT STORAGE

REMOVAL

REMOVAL - PASSENGER STORAGE BIN

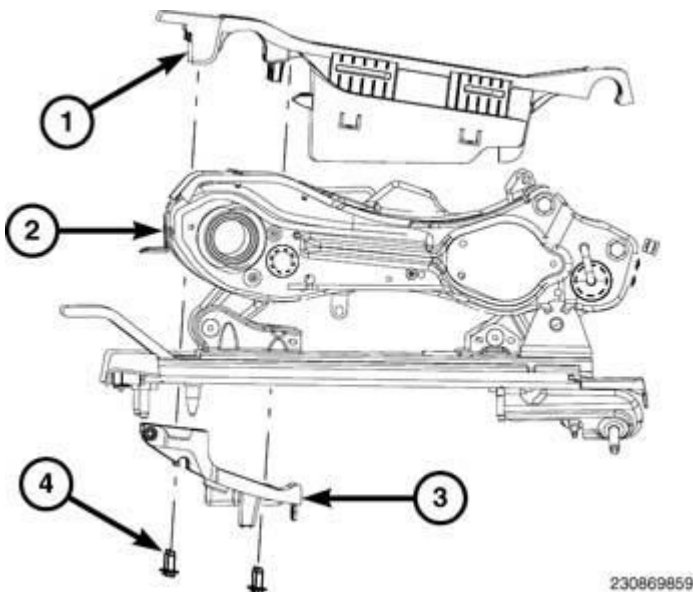


Fig. 577: Storage Bin, Seat Track Assembly, Storage Bin Support & Bolts

Courtesy of CHRYSLER GROUP, LLC

1. Remove the seat cushion and cover. Refer to **COVER, SEAT CUSHION, REMOVAL** and **COVER, SEAT CUSHION, REMOVAL**.
2. Remove the bolts (4) and remove the storage bin support (3).
3. Remove the storage bin (1) from the seat track assembly (2).

INSTALLATION

INSTALLATION - PASSENGER STORAGE BIN

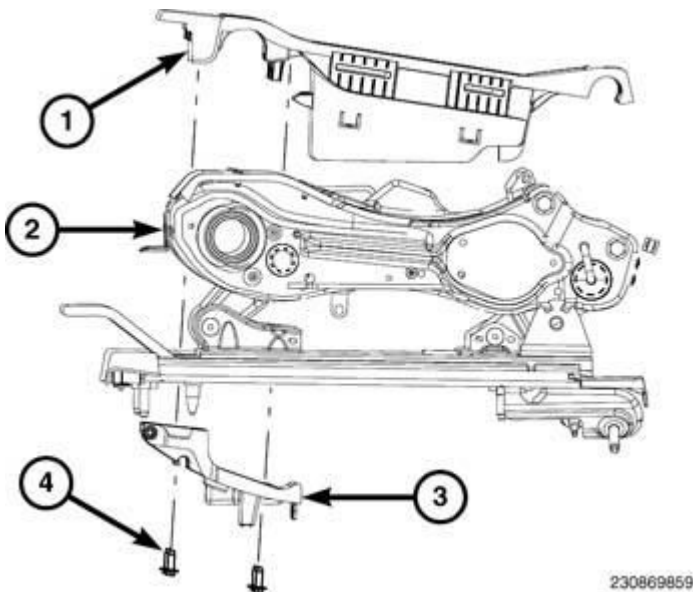


Fig. 578: Storage Bin, Seat Track Assembly, Storage Bin Support & Bolts
Courtesy of CHRYSLER GROUP, LLC

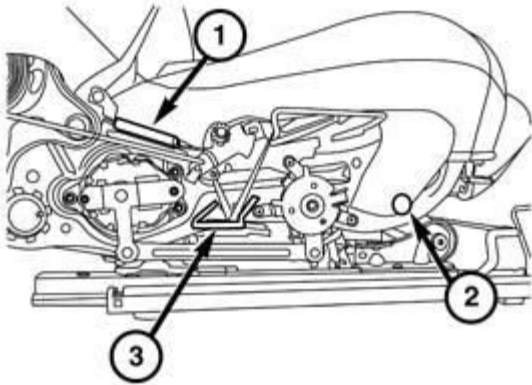
1. Install the storage bin (1) onto the seat track assembly (2).
2. Install the storage bin support (3) and install the bolts (4).
3. Tighten the bolts to (5.5 N.m 49 in. lbs.).
4. Install the seat cushion and cover. Refer to **COVER, SEAT CUSHION, INSTALLATION** and **COVER, SEAT CUSHION, INSTALLATION**.

COVER, SEAT CUSHION

REMOVAL

REMOVAL

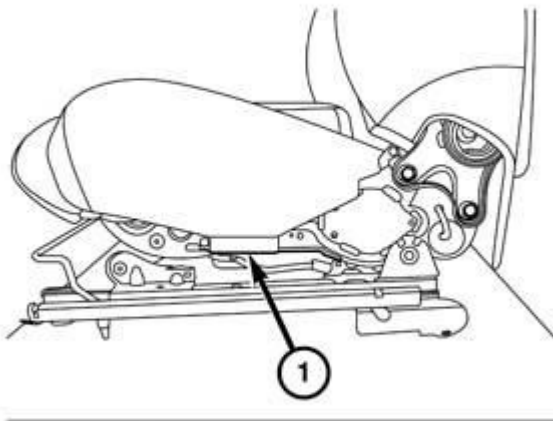
PASSENGER SIDE WITH STORAGE



231969526

Fig. 579: Push Pin & Attachment Clips
Courtesy of CHRYSLER GROUP, LLC

1. Remove the seat back assembly. Refer to **SEAT BACK, FRONT, REMOVAL**.
2. Separate the attachment clips (1, 3) and remove the push pin (2).



231969527

Fig. 580: Attachment Clip

Courtesy of CHRYSLER GROUP, LLC

3. Separate the attachment clip (1).

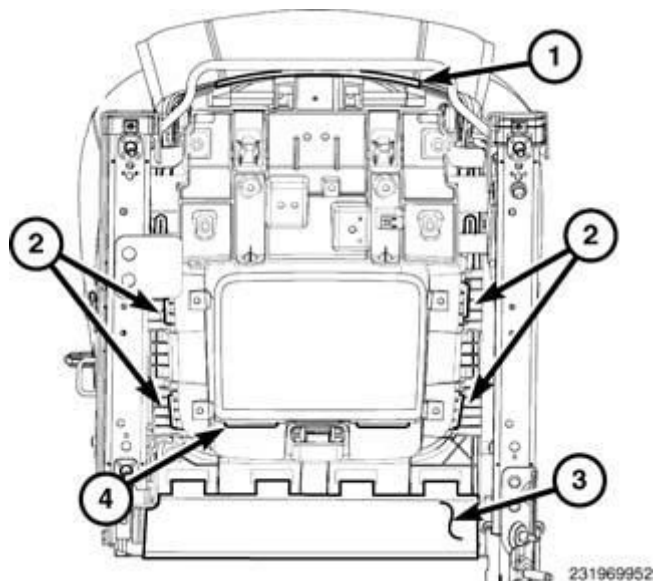


Fig. 581: Storage seat shown, without storage similar.
Courtesy of CHRYSLER GROUP, LLC

4. From under the seat separate the front attachment clips (1).
5. Separate the rear bolster cover attachment clips (3).
6. Separate the bolster cover clips (2, 4) attaching the cover to the storage bin.

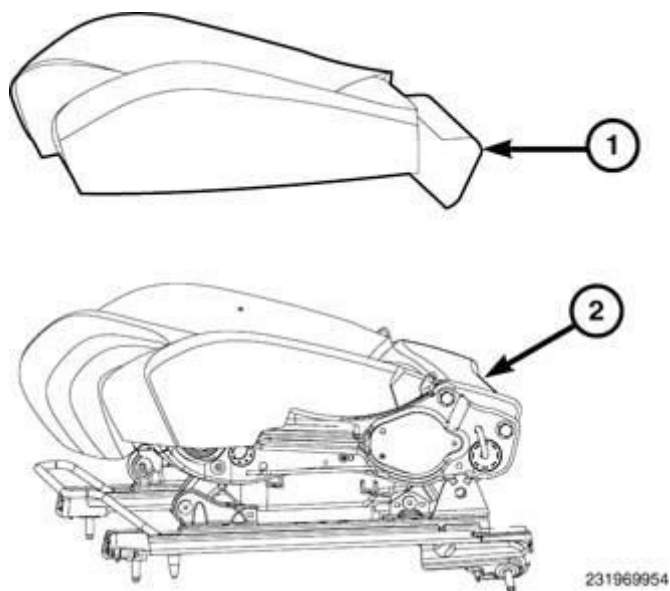


Fig. 582: Bolster Cushion & Cover
Courtesy of CHRYSLER GROUP, LLC

7. Separate and remove the bolster cushion cover (1) from the bolster cushion (2).

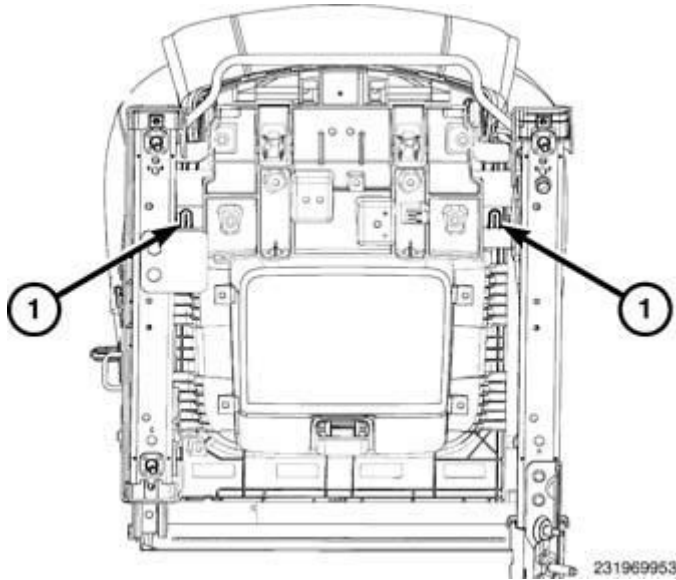


Fig. 583: Cushion Hooks

Courtesy of CHRYSLER GROUP, LLC

8. Lift the bolster cushion off of the seat track assembly and release the cushion hooks (1) from the underside of the seat track assembly.

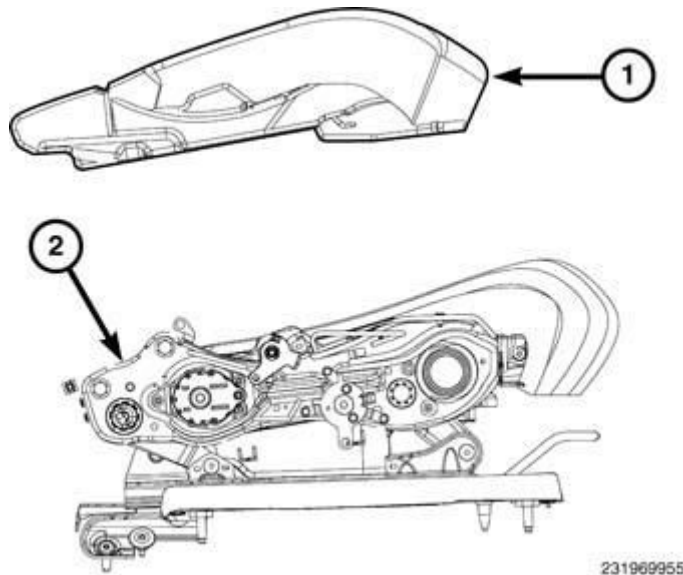
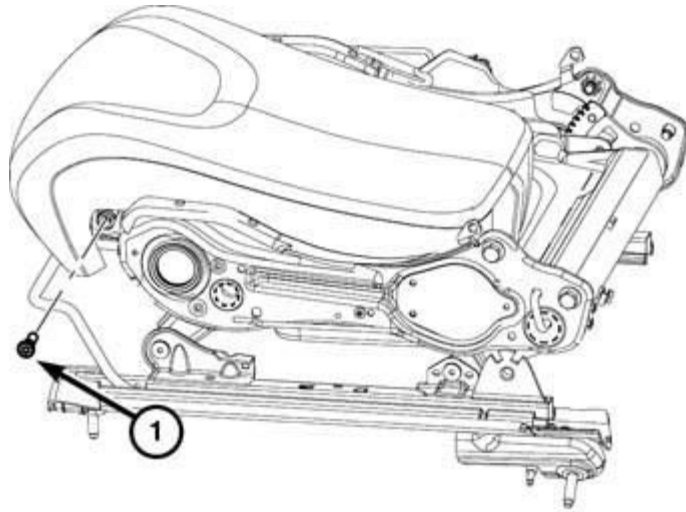


Fig. 584: Bolster Cushion & Seat Track Assembly

Courtesy of CHRYSLER GROUP, LLC

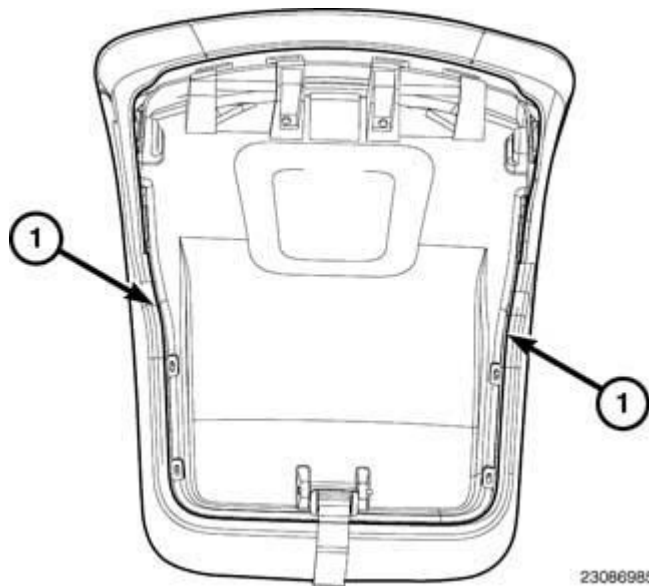
9. Remove the bolster cushion (1) from the seat track assembly (2).



230869855

Fig. 585: Storage Bin Lid Pivot Bolt
Courtesy of CHRYSLER GROUP, LLC

10. Remove the storage bin lid pivot bolts (1) and remove the storage bin lid from the seat cushion assembly.



230869857

Fig. 586: Storage Bin Lid Cover Attachment Clips
Courtesy of CHRYSLER GROUP, LLC

11. Separate the attachment clips (1) from around the outside edge of the storage bin lid cover.

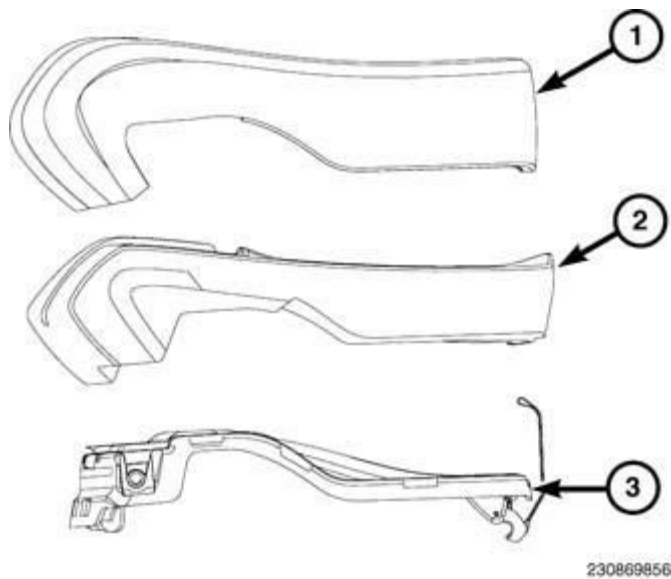


Fig. 587: Storage Bin Lid Cover, Cushion & Storage Bin Lid
Courtesy of CHRYSLER GROUP, LLC

12. Remove the storage bin lid cover (1) and the cushion (2) from the storage bin lid (3).

PASSENGER AND DRIVER WITHOUT STORAGE

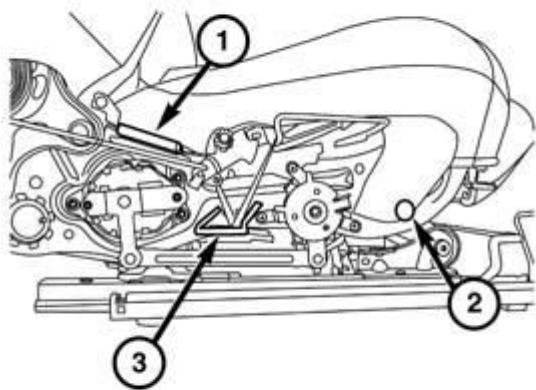
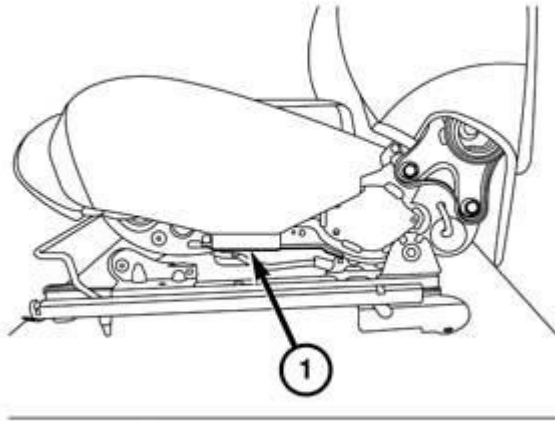


Fig. 588: Push Pin & Attachment Clips
Courtesy of CHRYSLER GROUP, LLC

1. Remove the seat back assembly. Refer to **SEAT BACK, FRONT, REMOVAL**.

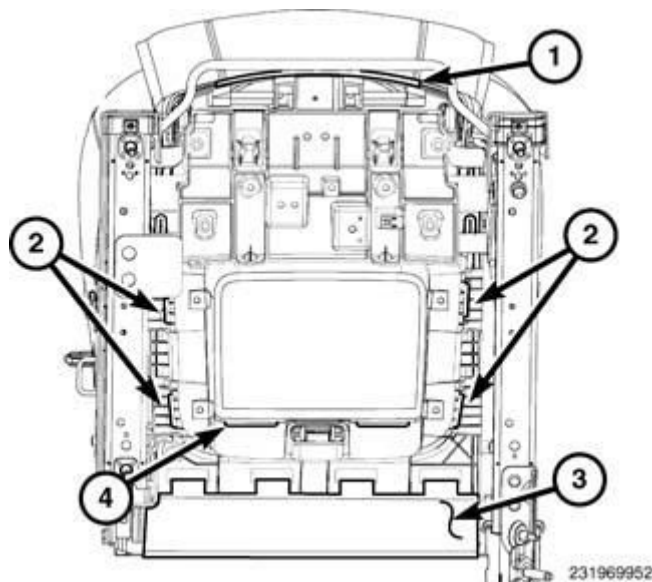
2. Separate the attachment clips (1, 3) and remove the push pin (2).



231969527

Fig. 589: Attachment Clip
Courtesy of CHRYSLER GROUP, LLC

3. Separate the attachment clip (1).



231969952

Fig. 590: Storage seat shown, without storage similar.
Courtesy of CHRYSLER GROUP, LLC

4. From under the seat separate the front attachment clips (1).

5. Separate the rear cover attachment clips (3).

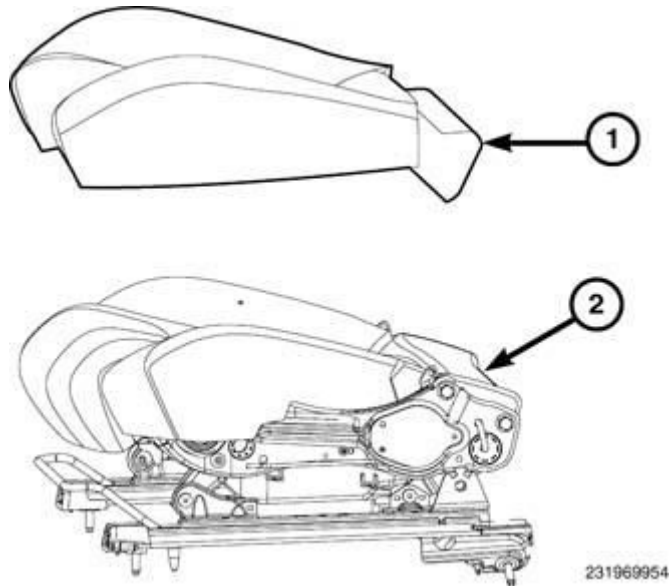


Fig. 591: Bolster Cushion & Cover
 Courtesy of CHRYSLER GROUP, LLC

6. Separate the seat cushion cover (1) and the seat cushion (2) from the seat track assembly.

INSTALLATION

INSTALLATION

PASSENGER SIDE WITH STORAGE

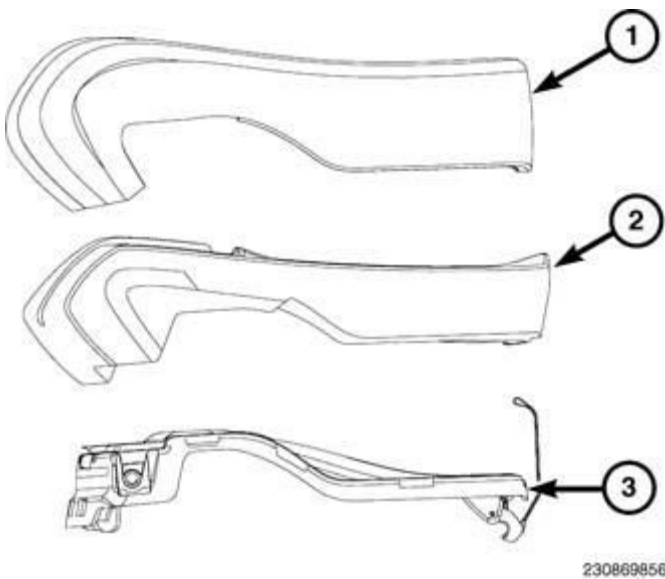


Fig. 592: Storage Bin Lid Cover, Cushion & Storage Bin Lid
 Courtesy of CHRYSLER GROUP, LLC

1. Place the storage bin lid cushion (2) and cover (1) onto the storage bin lid (3) fully.



Fig. 593: Storage Bin Lid Cover Attachment Clips
Courtesy of CHRYSLER GROUP, LLC

2. Secure the attachment clips (1) around the outside edge of the storage bin lid cover.

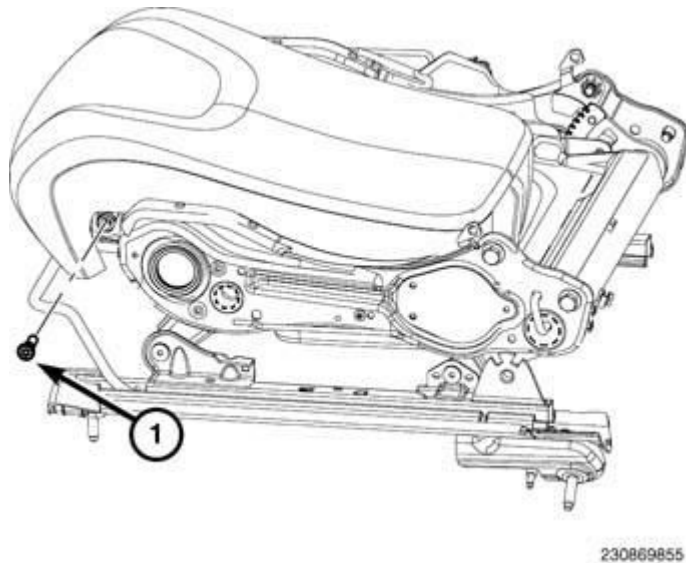


Fig. 594: Storage Bin Lid Pivot Bolt
Courtesy of CHRYSLER GROUP, LLC

3. Install the storage bin lid pivot bolts (1) and tighten to (12 N.m 9 ft. lbs.).

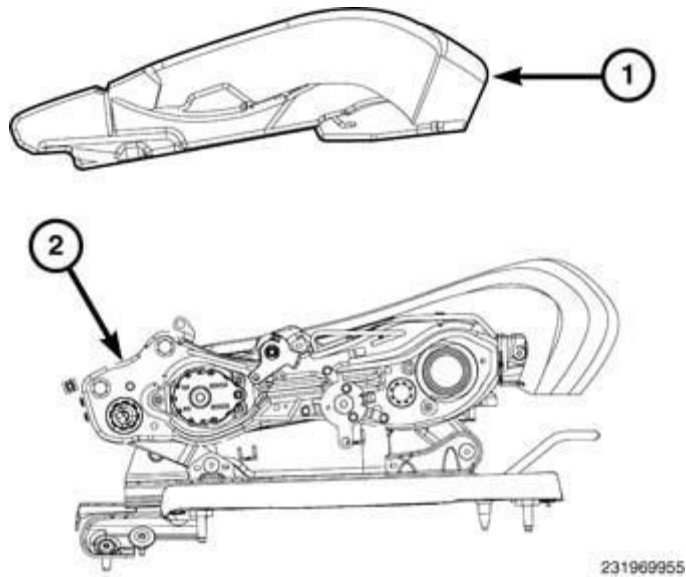


Fig. 595: Bolster Cushion & Seat Track Assembly
Courtesy of CHRYSLER GROUP, LLC

4. Install the bolster cushion (1) onto the seat track assembly (2).

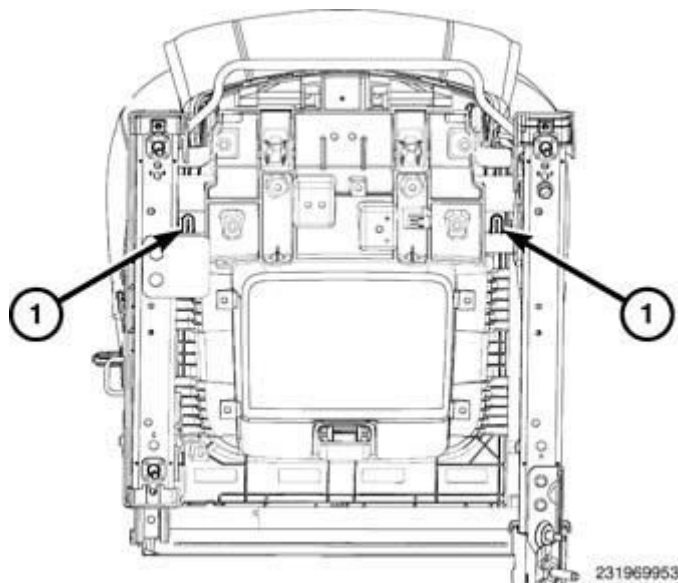


Fig. 596: Cushion Hooks
Courtesy of CHRYSLER GROUP, LLC

5. From the underside of the seat, secure the lower bolster cushion hooks (1) fully.

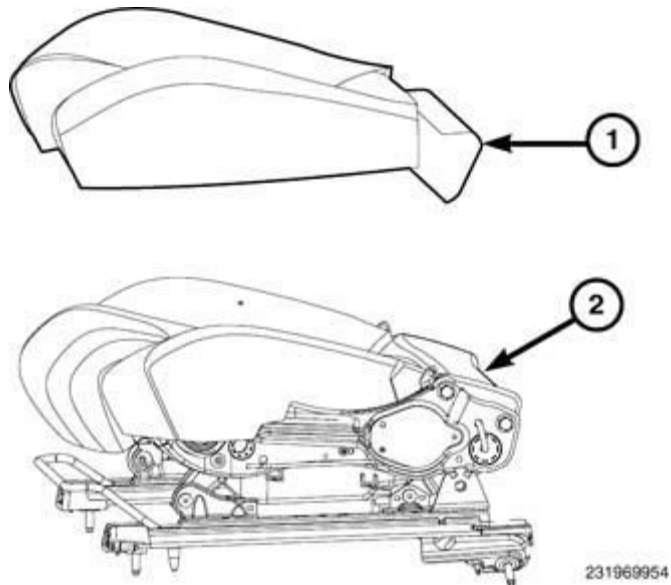


Fig. 597: Bolster Cushion & Cover
Courtesy of CHRYSLER GROUP, LLC

6. Position the bolster cushion cover (1) onto the bolster cushion (2).

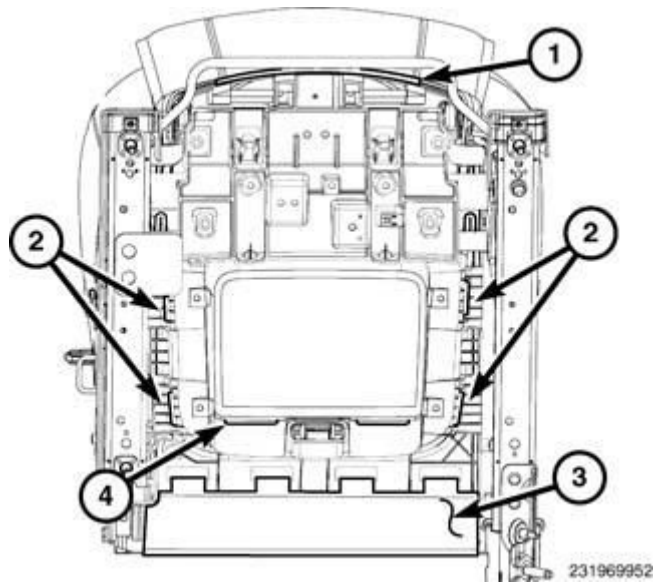
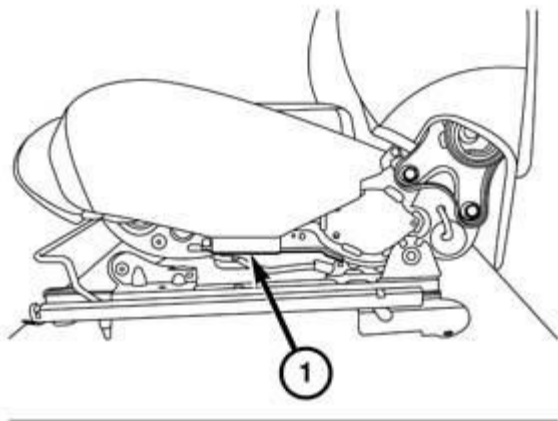


Fig. 598: Storage seat shown, without storage similar.
Courtesy of CHRYSLER GROUP, LLC

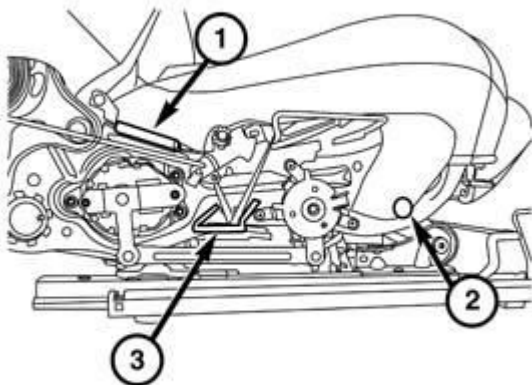
7. Attach the bolster cushion attachment clips (2, 4) to the storage bin and seat fully.
8. Attach the front (1) and rear clips (3) to the seat track assembly and seat fully.



231969527

Fig. 599: Attachment Clip
Courtesy of CHRYSLER GROUP, LLC

9. Attach the bolster cover side clip (1) and seat fully.



231969526

Fig. 600: Push Pin & Attachment Clips
Courtesy of CHRYSLER GROUP, LLC

10. Attach the bolster cover side clips (1, 3) and install the push pin (2).
11. Install the seat back assembly. Refer to **SEAT BACK, FRONT, INSTALLATION**.

PASSENGER AND DRIVER WITHOUT STORAGE

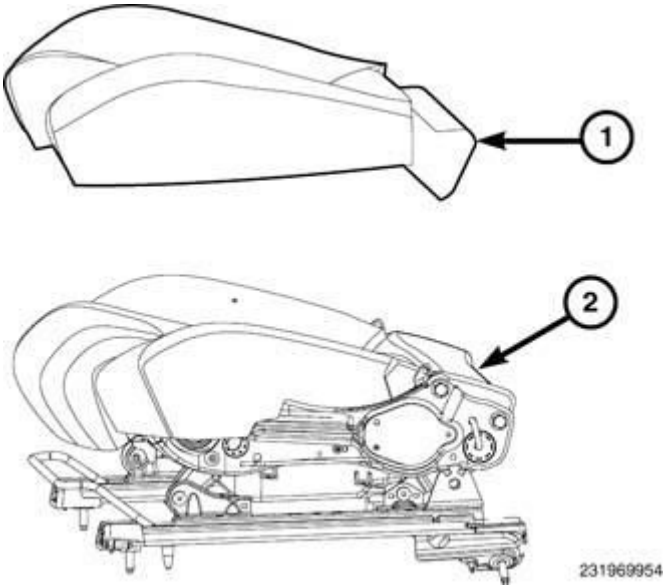


Fig. 601: Bolster Cushion & Cover
 Courtesy of CHRYSLER GROUP, LLC

1. Position the seat cushion (2) and the seat cushion cover (1) onto the seat track assembly and seat fully.

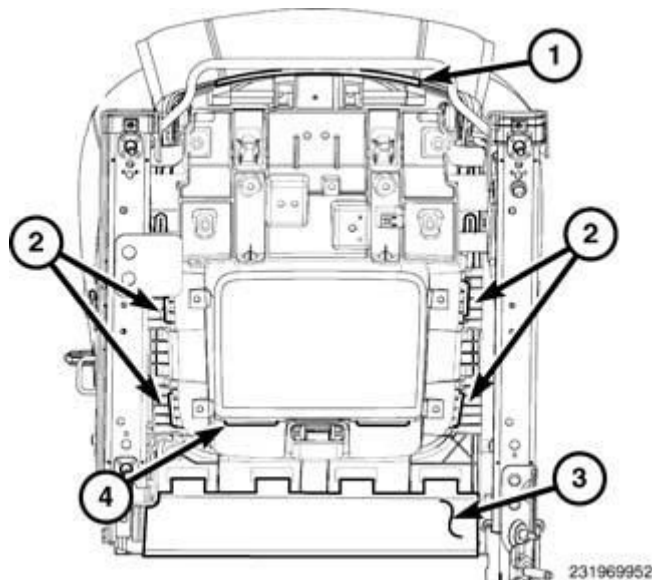
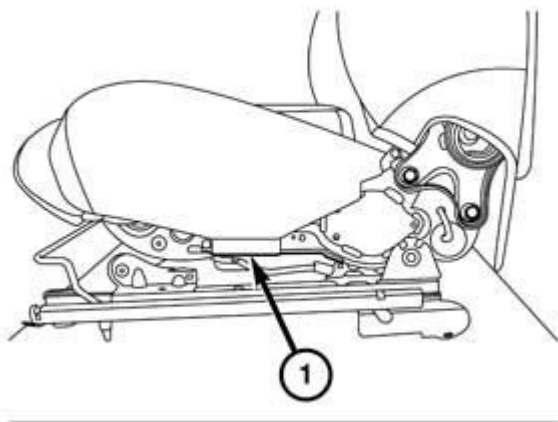


Fig. 602: Storage seat shown, without storage similar.
 Courtesy of CHRYSLER GROUP, LLC

2. Secure the front clips (1).

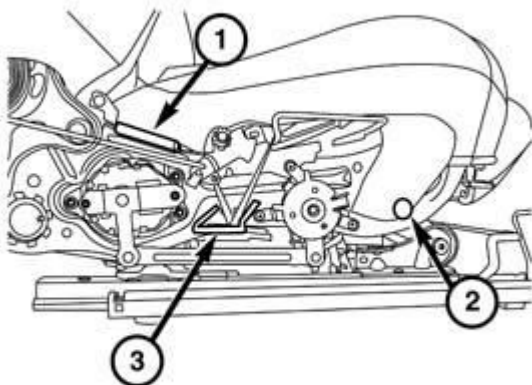
3. Secure the rear clips (3) fully.



231969527

Fig. 603: Attachment Clip
Courtesy of CHRYSLER GROUP, LLC

4. Seat the attachment clip (1) fully.



231969526

Fig. 604: Push Pin & Attachment Clips
Courtesy of CHRYSLER GROUP, LLC

5. Seat the attachment clips (1, 3) and install the push pin (2) fully.
6. Install the seat back assembly. Refer to **SEAT BACK, FRONT, INSTALLATION**.

HANDLE, FRONT RECLINER

REMOVAL

REMOVAL

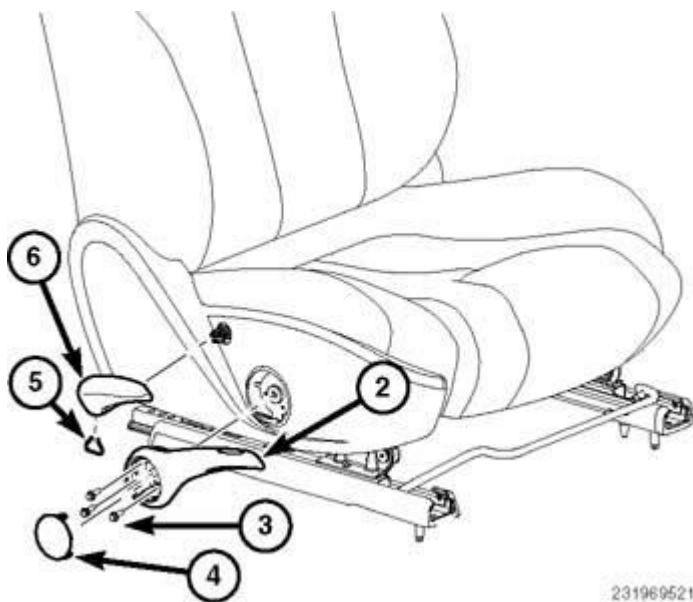


Fig. 605: Lift Handle, Recliner Handle, Clip, Fasteners & Cap
Courtesy of CHRYSLER GROUP, LLC

1. Using a small flat bladed tool or equivalent, remove the lift handle trip cap (4).
2. Remove the fasteners (3) and remove the lift handle (2).
3. Using a small hook type tool or equivalent, release the clip (5) and remove the recliner handle (6).

INSTALLATION

INSTALLATION

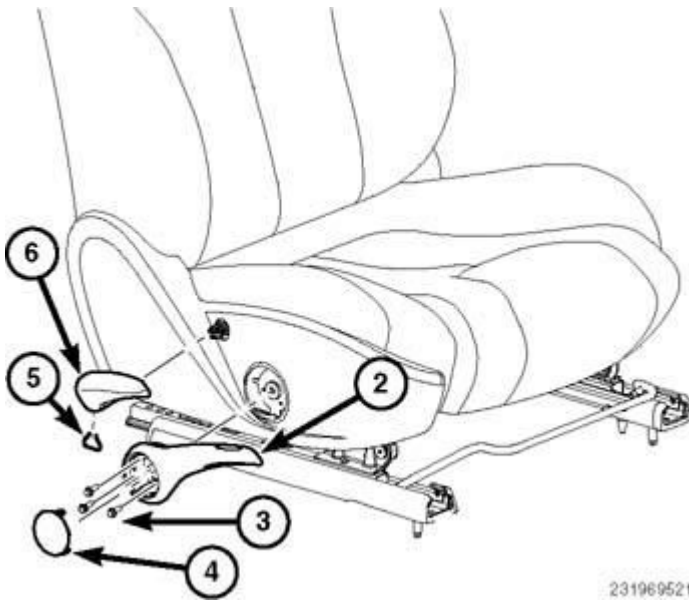


Fig. 606: Lift Handle, Recliner Handle, Clip, Fasteners & Cap
Courtesy of CHRYSLER GROUP, LLC

1. Install the clip (5) onto the recliner handle (6) and seat the handle onto the recliner shaft fully.
2. Install the lift handle (2) and install the fasteners (3).
3. Tighten the fasteners (3) to (5.5 N.m 49 in. lbs.) and install the trim cap (4).

HEADREST

REMOVAL

REMOVAL

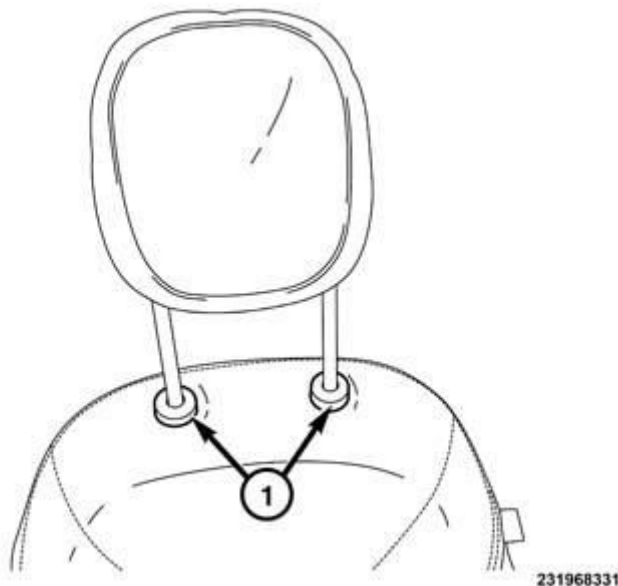


Fig. 607: Head Restraint Sleeves

Courtesy of CHRYSLER GROUP, LLC

1. Press the release tab on the two head restraint sleeves (1) and pull the head restraint straight upward.

INSTALLATION

INSTALLATION

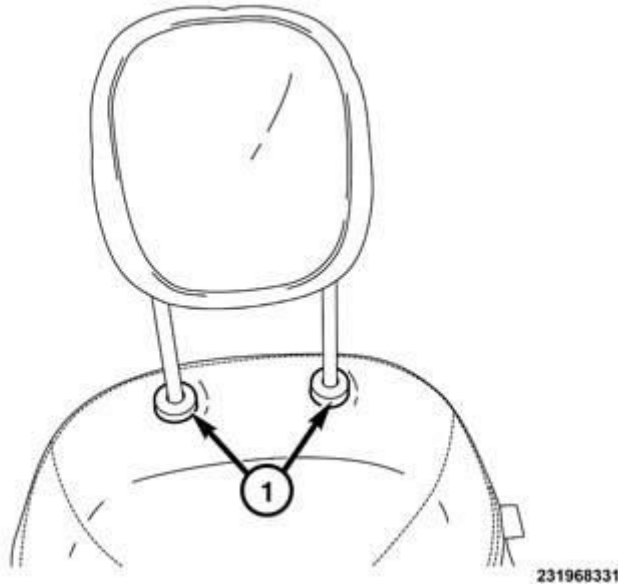


Fig. 608: Head Restraint Sleeves

Courtesy of CHRYSLER GROUP, LLC

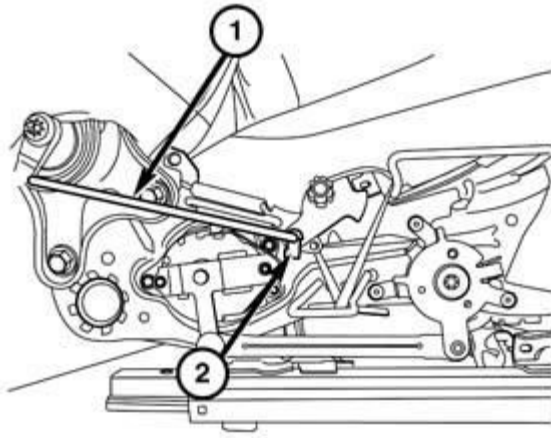
1. Press the release tab on the two head restraint sleeves (1) and push the head restraint straight downward.

SEAT BACK, FRONT

REMOVAL

REMOVAL

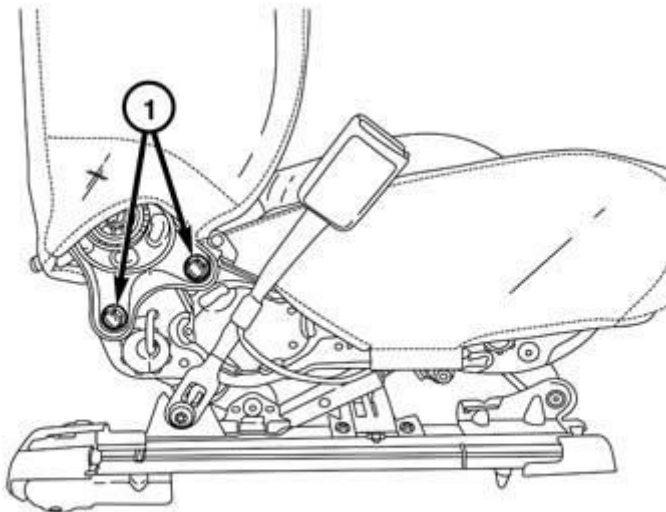
1. Remove the seat. Refer to **SEAT, REMOVAL** .
2. Remove the side shields. Refer to **SIDE SHIELDS, SEAT CUSHION, FRONT, REMOVAL**.



231969528

Fig. 609: Recliner Link & Clip
Courtesy of CHRYSLER GROUP, LLC

3. Release the clip (2) and disconnect the recliner link (1), if equipped.



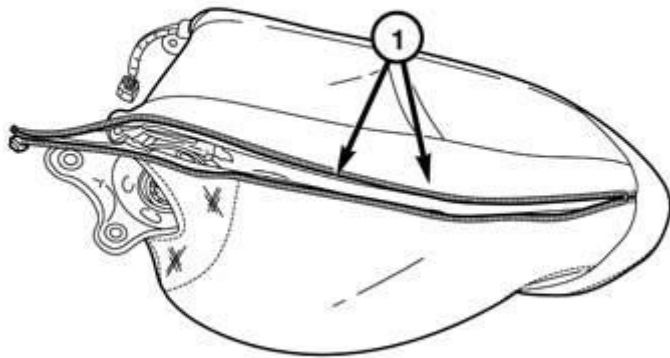
231968330

Fig. 610: Seat Back Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Remove the bolts (1) and disconnect the electrical connectors to the seat back accessories, if equipped.
5. Remove the seat back.

DISASSEMBLY

DISASSEMBLY

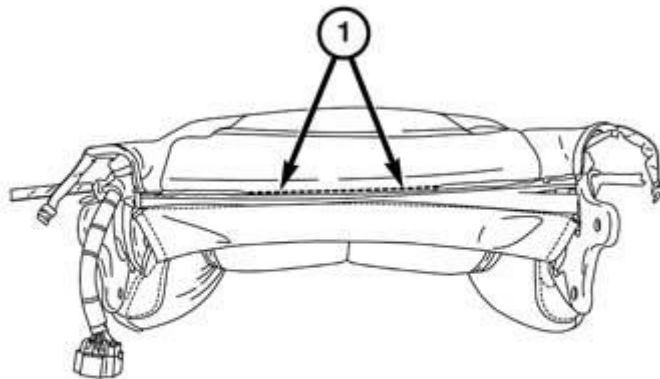


231968332

Fig. 611: Rear Zippers

Courtesy of CHRYSLER GROUP, LLC

1. Remove the seat back. Refer to **SEAT BACK, FRONT, REMOVAL**.
2. Unzip the two rear zippers (1).

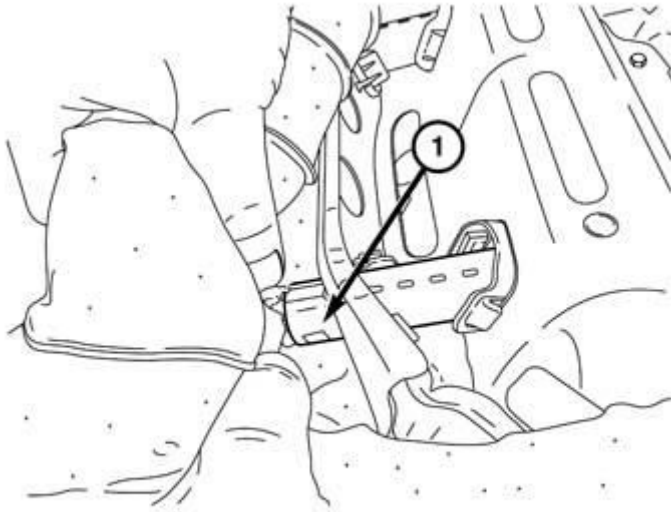


231968333

Fig. 612: Lower Zip Strips

Courtesy of CHRYSLER GROUP, LLC

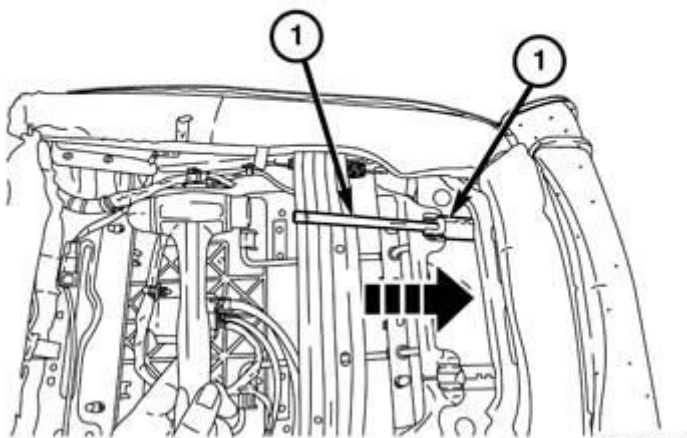
3. Release the lower zip strips (1).



231968334

Fig. 613: Headrest Sleeves Tab
Courtesy of CHRYSLER GROUP, LLC

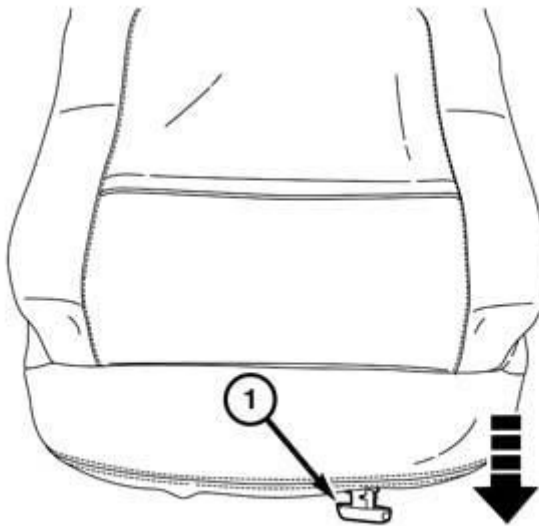
4. Pull the foam up far enough to expose the headrest sleeves and depress the tab (1) while removing the headrest sleeve.



231968335

Fig. 614: Tapping Bottom Of Head Restraint Sleeve
Courtesy of CHRYSLER GROUP, LLC

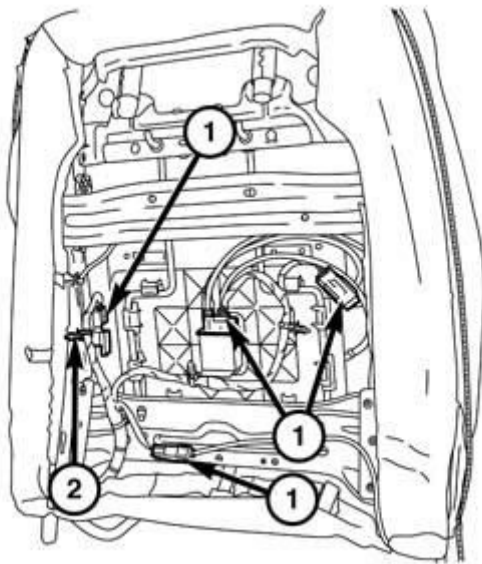
5. Using a hammer and drift pin (1), tap the bottom of the head restraint sleeve.



231968317

Fig. 615: Removing Head Restraint Sleeve
Courtesy of CHRYSLER GROUP, LLC

6. Remove the head restraint sleeve (1) from the seat back.



231968319

Fig. 616: Wire Guides & Connectors
Courtesy of CHRYSLER GROUP, LLC

7. Disconnect the electrical connectors (1) and disconnect the two wire guides (2) from the seat back frame.

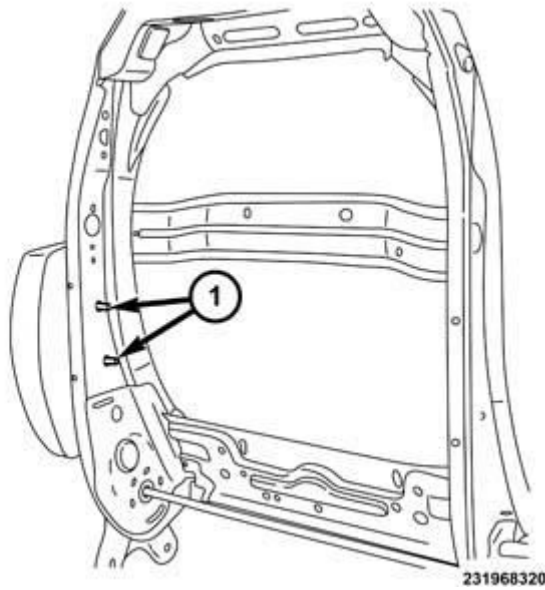


Fig. 617: Seat Air Bag Fasteners
Courtesy of CHRYSLER GROUP, LLC

8. Remove the two fasteners (1) for the seat air bag located on the inside of the seat back frame.

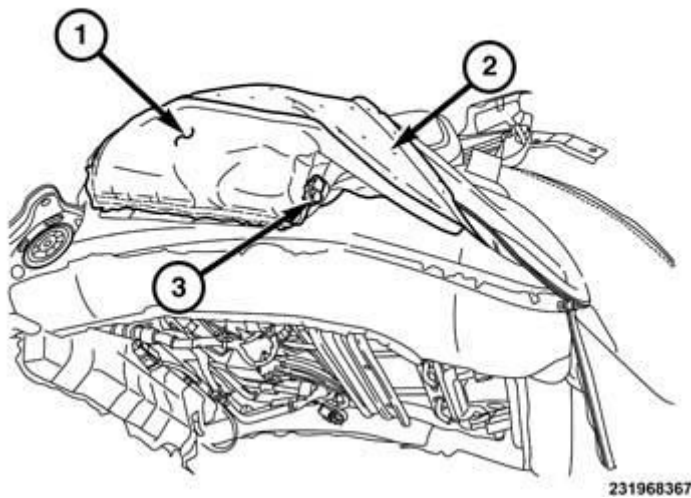
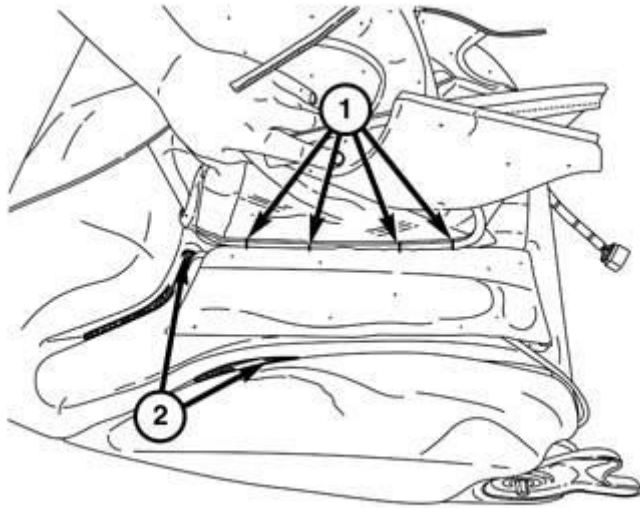


Fig. 618: Seat Air Bag, Cushion Pocket & Connector
Courtesy of CHRYSLER GROUP, LLC

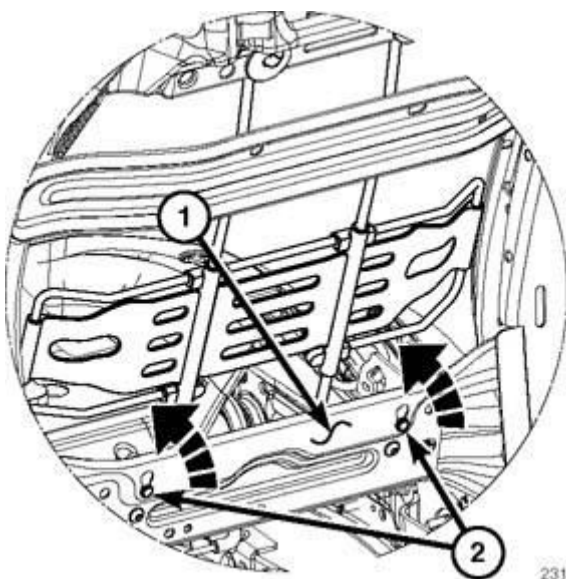
9. Remove the seat air bag (1) from frame and cushion pocket (2).
10. Disconnect squib wiring connector (3) from the seat air bag.
11. Route the seat air bag out of the seat cover pocket (2).



231968368

Fig. 619: Hog Rings & Hook And Loop Fasteners
Courtesy of CHRYSLER GROUP, LLC

12. Disconnect the hook and loop fasteners (2) along both sides and the center of the front of the seat cover and cushion.
13. Cut the hog rings (1) that connect the seat back cover to the seat back foam and remove the seat cover from the seat back cushion.
14. Disconnect the heated seat pad wiring connector from the back of the seat frame, if equipped and remove the seat back cushion from the seat back frame assembly.



231969517

Fig. 620: Disconnecting Lower Lumbar Anchors From Seat Back Frame Assembly
Courtesy of CHRYSLER GROUP, LLC

15. Disconnect the lower lumbar anchors (2) from the seat back frame assembly (1).

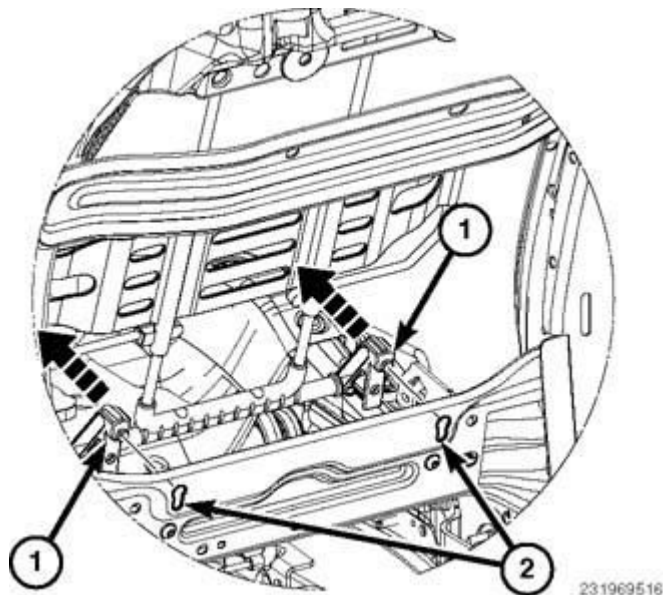


Fig. 621: Releasing Lower Lumbar From Keyhole Slots
Courtesy of CHRYSLER GROUP, LLC

16. Release the lower lumbar (1) from keyhole slots (2).

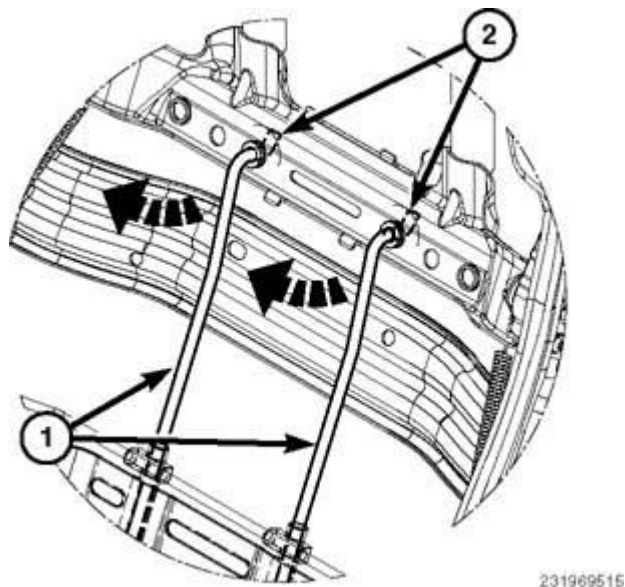


Fig. 622: Rotating Lumbar Upward And Disconnecting Upper Lumbar Support Rods From Grommets
Courtesy of CHRYSLER GROUP, LLC

17. Rotate the lumbar upward and disconnect the upper lumbar support rods (1) from the grommets (2).

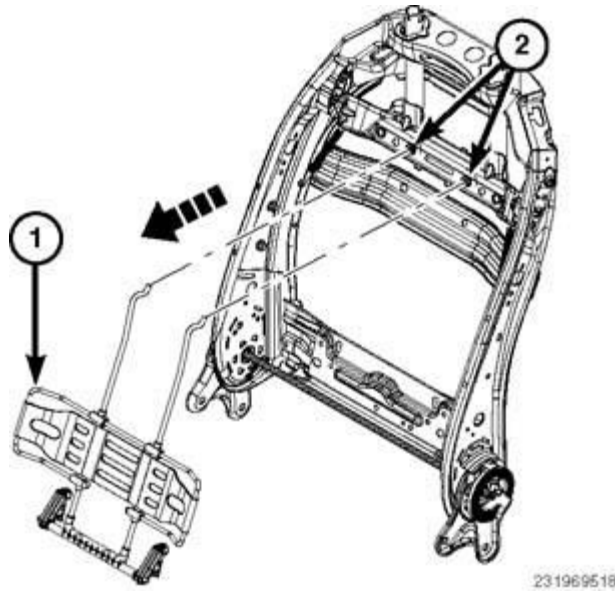


Fig. 623: Removing Lumbar From Seat Back Frame
Courtesy of CHRYSLER GROUP, LLC

18. Remove the lumbar (1) from the seat back frame (2).

ASSEMBLY

ASSEMBLY

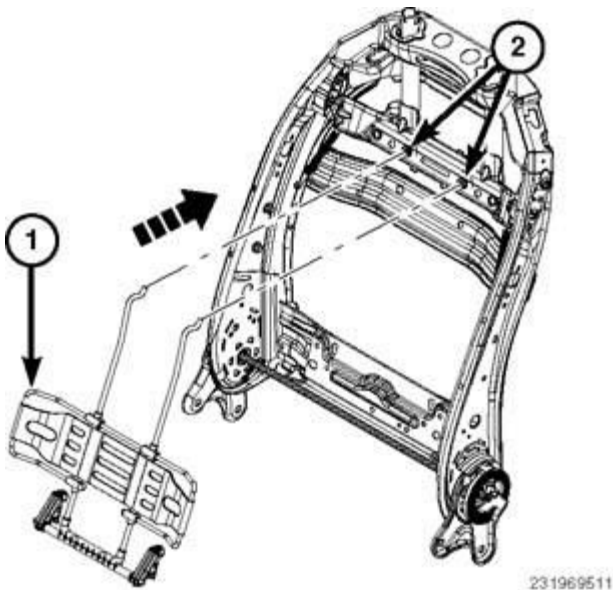


Fig. 624: Installing Lumbar Assembly Onto Seat Back Frame Assembly
Courtesy of CHRYSLER GROUP, LLC

1. Install the lumbar assembly (1) onto the seat back frame assembly (2).

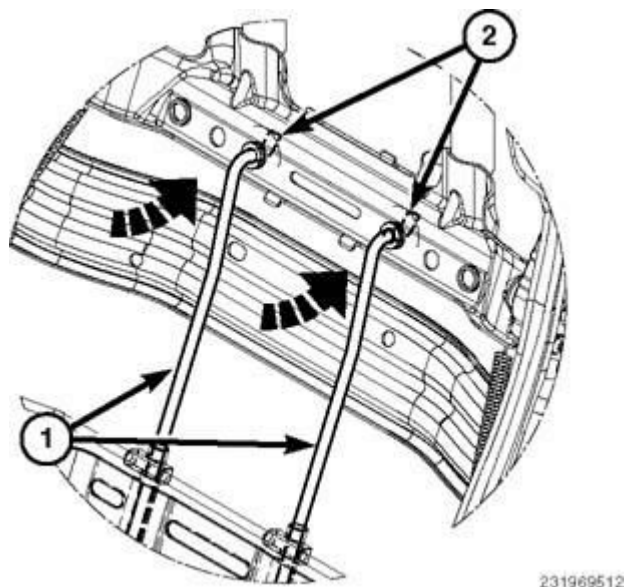


Fig. 625: Positioning Upper Lumbar Support Rods Into Grommets And Rotating Lumbar Down Into Seat Frame Assembly

Courtesy of CHRYSLER GROUP, LLC

2. Position the upper lumbar support rods (1) into the grommets (2) and rotate the lumbar down into the seat frame assembly.

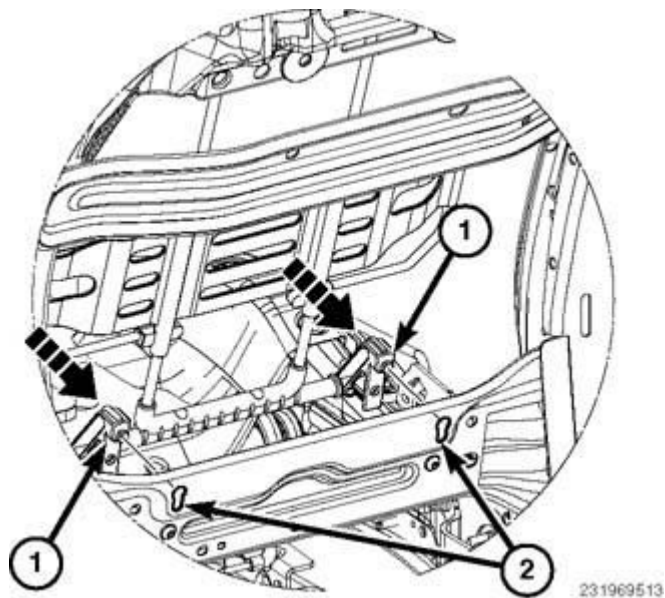


Fig. 626: Positioning Lower Lumbar Assembly Into Keyhole Slots

Courtesy of CHRYSLER GROUP, LLC

3. Position the lower lumbar assembly (1) into the keyhole slots (2).

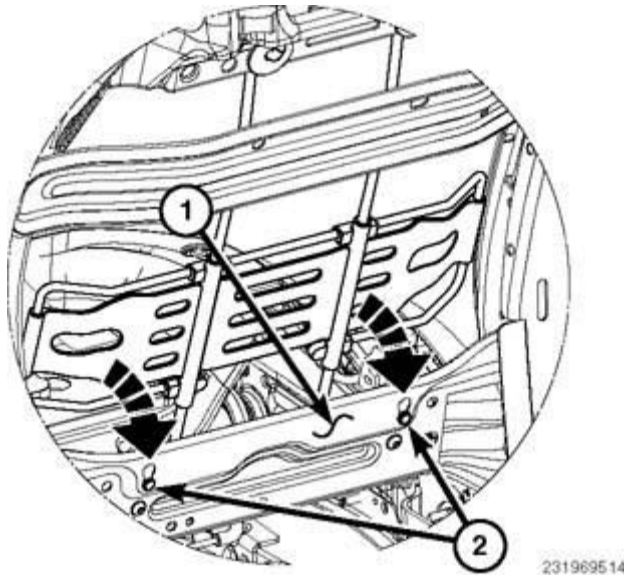


Fig. 627: Securing Lower Lumbar Anchors Fully Into Seat Back Assembly
 Courtesy of CHRYSLER GROUP, LLC

4. Secure the lower lumbar anchors (2) fully into the seat back assembly (1).

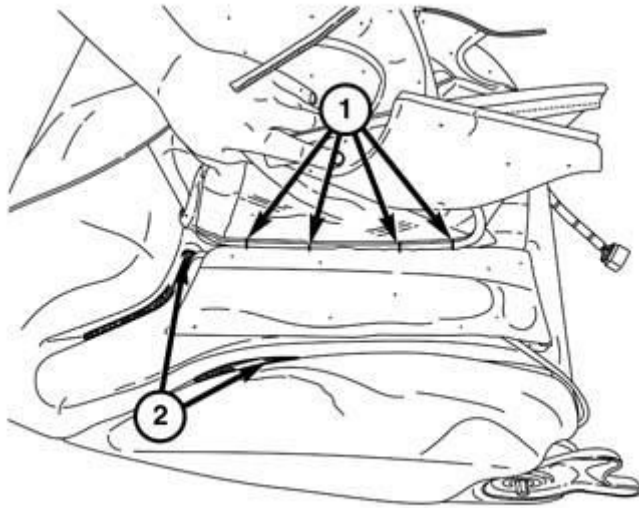


Fig. 628: Hog Rings & Hook And Loop Fasteners
 Courtesy of CHRYSLER GROUP, LLC

5. Install the seat back cushion assembly onto the seat frame and connect the heated seat pad wiring connector, if equipped.
6. Position the seat cover assembly onto the cushion and install new hog rings (1).
7. Connect the hook and loop fasteners (2) along both sides and the center of the front of the seat cover and cushion.

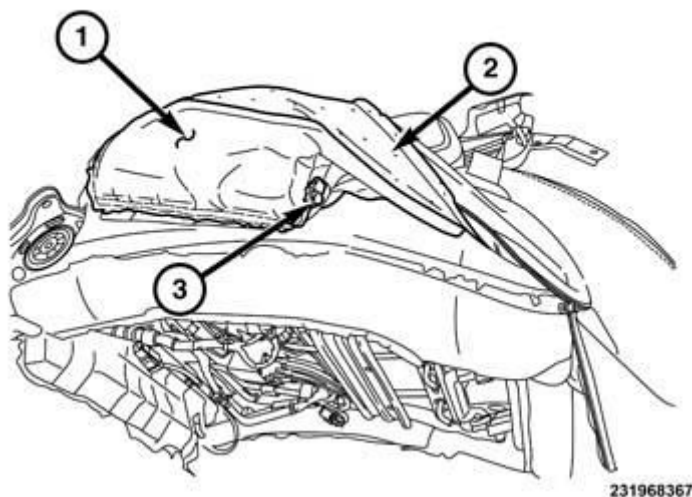


Fig. 629: Seat Air Bag, Cushion Pocket & Connector
Courtesy of CHRYSLER GROUP, LLC

8. Position the seat air bag (1) into the seat cover pocket (2).
9. Connect the squib wiring electrical connector (3).
10. Install the seat air bag (1) onto the frame and into the cushion pocket (2).

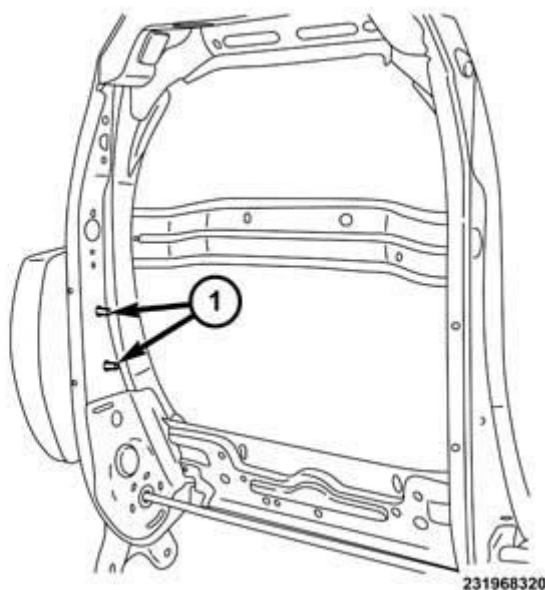
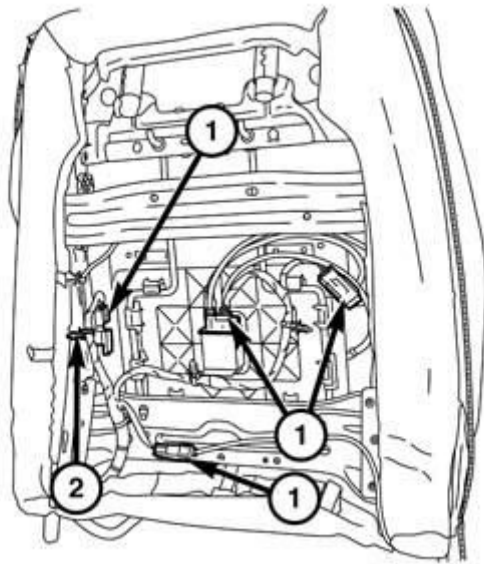


Fig. 630: Seat Air Bag Fasteners
Courtesy of CHRYSLER GROUP, LLC

11. Located on the inside of the seat back frame, install the two fasteners (1) and tighten to (10 N.m 89 in. lbs.).

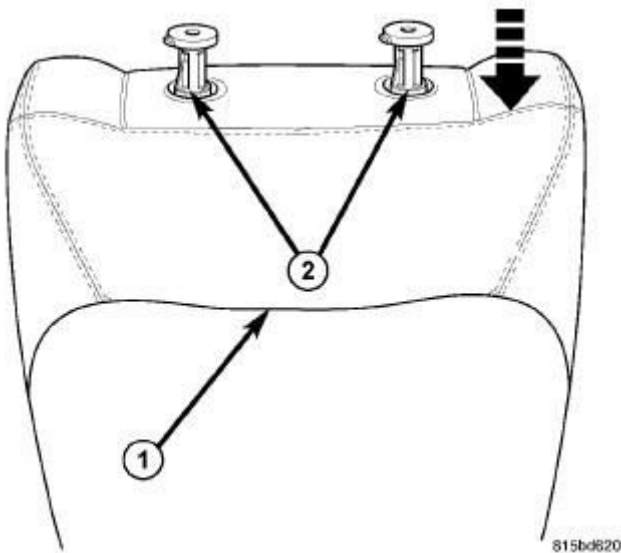


231968319

Fig. 631: Wire Guides & Connectors

Courtesy of CHRYSLER GROUP, LLC

12. Connect the electrical connectors (1) and connect the two wire guides (2) to the seat back frame.



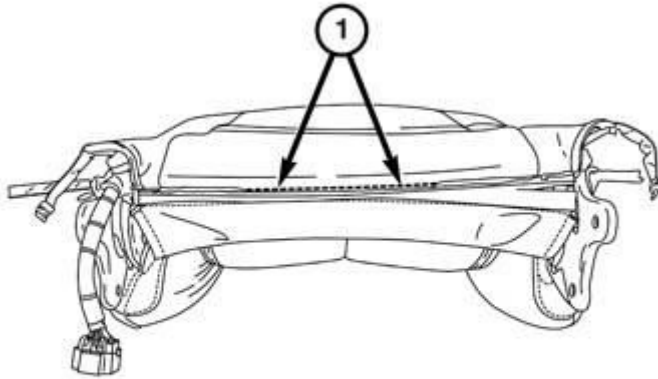
815bd820

Fig. 632: Headrest Sleeve Install

Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical front seat back and head restraint sleeves shown.

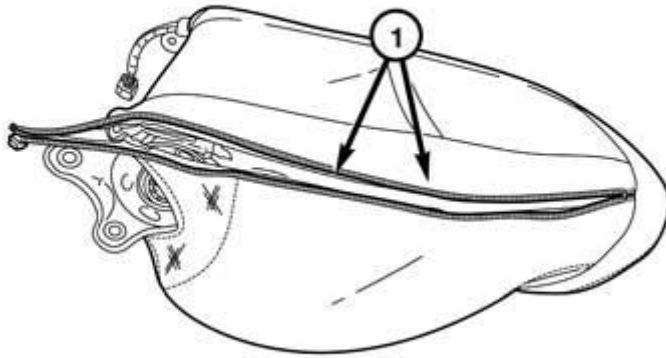
13. Position the seat back cover and cushion (1) onto the seat back frame.
14. Install the headrest sleeves (2) by pushing down on the sleeve.



231968333

Fig. 633: Lower Zip Strips
Courtesy of CHRYSLER GROUP, LLC

15. Secure the lower zip strips (1), fully.



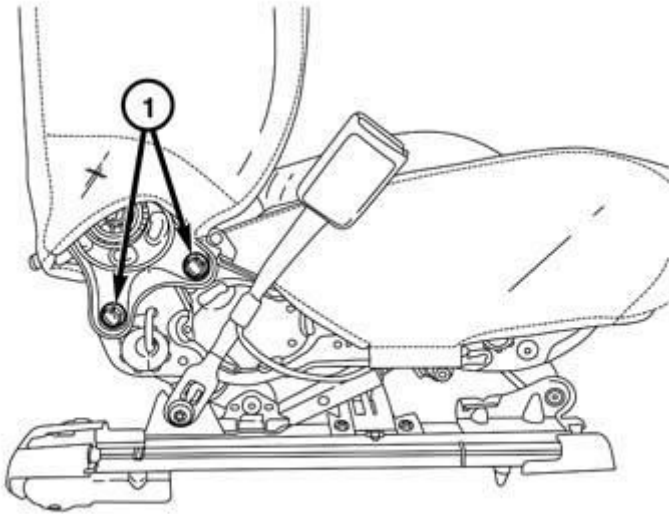
231968332

Fig. 634: Rear Zippers
Courtesy of CHRYSLER GROUP, LLC

16. Close the side zippers (1) fully and tuck the zipper up into the seat back cover.
17. Install the seat back. Refer to **SEAT BACK, FRONT, INSTALLATION**.

INSTALLATION

INSTALLATION

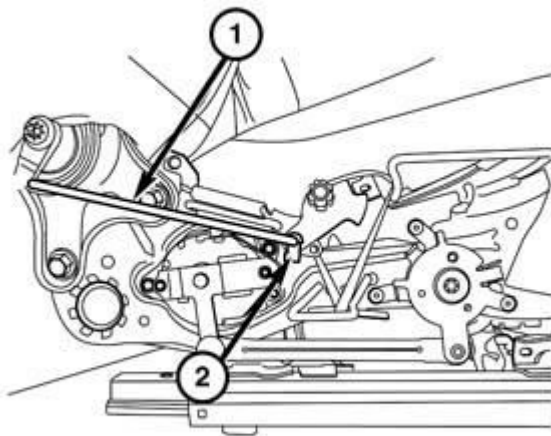


231968330

Fig. 635: Seat Back Bolts

Courtesy of CHRYSLER GROUP, LLC

1. Position the seat back assembly back onto the seat track assembly and install the bolts (1).
2. Tighten the bolts (1) to (50 N.m 37 ft. lbs.)
3. Connect the electrical connectors to the seat back accessories, if equipped.

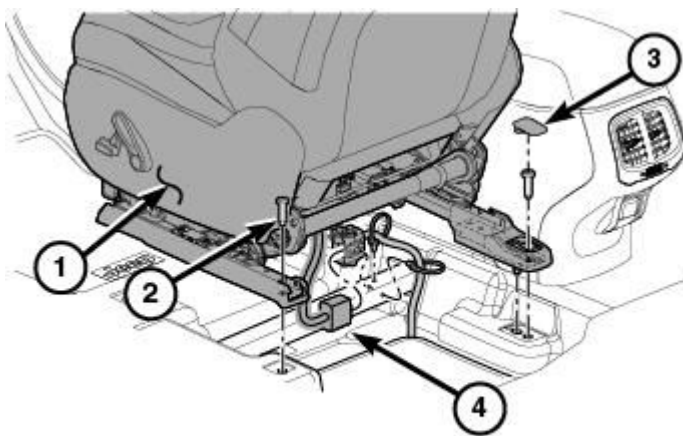


231969528

Fig. 636: Recliner Link & Clip

Courtesy of CHRYSLER GROUP, LLC

4. Connect the recliner link (1) and secure the clip (2) fully, if equipped.
5. Install the side shields. Refer to **SIDE SHIELDS, SEAT CUSHION, FRONT, INSTALLATION**.
6. Install the seat. Refer to **SEAT, INSTALLATION**.

SEAT**REMOVAL****REMOVAL**

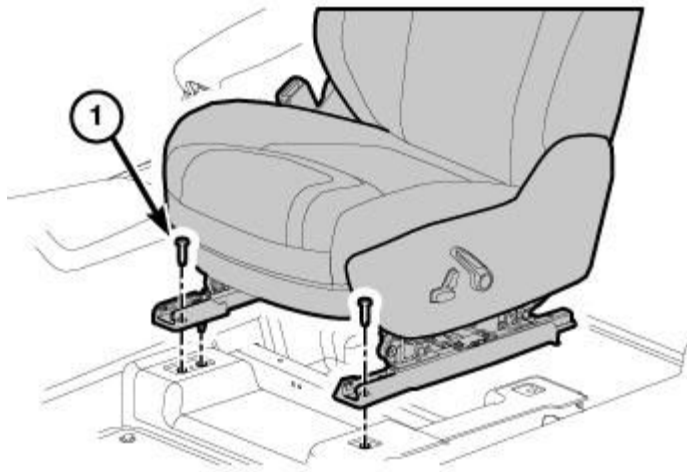
2319004716

Fig. 637: Identifying Driver Seat, Harness Connector & Fasteners
Courtesy of CHRYSLER GROUP, LLC

NOTE: Passenger seat shown, driver seat similar.

NOTE: Upon completion of the seat installation it will be necessary to use a scan tool to configure the occupant classification module.

1. Slide seat (1) forward.
2. Using trim stick (special tool #C-4755, Trim Stick), pry open the inboard rear seat adjuster cover.
3. Remove the rear seat adjuster bolts (2).



231900465

Fig. 638: Identifying Front Seat & Adjuster Bolts
Courtesy of CHRYSLER GROUP, LLC

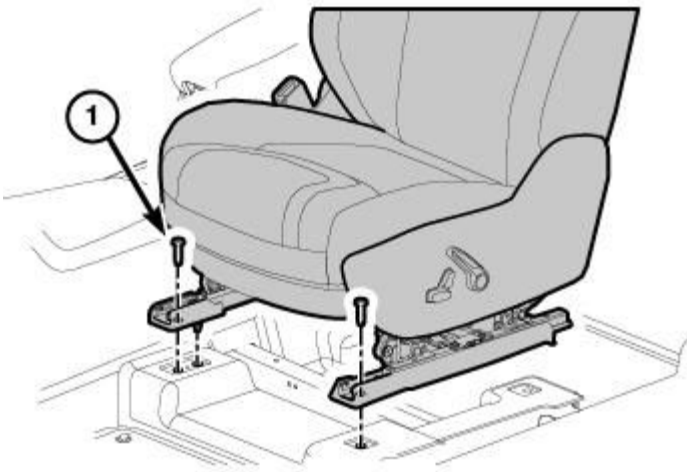
4. Slide seat rearward.
5. Remove both front seat adjuster bolts (1).
6. Disconnect and isolate the negative battery cable.
7. Disconnect all electrical connectors.

CAUTION: Do not use the adjuster release bar as a handle when removing or installing the front seat.

8. Remove the front seat from the vehicle.

INSTALLATION

INSTALLATION



231900465

Fig. 639: Identifying Front Seat & Adjuster Bolts

Courtesy of CHRYSLER GROUP, LLC

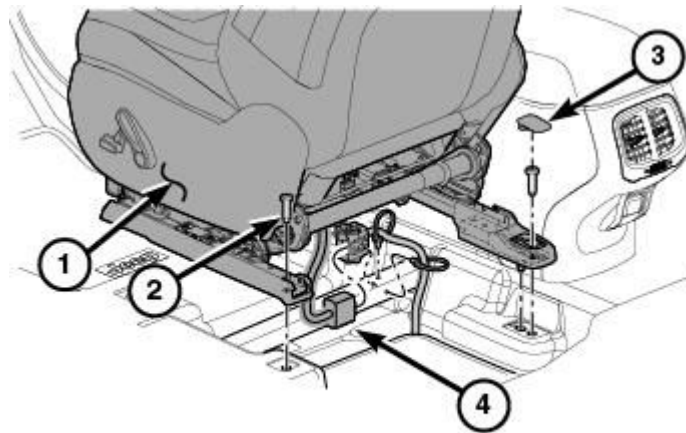
NOTE: Passenger seat shown, driver seat similar.

NOTE: Upon completion of the seat installation it will be necessary to use a scan tool to configure the occupant classification module.

1. Position the front seat Into the vehicle.

CAUTION: Do not use the adjuster release bar as a handle when removing or installing the front seat.

2. Connect all electrical connectors.
3. Connect the negative battery cable.
4. Slide seat (1) rearward.
5. Install both front seat adjuster bolts (1). Tighten to 40 N.m (30 ft. lbs.).



2319004716

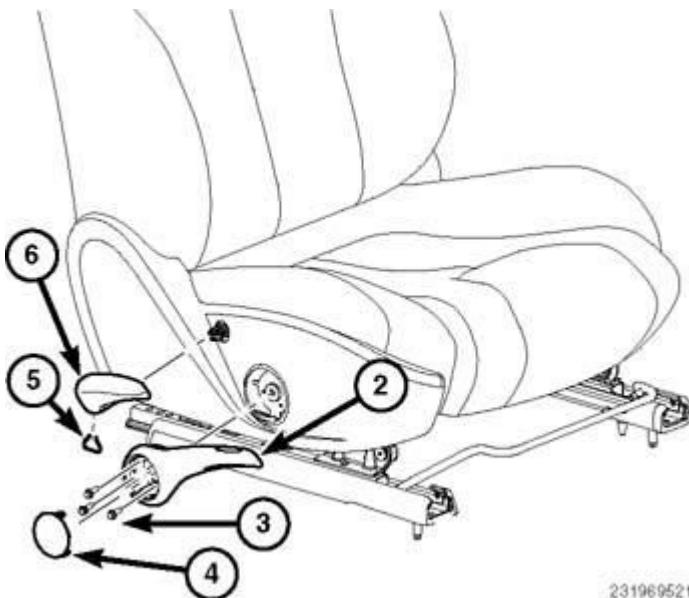
Fig. 640: Identifying Driver Seat, Harness Connector & Fasteners
Courtesy of CHRYSLER GROUP, LLC

6. Slide seat (1) forward.
7. Install the rear seat adjuster bolts (2). Tighten to 40 N.m (30 ft. lbs.).
8. Close the cover on the inboard rear seat adjuster cover.
9. With the use of a scan tool, configure the occupant classification module.

SIDE SHIELDS, SEAT CUSHION, FRONT

REMOVAL

REMOVAL

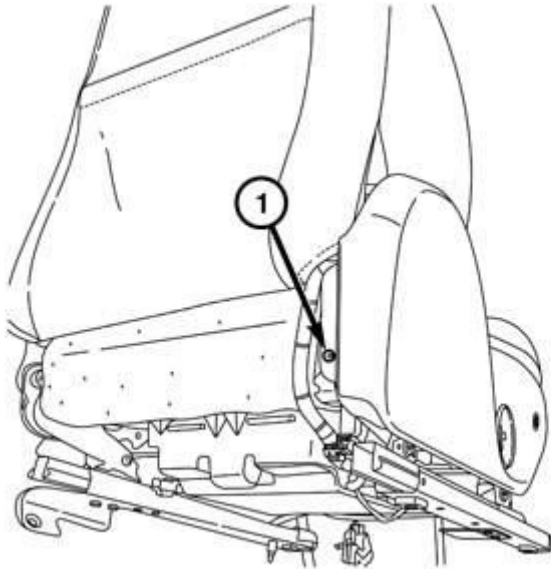


231969521

Fig. 641: Lift Handle, Recliner Handle, Clip, Fasteners & Cap

Courtesy of CHRYSLER GROUP, LLC

1. Remove the adjustment handles (2, 6), if equipped. Refer to **HANDLE, FRONT RECLINER, REMOVAL**.

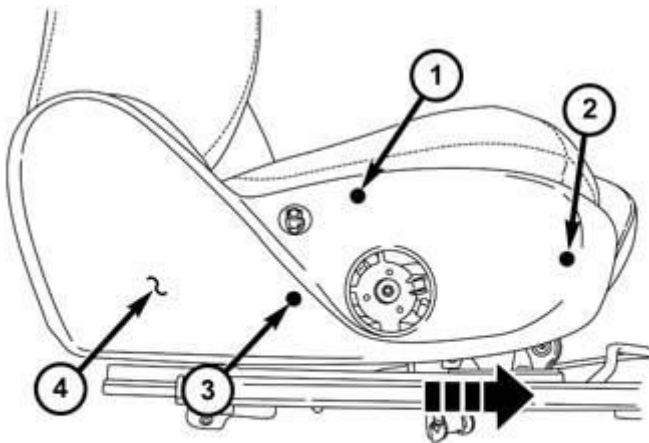


231968322

Fig. 642: Rear Screw

Courtesy of CHRYSLER GROUP, LLC

2. Remove the rear screw (1).

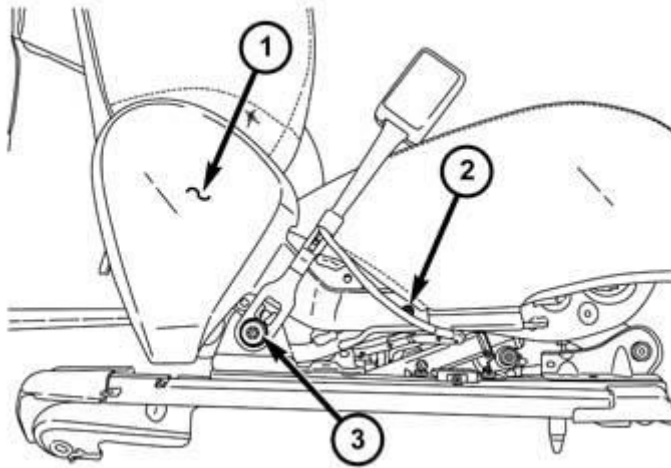


231968321

Fig. 643: Side Shield, Retaining Clip & Retaining Tabs

Courtesy of CHRYSLER GROUP, LLC

3. Release the retaining clip (3).
4. Lift up on the side shield (4) slightly and release the retaining tab (1).
5. Push forward on the side shield (4) and release the retaining tab (2).
6. Remove the side shield and disconnect the electrical connectors, if equipped.



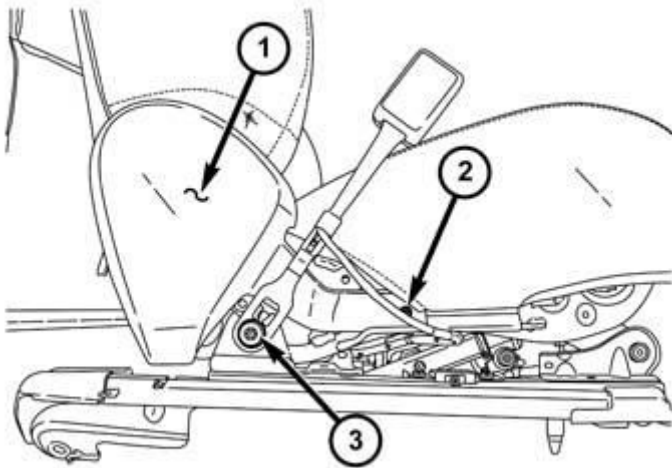
231968323

Fig. 644: Side Shield, Screw & Bolt
Courtesy of CHRYSLER GROUP, LLC

7. Remove the seat belt buckle bolt (3) and remove the buckle.
8. Remove the screw (2) and remove the side shield (1).

INSTALLATION

INSTALLATION

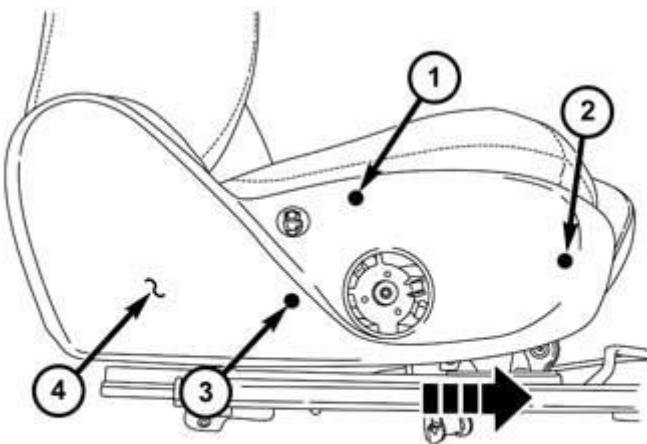


231968323

Fig. 645: Side Shield, Screw & Bolt

Courtesy of CHRYSLER GROUP, LLC

1. Install the side shield (1) and install the screw (2).
2. Install the buckle and install the bolt (3).
3. Tighten the seat belt buckle retaining bolt to (45 N.m 33 ft. lbs.).



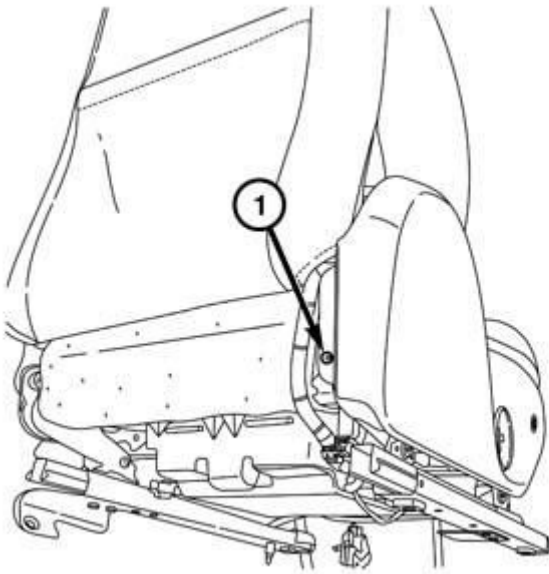
231968321

Fig. 646: Side Shield, Retaining Clip & Retaining Tabs

Courtesy of CHRYSLER GROUP, LLC

4. Position the side shield (4) back onto the seat assembly and secure the front retaining tab (2).
5. Push back on the side shield and secure the retaining tab (1).

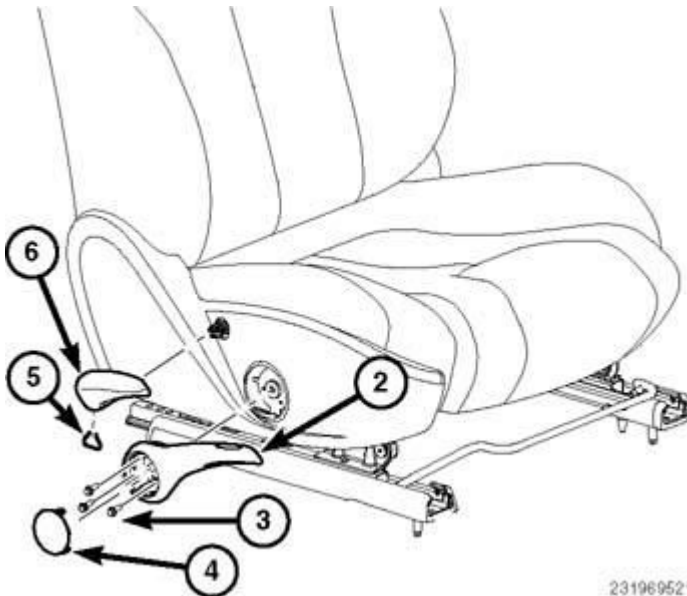
6. Secure the retaining clip (3) fully.



231968322

Fig. 647: Rear Screw
Courtesy of CHRYSLER GROUP, LLC

7. Install the rear screws (1).



231969521

Fig. 648: Lift Handle, Recliner Handle, Clip, Fasteners & Cap
Courtesy of CHRYSLER GROUP, LLC

8. Install the adjustment handles (2, 6), if equipped. Refer to **HANDLE, FRONT RECLINER, INSTALLATION**.

SEATS, REAR

WARNING

WARNING

WARNING: To avoid serious or fatal injury on vehicles equipped with the Supplemental Restraint System (SRS), never attempt to repair the electrically conductive circuits or wiring components related to the SRS for which there is no MOPAR wiring repair kit. It is important to use **ONLY** the recommended splicing kit and procedure. For applicable and available MOPAR wiring repair kits, please visit the MOPAR® Connector Web Site at the following address on the internet: (<http://dto.vftis.com/mopar/disclaimer.asp>). Inappropriate repairs can compromise the conductivity and current carrying capacity of those critical electrical circuits, which may cause SRS components not to deploy when required, or to deploy when not required. Only minor cuts or abrasions of wire and terminal insulation where the conductive material has not been damaged, or connector insulators where the integrity of the latching and locking mechanisms have not been compromised may be repaired using appropriate methods.

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid potential physical injury or damage to sensitive electronic circuits and systems, always disconnect and isolate the battery negative (ground) cable and the positive cable, then ground the positive cable to discharge the Occupant Restraint Controller (ORC) capacitor before performing any welding operations on the vehicle. Failure to take the proper precautions could result in accidental airbag deployment, possible damage to the Supplemental Restraint System (SRS) circuits and components, and possible damage to other electronic circuits and components. Whenever a welding process is being performed within 12 inches (30 centimeters) of an electronic module or wiring harness, then that module or harness should be relocated out of the way, or disconnected. Always protect against component or vehicle damage from weld spatter by using weld blankets and screens.

WARNING: To avoid serious or fatal injury, do not attempt to dismantle an airbag unit or tamper with its inflator. Do not puncture, incinerate or bring into contact with electricity. Do not store at temperatures exceeding 93° C (200° F). An airbag inflator unit may contain sodium azide and potassium nitrate. These materials are poisonous and extremely flammable. Contact with acid, water, or heavy metals may produce harmful and irritating gases (sodium hydroxide is formed in the presence of moisture) or combustible compounds. An airbag inflator unit may also contain a gas canister pressurized to over 17.24 kPa (2500 psi). Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: To avoid serious or fatal injury when handling a seat belt tensioner retractor or buckle, proper care should be exercised to keep fingers out from under the retractor or buckle cover and away from the seat belt webbing or cable where it exits from the retractor or buckle cover.

WARNING: To avoid serious or fatal injury, replace all Supplemental Restraint System (SRS) components only with parts specified in the Chrysler Mopar® Parts Catalog. Substitute parts may appear interchangeable, but internal differences may result in inferior occupant protection.

WARNING: To avoid serious or fatal injury, the fasteners, screws, and bolts originally used for the Supplemental Restraint System (SRS) components must never be replaced with any substitutes. These fasteners have special coatings and are specifically designed for the SRS. Anytime a new fastener is needed, replace it with the correct fasteners provided in the service package or specified in the Chrysler Mopar® Parts Catalog.

WARNING: To avoid serious or fatal injury when a steering column has an airbag unit attached, never place the column on the floor or any other surface with the steering wheel or airbag unit face down. Failure to follow these

instructions may result in possible serious or fatal injury.

SEAT, REAR

REMOVAL

REMOVAL

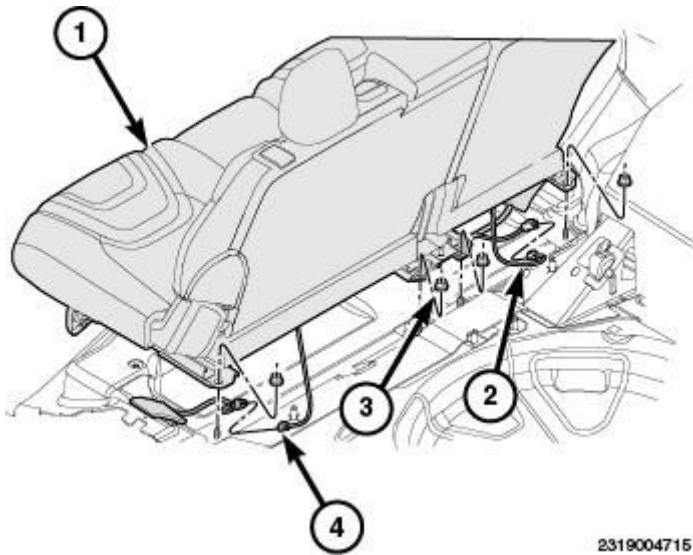


Fig. 649: Identifying Rear Seat, Electrical Connectors & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Fold the rear seat backs down and remove the rear nuts (3).
2. Disconnect the electrical connectors (4) and (2).

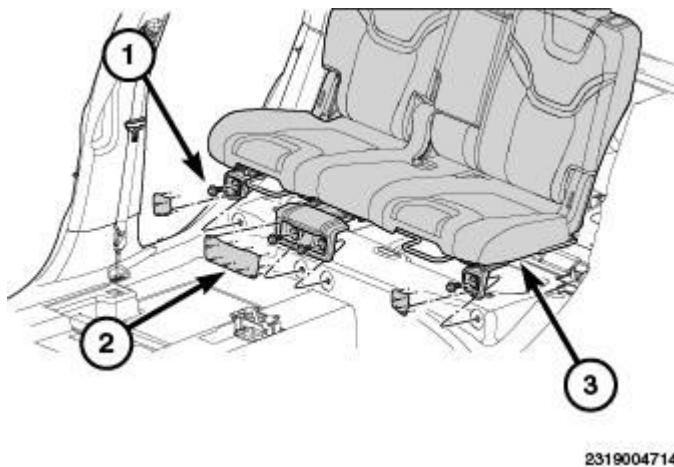
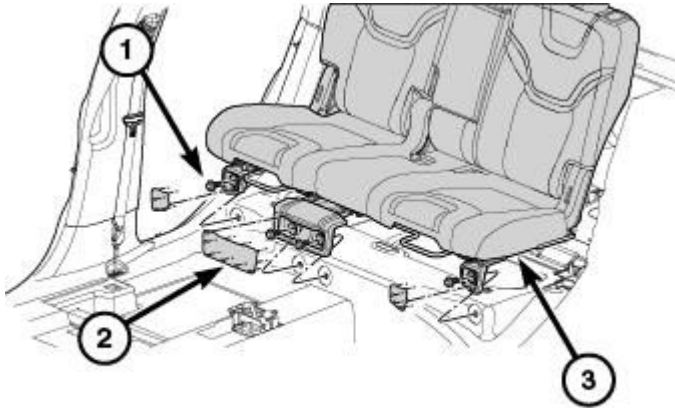


Fig. 650: Identifying Rear Seat, Electrical Connectors & Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Fold the seat backs up.

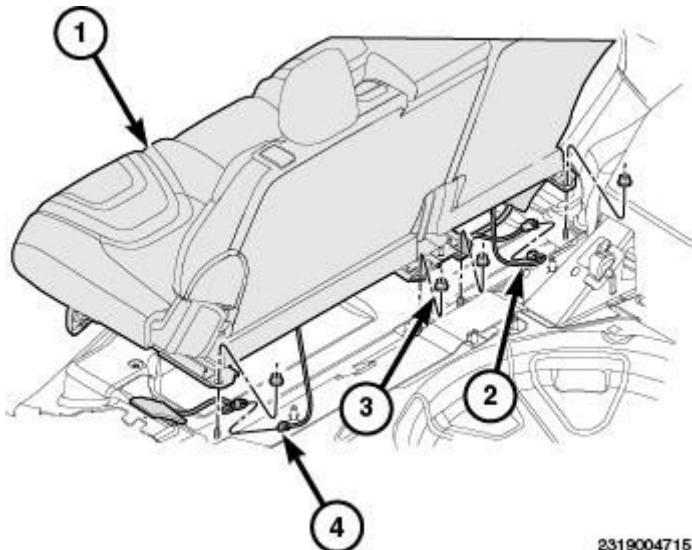
4. Open the fasteners covers (2).
5. Remove the bolts (1).
6. Disconnect the electrical connectors, if equipped, and remove the seat assembly.

INSTALLATION**INSTALLATION**

2319004714

Fig. 651: Identifying Rear Seat, Electrical Connectors & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Position the seat assembly (3) back into the vehicle.
2. Install the bolts (1) and tighten to 85 N.m (63 ft. lbs.).
3. Install the trim covers (2) and seat fully.



2319004715

Fig. 652: Identifying Rear Seat, Electrical Connectors & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Connect the electrical connectors (2) and (4).
5. Install the nuts and tighten to 85 N.m (63 ft. lbs.).

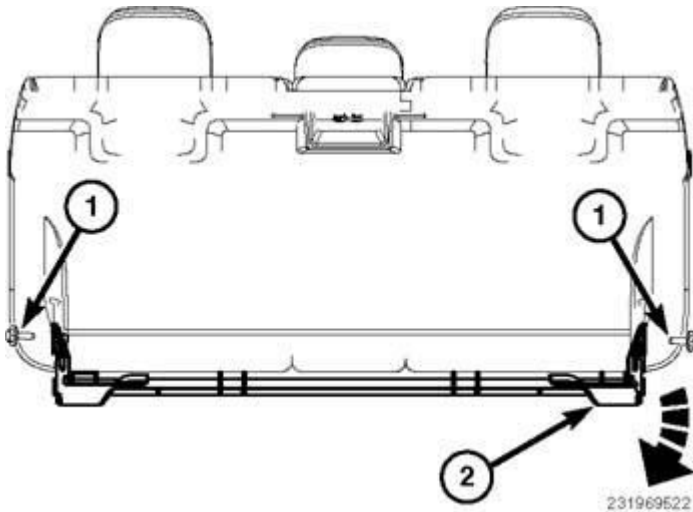
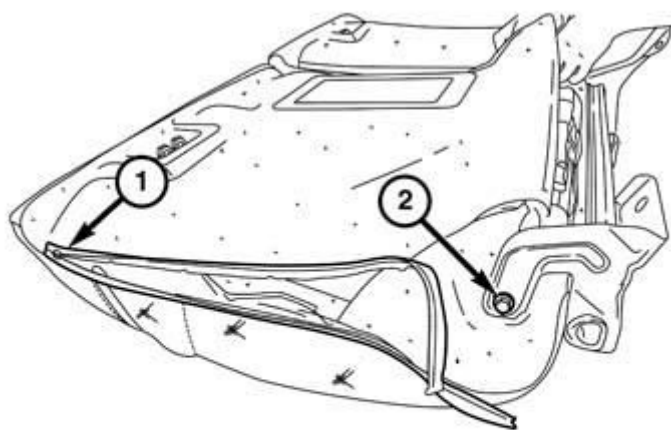
COVER, SEAT BACK**REMOVAL****REMOVAL****REMOVAL - BENCH SEAT**

Fig. 653: Seat Back Mounting Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Remove the rear seat back assembly. Refer to **SEATS, REAR** .
2. Remove the bolts (1) and remove the seat back mounting bracket (2).

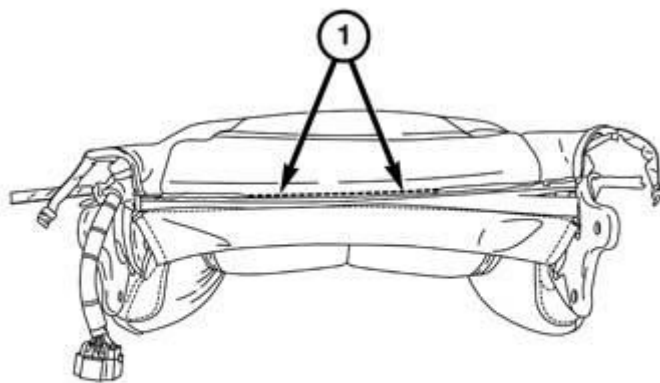


231968328

Fig. 654: Seat Back Cover

Courtesy of CHRYSLER GROUP, LLC

3. Unzip the seat back cover (1).



231968333

Fig. 655: Lower Zip Strips

Courtesy of CHRYSLER GROUP, LLC

4. Release the lower zip strips (1).

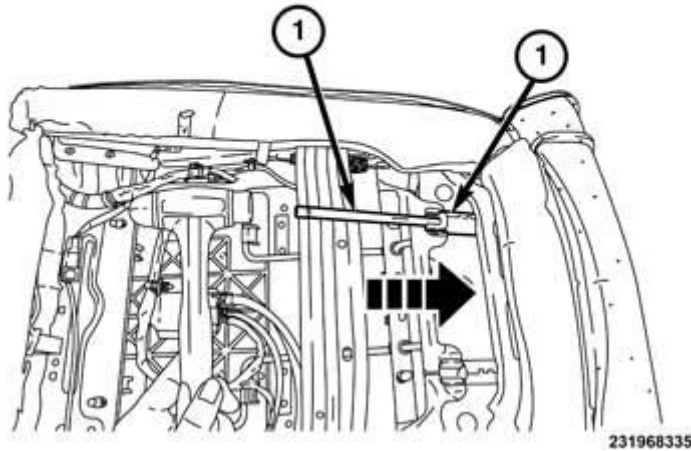


Fig. 656: Tapping Bottom Of Head Restraint Sleeve
Courtesy of CHRYSLER GROUP, LLC

NOTE: Front seat headrest sleeve removal shown, rear seat is similar.

5. Using a hammer and drift pin (1), tap the bottom of the head restraint sleeve.

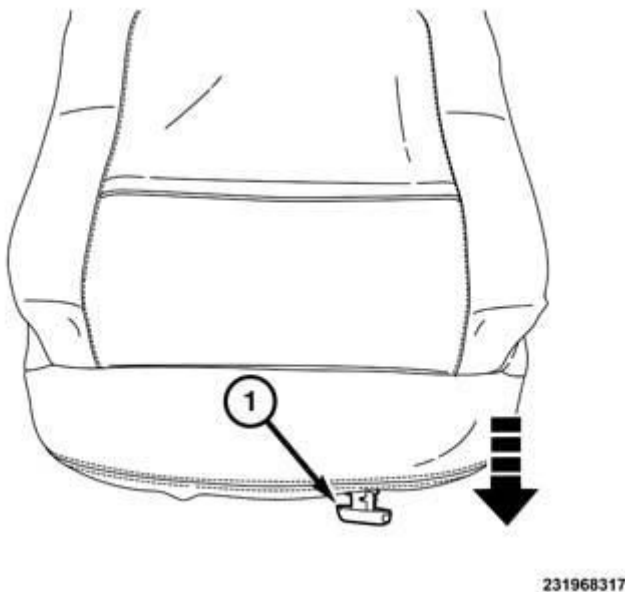


Fig. 657: Removing Head Restraint Sleeve
Courtesy of CHRYSLER GROUP, LLC

NOTE: Front seat headrest sleeve removal shown, rear seat is similar.

6. Remove the head restraint sleeve (1) from the seat back.

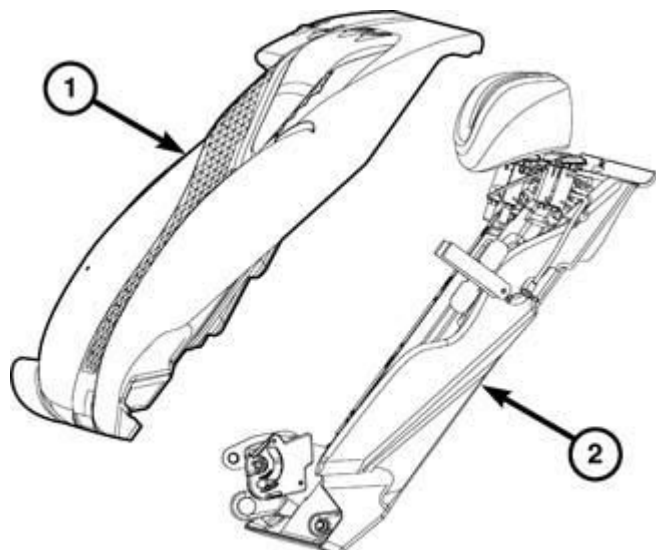


Fig. 658: Seat Back Cushion And Cover Assembly
Courtesy of CHRYSLER GROUP, LLC

7. Remove the seat cushion cover and cushion (1) from the seat back frame assembly.

REMOVAL - SPLIT SEAT

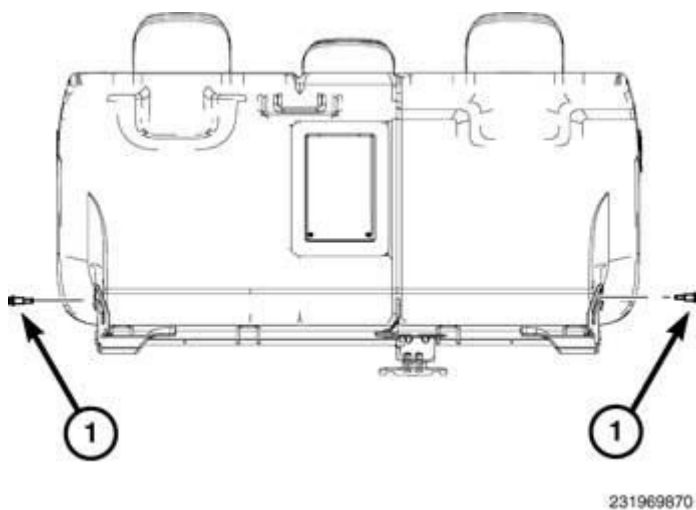
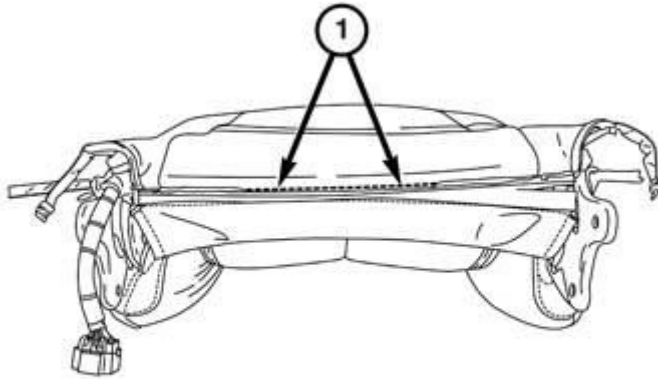


Fig. 659: Seat Back Support Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: 40% seat back service is similar to the 60% seat back unless otherwise noted.

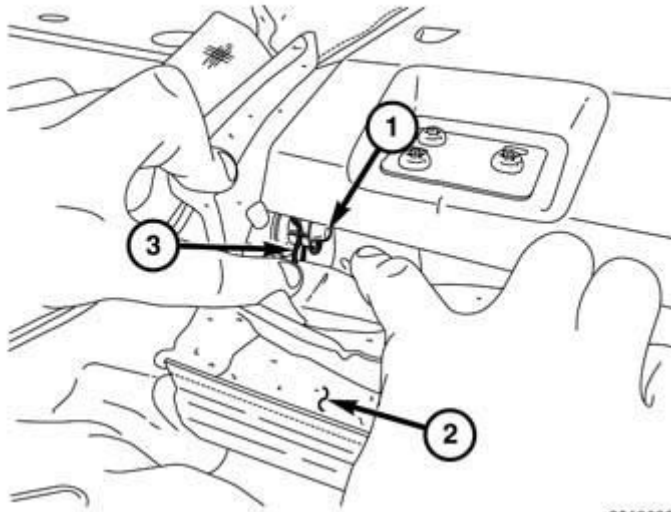
1. Remove the rear seat back assembly. Refer to **SEATS, REAR**.
2. Remove the seat back support bolts (1).



231968333

Fig. 660: Lower Zip Strips
Courtesy of CHRYSLER GROUP, LLC

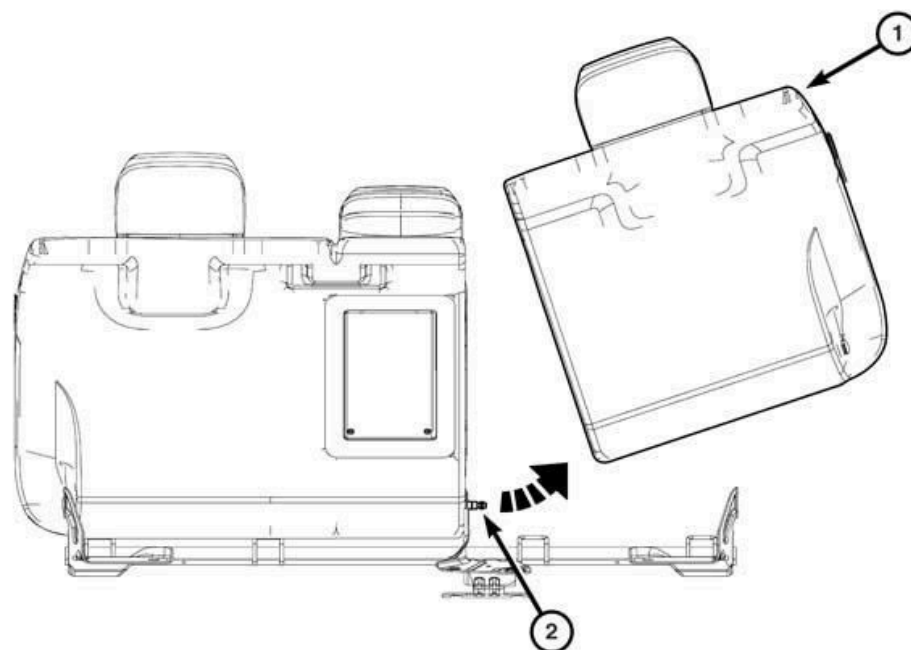
3. Release the lower zip strips (1).



231968329

Fig. 661: Lower Cover, Retaining Clip & Pivot Pin
Courtesy of CHRYSLER GROUP, LLC

4. Position aside the 40% section lower cover (2) and remove the retaining clip (3) from the 60% lower pivot pin (1).



231969861

Fig. 662: Removing 40% Seat Back Assembly From Rear Support Bracket
Courtesy of CHRYSLER GROUP, LLC

5. Remove the 40% seat back assembly (1) from the rear support bracket and off of the pivot pin (2).

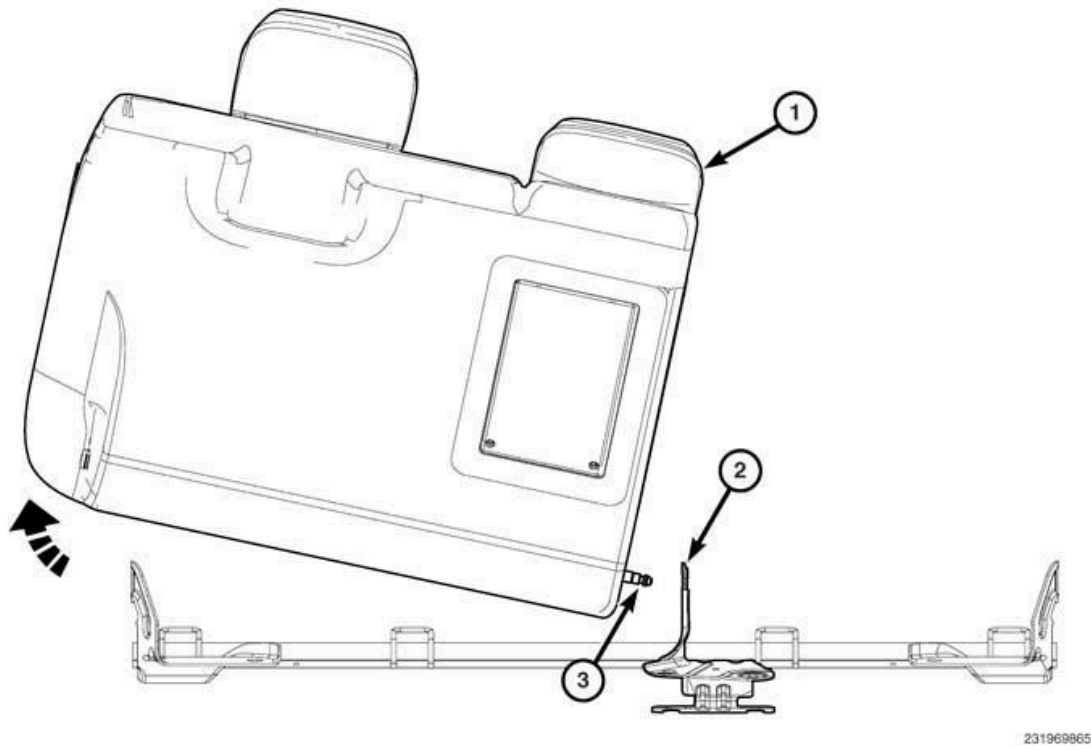


Fig. 663: Removing 60% Seat Back Assembly From Rear Support Bracket
Courtesy of CHRYSLER GROUP, LLC

6. Remove the 60% seat back assembly (1) from the support bracket (2) and release the pivot pin (3).

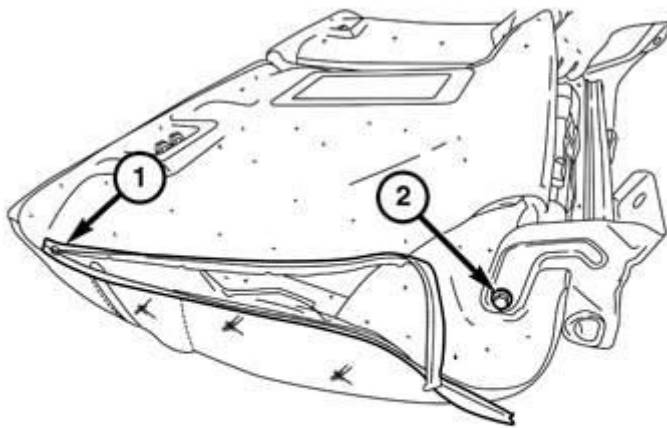


Fig. 664: Seat Back Cover
Courtesy of CHRYSLER GROUP, LLC

7. Unzip the seat back covers (1).

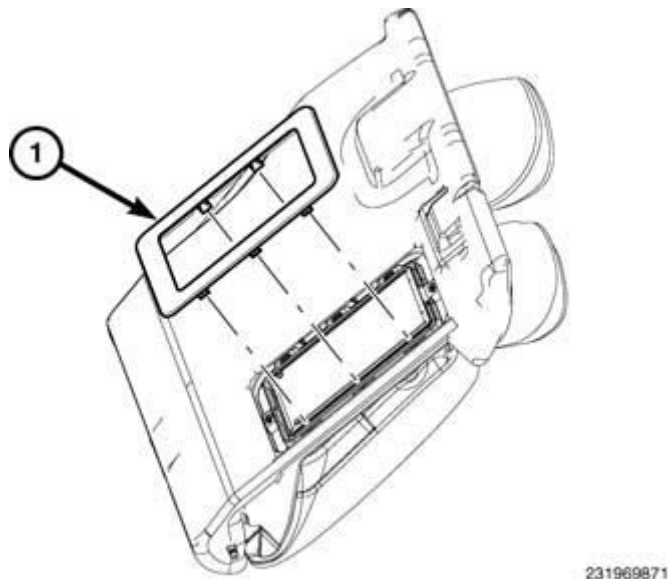


Fig. 665: Pass Through Door Trim Ring
Courtesy of CHRYSLER GROUP, LLC

8. Using a (special tool #C-4755, Trim Stick) or equivalent, remove the pass through door trim ring (1).

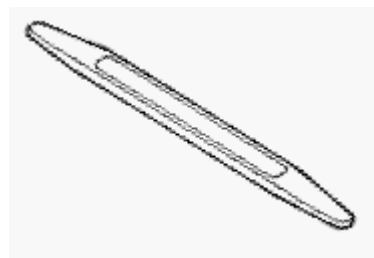


Fig. 666: Trim Stick
Courtesy of CHRYSLER GROUP, LLC

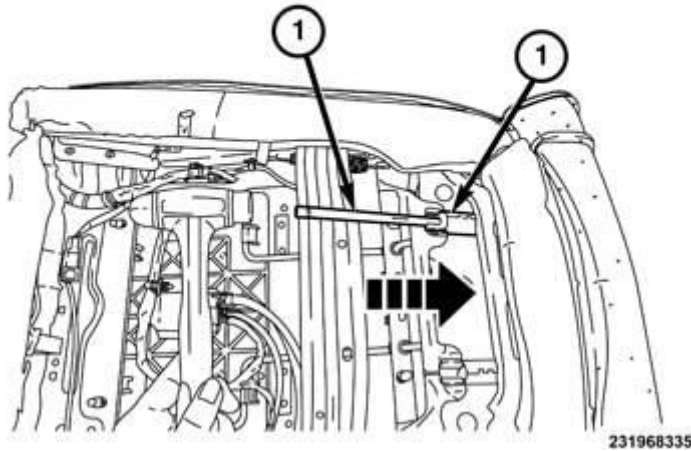


Fig. 667: Tapping Bottom Of Head Restraint Sleeve
Courtesy of CHRYSLER GROUP, LLC

NOTE: Front seat headrest sleeve removal shown, rear seat is similar.

9. Using a hammer and drift pin (1), tap the bottom of the head restraint sleeve.

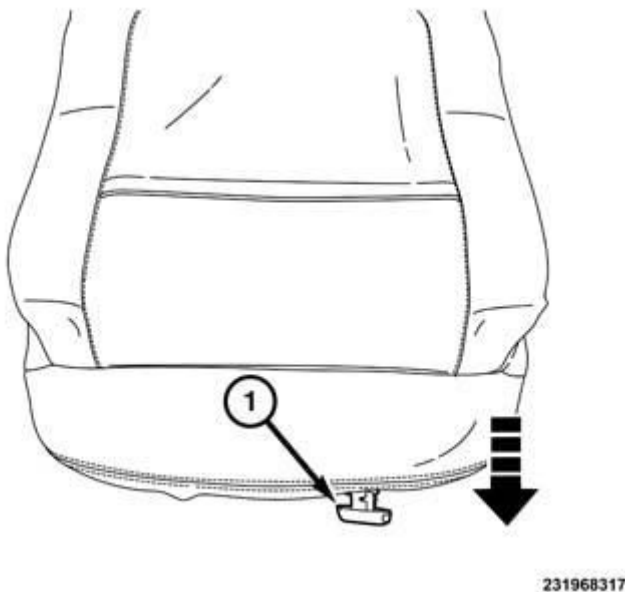


Fig. 668: Removing Head Restraint Sleeve
Courtesy of CHRYSLER GROUP, LLC

NOTE: Front seat headrest sleeve removal shown, rear seat is similar.

10. Remove the head restraint sleeves (1) from the seat back.

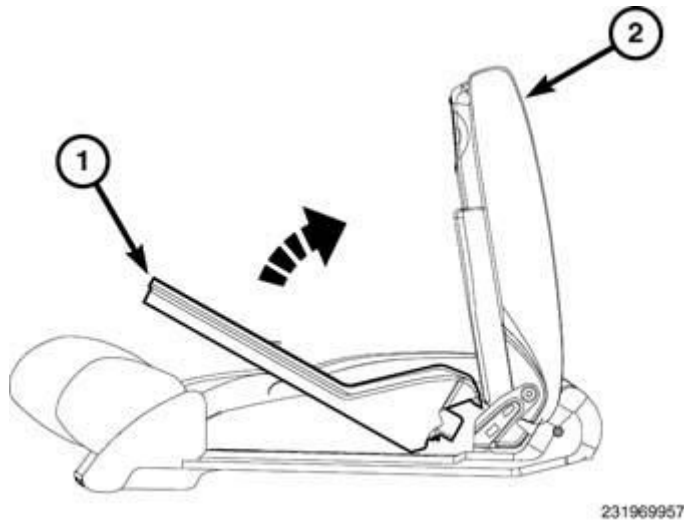


Fig. 669: Removing Pass Through Trim
Courtesy of CHRYSLER GROUP, LLC

11. Open the pass through lid/armrest (2) and using a (special tool #C-4755, Trim Stick) or equivalent, remove the pass through trim (1).

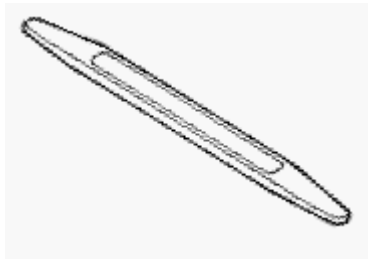


Fig. 670: Trim Stick
Courtesy of CHRYSLER GROUP, LLC

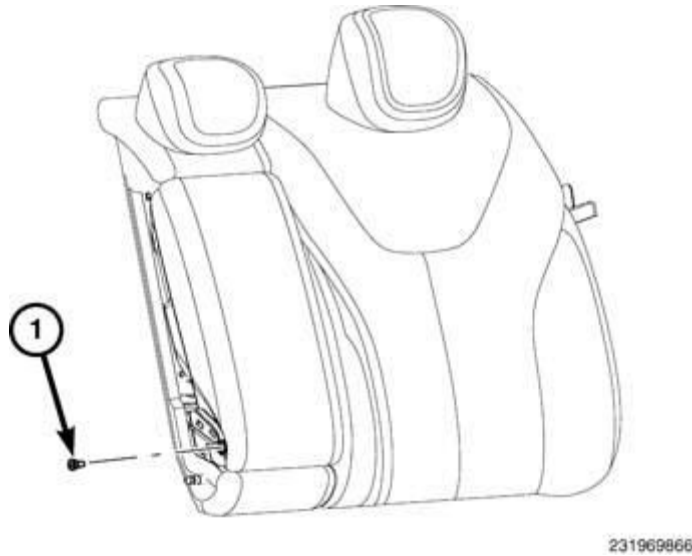


Fig. 671: Arm Rest Pivot Bolt
Courtesy of CHRYSLER GROUP, LLC

12. Remove the arm rest pivot bolt (1).

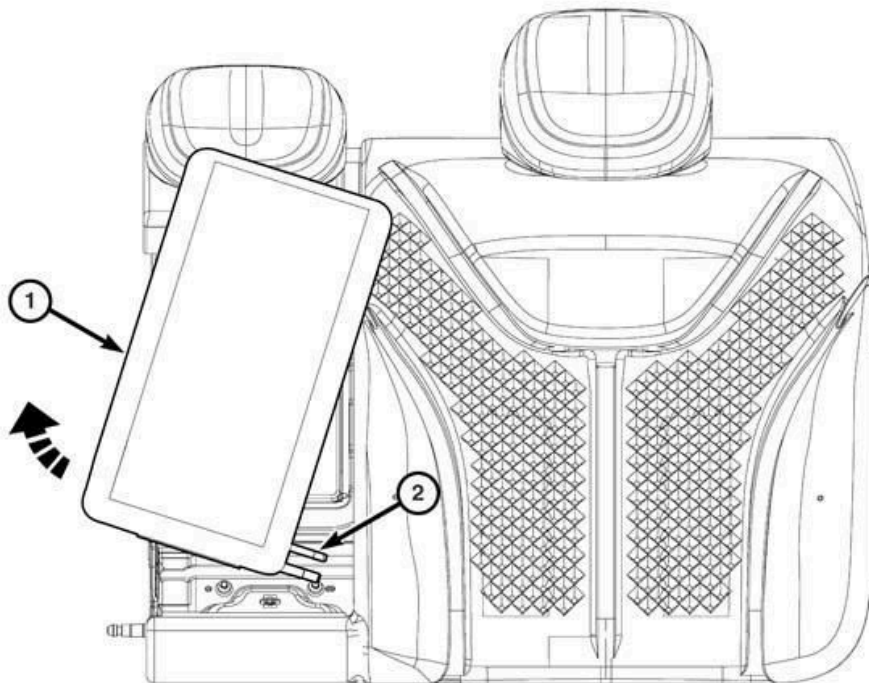


Fig. 672: Pivoting Armrest Assembly Out Of Support Bracket
Courtesy of CHRYSLER GROUP, LLC

13. Pivot the armrest assembly (1) out of the support bracket and off of the pivot and detent pins (2) and remove the armrest.

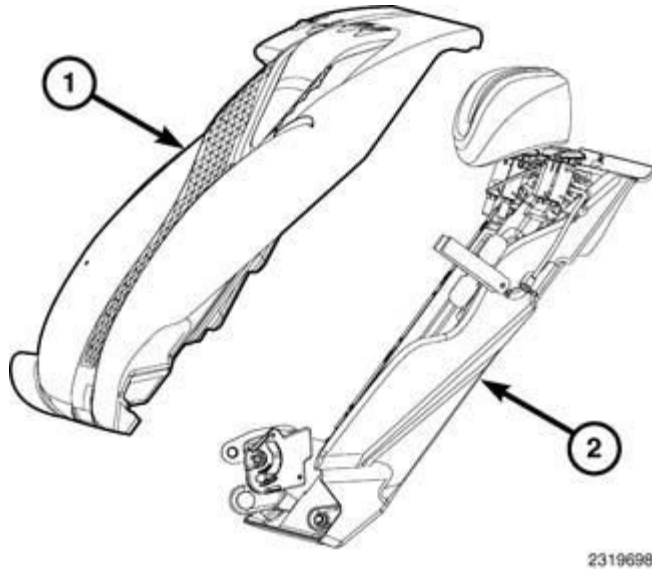


Fig. 673: Seat Back Cushion And Cover Assembly
Courtesy of CHRYSLER GROUP, LLC

14. Remove the seat cushion cover and cushion (1) from the seat back frame assembly.

INSTALLATION

INSTALLATION

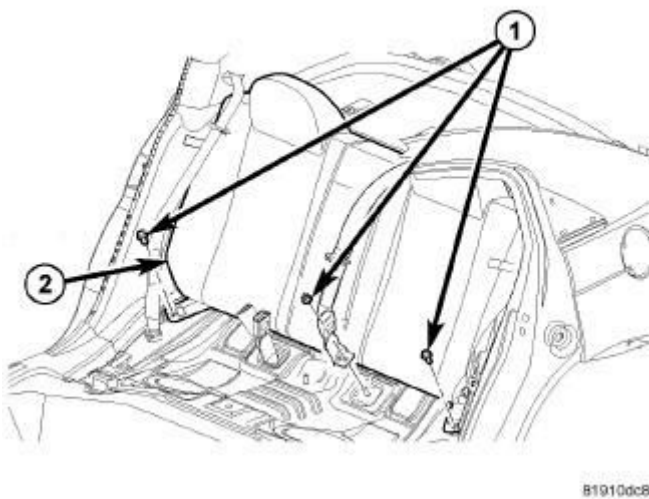


Fig. 674: Rear Seat Back
Courtesy of CHRYSLER GROUP, LLC

1. Carefully install the seat back cover to the foam, installing the hog rings.
2. Engage the J-hook at the bottom of the seat back cover.

3. Install the seat back to the frame.
4. Install the fastener to the side of the appropriate seat back.
5. Install the seat back to the vehicle. Refer to **SEATS, REAR** .

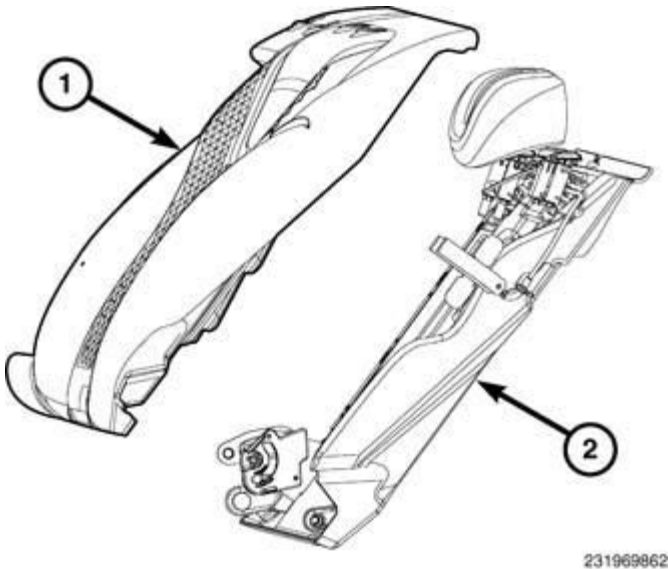
INSTALLATION - BENCH SEAT

Fig. 675: Seat Back Cushion And Cover Assembly
Courtesy of CHRYSLER GROUP, LLC

1. Position the seat back cushion and cover assembly (1) onto the seat back assembly.

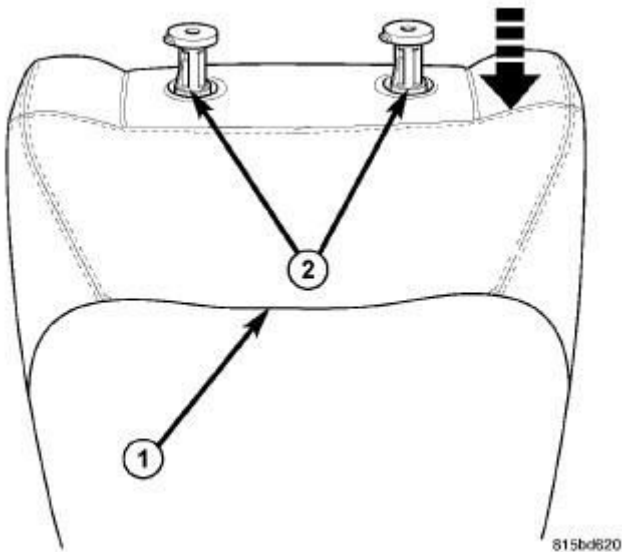
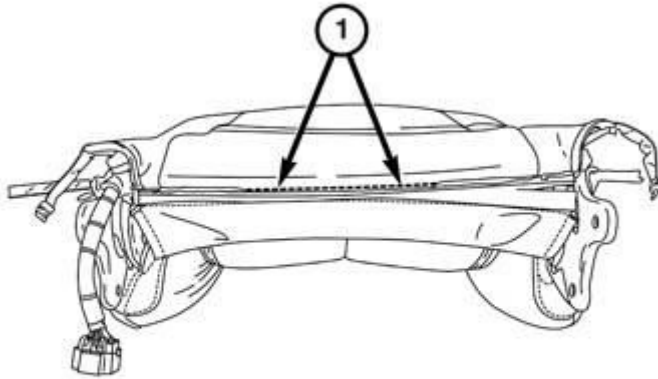


Fig. 676: Headrest Sleeve Install
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical front seat back and headrest sleeves shown, rear seat headrest sleeves typical.

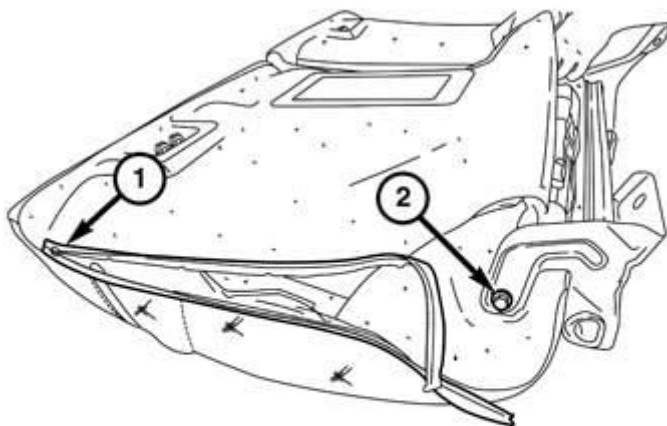
2. Install the headrest sleeves (2) by pushing down on the sleeve.



231968333

Fig. 677: Lower Zip Strips
Courtesy of CHRYSLER GROUP, LLC

3. Secure the lower zip strips (1), fully.



231968328

Fig. 678: Seat Back Cover
Courtesy of CHRYSLER GROUP, LLC

4. Close the side zippers (1) fully and tuck the zipper up into the seat back cover.

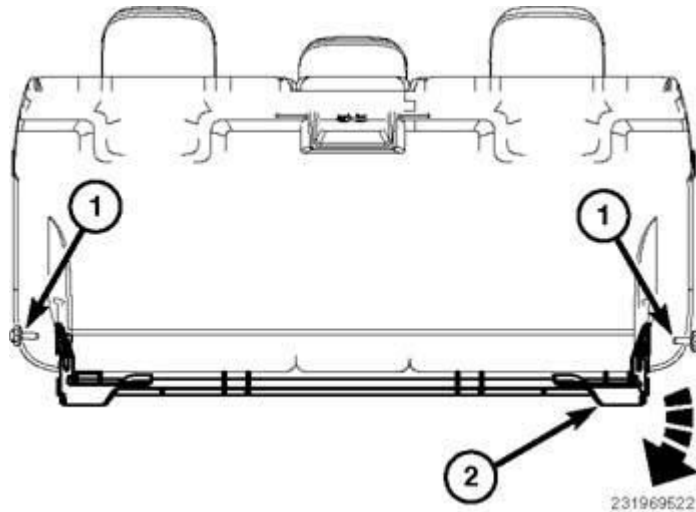


Fig. 679: Seat Back Mounting Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Install the rear seat back mounting bracket (2) onto the seat back assembly and install the bolts (1).
6. Tighten the bolts to (25 N.m 18 ft. lbs.).
7. Install the rear seat back assembly back into the vehicle. Refer to **SEATS, REAR**.

INSTALLATION - SPLIT SEAT

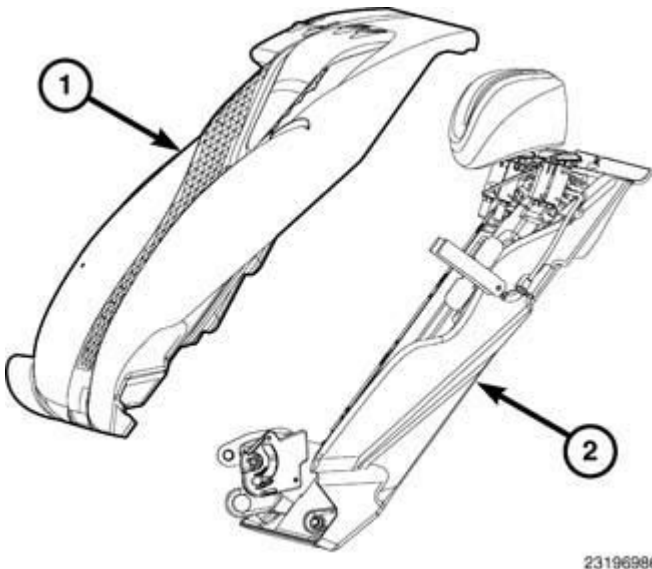


Fig. 680: Seat Back Cushion And Cover Assembly
Courtesy of CHRYSLER GROUP, LLC

NOTE: 40% seat back service is similar to the 60% seat back unless otherwise noted.

1. Position the seat back cushion and cover assembly (1) onto the seat back assembly.

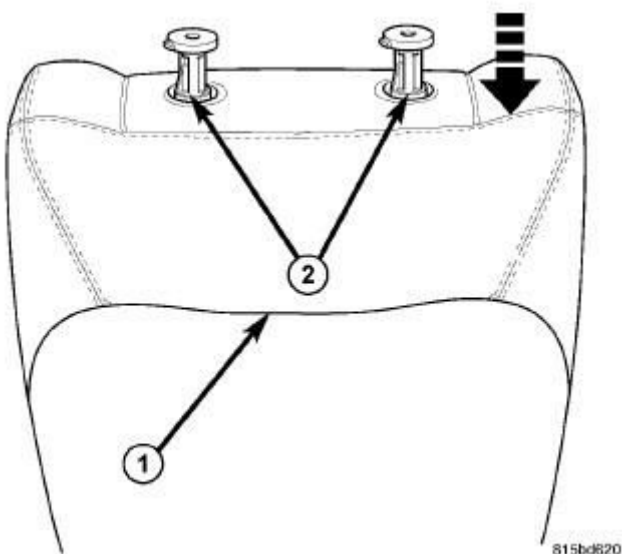


Fig. 681: Headrest Sleeve Install
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical front seat back and headrest sleeves shown, rear seat headrest sleeves typical.

2. Install the headrest sleeves (2) by pushing down on the sleeve.

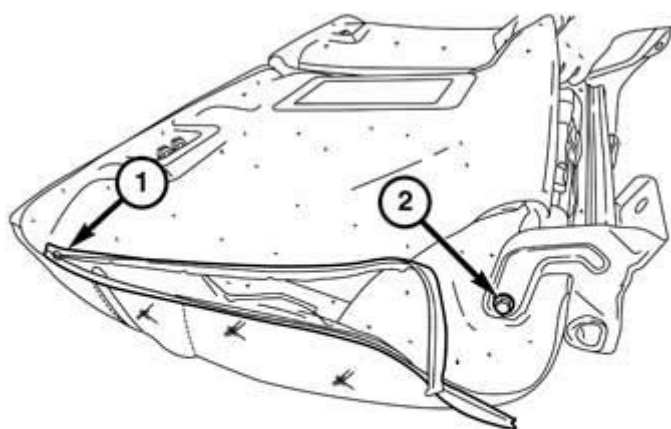
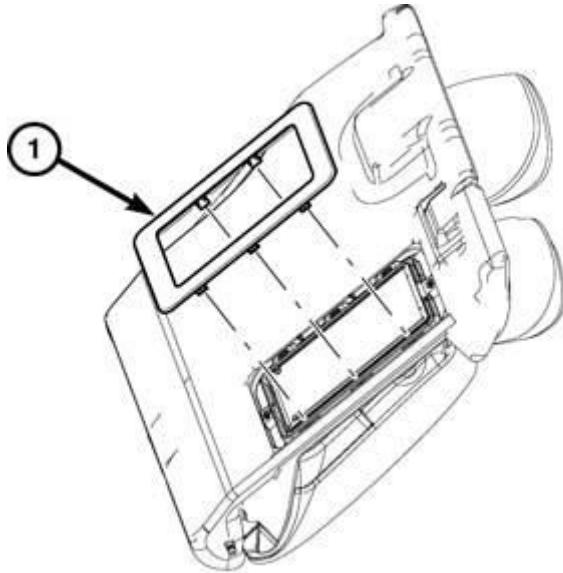


Fig. 682: Seat Back Cover
Courtesy of CHRYSLER GROUP, LLC

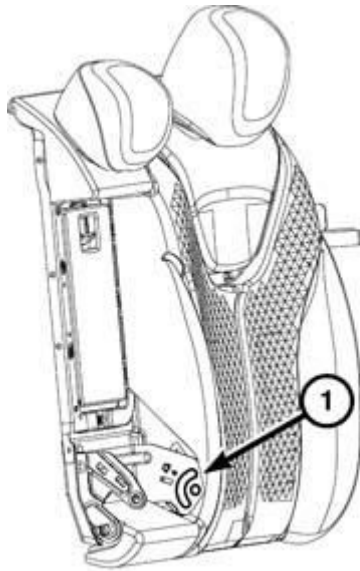
3. Close the side zippers (1) fully and tuck the zipper up into the seat back cover.



231969871

Fig. 683: Pass Through Door Trim Ring
Courtesy of CHRYSLER GROUP, LLC

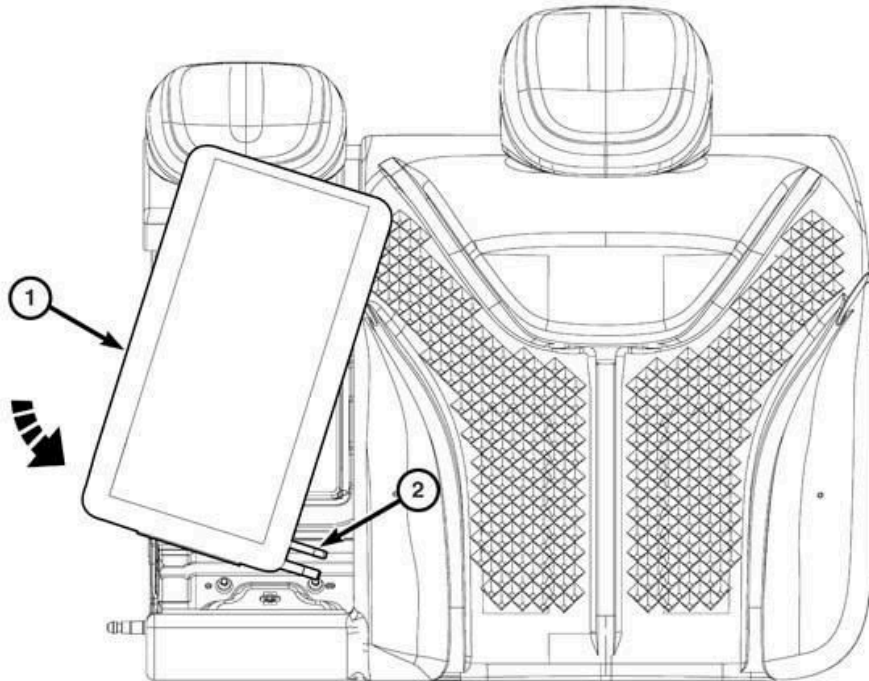
4. Position the pass through trim ring (1) onto the seat back and seat fully.



231969958

Fig. 684: Detent Slotted Guide
Courtesy of CHRYSLER GROUP, LLC

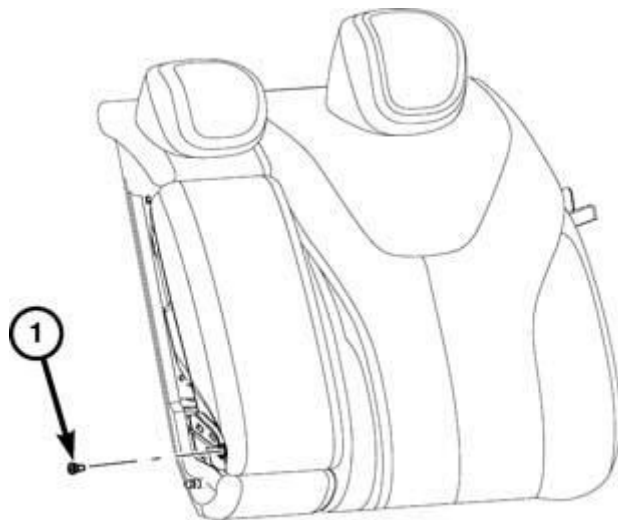
5. Locate the detent slotted guide (1) in the 60% seat back assembly.



231969866

Fig. 685: Positioning Armrest Assembly Back Into Place
Courtesy of CHRYSLER GROUP, LLC

6. Position the armrest assembly (1) back into place with the pivot pins (2) inserted into the detent slotted guide from the previous step and pivot the armrest down into the support bracket.



231969866

Fig. 686: Arm Rest Pivot Bolt
Courtesy of CHRYSLER GROUP, LLC

7. Install the armrest pivot bolt (1) and tighten to (25 N.m 18 ft. lbs.).

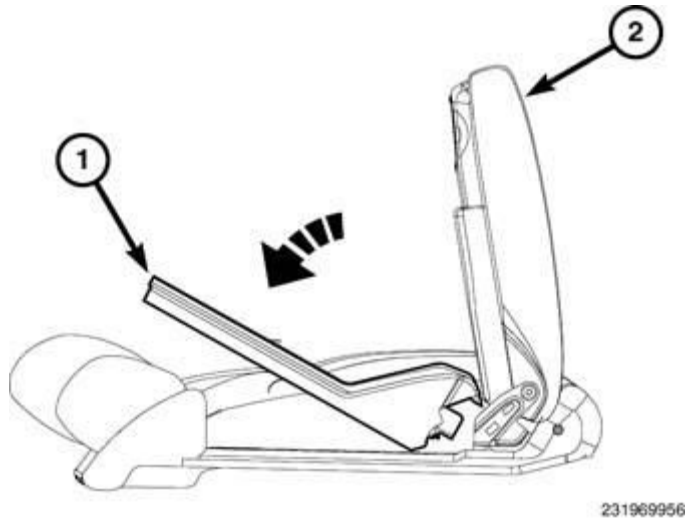


Fig. 687: Installing Pass Through Trim
Courtesy of CHRYSLER GROUP, LLC

8. Open the pass through lid/armrest (2) and install the trim panel (1).
9. Seat the trim panel (1), fully.

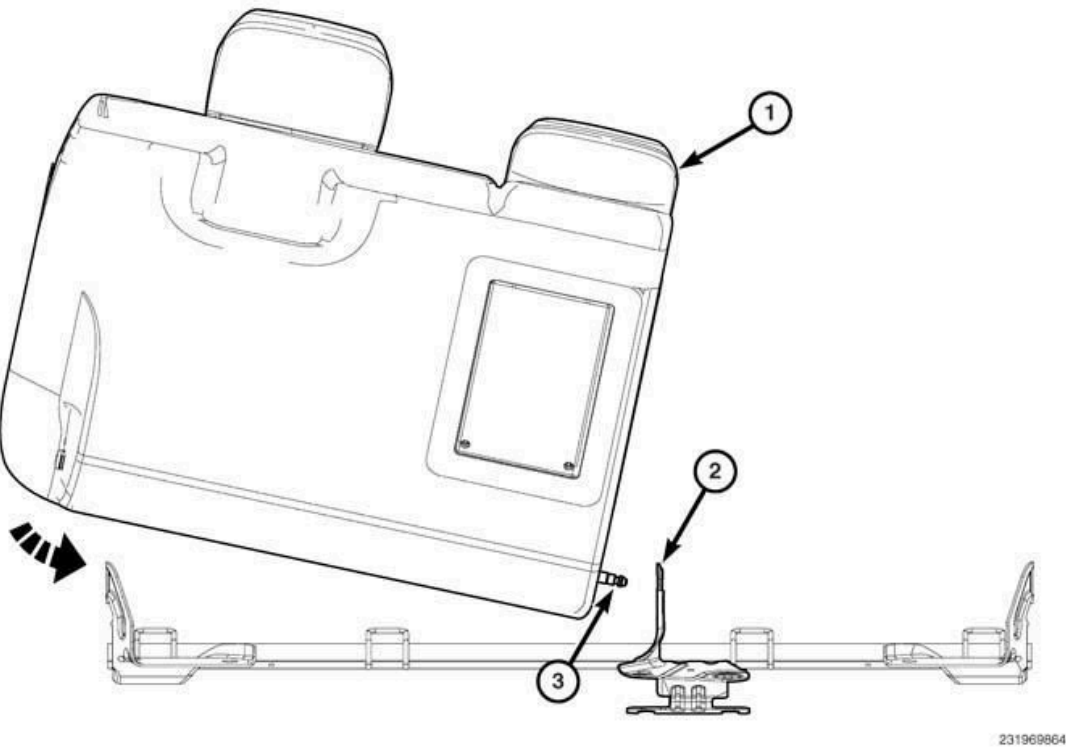


Fig. 688: Installing 60% Seat Back Assembly Into Support Bracket
Courtesy of CHRYSLER GROUP, LLC

10. Install the 60% seat back assembly (1) pivot pin (3) into the support bracket (2) and pivot down into the support bracket fully.

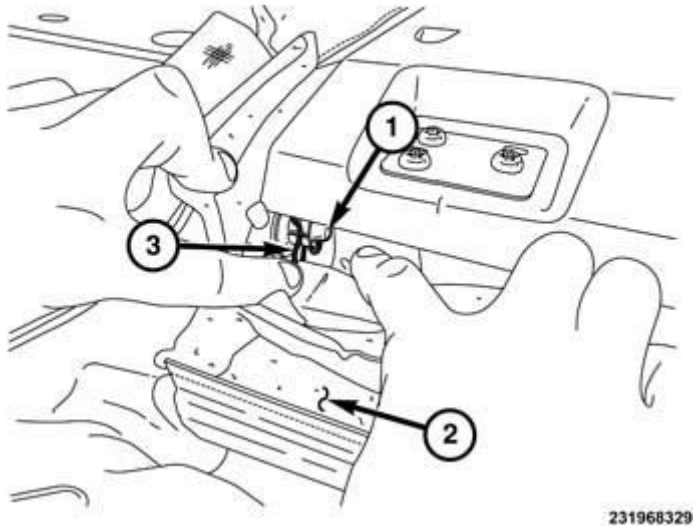


Fig. 689: Lower Cover, Retaining Clip & Pivot Pin
Courtesy of CHRYSLER GROUP, LLC

11. Verify that the retaining clip (3) is installed fully onto the 40% seat back pivot (1).

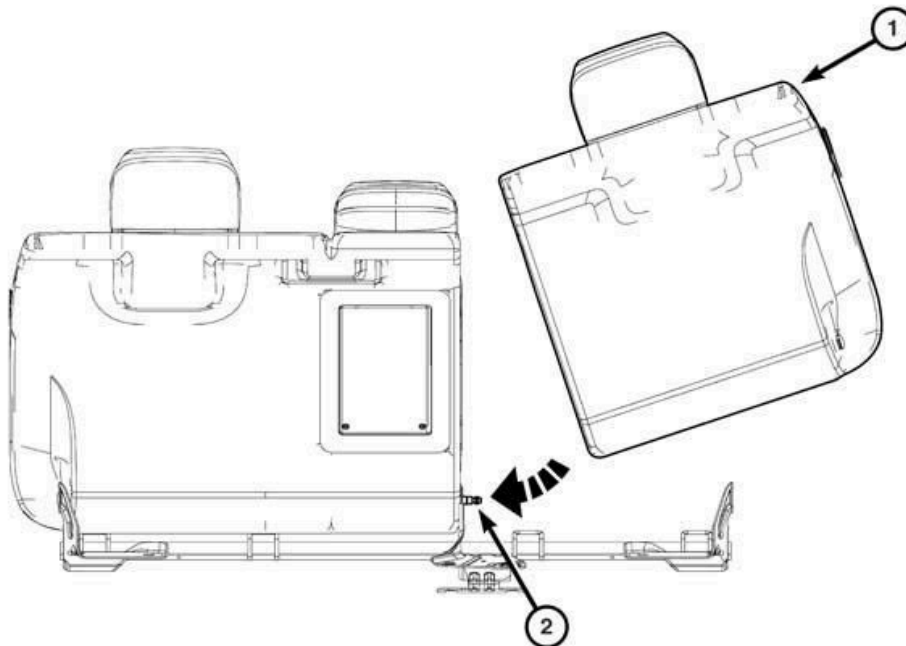


Fig. 690: Installing 40% Seat Back Assembly Into Support Bracket
Courtesy of CHRYSLER GROUP, LLC

12. Install the 40% seat back assembly (1) onto the pivot pin (2) and onto the support bracket fully.

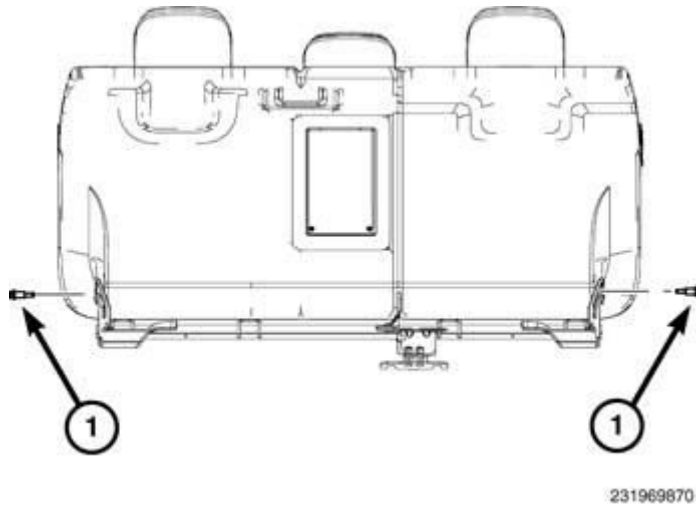


Fig. 691: Seat Back Support Bolts
Courtesy of CHRYSLER GROUP, LLC

13. Install the seat back pivot bolts (1) and tighten to (25 N.m 18 ft. lbs.)

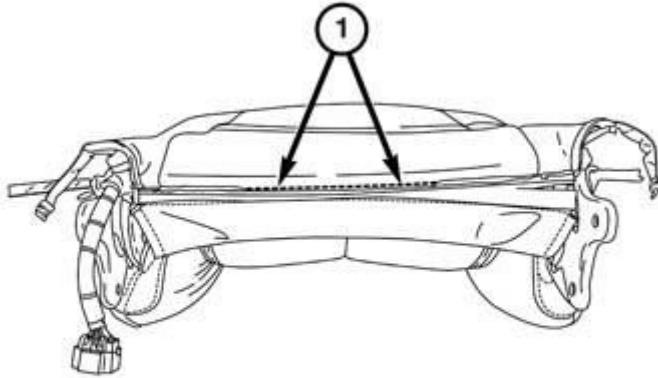
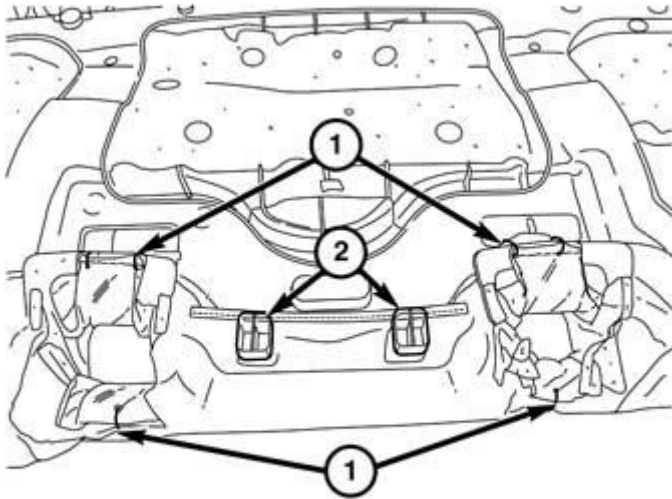


Fig. 692: Lower Zip Strips
Courtesy of CHRYSLER GROUP, LLC

14. Secure the lower zip strips (1), fully.
15. Install the rear seat back assembly back into the vehicle. Refer to **SEATS, REAR**.

COVER, SEAT CUSHION

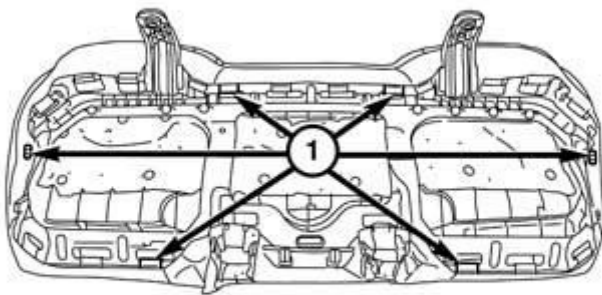
REMOVAL**REMOVAL**

231968324

Fig. 693: Hog Rings & Hooks

Courtesy of CHRYSLER GROUP, LLC

1. Remove the rear seat cushion. Refer to **COVER, SEAT CUSHION** .
2. Remove the hog rings (1) and separate the fabric from the hooks (2).

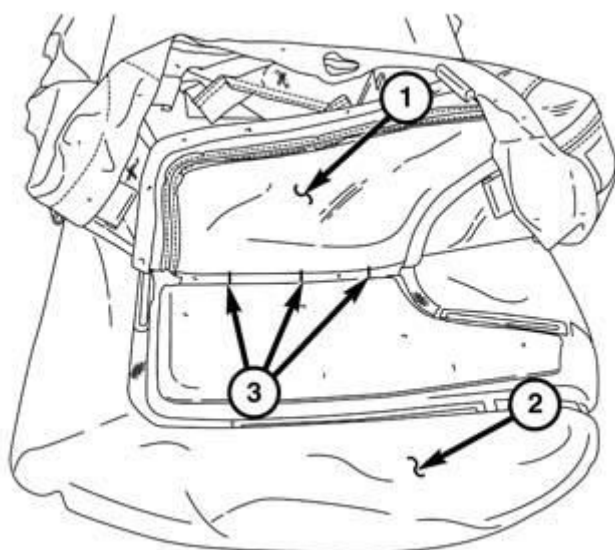


231968325

Fig. 694: J-Straps

Courtesy of CHRYSLER GROUP, LLC

3. Release the remaining j-strap (1) and separate the cushion and cover from the seat cushion frame.



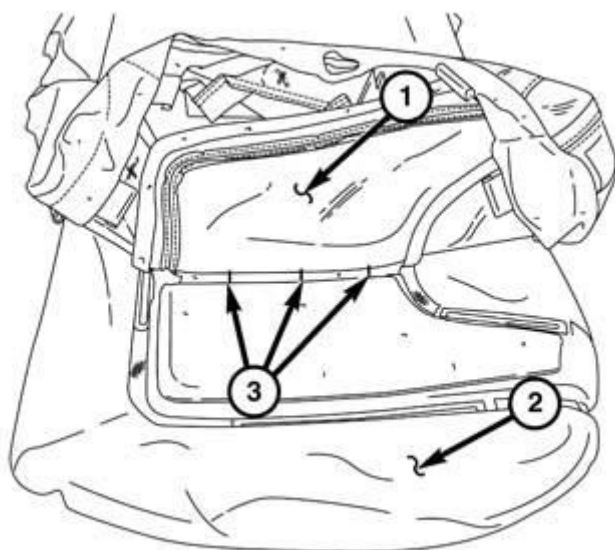
231968326

Fig. 695: Cover, Cushion & Hog Rings
Courtesy of CHRYSLER GROUP, LLC

4. Position aside the cover (1) and expose the hogs (3).
5. Remove the hog rings (3) and separate the cover (1) from the cushion (2).

INSTALLATION

INSTALLATION

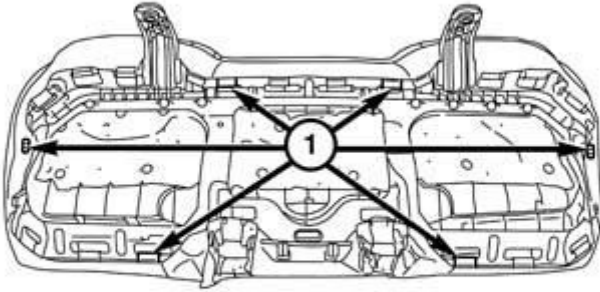


231968326

Fig. 696: Cover, Cushion & Hog Rings

Courtesy of CHRYSLER GROUP, LLC

1. Position the cover (1) onto the cushion (2) and install new hog rings (3).
2. Install the cover (1) over the cushion (2) and secure the hook and loop fasteners fully.

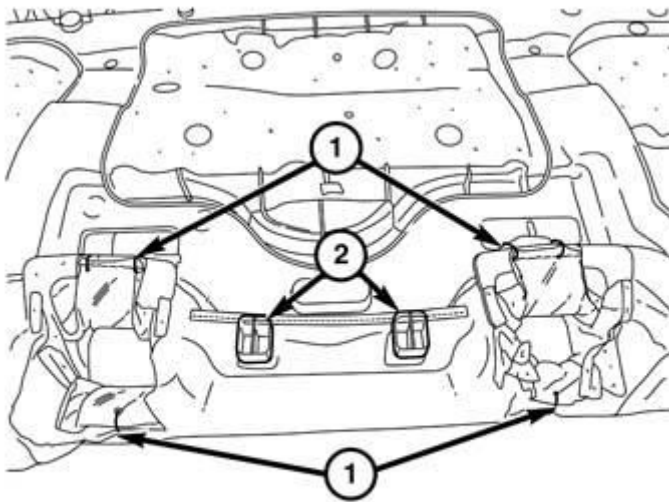


231968325

Fig. 697: J-Straps

Courtesy of CHRYSLER GROUP, LLC

3. Fasten the j-straps (1) around the perimeter of the seat frame.

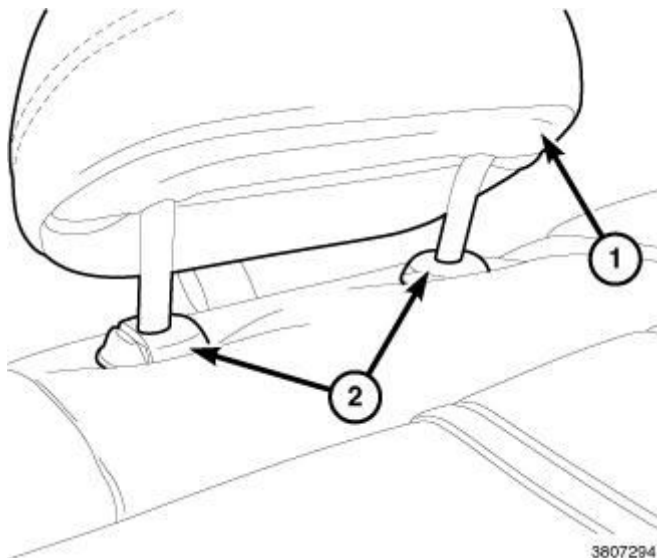


231968324

Fig. 698: Hog Rings & Hooks

Courtesy of CHRYSLER GROUP, LLC

4. Fasten the cover over the hooks (2) and install new hog rings (1).
5. Install the seat cushion assembly. Refer to **INSTALLATION** .

HEADREST**REMOVAL****REMOVAL****Fig. 699: Head Restraint & Guides****Courtesy of CHRYSLER GROUP, LLC**

1. Raise the head restraint (1) slightly.
2. At the same time, press both buttons on the head restraint guides (2) and pull upward to release the head restraint (1).
3. Remove the head restraint (1) from the seat back.

INSTALLATION**INSTALLATION**

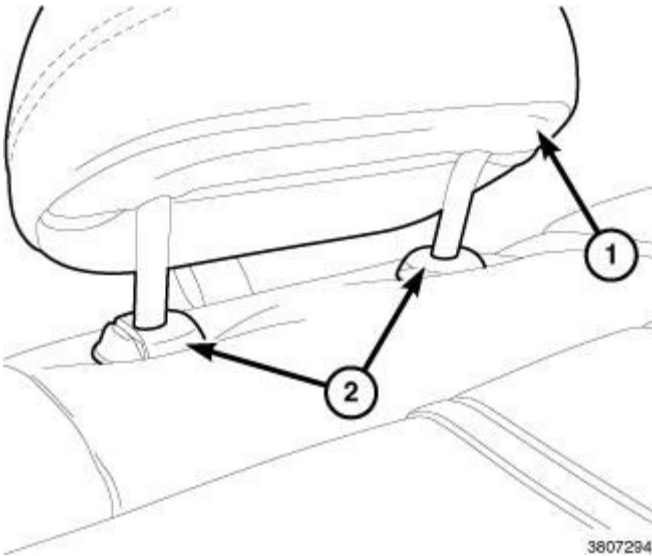


Fig. 700: Head Restraint & Guides

Courtesy of CHRYSLER GROUP, LLC

1. Place the head restraint (1) in position.
2. Push the head restraint (1) down into the lock position.
3. Raise the head restraint (1) to ensure it locks at the last stop.

STATIONARY GLASS

WARNING

WARNING

WARNING: Do not operate the vehicle within 24 hours of windshield installation. It takes at least 24 hours for urethane adhesive to cure. If it is not cured, the windshield may not perform properly in an accident.

- Urethane adhesives are applied as a system. Use glass cleaner, glass prep solvent, glass primer, PVC (vinyl) primer and pinch weld (fence) primer provided by the adhesive manufacturer. If not, structural integrity could be compromised.
- Chrysler does not recommend glass adhesive by brand. Technicians should review product labels and technical data sheets, and use only adhesives that their manufacturer's warrant will restore a vehicle to the requirements of FMVSS 212. Technicians should also insure that primers and cleaners are compatible with the particular adhesive used.
- Be sure to refer to the urethane manufacturer's directions for curing time specifications, and do not use adhesive after its expiration date.

- Vapors that are emitted from the urethane adhesive or primer could cause personal injury. Use them in a well-ventilated area.
- Skin contact with urethane adhesive should be avoided. Personal injury may result.
- Always wear eye and hand protection when working with glass.

Failure to follow these instructions may result in possible serious or fatal injury.

CAUTION: Protect all painted and trimmed surfaces from coming in contact with urethane or primers.

Be careful not to damage painted surfaces when removing moldings or cutting urethane around windshield.

GLASS, LIFTGATE

REMOVAL

REMOVAL

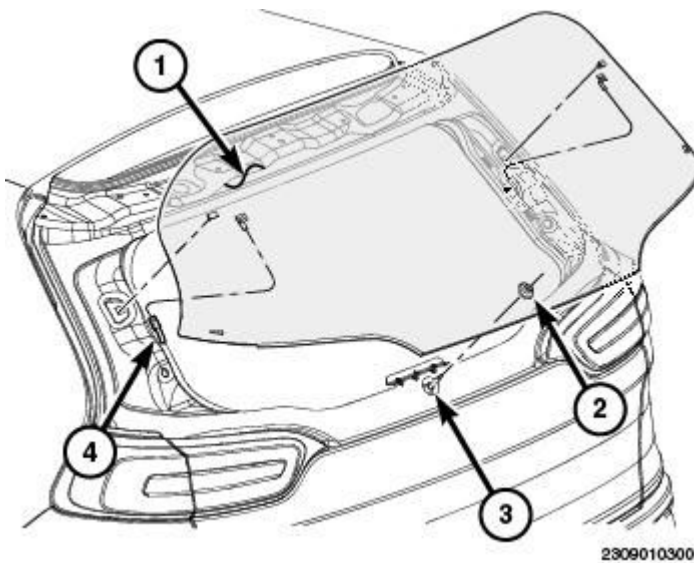


Fig. 701: Identifying Liftgate Glass, Rear Wiper Arm, Heated Backlite Electrical Connector & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Before proceeding with the following repair procedure, review all warnings and cautions. Refer to **STATIONARY GLASS, WARNING**.
2. Remove liftgate trim panels. Refer to **PANEL, TRIM, REMOVAL**.
3. Remove the spoiler. Refer to **SPOILER, REMOVAL**.
4. Remove rear window wiper arm (4), if equipped. Refer to **ARM, WIPER, REMOVAL**.

5. Disconnect the heated backlite electrical connectors (1), if equipped.

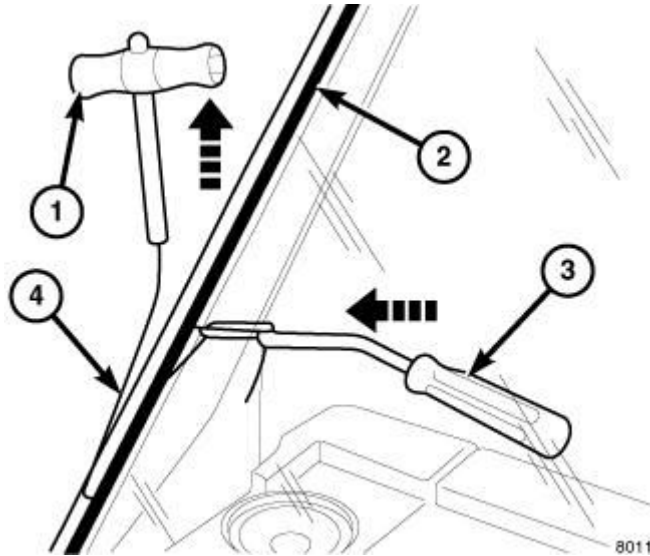


Fig. 702: Adhesive Separation
Courtesy of CHRYSLER GROUP, LLC

- | |
|--|
| 1 - T-HANDLE
2 - WINDSHIELD ADHESIVE
3 - COUNTER SUPPORT
4 - CUTTING WIRE |
|--|

NOTE: Windshield removal shown, backlite similar.

6. Using a windshield cut-out wire or other suitable tool, separate the adhesive.
7. Carefully remove backlite.

INSTALLATION

INSTALLATION

WARNING: Allow the urethane at least 24 hours to cure before returning the vehicle to use.

CAUTION: Roll down the left and right front door glass and open the rear glass slider (if available) before installing backlite to avoid pressurizing the passenger compartment if a door is slammed before urethane is cured. Water leaks can result.

NOTE: The backlite fence should be cleaned of most of its old urethane bonding material. A small amount of old urethane, approximately 1-2 mm in height,

should remain on the fence. Do not grind off or completely remove all old urethane from the fence, the paint finish and bonding strength will be adversely affected. Support spacers should be replaced with new parts. Replace any missing or damaged spacers around the perimeter of the liftgate opening.

GLASS PREPARATION - INSTALLING A PREVIOUSLY INSTALLED BACKLITE

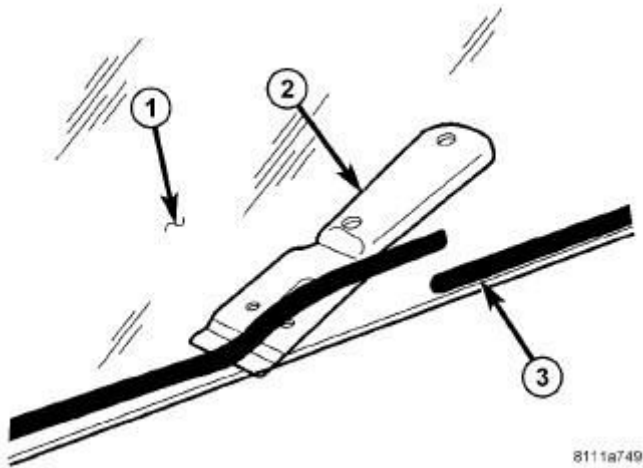


Fig. 703: Glass Adhesive Preparation
Courtesy of CHRYSLER GROUP, LLC

- | |
|---|
| 1 - WINDSHIELD
2 - SCRAPER
3 - OLD ADHESIVE |
|---|

1. Before proceeding with the following repair procedure, review all warnings and cautions. Refer to **STATIONARY GLASS, WARNING.**
2. Level old bead of backlite adhesive (3) to a thickness of approximately 1 mm (0.04 in.) and remove loose adhesive.

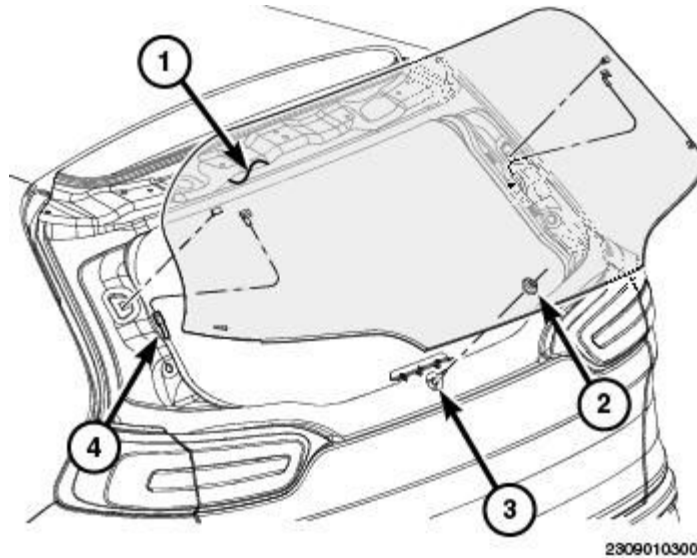


Fig. 704: Identifying Liftgate Glass, Rear Wiper Arm, Heated Backlite Electrical Connector & Fasteners

Courtesy of CHRYSLER GROUP, LLC

3. Position the backlite glass over the wiper shaft (5) and onto the liftgate.
4. Position backlite in center of liftgate opening and resting on the guide pins (2)

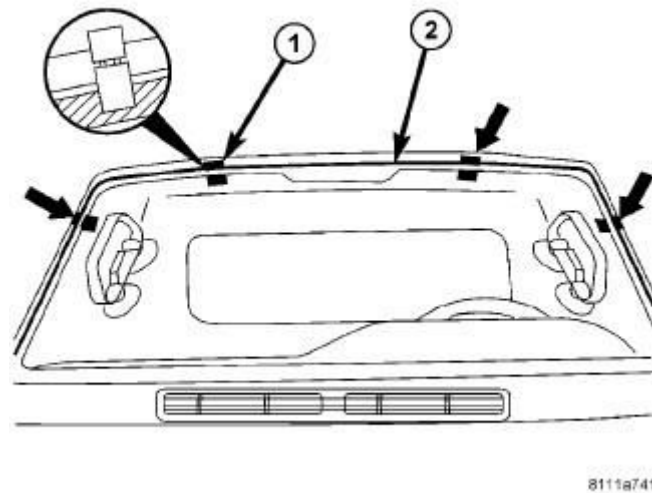


Fig. 705: Applying Adhesive Tape To Windshield

Courtesy of CHRYSLER GROUP, LLC

- | |
|----------------------|
| 1 - TAPE |
| 2 - WINDSHIELD FRAME |

5. Apply adhesive tape strips (1) around the perimeter of the liftgate opening to aid in installation.

NOTE: Windshield installation shown, backlite similar.

6. Verify the backlite gap is parallel to with the liftgate opening.
7. Cut tape with a sharp knife and remove backlite.

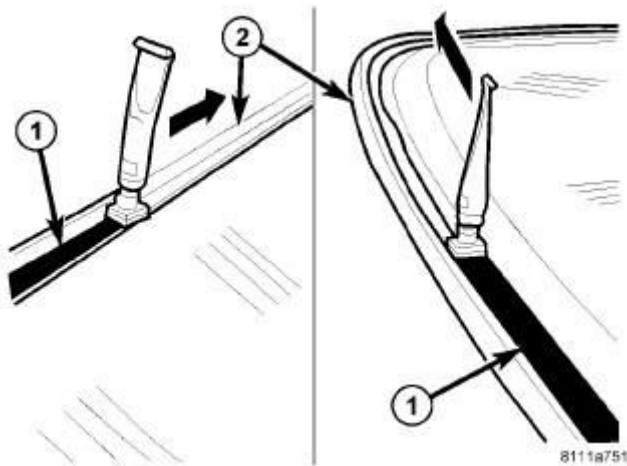


Fig. 706: Windshield Primer
Courtesy of CHRYSLER GROUP, LLC

- | |
|-----------------------------------|
| 1 - PRIMER
2 - WINDSHIELD SEAL |
|-----------------------------------|

NOTE: Typical primer installation shown.

8. Clean and dry area of glass (2) to be re-glued with a suitable glass preparation solvent and rag.
9. Using a flash light, verify that glass primer is without damage.
10. Re-prime any damaged area. If old adhesive has been exposed for more than 12 hours, entire adhesive area needs to be re-primed.

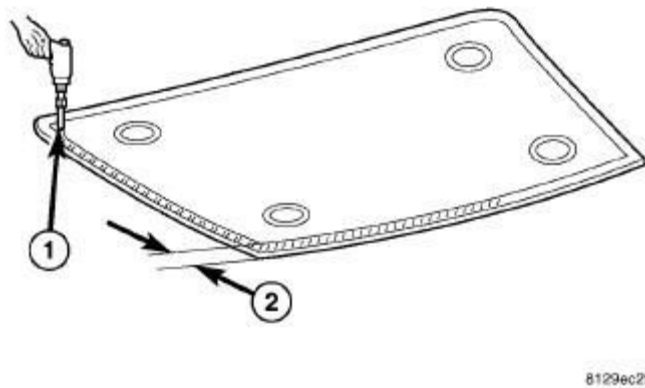


Fig. 707: Applying Primer
Courtesy of CHRYSLER GROUP, LLC

11. Apply primer (1) around the perimeter of the glass to a width of 15 mm (0.5 in.) (2).
12. Allow primer to air dry for at least 10 minutes.
13. Using a flash light, verify that glass primer is without damage.

GLASS PREPARATION - INSTALLING A NEW BACKLITE

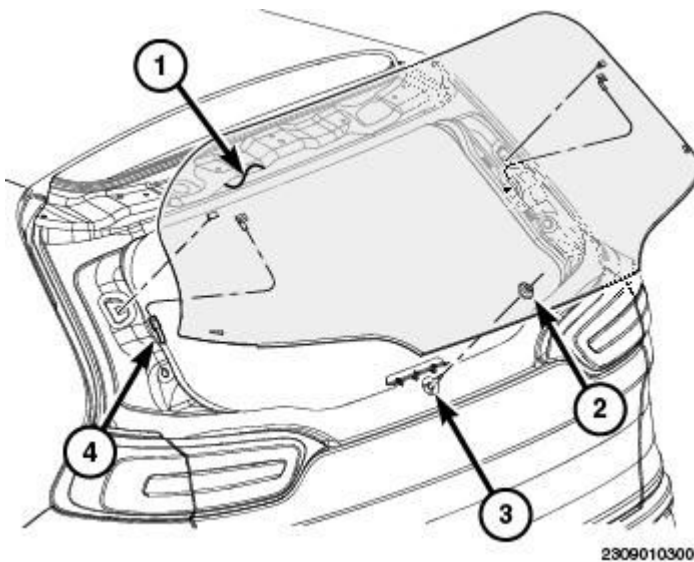
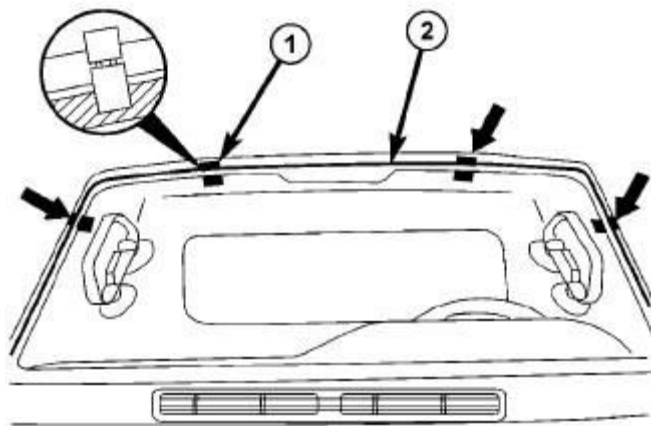


Fig. 708: Identifying Liftgate Glass, Rear Wiper Arm, Heated Backlite Electrical Connector & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Position the backlite glass over the wiper shaft (5) and onto the liftgate.
2. Position backlite in center of liftgate opening and resting on the guide pins (2)



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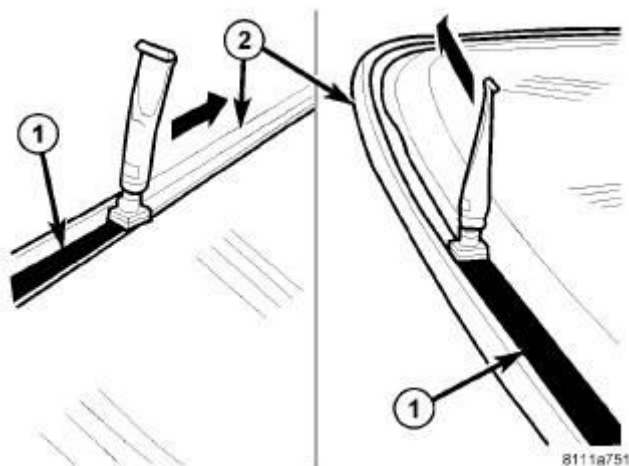
Fig. 709: Applying Adhesive Tape To Windshield
Courtesy of CHRYSLER GROUP, LLC

- | |
|---|
| <p>1 - TAPE</p> <p>2 - WINDSHIELD FRAME</p> |
|---|

3. Apply adhesive tape strips (1) around the perimeter of the liftgate opening to aid in installation.

NOTE: Windshield installation shown, backlite similar.

4. Verify the backlite gap is parallel to with the liftgate opening.
5. Cut tape with a sharp knife and remove backlite.



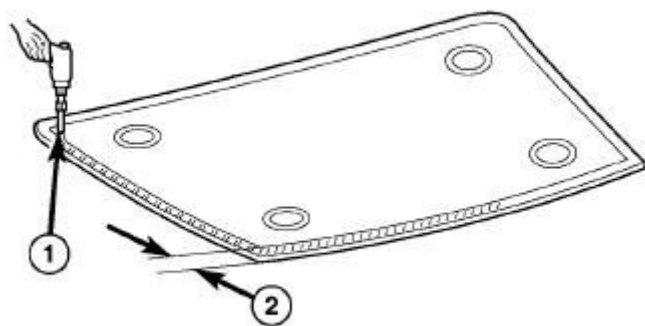
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Fig. 710: Windshield Primer
Courtesy of CHRYSLER GROUP, LLC

- 1 - PRIMER
- 2 - WINDSHIELD SEAL

NOTE: Typical primer installation shown.

6. Clean and dry area of glass (2) to be re-glued with a suitable glass preparation solvent and rag.
7. Apply primer to gluing surface at backlite seal.

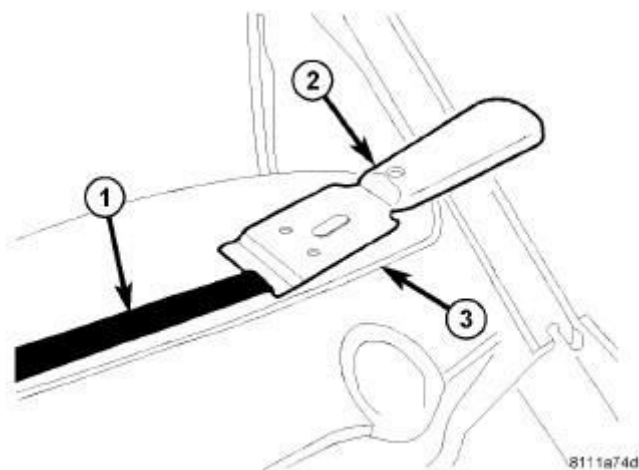


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Fig. 711: Applying Primer
Courtesy of CHRYSLER GROUP, LLC

8. Apply primer (1) around the perimeter of the glass to a width of 15 mm (0.5 in.) (2).
9. Allow primer to air dry for at least 10 minutes.
10. Using a flash light, verify that glass primer is without damage.

LIFTGATE OPENING PREPARATION



8111a74d

Fig. 712: Smoothing Windshield Adhesive
Courtesy of CHRYSLER GROUP, LLC

- 1 - OLD ADHESIVE
- 2 - SCRAPER
- 3 - WINDSHIELD OPENING

NOTE: Windshield opening shown, liftgate opening similar.

1. Clean and vacuum liftgate opening.
2. Level old bead of liftgate opening adhesive (1) to a thickness of approximately 1 mm (0.04 in.) and remove loose adhesive.

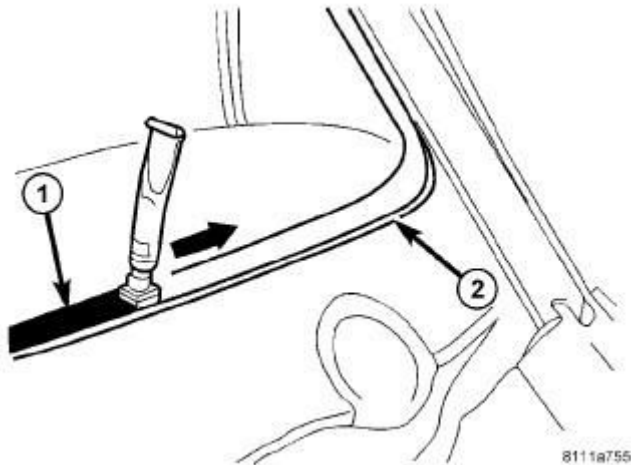


Fig. 713: Applying Windshield Primer
Courtesy of CHRYSLER GROUP, LLC

- 1 - PRIMER
- 2 - WINDSHIELD OPENING

NOTE: Windshield opening shown, liftgate opening similar.

3. Clean and dry area of liftgate opening to be re-glued with a suitable glass preparation solvent and rag.
4. Re-prime any damaged area. If old adhesive has been exposed for more than 12 hours, entire adhesive area needs to be re-primed.
5. Allow primer to air dry for at least 10 minutes.

BACKLITE INSTALLATION

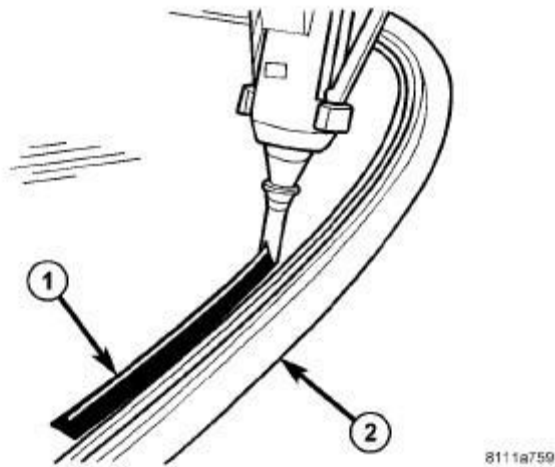


Fig. 714: Applying Windshield Adhesive
 Courtesy of CHRYSLER GROUP, LLC

- 1 - ADHESIVE BEAD
- 2 - WINDSHIELD SEAL

1. Apply bead of adhesive (1) with a triangular nozzle directly to the backlite seal starting at bottom in center of the backlite.

CAUTION: Always apply bead of adhesive to the backlite. Always install the backlite within 5 minutes after applying adhesive.

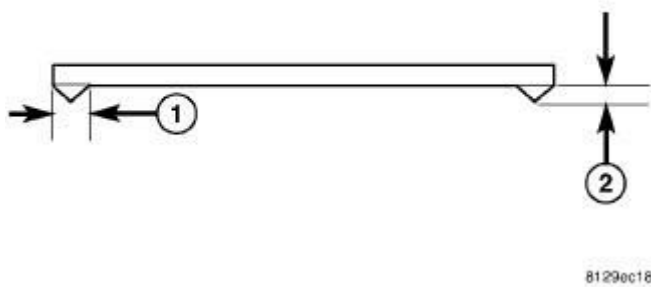


Fig. 715: Identifying Adhesive Bead Dimensions
 Courtesy of CHRYSLER GROUP, LLC

- 1 - ADHESIVE WIDTH 9.5 mm (0.375 in)
- 2 - ADHESIVE HEIGHT 12.7 mm (0.50 in)

2. Bead dimensions should be approximately 9.5 mm wide (1) by 12.7 mm in height (2).

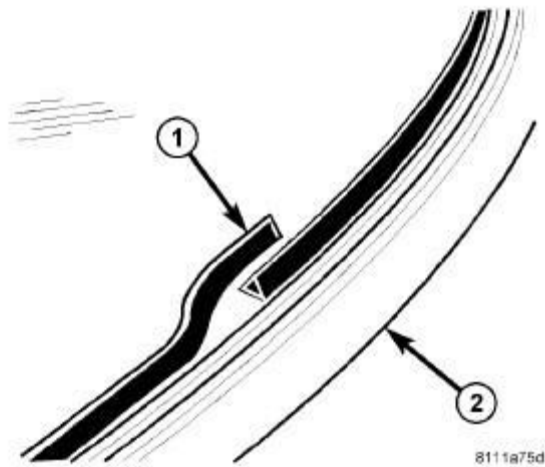


Fig. 716: Identifying Windshield Adhesive Overlap
Courtesy of CHRYSLER GROUP, LLC

1 - ADHESIVE BEAD
2 - WINDSHIELD SEAL

3. Allow end of adhesive bead (1) to run out parallel to the start of the bead and smooth ends flush.

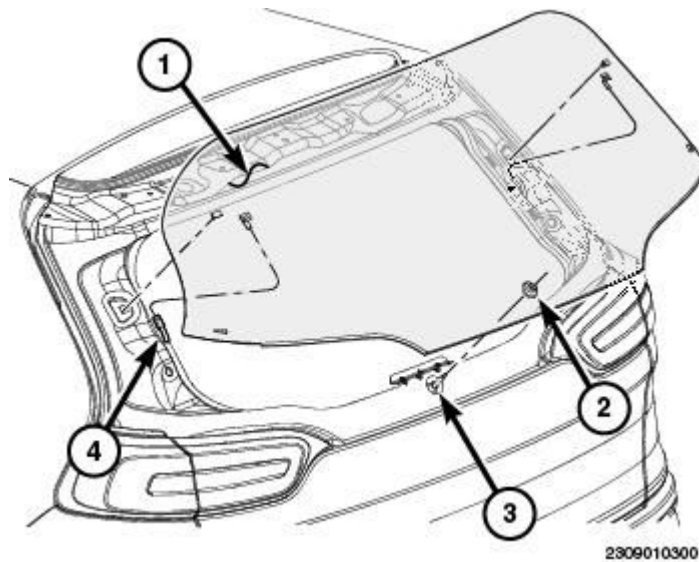


Fig. 717: Identifying Liftgate Glass, Rear Wiper Arm, Heated Backlite Electrical Connector & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Position the backlite glass over the wiper shaft (5) and onto the liftgate.
5. Position backlite in center of liftgate opening and resting on the guide pins (2).
6. Use the tape as a guide to aid installation of the backlite into the center of the cutout.
7. Carefully lay down the backlite and press on.

CAUTION: It is no longer possible to move the backlite after installation. The backlite should never be pressed into place by more than one person, because the backlite can break if pressed simultaneously on both sides.

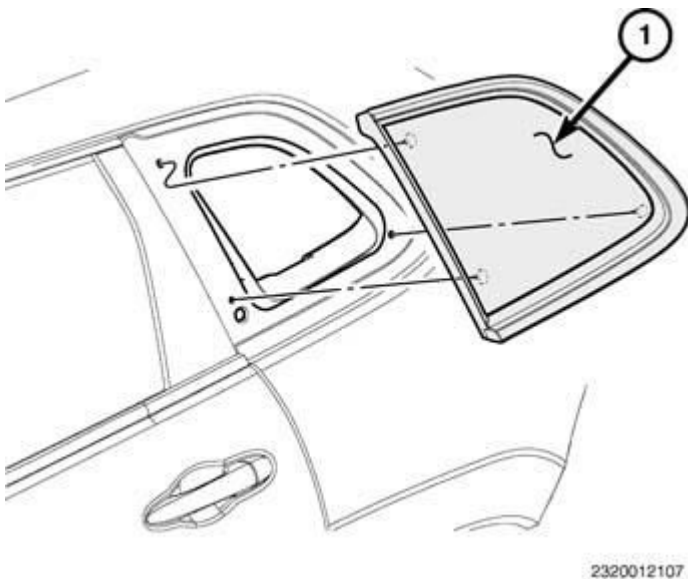
CAUTION: Roll down the left and right front door glass and open the rear glass slider (if available) before installing backlite to avoid pressurizing the passenger compartment if a door is slammed before urethane is cured. Water leaks can result.

8. Install the rear wiper arm, if equipped. Refer to ARM, WIPER, INSTALLATION.
9. Install the liftgate trim panels. Refer to PANEL, TRIM, INSTALLATION.
10. Install the spoiler. Refer to SPOILER, INSTALLATION.

GLASS, QUARTER

REMOVAL

REMOVAL



2320012107

Fig. 718: Identifying Quarter Glass
Courtesy of CHRYSLER GROUP, LLC

1. Before proceeding with the following repair procedure, review all warnings and cautions. Refer to STATIONARY GLASS, WARNING.
2. Remove the upper quarter trim from the side of the vehicle being serviced. Refer to PANEL, QUARTER TRIM, REMOVAL.
3. Reposition the headliner on the side of the vehicle being serviced as necessary.

CAUTION: Be careful not to damage painted surfaces when removing moldings or cutting urethane around the fixed glass/windshield.

4. Using a razor knife, cut the urethane adhesive that secures the quarter glass (1) to window fence (2).
5. Carefully push the quarter window glass (1) from the opening.

INSTALLATION

INSTALLATION

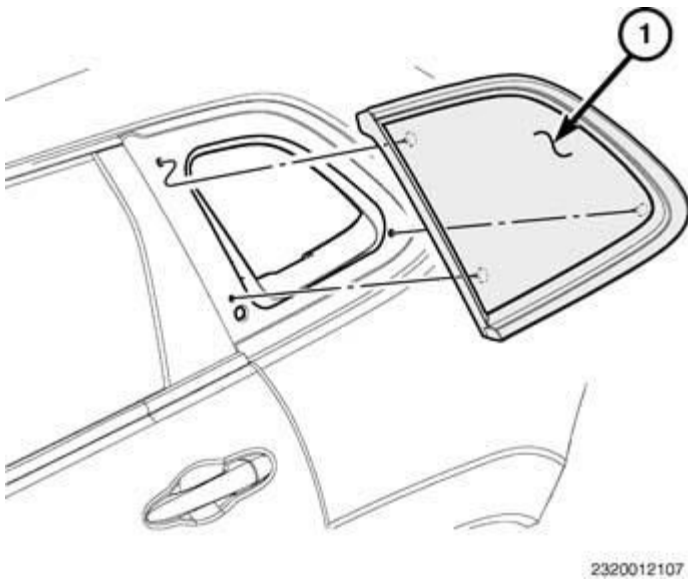


Fig. 719: Identifying Quarter Glass
Courtesy of CHRYSLER GROUP, LLC

WARNING: Do not operate the vehicle within 24 hours of quarter glass installation. It takes at least 24 hours for urethane adhesive to cure. If it is not cured, the quarter glass may not perform properly if the vehicle is in an accident.

CAUTION: To help prevent water leaks, partially roll down the left and right door glass before installing the quarter glass. This avoids pressurizing the passenger compartment if a door is slammed before the urethane is cured.

CAUTION: Protect all painted and trimmed surfaces from coming in contact with urethane or primers.

NOTE: To prevent corrosion, do not damage paint on the quarter glass fence when removing original urethane.

NOTE: The quarter glass fence should be cleaned of most of its old urethane adhesive.

A small amount of old urethane, approximately 1 mm (.04 in.) in height should remain on the fence. Do not completely remove all old urethane from the fence, the paint finish and bonding strength will be adversely affected.

1. Using a razor knife, level the original bead of urethane on the fence to a thickness of approximately 1 mm (0.04 in.).
2. If the quarter glass (1) is being reused, remove as much of the original urethane as possible from the glass surface using a razor knife.

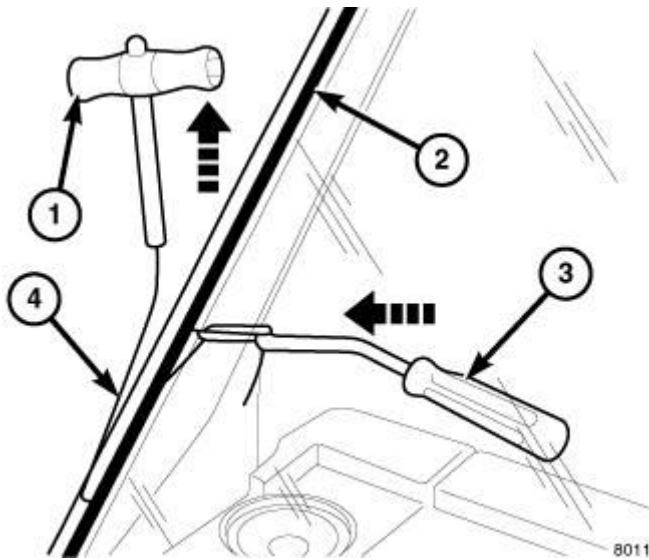
WARNING: Do not use solvent based glass cleaners to clean the quarter glass before applying glass prep and primer or poor glass adhesion may result.

3. Clean the inside of the quarter glass (1) with an ammonia based glass cleaner and a lint-free cloth.
4. Apply glass prep adhesion promoter 25 mm (1 in.) wide around the perimeter of the glass and 5 mm (0.2 in.) from the edge of the glass and wipe dry with a clean lint-free cloth until no streaks are visible.
5. Apply glass primer 25 mm (1 in.) wide around the perimeter of the glass and 5 mm (0.2 in.) from the edge of the glass. Allow at least three minutes drying time.
6. Using a flashlight, verify that the primer is completely and evenly installed along the perimeter of the quarter glass.
7. Re-prime any area that is not fully and evenly primed.
8. Clean the quarter glass fence with an ammonia based glass cleaner and a lint-free cloth.
9. Apply pinch weld primer 15 mm (0.75 in.) wide around the quarter glass fence. Allow at least three minutes drying time.
10. Using a flashlight, verify that the primer is completely and evenly installed along the quarter glass fence.
11. Re-prime any area that is not fully and evenly primed.

CAUTION: Always apply the bead of adhesive to the quarter glass. Always install the quarter glass within 5 minutes after applying the adhesive.

NOTE: If the original urethane adhesive has been exposed for more than 12 hours, the entire adhesive area will need to be re-primed prior to installing new adhesive.

12. Apply approximately a 10 mm (0.4 in.) wide bead of adhesive with a triangular nozzle approximately 6 mm (0.230 in.) from the edge of the glass starting at the bottom center of the quarter glass.
13. Run the end of the adhesive bead on the quarter glass parallel to the start of the bead and smooth the ends flush.
14. Place the quarter glass (1) into the window opening (2) and insert mounting studs through the holes in the window fence.
15. Position the headliner as necessary.
16. Install the quarter trim. Refer to **PANEL, QUARTER TRIM, INSTALLATION**.

WINDSHIELD**REMOVAL****REMOVAL****Fig. 720: Adhesive Separation**

Courtesy of CHRYSLER GROUP, LLC

1. Before proceeding with the following repair procedure, review all warnings and cautions.
2. Disconnect and isolate the negative battery cable.
3. Remove the rear view mirror. Refer to **MIRROR, REARVIEW, REMOVAL**.
4. Remove the exterior cowl panel. Refer to **COVER, COWL PANEL, REMOVAL**.

CAUTION: Be careful not to damage painted surfaces when removing moldings or cutting urethane around the windshield.

5. Remove the molding from the top of the windshield.
6. Using an assistant and a wire-type windshield cut-out tool (1, 3 and 4), cut and separate the urethane adhesive (2) securing the windshield to the windshield fence.

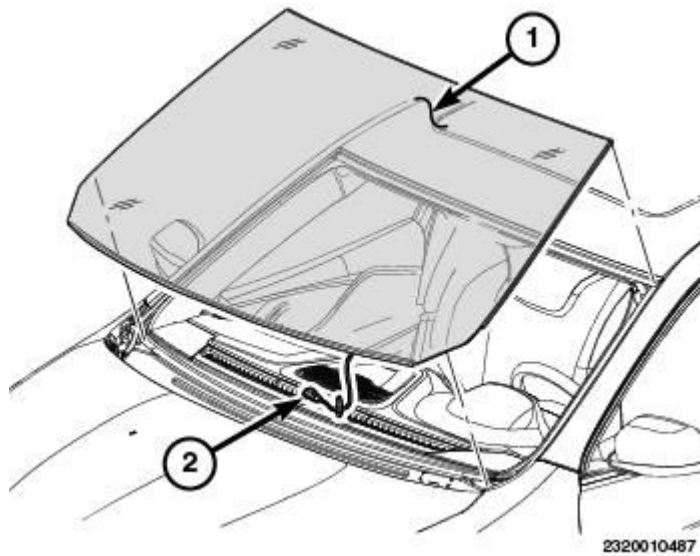


Fig. 721: Identifying Windshield & Harness Connector
Courtesy of CHRYSLER GROUP, LLC

7. Using appropriate tools, carefully remove the windshield (1) from the vehicle.

INSTALLATION

INSTALLATION

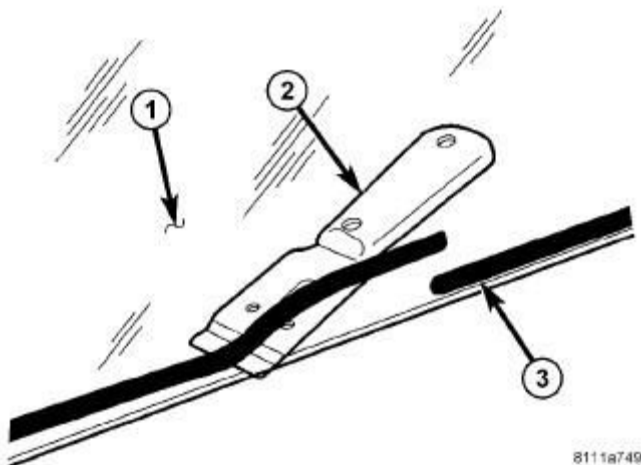


Fig. 722: Removing Old Windshield Adhesive
Courtesy of CHRYSLER GROUP, LLC

WARNING: Do not operate the vehicle within 24 hours of windshield installation. It takes at least 24 hours for urethane adhesive to cure. If it is not cured, the windshield may not perform properly if the vehicle is in an accident.

CAUTION: To help prevent water leaks, partially roll down the left and right door

glass before installing the windshield. This avoids pressurizing the passenger compartment if a door is slammed before the urethane is cured.

CAUTION: Protect all painted and trimmed surfaces from coming in contact with urethane or primers.

1. If the windshield (1) is being reused, remove as much of the original urethane (3) as possible from the glass surface using a razor knife (2).

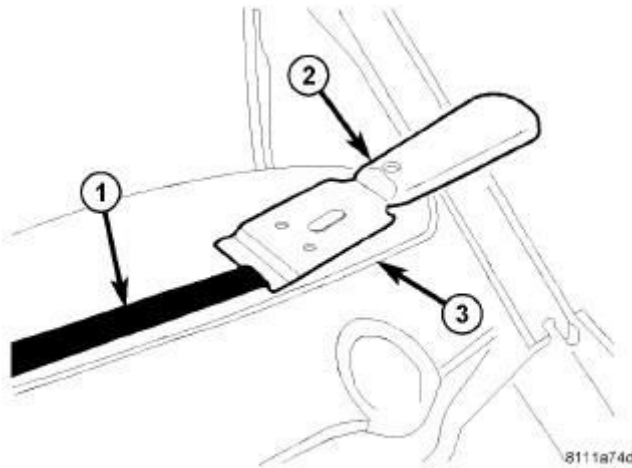


Fig. 723: Leveling Windshield Adhesive
Courtesy of CHRYSLER GROUP, LLC

NOTE: To prevent corrosion, do not damage paint on windshield fence when removing original urethane.

NOTE: The windshield fence should be cleaned of most of its old urethane adhesive. A small amount of old urethane, approximately 1 mm (.04 in.) in height should remain on the fence. Do not completely remove all old urethane from the fence, the paint finish and bonding strength will be adversely affected. Support spacers located near the cowl at the bottom of the windshield fence should be replaced with new spacers. Replace any missing or damaged spacers around the perimeter of the windshield fence.

2. Using a razor knife (2), level the original bead of urethane (1) on the windshield fence (3) to a thickness of approximately 1 mm (0.04 in.) and remove any damaged adhesive backed spacers.

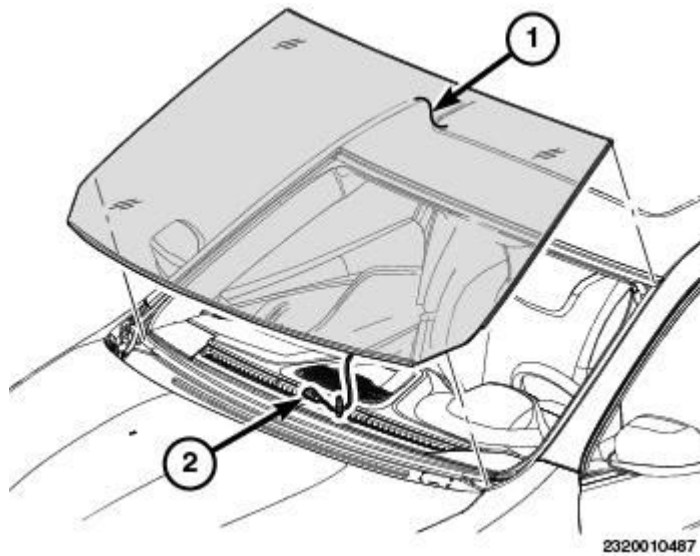


Fig. 724: Identifying Windshield & Harness Connector
Courtesy of CHRYSLER GROUP, LLC

3. Install new adhesive backed spacers (2) along the windshield fence as required.
4. Install a new rubber seal along the top of the windshield (1).
5. Using an assistant, position the windshield into the windshield opening and against the windshield fence and spacers (2).
6. Verify the windshield lays evenly against the fence at the top, bottom and sides of the opening. If not, the fence must be formed to the shape of the windshield.
7. Mark the windshield and the windshield fence with a grease pencil or pieces of masking tape to use as a reference for installation.
8. Using an assistant, remove the windshield from the windshield opening and place it on a suitable padded work surface.

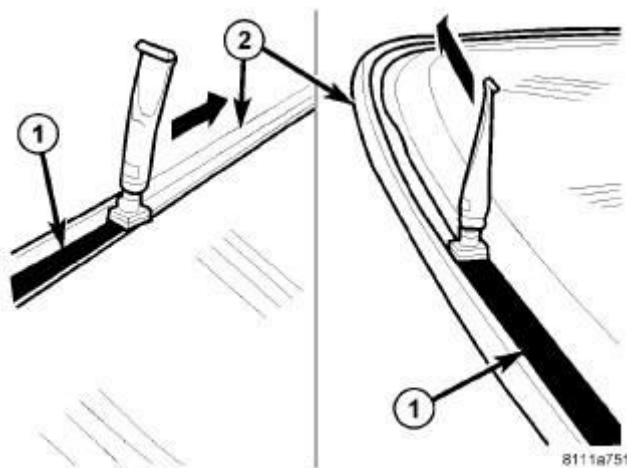


Fig. 725: Applying Primer To Gluing Surface Of Windshield Seal
Courtesy of CHRYSLER GROUP, LLC

WARNING: Do not use solvent based glass cleaners to clean the windshield before applying glass prep and primer or poor glass adhesion may result.

9. Clean the inside of the windshield with an ammonia based glass cleaner and a lint-free cloth.
10. Apply glass prep adhesion promoter 25 mm (1 in.) wide (1) around the perimeter of the windshield (2) and 5 mm (0.2 in.) from the edge of the glass and wipe dry with a clean lint-free cloth until no streaks are visible.
11. Apply glass primer 25 mm (1 in.) wide (1) around the perimeter of the windshield (2) and 5 mm (0.2 in.) from the edge of the glass. Allow at least three minutes drying time.
12. Using a flashlight, verify that the primer is completely and evenly installed along the perimeter of the windshield.
13. Re-prime any area that is not fully and evenly primed.

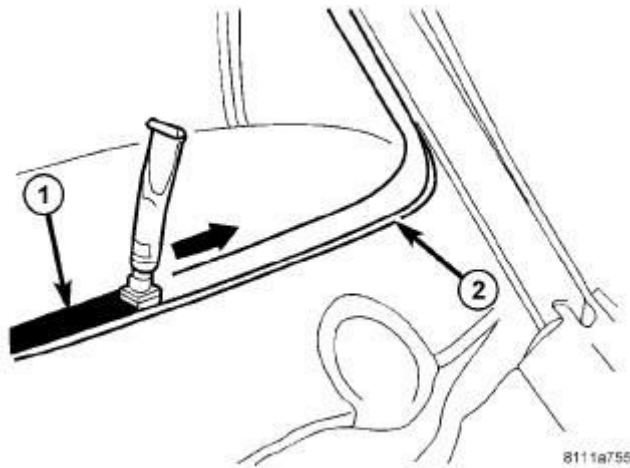


Fig. 726: Applying Windshield Primer
Courtesy of CHRYSLER GROUP, LLC

14. Clean the windshield fence with an ammonia based glass cleaner and a lint-free cloth.
15. Apply pinch weld primer 15 mm (0.75 in.) wide (1) around the windshield fence (2). Allow at least three minutes drying time.
16. Using a flashlight, verify that the primer is completely and evenly installed along the windshield fence.
17. Re-prime any area that is not fully and evenly primed.

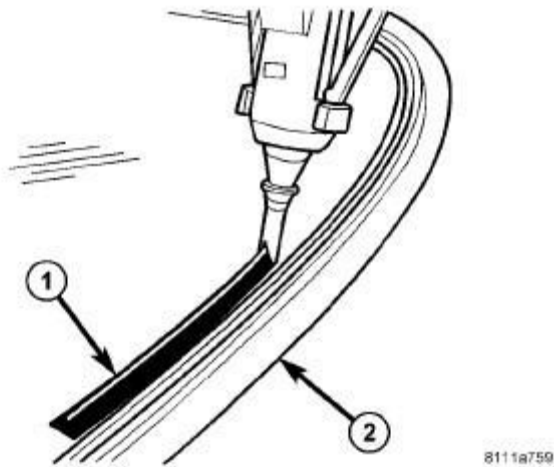


Fig. 727: Applying Windshield Adhesive
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Always apply the bead of adhesive to the windshield. Always install the windshield within 5 minutes after applying the adhesive.

NOTE: If the original urethane adhesive has been exposed for more than 12 hours, the entire adhesive area will need to be re-primed prior to installing new adhesive.

18. Apply approximately a 10 mm (0.4 in.) wide bead of adhesive (1) with a triangular nozzle approximately 6 mm (0.230 in.) from the edge of the glass (2) starting at the bottom center of the windshield.

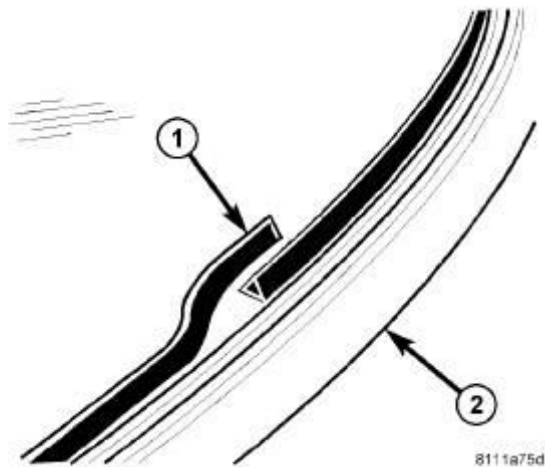


Fig. 728: Windshield Adhesive Overlap
Courtesy of CHRYSLER GROUP, LLC

19. Run the end of the adhesive bead (1) on the windshield (2) parallel to the start of the bead and smooth the ends flush.

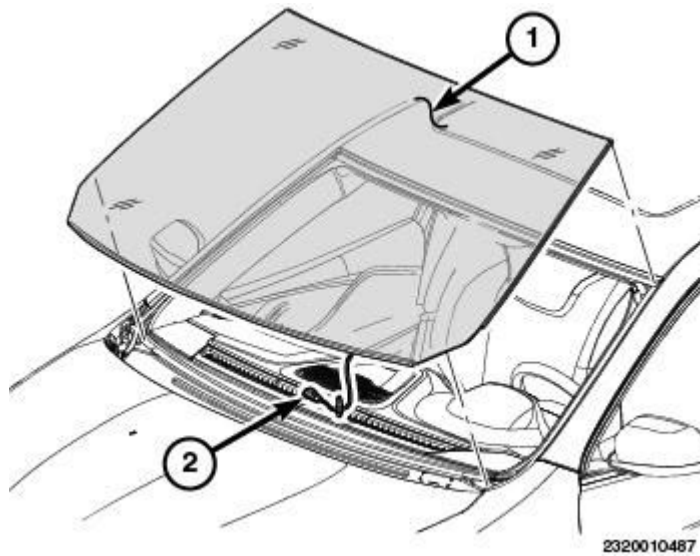


Fig. 729: Identifying Windshield & Harness Connector
 Courtesy of CHRYSLER GROUP, LLC

20. Using an assistant, position the windshield (1) over the windshield opening.
21. Using the grease pencil marks or tape as reference points, align the windshield to the windshield opening.
22. Carefully lower the windshield into the windshield opening. Guide the windshield and the rubber seal at the top the windshield into its proper location.

CAUTION: It is not possible to move the windshield after installation. The windshield should never be pressed into place by more than one person, because the windshield can break if pressed simultaneously on both sides.

23. Push the windshield inward until the windshield comes into contact with the spacers (2) located on the windshield fence.
24. Install the cowl grill. Refer to COVER, COWL PANEL, INSTALLATION.
25. Install the rear view mirror onto the windshield. Refer to MIRROR, REARVIEW, INSTALLATION.
26. Connect the negative battery cable.

SUNROOF, DUAL PANE

DESCRIPTION

DESCRIPTION

The power sunroof system allows the sunroof to be opened, closed or placed in the vent position electrically by actuating a switch in the overhead console. The sunroof system receives battery feed through a fuse in the Power Distribution Center (PDC). The sunroof will operate normally with the key in any position while the Accessory Delay system is active.

The front sunroof glass panel tilts upward at the rear for ventilation and slides rearward under the fixed rear glass panel when open. The panel seals flush with the roof in the closed position to eliminate wind noise. The sunroof includes an electric rolling sunshade to cover the deep-tinted glass panel.

In addition to the standard power sunroof operation, this vehicle offers several additional features. There is an express (one-touch) opening and closing feature as well as Excessive Force Limitation (EFL). The EFL function detects obstacles trapped between the glass and the vehicle roof during a closing motion. Upon sensing an obstacle the EFL function will reverse direction of the glass to allow removal of the obstacle.

The main components of the power sunroof system are:

- The motor/module assembly
- The power sunroof glass and frame assembly
- The power sunroof switch
- The electric rolling sunshade

PARTS LIST

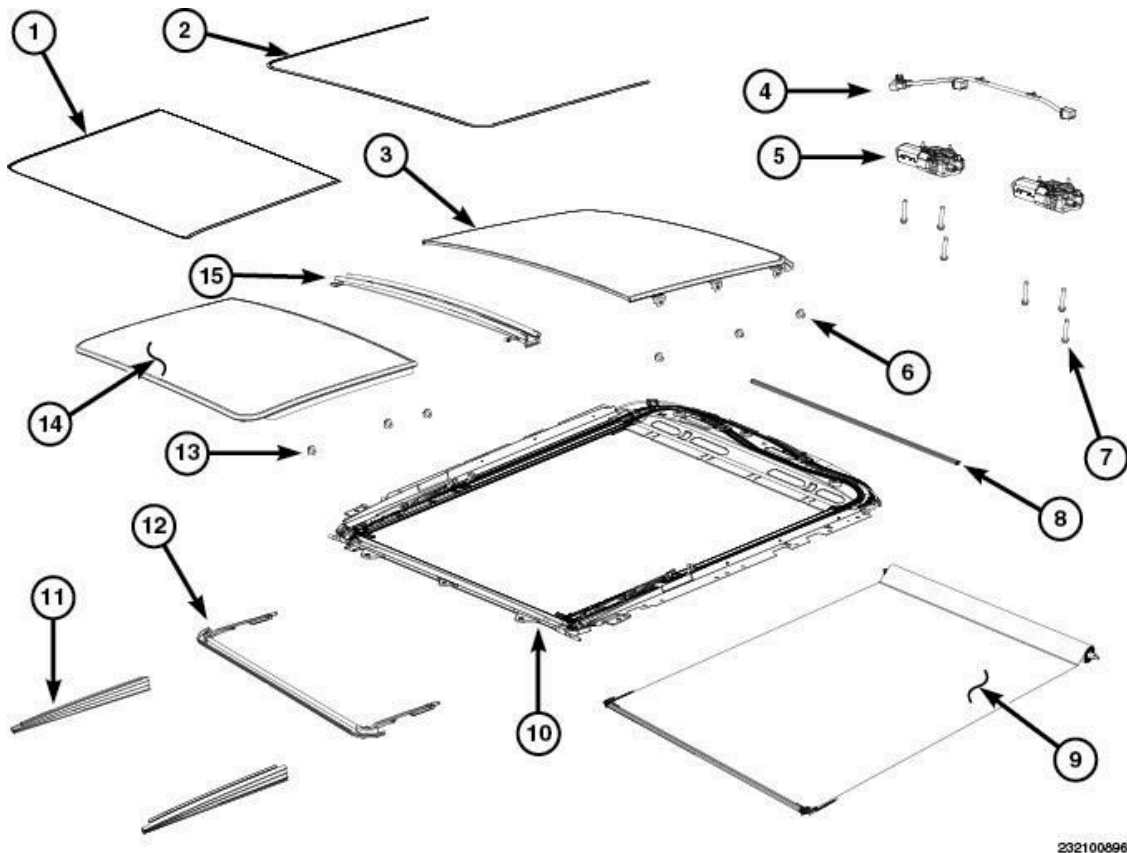


Fig. 730: Exploded View Of Dual Pane Sunroof
Courtesy of CHRYSLER GROUP, LLC

PARTS LIST

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2014 Jeep Cherokee Trailhawk

2014 ACCESSORIES AND EQUIPMENT Body - Interior & Exterior - Cherokee

1 - FRONT GLASS PANEL SEAL	9 - ROLLER SUNSHADE
2 - REAR GLASS PANEL SEAL	10 - SUNROOF FRAME ASSEMBLY
3 - REAR GLASS PANEL	11 - MECHANISM COVERS
4 - WIRE HARNESS	12 - WIND DEFLECTOR
5 - MOTORS	13 - FRONT GLASS FASTENERS (6) 4.5 N.m (40 in. lbs.)
6 - REAR GLASS FASTENERS (6) 4.5 N.m (40 in. lbs.)	14 - FRONT GLASS PANEL
7 - MOTOR SCREWS 4 N.m (35 in. lbs.)	15 - DRAIN TROUGH
8 - TENSION BAR	

OPERATION

OPERATION

This vehicle has a vent, tilt and slide power sunroof system with express (one-touch) open and closing feature. The sunroof system receives constant battery feed through a fuse in the Power Distribution Center (PDC). The sunroof will operate normally with the key in the "RUN" or "ACCESSORY" position. If the sunroof is moving when the key is turned to the START position (crank engine), all motions will stop. The sunroof will also stop a requested motion if the key is turned "OFF".

A combination push-button and rocker switch module mounted in the overhead console controls sunroof operation. The sunroof switch is a rocker design with a push button in the center of the two halves of the rocker. Pressing the rocker towards the front of the car commands the sunroof closed. Pressing the rocker towards the rear of the car commands the sunroof open. Pressing the center push button commands the front sunroof glass panel up into the vent position (Rear of the front sunroof glass raises above the vehicle roof with glass still covering the sunroof opening). All switch commands operate with the glass starting in any position. Refer to **SWITCH, SUNROOF, OPERATION** for additional information.

An electronic control system, integral to the motor/module assembly, provides the express open and close functions. Pressing the "close" end of the rocker switch moves the sunroof glass panel to the full closed position. During express closing, anytime an obstacle is detected in the way of the glass, the motor will stop and reverse travel to avoid pinching an occupant's finger, ice in the track, etc. This function is called Excessive Force Limitation (EFL). There are two methods of overriding the EFL function.

1. When three EFL events occur without the glass being allowed to fully close, the next close attempt will only move while the close switch is continuously actuated. This allows the sunroof to be forced closed if multiple close attempts fail.
2. If the sunroof close switch is continuously actuated during an EFL event, through the reversal, and during a two second wait time, then continuing to hold the close switch will cause the roof to move towards close with the EFL protection disabled. This allows the sunroof to be forced closed if it is known that a reversal will occur. This secondary EFL override may be necessary when known debris (ice blockage for example) is preventing the glass panel from closing.

While in EFL override, the closing motion will cease if the sunroof switch is released at any time.

DIAGNOSIS AND TESTING**DIAGNOSIS AND TESTING - SUNROOF**

For sunroof electrical system diagnosis and testing procedures, refer to **DIAGNOSIS AND TESTING** .

WATER DRAINAGE AND WIND NOISE DIAGNOSIS

The sliding glass panel is designed to seal water entry with a snug fit between the roof and the seal. The fit can be checked by inserting a business card or equivalent, between the roof and the seal. The piece of paper should have some resistance when pulled out when the glass panel is in the closed position. The sunroof housing will drain off a minimum amount of water. Excessive wind noise could result if the gap clearances are exceeded. The sunroof glass panel may need to be adjusted. Refer to **ADJUSTMENTS** and **ADJUSTMENTS** .

Adequate drainage is provided by a drain trough in the sunroof housing which encircles the sliding glass panel and leads to drain hoses. If a wet headliner or other water leak complaints are encountered, before performing any adjustments, first ensure that the drainage system is not plugged or disconnected. Use a pint container to pour water into the sunroof housing drain trough. If water flow is restricted, use compressed air to blow out any material plugging the drain system. Retest system again.

To further check for a disconnected drain hose:

NOTE: **Care must be taken not to fold or kink the headliner upon removal.**

1. Lower headliner as necessary to gain access to sunroof housing drain tubes. Refer to **HEADLINER, REMOVAL**.
2. Repair as necessary.

HIGH OPERATIONAL NOISE

If a scratching noise is observed as the sunroof glass is cycled from open to closed and closed to open this could be caused by dust and debris accumulation in the guide tracks. To correct this issue, refer to **SUNROOF, DUAL PANE, STANDARD PROCEDURE**.

STANDARD PROCEDURE**STANDARD PROCEDURE - NEW INITIALIZE AND TEACH**

The following steps are necessary initialize and teach a module that has never been initialized (newly reflashed).

1. Press and hold the glass close switch until the glass moves to the full vent up position and then bounces back to vent up.
2. The shade will then move to flush, bounces back and stop at the halfway position.
3. Once both the shade and glass have stopped, release the glass close switch and press it again within five seconds.

4. The shade moves to full open, and the glass will move to full open.
5. The glass will move to full flush.
6. The shade will move to flush. Hold the switch until the glass and shade have completed their movements.
7. Release the glass close switch. Glass and shade are now initialized and taught.

STANDARD PROCEDURE - RE-INITIALIZE AND RE-TEACH

The following steps are necessary initialize and teach a module that has been previously initialized and taught.

1. With the glass at flush, press and hold the glass close switch for 10 seconds.
2. Continue to press and hold the glass close switch until the glass moves to full vent up and bounces back to vent up.
3. The shade will then move to flush, bounce back, and stops at the halfway position.
4. Once both the shade and glass have stopped, release the glass close switch and press it again within 5 seconds.
5. The shade moves to full open, and the glass will move to full open.
6. The glass will move to flush.
7. The shade will move to flush. Hold the switch until the glass and shade have completed their movements.
8. Release the glass close switch. Glass and shade are now initialized and taught.

STANDARD PROCEDURE - CLEAN AND RE-GREASE SUNROOF GUIDE TRACKS

2321032783

Fig. 731: Identifying Wind Deflector
Courtesy of CHRYSLER GROUP, LLC

1. Open glass fully to expose the guide tracks.
2. Hold down the wind deflector (1).

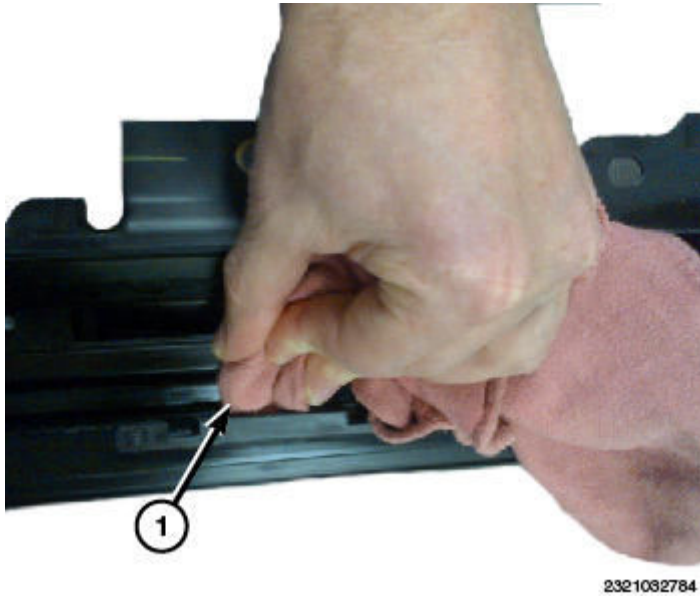


Fig. 732: Identifying Channels
Courtesy of CHRYSLER GROUP, LLC

3. Wipe out the channels (1) and remove any accumulated dust and debris.

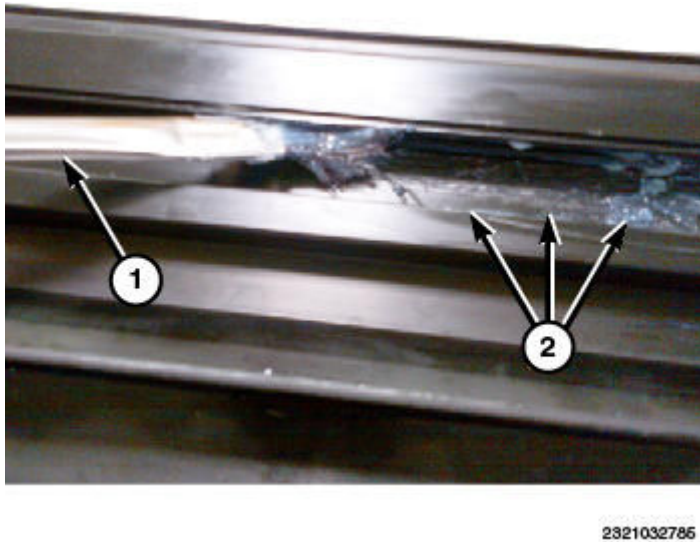
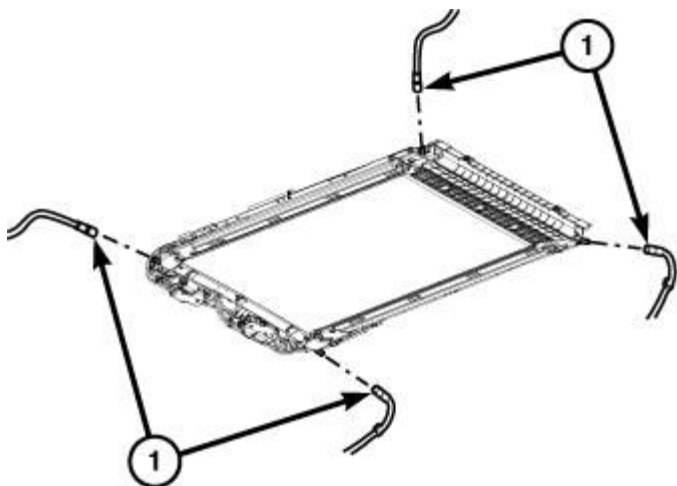


Fig. 733: Applying Mopar Grease To Tracks
Courtesy of CHRYSLER GROUP, LLC

4. Using Mopar Grease P/N 68079674AA with a small brush (1), apply grease (2) to the tracks as shown.
5. Cycle the glass open and close to verify high operating noise no longer exists. Repeat process if necessary.

REMOVAL

REMOVAL



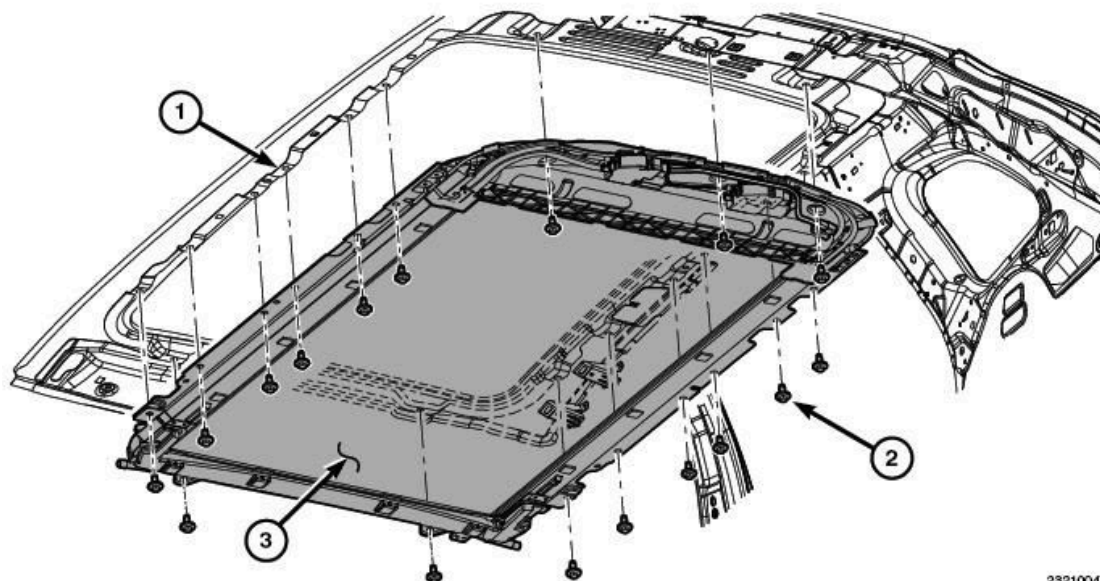
2823363

Fig. 734: Four Drain Tubes

Courtesy of CHRYSLER GROUP, LLC

NOTE: For exploded view and call outs, refer to SUNROOF, DUAL PANE, DESCRIPTION.

1. Move glass panel to the fully closed position.
2. Disconnect and isolate the battery negative cable.
3. Lower the headliner in the vehicle enough to gain access to the sunroof assembly. Refer to HEADLINER, REMOVAL.
4. Disconnect the four drain tubes (1) from sunroof housing.
5. Disconnect the sunroof wire harness electrical connector.



2321004720

Fig. 735: Identifying Sunroof Assembly, Roof Panel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

6. Loosen the 14 bolts (3) attaching sunroof assembly.
7. With the help of an assistant, support the sunroof and remove the 17 bolts attaching sunroof assembly (2) to roof panel.
8. Remove the sunroof assembly (2) from vehicle.

INSTALLATION

INSTALLATION

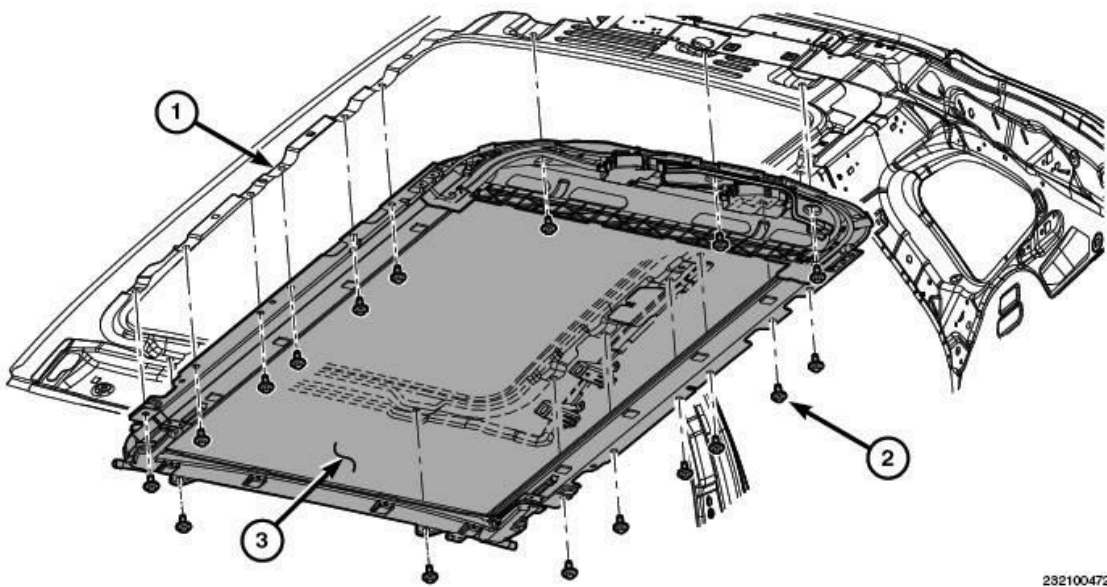
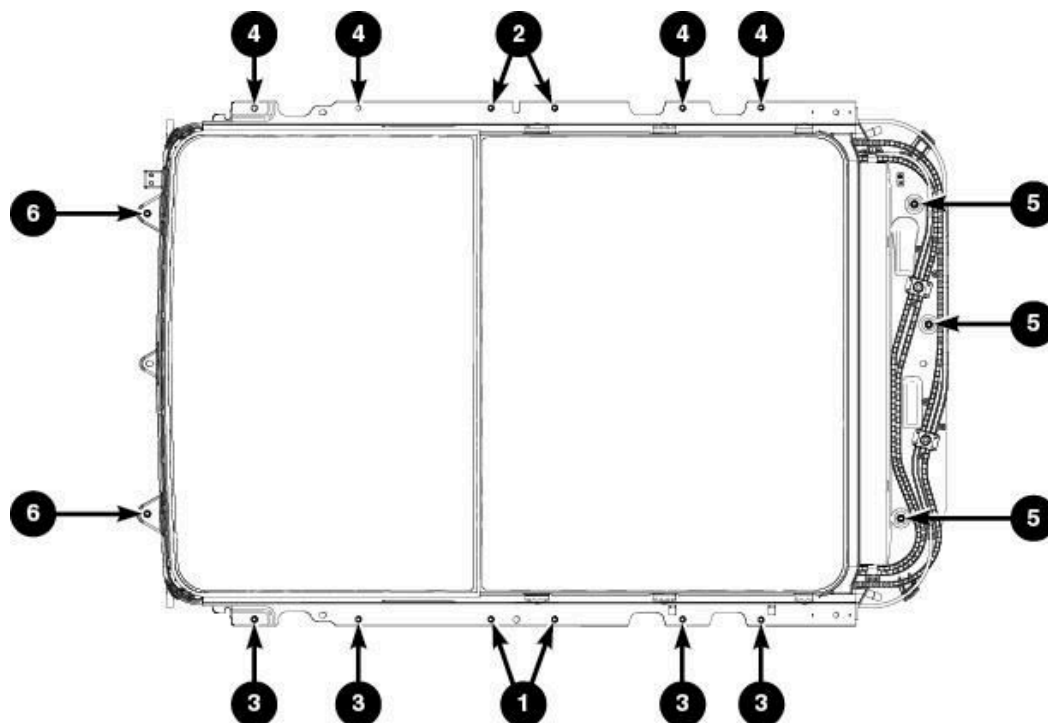


Fig. 736: Identifying Sunroof Assembly, Roof Panel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

NOTE: After installation the sunroof motors will need to be initialized.

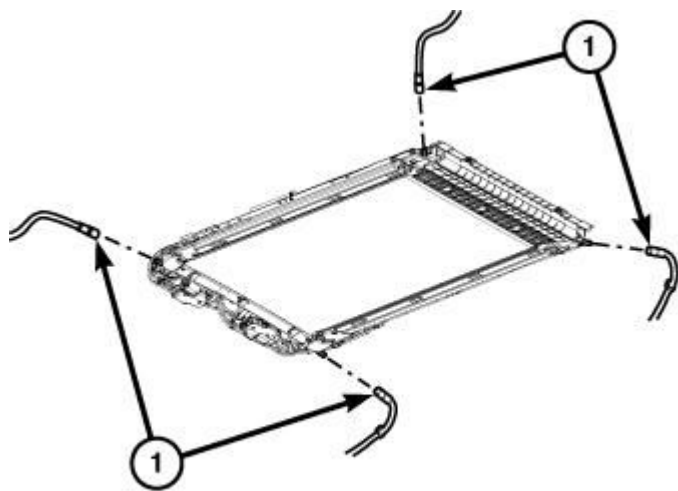
1. Verify that glass panel is fully closed.
2. Locate the alignment holes along the sides of the module assembly and position the holes so that they line up with the holes located in sunroof frame (1).
3. Raise sunroof module assembly (2) and guide it carefully into position.
4. While supporting the sunroof assembly Install the 17 bolts (2).



2321010042

Fig. 737: Identifying Sunroof Assembly Frame Alignment Holes
Courtesy of CHRYSLER GROUP, LLC

5. Tighten the bolts to 9 N.m (80 in. lbs.) using the sequence shown.



2823363

Fig. 738: Four Drain Tubes
Courtesy of CHRYSLER GROUP, LLC

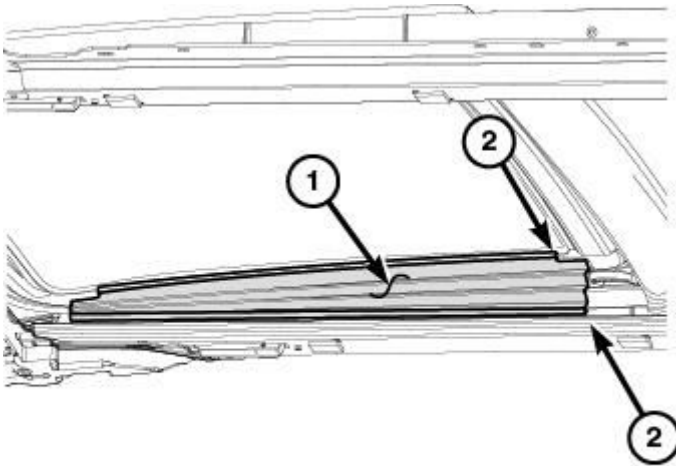
6. Connect the electrical connector.
7. Connect the drain tubes (1) to the sunroof.
8. Connect the battery negative cable.

9. Test sunroof operation, adjust if necessary. Refer to **ADJUSTMENTS** and **ADJUSTMENTS**.
10. Install the headliner. Refer to **HEADLINER, INSTALLATION**.
11. Initialize sunroof motor. Refer to **SUNROOF, DUAL PANE, STANDARD PROCEDURE**.

COVER, SUNROOF MECHANISM

REMOVAL

REMOVAL



2321010035

Fig. 739: Identifying Sunroof Mechanism Cover & Mounting Flanges
Courtesy of CHRYSLER GROUP, LLC

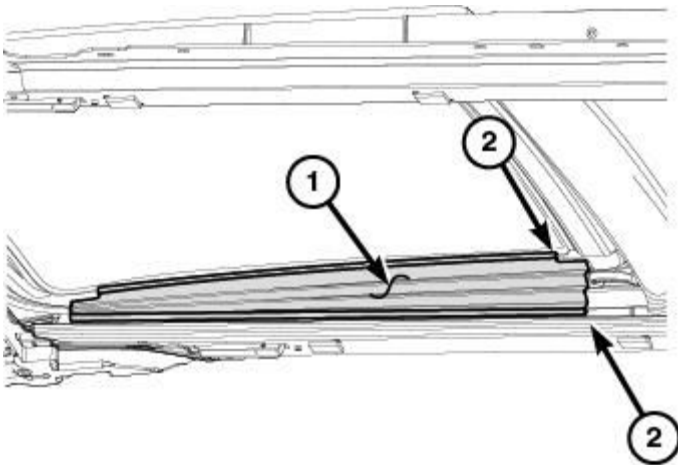
1. Move the front glass into the full closed position.
2. Open the sunshade into the full open position.

CAUTION: Separate the mechanism covers by pulling on the metal flanges only. Pulling on the cover membrane may result in tearing of the membrane.

3. Separate the mechanism cover (1) from the tabs on the glass panel and frame assembly by pulling on the mounting flanges (2) only.

INSTALLATION

INSTALLATION



2321010035

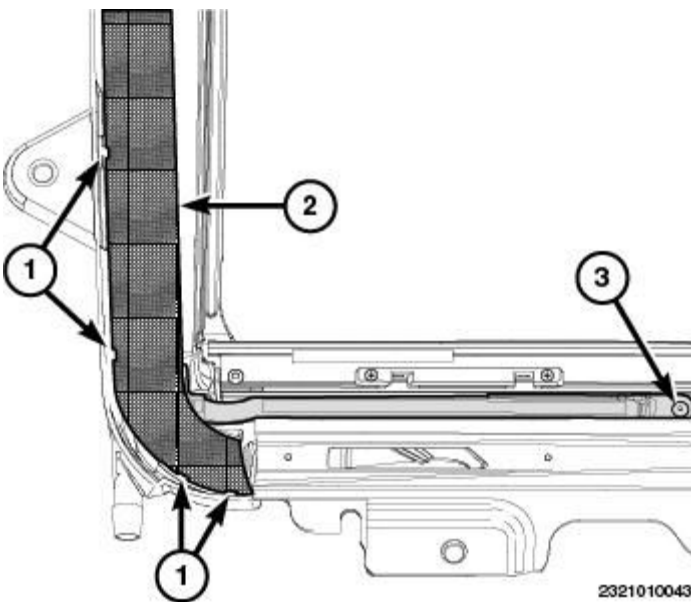
Fig. 740: Identifying Sunroof Mechanism Cover & Mounting Flanges
 Courtesy of CHRYSLER GROUP, LLC

1. With the sunroof in the open position, snap the mechanism cover (1) into the lower guide channel and the glass panel and seat the flanges (2) fully.

DEFLECTOR, WIND

REMOVAL

REMOVAL



2321010043

Fig. 741: Identifying Wind Deflector Cloth & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

1. Move the front glass into the full open position.
2. Lower the headliner as necessary to catch any debris that falls while removing the wind deflector rivets (3). Refer to **HEADLINER, REMOVAL**.
3. Separate the front of the wind deflector cloth from the clips (1) in the frame assembly.
4. Remove the rivet (3) securing the wind deflector assembly to the side rails.

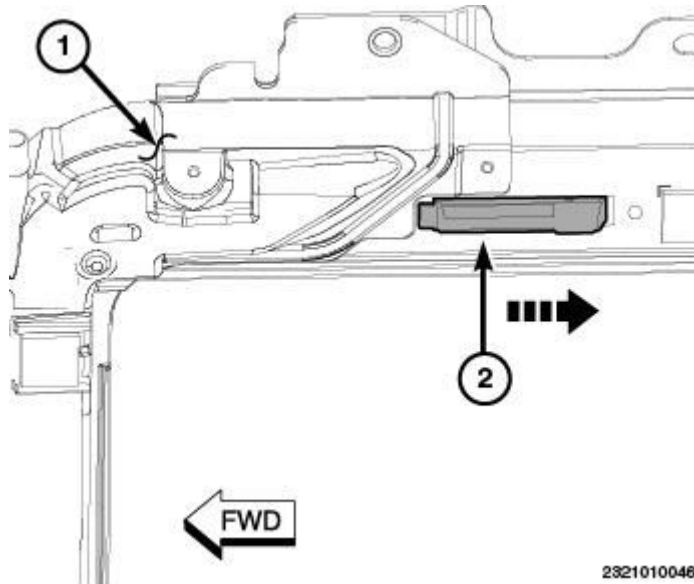


Fig. 742: Identifying Rear Deflector Bases & Slide Rail Assembly
 Courtesy of CHRYSLER GROUP, LLC

5. Slide the rear deflector bases (2) rearward and remove from the side rail assembly (1).
6. Remove the wind deflector.

INSTALLATION

INSTALLATION

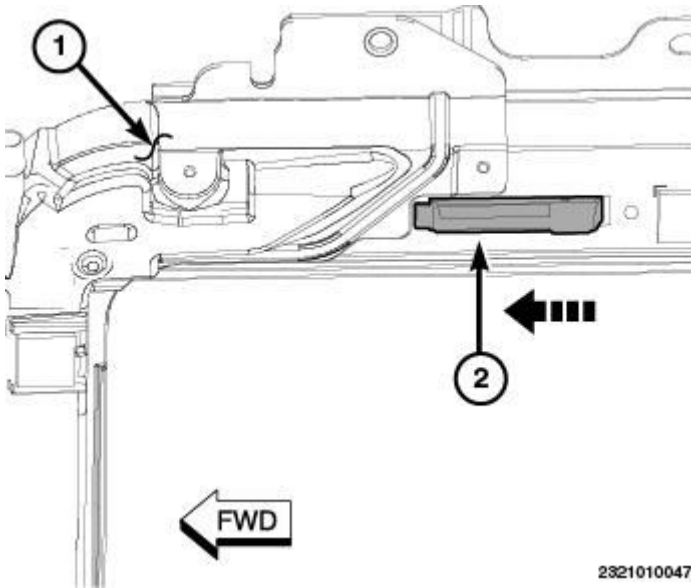


Fig. 743: Identifying Deflector Swing Arm Bases & Slots Of Side Rails
Courtesy of CHRYSLER GROUP, LLC

1. Remove all debris created during removal from the hole in the sunroof frame.
2. Position the deflector swing arm bases (2) into the slots of the side rails (1) and slide forward.

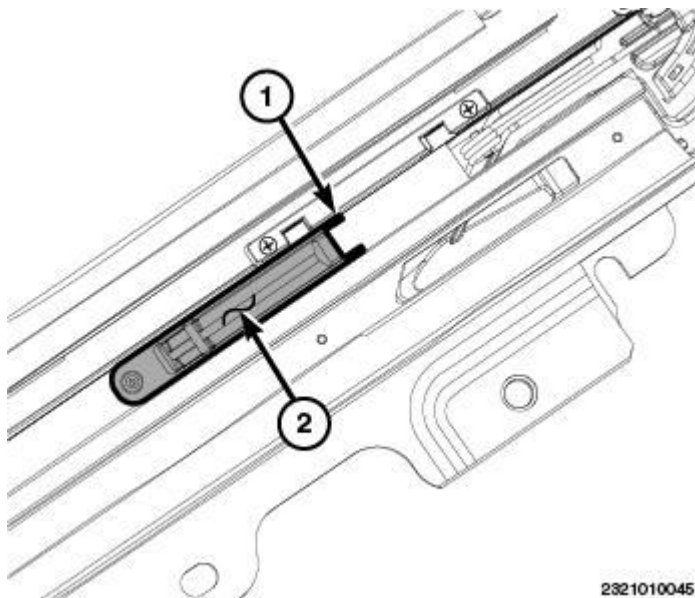


Fig. 744: Identifying Front Tabs & Swing Arm Bases
Courtesy of CHRYSLER GROUP, LLC

3. Make sure the front tabs (1) of the swing arm bases (2) are positioned above the rail.

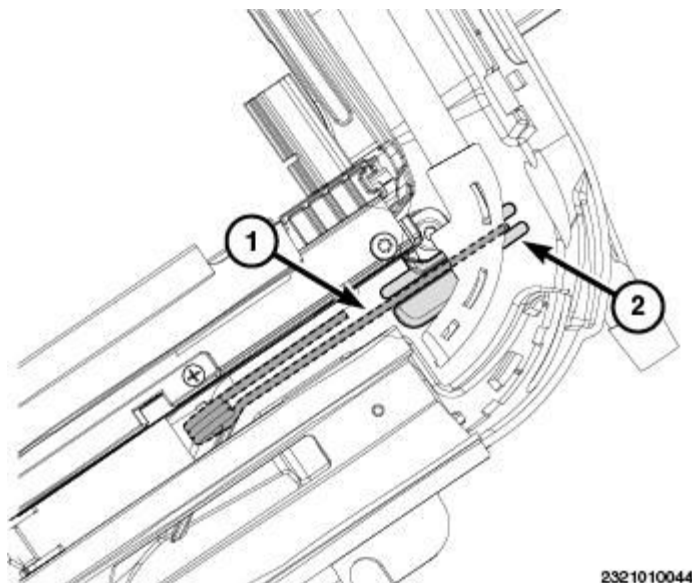


Fig. 745: Identifying Lift Springs & Slots
Courtesy of CHRYSLER GROUP, LLC

4. Make sure the lift springs (1) are correctly positioned into the slots (2) on the side rails and the swing arms.

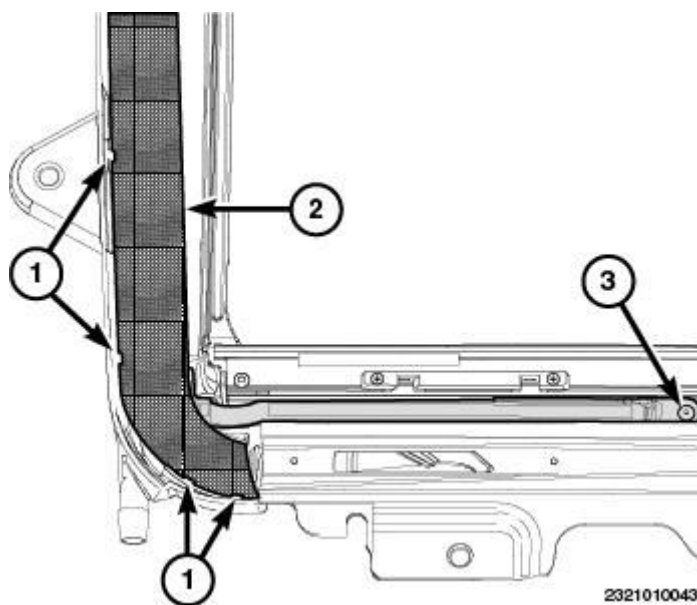
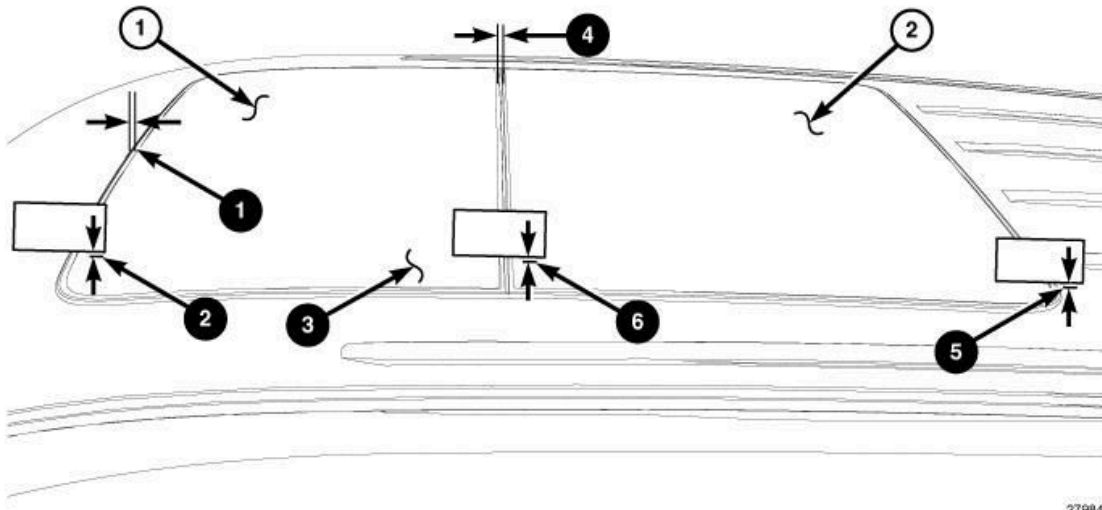


Fig. 746: Identifying Wind Deflector Cloth & Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. Install new rivets (3).
6. Starting at the center notch, seat the front of the fabric into the front clips (1) fully.
7. Install the headliner. Refer to **HEADLINER, INSTALLATION**.

GLASS, SUNROOF, FRONT**ADJUSTMENTS****ADJUSTMENTS**

2798479

Fig. 747: Dual Pane Sunroof Glass Adjustment

Courtesy of CHRYSLER GROUP, LLC

1 - FRONT GLASS PANEL

2 - REAR GLASS PANEL

GLASS ADJUSTMENT SEQUENCE

1 - SET THE FRONT GLASS PANEL FRONT GAP TO 3 mm (0.12 in.)

2 - SET THE FRONT OF THE FRONT GLASS PANEL FLUSH TO UNDER FLUSH 2.5 mm (0.10 in.)

3 - SET THE REAR OF THE FRONT GLASS PANEL FLUSH WITH THE ROOF

4 - SET THE FRONT OF THE REAR GLASS PANEL GAP TO 3.5 mm TO 4 mm (0.14 in. to 0.16 in)

5 - SET THE REAR OF THE REAR GLASS PANEL OVER FLUSH 0 mm TO 2.5 mm (0.0 in. to 0.10 in)

6 - SET THE FRONT OF THE REAR GLASS PANEL FLUSH TO UNDER FLUSH 2.5 mm (0.10 in.)

1. Initialize sunroof motor. Refer to **SUNROOF, DUAL PANE, STANDARD PROCEDURE**.
2. Open the sunshade fully.
3. Verify the sunroof glass panel is in the fully closed position.
4. Separate the mechanism covers from the tabs on the glass panel.
5. Loosen the attaching screws on each side of the rear glass panel enough to permit adjustment of the glass gap and flush.
6. Loosen the attaching screws on each side of the front glass panel enough to permit adjustment of the glass gap and flush.

NOTE: Use shims to maintain gap during the flush adjustments.

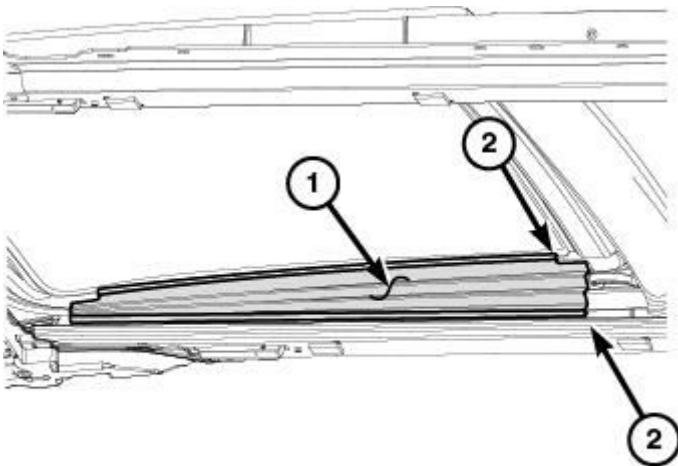
7. Adjust the front edge of the front glass gap to 3 mm (0.12 in.).
8. Adjust the front surface of the front sunroof glass panel 0.00 mm to 2.5 mm (0.00 in. to 0.10 in.) below the top surface of the roof.
9. Tighten the front glass panel attaching screws to 4.5 N.m (40 in. lbs.).
10. Adjust the rear surface of the front sunroof glass panel flush with the top surface of the roof.
11. Tighten the remaining front glass panel attaching screws to 4.5 N.m (40 in. lbs.).

NOTE: Use shims to maintain gap during the flush adjustments.

12. Adjust the front edge of the rear glass gap 3.5 mm (0.12 in.) minimum to 4.0 mm (35.5 in.) maximum.
13. Adjust the rear surface of the rear sunroof glass panel 0.00 mm to 2.5 mm (0.00 in. to 0.10 in.) above the top surface of the roof.
14. Tighten the rear screws of the rear glass panel to 4.5 N.m (40 in. lbs.).
15. Adjust the front surface of the rear sunroof glass panel 0.00 mm to 2.5 mm (0.00 in. to 0.10 in.) below the top surface of the front glass panel.
16. Tighten the remaining rear glass panel attaching screws to 4.5 N.m (40 in. lbs.).
17. Check for proper fit. If not OK, repeat glass panel adjustment.
18. Position the mechanism covers over the glass tabs between the locating features and seat fully.
19. Verify sunroof operation and alignment.

REMOVAL

REMOVAL

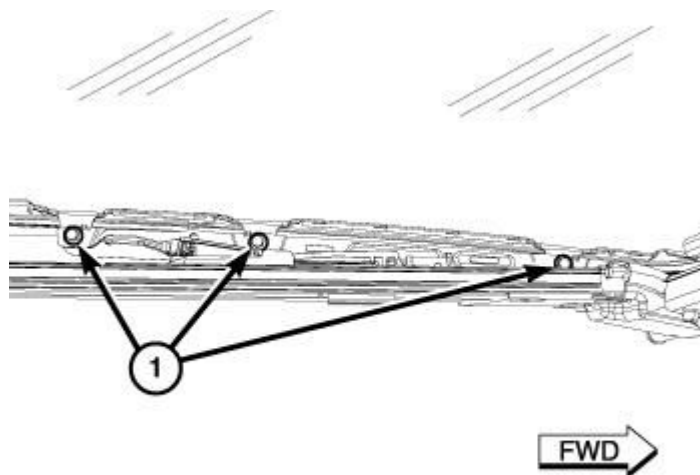


2321010035

Fig. 748: Identifying Sunroof Mechanism Cover & Mounting Flanges
 Courtesy of CHRYSLER GROUP, LLC

1. Open the sunshade fully.

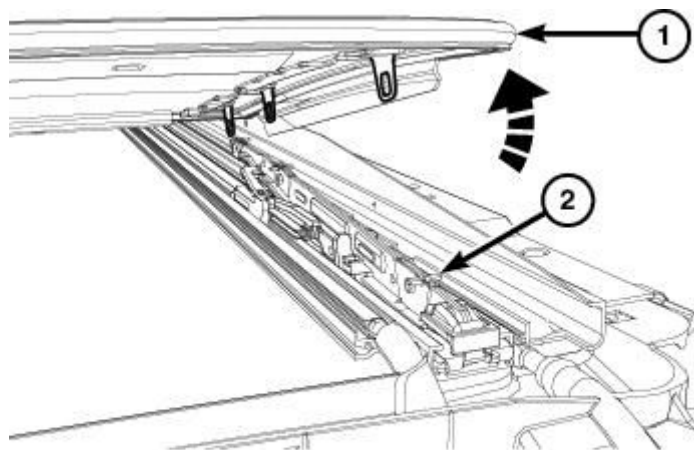
2. Open the front glass to the vent position and remove the mechanism covers (1). Refer to **COVER, SUNROOF MECHANISM, REMOVAL**.



2820484

Fig. 749: Six Glass Panel Screws
 Courtesy of CHRYSLER GROUP, LLC

3. Remove the six glass panel screws (1).



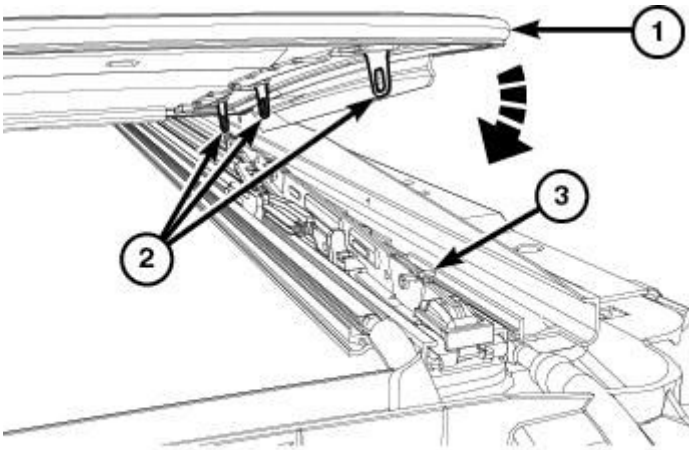
2321010187

Fig. 750: Identifying Glass Panel & Guide Mechanisms
 Courtesy of CHRYSLER GROUP, LLC

4. Lift off the glass panel (1) from the guide mechanisms (2) and remove from vehicle.

INSTALLATION

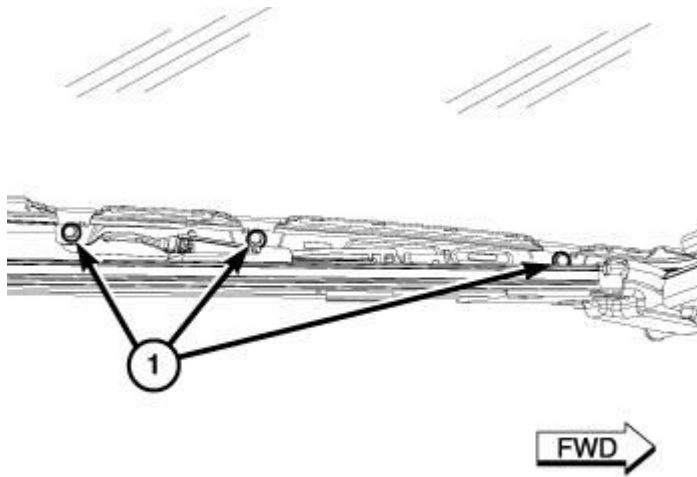
INSTALLATION



2321010188

Fig. 751: Identifying Glass Panel & Guide Mechanism/Lift Arms
Courtesy of CHRYSLER GROUP, LLC

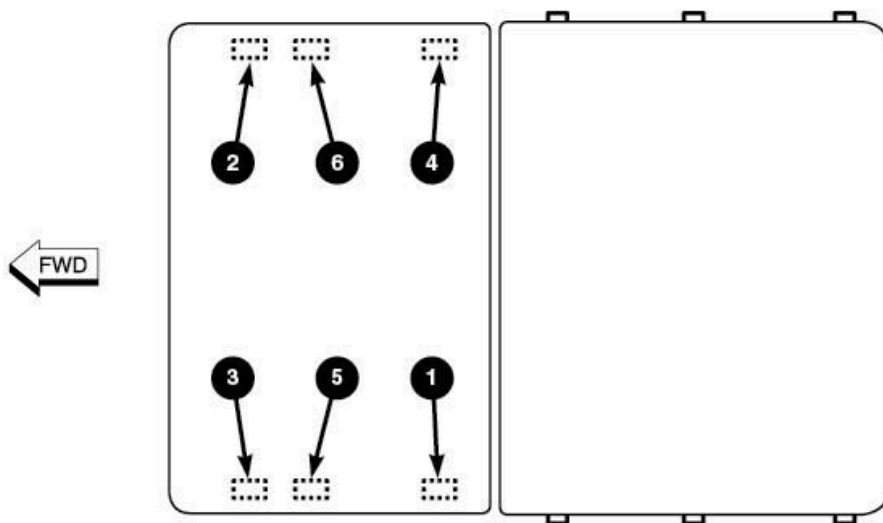
1. Position the glass panel (1) onto the guide mechanism/lift arms (3).



2820484

Fig. 752: Six Glass Panel Screws
Courtesy of CHRYSLER GROUP, LLC

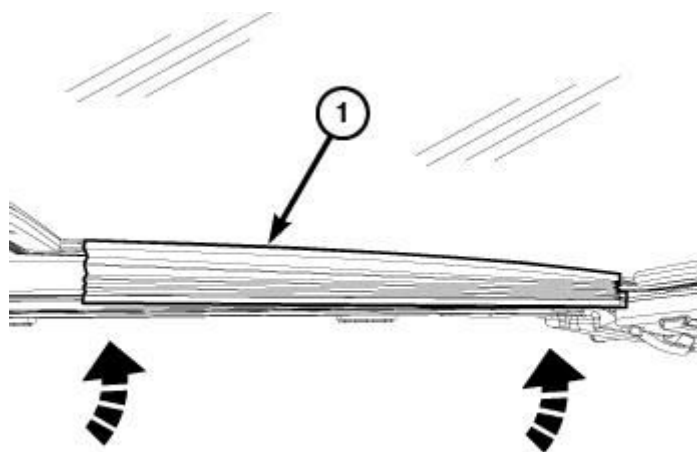
2. Start the six attaching screws (1).



2321010034

Fig. 753: Identifying Glass Panel Screws
Courtesy of CHRYSLER GROUP, LLC

3. Connect a 12v power supply and verify that the sunroof is in the closed position.
4. Initialize sunroof motor. Refer to **SUNROOF, DUAL PANE, STANDARD PROCEDURE**.
5. Adjust the sunroof glass. Refer to **ADJUSTMENTS** and **ADJUSTMENTS**.
6. Tighten the six screws to 4.5 N.m (40 in. lbs.) using the sequence shown.



2820643

Fig. 754: Mechanism Covers
Courtesy of CHRYSLER GROUP, LLC

7. Position the mechanism covers (1) over the glass tabs between the locating features and seat fully.

8. Verify sunroof operation and alignment.

GLASS, SUNROOF, REAR

ADJUSTMENTS

ADJUSTMENTS

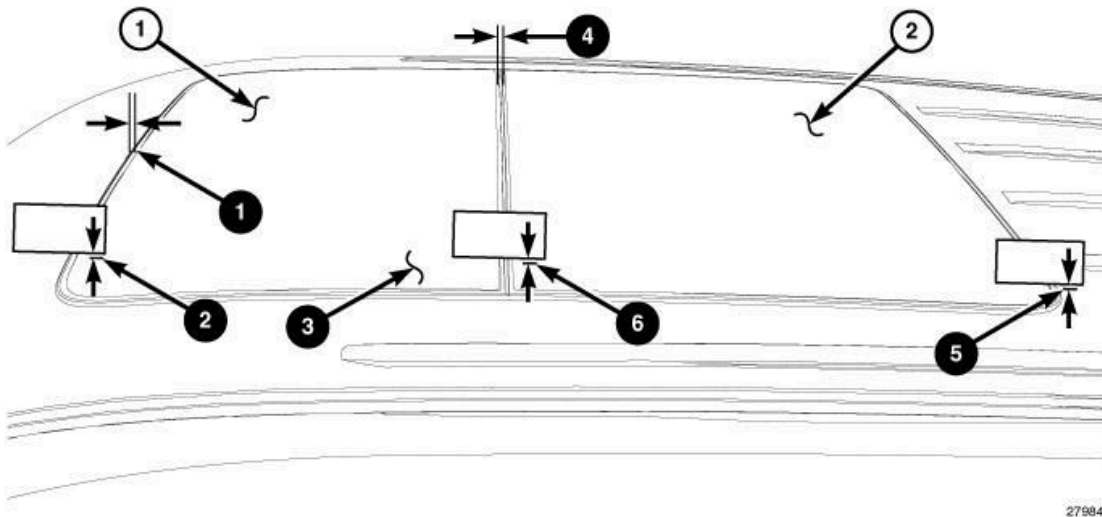


Fig. 755: Dual Pane Sunroof Glass Adjustment
 Courtesy of CHRYSLER GROUP, LLC

1 - FRONT GLASS PANEL

2 - REAR GLASS PANEL

GLASS ADJUSTMENT SEQUENCE

1 - SET THE FRONT GLASS PANEL FRONT GAP TO 3 mm (0.12 in.)

2 - SET THE FRONT OF THE FRONT GLASS PANEL FLUSH TO UNDER FLUSH 2.5 mm (0.10 in.)

3 - SET THE REAR OF THE FRONT GLASS PANEL FLUSH WITH THE ROOF

4 - SET THE FRONT OF THE REAR GLASS PANEL GAP TO 3.5 mm TO 4 mm (0.14 in. to 0.16 in)

5 - SET THE REAR OF THE REAR GLASS PANEL OVER FLUSH 0 mm TO 2.5 mm (0.0 in. to 0.10 in)

6 - SET THE FRONT OF THE REAR GLASS PANEL FLUSH TO UNDER FLUSH 2.5 mm (0.10 in.)

1. Initialize sunroof motor. Refer to **SUNROOF, DUAL PANE, STANDARD PROCEDURE**.
2. Open the sunshade fully.
3. Verify the sunroof glass panel is in the fully closed position.
4. Separate the mechanism covers from the tabs on the glass panel.
5. Loosen the attaching screws on each side of the rear glass panel enough to permit adjustment of the glass gap and flush.
6. Loosen the attaching screws on each side of the front glass panel enough to permit adjustment of the glass gap and flush.

NOTE: Use shims to maintain gap during the flush adjustments.

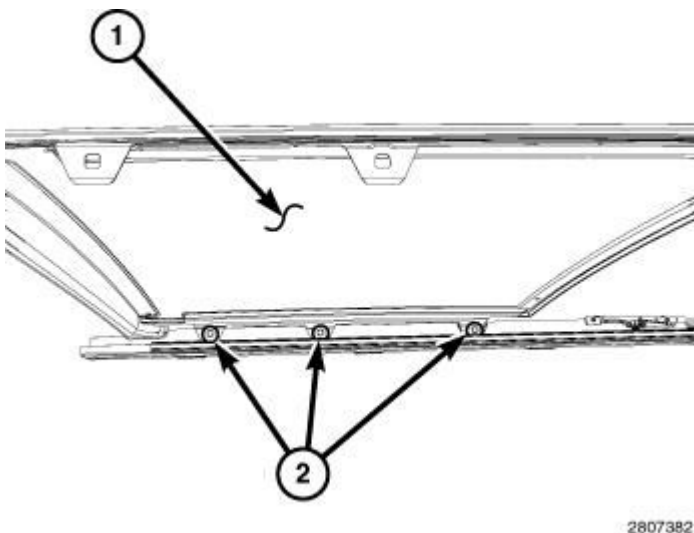
7. Adjust the front edge of the front glass gap to 3 mm (0.12 in.).
8. Adjust the front surface of the front sunroof glass panel 0.00 mm to 2.5 mm (0.00 in. to 0.10 in.) below the top surface of the roof.
9. Tighten the front glass panel attaching screws to 4.5 N.m (40 in. lbs.).
10. Adjust the rear surface of the front sunroof glass panel flush with the top surface of the roof.
11. Tighten the remaining front glass panel attaching screws to 4.5 N.m (40 in. lbs.).

NOTE: Use shims to maintain gap during the flush adjustments.

12. Adjust the front edge of the rear glass gap 3.5 mm (0.12 in.) minimum to 4.0 mm (35.5 in.) maximum.
13. Adjust the rear surface of the rear sunroof glass panel 0.00 mm to 2.5 mm (0.00 in. to 0.10 in.) above the top surface of the roof.
14. Tighten the rear screws of the rear glass panel to 4.5 N.m (40 in. lbs.).
15. Adjust the front surface of the rear sunroof glass panel 0.00 mm to 2.5 mm (0.00 in. to 0.10 in.) below the top surface of the front glass panel.
16. Tighten the remaining rear glass panel attaching screws to 4.5 N.m (40 in. lbs.).
17. Check for proper fit. If not OK, repeat glass panel adjustment.
18. Position the mechanism covers over the glass tabs between the locating features and seat fully.
19. Verify sunroof operation and alignment.

REMOVAL

REMOVAL



2807382

Fig. 756: Six Bolts & Glass Panel
Courtesy of CHRYSLER GROUP, LLC

1. Close the front glass panel and open the sunshade fully.
2. Remove the sunroof assembly. Refer to **SUNROOF, DUAL PANE, REMOVAL**.
3. Remove the six bolts (2) and remove the glass panel (1).

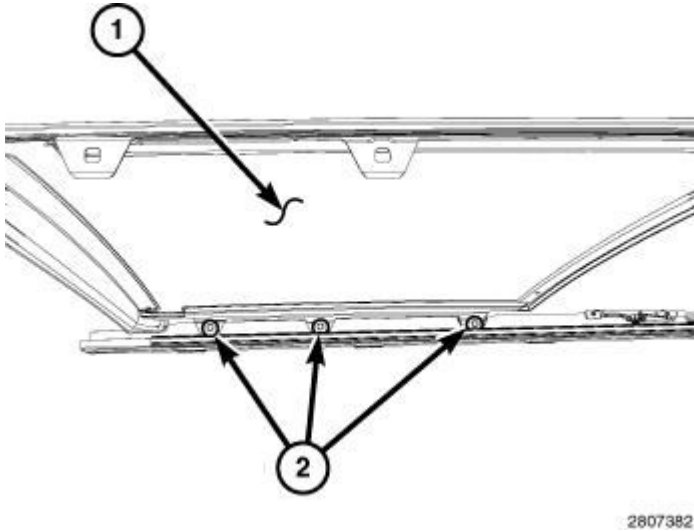
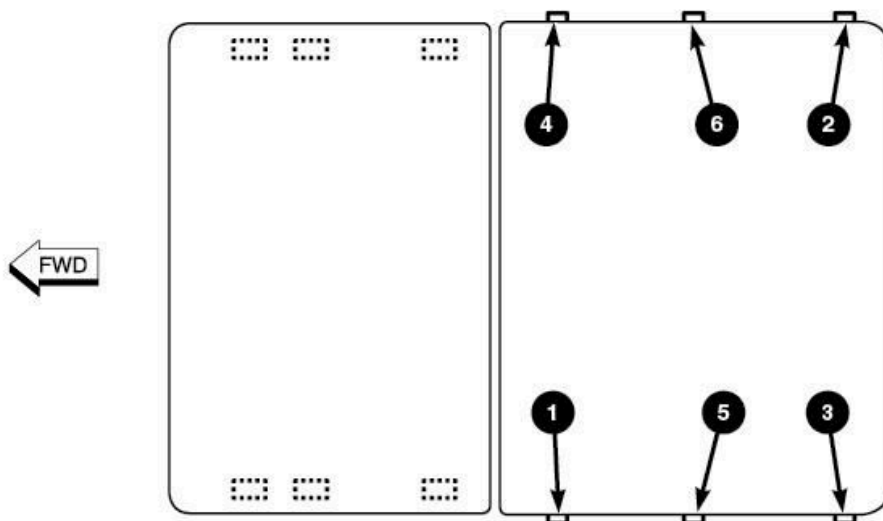
INSTALLATION**INSTALLATION**

Fig. 757: Six Bolts & Glass Panel
Courtesy of CHRYSLER GROUP, LLC

1. Install the glass (1) and install the six bolts (2).



2321010036

Fig. 758: Identifying Sunroof Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Tighten the bolts to 4.5 N.m (40 in. lbs.) using the sequence shown.
3. Install the sunroof assembly. Refer to **SUNROOF, DUAL PANE, INSTALLATION**.
4. Check and adjust the sunroof glass panels. Refer to **ADJUSTMENTS** and **ADJUSTMENTS**.
5. Verify sunroof operation and alignment.

MOTOR, SUNROOF

DESCRIPTION

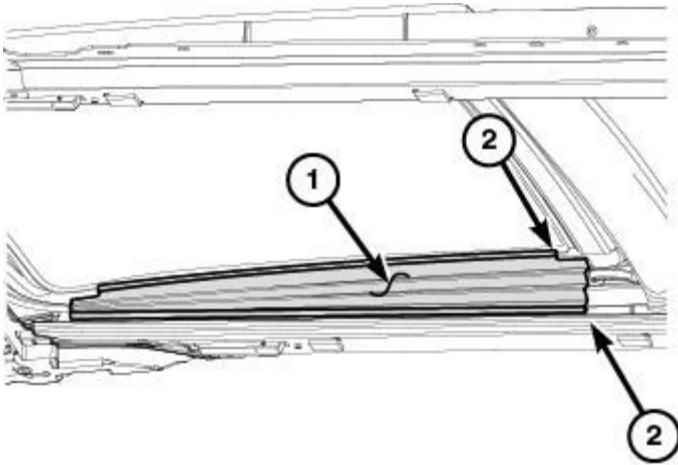
DESCRIPTION

For service information, refer to **DESCRIPTION**.

SUNSHADE, SUNROOF

REMOVAL

REMOVAL



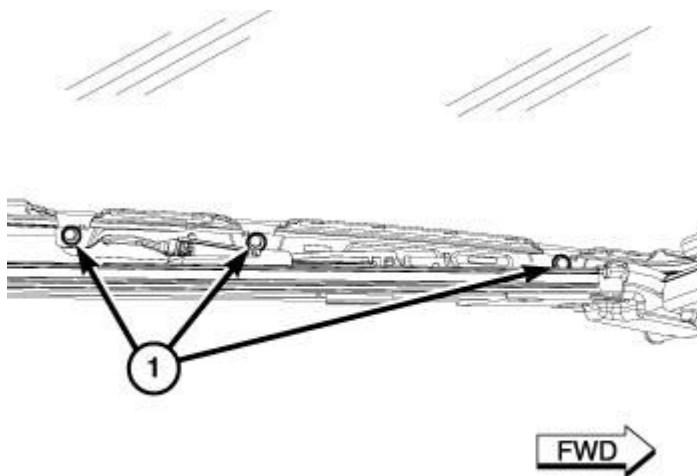
2321010035

Fig. 759: Identifying Sunroof Mechanism Cover & Mounting Flanges
 Courtesy of CHRYSLER GROUP, LLC

1. Open the sunshade fully.
2. Open the front glass into the vent position.

CAUTION: Separate the mechanism covers by pulling on the metal flanges only. Pulling on the cover membrane may result in tearing of the membrane.

3. Separate the mechanism cover (1) from the tabs on the glass panel by pulling on the mounting flanges (2) only.
4. Close the front glass fully.

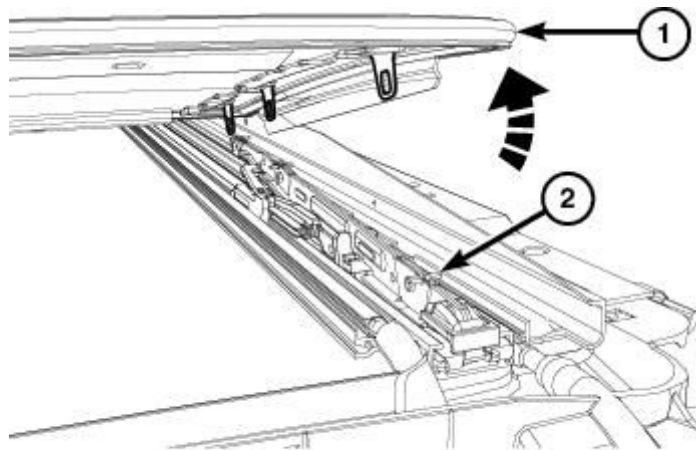


2820484

Fig. 760: Six Glass Panel Screws

Courtesy of CHRYSLER GROUP, LLC

5. Remove the six glass panel screws (1).

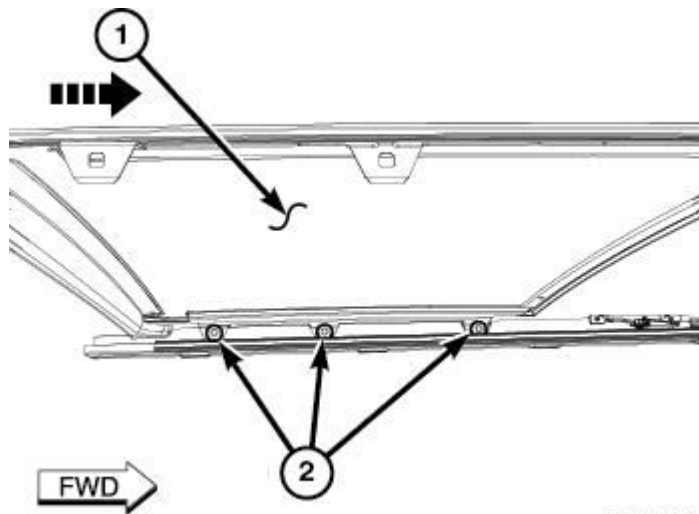


2321010187

Fig. 761: Identifying Glass Panel & Guide Mechanisms

Courtesy of CHRYSLER GROUP, LLC

6. Lift off the glass panel (1) from the guide mechanisms (2) and remove from vehicle.



2321012149

Fig. 762: Identifying Rear Glass & Fasteners

Courtesy of CHRYSLER GROUP, LLC

7. Remove the rear glass fasteners (2) and carefully slide the rear glass (1) panel forward to gain access to the sunshade.

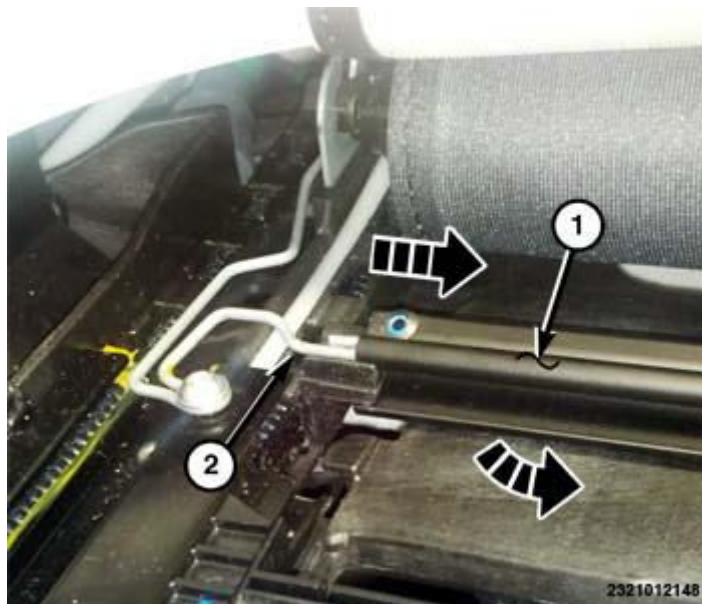


Fig. 763: Releasing Tension Bar Using Small Flat Bladed Tool
Courtesy of CHRYSLER GROUP, LLC

8. Using a small flat bladed tool or equivalent, release the tension bar (1) then slide off the clip (2) and remove.

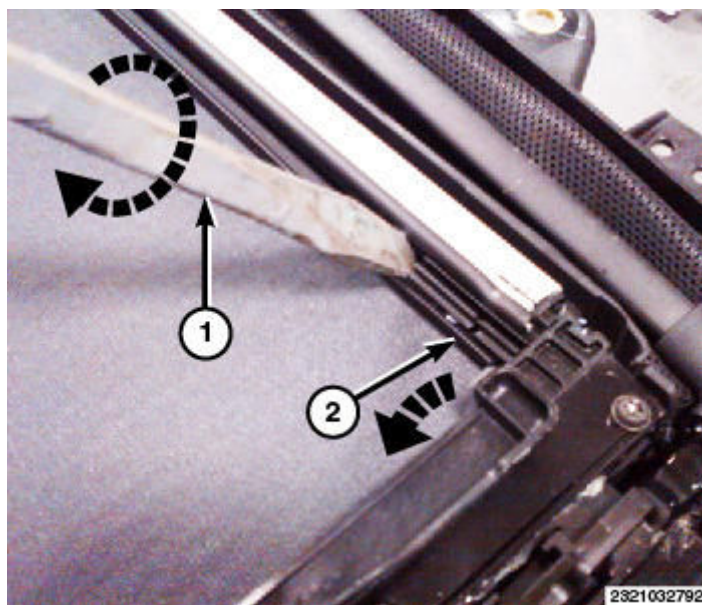


Fig. 764: Removing Shade From Overmolds Using Large Flat Bladed Tool
Courtesy of CHRYSLER GROUP, LLC

NOTE: The sunshade retraction spring force is significant. Firmly hold onto the sunshade while releasing the shade from the overmolds in the following steps.

9. Insert a large flat bladed tool (1) into the slot on the overmold brackets.
10. Twist the tool (1) and release the sunshade beam (2) by rotating the tool down and back.
11. Repeat on each side.
12. Allow the spring to retract remaining fabric into the roll.

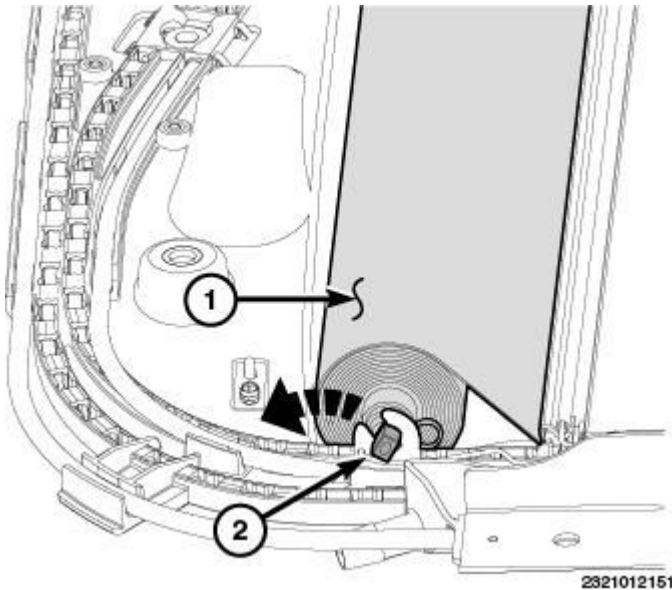


Fig. 765: Removing Sunshade Assembly From Frame Assembly
Courtesy of CHRYSLER GROUP, LLC

13. Twist the sunshade axle (2) and release the sunshade assembly (1) from the frame assembly and position toward the rear of the bracket.

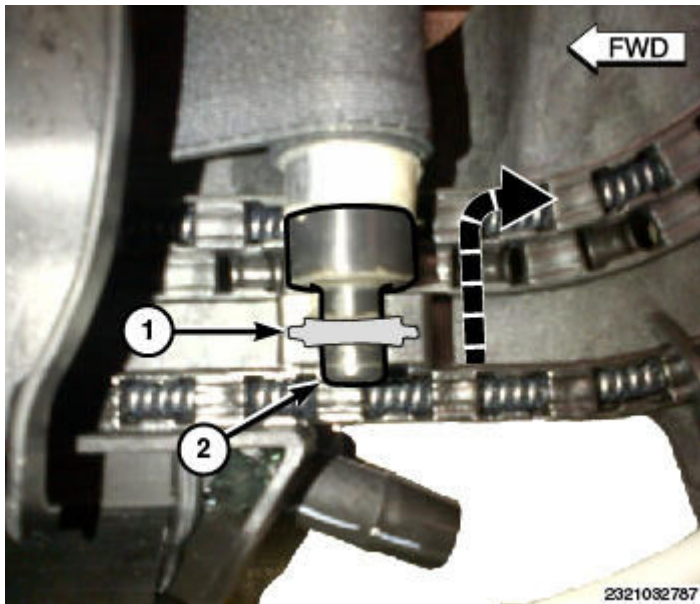


Fig. 766: Removing Support Pin (2) From Support Bracket

Courtesy of CHRYSLER GROUP, LLC

14. Separate the support pin (2) from the support bracket (1) and position behind the bracket.

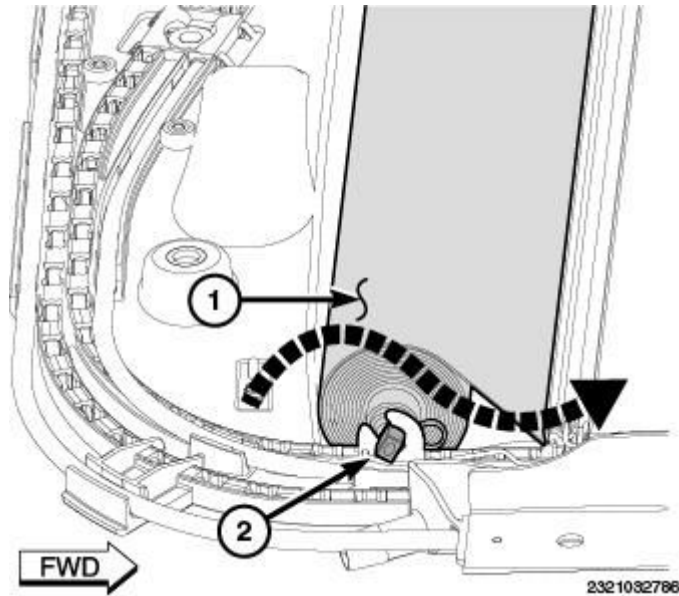


Fig. 767: Lifting Axle From Frame Bracket & Removing Sunshade Out Of Sunroof Opening
Courtesy of CHRYSLER GROUP, LLC

15. Lift the axle (2) up and over the frame bracket then remove the sunshade (1) out of the sunroof opening.

INSTALLATION

INSTALLATION

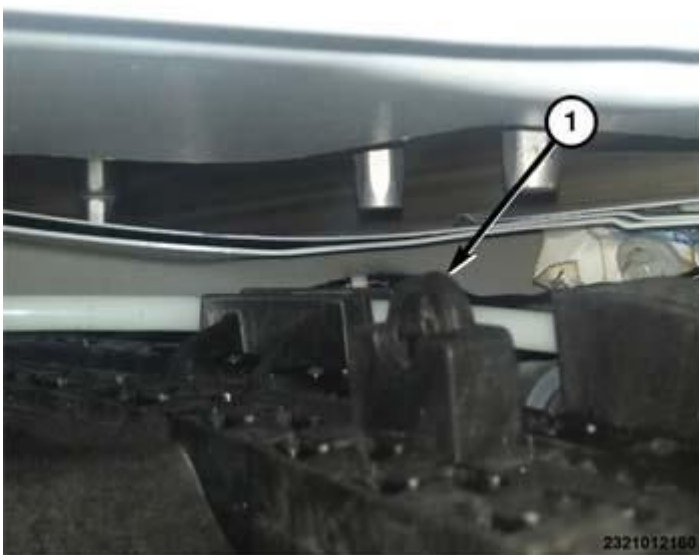


Fig. 768: Identifying Support Bracket

Courtesy of CHRYSLER GROUP, LLC

1. Position the sunshade back into the vehicle with the support pin behind the support bracket (1).

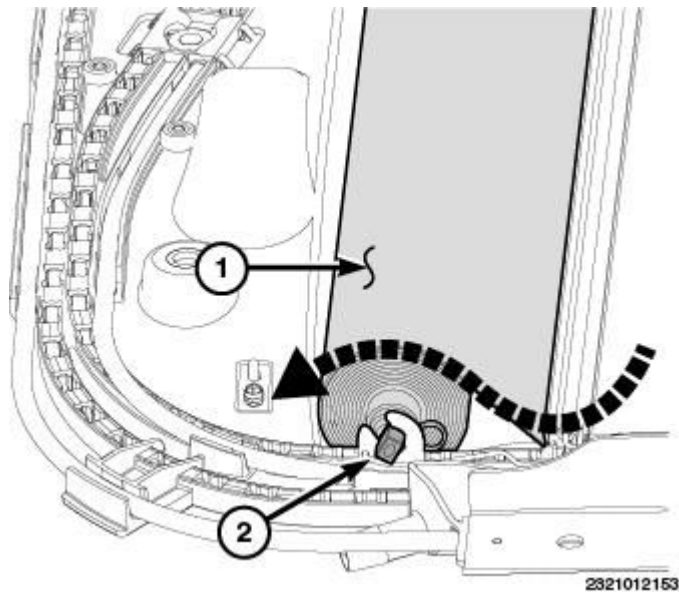


Fig. 769: Identifying Flattened Steel Rod & Shade Assembly
Courtesy of CHRYSLER GROUP, LLC

2. Locate the flattened steel rod (2) on the right hand side of the shade assembly (1) and position behind the steel support plate.

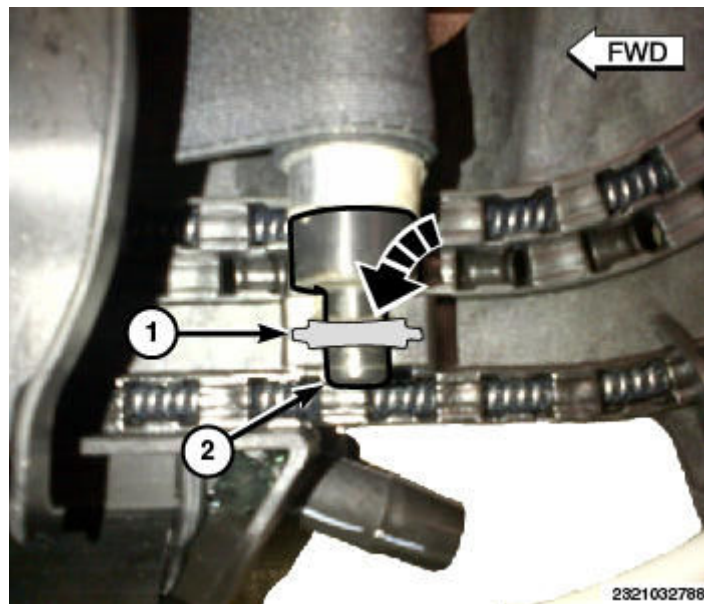


Fig. 770: Identifying Support Pin & Support Bracket
Courtesy of CHRYSLER GROUP, LLC

3. Position the support pin (2) back into the support bracket (1).

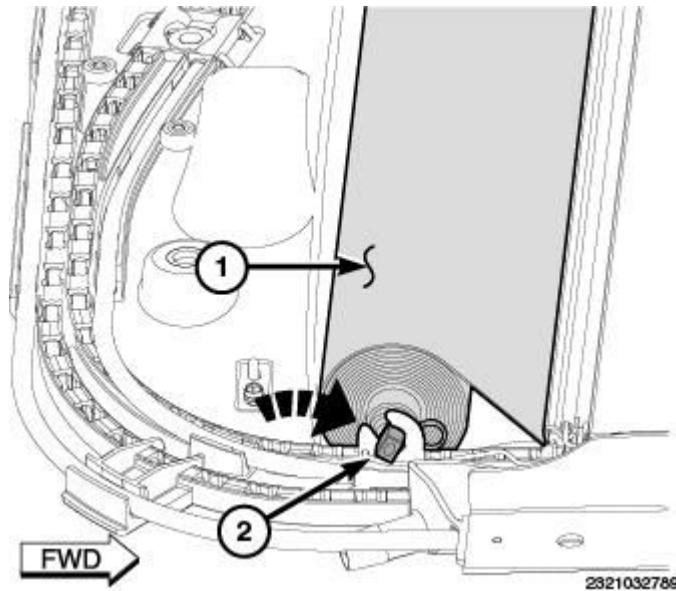


Fig. 771: Installing Flattened Steel Rod Into Slot In Steel Support Plate
Courtesy of CHRYSLER GROUP, LLC

4. Insert the flattened steel rod (2) into the slot in the steel support plate in the rear beam.

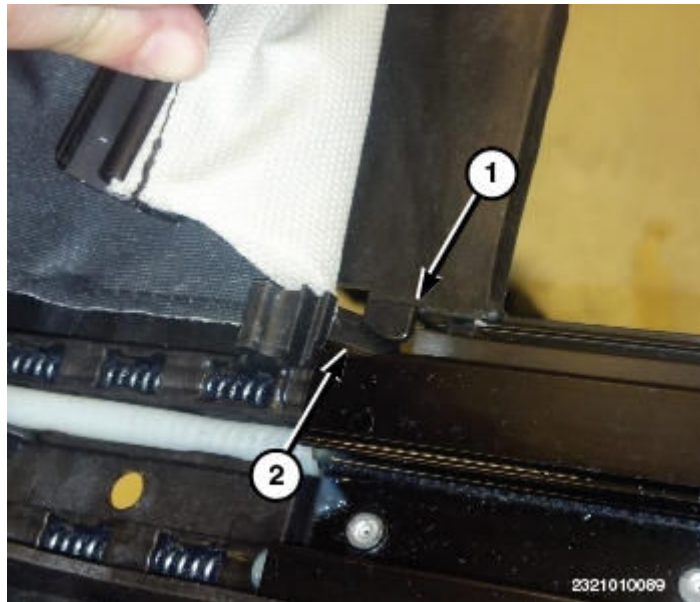


Fig. 772: Identifying Plastic Support Runner & Tab
Courtesy of CHRYSLER GROUP, LLC

NOTE: The sunshade retraction spring force is significant. Firmly hold onto the sunshade while securing the shade to the overmolds in the following steps.

5. Pull the sunshade fabric toward the front of the assembly and guide it under the tension bar mounting brackets.
6. While lifting up on the fabric, expose the plastic support runners (2) and guide them under the tabs (1) at each side of the opening.

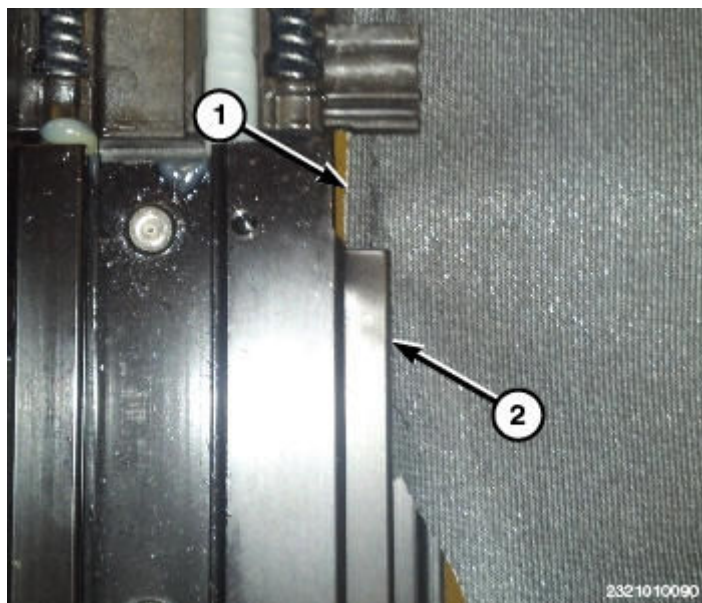


Fig. 773: Identifying Sunshade Fabric & Side Rails
Courtesy of CHRYSLER GROUP, LLC

7. Guide the sunshade fabric (1) under the flanges along the side rails (2) and extend the sunshade toward the overmolds.

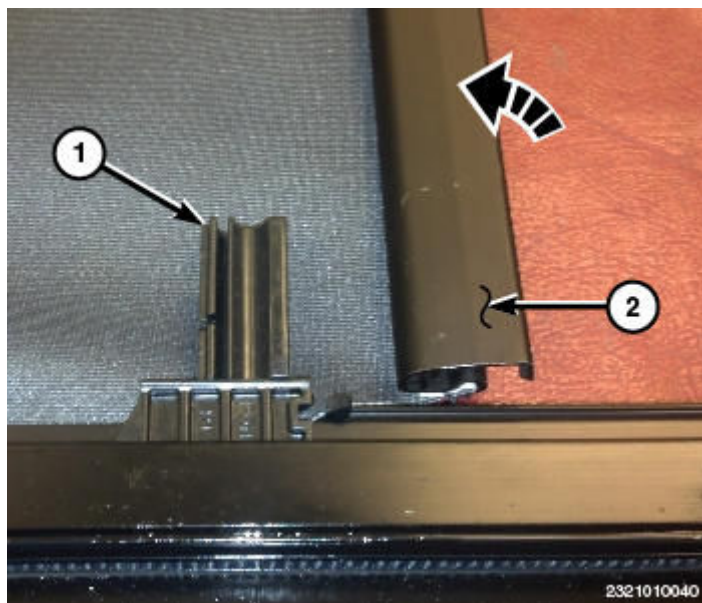


Fig. 774: Identifying Front Aluminum Beam & Overmolds
Courtesy of CHRYSLER GROUP, LLC

8. With the front aluminum beam (2) pulled out in front of the overmolds (1), roll the beam back.

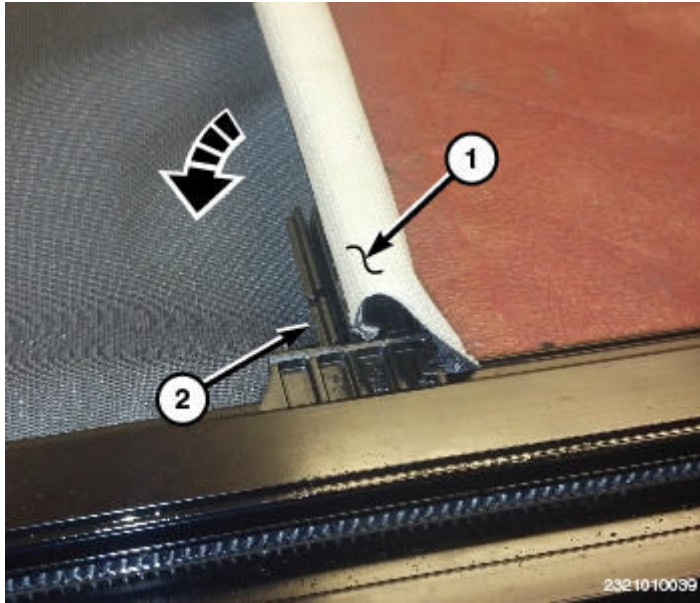


Fig. 775: Identifying Beam & Overmolds
Courtesy of CHRYSLER GROUP, LLC

9. With the beam (1) rolled over and positioned over the overmolds (2), complete rolling the beam over until it snaps into the overmolds fully.

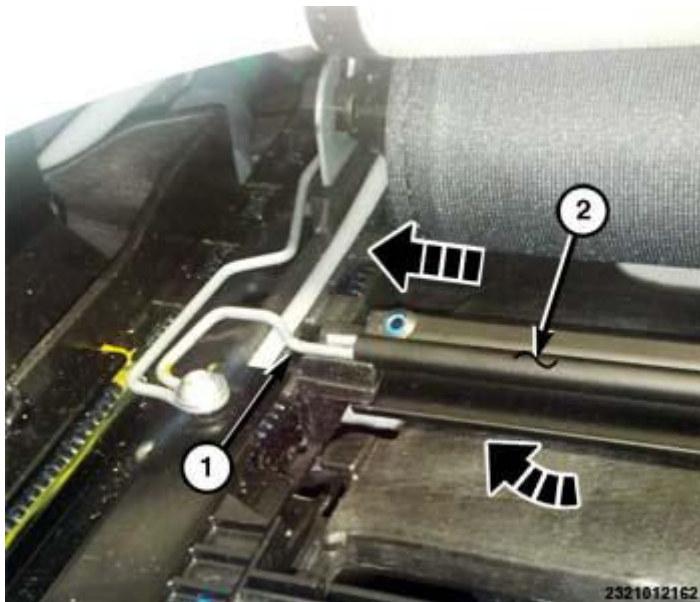


Fig. 776: Identifying Tension Bar & Clip
Courtesy of CHRYSLER GROUP, LLC

10. Position the tension bar (2) back into place and slide onto the clip (1).
11. Rotate the bar (2) up and seat onto the brackets fully.

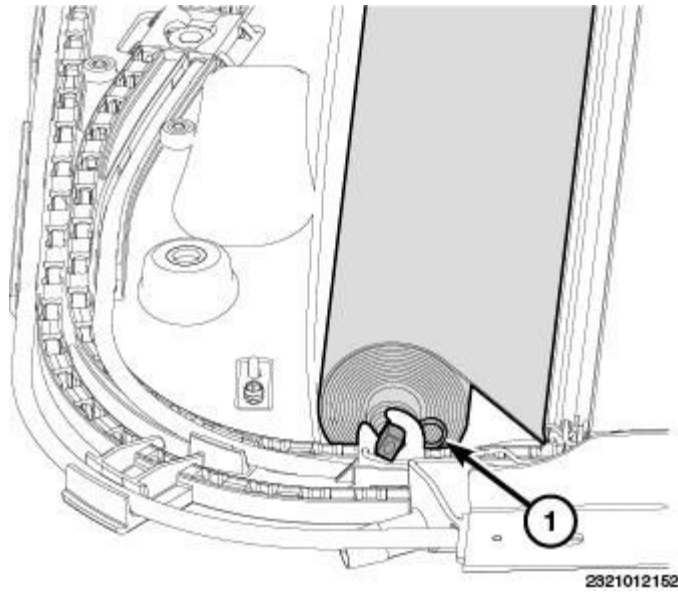


Fig. 777: Identifying Pin
Courtesy of CHRYSLER GROUP, LLC

12. Pull out the pin (1) and release the tension on the retraction spring.

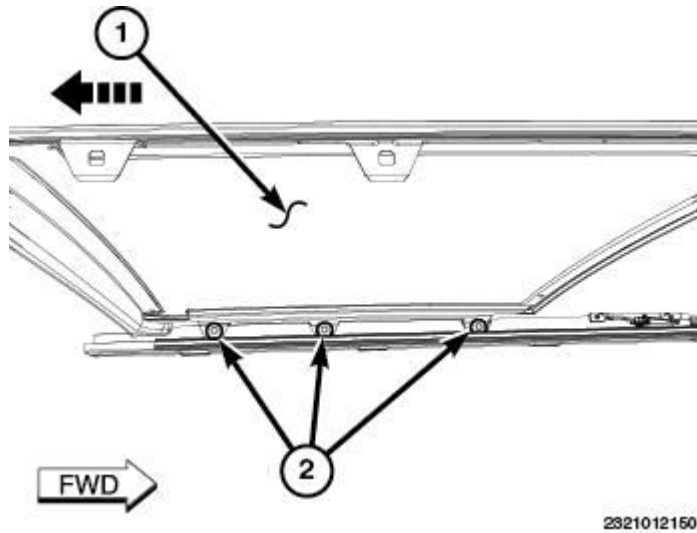
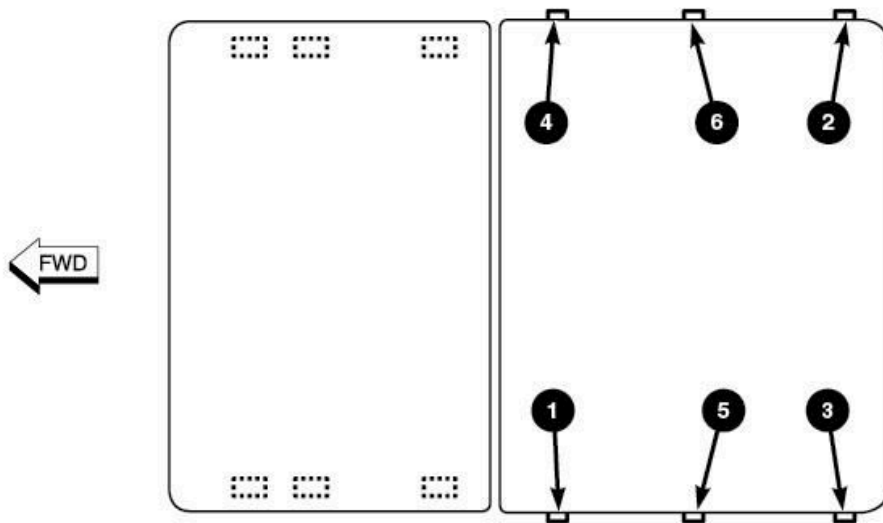


Fig. 778: Identifying Rear Glass & Fasteners
Courtesy of CHRYSLER GROUP, LLC

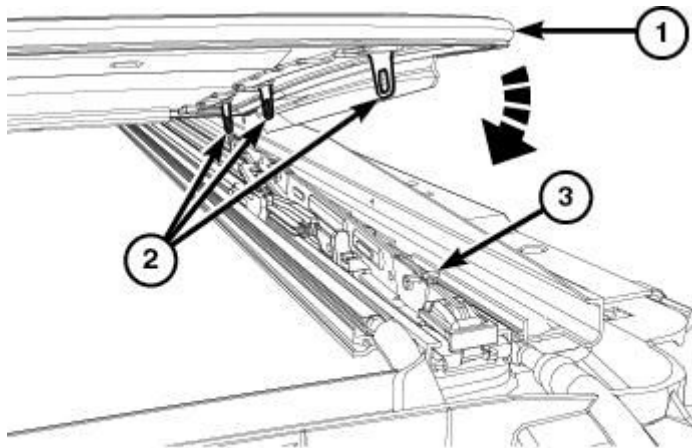
13. Position the rear glass (1) back and install the six rear bolts (2).



2321010036

Fig. 779: Identifying Sunroof Bolts
Courtesy of CHRYSLER GROUP, LLC

Tighten the bolts to 4.5 N.m (40 in. lbs.) using the sequence shown.



2321010188

Fig. 780: Identifying Glass Panel & Guide Mechanism/Lift Arms
Courtesy of CHRYSLER GROUP, LLC

14. Position the glass panel (1) onto the guide mechanism/lift arms (3).

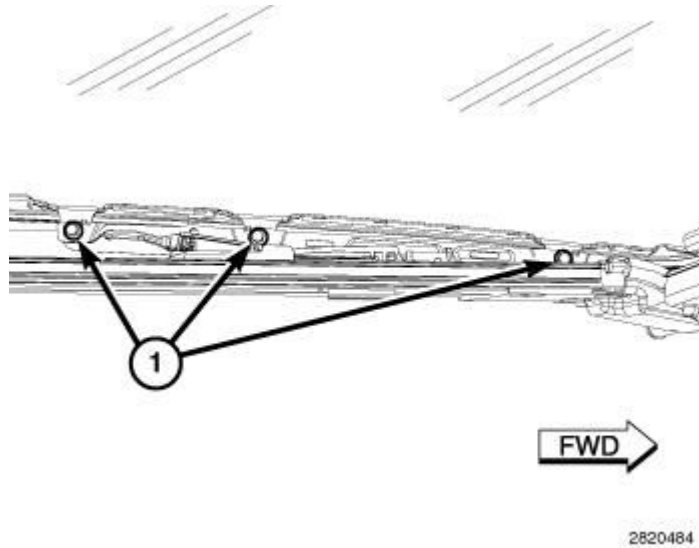


Fig. 781: Six Glass Panel Screws
Courtesy of CHRYSLER GROUP, LLC

15. Start the six attaching screws (1).

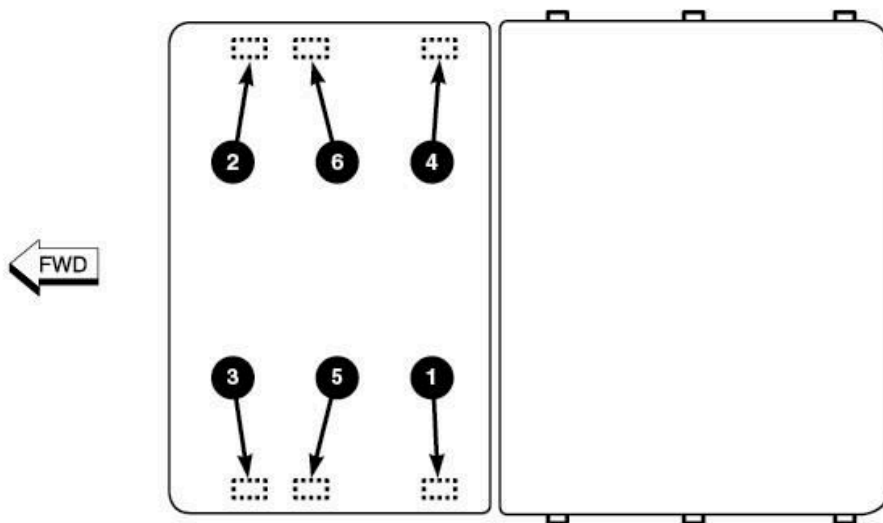
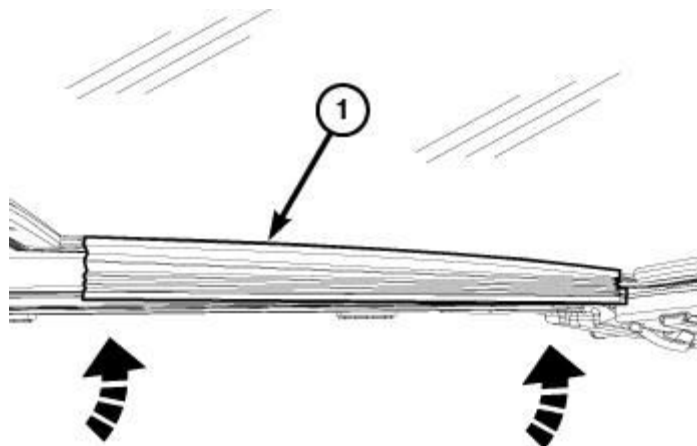


Fig. 782: Identifying Glass Panel Screws
Courtesy of CHRYSLER GROUP, LLC

16. Connect a 12v power supply and verify that the sunroof is in the closed position.
17. Adjust the sunroof glass. Refer to **ADJUSTMENTS** and **ADJUSTMENTS**.
18. Tighten the six screws to 4.5 N.m (40 in. lbs.) using the sequence shown.



2820643

Fig. 783: Mechanism Covers

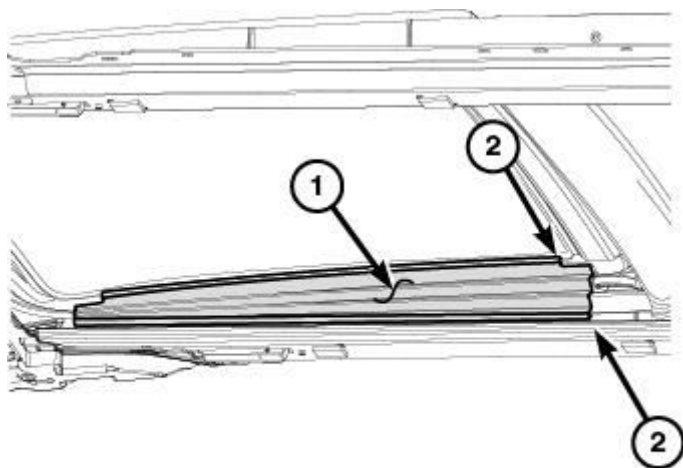
Courtesy of CHRYSLER GROUP, LLC

19. Position the mechanism covers (1) over the glass tabs between the locating features and seat fully.
20. Initialize sunroof motor. Refer to **SUNROOF, DUAL PANE, STANDARD PROCEDURE**.
21. Verify sunroof operation and alignment.

TROUGH, SUNROOF

REMOVAL

REMOVAL



2321010035

Fig. 784: Identifying Sunroof Mechanism Cover & Mounting Flanges

Courtesy of CHRYSLER GROUP, LLC

1. Open the front glass to the vent position and remove the mechanism covers (1). Refer to **COVER, SUNROOF MECHANISM, REMOVAL**.

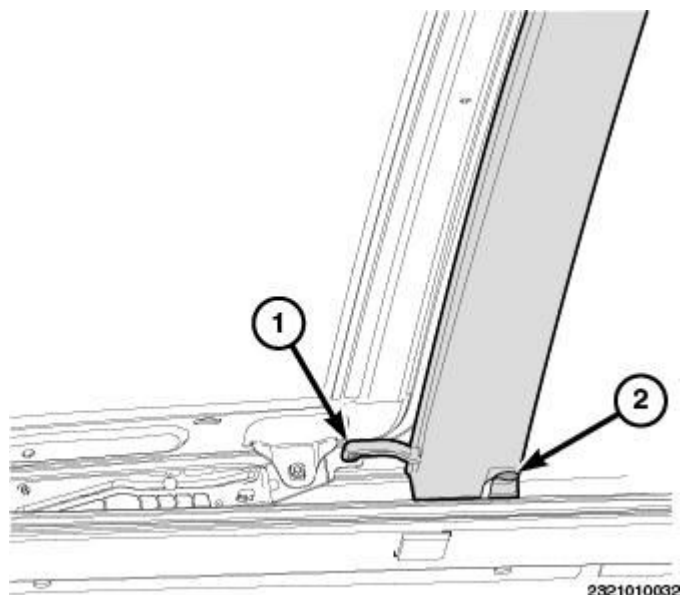


Fig. 785: Identifying Trough Arm
Courtesy of CHRYSLER GROUP, LLC

2. Release the trough arm (1) from the mechanisms and slide the drain trough rearward.

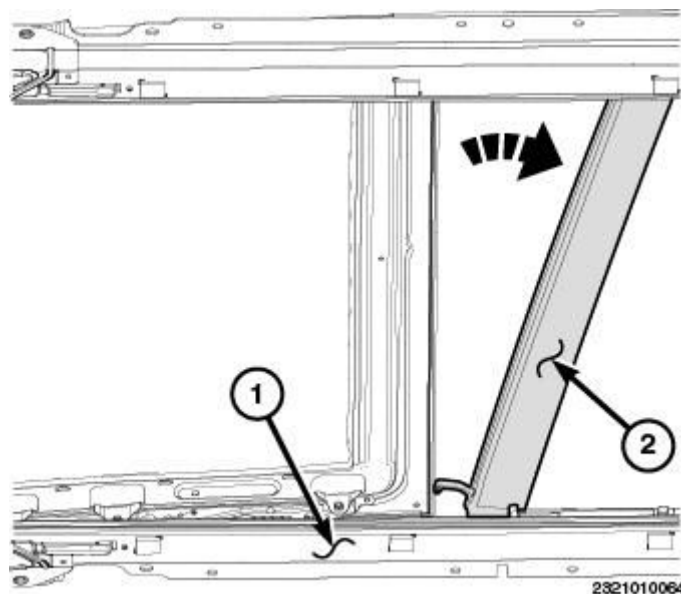


Fig. 786: Identifying Drain Trough & Frame Assembly
Courtesy of CHRYSLER GROUP, LLC

3. Twist the drain trough (2) in the frame assembly (1) and remove.

INSTALLATION

INSTALLATION

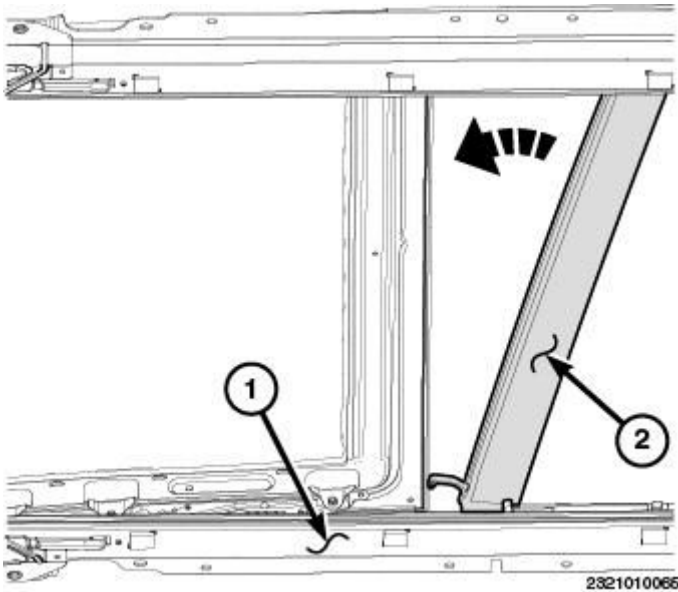


Fig. 787: Identifying Drain Trough & Sunroof Frame Assembly
Courtesy of CHRYSLER GROUP, LLC

1. Position the drain trough (2) up into the sunroof frame assembly (1).

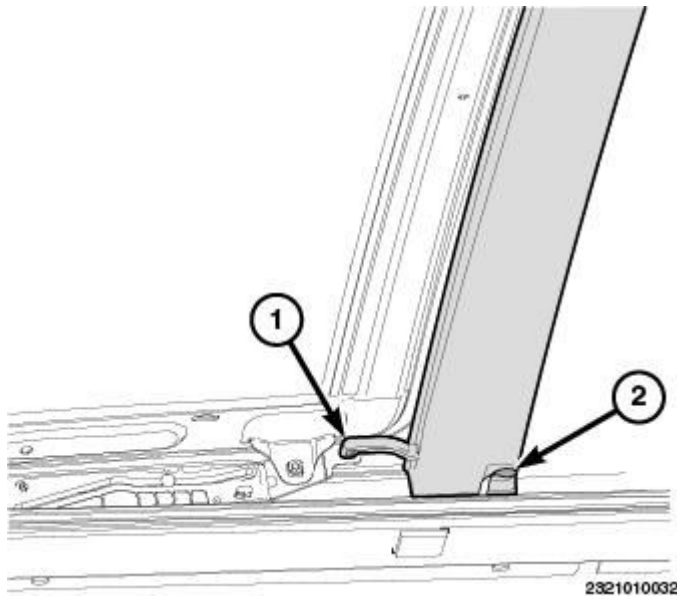
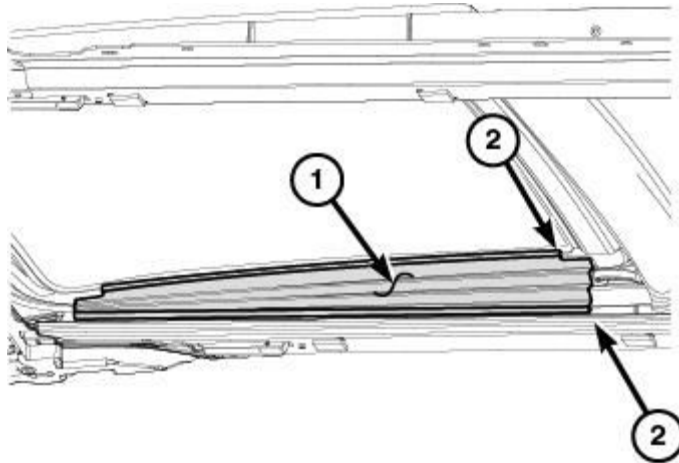


Fig. 788: Identifying Trough Arm
Courtesy of CHRYSLER GROUP, LLC

2. Slide the trough forward over the support spring (2) and connect the arms (1) to the mechanisms.



2321010035

Fig. 789: Identifying Sunroof Mechanism Cover & Mounting Flanges
 Courtesy of CHRYSLER GROUP, LLC

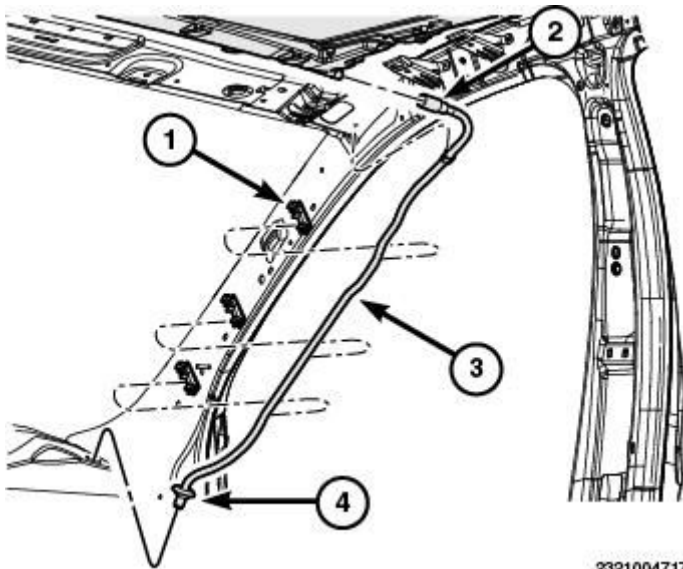
3. Install the mechanism covers (1). Refer to COVER, SUNROOF MECHANISM, INSTALLATION.

TUBE, SUNROOF DRAIN

REMOVAL

REMOVAL

FRONT

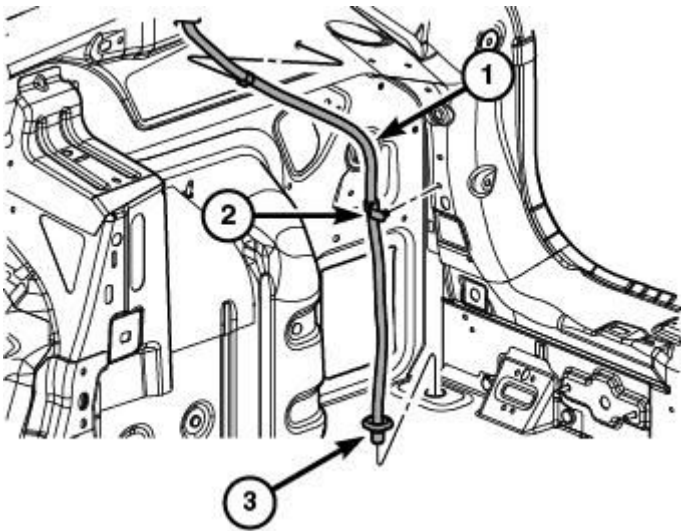


2321004717

Fig. 790: Identifying Sunroof, Support Clips, Tube & Floor Grommet
 Courtesy of CHRYSLER GROUP, LLC

1. Remove the A-pillar trim. Refer to **PANEL, A-PILLAR TRIM, REMOVAL**.
2. Remove the instrument panel speakers as necessary. Refer to **SPEAKER, REMOVAL**.
3. Lower the headliner as necessary to gain access to the drain tube. Refer to **HEADLINER, REMOVAL**.
4. Separate the drain tube from the support clips (1).
5. Disconnect the drain tube from the floor grommet (4).
6. Disconnect the tube from the sunroof (2) and pull the tube (3) up through the instrument panel.

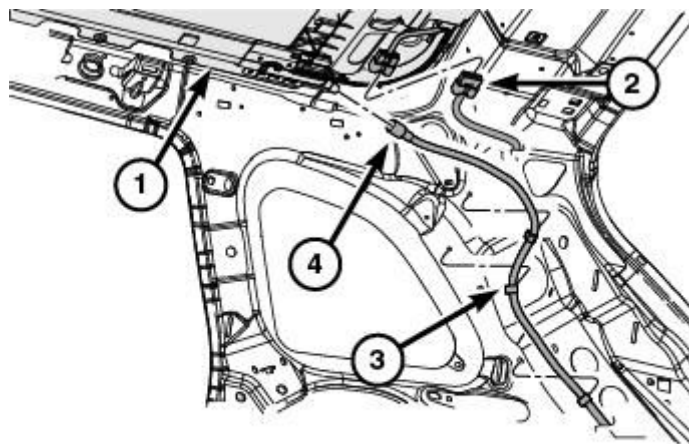
REAR



2921004718

Fig. 791: Identifying Drain Tube, Support Clips & Floor Grommet
 Courtesy of CHRYSLER GROUP, LLC

1. Remove the upper B-pillar trim. Refer to **PANEL, B-PILLAR TRIM, REMOVAL**.
2. Remove the rear grab handles. Refer to **HANDLE, GRAB, REMOVAL**.
3. Remove the quarter trim panel. Refer to **PANEL, QUARTER TRIM, REMOVAL**.
4. Lower the headliner as necessary to gain access to the drain tube. Refer to **HEADLINER, REMOVAL**.
5. Separate the drain tube support clips (2).
6. Disconnect the drain tube from the floor grommet (3).



2321004719

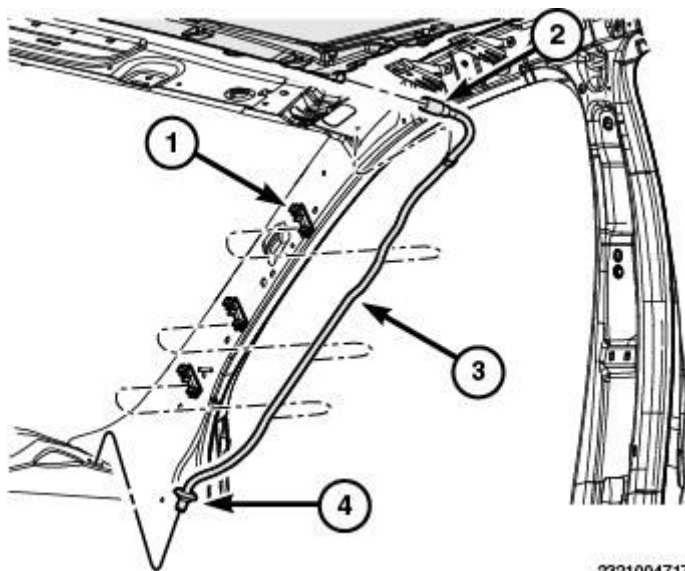
Fig. 792: Identifying Sunroof, Tube & Clips
Courtesy of CHRYSLER GROUP, LLC

7. Disconnect the tube (4) from the sunroof (1) and remove the tube (3).

INSTALLATION

INSTALLATION

FRONT



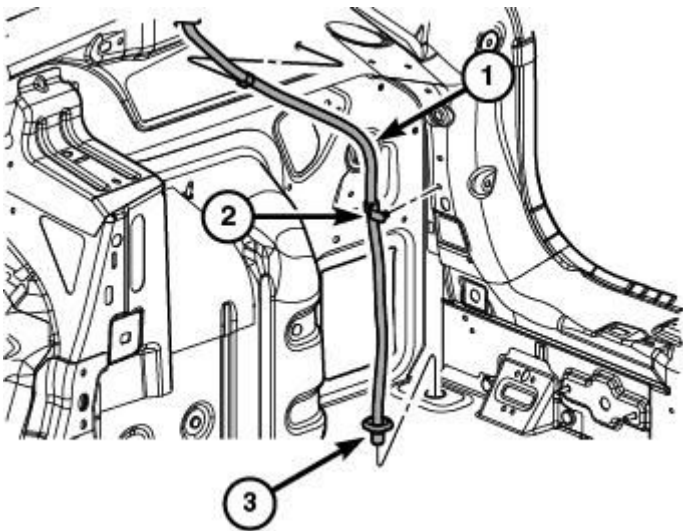
2321004717

Fig. 793: Identifying Sunroof, Support Clips, Tube & Floor Grommet
Courtesy of CHRYSLER GROUP, LLC

1. Install the front tube (3) and seat into the support fasteners (1) fully.
2. Position the lower portion through the grommet (4) in the body.

3. Connect the new drain tube to the sunroof housing (2) and test drainage.
4. Install the headliner. Refer to **HEADLINER, INSTALLATION**.
5. Install the instrument panel speaker. Refer to **SPEAKER, INSTALLATION**.
6. Install the A-pillar trim. Refer to **PANEL, A-PILLAR TRIM, INSTALLATION**.

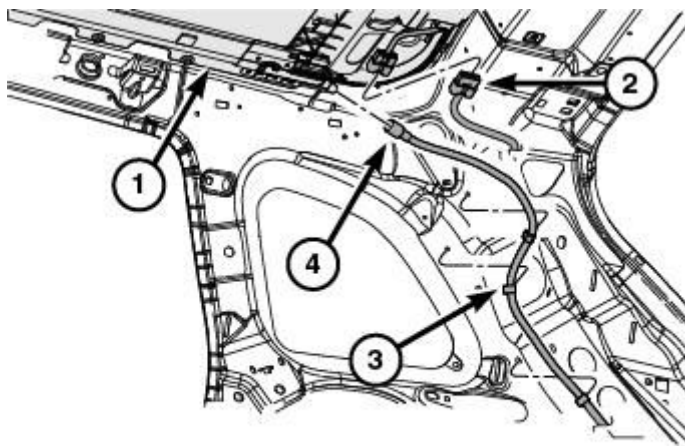
REAR



2321004718

Fig. 794: Identifying Drain Tube, Support Clips & Floor Grommet
Courtesy of CHRYSLER GROUP, LLC

1. Install the rear tube and seat the push pin fasteners (2) fully.
2. Position the lower portion (3) through the grommet in the body.



2321004719

Fig. 795: Identifying Sunroof, Tube & Clips
Courtesy of CHRYSLER GROUP, LLC

3. Connect the new drain tube (4) to the sunroof housing (1) and test drainage.
4. Install the headliner. Refer to **HEADLINER, INSTALLATION**.
5. Install the quarter trim panel. Refer to **PANEL, QUARTER TRIM, INSTALLATION**.
6. Install the grab handles. Refer to **HANDLE, GRAB, INSTALLATION**.
7. Install the upper B-pillar trim. Refer to **PANEL, B-PILLAR TRIM, INSTALLATION**.

BODY STRUCTURE

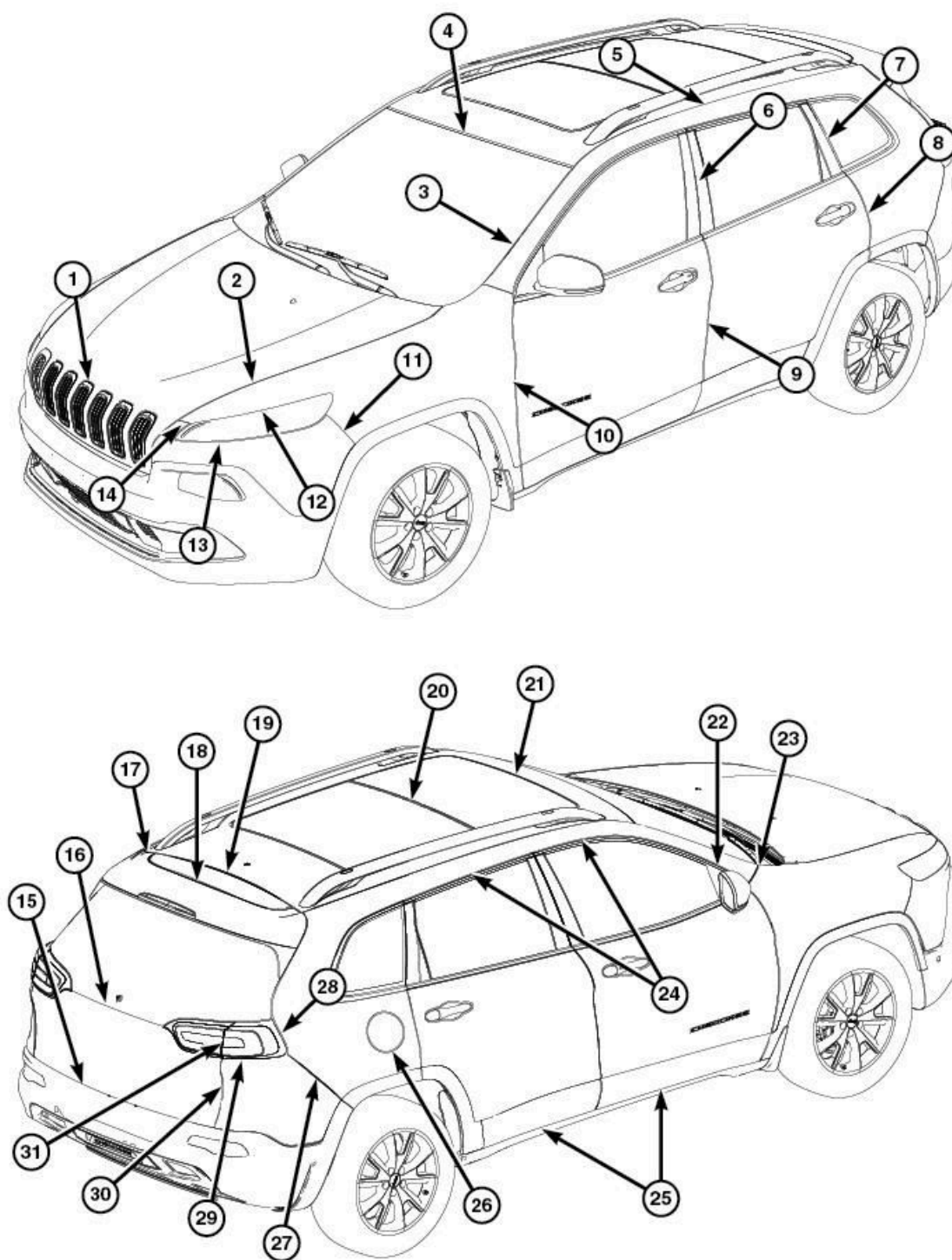
GAP AND FLUSH

SPECIFICATIONS

BODY GAP AND FLUSH MEASUREMENTS

2014 Jeep Cherokee Trailhawk

2014 ACCESSORIES AND EQUIPMENT Body - Interior & Exterior - Cherokee



2308010492

Fig. 796: Identifying Body Gap And Flush Measurements
Courtesy of CHRYSLER GROUP, LLC

NOTE: All measurements are in millimeters.

2014 Jeep Cherokee Trailhawk

2014 ACCESSORIES AND EQUIPMENT Body - Interior & Exterior - Cherokee

- O/F = Over Flush
- U/D = Up/Down
- U/F = Under Flush
- F/A = Fore/Aft

BODY GAP AND FLUSH MEASUREMENTS TABLE

DIMENSION	DESCRIPTION	GAP	FLUSH
1	Grille Ring to Hood	1.0 +/- 0.5	-
2	Hood to Fender	3.5 +/- 1.5 Parallel within 1.0 Side to side within 2.0	0.0 +/- 1.5 0.0 +/- 1.0 Hood U/D within 1.0 of curve
3	Windshield to A-pillar	4.0 +/- 2.0	-
4	Windshield to Roof	6.5 +/- 2.0	Windshield U/F 2.0 +/- 1.5
5	Roof to Body Side Aperture	-	Roof U/F 6.5 +/- 1.5 Transition to 8.0 in rear
6	Front Door Applique to Rear Door Applique	4.0 +/- 2.0 Parallel within 1.5	0.0 +/- 1.5
7	Quarter Glass to Rear Door Applique	4.0 +/- 1.5 Parallel within 1.0	Quarter Glass O/F 1.0 +/- 1.5
8	Rear Door to Body Side Aperture	3.5 +/- 1.0 Parallel within 1.0	0.0 +/- 1.0
9	Front Door to Rear Door	3.5 +/- 1.0 Parallel within 1.0	Front Door O/F 0.5 +/- 1.0
10	Fender to Front Door Feature Line U/D 0.0 +/- 1.0	3.5 +/- 1.0 Parallel within 1.0	Fender O/F 0.5 +/- 1.0
11	Upper Fascia to Fender	0.0 +/- 0.5	0.0 +/- 0.5
12	Daylight Running Lamp to Fender	1.0 +/- 1.0	Lamp U/F 1.0 +/- 0.5
13	Daylight Running Lamp to Fascia	1.0 +/- 1.0	Lamp U/F 1.5 +/- 1.0
14	Upper Fascia to Fender	0.0 +/- 1.0	Fascia O/F 0.5 +/- 0.5 Cross Car 0.0 +/- 1.0
15	Fascia to Liftgate	5.5 +/- 1.5 Parallel within 1.5	0.0 +/- inboard transitioning to O/F 4.0 outboard

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16	Liftgate to Liftgate Glass	4.0 +/- 1.5	Liftgate U/F 0.5 +/- 1.5
17	Spoiler to Body Side Aperture	5.0 +/- 1.5 Parallel within 1.5	Spoiler U/F 3.0 +/- 1.5 Consistent within 1.5
18	Spoiler to Roof	6.0 +/- 1.5 Parallel within 1.5	Spoiler U/F 2.0 +/- 1.5 Consistent within 1.5
19	Liftgate to Roof	6.0 +/- 1.0 Parallel within 0.5	Liftgate U/F 2.0 +/- 1.0 Consistent within 1.0
20	Rear Sunroof Glass to Front Sunroof Glass	0.0 +/- 0.0	Rear Sunroof Glass 0.0 to U/F 2.5 Consistent within 1.5
21	Sunroof Glass to Front Roof	0.0 +/- 0.0	Sunroof Front 0.0 to U/F 2.5 Sunroof Rear 0.0 to O/F 2.5 Consistent within 1.5
22	Door Molding to Mirror Flag	0.0 +/- 0.5	Flag O/F 2.0 +/- 1.5 transitioning to 3.5 at top
23	Fender to A-pillar	2.0 +/- 1.0 Parallel within 1.0 Side to side within 1.0	0.0 +/- 1.0 Cross Car within 1.0
24	Door Molding to Body Side Aperture	4.5 +/- 1.5 Parallel within 1.5	Molding U/F 1.5 +/- 1.5
25	Sill Moldings to Door Cladding	6.0 +/- 2.0	Cross car varies +/- 2.0
26	Fuel Door to Body Side Aperture	2.5 +/- 0.5	Door U/F 0.5 +/- 0.5
27	Body Side Aperture to Rear Fascia	1.0 +/- 1.0	Fascia U/F 0.5 +/- 0.5 transitioning to flush at Lamp and Flare
28	Body Side Aperture Lamp to Body Side Aperture	0.0 + 0.5 Parallel within 1.0	Lamp U/F 0.5 +/- 1.0 transitioning to 0.0 at top
29	Body Side Aperture Lamp to Body Side Fascia	1.0 +/- 1.0 Side to side within 1.0	Varies +/- 1.0
30	Liftgate to Fascia	4.0 +/- 1.5	Fascia (top) O/F 2.0 +/- 1.5 transitioning to 1.5 at bottom

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		Side to side within 1.5	Consistent within 1.5
31	Body Side Aperture Lamp to Liftgate Lamp	4.0 +/- 1.5 Parallel within 1.5 Side to side within 2.0	Varies +/- 1.5 Consistent within 1.5 Side to Side within 2.0

2014 ACCESSORIES AND EQUIPMENT**Chime/Buzzer/Driver Assist - Service Information - Cherokee****DESCRIPTION****BLIND SPOT MONITOR SYSTEM**

The Blind Spot Monitor (BSM) system is an available factory-installed electronic driving aid. This system provides both blind spot and Rear Cross Path (RCP) monitoring features. While the vehicle is being driven, this system alerts the vehicle operator when it detects other highway licensable vehicles that enter the targeted blind spot and cross path alert zones. These zones lie immediately to the right and behind as well as immediately to the left and behind the vehicle. Due to the surrounding rear vehicle structure or other adjacent stationary obstacles outside of the vehicle, these zones might be more difficult for the vehicle operator to easily monitor.

When the BSM system detects another vehicle within one of the target zones, the system is capable of illuminating an amber triangle icon located in each outside rear view mirror glass, as well as reducing audio system volume and sounding chime tones through the audio system speakers to provide the vehicle operator with both visual and audible alerts. However, it should be noted that this BSM system is intended to supplement and not to replace safe vehicle operating habits, including proper adjustment and use of the standard equipment inside and outside rear view mirrors.

The BSM system includes the following major components, which are described in further detail elsewhere within this service information:

- **Blind Spot Displays** - Vehicles equipped with the BSM system have an amber Light Emitting Diode (LED) unit mounted on the back of each outside rear view mirror glass case behind the translucent outline of a triangle in the mirror glass. The BSM system illuminates the appropriate triangle icon in amber each time a vehicle is detected in one of the blind spot or rear cross path alert zones.
- **Blind Spot Sensors** - Vehicles equipped with the BSM system have both a Left Blind Spot Sensor (LBSS) and a Right Blind Spot Sensor (RBSS). The LBSS and the RBSS each include a RADAR sensor and an integral electronic control unit. Each of the two control units is independent, communicates on the Controller Area Network (CAN) data bus with its respective Driver Door Module (DDM) or Passenger Door Module (PDM), which is hard wired to its respective right or left blind spot display. The LBSS and the RBSS are concealed behind their respective right or left outboard end of the rear bumper fascia, just behind each rear wheel opening.
- **Door Modules**
 - An electronic Driver Door Module (DDM) and Passenger Door Module (PDM) receives electronic messages over the Controller Area Network (CAN) data bus from its respective Left Blind Spot Sensor (LBSS) or Right Blind Spot Sensor (RBSS) to control a hard wired output to the BSM display in its respective outside rear view mirror. The door modules are concealed behind the front door trim panels on each front door inside panel.
- **Electronic Vehicle Information Center** - In vehicles equipped with the optional BSM system, the Electronic Vehicle Information Center (EVIC) within the Instrument Cluster (IC) (also known as the

Instrument Panel Cluster/IPC) may display textual warnings and error messages related to the current operating status of the BSM system.

- **Radio Receiver Module** - The virtual buttons in the touch screen of the optional premium Radio Receiver Module (RRM) (also known as the radio or the head unit) provide an interface that allows the vehicle operator to enable, disable and modify certain BSM system settings using the customer programmable features option.

Hard wired circuitry connects the BSM system components to each other through the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other and to the vehicle electrical system through the use of a combination of soldered splices, splice block connectors and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin out and location views for the various wire harness connectors, splices and grounds.

The BSM system components cannot be adjusted or repaired. If any of the BSM system components becomes damaged or ineffective, that component must be replaced.

CHIME WARNING SYSTEM

A chime warning system is standard factory-installed equipment. The chime warning system uses an electromechanical transducer and an electromechanical relay that are soldered onto the electronic circuit board within the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) to provide audible indications of various vehicle conditions that may require the attention of the vehicle operator or occupants.

The electromechanical transducer generates beep tones and chime tones, while the electromechanical relay generates click tones to emulate the sounds associated with conventional turn signal and hazard warning flasher operation. The microprocessor-based IC utilizes electronic **chime request** messages received from other modules in the vehicle over the Controller Area Network (CAN) data bus along with hard wired inputs to monitor many sensors and switches throughout the vehicle. In response to those inputs, the circuitry and programming of the IC allow it to control the audible outputs that are produced through its on-board transducer and relay.

The IC is capable of producing the following audible outputs:

- **Slow Rate Repetitive Click** - Repeated **click** tones that are issued at a slow rate of about 90 clicks per minute.
- **Fast Rate Repetitive Click** - Repeated **click** tones that are issued at a fast rate of more than about 180 clicks per minute.
- **Single Chime Tone** - A single **beep** or **chime** tone.
- **Slow Rate Repetitive Chime Tones** - Repeated **chime** tones that are issued at a rate of about 50 chimes per minute.
- **Fast Rate Repetitive Chime Tones** - Repeated **chime** tones that are issued at a rate of about 180 chimes per minute.

Hard wired circuitry connects the IC and the various chime warning system switch and sensor inputs to their modules and to each other through the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the IC through the use of a combination of soldered splices, splice block connectors and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin out and location views for the various wire harness connectors, splices and grounds.

The IC chime warning system circuits and components cannot be adjusted or repaired. If the IC circuitry, the on-board transducer or the relay are damaged or ineffective, the IC assembly must be replaced.

FORWARD COLLISION WARNING PLUS

The Forward Collision Warning Plus (FCW+) system is an enhancement to the current vehicles equipped with Adaptive Cruise Control (ACC) and a Forward Facing Camera (FFC). This system uses the FFC for enhanced sensitivity to objects in front of the vehicle. The system utilizes radar and video input to detect whether the vehicle is approaching another vehicle or large obstacle in its path too rapidly and warn/assist the driver in avoiding the incident. The system communicates with other components on the vehicle to apply the brakes and/or to alert the driver through visual and audible warnings. The FCW Plus function operates regardless of whether ACC with stop and go is active or not. The system operates down to 0 mph and provides audible closing/proximity warnings as well as brake pedal vibration.

Forward Collision Warning options and Active Braking settings can be changed. When the vehicle is equipped with a Uconnect® 8.4/8.4A system screen, the Safety and Driving Assistance soft key needs to be selected to access the options menu. When the vehicle is equipped with the Uconnect® 5.0 system, pressing the "+ MORE" hard-key located on the lower right side of the Uconnect® system will bring you to the "Settings" soft key.

The system also monitors the torque sensor inside the EPS to verify the driver's hands remain on the wheel. If no driver's steering input is received for 3-5 seconds, the system alert the driver with audio and visual warning. If the steering wheel continues to receive no torque input from the driver, the FCW+, ACC+ and LDW+ will deactivate. Once the vehicle has achieved road speeds of 60 km/h (37 mph) and below 160 km/h (100 mph), sense the drivers steering input and the FFC can clearly detect the lines in the road, the system will enable again. The system will also disable when the drivers seatbelt is unbuckled while the vehicle is travelling at speeds of 10 mph or greater.

The following is a list of FCW+ operations:

- Utilizes Radar and Video sensors to detect whether the vehicle is approaching another vehicle or large obstacle in its path too rapidly and warn / assist the driver in avoiding / mitigating the incident;
- The driver has the ability to adjust the sensitivity and turn brake support on or off in the radio;
- Prefill: Prepares the brakes for emergency braking;
- Audible & Visual Warnings;
- Brake Jerk: Short deceleration to alert driver;
- CMS (Collision Mitigation System) Up to 1.5 sec of braking to give driver additional reaction time;

- ABA (Advanced Brake Assist) If the driver is not braking enough, ABA will increase the braking to avoid / mitigate the accident. **NOTE: it is important to note the system will use "mitigated" braking to avoid accidents, but will not completely stop the vehicle in all scenarios if an impact is imminent - its purpose is to "warn and assist".**

LANE DEPARTURE WARNING (LDW+)

Haptic Lane Departure Warning Plus (LDW+) - This system is an available option offered on vehicles equipped with Electronic Power Steering (EPS) and the Forward Facing camera (FFC). The system can be turned on or off with a single hard button the Auxiliary Switch Bank Module (ASBM). The LED on the button will inform the driver of the system status when the driver is not on the Drive Assist screen. The system operates when enabled above 60 km/h (37 mph) and below 160 km/h (100 mph).

The LDW+ system issues a warning alert to the driver in case of an unintended lane departure (i.e the driver did not use turn signals beforehand to confirm a planned lane change). The LDW system uses the Forward Facing Camera (FFC) to detect lane markings and measure vehicle position within those lane boundaries. The warning can be audible, visual or haptic feedback to the driver, for example through a vibration in the steering wheel that feels like a virtual "rumble strip" induced by the electronic powered steering (EPS) system. If the driver continues to unintentionally drift out of the lane, the system provides a visual warning to prompt the driver to adjust the vehicle's trajectory to remain within the lane boundaries. When only a single lane marking is detected and the driver unintentionally drifts across the lane marking (again, no turn signal), the LDW system provides a visual warning through the instrument cluster to prompt the driver to remain within the lane. When only a single lane marking is detected, as haptic warning will not be provided. The driver may manually override the haptic warning by applying torque into the steering wheel at any time. The use of the turn signal suppresses the warning.

No Hands Recognition Strategy - When operating conditions have been met, the LDW system will employ a "No Hands Recognition Strategy". The system monitors the torque sensor inside the EPS to verify the driver's hands remain on the wheel. If the hands are not detected, this will cause an audible warning to the driver consisting of left front and right front chimes as well as displaying a visual warning message. The strategy will cancel LDW+ activation if the driver does not return their hands to the wheel.

The driver can configure the torque feedback amount and warning zone start point through personalization settings in the radio. Three settings for each are provided.

The LDW system will indicate the current lane drift condition through the Electronic Vehicle Information Center (EVIC). When the LDW system is ON, the lane lines are gray when the lane boundaries have not been detected and the LDW indicator is solid white.

Changing LDW+ Status:

1. Press the "Controls" soft-key located on the bottom of the Uconnect® system screen.
2. Press the "Settings" soft-key.
3. Press the "Safety and Driving Assistance" soft-key.

Personalization Settings:

- The LDW+ system can be enabled/disabled via an ON/OFF defeat switch with indicator (indicator ON when system is OFF). The indicator will remain ON when a fault is detected in the LDW+ system.
- The LDW+ system retains the last system state (enabled or disabled) from the last ignition cycle when the ignition is changed to the ON/RUN position.
- The LDW+ system has a lane warning sensitivity setting to adjust earliest to latest haptic feedback warning levels (e.g. early, medium, late) located within the personalization settings.
- The LDW+ system retains the last lane warning sensitivity setting from the last ignition cycle when the ignition is changed to the ON/RUN position.
- The LDW+ system has a torque intensity setting to adjust the torque level (e.g. low, medium, high) of the haptic warning located within the personalization settings.
- The LDW+ lane sensitivity and torque intensity settings will not be locked out during driving.

EVIC Lane Detection Display -

3.5 EVIC Screen - Left Lane Departure - Only Left Lane Detected (Right Side Similar) :

- When the LDW system is ON, the LDW indicator is solid white when only the left lane marking has been detected and the system is ready to provide visual warnings in the EVIC if an unintentional lane departure occurs.
- When the LDW system senses that the lane has been approached and is in a lane cross situation, the left thick lane line flashes from gray to flashing white, the left thin line remains solid and the LDW indicator changes from solid white to a flashing yellow.

Left Lane Departure - Both Lanes Detected:

- When the LDW system is ON, the lane lines turn from gray to white to indicate that the lane markings have been detected. The LDW indicator is solid green when both lane marking have been detected and the system is "armed" to provide visual warnings in the EVIC and a torque warning in the steering wheel if an unintentional lane departure occurs.
- When the LDW system sense a lane cross situation, the left thick lane line turns solid white, the right thin line remains solid white. The LDW indicator changes from solid green to solid yellow. At this time torque is applied to the steering wheel in the opposite direction of the lane boundary. For example, if approaching the left side of the lane, the steering wheel will torque to the right side.
- When the LDW system senses the lane has been approached and is in a lane cross situation, the left thick lane line flashes from white to gray, the right thin line remains solid white and the LDW indicator changes from solid yellow to flashing yellow. At this time torque is applied to the steering wheel in the opposite direction of the lane boundary. For example, if approaching the left side of the lane, the steering wheel will torque to the right side.

7.0 EVIC Screen - Left Lane Departure - Only Left Lane Detected (Right Side Similar)

- When the LDW system is on, the lane lines are gray when the lane boundaries have not been detected and the LDW indicator is solid white.

- When the LDW system is ON, the LDW indicator is solid white when only the left lane marking has been

detected and the system is ready to provide visual warning in the EVIC if an unintentional lane departure occurs.

- When the LDW system senses the lane has been approached and is in a lane cross situation, the left lane line flashes think yellow and the right lane line remains grey.

Left Lane Departure - Both Lanes Detected:

- When the LDW system is ON, the lane lines turn from gray to white to indicate that the lane marking have been detected. The LDW indicator is solid green when both lane markings have been detected and the system is "armed" to provide visual warning in the EVIC and a torque warning in the steering wheel if an unintentional lane departure occurs.
- When the LDW system sense a lane cross situation, the left lane line changes to think yellow and the right lane line. The LDW indicator changes from solid green to solid yellow. At this time torque is applied to the steering wheel in the opposite direction of the lane boundary.
- When the LDW system senses the lane has been approached and is in a lane cross situation, the left lane line flashes yellow and the right lane line remains white. The LDW indicator changes from solid yellow to flashing yellow. At this time, torque is applied to the steering wheel in the opposite direction of the lane boundary.

PARK ASSIST SYSTEM

A park assist system is an optional factory-installed electronic parking aid. There are also three distinct versions of the park assist system. The three versions can be readily identified by noting the quantity of ultrasonic sensors installed and the sensor location in the rear or the front and rear bumper fascias. Additional details of each of these versions and their components can be found elsewhere in this service information.

- **Rear Park Assist** - The Rear Park Assist (RPA) alerts the vehicle operator to obstacles located in the path immediately behind the vehicle. This system has four radar sensors, all installed in the rear bumper fascia.
- **Front and Rear Park Assist** - The Front and Rear Park Assist (FRPA) alerts the vehicle operator to obstacles located in the path immediately in front of the vehicle as well as those behind. This system has ten radar sensors, four installed in the rear bumper fascia and six installed in the front bumper fascia. In vehicles equipped with an automatic transmission, the FRPA can also provide an additional autonomous braking alert (also known as stop and release) feature when the automatic transmission gear selector is in Reverse (R) and certain obstacles are detected at the rear of the vehicle. The autonomous braking feature is not available in vehicles equipped with a manual transmission.
- **Parallel and Perpendicular Park Assist** - The Parallel and Perpendicular Park Assist (PPPA) includes all of the features of the FRPA, but adds semiautomatic parallel and perpendicular parking assistance features. This system has twelve radar sensors, six installed in the rear bumper fascia and six installed in the front bumper fascia.

Hard wired circuitry connects the RPA, FRPA or PPPA components to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the RPA, FRPA or PPPA components through the use of a combination of soldered splices, splice block connectors and many different types of wire harness terminal connectors and insulators. Refer to the

appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin out and location views for the various wire harness connectors, splices and grounds.

The RPA, FRPA and PPPA system components cannot be adjusted or repaired. If any of these components is damaged or ineffective, that component must be replaced.

REAR PARK ASSIST

A Rear Park Assist (RPA) system is an optional factory-installed electronic parking aid. During parking and other similar vehicle maneuvers this system alerts the vehicle operator to the approximate relative distance of obstacles located in the path immediately behind the vehicle which, due to the surrounding rear vehicle structure, might be otherwise difficult to perceive. When an obstacle is detected, the system uses graphics and chimes to provide the vehicle operator with visual and audible indications of the presence and proximity of such objects.

The RPA system includes the following major components, which are described in further detail elsewhere in this service information:

- **Body Control Module** - The Body Control Module (BCM) serves as the gateway between the Controller Area Network (CAN) C and the CAN Interior High Speed (IHS) data bus networks used to communicate between the Park Assist Module (PAM), the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) and the Radio Receiver Module (RRM) (also known as the radio or the head unit).
- **Instrument Cluster** - In vehicles equipped with the optional RPA system, the Electronic Vehicle Information Center (EVIC) within the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) displays vehicle graphics and amber or red arc sections that illustrate the approximate location and relative distance of obstacles within the rear path of the vehicle. The EVIC also displays textual warnings and error messages along with issuing audible alerts related to the current operating status of the RPA system.
- **Park Assist Module** - Vehicles equipped with the RPA system include a 4 channel Park Assist Module (PAM) (also known as the ParkTronic System/PTS module), which is secured through integral mounting tabs to weld studs on the left quarter inner panel just behind the left rear wheel house, where it is concealed beneath the quarter inside trim within the cargo area of the vehicle.
- **Park Assist Off Switch** - The optional RPA system can be manually disabled or enabled using a park assist Off switch. The park assist Off switch is integral to the instrument panel switch pod (also known as the Accessory Switch Bank Module/ASBM) in the instrument panel center stack below the heater and air conditioner controls. This switch allows the operator to turn the RPA system Off.
- **Park Assist Sensors** - Vehicles equipped with the RPA system have four ultrasonic park assist sensors that are concealed behind the rear bumper fascia. Only the sensor membrane is visible on the outer surface of the rear bumper fascia. Each sensor is snapped into an individual molded plastic mounting bracket located at horizontal intervals along the inside surface of the rear bumper fascia.
- **Radio Receiver Module** - In vehicles equipped with the RPA system, the PAM sends electronic message requests to the RRM to generate audible signals indicating the approximate distance of obstacles from the rear path of the vehicle. The RRM is capable of generating repetitive single chime tones at several varying frequencies or continuous tones through the rear audio system speakers. If the audio system speakers are already in use, the RRM will mute that output during chime tone generation. In addition, the

RRM provides an interface that allows the vehicle operator to manually disable or enable the RPA system using the customer programmable features option.

FRONT AND REAR PARK ASSIST

A Front and Rear Park Assist (FRPA) system is an optional factory-installed electronic parking aid. During parking and other similar vehicle maneuvers this system alerts the vehicle operator to the approximate relative distance of obstacles located in the paths immediately behind and ahead of the vehicle which, due to the surrounding vehicle structures, might be otherwise difficult to perceive. When an obstacle is detected, the system uses graphics and chimes to provide the vehicle operator with visual and audible indications of the presence and proximity of such objects.

The FRPA is also capable of providing an autonomous brake warning (also known as brake and release) feature. When enabled, this feature will alert the vehicle operator when the automatic transmission gear selector is in the Reverse (**R**) position and an object is detected in the rear path of the vehicle by aggressively applying and releasing the brakes. Following an autonomous brake warning application, an icon representing the rear of the vehicle with three red arcs and the text **BRAKE!** will appear in the Electronic Vehicle Information Center (EVIC) within the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC). This brake warning feature is not available in vehicles equipped with a manual transmission.

The FRPA system includes the following major components, which are described in further detail elsewhere in this service information:

- **Antilock Brake Module** - The Antilock Brake Module (ABM) controls the application of the vehicle brakes to implement the autonomous brake warning feature when it receives the appropriate electronic message input over the Controller Area Network (CAN) data bus from the Park Assist Module (PAM).
- **Body Control Module** - The Body Control Module (BCM) serves as the gateway between the Controller Area Network (CAN) C and the CAN Interior High Speed (IHS) data bus networks used to communicate between the Park Assist Module (PAM), the Antilock Brake Module (ABM), the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) and the Radio Receiver Module (RRM).
- **Instrument Cluster** - In vehicles equipped with the optional FRPA system, the Electronic Vehicle Information Center (EVIC) within the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) displays vehicle graphics and amber or red arc sections that illustrate the approximate location of obstacles within the front or rear paths of the vehicle. The EVIC also displays textual warnings and error messages along with issuing audible alerts related to the current operating status of the FRPA system.
- **Park Assist Module** - Vehicles equipped with the FRPA system include a 10 channel Park Assist Module (PAM) (also known as the ParkTronic System/PTS module), which is secured through integral mounting tabs to weld studs on the left quarter inner panel just behind the left rear wheel house, where it is concealed beneath the quarter inside trim within the cargo area of the vehicle.
- **Park Assist Off Switch** - The optional FRPA system can be manually disabled or enabled using a park assist Off switch. The park assist Off switch is integral to the instrument panel switch pod (also known as the Accessory Switch Bank Module/ASBM) in the instrument panel center stack below the heater and air conditioner controls. This switch allows the operator to turn the FRPA system Off.
- **Park Assist Sensors** - Vehicles equipped with the FRPA system have ten ultrasonic park assist sensors. Four are concealed behind the rear bumper fascia and six are concealed behind the front bumper fascia.

Only the sensor membrane is visible on the outer surface of the bumper fascia. Each sensor is snapped into an individual molded plastic mounting bracket located at horizontal intervals along the inside surfaces of the front and rear bumper fascias.

- **Radio Receiver Module** - In vehicles equipped with the FRPA system, the PAM sends electronic message requests to the RRM to generate audible signals indicating the approximate distance of obstacles from the front and rear paths of the vehicle. The RRM is capable of generating repetitive single chime tones at several varying frequencies or continuous tones through the front or rear audio system speakers. If the audio system speakers are already in use, the RRM will mute that output during chime tone generation. In addition, the RRM provides an interface that allows the vehicle operator to manually disable or enable the FRPA system using the customer programmable features option.

PARALLEL AND PERPENDICULAR PARK ASSIST

A Parallel and Perpendicular Park Assist (PPPA) system is an optional factory-installed electronic parking aid. During parking and other similar vehicle maneuvers this system alerts the vehicle operator to the approximate relative distance of obstacles located in the paths immediately behind and ahead of the vehicle which, due to the surrounding vehicle structures, might be otherwise difficult to perceive. When an obstacle is detected, the system uses graphics and chimes to provide the vehicle operator with visual and audible indications of the presence and proximity of such objects.

The PPPA is also capable of providing an autonomous brake warning (also known as brake and release) feature. When enabled, this feature will alert the vehicle operator when the automatic transmission gear selector is in the Reverse (**R**) position and an object is detected in the rear path of the vehicle by aggressively applying and releasing the brakes. Following an autonomous brake warning application, an icon representing the rear of the vehicle with three red arcs and the text **BRAKE!** will appear in the Electronic Vehicle Information Center (EVIC) within the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC). This brake warning feature is not available in vehicles equipped with a manual transmission.

Finally, the PPPA provides a semiautomatic parallel and perpendicular park assist feature. When enabled, this feature will identify a suitable parking spot and help to steer the vehicle into a selected parallel or perpendicular parking spot accordingly.

The PPPA system includes the following major components, which are described in further detail elsewhere in this service information:

- **Antilock Brake Module** - The Antilock Brake Module (ABM) controls the application of the vehicle brakes to implement the autonomous brake warning feature when it receives the appropriate electronic message input over the Controller Area Network (CAN) data bus from the Park Assist Module (PAM).
- **Body Control Module** - The Body Control Module (BCM) serves as the gateway between the Controller Area Network (CAN) C and the CAN Interior High Speed (IHS) data bus networks used to communicate between the Park Assist Module (PAM), the Antilock Brake Module (ABM), the Electronic Power Steering (EPS) module, the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) and the Radio Receiver Module (RRM).
- **Electronic Power Steering Module** - The Electronic Power Steering (EPS) module controls the vehicle steering in order to maneuver the vehicle into a selected parallel or perpendicular parking space based upon electronic message inputs received over the Controller Area Network (CAN) data bus from the Park Assist Module (PAM).

- **Instrument Cluster** - In vehicles equipped with the optional PPPA system, the Electronic Vehicle Information Center (EVIC) within the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) displays vehicle graphics and amber or red arc sections that illustrate the approximate location of obstacles within the front or rear paths of the vehicle. The EVIC displays graphics and text to support the parallel and perpendicular parking features, textual warnings and error messages along with issuing audible alerts related to the current operating status of the PPPA system.
- **Parallel And Perpendicular Park Assist On Switch** - The Parallel and Perpendicular Park Assist (PPPA) features of the optional PPPA system can be selected and toggled using a PPPA On switch. The PPPA On switch is integral to the instrument panel switch pod (also known as the Accessory Switch Bank Module/ASBM) in the instrument panel center stack below the heater and air conditioner controls. This switch allows the operator to turn the PPPA features On and toggle between the parallel and the perpendicular park assist features.
- **Park Assist Module** - Vehicles equipped with the PPPA system include a 12 channel Park Assist Module (PAM) (also known as the ParkTronic System/PTS module), which is secured through integral mounting tabs to weld studs on the left quarter inner panel just behind the left rear wheel house, where it is concealed beneath the quarter inside trim within the cargo area of the vehicle.
- **Park Assist Off Switch** - The optional PPPA system can be manually disabled or enabled using a park assist Off switch. The park assist Off switch is integral to the instrument panel switch pod (also known as the Accessory Switch Bank Module/ASBM) in the instrument panel center stack below the heater and air conditioner controls. This switch allows the operator to turn the FRPA system Off.
- **Park Assist Sensors** - Vehicles equipped with the PPPA system have twelve ultrasonic park assist sensors. Six are concealed behind the rear bumper fascia and six are concealed behind the front bumper fascia. Only the sensor membrane is visible on the outer surface of the bumper fascia. Each sensor is snapped into an individual molded plastic mounting bracket located at horizontal intervals along the inside surfaces of the front and rear bumper fascias.
- **Radio Receiver Module** - In vehicles equipped with the PPPA system, the PAM sends electronic message requests to the RRM to generate audible signals indicating the approximate distance of obstacles from the front and rear paths of the vehicle. The RRM is capable of generating repetitive single chime tones at several varying frequencies or continuous tones through the front or rear audio system speakers. If the audio system speakers are already in use, the RRM will mute that output during chime tone generation. In addition, the RRM provides an interface that allows the vehicle operator to manually disable or enable the PPPA system using the customer programmable features option.

OPERATION

BLIND SPOT MONITOR SYSTEM

The primary components of the Blind Spot Monitor (BSM) system are the micro-controller based Electronic Control Units (ECU) integral to each of the two Radio Detection And Ranging (RADAR) sensors, one behind each outboard side of the rear bumper fascia. Each ECU operates on battery current received from a fuse in the interior Power Distribution Center (PDC) whenever the status of the ignition switch is On, and the ECU has a path to ground at all times through a take out and eyelet terminal of the body wire harness that is secured to the body sheet metal. Each of these ECU communicate with each other as well as with other electronic modules in the vehicle over the Controller Area Network (CAN) data bus network.

The BSM system ECU continually monitor all of the BSM system circuits and components for readiness, and will store a Diagnostic Trouble Code (DTC) for any fault that is detected. The ECU also communicate with a diagnostic scan tool over the CAN data bus. When a BSM system ECU stores a DTC, it sends an electronic request message to the Electronic Vehicle Information Center (EVIC) in the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) and a **SERVICE BLIND SPOT SYSTEM** or **BLIND SPOT SYSTEM TEMPORARILY UNAVAILABLE** textual message is displayed by the EVIC to alert the vehicle operator.

The BSM system ECU also monitor electronic messages received over the CAN data bus from the Radio Receiver Module (RRM) (also known as the radio or the head unit) indicating the customer programmable features settings for the BSM system. The BSM system ECU receive and analyze data inputs directly from the radar sensors, calculate and provide the proper hard wired outputs to illuminate the visual alert displays in their respective right or left outside rear view mirrors, as well as calculate and communicate the proper audible alert output requests to the RRM over the CAN data bus.

The BSM radar sensors allow the BSM system ECU to locate and identify nearby objects of interest meeting the criteria established by algorithms within the system software. The BSM displays provide the vehicle operator with a visual alert indicating that an object of interest has been detected within one of the vehicle detection zones. The BSM audible alerts are then issued by the RRM through the appropriate audio system speakers based upon electronic **audible alert request** messages received from the BSM system ECU. The BSM system ECU also send electronic **radio mute request** messages over the CAN data bus to the RRM whenever an audible alert is requested. This message activates the radio mute function while the audible alert is being sounded, then resumes normal radio function when the alert is completed.

The hard wired circuits between components related to the BSM system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the BSM system or the electronic controls and communication between ECU and other devices that provide some features of this system. The most reliable, efficient and accurate means to diagnose the BSM system or the ECU and communication related to BSM system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

BLIND SPOT MONITOR MODE

Unless disabled in the customer programmable features settings received through the Radio Receiver Module (RRM) (also known as the radio or the head unit), the Blind Spot Monitor (BSM) mode is active only when the manual transmission gear selector is in a position other than Reverse (**R**) or the automatic transmission gear selector is in a position other than Reverse (**R**) or Park (**P**). The BSM mode is intended to provide a visual alert to the driver when a target vehicle (object of interest) is located in the lane adjacent to and just behind either outside rear view mirror (the detection zone), in the blind spot area where vision of target vehicles may be inhibited by the rear structure of the host vehicle. If a turn signal is activated in the host vehicle in the same direction as that in which the target vehicle is located, an audible alert tone will also be generated. The audible alerts of the BSM mode are not active unless the turn signal is activated.

The width of the BSM mode detection zone covers one traffic lane over on each side of the host vehicle, approximately 4.0 meters (13 feet). The length of the BSM mode detection zone starts at the outside rear view mirror and extends approximately 4.5 meters (15 feet) rearward from the rear edge of the rear fascia. The BSM mode visual alerts are activated immediately if an object of interest is within the detection zone and meets the warning criteria. However, the BSM system will not activate these alerts if:

- The object of interest (target vehicle) comes from the rear of the detection zone and passes the host vehicle at a speed greater than 50 kilometers-per-hour (31 miles-per-hour).
- The object of interest (target vehicle) enters the detection zone from the front and remains in the zone for less than 1.5 seconds.
- The object of interest (target vehicle) passes through the detection zone with a relative speed greater than 20 kilometers-per-hour (12 miles-per-hour).
- The object of interest (target vehicle) passes the host vehicle from the opposite direction.

The BSM mode audible alert may be deactivated if the operator prefers using the customer programmable features settings within the RRM. The BSM mode can be configured for visual and audible alerts, visual alerts only or for the entire BSM system (including Rear Cross Path/RCP mode) to be turned Off.

REAR CROSS PATH MODE

Unless disabled in the customer programmable features settings received through the Radio Receiver Module (RRM) (also known as the radio or the head unit), the Blind Spot Monitor (BSM) system provides a feature called Rear Cross Path (RCP) mode. The RCP mode is active only when the transmission gear selector (manual or automatic) is in the Reverse (**R**) position. The RCP mode is intended to aid the driver when backing out of parking spaces where vision of vehicles crossing laterally through the rear path of the host vehicle may be blocked. The host vehicle must proceed slowly and cautiously out of the parking space until the rear end of the vehicle is exposed. The BSM radar sensors will then have a clear view of the crossing traffic and, if an oncoming vehicle (object of interest) is detected, will generate visual and audible alerts to the operator of the host vehicle.

The BSM system monitors the rear detection zones on both sides of the vehicle for objects that are moving toward the side of the vehicle with speeds of from 1 to 3 kilometers-per-hour (1 to 2 miles-per-hour) up to 35 kilometers-per-hour (22 miles-per-hour), such as typically encountered in parking lot situations. In vehicles equipped with the BSM option, the RCP mode is enabled from the factory as a default. The RCP mode can be manually disabled and enabled by the vehicle operator using the customer programmable features option of the RRM.

The RCP mode normally uses the same BSM system customer programmable features settings. However, the RCP mode will always include the audible alert feature, even if it was disabled for the BSM mode using the RRM customer programmable features settings. The audible alert can not be deactivated for the RCP mode. The RCP mode visual alert is illuminated only in the display located on the same side of the vehicle where the object of interest is detected. Likewise, the RCP mode repeating short audible alert is issued only through the audio system speakers located on the same side of the vehicle where the object of interest is detected.

STANDBY MODE

The Blind Spot Monitor (BSM) system remains in standby mode as long as the park brake is applied in a _____

vehicle with a manual transmission, or while the automatic transmission gear selector lever is in the Park (P) position. In the standby mode the system receives vehicle information, responds to changes in customer programmable features settings received through the Radio Receiver Module (RRM) (also known as the radio or the head unit) and can perform limited self-diagnostics indicating hard system fault conditions.

CHIME WARNING SYSTEM

The chime warning system operates on battery current received from the Body Control Module (BCM) on a non-switched fused B(+) circuit so that the system may operate regardless of the ignition switch status. The chime warning system also monitors the ignition switch status so that some chime features are functional only when the status of the ignition switch is On, while other features are functional regardless of the ignition switch status.

In nearly every instance the chime warning system simply provides an audible output to support a visual indication provided by a gauge or an indicator in the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC), or a textual message displayed by the Electronic Vehicle Information Center (EVIC). Outputs of the system include the following:

- **Battery Voltage Low Warning** - The IC transducer will generate one short chime when the **BATTERY VOLTAGE LOW** textual message is displayed in the EVIC. This warning indicates that the monitored electrical system voltage is low. This chime will only occur once during any ignition cycle.
- **Blind Spot Detection Temporarily Unavailable Warning** - The IC transducer will generate one short chime when the **BLIND SPOT DETECTION TEMPORARILY UNAVAILABLE** textual message is displayed in the EVIC. This warning indicates that the optional Blind Spot Monitor (BSM) system has been automatically disabled temporarily.
- **Blind Spot Detection Unavailable - Astronomy Zone Warning** - The IC transducer will generate one short chime when the **BLIND SPOT DETECTION UNAVAILABLE - ASTRONOMY ZONE** textual message is displayed in the EVIC. This warning indicates that the optional Blind Spot Monitor (BSM) system has been automatically turned Off.
- **Blind Spot Detection Unavailable - Wipe Off Rear Bumper Warning** - The IC transducer will generate one short chime when the **BLIND SPOT DETECTION UNAVAILABLE - WIPE OFF REAR BUMPER** textual message is displayed in the EVIC. This warning indicates that the optional Blind Spot Monitor (BSM) system has been automatically disabled due to an accumulation of road film, snow or ice on the rear bumper fascia that must be removed. This chime will occur each time the BSM system features would normally be employed.
- **Blind Spot System Off Warning** - The IC transducer will generate one short chime when the **BLIND SPOT SYSTEM OFF** textual message is displayed in the EVIC. This warning indicates that the optional Blind Spot Monitor (BSM) system has been manually turned Off by the vehicle operator.
- **Brake Fluid Low Warning** - The IC transducer will generate one short chime when the **BRAKE FLUID LOW** textual message is displayed in the EVIC. This warning indicates that the fluid level in the brake master cylinder is low. This chime will only occur once during any ignition cycle.
- **Check Fuel Cap Warning** - The IC transducer will generate one short chime when the **CHECK FUEL CAP** textual message is displayed in the EVIC. This warning indicates that the fuel cap is loose or not installed while the engine is running.
- **Door Open Warning** - The IC transducer will generate repetitive chimes at a slow rate when a **DOOR**

OPEN or **DOORS OPEN** textual message is displayed in the EVIC. This warning indicates that a door is, or multiple doors are not closed or completely latched while the vehicle is moving.

- **Driver Seat Belt Unbuckled Warning** - The IC transducer will generate repetitive chimes at a slow rate when the **DRIVER SEATBELT UNBUCKLED** textual message is displayed in the EVIC. This warning indicates that the driver side front seat belt is unbuckled while the vehicle is moving.
- **Engine Temperature Too Hot Warning** - The IC transducer will generate repetitive chimes at a slow rate when the **ENGINE TEMPERATURE TOO HOT** textual message is displayed in the EVIC. This warning indicates that the monitored engine coolant temperature is too hot. This chime will only recur during an ignition cycle if the engine coolant temperature cycles below the temperature threshold and back to above that threshold once again.
- **Front Seat Belts Unbuckled Warning** - The IC transducer will generate repetitive chimes at a slow rate when the **FRONT SEAT BELTS UNBUCKLED** textual message is displayed in the EVIC. This warning indicates that both the driver side and passenger side front seat belts are unbuckled while the vehicle is moving.
- **Fuel Low Warning** - The IC transducer will generate one short chime when the **FUEL LOW** textual message is displayed in the EVIC. This warning indicates that the monitored fuel level in the fuel tank is low. This chime will only occur once during any ignition cycle.
- **Headlight Out Warning** - The IC transducer will generate one short chime when the **HEADLIGHT OUT** textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in a low beam headlight circuit. This chime will only occur once during any ignition cycle.
- **High Beam Headlight Out Warning** - The IC transducer will generate one short chime when the **HIGH BEAM HEADLIGHT OUT** textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in a high beam headlight circuit. This chime will only occur once during any ignition cycle.
- **Ignition Or Accessory On, Lights On Warning** - The IC transducer will generate repetitive chimes at a slow rate when the **IGNITION OR ACCESSORY ON, LIGHTS ON** textual message is displayed in the EVIC. This warning indicates that the status of the ignition switch, an accessory system and the exterior lighting is On with the driver side front door open. The chimes will continue to sound until the status of the ignition switch, all accessory systems and the exterior lighting system is Off, or until the driver side front door is closed, whichever occurs first.
- **Inflate Tire Warning** - The IC transducer will generate one short chime when the **INFLATE TIRE TO XX Kpa (PSI)** textual message is displayed in the EVIC. This warning indicates that the Tire Pressure Monitor (TPM) system has detected a tire with a low inflation pressure. This chime will only occur once during any ignition cycle.
- **Key Fob Has Left Vehicle Warning** - The IC transducer will generate repetitive chimes at a slow rate when the **KEY FOB HAS LEFT VEHICLE** textual message is displayed in the EVIC. This warning indicates that the optional Keyless Go (KG) system will not operate until a valid key fob is detected within the vehicle.
- **Key Fob Not Detected Warning** - The IC transducer will generate repetitive chimes at a slow rate when the **KEY FOB NOT DETECTED** textual message is displayed in the EVIC. This warning indicates that the optional Keyless Go (KG) system will not operate until a valid key fob is detected within the vehicle.
- **Key In Ignition And Lights On Warning** - The IC transducer will generate repetitive chimes at a slow rate when the **KEY IN IGNITION AND LIGHTS ON** textual message is displayed in the EVIC. This warning indicates that the key is in the ignition switch and the exterior lighting system is turned On. The

chimes will continue to sound until the key is removed from the ignition switch or the exterior lighting system is turned Off, whichever occurs first.

- **Key In Ignition Warning** - The IC transducer will generate repetitive chimes at a fast rate when the **KEY IN IGNITION** textual message is displayed in the EVIC. This warning indicates that the key is in the ignition switch with the driver side front door open. The chimes will continue to sound until the key is removed from the ignition switch or the driver side front door is closed, whichever occurs first.
- **Left Turn Signal Light Out Warning** - The IC transducer will generate one short chime when the **LEFT TURN SIGNAL LIGHT OUT** textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in a left turn signal light circuit. This chime will only occur once during any ignition cycle.
- **Lights On Warning** - The IC transducer will generate repetitive chimes at a slow rate when the **LIGHTS ON** textual message is displayed in the EVIC. This warning indicates that the exterior lighting is turned On while the status of the ignition switch is Off. The chimes will continue to sound until the exterior lighting is turned Off or the ignition switch transitions to a status other than Off, whichever occurs first.
- **Oil Change Due Warning** - The IC transducer will generate one short chime when the **OIL CHANGE DUE** textual message is displayed in the EVIC. This warning indicates that the monitored engine oil change interval has been surpassed. This chime will only occur once during any ignition cycle.
- **Oil Pressure Low Warning** - The IC transducer will generate one short chime when the **OIL PRESSURE LOW** textual message is displayed in the EVIC. This warning indicates that the monitored engine oil pressure is low.
- **Park Assist Sensor Fail Warning** - The IC transducer will generate one short chime when the **PARK ASSIST SENSOR FAIL** textual message is displayed in the EVIC. This warning indicates that a sensor of the optional park assist system has failed.
- **Park Assist System Disabled Warning** - The IC transducer will generate one short chime when the **PARK ASSIST SYSTEM DISABLED** textual message is displayed in the EVIC. This warning indicates that the optional park assist system has been automatically disabled due to a fault in a monitored circuit or component of the system. This chime will occur each time the park assist system features would normally be employed.
- **Park Assist Unavailable - Wipe Off Sensors Warning** - The IC transducer will generate one short chime when the **PARK ASSIST UNAVAILABLE - WIPE OFF SENSORS** textual message is displayed in the EVIC. This warning indicates that the optional park assist system has been automatically disabled due to an accumulation of road film, snow or ice on the sensor membrane that must be removed. This chime will occur each time the park assist system features would normally be employed.
- **Parking Brake Engaged Warning** - The IC transducer will generate one short chime when the **PARKING BRAKE ENGAGED** textual message is displayed in the EVIC. This warning indicates that the parking brake is engaged while the vehicle is moving. This chime will only occur once during any ignition cycle.
- **Parking Light Out Warning** - The IC transducer will generate one short chime when the **PARKING LIGHT OUT** textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in a parking light circuit. This chime will only occur once during any ignition cycle.
- **Passenger Seat Belt Unbuckled Warning** - The IC transducer will generate repetitive chimes at a slow rate when the **PASSENGER SEATBELT UNBUCKLED** textual message is displayed in the EVIC. This warning indicates that the passenger side front seat belt is unbuckled while the vehicle is moving.

- **Plate Light Out Warning** - The IC transducer will generate one short chime when the **PLATE LIGHT OUT** textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in a license plate light circuit. This chime will only occur once during any ignition cycle.
- **Rain Sensor Failure Warning** - The IC transducer will generate one short chime each time the **RAIN SENSOR FAILURE** textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in the rain sensor in vehicles equipped with the optional automatic windshield wiper system. This chime will only occur once during any ignition cycle.
- **Reverse Light Out Warning** - The IC transducer will generate one short chime when the **REVERSE LIGHT OUT** textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in a reverse (or backup) light circuit. This chime will only occur once during any ignition cycle.
- **Right Turn Signal Light Out Warning** - The IC transducer will generate one short chime when the **RIGHT TURN SIGNAL LIGHT OUT** textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in a right turn signal light circuit. This chime will only occur once during any ignition cycle.
- **Service Airbag System Warning** - The IC transducer will generate one short chime each time the **SERVICE AIRBAG SYSTEM** textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in a circuit or component of the Supplemental Restraint System (SRS). This chime will only occur once during any ignition cycle.
- **Service Airbag Warning Light** - The IC transducer will generate one short chime each time the **SERVICE AIRBAG WARNING LIGHT** textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in the airbag indicator circuit of the Supplemental Restraint System (SRS). This chime will only occur once during any ignition cycle.
- **Service Antilock Brake System Warning** - The IC transducer will generate one short chime each time the **SERVICE ANTILOCK BRAKE SYSTEM WARNING** textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in a circuit or component of the Antilock Brake System (ABS). This chime will only occur once during any ignition cycle.
- **Service Blind Spot System Warning** - The IC transducer will generate one short chime each time the **SERVICE BLIND SPOT SYSTEM** textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in a circuit or component of the optional Blind Spot Monitor (BSM) system. This chime will only occur once during any ignition cycle.
- **Service Electronic Braking System Warning** - The IC transducer will generate one short chime each time the **SERVICE ELECTRONIC BRAKING SYSTEM** textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in a circuit or component of the electronic braking system. This chime will only occur once during any ignition cycle.
- **Service Electronic Throttle Control Warning** - The IC transducer will generate one short chime each time the **SERVICE ELECTRONIC THROTTLE CONTROL** textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in a circuit or component of the Electronic Throttle Control (ETC) system. This chime will only occur once during any ignition cycle.
- **Service Keyless System Warning** - The IC transducer will generate one short chime when the

SERVICE KEYLESS SYSTEM textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in a circuit or component of the optional Passive Entry Keyless Go (PEKG) system.

- **Service Park Assist System Warning** - The IC transducer will generate one short chime when the **SERVICE PARK ASSIST SYSTEM** textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in a circuit or component of the optional park assist system. This chime will only occur once during any ignition cycle.
- **Service Power Steering Warning** - The IC transducer will generate one short chime when the **SERVICE POWER STEERING** textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in a circuit or component of the electric power steering system. This chime will only occur once during any ignition cycle.
- **Service Tire Pressure System Warning** - The IC transducer will generate one short chime each time the **SERVICE TIRE PRESSURE SYSTEM** textual message is displayed in the EVIC. This warning indicates that a Diagnostic Trouble Code (DTC) has been set for a fault monitored in a circuit or component of the Tire Pressure Monitor (TPM) system. This chime will only occur once during any ignition cycle.
- **Traction Control Off Warning** - The IC transducer will generate one short chime when the **TRACTION CONTROL OFF** textual message is displayed in the EVIC. This warning indicates that the Electronic Stability Control (ESC) has been manually turned Off by the vehicle operator.
- **Trunk Open Warning** - The IC transducer will generate repetitive chimes at a slow rate when the **TRUNK OPEN** textual message is displayed in the EVIC. This warning indicates that the trunk (deck lid) is not closed or completely latched while the vehicle is moving.
- **Turn Signal Indication** - The IC relay will generate repetitive clicks at a slow rate whenever a turn signal is active. The clicks will occur at a fast rate when a turn signal bulb outage is detected.
- **Turn Signal On Reminder** - The IC transducer will generate repetitive chimes at a slow rate when the **TURN SIGNAL ON** textual message is displayed in the EVIC. This reminder indicates that a turn signal has been active continuously for 1.6 kilometers (1 mile) with the vehicle moving. The hazard warning flashers will not activate this chime feature.
- **Vehicle Not In Park Warning** - The IC transducer will generate one short chime when the **VEHICLE NOT IN PARK** textual message is displayed in the EVIC. This warning indicates that the PARK position of the transmission is not engaged.
- **Washer Fluid Low Warning** - The IC transducer will generate one short chime when the **WASHER FLUID LOW** textual message is displayed in the EVIC. This warning indicates that the fluid level in the windshield washer reservoir is low. This chime will only occur once during any ignition cycle.

The IC provides chime service for all available features in the chime warning system, except for the audible warning function provided by the Radio Receiver Module (RRM) for the optional park assist system. The IC relies upon its internal programming, numerous hard wired inputs and electronic message inputs received from other electronic modules over the Controller Area Network (CAN) data bus to provide the chime warning system features. The programming of the IC determines the priority of each chime request input that is received, as well as the rate and duration of each chime that is to be generated.

The hard wired circuits between components related to the chime warning system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness

routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the chime warning system or the electronic controls and communication between modules and other devices that provide some features of the chime warning system. The most reliable, efficient and accurate means to diagnose the chime warning system or the electronic controls and communication related to chime warning system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

FORWARD COLLISION WARNING PLUS

The Forward Collision Warning Plus (FCW+) system is only active when the status of the ignition switch is ON and the PRNDL is in D (Drive). The system can be manually disabled and enabled by the vehicle operator using hard button on the Auxiliary Switch Bank Module (ASBM). The default status of FCW+ is "On". The system state is kept in memory from one key cycle to the next. If the system is turned OFF, it will remain OFF when the vehicle is restarted. The minimum speed for FCW+ activation is 5 mph (10 km/h).

Components that make up the FCW+ system are the Forward Facing Camera (FFC), Powertrain Control Module (PCM), ASBM and the Adaptive Cruise Control Plus (ACC+) radar sensor/module. The radar module is the component that is responsible for the FCW+, Lane Departure Warning Plus (LDW+) and ACC+ decision making. The radar sensor receives data from the FFC and performs a data fusion with its own sensor data. At this point, the radar determines if a FCW+, LDW+ or ACC+ event needs to occur.

Since there are multiple modules involved in the operation of the FCW+ system, all faults or diagnostic trouble codes should be checked during diagnosis. The system utilizes the radar sensor in front of the vehicle, so any alignment or configuration issues may cause the system to be inoperative. If the ACC radar detects incorrect or compromised information from the FFC, the ACC+/FCW+ will function in a limited capacity. If the data consistency continue to occur from the FFC, a fault code will set.

NOTE: **The FCW+ does not stop the vehicles automatically, but alerts and assists the driver to help avoid or mitigate a collision. If the driver does not respond to any of the audible, visual, and haptic warnings, the impact may not be avoided**

The FCW+ system uses fusion of the sensor data from the ACC radar and the FFC to detect a probable frontal or forward collision. The following actions will be performed when qualified:

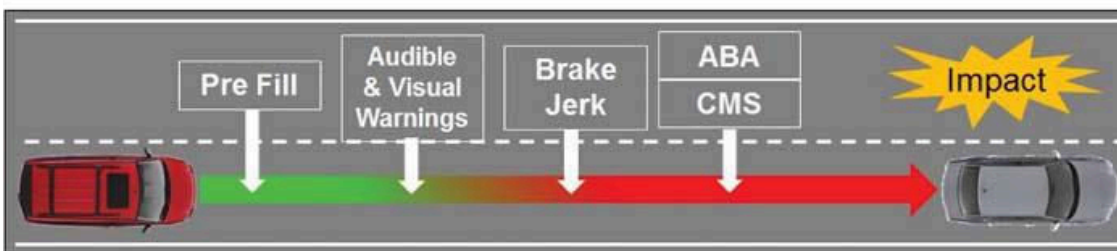
- **Pre Fill -**

The pre-fill process prepares the brakes for emergency braking by engaging the pump and applying a small amount of pressure to the brakes. This allows for immediate braking. Sufficient pressure applied between the brake pads and the discs means that driver intervention has a more immediate impact.

- **Audible and Visual Warnings** - Audible sounds within the cabin of the vehicle and visual warnings shown within the EVIC are activated when necessary to notify the driver.
- **Brake Jerk** - A short deceleration is performed to alert the driver.
- **Collision Mitigation System (CMS)** - CMS assists braking operation by automatically applying an

appropriate amount of braking force to help avoid or minimize the chances of hitting a vehicle. CMS allows up to 1.5 seconds of braking to give the driver additional reaction time. When CMS activates its automatic brake, it also turns the brake lights on.

- **Advanced Brake Assist (ABA)** - Once the driver presses the brake pedal, advanced brake assist (ABA) will engage. If the driver is not applying enough force, ABA will increase the braking force required to avoid or mitigate the accident. If the driver does not react to any of the previous warnings, the collision cannot be avoided.



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Fig. 1: Forward Collision Warning Plus
Courtesy of CHRYSLER GROUP, LLC

The hard wired circuits between components related to the FCW+ system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the FCW+ system or the electronic controls and communication between modules and other devices that are provided some features of the FCW+ system. The most reliable, efficient and accurate means to diagnose the system or the electronic controls and communication related to the FCW+ system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

LANE DEPARTURE WARNING (LDW+)

The purpose of the Lane Departure Warning (LDW+) system is to provide a warning alert to the driver in case of an unintended lane departure (i.e the driver did not use turn signals beforehand to confirm a planned lane change).

The LDW+ system will be enabled and ready to provide feedback when the following conditions are met:

- System voltage is in a normal operating range.
- The vehicle ignition is in the ON/RUN state & driver has enabled the system & reverse gear is NOT engaged.
- No LDW+ system faults are present.
- Roads with positive or negative inclination transition (change in road grade) of up to 5%
- Left and Right lane boundaries are both detected simultaneously. (HAPTIC only)
- Vehicle speed is above 37 mph (60 km/h) and below 100 mph (180 km/h)
- No intervention of the safety systems ABS, ESP and DAS Safety Requests, e.g. ABA, ACC takeover request, FCW, etc. Note: After the intervention of a safety system has ended, the LDW+ system can only provide haptic feedback warnings again after a calibratable period has been allowed to elapse.

The LDW+ system will retain the last system state (enabled or disabled) and the last lane warning sensitivity selected in the radio from the last ignition cycle when the ignition is changed to the On/Run position.

The system can be overridden by the driver using a variety of methods, including turn signals, driver steering torque, steering torque rate, and acceleration and deceleration rate. The LDW+ system can also be turned on or off with a single hard button on the switch bank. The LED on the button will inform the driver of the system status when the driver is not on the driver assist screen in the EVIC. The feature will automatically disable when a safety system engages (such as traction control).

The main component of the LDW+ system is the forward facing camera. The camera mounts near the rear view mirror and communicates on the CAN-C bus. The camera also has a dedicated private CAN B bus that connects directly to the radar sensor and that is used for forward collision warning and adaptive cruise control. The camera has the ability to detect alignment faults and is adjusted similar to the smart beam camera.

Another important factor in system operation is road condition. The forward facing camera has the ability to detect the contrast of the surface of the pavement and the white or yellow lines. Roads that are not marked or that have extremely worn markings may not be detected by the camera which will disable the system. While monitoring the EVIC display for driver assist systems, a customer can tell if the system is enabled by the solid lines on the display. This is also important for diagnosing an intermittent or inoperative concern.

The system also monitors the torque sensor inside the EPS to verify the driver's hands remain on the wheel. If no driver's steering input is received, the system will deactivate until all enabling conditions are met. These Include:

- Drivers steering input.
- The FFC can clearly detect the lines in the road.
- There are no Diagnostic Trouble Codes (DTC) present in the steering or LDW+ system.
- Vehicle speed is above 37 mph (60 km/h) and below 100 mph (180 km/h).

COMPONENT RESPONSIBILITY - BODY CONTROL MODULE (BCM)

- Acquisition on the CAN-C bus of the LDW+ system enabled/disabled status from the Forward Facing Camera (FFC) to control the Auxiliary Switch Bank Module (ASBM) LED indication.

- Acquisition on the CAN-C bus of the chime request from the FFC to inform the driver to place his/her hands on the steering wheel.
- Acquisition on the CAN-C bus of the current LDW+ system sensitivity setting from the FFC.
- Acquisition on the CAN-C bus of the current LDW+ system torque intensity setting from the FFC.
- Acquisition on the LIN bus of the LDW+ system enable/disable switch (pressed/not pressed) status from the ASBM.
- Gates the ASBM on/off signal command on LIN to a signal on CAN-C.
- Gates the current ASBM status signal on CAN-C to the BCM concerning an ASBM control signal on the LIN bus.
- Transmission on the CAN-B bus of the chime request to the Radio to inform the driver to place his/her hands on the steering wheel (audible alert).
- Transmission on the CAN-B bus of the LDW+ system current sensitivity setting to the Radio.
- Transmission on the CAN-B bus of the LDW+ system current torque intensity setting to the Radio.
- Transmission on the CAN-C bus of the brake pedal status to the FFC.
- Transmission on the CAN-C bus of the (left/right) turn signal lamp status to the FFC.
- Transmission on the CAN-C bus of the wiper status (parked/not parked) to the FFC.
- Transmission on the CAN-C bus of the LDW+ system enable/disable request to the FFC (gated from LIN).
- Transmission on the CAN-C bus of the LDW+ system sensitivity setting request (gated from CAN-B) to the FFC.
- Transmission on the CAN-C bus of the LDW+ system torque intensity setting request (gated from CAN-B) to the FFC.
- Transmission on the LIN bus of the LDW+ system enable/disable switch indicator control status to the ASBM (gated from CAN-C).

COMPONENT RESPONSIBILITY - ELECTRONIC POWER STEERING (EPS)

- Apply directional torque to the steering wheel based on lane position of vehicle during an unintentional lane departure.
- Manage the Torque Overlay Interface (TOI).
- Acquisition on the CAN-C bus of the torque overlay interface activation request from the FFC.
- Acquisition on the CAN-C bus of the FFC system status from the FFC.
- Acquisition on the CAN-C bus of the FFC drive style status from the FFC.
- Transmission on the CAN-C bus of the steering angle and steering angle rate to the FFC.
- Transmission on the CAN-C bus of the FFC Torque Overlay Interface activation status to the FFC.
- Transmission on the CAN-C bus of the FFC Torque Overlay Interface fault status to the FFC.
- Transmission on the CAN-C bus of the DST Torque Overlay Interface activation status to the FFC.
- Transmission on the CAN-C bus of the EPS temporary deactivation status to the FFC.
- Transmission on the CAN-C bus of the steering column torque to the FFC.
- Transmission on the CAN-C bus of the steering column torque validity to the FFC.

- Transmission on the CAN-C bus of the EPS motor torque to the FFC.
- Transmission on the CAN-C bus of the EPS motor torque validity to the FFC.

COMPONENT RESPONSIBILITY - FORWARD FACING CAMERA (FFC)

- Monitor the road scenario.
- Process the video image.
- Quantify the geometry of the lane boundaries in front of the vehicle.
- Calculate the torque request to control the vehicle response based on lane position of vehicle.
- Evaluate the "Hands Off" condition. When the driver's hands are not detected on the steering wheel, the system provides an audible warning consisting of left front and right front chimes to inform the driver to place his/her hands on the steering wheel.
- Acquisition on the CAN-C bus of the EPS motor torque from the EPS.
- Acquisition on the CAN-C bus of the FFC Torque Overlay Interface activation status from the EPS.
- Acquisition on the CAN-C bus of the FFC Torque Overlay Interface fault status from the EPS.
- Acquisition on the CAN-C bus of the effective torque applied on the steering wheel from the EPS.
- Acquisition on the CAN-C bus of the brake pedal status from the BCM.
- Acquisition on the CAN-C bus of the (left/right) turn signal request status from the SCCM.
- Acquisition on the CAN-C bus of the (left/right) turn signal lamp status from the BCM.
- Acquisition on the CAN-C bus of the wiper status (parked/not parked) from the BCM.
- Acquisition on the CAN-C bus of the LDW+ system enable/disable request from the BCM.
- Acquisition on the CAN-C bus of the customer-selected LDW+ system sensitivity setting from the BCM.
- Acquisition on the CAN-C bus of the customer-selected LDW+ system torque intensity setting from the BCM.
- Acquisition on the CAN-C bus of the ABS status from the BSM.
- Acquisition on the CAN-C bus of the ESC status from the BSM.
- Acquisition on the CAN-C bus of the DAS request active status from the BSM.
- Acquisition on the CAN-C bus of the vehicle speed from the BSM.
- Acquisition on the CAN-C bus of the yaw rate offset from the BSM.
- Acquisition on the CAN-C bus of the lateral acceleration offset from the BSM.
- Acquisition on the CAN-C bus of the longitudinal acceleration offset from the BSM.
- Acquisition on the CAN-C bus of the ACC takeover request from the DASM.
- Acquisition on the CAN-C bus of the Forward Collision Warning system status from the DASM.
- Acquisition on the CAN-C bus of the engine start/stop status from the ECM.
- Acquisition on the CAN-C bus of the gas pedal position from the ECM.
- Acquisition on the CAN-C bus of the reverse gear status from the ECM.
- Acquisition on the CAN-C bus of the steering angle from the EPS.
- Acquisition on the CAN-C bus of the steering angle rate from the EPS.
- Acquisition on the CAN-C bus of the DST Torque Overlay Interface activation status from the EPS.

- Acquisition on the CAN-C bus of the EPS temporary deactivation status from the EPS.
- Acquisition on the CAN-C bus of the yaw rate from the ORC.
- Acquisition on the CAN-C bus of the lateral acceleration from the ORC.
- Acquisition on the CAN-C bus of the longitudinal acceleration from the ORC.
- Transmission on the CAN-C bus of the torque request to the EPS.
- Transmission on the CAN-C bus of the LDW+ system enabled/disabled status to the BCM.
- Transmission on the CAN-C bus of the chime request to the BCM (gateway) to inform the driver to place his/her hands on the steering wheel.
- Transmission on the CAN-C bus of the current LDW+ system sensitivity and torque intensity settings to the BCM and IPC.
- Transmission on the CAN-C bus of the LDW+ lane boundary detection status to the IPC.
- Transmission on the CAN-C bus of the LDW+ warning status to the IPC.
- Transmission on the CAN-C bus of the LDW+ ISO telltale status to the IPC.
- Transmission on the CAN-C bus of the LDW+ display popup status to the IPC.
- Transmission on the CAN-C bus of the LDW+ fault status to the IPC.

COMPONENT RESPONSIBILITY - INSTRUMENT PANEL CLUSTER (IPC)

- Display LDW+ system state, configuration (sensitivity setting, torque intensity setting), lane boundary detection, warning and fault status.
- Acquisition on the CAN-C bus of the LDW+ lane boundary detection status from the FFC.
- Acquisition on the CAN-C bus of the LDW+ warning status from the FFC.
- Acquisition on the CAN-C bus of the LDW+ fault status from the FFC.
- Acquisition on the CAN-C bus of the LDW+ ISO telltale status from the FFC.
- Acquisition on the CAN-C bus of the LDW+ display popup status from the FFC.
- Acquisition on the CAN-C bus of the current LDW+ system sensitivity setting from the FFC.
- Acquisition on the CAN-C bus of the current LDW+ system torque intensity setting from the FFC.

COMPONENT RESPONSIBILITY - AUXILIARY SWITCH BANK MODULE (ASBM)

- Display LDW+ system defeat switch state (LED illuminated = LDW+ System is OFF, i.e. "defeated").
- Transmission on the LIN bus of the LDW+ system enable/disable switch (pressed/not pressed) status to the BCM.
- Acquisition on the LIN bus of the LDW+ system enable/disable switch indicator control status from the BCM.

CAMERA -

The camera is able to detect lane markings of any color (especially yellow and white which common colors for lane markings). The camera is able to detect and quantify the following information regarding the lane boundaries:

- The lateral distance from the center of the vehicle to the left lane boundary.
- The lateral distance from the center of the vehicle to the right lane boundary.
- The heading angle of the vehicle with respect to the center axis of the lane.
- A measurement of the radius of curvature of the road ahead of the vehicle.
- The type of lane boundary, i.e. double line, solid line, dashed line, road edge.
- The camera shall be capable of detecting if the camera lens is occluded and the windshield needs to be cleaned. During this condition, an indication is provided to clean the windshield.
- The camera is capable of self-monitoring and diagnosis to determine whether it is operating properly.
- The effective horizontal field of view of the camera is at a minimum of 36 degrees.
- The effective vertical field of view of the camera is at a minimum of 20 degrees.

IMAGE ACQUISITION -

These functional requirements address a vision-based approach for measurement of vehicle lateral position relative to lane boundaries in the lane of travel.

- In the daytime, the camera shall be able to detect lane markings where lighting and environmental conditions provide good visibility in excess of 30 meters.
- At night, the camera shall be able to detect lane markings with lighting conditions provided by standard, production low beam headlamps, with or without additional sources of road illumination, and where environmental conditions provide good visibility in excess of 30 meters.
- The camera shall be capable of compensating for sudden changes in lighting conditions such as during tunnel entry/exit.
- The LDW+ system shall not have degraded performance from changes of the camera pitch angle due to vehicle dynamics (e.g. during hard braking or acceleration) or under maximum rated vehicle loading conditions, i.e. gross vehicle weight rating (GVWR).
-

The hard wired circuits between components related to the LDW+ system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the LDW+ system or the electronic controls and communication between ECU and other devices that provide some features of this system. The most reliable, efficient and accurate means to diagnose the LDW+ system and related communication operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

PARK ASSIST SYSTEM

Details for the three versions of the park assist system available for this vehicle (Rear Park Assist/RPA, Front and Rear Park Assist/FRPA, or Parallel and Perpendicular Park Assist/PPPA) can be found under dedicated, separate headings within this service information.

The hard wired circuits between components related to the park assist system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the park assist system or the electronic controls and communication between modules and other devices that provide some features of the park assist system. The most reliable, efficient and accurate means to diagnose the park assist system or the electronic controls and communication related to park assist system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REAR PARK ASSIST

The Rear Park Assist (RPA) system is active only when the status of the ignition switch is On, the transmission gear selector lever is in the Reverse (**R**) position and the vehicle speed is less than about 11 kilometers-per-hour (7 miles-per-hour). The system can be manually disabled and enabled by the vehicle operator using the park assist Off push button in the instrument panel switch pod (also known as the Accessory Switch Bank Module/ASBM). In vehicles equipped with this option, the system is enabled from the factory as a default.

Reasons for disabling the system include trailer towing and off road use. With a trailer attached to the vehicle the audible and visual RPA alerts would be incessant whenever the gear selector lever was in the Reverse (**R**) position due to the proximity of the trailer to the rear of the vehicle. Similarly, operating the vehicle off road may cause the RPA alerts to become distracting due to the proximity of large trees or boulders and the extreme rear approach angles that may be encountered while maneuvering on off road trails or terrain.

When the system is disabled, a **PARK ASSIST SYSTEM OFF** graphic and textual message will appear in the EVIC display of the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) at the beginning of each ignition On cycle, and whenever the gear selector lever is in the Reverse (**R**) position. When the system is enabled, a **PARK ASSIST SYSTEM ON** graphic and textual message will appear in the EVIC display of the IC at the beginning of each ignition On cycle, and a **PARK ASSIST READY** graphic and textual message will appear in the display whenever the gear selector lever is in the Reverse (**R**) position.

The micro-controller based, 4 channel Park Assist Module (PAM) (also known as the ParkTronic System/PTS module) is the central component of the RPA system. It supplies voltage to the park assist sensors, receives and analyzes data from the sensors, calculates and communicates the proper display information to the EVIC display, calculates and communicates the proper audible outputs to the Radio Receiver Module (RRM), performs system diagnostics and communicates with other electronic modules in the vehicle or with a diagnostic scan tool over the Controller Area Network (CAN) data bus. The PAM operates on battery voltage received through a fused ignition (run) fuse in the Power Distribution Center (PDC) and is grounded through a take out of the body wire harness secured to the body sheet metal.

Four ultrasonic park assist sensors in the rear bumper fascia allow the RPA system to locate and identify the proximity of nearby obstacles. These sensors each generate ultrasonic sound pulses when triggered by the PAM, then signal the PAM when an echo of the reflected sound pulses is received. The detection distance range from the rear of the vehicle is about 2 meters (80 inches), and the detection height range from the ground is about 0.2 meters (7.8 inches) to about 0.8 meters (31 inches). The detection area extends somewhat around both rear

corners of the vehicle.

The EVIC display unit provides the vehicle operator with a graphical representation of the vehicle along with numerous illuminated arc sections that indicate the relative location and range of detected objects. The display is visible directly in front of the vehicle operator and operates based upon the electronic message inputs received from the PAM over the CAN data bus. There are three regions at the rear of the vehicle designated for arc alerts: Center, Left and Right. The Center region consists of six zones, while the Right and Left regions consist of two zones. The zones range from furthest to nearest from the rear of the vehicle. The arc sections are illuminated in an amber color until the nearest zone is reached, at which point the arc sections become illuminated red in color.

Meanwhile, the RRM generates audible indications of a detected object by emitting a series of chime tones that grow progressively higher in frequency as the vehicle gets closer to the object. As the vehicle comes within about 30 centimeters (12 inches) of the object, the audible warning changes from a high frequency series of chime tones to a single continuous tone. If the audio system is active when the RRM receives a chime request message from the PAM, the audio output will be muted automatically while the RPA audible warnings are being generated.

When the PAM monitors a problem in any of the RPA system circuits or components, it stores a fault code or Diagnostic Trouble Code (DTC) in its memory circuit, sends an electronic message to the EVIC and the EVIC displays a graphic with a **SERVICE PARK ASSIST SYSTEM** textual message. If the PAM detects that the park assist sensors are inoperative due to an accumulation of road film, mud, ice or snow on the rear fascia, the EVIC will display a **WIPE OFF REAR PARK ASSIST SENSORS** graphic and textual message. When the system is disabled by the PAM due to a detected external error or influence, a **PARK ASSIST SYSTEM DISABLED** graphic and textual message will appear in the EVIC display of the IC whenever a new ignition cycle begins and each time the gear selector lever is in the Reverse (**R**) position.

FRONT AND REAR PARK ASSIST

The Front and Rear Park Assist (FRPA) system is active only when the status of the ignition switch is On, the automatic transmission gear selector lever is in the Drive (**D**) or Reverse (**R**) position, the manual transmission gear selector lever is in the Reverse **R** or is not in Reverse and the vehicle speed is less than about 11 kilometers-per-hour (7 miles-per-hour). The system can be manually disabled and enabled by the vehicle operator using the park assist Off push button in the instrument panel switch pod (also known as the Accessory Switch Bank Module/ASBM). In vehicles equipped with this option, the system is enabled from the factory as a default.

Reasons for disabling the system include trailer towing and off road use. With a trailer attached to the vehicle the audible and visual FRPA alerts would be incessant whenever the gear selector lever was in the Reverse (**R**) position due to the proximity of the trailer to the rear of the vehicle. Similarly, operating the vehicle off road may cause the FRPA alerts to become distracting due to the proximity of large trees or boulders and the extreme front and rear approach angles that may be encountered while maneuvering on off road trails or terrain.

When the system is disabled, a **PARK ASSIST SYSTEM OFF** graphic and textual message will appear in the EVIC display of the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) at the beginning of each ignition On cycle, whenever the automatic transmission gear selector lever is in the Drive (**D**) or Reverse (**R**) positions, or whenever the manual transmission gear selector lever is in the Reverse (**R**) or not in

Reverse positions. When the system is enabled, a **PARK ASSIST SYSTEM ON** graphic and textual message will appear in the EVIC display of the IC at the beginning of each ignition On cycle, and a **PARK ASSIST READY** graphic and textual message will appear in the display whenever the automatic transmission gear selector lever is in the Drive (**D**) or Reverse (**R**) positions and the vehicle speed is less than about 11 kilometers-per-hour (7 miles-per-hour), or whenever the manual transmission gear selector lever is in the Reverse (**R**) or not in Reverse positions and the vehicle speed is less than about 11 kilometers-per-hour (7 miles-per-hour).

The micro-controller based, 10 channel Park Assist Module (PAM) (also known as the ParkTronic System/PTS module) is the central component of the FRPA system. It supplies voltage to the park assist sensors, receives and analyzes data from the sensors, calculates and communicates the proper display information to the EVIC display, calculates and communicates the proper audible outputs to the Radio Receiver Module (RRM) (also known as the radio or the head unit), performs system diagnostics and communicates with other electronic modules in the vehicle or with a diagnostic scan tool over the Controller Area Network (CAN) data bus. The PAM operates on battery voltage received through a fused ignition (run) fuse in the Power Distribution Center (PDC) and is grounded through a take out of the body wire harness secured to the body sheet metal.

Six ultrasonic park assist sensors in the front bumper fascia and four sensors in the rear bumper fascia allow the FRPA system to locate and identify the proximity of nearby obstacles. These sensors each generate ultrasonic sound pulses when triggered by the PAM, then signal the PAM when an echo of the reflected sound pulses is received. The detection distance range from the front of the vehicle is about 1.2 meters (47 inches), or from the rear of the vehicle is about 2 meters (80 inches). The detection height range from the ground is about 0.2 meters (7.8 inches) to about 0.8 meters (31 inches). The detection area extends somewhat around both front and rear corners of the vehicle.

In vehicles with an automatic transmission, the FRPA has an available autonomous brake warning feature (also known as brake and release). When the transmission gear selector position is Reverse (**R**), an object is detected at the rear of the vehicle at a vehicle velocity based distance value and the ultrasonic sensors are capable of detecting an object the PAM sends an electronic **brake and release** message to the Antilock Brake Module (ABM) over the CAN data bus network. The autonomous brake warning is aggressively performed by the ABM to reduce vehicle speed and pre-fill the brake hydraulic system in an effort to warn and to give the vehicle operator more time to react to a detected object at the rear of the vehicle.

The autonomous brake warning feature is an alert function, not a comfort function; therefore, the brake application will be sharp and sudden to disturb, rather than smooth and discrete. This feature is enabled from the factory as a default, but can be manually disabled or enabled by the vehicle operator using the customer programmable features settings menu of the RRM.

The EVIC display unit provides the vehicle operator with a graphical representation of the vehicle along with numerous illuminated arc sections that indicate the relative location and range of detected objects. The display is visible directly in front of the vehicle operator and operates based upon the electronic message inputs received from the PAM over the CAN data bus. There are three regions at the front or rear of the vehicle designated for arc alerts: Center, Left and Right. The Front Center region consists of five zones, the Rear Center region consist of six zones, while the Right and Left regions at the front and rear both consist of two zones. The zones range from furthest to nearest from the vehicle. The arc sections are illuminated in an amber color until the nearest zone is reached, at which point the arc sections become illuminated red in color.

Meanwhile, the RRM generates audible indications of a detected object by emitting a series of chime tones that grow progressively higher in frequency as the vehicle gets closer to the object. As the vehicle comes within about 30 centimeters (12 inches) of the object, the audible warning changes from a high frequency series of chime tones to a single continuous tone. If the audio system is active when the RRM receives a chime request message from the PAM, the audio output will be muted automatically while the FRPA audible warnings are being generated.

When the PAM monitors a problem in any of the FRPA system circuits or components, it stores a fault code or Diagnostic Trouble Code (DTC) in its memory circuit, sends an electronic message to the EVIC and the EVIC displays a graphic with a **SERVICE PARK ASSIST SYSTEM** textual message. If the PAM detects that the park assist sensors are inoperative due to an accumulation of road film, mud, ice or snow on the front or rear fascia, the EVIC will display a **WIPE OFF FRONT PARK ASSIST SENSORS** or **WIPE OFF REAR PARK ASSIST SENSORS** graphic and textual message. When the system is disabled by the PAM due to a detected external error or influence, a **PARK ASSIST SYSTEM DISABLED** graphic and textual message will appear in the EVIC display of the IC whenever a new ignition cycle begins and each time the automatic transmission gear selector lever is in the Drive (**D**) or Reverse (**R**) position or the manual transmission gear selector lever is in the Reverse (**R**) or not in Reverse positions.

PARALLEL AND PERPENDICULAR PARK ASSIST

The Parallel and Perpendicular Park Assist (PPPA) system is active only when the status of the ignition switch is On, the automatic transmission gear selector lever is in the Drive (**D**) or Reverse (**R**) position, the manual transmission gear selector lever is in the Reverse **R** or is not in Reverse and the vehicle speed is less than about 11 kilometers-per-hour (7 miles-per-hour). The front and rear park assist features of this system can be manually disabled and enabled by the vehicle operator using the Park Assist Off push button in the instrument panel switch pod (also known as the Accessory Switch Bank Module/ASBM). In vehicles equipped with this option, the system is enabled from the factory as a default.

Reasons for disabling the system include trailer towing and off road use. With a trailer attached to the vehicle the audible and visual park assist alerts would be incessant whenever the gear selector lever was in the Reverse (**R**) position due to the proximity of the trailer to the rear of the vehicle. Similarly, operating the vehicle off road may cause the park assist alerts to become distracting due to the proximity of large trees or boulders and the extreme front and rear approach angles that may be encountered while maneuvering on off road trails or terrain.

When the system is disabled, a **PARK ASSIST SYSTEM OFF** graphic and textual message will appear in the EVIC display of the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) at the beginning of each ignition On cycle, whenever the automatic transmission gear selector lever is in the Drive (**D**) or Reverse (**R**) positions, or whenever the manual transmission gear selector lever is in the Reverse (**R**) or not in Reverse positions. When the system is enabled, a **PARK ASSIST SYSTEM ON** graphic and textual message will appear in the EVIC display of the IC at the beginning of each ignition On cycle, and a **PARK ASSIST READY** graphic and textual message will appear in the display whenever the automatic transmission gear selector lever is in the Drive (**D**) or Reverse (**R**) positions and the vehicle speed is less than about 11 kilometers-per-hour (7 miles-per-hour), or whenever the manual transmission gear selector lever is in the Reverse (**R**) or not in Reverse positions and the vehicle speed is less than about 11 kilometers-per-hour (7 miles-per-hour).

The micro-controller based, 12 channel Park Assist Module (PAM) (also known as the ParkTronic System/PTS module) is the central component of the park assist system. It supplies voltage to the park assist sensors, receives and analyzes data from the sensors, calculates and communicates the proper display information to the EVIC display, calculates and communicates the proper audible outputs to the Radio Receiver Module (RRM), performs system diagnostics and communicates with other electronic modules in the vehicle or with a diagnostic scan tool over the Controller Area Network (CAN) data bus. The PAM operates on battery voltage received through a fused ignition (run) fuse in the Power Distribution Center (PDC) and is grounded through a take out of the body wire harness secured to the body sheet metal.

Six ultrasonic park assist sensors in the front bumper fascia and six sensors in the rear bumper fascia allow the park assist system to locate and identify the proximity of nearby obstacles. These sensors each generate ultrasonic sound pulses when triggered by the PAM, then signal the PAM when an echo of the reflected sound pulses is received. The detection distance range from the front of the vehicle is about 1.2 meters (47 inches), or from the rear of the vehicle is about 2 meters (80 inches). The detection height range from the ground is about 0.2 meters (7.8 inches) to about 0.8 meters (31 inches). The detection area extends somewhat around both front and rear corners of the vehicle. In the PPPA system, the four sensors on the outboard right and left ends of the front and rear fascias have increased range over the other eight sensors and are not interchangeable.

In vehicles with an automatic transmission, the PPPA has an available autonomous brake warning feature (also known as brake and release). When the transmission gear selector position is Reverse (**R**), an object is detected at the rear of the vehicle at a vehicle velocity based distance value and the ultrasonic sensors are capable of detecting an object the PAM sends an electronic **brake and release** message to the Antilock Brake Module (ABM) over the CAN data bus network. The autonomous brake warning is aggressively performed by the ABM to reduce vehicle speed and pre-fill the brake hydraulic system in an effort to warn and to give the vehicle operator more time to react to a detected object at the rear of the vehicle.

The autonomous brake warning feature is an alert function, not a comfort function; therefore, the brake application will be sharp and sudden to disturb, rather than smooth and discrete. This feature is enabled from the factory as a default, but can be manually disabled or enabled by the vehicle operator using the customer programmable features settings menu of the Radio Receiver Module (RRM) (also known as the radio or the head unit).

The EVIC display unit provides the vehicle operator with a graphical representation of the vehicle along with numerous illuminated arc sections that indicate the relative location and range of detected objects. The display is visible directly in front of the vehicle operator and operates based upon the electronic message inputs received from the PAM over the CAN data bus. There are three regions at the front or rear of the vehicle designated for arc alerts: Center, Left and Right. The Front Center region consists of five zones, the Rear Center region consist of six zones, while the Right and Left regions at the front and rear both consist of two zones. The zones range from furthest to nearest from the vehicle. The arc sections are illuminated in an amber color until the nearest zone is reached, at which point the arc sections become illuminated red in color.

Meanwhile, the RRM generates audible indications of a detected object by emitting a series of chime tones that grow progressively higher in frequency as the vehicle gets closer to the object. As the vehicle comes within about 30 centimeters (12 inches) of the object, the audible warning changes from a high frequency series of chime tones to a single continuous tone. If the audio system is active when the RRM receives a chime request message from the PAM, the audio output will be muted automatically while the park assist audible warnings are being generated.

The semiautomatic parallel and perpendicular parking feature is designed to assist the vehicle operator, not to substitute for the vehicle operator. The vehicle operator must stay in full control of the acceleration and braking of the vehicle. The driver initiates the parallel and perpendicular parking feature by using the Parallel And Perpendicular Park Assist On push button in the instrument panel switch pod (also known as the Accessory Switch Bank Module/ASBM).

Once the parallel and perpendicular park feature is turned On, a Active Park Sense Search screen pops up in the EVIC display unit. The initial search screen to pop up will be for the parallel parking feature, but text at the bottom of the EVIC display advises, **Press OK for Perpendicular Park**. The vehicle operator can then press the **OK** push button in the EVIC switch pod on the left horizontal spoke of the steering wheel to toggle back and forth between the parallel parking space and perpendicular parking space search screens. From this point through completion of the selected parking maneuver, the system will automatically coach the vehicle operator through the location of an appropriate parking space and the parking maneuver using both graphical representations and text that pops up within the EVIC display unit.

During parallel and perpendicular parking maneuvers the PPPA system assists the vehicle operator by measuring and identifying an appropriate parking space while driving slowly past the potential space. Then the system calculates the appropriate trajectory and controls the steering wheel to steer the vehicle into the selected space. Depending upon the parking maneuver selected, the PPPA system is capable of steering a vehicle into a parallel or a perpendicular parking space on either the driver side or the passenger side of the vehicle. The PAM controls the measuring and maneuvering of the vehicle by monitoring the ultrasonic sensor inputs and sending the appropriate electronic messages to the Electronic Power Steering (EPS) module over the CAN data bus.

When the PAM monitors a problem in any of the park assist system circuits or components, it stores a fault code or Diagnostic Trouble Code (DTC) in its memory circuit, sends an electronic message to the EVIC and the EVIC displays a graphic with a **SERVICE PARK ASSIST SYSTEM** textual message. If the PAM detects that the park assist sensors are inoperative due to an accumulation of road film, mud, ice or snow on the front or rear fascia, the EVIC will display a **WIPE OFF FRONT PARK ASSIST SENSORS** or **WIPE OFF REAR PARK ASSIST SENSORS** graphic and textual message. When the system is disabled by the PAM due to a detected external error or influence, a **PARK ASSIST SYSTEM DISABLED** graphic and textual message will appear in the EVIC display of the IC whenever a new ignition cycle begins and each time the automatic transmission gear selector lever is in the Drive (**D**) or Reverse (**R**) position or the manual transmission gear selector lever is in the Reverse (**R**) or not in Reverse positions.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - BLIND SPOT MONITOR SYSTEM

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

The following textual messages related to the Blind Spot Monitor (BSM) system may appear within the Electronic Vehicle Information Center (EVIC) display of the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC):

- **BLIND SPOT SYSTEM OFF** - This message to the vehicle operator when the ignition switch first transitions to the On status indicates that the BSM system has been turned Off using the customer programmable features function of the Radio Receiver Module (RRM) (also known as the radio or the head unit).
- **SERVICE BLIND SPOT SYSTEM** - This message to the vehicle operator while the ignition switch status is On indicates that the BSM system is unavailable due to a monitored system fault or faults.
- **BLIND SPOT SYSTEM TEMPORARILY UNAVAILABLE** - This message to the vehicle operator while the ignition switch status is On indicates that the BSM system is temporarily unavailable as a result of one of the following:
 1. **Sensor Blockage** - The amber BSM visual icon in both outside rear view mirrors will be illuminated as long as blockage exists or until the ignition switch status transitions to Off, whichever occurs first.
 2. **Monitored System Fault** - The BSM system has detected a monitored system fault condition and has stored a Diagnostic Trouble Code (DTC). The amber BSM visual icon will be illuminated in both outside rear view mirrors for as long as the condition exists or until the ignition switch status transitions to Off, whichever occurs first.

NOTE: If the **BLIND SPOT SYSTEM TEMPORARILY UNAVAILABLE** message is received for a minimum of 5 minutes, please verify that the outboard area at each end of the rear fascia behind the rear wheel openings where the radar sensors are located is not blocked by snow, ice or road debris. If the area is blocked, remove the blockage and verify that the message is no longer present in the EVIC display.

NOTE: If the vehicle has experienced any trauma in the outboard area at each end of the rear fascia behind the rear wheel openings where the sensors are located, even if the fascia is not damaged, the radar sensor may have become misaligned. A misaligned radar sensor will result in the BSM system not operating properly.

The hard wired circuits between components related to the BSM system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the BSM system or the electronic controls and communication between modules and other devices that provide some features of the system. The most reliable, efficient and accurate means to diagnose the BSM system or the electronic controls and communication related to BSM system operation requires the use of a diagnostic scan tool. Refer to **DIAGNOSIS AND TESTING** or **DIAGNOSIS AND TESTING** .

DIAGNOSIS AND TESTING - CHIME WARNING SYSTEM

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

The hard wired circuits between components related to the chime warning system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the chime warning system or the electronic controls and communication between modules and other devices that provide some features of the chime warning system. The most reliable, efficient and accurate means to diagnose the chime warning system or the electronic controls and communication related to chime warning system operation requires the use of a diagnostic scan tool. Refer to **DIAGNOSIS AND TESTING** .

DIAGNOSIS AND TESTING - FORWARD COLLISION WARNING

The hard wired circuits between components related to the Forward Collision Warning (FCW+) system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the FCW+ system or the electronic controls and communication between modules and other devices that provide some features of the FCW+ system. The most reliable, efficient and accurate means to diagnose the FCW+ system or the electronic controls and communication related to FCW+ system operation requires the use of a diagnostic scan tool.

DIAGNOSIS AND TESTING - LANE DEPARTURE WARNING SYSTEM

The hard wired circuits between components related to the Lane Departure Warning (LDW+) system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the LDW+ system or the electronic controls and communication between modules and other devices that provide some features of the

LDW+ system. The most reliable, efficient and accurate means to diagnose the LDW+ system or the electronic controls and communication related to LDW+ system operation requires the use of a diagnostic scan tool.

DIAGNOSIS AND TESTING - PARK ASSIST SYSTEM

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

If a **SERVICE PARK ASSIST SYSTEM** graphic and textual message appears in the Electronic Vehicle Information Center (EVIC) display of the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC), be certain to confirm the following:

- Be certain that the rear bumper fascia (with Rear Park Assist/RPA) is, or the front and rear bumper fascias (with Front and Rear Park Assist/FRPA or with Parallel and Perpendicular Park Assist/PPPA) are free of dirt and debris to keep the system operating properly.
- The presence of jackhammers, large trucks and other sources of vibration in the vicinity of the vehicle could also impact the performance of the system.

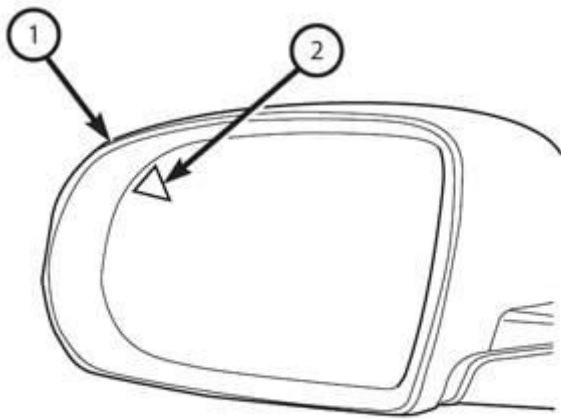
The hard wired circuits between components related to the park assist system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the park assist system or the electronic controls and communication between modules and other devices that provide some features of the park assist system. The most reliable, efficient and accurate means to diagnose the park assist system or the electronic controls and communication related to park assist system operation requires the use of a diagnostic scan tool. Refer to **DIAGNOSIS AND TESTING**.

DISPLAY, BLIND SPOT

DESCRIPTION

DESCRIPTION



0809004962

Fig. 2: Outside Rear View Mirror & Translucent Triangle Icon
Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with the Blind Spot Monitor (BSM) system have a display that appears in both the right and left outside rear view mirrors (1). The display consists of a translucent triangle icon (2) in the mirror glass that is illuminated by an amber Light Emitting Diode (LED) unit mounted behind the icon on the mirror glass case. When illuminated, only the amber colored triangle is visible on the outer surface of the mirror glass. The LED unit for the display is connected to the vehicle electrical system along with the other wiring for the power mirror through a dedicated take out and connector of the door wire harness.

The BSM displays are each integral to the outside rear view mirror glass and case unit. The displays cannot be adjusted or repaired. If a BSM display is ineffective or damaged, the entire mirror glass and case unit must be replaced. Refer to **MIRROR, OUTSIDE REARVIEW, REMOVAL** and **MIRROR, OUTSIDE REARVIEW, GLASS, REMOVAL**.

OPERATION

OPERATION

The Blind Spot Monitor (BSM) displays provide the vehicle operator with a visual alert that a target vehicle (object of interest) has been detected by the BSM system within one of the BSM or Rear Cross Path (RCP) detection zones. The BSM display is also illuminated momentarily as a bulb test each time the ignition switch status transitions to On as a part of the BSM system self tests. If a BSM display remains illuminated with the park brake applied or with the automatic transmission gear selector lever in the Park (P) position, it indicates that the BSM system has registered a system fault and may require service.

Each BSM display is completely controlled by a hard wired output of the Driver Door Module (DDM) or Passenger Door Module (PDM) on the same side of the vehicle as the display. The DDM and PDM receive electronic messages over the Controller Area Network (CAN) data bus from the Blind Spot Module (BSM) integral to the Radio Detection And Ranging (RADAR) smart sensor (also known as Left Blind Spot Sensor/LBSS or Right Blind Spot Sensor) for the same side of the vehicle. The display units are grounded at all times through a takeout and evelet terminal of the body wire harness that is secured to the body sheet metal.

The hard wired circuits between the BSM displays and the DDM or PDM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the BSM displays or the electronic controls and communication between other modules and devices that provide some features of the BSM displays. The most reliable, efficient and accurate means to diagnose the BSM displays or the electronic controls and communication related to BSM display operation requires the use of a diagnostic scan tool.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - BLIND SPOT DISPLAY

The hard wired circuits between the Blind Spot Monitor (BSM) displays and the Driver Door Module (DDM) or Passenger Door Module (PDM) may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the BSM displays or the electronic controls and communication between other modules and devices that provide some features of the BSM displays. The most reliable, efficient and accurate means to diagnose the BSM displays or the electronic controls and communication related to BSM display operation requires the use of a diagnostic scan tool.

REMOVAL

REMOVAL

The Blind Spot Monitor (BSM) display Light Emitting Diode (LED) indicator and icon are integral to the outside rear view mirror glass and case unit. Refer to **MIRROR, OUTSIDE REARVIEW, REMOVAL** and **MIRROR, OUTSIDE REARVIEW, GLASS, REMOVAL** .

INSTALLATION

INSTALLATION

The Blind Spot Monitor (BSM) display Light Emitting Diode (LED) indicator and icon are integral to the outside rear view mirror glass and case unit. Refer to **MIRROR, OUTSIDE REARVIEW, INSTALLATION** and **MIRROR, OUTSIDE REARVIEW, GLASS, INSTALLATION** .

DISPLAY, PARK ASSIST

DESCRIPTION

DESCRIPTION

The park assist graphics share the Electronic Vehicle Information Center (EVIC) display, which is an electronic display unit located near the center of, and soldered onto the printed circuit board of the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC). Refer to **CENTER, ELECTRONIC VEHICLE**

INFORMATION, DESCRIPTION . The park assist display along with the EVIC electronic display unit receive battery current and ground from, and are completely controlled by the IC circuit board.

The park assist graphics are only displayed when the system is active, sound and display mode is enabled, and an object or obstacle is detected within a detection area. The IC then displays the park assist graphic along with the appropriate object detection alert bar and arc sections within the EVIC display to indicate the approximate relative distance and location of the object or obstacle.

The EVIC electronic display unit is serviced only as a complete unit with the IC. The display unit cannot be adjusted or repaired. If ineffective or damaged, the entire IC unit must be replaced.

OPERATION

OPERATION

The park assist display in the Electronic Vehicle Information Center (EVIC) within the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) provides the vehicle operator with visual feedback by illuminating a vehicle graphic and object detection bar and arc sections in zones at the rear (with Rear Park Assist/RPA) or front and rear (with Front and Rear Park Assist/FRPA or with Parallel and Perpendicular Park Assist/PPPA) of the icon indicating the approximate relative location and distance of an object or obstacle from the vehicle. The fewer bar and arc sections illuminated, the nearer the object. In addition, the nearest bar sections can change from solid illumination to flashing on and off or from amber to red in color as the object or obstacle becomes nearer.

The IC will display the park assist graphics in the EVIC electronic display unit whenever an object is within the detection area and an electronic request message is received from the Park Assist Module (PAM) (also known as the ParkTronic System/PTS module) over the Controller Area Network (CAN) data bus.

Conventional diagnostic methods will not prove conclusive in the diagnosis of the park assist display or the electronic controls and communication between modules and other devices that provide some features of the park assist display. The most reliable, efficient and accurate means to diagnose the park assist display or the electronic controls and communication related to park assist display operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

MODULE, BLIND SPOT

DESCRIPTION

DESCRIPTION

The optional Blind Spot Monitor (BSM) system used in this vehicle has two control modules. One control module is dedicated to each side of the vehicle. A Blind Spot Module (BSM) is integral to the Left Blind Spot Sensor (LBSS) or Right Blind Spot Sensor (RBSS) for the same side of the vehicle. Refer to **SENSOR, BLIND SPOT, DESCRIPTION**.

OPERATION

OPERATION

The optional Blind Spot Monitor (BSM) system used in this vehicle has two control modules. One control module is dedicated to each side of the vehicle. The blind spot modules are each integral to the blind spot sensor for the same side of the vehicle. Refer to **SENSOR, BLIND SPOT, OPERATION**.

REMOVAL

REMOVAL

Two blind spot modules are used in this vehicle, one for the left side and one for the right side. Each blind spot module is integral to the blind spot sensor on the same side of the vehicle. Refer to **SENSOR, BLIND SPOT, REMOVAL**.

INSTALLATION

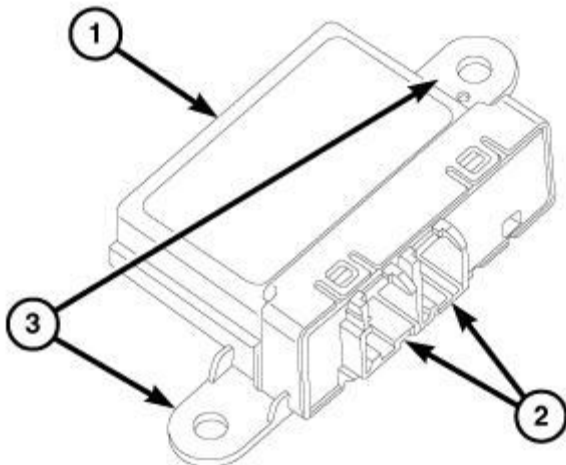
INSTALLATION

Two blind spot modules are used in this vehicle, one for the left side and one for the right side. Each blind spot module is integral to the blind spot sensor on the same side of the vehicle. Refer to **SENSOR, BLIND SPOT, INSTALLATION**.

MODULE, PARK ASSIST

DESCRIPTION

DESCRIPTION



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Fig. 3: Park Assist Module, Connector Receptacles & Mounting Tabs
Courtesy of CHRYSLER GROUP, LLC

The Park Assist Module (PAM) (also known as the ParkTronic System/PTS module) (1) is secured with two nuts to weld studs through two mounting tabs (3) integral to the module housing on the left quarter inner panel just behind the left rear wheel house. The module is concealed behind the quarter inner trim within the cargo area of the vehicle. Concealed within the molded plastic PAM housing is a micro-controller and the other electronic circuitry of the module. The module housing is sealed to enclose and protect the internal electronic circuitry.

There are three unique versions of the PAM used that are similar in appearance, but are not interchangeable. The PAM version depends upon the version of the park assist system in the vehicle. The Rear Park Assist (RPA) uses a 4 channel PAM, the Front and Rear Park Assist (FRPA) system uses a 10 channel PAM, and the Parallel and Perpendicular Park Assist (PPPA) uses a 12 channel PAM.

Two or three connector receptacles (2) containing terminal pins are integral to the downward-facing side of the housing. The module is connected to the vehicle electrical system through dedicated take outs and connectors of the body wire harness. The number of connector receptacles and body harness take outs also depends upon which of the three available versions of the park assist system is installed in the vehicle.

The PAM cannot be adjusted or repaired and, if damaged or ineffective, it must be replaced with a new unit. The PAM software is flash programmable.

OPERATION

OPERATION

The micro-controller within the Park Assist Module (PAM) (also known as the ParkTronic System/PTS module) contains the park assist system logic circuits. The PAM uses On-Board Diagnostics (OBD) and can communicate with other electronic modules in the vehicle as well as with the diagnostic scan tool using the Controller Area Network (CAN) data bus. This method of communication is also used for park assist system diagnosis and testing through the 16-way data link connector located on the driver side lower edge of the instrument panel.

The PAM provides source current to the park assist sensors located on the bumper fascia or fascias. The PAM then monitors return inputs from each of the sensors on dedicated hard wired data communication circuits. These sensor inputs allow the PAM to determine when an obstacle is in the path of the vehicle, to calculate the relative location of an obstacle and to determine whether the distance to that obstacle is increasing or decreasing.

Pre-programmed decision algorithms and calibrations allow the PAM micro-controller to determine the appropriate park assist system outputs based upon the inputs received from the park assist sensors and electronic messages received from other modules in the vehicle over the CAN data bus. When the programmed conditions are met, the PAM sends electronic messages to the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) and the Radio Receiver Module (RRM) (also known as the radio or the head unit) over the CAN data bus to obtain the proper park assist system visual and audible outputs.

In vehicles equipped with an automatic transmission and the optional Front and Rear Park Assist (FRPA) or the Parallel and Perpendicular Park Assist (PPPA), the PAM also communicates with the Antilock Brake Module (ABM) using electronic messaging over the CAN data bus to provide the autonomous brake (also known as

brake and release) warning feature. In vehicles equipped with the optional PPPA, the PAM also communicates with the Electronic Power Steering (EPS) module using electronic messaging over the CAN data bus to provide the semiautomatic parallel and perpendicular parking features.

While the system is active, the PAM micro-controller continuously monitors all of the park assist system electrical circuits and components to determine the system readiness. If a monitored system fault is detected, the PAM sets a Diagnostic Trouble Code (DTC) and sends the appropriate electronic messages to the IC to control the display of the appropriate park assist system graphics and textual messages in the Electronic Vehicle Information Center (EVIC) display within the IC and the generation of the appropriate audible warnings by the IC.

The PAM receives battery current on a fused ignition output (run) circuit through the Power Distribution Center/PDC). The PAM has a path to ground at all times through a ground circuit and take out of the body wire harness that is secured to the body sheet metal. These connections allow the PAM to be operational whenever the status of the ignition switch is On.

The hard wired circuits between components related to the PAM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the PAM or the electronic controls and communication between modules and other devices that provide some features of the park assist system. The most reliable, efficient and accurate means to diagnose the PAM or the electronic controls and communication related to park assist system operation requires the use of a diagnostic scan tool. Refer to **DIAGNOSIS AND TESTING** .

DIAGNOSIS AND TESTING

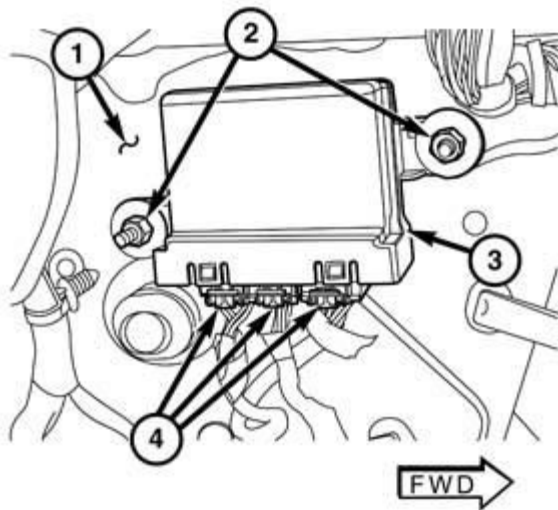
DIAGNOSIS AND TESTING - PARK ASSIST MODULE

The hard wired circuits between components related to the Park Assist Module (PAM) (also known as the ParkTronic System/PTS module) may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the PAM or the electronic controls and communication between modules and other devices that provide some features of the park assist system. The most reliable, efficient and accurate means to diagnose the PAM or the electronic controls and communication related to park assist system operation requires the use of a diagnostic scan tool. Refer to **DIAGNOSIS AND TESTING** .

REMOVAL

REMOVAL



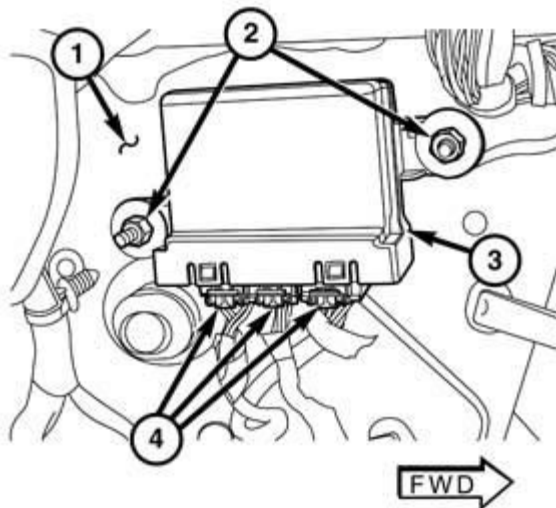
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Fig. 4: Left Quarter Inner Panel, Connectors & Nuts
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery.
2. Remove the trim from the left quarter inner panel (1). Refer to **PANEL, QUARTER TRIM, REMOVAL**.
3. Disconnect the body wire harness connectors (4) from the Park Assist Module (PAM) (also known as the ParkTronic System/PTS module) (3) connector receptacles on the left quarter inner panel just behind the left rear wheel house.
4. Remove the two nuts (2) that secure the PAM to the weld studs on the quarter inner panel.
5. Remove the PAM from the vehicle.

INSTALLATION

INSTALLATION



0809008696

Fig. 5: Left Quarter Inner Panel, Connectors & Nuts
Courtesy of CHRYSLER GROUP, LLC

1. Position the Park Assist Module (PAM) (also known as the ParkTronic System/PTS module) (3) onto the weld studs on the left quarter inner panel (1) just behind the left rear wheel house.
2. Install and tighten the two nuts (2) that secure the PAM to the weld studs. Tighten the nuts securely.
3. Reconnect the body wire harness connectors (4) to the PAM connector receptacles.
4. Reinstall the trim onto the left quarter inner panel. Refer to **PANEL, QUARTER TRIM, INSTALLATION**.
5. Reconnect the negative cable to the battery.

NOTE: If this Electronic Control Unit (ECU) is being replaced with a new unit, a diagnostic scan tool **MUST** be used to align the PROXI configuration data into the new ECU. Follow the routine outlined in the diagnostic scan tool for PROXI Configuration Alignment under Body Control Module (BCM) Miscellaneous Functions menu.

SENSOR, BLIND SPOT

DESCRIPTION

DESCRIPTION

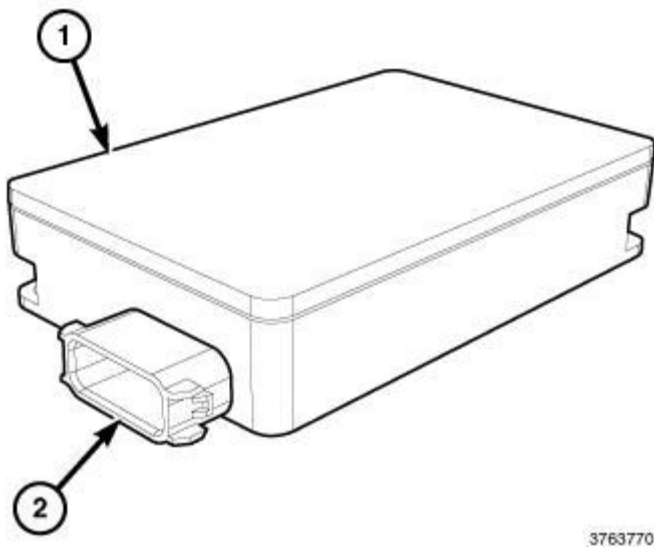


Fig. 6: Blind Spot Sensor & Connector
Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with the optional Blind Spot Monitor (BSM) system have two primary components. These components are the two Radio Detection And Ranging (RADAR) blind spot sensors (1) (also known as the Left or Right Blind Spot Sensors/LBSS or RBSS). In this vehicle, each sensor also includes an internal micro-controller and control circuitry that monitors and controls both the sensor and the blind spot display for the same side of the vehicle. This explains why the sensors are sometimes referred to as smart sensors.

Each sensor with control circuitry is contained and protected within a molded plastic case that includes an integral connector receptacle (2) at one end. The sensors are each connected to the vehicle electrical system through a dedicated take out and connector of the rear bumper fascia wire harness. The two sensors are concealed behind the outboard ends of the rear bumper fascia. Each sensor is snapped into a dedicated molded plastic mounting bracket that is permanently affixed to the inside surface of the fascia just behind the left and right rear wheel openings.

The blind spot sensors and control circuitry cannot be adjusted or repaired. If a sensor is damaged or ineffective, it must be replaced with a new unit. The sensor module software is flash capable. The mounting bracket for each sensor is serviced only as a unit with the rear bumper fascia.

OPERATION

OPERATION

The Blind Spot Monitor (BSM) Radio Detection And Ranging (RADAR) smart sensors (also known as the Left Blind Spot Sensor/LBSS and Right Blind Spot Sensor/RBSS) are each controlled by their on-board micro-controller and control circuitry. When the micro-controller recognizes that the appropriate conditions exist, it will energize the sensor to generate 25 Gigahertz radar pulses through the blind spot zone on that side of the vehicle. The sensor receives and filters the radar signals being returned from any objects detected within the zone, then transmits the appropriate data identifying the position and speed of identified objects to the micro-controller.

The micro-controller analyzes the sensor data to determine whether any detected objects should be reported. When it is determined that an object should be reported, the micro-controller sends electronic request messages over the Controller Area Network (CAN) data bus to its respective Driver Door Module (DDM) or Passenger Door Module (PDM). The DDM or PDM then controls its respective left or right BSM display directly through a hard wired output. The micro-controller of the LBSS or RBSS also sends electronic messages to the Radio Receiver Module (RRM) (also known as the radio or head unit) to mute any current output through the sound system speakers and to generate chime tones as an audible alert.

Each of the two BSM smart sensors is independent and communicates on the CAN data bus. The sensor performs a bulb test by requesting illumination of the triangle icon in its respective right or left blind spot display for a few seconds each time the status of the ignition switch transitions to On. Each sensor micro-controller also continually monitors the BSM system and the sensor circuits and will store a Diagnostic Trouble Code (DTC) for any fault that is detected.

The hard wired circuits between of the smart sensors may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the smart sensors or the electronic controls and communication between other modules and devices that provide some features of the BSM system. The most reliable, efficient and accurate means to diagnose the smart sensors or the electronic controls and communication related to LBSS or RBSS operation requires the use of a diagnostic scan tool. Refer to **DIAGNOSIS AND TESTING** or **DIAGNOSIS AND TESTING** .

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - BLIND SPOT SENSOR

The hard wired circuits between the Blind Spot Monitor (BSM) smart sensors (also known as the Left Blind Spot Sensor/LBSS and the Right Blind Spot Sensor/RBSS) may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the smart sensors or the electronic controls and communication between modules and other devices that provide some features of the BSM system. The most reliable, efficient and accurate means to diagnose the smart sensors or the electronic controls and communication related to LBSS or RBSS operation requires the use of a diagnostic scan tool.

REMOVAL

REMOVAL

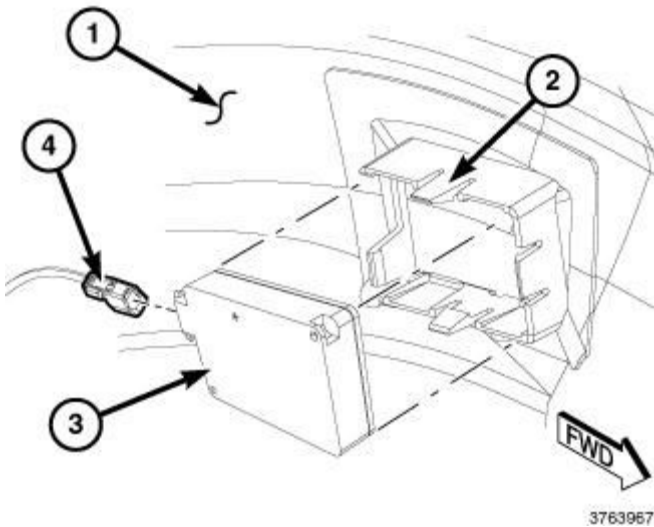


Fig. 7: Blind Spot Sensor, Latch Tabs & Harness Connector
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery.
2. Reach up behind the outboard end of the rear bumper fascia to access and disconnect the rear bumper fascia wire harness connector (4) from the Left Blind Spot Sensor (LBSS) or Right Blind Spot Sensor (RBSS) (3) connector receptacle.
3. Disengage the latch tabs (2) of the BSM sensor mounting bracket and pull the LBSS or RBSS out of the bracket.

INSTALLATION

INSTALLATION

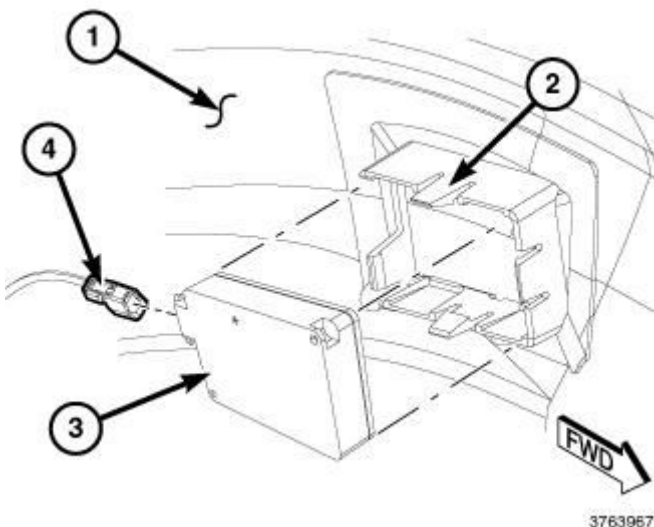


Fig. 8: Blind Spot Sensor, Latch Tabs & Harness Connector

Courtesy of CHRYSLER GROUP, LLC

1. Reach up behind the outboard end of the rear bumper fascia to position the Left Blind Spot Sensor (LBSS) or Right Blind Spot Sensor (RBSS) (3) to the mounting bracket on the inside surface of the fascia (1).
2. Using hand pressure, press the LBSS or RBSS firmly and evenly into the mounting bracket until the latch tabs (2) are fully engaged.
3. Reconnect the rear bumper fascia wire harness connector (4) to the LBSS or RBSS sensor connector receptacle.
4. Reconnect the negative cable to the battery.

NOTE: If this Electronic Control Unit (ECU) is being replaced with a new unit, a diagnostic scan tool **MUST** be used to align the PROXI configuration data into the new ECU. Follow the routine outlined in the diagnostic scan tool for PROXI Configuration Alignment under Body Control Module (BCM) Miscellaneous Functions menu.

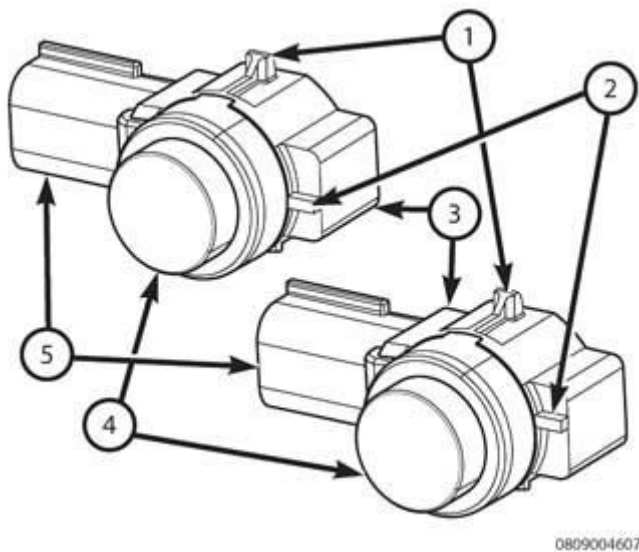
SENSOR, PARK ASSIST**DESCRIPTION****DESCRIPTION**

Fig. 9: Park Assist Sensor

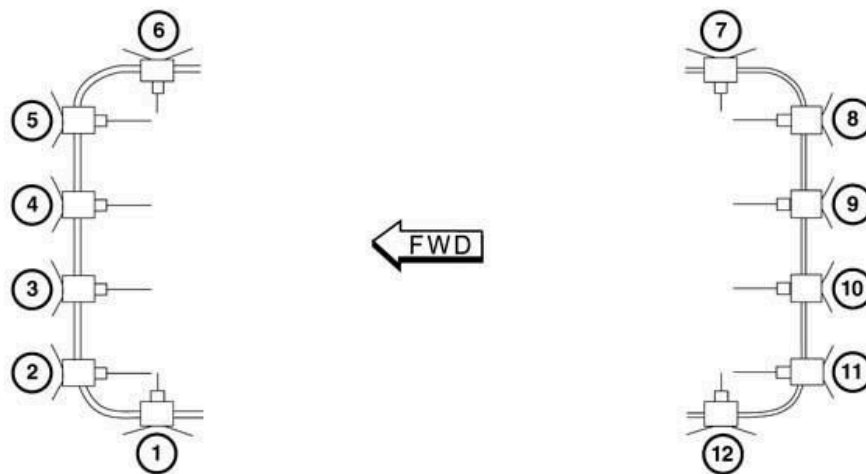
Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with the park assist system have up to twelve park assist sensors (3). Vehicles with Rear Park Assist (RPA) have four sensors installed in the rear bumper fascia. Vehicles with Front and Rear Park Assist (FRPA) have four sensors in the rear bumper fascia plus six sensors in the front bumper fascia. Each of these sensors is a Generation 5.0 sensor and is identical in construction and is interchangeable.

Vehicles with Parallel and Perpendicular Park Assist (PPPA) have six sensors in the rear fascia and six sensors in the front fascia. However, the sensors in each right and left outward-facing end of the front and rear fascias has a unique Generation 5.1 sensor, while the forward and rearward-facing sensors are still the Generation 5.0 type. The Generation 5.1 sensors offer increased range required to support the parallel and perpendicular parking features of the PPPA system. The only physical difference between the two sensor types besides the part number is the offset location of the indexing feature (2) on the sensor body. This offset indexing feature is designed to match up with an indexing notch in the sensor bracket to prevent installation of a sensor in an incorrect location.

Only the membrane (4) of each sensor is visible through a hole in the outer vertical surface of the fascia. The remainder of each sensor including the sensor mounting bracket, the sensor spacer (also known as the O-ring or decoupling ring) and the sensor wiring connection is concealed behind the fascia. A sensor wire harness behind the fascia connects the sensors to the vehicle electrical system.

The electronic circuitry and a communication chip for each sensor is enclosed and protected within the molded black plastic sensor housing. The housing includes an integral connector receptacle (5) and two integral latch tabs (1). The sensor membrane extends from the surface of the sensor housing, and is finished to match the outer surface of the fascia.



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Fig. 10: Park Assist Sensors Numbering System
Courtesy of CHRYSLER GROUP, LLC

The numbering system for the park assist sensors allows for up to twelve sensors on the vehicle, six front and six rear. The sensors are numbered in a clockwise manner starting at the left front fascia. Regardless of whether the vehicle is equipped with RPA, FRPA or PPPA the left front sensor location is always considered the number 1 sensor. The numbering continues in a clockwise direction around the vehicle to the left rear sensor, which is always considered the number 12 sensor.

A resilient O-ring spacer (also known as a decoupling ring) around the circumference of the sensor membrane isolates the membrane from the openings in the fascia. Each sensor is snapped into its own dedicated molded

plastic mounting bracket. Each sensor mounting bracket is heat-staked to the back side of the bumper fascia.

The park assist sensors cannot be adjusted or repaired. If a sensor is ineffective or damaged it must be replaced with a new unit. The sensor spacers are available for individual service replacement. The sensor mounting brackets are serviced only as a unit with the bumper fascia.

OPERATION

OPERATION

The park assist sensors are ultrasonic transceivers that are completely controlled by the Park Assist Module (PAM) (also known as the ParkTronic System/PTS module). The sensors transmit and receive ultrasonic signals. The sensors each receive battery current and ground in parallel from the PAM, but are each connected to individual dedicated serial bus communication circuits to the module.

Each sensor membrane is oscillated, then quieted by the PAM in a pulsing fashion. While the sensor membrane oscillates, it emits an ultrasonic signal. This signal will bounce or echo off of objects within the field of vision for that sensor. While quieted, each membrane receives the echoes of the ultrasonic signals it and the other sensors have transmitted. The sensors then communicate this echo pulse data over the serial bus lines back to the PAM. The micro-controller within the PAM uses the intervals between the ultrasonic transmission and reception data from the sensors to calculate the distance to any obstacles identified by the ultrasonic echoes.

The hard wired circuits between components related to the park assist sensors may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the park assist sensors or the electronic controls and communication between modules and other devices that provide some features of the park assist system. The most reliable, efficient and accurate means to diagnose the park assist sensors or the electronic controls and communication related to park assist sensor operation requires the use of a diagnostic scan tool. Refer to **DIAGNOSIS AND TESTING**.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - PARK ASSIST SENSOR

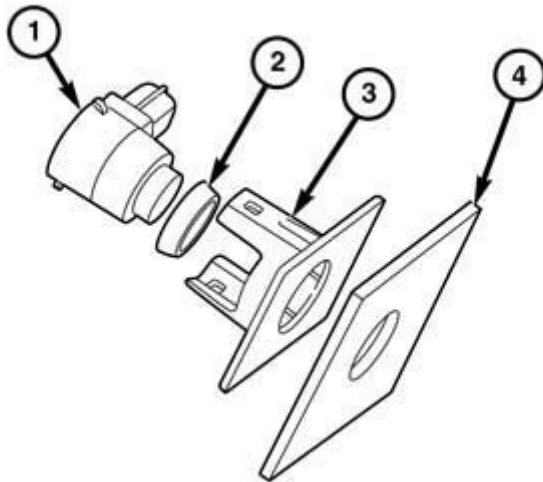
The hard wired circuits between the park assist sensors and the Park Assist Module (PAM) (also known as the ParkTronic System/PTS module) may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the park assist sensors or the electronic controls and communication between other modules and devices that provide some features of the park assist system. The most reliable, efficient and accurate means to diagnose the park assist sensors or the

electronic controls and communication related to park assist sensor operation requires the use of a diagnostic scan tool. Refer to **DIAGNOSIS AND TESTING** .

REMOVAL

FRONT CENTER



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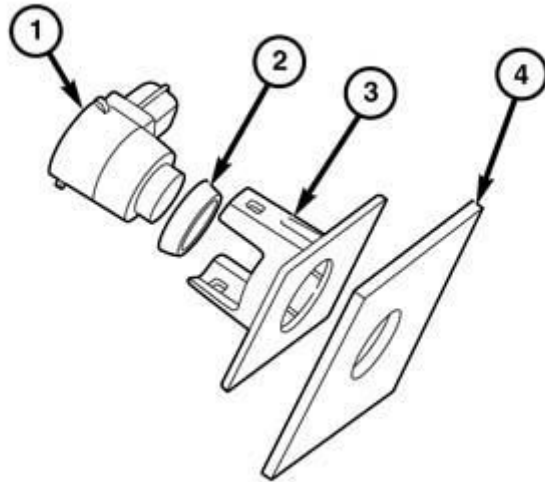
Fig. 11: Park Assist Sensor, Spacer, Bracket & Fascia
Courtesy of CHRYSLER GROUP, LLC

NOTE: The park assist sensors (1) and the resilient sensor spacers (2) (also known as decoupling rings or O-rings) are each available for separate service replacement. The sensor brackets (3) are bonded to and integral to the inside surface of the bumper fascia (4).

NOTE: In vehicles equipped with the optional Parallel and Perpendicular Park Assist (PPPA) option only, the park assist sensors located in the outward facing ends of both the front and rear bumper fascias are unique and must not be interchanged with any other forward or rearward facing park assist sensor.

1. Disconnect and isolate the negative cable from the battery.
2. Remove the front bumper fascia from the vehicle. Refer to **FASCIA, FRONT, REMOVAL** .
3. From behind the front bumper fascia (4), disconnect the wire harness connector from the park assist sensor (1) connector receptacle.
4. Carefully pry the sensor bracket (3) latch features away from the latch tabs of the sensor far enough to disengage the sensor from the bracket.
5. Disengage the resilient O-ring spacer (2) from around the circumference of the sensor membrane protrusion.

FRONT OUTBOARD



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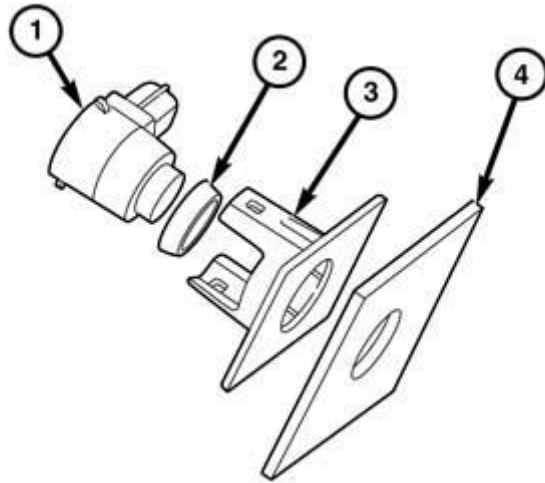
Fig. 12: Park Assist Sensor, Spacer, Bracket & Fascia
Courtesy of CHRYSLER GROUP, LLC

NOTE: The park assist sensors (1) and the resilient sensor spacers (2) (also known as decoupling rings or O-rings) are each available for separate service replacement. The sensor brackets (3) are bonded to and integral to the inside surface of the bumper fascia (4).

NOTE: In vehicles equipped with the optional Parallel and Perpendicular Park Assist (PPPA) option only, the park assist sensors located in the outward facing ends of both the front and rear bumper fascias are unique and must not be interchanged with any other forward or rearward facing park assist sensor.

1. Disconnect and isolate the negative cable from the battery.
2. Remove the fasteners that secure the front of the front fender wheel house splash shield to the front bumper fascia, the front belly pan and the front end structure. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL**.
3. Pull the splash shield back from the front bumper fascia far enough to access and disconnect the wire harness connector from the park assist sensor (1) connector receptacle.
4. Carefully pry the sensor bracket (3) latch features away from the latch tabs of the sensor far enough to disengage the sensor from the bracket.
5. Disengage the resilient O-ring spacer (2) from around the circumference of the sensor membrane protrusion.

REAR



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Fig. 13: Park Assist Sensor, Spacer, Bracket & Fascia
Courtesy of CHRYSLER GROUP, LLC

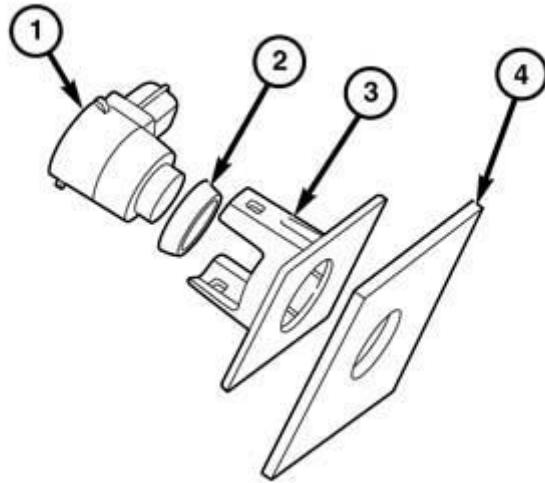
NOTE: The park assist sensors (1) and the resilient sensor spacers (2) (also known as decoupling rings or O-rings) are each available for separate service replacement. The sensor brackets (3) are bonded to and integral to the inside surface of the bumper fascia (4).

NOTE: In vehicles equipped with the optional Parallel and Perpendicular Park Assist (PPPA) option only, the park assist sensors located in the outward facing ends of both the front and rear fascias are unique and must not be interchanged with any other forward or rearward facing park assist sensor.

1. Disconnect and isolate the negative cable from the battery.
2. Reach up behind the rear bumper fascia (4) to access and disconnect the wire harness connector from the park assist sensor (1) connector receptacle.
3. Carefully pry the sensor bracket (3) latch features away from the latch tabs of the sensor far enough to disengage the sensor from the bracket.
4. Disengage the resilient O-ring spacer (2) from around the circumference of the sensor membrane protrusion.

INSTALLATION

FRONT CENTER



080968288

Fig. 14: Park Assist Sensor, Spacer, Bracket & Fascia
Courtesy of CHRYSLER GROUP, LLC

NOTE: The park assist sensors (1) and the resilient sensor spacers (2) (also known as decoupling rings or O-rings) are each available for separate service replacement. The sensor brackets (3) are bonded to and integral to the inside surface of the bumper fascia (4).

NOTE: In vehicles equipped with the optional Parallel and Perpendicular Park Assist (PPPA) option only, the park assist sensors located in the outward facing ends of both the front and rear bumper fascias are unique and must not be interchanged with any other forward or rearward facing park assist sensor.

1. Engage the O-ring spacer (2) around the circumference of the sensor membrane protrusion.

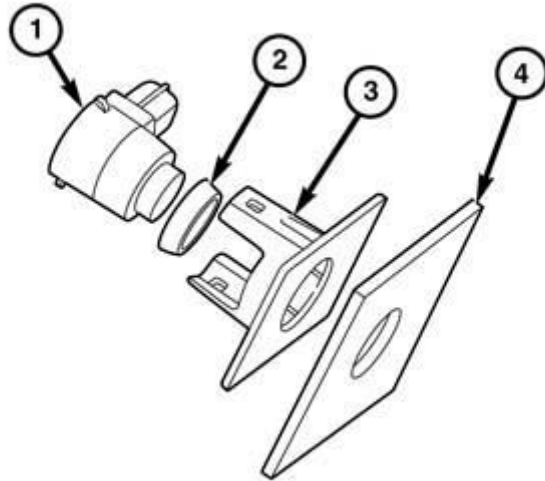
NOTE: Production and all service replacement O-ring spacers are tapered. The wide side (base) of the O-ring should be seated against the sensor housing and the narrow side should be oriented toward the outer surface of the sensor membrane and the rear fascia.

2. From behind the front bumper fascia, align and insert the park assist sensor (1) into the sensor bracket (3) on the inside surface of the bumper fascia (4) until the bracket latch features are fully engaged over the latch tabs of the sensor.

NOTE: Be certain that each sensor membrane is properly centered in the openings of the bumper fascia and that the resilient O-ring spacers are not pinched. Improper centering or pinched O-rings can be detrimental to proper park assist sensor operation. Be certain that the sensor membrane is flush with the outer surface of the bumper fascia.

3. Reconnect the wire harness connector to the sensor connector receptacle.
4. Reinstall the front bumper fascia onto the vehicle. Refer to **FASCIA, FRONT, INSTALLATION**.
5. Reconnect the negative cable to the battery.

FRONT OUTBOARD



080968288

Fig. 15: Park Assist Sensor, Spacer, Bracket & Fascia
Courtesy of CHRYSLER GROUP, LLC

NOTE: The park assist sensors (1) and the resilient sensor spacers (2) (also known as decoupling rings or O-rings) are each available for separate service replacement. The sensor brackets (3) are bonded to and integral to the inside surface of the bumper fascia (4).

NOTE: In vehicles equipped with the optional Parallel and Perpendicular Park Assist (PPPA) option only, the park assist sensors located in the outward facing ends of both the front and rear bumper fascias are unique and must not be interchanged with any other forward or rearward facing park assist sensor.

1. Engage the O-ring spacer (2) around the circumference of the sensor membrane protrusion.

NOTE: Production and all service replacement O-ring spacers are tapered. The wide side (base) of the O-ring should be seated against the sensor housing and the narrow side should be oriented toward the outer surface of the sensor membrane and the bumper fascia.

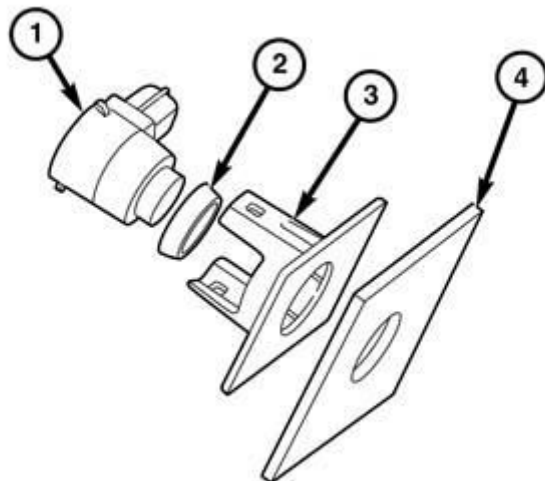
2. Pull the front of the front fender wheel house splash shield back from the front bumper fascia far enough to align and insert the sensor (1) into the sensor bracket (3) on the inside surface of the bumper fascia (4)

until the bracket latch features are fully engaged over the latch tabs of the sensor.

NOTE: Be certain that each sensor membrane is properly centered in the openings of the bumper fascia and that the resilient O-ring spacers are not pinched. Improper centering or pinched O-rings can be detrimental to proper park assist sensor operation. Be certain that the sensor membrane is flush with the outer surface of the bumper fascia.

3. Reconnect the wire harness connector to the sensor connector receptacle.
4. Reinstall the fasteners that secure the front of the front fender wheel house splash shield to the front bumper fascia, the front belly pan and the front end structure. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION**.
5. Reconnect the negative cable to the battery.

REAR



080968288

Fig. 16: Park Assist Sensor, Spacer, Bracket & Fascia
Courtesy of CHRYSLER GROUP, LLC

NOTE: The park assist sensors (1) and the resilient sensor spacers (2) (also known as decoupling rings or O-rings) are each available for separate service replacement. The sensor brackets (3) are bonded to and integral to the inside surface of the bumper fascia (4).

NOTE: In vehicles equipped with the optional Parallel and Perpendicular Park Assist (PPPA) option only, the park assist sensors located in the outward facing ends of both the front and rear bumper fascias are unique and must not be interchanged with any other forward or rearward facing park assist sensor.

1. Engage the O-ring spacer (2) around the circumference of the sensor membrane protrusion.

NOTE: Production and all service replacement O-ring spacers are tapered. The wide side (base) of the O-ring should be seated against the sensor housing and the narrow side should be oriented toward the outer surface of the sensor membrane and the rear fascia.

2. Reach up behind the rear bumper fascia far enough to align and insert the sensor (1) into the sensor bracket (3) on the inside surface of the bumper fascia (4) until the bracket latch features are fully engaged over the latch tabs of the sensor.

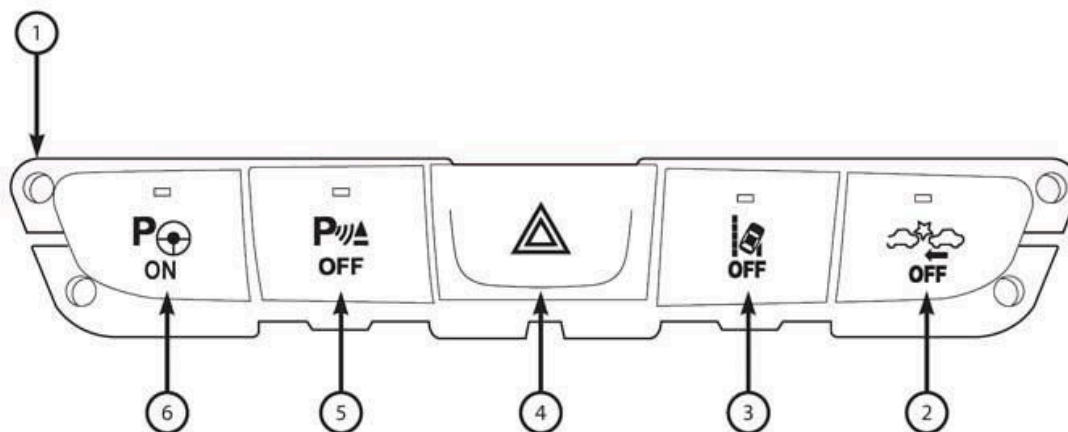
NOTE: Be certain that each sensor membrane is properly centered in the openings of the bumper fascia and that the resilient O-ring spacers are not pinched. Improper centering or pinched O-rings can be detrimental to proper park assist sensor operation. Be certain that the sensor membrane is flush with the outer surface of the bumper fascia.

3. Reconnect the wire harness connector to the sensor connector receptacle.
4. Reconnect the negative cable to the battery.

SWITCH, PARK ASSIST

DESCRIPTION

DESCRIPTION



0809005080

Fig. 17: Park Assist Switch
Courtesy of CHRYSLER GROUP, LLC

The park assist Off switch (5) and the Parallel and Perpendicular Park Assist (PPPA) On switch (6) are integral to the instrument panel switch pod (1) (also known as the Accessory Switch Bank Module/ASBM), which is secured to the instrument panel center bezel just below the heater and air conditioner controls. Refer to **POD, SWITCH, DESCRIPTION**.

The park assist Off switch push button is clearly identified with a white International Control and Display Symbol graphic for **Parking Aid** and the text **OFF**. The PPPA On switch push button is clearly identified with white International Control and Display Symbol graphics for **Parking** and **Electric Power Steering** along with the text **ON**.

An amber Light Emitting Diode (LED) unit is illuminated behind a small clear plastic jewel-like lens in the park assist Off push button to give a visual indication whenever the park assist system has been manually disabled or if a system fault is monitored. Another amber LED unit is illuminated in the PPPA On push button whenever that system has been enabled. Both switches are only functional while the status of the ignition switch is On. The switch buttons also have panel lamps dimmer controlled illumination for night visibility.

All of the circuitry and components of the park assist Off switch and the PPPA On switch are contained within a molded black plastic instrument panel switch pod housing. A single connector receptacle is integral to the back of the switch pod housing. The switch is connected to the vehicle electrical system through a dedicated take out and connector of the instrument panel wire harness.

The park assist Off switch and the PPPA On switch cannot be adjusted or repaired and, if either switch is ineffective or damaged, the entire instrument panel switch pod unit must be replaced with a new unit.

OPERATION

OPERATION

The status of the park assist Off switch and the Parallel and Perpendicular Park Assist (PPPA) On switch is continually monitored by the circuitry within the instrument panel switch pod (also known as the Accessory Switch Bank Module/ASBM). The switch pod receives battery voltage at all times on a fused battery feed circuit and has a path to ground at all times through the instrument panel wire harness. The inputs to and outputs from the switch pod consist of electronic message communication with the Body Control Module (BCM) over the single wire Local Interface Network (LIN) data bus.

Each time the park assist Off switch or PPPA On switch push button is depressed the switch pod circuitry sends an electronic **switch status** message input to the BCM over the LIN data bus. The BCM then relays an electronic **switch request** message to the Park Assist Module (PAM) over the Controller Area Network (CAN) data bus. The PAM responds to each **switch request** message by toggling the status of the appropriate park assist system feature from enabled to disabled, or from disabled to enabled, then sends an electronic **system status** message back to the BCM over the CAN data bus as confirmation.

The BCM responds to the system status message by sending a message to the switch pod over the LIN data bus to control the park assist Off switch or PPPA On switch Light Emitting Diode (LED) units so that they are illuminated only when appropriate while the status of the ignition switch is On, and are extinguished when the status of the ignition switch is anything except On. If the park assist system is disabled due to a monitored fault or failure, a press of the park assist Off push button will result in the LED flashing on and off for about 5

seconds, then lighting solid.

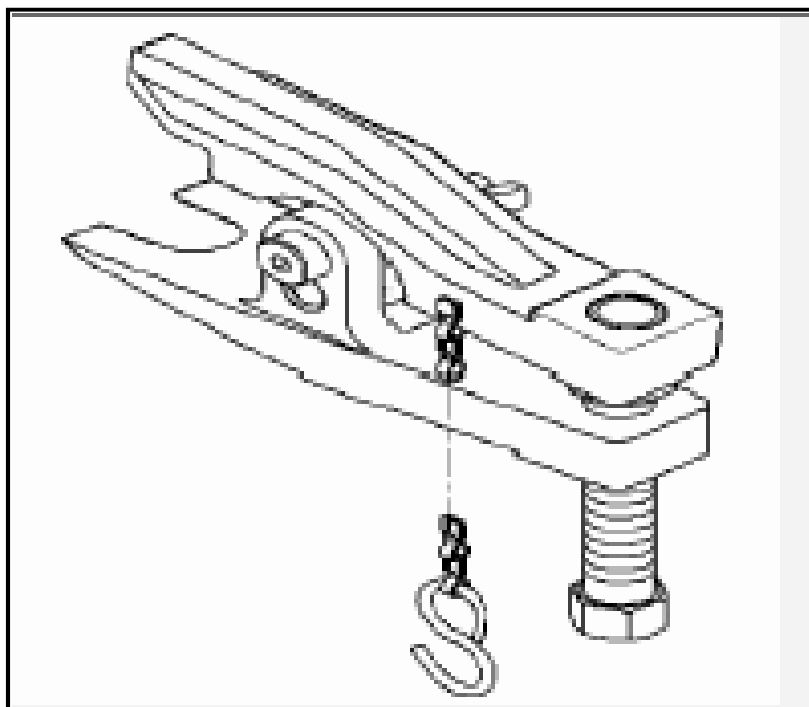
The hard wired circuits between components related to the park assist Off switch and the PPPA On switch may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the electronic controls and communication between modules and other devices that provide some features of the park assist system. The most reliable, efficient and accurate means to diagnose the park assist Off switch, the PPPA On switch or the electronic controls and communication related to park assist switch operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

2014 ACCESSORIES AND EQUIPMENT

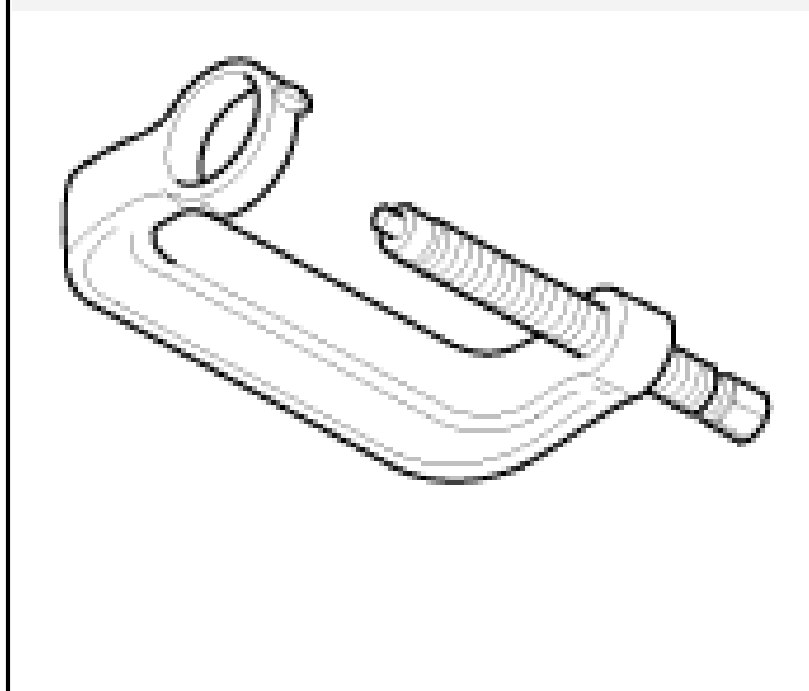
Frame and Bumpers - Cherokee

SPECIAL TOOLS

SPECIAL TOOLS



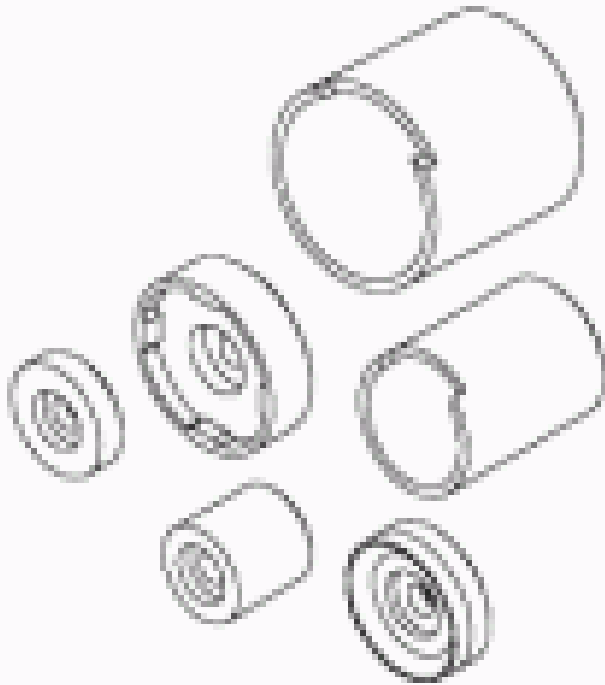
9360 - Remover, Ball Joint
(Originally Shipped In Kit Number(s)
9329, 9515, 9516, 9516-CAN, 9517,
9517-CAN, 9518, 9519, 9540, 9541.)



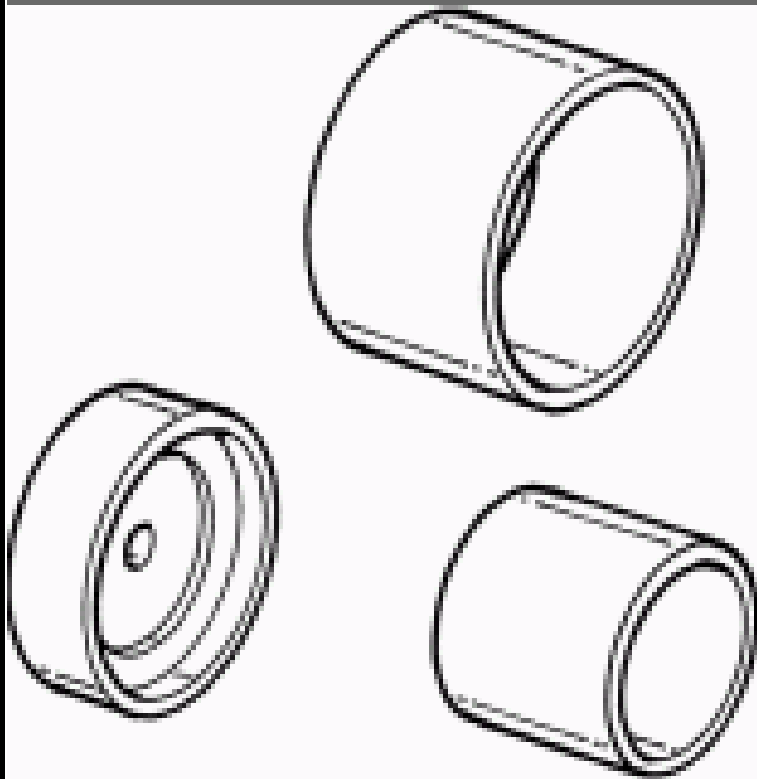
C-4212F - Press, Ball Joint
(Originally Shipped In Kit Number(s)
6745, 6880, 6881, MLR-C03.)

2014 Jeep Cherokee Trailhawk

2014 ACCESSORIES AND EQUIPMENT Frame and Bumpers - Cherokee



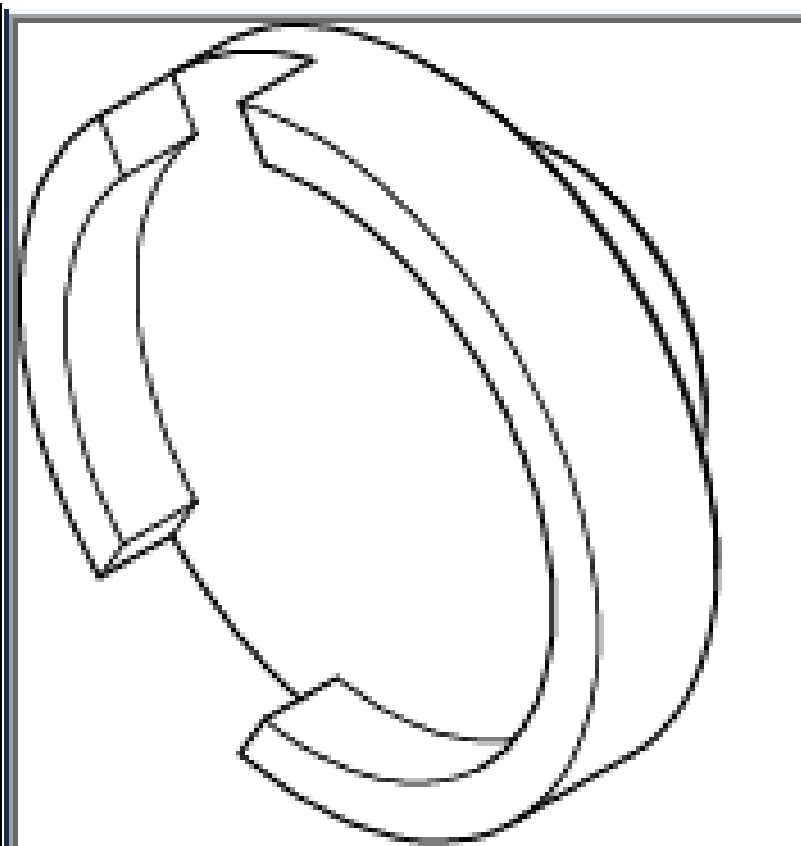
8858-6 - Remover
(Originally Shipped In Kit Number(s).)



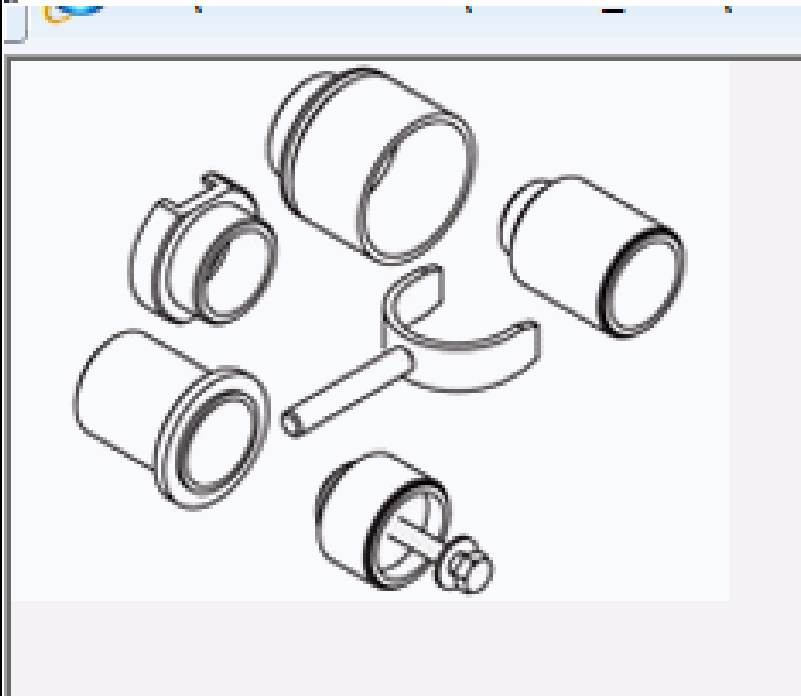
8861-2 - Receiver, Ball Joint
(Originally Shipped In Kit Number(s).)

2014 Jeep Cherokee Trailhawk

2014 ACCESSORIES AND EQUIPMENT Frame and Bumpers - Cherokee



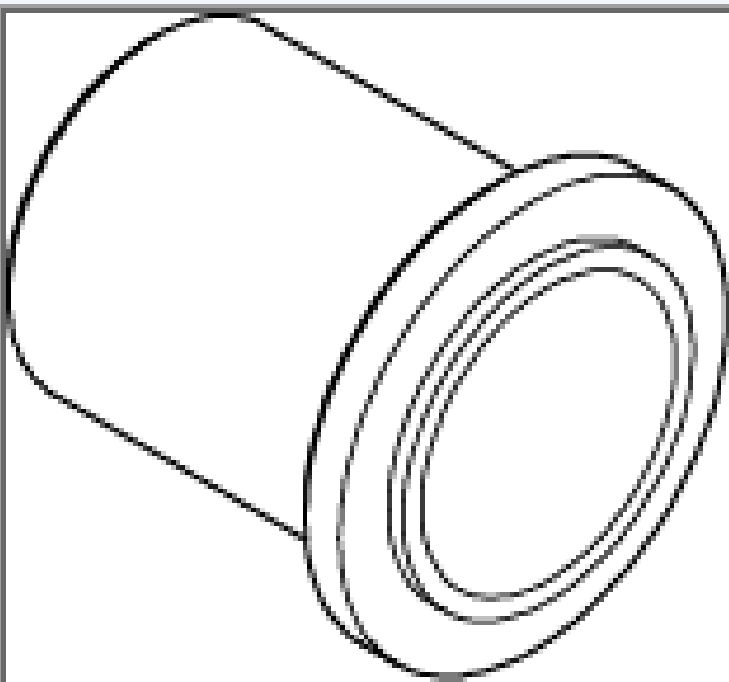
9031-4 - Installer, Bushing
(Originally Shipped In Kit Number(s)
9074, 9076, 9090, 9329-SUP, 9396, 9515-
SUP, 9516-SUP, 9517-SUP, 9518, 9519,
9540-SUP, 9541-SUP.)



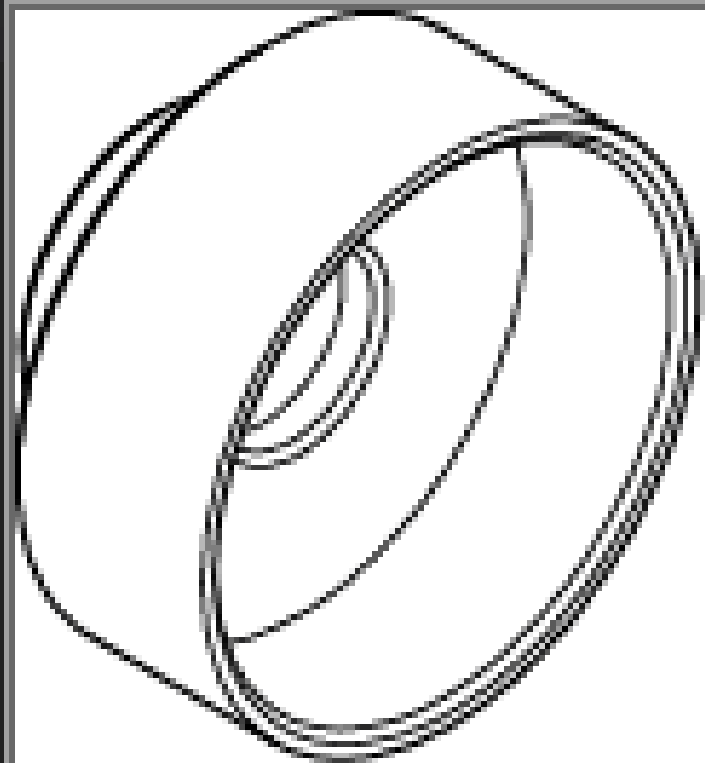
9958 - Remover/Installer, Axle Bushing
(Originally Shipped In Kit Number(s)
10089.)

2014 Jeep Cherokee Trailhawk

2014 ACCESSORIES AND EQUIPMENT Frame and Bumpers - Cherokee



9958-3 - Installer, Bushing
(Originally Shipped In Kit Number(s)
10089, 10125.)



10106-2 - Receiver, Depth Setting
(Originally Shipped In Kit Number(s)
10105, 10108.)

SPECIFICATIONS

2014 Jeep Cherokee Trailhawk

2014 ACCESSORIES AND EQUIPMENT Frame and Bumpers - Cherokee

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

DESCRIPTION	N.m	Ft Lbs	In Lbs
Front suspension crossmember mounting bolts	189	139	-
Front suspension crossmember upper mounting bolts	120	86	-
Front upper bumper reinforcement bolts	45	33	-
Lower ball joint to control arm nut (new)	25 plus 175°	18 plus 175°	-
Lower load beam bracket bolts	95	70	-
Lower load beam extension bolts	45	33	-
Lower transversal link to lower control arm bolt	130	96	-
Outer tie rod end to knuckle nut (new)	25 plus 80°	18 plus 80°	-
Rear bumper reinforcement nuts	28	21	-
Rear crossmember to body bolts	150	111	-
Rear crossmember to lower transversal link bolt	90 plus 45°	66 plus 45°	-
Rear crossmember to upper transversal link nut and bolt	90 plus 45°	66 plus 45°	-
Skid plate to underbody bolts	20	15	-
Skid plate to skid plate bolts	20	15	-
Stabilizer bar (rear) to cradle bolts	110	81	-
Stabilizer link to stabilizer bar nut	55	41	-
Tow hook (front) to bracket nut	25	18	-
Tow hook (front) to bumper bolts	47	35	-
Tow hook (front) bracket to load beam bolts	50	37	-
Tow hook (rear) bolts	80	59	-
Trailer hitch bolts	165	122	-
Underbody shield to floor pan bolt	5	-	44
Underbody shield to floor pan nut	4	-	35
Upper transversal link to lower control arm	80 plus 45°	59 plus 45°	-

BUMPERS

FASCIA, FRONT

REMOVAL

REMOVAL

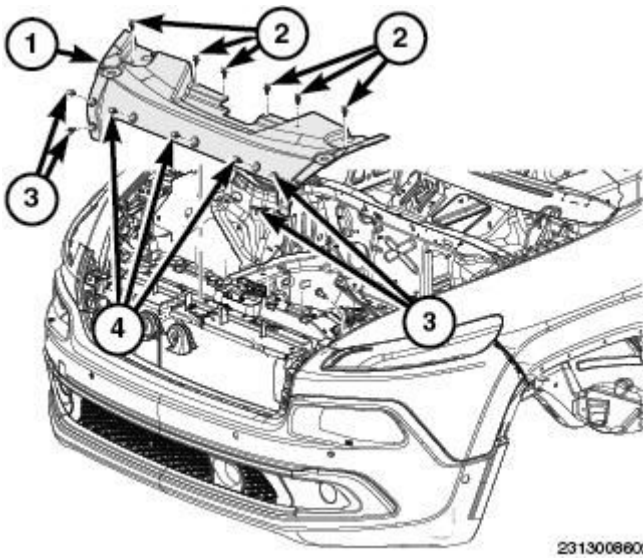


Fig. 1: Upper Close Out Panel Cover Components
Courtesy of CHRYSLER GROUP, LLC

1. Open the hood.
2. Remove the push pin fasteners and remove the radiator closeout panel (1).

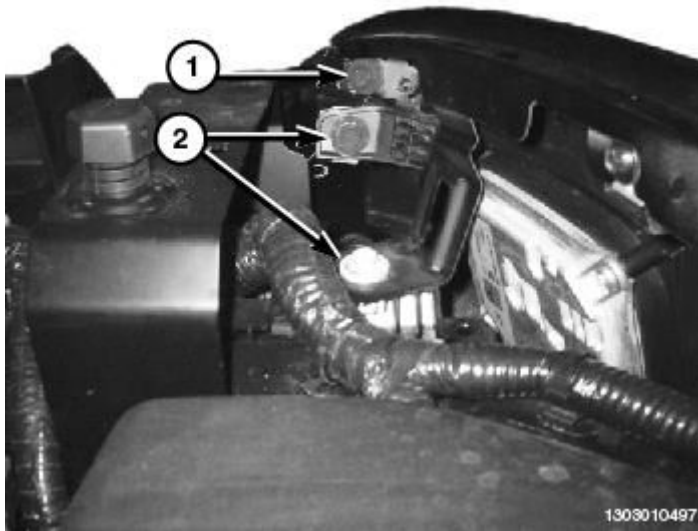


Fig. 2: Identifying Fender & Fascia Bracket Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Remove the fender (1) and fascia bracket fasteners (2).

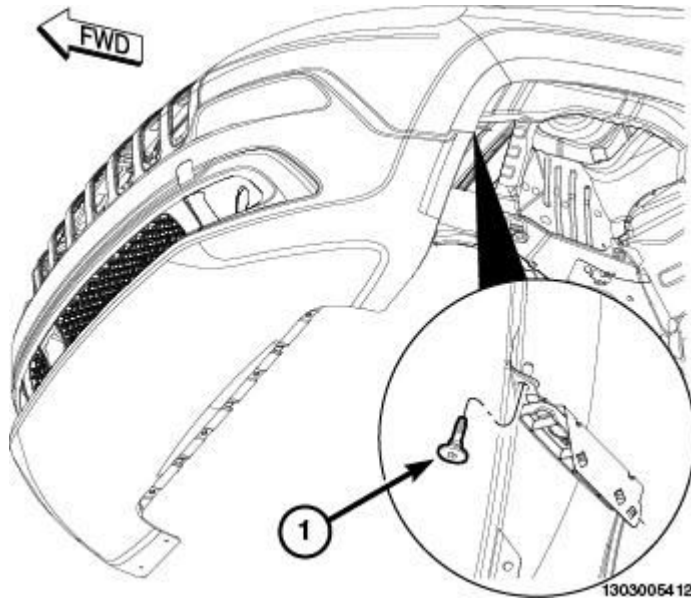
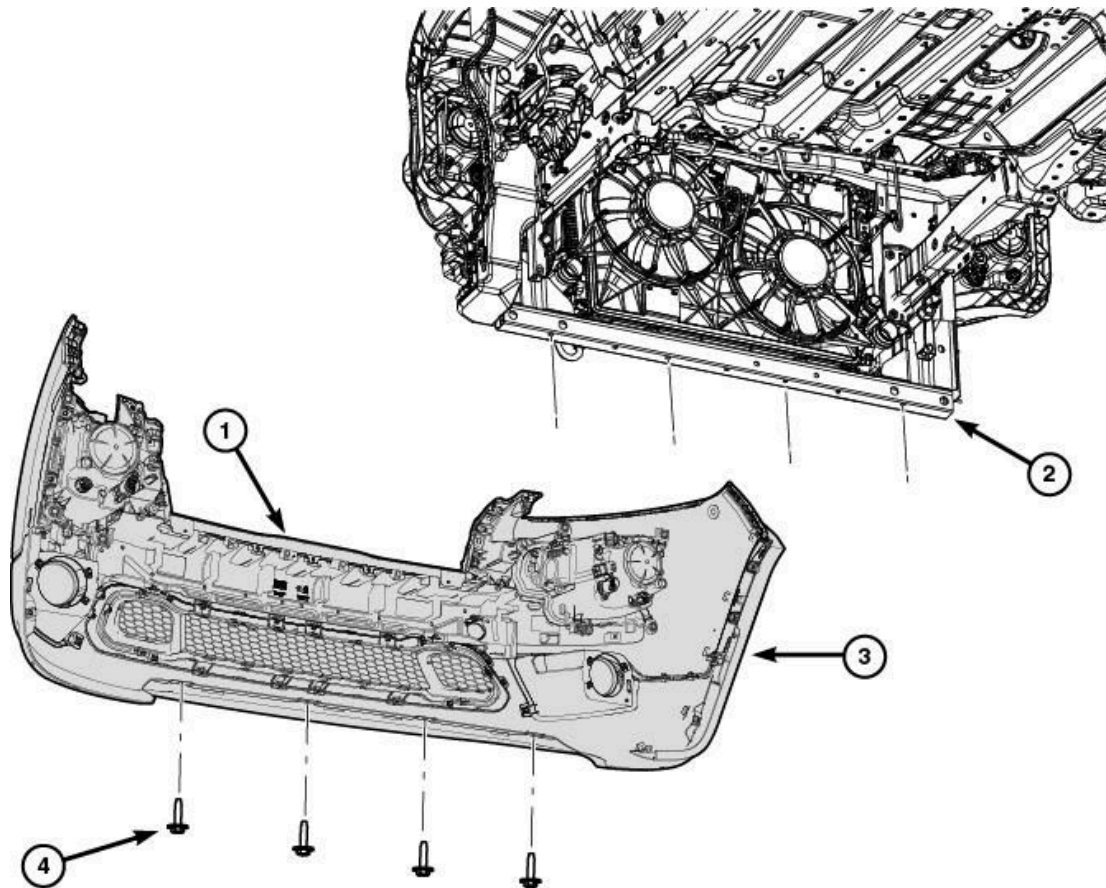


Fig. 3: Identifying Fender To Fascia Fastener
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the negative battery cable.
5. Raise and support the vehicle.
6. Remove the engine belly pan. Refer to **BELLY PAN, REMOVAL**.
7. Remove the front wheel flare. Refer to **MOLDING, FRONT WHEEL OPENING, REMOVAL**.
8. Accessing from the wheelhouse, remove the fender to fascia fastener (1). Repeat for the opposite side.



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Fig. 4: Identifying Upper Fascia Closeout Panel, Radiator Support & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

9. Remove the lower fasteners (4).
10. Remove the eight push pin fasteners (2) from the upper fascia closeout panel (1).
11. Remove the upper fascia closeout panel (1) from the vehicle.
12. Remove the two fascia to upper radiator support push pins (1) located above the headlamp. Repeat on the opposite side.
13. Remove the fascia to upper radiator fasteners (2, 3, 6).
14. Carefully pull out on the upper and lower fascia sides (4, 5) to disengage the fascia retaining tabs. Repeat on the opposite side.
15. Remove the fascia from the vehicle.
16. Accessing from under the vehicle, disconnect the active grille shutter wire harness.
17. If equipped, disconnect the fog lamps.

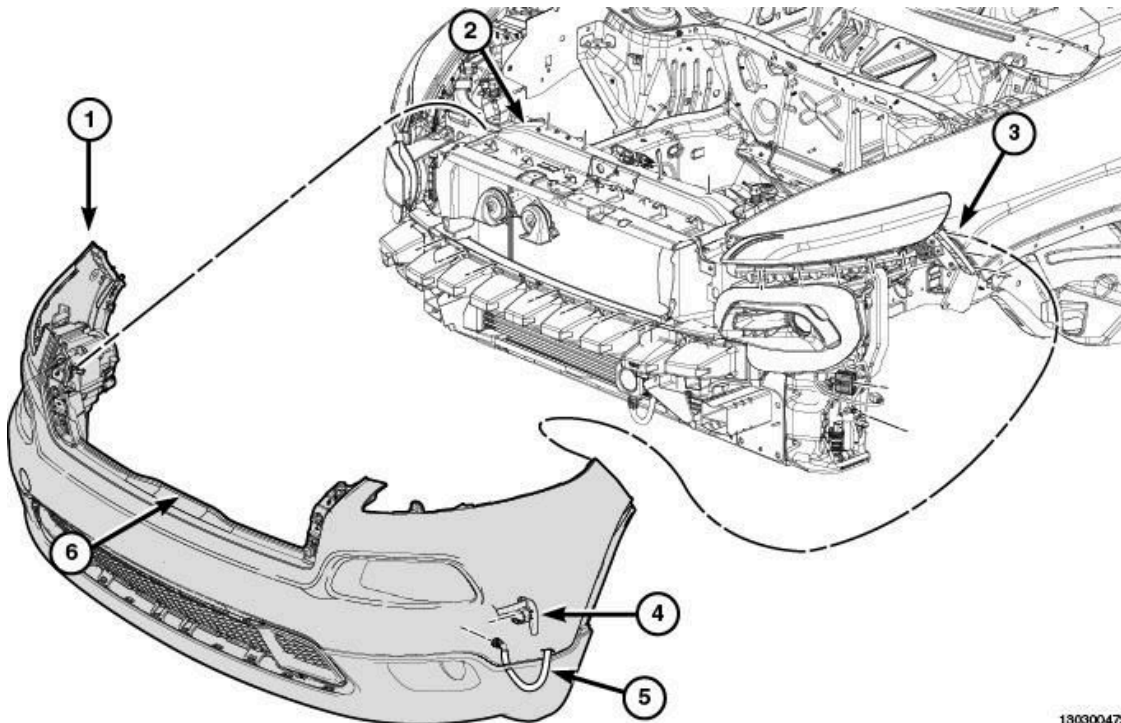


Fig. 5: Identifying Upper Fascia Closeout Panel, Upper & Lower Fascia Sides & Fasteners
Courtesy of CHRYSLER GROUP, LLC

INSTALLATION

INSTALLATION

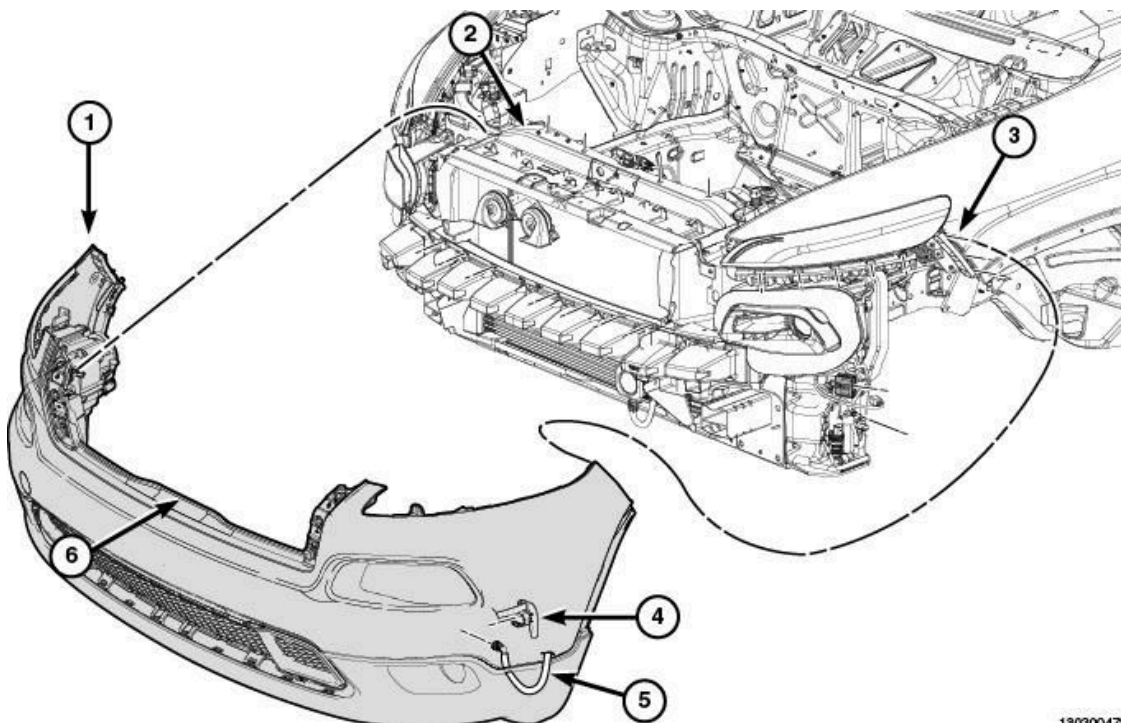


Fig. 6: Identifying Upper Fascia Closeout Panel, Upper & Lower Fascia Sides & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. With the help of an assistant, position the fascia to the vehicle.
2. Align and hand tap the fascia sides (4, 5) to engage the fascia retaining tabs. Repeat on the opposite side.
3. Install the fascia to upper radiator fasteners (2, 3, 6). Tighten the fasteners securely.
4. Install the four fascia to upper radiator support push pins (1).

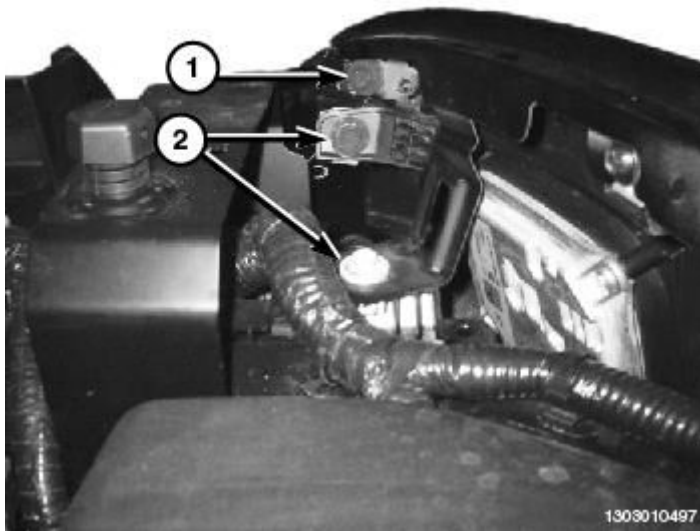


Fig. 7: Identifying Fender & Fascia Bracket Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. Install the fascia bracket fasteners (1) and (2).

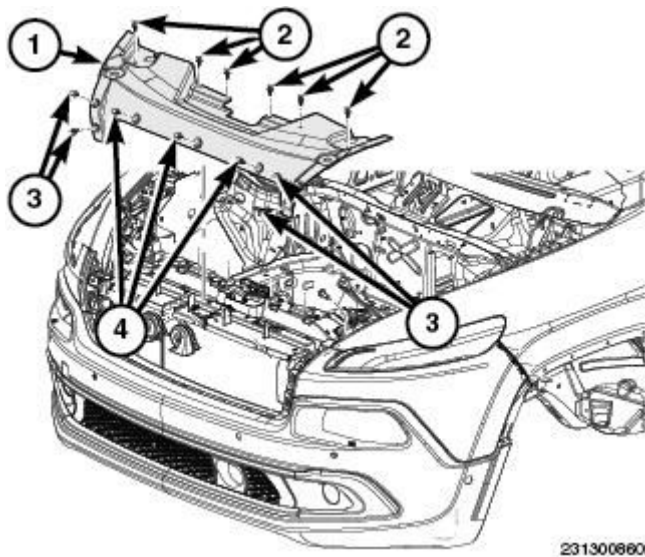


Fig. 8: Upper Close Out Panel Cover Components

Courtesy of CHRYSLER GROUP, LLC

6. Position the upper radiator closeout panel (1) back into place and install the push pin fasteners.

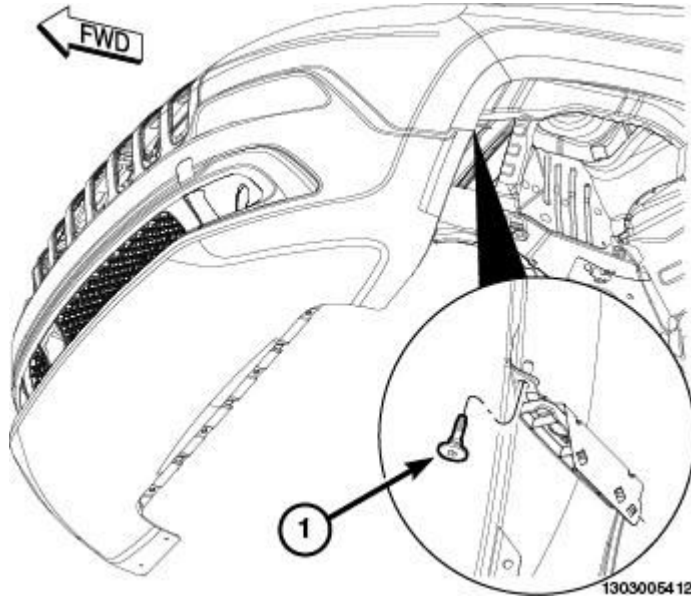


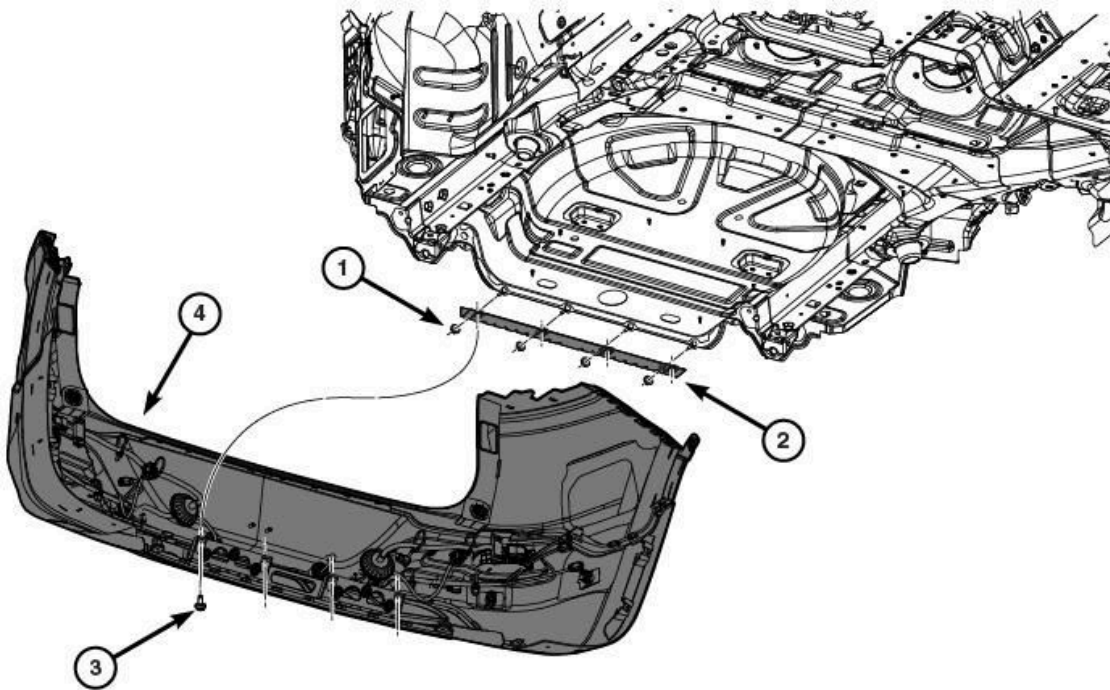
Fig. 9: Identifying Fender To Fascia Fastener
Courtesy of CHRYSLER GROUP, LLC

7. Raise the vehicle.
8. Install the fender to fascia fastener (1). Tighten the fastener securely. Repeat for the opposite side.
9. If equipped, connect the fog lamps.
10. Accessing from under the vehicle, connect the active grille shutter wire harness.
11. Position the fascia lower closeout panel (1), install the thirteen fasteners (2) securing the fascia lower close out panel. Tighten the fasteners securely.
12. Install the front splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION**.
13. Lower the vehicle.
14. Connect the negative battery cable.
15. Close the hood.

FASCIA, REAR

REMOVAL

REMOVAL



1309004725

Fig. 10: Identifying Rear Fascia Assembly & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Open the liftgate.
2. Disconnect the negative battery cable.
3. Raise and support the vehicle.
4. Remove the wheelhouse splash shields. Refer to **SHIELD, SPLASH, REAR WHEELHOUSE, REMOVAL**.
5. Remove the push pin retainer (3) that secures the underside of the rear fascia assembly.

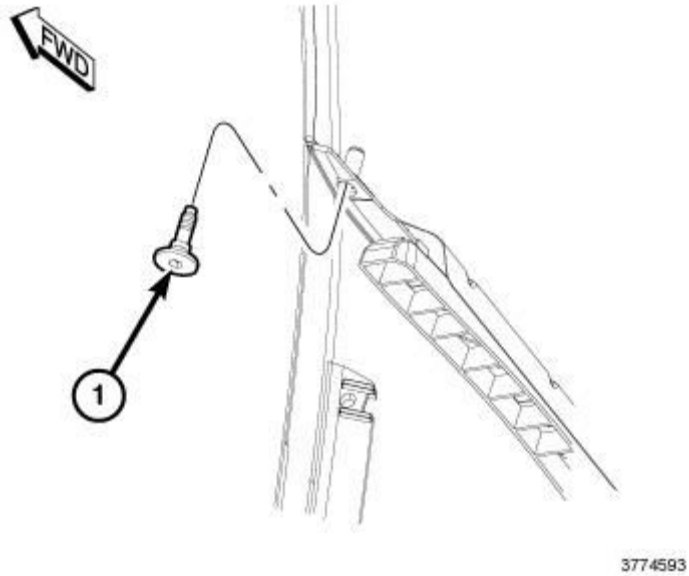


Fig. 11: Fender To Fascia Fastener
Courtesy of CHRYSLER GROUP, LLC

6. Accessing from the wheelhouse, remove the fender to fascia fastener (1). Repeat for the opposite side.

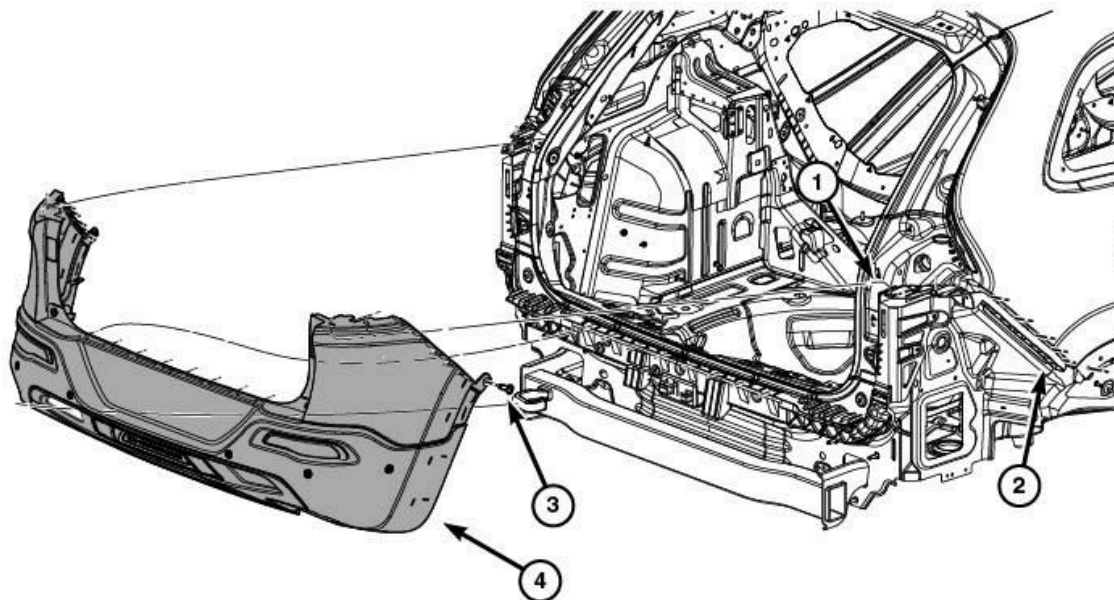
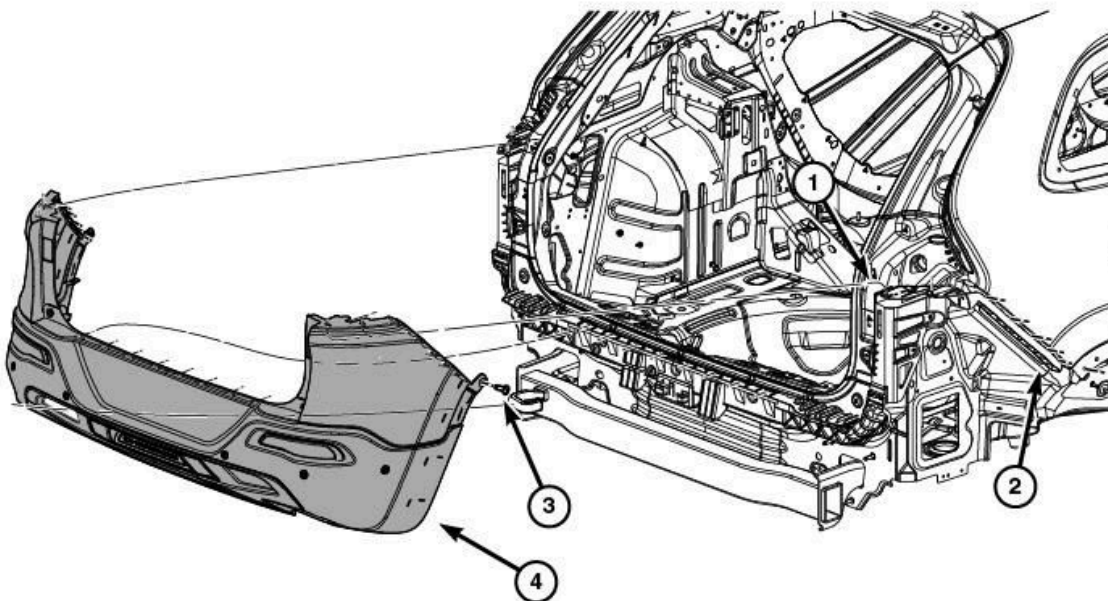


Fig. 12: Identifying Rear Fascia Assembly, Fender To Fascia Fastener & Push Pin Retainers
Courtesy of CHRYSLER GROUP, LLC

7. Remove the quarter panel wheel opening flare molding. Refer to **MOLDING, REAR WHEEL OPENING, REMOVAL**.
8. Remove the bolts (3).
9. Pull out on the fascia (4) at the wheel house opening (2) to disengage the fascia from the retaining bracket. Repeat on the opposite side.
10. With the help of an assistant, pull rearward to disengage the fascia (1) from the rear retaining bracket. **Do not completely remove at this time.**
11. Disconnect the vehicle wiring harness (2).
12. Remove the fascia (1) from vehicle.

INSTALLATION

INSTALLATION



1309004726

Fig. 13: Identifying Rear Fascia Assembly, Fender To Fascia Fastener & Push Pin Retainers
Courtesy of CHRYSLER GROUP, LLC

1. With the help of an assistant, position the fascia (4) to the vehicle.
2. Connect the vehicle wiring harness.
3. With the help of an assistant and using firm pressure, align and push forward to engage the fascia to the rear retaining bracket.

4. Align the fascia (4) with the retaining brackets at the tail lamp (1) and wheelhouse openings (2). Using firm pressure push in to engage. Repeat on the opposite side.

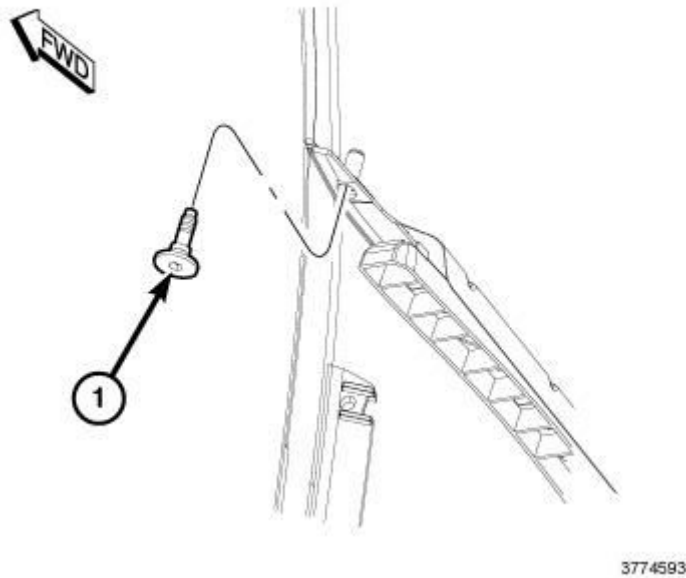
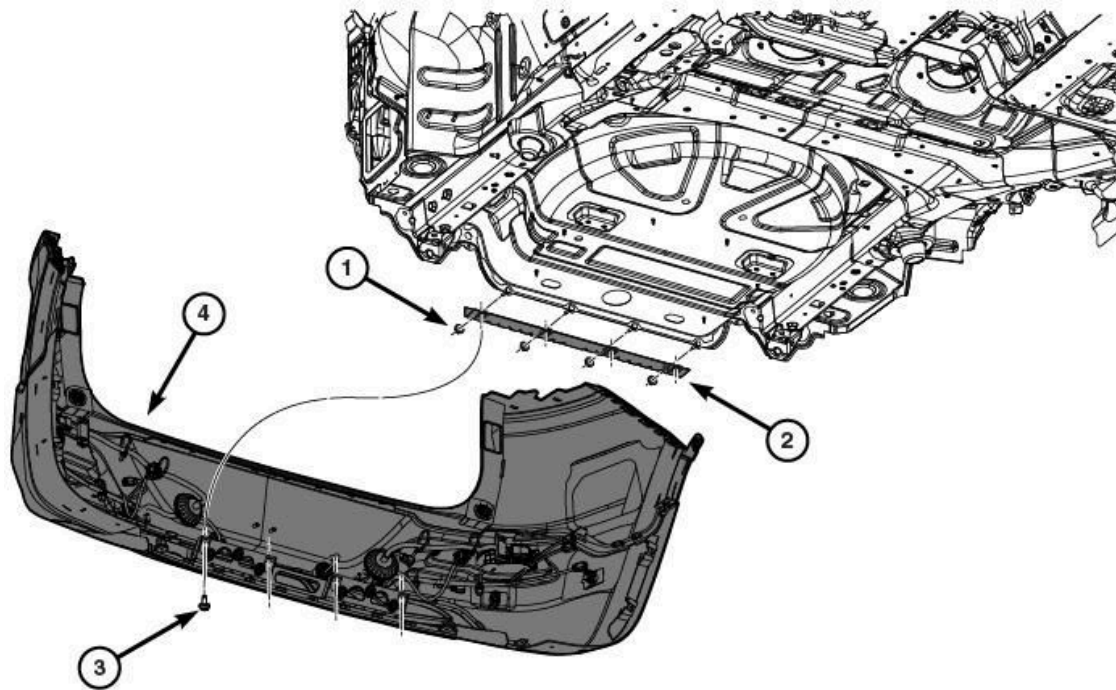


Fig. 14: Fender To Fascia Fastener

Courtesy of CHRYSLER GROUP, LLC

5. Accessing from the wheelhouse, install the fastener (1) that secures the rear fascia assembly to the rear quarter. Tighten the fastener securely. Repeat for opposite side.



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Fig. 15: Identifying Rear Fascia Assembly & Fasteners
Courtesy of CHRYSLER GROUP, LLC

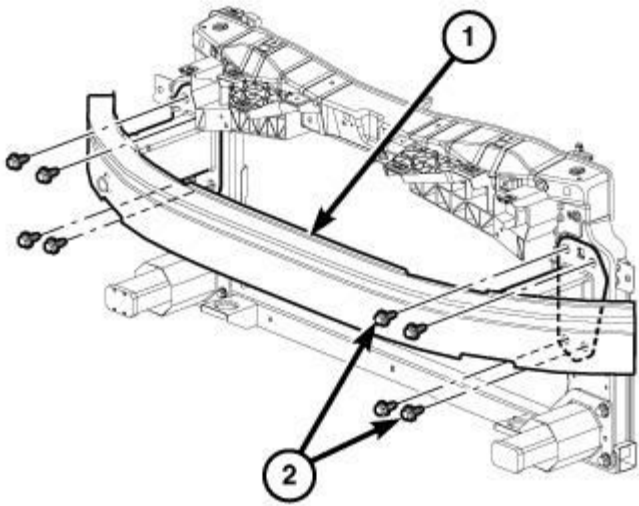
6. Install the fasteners (3) that secures the rear fascia assembly to the underbody.
7. Install the wheelhouse splash shields. Refer to **SHIELD, SPLASH, REAR WHEELHOUSE, INSTALLATION**.
8. Connect the negative battery cable.

REINFORCEMENT, BUMPER, FRONT

REMOVAL

REMOVAL

UPPER REINFORCEMENT

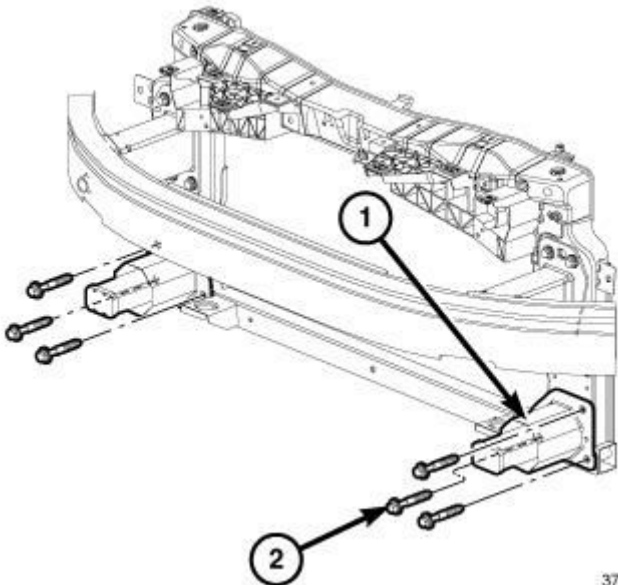


3772539

Fig. 16: Upper Bumper Reinforcement & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Remove front fascia. Refer to **FASCIA, FRONT, REMOVAL**.
2. Remove the fasteners (2) securing the upper bumper reinforcement (1) to the frame/front end module. Repeat on the opposite side and remove the upper bumper reinforcement (1).

LOWER REINFORCEMENT

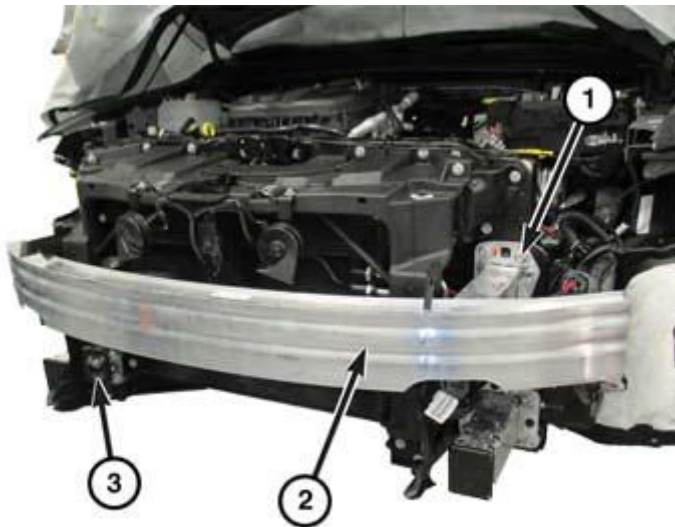


3772580

Fig. 17: Lower Bumper Reinforcements & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Remove front fascia. Refer to **FASCIA, FRONT, REMOVAL**.

2. Remove the fasteners (2) securing the lower bumper reinforcement (1) to the frame/front end module.
Remove the lower bumper reinforcement (2).
3. If necessary, repeat steps for the opposite side.

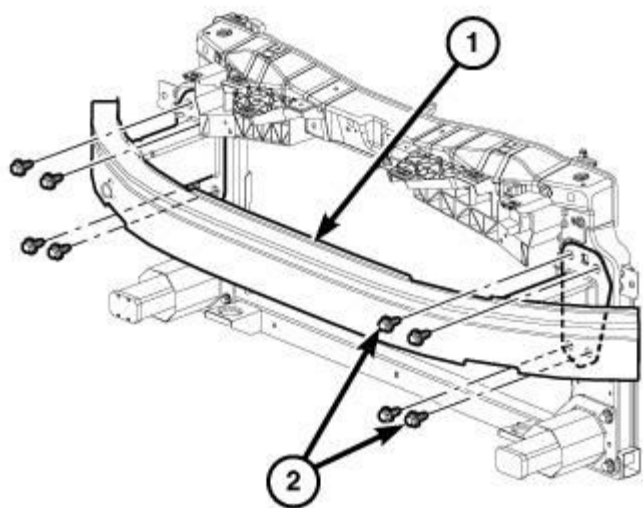
INSTALLATION**INSTALLATION**

2311036493

Fig. 18: Identifying Front Bumper Reinforcement, Bolts & Adaptive Cruise Control Module
Courtesy of CHRYSLER GROUP, LLC

1. Position the front bumper reinforcement (2) and install the bolts (1). Tighten the front bumper reinforcement bolts to the proper. Refer to **SPECIFICATIONS**.
2. Install the adaptive cruise control module (3). Refer to **MODULE, ADAPTIVE CRUISE CONTROL, INSTALLATION**.
3. Install the front fascia. Refer to **FASCIA, FRONT, INSTALLATION**.

UPPER REINFORCEMENT

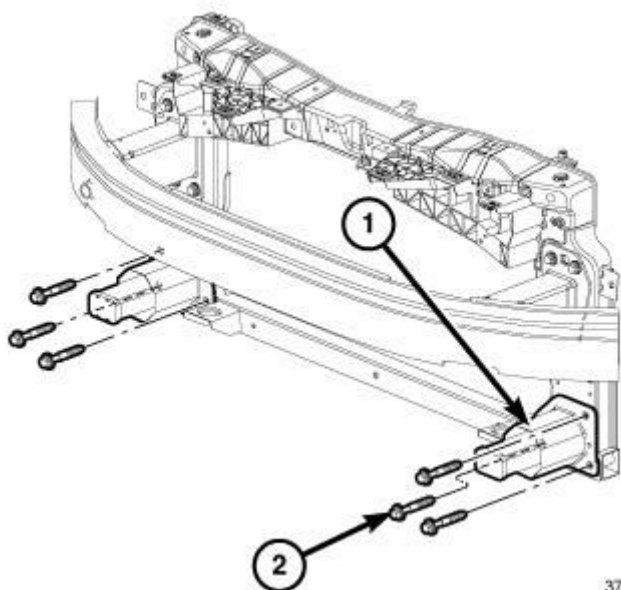


3772539

Fig. 19: Upper Bumper Reinforcement & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Position the upper bumper reinforcement (1) to the frame/front end module.
2. Install the fasteners securing the upper bumper reinforcement (1) to the frame/front end module. Tighten the fasteners to 45 N.m (33 ft. lbs.). Repeat on the opposite side.
3. Install the front fascia. Refer to **FASCIA, FRONT, INSTALLATION**.

LOWER REINFORCEMENT



3772580

Fig. 20: Lower Bumper Reinforcements & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Position the lower bumper reinforcement (1) to the frame/front end module.
2. Install the fasteners (2) securing the lower bumper reinforcement (1) to the frame/front end module. Tighten the fasteners to 45 N.m (33 ft. lbs.).
3. Install the front fascia. Refer to **FASCIA, FRONT, INSTALLATION**.
4. If necessary, repeat steps for opposite side.

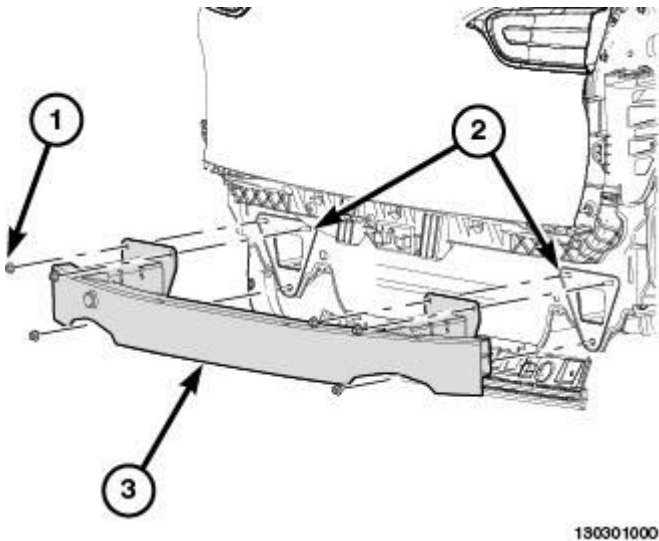
REINFORCEMENT, BUMPER, REAR**REMOVAL****REMOVAL****STANDARD BUMPER**

Fig. 21: Identifying Rear Bumper Reinforcement & Nuts
Courtesy of CHRYSLER GROUP, LLC

1. Remove rear fascia. Refer to **FASCIA, REAR, REMOVAL**.
2. Remove nuts (1) attaching rear bumper reinforcement (3) to frame rail.
3. Remove bumper reinforcement (3) from vehicle.

TRAILHAWK BUMPER

NOTE: Trailer hitch shown, bumper beam similar.

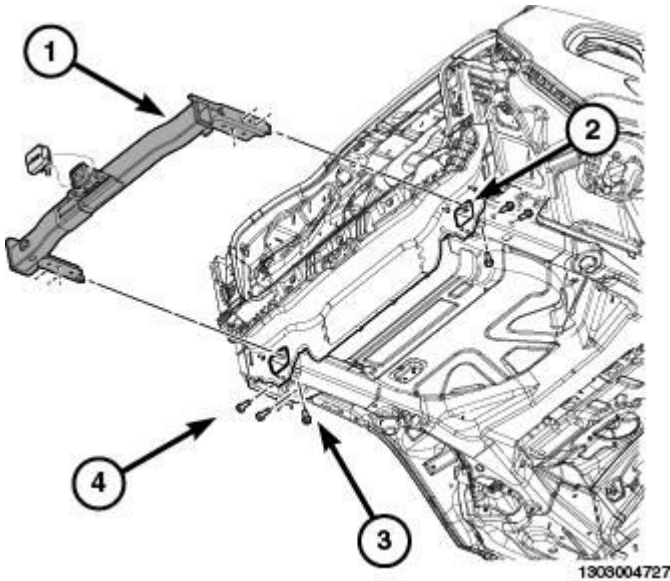


Fig. 22: Identifying Rear Fascia, Trailer Hitch & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Remove the rear fascia. Refer to **FASCIA, REAR, REMOVAL**.
2. Remove the bolts (3, 4) and remove the hitch (1).

INSTALLATION

INSTALLATION

STANDARD BUMPER

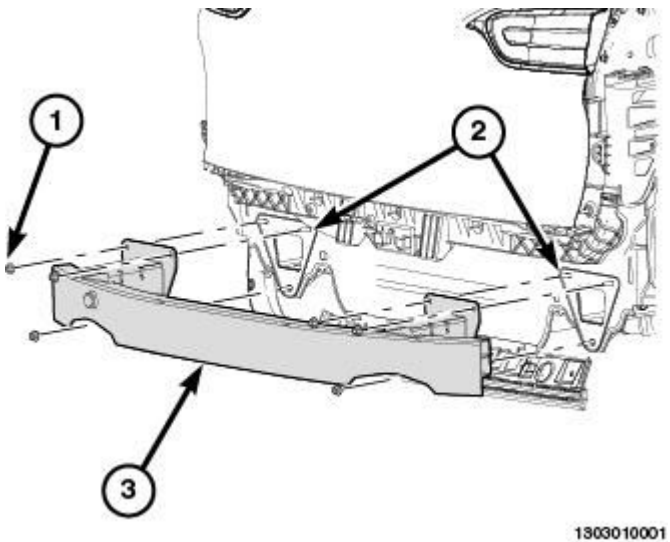


Fig. 23: Identifying Rear Bumper Reinforcement & Nuts
Courtesy of CHRYSLER GROUP, LLC

1. Position rear bumper reinforcement (3) on vehicle.

2. Install nuts (1) attaching the bumper reinforcement to frame rail.
3. Tighten nuts (2) to 28 N.m (21 ft lbs).
4. Install rear fascia. Refer to **FASCIA, REAR, INSTALLATION**.

TRAILHAWK BUMPER

NOTE: Trailer hitch shown, bumper beam similar.

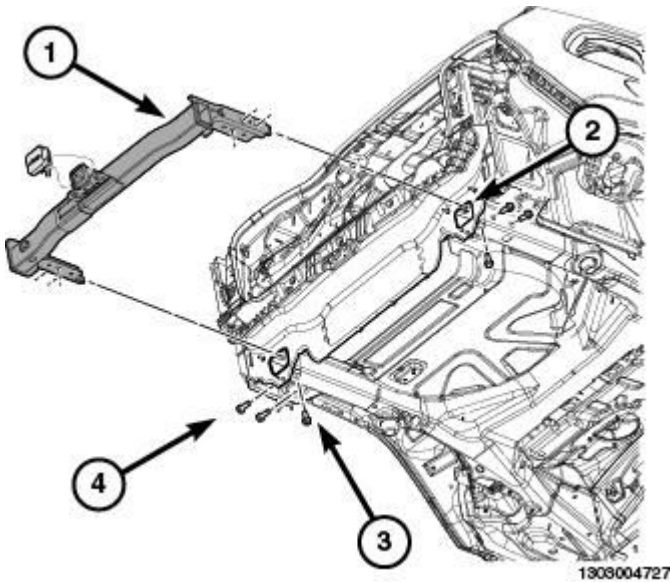


Fig. 24: Identifying Rear Fascia, Trailer Hitch & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Position the bumper beam (1) into the frame openings (2).
2. Install the bolts (3, 4) and tighten to 165 N.m (122 ft lbs)
3. Install the rear fascia. Refer to **FASCIA, REAR, INSTALLATION**.

FRAME

WARNING

WARNINGS

WARNING: Use an Occupational Safety and Health Administration (OSHA) approved breathing filter, when spraying paint or solvents in a confined area. Failure to follow these instructions may result in possible serious or fatal injury.

- avoid prolonged skin contact with petroleum or alcohol based cleaning solvents.

- do not stand under a hoisted vehicle that is not properly supported on safety stands. Failure to follow these instructions may result in possible serious or fatal injury.

CAUTION: When holes are drilled or punched in an inner body panel, verify the depth of space to the outer body panel, electrical wiring or other components. Damage to the vehicle can result.

- do not weld exterior panels unless combustible material on the interior of vehicle is removed from the repair area. Fire or hazardous conditions, can result.
- always have a fire extinguisher ready for use when welding.
- disconnect the negative (-) cable clamp from the battery when servicing electrical components that are live when the ignition is off. Damage to electrical system can result.
- do not use abrasive chemicals or compounds on painted surfaces. Damage to finish can result.
- do not use harsh alkaline based cleaning solvents on painted or upholstered surfaces. Damage to finish or color can result.
- do not hammer or pound on plastic trim panel when servicing interior trim. Plastic panels can break.

RESTRAINT WARNINGS

WARNING: To avoid potential physical injury, or damage to sensitive electronic circuits and systems, always disconnect and isolate the battery negative (ground) cable and the positive cable, then ground the positive cable to discharge the ORC capacitor before performing any welding operations on the vehicle. Failure to take the proper precautions could result in accidental airbag deployment, possible damage to the Supplemental Restraint System (SRS) circuits and components, and possible damage to other electronic circuits and components. Whenever a welding process is being performed within 30 cm (12 in) of an electronic module/harness, then that module/harness should be relocated out of the way, or disconnected. Always protect against component or vehicle damage from weld spatter by using weld blankets and screens. Failure to follow these instructions may result in serious or fatal injury.

WARNING: To avoid serious or fatal injury on vehicles equipped with the Supplemental Restraint System (SRS), never attempt to repair the electrically conductive circuits or wiring components related to the SRS for which there is no MOPAR wiring repair kit. It is important to use **ONLY** the recommended splicing kit and procedure. For applicable and available MOPAR wiring repair kits, please visit the MOPAR Connector Web Site at

the following address on the Internet:
(<http://dto.vftis.com/mopar/disclaimer.asp>). Inappropriate repairs can compromise the conductivity and current carrying capacity of those critical electrical circuits, which may cause SRS components not to deploy when required, or to deploy when not required. Only minor cuts or abrasions of wire and terminal insulation where the conductive material has not been damaged, or connector insulators where the integrity of the latching and locking mechanisms have not been compromised may be repaired using appropriate methods.

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid potential physical injury or damage to sensitive electronic circuits and systems, always disconnect and isolate the battery negative (ground) cable and the positive cable, then ground the positive cable to discharge the Occupant Restraint Controller (ORC) capacitor before performing any welding operations on the vehicle. Failure to take the proper precautions could result in accidental airbag deployment, possible damage to the Supplemental Restraint System (SRS) circuits and components, and possible damage to other electronic circuits and components. Whenever a welding process is being performed within 12 inches (30 centimeters) of an electronic module or wiring harness, then that module or harness should be relocated out of the way, or

disconnected. Always protect against component or vehicle damage from weld spatter by using weld blankets and screens.

WARNING: To avoid serious or fatal injury, do not attempt to dismantle an airbag unit or tamper with its inflator. Do not puncture, incinerate or bring into contact with electricity. Do not store at temperatures exceeding 93° C (200° F). An airbag inflator unit may contain sodium azide and potassium nitrate. These materials are poisonous and extremely flammable. Contact with acid, water, or heavy metals may produce harmful and irritating gases (sodium hydroxide is formed in the presence of moisture) or combustible compounds. An airbag inflator unit may also contain a gas canister pressurized to over 17.24 kPa (2500 psi). Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: To avoid serious or fatal injury when handling a seat belt tensioner retractor. Exercise proper care to keep fingers out from under the retractor cover and away from the seat belt webbing where it exits from the retractor cover. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: To avoid serious or fatal injury, replace all Supplemental Restraint System (SRS) components only with parts specified in the Chrysler Mopar® Parts Catalog. Substitute parts may appear interchangeable, but internal differences may result in inferior occupant protection.

WARNING: To avoid serious or fatal injury, the fasteners, screws, and bolts originally used for the Supplemental Restraint System (SRS) components must never be replaced with any substitutes. These fasteners have special coatings and are specifically designed for the SRS. Anytime a new fastener is needed, replace it with the correct fasteners provided in the service package or specified in the Chrysler Mopar® Parts Catalog.

WARNING: To avoid serious or fatal injury when a steering column has an airbag unit attached, never place the column on the floor or any other surface with the steering wheel or airbag unit face down. Failure to follow these instructions may result in possible serious or fatal injury.

USE OF HEAT DURING REPAIR

WARNING: Chrysler Group LLC engineering's position on the use of heat during collision repair is as follows:

- Any body panel or frame component damaged which is to be repaired and reused, must be repaired using the "cold straightening" method. No heat may be used during the

straightening process.

- During rough straightening prior to panel replacement, damaged panels or frame components may be heated to assist in body/frame realignment. The application of heat must be constrained to the parts which will be replaced and not allowed to affect any other components.

This "no heat" recommendation is due to the extensive use of high strength and advanced high strength steels in Chrysler Group LLC products. High-strength materials can be substantially and negatively affected from heat input which will not be obviously known to the repairer or consumer.

Ignoring these recommendations may lead to serious compromises in the ability to protect occupants in a future collision event, reduce the engineered qualities and attributes, or decrease the durability and reliability of the vehicle.

This statement supersedes any previously released information by the Chrysler Group LLC.

Failure to follow these instructions may result in serious or fatal injury.

SPECIFICATIONS

FRAME DIMENSIONS

NOTE: Frame dimensions are listed in metric scale millimeter (mm). All dimensions are from center to center of Principal Locating Point (PLP), or from center to center of PLP and fastener location.

VEHICLE PREPARATION

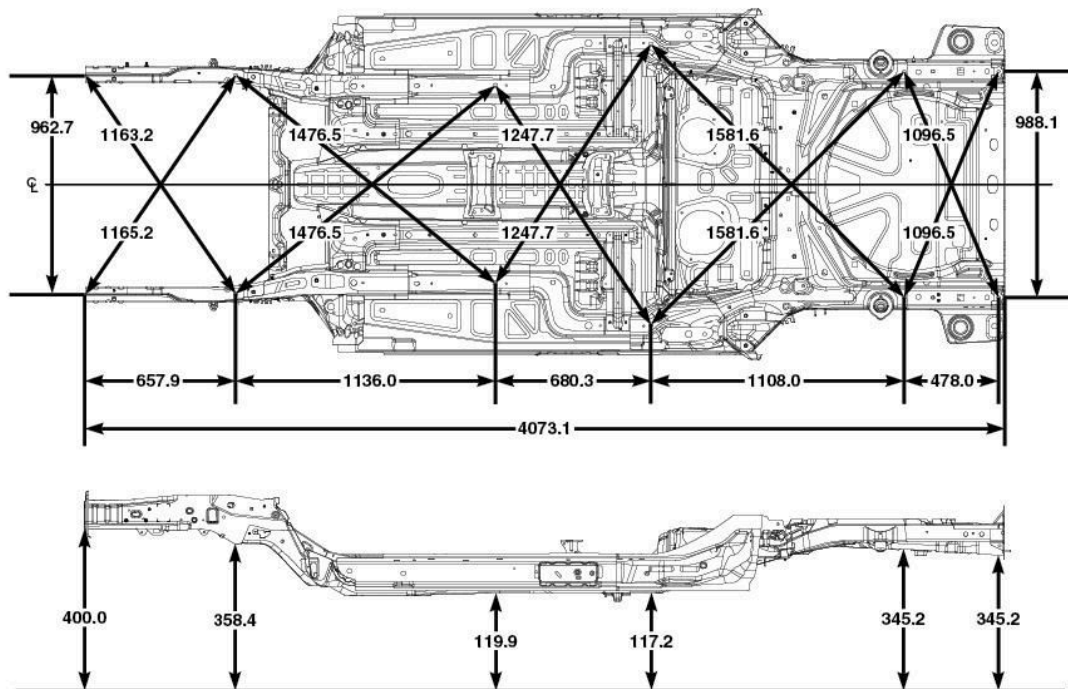
Position the vehicle on a level work surface. Using screw or bottle jacks, adjust the vehicle PLP heights to the specified dimension above a level work surface. Vertical dimensions can be taken from the work surface to the locations indicated were applicable.

INDEX

DESCRIPTION	FIGURE
Under Body Dimensions	Fig. 25
Under Hood Dimensions	Fig. 26

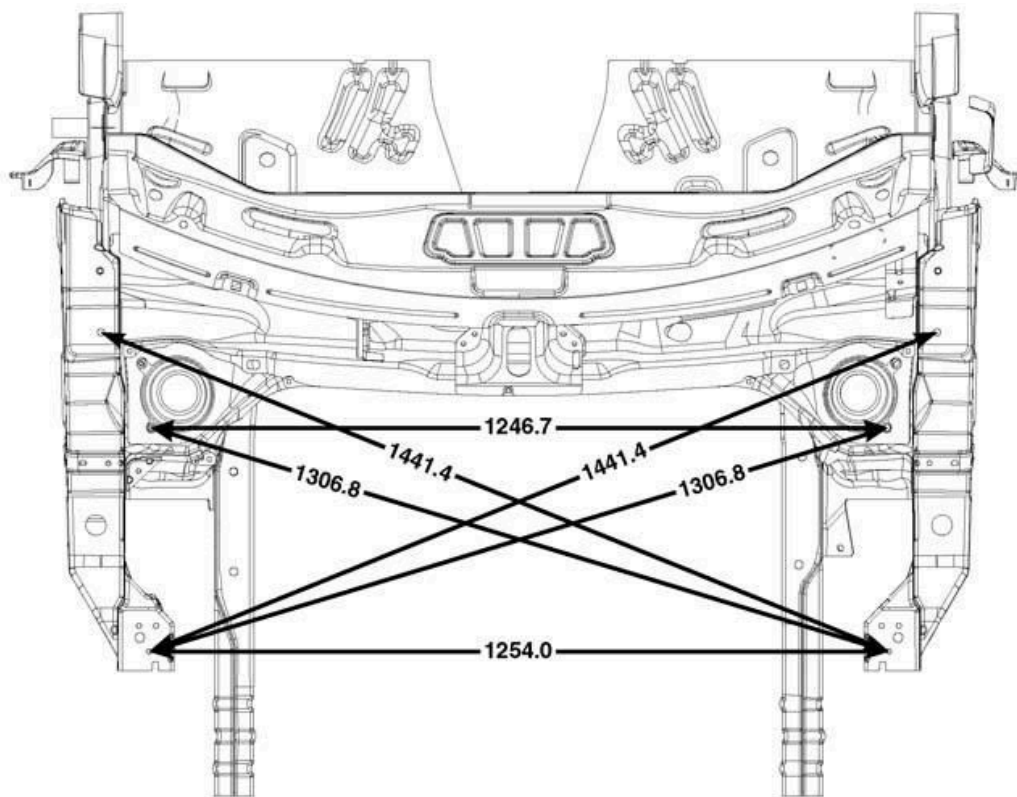
2014 Jeep Cherokee Trailhawk

2014 ACCESSORIES AND EQUIPMENT Frame and Bumpers - Cherokee



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Fig. 25: Figure 1 - Under Body Dimensions
Courtesy of CHRYSLER GROUP, LLC



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Fig. 26: Figure 2 - Under Hood Dimensions
Courtesy of CHRYSLER GROUP, LLC

CROSSMEMBER, FRONT SUSPENSION

REMOVAL

REMOVAL

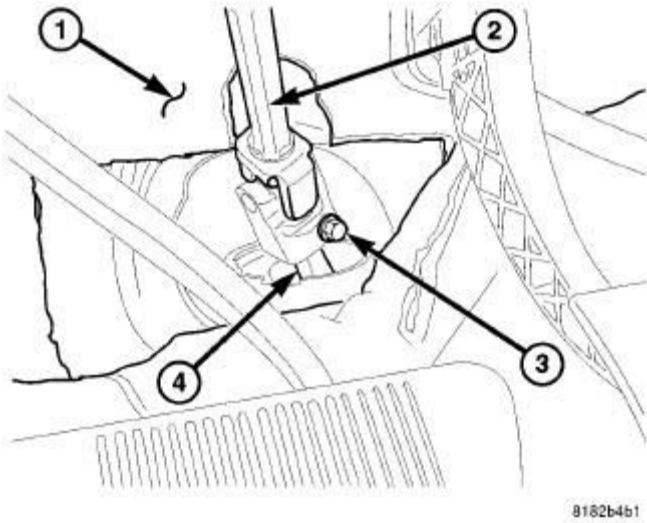


Fig. 27: Floor Carpet, Intermediate Shaft, Coupling Bolt & Steering Gear Pinion Shaft
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Before proceeding, refer to **FRONT, WARNING** .

1. Disconnect battery negative cable.
2. Using a steering wheel holder, lock the steering wheel in place to keep it from rotating. This keeps the clockspring in the proper orientation.
3. Remove pinch bolt (3) and separate intermediate shaft (2) from steering gear shaft.

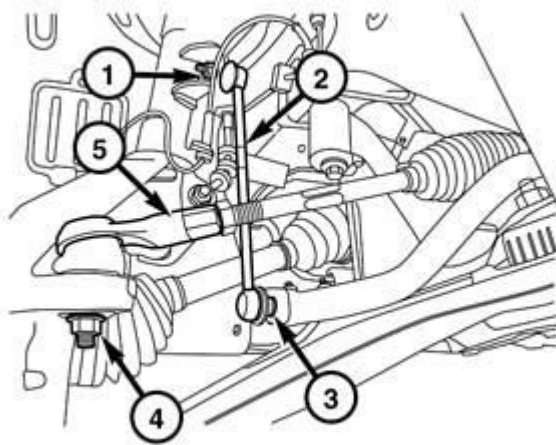


Fig. 28: Identifying Stabilizer Bar Link, Nuts & Ball Joint Nut
Courtesy of CHRYSLER GROUP, LLC

4. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
5. Remove the wheel mounting bolts, then the tire and wheel assembly.
6. If equipped, remove the engine belly pan. Refer to **BELLY PAN, REMOVAL**.
7. At each end of the stabilizer bar, while holding the stabilizer bar link stud stationary, remove the nut (3) securing the link (2) to the stabilizer bar and position aside.

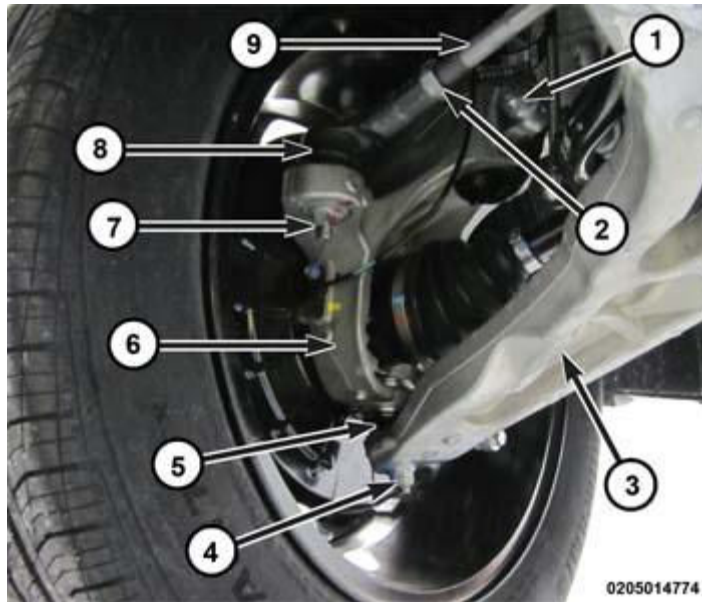
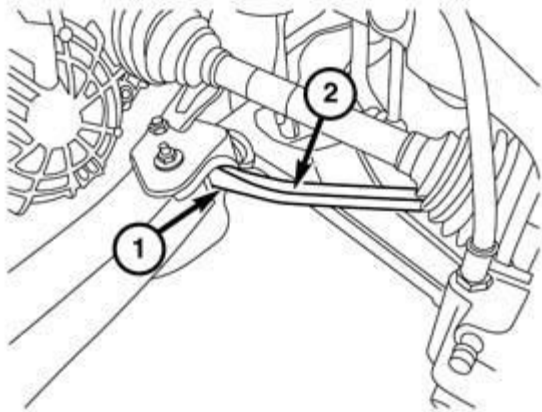


Fig. 29: Removing/Installing The Lower Ball Joint Nut To Control Arm
Courtesy of CHRYSLER GROUP, LLC

NOTE: Discard the ball joint retaining nut. Use a NEW nut when installing the ball joint.

8. Remove the ball joint to control arm retaining nut (4).
9. Remove the outer tie rod retaining nut (7) and separate the outer tie rod end (7) from the knuckle



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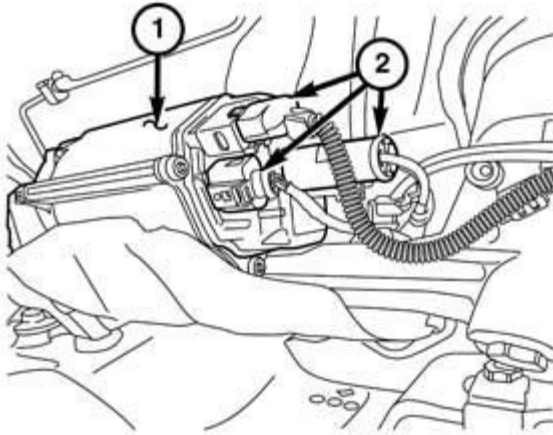
Fig. 30: Opening Between Control Arm Front Mounting Bolt & Front Fascia Support Beam & Pry Bar

Courtesy of CHRYSLER GROUP, LLC

NOTE: Use care when separating the ball joint stud from the knuckle so the ball joint boot does not get cut.

NOTE: After separating the control arm from the knuckle, do not let it swing rapidly back up, this can tear the ball joint dust boot.

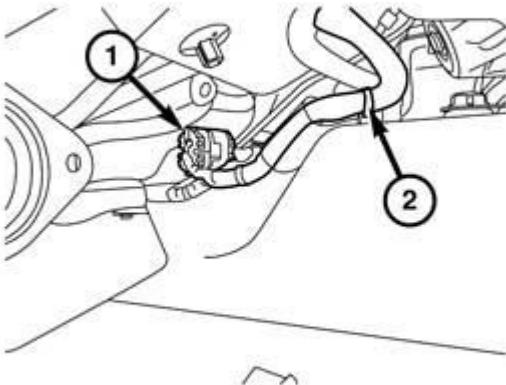
10. Insert a pry bar (2) in the opening (1) between the control arm front mounting bolt and the front fascia support beam.
11. Separate the lower control arm from the knuckle by prying down with the pry bar (2).
12. Remove the lower load beam. Refer to **LOAD BEAM, LOWER, REMOVAL**.



191069435

Fig. 31: Steering Gear Control Module & Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

13. Disconnect the downstream oxygen sensor harness connector.
14. Remove the exhaust extension pipe.
15. Disconnect the harness connectors (2) at the steering gear control module (1).



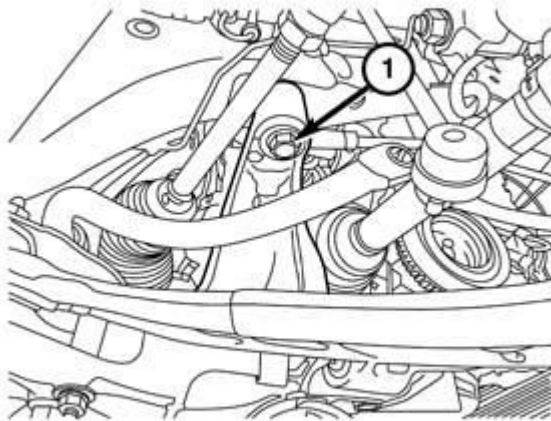
191069436

Fig. 32: Steering Gear Connector & Tie Strap
Courtesy of CHRYSLER GROUP, LLC

16. Disconnect the steering gear connector (1) from the body harness connector at the bottom of the dash panel.
17. Separate the steering gear harness from the crossmember by removing the tie strap (2) from the crossmember.
18. Remove the rear engine mount.

NOTE: Before lowering the front suspension crossmember, the location of the crossmember must be marked on the body of the vehicle. Do this so the crossmember can be relocated, upon reinstallation, against the body of vehicle in the same location as before removal. If the front suspension crossmember is not reinstalled in exactly the same location as before removal, the preset front wheel alignment settings (caster and camber) may be lost.

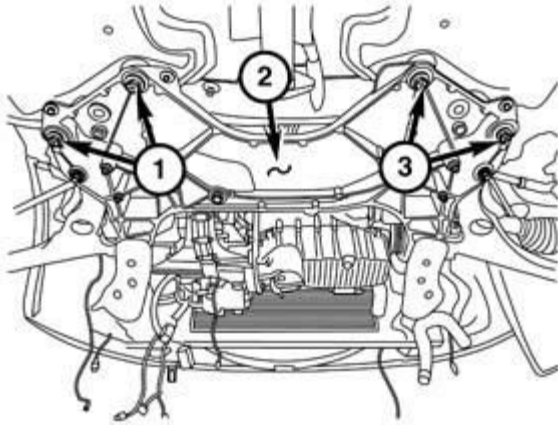
- 19.
20. Mark the position of the cross member with a grease pencil or equivalent.



020568633

Fig. 33: Upper Crossmember Mounting Bolt
Courtesy of CHRYSLER GROUP, LLC

21. Support the crossmember with a transmission jack, or equivalent.
22. Remove the upper mounting bolt (1) from each side of the crossmember.



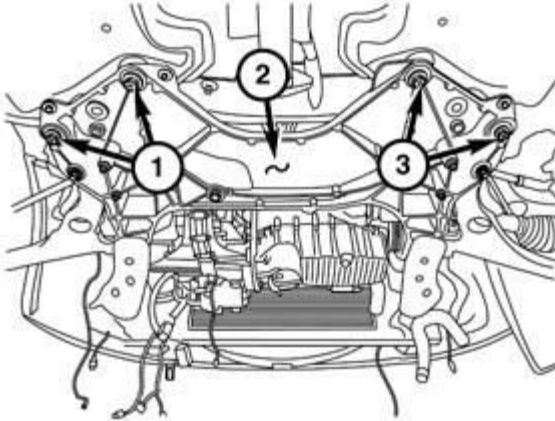
020568626

Fig. 34: Crossmember Rear Mounting Bolts
Courtesy of CHRYSLER GROUP, LLC

23. Remove the four rear mounting bolts (1, 3) that secure the crossmember (2) to the vehicle
24. Slowly lower the crossmember with the jack and remove from the vehicle.

INSTALLATION

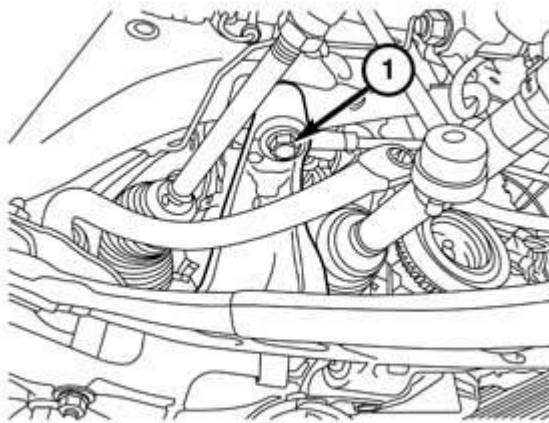
INSTALLATION



020568626

Fig. 35: Crossmember Rear Mounting Bolts
Courtesy of CHRYSLER GROUP, LLC

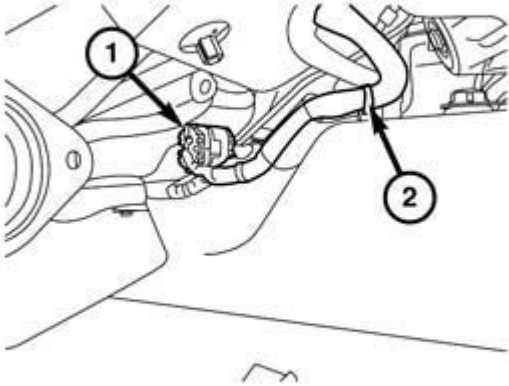
1. Slowly raise the crossmember (2) into mounted position using the transmission jack matching the crossmember to the marked locations on the body made during removal.
2. Install four mounting bolts (1, 3) and tighten to 189 N.m (139 ft lbs).



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Fig. 36: Upper Crossmember Mounting Bolt
Courtesy of CHRYSLER GROUP, LLC

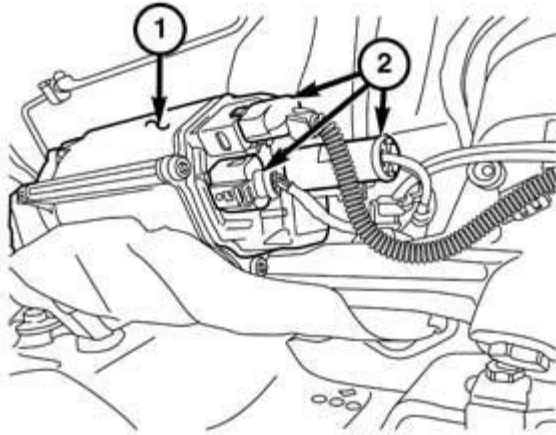
3. Install the upper mounting bolt (1) on each side of the crossmember and tighten to 120 N.m (86 ft lbs).



191069436

Fig. 37: Steering Gear Connector & Tie Strap
Courtesy of CHRYSLER GROUP, LLC

4. Connect the steering harness connector (1) to the body harness connector at the bottom of the dash panel.
5. Install the tie strap (2) to the crossmember.



191069435

Fig. 38: Steering Gear Control Module & Harness Connectors
 Courtesy of CHRYSLER GROUP, LLC

6. Connect the harness connectors (2) at the steering gear module (1).
7. Install the rear engine mount. Refer to **INSULATOR, ENGINE MOUNT, RIGHT, INSTALLATION** for 2.0L Diesel, **INSULATOR, ENGINE MOUNT, LEFT, INSTALLATION** for 2.0L Diesel, **INSULATOR, ENGINE MOUNT, REAR, INSTALLATION** for 2.0L Diesel, **INSULATOR, ENGINE MOUNT, LEFT, INSTALLATION** for 2.4L, **INSULATOR, ENGINE MOUNT, REAR, INSTALLATION** for 2.4L, **INSULATOR, ENGINE MOUNT, RIGHT, INSTALLATION** for 2.4L, **INSULATOR, ENGINE MOUNT, LEFT, INSTALLATION** for 3.2L, **INSULATOR, ENGINE MOUNT, RIGHT, INSTALLATION** for 3.2L, **INSULATOR, ENGINE MOUNT, REAR, INSTALLATION** for 3.2L.
8. Install the exhaust extension pipe.
9. Connect the downstream oxygen sensor harness connector.
10. Install the lower load beams (1). Refer to **LOAD BEAM, LOWER, INSTALLATION**.

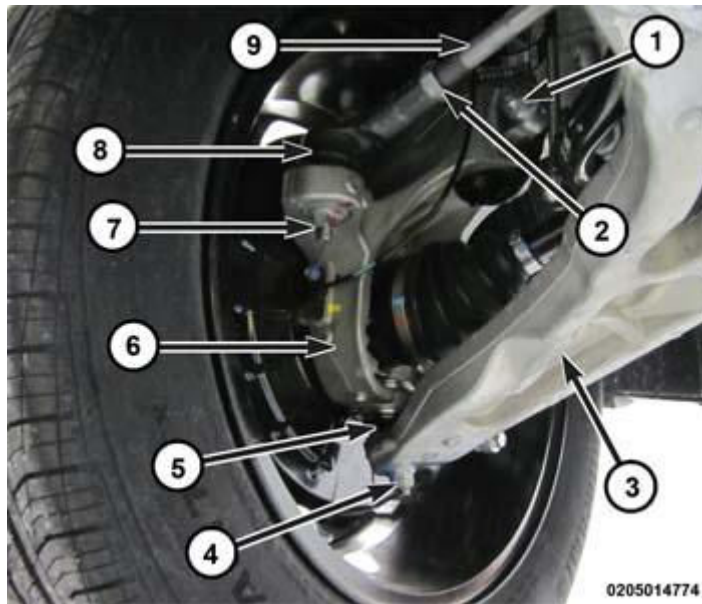
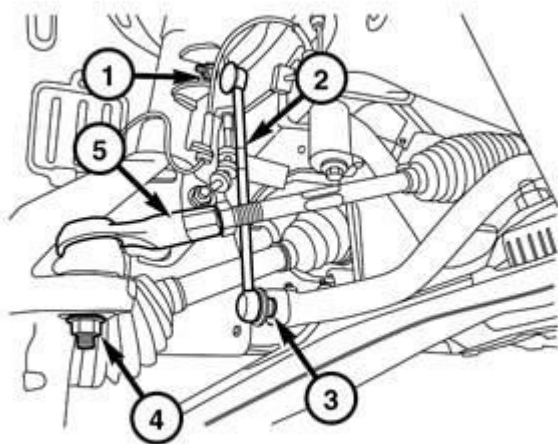


Fig. 39: Removing/Installing The Lower Ball Joint Nut To Control Arm
Courtesy of CHRYSLER GROUP, LLC

11. Insert the lower ball joint into the control arm, install a **NEW** nut (4) and tighten to 25 N.m Plus 175° (18 ft lbs Plus 175°).
12. Install the outer tie rod end (8) into the knuckle and install a **NEW** retaining nut (7) and tighten to 25 N.m Plus 80° (18 ft lbs Plus 80°).



1715005814

Fig. 40: Identifying Stabilizer Bar Link, Nuts & Ball Joint Nut
Courtesy of CHRYSLER GROUP, LLC

13. Install the stabilizer link stud into the stabilizer bar and install the nut.
14. Hold the stabilizer link stud stationary and tighten the nut to 63 N.m (46 ft lbs).

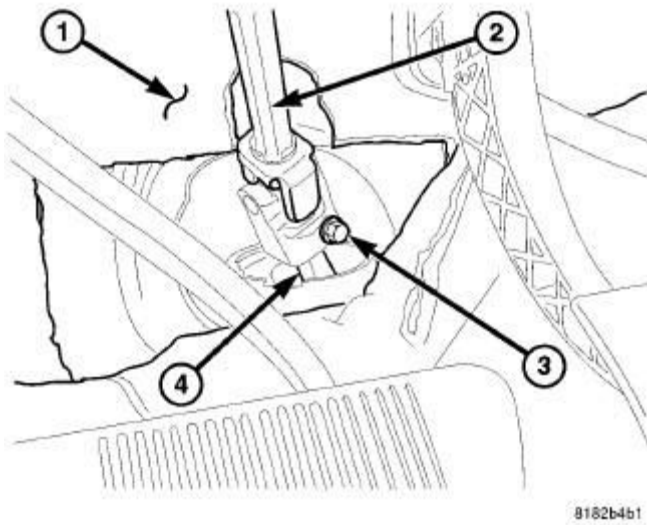


Fig. 41: Floor Carpet, Intermediate Shaft, Coupling Bolt & Steering Gear Pinion Shaft
 Courtesy of CHRYSLER GROUP, LLC

15. If equipped, install the engine belly pan. Refer to **BELLY PAN, INSTALLATION**.
16. Install the tire and wheel assembly. Refer to **INSTALLATION**.
17. Lower the vehicle.
18. Install the intermediate shaft (2) to the steering gear pinion shaft (4).
19. Install a **NEW** pinch bolt (3) and tighten to specification. Refer to **COLUMN, SPECIFICATIONS**.
20. Remove the steering wheel holder.
21. Connect the battery negative cable.
22. Check and adjust wheel alignment as necessary. Refer to **FRONT SUSPENSION & WHEEL ALIGNMENT**.

CROSSMEMBER, REAR SUSPENSION

REMOVAL

REMOVAL

ALL WHEEL DRIVE

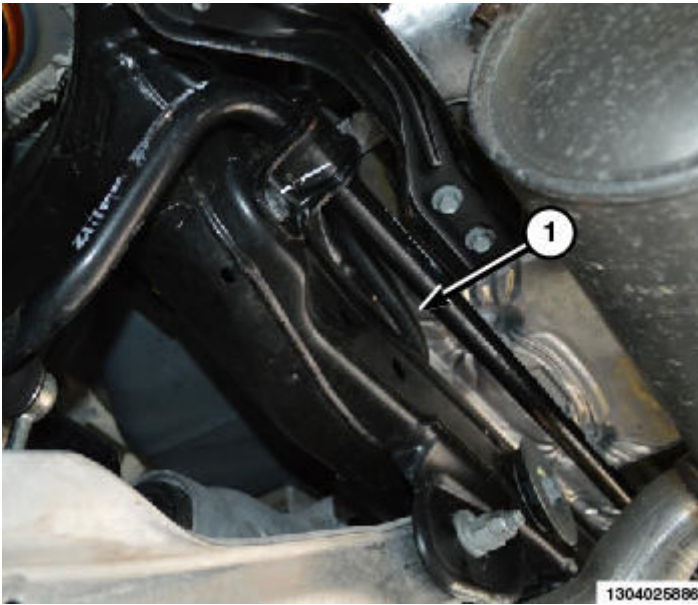


Fig. 42: Identifying Rear Suspension Crossmember (All Wheel Drive)
Courtesy of CHRYSLER GROUP, LLC

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove the muffler. Refer to **MUFFLER, EXHAUST, REMOVAL** .
3. Remove the rear stabilizer bar. Refer to **STABILIZER BAR, REAR SUSPENSION, REMOVAL** .
4. Remove the rear driveline module. Refer to **REMOVAL** .
5. Remove the remaining knuckle. Refer to **KNUCKLE, REAR, REMOVAL** .
6. Separate the vent tube from the crossmember.

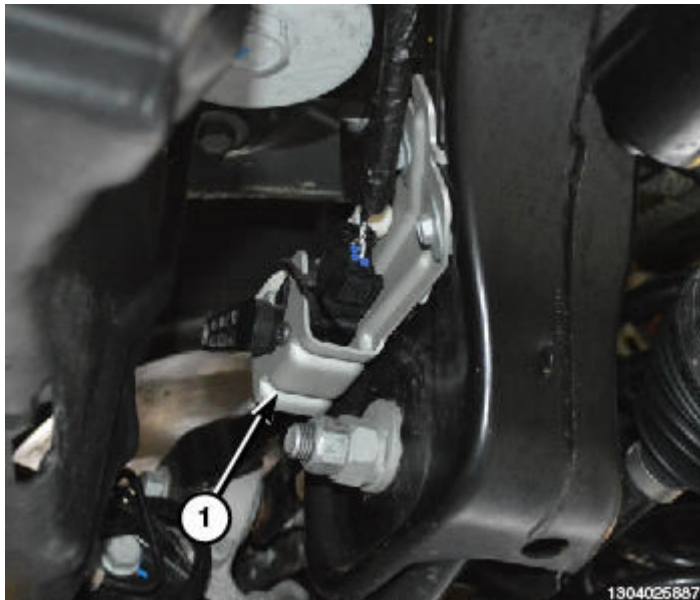


Fig. 43: Identifying Ride Height Sensor
Courtesy of CHRYSLER GROUP, LLC

7. Remove the ride height sensor (1), if equipped.

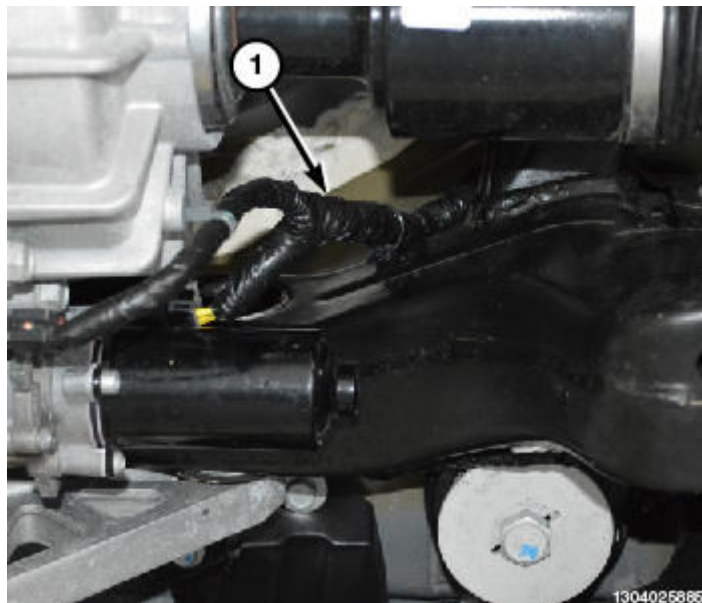


Fig. 44: Identifying Wire Harness From Crossmember
Courtesy of CHRYSLER GROUP, LLC

8. Separate the wire harness (1) from the crossmember.

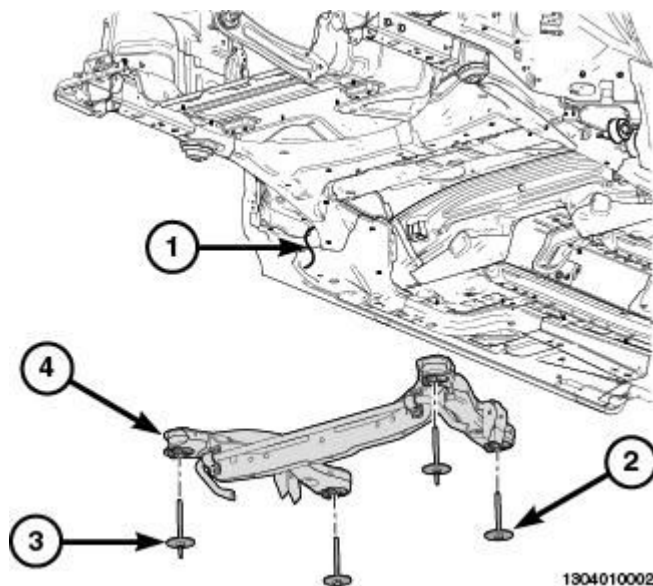


Fig. 45: Identifying Rear Crossmember & Mounting Bolts
Courtesy of CHRYSLER GROUP, LLC

9. Remove the rear crossmember mounting bolts (2, 3) and remove the rear crossmember (4) from the vehicle (1).
10. If necessary, remove the spring links. Refer to **LINK, CAMBER, REMOVAL** , **LINK, TOE,**

REMOVAL and LINK, SPRING, REMOVAL .

11. If necessary, remove the bushings. Refer to **ISOLATOR, REAR CROSSMEMBER, DIFFERENTIAL, REMOVAL** and **ISOLATOR, REAR CROSSMEMBER, FRAME, REMOVAL**.

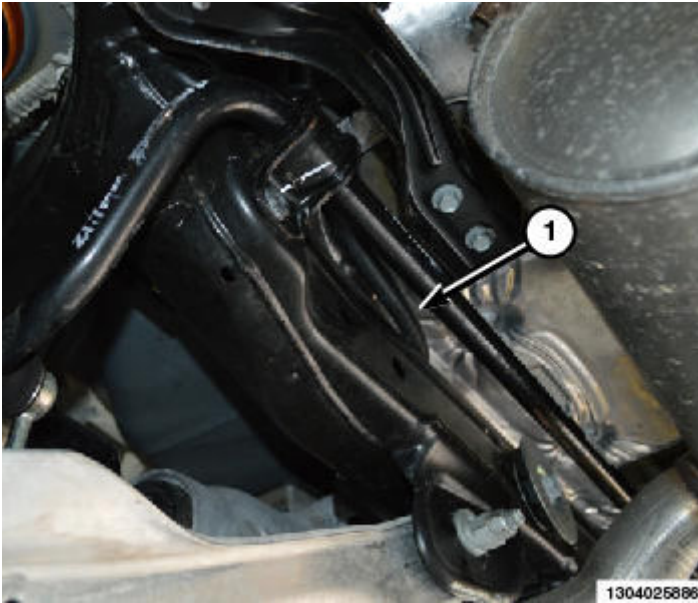
FRONT WHEEL DRIVE

Fig. 46: Identifying Rear Suspension Crossmember (All Wheel Drive)

Courtesy of CHRYSLER GROUP, LLC

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove both rear knuckles. Refer to **KNUCKLE, REAR, REMOVAL** .
3. Remove the muffler. Refer to **MUFFLER, EXHAUST, REMOVAL** .
4. Remove the rear stabilizer bar. Refer to **STABILIZER BAR, REAR SUSPENSION, REMOVAL** .
5. Separate the vent tube from the crossmember.

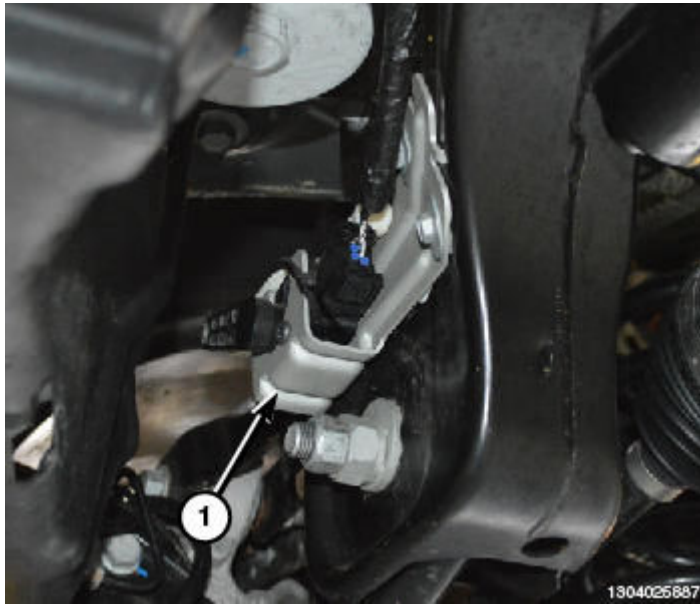


Fig. 47: Identifying Ride Height Sensor
Courtesy of CHRYSLER GROUP, LLC

6. Remove the ride height sensor, if equipped.

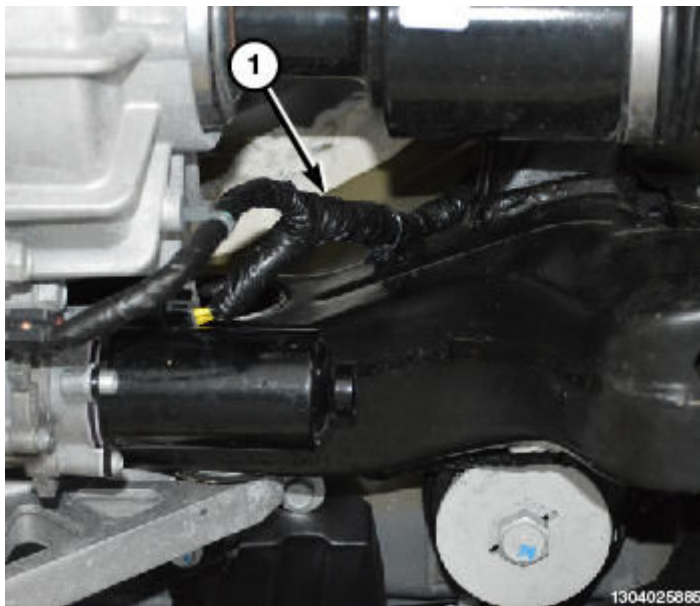


Fig. 48: Identifying Wire Harness From Crossmember
Courtesy of CHRYSLER GROUP, LLC

7. Separate the wire harness from the crossmember.

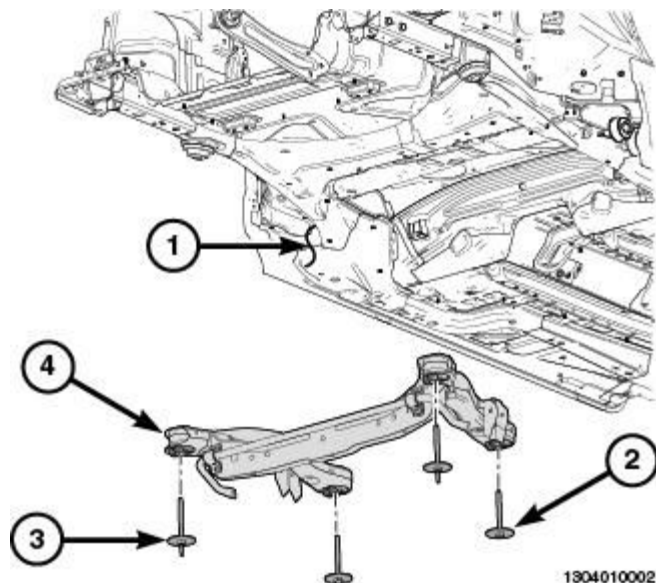


Fig. 49: Identifying Rear Crossmember & Mounting Bolts
Courtesy of CHRYSLER GROUP, LLC

8. Remove the rear crossmember mounting bolts (2, 3) and remove the rear crossmember (4) from the vehicle.
9. If necessary, remove the spring links. Refer to **LINK, CAMBER, REMOVAL** , **LINK, TOE, REMOVAL** and **LINK, SPRING, REMOVAL** .
10. If necessary, remove the bushings. Refer to **ISOLATOR, REAR CROSSMEMBER, DIFFERENTIAL, REMOVAL** and **ISOLATOR, REAR CROSSMEMBER, FRAME, REMOVAL**.

INSTALLATION

INSTALLATION

ALL WHEEL DRIVE

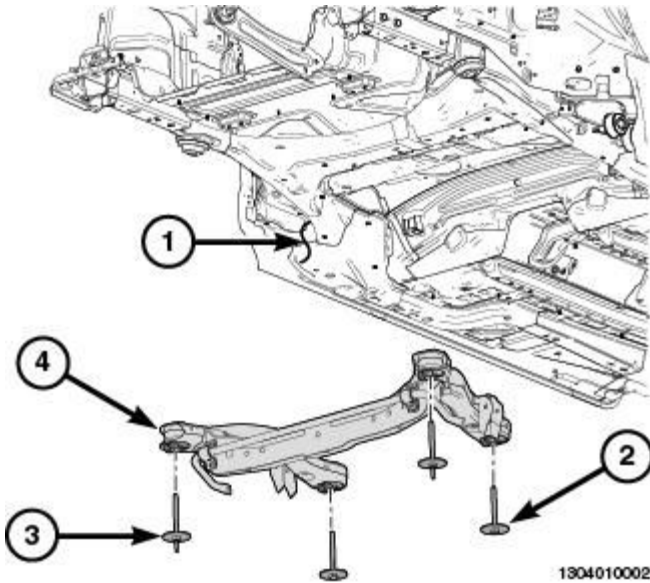


Fig. 50: Identifying Rear Crossmember & Mounting Bolts
Courtesy of CHRYSLER GROUP, LLC

1. If necessary, install the bushings. Refer to **ISOLATOR, REAR CROSSMEMBER, DIFFERENTIAL, INSTALLATION** and **ISOLATOR, REAR CROSSMEMBER, FRAME, INSTALLATION**.
2. If necessary, install the spring links. Refer to **LINK, CAMBER, INSTALLATION** , **LINK, TOE, INSTALLATION** and **LINK, SPRING, INSTALLATION** .
3. Install the rear crossmember (2) to the body and install the mounting bolts (1, 3) and tighten to 150 N.m (111 ft. lbs.).
4. Install the rear stabilizer bar. Refer to **STABILIZER BAR, REAR SUSPENSION, INSTALLATION** .

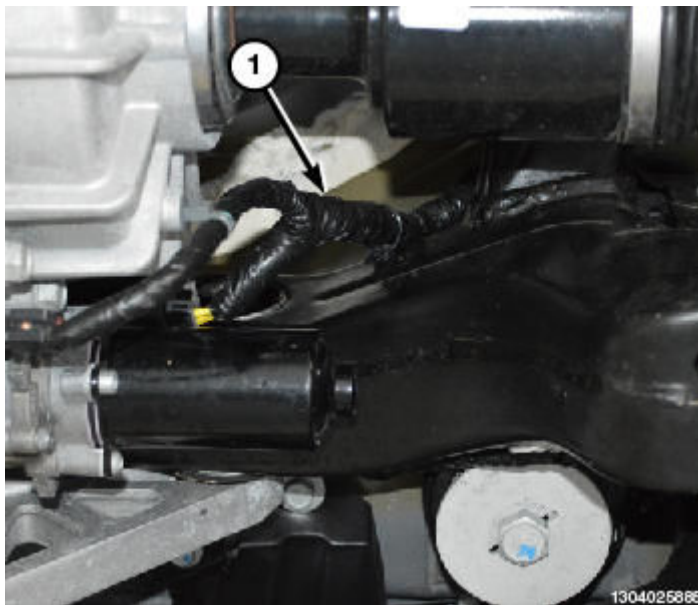


Fig. 51: Identifying Wire Harness From Crossmember
Courtesy of CHRYSLER GROUP, LLC

5. Connect the wire harness (1) to the crossmember.

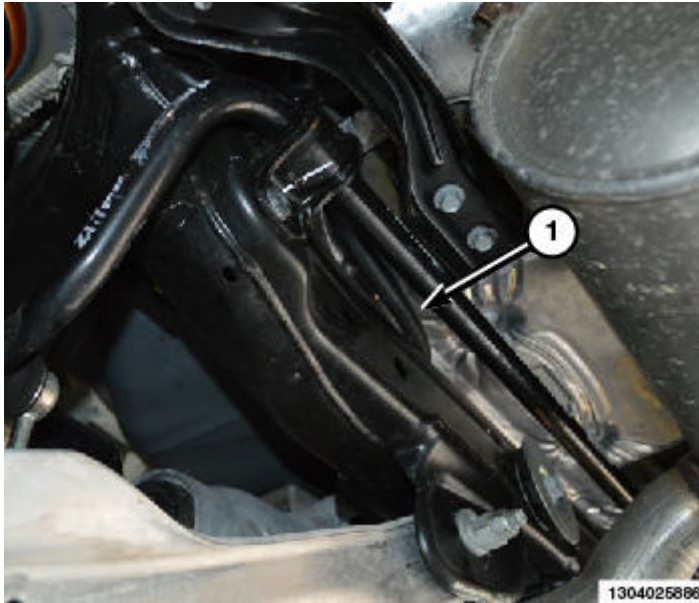


Fig. 52: Identifying Rear Suspension Crossmember (All Wheel Drive)
Courtesy of CHRYSLER GROUP, LLC

6. Connect the vent tube (1) to the crossmember.

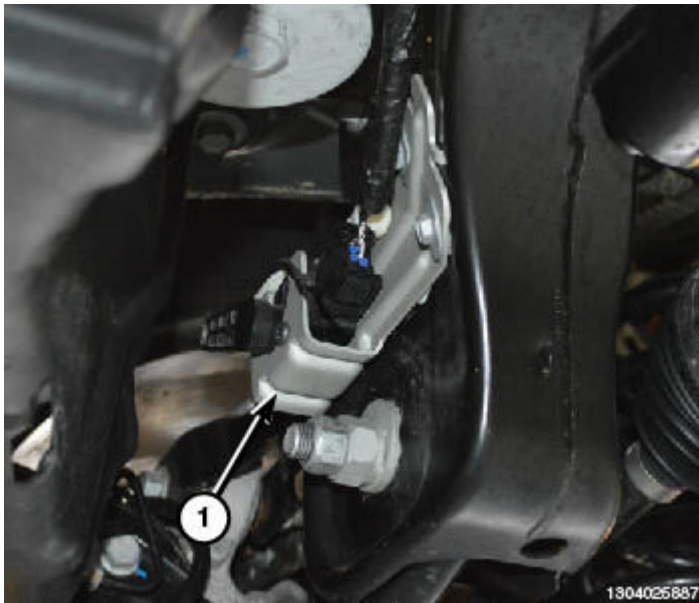


Fig. 53: Identifying Ride Height Sensor
Courtesy of CHRYSLER GROUP, LLC

7. Install the ride height sensor (1), if equipped.
8. Install the rear driveline module. Refer to **INSTALLATION** .

9. Install the knuckles as necessary. Refer to **KNUCKLE, REAR, INSTALLATION** .
10. Install the exhaust to the vehicle. Refer to **MUFFLER, EXHAUST, INSTALLATION** .
11. Lower the vehicle and tighten the following fasteners with the vehicle at normal ride height:
 - Lower transversal link to rear crossmember: 90 N.m (66 ft. lbs.) Plus 45°.
 - Upper transversal link to rear crossmember: 90 N.m (66 ft. lbs.) Plus 45°.
 - Upper transversal link to lower control arm: 80 N.m (59 ft. lbs.) Plus 45°.
12. Perform a wheel alignment. Refer to **WHEEL ALIGNMENT, STANDARD PROCEDURE** then tighten the lower transversal link to lower control arm bolt to 130 N.m (96 ft. lbs.).

FRONT WHEEL DRIVE

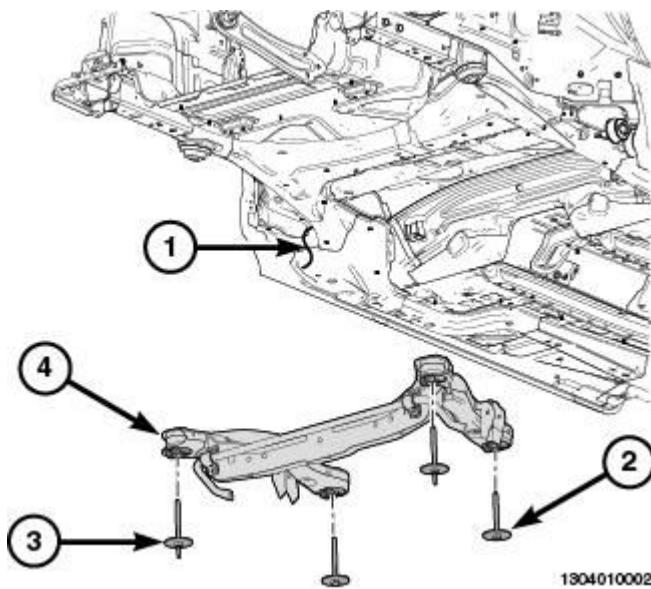


Fig. 54: Identifying Rear Crossmember & Mounting Bolts
Courtesy of CHRYSLER GROUP, LLC

1. If necessary, install the bushings. Refer to **ISOLATOR, REAR CROSSMEMBER, DIFFERENTIAL, INSTALLATION** and **ISOLATOR, REAR CROSSMEMBER, FRAME, INSTALLATION**.
2. If necessary, install the spring links. Refer to **LINK, CAMBER, INSTALLATION** , **LINK, TOE, INSTALLATION** and **LINK, SPRING, INSTALLATION** .
3. Install the rear crossmember (2) to the body and install the mounting bolts (1, 3) and tighten to 150 N.m (111 ft. lbs.).
4. Install the rear stabilizer bar. Refer to **STABILIZER BAR, REAR SUSPENSION, INSTALLATION** .

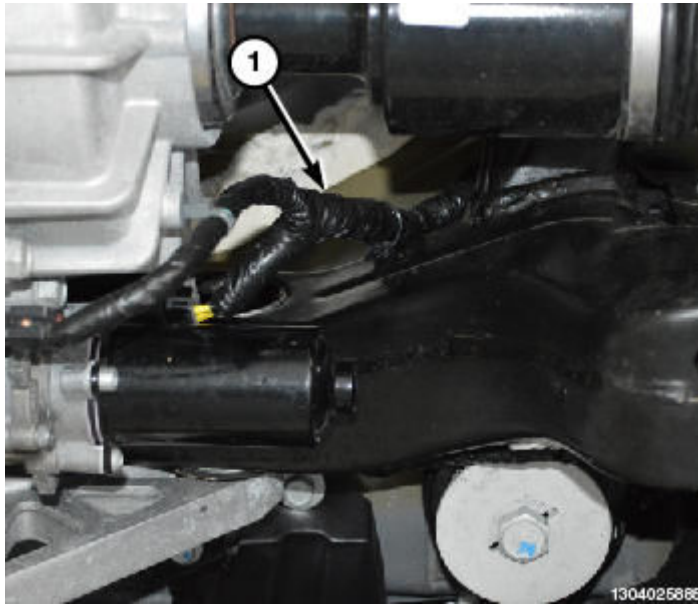


Fig. 55: Identifying Wire Harness From Crossmember
Courtesy of CHRYSLER GROUP, LLC

5. Connect the wire harness (1) to the crossmember.

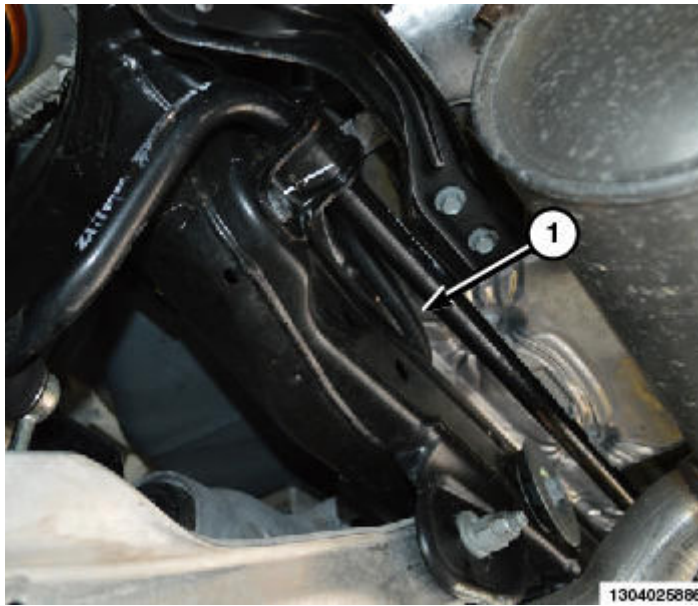


Fig. 56: Identifying Rear Suspension Crossmember (All Wheel Drive)
Courtesy of CHRYSLER GROUP, LLC

6. Connect the vent tube (1) to the crossmember.

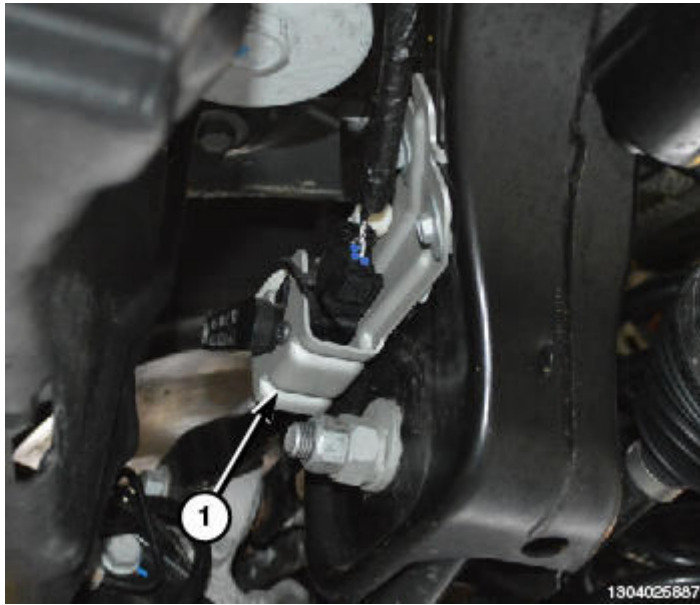


Fig. 57: Identifying Ride Height Sensor
Courtesy of CHRYSLER GROUP, LLC

7. Install the ride height sensor (1), if equipped.
8. Install the knuckles as necessary. Refer to **KNUCKLE, REAR, INSTALLATION** .
9. Install the exhaust to the vehicle. Refer to **MUFFLER, EXHAUST, INSTALLATION** .
10. Lower the vehicle and tighten the following fasteners with the vehicle at normal ride height:
 - Lower transversal link to rear crossmember: 90 N.m (66 ft. lbs.) Plus 45°.
 - Upper transversal link to rear crossmember: 90 N.m (66 ft. lbs.) Plus 45°.
 - Upper transversal link to lower control arm: 80 N.m (59 ft. lbs.) Plus 45°.
11. Perform a wheel alignment. Refer to **WHEEL ALIGNMENT, STANDARD PROCEDURE** then tighten the lower transversal link to lower control arm bolt to 130 N.m (96 ft. lbs.).

HITCH, TRAILER

REMOVAL

REMOVAL

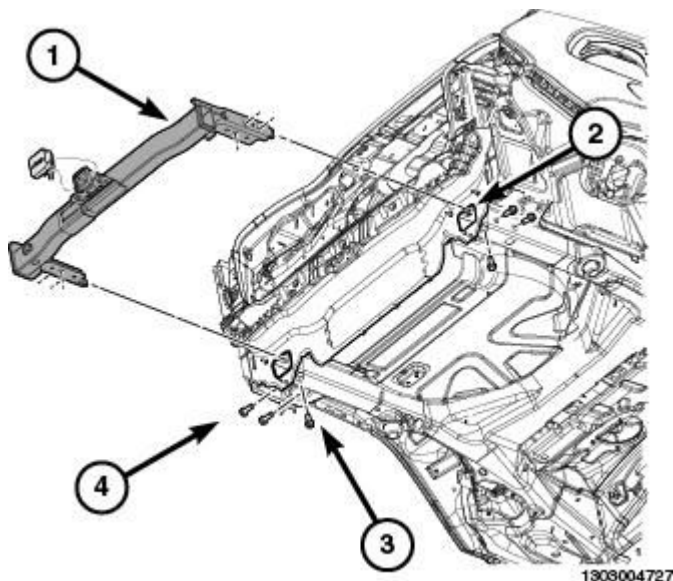


Fig. 58: Identifying Rear Fascia, Trailer Hitch & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Remove the rear fascia. Refer to **FASCIA, REAR, REMOVAL**.
2. Remove the bolts (3, 4) and remove the hitch (1).

INSTALLATION

INSTALLATION

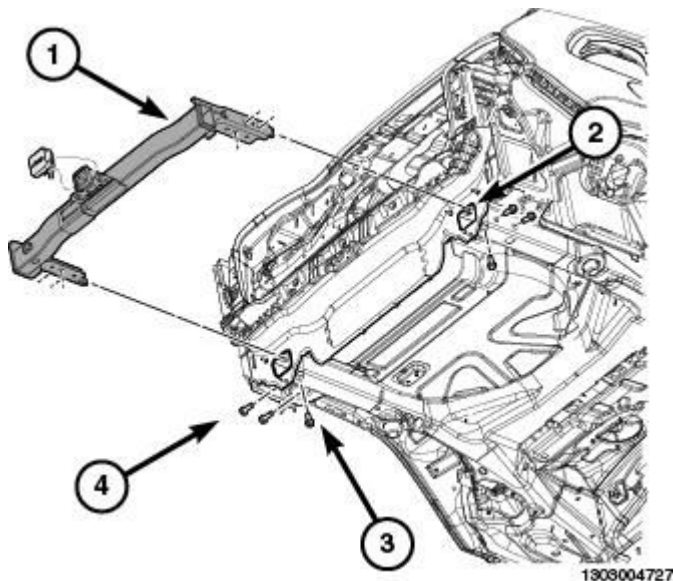


Fig. 59: Identifying Rear Fascia, Trailer Hitch & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Position the hitch (1) back into the frame openings (2).

2. Install the bolts (3, 4) and tighten to 165 N.m (122 ft. lbs.)

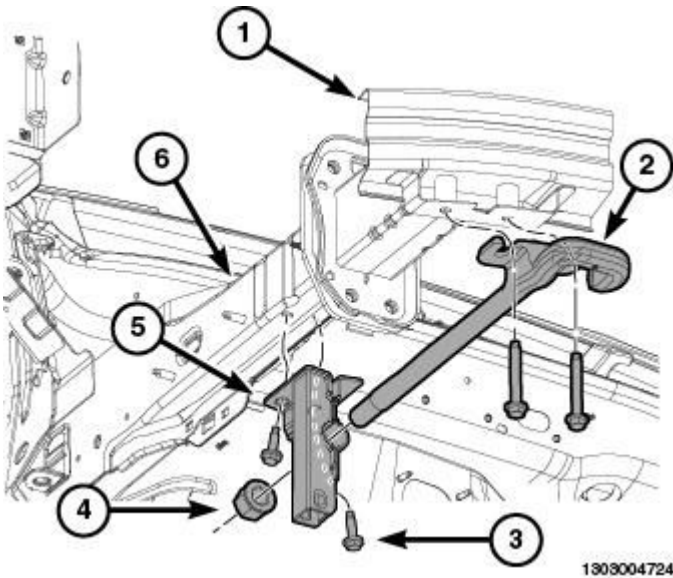
HOOK(S), TOW, FRONT**REMOVAL****REMOVAL**

Fig. 60: Identifying Front Tow Hook, Bracket & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Remove the bolts and remove the nut (4).
2. Remove the tow hook (2)
3. Remove the bolts (5) and remove the bracket.

INSTALLATION**INSTALLATION**

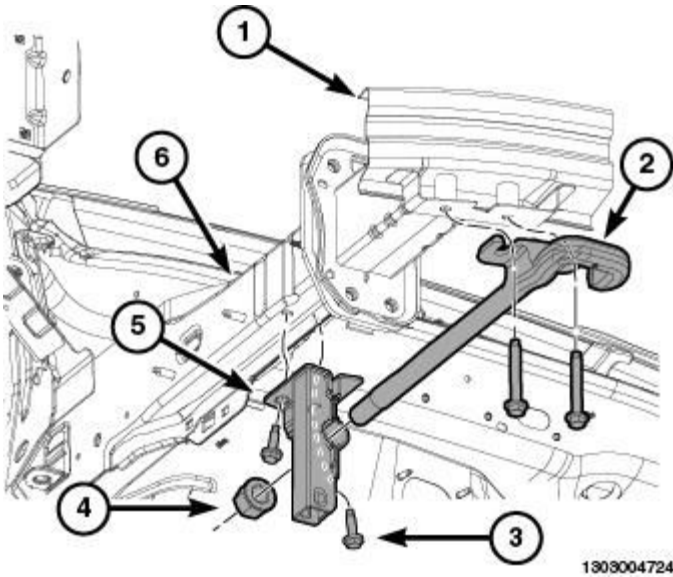


Fig. 61: Identifying Front Tow Hook, Bracket & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Install the bracket (5) and install the bolts (3)
2. Install the hook (2).
3. Install the bolts and install the nut (4).

HOOK(S), TOW, REAR

REMOVAL

REMOVAL

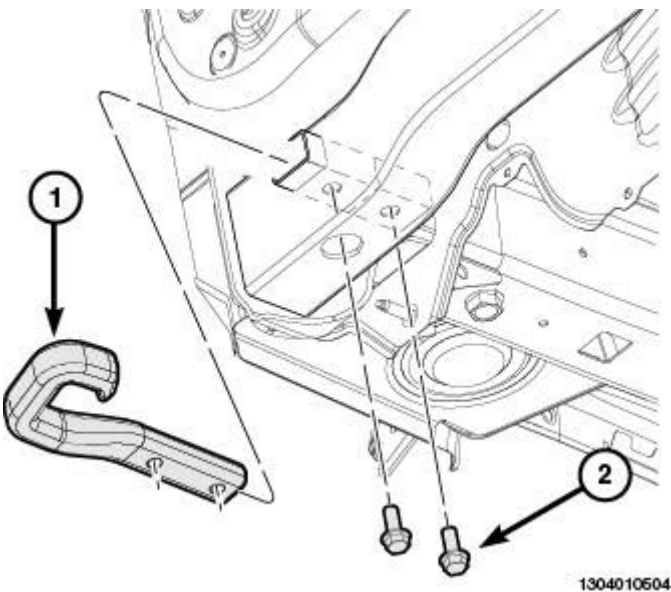


Fig. 62: Identifying Rear Tow Hook & Bolts

Courtesy of CHRYSLER GROUP, LLC

1. Remove the bolts (2) and remove the hook (1).

INSTALLATION

INSTALLATION

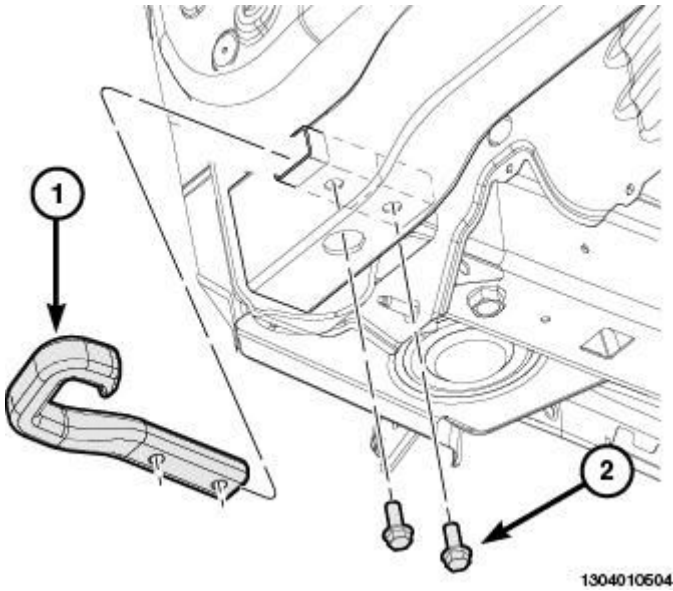


Fig. 63: Identifying Rear Tow Hook & Bolts

Courtesy of CHRYSLER GROUP, LLC

1. Install the hook (1) and install the bolts (2).

ISOLATOR, REAR CROSSMEMBER, DIFFERENTIAL

REMOVAL

REMOVAL

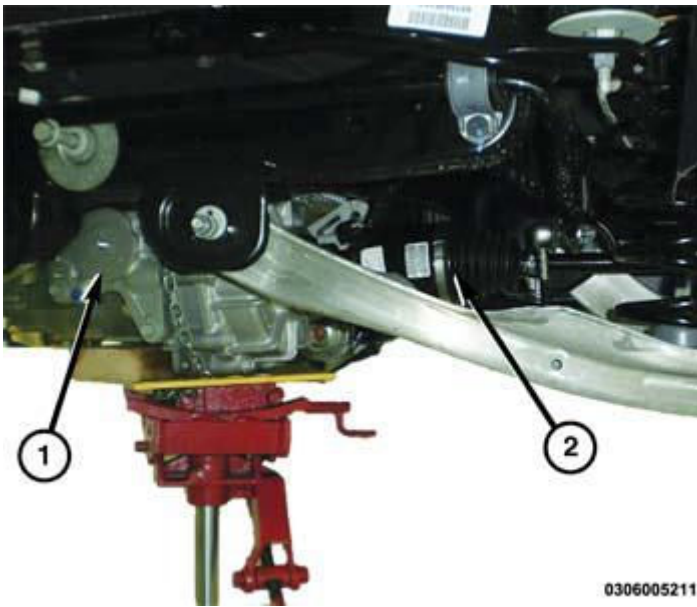


Fig. 64: Installing The Half Shaft Onto The Rear Drive Module
Courtesy of CHRYSLER GROUP, LLC

1. Remove the rear differential (1) as necessary to gain enough access to the differential support isolators. Refer to **REMOVAL**.

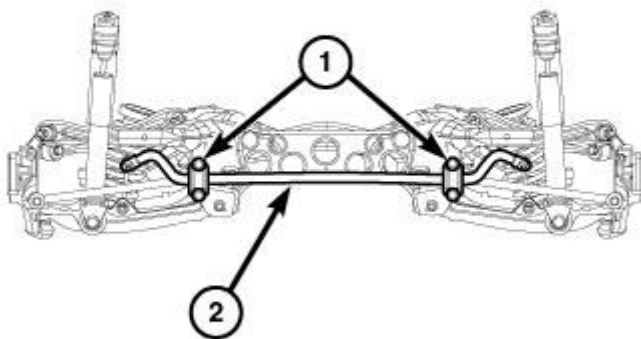
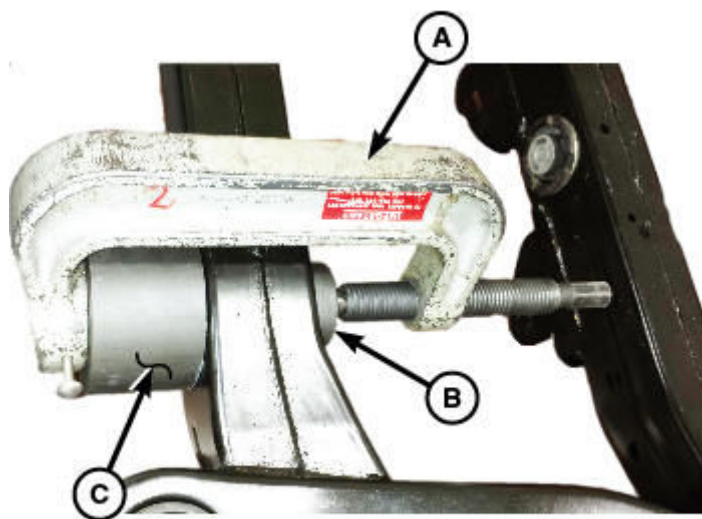


Fig. 65: Bolts & Stabilizer Bar
Courtesy of CHRYSLER GROUP, LLC

2. Remove the bolts (1) and lower the stabilizer bar (2).



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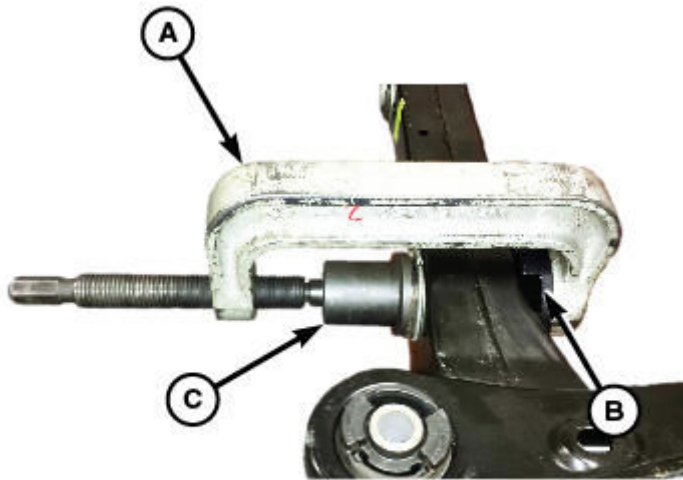
Fig. 66: Identifying Special Tools Over Isolator Crossmember Assembly
Courtesy of CHRYSLER GROUP, LLC

NOTE: Prior to using special tools, lubricate Press, Ball Joint: C-4212F (A) threads to provide ease of use and promote tool longevity.

3. Assemble tools over isolator crossmember assembly as shown:
 1. (special tool #C-4212F, Press, Ball Joint)
 2. (special tool #8858-6, Remover)
 3. (special tool #8861-2, Receiver, Ball Joint)
4. Tighten Press, Ball Joint C-4212F (1) screw-drive, pressing isolator out of the crossmember.

INSTALLATION

INSTALLATION

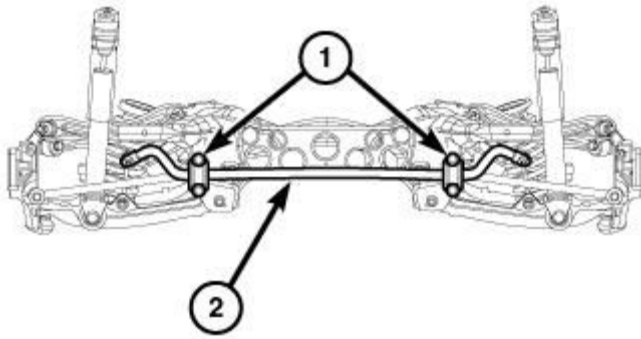


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Fig. 67: Identifying Special Tools Over Isolator Crossmember Assembly
Courtesy of CHRYSLER GROUP, LLC

NOTE: Prior to using special tools, lubricate Press, Ball Joint: C-4212F (3) threads to provide ease of use and promote tool longevity.

1. Assemble tools over isolator crossmember assembly as shown:
 1. (special tool #C-4212F, Press, Ball Joint)
 2. (special tool #9031-4, Installer, Bushing)
 3. Pusher 9958-3 of (special tool #9958, Remover/Installer, Axle Bushing)
2. Tighten Press, Ball Joint C-4212F (A) screw-drive, pressing isolator into crossmember. Install isolator until isolator can flange contacts surface of crossmember.
3. Remove the tools.



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Fig. 68: Bolts & Stabilizer Bar

Courtesy of CHRYSLER GROUP, LLC

4. Position the stabilizer bar (2) and install the upper and lower stabilizer bar to cradle bolts (1) and tighten to 110 N.m (81 ft. lbs.).
5. Install the rear differential. Refer to **INSTALLATION** .

ISOLATOR, REAR CROSSMEMBER, FRAME

REMOVAL

REMOVAL

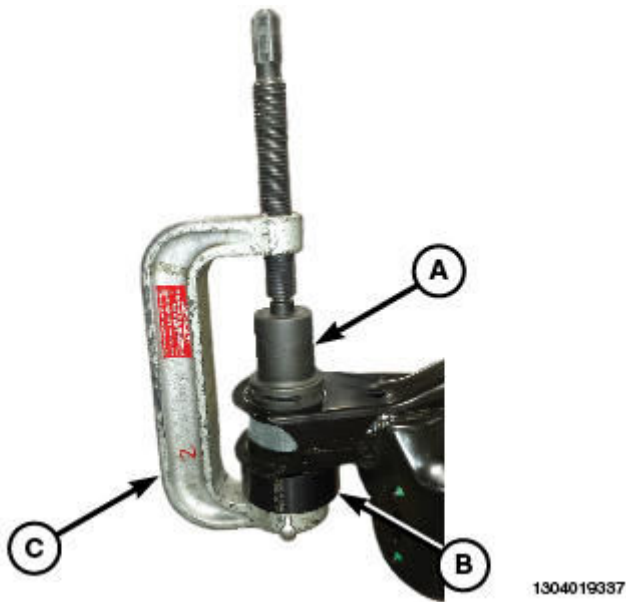


Fig. 69: Identifying Special Tools Over Isolator Crossmember Assembly
Courtesy of CHRYSLER GROUP, LLC

1. Remove the rear crossmember. Refer to **CROSSMEMBER, FRONT SUSPENSION, REMOVAL** and **CROSSMEMBER, REAR SUSPENSION, REMOVAL**.

NOTE: Prior to using special tools, lubricate Press, Ball Joint: C-4212F (3) threads to provide ease of use and promote tool longevity.

2. Assemble tools over isolator crossmember assembly as shown:
 - a. (special tool #9958-3, Installer, Bushing)
 - b. (special tool #10106-2, Receiver, Depth Setting)
 - c. (special tool #C-4212F, Press, Ball Joint)
3. Tighten Press, Ball Joint C-4212F (c) screw-drive, pressing isolator out of the crossmember.

INSTALLATION

INSTALLATION

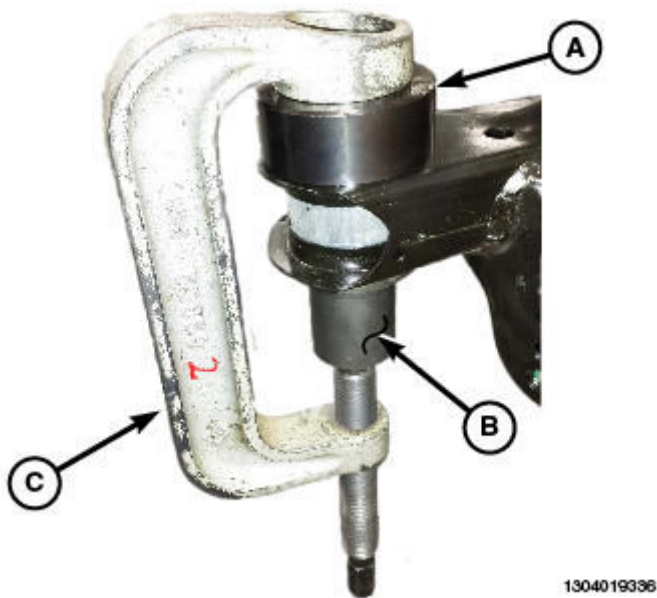


Fig. 70: Installing Isolator On Crossmember Using Special Tools
 Courtesy of CHRYSLER GROUP, LLC

1. Position isolator (1) on crossmember (2) isolator bore.

NOTE: Prior to using special tools, lubricate Press, Ball Joint (3) threads to provide ease of use and promote tool longevity.

2. Assemble tools over isolator as shown:
 1. (special tool #10106-2, Receiver, Depth Setting)
 2. (special tool #9958-3, Installer, Bushing)
 3. (special tool #C-4212F, Press, Ball Joint)
3. Tighten Press, Ball Joint screw-drive, pressing isolator (5) into crossmember (4). Install isolator until isolator can flange contacts surface of crossmember.
4. Remove tools.
5. Install the rear suspension crossmember. Refer to **CROSSMEMBER, FRONT SUSPENSION, INSTALLATION** and **CROSSMEMBER, REAR SUSPENSION, INSTALLATION**.

LOAD BEAM, LOWER

REMOVAL

REMOVAL

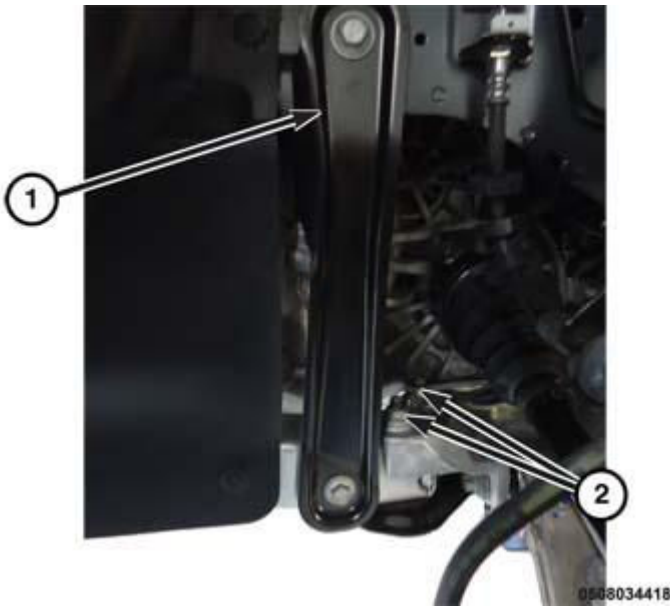


Fig. 71: Identifying Vertical Bracket & Nuts
Courtesy of CHRYSLER GROUP, LLC

1. Remove the front fascia. Refer to **FASCIA, FRONT, REMOVAL**.
2. Remove the vertical bracket (1) from the side of the lower load beam.

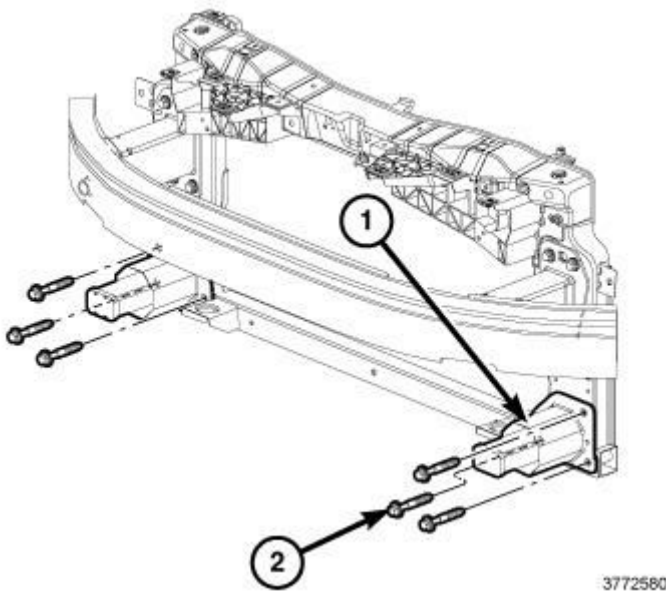


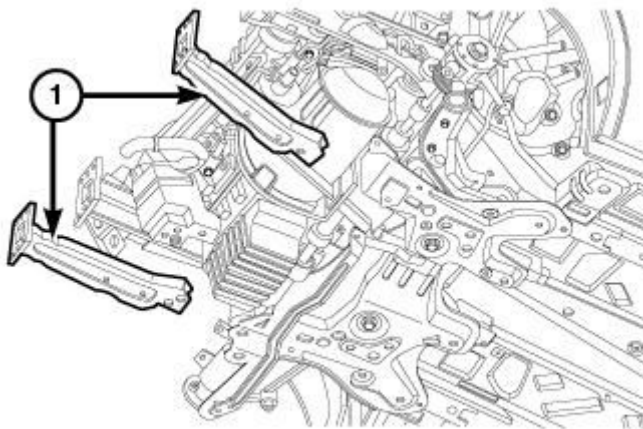
Fig. 72: Lower Bumper Reinforcements & Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Remove the bolts (2) and the lower load beam extensions (1).



Fig. 73: Identifying Lower Load Beam Bracket
Courtesy of CHRYSLER GROUP, LLC

4. Remove the four bolts and the lower load beam bracket (1).



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Fig. 74: Front Fascia Support Beams
Courtesy of CHRYSLER GROUP, LLC

5. Remove the lower load beams (1).

INSTALLATION

INSTALLATION



Fig. 75: Identifying Lower Load Beam Bracket
Courtesy of CHRYSLER GROUP, LLC

1. Position a lower load beam on the vehicle and install the lower load beam bracket (1) and bolts. Repeat for both lower load beams.

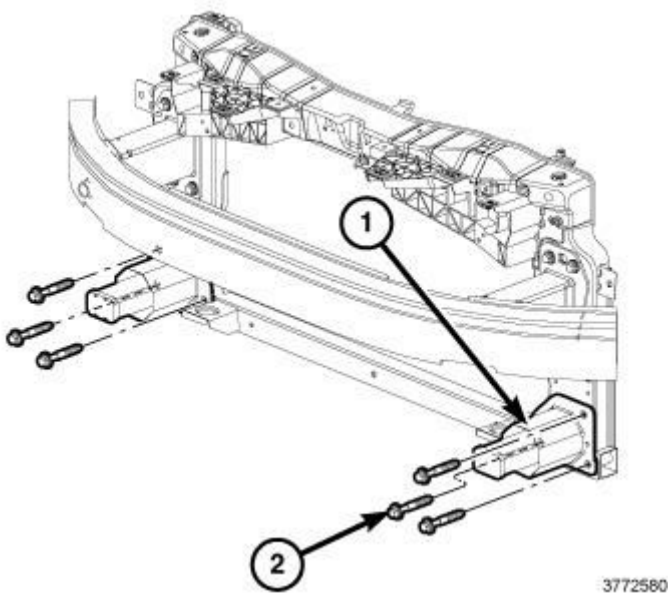


Fig. 76: Lower Bumper Reinforcements & Fasteners
Courtesy of CHRYSLER GROUP, LLC

2. Position the lower load beam extensions (1) and install the bolts (2).
3. Tighten the lower load beam extension bolts (2) to specification. Refer to **SPECIFICATIONS**.
4. Tighten the lower load beam bracket bolts to specification. Refer to **FRAME, SPECIFICATIONS**.

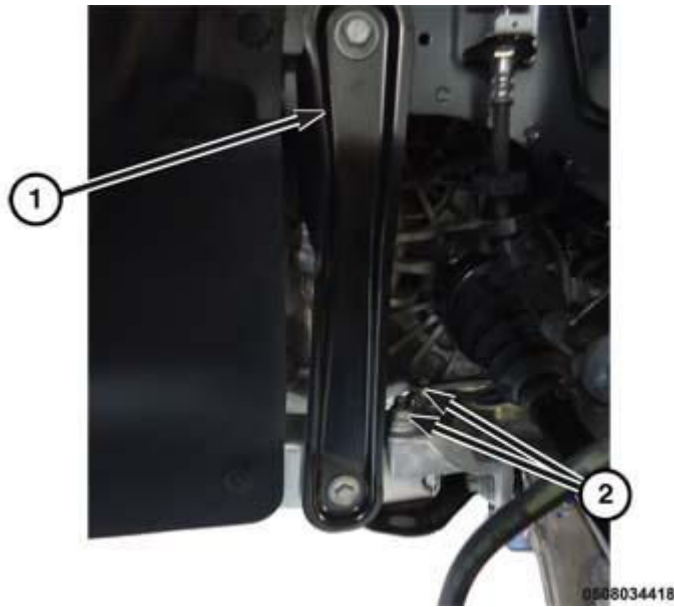


Fig. 77: Identifying Vertical Bracket & Nuts
Courtesy of CHRYSLER GROUP, LLC

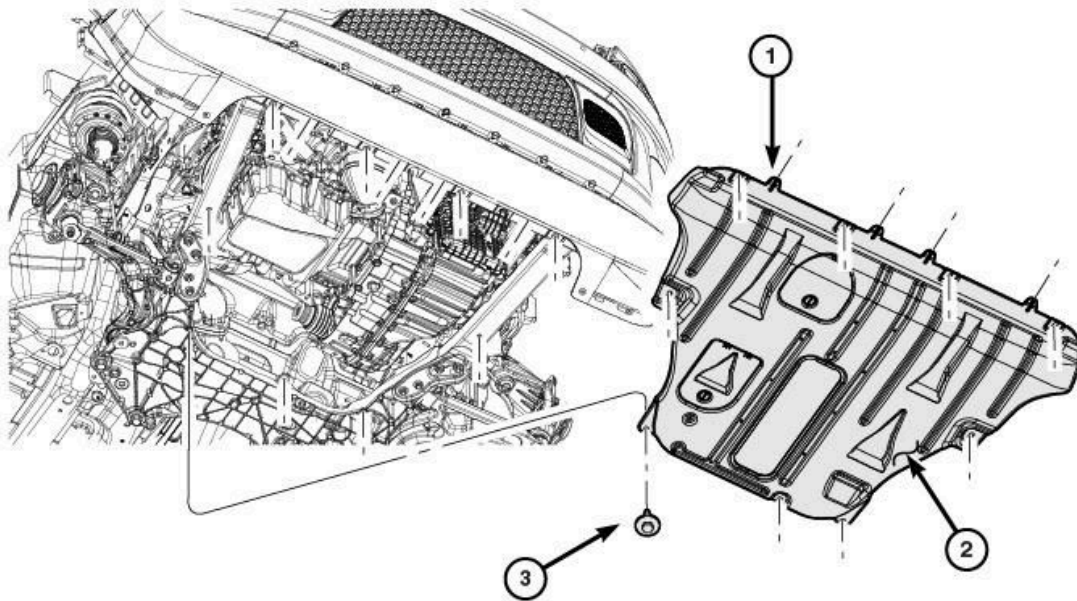
5. Install the vertical brace (1) and tighten the bolts.
6. Install the front fascia. Refer to **FASCIA, FRONT, INSTALLATION**.

UNDER BODY PROTECTION

BELLY PAN

REMOVAL

REMOVAL



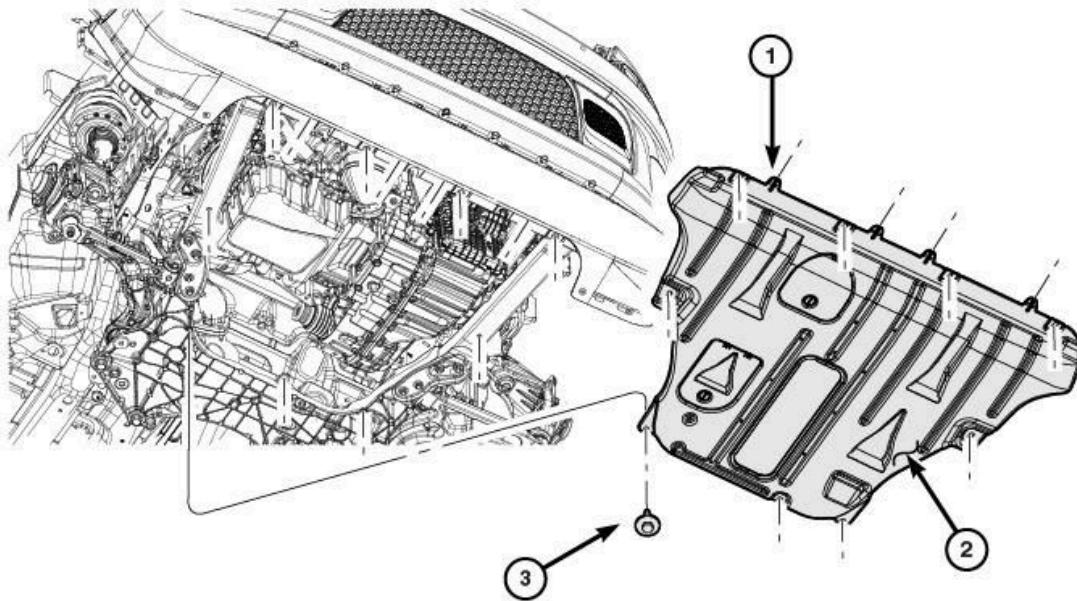
1305005022

Fig. 78: Identifying Engine Belly Pan & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Raise and support the vehicle.
2. Remove the nine fasteners (3) securing the engine belly pan (2).
3. Remove the engine belly pan (2) from the underside of the vehicle.

INSTALLATION

INSTALLATION



1305005022

Fig. 79: Identifying Engine Belly Pan & Fasteners
Courtesy of CHRYSLER GROUP, LLC

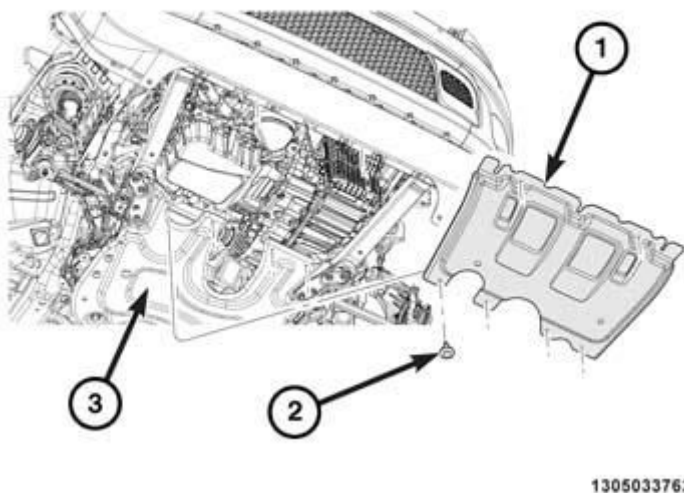
1. Insert the tabs (1) into the slots on the fascia and Position the engine belly pan (1) to the underside of the vehicle.
2. Install the nine fasteners (3) securing the engine belly pan (2). Tighten the fasteners securely.

PLATE, SKID, FRONT

REMOVAL

REMOVAL

TRANSMISSION SKID PLATE

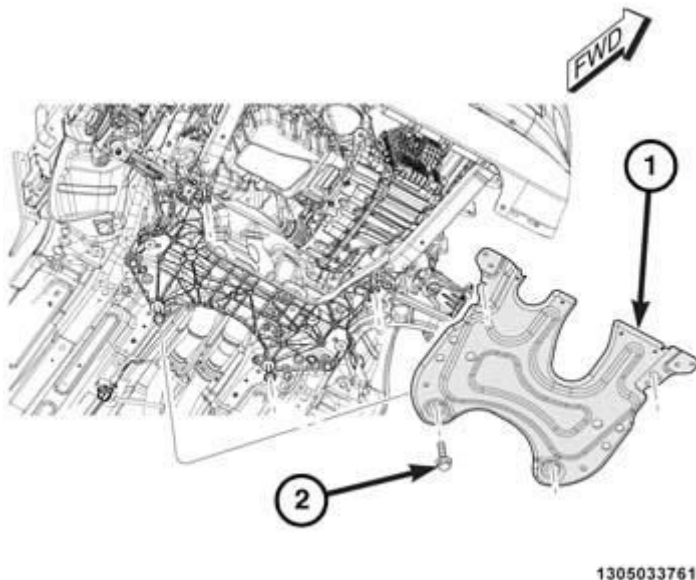


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Fig. 80: Identifying Front Skid Plate, Transmission Skid Plate & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove the bolts (2) from the frame and the front skid plate (3).
3. Remove the transmission skid plate (1).

FRONT SKID PLATE



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Fig. 81: Identifying Front Skid Plate & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .

2. Remove the transmission skid plate. Refer to **PLATE, SKID, FRONT, REMOVAL**.
3. Remove the bolts (2) and the front skid plate (1).

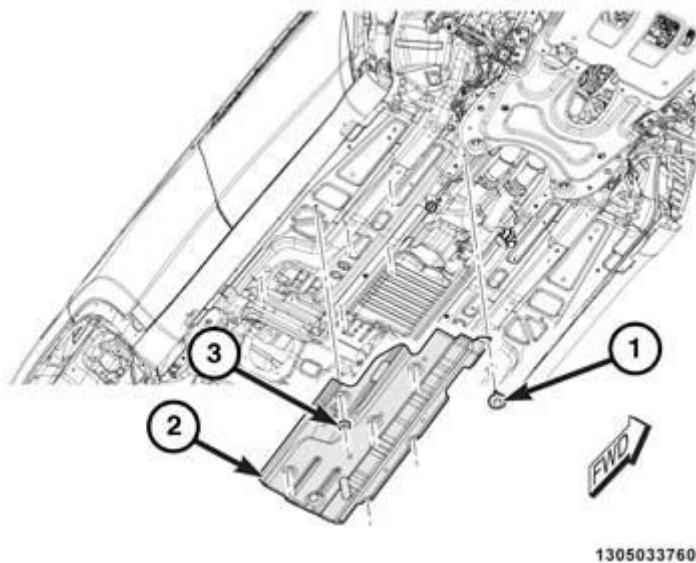
RIGHT SKID PLATE

Fig. 82: Identifying Right Skid Plate & Fasteners
Courtesy of CHRYSLER GROUP, LLC

NOTE: Right side skid plate shown, left side skid plate is similar.

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove the bolts (1), the nut (3) and the right skid plate (2).

INSTALLATION**INSTALLATION****TRANSMISSION SKID PLATE**

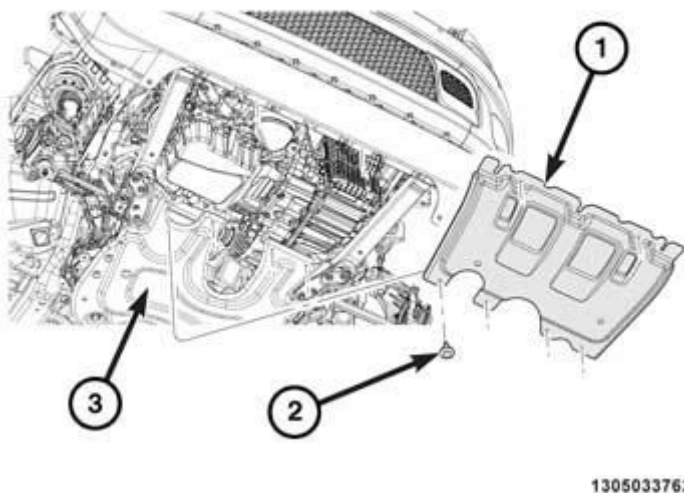


Fig. 83: Identifying Front Skid Plate, Transmission Skid Plate & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Position the transmission skid plate (1) and install the bolts (2).
2. Tighten the bolts to specification. Refer to **SPECIFICATIONS**.

FRONT SKID PLATE

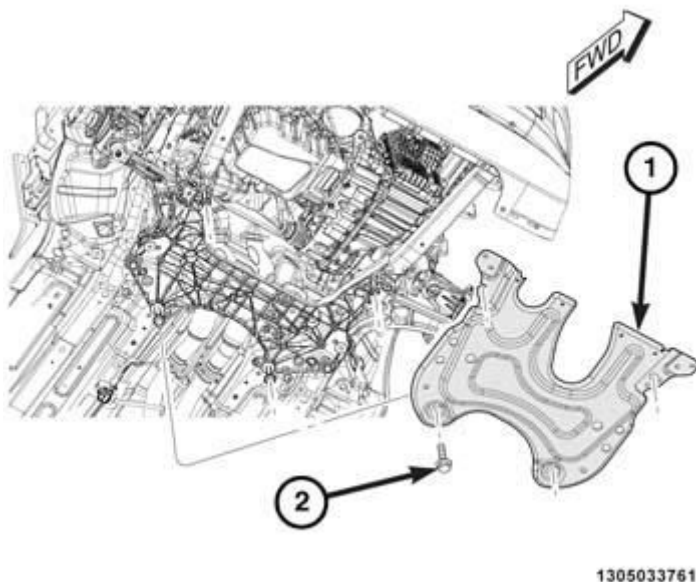


Fig. 84: Identifying Front Skid Plate & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Position the front skid plate (1) and install the bolts (2).
2. Tighten the bolts to specification. Refer to **SPECIFICATIONS**.

3. Install the transmission skid plate. Refer to **PLATE, SKID, FRONT, INSTALLATION**.

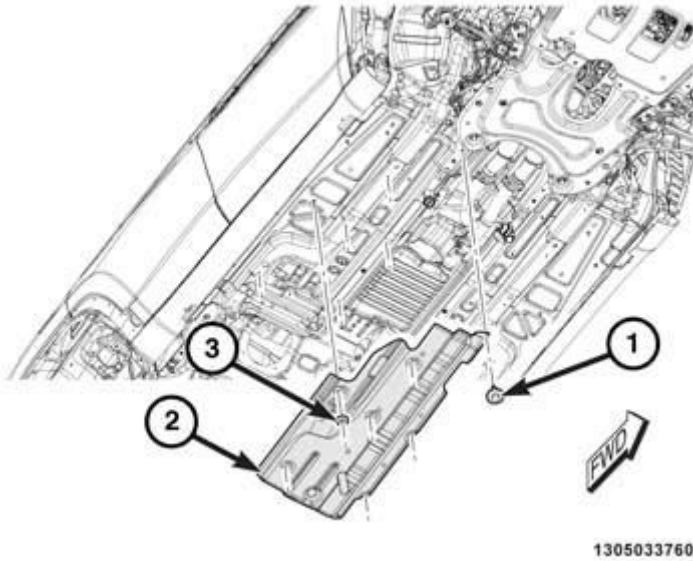
RIGHT SKID PLATE

Fig. 85: Identifying Right Skid Plate & Fasteners

Courtesy of CHRYSLER GROUP, LLC

NOTE: Right skid plate shown, left skid plate is similar.

1. Position the right skid plate (2). Install the bolts (1) and nut (3).
2. Tighten the fasteners to specification. Refer to **SPECIFICATIONS**.

SHIELD, UNDERBODY**REMOVAL****REMOVAL**

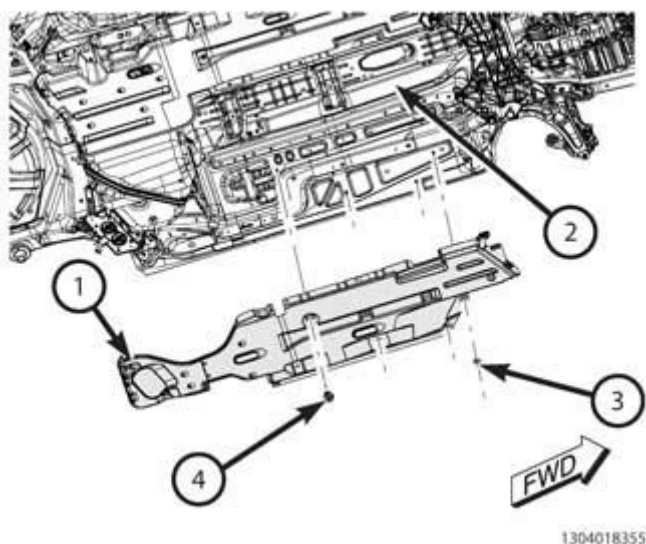


Fig. 86: Identifying Underbody Shield, Vehicle Underbody & Fasteners
Courtesy of CHRYSLER GROUP, LLC

NOTE: Right side shown, left side typical.

1. Raise and support the vehicle.
2. Remove the two push pin fasteners (4)
3. Remove the two retaining nuts (3) that secure the underbody shield (1) to the vehicle underbody (2).
4. Remove the seven fasteners that secure the underbody shield (1) to the vehicle underbody (2).
5. Remove the underbody shield (1) from the vehicle.

INSTALLATION

INSTALLATION

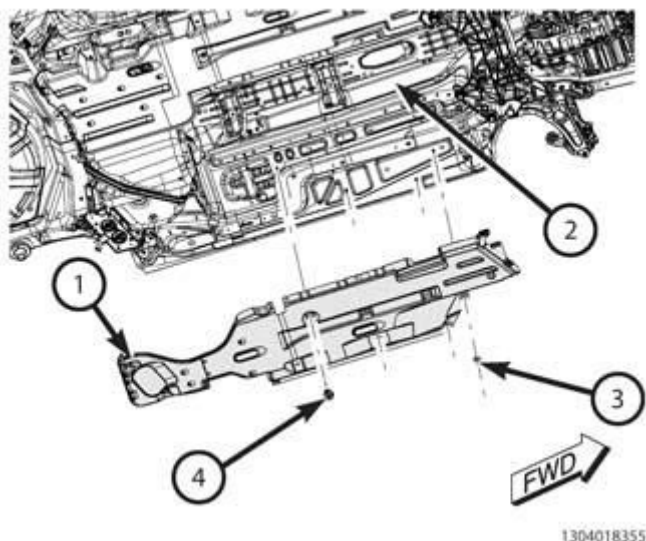


Fig. 87: Identifying Underbody Shield, Vehicle Underbody & Fasteners

Courtesy of CHRYSLER GROUP, LLC

NOTE: **Right side shown, left side typical.**

1. Position the underbody shield (1) to the vehicle.
2. Install the two retaining nuts (3) that secure the underbody shield (1) to the vehicle underbody (2). Tighten to 4 N.m (35 in. lbs.).
3. Install the two push pin fasteners (4) that secure the underbody shield (1).
4. Install the seven fasteners that secure the underbody shield (1) to the vehicle underbody (2). Tighten to 5 N.m (44 in. lbs.).
5. Lower the vehicle.

2014 ACCESSORIES AND EQUIPMENT

Heated Glass - Service Information - Cherokee

DESCRIPTION

DESCRIPTION

CAUTION: Grid lines can be damaged or scraped off with sharp instruments. Care should be taken when cleaning or removing foreign materials, decals or stickers from the rear glass. Normal glass cleaning solvents or hot water used with soft toweling is recommended.

The rear window defogger system consists of two vertical bus bars and a series of grid lines fired onto the inside surface of the rear window.

The front windshield wiper defogger system (if equipped) consists of three horizontal grid lines fired onto the inside surface of the front windshield.

The defrost for each system is turned on or off by a push-buttons. The soft switch is located in the Uconnect touch screen menu. The hard switch is located on the center of the instrument panel center bezel. (Refer to **DESCRIPTION**)

Circuit protection is provided by fuses located in the power distribution center (PDC). The heater mirrors, rear defrost and front windshield wiper de-icer each have a separate fuse.

OPERATION

OPERATION

The defogger system can be controlled by a momentary switch located in the A/C-heater control. An amber indicator will illuminate whenever either switch is pushed to the ON position.

The defogger system can also be controlled by momentary soft switches located in the U-Connect® touch screen. The front or rear defrost switch will illuminate when selected for use.

When the rear window defogger switch is pressed to ON with the ignition switch in RUN, the switch sends a request signal over the CAN Bus to the Power Distribution Center (PDC) to energize the internal high side driver. When energized, the high side driver provides battery current to the rear window defogger grid lines and to the heated side view mirrors. The grid lines heat the glass to help clear the rear window and side mirror surfaces of fog or frost.

The front window defogger switch is pressed to ON with the ignition switch in RUN, the switch sends a signal over the CAN bus to a relay grid located inside the PDC. That relay is actuated by a low-side driver in the BCM.

The Wiper Deicer system is automatically activated when the outside ambient temperature is less than 40 degrees F (5C) and either the rear defrost system or full front defrost system is active. The wiper blade Deicer will be able to unfreeze both wiper blades from the windshield in 8 minutes or less at minus 10 degrees F (-23C) if the vehicle is stationary.

The defogger and Deicer system will automatically turn off after an initial programmed time interval of about ten minutes, as long as the ignition switch is in RUN. After the initial time interval has expired, if either switch is pressed to ON again during the same ignition cycle, the defogger system will automatically turn off after about five minutes.

Repair of the defogger grid lines, bus bars, terminals or pigtail wires can be accomplished using the Mopar® Rear Window Defogger Repair Kit (Part Number 04549275) or equivalent. Refer to **GRID, DEFOGGER, STANDARD PROCEDURE**.

The defogger control system is diagnosed using a scan tool. Refer to **DIAGNOSIS AND TESTING**.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - ELECTRIC BACK LIGHT (EBL) SYSTEM

NOTE: Illumination of the rear window defogger indicator lamp in the instrument cluster does not necessarily mean that electrical current is reaching the rear window glass heating grid.

NOTE: Refer to **SYSTEM WIRING DIAGRAMS** for circuit descriptions and diagrams.

Operation of the EBL system can be confirmed by the following:

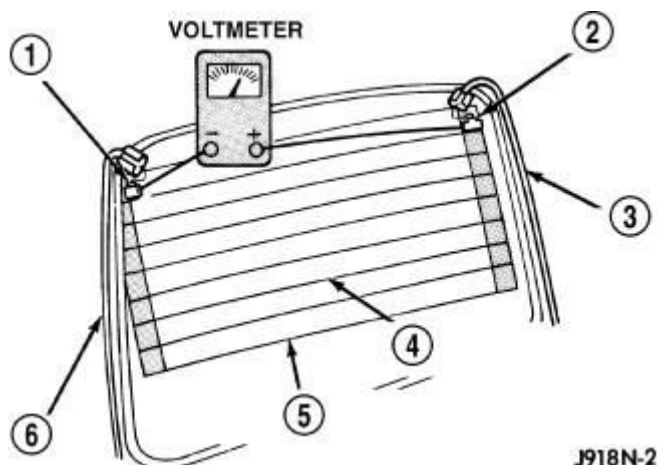


Fig. 1: Rear Window Glass Grid Test
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical heated rear window glass shown.

1. Use a scan tool and check for Diagnostic Trouble Codes (DTCs) related to the Body Control Module (BCM) and the lower accessory switchbank. If no DTCs are found, go to Step 2. If any DTCs are found, repair as required.
2. Turn the ignition to RUN and press the rear window defogger switch to on. Rear window defogger operation can be checked by feeling the surfaces of the rear window glass. A distinct difference in temperature between the grid lines (5) and the adjacent clear glass should be detected within three to four minutes of operation.
3. If a temperature difference is not detected, use a 12 volt Direct Current (DC) voltmeter and contact the rear glass heating grid terminal A (1) with the negative lead, and terminal B (2) with the positive lead. The voltmeter should read battery voltage. If the voltmeter does not read battery voltage, check the following:
 - Confirm the ignition is in RUN.
 - Confirm the rear window defogger switch is on.
 - Confirm the EBL feed wire (3) is connected to the heating grid positive terminal and that there is continuity between the heating grid and the EBL relay in the Power Distribution Center (PDC).
 - Confirm the EBL ground wire (6) is connected to the heating grid negative terminal and that there is continuity to ground.
 - Confirm the EBL relay in the PDC is operational. Refer to **SYSTEM WIRING DIAGRAMS**.
4. If broken defogger grid lines or bus bars are suspected, use a 12 volt DC voltmeter and contact terminal A with the negative lead and each rear glass heating grid line at its mid-point C (4) with the positive lead. The voltmeter should read approximately 6 volts at each grid line mid-point. If the voltmeter does not read approximately 6 volts, repair the open grid line(s) or bus bar(s). Refer to **GRID, DEFOGGER, STANDARD PROCEDURE**.
5. If the EBL system operation has been verified but the rear window defogger indicator in the instrument cluster does not illuminate, replace the switch bank.

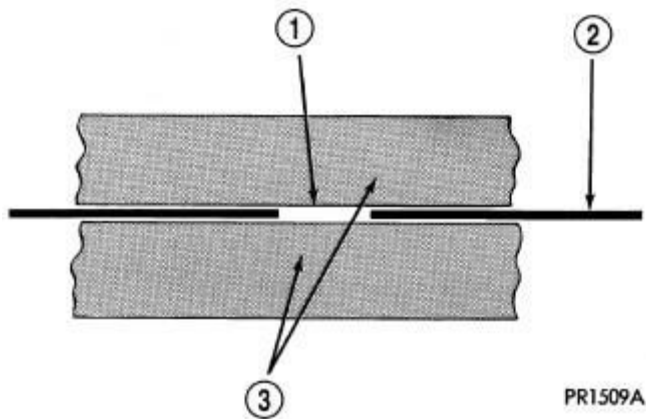
GRID, DEFOGGER

STANDARD PROCEDURE

STANDARD PROCEDURE - GRID LINE AND TERMINAL REPAIR

WARNING: Materials contained in the Repair Kit (Part Number 04549275) may cause skin or eye irritation. The kit contains epoxy resin and amine type hardener, which are harmful if swallowed. Avoid contact with the skin and eyes. For skin contact, wash the affected areas with soap and water. For contact with the eyes, flush with plenty of water. Do not take internally. If taken internally, induce vomiting and call a physician immediately. Use with adequate ventilation. Do not use near fire or flame. Contains flammable solvents. Keep out of the reach of children. Failure to follow these instructions may result in serious or fatal injury.

Repair of the rear glass heating grid lines, bus bars, terminals or pigtail wires can be accomplished using the Mopar® Rear Window Defogger Repair Kit (Part Number 04549275) or equivalent.

**Fig. 2: Grid Line Repair - Typical**

Courtesy of CHRYSLER GROUP, LLC

1. Mask the repair area with masking tape (3) so that the conductive epoxy can be applied neatly. Extend the epoxy application onto the grid line (2) or the bus bar on each side of the break (1).
2. Follow the instructions in the repair kit for preparing the damaged area.
3. Remove the package separator clamp and mix the two conductive epoxy components thoroughly within the packaging. Fold the package in half and cut the center corner to dispense the epoxy.
4. Apply the epoxy through the slit in the masking tape or template. Overlap both ends of the break by at least 19 millimeters (0.75 inch).
5. For a terminal or pigtail wire replacement, mask the adjacent areas so the epoxy can be extended onto the adjacent grid line as well as the bus bar. Apply a thin layer of epoxy to the area where the terminal or pigtail wire was fastened and onto the adjacent grid line.
6. Apply a thin layer of conductive epoxy to the terminal or bare wire end of the pigtail and place it in the proper location on the bus bar. To prevent the terminal or pigtail wire from moving while the epoxy is curing, it must be wedged or clamped.
7. Carefully remove the masking tape or template.

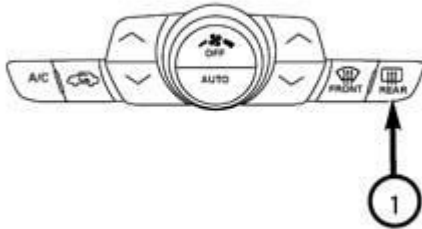
CAUTION: Do not allow the glass surface to exceed 204° C (400° F) when using a heat gun, or the glass may fracture.

8. Allow the epoxy to cure 24 hours at room temperature, or carefully use a heat gun for 15 minutes. When using a heat gun, hold it approximately 25.4 centimeters (10 inches) from the repair and do not allow the glass surface to exceed 204° C (400° F).
9. After the conductive epoxy is properly cured, remove the wedge or clamp from the terminal or pigtail wire.
10. Connect the wire harness leads to the grid terminals or pigtail wires and verify EBL operation.

SWITCH, DEFOGGER

DESCRIPTION

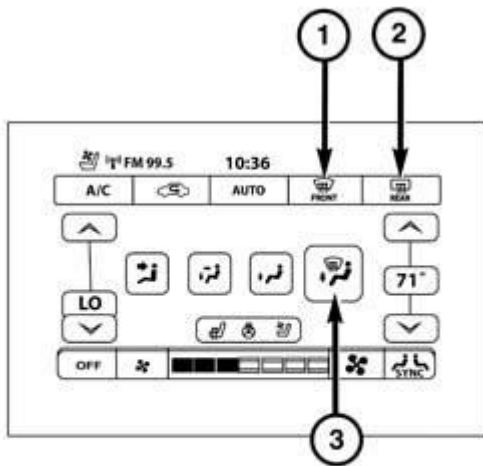
DESCRIPTION



0812002401

Fig. 3: Rear Window Defogger Switch
 Courtesy of CHRYSLER GROUP, LLC

The momentary push-button switch for the rear window defogger (EBL) system can be located in the A/C-heater control in the center of the instrument panel.



0812002402

Fig. 4: Heated Mirror System Switches
 Courtesy of CHRYSLER GROUP, LLC

There is an option for the switches to be located within the U-Connect touch screen. An amber indicator will illuminate to indicate when the EBL system is turned on for either switch.

OPERATION

OPERATION

An amber indicator will illuminate when either window defogger switch is activated. When activated, the switch sends a request signal to the Body Control Module (BCM) to energize the internal EBL high side driver to provide battery current to the appropriate window defogger grid lines and to the heated side view mirrors, when equipped.

NOTE: **The defroger system turns off automatically after 10 minutes of initial operation. Each following activation cycle of the defrost system will last 5 minutes.**

The defogger/deicer system will automatically turn off after an initial programmed time interval of about 10 minutes as long as the ignition switch is in RUN. After the initial time interval has expired, if the window defogger switch is pressed to ON again during the same ignition cycle, the defogger/deicer system will automatically turn off after about 5 minutes. The defogger/deicer system will also turn off if the ignition switch is turned to any position other than RUN or by manually pressing the window defogger switch a second time.

The window defogger switch is diagnosed using a scan tool. Refer to **DIAGNOSIS AND TESTING** .

The window defogger switch and indicator cannot be adjusted or repaired. The switch bank (hard switch) or the radio (soft switch) must be replaced if diagnostics lead to switch replacement.

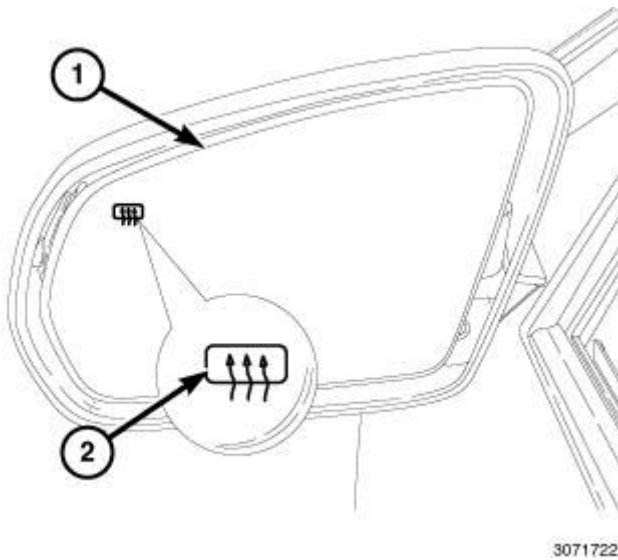
2014 ACCESSORIES AND EQUIPMENT**Heated Mirrors - Service Information - Cherokee****DESCRIPTION****DESCRIPTION**

Fig. 1: Heated Outside Rear View Mirrors & Window Defogger
Courtesy of CHRYSLER GROUP, LLC

Electrically heated outside rear view mirrors (1) are optional on some models. Vehicles with this option can be visually identified by the International Standards Organization (ISO) icon for rear window defogger (2), which appears on the corner of the outside rear view mirror glass.

The heated mirror system operates in concert with the rear window defogger system, also known as the Electric Back Light (EBL). The EBL system is controlled by the rear window defogger switch, located in the A/C heater control or a soft switch located in the U-Connect touch screen menu. An amber indicator lamp in the control will illuminate to indicate when the heated mirror system is on. Refer to **SWITCH, DEFOGGER, DESCRIPTION**.

The heated mirror system will automatically turn off after a programmed time interval of about ten minutes as long as the ignition is in RUN. After the initial time interval has expired, if the rear window defogger system is turned on again during the same ignition cycle, the heated mirror system will automatically turn off after about five minutes. The heated mirror system will also turn off if the ignition is set to any position other than RUN, or by manually pressing the rear window defogger switch a second time.

Circuit protection is provided by a fuse located in the Power Distribution Center (PDC).

OPERATION

OPERATION

When equipped, the heated mirror system is activated when the rear window defogger (EBL) system is turned on. Refer to **OPERATION** . When the heated mirror system is activated, an electric heater grid located behind the glass of each outside rear view mirror becomes energized and produces heat to help clear the mirror of ice, snow, or fog.

If the outside mirror heating grids are both inoperative, refer to **DIAGNOSIS AND TESTING** .

The heating grid behind each outside mirror glass cannot be repaired and the mirror assembly must be replaced if the heating grid is found inoperative or damaged. Refer to **MIRROR, OUTSIDE REARVIEW, REMOVAL** and **MIRROR, OUTSIDE REARVIEW, GLASS, REMOVAL** .

2014 ACCESSORIES AND EQUIPMENT**Heated Seats - Service Information - Cherokee****DESCRIPTION****DESCRIPTION**

Vehicles with the optional heated seat system can be visually identified by the two heated seat switches located in the Radio Receiver Module (RRM), in the center of the instrument panel. The heated seat system allows the driver and front seat passenger to select from two different levels of electrical seat heating (HI and LO).

The heated seat system includes the following major components:

- **Heated Seat Switches** - Two heated seat switches are used per vehicle, one for each front heated seat. Both switches are integral to the Radio Receiver Module (RRM). Refer to **SWITCH, HEATED SEAT, DESCRIPTION**.
- **Comfort Seat and Wheel Module** - One Comfort Seat and Wheel Module (CSWM) is used per vehicle. The CSWM is mounted under the driver seat and contains the control logic and software for the front heated seat system. Refer to **MODULE, COMFORT SEAT AND WHEEL, DESCRIPTION**.
- **Heated Seat Elements** - Four heated seat elements are used per vehicle. Two heated seat elements for each seat, one on the seat back cushion and the other on the seat bottom cushion. The heated seat elements are hard-wired to the CSWM. Refer to **PAD, HEATER, DESCRIPTION**.

OPERATION**OPERATION**

The Comfort Seat and Wheel Module (CSWM) directly provides power to the seat heating elements in the seat cushions and backs for seat heating. Fused ignition switch output (run) circuits are used, so that the heated seat system will only operate when the ignition switch is in the On position and the engine is running. The module responds to heated seat thermistor sensor feedback from each heating element and ignition switch status inputs by controlling the electrical output to the front seat heating elements. The heated seat system will turn off automatically whenever the ignition switch is turned to any position except On.

Pressing a heated seat switch once will select high-level heating and pressing the same switch a second time will select low-level heating. Pressing the switch a third time will shut the heating elements off. When the switch is pressed, the CSWM energizes an integral solid-state relay, which supplies battery current to the heating elements. If high-level heating is initially selected, the heated seat control system will automatically switch to a lower level temperature after 50 minutes of continuous operation at the desired temperature level. Operation in the low-level setting automatically turns to off after 45 minutes.

The driver seat heat system and passenger seat heat system each consist of a cushion element connected in parallel with a back element. Both systems have a seat cushion with a thermistor sensor that provides feedback to the CSWM. Both systems seat cushion and seat back have a thermostat that will request the heated seat to turn off if the temperature reaches or exceeds 135 °F (+/- 9 ° F). The CSWM will also turn off the heated seat

elements if an open or short in the heating element circuit is detected.

Auto On Feature

The Auto On feature is a customer configurable feature that when enabled will activate the driver heated seat and heated steering wheel on engine start based on ambient temperature. If Auto On feature is enabled, and the ambient temperature is at or below 40° F the CSWM will activate the driver heated seat and heated steering wheel feature at the high level during engine start. This feature also works with Remote Start.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - HEATED SEAT SYSTEM

NOTE: Vehicles equipped with the heated seat option utilize a voltage cut-off feature. This feature turns off power to the heated seat system anytime vehicle voltage is below 9.0 volts or above 16.0 volts. Be certain to check the vehicle electrical system for proper voltage anytime the heated seat system appears inoperative.

NOTE: If a Diagnostic Trouble Code (DTC) can not be verified, it is a good indication that an intermittent fault condition may be present. To help find an intermittent problem, sit in the seat in question and move around the heating elements within the seat while testing continuity. Wiggle the heated seat wire harness and electrical connectors while testing continuity.

NOTE: For complete circuit diagrams, refer to **SYSTEM WIRING DIAGRAMS** . Wiring Information includes wiring diagrams, connector pin-out and location views, details of wire harness routing and retention, splice and ground locations and proper wire and connector repair procedures.

Before testing any individual components in the heated seat system, check the following:

- Check to see if the concern is isolated to only one seat. Operate the other heated seat.
- Check the fuse in the Power Distribution Center (PDC) and for power at the CSWM. Repair as necessary.
- Using a scan tool, check for any Diagnostic Trouble Codes (DTCs) related to the Comfort Seat and Wheel Module (CSWM) and/or the Radio Receiver Module (RRM). If any DTCs are found, repair as necessary (Refer to **DTC INDEX**).
- Check the vehicles battery open-circuit voltage and charging system performance. If the vehicle's electrical system is defective or weak it may not be supplying sufficient energy to operate the heated seat system.

PAD, HEATER

DESCRIPTION

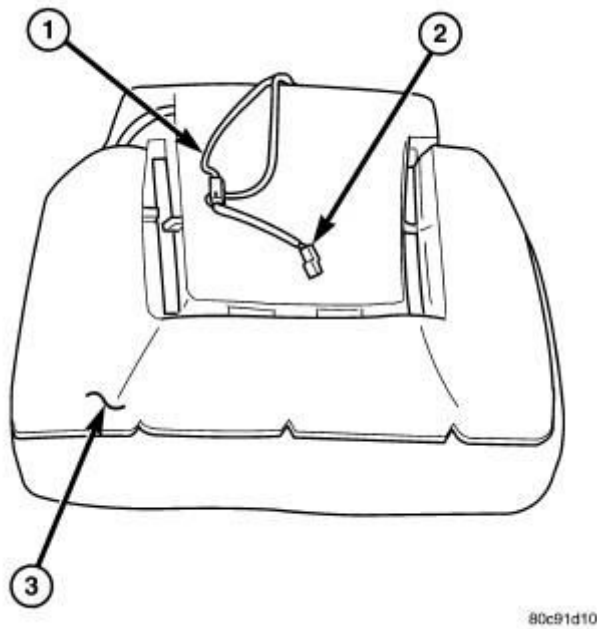
DESCRIPTION

Fig. 1: Removing/Installing Heated Seat Element
Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with the optional heated seat system have two heated seats. One heating element (1) is used for each seat bottom cushion and another heating element is used for each seat back cushion.

All of the heated seat elements consist of multiple heating circuits operating in parallel throughout the carbon fiber element and a wire lead and connector (2). The heated seat elements are captured between the seat cover and the seat cushion (3). If a malfunction occurs in one or more of the individual circuits, the remaining operational circuits will continue to provide heat.

OPERATION**OPERATION**

Battery current is directed to the heated seat elements by the Comfort Seat and Wheel Module (CSWM). The CSWM will energize the heated seat elements when a heated seat switch is pressed on.

As electrical current passes through each heated seat element, the resistance of the wire used in the element disperse some of the electrical current in the form of heat. The heat produced by the heated seat element then radiates through the seat bottom and seat back covers, warming the seat covers and its occupant.

The heated seat elements cannot be repaired and must be replaced if inoperative or damaged.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - HEATED SEAT ELEMENT

- NOTE:** For complete circuit diagrams, **SYSTEM WIRING DIAGRAMS** . Wiring Information includes wiring diagrams, connector pin-out and location views, details of wire harness routing and retention, splice and ground locations and proper wire and connector repair procedures.
- NOTE:** The wire harness connectors for the heating elements are located under the seat.
- NOTE:** When checking heated seat elements for continuity, be certain to move the heating element being checked. Moving the element, such as sitting in the seat will eliminate the possibility of an intermittent open in the element which would only be evident if the element was in a certain position.
1. Locate and disconnect the seat heating element electrical connectors as necessary.
 2. Check the resistance between the circuits leading in and out of the suspect heated seat element. The resistance should be between the specifications listed in the following Heated Seat Element Resistance table . If OK, refer to **DIAGNOSIS AND TESTING**. If not OK, replace the inoperative heated seat element. Refer to **PAD, HEATER, REMOVAL**.

HEATED SEAT ELEMENT RESISTANCE

Element Location	Acceptable Resistance Value
Driver Seat Bottom Cushion	7.8 - 9.6 ohms
Passenger Seat Bottom Cushion	8.4 - 10.4 ohms
Driver and Passenger Seat Back Cushion	8.5 - 10.6 ohms

REMOVAL**REMOVAL**

WARNING: Disable the airbag system before attempting any component diagnosis or service of the front seats, when equipped with front seat air bags. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

NOTE: Seat bottom cushion shown in illustrations, seat back cushion similar.

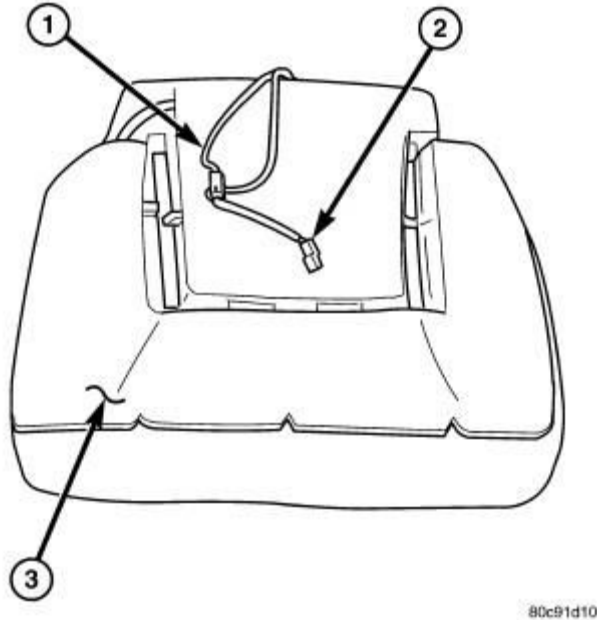


Fig. 2: Removing/Installing Heated Seat Element
 Courtesy of CHRYSLER GROUP, LLC

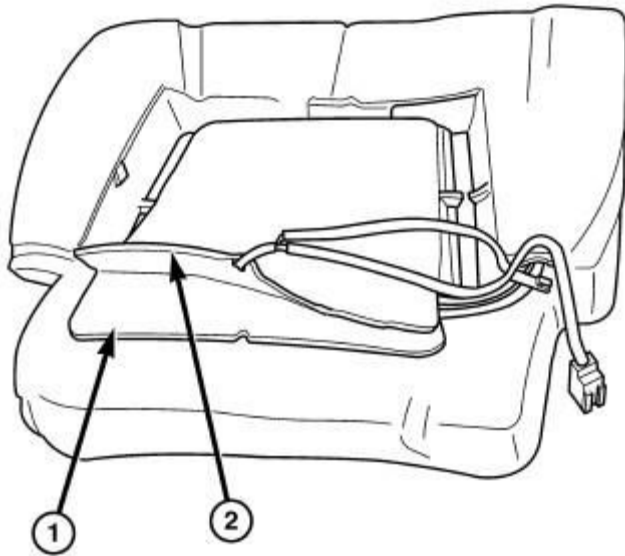
1. Disconnect and isolate the negative battery cable.
2. Remove the appropriate seat bottom or seat back cushion and place it on a workbench (Refer to **SEATS, FRONT** or **SEATS, REAR**).
3. Remove the seat bottom or seat back cover from the cushion (1) (Refer to **SEATS, FRONT** or **SEATS, REAR**).
4. Make note of the installed location of the heated seat element on the cushion (3) being serviced.
5. Remove the heated seat element from the foam cushion by peeling the element away from the cushion. Be careful not to remove excessive foam from the cushion.

INSTALLATION

INSTALLATION

CAUTION: During heated seat element replacement, be careful not to fold or crease the new heating element. Folds or creases will cause premature heated seat element failure.

NOTE: Front seat bottom cushion shown, rear seat and seat back cushions similar.



80c91c12

Fig. 3: Identifying Replacement Heating Element And Factory Installed Heating Element
 Courtesy of CHRYSLER GROUP, LLC

1. Peel off the adhesive backing from the replacement heated seat element (2).
2. Position the heated seat element to the foam cushion directly where the original heater element was located. There will be adhesive marks on the cushion outlining the factory installed location (1).
3. Firmly press the heated seat element onto the foam cushion. Make sure the adhesive is fully adhered to the cushion.
4. Install the cover onto the seat bottom or seat back cushion (1) (Refer to **SEATS, FRONT** or **SEATS, REAR**).

NOTE: Make certain the heated seat element and airbag wire harnesses are correctly routed. Any excess wire should be securely placed between the rear of the seat bottom cushion and the rear seat cover flap.

5. Install the seat bottom or seat back cushion (Refer to **SEATS, FRONT** or **SEATS, REAR**).
6. Install the seat. Refer to **SEAT, INSTALLATION SEAT, REAR, INSTALLATION** .
7. Reconnect the negative battery cable.
8. Verify proper heated seat system operation.

SWITCH, HEATED SEAT

DESCRIPTION

DESCRIPTION



0804005802

Fig. 4: View of Vented Seats U-Connect Touch Screen
 Courtesy of CHRYSLER GROUP, LLC

The switches (1) for the optional front heated seat system are located in the U-Connect Touch™ screen module, at the center of the instrument panel. The heated seat system allows the driver and front seat passenger to select from two different levels of electrical seat heating (HI and LO). When the heated seat switches are pressed on, each heated seat switch illuminates either HI or LO, and an International Standards Organization (ISO) symbol appears at the top of the U-Connect Touch™ screen module.

OPERATION

OPERATION

When either of the hard or soft front heated seat switches are pressed with the engine running, a signal is sent to the Comfort Seat and Wheel Module (CSWM) over the Controller Area Network (CAN) data bus, signaling the module to energize the heating elements for the selected seat. Indicator lamps illuminate for each heated seat switch and indicate the level of heat in use (HI or LO). Pressing a heated seat switch once will select high-level heating and pressing the same switch a second time will select low-level heating. Pressing the switch a third time will shut the heating elements off.

The CSWM energizes the integral solid-state relays that supply battery current to the heating elements. During high-temperature level operation, the HI indicator illuminates on the U-Connect Touch™ screen. After 50 minutes of high-temperature level heating, the CSWM automatically lowers the heat level to low. At that time, the LO indicator illuminates on the U-Connect Touch™ screen. Operation on the low-temperature level setting will automatically turn off after 45 minutes.

The individual front heated seat switches located in the U-Connect Touch™ screen module cannot be adjusted or repaired. If a front heated seat switch or indicator is inoperative or damaged, the entire U-Connect Touch™ screen module must be replaced. Refer to **RADIO, REMOVAL**.

2014 ACCESSORIES AND EQUIPMENT

Heated/Cooled Accessories - Service Information - Cherokee

DESCRIPTION

HEATED STEERING WHEEL



Fig. 1: View of Vented Seats U-Connect Touch Screen
 Courtesy of CHRYSLER GROUP, LLC

The heated steering wheel system is designed to enhance the thermal comfort of the driver by heating the steering wheel, when desired. The steering wheel heating element is made of copper wire and is sandwiched between the leather and the substrate material of the steering wheel. A vehicle with a heated steering wheel can easily be identified by the heated steering wheel switch (3) located in the U-Connect Touch™ screen module, at the center of the instrument panel. When the heated steering wheel switch is pressed on, the heated steering wheel switch illuminates and an International Standards Organization (ISO) symbol appears in the top corner of the U-Connect Touch™ screen module.

The heated steering wheel system consists of the following major components

- **Heated Steering Wheel Switch** - Refer to **SWITCH, HEATED STEERING WHEEL, DESCRIPTION**.
- **Comfort Seat and Wheel Module** - Refer to **MODULE, COMFORT SEAT AND WHEEL, DESCRIPTION**.
- **Heated Steering Wheel** - Refer to **OPERATION**.

VENTED SEATS



0804005802

Fig. 2: View of Vented Seats U-Connect Touch Screen
 Courtesy of CHRYSLER GROUP, LLC

The vented seat system is designed to enhance the thermal comfort of the driver and front seat occupant, when desired. Occupant comfort is achieved by pulling air from the outside of the seating surfaces into the seat back and cushion of the seat. A vehicle with vented seats can be identified by the vented seat switches (2) located in the Radio Receiver Modules (RRM) U-Connect touch screen.

Each vented seat switch illuminates when the vented seat system is on.

The vented seat system consist of the following major components (there are two different available seat modules, the HSM and the CSWM) :

- **Vented Seat Pads** - Refer to [**PAD, VENTED SEAT, DESCRIPTION**](#) for more information.
- **Vented Seat Switches** - Refer to [**SWITCH, VENTED SEAT, DESCRIPTION**](#) for more information.
- **Vented Seat Motors** - Refer to [**MOTOR, VENTED SEAT, DESCRIPTION**](#) for more information.
- **Custom Seat and Wheel Module** - Refer to [**MODULE, COMFORT SEAT AND WHEEL, DESCRIPTION**](#) .

OPERATION

HEATED STEERING WHEEL

Operation of the steering wheel heating element is controlled by the Comfort Seat and Wheel Module (CSWM). The Steering Column Control Module is the interface between the heated steering wheel and the vehicle. The CSWM provides power to the heated steering wheel heating elements in the steering wheel. A temperature sensor is integrated into the steering wheel heating element that sends the temperature of the steering wheel to the steering wheel switch. The steering wheel switch sends this information over the LIN bus to the SCCM. The SCCM then sends this information over the CAN C bus to the Body Control Module (BCM). The BCM sends

this information to the CSWM over the CAN I bus. The normal heating cycle of the steering wheel will last up to 50 minutes on high setting, unless the switch is pressed again. The heated steering wheel system will automatically shut off if the heating element reaches a temperature greater than 46° C (115° F), or if a fault is detected. If for any reason a fault in the heated steering wheel system becomes present, a Diagnostic Trouble Code (DTC) will set.

Auto On Feature

The Auto On feature is a customer configurable feature that when enabled will activate the driver heated seat and heated steering wheel on engine start based on ambient temperature. If Auto On feature is enabled, and the ambient temperature is at or below 40° F the CSWM will activate the driver heated seat and heated steering wheel feature at the high level during engine start. This feature also works with Remote Start.

The heated steering wheel system is diagnosed using a scan tool. Refer to **DIAGNOSIS AND TESTING** .

The steering wheel heating element is not serviced separately from the steering wheel and if inoperative or damaged, the entire steering wheel assembly must be replaced. Refer to **WHEEL, STEERING, REMOVAL** .

VENTED SEATS

The Vented Seat assembly is located internally to the front seats and are intended to enhance the thermal comfort of the seat occupant by ventilating seat to occupant interface. Occupant comfort is achieved by pulling air from the seat surface to the back and underside under side of the seat.

The vented seats are controlled by the heated seat module (HSM also know as the Comfort Seat Wheel Module or CSWM) which provides variable analog voltages driving the 12V vented seat motors in the seats. The vented seats have 2 selectable speeds with a hidden intermediate speed for the fans. For seat venting, each press of the vented seat switch will cause the vented seat to change venting modes. From OFF to HI, from HI to LO and from LO to OFF. The HSM shall turn on the vented seats only with the engine running. Both vented seats operate separately from each other, and will not operate at the same time as the heated seats. To review vented seat switch information, refer to **SWITCH, VENTED SEAT, DESCRIPTION**.

DIAGNOSIS AND TESTING

HEATED STEERING WHEEL

NOTE: Vehicles equipped with the heated steering wheel option utilize a low voltage cut-off feature. This feature turns off power to the heated steering wheel anytime vehicle voltage is below 9.0 volts or above 16.0 volts. Be certain to check the vehicle electrical system for proper voltage anytime the heated steering wheel appears inoperative.

NOTE: If a Diagnostic Trouble Code (DTC) can not be verified, it is a good indication that an INTERMITTENT fault condition may be present. To help find an intermittent problem, move the steering wheel around while testing continuity. Also wiggle the heated steering wheel wire harness and electrical connectors

while testing continuity.

NOTE: For complete circuit diagrams, see **SYSTEM WIRING DIAGRAMS** . Wiring Information includes wiring diagrams, connector pin-out and location views, details of wire harness routing and retention, splice and ground locations and proper wire and connector repair procedures.

NOTE: The Auto On feature is designed to function at an ambient temperature of 40° F or below. Make sure this option is enabled the customer programmable interface prior to diagnosis of an inoperative Auto On feature concern.

Before testing any individual components in the heated steering wheel system, check the following:

- Using a scan tool, check for any Diagnostic Trouble Codes (DTCs) related to the Comfort Seat and Wheel module (CSWM), U-Connect Touch TM screen module and the Radio Receiver Module (RRM). If any DTCs are found, repair as necessary.
- Check the vehicles battery open-circuit voltage and charging system performance. If the vehicle's electrical system is defective or weak it may not be supplying sufficient energy to operate the heated steering wheel system.
- If there are no DTCs and the heated steering wheel system functions properly, but the heated steering wheel indicator does not illuminate, the entire U-Connect Touch TM screen module (Integrated Center Stack) must be replaced (Refer to **RADIO**).

VENTILATED SEATS

NOTE: Vehicles equipped with the ventilated seat option utilize a low voltage cut-off feature. This feature turns off power to the ventilated seat system anytime vehicle voltage is below 11.7 volts or above 15.5 volts. Be certain to check the vehicle electrical system for proper voltage anytime the ventilated seat system appears inoperative.

NOTE: If a Diagnostic Trouble Code (DTC) can not be verified, it is a good indication that an INTERMITTENT fault condition may be present. To help find an intermittent problem, sit in the seat in question and move around within the seat while testing continuity. Also wiggle the ventilated seat wire harness and electrical connectors while testing continuity.

NOTE: For complete circuit diagrams, see **SYSTEM WIRING DIAGRAMS** . Wiring Information includes wiring diagrams, connector pin-out and location views, details of wire harness routing and retention, splice and ground locations and proper wire and connector repair procedures.

Before testing any individual components in the ventilated seat system, check the following:

- Check the ignition fuse in the Power Distribution Center (PDC). Repair as necessary.
- Using a scan tool, check for any Diagnostic Trouble Codes (DTCs) related to the Heated Seat Module (HSM) and the U-Connect Touch™ screen module. If any DTCs are found, repair as necessary (Refer to **DTC INDEX**).
- Check the vehicles battery open-circuit voltage and charging system performance. If the vehicle's electrical system is defective or weak it may not be supplying sufficient energy to operate the front vented seat system.
- If there are no DTCs and the front vented seat system functions properly, but a vented seat indicator does not illuminate, the entire U-Connect Touch™ screen module must be replaced (Refer to **RADIO**).

SWITCH, HEATED STEERING WHEEL

DESCRIPTION

DESCRIPTION



Fig. 3: View of Vented Seats U-Connect Touch Screen
Courtesy of CHRYSLER GROUP, LLC

The switch (3) for the optional heated steering wheel is located in the U-Connect Touch™ screen module, at the center of the instrument panel. When the heated steering wheel switch is pressed on, the heated steering wheel switch illuminates and an International Standards Organization (ISO) symbol appears at the top of the U-Connect Touch™ screen module.

OPERATION

OPERATION

The heated steering wheel switch allows the driver to turn on and off the heated steering wheel. The heated

steering wheel will remain off until the driver presses the switch. Once the switch is pressed, the switch will illuminate and an International Standards Organization (ISO) symbol appears in to top corner of the U-Connect Touch™ screen module, indicating that the heating element in the steering wheel is operating. Pressing the switch while the heated steering wheel is on, will turn the heating steering wheel off.

The heated steering wheel switch also functions as a visual indicator for a fault with the heated steering wheel system. When the heated steering wheel switch is pressed and a fault is present in the heated steering wheel system, the switch will illuminate for two seconds and then immediately turn off.

The heated steering wheel switch is diagnosed using a scan tool.

The heated steering wheel switch located in the U-Connect Touch™ screen module cannot be adjusted or repaired. If a heated steering wheel switch or indicator lamp is inoperative or damaged, the entire U-Connect Touch™ screen module must be replaced (Refer to **RADIO**).

SWITCH, VENTED SEAT

DESCRIPTION

DESCRIPTION



Fig. 4: View of Vented Seats U-Connect Touch Screen
Courtesy of CHRYSLER GROUP, LLC

The vented seat system is designed to enhance the thermal comfort of the driver and front seat occupant, when desired. Occupant comfort is achieved by pulling air from the outside of the seating surfaces into the seat back and cushion of the seat. A vehicle with vented seats can be identified by the vented seat switches (2) located in the Radio Receiver Modules (RRM) U-Connect touch screen. Each vented seat switch illuminates when the vented seat system is on.

OPERATION

OPERATION

The two vented seat switches are momentary push button type switches that are used to operate the front vented seats. When a vented seat switch is pressed, Light Emitting Diode(s) (LEDs) on the face of that switch will illuminate to indicate the desired mode for that particular vented seat, and a request signal is sent over the Controller Area Network (CAN) bus to the Heated Seat Module (HSM). The HSM provides variable analog voltages that drive the two 12 volt vented seat motors in the seat. There are three settings for each vented seat; off, hi and lo. The vented seat system always starts in the off setting, where none of the LEDs on the switches are illuminated. Pressing a switch once will change the setting for that particular seat from off to hi, and will illuminate both LEDs on the switch. Pressing the same vented seat switch again will change the setting from hi to lo, and only one LED on that switch will illuminate. Pressing the switch once again will change the setting from lo to off again. If for any reason a fault in the vented seat system becomes present, a Diagnostic Trouble Code (DTC) will set and a LED in the vented seat switch will illuminate for two seconds and then go out.

The vented seat switches are diagnosed using a scan tool.

PAD, VENTED SEAT

DESCRIPTION

DESCRIPTION

NOTE: Seat cushion shown, seat back cushion similar.

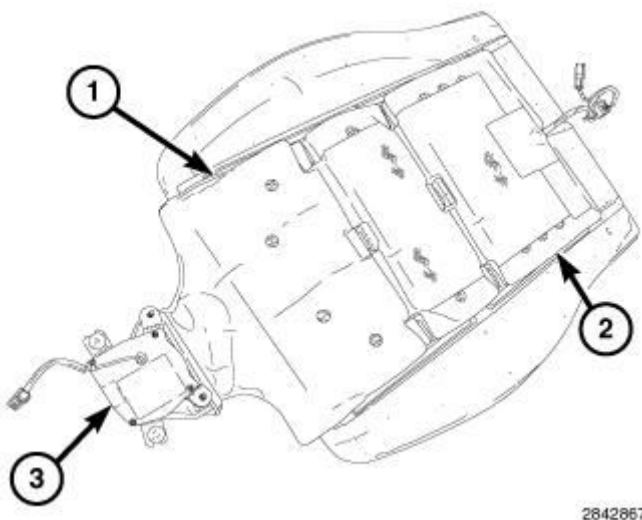


Fig. 5: Vented Seat Pad, 12 Volt Motor & Heated Seat Pad
 Courtesy of CHRYSLER GROUP, LLC

When equipped, each seat bottom and seat back cushion have there own vented seat pad (1) and 12 volt motor (3). The vented seat pad and the heated seat pad (2) are a one piece assembly. The vented and heated pad

assemblies are located between each front seat cushion and cover and are attached to each cushion, by an adhesive.

OPERATION

OPERATION

The vented seat pads provide a path for the air to be pulled away from the seat bottom and seat back surfaces for seat ventilation.

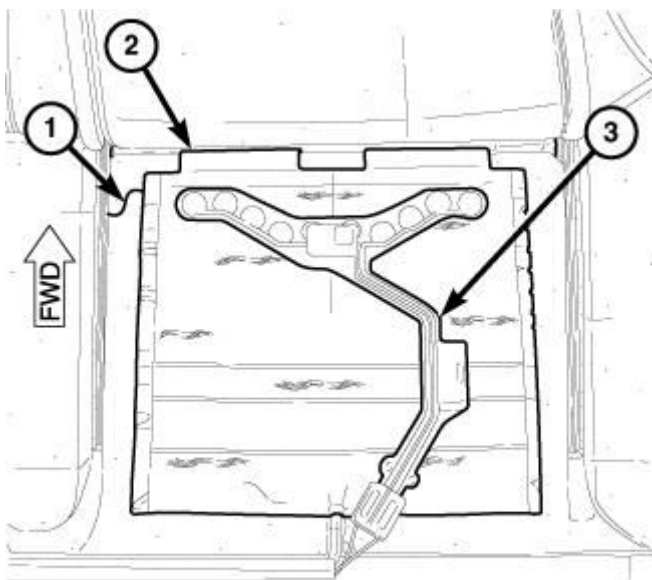
The vented seat pads cannot be repaired and must be replaced if found damaged.

REMOVAL

REMOVAL

WARNING: Disable the airbag system before attempting any component diagnosis or service of the front seats, when equipped with front seat air bags. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

NOTE: Front seat bottom cushion shown, front seat back cushion similar.



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Fig. 6: Front Passenger Seat Bottom Cushion, Occupant Detection Sensor (ODS) & Heater Element
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove the appropriate front seat and place it on a workbench. Refer to **SEAT, REMOVAL**.
3. Remove the vented seat motor from the seat cushion being serviced. Refer to **MOTOR, VENTED SEAT, REMOVAL**.
4. Remove the seat bottom or seat back cover from the cushion (1) (Refer to **SEATS, FRONT**).

NOTE: On all models, the front passenger seat contains an Occupant Detection Sensor (ODS) to provide information to the Occupant Restraint Controller (ORC).

5. When servicing the front passenger vented and heated seat pad assembly (2), be sure to replace the Occupant Detection Sensor (ODS) (3). Refer to **SENSOR, OCCUPANT DETECTION, DESCRIPTION**.

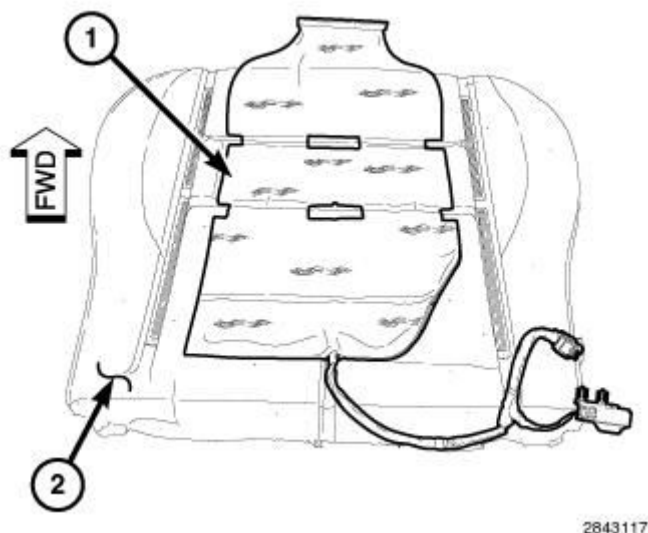


Fig. 7: Heated Seat Pad Assembly & Cushion
Courtesy of CHRYSLER GROUP, LLC

NOTE: When servicing the seat back vented and heated pad assembly, carefully guide the vented pad through the opening in the seat back cushion while removing the pad assembly.

6. Remove the vented and heated seat pad assembly (1) by slowly peeling the pad away from the cushion (2). Be careful not to remove excessive foam from the cushion.

INSTALLATION

INSTALLATION

CAUTION: During vented and heated seat pad replacement, be careful not to fold or

crease the new seat pad. Folds or creases will cause premature failure.

NOTE: Front seat bottom cushion shown, front seat back cushion similar.

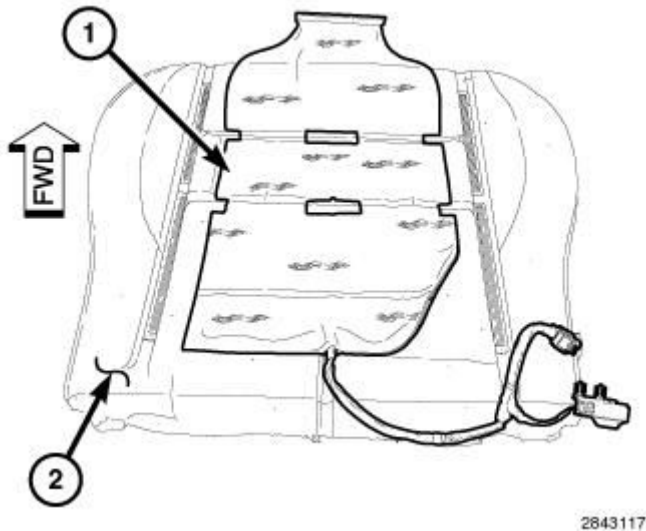
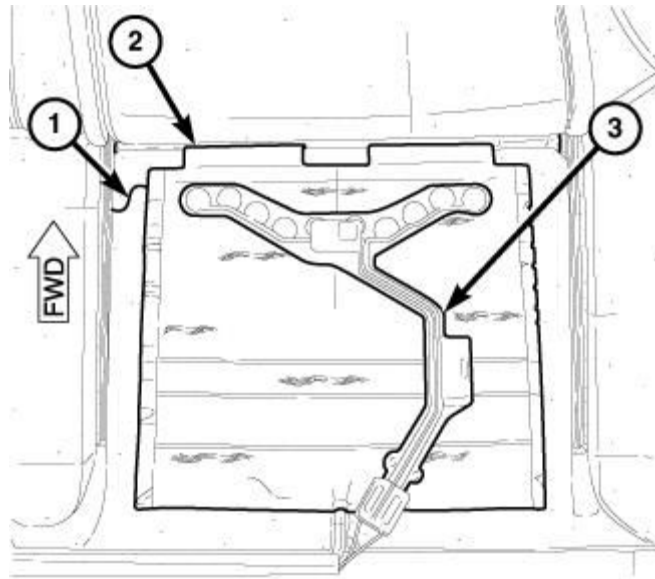


Fig. 8: Heated Seat Pad Assembly & Cushion
Courtesy of CHRYSLER GROUP, LLC

1. Peel off the adhesive backing from the replacement vented and heated seat pad assembly (1).

NOTE: When servicing the seat back vented and heated pad assembly, carefully guide the vented pad through the opening in the seat back cushion while installing the pad assembly.

2. Position the seat pad to the foam cushion directly where the original seat pad was located. There will be adhesive marks on the cushion outlining the factory installed location.
3. Firmly press the vented and heated pad assembly onto the foam cushion. Make sure the adhesive is fully adhered to the cushion.



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Fig. 9: Front Passenger Seat Bottom Cushion, Occupant Detection Sensor (ODS) & Heater Element
Courtesy of CHRYSLER GROUP, LLC

4. When servicing the front passenger bottom vented and heated seat pad assembly (2), install a new Occupant Detection Sensor (ODS) (3). Refer to **SENSOR, OCCUPANT DETECTION, INSTALLATION** .
5. Install the seat bottom or seat back cover onto the cushion (1) (Refer to **SEATS, FRONT**).
6. Install the vented seat motor and cushion. Refer to **MOTOR, VENTED SEAT, INSTALLATION**.
7. Install the seat. Refer to **SEAT, INSTALLATION** .

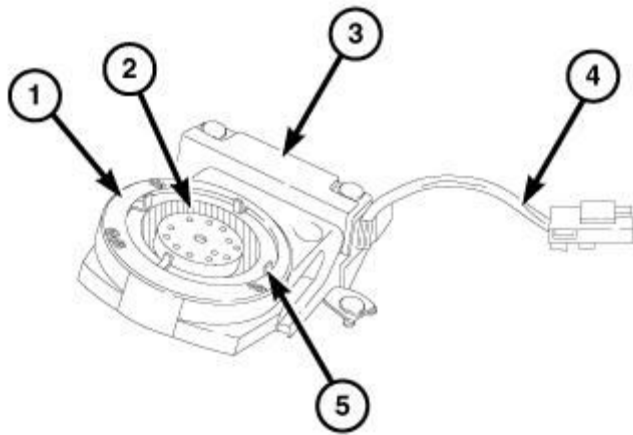
NOTE: Make certain the vented and heated seat wire harnesses and ODS harness (when equipped) are correctly routed. Any excess wire for the heated seat element and ODS should be securely placed between the rear of the foam cushion and the rear seat cover flap.

8. Reconnect the negative battery cable.
9. Verify proper vented and heated seat system operation.

MOTOR, VENTED SEAT

DESCRIPTION

DESCRIPTION



2841423

Fig. 10: Vented Seat Motor, Integral Fan Blade, Wire Lead And Connector, Metal Mounting Bracket & Plastic Tabs

Courtesy of CHRYSLER GROUP, LLC

when equipped, each front seat has two vented seat motors (1). One motor is mounted to the seat back frame and the second motor is mounted to the seat bottom pan. Each vented seat motor is attached to a vented pad.

Each vented seat motor consists of a 12 volt motor with a wire lead and connector (4), an integral fan blade (2), a metal mounting bracket (3) and four plastic tabs (5) that secure the motor to the vented pad. The vented seat motors can be seen once the cushions and covers have been removed.

OPERATION

OPERATION

The vented seat motors will only operate with the engine running and will not operate at the same time as the heated seats. The vented seat motors are controlled by the Heated Seat Module (HSM). The HSM provides the vented seat motors with variable analog voltages giving the motors two selectable speeds. These speeds are selected by the driver and/or front passenger by pressing the vented seat switches. Switching the vented seats on while the heated seats are already operating will disable the heating of the seat and start the venting of the seat. Both front vented seats work independently from each other, so that the driver and front passenger can choose there own settings for individual comfort preferences.

The vented seat system is diagnosed using a scan tool. Comfort Seat and Wheel Module. Refer to **DIAGNOSIS AND TESTING** .

The vented seat motors cannot be adjusted or repaired and must be replaced if inoperative or damaged.

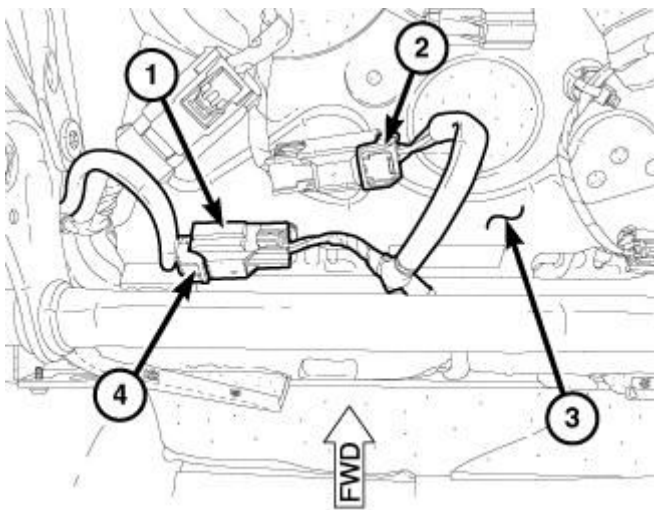
REMOVAL

REMOVAL

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

NOTE: LHD passenger seat shown in illustrations, RHD and driver seat similar.

SEAT BOTTOM CUSHION MOTOR



2841920

Fig. 11: Heated Seat Pad Electrical Connectors, Seat Cushion Pan & Heated Seat Pad Electrical Connector

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove the appropriate seat and place it on a workbench. Refer to **SEAT, REMOVAL**.
3. Disconnect the heated seat pad electrical connectors (2 and 4) located on the seat cushion pan (3).
4. Disengage the heated seat pad electrical connector (1) from the seat cushion pan.

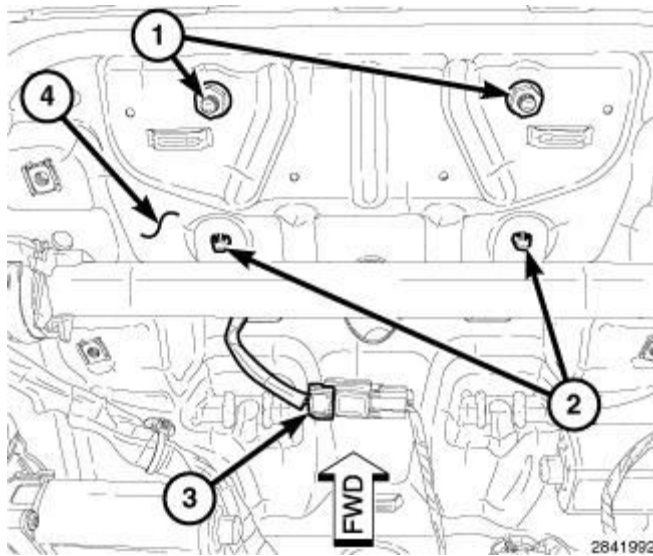


Fig. 12: Two Nuts, Two Push Pin Retainers & Seat Cushion Pan
Courtesy of CHRYSLER GROUP, LLC

5. When servicing the passenger seat, remove the comfort seat and wheel module with bracket. Refer to **MODULE, COMFORT SEAT AND WHEEL, REMOVAL**.
6. Remove the two nuts (1) and disengage the two push pin retainers (2) that secure the vented seat motor to the seat cushion pan (4).
7. Disconnect the vented seat motor electrical connector (3).

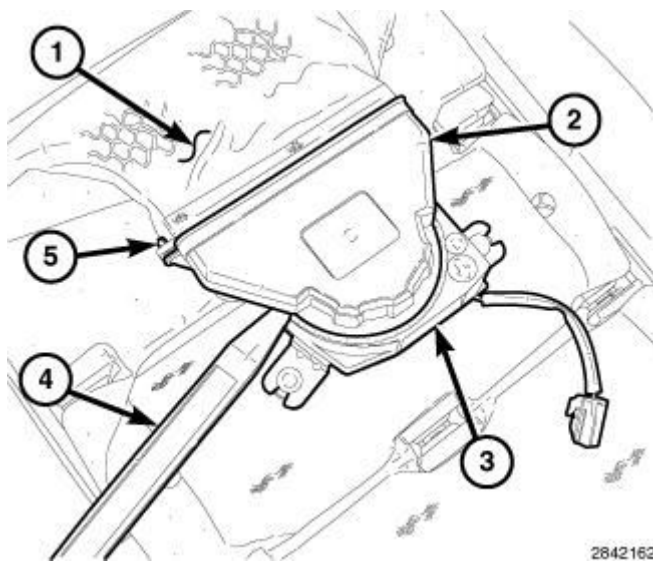


Fig. 13: Trim Stick, Vented Seat Motor & Vented Seat Duct
Courtesy of CHRYSLER GROUP, LLC

NOTE: Illustration shown with seat cover removed. It is not necessary to completely remove the seat bottom cushion cover from the seat bottom cushion to service the vented seat motor.

8. Remove the seat bottom cushion cover from the seat cushion pan (Refer to **SEATS, FRONT**).

NOTE: On all models, the front passenger seat bottom cushion contains an Occupant Detection Sensor (ODS) to provide information to the Occupant Restraint Controller (ORC). Be sure to disconnect the wire harness connector for the ODS prior to removing the front passenger seat cover and cushion. Refer to **SENSOR, OCCUPANT DETECTION, REMOVAL** .

9. Remove the seat bottom cushion (3) and cover from the seat cushion pan and place on a workbench (Refer to **SEATS, FRONT**).
10. Using Trim Stick (special tool #C-4755, Trim Stick) or equivalent (4), carefully disengage the four retaining clips that secure the vented seat motor (3) to the vented seat duct (2) and remove the motor.
11. If required, carefully disengage the retaining tab (5) and remove the vented seat duct from the vented seat pad (1).

SEAT BACK CUSHION MOTOR

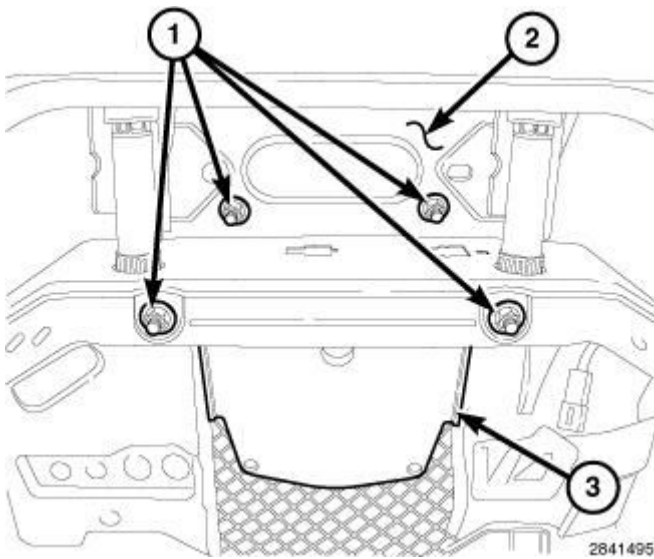


Fig. 14: Four Nuts, Vented Seat Motor & Seat Back Frame
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove the appropriate seat and place it on a workbench. Refer to **SEAT, REMOVAL** .
3. Remove the seat back cover from the seat back frame (Refer to **SEATS, FRONT**).
4. Remove the four nuts (1) that secure the vented seat motor (3) to the seat back frame (2).

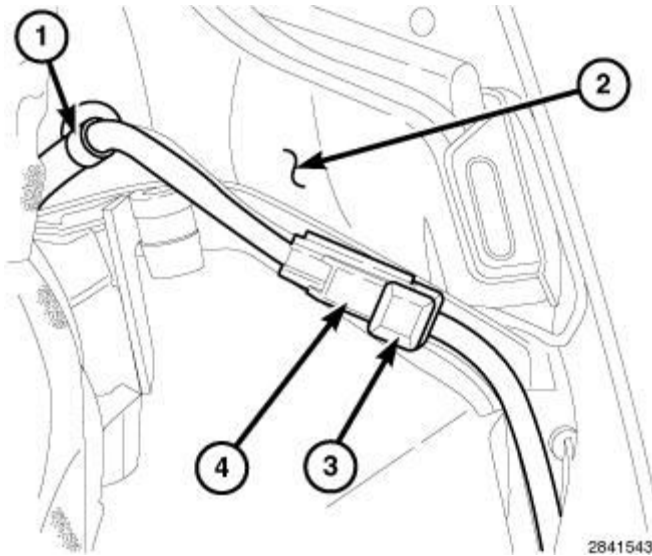


Fig. 15: Vented Seat Motor Electrical Harness Retainer, Connector & Seat Back Frame
Courtesy of CHRYSLER GROUP, LLC

5. Move the top of the seat back cushion out of way and disconnect the electrical connector (3) for the vented seat motor.
6. Disengage the vented seat motor electrical harness retainer (1) and the connector (4) from the seat back frame (2).

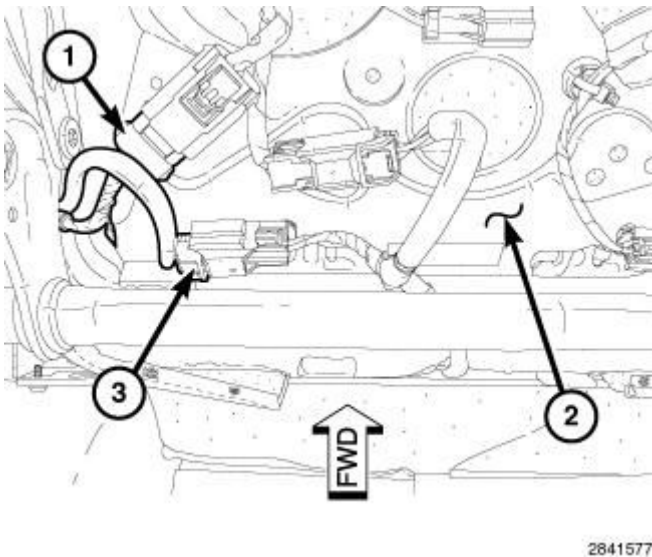


Fig. 16: Air Bag Electrical Connector, Seat Back Heated Pad Electrical Connector & Seat Cushion Pan
Courtesy of CHRYSLER GROUP, LLC

7. Disconnect the air bag electrical connector (1) and seat back heated pad electrical connector (3) located on the seat cushion pan (2).

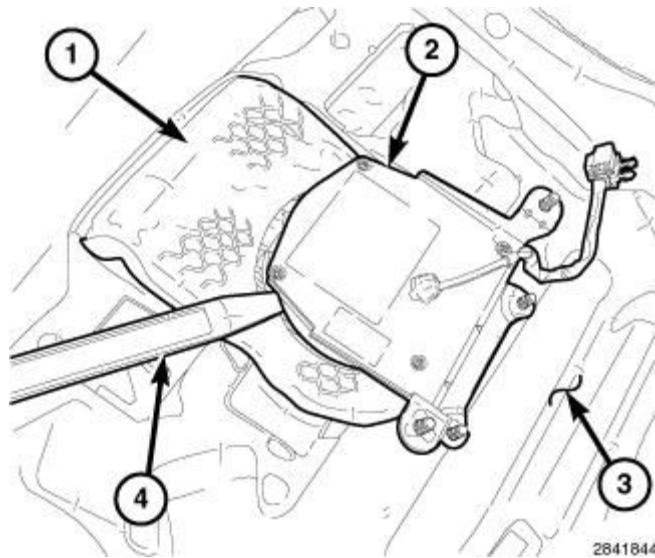


Fig. 17: Trim Stick, Vented Seat Motor & Vented Seat Pad
Courtesy of CHRYSLER GROUP, LLC

NOTE: It is not necessary to remove the seat back cushion cover from the seat back cushion to replace the seat back vented seat motor. Keep the seat cushion and cover together as an assembly while performing this procedure.

8. Remove the seat back cover and cushion (3) as an assembly and place on a workbench (Refer to **SEATS, FRONT**).
9. Using Trim Stick (special tool #C-4755, Trim Stick) or equivalent (4), carefully disengage the four retaining clips that secure the vented seat motor (2) to the vented seat pad (1) and remove the motor.

INSTALLATION

INSTALLATION

NOTE: LHD passenger seat shown in illustrations, RHD and driver seat similar.

SEAT BOTTOM CUSHION MOTOR

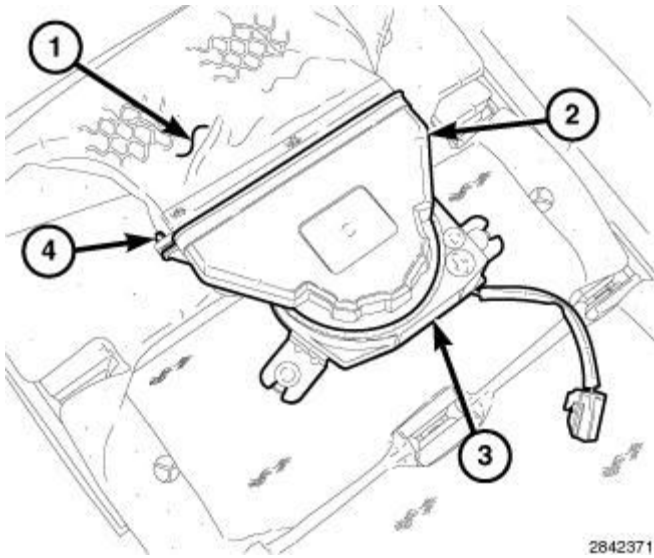


Fig. 18: Vented Seat Duct, Vented Seat Pad, Vented Seat Motor & Retaining Tab
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Illustration shown with seat cover removed from cushion.

1. If removed, install the vented seat duct (2) onto the vented seat pad (1). Be sure the retaining tab (4) is fully engaged.
2. Position the vented seat motor (3) to the vented seat duct and carefully engage the four retaining clips that secure the vented seat motor (3) to the duct. Be sure the retaining clips are fully engaged.

NOTE: On all models, the front passenger seat bottom cushion contains an Occupant Detection Sensor (ODS) to provide information to the Occupant Restraint Controller (ORC). Be sure to reconnect the wire harness connector for the ODS once the front passenger seat bottom cushion and cover are installed. Refer to SENSOR, OCCUPANT DETECTION, INSTALLATION .

3. Install the seat bottom cushion (Refer to SEATS, FRONT).

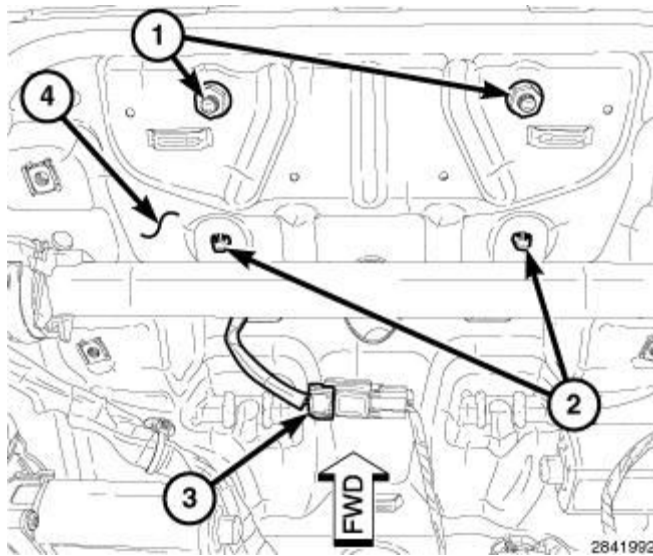


Fig. 19: Two Nuts, Two Push Pin Retainers & Seat Cushion Pan
Courtesy of CHRYSLER GROUP, LLC

4. Position the vented seat motor to the seat cushion pan (4), install the two nuts (1) and engage the two push pin retainers (2). Tighten the nuts securely.
5. Connect the vented seat motor electrical connector (3).
6. Install the seat bottom cushion cover (Refer to **SEATS, FRONT**).
7. When servicing the passenger seat, install the Comfort Seat and Wheel Module with bracket. Refer to **MODULE, COMFORT SEAT AND WHEEL, INSTALLATION** .

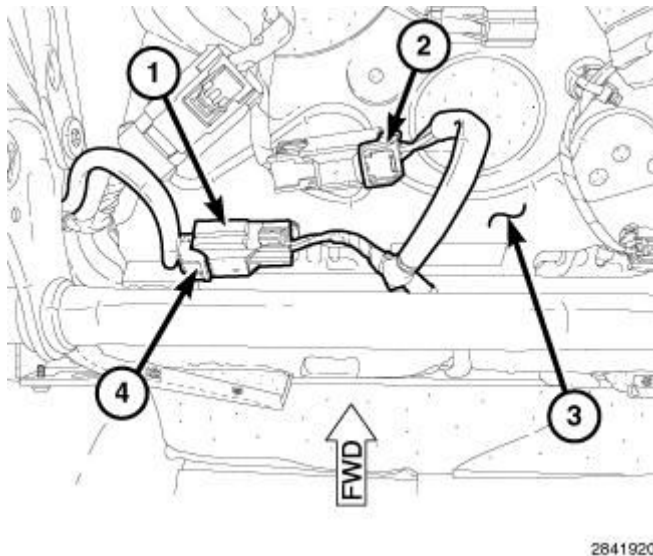


Fig. 20: Heated Seat Pad Electrical Connectors, Seat Cushion Pan & Heated Seat Pad Electrical Connector
Courtesy of CHRYSLER GROUP, LLC

8. Engage the heated seat pad electrical connector (1) to the seat cushion pan (3).

9. Connect the heated seat pad electrical connectors (2 and 4).

NOTE: On all models, the front passenger seat bottom cushion contains an Occupant Detection Sensor (ODS) to provide information to the Occupant Restraint Controller (ORC). Be sure to reconnect the wire harness connector for the ODS once the front passenger seat bottom cushion and cover are installed. Refer to SENSOR, OCCUPANT DETECTION, INSTALLATION .

10. Install the seat. Refer to SEAT, INSTALLATION .
11. Reconnect the negative battery cable.
12. Verify proper vented seat system operation.

SEAT BACK CUSHION MOTOR

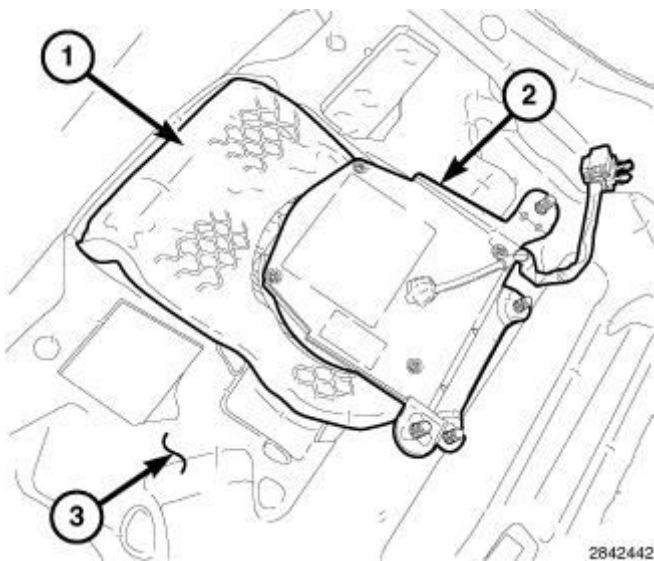


Fig. 21: Vented Seat Motor & Vented Seat Pad
Courtesy of CHRYSLER GROUP, LLC

1. Position the vented seat motor (2) to the vented seat pad (1) and carefully engage the four retaining clips that secure the motor to the pad. Be sure the retaining clips are fully engaged.

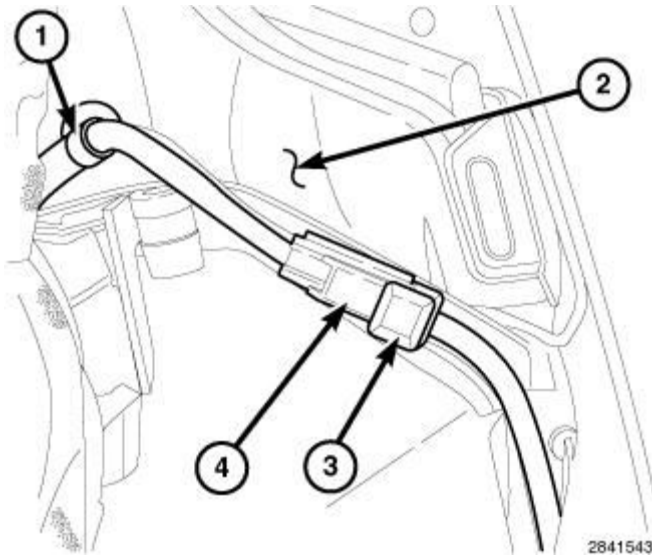


Fig. 22: Vented Seat Motor Electrical Harness Retainer, Connector & Seat Back Frame
Courtesy of CHRYSLER GROUP, LLC

2. Position the seat back cushion and cover onto the seat back frame (2).
3. Engage the vented seat motor electrical harness retainer (1) and the connector (4) to the seat back frame.
4. Connect the vented seat motor electrical connector (3).

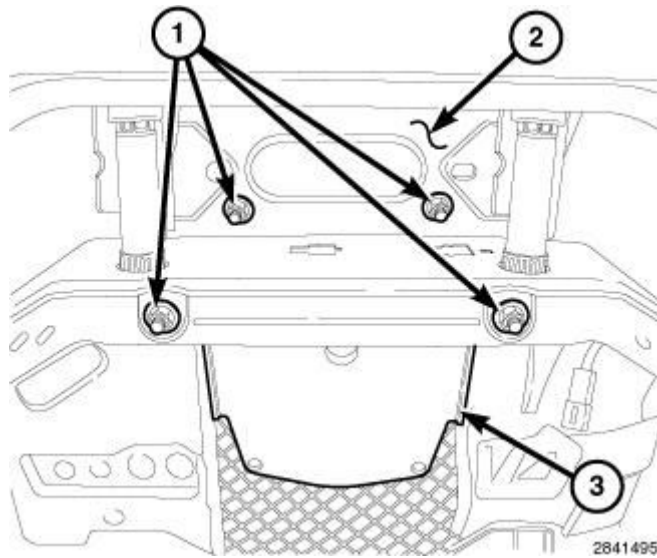
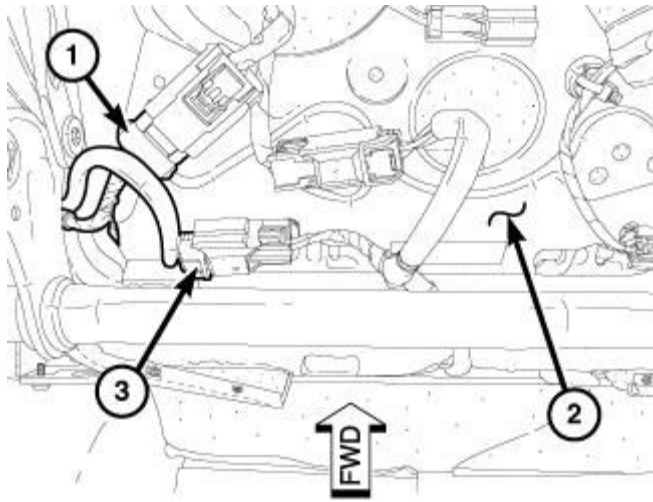


Fig. 23: Four Nuts, Vented Seat Motor & Seat Back Frame
Courtesy of CHRYSLER GROUP, LLC

5. Position the vented seat motor (3) to the seat back frame (2) and install the four nuts (1). Tighten the nuts securely.
6. Install the seat back cushion cover onto the seat back frame (Refer to **SEATS, FRONT**).



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Fig. 24: Air Bag Electrical Connector, Seat Back Heated Pad Electrical Connector & Seat Cushion Pan

Courtesy of CHRYSLER GROUP, LLC

7. Connect the air bag electrical connector (1) and seat back heated pad electrical connector (3) at the seat cushion pan (2).
8. Install the seat. Refer to **SEAT, INSTALLATION** .
9. Reconnect the negative battery cable.
10. Verify proper vented seat system operation.

2014 ACCESSORIES AND EQUIPMENT**Horn System - Service Information - Cherokee****DESCRIPTION****DESCRIPTION**

An electrically-operated horn system is standard factory-installed equipment in this vehicle. Depressing the Driver AirBag (DAB) trim cover in the center of the steering wheel actuates the horn switch contacts, which provides the vehicle operator with a convenient, audible signaling device that can be used to alert pedestrians or the operators of other vehicles in near proximity.

The Body Control Module (BCM) serves as the controller for the horn system, which also allows the BCM to utilize the horn system when providing audible outputs to support other vehicle features such as the horn chirp verification of the Remote Keyless Entry (RKE) and Remote Start systems, as well as the pulsing horn deterrent feature of the optional Vehicle Theft Alarm (VTA) and RKE Panic mode.

The horn system includes the following major components, which are described in further detail elsewhere in this service information:

- **Horn Relay** - The horn relay is soldered onto the Printed Circuit Board (PCB) located within the Body Control Module (BCM) and is not serviceable. The BCM is concealed within the instrument panel behind a fuse access panel outboard of the steering column.
- **Horns** - The standard dual-note horns are located on a bracket secured to the Front End Module (FEM) carrier near the center of the upper radiator cross member, just behind the radiator grille panel. The appearance shield covering the FEM carrier, the cross member and the outboard sides of the cooling module must be removed to gain access to the horns for service.
- **Horn Switch Plate** - The floating horn switch plate is secured to the back of the DAB housing within the steering wheel hub cavity and also serves as the mounting bracket between the DAB and the steering wheel.

Certain functions and features of the horn system rely upon resources shared with other electronic modules in the vehicle over the Local Interface Network (LIN) data bus and the Controller Area Network (CAN) data bus. Other electronic modules in the vehicle that may affect horn system operation are:

- **Body Control Module** - The Body Control Module (BCM) is concealed within the instrument panel outboard of the steering column. The BCM is both a LIN bus master node and a gateway to the CAN data bus. Refer to **MODULE, BODY CONTROL, DESCRIPTION**.
- **Radio Frequency Hub Module** - The Radio Frequency Hub Module (RFHM) (also known as the RF Hub) is located on the upper right D-pillar near the liftgate opening upper header where it is concealed behind the interior trim. Refer to **MODULE, RADIO FREQUENCY (RF HUB), DESCRIPTION**.

The BCM and the RFHM each contain a microcontroller and programming that allow them to communicate with each other and other electronic modules in the vehicle using the Controller Area Network (CAN) data bus. Refer to **COMMUNICATION, DESCRIPTION**.

Hard wired circuitry connects the various horn system components to each other through the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other and to the vehicle electrical system through the use of a combination of soldered splices, splice block connectors and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention as well as pin out and location views for the various wire harness connectors, splices and grounds.

OPERATION

OPERATION

The horn system components operate on battery current received through non-switched fused B(+) circuits so that the system will remain operational, regardless of the status of the ignition switch (also known as the Keyless Ignition Node/KIN or IGnition Node Module/IGNM). The Body Control Module (BCM) controls the output of battery current to the horns through a horn relay soldered to a Printed Circuit Board (PCB) located within the BCM. The BCM controls the relay based upon internal programming, hard wired inputs from the horn switch as well as electronic message inputs received from the Radio Frequency Hub Module (RFHM) (also known as the RF Hub) over the Controller Area Network (CAN) data bus.

The vehicle operator can control typical horn system signaling through the horn switch contacts on the horn switch plate on the back of the Driver AirBag (DAB) within the hub cavity of the steering wheel. When the DAB trim cover in the center of the steering wheel is depressed, the horn switch contacts close, providing a hard wired analog input to the BCM.

In addition, the RFHM sends electronic **horn request** messages to the BCM over the CAN data bus in response to inputs received from the Remote Keyless Entry (RKE) transmitter in vehicles without the optional Passive Entry Keyless Go (PEKG) system, or received from the FOB with Integrated Key (FOBIK) transmitter in vehicles with the PEKG system. Lastly, as the Vehicle Theft Security System (VTSS) controller, the BCM can activate the horn system based upon programming and both hard wired and electronic message inputs from the various VTSS components.

The horns can be activated by the BCM to support each of the following features:

- **Remote Keyless Entry System** - Remote Keyless Entry (RKE) system **Lock** request audible verification.
- **Remote Keyless Entry System** - Remote Keyless Entry (RKE) system **Panic** mode audible alert.
- **Remote Start System** - Remote Start System **Start** request audible verification.
- **Vehicle Theft Alarm** - Vehicle Theft Alarm (VTA) audible alarm.

The RKE system **Lock** request audible verification is a customer programmable feature, which allows the feature to be enabled or disabled to suit individual preferences. Refer to **CENTER, ELECTRONIC VEHICLE INFORMATION, OPERATION**.

The hard wired circuits between components related to the horn system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes

wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the horn system or the electronic controls and communication between modules and other devices that provide some features of the horn system. The most reliable, efficient and accurate means to diagnose the horn system or the electronic controls and communication related to horn system operation requires the use of a diagnostic scan tool.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - HORN SYSTEM

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

NOTE: A continuously sounding horn is immediately resolved by disconnecting the wiring at the horns.

HORN SYSTEM DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
HORNS SOUND CONTINUOUSLY	1. Ineffective horn feed circuit.	1. Test and repair shorted horn feed circuit if required.
	2. Ineffective horn switch return circuit.	2. Test and repair shorted horn switch return circuit if required.
	3. Ineffective horn relay.	3. Test and replace the horn relay, which is integral to the Body Control Module (BCM), if required.
	4. Ineffective horn switch.	4. Test and replace the shorted horn switch, which is integral to the Driver AirBag (DAB), if required.
	5. Ineffective Body Control Module (BCM) inputs or outputs.	5. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
HORNS SOUND INTERMITTENTLY AS THE STEERING WHEEL IS ROTATED	1. Ineffective horn switch return circuit.	1. Test and repair intermittently shorted horn switch return circuit if required.
	2. Ineffective horn switch.	2. Test and replace the intermittently open or shorted horn switch, which is integral to the Driver AirBag (DAB), if required.

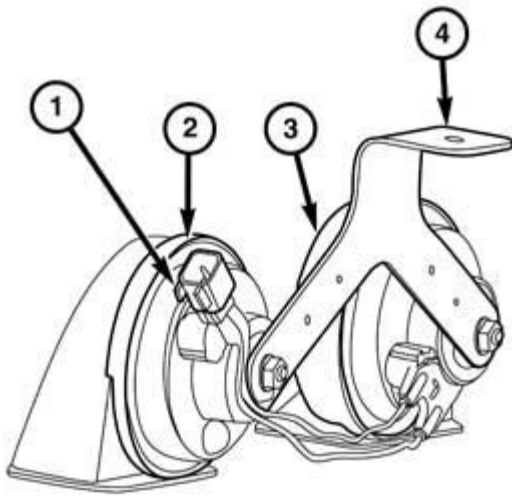
2014 Jeep Cherokee Trailhawk**2014 ACCESSORIES AND EQUIPMENT Horn System - Service Information - Cherokee**

HORNS DO NOT SOUND	1. Ineffective horn ground circuit.	1. Test and repair open horn ground circuit if required.
	2. Ineffective horn feed circuit.	2. Test and repair open horn feed circuit if required.
	3. Ineffective horn relay.	3. Test and replace the horn relay, which is integral to the Body Control Module (BCM), if required.
	4. Ineffective horns.	4. Test and replace open horns if required.
	5. Ineffective horn switch feed circuit.	5. Test and repair open horn switch feed circuit if required.
	6. Ineffective horn switch return circuit.	6. Test and repair open horn switch return circuit if required.
	7. Ineffective horn switch.	7. Test and replace the open horn switch, which is integral to the Driver AirBag (DAB), if required.
	8. Ineffective BCM inputs or outputs.	8. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

SPECIFICATIONS**SPECIFICATIONS****SPECIFICATIONS**

TORQUE SPECIFICATIONS			
DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Horn Mounting Bracket Screw	6	-	53

HORN**DESCRIPTION****DESCRIPTION**



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Fig. 1: Horns, Connector & Bracket**Courtesy of CHRYSLER GROUP, LLC**

Dual electromagnetic diaphragm-type horns are standard equipment on this vehicle. A low note (3) and a high note (2) trumpet-style horn are each secured to a mounting bracket (4). The horn and mounting bracket unit is then secured by a single screw to the Front End Module (FEM) carrier atop the upper radiator cross member. The mounting bracket fastening provision is concealed beneath an appearance shield. Internally the two horns are identical in construction and the external horn trumpets are symmetrically opposite.

A short jumper harness connects the horns to each other electrically so they can both be connected through a single connection (1) integral to the left horn. A dedicated take out and connector of the FEM wire harness connects the horns to the vehicle electrical system.

The two horns and the mounting bracket are factory-tuned as a unit and, therefore, are serviced only as a unit. These horns cannot be adjusted or repaired. If either horn or the mounting bracket is ineffective or damaged, the entire unit must be replaced.

OPERATION

OPERATION

Each horn has a path to ground at all times through its wire harness connection to an eyelet terminal secured to the body sheet metal. The horns are completely controlled by a fused B(+) output received through a relay soldered onto the Printed Circuit Board (PCB) within the Body Control Module (BCM).

Within the two halves of the horn housing are a flexible diaphragm, a plunger, an electromagnetic coil and a set of contact points. The diaphragm is secured in suspension around its perimeter by the mating surfaces of the

horn housing. The plunger is secured to the center of the diaphragm and extends into the center of the electromagnetic coil. The contact points control the current flow through the windings of the electromagnetic coil.

When the horn is energized, electrical current flows through the closed contact points to the electromagnetic coil. The resulting electromagnetic field draws the plunger and diaphragm toward it until that movement mechanically opens the contact points. When the contact points open, the electromagnetic field collapses allowing the plunger and diaphragm to return to their relaxed positions and closing the contact points again. This cycle continues repeating at a very rapid rate producing the vibration and movement of air that creates the sound that is directed through the horn trumpet outlet.

The horns as well as the hard wired input circuits for the horns may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information.

DIAGNOSIS AND TESTING

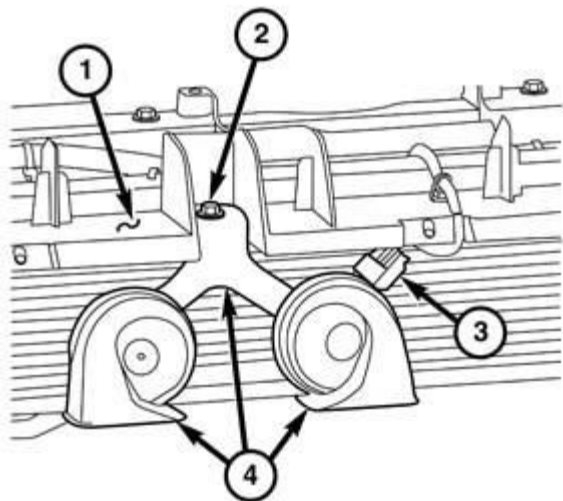
DIAGNOSIS AND TESTING - HORNS

Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

1. Disconnect the Front End Module (FEM) wire harness connectors from the pigtail connector on the horn and mounting bracket unit. Check for continuity between the horn ground circuit in the FEM wire harness connector for the horns and a good ground. There should be continuity. If OK, go to Step 2. If not OK, repair the open ground circuit to ground as required.
2. Check for battery voltage at the horn circuit in the FEM wire harness connector for the horns. There should be zero volts. If OK, go to Step 3. If not OK, repair the shorted horn circuit between the horns and the Body Control Module (BCM) as required.
3. Depress the horn switch. There should now be battery voltage at the horn circuit of the FEM wire harness connector for the horns. If OK, replace the ineffective horn and mounting bracket unit. If not OK, use a diagnostic scan tool and the appropriate diagnostic information for further diagnosis of the Body Control Module (BCM) inputs and outputs.

REMOVAL

REMOVAL



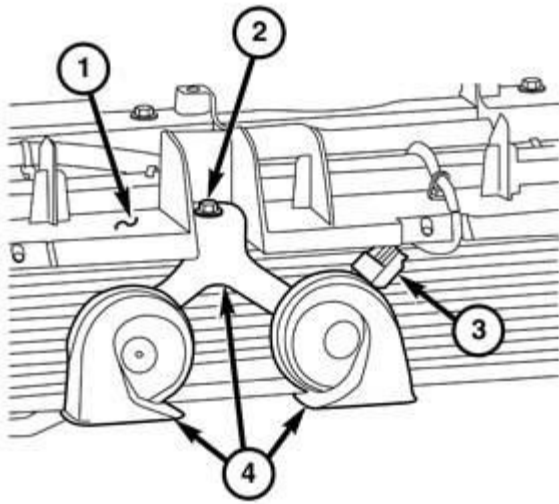
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Fig. 2: Carrier, Screw, Connector & Bracket
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery.
2. Remove the appearance shield from over the Front End Module (FEM) carrier (1) on the upper radiator cross member.
3. Disconnect the FEM wire harness connector (3) from the pigtail wire connector for the horns.
4. Remove the screw (2) that secures the horn mounting bracket (4) to the top surface of the FEM carrier.
5. Remove both horns and the mounting bracket from the vehicle as a unit.

INSTALLATION

INSTALLATION



0814005392

Fig. 3: Carrier, Screw, Connector & Bracket
Courtesy of CHRYSLER GROUP, LLC

1. Position the horns and the mounting bracket (4) to the Front End Module (FEM) carrier (1) atop the upper radiator cross member as a unit.
2. Install and tighten the screw (2) that secures the horn mounting bracket to the top surface of the FEM carrier. Tighten the screw to 6 N.m (53 in. lbs.).
3. Reconnect the FEM wire harness connector (3) to the pigtail wire connector for the horns.
4. Reinstall the appearance shield onto the FEM carrier.
5. Reconnect the negative cable to the battery.

RELAY, HORN

DESCRIPTION

DESCRIPTION

The horn relay is a electromechanical device that consists of an electromagnetic coil, a resistor and a pair of normally open electrical contacts. One of the two electrical contacts is fixed, while the other contact is movable. The movable relay contact is held away from the fixed contact by spring pressure. The horn relay for this vehicle is soldered in place on the Printed Circuit Board (PCB) internal to the Body Control Module (BCM), which is located within the instrument panel outboard of the steering column.

The horn relay cannot be repaired or adjusted and, if ineffective or damaged, the entire BCM unit must be replaced.

OPERATION

OPERATION

The horn relay within the Body Control Module (BCM) switches battery current to the horns when the BCM energizes the electromagnetic coil of the relay. When the electromagnetic relay coil is energized, it draws and holds the normally open movable contact of the relay against the fixed relay contact. The closed relay contacts supply fused battery current from the BCM to energize the horns.

When the BCM de-energizes the electromagnetic relay coil, spring pressure returns the movable contact to the normally open position, which de-energizes the horns. The resistor within the relay is connected in parallel with the electromagnetic coil, and helps to dissipate voltage spikes that are produced when the coil is de-energized.

The hard wired output of the horn relay within the BCM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the BCM or the electronic controls and communication between modules and other devices that provide some features of the BCM controlled horn relay. The most reliable, efficient and accurate means to diagnose the BCM or the electronic controls and communication related to BCM controlled horn relay operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - HORN RELAY

The hard wired output of the horn relay in the Body Control Module (BCM) may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the BCM or the electronic controls and communication between modules and other devices that provide some features of the BCM controlled horn relay. The most reliable, efficient and accurate means to diagnose the BCM or the electronic controls and communication related to BCM controlled horn relay operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

REMOVAL

The horn relay used in this vehicle is soldered onto a Printed Circuit Board (PCB) internal to the Body Control Module located in the instrument panel outboard of the steering column. The horn relay is integral to and serviced only as a unit with the BCM. Refer to **MODULE, BODY CONTROL, REMOVAL** .

INSTALLATION

INSTALLATION

The horn relay used in this vehicle is soldered onto a Printed Circuit Board (PCB) internal to the Body Control Module (BCM) located in the instrument panel outboard of the steering column. The horn relay is integral to

and serviced only as a unit with the BCM. Refer to **MODULE, BODY CONTROL, INSTALLATION**.

SWITCH, HORN

DESCRIPTION

DESCRIPTION

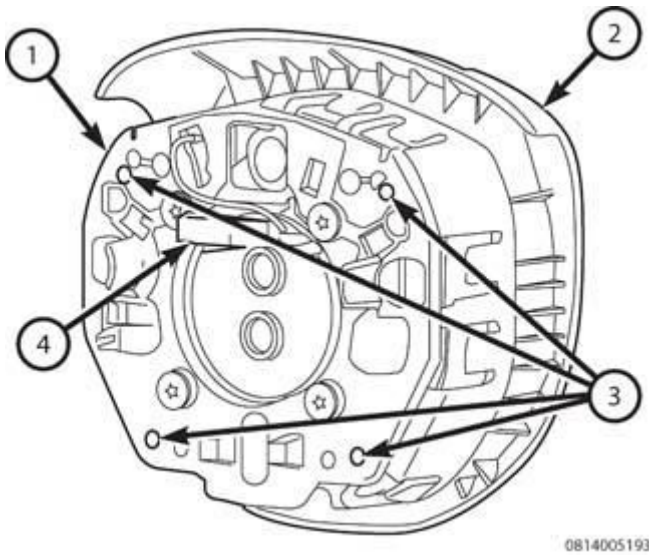


Fig. 4: Horn Switch Plate, Mounting Plate, Horn Switch Contacts & Connector
Courtesy of CHRYSLER GROUP, LLC

The horn switch for this vehicle consists of four individual sets of normally open contacts wired in parallel so that all four sets of contacts operate as one switch. The horn switch contacts (3) are secured to, but insulated from a stamped metal floating horn switch plate (1) that also serves as the mounting plate for the Driver AirBag (DAB) (2). The horn switch plate is over-molded with integral plastic insulators for the horn contacts and routing clips for the contact wiring.

The horn switch plate is secured to but isolated from the DAB housing with four sleeved screws and insulating washers. Each sleeved screw passes through a small coiled spring retained by an interference fit within an isolator on the switch plate. A dedicated take out and connector of the steering wheel wire harness connects the horn switch plate to the vehicle electrical system through a connector (4) on the upper edge of the switch plate. A mounting spring on each outboard side of the horn switch plate is secured within the hub of the steering wheel under a hook formation in the steering wheel hub armature adjacent to each horizontal steering wheel spoke.

The components that make up the horn switch plate cannot be adjusted or repaired. If damaged or ineffective, the entire DAB and horn switch plate must be replaced as a unit.

OPERATION

OPERATION

The floating horn switch plate allows the vehicle operator to actuate the horns by depressing anywhere on the upper surface of the Driver AirBag (DAB) trim cover in the center of the steering wheel. The four sets of horn switch contacts are wired in parallel so they perform as a single switch. One contact from each pair is connected to a path to ground at all times through the steering wheel wire harness and the clockspring.

When the DAB trim cover is depressed, the DAB housing compresses the coil springs isolating the floating horn switch plate causing at least one of the four sets of electrically conductive horn switch contacts to close. When the DAB trim cover is released, the coil springs on the switch plate return the DAB to its at rest position and open the horn switch contacts, which opens the horn switch circuit. The closed horn switch contacts provide a ground signal to the Body Control Module (BCM), which will energize the control coil of the horn relay located within the BCM. The horn relay in the BCM then controls the output to the horns accordingly.

The hard wired circuits between components related to the horn switch plate may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - HORN SWITCH

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

1. Remove the Driver AirBag (DAB) from the steering wheel. Refer to **AIR BAG, DRIVER, REMOVAL**.
2. Disconnect the steering wheel wire harness connector from the horn switch pigtail wire harness connector.
3. With the horn switch contacts released, check for continuity between the two terminals in the horn switch pigtail wire harness connector. There should be no continuity. If OK, go to Step 4. If not OK, replace the ineffective horn switch plate and DAB as a unit.
4. With each of the horn switch contacts compressed one at a time, check for continuity between the two terminals in the horn switch pigtail wire harness connector. There should now be continuity. If OK, go to Step 5. If not OK, replace the ineffective horn switch plate and DAB as a unit.

5. Check the steering wheel wire harness for shorts or opens between the horn switch connector and the clockspring. If OK, go to Step 6. If not OK, repair or replace the steering wheel wire harness as required.
6. Check the clockspring ground circuit between the clockspring and the ground source for continuity. If OK, go to Step 7. If not OK, repair or replace the clockspring or the open ground circuit as required.
7. Check the horn switch output circuit between the clockspring and the horn switch output circuit at the Body Control Module (BCM) for shorts or opens. Repair or replace the clockspring or the shorted or open circuit as required.

REMOVAL**REMOVAL**

The horn switch is serviced only as a unit with the Driver AirBag (DAB). Refer to **AIR BAG, DRIVER, REMOVAL** .

INSTALLATION**INSTALLATION**

The horn switch is serviced only as a unit with the Driver AirBag (DAB). Refer to **AIR BAG, DRIVER, INSTALLATION** .

2014 ACCESSORIES AND EQUIPMENT

Lamps/Lighting - Exterior - Service Information - Cherokee

WARNING

WARNING

WARNING: To avoid serious or fatal injury, eye protection should be used when servicing any glass components.

WARNING: To avoid serious or fatal injury when working on the High Intensity Discharge (HID) headlamp system, be certain to take the proper precautions. The headlamp switch must be in the OFF position. Disconnect and isolate the battery negative cable. There is a risk of fatal injury caused by contact with high voltage used in the HID headlamps. There is a risk of explosion or fire caused by highly flammable materials in the vicinity of damaged HID lighting elements. There is a risk of injury caused by exposure to Ultra Violet (UV) light, a risk of burns caused by high component operating temperatures, a risk of mercury poisoning through glass splinters produced by bursting HID lighting elements. There is also a risk of poisoning caused by inhalation of mercury vapors and by toxic salts and mercury compounds being ingested or coming into contact with the skin. Do not come into contact with parts that are under high voltage. Persons with active electronic implants (e.g. heart pacemakers) must never work on HID headlamps. Wear insulated safety shoes, safety glasses and protective gloves. Remove flammable materials and ensure sufficient ventilation in the working area.

CAUTION: Do not contaminate the glass of halogen bulbs with fingerprints or allow contact with other possibly oily surfaces. Reduced bulb life will result.

CAUTION: Do not use bulbs with higher candle power than indicated in the Bulb Application table. In addition, do not use fuses, circuit breakers or relays having greater amperage value than indicated on the fuse panel or in the Owner's Manual. Damage to lamps, lenses, wiring and other related electrical components can result.

DESCRIPTION

DESCRIPTION

The exterior lighting system for this vehicle includes the following exterior lamp units:

- **Center High Mounted Stop Lamp** - A standard equipment Center High Mounted Stop Lamp (CHMSL) is centered on the liftgate spoiler just above the flip-up glass opening at the rear of the vehicle.
- **Daytime Running Lamps** - The Daytime Running Lamps (DRL) are located in the combination Park/Turn lamp assembly. The DRLs on this vehicle are LED. There is a LED module located on the back of the lamp assembly.
- **Front Fog Cornering Lamps** - Vehicles equipped with this option have a separate fog lamp unit mounted near each outboard end of the front fascia, below each front lamp unit.
- **Front Lamp Units** - A halogen front lamp unit is standard equipment on vehicles manufactured for domestic markets. A High Intensity Discharge (HID) front lamp unit is optional equipment in vehicles manufactured for export markets and optional for domestic market vehicles. The front lamp units are mounted to the front fascia on either side of the mid grille opening.
- **License Plate Lamps** - Two standard equipment rear license plate lamp units are mounted to the underside of the light bar and handle unit, just above the license plate tub formation on the outer liftgate panel.
- **Outside Mirror Signal Lamps** - Vehicles equipped with this option have a signal lamp unit integral to the lower forward facing surface of each outside rear view mirror. These signal lamps are serviced only as a unit with the outside rear view mirror assembly.
- **Rear Lamp Unit** - Full 48-element LED illumination on either side of the vehicle - 24-LED elements are position on either side of the tailgate-to-rear aperture split line. The rear lamp unit combines a three-shot lens that integrates clear, red, and black surround surfacing. Direction signals and braking lamps illuminate on the outside array of the lamp, running lamps illuminate on the full array inside and outside.
- **Rear Fog Lamps** - In certain export markets where they are required, two rectangular fog lamps with red lenses and reflectors are located in the rear bumper fascia, one just inboard and below each rear lamp unit. In domestic market vehicles, a red reflector is installed in the rear fascia in place of a rear fog lamp.

These exterior lighting lamp units and their controls are combined to provide the following exterior lighting features:

- **Automatic Headlamps** - Automatic headlamps are optional equipment on this vehicle. The headlamp switch includes an **A** (Automatic) position and an automatic headlamp sensor senses ambient light levels. The automatic headlamp sensor is integral to the sun load sensor located on the top of the instrument panel. When the **A** position of the headlamp switch is selected, the headlamps are turned ON and OFF automatically as ambient light levels dictate.
- **Automatic High Beam Control** - Vehicles equipped with the optional automatic high beam control system include a unique digital light-sensing imager camera inside the vehicle on the windshield next to the rear view mirror. The conditions that need to be met for Automatic High Beam Control (AHBC) are:
 1. The headlamp switch needs to be set to AUTO.
 2. Customer preference in the radio options needs to be enable.
 3. The stalk moved to the back/high beam position.
 4. Appropriate light conditions.
- **Backup Lamps** - In domestic market vehicles, the backup (or reverse) lamps include a clear bulb, reflector and clear lens that are integral to each inner and outer rear lamp unit. In export market vehicles, backup lamps are found in only the two inner rear lamp units.

- **Brake Lamps** - The brake (or stop) lamps are LED and are integral to each outer rear lamp unit, and the red lens and multiple Light-Emitting Diode (LED) units of the CHMSL. On vehicles equipped with combined rear lighting, the turn signal and stop lamp use the same LED elements. When combined rear lighting is present, turn signals are allowed to interrupt stop lamp actuation to allow turn signal actuation.
- **Daytime Running Lamps** - Domestic market vehicles with HID front lamp units and DRL illuminate a dedicated DRL bulb in the combination park/turn lamp unit, while export market vehicles illuminate a combination DRL/position lamp bulb in each front lamp unit.
- **Exterior Lamp Fail-Safe Operation** - The ElectroMechanical Instrument Cluster (EMIC) (also known as the Cab Compartment Node/CCN) and the Body Control Module (BCM) provide a fail-safe feature which will automatically turn ON the low beam headlamps and all park lamps when the ignition switch is in the ON position and there is no detected input from the headlamp switch, or when there is no communication over the Controller Area Network (CAN) data bus.
- **Exterior Lamp Load Shedding** - The BCM provides a battery saver feature which will automatically turn OFF all exterior lamps that remain ON with the ignition switch in the LOCK position after a timed interval of about eight minutes.
- **Front Fog Cornering Lamps** - The optional front fog lamps include the bulb, reflector and lens of each adjustable front fog lamp unit.
- **Hazard Warning Lamps** - The hazard warning lamps include the bulbs, reflectors and lenses of each lamp in the right and left, front and rear turn signal circuits.
- **Headlamp Delay** - The low or high beam headlamps remain illuminated for 90 seconds after the ignition switch has been turned to the OFF position. If the vehicle is equipped with the optional Electronic Vehicle Information Center (EVIC), the delay interval is customer-programmable for 0, 30, 60 or 90 seconds.
- **Headlamps** - Two headlamp systems are available on this vehicle for domestic markets. The standard halogen headlamp system includes two single filament halogen bulbs in each front lamp unit, one low beam and one high beam. The optional HID headlamp system includes a single HID lighting element/igniter unit for low or high beam headlamps. An electric motor and mechanism internal to the HID lamp unit closes a shutter for low beams and opens the shutter for high beams. The HID front lamp units each include an electronic ballast module, while an Automatic Headlamp Leveling Module (AHLM) that serves both front lamp units levelling motor. Both headlamp systems also include an adjustable reflector and clear lens integral to each front lamp unit.
- **Headlamp Leveling** - On all vehicles equipped with optional HID headlamps, an Automatic Headlamp Leveling Module (AHLM) controls a headlamp leveling actuator motor attached to each front lamp unit to automatically perform headlamp adjustments using inputs from front and rear axle sensors to monitor changes in the vehicle suspension height. On vehicles equipped with manual headlamp levelling, the BCM directly drives both of the headlamp motors.
- **Optical Horn** - Also known as flash-to-pass, the beam selection function of the multi-function switch control stalk has a momentary intermediate position that allows the headlamp high beams to be flashed momentarily, without changing the headlamp beam selection.
- **Park Lamps** - The front park lamps include either the bulbs, the reflectors and the clear lenses of the park lamp compartment in both front combination lamp units. On vehicles not equipped with repeater lamp units, the front lamps also include the front side marker lamp bulbs and reflectors. On vehicles equipped with repeater lamp units, only the side marker reflectors are retained in the front lamp units. The rear park lamps include a clear bulb, a reflector and a red lens integral to each inner and outer rear lamp unit as well as the clear bulbs and lenses of the two license plate lamp units.

- **Rear Fog Lamps** - Rear fog lamps are available only in certain export markets where they are required equipment. The rear fog lamps include a clear bulb and a red lens and reflector that are integral to each rear fog lamp unit located below the outer tail lamps in the rear fascia. On domestic market vehicles, only the red reflector is retained in the rear fascia.
- **Turn Signal Lamps** - The front turn signal lamps include an amber bulb, a reflector, and a clear lens that are integral to each front combination lamp unit. On vehicles equipped with the optional outside mirror signal lamps, there are several amber LED units integral to each mirror signal lamp unit that are also activated by the turn signal circuits for the same side of the vehicle. Depending upon market requirements, the rear turn signal lamps include either a clear bulb and a red lens or an amber lens and a reflector that are integral to each outer rear lamp unit. On vehicles equipped with combined rear lighting, the turn signal and stop lamps use the same bulb filament. When combined rear lighting is preset, turn signals are allowed to interrupt stop lamp actuation to allow turn signal actuation.

Other components of the exterior lighting system for this vehicle include:

- **Automatic Headlamp Leveling Module** - Vehicles equipped with HID headlamps have an AHLM located in the passenger cabin underneath the glove box. The AHLM monitors the vehicle ride height through the front and rear axle sensors, then provides inputs to the headlamp leveling motor on each front lamp unit as appropriate.
- **Axle Sensors** - Vehicles equipped with HID headlamps have an axle sensor for both the front and the rear axles, which monitor the suspension height of the vehicle.
- **Backup Lamp Switch** - A Transmission Range Sensor (TRS) integral to the solenoid pack on the valve body of the electronic automatic transmission performs the backup lamp switch function for this vehicle.
- **Brake Lamp Switch** - A plunger-type brake lamp switch is located on the steering column support bracket under the instrument panel and is actuated by the brake pedal arm when the brake pedal is depressed.
- **Daytime Running Lamp Relays** - All vehicles equipped with optional HID headlamps have two DRL relays located in the Power Distribution Center (PDC).
- **Electronic Ballast Module** - Vehicles equipped with the HID headlamps have an electronic ballast module secured to the underside of each front lamp unit. Each module controls the HID lighting element/igniter within the front lamp unit to which it is mounted.
- **Hazard Switch** - A latching push button-actuated hazard switch is integral to the switch pod located just below the heater and air conditioner controls in the center stack area of the instrument panel.
- **Headlamp Leveling Motor** - A headlamp leveling actuator motor is attached to each front lamp unit housing of vehicles manufactured with HID headlamps.
- **Headlamp Switch** - A headlamp switch is located on the left side of the instrument panel, below the left instrument panel vent outboard of the steering column. The headlamp switch includes a rotary knob to turn the park lamps and headlamps ON or OFF and is pushed inward for selecting the optional front fog lamps on vehicles so equipped. The headlamp switch also features a vertical thumbwheel for selecting the panel lamps dimming level, a PARADE mode to illuminate all Vacuum Fluorescent Display (VFD) units at full brightness for visibility when driving in daylight with the exterior lighting turned ON, and for interior lighting control.
- **Instrument Cluster** - The ElectroMechanical Instrument Cluster (EMIC) is also known as the Cab Compartment Node (CCN) in this vehicle. The EMIC/CCN is located in the instrument panel above the

steering column opening, directly in front of the driver. Refer to **DESCRIPTION**.

- **Multi-Function Switch** - The multi-function switch is integral to the Steering Column Control Module (SCCM) located on the steering column, just below the steering wheel. A control stalk that extends from the left side of the SCM is used to select the turn signal lamps (right or left) and to select the headlamp beam (low, high or optical horn).
- **Park Brake Switch** - A park brake switch is located on the park brake lever mechanism on the cowl side inner panel (Left-Hand Drive/LHD) or the right side of the floor panel transmission tunnel (Right-Hand Drive/RHD) to the left of the steering column.
- **Steering Control Module** - The Steering Control Module (SCM) is located within and integral to the Steering Column Control Module (SCCM) located on the top of the steering column, just below the steering wheel. Refer to **MODULE, STEERING COLUMN, DESCRIPTION**.
- **Body Control Module** - The Body Control Module (BCM) is located beneath the instrument panel on the driver side of the vehicle. Refer to **MODULE, BODY CONTROL, DESCRIPTION**.
- **Trailer Tow Wiring** - Domestic market vehicles with a factory-installed trailer towing package have a trailer tow wire harness with a combination 4-way and heavy duty 7-way trailer tow connector installed in the rear bumper fascia near the trailer hitch receiver. This package also includes an electric trailer brake wiring provision that terminates at a connector located on top of the large body harness connection bracket under the instrument panel to the left of the steering column. An electric trailer brake pigtail harness and an instruction card are available through MOPAR® to ease installation of most aftermarket electric trailer brake controllers.
- **Trailer Tow Relays** - Domestic market vehicles with a factory-installed trailer towing package have two trailer tow relays installed in the TIPM in the engine compartment. One relay is for the trailer right turn and brake lamps, and the other is for the trailer left turn and brake lamps.

Hard wired circuitry connects the exterior lighting system components to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the exterior lighting components through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

OPERATION

OPERATION

Following are paragraphs that briefly describe the operation of each of the major exterior lighting systems. The lamps and the hard wired circuits between components related to the exterior lighting system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the exterior lighting

system or the electronic controls or communication between modules and other devices that provide some features of the exterior lighting system. The most reliable, efficient and accurate means to diagnose the exterior lighting system or the electronic controls and communication related to exterior lighting system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

AUTOMATIC HEADLAMP

The two optional automatic headlamp systems can include the headlamp switch, the Body Control Module (BCM), the heater and air conditioner control head (also known as the Electronic Climate Control/ECC). The auto headlamp system has two available sensors that give the BCM feedback for lamp control. The light rain sensor and the twilight sensor on the top of the instrument panel are the two available sensors.

If the vehicle is not equipped with a light rain sensor, the twilight sensor provides the ambient light level input to the A/C - heater control whenever the ignition switch status is ON. The A/C - heater control responds to this input by sending the appropriate electronic **light level** messages to the BCM over the Controller Area Network (CAN) data bus. When the **AUTO** (Automatic) position is selected with the headlamp switch, the BCM receives a hard wired multiplex input from the headlamp switch. The BCM also receives electronic messages over the CAN data bus from the Powertrain Control Module (PCM) (also known as the Engine Control Module/ECM) indicating the engine is running. **The twilight sensor is only used for auto headlamp operation when the vehicle is not equipped with an optional light rain sensor.**

If the vehicle is equipped with a light rain sensor, then this rain sensor is what is read by the BCM.

The BCM responds to either input condition by automatically controlling a Pulse-Width Modulated (PWM) voltage output to the selected headlamp bulb filaments through the right and left low or high beam driver circuits to illuminate the headlamps. The BCM also remembers which beams (low or high) were selected when the headlamps were last turned OFF, and energizes those beams and lamps again the next time it turns the headlamps ON.

AUTOMATIC HIGH BEAM CONTROL

The optional auto high beam system (**if equipped with the Forward Facing Camera (FFC)**) includes the digital imager Forward Facing (FFC), the BCM, the radio, the IC and the headlamp switch. First, the **Auto High Beams** option must be enabled using the customer programmable features function of the radio. Then the **AUTO** (Automatic) position must be selected using the rotary knob of the headlamp switch, the headlamp beam selector switch must be in the high beam position and the appropriate lighting conditions must be present. Finally, the vehicle speed must be greater than 32 kilometers-per-hour (20 miles-per-hour).

Once all of these prerequisites have been met, the HaLF module (otherwise known as the Forward Facing Camera or FFC) automatically sends the appropriate electronic **headlamp beam select switch status** messages to the BCM over the CAN C data bus. The BCM follows the command from the HaLF and turns on or off the high beams appropriately. The BCM also sends a message to the cluster for "Enabled" and "Disabled" display messages. These messages should not display unless under optimal lighting conditions (night, dusk, etc.).

BACKUP LAMPS

The backup (or reverse) lamps have a path to ground at all times through a takeout and eyelet terminal of the

body wire harness that is secured to the body sheet metal within the passenger compartment. On vehicles with a manual transmission, the backup lamp switch provides a hard wired input to the PCM through a backup lamp switch signal circuit, and the PCM sends the appropriate electronic **reverse gear status** messages to the BCM over the CAN data bus. The BCM then controls a battery feed to the backup lamps on the backup lamp feed circuit as required whenever the ignition switch status is ON.

On vehicles with an automatic transmission, the PCM continually monitors electronic an hard wired multiplex input from the Transmission Range Sensor (TRS), then sends the appropriate electronic **gear selector status** messages received from the Gear Shift Module (GSM) over the CAN data bus, then relays the appropriate electronic **reverse gear status** messages to the BCM over the CAN data bus.

BRAKE LAMPS

The brake (or stop) lamps and the Center High Mounted Stop Lamp (CHMSL) each have a path to ground at all times through a takeout and eyelet terminal of the body wire harness that is secured to the body sheet metal within the passenger compartment. The brake lamp switch is continually monitored by the BCM. When the normally open circuit of the brake lamp switch is closed by the brake pedal arm, the BCM responds to the brake lamp switch input by providing a control output that energizes or de-energizes the brake lamps.

Some models can be equipped with combined rear lighting. This option allows the brake lamp and the turn signal lamp to use the same single bulb filament. The turn signal operation will take precedence when commanded on.

DAYTIME RUNNING LAMPS

Vehicles equipped with this option or manufactured for sale in Canada illuminate the LED bulbs of both front combination turn/park lamp units when the engine is running, the parking brake is released and the exterior lamps are turned OFF. The BCM must be programmed appropriately for this feature to be enabled. Once enabled, anytime the BCM receives electronic messages over the CAN data bus from the PCM indicating the engine is running, a hard wired multiplex input from the headlamp switch indicating the status of the headlamp switch is OFF and a hard wired input from the park brake switch indicating that the parking brake is released, the BCM provides an output to the proper bulb filaments through the right and left front turn signal feed circuits to produce illumination at the proper intensity.

FRONT FOG AND CORNERING LAMPS

Vehicles equipped with optional front fog lamps include a front fog lamp switch integral to the headlamp switch on the instrument panel. The front fog lamps have a path to ground at all times through their connection to the Front End Module (FEM) wire harness and a takeout with an eyelet terminal that is secured to the body sheet metal.

When the BCM input from the headlamp switch assembly indicates the fog lamps are selected, it controls front fog lamp operation by providing a battery voltage output to the fog lamps through the right and left front fog lamp control circuits. The BCM also sends the appropriate electronic **front fog lamp status** messages to the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) to illuminate or extinguish the front fog lamp indicator.

Fog Lamp Dropout with High Beam Activation - If the front fog lamps are active and the vehicle's high beams turn ON, then the front fog lamp outputs shall turn OFF and the IPC indicator will also turn off and remain off until the high beams are turned OFF. If vehicle high beams are active and the front fog lamp command is operated, the IPC indicator will remain OFF. The BCM will keep track of a fog lamp request and honor the request when the high beams are turned OFF.

The BCM also provides a battery saver (load shedding) feature for the front fog lamps, which will turn these lamps OFF if they are left ON for more than about eight minutes when the status of the ignition switch is LOCK, if there is a charging system failure or if the electrical system voltage falls below about 11.75 volts for more than about 30 seconds.

Each front fog lamp includes an integral adjustment screw to be used for static aiming of the fog lamp beams.

FRONT FOG CORNERING LAMPS

The Cornering lights function is derived from two different inputs. Steering angle or the activation of the turn signal lamps. Both of those items can induce lamp cornering activation. In the event that both are creating an active request at the same time, the steering angle will be given priority to the expense of the one based on the turn signal lights. In the case of the steering angle sensor, the lamps will activate at the "10 and 2" positions when turning. When neither angle is breached, both of the front fog lamps remain on uninterrupted.

HAZARD WARNING LAMPS

The hazard warning system includes the IC, the BCM and the hazard latching switch in the switch pod bank in the center area of the instrument panel. The hazard switch provides a hard wired input to the BCM. When the BCM receives an input from the hazard switch, it controls hazard warning system operation and flash rate by controlling battery voltage outputs through high side drivers on the front and rear, right and left turn signal control circuits.

The BCM also sends the appropriate electronic **hazard switch status** messages to the IC over the CAN data bus to control the illumination and flash rate of the right and left turn signal indicators, as well as to control the click rate of an electromechanical relay soldered onto the IC electronic circuit board that emulates the sound emitted by a conventional electromechanical hazard warning flasher.

HEADLAMPS

The headlamp system includes the IC, the Steering Control Module (SCM), the BCM, the headlamp switch and the multi-function switch on the steering column. The headlamp bulbs have a path to ground at all times through their connection to the FEM wire harness. The FEM harness has takeouts with eyelet terminals that are secured to the front end sheet metal within the engine compartment. The BCM will store a Diagnostic Trouble Code (DTC) for any shorts or opens in the headlamp circuits.

The BCM monitors a hard wired multiplex input to determine the status of the headlamp switch. The BCM also monitors electronic **headlamp beam select switch status** messages received from the SCM over the CAN data bus. The BCM responds to these inputs by providing a pulse width modulated voltage output to the headlamp bulbs through high side drivers on the right and left headlamp feed circuits to illuminate the headlamps, and controls the high and low beam shutter operation through high side drivers on the right and left high beam feed

circuits. The BCM also sends the appropriate electronic **headlamp beam status** messages to the IC to control the illumination of the high beam indicator.

The BCM also remembers which beams (LOW or HIGH) were selected when the headlamps were last turned OFF, and energizes those beams again the next time the headlamps are turned ON. The BCM provides a battery saver (load shedding) feature for the headlamps, which will turn these lamps OFF if they are left ON for more than about eight minutes when the ignition switch status is LOCK. The SCM and the BCM each provide a fail-safe feature for the headlamps, which will cause the BCM to turn the low beam headlamps ON automatically if there is no input available from the headlamp switch or the multi-function switch. The BCM also provides a fail-safe feature for the headlamps that will turn the headlamps ON automatically whenever a loss of CAN bus communication is detected when the ignition switch status is ON.

Each headlamp includes an integral reflector adjustment screw to be used for static aiming of the headlamps.

HEADLAMP LEVELING

On vehicles with the HID headlamps, an automatic leveling system is used that includes front and rear axle sensors and an Automatic Headlamp Leveling Module (AHLM) located under the dash on the passenger side compartment. A headlamp leveling motor located on the back of each HID lamp unit is mechanically connected through an integral pushrod to the adjustable headlamp reflector.

The automatic headlamp leveling system automatically adjusts the headlamp beam reflectors to compensate for changes in vehicle suspension height regardless of whether caused by the loading of the vehicle suspension or vehicle pitch changes caused by acceleration and deceleration. The actuator motors are automatically adjusted by the AHLM, which reads the front and the rear axle sensors to determine the suspension height changes. The circuitry of the AHLM provides a voltage signal to the electronic circuitry of both leveling actuator motors and the electronic circuitry of these stepper motors responds to the voltage inputs received from the AHLM to move the headlamp reflectors to the selected position.

The headlamp leveling motors have a path to ground at all times. The automatic headlamp leveling components operate on battery current received only when the exterior lighting and the ignition switch are turned ON.

MANUAL HEADLAMP LEVELING

In certain markets where required, a headlamp leveling system is provided on the vehicle. The headlamp leveling system includes unique front headlamp units each connected to a headlamp leveling actuator motor, and a roller-actuated headlamp leveling switch integral to the headlamp switch pod on the instrument panel. The headlamp leveling system allows the headlamp beams to be adjusted to one of four vertical positions to compensate for changes in inclination caused by the loading of the vehicle suspension. The leveling motors are mechanically connected through an integral pushrod to the adjustable headlamp mounting collar.

Each time the headlamp leveling switch is depressed the circuitry of the switch pod provides an electronic **select status up** or **select status down** message input to the BCM over the a data bus. The BCM provides a voltage output to the headlamp leveling motors through high side drivers on the headlamp leveling motor right and left signal circuits to move the headlamp reflectors to the selected position based upon the voltage input received from the BCM. The BCM also sends the appropriate electronic messages back to the switch to control the illumination of the **1** , **2** , or **3** Light Emitting Diode (LED) selected position indicator in the leveling switch

button. BCM logic will only allow the headlamp leveling system to operate while the ignition switch is in the ON position and the exterior lighting is turned ON.

HEADLAMP TIME DELAY

The headlamp delay feature includes the headlamp switch and the BCM. In vehicles with the optional EVIC, this feature is customer programmable using the EVIC switch pod and the EVIC electronic display unit to select delay intervals of 0 seconds (disabled), 30 seconds, 60 seconds and 90 seconds. If the headlamp switch remains in the headlamp **AUTO** (Automatic) position until after the ignition switch status transitions to OFF, then the headlamps will remain illuminated until after the selected delay interval has elapsed. The park lamps will not stay ON during the headlamp time delay interval. The default delay interval is 90 seconds, but can be reprogrammed by the customer using the EVIC switch pod.

PARK LAMPS

The park lamps system includes the headlamp switch on the instrument panel and the BCM. The front park lamps each have a path to ground at all times through their connection to the FEM wire harness. The FEM wire harness has takeouts with eyelet terminals that are secured to the body sheet metal. The rear park/tail lamps and license plate lamp bulb each have a path to ground at all times through a takeout and eyelet terminal of the body wire harness that is also secured to the body sheet metal.

The BCM monitors a hard wired multiplex input from the headlamp switch. The BCM responds to this input by controlling a battery voltage output to the appropriate lamps and bulbs through high side drivers on the front and rear, right and left lamp driver and control circuits. The BCM also sends the appropriate electronic **park lamps status** messages to the IC to control the illumination and lighting level of the panel lamps.

The BCM provides a battery saver (load shedding) feature for the park lamps, which will turn these lamps OFF if they are left ON for more than about eight minutes while the ignition switch status is LOCK. The BCM also provides a fail-safe feature for the park lamps, which will turn the park lamps and low beam headlamps ON automatically if there is no input available from the headlamp switch after the ignition switch status transitions to ON. The BCM also provides a fail-safe feature for the park lamps that will turn the park lamps and low beam headlamps ON automatically whenever a loss of CAN bus communication is detected after the ignition switch status transitions to ON.

TURN SIGNAL LAMPS

The left or right direction signals are activated using the left stalk switch input to the SCCM. These commands are codified using a resistive divider, into the analogical command that is read by the SCCM and then sent to the BCM over CAN-C.

The turn signal lamps system includes the multi-function switch on the steering column, the SCM, the IC and the BCM. The front turn signal lamp bulbs each have a path to ground at all times through their connection to the combination park/turn lamp and dash wire harness. The combination park/turn lamp and dash wire harness has takeouts with eyelet terminals that are secured to the body sheet metal. The rear turn signal lamps are LED elements within the rear outer tail lamp housing.

The SCM monitors a hard wired multiplex input from the multi-function switch to determine the status of the

turn signal switch, then sends the appropriate electronic **turn signal switch status** messages to the BCM over the CAN data bus. The BCM responds to these messages by controlling a battery voltage output and the flash rate for either the right or left turn signal lamps through high side drivers on the appropriate front and rear, right or left turn signal control circuits. The BCM also sends the appropriate electronic messages to the IC to control the illumination and flash rate of the right or left turn signal indicators, as well as to control the click rate of an electromechanical relay soldered onto the IC electronic circuit board that emulates the sound emitted by a conventional electromechanical turn signal flasher.

The BCM also provides a Turn Signal ON warning that will send a **turn signal ON warning** request message to the IC over the CAN bus that causes the IC to generate repetitive chimes to indicate that a turn signal has been active continuously for 1.6 kilometers (1 mile) with the vehicle speed greater than 22 kilometers-per-hour (15 miles-per-hour). The chime will continue until the turn signal input becomes inactive or until the vehicle speed message indicates that the speed is less than 22 kilometers-per-hour (15 miles-per-hour), whichever occurs first.

SNA Definition - Signal Not Acquired. If the SCCM detects an issue (stuck switch, etc) and sets an active fault, the SCCM shall broadcast the SNA state to the BCM. BCM will default to an idle state and keep all turn signal outputs OFF until a valid request is received.

Combined Rear Lighting - Some models will be equipped with combined rear lighting. The stop lamp and the turn signal lamp share the same single bulb filament. When the turn signal is activated, the SCCM recognizes the signal switch request. The SCCM sends this message over the CAN C bus to the BCM for processing. The BCM then actuates the single bulb filament for signal operation only until the stalk is reset back to the neutral position.

Combined Front Park/Turn - When the turn signal function is active, the BCM will apply the normal voltage to the turn signal output. When both the park and the turn functions (or hazards) are active, the BCM will switch between park intensity and turn intensity for the duration of the front left turn or right turn (or hazard) event.

Lane Change Function - If either of the turn signals are actuated for a time equal to or less than 500 ms, the BCM will activate the requested turn signal light and will blink for three blinks. At the same time the signals are switched ON, the BCM will also activate the internal signal corresponding with the selected side. The internal signal will show ON for the entire period of the turn signal even and will not show to be blinking. The internal signal is synchronous with the signal activation and will turn OFF at the end of the event. After 3 blink cycles, the BCM switches OFF the turn signals, the CAN-B signals, and the internal signals corresponding to the selected side.

Turn Signal Alert Feature - When either the left or right turn signal are activated, the IPC (Cluster) will record the distance travelled using odometer information by way of the CAN-B signal. When one mile (1.6 km) has been traveled, the cluster will assume that the operator has unintentionally left the turn signals activated and two alerts will occur: A slow audible chime will emit from the cluster or an icon and textual message will display on the cluster.

CONTROL MODULE RESPONSIBILITY

- BCM - Turn signal lights request from the SCCM, received from the turn signal multi-function switch.

- BCM - Turn signal lights powering (left and right sides)
- BCM - Turn signal light status transmittal over CAN-B.
- BCM - Combined lighting turn/stop and park/turn lamp management.
- IPC - Obtain turn signal lamp status from CAN-B
- IPC - Turn signal lights signalling management.
- IPC - Turn signal lights fail signalling management.
- SCCM - Turn signal output acquisition from the multi-function switch
- SCCM - Turn signal activation request to BCM over CAN-C

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - EXTERIOR LIGHTING

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

NOTE: When diagnosing the exterior lighting circuits, remember that high generator output can burn out bulbs rapidly and repeatedly; and, that dim or flickering bulbs can be caused by low generator output or poor battery condition. If one of these symptoms is a problem on the vehicle, be certain to diagnose the battery and charging system, then repair as necessary.

NOTE: A good ground is necessary for proper lighting operation. If a lighting problem is being diagnosed that involves multiple symptoms, systems, or components, the problem can often be traced to a loose, corroded, or open ground.

The lamps and the hard wired circuits between components related to the exterior lighting system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the exterior lighting system or the electronic controls or communication between modules and other devices that provide some features of the exterior lighting system. The most reliable, efficient, and accurate means to diagnose the exterior lighting system or the electronic controls and communication related to exterior lighting system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

AUTOMATIC HEADLAMPS

NOTE: Be certain that the headlamps can be turned ON and OFF manually before attempting to diagnose and repair the Automatic Headlamps. If not, diagnose and repair those problems before attempting to repair the Automatic Headlamps.

NOTE: The Automatic Headlamp switch is integral to the headlamp switch itself, which communicates with the Body Control Module (BCM) over via data bus. Before performing any of the following tests, determine whether the other functions of the headlamp are operational. If the other functions are ineffective, diagnose and repair that problem before attempting to repair the Automatic Headlamps.

CONDITION	POSSIBLE CAUSES	CORRECTION
AUTO HEADLAMPS INEFFECTIVE	1. Feature not enabled.	1. Enable Auto Low or Auto Low/High using the customer programmable features function of the Electronic Vehicle Information Center (EVIC).
	2. Ineffective headlamp switch.	2. Test and replace switch if required.
	2. Incorrect BCM configuration.	2. Use a diagnostic scan tool to check and configure BCM if required.
	3. Ineffective circuits between sun load sensor and air conditioner - heater control (except with automatic wipers).	3. Test and repair sun sensor and sun sensor return circuits if required.
	4. Ineffective sun load sensor (except with automatic wipers). If vehicle is export, then LRSM is 100% in control of light identification and not the Sun Sensor.	4. Test and replace sun load sensor if required. Connect the scan tool and monitor the sensor voltage while covering and uncovering the sensor. A covered sensor voltage should read approximately 4.6V and an uncovered sensor should read approximately 2.3V.
	5. Ineffective Light Rain Sensor Module (LRSM) (with automatic wipers).	5. Use a diagnostic scan tool to test and replace the LRSM if required. Refer to the appropriate diagnostic information.
	6. Ineffective BCM inputs or outputs.	6. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

AUTO HIGH BEAM HEADLAMP

Please make sure the beauty cover is installed in position while testing the (Forward Facing Camera) FFC and Auto High Beams. Loss of cover creates interference with the imager of the camera.

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CONDITION	POSSIBLE CAUSES	CORRECTION
AUTO HIGH BEAM CONTROL SYSTEM IS INOPERATIVE.	1. Feature is not enabled.	1. Enable Auto Low/High using the customer programmable features function located within the radio.
	2. Automatic headlamps are not turned ON .	2. Turn automatic headlamps ON using the control knob of the headlamp switch.
	3. Headlamp high beams are not selected.	3. Turn high beam headlamps ON using the stalk.
	4. Vehicle speed is below 34 kilometers-per-hour (18 miles-per-hour).	4. Increase vehicle speed. This system not designed to operate at speeds below 34 kilometers-per-hour (18 miles-per-hour).
	5. Incorrect (Body Control Module) BCM configuration.	5. Use a diagnostic scan tool to check and correct the BCM configuration settings if required. Refer to the appropriate diagnostic information.
	6. FFC is inoperative on the bus or a loss of CAN C bus communication.	6. Using the WiTech, confirm the FFC is off-line and to test the CAN C bus system.
	7. Ineffective ground circuit to the FFC.	7. Test and repair open ground circuit to the forward facing camera as required.
	8. Ineffective feed circuit to the FFC.	8. Test and repair open fused run relay output circuit to the forward facing camera if required.
	9. Forward Facing Camera imager lens dirty or obstructed.	9. Clean imager lens and windshield or remove obstructions from the windshield glass if required.
	10. FFC bussed outputs to the BCM.	10. Use a diagnostic scan tool confirm the FFC operation.
	11. FFC is in a limited function mode.	11. Use a diagnostic scan tool and check for DTCs relative to FFC reliant components.

BACKUP LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
BACKUP LAMP DOES NOT ILLUMINATE	1. Ineffective or missing bulb.	1. Test and replace backup lamp bulb if required.
	2. Ineffective ground circuit.	2. Test and repair open backup lamp ground circuit if required.
	3. Ineffective feed circuit.	3. Test and repair open backup lamp feed circuit if required.

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BACKUP LAMP DOES NOT EXTINGUISH	4. Ineffective switch.	4. Test and replace backup lamp switch (manual transmission) or TRS (automatic transmission) if required.
	5. Ineffective BCM inputs or outputs.	5. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
	1. Ineffective feed circuit.	1. Test and repair shorted backup lamp feed circuit if required.
	2. Ineffective switch.	2. Test and replace backup lamp switch (manual transmission) or transmission range sensor (automatic transmission) if required.
	3. Ineffective BCM inputs or outputs.	3. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

BRAKE LAMPS

NOTE: The brake lamps and the Center High Mounted Stop Lamp (CHMSL) are illuminated by several Light-Emitting Diode (LED) units that are soldered to the electronic circuit board within the lamp housing. The CHMSL is hard wired to the output of the brake lamp switch, while the brake lamps are powered by high side drivers within the BCM based upon an input from the brake lamp switch. If the brake lamps and all of the LED units within the CHMSL fail to operate, diagnose and repair the brake lamps before attempting to repair the CHMSL. If the brake lamps operate but none of the CHMSL LED units illuminate, test and repair the CHMSL ground or feed circuit if required. If some of the CHMSL LED units operate and others do not, the CHMSL assembly must be replaced with a new unit.

CONDITION	POSSIBLE CAUSES	CORRECTION
BRAKE LAMP DOES NOT ILLUMINATE	1. Ineffective ground circuit.	1. Test and repair open brake lamp ground circuit if required.
	2. Ineffective fuse.	2. Test and replace the fuse in the BCM if required.
	3. Ineffective feed circuit.	3. Test and repair open brake lamp switch output circuit or stop lamp output circuit if required.
	4. Ineffective switch.	4. Test and replace brake lamp switch if required.
	5. Ineffective BCM inputs or outputs.	5. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
BRAKE LAMP DOES NOT EXTINGUISH	1. Ineffective feed circuit.	1. Test and repair shorted brake lamp switch output circuit or stop lamp output

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		circuit if required.
	2. Improperly adjusted switch.	2. Adjust the brake lamp switch if required.
	3. Ineffective switch.	3. Test and replace brake lamp switch if required.
	4. Ineffective BCM inputs or outputs.	4. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

DAYTIME RUNNING LAMPS

NOTE: Before performing the following tests, determine whether the turn signals operate. If the turn signals are also ineffective, diagnose and repair that problem before attempting to repair the Daytime Running Lamps.

CONDITION	POSSIBLE CAUSES	CORRECTION
DAYTIME RUNNING LAMPS WILL NOT ILLUMINATE	1. Incorrect BCM programming. 2. Automatic transmission in PARK position. 3. Parking brake applied. 4. Engine not running. 5. Ineffective LED Module 6. Ineffective BCM inputs or outputs.	1. Use a diagnostic scan tool to check and configure BCM if required. 2. Place the transmission gear selector lever in any position except PARK. 3. Release the parking brake. 4. Start the engine. 5. Confirm power and ground at the LED module prior to replacement. 6. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

FRONT FOG LAMPS

NOTE: The front fog lamp switch is integral to the left multi-function switch/Steering Control Module (SCM), which communicates with the Body Control Module (BCM). The BCM communicates or broadcasts to the ElectroMechanical Instrument Cluster (EMIC)/Cab Compartment Node (CCN) over the CAN-B. Before performing any of the following tests, determine whether the other functions of the left multi-function switch/SCM are operational. If the other left multi-function switch/SCM functions are ineffective, diagnose and repair that problem before attempting to repair the Front Fog Lamps.

If the BCM receives a short or open circuit from the fog lamp switch, the BCM will set a DTC for each present faulted condition. If the BCM received an open or short circuit while the front fog lamps are ON then the BCM will retain the last state of the fog lamp switch until the next engine cycle. After the next ignition cycle if the headlamp switch is still faulted, the BCM will not activate the front fog lamps.

If the front fog lamp switch is active for 20 second or more, the BCM shall activate the front fog lamps and will

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set a front fog stick switch fault DTC. If the front fog lamp switch remains faulted, the BCM will continue to drive the front fog lamps in a normal manner until the switch is repaired or replaced. If the front fog switch is no longer stuck, the BCM will clear the related fault DTC.

If the BCM received a front fog command and the PROXI is not correct or set for the vehicle being equipped with fog lamps, the BCM will set a misbuild fault. Run PROXI configuration first.

CONDITION	POSSIBLE CAUSES	CORRECTION
FRONT FOG LAMP DOES NOT ILLUMINATE	1. Ineffective or missing bulb.	1. Test and replace front fog lamp bulb if required.
	2. Ineffective ground circuit.	2. Test and repair open front fog lamp ground circuit if required.
	3. Ineffective feed circuit.	3. Test and repair open front fog lamp feed circuit if required.
	4. Ineffective EMIC (CCN) inputs or outputs.	4. Use a diagnostic scan tool and the appropriate diagnostic information for further EMIC diagnosis.
	5. Ineffective BCM inputs or outputs.	5. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
FRONT FOG LAMP DOES NOT EXTINGUISH	1. Ineffective feed circuit.	1. Test and repair shorted front fog lamp feed circuit if required.
	2. Ineffective EMIC (CCN) inputs or outputs.	2. Use a diagnostic scan tool and the appropriate diagnostic information for further EMIC diagnosis.
	3. Ineffective BCM inputs or outputs.	3. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

HAZARD WARNING LAMPS

NOTE: The hazard switch is integral to the instrument panel switch bank, which provides a hard wired output to the BCM. Before performing any of the following tests, confirm whether the left and right turn signals operate satisfactorily. Then determine whether the other functions of the instrument panel switch bank are operational. If the turn signals are ineffective or operate improperly, or if the other instrument panel switch bank functions are ineffective, diagnose and repair those problems before attempting to repair the hazard warning lamps system.

CONDITION	POSSIBLE CAUSES	CORRECTION
HAZARD WARNING LAMPS DO NOT FLASH	1. Ineffective instrument panel switch bank.	1. Test and replace instrument panel switch bank if required.
	2. Ineffective BCM inputs or	2. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the

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	outputs.	appropriate diagnostic information.
HAZARD WARNING LAMPS DO NOT STOP FLASHING	1. Ineffective instrument panel switch bank. 2. Ineffective BCM inputs or outputs.	1. Test and replace instrument panel switch bank if required. 2. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

HEADLAMPS

NOTE: As part of the exterior lighting fail-safe feature, upon ignition ON, all exterior park lamps and the headlamp low beams will illuminate regardless of the left multi-function switch control knob position if the SCM cannot detect an input from the left multi-function switch, or if there is a loss of communication between the left multi-function switch/SCM and the EMIC or between the EMIC and the BCM. Diagnose and repair those problems before attempting to repair the Headlamps. In addition, the BCM will store a Diagnostic Trouble Code (DTC) for an open or shorted headlamp circuit.

CONDITION	POSSIBLE CAUSES	CORRECTION
HEADLAMP DOES NOT ILLUMINATE	1. Ineffective or missing bulb.	1. Test and replace headlamp bulb if required.
	2. Ineffective ground circuit.	2. Test and repair open headlamp ground circuit if required.
	3. Ineffective feed circuit.	3. Test and repair open headlamp low beam or high beam feed circuit if required.
	4. Ineffective EMIC (CCN) inputs or outputs.	4. Use a diagnostic scan tool and the appropriate diagnostic information for further EMIC diagnosis.
	5. Ineffective BCM inputs or outputs.	5. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
HEADLAMP DOES NOT EXTINGUISH	1. Ineffective feed circuit.	1. Test and repair shorted headlamp low beam or high beam feed circuit if required.
	2. Ineffective EMIC (CCN) inputs or outputs.	2. Use a diagnostic scan tool and the appropriate diagnostic information for further EMIC diagnosis.
	3. Ineffective BCM inputs or outputs.	3. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
HEADLAMPS ILLUMINATE WITH IGNITION ON AND HEADLAMP SWITCH OFF (FAIL-SAFE OPERATION)	1. Loss of LIN or CAN data bus communication.	1. Test and repair the LIN or CAN data bus if required. Refer to the appropriate diagnostic information.

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HEADLAMPS WILL NOT SWITCH FROM HIGH TO LOW BEAMS, OR FROM LOW TO HIGH BEAMS	1. Ineffective EMIC (CCN) inputs or outputs.	1. Use a diagnostic scan tool and the appropriate diagnostic information for further EMIC diagnosis.
	2. Ineffective BCM inputs or outputs.	2. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

HEADLAMP LEVELING - AUTOMATIC

NOTE: Before performing any of the following tests, confirm whether the park lamps operate satisfactorily. If the park lamps are ineffective or operate improperly, diagnose and repair that problem before attempting to repair the automatic headlamp leveling function.

CONDITION	POSSIBLE CAUSES	CORRECTION
ONE LEVELING MOTOR IS INEFFECTIVE	1. Ineffective ground circuit.	1. Test and repair open leveling motor ground circuit if required.
	2. Ineffective feed circuit.	2. Test and repair open leveling motor feed circuit if required.
	3. Ineffective signal circuit.	3. Test and repair open headlamp adjust signal circuit if required.
	4. Ineffective motor.	4. Test and replace headlamp leveling motor (front lamp unit) if required.
BOTH LEVELING MOTORS ARE INEFFECTIVE	1. Ineffective motor ground circuit.	1. Test and repair open leveling motor ground circuit if required.
	2. Ineffective motor feed circuit.	2. Test and repair open leveling motor feed circuit if required.
	3. Ineffective signal circuit.	3. Test and repair open or shorted leveling motor signal circuit if required.
	4. Ineffective Automatic Headlamp Leveling Module (AHLM) (also known as the High Intensity Discharge Transducer/HIDT) inputs or outputs.	4. Use a diagnostic scan tool to test the AHLM inputs and outputs. Refer to the appropriate diagnostic information.
	5. Ineffective BCM inputs or outputs.	5. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
	6. Ineffective motors.	6. Test and replace leveling motors (front lamp units) if required.

HEADLAMP LEVELING - MANUAL

NOTE: Before performing any of the following tests, confirm whether the park lamps operate satisfactorily. If the park lamps are ineffective or operate improperly, or if the other instrument panel switch pod functions are ineffective, diagnose and repair those problems before attempting to repair the manual headlamp leveling function.

CONDITION	POSSIBLE CAUSES	CORRECTION
ONE LEVELING MOTOR IS INEFFECTIVE	1. Ineffective ground circuit.	1. Test and repair open leveling motor ground circuit if required.
	2. Ineffective feed circuit.	2. Test and repair open leveling motor feed circuit if required.
	3. Ineffective signal circuit.	3. Test and repair open headlamp leveling motor signal circuit if required.
	4. Ineffective motor.	4. Test and replace headlamp leveling motor if required.
BOTH LEVELING MOTORS ARE INEFFECTIVE	1. Ineffective switch inputs or outputs.	1. Use a diagnostic scan tool and the appropriate diagnostic information for further switch diagnosis.
	2. Ineffective motor ground circuit.	2. Test and repair open leveling motor ground circuit if required.
	3. Ineffective motor feed circuit.	3. Test and repair open leveling motor feed circuit if required.
	4. Ineffective signal circuit.	4. Test and repair open or shorted headlamp leveling motor signal circuit if required.
	5. Ineffective BCM inputs or outputs.	5. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
	6. Ineffective motors.	6. Test and replace leveling motors if required.

PARK LAMPS

NOTE: As part of the exterior lighting fail-safe feature, upon ignition ON, all exterior park lamps and the headlamp low beams will illuminate regardless of the left multi-function switch control knob position if the SCM cannot detect an input from the left multi-function switch, or if there is a loss of communication between the left multi-function switch/SCM and the EMIC or between the EMIC and the BCM. Diagnose and repair those problems before attempting to repair the Park Lamps.

CONDITION	POSSIBLE CAUSES	CORRECTION
PARK LAMP DOES NOT ILLUMINATE	1. Ineffective or missing bulb.	1. Test and replace park lamp bulb if required.

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	2. Ineffective ground circuit.	2. Test and repair open park lamp ground circuit if required.
	3. Ineffective feed circuit.	3. Test and repair open park lamp feed circuit if required.
	4. Ineffective EMIC (CCN) inputs or outputs.	4. Use a diagnostic scan tool and the appropriate diagnostic information for further EMIC diagnosis.
	5. Ineffective BCM inputs or outputs.	5. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
PARK LAMP DOES NOT EXTINGUISH	1. Ineffective feed circuit.	1. Test and repair shorted park lamp feed circuit if required.
	2. Ineffective EMIC (CCN) inputs or outputs.	2. Use a diagnostic scan tool and the appropriate diagnostic information for further EMIC diagnosis.
	3. Ineffective BCM inputs or outputs.	3. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

TURN SIGNAL LAMPS

NOTE: The turn signal switch is integral to the left multi-function switch/SCM, which communicates with the EMIC/CCN over the LIN data bus. Before performing any of the following tests, determine whether the other functions of the left multi-function switch/SCM are operational. If the other left multi-function switch/SCM functions are ineffective, diagnose and repair that problem before attempting to repair the Turn Signal Lamps.

Turn Lamp Fault Environment - Diagnoses is performed for the front and rear turns signal lamps by the BCM. If Combined Front Park/Turn is present on the vehicle, the BCM will only perform diagnostics when the turn signal is placed into an active state. If a left or right turn signal is requested and a faulted condition is present for either the front or rear turn signals at the time of the activation, the frequency of the CAN-B signals will show doubled corresponding to the side of the fault. If the left or right side has a faulted condition, the cluster will send an internal signal to display to the driver the faulted condition. However, the BCM output frequency to the lamps will not be changed during this faulted state. Even if the CAN-B frequency is doubled, the output from the BCM to the lamps will still be driven at a normal operating frequency.

It is required that, during the same ignition cycle, if a turn signal lamp or bulb is replaced, the system will recover with no intervention by the technician. Starting the vehicle and disconnecting a turn signal bulb or LED will result in an open fault. Replacing the bulb or LED lamp assembly causes the fault to change from active to stored. Normal signalling behavior will return. This process applies to any of the six exterior lighting turn signal displays in use for this vehicle.

CONDITION	POSSIBLE CAUSES	CORRECTION
ONE TURN SIGNAL LAMP	1. Ineffective or missing	1. Test and replace turn signal bulb if

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DOES NOT ILLUMINATE	bulb.	required.
	2. Ineffective ground circuit.	2. Test and repair open ground circuit if required.
	3. Ineffective feed circuit.	3. Test and repair open right or left turn signal feed circuit if required.
	4. Ineffective BCM inputs or outputs.	4. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
ALL RIGHT SIDE OR ALL LEFT SIDE TURN SIGNAL LAMPS (OR BOTH SIDES) DO NOT FLASH	1. Ineffective feed circuit.	1. Test and repair open right or left turn signal feed circuit if required.
	2. Ineffective EMIC (CCN) inputs or outputs.	2. Use a diagnostic scan tool and the appropriate diagnostic information for further EMIC diagnosis.
	3. Ineffective BCM inputs or outputs.	3. Use a diagnostic scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
ALL RIGHT SIDE OR ALL LEFT SIDE TURN SIGNALS DO NOT FLASH	1. Ineffective or missing bulb.	1. Test and replace turn signal bulb if required.
	2. Ineffective ground circuit.	2. Test and repair open bulb ground circuit if required.
	3. Ineffective feed circuit.	3. Test and repair open right or left turn signal feed circuit if required.
TURN SIGNALS DO NOT AUTOMATICALLY CANCEL	1. Ineffective cancel cam.	1. Inspect and replace the turn signal cancel cam (clockspring) if required.
	2. Ineffective cancel actuator.	2. Inspect and replace the turn signal cancel actuator (left multi-function switch) if required.

STANDARD PROCEDURE**STANDARD PROCEDURE - LAMP ALIGNMENT****VEHICLE PREPARATION FOR LAMP ALIGNMENT**

1. Check for and correct any burnt out bulbs.
2. Repair or replace any ineffective, worn or damaged body or suspension components that could hinder proper lamp alignment.
3. Verify the proper tire inflation pressures.
4. Remove any accumulations of mud, snow or ice from the vehicle underbody and clean the front lamp lenses.
5. Verify that there is no load in the vehicle (cargo or passengers), except for the driver.
6. The fuel tank should be FULL. Add 2.94 kilograms (6.5 pounds) of weight over the fuel tank for each estimated gallon of missing fuel.

7. Verify the correct vehicle suspension height.

LAMP ALIGNMENT SCREEN PREPARATION

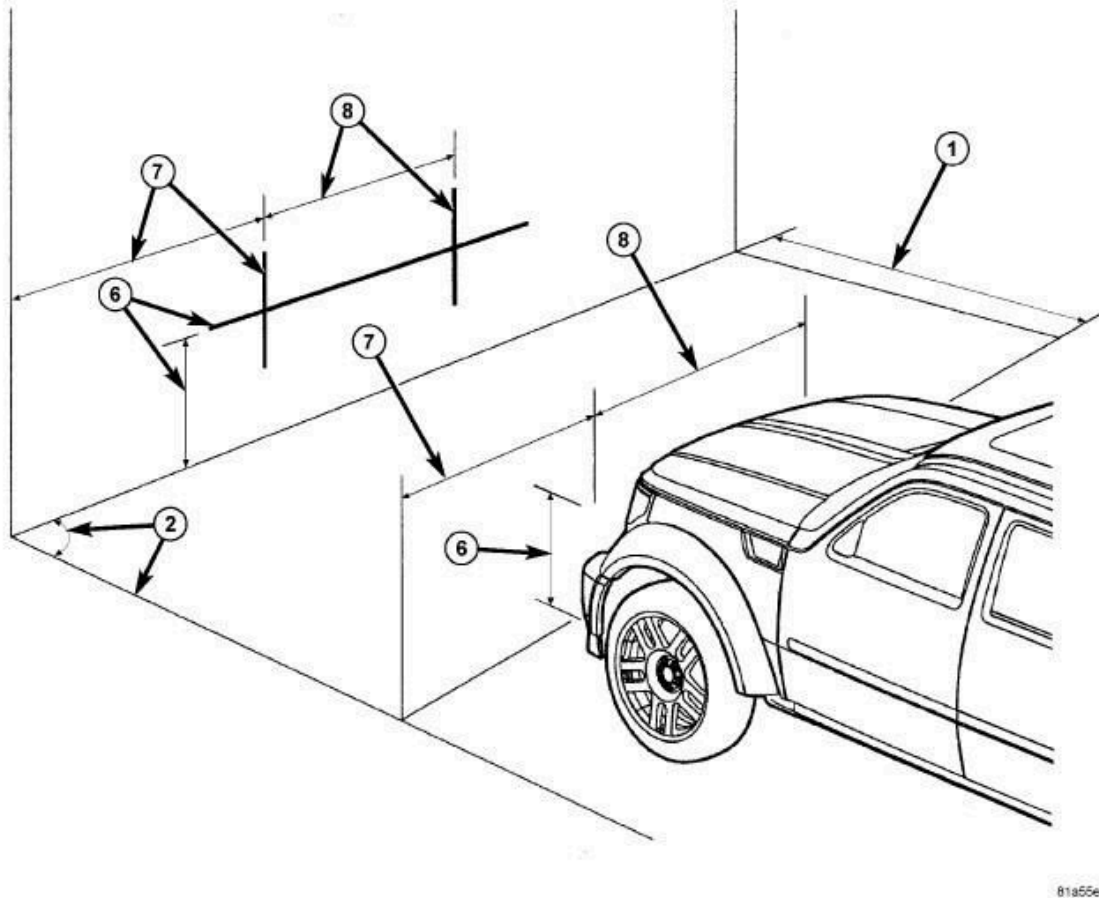


Fig. 1: Lamp Alignment Screen Preparation
Courtesy of CHRYSLER GROUP, LLC

The procedure that follows will prepare a suitable front lamp alignment screen.

1. Tape a line on a level floor 7.62 meters (25 feet) away from and parallel to the flat wall that will be used as the lamp alignment screen. The level floor will be used as the horizontal zero reference.
2. An adjacent wall or floor member that is perpendicular to the alignment screen can be used as the vertical zero reference. If there is no adjacent wall or floor member that is perpendicular to the screen, tape a second line on the floor perpendicular to both the alignment screen and the first line, and outboard of either side of where the vehicle will be positioned. This will be used as the vertical zero reference.
3. Position the vehicle so that the side of the vehicle is parallel to the vertical zero reference, and so that the front of the lamp lenses are in the vertical plane of the parallel line taped on the floor 7.62 meters (25 feet) away from the screen.
4. Rock the vehicle side-to-side three times to allow the suspension to stabilize.
5. Jounce the front suspension three times by pushing downward on the front bumper and releasing.

6. Measure the distance between the optical center of one of the lamps being aimed (head or fog) and the floor (horizontal zero reference). Transfer this measurement to the alignment screen with a piece of tape placed horizontally to the floor. This line will be used as the lamp horizontal reference.
7. Measure the distance between the vertical zero reference and the optical center of the nearest lamp being aimed (head or fog). Transfer this measurement to the alignment screen with a piece of tape placed vertically across the appropriate (head or fog) lamp horizontal reference. This is the centerline reference for the first lamp.
8. Measure the distance on center between the first and the second lamp being aimed. Transfer this measurement to the alignment screen with a second piece of tape placed vertically across the appropriate (head or fog) lamp horizontal reference. This is the centerline reference for the second lamp.

HEADLAMP ALIGNMENT

NOTE: Due to the linear nature of the headlamp cutoff, a properly aimed low beam headlamp will project the top edge of the high intensity pattern on the alignment screen from the horizontal line to 50 millimeters (2 inches) below the horizontal line for domestic market vehicles, or to 125 millimeters (5 inches) below the horizontal line for export market vehicles. No horizontal (right/left) adjustment is required for this headlamp beam pattern in domestic market vehicles. Export market vehicles have a second horizontal (right/left) adjustment screw provided. The high beam pattern will be correct when the low beams are properly aimed.

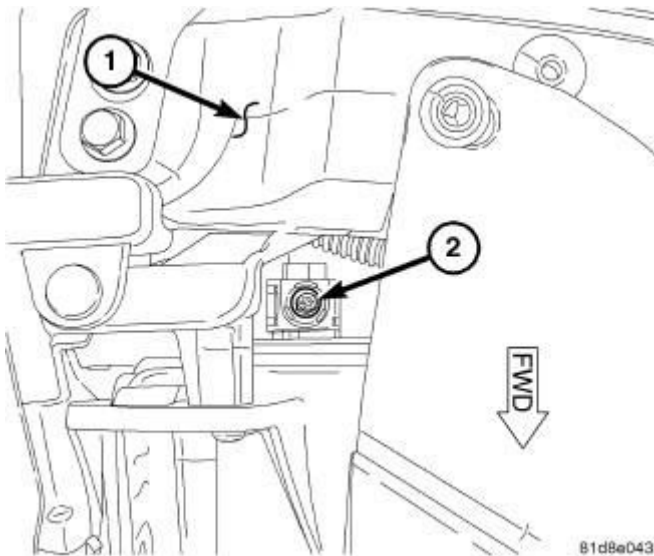


Fig. 2: Headlamp Vertical Adjustment Screw
Courtesy of CHRYSLER GROUP, LLC

1. Turn the headlamps ON and select the LOW beams for vehicles in all markets.
2. On all vehicles except those with headlamp leveling, use a screwdriver to rotate the headlamp vertical adjustment screw (2) on the back of the front lamp unit just inboard of the fender and forward of the upper radiator crossmember (1) to adjust the beam height as required.

3. For export markets only, use a screwdriver to rotate the headlamp horizontal adjustment screw on each headlamp to adjust the beam right or left as required.

FOG LAMP ALIGNMENT

NOTE: A properly aimed front fog lamp will project a pattern on the alignment screen 100 millimeters (4 inches) below the fog lamp centerline and straight ahead of the lamp for domestic market vehicles.

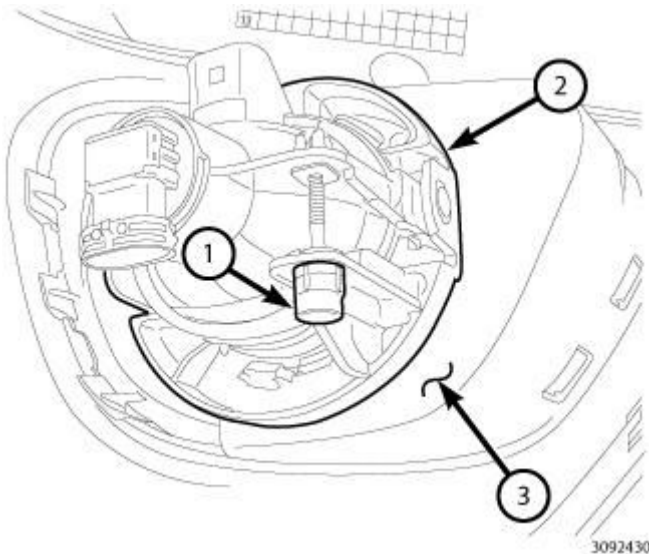


Fig. 3: Vertical Adjustment Screw, Front Fog Lamp & Front Fascia
Courtesy of CHRYSLER GROUP, LLC

1. Turn the fog lamps ON.
2. Insert a screwdriver through the clearance hole in the underside of the front fascia (3) closure panel below each fog lamp (2) to rotate the vertical adjustment screw (1) on each lamp to adjust the beam height as required.

SPECIFICATIONS

SPECIFICATIONS

BULB APPLICATION TABLE

LAMP	BULB
BACKUP	T-20 (W21W)
BRAKE	3157 (P27/7W)
CENTER HIGH MOUNTED STOP	LIGHT-EMITTING DIODES SERVICED IN ASSEMBLY
DAYTIME RUNNING LAMP	LIGHT-EMITTING DIODES SERVICED IN ASSEMBLY

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FRONT FOG	H11LL/55W
FRONT PARK	7442NALL
FRONT SIDE MARKER	FEDERAL MOGUL SOCKET 194 BULB
FRONT TURN SIGNAL	7442NALL
HEADLAMP (HALOGEN)	Halogen HIR2
HEADLAMP (HID)	HID Version D3S Xenon Burner
LICENSE PLATE	W5W
REAR PARK	LIGHT-EMITTING DIODES SERVICED IN ASSEMBLY
REAR SIDE MARKER	LIGHT-EMITTING DIODES SERVICED IN ASSEMBLY
REAR TURN SIGNAL	LIGHT-EMITTING DIODES SERVICED IN ASSEMBLY

BALLAST, HIGH INTENSITY DISCHARGE (HID)

DESCRIPTION

DESCRIPTION



Fig. 4: Electronic Ballast Module & Screws
Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with the optional High Intensity Discharge (HID) headlamps have an electronic ballast module (1) mounted to the inboard side of each upper lamp unit. The electronic circuitry of the module is contained within a die cast aluminum module housing, which is secured by four screws through integral mounting tabs to the molded plastic front lamp unit housing.

The sealed connector receptacle of the module is integral located on the side of the housing. The connector receptacle contains terminal pins that connect the module to the vehicle electrical system, to the high tension HID cable and to the front lamp unit through dedicated take outs and connectors of the front lamp unit wire harness.

The electronic ballast module cannot be adjusted or repaired and, if damaged or ineffective, it must be replaced.

OPERATION

OPERATION

The electronic ballast module operates on battery current and ground received directly from the Body Control Module (BCM). Each module controls operation of the High Intensity Discharge (HID) igniter and lighting element for the front lamp unit on which it is installed. The BCM monitors a hard wired input from the headlamp switch to determine the proper control outputs to the electronic ballast module, which then provides a controlled voltage to operate the HID lamp igniter as appropriate.

The BCM also monitors electronic message inputs received from the Steering Control Module (SCM) over the Controller Area Network (CAN) Interior High Speed (IHS) data bus based upon multi-function switch inputs and, if the vehicle is so equipped, from the SmartBeam® (also known as the Automatic High Beam Module/AHBM) and the Light Rain Sensor Module (LRSM) (also known as the Rain Sensor Module/RSM, Light Sensor Module/LSM or Rain/Light Sensor Module/RLSM) to determine the proper lighting outputs to provide to the ballast module.

When a proper 12 volt Direct Current (DC) control output is received from the BCM, the HID electronic ballast module activates the HID igniter integral to the lighting element through a high-tension cable to provide a high voltage (up to about 800 volts Alternating Current/AC) surge. The igniter further steps up this AC voltage to up to about 25, 000 volts, which creates a light arc between the lighting element electrodes. Once the igniter and electronic ballast module detect a suitably stable light arc, they switch over to a power-limiting mode to sustain the light arc, which requires only about 85 volts to sustain proper lighting element output.

The hard wired electronic ballast module circuits may be diagnosed using conventional diagnostic tools and procedures. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the electronic ballast module or the electronic controls and communication that provide some features of the HID lamp system. Proper diagnosis of the electronic ballast module, the BCM, the SCM, the SmartBeam®, the LRSM, the CAN data bus and the electronic communication related to electronic ballast module operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

REMOVAL



Fig. 5: Electronic Ballast Module & Screws
Courtesy of CHRYSLER GROUP, LLC

WARNING: To avoid serious or fatal injury when working on the High Intensity Discharge (HID) headlamp system, be certain to take the proper precautions. The headlamp switch must be in the OFF position. Disconnect and isolate the battery negative cable. There is a risk of fatal injury caused by contact with high voltage used in the HID headlamps. There is a risk of explosion or fire caused by highly flammable materials in the vicinity of damaged HID lighting elements. There is a risk of injury caused by exposure to Ultra Violet (UV) light, a risk of burns caused by high component operating temperatures, a risk of mercury poisoning through glass splinters produced by bursting HID lighting elements. There is also a risk of poisoning caused by inhalation of mercury vapors and by toxic salts and mercury compounds being ingested or coming into contact with the skin. Do not come into contact with parts that are under high voltage. Persons with active electronic implants (e.g. heart pacemakers) must never work on HID headlamps. Wear insulated safety shoes, safety glasses and protective gloves. Remove flammable materials and ensure sufficient ventilation in the working area.

1. Disconnect and isolate the battery negative cable.
2. Remove the upper lamp unit from the vehicle. Refer to **UNIT, FRONT LAMP, REMOVAL**.
3. Remove the screws (2) that secure the electronic ballast module (1) to the inboard side of the front lamp unit housing.
4. Pull the ballast module away from the front lamp unit far enough to access and disconnect the wire harness connections within the front lamp unit.
5. Remove the electronic ballast module from the lamp.

INSTALLATION

INSTALLATION

WARNING: To avoid serious or fatal injury when working on the High Intensity Discharge (HID) headlamp system, be certain to take the proper precautions. The headlamp switch must be in the OFF position. Disconnect and isolate the battery negative cable. There is a risk of fatal injury caused by contact with high voltage used in the HID headlamps. There is a risk of explosion or fire caused by highly flammable materials in the vicinity of damaged HID lighting elements. There is a risk of injury caused by exposure to Ultra Violet (UV) light, a risk of burns caused by high component operating temperatures, a risk of mercury poisoning through glass splinters produced by bursting HID lighting elements. There is also a risk of poisoning caused by inhalation of mercury vapors and by toxic salts and mercury compounds being ingested or coming into contact with the skin. Do not come into contact with parts that are under high voltage. Persons with active electronic implants (e.g. heart pacemakers) must never work on HID headlamps. Wear insulated safety shoes, safety glasses and protective gloves. Remove flammable materials and ensure sufficient ventilation in the working area.



Fig. 6: Electronic Ballast Module & Screws
Courtesy of CHRYSLER GROUP, LLC

1. Position the electronic ballast module (1) to the inboard side of the front lamp unit housing.
2. Reconnect the wire harness connections within the front lamp unit to the module connector receptacles.
3. Install and tighten the screws (2) that secure the module to the housing. Tighten the screws securely.
4. Reinstall the front lamp unit into the vehicle. Refer to **UNIT, FRONT LAMP, INSTALLATION**.

5. Reconnect the battery negative cable.

CAM, TURN SIGNAL CANCEL

DESCRIPTION

DESCRIPTION

The turn signal cancel cam is concealed within the clockspring case on the steering column. The turn signal cancel cam consists of integral eccentrics on the outer circumference of the molded plastic clockspring rotor. The clockspring mechanism provides turn signal cancellation as well as a constant electrical connection between the rotating electrical components on the steering wheel and the instrument panel wire harness on the steering column. The multi-function switch and the housing of the clockspring are secured to the steering column and remain stationary. The rotor of the clockspring, including the turn signal cancel cam lobes, rotate with the steering wheel.

The turn signal cancel cam is serviced as a unit with the clockspring and cannot be repaired. If ineffective or damaged, the entire clockspring unit must be replaced. Refer to **CLOCKSPRING, REMOVAL** .

OPERATION

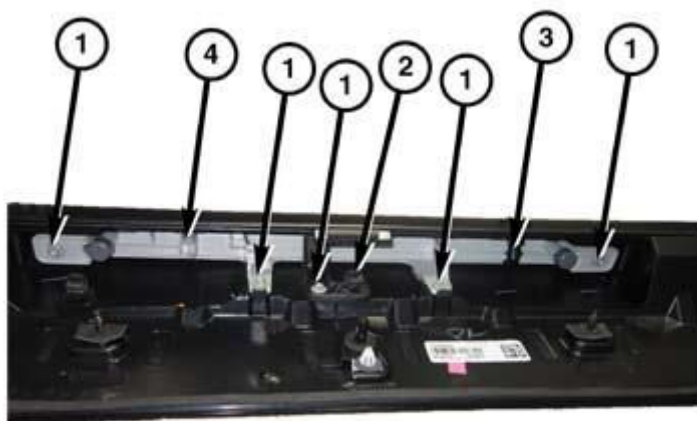
OPERATION

When the multi-function switch control stalk is moved to a latched turn signal ON position, a turn signal cancel actuator is extended from the inside surface of the switch housing through a small opening on the left side of the Steering Column Control Module (SCCM) mounting housing toward the turn signal cancel cam. As the steering wheel is rotated to complete the turn, one of the cam eccentrics will contact the actuator, automatically cancelling the turn signal event and releasing the latched multi-function switch control stalk to the neutral or OFF position.

LAMP, CENTER HIGH MOUNTED STOP

REMOVAL

REMOVAL



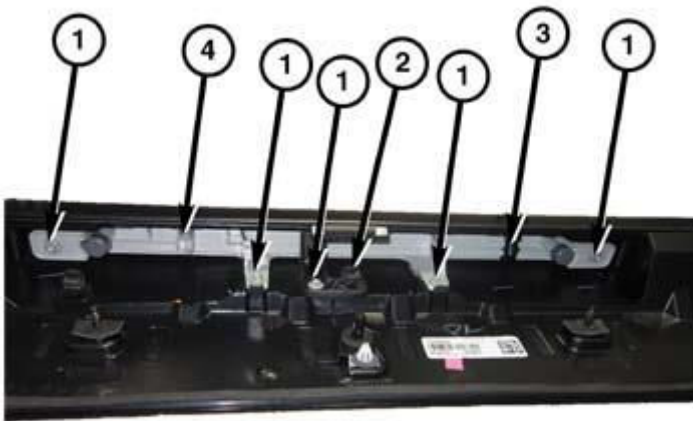
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Fig. 7: Center High Mounted Stop Lamp
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the rear spoiler from the vehicle. Refer to **SPOILER, REMOVAL**.
3. Working from the back of the rear spoiler, remove the support bracket (2), the washer nozzle hose from the nozzle and the washer nozzle itself (3).
4. Disconnect the electrical connection (4) from the back of the CHMSL assembly.
5. Remove five screws (5) that secure the CHMSL to the spoiler assembly.
6. Remove the CHMSL assembly from the spoiler.

INSTALLATION

INSTALLATION



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Fig. 8: Center High Mounted Stop Lamp
 Courtesy of CHRYSLER GROUP, LLC

1. Position the Center High Mounted Stop Lamp (CHMSL) into the rear spoiler for installation.
2. Secure the CHMSL to the rear spoiler using the provided fasteners (1). Secure the center bolts first and then the outer bolts last.
3. Connect the body electrical connector to the receptacle (4) on the back of the CHMSL.
4. Install the bracket (2) to the CHMSL.
5. Install the washer nozzle (3) to the CHMSL.
6. Route the washer fluid tube and seat into position on the CHMSL.
7. Install the rear spoiler to the vehicle. Refer to **SPOILER, INSTALLATION**.
8. Connect the negative battery cable to the proper negative battery terminal.

LAMP, FOG

REMOVAL

BULB

CAUTION: Do not contaminate the bulb glass by touching it with your fingers or by allowing it to contact other oily surfaces. Shortened bulb life will result.

1. Disconnect and isolate the battery negative cable.
2. Raise the vehicle until the wheel well access cover for the fog lamps can be reached comfortably.
3. Twist the top rotational button until the top of the cover releases. Rotate the cover 180° allowing full access to the back of the fog lamp and bulb assembly.

4. Disconnect the harness from the back of the fog lamp assembly.
5. Remove the four fasteners securing the lamp to the lower front fascia.
6. Pull the fog lamp through the access hole.
7. Depress on the two points of the bulb socket to release and remove from the fog lamp assembly.
8. Remove the bulb from the bulb socket.

LAMP

1. Disconnect and isolate the battery negative cable.
2. Raise the vehicle until the wheel well access cover for the fog lamps can be reached comfortably.
3. Twist the top rotational button until the top of the cover releases. Rotate the cover 180° allowing full access to the back of the fog lamp and bulb assembly.
4. Disconnect the harness from the back of the fog lamp assembly.
5. Remove the four fasteners securing the lamp to the lower front fascia.
6. Pull the fog lamp through the access hole.

INSTALLATION**BULB**

CAUTION: Always use the correct bulb size and type for replacement. An incorrect bulb size or type may overheat and cause damage to the lamp, the socket or the lamp wiring.

CAUTION: Do not contaminate the bulb glass by touching it with your fingers or by allowing it to contact other oily surfaces. Shortened bulb life will result.



0817010626

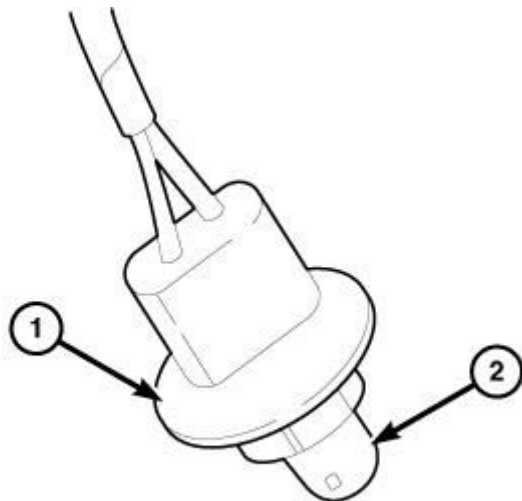
Fig. 9: Fog Lamp, Bulb & Socket

Courtesy of CHRYSLER GROUP, LLC

1. Secure the replacement bulb into the bulb socket (3).
2. Insert the bulb and socket into the back of the fog lamp assembly.
3. Connect the wiring harness connector to the back of the fog lamp socket.
4. Close the access cover in the wheel well area.
5. Connect the negative battery cable to the battery negative post.

LAMP

1. Insert the fog lamp through the access panel in the wheel well.
2. Line up the lamp with the screw holes and secure the lamp using all four fasteners.
3. Attach the harness connector to the back of the lamp assembly.
4. Turn the access cover until the cover is lined up and the button can be turned to secure the cover to the wheel well.
5. Lower the vehicle to access and connect the negative battery cable to the negative battery post.

LAMP, LICENSE PLATE**REMOVAL****BULB**

3113244

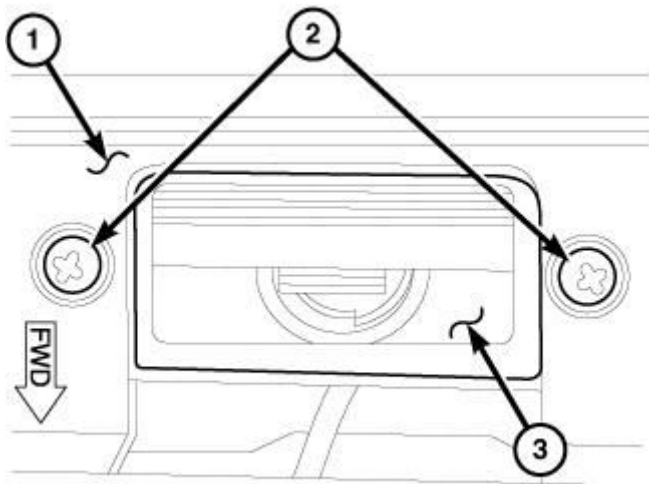
Fig. 10: Bulb & Socket

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the license plate lamp from the rear fascia.

3. Pull the base of the bulb (2) straight out of the socket (1).

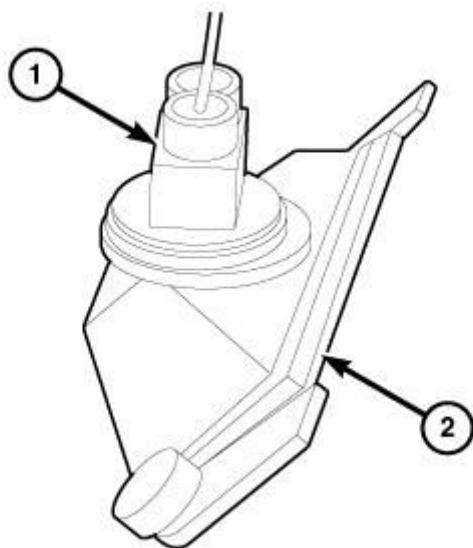
LAMP



3133689

Fig. 11: Two Screws, License Plate Lamp & Rear Fascia
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the two screws (2) that secure the license plate lamp (3) to the rear fascia (1).
3. Slide the license plate lamp to one side of the fascia opening far enough to lower one end of the lamp through the opening, then lower the opposite end through the opening.



3133719

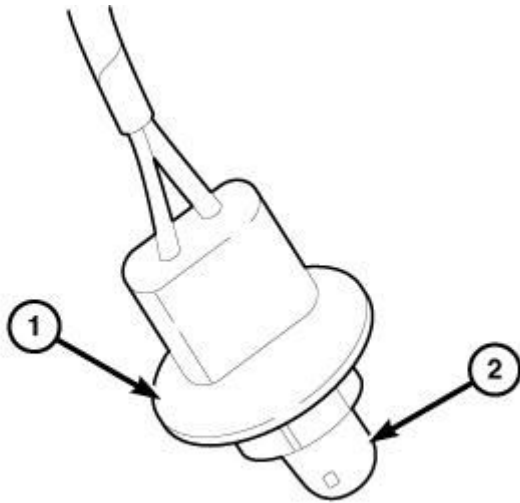
Fig. 12: Bulb Socket & Lamp Housing
Courtesy of CHRYSLER GROUP, LLC

4. Firmly grasp the bulb socket (1) on the top of the lamp housing (2) and rotate it counterclockwise about 30 degrees to unlock it.
5. Pull the socket and bulb straight out of the lamp housing.
6. Remove the lamp lens and housing from the vehicle.

INSTALLATION

BULB

CAUTION: Always use the correct bulb size and type for replacement. An incorrect bulb size or type may overheat and cause damage to the lamp, the socket or the lamp wiring.



3113244

Fig. 13: Bulb & Socket

Courtesy of CHRYSLER GROUP, LLC

1. Align the base of the license plate lamp bulb (2) with the socket (1).
2. Push the bulb straight into the socket until the base is firmly seated.
3. Reinstall the license plate lamp into the rear fascia.
4. Reconnect the battery negative cable.

LAMP

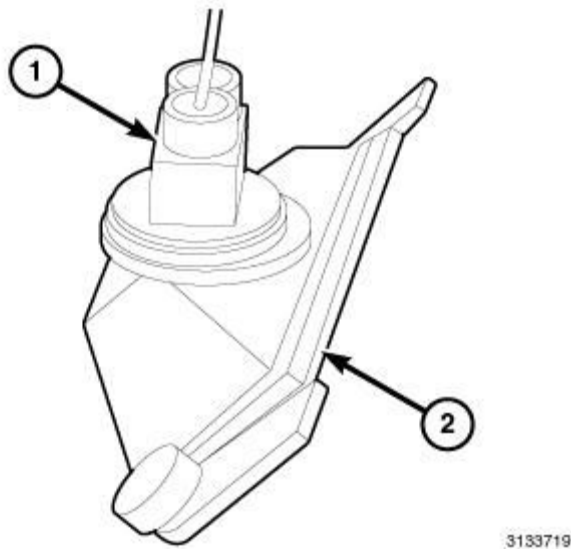


Fig. 14: Bulb Socket & Lamp Housing
Courtesy of CHRYSLER GROUP, LLC

1. Position the license plate lamp lens and housing (2) close enough to the rear fascia mounting hole to align the socket (1) and bulb with the keyed opening on the top of the housing.
2. Insert the socket and bulb into the housing until the socket is firmly seated.
3. Rotate the socket clockwise about 30 degrees to lock it into place.

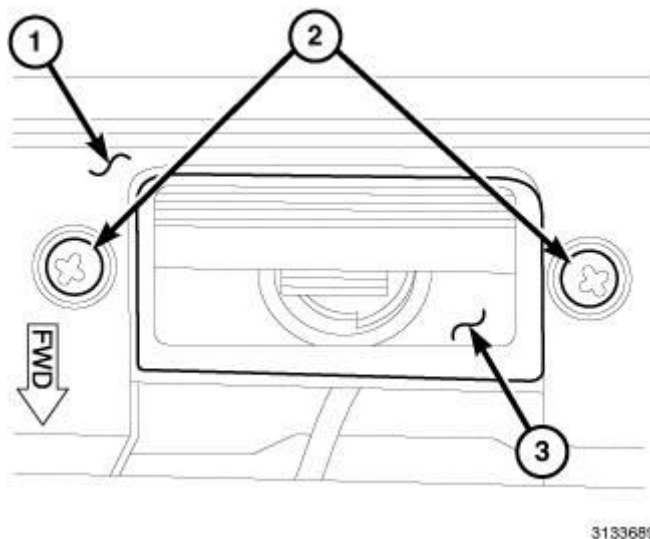


Fig. 15: Two Screws, License Plate Lamp & Rear Fascia
Courtesy of CHRYSLER GROUP, LLC

4. Insert one end of the license plate lamp (3) into one side of the rear fascia (1) mounting hole and slide it to that side far enough to insert the opposite end through the opening.
5. Center the lamp in the opening.
6. Install and tighten the two screws (2) that secure the lamp to the rear fascia. Tighten the screws securely.

7. Reconnect the battery negative cable.

LAMP, MIRROR

REMOVAL

PUDDLE LAMP

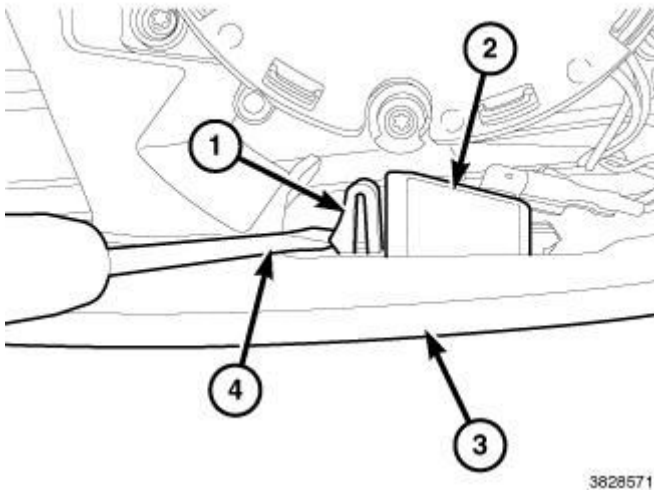
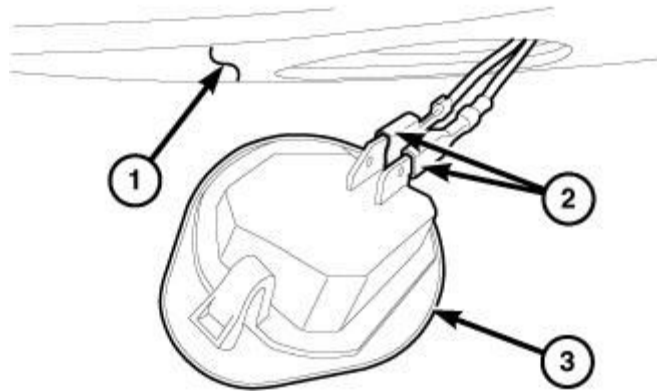


Fig. 16: Latch, Puddle Lamp, Mirror Shell & Screw Driver
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.

NOTE: The graphic shows the puddle lamp latch with the mirror glass and case removed for clarity; however, it is NOT necessary to remove the mirror glass and case to remove or to install the puddle lamp.

2. Insert a small flat-bladed screw driver (4) between the bottom of the mirror housing bezel and the lower edge of the mirror glass and case to access the puddle lamp (2) latch feature (1).
3. Push the outboard side of the puddle lamp latch feature toward the lamp far enough to release the lamp from the underside of the mirror shell.
4. Disengage the inboard side of the puddle lamp from the inboard side of the lamp opening in the mirror shell.

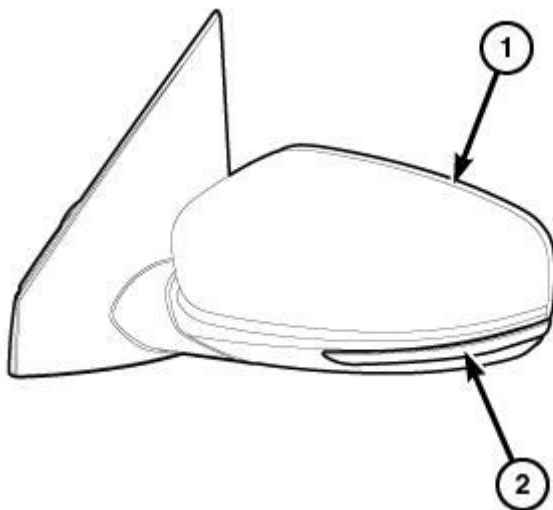


3828676

Fig. 17: Puddle Lamp & Connectors
Courtesy of CHRYSLER GROUP, LLC

5. Pull the puddle lamp (3) away from the mirror shell (1) far enough to access and disconnect the two mirror wire harness connectors (2) from the two terminals of the puddle lamp.
6. Remove the puddle lamp from the mirror.

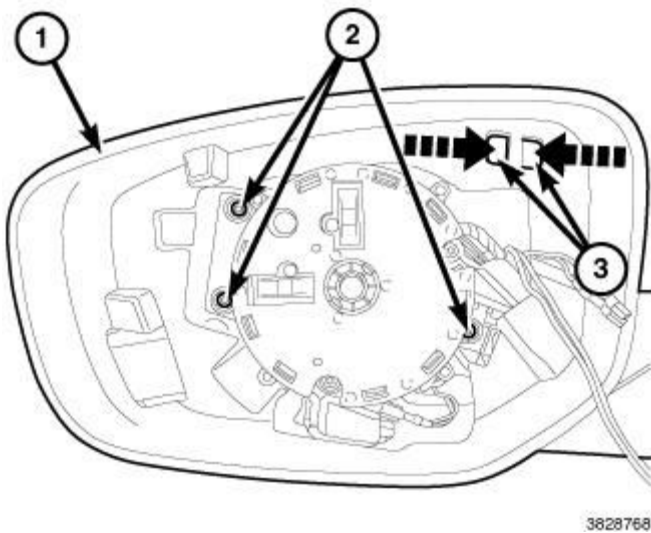
SIGNAL LAMP



3811773

Fig. 18: Outside Rear View Mirror & Signal Lamp
Courtesy of CHRYSLER GROUP, LLC

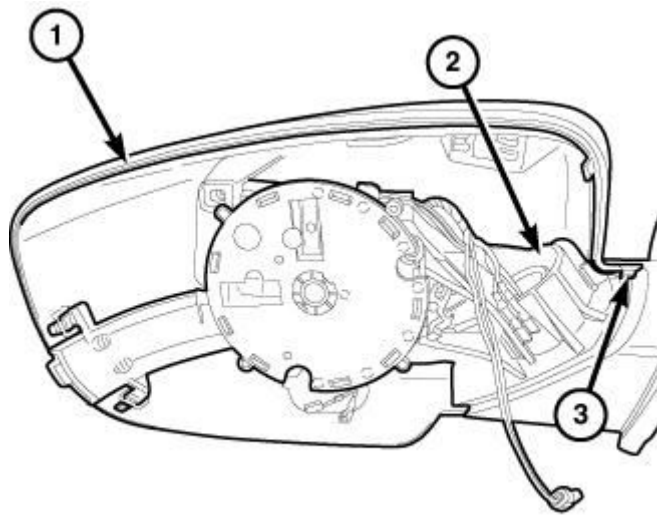
Vehicles equipped with the optional signal lamps (2) located in the outside rear view mirrors (1) have two Light Emitting Diode (LED) units that illuminate an optic light pipe through a clear lens on the lower, forward and outboard facing surfaces of the mirror shell. Illumination of these lamps is coordinated with the illumination of the turn signals for the same side of the vehicle.



3828768

Fig. 19: Mirror Housing, Fasteners & Retaining Tabs
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the mirror glass and case unit from the outside rear view mirror. Refer to **MIRROR, OUTSIDE REARVIEW, REMOVAL** and **MIRROR, OUTSIDE REARVIEW, GLASS, REMOVAL**.
3. Remove the puddle lamp from the outside rear view mirror. Refer to **LAMP, MIRROR, REMOVAL**.
4. Remove the three screws (2) that secure the mirror bezel and housing unit (1) to both the mirror shell and the mirror arm.
5. Insert two flat-bladed screwdrivers into the two holes (3) in the upper inboard corner of the mirror housing and push the screwdriver handles away from each other to pry the two latch features of the housing toward each other far enough to disengage the housing latch features from the mirror shell.
6. Remove the mirror bezel and housing unit from the mirror shell and the mirror arm.



3828786

Fig. 20: Mirror Shell, Mirror Arm & Tab

Courtesy of CHRYSLER GROUP, LLC

7. Disengage the tab (3) that secures the inboard end of the mirror shell (1) to the notch in the inboard end of the mirror arm (2).

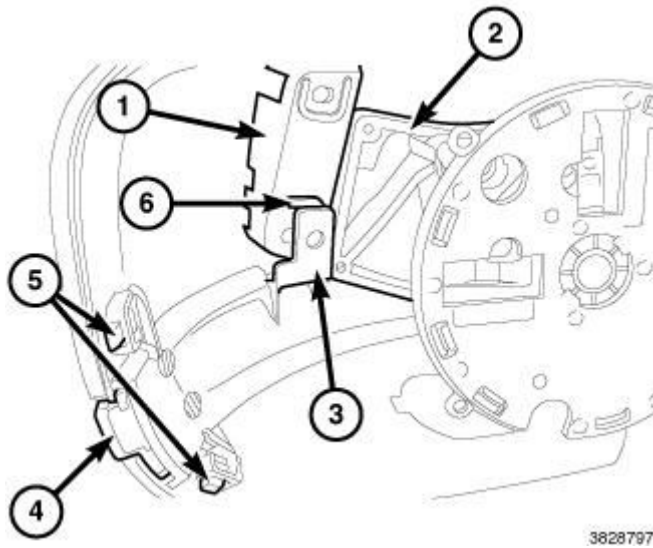


Fig. 21: Turn Signal Retaining Tabs

Courtesy of CHRYSLER GROUP, LLC

8. From within the outboard end of the mirror shell, carefully pry the mounting tab (3) of the signal lamp (4) housing away from the face of the mounting pocket formation (1) integral to the interior of the mirror shell until it disengages from the locating rib (6) with a light audible snap.
9. Slide the mirror shell mounting pocket formation off of the outboard end of the mirror arm (2).
10. From outside of the mirror shell, press the inboard end of the signal lamp lens into the interior of the shell.
11. Press the outboard end of the signal lamp inboard far enough to disengage the two lamp mounting tabs (5) from the lamp mounting tab receptacle loops integral to the outboard end of the mirror shell interior.
12. Set the mirror shell aside.

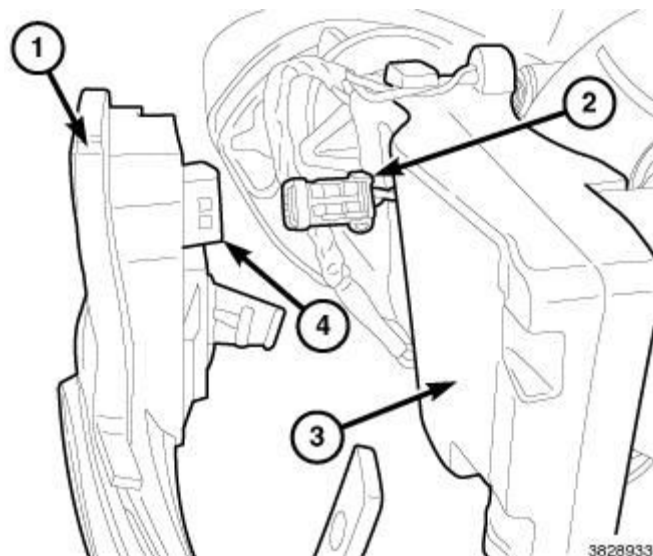


Fig. 22: Signal Lamp Housing, Harness Connector, Mirror Arm & Connector Receptacle
 Courtesy of CHRYSLER GROUP, LLC

13. Disconnect the mirror wire harness connector (2) from the connector receptacle (4) integral to the signal lamp housing (1).
14. Remove the signal lamp from the mirror arm (3).

INSTALLATION

PUDDLE LAMP

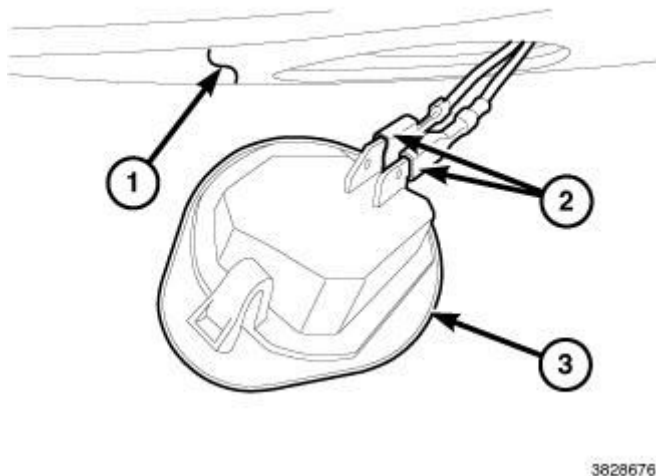
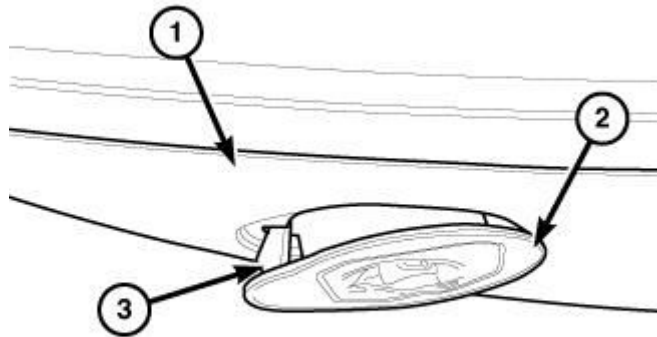


Fig. 23: Puddle Lamp & Connectors
 Courtesy of CHRYSLER GROUP, LLC

1. Position the puddle lamp (3) near the lamp opening on the underside of the mirror shell (1).

2. Reconnect the two mirror wire harness connectors (2) to the two terminals of the puddle lamp. Be certain to connect small connector to the small lamp terminal and the large connector to the large lamp terminal.

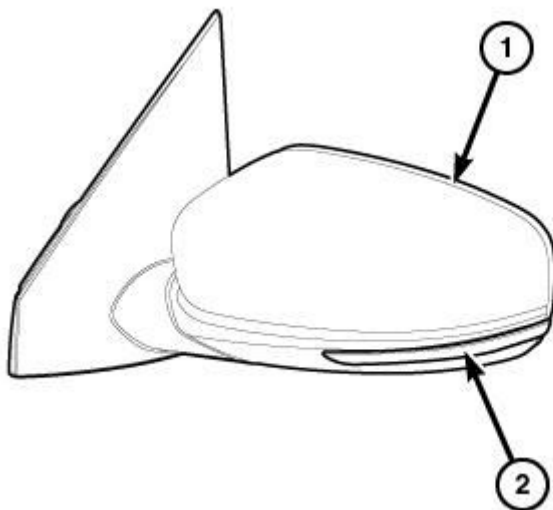


3828739

Fig. 24: Mirror Shell, Puddle Lamp & Latch
Courtesy of CHRYSLER GROUP, LLC

3. Engage the hook features on the inboard side of the puddle lamp (2) into the inboard side of the lamp opening in the mirror shell (1).
4. Using hand pressure, push the outboard side of the lamp up into the opening in the mirror shell until the latch feature (3) snaps into place.
5. Reconnect the battery negative cable.

SIGNAL LAMP



3811773

Fig. 25: Outside Rear View Mirror & Signal Lamp

Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with the optional signal lamps (2) located in the outside rear view mirrors (1) have two Light Emitting Diode (LED) units that illuminate an optic light pipe through a clear lens on the lower, forward and outboard facing surfaces of the mirror shell. Illumination of these lamps is coordinated with the illumination of the turn signals for the same side of the vehicle.

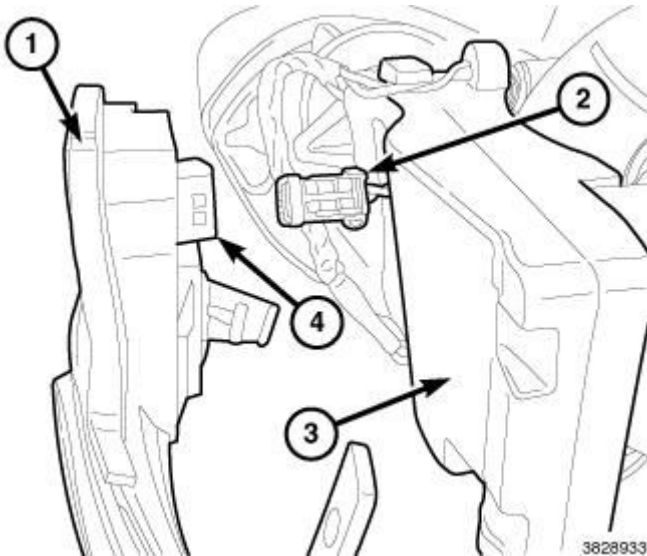


Fig. 26: Signal Lamp Housing, Harness Connector, Mirror Arm & Connector Receptacle
Courtesy of CHRYSLER GROUP, LLC

1. Position the signal lamp (1) to the forward facing surface of the mirror arm (3).
2. Reconnect the mirror wire harness connector (2) to the connector receptacle (4) integral to the signal lamp housing. Be certain the connector is fully engaged and latched.

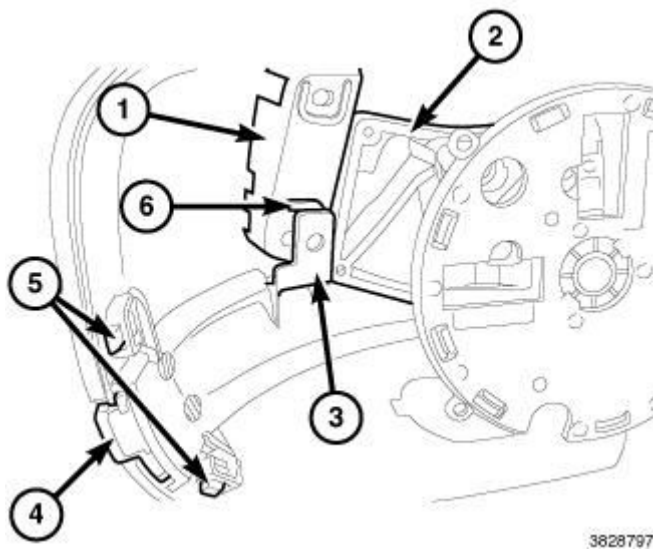


Fig. 27: Turn Signal Retaining Tabs
Courtesy of CHRYSLER GROUP, LLC

3. Engage the two signal lamp mounting tabs (5) into the lamp mounting tab receptacle loops integral to the outboard end of the mirror shell interior.
4. From within the interior of the mirror shell, press the inboard end of the signal lamp lens (4) into engagement with the mounting hole of the shell.
5. Slide the mounting pocket formation (1) integral to the interior of the mirror shell over the outboard end of the mirror arm (2).
6. From within the outboard end of the mirror shell, press the mounting tab (3) of the signal lamp into position against the locating rib (6) on the face of the mounting pocket until it engages with a light audible snap.

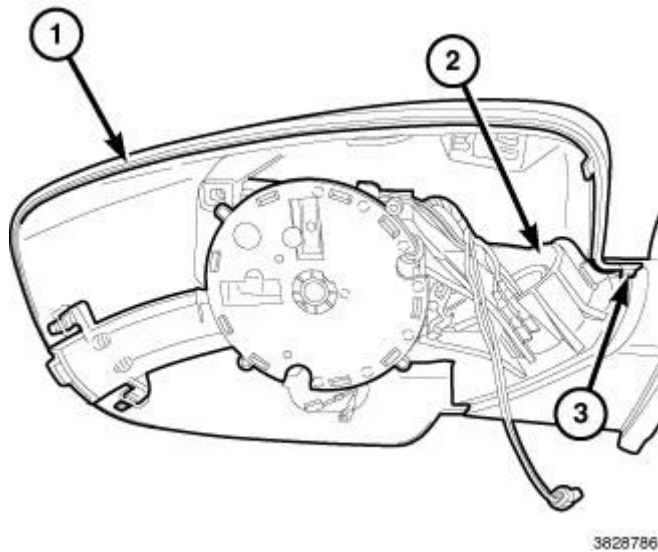


Fig. 28: Mirror Shell, Mirror Arm & Tab
Courtesy of CHRYSLER GROUP, LLC

7. Engage the tab (3) that secures the inboard end of the mirror shell (1) to the notch in the inboard end of the mirror arm (2).

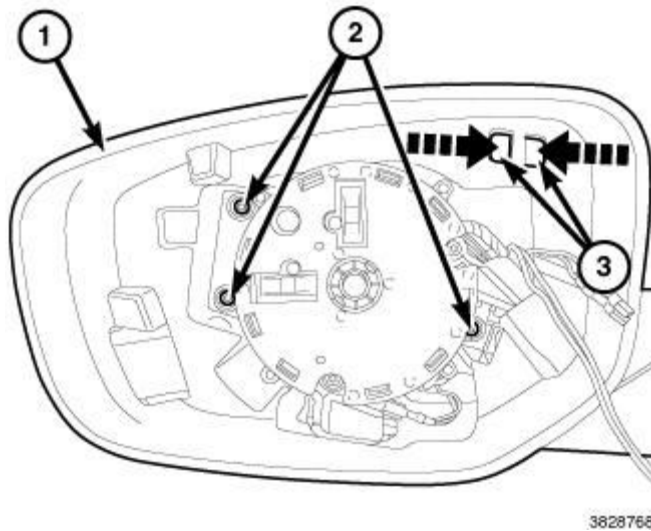


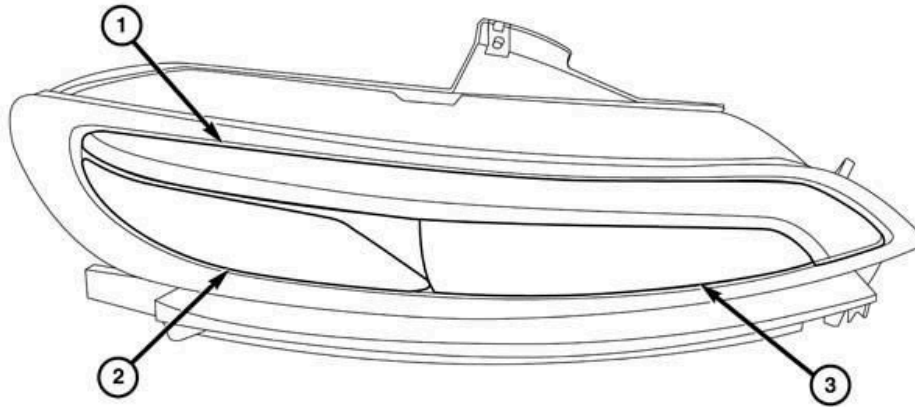
Fig. 29: Mirror Housing, Fasteners & Retaining Tabs
Courtesy of CHRYSLER GROUP, LLC

8. Position the mirror bezel and housing unit (1) over the mirror arm and the mirror shell. Be certain that the mirror wire harness is not pinched between the bezel and the shell, and that the wiring for the puddle lamp is routed through the mounting hole in the underside of the shell.
9. With the bezel aligned with the shell, squeeze the two together until the latch features (3) of the housing engage the receptacle of the shell with a light audible snap.
10. Install and tighten the three screws (2) that secure the mirror bezel and housing unit to both the mirror shell and the mirror arm. Tighten the screws securely.
11. Reinstall the puddle lamp into the outside rear view mirror. Refer to **LAMP, MIRROR, INSTALLATION**.
12. Reinstall the mirror glass and case unit into the outside rear view mirror. Refer to **MIRROR, OUTSIDE REARVIEW, INSTALLATION** and **MIRROR, OUTSIDE REARVIEW, GLASS, INSTALLATION**.
13. Reconnect the battery negative cable.

LAMP, PARK AND TURN SIGNAL

DESCRIPTION

DESCRIPTION



0817008758

Fig. 30: Park And Turn Signal Lamp
Courtesy of CHRYSLER GROUP, LLC

This vehicle is equipped with a combination Park and Turn signal lamp assembly. The combination lamp includes the following components:

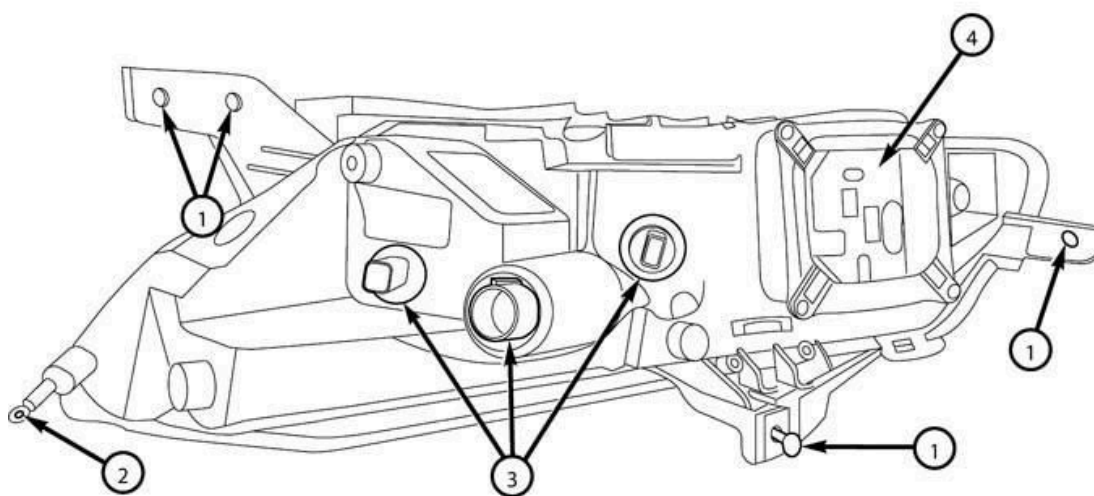
- **Daytime Running Lamp (1):** Domestic market vehicles with HID front lamp units and DRL illuminate a dedicated DRL LED bar in the combination lamp unit. This bar is made up of ten LED points of light.
- **Turn signal lamp (2):**

The front turn signal indicator integral to the combination lamp uses a single amber bulb.

- **Park lamps (3):** The front park indicator integral to the combination lamp assembly uses a single amber colored bulb.
- **Side marker lamp (3):** The side marker indicator integral to the combination lamp uses a single clear bulb.
- **LED Module:** The LED module is secured to the back of the combination lamp by four fasteners.

REMOVAL

LAMP

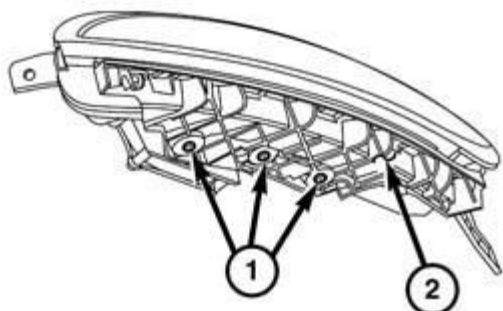


0823006551

Fig. 31: Front Park/Turn Signal Lamp Housing
 Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the front fascia. Refer to **FASCIA, FRONT, REMOVAL** .
3. Disconnect the wire harness connector from the connector receptacles (3) on the back of the front park/turn signal lamp housing.
4. Remove the fasteners (1) that secure the lamp housing in place.
5. Pull out on the lamp until the alignment pin (2) has been released.

PARK/TURN LAMP BEZEL REMOVAL



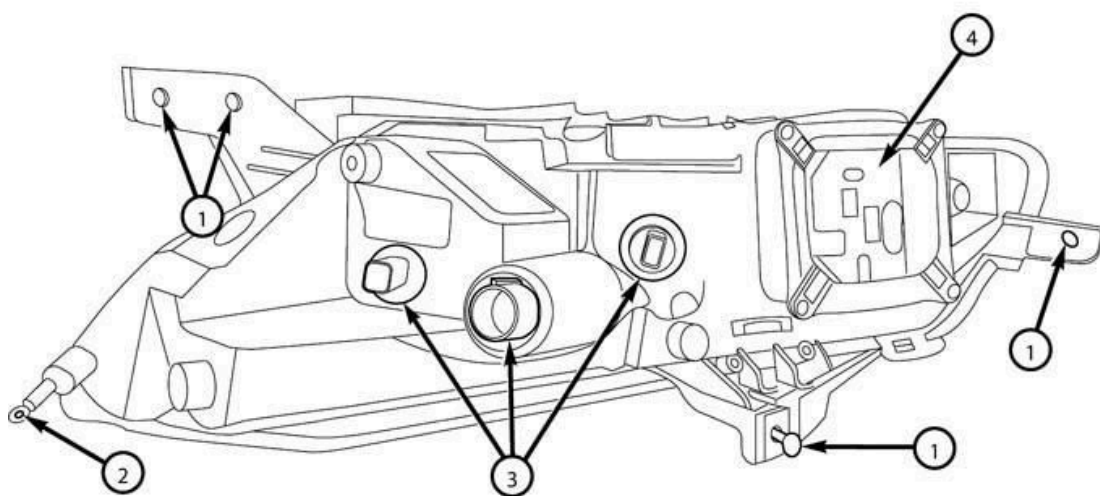
0817009115

Fig. 32: Park/Turn Lamp Assembly

Courtesy of CHRYSLER GROUP, LLC

1. Remove the park/turn lamp assembly. This will involve front fascia removal. Refer to **LAMP, PARK AND TURN SIGNAL, REMOVAL**.
2. Flip the lamp assembly over to access the three fasteners (1) securing the bezel to the bottom of the lamp assembly.
3. Remove the bezel from the lamp assembly.

INSTALLATION**INSTALLATION**

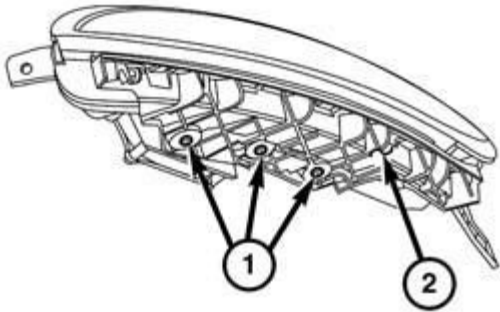


0823006551

Fig. 33: Front Park/Turn Signal Lamp Housing
 Courtesy of CHRYSLER GROUP, LLC

1. Position the lamp assembly to the vehicle for installation and insert the alignment pin (2) into position.
2. Install the fasteners (1) that secure the lamp in place.
3. Connect the wire harness connectors to the connector receptacles (3) on the back of the front park/turn signal lamp housing.
4. Install the front fascia to the vehicle. Refer to **FASCIA, FRONT, INSTALLATION** .
5. Connect the negative battery cable to the negative battery terminal.

PARK/TURN LAMP BEZEL REMOVAL



0817009115

Fig. 34: Park/Turn Lamp Assembly

Courtesy of CHRYSLER GROUP, LLC

1. Position the bezel to the bottom of the lamp assembly for installation.
2. Secure the bezel to the lamp assembly by inserting and tightening the three fasteners (1).
3. Install the front lamp assembly. Refer to **LAMP, PARK AND TURN SIGNAL, INSTALLATION**.

MOTOR, HEADLAMP LEVELING

DESCRIPTION

DESCRIPTION

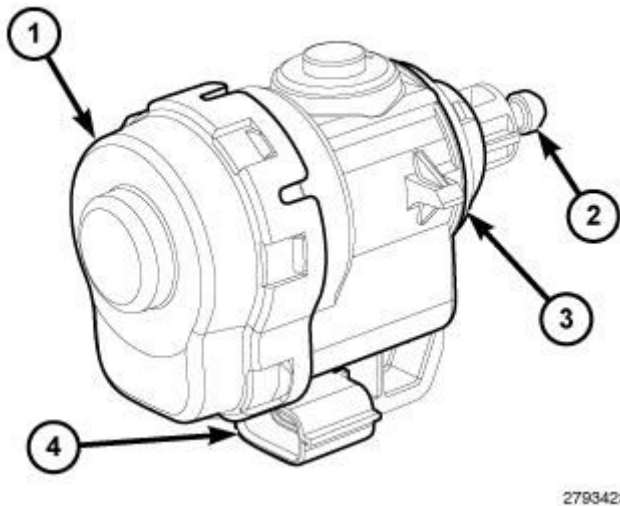


Fig. 35: Headlamp Leveling Motor, Integral Molded Connector Receptacle & Ball Formation
Courtesy of CHRYSLER GROUP, LLC

The headlamp leveling motor (1) is located on the rear lower surface of each front lamp unit on vehicles equipped with High Intensity Discharge (HID) headlamps and the automatic headlamp leveling system. The motor is encased within a molded plastic housing and is secured by an integral wedge-type mounting flange (3) to a keyed flange on the back of the front lamp unit housing. A rubber seal around the circumference of the mounting flange seals the motor to the lamp housing.

The outside of the motor housing features an integral molded connector receptacle (4) facing rearward on its lower surface, and a plastic pushrod with a ball formation (2) on its free end extends from the motor mounting flange. Within the motor housing is a 12-volt Direct Current (DC) servo motor, an electronic controller board that includes the motor logic circuits, and an integral screw-drive transmission. The headlamp leveling motor is connected to the vehicle electrical system through a dedicated take out and connector of the Front End Module (FEM) wire harness.

The headlamp leveling motor is serviced as a unit with the front lamp unit. The motor cannot be repaired and, if ineffective or damaged, the entire front lamp unit must be replaced.

OPERATION

OPERATION

The controller board and logic circuitry of the headlamp leveling motor controls motor operation based upon a voltage signal input received from the Body Control Module (BCM). On vehicles with High Intensity Discharge (HID) lighting and the automatic headlamp leveling system, the BCM uses electronic messages received over the Controller Area Network (CAN) data bus from the Automatic Headlamp Leveling Module (AHLM) (also known as the High Intensity Discharge Transducer/HIDT) to determine the correct voltage signal to provide the leveling motor.

The headlamp leveling motors have a path to ground at all times. The motors operate on battery voltage received through the headlamp low beam feed circuits so that the system will only operate when the headlamp

low beams are turned ON. When the motor is energized it will extend or retract the motor pushrod through an integral screw-drive transmission. The ball on the end of the pushrod is snapped into a socket clip on the back of the reflector within the front lamp unit housing, which will cause the reflector to move as the pushrod is extended or retracted, changing the angle at which the light is projected from the headlamp.

The hard wired circuits for the headlamp leveling motors may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the active electronic elements within the headlamp leveling motors or the electronic controls and communication between other modules and devices that provide some features of the headlamp leveling system. The most reliable, efficient, and accurate means to diagnose the headlamp leveling motor or the electronic controls and communication related to headlamp leveling system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

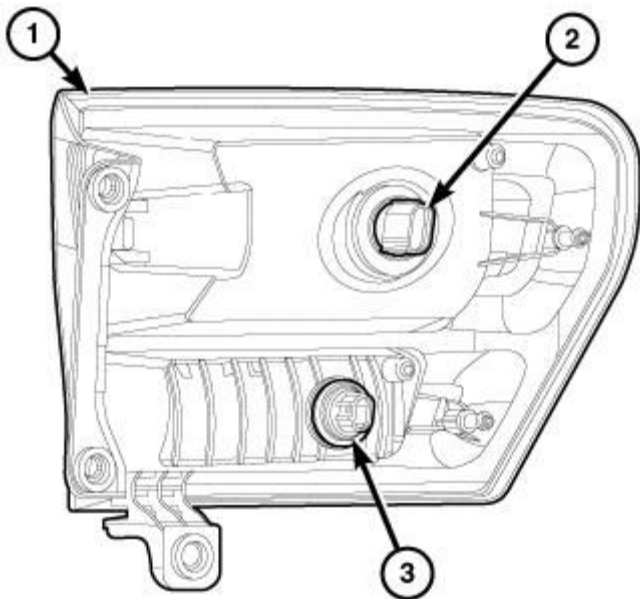
LAMP, TAIL STOP TURN

REMOVAL

BULB

Each rear lamp unit for this vehicle consists of two pieces. An outer rear lamp unit that is secured at the rear of each quarter panel. An inner rear lamp is secured on each outboard side of the liftgate outer panel adjacent to the outer lamp.

OUTER LAMP



2758572

Fig. 36: Outer Rear Lamp Unit & Bulbs
Courtesy of CHRYSLER GROUP, LLC

NOTE: In vehicles manufactured for domestic markets, the outer rear lamp unit (1) contains a bulb (2) for tail/stop/rear side marker/turn signal functions and a second bulb (3) behind a clear lens for an auxiliary backup lamp function. In vehicles manufactured for export markets, the tail/stop/rear side marker functions are performed by one bulb (2) and a separate turn signal bulb (3) behind an amber lens is used in place of the auxiliary backup bulb. The service procedures for each bulb are the same, only the bulb sizes and types may differ.

1. Disconnect and isolate the battery negative cable.
2. Remove the outer rear lamp unit (1) from the end of the quarter panel. Refer to **LAMP, TAIL STOP TURN, REMOVAL**.
3. Firmly grasp the appropriate bulb socket (2 or 3) on the back of the rear lamp unit housing and rotate it counterclockwise about 30 degrees to unlock it.
4. Pull the socket and bulb straight out from the keyed opening in the housing.
5. Pull the base of the bulb straight out of the socket.

INNER LAMP

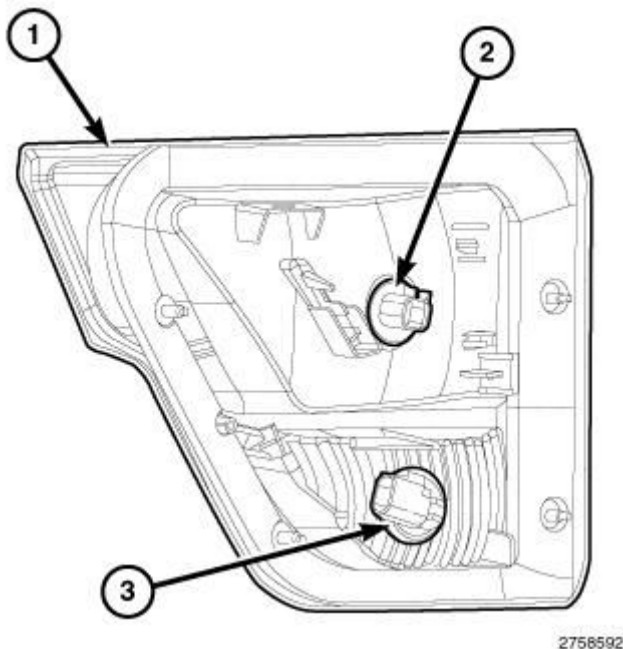


Fig. 37: Inner Rear Lamp Unit & Bulbs
Courtesy of CHRYSLER GROUP, LLC

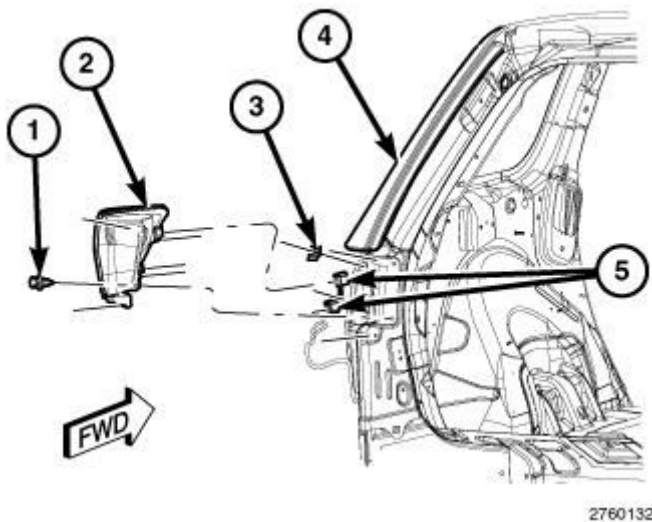
NOTE: The inner rear lamp unit contains two bulbs. The upper socket contains the tail lamp bulb, while the lower socket contains the backup lamp bulb. The service procedures for each bulb are the same, only the bulb sizes and types may differ.

1. Disconnect and isolate the battery negative cable.
2. Open the liftgate to access and remove the inside trim panel from the lower liftgate. Refer to **PANEL, TRIM, REMOVAL**.
3. Firmly grasp the appropriate bulb socket (2 or 3) on the back of the lamp housing (1) and rotate it counterclockwise about 30 degrees to unlock it.
4. Pull the socket and bulb straight out of the lamp.
5. Pull the base of the bulb straight out of the socket.

LAMP

Each rear lamp unit for this vehicle consists of two pieces. An outer rear lamp unit that is secured at the rear of each quarter panel. An inner rear lamp is secured on each outboard side of the decklid or liftgate (depending on application) adjacent to the outer lamp.

OUTER

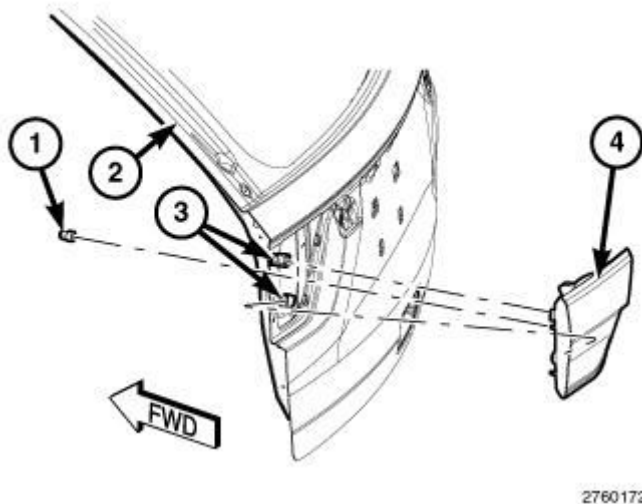


2760132

Fig. 38: Outer Rear Tail Lamp Housing, Grommets, Push-Pins & Connectors
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Locate and remove the plastic push-pin fastener that secures the bracket on the bottom of the inboard side of the outer rear tail lamp housing (2) to the upper flange of the rear fascia.
3. Open the liftgate to access and remove the two plastic push-pin fasteners (1) that secure the inboard side of the lamp to the side jamb of the liftgate opening.
4. Pull the outboard side of the lamp rearward far enough to disengage the two ball studs on the back of the lamp housing from the plastic grommets (3) in the lamp opening of the body sheet metal (4).
5. Pull the lamp away from the vehicle far enough to access and disconnect the two body wire harness connectors (5) from the two bulb socket connector receptacles on the back of the lamp housing.
6. Remove the lamp from the vehicle.

INNER



2760172

Fig. 39: Inner Rear Tail Lamp Unit, Acorn Nuts & Connectors
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Open the liftgate (2) to access and remove the inside trim panel from the lower liftgate. Refer to **PANEL, TRIM, REMOVAL**.
3. Disconnect the two liftgate wire harness connectors (3) from the bulb socket connector receptacles on the back of the inner rear tail lamp unit (4).
4. Remove the four acorn nuts (1) that secure the four studs on the back of the lamp housing to the lamp opening of the liftgate.
5. Remove the lamp from the vehicle.

INSTALLATION

BULB

Each rear lamp unit for this vehicle consists of two pieces. An outer rear lamp unit that is secured at the rear of each quarter panel. An inner rear lamp is secured on each outboard side of the liftgate outer panel adjacent to the outer lamp.

OUTER LAMP

CAUTION: Always use the correct bulb size and type for replacement. An incorrect bulb size or type may overheat and cause damage to the lamp, the socket or the lamp wiring.

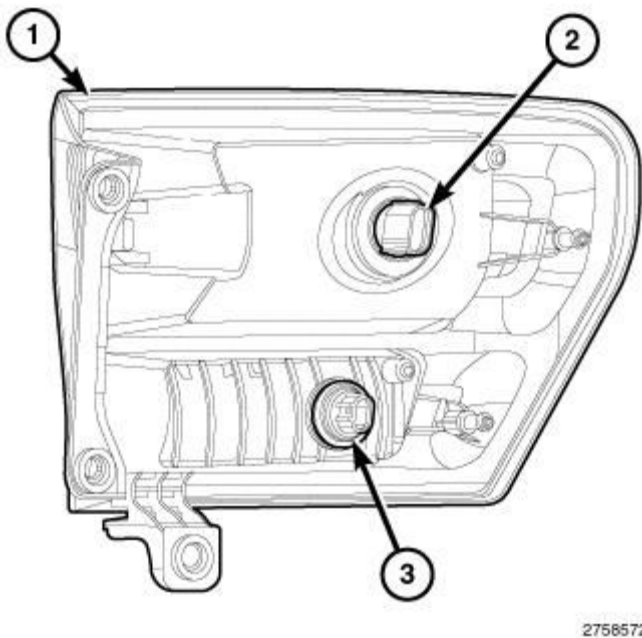


Fig. 40: Outer Rear Lamp Unit & Bulbs
Courtesy of CHRYSLER GROUP, LLC

NOTE: In vehicles manufactured for domestic markets, the outer rear lamp unit (1) contains a bulb (2) for tail/stop/rear side marker/turn signal functions and a second bulb (3) behind a clear lens for an auxiliary backup lamp function. In vehicles manufactured for export markets, the tail/stop/rear side marker functions are performed by one bulb (2) and a separate turn signal bulb (3) behind an amber lens is used in place of the auxiliary backup bulb. The service procedures for each bulb are the same, only the bulb sizes and types may differ.

1. Align the base of the bulb with the appropriate bulb socket (2 or 3).
2. Push the bulb straight into the socket until the base is firmly seated.
3. Align the socket and bulb with the keyed opening on the back of the outer rear lamp unit housing (1).
4. Insert the socket and bulb into the housing until the socket is firmly seated.
5. Rotate the socket clockwise about 30 degrees to lock it into place.
6. Reinstall the outer rear lamp unit. Refer to **LAMP, TAIL STOP TURN, INSTALLATION**.
7. Reconnect the battery negative cable.

INNER LAMP

CAUTION: Always use the correct bulb size and type for replacement. An incorrect bulb size or type may overheat and cause damage to the lamp, the socket or the lamp wiring.

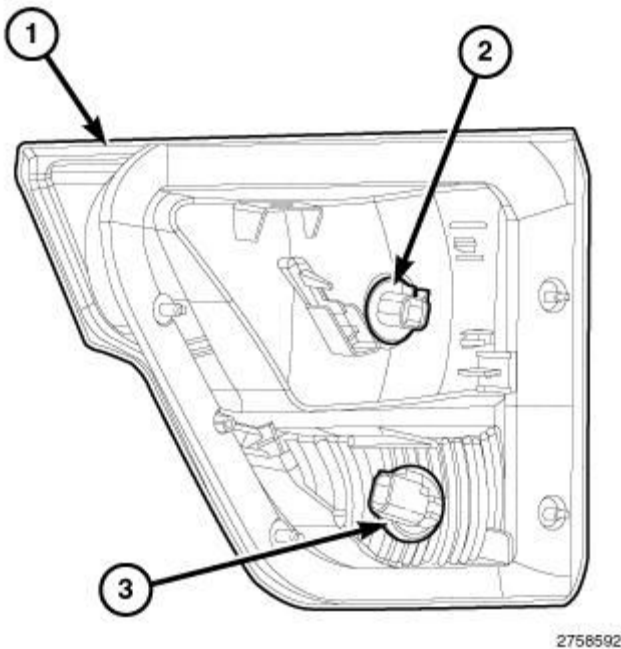


Fig. 41: Inner Rear Lamp Unit & Bulbs
 Courtesy of CHRYSLER GROUP, LLC

NOTE: The inner rear lamp unit contains two bulbs. The upper socket contains the tail lamp bulb, while the lower socket contains the backup lamp bulb. The service procedures for each bulb are the same, only the bulb sizes and types may differ.

1. Align the base of the bulb with the appropriate bulb socket (2 or 3).
2. Push the bulb straight into the socket until the base is firmly seated.
3. Align the socket and bulb with the keyed opening on the back of the inner rear lamp unit housing (1).
4. Insert the socket and bulb into the housing until the socket is firmly seated.
5. Rotate the socket clockwise about 30 degrees to lock it into place.
6. Reinstall the inside trim panel to the lower liftgate. Refer to **PANEL, TRIM, INSTALLATION**.
7. Reconnect the battery negative cable.

LAMP

Each rear lamp unit for this vehicle consists of two pieces. An outer rear lamp unit that is secured at the rear of each quarter panel. An inner rear lamp is secured on each outboard side of the decklid or liftgate (depending on application) adjacent to the outer lamp.

OUTER

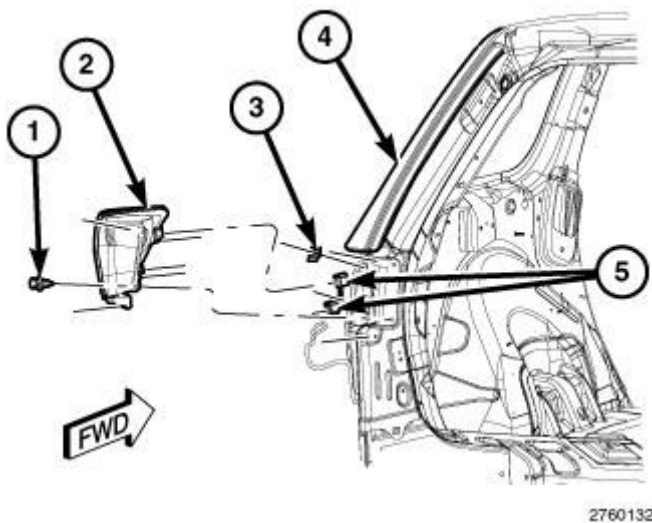


Fig. 42: Outer Rear Tail Lamp Housing, Grommets, Push-Pins & Connectors
 Courtesy of CHRYSLER GROUP, LLC

1. Check to be certain that the two plastic grommets (3) are in good condition and properly installed in the outboard side of the lamp opening of the body sheet metal (4).
2. Position the outer rear lamp unit (2) to the lamp opening of the body sheet metal.
3. Reconnect the two body wire harness connectors (5) to the two bulb socket connector receptacles on the back of the lamp housing.
4. Align the two ball studs on the back of the lamp housing with the plastic grommets in the lamp opening of the body sheet metal.
5. Using hand pressure, push firmly and evenly on the outboard top and bottom of the lamp until both ball studs snap into the grommets.
6. Reinstall the upper plastic push-pin fastener (1) followed by the lower fastener that secures the inboard side of the outer rear lamp unit to the side jamb of the liftgate opening.
7. Reinstall the plastic push-pin fastener that secures the bracket on the bottom of the inboard side of the outer rear tail lamp housing to the upper flange of the rear fascia.
8. Reconnect the battery negative cable.

INNER

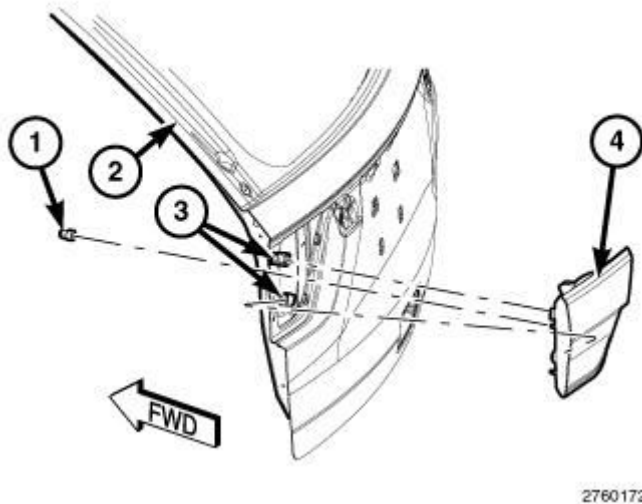


Fig. 43: Inner Rear Tail Lamp Unit, Acorn Nuts & Connectors
 Courtesy of CHRYSLER GROUP, LLC

1. Position the inner rear lamp unit (4) to the lamp opening of the liftgate (2).
2. Install and tighten the four acorn nuts (1) that secure the four studs on the back of the lamp housing to the lamp opening of the liftgate in the following sequence: upper outboard, upper inboard, lower outboard then lower inboard. Tighten the nuts securely.
3. Reconnect the two liftgate wire harness connectors (3) to the bulb socket connector receptacles on the back of the lamp housing.
4. Reinstall the inside trim panel to the lower liftgate. Refer to **PANEL, TRIM, INSTALLATION** .
5. Reconnect the battery negative cable.

SWITCH, BACKUP LAMP

DESCRIPTION

DESCRIPTION

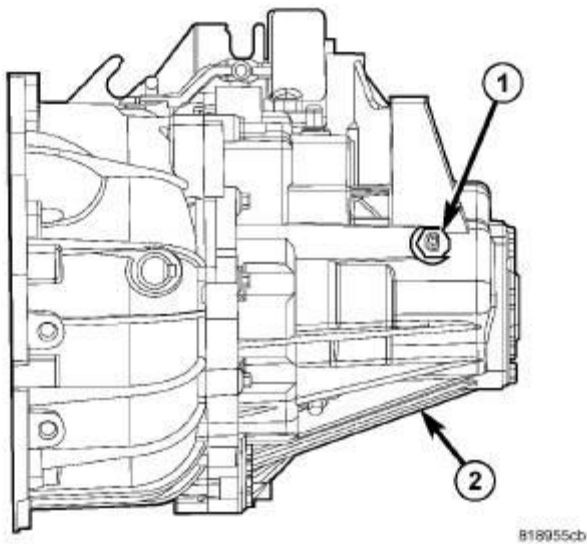


Fig. 44: Backup Lamp Switch

Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with a manual transmission (2) have a normally open, spring-loaded plunger type backup lamp switch (1). Vehicles with an optional electronic automatic transmission have a Gear Shift Module (GSM) that is used to perform several functions, including that of the backup lamp switch. The GSM is described in further detail elsewhere in this service information. Refer to the service and diagnostic information for the automatic transmission type installed in the vehicle.

The backup lamp switch is located in a threaded hole in the manual transmission housing. The switch has a threaded body and a hex formation near the plunger end of the switch. An integral connector receptacle at the end of the switch opposite the plunger connects the switch to the vehicle electrical system through a take out and connector of the engine wire harness. When installed, only the switch connector and the hex formation are visible on the outside of the transmission housing.

The backup lamp switch cannot be adjusted or repaired and, if ineffective or damaged, the entire switch unit must be replaced.

OPERATION

OPERATION

The backup lamp switch controls a path to ground for the Powertrain Control Module (PCM) (also known as the Engine Control Module/ECM) on the reverse switch signal circuit. The PCM reads this input through an internal pull-up, then sends an electronic **reverse switch status** message to the Body Control Module (BCM) over the Controller Area Network (CAN) data bus network. The BCM controls an output through a high side driver that regulates the flow of battery current to the backup lamp bulbs as appropriate on the backup lamp feed circuit.

The backup lamp switch plunger is mechanically actuated by the gearshift mechanism within the transmission,

which will depress the switch plunger and close the switch contacts whenever the REVERSE gear has been selected. The switch has a path to ground at all times through a take out and eyelet terminal of the engine wire harness that is secured to the body sheet metal.

The backup lamp switch as well as the hard wired inputs and outputs of the switch may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the electronic controls or communication between modules and other devices that provide some features of the backup lamp switch input. The most reliable, efficient, and accurate means to diagnose the electronic controls and communication related to backup lamp switch operation requires the use of a diagnostic scan tool.

DIAGNOSIS AND TESTING

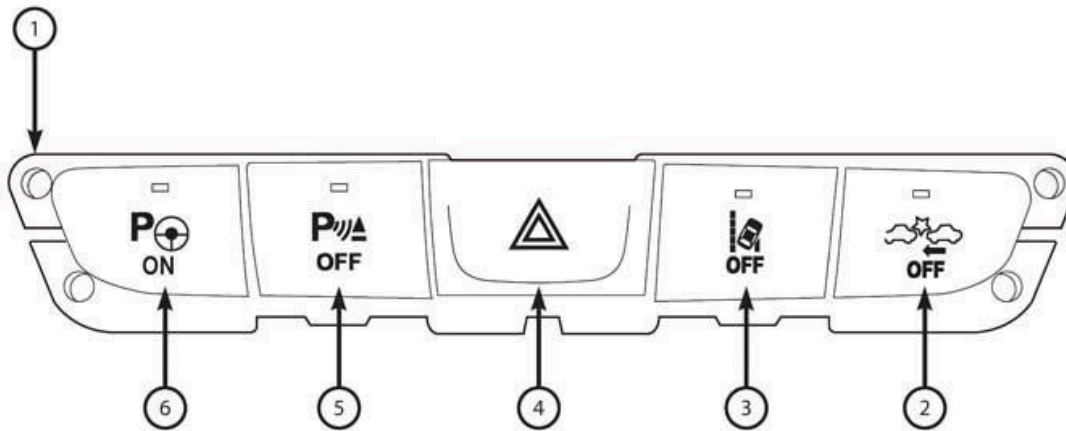
DIAGNOSIS AND TESTING - BACKUP LAMP SWITCH

1. Disconnect and isolate the battery negative cable.
2. Locate and disconnect the engine wire harness connector from the backup lamp switch connector receptacle.
3. Check for continuity between the two terminal pins in the backup lamp switch connector receptacle.
 - a. With the gear selector lever in the REVERSE position, there should be continuity.
 - b. With the gear selector lever in any position other than REVERSE, there should be no continuity.
4. If the switch fails either of these two continuity tests, replace the ineffective backup lamp switch.

SWITCH, HAZARD WARNING

DESCRIPTION

DESCRIPTION



0809005080

Fig. 45: Switch Pod

Courtesy of CHRYSLER GROUP, LLC

The hazard warning flasher switch (4) is located in the switch pod (1) below the radio screen. A red, stencil-like International Control and Display Symbol icon for **Hazard Warning** identifies the hazard warning flasher switch button.

The hazard switch button has panel lamps dimmer controlled illumination for night visibility. The switch button latches to a slightly lowered position when the hazard warning system is activated and the icon on the switch button may illuminate at an increased intensity while the turn signals and turn signal indicators are flashing. The switch button latches to a position flush with the other push buttons in the switch pod when the hazard warning is deactivated.

All of the circuitry and components of the hazard switch are contained within the molded plastic control head or switch bank housing. The switch is connected to the vehicle electrical system through a dedicated take out and connector of the instrument panel wire harness.

The hazard switch cannot be adjusted or repaired and, if ineffective or damaged, the switch pod will need be replaced. Refer to **POD, SWITCH, DESCRIPTION**.

OPERATION

OPERATION

The hazard switch has a path to ground at all times through the instrument panel wire harness. Whenever the hazard switch is in its latched and lowered position, the switch bank circuitry provides a hard wired ground signal output to the Body Control Module (BCM) and the hazard warning system is selected. When the BCM receives a hazard switch input, it then controls hazard warning system operation and flash rate by controlling battery voltage outputs through high side drivers on the right and left, front and rear turn signal feed circuits.

The BCM also sends the appropriate electronic messages to the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) over the Controller Area Network (CAN) data bus to control the illumination and flash rate of the right and left turn signal indicators, as well as to control the click rate of an electromechanical relay soldered onto the IC electronic circuit board that emulates the sound emitted by a conventional hazard warning flasher.

The hard wired circuits for the hazard switch may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the electronic controls and communication between other modules and devices that provide some features of the hazard warning system. The most reliable, efficient, and accurate means to diagnose the hazard switch or the electronic controls and communication related to hazard warning system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - HAZARD WARNING SWITCH

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

The hazard switch as well as the hard wired inputs and outputs of the heater or air conditioner and heater control head or the Integrated Center Stack (ICS) switch bank may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information.

1. Remove the control head or switch bank from the instrument panel as a unit, but do not disconnect it from the instrument panel wire harness.
2. Using a multi-meter, test the continuity between the ground terminal and the hazard switch sense terminal of the control head or switch bank. There should be continuity when the hazard switch push button is in its latched (lowered) position, and no continuity when the push button is in its unlatched (flush) position.
3. If the switch fails either of the continuity tests, replace the ineffective control head or switch bank as required.

SWITCH, HEADLAMP

DESCRIPTION

DESCRIPTION



Fig. 46: Headlamp Switch

Courtesy of CHRYSLER GROUP, LLC

The headlamp switch (1) is located on the instrument panel, molded into the steering column opening cover to the left of the steering column. Several different switches are used, depending upon optional equipment requirements. The standard switch features a three-position rotary knob for exterior lighting control. An optional switch has a fourth position added to the rotary knob for automatic headlamps and a momentary PUSH function added to the rotary knob for front fog lamp control.

Each of these switches is constructed of molded plastic. On vehicles with optional fog lamps the rotary knob also has the International Control and Display Symbol icon for **Front Fog Light** applied to it. The switch face plate is also labeled with graphics and icons to clearly identify the many functions of the rotary knob.

The back of the switch housing has an integral connector receptacle containing terminal pins that connect the switch to the vehicle electrical system through a dedicated take out and connector of the instrument panel wire harness. A panel dimmer controlled Light Emitting Diode (LED) unit soldered to the circuit board within the switch provides back lighting for visibility at night, but is not serviceable.

The headlamp switch cannot be repaired and, if ineffective or damaged, it must be replaced.

OPERATION

OPERATION

The headlamp switch uses a single resistor multiplexed output to control the many functions and features it provides. The switch receives a clean ground from the Body Control Module (BCM) on a headlamp switch MUX return circuit. The BCM then reads the switch outputs using an internal pull up on the headlamp/fog lamp switch signal circuit to control the exterior lighting functions.

The switch illumination circuit receives a path to ground at all times through an instrument panel ground circuit.

The illumination level is controlled by a Pulse-Width Modulated (PWM) output received from the BCM on a panel lamps driver circuit. The BCM controls this output based upon the panel lamps dimmer signal circuit input from the interior lighting thumbwheel switch in the dimmer module. Refer to **SWITCH, DIMMER, OPERATION**.

The headlamp switch operates as follows:

- **Front Fog Lamps Control** - For vehicles so equipped, the rotary knob on the headlamp switch is depressed to activate or deactivate the optional front fog lamps. The headlamp switch provides the appropriate resistor multiplexed output to the BCM over the headlamp/fog lamp switch signal circuit, and the BCM reads and responds to this input by energizing or de-energizing the right and left front and rear fog lamp control circuits through internal High Side Drivers (HSD) and by sending an electronic confirmation message to the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) over the Controller Area Network (CAN) data bus, which controls the front fog lamp indicator as appropriate.
- **Exterior Lighting Control** - The rotary knob on the headlamp switch is rotated to a detent position to activate or deactivate the exterior lighting. The headlamp switch provides the appropriate resistor multiplexed output to the BCM over the headlamp/fog lamp switch signal circuit, and the BCM responds by energizing or de-energizing the right and left park lamp feed circuits and the right and left high or low beam driver circuits through internal HSDs and by sending an electronic confirmation message to the IC over the CAN data bus, which controls the high beam indicator as appropriate. The BCM also remembers which headlamp beams were last selected with the multi-function switch, and energizes those beams by default the next time the headlamps are turned ON. If the vehicle is equipped with optional automatic headlamps and the **AUTO** (Automatic) position is selected, the BCM monitors an electronic **ambient light level** message received over the Local Interface Network (LIN) data bus from the Light Rain Sensor Module (LRSM) (also known as the Rain Light Sensor Module/RLSM, the Rain Sensor Module/RSM or the Light Sensor Module/LSM) from the turn to the exterior lighting ON and OFF automatically while the ignition switch status is ON. If vehicle is not equipped with a RLSM,/LSM/RSM but is equipped with auto head lamps, the BCM also monitors for an electronic **ambient light level** message received over the CAN data bus from the air conditioner - heater control module based upon a hard wired input from the sun sensor

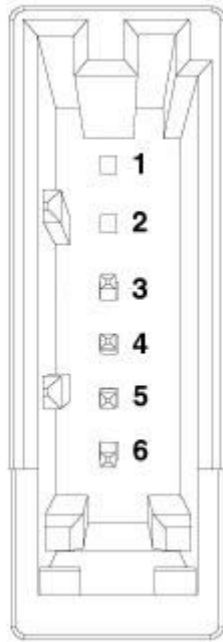
The headlamp switch as well as the hard wired inputs and outputs of the switch may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - HEADLAMP SWITCH

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before

performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.



2986787

Fig. 47: Terminals Of The Switch
Courtesy of CHRYSLER GROUP, LLC

1. Remove the headlamp switch from the instrument panel. Refer to **SWITCH, HEADLAMP, REMOVAL**.
2. Disconnect the instrument panel wire harness connector from the back of the headlamp switch.
3. Using an ohmmeter, test the resistance between the terminals of the switch as shown in the Headlamp Switch Tests table.

HEADLAMP SWITCH TESTS TABLE

HEADLAMP SWITCH TESTS	
SWITCH POSITION (PINS)	*RESISTANCE RANGE (OHMS)
AUTO (3 and 6)	4028.0 - 4452.0
OFF (3 and 6)	1938.0 - 2142.0
PARK (3 and 6)	1073.5 - 1186.5
HEADLAMP (3 and 6)	627.0 - 693.0
FOG LAMP - AUTO (3 and 6)	347.2 - 383.8
FOG LAMP - OFF (3 and 6)	317.7 - 351.1
FOG LAMP - PARK (3 and 6)	280.6 - 310.1
FOG LAMP - HEADLAMP (3 and 6)	236.6 - 261.5
	LEDs - SET MULTIMETER TO DIODE MODE - CONNECT PIN 4 TO PLUS (+), CONNECT PIN

SWITCH ILLUMINATION (4 and 5)

5 TO MINUS (-) - LEDs SHOULD BARELY GLOW

*All resistance values are plus or minus 5%.

4. If the switch fails any of the tests, replace the ineffective headlamp switch as required.

REMOVAL

REMOVAL

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.



Fig. 48: Headlamp Switch Harness Receptacle & Push Down Tabs
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the drivers side lower steering column cover panel. Refer to **COVER, STEERING COLUMN OPENING, REMOVAL**.
3. With the panel loosened, disconnect the wiring connector from the headlamp switch harness receptacle (2).

4. Remove the panel to access the two push down tabs (1). Press down on both tabs to and press the switch outward from the panel.
5. Remove the headlamp switch.

INSTALLATION

INSTALLATION

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.



Fig. 49: Headlamp Switch Harness Receptacle & Push Down Tabs
Courtesy of CHRYSLER GROUP, LLC

1. Align the headlamp switch to the mounting location in the instrument panel steering column opening cover.
2. Using hand pressure, push the switch through in order to seat the switch to the housing. Make sure both pawl retainers (1) have cleared the opening and are retaining the switch to the cover.
3. Connect the wiring harness to the headlamp switch harness receptacle (2).
4. Install the lower steering column cover. Refer to **COVER, STEERING COLUMN OPENING, INSTALLATION**.

5. Reconnect the battery negative cable.

SWITCH, MULTIFUNCTION

DESCRIPTION

DESCRIPTION

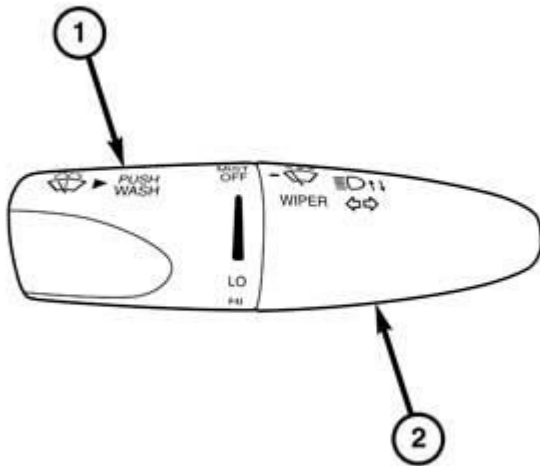


Fig. 50: Control Knob & Control Stalk
Courtesy of CHRYSLER GROUP, LLC

The multi-function switch is located on the left side of the steering column, just below the steering wheel. This switch is the primary control for the front wiper and washer systems, the turn signals and for headlamp beam selection. The only visible components of the switch are the control stalk (2) and the control knob (1) that extend through the steering column shrouds on the left side of the column. The remainder of the switch including its mounting provisions, its electrical connections and the turn signal cancel actuator are concealed within the Steering Column Control Module (SCCM) mounting housing beneath the shrouds.

The multi-function switch controls as well as the SCCM mounting housing are constructed of molded black plastic. Each of the switch controls has white International Control and Display Symbol graphics applied to it, which clearly identify its many functions. The multi-function switch is integral to the SCCM mounting housing.

The SCCM mounting housing is located near the top of the steering column below the steering wheel. In addition to the integral multi-function switch the SCCM mounting housing incorporates the Steering Control Module (SCM) and has integral features to support the mounting of the clockspring. All of the multi-function switch inputs and outputs are directly connected to the SCM. The SCM is an electronic microcontroller that serves as a Local Interface Network (LIN) master node and also as a gateway to the Controller Area Network

(CAN) data bus.

The SCCM mounting housing also features an integral interconnect connector receptacle. This interconnect connects all of the inputs and outputs of the SCM to the vehicle electrical system through several terminal pins of the clockspring interconnect connector and the pass through circuits of the clockspring. The clockspring is connected to the vehicle electrical system through a dedicated take out and connector of the instrument panel wire harness.

The multi-function switch provides the vehicle operator with a control interface for the following exterior lighting functions:

- **Front Washer Control** - The multi-function switch control knob provides a momentary WASH position for washer system operation.
- **Front Wiper Control** - The multi-function switch control knob provides detent switching for two continuous wipe switch positions, low (LO) speed or high (HI) speed and an intermittent wipe mode with four delay interval positions. The four delay positions become four sensitivity positions for vehicles equipped with the optional automatic wiper system. The control knob also has a momentary pulse wipe (MIST) feature switch position.
- **Headlamp Beam Selection** - The multi-function switch control stalk provides detent switching for selection of the headlamp HIGH or LOW beams.
- **Headlamp Optical Horn** - The multi-function switch control stalk includes momentary switching of the headlamp high beam circuits to provide an optical horn feature (sometimes referred to as flash-to-pass), which allows the vehicle operator to momentarily flash the headlamp high beams as an optical signalling device.
- **Turn Signal Control** - The multi-function switch control stalk provides both momentary non-detent (lane change) switching and detent switching with automatic cancellation for both the left and right turn signal.

The multi-function switch cannot be adjusted or repaired. If any function of the switch is ineffective, or if the switch is damaged, the entire SCCM mounting housing, SCM and multi-function switch unit must be replaced. Refer to **MODULE, STEERING COLUMN, REMOVAL**. The clockspring is available for separate service replacement.

OPERATION

OPERATION

The multi-function switch uses resistor multiplexing to control the many functions and features it provides using a minimal number of hard wired circuits. The switch receives clean grounds from the Steering Control Module (SCM), then provides resistor multiplexed return outputs to the SCM to indicate the selected switch positions. The SCM then sends electronic **switch status** messages over the Controller Area Network (CAN) data bus to the Body Control Module (BCM) and other electronic modules in the vehicle.

If the SCM detects no inputs from the multi-function switch, it transmits an electronic **Signal Not Available (SNA)** status message over the CAN data bus. The SNA status signals the other electronic modules to implement a fail-safe or default mode of operation. For the exterior lighting system, the multi-function switch

fail-safe mode automatically selects LOW beams when the headlamps are turned ON. For the wiper system, the multi-function switch fail-safe mode will maintain the last selected wiper system mode of operation for the remainder of the current ignition cycle, after which the wiper system will default to OFF.

The hard wired inputs and outputs of the SCM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the multi-function switch or the electronic controls and communication between other modules and devices that provide some features of the lighting or wiper and washer systems. The most reliable, efficient and accurate means to diagnose the multi-function switch or the electronic controls and communication related to right multi-function switch operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

Following are descriptions of how the multi-function switch is operated to control the functions and features it provides:

- **Front Washer Control** - The control knob on the end of the multi-function switch control stalk is depressed toward the steering column to the momentary WASH position to activate the washer pump/motor in the FRONT WASH mode. The washer pump/motor will continue to operate for as long as the control knob is held in this position. The SCM reads the resistor multiplexed input from the multi-function switch and sends an electronic **front washer switch status** message over the CAN data bus to the BCM and to other electronic modules in the vehicle.
- **Front Wiper Control** - The control knob on the end of the multi-function switch control stalk is rotated to one of the two continuous wiper detent positions (LO or HI), to one of four intermittent delay or sensitivity wiper detent positions, or to the OFF position to select the FRONT WIPER mode. The SCM reads the resistor multiplexed input from the multi-function switch and sends electronic **front wiper switch status** messages over the CAN data bus to the BCM and to other electronic modules in the vehicle.
- **Front Wiper Mist Mode** - The control knob on the end of the multi-function switch control stalk is rotated to the momentary MIST position to activate the wiper MIST mode. The wiper motor will continue to operate, one complete cycle at a time, for as long as the control knob is held in this position. The SCM reads the resistor multiplexed input from the multi-function switch and sends an electronic **front wiper switch status** message over the CAN data bus to the BCM and to other electronic modules in the vehicle.
- **Headlamp Beam Selection** - The headlamp high beams are selected when the multi-function switch control stalk is pushed forward to the high beam selection detent position. The low beams are selected when the control stalk is pulled rearward to the low beam selection detent position. The SCM reads the resistor multiplexed input from the multi-function switch and sends an electronic **beam select switch status** message over the CAN data bus to the BCM and to other electronic modules in the vehicle.
- **Headlamp Optical Horn** - The headlamp optical horn is selected each time the multi-function switch control stalk is pulled fully rearward to a momentary position. The headlamp HIGH beams will remain illuminated for as long as the control stalk is held in this momentary position and the LOW beams will be restored when the control stalk is released. The SCM reads the resistor multiplexed input from the multi-function switch and sends an electronic **beam select switch status** message over the CAN data bus to the BCM and to other electronic modules in the vehicle.
- **Turn Signal Control** - The turn signals are requested when the multi-function switch control stalk is moved downward (LEFT signal) or upward (RIGHT signal). The control stalk has a detent position in each direction that provides turn signals with automatic cancellation, and an intermediate, momentary

position in each direction that automatically provides three turn signal blinks as a LANE CHANGE feature when the control stalk is tapped or will energize the turn signals for as long as the control stalk is held in the momentary position. When the control stalk is moved to a detent turn signal switch position, a cancel actuator extends from the multi-function switch through the Steering Column Control Module (SCCM) mounting housing toward the center of the steering column. A turn signal cancel cam that is integral to the clockspring rotor rotates with the steering wheel and the cam lobes contact the cancel actuator when it is extended from the multi-function switch. When the steering wheel is rotated during a turning maneuver, one of the turn signal cancel cam lobes will contact the turn signal cancel actuator. The cancel actuator latches against the cancel cam rotation in the direction opposite that which is signaled. If the LEFT turn signal detent is selected, the lobes of the cancel cam will ratchet past the cancel actuator when the steering wheel is rotated to the left, but will unlatch the cancel actuator as the steering wheel rotates to the right and returns to center, which will cancel the turn signal event and release the control stalk from the detent so it returns to the neutral OFF position. The SCM reads the resistor multiplexed input from the multi-function switch and sends an electronic **turn signal switch status** message over the CAN data bus to the BCM and to other electronic modules in the vehicle.

REMOVAL

REMOVAL

The multi-function switch is serviced only as a unit with the Steering Column Control Module (SCCM) mounting housing, the Steering Control Module (SCM) and multi-function switch unit. Refer to **MODULE, STEERING COLUMN, REMOVAL** . The clockspring is available for separate service replacement.

INSTALLATION

INSTALLATION

The multi-function switch is serviced only as a unit with the Steering Column Control Module (SCCM) mounting housing, the Steering Control Module (SCM) and multi-function switch unit. Refer to **MODULE, STEERING COLUMN, INSTALLATION** . The clockspring is available for separate service replacement.

SWITCH, STOP LAMP

DESCRIPTION

DESCRIPTION

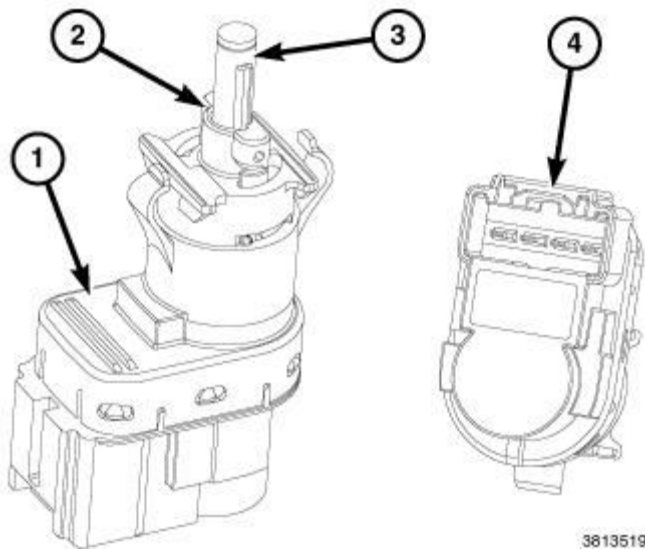


Fig. 51: Stop Lamp Switch, Mounting Collar, Switch Plunger & Connector Receptacle
Courtesy of CHRYSLER GROUP, LLC

The brake (or stop) lamp switch (1) is a two-circuit, spring-loaded plunger actuated switch that is secured to the brake pedal support bracket under the instrument panel on the driver side of the vehicle. The molded plastic switch housing has an integral connector receptacle (4) containing four terminal pins. The switch is connected to the vehicle electrical system through a dedicated take out and connector of the body wire harness.

The switch plunger (3) extends through a mounting collar (2) on one end of the switch housing. The plunger has a telescoping self-adjustment feature that is activated as the switch is being installed by the brake pedal in its normal at-rest position.

This brake lamp switch cannot be repaired. If the switch is damaged or ineffective it must be replaced with a new unit.

OPERATION

OPERATION

The brake (or stop) lamp switch controls two independent circuits. These circuits are described as follows:

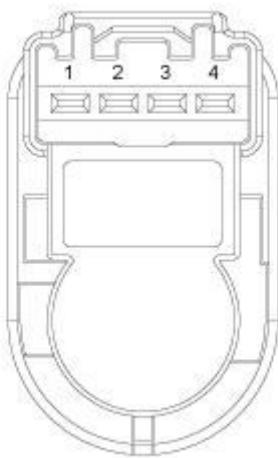
- **Normally Closed** - The normally closed circuit provides a hard wired output to the Body Control Module (BCM) indicating the position of the brake pedal, depressed or released. The BCM responds by relaying electronic **brake switch status** messages over the Controller Area Network (CAN) data bus to other electronic modules in the vehicle.
- **Normally Open** - The normally open circuit provides hard wired outputs to the BCM, the Powertrain Control Module (PCM) and the Radio Frequency Hub Module (RFHM) (also known as the RF Hub) whenever the brake pedal is depressed. The BCM responds to the normally open input by providing a control output that energizes or de-energizes the brake lamps. The RFHM responds to the normally open input by providing a control output that energizes or de-energizes the Brake Transmission Shift Interlock (BTSI) solenoid.

The brake lamp switch as well as the hard wired inputs and outputs of the switch may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, the switch can only be tested while installed and, while in the installed position, the switch terminals are inaccessible to test meter probes. The most reliable, efficient and accurate means to diagnose the electronic controls and communication related to brake lamp switch operation requires the use of a diagnostic scan tool to read the switch status through the BCM. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - STOP LAMP SWITCH

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.



3828400

Fig. 52: Stop Lamp Switch Connector End View
Courtesy of CHRYSLER GROUP, LLC

The brake lamp switch as well as the hard wired inputs and outputs of the switch may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, the switch can only be tested while installed and, while in the installed position, the switch terminals are inaccessible to test meter probes. The most reliable, efficient and accurate means to diagnose the electronic controls and communication related to brake lamp switch operation requires the use of a diagnostic scan tool to read the switch status through the BCM and the PCM.

1. Using a scan tool, check for Diagnostic Trouble Codes (DTCs) in the BCM and PCM. If no DTCs are found, go to Step 2. If any DTCs are found, refer to **DTC INDEX** to locate the DTC and repair as needed.
2. Monitor the Brake Lamp Switch operation by using the diagnostic scan tool to verify that both switch states in the BCM changes while actuating the brake pedal. If actuation is detected in the BCM, move to the PCM to confirm actuation is detected.



0617003990

Fig. 53: Identifying Brake Switch Condition
Courtesy of CHRYSLER GROUP, LLC

3. If damage to the switch is present for any reason the switch is to be replaced. If a switch is removed and the plunger length differs from a new switch, the switch should always be replaced and not reinstalled. The nominal height for a new switch (tip of the plunger to the body of the switch) is 16.90mm.
 - 1 - Defective brake switch due to the switch tab being sheared off.
 - 2 - Defective brake switch due to the switch tab being offset.
 - 3 - Normal operational brake lamp switch to be used for installation.

REMOVAL

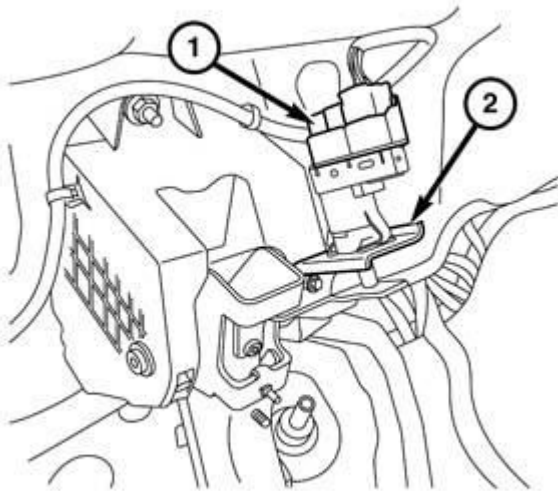
REMOVAL

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before

performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

CAUTION: Never remove or install the brake lamp switch while the brake pedal arm is disassembled from the brake booster push rod.

CAUTION: Do not depress, lift or move the brake pedal during brake lamp switch removal to avoid switch damage. Do not depress, lift or move the brake pedal during brake lamp switch installation to avoid improper switch adjustment.



081769096

Fig. 54: Stop Lamp Switch & Brake Pedal Support Bracket
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Locate the brake lamp switch (1) on the brake pedal support bracket (2) on the dash panel under the instrument panel.
3. Disconnect the body wire harness connector from the brake lamp switch.

NOTE: If a click noise is heard during switch removal, the switch may have internal damage and should be replaced.

4. Press the brake lamp switch against the bracket while rotating the switch housing clockwise about 45 degrees to align the tabs on the switch locking collar with the keyed hole in the brake pedal support

bracket.

5. Pull the switch straight away from the keyed hole to remove it from the bracket.
6. Remove the switch from the vehicle.



Fig. 55: Identifying Brake Switch Condition
Courtesy of CHRYSLER GROUP, LLC

7. If damage to the switch is present for any reason the switch is to be replaced. If a switch is removed and the plunger length differs from a new switch, the switch should always be replaced and not reinstalled. The nominal height for a new switch (tip of the plunger to the body of the switch) is 16.90mm.
 - 1 - Defective brake switch due to the switch tab being sheared off.
 - 2 - Defective brake switch due to the switch tab being offset.
 - 3 - Normal operational brake lamp switch to be used for installation.

INSTALLATION

INSTALLATION

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

CAUTION: Never remove or install the brake lamp switch while the brake pedal arm is disassembled from the brake booster push rod.

CAUTION: Do not depress, lift or move the brake pedal during brake lamp switch removal to avoid switch damage. Do not depress, lift or move the brake pedal during brake lamp switch installation to avoid improper switch adjustment.

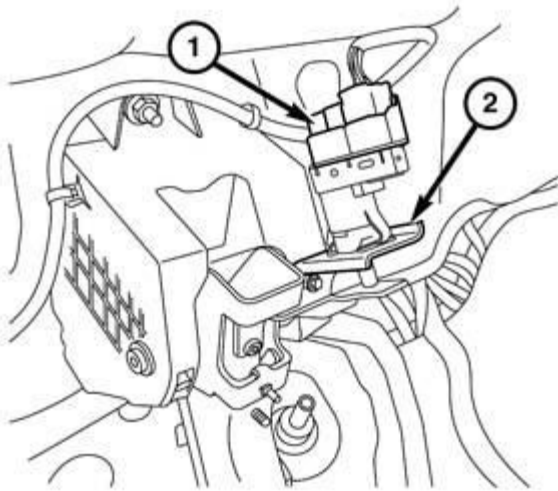
NOTE: Be certain that the brake pedal bracket is not bent or damaged before installing or reinstalling a brake lamp switch. Inspect the brake switch tab location making sure its in the proper location indicating that the switch is not defective.



Fig. 56: Identifying Brake Switch Condition
Courtesy of CHRYSLER GROUP, LLC

NOTE: If damage to the switch is present for any reason the switch is to be replaced. If a switch is removed and the plunger length differs from a new switch, the switch should always be replaced and not reinstalled. The nominal height for a new switch (tip of the plunger to the body of the switch) is 16.90mm.

- 1 - Defective brake switch due to the switch tab being sheared off.
- 2 - Defective brake switch due to the switch tab being offset.
- 3 - Normal operational brake lamp switch to be used for installation.



081769096

Fig. 57: Stop Lamp Switch & Brake Pedal Support Bracket
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Be certain that the brake pedal bracket is not bent before installing or reinstalling a brake lamp switch.

1. Position the brake lamp switch (1) near the brake pedal support bracket (2) on the dash panel under the instrument panel.
2. Align the tabs on the brake lamp switch locking collar with the keyed hole in the brake pedal support bracket.
3. Holding the brake lamp switch perpendicular to the support bracket, insert the tabs on the brake lamp switch locking collar through the keyed hole in the support bracket until the switch housing is firmly seated against the bracket.
4. Rotate the switch housing counterclockwise about 45 degrees to engage the tabs on the locking collar with the support bracket.
5. Reconnect the body wire harness connector to the connector receptacle on the switch.
6. Reconnect the battery negative cable.

UNIT, FRONT LAMP

STANDARD PROCEDURE

STANDARD PROCEDURE - LAMP LENS DEFOGGING

Some customers may report that on occasion, vehicle exterior lamp assemblies are fogged with a light layer of

condensation on the inside of the lenses. This may be reported after the lamps have been turned on and brought up to operating temperature, turned off, and then rapidly cooled by cold water (such as rain, or the water from a car wash). Lens fogging can also occur under certain atmospheric conditions after a vehicle has been parked outside overnight (i.e., a warm humid day followed by clear cool night). This will usually clear as atmospheric conditions change to allow the condensation to change back into a vapor. Turning the lamps on will usually accelerate this process.

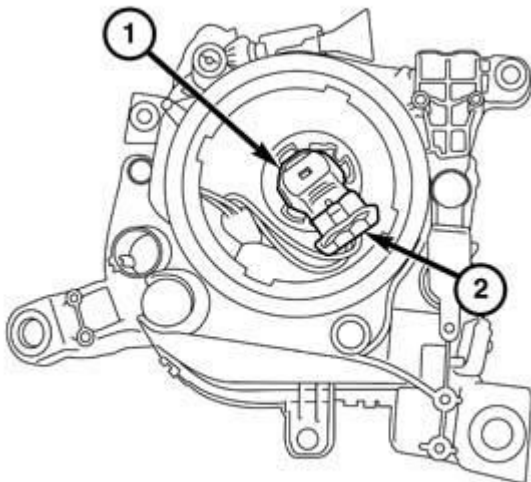
A lamp that exhibits condensation/fogging should be evaluated in a service bay environment by first drying all water from the outside surface of the lens and operating the lamp for 20 minutes. If the condensation/fogging has begun to clear from the lamp lens after 20 minutes with the lamps operating, this indicates the lamp sealing has not been breached, and the lamp does not need to be replaced.

If the condensation/fogging has not begun to clear after 20 minutes with the lamps operating, or the lamp has large amounts of water droplets visible on most internal surfaces, this indicates a problem with the lamp sealing that has allowed water to enter the lamp. In this instance, the customer is also likely to report that moisture in the lamp is always present and never disappears. A lamp that exhibits internal moisture permanently should be replaced.

REMOVAL

BULB - HEADLAMP

CAUTION: Do not contaminate the bulb glass by touching it with your fingers or by allowing it to contact other oily surfaces. Shortened bulb life will result.



0823006553

Fig. 58: Headlamp Bulb Base & Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. For passenger side bulb assembly, position the air cleaner box out of the way. Refer to **AIR CLEANER, REMOVAL** for 2.0L Diesel, **AIR CLEANER, REMOVAL** for 2.4L or **AIR CLEANER, REMOVAL** for 3.2L.
3. Firmly grasp the headlamp bulb access cover on the outboard back of the front lamp unit housing and rotate it counterclockwise about 30 degrees to unlock it.
4. Remove the access cover from the lamp housing.
5. Firmly grasp the headlamp bulb base (1) on the back of the reflector within the front lamp unit housing and rotate it counterclockwise about 30 degrees to unlock it.
6. Pull the bulb and base straight out from the keyed opening in the reflector.

NOTE: Take care to prevent the front lamp unit wire harness and connector from falling back into the lamp housing after disconnecting it from the bulb.

7. Disconnect the front lamp unit wire harness connector (2) from the bulb connector receptacle.
8. Remove the bulb from the back of the front lamp unit.

LAMP

WARNING: To avoid serious or fatal injury when working on the High Intensity Discharge (HID) headlamp system, be certain to take the proper precautions. The headlamp switch must be in the OFF position. Disconnect and isolate the battery negative cable. There is a risk of fatal injury caused by contact with high voltage used in the HID headlamps. There is a risk of explosion or fire caused by highly flammable materials in the vicinity of damaged HID lighting elements. There is a risk of injury caused by exposure to Ultra Violet (UV) light, a risk of burns caused by high component operating temperatures, a risk of mercury poisoning through glass splinters produced by bursting HID lighting elements. There is also a risk of poisoning caused by inhalation of mercury vapors and by toxic salts and mercury compounds being ingested or coming into contact with the skin. Do not come into contact with parts that are under high voltage. Persons with active electronic implants (e.g. heart pacemakers) must never work on HID headlamps. Wear insulated safety shoes, safety glasses and protective gloves. Remove flammable materials and ensure sufficient ventilation in the working area.

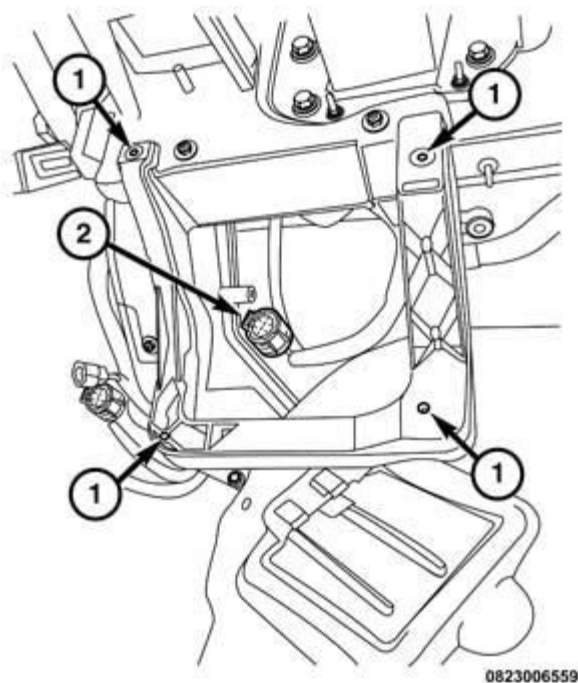


Fig. 59: Front End Module (FEM)

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the fascia from the Front End Module (FEM) (1). Refer to **FASCIA, FRONT, REMOVAL**.
3. Remove the 4 screws (1) that secures the lower front lamp unit to the vehicle.
4. Pull the lamp away from the front of the vehicle far enough to access and disconnect the wire harness connection (2) from the back of the lamp housing.
5. Remove the front lamp unit from the vehicle.

LIGHTING ELEMENT - HIGH INTENSITY DISCHARGE

WARNING: To avoid serious or fatal injury when working on the High Intensity Discharge (HID) headlamp system, be certain to take the proper precautions. The headlamp switch must be in the OFF position. Disconnect and isolate the battery negative cable. There is a risk of fatal injury caused by contact with high voltage used in the HID headlamps. There is a risk of explosion or fire caused by highly flammable materials in the vicinity of damaged HID lighting elements. There is a risk of injury caused by exposure to Ultra Violet (UV) light, a risk of burns caused by high component operating temperatures, a risk of mercury poisoning through glass splinters produced by bursting HID lighting elements. There is also a risk of poisoning caused by inhalation of mercury vapors and by toxic salts and mercury compounds being ingested or coming into contact with the skin. Do not come into contact with parts that are under high voltage. Persons with active electronic implants (e.g. heart

pacemakers) must never work on HID headlamps. Wear insulated safety shoes, safety glasses and protective gloves. Remove flammable materials and ensure sufficient ventilation in the working area.

CAUTION: Do not contaminate the lighting element glass by touching it with your fingers or by allowing it to contact other oily surfaces. Shortened lighting element life will result.

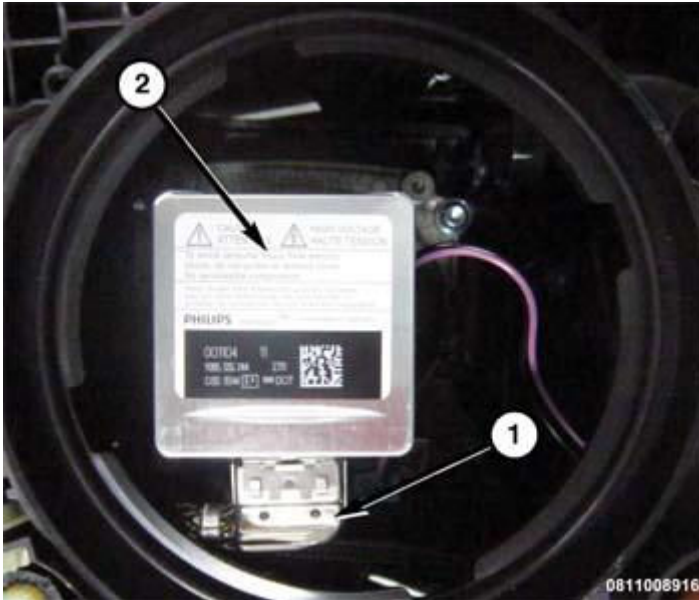


Fig. 60: HID Igniter & High Tension Cable
Courtesy of CHRYSLER GROUP, LLC

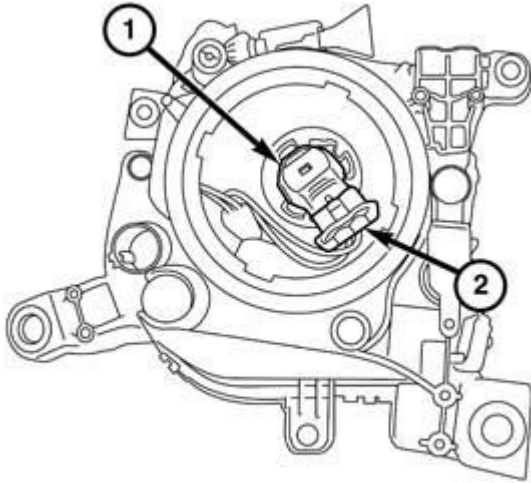
1. Disconnect and isolate the battery negative cable.
2. Remove the front fascia. Refer to **FASCIA, FRONT, REMOVAL**.
3. Remove the front headlamp assembly. Refer to **UNIT, FRONT LAMP, REMOVAL**.
4. Firmly grasp the headlamp bulb access cover on the outboard back of the front lamp unit housing and rotate it counterclockwise about 30 degrees to unlock it.
5. Remove the access cover from the lamp housing.

NOTE: Take care to prevent the high tension cable from falling back into the lamp housing after disconnecting it from the HID igniter (2).

6. Disconnect the high tension cable (1) from the HID igniter connector receptacle on the back of the reflector within the front lamp unit housing.
7. Firmly grasp the igniter (2) and rotate it counterclockwise about 30 degrees to unlock it.
8. Pull the HID igniter and lighting element straight out from the keyed opening in the reflector.
9. Remove the igniter and lighting element from the back of the front lamp unit.

INSTALLATION

BULB - HEADLAMP



0823006553

Fig. 61: Headlamp Bulb Base & Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Always use the correct bulb size and type for replacement. An incorrect bulb size or type may overheat and cause damage to the lamp, the socket or the lamp wiring.

CAUTION: Do not contaminate the bulb glass by touching it with your fingers or by allowing it to contact other oily surfaces. Shortened bulb life will result.

1. Position the headlamp bulb close enough to the back of the front lamp unit housing to access and reconnect the lamp wire harness connector (1) to the headlamp bulb connector receptacle.
2. Insert the headlamp bulb into the reflector opening until firmly seated.
3. Rotate the base clockwise about 30 degrees to lock it into place.
4. Position the headlamp bulb access cover onto the outboard back of the front lamp unit housing and rotate it clockwise about 30 degrees to lock it into place.
5. Install the air cleaner assembly (for passenger bulb installations). Refer to **AIR CLEANER, INSTALLATION** for 2.0L Diesel, **AIR CLEANER, INSTALLATION** for 2.4L or **AIR CLEANER, INSTALLATION** for 3.2L.
6. Reconnect the battery negative cable.

LAMP

WARNING: To avoid serious or fatal injury when working on the High Intensity Discharge (HID) headlamp system, be certain to take the proper precautions. The headlamp switch must be in the OFF position. Disconnect and isolate the battery negative cable. There is a risk of fatal injury caused by contact with high voltage used in the HID headlamps. There is a risk of explosion or fire caused by highly flammable materials in the vicinity of damaged HID lighting elements. There is a risk of injury caused by exposure to Ultra Violet (UV) light, a risk of burns caused by high component operating temperatures, a risk of mercury poisoning through glass splinters produced by bursting HID lighting elements. There is also a risk of poisoning caused by inhalation of mercury vapors and by toxic salts and mercury compounds being ingested or coming into contact with the skin. Do not come into contact with parts that are under high voltage. Persons with active electronic implants (e.g. heart pacemakers) must never work on HID headlamps. Wear insulated safety shoes, safety glasses and protective gloves. Remove flammable materials and ensure sufficient ventilation in the working area.

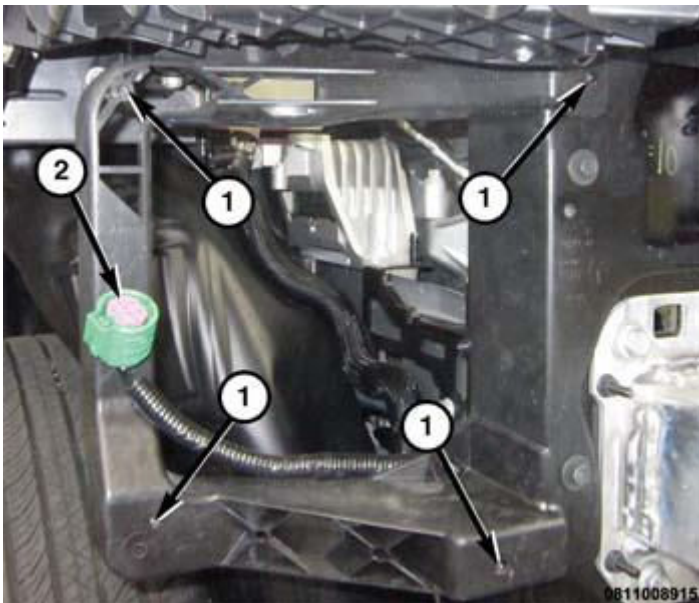


Fig. 62: Screws & Wire Harness Connector

Courtesy of CHRYSLER GROUP, LLC

1. Position the front lamp unit close enough to the front of the vehicle to reconnect the headlamp and dash wire harness connections to the front lamp unit wire harness connector (2) on the back of the lamp housing.
2. Install and tighten the four screw (1) to secure the front lamp unit to the mounting bracket.
3. Reinstall the fascia onto the FEM. Refer to **FASCIA, FRONT, INSTALLATION** .
4. Reconnect the battery negative cable.

5. Confirm proper headlamp alignment. Refer to STANDARD PROCEDURE.

LIGHTING ELEMENT - HIGH INTENSITY DISCHARGE

WARNING: To avoid serious or fatal injury when working on the High Intensity Discharge (HID) headlamp system, be certain to take the proper precautions. The headlamp switch must be in the OFF position. Disconnect and isolate the battery negative cable. There is a risk of fatal injury caused by contact with high voltage used in the HID headlamps. There is a risk of explosion or fire caused by highly flammable materials in the vicinity of damaged HID lighting elements. There is a risk of injury caused by exposure to Ultra Violet (UV) light, a risk of burns caused by high component operating temperatures, a risk of mercury poisoning through glass splinters produced by bursting HID lighting elements. There is also a risk of poisoning caused by inhalation of mercury vapors and by toxic salts and mercury compounds being ingested or coming into contact with the skin. Do not come into contact with parts that are under high voltage. Persons with active electronic implants (e.g. heart pacemakers) must never work on HID headlamps. Wear insulated safety shoes, safety glasses and protective gloves. Remove flammable materials and ensure sufficient ventilation in the working area.

CAUTION: Always use the correct lighting element size and type for replacement. An incorrect size or type may overheat and cause damage to the lamp or the lamp wiring.

CAUTION: Do not contaminate the lighting element glass by touching it with your fingers or by allowing it to contact other oily surfaces. Shortened lighting element life will result.

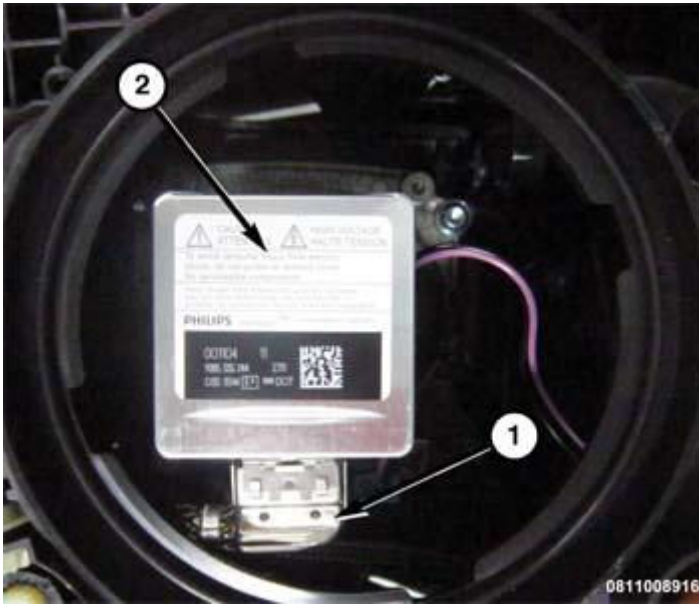


Fig. 63: HID Igniter & High Tension Cable
Courtesy of CHRYSLER GROUP, LLC

1. Align and insert the High Intensity Discharge (HID) igniter and lighting element unit (2) straight into the opening in the front lamp unit reflector as a unit.
2. Press the igniter firmly and evenly toward the reflector until the base is firmly seated.
3. Rotate the igniter clockwise about 30 degrees to lock it into place.
4. Reconnect the high tension cable connector (1) to the connector receptacle integral to the lower edge of the igniter housing.
5. Position the headlamp bulb access cover onto the outboard back of the front lamp unit (2) housing and rotate it clockwise about 30 degrees to lock it into place.
6. Reconnect the battery negative cable.

2014 ACCESSORIES AND EQUIPMENT

Lamps/Lighting - Interior - Service Information - Cherokee

WARNING

WARNING

WARNING: To avoid serious or fatal injury, eye protection should be used when servicing any glass components.

CAUTION: Do not contaminate the glass of halogen bulbs with fingerprints or allow contact with other possibly oily surfaces. Reduced bulb life will result.

CAUTION: Do not use bulbs with higher candle power than indicated in the BULB APPLICATION TABLE . In addition, do not use fuses, circuit breakers or relays having greater amperage value than indicated on the fuse panel or in the Owner's Manual. Damage to lamps, lenses, wiring and other related electrical components can result.

DESCRIPTION

DESCRIPTION

The interior lighting system for this vehicle includes lighting on the dome/courtesy lamp circuit and the non-dimming panel lamps circuit. The lamps on the dome/courtesy circuit include:

- **Cargo Lamp** - An available cargo lamp is located in the left quarter inside panel just forward of the trunk side trim panel at the back of the vehicle and is controlled by the courtesy lamp circuit.
- **Dome/Reading Lamps** - Standard front seat driver side and passenger side dome/reading lamps are located in a mounting bracket on the headliner above the instrument panel near the upper windshield header and are controlled by both the courtesy lamp circuit and by independent push button switches adjacent to each lamp.
- **Vanity Lamps** - An optional single intensity, incandescent vanity lamp is located on each side of a covered mirror on both the right and left sun visors, and is controlled by an integral vanity mirror cover-actuated switch.
- **Glove Box Lamp** - A standard glove box lamp with a single LED unit and an integral switch is located in the glove box housing of the instrument panel and illuminates whenever the glove box is opened.
- **Courtesy Lamps** - Standard incandescent courtesy lamps are located under the right and left ends of the instrument panel, and are controlled by the courtesy lamp circuit.
- **Front Door Map Pocket Lamps** - Front door trim panel map pockets on some models include an LED lamp unit to assist visibility at night. These lamps are controlled by the panel lamps dimmer circuit and illuminate whenever the exterior lighting is turned ON.

- **Center Dome Lamps** - The standard incandescent rear dome/reading lamps are controlled by both the courtesy lamp circuit and independent lens-actuated switches.

Most controls on the instrument panel and elsewhere in the interior of the vehicle are illuminated by Light-Emitting Diode (LED) units on a non-dimming panel lamps circuit for night visibility. These LED units are soldered to internal circuit boards and are not serviceable.

Other components of the interior lighting system for this vehicle include:

- **Body Control Module** - The Body Control Module (BCM) is located under the instrument panel to the left of the steering column in the passenger compartment of the vehicle. Refer to **MODULE, BODY CONTROL, DESCRIPTION**.
- **Door Ajar Switches** - A door ajar switch is integral to the door latch mechanism of each door.
- **Liftgate Ajar Switch** - A liftgate ajar switch is integral to the latch mechanism of the liftgate.
- **Instrument Panel Cluster** - The Instrument Panel Cluster (IPC) is located in the instrument panel above the steering column opening, directly in front of the driver. Refer to **DESCRIPTION**.
- **Headlamp Switch** - A headlamp switch is located on the left side of the instrument panel, below and outboard of the steering column. The headlamp switch includes a thumbwheel for selecting the panel lamps dimming level and for interior lighting control. A PARADE position of the thumbwheel illuminates all display units at full brightness for visibility when driving in daylight with the exterior lighting turned ON. There are also detent positions to turn ON all interior courtesy lighting, and a DEFEAT position that overrides door ajar switch control of interior lighting. Refer to **SWITCH, HEADLAMP, DESCRIPTION**.

Hard wired circuitry connects the interior lighting system components to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the interior lighting components through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention as well as pin-out and location views for the various wire harness connectors, splices and grounds.

OPERATION

OPERATION

The lamps of the interior lighting system can be divided into two general classifications based upon the circuit that controls their operation: The courtesy lamp circuit, or the non-dimming panel lamps circuit. The following are paragraphs that briefly describe the operation of each of these interior lighting circuits.

The lamps and the hard wired circuits between components related to the interior lighting system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness

connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the interior lighting system or the electronic controls or communication between modules and other devices that provide some features of the interior lighting system. The most reliable, efficient, and accurate means to diagnose the interior lighting system or the electronic controls and communication related to interior lighting system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

COURTESY LAMP CIRCUIT

The courtesy lamp circuit includes the dome/reading lamps located on the headliner near the center of the windshield opening upper header and the cargo (or trunk) lamp located on the rear edge of the left quarter inner trim near the left trunk trim panel at the rear of the vehicle. The lamps in the courtesy lamp circuit are provided with battery voltage and ground by the Body Control Module (BCM) using internal low side drivers through two ground circuits based upon hard wired inputs from the ignition switch and the door ajar switches. Power for the Trunk Lighting Function is sourced via a dedicated high side relay. The BCM also uses electronic message inputs received from other electronic modules in the vehicle over the Controller Area Network (CAN) data bus to control these outputs.

When a door or trunk ajar switch input to the BCM transitions to closed, the BCM will illuminate the courtesy lamps and keep them active for up to about 3 minutes. After all of the ajar switch inputs to the BCM transition to open, the BCM will keep the courtesy lamps illuminated for about 10 seconds. The BCM also provides courtesy lamp operation based upon certain inputs received from the Remote Keyless Entry (RKE) transmitter to provide an Illuminated Entry feature and in response to certain electronic message inputs received from the Occupant Restraint Controller (ORC) or the Powertrain Control Module (PCM) over the CAN data bus.

For those lamps in the courtesy lamp circuit with independent switching such as the dome/reading lamps, the BCM provides a second feed to the switches using another internal low side driver through a separate load shed circuit. The BCM provides a battery saver (load shedding) feature for these lamps, which will automatically turn the lamps OFF if they are left ON for more than about fifteen minutes with the ignition switch in the OFF position.

READING LAMP CIRCUIT

For those lamps on the courtesy lamp circuit with independent switching such as the map or reading lamps, the EMIC also provides a battery voltage output to those switches through a separate reading lamp circuit. The EMIC provides a battery saver (load shedding) feature for the reading lamp circuit as well as the courtesy lamp circuit, which will automatically turn these lamps OFF if they are left ON for more than about 10 minutes after the electronic **ignition switch status** message transitions to OFF. If any reading lamp input is received subsequent to a 10 minute load shed and prior to a new ignition cycle, the reading lamps will turn OFF after 90 seconds.

PANEL LAMPS DIMMER CIRCUIT

The panel lamps dimmer circuit actually includes several circuits. These circuits control the back lighting illumination and dimming level of the headlamp switch, the dimmer module, the automatic transmission gear selector bezel lamp, the front door map pocket lamps, as well as the center floor console cup holder and forward

storage compartment lamps. All lamps in the panel lamps dimmer circuits are provided a path to ground at all times through a hard wired ground circuit. These lamps are illuminated by a 12-volt Pulse Width Modulated (PWM) output of the BCM through several panel lamps dimmer circuits.

This shared PWM output synchronizes the selected illumination intensity level of all the lamps in the panel lamps dimmer circuits. The BCM uses hard wired resistor multiplexed inputs from the rotary exterior lighting control knob of the headlamp switch to determine when the exterior lighting is turned ON and from the thumbwheel of the dimmer module to determine the dimming level selection. Then the BCM provides the appropriate PWM outputs through the panel lamps dimmer circuits as well as electronic **dimming level** messages over the CAN data bus to other electronic modules in the vehicle.

The Instrument Cluster (IC) (also known as the Common Instrument Cluster/CIC) and the Integrated Center Stack (ICS) use the electronic **dimming level** messages to control the illumination intensity of their own back lighting, controls and display units. In addition, when the interior lighting thumbwheel of the dimmer module is moved to the PARADE (or funeral) mode detent position, all of the electronic display units are illuminated at their full intensity levels for increased visibility when the vehicle is driven during daylight hours with the exterior lighting turned ON. The PARADE mode has no effect on the illumination intensity of incandescent panel lamps.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - INTERIOR LIGHTING

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

NOTE: When diagnosing the interior lighting circuits, remember that high generator output can burn out bulbs rapidly and repeatedly; and, that dim or flickering bulbs can be caused by low generator output or poor battery condition. If one of these symptoms is a problem on the vehicle, be certain to diagnose the battery and charging system, then repair as necessary.

NOTE: A good ground is necessary for proper lighting operation. If a lighting problem is being diagnosed that involves multiple symptoms, systems, or components, the problem can often be traced to a loose, corroded, or open ground.

WARNING: On vehicles equipped with the high voltage system, disconnecting the 12-volt battery negative cable alone will not power down the 12-volt system. You must perform the 12-volt Power Down procedure before proceeding.

Failure to follow these instructions may result in possible serious or fatal injury.

The lamps and the hard wired circuits between components related to the interior lighting system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the interior lighting system or the electronic controls or communication between modules and other devices that provide some features of the interior lighting system. The most reliable, efficient, and accurate means to diagnose the interior lighting system or the electronic controls and communication related to interior lighting system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

COURTESY LAMP CIRCUIT

CONDITION	POSSIBLE CAUSES	CORRECTION
A SINGLE LAMP IN THE COURTESY LAMP CIRCUIT DOES NOT ILLUMINATE	1. Ineffective or missing bulb.	1. Test and replace the courtesy lamp bulb if required.
	2. Ineffective lamp switch.	2. Test and replace a dome/reading lamp switch if required.
	3. Ineffective ground circuit.	3. Test and repair the open ground circuit if required.
	4. Ineffective feed circuit.	4. Test and repair the open feed circuit if required.
ALL LAMPS IN THE COURTESY LAMP CIRCUIT DO NOT ILLUMINATE	1. Ineffective ground circuit.	1. Test and repair the open ground circuit if required.
	2. Ineffective feed circuit.	2. Test and repair the open feed circuit if required.
	3. Courtesy DEFEAT feature turned ON.	3. Turn courtesy DEFEAT feature OFF.
	4. Ineffective courtesy lamp control circuit.	4. Test and repair the courtesy lamp control circuit if required.
	5. Ineffective Body Control Module (BCM) inputs or outputs.	5. Use a diagnostic scan tool and the appropriate diagnostic information for further BCM diagnosis.
A SINGLE LAMP IN THE COURTESY LAMP CIRCUIT DOES NOT EXTINGUISH	1. Ineffective lamp switch.	1. Test and replace a dome/reading lamp switch if required.
ALL LAMPS IN THE COURTESY LAMP CIRCUIT DO NOT EXTINGUISH	1. Ineffective ajar switch.	1. Test and replace a door ajar or liftgate ajar switch if required.
	2. Ineffective ajar switch sense circuit.	2. Test and repair the shorted ajar switch sense circuit if required.
	3. Ineffective BCM inputs or	3. Use a diagnostic scan tool and the

2014 Jeep Cherokee Trailhawk

2014 ACCESSORIES AND EQUIPMENT Lamps/Lighting - Interior - Service Information - Cherokee

outputs.

appropriate diagnostic information for further BCM diagnosis.

PANEL LAMPS DIMMER CIRCUIT

NOTE: As part of the exterior lighting fail-safe feature, upon ignition ON all of the panel lamps dimmer circuit lamps will illuminate at full intensity and the exterior park lamps and headlamp low beams will illuminate regardless of the left multi-function switch control knob and sleeve positions if the Steering Control Module (SCM) cannot detect an input from the left multi-function switch, or if there is a loss of data bus communication.

CONDITION	POSSIBLE CAUSES	CORRECTION
A SINGLE LAMP DOES NOT ILLUMINATE	1. Ineffective or missing bulb or Light Emitting Diode (LED) unit. 2. Ineffective ground circuit. 3. Ineffective feed circuit.	1. Test and replace the lamp bulb or LED unit if required. 2. Test and repair the open lamp ground circuit if required. 3. Test and repair the open lamp feed circuit if required.
A SINGLE LAMP DOES NOT EXTINGUISH	1. Ineffective feed circuit.	1. Test and repair the shorted lamp feed circuit if required.
ALL LAMPS DO NOT ILLUMINATE	1. Ineffective ground circuit. 2. Ineffective feed circuit. 3. Ineffective BCM inputs or outputs.	1. Test and repair the open lamp ground circuit if required. 2. Test and repair the open lamp feed circuit if required. 3. Use a diagnostic scan tool and the appropriate diagnostic information for further BCM diagnosis.
ALL LAMPS ILLUMINATE AT FULL INTENSITY AT IGNITION ON	1. Ineffective dimmer module. 2. Ineffective BCM inputs or outputs. 3. Loss of data bus communication.	1. Test and replace the dimmer module if required. 2. Use a diagnostic scan tool and the appropriate diagnostic information for further BCM diagnosis. 3. Use a diagnostic scan tool to test the data bus. Refer to the appropriate diagnostic information.

SPECIFICATIONS

COURTESY LAMPS

BULB APPLICATION TABLE

LAMP	BULB

2014 Jeep Cherokee Trailhawk

2014 ACCESSORIES AND EQUIPMENT Lamps/Lighting - Interior - Service Information - Cherokee

COURTESY	906
FRONT DOME	MOPAR® 68090625AA
REAR DOME	MOPAR® 68090625AA
GLOVE BOX LAMP	LIGHT EMITTING DIODES (LED) SERVICED IN OVERHEAD CONSOLE ASSEMBLY
LIFTGATE LAMP	579
VANITY LAMP	MOPAR® 06501966

TORQUE SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Under Instrument Panel Courtesy Lamp Mounting Screw	2	-	17

LAMP, READING

REMOVAL

BULB - OVERHEAD CONSOLE

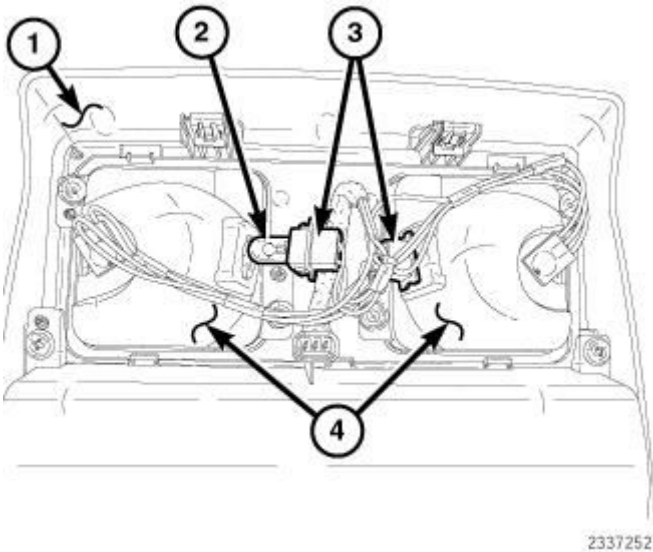


Fig. 1: Dome/Reading Lamp Socket

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the overhead console (1) from the headliner.
3. Grasp the dome/reading lamp socket (3) firmly and push it to one side far enough to unsnap the socket latch features from the lamp housing (4).
4. Pull the socket and bulb (2) out of the lamp housing.
5. Pull the base of the bulb straight out of the lamp socket.

INSTALLATION

BULB - OVERHEAD CONSOLE

CAUTION: Always use the correct bulb size and type for replacement. An incorrect bulb size or type may overheat and cause damage to the lamp, the socket or the lamp wiring.

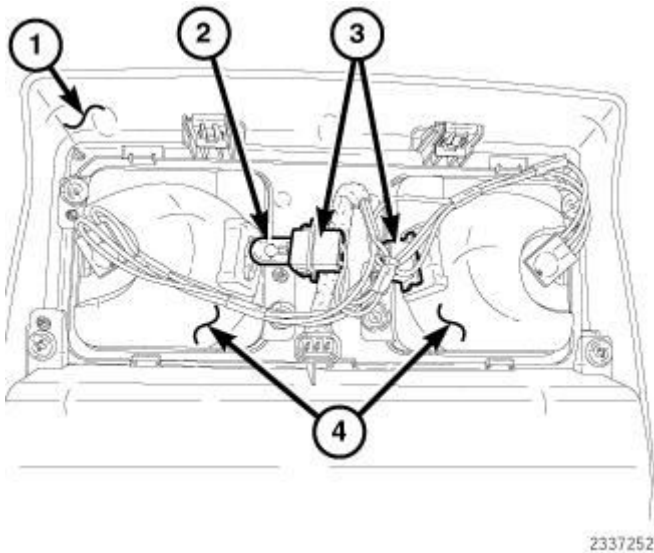


Fig. 2: Dome/Reading Lamp Socket
Courtesy of CHRYSLER GROUP, LLC

1. Align the base of the bulb (2) with the overhead console dome/reading lamp socket (3).
2. Push the bulb straight into the socket until the base is fully seated.
3. Align the socket and bulb with the keyed opening in the lamp housing (4).
4. Insert the bulb and socket straight into the housing until the socket latch features are both fully engaged.
5. Reinstall the overhead console (1) to the headliner.
6. Reconnect the battery negative cable.

LAMP, VANITY

DESCRIPTION

DESCRIPTION

If the overhead visor is equipped with illumination, the lamp and bulb are not serviced. Replacement of the visor is necessary if the bulb is found to be burned out. Refer to **VISOR, REMOVAL**.

SWITCH, DIMMER

DESCRIPTION**DESCRIPTION**

This vehicle has a panel dimmer switch (also known as the dimmer module) (1) that is located within the headlamp switch housing on the instrument panel steering column opening cover. The standard dimmer module features a single thumbwheel for panel lamps dimming and interior lighting control. There is also an optional switch with a second thumbwheel. The second thumbwheel is used for ambient (also known as halo) lighting control in vehicles with the ambient lighting option.

The dimmer module is constructed of molded plastic. The thumbwheel is molded plastic and knurled around its circumference to ease operator control. The headlamp switch face plate is labeled with graphics and International Control and Display Symbol icons to clearly identify the functions of the thumbwheel or optional thumbwheels.

The headlamp switch housing is snapped into place within the mounting hole of the steering column opening and held in place by two tension push down to release springs built into the headlamp switch housing itself. The back of the switch housing has an integral connector receptacle containing terminal pins that connect the module to the vehicle electrical system through a dedicated take out and connector of the instrument panel wire harness. Panel dimmer controlled Light Emitting Diode (LED) units soldered to the circuit board within the module provide back lighting for visibility at night, but are not serviceable.

The switch cannot be repaired and, if ineffective or damaged, it must be replaced. Refer to **SWITCH, HEADLAMP, REMOVAL**.

OPERATION**OPERATION**

The panel dimmer switch (also known as the dimmer module) uses a single resistor multiplexed output for each switch thumbwheel to control the many functions and features it provides. The switch receives a clean ground from the Body Control Module (BCM) on a multifunction switch MUX return circuit. It then provides outputs to the BCM on a panel lamps dimmer signal circuit to control panel dimmer and interior lighting functions, or on a dimmer environmental lighting circuit to control ambient (halo) lighting functions.

The dimmer module illumination circuit receives a path to ground at all times through an instrument panel ground circuit. The illumination level is controlled by a Pulse-Width Modulated (PWM) output received from the BCM on a panel lamps driver circuit. The BCM controls this output based upon the panel lamps dimmer signal circuit input from the dimmer module.

The dimmer module operates as follows:

- **Ambient (Halo) Lighting Control** - On vehicles so equipped, the right thumbwheel on the dimmer module is rotated to the ambient DEFEAT or one of the six ambient dimmer detent positions to control the ambient (halo) lighting level. The dimmer module provides the appropriate resistor multiplexed output to the BCM over the dimmer environmental lighting circuit. The BCM reads and responds to this input by providing the appropriate control outputs through internal HSDs over the liftgate courtesy feeds

driver circuit.

- **Interior Lighting Control** - The left thumbwheel on the dimmer module is rotated to the dome DEFEAT, dome ON, PARADE mode, or one of the six panel dimmer detent positions to control the interior courtesy/dome and panel lamps. The dimmer module provides the appropriate resistor multiplexed output to the BCM over the panel lamps dimmer signal circuit. The BCM reads and responds to this input by providing the appropriate control outputs through internal HSDs over the courtesy lamps, panel lamps and reading lamps driver circuits, and by sending appropriate electronic **dimming level** messages to other electronic modules over the CAN data bus.

The dimmer module as well as the hard wired inputs and outputs of the module may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information.

SWITCH, DOOR AJAR

DESCRIPTION

DOOR

This vehicle has four door ajar switches, one for each door. Each switch is concealed within and integral to its respective door latch unit. The switches are momentary leaf contact-type micro switch units that are actuated by the mechanisms internal to the door latch. An integral connector receptacle on each door latch connects the door ajar switch and the power lock motor to the vehicle electrical system through its respective door wire harness.

The door ajar switches cannot be adjusted or repaired and, if ineffective or damaged, the door latch unit must be replaced. Refer to **LATCH, DOOR, REMOVAL** or **LATCH, DOOR, REMOVAL**.

LIFTGATE

A liftgate ajar switch is standard equipment on this vehicle. The switch is concealed within and integral to the liftgate latch unit. The switch is a momentary leaf contact-type micro switch unit that is actuated by the liftgate latch mechanism. An integral connector receptacle on the liftgate latch connects the liftgate ajar switch to the vehicle electrical system through the liftgate wire harness.

The liftgate ajar switch cannot be adjusted or repaired and, if ineffective or damaged, the liftgate latch unit must be replaced. Refer to **LATCH, LIFTGATE, REMOVAL**.

OPERATION

DOOR

The door ajar switches are actuated by the mechanisms internal to the door latch. When a door is closed and properly latched, its door ajar switch is an open circuit. When a door is open or only partially latched, the door ajar switch is a closed circuit. The door ajar switches are hard wired in series between a body ground and the Body Control Module (BCM). The BCM reads the hard wired door ajar switch inputs through internal pull-ups, then uses these inputs to control many electronic functions and features of the vehicle. The BCM also sends electronic **door ajar switch status** messages to other electronic modules in the vehicle over the Controller Area Network (CAN) data bus.

The door ajar switches as well as the hard wired inputs and outputs of the switches may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information.

LIFTGATE

The liftgate ajar switch is actuated by the liftgate latch mechanism. When the liftgate is closed and properly latched, the liftgate ajar switch is an open circuit. When the liftgate is open or only partially latched, the liftgate ajar switch is a closed circuit. The liftgate ajar switch is hard wired in series between a body ground and the Body Control Module (BCM) on vehicles without the power liftgate option, or the Power LiftGate Module (PLGM) on vehicles with the power liftgate option. The BCM or the PLGM reads the hard wired liftgate ajar switch input through an internal pull-up, then uses this input to control many electronic functions and features of the vehicle. The BCM or the PLGM also sends electronic **liftgate ajar switch status** messages to other electronic modules in the vehicle over the Controller Area Network (CAN) data bus.

The liftgate ajar switch as well as the hard wired inputs and outputs of the switch may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information.

LAMP, DOME

REMOVAL

LAMP - CENTER

1. Disconnect and isolate the battery negative cable.
2. To remove and replace a bulb, use a trim stick to pop loose the lens covering the defective bulb. Remove bulb and replace.
3. To remove the entire dome lamp assembly, Insert a trim stick between the lamp housing and the headliner to pry the dome lamp assembly loose.
4. Disconnect the harness from the back of the dome lamp.

INSTALLATION

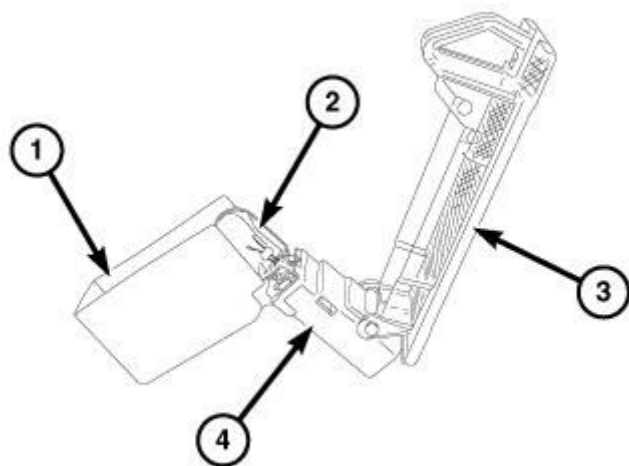
LAMP - CENTER

1. Position the dome lamp to the mounting hole in the headliner.
2. Reconnect the wire harness connector to the connector on the back of the lamp.
3. Set the lamp into the opening in the headliner.
4. Gently and evenly press the lens lamp into the mounting hole until the bezel of the lamp housing is snapped flush with the headliner.
5. Reconnect the battery negative cable.

LAMP, CARGO

REMOVAL

BULB

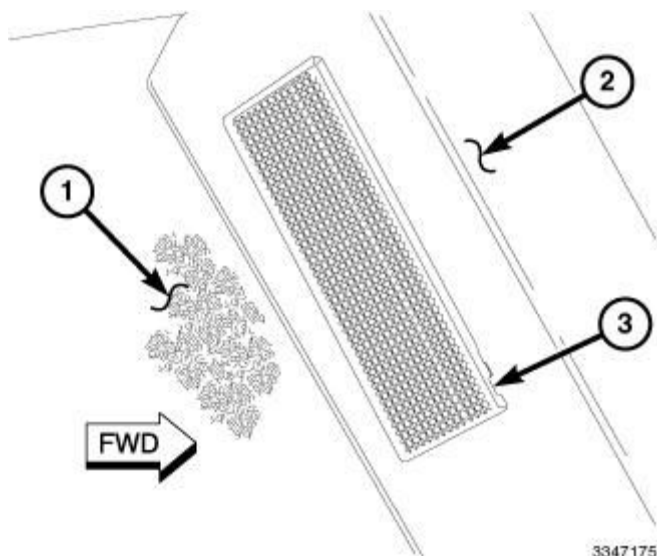


3347239

Fig. 3: Lamp Hood, Bulb, Lamp Lens & Lamp Socket
 Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the cargo lamp from the vehicle. Refer to **LAMP, CARGO, REMOVAL**.
3. Disengage the end of the lamp lens (3) with the latch feature from the retention pin on each side of the lamp hood (1).
4. Pivot the lens up from over the hood.
5. Unfold the lamp hood from the lamp socket (4) far enough to access the bulb (2).
6. Pull the base of the bulb straight out of the socket.

LAMP



3347175

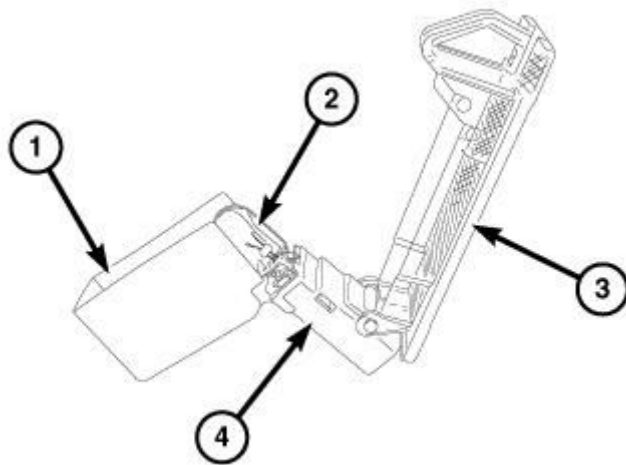
Fig. 4: Trunk Side Trim Panel, Left Quarter Trim Panel & Cargo Lamp

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Locate the cargo lamp (3) in the rear edge of the left quarter trim panel (2) near the trunk side trim panel (1).
3. Using a trim stick or another suitable wide flat-bladed tool, carefully pry the notched lower end of the cargo lamp lens to disengage the lower end of the lamp housing from the mounting hole in the quarter trim panel.
4. Pull the upper end of the lamp housing out of the mounting hole far enough to access and disconnect the body wire harness connector from the lamp connector receptacle.
5. Remove the cargo lamp from the vehicle.

INSTALLATION**BULB**

CAUTION: Always use the correct bulb size and type for replacement. An incorrect bulb size or type may overheat and cause damage to the lamp, the socket or the lamp wiring.



3347239

Fig. 5: Lamp Hood, Bulb, Lamp Lens & Lamp Socket

Courtesy of CHRYSLER GROUP, LLC

1. Align the base of the bulb (2) with the cargo lamp socket (4).
2. Push the bulb straight into the socket until the base is firmly seated.
3. Fold the lamp hood (1) back over the bulb until it is parallel to the lamp socket and connector.
4. Pivot the lens down over the hood.
5. Press the end of the lamp lens with the latch feature down firmly and evenly over the hood until the lens

snaps into place over the retention pin on each side of the hood.

6. Install the cargo lamp into the vehicle. Refer to **LAMP, CARGO, INSTALLATION**.
7. Reconnect the battery negative cable.

LAMP

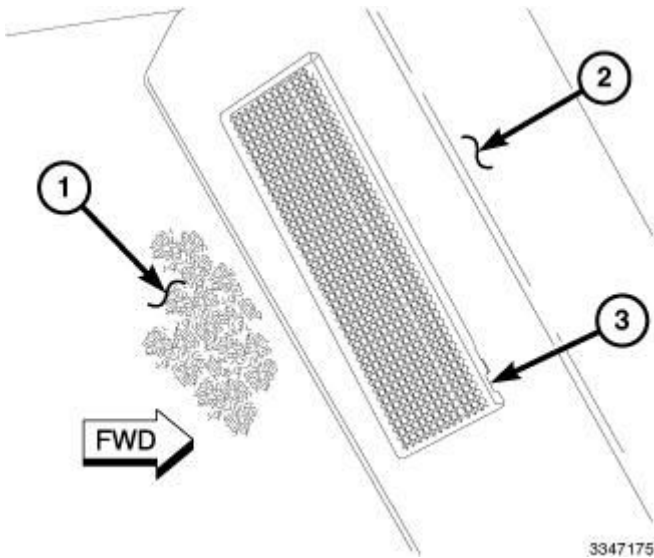


Fig. 6: Trunk Side Trim Panel, Left Quarter Trim Panel & Cargo Lamp
 Courtesy of CHRYSLER GROUP, LLC

1. Position the cargo lamp (3) close enough to the mounting hole in the rear edge of the left quarter trim panel (2) near the trunk side trim panel (1) to access and reconnect the body wire harness connector to the lamp connector receptacle.
2. Engage the wiring and connector on the upper end of the lamp housing into the upper end of the mounting hole.
3. Using hand pressure, press the notched lower end of the cargo lamp lens firmly and evenly into the mounting hole against the spring pressure of the latch feature until the latch snaps into place.
4. Reconnect the battery negative cable.

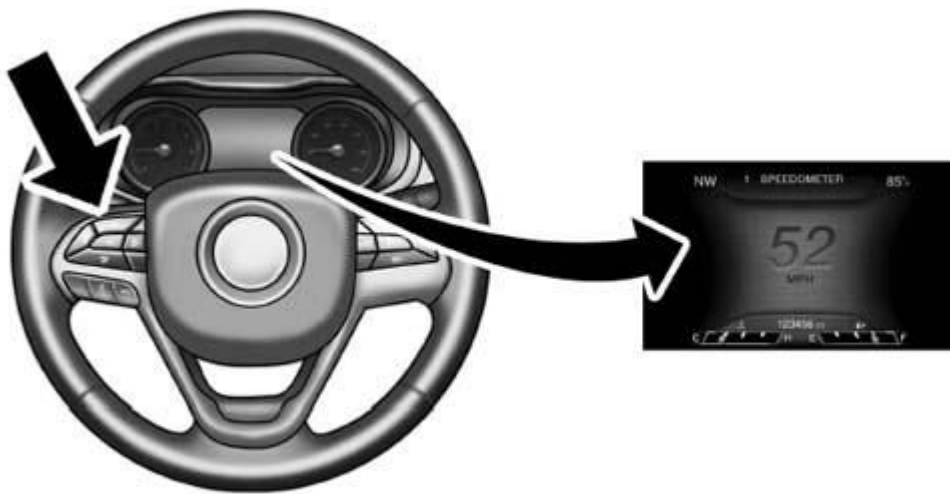
2014 ACCESSORIES AND EQUIPMENT**Message Center - Service Information - Cherokee****CENTER, ELECTRONIC VEHICLE INFORMATION****DESCRIPTION****DESCRIPTION****0409004648**

Fig. 1: Electronic Vehicle Information Center (EVIC) Driver-Interactive Display
Courtesy of CHRYSLER GROUP, LLC

The Electronic Vehicle Information Center (EVIC) features a driver-interactive display. The display is located in the middle of the instrument cluster between the speedometer and tachometer. This system conveniently allows the driver to select a variety of useful information by pressing the switches mounted on the steering wheel. The EVIC displays information related to the following:

- Audio mode display
- Compass display
- Fuel saver indicator, Economizer (ECO) display
- Navigation system screens - If Equipped
- Outside temperature display
- Park Assist System - If Equipped
- Personal Settings (customer programmable features)
- System Status

- Tire Pressure Monitor System - If Equipped
- Trip computer functions
- U-Connect™ hands-free communication system displays - If Equipped
- Vehicle information warning message displays

The EVIC system is comprised of several different components. Those components are:

- Instrument Cluster
- Steering Wheel Switches
- Ambient Temperature Sensor
- Controller Area Network (CAN) Data Bus
- Local Interface Network (LIN) Data Bus

The EVIC display is part of the Instrument Cluster assembly and is not serviced as a separate component. If the display is inoperative the complete Instrument Cluster assembly must be replaced. Refer to **REMOVAL** . If the EVIC function buttons are inoperative and require replacement, refer to **SWITCH, EVIC CONTROL, REMOVAL** for the appropriate procedure.

OPERATION

EVIC SWITCHES



Fig. 2: EVIC Function Buttons

Courtesy of CHRYSLER GROUP, LLC

The EVIC function buttons are used to operate the different functions of the EVIC system. Pressing and releasing the **Arrow** buttons allows the driver to scroll through and select the Compass/Temperature, Trip Computer, Personal Settings or System Status functions. The **OK** button allows the selection of setting or resetting of the function currently displayed at that time.

EVIC DISPLAY MODES

SYSTEM STATUS

Displays warnings and user interaction messages. Initial warnings will be displayed accompanied by a series of audible beeps. Critical text warnings will be displayed until the failure is corrected. Non-critical text warnings will be displayed for 60 seconds. The driver can scroll to view multiple messages by using the menu buttons.

When the appropriate conditions exist, the EVIC displays the following messages:

- Turn signal on
- Perform service
- Key not programmed - damaged key
- Key not programmed - invalid key
- Key not programmed - exceeded key program limit
- Programming active - new key programmed
- Service security key
- Invalid key - try alternate key
- Driver/passenger door open (with graphic)
- Left/right rear door open (with graphic)
- Doors open (with graphic)
- Liftgate open (with graphic)
- Liftgate/door open (with graphic)
- Liftgate/doors open (with graphic)
- Liftglass open (with graphic)
- Hood open (with graphic)
- Hood/door open (with graphic)
- Hood/doors open (with graphic)
- Liftgate/hood open (with graphic)
- Hood/glass/door open (with graphic)
- Hood/glass/doors open (with graphic)
- Hood/gate/door open (with graphic)
- Hood/gate/doors open (with graphic)
- Liftglass/door open (with graphic)
- Liftglass/doors open (with graphic)
- Liftglass/hood open (with graphic)
- Washer fluid low (with graphic)
- Coolant low (with graphic)
- Oil change required
- Oil change reset
- Check gauges
- Auto highbeam on
- Auto highbeam off

- Park assist disabled
- Service suspension
- Service park assist system
- Transmission over temp
- Check shift procedure
- Service 4wd system
- 4wd system in neutral
- Low brake fluid level
- Warning! Limit speed
- Check gas cap
- ESC off
- Hill descent control
- Memory #1 positions set
- Memory #2 positions set
- Memory system disabled - seatbelt fastened (with graphic)
- Memory system disabled - vehicle not in park
- Driver 1 memory
- Driver 2 memory
- Adj. Pedals disabled - cruise control set
- Adj. Pedals disabled - shifter in reverse
- Tire low pressure
- Check TPM system
- Exhaust Service Required - See Dealer Now (diesel models only)
- Exhaust System - Regeneration Required Now (diesel models only)
- Left front low pressure (premium TPM system only)
- Right front low pressure (premium TPM system only)
- Left rear low pressure (premium TPM system only)
- Right rear low pressure (premium TPM system only)
- Spare low pressure (premium TPM system only)
- Water in fuel (diesel models only)
- Service blind spot system
- Blind spot system unavailable
- Blind spot system off

TRIP COMPUTER

Press and release the **MENU** buttons until one of the following Trip Functions displays in the EVIC:

- Average Fuel Economy
- Distance To Empty
- Elapsed Time
- Display Units of Measure in

Press the **STEP** button to cycle through all the Trip Computer functions.

The Trip Functions mode displays the following information:

- **Average Fuel Economy** Shows the average fuel economy since the last reset. When the fuel economy is reset, the display will read "RESET" or show dashes for two seconds. Then, the history information will be erased, and the averaging will continue from the last fuel average reading before the reset.
- **Distance To Empty (DTE)** Shows the estimated distance that can be traveled with the fuel remaining in the tank. This estimated distance is determined by a weighted average of the instantaneous and average fuel economy, according to the current fuel tank level. DTE cannot be reset through the **RESET** button. When the DTE value is less than 30 miles (48 km) estimated driving distance, the DTE display will change to a text display of "LOW FUEL." This display will continue until the vehicle runs out of fuel. Adding a significant amount of fuel to the vehicle will turn off the "LOW FUEL" text and a new DTE value will display.
- **Elapsed Time** Shows the total elapsed time of travel since the last reset when the ignition switch is in the ACC position. Elapsed time will increment when the ignition switch is in the ON or START position.
- **Display Units of Measure in:** To make your selection, press and release the **RESET** button until "US" or "METRIC" appears.

To Reset The Display Reset will only occur while a reset function is being displayed. Press and release the **RESET** button once to clear the reset function being displayed. To reset all reset functions, press and release the **RESET** button a second time within 3 seconds of resetting the currently displayed function (>Reset ALL will display during this 3 second window).

HANDS FREE TELEPHONE - IF EQUIPPED

Provides the following information and features for the optional hands-free communications system:

- Phone status: idle, voice mail, roaming, battery strength and signal strength in increments of 20 percent
- Call status: Incoming call, connecting, connected, air time in minutes and seconds, call ended, busy, call failed, roaming and no phone connection
- UConnect Active
- Caller ID phone number display

NAVIGATION - IF EQUIPPED

Navigation Display Control Press and release the MENU button until Navigation displays in the EVIC. When the Navigation System is On, the steering wheel buttons can be used to select the Map or Menu display on the Navigation Unit. When the Menu display is active, the STEP button can be used to scroll through the list, the RESET button can be used to select an item, and the AUDIO MODE button can be used to return to the

previous menu. When the Map display is active, pressing the RESET button will change the Navigation Unit Display to the Menu.

Turn-By-Turn Directions The EVIC displays turn-by-turn directions to a programmed destination when Turn-By-Turn Navigation is enabled through Personal Settings. When enabled, the EVIC displays the name of the approaching road at the top of the screen, followed by an arrow to indicate the direction to turn the vehicle, and a count down to indicate the distance to the turn.

PERSONAL SETTINGS MODE (CUSTOMER PROGRAMMABLE FEATURES)

Allows the driver to set and recall features when the transmission is in Park by pressing and releasing the **MENU** button until Personal Settings is displayed in the EVIC. Pressing and releasing the **STEP** button will scroll through the following personal settings choices:

- **Language** When in this display you may select one of five languages for all display nomenclature, including the trip functions and the navigation system (if equipped). Press the **RESET** button while in this display to select English, Espanol, or Francais. Then, as you continue, the information will display in the selected language.

NOTE: **The EVIC will not change the UConnect™ language selection.**

- **Lock Doors Automatically at 15 mph (24 km/h)** When ON is selected, all doors will lock automatically when the vehicle reaches a speed of 15 mph (24 km/h). To make your selection, press and release the **RESET** button until "ON" or "OFF" appears.
- **Unlock Doors Automatically on Exit** When ON is selected, all doors will unlock when the vehicle is stopped and the transmission is in the P (Park) or N (Neutral) position and the driver's door is opened. To make your selection, press and release the **RESET** button until "ON" or "OFF" appears.
- **Remote Key Unlock** When DRIVER DOOR 1ST PRESS is selected, only the driver's door will unlock on the first press of the remote keyless entry unlock button. When Driver Door 1st Press is selected, you must press of the remote keyless entry unlock button twice to unlock the passenger's doors. When ALL DOORS 1ST PRESS is selected, all of the doors will unlock on the first press of the remote keyless entry unlock button. To make your selection, press and release the **RESET** button until "Driver Door 1st Press" or "All Doors 1st Press" appears.
- **Sound Horn with Remote Key Lock** When ON is selected, a short horn sound will occur when the remote keyless entry "Lock" button is pressed. This feature may be selected with or without the flash lights on lock/unlock feature. To make your selection, press and release the **RESET** button until "ON" or "OFF" appears.
- **Flash Lights with Remote Key Lock** When ON is selected, the front and rear turn signals will flash when the doors are locked or unlocked with the remote keyless entry transmitter. This feature may be selected with or without the sound horn on lock feature selected. To make your selection, press and release the **RESET** button until "ON" or "OFF" appears.
- **Delay Turning Headlights Off** When this feature is selected, the driver can choose to have the headlights remain on for 0, 30, 60, or 90 seconds when exiting the vehicle. To make your selection, press and release the **RESET** button until "0," "30," "60," or "90" appears.
- **Turn Headlights On with Remote Key Unlock** When this feature is selected, the headlights will

activate and remain on for up to 90 seconds when the doors are unlocked with the remote keyless entry transmitter. To make your selection, press and release the **RESET** button until "OFF," "30 sec.," "60 sec.," or "90 sec." appears.

- **Headlights On with Wipers (Available with Auto Headlights Only)** When this feature is selected and the headlight switch is in the AUTO position, the headlights will activate approximately 10 seconds after the wipers are turned on. To make your selection, press and release the **RESET** button until "ON" or "OFF" appears.
- **Delay Power Off to Accessories Until Exit** When this feature is selected, the power window switches, radio, hands-free system (if equipped), DVD video system (if equipped), power sunroof (if equipped), and power outlets will remain active for up to 10 minutes after the ignition switch is turned off. Opening a vehicle door will cancel this feature. To make your selection, press and release the **RESET** button until "Off," "45 sec.," "5 min.," or "10 min." appears.
- **Confirmation of Voice Commands - If Equipped** When ON is selected, all voice commands from the UConnect™ system are confirmed. To make your selection, press and release the **RESET** button until "ON" or "OFF" appears.
- **Display Units of Measure in** The EVIC, odometer, and navigation system (if equipped) can be changed between English and Metric units of measure. To make your selection, press and release the **RESET** button until "US" or "METRIC" appears.

COMPASS/TEMPERATURE

Compass heading and outside temperature are displayed on the EVIC display screen. One of eight compass headings to indicate the direction the vehicle is facing (N, S, E, W, NE, NW, SE, SW) and one of 15 compass variance settings can be programmed. Outside temperature is displayed in °C (degrees Celsius) or °F (degrees Fahrenheit).

For additional information regarding the compass, refer to Personal Settings (Customer Programmable Features) in this article .

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - ELECTRONIC VEHICLE INFORMATION CENTER

The Electronic Vehicle Information Center (EVIC) data is obtained from several components on the Controller Area Network (CAN) Data Bus circuit. The EVIC will not function properly if the bus messages from any of these components is not received. If no EVIC data is displayed, check the CAN Data Bus circuit communications, the Instrument Cluster functions and the Body Control Module (BCM).

The use of a scan tool and the proper diagnostic procedures information are recommended for further testing of the EVIC and the CAN Data Bus circuit. Refer to the appropriate wiring information for complete circuit schematic or connector pin-out information.

SENSOR, AMBIENT TEMPERATURE

DESCRIPTION

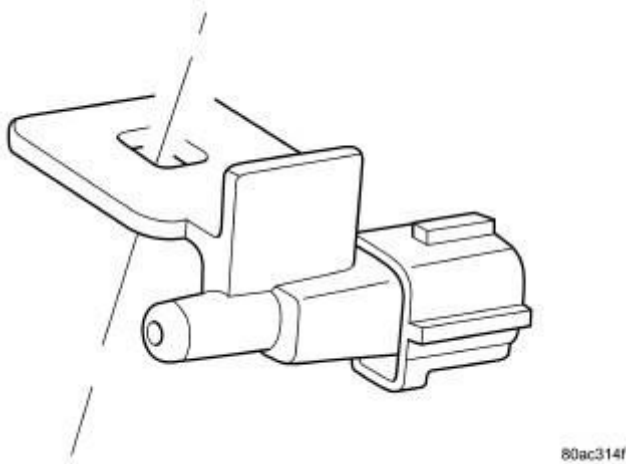
DESCRIPTION

Fig. 3: Identifying Ambient Air Temperature Sensor
Courtesy of CHRYSLER GROUP, LLC

The ambient air temperature sensor is a variable resistor that monitors the air temperature outside of the vehicle. The Automatic Temperature Control (ATC) heating and A/C system uses the ambient air temperature sensor data to help maintain optimum passenger compartment temperature levels. The ambient air temperature sensor is mounted behind the front fascia.

OPERATION**OPERATION**

The ambient air temperature sensor is a variable resistor that operates on a 5 volt Direct Current (DC) reference signal sent by the Body Control Module (BCM). The ambient air temperature sensor is connected to the BCM through a two-wire lead and connector of the vehicle wire harness. The ambient air temperature sensor changes its internal resistance in response to changes in the outside air temperature, which either increases or decreases the reference signal voltage read by the BCM. The BCM converts and broadcasts the sensor data over the Controller Area Network (CAN) data bus, where it is read by the A/C-heater control, Powertrain Control Module (PCM) and other vehicle control modules.

The ambient air temperature sensor is diagnosed using a scan tool. Refer to the appropriate Diagnostic Information .

The ambient air temperature sensor cannot be adjusted or repaired and must be replaced if inoperative or damaged. Refer to **SENSOR, AMBIENT TEMPERATURE, REMOVAL**.

REMOVAL**REMOVAL**

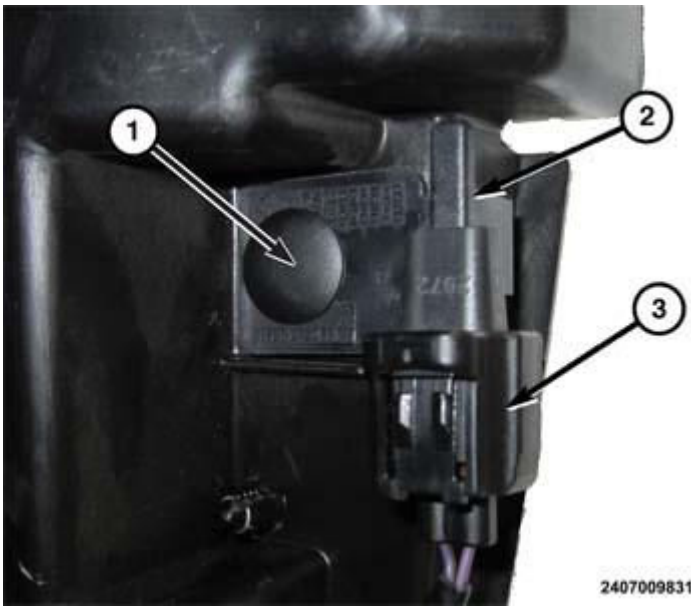


Fig. 4: Ambient Temperature Sensor, Connector & Push Pin
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Disconnect the wire harness connector (3) from the ambient air temperature sensor (2).
3. Remove the push pin (1) that secures the ambient air temperature sensor and remove the sensor.

INSTALLATION

INSTALLATION

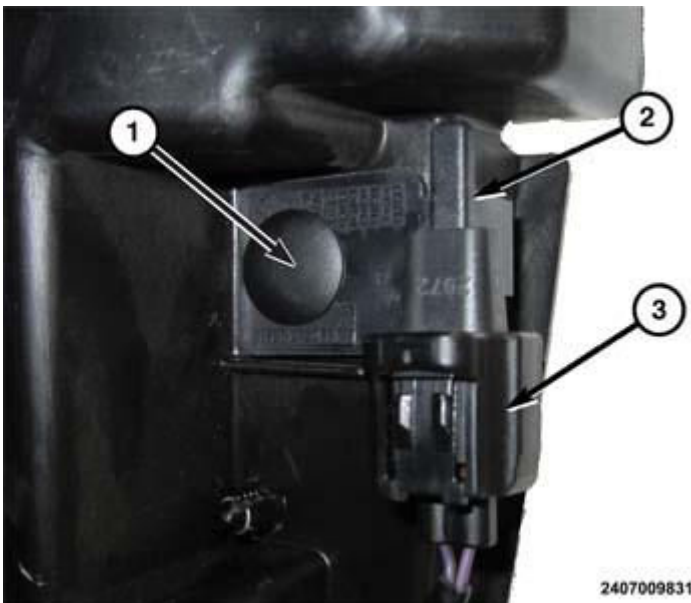


Fig. 5: Ambient Temperature Sensor, Connector & Push Pin
Courtesy of CHRYSLER GROUP, LLC

1. Install the push pin (2) that secures the ambient air temperature sensor to the vehicle.
2. Connect the wire harness connector (3) to the ambient air temperature sensor (2).
3. Connect the negative battery cable.

SWITCH, EVIC CONTROL

DESCRIPTION

DESCRIPTION



Fig. 6: EVIC Function Buttons
Courtesy of CHRYSLER GROUP, LLC

The Electronic Vehicle Information Center (EVIC) control switch pod is located in the left spoke of the steering wheel spoke bezel. This switch has up to eight push buttons. Five of the push buttons are used on all vehicles equipped with the EVIC. Three additional push buttons are found on vehicles equipped with the optional Uconnect™ Hands-Free Communication System. The only visible components of the switch pod are the switch push buttons and a decorative bezel around the push buttons, which stands slightly proud of the steering wheel spoke bezel. The remainder of the switch pod including its mounting provisions and its electrical connection are concealed beneath the spoke bezel.

The switch pod housing and push buttons are constructed of molded plastic. Each of the push buttons has white International Control and Display Symbol graphics or text applied to it, which clearly identify the function of each push button. The switch pod is secured through three integral mounting tabs to mounting bosses on the back of the spoke bezel by three screws. A connector receptacle integral to the inboard end of the switch pod housing connects the EVIC control switch pod to the vehicle electrical system through a dedicated take out and connector of the steering wheel wire harness.

The EVIC control switch pod cannot be adjusted or repaired. If any function of the switch is ineffective or damaged, the entire switch pod unit must be replaced.

OPERATION

OPERATION

The Electronic Vehicle Information Center (EVIC) control switch pod is a resistor multiplexed unit that receives source current from and provides hard wired inputs to the Local Interface Network (LIN) slave node circuitry of the LIN module or integral to the cruise control switch pod in the right spoke of the steering wheel spoke bezel. The LIN slave node circuitry communicates the switch states of the EVIC control switch pod, the remote radio switches, the horn switch and the heated steering wheel sensor (if equipped) over the LIN data bus to the LIN master node integral to the Steering Column Module (SCM) integral to the Steering Column Control Module (SCCM) mounting housing located on the top of the steering column below the clockspring. The SCM is also a gateway to the Controller Area Network (CAN) data bus.

The EVIC control switch pod contains four push buttons whose functions are:

- **Down Arrow** - Pressing and releasing the Down Arrow push button allows the operator to scroll downward through the various EVIC main menus and sub menus.
- **Left Arrow** - Pressing and releasing the Left Arrow push button returns you to the previous sub menu or main menu.
- **Right Arrow** - Pressing and releasing the Right Arrow (Select) push button allows the operator to navigate, select and reset items or settings in the currently displayed EVIC main menu or sub menu. Pressing and holding the Right Arrow (Select) push button for two seconds provides a global reset of all of those EVIC features that can be reset, whether currently displayed or not.
- **Up Arrow** - Pressing and releasing the Up Arrow push button allows the operator to scroll upward through the various EVIC main menus and sub menus.

For vehicles equipped with the Uconnect® Hands-Free Communication System, the EVIC control switch pod contains two additional switch push buttons whose functions are:

- **VR (Voice Recognition)** - This switch button activates the Uconnect® Voice Command system.
- **Phone** - This switch push button activates the Uconnect® Hands-Free Phone system.

The LIN slave node circuitry of the LIN module or the cruise control switch pod provides current for all of the switches and sensors on the rotating steering wheel as well as for the Light Emitting Diode (LED) back lighting of both the cruise control and the EVIC control switch pods. The SCM continually monitors all of the hard wired speed control switch circuits as well as the LIN bus data. The SCM will store a Signal Not Available (SNA) code for any LIN bus input errors. The SCM also communicates with other electronic modules over the CAN data bus. Therefore, any SCM DTC information can be retrieved using a diagnostic scan tool connected to the Data Link Connector (DLC).

The analog resistor multiplexed circuits of the EVIC control switch pod as well as the hard wired circuits between the switch pod and the speed control switch pod may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the LIN slave or master nodes, the SCM or the electronic controls and communication between modules and other devices that provide some features of the EVIC system. The most reliable, efficient, and accurate means to diagnose the EVIC control switch pod, the LIN slave or master nodes, the SCM or the electronic controls and

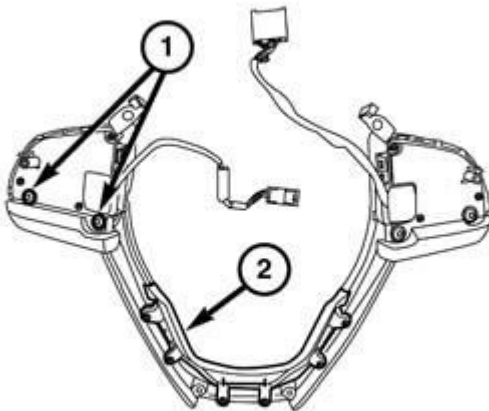
communication related to EVIC system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

REMOVAL

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

1. Disconnect and isolate the battery negative cable.
2. Remove the remote radio switch. Refer to **SWITCH, REMOTE RADIO, REMOVAL** .



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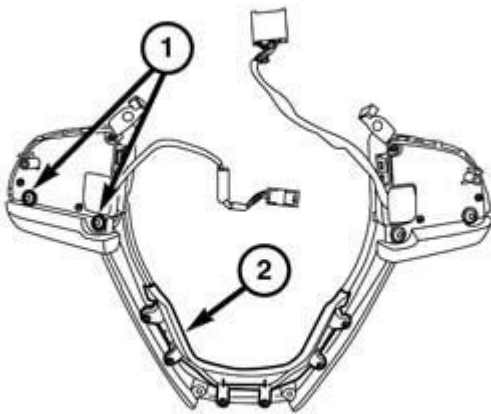
Fig. 7: Steering Wheel Front Bezel & Screws
Courtesy of CHRYSLER GROUP, LLC

3. From the back of the steering wheel front bezel (2), remove the two screws (1) that secure the EVIC switch pod to the bezel.
4. Remove the switch from the bezel.

INSTALLATION

INSTALLATION

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.



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Fig. 8: Steering Wheel Front Bezel & Screws

Courtesy of CHRYSLER GROUP, LLC

1. Position the Electronic Vehicle Information center (EVIC) switch pod to the back of the steering wheel front bezel (2).
2. Install and tighten the two screws (1) that secure the switch to the bezel. Tighten the screws securely.
3. Install the remote radio switch. Refer to **SWITCH, REMOTE RADIO, INSTALLATION** .
4. Connect the negative battery cable.

2014 ACCESSORIES AND EQUIPMENT**Navigation/Telecommunication - Service Information - Cherokee****DESCRIPTION****HANDS FREE PHONE**

A Uconnect™ Hands Free Phone system is factory-installed optional equipment. This system allows hands free use of compatible mobile phones for sending and receiving phone calls and text messages as well as for streaming audio from those devices through the audio system in the vehicle. The Hands Free Phone system includes the following major components, which are described in further detail elsewhere in this service information:

- **Bluetooth™ Antenna** - A Bluetooth™ antenna is internal and integral to the Radio Receiver Module (RRM) (also known as the radio or the head unit).
- **Bluetooth™ Phone** - A customer-supplied and paired Bluetooth™ phone is a required component of the hands free phone system.
- **Body Control Module** - The Body Control Module (BCM) (also known as the Common Body Controller/CBC) is located on the right cowl side inner panel within the passenger compartment, where it is concealed behind the cowl side kick panel to the right of the instrument panel. The BCM is the configuration master node for the vehicle. Refer to **MODULE, BODY CONTROL, DESCRIPTION**.
- **Electronic Vehicle Information Center Switch Pod** - The Electronic Vehicle Information Center (EVIC) switch pod is located in the left horizontal spoke of the steering wheel. In addition to the EVIC switch buttons this switch pod contains the Uconnect™ Voice Recognition (VR) (also known as Voice Command) switch button and the Uconnect™ Phone switch button of the Hands Free Phone system. Refer to **SWITCH, EVIC CONTROL, DESCRIPTION**.
- **Microphones** - Stereo microphones are integral to the inside rear view mirror in vehicles equipped with the Uconnect™ Hands Free Phone system. These microphones are located on the top surface of the mirror housing, one to each side of center. Refer to **MICROPHONE, DESCRIPTION**.
- **Radio Receiver Module** - The Radio Receiver Module (RRM) (also known as the radio or the head unit) is located near the top of the instrument panel center stack area and is the primary component of the phone system in this vehicle. In addition to a 213 millimeter (8.4 inch) color electronic touchscreen display, a microcontroller, a Bluetooth™ transceiver, a navigation module, flash memory and sophisticated Advanced Speech Recognition (ASR) input capability through Voice Recognition (VR) software. The ASR software includes many different available languages. Each vehicle is equipped with a list of available languages, which are made available from the factory based upon languages most commonly used for the market destination. Refer to **RADIO, DESCRIPTION**.

The RRM also contains a microcontroller and programming that allows it to communicate with other electronic modules in the vehicle over the Controller Area Network - Interior High Speed (CAN-IHS) data bus. Refer to **COMMUNICATION, DESCRIPTION**.

The Uconnect™ Hands Free Phone system components cannot be adjusted or repaired. If any Hands Free Phone system component is damaged or ineffective, that component must be replaced. The Hands Free Phone

system software is flash programmable through the Universal Serial Bus (USB) port.

NAVIGATION

A factory-installed satellite navigation system based upon the Global Positioning System (GPS) is an available option on this vehicle. Depending upon the optional touchscreen Radio Receiver Module (RRM) (also known as the radio or the head unit) selected for the vehicle, there are some variations in navigation system features available. Each system provides the vehicle operator with both visual and audible guidance to a chosen destination. An available premium navigation system includes such features as one-shot Voice Recognition (VR) destination entry, three dimensional city models and landmarks, digital terrain modeling, SiriusXM™ Travel Link and SiriusXM™ Traffic.

A color touchscreen electronic display provides a graphical interface for programming, searching for and selecting destinations. In vehicles also equipped with a Uconnect™ Hands-Free telecommunication option, the available navigation systems are also equipped with Advanced Speech Recognition (ASR) input capability allowing hands-free operation. Each system provides visual guidance through dynamic maps with a turn-by-turn feature that can be enabled or disabled by the vehicle operator, while voice prompts through the audio system of the vehicle provide the vehicle operator with audible alerts and directions coordinated with the visual displays. The system also displays and logs valuable trip information such as speed, posted speed limit, distance and Estimated Time of Arrival (ETA).

The premium navigation system is activated when the vehicle is shipped from the factory, while another available system is shipped from the factory as Navigation Ready. The Navigation Ready system allows the customer to choose whether to have the dealer activate the embedded navigation module after the vehicle has been delivered.

The navigation system includes the following major components, which are described in further detail elsewhere in this service information:

- **Body Control Module** - The Body Control Module (BCM) (also known as the Common Body Controller/CBC) is located on the right cowl side inner panel within the passenger compartment, where it is concealed behind the cowl side kick panel to the right of the instrument panel. The BCM is the configuration master node for the vehicle. Refer to **MODULE, BODY CONTROL, DESCRIPTION**.
- **Combination Antenna** - The navigation module acquires GPS position data through a roof-mounted combination antenna that also receives satellite audio and cellular signals. Refer to **ANTENNA, SATELLITE, AUDIO, DESCRIPTION**.
- **Electronic Vehicle Information Center** - The Electronic Vehicle Information Center (EVIC) is an electronic display within the Instrument Cluster (IC) (also known as the Common Instrument Cluster/CIC). When Turn-By-Turn navigation is enabled through the EVIC Personal Settings menu, the EVIC displays turn-by-turn directions to the chosen destination supplemental to the navigation display within the RRM touchscreen unit. Refer to **CENTER, ELECTRONIC VEHICLE INFORMATION, DESCRIPTION**.
- **Electronic Vehicle Information Center Switch Pod** - The Electronic Vehicle Information Center (EVIC) switch pod is located in the left horizontal spoke of the steering wheel. In addition to the EVIC switch buttons this switch pod contains the Uconnect™ Voice Recognition (VR) (also known as Voice Command) switch button and the Uconnect™ Phone switch button of the Uconnect™ Hands-Free Phone

system. Refer to **SWITCH, EVIC CONTROL, DESCRIPTION** .

- **Microphones** - Stereo microphones are integral to the inside rear view mirror in vehicles equipped with the Uconnect™ Hands-Free Phone system. These microphones are located on the top surface of the mirror housing, one to each side of center. Refer to **MICROPHONE, DESCRIPTION** .
- **Radio Receiver Module** - The Radio Receiver Module (RRM) (also known as the radio or the head unit) contains the central components of the navigation system. In addition to a 213 millimeter (8.4 inch) color electronic touchscreen display, a navigation module is internal and integral to each RRM that is equipped with navigation capability. The navigation module contains all of the navigation system hardware and software. Hardware includes the GPS receiver, an electronic gyroscope, a microcontroller and flash memory for system software and map data storage. Refer to **RADIO, DESCRIPTION** .

The IC and the RRM each contain a microcontroller and programming that allow them to communicate with each other and other electronic modules in the vehicle using the Controller Area Network - Interior High Speed (CAN - IHS) data bus. Refer to **COMMUNICATION, DESCRIPTION** .

The navigation system components cannot be adjusted or repaired. If any of the navigation system components is damaged or ineffective, that component must be replaced. The external combination antenna can be repaired separately from the RRM. The navigation system software as well as the map data is flash programmable through the Universal Serial Bus (USB) port.

UCONNECT ACCESS

A Uconnect™ Access system is factory-installed optional equipment. The Uconnect™ Access system uses an embedded cellular connection and available subscription service packages to enable several mobile connectivity features. Vehicles equipped with the Uconnect™ Access system can be readily identified by two switch buttons on the inside rear view mirror identified with **ASSIST** and **9-1-1** labels.

To fully enable the Uconnect™ Access system, a Uconnect™ Access account must first be established by following the steps described in the Uconnect™ Access registration process at **www.MoparOwnerConnect.com** . Next, one of two optional subscription service packages must be selected. The two packages are:

- **Uconnect™ Access Assist Package** - This package provides one touch 9-1-1 calling and roadside assistance calling features.
- **Uconnect™ Access Advantage Package** - This package also includes the one touch 9-1-1 calling and roadside assistance calling features found in the Assist Package. In addition, this package provides features such as Bing™ hands-free search and voice-to-text hands-free text message dictation, both through the user's compatible, paired and enabled Bluetooth™ phone. Another feature of this package is remote vehicle services like remote **Lock** , **Unlock** and **Start** . The remote vehicle services can be activated through the user's compatible smart phone after the **Uconnect™ Access Mobile** smart phone app is installed on the smart phone. Download and installation of the **Uconnect™ Access Mobile** smart phone app can be done during the Uconnect™ Access registration process at **www.MoparOwnerConnect.com** or from the user's smart phone App storefront. The user can also activate the remote vehicle services feature from the Uconnect™ Access web portal.

NOTE: **A free trial period of the Uconnect™ Access Assist or Advantage subscription**

packages may be offered after successful completion of the Uconnect™ Access registration process.

The Uconnect™ Store Front is accessible from the appropriate Radio Receiver Module (RRM) (also known as the radio or the head unit) touch screen menu once the Uconnect™ Access registration process has been successfully completed. In the future, additional Uconnect™ Access compatible applications (also known as RRM apps) will be made available for purchase and download from the Uconnect™ Store Front.

The Uconnect™ Access system includes the following major components, which are described in further detail elsewhere in this service information:

- **Access Switches** - In vehicles equipped with Uconnect™ Access, the inside rear view mirror also contains two integral push button switches and a Light Emitting Diode (LED) indicator located on the rearward-facing housing just below the center of the mirror glass for activation of the **ASSIST** and **9-1-1** features.
- **Bluetooth™ Antennas** - Bluetooth™ antennas are internal and integral to the RRM.
- **Bluetooth™ Phone** - A customer-supplied and paired Bluetooth™ smart phone is a required component of the Uconnect™ Access system to enable remote services.
- **Body Control Module** - The Body Control Module (BCM) (also known as the Common Body Controller/CBC) is located on the right cowl side inner panel within the passenger compartment, where it is concealed behind the cowl side kick panel to the right of the instrument panel. The BCM is the configuration master node for the vehicle. Refer to **MODULE, BODY CONTROL, DESCRIPTION**.
- **Combination Antenna** - The Radio Receiver Module (RRM) (also known as the radio or the head unit) sends and receives cellular data through a roof-mounted combination antenna that also receives satellite audio and Global Positioning System (GPS) navigation signals. Refer to **ANTENNA, SATELLITE, AUDIO, DESCRIPTION**.
- **Electronic Vehicle Information Center Switch Pod** - The Electronic Vehicle Information Center (EVIC) switch pod is located in the left horizontal spoke of the steering wheel. In addition to the EVIC switch buttons this switch pod contains the Voice Recognition (VR) switch button and the Phone switch button of the hands-free phone system. Refer to **SWITCH, EVIC CONTROL, DESCRIPTION**.
- **Microphones** - Stereo microphones are integral to the inside rear view mirror in vehicles equipped with the hands-free phone system. These microphones are located on the top surface of the mirror housing, one to each side of center. Refer to **MICROPHONE, DESCRIPTION**.
- **Radio Frequency Hub Module** - The Radio Frequency Hub Module (RFHM) (also known as the RF Hub) is a key component of the Uconnect™ Access remote vehicle services feature. The RFHM is located on the left rear quarter inner panel in the cargo area within the passenger compartment and concealed behind the quarter trim panel. Refer to **MODULE, RADIO FREQUENCY (RF HUB), DESCRIPTION**.
- **Radio Receiver Module** - The Radio Receiver Module (RRM) (also known as the radio or the head unit) is located near the top of the instrument panel center stack area and is the primary component of the Uconnect™ Access system in this vehicle. The RRM includes a 213 millimeter (8.4 inch) color electronic touchscreen display, a microcontroller, a Bluetooth™ transceiver, a navigation module, flash memory and sophisticated Advanced Speech Recognition (ASR) input capability through Voice Recognition (VR) software. The ASR software includes many different available languages. Each vehicle is equipped with a list of available languages, which are made available from the factory based upon languages most

commonly used for the market destination. Refer to **RADIO, DESCRIPTION**.

- **Uconnect™ Access Registration And Applications** - Uconnect™ Access registration must be completed before individual RRM apps or Uconnect™ Access subscription packages can be purchased from the Uconnect™ Store Front. The Uconnect™ Access Mobile smart phone app must also be installed on the user's compatible smart phone for the remote vehicle services features to operate. Many additional Uconnect™ Access apps are under development for later release.

The RRM contains a microcontroller and programming that allows it to communicate with other electronic modules in the vehicle over the Controller Area Network - Interior High Speed (CAN-IHS) data bus. In vehicles equipped with Uconnect™ Access, the RRM also uses electronic message communication with other electronic modules in the vehicle over the CAN-C data bus. Refer to **COMMUNICATION, DESCRIPTION**.

The Uconnect™ Access system components cannot be adjusted or repaired. If any Uconnect™ Access system component is damaged or ineffective, that component must be replaced. The external combination antenna can be repaired separately from the RRM. The Uconnect™ Access system software is flash programmable through the Universal Serial Bus (USB) port.

WI-FI HOT SPOT

Vehicles equipped with the Uconnect™ Access system can become a Wi-Fi hot spot with payment of a daily, weekly or monthly subscription option. This system allows the use of the vehicle as a Wi-Fi hot spot for connecting consumer Wi-Fi devices to the Internet through a Wi-Fi antenna and an embedded cellular connection that are internal and integral to the Radio Receiver Module (RRM) (also known as the radio or the head unit), and the external cellular combination antenna.

The Wi-Fi Hot Spot system includes the following major components, which are described in further detail elsewhere in this service information:

- **Wi-Fi Antenna** - The Wireless Local Area Network (WLAN) (also known as Wi-Fi) antenna is internal and integral to the RRM.
- **Wi-Fi Device** - A customer-supplied Wi-Fi capable device is a required component of the Wi-Fi Hot Spot system.
- **Combination Antenna** - The RRM sends and receives cellular data through a roof-mounted combination antenna that also receives satellite audio and Global Positioning System (GPS) navigation signals. Refer to **ANTENNA, SATELLITE, AUDIO, DESCRIPTION**.
- **Radio Receiver Module** - The Radio Receiver Module (RRM) (also known as the radio or the head unit) is located near the top of the instrument panel center stack area and is the primary component of the telecommunication system in this vehicle. The RRM includes a 213 millimeter (8.4 inch) color electronic touchscreen display, a microcontroller, a Bluetooth™ transceiver, a navigation module, flash memory and sophisticated Advanced Speech Recognition (ASR) input capability through Voice Recognition (VR) software. The ASR software includes many different available languages. Each vehicle is equipped with a list of available languages, which are made available from the factory based upon languages most commonly used for the market destination. Refer to **RADIO, DESCRIPTION**.

The Uconnect™ Access Wi-Fi Hot Spot system components cannot be adjusted or repaired. If any Wi-Fi Hot Spot system component is damaged or ineffective, that component must be replaced. The external combination

antenna can be repaired separately from the RRM. The Wi-Fi Hot Spot system software is flash programmable through the Universal Serial Bus (USB) port.

OPERATION

HANDS FREE PHONE

The Uconnect™ Hands Free Phone system relies upon Bluetooth™ technology to enable wireless connectivity between Bluetooth™ compatible, paired and turned On mobile devices and the on-board entertainment system components. This system also relies upon Advanced Speech Recognition (ASR) software to enable Voice Commands to control the mobile device as well as the components and features of some other on-board systems.

The system will recognize up to ten Bluetooth™ compatible devices, each of which is identified within the system by the name acquired from the device during the pairing process. The Hands Free Phone system will communicate with a paired device that is anywhere within the vehicle. However, covering the paired device with a metal object may block the signal.

The Hands Free Phone system is operated in one of two ways: actively or passively. Active operation begins with the vehicle operator depressing a push button in the Electronic Vehicle Information Center (EVIC) switch pod on the face of the left horizontal spoke of the steering wheel. The Uconnect™ Voice Recognition (**VR**) (also known as Voice Command) button is depressed for hands free Voice Command access to available features other than the phone, or the Uconnect™ Phone (**Phone** is identified by a phone handset icon) button is depressed for hands free phone access.

The **VR** or **Phone** button press provides a resistor multiplexed input to the Local Interface Network (LIN) slave node integral to the EVIC switch pod. The LIN slave node sends an electronic **switch press** message to the LIN master node integral to the Body Control Module (BCM) (also known as the Common Body Controller/CBC). The BCM is also a gateway to the CAN - Interior High Speed (CAN-IHS) data bus and relays the message over CAN-IHS data bus to the Radio Receiver Module (RRM) (also known as the radio or the head unit).

When the RRM receives the electronic **switch press** message, the RRM suppresses any current audio output and issues an audible **beep** to indicate that the VR hardware is prepared to receive a Voice Command. Part of the Uconnect™ Hands Free Phone system hardware includes the VR stereo microphones integral to the top surface of the inside rear view mirror. The microphones provide a hard wired input of Voice Commands to the VR engine within the RRM, and the ASR software converts that input into an electronic instruction message broadcast over the CAN-IHS data bus to invoke the appropriate system response. If no appropriate Voice Command is received within a few seconds following the audible **beep**, the system will provide an audible verbal output listing a menu of the available Voice Command options.

Passive operation begins when an incoming cellular call is received. If the Bluetooth™ phone is Short Message Service (SMS) text message capable and compatible with the Uconnect™ system (see the Uconnect™ web site), passive operation will also begin when an SMS text message is received. The call or SMS text message is relayed to the Bluetooth™ transceiver embedded within the RRM. The Bluetooth™ transceiver then instructs the RRM to announce the incoming call or message. The vehicle operator presses the Uconnect™ **Phone** button in the EVIC switch pod or the soft button that will appear in the RRM display to accept the call, or the soft button that will appear in the RRM display to accept the message.

The Bluetooth™ transceiver connects the voices of the two phone parties using outputs through the audio system speakers and inputs through the Uconnect™ hands free microphones. In the case of a text message, the Bluetooth™ transceiver sends the message to the VR hardware and the ASR software converts the message from text to voice and plays it through the audio system speakers.

If the RRM has the optional 213 millimeter (8.4 inch) electronic touchscreen display, the text message can then be replied to by depressing the Uconnect™ **VR** button and giving an **SMS** Voice Command to select from several predetermined short text phrase responses. If the RRM has the 127 millimeter (5 inch) display, it can receive and display SMS text messages, but it is not equipped to reply to text messages.

The Hands Free Phone system operates on battery current received through a fused B(+) circuit, but also monitors the ignition switch (also known as the Keyless Ignition Node/KIN or IGnition Node Module/IGNM) status through electronic messages received over the CAN-IHS data bus. If a call is in progress when the status of the ignition switch transitions to Off, the system will continue to operate until the call has been completed.

The RRM receives electronic message inputs over the CAN-IHS data bus related to the Hands Free Phone system. The RRM is also connected to the CAN-C data bus; however, the RRM is not a CAN gateway. All electronic message outputs of the RRM are carried over the CAN-IHS data bus. When the RRM monitors a problem in any of the audio system circuits and components, or in any of the Bluetooth™ transceiver circuits, it stores a fault code or Diagnostic Trouble Code (DTC) in its memory circuit.

The hard wired circuits between components related to the RRM and the Hands Free Phone system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the RRM or the electronic controls and communication between modules and other devices that provide some features of the Hands Free Phone system. The most reliable, efficient and accurate means to diagnose the RRM or the electronic controls and communication related to Hands Free Phone system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

NAVIGATION

The optional navigation system is active whenever the Radio Receiver Module (RRM) (also known as the radio or the head unit) electronic display is powered On. In vehicles equipped with a navigation system that allows activation after the vehicle has been delivered, all post delivery activations must be performed by the dealer.

If a navigation system menu or map isn't being actively displayed, the system is still operating in the background. The menu, map or route that was active when the RRM electronic display was powered Off along with all other user-relevant information is saved in nonvolatile memory by the navigation module for display again the next time the RRM electronic display is powered On and the navigation system is selected.

Once a destination is selected, the navigation system uses information from stored map data to quickly calculate a route. As the vehicle is driven along that route, the vehicle operator is guided with visual displays and voice prompts. Any variances from that route will cause the navigation system to automatically recalculate and

deliver a revised route to the chosen destination.

When Turn-By-Turn Navigation is enabled through the Personal Settings menu of the Electronic Vehicle Information Center (EVIC), the EVIC supplements the RRM display with a more focused turn-by-turn display which includes: the name of the approaching crossroad, an arrow indicating the upcoming turn direction and a countdown to indicate the distance to that turn.

All vehicles have their original map and Points-Of-Interest (POI) data stored in nonvolatile flash memory integral to the navigation module integral and internal to the RRM. Updated map and POI data as well as updated navigation software for these vehicles can be uploaded to the system using Universal Serial Bus (USB) media. The originally installed data is based upon the market for which the vehicle was manufactured. Navigation software updates are also uploaded to the system using USB media.

The Global Positioning System (GPS) receiver of the navigation module is capable of acquiring and tracking GPS signal inputs through the roof-mounted combination antenna from numerous satellites simultaneously to calculate and display the position and direction of the vehicle. However, when access to satellite signals is blocked by bridges, tunnels or other obstacles, the navigation module relies upon Dead Reckoning (DR) to aid in calculating vehicle position and direction. The navigation module uses pulse signals from the wheel speed sensors, a Reverse gear indicator input and an internal electronic gyroscope sensor to provide DR vehicle position and direction calculations to supplement GPS satellite signals.

User input mechanisms for the navigation system include the RRM touchscreen and the Uconnect™ Hands-Free Voice Recognition (VR) (also known as Voice Command) verbal commands. The VR function uses Advanced Speech Recognition (ASR) software. Master control of the VR function is handled by the VR engine internal and integral to the RRM. The VR recognizes and responds to certain global commands, while other commands are specific to the RRM or the navigation system.

For safety reasons some input, editing and setting features of the navigation system are restricted when the vehicle is in motion or when a hands-free phone call is active. This includes many features that require touchscreen inputs. However, many of those same features disabled for touchscreen inputs remain enabled for Uconnect™ Hands-Free VR inputs.

The navigation module receives electronic message inputs within the RRM over the Controller Area Network - Interior High Speed (CAN-IHS) data bus; however, the RRM is not a CAN gateway. All electronic message outputs of the navigation module and the RRM are carried over the CAN-IHS data bus. When the RRM monitors a problem in any of the audio system circuits and components, or in any of the navigation system antenna circuits, it stores a fault code or Diagnostic Trouble Code (DTC) in its memory circuit. The external combination antenna may be diagnosed separately from the RRM.

The hard wired circuits between components related to the RRM and the navigation system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the RRM or the electronic controls and communication between modules and other devices that provide some features of the

navigation system. The most reliable, efficient and accurate means to diagnose the RRM or the electronic controls and communication related to navigation system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

UCONNECT ACCESS

The two switch buttons on the inside rear view mirror identified with **ASSIST** and **9-1-1** labels in vehicles equipped with the optional Uconnect™ Access system provide active control of the one-touch 9-1-1 calling and roadside assistance calling features. The **ASSIST** button behavior is dependent upon the Uconnect™ Assist or Advantage subscription status. If either subscription is active, pressing the **ASSIST** allows the user to contact the Chrysler Customer Care Center, the Uconnect™ Customer Care Center for Uconnect™ Access related issues or the Roadside Assistance Call Center. If both subscriptions are inactive, only the Chrysler Customer Care Center or the Roadside Assistance Call Center may be contacted. The **9-1-1** button is enabled with or without a subscription. These switches provide a resistor multiplexed input to the Local Interface Network (LIN) slave node integral to the inside rear view mirror.

The LIN slave node sends an electronic **switch press** message to the LIN master node integral to the Body Control Module (BCM) (also known as the Common Body Controller/CBC). The BCM relays the message over the Controller Area Network - Interior High Speed (CAN-IHS) data bus, where it is retrieved by the Radio Receiver Module (RRM) (also known as the radio or the head unit). There is also an **ASSIST** soft button available in a menu of the RRM that provides a direct input to the Uconnect™ Access system.

The Light Emitting Diode (LED) indicator between the push buttons provides an indication of the status of the Uconnect™ Access embedded cellular device. Any fault indication is accompanied by a pop up screen in the RRM (also known as the radio or the head unit) electronic display. The following indications are provided whenever the status of the ignition switch is On or Accessory:

- **Solid Green** - No active call.
- **Flashing Green** - A call is active.
- **Solid Red** - A CAN, embedded cellular device or cellular antenna fault has been detected.
- **Off** - No power supply to the rear view mirror.

If a Bluetooth™ phone is Short Message Service (SMS) text message capable and compatible with the Uconnect™ Access system (see the Uconnect™ web site for a phone compatibility list), a Uconnect™ Advantage subscription provides an enhanced SMS text message free form dictation feature to compose a response when a text message is received. The call or SMS text message is relayed to the Bluetooth™ transceiver embedded within the RRM. The Bluetooth™ transceiver then instructs the RRM to announce the incoming call or message. The vehicle operator presses the Uconnect™ **Phone** button in the EVIC switch pod or the soft button that will appear in the RRM display to accept the message and dictate a response.

If the vehicle has had the optional Uconnect™ Mobile application (also known as app) downloaded, installed and enabled on their smart phone the Uconnect™ Advantage subscription can provide remote door locking and unlocking, remote starting and remote horn and lights features. In the Uconnect™ Access system the Mobile app on the smart phone calls the RRM in the vehicle, the RRM communicates through electronic messages over the Controller Area Network - C (CAN-C) data bus with the Radio Frequency Hub Module (RFHM) (also known as the RF Hub) and the RFHM communicates over the CAN-C bus with the Body Control Module

(BCM) (also known as the Common Body Controller/CBC) to achieve the requested remote features. While the RRM uses electronic message communication over the CAN-C data bus and the CAN - Interior High Speed (CAN-IHS) data bus, the RRM is not a CAN gateway.

The Uconnect™ Advantage subscription also enables hands-free mobile Bing™ local search and navigation capabilities.

The hard wired circuits between components related to the RRM and the Uconnect™ Access system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the RRM or the electronic controls and communication between modules and other devices that provide some features of the Uconnect™ Access system. The most reliable, efficient and accurate means to diagnose the RRM or the electronic controls and communication related to Uconnect™ Access system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

WI-FI HOT SPOT

Vehicles equipped with the optional Uconnect™ Access system are capable of becoming Wi-Fi hot spots with the Wi-Fi Hot Spot system. The Radio Receiver Module (RRM) (also known as the radio or the head unit) includes both an integral internal Wireless Local Area Network (WLAN) (also known as Wi-Fi) antenna and an embedded cellular connection. Along with a paid daily, weekly or monthly subscription service these features allow the vehicle to become a Wireless Access Point (WAP) for access to the Internet through Wi-Fi capable and enabled devices.

An Application Settings menu of the RRM allows the adjustment of the WAP password and security settings. The external combination antenna can be diagnosed and repaired separately from the RRM.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - HANDS-FREE PHONE

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

The hard wired circuits between components related to the Radio Receiver Module (RRM) (also known as the radio or the head unit) and the Uconnect™ Hands-Free Phone system may be diagnosed using conventional

diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the RRM or the electronic controls and communication between modules and other devices that provide some features of the Uconnect™ Hands-Free Phone system. The most reliable, efficient and accurate means to diagnose the RRM or the electronic controls and communication related to Uconnect™ Hands-Free Phone system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

NOTE: Validation and diagnosis of many of the conditions listed below will require access to both the paired Bluetooth™ device and the PIN required for that device.

HANDS-FREE PHONE DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
PHONE NOT AVAILABLE	1. Bluetooth phone not paired to the RRM. 2. Bluetooth phone not present or turned Off. 3. Bluetooth phone has low battery. 4. The boot procedure for the RRM, the phone or both did not complete successfully. 5. A phone freeze has occurred.	1. Be certain that the phone is Bluetooth compatible and is paired to the RRM. 2. Be certain that the paired phone is present, turned On and that the Bluetooth option is enabled in the phone. 3. At low battery levels, some phones will turn Off Bluetooth functionality. Be certain that the phone battery is charged to an adequate level. 4. Cycle both the RRM and the phone Off, then On again in an attempt to complete a successful boot procedure. 5. Power cycle the phone. Refer to the operator's manual for the phone.
	1. The phone is not Bluetooth enabled. 2. The phone does not support the Bluetooth Hands-Free Profile. 3. Incorrect discovered Bluetooth device selected in phone. 4. The PIN of the phone is not the same as the PIN	1. The Bluetooth transceiver requires that the cellular phone be Bluetooth enabled. The phone must be upgraded to one that is Bluetooth enabled. A list of suggested phones is available at: http://www.chrysler.com/uconnect 2. The Bluetooth transceiver requires that the cellular phone support the Hands-Free Profile. The phone must be upgraded to one that supports the Hands-Free Profile. A list of suggested phones is available at: http://www.chrysler.com/uconnect 3. Be certain to select Uconnect in the discovered Bluetooth™ devices in the phone for pairing. 4. The PIN assigned by the RRM during pairing

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PHONE PAIRING FAILED	assigned by the RRM during pairing. 5. Phone pairing is locked (password protected). 6. The RRM has reached the maximum number of allowed devices paired. 7. The phone has reached the maximum number of allowed devices paired. 8. The boot procedure for the RRM, the phone or both did not complete successfully. 9. A phone freeze has occurred.	must match the PIN of the phone. 5. To unlock phone pairing in the phone, be certain that password protection is turned Off. 6. Remove one of the previously paired devices from the paired list of the RRM. 7. Remove one of the previously paired devices from the paired list of the phone, or delete the pairing history from the phone. Refer to the operator's manual for the phone. 8. Cycle both the RRM and the phone Off, then On again in an attempt to complete a successful boot procedure. 9. Perform a hard reset (power cycle) to the phone. Refer to the operator's manual for the phone.
PHONE WILL NOT RECONNECT AFTER PAIRING	1. Bluetooth settings in phone are incorrect. 2. Phone pairing is locked (password protected). 3. The boot procedure for the RRM, the phone or both did not complete successfully. 4. A phone freeze has occurred.	1. Bluetooth settings in phone should be set to auto-connect or select Uconnect™ as a trusted device in phone. 2. To unlock phone pairing in the phone, be certain that password protection is turned Off. 3. Cycle both the RRM and the phone Off, then On again in an attempt to complete a successful boot procedure. 4. Perform a hard reset (power cycle) to the phone. Refer to the operator's manual for the phone.
	1. User is not waiting for the beep tone acknowledgement before issuing Voice Commands. 2. User is not issuing Voice Commands in a smooth and consistent speaking voice. 3. User is not using proper Voice Command syntax. 4. High noise levels within the passenger	1. Be certain the user knows to wait for the acknowledgement beep tone prior to issuing Voice Commands. 2. Be certain the user is issuing Voice Commands in a normal, smooth and consistent speaking voice. The Advanced Speech Recognition (ASR) engine is designed to recognize normal speech patterns and at a normal tone. Some users tend to speak to a computer loud and slow, which results in reduced performance. 3. User must speak using proper Voice Command syntax. 4. ASR engine performance is increased when noise conditions in the passenger compartment are lowered. Ideal conditions include having the

POOR VOICE RECOGNITION	compartment. 5. Passengers are talking while the user is attempting to issue a Voice Command. 6. Foreign objects interfering with microphone input. 7. The inside rear view mirror is not properly attached to the mount. 8. The incorrect Uconnect switch button is being depressed. 9. Microphone failure.	windows closed and the blower fan set to Low or Off. 5. Although designed to focus on sounds from the driver's seated position, the directional microphones will pick up sounds from any seating position in the vehicle. ASR engine performance is increased in low noise environments. 6. Verify that there are no foreign objects hanging from the inside rear view mirror that could be interfering with microphone reception. 7. The inside rear view mirror must be firmly mounted to the mounting location. Be certain the mirror is properly installed. 8. Phone features are accessed using the Uconnect Phone button on the steering wheel or the Phone soft key in the RRM display. Other Uconnect Voice Command features are accessed using the Uconnect VR button or soft key. 9. Use a diagnostic scan tool and the appropriate diagnostic procedures for further diagnosis of the microphone.
PHONE BOOK DOES NOT DOWNLOAD	1. Phone does not support the Phone Book Access Profile (PBAP). 2. Phone book transfer not enabled in phone during pairing. 3. Missing contacts from downloaded phone book.	1. The Uconnect system requires that the cellular phone support the PBAP profile. To enable the Uconnect phone book download feature, the phone must be upgraded to one that is PBAP enabled. A list of suggested phones is available at: http://www.chrysler.com/uconnect 2. Be certain that phone book transfer is accepted or enabled in the phone during pairing to enable the Uconnect phone book download feature. 3. Only contacts with a phone number are downloaded from phone and the number of contacts downloaded is limited to 1000.
	1. User is not waiting for the beep tone acknowledgement before issuing Voice Commands. 2. User is not issuing Voice Commands in a smooth and consistent speaking voice. 3. User is not using proper	1. Be certain the user knows to wait for the acknowledgement beep tone prior to issuing Voice Commands. 2. Be certain the user is issuing Voice Commands in a normal, smooth and consistent speaking voice. The Advanced Speech Recognition (ASR) engine is designed to recognize normal speech patterns and at a normal tone. Some users tend to speak to a computer loud and slow, which results in reduced performance. 3. User must speak using proper Voice Command

PHONE BOOK NAMES NOT RECOGNIZED CONSISTENTLY	Voice Command syntax. 4. Phone book names too short. 5. Name not spoken by user as it appears in the phone book. 6. Multiple similar sounding names in the phone book. 7. Phone book download not yet completed. 8. High noise levels within the passenger compartment. 9. Passengers are talking while the user is attempting to issue a Voice Command. 10. Foreign objects interfering with microphone input. 11. The inside rear view mirror is not properly attached to the mount. 12. The incorrect Uconnect switch button is being depressed. 13. Microphone failure.	syntax (i.e.: say Call - then name, or say Dial - then number). 4. For increased performance, it is recommended to use both first and last names for phone book entries. Example: Daniel Johnson as opposed to Dan . 5. Speak the full contact name as it appears in the phone book. Do not use nicknames. 6. For increased performance it is recommended that the user do not enter similar sounding names in the phone book. 7. Depending upon the size of the contact list on the phone, the download may not have had time to complete. If the Phone Book button on the RRM phone screen appears grayed out, the contact list download is still in progress. Wait until download completes. 8. ASR engine performance is increased when noise conditions in the passenger compartment are lowered. Ideal conditions include having the windows closed and the blower fan set to Low or Off. 9. Although designed to focus on sounds from the driver's seated position, the directional microphones will pick up sounds from any seating position in the vehicle. ASR engine performance is increased in low noise environments. 10. Verify that there are no foreign objects hanging from the inside rear view mirror that could be interfering with microphone reception. 11. The inside rear view mirror must be firmly mounted to the mounting location. Be certain the mirror is properly installed. 12. Phone features are accessed using the Uconnect Phone button on the steering wheel or the Phone soft key in the RRM display. Other Uconnect Voice Command features are accessed using the Uconnect VR button or soft key. 13. Use a diagnostic scan tool and the appropriate diagnostic procedures for further diagnosis of the microphone.
	1. High noise levels within the passenger	1. ASR engine performance is increased when noise conditions in the passenger compartment are lowered. Ideal conditions include having the

POOR PHONE AUDIO QUALITY	compartment. 2. Passengers are talking while the user is attempting to issue a Voice Command. 3. Foreign objects interfering with microphone input. 4. The inside rear view mirror is not properly attached to the mount. 5. Microphone failure.	windows closed and the blower fan set to Low or Off. 2. Although designed to focus on sounds from the driver's seated position, the directional microphones will pick up sounds from any seating position in the vehicle. ASR engine performance is increased in low noise environments. 3. Verify that there are no foreign objects hanging from the inside rear view mirror that could be interfering with microphone reception. 4. The inside rear view mirror must be firmly mounted to the mounting location. Be certain the mirror is properly installed. 5. Use a diagnostic scan tool and the appropriate diagnostic procedures for further diagnosis of the microphone.
NO PHONE AUDIO	1. The settings in the phone cause the phone audio to be routed to a handset.	1. Route the phone audio to the hands-free device.
CALL LOG INOPERATIVE OR INACCURATE	1. Call log not supported by phone. 2. The phone is not providing accurate call log data.	1. The Uconnect system requires that the cellular phone support the call log feature. To enable the Uconnect call log feature, the phone must be upgraded to one that is call log enabled. A list of suggested phones is available at: http://www.chrysler.com/uconnect 2. Refer to the operator's manual for the phone.
AUDIO OUTPUT TOO LOW	1. Volume setting on the Bluetooth device set too low. 2. Volume setting on the RRM set too low.	1. Set the volume of the phone or other Bluetooth device to about three quarters (3/4) of full or maximum volume. 2. Set the volume of the RRM to the desired level during an active Uconnect Hands-Free Phone call session.

DIAGNOSIS AND TESTING - NAVIGATION

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper

precautions could result in accidental airbag deployment.

The hard wired circuits between components related to the Radio Receiver Module (RRM) (also known as the radio or the head unit) and the Uconnect™ Navigation system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the RRM or the electronic controls and communication between modules and other devices that provide some features of the Uconnect™ Navigation system. The most reliable, efficient and accurate means to diagnose the RRM or the electronic controls and communication related to Uconnect™ Navigation system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING - UCONNECT ACCESS

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

The hard wired circuits between components related to the Radio Receiver Module (RRM) (also known as the radio or the head unit) and the Uconnect™ Access system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the RRM or the electronic controls and communication between modules and other devices that provide some features of the Uconnect™ Access system. The most reliable, efficient and accurate means to diagnose the RRM or the electronic controls and communication related to Uconnect™ Access system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

NOTE: Validation and diagnosis of many of the conditions listed below will require access to both the paired Bluetooth™ device and the PIN required for that device.

UCONNECT ACCESS DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
	1. User is not waiting for the beep tone	1. Be certain the user knows to wait for the acknowledgement beep tone prior to issuing

POOR VOICE RECOGNITION	acknowledgement before issuing Voice Commands. 2. User is not issuing Voice Commands in a smooth and consistent speaking voice. 3. User is not using proper Voice Command syntax. 4. High noise levels within the passenger compartment. 5. Passengers are talking while the user is attempting to issue a Voice Command. 6. Foreign objects interfering with microphone input. 7. The inside rear view mirror is not properly attached to the mount. 8. The incorrect Uconnect switch button is being depressed. 9. Microphone failure.	Voice Commands. 2. Be certain the user is issuing Voice Commands in a normal, smooth and consistent speaking voice. The Advanced Speech Recognition (ASR) engine is designed to recognize normal speech patterns and at a normal tone. Some users tend to speak to a computer loud and slow, which results in reduced performance. 3. User must speak using proper Voice Command syntax. 4. ASR engine performance is increased when noise conditions in the passenger compartment are lowered. Ideal conditions include having the windows closed and the blower fan set to Low or Off. 5. Although designed to focus on sounds from the driver's seated position, the directional microphones will pick up sounds from any seating position in the vehicle. ASR engine performance is increased in low noise environments. 6. Verify that there are no foreign objects hanging from the inside rear view mirror that could be interfering with microphone reception. 7. The inside rear view mirror must be firmly mounted to the mounting location. Be certain the mirror is properly installed. 8. Phone features are accessed using the Uconnect Phone button on the steering wheel or the Phone soft key in the RRM (also known as the radio or head unit) display. Other Uconnect Voice Command features are accessed using the Uconnect VR button or soft key. 9. Use a diagnostic scan tool and the appropriate diagnostic procedures for further diagnosis of the microphone.
TEXT MESSAGING INOPERATIVE	1. The Bluetooth Message Access Profile (MAP) is not supported by the phone. 2. The Connect-To-Your-Messages setting has not	1. The Uconnect system requires that the cellular phone support the Bluetooth MAP for the text messaging feature. To enable the Uconnect text messaging feature, the phone must be upgraded to one that supports Bluetooth MAP. A list of suggested phones is available at: http://www.chrysler.com/uconnect 2. Accept the Connect-To-Your-Messages setting on the phone. Refer to the operator's manual for

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	been accepted on the phone.	the phone.
ENHANCED VOICE-TO-TEXT (DICTATED) MESSAGING RESPONSE FEATURE INOPERATIVE	1. Uconnect registration incomplete. 2. Uconnect Access Advantage subscription service is inactive or not installed in the RRM (also known as the radio or head unit). 3. The Bluetooth Message Access Profile (MAP) is not supported by the phone. 4. The Connect-To-Your-Messages setting has not been accepted on the phone.	1. Select the Apps soft key in the RRM (also known as the radio or head unit) display, then select the Uconnect Registration App soft key from the Apps list. For further assistance press the ASSIST button on the inside rear view mirror to contact Uconnect Customer Care. 2. This feature is only available with the Uconnect Access Advantage subscription service. Be certain that the subscription service account is active and installed in the RRM (also known as the radio or head unit). 3. The Uconnect system requires that the cellular phone support the Bluetooth MAP for the text messaging feature. To enable the Uconnect text messaging feature, the phone must be upgraded to one that supports Bluetooth MAP. A list of suggested phones is available at: http://www.chrysler.com/uconnect 4. Accept the Connect-To-Your-Messages setting on the phone. Refer to the operator's manual for the phone.
UNABLE TO DOWNLOAD APPLICATIONS FROM UCONNECT STORE FRONT	1. Uconnect registration incomplete. 2. Cellular antenna issue.	1. Select the Apps soft key in the RRM (also known as the radio or head unit) display, then select the Uconnect Registration App soft key from the Apps list. For further assistance press the ASSIST button on the inside rear view mirror to contact Uconnect Customer Care. 2. Refer to the Audio And Video System service information for further diagnosis of the cellular (combination) antenna.
	1. Uconnect registration incomplete. 2. Uconnect Access Mobile application (app) not downloaded or not fully installed to smart	1. Select the Apps soft key in the RRM (also known as the radio or head unit) display, then select the Uconnect Registration App soft key from the Apps list. For further assistance press the ASSIST button on the inside rear view mirror to contact Uconnect Customer Care. 2. Download the Uconnect Access Mobile app to the user's smart phone from www.MoparOwnerConnect.com . Allow sufficient time for the Uconnect Access Mobile application (app) download to smart phone to complete. Download times will vary widely with

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REMOTE SERVICES INOPERATIVE	phone. 3. Uconnect Access Advantage subscription service is inactive or not installed in the RRM (also known as the radio or head unit). 4. Cellular antenna issue. 5. Radio Frequency Hub Module (RFHM) issue.	the throughput performance of the user's smart phone and the accessibility of the user's cellular network services. 3. This feature is only available with the Uconnect Access Advantage subscription service. Be certain that the subscription service account is active and installed in the RRM (also known as the radio or head unit). 4. Refer to the Audio And Video System service information for further diagnosis of the cellular (combination) antenna. 5. Further diagnosis of the RFHM requires the use of a diagnostic scan tool and the appropriate diagnostic procedures.
AUDIO OUTPUT TOO LOW	1. Volume setting on Bluetooth device set too low. 2. Volume setting on the RRM (also known as the radio or head unit) set too low.	1. Set the volume of the phone or other Bluetooth device to about three quarters (3/4) of full or maximum volume. 2. Set the volume of the RRM (also known as the radio or head unit) to the desired level during an active Uconnect Access feature session.
UCONNECT ACCESS INOPERATIVE - NO GREEN OR RED LED INDICATOR	1. Status of ignition switch is Off. 2. Inside rear view mirror wiring not connected. 3. Ineffective ground circuit. 4. Ineffective feed circuit.	1. Ignition switch status must be On or Accessory during Uconnect Access operation. 2. Be certain the wire harness for the inside rear view mirror is connected and fully engaged. 3. Test and repair the open inside rear view mirror ground circuit if required. 4. Test and repair the open inside rear view mirror feed circuit if required.
UCONNECT ACCESS INOPERATIVE - GREEN LED INDICATOR	1. Uconnect registration incomplete. 2. Uconnect Access Assist or Advantage subscription service is inactive or not installed in the RRM (also known as the radio or head unit). 3. Uconnect Access application (app) corrupt or improperly installed.	1. Select the Apps soft key in the RRM (also known as the radio or head unit) display, then select the Uconnect Registration App soft key from the Apps list. For further assistance press the ASSIST button on the inside rear view mirror to contact Uconnect Customer Care. 2. Many Uconnect Access features are only available with the Uconnect Access Assist or Advantage subscription service. Be certain that the subscription service account is active and installed in the RRM (also known as the radio or head unit). 3. Perform the Uconnect Access System Reinstall Applications Standard Procedure. Refer to STANDARD PROCEDURE.
	1. Loss of Controller Area	1. Further diagnosis of CAN-IHS or CAN-C

UCONNECT ACCESS INOPERATIVE - RED LED INDICATOR	Network (CAN) - Interior High Speed (IHS) or CAN-C communication.	communication requires the use of a diagnostic scan tool and the appropriate diagnostic procedures.
	2. Cellular antenna issue.	2. Refer to the Audio And Video System service information for further diagnosis of the cellular (combination) antenna.
	3. Ineffective embedded cellular device.	3. Test and replace the RRM (also known as the radio or head unit) if required.

DIAGNOSIS AND TESTING - WI-FI HOT SPOT

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

The hard wired circuits between components related to the Radio Receiver Module (RRM) (also known as the radio or the head unit) and the Uconnect™ Wi-Fi Hot Spot system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the RRM or the electronic controls and communication between modules and other devices that provide some features of the Uconnect™ Wi-Fi Hot Spot system. The most reliable, efficient and accurate means to diagnose the RRM or the electronic controls and communication related to Uconnect™ Wi-Fi Hot Spot system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

NOTE: Validation and diagnosis of many of the conditions listed below will require access to both the paired Bluetooth™ device and the PIN required for that device.

WI-FI HOT SPOT DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
	1. Uconnect registration incomplete.	1. Select the Apps soft key in the RRM display, then select the Uconnect Registration App soft key from the Apps list. For further assistance press the ASSIST button on the inside rear view mirror to contact Uconnect Customer Care.
	2. Uconnect Wi-Fi	2. This feature is only available with the

WI-FI HOT SPOT INOPERATIVE	subscription service is inactive, expired or not installed in the RRM. 3. Wi-Fi capability is not enabled in user's Bluetooth device. 4. Selected Wireless Access Point (WAP) is incorrect. 5. Wireless Access Point (WAP) password or security settings incorrect. 6. Cellular antenna issue.	Uconnect Wi-Fi subscription service. Be certain that the subscription service account is active and installed in the RRM. 3. Confirm Wi-Fi setting in user's Bluetooth device is enabled. Refer to the user's manual for that device. 4. Confirm that correct WAP is selected in user's Bluetooth device. Refer to the user's manual for that device. 5. Use the Application Settings menu of the RRM to confirm or adjust the WAP password and security settings. 6. Refer to the Audio And Video System service information for further diagnosis of the cellular antenna.
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STANDARD PROCEDURE

NAVIGATION SYSTEM - ACTIVATION

In vehicles equipped with the optional Navigation Ready version of the Radio Receiver Module (RRM) (also known as the radio or the head unit), if the customer chooses to have the navigation system activated, the vehicle must be returned to the dealer for system activation. The dealer activates the navigation system as follows:

NOTE: Once a Radio Receiver Module (RRM) (also known as the radio or the head unit) with the Navigation Ready feature has had the Navigation feature activated, any factory replacement RRM for the same vehicle will be provided with the Navigation system already activated.

1. Place the RRM into Dealer Mode using a simultaneous 3 button press of the driver side Temperature Up, driver side Temperature Down and Front Defrost push buttons.
2. The Dealer Mode screen will appear in the RRM display showing the System Information menu. Select the **VP3 Navigation Activation** menu item.
3. A Navigation Activation screen appears advising that an Activation Code needs to be purchased and referencing Technical Service Bulletin (TSB) 08-031-12. A 16 digit alpha numeric Request Code appears just below the displayed text.
4. With the Request Code and the Vehicle Identification Number (VIN), log onto the DealerConnect web site (<https://dealerconnect.chrysler.com/>). Locate the Navigation Activation link on the web site, enter the Request Code and VIN as appropriate. The web site will respond with an alpha numeric Activation Code.

NOTE: During the initial launch of this product, the dealer will be provided with a Navigation Activation phone number (Nokia Location And Content Call Center) to use in order to obtain an Activation Code rather than the

DealerConnect link mentioned in Step 4.

5. With the Activation Code, go back to the RRM and press the **OK** button on the Navigation Activation screen. A Data Entry screen will appear. Enter the Activation Code, then press the **OK** button on the Data Entry screen.
6. The navigation system has now been activated using the hardware and software that was installed in the RRM at the time that it was manufactured. If the customer wishes to update the factory installed map and Points-Of-Interest (POI) software, it may be purchased at the customer's expense and downloaded from the Navteq Maps web site (www.navigation.com). See Navigation System - Restore Or Update. Refer to **STANDARD PROCEDURE**.

NAVIGATION SYSTEM - RESTORE OR UPDATE

Navigation System map and Point-Of-Interest (POI) data updates may become available occasionally through the Navteq Maps web site (www.navigation.com). The updated information as well as some additional feature applications can be downloaded and copied to Universal Serial Bus (USB) media for transfer and installation to the navigation module within the Radio Receiver Module (RRM) (also known as the radio or the head unit) in the vehicle. These are fee-based applications and updates, which are made at the option and expense of the customer.

However, a new RRM is equipped with only a standard base version of the map and POI data. Before an original RRM is replaced by the dealer with a new unit, the version of the map and POI data on the original RRM must be noted. If the version of the map and POI data found on the new RRM is not equal to or newer than the version that was found on the replaced RRM, updated data will have to be downloaded and installed to the new RRM at the expense of the dealer.

UCONNECT ACCESS SYSTEM - REINSTALL APPLICATIONS

NOTE: The following procedure may assist the dealer technician in diagnosis by reloading the applications for which the vehicle owner or operator has valid subscriptions. This is primarily used to troubleshoot any application provisioning or data corruption issues. The reinstallation process may take up to 30 minutes, depending upon the number of apps and the cellular signal strength seen on the Apps orb of the Radio Receiver Module (RRM).

The Reinstall Applications procedure can only be initiated from the touchscreen of the Radio Receiver Module (RRM) (also known as the radio or the head unit).

During this procedure, the subscribed applications are removed from the RRM and reinstalled based upon data found on the cloud server. The applications reinstalled onto the RRM will be based upon valid subscriptions and is referred to as Digital Rights.

1. Navigate through the **Apps > Uconnect Store > My Apps > Settings** on the RRM touchscreen.
2. Select **Reinstall Apps**.
3. Press the **Continue** soft key to initiate the Reinstall Applications procedure, or press the **Help** soft key for

more information.

4. When the **Apps** reinstalled. **Radio will restart shortly**. screen appears, press the **OK** soft key.
5. Once the request is processed, a screen will appear alerting the customer with the message, **Important: Application Data Reset Initiated. After Radio Resets, all application data will be lost. Please Wait.** After the radio reset occurs, the apps will begin to be reinstalled. The reinstallation process may take up to 30 minutes, depending upon the number of apps and the cellular signal strength seen on the Apps orb of the RRM.

NOTE: One or two ignition cycles (including bus time-outs) may speed the reloading process following the radio reset.

UCONNECT ACCESS SYSTEM - REMOVE ACCOUNTS

NOTE: The following procedure is provided to the dealer technician as **INFORMATION ONLY**. This procedure is intended for use by the vehicle owner or operator. This procedure is used when selling the vehicle or cancelling the Uconnect Access account. Removing the account will disassociate the Vehicle Identification Number (VIN) from the account and remove Uconnect Access features from the vehicle. The Uconnect Access features can be reinstated by repeating the registration process through the Radio Receiver Module (RRM) (also known as the radio or the head unit) and following the directions associated with registering for Uconnect Access.

The Remove Accounts procedure can be initiated by one of three methods:

- Through the touchscreen of the RRM.
- Through the Uconnect™ Call Center (**ASSIST** button on inside rear view mirror) or under **Uconnect™ Apps** selection of the RRM display.
- Through the Uconnect™ Owners information accessed through the Mopar Owner Connect web site (www.moparownerconnect.com).

The following describes the Remove Accounts procedure accomplished through the RRM touchscreen:

1. Navigate through **Apps > Uconnect Store > My Apps > Settings** on the RRM touchscreen.
2. Select **Remove Uconnect Account**.
3. Press the **Continue** soft key after each of the two **Warning** screens, or press the **Cancel** soft key to abort the procedure.
4. When the **Authentication** screen is reached, enter the 4 digit **Uconnect Access ID**.
5. Press the **Continue** soft key to continue the Remove Accounts procedure, the **Help** soft key for additional information or the **Cancel** soft key to abort the Remove Accounts procedure.
6. When the **This vehicle has been removed from your account**. screen appears, press the **OK** soft key. Once the request is processed, a screen will appear alerting the customer with the message, **Important: Application Data Reset Initiated. After Radio Resets, all application data will be lost. Please Wait.**
7. After the radio reset occurs, Uconnect Access applications will no longer be available and the **Uconnect**

Registration screen will appear each time the **Apps** soft key is selected until a new valid registration has been successfully completed.

ANTENNA, NAVIGATION

DESCRIPTION

DESCRIPTION

The navigation antenna is integrated into a roof-mounted combination antenna that also receives satellite audio and cellular signals. Refer to **ANTENNA, SATELLITE, AUDIO, DESCRIPTION** .

OPERATION

OPERATION

The navigation module acquires Global Positioning System (GPS) position data through a roof-mounted combination antenna that also receives satellite audio and cellular signals. Refer to **ANTENNA, SATELLITE, AUDIO, DESCRIPTION** .

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - NAVIGATION ANTENNA

Refer to **DIAGNOSIS AND TESTING** .

REMOVAL

REMOVAL

The navigation antenna is serviced as a unit with the combination antenna located on the roof panel. Refer to **ANTENNA, SATELLITE, AUDIO, REMOVAL** .

INSTALLATION

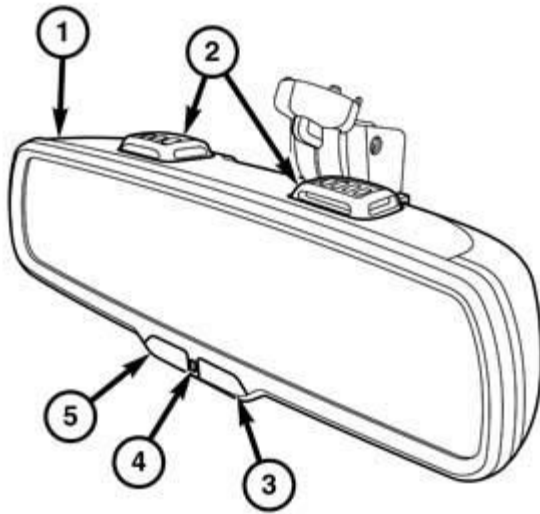
INSTALLATION

The navigation antenna is serviced as a unit with the combination antenna located on the roof panel. Refer to **ANTENNA, SATELLITE, AUDIO, INSTALLATION** .

MICROPHONE

DESCRIPTION

DESCRIPTION



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Fig. 1: Inside Rear View Mirror Housing
Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with the optional hands-free system have two stereo microphones (2) mounted in the top surface of the inside rear view mirror housing (1), one to each side of center. The two microphones are individually powered by and provide hard wired inputs to the Radio Receiver Module (RRM) (also known as the radio or the head unit) in the instrument panel whenever the Voice Recognition (VR) feature of the hands-free system is active. These two microphones are connected to the vehicle electrical system through a connector receptacle integral to the forward-facing surface of the inside rear view mirror housing by a dedicated take out and connector of the overhead wire harness.

In vehicles equipped with the optional Uconnect™ Access system, the inside rear view mirror system also houses both a **9-1-1** push button (3) and a **Assist** push button (5).

The microphones cannot be adjusted or repaired and, if damaged or ineffective, they must be replaced as a unit with the inside rear view mirror assembly.

OPERATION

OPERATION

When the hands-free Voice Recognition (VR) control circuitry integral and internal to the Radio Receiver Module (RRM) (also known as the radio or the head unit) detects the appropriate inputs or requests, it energizes the circuitry of the two stereo microphones within the inside rear view mirror housing. The microphones remain active until they are deactivated by the hands-free VR control circuitry, or until the status of the ignition switch (also known as the Keyless Ignition Node/KIN or Ignition Node Module/IGNM) transitions to Off, whichever occurs first.

The inputs from the microphones is processed, filtered and redirected by the VR control circuitry and logic as appropriate. Those inputs can be redirected to the Advanced Speech Recognition (ASR) engine or to the audio send circuitry of the Bluetooth™ transceiver. Each of these electronic modules is also integral and internal to the RRM.

The status of the Uconnect™ Access **Assist** and **9-1-1** push buttons is relayed by the Local Interface Network (LIN) slave node integral to the inside rear view mirror over the LIN data bus to the Body Control Module (BCM) (also known as the Common Body Controller/CBC), which is a LIN master node. The BCM is also a Controller Area Network (CAN) data bus gateway and relays the push button status information to the RRM over the CAN - Interior High Speed (CAN-IHS) data bus.

The hard wired inputs and outputs of the microphones in the inside rear view mirror may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the microphone or the electronic controls and communication between modules and other devices that provide some features of the RRM controlled microphones. The most reliable, efficient and accurate means to diagnose the RRM or the electronic controls and communication related to RRM-controlled microphone operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - MICROPHONE

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

The hard wired inputs and outputs of the microphones in the inside rear view mirror may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the microphone or the electronic controls and communication between modules and other devices that provide some features of the Radio Receiver Module (RRM) (also known as the radio or the head unit) controlled microphones. The most reliable, efficient and accurate means to diagnose the RRM or the electronic controls and communication related to RRM-controlled microphone operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

REMOVAL

The inside rear view mirror mounted microphones used in this vehicle are integral to and serviced only as a unit with the inside rear view mirror. Refer to **MIRROR, REARVIEW, REMOVAL**.

INSTALLATION

INSTALLATION

The inside rear view mirror mounted microphones used in this vehicle are integral to and serviced only as a unit with the inside rear view mirror. Refer to **MIRROR, REARVIEW, INSTALLATION** .

2014 ACCESSORIES AND EQUIPMENT

Power Liftgate - Service Information - Cherokee

WARNING

WARNING

WARNING: There is a small area located on each side of the liftgate from about the belt line down to the sill which is not protected by the power liftgate system pinch sensors. Extreme caution must be taken to prevent body extremities or other objects from entering this area once the liftgate reaches the secondary latch contact position, which is about 13 millimeters (1/2 inch) before the liftgate is fully closed. Failure to observe this warning may result in serious or fatal injury.

WARNING: Never attempt to enter, exit or reach through the liftgate opening with the power liftgate in motion. You could cause damage to the power liftgate system or components, and serious or fatal injuries may result.

CAUTION: Never attempt to operate the power liftgate system while the Power Drive Unit (PDU) or a gas-charged hydraulic strut or prop is removed or disconnected. Damage to the power liftgate system or components may result.

DESCRIPTION

DESCRIPTION

A power operated liftgate system is an available option on this vehicle. The power liftgate system includes the following major components, which are described in further detail elsewhere in this service information:

- **Chime** - An electronic power liftgate chime tone generator is located on the inside of the left inner D-pillar just below the belt line, where it is concealed behind the interior D-pillar trim.
- **D-Pillar Switch** - A power liftgate D-pillar switch (also known as the rear zone switch) is located in a bezel near the back of the left quarter inside trim panel near the D-pillar.
- **Exterior Latch Handle Switch** - A power liftgate exterior latch handle switch (also known as the outside handle switch) is integral to the unique power liftgate exterior latch handle.
- **Latch** - A unique, electrically actuated power liftgate latch and latch cinching mechanism is installed in place of the latch used on vehicles without the power liftgate system option.
- **Overhead Console Switch** - A power liftgate overhead console switch (also known as the front zone switch) is located between the two front reading lamp switches in the overhead console.
- **Pinch Sensors** - A power liftgate pinch sensor is located on each side shut face of the liftgate and extends from about the belt line to just below the liftgate opening header. The right side pinch sensor includes an

integral thermistor.

- **Power Drive Unit** - An electrically operated Power Drive Unit (PDU) is installed on the left side of the liftgate between the liftgate and the liftgate opening trough. It is secured to the same ball studs that are used for the conventional gas-charged hydraulic strut or prop that the PDU replaces.
- **Power Liftgate Module** - The Power LiftGate Module (PLGM) (also known as the Power Liftgate/PLG control module) is concealed behind the liftgate sill scuff plate and trim, on the inside of the back rear cargo area. The PLGM is secured by two integral mounting tabs and an integral latch tab to slots in the sheet metal. Refer to **MODULE, POWER LIFTGATE CONTROL, DESCRIPTION**.
- **Thermistor** - A thermistor is internal and integral to the right side pinch sensor.

Hard wired circuitry connects the power liftgate system components to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the power liftgate components through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin out and location views for the various wire harness connectors, splices and grounds.

OPERATION

OPERATION

The components and features of the power liftgate system are designed to provide the vehicle operator with convenient and safe access to the cargo area of the vehicle. The power liftgate components convert electrical energy produced by the electrical system of the vehicle into the mechanical action necessary to latch, unlatch, raise and lower the liftgate with the simple touch of a button or the slight pull of the exterior liftgate latch handle.

Battery voltage is supplied to the Power LiftGate Module (PLGM) through a fused B(+) fuse in the Power Distribution Center (PDC) so the PLGM can operate regardless of the ignition switch status. The PLGM monitors many hard wired switch and sensor inputs from the liftgate latch and cinch mechanisms, the Power Drive Unit (PDU), the D-pillar power liftgate switch, the exterior latch handle power liftgate switch, the overhead console power liftgate switch, both pinch sensors and the thermistor in the right pinch sensor.

The PLGM also monitors many electronic message inputs received over the Controller Area Network (CAN) data bus network. Electronic message inputs include: ignition switch status, Transmission Range Sensor (TRS) status, vehicle speed, Remote Keyless Entry (RKE) commands, vehicle theft alarm status, power lock system status and (if equipped) liftgate flip-up glass ajar switch status. In response to those many inputs, the PLGM logic allows it to properly control numerous hard wired outputs that operate the power liftgate latch and cinch mechanisms and the PDU that opens and closes the liftgate as well as the chime tone generator that provides audible indications of the power liftgate status. The PLGM will also place electronic messages on the CAN data bus indicating the liftgate status and many of the hard wired sensor inputs it receives for use by other electronic modules in the vehicle.

Operation of the power liftgate requires the transmission be in the Park or Neutral positions, the vehicle speed

not be greater than zero and that the liftgate flip-up glass is closed. When the vehicle is also unlocked, the power liftgate can be opened by lifting the exterior liftgate latch handle. If the vehicle is locked, a single press of the overhead console power liftgate button or two presses within five seconds of the RKE Liftgate button on the FOB with Integrated Key (FOBIK) will unlock and open the liftgate. The fully open liftgate can be closed automatically by depressing the D-Pillar switch or the overhead console switch one time or by depressing the RKE Liftgate button on the FOBIK twice within five seconds. The fully open liftgate can also be closed manually by pulling it down in the same manner as a non-power liftgate.

The PLGM also confirms safety requirements are met before supplying power to the PDU to begin any power cycle. The PLGM software detects obstructions through inputs from the two pinch sensors as well as by monitoring the resistance to travel of the PDU. When a sufficient obstruction is detected, the PLGM will reverse the direction of the liftgate. Also, an exterior liftgate handle pull during an automatic **Close** cycle will reverse the power liftgate operation to **Open**, while an exterior liftgate handle pull during an automatic **Open** cycle will cancel the cycle and put the power liftgate into full manual operation. In addition to the Electronic Vehicle Information Center (EVIC) customer programmable audible power liftgate chime alerts, when a customer programmable feature is set to **Flash Lamps With Lock**, two flashes of the exterior signal lamps will occur at the beginning of each power liftgate **Open** or **Close** cycle.

The PLGM continually monitors all of the power liftgate system circuits and components, and will store a Diagnostic Trouble Code (DTC) for any problem it detects. The PLGM uses an adaptive memory which allows it to relearn and adapt to changes in the system that might occur due to component wear or ambient conditions. If a power liftgate system component is replaced or a liftgate adjustment is made, the PLGM is required to relearn the effort and time required to open or close the liftgate. This learn cycle can be initiated with a diagnostic scan tool. Refer to **MODULE, POWER LIFTGATE CONTROL, STANDARD PROCEDURE**.

The hard wired circuits and components of the power liftgate system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the power liftgate system or the electronic controls or communication between other modules and devices that provide some features of the system. The most reliable, efficient, and accurate means to diagnose the power liftgate system or the electronic controls and communication related to system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - POWER LIFTGATE SYSTEM

NOTE: **Before any testing of the power liftgate system is attempted, the battery should be fully-charged.**

The latch, the sensors, the switches and the hard wired circuits between components related to the power liftgate system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the electronic controls or communication between modules and other devices that provide some features of the power liftgate system. The most reliable, efficient, and accurate means to diagnose the power liftgate system or the electronic controls and communication related to power liftgate system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

Following are quick reference diagnostic tables to help when diagnosing and testing the power liftgate system.

SYMPTOM DRIVEN POWER LIFTGATE SYSTEM DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
LIFTGATE WILL NOT INITIATE POWER OPEN/POWER CLOSE WITH EITHER FOB/K OR OVERHEAD CONSOLE SWITCH	1. Power Liftgate System Inhibitors preventing operation.	1. Check Inhibit Monitors using a diagnostic scan tool. Refer to POWER LIFTGATE SYSTEM INHIBIT MONITORS . Repair if required.
	2. Power Liftgate Input/Output status incorrect.	2. Check power liftgate input - output status using a diagnostic scan tool. Refer to POWER LIFTGATE INPUT - OUTPUT TABLE . Repair if required.
	3. Binding or sticking of components.	3. Establish location of binding or sticking components. Repair or replace if required.
	4. Wiring problems (system or vehicle).	4. Refer to the appropriate wiring information. Repair if required.
	5. Ineffective Power LiftGate Module (PLGM).	5. Test the PLGM using a diagnostic scan tool. Replace if required.
	6. Ineffective power liftgate latch assembly.	6. Check for foreign matter or damaged components preventing proper latch operation. Use diagnostic scan tool to cycle the latch. Replace if required.
	7. Ineffective liftgate Power Drive Unit (PDU).	7. Use a diagnostic scan tool to cycle the PDU. Replace if required.
FOBIK DOES NOT OPERATE POWER LIFTGATE, BUT OVERHEAD CONSOLE SWITCH DOES	1. Power Liftgate System Inhibitors preventing operation.	1. Check Inhibit Monitors using a diagnostic scan tool. Refer to POWER LIFTGATE SYSTEM INHIBIT MONITORS . Repair if required.
	2. Power Liftgate Input/Output status incorrect.	2. Check power liftgate input - output status using a diagnostic scan tool. Refer to POWER LIFTGATE INPUT - OUTPUT TABLE . Repair if required.
	3. Key in ignition.	3. FOB with Integrated Key (FOBIK) buttons do not function while key is in ignition by design. Remove key from ignition and retry.
	4. Ineffective FOBIK.	4. Reprogram FOBIK and retry. Replace if required.

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	5. Ineffective Keyless Ignition Node (KIN).	5. Test the KIN using a diagnostic scan tool. Replace if required.
	6. Wiring problems (system or vehicle).	6. Refer to the appropriate wiring information. Repair if required.
	7 Ineffective Controller Area Network (CAN) data bus.	7. Test the CAN data bus using a diagnostic scan tool. Repair if required.
	8. Ineffective PLGM.	8. Test the PLGM using a diagnostic scan tool. Replace if required.
OVERHEAD CONSOLE SWITCH DOES NOT OPERATE POWER LIFTGATE - BUT FOB/K DOES	1. Power Liftgate System Inhibitors preventing operation.	1. Check Inhibit Monitors using a diagnostic scan tool. Refer to POWER LIFTGATE SYSTEM INHIBIT MONITORS . Repair if required.
	2. Power Liftgate Input/Output status incorrect.	2. Check power liftgate input - output status using a diagnostic scan tool. Refer to POWER LIFTGATE INPUT - OUTPUT TABLE . Repair if required.
	3. Ineffective power liftgate overhead console switch.	3. Test the overhead console switch. Replace if required.
	4. Wiring problems (system or vehicle).	4. Refer to the appropriate wiring information. Repair if required.
	5. Ineffective PLGM.	5. Test the PLGM using a diagnostic scan tool. Replace if required.
LATCH WILL NOT RELEASE WITH EXTERIOR HANDLE, POWER-OPEN CYCLE MAY OR MAY NOT INITIATE	1. Power Liftgate System Inhibitors preventing operation.	1. Check Inhibit Monitors using a diagnostic scan tool. Refer to POWER LIFTGATE SYSTEM INHIBIT MONITORS . Repair if required.
	2. Power Liftgate Input/Output status incorrect.	2. Check power liftgate input - output status using a diagnostic scan tool. Refer to POWER LIFTGATE INPUT - OUTPUT TABLE . Repair if required.
	3. Ineffective power liftgate exterior handle switch.	3. Test the exterior handle switch. Replace if required.
	4. Ineffective power liftgate latch assembly.	4. Check for foreign matter or damaged components preventing proper latch operation. Use diagnostic scan tool to cycle the latch. Replace if required.
	5. Wiring problems (system or vehicle).	5. Refer to the appropriate wiring information. Repair if required.
	6. Binding or sticking of components.	6. Establish location of binding or sticking components. Repair or replace if required.
		7. Test the PLGM using a diagnostic scan

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	7. Ineffective PLGM.	tool. Replace if required.
LIFTGATE REVERSES DIRECTION DURING POWER OPEN - POWER CLOSE CYCLE	1. FOB/K button being hit more than the two times, or overhead console switch being hit more than once.	1. By design, the liftgate will reverse direction if the FOB/K button is depressed more than twice or the overhead console switch button is depressed more than once.
	2. Power Liftgate System Inhibitors preventing operation.	2. Check Inhibit Monitors using a diagnostic scan tool. Refer to <u>POWER LIFTGATE SYSTEM INHIBIT MONITORS</u> . Repair if required.
	3. Power Liftgate Input/Output status incorrect.	3. Check power liftgate input - output status using a diagnostic scan tool. Refer to <u>POWER LIFTGATE INPUT - OUTPUT TABLE</u> . Repair if required.
	4. Binding or sticking of components.	4. Establish location of binding or sticking components. Repair or replace if required.
	5. Wiring problems (system or vehicle).	5. Refer to the appropriate wiring information. Repair if required.
	6. Ineffective liftgate PDU.	6. Use a diagnostic scan tool to cycle the PDU. Replace if required.
	7. Ineffective PLGM.	7. Test the PLGM using a diagnostic scan tool. Replace if required.
LATCH WILL NOT POWER-CINCH TO PRIMARY POSITION DURING MANUAL OR POWER OPERATION	1. Power Liftgate System Inhibitors preventing operation.	1. Check Inhibit Monitors using a diagnostic scan tool. Refer to <u>POWER LIFTGATE SYSTEM INHIBIT MONITORS</u> . Repair if required.
	2. Pinch sensor activated or opened shorted circuit.	2. Check pinch sensor status using a diagnostic scan tool. Repair or replace if required.
	3. Power Liftgate Input/Output status incorrect.	3. Check power liftgate input - output status using a diagnostic scan tool. Refer to <u>POWER LIFTGATE INPUT - OUTPUT TABLE</u> . Repair if required.
	4. Binding or sticking of components.	4. Establish location of binding or sticking components. Repair or replace if required.
	5. Liftgate weather seal force too high.	5. Inspect weather seals for damage, improper installation, foreign matter or other possible obstructions. Repair if required.
	6. Wiring problems (system or vehicle).	6. Refer to the appropriate wiring information. Repair if required.
	7. Ineffective power liftgate latch assembly.	7. Check for foreign matter or damaged components preventing proper latch operation. Use diagnostic scan tool to cycle the latch. Replace if required.
		8. Test the PLGM using a diagnostic scan

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	8. Ineffective PLGM.	tool. Replace if required.
LIFTGATE SAGS AFTER COMPLETION OF POWER OPEN CYCLE OR MANUAL OPENING	1. Loose or damaged PDU or strut mounts.	1. Check for loose or broken PDU (left side) or strut (right side) ball stud attachments. Repair or replace if required.
	2. Ineffective liftgate gas-charged strut (prop rod).	2. Check gas-charged strut (prop rod) on right side of liftgate. Replace if required.
HIGH OPENING EFFORT - LIFTGATE OPENS VERY SLOWLY DURING MANUAL OR POWER OPERATION	1. Power Liftgate System Inhibitors preventing operation.	1. Check Inhibit Monitors using a diagnostic scan tool. Refer to POWER LIFTGATE SYSTEM INHIBIT MONITORS . Repair if required.
	2. Loose or damaged PDU or strut mounts.	2. Check for loose or broken PDU (left side) or strut (right side) ball stud attachments. Repair or replace if required.
	3. Ineffective liftgate gas-charged strut (prop rod).	3. Check gas-charged strut (prop rod) on right side of liftgate. Replace if required.
	4. Binding or sticking of components.	4. Establish location of binding or sticking components. Repair or replace if required.
	5. Wiring problems (system or vehicle).	5. Refer to the appropriate wiring information. Repair if required.
	6. Vehicle located on too steep of a grade for power liftgate operation.	6. Operate liftgate manually.
	7. Ineffective liftgate PDU.	7. Use a diagnostic scan tool to cycle the PDU. Replace if required.
LIFTGATE CONTINUES TO POWER-CLOSE AFTER REACHING FULL-CLOSED POSITION	1. Power Liftgate Input/Output status incorrect.	1. Check power liftgate input - output status using a diagnostic scan tool. Refer to POWER LIFTGATE INPUT - OUTPUT TABLE . Repair if required.
	2. Wiring problems (system or vehicle).	2. Refer to the appropriate wiring information. Repair if required.
	3. Binding or sticking of components.	3. Establish location of binding or sticking components. Repair or replace if required.
	4. Ineffective power liftgate latch assembly.	4. Check for foreign matter or damaged components preventing proper latch operation. Use diagnostic scan tool to cycle the latch. Replace if required.
	5. Ineffective PLGM.	5. Test the PLGM using a diagnostic scan tool. Replace if required.
LIFTGATE CONTINUES TO POWER-OPEN AFTER REACHING FULL-OPEN POSITION - MAY PULSE SEVERAL TIMES	1. Power Liftgate Input/Output status incorrect.	1. Check power liftgate input - output status using a diagnostic scan tool. Refer to POWER LIFTGATE INPUT - OUTPUT TABLE . Repair if required.

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	2. Wiring problems (system or vehicle).	2. Refer to the appropriate wiring information. Repair if required.
	3. Ineffective full open switch (liftgate PDU).	3. Use a diagnostic scan tool to check the switch status and cycle the PDU. Replace if required.
	4. Ineffective PLGM.	4. Test the PLGM using a diagnostic scan tool. Replace if required.
SQUEAKS, NOISES AND RATTLES	1. Foreign material within liftgate panel.	1. Remove foreign material from within liftgate if required.
	2. Worn or loose liftgate components.	2. Inspect and tighten or replace loose liftgate components if required.
LIFTGATE UNLATCHES OR INITIATES POWER OPEN OR POWER CLOSE CYCLE UNEXPECTEDLY	1. Inadvertent power liftgate activation.	1. Use a diagnostic scan tool to read and record PLGM activation history.
	2. Power Liftgate System Inhibitors preventing operation.	2. Check Inhibit Monitors using a diagnostic scan tool. Refer to POWER LIFTGATE SYSTEM INHIBIT MONITORS . Repair if required.
	3. Power Liftgate Input/Output status incorrect.	3. Check power liftgate input - output status using a diagnostic scan tool. Refer to POWER LIFTGATE INPUT - OUTPUT TABLE . Repair if required.
	4. Wiring problems (system or vehicle).	4. Refer to the appropriate wiring information. Repair if required.
	5. Ineffective power liftgate overhead console switch.	5. Test the overhead console switch. Replace if required.
	6. Ineffective FOB/K.	6. Reprogram FOB/K and retry. Replace if required.
	7. Ineffective power liftgate latch assembly.	7. Check for foreign matter or damaged components preventing proper latch operation. Use diagnostic scan tool to cycle the latch. Replace if required.
	8. Ineffective PLGM.	8. Test the PLGM using a diagnostic scan tool. Replace if required.

POWER LIFTGATE SYSTEM CONTROL PARAMETERS

The power liftgate system is designed with a number of control parameters, which are conditions that must be fulfilled to allow operation. These control parameters are listed below:

- The Power LiftGate Module (PLGM) will inhibit operation of the power liftgate in extreme ambient temperatures. These temperatures are at or below about -30° C (-22° F) and at or above about 65° C (149° F). The pinch sensor/thermistor assembly on the right side of the liftgate monitors the ambient temperature.

- The transmission must be in the **Park (P)** or **Neutral (N)** positions for the power liftgate system to operate.
- The vehicle speed input must be zero (0) for the power liftgate system to operate.
- The electrical system voltage must be within minimum and maximum specifications for the power liftgate system to operate. A low-voltage cut off is built into the power liftgate system to prevent the battery from discharging to the point where the vehicle cannot be operated.
- If the ignition switch is in the **Start** position, the power liftgate system will not initiate a power cycle.
- If the ignition switch is moved to the **Start** position during a power cycle, the power liftgate will pause.
- If the vehicle is locked, the exterior liftgate handle will not release the latch. The FOB with Integrated Key (FOBIK) and the overhead console switch will work for power open or close cycles.
- If the vehicle theft alarm is armed, the overhead console switch will not open the liftgate; however, the FOBIK will.
- If a liftgate pinch sensor is activated during a power close, the liftgate will reverse direction. If a pinch sensor is already active, the power liftgate system will not initiate a power close. A pinch activation during latch cinch will stop the cinch operation.
- If something sufficiently impedes liftgate travel, the power liftgate will detect an obstacle and reverse direction, traveling to full open or full closed.
- If multiple obstacles are detected during the same power open or close cycle, the liftgate will abort that power cycle and go into full manual operation.
- The power liftgate components are protected by the power liftgate system fuse. If the fuse is ineffective, the power liftgate system will not function.
- Some Diagnostic Trouble Codes (DTC) stored in the PLGM may cause the power liftgate system not to operate. Always use a diagnostic scan tool to check and clear DTCs from the PLGM before and after servicing any power liftgate system components.

POWER LIFTGATE INPUT - OUTPUT TABLE

POWER LIFTGATE INPUT - OUTPUT TABLE

INPUT	NORMAL READINGS			
	FULLY CLOSED AND LATCHED	FULLY OPEN	BETWEEN FULLY OPEN AND CLOSED	DESCRIPTION
PRIMARY RATCHET - AJAR SWITCH CLOSED	FALSE	TRUE	TRUE	Primary/Ajar switch, internal to the liftgate latch. Open when latch is in primary. Closed when latch is out of primary.
SECONDARY RATCHET SWITCH CLOSED	FALSE	TRUE	TRUE	Internal to the liftgate latch. Indicates when the latch is in secondary position. Open when in secondary position. Closed when out of secondary

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				position.
SECTOR GEAR SWITCH CLOSED	FALSE	FALSE	FALSE	Internal to the liftgate latch. Essentially a park switch for the latch. When latch is running a cinch or release, this switch is Closed . After cinch or release is complete, the Power LiftGate Module (PLGM) will reverse direction of the latch until the switch is Open .
FULL OPEN SWITCH CLOSED	FALSE	TRUE	FALSE	Internal to the Power Drive Unit (PDU). Indicates when the liftgate is a few degrees from full open. Closed when full open. Open when not full open.
POSITION SENSOR NUMBER 1 AND NUMBER 2 CLOSED	FALSE OR TRUE	FALSE OR TRUE	FALSE OR TRUE	When in motion, these signals will toggle between Open and Closed . The two signals together tell the PLGM the speed and distance of liftgate travel. These inputs are also used by the PLGM to sense obstacles encountered by the liftgate.
POSITION SENSOR PULSE COUNTS	100	1600 TO 1800	100 TO 1600	This is a counter derived from the pulses coming from Position Sensors number 1 and 2. This count represents total travel of the liftgate (to mechanical end of travel).
GATE FULL OPEN SWITCH POSITION COUNTS	ABOUT 1600	ABOUT 1600	ABOUT 1600	This is a counter derived from the pulses coming from Position Sensors number 1 and 2. This count represents the position of the full open switch in the PDU.
INPUT	NORMAL (NOT PRESSED)	PRESSED	DESCRIPTION	
LEFT PINCH SENSOR	About 4.1 Volts (10 Kilohms)	Less than 1 Volt	Pinch sensor reads 10 kilohms when not pinched. When pinched, shorts out the 10 kilohm resistor and should read from 0 to about 200 ohms.	
			Right pinch sensor has a 10 kilohm at room	

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RIGHT PINCH SENSOR	About 1.7 Volts at 21° C (70° F)	Less than 1 Volt	temperature thermistor in place of the resistor. When not pinched, resistance is proportional to the ambient temperature. When pinched, shorts out the thermistor and should read from 0 to about 200 ohms.
EXTERIOR HANDLE SWITCH	5 Volts (Normally Open)	About 3.4 Volts (4.7 Kilohms)	Located in the liftgate latch. Open circuit when not active. 4.7 kilohms to ground when handle is activated.
OVERHEAD CONSOLE SWITCH	About 4.7 Volts	About 3.4 Volts	When not pressed, should read about 810 kilohms. When pressed, should read about 4.7 kilohms.
D-PILLAR (REAR ZONE) SWITCH	About 4.7 Volts	About 3.4 Volts	When not pressed, should read about 810 kilohms. When pressed, should read about 4.7 kilohms.
OUTPUT	DESCRIPTION	DIAGNOSE	
HALL EFFECT POWER	Provides +5 Volts to the Hall sensors in the PDU	As long as the PLGM is awake it should read approximately +5 volts.	
LATCH MOTOR	Provides +/- 12 Volts to latch motor for cinch and release	Actuate with diagnostic scan tool. Should see positive voltage on the cinch wiring connector terminal for cinch direction. Should see positive voltage on the release wiring connector terminal for release direction. Refer to the appropriate wiring information for specific harness and connector pinout information.	
DRIVE MOTOR	Provides +/- 12 Volts to PDU for power Open or Close	Actuate with diagnostic scan tool. Should see positive voltage on the open wiring connector terminal for open direction. Should see positive voltage on the close wiring connector terminal for close direction. Refer to the appropriate wiring information for specific harness and connector pinout information.	
CHIME	Provides signal to output sound	Actuate with diagnostic scan tool. While monitoring with a digital multimeter some activity should be present, but not much voltage.	

POWER LIFTGATE SYSTEM INHIBIT MONITORS

The following is a list of inhibit monitors that may be observed using an appropriate diagnostic scan tool.

INHIBIT MONITOR	POSSIBLE CAUSES	CORRECTION
\$80 OPEN INHIBIT - VOLTAGE TOO LOW	1. Low or dead battery.	1. Test and charge battery. Replace if required.
	2. Ineffective power or ground circuits to the Power LiftGate Module (PLGM).	2. Check the power and ground circuits for the PLGM. Repair if required.

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\$82 CLOSE INHIBIT - VOLTAGE TOO LOW	3. Inaccurate voltage reading from the PLGM.	3. Compare the PLGM battery reading using a diagnostic scan tool with a voltmeter reading at the PLGM wiring connections. If a voltage difference of 0.5 Volt or greater is obtained, replace the PLGM.
\$81 OPEN INHIBIT - VOLTAGE TOO HIGH	1. Charging system over voltage.	1. Test the charging system. Repair if required.
\$83 CLOSE INHIBIT - VOLTAGE TOO HIGH	2. Inaccurate voltage reading from the PLGM.	2. Compare the PLGM battery reading using a diagnostic scan tool with a voltmeter reading at the PLGM wiring connections. If a voltage difference of 0.5 Volt or greater is obtained, replace the PLGM.
\$84 OPEN INHIBIT - TEMPERATURE TOO LOW	1. Temperature was below - 30° C (-22° F) when the operation was attempted.	1. Inform customer of power liftgate system temperature operating range.
	2. Open or high resistance to right pinch sensor thermistor through signal or ground circuit.	2. Check the signal and ground circuits between the pinch sensor and the PLGM including the in-line connectors. Repair if required.
	3. Ineffective right pinch sensor or thermistor.	3. Allow vehicle to sit in a constant temperature environment for one hour with the liftgate open. Test the resistance of the right pinch sensor and thermistor compared to specification. Replace if required.
	4. Inaccurate temperature reading from the PLGM.	4. Allow vehicle to sit in a constant temperature environment for one hour with the liftgate open. Compare the PLGM temperature reading using a diagnostic scan tool with the temperature indicated by the resistance specification of the right pinch sensor and thermistor. If the right pinch sensor and thermistor are within range of specification and the temperature difference at the PLGM is greater than 4.5° C (8° F), replace the PLGM.
\$86 CLOSE INHIBIT - TEMPERATURE TOO LOW		
\$85 OPEN INHIBIT - TEMPERATURE TOO HIGH	1. Temperature was above 65° C (149° F) when the operation was attempted.	1. Inform customer of power liftgate system temperature operating range.
	2. Shorted or partially shorted right pinch sensor thermistor through signal or ground circuit.	2. Check the signal and ground circuits between the pinch sensor and the PLGM including the in-line connectors. Repair if required.
	3. Ineffective right pinch sensor or thermistor.	3. Allow vehicle to sit in a constant temperature environment for one hour with the liftgate open. Test the resistance of the right pinch sensor and thermistor compared to

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\$87 CLOSE INHIBIT - TEMPERATURE TOO HIGH		specification. Replace if required.
	4. Inaccurate temperature reading from the PLGM.	4. Allow vehicle to sit in a constant temperature environment for one hour with the liftgate open. Compare the PLGM temperature reading using a diagnostic scan tool with the temperature indicated by the resistance specification of the right pinch sensor and thermistor. If the right pinch sensor and thermistor are within range of specification and the temperature difference at the PLGM is greater than 4.5° C (8° F), replace the PLGM.
\$88 CLOSE INHIBIT - LEFT PINCH SENSOR ACTIVE	1. Left pinch sensor was activated prior to activation of power close cycle.	1. Check for obstructions causing pinch sensor activation. Repair if required. If no obstructions found, inform customer of pinch sensor operation.
	2. Short to ground on left pinch sensor signal circuit.	2. Check the signal circuit between the pinch sensor and the PLGM including the in-line connectors. Repair if required.
	3. Ineffective left pinch sensor.	3. Test the resistance of the left pinch sensor in an unpinched state. If the resistance is less than 9 kilohms, replace the left pinch sensor.
	4. Ineffective PLGM.	4. Use a diagnostic scan tool to observe the voltage of the left pinch sensor input. With the sensor disconnected the reading should be approximately 5 volts. Short the pinch sensor circuit to ground and the reading should be approximately 0 volts. If the readings are not okay, replace the PLGM.
\$89 CLOSE INHIBIT - RIGHT PINCH SENSOR ACTIVE	1. Right pinch sensor was activated prior to activation of power close cycle.	1. Check for obstructions causing pinch sensor activation. Repair if required. If no obstructions found, inform customer of pinch sensor operation.
	2. Short to ground on right pinch sensor signal circuit.	2. Check the signal circuit between the pinch sensor and the PLGM including the in-line connectors. Repair if required.
	3. Ineffective right pinch sensor.	3. Test the resistance of the right pinch sensor in an unpinched state. If the resistance is less than 9 kilohms, replace the right pinch sensor.
	4. Ineffective PLGM.	4. Use a diagnostic scan tool to observe the voltage of the right pinch sensor input. With the sensor disconnected the reading should be approximately 5 volts. Short the pinch sensor circuit to ground and the reading should be approximately 0 volts. If the readings are not

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		okay, replace the PLGM.
\$8A OPEN INHIBIT - NOT IN PARK OR NEUTRAL	1. Operator attempted power open cycle when vehicle was not in Park or Neutral.	1. Inform customer of power liftgate system operating restrictions.
	2. Operator attempted manual latch release with exterior handle when vehicle was not in Park or Neutral.	2. Inform customer of power liftgate system operating restrictions.
	3. Ignition switch status problem.	3. Use a diagnostic scan tool to observe the electronic message inputs received by the PLGM over the CAN data bus. Verify the ignition switch status reads correctly. Repair if required.
	4. Transmission Range Sensor (TRS) problem.	4. Use a diagnostic scan tool to observe the electronic message inputs received by the PLGM over the CAN data bus. Verify PRNDL status reads correctly. If not okay, repair or replace the TRS if required.
	5. Overhead console power liftgate switch problem.	5. Use a diagnostic scan tool to observe the overhead console liftgate switch inputs to the PLGM. Verify the inputs are correct under different voltage and driving conditions. If not okay, repair or replace the switch if required.
	6. FOB with Integrated Key (FOBIK) or Keyless Ignition Node (KIN) (also known as Wireless Control Module/WCM) problem.	6. Verify proper operation of the FOBIK and the Remote Keyless Entry (RKE) system. Repair or replace if required.
	7. Exterior liftgate latch handle switch problem.	7. Use a diagnostic scan tool to observe the exterior liftgate latch handle switch inputs to the PLGM. Verify the inputs are correct under different voltage and driving conditions. If not okay, repair or replace the switch if required.
\$8B CLOSE INHIBIT -	1. Operator attempted power close cycle when vehicle was not in Park or Neutral.	1. Inform customer of power liftgate system operating restrictions.
	2. Ignition switch status problem.	2. Use a diagnostic scan tool to observe the electronic message inputs received by the PLGM over the CAN data bus. Verify the ignition switch status reads correctly. Repair if required.
	3. TRS problem.	3. Use a diagnostic scan tool to observe the electronic message inputs received by the PLGM over the CAN data bus. Verify

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NOT IN PARK OR NEUTRAL		PRNDL status reads correctly. If not okay, repair or replace the TRS if required.
	4. Overhead console power liftgate switch problem.	4. Use a diagnostic scan tool to observe the overhead console liftgate switch inputs to the PLGM. Verify the inputs are correct under different voltage and driving conditions. If not okay, repair or replace the switch if required.
	5. FOBIK or KIN problem.	5. Verify proper operation of the FOBIK and the RKE system. Repair or replace if required.
\$8C OPEN INHIBIT - NON-ZERO VEHICLE SPEED	1. Operator attempted power open cycle when vehicle is in Neutral and rolling.	1. Inform customer of power liftgate system operating restrictions.
	2. Ignition switch status problem.	2. Use a diagnostic scan tool to observe the electronic message inputs received by the PLGM over the CAN data bus. Verify the ignition switch status reads correctly. Repair if required.
	3. Vehicle Speed Sensor (VSS) problem.	3. Use a diagnostic scan tool to observe the electronic message inputs received by the PLGM over the CAN data bus. Verify the vehicle speed status reads correctly. If not okay, repair or replace the VSS if required.
	4. Overhead console power liftgate switch problem.	4. Use a diagnostic scan tool to observe the overhead console liftgate switch inputs to the PLGM. Verify the inputs are correct under different voltage and driving conditions. If not okay, repair or replace the switch if required.
	5. FOBIK or KIN problem.	5. Verify proper operation of the FOBIK and the RKE system. Repair or replace if required.
	6. Exterior liftgate latch handle switch problem.	6. Use a diagnostic scan tool to observe the exterior liftgate latch handle switch inputs to the PLGM. Verify the inputs are correct under different voltage and driving conditions. If not okay, repair or replace the switch if required.
	1. Operator attempted power close cycle when vehicle is in Neutral and rolling.	1. Inform customer of power liftgate system operating restrictions.
	2. Ignition switch status problem.	2. Use a diagnostic scan tool to observe the electronic message inputs received by the PLGM over the CAN data bus. Verify the ignition switch status reads correctly. Repair

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\$8D CLOSE INHIBIT - NON-ZERO VEHICLE SPEED		if required.
	3. VSS problem.	3. Use a diagnostic scan tool to observe the electronic message inputs received by the PLGM over the CAN data bus. Verify the vehicle speed status reads correctly. If not okay, repair or replace the VSS if required.
	4. Overhead console power liftgate switch problem.	4. Use a diagnostic scan tool to observe the overhead console liftgate switch inputs to the PLGM. Verify the inputs are correct under different voltage and driving conditions. If not okay, repair or replace the switch if required.
	5. FOBIK or KIN problem.	5. Verify proper operation of the FOBIK and the RKE system. Repair or replace if required.
\$8E OPEN INHIBIT - IGNITION IN START POSITION	1. Operator attempted power open cycle with the ignition switch in the Start position.	1. Inform customer of power liftgate system operating restrictions.
	2. Ignition switch status problem.	2. Use a diagnostic scan tool to observe the electronic message inputs received by the PLGM over the CAN data bus. Verify the ignition switch status reads correctly. Repair if required.
	3. Overhead console power liftgate switch problem.	3. Use a diagnostic scan tool to observe the overhead console liftgate switch inputs to the PLGM. Verify the inputs are correct under different voltage and driving conditions. If not okay, repair or replace the switch if required.
	4. FOBIK or KIN problem.	4. Verify proper operation of the FOBIK and the RKE system. Repair or replace if required.
\$8F CLOSE INHIBIT - IGNITION IN START POSITION	1. Operator attempted power close cycle with the ignition switch in the Start position.	1. Inform customer of power liftgate system operating restrictions.
	2. Ignition switch status problem.	2. Use a diagnostic scan tool to observe the electronic message inputs received by the PLGM over the CAN data bus. Verify the ignition switch status reads correctly. Repair if required.
	3. Overhead console power liftgate switch problem.	3. Use a diagnostic scan tool to observe the overhead console liftgate switch inputs to the PLGM. Verify the inputs are correct under different voltage and driving conditions. If not okay, repair or replace the switch if required.

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	4. FOBIK or KIN problem.	4. Verify proper operation of the FOBIK and the RKE system. Repair or replace if required.
\$90 OPEN INHIBIT - IN-PLANT MODE	1. Power open cycle will not function because the PLGM is in the in-plant mode.	1. Use a diagnostic scan tool to perform the PLGM learn cycle. Refer to MODULE, POWER LIFTGATE CONTROL, STANDARD PROCEDURE . If learn cycle does not correct the problem, replace the PLGM if required.
\$91 CLOSE INHIBIT - IN-PLANT MODE	1. Power close cycle will not function because the PLGM is in the in-plant mode.	1. Use a diagnostic scan tool to perform the PLGM learn cycle. Refer to MODULE, POWER LIFTGATE CONTROL, STANDARD PROCEDURE . If learn cycle does not correct the problem, replace the PLGM if required.
\$92 OPEN INHIBIT - GEAR/SPEED MISMATCH	1. Power open cycle will not function because of a conflict between the TRS and VSS inputs.	1. Use a diagnostic scan tool to observe the electronic message inputs to the PLGM over the CAN data bus. Verify the vehicle speed and the PRNDL status read correctly. If not okay, repair or replace the TRS or VSS if required. NOTE: This inhibitor could also have been operator induced by placing the transmission in Park when the vehicle is still rolling and immediately attempting a power open cycle command.
	2. Ignition switch status problem.	2. Use a diagnostic scan tool to observe the electronic message inputs received by the PLGM over the CAN data bus. Verify the ignition switch status reads correctly. Repair if required.
\$93 CLOSE INHIBIT - GEAR/SPEED MISMATCH	1. Power close cycle will not function because of a conflict between the TRS and VSS inputs.	1. Use a diagnostic scan tool to observe the electronic message inputs to the PLGM over the CAN data bus. Verify the vehicle speed and the PRNDL status read correctly. If not okay, repair or replace the TRS or VSS if required. NOTE: This inhibitor could also have been operator induced by placing the transmission in Park when the vehicle is still rolling and immediately attempting a power close cycle command.
	2. Ignition switch status problem.	2. Use a diagnostic scan tool to observe the electronic message inputs received by the PLGM over the CAN data bus. Verify the ignition switch status reads correctly. Repair if required.
	1. Operator induced by	

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\$94 OPEN INHIBIT - NOT FULLY OPEN OR FULLY CLOSED	placing the liftgate latch in the primary or secondary latch position while the liftgate was open.	1. Inform customer of proper power liftgate and latch operation.
	2. Conflict between power liftgate latch switches and PDU full open switch inputs to the PLGM.	2. Use a diagnostic scan tool to observe the liftgate latch full open, primary, secondary, sector and pawl switch readings with the liftgate in the fully open position. Verify that the full open, primary, secondary and pawl switch readings are all Closed and the sector switch reading is Open . Then, with the liftgate in the fully closed position, verify that the full open, primary, secondary and pawl switch readings are all Open and the sector switch reading is Closed . Repair if required.
	3. PDU full open switch problem.	3. Use a diagnostic scan tool to verify proper operation of the full open switch during a power liftgate cycle. Repeat during a manual liftgate cycle. In each case the switch reading should be Closed with the liftgate a few degrees below fully opened and Open in all other positions. Repair if required.
\$95 LATCH RELEASE INHIBIT - LOCK ENGAGED	1. Vehicle was locked when the operator attempted to release the power liftgate latch using the exterior latch handle.	1. Inform customer of proper power liftgate and latch operation.
	2. Invalid lock status received by the PLGM.	2. Use a diagnostic scan tool to observe the electronic message inputs to the PLGM over the CAN data bus. Cycle the power door locks using the FOB/K, the interior lock switches and the automatic (or rolling) lock feature. Verify that the lock status reads correctly. Repair if required.
\$96 LATCH CINCH ABORTED - LEFT PINCH SENSOR ACTIVE	1. Left pinch sensor was activated when power liftgate latch was cinching.	1. Check for obstructions causing pinch sensor activation. Check the pinch sensor for areas that may be coming into contact with other parts of the vehicle. Ensure the pinch sensor is properly secured to the liftgate. Repair if required. If no obstructions found, inform customer of pinch sensor operation.
	2. Short to ground on left pinch sensor signal circuit.	2. Check the signal circuit between the pinch sensor and the PLGM including the in-line connectors. Repair if required.
	3. Ineffective left pinch sensor.	3. Test the resistance of the left pinch sensor in an unpinched state. If the resistance is less

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		than 9 kilohms, replace the left pinch sensor.
	4. Ineffective PLGM.	4. Use a diagnostic scan tool to observe the voltage of the left pinch sensor input. With the sensor disconnected the reading should be approximately 5 volts. Short the pinch sensor circuit to ground and the reading should be approximately 0 volts. If the readings are not okay, replace the PLGM.
\$97 LATCH CINCH ABORTED - RIGHT PINCH SENSOR ACTIVE	1. Right pinch sensor was activated when power liftgate latch was cinching.	1. Check for obstructions causing pinch sensor activation. Check the pinch sensor for areas that may be coming into contact with other parts of the vehicle. Ensure the pinch sensor is properly secured to the liftgate. Repair if required. If no obstructions found, inform customer of pinch sensor operation.
	2. Short to ground on right pinch sensor signal circuit.	2. Check the signal circuit between the pinch sensor and the PLGM including the in-line connectors. Repair if required.
	3. Ineffective right pinch sensor.	3. Test the resistance of the right pinch sensor in an unpinched state. If the resistance is less than 9 kilohms, replace the right pinch sensor.
	4. Ineffective PLGM.	4. Use a diagnostic scan tool to observe the voltage of the right pinch sensor input. With the sensor disconnected the reading should be approximately 5 volts. Short the pinch sensor circuit to ground and the reading should be approximately 0 volts. If the readings are not okay, replace the PLGM.
\$98 OPEN CANCELLED - HANDLE ACTIVE	1. Operator induced by grabbing the exterior handle while a power open cycle was taking place.	1. Inform customer of power liftgate system operating restrictions.
	2. Exterior liftgate latch handle switch problem.	2. Use a diagnostic scan tool to observe the exterior liftgate latch handle switch inputs to the PLGM. Verify the liftgate latch handle switch (located in the exterior latch handle assembly) reading is approximately 2.4 volts with handle activated and greater than 4.6 volts when released. Using a digital multimeter, measure the resistance of the liftgate latch handle switch. The multimeter should read approximately 4.7 kilohms activated, and open with the handle released. If not okay, repair or replace the switch if required.

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\$99 OPEN CANCELLED - RKE ACTIVE	1. A power open cycle was cancelled during the first two seconds (while chiming) by an RKE signal.	1. Inform customer of power liftgate system operating restrictions. FOBIK buttons may get inadvertently pressed when in a pocket or purse. Rapid pressing of the buttons may also be the cause.
	2. FOBIK or KIN problem.	2. Verify proper operation of the FOBIK and the RKE system. Repair or replace if required.
\$9A OPEN CANCELLED - OVERHEAD/IP ACTIVE	1. A power open cycle was cancelled during the first two seconds (while chiming) by an overhead console power liftgate switch signal.	1. Inform customer of power liftgate system operating restrictions. The overhead console power liftgate switch may have been double pressed.
	2. Overhead console power liftgate switch problem.	2. Use a diagnostic scan tool to observe the overhead console liftgate switch inputs to the PLGM. Verify the inputs are correct under different voltage and driving conditions. If not okay, repair or replace the switch if required.
\$9B CLOSE CANCELLED - HANDLE ACTIVE	1. Operator induced by grabbing the exterior handle while a power close cycle was taking place.	1. Inform customer of power liftgate system operating restrictions.
	2. Exterior liftgate latch handle switch problem.	2. Use a diagnostic scan tool to observe the exterior liftgate latch handle switch inputs to the PLGM. Verify the liftgate latch handle switch (located in the exterior latch handle assembly) reading is approximately 2.4 volts with handle activated and greater than 4.6 volts when released. Using a digital multimeter, measure the resistance of the liftgate latch handle switch. The multimeter should read approximately 4.7 kilohms activated, and open with the handle released. If not okay, repair or replace the switch if required.
\$9C CLOSE CANCELLED - RKE ACTIVE	1. A power close cycle was cancelled during the first two seconds (while chiming) by an RKE signal.	1. Inform customer of power liftgate system operating restrictions. FOBIK buttons may get inadvertently pressed when in a pocket or purse. Rapid pressing of the buttons may also be the cause.
	2. FOBIK or KIN problem.	2. Verify proper operation of the FOBIK and the RKE system. Repair or replace if required.
	1. A power close cycle was cancelled during the first two	1. Inform customer of power liftgate system

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\$9D CLOSE CANCELLED - OVERHEAD/IP ACTIVE	seconds (while chiming) by an overhead console power liftgate switch signal.	operating restrictions. The overhead console power liftgate switch may have been double pressed.
	2. Overhead console power liftgate switch problem.	2. Use a diagnostic scan tool to observe the overhead console liftgate switch inputs to the PLGM. Verify the inputs are correct under different voltage and driving conditions. If not okay, repair or replace the switch if required.
\$9E CLOSE CANCELLED - LEFT PINCH SENSOR DETECTED	1. A power close cycle was cancelled during the first two seconds (while chiming) by a left pinch sensor signal.	1. Check for obstructions causing pinch sensor activation. Check the pinch sensor for areas that may be coming into contact with other parts of the vehicle. Ensure the pinch sensor is properly secured to the liftgate. Repair if required. If no obstructions found, inform customer of pinch sensor operation.
	2. Short to ground on left pinch sensor signal circuit.	2. Check the signal circuit between the pinch sensor and the PLGM including the in-line connectors. Repair if required.
	3. Ineffective left pinch sensor.	3. Test the resistance of the left pinch sensor in an unpinched state. If the resistance is less than 9 kilohms, replace the left pinch sensor.
	4. Ineffective PLGM.	4. Use a diagnostic scan tool to observe the voltage of the left pinch sensor input. With the sensor disconnected the reading should be approximately 5 volts. Short the pinch sensor circuit to ground and the reading should be approximately 0 volts. If the readings are not okay, replace the PLGM.
\$9F CLOSE CANCELLED - RIGHT PINCH SENSOR DETECTED	1. A power close cycle was cancelled during the first two seconds (while chiming) by a right pinch sensor signal.	1. Check for obstructions causing pinch sensor activation. Check the pinch sensor for areas that may be coming into contact with other parts of the vehicle. Ensure the pinch sensor is properly secured to the liftgate. Repair if required. If no obstructions found, inform customer of pinch sensor operation.
	2. Short to ground on right pinch sensor signal circuit.	2. Check the signal circuit between the pinch sensor and the PLGM including the in-line connectors. Repair if required.
	3. Ineffective right pinch sensor.	3. Test the resistance of the right pinch sensor in an unpinched state. If the resistance is less than 9 kilohms, replace the right pinch sensor.
		4. Use a diagnostic scan tool to observe the voltage of the right pinch sensor input. With the sensor disconnected the reading should be

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	4. Ineffective PLGM.	approximately 5 volts. Short the pinch sensor circuit to ground and the reading should be approximately 0 volts. If the readings are not okay, replace the PLGM.
\$A0 OPEN REVERSAL - GEAR OR SPEED STATE CHANGE	1. Operator shifted vehicle out of Park or Neutral while a power open cycle was in progress.	1. Inform customer of power liftgate system operating restrictions.
	2. VSS problem.	2. Use a diagnostic scan tool to observe the electronic message inputs received by the PLGM over the CAN data bus. Verify the vehicle speed status reads correctly. If not okay, repair or replace the VSS if required.
	3. TRS problem.	3. Use a diagnostic scan tool to observe the electronic message inputs received by the PLGM over the CAN data bus. Verify PRNDL status reads correctly. If not okay, repair or replace the TRS if required.
\$A1 OPEN REVERSAL - USER INPUT	1. Operator activated either a FOB/K button or the overhead console power liftgate switch while a power open or power close cycle was in progress	1. Inform customer of power liftgate system operating restrictions. The overhead console power liftgate switch may have been double pressed or the FOB/K buttons may get inadvertently pressed when in a pocket or purse. Rapid pressing of the buttons may also be the cause.
	2. Overhead console power liftgate switch problem.	2. Use a diagnostic scan tool to observe the overhead console liftgate switch inputs to the PLGM. Verify the inputs are correct under different voltage and driving conditions. If not okay, repair or replace the switch if required.
	3. FOB/K or KIN problem.	3. Verify proper operation of the FOB/K and the RKE system. Repair or replace if required.
\$A2 CLOSE REVERSAL - USER INPUT	1. Operator activated either a FOB/K button or the overhead console power liftgate switch while a power open or power close cycle was in progress.	1. Inform customer of power liftgate system operating restrictions. The overhead console power liftgate switch may have been double pressed or the FOB/K buttons may get inadvertently pressed when in a pocket or purse. Rapid pressing of the buttons may also be the cause.
	2. Overhead console power liftgate switch problem.	2. Use a diagnostic scan tool to observe the overhead console liftgate switch inputs to the PLGM. Verify the inputs are correct under different voltage and driving conditions. If not okay, repair or replace the switch if

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		required.
	3. FOBIK or KIN problem.	3. Verify proper operation of the FOBIK and the RKE system. Repair or replace if required.
SA3 CLOSE REVERSAL - LEFT PINCH SENSOR DETECTED	1. A power close cycle reversed direction due to a left pinch sensor signal.	1. Check for obstructions causing pinch sensor activation. Check the pinch sensor for areas that may be coming into contact with other parts of the vehicle. Ensure the pinch sensor is properly secured to the liftgate. Repair if required. If no obstructions found, inform customer of pinch sensor operation.
	2. Short to ground on left pinch sensor signal circuit.	2. Check the signal circuit between the pinch sensor and the PLGM including the in-line connectors. Repair if required.
	3. Ineffective left pinch sensor.	3. Test the resistance of the left pinch sensor in an unpinched state. If the resistance is less than 9 kilohms, replace the left pinch sensor.
	4. Ineffective PLGM.	4. Use a diagnostic scan tool to observe the voltage of the left pinch sensor input. With the sensor disconnected the reading should be approximately 5 volts. Short the pinch sensor circuit to ground and the reading should be approximately 0 volts. If the readings are not okay, replace the PLGM.
SA4 CLOSE REVERSAL - RIGHT PINCH SENSOR DETECTED	1. A power close cycle reversed direction due to a right pinch sensor signal.	1. Check for obstructions causing pinch sensor activation. Check the pinch sensor for areas that may be coming into contact with other parts of the vehicle. Ensure the pinch sensor is properly secured to the liftgate. Repair if required. If no obstructions found, inform customer of pinch sensor operation.
	2. Short to ground on right pinch sensor signal circuit.	2. Check the signal circuit between the pinch sensor and the PLGM including the in-line connectors. Repair if required.
	3. Ineffective right pinch sensor.	3. Test the resistance of the right pinch sensor in an unpinched state. If the resistance is less than 9 kilohms, replace the right pinch sensor.
	4. Ineffective PLGM.	4. Use a diagnostic scan tool to observe the voltage of the right pinch sensor input. With the sensor disconnected the reading should be approximately 5 volts. Short the pinch sensor circuit to ground and the reading should be approximately 0 volts. If the readings are not okay, replace the PLGM.
	1. A power close cycle	

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\$A5 CLOSE REVERSAL - HANDLE ACTIVE	reversed direction due to the operator grabbing the exterior handle while the cycle was taking place.	1. Inform customer of power liftgate system operating restrictions.
	2. Exterior liftgate latch handle switch problem.	2. Use a diagnostic scan tool to observe the exterior liftgate latch handle switch inputs to the PLGM. Verify the liftgate latch handle switch (located in the exterior latch handle assembly) reading is approximately 2.4 volts with handle activated and greater than 4.6 volts when released. Using a digital multimeter, measure the resistance of the liftgate latch handle switch. The multimeter should read approximately 4.7 kilohms activated, and open with the handle released. If not okay, repair or replace the switch if required.
\$A6 OPEN ABORTED - HANDLE ACTIVE	1. A power open cycle was aborted due to the operator grabbing the exterior handle while the cycle was taking place.	1. Inform customer of power liftgate system operating restrictions.
	2. Exterior liftgate latch handle switch problem.	2. Use a diagnostic scan tool to observe the exterior liftgate latch handle switch inputs to the PLGM. Verify the liftgate latch handle switch (located in the exterior latch handle assembly) reading is approximately 2.4 volts with handle activated and greater than 4.6 volts when released. Using a digital multimeter, measure the resistance of the liftgate latch handle switch. The multimeter should read approximately 4.7 kilohms activated, and open with the handle released. If not okay, repair or replace the switch if required.
\$A7 OPEN OBSTACLE	1. A power open cycle reversed direction due to an obstacle detected while the cycle was taking place.	1. Normal operation. Inform customer of power liftgate system operating restrictions.
	2. Binding or sticking of components.	2. Use a diagnostic scan tool to determine the Gate Position indicated in the Inhibit Monitor record. Move the liftgate manually to that location and note the components involved in the obstruction or binding. Repair or replace the components if required.
		3. Use a diagnostic scan tool to perform the

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	3. The PLGM is not properly calibrated.	PLGM learn cycle. Refer to MODULE, POWER LIFTGATE CONTROL, STANDARD PROCEDURE . If learn cycle does not correct the problem, replace the PLGM if required.
\$A8 CLOSE OBSTACLE	1. A power close cycle reversed direction due to an obstacle detected while the cycle was taking place.	1. Normal operation. Inform customer of power liftgate system operating restrictions.
	2. Binding or sticking of components.	2. Use a diagnostic scan tool to determine the Gate Position indicated in the Inhibit Monitor record. Move the liftgate manually to that location and note the components involved in the obstruction or binding. Repair or replace the components if required.
	3. The PLGM is not properly calibrated.	3. Use a diagnostic scan tool to perform the PLGM learn cycle. Refer to MODULE, POWER LIFTGATE CONTROL, STANDARD PROCEDURE . If learn cycle does not correct the problem, replace the PLGM if required.
\$A8 LATCH IS NOT NEAR SECONDARY STATE	1. Operator induced by placing the liftgate latch in the primary or secondary latch position while the liftgate was open.	1. Inform customer of proper power liftgate and latch operation.
	2. Wiring problem.	Use a diagnostic scan tool to observe and verify that the position sensor 1 and 2 in the PDU toggle between Open and Closed . If readings are inaccurate, diagnose the wiring for possible opens or shorts to ground or voltage. Refer to the appropriate wiring information. Repair if required.
	3. PDU position sensor problem.	3. Manually open the liftgate to the fully open position. Bring the liftgate down to just before the latch contacts the striker. Using a diagnostic scan tool observe the Gate Position counts. If the count is greater than 20, replace the ineffective PDU.
	4. PLGM problem.	Use a diagnostic scan tool to observe the position sensor 1 and 2 status. Disconnect the PDU electrical connector. Apply opens and grounds to the position sensor signal circuits. Verify that the PLGM reads the correct Open and Closed status. If not okay, replace the PLGM if required.

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\$AB OPEN INHIBIT - VTA ARMED	1. The overhead console power liftgate switch would not initiate a power open cycle because the Vehicle Theft Alarm (VTA) was armed.	1. Normal operation. Inform customer of power liftgate system operating restrictions.
	2. Invalid VTA status.	2. Use a diagnostic scan tool to observe and verify that electronic messages from the instrument cluster (also known as the Cab Compartment Node/CCN) over the CAN data bus indicate proper operation of the VTA system. If not okay, repair or replace components if required.
\$AC OPEN INHIBIT - INVALID INPUT	1. The power liftgate D-pillar switch would not initiate a power open cycle because a power open is not allowed from that input.	1. Normal operation. Inform customer of power liftgate system operating restrictions.
\$AD OPEN INHIBIT - FLIPPER GLASS AJAR	1. Operator attempted a power open cycle while the liftgate flip-up glass was ajar.	1. Normal operation. Inform customer of power liftgate system operating restrictions.
	2. Liftgate flip-up glass ajar switch problem.	2. Use a diagnostic scan tool to observe and verify that electronic messages from the Body Control Module (BCM) over the CAN data bus indicate the proper status of the liftgate flip-up glass. If not okay, repair or replace flip-up glass ajar switch if required.
\$AE CLOSE INHIBIT - FLIPPER GLASS AJAR	1. Operator attempted a power close cycle while the liftgate flip-up glass was ajar.	1. Normal operation. Inform customer of power liftgate system operating restrictions.
	2. Liftgate flip-up glass ajar switch problem.	2. Use a diagnostic scan tool to observe and verify that electronic messages from the Body Control Module (BCM) over the CAN data bus indicate the proper status of the liftgate flip-up glass. If not okay, repair or replace flip-up glass ajar switch if required.

STANDARD PROCEDURE

STANDARD PROCEDURE - LIFTGATE OPERATION

The liftgate must open and close freely and smoothly in order for the power liftgate system to function properly. The power liftgate system is designed to compensate for some minor changes in opening and closing effort caused by moderate changes in temperature or vehicle attitude. However, if there are extreme deficiencies in the alignment of the liftgate to the liftgate opening causing mechanical interference, or if there is extreme binding in a liftgate hinge or liftgate prop rod, appropriate adjustments or mechanical repairs may be required.

Manually operate the liftgate of another vehicle of the same model that is known to be in good condition for a comparison of liftgate opening and closing effort. Liftgate adjustment procedures and specifications are the same for vehicles with or without the optional power liftgate system. Refer to **LIFTGATE, ADJUSTMENTS**.

SPECIFICATIONS

SPECIFICATIONS

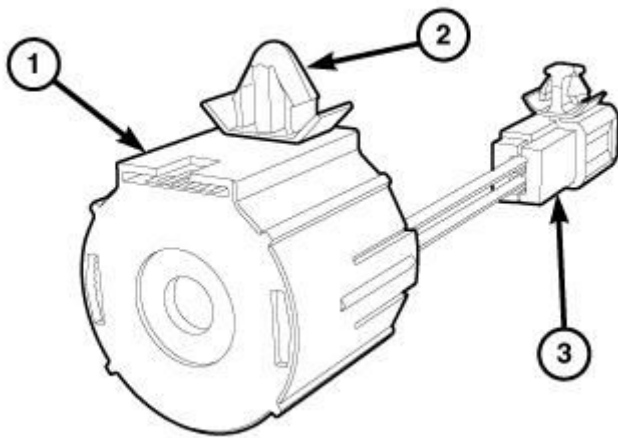
TORQUE SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Power Drive Unit (PDU) Ball Studs	30	22	-
Power Liftgate Latch Mounting Screws	12	-	106

CHIME

DESCRIPTION

DESCRIPTION



2778201

Fig. 1: Power Liftgate, Chime, Retainer & Connector
Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with an optional power operated liftgate have a power liftgate chime (1). The chime is concealed behind the left quarter inner trim panel. The chime is contained within small cylindrically-shaped molded plastic housing that is secured to the left inner D-pillar sheet metal by an integral molded plastic retainer (2).

The chime has a pigtail wire and connector (3) that connects it to the vehicle electrical system through a

dedicated take out and connector of the body wire harness.

The chime cannot be adjusted or repaired and, if damaged or ineffective, the entire chime unit must be replaced.

OPERATION

OPERATION

The power liftgate chime can produce either single or repetitive, audible chime tones as an alert heard at the rear of the vehicle at the start of any power liftgate opening or closing cycle. The chime is completely controlled by and receives both a path to ground and current through hard wired circuits from the Power LiftGate Module (PLGM) (also known as the Power LiftGate/PLG control module). The PLGM outputs a Pulse Width Modulated (PWM) signal to drive the chime. When activated in the repetitive mode the chime is pulsed ON and OFF in 0.5 second intervals.

If the power liftgate chime is enabled through the Electronic Vehicle Information Center (EVIC) customer programmable features, there are four chime tones generated at the beginning of a power **Close** cycle. There are also four chime tones generated in response to a power **Open** cycle from all operator inputs except the exterior liftgate handle switch, which is associated with three chime tones only. Any reversal during a power cycle operation will result in two chime tones being generated.

The power liftgate chime as well as the hard wired circuits to the chime unit may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information.

REMOVAL

REMOVAL

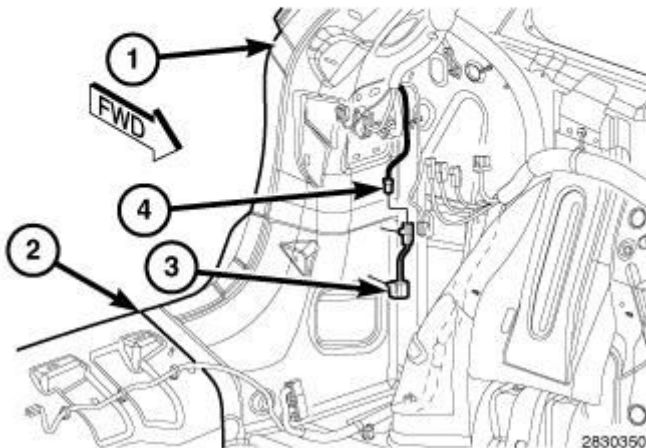
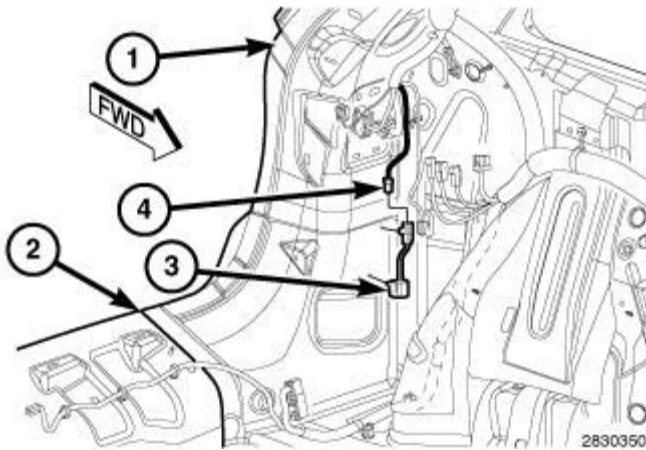


Fig. 2: Sill, D-Pillar, Power Liftgate, Chime & Harness Connector

Courtesy of CHRYSLER GROUP, LLC

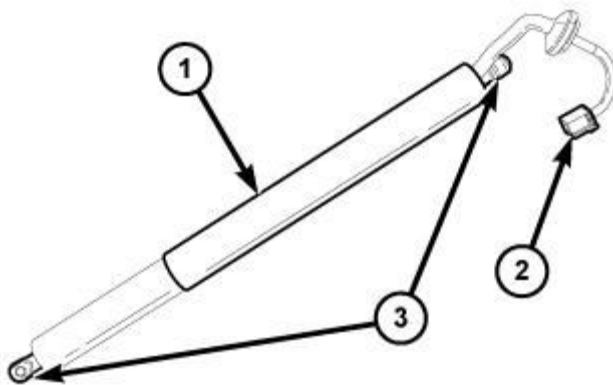
1. Disconnect and isolate the battery negative cable.
2. Remove the scuff plate from the liftgate opening sill (2). Refer to **PLATE, SCUFF, DOOR SILL, REMOVAL**.
3. Move the quarter trim panel away from the lower left inner D-pillar (1) far enough to access the power liftgate chime (3). Refer to **PANEL, QUARTER TRIM, REMOVAL**.
4. Disconnect the body wire harness connector (4) from the chime pigtail wire connector.
5. Disengage the retainer integral to the chime pigtail wire connector from the body sheet metal.
6. Disengage the retainer integral to the chime housing from the body sheet metal.
7. Remove the chime from the vehicle.

INSTALLATION**INSTALLATION****Fig. 3: Sill, D-Pillar, Power Liftgate, Chime & Harness Connector****Courtesy of CHRYSLER GROUP, LLC**

1. Position the power liftgate chime (3) to the left inner D-pillar (1) in the vehicle.
2. Engage the retainer integral to the chime housing into the hole in the inner D-pillar.
3. Reconnect the chime pigtail wire connector to the body wire harness connector (4) for the chime.
4. Engage the retainer integral to the chime pigtail wire connector with the hole in the inner D-pillar.
5. Reinstall the quarter trim panel to the lower left inner D-pillar. Refer to **PANEL, QUARTER TRIM, INSTALLATION**.
6. Reinstall the scuff plate onto the liftgate opening sill (2). Refer to **PLATE, SCUFF, DOOR SILL,**

INSTALLATION .

7. Reconnect the battery negative cable.

DRIVE UNIT, POWER**DESCRIPTION****DESCRIPTION**

2774920

Fig. 4: Socket-Type Pivot End & Connector
Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with an optional power liftgate system, are equipped with a single Power Drive Unit (PDU) mounted in place of the standard equipment gas-charged lift strut on the left side of the liftgate. The PDU is equipped with a socket-type pivot end (3) with spring clip retainer at both the top and bottom and is mounted using the same ball studs at the top of the left liftgate opening side trough and near the belt line of the left liftgate shut face as are used for securing a conventional gas-charged lift strut.

The PDU appears similar in construction to a conventional gas-charged lift strut, but has both upper and lower cylinders or tubes that are noticeably larger in diameter than the cylinder and rod found on most conventional gas-charged lift struts. This larger diameter accommodates a small, but powerful reversible electric motor, a small planetary gear set transmission, a full-open switch, a screw-type drive unit and two Hall effect sensors. There are also two coil-type springs within the PDU; one long spring with large diameter coils, and one short spring with smaller diameter coils.

The PDU has a pigtail wire harness and connector (2) that exits the top of the larger upper cylinder. The pigtail harness is equipped with a large rubber grommet where the harness passes through the sheet metal of the left liftgate opening side trough. The PDU wiring is connected to the vehicle electrical system through a dedicated

takeout and connector of the body wire harness near the top of the inner D-pillar.

The PDU cannot be adjusted or repaired and, if damaged or inoperative, it must be replaced with a new unit.

OPERATION

OPERATION

The motor, transmission and screw-drive portions of the power liftgate Power Drive Unit (PDU) provide the power and torque required to open or close the liftgate under most conditions. The Hall effect sensors provide the Power LiftGate Module (PLGM) (also known as the Power LiftGate/PLG control module) with both a speed signal and a direction signal. These Hall effect inputs allow the PLGM to monitor and respond appropriately to any irregularities in liftgate travel and or operation. The full-open switch is used to let the PLGM know when the liftgate is approaching the full open position.

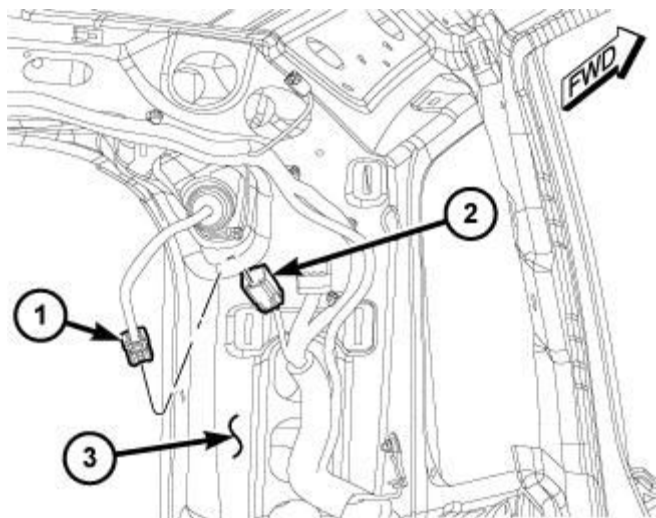
The long, large diameter coil spring within the PDU is strong enough to assist in opening and, in combination with the gas-charged lift cylinder on the right side of the liftgate, will support the liftgate in any open position. The short, small-diameter spring provides an initial lift-off that moves the liftgate latch away from the latch striker after the power liftgate latch is initially released.

The hard wired input and output circuits of the PDU may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the electronic controls that provide many features of the power liftgate system. The most reliable, efficient and accurate means to diagnose the PDU or the electronic controls related to operation of the power liftgate system requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

REMOVAL

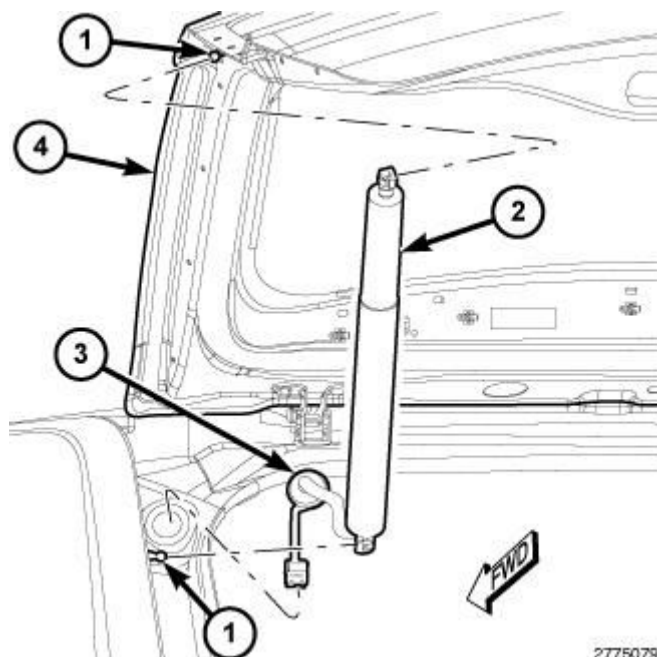
WARNING: To avoid serious or fatal injury, during service lift the ball socket end retaining clip only far enough to release the socket from the ball stud. Excessive prying or removal of the clip may result in improper clip spring tension. Improper clip tension may result in the support cylinder separating from the ball stud causing sudden, unexpected loss of liftgate support.



2775112

Fig. 5: Pigtail Wire Connector & Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Open and support the liftgate with a suitable prop.
3. Remove the trim from the inside of the rear quarter trim panel (3). Refer to **PANEL, QUARTER TRIM, REMOVAL**.
4. Disconnect the power liftgate Power Drive Unit (PDU) pigtail wire connector (1) from the body wire harness connector (2) on the inside of the trim panel.

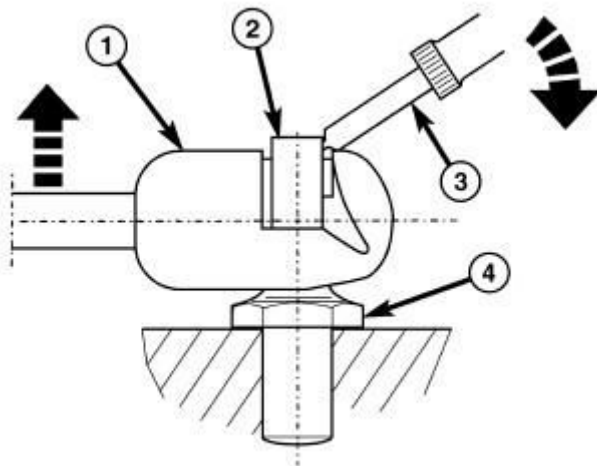


2775079

Fig. 6: Grommet & PDU

Courtesy of CHRYSLER GROUP, LLC

5. Unseat the grommet (3) of the PDU (2) pigtail wire from the clearance hole in the upper left liftgate opening trough and pull the connector through the clearance hole.



80170308

Fig. 7: Removing PDU Ball Socket From Ball Stud

Courtesy of CHRYSLER GROUP, LLC

6. Insert a small flat-bladed tool (3) into the notch on the outer face of the ball socket end (1) on the lower end of the PDU and carefully pry the retaining clip (2) outward while pulling the ball socket away from the ball stud (4) on the liftgate.
7. Release the retaining clip to its installed position.
8. Repeat Step 6 and Step 7 for the ball socket on the upper end of the PDU at the left liftgate opening trough.
9. Remove the PDU from the vehicle as a unit.

INSTALLATION

INSTALLATION

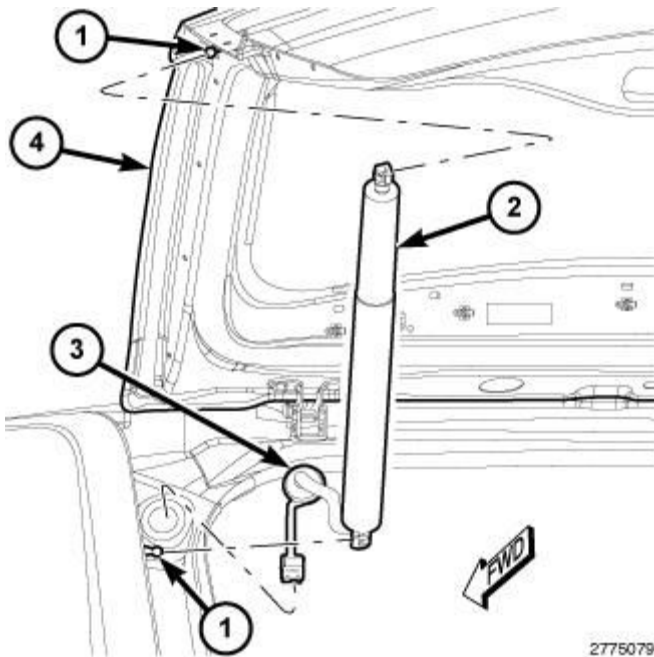
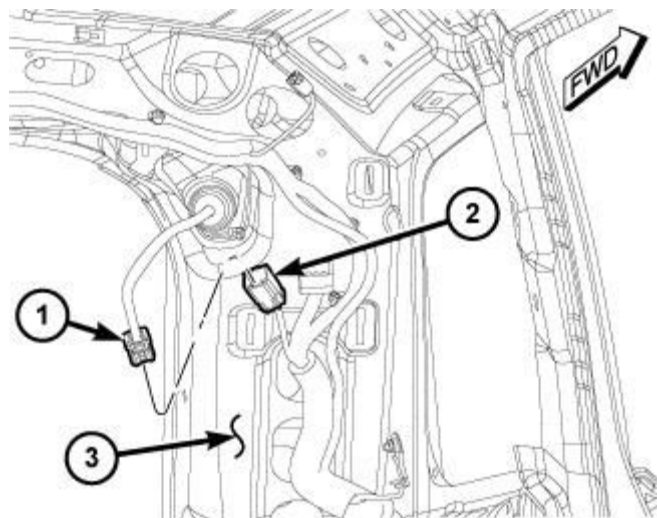


Fig. 8: Grommet & PDU

Courtesy of CHRYSLER GROUP, LLC

1. Check to be certain that the ball studs (1) on the liftgate trough and the liftgate are both in good condition and properly tightened. Tighten the ball studs to 30 N.m (22 ft. lbs.).
2. Position the ball socket on the upper end of the power liftgate Power Drive Unit (PDU) (2) to the ball stud on the left liftgate opening trough.
3. Using hand pressure, press the ball socket onto the ball stud until the retainer clip snaps into place.
4. Repeat Step 2 and Step 3 for the ball socket on the lower end of the PDU at the ball stud on the liftgate (4).
5. Inspect to be certain that the retaining clip on each of the PDU ball socket ends is fully seated.
6. Insert the PDU pigtail wire and connector through the clearance hole in the upper left liftgate opening trough and seat the grommet (3).



2775112

Fig. 9: Pigtail Wire Connector & Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

7. Reconnect the PDU pigtail wire connector (1) to the body wire harness connector (2) on the inside of the trim panel.
8. Install the trim onto the inside of the left quarter trim pillar/panel (3). Refer to **PANEL, QUARTER TRIM, INSTALLATION**.
9. Remove the service support prop from the liftgate.
10. Reconnect the battery negative cable.
11. Perform the Power Liftgate Learn/Relearn Cycle standard procedure. Refer to **STANDARD PROCEDURE**.

LATCH, LIFTGATE

DESCRIPTION

DESCRIPTION

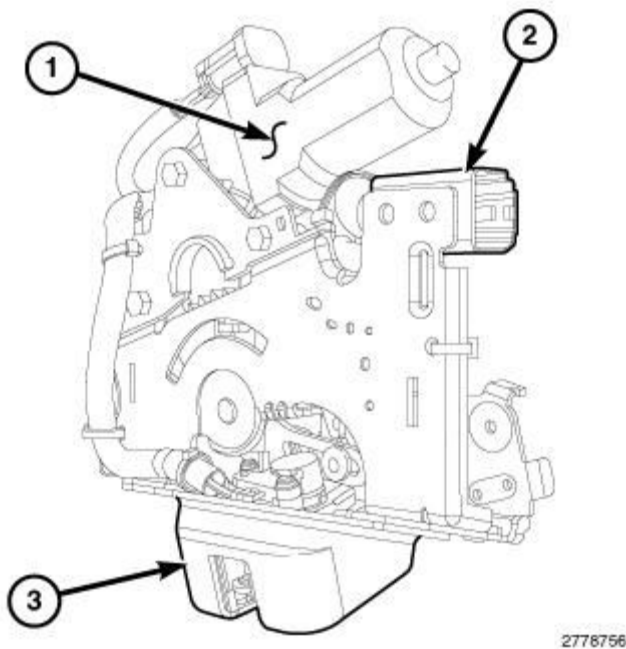


Fig. 10: Latch Assembly, Actuator Motor & Connector
Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with an optional power liftgate are equipped with a unique latch assembly (3) that performs the same function as a manual liftgate latch, but includes a Direct Current (DC) electric cinch and release actuator motor (1). This latch also includes three integral switches: a sector switch, a secondary ratchet switch and a primary ratchet switch. The primary ratchet switch also provides the liftgate ajar signal from the power liftgate latch.

Only the lower latch housing is visible on the lower center of the liftgate shut face, where the latch is secured with three screws. The remainder of the latch mechanism extends upward into the interior of the liftgate shell, where it is concealed between the liftgate outer panel and the lower liftgate trim panel. An integral pigtail wire harness and connector (2) connects the latch to the vehicle electrical system through a dedicated take out and connector of the liftgate wire harness.

The power liftgate latch cannot be repaired. If the latch mechanism, the actuator motor or any one of the three latch switches is damaged or ineffective, the entire power liftgate latch unit must be replaced.

OPERATION

OPERATION

The power cinching liftgate latch actuator motor (cinch/release motor) provides the torque required to close the liftgate from the secondary to the primary closed and latched position. The actuator also releases the liftgate from the primary closed and latched position to the fully unlatched and movable position. The actuator motor includes a small drive gear that meshes with the internal gear mechanism of the latch assembly to drive the latch and perform the power cinch and release functions.

The latch actuator is controlled by the Power LiftGate Module (PLGM) (also known as the Power LiftGate/PLG

control module), which controls the cinch and release functions and limits actuator current draw to protect the assembly. The PLGM also monitors the latch and latch pawl positions through hard wired inputs from the sector, primary ratchet and secondary ratchet switches integral to the latch. If the power liftgate pinch sensors are damaged or ineffective, the PLGM will disable the cinching function of the latch.

Following every cinch or release sequence, the power liftgate latch will return to a **home** or neutral position. If for any reason the latch is unable to return to the **home** position, the PLGM will sense this through the integral latch switch inputs and prevent the latch from releasing. If this condition exists, activation of the power liftgate using the front or rear switches, the exterior handle, Passive Entry or the Remote Keyless Entry (RKE) FOB with Integrated Key (FOBIK) will result in a short, audible beep tone being issued from the power liftgate chime. This indicates that the Power Liftgate Latch Homing standard procedure must be performed. Refer to **LATCH, LIFTGATE, STANDARD PROCEDURE**.

The hard wired input and output circuits of the power liftgate latch may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the electronic controls that provide some features of the power liftgate system. The most reliable, efficient and accurate means to diagnose the power liftgate latch or the electronic controls related to operation of the power liftgate system requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

STANDARD PROCEDURE

POWER LIFTGATE LATCH HOMING

Following every power liftgate cinch or release sequence, the latch returns to a **home** or neutral position. If for any reason the latch is unable to return to the **home** position, the Power LiftGate Module (PLGM) (also known as the Power LiftGate/PLG control module) will sense this through hard wired inputs from the sector, primary ratchet and secondary ratchet switches integral to the latch and prevent the latch from releasing. If this condition exists, activation of the power liftgate using the front or rear switches, or the Remote Keyless Entry (RKE) FOB with Integrated Key (FOBIK) will result in a short, audible beep tone being issued from the power liftgate chime. This indicates that it is necessary to perform a latch homing routine. Latch homing in many cases can be initiated by pulling on the exterior liftgate handle. If unsuccessful, then a diagnostic scan tool must be used to run a routine that allows the latch to be returned to the **home** position as follows:

1. Connect a diagnostic scan tool to the Data Link Connector (DLC).
2. Follow the programming steps outlined in the diagnostic scan tool for **Latch Home Position Test** under the **PLGM/Power LiftGate Module** menu item.
3. If the **Latch Home Position Test** is unsuccessful, disconnect the battery for 60 seconds. Reconnect the battery, then lift the outside liftgate handle and hold it for at least 20 seconds to actuate the handle switch.
4. If the liftgate latch still does not release, use the diagnostic scan tool to select **Actuators** and **Latch Motor Release Direction**. This will drive the latch motor for longer than actuating the outside handle switch.
5. If driving the latch motor using the **Latch Motor Release Direction** works to release the latch, perform the **Latch Home Position Test** again before returning the vehicle to the owner. If driving the latch motor using the **Latch Motor Release Direction** does not work to release the latch, use the Power Liftgate Latch Manual Override standard procedure to open the liftgate and continue the diagnosis as required.

Refer to **LATCH, LIFTGATE, STANDARD PROCEDURE.**

POWER LIFTGATE LATCH MANUAL OVERRIDE

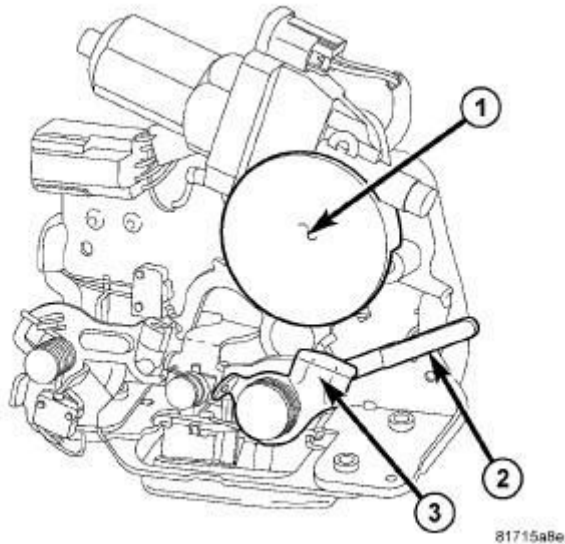


Fig. 11: View Of Power Liftgate Latch Assembly
Courtesy of CHRYSLER GROUP, LLC

NOTE: If the power liftgate latch (1) latch release function becomes inoperative, it may be released manually by operating the manual latch release lever (3). If the power liftgate latch cinch release function becomes inoperative, it may be overridden by pushing downward on the manual cinch override lever (2).

1. Remove the access cover from the center of the lower liftgate trim panel.
2. Reach around to the rearward face of the latch assembly to access and manually actuate the appropriate release lever for the current latch condition.

REMOVAL

REMOVAL

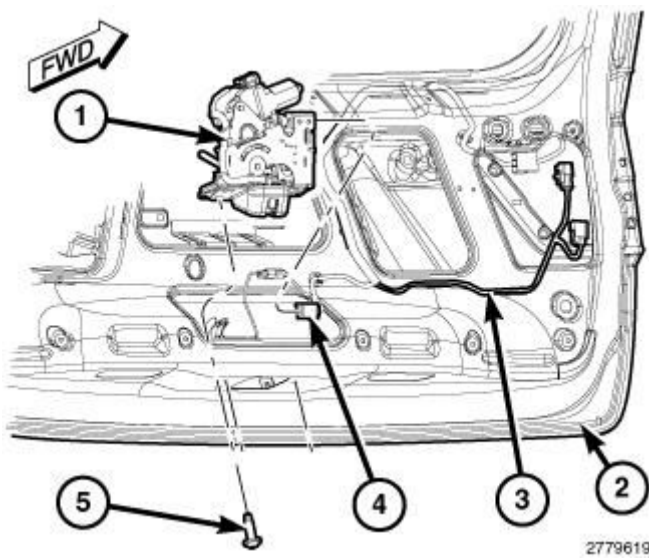


Fig. 12: Liftgate, Screws & Liftgate Latch, Connector, Wire Harness
Courtesy of CHRYSLER GROUP, LLC

1. Open the liftgate.
2. Disconnect and isolate the battery negative cable.
3. Remove the lower trim panel from the inside of the liftgate (2). Refer to **PANEL, TRIM, REMOVAL**.
4. Remove the three screws (5) that secure the power liftgate latch (1) to the lower shut face of the liftgate.
5. Disconnect the connector (4) of the liftgate wire harness (3) from the pigtail wire connector of the latch.
6. Remove the latch from the inside of the liftgate.

INSTALLATION

INSTALLATION

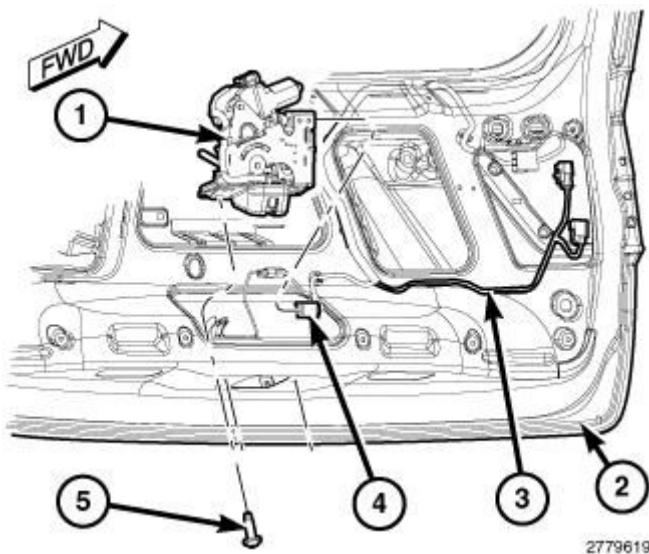


Fig. 13: Liftgate, Screws & Liftgate Latch, Connector, Wire Harness

Courtesy of CHRYSLER GROUP, LLC

1. Position the power liftgate latch (1) into the inside of the liftgate (2).
2. Reconnect the connector (4) of the liftgate wire harness (3) to the pigtail wire connector of the latch.
3. Loosely install the screw (5) into the right rear mounting hole that secures the latch to the lower shut face of the liftgate.
4. Install and tighten the two screws into the front mounting holes that secure the latch to the liftgate. Tighten the screws to 12 N.m (106 in. lbs.).
5. Tighten the left rear latch mounting screw to 12 N.m (106 in. lbs.).
6. Reinstall the lower trim panel onto the inside of the liftgate. Refer to **PANEL, TRIM, INSTALLATION**.
7. Reconnect the battery negative cable.
8. Perform the Power Liftgate Learn/Relearn Cycle standard procedure. Refer to **STANDARD PROCEDURE**.

SENSOR, PINCH

DESCRIPTION

DESCRIPTION

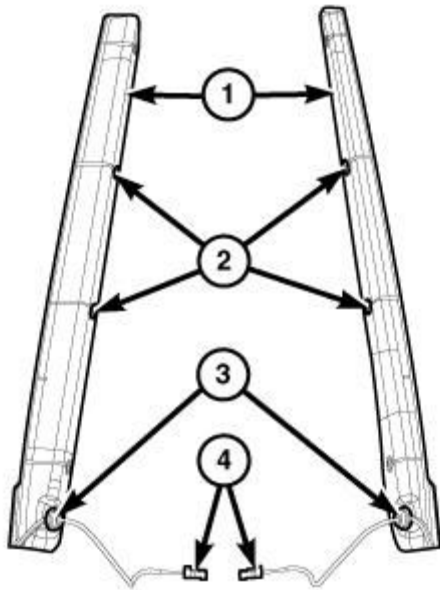


Fig. 14: Two Pinch Sensors, Five Plastic Clips, Wire And Connector & Grommet
 Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with an optional power operated liftgate system use two pinch sensors (1) (also known as anti-pinch sensors). One sensor is located on each side jamb of the liftgate, extending from the belt line to just below the liftgate header. Externally, these pinch sensors appear very similar to a synthetic rubber weather strip.

that is secured by five plastic clips (2) to the side jamb of the liftgate. However, internally each pinch sensor has two electrically conductive membranes (also known as tape switches), a diagnostic resistor and a plastic carrier. The right side pinch sensor also contains a thermistor.

Each pinch sensor has a short pigtail wire and connector (4) that exits through a grommet (3) on the lower end of the inboard side of each unit and passes through a dedicated hole in the side jamb of the liftgate near the belt line into the interior of the liftgate. Concealed within the liftgate each sensor is connected to the vehicle electrical system through a dedicated take out and connector of the liftgate wire harness.

A pinch sensor cannot be adjusted or repaired. If damaged or ineffective, the entire sensor unit must be replaced.

OPERATION

OPERATION

The two pinch sensors (also known as anti-pinch sensors) are tactile sensors that are able to react to the slightest pressure. They are used to provide additional protection against vehicle damage or personal injury caused by obstructions between the liftgate and the liftgate opening of the vehicle. The interior of each sensor contains two electrically conductive polymer material membranes that will close a circuit when the sensor is contacted.

During a **close** cycle of the power liftgate, if either of the two pinch sensors come in contact with an obstacle, the pinch sensor circuit is closed. The closed sensor circuit provides a sense input to the Power LiftGate Module (PLGM) (also known as the Power LiftGate/PLG control module) indicating there is an obstruction in the path of the closing liftgate. The PLGM will then stop the liftgate **close** cycle immediately and return the liftgate to the full open position.

The thermistor integral to the right pinch sensor provides a temperature sense input that allows the PLGM to monitor and compensate for extreme temperature conditions and provide proper power liftgate operation. This temperature sense input is only provided when the pinch sensor is an open circuit because, when the sensor is a closed circuit, the thermistor is shorted. As the outside temperature increases, the resistance reading decreases. As temperature decreases, the resistance reading increases.

The pinch sensors are wired in series with the PLGM, so if either pinch sensor becomes a closed or shorted circuit the module will act as though both sensors are closed circuits. Each sensor also contains a diagnostic resistor, which allows the PLGM to diagnose a problem in the pinch sensor circuits and store a Diagnostic Trouble Code (DTC) for any problem it detects.

The hard wired input and output circuits of the power liftgate pinch sensors may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the electronic controls and communication that provide some features of the power liftgate system. The most reliable, efficient and accurate means to diagnose the power liftgate pinch sensors or the electronic controls and communication related to operation of the power liftgate system requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - PINCH SENSOR**SENSOR**

WARNING: To avoid serious or fatal injury during testing of pinch sensor operation, use extreme caution to keep away from the closing liftgate.

To verify power liftgate system pinch sensor operation:

1. Remove the liftgate trim panel to access and disconnect the inoperable pinch sensor's electrical connector. Using an ohmmeter, check for continuity on the two wires leading from the pinch sensor. While depressing either pinch sensor, continuity should be less than 400 ohms. While NOT depressing the left pinch sensor, continuity should be 10, 000 ohms $\pm$ 500 ohms. While NOT depressing the right pinch sensor, continuity will vary with ambient temperature (see table below), but should always be greater than 4000 ohms. If the measured pinch sensor meets the stated continuity, then it is OK at this time. If the measured continuity is outside of the stated ranges, replace the pinch sensor.
2. Remove the lower trim from the inside of the liftgate to access and disconnect the pinch sensor pigtail wire connectors from the liftgate wire harness. Using an ohmmeter, check the resistance between the two pins of each pinch sensor pigtail wire connector. When the sensor is depressed (contacts are closed), the resistance should be 300 ohms maximum. When the pinch sensor is released (contacts are open) the resistance should be 10, 000 ohms minimum. If not OK, replace the ineffective pinch sensor.

THERMISTOR

The thermistor portion of the right pinch sensor provides a temperature sense input to the Power LiftGate Module (PLGM) (also known as the Power LiftGate/PLG control module). The temperature input is only provided when the pinch sensor is in a non-pinched (contacts are open) condition. When the pinch sensor contacts are closed (sensor is pinched) this input is unavailable because the thermistor is shorted. Remove the lower trim from the inside of the liftgate to access and disconnect the right pinch sensor pigtail wire connector from the liftgate wire harness. Refer to the **Right Pinch Sensor Thermistor Resistance** table and check between the two terminals of the sensor connector for the proper thermistor resistance at the listed temperatures. If the sensor fails this test, replace the right pinch sensor unit.

RIGHT PINCH SENSOR THERMISTOR RESISTANCE TABLE

RIGHT PINCH SENSOR THERMISTOR RESISTANCE	
TEMPERATURE	RESISTANCE
0°C (32°F)	29330 - 35990 Ohms
25°C (77°F)	9120 - 10880 Ohms
40°C (104°F)	4900 - 5750 Ohms

REMOVAL**REMOVAL**

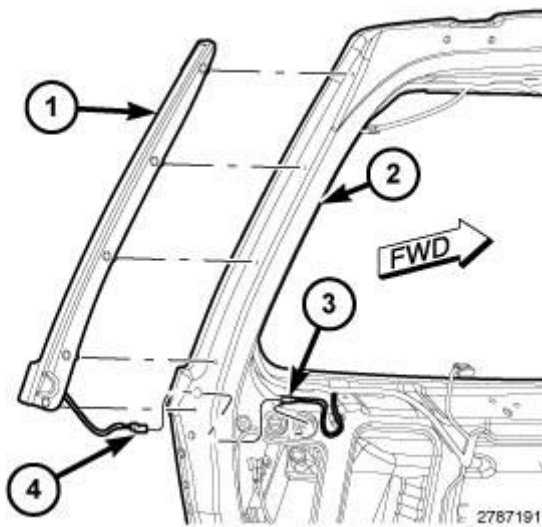


Fig. 15: Liftgate, Pigtail Wire Connector, Harness Connector & Pinch Sensor
 Courtesy of CHRYSLER GROUP, LLC

1. Open the liftgate (2).
2. Disconnect and isolate the battery negative cable.
3. Remove the lower trim from the liftgate inner panel. Refer to **PANEL, TRIM, REMOVAL**.
4. Reach through the access hole in the liftgate inner panel to access and disconnect the pinch sensor pigtail wire connector (4) from the liftgate wire harness connector (3).
5. Disengage the five plastic retainers of the pinch sensor (1) from the liftgate shut face.
6. Disengage the pigtail wire grommet on the lower end of the pinch sensor from the clearance hole in the liftgate shut face.
7. While guiding the pigtail wire out through the clearance hole, remove the pinch sensor from the liftgate.

INSTALLATION

INSTALLATION

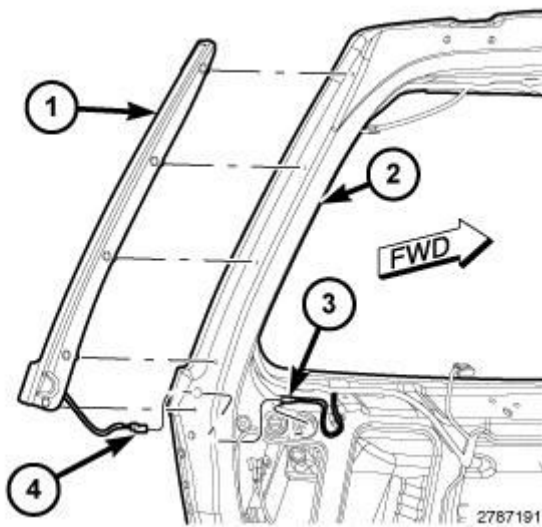


Fig. 16: Liftgate, Pigtail Wire Connector, Harness Connector & Pinch Sensor
 Courtesy of CHRYSLER GROUP, LLC

1. While guiding the pinch sensor pigtail wire and connector (4) through the clearance hole in the liftgate (2) shut face, position the sensor to the liftgate.
2. Engage the pigtail wire grommet on the lower end of the pinch sensor into the clearance hole in the liftgate shut face.
3. Engage the five plastic retainers of the pinch sensor (1) to the holes in the liftgate shut face.
4. Reach through the access hole in the liftgate inner panel to access and reconnect the pinch sensor pigtail wire connector to the liftgate wire harness connector (3).
5. Reinstall the lower trim onto the liftgate inner panel. Refer to **PANEL, TRIM, INSTALLATION**.
6. Reconnect the battery negative cable.

SWITCH, D-PILLAR

DESCRIPTION

DESCRIPTION

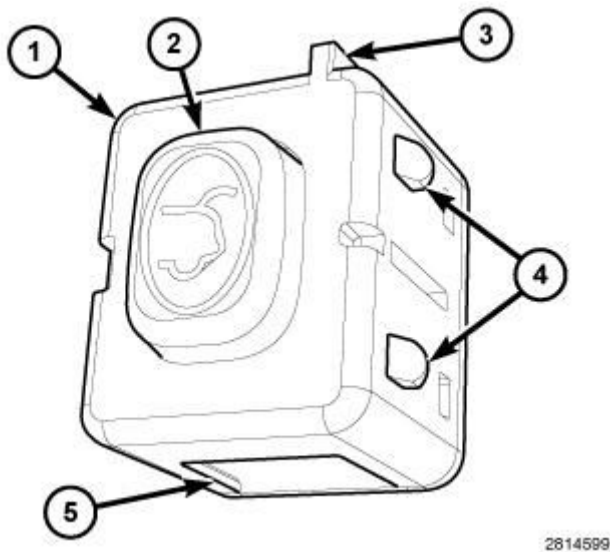


Fig. 17: Power Liftgate Switch, Push Button, Snap Features & Connector Receptacle
Courtesy of CHRYSLER GROUP, LLC

The rear power liftgate switch (1) (also known as the D-pillar switch) is located on the left quarter trim panel, in a mounting hole bezel located between the left rear inner wheel housing and the D-pillar. This switch has a single momentary push button (2) and is used to provide a **Close** request to the Power LiftGate Module (PLGM).

The switch is constructed of molded plastic and the push button has a smooth, concave face with an International Control and Display Symbol icon for **Liftgate Release** or **Liftgate Open** applied to it. The switch housing is secured within the receptacle on the back of the switch mounting bezel by two snap features (4) integral to each side of the switch housing. The top of the switch housing has an integral spline (3) that ensures proper switch orientation when it engages a keyway integral to the switch bezel receptacle.

The bottom of the switch housing has an integral connector receptacle (5) containing terminal pins that connect the switch to the vehicle electrical system through a dedicated take out and connector of the body wire harness.

The rear power liftgate switch cannot be repaired and, if ineffective or damaged, it must be replaced.

OPERATION

OPERATION

The rear power liftgate switch (also known as the D-pillar switch) is a momentary, push button actuated, resistor multiplexed switch. The switch receives source voltage from the Power LiftGate Module (PLGM) through an internal pull up on a power liftgate logic return circuit. The switch then provides a multiplexed output to the PLGM on a liftgate switch rear signal circuit. The output to the PLGM indicates whether the switch push button is depressed or released.

When the switch push button is depressed, it provides a **Close** request to the PLGM. If the push button is depressed a second time, while the PLGM is in the process of closing the liftgate, the PLGM will automatically

reverse the liftgate to the full open position. This switch will NOT open the liftgate if it is already closed.

The rear power liftgate switch as well as the hard wired inputs and outputs of the switch may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the power liftgate system or the electronic controls and communication between other modules and devices that provide some features of the power liftgate system. The most reliable, efficient, and accurate means to diagnose the power liftgate system or the electronic controls and communication related to rear power liftgate switch operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

REMOVAL

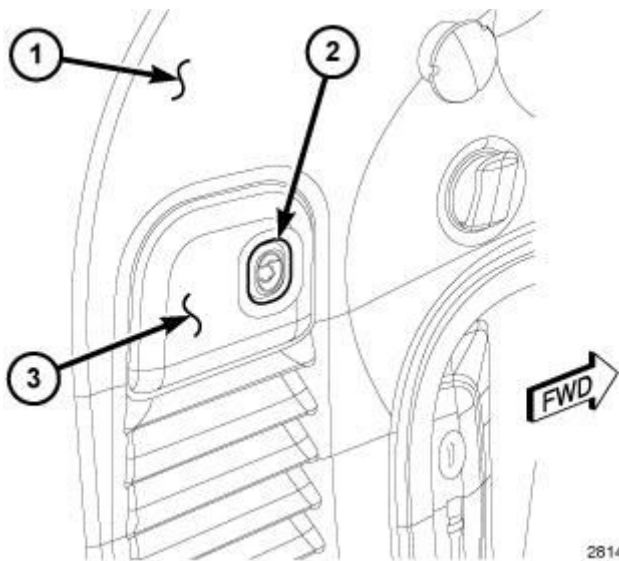


Fig. 18: Power Liftgate Switch, Bezel & Quarter Trim Panel
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Using a trim stick or another suitable wide flat-bladed tool, carefully pry the edges of the rear power liftgate switch (2) bezel (3) away from the left quarter trim panel (1) far enough to disengage the two integral latch features of the bezel from the quarter trim panel bezel opening.
3. Pull the switch and bezel unit away from the quarter trim panel far enough to access and disconnect the body wire harness connector from the connector receptacle on the bottom of the switch.

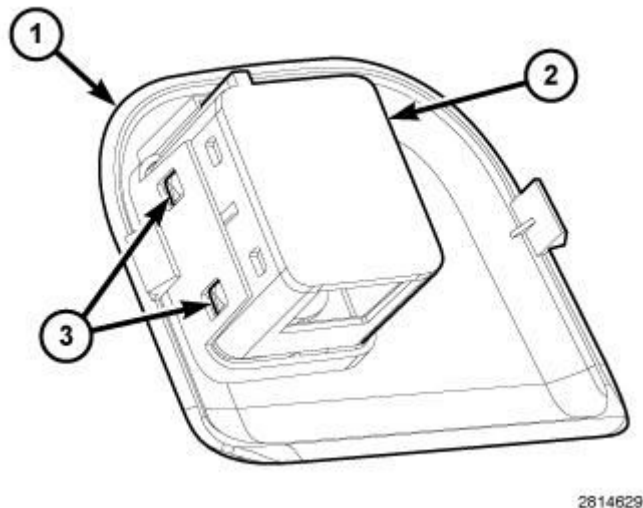


Fig. 19: Bezel, Switch & Two Snap Features
Courtesy of CHRYSLER GROUP, LLC

4. Using a trim stick or another suitable wide flat-bladed tool, carefully pry the sides of the switch receptacle on the back of the bezel (1) away from the switch (2) far enough to release the two snap features (3) on each side of the switch housing.
5. Remove the rear power liftgate switch from the receptacle on the back of the switch bezel.

INSTALLATION

INSTALLATION

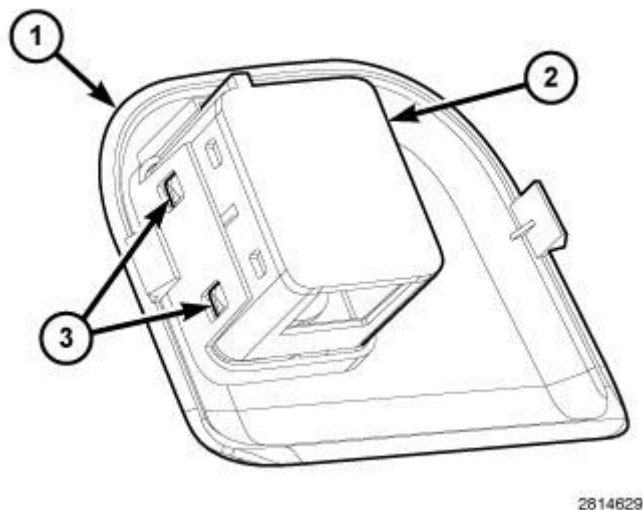


Fig. 20: Bezel, Switch & Two Snap Features
Courtesy of CHRYSLER GROUP, LLC

1. Position the rear power liftgate switch (2) to the receptacle on the back of the switch bezel (1) being

certain to align the spline on the top of the switch housing with the keyway at the top of the receptacle.

2. Using hand pressure, press the switch firmly and evenly into the receptacle until the two snap features (3) on each side of the switch housing snap into place and the switch is fully engaged in the receptacle.

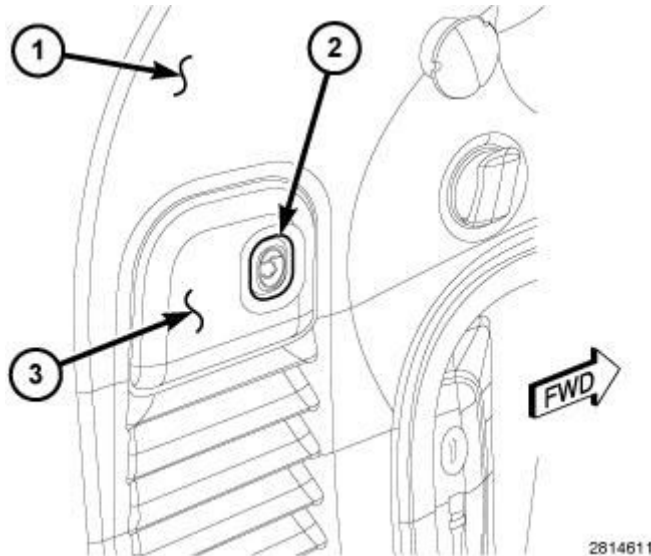


Fig. 21: Power Liftgate Switch, Bezel & Quarter Trim Panel
 Courtesy of CHRYSLER GROUP, LLC

3. Position the switch (2) and switch bezel (3) unit close enough to the bezel opening in the left quarter trim panel (1) to access and connect the body wire harness connector to the connector receptacle on the bottom of the switch housing.
4. Align the switch bezel to the quarter trim panel bezel opening and, using hand pressure, press the bezel firmly and evenly into the opening until the two latch features integral to the back of the bezel are fully engaged.
5. Reconnect the battery negative cable.

SWITCH, EXTERIOR HANDLE

DESCRIPTION

DESCRIPTION

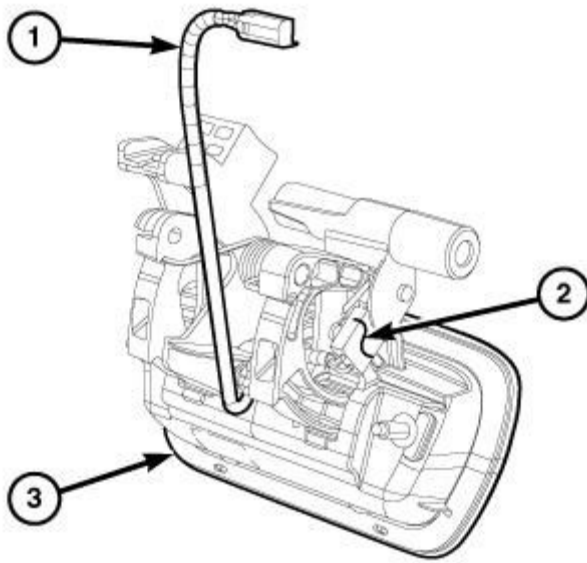


Fig. 22: Power Liftgate Exterior Handle Switch, Latch Handle Assembly & Wire
Courtesy of CHRYSLER GROUP, LLC

The power liftgate exterior handle switch (2) is integral to a unique liftgate exterior latch handle assembly (3). Externally the latch handle and the handle bezel or housing appear identical to the latch handle used without a power liftgate option. However, within the liftgate the power liftgate handle includes the dedicated exterior handle switch and it has no mechanical cables or linkage connecting it to the liftgate latch. The exterior handle switch is mechanically actuated by the exterior latch handle, and is used to provide an **Open** request to the Power LiftGate Module (PLGM).

The exterior handle switch is a micro switch. The switch housing is constructed of molded plastic and includes a short pigtail wire (1) and connector. The switch housing is secured to one of the pivot stanchions on the back of the handle bezel or housing. The switch pigtail wire and connector connect the switch to the vehicle electrical system through a dedicated take out and connector of the liftgate wire harness.

The power liftgate exterior handle switch cannot be repaired or adjusted. If the switch is ineffective or damaged, the entire liftgate exterior latch handle unit must be replaced.

OPERATION

OPERATION

The power liftgate exterior handle switch is a momentary, plunger actuated, resistor multiplexed micro switch. The switch receives source voltage from the Power LiftGate Module (PLGM) through an internal pull up on a power liftgate logic return circuit. The switch then provides a multiplexed output to the PLGM on a liftgate switch MUX input 2 circuit. The output to the PLGM indicates whether the switch plunger is depressed or extended. When the switch plunger is extended, it provides an **Open** request to the PLGM.

An exterior handle switch input to the PLGM will begin a power **Open** cycle of the liftgate if the liftgate is fully

closed when it occurs, will cancel a power **Open** cycle and put the power liftgate in manual operating mode if the liftgate is already in a power **Open** cycle when it occurs, will reverse the liftgate to open if it occurs during a power **Close** cycle, or may be used to home the latch as described in the Power Liftgate Latch Homing standard procedure. Refer to **LATCH, LIFTGATE, STANDARD PROCEDURE**.

The power liftgate exterior handle switch as well as the hard wired inputs and outputs of the switch may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the power liftgate system or the electronic controls and communication between other modules and devices that provide some features of the power liftgate system. The most reliable, efficient, and accurate means to diagnose the power liftgate system or the electronic controls and communication related to power liftgate exterior handle switch operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

REMOVAL

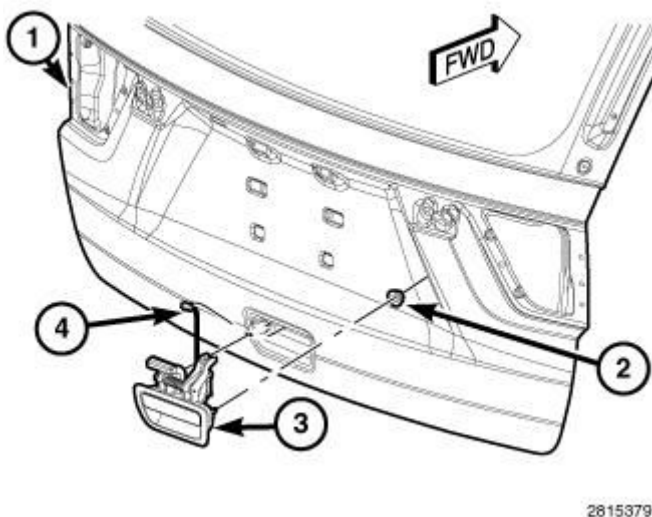


Fig. 23: Liftgate, Exterior Handle, Two Nuts & Wire Connector
Courtesy of CHRYSLER GROUP, LLC

1. Open the liftgate.
2. Disconnect and isolate the battery negative cable.
3. Remove the power liftgate latch from the liftgate (1) inner panel. Refer to **LATCH, LIFTGATE, REMOVAL**.
4. Disconnect the power liftgate exterior handle (3) switch pigtail wire connector (4) from the liftgate wire harness connector.
5. Remove the two nuts (2) that secure the two studs on the back of the handle housing to the inside of the liftgate outer panel.
6. From the outside of the liftgate, remove the power liftgate exterior handle and switch through the liftgate outer panel latch handle pocket as a unit.

INSTALLATION

INSTALLATION

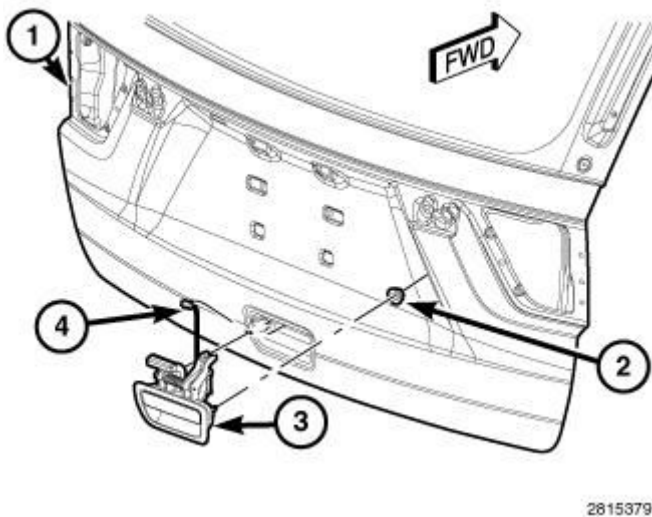


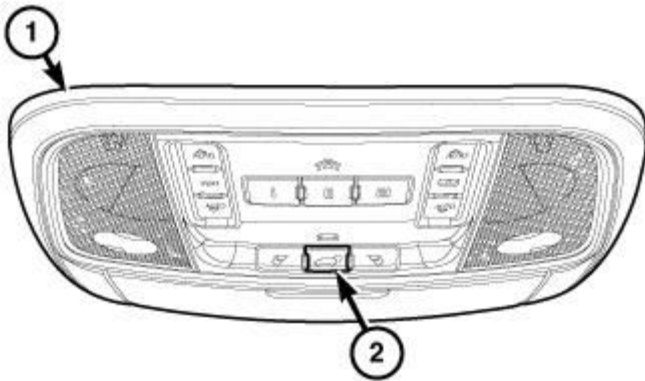
Fig. 24: Liftgate, Exterior Handle, Two Nuts & Wire Connector
Courtesy of CHRYSLER GROUP, LLC

1. Position the power liftgate exterior handle (3) and switch into the liftgate outer panel (1) latch handle pocket as a unit. Be certain not to pinch the exterior handle switch pigtail wire (4) between the handle housing and the liftgate outer panel.
2. Install and tighten the two nuts (2) that secure the two studs on the back of the handle housing to the inside of the liftgate outer panel. Tighten the nuts securely.
3. Reconnect the power liftgate exterior handle switch pigtail wire connector to the liftgate wire harness connector.
4. Reinstall the power liftgate latch onto the liftgate. Refer to **LATCH, LIFTGATE, INSTALLATION**.
5. Reconnect the battery negative cable.

SWITCH, OVERHEAD CONSOLE

DESCRIPTION

DESCRIPTION



2815126

Fig. 25: Front Power Liftgate Switch
Courtesy of CHRYSLER GROUP, LLC

The front power liftgate switch (2) (also known as the overhead console switch) is located in the forward switch pod of the overhead console (1), between the two reading lamp switches. This switch has a single momentary push button and is used to provide a toggling **Open** or **Close** request to the Power LiftGate Module (PLGM).

The switch is constructed of molded plastic and the push button has a smooth face with an International Control and Display Symbol icon for **Liftgate Release** or **Liftgate Open** applied to it. The switch button has instrument panel dimmer controlled Light Emitting Diode (LED) back lighting for night visibility.

The front power liftgate switch is integral to the overhead console switch pod assembly on the printed circuit board for the overhead console. The switch cannot be repaired or adjusted and, if ineffective or damaged, the entire overhead console unit must be replaced. Refer to **CONSOLE, OVERHEAD, FRONT, REMOVAL**.

OPERATION

OPERATION

The front power liftgate switch (also known as the overhead console switch) is a momentary, push button actuated, resistor multiplexed switch. The switch has a path to ground at all times through an eyelet terminal secured by a screw to the body sheet metal within the passenger compartment. The switch provides a multiplexed output to the PLGM on a liftgate switch front signal circuit. The PLGM reads the switch output through an internal pull up. The output to the PLGM indicates whether the switch push button is depressed or released.

When the switch push button is depressed, it provides an **Open** or a **Close** request to the PLGM. The PLGM interprets the request based upon the present status of the liftgate. If the monitored status of the liftgate is not closed, the front switch input is interpreted as a **Close** request. If the status of the liftgate is not opened, the front switch input is interpreted as an **Open** request. If the switch button is depressed a second time, while the PLGM is in the process of opening or closing the liftgate, the PLGM will automatically reverse the liftgate to the full open position.

The front power liftgate switch as well as the hard wired inputs and outputs of the switch may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the power liftgate system or the electronic controls and communication between other modules and devices that provide some features of the power liftgate system. The most reliable, efficient, and accurate means to diagnose the power liftgate system or the electronic controls and communication related to front power liftgate switch operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

2014 ACCESSORIES AND EQUIPMENT

Power Locks - Service Information - Cherokee

DESCRIPTION

DESCRIPTION

A power operated door lock system is available factory-installed equipment on this vehicle. The power lock system allows all of the doors to be locked or unlocked electrically. Locking or unlocking the vehicle using the power lock system can be accomplished by up to three different methods:

- **Power Lock System** - Operating a power lock system switch on either front door inside trim panel will lock or unlock the latches of all four doors. Operating the power liftgate switch on the front overhead console will unlatch and open the liftgate. Operating a fuel door release switch on the driver side front door trim panel will unlatch the fuel filler door in the right quarter outside panel.
- **Remote Keyless Entry System** - Depressing the **Lock** or **Unlock** button of the optional Remote Keyless Entry (RKE) system transmitter (also known as the FOB with Integrated Key/FOBIK) can also be used to lock or unlock the latches of the doors. Depressing the **Liftgate Release** button of the RKE transmitter two times will unlatch the liftgate. The specific locks operated and the number of FOBIK button presses required varies depending upon the Customer Programmable settings chosen by the vehicle operator.
- **Passive Entry System** - On vehicles with the optional Passive Entry Keyless Go (PEKG) system, contacting the capacitive **Unlock** switch on the inside of either exterior front door Smart handle pull or depressing the tactile **Lock** button of either front door Smart handle while a valid FOBIK is identified in that same zone can be used to lock or unlock the doors. Also depressing the tactile electronic liftgate handle while a valid FOBIK is identified in that same zone can be used to unlatch the deck lid. The specific locks operated varies depending upon the Customer Programmable settings chosen by the vehicle operator.

Additional details of each of these subsystems and their components can be found in the subheadings and paragraphs that follow.

PASSIVE ENTRY SYSTEM

A Passive Entry Keyless Go (PEKG) system is available factory-installed equipment for this vehicle. The PEKG system allows the vehicle to be unlocked without the use of a mechanical key, as long as an authorized FOB with Integrated Key (FOBIK) is in the possession of the individual or in close proximity to the aperture of the vehicle that is to be unlocked. All other features and Customer Programmable feature settings of the power lock system and the Remote Keyless Entry (RKE) system function the same as they would on vehicles without the PEKG system option.

The PE system includes the following major components, which are described in further detail elsewhere in this service information:

- **Electronic Liftgate Latch Release Switch** - A tactile liftgate release switch is located where you normally would find a mechanical latch mechanism.

- **Door Handle Switches** - Each PE door outside handle (also known as a Smart handle) is equipped with three switches and an Integrated Circuit (IC). A tactile **Lock** switch is located on the outer horizontal surface of each door handle pull, a capacitive **Unlock** switch membrane is located on the inner vertical surface of the handle pull, while a Hall effect switch and an IC are concealed within the handle pull unit.
- **Low Frequency Antennas** - The PE system includes four Low Frequency (LF) antennas, one mounted beneath the front of the center floor console, one on each rear door hardware module carrier concealed behind the inside trim panel, one in front of the left rear seat floor and one concealed behind the rear fascia at the rear of the vehicle.
- **Radio Frequency Hub Module** - The Radio Frequency Hub Module (RFHM) (also known as the RF Hub) is the Passive Entry Keyless Go (PEKG) system control module and RF receiver located in the rear cargo area headliner. Refer to **MODULE, RADIO FREQUENCY (RF HUB), DESCRIPTION** .

Hard wired circuitry connects many of the PE system components to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the PE system components through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

POWER LOCK SYSTEM

The power lock system includes the following major components, which are described in further detail elsewhere in this service information:

- **Body Control Module** - The Body Control Module (BCM) is located beneath the instrument panel on the driver side of the vehicle. Refer to **MODULE, BODY CONTROL, DESCRIPTION** .
- **Electronic Vehicle Information Center** - The Electronic Vehicle Information Center (EVIC) includes the EVIC switches and the U-Connect Touch™ screen module in the Integrated Center Stack (ICS) located in the center stack area of the instrument panel. Refer to **CENTER, ELECTRONIC VEHICLE INFORMATION, DESCRIPTION** .
- **Fuel Door Release Switch** - A switch in the map pocket on the driver side front door inside trim panel will unlatch the fuel filler door in the right outside quarter panel.
- **Power Lock Motors** - A reversible electric power lock motor is integral to the latch of each front and rear door and the liftgate.
- **Power Lock Switches** - A power lock switch is integral to the switch module located on the forward end of the arm rest of each front door inside trim panel.

These components and their controls are combined to provide the following power lock system central locking and unlocking features:

- **Automatic Door Locking** - Automatic door locking (also known as rolling door locks) automatically locks any unlocked door when the vehicle speed exceeds about 25.7 kilometers per hour (15 miles per hour). This is a Customer Programmable feature.

- **Automatic Door Unlocking** - Automatic door unlocking (also known as automatic unlock doors on exit) automatically unlocks the doors after they were automatically locked when the vehicle speed exceeded about 25.7 kilometers per hour (15 miles per hour), the vehicle speed has returned to zero, the transmission shift lever is in the **Neutral** or **Park** positions and the driver side front door is opened. This is a Customer Programmable feature.
- **Customer Programmable Features** - The vehicle operator interfaces with the BCM, which is the power lock system controller, using the EVIC. EVIC switches allow the vehicle operator to set or change the power lock system Customer Programmable Features through the EVIC display.
- **Door Lock Inhibit** - Prevents locking the doors using a power door lock switch or the **Lock** button of the Remote Keyless Entry (RKE) system transmitter (also known as the FOB with Integrated Key/FOBIK) if the key is in the ignition and the driver side front door is open.
- **Enhanced Accident Response System** - In the event of a vehicle impact that causes airbag deployment but leaves vehicle electrical power intact, the Enhanced Accident Response System (EARS) automatically turns OFF the supply of fuel to the engine, turns ON the interior courtesy lamps, turns ON the hazard warning flashers and unlocks the doors after the vehicle speed has returned to zero. This helps emergency responders in their efforts to render the appropriate assistance. The courtesy lamps and hazard flashers remain ON as long as the battery has power or until the key is removed from the ignition.
- **Illuminated Entry** - Automatic illumination of the interior courtesy lamps when the vehicle is unlocked using the power lock system.

Hard wired circuitry connects the power lock system components to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the power lock system components through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

REMOTE KEYLESS ENTRY SYSTEM

The Remote Keyless Entry (RKE) system is available factory-installed equipment on this vehicle. The RKE system includes the following major components, which are described in further detail elsewhere in this service information:

- **Electronic Vehicle Information Center** - The Electronic Vehicle Information Center (EVIC) is a digital display integral to the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC). The EVIC includes the EVIC switch pod in the right horizontal spoke of the steering wheel. Refer to **CENTER, ELECTRONIC VEHICLE INFORMATION, DESCRIPTION**.
- **Radio Frequency Hub Module** - The Radio Frequency Hub Module (RFHM) (also known as the RF Hub) is the RKE system control module and RF receiver located up in the rear cargo headliner. Refer to **MODULE, RADIO FREQUENCY (RF HUB), DESCRIPTION**.
- **Remote Keyless Entry System Transmitter** - The RKE system transmitter (also known as the FOB with Integrated Key/FOBIK) is the battery powered, wireless and portable Radio Frequency (RF) user controller for all of the features of the RKE system.

These components and their controls are combined to provide the following RKE system features:

- **Customer Programmable Features** - The vehicle operator interfaces with the RFHM, which is the RKE system controller, using the EVIC. EVIC switches allow the vehicle operator to set or change the RKE system Customer Programmable Features through the EVIC display.
- **Flash Lights With Lock And Unlock** - This is a Customer Programmable feature of the RKE system. The first option has the park lamps flash as an optical verification that the RKE system has received a valid **Lock** or **Unlock** request from the FOBIC. The second option disables the optical verification feature.
- **Panic Feature** - In certain markets the FOBIC may also be equipped with a red **Panic** button. Depressing the **Panic** button of the FOBIC while within transmitter range will sound the vehicle signal horn and flash the exterior lighting of the vehicle for about three minutes or until the **Panic** button is depressed a second time, whichever occurs first. Attaining a vehicle speed of about 25.7 kilometers per hour (15 miles per hour) will also cancel the Panic event.
- **Programming Additional Transmitters** - Two RKE transmitters are shipped with the vehicle from the factory, but the RKE system can retain the vehicle access codes of up to a total of eight transmitters. The transmitter codes are retained in the RKE system controller memory, even if the battery is disconnected. If a FOBIC is ineffective, lost or an additional FOBIC is desired, new transmitter vehicle access codes can be programmed into the system using a diagnostic scan tool.
- **Remote Liftgate Unlatching** - Depressing the **Liftgate Release** button of the FOBIC twice within 5 seconds while within transmitter range will unlatch and open the liftgate of the vehicle.
- **Remote Engine Start** - On vehicles equipped with the optional Remote Starting System, depressing the **Remote Start** button of the FOBIC twice while within transmitter range will lock all of the vehicle doors and start the engine of the vehicle.
- **Remote Locking** - Depressing the **Lock** button of the FOBIC while within transmitter range will lock all of the vehicle doors.
- **Remote Unlocking** - Depressing the **Unlock** button of the FOBIC while within transmitter range will unlock the vehicle and activate the Illuminated Entry System. The specific locks operated and the number of FOBIC button presses required varies depending upon the Customer Programmable settings chosen by the vehicle operator.
- **Remote Unlock Sequence** - This is a Customer Programmable feature of the RKE system. There are two options available. The first option allows only the driver side front door to unlock when the FOBIC **Unlock** button is depressed one time, and the remaining doors unlock when the button is depressed a second time within 5 seconds of the first press. The second option allows all doors to unlock upon a single press of the FOBIC **Unlock** button.
- **Sound Horn On Lock** - This is a Customer Programmable feature of the RKE system. There are two options available. The first option has the signal horn of the vehicle sound a short chirp as an audible verification that the RKE system received a valid **Lock** request from the FOBIC. The second option disables the audible verification feature.
- **Vehicle Theft Alarm Arming** - If the vehicle is equipped with the optional Vehicle Theft Alarm (VTA), depressing the **Lock** button of the FOBIC while within transmitter range will arm the VTA in addition to activating the remote locking feature.
- **Vehicle Theft Alarm Disarming** - If the vehicle is equipped with the optional Vehicle Theft Alarm (VTA), depressing the **Unlock** button of the FOBIC while within transmitter range will disarm the VTA in addition to activating the remote unlocking feature.

Hard wired circuitry connects many of the RKE system components to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the RKE system components through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

OPERATION

OPERATION

PASSIVE ENTRY SYSTEM

In the Passive Entry Keyless Go (PEKG) system the doors are unlocked passively; however, they must still be locked actively after exiting the vehicle using the tactile **Lock** button on either front door Smart handle. When the system senses a hand approaching the capacitive switch in the door Smart handle pull or detects a button press of the liftgate release switch, it sends out challenge messages through the Low Frequency (LF) antennas to authenticate the presence and location of a valid FOB with Integrated Key (FOBIK).

The FOBIK responds by sending a Very High Frequency (VHF) message back to the receiver within the Radio Frequency Hub Module (RFHM) (also known as the RF Hub). If the RFHM determines the FOBIK is valid and that it is located outside the vehicle in the same zone or vicinity as the door handle or liftgate switch being activated, it sends an electronic **Unlock Request** message over the Controller Area Network (CAN) data bus to the Body Control Module (BCM) to automatically unlock and allow entry to that aperture.

The PEKG system circuits and FOBIK inputs are continually monitored by the microprocessor and software contained within the RFHM. When the RFHM monitors a problem in any of the PEKG system circuits or FOBIK inputs, it stores a Diagnostic Trouble Code (DTC) in its memory circuit. The hard wired circuits between components related to the PEKG system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the PEKG system or the electronic controls or communication between other modules and devices that provide features of the PEKG system. The most reliable, efficient, and accurate means to diagnose the PEKG system or the electronic controls and communication related to PEKG system operation, as well as the retrieval or erasure of a DTC requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

POWER LOCK SYSTEM

The power lock system uses non-switched battery current received through a fused B(+) fuse in the Body Control Module (BCM) so that the system remains operational regardless of the status of the ignition switch. The BCM is the primary power lock system controller. On vehicles equipped with a Drivers Door Module (DDM), the power lock switches are hard wired direct to the DDM. The DDM then sends the switch status via

CAN to the BCM. For those vehicles equipped with a Smart Motor instead of the DDM, the power door lock switches are hardwired directly to the BCM. The BCM, DDM and PDM all communicate with each other and with other electronic modules in the vehicle over the Controller Area Network (CAN) data bus.

When the BCM receives an input from a door module or from a switch on a Smart motor system, it responds to these request messages by providing the appropriate outputs to each of the power lock motors to lock or unlock each of the door latches. The BCM also monitors a hard wired input from the power liftgate module and electronic message inputs indicating automatic transmission gear selector position and vehicle speed. The BCM uses all of these inputs and internal programming to determine whether or not to provide the output necessary to operate the liftgate latch release motor.

The BCM also stores the power lock system Customer Programmable feature settings received over the CAN data bus from the Electronic Vehicle Information Center (EVIC). The BCM uses these settings and internal programming along with hard wired and electronic message inputs to determine the proper outputs needed to produce each of the appropriate power lock system features.

The power lock system circuits are continually monitored and controlled by the microprocessor and software contained within the BCM. When the BCM monitors a problem in any of the power lock system circuits or components, it stores a fault code or Diagnostic Trouble Code (DTC) in its memory circuit. The hard wired circuits between components related to the power lock system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the power lock system or the electronic controls or communication between other modules and devices that provide features of the power lock system. The most reliable, efficient, and accurate means to diagnose the power lock system or the electronic controls and communication related to power lock system operation, as well as the retrieval or erasure of a DTC requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOTE KEYLESS ENTRY SYSTEM

The Remote Keyless Entry (RKE) system uses non-switched battery current received through a fused B(+) fuse in the Body Control Module (BCM) so that the system remains operational regardless of the ignition switch position. The Radio Frequency Hub Module (RFHM) (also known as the RF Hub) is the primary RKE system controller as well as the Radio Frequency (RF) RKE receiver. The RFHM validates the vehicle access code of each RKE transmitter (also known as FOB with Integrated Key/FOBIK) from which it receives RF signal inputs. It ignores requests from any transmitter for which it has no stored vehicle access code.

The RFHM communicates and shares resources with the BCM and many other electronic modules in the vehicle over the CAN data bus. The RFHM also stores the RKE system Customer Programmable feature settings received over the CAN data bus from the Electronic Vehicle Information Center (EVIC). When the RFHM receives an input from a valid transmitter source, it uses these settings and internal programming to send the appropriate electronic request messages to the BCM and other electronic modules over the CAN data bus to invoke the proper RKE system features and responses.

The RKE system circuits and transmitter inputs are continually monitored by the microprocessor and software

contained within the RFHM. When the RFHM monitors a problem in any of the RKE system circuits or transmitters, it stores a Diagnostic Trouble Code (DTC) in its memory circuit. The hard wired circuits between components related to the RKE system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the RKE system or the electronic controls or communication between other modules and devices that provide features of the RKE system. The most reliable, efficient, and accurate means to diagnose the RKE system or the electronic controls and communication related to RKE system operation, as well as the retrieval or erasure of a DTC requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - POWER LOCK SYSTEMS

PASSIVE ENTRY SYSTEM

As a preliminary diagnosis for the Passive Entry Keyless Go (PEKG) system, first check using the Electronic Vehicle Information Center (EVIC) or with a diagnostic scan tool to be certain that this Customer Programmable feature is enabled. Next, confirm that the power lock system and the RKE system operate satisfactorily. If the power lock system or the RKE system fails to operate correctly, repair that problem before attempting to diagnose the PEKG system.

The most reliable, efficient, and accurate means to diagnose the PEKG system requires the use of a diagnostic scan tool and the appropriate diagnostic information. The diagnostic scan tool can provide confirmation that the CAN data bus is functional, that all of the proper electronic modules are sending and receiving the proper electronic messages over the CAN data bus, and that the Radio Frequency Hub Module (RFHM) (also known as the RF Hub) is sending the proper Radio Frequency (RF) signals to and receiving the proper RF signals from the RKE transmitters (also known as FOB with Integrated Key/FOBIK) to perform its PEKG system functions.

Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

POWER LOCK SYSTEM

Following are tests that may help to diagnose the hard wired components and circuits of the power lock system. However, these tests may not prove conclusive in the diagnosis of this system. In order to obtain conclusive testing of the power lock system, the Controller Area Network (CAN) data bus and all of the electronic modules that provide inputs to, or receive outputs from the power lock system components must also be tested.

The most reliable, efficient, and accurate means to diagnose the power lock system requires the use of a diagnostic scan tool and the appropriate diagnostic information. The diagnostic scan tool can provide confirmation that the CAN data bus is functional, that all of the proper electronic modules are sending and receiving the proper electronic messages over the CAN data bus, and that the power lock motors are receiving

the proper hard wired outputs from the Body Control Module (BCM) (also known as the Common Body Controller/CBC) for them to perform their power lock system functions.

Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

PRELIMINARY DIAGNOSIS

As a preliminary diagnosis for the power lock system, note the system operation while you actuate both the **Lock** and **Unlock** functions with the power lock switches and with the Remote Keyless Entry (RKE) transmitter (also known as the FOB with Integrated Key/FOBIK). Then, proceed as follows:

1. If the entire power lock system fails to function with either the power lock switches or the FOBIK, check the fused B(+) fuse for the power lock system.
2. If the power lock system functions with both power lock switches, but not with the FOBIK, proceed to diagnosis of the RKE system.
3. If the power lock system functions with the FOBIK, but not with one or both power lock switches, proceed to diagnosis of the door lock switches.
4. If only one power lock motor fails to operate with both power lock switches and the RKE transmitter, proceed to diagnosis of the power lock motor.

REMOTE KEYLESS ENTRY SYSTEM

Following are tests that may help to diagnose the Remote Keyless Entry (RKE) system. However, these tests may not prove conclusive in the diagnosis of this system. In order to obtain conclusive testing of the RKE system, the Controller Area Network (CAN) data bus network and all of the electronic modules that provide inputs to, or receive outputs from the RKE system components must also be tested.

The most reliable, efficient, and accurate means to diagnose the RKE system requires the use of a diagnostic scan tool and the appropriate diagnostic information. The diagnostic scan tool can provide confirmation that the CAN data bus is functional, that all of the proper electronic modules are sending and receiving the proper electronic messages over the CAN data bus, and that the Radio Frequency Hub Module (RFHM) (also known as the RF Hub) is being sent the proper Radio Frequency (RF) signals by the RKE transmitters (also known as FOB with Integrated Key/FOBIK) to perform its RKE system functions.

Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

PRELIMINARY DIAGNOSIS

As a preliminary diagnosis for the RKE system, first confirm that the power lock system operates satisfactorily. If the power lock system fails to operate correctly, repair that problem before attempting to diagnose the RKE system. If the problem being diagnosed involves only one or more Customer Programmable features, check using the Electronic Vehicle Information Center (EVIC) or with a diagnostic scan tool to be certain that these programmable features are enabled. If the features are enabled and still fail to operate, the RFHM and the CAN

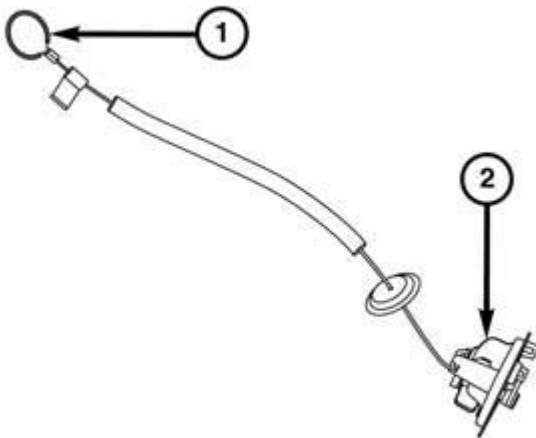
data bus must be tested. Next, note the RKE system operation while you perform both the **Lock** and **Unlock** functions with the FOBIK. Then, proceed as follows:

1. If the power lock system functions with both power lock switches, but not with the FOBIK, proceed to diagnosis of the FOBIK.
2. If the FOBIK checks okay, proceed to diagnosis of the RFHM or the CAN data bus. The use of a diagnostic scan tool and the appropriate diagnostic information are required.

ACTUATOR, FUEL DOOR

DESCRIPTION

DESCRIPTION



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Fig. 1: Mechanical Emergency Release Cable & Actuator Mechanism
Courtesy of CHRYSLER GROUP, LLC

An electronically actuated fuel door release mechanism is standard equipment in this vehicle. A striker on the fuel door is engaged by a latch and actuator mechanism (2) integral to the fuel filler housing located behind the fuel door opening of the outer quarter panel. The actuator mechanism is operated by an electronic solenoid that is also integral to the fuel filler housing. A short wire harness connected to the solenoid passes through a rubber grommet and a hole in the body sheet metal into the trunk compartment along with a mechanical emergency release cable (1). The solenoid is connected to the vehicle electrical system through a dedicated take out and connector of the body wire harness located on the right side of the trunk.

OPERATION

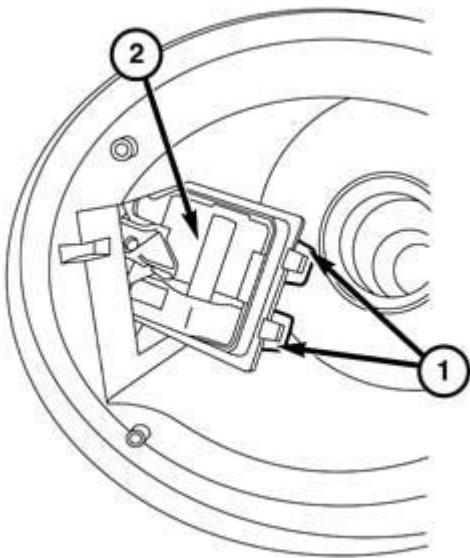
OPERATION

The fuel filler door actuator solenoid is energized by fused battery feed received from the fuel filler door switch located within the map pocket of the driver side front door inside trim panel whenever the momentary switch button is depressed. The solenoid is connected to a path to ground at all times through a take out of the body wire harness that is secured to the body sheet metal. These connections allow the solenoid to operate regardless of the ignition switch status.

If the vehicle electrical system, the fuel filler release solenoid, the switch or the release solenoid electrical circuits are damaged or ineffective, pulling the mechanical emergency release cable located within the trunk compartment will manually release the fuel filler door.

REMOVAL**REMOVAL**

Fuel Door Actuator Removal.

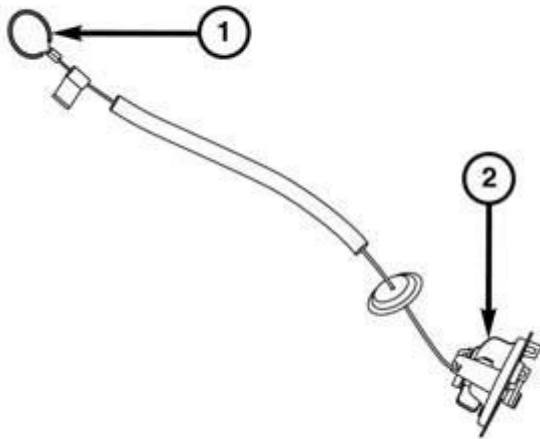


082370948

Fig. 2: Lock Tabs & Fuel Door Actuator
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Open the fuel door using the push button switch within the map pocket of the drivers door panel. If unable to actuate the fuel door with the switch then open the trunk and pull the mechanical emergency release cable to release the fuel door manually. The mechanical emergency release cable is located on the right side within the trunk compartment.
3. Once the fuel door is open you can access the fuel door actuator (2). There are two lock tabs (1) holding

the actuator in place. Use a screw driver or like object to pop the fuel door actuator out from underneath the tabs.



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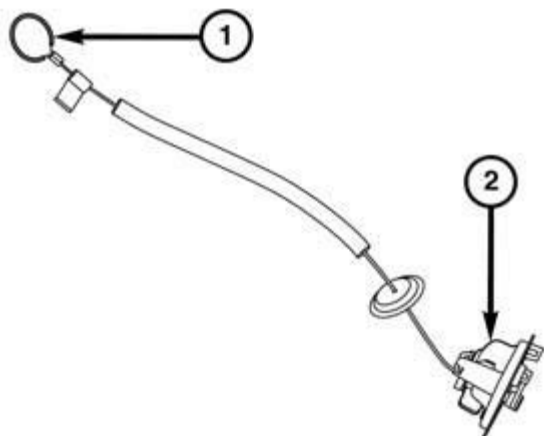
Fig. 3: Mechanical Emergency Release Cable & Actuator Mechanism
Courtesy of CHRYSLER GROUP, LLC

4. Once the fuel door actuator is free of the tabs, remove the rubber grommet and maneuver the actuator through the opening that the actuator is fed through so that you are feeding the actuator back into the trunk.
5. Disconnect the fuel door actuator harness from the solenoid assembly.
6. Disconnect the mechanical emergency fuel door release cable from the interior wall of the trunk and pull the actuator and cable out from the trunk, fully removing the actuator and cable from the vehicle.

INSTALLATION

INSTALLATION

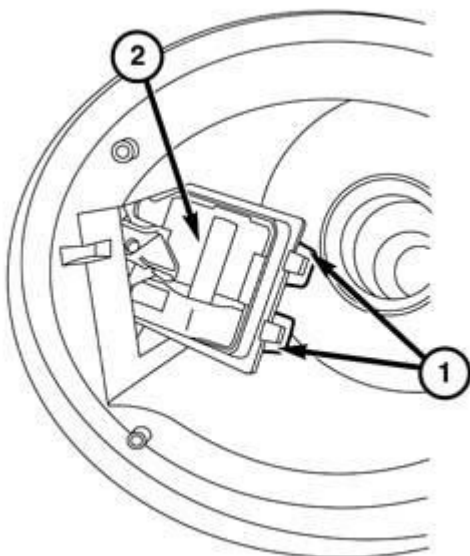
Fuel Door Actuator Installation.



082371064

Fig. 4: Mechanical Emergency Release Cable & Actuator Mechanism
Courtesy of CHRYSLER GROUP, LLC

1. The fuel door actuator is routed through the passenger side interior of the trunk through the opening in the body sheet metal that allows the actuator to pass through and reside within filler housing. Feed the actuator through this opening while maneuvering the actuator.

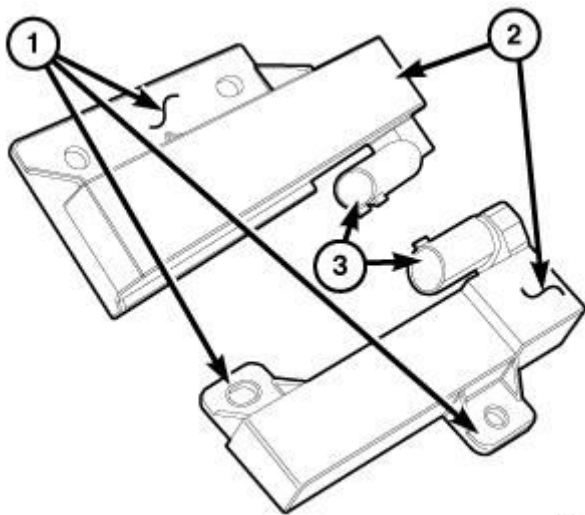


082370948

Fig. 5: Lock Tabs & Fuel Door Actuator

Courtesy of CHRYSLER GROUP, LLC

2. Once the actuator is inserted through the hole and into the housing area, position the actuator so that the lock tabs on the housing will mesh with the tabs on the actuator. Snap/secure the actuator into place.
3. Connect the fuel door actuator harness connector to the solenoid assembly.
4. Connect the mechanical emergency release cable into position on the passenger side of the trunk compartment.
5. Reconnect the battery negative cable and test for proper fuel door actuation.

ANTENNA, PASSIVE ENTRY**DESCRIPTION****DESCRIPTION**

3072245

Fig. 6: Integral Connector Receptacle, Ferrite Antenna Units & Flanges
Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with the Passive Entry (PE) and Keyless Go (KG) systems have several Low Frequency (LF), ferrite antenna units (2) located within the vehicle. Each ferrite PE antenna unit is contained within a molded black plastic housing with an integral connector receptacle (3) molded into one end. The connector receptacle contains terminal pins that connect the antenna to the vehicle electrical system through a twisted pair of conductors and a connector that are part of the adjacent wire harness.

Each antenna housing also includes an integral mounting flange or flanges (1) which can be used to mount the unit with screws. However, in some applications the antenna mounting flanges are snapped into a spring steel adapter or retainer, which allows the antenna unit to be securely clipped in place over a body flange rather than being secured with screws. This vehicle platform uses five PE antenna units. One is secured to the underside of the center floor console, one is secured to each rear door hardware module carrier concealed behind the inside door trim panels, one is secured in front of the rear seat to the floor and one is concealed behind the rear fascia

to the bracket.

The antennas are each connected to the Radio Frequency Hub Module (RFHM) (also known as the RF Hub) on dedicated and sequentially numbered circuits. The left rear door antenna is connected through the antenna 1 circuits, the right rear door antenna is connected through the antenna 2 circuits, the trunk antenna is connected through the antenna 3 circuits, the center floor console is connected through the antenna 4 circuits and the rear fascia bracket antenna is connected through the antenna 5 circuits.

PASSIVE ENTRY LOW FREQUENCY ANTENNA AND CIRCUIT NUMBERING	
Location	Antenna And Circuit Number
Left Rear Door	1
Right Rear Door	2
Center Floor Console	3
Left Rear Floor	4
Rear Fascia Bracket	5

An LF antenna unit cannot be adjusted or repaired. If ineffective or damaged, it must be replaced with a new unit. For applications where it is used, the antenna unit adapter or retainer may be serviced only as a unit with the LF antenna.

OPERATION

OPERATION

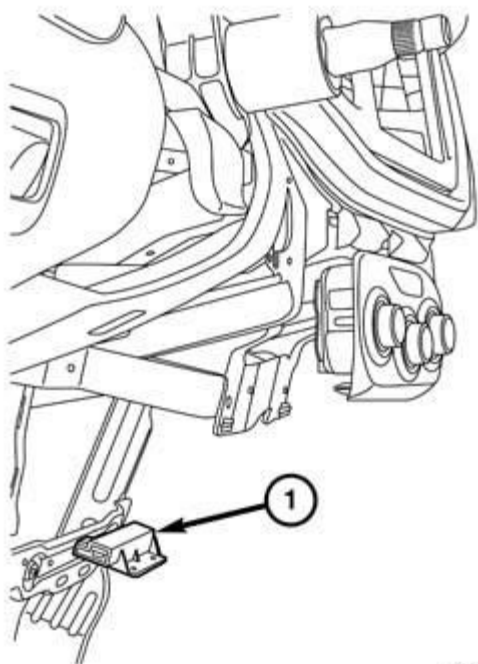
The Passive Entry (PE) antenna units allow the transmitter within the Radio Frequency Hub Module (RFHM) (also known as the RF Hub) to communicate via Low Frequency (LF) radio transmission with a FOB with Integrated Key (FOBIK) that is located inside the vehicle or, at most, about 0.7 meters (2.5 feet) horizontally in all directions around the outside of the vehicle. The RFHM uses communication through the antenna units to wake up and challenge a FOBIK that is within range in order to authenticate whether that FOBIK is valid (programmed) to the vehicle. The RFHM communication with the FOBIK is on 125 kilohertz using Frequency-Shift Keying (FSK) modulation.

Each antenna unit has two dedicated connections to the RFHM. One connection is the LF antenna output circuit, while the other connection is the LF antenna return circuit. These circuits to each antenna unit are a twisted pair to help reduce the potential for induced electrical interference. The RFHM microprocessor continuously monitors all of the antenna units and will store a Diagnostic Trouble Code (DTC) for any fault that it detects.

The hard wired inputs and outputs of the LF antenna units may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, the most reliable, efficient, and accurate means to diagnose the LF antenna units requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

CENTER FLOOR CONSOLE



082370505

Fig. 7: Low Frequency (LF) Antenna**Courtesy of CHRYSLER GROUP, LLC**

1. Disconnect and isolate the battery negative cable.
2. Remove the center floor console from the vehicle. Refer to **CONSOLE, FLOOR, REMOVAL**.
3. Disconnect the wire harness connector from the connector receptacle for the Low Frequency (LF) antenna (1) beneath the front of the console.
4. Remove the two screws that secure the antenna to the bracket beneath the front of the console.
5. Remove the antenna from the console.

REAR DOOR

**Fig. 8: Antenna, Connector & Screws**

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the trim panel from the inside of the rear door. Refer to **PANEL, REAR DOOR TRIM, REMOVAL**.
3. Disconnect the door wire harness connector (3) from the Low Frequency (LF) antenna connector receptacle.
4. Remove the two screws that secure the antenna (2) to the inside of the rear door hardware module carrier.
5. Remove the antenna (1) from the carrier.

REAR FASCIA BRACKET

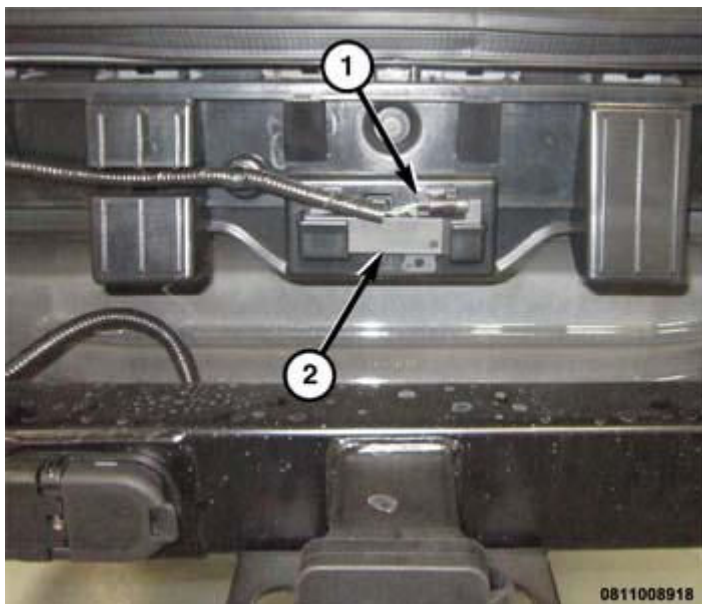
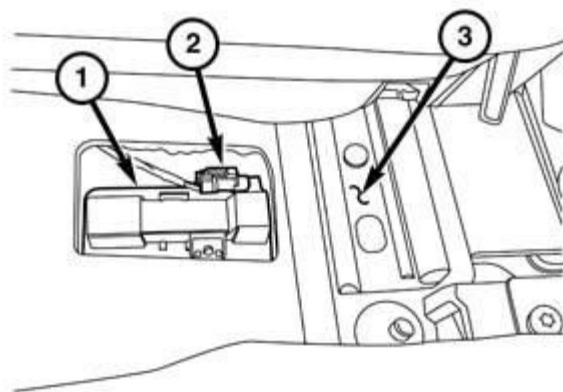


Fig. 9: Low Frequency Antenna & Connector
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the rear fascia from the vehicle. Refer to **FASCIA, REAR, REMOVAL** .
3. Disconnect the wire harness connector (1) from the connector receptacle for the Low Frequency (LF) antenna (2) located in a pocket near the center of the rear fascia bracket.
4. Unsnap the antenna from the retainer integral to the rear fascia bracket.
5. Remove the LF antenna from the vehicle.

TRUNK



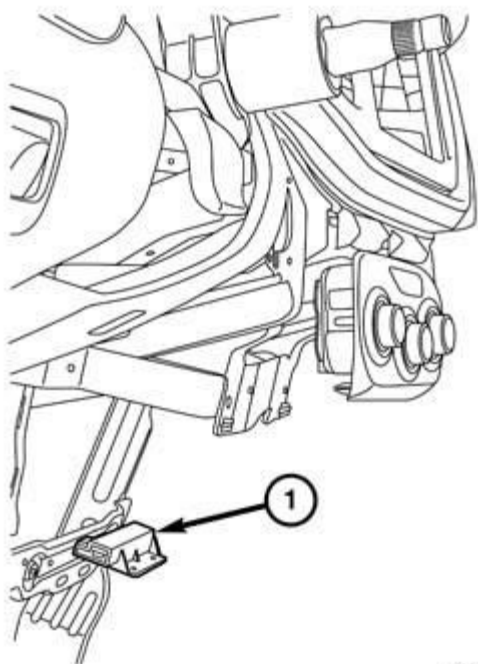
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Fig. 10: LF Antenna, Connector & Cover
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Fold and move forward the drivers side second row set. Next to the left side of the right side seat track (3) is a cover cut into the carpet. Fold this cover up to expose the LF antenna (1).
3. Disconnect the body wire harness connector from the Low Frequency (LF) antenna connector receptacle (2).
4. Remove the fasteners that secure the antenna in position.
5. Remove the LF antenna.

INSTALLATION

CENTER FLOOR CONSOLE



082370505

Fig. 11: Low Frequency (LF) Antenna**Courtesy of CHRYSLER GROUP, LLC**

1. Position the Low Frequency (LF) antenna (1) to the bracket beneath the front of the center floor console.
2. Install and tighten the two screws that secure the antenna to the bracket beneath the front of the console. Tighten the screws securely.
3. Reconnect the wire harness connector to the antenna connector receptacle.
4. Reinstall the console into the vehicle. Refer to **CONSOLE, FLOOR, INSTALLATION** .
5. Reconnect the battery negative cable.

REAR DOOR



Fig. 12: Antenna, Connector & Screws

Courtesy of CHRYSLER GROUP, LLC

1. Position the Low Frequency (LF) antenna (1) to the rear door hardware module carrier.
2. Install and tighten the two screws (2) that secure the antenna to the carrier. Tighten the screws securely.
3. Reconnect the door wire harness connector (3) to the antenna connector receptacle.
4. Reinstall the trim panel onto the inside of the rear door. Refer to **PANEL, REAR DOOR TRIM, INSTALLATION**.
5. Reconnect the battery negative cable.

REAR FASCIA BRACKET

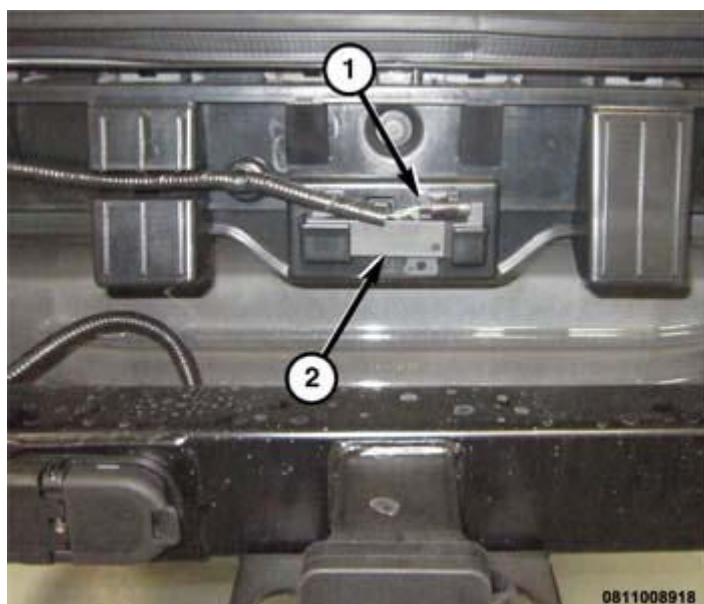
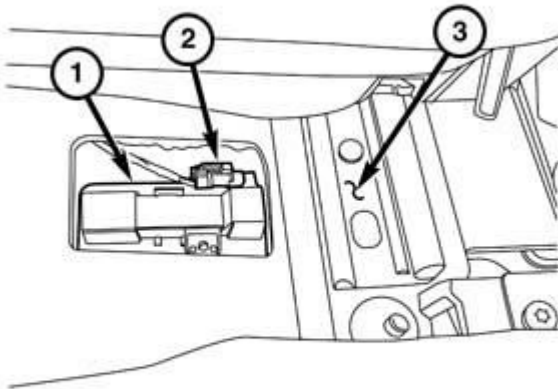


Fig. 13: Low Frequency Antenna & Connector

Courtesy of CHRYSLER GROUP, LLC

1. Position the Low Frequency (LF) antenna (2) in the pocket near the center of the rear fascia bracket.
2. Reconnect the wire harness connector (1) to the connector receptacle for the antenna.
3. Align the antenna with the retainers integral to the rear fascia bracket, then slide it downward until it snaps into place.
4. Reinstall the rear fascia onto the vehicle. Refer to **FASCIA, REAR, INSTALLATION** .
5. Reconnect the battery negative cable.

FORWARD CARGO FLOOR

0823006560

Fig. 14: LF Antenna, Connector & Cover

Courtesy of CHRYSLER GROUP, LLC

1. Position the Low Frequency (LF) antenna (1) into position in the opening on the floor behind the drivers second row seat, to the left of the right side seat track (3).
2. Install the fasteners that secure the antenna to the floor.
3. Reconnect the body wire harness connector to the antenna connector receptacle (2).
4. Reconnect the battery negative cable.

MOTOR, DOOR LOCK**DESCRIPTION**

DESCRIPTION

Power operated door locking and liftgate latching mechanisms are available equipment in this vehicle. The lock mechanisms of each door and the liftgate latch of vehicles with the power lock system are actuated by a reversible electric motor integral to each latch unit. A connector receptacle integral to each latch connects the power lock motor and the integral door or liftgate ajar micro switch to the vehicle electrical system through a dedicated take out and connector of the door or body wire harness.

The power lock motors cannot be adjusted or repaired and, if ineffective or damaged, the entire door or liftgate latch unit must be replaced.

OPERATION**OPERATION**

The power lock motors are controlled by outputs received from the Body Control Module (BCM). The BCM acts upon programming, hard wired inputs from the driver or passenger door lock switches as well as electronic **lock** or **unlock** command message inputs received over the Controller Area Network (CAN) data bus from the Radio Frequency Hub Module (RFHM) (also known as the RF Hub) based upon inputs from the Remote Keyless Entry (RKE) or FOB with Integrated Key (FOBIK) transmitters.

A positive and negative battery connection to the two lock motor terminals will cause the motor to move in one direction, locking or unlocking the latch. Reversing the current will cause the motor to move in the opposite direction.

The power lock motors and the hard wired circuits between the motors and the BCM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the power lock system or the electronic controls or communication between other modules and devices that provide some features of the power lock system. The most reliable, efficient, and accurate means to diagnose the power lock motors or the electronic controls and communication related to power lock motor operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING**DIAGNOSIS AND TESTING - POWER LOCK MOTOR**

Remember, the Body Control Module (BCM) circuitry controls the outputs to the power lock motors. If both the power lock motors and the circuits between the motors and the BCM test okay, the use of a diagnostic scan tool is required for further power lock system diagnosis. Refer to the appropriate diagnostic information.

Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

1. Check the power lock motor for correct operation while moving a power lock switch to both the **Lock** and **Unlock** positions.

2. Disconnect the door or body wire harness connector from the inoperative power lock motor.
3. Apply 12 volts to the lock and unlock driver circuit cavities of the power lock motor connector to check its operation in one direction.
4. Reverse the connection polarity to check the motor operation in the opposite direction.
5. If motor operation is okay in both directions, check both the lock and unlock circuits between the lock motor and the BCM and repair if required. If motor operation is not okay in both directions, replace the latch unit containing the ineffective power lock motor.

SWITCH, DOOR HANDLE

DESCRIPTION

DESCRIPTION

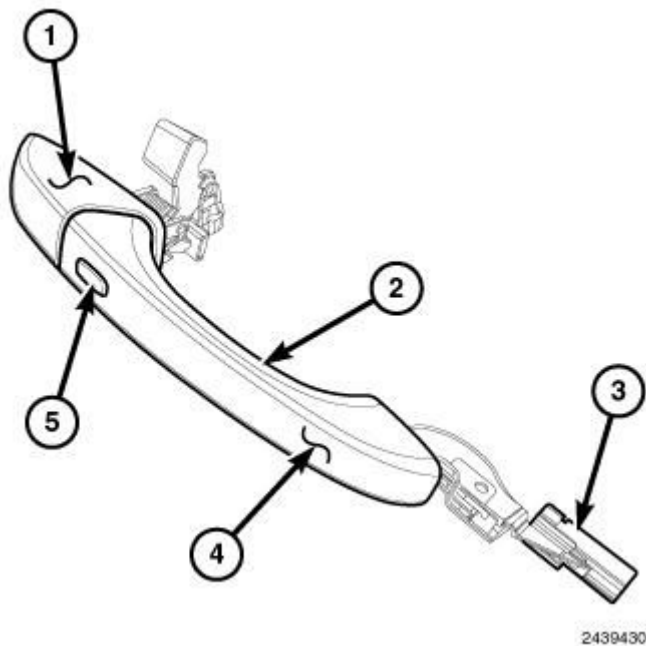


Fig. 15: Front Door Handle Components
Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with the optional Passive Entry (PE) system have unique outside front door handles that incorporate three switches and a logic circuit. These unique PE door handles are sometimes referred to as smart handles. The handle itself is very similar in appearance to those used in conventional non-PE applications, consisting primarily of a grip (4) and a base (1).

The PE door handles can be readily identified by a tactile, resistive membrane lock switch (5) located on the outward facing vertical surface at the rearward end of the handle grip, and by a capacitive sensor or switch membrane patch on the inside surface (2) of the grip. A third, Hall-effect type switch as well as an Integrated Circuit (IC) chip are concealed within the grip near the handle base.

The mechanical functions and mounting provisions of the PE handle are identical to those of a conventional outside door handle. However, an integral connector receptacle (3) is located at the forward end of the handle grip where it is concealed within the door interior. The PE handle is connected to the vehicle electrical system through a dedicated take out and connector of the door wire harness.

The individual switches of the PE outside front door handles cannot be adjusted or repaired. If any one of the switches, the IC or any of the mechanical handle components is damaged or ineffective, the entire handle unit must be replaced. Refer to **HANDLE, EXTERIOR, REMOVAL** and **HANDLE, INTERIOR, REMOVAL**.

OPERATION

OPERATION

The three switches of each Passive Entry (PE) outside front door handles are each powered by and provide a direct input to the Integrated Circuit (IC) of that door handle. The IC of each PE outside front door handle receives power from the Radio Frequency Hub Module (RFHM) (also known as the RF Hub) on a signal circuit, and a clean ground from the RFHM on a return circuit. The PE handle IC and the RFHM communicate with each other by modulating the current in the signal circuit.

Each PE outside front door handle has three switches. The inputs from those three switches and the handle logic circuit allow each handle to send the RFHM up to four different signals: Unlock Request, Hall, Lock Request and Error. The RFHM determines the system response based upon the inputs it receives from each handle as well as the inputs it receives through the authentication process with each detected FOB with Integrated Key (FOBIK).

The tactile, mechanical, resistive membrane lock switch allows the user to actively lock the vehicle. The capacitive switch senses a hand approaching the handle grip to passively unlock the vehicle. The Hall-effect switch senses handle grip movement. An adaptation algorithm in the logic circuit of each handle can modify the sensitivity of the capacitive switches as well as system responses to the Hall-effect switch inputs to compensate for sensed repeated or continuous actuations such as might be caused by the switch membrane being wetted, but restores normal sensitivity about one minute after the repeated or continuous actuation input ceases.

The hard wired inputs and outputs of the PE outside front door handle may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, the most reliable, efficient and accurate means to diagnose this component requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

SWITCH, FUEL DOOR

DESCRIPTION

DESCRIPTION

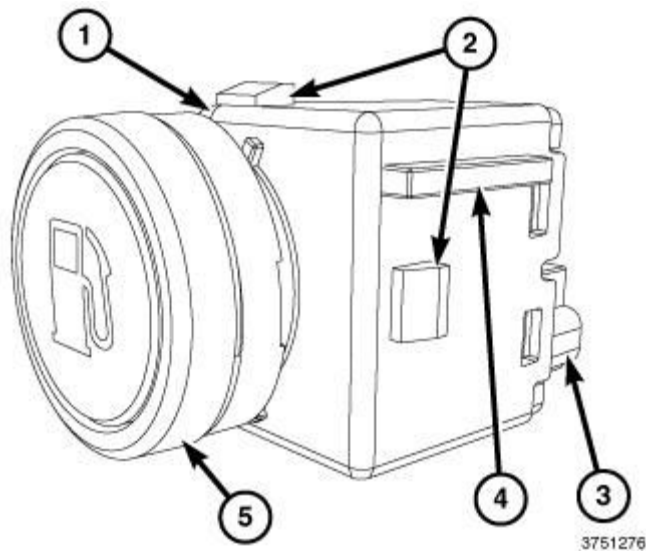


Fig. 16: Switch, Latch Features, Receptacle & Alignment Spline
Courtesy of CHRYSLER GROUP, LLC

The fuel door release switch (1) is mounted in the map pocket of the driver side front door inside trim panel. Only the switch button is visible on the outer surface of the trim panel. The black plastic switch button has a white International Control and Display Symbol icon applied to it, which clearly identifies its function. A Light Emitting Diode (LED) unit within the switch illuminates the icon on the switch button for improved visibility.

The black, molded plastic switch housing encloses the switch button mechanism and the switch circuitry including the switch contacts. A connector receptacle (3) is integral to the back of the switch housing, while integral latch features (2) and an alignment spline (4) on the sides of the housing are used to secure and locate the switch within a mounting receptacle integral to a reinforcement on the back side of the door trim panel. The fuel door release switch is connected to the vehicle electrical system through a dedicated take out and connector of the door wire harness.

The fuel door release switch cannot be adjusted or repaired and, if ineffective or damaged, the unit must be replaced.

OPERATION

OPERATION

The fuel door release switch is a normally open, momentary switch that is connected to fused battery feed at all times. When the switch button is depressed, it provides a battery feed signal to the fuel door release actuator solenoid on the fuel filler housing through a fuel door control circuit.

The hard wired circuit between the fuel door release switch and the fuel door release actuator solenoid may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information.

REMOVAL

REMOVAL

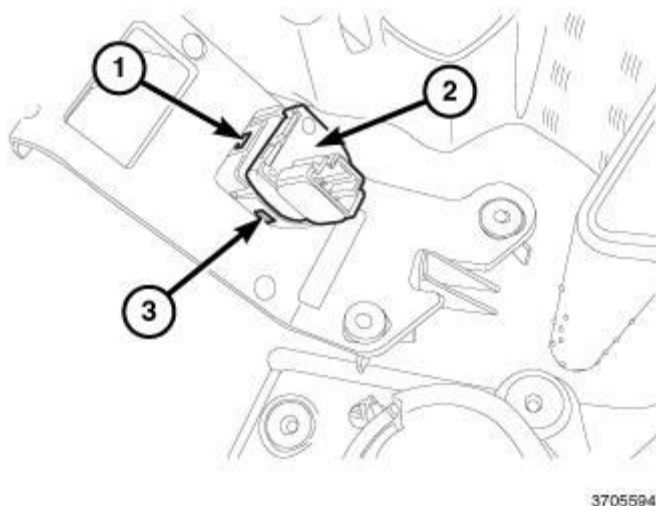


Fig. 17: Latch Tabs & Release Switch
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the trim panel from the inside of the driver side front door. Refer to **PANEL, DOOR TRIM, REMOVAL**.
3. Working from the back side of the door trim panel, disengage the latch tabs (1 and 3) that secure the fuel door release switch (2) to the receptacle integral to the trim panel reinforcement.
4. Remove the switch from the door trim panel.

INSTALLATION

INSTALLATION

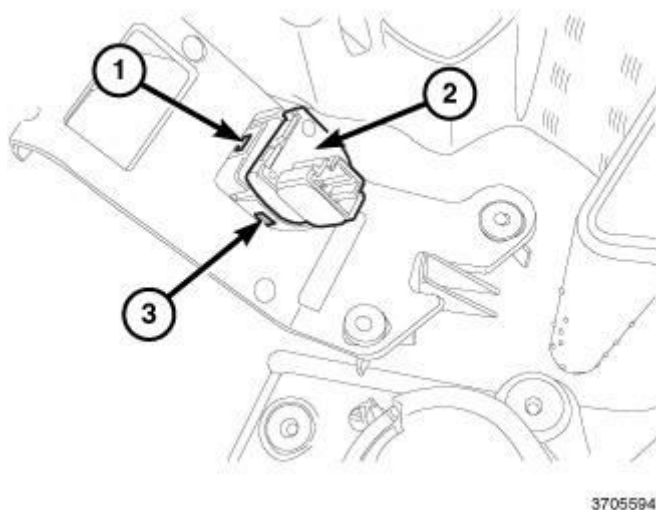


Fig. 18: Latch Tabs & Release Switch

Courtesy of CHRYSLER GROUP, LLC

1. Align the fuel door release switch (2) with the receptacle integral to the reinforcement on the back side of the driver side front door trim panel.
2. Using hand pressure, push the switch into the receptacle until each of the switch latch tabs (1 and 3) are fully engaged.
3. Reinstall the trim panel onto the inside of the driver side front door. Refer to **PANEL, DOOR TRIM, INSTALLATION**.
4. Reconnect the battery negative cable.

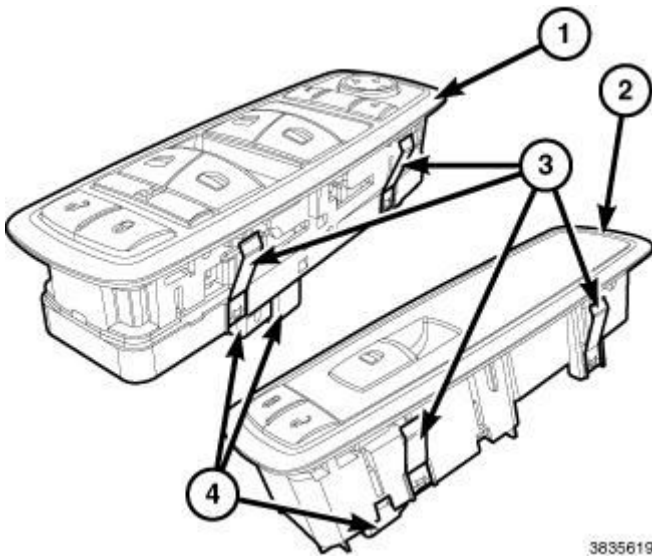
SWITCH, LOCK**DESCRIPTION****DESCRIPTION**

Fig. 19: Driver Side & Passenger Side Front Door Power Switch Module & Bezel Unit
Courtesy of CHRYSLER GROUP, LLC

A front door power switch module and bezel unit is located near the forward end of the arm rest of each front door trim panel. Separate modules are used for the driver side (1) and the passenger side (2) front doors. In addition, there are three versions of each module to accommodate power window and power mirror options. Each switch button in both modules is identified with either an International Control and Display Symbol icon or text that clearly identifies the switch function, and each switch button has a Light Emitting Diode (LED) unit soldered to the switch circuit board that provides back lighting of the icon or text for night visibility.

The Driver Door Switch Assembly contains window lift switches for front windows (driver and passenger) including auto-down or an auto-down and auto-up (also known as one-touch down or up and express down or up) features for both front door windows, window lift switches for rear windows (as equipped), window lockout switch (as equipped), power mirror switch with mirror select (as equipped), and a power fold button (as

equipped - LIN & Hybrid only). The passenger side power door switch module may combine power lock switches with a passenger side front door power window switch with the auto-down or the auto down and auto-up features. Each power switch module housing is secured within the trim panel armrest by four spring clip retainers (3), two on each side of the module housing. A connector receptacle (4) integral to each module housing connects the switches to the vehicle electrical system through dedicated take outs and connectors of the door wire harnesses.

Each front door power switch module may include the following switches:

- **Power Lock Switch** - A momentary switch button to control the **Lock** function of the power lock system is standard equipment in each front door power switch module in vehicles equipped with the optional power lock system.
- **Power Unlock Switch** - A momentary switch button to control the **Unlock** function of the power lock system is standard equipment in each front door power switch module in vehicles equipped with the optional power lock system.
- **Power Mirror Selector Switch (Driver Side Switch Only)** - In vehicles equipped with the power outside rear view mirror option, two latching mirror selector switch buttons choose the power mirror to be adjusted, **R** (right) or **L** (left).
- **Power Mirror Control Switch (Driver Side Switch Only)** - In vehicles equipped with the power outside rear view mirror option, after a power mirror is selected, pressing down on one of the four arrowheads on the circular, concave momentary mirror control switch pad will move the selected mirror in that direction for as long as the pad is held down or until the limit of the mirror travel is reached.
- **Power Window Lockout Switch (Driver Side Switch Only)** - In vehicles equipped with the power window option, a latching push-button power window lockout switch allows the vehicle operator to lock out the power window switches on each front and rear passenger door so that those windows may be operated only from the driver side front door master switches. When the lockout switch is engaged, the LED back lighting for each front and rear passenger door power window switch is extinguished.
- **Power Window Switches** - In vehicles equipped with the power window option, a single two-way, momentary power window switch with a push-to-open and a lift-to-close tab is provide for each front and rear passenger door window. The driver side switch module contains four of these power window switches, one switch dedicated to each door window. In vehicles with the base power window system, all power window switches are of a high current design and the switch tabs for the driver and passenger side front door power windows have an intermediate detent in the down direction which is used to activate the **Auto-Down** (also known as express down or one-touch down) feature. In vehicles equipped with the premium power window system, the front door power window switches are a low current design and a time based (less than 800 milliseconds) activation in the up or down direction on either front door power window switch activates the **Auto-Down** or **Auto-Up** (also known as express up and down, or one-touch up and down) feature.

The front door power switch modules cannot be adjusted or repaired. If damaged or ineffective, the entire driver side or passenger side front door power switch module must be replaced as a unit.

OPERATION

OPERATION

The Main function of the this switch assembly is to control the opening or closing of the Power windows and power locks based on the manual input given. The Driver Door Switch Assemblies are classified as high current, low current (LIN) or "hybrid." High current Door Switch Assemblies directly control windows and mirrors through high current switched contacts within the switch assembly. Low current (LIN) Door Switch Assemblies control windows and mirrors via messages sent over the LIN bus to a module which directly controls the windows and mirrors. Hybrid Door Switch Assemblies control front windows and mirrors via LIN messages, while controlling rear windows through high current switched contacts. In all cases, Door Locks are controlled by an RMUX signal to the module which directly controls the door lock solenoids.

The front door power switch module provides resistor multiplexed outputs to the Body Control Module (BCM) indicating the power lock switch selection, and the BCM operates the lock motors accordingly. On vehicles with the power outside rear view mirror option, the driver side front door power switch module also provides hard wired analog outputs directly from the power mirror selector and control switches to the power mirrors.

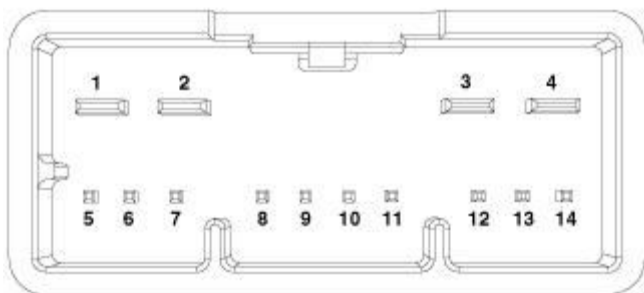
On vehicles with a base power window system option, the driver side front door power switch module provides high current hard wired analog outputs directly to the driver side front power window motor, or to the front and rear passenger door power window motors through the power window switch for that door. In the base power window system, an integrated circuit within each front door power switch module monitors inputs from the auto-down detent of the front door power window switches to invoke that feature.

On vehicles with a premium power window system option, the driver and passenger side front door power switch modules provide low current hard wired outputs to the driver or passenger side front r window motors, while the rear passenger power window motors still rely upon high current hard wired outputs from the switches. In the premium power window system, the BCM monitors the front door power window switches to invoke the auto-down and auto-up features through the smart power window motors.

The hard wired inputs and outputs of the driver and passenger side front door power switch modules may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the electronic controls of the power switch modules or in the diagnosis of the other modules and electronic controls that provide some features of the power lock, power mirror or power window systems. The most reliable, efficient, and accurate means to diagnose the driver side power switch module or the electronic controls and communication related to power lock, power mirror or power window system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

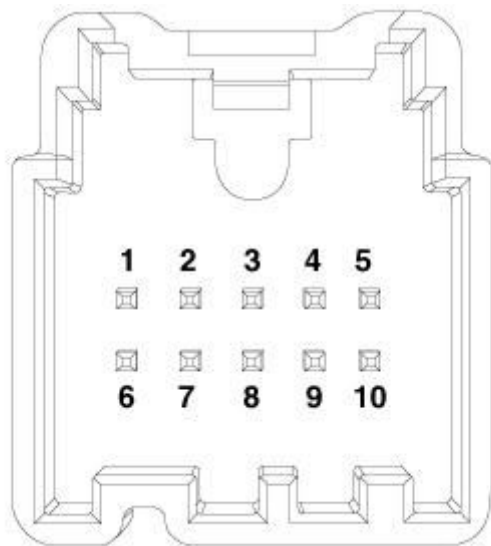
DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - POWER FRONT DOOR SWITCH MODULES



2851221

Fig. 20: Driver Front Door Switch Module Connector Receptacle
Courtesy of CHRYSLER GROUP, LLC



2851230

Fig. 21: Passenger Front Door Switch Module Connector Receptacle
Courtesy of CHRYSLER GROUP, LLC

1. Remove the power switch module and bezel unit from the front door trim panel. Refer to **SWITCH, LOCK, REMOVAL**.
2. Disconnect the door wire harness connector from the power switch module.
3. Using an ohmmeter, test the resistance between the terminals of the front door power lock or power window switch as shown in the Power Lock or Power Window Switch Tests chart .

NOTE: The switches in the driver front door switch module not listed in the Switch Test Tables provide inputs to the Driver Door Module (DDM) over a Local Interface Network (LIN) data bus and cannot be resistance tested.

The use of a diagnostic scan tool and the appropriate diagnostic information is required for further testing of those switches.

POWER LOCK SWITCH TESTS - PASSENGER DOOR	
SWITCH POSITION (PINS)	RESISTANCE RANGE (OHMS)
LOCK (4 and 8)	326 - 341
UNLOCK (4 and 8)	99 - 103
NEUTRAL (4 and 8)	>1 megohm

POWER WINDOW SWITCH TESTS - DRIVER DOOR	
SWITCH POSITION (PINS)	RESISTANCE (OHMS)
MASTER LEFT REAR WINDOW	
UP SWITCH - NEUTRAL (2 and 5)	>1 megohm
UP SWITCH - UP (2 and 5)	<2
DOWN SWITCH - NEUTRAL (2 and 7)	>1 megohm
DOWN SWITCH - DOWN (2 and 7)	<2
MASTER RIGHT REAR WINDOW	
UP SWITCH - NEUTRAL (2 and 12)	>1 megohm
UP SWITCH - UP (2 and 12)	<2
DOWN SWITCH - NEUTRAL (2 and 14)	>1 megohm
DOWN SWITCH - DOWN (2 and 14)	<2

POWER WINDOW SWITCH TESTS - PASSENGER DOOR	
SWITCH POSITION (PINS)	RESISTANCE RANGE (OHMS)
UP (4 and 8)	990 - 1022
AUTO UP (4 and 8)	329 - 349
DOWN (4 and 8)	2970 - 3042
AUTO DOWN (4 and 8)	0 - 12
NEUTRAL (4 and 8)	>1 megohm

- If a switch fails any of the tests, replace the ineffective front door power switch module and bezel unit as required.

REMOVAL

REMOVAL

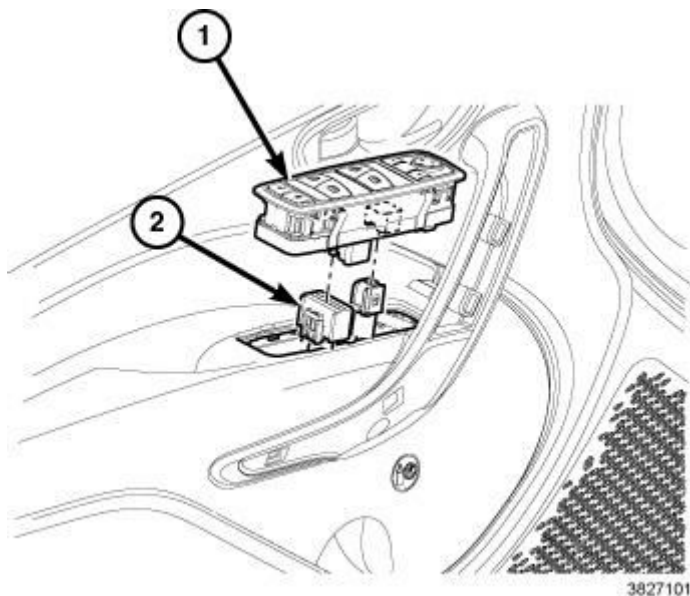


Fig. 22: Front Door Switch Module & Door Wire Harness Connector

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Using (special tool #C-4755, Trim Stick), pry the bezel of the front door switch module (1) up and away from the front door trim panel arm rest far enough to disengage the four spring steel retainers of the switch from the arm rest opening.
3. Pull the switch module away from the mounting hole of the arm rest far enough to access and disconnect the door wire harness connector (2) from the switch connector receptacle.
4. Remove the switch module from the vehicle.

INSTALLATION

INSTALLATION

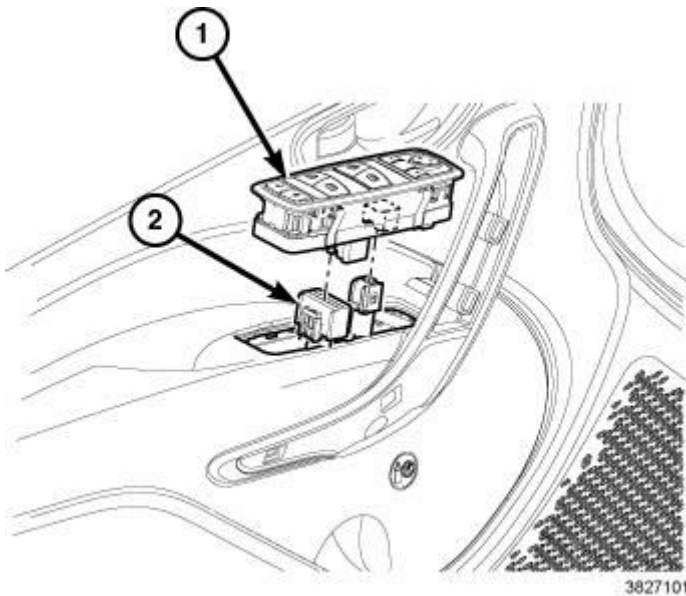


Fig. 23: Front Door Switch Module & Door Wire Harness Connector

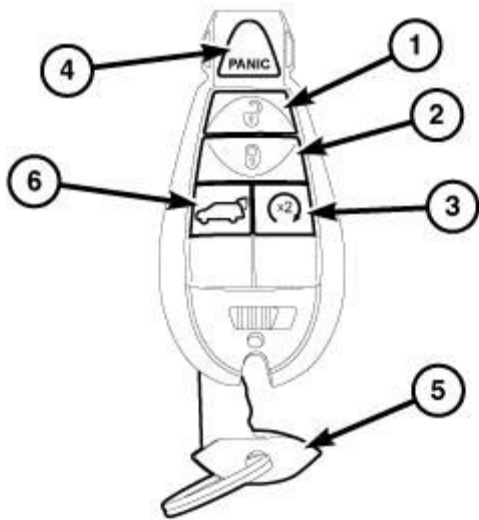
Courtesy of CHRYSLER GROUP, LLC

1. Position the front door switch module (1) close enough to the mounting hole in the arm rest of the front door trim panel to access and reconnect the front door wire harness connector (2) to the switch connector receptacle.
2. Align the switch module to the arm rest mounting hole.
3. Using hand pressure, press the switch module firmly and evenly into the mounting hole until the four spring steel retainers of the switch are fully engaged and the switch bezel is fully seated against the arm rest.
4. Reconnect the battery negative cable.

TRANSMITTER, INTEGRATED KEY FOB

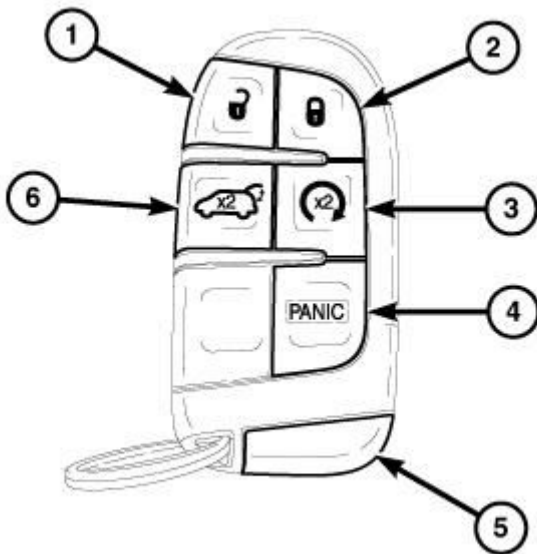
DESCRIPTION

DESCRIPTION



3823026

Fig. 24: FOBIK Transmitter - Without Passive Entry Keyless Go System
Courtesy of CHRYSLER GROUP, LLC



3068587

Fig. 25: FOBIK Transmitter - With Passive Entry Keyless Go System
Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with the power lock system may also have the optional Remote Keyless Entry (RKE) or the optional Passive Entry Keyless Go (PEKG) system. These vehicles are each shipped from the factory with two FOB with Integrated Key (FOBIK) Remote Keyless Entry (RKE) transmitters programmed to the vehicle as standard equipment. Although either type of transmitter can be programmed for compatibility with the power lock, Vehicle Theft Alarm (VTA) and remote start system features of the other, the FOBIK for vehicles without the PEKG system will not operate the passive entry system features, and neither FOBIK is compatible with the ignition switch design of the other.

The transmitter circuitry of both FOBIK types is contained and protected within a molded black plastic case with a black soft rubber touch pad on the face divided into six sections. The rearward end of the FOBIK case has a key ring and houses a mechanically coded, metal emergency key (5) that is released by sliding a latch button on the FOBIK case.

Depending upon vehicle equipment, each FOBIK has at least three and no more than five functional resistive membrane switches located beneath the six touch pad sections. Each functional touch pad section is clearly identified by white icons or white text and icons identifying the specific function obtained by pushing that button. Domestic market vehicles also include either a hard red plastic button with the white text **PANIC**, or a touch pad section on the FOBIK with the red text **PANIC** applied to it. Not counting the **PANIC** button or touch pad (4), the available switches include:

- **Unlock (1)** - Standard Equipment.
- **Lock (2)** - Standard equipment.
- **Remote Start (3)** - Only for vehicles equipped with the factory-installed remote start system.
- **Trunk (6)** - Standard equipment.

The FOBIK RKE transmitter is the primary customer active interface for remotely operating the power lock system, the RKE system, the VTA system and the remote start system components and features. However, the FOBIK also has an important passive role in each of the following vehicle systems:

- **Keyless Go System** - Refer to **DESCRIPTION**.
- **Passive Entry System** - Refer to **DESCRIPTION**.
- **Sentry Key® Theft Deterrent System** - Refer to **DESCRIPTION**.
- **Vehicle Theft Security System (VTSS)** - Refer to **DESCRIPTION**.

Other than battery replacement, the FOBIK cannot be adjusted or repaired. Once a FOBIK has been programmed to a vehicle, it cannot be reprogrammed for use on any other vehicle. If damaged or ineffective, the FOBIK must be replaced with a new unit. A new and unused FOBIK unit must be properly programmed in order to function properly with the systems of the vehicle. The mechanical emergency key of the new FOBIK must also be cut to match the coding of the lock cylinders in the vehicle.

OPERATION

OPERATION

The FOB with Integrated Key (FOBIK) incorporates many useful functions into a single, compact unit. The transducer on the internal circuit board of the FOBIK uses low frequency Radio Frequency (RF) communication to ensure vehicle security through an electronic validation or handshake process that is performed with the Radio Frequency Hub Module (RFHM) (also known as the RF Hub) each time the engine is started.

When any one of the Remote Keyless Entry (RKE) buttons of the FOBIK is depressed, the on-board transmitter of the FOBIK generates a high frequency RF request signal that is received and validated by the RFHM. If the RFHM determines that the RF signal was generated by a FOBIK that is valid for the vehicle, the RFHM relays

electronic request messages to the appropriate electronic modules in the vehicle over the Controller Area Network (CAN) data bus to invoke the functions or features associated with the request.

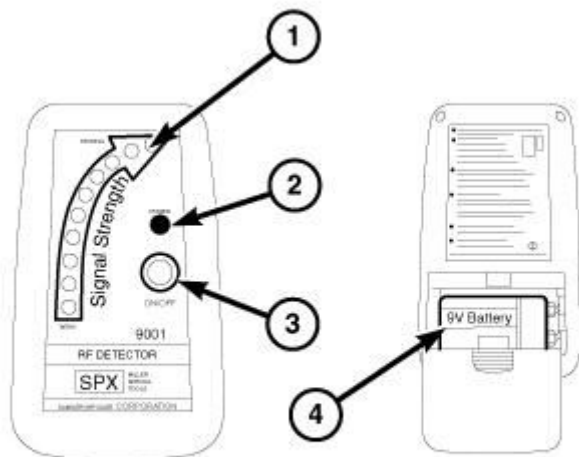
The integrated mechanical emergency key of the FOBIK provides emergency access to the vehicle in case the battery in the vehicle or the transmitter becomes discharged. The emergency key can also be retained to keep any locked on-board vehicle storage compartments such as the glove box secured, for example: While the vehicle is being attended to by a parking valet.

Each vehicle owner is provided with a four-digit Personal Identification Number (PIN) by the dealer at the time of vehicle purchase. This number is required along with a diagnostic scan tool for the dealer to program an additional or replacement FOBIK into the electronics of the vehicle. The emergency key included with a new additional or replacement blank FOBIK must also be cut to match the coding of the lock cylinders in the vehicle.

Diagnosis of a FOBIK transmitter requires the use of a Radio Frequency Detector such as special tool (special tool #9001, RF Detector). Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - FOBIK TRANSMITTER



114508

Fig. 26: Radio Frequency Detector #9001
Courtesy of CHRYSLER GROUP, LLC

Use a Radio Frequency Detector such as special tool (special tool #9001, RF Detector) to confirm that the Remote Keyless Entry (RKE) transmitter is functioning. Typical testing distance is 2.5 centimeters (1 inch) for the transmitters of vehicles manufactured for Asian markets, and 30.5 centimeters (12 inches) for all others.

1. Position the transmitter the appropriate distance from the special tool.

2. Depress any transmitter button, then test each button individually. The special tool will issue an audible beep tone if a satisfactory radio signal strength that lights five or more Signal Strength Light Emitting Diode (LED) units is detected.
3. Repeat Step 2 three times. If the transmitter fails any of the signal strength tests, use a diagnostic scan tool and the appropriate diagnostic information to complete further diagnosis.

STANDARD PROCEDURE

STANDARD PROCEDURE - FOB/K TRANSMITTER BATTERY REPLACEMENT

WITHOUT PASSIVE ENTRY KEYLESS GO SYSTEM

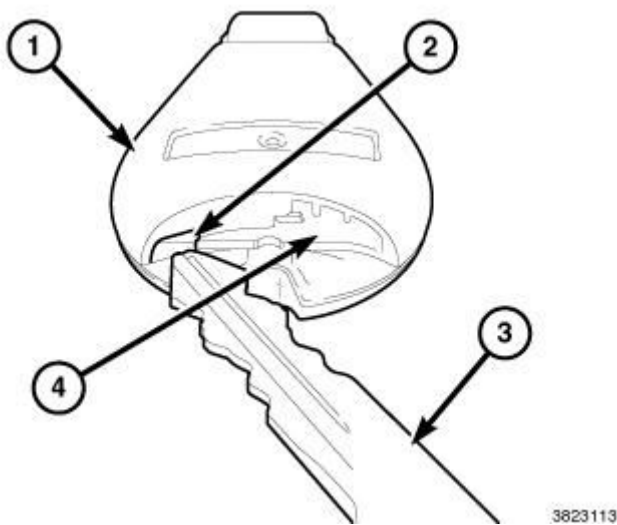


Fig. 27: Case, Notch, Emergency Key & Storage Slot
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not touch or disturb the metal contacts for the battery. Avoid touching the new battery. Battery contamination from oils on your skin may result in shortened battery life. If the battery or contacts are contaminated, clean them thoroughly with rubbing alcohol.

1. Unlatch and remove the emergency key (3) from the storage slot (4) of the FOB with Integrated Key (FOBIK) case (1).
2. With the back of the FOBIK case facing upward, insert the tip of the emergency key into the notch (2) between the case halves and twist the key to unsnap and separate the front case half from the back case half.

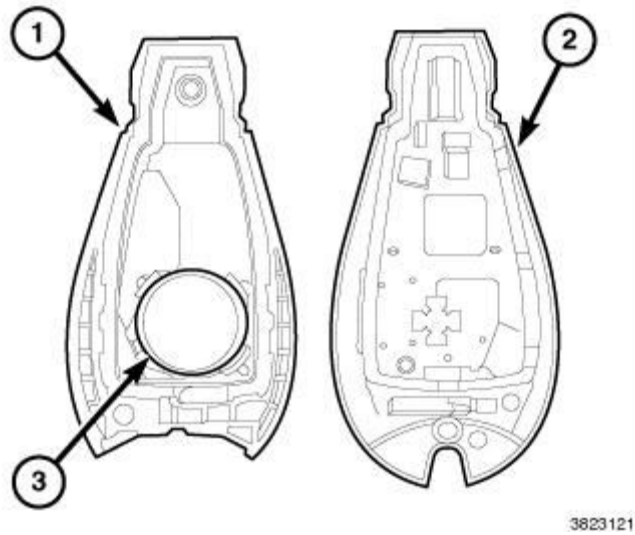
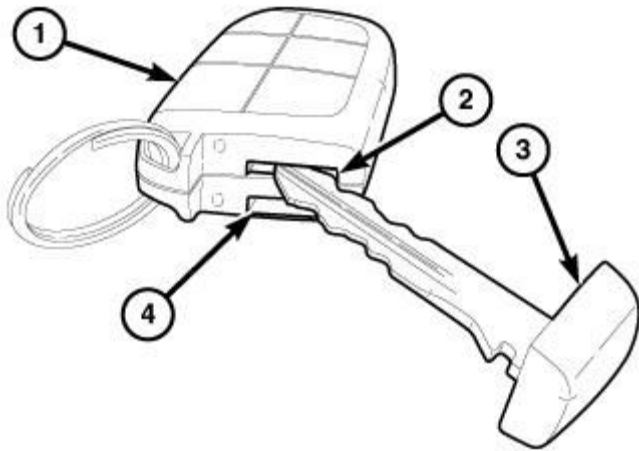


Fig. 28: Back Half Of FOBIK Case, Front Half Of FOBIK Case & Battery
 Courtesy of CHRYSLER GROUP, LLC

3. Lift the battery (3) out of the receptacle in the back half of the FOBIK case (1).
4. Replace the battery with a recommended replacement battery. Refer to **TRANSMITTER, INTEGRATED KEY FOB, SPECIFICATIONS**.
5. Install the new battery into the receptacle in the back half of the FOBIK case with the negative terminal facing upward.
6. Align the front half of the FOBIK case (2) with the back half.
7. Using hand pressure, squeeze the two FOBIK case halves around their perimeters until they snap back together.
8. Reinsert the emergency key into the storage slot of the FOBIK case.
9. Test the FOBIK operation.

WITH PASSIVE ENTRY KEYLESS GO SYSTEM

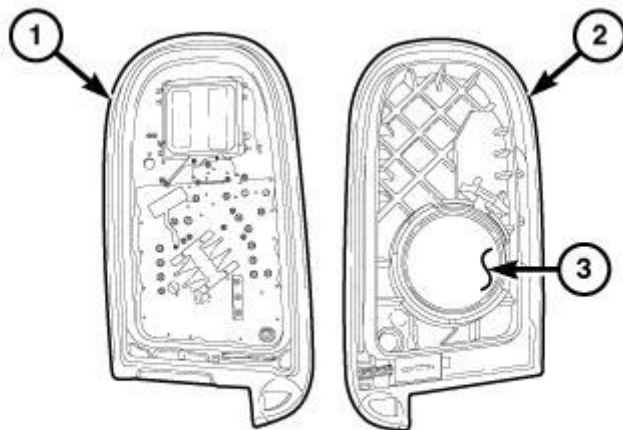


3068797

Fig. 29: Emergency Key, Storage Slot & Integrated Key (FOBIK) Case
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not touch or disturb the metal contacts for the battery. Avoid touching the new battery. Battery contamination from oils on your skin may result in shortened battery life. If the battery or contacts are contaminated, clean them thoroughly with rubbing alcohol.

1. Unlatch and remove the emergency key (3) from the storage slot (4) of the FOB with Integrated Key (FOBIK) case (1).
2. With the front of the FOBIK case facing upward, insert the tip of the emergency key into the notch (2) between the case halves and twist the key to unsnap and separate the front case half from the back case half.



3068870

Fig. 30: FOBIK Case & Battery

Courtesy of CHRYSLER GROUP, LLC

3. Lift the battery (3) out of the receptacle in the back half of the FOBIK case (2).
4. Replace the battery with a recommended replacement battery. Refer to **TRANSMITTER, INTEGRATED KEY FOB, SPECIFICATIONS**.
5. Install the new battery into the receptacle in the back half of the FOBIK case with the negative terminal facing upward.
6. Align the front half of the FOBIK case (1) with the back half.
7. Using hand pressure, squeeze the two FOBIK case halves around their perimeters until they snap back together.
8. Reinsert the emergency key into the storage slot of the FOBIK case.
9. Test the FOBIK operation.

STANDARD PROCEDURE - FOBIK TRANSMITTER PROGRAMMING

FOB with Integrated Key (FOBIK) transmitter programming may require the use of the Personal Identification Number (PIN) for the vehicle, a diagnostic scan tool and the appropriate diagnostic information. Also be certain that the FOBIK and any replaced electronic modules are programmed in the proper sequence. Refer to **STANDARD PROCEDURE**.

SPECIFICATIONS**SPECIFICATIONS - FOBIK TRANSMITTER****BATTERY**

The FOB with Integrated Key (FOBIK) transmitter is powered by a single 3-volt lithium and manganese dioxide button cell battery, which can be removed and replaced without special tools. Refer to **TRANSMITTER, INTEGRATED KEY FOB, STANDARD PROCEDURE**. The international standard battery type designation is: **CR2032**. This battery type is available at many local retail stores. Typical battery life is approximately three years.

CAUTION: Do not handle the batteries any more than necessary. Hands must be clean and dry.

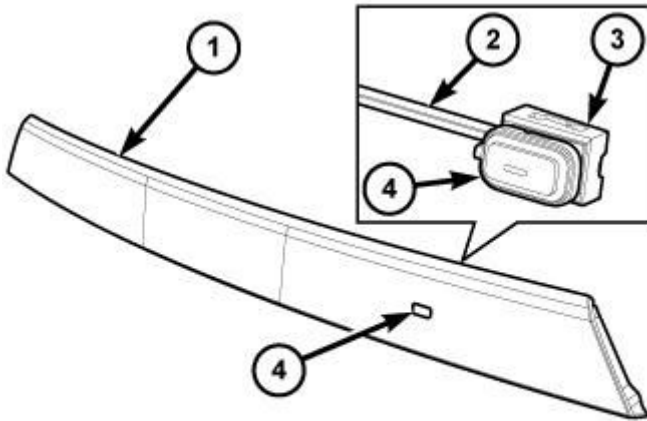
RANGE

Normal FOBIK Remote Keyless Entry (RKE) transmitter operation range for vehicles manufactured for domestic markets is up to 20 meters (66 feet) away from the vehicle. On vehicles manufactured for export markets, normal FOBIK transmitter operation range is up to 10 meters (33 feet) away from the vehicle. If a domestic market vehicle is equipped with the optional factory-installed Remote Start System, the normal FOBIK transmitter operation range is increased to up to 91 meters (300 feet). Please note that the actual FOBIK transmitter range values may be better or worse than specified above, depending upon many possible variables in the environment at the specific time and location that any FOBIK transmission is attempted.

SWITCH, LIFTGATE RELEASE

DESCRIPTION

DESCRIPTION



2810385

Fig. 31: Liftgate Handle And Light Bar Unit, PE Liftgate Lock And Unlock Switch And Push Button
Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with the optional Passive Entry (PE) system have a unique liftgate handle and light bar unit (1) that incorporates a PE liftgate lock and unlock switch (3) and push button (4). This tactile switch is secured to the back of the right side of the handle and light bar unit by three latch features integral to the back of the handle housing. The switch button extends through a clearance hole in the handle housing so that it can be accessed on the outer surface of the handle to the right side of center.

The switch is soldered to the handle and light bar unit wire harness secured to the back of the handle housing that connects the switch along with the liftgate flip-up glass latch release switch, the two license plate lamps and, if the vehicle is so equipped, the rear view camera to the vehicle electrical system through a dedicated take out and connector of the liftgate wire harness.

The PE liftgate lock and unlock switch cannot be adjusted or repaired. If the switch is damaged or ineffective, the entire liftgate handle and light bar unit wire harness must be replaced.

OPERATION

OPERATION

The Passive Entry (PE) liftgate lock and unlock switch is a normally open switch that is hard wired to the Remote Frequency Hub (RFHUB) through a signal circuit and a return circuit. The RFHUB continually monitors the condition of the PE liftgate lock and unlock switch and circuits, and will store a Diagnostic Trouble Code (DTC) for any fault that is detected in these circuits.

When the switch button is depressed, it provides a signal to the RFHUB. The RFHUB determines the system response based upon the inputs it receives through the authentication process with each detected FOB with Integrated Key (FOBIK). If the authentication process is successful, the RFHUB sends an electronic **lock request** or **unlock request** message to the Body Control Module (BCM) over the Controller Area Network (CAN) data bus, and the BCM energizes the liftgate lock and unlock relay accordingly.

The hard wired circuits between the PE liftgate lock and unlock switch and the RFHUB may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the switch or the electronic controls and communication between other modules and devices that provide some features of the PE system. The most reliable, efficient, and accurate means to diagnose the PE system or the electronic controls and communication related to liftgate lock and unlock switch operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

2014 ACCESSORIES AND EQUIPMENT**Power Mirrors - Service Information - Cherokee****DESCRIPTION****AUTOMATIC DIMMING INSIDE REAR VIEW MIRROR SYSTEM**

The automatic dimming inside rear view mirror is available factory-installed equipment on this vehicle. This mirror is also known as the ElectroChromic Mirror Module (ECMM). This mirror system uses an ElectroChromic (EC) material and will automatically adjust the reflectance of the mirror glass to reduce glare from the headlamps of following vehicles during dark or night time driving conditions. Reducing glare will improve driver comfort and vision under these driving conditions. The components of the automatic dimming inside rear view mirror system are completely self-contained within the inside rear view mirror. Refer to **MIRROR, AUTOMATIC DAY AND NIGHT, DESCRIPTION**.

Certain functions and features of the EC mirror system may rely upon resources shared by other electronic modules in the vehicle over a Local Interface Network (LIN) data bus as well as over the Controller Area Network (CAN) data bus. Other electronic modules in the vehicle that may affect EC mirror operation are:

- **Body Control Module** - The Body Control Module (BCM) is located beneath the instrument panel on the driver side of the vehicle. The BCM controls many of the body electrical system components. The BCM is both a LIN master node and a gateway to the CAN data bus. Refer to **MODULE, BODY CONTROL, DESCRIPTION**.
- **Powertrain Control Module** - The Powertrain Control Module (PCM) (also known as the Engine Control Module/ECM) is located beneath the hood in the engine compartment of the vehicle. The PCM controls many of the powertrain electrical system components. The PCM communicates on the CAN data bus. Refer to **MODULE, POWERTRAIN CONTROL, DESCRIPTION**.
- **Transmission Control Module** - On vehicles with an automatic transmission, the Transmission Control Module (TCM) (also known as the Engine Control Module/ECM) is located beneath the hood in the engine compartment of the vehicle. The TCM controls many of the automatic transmission electrical system components. The TCM communicates on the CAN data bus. Refer to **MODULE, TRANSMISSION CONTROL, OPERATION**.

These components and their controls are combined to provide the following EC mirror system feature:

- **Dimming Disabled In Reverse** - The automatic dimming feature of the EC mirrors is disabled anytime the Reverse position of the transmission is selected.

POWER OPERATED OUTSIDE REAR VIEW MIRROR SYSTEM

The power operated outside rear view mirror system is available factory-installed equipment on this vehicle. This system allows the driver to adjust both the driver and passenger side outside rear view mirrors electrically from the driver seat by operating switches on the arm rest of the driver side front door inside trim panel. These switches allow the vehicle operator a convenient means of adjusting the mirrors to optimize peripheral vision to include the areas at the sides and rear corners of the vehicle, those blind spot areas that are generally blocked

from the view of the vehicle operator by the vehicle structure.

The power operated outside rear view mirror system includes the following major components, which are described in further detail elsewhere in this service information:

- **Power Mirror** - Vehicles equipped with the power operated outside rear mirror system have a power operated mirror secured to the mirror flag area at the front of each front door glass opening. Refer to **MIRROR, OUTSIDE REARVIEW, DESCRIPTION**.
- **Power Mirror Switch** - Vehicles equipped with the power operated outside rear view mirror system have a power mirror selector switch, a power mirror control switch, and a power folding mirror switch integral to the power switch module located near the front of the arm rest on the driver side front door interior trim panel. Refer to **SWITCH, LOCK, DESCRIPTION**.

Certain functions and features of the power operated outside rear view mirror system may rely upon resources shared by other electronic modules in the vehicle over a Local Interface Network (LIN) data bus as well as over the Controller Area Network (CAN) data bus. Other electronic modules in the vehicle that may affect power operated outside rear view mirror operation are:

- **Blind Spot Sensors** - Vehicles equipped with the BSM system have both a Left Blind Spot Sensor (LBSS) and a Right Blind Spot Sensor (RBSS). The LBSS and the RBSS each include a RADAR sensor and an integral electronic control unit. Each of the two control units is independent, communicates on the Controller Area Network (CAN) data bus and is hard wired to its respective right or left blind spot display. The LBSS and the RBSS are concealed behind their respective right and left outboard ends of the rear bumper fascia, just behind the rear wheel openings.
- **Body Control Module** - The Body Control Module (BCM) is located beneath the instrument panel on the driver side of the vehicle. The BCM controls many of the body electrical system components. The BCM is both a LIN master node and a gateway to the CAN data bus. Refer to **MODULE, BODY CONTROL, DESCRIPTION**.
- **Radio Frequency Hub Module** - The Radio Frequency Hub Module (RFHM) (also known as the RF Hub) is the RKE system control module and RF receiver located in the rear cargo area headliner. Refer to **MODULE, RADIO FREQUENCY (RF HUB), DESCRIPTION**.

These components and their controls are combined to provide the following power operated outside rear view mirror system features:

- **Blind Spot Monitor Display** - In vehicles also equipped with the optional Blind Spot Monitor (BSM) system, an amber Light Emitting Diode (LED) unit behind a small, triangular translucent icon in each outside rear view mirror glass is illuminated each time the right or left blind spot sensor detects an object of interest in one of the monitored vehicle blind spots. Refer to **DISPLAY, BLIND SPOT, DESCRIPTION**.
- **Heated Mirrors** - The heated mirror option includes an electric heating grid behind the mirror glass in each outside rear view mirror, which can clear the mirror glass of ice, snow, or fog. Refer to **DESCRIPTION**.
- **Puddle Lamps** - In vehicles equipped with this option, white Light Emitting Diode (LED) units behind a small round lens on the underside of each outside rear view mirror illuminate the ground outside each front door when a door is opened. Refer to **DESCRIPTION**.

- **Signal Lamps** - In vehicles equipped with this option, two amber Light Emitting Diode (LED) units illuminate a light pipe behind a clear lens that wraps around the lower outward and forward-facing surfaces of each mirror shell in concert with the turn signals. Refer to **DESCRIPTION**.

OPERATION

OPERATION

AUTOMATIC DIMMING INSIDE REAR VIEW MIRROR SYSTEM

The ElectroChromic Mirror Module (ECMM) of the automatic dimming inside rear view mirror system receives battery current on a fused ignition output (run) circuit from a fuse in the Junction Block (JB) (also known as the interior Power Distribution Center/PDC). The ECMM has a path to ground at all times through a take out and eyelet terminal of the body wire harness that is secured to the body sheet metal. These connections allow the automatic dimming inside rear view mirror system to operate. When the automatic dimming mirror system is on, a green power indicator within the mirror housing is illuminated by an integral Light-Emitting Diode (LED) unit.

POWER OPERATED OUTSIDE REAR VIEW MIRRORS

The power operated outside rear view mirrors are connected to battery current at all times. Each mirror head contains two electric motors, two drive mechanisms, an electric heating element and the mirror glass. First, a mirror selector switch button is depressed in the driver door power switch module to determine whether the mirror adjuster switch will have control over the right or left mirror. If the vehicle is equipped with the high current door power switch module configuration, hard wired ground and battery current outputs to each power mirror motor determine whether the horizontal or the vertical motor will be operated and the polarity of those outputs control the direction in which the motor will move the drive unit and mirror glass.

Power mirror and mirror switch functionality is the same with the low current configuration; however, the driver door power switch module sends power mirror switch status messages over the Local Interface Network (LIN) data bus to the driver front door control module. The driver front door control module then controls the high current outputs to the driver door mirror motors or sends electronic request messages over the Controller Area Network (CAN) Interior High Speed (IHS) data bus to the passenger front door control module to control high current outputs to the passenger door mirror motors.

The power mirror switch is diagnosed using a scan tool, refer to **DIAGNOSIS AND TESTING** for the appropriate information.

MIRROR, AUTOMATIC DAY AND NIGHT

DESCRIPTION

DESCRIPTION

INSIDE MIRROR - An automatic dimming inside rear view mirror is an available factory-installed option on this vehicle. This mirror features a thin layer of ElectroChromic (EC) material sandwiched between two pieces

of conductive glass to make up the face of the mirror. The EC material explains how this mirror also became known as the ElectroChromic Mirror Module (ECMM). The ECMM will automatically change the reflectance of the inside rear view mirror glass to reduce the glare of headlamps approaching the vehicle from the rear while driving during dark or night time conditions. The ability to turn this option ON or OFF will be found in the U-Connect touch screen as a soft button select switch.

The ECMM is a completely self-contained unit that replaces the standard equipment prismatic inside rear view mirror. Besides the mirror glass, the ECMM includes two photocell sensors, the electronic mirror control circuitry and the hardware necessary to communicate as a Local Interface Network (LIN) slave node on the LIN data bus.

Hard wired circuitry connects the ECMM to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the ECMM through the use of a combination of soldered splices, splice block connectors and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention as well as pin-out and location views for the various wire harness connectors, splices and grounds.

The ECMM cannot be repaired or adjusted. If any component of this unit is ineffective or damaged, the entire ECMM unit must be replaced.

OUTSIDE MIRROR - The automatic dimming driver side outside rear view mirror is able to automatically change its reflectance. The automatic dimming outside rear view mirror replaces the standard equipment outside rear view mirror. The two layers of conductive mirror glass with a thin layer of electrochromic material between them is contained within the outside rear view mirror glass case. However, this mirror relies upon the photocells and mirror control circuitry of the automatic dimming inside rear view mirror to control its reflectance.

The automatic dimming outside rear view mirror is secured to the same mounting flag on the front door panel and in the same manner that is used to mount the standard equipment outside rear view mirrors. The mirror is connected to the vehicle electrical system through a dedicated take out and connector of the front door wire harness. The automatic dimming circuitry of the outside rear view mirror receives current through auto day/night mirror feed (+) and return (-) circuits from the inside rear view mirror, and will only operate when the ignition switch is in the ON or START positions.

The automatic dimming outside rear view mirror sensitivity cannot be repaired or adjusted. If any component of this unit is ineffective or damaged, the entire outside rear view mirror unit must be replaced. For service procedures, refer to **MIRROR, OUTSIDE REARVIEW, REMOVAL** , **MIRROR, OUTSIDE REARVIEW, GLASS, REMOVAL** , **MIRROR, OUTSIDE REARVIEW, INSTALLATION** and **MIRROR, OUTSIDE REARVIEW, GLASS, INSTALLATION** .

OPERATION

OPERATION

Both the inside and outside automatic dimming mirrors receive battery current through a fused ignition switch output (run/start) circuit and fuse in the Body Control Module (BCM), and will only operate when the ignition

switch is in the ON or START positions.

INSIDE

The soft switch located in the U-Connect touch screen provides the vehicle operator with a manual control of whether the automatic dimming feature is operational. If the dimming is turned to the off position, the mirror will always turn back ON by default at the onset of a new ignition ON cycle. The automatic dimming mirror circuitry also senses the backup lamp circuit, and will automatically disable its self-dimming feature whenever the transmission gear selector is in the REVERSE position.

The ambient photocell sensor of the mirror faces forward, to detect the outside light levels through the windshield glass. A second headlamp photocell sensor is located in the upper right quadrant of the mirror face, to detect the light level received at the rear window side of the mirror. When the mirror control circuitry detects that the difference between the two sensed light levels has become too great (the light level received at the rear of the mirror is much higher than that at the front of the mirror) the mirror begins to darken. A thin layer of electrochromic material between two pieces of conductive glass make up the face of the mirror.

On vehicles equipped with an optional driver side automatic dimming outside rear view mirror, the signal to control the dimming of that mirror is generated by the automatic dimming inside rear view mirror circuitry. That signal is then delivered to the driver side outside rear view mirror on two hard wired circuits.

The BCM determines the ignition status and the gear status. Once determined, the BCM sends an enable/disable signal over the LIN bus to the electrochromic mirror. The electrochromic mirror reads the internal message for the sensor value and determines the ratio between forward/backward light intensity, along with the enable signal coming from the BCM, to determine the reflecting mode to be used.

OUTSIDE

The driver side automatic dimming outside mirror is operated by the same controls and circuitry as the automatic inside rear view mirror. When the automatic inside rear view mirror is switched ON or OFF, the automatic dimming outside mirror is likewise switched ON or OFF. Just as in the automatic inside rear view mirror, a thin layer of electrochromic material between two pieces of conductive glass make up the face of the automatic dimming outside mirror. However, the signal to control the dimming of the outside mirror is generated by the automatic dimming inside rear view mirror control circuitry based upon the inputs from the two photocell sensors integral to the inside mirror. That signal is then delivered to the driver side outside rear view mirror on two hard wired circuits.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - AUTOMATIC DIMMING INSIDE REAR VIEW MIRROR

For complete circuit diagrams, refer to **SYSTEM WIRING DIAGRAMS** .

1. With the status of the ignition switch Of, disconnect and isolate the battery negative cable. Unplug the wire harness connector from the ElectroChromic Mirror Module (ECMM). Reconnect the battery negative cable, then transition the status of the ignition switch to On. Check for battery voltage at the fused ignition output (run) circuit cavity of the wire harness connector for the ECMM. If OK, go to step

2. If not OK, repair the open circuit as required.
2. Transition the status of the ignition switch to Off. Disconnect and isolate the battery negative cable. Check for continuity between the ground circuit cavity of the wire harness connector for the ECMM and a good ground. There should be continuity. If OK, go to step 3. If not OK, repair the open circuit to ground as required.
3. Reconnect the wire harness connector for the ECMM. Reconnect the battery negative cable. Cover the forward facing ambient photocell sensor to keep out any ambient light. Transition the status of the ignition switch to On. Place the transmission gear selector lever in the Neutral position.

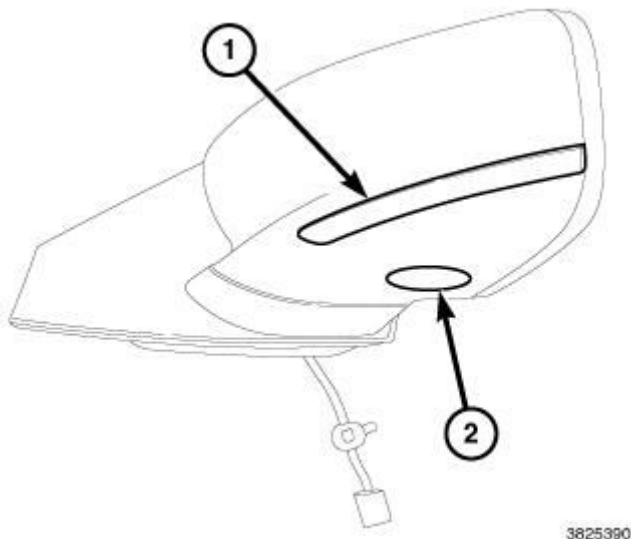
NOTE: **The ambient photocell sensor must be covered completely, so that no light reaches the sensor. Use a finger pressed tightly against the sensor, or cover the sensor completely with electrical tape.**

4. Shine a light into the rearward facing headlamp photocell sensor. The mirror glass should darken. Turn the light Off. The mirror glass should return to normal reflectance. If OK, go to step 5. If not OK, replace the ineffective ECMM unit.
5. Use a diagnostic scan tool and the appropriate diagnostic procedure to perform further ECMM diagnosis.

MIRROR, OUTSIDE REARVIEW

DESCRIPTION

DESCRIPTION



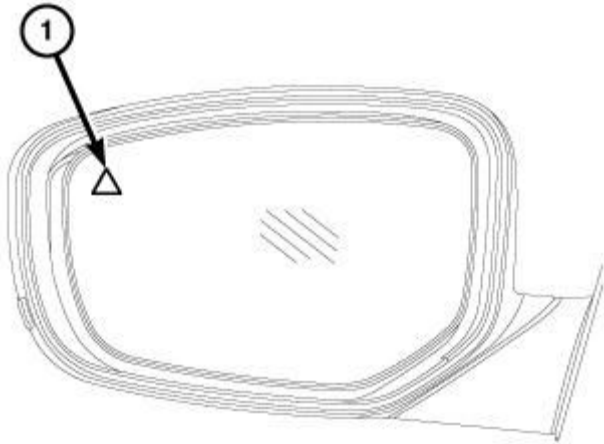
3825390

Fig. 1: Signal Lamps & Puddle Lamps
Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with the optional power operated outside rear view mirror system are equipped with a power mirror head unit located on the outside of each front door. Each power mirror has a molded plastic housing and bezel that faces rearward and a molded plastic decorative cover or shell that faces forward. The shell may also

include openings to accommodate Light Emitting Diode (LED) signal lamps (1) and puddle lamps (2) on vehicles equipped with those optional features.

The housing and shell are secured to a molded plastic arm with an integral, hollow pivot pin that is secured to the mirror mounting bracket. This pivot pin features a spring-loaded detent mechanism that allows the mirror to be manually folded toward the door glass for additional clearance during vehicle shipping or storage. The mirror mounting bracket has three threaded studs that are used to secure the mirror assembly to the flag area at the front of each front door glass opening.



3825398

Fig. 2: Blind Spot Monitor (BSM) LED Indicator Lamp Unit
Courtesy of CHRYSLER GROUP, LLC

The open rearward-facing side of the housing and bezel unit serves as a seat within which the mirror glass is exposed to the view of the vehicle operator. The mirror glass is mounted within a molded plastic case. In vehicles with the heated mirror option, a glass heating grid locked within a plastic membrane is sandwiched between the back of the mirror glass and the case. A Blind Spot Monitor (BSM) LED indicator lamp unit (1) is also integral to the case in vehicles with that option.

The mirror glass case snaps onto a swivel assembly integral to the mirror articulation mechanism on the arm within the mirror housing. The mirror articulation mechanism includes two small Direct Current (DC) electric motors with gear drives and clutch units that connect them to the swivel assembly. A mirror wire harness is connected to each of the electrical elements within the mirror housing and is routed through the hollow pivot pin and the mounting bracket to the interior of the front door, where it connects the mirror to the vehicle electrical system through a dedicated take out and connector of the door wire harness.

The power operated outside rear view mirror housing and bezel, mounting bracket, arm and articulation mechanism cannot be adjusted or repaired. If damaged or ineffective, the entire mirror unit must be replaced. Refer to **MIRROR, OUTSIDE REARVIEW, REMOVAL** and **MIRROR, OUTSIDE REARVIEW, GLASS, REMOVAL**. The puddle lamp and the signal lamp are available for separate service replacement. Refer to **LAMP, MIRROR, REMOVAL**. The mirror shell as well as a mirror glass and case unit with an integral heating grid and BSM indicator lamp are available for separate service replacement. Refer to **MIRROR, OUTSIDE REARVIEW, REMOVAL** and **MIRROR, OUTSIDE REARVIEW, GLASS, REMOVAL**.

REMOVAL .**OPERATION****OPERATION**

Each power mirror articulation mechanism is driven by two individual Direct Current (DC) reversible electric motors. Each motor also features Positive Temperature Coefficient (PTC) protection. One motor in each mirror controls horizontal (left and right) movement, while the second motor controls vertical (up and down) movement. The power mirror selector switch setting determines which mirror is to receive the output from the power mirror control switch.

The power mirror control switch determines which motor will be energized and the direction in which the motor will be driven. When battery current and ground are output from the control switch to the two motor terminals, the motor rotates in one direction. When the switch output polarity to the motor connections is reversed, the motor rotates in the opposite direction. The mirror articulation mechanism also incorporates clutches that protect the mechanism by disengaging the drive whenever the travel limits of the articulation swivel have been reached.

The power mirrors as well as the hard wired input circuits for the mirrors may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information.

DIAGNOSIS AND TESTING**DIAGNOSIS AND TESTING - POWER OUTSIDE REAR VIEW MIRROR**

The following tests will confirm whether the power mirror horizontal and vertical motors and articulation mechanisms are functional in either a driver or passenger outside rear view mirror. If the mirror motors and mechanisms pass the following tests, but a mirror fails to operate using the power mirror switch integral to the power lock and power window switch pod on the driver side front door, be certain to test the switch and the wiring between the switch and the mirror before considering component replacement.

Refer to **SWITCH, LOCK, DIAGNOSIS AND TESTING** and refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

1. Disconnect and isolate the battery negative cable.
2. Remove the trim panel from the inside of the door to which the ineffective power mirror is secured. Refer to **PANEL, DOOR TRIM, REMOVAL** .
3. Disconnect the door wire harness connector from the connector for the mirror to be tested.
4. Reconnect the battery negative cable.
5. Connect a jumper wire to a good body ground.
6. Connect a second jumper wire to a source of fused 12-volt battery current.
7. See the Power Mirror Motor Test table below for the correct jumper wire connections to the power mirror wire harness connector.

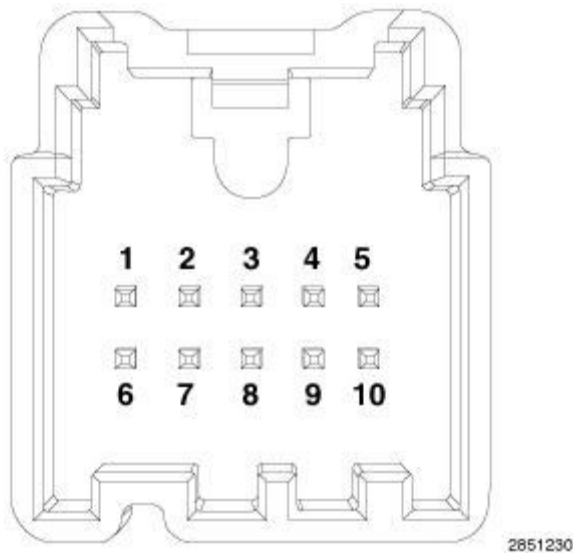


Fig. 3: Passenger Front Door Switch Module Connector Terminal Identification
Courtesy of CHRYSLER GROUP, LLC

POWER MIRROR MOTOR TEST TABLE

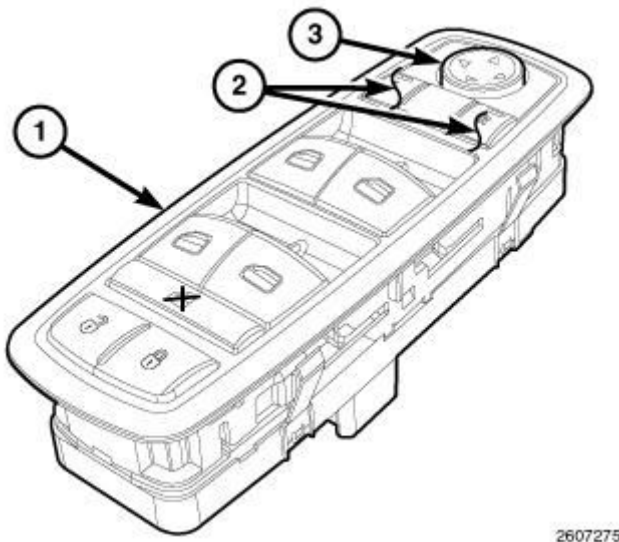
POWER MIRROR MOTOR TEST			
MIRROR CONNECTOR PINS		MIRROR REACTION	
12 VOLTS	GROUND	RIGHT MIRROR	LEFT MIRROR
Pin 1	Pin 2	-	Up
Pin 6	Pin 2	-	Left
Pin 2	Pin 1	-	Down
Pin 2	Pin 6	-	Right
Pin 7	Pin 2	Up	-
Pin 4	Pin 2	Left	-
Pin 2	Pin 7	Down	-
Pin 2	Pin 4	Right	-

NOTE: If either the horizontal or the vertical power mirror motor and articulation mechanism do not respond as indicated in the table, replace the ineffective power mirror assembly. If both power mirror motors and mechanisms respond as indicated in the table, test the power mirror switch. If the switch tests okay, test and repair the wiring between the power mirror switch and the power mirror for a short or open circuit as required.

SWITCH, MIRROR

DESCRIPTION

DESCRIPTION



2607275

Fig. 4: Driver Front Door Power Switch Module
Courtesy of CHRYSLER GROUP, LLC

The power mirror switch includes the mirror selector switch (2) and the mirror control switch (3), which are both integral to the driver side front door power switch module (1) located near the forward end of the arm rest on the driver side front door inside trim panel. The mirror selector switch includes two momentary push buttons marked **R** (Right) and **L** (Left). The mirror control switch includes a momentary selector disc marked with four directional arrow heads.

There are two unique versions of the driver side front door power switch module. One version is for use in vehicles equipped with the base power window system and is a high current design. The other version is for use in vehicles equipped with the premium power window system and is a low current design. Either version will operate the power mirror system correctly, but an incorrect version will not be compatible with the front door power window system components.

The power mirror switch is serviced only as a unit with the driver side front door power switch module (1). If any part of this switch module is ineffective or damaged, the entire module must be replaced with a new unit. Refer to **SWITCH, LOCK, REMOVAL**.

OPERATION

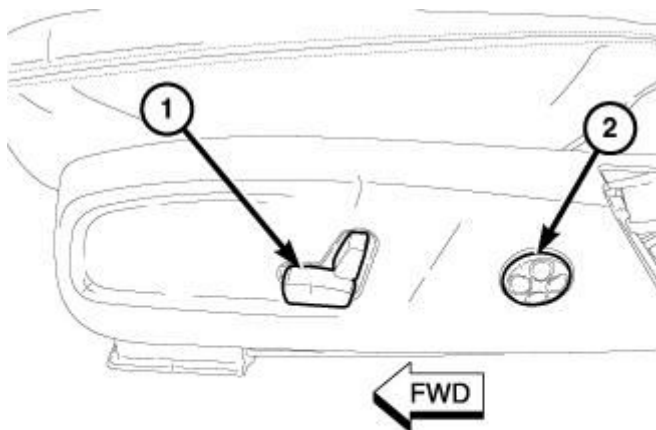
OPERATION

The power mirror switch circuitry within the driver side front door power switch module is connected to battery current through a non-switched fused B(+) circuit received from a fused B(+) fuse in the underhood Power Distribution Center (PDC). The power mirror switch circuitry also has a path to ground at all times through a take out and eyelet terminal of the body wire harness that is secured to the body sheet metal. These connections allow the power mirror switch to remain operational regardless of the status of the ignition switch.

A latching push button power mirror selector switch has three positions, **L** (left), **R** (right) and **N** (neutral). After the right or left mirror is selected, one of the four directional arrows on the momentary power mirror control switch disc is depressed to move the selected mirror up, down, right or left. The power mirror control

switch directs the appropriate battery current and ground feeds to the proper horizontal or vertical motor within the mirror articulating mechanism of the selected power mirror.

The power mirror switches as well as the hard wired input and output circuits of the switches may be diagnosed using conventional diagnostic tools and procedures. Refer to **SWITCH, LOCK, DIAGNOSIS AND TESTING** .

2014 ACCESSORIES AND EQUIPMENT**Power Seats - Service Information - Cherokee****DESCRIPTION****DESCRIPTION**

2979749

Fig. 1: Seat Position Switch & Lumbar Switch
Courtesy of CHRYSLER GROUP, LLC

A driver side six-way power seat is available on this vehicle. The power seat system allows the driver to electrically adjust the seating position using the power seat switch (1) located on the outboard seat cushion side shield. This graphic also shows the available lumbar option if equipped (2).

The six-way power seat can be adjusted forward, rearward, front up and front down. This power seat system may also be equipped with heated seats.

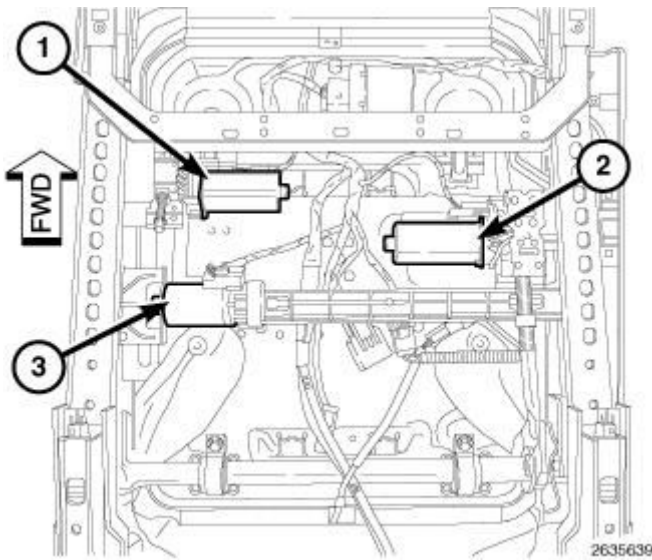
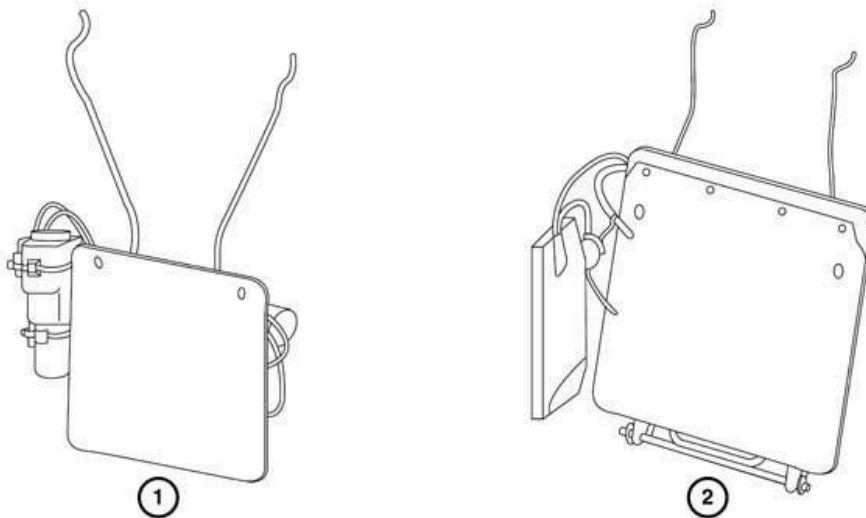


Fig. 2: Reversible Motor, Up/Down Seat Motor & Forward/Rearward Seat Motor
 Courtesy of CHRYSLER GROUP, LLC

The power seat adjuster assembly is made up of an upper and a lower power seat adjuster. The upper power seat adjuster contains one reversible motor (1) that is connected to a gearbox that tilts the front of the seat cushion up and down. The lower power seat adjusted contains two reversible motors connected to gearboxes. One motor (2) tilts the rear of the seat up and down and the other motor (3) moves the seat assembly forward and rearward. When the rear and front tilt motors are activated together, the height of the driver seat raises and lowers. Each motor contains a self-resetting circuit breaker to protect it from overload. Consecutive or frequent resetting of the circuit breakers may damage the motors.

The power seat motors cannot be adjusted or repaired and if inoperative or damaged, the entire power seat adjuster assembly must be replaced.



0825008028

Fig. 3: Heated & Vented Seat System (HVS Equipped) Lumbar System & Heated Only Or Non Heated Or Non Vented Seat (non-HVS) Lumbar System
Courtesy of CHRYSLER GROUP, LLC

There are two possible lumbar systems available for this vehicle.

- **HEATED AND VENTED SEAT SYSTEM (HVS equipped) LUMBAR SYSTEM (1)**
- **HEATED ONLY OR NON HEATED OR NON VENTED SEAT (non-HVS) LUMBAR SYSTEM (2).**

OPERATION

OPERATION

The power seat system receives battery current through a fuse in the Power Distribution Center (PDC) and remains operational, regardless of ignition position.

When a power seat switch is actuated, a battery feed and a ground path are applied through the power seat switch contacts to the appropriate motor or motors. The motor and drive unit operate to move the seat in the selected direction until the switch is released, or until the travel limit of the gearbox and linkage is reached. When the switch is moved in the opposite direction, the battery feed and ground path to the motor is reversed through the switch contacts. This causes the motor to run in the opposite direction.

The power seat motors, gearboxes and linkage cannot be adjusted or repaired and if inoperative or damaged, the entire power seat adjuster and seat cushion pan, or the power reclining seat back must be replaced as an assembly.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - POWER SEAT SYSTEM

NOTE: For complete circuit diagrams, refer to **SYSTEM WIRING DIAGRAMS** . Wiring Information includes wiring diagrams, connector pin-out and location views, details of wire harness routing and retention, splice and ground locations and proper wire and connector repair procedures.

Operate the power seat switches and power lumbar support switch. Move the seat, seat back and power lumbar support in all directions. The seat and lumbar support should move in each of the selected directions. If any of the power seat and/or lumbar support motors fail to operate in more than one direction, proceed as follows:

1. Inspect the power seat and power lumbar pneumatic motor to ensure the electrical connectors are fully connected to the motor. If OK, go to Step 2. If not OK, reconnect the electrical connector(s).
2. Check the power seat fuse in the Power Distribution Center (PDC). If OK, go to Step 3. If not OK, replace the fuse.
3. Remove the power seat switch and/or power lumbar switch from the seat cushion side panel. Check for

battery voltage at the fused B(+) circuit cavity of the switch wire harness connector. If OK, go to Step 4. If not OK, repair the open circuit as required.

4. Check for continuity between the ground circuit cavity of the power seat switch and/or power lumbar switch wire harness connector and a good ground. There should be continuity. If OK, go to Step 5. If not OK, repair the open circuit to ground as required.
5. Test the power seat switch and/or power lumbar switch. Refer to **SWITCH, SEAT, DIAGNOSIS AND TESTING** and **SWITCH, LUMBAR CONTROL, DIAGNOSIS AND TESTING**. If the switch tests OK, check the wire harness between the switch and the motor(s) (refer to **SYSTEM WIRING DIAGRAMS**). If the circuits check OK, replace the inoperative power seat track or the seat back assembly (Refer to **SEATS, FRONT** or **SEATS, REAR**). If the circuits are not OK, repair the wire harness as required.

SWITCH, MEMORY

DESCRIPTION

DESCRIPTION

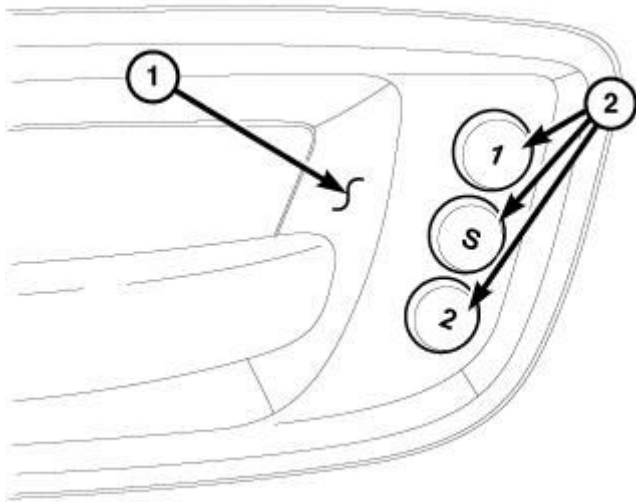


Fig. 4: Memory Switch & Driver Door Trim Panel
Courtesy of CHRYSLER GROUP, LLC

When equipped, the memory seat switch (2) is located on the driver door trim panel (1). The driver seating position can be automatically adjusted for two different driver preference settings using the memory seat switch. The memory seat system is able to store and recall all driver power seat positions (fore/aft, up/down, tilt and recline), driver side power rear view mirror position and the power adjustable steering column position, when equipped. The memory system is also able to store and recall up to twenty radio station presets for two drivers (ten AM and ten FM). The memory system also will store and recall the last station listened to for each driver, even if it is not one of the twenty preset stations.

OPERATION

OPERATION

When one of the two driver memory seat switches is pressed, a resistance signal is sent to the Memory Seat Module (MSM) over the Controller Area Network (CAN) data bus. The MSM is responsible for the 12 volt Direct Current (DC) feed and ground path to the power seat motors.

The MSM receives the memory seat switch set and selection inputs through the CAN bus circuit, along with input signals from the hall effect sensors in the driver side mirror and power adjustable steering column (when equipped), and hardwired input signals from the hall effect sensors mounted in each of the driver power seat motors. The programmed software in the module allow it to know where the driver seat, driver side mirror and power adjustable steering column (when equipped) are located in their designed travel, by the pulse count generated from each hall effect sensor. This way, when a memory switch is pressed, the MSM powers the driver seat, driver side mirror and power adjustable steering column (when equipped), until each correct preset location is achieved. The MSM will prevent seat memory recall function from being initiated if the transmission gear selector lever is not in the Park position or if the driver seat belt is latched. These inputs are monitored by the MSM over the CAN bus.

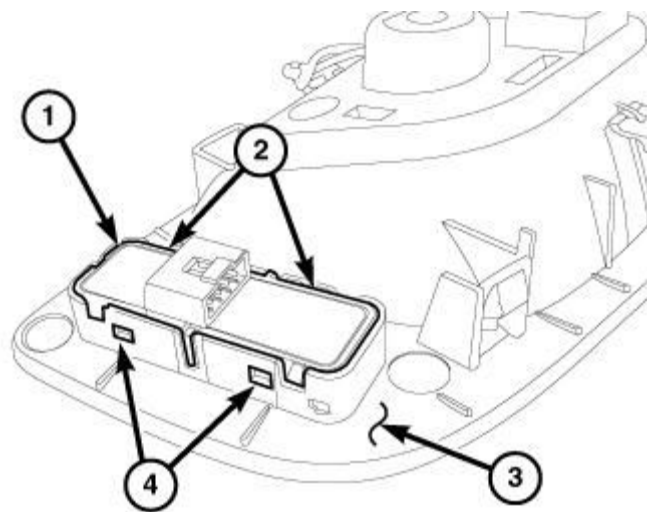
- A memory setting is saved by pressing the "set" button, then pressing either the memory "1" or "2" button within five seconds of pressing the "set" button.
- A memory setting is recalled by pressing either the memory "1" or "2" button, or by pressing the unlock button on a "linked" Remote Keyless Entry (RKE) transmitter.

The memory seat switch is diagnosed using a scan tool. Refer to **DIAGNOSIS AND TESTING** .

The memory seat switch cannot be adjusted or repaired and must be replaced if damaged or inoperative.

REMOVAL**REMOVAL**

NOTE: **Take the proper precautions to protect the door handle and bezel from cosmetic damage while performing this procedure.**



3067628

Fig. 5: Memory Seat Switch & Retaining Tabs

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove the driver door handle and place it on a workbench. Refer to **PANEL, DOOR TRIM, REMOVAL**.
3. Using an appropriate flat bladed tool, gently disengage the four retaining tabs (2 and 4) that secure the memory seat switch (1) to the back of the driver door handle bezel (3).
4. Remove the memory seat switch from the driver door handle bezel.

INSTALLATION

INSTALLATION

NOTE: Take the proper precautions to protect the door handle and bezel from cosmetic damage while performing this procedure.

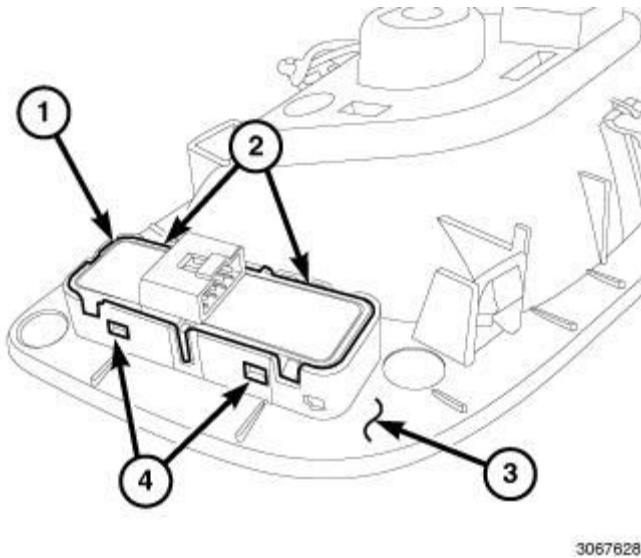


Fig. 6: Memory Seat Switch & Retaining Tabs
Courtesy of CHRYSLER GROUP, LLC

1. Install the memory seat switch (1) into the driver door handle bezel (3). Push the switch firmly into the bezel until the retaining tabs (2 and 4) are fully engaged.
2. Install the driver door handle and bezel. Refer to **PANEL, DOOR TRIM, INSTALLATION**.
3. Reconnect the negative battery cable.
4. Using a scan tool, perform the Power Seat System Verification test. Refer to **STANDARD PROCEDURE**.
5. Verify proper memory seat system operation.

MOTOR, SEAT

REMOVAL

REMOVAL- SEAT HEIGHT ADJUSTMENT MOTOR

WARNING: Disable the airbag system before attempting any component diagnosis or service of the front seats, when equipped with front seat air bags. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

WARNING: Use caution when removing the height adjust motor and gearbox assembly (2) if the motor is inoperative, and the power seat is not in the full up position. The seat adjuster assembly is under load from the height adjust assist spring and may cause the motor to rotate under pressure

when the fasteners are removed. The seat adjuster assembly also may spring upward when the motor is removed. If the height adjust motor is operative, move the power seat to the full up position prior to disconnecting the battery.

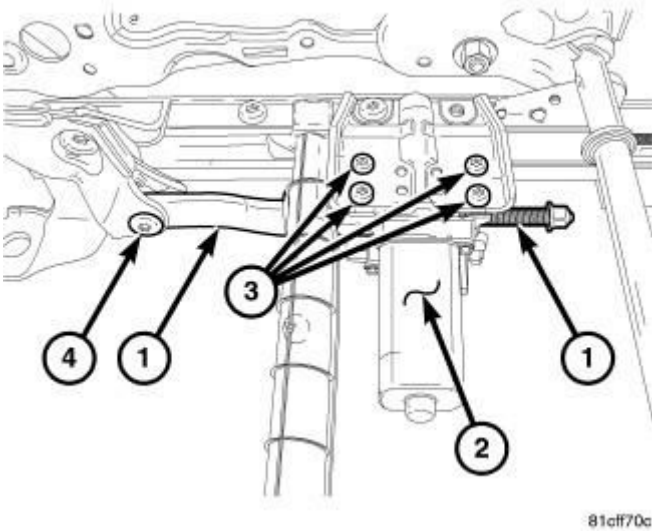
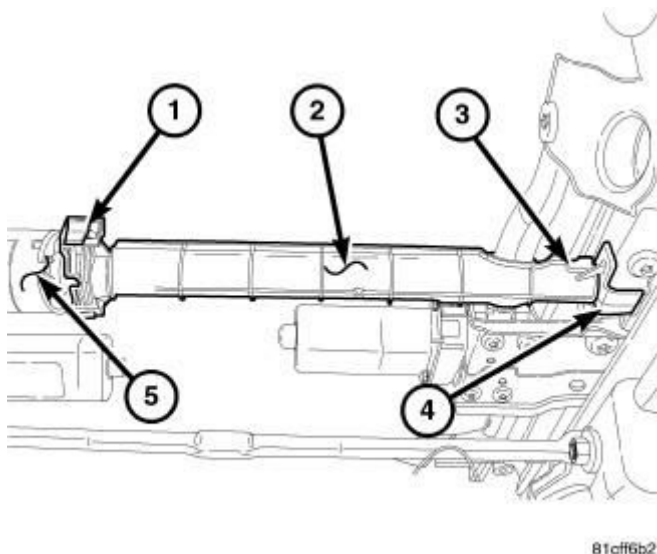


Fig. 7: Height Adjust Motor And Gearbox Assembly
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove the inoperative front seat. Refer to **SEAT, REMOVAL**.
3. Disconnect the height adjust motor electrical connector.
4. Remove the height adjust motor gearbox spindle (1) retaining screw (4).
5. Remove the motor retaining screws (3).
6. Remove the height adjust motor and gearbox assembly (2) from the seat track.

REMOVAL- SEAT FORWARD/AFT MOTOR

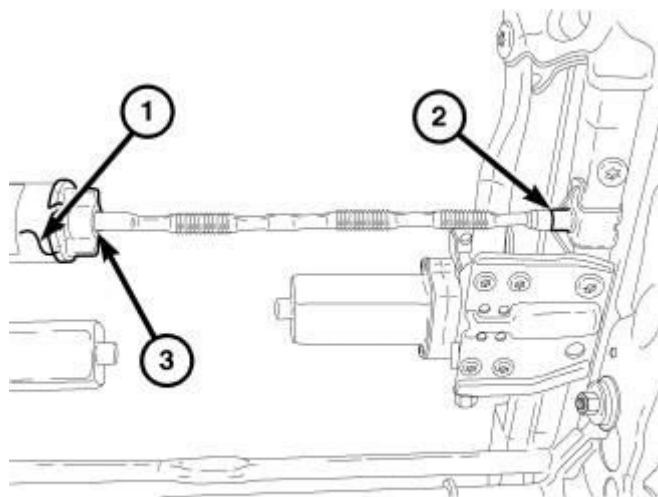
WARNING: Disable the airbag system before attempting any component diagnosis or service of the front seats, when equipped with front seat air bags. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.



81cff6b2

Fig. 8: Identifying Power Seat Fore/Aft Motor
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove the inoperative front seat. Refer to **SEAT, REMOVAL** .
3. Remove the flex drive cable cover (2).
 - a. Using a small flat bladed tool, release the mounting strap (1) that secures the flex drive cable cover (2) to the fore/aft motor (5).
 - b. Pivot the cover away from the cable and pull it away from the seat frame (4) to disengage the cover slot from the mounting tab (3).

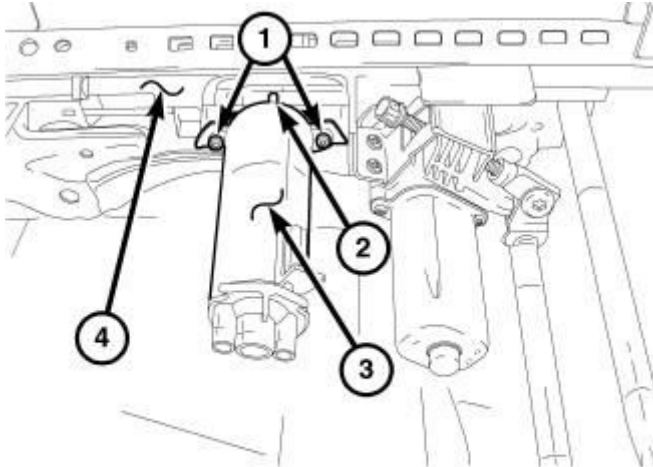


81cff6d2

Fig. 9: Flex Drive Cable
Courtesy of CHRYSLER GROUP, LLC

4. Remove the flex drive cable.

- a. Carefully bend the flex drive cable at the center and pull the motor end (3) away from the fore/aft motor (1) to disengage.
- b. Pull the cable out of the screw drive assembly (2) and remove from seat track.



81c1f6eb

Fig. 10: Seat Frame Assembly
 Courtesy of CHRYSLER GROUP, LLC

5. Disconnect the fore aft motor electrical connector.
6. Remove the fore/aft motor to mounting bracket retaining screws (1).
7. Remove the fore/aft motor (3).
8. Remove the short flex drive cable (2) from the seat frame assembly (4).

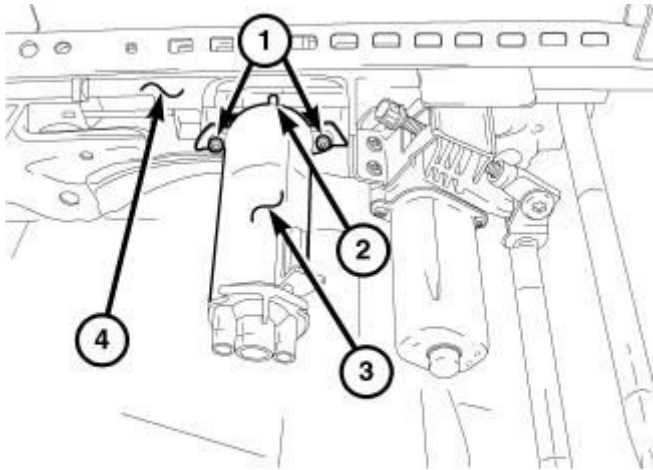
INSTALLATION

INSTALLATION - SEAT FORWARD/AFT MOTOR

WARNING: Disable the airbag system before attempting any component diagnosis or service of the front seats, when equipped with front seat air bags. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions may result in accidental airbag deployment and possible serious or fatal injury.

CAUTION: Seat track side to side timing may be off if the fore aft motor was completely inoperative prior to removal. In the event the track timing is in question, proceed to for track timing procedure. If track timing is not in question proceed to.

1. Using the square drive end of the old flex drive cable and a variable speed drill motor, drive the seat track screw drive assemblies reward until they reach the rear stops.
 - a. Clamp one end of the old cable into the drill motor chuck.
 - b. Put the other cable end into the seat track screw drive cable slot and slowly drive the seat track assembly reward until it reaches the rear stops. Take care not to bind the cable when the drive reaches the stop.
 - c. Repeat this procedure for the other seat track.



81cfff6eb

Fig. 11: Removing/Installing Short Flex Drive Cable & Fore/Aft Motor
 Courtesy of CHRYSLER GROUP, LLC

2. Install the short flex drive cable (2) into the seat frame assembly (4). Ensure the square cable end is properly aligned and fully inserted into the square drive slot of the screw drive assembly.
3. Install the fore/aft motor (3) ensuring the square cable end is properly aligned and fully inserted into the square drive slot of the motor.
4. Install the motor retaining screws (1). Tighten the screws to 5 N.m (45 in. lbs.).

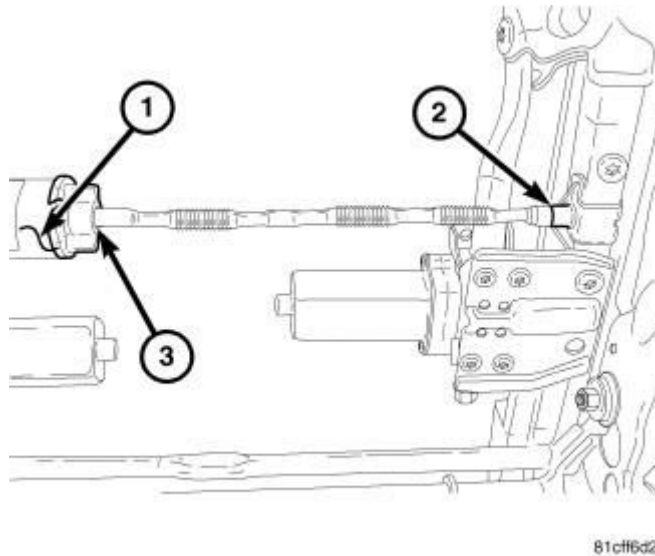


Fig. 12: Flex Drive Cable
Courtesy of CHRYSLER GROUP, LLC

5. Install the flex drive cable.
 - a. Install the flex drive cable into the seat frame assembly (2). Ensure the square cable end is properly aligned and fully inserted into the square drive slot of the screw drive assembly.
 - b. Install the flex drive cable into the fore/aft motor (1). Ensure the square cable end is properly aligned and fully inserted into the square drive slot of the motor assembly (3).

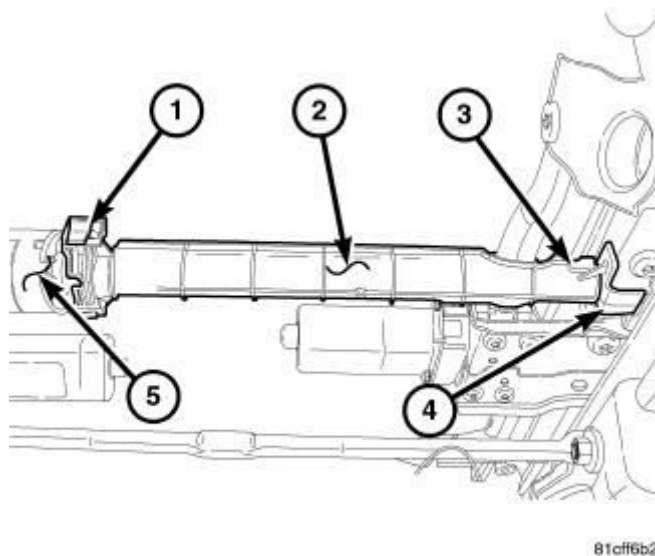


Fig. 13: Identifying Power Seat Fore/Aft Motor
Courtesy of CHRYSLER GROUP, LLC

6. Position the flex drive cable cover (2) onto the seat track assembly (4). Ensure the cover slots are properly aligned and fully inserted onto the mounting tabs (3).
7. Pivot the cable cover towards the cable and onto the fore/aft motor (5).

8. Secure the cover to the motor with the retaining strap (1).
9. Connect the fore/aft motor electrical connector.
10. Install the power seat. Refer to **SEAT, INSTALLATION** .
11. Verify proper power seat operation.

INSTALLATION

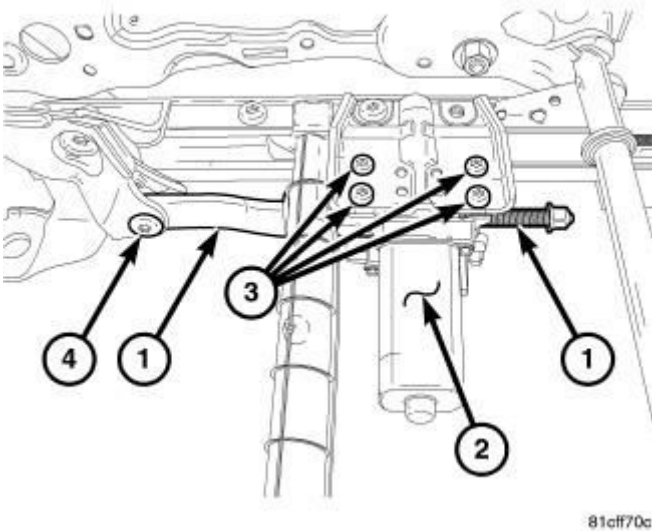


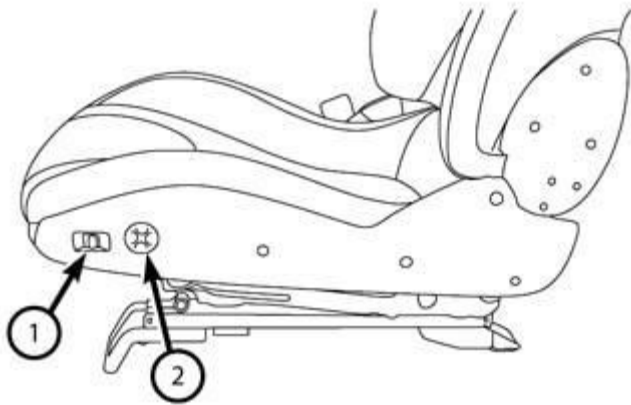
Fig. 14: Height Adjust Motor And Gearbox Assembly
Courtesy of CHRYSLER GROUP, LLC

1. Screw the height adjust motor gearbox spindle (1) in or out as necessary until the motor retaining screws (3) and spindle screw (4) holes are aligned and all fasteners can be installed.
2. Position the height adjust motor and gearbox assembly (2) onto the seat track.
3. Install the motor retaining screws (3). Tighten the screws to 12 N.m (106 in. lbs.).
4. Install the height adjust motor gearbox spindle (1) retaining screw (4). Tighten the screw to 17 N.m (150 in. lbs.).
5. Connect the motor electrical connector.
6. Install the seat. Refer to **SEAT, INSTALLATION** .
7. Reconnect the negative battery cable.
8. Verify proper power seat operation.

SWITCH, SEAT

DESCRIPTION

DESCRIPTION



082574994

Fig. 15: Seat Position Switch & Power Seat Recliner Switch
Courtesy of CHRYSLER GROUP, LLC

NOTE: Driver power seat switch shown.

The standard driver power seat and available power front passenger seats can be adjusted using the power seat switch located on the outboard seat cushion side shield.

The power seat adjuster switch assembly is used for adjusting the front seats (both driver and passenger) position, it could have one or two knobs depending on the different versions (4-way, 6-way, 8-way).

Both the high current and low current versions of the power seat adjuster switch assemblies is to provide a means to electrically adjust the position of the front driver and passenger seats, high current switch feeds the Seat motors directly whilst low current is used in vehicles with Memory Recall feature so the signal travel to an ECU which controls the motors.

OPERATION

OPERATION

When a power seat switch is actuated, a battery feed and a ground path are applied through the switch contacts to the power seat track adjuster motor. The selected adjuster motor operates to move the seat through its drive unit in the selected direction until the switch is released, or until the travel limit of the adjuster is reached. When the switch is moved in the opposite direction, the battery feed and ground path to the motor are reversed through the switch contacts. This causes the adjuster motor to run in the opposite direction.

On vehicles equipped with the memory seat system, the driver memory seat switch provides a resistive signal/input to the Memory Seat Module (MSM). The MSM is responsible for the 12 volt battery feed and ground path to the power seat adjuster motors.

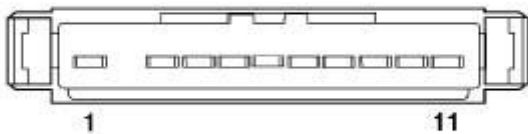
No power seat switch should be held applied in any direction after the adjuster has reached its travel limit. The

power seat adjuster motors each contain a self-resetting circuit breaker to protect them from overload. However, consecutive or frequent resetting of the circuit breaker may result in motor damage.

The individual switches in the power seat switch cannot be adjusted or repaired. If a switch is damaged or inoperative, the entire power seat switch must be replaced.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - POWER SEAT SWITCH



8132c253

Fig. 16: Power Seat Switch Terminals
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the power seat switch from the power seat. Refer to **SWITCH, SEAT, REMOVAL**.
3. Use an ohmmeter to test the continuity of the power seat switch. If not OK, replace the faulty power seat switch. If switch tests OK, refer to **DIAGNOSIS AND TESTING**.

POWER SEAT SWITCH CONTINUITY

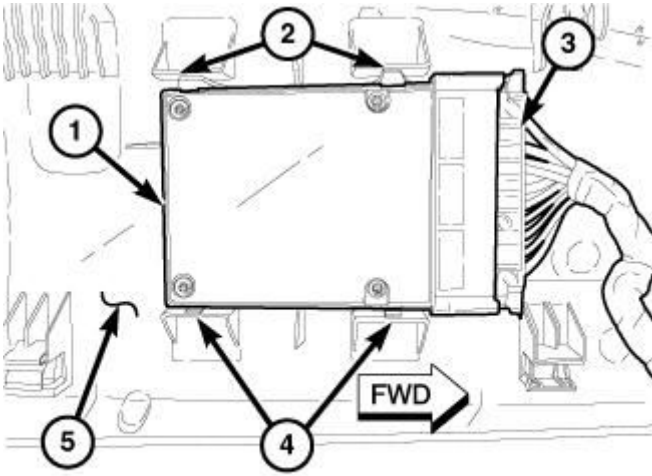
SWITCH POSITION	CONTINUITY BETWEEN
OFF	7-1, 7-3, 7-4, 7-5, 7-8, 7-9, 7-10, 7-11
RECLINER UP	6-3, 7-1, 7-4, 7-5, 7-8, 7-9, 7-10, 7-11
RECLINER DOWN	6-1, 7-3, 7-4, 7-5, 7-8, 7-9, 7-10, 7-11
HORIZONTAL FORWARD	6-8, 7-1, 7-3, 7-4, 7-5, 7-9, 7-10, 7-11
HORIZONTAL REARWARD	6-4, 7-1, 7-3, 7-5, 7-8, 7-9, 7-10, 7-11

REMOVAL

REMOVAL

WARNING: Disable the airbag system before attempting any front seat diagnosis or

service. Disconnect and isolate the negative battery (ground) cable and wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.



2980599

Fig. 17: Electrical Connector, Power Seat Switch, Seat Cushion Side Trim Panel & Four Retaining Tabs
Courtesy of CHRYSLER GROUP, LLC

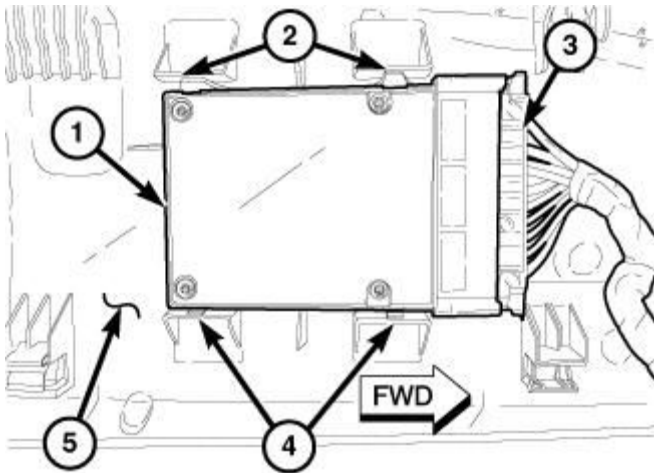
1. Position the seat being serviced all the way forward.
2. Disconnect and isolate the negative battery cable.

NOTE: It is not necessary to remove the seat belt anchor from the seat when servicing the power seat switch.

3. Remove the outboard seat cushion side trim panel (5) from the seat. Refer to **SIDE SHIELDS, SEAT CUSHION, FRONT, REMOVAL**.
4. Using Trim Stick (special tool #C-4755, Trim Stick) or equivalent, carefully disengage the four tabs (2 and 4) that secure the power seat switch (1) to the seat cushion side trim panel.
5. Disconnect the electric connector (3) from the power seat switch and remove the switch.

INSTALLATION

INSTALLATION



2980599

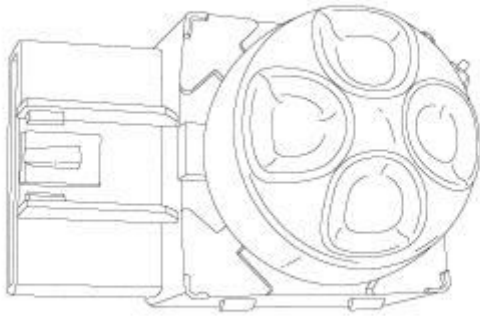
Fig. 18: Electrical Connector, Power Seat Switch, Seat Cushion Side Trim Panel & Four Retaining Tabs
Courtesy of CHRYSLER GROUP, LLC

1. Connect the electrical connector (3) to the power seat switch (1). Make sure the connector is fully engaged to the switch.
2. Position the power seat switch to the seat cushion side trim panel (5) and engage the four retaining tabs (2 and 4) that secure the switch to the trim panel. Make sure the retaining tabs are fully engaged.
3. Install the outboard seat cushion side trim panel. Refer to **SIDE SHIELDS, SEAT CUSHION, FRONT, INSTALLATION**.
4. Connect the negative battery cable.
5. Verify proper power seat operation.

SWITCH, LUMBAR CONTROL

DESCRIPTION

DESCRIPTION



2733809

Fig. 19: Power Lumbar Switch
Courtesy of CHRYSLER GROUP, LLC

The Power Lumbar Switch which is located at the side bottom of both driver and front passenger seat. It is used to provide a means to electrically adjust the position of the front driver and passenger seats to make it more comfortable. It is able to adjust the Seat Back Rest Lumbar support forward and Rearward. It is also able to adjust the Lumbar Support position upward and downward. It's a high current switch driving the seat motors directly from battery feed.

There are two available lumbar systems available for this model. Vehicles with Heated and Vented Seats (HVS) receive a motor and cable driver lumbar system. Vehicle with heated seat or no heating or cooled accessories will receive a non-HVS system which involves a pneumatic pump and bladder.

OPERATION

OPERATION

HEATED ONLY OR NON HEATED OR NON VENTED SEAT (non-HVS) LUMBAR SYSTEM - When a power lumbar support switch is actuated, a battery feed and a ground path are applied through the switch contacts to the power lumbar pneumatic pump. The pneumatic pump operates the lumbar support bladder in the selected direction until the switch is released, or until the fill limit of the bladder is reached. When the switch is moved in the opposite direction, the battery feed and ground path to the motor are reversed through the switch contacts. This causes the pneumatic pump motor to run in the opposite direction.

The power lumbar support switch should not be held applied in any direction after the bladder has reached its travel limit. The power lumbar support pneumatic motor contains a self-resetting circuit breaker to protect from overload. However, consecutive or frequent resetting of the circuit breaker may result in motor damage.

The power lumbar switch cannot be adjusted or repaired and must be replaced if damaged or inoperative.

HEATED AND VENTED SEAT SYSTEM (HVS equipped) LUMBAR SYSTEM - When a power lumbar

support switch is actuated, a battery feed and a ground path are applied through the switch contacts to the power lumbar support adjuster. The selected lumbar support adjuster motor operates the lumbar support adjuster mechanism through its drive unit in the selected direction until the switch is released, or until the travel limit of the adjuster is reached. When the switch is moved in the opposite direction, the battery feed and ground path to the motor are reversed through the switch contacts. This causes the selected power lumbar support adjuster motor to run in the opposite direction.

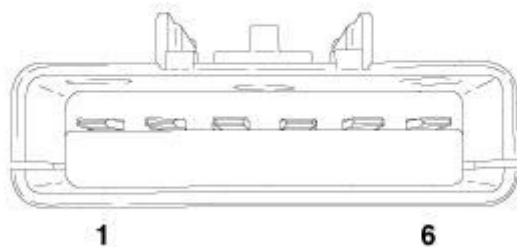
No power lumbar support switch should be held applied in any direction after the adjuster has reached its travel limit. The power lumbar support adjuster motors each contain a self-resetting circuit breaker to protect them from overload. However, consecutive or frequent resetting of the circuit breaker may result in motor damage.

The power lumbar switch cannot be adjusted or repaired and must be replaced if damaged or inoperative.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - POWER LUMBAR SWITCH

NOTE: For complete circuit diagrams, refer to **SYSTEM WIRING DIAGRAMS** . Wiring Information includes wiring diagrams, connector pin-out and location views, details of wire harness routing and retention, splice and ground locations and proper wire and connector repair procedures.



2834249

Fig. 20: Power Lumbar Switch Connector Terminals
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the power lumbar support switch from the seat. Refer to **SWITCH, LUMBAR CONTROL, REMOVAL**.
3. Use an ohmmeter to test the continuity of the power lumbar support switch using the following table. If not OK, replace the inoperative power lumbar support switch. If switch tests OK, check for an open or short in the power lumbar support circuit wiring. If no open or short is found, replace the power lumbar

support adjuster motor(s) as required.

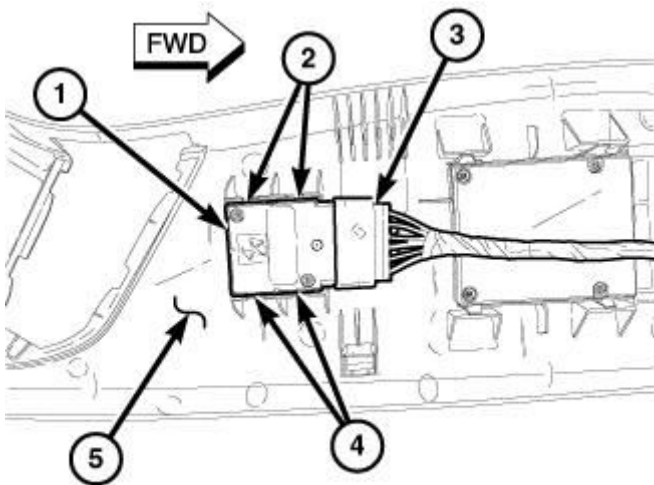
LUMBAR SWITCH CONTINUITY

SWITCH POSITION	CONTINUITY BETWEEN
OFF	1-2, 1-3, 1-4, 1-5, 2-3, 2-4, 2-5, 3-4, 3-5, 4-5
UP	1-2, 1-3, 1-4, 2-3, 2-4, 3-4, 5-6
DOWN	1-3, 1-4, 1-5, 2-3, 2-4, 2-5, 3-4, 3-5, 4-5
IN	1-2, 1-4, 1-5, 2-6, 3-4, 3-5, 4-5
OUT	2-4, 2-5, 3-6, 4-5

REMOVAL

REMOVAL

WARNING: Disable the airbag system before attempting any front seat diagnosis or service. Disconnect and isolate the negative battery (ground) cable and wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.



2980511

Fig. 21: Electrical Connector, Power Lumbar Control Switch, Seat Cushion Side Trim Panel & Four Retaining Tabs

Courtesy of CHRYSLER GROUP, LLC

1. Position the seat being serviced all the way forward.
2. Disconnect and isolate the negative battery cable.

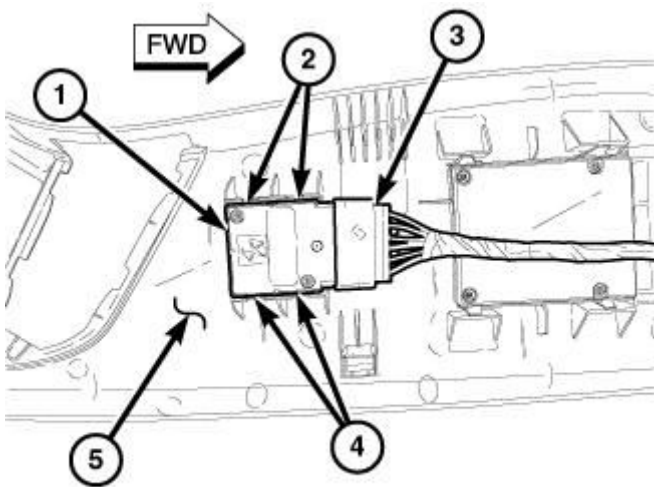
NOTE: It is not necessary to remove the seat belt anchor from the seat when

servicing the power lumbar control switch.

3. Remove the outboard seat cushion side trim panel (5) from the seat. Refer to **SIDE SHIELDS, SEAT CUSHION, FRONT, REMOVAL** .
4. Using Trim Stick (special tool #C-4755, Trim Stick) or equivalent, carefully disengage the four tabs (2 and 4) that secure the lumbar control switch (1) to the seat cushion side trim panel.
5. Disconnect the electric connector (3) from the lumbar control switch and remove the switch.

INSTALLATION

INSTALLATION



2980511

Fig. 22: Electrical Connector, Power Lumbar Control Switch, Seat Cushion Side Trim Panel & Four Retaining Tabs

Courtesy of CHRYSLER GROUP, LLC

1. Connect the electrical connector (3) to the power lumbar control switch (1). Make sure the connector is fully engaged to the switch.
2. Position the lumbar control switch to the seat cushion side trim panel (5) and engage the four retaining tabs (2 and 4) that secure the switch to the trim panel. Make sure the retaining tabs are fully engaged.
3. Install the outboard seat cushion side trim panel. Refer to **SIDE SHIELDS, SEAT CUSHION, FRONT, INSTALLATION** .
4. Connect the negative battery cable.
5. Verify proper power lumbar support operation.

2014 ACCESSORIES AND EQUIPMENT**Power Top/Sunroof - Service Information - Cherokee****DESCRIPTION****DUAL PANE SUNROOF**

The optional dual pane (also known as the CommandView®) sunroof has one movable deep tinted glass pane over the front row seating and one fixed deep tinted glass pane over the second row seating. This unit also features a power operated sunshade that extends over both the front and rear glass panes when closed. If one of the switch push buttons for the movable pane is actuated while the sunshade is extended over the front glass opening, the system will automatically retract the sunshade to behind the front glass opening before moving the sunroof glass pane. Therefore, the sunshade can never cover the movable glass pane opening unless the pane is in the fully closed position.

The dual pane power sunroof system allows the sliding glass sunroof panel to be opened, closed or placed in a ventilation position electrically by actuating one of three switch push buttons located in the overhead console. The electronic controls integral to the sunroof motor and module unit provide an express (also known as one-touch) feature to simplify sunroof opening and closing while driving. The electronics also provide an Excess Force Limitation (EFL) feature, which detects obstacles trapped between the glass and the opening in the vehicle roof panel during closing.

A second two push button switch in the overhead console provides separate express features for opening and closing the sunshade. The power operated sunshade electronics also provide an EFL feature, which detects obstacles trapped between the sunshade and the opening in the vehicle roof panel during closing.

The sliding sunroof glass panel tilts upward at the rear for the ventilation position, or slides downward and rearward beneath the fixed glass panel for the open position. The sliding glass panel seals flush with the roof in the closed position to eliminate wind noise, and an integrated mesh wind deflector reduces wind buffeting at low speeds with the sunroof open.

The major components of the dual pane power sunroof system include:

- **Fixed Glass Panel** - Refer to **SUNROOF, DUAL PANE, DESCRIPTION** .
- **Frame and Mechanism** - Refer to **SUNROOF, DUAL PANE, DESCRIPTION** .
- **Motor And Electronic Module Units** - The dual pane power sunroof and power sunshade motor and electronic module units are secured to each side of center on the front frame member of the sunroof, between the outer roof panel and the headliner.
- **Power Sunshade** - Refer to **SUNROOF, DUAL PANE, DESCRIPTION** .
- **Sliding Glass Panel** - Refer to **SUNROOF, DUAL PANE, DESCRIPTION** .
- **Switches** - The dual pane power sunroof and power sunshade switches are integral to the overhead console centered in the headliner between the windshield upper header and the front of the sunroof opening.
- **Wind Deflector** - Refer to **SUNROOF, DUAL PANE, DESCRIPTION** .

Hard wired circuitry connects the dual pane power sunroof system components to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the dual pane power sunroof system components through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

OPERATION

DUAL PANE SUNROOF AND SUNSHADE

The dual pane power sunroof sliding glass panel and power sunshade motors both receive battery feed through a fused B(+) circuit from the Power Distribution Center (PDC). However, the on-board electronic module of each sunroof or sunshade motor monitors an input on a fused ignition (run - accessory) circuit and is configured to only allow the power sunroof and the power sunshade to be operated with the switches in the overhead console when the ignition switch is in the ON or ACCESSORY positions, or using the accessory delay feature for a timed interval after the ignition is turned to the OFF position as long as neither front door has been opened.

The electric motor and electronic module unit of the sunroof or sunshade moves the sliding glass panel or the sunshade through the use of mechanical drive cables as well as mechanical linkages and guides. Refer to **SUNROOF, DUAL PANE, DESCRIPTION** for additional information on these components..

The on-board electronic modules integral to the power sunroof and sunshade motors provide both express (also known as one-touch) and manual opening and closing for their respective motors based upon module programming and the inputs received from the sunroof and sunshade switches integral to the overhead console. The electronic modules store and recall a sliding glass panel or a power sunshade hard stop position, then counts the direction and number of motor rotations from that hard stop to enable the express open and close features. These hard stops must be learned by a service replacement motor and electronic module unit during an initialization procedure.

In addition, the electronic modules are programmed to move only one motor at a time. The two motors communicate switch input information as well as sunroof and sunshade position information with each other through a serial bus circuit, but do not communicate with any other electronic modules in the vehicle. The electronic modules are programmed to move the sunshade out of the way into a safe mid-open position automatically before allowing the sliding glass panel to move. Likewise, if the sunshade switch is depressed to close the sunshade while the sliding glass panel is in an open position, the electronic modules are programmed to automatically close the glass panel before closing the sunshade.

The electronic modules also provide an obstacle detection (also known as Excess Force Limitation/EFL) feature for both the sliding glass panel and the sunshade. The modules each monitor motor closing load through motor speed. When an obstacle is detected due to a significant decrease in motor speed, the module will stop the motor closing motion while limiting the forces applied to the obstacle, then reverse the motor direction to allow the obstacle to be removed.

The electronic modules provide a thermal protection feature to protect the motors from abuse or overheating. If

the motor is cycled enough to cause overheating, the software will allow one final closing cycle before it stops responding to further switch inputs. Once a motor has cooled sufficiently, normal operation will be automatically restored. However, the ignition switch must remain in the ON or ACCESSORY positions so that the module remains awake long enough to monitor the cool down of the motor.

The power sunroof and sunshade circuits and switches may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the on-board electronic modules or the power sunroof and power sunshade motors. If there are no issues with the power sunroof and sunshade mechanisms and the power sunroof or power sunshade switches and circuitry test okay, but the motor and express or EFL features are still ineffective following the initialization procedure, the motor and electronic module unit must be replaced.

STANDARD PROCEDURE

STANDARD PROCEDURE - DRIVE MOTOR TEACH PROCEDURE

REPLACEMENT DRIVE MOTOR

1. Operate the sunroof manually and continuously through one full Vent and Slide cycle.
2. After completion of complete cycle, release sunroof switch. Sunroof will now operate normally.
3. Verify sunroof express function operation.

ORIGINAL DRIVE MOTOR

1. Press and hold sunroof Vent switch until the sunroof glass vents and stops.
2. Release sunroof switch.
3. Press and hold sunroof Vent switch once again for at least 15 seconds. After 15 seconds of pressing the Vent switch, the sunroof glass will automatically move and stop at a new location.
4. Release sunroof switch.
5. Operate the sunroof manually and continuously through one full Vent and Slide cycle.
6. After completion of complete cycle, release sunroof switch. Sunroof will now operate normally.
7. Verify sunroof express function operation.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - POWER SUNROOF SYSTEM

The hard wired circuits between components related to the operation of the single pane power sunroof system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the electronic module

integral to the power sunroof motor. If the power sunroof switches, motors and circuitry test okay, but the express or Excess Force Limitation (EFL) features are still ineffective following the calibration and initialization procedures, the motor and module unit must be replaced.

NOTE: If there is no sliding sunroof panel movement when the power sunroof switch **OPEN** or **CLOSE** push button is depressed, but there is movement when the **VENT** push button is depressed, the sunroof module requires calibration. Complete the **Single Pane Sunroof Motor And Module Initialization** procedure prior to performing any further sunroof diagnosis. Refer to **MOTOR, SUNROOF, STANDARD PROCEDURE**.

CONDITION	POSSIBLE CAUSES	CORRECTION
POWER SUNROOF COMPLETELY INOPERATIVE	1. Ineffective ground circuit.	1. Test and repair the open sunroof motor ground circuit if required.
	2. Ineffective feed circuit.	2. Test and repair the open sunroof motor feed circuit if required.
	3. Ineffective sunroof switch.	3. Test and replace the sunroof switch (overhead console assembly) if required.
	4. Ineffective sunroof motor and module unit.	4. Replace the sunroof motor and module unit if required.
AUDIBLE WHINE WHEN POWER SUNROOF SWITCH IS ACTUATED	1. Binding drive cable.	1. Replace the binding drive cable if required.
	2. Ineffective sunroof motor and module unit.	2. Replace the sunroof motor and module unit if required.
AUDIBLE CLICKING OR RATCHETING WHEN POWER SUNROOF SWITCH IS ACTUATED	1. Improperly adjusted sliding glass panel.	1. Adjust the sunroof glass panel if required. Refer to <u>ADJUSTMENTS</u> or <u>ADJUSTMENTS</u> .
	2. Damaged or worn drive cable.	2. Replace the broken or worn drive cable if required.
	3. Damaged or worn motor drive gear.	3. Replace the sunroof motor and module unit if required.
POWER SUNROOF VENTS AND OPENS BUT DOES NOT CLOSE	1. Damaged or disengaged trough guide.	1. Replace or reinstall trough guide if required.
	2. Binding drive cable.	2. Replace the binding drive cable if required.
	3. Ineffective CLOSE circuit.	3. Repair the sunroof CLOSE circuit between the switch and the motor if required.
	4. Ineffective sunroof switch.	4. Test and replace the sunroof switch (overhead console assembly) if required.
	5. Ineffective sunroof motor and module unit.	5. Replace the sunroof motor and module unit if required.
	1. Binding drive cable.	1. Replace the binding drive cable if required.

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POWER SUNROOF VENTS AND CLOSES BUT DOES NOT OPEN	2. Ineffective OPEN circuit.	2. Repair the sunroof OPEN circuit between the switch and the motor if required.
	3. Ineffective sunroof switch.	3. Test and replace the sunroof switch (overhead console assembly) if required.
	4. Ineffective sunroof motor and module unit.	4. Replace the sunroof motor and module unit if required.
POWER SUNROOF DOES NOT VENT	1. Binding drive cable.	1. Replace the binding drive cable if required.
	2. Ineffective VENT circuit.	2. Repair the sunroof VENT circuit between the switch and the motor if required.
	3. Ineffective sunroof switch.	3. Test and replace the sunroof switch (overhead console assembly) if required.
	4. Ineffective sunroof motor and module unit.	4. Replace the sunroof motor and module unit if required.
POWER SUNROOF GLASS MOVEMENT INCONSISTENT - NOT SMOOTH AND UNIFORM	1. Improperly adjusted sliding glass panel.	1. Adjust the sunroof glass panel if required. Refer to <u>ADJUSTMENTS</u> or <u>ADJUSTMENTS</u> .

SPECIFICATIONS

SPECIFICATIONS

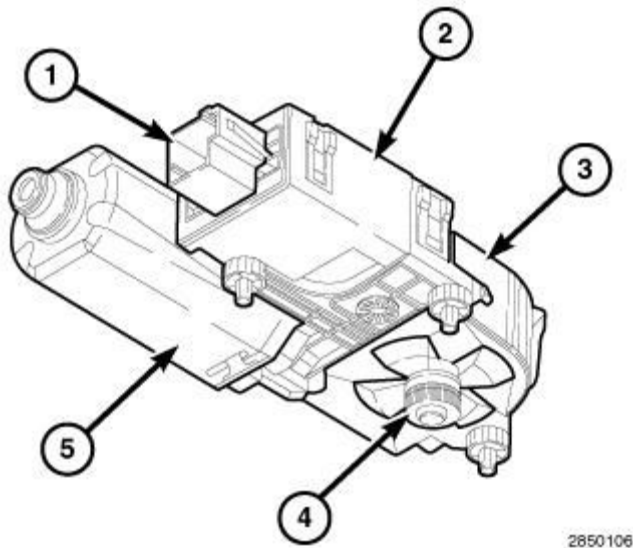
TORQUE SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Dual Pane Sunroof Or Sunshade Motor And Module Mounting Screws	3.8	-	34
Single Pane Sunroof Motor And Module Mounting Screws	4	-	35

MOTOR, SUNROOF

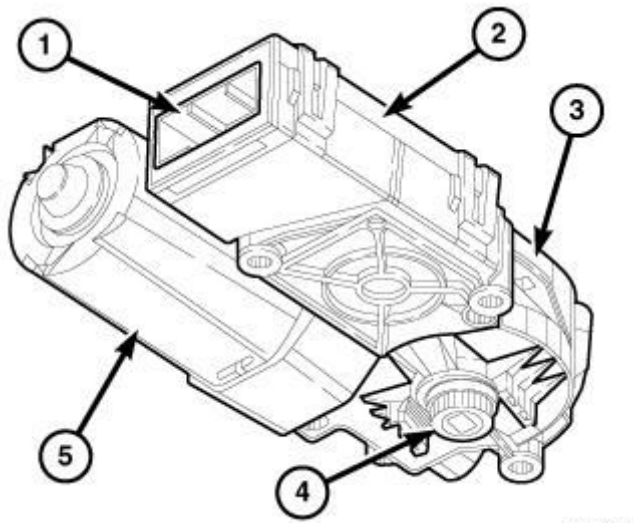
DESCRIPTION

DESCRIPTION



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Fig. 1: Single Pane Sunroof Motor
Courtesy of CHRYSLER GROUP, LLC



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Fig. 2: Dual Pane Sunroof Or Sunshade Motor
Courtesy of CHRYSLER GROUP, LLC

The motor and electronic module units for both the single pane sunroof and the dual pane sunroof or sunshade are quite similar, but are not interchangeable. However, the dual pane sunroof and sunshade motor and module units are interchangeable and configure themselves to either sunroof or sunshade operation through a configuration pin in the sunshade connector of the sunroof wire harness. Each sunroof motor (5) is a reversible, 12-volt Direct Current (DC), permanent magnet motor with internal thermal protection.

The single panel sunroof has a single motor and electronic module unit secured by three screws near the center of the underside of the front sunroof frame member where it is concealed above the headliner. The dual pane sunroof has two motor and electronic modules, each secured by three screws to the underside of the front sunroof frame member and concealed above the headliner. The motor to the left of center operates the sliding

glass mechanism, while the motor to the right of center operates the power sunshade mechanism.

Each motor is connected mechanically to the sunroof or sunshade drive gear (4) through a right angle drive, gear reduction transmission (3). Each motor also is connected electrically to an on-board electronic control unit (2) that has an integral connector receptacle (1) that connects the unit to the vehicle electrical system through a dedicated take out and connector of the sunroof wire harness.

The sunroof motor or sunshade motor and electronic module units cannot be repaired. If ineffective or damaged, the entire motor and module unit must be replaced.

OPERATION

OPERATION

The single pane and dual pane power sunroof and power sunshade motors are each completely controlled by the circuitry of their respective on-board electronic module. The module receives battery current on a fused B(+) circuit from the Power Distribution Center (PDC) and has a path to ground at all times through a take out and eyelet terminal connector secured by a ground screw to the body sheet metal. These connections allow the module to function regardless of the ignition switch position.

However, the modules both monitor an input on a fused ignition switch output (run - accessory) circuit, and provide a source current to the sunroof and sunshade switches in the overhead console only when the ignition switch is in the ON or ACCESSORY positions, or while the accessory delay feature is active. The modules then monitor a separate input circuit for each switch position, which it uses to determine the proper outputs to the power sunroof or power sunshade motor. A positive and negative battery connection to the two motor brushes will cause the power sunroof or sunshade motor to rotate in one direction. Reversing the current through these same two brushes will cause the motor to rotate in the opposite direction.

The hard wired circuits of the power sunroof and power sunshade motors as well as those between the electronic modules and switches may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the electronic module integral to the power sunroof and power sunshade motors. If the power sunroof or power sunshade switches and the hard wired circuitry test okay, but the motor or the express or Excess Force Limitation (EFL) features are still ineffective following the calibration and initialization procedures, the motor and module must be replaced as a unit.

STANDARD PROCEDURE

DUAL PANE SUNROOF OR SUNSHADE OVERRIDE POSITION CALIBRATION

SLIDING GLASS

The sliding glass panel motor stalls when the glass reaches the fully vented position and the electronic motor module learns that position (hard stop), then counts the number of motor rotations to know where the fully closed and fully open positions of the glass are located. The following procedure causes a previously calibrated and properly operating electronic motor module to relearn the fully vented motor stall position.

1. Be certain electrical system voltage is at or above 12.5 volts.
2. Be certain the key is in the ignition switch and the switch is in the ON position.
3. Be certain the power sunshade is open at least beyond the back of the sliding glass panel opening.
4. Depress and hold the VENT push button of the sunroof switch until the sliding glass panel is in the fully vented position or until the motor will not drive the glass any further towards the fully vented position.
5. Open the driver side front door.
6. Turn the ignition switch to the OFF position.
7. Within 2 seconds, turn the ignition switch back to the ON position.
8. Within 2 seconds, depress and hold the VENT push button of the sunroof switch for about ten seconds. At the end of ten seconds, the motor will try to drive the sliding glass panel to the fully vented position. Once motor stall is detected the electronic module will write that stall position to memory as the new glass position.
9. Verify sliding glass panel motor operation by cycling the glass to fully opened, fully closed, fully vented, then fully closed again.

SUNSHADE

The sunshade motor stalls when the shade reaches the fully closed position and the electronic motor module learns that position (hard stop), then counts the number of motor rotations to know where the mid-opened and fully opened positions of the shade are located. The following procedure causes a previously calibrated and properly operating electronic motor module to relearn the fully closed motor stall position.

1. Be certain electrical system voltage is at or above 12.5 volts.
2. Be certain the key is in the ignition switch and the switch is in the ON position.
3. Be certain the sliding glass panel is in the fully closed position.
4. Depress and hold the CLOSE push button of the sunshade switch until the shade is in the fully closed position or until the motor will not drive the shade any further towards the fully closed position.
5. Open the driver side front door.
6. Turn the ignition switch to the OFF position.
7. Within 2 seconds, turn the ignition switch back to the ON position.
8. Within 2 seconds, depress and hold the CLOSE push button of the sunshade switch for about ten seconds. At the end of ten seconds, the motor will try to drive the shade to the fully closed position. Once motor stall is detected, the electronic module will write that stall position to memory as the new shade position.
9. Verify sunshade motor operation by cycling the shade to mid-opened, fully opened, then fully closed again.

DUAL PANE SUNROOF OR SUNSHADE OBSTACLE DETECTION UPDATE

The obstacle detection function (also known as Excessive Force Limitation/EFL) updates the sunroof sliding glass panel and sunshade closing profiles after each successful CLOSE event as long as temperature and voltage are within a normal range. Being certain that these parameters are within range and cycling the sliding glass panel and sunshade will update the obstacle detection settings in the electronic module software.

- Be certain electrical system voltage is at or above 12.5 volts.
- Be certain vehicle is in an area that is near room temperature - 20 to 25° C (68 to 77° F).
- Be certain the key is in the ignition switch and the switch is in the ON position.
- Be certain there are no physical binds or blockages to sliding glass panel or sunshade travel.

SLIDING GLASS

1. Be certain the power sunshade is in the fully open position.
2. Depress the VENT push button of the sunroof switch so that the sliding glass panel travels to the fully vented position.
3. Depress the CLOSE push button of the sunroof switch so that the sliding glass panel travels to the fully closed position.
4. Depress the OPEN push button of the sunroof switch so that the sliding glass panel travels to the fully opened position.
5. Depress the CLOSE push button of the sunroof switch so that the sliding glass panel travels to the fully closed position.
6. Repeat Steps 2 through 5 for at least 5 complete sliding glass panel cycles (VENT, CLOSE, OPEN, CLOSE).

SUNSHADE

1. Be certain the sunroof sliding glass is in the fully closed position.
2. Depress the OPEN push button of the sunshade switch so that the shade travels to the mid-open position.
3. Depress the OPEN push button of the sunshade switch again so that the shade travels to the fully opened position.
4. Depress the CLOSE push button of the sunshade switch so that the shade travels to the fully closed position.
5. Repeat Steps 2 through 4 for at least 5 complete sunshade panel cycles (MID-OPEN, FULL-OPEN, CLOSE).

SUNROOF MOTOR AND MODULE INITIALIZATION**SINGLE PANE SUNROOF****INITIALIZATION**

A new motor is shipped uncalibrated with no vehicle cycles having been run. After installation and connection of the wire harness, the following steps must be taken to initialize the new motor and module unit.

NOTE: **Verify that the battery is in good condition prior to performing this procedure. Do not leave the vehicle on a battery charger while performing this procedure. If the voltage at the sunroof motor and module unit drops below 11 volts or exceeds 15 volts at anytime while this procedure is being performed, the motor and module initialization procedure will not be properly completed.**

NOTE: If at any point during the following procedure the sunroof does not respond as expected, restart the procedure at Step 1.

1. Depress and hold the CLOSE push button of the sunroof switch until the sunroof sliding glass panel moves to the fully closed hard stop and then back to the tilt (VENT) position.
2. Release the CLOSE push button of the sunroof switch, then depress and hold the CLOSE push button again within 5 seconds.
3. As the CLOSE push button of the sunroof switch is held, the sunroof sliding glass panel will move to the fully closed position, then to the fully opened position and then fully closed again.
4. Initialization is complete. Release the sunroof switch push button.

REINITIALIZATION

The following procedure causes a previously calibrated and properly operating electronic motor module to relearn and update motor stall position and obstacle detection.

NOTE: If at any point during the following procedure the sunroof does not respond as expected, restart the procedure at Step 1.

1. Depress and hold the CLOSE push button of the sunroof switch until the sliding glass panel is fully closed.
2. Continue to hold the CLOSE push button of the sunroof switch. It will take at least 10 seconds for the initialization process to begin.
3. The sunroof sliding glass panel will move to the hard stop and then back to the tilt (VENT) position.
4. Release the CLOSE push button of the sunroof switch, then depress and hold the CLOSE push button again within 5 seconds.
5. As the CLOSE push button of the sunroof switch is held, the sunroof sliding glass panel will move to the fully closed position, then to the fully opened position and then fully closed again.
6. Initialization is complete. Release the sunroof switch push button.

DUAL PANE SUNROOF

A new motor is shipped uncalibrated with no vehicle cycles having been run. After installation and connection of the wire harness, the following steps must be taken to initialize the new motor and module unit.

NOTE: Verify that the battery is in good condition prior to performing this procedure. Do not leave the vehicle on a battery charger while performing this procedure. If the voltage at the sunroof motor and module unit drops below 11 volts or exceeds 15 volts at anytime while this procedure is being performed, the motor and module initialization procedure will not be properly completed.

SUNROOF

1. Turn the ignition switch to the ON position.

2. Depress and hold the VENT push button of the sunroof switch until the sliding glass panel has moved to the fully vented position.
3. Be certain that the sunshade has opened to at least beyond the back of the sliding glass panel opening before finishing the sunroof motor and module initialization.
4. Depress the VENT push button of the sunroof switch and release. The sliding glass panel should travel to the fully vented position.
5. Depress the CLOSE push button of the sunroof switch and release. The sliding glass panel should travel past the fully closed position, then reverse direction back to fully closed to set the sunroof seal.
6. Depress the OPEN push button of the sunroof switch and release. The sliding glass panel should travel to the fully opened position.
7. Depress the CLOSE push button of the sunroof switch and release. The sliding glass panel should travel to the fully closed position.
8. Repeat Steps 4 through 7 for at least 5 complete sliding glass panel cycles (VENT, CLOSE, OPEN, CLOSE).

SUNSHADE

1. Turn the ignition switch to the ON position.
2. Depress and hold the CLOSE push button of the sunroof switch until the sliding sunshade panel has moved to the fully closed position.
3. Be certain that the sunroof sliding glass panel is in the fully closed position before finishing the sunshade motor and module initialization.
4. Depress the OPEN push button of the sunshade switch and release. The sunshade panel should travel to the mid-open position at least beyond the back of the sliding glass panel opening.
5. Depress the OPEN push button of the sunshade switch again and release. The sunshade panel should travel to the fully opened position.
6. Depress the CLOSE push button of the sunshade switch and release. The sunshade panel should travel to the fully closed position.
7. Repeat Steps 4 through 6 for at least 5 complete sunshade panel cycles (MID-OPEN, FULL-OPEN, CLOSE).

SUNROOF OR SUNSHADE OBSTACLE DETECTION REVERSAL OVERRIDE**SINGLE PANE**

There are two methods for overriding the obstacle detection feature if the single pane sunroof sliding glass is unable to close due to a known blockage condition (ice, leaves, debris in track).

OVERRIDE - METHOD 1

Depress and hold the CLOSE push button of the sunroof switch during the close. The sunroof will be in override mode during the close.

OVERRIDE - METHOD 2

Once the sunroof encounters and reverses on an obstacle during express (one touch) closing three consecutive times, the sunroof will be in override mode. All push button commands will be in manual mode (no one-touch or express mode) while the obstacle detection feature is in override mode.

EXITING OVERRIDE MODE

Any sunroof obstacle detection override mode is exited by reaching the close position. Once the override has been exited, all normal operations will resume including the obstacle detection feature.

DUAL PANE

There are two methods for overriding the obstacle detection feature if the dual pane sunroof sliding glass panel or sunshade is unable to close due to a known blockage condition (ice, leaves, debris in track).

OVERRIDE - METHOD 1

Depress and hold the CLOSE push button of the sunroof or sunshade switch during the initial close, during the reversal and for 2 seconds after the reversal stops. If the CLOSE push button is released at any time between the initial close and the end of the 2 seconds after the reversal stops, the sunroof or sunshade will not enter override mode. Once the CLOSE push button has been held through these events, the sunroof or sunshade will be in primary override mode. All CLOSE push button commands will be in manual mode (no one-touch or express mode) while the obstacle detection feature is in primary override mode.

OVERRIDE - METHOD 2

Once the sunroof or sunshade encounters and reverses on an obstacle during closing three consecutive times with no other sunroof or sunshade push button switches being depressed, the fourth time the CLOSE push button is depressed, the sunroof or sunshade will be in override mode. All push button commands will be in manual mode (no one-touch or express mode) while the obstacle detection feature is in override mode.

EXITING OVERRIDE MODE

Any sunroof or sunshade obstacle detection override mode is exited by either reaching the close position or by depressing any sunroof or sunshade switch push button except CLOSE to remove the obstacle. Once the override has been exited, all normal operations will resume including the obstacle detection feature.

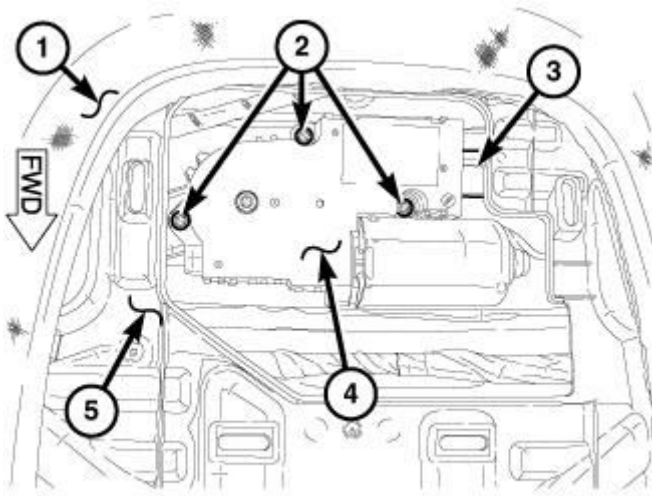
REMOVAL

REMOVAL

WARNING: Do not attempt to move or reposition the sunroof glass panel or drive cables with the sunroof motor and module unit removed. Damage to the vehicle, to the sunroof or personal injuries may result.

WARNING: The Sunroof Motor And Module Initialization procedure must be completed any time a sunroof motor and module unit is replaced with a new component. Failure to perform this procedure may result in damage

to the vehicle, to the sunroof or in serious or fatal injuries.



2842625

Fig. 3: Headliner, Bracket, Module Unit, Screws & Module Connector Receptacle
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Lower the headliner (1) from the inner roof panel. Refer to **HEADLINER, REMOVAL**.
3. Remove the three screws (2) that secure the motor and module to the sunroof frame.
4. Lower the motor and module unit far enough to access and disconnect the sunroof wire harness connector from the motor and module connector receptacle (3).
5. Remove the sunroof motor and module unit from the vehicle.

INSTALLATION

INSTALLATION

WARNING: Do not attempt to move or reposition the sunroof glass panel or drive cables with the sunroof motor and module unit removed. Damage to the vehicle, to the sunroof or personal injuries may result.

WARNING: The Sunroof Motor And Module Initialization procedure must be completed any time a sunroof motor and module unit is replaced with a new component. Failure to perform this procedure may result in damage to the vehicle, to the sunroof or in serious or fatal injuries.

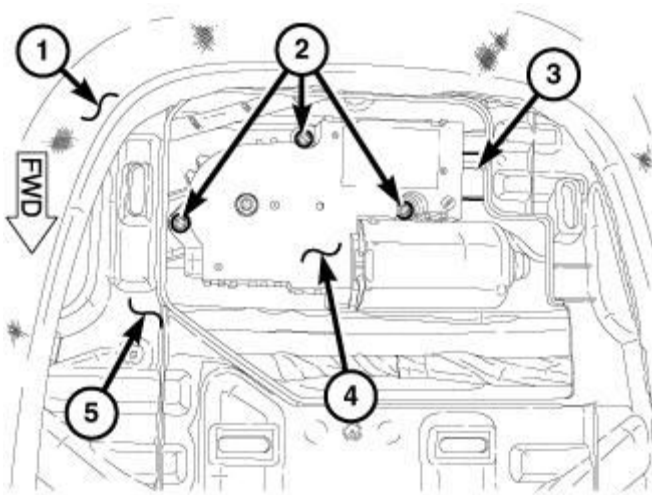


Fig. 4: Headliner, Bracket, Module Unit, Screws & Module Connector Receptacle
 Courtesy of CHRYSLER GROUP, LLC

1. Position the sunroof motor and module unit (4) close enough to the sunroof frame to access and reconnect the sunroof wire harness connector to the motor and module connector receptacle (3).
2. Position the motor and module through the headliner bracket opening and onto the sunroof frame.
3. Install and tighten the three screws (2) that secure the motor and module to the sunroof frame. Tighten the screws to 4 N.m (35 in. lbs.).
4. Reinstall the headliner (1) to the inner roof panel. Refer to **HEADLINER, INSTALLATION** .
5. Reconnect the battery negative cable.
6. Perform the Sunroof Motor And Module Initialization standard procedure. Refer to **MOTOR, SUNROOF, STANDARD PROCEDURE**.

SWITCH, SUNROOF

DESCRIPTION

DESCRIPTION

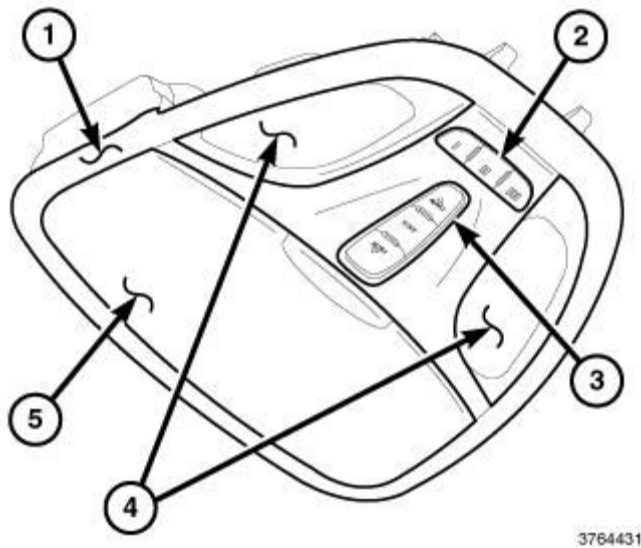


Fig. 5: Overhead Console Components
Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with a power sunroof have a power sunroof switch (3) integral to the overhead console (1) located in the headliner just forward of the sunroof opening. The switch buttons are centered between the two map/reading lamps (4), forward of the sunglasses storage bin (5) and, if equipped, rearward of the universal transmitter (Homelink®) push buttons (2). This switch has three momentary push buttons clearly identified by either text or icons indicating their functions. The three functions are from front-to-back: AUTO (CLOSE), VENT and AUTO (OPEN). The switch push buttons also have instrument panel dimmer controlled Light Emitting Diode (LED) units that provide back lighting for visibility at night.

The power sunroof switch is connected to the vehicle electrical system through the printed circuit board of the overhead console, which is connected to a dedicated take out and connector of the overhead wire harness. If the switch is ineffective or damaged, the entire overhead console must be replaced.

OPERATION

OPERATION

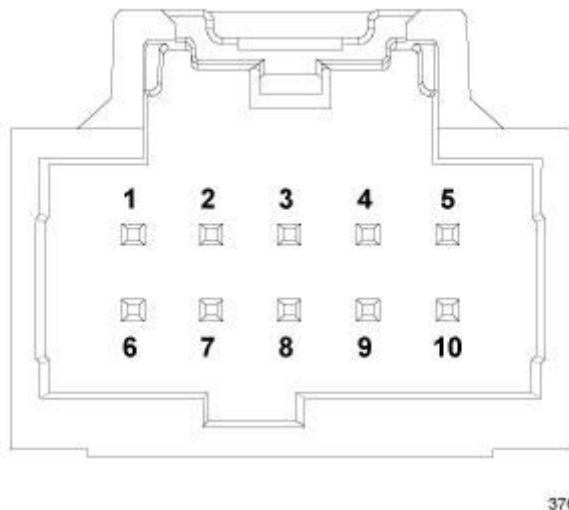
The power sunroof switch is hard wired to the electronic module integral to the power sunroof motor. The electronic module provides the switch with a source current whenever the status of the ignition switch is ON or ACCESSORY. When one of the switch push buttons is depressed, it sends a signal back to the electronic module and the electronic module controls the motor to move the sunroof panel to the appropriate position.

A short duration (less than 800 milliseconds) press of the switch push button is interpreted by the electronic module as an AUTO (also known as express or one touch) command, where the motor will automatically move the glass panel to the fully open, fully closed or the ventilation position. A long duration (greater than 800 milliseconds) press of the push button is interpreted by the electronic module as a manual command, where the motor moves only as long as the push button is held in the depressed position. During an AUTO event, any new switch input will immediately stop the event in progress which, as in the manual mode, allows the customer to stop the sliding glass panel at any desired location.

The power sunroof switch may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - POWER SUNROOF SWITCH



3764602

Fig. 6: Overhead Console Wire Harness Connector End View
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the overhead console from the headliner. Refer to **CONSOLE, OVERHEAD, FRONT, REMOVAL**.
3. Disconnect the overhead wire harness connector from the overhead console connector receptacle.
4. Using a multimeter, test the continuity between the terminals of the overhead console connector receptacle while actuating the power sunroof switch as shown in the Sunroof Switch Tests chart.

SUNROOF SWITCH TESTS	
SWITCH POSITION	CONTINUITY BETWEEN PINS
NO BUTTONS PRESSED (OFF)	NO CONTINUITY BETWEEN PINS 7, 8 or 9 and PIN 10
AUTO (OPEN)	7 and 10
AUTO (CLOSE)	9 and 10
VENT	8 and 10

5. If the switch fails any of the tests, replace the overhead console and the switch as a unit.

REMOVAL

REMOVAL

The power sunroof switch is serviced only as a unit with the overhead console. Refer to **CONSOLE, OVERHEAD, FRONT, REMOVAL** .

INSTALLATION

INSTALLATION

The power sunroof switch is serviced only as a unit with the overhead console. Refer to **CONSOLE, OVERHEAD, FRONT, INSTALLATION** .

2014 ACCESSORIES AND EQUIPMENT**Power Windows - Service Information - Cherokee****DESCRIPTION****DESCRIPTION**

The power window system allows each of the door windows to be raised and lowered electrically by actuating a switch on the trim panel of each respective door. A master switch on the driver side front door trim panel allows the driver to raise or lower each of the passenger door windows, and to lock out the individual switches on the passenger doors from operation. The power window system receives battery feed only when the ignition switch is in the RUN or ACCESSORY position. The power window system will also operate when in power accessory delay

Vehicles equipped with Express Up Windows are equipped with a door module. Refer to **OPERATION** for further information.

Vehicle equipped with One Touch Down (OTD) employ a Smart Window Motor. Refer to **OPERATION** for further information.

For service of mechanical components, such as the regulator, lift plate, window tracks, or glass refer to **BODY - INTERIOR & EXTERIOR** .

OPERATION**OPERATION**

Power Window Switch - The power windows are controlled by a window/lock switch on the trim panel of each front door. Switches in the driver door window/lock switch allows the driver to control the passenger windows. The power window switch for the driver side front door window has a second detent position beyond the normal Down position, that provides an automatic one-touch window down feature. Some vehicles may be equipped with an express closing feature (front windows only). During an express closing, anytime an obstacle is detected in the way of the glass, the motor will stop and reverses travel to avoid pinching an occupant fingers. Modules in the doors are programmed to compare the position of the glass to the amount of current being used to drive up the glass. The system also includes various features to manage the perceived forces on the glass as it travels up. If the express closing calibration is lost, the system will self-calibrate itself after the windows are moved up and down two cycles. The power window switches control the battery and ground feeds to the power window motors. All passenger door power window switches receive their battery and ground feeds through the circuitry of the window/lock switch. When the power window lockout switch is in the Lock position, the battery feed for the individual passenger door power window switches is interrupted. Please review the power window switch service information for further operation detail. Refer to **SWITCH, POWER WINDOW, DESCRIPTION**.

Door Control Modules (DCM) - The (Driver Door Module (DDM) and Passenger Door Module (PDM)) opens or closes the windows when a actuation input signal from the window switch is received. This is only

powered when the ignition switch is in the RUN or ACCESSORY position. Power is supplied to the modules through the Power Distribution Center (PDC). For further DCM/DDM/PDM operation, refer to **MODULE, DOOR, DESCRIPTION** .

Power Window Motor - A permanent magnet reversible motor moves the window regulator through an integral gearbox mechanism. A positive and negative battery connection to the two motor terminals will cause the motor to rotate in one direction. Reversing the current through these same two connections will cause the motor to rotate in the opposite direction. Each individual motor is grounded through the master switch. In addition, each power window motor is equipped with an integral self-resetting circuit breaker to protect the motor from overloads. The power window motor and gearbox assembly cannot be adjusted or repaired. If damaged or ineffective, the entire unit must be replaced. Refer to **MOTOR, WINDOW REGULATOR, REMOVAL**.

EXPRESS UP/DOWN WINDOW FEATURE

Express operation is time-driven. If the window button is pressed for more than 50 milliseconds but less than 800 milliseconds, the window motor activates express operation. The smart motors will ignore any switch input lasting longer than 15 seconds. Vehicles may be equipped with either express down or express up and down.

EXPRESS AUTO-UP FEATURE WITH ANTI-PINCH PROTECTION

AUTO-Up Feature With Anti-Pinch Protection - If Equipped Lift the window switch to the second detent, release, and the window will go up automatically. To stop the window from going all the way up during the AUTO-up operation, push down on the switch briefly. To close the window part way, lift the window switch to the first detent and release it when you want the window to stop.

Anti-Pinch Functionality - The Anti-Pinch strategy is only active after the system has been initialized. This function will work during manual and express window functions. If the window runs into any obstacle during auto-closure, it will reverse direction and then go back down. Remove the obstacle and use the window switch again to close the window. Any impact due to rough road conditions may trigger the auto-reverse function unexpectedly during auto-closure. If this happens, pull the switch lightly to the first detent and hold to close the window manually.

EXPRESS DOWN WINDOW FEATURE

This feature allows the driver or front passenger to lower the door glass to its full-down position without holding the switch while the glass is in motion. To activate the Express-down feature depress the window switch to its second detent and release, the door glass will lower automatically. This feature may also be controlled and allows you to remotely lower both front door windows at the same time. To use this feature, press and release the UNLOCK button on the Remote Keyless Entry (RKE) transmitter and then immediately press and hold the UNLOCK button until the windows lower to the desired level or until they lower completely.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - POWER WINDOWS

For complete circuit diagrams, refer to **SYSTEM WIRING DIAGRAMS** .

ALL WINDOWS INOPERATIVE

1. Check the circuit breaker. If OK, go to Step 2. If not OK, replace the inoperative circuit breaker.
2. Disconnect and isolate the battery negative cable. Remove the window/lock switch from the driver side front door trim panel. Unplug the wire harness connector.
3. Check for continuity between the ground circuit cavity of the door module wire harness connector and a good ground. If OK, go to Step 4. If not OK, repair the circuit to ground as required.
4. Connect the battery negative cable. Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run) circuit cavity of the window/lock switch wire harness connector. If OK, refer to **SWITCH, LOCK, DIAGNOSIS AND TESTING** . If not OK, repair the circuit as required.

ONE WINDOW INOPERATIVE

The window glass must be free to slide up and down for the power window motor to function properly. If the glass is not free to move up and down, the motor will overload and trip the integral circuit breaker. To determine if the glass is free, disconnect the regulator from the glass. Then slide the window up and down by hand.

There is an alternate method to check if the glass is free. Position the glass between the up and down stops. Then, shake the glass in the door. Check that the glass can be moved slightly from side to side, front to rear, and up and down. Then check that the glass is not bound tight in the tracks. If the glass is free, proceed with the diagnosis that follows. If the glass is not free, determine the cause of the condition.

If the only inoperative window is in the driver or passenger side front door and the preceding checks have not identified a problem. Refer to **MOTOR, WINDOW REGULATOR, DIAGNOSIS AND TESTING**. If the problem being diagnosed involves only the Auto-down feature for the driver side front door window, but all of the power windows are operational, replace the driver's side window/lock switch. For diagnosis of the window/lock switch, refer to **SWITCH, LOCK, DIAGNOSIS AND TESTING** . For a rear power window problem, proceed with the following:

1. Disconnect and isolate the battery negative cable. Unplug the wire harness connector from the power window switch unit on the door with the inoperative power window. Check for continuity between the ground circuit cavity of the power window switch wire harness connector and a good ground. There should be continuity. If OK, go to Step 2. If not OK, repair the open circuit to the power window and door lock master switch as required.
2. Connect the battery negative cable. Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run) circuit cavity in the body half of the power window switch unit wire harness connector. If OK, go to Step 3. If not OK, repair the open circuit to the power window and door lock master switch as required.
3. Test the power window switch continuity. Refer to **SWITCH, POWER WINDOW, DIAGNOSIS AND TESTING**. If OK, go to Step 4. If not OK, replace the power window switch.
4. Check the continuity in each circuit between the inoperative power window switch wire harness connector cavities and the corresponding power window motor wire harness connector cavities. If OK, refer to **MOTOR, WINDOW REGULATOR, DIAGNOSIS AND TESTING**. If not OK, repair the open circuit(s) as required.

NOTE: All passenger door power window switches receive their battery and ground feed for operating the passenger door power window motors through the driver side power window and lock master switch and wire harness connector.

STANDARD PROCEDURE

DOOR MODULE LEARN PROCEDURES

- NOTE:**
- This procedure must be performed anytime the power window system has been serviced in either front door or when there is a possible concern with a door module calibration.
 - The battery must be fully charged or the vehicle running before proceeding with the learn procedure.
 - All doors must be completely closed before proceeding.
 - It is suggested to sit inside the vehicle in the drivers seat and close the door.

Express-up / Express-down possible concerns.

- Glass will not lower all the way down flush to the belt-line.
- Glass will not raise fully; wind noise / water leak.
- Glass will not raise automatically (Express-up) after lifting the switch to the second detent and releasing.

To relearn the door module memory after module replacement, perform the following procedure:

1. Check and repair any door module Diagnostic Trouble Code (DTC) (s) unrelated to missing calibration before proceeding.
2. Using the window switch, lower the door glass to the full-down position by pushing down (depress) the window switch to its second detent and hold the switch until the door glass is fully open. Continue to hold the window switch down for two seconds after the door glass is fully open.
3. Raise the door glass to the full-up position by pulling up on the window switch and hold the switch until the door glass is fully closed. Continue to hold the window switch up for two seconds after the door glass is full closed.
4. Code should now be stored. Clear code and test window operations.

To relearn the door module memory after window/regulator replacement, perform the following procedure:

1. Using the scan tool, go to the network topology screen.
2. Click on the Diagnostic Procedures tab at the lower portion of the screen.
3. Run ECU Reset for DDM/PDM.
4. DDM/PDM calibration missing DTC will now set.

5. Using the window switch, lower the door glass to the full-down position by pushing down (depress) the window switch to its second detent and hold the switch until the door glass is fully open. Continue to hold the window switch down for two seconds after the door glass is fully open.
6. Raise the door glass to the full-up position by pulling up on the window switch and hold the switch until the door glass is fully closed. Continue to hold the window switch up for two seconds after the door glass is full closed.
7. DTC will now be stored. Clear code and test window operations.

MOTOR, WINDOW REGULATOR

DESCRIPTION

DESCRIPTION

The power window system allows each of the door windows to be raised and lowered electrically by actuating a switch on the trim panel of each respective door. A master switch on the driver side front door trim panel allows the driver to raise or lower each of the passenger door windows, and to lock out the individual switches on the passenger doors from operation. The power window system receives battery feed only when the ignition switch is in the RUN or ACCESSORY position. The power window system will also operate when in power accessory delay

Vehicles equipped with Express Up Windows are equipped with a door module. Refer to **OPERATION** for further information.

Vehicle equipped with One Touch Down (OTD) employ a Smart Window Motor. Refer to **OPERATION** for further information.

For service of mechanical components, such as the regulator, lift plate, window tracks, or glass refer to **BODY - INTERIOR & EXTERIOR** .

OPERATION

POWER WINDOW MOTOR - STANDARD

A positive and negative battery connection to the two motor terminals will cause the power window motor to rotate in one direction. Reversing the current through these same two connections will cause the motor to rotate in the opposite direction.

Because the Drivers Door Module (DDM) drives the window, it can sense when the top and bottom travel has been reached and stop driving the window regardless of the window switch position (no hall pulses within 50 ms). The DDM considers the Hall Effect faulted if no pulses are sensed when the window is driven up and down. When this condition is detected, the DDM will activate the motor until the switch is released or a stuck fault is set (10 seconds). In addition, each power window motor is equipped with an integral self-resetting circuit breaker to protect the motor from overloads.

The driver side motor is controlled directly by the DDM. The passenger side motor receives current through a

window up relay and a window down relay. The up and down window relays are controlled by the DDM.

There is also a fuse in the Power Distribution Center (PDC) to protect the passenger window circuits and a fuse in the PDC to protect the drivers window circuits.

POWER WINDOW MOTOR - SMART

Vehicles equipped with the One Touch Down (OTD) option use a "smart" window motor assembly. The smart window motors contain the electronics required to provide express up or down operation without the use of separate door modules.

The smart window motor will enter sleep mode after 20 seconds if ALL of the following conditions are true:

- No motor movement (stall condition previously detected)
- No switch input is active or the stuck switch condition has not been detected
- No stuck relay condition has been detected
- Window thermal protection is not in severe or activated mode

The smart window motor wakes up based on the following inputs:

- Any switch input becomes active
- Hardware reset
- Voltage is detected in any output from the relay to the motor terminals

The smart window motor does not communicate with the other modules on the vehicle. The rear windows on vehicles equipped with one-touch power front windows operate in the same manner used for the standard power window system. The one touch feature is not available for the rear windows.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - WINDOW SMART MOTOR

When a window motor is installed, it must be initialized to program the up and down stops. The initialization procedure is to manually drive the window motor to both the top and bottom of the window travel. Initialization is performed by holding the switch for two seconds after the window reaches the full up position.

Diagnosing a motor concern requires the technician to diagnose by the process of elimination. If a window motor is inoperative, verify that all switch signals to the motor are correct. Verify power and ground at the window motor. If the switch signals, power and ground are okay and there are no obstructions, attempt to initialize the motor prior to replacement.

DIAGNOSIS AND TESTING - WINDOW MOTOR

1. Remove door trim panel. Refer to **PANEL, DOOR TRIM, REMOVAL**.
2. Connect positive (+) lead from a test battery to either of the two motor terminals.

3. Connect negative (-) lead from test battery to remaining motor terminal.
4. The motor should now rotate in one direction to either move window up or down.
 - a. If window happens to already be in full UP position and motor is connected so as to move it in UP direction no movement will be observed.
 - b. Likewise, motor connected to move window in DOWN direction no movement will be observed if window is already in full DOWN position.
 - c. Reverse battery leads in Step 2 and Step 3 and window should now move. If window does not move, replace motor.
5. If window moved completely up or down, the test leads should be reversed one more time to complete a full window travel inspection.
6. If window does not move, check to make sure that it is free.
7. It is necessary that the window be free to slide up and down in the glass channels. If the window is not free to move up and down, the window lift motor will not be able to move the glass.
8. To determine if the glass is free, disconnect the regulator from the glass lift plate. Remove the two attaching screws, and slide the window up and down by hand.

REMOVAL

REMOVAL

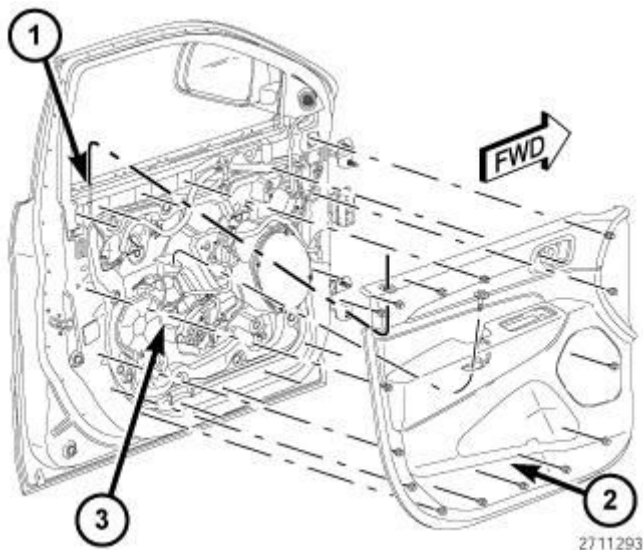


Fig. 1: Interior Trim panel

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove the door interior trim panel (2). Refer to **PANEL, DOOR TRIM, REMOVAL** or **PANEL, REAR DOOR TRIM, REMOVAL** for the appropriate procedure.

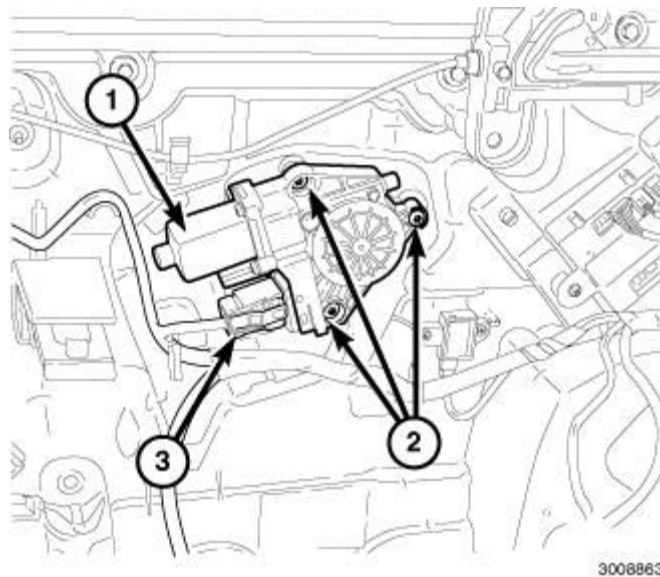


Fig. 2: Power Window Motor Electrical Connector, Three Fasteners, Power Window Motor And Gear Assembly

Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the power window motor electrical connector (3).
4. Remove the three fasteners (2) that secure the power window motor and gear assembly (1) to the carrier plate and remove the motor and gear assembly.

INSTALLATION

INSTALLATION

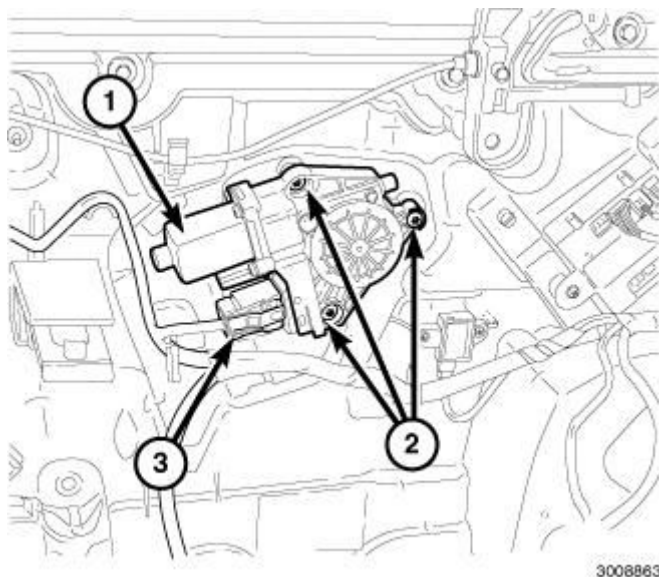


Fig. 3: Power Window Motor Electrical Connector, Three Fasteners, Power Window Motor And Gear Assembly

Courtesy of CHRYSLER GROUP, LLC

NOTE: The power window motor may need to be actuated momentarily to line up the gear in the drive assembly with the regulator.

1. Connect the power window motor electrical connector to the motor electrical connector receptacle (3).
2. Position the power window motor and gear assembly (2) on the carrier plate (1) aligning the drive gear with the regulator.
3. If necessary, temporarily connect the window switch assembly and battery to actuate the motor.
4. Install and tighten the three fasteners (4) that secure the power window motor and gear assembly to the carrier plate.

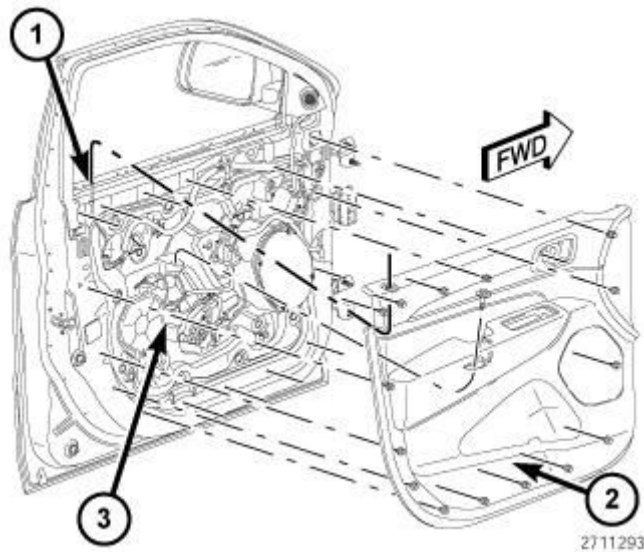


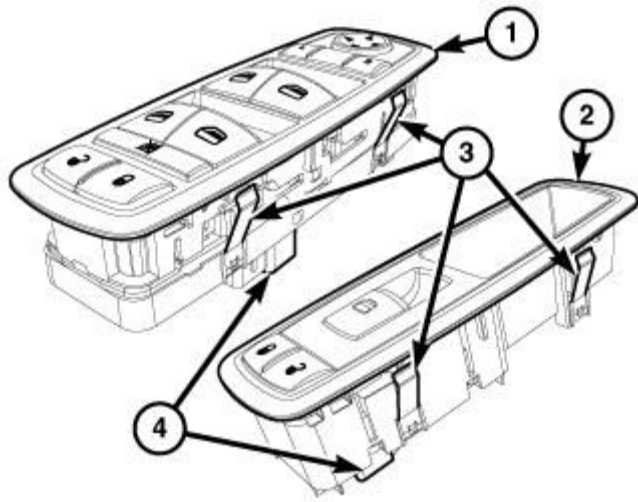
Fig. 4: Interior Trim panel
Courtesy of CHRYSLER GROUP, LLC

5. Reinstall the door interior trim panel (2). Refer to **PANEL, DOOR TRIM, INSTALLATION** or **PANEL, REAR DOOR TRIM, INSTALLATION** for the appropriate procedure.
6. Connect the negative battery cable.

SWITCH, POWER WINDOW

DESCRIPTION

DESCRIPTION



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Fig. 5: Driver Side Module, Passenger Side Module, Four Spring Clip Retainers & Connector Receptacle
 Courtesy of CHRYSLER GROUP, LLC

A front door power switch module and bezel unit is located near the forward end of the arm rest of each front door trim panel. Two different modules are used: a driver side module (1), and a passenger side module (2). Each switch button in both modules is identified with either an International Control and Display Symbol icon or text that clearly identifies the switch function, and each switch button has a Light Emitting Diode (LED) unit soldered to the switch circuit board that provides back lighting of the icon or text for night visibility.

Each switch module housing is secured within the trim panel armrest by four spring clip retainers (3), two on each side of the switch module housing. The passenger side switch module includes a small cubby bin. A connector receptacle (4) integral to the switch module housing connect the switches to the vehicle electrical system through dedicated take outs and connectors of the door wire harness.

The front door power switch modules include the following switches:

- **Power Lock Switch** - A momentary switch button to control the **Lock** function of the power lock system.
- **Power Unlock Switch** - A momentary switch button to control the **Unlock** function of the power lock system.
- **Power Mirror Selector Switch (Driver Side Switch Only)** - Three mirror selector switch buttons choose the power mirror to be adjusted, **R** (right), **L** (left) or a power fold position (both mirrors).
- **Power Mirror Direction Control Switch (Driver Side Switch Only)** - After a power mirror is selected, pressing down on one of the arrows on the momentary mirror direction switch will move the selected mirror in that direction for as long as it is held down until the limit of the mirror travel is reached.
- **Power Window Lockout Switch (Driver Side Switch Only)** - A latching push-button power window lockout switch allows the vehicle operator to lock out the power window switches on each front and rear passenger door so that those windows may be operated only from the driver side front door master switches. When the lockout switch is engaged, the LED back lighting for each front and rear passenger

door power window switch is extinguished.

- **Power Window Switches** - A single two-way, momentary power window switch with a push-to-open and a lift-to-close tab is provide for each passenger door window while the driver side switch module contains four of these power window switches, one switch dedicated to each door window. The switch tab for the driver side front door power window has a second detent in the down direction which is used to activate the **Auto-Down** (also known as express down or one-touch down) feature. A second detent in the up direction on both front door power window switches activates the **Express-Up** feature.

The front door power switch modules cannot be adjusted or repaired. If damaged or ineffective, the entire driver side or passenger side front door switch module must be replaced as a unit.

There are 3 available driver door switch assemblies :

- 1-touch up and down driver window control
- 1-touch down only driver window control
- 1-touch down only driver window control and manual door locks and mirrors

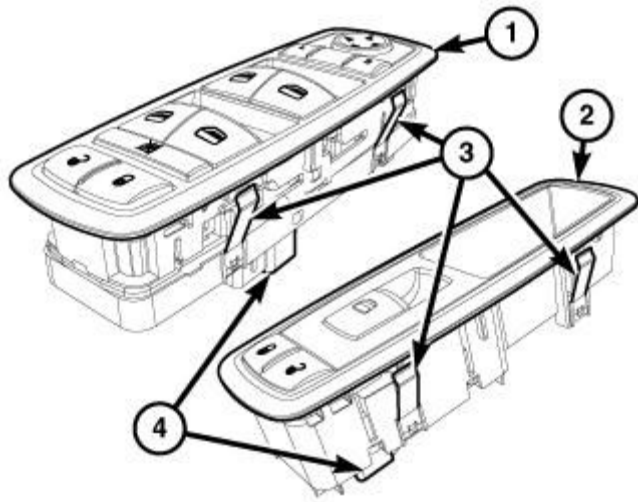
There are 3 available passenger door switch assemblies:

- 1-touch up and down passenger window control
- Manual passenger window control
- Manual passenger window control and manual door locks.

OPERATION

OPERATION

WITH SMART MOTOR



2824067

Fig. 6: Driver Side Module, Passenger Side Module, Four Spring Clip Retainers & Connector Receptacle
Courtesy of CHRYSLER GROUP, LLC

The driver side front door power switch module combines a power lock switch, a power window switch for each of the four door windows including auto-down (also known as one-touch down or express down) and express up features for both front door windows, a power window lockout switch, a power mirror selector switch, and a power mirror adjustment switch in a single unit. The passenger side power door switch module combines a power lock switch and a passenger side front door power window switch with the auto-down and express up features.

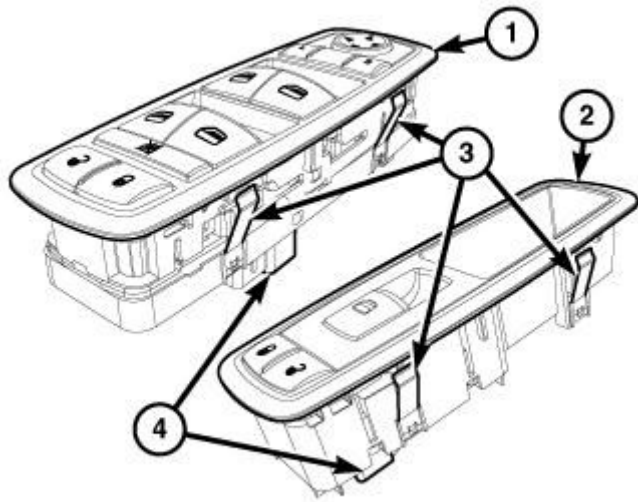
The driver side front door power switch module provides resistor multiplexed outputs to the driver smart motor indicating the power lock switch selection, hard wired analog outputs indicating the power mirror selector switch and adjustment switch selections, and electronic message outputs over a Local Interface Network (LIN) data bus connection indicating the power window switch selections. The passenger side front door power switch module provides resistor multiplexed outputs to the passenger door module indicating both the power lock and power window switch selections.

The hard-wired circuits between the driver side front door power switch module and the driver side door smart motor or the rear door power window switches may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the electronic controls and communication between the switch module and the smart motor. **The smart window motor does not communicate with other modules on the vehicle**. The most reliable, efficient, and accurate means to diagnose the driver side power switch module or the electronic controls and communication related to power lock, power mirror or power window system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

The hard-wired circuits between the passenger side front door power switch module and the passenger side smart motor may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The most reliable, efficient, and accurate means to diagnose the power switch module or the

electronic controls and communication related to power lock or power window system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

WITH DOOR MODULE



2824067

Fig. 7: Driver Side Module, Passenger Side Module, Four Spring Clip Retainers & Connector Receptacle
Courtesy of CHRYSLER GROUP, LLC

The driver side front door power switch module combines a power lock switch, a power window switch for each of the four door windows including auto-down (also known as one-touch down or express down) and express up features for both front door windows, a power window lockout switch, a power mirror selector switch, and a power mirror adjustment switch in a single unit. The passenger side power door switch module combines a power lock switch and a passenger side front door power window switch with the auto-down and express up features.

The driver side front door power switch module provides resistor multiplexed outputs to the driver door module indicating the power lock switch selection, hard wired analog outputs indicating the power mirror selector switch and adjustment switch selections, and electronic message outputs over a Local Interface Network (LIN) data bus connection indicating the power window switch selections. The passenger side front door power switch module provides resistor multiplexed outputs to the passenger door module indicating both the power lock and power window switch selections.

The hard-wired circuits between the driver side front door power switch module and the driver side door module or the rear door power window switches may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the electronic controls and communication between the switch module and the door module or in the diagnosis of the electronic controls and communication between other modules and the door module that provide some features of the power lock, power mirror or power window systems. The most reliable, efficient, and accurate means to diagnose the driver side power switch module or the electronic

controls and communication related to power lock, power mirror or power window system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - POWER WINDOW SWITCHES

The master window switch has an Auto-Down feature. Actuation of the master switch to the second down position will move the drivers side window completely down. The electronic switch will automatically disconnect the motor approximately one second after the window bottoms out. Failure of the electronic switch to detect stall current, will cause the switch to disconnect after approximately 13 seconds. The auto down function can be canceled by any movement of that switch.

MASTER WINDOW SWITCH TEST

SWITCH POSITION	CONTINUITY BETWEEN
OFF	5/13 AND 2
	5/13 AND 3
	5/13 AND 6
	5/13 AND 7
LEFT FRONT UP-NON EXPRESS	1 AND 10
LEFT FRONT DOWN-NON EXPRESS	1 AND 9
RIGHT FRONT UP-NON EXPRESS	1 AND 12
RIGHT FRONT DOWN-NON EXPRESS	1 AND 14
LEFT REAR UP	1 AND 2
LEFT REAR DOWN	1 AND 3
RIGHT REAR UP	1 AND 6
RIGHT REAR DOWN	1 AND 7
LOCKOUT SWITCH (SWITCH NOT DEPRESSED)	1 AND 4

PASSENGER WINDOW SWITCH TEST

SWITCH POSITION	CONTINUITY BETWEEN	RESISTANCE VALUE
UP	4 AND 8	330 Ω $\pm$ 10%
DOWN	4 AND 8	3000 Ω $\pm$ 10%

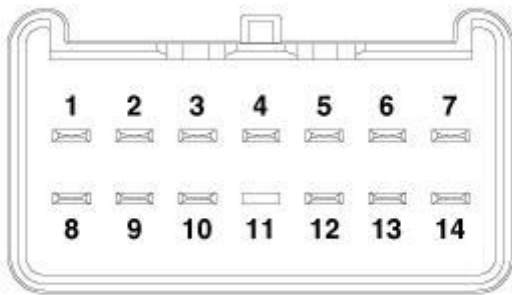
FRONT DOOR - DRIVER SIDE

Any diagnosis of the power window system should begin with the use of the scan tool. For information on the use of the scan tool, refer to the appropriate Diagnostic Service Information .

The diagnosis found here applies to the passenger power window switches. If the problem being diagnosed is an inoperative power window switch illumination lamp, but the power window switch operates as designed, replace the faulty door power window switch.

For complete circuit diagrams, refer to **SYSTEM WIRING DIAGRAMS**.

1. Disconnect and isolate the battery negative cable.
2. Remove the power window switch from the door trim panel. Refer to **SWITCH, POWER WINDOW, REMOVAL**.
3. Check the door power window switch continuity as shown in the power window switch test table below.

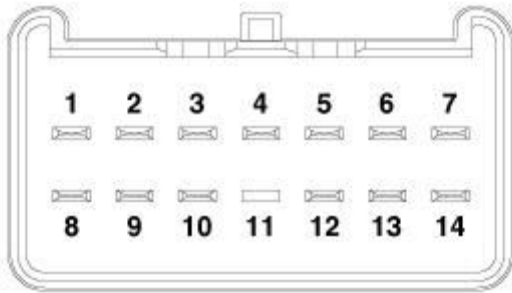


3834819

Fig. 8: Driver Window Switch Connector End View
Courtesy of CHRYSLER GROUP, LLC

BASE HIGH CURRENT WINDOW SWITCH

CAVITY	CIRCUIT
1	F30 - PWR - GENERIC IGN RUN/ACC
2	Q411 - WDO - MASTER CTRL UP RR LT
3	Q611 - WDO - MASTER CTRL DN RR LT
4	Q15 - WDO - PWR WINDOW SW LOCK OUT FEED
5	Z919 - GND - GENERIC 19
6	Q412 - WDO - MASTER CTRL UP RR RT
7	Q412 - WDO - MASTER CTRL DN RR RT
8	F30 - PWR - GENERIC IGN RUN/ACC
9	Q21 - WDO - WINDOW DOWN FT DRIV
10	Q11 - WDO - WINDOW UP FT DRIVE
11	EMPTY
12	Q414 - WDOMASTER CTRL UP PASS
13	Z919 - GND - GENERIC 19
14	Q614 - WDO - MASTER CTRL DN PASS



3834819

Fig. 9: Driver Window Switch Connector End View
Courtesy of CHRYSLER GROUP, LLC

SMART WINDOW LOW CURRENT SWITCH

CAVITY	CIRCUIT
1	F30 - PWR - GENERIC IGN RUN/ACC
2	Q411 - WDO - MASTER CTRL UP RR LT
3	Q611 - WDO - MASTER CTRL DN RR LT
4	Q15 - WDO - PWR WINDOW SW LOCK OUT FEED
5	Z919 - GND - GENERIC 19
6	Q412 - WDO - MASTER CTRL UP RR RT
7	Q412 - WDO - MASTER CTRL DN RR RT
8	F30 - PWR - GENERIC IGN RUN/ACC
9	Q21 - WDO - WINDOW DOWN FT DRIV
10	Q11 - WDO - WINDOW UP FT DRIVE
11	EMPTY
12	Q414 - WDOMASTER CTRL UP PASS
13	Z919 - GND - GENERIC 19
14	Q614 - WDO - MASTER CTRL DN PASS

ALL SMART MOTOR WINDOW SWITCH RESISTANCE VALUES

Mode	Low Limit	Nominal	High Limit
Up / Auto Up	228 Ohm	235 Ohm	240 Ohm
Down / Auto Down	228 Ohm	235 Ohm	240 Ohm

FRONT DOOR - PASSENGER SIDE

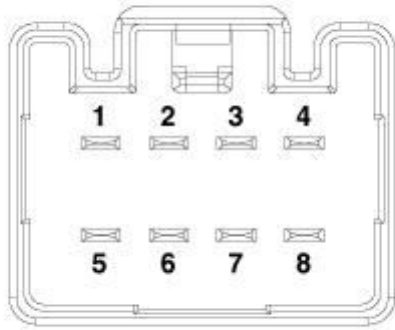
Any diagnosis of the power window system should begin with the use of the scan tool. For information on

the use of the scan tool, refer to the appropriate Diagnostic Service Information .

The diagnosis found here applies to the passenger power window switches. If the problem being diagnosed is an inoperative power window switch illumination lamp, but the power window switch operates as designed, replace the faulty door power window switch.

For complete circuit diagrams, refer to **SYSTEM WIRING DIAGRAMS**

1. Disconnect and isolate the battery negative cable.
2. Remove the power window switch from the door trim panel. Refer to **SWITCH, POWER WINDOW, REMOVAL**.
3. Check the door power window switch continuity as shown in the power window switch test table below.

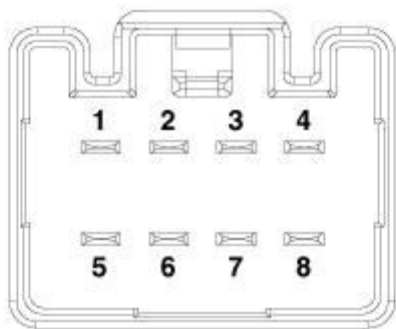


3835020

Fig. 10: Passenger Window Switch Connector End View
Courtesy of CHRYSLER GROUP, LLC

BASE SWITCH W/O POWER LOCKS

CAVITY	CIRCUIT
1	Q614 - WDO - MASTER CTRL DN PASS
2	F30 - PWR - GENERIC IGN RUN/ACC
3	Q12 - WDO - WINDOW UP FT PASS
4	Q414 - WDO - MASTER CTRL UP PASS
5	Q22 - WDO - WINDOW DOWN FT PASS
6	EMPTY
7	EMPTY
8	Z916 - GND - GENERIC 16



3835020

Fig. 11: Passenger Window Switch Connector End View
 Courtesy of CHRYSLER GROUP, LLC

BASE SWITCH WITH POWER LOCKS

CAVITY	CIRCUIT
1	Q614 - WDO - MASTER CTRL DN PASS
2	F30 - PWR - GENERIC IGN RUN/ACC
3	Q12 - WDO - WINDOW UP FT PASS
4	Q414 - WDO - MASTER CTRL UP PASS
5	Q22 - WDO - WINDOW DOWN FT PASS
6	G160 - DRL - DOORLOCK SW SIG FT PASS
7	F30 - PWR - GENERIC IGN RUN/ACC
8	P371 - DRL - DOOR LOCK SW RTN DRIV

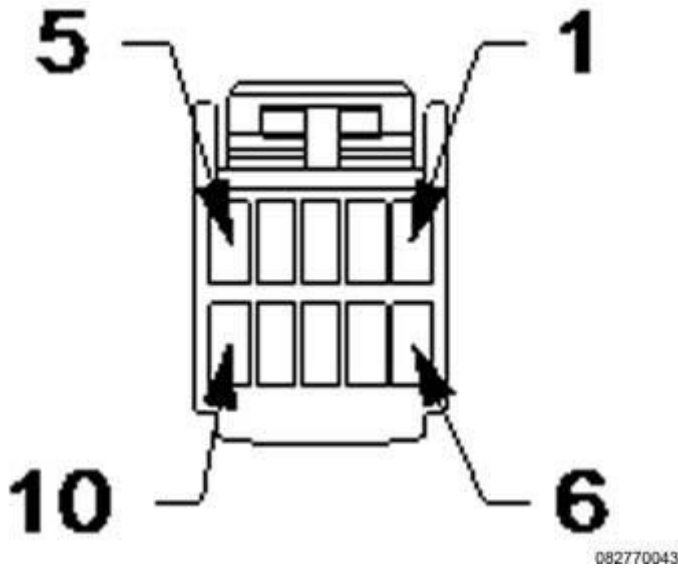


Fig. 12: Power Window Switch Smart Motor Connector End View
Courtesy of CHRYSLER GROUP, LLC

POWER WINDOW SWITCH SMART MOTOR

CAVITY	CIRCUIT
1	F981 - PWR - GENERIC IGN RUN/ACC
2	Q12 - WDO - WINDOW UP FT PASS
3	Q414 - WDO - MASTER CTRL UP PASS
4	P371 - DRL - DOOR LOCK SW RTN DRIV
5	EMPTY
6	Q22 - WDO - WINDOW DOWN FT PASS
7	Q614 - WDO - MASTER CTRL DN PASS
8	G160 - DRL - DOOR LOCK SW SIG FT PASS
9	EMPTY
10	EMPTY

POWER WINDOW SWITCH TESTS - PASSENGER DOOR WINDOW

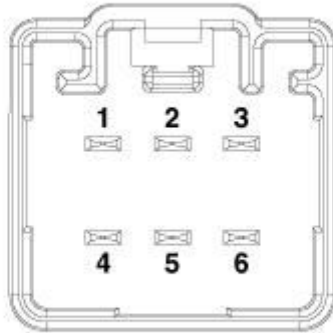
Passenger Window Switch Functions and (Pin #'s)	RESISTANCE RANGE (OHMS)
UP (4 and 8)	990 - 1022
AUTO UP (4 and 8)	329 - 349
DOWN (4 and 8)	2970 - 3042
AUTO DOWN (4 and 8)	0 - 12
NEUTRAL (4 and 8)	1 megohm

POWER LOCK SWITCH TESTS - PASSENGER DOOR LOCK

Door Lock Switches functions and (Pin #'s)	RESISTANCE RANGE (OHMS)
NEUTRAL (4 and 8)	1 megohm

LOCK (4 and 8)	326 - 341
UNLOCK (4 and 8)	99 - 103

REAR DOOR



3835039

Fig. 13: Rear Power Window Switch Connector End View
Courtesy of CHRYSLER GROUP, LLC

The following test procedure applies to the rear door power window switches on all vehicles equipped with power windows, with or without power locks.

1. Remove the power window switch from the rear door trim panel. Refer to **SWITCH, POWER WINDOW, REMOVAL**.
2. Using an ohmmeter, test the continuity between the terminals of the rear door power window switch as shown in the Rear Door Power Window Switch Tests table.

REAR DOOR POWER WINDOW SWITCH TESTS TABLE

REAR DOOR POWER WINDOW SWITCH TESTS	
SWITCH POSITION	CONTINUITY BETWEEN (PINS)
NEUTRAL	1 and 4, 3 and 6
UP	2 and 4, 3 and 5
DOWN	2 and 3, 4 and 5
SWITCH ILLUMINATION	LEDs - SET MULTIMETER TO DIODE MODE - CONNECT PIN 2 TO PLUS (+), CONNECT PIN 5 TO MINUS (-) - LEDs SHOULD BARELY GLOW

3. If a switch fails any of the tests, replace the ineffective rear door power window switch as required.

REMOVAL

REMOVAL

FRONT DOOR

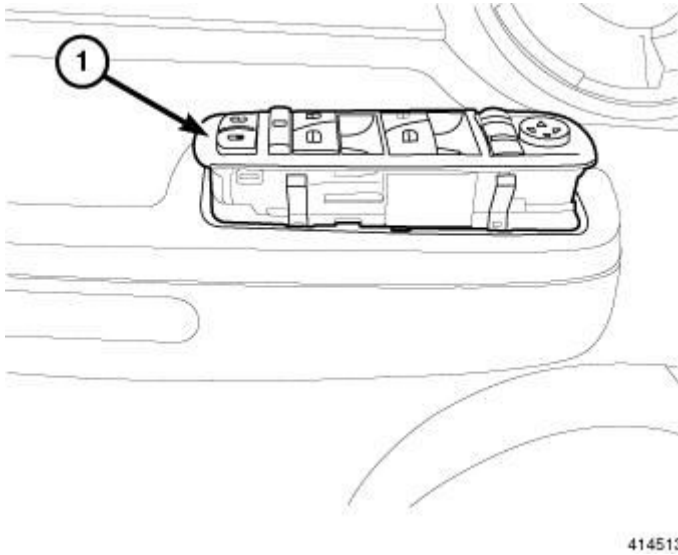


Fig. 14: Power Window Switch
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove door trim panel. Refer to **PANEL, DOOR TRIM, REMOVAL** .
3. Disconnect switch wire connector.
4. Remove switch assembly (1).

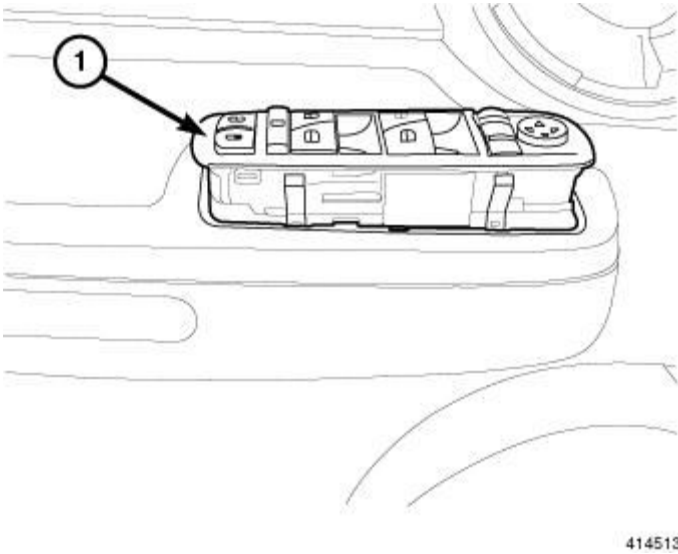
REAR DOOR

1. Disconnect and isolate the negative battery cable.
2. Remove the interior handle. Refer to **HANDLE, EXTERIOR, REMOVAL** .
3. Disconnect the electrical connector.
4. Remove the switch from the handle.

INSTALLATION

INSTALLATION

FRONT DOOR

**Fig. 15: Power Window Switch**

Courtesy of CHRYSLER GROUP, LLC

1. Install the switch (1) by snapping into place.
2. Connect switch wire connector.
3. Install the door trim panel. Refer to **PANEL, DOOR TRIM, INSTALLATION** .
4. Connect the negative battery cable.

REAR DOOR

1. Install the switch to the handle.
2. Connect the electrical connector.
3. Install the interior door handle. Refer to **HANDLE, EXTERIOR, INSTALLATION** .
4. Connect the negative battery cable.

2014 ACCESSORIES AND EQUIPMENT**Speed Control - Service Information - Cherokee****DESCRIPTION****DESCRIPTION**

Two electronic speed control systems are available factory-installed equipment on this vehicle: a conventional system and an adaptive system. Additional details of these two systems and their components can be found under the subheadings and paragraphs that follow.

ADAPTIVE SPEED CONTROL STOP AND GO**Quick Overview:**

- Utilizes Radar and camera sensors to identify vehicles in forward path and maintains a selectable distance between the vehicle and the one in front of it;
- ACC with stop and go has full functionality between 0 and 100 mph;
- After ACC with stop and go brings the vehicle to a stop, the driver must indicate the intention to resume by either pressing the resume button or tapping the accelerator pedal;
- Driver can select one of four following distances depending on driver preference.

Functional Overview - The optional **ACC Plus (ACC +)** system (also known as ACC Stop and Go) has functionality beyond that of Normal Cruise Control and Adaptive Cruise Control. This system has the functionality of the cruise control system of maintaining a driver defined Set Speed without the driver needing to press the throttle. This system also has the functionality of the regular ACC system of increasing and decreasing the vehicle speed based on target vehicles moving slower than the ACC Set Speed. Beyond the functionality of the regular ACC system, this system offers a larger operational speed range, which constitutes of speeds from 0 mph to a configurable upper bound. If a target vehicle comes to a standstill, the ACC+ system will also bring the ACC+ host vehicle to a stop, and will keep the vehicle at a standstill for an undetermined period of time by first applying the brakes, and after the brakes time-out, cancelling the ACC+ system and applying the Electronic Park Brake (EPB). The ACC with stop and go system will also incorporate Forward Collision Warning-Plus (FCW). With grade braking, the transmission will automatically downshift to maintain selected vehicle speed and distance, preventing overheating of brakes.

The ACC sensor, the FFC, the ABM, the EMIC, the EVIC, the PCM and the SCM each contain a microprocessor and programming that allow them to communicate with each other using the Controller Area Network (CAN) data bus. This method of communication is used by the ACC module to provide inputs to the ABM, the EVIC and the PCM. This is also used by the ABM to provide inputs to the PCM, by the SCM to relay the status of the speed control switches to the PCM and by the PCM for control of the indicators in the EMIC and the indications in the EVIC. Refer to **COMMUNICATION, DESCRIPTION**.

The ACC with stop and go system used also incorporates grade braking and Forward Collision Warning-Plus (FCW). With grade braking, the transmission will automatically downshift to maintain selected vehicle speed and distance, preventing overheating of brakes.

The optional equipment ACC+ system includes the following major components, which are described in further detail elsewhere in this service information:

- **Adaptive Speed Control Module** - An adaptive speed control sensor (also known as the Adaptive Cruise Control/ACC sensor or module and the radar sensor or module) is located on a bracket secured near the center of the underside of the front bumper support member of the Front End Module (FEM) behind the front fascia. Refer to **MODULE, ADAPTIVE CRUISE CONTROL, DESCRIPTION**.
- **Antilock Brake Module** - An Antilock Brake Module (ABM) (also known as Controller Antilock Brake/CAB or the Electronic Stability Control/ESC module) is located on the antilock brake Hydraulic Control Unit (HCU) in the engine compartment. Refer to **MODULE, ANTI-LOCK BRAKE SYSTEM, DESCRIPTION**.
- **Brake Lamp Switch** - The brake (also known as stop) lamp switch is located on the brake pedal support bracket under the driver side of the instrument panel. Refer to **SWITCH, STOP LAMP, DESCRIPTION**.
- **ElectroMechanical Instrument Cluster** - A CRUISE indicator is located in the fixed segment display of the ElectroMechanical Instrument Cluster (EMIC) (also known as the Cab Compartment Node/CCN) that provides an indication to the vehicle operator when the speed control system is turned ON. Refer to **DESCRIPTION**.
- **Electronic Vehicle Information Center** - The Electronic Vehicle Information Center (EVIC) is located in the ElectroMechanical Instrument Cluster (EMIC) (also known as the Cab Compartment Node/CCN) and provides an interface to the vehicle operator for setting the adaptive speed control customer preferences as well as a display of the adaptive speed control and Forward Collision Warning (FCW) system status messages. Refer to **CENTER, ELECTRONIC VEHICLE INFORMATION, DESCRIPTION**.
- **Forward Facing Camera** - The Forward Facing Camera (FFC) is located inside the Combined Rear View Mirror Module (CRVMM) housing assembly. The FFC provides input for data fusion purposes allowing the ACC sensor radar data to be redundancy checked. Refer to **MODULE, FORWARD FACING CAMERA, DESCRIPTION**.
- **Powertrain Control Module** - The Powertrain Control Module (PCM) located in the right front corner of the engine compartment contains the software and hardware that monitors all of the speed control system inputs and controls all of the speed control system outputs. Refer to **MODULE, POWERTRAIN CONTROL, DESCRIPTION**.
- **Speed Control Switches** - A speed control switch pod containing six momentary switch push buttons is located in the right horizontal spoke of the steering wheel. Refer to **SWITCH, SPEED CONTROL, DESCRIPTION**.
- **Steering Control Module** - A Steering Control Module (SCM) is integral to the Steering Column Control Module (SCCM) located at the top of the steering column just below the steering wheel. Refer to **MODULE, STEERING COLUMN, DESCRIPTION**.
- **Wheel Speed Sensors** - A wheel speed sensor is located on the knuckle of each front and rear wheel. Refer to **SENSOR, WHEEL SPEED, FRONT, DESCRIPTION**.

Hard wired circuitry connects the adaptive electronic speed control system components to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the speed control system components through the use of a combination of soldered

splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

CONVENTIONAL SPEED CONTROL

The standard equipment conventional electronic speed control system includes the following major components, which are described in further detail elsewhere in this service information:

- **Antilock Brake Module** - An Antilock Brake Module (ABM) (also known as Controller Antilock Brake/CAB or the Electronic Stability Control/ESC module) is located on the antilock brake Hydraulic Control Unit (HCU) in the engine compartment. Refer to **MODULE, ANTI-LOCK BRAKE SYSTEM, DESCRIPTION**.
- **Brake Lamp Sensor** - The brake (also known as stop) lamp sensor is located on the brake pedal support bracket under the driver side of the instrument panel. (Refer to **SWITCH, STOP LAMP**).
- **ElectroMechanical Instrument Cluster** - A CRUISE indicator is located in the fixed segment display of the ElectroMechanical Instrument Cluster (EMIC) (also known as the Cab Compartment Node/CCN) that provides an indication to the vehicle operator when the speed control system is turned ON. Refer to **DESCRIPTION**.
- **Powertrain Control Module** - The Powertrain Control Module (PCM) in the right front corner of the engine compartment contains the software and hardware that monitors all of the speed control system inputs and controls all of the speed control system outputs. Refer to **MODULE, POWERTRAIN CONTROL, DESCRIPTION**.
- **Speed Control Switches** - A speed control switch pod containing four momentary switch push buttons is located in the right horizontal spoke of the steering wheel. Refer to **SWITCH, SPEED CONTROL, DESCRIPTION**.
- **Steering Control Module** - A Steering Control Module (SCM) is integral to the Steering Column Control Module (SCCM) located at the top of the steering column just below the steering wheel. Refer to **MODULE, STEERING COLUMN, DESCRIPTION**.
- **Wheel Speed Sensors** - A wheel speed sensor is located on the knuckle of each front and rear wheel. Refer to **SENSOR, WHEEL SPEED, FRONT, DESCRIPTION**.

The ABM, the EMIC, the PCM and the SCM each contain a microprocessor and programming that allow them to communicate with each other using the Controller Area Network (CAN) data bus. This method of communication is used by the SCM to relay the status of the speed control switches to the PCM, and by the PCM for control of the CRUISE indicator in the EMIC. Refer to **COMMUNICATION, DESCRIPTION**.

Hard wired circuitry connects the conventional electronic speed control system components to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the speed control system components through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

OPERATION

OPERATION

ADAPTIVE SPEED CONTROL

The vehicle operator controls all adaptive speed control system (ACC) features through the speed control switch pod on the face of the right horizontal spoke of the steering wheel. When a push button of the switch pod is depressed, it provides a hard wired resistor multiplexed analog input to the Steering Control Module (SCM).

The SCM reads the speed control switch input, then relays an electronic **speed control switch** status message to the Powertrain Control Module (PCM) and to the adaptive speed control sensor (also known as the Adaptive Cruise Control/ACC sensor or module, or as the radar sensor or module) over the Controller Area Network (CAN) data bus. The PCM and ACC sensor microprocessors continually monitor these inputs as well as electronic **wheel speed** message inputs from the Antilock Brake Module (ABM) (also known as the Controller Antilock Brake/CAB, the Electronic Stability Control/ESC module or the Antilock Brake System/ABS module), electronic **gear selector** message inputs from the Transmission Control Module TCM, video data from the Forward Facing Camera (FFC) and numerous hard wired inputs including the brake (or stop) lamp switch, then provides the appropriate electronic message and hard wired outputs to invoke the requested electronic speed control features.

Using the MODE push button of the speed control switch pod on the face of the right horizontal spoke of the steering wheel, the vehicle operator can choose between adaptive speed control and conventional speed control modes of operation. As the name implies, when in the conventional speed control mode the speed control system is used and functions exactly like a conventional speed control system. When in the adaptive speed control mode, the vehicle operator can use the DISTANCE push button of the speed control switch pod to select from one of three distance settings for the adaptive cruise system to maintain. These settings equate to the time in seconds separating the vehicle from a preceding vehicle. The FFC and the ACC sensor share a private bus allowing data fusion to occur within the ACC sensor. The ACC sensor then uses this information to send electronic message outputs to the ABM, the TCM and the PCM to maintain the selected separation distance. The available distance settings are:

- 1 - 1.0 second
- 2 - 1.5 seconds
- 3 - 2.0 seconds

If the ECM/PCM detects a fault on one of the following systems, it will disable the cruise control system. The ECM/PCM will store an appropriate DTC.

- Engine Speed Sensor
- Sensor or actuators of the electric throttle (only for gasoline engines)
- Accelerator Pedal Potentiometer (APP Sensor)
- Brake Pedal Position
- Clutch Switch rationality
- Engine Load sensor (only for gasoline engines)

- Ignition Coils (only for gasoline engines)
- Fuel Injectors
- High pressure system components (only for GDI and Diesel engines)
- Turbo sensors or actuators.

The PCM and ACC sensor microprocessors continuously monitor all of the speed control system electrical circuits to determine the system readiness and accuracy. If the PCM or ACC sensor detects a monitored system fault, it sets and stores a Diagnostic Trouble Code (DTC). The PCM and ACC components use On-Board Diagnostics (OBD) and can communicate with other electronic modules in the vehicle as well as with the diagnostic scan tool using the CAN data bus. This method of communication is used for control of the Malfunction Indicator Lamp (MIL) (also known as the Check Engine lamp) in the ElectroMechanical Instrument Cluster (EMIC) (also known as the Cab Compartment Node/CCN) and for system diagnosis and testing through the 16-way data link connector located on the driver side lower edge of the instrument panel.

The hard wired inputs and outputs for the PCM and the ACC sensor may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the PCM, the ACC sensor or the electronic controls or communication between other modules and devices that provide features of the adaptive speed control system. The most reliable, efficient, and accurate means to diagnose the PCM, the ACC sensor or the electronic controls and communication related to speed control system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

CONVENTIONAL SPEED CONTROL

The vehicle operator controls all conventional speed control system features through the speed control switch pod on the face of the right horizontal spoke of the steering wheel. When a push button of the switch pod is depressed, it provides a hard wired resistor multiplexed analog input to the Steering Control Module (SCM).

The SCM reads the speed control switch input via LIN, then relays an electronic **speed control switch** status message to the Powertrain Control Module (PCM) over the Controller Area Network (CAN) C data bus. The PCM software continually monitors these inputs as well as electronic **vehicle distance** message inputs from the Antilock Brake Module (ABM) (also known as the Controller Antilock Brake/CAB, the Electronic Stability Control/ESC module or the Antilock Brake System/ABS module) and numerous hard wired inputs including the brake (or stop) lamp switch, then provides the appropriate electronic message and hard wired outputs to invoke the requested electronic speed control features.

The PCM microprocessor continuously monitors all of the speed control system electrical circuits to determine the system readiness. If the PCM detects a monitored system fault, it sets and stores a Diagnostic Trouble Code (DTC). The PCM uses On-Board Diagnostics (OBD) and can communicate with other electronic modules in the vehicle as well as with the diagnostic scan tool using the CAN data bus. This method of communication is used for control of the Malfunction Indicator Lamp (MIL) (also known as the Check Engine lamp) in the ElectroMechanical Instrument Cluster (EMIC) (also known as the Cab Compartment Node/CCN) and for system diagnosis and testing through the 16-way data link connector located on the driver side lower edge of the instrument panel.

If the ECM/PCM detects a fault on one of the following systems, it will disable the cruise control system. The

ECM/PCM will store an appropriate DTC.

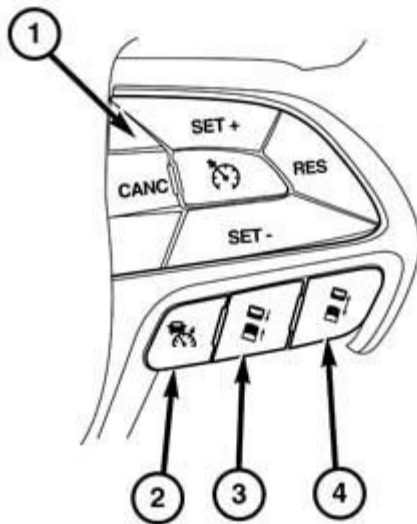
- Engine Speed Sensor
- Sensor or actuators of the electric throttle (only for gasoline engines)
- Accelerator Pedal Potentiometer (APP Sensor)
- Brake Pedal Position
- Clutch Switch rationality
- Engine Load sensor (only for gasoline engines)
- Ignition Coils (only for gasoline engines)
- Fuel Injectors
- High pressure system components (only for GDI and Diesel engines)
- Turbo sensors or actuators.

The hard wired inputs and outputs for the PCM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the PCM or the electronic controls or communication between other modules and devices that provide features of the conventional speed control system. The most reliable, efficient, and accurate means to diagnose the PCM or the electronic controls and communication related to speed control system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

SWITCH, SPEED CONTROL

DESCRIPTION

DESCRIPTION



0811003272

Fig. 1: Speed Control Switch Pod
Courtesy of CHRYSLER GROUP, LLC

The speed control switch pod (1) is located in the right spoke of the steering wheel spoke bezel. Two different switches are used. One switch has five buttons and is used on vehicles not equipped with the optional adaptive speed control (also known as the Adaptive Cruise Control/ACC) system. The other switch has eight buttons and is used on vehicles equipped with the ACC system option. These switches are the primary control used by the vehicle operator to manage the particular speed control system installed in the vehicle. The only visible components of the switch pod are the switch push buttons and a decorative bezel around the push buttons, which stands slightly proud of the steering wheel spoke bezel. The remainder of the switch pod including its mounting provisions and its electrical connection are concealed beneath the spoke bezel.

The switch pod housing and push buttons are constructed of molded plastic. Each of the push buttons has white International Control and Display Symbol graphics or text applied to it, which clearly identify the function of each push button. The switch pod is secured through three integral mounting tabs to mounting bosses on the back of the spoke bezel by three screws. A connector receptacle integral to the inboard end of the switch pod housing connects the speed control switch and the Local Interface Network (LIN) slave node circuitry integral to the switch pod to the vehicle electrical system through a dedicated take out and connector of the steering wheel wire harness.

The speed control switch pod cannot be adjusted or repaired. If any function of the switch or the LIN slave node is ineffective or damaged, the entire switch pod unit must be replaced.

OPERATION

OPERATION

The speed control switch pod is a resistor multiplexed unit that provides LIN bussed inputs to the Steering Control Module (SCM) microprocessor integral to the Steering Column Control Module (SCCM). The speed control switch pod also contains the circuitry of a Local Interface Network (LIN) slave node, which provides source current for and communicates the switch or sensor states of the Electronic Vehicle Information Center (EVIC) switches, the remote radio switches, the paddle shifter switches (if equipped), the horn switch and the heated steering wheel sensor (if equipped) over the LIN data bus to the SCM, which is the LIN master node.

The speed control switch pod for vehicles equipped with a conventional electronic speed control system and not equipped with the optional adaptive speed control (also known as the Adaptive Cruise Control/ACC) system contains four switch push buttons whose functions are:

- **On/Off** - This switch button enables or disables the speed control system and clears any previous speed control set speed from system memory.
- **Resume / +** - This switch button restores the vehicle to a previously stored set speed or accelerates the vehicle from an already attained set speed.
- **Cancel** - This switch button cancels the current speed control event, but does not turn the system OFF or clear the currently stored set speed.
- **Set / -** - This switch button sets the current vehicle speed as the stored set speed or decelerates (coasts) the vehicle to a speed that is slower than the already attained set speed.

The optional adaptive speed control switch pod for vehicles equipped with the ACC system option contains the same four switch push buttons as the conventional speed control switch pod, then adds two buttons whose functions are:

- **Mode** - This switch button toggles the speed control system between adaptive (ACC) or conventional (non-ACC) modes of operation.
- **Distance Buttons** - These switch buttons select the separation or following distance (in seconds) that the ACC system maintains between this vehicle and any preceding vehicle.

The SCM LIN master node provides a clean ground and fused B(+) current for all of the switches and sensors on the rotating steering wheel through the LIN slave node circuitry of the speed control switch pod as well as for the Light Emitting Diode (LED) back lighting of both the speed control and the EVIC switch pods. The SCM continually monitors all of the hard wired speed control switch circuits as well as the LIN bus data. The SCM will set a Diagnostic Trouble Code (DTC) for any problem it detects in the speed control switch circuits, and will store a Signal Not Available (SNA) code for any LIN bus input errors. The SCM also communicates with other electronic modules over the Controller Area Network (CAN) data bus. Therefore, any SCM DTC information can be retrieved using a diagnostic scan tool connected to the Data Link Connector (DLC).

The analog resistor multiplexed circuits of the speed control switch pod as well as the hard wired circuits between the switch pod and the SCM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

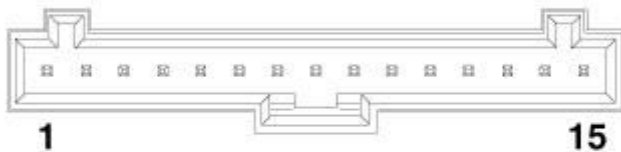
However, conventional diagnostic methods will not prove conclusive in the diagnosis of the LIN slave or master nodes, the SCM, the SCCM or the electronic controls and communication between modules and other

devices that provide some features of the speed control system. The most reliable, efficient, and accurate means to diagnose the speed control switch pod, the LIN slave or master nodes, the SCM or the electronic controls and communication related to speed control system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - SPEED CONTROL SWITCH

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.



2827003

Fig. 2: Speed Control Switch Harness Connector Terminal Identification

Courtesy of CHRYSLER GROUP, LLC

NOTE: The following test confirms only correct speed control switch functions. It does not test or confirm any of the Local Interface Network (LIN) slave node inputs, outputs or functions. LIN slave node testing requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

1. Remove the speed control switch pod from the steering wheel. Refer to **SWITCH, SPEED CONTROL, REMOVAL**.
2. Disconnect the steering wheel wire harness connector from the back of the speed control switch pod.
3. Using an ohmmeter, test the resistance between the terminals of the switch as shown in the Speed Control

Switch Tests table.

SPEED CONTROL SWITCH TESTS TABLE

SPEED CONTROL SWITCH TESTS	
SWITCH POSITION	PINS (*RESISTANCE - OHMS)
NO PUSH BUTTONS DEPRESSED	13 and 14 (20708) 14 and 15 (20591)
ON / OFF	13 and 14 (464) 14 and 15 (133)
CANCEL	13 and 14 (896) 14 and 15 (457)
DISTANCE (WITH ADAPTIVE SPEED CONTROL ONLY)	13 and 14 (1515) 14 and 15 (899)
MODE (WITH ADAPTIVE SPEED CONTROL ONLY)	13 and 14 (2468) 14 and 15 (1518)
SET / - (DECEL)	13 and 14 (4088) 14 and 15 (2471)
RESUME / + (ACCEL)	13 and 14 (7408) 14 and 15 (4091)
*All resistance values are plus or minus 5%.	

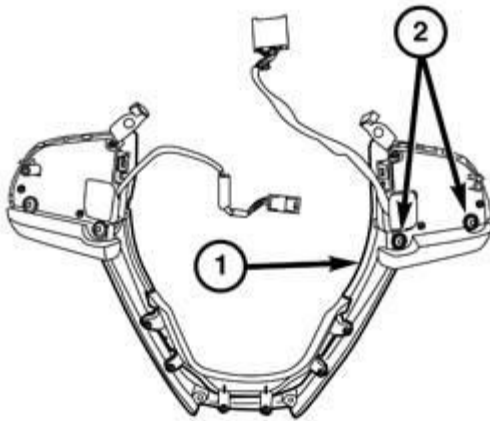
- If the switch fails any of the tests, replace the ineffective speed control switch pod as required.

REMOVAL

REMOVAL

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

- Disconnect and isolate the battery negative cable.
- Remove the remote radio switch. Refer to **SWITCH, REMOTE RADIO, REMOVAL**.



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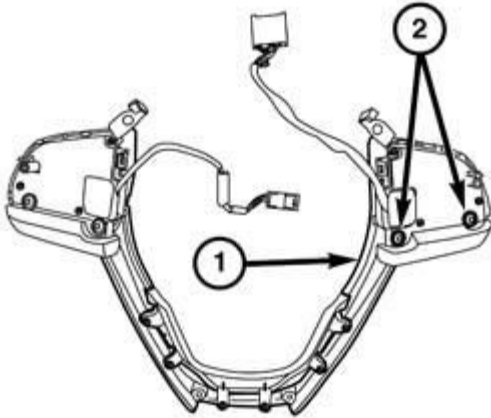
Fig. 3: Steering Wheel Bezel & Screws
Courtesy of CHRYSLER GROUP, LLC

3. From the back of the steering wheel front bezel (2), remove the two screws (1) that secure the speed control switch pod to the bezel.
4. Remove the switch from the bezel.

INSTALLATION

INSTALLATION

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.



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Fig. 4: Steering Wheel Bezel & Screws

Courtesy of CHRYSLER GROUP, LLC

1. Position the Speed Control switch pod to the back of the steering wheel front bezel (2).
2. Install and tighten the two screws (1) that secure the switch to the bezel. Tighten the screws securely.
3. Install the remote radio switch. Refer to **SWITCH, REMOTE RADIO, INSTALLATION** .
4. Connect the negative battery cable.

2014 ACCESSORIES AND EQUIPMENT**Vehicle Theft Security - Service Information - Cherokee****DESCRIPTION****VEHICLE THEFT SECURITY SYSTEM**

The Vehicle Theft Security System (VTSS) is available factory-installed equipment for this vehicle. The VTSS includes various standard and optional features that provide protection against unauthorized vehicle access, operation and intrusion. The VTSS is comprised of two primary subsystems: The Sentry Key Immobilizer System (SKIS) and the Vehicle Theft Alarm (VTA). Additional details of each of these subsystems and their components can be found elsewhere within this service information.

Except for the Sentry Key transponders which rely upon Radio Frequency (RF) communication, hard wired circuitry connects the VTA and SKIS components to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the SKIS or VTA components through the use of a combination of soldered splices, splice block connectors and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin out and location views for the various wire harness connectors, splices and grounds.

SENTRY KEY IMMOBILIZER SYSTEM

The Sentry Key Immobilizer System (SKIS) is factory-installed standard equipment on this model. The SKIS provides passive vehicle protection, immobilizing the vehicle by preventing the engine from operating unless a valid electronically encoded key or FOB with Integrated Key (FOBIK) is detected. In vehicles not equipped with the Passive Entry Keyless Go (PEKG) system, a valid encoded key or FOBIK must be present within the IGnition Node Module (IGNM) (also known as the Keyless Ignition Node/KIN) for the engine to continue to operate. In vehicles equipped with the optional PEKG system, the FOBIK must only be present somewhere within the passenger compartment of the vehicle for the engine to continue to operate.

The SKIS used in combination with the export premium version of the Vehicle Theft Alarm (VTA) adds a steering shaft lock feature that provides passive protection by preventing the vehicle from being steered unless a valid encoded key or FOBIK is present within the IGNM (without PEKG), or a valid FOBIK is present somewhere within the passenger compartment of the vehicle (with PEKG). The export premium version of the VTA is only available in vehicles manufactured for sale in certain markets where it is required equipment.

The SKIS includes the following major components, which are described in further detail elsewhere in this service information:

- **Body Control Module** - The Body Control Module (BCM) is concealed within the instrument panel outboard of the steering column. Refer to **MODULE, BODY CONTROL, DESCRIPTION**.
- **Ignition Node Module** - The IGnition Node Module (IGNM) (also known as the Keyless Ignition

Node/KIN) is located in the instrument panel just inboard of the steering column. Refer to **MODULE, IGNITION NODE, DESCRIPTION** .

- **Instrument Cluster** - The Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) is located in the instrument panel, above the steering column and directly in front of the vehicle operator. Refer to **DESCRIPTION** .
- **Low Frequency Antenna** - Vehicles equipped with the optional Passive Entry Keyless Go (PEKG) system have several low frequency antenna units strategically placed within the vehicle. Refer to **ANTENNA, PASSIVE ENTRY, DESCRIPTION** .
- **Powertrain Control Module** - The Powertrain Control Module (PCM) (also known as the Engine Control Module/ECM) is located on the inboard side of the battery tray in the left front corner of the engine compartment. Refer to **MODULE, POWERTRAIN CONTROL, DESCRIPTION** .
- **Radio Frequency Hub Module** - The Radio Frequency Hub Module (RFHM) (also known as the RF Hub) is located on the upper right D-pillar near the liftgate opening upper header where it is concealed behind the interior trim. Refer to **MODULE, RADIO FREQUENCY (RF HUB), DESCRIPTION** .
- **Sentry Key Transponder** - A Sentry Key transponder microchip is located within each key or FOB with Integrated Key (FOBIK). Refer to **KEY, TRANSPONDER, DESCRIPTION** .
- **Shaft Lock Module** - A shaft lock module (also known as the Electronic Steering Column Lock/ESCL module) is located on the steering column below the instrument panel in the passenger compartment of vehicles built for sale in certain export markets where it is required equipment and equipped with the export premium version of the VTA. Refer to **MODULE, SHAFT LOCK, DESCRIPTION** .

VEHICLE THEFT ALARM

The Vehicle Theft Alarm (VTA) is factory-installed optional equipment in this vehicle. The VTA is available in different configurations and versions. One configuration is designed for vehicles manufactured for sale in domestic markets; while, another configuration is designed for vehicles manufactured for sale in export markets. In addition, the VTA for export markets is available in two versions: base and premium.

Each of these systems provide perimeter vehicle protection by monitoring the vehicle doors, the liftgate and the status of the ignition (also known as the Ignition Node Module/IGNM or Keyless Ignition Node/KIN). In vehicles manufactured for some markets the VTA also monitors the hood. If unauthorized vehicle access, intrusion or tampering is detected with any of these systems, the vehicle horn is pulsed as an audible deterrent and certain exterior lamps are flashed as a visual deterrent.

The export premium version of the VTA system is only available in vehicles manufactured for sale in certain markets where it is required equipment. The export premium version of the VTA provides the same perimeter protection features as the base version, but adds interior vehicle intrusion and vehicle anti-tilt protection. The export premium VTA also replaces the pulsing horn feature of the base version with an alarm siren module providing the audible deterrent, while retaining the flashing exterior lamps as the visual deterrent.

The VTA includes the following major components, which are described in further detail elsewhere in this service information:

- **Alarm Siren Module** - An alarm siren module is located on the engine compartment side of the Front End Module (FEM) carrier between the right front lamp unit housing and the cooling module. The alarm siren is used only in vehicles built for sale in certain export markets where it is required equipment. Refer

to **SIREN, DESCRIPTION**.

- **Body Control Module** - The Body Control Module (BCM) is concealed within the instrument panel outboard of the steering column. The BCM is both a LIN bus master node and a gateway to the CAN data bus. Refer to **MODULE, BODY CONTROL, DESCRIPTION**.
- **Door Ajar Switches** - A door ajar switch is integral to the door latch mechanism of each front and rear door. Refer to **LATCH, LIFTGATE, REMOVAL**.
- **Hood Ajar Switch** - A hood ajar switch is integral to the hood latch assembly of vehicles manufactured for certain export markets. Refer to **SWITCH, HOOD AJAR, DESCRIPTION**.
- **Ignition Node Module** - The IGnition Node Module (IGNM) (also known as the Keyless Ignition Node/KIN) is located in the instrument panel just inboard of the upper steering column opening. Refer to **MODULE, KEYLESS IGNITION NODE, DESCRIPTION**.
- **Instrument Cluster** - The Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) is located in the instrument panel above the steering column and directly in front of the driver. Refer to **DESCRIPTION**.
- **Liftgate Ajar Switch** - A liftgate ajar switch is integral to the latch for the liftgate in the vehicle. Refer to **LATCH, LIFTGATE, REMOVAL**.
- **Radio Frequency Hub Module** - The Radio Frequency Hub Module (RFHM) (also known as the RF Hub) is located on the upper right D-pillar near the liftgate opening upper header where it is concealed behind the interior trim. Refer to **MODULE, RADIO FREQUENCY (RF HUB), DESCRIPTION**.
- **Ultrasonic And Anti-tilt Module** - In vehicles equipped with the premium VTA, an Ultrasonic and Anti-tilt Module (UAM) (also known as the Intrusion Transceiver Module/ITM) is located on and concealed above the overhead console trim cover on the headliner near the center of the upper windshield opening. Refer to **MODULE, ULTRASONIC AND ANTI-TILT, DESCRIPTION**.

OPERATION

VEHICLE THEFT SECURITY SYSTEM

The Vehicle Theft Security System (VTSS) is comprised of two primary subsystems: Sentry Key Immobilizer System (SKIS) and Vehicle Theft Alarm (VTA). Additional operational details on each of these two subsystems of the VTSS can be found elsewhere within this service information.

SENTRY KEY IMMOBILIZER SYSTEM

The Sentry Key Immobilizer System (SKIS) is designed to provide passive protection against unauthorized vehicle use by disabling the engine whenever an attempt is made to operate the vehicle using anything other than a key or FOB with Integrated Key (FOBIK) equipped with a valid Sentry Key transponder microchip. The SKIS is considered a passive protection system because it is always active when the ignition system is energized and does not require any customer intervention.

The microcontroller-based Radio Frequency Hub Module (RFHM) (also known as the RF Hub) uses Radio Frequency (RF) communication to challenge and obtain confirmation that the key or FOBIK being used is a valid key or FOBIK for operating the vehicle. The microcontroller-based RFHM hardware and software also uses electronic messages to communicate with the IGnition Node Module (IGNM) (also known as the Keyless Ignition Node/KIN) over a private serial bus and with other electronic modules in the vehicle over the

Controller Area Network (CAN) data bus. Refer to **COMMUNICATION, OPERATION** .

Pre-programmed Sentry Key transponders are provided with the vehicle from the factory. Each RFHM will recognize a maximum of eight Sentry Keys or FOBIK units. If the customer would like additional Sentry Keys or FOBIK units other than those provided with the vehicle, they may be purchased from any authorized dealer. These additional Sentry Keys or FOBIK units must be programmed to the RFHM in the vehicle in order for the system to recognize them as valid keys. This can be done by the dealer using a diagnostic scan tool. Refer to **STANDARD PROCEDURE**.

In vehicles equipped with an export premium version of the Vehicle Theft Alarm (VTA), the Body Control Module (BCM) controls an electronic shaft lock module (also known as the Electronic Steering Lock/ESL or the Electronic Steering Column Lock/ESCL) on the steering column that locks the steering shaft from rotation unless the BCM receives a electronic **valid key** message from the RFHM. The BCM also communicates with the electronic shaft lock module over the CAN data bus to monitor and control the shaft lock function.

The BCM performs a self-test of the SKIS and the shaft lock module each time the ignition status transitions to On, and will store fault information in the form of a Diagnostic Trouble Code (DTC) for any system or component malfunction that is detected. If a fault is detected, the BCM will illuminate the security indicator in the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) or the IC will display a textual **SHAFT LOCK ERROR** message in the Electronic Vehicle Information Center (EVIC) display as appropriate.

The hard wired circuits between components related to the SKIS may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the SKIS or the electronic controls and communication between other modules and devices that provide some features of the SKIS. The most reliable, efficient and accurate means to diagnose the SKIS or the electronic controls and communication related to SKIS operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

VEHICLE THEFT ALARM

The base version of the Vehicle Theft Alarm (VTA) is designed to provide either active or passive perimeter protection of the vehicle by monitoring the vehicle doors, the ignition and the liftgate. In vehicles built for certain markets where it is required equipment, the perimeter protection also includes monitoring of the hood. If the VTA system detects any attempt to compromise a monitored vehicle system or feature, the vehicle horn is pulsed as an audible deterrent and certain exterior lamps are flashed as a visual deterrent.

The Body Control Module (BCM) includes the logic and control circuits for the base versions of the VTA. Each of the ajar switches provides hard wired inputs to the BCM, while the BCM provides control outputs to the vehicle horns and lighting systems. The Radio Frequency Hub Module (RFHM) (also known as the RF Hub) monitors the status of the Ignition Node Module (IGNM) (also known as the Keyless Ignition Node/KIN) through a private serial bus and relays this information to the BCM as electronic messages transmitted over the Controller Area Network (CAN) data bus.

The premium version of the VTA includes an Ultrasonic and Anti-tilt Module (UAM) (also known as the Intrusion Transceiver Module/ITM). The UAM provides interior intrusion protection as well as vehicle tow-away and tire theft protection. The UAM includes the logic and control circuits for these features of the VTA and is also a slave node communicating over the Local Interface Network (LIN) data bus. The UAM is armed and disarmed by electronic messages received over the LIN data bus from the BCM, which is a LIN master node. While armed, the UAM uses external ultrasonic transmit and receive transducers to monitor the vehicle interior for movement as well as internal accelerometers to monitor vehicle pitch and roll. When an exception is detected, the UAM relays this information to the BCM over the LIN bus, and the BCM invokes the VTA audible and visual alerts. In vehicles with an ITM, the horn output function of the BCM is replaced by an output of the alarm siren module that is controlled by the BCM over the LIN data bus.

The hard wired circuits between components related to the VTA system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the VTA system or the electronic controls and communication between modules and devices that provide some features of the VTA system. The most reliable, efficient and accurate means to diagnose the VTA system or the electronic controls and communication related to VTA system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

OPERATING MODES

Following are paragraphs that briefly describe the operation of each of the Vehicle Theft Alarm (VTA) operating modes.

- **Enabling** - The Body Control Module (BCM) and the Radio Frequency Hub Module (RFHM) (also known as the RF Hub) must have the Vehicle Theft Alarm (VTA) function electronically enabled in order for the VTA to perform as designed. The BCM stores and compares vehicle configuration data with other Electronic Control Units (ECU) in the vehicle, including the RFHM. This process is referred to as PROgramming Of Configuration of Systems Integrated (PROCSI) (also known as PROXI). If a configuration mismatch is detected, the BCM sets a Diagnostic Trouble Code (DTC). A configuration mismatch will require the performance of a Restore BCM PROXI Configuration routine, or a PROXI Configuration Alignment routine using a diagnostic scan tool.
- **Arming** - Passive arming of the VTA occurs when the vehicle is exited with the key or FOB with Integrated Key (FOBIK) removed from the ignition, the headlamps are turned Off and the doors are locked while they are open using the power lock switch. Active arming occurs when the Lock button on the Remote Keyless Entry (RKE) transmitter is depressed to lock the vehicle. For active arming to occur, the doors and the liftgate must be closed and the status of the ignition must be Off when the RKE transmitter Lock button is depressed. The power lock switch will not function if a key or FOBIK is in the ignition with the driver side front door open.

Pre-arming of the VTA is initiated when the vehicle is locked using a power door lock switch or when the RKE transmitter Lock button is depressed. Pre-arming will not occur if the key or FOBIK is in the ignition with the driver side front door open. When the VTA is pre-armed, the arming sequence is delayed until all of the doors and the liftgate have been closed. The VTA will remain in pre-armed mode

for up to 16 seconds after all doors and the liftgate have been closed.

Once the VTA begins the passive or active arming sequence, the security indicator in the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) will flash rapidly for about 16 seconds. This indicates that VTA arming is in progress. If the ignition status transitions to On, if a door or the liftgate is unlocked or opened by any means, or if the RKE Panic button (if equipped) is depressed during the 16 second arming process, the security indicator will stop flashing and the arming process will abort. Once the arming sequence is successfully completed, the security indicator will flash at a slower rate, indicating that the VTA is armed.

On vehicles equipped with the hood ajar switch, the VTA arming sequence will occur regardless of whether the hood is open or closed, but the security indicator will illuminate solid and the engine compartment will not be protected unless the hood is closed when the VTA arming sequence first begins. Also, if the status of the hood ajar switch changes from open to closed during the 16 second arming process, the security indicator will switch from solid to flashing. Once the arming process is successfully completed, the security indicator will flash at a slower rate, indicating that the VTA is armed.

- **Disarming** - Passive disarming of the Vehicle Theft Alarm (VTA) occurs by inserting a valid Sentry Key Immobilizer System (SKIS) key or FOB with Integrated Key (FOBIK) into the ignition or when the ignition status transitions to On. Active disarming of the VTA for all markets occurs when the vehicle is unlocked by depressing the Unlock button of the Remote Keyless Entry (RKE) transmitter. Once the alarm has been activated, either disarming method will also deactivate the alarm. Depressing the Panic button (if equipped) on the RKE transmitter will **not** disarm the VTA.
- **Alarm** - The Vehicle Theft Alarm (VTA) alarm output provides both visual and audible outputs; however, the time intervals of these outputs vary by the requirements of the market for which the vehicle is manufactured. In all cases, the visual output will be a flashing On and Off of the exterior lamps, while the audible output will be either a pulsing of the horn or, if the vehicle is so equipped, the siren. For vehicles with the base version of the VTA, the inputs that will trigger the alarm include a change in the status of the ignition, the door ajar switches, the liftgate ajar switch and, in vehicles built for certain markets where they are required, the hood ajar switch. In vehicles with the premium version of the VTA, the inputs that will trigger the alarm also include any movement detected within the vehicle passenger compartment, or a change in the vehicle pitch or roll of greater than about 0.5 degrees.
- **Power-Up Mode** - When the armed Vehicle Theft Alarm (VTA) senses that the battery has been disconnected and reconnected, it enters its power-up mode. In the power-up mode the armed alarm system remains armed following a battery failure or disconnect. If the VTA was armed prior to a battery disconnect or failure, the technician or vehicle operator will have to actively or passively disarm the alarm system after the battery is reconnected. The power-up mode will also apply if the battery goes dead while the system is armed, and battery jump-starting is attempted. The VTA will be armed until the technician or vehicle operator has actively or passively disarmed the alarm system.

If the VTA is in the disarmed mode prior to a battery disconnect or failure, it will remain disarmed after the battery is reconnected or replaced, or if jump-starting is attempted.

- **Tamper Alert** - The Vehicle Theft Alarm (VTA) tamper alert feature will pulse the horn three times upon VTA disarming if the alarm was triggered and has since timed out, or if the battery has been disconnected and reconnected. This feature alerts the vehicle operator that the VTA alarm was activated while the vehicle was unattended. This feature is disabled in vehicles manufactured for certain export

markets where it is required.

- **Anti-tilt And Intrusion Alarm Disabling** - The anti-tilt and intrusion alarm is an exclusive feature of the premium version of the Vehicle Theft Alarm (VTA). When this version of the VTA is armed, the Ultrasonic and Anti-tilt Module (UAM) (also known as the Intrusion Transceiver Module/ITM) uses ultrasonic transmit and receive transducers to monitor the interior of the vehicle for movement and low gravity accelerometers to monitor vehicle pitch and roll. If interior motion or change in vehicle attitude are detected, the UAM sends an electronic message to the Body Control Module (BCM) over the Local Interface Network (LIN) data bus to invoke the audible and visual alarm features.

The anti-tilt and intrusion alarm features of the premium VTA can be disabled by depressing the Lock button on the Remote Keyless Entry (RKE) transmitter 3 times within 15 seconds during VTA pre-arming, while the security indicator is still flashing rapidly. The VTA provides a single short siren chirp as an audible confirmation that the anti-tilt and intrusion alarm features disable request has been received. The default for the UAM features is enabled; therefore, the disable procedure must be repeated each time the VTA is disarmed, then armed again to prevent the system from monitoring interior movement and vehicle pitch and roll.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - VEHICLE THEFT SECURITY SYSTEM

The Vehicle Theft Security System (VTSS) is divided into two basic subsystems: Sentry Key Immobilizer System (SKIS) and Vehicle Theft Alarm (VTA). The recommended procedures for diagnosis and testing of each of these two VTSS subsystems can be found elsewhere within this service information.

DIAGNOSIS AND TESTING - SENTRY KEY IMMOBILIZER SYSTEM

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

The hard wired circuits between modules and components related to the Sentry Key Immobilizer System (SKIS) may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the SKIS or the electronic controls and communication between other modules and devices that provide features of the SKIS. The most reliable, efficient and accurate means to diagnose the SKIS or the electronic controls and

communication related to SKIS operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

SENTRY KEY IMMOBILIZER SYSTEM DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
SECURITY INDICATOR FAILS TO LIGHT DURING BULB TEST	1. Ineffective Light-Emitting Diode (LED). 2. Ineffective security indicator circuit. 3. Ineffective ground circuit. 4. Ineffective battery feed circuit. 5. Ineffective ignition feed circuit.	1. Use a diagnostic scan tool to perform the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) actuator test. Refer to the appropriate diagnostic information. 2. Check the security indicator circuit between the Body Control Module (BCM) and the IC for an open or short. Repair the circuit, if required. 3. Test and repair the open ground circuit at the connector for the IC, if required. 4. Test and repair the open battery feed circuit at the connector for the IC, if required. 5. Test and repair the open ignition feed circuit at the connector for the IC, if required.
SECURITY INDICATOR FLASHES FOLLOWING BULB TEST	1. Invalid key or FOB with Integrated Key (FOBIK) in the ignition. 2. Key-related fault.	1. Replace the invalid key or FOBIK with a known valid key or FOBIK. 2. Use a diagnostic scan tool and the appropriate diagnostic information for further diagnosis.
SECURITY INDICATOR LIGHTS SOLID FOLLOWING BULB TEST	1. SKIS system malfunction/fault detected. 2. SKIS system ineffective.	1. Use a diagnostic scan tool and the appropriate diagnostic information for further diagnosis. 2. Use a diagnostic scan tool and the appropriate diagnostic information for further diagnosis.

DIAGNOSIS AND TESTING - VEHICLE THEFT ALARM

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in

accidental airbag deployment.

The hard wired circuits between modules and components related to the Vehicle Theft Alarm (VTA) system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the VTA or the electronic controls and communication between other modules and devices that provide features of the VTA. The most reliable, efficient and accurate means to diagnose the VTA or the electronic controls and communication related to VTA operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

STANDARD PROCEDURE**SENTRY KEY IMMOBILIZER SYSTEM INITIALIZATION**

The Sentry Key Immobilizer System (SKIS) must be initialized following the service replacement of a Body Control Module (BCM), a Radio Frequency Hub Module (RFHM) (also known as the RF Hub), a Powertrain Control Module (PCM) (also known as the Engine Control Module/ECM) or a electronic shaft lock module (also known as the Electronic Steering Lock/ESL or the Electronic Steering Column Lock/ESCL). SKIS initialization requires the use of a diagnostic scan tool. Initialization will also require that you have security access and a temporary authorization PIN code. The PIN code **MUST** be used to enter the Secured Access Mode. Refer to **STANDARD PROCEDURE** . This procedure will require you to log into DealerCONNECT and enter a PIN when requested. The PIN is temporary and will be active for 12 hours. After 12 hours, a new PIN will need to be obtained from DealerCONNECT.

NOTE: If the Body Control Module (BCM) is replaced in a vehicle equipped with the Sentry Key Immobilizer System (SKIS), the unique Secret Key data must be transferred from the Radio Frequency Hub Module (RFHM) (also known as the RF Hub) to the new BCM using the appropriate programming procedure. This procedure also requires the use of a diagnostic scan tool to enter the Secured Access Mode in the RFHM.

NOTE: If the electronic shaft lock module (also known as the Electronic Steering Lock/ESL or the Electronic Steering Column Lock/ESCL) is replaced in a vehicle equipped with the Sentry Key Immobilizer System (SKIS), the unique Secret Key data must be transferred from the Body Control Module (BCM) to the new electronic shaft lock module using the appropriate programming procedure. This procedure also requires the use of a diagnostic scan tool to enter the Secured Access Mode in the BCM.

NOTE: If the Powertrain Control Module (PCM) (also known as the Engine Control Module/ECM) is replaced in a vehicle equipped with the Sentry Key Immobilizer

System (SKIS), the unique Secret Key data must be transferred from the Body Control Module (BCM) to the new PCM using the appropriate programming procedure. This procedure also requires the use of a diagnostic scan tool to enter the Secured Access Mode in the BCM.

SENTRY KEY TRANSPONDER PROGRAMMING

All Sentry Keys or FOB with Integrated Key (FOBIK) units included with the vehicle are pre-programmed to work with the Radio Frequency Hub Module (RFHM) (also known as the RF Hub) when the vehicle is shipped from the factory. The RFHM can be programmed to recognize up to a total of eight Sentry Key or FOBIK transponder units. When programming a blank transponder, the Sentry Key mechanical key must first be cut to match the ignition lock cylinder (if equipped) or the FOBIK mechanical key must be cut to match the door lock cylinder in the vehicle for which it will be used. Once the mechanical key has been cut, the RFHM must be programmed to recognize it as a valid key transponder. To program the RFHM to recognize a new or additional valid key transponder, the Secured Access Method must be used. The details of this programming method can be found under **FOBIK Programming** elsewhere in this service information using the link that follows. Refer to **STANDARD PROCEDURE**. This procedure will require you to log into DealerCONNECT and enter a PIN when requested. The PIN is temporary and will be active for 12 hours. After 12 hours, a new PIN will need to be obtained from DealerCONNECT.

SPECIFICATIONS

SPECIFICATIONS

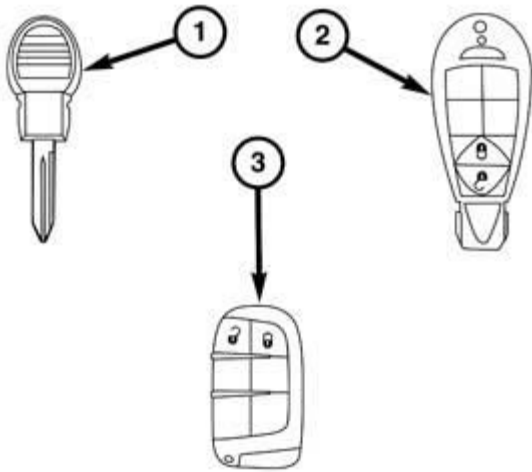
TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS			
DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Alarm Siren Module Mounting Nut	6	-	53
Stand Alone Hood Ajar Switch Bracket Mounting Screw	5.5	4	-

KEY, TRANSPONDER

DESCRIPTION

DESCRIPTION



083168754

Fig. 1: Transponder Keys**Courtesy of CHRYSLER GROUP, LLC**

Three unique variations of a transponder key are available for this vehicle. They are:

- **Sentry Key Immobilizer System Transponder Key** - The Sentry Key Immobilizer System (SKIS) transponder key (1) is used in combination with an IGnition Node Module (IGNM) (also known as the Wireless Ignition Node/WIN) featuring a rotary-type ignition switch. This transponder key is used only for vehicles that are not equipped with the optional Remote Keyless Entry (RKE) system.
- **Remote Keyless Entry System Transponder Key** - The Remote Keyless Entry (RKE) system transponder key (2) is also known as a FOB with Integrated Key (FOBIK). Like the SKIS transponder key, the RKE FOBIK transponder key is used in combination with an IGnition Node Module (IGNM) (also known as the Wireless Ignition Node/WIN) featuring a rotary-type ignition switch. This transponder key is used for vehicles that are equipped with the RKE system, but not with the optional Passive Entry Keyless Go (PEKG) system.
- **Passive Entry Keyless Go System Transponder Key** - The Passive Entry Keyless Go (PEKG) system transponder key (3) is also known as a FOB with Integrated Key (FOBIK). However, unlike the SKIS transponder key and RKE FOBIK transponder key, the PEKG transponder key is used in combination with an IGnition Node Module (IGNM) (also known as the Keyless Ignition Node/KIN) featuring a push button-type ignition switch. This transponder key is used only for vehicles that are equipped with the PEKG system.

Regardless of the type of transponder key used for this vehicle, in addition to having to be cut to match the mechanical coding of the lock cylinders and programmed for operation of the RKE system, each ignition key has a transponder microchip included that carries a unique transponder identification code. This identification code that is permanently programmed into it by the manufacturer must be programmed into the Radio Frequency Hub Module (RFHM) (also known as the RF Hub) to be recognized by the SKIS as a valid key.

The Sentry Key transponder key cannot be adjusted or repaired. If ineffective or damaged, the entire transponder key or FOB/IK and RKE transmitter unit must be replaced.

OPERATION

OPERATION

When the status of the ignition switch transitions to On the Ignition Node Module (IGNM) sends an electronic **ignition switch status** message over a private serial bus to the Radio Frequency Hub Module (RFHM) (also known as the RF-Hub). In vehicles not equipped with the Passive Entry Keyless Go (PEKG) system, the IGNM uses an internal antenna to communicate with the Sentry Key transponder based upon inputs received from the RFHM through the private serial bus. In vehicles that are equipped with the PEKG system, the RFHM relies upon several Low Frequency (LF) antenna units to challenge the Sentry Key transponders using a LF signal, then monitors responses from the Sentry Key transponders received as Very High Frequency (VHF) signals.

The RFHM determines whether a valid key is present based upon the response from the transponder. If a valid key is detected, that fact is communicated by the RFHM to the Body Control Module (BCM), and by the BCM to the Powertrain Control Module (PCM) (also known as the Engine Control Module/ECM) over the Controller Area Network (CAN) data bus, and the PCM allows the engine to continue running. If the BCM receives an electronic **invalid key** message or no message, or if the PCM receives an electronic **invalid key** message or no message over the CAN data bus, the engine will be disabled. The Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) will also respond to the **invalid key** message on the CAN data bus by flashing the security indicator On and Off.

Each Sentry Key has a unique transponder identification code permanently programmed into it by the manufacturer. Likewise, the RFHM has a unique Secret Key code programmed into it by the manufacturer. When a Sentry Key is programmed into the memory of the RFHM, the RFHM stores the transponder identification code from the Sentry Key and the Sentry Key learns the Secret Key code from the RFHM. Once the Sentry Key learns the Secret Key code of the RFHM, it is permanently stored in the memory of the transponder. Therefore, once a Sentry Key has been programmed to a particular vehicle, it cannot be used on any other vehicle. Refer to **STANDARD PROCEDURE**.

The Sentry Key Immobilizer System (SKIS) performs a self-test each time the ignition switch status transitions to On, and will store key-related fault information in the form of a Diagnostic Trouble Code (DTC) in RFHM memory if a Sentry Key transponder problem is detected. The Sentry Key transponder chip can be diagnosed, and any stored DTC can be retrieved using a diagnostic scan tool. Refer to the appropriate diagnostic information.

Common communication problems:

- Two transponder keys too close to each other.
- Another transponder device (i.e.: Speed Pass) too close to the Sentry Key transponder.

A security indicator illuminated solid (not flashing) in the IC indicates that there is a system failure.

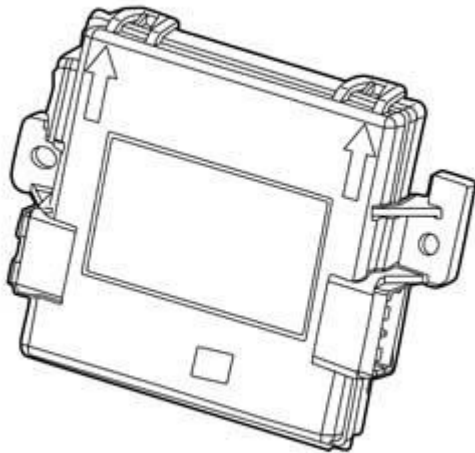
- Loss of PCM/CAN data bus communication.
- Failed antenna circuit.

NOTE: After a RFHM is replaced with a new unit, the Sentry Key transponders need to be programmed to the new RFHM. Follow the instructions found in the diagnostic scan tool for the Replace RFHM Routine . The Sentry Key transponders and the Remote Keyless Entry (RKE) transmitters (if equipped) will both be programmed during this operation. There is no need to program the RKE transmitter again once the Sentry Key transponder key has been programmed to the new RFHM. This procedure will require you to log into DealerCONNECT and enter a PIN when requested. The PIN is temporary and will be active for 12 hours. After 12 hours, a new PIN will need to be obtained from DealerCONNECT.

MODULE, SENTRY KEY IMMOBILIZER (SKIM)

DESCRIPTION

DESCRIPTION



0831002982

Fig. 2: Sentry Key Immobilizer Module (SKIM)
Courtesy of CHRYSLER GROUP, LLC

The functions and features of the Sentry Key Immobilizer Module (SKIM) (also previously known as the Sentry Key REmote Entry Module/SKREEM, the Wireless Control Module/WCM or the Wireless Ignition Node/WIN) are all integral to the Radio Frequency Hub Module (RFHM) (also known as the RF Hub) and either the Keyless Ignition Node (KIN) in vehicles equipped with the push button ignition Keyless Go (KG) system or the IGnition Node Module (IGNM) in vehicles equipped with a rotary ignition key or FOB with Integrated Key (FOBIK).

The RFHM is the primary component of the Sentry Key Immobilizer System (SKIS). It is also the receiver for the Remote Keyless Entry (RKE) system, the Passive Entry (PE) system, the remote start system and the Tire Pressure Monitor (TPM) system on vehicles so equipped. The RFHM is located on the inner roof panel reinforcement near the liftgate opening within the passenger compartment, where it is concealed above the headliner trim. Refer to **MODULE, RADIO FREQUENCY (RF HUB), DESCRIPTION** .

The KIN includes the integral ignition push button. The IGNM includes the ignition rotary FOBIK switch or key cylinder switch. The KIN or the IGNM is located in the instrument panel, just to the right of the steering column. The remainder of the KIN or IGNM including its mounting provisions and electrical connections are concealed within the instrument panel. Refer to **MODULE, KEYLESS IGNITION NODE, DESCRIPTION** or **MODULE, IGNITION NODE, DESCRIPTION** .

OPERATION

OPERATION

The functions and features of the Sentry Key Immobilizer Module (SKIM) (also previously known as the Sentry Key REMote Entry Module/SKREEM, the Wireless Control Module/WCM or the Wireless Ignition Node/WIN) are all integral to the Radio Frequency Hub Module (RFHM) (also known as the RF Hub) and the IGnition Node Module/IGNM or the Keyless Ignition Node (KIN) in this vehicle. The RFHM contains a Radio Frequency (RF) transceiver and a microcontroller.

In vehicles with a rotary ignition switch the RFHM controls Low Frequency (LF) signaling with the Sentry Key transponder integral to the mechanical key or FOB with Integrated Key (FOBIK) through a tuned antenna internal to the IGNM. The IGNM transmits the received LF signal and the selected ignition switch status back to the RFHM. In vehicles with the push button Keyless Go (KG) system, the RFHM transmits LF signals to, and receives LF signals from the Sentry Key transponder integral to the FOBIK through a tuned antenna internal to the RFHM housing, while the KIN allows the vehicle operator to select and monitor the status of the ignition switch and also transmits the selected ignition switch status back to the RFHM.

The RFHM also serves as the Remote Keyless Entry (RKE) RF receiver and, if the vehicle is so equipped, the receiver for the remote start system and for the Tire Pressure Monitoring (TPM) system. Refer to **DESCRIPTION** , **OPERATION** and **TIRE PRESSURE MONITORING, DESCRIPTION** . The RFHM communicates over the Controller Area Network (CAN) data bus with the Body Control Module (BCM), the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC), the Powertrain Control Module (PCM) (also known as the Engine Control Module/ECM) or the diagnostic scan tool. It also communicates over a dedicated Local Interface Network (LIN) data bus circuit with the IGNM or the KIN.

The RFHM and the PCM both use software that includes a rolling code algorithm strategy, which helps to reduce the possibility of unauthorized Sentry Key Immobilizer System (SKIS) disarming. The rolling code algorithm ensures security by preventing an override of the SKIS through the unauthorized substitution of the RFHM or the PCM. However, the use of this strategy also means that replacement of either the RFHM or the PCM units will require a system initialization procedure to restore system operation.

The RFHM retains in memory the ID numbers of any Sentry Key or FOBIK transponder that is programmed into it. A maximum of eight Sentry Key transponders can be programmed into the RFHM. For added system security, each RFHM is programmed with a unique Secret Key code. This code is stored in memory, sent over

the CAN data bus to the PCM, and is encoded to the transponder of every Sentry Key that is programmed into the RFHM. Therefore, the Secret Key code is a common element that is found in every component of the SKIS.

Another security code called a PIN is used to gain access to the RFHM Secured Access Mode. The Secured Access Mode is required during service to perform the SKIS initialization and Sentry Key transponder programming procedures. The RFHM also stores the Vehicle Identification Number (VIN) in its memory, which it learns through a CAN data bus message from the PCM during SKIS initialization.

In the event that a RFHM replacement is required, the Secret Key code can be transferred to the new RFHM from the PCM using the diagnostic scan tool and the SKIS initialization procedure. Proper completion of the SKIS initialization will allow the existing Sentry Key transponder units to be programmed into the new RFHM so that new Sentry Key units will not be required. In the event that the original Secret Key code cannot be recovered, RFHM replacement will also require new Sentry Key units. The diagnostic scan tool will alert the technician during the SKIS initialization procedure if new Sentry Key units are required. Refer to **STANDARD PROCEDURE** .

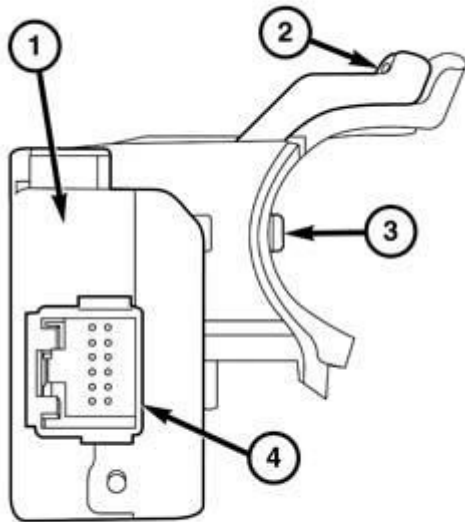
When the status of the ignition switch transitions to On, the RFHM transmits a LF signal to excite the transponder in the FOBK. The RFHM then waits for a LF signal response from the transponder. If the response received identifies the key or FOBK as valid, the RFHM sends an electronic **valid key** message to the PCM over the CAN data bus. If the response received identifies the key or FOBK as invalid or if no response is received from the key or FOBK transponder, the RFHM sends an **invalid key** message to the PCM. The PCM will enable or disable engine operation based upon the status of the RFHM messages. It is important to note that the default condition in the PCM is an **invalid key** ; therefore, if no message is received from the RFHM by the PCM, the engine will be disabled and the vehicle immobilized after two seconds of running.

The RFHM also sends electronic **security indicator** request messages to the IC over the CAN data bus to tell the IC how to operate the security indicator. The **security indicator** request message from the RFHM tells the IC to turn the indicator On for about three seconds each time the status of the ignition switch transitions to On as a bulb test. After completion of the bulb test, the RFHM sends **security indicator** request messages to the IC to turn the indicator Off, turn the indicator On or to flash the indicator On and Off. If the security indicator flashes or stays On solid after the bulb test, it signifies a SKIS fault. If the RFHM detects a system malfunction or the SKIS has become ineffective, the security indicator will stay On solid. If the RFHM detects an invalid key or FOBK, or if a key or FOBK transponder-related fault exists, the security indicator will flash.

The SKIS performs a self-test each time the status of the ignition switch transitions to On, and will store fault information in the form of a Diagnostic Trouble Code (DTC) in RFHM memory if a system malfunction is detected. The hard wired circuits of the RFHM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the RFHM or the electronic controls and communication between other modules and devices that provide some features of the SKIS. The most reliable, efficient and accurate means to diagnose the RFHM or the electronic controls and communication related to RFHM operation requires the use of a diagnostic scan tool.

MODULE, SHAFT LOCK

DESCRIPTION

DESCRIPTION

0831005390

Fig. 3: Shaft Lock Module, Locking Bolt, Mounting Bracket & Connector Receptacle
Courtesy of CHRYSLER GROUP, LLC

A shaft lock module (1) (also known as the Electronic Steering Column Lock/ESCL or the Elektronische Lenkungs Verriegelung/ELV) is part of the premium version of the Sentry Key Immobilizer System (SKIS) in the Vehicle Theft Security System (VTSS). The premium version of the SKIS is only available in vehicles built for certain markets, where the additional features offered by this system are required. The module is located near the upper end of the steering column housing below the instrument panel in the passenger compartment.

The shaft lock module includes a die cast aluminum cover that conceals and protects the electronic circuitry of the module, which includes a single integral connector receptacle (4). The electronics of the module are connected to the vehicle electrical system through a dedicated take out and connector of the instrument panel wire harness. The bi-directional electric motor that actuates the locking bolt (3) is also contained within a die cast metal housing. That housing includes an integral saddle type mounting bracket (2) that is clamped securely to the steering column housing by two tamper resistant screws.

The mounting provisions for the shaft lock module are designed to resist unauthorized tampering. The module cannot be removed from the steering column while the steering column is installed in the vehicle. The shaft lock module cannot be adjusted or repaired and, if ineffective or damaged it must be replaced.

OPERATION**OPERATION**

The electronic shaft lock module (also known as the Electronic Steering Column Lock/ESCL or the

Elektronische Lenkungs Verriegelung/ELV) is designed to work in conjunction with the Body Control Module (BCM) to control a locking bolt that engages a machined slot in the steering shaft to prevent shaft rotation whenever a valid key is not present in the Ignition Node Module (IGNM) (without Keyless Go/KG), or when the status of the Keyless Ignition Node/KIN transitions to Off (with KG). The shaft lock module can only be unlocked if the presence of a valid FOB with Integrated Key (FOBIK) unit is detected within the IGNM (without KG), or when the status of the KIN (with KG) transitions from Off to any other status.

The electronic circuitry within the shaft lock module contains all of the logic circuits and components to monitor and control the operation of the shaft locking bolt. The module uses the Controller Area Network (CAN) data bus for bi-directional communication with the BCM. If the module detects a problem with the positioning or operation of the locking bolt, it sends an error message to the BCM. The BCM then sets and stores a Diagnostic Trouble Code (DTC) and sends an electronic error message over the CAN data bus to other electronic modules in the vehicle.

The shaft lock module continuously monitors inputs from the BCM and the Antilock Brake System module (ABS) (also known as the Antilock Brake Module/ABM or the Brake System Module/BSM), then energizes the electric motor to move the locking bolt to the locked or unlocked position based upon those inputs. If the BCM receives an input from the Radio Frequency Hub Module (RFHM) (also known as the RF Hub) indicating that an invalid FOBIK has been detected, the locking bolt remains in the locked position.

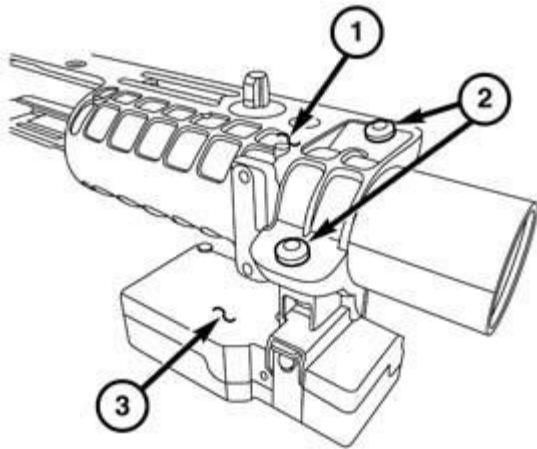
When the RFHM indicates that a valid FOBIK has been detected within the IGNM (without KG), or within the vehicle when the status of the KIN (with KG) transitions from Off to any other status, the BCM has the shaft lock module operate a motor to move the locking bolt to the unlocked position. However, to prevent inadvertent column locking due to a failure while the vehicle is being operated, the module cannot move the locking bolt from the unlocked position to the locked position while a vehicle speed input indicates that the vehicle is still moving.

The hard wired circuits of the shaft lock module may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the shaft lock module or the electronic controls and communication between other modules and devices that provide some features of the SKIS. The most reliable, efficient and accurate means to diagnose the shaft lock module or the electronic controls and communication related to SKIS operation requires the use of a diagnostic scan tool.

REMOVAL

REMOVAL

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.



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Fig. 4: Steering Column Housing, Tamper Resistant Screws & Shaft Lock Module
Courtesy of CHRYSLER GROUP, LLC

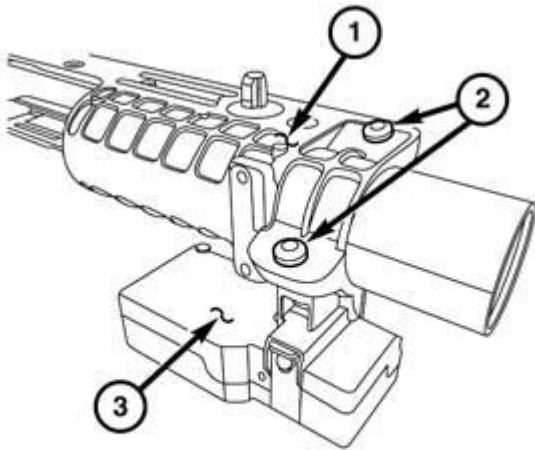
1. Disconnect and isolate the negative cable from the battery.
2. Remove the steering column from the vehicle. Refer to **COLUMN, REMOVAL**.
3. Remove and discard the two tamper resistant screws (2) that secure the shaft lock module (3) to the steering column housing (1). One of three methods is suggested:
 - Cut a straight slot in the top of each screw to enable removal with a screw driver.
 - Use a drift punch and a hammer to rotate each screw counterclockwise far enough to grasp and complete removal using locking pliers.
 - Use an appropriate drill bit to bore a hole in the center of each screw, then use an appropriate screw extractor to complete screw removal.
4. Remove the shaft lock module from the steering column.

INSTALLATION

INSTALLATION

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to

disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.



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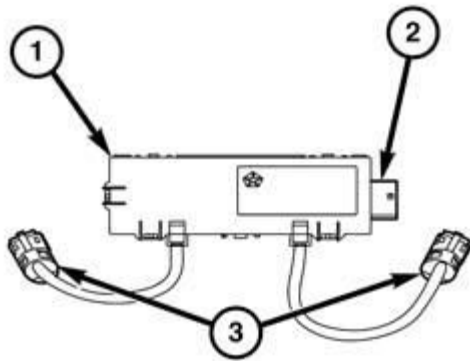
Fig. 5: Steering Column Housing, Tamper Resistant Screws & Shaft Lock Module
Courtesy of CHRYSLER GROUP, LLC

1. Carefully inspect the shaft lock module (also known as the Electronic Steering Column Lock/ESCL or the Elektronische Lenkungs Verriegelung/ELV) interface area of the module, the steering shaft and the steering column housing for damage or debris. Remove debris or replace damaged components that could hinder proper shaft lock module operation as required.
2. Position the shaft lock module (3) onto the steering column housing (1).
3. Install and tighten two new tamper resistant screws (2) to secure the shaft lock module to the steering column housing. Tighten the screws until the heads shear off.
4. Reinstall the steering column into the vehicle. Refer to **COLUMN, INSTALLATION** .
5. Reconnect the negative cable to the battery.

MODULE, ULTRASONIC AND ANTI-TILT

DESCRIPTION

DESCRIPTION



0831005635

Fig. 6: UAM Housing, Transducer & Connector Receptacle
Courtesy of CHRYSLER GROUP, LLC

The Ultrasonic and Anti-tilt Module (UAM) (also known as the Ultrasonic Alarm Module/UAM or the Intrusion Transceiver Module/ITM) is part of the premium version of the Vehicle Theft Alarm (VTA) available only in Right-Hand Drive (RHD) vehicles manufactured for certain export markets where it is required equipment. The UAM is concealed above the overhead console trim cover at the front center of the headliner. Only the rearward-facing transmit and receive ultrasonic transducer membranes are visible within small grilled openings on the outboard rear corners of the overhead console trim cover within the passenger compartment of the vehicle.

The molded black plastic UAM housing (1) and both transducers (3) are fit into mounts and fittings integral to and concealed on the inside surface of the overhead console trim cover. Each of the transducers is hard wired to the UAM housing. The overhead console trim cover is secured by snap clips that pass through the console opening in the headliner into the overhead console mounting bracket above the headliner substrate. A connector receptacle (2) integral to the right end of the UAM housing contains terminal pins that are connected to the vehicle electrical system through a dedicated take out and connector of the overhead wire harness.

Concealed within the center of the UAM housing is the electronic circuitry of the module. The UAM housing is sealed to enclose and protect the internal components of the module including a microcontroller, anti-tilt sensors and electronic communication circuitry. The UAM is also a Local Interface Network (LIN) slave node and communicates over the LIN data bus with the Body Control Module (BCM), which is a LIN master node.

The UAM and the two ultrasonic transducers cannot be adjusted or repaired. If ineffective or damaged, the entire UAM and both transducers must be replaced as a unit.

OPERATION

OPERATION

The Ultrasonic and Anti-tilt Module (UAM) (also known as the Ultrasonic Alarm Module/UAM or the Intrusion Transceiver Module/ITM) controls all of the added features of the premium version of the Vehicle Theft Alarm (VTA). The UAM adds personal property theft protection by detecting movement within the interior of the vehicle and provides tire-theft and tow-away protection by monitoring the pitch and roll of the vehicle. The microcontroller within the UAM contains both motion detection and anti-tilt logic and is also a Local Interface Network (LIN) slave node that communicates over the LIN data bus with the Body Control Module (BCM), which is a LIN master node.

The UAM receives battery voltage on a fused B+ circuit through a fuse in the Power Distribution Center (PDC) and is grounded at all times through a take out and connector of the body wire harness that is secured to the body sheet metal at a remote ground point. These connections allow the UAM to remain operational, regardless of the status of the ignition switch. The UAM receives an electronic **arm request** message from the BCM over the LIN data bus whenever the VTA is armed. However, the UAM features may be disarmed by the customer by pressing and releasing the Lock button of the Remote Keyless Entry (RKE) transmitter three additional times during the 16 second pre-arm period of the VTA, while the security indicator in the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) is still flashing rapidly.

While the VTA is armed, the UAM generates ultra high frequency sound bursts into the vehicle interior through an ultrasonic transmit transducer and monitors the return signal input through an ultrasonic receive transducer. The UAM logic uses an algorithm to detect movement in the vehicle interior through modulation of the ultrasonic echo that occurs due to the Doppler effect. The UAM also monitors internal low gravity (also known as low G) accelerometers to detect changes in vehicle pitch and roll. If interior movement or changes in vehicle pitch and roll are detected, the UAM sends electronic **alarm request** messages to the BCM over the LIN data bus, and the BCM invokes the VTA visual and audible alerts. Vehicle operators must be made aware that items in the vehicle that could move or sway due to environmental conditions or external vibrations may cause nuisance or phantom alarms.

The hard wired circuits of the UAM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the UAM or the electronic controls and communication between modules and other devices that provide some features of the VTA. The most reliable, efficient and accurate means to diagnose the UAM or the electronic controls and communication related to VTA operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING

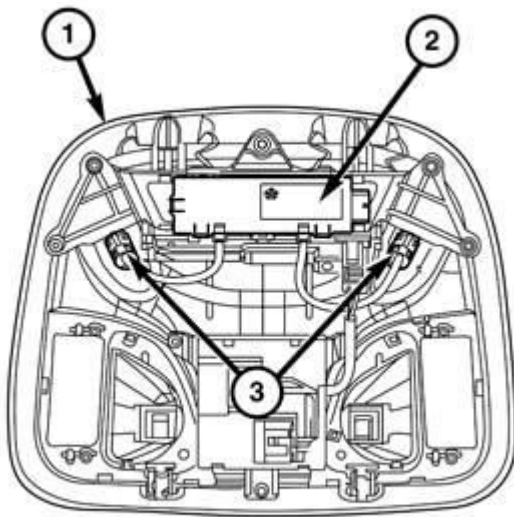
DIAGNOSIS AND TESTING - ULTRASONIC AND ANTITILT MODULE

The hard wired circuits between the Ultrasonic and Anti-tilt Module (UAM) (also known as the Ultrasonic Alarm Module/UAM or the Intrusion Transceiver Module/ITM) and the Body Control Module (BCM) may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the UAM or the electronic controls and communication between other modules and devices that provide some features of the Vehicle Theft Alarm (VTA) system. The most reliable, efficient and accurate means to diagnose the UAM or the electronic controls and communication related to VTA system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

REMOVAL



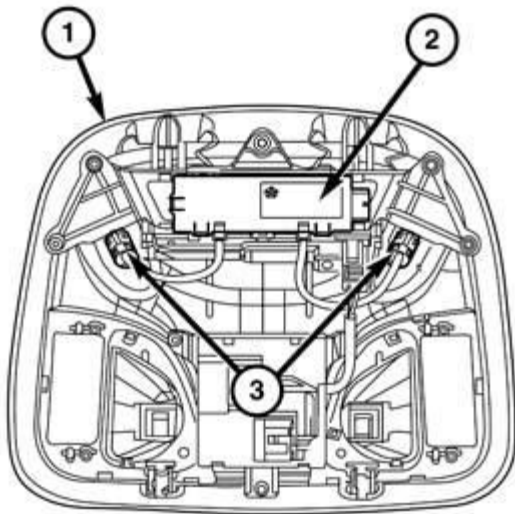
0831005636

Fig. 7: Console Trim Cover, Transducer & UAM
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery.
2. Remove the overhead console from the headliner. Refer to **CONSOLE, OVERHEAD, FRONT, REMOVAL**.
3. Working from above the overhead console trim cover (1) rotate each of the two Ultrasonic and Anti-tilt Module (UAM) transducers (3) counterclockwise about 30 degrees to disengage them from the rearward-facing receptacles on each side of the console trim cover inside surface.
4. Unlatch the UAM (2) from the mounting provisions integral to the inside surface of the console trim cover.
5. Remove the UAM and both transducers from the overhead console as a unit.

INSTALLATION

INSTALLATION



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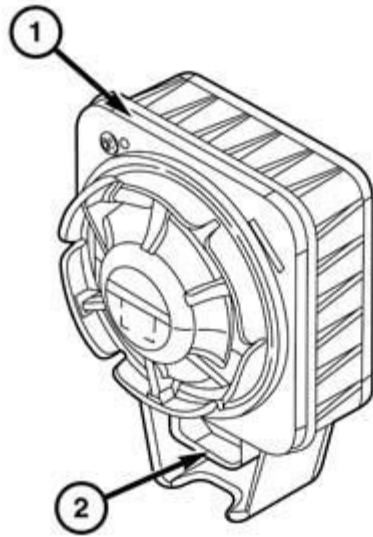
Fig. 8: Console Trim Cover, Transducer & UAM
 Courtesy of CHRYSLER GROUP, LLC

1. Position the Ultrasonic and Anti-tilt Module (UAM) (2) and both transducers (3) to the inside surface of the overhead console trim cover (1).
2. Latch the UAM into the mounting provisions integral to the inside surface of the console trim cover.
3. Carefully insert and rotate each of the two UAM transducers about 30 degrees clockwise into the rearward-facing receptacles on each side of the console trim cover inside surface.
4. Reinstall the overhead console onto the headliner. Refer to **CONSOLE, OVERHEAD, FRONT, INSTALLATION**.
5. Reconnect the negative cable to the battery.

SIREN

DESCRIPTION

DESCRIPTION



0831005296

Fig. 9: Siren Housing & Integral Connector Receptacle
Courtesy of CHRYSLER GROUP, LLC

An alarm siren module is part of the premium version of the Vehicle Theft Alarm (VTA) in the Vehicle Theft Security System (VTSS). The premium version of the VTA is only available in vehicles built for certain markets, where the additional features offered by this system are required. This unit is designed to provide the audible alert requirements for the premium VTA.

The alarm siren module consists of microcontroller based electronic control circuitry, the piezoelectric siren and a nickel metal hydride backup battery. All of the alarm module components are protected and sealed within a molded plastic housing (1). An integral connector receptacle (2) is integral to a stanchion that extends from the bottom of the housing and connects the unit to the vehicle electrical system through a dedicated take out and connector of the Front End Module (FEM) wire harness.

The back of the alarm siren module housing includes a threaded stud that is used to secure the unit to the vehicle. The siren is located on the engine compartment side of the Front End Module (FEM) carrier, below the upper radiator cross member between the right side of the cooling module and the right front lamp unit housing.

The alarm siren module cannot be repaired or adjusted and, if ineffective or damaged, it must be replaced.

OPERATION

OPERATION

The microcontroller within the alarm siren module provides the siren unit features and functions based upon internal programming and electronic **arm** and **disarm** messages received from the Body Control Module (BCM) over a Local Interface Network (LIN) data bus connection. The BCM monitors inputs from the

Intrusion Transceiver Module (ITM) to control the output to the alarm siren module. The siren module receives battery voltage on a fused B(+) circuit through a fuse in the BCM and receives a path to ground through a ground circuit in the Front End Module (FEM) wire harness. These connections allow the siren to remain operational, regardless of the status of the ignition switch.

When the premium version of the Vehicle Theft Alarm (VTA) is armed, the siren module continuously monitors electronic message inputs from the BCM to sound its internal siren. While armed, the siren also enters its auto-detect mode. While in the auto-detect mode, if the siren module detects that its power supply or communication circuits are being tampered with or have been sabotaged, it will sound an audible alarm and continue to operate through an on-board backup battery. If the siren module is in its disarmed mode when its power supply or communication circuits are interrupted, the siren will not sound.

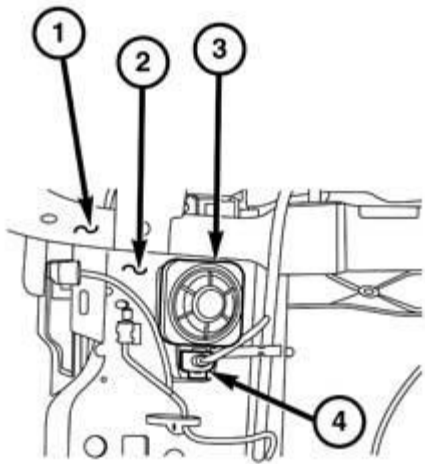
The alarm siren module will also notify the BCM when the backup battery requires charging, and the BCM will send electronic messages that will allow the backup battery to be recharged through the battery voltage and ground circuits to the alarm siren module only while the status of the ignition switch is On and the engine is running. This prevents the potential discharge of the main battery while the vehicle is not being operated.

The alarm siren module will self-detect problems with its internal and external power supply and communication circuits, then send electronic messages indicating the problem to the BCM upon receiving an **arm** or **disarm** request message. The BCM will store a Diagnostic Trouble Code (DTC) for any detected alarm siren module fault. The DTC can then be retrieved with a diagnostic scan tool through the 16-way Data Link Connector (DLC) located under the driver side lower edge of the instrument panel over the Controller Area Network (CAN) data bus.

The hard wired inputs and outputs for the alarm siren module may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the alarm siren module or the electronic controls and communication between other modules and devices that provide some features of the VTA system. The most reliable, efficient and accurate means to diagnose the alarm siren module or the electronic controls and communication related to alarm siren module operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

REMOVAL



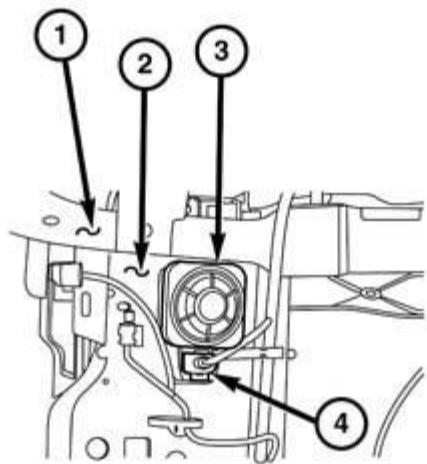
0831005389

Fig. 10: Upper Radiator Cross Member, FEM Carrier, Alarm Siren Module & Connector
 Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery.
2. Remove the engine air cleaner housing from the right side of the engine compartment. Refer to **BODY, AIR CLEANER, REMOVAL** for 2.0L Diesel, **BODY, AIR CLEANER, REMOVAL** for 2.4L or **BODY, AIR CLEANER, REMOVAL** for 3.2L.
3. Locate the alarm siren module (3) on the engine compartment side of the Front End Module (FEM) carrier (2), below the upper radiator cross member (1) between the right side of the cooling module and the back of the right front lamp unit housing.
4. Disconnect the FEM wire harness connector (4) from the connector receptacle for the siren.
5. Remove the appearance shield from the upper radiator cross member.
6. From the front of the FEM carrier, remove the nut that secures the siren to the FEM carrier located between the right side of the cooling module and the right front lamp unit housing.
7. Remove the siren from the engine compartment side of the FEM carrier.

INSTALLATION

INSTALLATION



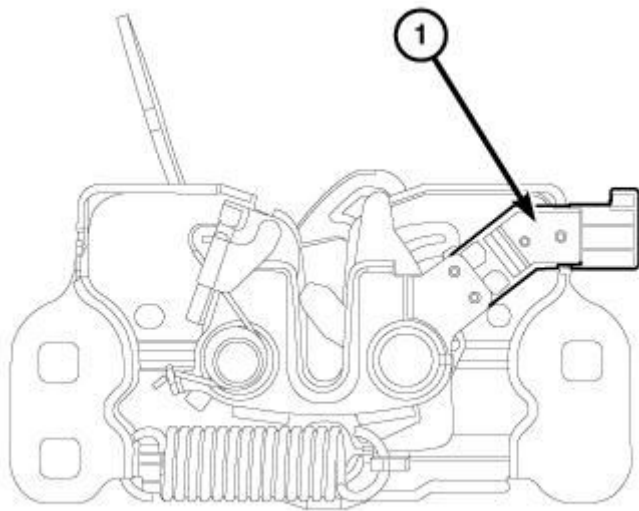
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Fig. 11: Upper Radiator Cross Member, FEM Carrier, Alarm Siren Module & Connector
Courtesy of CHRYSLER GROUP, LLC

NOTE: If the alarm siren module has been replaced with a new unit, a diagnostic scan tool **MUST** be used to initialize and configure the new unit in the Body Control Module (BCM) before the Vehicle Theft Security System (VTSS) can operate as designed. Follow the programming steps outlined in the diagnostic scan tool for **INITIALIZE SIREN** under **MISCELLANEOUS FUNCTIONS** for the **BODY CONTROL MODULE/BCM** menu item as appropriate.

1. Position the alarm siren module (3) to the engine compartment side of the Front End Module (FEM) carrier (2), below the upper radiator cross member (1) between the right side of the cooling module and the back of the right front lamp unit housing.
2. From the front of the FEM carrier, install and tighten the nut that secures the siren to the FEM carrier located between the right side of the cooling module and the right front lamp unit housing. Tighten the nut to 6 N.m (53 in. lbs.).
3. Reinstall the appearance shield onto the upper radiator cross member.
4. Reconnect the FEM wire harness connector (4) to the connector receptacle of the siren.
5. Reinstall the engine air cleaner housing into the right side of the engine compartment. Refer to **BODY, AIR CLEANER, INSTALLATION** for 2.0L Diesel, **BODY, AIR CLEANER, INSTALLATION** for 2.4L or **BODY, AIR CLEANER, INSTALLATION** for 3.2L.
6. Reconnect the negative cable to the battery.

SWITCH, HOOD AJAR

DESCRIPTION**LATCH MOUNTED SWITCH**

2097165

Fig. 12: Hood Latch Mounted Hood Ajar Switch
Courtesy of CHRYSLER GROUP, LLC

There are two types of hood ajar switches used on this vehicle. This information covers the hood latch mounted hood ajar switch (1) that is standard equipment on all vehicles. A stand alone switch is also used on some vehicles in addition to the latch mounted switch, but is discussed elsewhere in this service information.

The latch mounted hood ajar switch is integrated into the hood latch assembly and is a normally open, single pole, spring-loaded plunger actuated switch. The input of this switch may be used for the Vehicle Theft Alarm (VTA) system as well as for the optional remote start system. The switch is connected to the vehicle electrical system through a dedicated take out and connector of the headlamp and dash wire harness.

The latch mounted hood ajar switch can not be adjusted or repaired. If damaged or ineffective this switch type must be replaced as a unit with the hood latch assembly.

STAND ALONE SWITCH

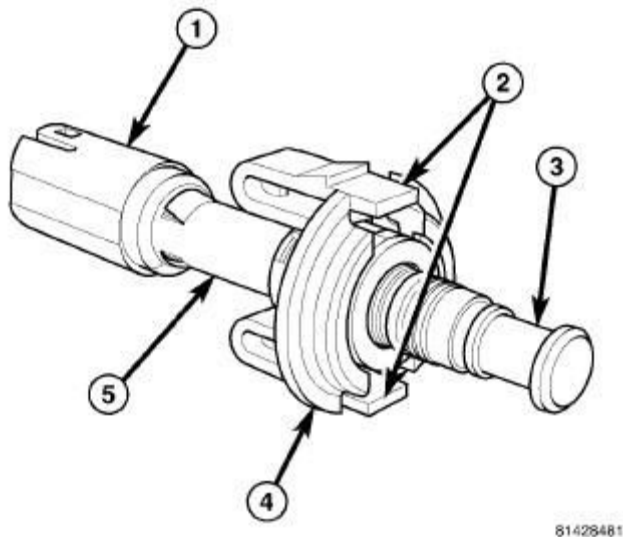


Fig. 13: Hood Ajar Switch

Courtesy of CHRYSLER GROUP, LLC

There are two types of hood ajar switches used on this vehicle. This information covers the stand alone hood ajar switch (1) that is optional equipment on some vehicles. A latch mounted hood ajar switch is standard on most vehicles, but is discussed elsewhere in this service information.

The stand alone switch has a molded plastic switch body (5) with an integral molded connector receptacle (1) on the lower end containing two terminal pins. The switch is connected to the vehicle electrical system through a dedicated take out and connector of the headlamp and dash wire harness. Two integral latches (2) lock the switch into a keyed mounting hole in the switch mounting bracket. The mounting bracket is secured to the left front fender load beam. The switch plunger (3) extends through a mounting collar (4) and a sleeve-like retainer ring on the upper end of the switch body. The retainer ring has a one time, self-adjustment feature that is activated after the switch is installed by closing the hood. The input of this switch is used exclusively for the start-stop system, which is optional equipment with certain optional engines.

Once a stand alone hood ajar switch is installed it cannot be readjusted or repaired. If the switch is damaged, ineffective or requires readjustment, it must be replaced with a new unit. The stand alone hood ajar switch bracket is available for separate service replacement.

OPERATION

LATCH MOUNTED SWITCH

The hood latch mounted hood ajar switch is actuated by the hood latch mechanism and the hood latch striker. When the hood is closed and properly latched, the latch mounted hood ajar switch is an open circuit. When the hood is open or only partially latched, the hood ajar switch is a closed circuit. The switch has two 500 ohm diagnostic resistors connected in parallel to the switch contacts located between the two switch terminals. The hood ajar switch is hard wired in series between a return circuit and a signal circuit of the Body Control Module (BCM).

The BCM reads the hard wired hood ajar switch input through an internal pull-up resistor, then uses this input to control other electronic functions and features of the vehicle. Some of these features may include the remote start system and the Vehicle Theft Alarm (VTA). The BCM may also send electronic **hood ajar switch status** messages to other electronic modules in the vehicle over the Controller Area Network (CAN) data bus.

The latch mounted hood ajar switch as well as the hard wired inputs and outputs of the switch may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information.

STAND ALONE SWITCH

The plunger of the optional stand alone hood ajar switch is actuated by the underside of the hood panel inner reinforcement as the hood panel is closed. When the hood is closed and properly latched, the hood ajar switch is an open circuit. When the hood is open or only partially latched, the hood ajar switch is a closed circuit. The switch has a 1 kilohm diagnostic resistor connected in parallel to the switch contacts located between the two switch terminals. The stand alone hood ajar switch is hard wired in series between a return circuit and a signal circuit of the Powertrain Control Module (PCM) (also known as the Engine Control Module/ECM).

The PCM reads the hard wired hood ajar switch input through an internal pull-up resistor, then uses this input to control certain features of the start-stop system. The PCM may also send electronic **hood ajar switch status** messages to other electronic modules in the vehicle over the CAN data bus.

The stand alone hood ajar switch as well as the hard wired inputs and outputs of the switch may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - LATCH MOUNTED HOOD AJAR SWITCH

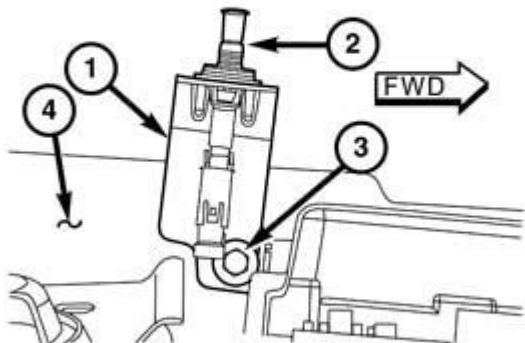
1. Disconnect and isolate the negative cable from the battery.
2. Disconnect the wire harness connector from the hood ajar switch.
3. Check for continuity between the two terminals of the hood ajar switch. There should be continuity with the hood latch open, and only the continuity of the two 500 ohm diagnostic resistors with the hood latch closed. If OK, use a diagnostic scan tool and the appropriate diagnostic procedure to complete testing of the Body Control Module (BCM) as well as the circuits between the BCM and the hood ajar switch. If not OK, replace the ineffective hood ajar switch.

DIAGNOSIS AND TESTING - STAND ALONE HOOD AJAR SWITCH

1. Disconnect and isolate the negative cable from the battery.
2. Disconnect the wire harness connector from the hood ajar switch.
3. Check for continuity between the two terminals of the hood ajar switch. There should be continuity with the switch plunger extended, and only the continuity of the 1 kilohm diagnostic resistor with the switch plunger depressed. If OK, use a diagnostic scan tool and the appropriate diagnostic procedure to complete testing of the Powertrain Control Module (PCM) (also known as the Engine Control Module/ECM) as well as the circuits between the PCM and the hood ajar switch. If not OK, replace the ineffective hood ajar switch.

REMOVAL

STAND ALONE SWITCH BRACKET



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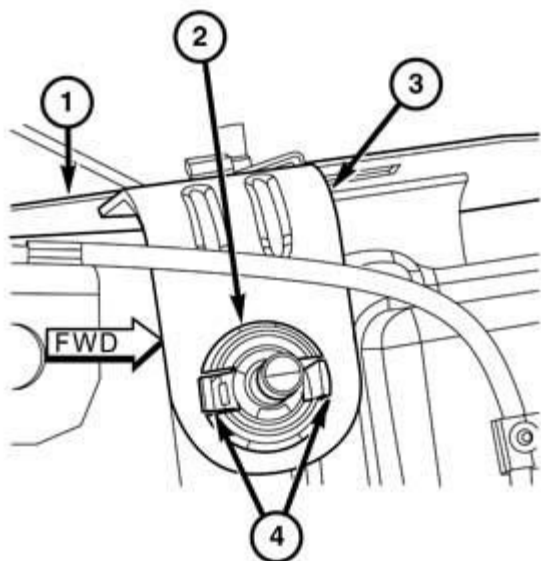
Fig. 14: Mounting Bracket, Hood Ajar Switch, Screws & Load Beam
Courtesy of CHRYSLER GROUP, LLC

1. Remove the stand alone hood ajar switch (2) from the mounting bracket (1). Refer to **SWITCH, HOOD AJAR, REMOVAL**.
2. Remove the screw (3) that secures the mounting bracket to the left front fender load beam (4).
3. Remove the mounting bracket from the left front fender load beam.

LATCH MOUNTED SWITCH

The latch mounted hood ajar switch used in this vehicle is integral to and serviced only as a unit with the hood latch. Refer to **LATCH, HOOD, REMOVAL**.

STAND ALONE SWITCH



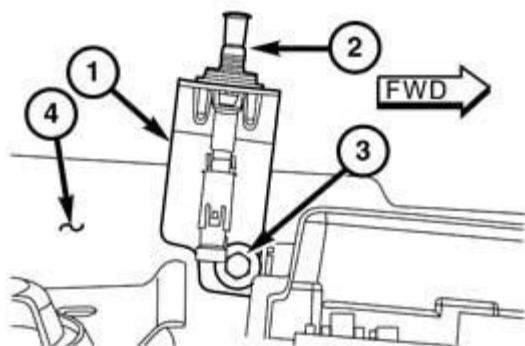
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Fig. 15: Mounting Bracket, Load Beam, Latch Tabs & Switch
Courtesy of CHRYSLER GROUP, LLC

1. Unlatch and open the hood.
2. Disconnect and isolate the negative cable from the battery.
3. Working from the top of the mounting bracket (3) on the left front fender load beam (1), squeeze the two stand alone hood ajar switch latch tabs (4) together far enough to pull the switch (2) upward.
4. Pull the switch up through the hole in the mounting bracket far enough to access and disconnect the wire harness connector from the switch connector receptacle.
5. Remove the stand alone hood ajar switch from the vehicle.

INSTALLATION

STAND ALONE SWITCH BRACKET



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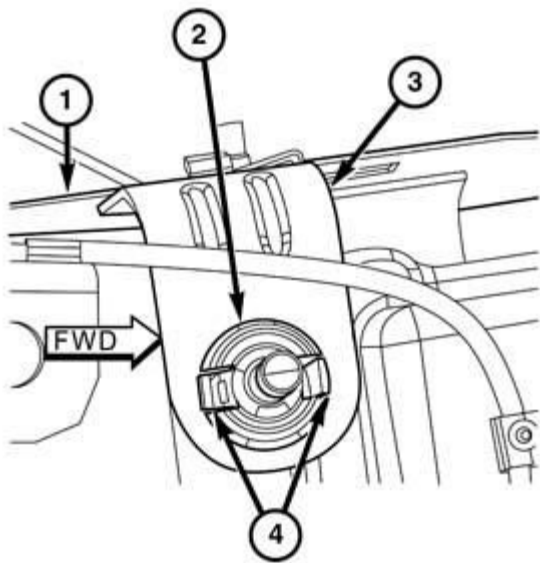
Fig. 16: Mounting Bracket, Hood Ajar Switch, Screws & Load Beam
Courtesy of CHRYSLER GROUP, LLC

1. Position the stand alone hood ajar switch mounting bracket (1) onto the left front fender load beam (4).
2. Install and tighten the screw (3) that secures the mounting bracket to the left front fender load beam. Tighten the screw to 5.5 N.m (4 ft. lbs.).
3. Reinstall the stand alone hood ajar switch (2) into the mounting bracket. Refer to **SWITCH, HOOD AJAR, INSTALLATION**.

LATCH MOUNTED SWITCH

The latch mounted hood ajar switch used in this vehicle is integral to and serviced only as a unit with the hood latch. Refer to **LATCH, HOOD, INSTALLATION** .

STAND ALONE SWITCH



0831005683

Fig. 17: Mounting Bracket, Load Beam, Latch Tabs & Switch
Courtesy of CHRYSLER GROUP, LLC

1. Position the stand alone hood ajar switch (2) near the mounting bracket (3) on the left front fender load beam (1).
2. Route the wire harness connector for the switch through the mounting hole in the mounting bracket from beneath and reconnect it to the switch connector receptacle.
3. From the top of the mounting bracket, align and insert the switch through the mounting hole and press it downward until the two integral switch latch tabs (4) snap into place.
4. Reconnect the negative cable to the battery.
5. Close and latch the hood.

2014 ACCESSORIES AND EQUIPMENT**Wiper System & Washer System - Service Information - Cherokee****DESCRIPTION****FRONT**

An electrically operated intermittent front wiper and washer system is standard factory-installed safety equipment on this vehicle. The wiper and washer system includes the following major components, which are described in further detail elsewhere in this service information:

- **Front Washer Nozzle** - Two fluidic front washer nozzles with integral check valves are secured by latch features to dedicated openings in the hood panel near the base of the windshield.
- **Front Washer Plumbing** - The plumbing for the front washer system consists of rubber hoses, hard plastic tubing and molded rubber or plastic fittings. The plumbing is routed to the dash panel from the washer reservoir along the outboard side of the left front fender load beam. From the dash panel the washer plumbing is routed along the left hood hinge to the hood, then across the underside of the hood panel to the washer nozzles.
- **Front Wiper Arms And Blades** - The two front wiper arms are secured with nuts to the threaded ends of the two wiper pivot shafts, which extend through the cowl plenum cover/grille panel located near the base of the windshield. The two front wiper blades are each secured to their wiper arm with an integral latch, and are parked on the glass near the bottom of the windshield when the front wiper system is not in operation. The left and right wiper arms and wiper blades are unique and are not interchangeable.
- **Front Wiper Module** - The wiper pivot shafts are the only visible components of the front wiper module. The remainder of the module is concealed within the cowl plenum beneath the cowl plenum cover/grille panel. The wiper module includes the wiper module bracket, three rubber-isolated wiper module mounts, the wiper motor, the wiper motor crank arm, the wiper drive link, the wiper connector link and the two wiper pivots.
- **Washer Fluid Level Switch** - The washer fluid level switch is located in a dedicated hole on the lower, outboard side of the washer reservoir, ahead of the left front fender wheel house splash shield.
- **Washer Pump/Motor** - The reversible electric washer pump/motor unit is located in a dedicated hole in a sump area on the lower, outboard side of the washer reservoir, ahead of the left front fender wheel house splash shield. This single reversible washer pump/motor provides washer fluid to either the front or the rear washer system plumbing, depending upon the direction of the pump motor rotation.
- **Washer Reservoir** - The washer reservoir is secured to the left outboard end of the Front End Module (FEM) where it is concealed between the left inner fender shield and the left outer fender panel, ahead of the left front fender wheel house splash shield. The filler neck and cap are the only visible components of the reservoir and, can be easily accessed from the left front corner of the engine compartment.

Certain functions and features of the front wiper and washer systems rely upon resources shared with other electronic modules in the vehicle over a Local Interface Network (LIN) data bus as well as over the Controller Area Network (CAN) data bus. Other electronic modules in the vehicle that may affect front wiper and washer system operation are:

- **Body Control Module** - The Body Control Module (BCM) is located within the instrument panel on the driver side of the vehicle. Refer to **MODULE, BODY CONTROL, DESCRIPTION**.
- **Light Rain Sensor Module** - A Light Rain Sensor Module (LRSM) (also known as the Rain Light Sensor Module/RLSM, the Light Sensor Module/LSM or the Rain Sensor Module/RSM) is used on vehicles equipped with the optional automatic wiper feature. The LRSM is located on a bracket bonded to the inside surface of the windshield glass, near the inside rear view mirror mount.
- **Right Multifunction Switch** - The right multifunction switch is integral to the Steering Column Control Module (SCCM) mounting housing along with the clockspring and the left multifunction switch on the top of the steering column just below the steering wheel. The right multifunction switch is connected to the Steering Control Module (SCM), which is also internal and integral to the SCCM mounting housing. Only the switch control stalk extending from the right side of the steering column is visible, while the remainder of the switch is concealed beneath the steering column shrouds. The right multifunction switch provides all of the driver controls for the front and rear wiper and washer systems.
- **Steering Control Module** - The Steering Control Module (SCM) is internal and integral to the Steering Column Control Module (SCCM) mounting housing which, along with the left and right multifunction switches and the clockspring, is located on the top of the steering column just below the steering wheel. The SCM is completely concealed within the SCCM mounting housing beneath the steering column shrouds. Refer to **MODULE, STEERING COLUMN, DESCRIPTION**.

The BCM and the SCM each contain a microcontroller and programming that allow them to communicate with each other and other electronic modules in the vehicle using the Controller Area Network (CAN) data bus. In addition the BCM and the RLSCM communicate with each other using the Local Interface Network data bus. Refer to **COMMUNICATION, DESCRIPTION**.

Hard wired circuitry connects the front wiper and washer system components to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the front wiper and washer system components through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin out and location views for the various wire harness connectors, splices and grounds.

HEADLAMP

An electrically operated headlamp washer system is standard factory-installed equipment on this vehicle when it is manufactured for certain markets with High Intensity Discharge (HID) headlamps. The headlamp washer system includes the following major components, which are described in further detail elsewhere in this service information:

- **Headlamp Washer Nozzle** - A headlamp washer nozzle is secured to the front fascia beneath each front lamp unit.
- **Headlamp Washer Pump/Motor** - The electric headlamp washer pump/motor unit is located in a dedicated hole on the lower, outboard side of the washer reservoir, ahead of the left front fender wheel house splash shield. This high pressure pump is located above and rearward of the reversible front and rear washer pump/motor unit on the reservoir.

- **Headlamp Washer Plumbing** - The plumbing for the headlamp washer system consists of large diameter rubber hoses and molded plastic fittings. The plumbing is routed to the washer nozzles on the front fascia from the washer reservoir. The connections at the headlamp washer pump and the two headlamp washer nozzles feature unique quick-connect fittings.
- **Headlamp Washer Relay** - The headlamp washer relay is soldered onto the Printed Circuit Board (PCB) located within the Power Distribution Center (PDC) and is not serviceable. The PDC is located within the engine compartment near the battery.
- **Washer Reservoir** - A unique washer reservoir is used on vehicles with the optional headlamp washer system, which has dedicated provisions for the headlamp washer pump and plumbing. This reservoir is mounted in the same location and using the same mounting hardware as is used for vehicles without the headlamp washers. The reservoir is concealed between the left inner fender shield and the left outer fender panel, ahead of the left front fender wheel house splash shield. The filler neck and cap are the only visible components of the reservoir and, are accessed from the left front corner of the engine compartment.

Certain functions and features of the headlamp washer system rely upon resources shared with other electronic modules in the vehicle over the Controller Area Network (CAN) data bus. Other electronic modules in the vehicle that may affect headlamp washer system operation are:

- **Body Control Module** - The Body Control Module (BCM) is located within the instrument panel on the driver side of the vehicle. Refer to **MODULE, BODY CONTROL, DESCRIPTION** .
- **Right Multifunction Switch** - The right multifunction switch is integral to the Steering Column Control Module (SCCM) along with the clockspring and the left multifunction switch on the top of the steering column just below the steering wheel. The right multifunction switch is connected to the Steering Control Module (SCM), which is also internal and integral to the SCCM mounting housing. Only the switch control stalk extending from the right side of the steering column is visible, while the remainder of the switch is concealed beneath the steering column shrouds. The right multifunction switch provides all of the driver controls for the headlamp washer system.
- **Steering Control Module** - The Steering Control Module (SCM) is internal and integral to the Steering Column Control Module (SCCM) mounting housing which, along with the left and right multifunction switches and the clockspring, is located on the top of the steering column just below the steering wheel. The SCM is completely concealed within the SCCM mounting housing beneath the steering column shrouds. Refer to **MODULE, STEERING COLUMN, DESCRIPTION** .

The BCM and the SCM each contain a microcontroller and programming that allow them to communicate with each other and other electronic modules in the vehicle using the Controller Area Network (CAN) data bus. Refer to **COMMUNICATION, DESCRIPTION** .

Hard wired circuitry connects the headlamp washer system components to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the headlamp washer system components through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin out and location views for the various wire harness connectors, splices and grounds.

REAR

An electrically operated rear wiper and washer system is standard factory equipment on this vehicle. The rear wiper and washer system includes the following major components which are described in further detail elsewhere in this service information:

- **Rear Washer Nozzle** - The rear washer nozzle and the integrated rear washer system check valve are located in the spoiler on the outer liftgate panel above the center of the liftgate glass opening.
- **Rear Washer Plumbing** - The plumbing for the rear washer system consists of rubber hoses, hard plastic tubing and molded rubber or plastic fittings. The plumbing is routed to the dash panel from the washer reservoir along the outboard side of the left front fender load beam. The plumbing is then routed through the dash into the passenger compartment, up the inner A-pillar to the headliner, above the headliner to the upper liftgate opening header, then through the upper liftgate opening header and the upper liftgate to the rear washer nozzle in the spoiler on the upper liftgate.
- **Rear Wiper Arm and Blade** - The single rear wiper arm and blade assembly is secured by a nut directly to the rear wiper motor output shaft which extends through a rubber grommet inserted through a hole in the liftgate glass and is parked near the base of the liftgate glass when the rear wiper system is not in operation.
- **Rear Wiper Motor** - The rear wiper motor includes the motor and three rubber-isolated wiper motor mounts. The wiper motor output shaft is the only visible component of the rear wiper motor. The remainder of the motor is concealed by the inner liftgate trim panel on the inside of the liftgate beneath the liftgate glass opening.
- **Washer Pump/Motor** - The reversible electric washer pump/motor unit is located in a dedicated hole in a sump area on the lower, outboard surface of the washer reservoir, ahead of the left front fender wheel house. This single reversible washer pump/motor provides washer fluid to either the front or the rear washer system plumbing, depending upon the direction of the pump motor rotation.
- **Washer Reservoir** - The washer reservoir is secured to the left outboard end of the Front End Module (FEM) where it is concealed between the left inner fender shield and the left outer fender panel, ahead of the left front fender wheel house splash shield. The filler neck and cap are the only visible components of the reservoir and, can be easily accessed from the left front corner of the engine compartment.

Certain functions and features of the rear wiper and washer systems rely upon resources shared with other electronic modules in the vehicle over a Local Interface Network (LIN) data bus as well as over the Controller Area Network (CAN) data bus. Other electronic modules in the vehicle that may affect rear wiper and washer system operation are:

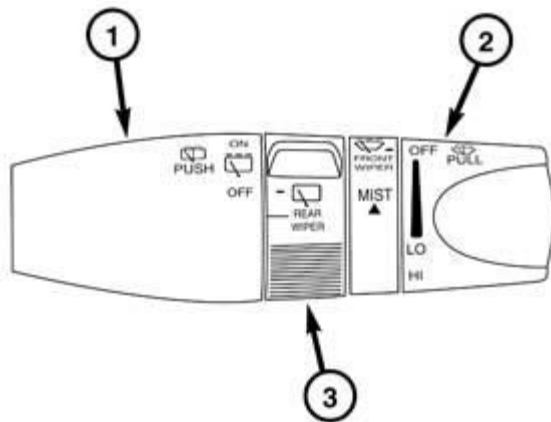
- **Body Control Module** - The Body Control Module (BCM) is located within the instrument panel on the driver side of the vehicle. Refer to **MODULE, BODY CONTROL, DESCRIPTION**.
- **Right Multifunction Switch** - The right multifunction switch is integral to the Steering Column Control Module (SCCM) mounting housing along with the clockspring and the left multifunction switch on the top of the steering column just below the steering wheel. The right multifunction switch is connected to the Steering Control Module (SCM), which is also internal and integral to the SCCM mounting housing. Only the switch control stalk extending from the right side of the steering column is visible, while the remainder of the switch is concealed beneath the steering column shrouds. The right multifunction switch provides all of the driver controls for the front and rear wiper and washer systems.

- **Steering Control Module** - The Steering Control Module (SCM) is internal and integral to the Steering Column Control Module (SCCM) mounting housing which, along with the left and right multifunction switches and the clockspring, is located on the top of the steering column just below the steering wheel. The SCM is completely concealed within the SCCM mounting housing beneath the steering column shrouds. Refer to **MODULE, STEERING COLUMN, DESCRIPTION**.

Hard wired circuitry connects the rear wiper and washer system components to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the rear wiper and washer system components through the use of a combination of soldered splices, splice block connectors and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin out and location views for the various wire harness connectors, splices and grounds.

OPERATION

FRONT



0833005928

Fig. 1: Control Knob, Control Stalk & Right Multifunction Switch
Courtesy of CHRYSLER GROUP, LLC

The front wiper and washer system is designed to provide the vehicle operator with a convenient, safe and reliable means of maintaining visibility through the windshield glass. The various components of this system are designed to convert electrical energy produced and stored by the vehicle electrical system into the mechanical action of the wiper blades to wipe the outside surface of the glass, as well as into the hydraulic action of the washer system to apply washer fluid stored in an on-board reservoir to the area of the glass to be

wiped. When combined, these components provide the means to effectively maintain clear visibility for the vehicle operator by removing excess accumulations of rain, snow, bugs, mud or other minor debris from the outer surface of the windshield glass that might be encountered while driving the vehicle under numerous types of inclement operating conditions.

The vehicle operator initiates all front and rear wiper and washer system functions with the control knob (2) and control sleeve (3) on the control stalk (1) of the right multifunction switch that extends from the right side of the steering column, just below the steering wheel. Rotating the control knob on the end of the control stalk, selects the Off, Delay (except with the optional automatic wiper system), Automatic (with the optional automatic wiper system only), Low or High front wiper system operating modes. In the Delay mode, the control knob also allows the vehicle operator to select from one of four intermittent wipe Delay intervals. In the Automatic mode, the control knob allows the vehicle operator to select from one of four automatic wiper sensitivity levels.

Pulling the control stalk rearward actuates the momentary front washer system switch, which selects the Wash and Wipe-After-Wash modes depending upon when and how long the switch is held closed. Raising the control stalk upward actuates another momentary switch and selects the Mist mode, which cycles the wiper blades for as long as the switch is held closed then completes the current cycle and parks the blades at the base of the windshield after the control stalk is released.

The right multifunction switch provides hard wired digital inputs to the Steering Control Module (SCM) internal to the Steering Column Control Module (SCCM) mounting housing for all of the wiper and washer system functions. The SCM then sends electronic **wiper switch** and **washer switch** status messages to the Body Control Module (BCM) over the Controller Area Network (CAN) data bus requesting the appropriate wiper and washer system operating modes.

Front wiper and washer system operation is completely controlled by the SCM and BCM logic circuits, and that logic will only allow these systems to operate when the status of the ignition is Accessory or On. The BCM uses intelligent, high current, self-protected high side switches to control integrated wiper relays that control wiper system operation by energizing or de-energizing the wiper motor low and high speed brushes. The right multifunction switch circuitry receives battery current and a clean ground output from the SCM, then provides digital inputs to the SCM to indicate the selected wiper and washer system mode.

The hard wired circuits and components of the front wiper and washer system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the electronic controls and communication between other modules and devices that provide some features of the front wiper and washer system. The most reliable, efficient and accurate means to diagnose the front wiper and washer system or the electronic controls and communication related to front wiper and washer system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

OPERATING MODES

Following are paragraphs that briefly describe the operation of each of the front wiper and washer system operating modes.

- **Continuous Wipe Mode** - When the Low position of the control knob on the control stalk of the right multifunction switch is selected the SCM sends an electronic **wiper switch low** status message to the

BCM over the CAN data bus. The BCM then directs battery current to the low speed brush of the wiper motor, causing the wipers to cycle at low speed.

When the High position of the control knob is selected the SCM sends an electronic **wiper switch high** status message to the BCM. The BCM then directs battery current to the high speed brush of the wiper motor, causing the wipers to cycle at high speed.

When the Off position of the right multifunction switch control knob is selected, the SCM sends an electronic **wiper switch off** status message to the BCM, then one of two events will occur. The event that occurs depends upon the position of the wiper blades on the windshield at the moment that the control knob Off position is selected.

If the wiper blades are in the down position on the windshield when the Off position is selected, the park switch that is integral to the wiper motor is closed to ground, which provides a hard wired park switch sense input to the BCM. The BCM then de-energizes the wiper motor and the wiper motor ceases to operate.

If the wiper blades are not in the down position on the windshield at the moment the Off position is selected, the park switch is an open circuit and the BCM continues running the wiper motor at low speed until the wiper blades are in the down position on the windshield and the park switch input to the BCM is again closed to ground.

- **Intermittent Wipe Mode** - The following applies to vehicles not equipped with the optional automatic wiper system, or to vehicles equipped with the automatic wiper system that have had that feature disabled using the customer programmable features function.

When the control knob on the control stalk of the right multifunction switch is moved to one of the four Delay interval positions the SCM sends an electronic **wiper switch delay interval** status message to the BCM. Then the BCM electronic intermittent wipe logic circuit responds by calculating the correct length of time between wiper sweeps based upon the selected delay interval input.

The BCM monitors the changing state of the wiper motor park switch through a hard wired park switch sense input. This input allows the BCM to determine the proper intervals at which to energize and de-energize the wiper motor low speed brush to operate the wiper motor intermittently for one low speed cycle at a time.

The BCM logic is also programmed to provide vehicle speed sensitivity to the selected intermittent wipe delay intervals. In order to provide this feature, the BCM monitors electronic **vehicle speed** messages from the Controller Antilock Brake (CAB) (also known as the Antilock Brake Module/ABM, the Antilock Brake System/ABS module or the Electronic Stability Control/ESC module) and doubles the selected delay interval whenever the vehicle speed is about 16 kilometers-per-hour (10 miles-per-hour) or less.

- **Automatic Wipe Mode** - If the vehicle is equipped with the optional automatic wiper system and it is enabled, when the control knob on the control stalk of the right multifunction switch is moved to one of the four sensitivity positions, the SCM sends an electronic **wiper switch sensitivity** message to the BCM over the CAN data bus. The BCM, which is also a Local Interface Network (LIN) data bus master node,

relays the **wiper switch sensitivity** message to the Light Rain Sensor Module (LRSM) (also known as the Rain Light Sensor Module/RLSM, the Light Sensor Module/LSM or the Rain Sensor Module/RSM), which is a LIN slave node over the LIN data bus.

The LRSM monitors an area within the wipe pattern of the windshield glass for the accumulation of moisture. Based upon internal programming and the selected sensitivity level, when sufficient moisture has accumulated the LRSM sends the appropriate electronic **wipe command** messages back to the BCM over the LIN data bus. Then the BCM operates the wiper system accordingly.

As the sensitivity level is set higher, the LRSM is more sensitive to moisture accumulation and will send **wipe commands** more frequently. The third (middle) sensitivity position of the control knob is designed to provide optimal wiper performance for most typical driving requirements. The BCM logic is also programmed to provide an immediate wipe cycle each time the control knob on the control stalk of the multifunction switch is moved from the Off position to one of the four sensitivity positions, and another immediate wipe cycle each time the control knob is moved from a lower sensitivity position to a higher sensitivity position.

Also, if a vehicle is equipped with automatic wipers but the feature has been disabled using the customer programmable features function, when any sensitivity position is selected with the right multifunction switch control knob the system will respond in the same manner as in the intermittent wipe mode. The automatic wiper system has features designed to protect the mechanical components of the wiper system, and will not allow automatic wiper operation under the following conditions:

- **Low Ambient Temperature** - When the ambient temperature is below 0° C (32° F), the automatic wipers will not operate during a new ignition cycle until the wiper switch has been moved to a different position than that which was selected at the moment the current ignition cycle began, or until a vehicle speed input is detected.
- **Transmission In Neutral** - When the transmission gear selector is placed in the Neutral N position while the ignition status is On, the automatic wipers will not operate during the current ignition cycle until the wiper switch has been moved to a different position than that which was selected at the moment that Neutral N was selected, until the vehicle speed is greater than 8 kilometers-per-hour (5 miles-per-hour) or until the transmission gear selector is moved out of the Neutral N position, whichever occurs first.
- **Mist Wipe Mode** - When the control stalk of the right multifunction switch is lifted upward to the momentary Mist position, the SCM sends an electronic **wiper mist mode** status message to the BCM. The BCM then energizes the low speed brush of the wiper motor for as long as the switch is held closed, then de-energizes the motor when the state of the switch changes to open, parking the wiper blades near the base of the windshield. The BCM can operate the wiper motor in this mode for only one low speed cycle at a time, or for an indefinite number of sequential low speed cycles, depending upon how long the switch is held closed.
- **Headlamps On With Wipers Mode** - The circuitry of the BCM provides an automatic Headlamps On With Wipers mode for vehicles equipped with the optional automatic headlamps. This is a customer programmable feature that can be enabled or disabled through the Electronic Vehicle Information Center (EVIC). If this feature is enabled, when the headlamp switch is in the Auto position, the headlamps will turn On automatically whenever the windshield wipers are turned On; and, if the headlamps were turned On automatically when the wipers were turned On, they will also turn Off automatically when the wipers are turned Off.

If this feature is enabled in vehicles equipped with the optional automatic wiper feature, when the automatic wiper mode is selected the headlamps will turn On automatically only after the wipers complete three automatic wipe cycles within about 30 seconds, and they will turn Off automatically after 3 minutes elapse without any automatic wipe cycles unless ambient light conditions dictate otherwise.

- **Wash Mode** - When the control stalk of the right multifunction switch is pulled rearward to the momentary Wash position for more than about one-half second with the wiper system operating, the SCM sends an electronic **washer switch** status message to the BCM. Then the BCM directs battery current and ground to the washer pump/motor. This will cause the washer pump/motor to be energized for as long as the switch is held closed (up to approximately 20 seconds) and to be de-energized when the control stalk is released.

When the control stalk is pulled to the momentary Wash position while the wiper system is operating in one of the Delay interval (or sensitivity level with automatic wipers) positions, the washer pump/motor operation is the same. However, the BCM logic also overrides the selected delay interval or sensitivity level and operates the wiper motor in a continuous low speed mode for as long as the control stalk is held in the momentary Wash position, then reverts to the selected delay interval or sensitivity level several wipe cycles after the control stalk is released. If the Wash switch is held closed for more than about 20 seconds, the BCM will suspend washer pump/motor operation until the control stalk is released for about 2 seconds, then cycled back to the Wash position.

- **Wipe-After-Wash Mode** - When the control stalk of the right multifunction switch is pulled rearward to the momentary Wash position for more than about one-half second while the wiper system is not operating, the SCM sends an electronic **washer switch** status message to the BCM. Then the BCM directs battery current and ground to operate the washer pump/motor and energizes the wiper motor in a continuous low speed mode for as long as the switch is held closed (up to approximately 20 seconds). When the control stalk is released, the BCM de-energizes the washer pump/motor immediately, but allows the wiper motor to operate for two or three additional wipe cycles before it de-energizes the wiper motor and parks the wiper blades near the base of the windshield.

If the control stalk is pulled rearward for more than about 20 seconds, the BCM will suspend washer pump/motor operation until the stalk is released for about 2 seconds and then cycled back to the Wash position; however, the wipers will continue to operate for as long as the switch is held closed. The BCM monitors the changing state of the wiper motor park switch through a hard wired wiper park switch sense circuit input. This input allows the BCM to count the number of wipe cycles that occur after the control stalk is released, and to determine the proper interval at which to de-energize the wiper motor to complete the Wipe-After-Wash mode cycle.

HEADLAMP

The headlamp washer system is designed to provide the vehicle operator with a convenient, safe, and reliable means of maintaining High Intensity Discharge (HID) headlamp lighting performance. The various components of this system are designed to convert electrical energy produced by the vehicle electrical system into the hydraulic action of the washer system to apply washer fluid stored in an on-board reservoir to the lenses of the two front lamp units, removing excess accumulations of snow, ice, bugs, mud, or other minor debris from the front lamps that might be encountered while driving the vehicle under numerous types of inclement operating conditions.

The vehicle operator initiates the headlamp washer system function using the control stalk of the right multifunction switch that extends from the right side of the steering column, just below the steering wheel. While the HID headlamp low beams are turned On, pulling the control stalk rearward towards the steering wheel beyond the actuation point for more than about 100 milliseconds (0.10 second) activates the front washer pump/motor. During any ignition cycle, the first time the front washer pump/motor is activated and; thereafter, each eleventh time the front washer pump/motor is activated, the headlamp washer pump/motor cycle is also activated.

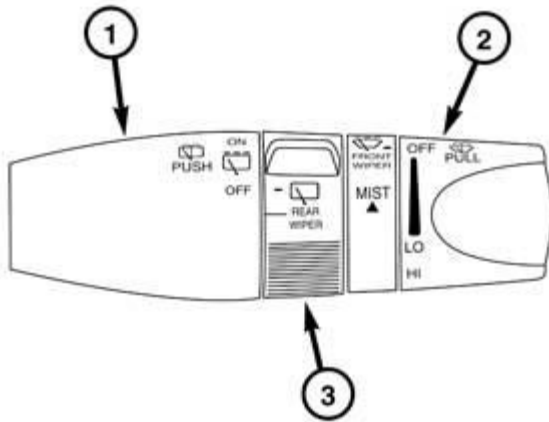
Each time the headlamp washers are employed, the headlamp washer pump/motor is activated using a two shot strategy. The initial shot wets the lenses of the HID headlamps. The lenses are then allowed to soak for a short interval before a second shot is dispensed to rinse the lenses. Each shot results in several high pressure streams of washer fluid being dispensed upon the headlamp lenses by the headlamp washer nozzles.

Headlamp washer system operation is completely controlled by the Body Control Module (BCM) logic circuits based upon programming and electronic **wash command** message inputs received from the Steering Control Module (SCM) internal to the Steering Column Control Module (SCCM) for all of the wiper and washer system functions. The SCM then sends electronic **wiper switch** and **washer switch** status messages to the BCM over the Controller Area Network (CAN) data bus requesting the appropriate wiper and washer system operating modes.

The BCM will only allow this system to operate when the status of the ignition is On and the headlamp low beams are turned On. When the appropriate inputs are monitored and the appropriate programming requirements have been met, the BCM provides the appropriate output to the headlamp washer relay integral to the Printed Circuit Board (PCB) within the Power Distribution Center (PDC). The BCM uses a Low Side Driver (LSD) to energize or de-energize the headlamp washer relay which, in turn, controls the operation of the headlamp washer pump/motor unit.

The hard wired circuits and components of the headlamp washer system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the headlamp washer system or the electronic controls and communication between other modules and devices that provide some features of the headlamp washer system. The most reliable, efficient and accurate means to diagnose the headlamp washer system or the electronic controls and communication related to headlamp washer system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REAR



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Fig. 2: Control Knob, Control Stalk & Right Multifunction Switch
Courtesy of CHRYSLER GROUP, LLC

The rear wiper and washer system is designed to provide the vehicle operator with a convenient, safe, and reliable means of maintaining visibility through the liftgate glass. The various components of this system are designed to convert electrical energy produced by the vehicle electrical system into the mechanical action of the wiper blade to wipe the outside surface of the glass, as well as into the hydraulic action of the washer system to apply washer fluid stored in an on-board reservoir to the area of the glass to be wiped. When combined, these components provide the means to effectively maintain clear visibility for the vehicle operator by removing excess accumulations of rain, snow, bugs, mud, or other minor debris from the outer surface of the liftgate glass that might be encountered while driving the vehicle under numerous types of inclement operating conditions.

The vehicle operator initiates all rear wiper and washer system functions with the control sleeve (3) and the control stalk (1) of the right (wiper) multifunction switch that extends from the right side of the steering column, just below the steering wheel. Rotating the control sleeve to a detent position selects the Off or Delay (Intermittent) rear wiper system operating modes. Pushing the control stalk to a momentary forward position actuates the rear washer system switch, which selects the rear wash mode and dispenses washer fluid in the wipe pattern on the liftgate glass for as long as the switch is held closed.

The right multifunction switch provides hard wired digital inputs to the Steering Control Module (SCM) internal to the Steering Column Control Module (SCCM) mounting housing for all of the wiper and washer system functions. The SCM then sends electronic **wiper switch** and **washer switch** status messages to the Body Control Module (BCM) over the Controller Area Network (CAN) data bus requesting the appropriate wiper and washer system operating modes.

Rear wiper and washer system operation is completely controlled by the SCM and BCM logic circuits, and that logic will only allow these systems to operate when the status of the ignition is Accessory or On. The BCM uses

a High Side Driver (HSD) to control rear wiper system operation by energizing or de-energizing the rear wiper motor. The right multifunction switch circuitry receives battery current and a clean ground output from the SCM, then provides digital inputs to the SCM to indicate the selected wiper and washer system mode.

The hard wired circuits and components of the rear wiper and washer system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the rear wiper and washer system or the electronic controls and communication between other modules and devices that provide some features of the rear wiper and washer system. The most reliable, efficient and accurate means to diagnose the rear wiper and washer system or the electronic controls and communication related to rear wiper and washer system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

OPERATING MODES

Following are paragraphs that briefly describe the operation of each of the rear wiper and washer system operating modes.

- **Intermittent Wipe Mode** - When the right (wiper) multifunction switch control sleeve is moved to the Delay (Intermittent) position, the SCM sends an electronic **rear wiper switch on** status message to the BCM over the CAN data bus. The BCM responds by energizing a High Side Driver (HSD) that directs battery current to the rear wiper motor. If the front wiper system is inactive, the BCM will cycle the rear wiper at a fixed intermittent speed. If the front wiper system is active, the BCM cycles the rear wiper in a synchronous manner, at one-half the speed of the front wipers. If Reverse (R) has been selected with the transmission gear selector, the BCM operates the rear wiper in a continuous manner.

When the Off position of the right multifunction switch control sleeve is selected, the SCM sends an electronic **rear wiper switch off** status message to the BCM over the CAN data bus. The event that occurs depends upon the position of the wiper blade on the liftgate glass at the moment that the control sleeve Off position is selected.

If the rear wiper blade is in the down position on the glass when the Off position is selected, the park switch that is integral to the rear wiper motor is an open circuit, which provides a hard wired park switch sense input to the BCM. The internal BCM circuitry pulls the park switch sense input to ground when the switch is open so that the microcontroller sees a ground when the wiper blade is parked. The BCM then de-energizes the rear wiper motor and the wiper motor ceases to operate.

If the rear wiper blade is not in the down position on the liftgate glass at the moment the Off position is selected, the park switch is closed to fused ignition output and the BCM continues running the wiper motor at low speed until the rear wiper blade is in the down position on the liftgate glass and the park switch input to the BCM is again pulled to ground.

- **Wash Mode** - When the control stalk of the right (wiper) multifunction switch is pushed forward to the momentary rear Wash position, the SCM sends an electronic **washer switch** status message to the BCM. Then the BCM directs battery current and ground to the washer pump/motor. This will cause the washer pump/motor to be energized for as long as the switch is held closed (up to approximately 20 seconds) and to be de-energized when the control stalk is released.

When the control stalk is pushed forward to the momentary Wash position while the rear wiper system is operating the washer pump/motor operation is the same. However, the BCM logic also overrides the selected wiper operating mode and operates the wiper motor in a continuous low speed mode for as long as the control stalk is held in the momentary Wash position, then reverts to the selected operating mode several wipe cycles after the control stalk is released. If the Wash switch is held closed for more than about 20 seconds, the BCM will suspend washer pump/motor operation until the control stalk is released for about 2 seconds, then cycled back to the Wash position.

- **Wipe-After-Wash Mode** - When the control stalk of the right (wiper) multifunction switch is pushed forward to the momentary rear Wash position for more than about one-half second while the rear wiper system is not operating, the BCM directs battery current and ground to the washer pump/motor and energizes the rear wiper motor in a continuous mode for as long as the switch is held closed. When the control stalk is released, the BCM de-energizes the washer pump/motor immediately, but allows the rear wiper motor to operate for about three additional wipe cycles. An additional wipe cycle is performed about six seconds later before the BCM de-energizes the rear wiper motor and parks the wiper blade near the base of the liftgate glass.

The BCM monitors the changing state of the wiper motor park switch through a hard wired wiper park switch sense circuit input. This input allows the BCM to monitor the number of wipe cycles that occur after the control stalk is released, and to determine the proper interval at which to de-energize the wiper motor to complete the Wipe-After-Wash mode cycle.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - FRONT WIPER AND WASHER SYSTEM

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

If the front wiper motor operates, but the wipers do not move on the windshield, replace the ineffective front wiper motor or wiper linkage module. If the washer pump/motor operates, but no washer fluid is dispensed on the glass; or, if the wipers operate, but chatter, lift or do not clear the glass, clean and inspect the front wiper and washer system components as required. Refer to **CLEANING** and **INSPECTION**.

The hard wired front wiper and washer system circuits and components may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the front wiper and washer system or the electronic controls and communication between other modules and devices that provide some features of the front wiper and washer system. The most reliable, efficient and accurate means to diagnose the front wiper and washer system or the electronic controls and communication related to front wiper and washer system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

NOTE: The front wiper and washer switches are integral to the right multifunction switch in the Steering Column Control Module (SCCM) mounting housing. The right multifunction switch communicates with the Steering Control Module (SCM), which is also internal and integral to the SCCM mounting housing. The SCM communicates with the Body Control Module (BCM) over the Controller Area Network (CAN) data bus. The BCM controls front wiper motor operation through wiper relays that are integral to the Printed Circuit Board (PCB) within the BCM.

Before performing any of the following tests, determine whether the other functions of the right multifunction switch are operational. If other right multifunction switch functions are ineffective, diagnose and repair that problem before attempting to repair the Wiper and Washer System.

FRONT WIPER AND WASHER SYSTEM DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
WIPER MOTOR DOES NOT OPERATE IN ANY SWITCH POSITION	1. Ineffective motor ground circuit.	1. Test and repair open wiper motor ground circuit if required.
	2. Ineffective motor feed circuits.	2. Test and repair low speed and high speed feed circuits between BCM and wiper motor if required.
	3. Ineffective SCM inputs or outputs.	3. Use a diagnostic scan tool and the appropriate diagnostic information for further SCM diagnosis.
	4. Ineffective BCM inputs or outputs.	4. Use a diagnostic scan tool and the appropriate diagnostic information for further BCM diagnosis.
	5. Ineffective wiper motor.	5. Test and replace open or shorted wiper motor as required.
WIPERS DO NOT PARK CORRECTLY	1. Ineffective wiper motor park switch input circuit.	1. Test and repair wiper park switch input circuit between BCM and wiper motor if required.
	2. Ineffective BCM inputs or outputs.	2. Use a diagnostic scan tool and the appropriate diagnostic information for further BCM diagnosis.
	3. Ineffective wiper motor park switch.	3. Test and replace wiper motor if required.
	1. Ineffective wiper motor.	1. Check amperage draw with linkage

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WIPER MOTOR OPERATES SLOWLY IN ALL SWITCH POSITIONS		disconnected from wiper motor output shaft. Correct draw should be about 2 amperes on Low speed, or 3 amperes on High speed. If incorrect, refer to the appropriate Possible Cause that follows:
	2. Amperage draw too low.	2. Test and repair shorted low and high speed feed circuits if required.
	3. Amperage draw too high.	3. With linkage disconnected from wiper motor output shaft, check linkage and pivots for binding. If binding is detected, repair or replace wiper linkage module if required. If no linkage binding detected, replace the wiper motor if required.
WIPERS RUN AT HIGH SPEED WITH SWITCH LOW SPEED SELECTED OR AT LOW SPEED WITH SWITCH HIGH SPEED SELECTED	1. Ineffective motor feed circuit wiring.	1. Test and repair low speed and high speed feed circuits between BCM and wiper motor if required.
AUTOMATIC WIPERS ONLY ARE INOPERATIVE	1. Automatic wipers (Rain Sensing) feature has been disabled.	1. Be certain that the automatic wipers (Rain Sensing) feature is enabled in the Customer Programmable Features Settings menu.
WASHER PUMP DOES NOT OPERATE	1. Ineffective washer pump ground circuit.	1. Test and repair open washer pump ground circuit if required.
	2. Ineffective washer pump feed circuits.	2. Test and repair washer pump feed circuits between BCM and washer pump if required.
	3. Ineffective SCM inputs or outputs.	3. Use a diagnostic scan tool and the appropriate diagnostic information for further SCM diagnosis.
	4. Ineffective BCM inputs or outputs.	4. Use a diagnostic scan tool and the appropriate diagnostic information for further BCM diagnosis.
	5. Ineffective washer pump.	5. Test and replace open or shorted washer pump if required.

DIAGNOSING FALSE WIPES (AUTOMATIC WIPER ONLY)

False wipes are unnecessary wipes that occur when the control knob of the right multifunction switch is in one of the four automatic wiper sensitivity positions and no rain or moisture is apparent within the wipe pattern on the windshield glass. Because this system is designed to operate whenever it detects moisture, if the switch is in one of the automatic wiper sensitivity positions any road spray, bug splatters or mist from passing cars or trucks may occasionally cause the wipers to cycle. These are normal characteristics of this system and are not false wipes.

False wipes generally are the result of foreign material or flaws that interfere with the system optics. The optics for this system allow the Light Rain Sensor Module (LRSM) (also known as the Rain Light Sensor Module/RLSM, the Light Sensor Module/LSM or the Rain Sensor Module/RSM) to precisely transmit several

InfraRed (IR) light beams and monitor the intensity of these beams reflected from the outer surface of the windshield glass to determine the presence of moisture. The sensitivity of this system is such that anything that distorts the focus or intensity of the IR light beams or impacts the ability of the photo diodes within the LRSM to see and accurately measure these light beams can result in the LRSM logic misinterpreting the resulting input data as moisture on the windshield. The optics for this system include the lenses of the LRSM, the adhesive silicone gelatin (SilGel) layer that bonds the LRSM to the inside of the windshield and the windshield glass.

The following procedure should only be used if false wipe occurrences are frequent and persistent. Perform diagnosis of the wiper system, the right multifunction switch, the Steering Control Module (SCM) and the LRSM using a diagnostic scan tool and the appropriate diagnostic procedures before performing the following:

NOTE: **The Light Rain Sensor Module (LRSM) mounting bracket is serviced as a unit with the windshield glass. If either the bracket or the glass is ineffective or damaged, the entire LRSM bracket and windshield glass unit must be replaced. Also, if the LRSM is removed from the mounting bracket for any reason, the integrity of the adhesive silicone gelatin (SilGel) layer of the LRSM will be compromised and the silicone gelatin pad must be replaced with a new unit.**

1. Carefully inspect the outer surface of the windshield glass for physical damage, including scratches, cracks or chips in the vicinity of the LRSM mounting bracket. **Scratches, cracks or chips in the windshield glass outside the area of the LRSM mounting bracket lenses will not cause false wipes.** If OK, go to Step 2. If not OK, replace the damaged windshield.
2. From the outside of the windshield glass, carefully inspect the adhesive layer between the windshield glass and the LRSM bracket for any large voids (air pockets). If an adhesive void greater than about 1 millimeter (0.04 inch) is observed, replace the flawed silicone gelatin pad. If OK, go to Step 3.
3. Lightly pull the LRSM away from the windshield bracket to confirm that both sides of the spring steel LRSM mounting band are fully engaged with the mounting bracket on the inside of the windshield glass. If OK, go to Step 4. If not OK, install the LRSM mounting band onto the bracket as required.
4. Remove the LRSM from the mounting bracket. Carefully inspect the LRSM mounting bracket for any physical damage and inspect the windshield glass area within the LRSM mounting bracket for contamination. If OK, go to Step 5. If contaminated, clean any foreign material from the windshield glass using rubbing alcohol and a lint-free cloth. If damaged, replace the damaged LRSM bracket and windshield as a unit.
5. Carefully replace the LRSM with a new unit. Refer to **MODULE, LIGHT RAIN SENSOR, INSTALLATION**.

DIAGNOSIS AND TESTING - HEADLAMP WASHER SYSTEM

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to

disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

Before attempting to diagnose the headlamp washer system, confirm whether the front washer system operates satisfactorily. If the front washer system is ineffective or operates improperly, diagnose and repair that problem before attempting to repair the headlamp washer system. If the front washer system operates satisfactorily and the headlamp washer pump/motor unit operates, but both headlamp washer nozzles do not dispense washer fluid on the front lamp unit lenses, inspect the headlamp washer plumbing for pinched or leaking hoses and fittings. If the headlamp washer pump/motor unit does not operate, check the headlamp washer system fuse.

The hard wired headlamp washer system circuits and components may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the headlamp washer system or the electronic controls and communication between other modules and devices that provide some features of the headlamp washer system. The most reliable, efficient and accurate means to diagnose the headlamp washer system or the electronic controls and communication related to headlamp washer system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING - REAR WIPER AND WASHER SYSTEM

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

If the rear wiper motor operates, but the wiper motor output shaft does not move, replace the ineffective rear wiper motor. If the washer pump/motor operates, but no washer fluid is dispensed on the glass; or, if the wiper operates, but chatters, lifts, or does not clear the glass, clean and inspect the rear wiper and washer system components as required. Refer to **CLEANING** and **INSPECTION**.

The hard wired rear wiper and washer system circuits and components may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the electronic controls and communication between other modules and devices that provide some features of the rear wiper and washer system. The most reliable, efficient and accurate means to diagnose the rear wiper and washer system or the

electronic controls and communication related to rear wiper and washer system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

NOTE: The rear wiper and washer switches are integral to the right multifunction switch in the Steering Column Control Module (SCCM). The right multifunction switch communicates with the Steering Control Module (SCM), which is also integral to the SCCM. The SCM communicates with the Body Control Module (BCM) over the Controller Area Network (CAN) data bus. The BCM controls rear wiper motor operation through the rear wiper relay that is integral to the Printed Circuit Board (PCB) within the BCM.

Before performing any of the following tests, determine whether the other functions of the right multifunction switch are operational. If other right multifunction switch functions are ineffective, diagnose and repair that problem before attempting to repair the Rear Wiper and Washer System.

REAR WIPER AND WASHER SYSTEM DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
WIPER MOTOR DOES NOT OPERATE IN ANY SWITCH POSITION	1. Ineffective motor ground circuit.	1. Test and repair open wiper motor ground circuit if required.
	2. Ineffective motor feed circuits.	2. Test and repair motor feed circuit between BCM and rear wiper motor if required.
	3. Ineffective SCM inputs or outputs.	3. Use a diagnostic scan tool and the appropriate diagnostic information for further SCM diagnosis.
	4. Ineffective BCM inputs or outputs.	4. Use a diagnostic scan tool and the appropriate diagnostic information for further BCM diagnosis.
	5. Ineffective wiper motor.	5. Test and replace open or shorted wiper motor if required.
WIPER DOES NOT PARK CORRECTLY	1. Ineffective wiper motor park switch input circuit.	1. Test and repair wiper park switch input circuit between BCM and rear wiper motor if required.
	2. Ineffective BCM inputs or outputs.	2. Use a diagnostic scan tool and the appropriate diagnostic information for further BCM diagnosis.
	3. Ineffective wiper motor park switch.	3. Test and replace rear wiper motor if required.
	1. Ineffective wiper motor.	1. Check amperage draw with wiper arm disconnected from rear wiper motor output shaft. Correct draw should be about 6 amperes. If incorrect, refer to the appropriate Possible Cause that follows:

2014 Jeep Cherokee Trailhawk

2014 ACCESSORIES AND EQUIPMENT Wiper System & Washer System - Service Information - Cherokee

WIPER MOTOR OPERATES SLOWLY	2. Amperage draw too low.	2. Test and repair shorted rear wiper motor signal and fused ignition switch output (run - accessory) circuits if required.
	3. Amperage draw too high.	3. With wiper arm disconnected from wiper motor output shaft check for binding between output shaft and motor output shaft housing. If binding is detected, lubricate if required. If no binding is detected, replace the wiper motor if required.
WASHER PUMP DOES NOT OPERATE	1. Ineffective washer pump ground circuit.	1. Test and repair open washer pump ground circuit if required.
	2. Ineffective washer pump feed circuit.	2. Test and repair washer pump feed circuit between BCM and washer pump if required.
	3. Ineffective SCM inputs or outputs.	3. Use a diagnostic scan tool and the appropriate diagnostic information for further SCM diagnosis.
	4. Ineffective BCM inputs or outputs.	4. Use a diagnostic scan tool and the appropriate diagnostic information for further BCM diagnosis.
	5. Ineffective washer pump.	5. Test and replace open or shorted washer pump if required.

SPECIFICATIONS

SPECIFICATIONS

TORQUE SPECIFICATIONS			
DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Front Wiper Arm Mounting Nuts	20	15	-
Rear Wiper Arm Mounting Nut	9	-	80
Front Wiper Module Mounting Screws	5.5	-	49
Front Wiper Motor Mounting Screws	7.5	-	66
Washer Reservoir Mounting Nuts	7	-	60
Washer Reservoir Mounting Screws	7	-	60

CLEANING

FRONT WASHER SYSTEM

CAUTION: Never introduce petroleum-based cleaners, solvents, or contaminants into the washer system. These products can rapidly deteriorate the rubber

seals and hoses of the washer system, as well as the rubber squeegees of the wiper blades.

CAUTION: Never use compressed air to flush the washer system plumbing. Compressed air pressures are too great for the washer system plumbing components and will result in further system damage. Never use sharp instruments to clear a plugged washer nozzle or damage to the nozzle orifice and improper nozzle spray patterns will result.

If the washer system is contaminated with foreign material, drain the washer reservoir by removing the washer pump/motor unit from the reservoir. Clean foreign material from the inside of the washer pump inlet filter screen and the washer reservoir using clean washer fluid, a mild detergent or a non-abrasive cleaner. Flush foreign material from the washer system plumbing by first disconnecting the washer hoses from the washer nozzles, then running the washer pump/motor to run clean washer fluid or water through the system. Plugged or restricted front washer nozzles cannot be back-flushed due to the integral check valve mechanism. If the washer nozzle obstruction cannot be cleared, replace the washer nozzle.

FRONT WIPER SYSTEM

CAUTION: Protect the rubber squeegees of the wiper blades from any petroleum-based cleaners, solvents, or contaminants. These products can rapidly deteriorate the rubber squeegees.

The squeegees of wiper blades exposed to the elements for a long time tend to lose their wiping effectiveness. Periodic cleaning of the squeegees is suggested to remove any deposits of salt or road film. The wiper blades, arms and windshield glass should only be cleaned using a sponge or soft cloth and windshield washer fluid, a mild detergent or a non-abrasive cleaner. If the wiper blades continue to leave streaks, smears, hazing or beading on the glass after thorough cleaning of the squeegees and the glass, the entire wiper blade assembly must be replaced.

REAR WASHER SYSTEM

CAUTION: Never introduce petroleum-based cleaners, solvents or contaminants into the washer system. These products can rapidly deteriorate the rubber seals and hoses of the washer system, as well as the rubber squeegee of the wiper blade.

CAUTION: Never use compressed air to flush the washer system plumbing. Compressed air pressures are too great for the washer system plumbing components and will result in further system damage. Never use sharp instruments to clear a plugged washer nozzle or damage to the nozzle orifice and improper nozzle spray patterns will result.

If the washer system is contaminated with foreign material, drain the washer reservoir by removing the washer pump/motor from the reservoir. Clean foreign material from the inside of the washer pump/motor inlet filter

screen and the washer reservoir using clean washer fluid, a mild detergent, or a non-abrasive cleaner. Flush foreign material from the washer system plumbing by first disconnecting the washer hose from the rear washer nozzle, then running the washer pump/motor to run clean washer fluid or water through the system. A plugged or restricted rear washer nozzle cannot be back-flushed due to the integral check valve mechanism. If the rear washer nozzle obstruction cannot be cleared, replace the rear washer nozzle.

REAR WIPER SYSTEM

CAUTION: Protect the rubber squeegee of the wiper blade from any petroleum-based cleaners, solvents or contaminants. These products can rapidly deteriorate the rubber squeegee.

The squeegee of a wiper blade exposed to the elements for a long time tends to lose its wiping effectiveness. Periodic cleaning of the squeegee is suggested to remove any deposits of salt or road film. The wiper blade, arm, and liftgate glass should only be cleaned using a sponge or soft cloth and windshield washer fluid, a mild detergent, or a non-abrasive cleaner. If the wiper blade continues to leave streaks, smears, hazing, or beading on the glass after thorough cleaning of the squeegees and the glass, the entire wiper blade assembly must be replaced.

INSPECTION

FRONT WASHER SYSTEM

The washer system components should be inspected periodically, not just when washer performance problems are experienced. This inspection should include the following points:

1. Check for ice or other foreign material in the washer reservoir. If contaminated, clean and flush the washer system. Refer to **CLEANING**.
2. Inspect the washer plumbing for pinched, leaking, deteriorated or incorrectly routed hoses and damaged or disconnected hose fittings. Replace damaged or deteriorated hoses and hose fittings. Leaking washer hoses can sometimes be repaired by cutting the hose at the leak and splicing it back together using an in-line connector fitting. Similarly, sections of deteriorated hose can be cut out and replaced by splicing in new sections of hose using in-line connector fittings. Whenever routing a washer hose or a wire harness containing a washer hose, it must be routed away from hot, sharp, or moving parts. Also, sharp bends that might pinch the washer hose must be avoided.

FRONT WIPER SYSTEM

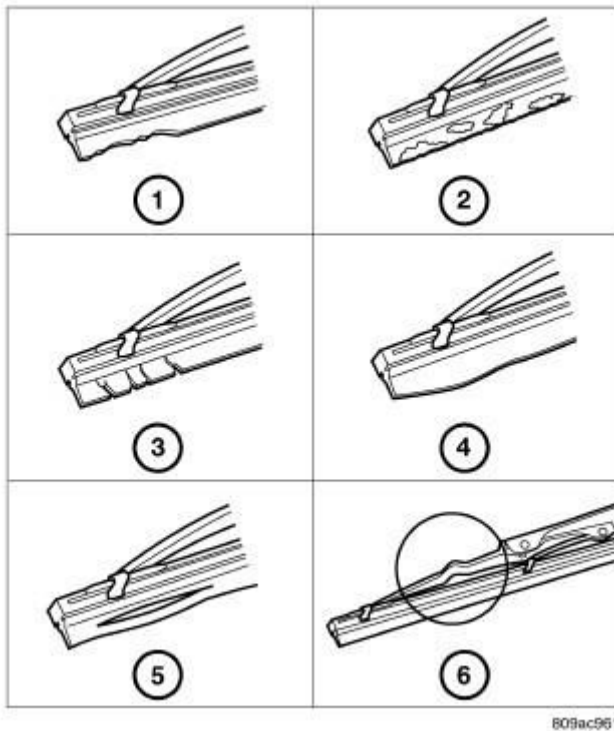


Fig. 3: Wiper Blades And Wiper Arms
Courtesy of CHRYSLER GROUP, LLC

The wiper blades and wiper arms should be inspected periodically, not just when wiper performance problems are experienced. This inspection should include the following points:

1. Carefully inspect the wiper blades for any indications of worn or uneven edges (1), foreign material deposits (2), hardening or cracking (3), deformation or fatigue (4) or splitting (5). Inspect the wiper blade support components and the wiper arms for damage (6) or corrosion. If the wiper arms and blades are contaminated with any foreign material, clean them and the glass as required. Refer to **CLEANING**. If a wiper blade or arm is damaged, or if corrosion is evident, replace the affected wiper arm or blade with a new unit. Do not attempt to repair a wiper arm or blade that is damaged or corroded.
2. Carefully lift the wiper blade off of the glass. Note the action of the wiper arm hinge. The wiper arm should pivot freely at the hinge, but with no lateral looseness evident. If there is any binding evident in the wiper arm hinge, or if there is evident lateral play in the wiper arm hinge, replace the wiper arm.

CAUTION: Do not allow the wiper arm to spring back against the glass without the wiper blade in place or the glass may be damaged.

3. Once proper hinge action of the wiper arm is confirmed, check the hinge for proper spring tension. Remove the wiper blade from the wiper arm. Either place a small postal scale between the blade end of the wiper arm and the glass, or carefully lift the blade end of the arm away from the glass using a small fish scale. On vehicles with unequal wiper arm lengths, be certain that measurements on both arms are taken at a point an equal distance from their wiper arm hinge pins. Compare the scale readings between

the right and left wiper arms. Replace a wiper arm if it has comparatively lower spring tension, as evidenced by a lower scale reading.

4. After cleaning and inspecting the wiper components and the glass, if the wiper blade still fails to clear the glass without smearing, streaking, chattering, hazing or beading, replace the wiper blade.

REAR WASHER SYSTEM

The washer system components should be inspected periodically, not just when washer performance problems are experienced. This inspection should include the following points:

1. Check for ice or other foreign material in the washer reservoir. If contaminated, clean and flush the washer system. Refer to **CLEANING**.
2. Inspect the washer plumbing for pinched, leaking, deteriorated, or incorrectly routed hoses and damaged or disconnected hose fittings. Replace damaged or deteriorated hoses and hose fittings. Leaking washer hoses can sometimes be repaired by cutting the hose at the leak and splicing it back together using an in-line connector fitting. Similarly, sections of deteriorated hose can be cut out and replaced by splicing in new sections of hose using in-line connector fittings. Whenever routing a washer hose or a wire harness containing a washer hose, it must be routed away from hot, sharp, or moving parts. Also, sharp bends that might pinch the washer hose must be avoided.

REAR WIPER SYSTEM

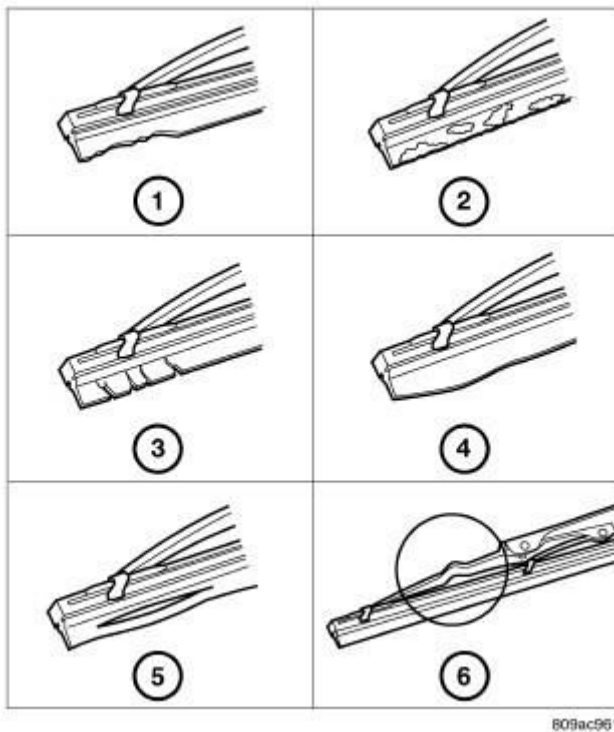


Fig. 4: Inspecting Wiper Blades
Courtesy of CHRYSLER GROUP, LLC

The rear wiper blade and wiper arm should be inspected periodically, not just when wiper performance problems are experienced. This inspection should include the following points:

1. Carefully inspect the wiper blade for any indications of worn or uneven edges (1), foreign material deposits (2), hardening or cracking (3), deformation or fatigue (4), or splitting (5). Inspect the wiper blade support components and the wiper arm for damage (6). If the wiper arm and blade are contaminated with any foreign material, clean them and the glass as required. Refer to **CLEANING**. If the wiper blade or arm is damaged, replace it with a new unit. Do not attempt to repair a wiper arm or blade that is damaged or corroded.
2. Carefully lift the wiper blade off of the glass. Note the action of the wiper arm hinge. The wiper arm should pivot freely at the hinge, but with no lateral looseness evident. If there is any binding evident in the wiper arm hinge, or there is evident lateral play in the wiper arm hinge, replace the wiper arm.

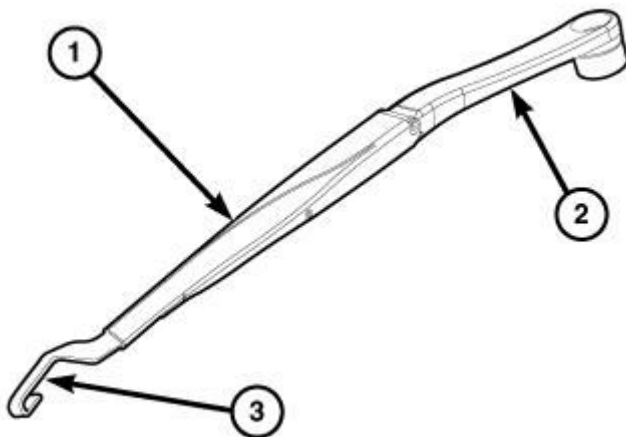
CAUTION: Do not allow the wiper arm to spring back against the glass without the wiper blade in place or the glass may be damaged.

3. Once proper hinge action of the wiper arm is confirmed, check the hinge for proper spring tension. The spring tension of the wiper arm should be sufficient to cause the rubber squeegee to conform to the curvature of the glass. Replace a wiper arm if it has insufficient spring tension to maintain contact between the squeegee and the glass.
4. After cleaning and inspecting the wiper components and the glass, if the wiper blade still fails to clear the glass without smearing, streaking, chattering, hazing, or beading, replace the wiper blade.

ARM, WIPER

DESCRIPTION

FRONT



3220910

Fig. 5: Stamped Steel Channel, Aluminum Pivot End & Stamped Steel Strap

Courtesy of CHRYSLER GROUP, LLC

The front wiper arms are the rigid members located between the wiper pivots that protrude from the cowl plenum cover/grille panel near the base of the windshield and the wiper blades on the windshield glass. These wiper arms have a somewhat sculpted appearance that actually has a functional purpose. The sculpting is designed to reduce wind buffeting, which helps to reduce wind noise within the passenger compartment of the vehicle.

These wiper arms feature an over-center hinge design that allows easy access to the windshield glass for cleaning. The wiper arm has a die cast aluminum pivot end (2) with a large, internally tapered mounting hole at one end. A molded black plastic cap snaps over the pivot end to conceal the wiper arm retaining nut and the mounting hole following wiper arm installation.

The wide end of a tapered, stamped steel channel (1) hinges on and is secured with a hinge pin to the blade end of the wiper arm pivot end. One end of a rigid stamped steel strap (3), is riveted and crimped within the narrow end of the stamped steel channel. The tip of the wiper blade end of this strap is bent back under itself to form a small hook to cradle the pivot block of the front wiper blade. The entire wiper arm has a satin black finish applied to all of its visible surfaces.

Concealed within the stamped steel channel is a long tension spring which is engaged with a formed wire link hooked over a metal dowel pin that passes through the underside of the pivot end. The opposite end of the spring is hooked over another metal dowel pin that passes through the underside of the steel channel.

The driver and passenger side wiper arms are unique and are not interchangeable. A wiper arm cannot be adjusted or repaired. If damaged or ineffective, the entire wiper arm unit must be replaced.

REAR

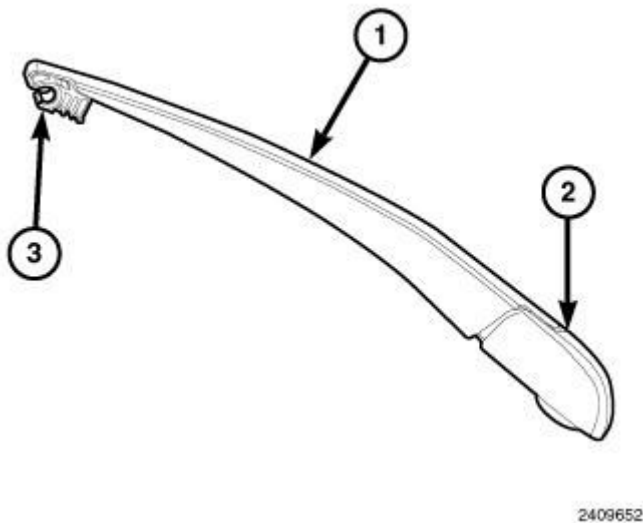


Fig. 6: Rear Wiper Arm

Courtesy of CHRYSLER GROUP, LLC

The rear wiper arm is the rigid member located between the rear wiper motor output shaft that protrudes through the liftgate glass above the center of the liftgate glass opening and the wiper blade on the outside of the glass. The wiper arm is constructed of molded black plastic. A hinged pivot end is also molded plastic.

A molded black plastic nut cover (2) with two pivot pins on the back end and snap features on the end nearest the wiper blade fits over the wiper arm retaining nut to conceal the nut and mounting hole following wiper arm installation. The wiper arm hinge and tension spring are concealed on the underside of the wide end of the arm (1), while an integral latch feature (3) concealed on the underside of the narrow end of the wiper arm accepts the pivot pin of the matching molded plastic wiper blade unit.

The rear wiper arm cannot be adjusted or repaired. If damaged or ineffective, the entire wiper arm unit must be replaced.

OPERATION

FRONT

The front wiper arms are designed to mechanically transmit the motion from the wiper pivots to the front wiper blades. The front wiper arm must be properly indexed to the wiper pivot in order to maintain the proper wiper blade travel on the glass. The tapered mounting hole in the wiper arm pivot end interlocks with the serrations on the tapered outer circumference of the wiper pivot shaft, allowing positive engagement and finite adjustment of this connection.

The mounting nut locks the front wiper arm to the threaded stud of the wiper pivot shaft. The spring-loaded wiper arm hinge controls the down-force applied through the tip of the wiper arm to the front wiper blade on the glass. The hook formation on the tip of the wiper arm provides a cradle for securing and latching the wiper blade pivot block to the wiper arm.

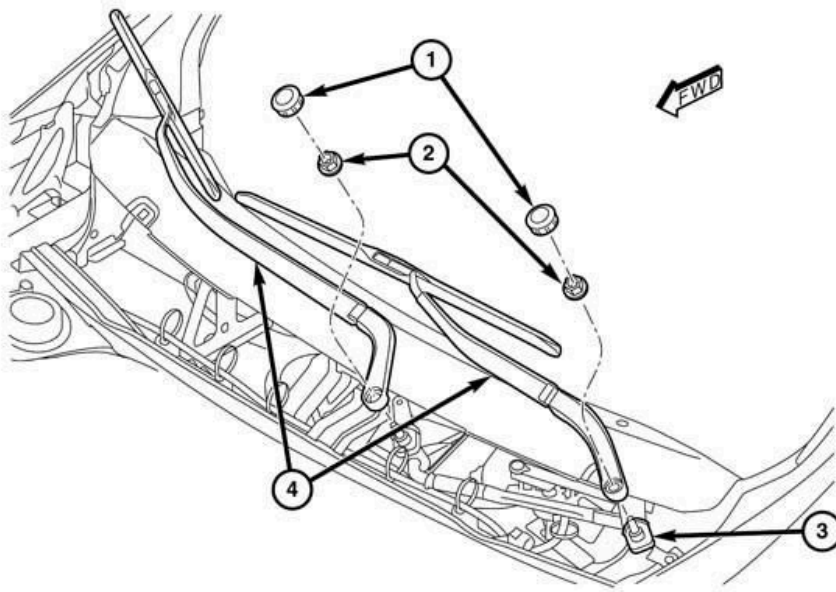
REAR

The rear wiper arm is designed to mechanically transmit the motion from the rear wiper motor output shaft to the rear wiper blade. The wiper arm must be properly indexed to the motor output shaft in order to maintain the proper wiper blade travel on the glass. The tapered hole in the wiper arm pivot end interlocks with the serrations on the outer circumference of the tapered motor output shaft, allowing positive engagement and finite adjustment of this connection.

A hex nut secures the wiper arm pivot end to the threads on the rear wiper motor output shaft and the plastic cover snaps over this connection for a neat appearance. The spring-loaded wiper arm hinge controls the down-force applied through the tip of the wiper arm to the wiper blade on the glass. The latch formation on the tip of the wiper arm provides a cradle for securing and latching the wiper blade pivot pin to the wiper arm.

REMOVAL

FRONT



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Fig. 7: Front Wiper Arm, Pivot Shaft, Nuts & Caps
Courtesy of CHRYSLER GROUP, LLC

1. Carefully pry the plastic nut cap (1) off of the pivot end of the wiper arm (4).
2. Remove the nut (2) that secures the wiper arm to the wiper pivot shaft (3).
3. Lift the front wiper arm to its over-center position to hold the wiper blade off of the glass and relieve the spring tension on the wiper arm to pivot shaft connection.
4. Use a slight rocking action to disengage the front wiper arm pivot end from the pivot shaft and remove the wiper arm.

CAUTION: The use of a battery terminal puller when removing the front wiper arm is NOT recommended except as a last resort, as this may damage the front wiper arm.

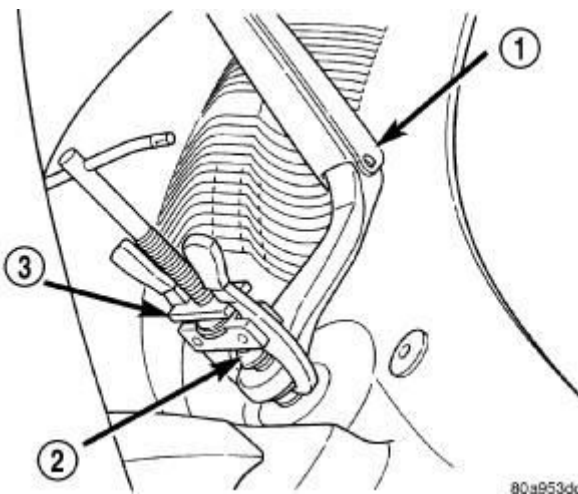
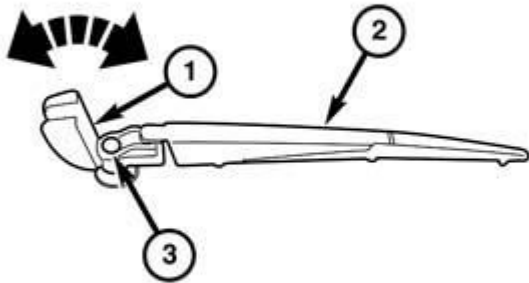


Fig. 8: Disengaging Wiper Arm From Pivot Shaft

Courtesy of CHRYSLER GROUP, LLC

5. If the rocking action failed to free the wiper arm from the pivot shaft, use a suitable battery terminal puller (3) to disengage the wiper arm (1) from the pivot shaft (2).
6. Remove the wiper arm pivot end from the pivot shaft.

REAR

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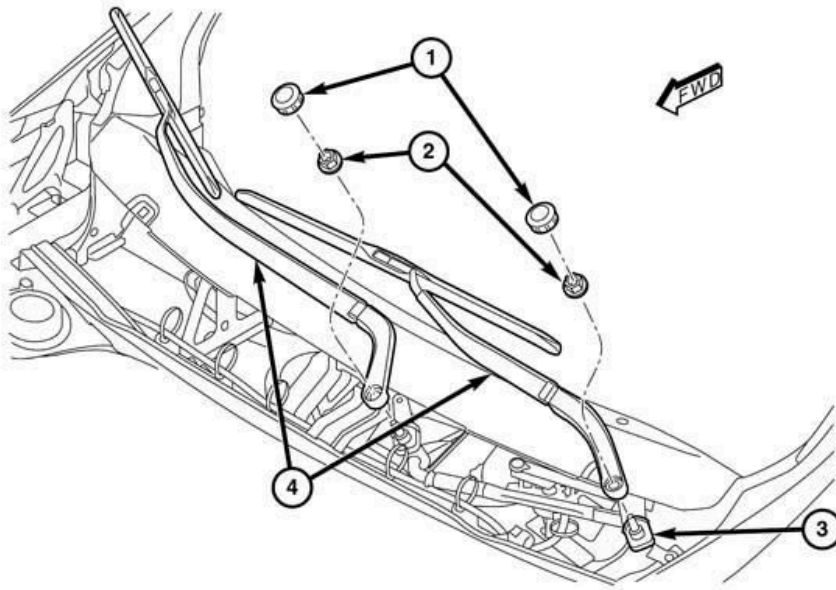
Fig. 9: Wiper Arm, Pivot Cover & Nut
Courtesy of CHRYSLER GROUP, LLC

1. Unsnap and swing the molded plastic pivot cover (1) off of the pivot end of the wiper arm (2).
2. Remove the nut (3) that secures the wiper arm to the rear wiper motor output shaft.

CAUTION: The use of a battery terminal puller when removing the rear wiper arm is NOT recommended as this may damage the rear wiper arm.

3. Use a slight rocking action to disengage the rear wiper arm pivot end from the output shaft and remove the wiper arm.

INSTALLATION**FRONT**



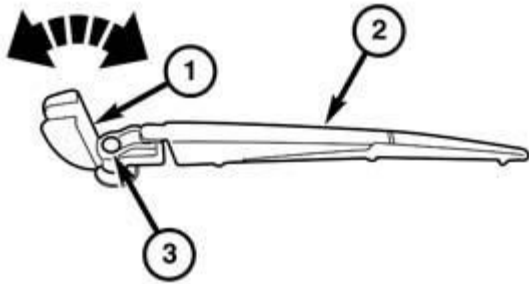
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Fig. 10: Front Wiper Arm, Pivot Shaft, Nuts & Caps
Courtesy of CHRYSLER GROUP, LLC

NOTE: Be certain that the wiper motor is in the park position before attempting to install the front wiper arms. Transition the status of the ignition switch to On and move the right multifunction switch control knob to its front wiper Off position. If the wiper pivots move, wait until they stop moving, then transition the ignition switch status back to Off. The front wiper motor is now in its park position.

1. The front wiper arms must be indexed to the pivot shafts with the front wiper motor in the park position to be properly installed. Position the wiper arm pivot end onto the wiper pivot shaft so that the lower edge of the wiper blade is aligned with the wiper alignment marks located near or within the lower margin of the windshield.
2. Once the wiper blade is aligned, lift the wiper arm away from the windshield slightly to relieve the spring tension on the pivot end and push the pivot end of the wiper arm (4) down firmly and evenly over the pivot shaft (3).
3. Install and tighten the nut (2) that secures the wiper arm to the pivot shaft. Tighten the nut to 20 N.m (15 ft. lbs.).
4. Wet the windshield glass, then operate the front wipers. Turn the wiper switch to the Off position, then check for the correct wiper arm alignment position and readjust as required.
5. Reinstall the plastic cap (1) onto the wiper arm pivot end.

REAR



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Fig. 11: Wiper Arm, Pivot Cover & Nut
Courtesy of CHRYSLER GROUP, LLC

NOTE: Be certain that the rear wiper motor is in the park position before attempting to install the rear wiper arm. Transition the status of the ignition switch to On and move the rear wiper switch to its Off position. If the wiper motor output shaft moves, wait until it stops moving, then transition the status of the ignition switch back to Off. The wiper motor is now in its park position.

1. The rear wiper arm (2) must be indexed to the rear wiper motor output shaft with the motor in the park position to be properly installed. Position the wiper arm pivot end onto the output shaft so that the tip of the wiper blade is horizontal and parallel with the sine wave rear window defogger grid line at the bottom of the liftgate glass.
2. With the rear wiper arm properly indexed, push the tapered mounting hole on the pivot end of the wiper arm down over the output shaft.
3. Install and tighten the nut (3) that secures the rear wiper arm to the output shaft. Tighten the nut to 9 N.m (80 in. lbs.).
4. Fold and snap the molded plastic pivot cover (1) over the nut on the pivot end of the rear wiper arm.
5. Wet the liftgate glass and operate the rear wiper. Turn the rear wiper switch to the Off position, then check for correct wiper arm position and readjust as required.

BLADE, WIPER

DESCRIPTION

FRONT

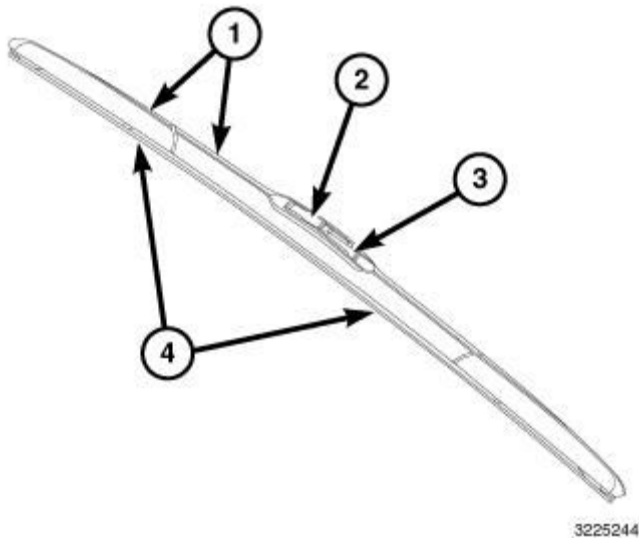


Fig. 12: Blade Covers, Integral Latch & Pivot Block
Courtesy of CHRYSLER GROUP, LLC

Each front wiper blade is secured by an integral latch (2) and an integral pivot block (3) to the hook formation on the tip of each wiper arm, and rests on the glass near the base of the windshield when the wipers are not in operation. These wiper blades have a somewhat sculpted appearance that actually has a functional purpose. The sculpted appearance is due to molded plastic blade covers (1) securely fastened over the bridges and links of the wiper blade. This sculpting is designed to reduce wind buffeting, which helps to reduce wind noise within the passenger compartment of the vehicle.

The wiper blade consists of the following components:

- **Blade Covers** - The molded plastic blade covers shield the wiper superstructure and elements to reduce wind buffeting.
- **Element (4)** - The wiper element or squeegee is the resilient rubber member of the wiper blade that contacts the glass.
- **Flexor** - The flexor is a rigid metal component running along the length of each side of the wiper element where it is gripped by the claws of the superstructure.
- **Superstructure** - The superstructure includes several stamped steel bridges and links with claw formations that grip the wiper blade element. Also included in this unit is the latching, molded plastic pivot block that secures the superstructure to the wiper arm. All of the metal components of the wiper blade have a satin black finish applied.

The passenger side wiper blades are 45.00 centimeters (17.71 inches) long. The driver side wiper blades are 65.00 centimeters (25.59 inches) long. They have non-replaceable rubber elements (squeegees). The wiper blades cannot be adjusted or repaired. If ineffective, worn or damaged the entire wiper blade unit must be replaced.

REAR

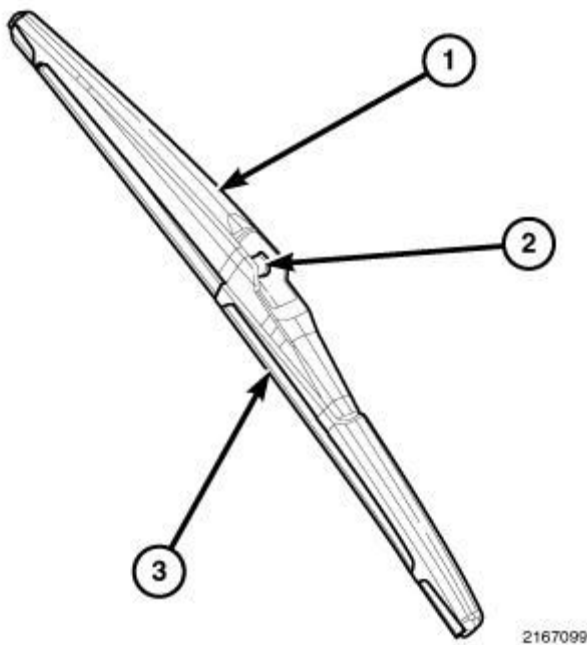


Fig. 13: Rear Wiper Blade Is Secured By An Integral Pivot Pin
Courtesy of CHRYSLER GROUP, LLC

The rear wiper blade is secured by an integral pivot pin (2) to a receptacle at the tip of the rear wiper arm, and rests near the base of the liftgate glass when the wiper is not in operation. The rear wiper blade consists of the following components:

- **Superstructure (1)** - The superstructure includes a molded black plastic bridge and plastic links with claw formations that grip the wiper blade element. Also included in this unit is the pivot pin that secures the superstructure to the wiper arm.
- **Element (3)** - The wiper element or squeegee is the resilient rubber member of the wiper blade that contacts the glass.
- **Flexor** - The flexor is a rigid metal component running along the length of each side of the wiper element where it is gripped by the claws of the superstructure.

The rear wiper blade is 35 centimeters (13.78 inches) long with a non-replaceable element (squeegee). The wiper blade superstructure cannot be adjusted or repaired. If ineffective, worn or damaged the entire wiper blade unit must be replaced.

OPERATION

FRONT

The wiper blades are moved back and forth across the glass by the wiper arms when the wipers are being operated. The wiper blade superstructure is the flexible frame that grips the wiper blade element and evenly distributes the force of the spring-loaded wiper arm along the length of the element. The combination of the wiper arm force and the flexibility of the superstructure makes the element conform to and maintain proper contact with the glass, even as the blade is moved over the varied curvature that may be encountered across the

glass surface.

The wiper element flexor provides the claws of the blade superstructure with a rigid, yet flexible component on the element which can be gripped. The rubber element is designed to be stiff enough to maintain an even cleaning edge as it is drawn across the glass, yet be resilient enough to conform to the glass surface and flip from one cleaning edge to the other each time the wiper blade changes directions.

REAR

The rear wiper blade is moved back and forth across the liftgate glass by the wiper arm when the rear wiper system is in operation. The wiper blade superstructure is the flexible frame that grips the wiper blade element and evenly distributes the force of the spring-loaded wiper arm along the length of the element. The combination of the wiper arm force and the flexibility of the superstructure makes the element conform to and maintain proper contact with the glass, even as the blade is moved over the varied curvature found across the glass surface.

The wiper element flexor provides the claws of the blade superstructure with a rigid, yet flexible component on the element which can be gripped. The rubber element is designed to be stiff enough to maintain an even cleaning edge as it is drawn across the glass, but resilient enough to conform to the glass surface and flip from one cleaning edge to the other each time the wiper blade changes directions.

REMOVAL

FRONT

CAUTION: Do not allow the wiper arm to spring back against the glass without the wiper blade in place or the glass may be damaged.

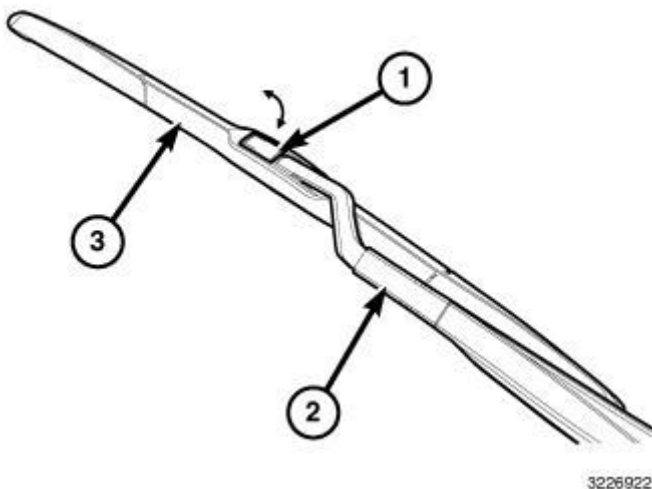
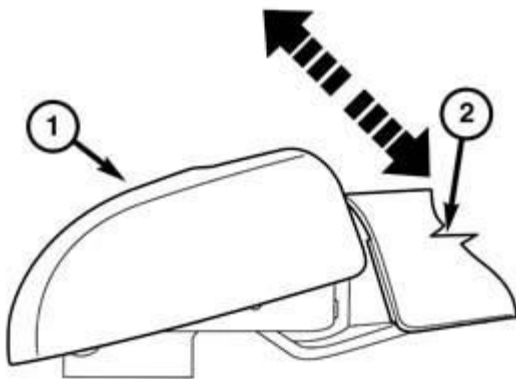


Fig. 14: Tab, Wiper Arm & Element
 Courtesy of CHRYSLER GROUP, LLC

NOTE: The notched end of the wiper element flexor should always be oriented towards the end of the wiper blade that is nearest to the wiper pivot.

1. Lift the wiper arm (2) to raise the wiper blade and element (3) off of the glass, until the wiper arm hinge is in its over-center position.
2. To remove the blade from the arm, lift or gently pry the latch release tab (1) located just in front of the pivot block at the tip of the arm upward until it stands perpendicular to the wiper arm.
3. Rotate the lower end of the blade slightly downward (toward the wiper element and away from the wiper arm), then slide the blade away from the tip towards the pivot end of the arm far enough to disengage the pivot block from the hook formation on the end of the arm.
4. Extract the hook formation on the tip of the wiper arm through the opening in the wiper blade superstructure between the latch and the pivot block.
5. Gently lower the tip of the wiper arm onto the glass.

REAR



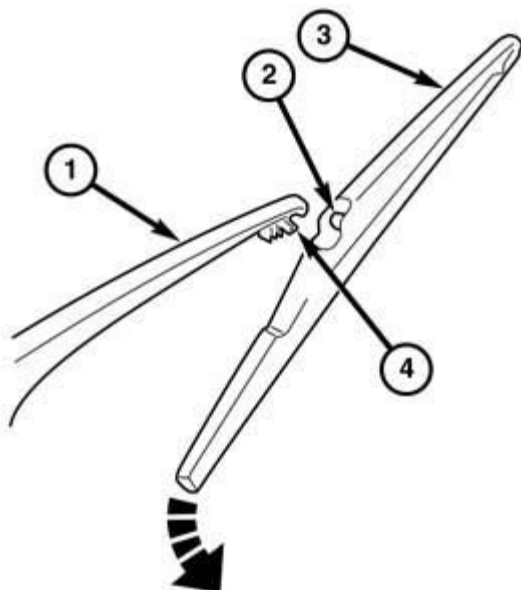
0833005794

Fig. 15: Rear Wiper Arm & Cover
Courtesy of CHRYSLER GROUP, LLC

1. Lift the rear wiper arm pivot cover (1) upward to allow the rear wiper blade to be raised off of the glass.

NOTE: The rear wiper arm cannot be raised to its over-center hinge position unless the pivot cover is raised first.

2. Lift the rear wiper arm (2) to its over-center hinge position to raise the wiper blade and element off of the liftgate glass.



0833005795

Fig. 16: Wiper Blade, Wiper Arm, Pivot Pin & Receptacle
Courtesy of CHRYSLER GROUP, LLC

3. To remove the wiper blade (3) from the wiper arm (1), grasp the end of the blade nearest to the motor output shaft, then over-rotate it out from under the arm and past its stop far enough to unsnap the blade pivot pin (2) from the receptacle (4) on the end of the arm.
4. Gently lower the tip of the wiper arm onto the glass.

INSTALLATION

FRONT

CAUTION: Do not allow the wiper arm to spring back against the glass without the wiper blade in place or the glass may be damaged.

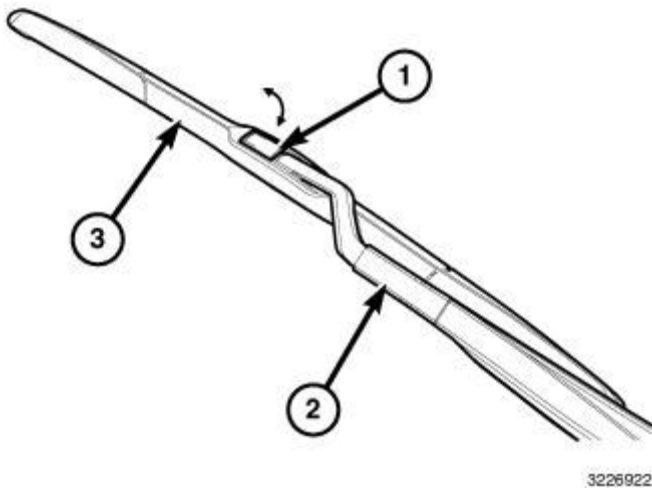
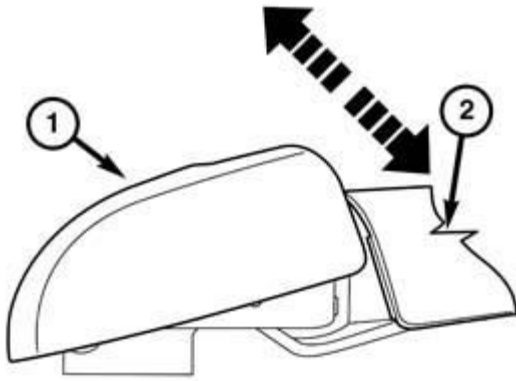


Fig. 17: Tab, Wiper Arm & Element
Courtesy of CHRYSLER GROUP, LLC

NOTE: The notched end of the wiper element flexor should always be oriented towards the end of the wiper blade that is nearest to the wiper pivot.

1. Lift the wiper arm (2) off of the windshield glass, until the wiper arm hinge is in its over-center position.
2. Position the wiper blade and element unit (3) near the hook formation on the tip of the arm with the notched end of the wiper element flexor oriented towards the end of the wiper arm that is nearest to the wiper pivot.
3. Insert the hook formation on the tip of the arm through the opening in the blade superstructure between the latch (1) and the pivot block far enough to engage the pivot block into the hook.
4. Slide the pivot block up into the hook formation on the tip of the wiper arm until it is fully engaged.
5. Rotate the latch release tab down into the blade until it snaps into its locked position. Latch engagement will be accompanied by an audible click.
6. Gently lower the wiper blade and element onto the glass.

REAR



0833005794

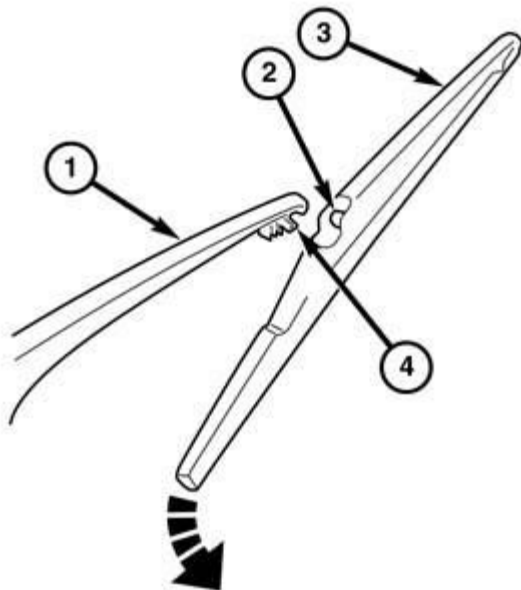
Fig. 18: Rear Wiper Arm & Cover

Courtesy of CHRYSLER GROUP, LLC

1. Lift the rear wiper arm pivot cap (1) upward to allow the rear wiper arm to be raised off of the glass.

NOTE: **The rear wiper arm cannot be raised to its over-center hinge position unless the pivot cover is raised first.**

2. Lift the rear wiper arm (2) to its over-center hinge position and off of the liftgate glass.



0833005795

Fig. 19: Wiper Blade, Wiper Arm, Pivot Pin & Receptacle
Courtesy of CHRYSLER GROUP, LLC

3. Position the rear wiper blade (3) with the pivot pin (2) aligned with the opening of the receptacle (4) on the tip of the wiper arm (1).
4. Using hand pressure, press the wiper blade pivot pin firmly and evenly into the wiper arm receptacle until it snaps into place.
5. Lower the wiper blade onto the glass and snap the pivot cover back into place.

CHECK VALVE, WASHER

DESCRIPTION

DESCRIPTION

Diaphragm-type washer system check valves are standard equipment in this vehicle. The check valves for the washer system are integral to their respective front and rear washer nozzles. Refer to **NOZZLE, WASHER, DESCRIPTION**.

OPERATION

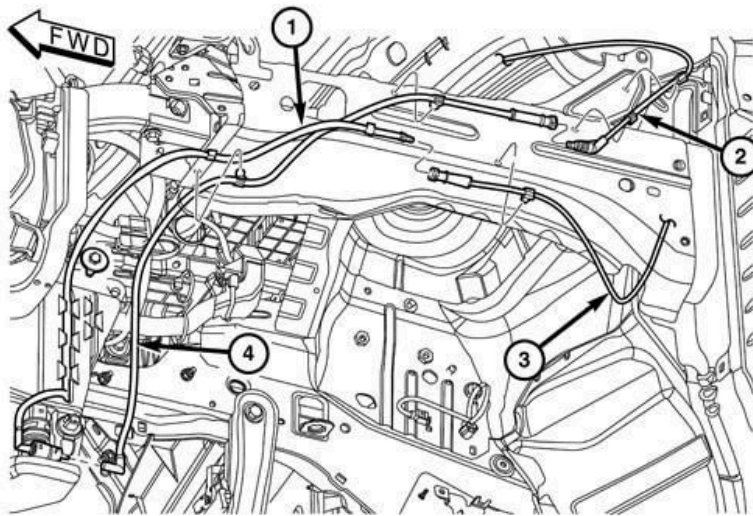
OPERATION

Diaphragm-type washer system check valves are standard equipment in this vehicle. The check valves for the washer system are integral to their respective front and rear washer nozzles. Refer to **NOZZLE, WASHER, OPERATION**.

HOSES AND TUBES, WASHER

DESCRIPTION

FRONT

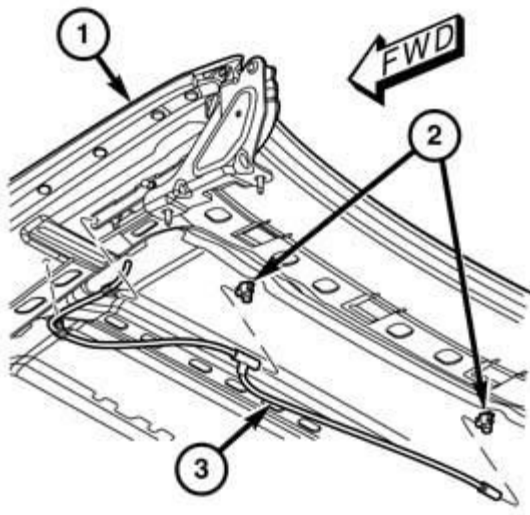


0833005485

Fig. 20: Front Washer Plumbing, Rear Washer Plumbing, Hood Plumbing & Body Plumbing
Courtesy of CHRYSLER GROUP, LLC

The reservoir front washer plumbing (4) consists of small diameter rubber hose or hard plastic tubing that is routed along with the reservoir rear washer plumbing (1) from the washer reservoir located on the left outboard Front End Module (FEM) hydroform ahead of the left front wheel housing. The plumbing is attached to its respective front or rear barbed outlet nipple of the washer pump/motor unit near the bottom of the reservoir, then routed through dedicated troughs integral to the reservoir to the left front fender load beam.

Plastic push-in type retainers secure the plumbing to the underside and the outboard side of the load beam. The front and rear plumbing are then connected by molded plastic quick-connect fittings above the left front wheel house. The front plumbing is connected to the hood plumbing (2). The rear plumbing is connected to the body plumbing (3), which is routed through a grommet and a hole in the dash panel into the passenger compartment.



0833005488

Fig. 21: Hood Plumbing, Hood Panel & Front Washer Nozzle
Courtesy of CHRYSLER GROUP, LLC

The hood plumbing (3) is routed from the load beam to the left hood hinge lower bracket, then to the left hood hinge upper bracket to the hood panel (1) and the inner hood reinforcement. The plumbing is then connected by molded rubber fittings to the barbed nipple of each front washer nozzle (2). The hood plumbing is also secured by plastic push-in type retainers to the load beam, the hood hinge and the inner hood reinforcement.

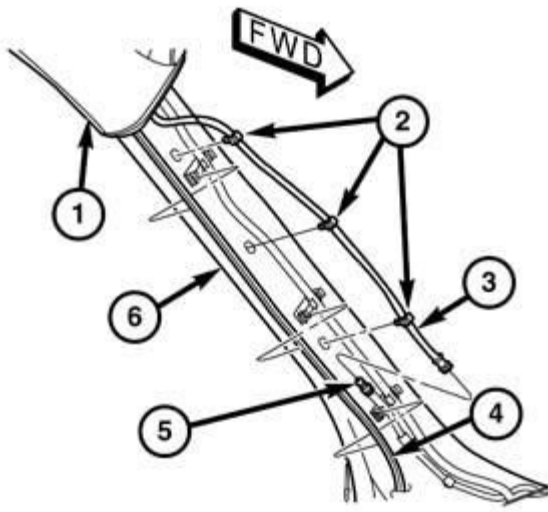
Washer hose or tube is available for service only as roll stock, which must then be cut to length. The molded plastic washer hose fittings and routing clips cannot be repaired. If these fittings or clips are ineffective or damaged, they must be replaced.

HEADLAMP

The headlamp washer system plumbing consists of a large diameter high pressure rubber supply line that is routed from the outlet nipple of the headlamp washer pump/motor unit on the washer reservoir to one barbed nipple of a wye fitting behind the center of the front fascia. The other two barbed nipples of the wye fitting are connected to two short lengths of supply line that each terminate at a headlamp washer nozzle behind the fascia and below the two front lamp units. The supply line connections at the nozzles and at the headlamp washer pump are secured using molded plastic quick-connect fittings.

Washer hose or tube is available for service only as roll stock, which must then be cut to length. The molded plastic washer plumbing fittings and routing clips cannot be repaired. If these fittings or clips are ineffective or damaged, they must be replaced.

REAR



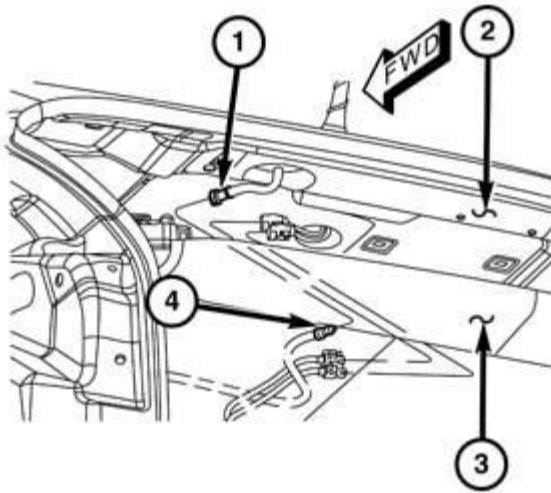
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Fig. 22: Rear Washer Plumbing
Courtesy of CHRYSLER GROUP, LLC

The reservoir rear washer plumbing consists of a small diameter rubber hose or hard plastic tubing that is routed along with the reservoir front washer plumbing from the washer reservoir under the left front fender ahead of the left front wheel house to the outboard side of the left front fender load beam. The plumbing is attached to its respective front or rear barbed outlet nipple of the washer pump/motor unit near the bottom of the reservoir. The plumbing is then secured by plastic push-in type retainers to the load beam.

The reservoir rear washer plumbing is connected by a molded plastic quick-connect fitting to the body rear washer plumbing above the left front wheel house. The body rear washer plumbing then passes from the engine compartment through a hole with a rubber grommet in the dash panel near the belt line to the left cowl side area within the passenger compartment.

The body rear washer plumbing (5) is routed up the inner left A-pillar (6), where it is connected by a molded plastic quick-connect fitting to the headliner rear washer plumbing (3). The plumbing is secured by plastic push-in type retainers (2) to the inner A-pillar. The headliner rear washer hose is secured to the headliner (1) substrate and routed along with the antenna wiring (4) toward the back of the vehicle.



0833005487

Fig. 23: Headliner, Rear Washer Plumbing & Upper Liftgate Opening Header
 Courtesy of CHRYSLER GROUP, LLC

Above the headliner (3) at the back of the vehicle the headliner rear washer plumbing (4) is connected to the liftgate rear washer plumbing (1) by another molded plastic quick-connect fitting. The liftgate rear washer plumbing is routed along with the liftgate wire harness through a clearance hole in the upper liftgate opening header (2) and rubber grommets in the upper liftgate opening trough and the liftgate inner and outer panels to the rear spoiler. The hose is secured to routing clips integral to the Center High Mounted Stop Lamp (CHMSL) housing within the spoiler to the barbed quick-connect nipple of the rear washer nozzle within the liftgate spoiler.

Washer hose or tube is available for service only as roll stock, which must then be cut to length. Portions of the rear washer plumbing is integral to the headliner. The molded plastic washer hose fittings and routing clips cannot be repaired. If these fittings or clips are ineffective or damaged, they must be replaced.

OPERATION

FRONT

Washer fluid in the washer reservoir is pressurized and fed by the washer pump/motor unit through the front washer system plumbing and fittings to the two front washer nozzles. Whenever routing the washer plumbing or a wire harness containing washer plumbing, it must be routed away from hot, sharp, or moving parts; and, sharp bends that might pinch the plumbing must be avoided.

HEADLAMP

Washer fluid in the washer reservoir is pressurized and fed by the headlamp washer pump/motor unit through

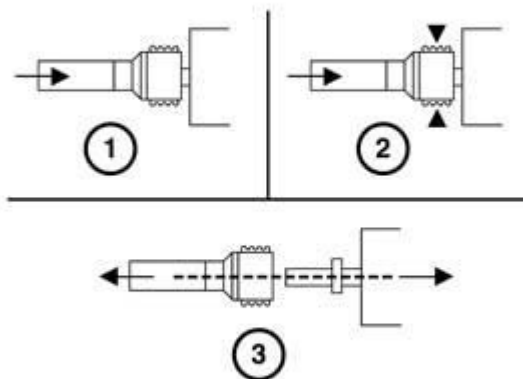
the headlamp washer system plumbing and fittings to the two telescopic headlamp washer nozzles. Whenever routing the washer plumbing, it must be routed away from hot, sharp, or moving parts; and, sharp bends that might pinch the plumbing must be avoided.

REAR

Washer fluid in the washer reservoir is pressurized and fed by the washer pump/motor unit through the rear washer system plumbing and fittings to the rear washer nozzle. Whenever routing the washer plumbing or a wire harness containing washer plumbing, it must be routed away from hot, sharp or moving parts; and, any sharp bends that might pinch the plumbing must be avoided.

STANDARD PROCEDURE

DISCONNECTING HIGH PRESSURE WASHER PLUMBING QUICK-CONNECT FITTINGS



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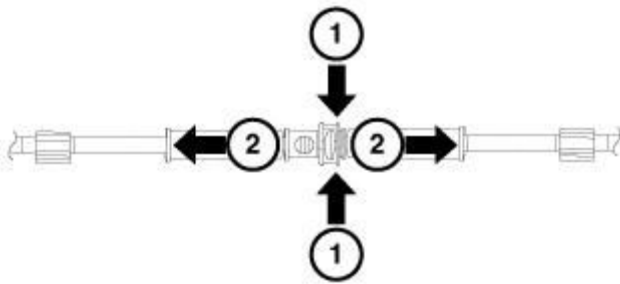
Fig. 24: Disconnecting High Pressure Washer Plumbing Quick-Connect Fittings
 Courtesy of CHRYSLER GROUP, LLC

Molded plastic quick-connect fittings join sections of the high pressure headlamp washer plumbing. To disconnect this fitting:

1. Push the molded plastic female half of the quick-connect fitting toward the male half quick-connect nipple of the headlamp washer pump, headlamp washer nozzle or other plumbing fitting.
2. While still pushing the two halves of the connector toward each other, squeeze or pinch the ribbed retainers on each side of the female half of the quick-connect between your thumb and forefinger.
3. Finally, pull the female half of the quick-connect fitting straight back from the male half quick-connect nipple to disconnect.

NOTE: When reconnecting the quick-connect fitting, align the female half of the fitting to the male half of the fitting. Do not attempt to reconnect using an angled approach. Push the two halves together until an audible click is heard.

DISCONNECTING LOW PRESSURE WASHER PLUMBING QUICK-CONNECT FITTINGS



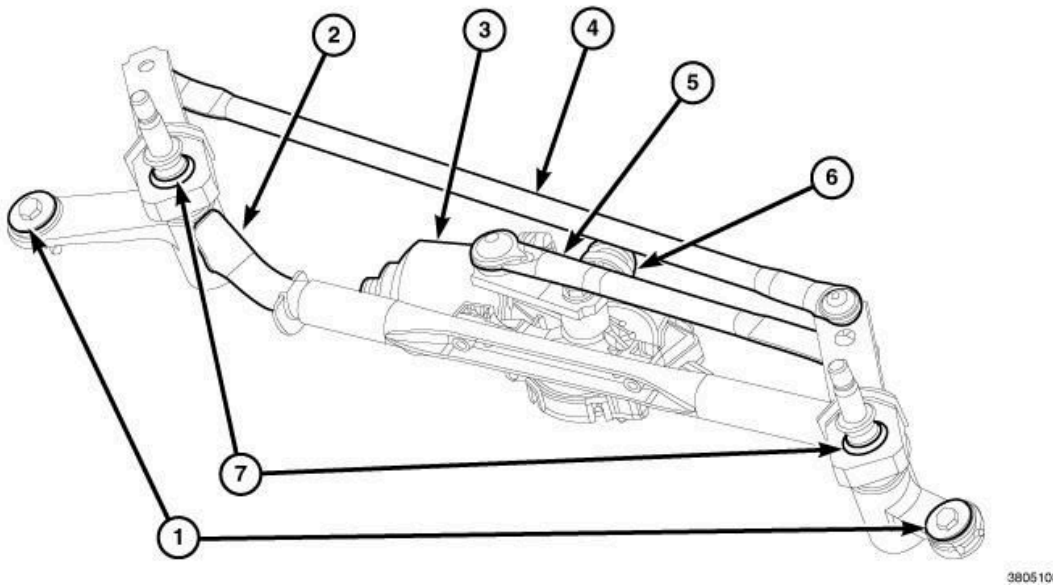
3318084

Fig. 25: Molded Plastic Quick-Connect & Washer Hose Tubes
Courtesy of CHRYSLER GROUP, LLC

Molded plastic quick-connect fittings join sections of the low pressure front and rear washer plumbing. To disconnect this fitting:

1. Squeeze the two solid sides (not the open sides) of the female half of the quick-connect fitting at the outer edge.
2. While still squeezing the female half of the fitting, pull the two sections of the washer plumbing away from each other.

DISCONNECTING REAR WASHER NOZZLE QUICK-CONNECT FITTING



3805103

Fig. 27: Wiper Arm Linkage Components
 Courtesy of CHRYSLER GROUP, LLC

The wiper linkage module is secured within the cowl plenum panel beneath the cowl plenum cover/grille panel. The ends of the wiper pivot shafts protrude through dedicated openings in the cowl plenum cover/grille panel to drive the wiper arms and blades and are the only visible components of the wiper linkage module.

The wiper linkage module consists of the following major components:

- **Bracket** - The wiper linkage module bracket (2) consists of two tubular members that extend from opposite sides of a die cast center section that serves as the wiper motor mount. Each tubular member has a die cast pivot bracket formation secured at the outboard end where the wiper pivots are secured. The wiper linkage module bracket is secured within the cowl plenum by two screws through two rubber insulators (1).
- **Crank Arm** - The wiper motor crank arm is a stamped steel unit with a slotted hole on the driven end that is secured to the wiper motor output shaft with a nut, and has a ball stud secured to the drive end.
- **Linkage** - A stamped steel drive link (5) connects the wiper motor crank arm to the left wiper pivot lever arm. A stamped steel connector link (4) connects the left wiper pivot lever arm to the right wiper pivot lever arm. Each link has a plastic socket-type bushing on each end. The bushing on the pivot end of each link is snap-fit over a ball stud on the crank arm or the pivot lever arm.
- **Motor** - The wiper motor (3) is secured by a bracket integral to the motor transmission housing with two screws and nuts near the center of the wiper linkage module bracket. A knob-like rubber insulator (6) on a stud integral to the motor transmission housing is engaged in a slot in a stamped bracket on the cowl plenum panel. The two-speed permanent magnet wiper motor features an integral transmission, an internal park switch and an internal automatic resetting circuit breaker. An integral connector receptacle connects the motor to the vehicle electrical system.
- **Pivots** - The two front wiper pivots (7) are secured to the ends of the wiper module bracket. The lever arm that extends from the lower end of the left pivot shaft has two ball studs that are engaged with the bushings of the drive and connector links. The lever arm of the right pivot shaft has a single ball stud that

is engaged with the bushing of the connector link. The upper end of each pivot shaft where the wiper arms will be fastened each is tapered and serrated with a threaded stud formation at the tip.

The wiper motor and crank arm unit is available for separate service replacement. Any other component of the wiper linkage module cannot be adjusted or repaired. If any component of the module other than the motor is ineffective or damaged, the entire wiper linkage module unit must be replaced.

OPERATION

OPERATION

The wiper linkage module operation is controlled by the battery current inputs received by the wiper motor through the Body Control Module (BCM). The wiper motor speed is controlled by current flow to either the low speed or the high speed set of brushes. The park switch is a single pole, single throw, momentary switch within the wiper motor that is mechanically actuated by the wiper motor transmission components. The park switch alternately closes the wiper park switch sense circuit to ground or to battery current, depending upon the position of the wipers on the glass. This feature allows the motor to complete its current wipe cycle after the wiper system has been turned Off, and to park the wiper blades in the lowest portion of the wipe pattern. The automatic resetting circuit breaker protects the motor from overloads.

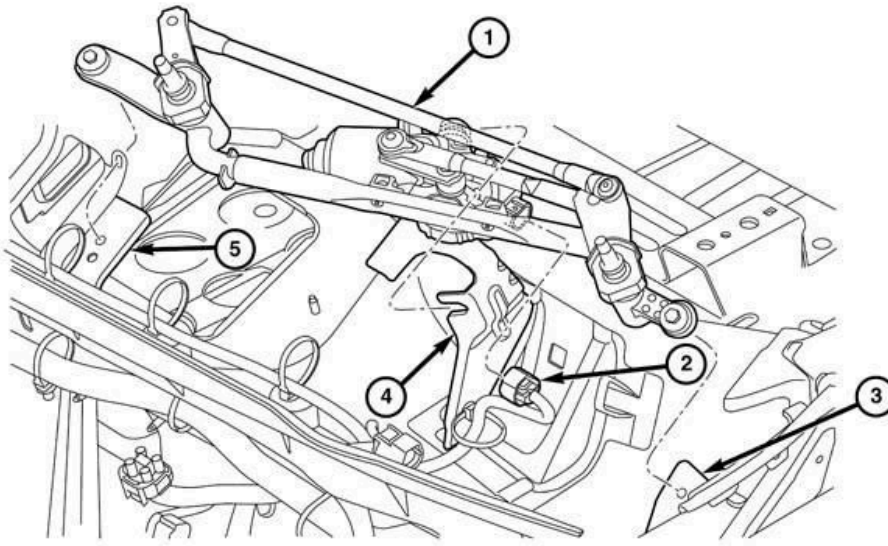
The wiper motor crank arm, the two wiper linkage members and the two wiper pivots mechanically convert the rotary output of the wiper motor to the back and forth wiping motion of the wiper arms and blades on the glass.

The hard wired inputs and outputs of the wiper motor may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the wiper motor or the electronic controls and communication between other modules and devices that provide some features of the wiper and washer system. The most reliable, efficient and accurate means to diagnose the wiper motor, the BCM or the electronic controls and communication related to wiper motor operation requires the use of a diagnostic scan tool. Refer to

DIAGNOSIS AND TESTING

REMOVAL

REMOVAL



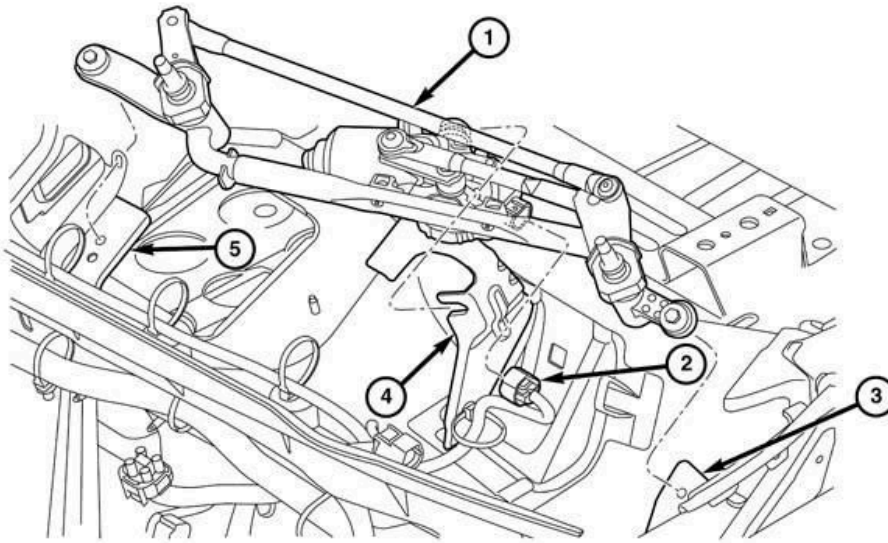
0833005796

Fig. 28: Front Wiper Module, Brackets & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery.
2. Remove both front wiper arms from the wiper pivots. Refer to **ARM, WIPER, REMOVAL**.
3. Remove the cowl plenum cover/grille panel from over the front wiper module.
4. Disconnect the wire harness (2) connector from the connector receptacle for the front wiper motor.
5. Remove the two screws that secure the ends of the front wiper module (1) bracket to the stamped brackets (3 and 5) within the cowl plenum.
6. Pull the front wiper module inboard far enough to disengage the knob-like rubber isolator from the slotted bracket (4) on the rearward wall of the cowl plenum.
7. Remove the front wiper module from the cowl plenum as a unit.

INSTALLATION

INSTALLATION



0833005796

Fig. 29: Front Wiper Module, Brackets & Fasteners
Courtesy of CHRYSLER GROUP, LLC

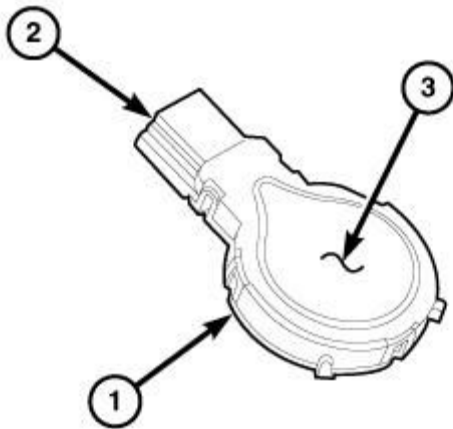
NOTE: The wiper motor can be removed from the wiper linkage module and is serviced independently from the remainder of the wiper linkage module for this vehicle. Refer to MOTOR, WIPER, REMOVAL.

1. Position the wiper linkage module (1) to the cowl as a unit.
2. Position the knob-like rubber isolator to the slotted bracket (4) on the rear wall of the cowl plenum panel and pull the module outboard far enough to seat the isolator into the bracket.
3. Starting on the outboard side, install and tighten the two screws that secure the wiper linkage module to the stamped brackets (3 and 5) within the cowl plenum. Tighten the screws to 5.5 N.m (49 in. lbs.).
4. Reconnect the wire harness connector (2) to the connector receptacle for the wiper motor. Be certain that the connector is fully engaged and locked.
5. Reinstall the cowl plenum cover/grille panel over the wiper linkage module. Refer to COVER, COWL PANEL, INSTALLATION.
6. Reinstall both wiper arms onto the wiper pivots. Refer to ARM, WIPER, INSTALLATION.
7. Reconnect the negative cable to the battery.

MODULE, LIGHT RAIN SENSOR

DESCRIPTION

DESCRIPTION



3805559

Fig. 30: Light Rain Sensor Module Components

Courtesy of CHRYSLER GROUP, LLC

The Light Rain Sensor Module (LRSM) (1) is the primary component of the automatic wiper system. The LRSM is also capable of performing an ambient light sensor function; therefore, it is alternately referred to as the Rain Light Sensor Module (RLSM), the Light Sensor Module (LSM) or the Rain Sensor Module (RSM). The LRSM is located on the inside of the windshield glass just below and to the right of the inside rear view mirror mounting button. The LRSM is concealed from view within the vehicle interior by a molded plastic inside rear view mirror bracket trim cover that fits over the top of the LRSM housing and the LRSM mounting bracket, but the LRSM is visible through the windshield glass from the exterior of the vehicle.

The molded black plastic LRSM housing has an integral connector receptacle (2) with three terminal pins. These terminal pins connect the LRSM to the vehicle electrical system through a dedicated take out and connector of the overhead wire harness that extends from above the headliner. The windshield side of the housing is filled with a clear, silicone gelatin (also known as SilGel) adhesive membrane pad (3), which serves as an optical coupler between the sensor and the inside of the windshield glass. A spring steel retaining strap or clip extends forward on each side of the housing to latch the LRSM to a molded black plastic mounting bracket, which is permanently bonded to the inside of the windshield glass.

Concealed and protected within the LRSM housing is the electronic circuitry of the module, which includes an InfraRed (IR) diode and photocell based light and rain sensors, control electronics and Local Interface Network (LIN) data bus communication management hardware. The LRSM is a LIN slave node and communicates over a single LIN bus circuit with the Body Control Module (BCM). The BCM is a LIN master node and a gateway to the Controller Area Network (CAN) data bus. The BCM controls the exchange of electronic messages back and forth between the LRSM and other electronic modules in the vehicle, as well as with a diagnostic scan tool connected to the Data Link Connector (DLC).

The LRSM cannot be adjusted or repaired. If ineffective or damaged, the entire module must be replaced. The silicone gelatin adhesive membrane pad is available for separate service replacement. The LRSM mounting bracket is serviced only as a unit with the windshield glass.

OPERATION

OPERATION

The Light Rain Sensor Module (LRSM) (1) (also known as the Rain Light Sensor Module/RLSM, the Light Sensor Module/LSM or the Rain Sensor Module/RSM) senses moisture and ambient light levels on the outside of the windshield glass and sends electronic messages to the Body Control Module (BCM) over the Local Interface Network (LIN) data bus to give an indication of the monitored conditions. The BCM relays messages back and forth between the LRSM and other electronic modules in the vehicle.

For the rain sensor function, InfraRed (IR) diodes within the LRSM generate infrared light beams that are aimed by the optics of the sensor through the windshield glass, while an IR photo diode monitors the infrared light reflected back from the windshield glass. When sufficient moisture accumulates within the wipe pattern on the windshield glass, less of the infrared light is reflected back and the sensor detects a change in the monitored infrared light intensity. For the light sensor function, an IR photo diode within the sensor monitors the intensity of the ambient infrared light received through the windshield glass and the sensor optics.

The internal programming of the LRSM sends the appropriate electronic **wipe command** messages to the BCM over the LIN data bus. The BCM then responds by activating or deactivating the wiper system. Similarly, the LRSM provides electronic **ambient light level** messages to the BCM, and the BCM relays these messages to other electronic modules in the vehicle.

The Steering Control Module (SCM) sends electronic **wiper switch status** and **automatic wipe sensitivity level** messages over the Controller Area Network (CAN) data bus to the BCM based upon the driver-selected settings of the control knob on the control stalk of the right multifunction switch. The higher the selected wipe sensitivity setting the more sensitive the LRSM is to the accumulated moisture on the windshield glass, and the more frequently the LRSM will send **wipe commands** to the BCM to operate the wiper system. The BCM also monitors electronic **automatic display brightness level** messages based upon the driver-selected settings of the Electronic Vehicle Information Center (EVIC) as well as electronic messages from other electronic modules in the vehicle received over the CAN data bus, then relays the messages to the LRSM over the LIN bus.

The LRSM operates on battery current received through a fused ignition output (run/accessory) circuit. The LRSM has a path to ground at all times through a take out of the body wire harness with an eyelet terminal that is secured to the body sheet metal. Therefore, the LRSM is operational only when the ignition switch status is On or Accessory.

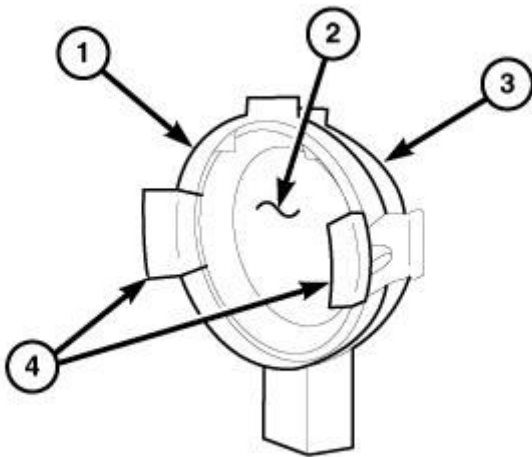
If the BCM receives an electronic status message from the LRSM indicating a sensor failure condition, a **Rain Sensor Failure** message should be displayed by the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC). It is important to note that the default operation of the automatic wiper system is continuous wipe On, while the default operation for automatic lighting is On. Therefore, if no command message is received by the BCM from the LRSM for more than about five seconds when the Automatic wipe mode is selected, the wipers will default to Low Speed or High Speed continuous wipe operation. Likewise, if no command message is received by the BCM from the LRSM when the Automatic lighting mode is selected, the exterior lighting will default to On. The BCM must be properly configured for the automatic wipers and automatic lighting options in order for these systems to function.

The hard wired circuits of the LRSM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the LRSM or the electronic controls and communication between other modules

and devices that provide some features of the automatic wiper and automatic lighting systems. The most reliable, efficient and accurate means to diagnose the LRSM or the electronic controls and communication related to LRSM operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

STANDARD PROCEDURE

PROTECTIVE CAP REMOVAL



3806254

Fig. 31: Protective Cap, Adhesive Membrane, LRSM & Latches
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The Light Rain Sensor Module (LRSM) (3) is equipped with a clear, silicone gelatin (SilGel) adhesive membrane (2) that serves as an optical coupler between the sensor and the windshield glass. Extreme care must be exercised to protect this membrane from contamination before it is installed in the vehicle. The LRSM should always be serviced only in a dust-free environment. Do not touch the membrane with your fingers or tools. The membrane should only come into contact with the clean and dry inside surface of the glass within the mounting bracket bonded to the windshield. The service replacement LRSM is shipped with a clear plastic protective cap (1) installed and secured to the outer circumference of the LRSM by two latch features (4). This protective cap should not be removed until immediately before the LRSM is to be installed using the following procedure.

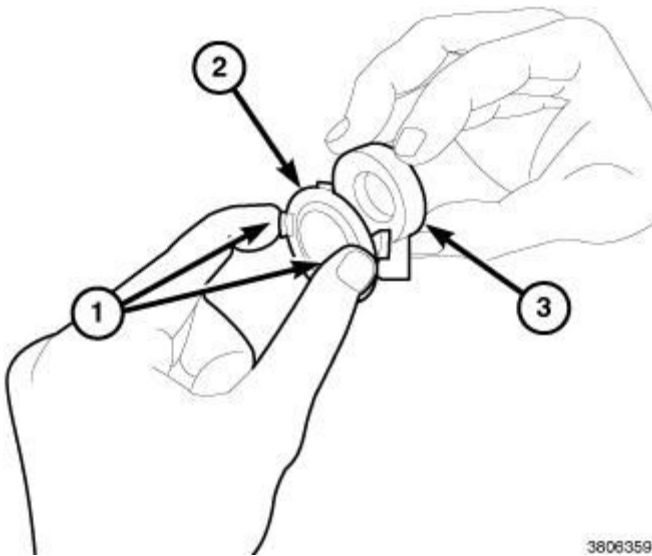
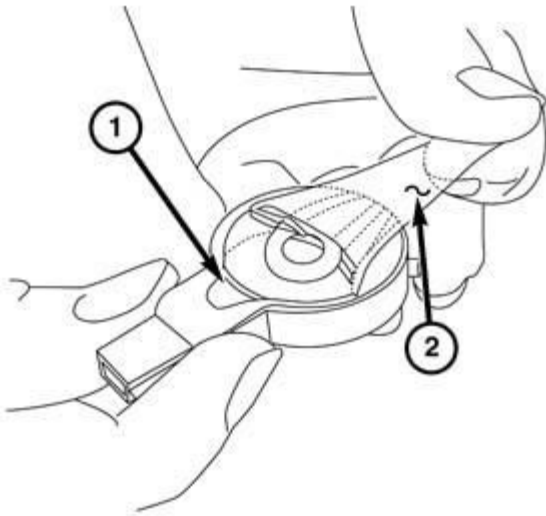


Fig. 32: Tabs, Protective Cap & LRS
 Courtesy of CHRYSLER GROUP, LLC

1. Firmly grasp the LRS (3) by the outer circumference from the side opposite the SilGel membrane pad.
2. Firmly grasp the protective shipping cap (2) of the LRS by the two latch release tabs (1) between your thumb and index finger from the SilGel membrane pad side of the module.
3. Firmly pinch the two latch release tabs together between your thumb and index finger far enough to release the two latch features of the protective cap from the outer circumference of the LRS.
4. Pull the protective cap off of the LRS.
5. Install the LRS into the mounting bracket bonded onto the windshield as instructed in the Installation procedure. Refer to **MODULE, LIGHT RAIN SENSOR, INSTALLATION**.

SILICONE GELATIN PAD REPLACEMENT



0833003672

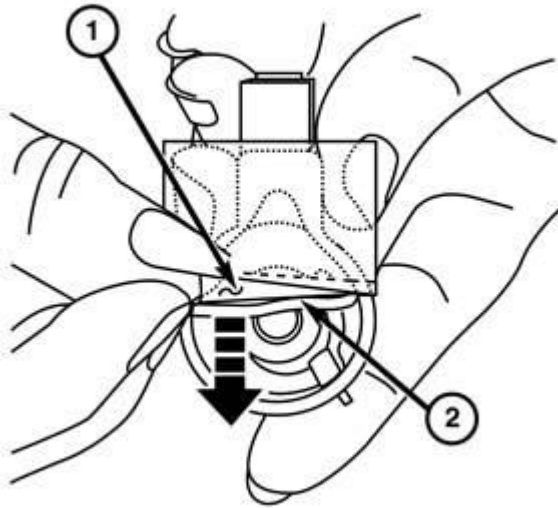
Fig. 33: LRSM & Adhesive Membrane
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The Light Rain Sensor Module (LRSM) is equipped with a clear, silicone gelatin (SilGel) adhesive membrane that serves as an optical coupler between the sensor and the windshield glass. Extreme care must be exercised to protect this membrane from contamination before it is installed in the vehicle. The LRSM should always be serviced only in a dust-free environment. Do not touch the membrane with your fingers or tools. The membrane should only come into contact with the clean and dry inside surface of the glass within the mounting bracket bonded to the windshield. If contaminated, clean any foreign material from the windshield glass using rubbing alcohol and a lint-free cloth. A contaminated SilGel membrane will negatively impact LRSM performance.

CAUTION: When installing the replacement silicone gelatin (SilGel) adhesive membrane pad onto the Light Rain Sensor Module (LRSM), it is necessary to minimize air pockets trapped between the SilGel membrane and the LRSM. Excessive air pockets will negatively impact LRSM performance. It is important to adhere to the procedure steps in a deliberate manner to achieve satisfactory results.

1. Carefully peel away the old silicone gelatin adhesive membrane pad (2) from the windshield (optics) side of the Light Rain Sensor Module (LRSM) (1).
2. Thoroughly clean the windshield (optics) side of the LRSM using isopropyl alcohol and a clean, lint-free cloth.

3. Using care not to contaminate, touch or damage the replacement pad, peel off the yellow protective foil.



0833003673

Fig. 34: Protective Film & Replacement Pad
Courtesy of CHRYSLER GROUP, LLC

4. Looking through the transparent protective film (1), align and center the replacement pad (2) over the windshield (optics) side of the LRSM. Then use a slow, smooth and deliberate motion to roll the pad onto the windshield (optics) side of the LRSM.
5. With the transparent protective film still in place, use a thumb and a firm wiping motion to press the entire surface pad against the windshield (optics) side of the LRSM.
6. To avoid contamination or damage of the replacement pad, do not remove the transparent protective film until just before reinstalling the LRSM onto the windshield. Refer to **MODULE, LIGHT RAIN SENSOR, INSTALLATION**.

REMOVAL

REMOVAL

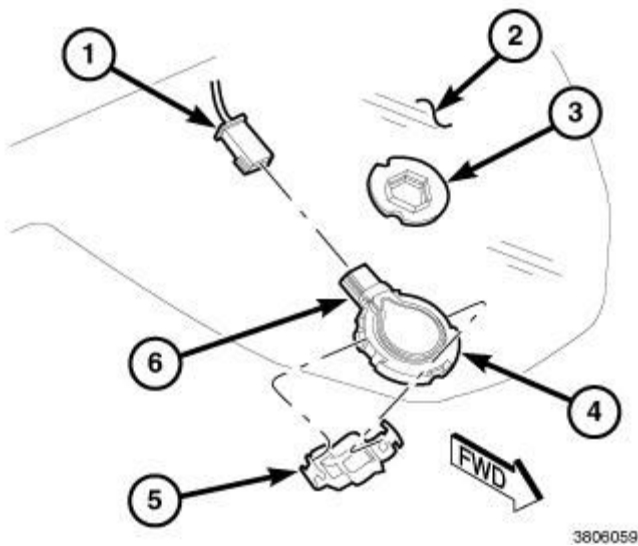


Fig. 35: LRS, Harness Connector, Mount Bracket & Retaining Strap
 Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery.
2. Remove the inside rear view mirror from the mounting button (3) on the inside of the windshield glass (2). Refer to **MIRROR, REARVIEW, REMOVAL**.
3. Disconnect the wire harness connector (1) from the connector receptacle for the Light Rain Sensor Module (LRS) (6).
4. Insert the tip of a small screwdriver into the rectangular cutout on one side of the spring steel retaining strap (5) on the LRS and carefully pry the end of the strap closest to the glass away from the groove in the mounting bracket (4) on the windshield. Now rotate the loose side of the strap away from the glass far enough to disengage the other side of the strap from the mounting bracket groove.
5. Firmly grasp the connector receptacle of the LRS to pull the module away from the windshield glass and the mounting bracket.
6. If the LRS will be reinstalled, the silicone gelatin (also known as SilGel) adhesive membrane pad MUST be removed, discarded and replaced with a new unit as described in: Standard Procedure - Silicone Gelatin Pad Replacement. Refer to **MODULE, LIGHT RAIN SENSOR, STANDARD PROCEDURE**.

INSTALLATION

INSTALLATION

CAUTION: The Light Rain Sensor Module (LRS) is equipped with a clear, silicone gelatin (SilGel) adhesive membrane that serves as an optical coupler between the sensor and the windshield glass. Extreme care must be exercised to protect this membrane from contamination before it is installed in the vehicle. The LRS should always be serviced only in a dust-free environment. Do not touch the membrane with your fingers or tools. The membrane should only come into contact with the clean and dry

inside surface of the glass within the mounting bracket bonded to the windshield. If contaminated, clean any foreign material from the windshield glass using rubbing alcohol and a lint-free cloth. A contaminated SilGel membrane will negatively impact LRSM performance.

CAUTION: When installing the Light Rain Sensor Module (LRSM) it is necessary to minimize air pockets trapped between the SilGel membrane and the windshield glass. Excessive air pockets will negatively impact LRSM performance. It is important to adhere to the procedure steps in a deliberate manner to achieve satisfactory results.

CAUTION: To avoid excessive air pockets, do not try to install the spring steel retaining strap until AFTER the Light Rain Sensor Module (LRSM) has been successfully positioned to the glass within the mounting bracket bonded to the windshield.

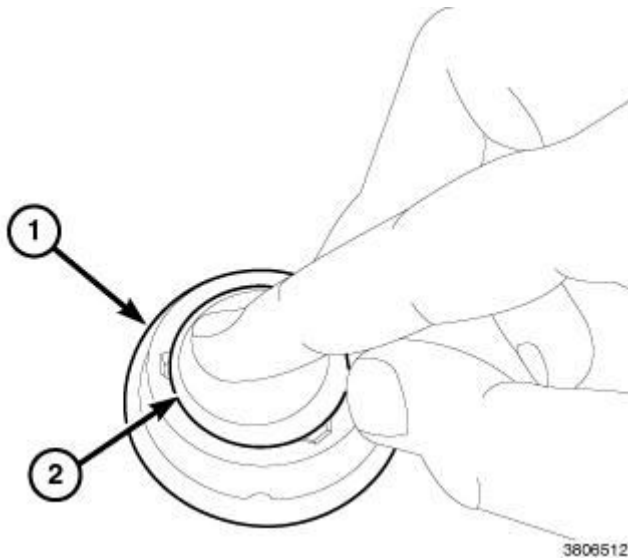


Fig. 36: LRSM & Mounting Bracket
Courtesy of CHRYSLER GROUP, LLC

1. If a new Light Rain Sensor Module (LRSM) is being installed, remove the protective shipping cap from the LRSM as described in: Standard Procedure - Protective Cap Removal. Refer to **MODULE, LIGHT RAIN SENSOR, STANDARD PROCEDURE**. If an existing LRSM is being reused, the silicone gelatin (also known as SilGel) adhesive membrane pad **MUST** be removed, discarded and replaced with a new unit as described in: Standard Procedure - Silicone Gelatin Pad Replacement. Refer to **MODULE, LIGHT RAIN SENSOR, STANDARD PROCEDURE**.
2. Grasp the LRSM (2) by the connector receptacle between your thumb and middle finger. Place your index finger on the back of the LRSM at the point opposite the connector receptacle.
3. Align the LRSM with the mounting bracket (1) bonded onto the inside of the windshield glass near the inside rear view mirror mounting button.
4. Slowly insert the LRSM into the mounting bracket at a slight angle so that the edge of the module nearest

the tip of your index finger makes the initial contact with the windshield glass.

5. Using a slow, deliberate motion and light pressure, draw your index finger across the back of the LRSM toward the connector receptacle until the silicone gelatin adhesive membrane pad is in full contact with the windshield glass.

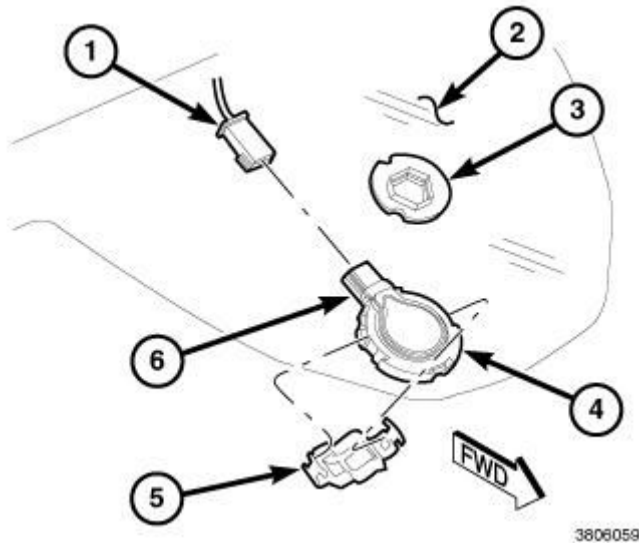


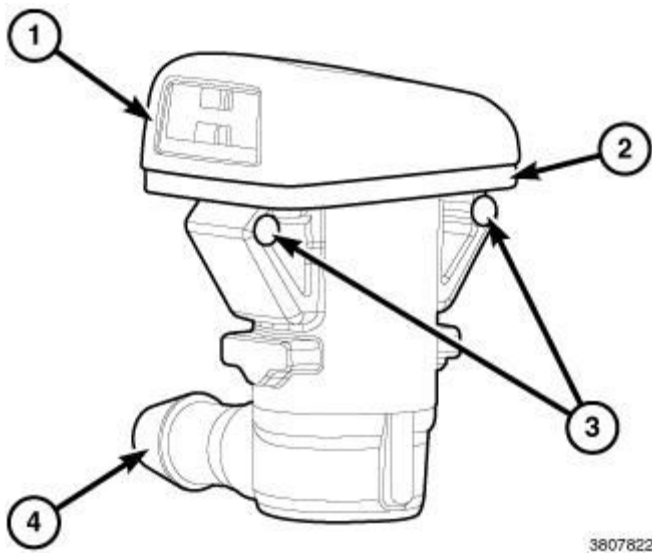
Fig. 37: LRSM, Harness Connector, Mount Bracket & Retaining Strap
Courtesy of CHRYSLER GROUP, LLC

6. Engage one side of the spring steel retaining strap (5) into the groove on one side of the LRSM mounting bracket (4) on the inside of the windshield glass (2).
7. Depress the opposite side of the retaining strap over the LRSM firmly and evenly until it fully engages the groove of the mounting bracket with an audible click.
8. Looking through the windshield from outside the vehicle, inspect the silicone gelatin adhesive membrane pad for air pockets. If air pockets are observed, let the vehicle stand for about four hours at room temperature to allow the air pockets to dissipate. If an adhesive void (air pocket) greater than about 1 millimeter (0.04 inch) is observed, replace the flawed silicone gelatin adhesive membrane pad with a new unit as described in: Standard Procedure - Silicone Gelatin Pad Replacement. Refer to **MODULE, LIGHT RAIN SENSOR, STANDARD PROCEDURE**.
9. Reconnect the wire harness connector (1) to the LRSM connector receptacle (6).
10. Reinstall the inside rear view mirror to the mounting button (3) on the inside of the windshield glass. Refer to **MIRROR, REARVIEW, INSTALLATION**.
11. Reconnect the negative cable to the battery.

NOZZLE, WASHER

DESCRIPTION

FRONT



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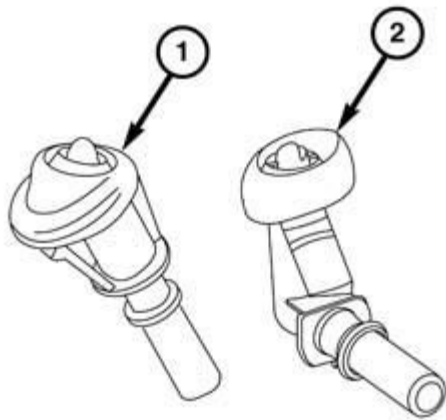
Fig. 38: Washer Nozzle Components
Courtesy of CHRYSLER GROUP, LLC

The fluidic front washer nozzles (1) are constructed of molded plastic and include an integral check valve. Each nozzle has two integral latches (3) that secure it in a dedicated hole in the hood panel near the base of the windshield. A resilient rubber gasket (2) seals the nozzle to the outer hood panel. The domed upper surface of the washer nozzle is visible on the outside of the hood panel and the nozzle orifices are oriented towards the windshield glass.

An integral diaphragm type check valve is contained within the body of each nozzle. The barbed washer plumbing fittings (4) for the nozzles extend below the hood panel and are accessible from the engine compartment when the hood is opened.

A front washer nozzle cannot be adjusted or repaired and, if ineffective or damaged, it must be replaced.

HEADLAMP



0833005537

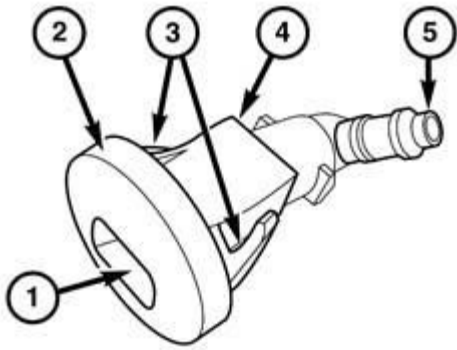
Fig. 39: On-Road Nozzle & Off-Road Nozzle
Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with the optional headlamp washer system have two static headlamp washer nozzles mounted in the front bumper fascia, one beneath each front lamp unit. Two unique versions of the nozzle are used and they are not interchangeable. The on-road version of the nozzle (1) used in vehicles that are not equipped with the optional off-road front bumper fascia can be identified by a more rounded bezel appearance and a straight quick-connect inlet nipple. The off-road version of the nozzle (2) used in vehicles that are equipped with the optional off-road front bumper fascia can be identified by a more elongated bezel appearance and a right angle quick-connect inlet nipple.

The fixed body of both molded plastic nozzles have a fixed integral mounting clip on the rearward side just below the bezel, and a movable integral mounting clip on the opposite side. Both also have an integral index tab that engages a notch in the front bumper fascia mounting hole. A large diameter high pressure washer fluid supply line from the dedicated headlamp washer pump/motor unit is connected to the inlet nipple on the nozzle body using a molded plastic quick-connect fitting.

The headlamp washer nozzle cannot be adjusted or repaired and, if ineffective or damaged, the nozzle must be replaced with a new unit.

REAR



0833008962

Fig. 40: Fluidic Rear Washer Nozzle
 Courtesy of CHRYSLER GROUP, LLC

The fluidic rear washer nozzle (4) is constructed of molded plastic and includes an integral check valve. The rear washer nozzle is secured by two integral latch features (3) within a mounting hole near the Center High-Mounted Stop Lamp (CHMSL) in the lower surface of the rear spoiler above the liftgate glass opening on the outer liftgate panel.

The outer surface of the washer nozzle is visible on the lower exterior surface of the spoiler, and a rubber gasket seals the nozzle bezel or flange (2) to the spoiler mounting hole. The nozzle orifice (1) is oriented downward towards the liftgate glass. The barbed washer plumbing quick-connect nipple fitting (5) is concealed between the spoiler and the liftgate outer panel.

The rear washer nozzle cannot be adjusted or repaired and, if ineffective or damaged, it must be replaced.

OPERATION

FRONT

The two washer nozzles are designed to dispense washer fluid into the wiper pattern area on the outside of the windshield glass. Pressurized washer fluid is fed to each nozzle from the washer reservoir by the washer pump/motor unit through a single supply line, which is attached to a barbed nipple on each washer nozzle below the hood panel. A fluidic matrix within the washer nozzle causes the pressurized washer fluid to be emitted from the nozzle orifice as an oscillating stream to more effectively cover a larger area of the glass to be cleaned.

The integral check valve in each nozzle prevents washer fluid from draining out of the washer supply lines back to the washer reservoir. This drain-back would result in a lengthy delay after the washer switch is actuated until

washer fluid was dispensed through the nozzles, because the washer pump would have to refill the washer plumbing from the reservoir to the nozzles. Such a drain-back condition could also result in water, dirt, or other outside contaminants being drawn into the washer system by a siphoning action through the washer nozzle orifice. This water could subsequently freeze and plug the nozzle, while other contaminants could interfere with proper nozzle operation and cause improper nozzle spray patterns. In addition, the check valve prevents washer fluid from siphoning out through the washer nozzles after the washer system is turned Off.

When the washer pump pressurizes and pumps washer fluid from the reservoir through the washer plumbing, the fluid pressure unseats a diaphragm from over a sump well within the nozzle by overriding the spring pressure applied to it by a piston. With the diaphragm unseated, washer fluid is allowed to flow toward the nozzle orifice. When the washer pump stops operating, the spring pressure on the piston seats the diaphragm over the sump well in the nozzle and fluid flow in either direction within the washer plumbing is prevented.

HEADLAMP

Each time the headlamp washer pump/motor unit is activated, pressure builds within the high pressure supply lines to each headlamp washer nozzle. As the hydraulic pressure is delivered to the nozzle, the nozzle sprays several high pressure streams against the lens of the front lamp unit.

REAR

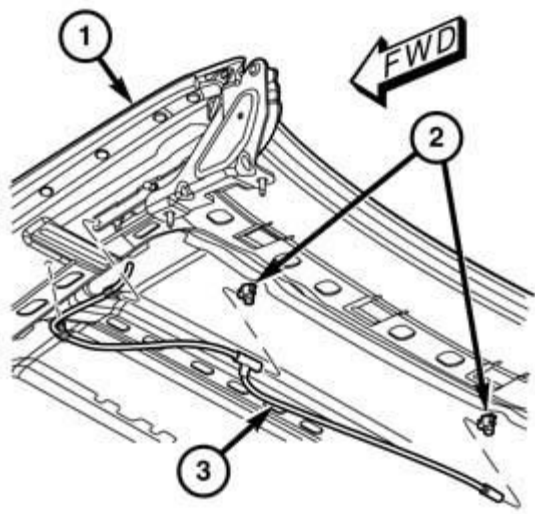
The rear washer nozzle is designed to dispense washer fluid into the wiper pattern area on the outside of the liftgate glass. Pressurized washer fluid is fed to the nozzle from the washer reservoir by the washer pump/motor through a single supply line, which is attached to a barbed nipple on the back of the nozzle. A fluidic matrix within the nozzle causes the pressurized washer fluid to be emitted from the nozzle orifice as an oscillating stream to more effectively cover a larger area of the glass to be cleaned.

The integral check valve in the nozzle prevents washer fluid from draining out of the washer supply hose back to the washer reservoir. This drain-back would result in a lengthy delay after the washer switch is actuated until washer fluid was dispensed through the nozzle because the washer pump would have to refill the washer plumbing from the reservoir to the nozzle. Such a drain-back condition could also result in water, dirt, or other outside contaminants being siphoned into the washer system through the washer nozzle orifice. This water could subsequently freeze and plug the nozzle, while other contaminants could interfere with proper nozzle operation and cause improper nozzle spray patterns. In addition, the check valve prevents washer fluid from siphoning through the washer nozzle after the washer system is turned Off.

When the washer pump pressurizes and pumps washer fluid from the reservoir through the washer plumbing, the fluid pressure unseats a diaphragm from over a sump well within the nozzle by overriding the spring pressure applied to it by a piston. With the diaphragm unseated, washer fluid is allowed to flow toward the nozzle orifice. When the washer pump stops operating, the spring pressure on the piston seats the diaphragm over the sump well within the nozzle and fluid flow in either direction within the washer plumbing is prevented.

REMOVAL

FRONT

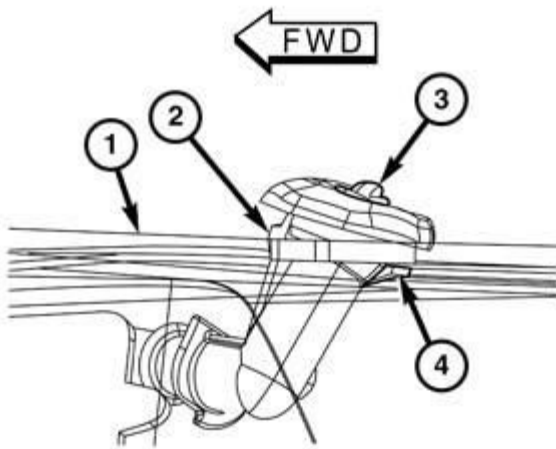


0833005488

Fig. 41: Hood Plumbing, Hood Panel & Front Washer Nozzle
Courtesy of CHRYSLER GROUP, LLC

1. From the underside of the hood (1), remove the push-in retainers that secure the rear edge of the hood silencer pad to the inner hood reinforcement as necessary to access the washer nozzle (2) plumbing connections.
2. From the underside of the hood, disconnect the washer plumbing (3) fitting from the barbed nipple of the washer nozzle.
3. From the underside of the hood, release the integral latch features of the washer nozzle and push the nozzle out through the mounting hole toward the top side of the hood.
4. Remove the washer nozzle from the top of the hood panel.

HEADLAMP



0833005538

Fig. 42: Headlamp Washer Nozzle
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Take proper precautions to ensure there is no cosmetic damage done to the paint finish of the headlamp washer nozzle cover or the front fascia during the following procedure.

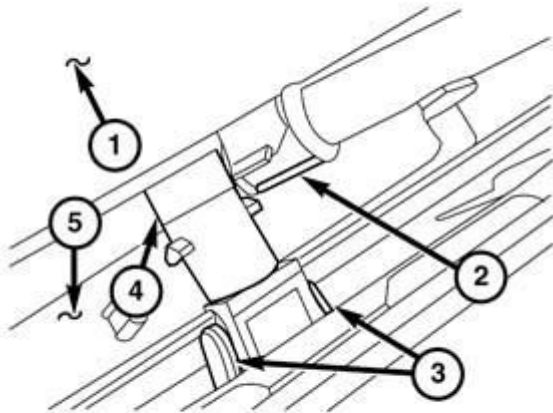
NOTE: There are two headlamp washer nozzle configurations available for this vehicle: one for vehicles not equipped with an off-road package, and another for vehicles equipped with an off-road package (shown here). However, the removal and installation procedures for these two nozzle configurations is identical.

1. Remove the front fascia from the vehicle. Refer to **FASCIA, FRONT, REMOVAL**.
2. From the back side of the front fascia (1), disconnect the high pressure hose quick-connect fitting from the quick-connect nipple of the headlamp washer nozzle.

Refer to **HOSES AND TUBES, WASHER, STANDARD PROCEDURE**.

3. From the back side of the front fascia, compress the movable mounting clip (2) of the headlamp washer nozzle (3) tightly against the body of the nozzle.
4. With the movable mounting clip fully compressed, tip the body of the nozzle forward far enough to raise the end of the movable clip through the mounting hole of the front fascia.
5. Disengage the fixed mounting clip (4) of the nozzle and pull it upward through the mounting hole of the front fascia.
6. Remove the headlamp washer nozzle from the front fascia.

REAR



0833008963

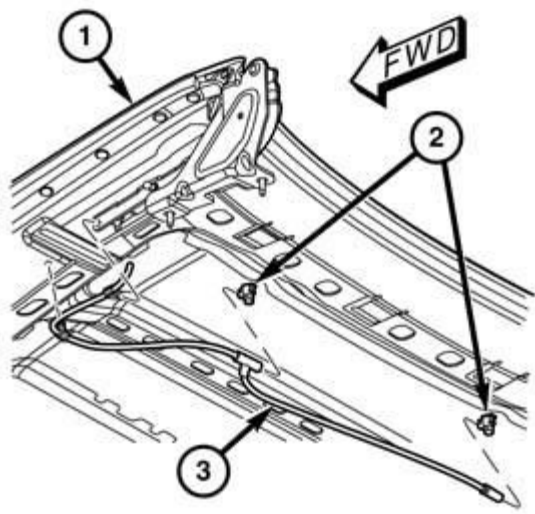
Fig. 43: Rear Washer Nozzle

Courtesy of CHRYSLER GROUP, LLC

1. Remove the liftgate spoiler from the top of the liftgate outer panel. Refer to **SPOILER, REMOVAL**.
2. From the interior of the spoiler (1), disengage the rear washer hose from the routing clips on the back of the Center High Mounted Stop Lamp (CHMSL) housing (5).
3. Disconnect the quick-connect fitting (2) of the washer hose from the quick-connect nipple of the rear washer nozzle (4). Refer to **HOSES AND TUBES, WASHER, STANDARD PROCEDURE**.
4. From the interior of the spoiler, release the latch features (3) of the rear washer nozzle and push the nozzle out through the mounting hole to the outside of the spoiler.
5. Remove the rear washer nozzle from the liftgate spoiler.

INSTALLATION

FRONT

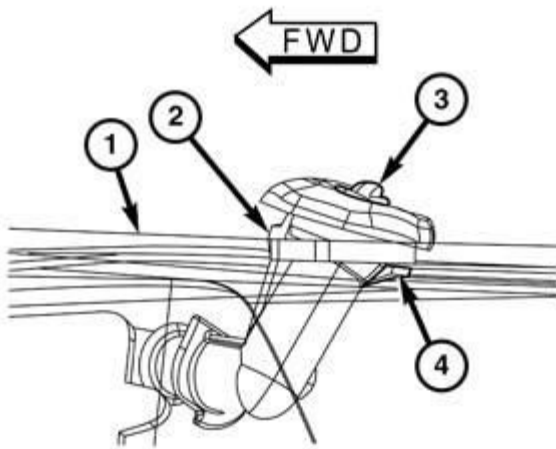


0833005488

Fig. 44: Hood Plumbing, Hood Panel & Front Washer Nozzle
 Courtesy of CHRYSLER GROUP, LLC

1. Position the washer nozzle (2) to the mounting hole on the outside of the hood panel (1).
2. Align the anti-rotation tabs of the nozzle with the anti-rotation notches in the mounting hole.
3. Using hand pressure, push firmly and evenly on the top of the washer nozzle until the integral latch features lock into place on the underside of the hood.
4. From the underside of the hood, reconnect the washer plumbing (3) fitting to the barbed nipple of the nozzle.
5. Reinstall the push-in retainers that secure the rear edge of the hood silencer pad to the inner hood reinforcement.

HEADLAMP



0833005538

Fig. 45: Headlamp Washer Nozzle
Courtesy of CHRYSLER GROUP, LLC

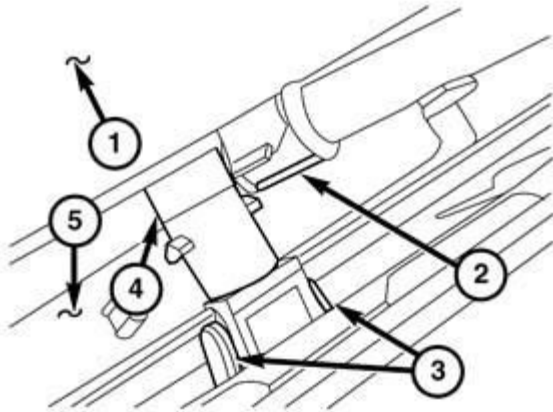
CAUTION: Take proper precautions to ensure there is no cosmetic damage done to the paint finish of the headlamp washer nozzle cover or the front fascia during the following procedure.

1. Insert the quick-connect nipple and body of the headlamp washer nozzle (3) into the mounting hole of the front fascia (1).
2. Engage the fixed mounting clip (4) on the nozzle body through the mounting hole.

Tilt the nozzle body rearward far enough to engage the movable mounting clip (2) through the mounting hole and until the nozzle bezel is flush with the surface of the front fascia.

3. From the back side of the front fascia (1), reconnect the high pressure hose quick-connect fitting to the quick-connect nipple of the headlamp washer nozzle.
4. Reinstall the front fascia onto the vehicle. Refer to **FASCIA, FRONT, INSTALLATION** .

REAR



0833008963

Fig. 46: Rear Washer Nozzle

Courtesy of CHRYSLER GROUP, LLC

1. Position the rear washer nozzle (4) to the mounting hole in the liftgate spoiler (1). Be certain that the rubber gasket is in position on the back of the nozzle bezel or flange.
2. Using hand pressure, push firmly and evenly on the nozzle bezel or flange until both integral latch features (3) are fully engaged on the inside of the spoiler mounting hole.
3. Reconnect the washer supply line quick-connect fitting (2) to the quick-connect barbed nipple on the back of the nozzle.
4. Engage the washer hose into the routing clips on the back of the Center High Mounted Stop Lamp (CHMSL) housing (5).
5. Reinstall the spoiler onto the liftgate outer panel. Refer to **SPOILER, INSTALLATION** .

MOTOR, WIPER

DESCRIPTION

FRONT

The front wiper motor is packaged with the wiper linkage module in this vehicle. Refer to **LINKAGE, WIPER ARM, DESCRIPTION**.

REAR

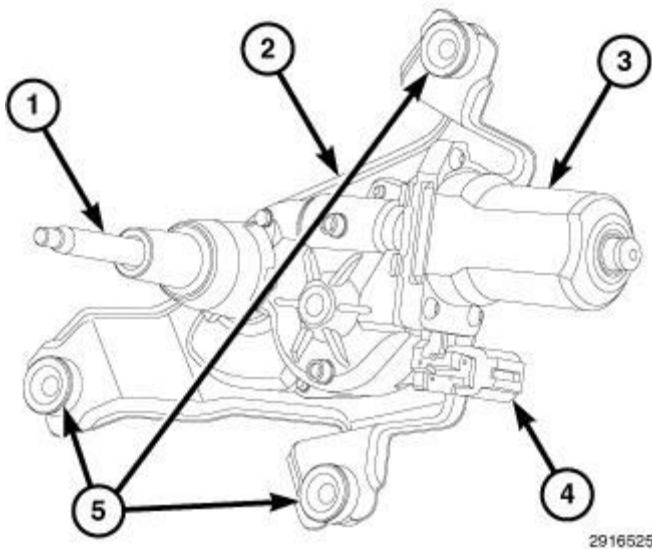


Fig. 47: Rear Wiper Motor, Motor Output Shaft, Integral Connector Receptacle & Rubber Isolators
Courtesy of CHRYSLER GROUP, LLC

The rear wiper motor is concealed behind the lower liftgate inside trim panel on the liftgate inner panel just below the liftgate glass near the center. The threaded and tapered end of the motor output shaft (1) that extends through the liftgate glass to drive the rear wiper arm and blade is the only visible component of the rear wiper motor. A rubber grommet is engaged within the output shaft clearance hole of the liftgate glass and seals the output shaft housing where it passes through the glass. An integral connector receptacle (4) connects the rear wiper motor to the vehicle electrical system through a dedicated take out and connector of the liftgate wire harness. The rear wiper motor consists of the following major components:

- **Bracket (2)** - The rear wiper motor bracket consists of a Stamped metal mounting plate for the wiper motor that is secured with screws to the wiper motor transmission housing. The bracket is secured with screws through three rubber isolators (5) to three mounting points that are integral to the liftgate inner panel.
- **Motor (3)** - The single-speed permanent magnet rear wiper motor is secured to the rear wiper motor bracket. The wiper motor includes an integral transmission, the motor output shaft, a park switch and an integral connector receptacle. An automatic resetting circuit breaker and an internal clutch mechanism protect the motor from overloads.

The rear wiper motor cannot be adjusted or repaired. If any component of the motor is ineffective or damaged, the entire rear wiper motor unit must be replaced. The motor output shaft grommet, the mounting hardware and the liftgate glass are available for individual service replacement.

OPERATION

FRONT

The front wiper motor is packaged with the wiper linkage module in this vehicle. Refer to **LINKAGE, WIPER ARM, OPERATION**.

REAR

The rear wiper motor operation is controlled by the Body Control Module (BCM), which uses relays soldered onto the BCM Printed Circuit Board (PCB) to control rear wiper system operation for energizing or de-energizing the rear wiper motor. The BCM uses internal programming, hard wired inputs received from the right (wiper) multifunction switch and the rear wiper motor park switch as well as electronic messages received over the Controller Area Network (CAN) data bus to provide the rear wiper and washer system operating modes.

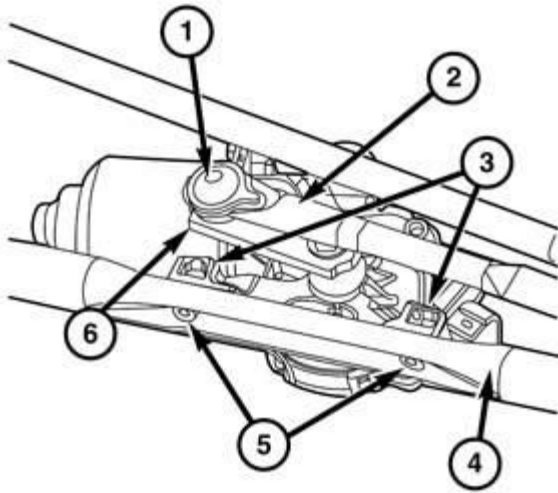
The rear wiper motor park switch is a single pole, single throw, momentary switch within the wiper motor that is mechanically actuated by the wiper motor transmission components. The park switch alternately closes and opens a voltage signal for the rear wiper motor electronic control logic circuitry of the BCM. The park switch is normally an open circuit when the rear wiper blade is in the parked position, and is connected to fused ignition output when the rear wiper blade is anywhere except parked.

This park switch input allows the electronic logic circuits of the BCM to control all of the electronic features of rear wiper motor operation and to keep the motor energized long enough to complete its current wipe cycle and park the wiper blade at the base of the glass after the status of the rear wiper system or the ignition switch transitions to Off. The internal BCM circuitry pulls the park switch sense input to ground when the switch is open so that the microcontroller sees a ground when the wiper blade is parked.

The rear wiper motor is grounded at all times through a take out with an eyelet terminal connector in the body wire harness that is secured to a ground location in the passenger compartment. The automatic resetting circuit breaker protects the motor from overloads. The rear wiper motor transmission converts the rotary output of the wiper motor to the back and forth wiping motion of the rear wiper arm and blade on the liftgate glass.

The hard wired inputs and outputs of the rear wiper motor may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the rear wiper motor or the electronic controls and communication between other modules and devices that provide some features of the rear wiper and washer system. The most reliable, efficient and accurate means to diagnose the rear wiper motor or the electronic controls and communication related to rear wiper motor operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL**FRONT**



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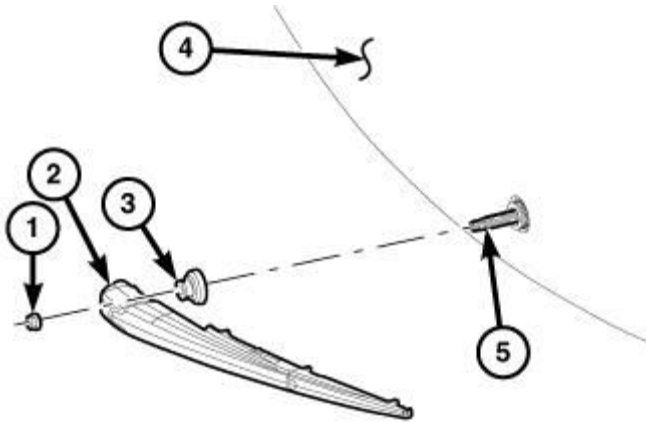
Fig. 48: Front Wiper Linkage Module
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not apply pressure to, or pry on the plastic drive link bushings. When removing a drive link from, or installing a drive link onto the ball stud on the wiper motor crank arm apply pressure to, or pry on only the metal portions of the drive link around the bushing. If the bushing is damaged, the entire wiper linkage module **MUST** be replaced.

CAUTION: Do not remove the crank arm nut from the wiper motor output shaft. The crank arm is indexed to the output shaft with the motor in the park position during the manufacturing process, but there are no provisions made for correctly indexing this connection in the field. If the crank arm to output shaft indexing is incorrect, the entire wiper motor and crank arm unit **MUST** be replaced.

1. Disconnect and isolate the negative cable from the battery.
2. Remove the front wiper linkage module from the cowl plenum and place it on a suitable work surface. Refer to **LINKAGE, WIPER ARM, REMOVAL**.
3. Disengage the socket bushing (1) of the wiper drive link (2) from the ball stud on the wiper motor crank arm (6) using two large screwdrivers, one on each side of the ball stud. Pry firmly and evenly between the crank arm and the metal portion of the drive link until the socket unsnaps from the ball.
4. Remove the two screws (5) that secure the motor bracket (3) to the module bracket (4).
5. Remove the wiper motor and crank arm as a unit from the module bracket.

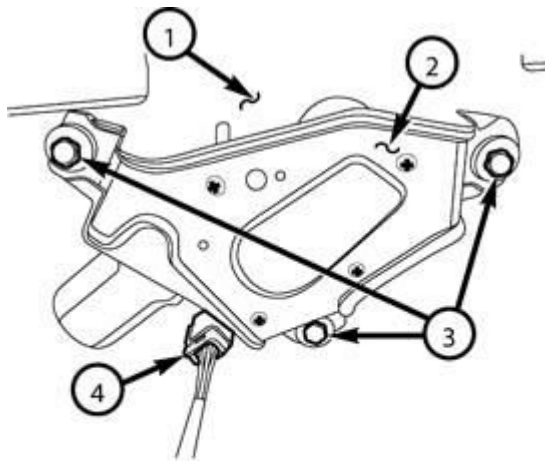
REAR



2918916

Fig. 49: Liftgate Glass, Rear Wiper Arm & Output Shaft
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery.
2. From the outside of the liftgate glass (4), remove the rear wiper arm (2) from the rear wiper motor output shaft (5). Refer to **ARM, WIPER, REMOVAL**.



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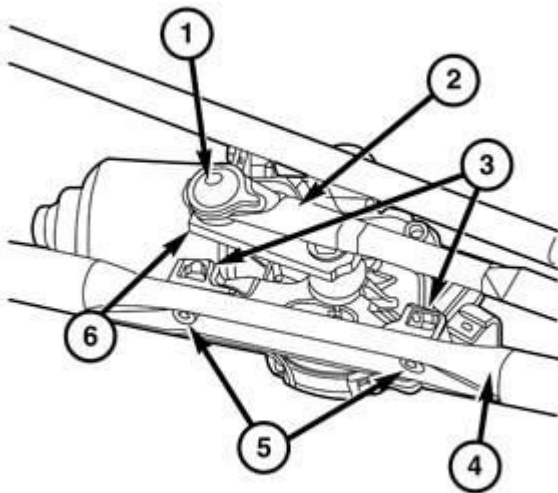
Fig. 50: Rear Wiper Motor
Courtesy of CHRYSLER GROUP, LLC

3. From the inside of the liftgate, remove the trim from the liftgate inner panel (1). Refer to **PANEL, TRIM, REMOVAL**.
4. Disconnect the liftgate wire harness connector (4) from the rear wiper motor (2) connector receptacle.
5. Remove the three screws (3) that secure the motor mounting bracket to the liftgate inner panel.

6. Carefully slide the rear wiper motor output shaft and housing out of the grommet installed in the clearance hole of the liftgate glass.
7. From the outside of the liftgate, remove the output shaft grommet from the clearance hole in the liftgate glass and discard.

INSTALLATION

FRONT



0833005471

Fig. 51: Front Wiper Linkage Module
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not apply pressure to, or pry on the plastic drive link bushings. When removing a drive link from, or installing a drive link onto the ball stud on the wiper motor crank arm apply pressure to, or pry on only the metal portions of the drive link around the bushing. If the bushing is damaged, the entire wiper linkage module **MUST** be replaced.

CAUTION: Do not remove the crank arm nut from the wiper motor output shaft. The crank arm is indexed to the output shaft with the motor in the park position during the manufacturing process, but there are no provisions made for correctly indexing this connection in the field. If the crank arm to output shaft indexing is incorrect, the entire wiper motor and crank arm unit **MUST** be replaced.

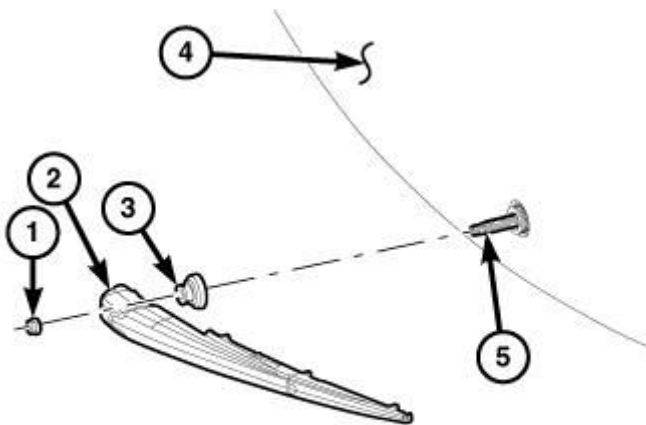
1. Position the front wiper motor unit to the front wiper module bracket (4).

2. Install and tighten the two screws (5) into the two nuts that secure the motor bracket (3) to the module bracket. Tighten the screws to 7.5 N.m (66 in. lbs.).
3. Position the socket bushing (1) of the wiper drive link (2) over the ball stud on the crank arm (6).
4. Place a short 19 millimeter or 3/4 inch socket over the domed cap side of the socket bushing as an installation tool. Use large channel-lock pliers to firmly and evenly apply enough pressure to the underside of the crank arm and the top of the socket installation tool to snap the bushing onto the ball stud. **Do not apply pressure directly to the plastic bushing.**

NOTE: Be certain to transition the ignition switch to the On status, then turn the front wiper switch On and Off again to cycle the wiper motor and linkage to their natural park position before reinstalling the front wiper arms onto the wiper pivots.

5. Reinstall the front wiper linkage module into the vehicle. Refer to **LINKAGE, WIPER ARM, INSTALLATION**.
6. Reconnect the negative cable to the battery.

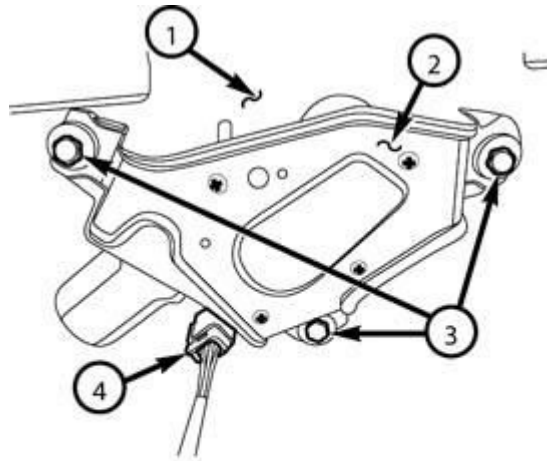
REAR



2918916

Fig. 52: Liftgate Glass, Rear Wiper Arm & Output Shaft
 Courtesy of CHRYSLER GROUP, LLC

1. From the outside of the liftgate, install a new rubber grommet (3) into the rear wiper motor output shaft clearance hole of the liftgate glass (4). Always use a new grommet in the glass.



0833005470

Fig. 53: Rear Wiper Motor

Courtesy of CHRYSLER GROUP, LLC

2. From the inside of the liftgate, position the rear wiper motor (2) output shaft and housing through the grommet in the liftgate glass clearance hole.
3. Position the rear wiper motor mounting bracket to the liftgate inner panel.
4. Install and tighten the three screws (3) that secure the motor mounting bracket to the liftgate inner panel. Tighten the screws securely.
5. Reconnect the liftgate wire harness connector (4) to the rear wiper motor connector receptacle.
6. Reinstall the trim onto the liftgate inner panel. Refer to **PANEL, TRIM, INSTALLATION**.
7. From the outside of the liftgate, reinstall the rear wiper arm onto the motor output shaft. Refer to **ARM, WIPER, INSTALLATION**.
8. Reconnect the negative cable to the battery.

PUMP, WINDSHIELD WASHER

DESCRIPTION

FRONT AND REAR

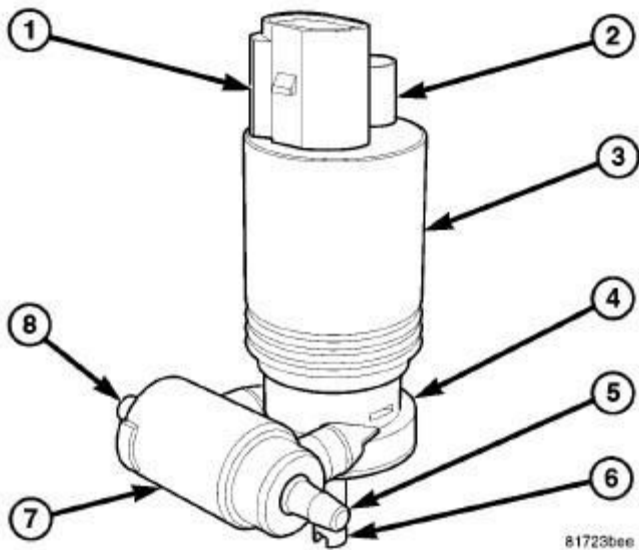


Fig. 54: Washer Pump/Motor
Courtesy of CHRYSLER GROUP, LLC

The washer pump/motor unit is located on the top of a sump area on the outboard side of the washer reservoir, which is located between the left front fender and the left front fender load beam ahead of the left front wheel house splash shield. A small permanently lubricated and sealed reversible electric motor (3) is coupled to the rotor-type washer pump (4). The use of an integral valve body (7) allows the washer pump/motor unit to provide washer fluid to either the front or the rear washer systems, depending upon the direction of the pump impeller rotation.

An inlet nipple (6) on the pump housing passes through a rubber grommet seal/filter screen installed in a dedicated mounting hole of the washer reservoir sump. The filter screen prevents most debris from entering the pump housing. When the pump is installed in the reservoir the front barbed outlet nipple (5) on the pump valve body housing connects the unit to the front washer plumbing, and the rear barbed outlet nipple (8) connects the unit to the rear washer plumbing. The letters **F** and **R** molded into the valve body housing adjacent to each nipple provide further clarification of the nipple assignments.

The washer pump/motor unit is retained on the reservoir by the interference fit between the pump inlet nipple and the grommet seal, which is a light press fit. The top of the washer pump is also secured to the washer reservoir by the use of a snap fit between the snap post (2) at the top of the pump motor housing and a receptacle molded into the reservoir that allows for mounting of the washer pump without the use of fasteners. An integral connector receptacle (1) on the top of the motor housing connects the unit to the vehicle electrical system through a dedicated take out and connector of the Front End Module (FEM) wire harness.

The washer pump/motor unit cannot be repaired. If ineffective or damaged, the entire washer pump/motor unit must be replaced. The rubber grommet seal/filter screen is available for separate service replacement.

HEADLAMP

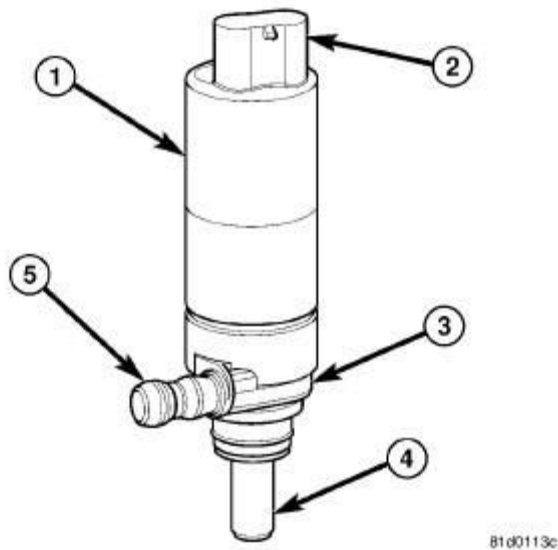


Fig. 55: Headlamp Washer Pump/Motor Unit
Courtesy of CHRYSLER GROUP, LLC

The headlamp washer pump/motor unit (1) of vehicles so equipped is located on the top of a sump area just above and rearward of the reversible front and rear washer pump on the outboard side of the washer reservoir, between the left front fender and left front fender load beam ahead of the left front wheel house splash shield. A small permanently lubricated and sealed electric motor is coupled to the rotor-type washer pump.

An inlet nipple (4) on the bottom of the pump housing (3) passes through a rubber grommet seal/filter screen installed in a dedicated mounting hole of the washer reservoir. When the pump is installed in the reservoir the quick connect outlet nipple (5) on the pump housing points toward the left side of the vehicle and connects the unit to the headlamp washer plumbing.

The headlamp washer pump/motor unit is retained on the reservoir by the interference fit between the pump inlet nipple and the grommet seal, which is a light press fit. The top of the washer pump is also secured to the washer reservoir by a light snap fit into a receptacle molded into the reservoir that allows for mounting of the washer pump without the use of fasteners. An integral connector receptacle (2) on the top of the motor housing connects the unit to the vehicle electrical system through a dedicated take out and connector of the Front End Module (FEM) wire harness.

The headlamp washer pump/motor unit cannot be repaired. If ineffective or damaged, the entire headlamp washer pump/motor unit must be replaced. The rubber grommet seal/filter screen is available for separate service replacement.

OPERATION

FRONT AND REAR

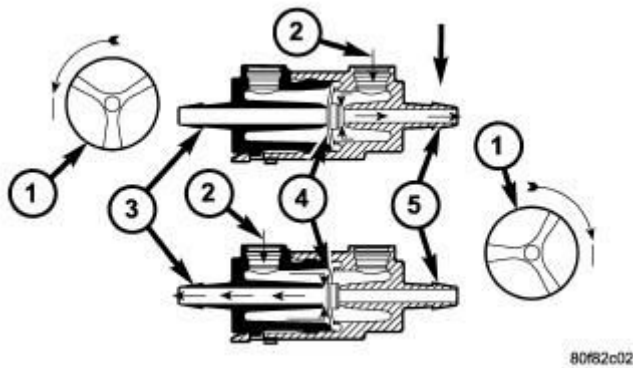


Fig. 56: Washer Pump/Motor Operation
 Courtesy of CHRYSLER GROUP, LLC

The washer pump/motor unit features a small Direct Current (DC) reversible electric motor. The direction of the motor is controlled by hard wired outputs from the Body Control Module (BCM). When battery current and ground are applied to the two pump motor terminals, the motor rotates in one direction. When the polarity of these connections is reversed, the motor rotates in the opposite direction. When the pump motor is energized, the rotor-type pump pressurizes the washer fluid and forces it through one of the two pump outlet nipples, and into the front or rear washer plumbing.

The BCM controls the hard wired outputs to the pump motor based upon electronic **washer switch** status messages received over the Controller Area Network (CAN) data bus from the Steering Control Module (SCM). The SCM monitors analog and digital inputs from the front and rear washer switch circuitry contained within the right multifunction switch to determine the proper electronic messages to send. Whenever the low washer fluid indicator is illuminated, the BCM is programmed to suppress all rear washer requests in order to give priority to the need for forward visibility.

Washer fluid is drawn through the pump inlet nipple from the washer reservoir to the inlet port of the washer pump housing. An integral valve body is located in a housing on the outlet port side (2) of the pump housing. A diaphragm (4) in this valve body controls which washer system plumbing receives the washer fluid being pressurized by the pump.

When the pump impeller (1) rotates in the counterclockwise direction (viewed from the bottom), the biased diaphragm is sealing off the rear washer system outlet and nipple so the pressurized washer fluid is pushed out through the pump front outlet port and the front washer outlet nipple (5). When the pump impeller rotates in the clockwise direction (viewed from the bottom), pressurized washer fluid is pushed out through the pump rear outlet port and moves the diaphragm to open the rear washer outlet nipple and seal off the front washer outlet nipple, then the pressurized washer fluid is pushed out through the rear washer outlet nipple (3).

The washer pump/motor unit and the hard wired motor control circuits from the BCM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the washer pump/motor unit or the electronic controls and communication between other modules and devices that provide some features of the front and rear wiper and washer system. The most reliable, efficient and accurate means to diagnose the washer pump/motor unit or the electronic controls and communication related to washer pump/motor unit operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

HEADLAMP

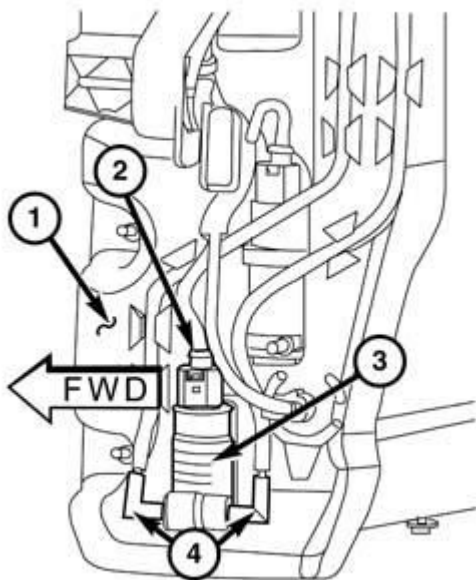
Headlamp washer pump/motor unit operation is completely controlled by the Body Control Module (BCM) logic circuits based upon electronic **headlamp switch** and **washer switch** status messages received from the Steering Control Module (SCM) over the Controller Area Network (CAN) data bus. The SCM monitors hard wired analog and digital inputs from the headlamp switch circuitry of the left multifunction switch and from the front washer switch circuitry of the right multifunction switch to determine the proper status messages to send.

The headlamp washer relay control coil operates on ground received from the BCM, and the BCM will only allow the relay to function while the engine is running. In addition, the BCM will only allow the headlamp washers to operate when the headlamps are turned On. The BCM uses both a Low Side Driver (LSD) to energize or de-energize the headlamp washer relay in the Power Distribution Center (PDC) which, in turn, controls the operation of the headlamp washer pump/motor unit.

The hard wired circuits and components of the headlamp washer pump/motor unit may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the headlamp washer pump/motor or the electronic controls and communication between other modules and devices that provide some features of the headlamp washer system. The most reliable, efficient and accurate means to diagnose the headlamp washer pump/motor unit or the electronic controls and communication related to headlamp washer pump/motor unit operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

FRONT AND REAR



0833005535

Fig. 57: Washer Pump/Motor Unit

Courtesy of CHRYSLER GROUP, LLC

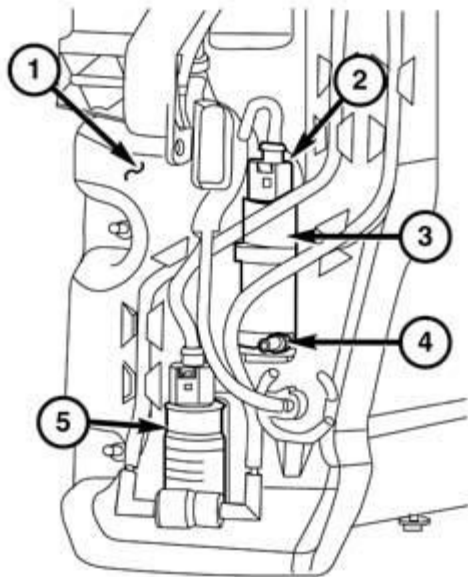
NOTE: **The washer pump/motor unit may be removed from the washer reservoir without removing the reservoir from the vehicle.**

1. Disconnect and isolate the negative cable from the battery.
2. Turn the steering wheel to move the front wheels to the full left position.
3. Raise and support the vehicle.
4. Remove the plastic push-in fasteners that secure the forward end of the left front wheel house splash shield to the inner fender panel and the front fascia. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL** .
5. Pull the forward end of the left front wheelhouse splash shield away from the inner fender panel and front fascia far enough to access the washer pump/motor unit (3) on the outboard side of the washer reservoir (1) on the outboard end of the Front End Module (FEM) hydroform.
6. Disconnect the FEM wire harness connector (2) for the washer pump motor from the motor connector receptacle.

NOTE: **To aid in reinstallation, note the installed position of the front and rear washer plumbing fittings (4) prior to disconnecting them from the washer pump.**

7. Disconnect the front and rear washer plumbing fittings from the barbed outlet nipples of the washer pump and allow the washer fluid to drain into a clean container for reuse.
8. Pull lightly outward on the top of the washer pump/motor housing away from the washer reservoir to disengage the snap post on the top of the motor from the receptacle in the reservoir.
9. Using hand pressure, firmly grasp and pull the washer pump upward far enough to disengage the pump inlet nipple from the rubber grommet seal/filter screen in the reservoir. Care must be taken not to damage the reservoir.
10. Remove the washer pump/motor unit from the washer reservoir.
11. Remove the rubber grommet seal from the washer pump mounting hole in the reservoir and discard.

HEADLAMP



0833005536

Fig. 58: Headlamp Washer Pump/Motor Unit
 Courtesy of CHRYSLER GROUP, LLC

NOTE: The headlamp washer pump/motor unit may be removed from the washer reservoir without removing the reservoir from the vehicle.

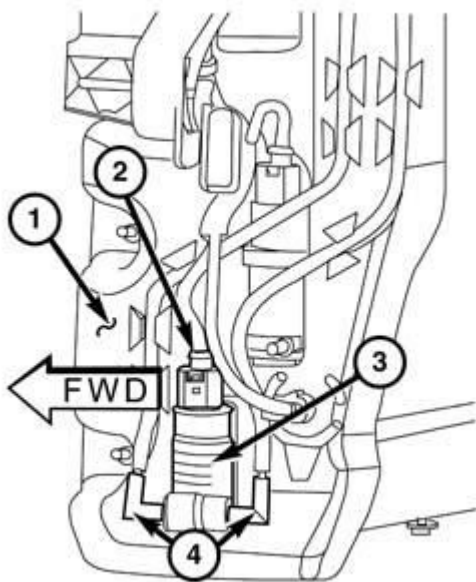
1. Disconnect and isolate the negative cable from the battery.
2. Siphon the washer fluid from the washer reservoir into a clean container for reuse.
3. Turn the steering wheel to move the front wheels to the full left position.
4. Raise and support the vehicle.
5. Remove the plastic push-in fasteners that secure the forward end of the left front wheelhouse splash shield to the inner fender panel and the front fascia. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL**.
6. Pull the forward end of the left front wheelhouse splash shield away from the inner fender panel and front fascia far enough to access the headlamp washer pump/motor unit (3) on the outboard side of the washer reservoir (1) on the outboard end of the Front End Module (FEM) hydroform. The headlamp washer pump is above and behind the reversible front and rear washer pump/motor unit (5).
7. Disconnect the FEM wire harness connector (2) for the headlamp washer pump motor from the motor connector receptacle.
8. Disconnect the high pressure headlamp washer supply line quick connect fitting from the headlamp washer pump outlet quick connect nipple. Refer to **HOSES AND TUBES, WASHER, STANDARD PROCEDURE**.
9. Pull lightly outward on the top of the headlamp washer pump/motor housing away from the washer reservoir to unsnap it from the molded receptacle in the reservoir.
10. Using hand pressure, firmly grasp and pull the headlamp washer pump upward far enough to disengage

the pump inlet nipple from the rubber grommet seal/filter screen in the reservoir. Care must be taken not to damage the reservoir.

11. Remove the rubber grommet seal/filter screen from the pump mounting hole in the washer reservoir and discard.

INSTALLATION

FRONT AND REAR



0833005535

Fig. 59: Washer Pump/Motor Unit
Courtesy of CHRYSLER GROUP, LLC

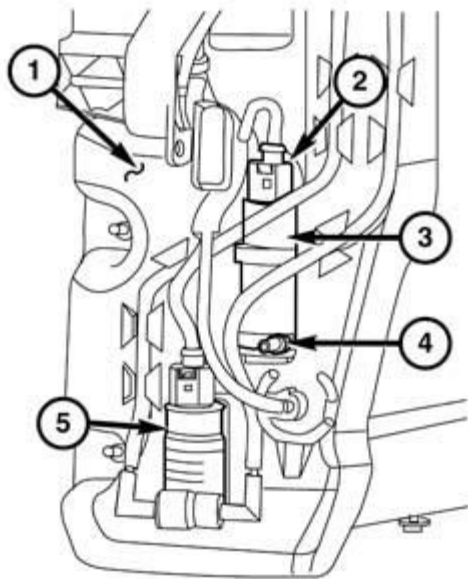
1. Lubricate a new rubber grommet seal/filter screen with clean washer fluid and install it into the washer pump mounting hole in the washer reservoir (1). Always use a new rubber grommet seal/filter screen on the reservoir.
2. Position the inlet nipple on the base of the pump housing of the washer pump/motor unit (3) to the rubber grommet seal/filter screen in the reservoir.
3. Using hand pressure, press firmly and evenly downward on the top of washer pump/motor unit until the inlet nipple is fully seated in the rubber grommet seal/filter screen in the pump mounting hole of the reservoir.
4. Align the snap post on the top of the motor housing with the snap post receptacle in the washer reservoir.
5. Using hand pressure, press firmly and evenly on the top of motor housing until the post snaps into the receptacle.

NOTE: Be certain to reconnect the front and rear washer plumbing fitting to the proper outlet nipples of the washer pump. Failure to properly connect the

fittings will cause the front and rear washer systems to operate incorrectly.

6. Reconnect the front and rear washer plumbing fittings (4) to the barbed outlet nipples of the washer pump.
7. Reconnect the Front End Module (FEM) wire harness connector (2) for the washer pump/motor unit to the connector receptacle on the top of the motor.
8. Reinstall the plastic push-in fasteners that secure the left front wheelhouse splash shield to the inner fender panel and the front fascia. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION**.
9. Lower the vehicle.
10. Reconnect the negative cable to the battery.
11. Refill the washer reservoir with the washer fluid drained from the reservoir during the removal procedure.

HEADLAMP



0833005536

Fig. 60: Headlamp Washer Pump/Motor Unit
Courtesy of CHRYSLER GROUP, LLC

1. Install a new rubber grommet seal/filter screen into the headlamp washer pump/motor unit mounting hole in the washer reservoir (1). Always use a new rubber grommet seal on the reservoir.
2. Position the inlet nipple of the headlamp washer pump/motor unit (3) to the rubber grommet seal/filter screen in the reservoir.
3. Using hand pressure, press firmly and evenly downward on the headlamp washer pump/motor unit until the inlet nipple is fully seated in the rubber grommet seal/filter screen in the pump mounting hole of the

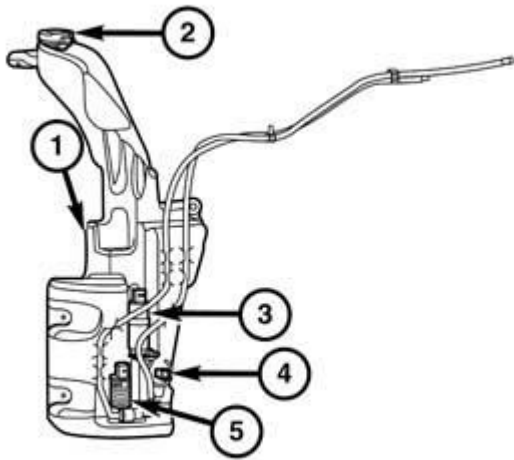
reservoir.

4. Using hand pressure, press the top of the headlamp washer pump/motor housing firmly inward far enough to engage the snap fit between the motor housing and the molded motor receptacle in the reservoir.
5. Reconnect the Front End Module (FEM) wire harness connector (2) to the connector receptacle on the top of the pump motor.
6. Reconnect the headlamp washer high pressure supply line quick connect fitting to the headlamp washer pump outlet quick connect nipple. Refer to **HOSES AND TUBES, WASHER, STANDARD PROCEDURE**.
7. Reinstall the plastic push-in fasteners that secure the left front wheelhouse splash shield to the inner fender panel and the front fascia. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION**.
8. Lower the vehicle.
9. Refill the washer reservoir with the washer fluid drained during removal.
10. Reconnect the negative cable to the battery.

RESERVOIR, WINDSHIELD WASHER

DESCRIPTION

DESCRIPTION



0833005656

Fig. 61: Windshield Washer Reservoir
Courtesy of CHRYSLER GROUP, LLC

A single washer fluid reservoir (1) is used for both the front and rear washer systems. The molded plastic

washer fluid reservoir is mounted on the left outboard side of the Front End Module (FEM) hydroform between the left front fender and the left front fender load beam, ahead of the left front wheel, where it is concealed by the left front wheel house splash shield. The only visible component of the washer reservoir is the filler neck and cap unit (2), which extends upward into the engine compartment just behind the upper radiator cross member. A bright yellow plastic filler cap with a rubber seal and an International Control and Display Symbol icon for **Windshield Washer** molded into it snaps over the open end of the filler neck. The cap hinges on and is secured to the reservoir filler neck by an integral retainer ring and bail strap.

There are separate, dedicated holes on the outboard side of the reservoir provided for the reversible front and rear washer pump/motor unit (5) and the washer fluid level switch (4). The inboard side of the washer reservoir has integral mounting tabs that are secured to weld studs on the FEM hydroform by two nuts. A mounting tab near the top of the filler neck is secured by a screw to the upper radiator cross member. A mounting tab at the upper rear corner of the reservoir is secured to the battery tray after the FEM is secured to the vehicle. The left front fender wheel house splash shield must be removed to access the washer reservoir for service.

A unique reservoir is used for vehicles manufactured for export markets with the optional High Intensity Discharge (HID) headlamps and the headlamp washer system. This reservoir has a dedicated sump and mounting receptacle for the headlamp washer pump (3) on the outboard side of the reservoir, above and rearward of the reversible front and rear washer pump. The location and mounting provisions for this reservoir are the same as those for vehicles without the headlamp washer system.

The washer reservoir cannot be repaired and, if ineffective or damaged, it must be replaced. The washer reservoir, rubber grommet seals for the washer pump/motor units and the washer fluid level switch as well as the filler cap are each available for individual service replacement.

OPERATION

OPERATION

The washer fluid reservoir provides a secure, on-vehicle storage location for a large reserve of washer fluid for operation of the front and rear washer systems. The washer reservoir filler neck provides a clearly marked and readily accessible point from which to add washer fluid to the reservoir.

The reversible front and rear washer pump/motor unit is located in a sump area near the bottom on the outboard side of the reservoir to be certain that washer fluid will be available to the pump as the fluid level in the reservoir becomes depleted. The front and rear washer pump/motor unit is mounted in the lowest position in the sump. The washer fluid level switch is mounted just above the sump area of the reservoir so that there will be adequate warning to the vehicle operator that the washer fluid level is low, before the front and rear washer systems will no longer operate.

On vehicles equipped with the headlamp washer system the reservoir features a second sump located rearward of and above the front and rear washer pump sump. This allows the front and rear washer systems to remain operational after the washer fluid level falls below the pump inlet for the headlamp washer pump.

REMOVAL

REMOVAL

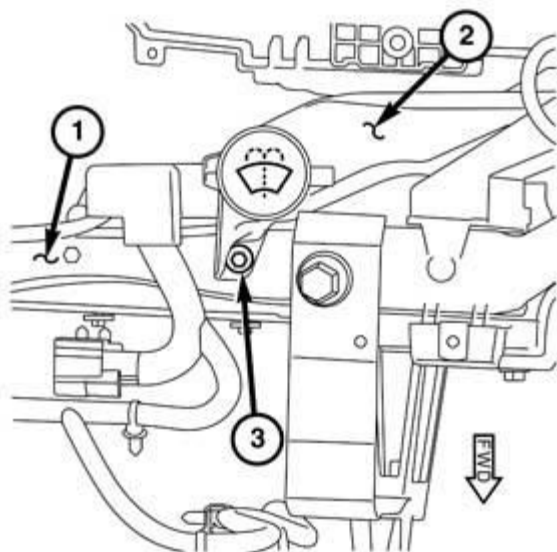
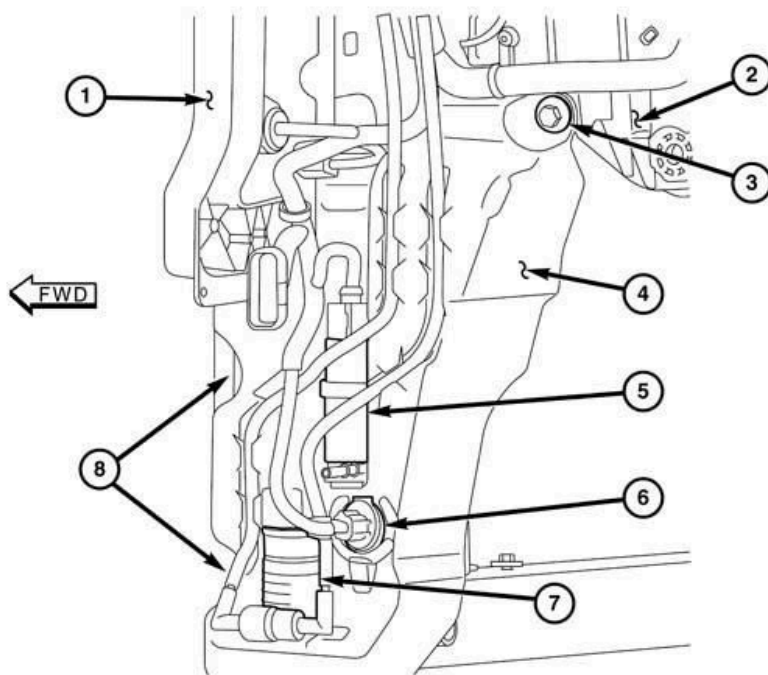


Fig. 62: Upper Radiator Support, Filler Neck & Screw
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery.
2. Turn the steering wheel to move the front wheels to the full left position.
3. Remove the screw (3) that secures the washer reservoir filler neck (2) to the upper radiator support (1).



0833005703

Fig. 63: Washer Fluid Level Switch, Pump/Motor & Headlamp Washer Pump/Motor
Courtesy of CHRYSLER GROUP, LLC

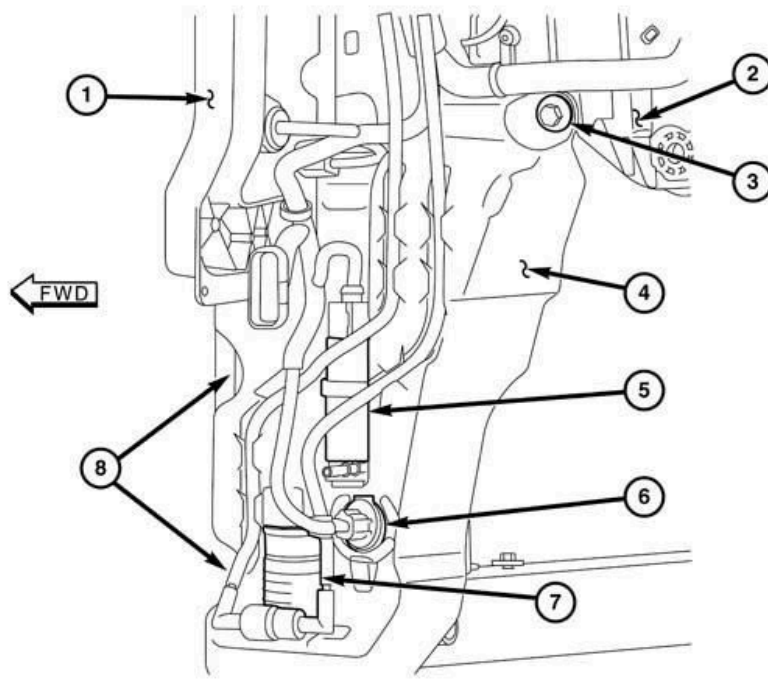
4. Raise and support the vehicle.
5. Remove the plastic push-in fasteners that secure the forward end of the left front wheelhouse splash shield to the inner fender panel and the front fascia. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL**.
6. Pull the forward end of the front wheelhouse splash shield away from the inner fender panel and front fascia far enough to access the washer reservoir (4) for service.
7. Disconnect the Front End Module (FEM) wire harness connectors from the washer fluid level switch (6), the washer pump/motor (7) and, if equipped, the headlamp washer pump/motor (5).

NOTE: **To aid in reinstallation, note the installed position of the washer hoses prior to disconnecting them from the washer pump.**

8. Disconnect the front and rear washer hoses from the barbed outlet nipples of the washer pump and allow the washer fluid to drain into a clean container for reuse.
9. If the vehicle is so equipped, disconnect the headlamp washer supply hose quick-connect fitting from the headlamp washer pump/motor.
10. Remove the screw (3) that secures the mounting tab on the upper rear corner of the washer reservoir to the battery tray (2).
11. Remove the two nuts (8) that secure the forward mounting tabs of the washer reservoir to the weld studs on the outboard side of the FEM hydroform (1).
12. Lower the washer reservoir from the vehicle, rotating it as necessary for clearance.

INSTALLATION

INSTALLATION



0833005703

Fig. 64: Washer Fluid Level Switch, Pump/Motor & Headlamp Washer Pump/Motor
Courtesy of CHRYSLER GROUP, LLC

1. Position the washer reservoir (4) into the left front fender wheel house from underneath the vehicle.
2. Raise the washer reservoir into position, rotating it as necessary for clearance.
3. Engage the two mounting tabs at the front of the washer reservoir over the weld studs on the outboard side of the Front End Module (FEM) hydroform (1).
4. Install and tighten the two nuts (8) that secure the washer reservoir to the weld studs on the FEM hydroform. Tighten the nuts to 7 N.m (60 in. lbs.).
5. Install and tighten the screw (3) that secures the mounting tab on the upper rear corner of the washer reservoir to the battery tray (2). Tighten the screw to 7 N.m (60 in. lbs.).

NOTE: Be certain to reconnect the front and rear washer hoses to the proper outlet nipples of the washer pump. Failure to properly connect the hoses will cause the front and rear washer systems to operate incorrectly.

6. Reconnect the front and rear washer hoses to the barbed outlet nipples of the washer pump (7).
7. If the vehicle is so equipped, reconnect the headlamp washer supply hose quick-connect fitting to the outlet nipple of the headlamp washer pump (5).
8. Reconnect the FEM wire harness connectors to the washer fluid level switch (6), the washer pump/motor and, if equipped, the headlamp washer pump/motor.
9. Reinstall the plastic push-in fasteners that secure the left front wheelhouse splash shield to the inner fender panel and the front fascia. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION**.
10. Lower the vehicle.

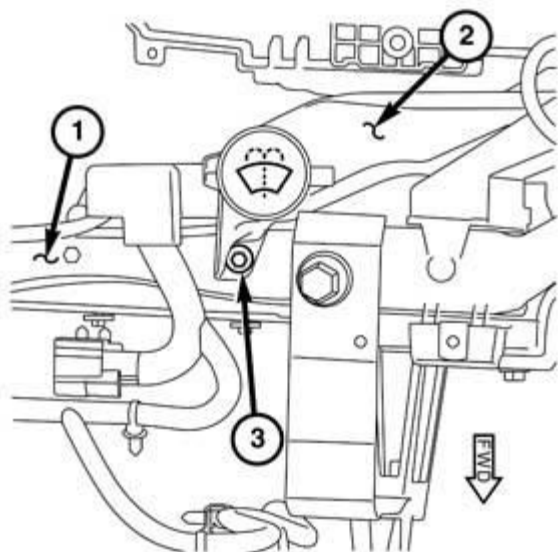


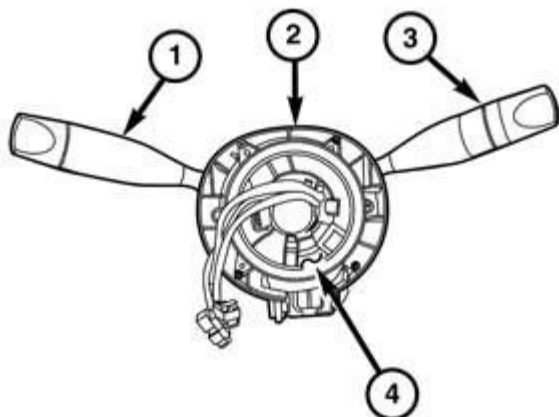
Fig. 65: Upper Radiator Support, Filler Neck & Screw
Courtesy of CHRYSLER GROUP, LLC

11. Install and tighten the screw (3) that secures the washer reservoir filler neck (2) mounting tab to the upper radiator cross member (1). Tighten the screw to 7 N.m (60 in. lbs.).
12. Refill the washer reservoir with the washer fluid drained during removal.
13. Reconnect the negative cable to the battery.

SWITCH, MULTIFUNCTION, RIGHT

DESCRIPTION

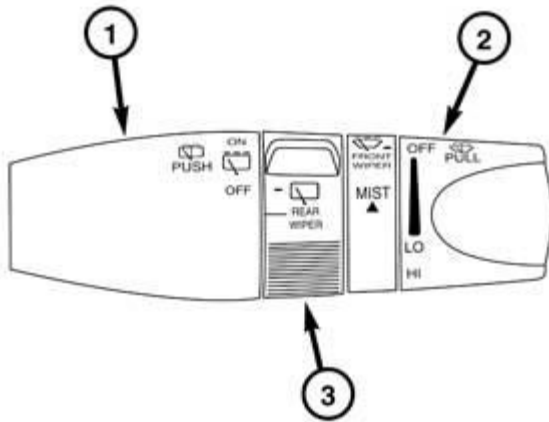
DESCRIPTION



1012006656

Fig. 66: Steering Column Control Module (SCCM) & Clockspring
Courtesy of CHRYSLER GROUP, LLC

The right (wiper) multifunction switch (3) is integral to the Steering Column Control Module (SCCM) (2), which includes both the left (1) and right multifunction switches, the microcontroller based Steering Control Module (SCM) and serves as the carrier for the clockspring (4). The right multifunction switch is located on the right side of the steering column, just below the steering wheel. This switch is the primary control for the front and rear wiper and washer systems.



0833005928

Fig. 67: Control Knob, Control Stalk & Right Multifunction Switch
Courtesy of CHRYSLER GROUP, LLC

The only visible components of the switch are the control stalk (1), control knob (2) and control sleeve (3) that extend through the steering column shrouds on the right side of the column. The remainder of the switch including its mounting provisions and electrical connections are concealed within the SCCM beneath the steering column shrouds. The switch controls are constructed of molded black plastic. Each of the switch controls has white International Control and Display Symbol graphics applied to it, which clearly identify its many functions.

The right (wiper) multifunction switch provides the vehicle operator with a control interface for the following wiper and washer system functions:

- **Continuous Front Wipers** - The right multifunction switch control knob provides detent switching for two continuous front wipe modes, low speed or high speed.
- **Intermittent Front Wipers** - The right multifunction switch control knob provides detent switching for the intermittent front wipe mode with four minor detent delay interval positions. The four delay positions become four sensitivity positions for vehicles equipped with the optional automatic wiper system.
- **Front Wiper Mist Mode** - The right multifunction switch control stalk includes momentary switching of the front wiper motor low speed circuit to provide a mist mode features (sometimes referred to as pulse wipe), which allows the vehicle operator to momentarily operate the front wipers for one or more complete cycles.
- **Front Washer Mode** - The right multifunction switch control stalk provides momentary switching for control of the front washer system operation.
- **Intermittent Rear Wipe Mode** - The right multifunction switch control sleeve provides detent switching for a single fixed interval intermittent rear wiper mode.

- **Rear Washer Mode** - The right multifunction switch control stalk provides momentary switching for control of rear washer system operation.

The right multifunction switch cannot be adjusted or repaired. If any function of the switch is ineffective, or if the switch is damaged, the entire SCCM mounting housing, SCM and multifunction switches unit must be replaced. Refer to **MODULE, STEERING COLUMN, REMOVAL**. The clockspring is available for separate service replacement.

OPERATION

OPERATION

The right (wiper) multifunction switch uses resistor multiplexing to control the many functions and features it provides using a minimal number of hard wired circuits. The switch receives clean grounds from the Steering Control Module (SCM), then provides resistor multiplexed return outputs to the SCM to indicate the selected switch positions. The SCM then sends electronic **switch status** messages over the Controller Area Network (CAN) data bus to the Body Control Module (BCM) and other electronic modules in the vehicle.

If the SCM detects no inputs from the right multifunction switch, it transmits an electronic **Signal Not Available (SNA)** status message over the CAN data bus. The SNA status signals the other electronic modules to implement a fail-safe or default mode of operation for the front and rear wiper systems. The fail-safe mode will maintain the last selected front and rear wiper system operation for the remainder of the current ignition cycle, after which both wiper systems will default to Off.

The hard wired inputs and outputs of the SCM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the right multifunction switch or the electronic controls and communication between other modules and devices that provide some features of the wiper and washer system. The most reliable, efficient and accurate means to diagnose the right multifunction switch or the electronic controls and communication related to right multifunction switch operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

Following are descriptions of how the right multifunction switch is operated to control the many front and rear wiper and washer system functions and features it provides:

- **Front Washer Control** - The right multifunction switch control stalk is pulled rearward towards the steering wheel to a momentary WASH position to activate the washer pump/motor in the front washer mode. The washer pump/motor will continue to operate for as long as the control stalk is held in this position. The SCM reads the resistor multiplexed input from the right multifunction switch and sends an electronic **front washer switch status** message over the CAN data bus to the BCM and to other electronic modules in the vehicle.
- **Front Wiper Control** - The control knob on the end of the right multifunction switch control stalk is rotated to one of the two continuous wiper detent positions (LO or HI), to one of four intermittent delay or sensitivity wiper detent positions, or to the OFF position to select the front wiper mode. The SCM reads the resistor multiplexed input from the right multifunction switch and sends electronic **front wiper switch status** messages over the CAN data bus to the BCM and to other electronic modules in the vehicle.

- **Front Wiper Mist Mode** - The right multifunction switch control stalk is lifted upward to a momentary MIST position to activate the front wiper MIST mode. The front wiper motor will continue to operate, one complete cycle at a time, for as long as the control stalk is held in this position. The SCM reads the resistor multiplexed input from the right multifunction switch and sends an electronic **front wiper switch status** message over the CAN data bus to the BCM and to other electronic modules in the vehicle.
- **Rear Washer Control** - The right multifunction switch control pushed forward away from the steering wheel to the momentary WASH positions to activate the washer pump/motor in the rear washer mode. The washer pump/motor will continue to operate in the rear washer mode for as long as the control stalk is held in this position. The SCM reads the input from the right multifunction switch and sends an electronic **rear washer switch status** message over the CAN data bus to the BCM and to other electronic modules in the vehicle.
- **Rear Wiper Control** - The rear wiper mode is selected when the right multifunction switch control sleeve is rotated to the fixed interval intermittent rear wipe detent ON position detent position. The SCM reads the input from the right multifunction switch and sends an electronic **rear wiper switch status** message over the CAN data bus to the BCM and to other electronic modules in the vehicle.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - RIGHT MULTIFUNCTION SWITCH

The hard wired inputs and outputs of the Steering Control Module (SCM) may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the right multifunction switch or the electronic controls and communication between other modules and devices that provide some features of the wiper and washer system. The most reliable, efficient and accurate means to diagnose the right multifunction switch or the electronic controls and communication related to right multifunction switch operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

REMOVAL

The right multifunction switch is serviced only as a unit with the Steering Column Control Module (SCCM) mounting housing, the Steering Control Module (SCM) and both multifunction switches. Refer to **MODULE, STEERING COLUMN, REMOVAL** . The clockspring is available for separate service replacement.

INSTALLATION

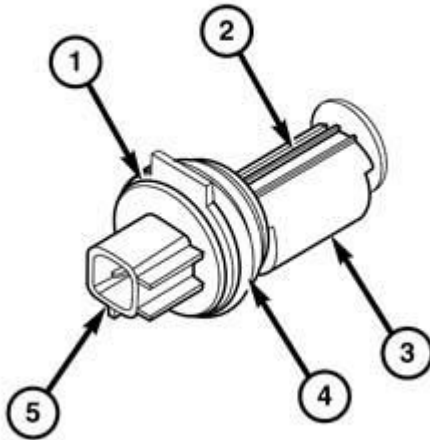
INSTALLATION

The right multifunction switch is serviced only as a unit with the Steering Column Control Module (SCCM) mounting housing, the Steering Control Module (SCM) and both multifunction switches. Refer to **MODULE, STEERING COLUMN, INSTALLATION** . The clockspring is available for separate service replacement.

SWITCH, WASHER FLUID LEVEL

DESCRIPTION

DESCRIPTION



0833005657

Fig. 68: Washer Fluid Level Switch
Courtesy of CHRYSLER GROUP, LLC

The washer fluid level switch is a single pole, single throw reed-type switch mounted just above the sump area near the bottom of the washer reservoir. Only the molded plastic switch mounting flange (1) and the integral connector receptacle (5) are visible when the switch is installed in the reservoir. A short barbed nipple formation extends from the inner surface of the switch mounting flange and is pressed through a rubber grommet seal (4) installed in the mounting hole of the reservoir.

A molded plastic float (3) hangs under a molded plastic beam (2) that extends axially from the switch mounting flange. A small permanent magnet is secured within a receptacle on the bottom of the float, and the reed switch is concealed within the beam.

The washer fluid level switch cannot be adjusted or repaired. If ineffective or damaged, it must be replaced. The grommet seal should be replaced with a new unit each time the switch is removed from the washer reservoir.

OPERATION

OPERATION

The washer fluid level switch uses a float to monitor the level of the washer fluid in the washer reservoir. The float contains a small magnet. When the float moves, the proximity of this magnet to a stationary reed switch within the beam formation of the switch changes. When the fluid level in the washer reservoir is at or above the

float level, the float rises and the influence of the float magnetic field is applied to the reed switch causing the normally open reed switch contacts to close. When the fluid level in the washer reservoir falls below the level of the float, the float falls and the influence of the float magnetic field is removed from the reed switch, causing the contacts of the normally open reed switch to open.

The washer fluid level switch is connected to the vehicle electrical system through a dedicated take out and connector of the Front End Module (FEM) wire harness. The switch is connected in series between the washer fluid switch sense and return circuits of the Body Control Module (BCM). When the switch opens, the BCM senses the input on the washer fluid switch return circuit. The BCM is programmed to respond to this input by sending an electronic message to the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) over the Controller Area Network (CAN) data bus requesting illumination of the low washer fluid indicator and the sounding of an audible chime tone warning.

The washer fluid level switch and the hard wired circuits between the switch and the BCM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the washer fluid level switch or the electronic controls and communication between other modules and devices that provide some features of the wiper and washer systems. The most reliable, efficient and accurate means to diagnose the washer fluid level switch or the electronic controls and communication related to washer fluid level switch operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

REMOVAL

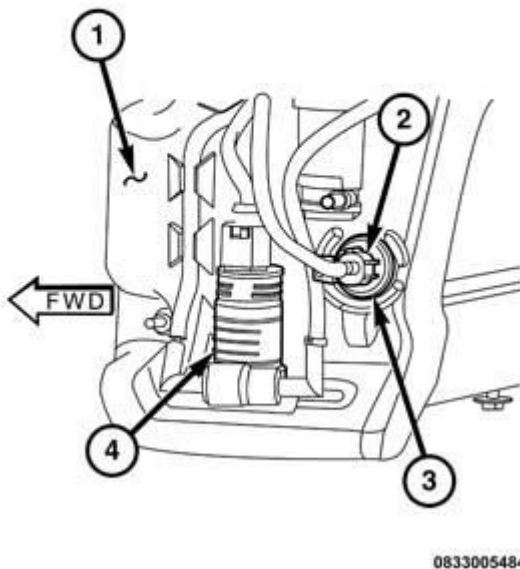


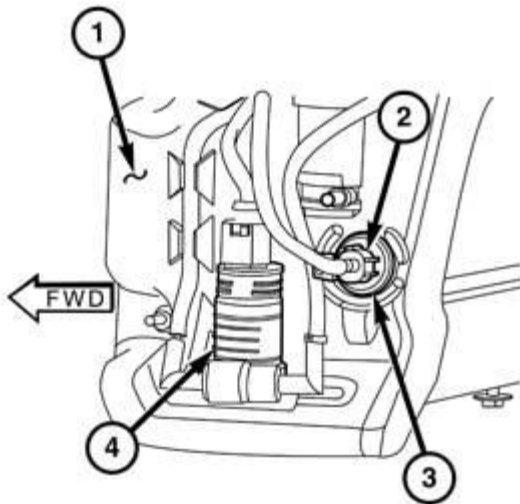
Fig. 69: Washer Fluid Level Sensor Unit & Connector
Courtesy of CHRYSLER GROUP, LLC

NOTE: **The washer fluid level switch can be removed from the washer reservoir without removing the reservoir from the vehicle.**

1. Disconnect and isolate the negative cable from the battery.
2. Turn the steering wheel to move the front wheels to the full left position.
3. Raise and support the vehicle.
4. Remove the plastic push-in fasteners that secure the forward end of the left front wheel house splash shield to the inner fender panel and the front fascia. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL** .
5. Pull the forward end of the left front wheel house splash shield away from the inner fender panel and front fascia far enough to access the washer fluid level sensor unit (3) on the outboard side of the washer reservoir (1) on the outboard end of the Front End Module (FEM) hydroform.
6. Disconnect the FEM wire harness connector (2) for the washer fluid level sensor from the sensor connector receptacle.
7. Disconnect one of the reservoir washer plumbing fittings from the barbed outlet nipple of the washer pump (4) and allow the washer fluid to drain into a clean container for reuse.
8. Using a trim stick or another suitable wide flat-bladed tool, gently pry the barbed nipple of the washer fluid level sensor out of the rubber grommet seal on the reservoir just above the sump. Care must be taken not to damage the reservoir.
9. Remove the washer fluid level sensor from the washer reservoir.
10. Remove the rubber grommet seal from the washer fluid level sensor mounting hole in the washer reservoir and discard.

INSTALLATION

INSTALLATION



0833005484

Fig. 70: Washer Fluid Level Sensor Unit & Connector
 Courtesy of CHRYSLER GROUP, LLC

1. Lubricate a new rubber grommet seal with clean washer fluid and install it into the washer fluid level sensor mounting hole in the washer reservoir (1). Always use a new rubber grommet seal on the reservoir.
2. Insert the float of the washer fluid level sensor (3) through the rubber grommet seal and into the washer reservoir. The flat of the index tab on the washer fluid level switch mounting flange should be pointed downward.
3. Using hand pressure, press firmly and evenly on the washer fluid level sensor mounting flange until the barbed nipple is fully seated in the rubber grommet seal in the mounting hole of the washer reservoir.
4. Reconnect the Front End Module (FEM) wire harness connector (2) for the washer fluid level sensor to the sensor connector receptacle.
5. Reconnect the reservoir washer plumbing fitting to the barbed outlet nipple of the washer pump (4).
6. Reinstall the plastic push-in fasteners that secure the left front wheel house splash shield to the inner fender panel and the front fascia. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION**.
7. Lower the vehicle.
8. Reconnect the negative cable to the battery.
9. Refill the washer reservoir with the washer fluid siphoned from the reservoir during the removal procedure.

2014 AUTOMATIC TRANSMISSION

948TE - Service Information - Cherokee

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - AUTOMATIC TRANSMISSION - GENERAL CONDITIONS

CAUTION: Before attempting any repair on an automatic transmission, check for Diagnostic Trouble Codes with the appropriate scan tool.

CAUTION: A unique transmission fluid has been developed for the 8HP transmission. This fluid is **NOT** compatible with ATF+4 or any other current Chrysler transmission fluid. For specifics about this unique fluid, see **FLUIDS, LUBRICANTS AND GENUINE PARTS** in the owner's manual.

Transmission malfunctions may be caused by these general conditions:

- Poor engine performance.
- Improper adjustments.
- Hydraulic malfunctions.
- Mechanical malfunctions.
- Electronic malfunctions.
- Power Transfer Unit performance (if equipped).

Diagnosis of these problems should always begin by checking the easily accessible variables: fluid level, fluid condition, and transmission fault codes using the appropriate scan tool. Then perform a road test to determine if the problem has been corrected or if more diagnosis is necessary.

AIR TESTING

The 948TE transmission can be air tested to evaluate the condition of the seals and clutch apply circuits within the transmission. An adaptor plate in place of the valve body is required to perform this test. A rubber tipped air chuck connected to a 413 kPa (60 PSI) regulated shop air hose will provide adequate air pressure and volume to properly test the sealing components within the transmission.

1. Position the vehicle on a suitable hoist with the transmission in neutral. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove the valve body. Refer to **VALVE BODY, REMOVAL**.

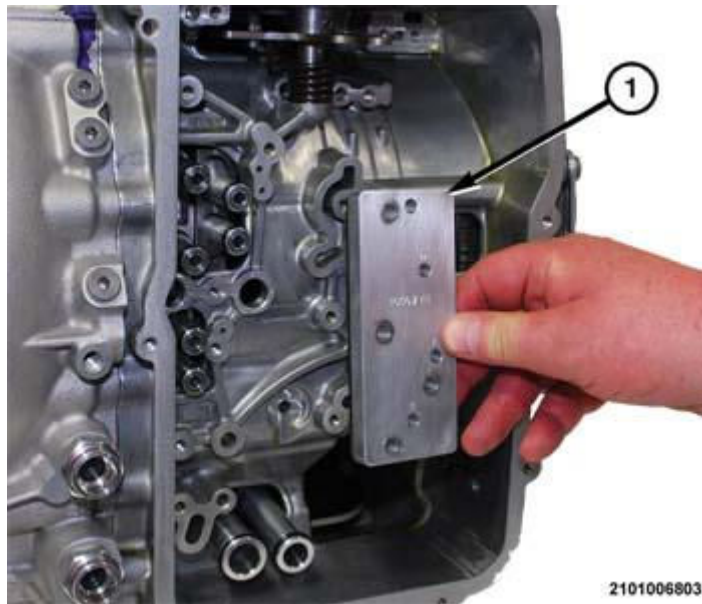


Fig. 1: Installing Air Test Adaptor Plate
Courtesy of CHRYSLER GROUP, LLC

3. Place the (special tool #10507, Plate, Air Pressure Test) (1) in position on the transmission housing.

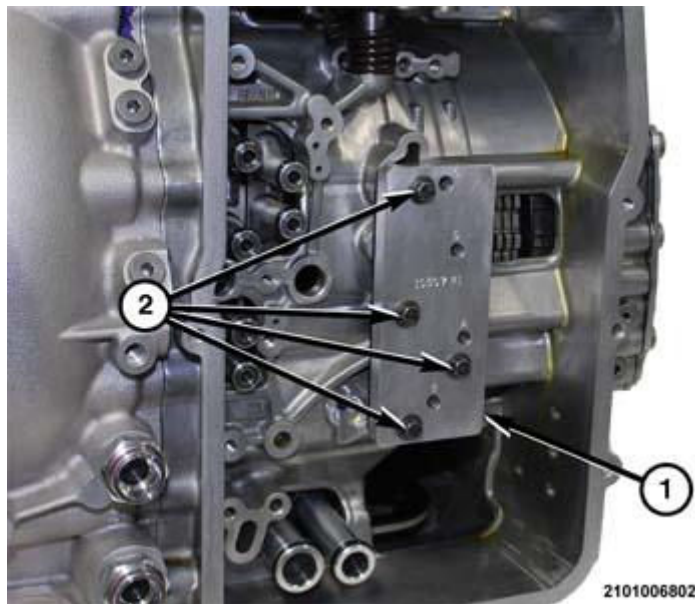


Fig. 2: Air Test Adaptor Plate Installed
Courtesy of CHRYSLER GROUP, LLC

4. Install the bolts (2) to hold the air test adaptor plate (1) to the transmission housing.

NOTE: Do not exceed 60 psi air pressure. Air Pressure greater than 413 kPa (60 psi) may create a false positive result. Lip seals that are marginal may seal under higher pressure.

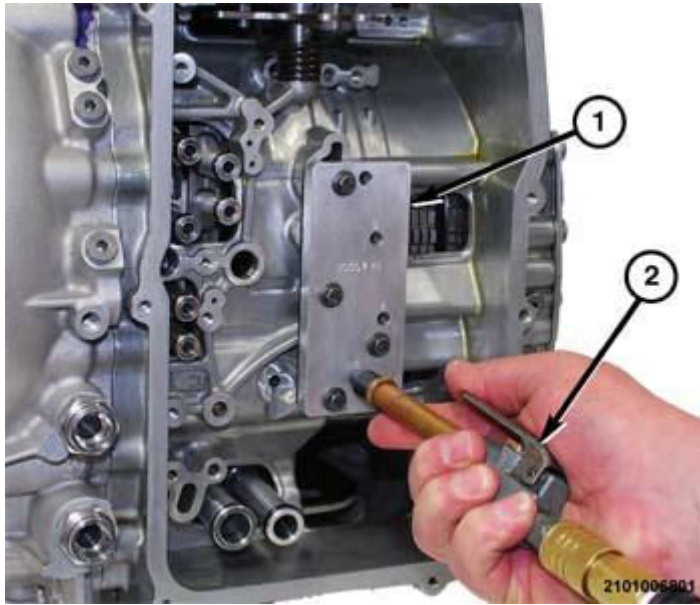


Fig. 3: Applying Air Pressure At Adaptor Plate
Courtesy of CHRYSLER GROUP, LLC

5. Using a rubber tip blow chuck (2) on a 413 kPa (60 psi) **regulated** shop air hose, pressurize each of the clutch apply circuits marked on the adaptor plate (1).
6. Each circuit should thump when the clutch or dog applies and hold until the air chuck is released.
 - If a clutch or dog does not apply and air escapes past a damaged seal, the transmission will need to be replaced or overhauled as necessary.
 - If the transmission passes the air test, the valve body or solenoid valve will be the likely cause of the transmission shifting problem. If the valve body or solenoid valves are defective, they will need to be replaced as necessary.
7. Install the valve body. Refer to **VALVE BODY, INSTALLATION**.
8. Road test the vehicle to verify the repair.

PRELIMINARY DIAGNOSIS

VEHICLE IS DRIVABLE

1. Check for transmission fault codes using the appropriate scan tool.
2. Road test and note how the transmission upshifts, downshifts, and engages.
3. Check fluid level and condition. Refer to **FLUID AND FILTER, STANDARD PROCEDURE**.

VEHICLE IS DISABLED

1. Check for transmission fault codes using the appropriate scan tool.
2. Position the vehicle on a hoist with the transmission in neutral. Refer to **HOISTING, STANDARD PROCEDURE**.
3. Check for cracked, leaking cooler lines.

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4. Check the fluid level and condition. Refer to **FLUID AND FILTER, STANDARD PROCEDURE**.
5. With the transmission in the park position, attempt to rotate halfshafts to make sure the transmission output shaft is intact.
6. Check the power transfer unit (PTU) (if equipped).
7. Raise and support vehicle on safety stands, start engine with transmission in the Park position and allow to idle for several minutes, shift transmission into gear, and note following:
 - a. On AWD vehicle, if propeller shaft turns but wheels do not, problem is with the differential or halfshafts.
 - b. If the propeller shaft does not turn and the transmission is noisy, stop the engine. Remove the oil pan, and check for debris. If the pan is clear, remove the transmission and check for damaged driveplate, torque converter, oil pump, or input shaft.
8. Check the transmission control module (TCM), wiring, valve body, and solenoids (Utilize fault codes to diagnose if available).

ROAD TEST

Prior to performing a road test, verify that the fluid level, fluid condition, and linkage adjustment have been verified.

During the road test, the transmission should be operated in each position to check for slipping and any variation in shifting.

If the vehicle operates properly at highway speeds, but has poor acceleration, the converter stator overrunning clutch may be slipping. If acceleration is normal, but high throttle opening is needed to maintain highway speeds, the converter stator clutch may have seized. Both of these stator defects require replacement of the torque converter and thorough transmission cleaning.

Slipping clutches can be isolated by comparing the "Elements in Use" chart with clutch operation encountered on a road test. This chart identifies which clutches are applied at each position of the selector lever.

A slipping clutch may also set a DTC and can be determined by operating the transmission in all selector positions.

948TE 9 Speed FWD/AWD/4WD Planetary Automatic Transmission with 6 shift elements and 4 planetary gear sets.								
		CLUTCH-A	CLUTCH-B	CLUTCH-C	CLUTCH-D	CLUTCH-E	CLUTCH-F	RATIO
GEAR	1st	X			X		X	4.700
GEAR	2nd	X		X			X	2.842
GEAR	3rd	X	X				X	1.909
GEAR	4th	X				X	X	1.382
GEAR	5th	X	X			X		1.000
GEAR	6th	X		X		X		0.808
GEAR	7th	X			X	X		0.699

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GEAR	8th			X	X	X		0.580
GEAR	9th		X		X	X		0.479
GEAR	NEUTRAL/PARK				X		X	
GEAR	R		X		X		X	3.805
Default Gear	4th Gear					X	X	

EMERGENCY RUNNING FUNCTION - LIMP IN MODE

In the event of a complete transmission electrical failure (loss of power to the transmission control module (TCM), the transmission enters default limp-in mode. When the TCM loses power, all solenoids are de-energized. Maximum pressure locks the transmission in fourth gear, and a diagnostic trouble code (DTC) is stored in memory. If the vehicle is in a forward gear range when the fault occurs, the transmission defaults to fourth gear.

The limp-in function remains active until the DTC is repaired or a stored DTC is erased with an appropriate scan tool.

FLUID LEAK DETECTION

The following procedure is for detecting transmission fluid leaks from the area between the transmission and the Power Transfer Unit (PTU). When transmission fluid is leaking from the weep hole in the area of the PTU, the seals around the differential output shaft and the differential side gear is most likely faulty. The large seals around the differential output shaft and side gear is serviceable without removing the transmission. The following procedure is recommended to determine which seal is leaking.

1. Disconnect the transmission vent tube from the adaptor nipple.
2. Adapt a compressed shop air coupling and a length neoprene hose onto the vent nipple.
3. Attach a 48 kPa (7 psi) regulated shop air source to the air coupling on the vent nipple.
4. Raise the vehicle on a suitable hoist.
5. Remove the PTU from the vehicle

Refer to **REMOVAL** .

6. Apply a soapy solution to the seals inside and around the differential output shaft.
7. Observe over several minutes to see if air bubbles form in the leak area.

Test Results

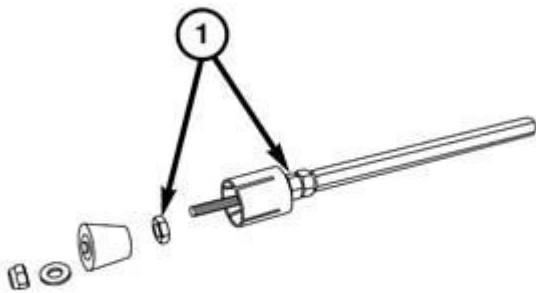
- If bubbles are emanating from the inner differential side gear seal, remove the adapter sleeve and replace the inner seal.
- If bubbles are emanating from the outer output shaft seal, remove the adapter sleeve replace the seal.
- If bubbles are emanating from the transmission housing casting, replace the porous component.

STANDARD PROCEDURES

BEARING TURNING TORQUE MEASUREMENT

To determine proper select shim thickness for the differential and transfer gear bearings, the turning torque must be measured. If just the differential or transfer gear bearings are being replaced it is not necessary to measure the bearing turning torque. The original factory installed shims will be sufficient to properly preload the bearings when the transmission is assembled. If the differential, transfer gear, or transmission housing castings are replaced the differential and transfer gear bearing turning torque will need to be reestablished.

Verify that the bearings and races are **NEW** and properly installed on/in clean components with the factory installed select shims behind the bearing races. Lightly lubricate the bearings with transmission fluid.



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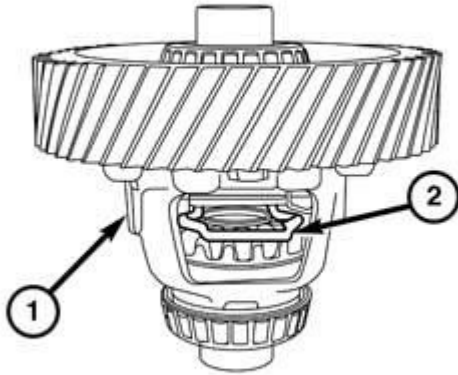
Fig. 4: Special Tool #C-4995A
Courtesy of CHRYSLER GROUP, LLC

Tool (special tool #C-4995A, Tool, Differential Bearing Torque) must be modified to be compatible with the following operation. Two 3/8-24 nuts (1) must be added to keep the center shaft from rotating in the cone and sleeve.

1. Remove the nylok™ nut and expander cone from the center shaft.
2. Remove the sleeve from the center shaft.
3. Install a nut on the center shaft and tighten it against the existing nut. Install the sleeve.
4. Install the 2nd nut inside the sleeve just far enough to install the cone and nut.
5. Install the cone and nut tight enough to keep the center shaft from rotating inside the cone and sleeve.

MEASUREMENT PROCEDURE

1. Position the differential on a clean work surface.



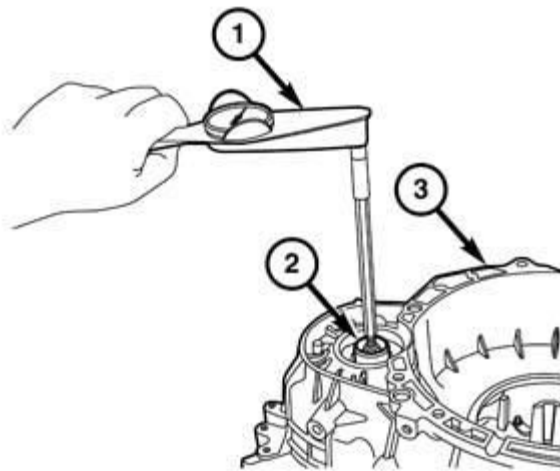
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Fig. 5: Differential Pinion Gears & Lock Tool
Courtesy of CHRYSLER GROUP, LLC

2. On 4WD transmissions tool 10425 is not required, there is no differential. on FWD and AWD transmissions, install the lock tool (special tool #10425, Tool, Pinion and Side Gear Locking) (2) between the differential (1) pinion gears next to the link pin to prevent the differential from rotating.
3. Position the transmission and bell housing on a suitable clean work bench.
4. Install new bearing races with the original select shims.
5. Install the differential with new bearings lightly lubricated with transmission fluid in the transmission housing.
6. Install the bell housing.
7. Install the bolts to hold the bell housing to the transmission housing. Tighten bolts to 50% on the specified torque value

Refer to **SPECIFICATIONS**.

8. Insert modified tool (special tool #C-4995A, Tool, Differential Bearing Torque) into the differential until the sleeve (C-4995-1) enters the halfshaft spline in the differential side gear.
9. Tighten the nut until the sleeve expands tightly in the side gear.
10. Tighten the jamb nut to prevent the center shaft from rotating in the sleeve.
11. Using a suitable wrench, rotate the differential 20 rotations clockwise and 20 rotations counterclockwise.



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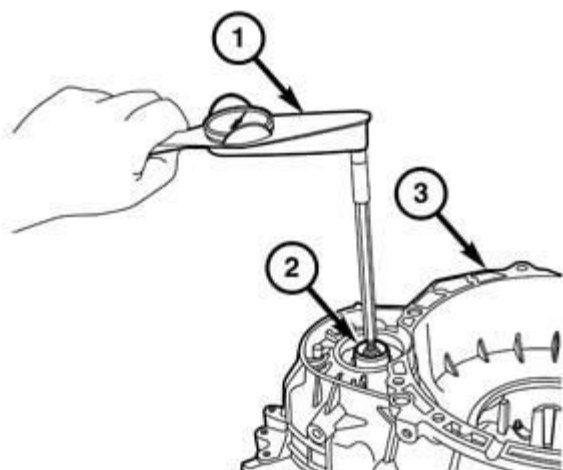
Fig. 6: Torque Wrench & Differential
Courtesy of CHRYSLER GROUP, LLC

12. Using a torque wrench (1), measure the turning resistance of the differential (2) after the initial break away. It should measure between 1.7 to 2.8 N.m (15 and 25 in lbs)
13. Adjust the turning torque by adding to or subtracting from the thickness of the select shims behind the differential bearing races.
14. After achieving proper differential turning torque, separate the bell housing from the transmission housing.
15. Install the transfer gear with new bearings into the transmission housing.
16. Install the bell housing.
17. Install the bolts to hold the bell housing to the transmission housing. Tighten bolts to 50% on the specified torque value

Refer to **SPECIFICATIONS**.

NOTE: **The turning torque of the differential and the transfer gear will be higher than the differential alone. The ring gear is driving a smaller gear on the transfer shaft.**

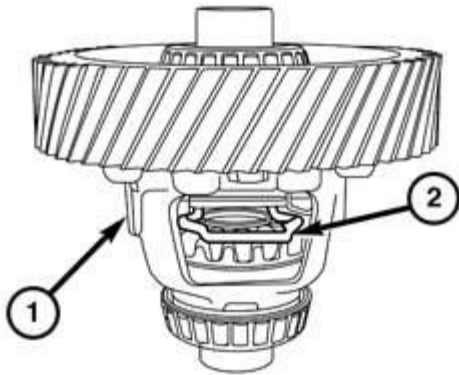
18. Using a suitable wrench, rotate the differential 20 rotations clockwise and 20 rotations counterclockwise.



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Fig. 7: Torque Wrench & Differential
Courtesy of CHRYSLER GROUP, LLC

19. Using a torque wrench (1), measure the turning resistance of the differential (2) after the initial break away. It should measure between 3.4 to 6.8 N.m (35 and 60 in lbs)
20. Adjust the turning torque by adding to or subtracting from the thickness of the select shims behind the transfer shaft bearing races.
21. Remove tool C-4995 from the differential.
22. Separate the bell housing from the transmission housing.
23. Remove the differential (1) and transfer gear (2).



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Fig. 8: Differential Pinion Gears & Lock Tool
Courtesy of CHRYSLER GROUP, LLC

24. On FWD and AWD transmissions, remove lock tool 10425 (2) from the differential (1).
25. Prepare transmission components for final assembly.

INPUT SHAFT END PLAY MEASUREMENT

Before disassembling the 948TE transmission measure the end play of the input shaft. This will aid in the assembly process when selecting a select shim.

1. Place the transaxle on a suitable clean work surface.
2. Remove the torque converter.
3. Use tools (special tool #8266B, End Play Socket Set) and (special tool #C-3339A, Set, Dial Indicator) attached to the input shaft, to measure the input shaft end play.

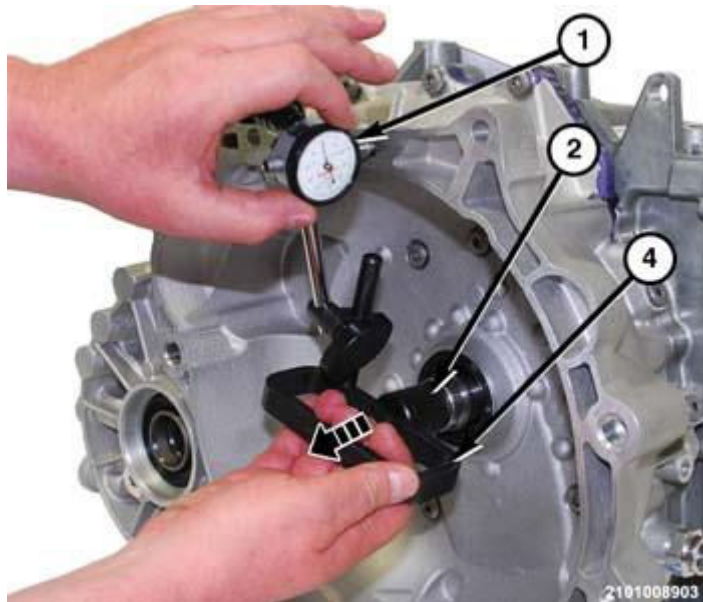


Fig. 9: Measuring Input Shaft End Play
Courtesy of CHRYSLER GROUP, LLC

4. Attach the dial indicator to the handle 8266-8.
5. Attach the handle to the spline adapter 8266-6.
6. Attach the spline adapter to the input shaft.
7. Position the dial indicator plunger on the bellhousing rim.
8. Pull outward on the handle and zero the dial indicator face.

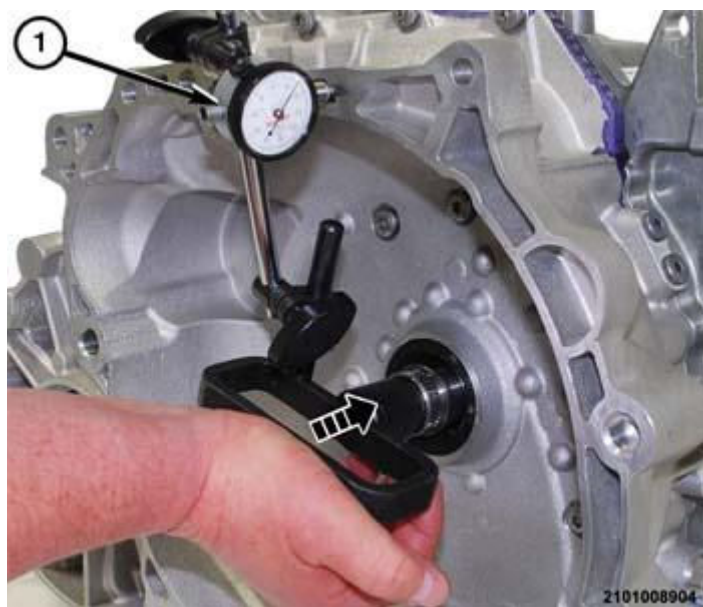


Fig. 10: Input Shaft End Play Measurement
Courtesy of CHRYSLER GROUP, LLC

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9. Push inward on the handle and read the dial indicator.
10. Record the measurement as a reference number for selecting the proper thickness select spacer when assembling the transmission.

SPECIFICATIONS**TORQUE SPECIFICATIONS****TIGHTENING SPECIFICATIONS 948TE TRANSAXLE**

Component	N.m	In. Lb.	Ft. Lb.
Flexplate to Torque Converter (apply Mopar ® Lock & Seal Adhesive or replace the bolts)	40	-	30
Flexplate to Crankshaft-M12X1.25X14.00 (Do Not Reuse Original Bolts)	95	-	70
Access Plate to Trans-M6X1X16	9	80	-
Engine to Transaxle-M12X1.25X65.00	93	-	69
Engine to Transaxle-M10X1.50X45.00	50	-	37
Engine to Transaxle-M10X1.50X54.50	51	-	38
Engine to Transaxle-M10X1.25X55.00	50	-	37
Engine to Transaxle-M10X1.25X65	49	-	36
Trans to Engine-M12X1.25X50.0	115	-	85
Trans to Engine-M12X1.25X97.1	63	-	46
Trans to Engine-M10X1.50X54.50	51	-	38
Trans to Engine-M10X1.25X55.00	50	-	37
Trans to Engine- M10X1.25X65	49	-	36
Trans Bracket to Trans-M12X1.75X60.42	105	-	77
Trans Bracket to Trans-M6X1.0X16.00	10	88	-
Trans Mount to Shock Tower-M10X1.50X70.00	65	-	48
Trans Mount to Rail-M12X1.75X60.00	105	-	77
Trans Mount to Trans-M14X1.5X75.00	170	-	125
Torque Strut Bracket to Trans-M12X1.75X35.00	220	-	162
Pivot Bracket to Trans-M14X2.0X60.00	160	-	118
PTU to Trans Flange-M10X1.5X50.00	48	-	35
Battery Negative to Auto Trans-M8X1.25X20.00	24	-	17
EPS Ground to Transmission-M8X1.25X46.00	22	-	16
EPS Ground to Transmission-M6X1.0X16.00	10	88	-
Bracket to Transaxle-M6X1.0X20.0	8	71	-
Heat Shield to Cradle-M6X1.00X14.00	8	71	-
Heat Shield to PTU-M6X1.00X14.00	8	71	-
Lever to Transaxle Shaft-M8X1.00	19	-	14
ATX Cable Adjust-M5X0.8X14.00	8	71	-

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Shift Cable Bracket to Trans-M6X1.00X14.00	12	106	-
Shift Cable Bracket to Trans-M6X1.0X20.0	8	71	-
Shifter Plate to Floor Pan-M6X1.0	9	80	-
Bracket to Front Crossmember-M12X1.75X95.00	90	-	66
Bracket to Front Crossmember-M12X1.75X40.00	70	-	52
FEM to Lower Load Path-M12X1.75X95.00	44	-	32
FEM to Inner Load Beam-M8X1.25X30.00	27	-	20
FEM to Upper Load Beam-M8X1.25X30.0	23	-	16
Vertical Link to Load Beam-M10X1.25X30.5	27	-	20
Tow Hook Bracket to Load Beam-M10X1.25X70.00	55	-	41
Engine Belly Pan to Engine X-Mbr-M6X1.00X25.50	10	88	-
Engine Belly Pan to Fascia C/Out-M6X1.00X25.50	10	88	-
Engine Belly Pan to Load Beam Rt/Lt-M6X1.00X25.50	10	88	-
Front Diff Bracket to Isolator Left-M12X1.5X65.0	120	-	88
Front Diff Bracket to Isolator Right-M12X1.5X65.0	120	-	88
Rear Diff Bracket to Isolator-M12X1.5X130.0	120	-	88

948TE INTERNAL TIGHTENING SPECIFICATIONS

Component	N.m	In. Lb.	Ft. Lb.
Plug - Screw TC Anti-Rotation	8	71	-
Screw - Oil Supply Tube M6x22	10.1	89	-
Plug - Screw M18 x 1.5 - 6e x 12	35	-	26
Screw - TORX M6x15 (Park guide) * = + angle 21°	4 *	35 *	-
Plug - Screw M18 x 1.5 - 6e x 12	35	-	26
Screw - TORX M6x15 (Gasket and cover)	10	88	-
Screw - TORX M6 x 42	12.5	111	-
Screw - TORX - Bell to Case M8x34	25	-	18
Screw - TORX M6x22	10	88	-
Plug - Screw M18 x 1.5 - 6e x 12	35	-	26
Plug - Screw - Bell Housing M10 x 1 - 6e x 8	12	106	-
Plug - Screw - Oil Fill M14 x 1.5 - 6e x 12	23	-	17
Fitting Assembly - Oil Cooler Line	30	-	22
Screw & Washer Assy - TORX - Pump Plate to Bell M8 x 69	25	-	18
Screw & Washer Assy - TORX - Pump Plate to Bell M8 x 25	25	-	18
Screw - TORX M6x22	10	88	-
Screw - TORX - Pump Plate to Bell M6x17	10	88	-
Screw - TORX w/patch M4 x 9	2.8	25	-
Screw - TORX Valve Body to Valve Body M5 x 40	6	53	-
Screw - TORX M5 x 12	6	53	-
Screw - Cover M5 x 50	6	53	-
Screw - TORX Wire Retention Plate M5x14	5.5	49	-

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Screw - TORX M5x12	5.7	50	-
Screw - TORX Valve Body to Case M6x62	8	71	-
Screw - TORX M6x70	8	71	-
Pan Assy - Oil	9.5	84	-
Screw - TORX M8x21	21	-	15
Nut - Stake	60	-	49

CLUTCH SPECIFICATIONS

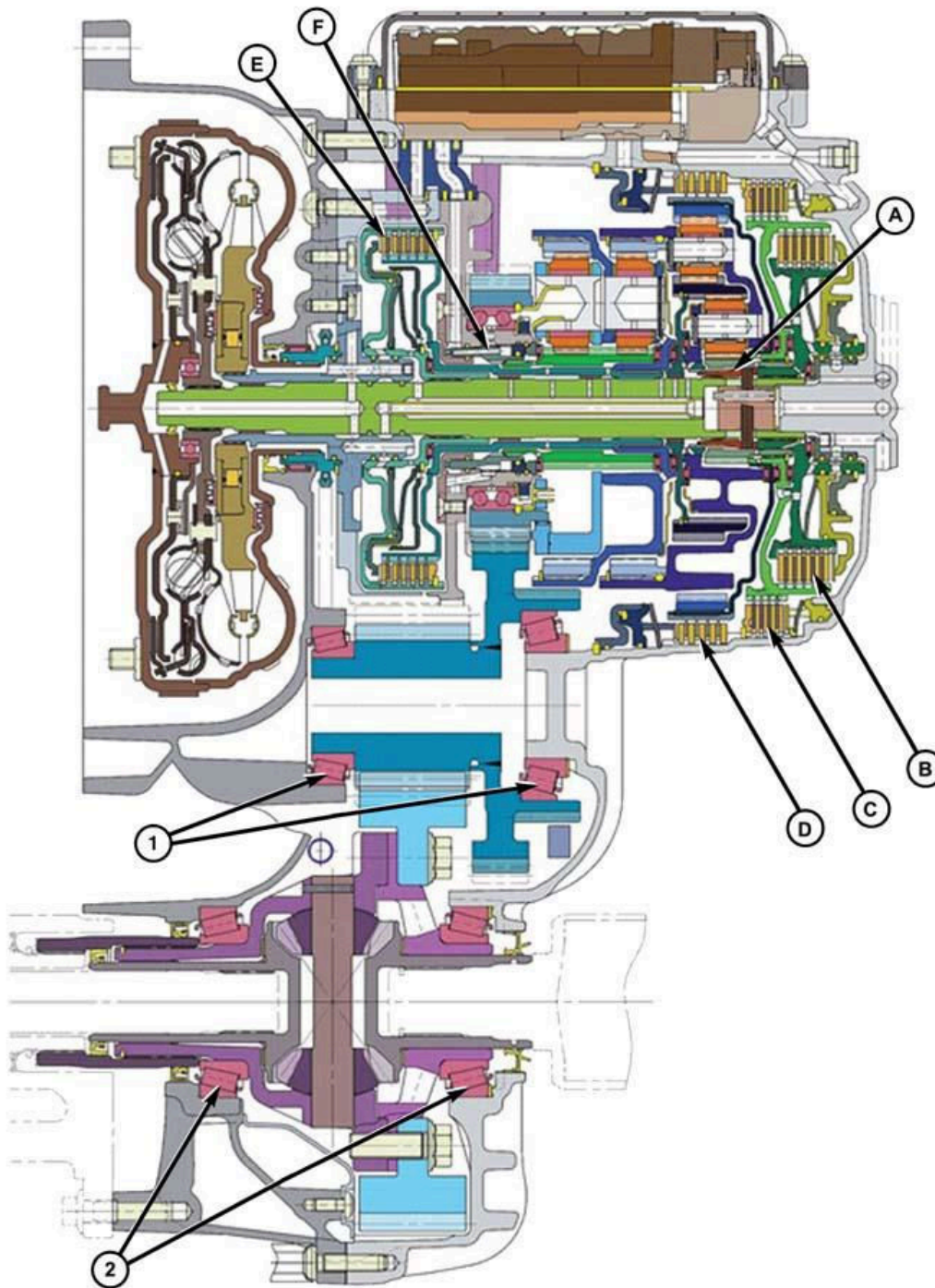
The B, C, D and E clutch clearance must be measured and properly set during the assembly process of the 948TE transmission. The recommended measurement procedures can be found in the appropriate CLUTCH - ADJUSTMENTS procedure.

CLUTCH COMPOSITION

A - Clutch	Dog Clutch
B - Clutch	5 Discs
C - Clutch	4 Discs
D - Clutch	4 Discs
E - Clutch	5 Discs
F - Clutch	Dog Clutch

CLUTCH CLEARANCE

B-clutch = 1.28 - 1.77 (0.050 - 0.070 in)	C-clutch = 0.76 - 1.15 (0.030 - 0.045 in)
D-clutch = 1.01 - 1.50 (0.040 - 0.059 in)	E-clutch = 1.28 - 1.77 (0.050 - 0.070 in)



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Fig. 11: Cutaway View Clutch Locations
Courtesy of CHRYSLER GROUP, LLC

TRANSMISSION GEAR RATIOS

Gear ratios for the 948TE automatic transmission are as follows:

2014 Jeep Cherokee Trailhawk

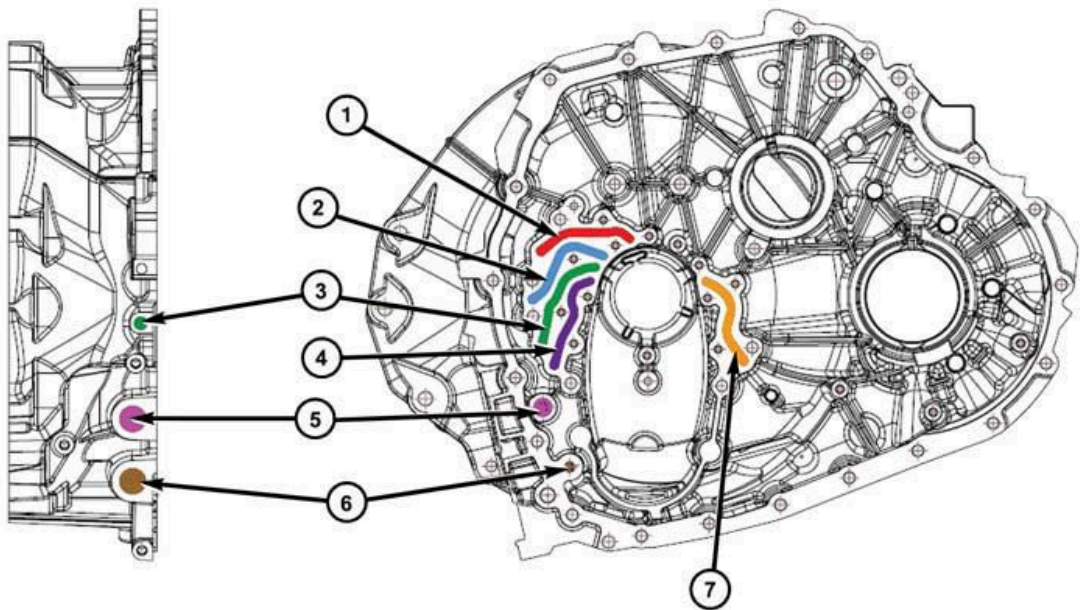
2014 AUTOMATIC TRANSMISSION 948TE - Service Information - Cherokee

GEAR	RATIO
1ST	4.70:1
2ND	2.824:1
3RD	1.909:1
4TH	1.382:1
5TH	1.00:1
6TH	0.808:1
7TH	0.699:1
8TH	0.58:1
9TH	0.479:1
REVERSE	3.805:1

SCHEMATICS AND DIAGRAMS

INTERNAL HYDRAULIC PASSAGES

Provided in the following illustrations are the locations of hydraulic passages that will aid in diagnosing leaks and clutch malfunctions.



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Fig. 12: Hydraulic Ports In Bellhousing
Courtesy of CHRYSLER GROUP, LLC

HYDRAULIC PORTS IN BELLHOUSING

1= Dog Clutch A - OFF	2= Clutch E
3= Torque Converter Open	4= Dog Clutch F - OFF

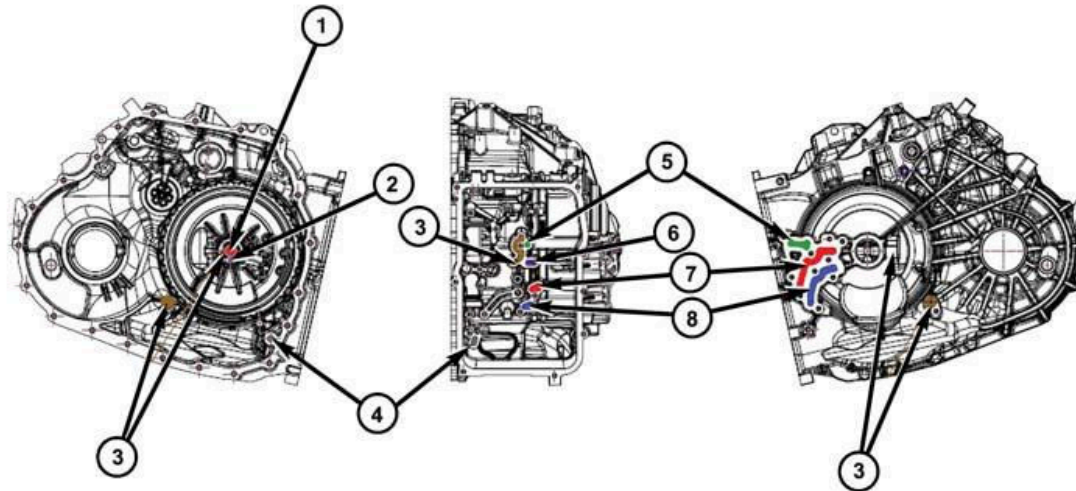
2014 Jeep Cherokee Trailhawk

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5= From Cooler

6= To Cooler

7= Dog Clutch F - ON



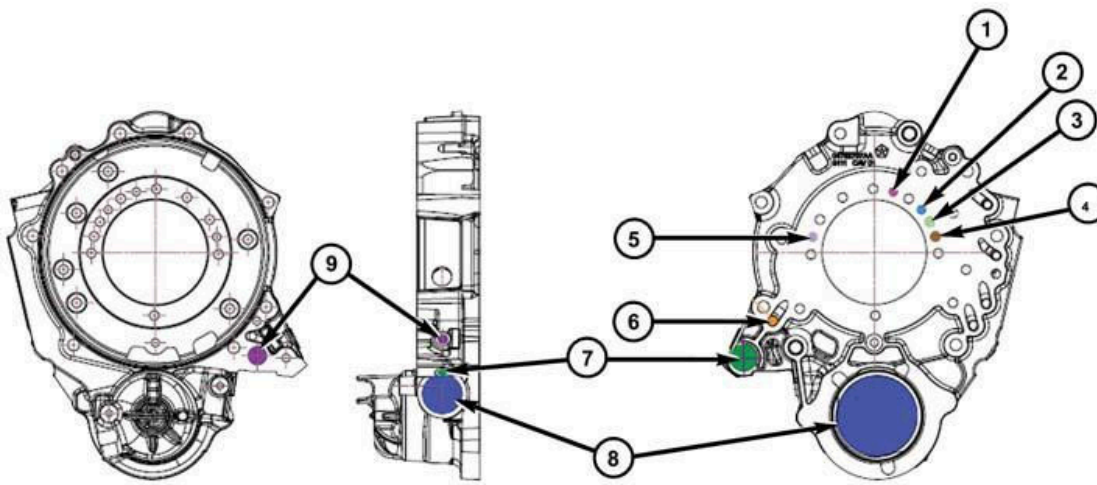
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Fig. 13: Hydraulic Ports In Housing

Courtesy of CHRYSLER GROUP, LLC

HYDRAULIC PORTS IN HOUSING

1= Dog Clutch A - ON	2= Clutch B
3= Lubrication	4= To Cooler
5= Clutch C	6= Clutch D
7= Dog Clutch A - ON	8= Clutch B



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Fig. 14: Hydraulic Ports In Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

HYDRAULIC PORTS IN INTERMEDIATE SUPPORT PLATE

1= Dog Clutch A - OFF	2= Clutch E
3= Clutch J	4= Dog Clutch F - OFF
5= Dog Clutch F - ON	6= Front Lubrication
7= Rear Lubrication	8= Pump
9= From Cooler	

SHIFT SOLENOID HYDRAULIC SCHEMATIC

The following schematic illustrates the hydraulic function of the electronic shift solenoids.

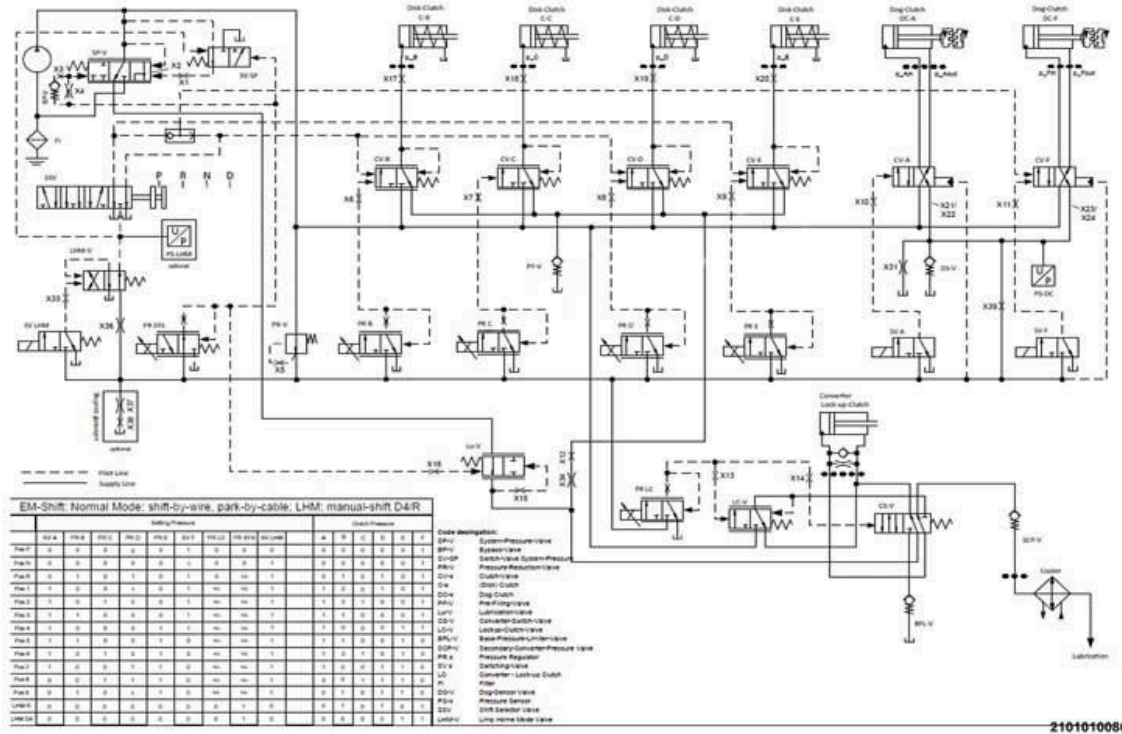


Fig. 15: Shift Solenoid Hydraulic Schematic
Courtesy of CHRYSLER GROUP, LLC

REMOVAL

FWD

WARNING: Hoisting and jack lift points provided in this service information are for a complete vehicle. When the transaxle is removed, the center of gravity will shift to the rear of the vehicle, possibly creating an unstable condition. Place safety stands under the rear frame rails behind the rear axle to stabilize the vehicle. Personal injury may result if safety stands are not used.

1. Position the vehicle on a suitable hoist with the transmission in neutral. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove the battery. Refer to **BATTERY, REMOVAL**.
3. Remove Powertrain Control Module (PCM). Refer to **MODULE, POWERTRAIN CONTROL, REMOVAL**.
4. Remove the power distribution center. Refer to **CENTER, POWER DISTRIBUTION (PDC), REMOVAL**.
5. Hoist the vehicle.
6. Remove the front wheels. Refer to **REMOVAL**.

7. Remove the left and right half shafts. Refer to **REMOVAL** . If accessible, install suitable cap-plugs in the axle seals to prevent leakage.
8. Remove the left front fender splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL** .
9. Remove the front fascia lower outboard rivets to the right front splash shield for lower load beam bolt access.
10. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .
11. Lower the vehicle until the brake rotors are 100 mm (4 in.) above the ground.
12. Release the lock lever on the wire connector on the front of the battery tray.
13. Separate the wire connector from the main engine harness.
14. Remove the battery tray. Refer to **TRAY, BATTERY, REMOVAL** .
15. Disconnect the vacuum line from the vacuum pump. Refer to **PUMP, VACUUM, REMOVAL** .
16. Disconnect the wire connector from the vacuum pump
17. Remove the nuts holding the vacuum pump to the mount bracket.
18. Separate the vacuum pump from the mount bracket.

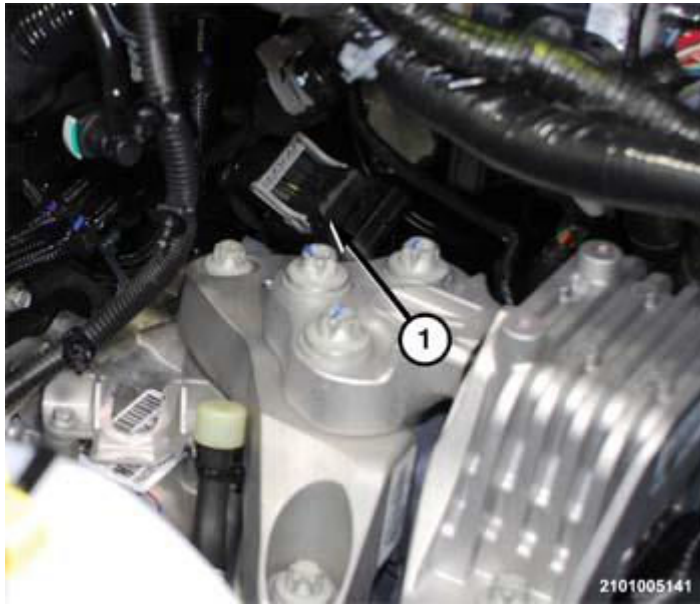


Fig. 16: Identifying Wire Connector Lock To TCM
Courtesy of CHRYSLER GROUP, LLC

19. Release the lock on the TCM connector (1).
20. Separate the wire connector (1) from the TCM.

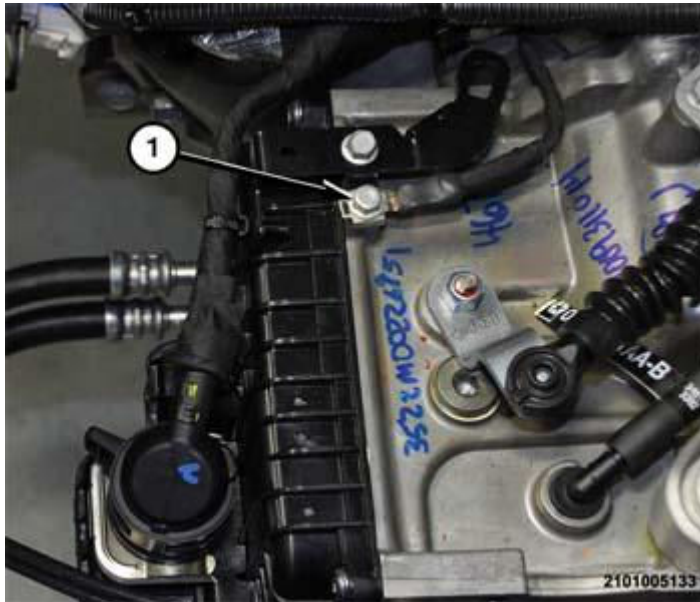


Fig. 17: Ground Cable At Top Transmission
Courtesy of CHRYSLER GROUP, LLC

21. Remove the bolt (1) holding the ground cable to the top of the transmission.
22. Separate the ground cable (1) from the transmission.



Fig. 18: View Of Ground Cable & Shift Cable
Courtesy of CHRYSLER GROUP, LLC

23. Using a suitable prying tool (1), separate the shift cable end (2) from the manual lever on the transmission.



Fig. 19: View Of Shift Cable Housing & Mount Bracket
Courtesy of CHRYSLER GROUP, LLC

24. Release the locks holding the shift cable housing (2) to the mount bracket (1) on the transmission.
25. Separate the shift cable (2) from the mount bracket (2).



Fig. 20: Transmission Valve Body Solenoid Connector
Courtesy of CHRYSLER GROUP, LLC

26. Rotate the lock lever (2) counterclockwise on the transmission solenoid connector.
27. Separate the transmission solenoid connector (2) from the transmission.
28. Position a floor jack under the transmission.

29. Raise the jack enough to relieve tension on the upper transmission mount.

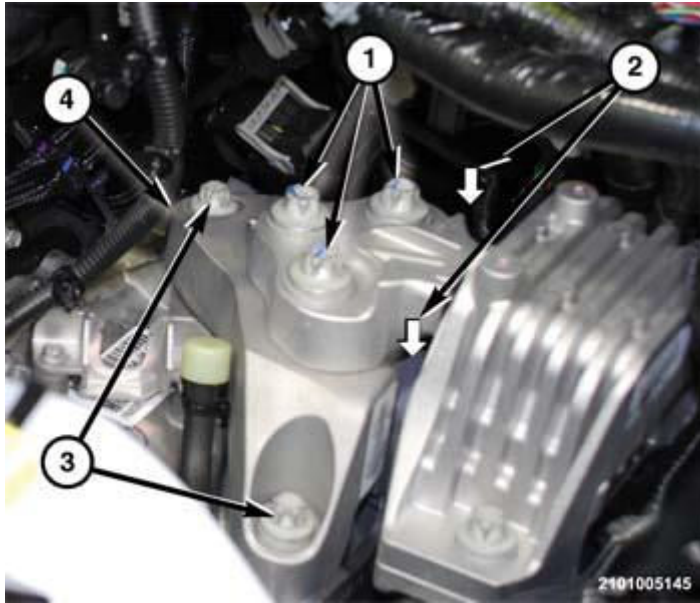


Fig. 21: Upper Transmission Mount Bolts
Courtesy of CHRYSLER GROUP, LLC

30. Remove the bolts (1) holding the upper transmission mount to the adaptor block (4).

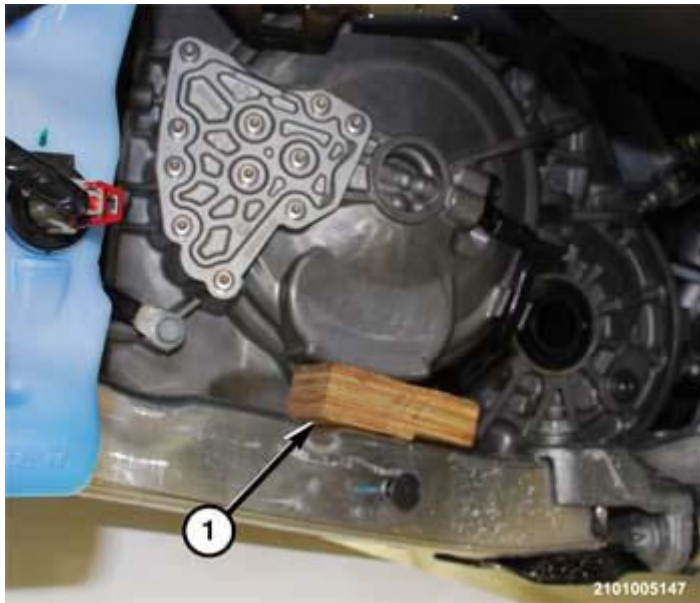


Fig. 22: Wooden Block Placed Between Transmission And Frame Rail
Courtesy of CHRYSLER GROUP, LLC

31. Place a wooden block (1) between the transmission end cover and the frame rail load beam.
32. Lower the floor jack until the wood block supports the transmission.



Fig. 23: Transmission End Cover Ground Cable
Courtesy of CHRYSLER GROUP, LLC

33. Remove the bolt (1) holding the ground cable to the transmission end cover.
34. Separate the ground cable (1) from the transmission.

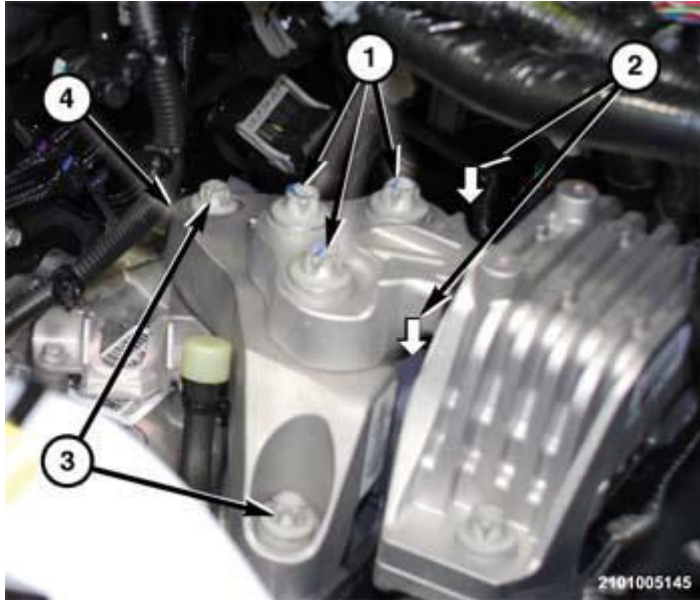


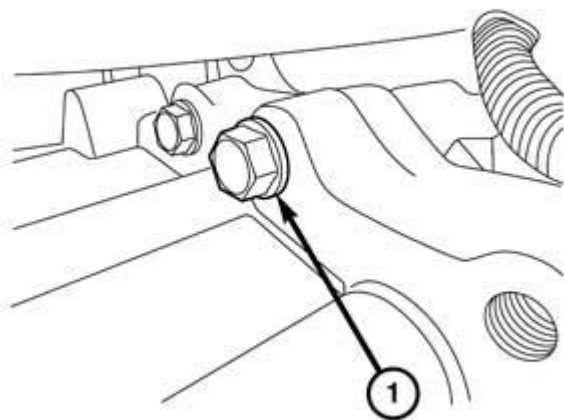
Fig. 24: Upper Transmission Mount Bolts
Courtesy of CHRYSLER GROUP, LLC

35. Remove the bolts (3) and hidden bolts (2) holding the transmission mount adaptor block (4) to the transmission.
36. Separate the transmission mount adaptor block (4) from the vehicle.



Fig. 25: Wire Harness Bracket & Bellhousing Bolt
Courtesy of CHRYSLER GROUP, LLC

37. Remove the upper bolt (1) holding the wire harness bracket and transmission bellhousing to the engine block



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Fig. 26: Upper Starter Bolt
Courtesy of CHRYSLER GROUP, LLC

38. If equipped with a 2.4L engine, loosen and back out the upper starter bolt (1).

NOTE: The bolt will not be able to be removed due to lack of clearance.



Fig. 27: Upper Bellhousing Bolts
Courtesy of CHRYSLER GROUP, LLC

39. Remove upper bolts (1) holding the transmission bellhousing to the engine block located behind the main engine wire harness.
40. Raise the vehicle and place safety stands under the rear frame rails behind the rear axle to stabilize the vehicles center of gravity. Refer to the WARNING at beginning of this procedure (see **FWD**).
41. Place a suitable drain pan under the transmission to collect fluid that may leak from the differential seals and cooler lines.



Fig. 28: Transmission Cooler Lines

Courtesy of CHRYSLER GROUP, LLC

42. Disengage the quick couplings holding the cooler lines to the transmission.
43. Separate the cooler lines from the transmission. If accessible, install suitable cap-plugs in the male and female ends of the cooler lines to prevent leakage.

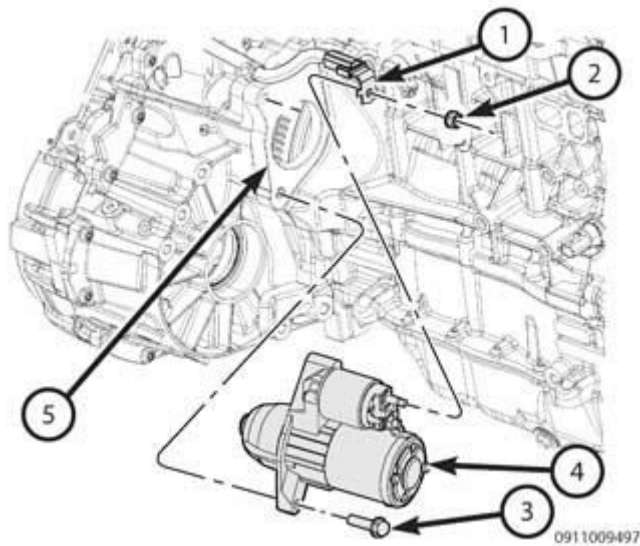


Fig. 29: Removing/Installing Starter

Courtesy of CHRYSLER GROUP, LLC

NOTE: After the bolts holding the starter motor to the bellhousing are removed the starter motor will remain the place.

44. If equipped with a 2.4L Remove the bolt (3) holding the starter (4) to the transmission bellhousing.



Fig. 30: Starter Bolts (3.2L)

Courtesy of CHRYSLER GROUP, LLC

45. If equipped with a 3.2L engine, remove the starter bolts (1).

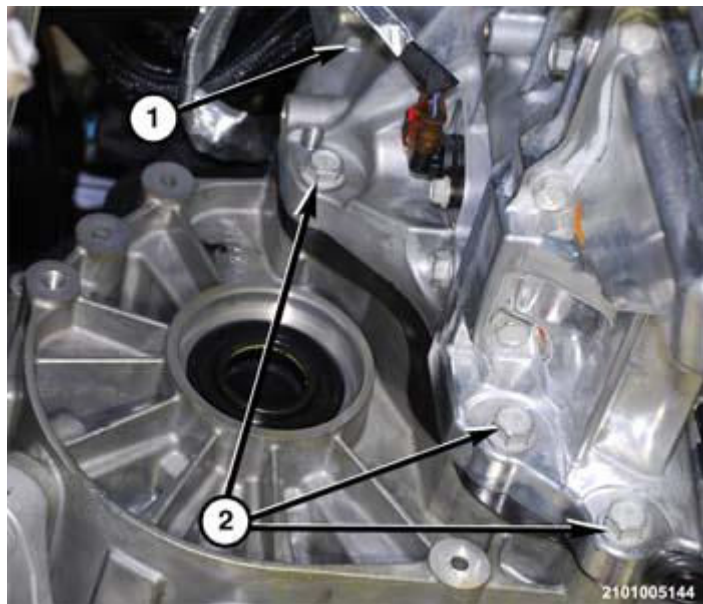


Fig. 31: Transmission Bellhousing Bolts Above The Differential Housing

Courtesy of CHRYSLER GROUP, LLC

46. Remove the bolt (1) holding the transmission bellhousing to the engine block from above the differential housing.
47. Remove the front exhaust pipe. Refer to **PIPE, EXHAUST CROSSUNDER, REMOVAL** .

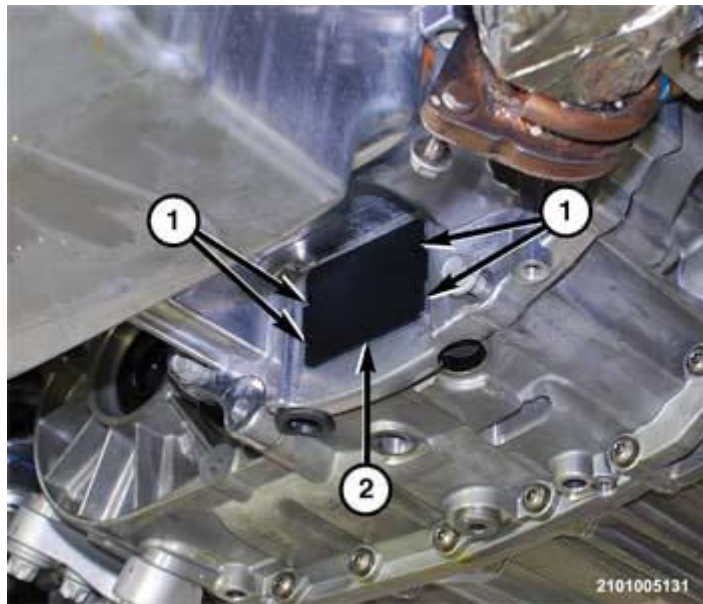


Fig. 32: Bellhousing Access Door
Courtesy of CHRYSLER GROUP, LLC

48. Remove the access door in the splash shield on the bellhousing.

NOTE: The crankshaft can be rotated using a wrench to turn the balancer pulley end bolt.

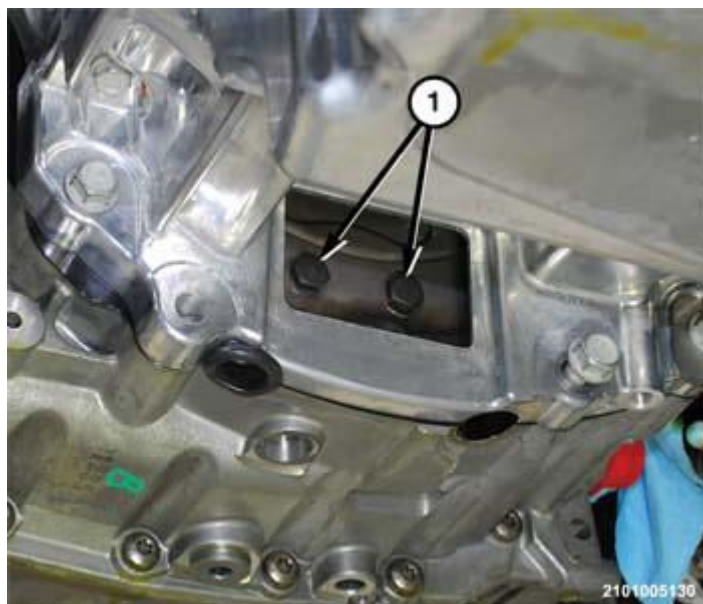


Fig. 33: Torque Converter Bolts
Courtesy of CHRYSLER GROUP, LLC

49. Through the access door opening, remove the bolts (1) holding the flexplate to the torque converter. Rotate the crankshaft to bring each set of bolts into view through the access door.

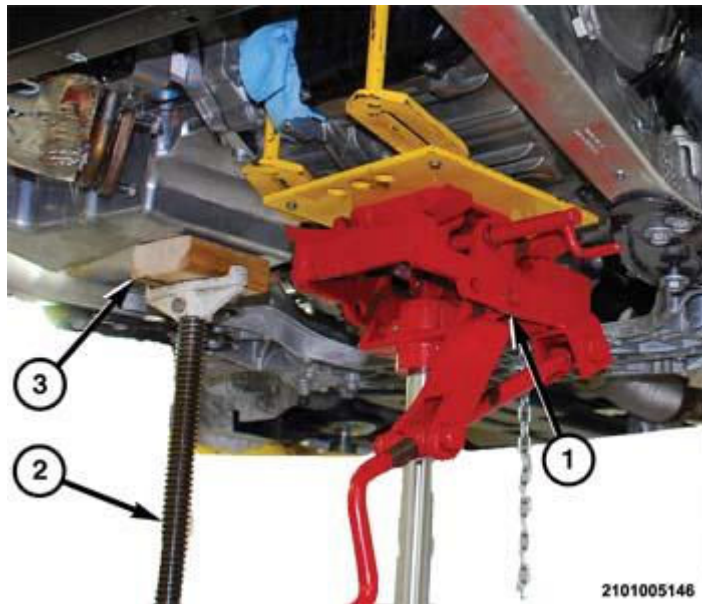


Fig. 34: Wooden Block Used To Protect Engine Oil Pan
Courtesy of CHRYSLER GROUP, LLC

50. Using a wooden block (3) to protect the engine oil pan, position a high stand (2) under the engine oil pan to support the engine.
51. Position a suitable transmission jack (1) under the transmission in a stable condition.
52. Secure the transmission to the lift plate of the transmission jack to avoid dropping the transmission during removal.

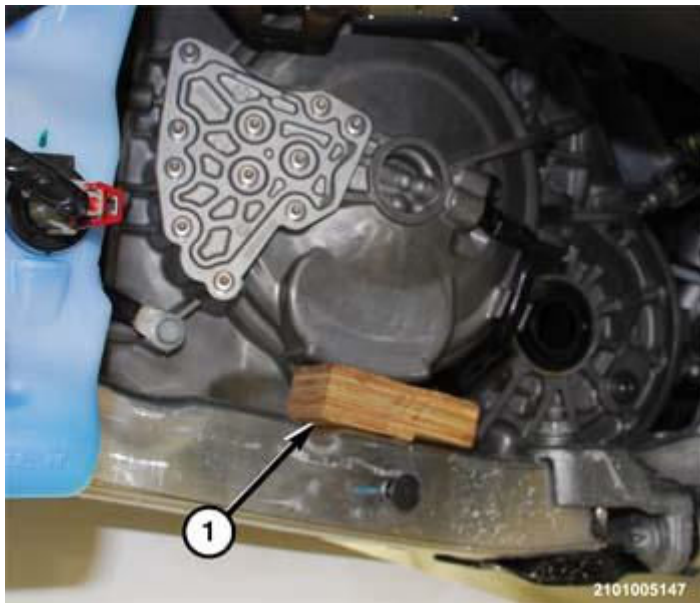


Fig. 35: Wooden Block Placed Between Transmission And Frame Rail
Courtesy of CHRYSLER GROUP, LLC

53. Lift the transmission jack and high stand until the wooden block (1) can be removed from between the

transmission end cover and the frame rail load beam.

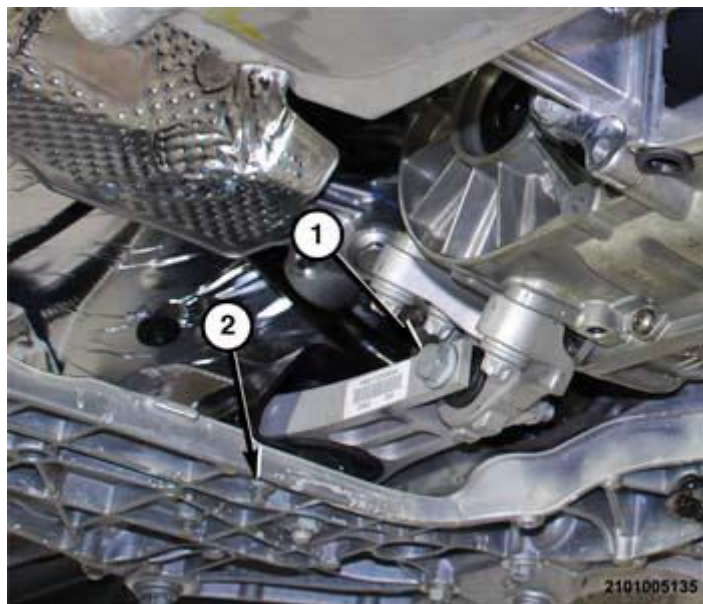


Fig. 36: Rear Transmission Mount
Courtesy of CHRYSLER GROUP, LLC

54. Remove the through bolt (1) holding the rear transmission mount to the suspension cradle.
55. Remove the through bolt (2) holding the rear transmission mount to the adapter block on the transmission bellhousing.
56. Push the rear transmission mount rearward into the bracket on the suspension cradle and out of the way.

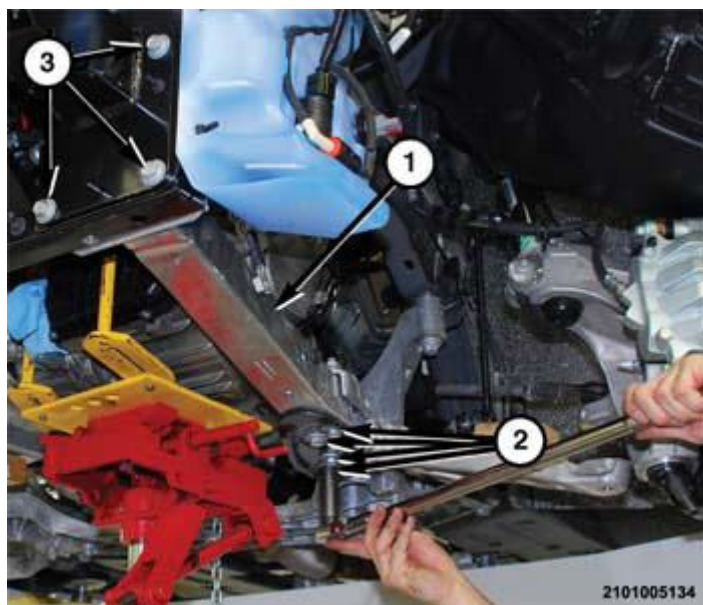


Fig. 37: Load Beam Bolts
Courtesy of CHRYSLER GROUP, LLC

57. Remove the bolts (2) holding the rear end of the load beam (1) to the suspension cradle.
58. Remove the bolts (3) holding the front of the load beam (1) to the radiator support panel.
59. Separate load beam (1) from the vehicle.

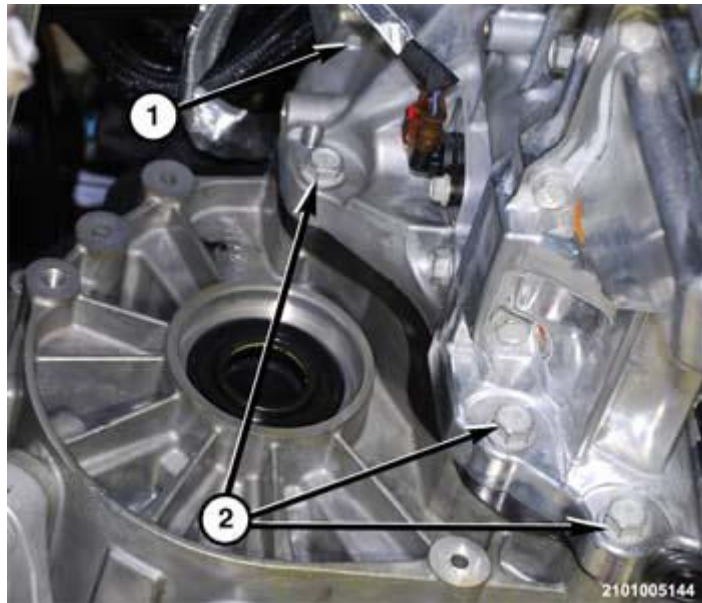


Fig. 38: Transmission Bellhousing Bolts Above The Differential Housing
Courtesy of CHRYSLER GROUP, LLC

60. Remove the bolts (2) holding the engine block and oil pan to the bellhousing next to the differential housing.



Fig. 39: Removing/Installing Transmission Bellhousing Bolts
Courtesy of CHRYSLER GROUP, LLC

61. Remove the bolts (1) holding the engine block and oil pan to the bellhousing from behind the exhaust maniverter.
62. Remove the bolt (1) holding the engine oil pan and exhaust bracket to the bellhousing.
63. Using a suitable prying tool, pry the bell housing away from the engine block
64. While guiding the transmission past obstacles, lower the transmission downward and away from the vehicle.

AWD/4WD

WARNING: Hoisting and jack lift points provided in this service information are for a complete vehicle. When the transaxle is removed, the center of gravity will shift to the rear of the vehicle, possibly creating an unstable condition. Place safety stands under the rear frame rails behind the rear axle to stabilize the vehicle. Personal injury may result if safety stands are not used.

1. Position the vehicle on a suitable hoist with the transmission in neutral. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove the battery. Refer to **BATTERY, REMOVAL** .
3. Remove the Powertrain Control Module (PCM). Refer to **MODULE, POWERTRAIN CONTROL, REMOVAL** .
4. Remove the Power Distribution Center (PDC). Refer to **CENTER, POWER DISTRIBUTION (PDC), REMOVAL** .
5. Remove the battery tray. Refer to **TRAY, BATTERY, REMOVAL** .
6. If equipped with a 2.4L, remove the intake manifold. Refer to **MANIFOLD, INTAKE, REMOVAL** .
7. If equipped with a 3.2L, disconnect the vacuum line from the vacuum pump. Refer to **PUMP, VACUUM, REMOVAL** .
8. For 3.2L disconnect the wire connector from the vacuum pump.
9. For 3.2L remove the nuts holding the vacuum pump to the mount bracket.
10. For 3.2L separate the vacuum pump from the mount bracket.

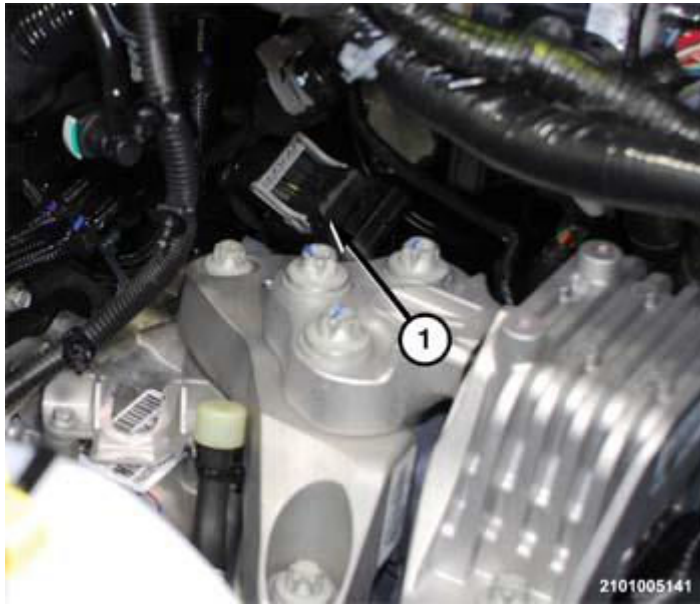


Fig. 40: Identifying Wire Connector Lock To TCM
Courtesy of CHRYSLER GROUP, LLC

11. Release the lock on the Transmission Control Module (TCM) connector (1).
12. Separate the wire connector (1) from the TCM.



Fig. 41: Ground Cable At Top Transmission
Courtesy of CHRYSLER GROUP, LLC

13. Remove the bolt (1) holding the ground cable to the top of the transmission.
14. Separate the ground cable (1) from the transmission.



Fig. 42: View Of Ground Cable & Shift Cable
Courtesy of CHRYSLER GROUP, LLC

15. Using a suitable prying tool (1), separate the shift cable end (2) from the manual lever on the transmission.



Fig. 43: View Of Shift Cable Housing & Mount Bracket
Courtesy of CHRYSLER GROUP, LLC

16. Release the locks holding the shift cable housing (2) to the mount bracket (1) on the transmission.
17. Separate the shift cable (2) from the mount bracket (2).



Fig. 44: Transmission Valve Body Solenoid Connector
Courtesy of CHRYSLER GROUP, LLC

18. Rotate the lock lever (2) counterclockwise on the transmission solenoid connector.
19. Separate the transmission solenoid connector (2) from the transmission.
20. Hoist the vehicle.
21. Remove the front wheels. Refer to **REMOVAL** .
22. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .
23. Remove the four rivets at the lower outboard edges of the front fascia to gain access to the lower load beam to core support bolts.
24. Remove the left and right half shafts. Refer to **REMOVAL** . If accessible, install suitable cap-plugs in the axle seals to prevent leakage.
25. Lower the vehicle until the brake rotors are 100 mm (4 in.) above the ground.
26. Position a floor jack under the transmission.
27. Raise the jack enough to relieve tension on the upper transmission mount.

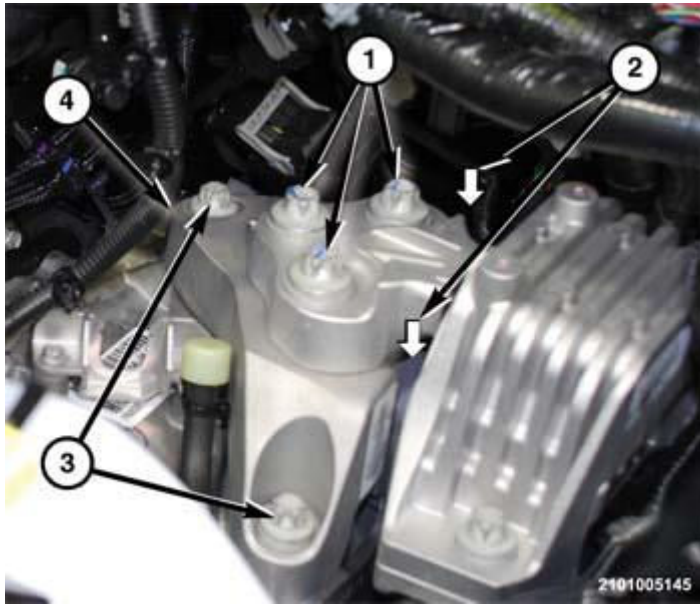


Fig. 45: Upper Transmission Mount Bolts
Courtesy of CHRYSLER GROUP, LLC

28. Remove the bolts (1) holding the upper transmission mount to the adaptor block (4).

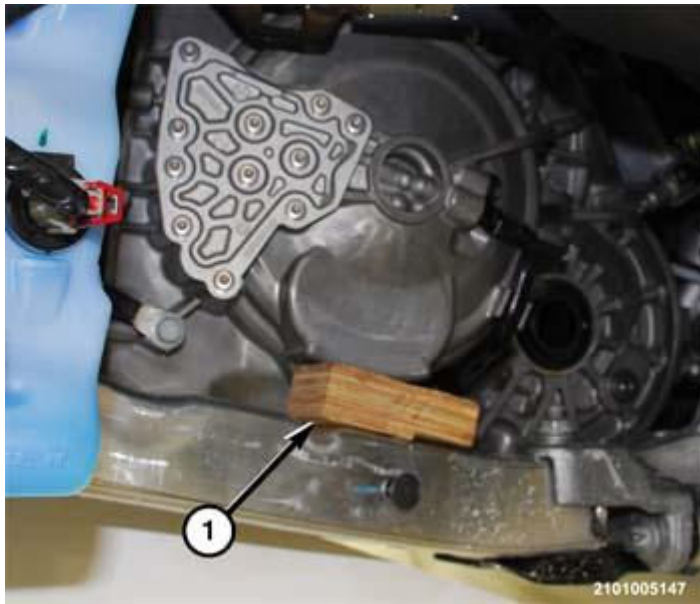


Fig. 46: Wooden Block Placed Between Transmission And Frame Rail
Courtesy of CHRYSLER GROUP, LLC

29. Place a wooden block (1) between the transmission end cover and the frame rail load beam.
30. Lower the floor jack until the wood block supports the transmission.



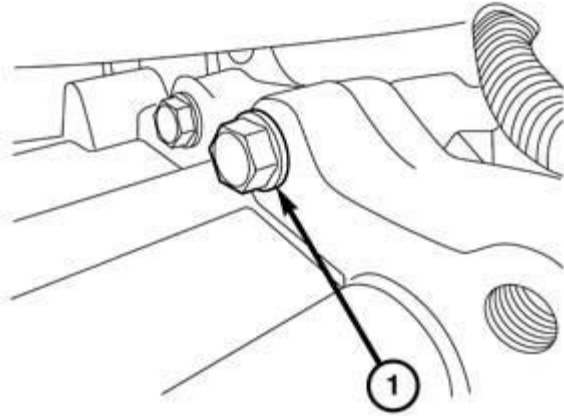
Fig. 47: Transmission End Cover Ground Cable
Courtesy of CHRYSLER GROUP, LLC

31. Remove the bolt (1) holding the ground cable to the transmission end cover.
32. Separate the ground cable (1) from the transmission.



Fig. 48: Wire Harness Bracket & Bellhousing Bolt
Courtesy of CHRYSLER GROUP, LLC

33. Remove the upper bolt (1) holding the wire harness bracket and transmission bellhousing to the engine block.



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Fig. 49: Upper Starter Bolt
Courtesy of CHRYSLER GROUP, LLC

34. If equipped with a 2.4L, loosen and back out the starter bolt (1).

NOTE: The bolt will not be able to be removed due to lack of clearance.



2101005142

Fig. 50: Upper Bellhousing Bolts
Courtesy of CHRYSLER GROUP, LLC

35. Remove upper bolts (1) holding the transmission bellhousing to the engine block located behind the main engine wire harness.
36. Raise the vehicle and place safety stands under the rear frame rails behind the rear axle to stabilize the vehicles center of gravity. Refer to the WARNING at beginning of this procedure (see **AWD/4WD**).
37. Place a suitable drain pan under the transmission to collect fluid that may leak from the differential seals and cooler lines.



Fig. 51: Transmission Cooler Lines
Courtesy of CHRYSLER GROUP, LLC

38. Disengage the quick couplings holding the cooler lines to the transmission.
39. Separate the cooler lines from the transmission. If accessible, install suitable cap-plugs in the male and female ends of the cooler lines to prevent leakage.

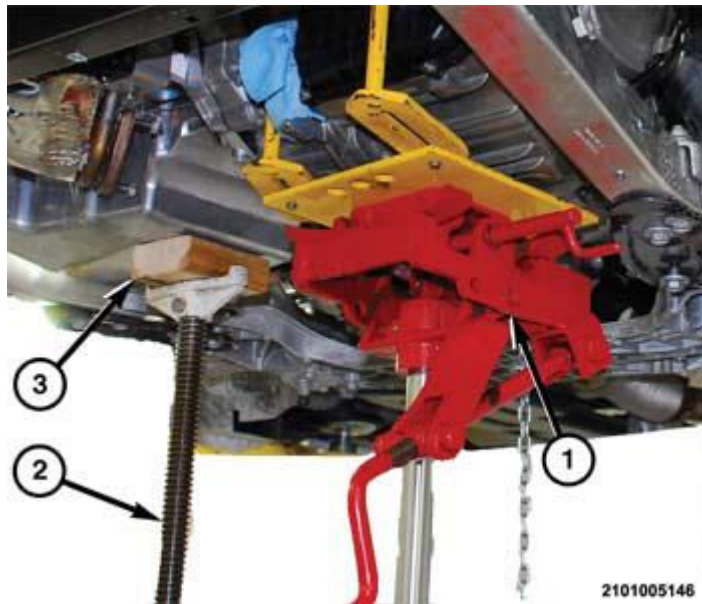


Fig. 52: Wooden Block Used To Protect Engine Oil Pan
Courtesy of CHRYSLER GROUP, LLC

40. Using a wooden block (3) to protect the engine oil pan, position a high stand (2) under the engine oil pan to support the engine.
41. Remove the power transfer unit (PTU). Refer to **REMOVAL**.

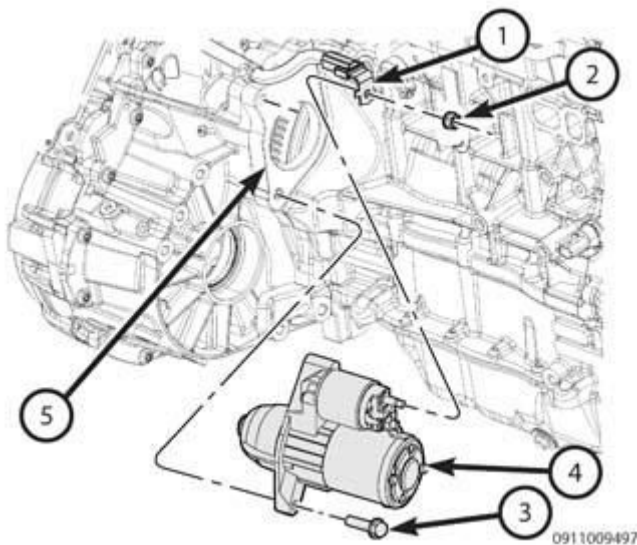


Fig. 53: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

NOTE: After the bolts holding the starter motor to the bellhousing are removed the starter motor will remain the place.

42. If equipped with a 2.4L, remove the bolt (3) holding the starter (4) to the transmission bellhousing.



Fig. 54: Starter Bolts (3.2L)

Courtesy of CHRYSLER GROUP, LLC

43. If equipped with a 3.2L, remove the starter bolts (1).
44. Remove the bolt (1) holding the transmission bellhousing to the engine block from above the differential housing.

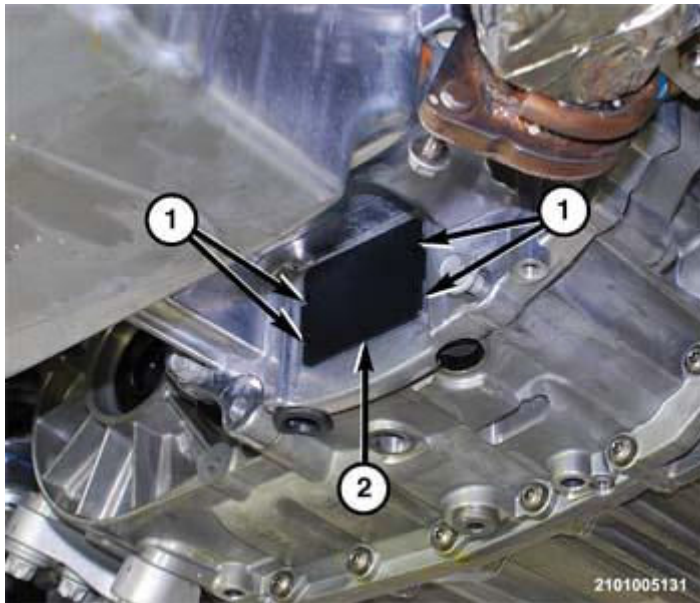


Fig. 55: Bellhousing Access Door

Courtesy of CHRYSLER GROUP, LLC

45. Remove the access door in the splash shield on the bellhousing.

NOTE: The crankshaft can be rotated using a wrench to turn the balancer pulley end bolt.

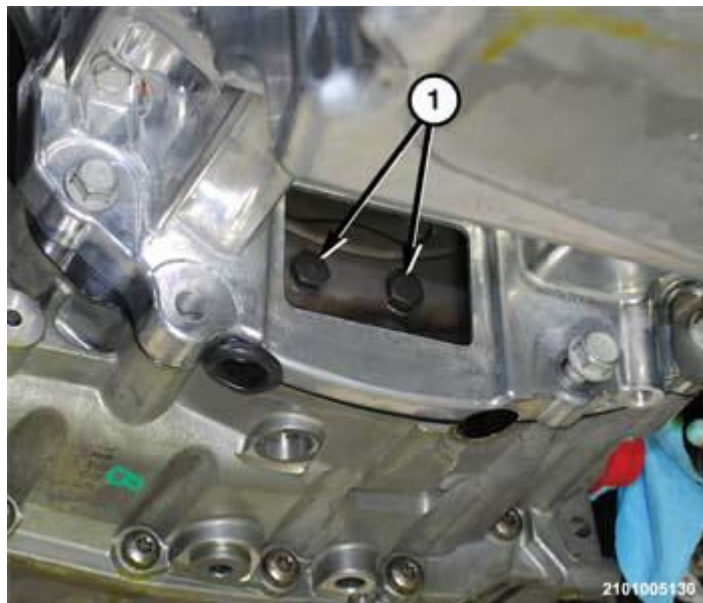


Fig. 56: Torque Converter Bolts
Courtesy of CHRYSLER GROUP, LLC

46. Through the access door opening, remove the bolts (1) holding the flexplate to the torque converter. Rotate the crankshaft to bring each set of bolts into view through the access door.

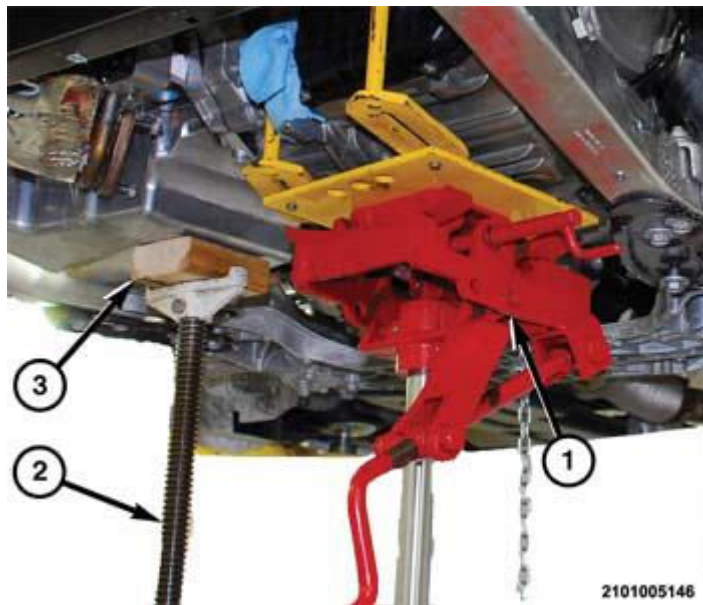


Fig. 57: Wooden Block Used To Protect Engine Oil Pan
Courtesy of CHRYSLER GROUP, LLC

47. Position a suitable transmission jack (1) under the transmission in a stable condition.

48. Secure the transmission to the lift plate of the transmission jack to avoid dropping the transmission during removal.
49. Remove the bolts (2) holding the engine block and oil pan to the bellhousing next to the differential housing.



Fig. 58: Removing/Installing Transmission Bellhousing Bolts
Courtesy of CHRYSLER GROUP, LLC

50. Remove the bolts (1) holding the engine block and oil pan to the bellhousing from behind the catalytic converter.
51. Remove the bolt (1) holding the engine oil pan and exhaust bracket to the bellhousing.
52. Using a suitable prying tool, pry the bell housing away from the engine block.
53. While guiding the transmission past obstacles, lower the transmission downward and away from the vehicle.

DISASSEMBLY

DISASSEMBLY

The 948TE automatic transmission can be overhauled if the vehicle is beyond it's warranty coverage. Verify that the vehicle is no longer covered by warranty before proceeding with this procedure. A clean work area is necessary to assure a properly functioning transmission after the overhaul procedures are completed. Special tools have been developed and are required to disassemble this transmission. Acquire all of the special tools before starting this procedure.

WARNING: Always wear safety glasses when cleaning, disassembling and assembling the transmission/transaxle. Contents of the transmission/transaxle can become projectiles (e.g., springs, snap-rings,

as well as metal and other debris). Failure to wear safety glasses may result in severe personal injury.

Before disassembling the transmission, wash the transmission with a suitable solvent and a siphon pressure washer to remove oily grime and loose dirt. Place the transmission on a clean work surface with ample fluid drainage or absorbency.

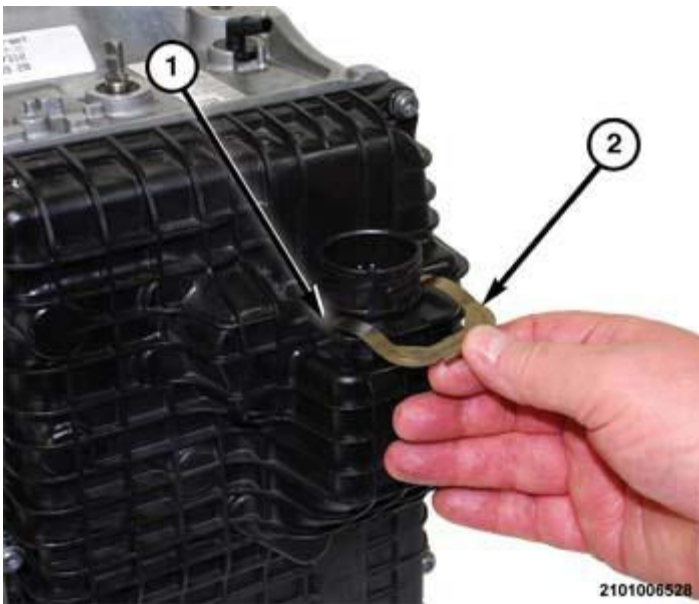


Fig. 59: Wire Connector Socket Clip
Courtesy of CHRYSLER GROUP, LLC

1. Remove the clip holding the wire connector socket in the valve body cover pan.

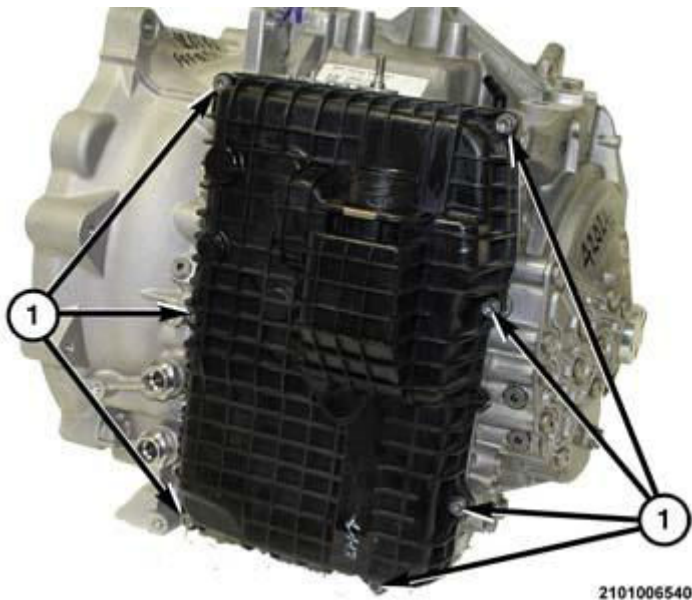


Fig. 60: Valve Body Cover Pan Bolts

Courtesy of CHRYSLER GROUP, LLC

2. Remove the valve body cover pan bolts (1).
3. Remove the valve body cover pan from the transmission.

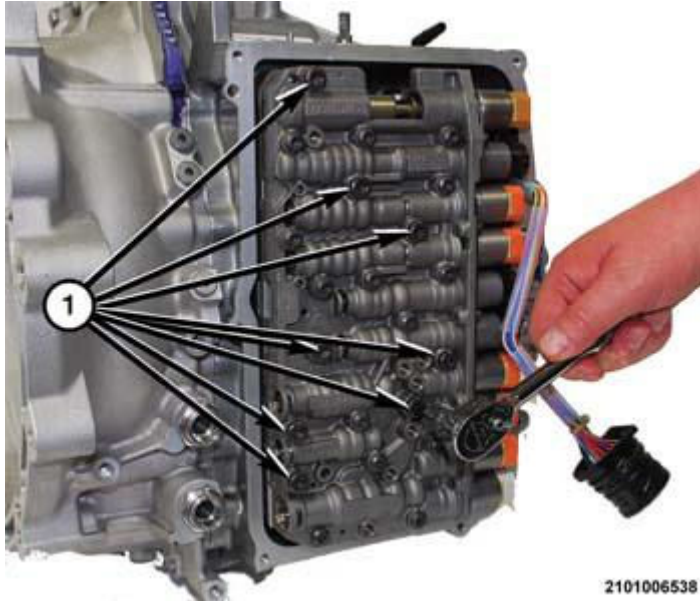


Fig. 61: Valve Body Bolts

Courtesy of CHRYSLER GROUP, LLC

4. Remove the valve body bolts (1).
5. Using a suitable prying tool, pry the valve body away from the adapter tubes.

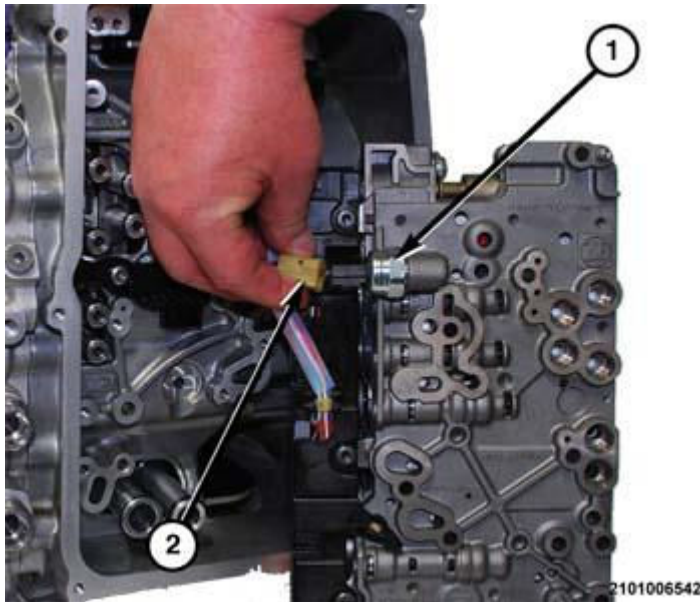


Fig. 62: Fluid Pressure Transducer Wire Harness Connector

Courtesy of CHRYSLER GROUP, LLC

6. Turn the valve body over to gain access to wire harness connectors.
7. Release the lock (2) on the fluid pressure transducer wire connector and separate the wire connector (2) from the fluid pressure transducer (1).

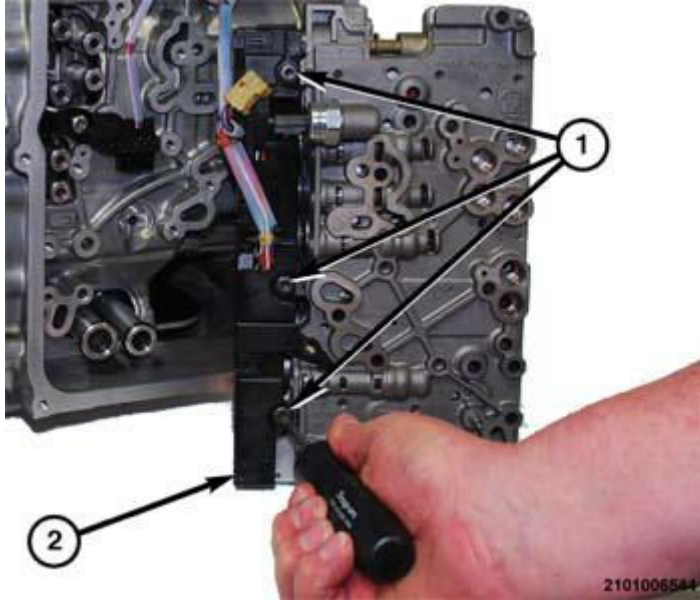


Fig. 63: Removing/Installing Wire Harness Connector At Valve Body Solenoids
Courtesy of CHRYSLER GROUP, LLC

8. Remove the bolts (1) holding the wire harness connector to the valve body and solenoids.
9. Using a suitable prying tool, Separate the wire harness connector (2) from the solenoids.
10. Separate the valve body from the transmission.

NOTE: **If the valve body is to be reused without disassembling it, store the valve body in a clean area until it is installed.**

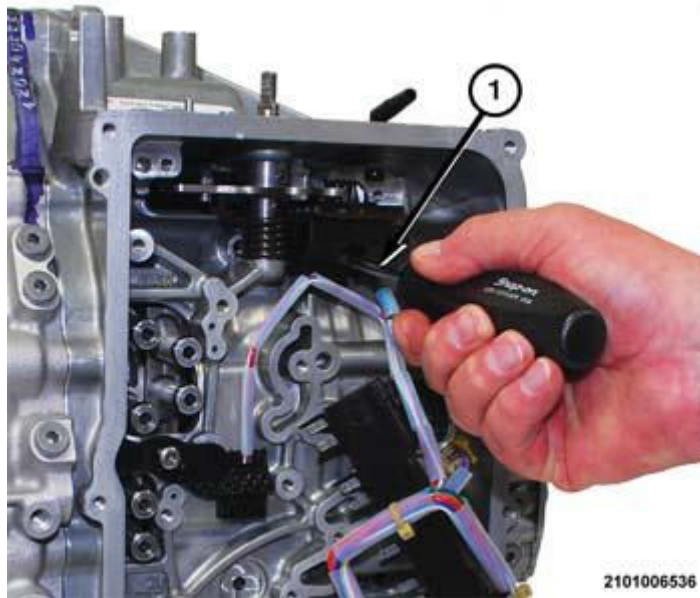


Fig. 64: Removing/Installing Transmission Range Sensor (TRS) Screw
Courtesy of CHRYSLER GROUP, LLC

11. Remove the Transmission Range Sensor (TRS) screw (1).

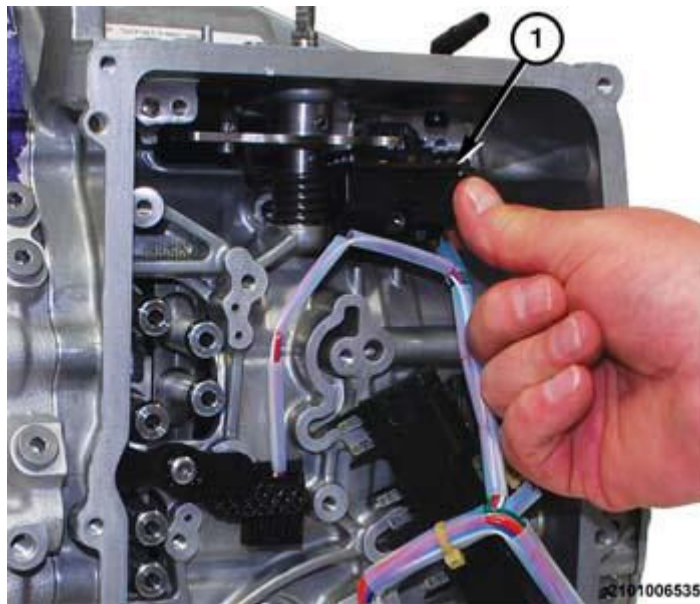


Fig. 65: Removing/Installing Transmission Range Sensor
Courtesy of CHRYSLER GROUP, LLC

12. Separate the TRS (1) from the transmission with the wire harness connected.

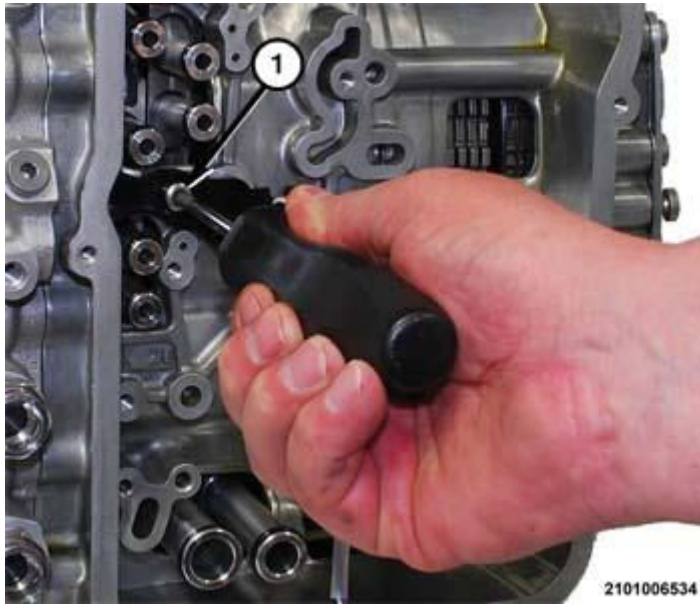


Fig. 66: Removing/Installing Speed Sensor Screw
Courtesy of CHRYSLER GROUP, LLC

13. Remove the speed sensor screw (1).



Fig. 67: Removing/Installing Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

14. Separate the speed sensor (1) from the transmission with the wire harness connected.

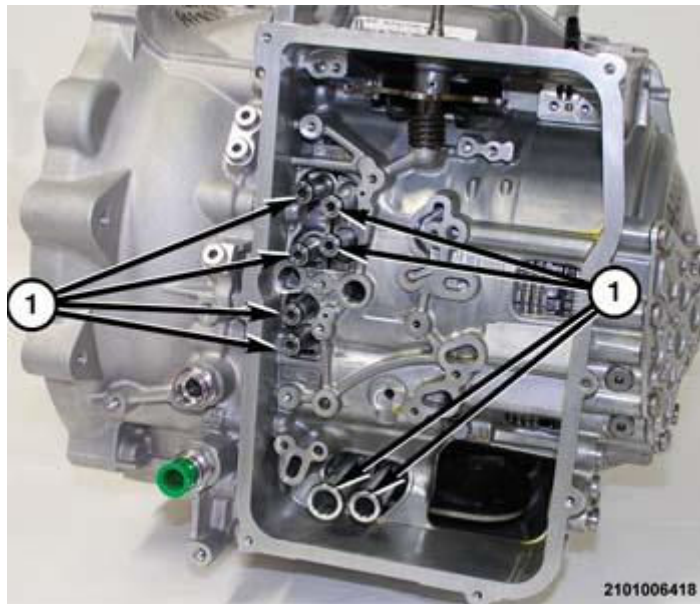


Fig. 68: Fluid Adapter Tubes & O-Ring Seals
Courtesy of CHRYSLER GROUP, LLC

15. Using suitable pliers, remove the fluid adapter tubes (1) from the transmission.

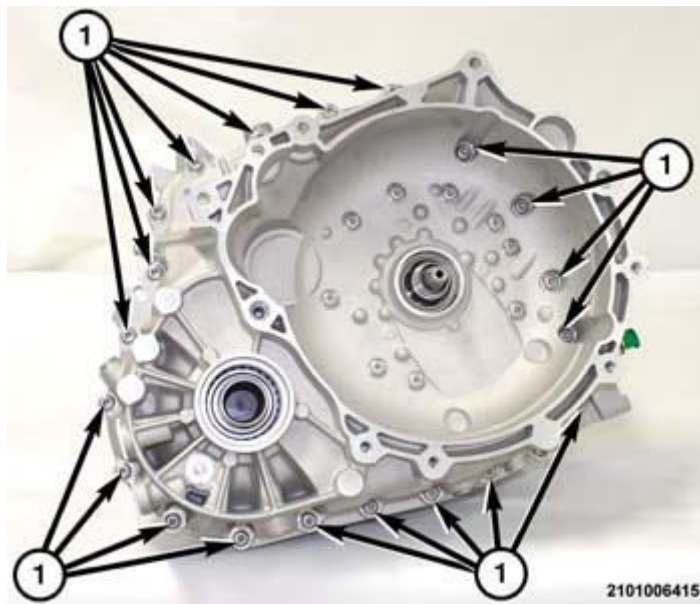


Fig. 69: Bellhousing To Transmission Housing Bolts
Courtesy of CHRYSLER GROUP, LLC

16. From around the perimeter of the transmission, remove the bellhousing bolts (1) holding the bellhousing to the transmission housing.

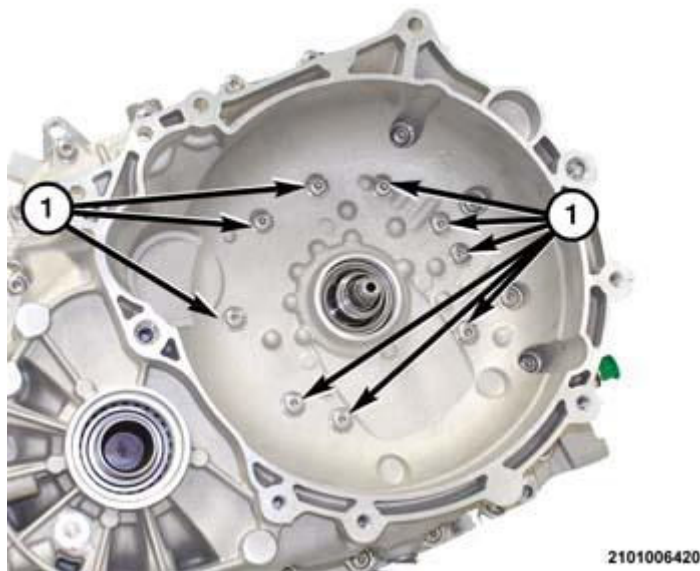


Fig. 70: Bellhousing To Output Gear Support Bolts
Courtesy of CHRYSLER GROUP, LLC

17. Remove the bellhousing bolts (1) holding the bellhousing to the output gear support.
18. Using wooden blocks to stabilize the transmission on the work surface, position the transmission on the bench with the bellhousing facing upward.
19. Using a suitable pry-bar in the pry point locations, pry upward to dislodge the bellhousing from the transmission housing.

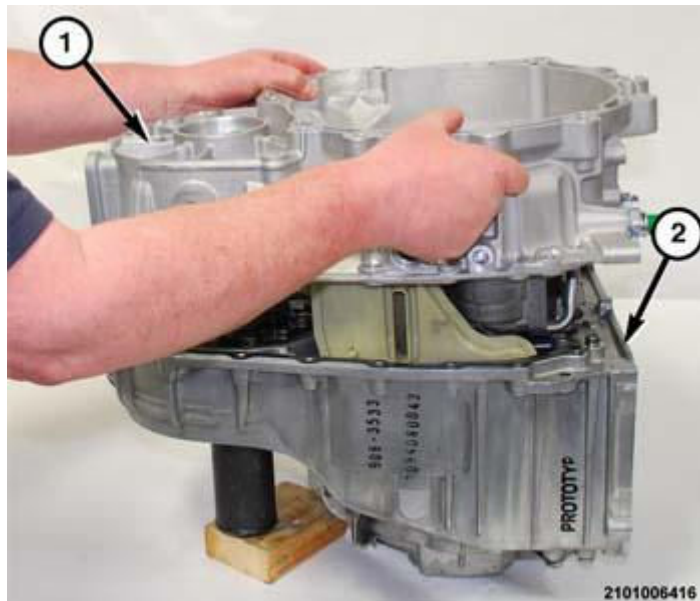


Fig. 71: Removing/Installing Bellhousing At Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

20. Lift the bellhousing (1) upward and separate the assembly from the transmission housing (2).

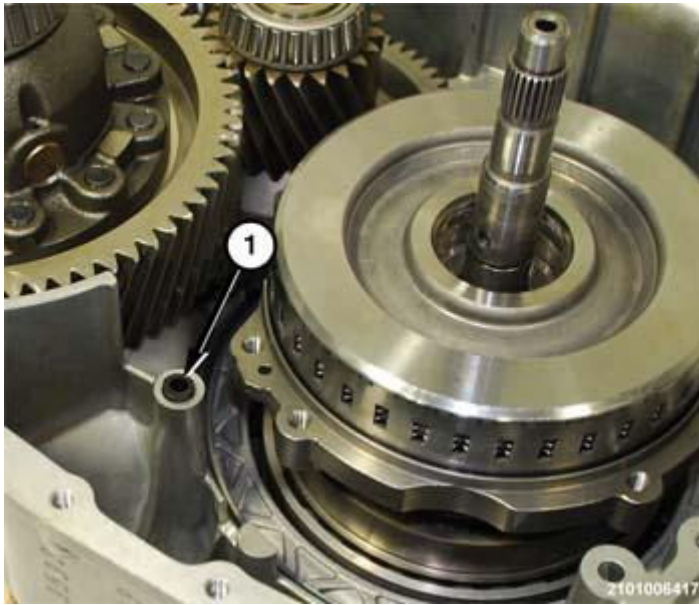


Fig. 72: Port Seal

Courtesy of CHRYSLER GROUP, LLC

21. Remove the seal (1) from the port in the transmission housing.



Fig. 73: Sealing Surface Of Transmission Housing

Courtesy of CHRYSLER GROUP, LLC

22. Separate the gasket (1) from the sealing surface of the transmission housing (2).

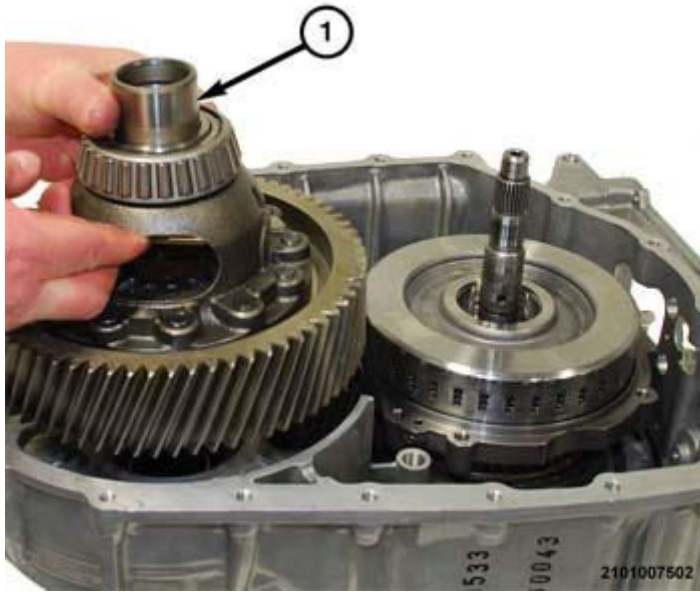


Fig. 74: Removing/Installing Differential Assembly
Courtesy of CHRYSLER GROUP, LLC

23. Remove the differential assembly (1) from the transmission housing.

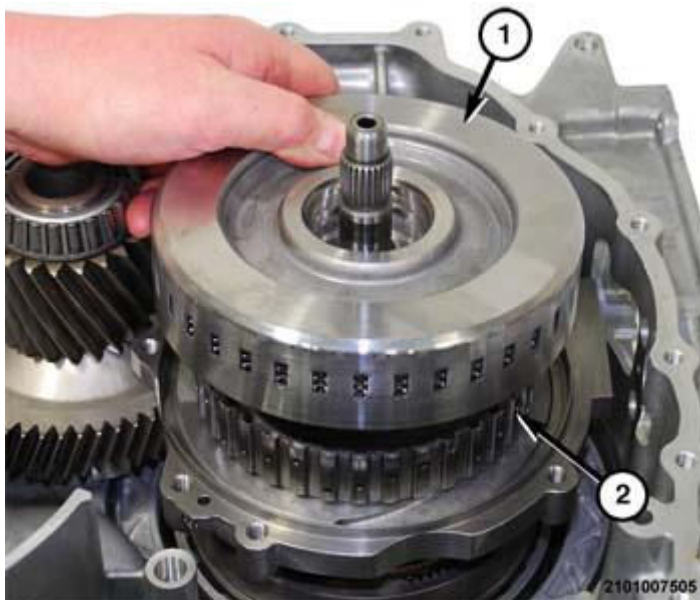


Fig. 75: Removing/Installing E-Clutch At E-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

24. Separate the E-clutch from the E-clutch hub and shaft (2).

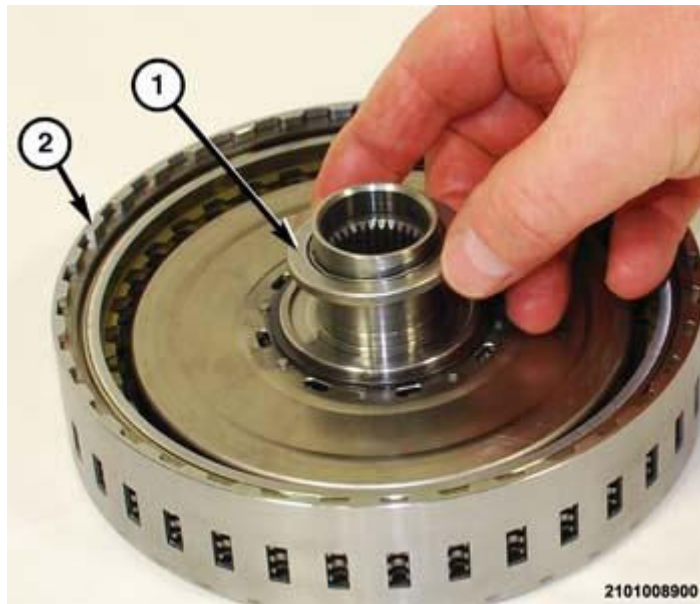


Fig. 76: Removing/Installing Thrust Bearing At E-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

25. Separate the thrust bearing (1) from the E-clutch (2) hub.

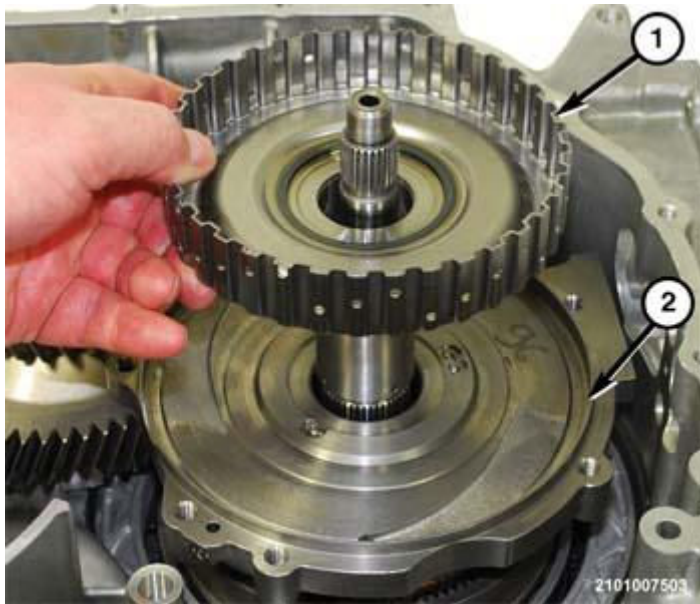


Fig. 77: E-Clutch Hub And Shaft
Courtesy of CHRYSLER GROUP, LLC

26. Separate the E-clutch hub and shaft (1) from the output gear support (2).



Fig. 78: Output Gear Support
Courtesy of CHRYSLER GROUP, LLC

27. Separate the output gear support (1) from the gear 4 planetary pinion carrier (2).



Fig. 79: Removing/Installing Transfer Gear
Courtesy of CHRYSLER GROUP, LLC

28. Remove the transfer gear from the transmission housing (1).

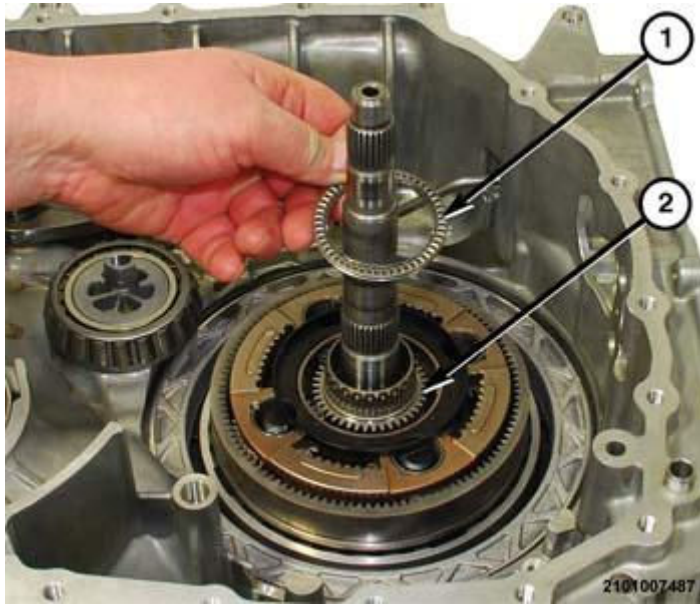


Fig. 80: Roller Type Thrust Bearing
Courtesy of CHRYSLER GROUP, LLC

29. Separate the roller type thrust bearing (1) from the sun gear 3 and 4 and Dog Clutch-F (2).



Fig. 81: Removing/Installing Sun Gear 3, 4 And Dog Clutch-F At Gear 4 Planetary Pinion Carrier
Courtesy of CHRYSLER GROUP, LLC

30. Separate the sun gear 3 and 4 and Dog Clutch-F (1) from the gear 4 planetary pinion carrier.



Fig. 82: Gear 4 Planetary Pinion Carrier
Courtesy of CHRYSLER GROUP, LLC

31. Separate the gear 4 planetary pinion carrier (1) from the annulus gear 4.

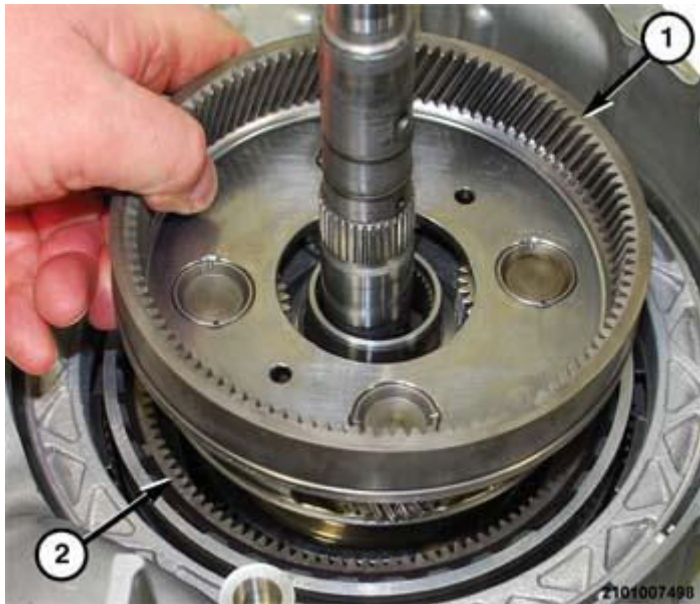


Fig. 83: Annulus Gear 4
Courtesy of CHRYSLER GROUP, LLC

32. Separate the annulus gear 4 from the annulus gear 3 (2).

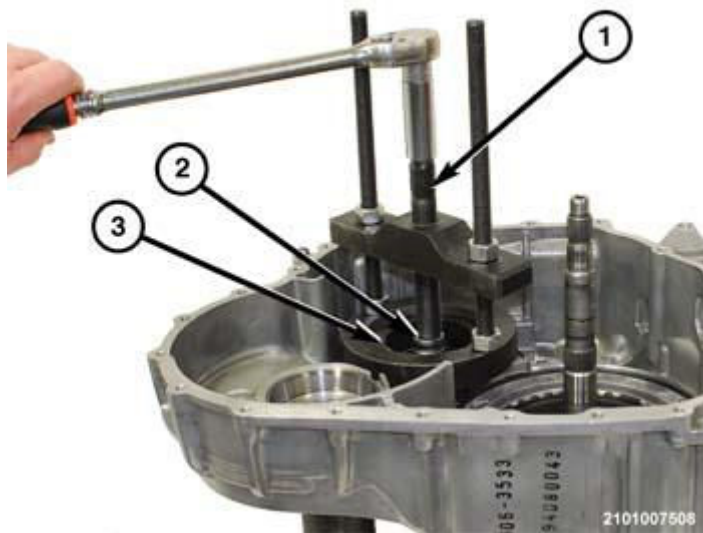


Fig. 84: Removing Transfer Gear Bearing Cone
Courtesy of CHRYSLER GROUP, LLC

33. Using Puller Press (special tool #C-293-PA, Puller, Press) (1), Adapter Blocks (special tool #9738, Blocks, Adapter) (3) and a suitable socket as a plug (2), remove the transfer gear bearing cone from the transmission housing.

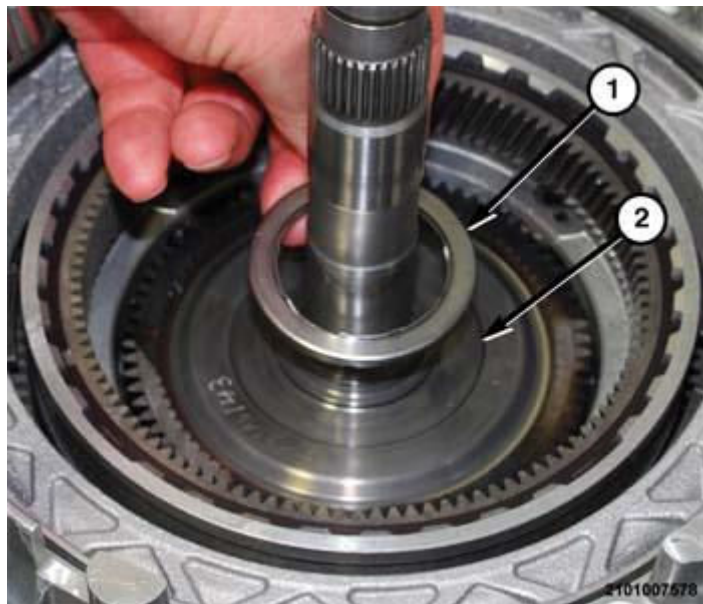


Fig. 85: Thrust Bearing & Annulus Gear 1 Planetary Hub
Courtesy of CHRYSLER GROUP, LLC

34. Separate the thrust bearing (1) from the annulus gear 1 planetary hub (2).



Fig. 86: Annulus Gear 1 Planetary Hub & Carrier Gear 1 And 2
Courtesy of CHRYSLER GROUP, LLC

35. Separate the annulus gear 1 planetary hub (1) from the carrier gear 1&2 (2).



Fig. 87: Thrust Bearing & Annulus Gear 1 Planetary Hub
Courtesy of CHRYSLER GROUP, LLC

36. Separate the thrust bearing (1) from under the annulus gear 1 planetary hub (2).

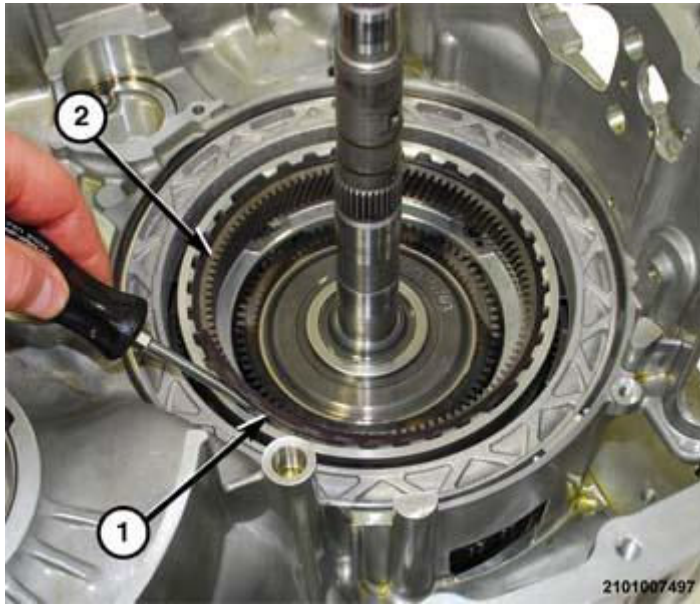


Fig. 88: Annulus Gear 3 & Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

37. Using a suitable screw driver, remove the snap-ring (1) holding the annulus gear 3 (2).

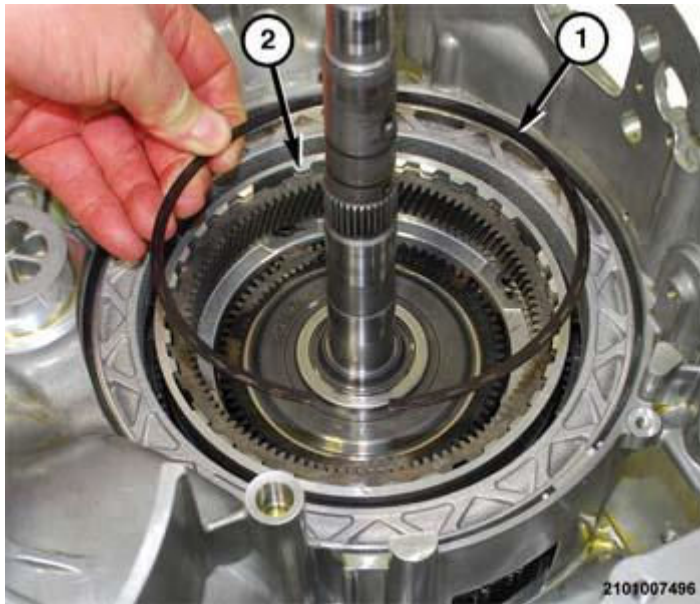


Fig. 89: Snap-Ring & Annulus Gear 3
Courtesy of CHRYSLER GROUP, LLC

38. Separate the snap-ring from the annulus gear 3 (2).



Fig. 90: Annulus Gear 3 & Carrier Gear 1&2
Courtesy of CHRYSLER GROUP, LLC

39. Separate the annulus gear 3 (1) from the carrier gear 1&2.

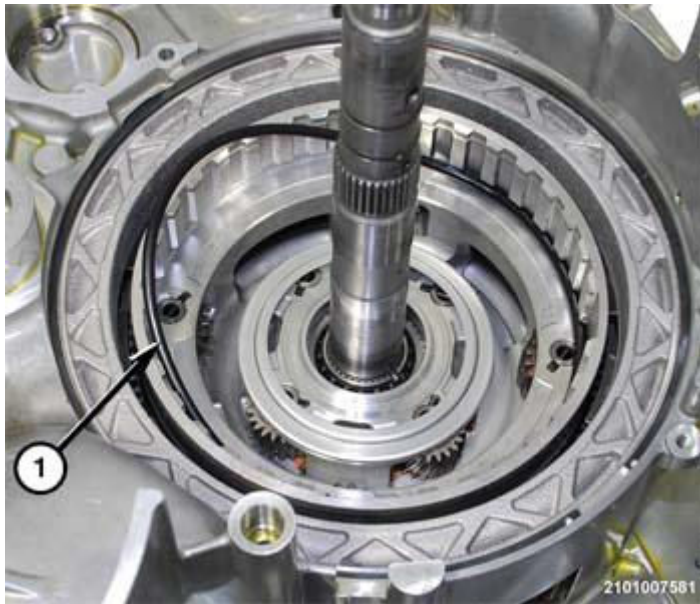


Fig. 91: Carrier Gear 1&2 & O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

40. Remove the O-ring seal (1) from the carrier gear 1&2.

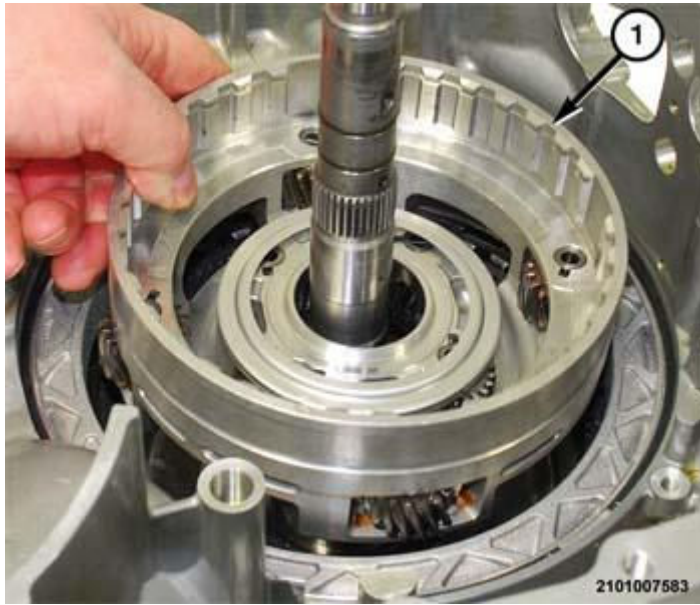


Fig. 92: Carrier Gear, Annulus Gear & D-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

41. Separate the carrier gear 1&2 (1) annulus gear 2, D-clutch hub and input shaft assembly.
42. Position the transmission housing on a suitable arbor pressure using wooden blocks for support.



Fig. 93: Gaining Access To Snap Ring-Ring & Groove
Courtesy of CHRYSLER GROUP, LLC

43. Using Tool (special tool #8901A, Pressing Tool) (with pressure scale removed (1) and legs (special tool #10428, Adapter, Pressing Tool), Compress the bellville spring to gain access to the snap ring-ring (3) holding the D-clutch piston retainer (2) into the transmission housing (4).

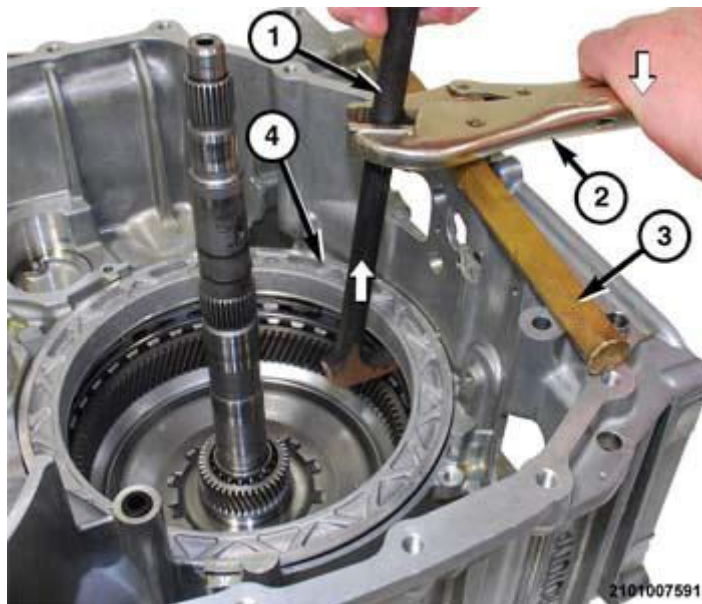


Fig. 94: Prying D-Clutch Piston Retainer Out Of Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

NOTE: The O-ring seal on the D-clutch piston retainer will hang up in the snapping groove during removal and will need to be pried out of the transmission housing.

44. Using a suitable pry-bar (1) vise-grip pliers (2) and a brass drift (3) coupled together, pry the D-clutch piston retainer (4) upward and out of the transmission housing.

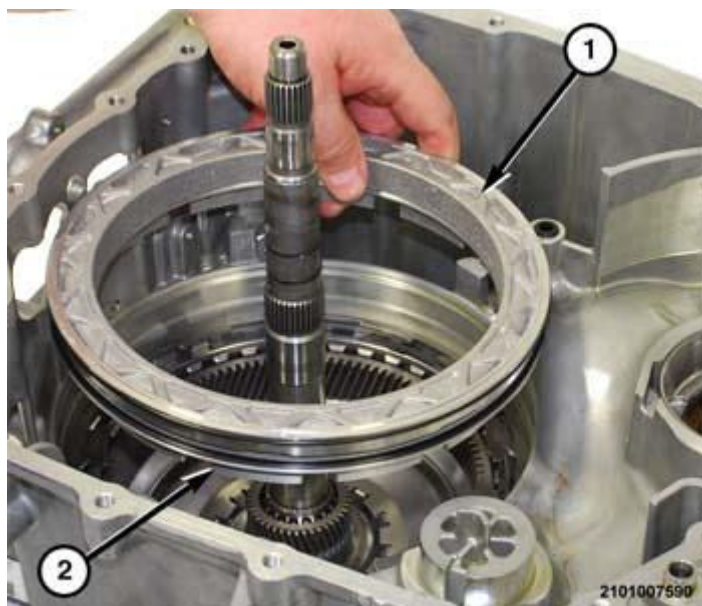


Fig. 95: D-Clutch Piston Retainer
Courtesy of CHRYSLER GROUP, LLC

45. Separate the D-clutch piston retainer (1) from the transmission housing.



Fig. 96: D-Clutch Piston & Retainer
Courtesy of CHRYSLER GROUP, LLC

46. Remove the D-clutch piston from the retainer.

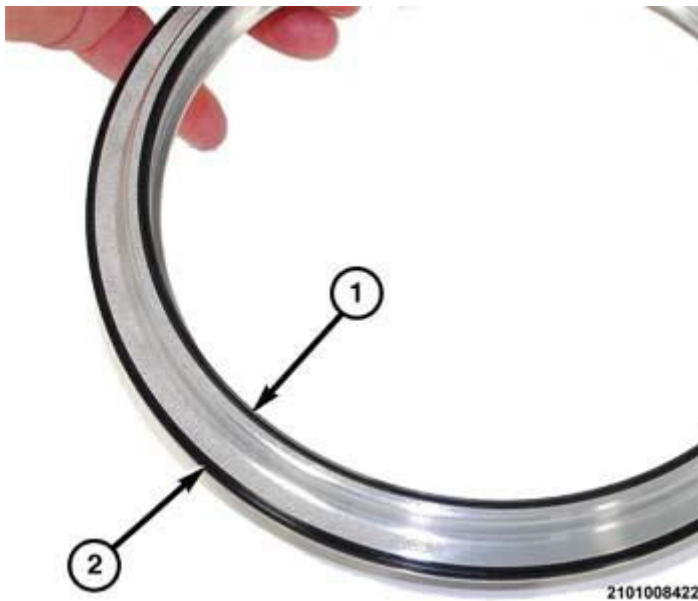


Fig. 97: D-Clutch Piston, Inner & Outer Seals
Courtesy of CHRYSLER GROUP, LLC

47. Remove the inner (1) and outer (2) lip seals from the D-clutch piston.



Fig. 98: D-Clutch Piston Retainer & O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

48. Remove the O-ring seal from the D-clutch piston retainer.

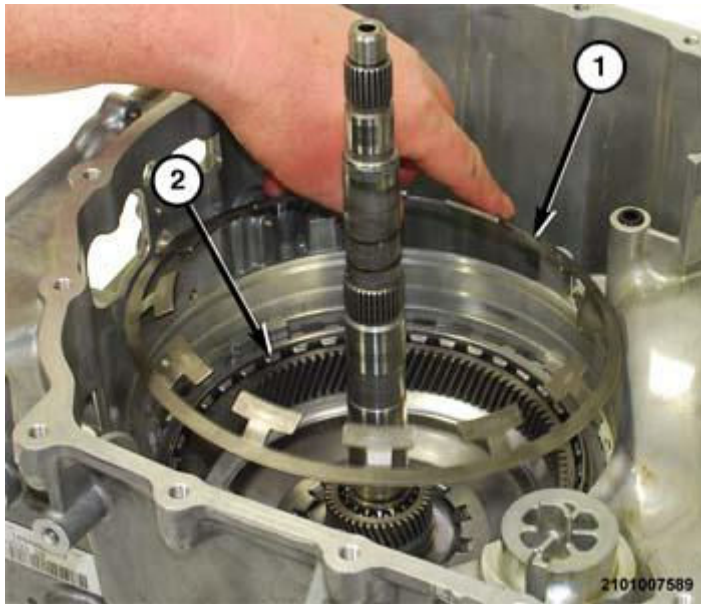


Fig. 99: Removing/Installing Bellville Spring
Courtesy of CHRYSLER GROUP, LLC

49. Separate the bellville spring from the transmission housing.



Fig. 100: Annulus Gear 2, D & C-Clutch Hub And Input Shaft Assembly
Courtesy of CHRYSLER GROUP, LLC

50. Separate the annulus gear 2, D and C-clutch hub and input shaft assembly (1) from the transmission housing.
51. Remove the annulus gear 2, D and C-clutch hub from the input shaft and B-clutch.



Fig. 101: Remove/Install Input Shaft Seal-Rings
Courtesy of CHRYSLER GROUP, LLC

52. Remove the seal-rings (1) from the lands (2) on the input shaft (3).

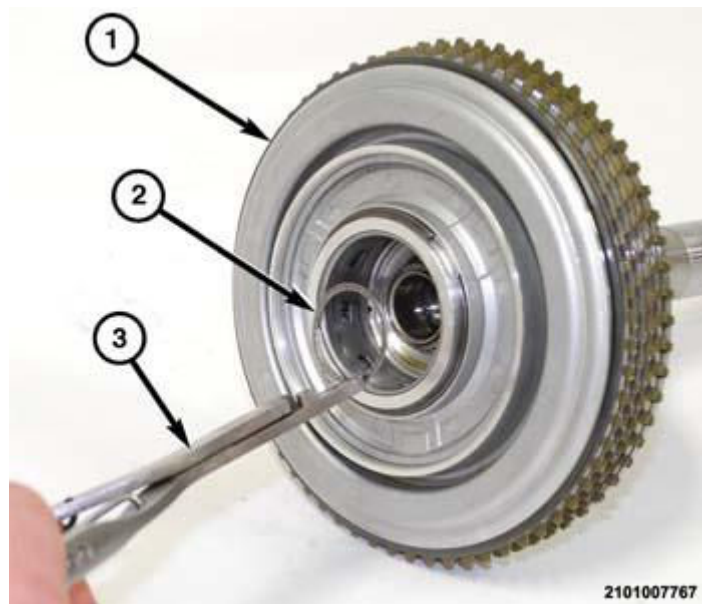


Fig. 102: Input Shaft/Dog Clutch A, B-Clutch Hub & Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

NOTE: Dog clutch A is permanently attached to the input shaft and cannot be disassemble. If the dog clutch A fails an air test, replace the input shaft.

53. Using a suitable snap-ring pliers (3), remove the snap-ring (2) holding the input shaft to the B-clutch (1) hub.
54. Separate the input shaft/dog clutch A from the B-clutch (1) hub.

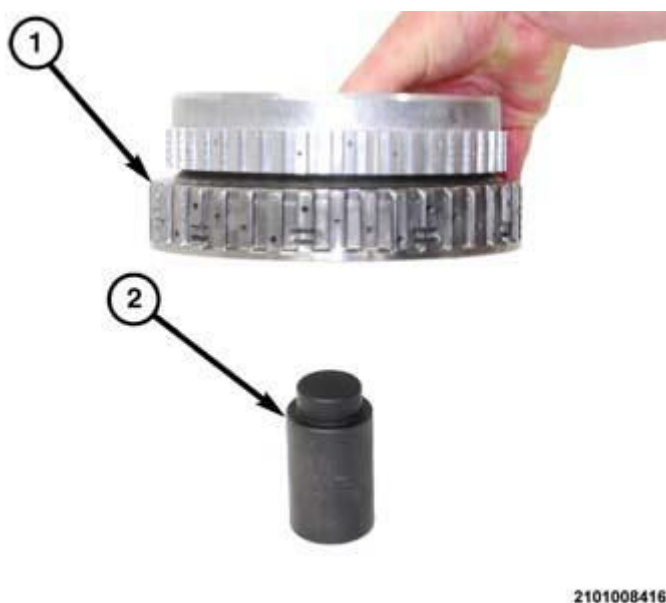


Fig. 103: Annulus Gear 2, D And C-Clutch Hub/B-Clutch Retainer
Courtesy of CHRYSLER GROUP, LLC

55. Place the annulus gear 2, D and C-clutch hub on tool (special tool #9611, Plug, Differential End) to hold the sun gear in position.



Fig. 104: Remove/Install Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

56. Using a suitable snap-ring pliers (1), remove the snap-ring (2) holding the sun gear 1 to the annulus gear 2, D and C-clutch hub.



Fig. 105: Annulus Gear 2, D And C-Clutch Hub (3) & Sun Gear 1
Courtesy of CHRYSLER GROUP, LLC

57. Turn the annulus gear 2 (2), D and C-clutch hub (3) over and remove the sun gear 1 (1).



Fig. 106: Annulus Gear 2, D-Clutch Hub & C-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

58. Separate the Annulus gear 2, D-clutch hub (1) from the C-clutch hub.



Fig. 107: Thrust Bearing & C-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

59. Separate the thrust bearing (1) from the C-clutch hub (2).

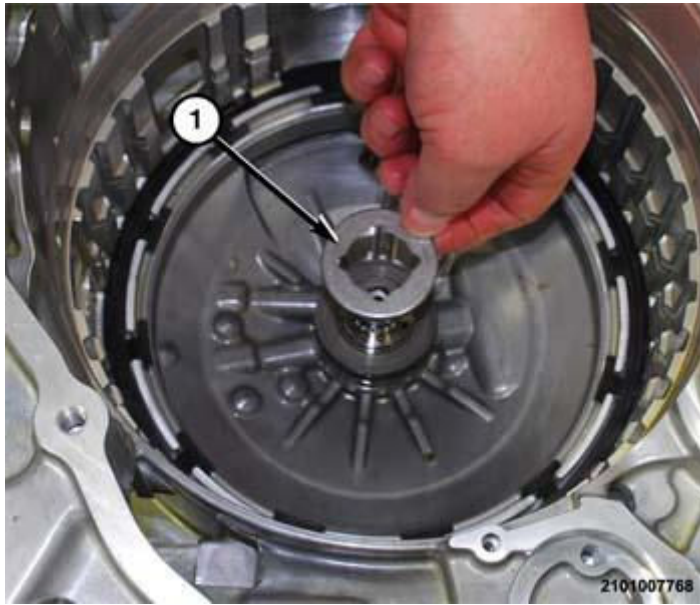


Fig. 108: Thrust Bearing & Input Shaft Rear Support
Courtesy of CHRYSLER GROUP, LLC

60. Remove the thrust bearing (1) from the input shaft rear support.



Fig. 109: Removing/Installing Input Shaft Rear Support Selective Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

61. Remove the input shaft rear support selective thrust washer (1).



Fig. 110: Removing D-Clutch Friction Discs & Steel Plates From Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

62. Separate the D-clutch friction discs and steel plates (1) from the transmission housing.

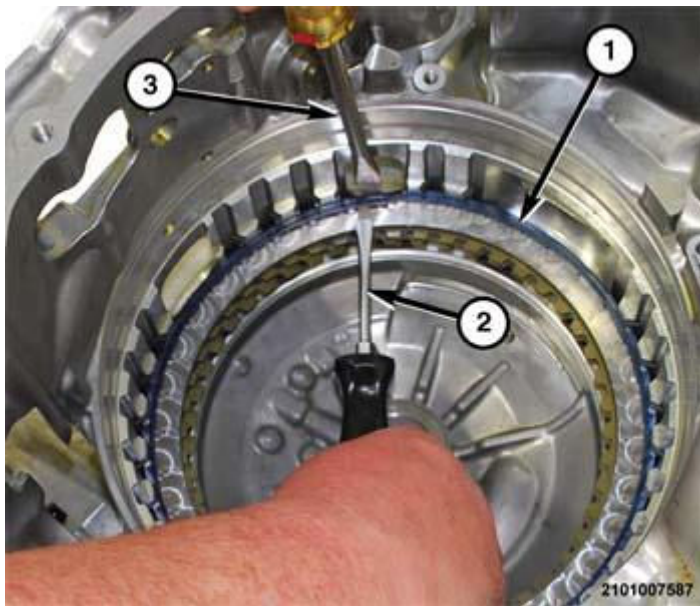


Fig. 111: Removing Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

63. Using two suitable screw drivers, lift (2) the snap-ring (1) and pry it inward (3) and out of from the groove in the transmission housing.



Fig. 112: Removing C-Clutch Friction Discs & Steel Plates From Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

64. Separate the C-clutch friction discs and steel plates (1) from the transmission housing.

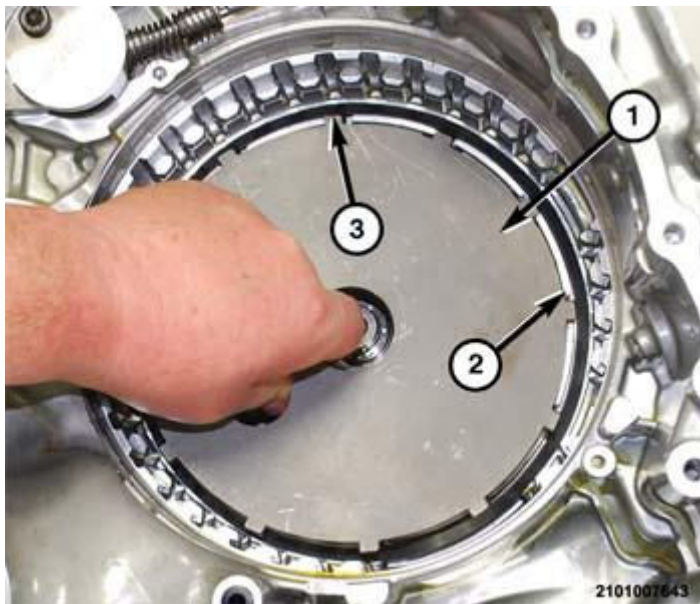


Fig. 113: C-Clutch Bellville Spring & Special Tool
Courtesy of CHRYSLER GROUP, LLC

65. Place the tool (special tool #10504, Compressor, Spring) (1) over the C-clutch bellville spring at the bottom of the transmission housing.

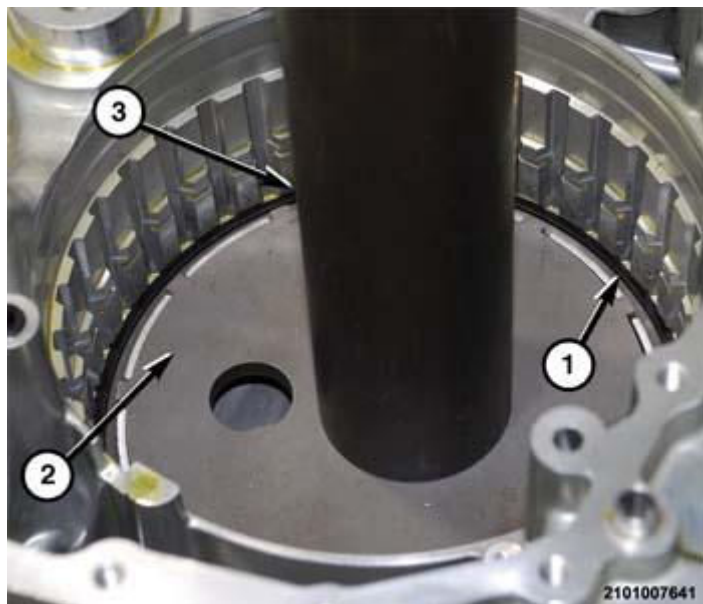


Fig. 114: C-Clutch Bellville Spring & Special Tools
Courtesy of CHRYSLER GROUP, LLC

66. Place tool (special tool #8228, Installer, Bearing) (3) over the input shaft support (tool 8901 with 10428 legs can also be used), compress the bellville spring to gain access to the stepped snap-ring (1).

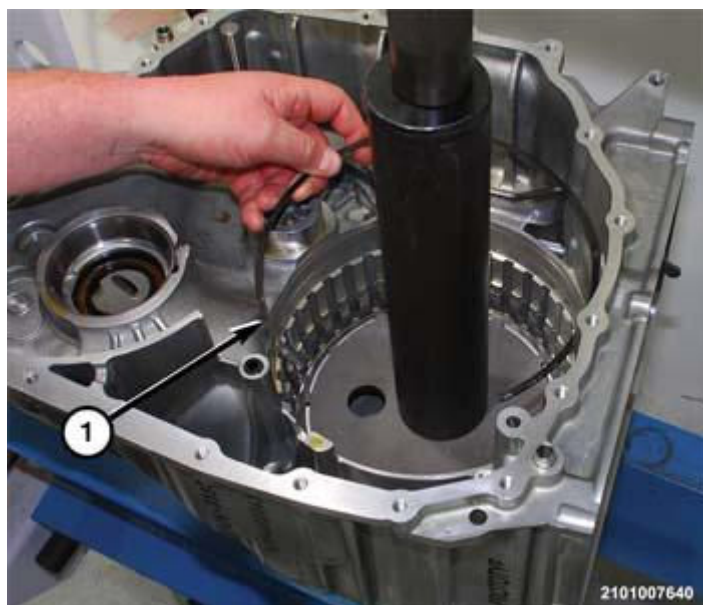


Fig. 115: Removing/Installing Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

67. Using a suitable screw driver, remove the snap-ring (1) holding the C-clutch bellville spring in the transmission housing.



Fig. 116: C-Clutch Bellville Spring & C-Clutch Piston
Courtesy of CHRYSLER GROUP, LLC

68. Separate the C-clutch bellville spring (1) from the C-clutch piston (2).

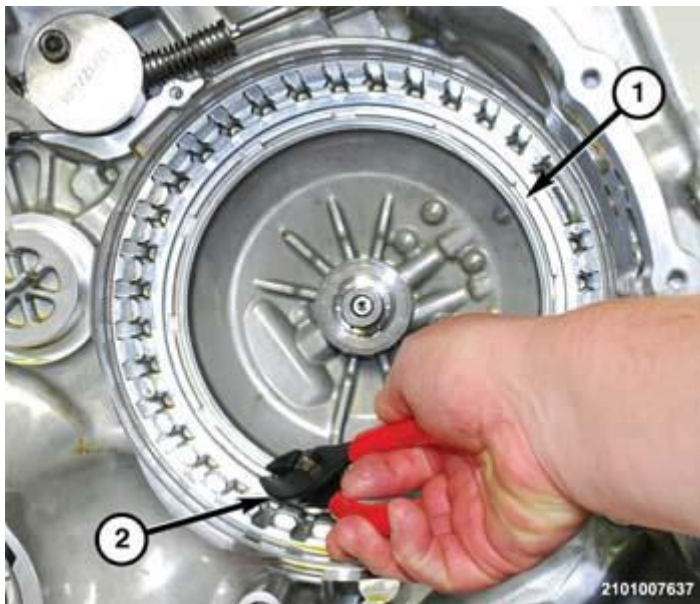


Fig. 117: Removing/Installing C-Clutch Piston
Courtesy of CHRYSLER GROUP, LLC

69. Using a suitable pliers (2), remove the C-clutch piston (1) from the transmission housing.

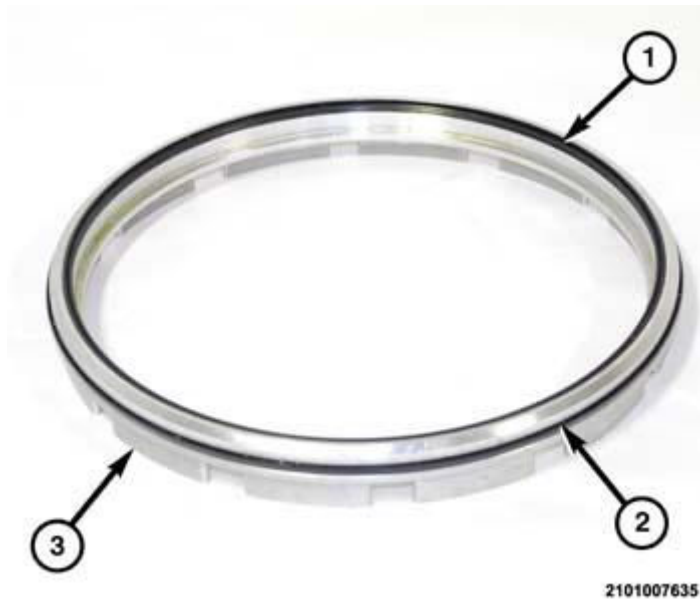


Fig. 118: C-Clutch Piston & Seals
Courtesy of CHRYSLER GROUP, LLC

70. If overhaul is being performed, remove inner (1) and outer (2) seals from the C-clutch piston.



Fig. 119: Removing/Installing Inner Seal-Rings
Courtesy of CHRYSLER GROUP, LLC

71. Using a suitable hook tool, remove the inner seal-rings (1) from the input shaft support.

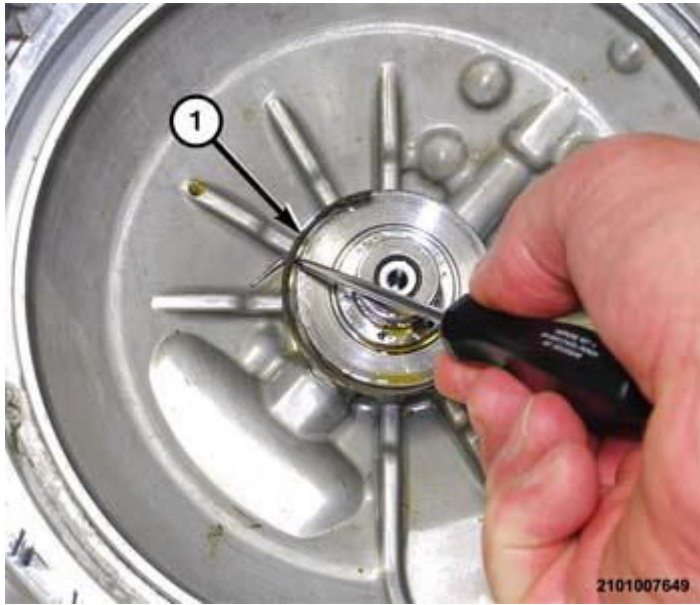


Fig. 120: Removing/Installing Outer Seal-Rings
Courtesy of CHRYSLER GROUP, LLC

72. Using a suitable hook tool, remove the outer seal-rings (1) from the input shaft support.



Fig. 121: Removing/Installing Split Roller Bearing
Courtesy of CHRYSLER GROUP, LLC

73. Using a suitable hook tool, remove the split roller bearing (1) from the input shaft support.

ASSEMBLY

ASSEMBLY

The work area, counter surfaces and tools must be thoroughly cleaned before attempting to assemble the 948TE transmission. All of the sub assemblies should be disassembled, cleaned, and assembled with new sealing components where applicable. The transmission housing should be clean and oil free before beginning this procedure. The B, C, D, and E-clutches should be properly measured and adjusted prior to assembling the transmission. If the transmission was contaminated with metallic material, all of the thrust bearings and roller bearing should be replaced. The bearing in the output gear support assembly is not serviceable. The output gear support assembly should be replaced if metal debris is present.

WARNING: Always wear safety glasses when cleaning, disassembling and assembling the transmission/transaxle. Contents of the transmission/transaxle can become projectiles (e.g., springs, snap-rings, as well as metal and other debris). Failure to wear safety glasses may result in severe personal injury.

1. Place the transmission housing on a clean work surface with the open interior upward.
2. Place wooden blocks under the transmission to stabilize it for assembly.



Fig. 122: Removing/Installing Split Roller Bearing
Courtesy of CHRYSLER GROUP, LLC

3. Install the split roller bearing (1) in position on the input shaft support.

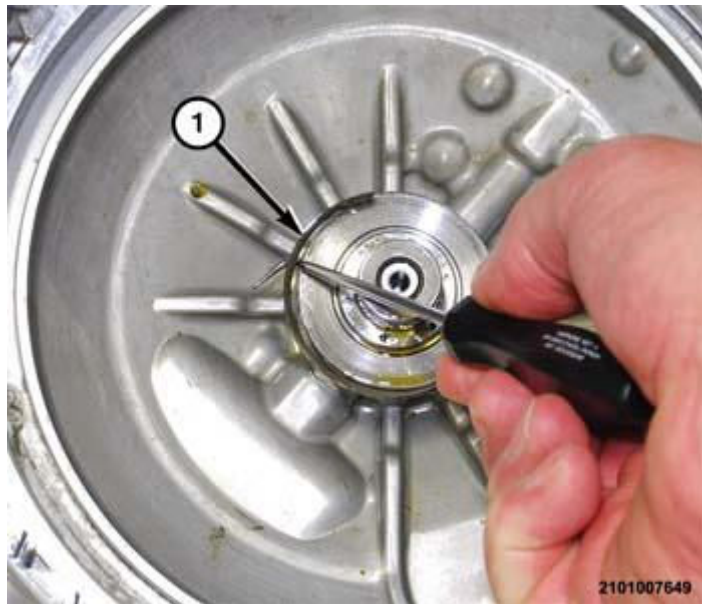


Fig. 123: Removing/Installing Outer Seal-Rings
Courtesy of CHRYSLER GROUP, LLC

4. Install the outer seal-rings (1) in the lands in the input shaft support.



Fig. 124: Removing/Installing Inner Seal-Rings
Courtesy of CHRYSLER GROUP, LLC

5. Install the inner seal-rings (1) in the lands in the input shaft support.



Fig. 125: Installing Inner Seal On C-Clutch Piston
Courtesy of CHRYSLER GROUP, LLC

6. Install the inner seal (2) on the C-clutch piston (1).

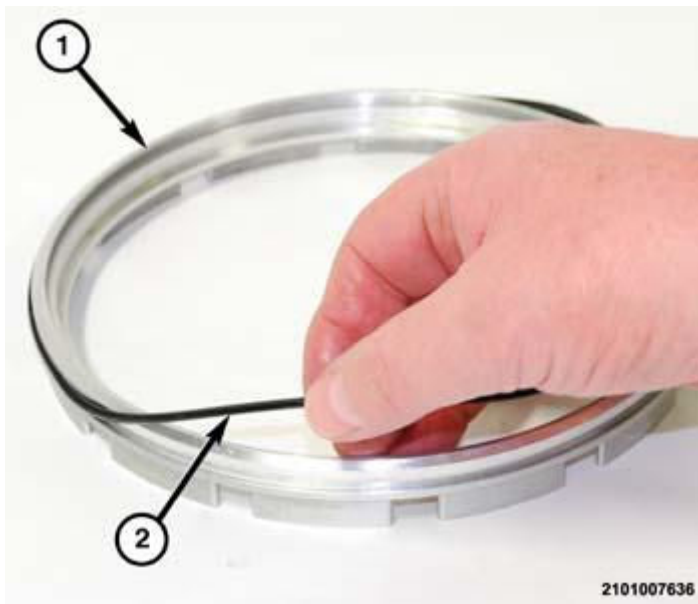


Fig. 126: Installing Outer Seal On C-Clutch Piston
Courtesy of CHRYSLER GROUP, LLC

7. Install the outer seal (2) on the C-clutch piston (1).



Fig. 127: Removing/Installing C-Clutch Piston
Courtesy of CHRYSLER GROUP, LLC

8. Install the C-clutch piston (1) in the transmission housing.

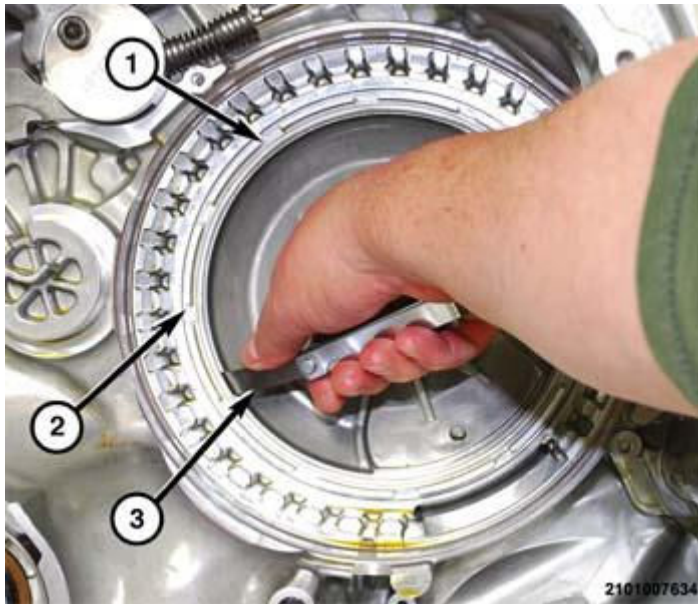


Fig. 128: Using Feeler Gauge To Turn Lip On Seal
Courtesy of CHRYSLER GROUP, LLC

9. If necessary, use a thin feeler gauge to turn the lip on the seal into the retainer as the piston is pushed downward.



Fig. 129: C-Clutch Bellville Spring & C-Clutch Piston
Courtesy of CHRYSLER GROUP, LLC

10. Place the C-clutch bellville spring (1) in position on the C-clutch piston (2).

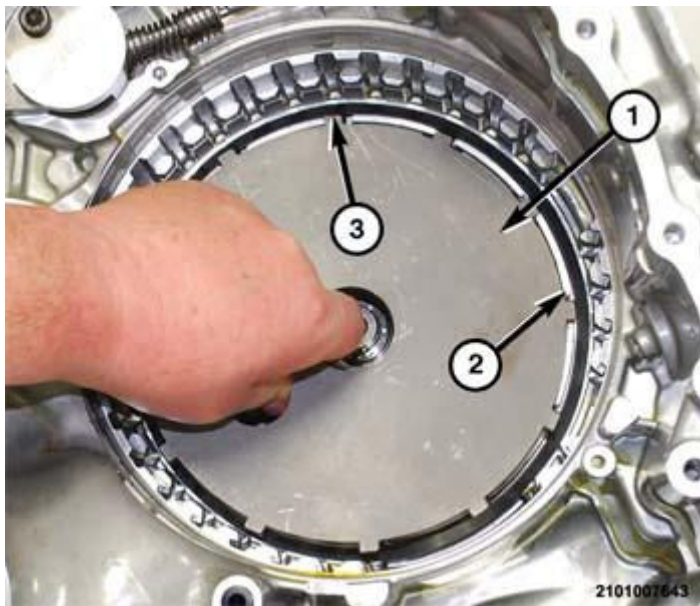


Fig. 130: C-Clutch Bellville Spring & Special Tool
Courtesy of CHRYSLER GROUP, LLC

11. Place the tool (special tool #10504, Compressor, Spring) (1) over the C-clutch bellville spring (3) at the bottom of the transmission housing.

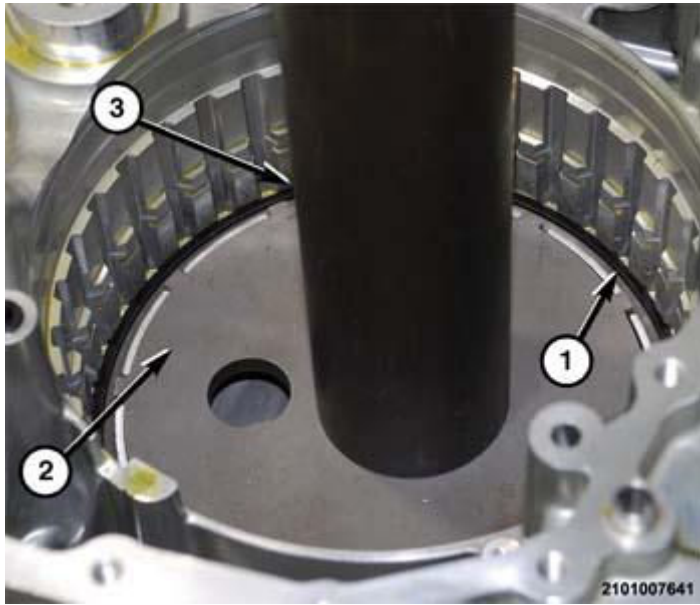


Fig. 131: C-Clutch Bellville Spring & Special Tools
Courtesy of CHRYSLER GROUP, LLC

12. Place tool (special tool #8228, Installer, Bearing) (3) over the input shaft support (tool 8901 with 10428 legs can also be used), compress the bellville spring to gain access to the snap-ring (1) groove.

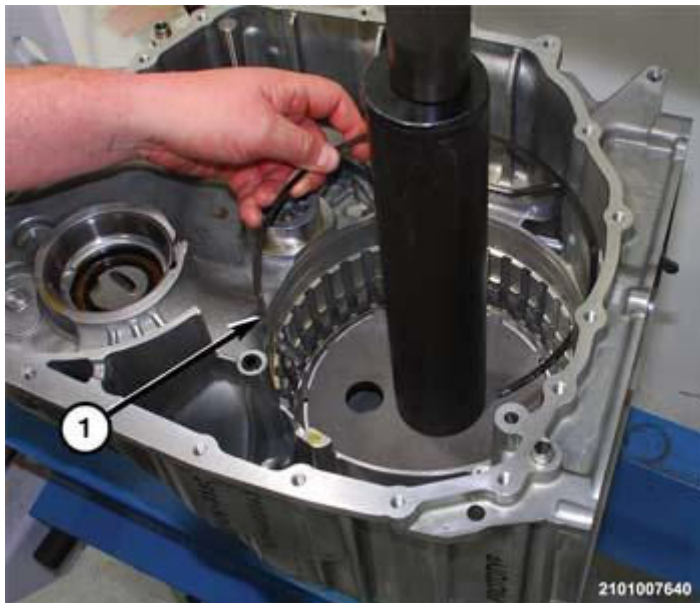


Fig. 132: Removing/Installing Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

13. Install the snap-ring (1), stepped side down, to hold the C-clutch bellville spring in the transmission housing.
14. Remove the transmission housing from the arbor press and position it on a clean work bench. Position wood blocks under transmission to stabilize it for assembly.

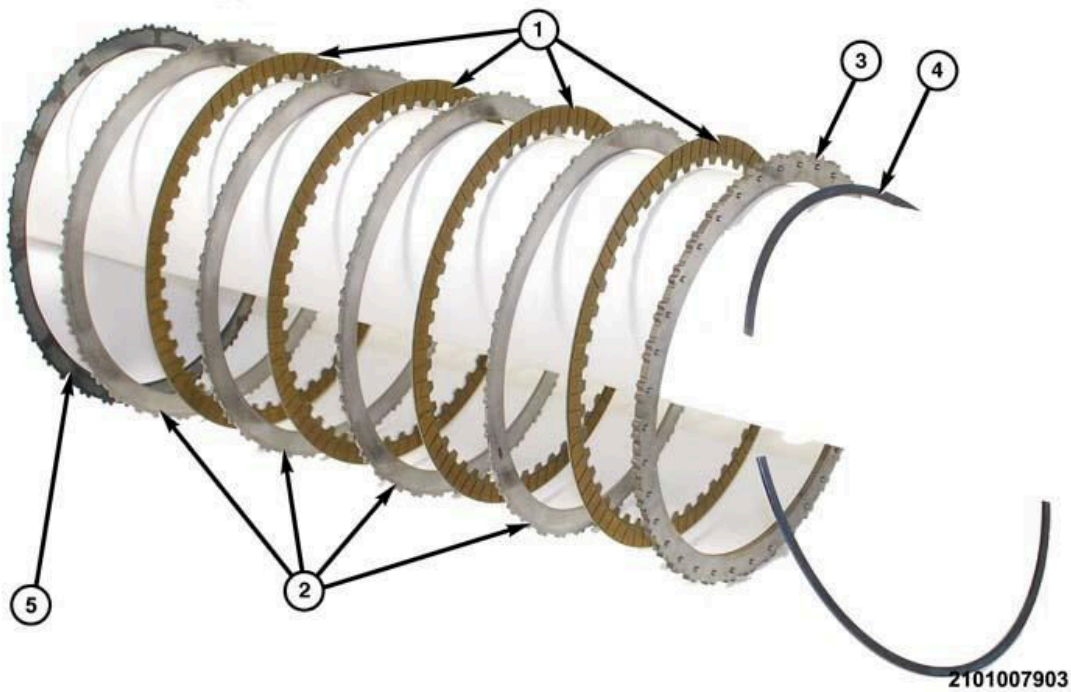


Fig. 133: Exploded View Of C-Clutch Wave Plate, Steel Plates, & Friction Discs
 Courtesy of CHRYSLER GROUP, LLC

15. Install the C-clutch wave plate (5), one steel plate (2), then install the friction discs (1) alternately separated with steel plates (2) into the transmission housing on top of the C-clutch piston.

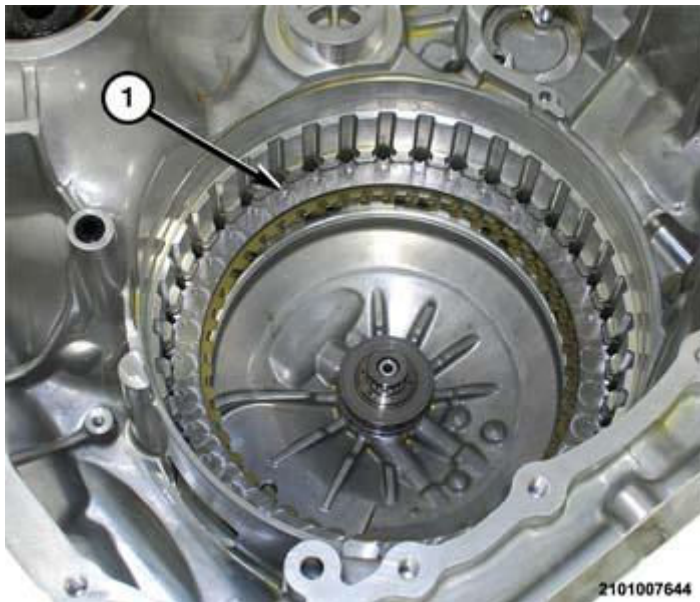


Fig. 134: C-Clutch Reaction Plate
 Courtesy of CHRYSLER GROUP, LLC

16. Install the C-clutch reaction plate (1) with raised bosses upward on top of the C-clutch disc and plate

pack.

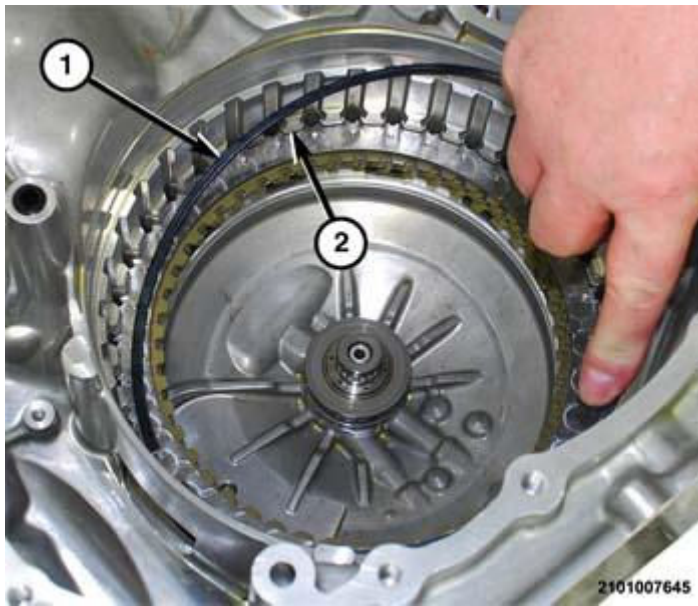


Fig. 135: Installing Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

17. Install the snap-ring (1) in the groove (2) in the transmission housing.

NOTE: Perform C-clutch measurements to verify that the correct selective plate is installed.

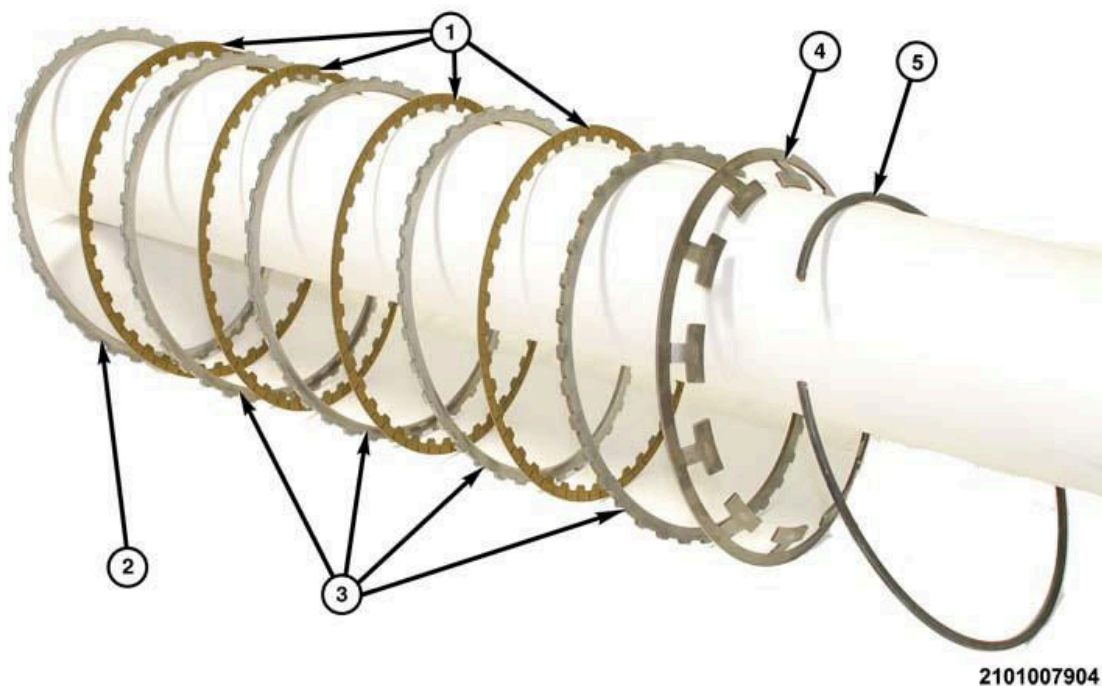


Fig. 136: Exploded View Of D-Clutch, Select Plate, Friction Plate & Steel Plates
Courtesy of CHRYSLER GROUP, LLC

NOTE: Perform D-clutch measurements to verify that the correct select plate (2) is installed.

18. Install the correct thickness selective plate (2).
19. Starting with a friction plate (1), alternately install the friction (1) and steel plates (3) in to the case.



Fig. 137: Removing/Installing Input Shaft Rear Support Selective Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

20. Install the input shaft rear support selective thrust washer.

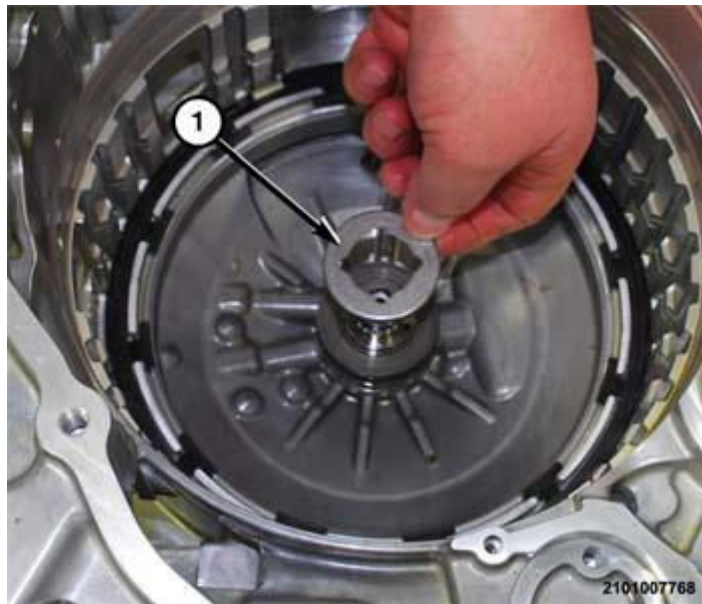


Fig. 138: Thrust Bearing & Input Shaft Rear Support
Courtesy of CHRYSLER GROUP, LLC

21. Install the thrust bearing (1) onto the input shaft rear support.

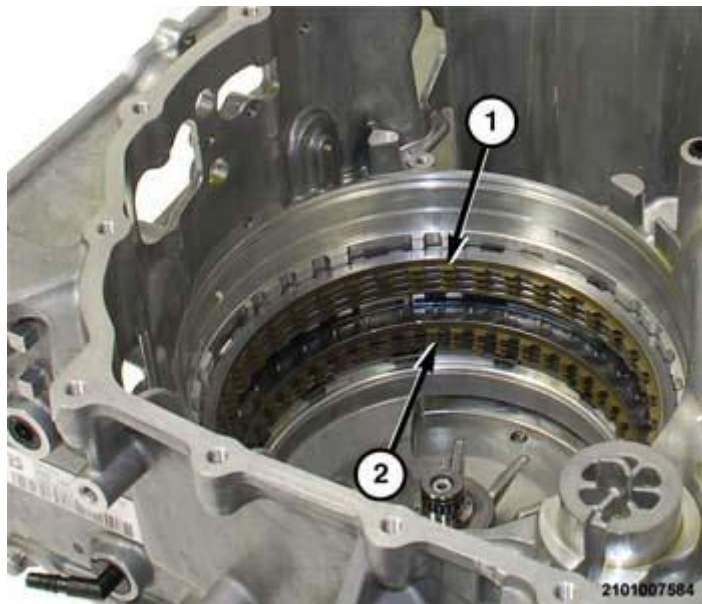


Fig. 139: D And C-Clutch Hubs & Input Shaft Assembly
Courtesy of CHRYSLER GROUP, LLC

22. Use a suitable screw driver to align the gaps in the friction discs in to D (1) and C (2) -clutch to prepare for installing the annulus gear 2, D and C-clutch hubs and input shaft assembly (1).

NOTE: Before Final assembly of the annulus gear 2, D and C-clutch hub and input shaft, measure the B-clutch to verify that proper select plate was installed

and air test the dog-A clutch and input shaft to verify proper sealing. The input shaft dog-A clutch hub are not serviceable and must be replaced if leaking.



Fig. 140: Thrust Bearing & C-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

23. Place the thrust bearing (1) in position on the C-clutch hub/B-clutch retainer (2).



Fig. 141: Annulus Gear 2, D-Clutch Hub & C-Clutch Hub/B-Clutch Retainer
Courtesy of CHRYSLER GROUP, LLC

24. Place the Annulus gear 2, D-clutch hub (1) in position on the C-clutch hub/B-clutch retainer (2).

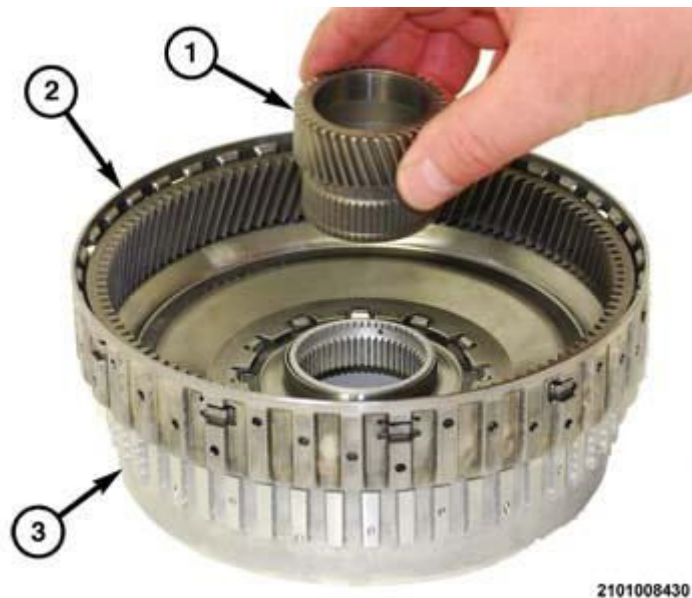


Fig. 142: Annulus Gear 2, D And C-Clutch Hub (3) & Sun Gear 1
Courtesy of CHRYSLER GROUP, LLC

25. Insert the sun gear 1 (1) into annulus gear 2 (2), D and C-clutch hub/B-clutch retainer (3).



Fig. 143: Annulus Gear 2, D And C-Clutch Hub/B-Clutch Retainer
Courtesy of CHRYSLER GROUP, LLC

26. Turn the annulus gear 2, D and C-clutch hub/B-clutch retainer over and place it on tool (special tool #9611, Plug, Differential End) (2) to hold the sun gear in position.



Fig. 144: Remove/Install Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

27. Using a suitable snap-ring pliers (1), install the snap-ring (2) to hold the sun gear 1 to the annulus gear 2, D and C-clutch hub/B-clutch retainer.



Fig. 145: Remove/Install Input Shaft Seal-Rings
Courtesy of CHRYSLER GROUP, LLC

28. Install NEW seal-rings (1) in the lands (2) on the input shaft (3).
29. Insert the input shaft into the B-clutch hub.

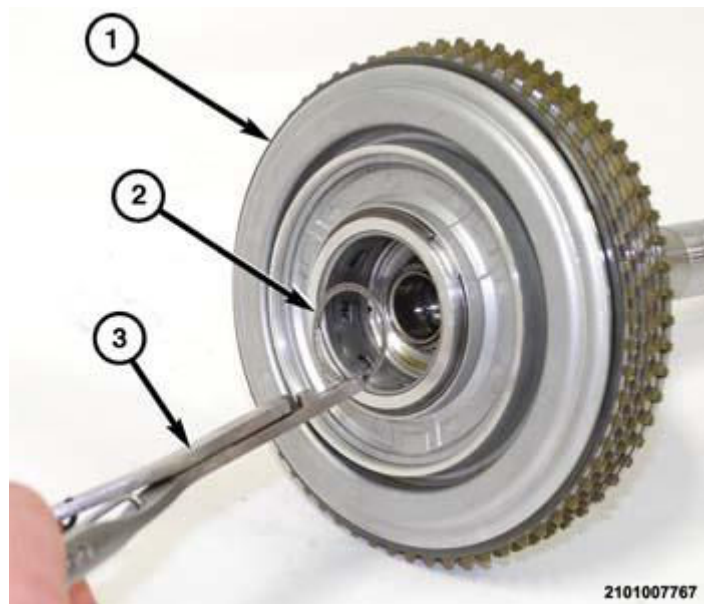


Fig. 146: Input Shaft/Dog Clutch A, B-Clutch Hub & Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

30. Using a suitable snap-ring pliers (3), install the snap-ring (2) to hold the input shaft to the B-clutch (1) hub.

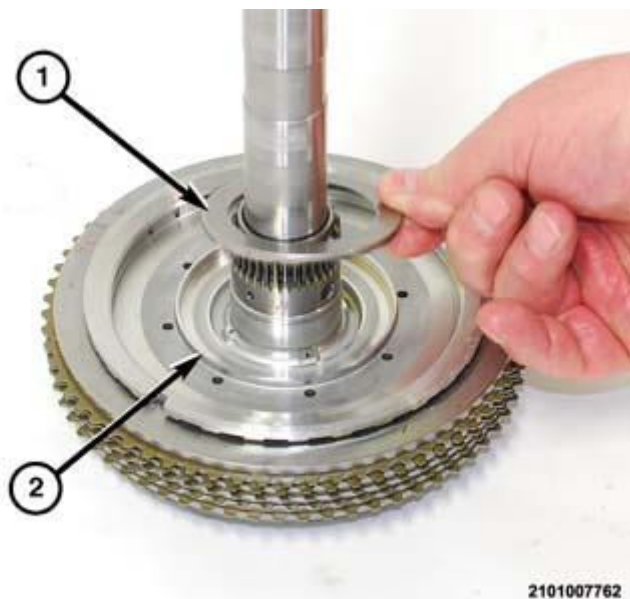


Fig. 147: Thrust Bearing & B-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

31. Place the thrust bearing on the B-clutch hub.
32. Install the annulus gear 2, D and C-clutch hub on the input shaft, B-clutch assembly.



Fig. 148: Annulus Gear 2, D & C-Clutch Hub And Input Shaft Assembly
Courtesy of CHRYSLER GROUP, LLC

33. Install the annulus gear 2, D and C-clutch hub, input shaft and B-clutch assembly (1) into the transmission housing.

NOTE: While not allowing the input shaft to slip inward, wriggle the annulus gear 2, D and C-clutch hubs and input shaft assembly (1) until they engage the D and C-clutch discs. A solid audible clunk will be heard if installed correctly. If the input shaft slips inward the B-clutch will come out of its retainer impeding proper installation.

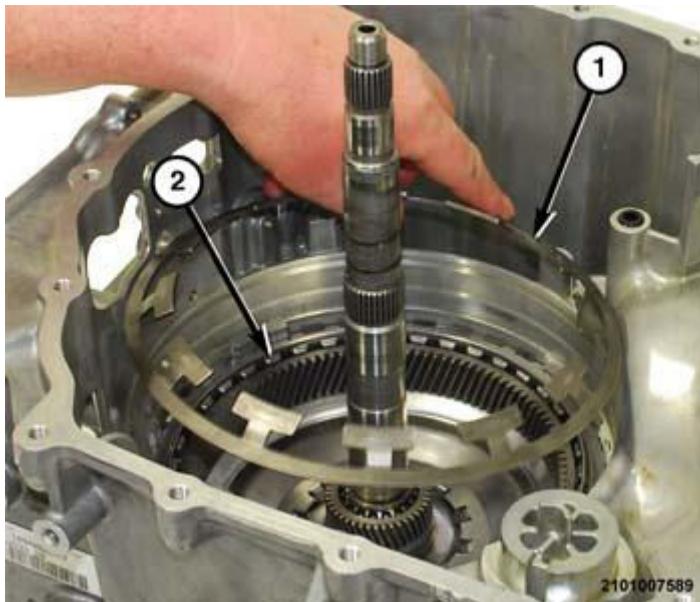


Fig. 149: Removing/Installing Bellville Spring

Courtesy of CHRYSLER GROUP, LLC

34. Place the D-clutch piston bellville spring (1) in position on the transmission housing (2).



Fig. 150: D-Clutch Piston Retainer & O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

35. Install NEW O-ring seal (2) in the D-clutch piston retainer (1).

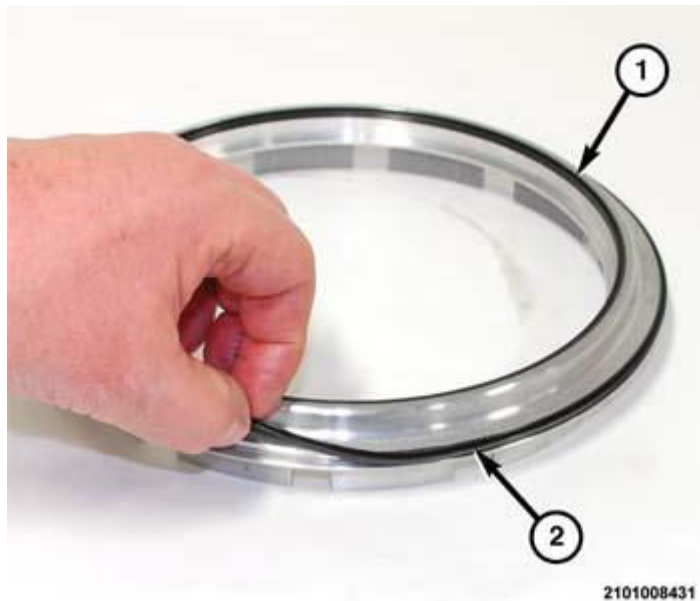


Fig. 151: D-Clutch Piston & Outer Lip Seal Ring
Courtesy of CHRYSLER GROUP, LLC

36. Install NEW outer lip seal ring (2) in the D-clutch piston (1).



Fig. 152: D-Clutch Piston & Inner Lip Seal Ring
Courtesy of CHRYSLER GROUP, LLC

37. Install NEW inner lip seal ring (1) in the D-clutch piston (2).



Fig. 153: D-Clutch Piston & Retainer
Courtesy of CHRYSLER GROUP, LLC

38. Install the D-clutch piston (2) in the retainer (1).

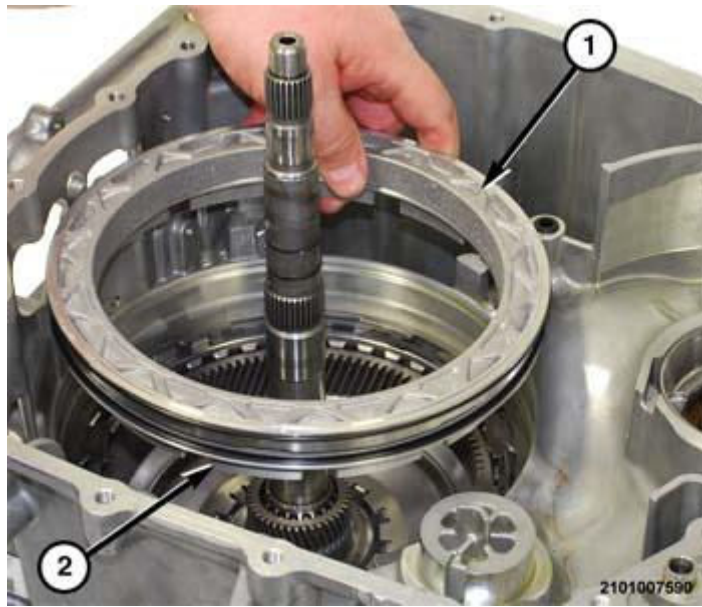


Fig. 154: D-Clutch Piston Retainer
Courtesy of CHRYSLER GROUP, LLC

39. Place the D-clutch piston (2) and retainer (1) assembly in the transmission housing over the D-clutch bellville spring. The fingers on the D-clutch piston (2) rest against the D-clutch select plate.
40. Position the transmission housing on a suitable arbor pressure using wooden blocks for support.

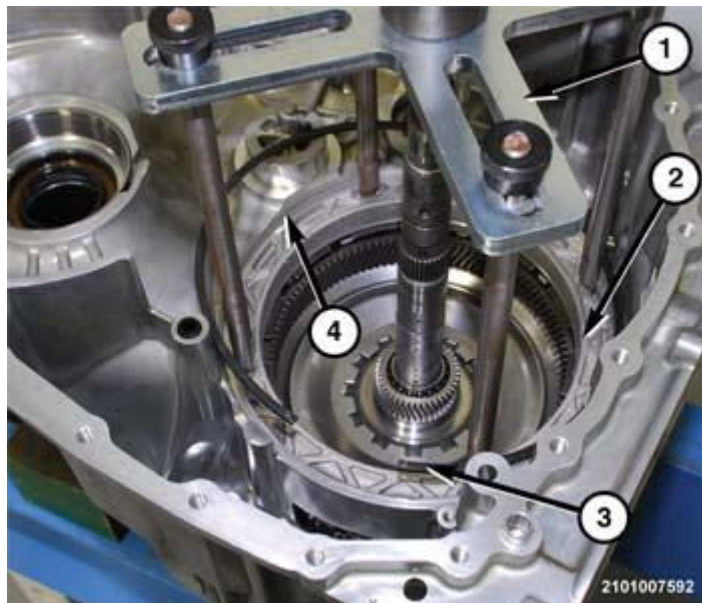


Fig. 155: Gaining Access To Snap Ring-Ring & Groove
Courtesy of CHRYSLER GROUP, LLC

41. Using Tool (special tool #8901A, Pressing Tool) (with the pressure scale removed) (1) and legs (special tool #10428, Adapter, Pressing Tool), Compress the bellville spring to gain access to the snap ring-ring groove (4) in the transmission housing.

42. Install the snap-ring to hold the D-clutch piston retainer (2) into the transmission housing (4).
43. Remove the transmission housing from the arbor press and place the transmission housing on the clean work surface. Use wood blocks to stabilize the transmission.

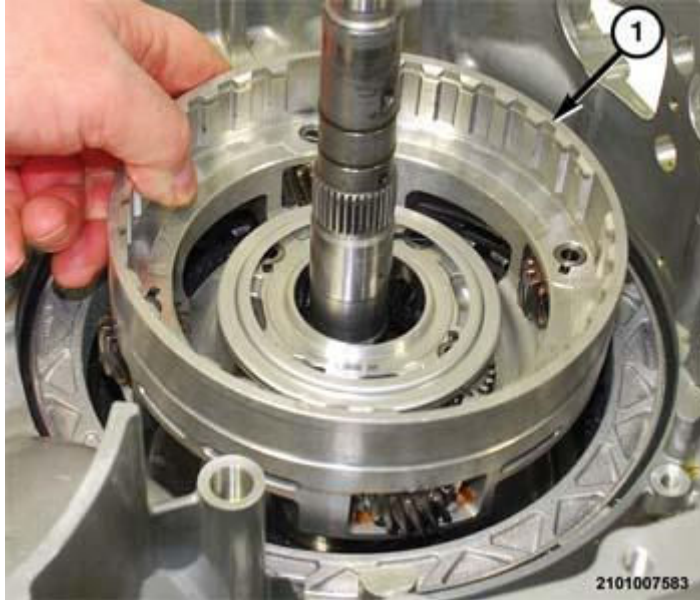


Fig. 156: Carrier Gear, Annulus Gear & D-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

44. Insert the carrier gear 1 and 2 (1) annulus gear 2, D-clutch hub and input shaft assembly onto the annulus gear 2, D and C-clutch hub and input shaft assembly.

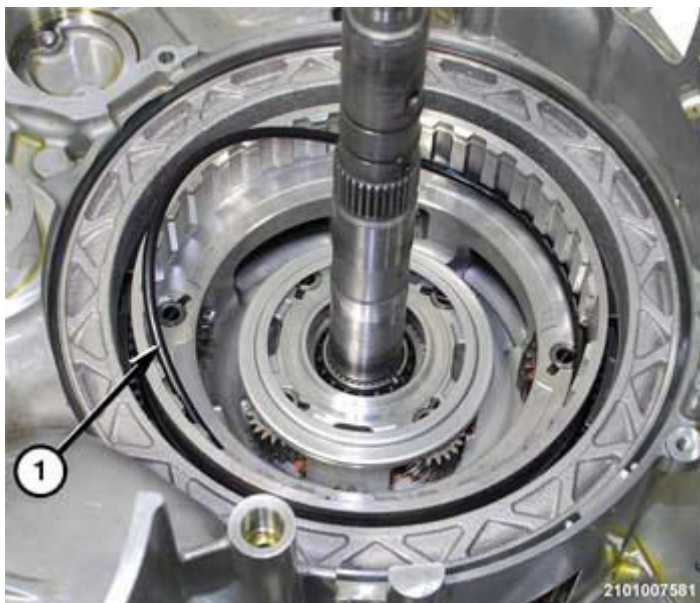


Fig. 157: Carrier Gear 1&2 & O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

45. Install the O-ring seal (1) into the carrier gear 1 and 2.



Fig. 158: Annulus Gear 3 & Carrier Gear 1&2
Courtesy of CHRYSLER GROUP, LLC

46. Install the annulus gear 3 (1) into the carrier gear 1 and 2.

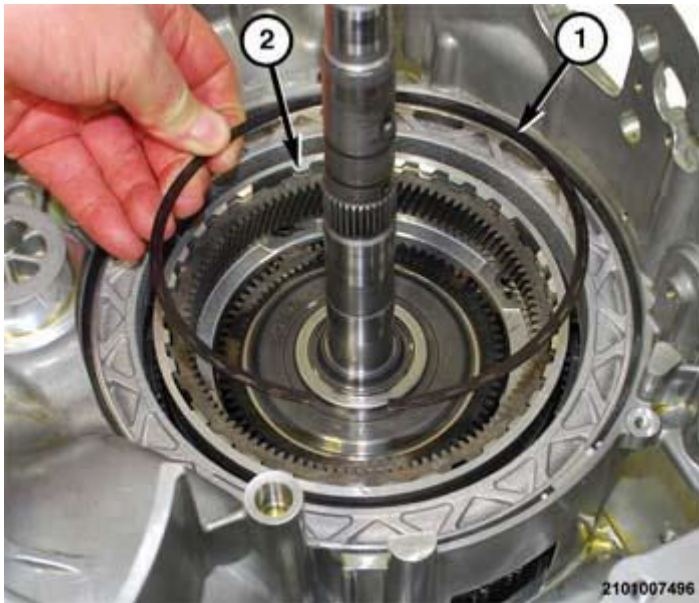


Fig. 159: Snap-Ring & Annulus Gear 3
Courtesy of CHRYSLER GROUP, LLC

47. Install the snap-ring to hold the annulus gear 3 (2) into the carrier gear 1 and 2.



Fig. 160: Thrust Bearing & Annulus Gear 1 Planetary Hub
Courtesy of CHRYSLER GROUP, LLC

48. Place the thrust bearing (1) in position under the annulus gear 1 planetary hub (2).



Fig. 161: Annulus Gear 1 Planetary Hub & Carrier Gear 1 And 2
Courtesy of CHRYSLER GROUP, LLC

49. Install the annulus gear 1 planetary hub (1) into the carrier gear 1 and 2 (2).

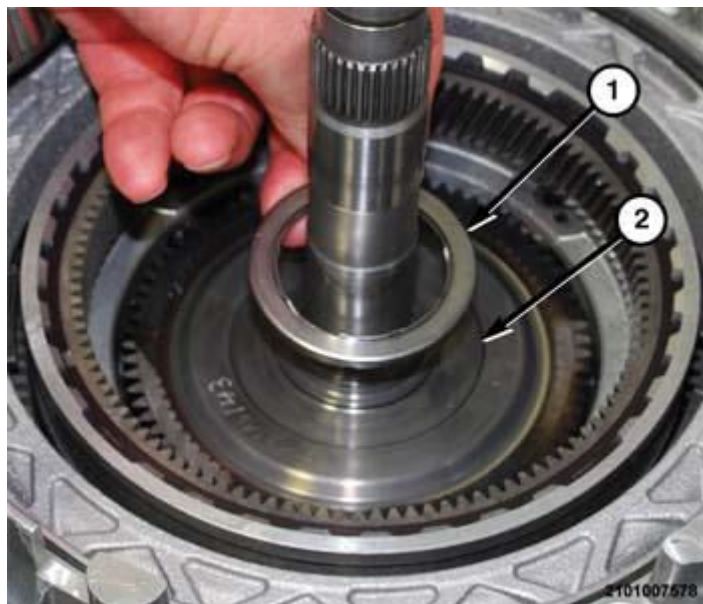


Fig. 162: Thrust Bearing & Annulus Gear 1 Planetary Hub
Courtesy of CHRYSLER GROUP, LLC

50. Place the thrust bearing (1) onto the annulus gear 1 planetary hub (2).

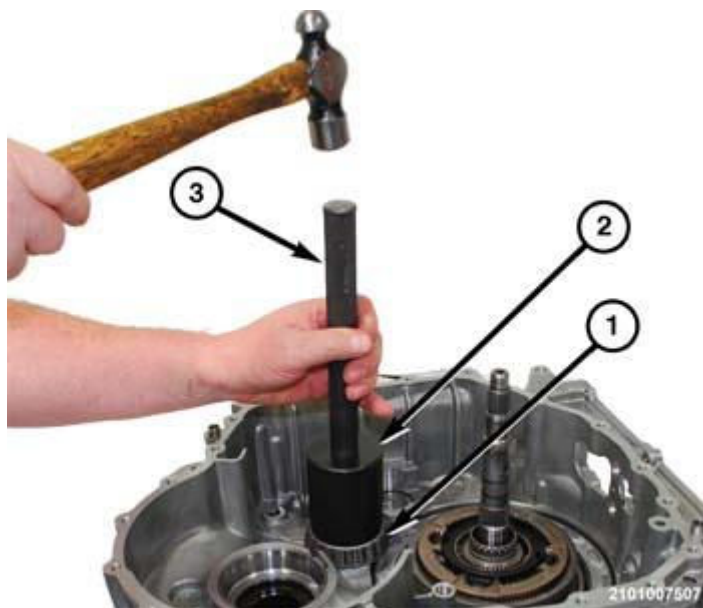


Fig. 163: Installing Transfer Gear Bearing Cone Onto Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

51. Using Bearing Installer (special tool #6888, Installer, Seal) (2), and handle (special tool #C-4171, Driver Handle, Universal) (3) install the transfer gear bearing cone (1) onto the transmission housing.

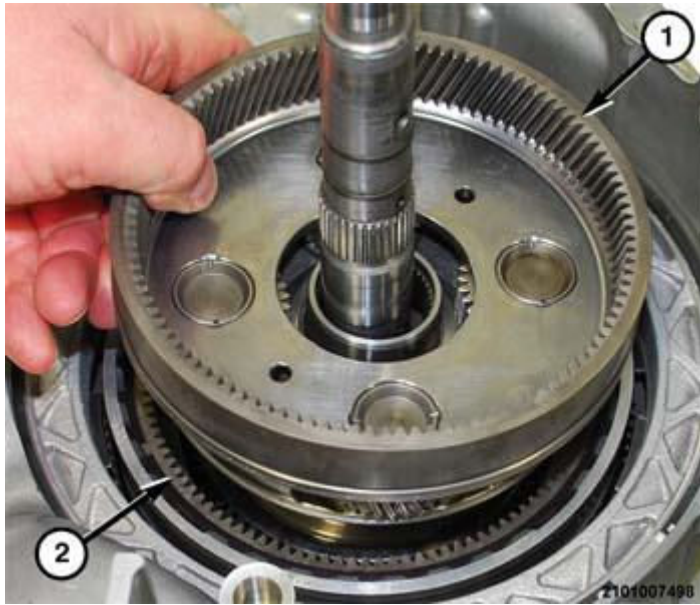


Fig. 164: Annulus Gear 4
Courtesy of CHRYSLER GROUP, LLC

52. Install the annulus gear 4 into the annulus gear 3 (2).



Fig. 165: Thrust Spacer & Underside Of Gear 4 Planetary Pinion Carrier
Courtesy of CHRYSLER GROUP, LLC

53. Install a NEW thrust spacer (1) on the underside of the gear 4 planetary pinion carrier (2).

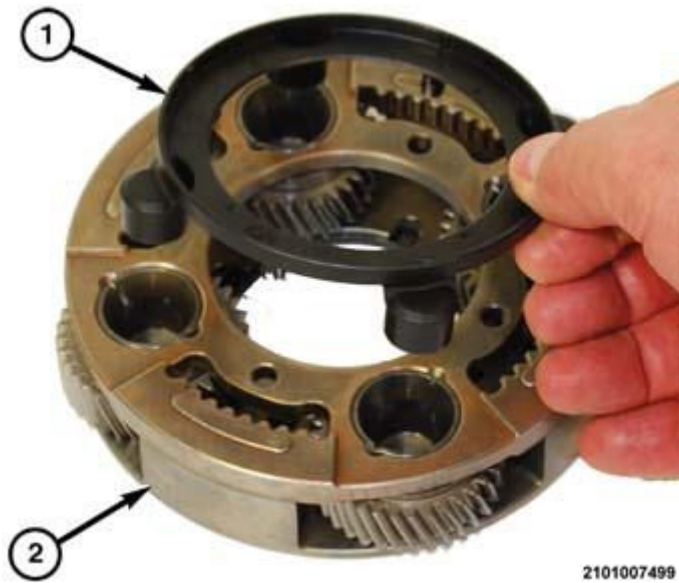


Fig. 166: Thrust Spacer & Topside Of Gear 4 Planetary Pinion Carrier
Courtesy of CHRYSLER GROUP, LLC

54. Install a NEW thrust spacer (1) on the topside of the gear 4 planetary pinion carrier (2).



Fig. 167: Gear 4 Planetary Pinion Carrier
Courtesy of CHRYSLER GROUP, LLC

55. Install the gear 4 planetary pinion carrier (1) into the annulus gear 4.



Fig. 168: Removing/Installing Sun Gear 3, 4 And Dog Clutch-F At Gear 4 Planetary Pinion Carrier
Courtesy of CHRYSLER GROUP, LLC

56. Install the sun gear 3 and 4 and Dog Clutch-F (1) into the gear 4 planetary pinion carrier.

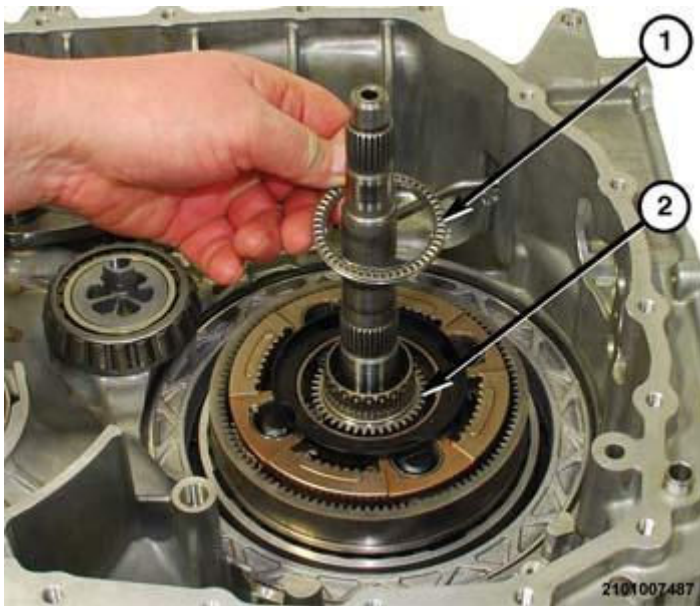


Fig. 169: Roller Type Thrust Bearing
Courtesy of CHRYSLER GROUP, LLC

57. Install the roller type thrust bearing (1) onto the sun gear 3 and 4 and Dog Clutch-F (2).

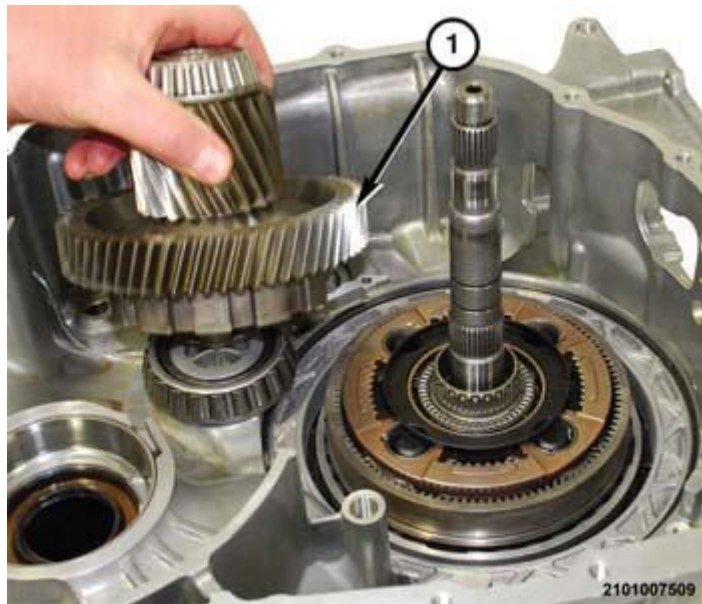


Fig. 170: Removing/Installing Transfer Gear
Courtesy of CHRYSLER GROUP, LLC

NOTE: If new transfer gear (1) or transmission housing are being replaced measurements must be performed to determine correct thickness for the bearing preload shims. If the bearings and races are replaced the factory installed preload shims do not require replacement.

58. If necessary, replace the bearings and races on the transfer gear (1).
59. Install the transfer gear (1) into the transmission housing.



Fig. 171: Output Gear Support
Courtesy of CHRYSLER GROUP, LLC

60. Install the output gear support (1) into the gear 4 planetary pinion carrier (2).



Fig. 172: E-Clutch Hub And Shaft
Courtesy of CHRYSLER GROUP, LLC

61. Install the E-clutch hub and shaft (1) into the output gear support (2).

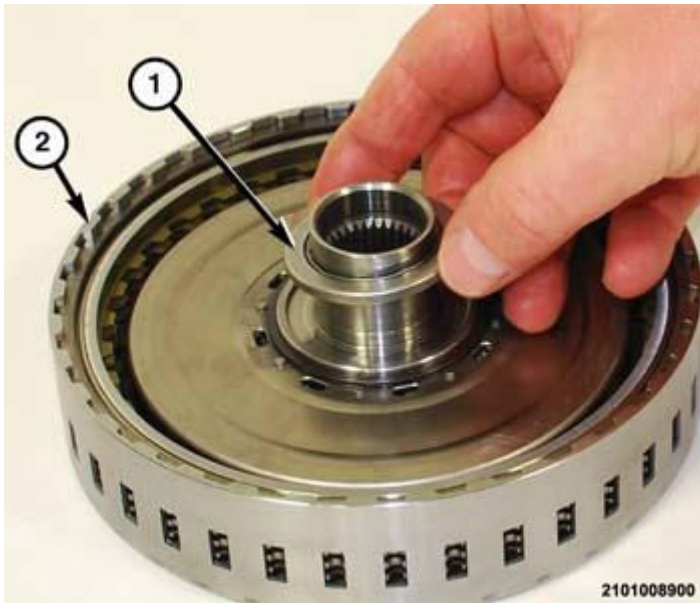


Fig. 173: Removing/Installing Thrust Bearing At E-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

62. Install the thrust bearing (1) on the E-clutch (2) hub.

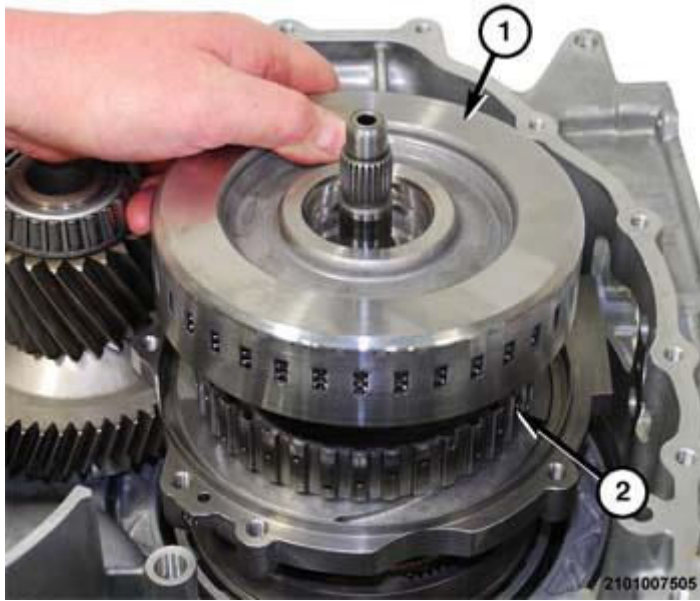


Fig. 174: Removing/Installing E-Clutch At E-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

NOTE: Before installing the E-clutch, use a suitable screwdriver to align the grooves in the friction.

63. Install the E-clutch onto the E-clutch hub and shaft (2).

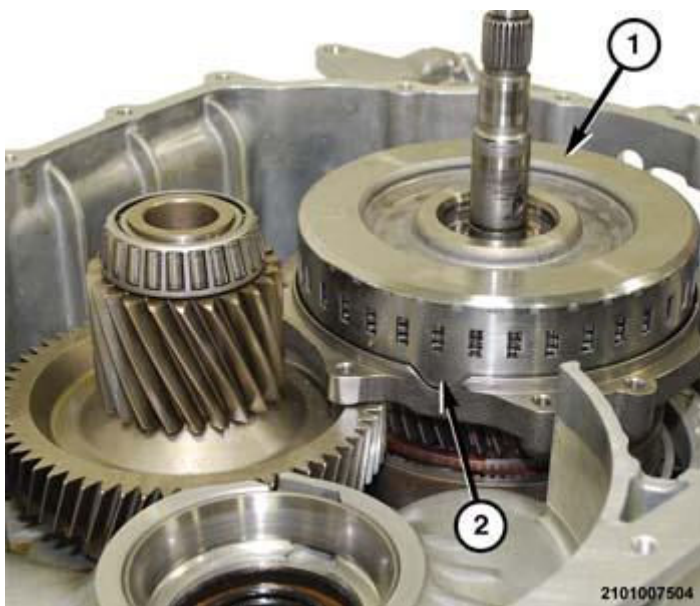


Fig. 175: E-Clutch Hub And Shaft
Courtesy of CHRYSLER GROUP, LLC

64. Wriggle the E-clutch (1) until all of the friction discs are fully engaged on the E-clutch hub and shaft.

NOTE: When the E-clutch (1) is fully seated the gap (2) will be very small between the E-clutch retainer and the output gear support.

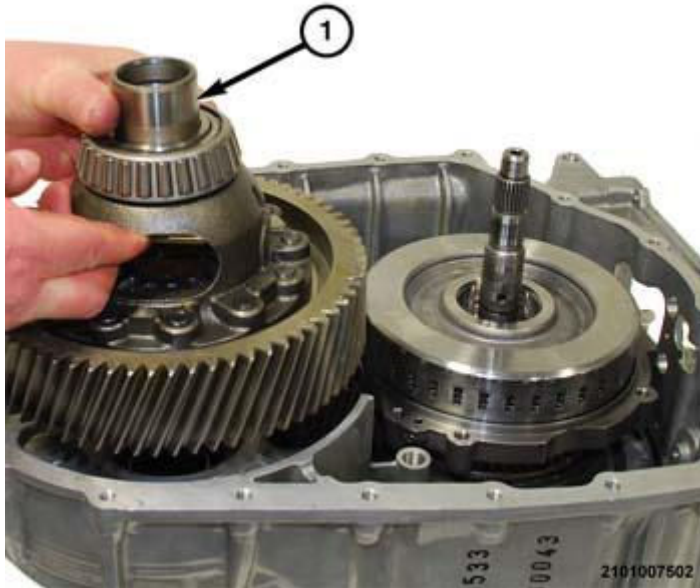


Fig. 176: Removing/Installing Differential Assembly
Courtesy of CHRYSLER GROUP, LLC

NOTE: If new differential (1) or transmission housing are being replaced measurements must be performed to determine correct thickness for the bearing preload shims. If the bearings and races are replaced the factory installed preload shims do not require replacement.

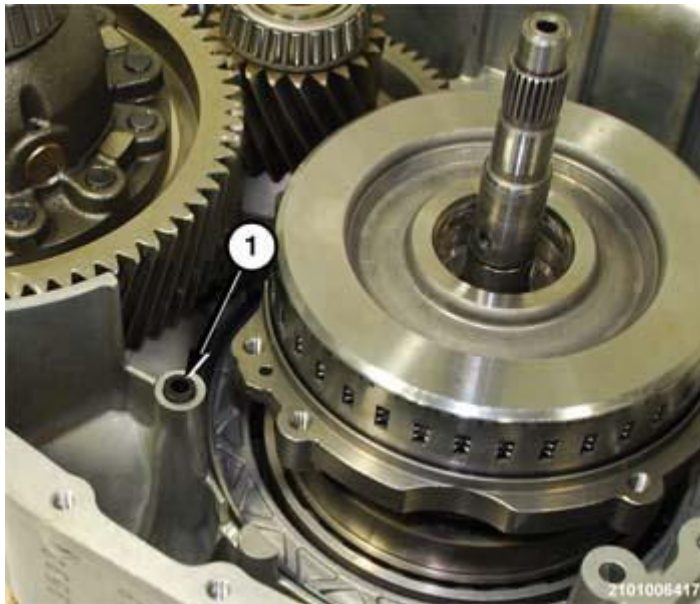
65. If necessary, replace the bearings and races on the differential (1).
66. Install the differential assembly (1) into the transmission housing.



2101006419

Fig. 177: Sealing Surface Of Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

67. Place a NEW gasket (1) in position on the sealing surface of the transmission housing (2).



2101006417

Fig. 178: Port Seal
Courtesy of CHRYSLER GROUP, LLC

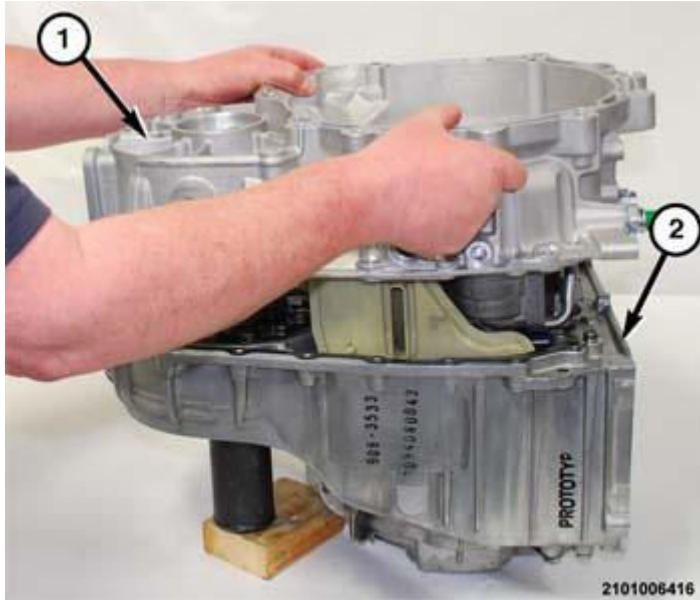
68. Install a NEW seal (1) in the port in the transmission housing.



2101006419

Fig. 179: Sealing Surface Of Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

69. Install the gasket (1) on the sealing surface of the transmission housing (2).
70. If necessary, replace the output seal and the impeller hub seal.



2101006416

Fig. 180: Removing/Installing Bellhousing At Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

71. While guiding the bellhousing (1) downward over the input and output shafts, place the bellhousing (1) in position on the transmission housing (2).



Fig. 181: Checking Guide Pin Alignment
Courtesy of CHRYSLER GROUP, LLC

72. Rotate the output gear clockwise to assure guide pin (1) alignment.

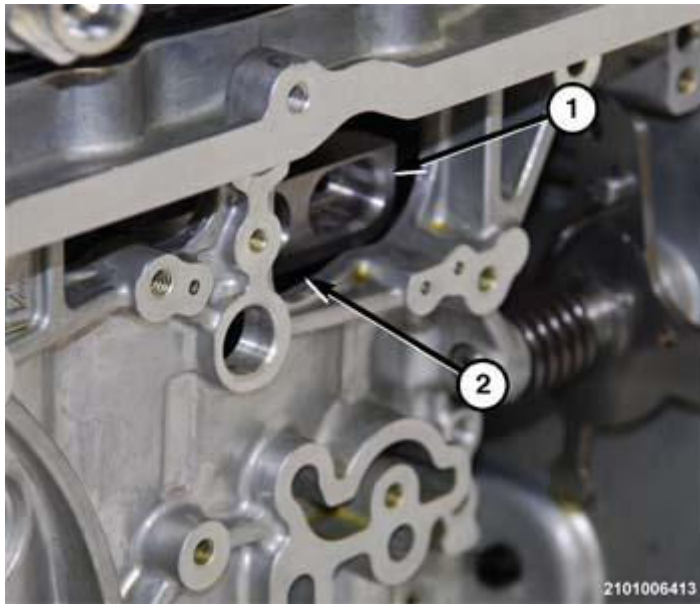


Fig. 182: Engaging Guide Pins In Transmission Housing Into Receptacle Holes
Courtesy of CHRYSLER GROUP, LLC

73. Rotate the output gear support (1) through the window (2) behind the valve body until the guide pin engages the receptacle hole in the bellhousing.
74. Engage the guide pins in the transmission housing into the receptacle holes bellhousing to assure proper alignment.
75. Install several bolts to hold the bell housing to the transmission housing. Tighten the bolts hand tight.

76. Position the transmission on the bench with the bellhousing facing outward.

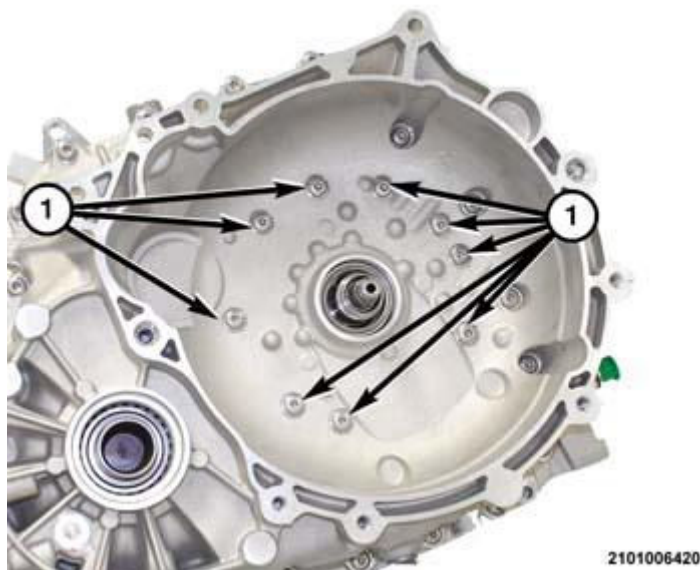


Fig. 183: Bellhousing To Output Gear Support Bolts
Courtesy of CHRYSLER GROUP, LLC

77. Install the bolts (1) with NEW seal washers to hold the bellhousing to the output gear support and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

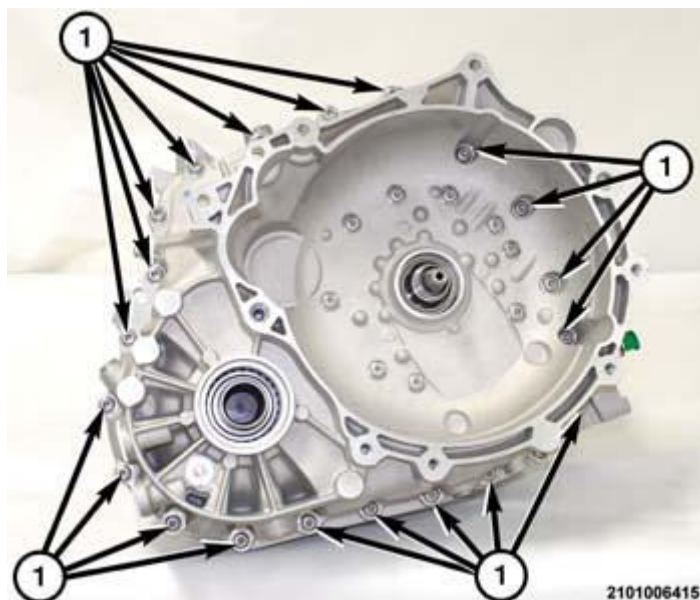


Fig. 184: Bellhousing To Transmission Housing Bolts
Courtesy of CHRYSLER GROUP, LLC

78. Install the bolts (1) to hold the bellhousing to the transmission housing and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

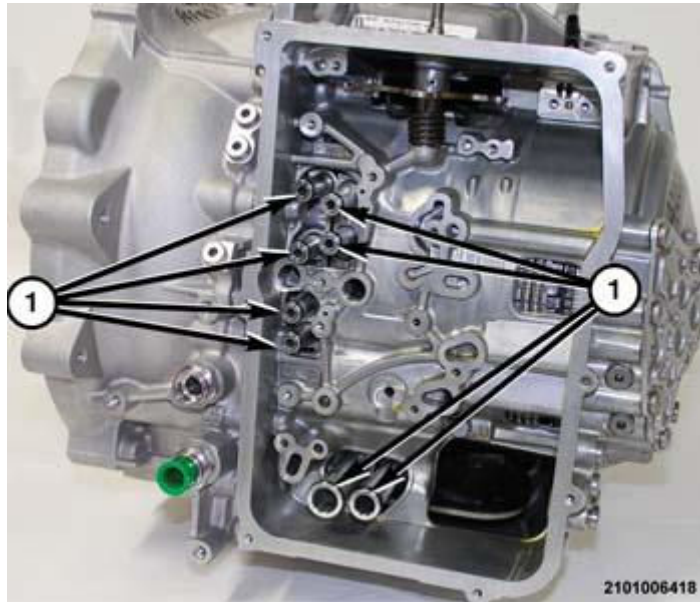


Fig. 185: Fluid Adapter Tubes & O-Ring Seals
Courtesy of CHRYSLER GROUP, LLC

79. Install NEW O-rings on both ends of the fluid transfer tubes.
80. Install the fluid adapter tubes (1) from the transmission.



Fig. 186: Removing/Installing Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

81. Insert the speed sensor (1) into the transmission with the wire harness connected.

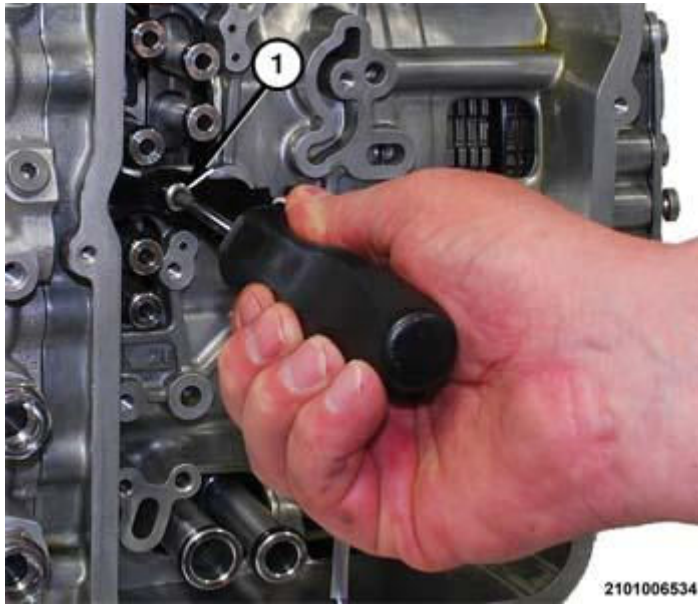


Fig. 187: Removing/Installing Speed Sensor Screw
Courtesy of CHRYSLER GROUP, LLC

82. Install the speed sensor screw (1) to hold the speed sensor to the transmission housing.

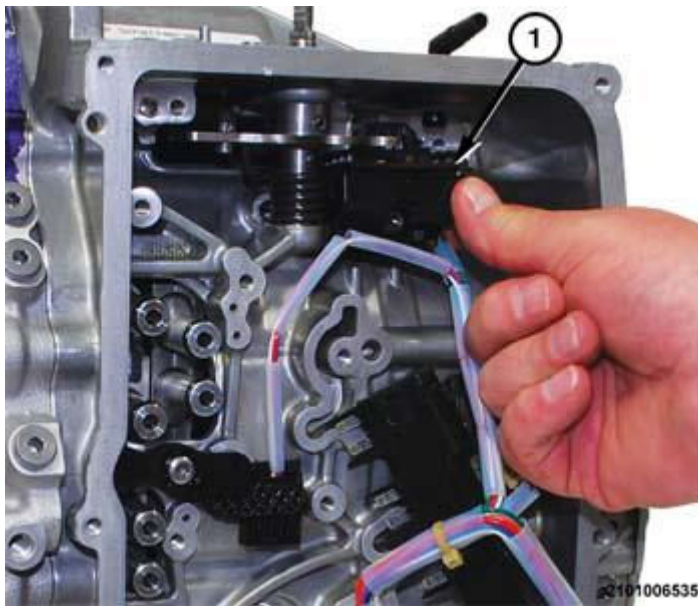


Fig. 188: Removing/Installing Transmission Range Sensor
Courtesy of CHRYSLER GROUP, LLC

83. Place the Transmission Range Sensor (TRS) (1) in position on the transmission with the wire harness connected.

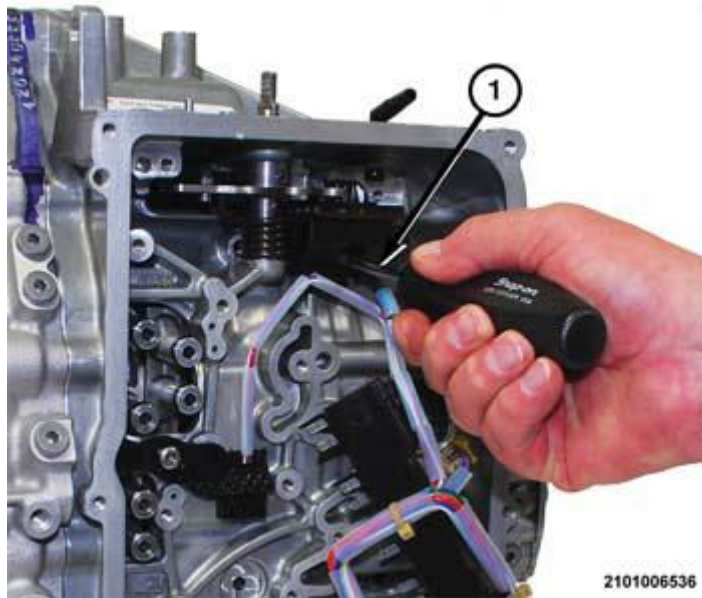


Fig. 189: Removing/Installing Transmission Range Sensor (TRS) Screw
Courtesy of CHRYSLER GROUP, LLC

84. Install the TRS screw (1) to hold the TRS to the transmission housing and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

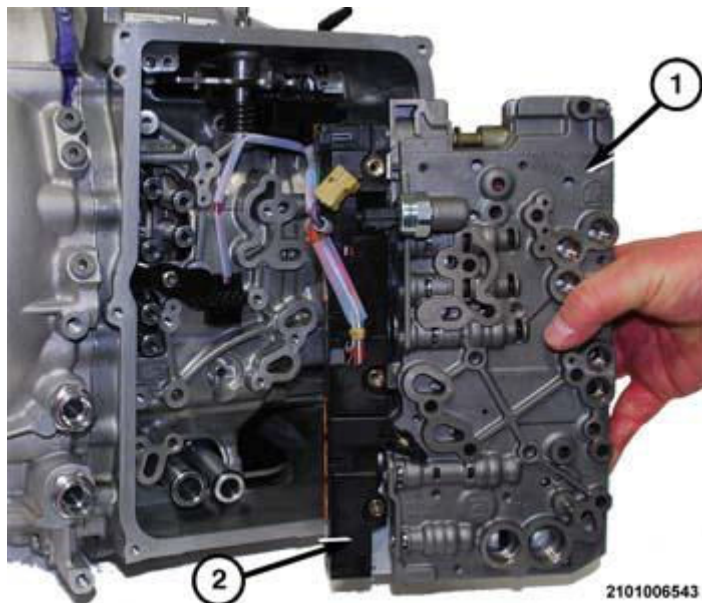


Fig. 190: Valve Body & Solenoids Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

85. Place the valve body (1) in position on the transmission.
86. Place the wire harness connector (2) in position on the solenoids.
87. Press the connector (2) inward to engage the terminals on the solenoids.

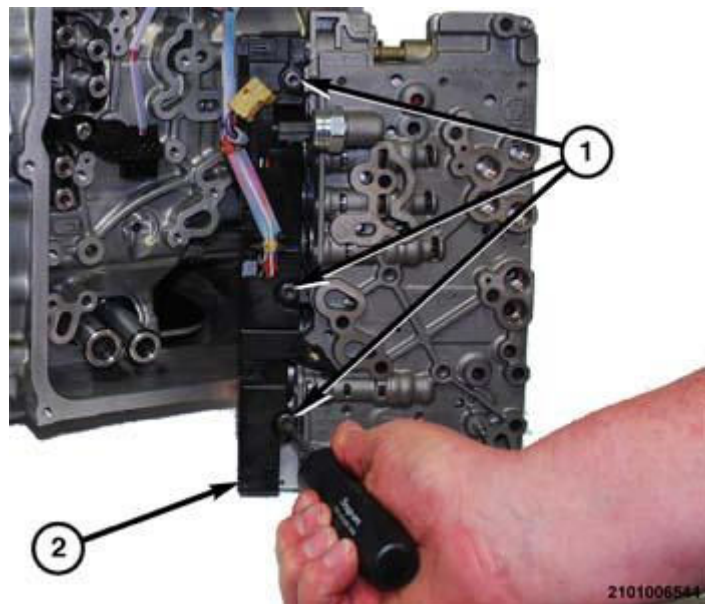


Fig. 191: Removing/Installing Wire Harness Connector At Valve Body Solenoids
Courtesy of CHRYSLER GROUP, LLC

88. Install the screws to hold the wire harness connector to the valve body and solenoids and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

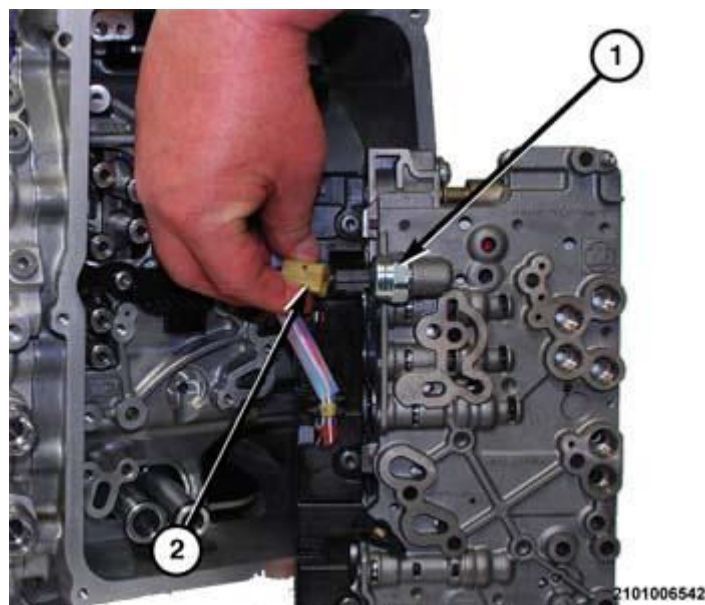


Fig. 192: Fluid Pressure Transducer Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

89. Insert the wire harness connector into the fluid pressure transducer connector
90. Press connector together until the lock engages.

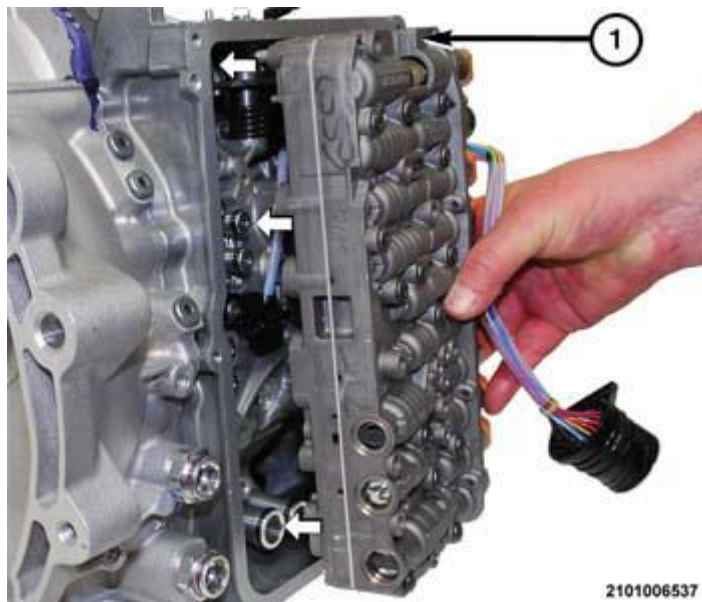


Fig. 193: Aligning Valve Body To Fluid Transfer Tubes
Courtesy of CHRYSLER GROUP, LLC

91. Turn the valve body (1) over and align the valve body (1) with the fluid transfer tubes.

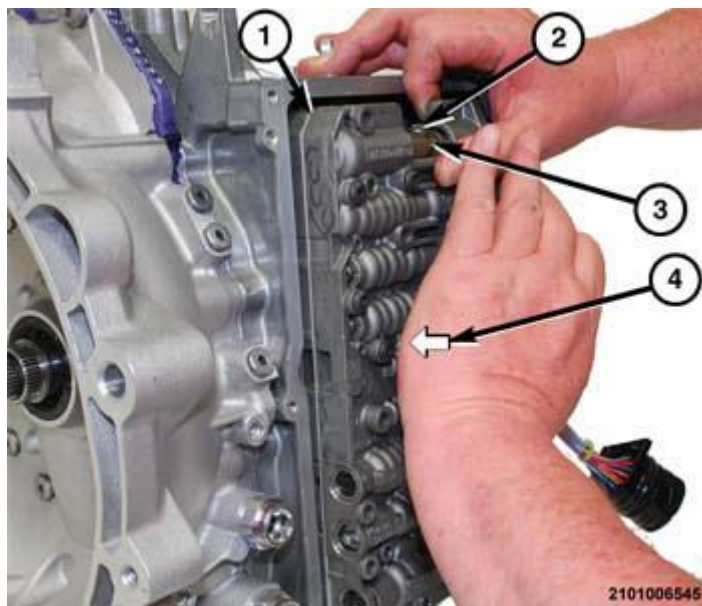


Fig. 194: Engaging Valve Body To Fluid Transfer Tubes
Courtesy of CHRYSLER GROUP, LLC

92. Guide the manual lever cam (2) into the slot (3) on the manual valve.
93. Firmly press (4) the valve body (1) inward until the O-rings on the fluid transfer adapters engage into receptacle holes on the valve body.

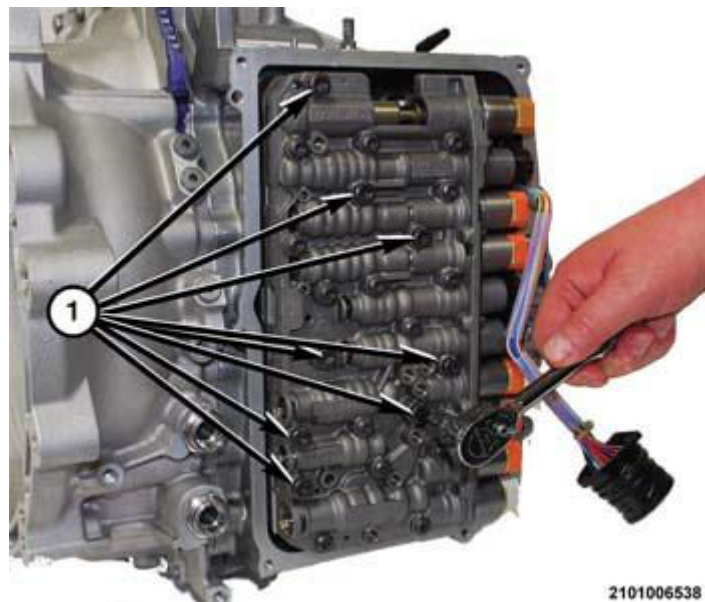


Fig. 195: Valve Body Bolts
Courtesy of CHRYSLER GROUP, LLC

94. Install the valve body bolts (1) to hold the valve body to the transmission housing and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

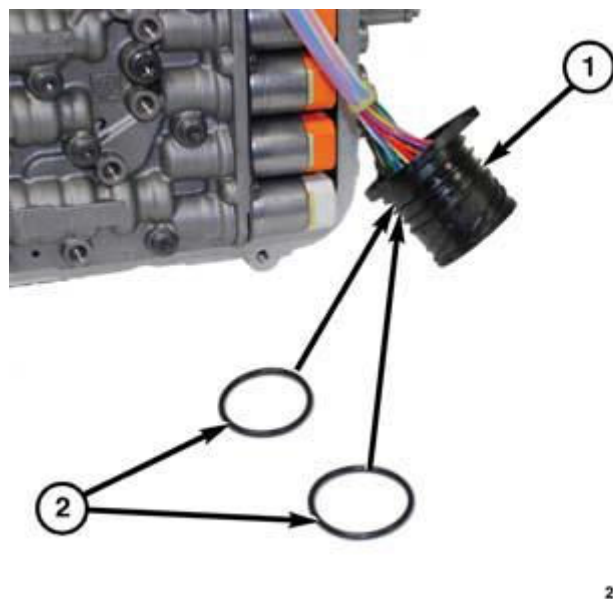


Fig. 196: Valve Body Solenoid Wire Harness Connector Socket O-Ring Seals
Courtesy of CHRYSLER GROUP, LLC

95. Install NEW O-ring seals (2) on the wire connector socket (1).

NOTE: A light coating of assembly lube can be applied to the O-ring seals (2) to ease installation.

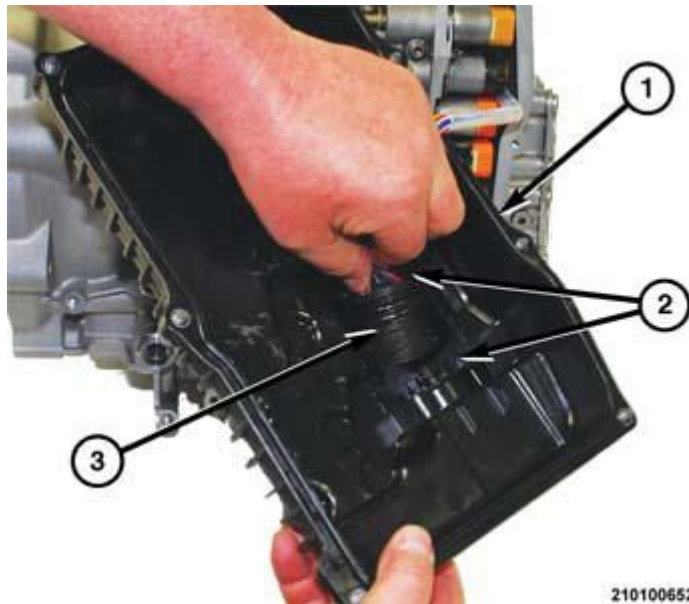


Fig. 197: Valve Body Cover Pan & Wire Connector Socket
Courtesy of CHRYSLER GROUP, LLC

96. Place the valve body cover pan (1) in position on the transmission.
97. Insert the wire connector socket (3) into the opening on the inside of valve body cover pan (1) with the flat side (2) of the socket on the left.

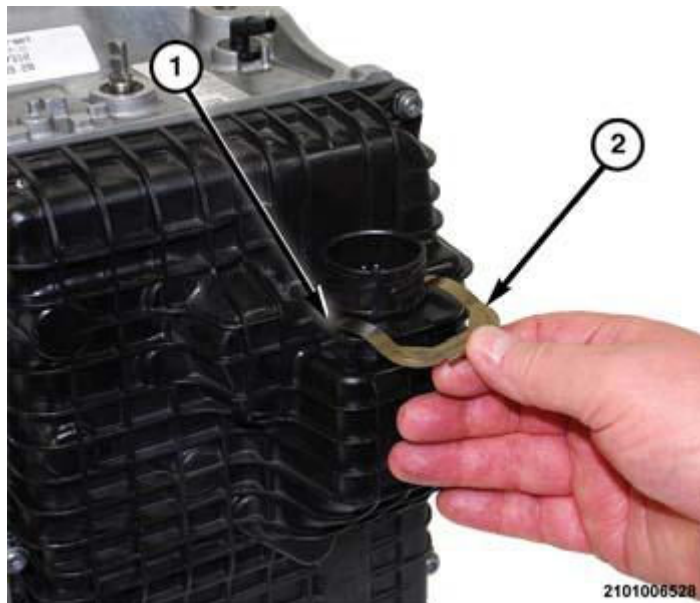


Fig. 198: Wire Connector Socket Clip
Courtesy of CHRYSLER GROUP, LLC

98. Press the wire connector socket inward until the retainer clip groove (1) is exposed on the outside of the valve body cover pan (1).
99. Install the clip (2) to hold the wire connector socket in the valve body cover pan.

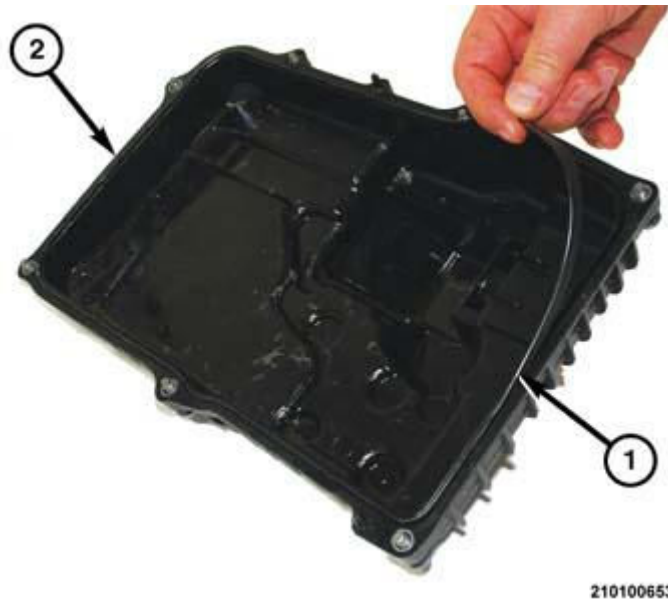


Fig. 199: Valve Body Cover Pan Gasket Seal
Courtesy of CHRYSLER GROUP, LLC

100. Install a NEW gasket seal (1) in the groove around the sealing surface of the valve body cover pan (2).

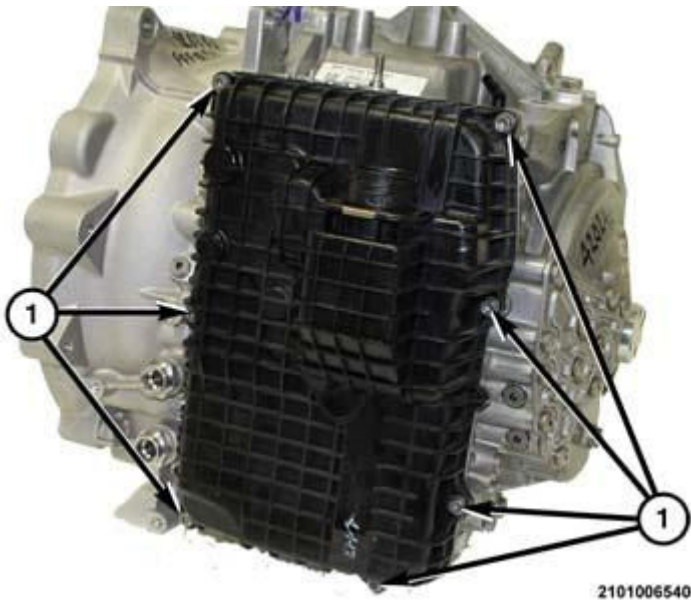


Fig. 200: Valve Body Cover Pan Bolts
Courtesy of CHRYSLER GROUP, LLC

101. Place the valve body cover pan gasket against the sealing surface of the transmission housing.
102. Install the valve body cover pan bolts (1) to hold the valve body cover pan to the transmission housing and tighten to the proper specifications. Refer to **SPECIFICATIONS**.
103. Install the transmission in the vehicle Refer to **INSTALLATION**.

104. Road test the vehicle to verify the repair.

INSTALLATION

FWD

WARNING: Hoisting and jack lift points provided in this service information are for a complete vehicle. When the transaxle is removed, the center of gravity will shift to the rear of the vehicle, possibly creating an unstable condition. Place safety stands under the rear frame rails behind the rear axle to stabilize the vehicle. Personal injury may result if safety stands are not used.

NOTE: If equipped with a 2.4L, be sure that the upper starter bolt is inserted into the proper hole in the transmission prior to mating transmission to block.

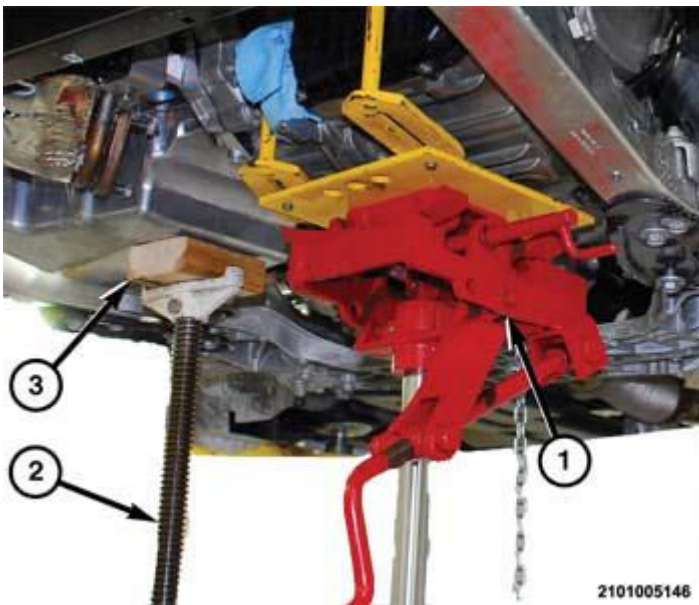


Fig. 201: Wooden Block Used To Protect Engine Oil Pan
Courtesy of CHRYSLER GROUP, LLC

1. While guiding the transmission past obstacles, jack (1) the transmission upward until the engine and the transmission are in line.
2. Push the bell housing against the engine block until the guide pins engage.



Fig. 202: Removing/Installing Transmission Bellhousing Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Install the bolt (1) to hold the engine oil pan and exhaust bracket to the bellhousing. Refer to **SPECIFICATIONS**.
4. Install the bolts (1) to hold the engine block and oil pan to the bellhousing in position on behind the exhaust maniverter. Refer to **SPECIFICATIONS**.

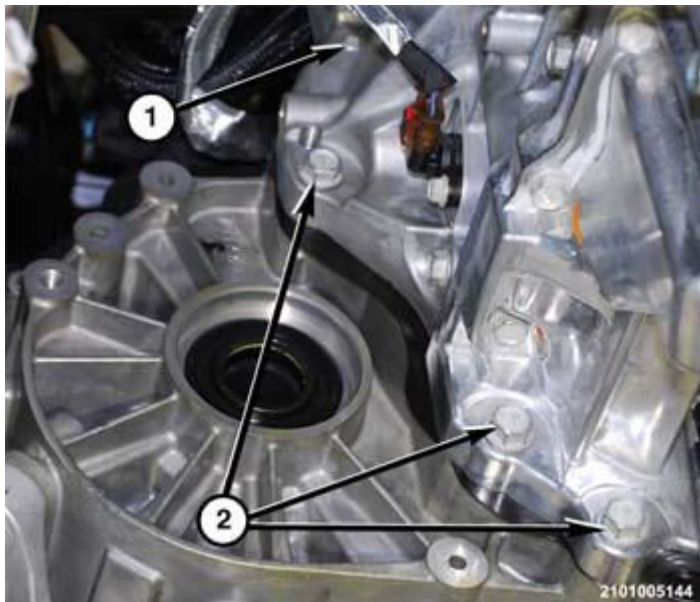


Fig. 203: Transmission Bellhousing Bolts Above The Differential Housing
Courtesy of CHRYSLER GROUP, LLC

5. Install the bolts (2) to hold the engine block and oil pan to the bellhousing next to the differential housing. Refer to **SPECIFICATIONS**.

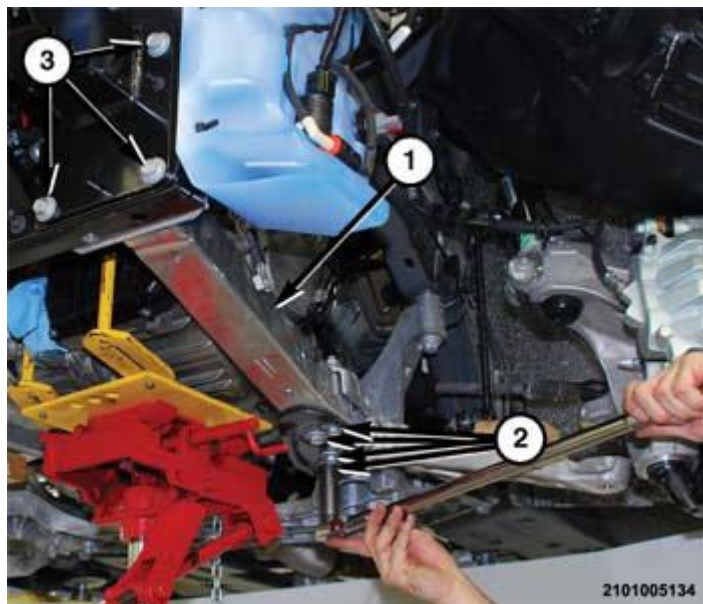


Fig. 204: Load Beam Bolts

Courtesy of CHRYSLER GROUP, LLC

NOTE: Shown in illustration with fascia removed for clarity.

6. Place the load beam (1) in position on the vehicle.
7. Install the bolts (3) to hold the front of the load beam (1) to the radiator support panel.
8. Install the bolts (2) to hold the rear end of the load beam (1) to the suspension cradle.

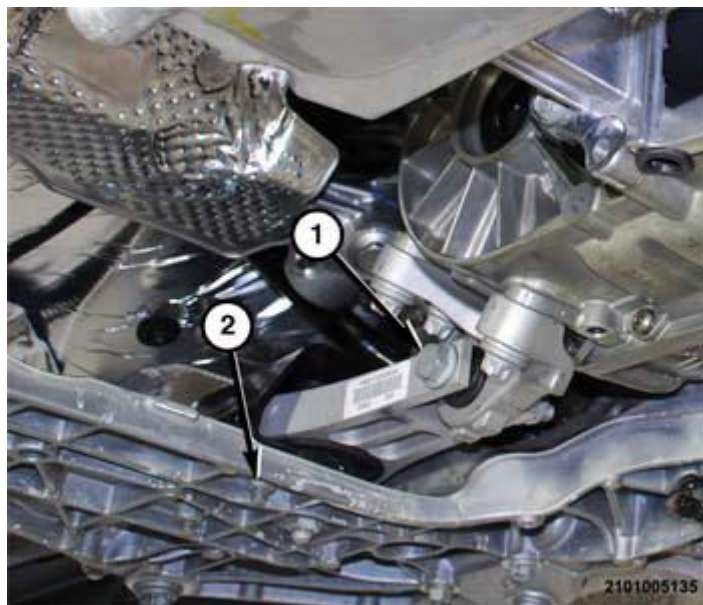


Fig. 205: Rear Transmission Mount

Courtesy of CHRYSLER GROUP, LLC

9. Push the rear transmission mount forward until the bolt holes line up.
10. Install the through bolt (2) to hold the rear transmission mount to the adapter block on the transmission bellhousing. Refer to **SPECIFICATIONS**.
11. Install the through bolt (1) to hold the rear transmission mount to the suspension cradle. Refer to **SPECIFICATIONS**.

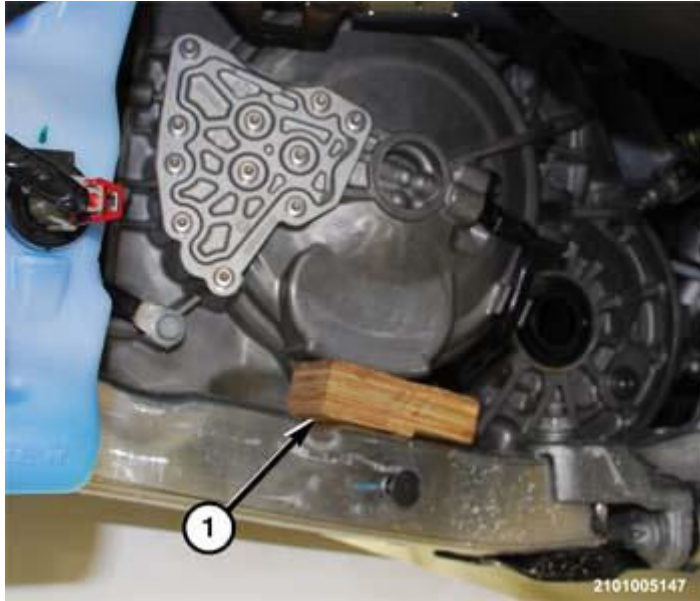


Fig. 206: Wooden Block Placed Between Transmission And Frame Rail
Courtesy of CHRYSLER GROUP, LLC

12. Place a wooden block (1) between the load beam and the transmission end cover.

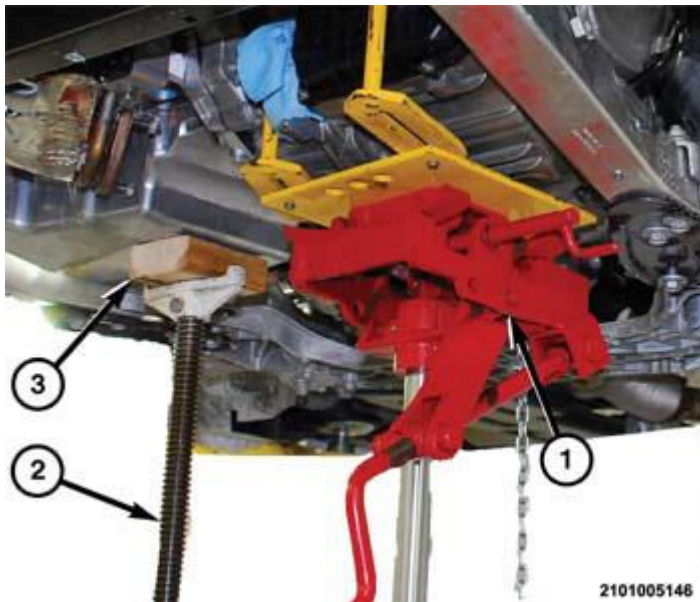


Fig. 207: Wooden Block Used To Protect Engine Oil Pan

Courtesy of CHRYSLER GROUP, LLC

13. Remove the safety chain holding the transmission to the transmission jack lift plate.
14. Lower the high stand (2) and the transmission jack (1) until the transmission rests on the wooden block.
15. Remove the high stand (2) and transmission jack (1) from under the vehicle.

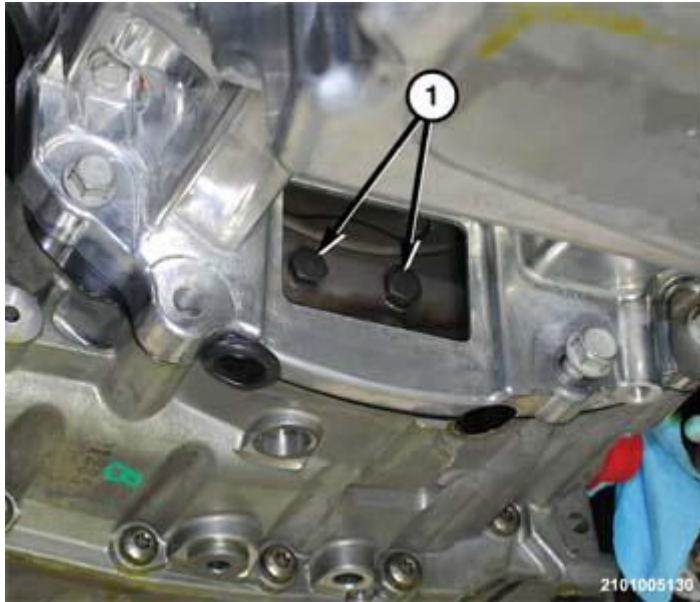


Fig. 208: Torque Converter Bolts

Courtesy of CHRYSLER GROUP, LLC

CAUTION: It is essential that correct length bolts be used to attach the converter to the driveplate. Failure to follow this caution may result in transmission damage.

16. Through the access door opening, Install **new** bolts (1) to hold the flexplate to the torque converter, Rotate the crankshaft to bring each set of bolts into view through the access door. Refer to **SPECIFICATIONS**.

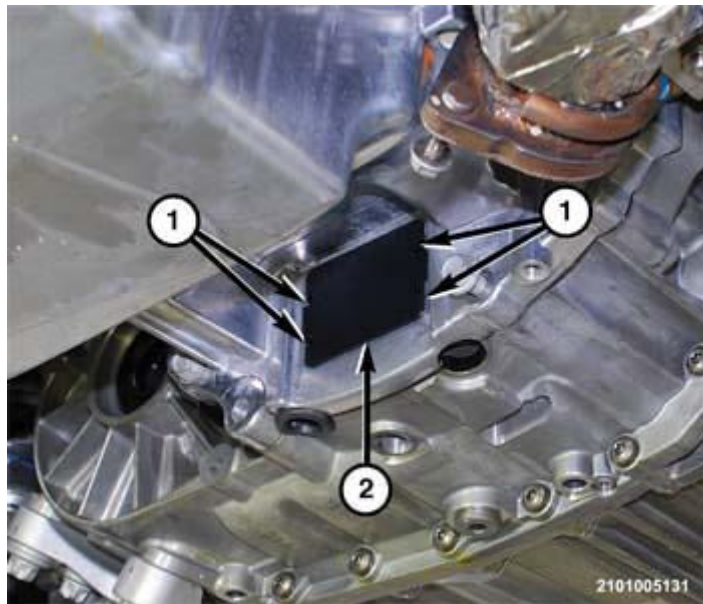


Fig. 209: Bellhousing Access Door
Courtesy of CHRYSLER GROUP, LLC

17. Install the access door in the splash shield on the bellhousing.
18. Install the front exhaust pipe. Refer to **PIPE, EXHAUST CROSSUNDER, INSTALLATION**.

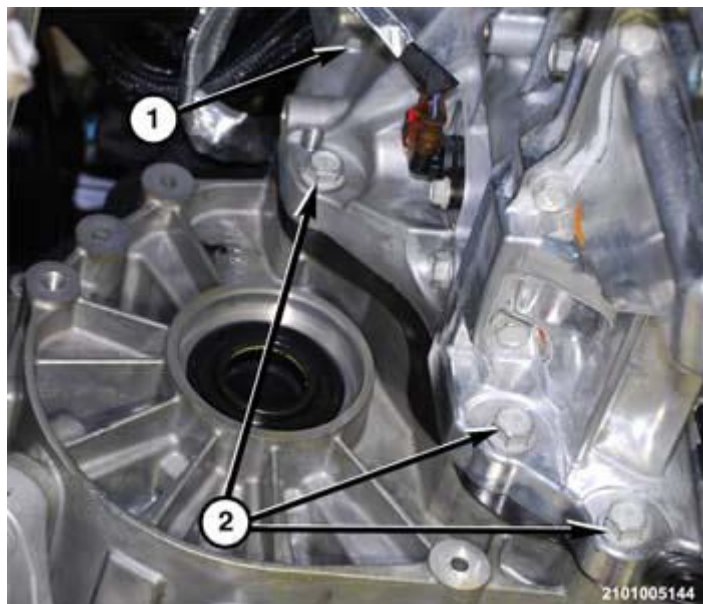


Fig. 210: Transmission Bellhousing Bolts Above The Differential Housing
Courtesy of CHRYSLER GROUP, LLC

19. Install the bolt (1) to hold the transmission bellhousing to the engine block above the differential housing. Refer to **SPECIFICATIONS**.

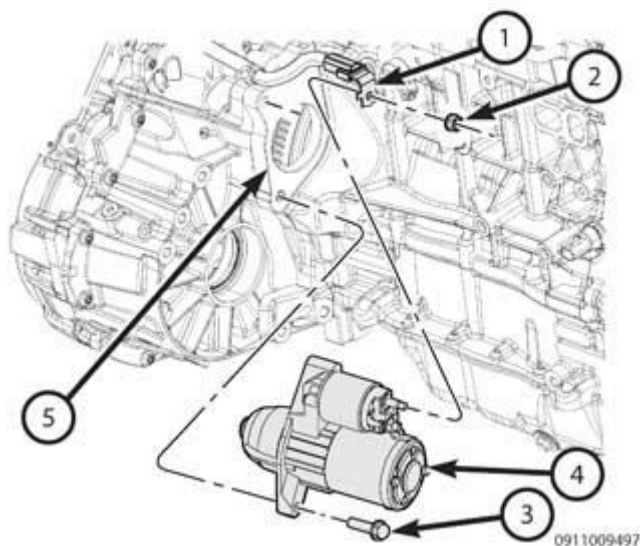


Fig. 211: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

20. If equipped with a 2.4L, install the bolt (3) to hold the starter (4) to the transmission bellhousing. Refer to **SPECIFICATIONS** .



Fig. 212: Starter Bolts (3.2L)
Courtesy of CHRYSLER GROUP, LLC

21. If equipped with a 3.2L, install the starter bolts (1) and tighten to the proper specification. Refer to **SPECIFICATIONS** .



Fig. 213: Transmission Cooler Lines
Courtesy of CHRYSLER GROUP, LLC

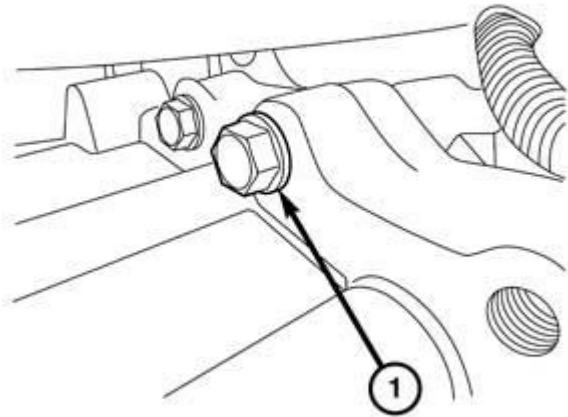
22. Guide the cooler lines in position on the transmission.
23. Engage the quick couplings to hold the cooler lines to the transmission.
24. Install the left and right half shafts. Refer to **INSTALLATION**.
25. Remove the safety stands under the rear frame rails behind the rear axle and lower the vehicle.



Fig. 214: Upper Bellhousing Bolts
Courtesy of CHRYSLER GROUP, LLC

26. Install upper bolts (1) to hold the transmission bellhousing to the engine block located behind the main

engine wire harness. Refer to **SPECIFICATIONS**.



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Fig. 215: Upper Starter Bolt

Courtesy of CHRYSLER GROUP, LLC

27. If equipped with a 2.4L, tighten the upper starter bolt (1). Refer to **SPECIFICATIONS** .



Fig. 216: Wire Harness Bracket & Bellhousing Bolt

Courtesy of CHRYSLER GROUP, LLC

28. Install the upper bolt (1) to hold the wire harness bracket and transmission bellhousing to the engine block. Refer to **SPECIFICATIONS**.

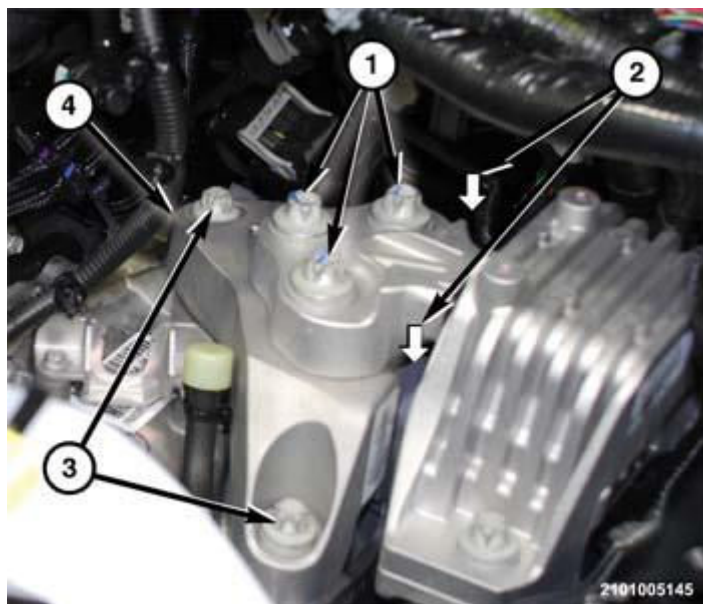


Fig. 217: Upper Transmission Mount Bolts
Courtesy of CHRYSLER GROUP, LLC

29. Place the transmission mount adaptor block (4) in position on the transmission.
30. Install the bolts (3) and hidden bolts (2) to hold the transmission mount adaptor block (4) to the transmission. Refer to **SPECIFICATIONS**.

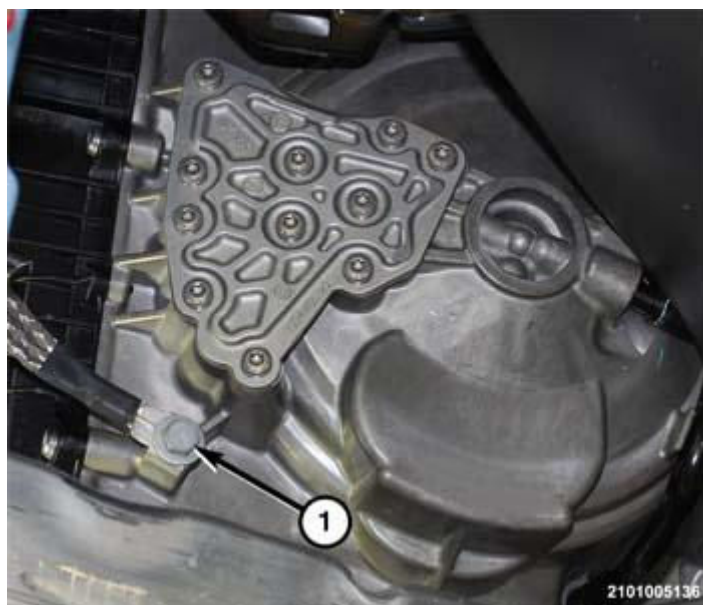


Fig. 218: Transmission End Cover Ground Cable
Courtesy of CHRYSLER GROUP, LLC

31. Place the ground cable (1) in position on the transmission.
32. Install the bolt (1) to hold the ground cable to the transmission end cover. Refer to **SPECIFICATIONS**.
33. Position a floor jack under the transmission.
34. Raise the transmission until the wood block is free to be removed.

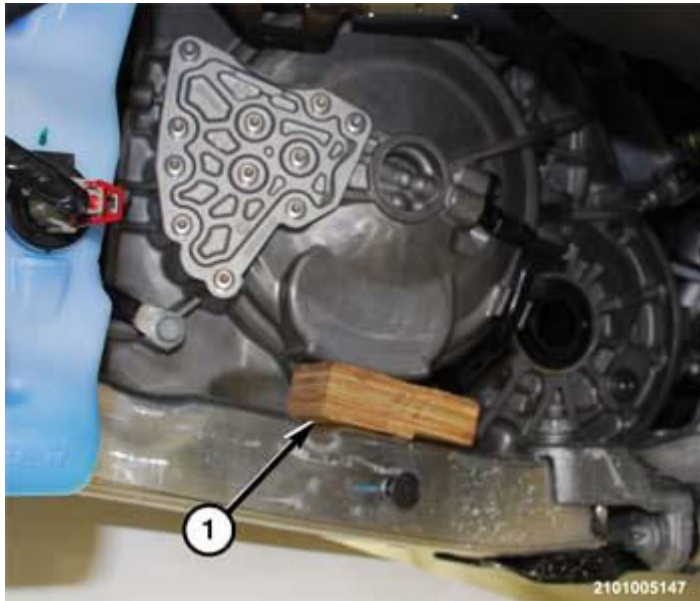


Fig. 219: Wooden Block Placed Between Transmission And Frame Rail
Courtesy of CHRYSLER GROUP, LLC

35. Remove the wooden block (1) from between the transmission end cover and the frame rail load beam.

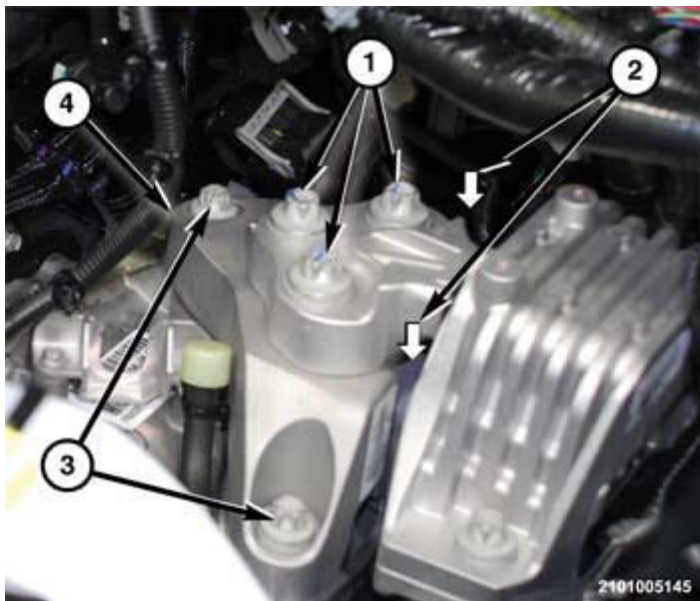


Fig. 220: Upper Transmission Mount Bolts
Courtesy of CHRYSLER GROUP, LLC

36. Install the bolts (1) to hold the upper transmission mount to the adaptor block (4). Refer to **SPECIFICATIONS**.
37. Lower and remove the floor jack.



Fig. 221: Transmission Valve Body Solenoid Connector
Courtesy of CHRYSLER GROUP, LLC

38. Engage the transmission solenoid connector (2) into transmission connector.
39. Rotate the lock lever (2) clockwise on the transmission solenoid connector.



Fig. 222: View Of Shift Cable Housing & Mount Bracket
Courtesy of CHRYSLER GROUP, LLC

40. Place the shift cable (2) in position on the mount bracket (2).
41. Press the shift cable housing (2) into the mount bracket (1) on the transmission.



Fig. 223: View Of Ground Cable & Shift Cable
Courtesy of CHRYSLER GROUP, LLC

42. Snap the shift cable end (2) in position on the manual lever on the transmission.



Fig. 224: Ground Cable At Top Transmission
Courtesy of CHRYSLER GROUP, LLC

43. Place the ground cable (1) in position on the transmission.

44. Install the bolt (1) to hold the ground cable to the top of the transmission. Refer to **SPECIFICATIONS**.

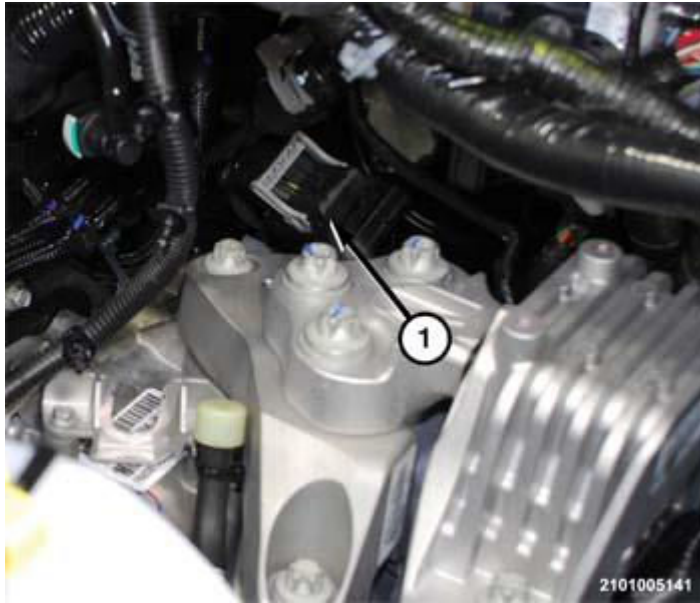


Fig. 225: Identifying Wire Connector Lock To TCM
Courtesy of CHRYSLER GROUP, LLC

45. Engage the wire connector (1) into the TCM connector.
46. Close the lock on the TCM connector (1).
47. Place the vacuum pump in position on the mount bracket. Refer to **PUMP, VACUUM, INSTALLATION** .
48. Install the nuts to hold the vacuum pump to the mount bracket.
49. Connect the wire connector onto the vacuum pump.
50. Connect the vacuum line onto the vacuum pump.
51. Install the battery tray. Refer to **TRAY, BATTERY, INSTALLATION** .
52. Install the power distribution center. Refer to **CENTER, POWER DISTRIBUTION (PDC), INSTALLATION** .
53. Engage the wire connector into the main engine harness on the front of the battery tray.
54. Engage the lock lever on the wire connector.
55. Install the PCM. Refer to **MODULE, POWERTRAIN CONTROL, INSTALLATION** .
56. Raise the vehicle.
57. Fill the transmission to the proper level with the specified fluid.
58. Install the belly pan. Refer to **BELLY PAN, INSTALLATION** .
59. Install new rivets at the lower outboard front fascia to right front splash shield.
60. Install the left front fender splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION** .
61. Install the front wheels. Refer to **INSTALLATION** .

62. Lower the vehicle.
63. Install the battery. Refer to **BATTERY, INSTALLATION**.
64. If transmission is replaced, program the Vehicle Identification Number (VIN) into the Transmission Control Module (TCM).

NOTE: **Note; only perform the Valve Body Solenoid Learn procedure if the valve body and/or the TCM was replaced during a repair. Do not perform this procedure if the repair did not require the valve body and/or TCM to be replaced. Do not perform this procedure if the transmission is being replaced.**

65. If valve body or the TCM was replaced, perform Valve Body Solenoid Learn procedure.
66. If transmission is replaced or internal repairs were made, perform Transmission Verification Test-948TE. Refer to **STANDARD PROCEDURE**.
67. Road test the vehicle to verify the repair.

AWD / 4WD

WARNING: Hoisting and jack lift points provided in this service information are for a complete vehicle. When the transaxle is removed, the center of gravity will shift to the rear of the vehicle, possibly creating an unstable condition. Place safety stands under the rear frame rails behind the rear axle to stabilize the vehicle. Personal injury may result if safety stands are not used.

NOTE: **If equipped with a 2.4L, be sure that the upper starter bolt is inserted into the proper hole in the transmission prior to mating transmission to block.**

1. While guiding the transmission past obstacles, jack (1) the transmission upward until the engine and the transmission are in line.
2. Push the bell housing against the engine block until the guide pins engage.



Fig. 226: Removing/Installing Transmission Bellhousing Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Install the bolt (1) to hold the engine oil pan and exhaust bracket to the bellhousing. Refer to **SPECIFICATIONS**.
4. Install the bolts (1) to hold the engine block and oil pan to the bellhousing in position on behind the exhaust maniverter. Refer to **SPECIFICATIONS**.
5. Install the bolts to hold the engine block and oil pan to the bellhousing next to the differential housing. Refer to **SPECIFICATIONS**.

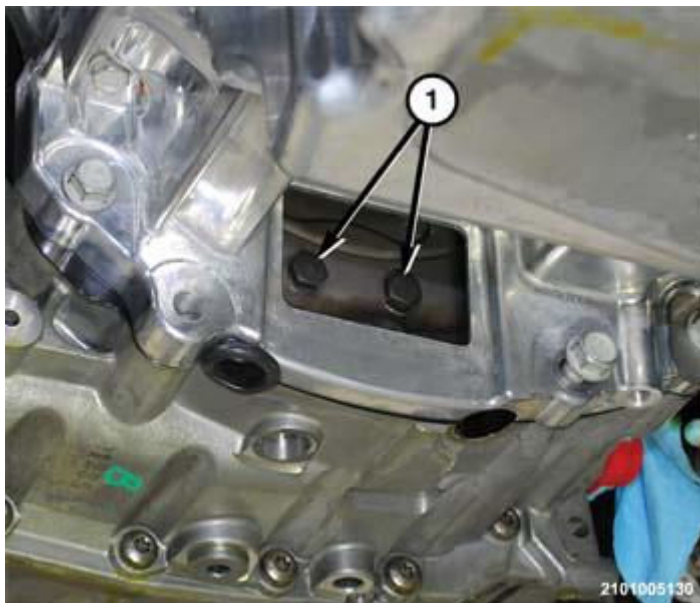


Fig. 227: Torque Converter Bolts
Courtesy of CHRYSLER GROUP, LLC

CAUTION: It is essential that correct length bolts be used to attach the converter to the driveplate. Failure to follow this caution may result in transmission damage.

6. Through the access door opening, Install **new** bolts (1) to hold the flexplate to the torque converter, Rotate the crankshaft to bring each set of bolts into view through the access door. Refer to **SPECIFICATIONS**.

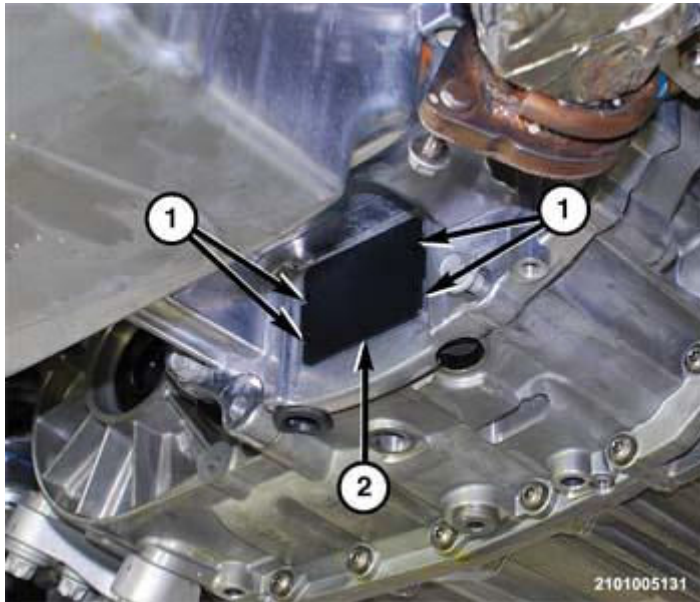


Fig. 228: Bellhousing Access Door
Courtesy of CHRYSLER GROUP, LLC

7. Install the access door in the splash shield on the bellhousing.

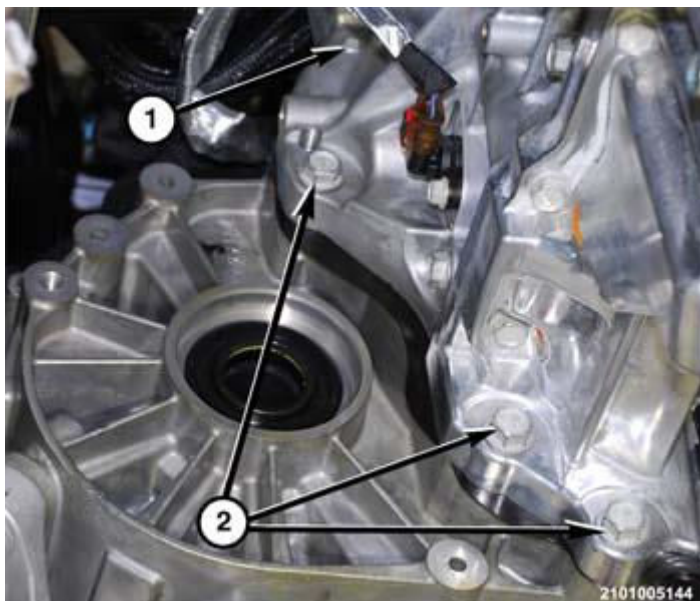


Fig. 229: Transmission Bellhousing Bolts Above The Differential Housing
Courtesy of CHRYSLER GROUP, LLC

8. Install the bolt (1) to hold the transmission bellhousing to the engine block above the differential housing. Refer to **SPECIFICATIONS**.

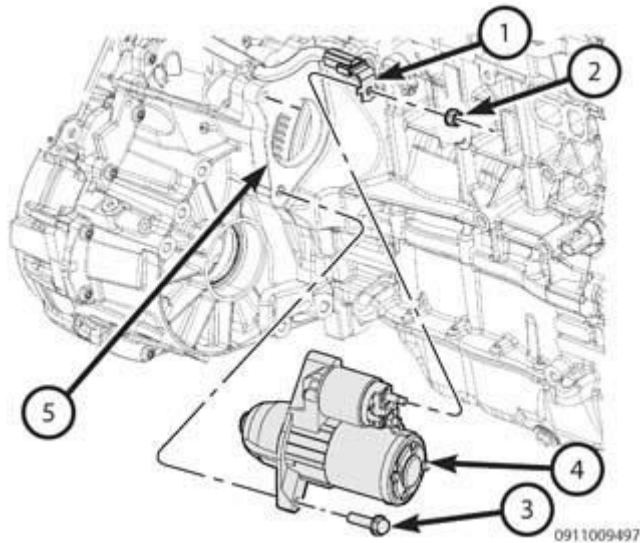


Fig. 230: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

9. If equipped with a 2.4L, install the bolt (3) to hold the starter (4) to the transmission bellhousing. Refer to **SPECIFICATIONS**.



Fig. 231: Starter Bolts (3.2L)
Courtesy of CHRYSLER GROUP, LLC

10. If equipped with a 3.2L, install the starter bolts (1) and tighten to the proper specification. Refer to **SPECIFICATIONS**.
11. Install the power transfer unit (PTU). Refer to **INSTALLATION**.

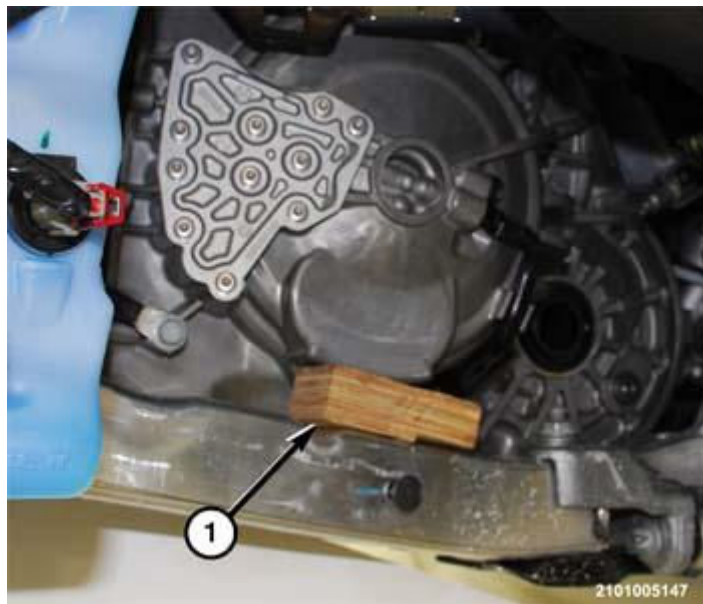


Fig. 232: Wooden Block Placed Between Transmission And Frame Rail
Courtesy of CHRYSLER GROUP, LLC

12. Insert a wood block (1) between the load beam and the transmission.

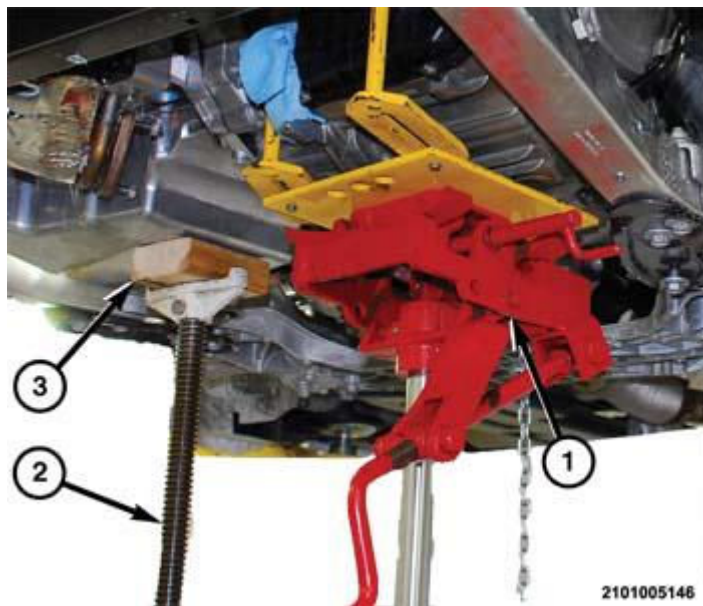


Fig. 233: Wooden Block Used To Protect Engine Oil Pan
Courtesy of CHRYSLER GROUP, LLC

13. Remove the safety chain holding the transmission to the transmission jack lift plate.

14. Lower the high stand (2) and the transmission jack (1) until the transmission rests on the wooden block.
15. Remove the high stand (2) and transmission jack (1) from under the vehicle.



Fig. 234: Transmission Cooler Lines
Courtesy of CHRYSLER GROUP, LLC

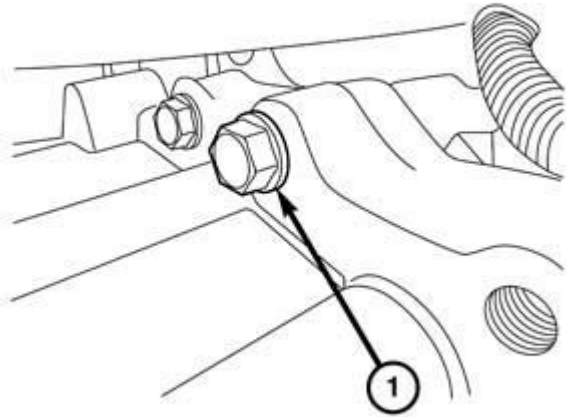
16. Guide the cooler lines in position on the transmission.
17. Engage the quick couplings to hold the cooler lines to the transmission.
18. Install the left and right half shafts. Refer to **INSTALLATION**.
19. Remove the safety stands under the rear frame rails behind the rear axle and lower the vehicle.



Fig. 235: Upper Bellhousing Bolts

Courtesy of CHRYSLER GROUP, LLC

20. Install upper bolts (1) to hold the transmission bellhousing to the engine block located behind the main engine wire harness. Refer to **SPECIFICATIONS**.



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Fig. 236: Upper Starter Bolt

Courtesy of CHRYSLER GROUP, LLC

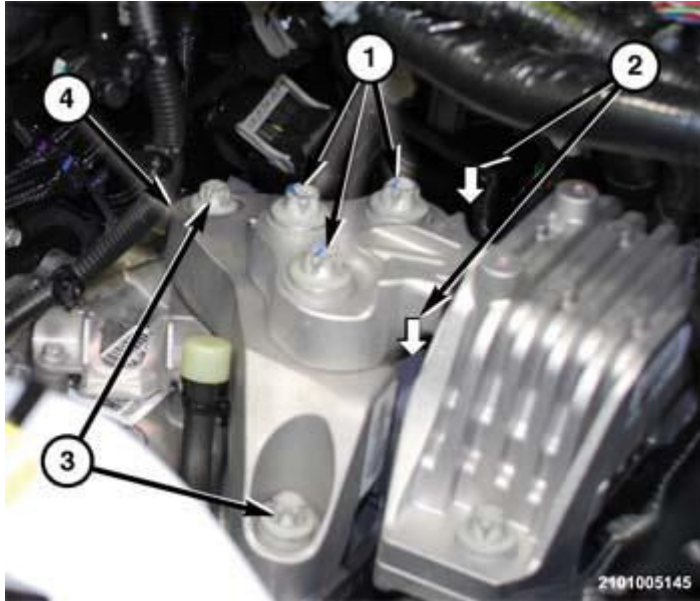
21. If equipped with a 2.4L, tighten the upper starter bolt. Refer to **SPECIFICATIONS**.



Fig. 237: Wire Harness Bracket & Bellhousing Bolt

Courtesy of CHRYSLER GROUP, LLC

22. Install the upper bolt (1) to hold the wire harness bracket and transmission bellhousing to the engine block. Refer to **SPECIFICATIONS**.

**Fig. 238: Upper Transmission Mount Bolts**

Courtesy of CHRYSLER GROUP, LLC

23. Place the transmission mount adaptor block (4) in position on the transmission.
24. Install the bolts (3) and hidden bolts (2) to hold the transmission mount adaptor block (4) to the transmission. Refer to **SPECIFICATIONS**.
25. Place the ground cable (1) in position on the transmission.
26. Install the bolt (1) to hold the ground cable to the transmission end cover. Refer to **SPECIFICATIONS**.
27. Position a floor jack under the transmission.
28. Raise the transmission until the wood block is free to be removed.

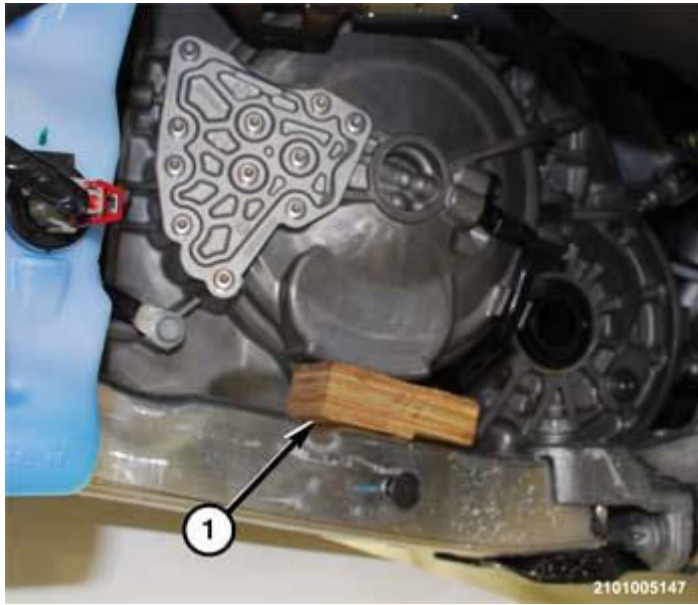


Fig. 239: Wooden Block Placed Between Transmission And Frame Rail
Courtesy of CHRYSLER GROUP, LLC

29. Remove the wooden block (1) from between the transmission end cover and the frame rail load beam.

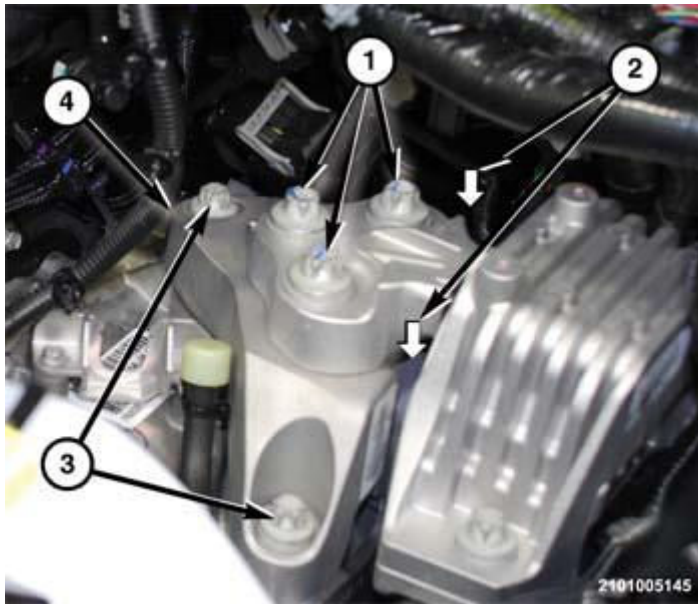


Fig. 240: Upper Transmission Mount Bolts
Courtesy of CHRYSLER GROUP, LLC

30. Install the bolts (1) to hold the upper transmission mount to the adaptor block (4). Refer to **SPECIFICATIONS**.
31. Lower and remove the floor jack.



Fig. 241: Transmission Valve Body Solenoid Connector
Courtesy of CHRYSLER GROUP, LLC

32. Engage the transmission solenoid connector (2) into transmission connector.
33. Rotate the lock lever (2) clockwise on the transmission solenoid connector.



Fig. 242: View Of Shift Cable Housing & Mount Bracket
Courtesy of CHRYSLER GROUP, LLC

34. Place the shift cable (2) in position on the mount bracket (2).
35. Press the shift cable housing (2) into the mount bracket (1) on the transmission.



Fig. 243: View Of Ground Cable & Shift Cable
Courtesy of CHRYSLER GROUP, LLC

36. Snap the shift cable end (2) in position on the manual lever on the transmission.



Fig. 244: Ground Cable At Top Transmission
Courtesy of CHRYSLER GROUP, LLC

37. Place the ground cable (1) in position on the transmission.
38. Install the bolt (1) to hold the ground cable to the top of the transmission. Refer to **SPECIFICATIONS**.

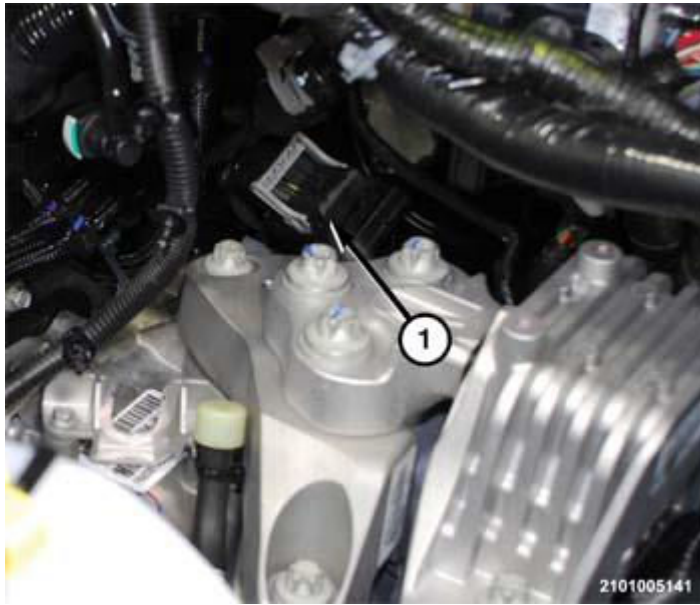


Fig. 245: Identifying Wire Connector Lock To TCM
 Courtesy of CHRYSLER GROUP, LLC

39. Engage the wire connector (1) into the TCM connector.
40. Close the lock on the TCM connector (1).
41. If equipped with a 3.2L, place the vacuum pump in position on the mount bracket. Refer to **PUMP, VACUUM, INSTALLATION** .
42. For 3.2L install the nuts to hold the vacuum pump to the mount bracket.
43. For 3.2L connect the wire connector onto the vacuum pump.
44. For 3.2L connect the vacuum line onto the vacuum pump.
45. If equipped with a 2.4L, install the intake manifold. Refer to **MANIFOLD, INTAKE, INSTALLATION** .
46. Install the battery tray Refer to **TRAY, BATTERY, INSTALLATION** .
47. Install the power distribution center. Refer to **CENTER, POWER DISTRIBUTION (PDC), INSTALLATION** .
48. Install the PCM. Refer to **MODULE, POWERTRAIN CONTROL, INSTALLATION** .
49. Engage the connectors on the PCM.
50. Raise the vehicle.
51. Fill the transmission to the proper level with the specified fluid.
52. Install the belly pan. Refer to **BELLY PAN, INSTALLATION** .
53. Install new rivets at the lower outboard front fascia to wheel well liners.
54. Install the front wheels. Refer to **INSTALLATION** .
55. Lower the vehicle.
56. Install the battery. Refer to **BATTERY, INSTALLATION** .
57. If transmission is replaced, program the Vehicle Identification Number (VIN) into the Transmission

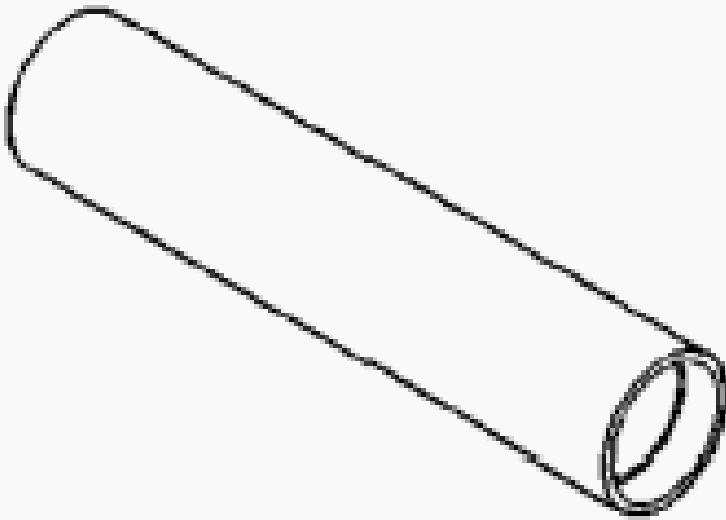
Control Module (TCM).

NOTE: Note; only perform the Valve Body Solenoid Learn procedure if the valve body and/or the TCM was replaced during a repair. Do not perform this procedure if the repair did not require the valve body and/or TCM to be replaced. Do not perform this procedure if the transmission is being replaced.

58. If valve body or the TCM was replaced, perform Valve Body Solenoid Learn procedure.
59. If transmission is replaced or internal repairs were made, perform Transmission Verification Test-948TE. Refer to **STANDARD PROCEDURE**.
60. Road test the vehicle to verify the repair.

SPECIAL TOOLS

SPECIAL TOOLS

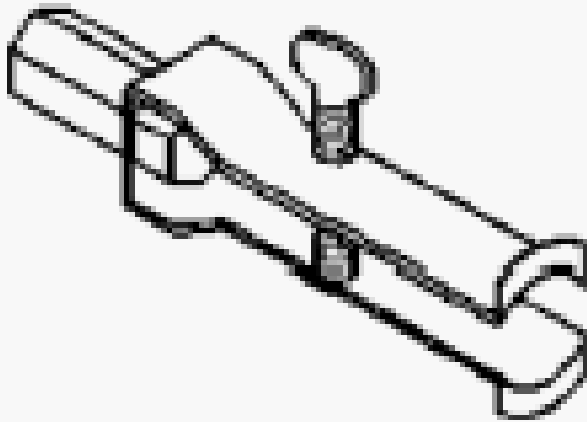
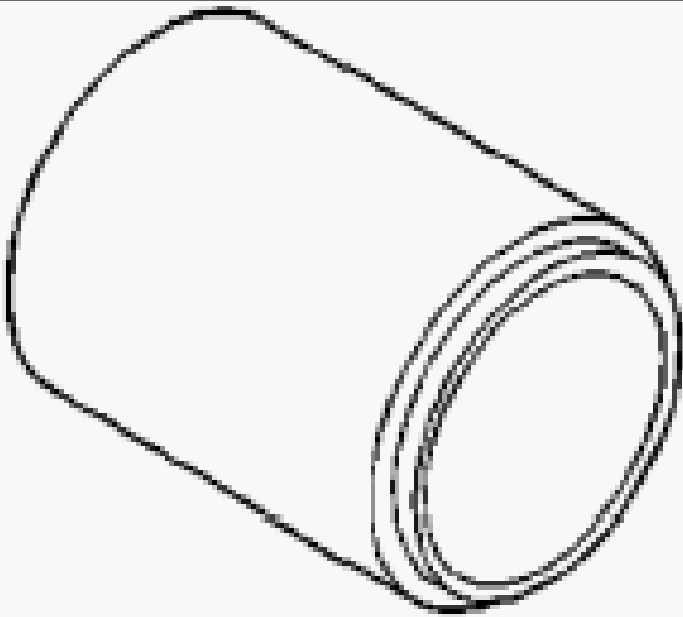


6052 - Installer, Bearing/Seal
(Originally Shipped In Kit Number(s)
6303, 6672, 8853.)

6888 - Installer, Seal
(Originally Shipped In Kit Number(s)
6894, 6895, 6896, 6898, 9720-SUP.)

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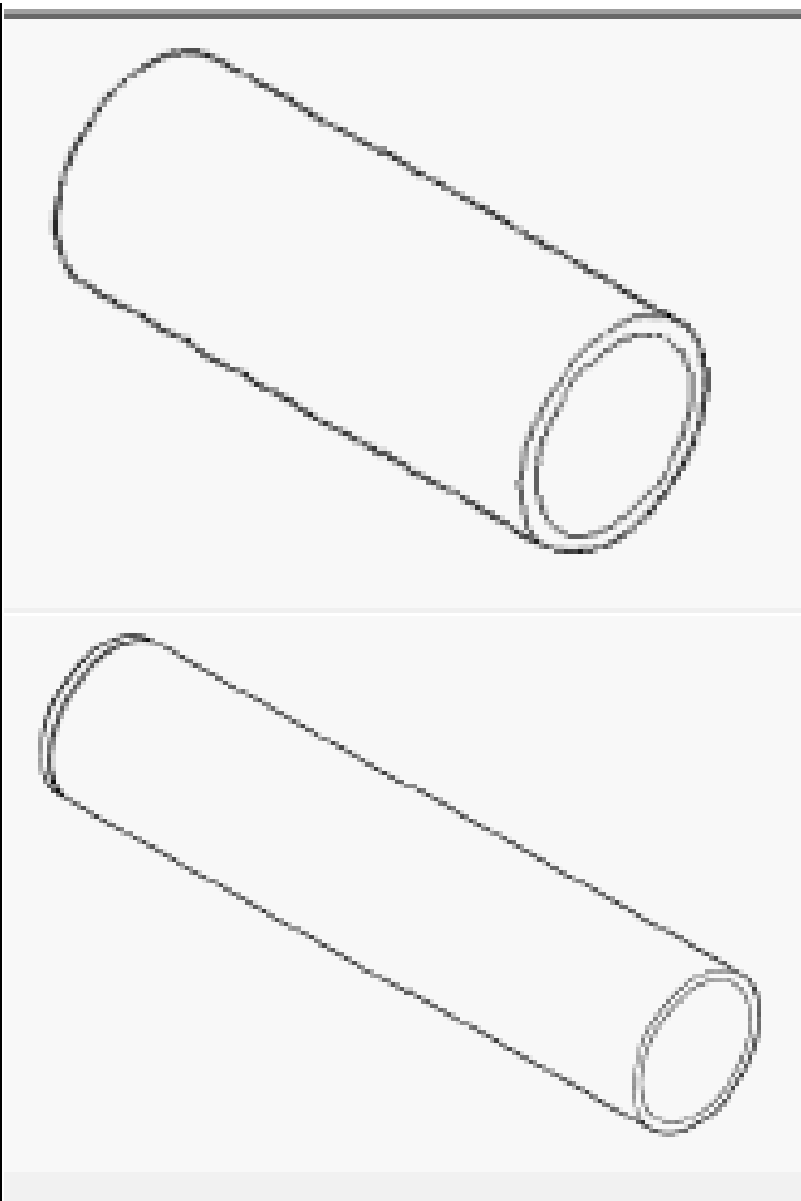


7794-A - Remover, Seal
(Originally Shipped In Kit Number(s)
6645.)

8148 - Cup
(Originally Shipped In Kit Number(s)
8104, 9975.)

2014 Jeep Cherokee Trailhawk

2014 AUTOMATIC TRANSMISSION 948TE - Service Information - Cherokee

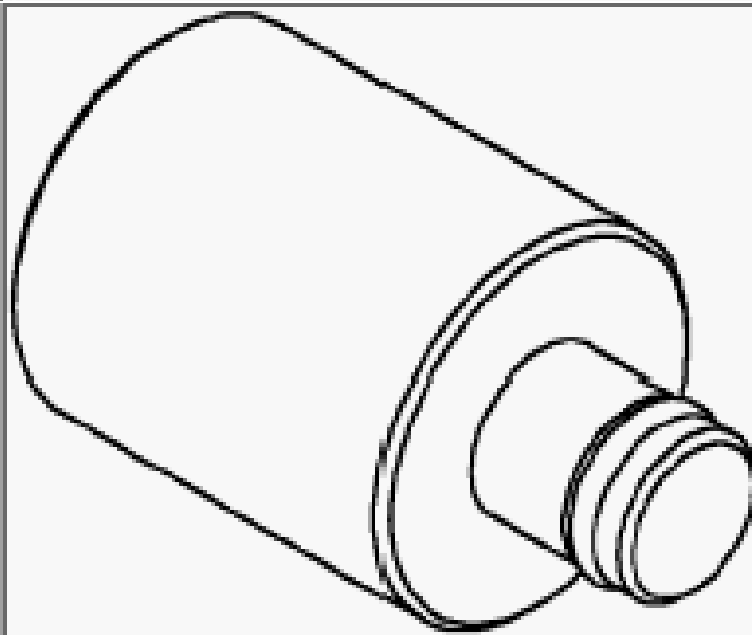
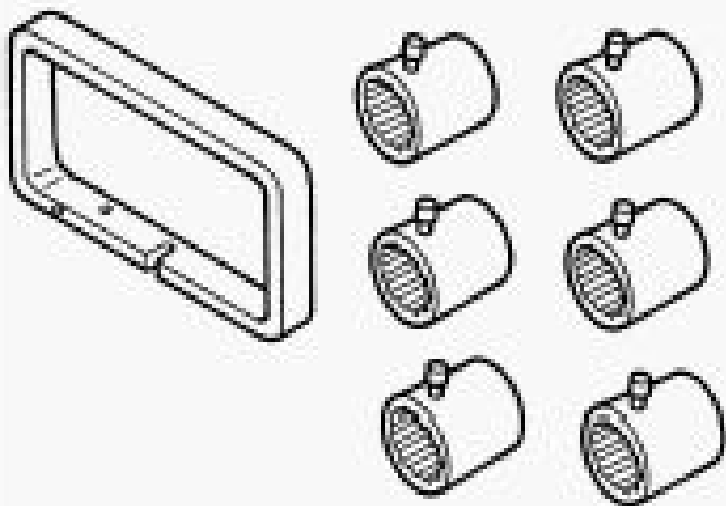


8228 - Installer, Bearing
(Originally Shipped In Kit Number(s)
8295, 8295CC, 8636.)

8266B - End Play Socket Set
(Originally Shipped In Kit Number(s)
8283, 8527, 8575, 8575CC.)

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8513A - Insert, Crankshaft
(Originally Shipped In Kit Number(s)
8283, 8527, 8575, 8999, 8999CC.)

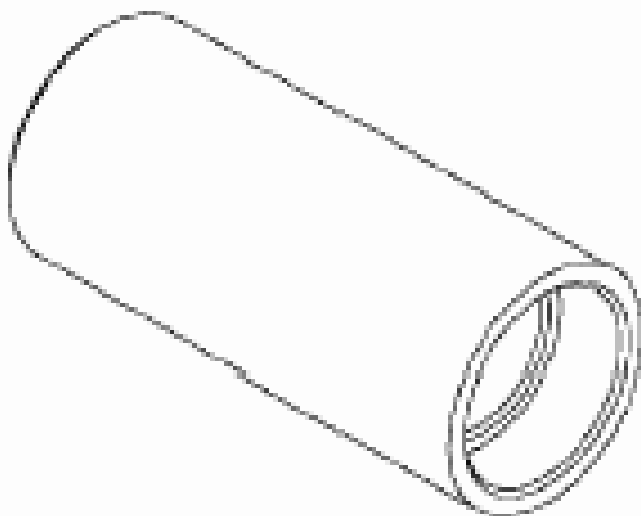
8594 - Installer, Bearing Cup

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2014 AUTOMATIC TRANSMISSION 948TE - Service Information - Cherokee



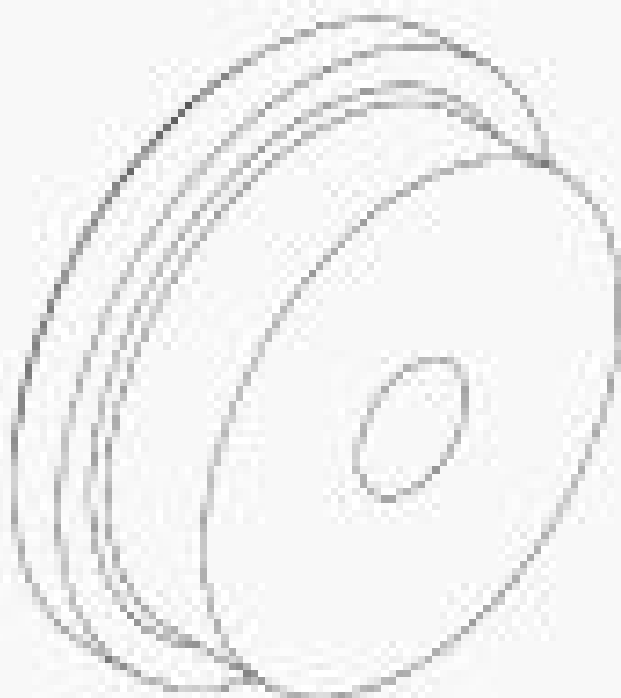
(Originally Shipped In Kit Number(s)
8666, 8667, 8705, 8705CC.)



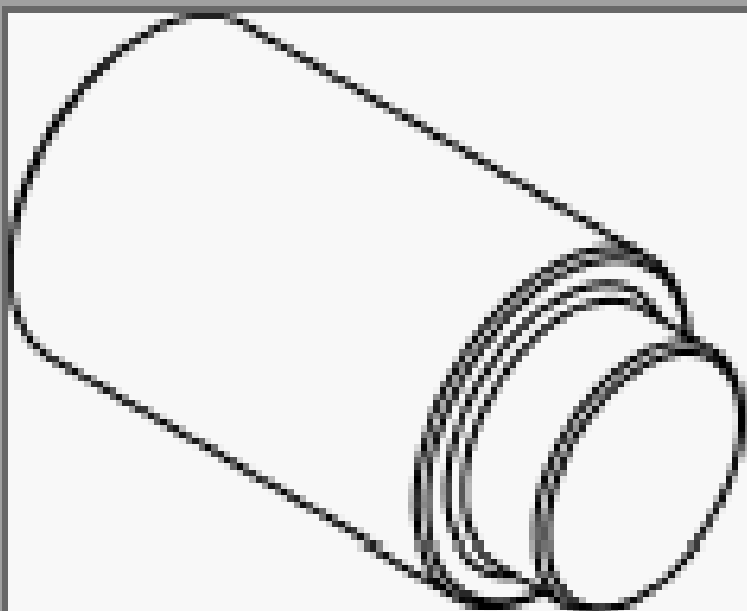
8840 - Installer, Oil Slinger
(Originally Shipped In Kit Number(s)
8715, 8719, 8719CC, 9975, 9976.)

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2014 AUTOMATIC TRANSMISSION 948TE - Service Information - Cherokee



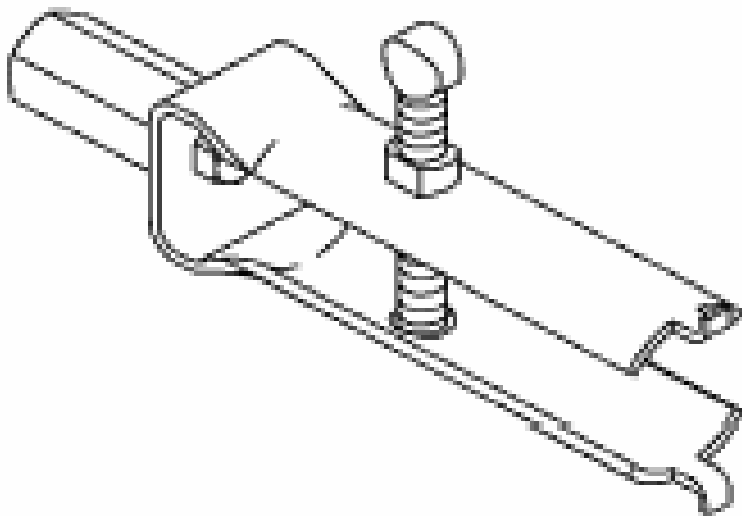
9588 - Installer, Bearing Cup
(Originally Shipped In Kit Number(s)
9692.)



9611 - Plug, Differential End
(Originally Shipped In Kit Number(s)
9690.)

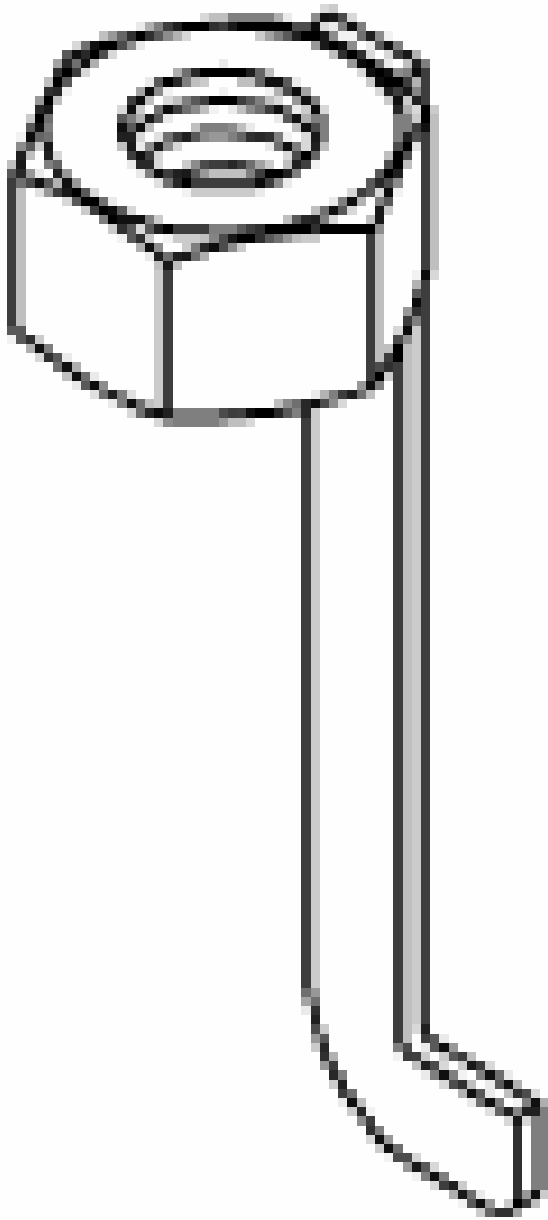
2014 Jeep Cherokee Trailhawk

2014 AUTOMATIC TRANSMISSION 948TE - Service Information - Cherokee



9664 - Remover, Bearing Cup
(Originally Shipped In Kit Number(s)
9675, 9685, 9695.)

9667 - Remover, Seal
(Originally Shipped In Kit Number(s)
9691.)

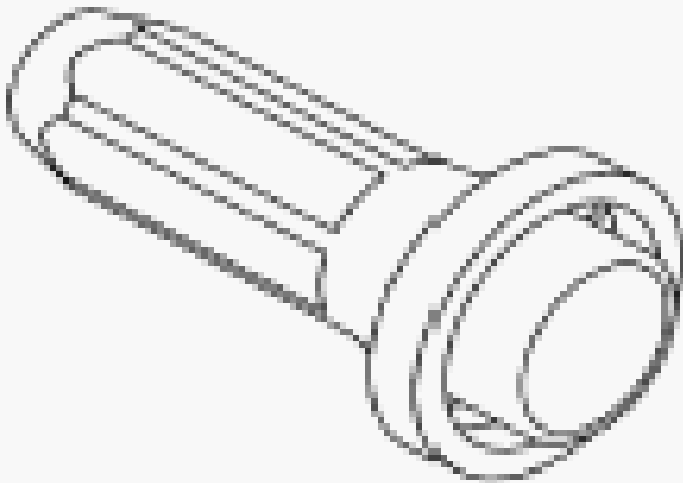


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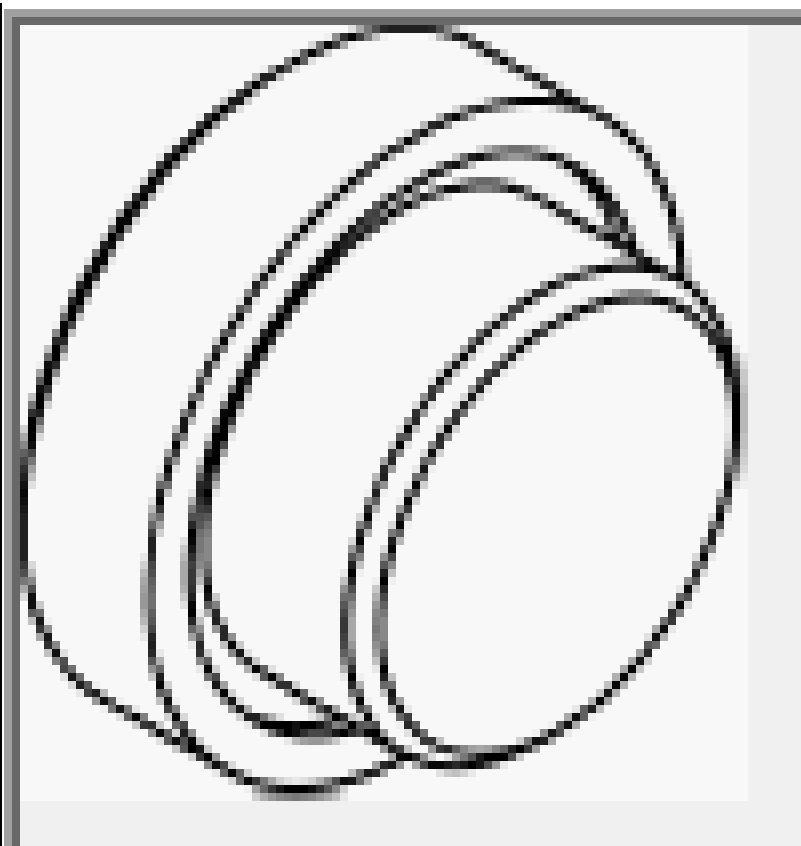
2014 AUTOMATIC TRANSMISSION 948TE - Service Information - Cherokee



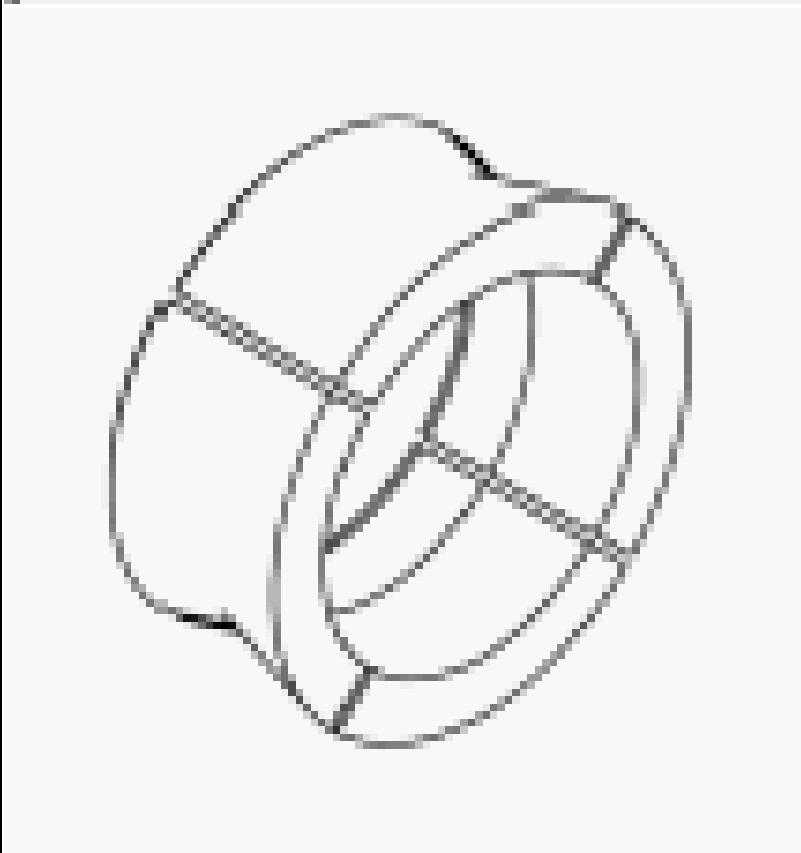
9676 - Adapter Plug
(Originally Shipped In Kit Number(s)
9675, 9685, 9695.)



9677 - Installer, Seal
(Originally Shipped In Kit Number(s)
9675, 9685, 9695.)



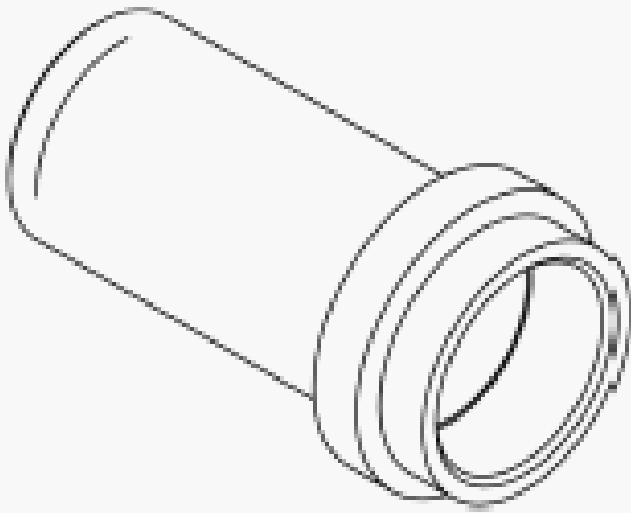
9678 - Press Plug
(Originally Shipped In Kit Number(s)
9675, 9685, 9695.)



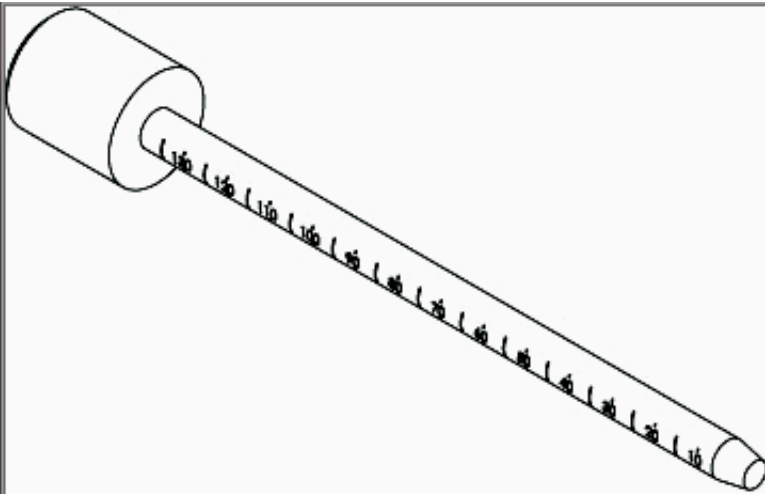
9738 - Blocks, Adapter
(Originally Shipped In Kit Number(s)
9720, 9967.)

2014 Jeep Cherokee Trailhawk

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10036 - Installer, Bearing Cup
(Originally Shipped In Kit Number(s)
10035.)

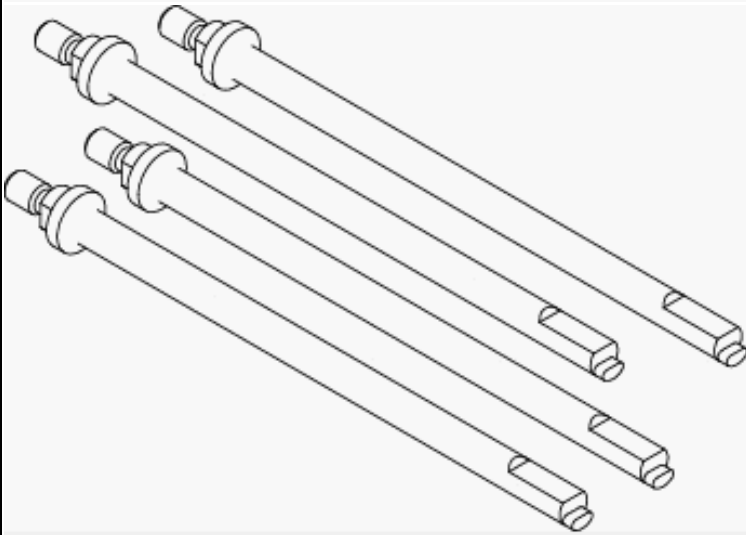
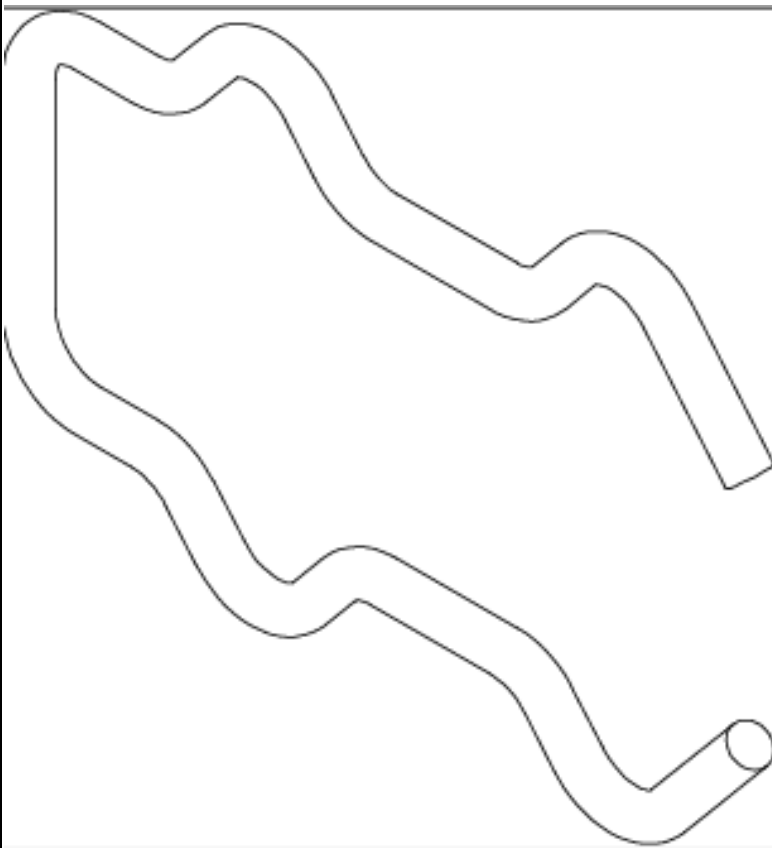


10323A - Dipstick
(Originally Shipped In Kit Number(s).)

10425 - Tool, Pinion and Side Gear
Locking
(Originally Shipped In Kit Number(s)
10419.)

2014 Jeep Cherokee Trailhawk

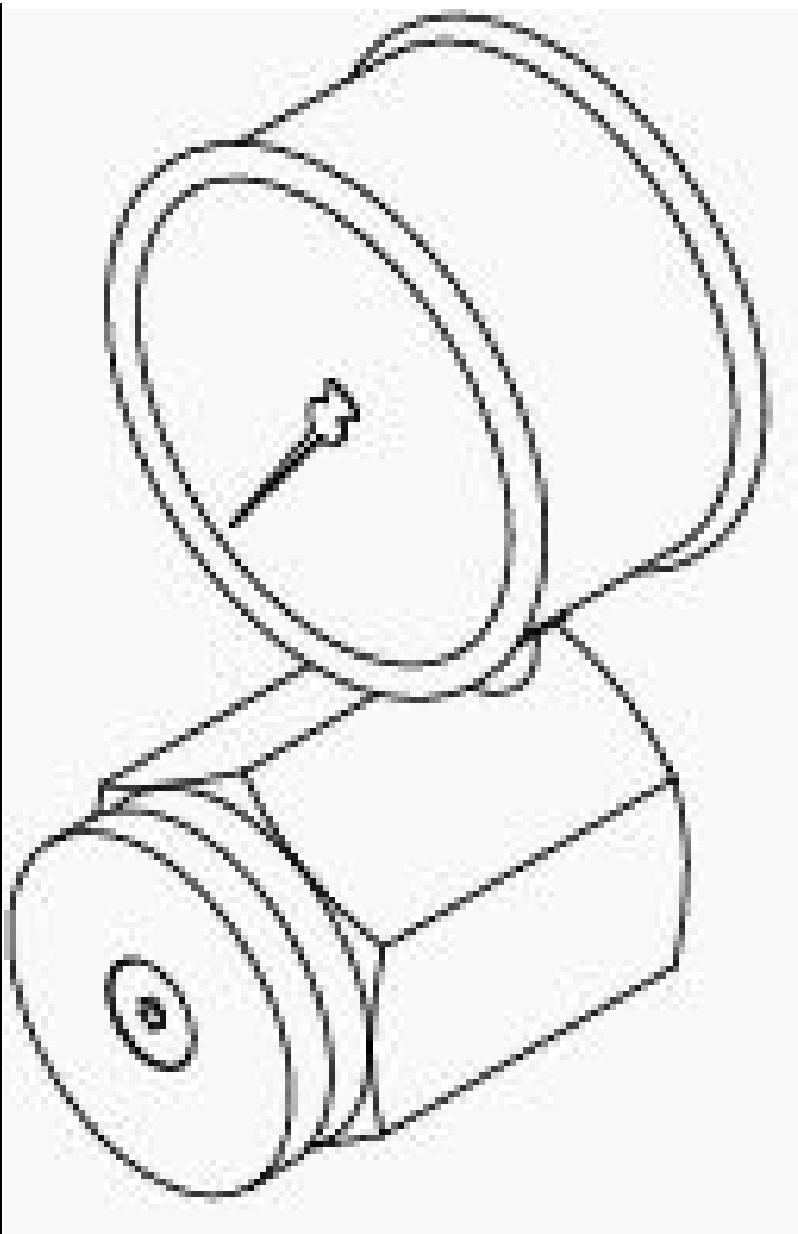
2014 AUTOMATIC TRANSMISSION 948TE - Service Information - Cherokee



10428 - Adapter, Pressing Tool
(Originally Shipped In Kit Number(s).)

2014 Jeep Cherokee Trailhawk

2014 AUTOMATIC TRANSMISSION 948TE - Service Information - Cherokee

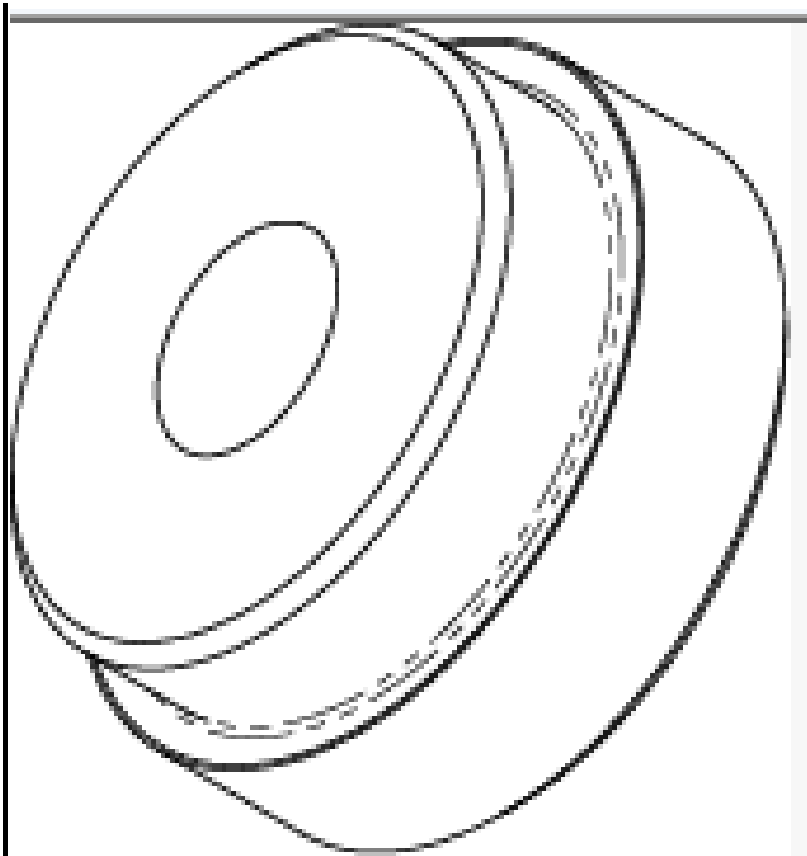


10429 - Gauge, Force
(Originally Shipped In Kit Number(s)
10419.)

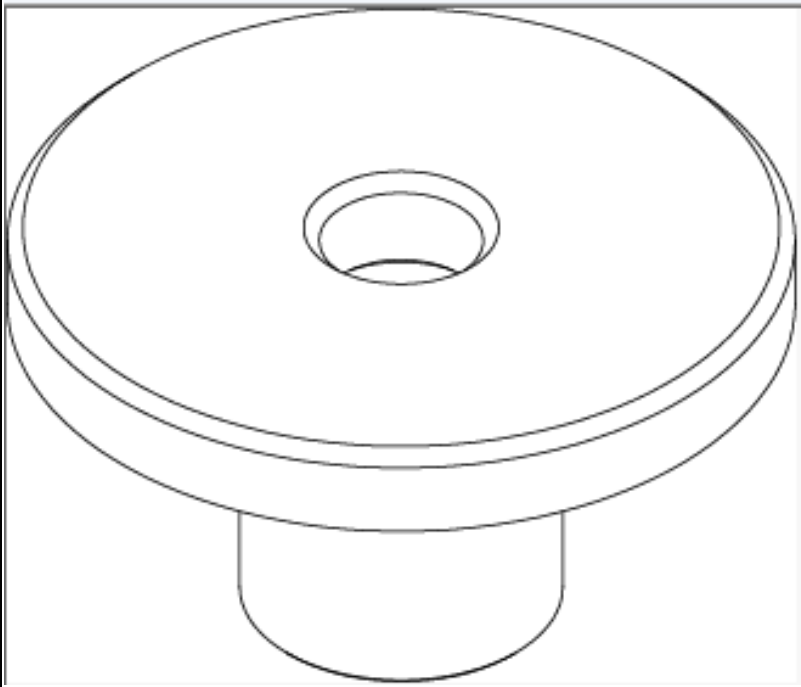
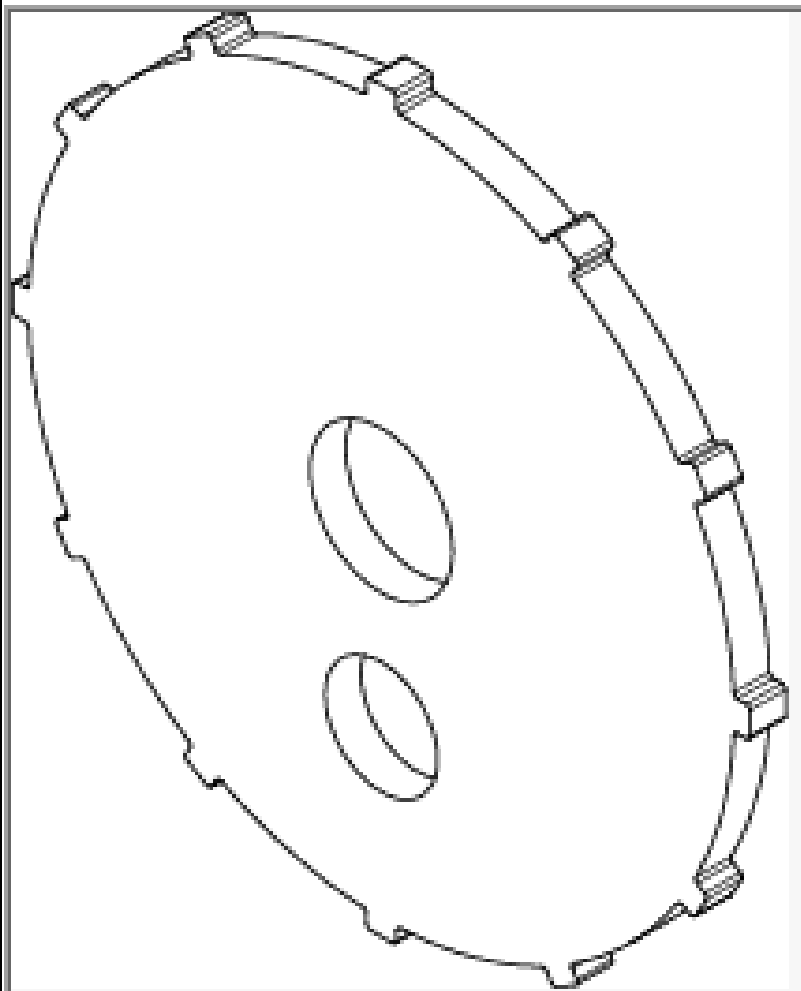
10503 - Installer, Bearing
(Originally Shipped In Kit Number(s).)

2014 Jeep Cherokee Trailhawk

2014 AUTOMATIC TRANSMISSION 948TE - Service Information - Cherokee



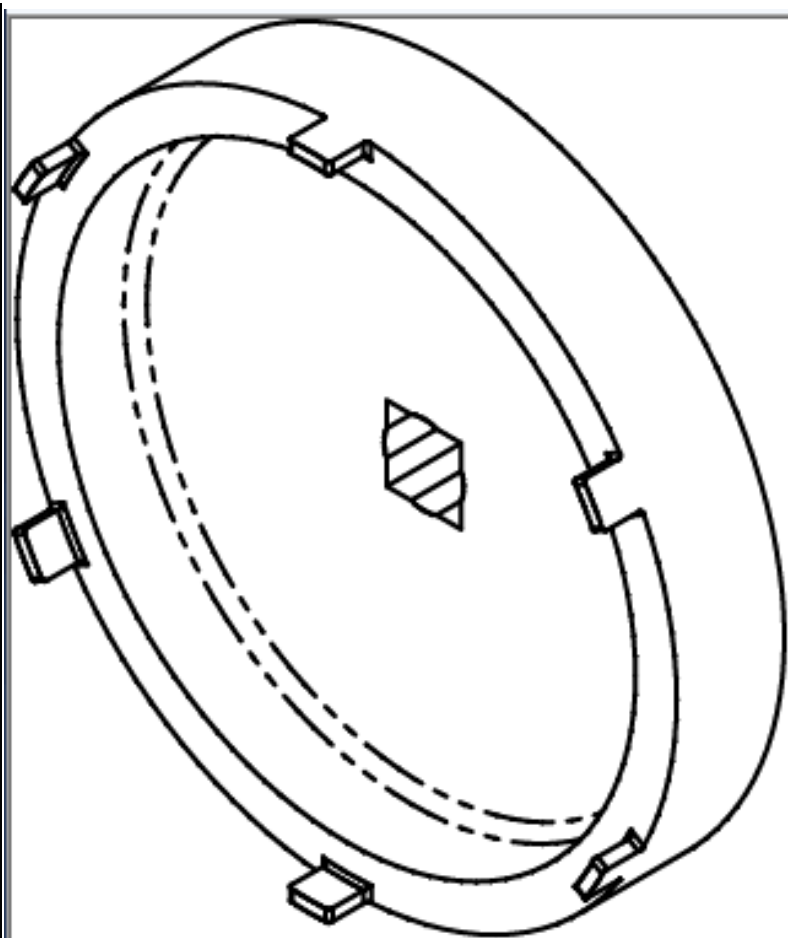
10504 - Compressor, Spring
(Originally Shipped In Kit Number(s).)



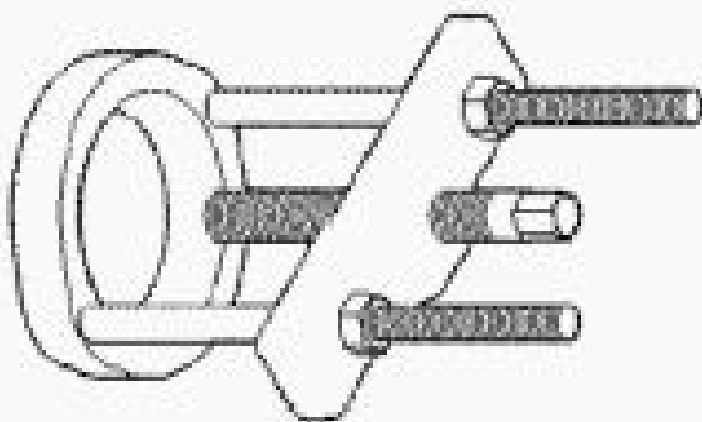
10506 - Installer, Oil Seal
(Originally Shipped In Kit Number(s).)

2014 Jeep Cherokee Trailhawk

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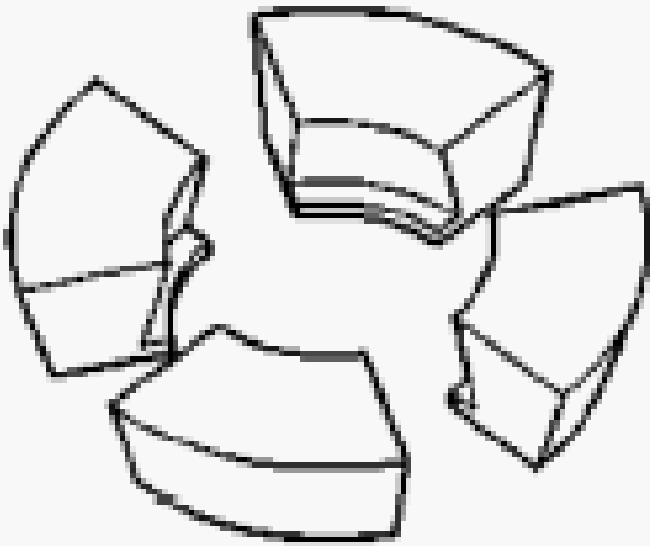
2012900210 - Wrench, Spanner
(Originally Shipped In Kit Number(s).)



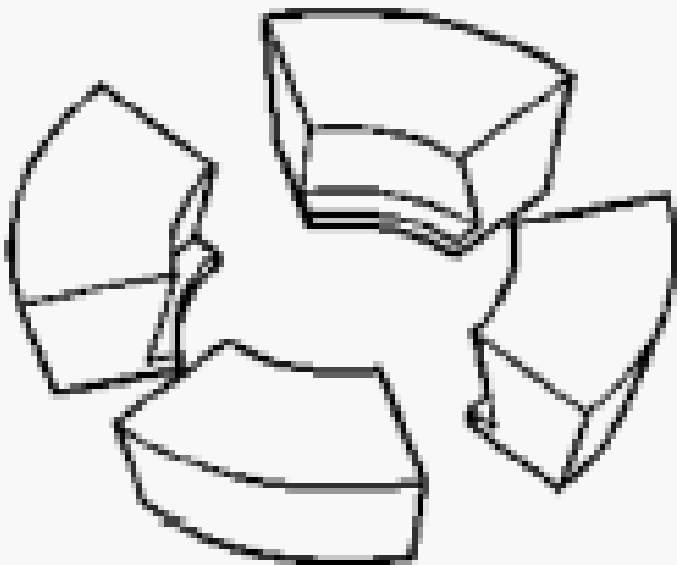
C-293-PA - Puller, Press
(Originally Shipped In Kit Number(s)
8418, 8837, C-293-M.)

2014 Jeep Cherokee Trailhawk

2014 AUTOMATIC TRANSMISSION 948TE - Service Information - Cherokee



C-293-37 - Block Set, Puller
(Originally Shipped In Kit Number(s)
8418, 8562, C-293-M, DD-914-CLT-L.)

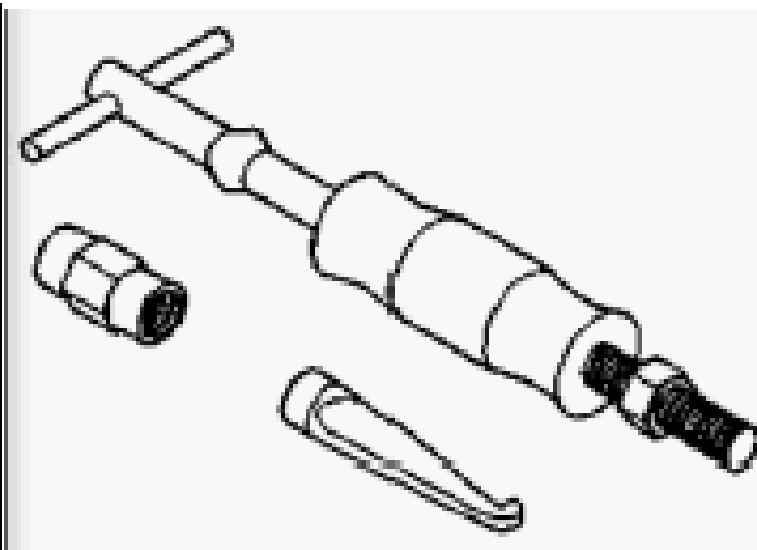


C-293-40 - Block Set, Puller
(Originally Shipped In Kit Number(s)
9695, 9870, 9971.)

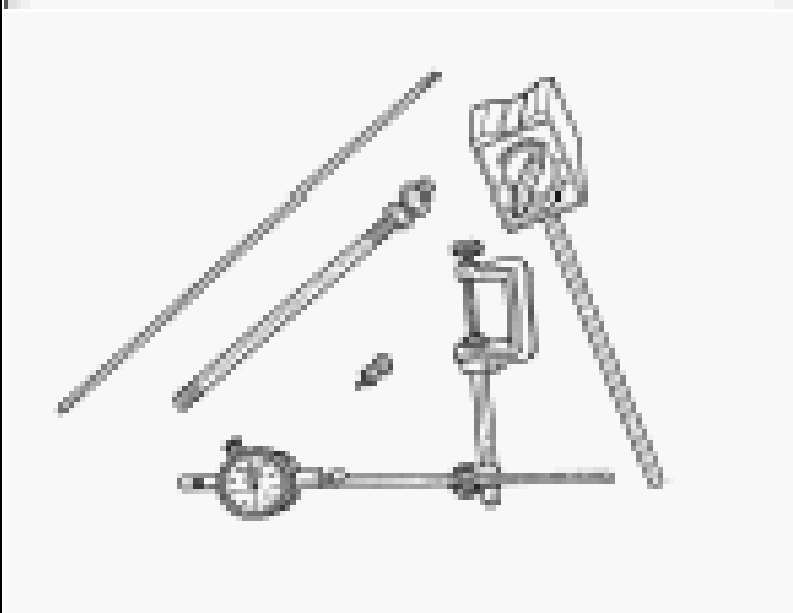
C-637 - Slide Hammer, Universal
(Originally Shipped In Kit Number(s)

2014 Jeep Cherokee Trailhawk

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9202.)

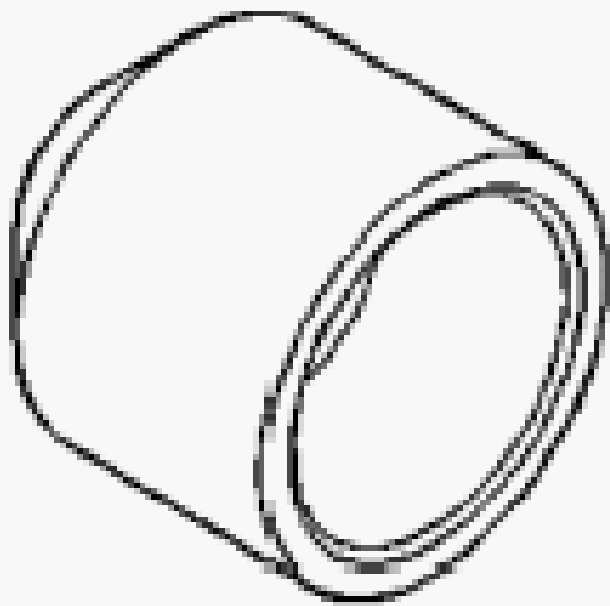
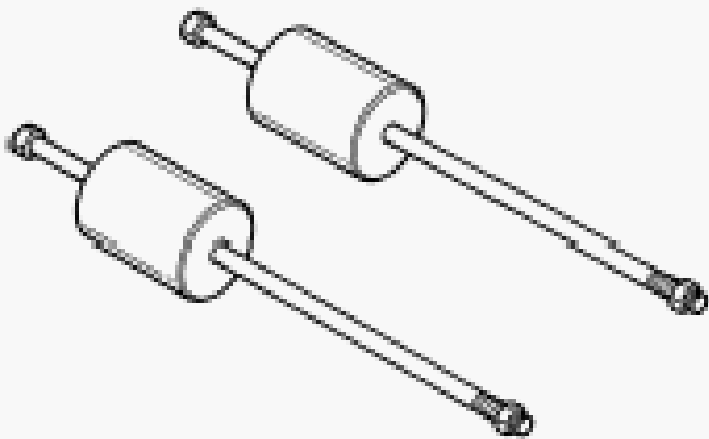


C-3339A - Set, Dial Indicator
(Originally Shipped In Kit Number(s)
9202.)

C-3752 - Slide Hammers
(Originally Shipped In Kit Number(s)
9202, 9202A-CAN, 9202-CAN, 9202CC.)

2014 Jeep Cherokee Trailhawk

2014 AUTOMATIC TRANSMISSION 948TE - Service Information - Cherokee

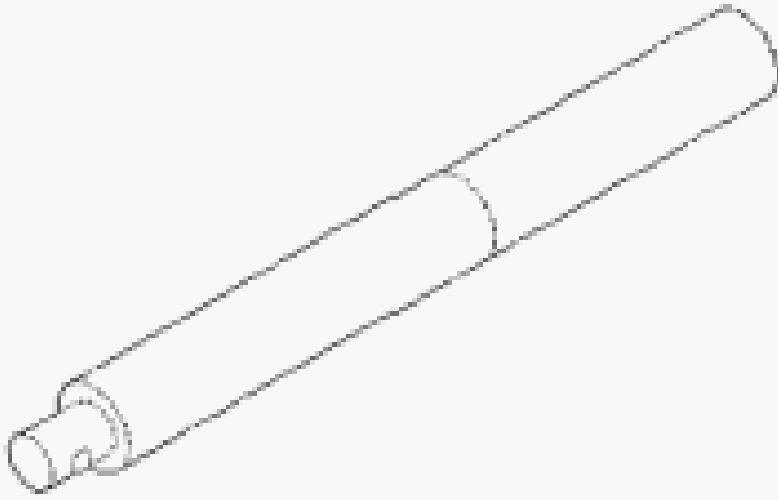


C-3972-A - Installer, Seal
(Originally Shipped In Kit Number(s)
9975.)

C-4171 - Driver Handle, Universal
(Originally Shipped In Kit Number(s)
9202, 9202A-CAN, 9202CC, 9299,
9299CC, 9299CC, 9300A-CAN.)

2014 Jeep Cherokee Trailhawk

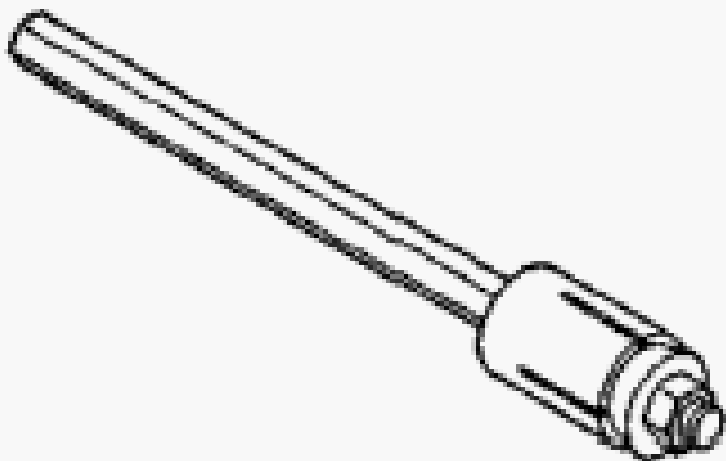
2014 AUTOMATIC TRANSMISSION 948TE - Service Information - Cherokee



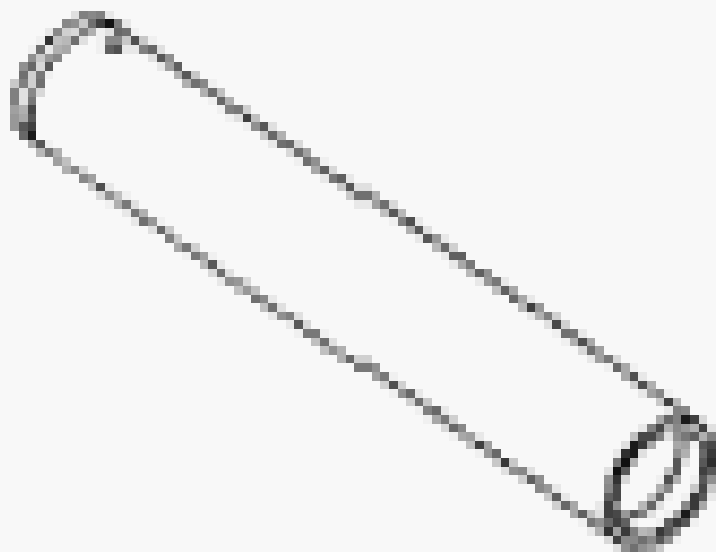
C-4310 - Installer, Bearing
(Originally Shipped In Kit Number(s) C-4306.)

2014 Jeep Cherokee Trailhawk

2014 AUTOMATIC TRANSMISSION 948TE - Service Information - Cherokee

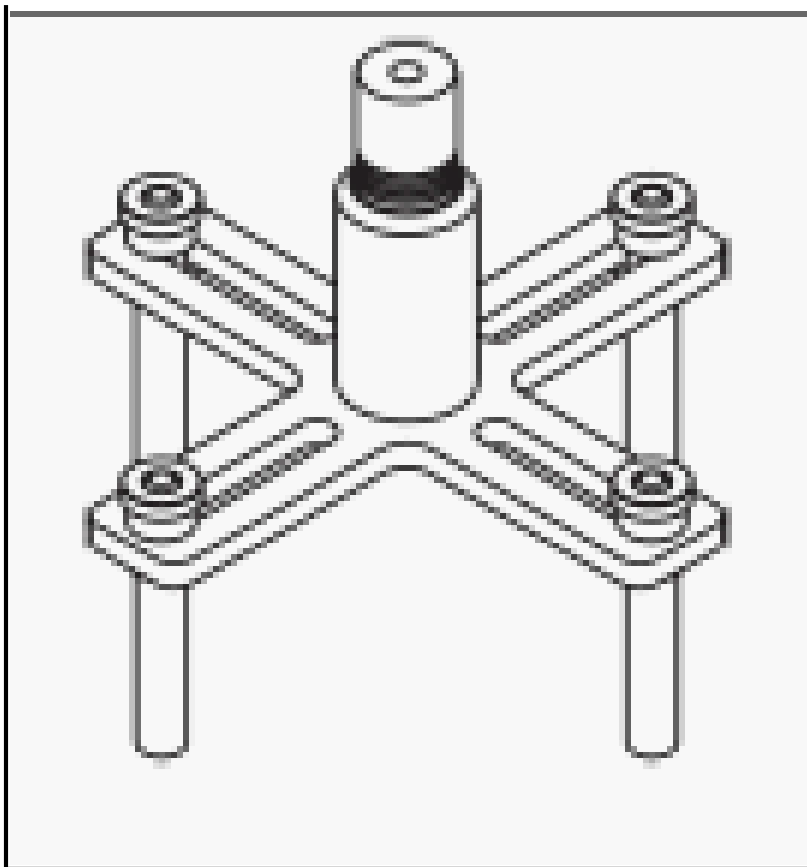


C-4995A - Tool, Differential Bearing Torque



MD998805 - Installer, Seal
(Originally Shipped In Kit Number(s)
9926.)

8901A - Pressing Tool
(Originally Shipped In Kit Number(s)
8901A.)



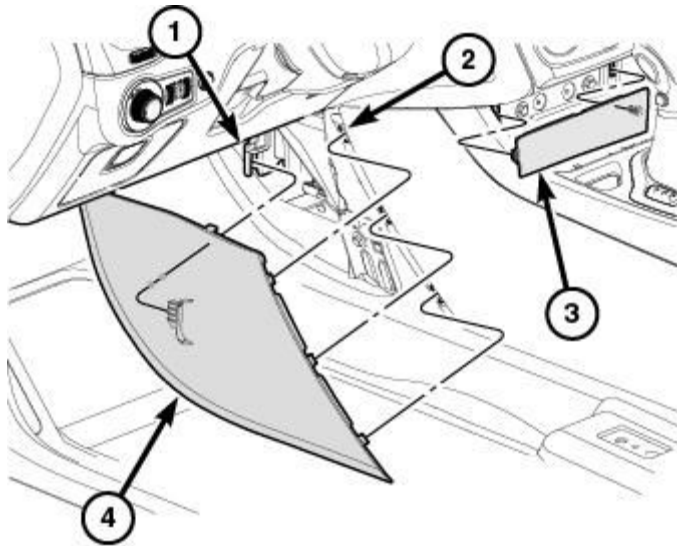
CABLE, SHIFT

ADJUSTMENTS

ADJUSTMENTS

ADJUSTMENT

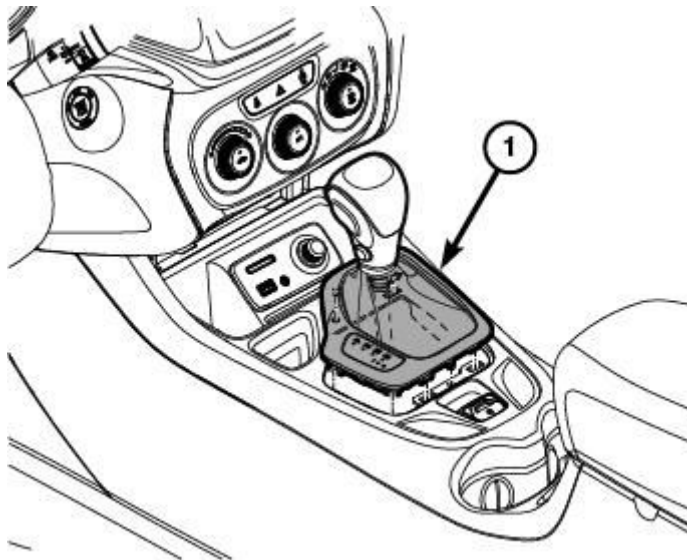
1. Park the vehicle on level ground and set the parking brake.



2316004759

Fig. 246: Console Trim Pieces
Courtesy of CHRYSLER GROUP, LLC

2. Using (special tool #C-4755, Trim Stick) or equivalent, remove the front trim (3) covering the console fasteners.



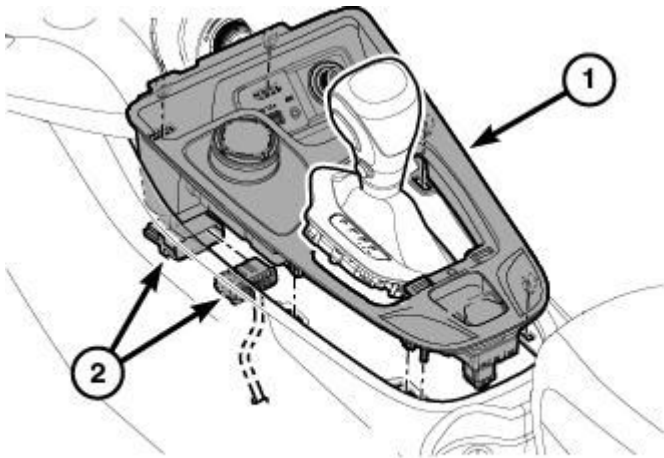
2316004757

Fig. 247: Shifter Bezel & Console Bezel
Courtesy of CHRYSLER GROUP, LLC

3. Detach shifter bezel (1) from console bezel using (special tool #C-4755, Trim Stick) or equivalent, pry up on bezel (1).

NOTE: Do not remove the shifter bezel, as it will fit through the opening in the console bezel when it is removed.

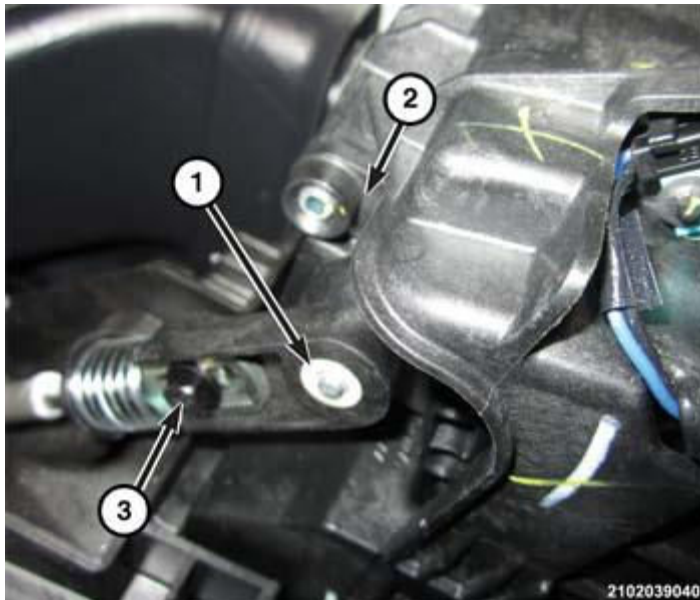
4. Place the shifter in the Neutral position by manually releasing the Brake Ignition Transmission Shift Interlock (BITSI). Refer to **SHIFT, BRAKE INTERLOCK, STANDARD PROCEDURE**.



2316004761

Fig. 248: Shifter Bezel, Console Bezel & Electrical Connectors
Courtesy of CHRYSLER GROUP, LLC

5. Using (special tool #C-4755, Trim Stick) or equivalent, separate the console bezel (1) and disconnect the electrical connectors (2).
6. Place the gearshift lever in Park (P) and remove ignition key.

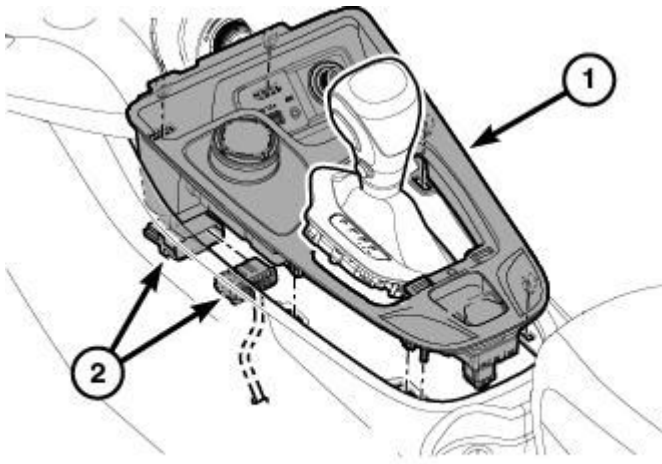


2102039040

Fig. 249: Shifter Cable End & Adjustment Screw
Courtesy of CHRYSLER GROUP, LLC

7. Loosen the cable adjustment screw (3) at the shifter end of the cable.

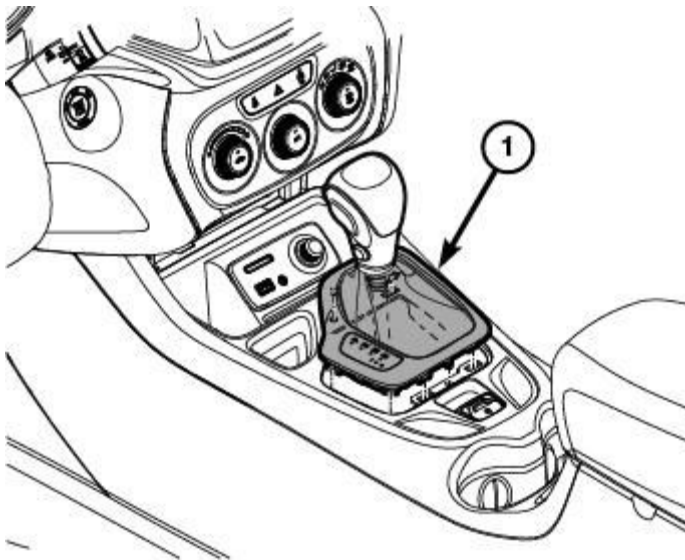
8. Pull the gearshift lever fully forward to the park detent position.
9. Release the park brake, then rock the vehicle to assure it is in park. Reset the park brake.
10. Tighten the cable adjustment screw to proper specification, refer to **SPECIFICATIONS**.
11. Verify adjustment by using the verification procedure.
12. Place the shifter in the Neutral position by manually releasing the Brake Ignition Transmission Shifter Interlock (BITSI). Refer to **SHIFT, BRAKE INTERLOCK, STANDARD PROCEDURE**.



2316004761

Fig. 250: Shifter Bezel, Console Bezel & Electrical Connectors
 Courtesy of CHRYSLER GROUP, LLC

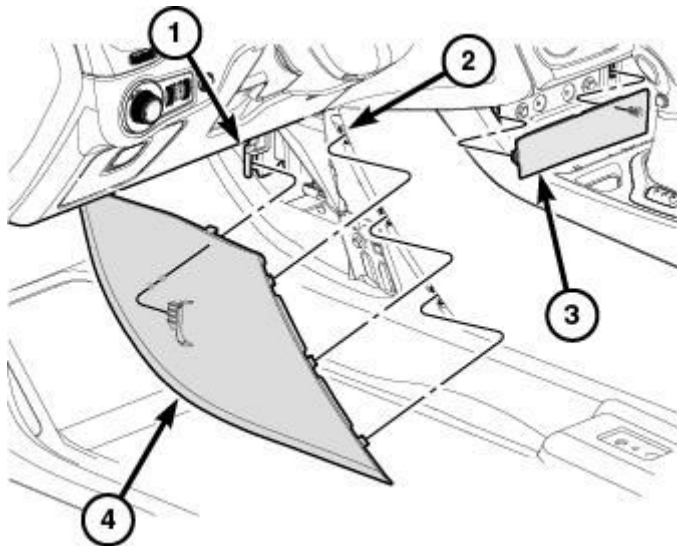
13. Insert the shifter bezel through the console bezel (1).
14. Connect the console bezel electrical connectors (2).
15. Install the console bezel (1) to the console.



2316004757

Fig. 251: Shifter Bezel & Console Bezel
Courtesy of CHRYSLER GROUP, LLC

16. Install the shifter bezel (1) to the console bezel.



2316004759

Fig. 252: Console Trim Pieces
Courtesy of CHRYSLER GROUP, LLC

17. Install the console front trim (3).

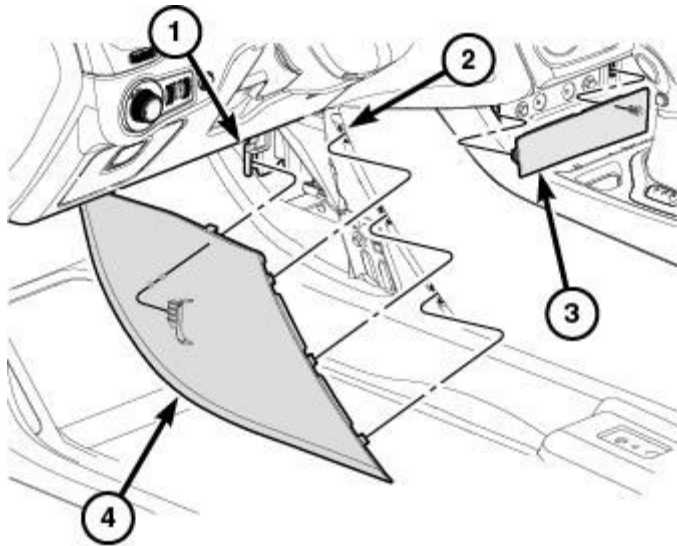
VERIFICATION

1. Place gearshift lever in Park (P).
2. Attempt to move vehicle by rocking back and forth on level ground. If vehicle does not move, attempt to start engine. If engine starts, the park position is correct.
3. Set parking brake.
4. Turn key to on/run and depress brake pedal. Place gearshift lever in Neutral (N).
5. Attempt to start engine. If engine starts in both Neutral (N) or Park (P), gearshift cable is adjusted properly. No adjustment is required.
6. If engine does not start in either Park (P) or Neutral (N), perform adjustment procedure.

REMOVAL

REMOVAL

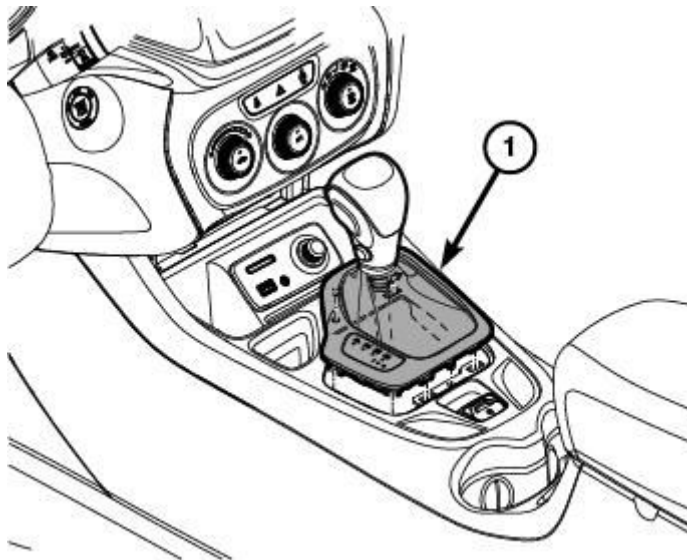
1. Set the parking brake.
2. Disconnect and isolate the negative battery cable.



2316004759

Fig. 253: Console Trim Pieces
 Courtesy of CHRYSLER GROUP, LLC

3. Using (special tool #C-4755, Trim Stick) or equivalent, remove the front trim (3) covering the console fasteners.



2316004757

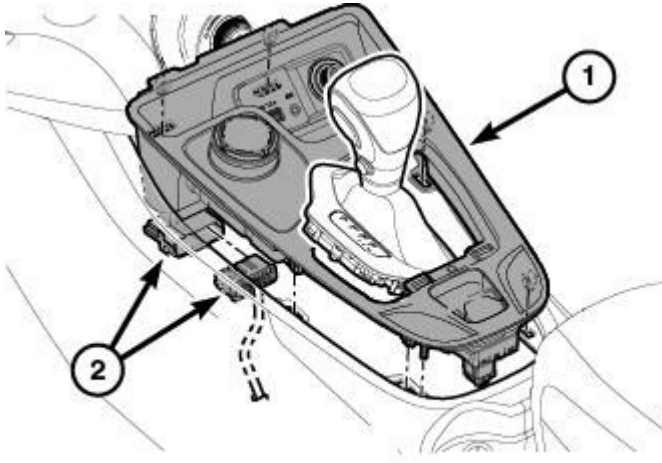
Fig. 254: Shifter Bezel & Console Bezel
 Courtesy of CHRYSLER GROUP, LLC

4. Detach shifter bezel (1) from console bezel using (special tool #C-4755, Trim Stick) or equivalent, pry up on bezel (1).

NOTE: Do not remove the shifter bezel, as it will fit through the opening in the console bezel when it is removed.

5. Place the shifter in the Neutral position by manually releasing the Brake Ignition Transmission Shift Interlock (BITSI)

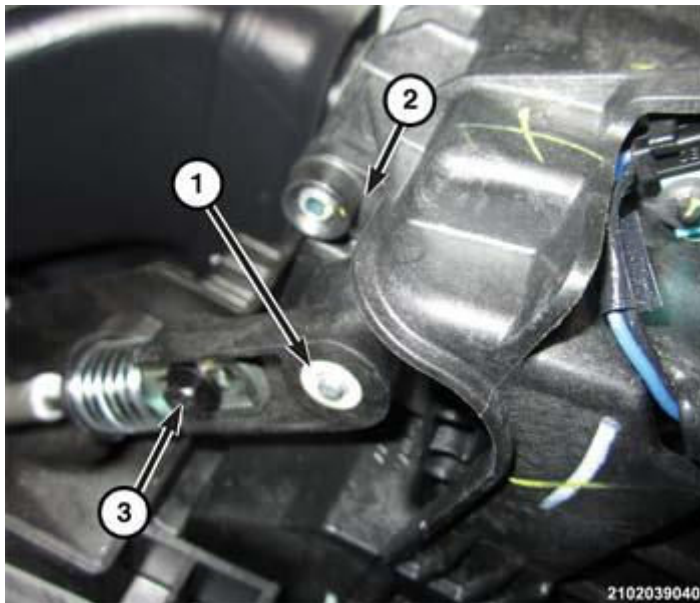
Refer to **SHIFT, BRAKE INTERLOCK, STANDARD PROCEDURE**.



2316004761

Fig. 255: Shifter Bezel, Console Bezel & Electrical Connectors
Courtesy of CHRYSLER GROUP, LLC

6. Using (special tool #C-4755, Trim Stick) or equivalent, separate the console bezel (1) and disconnect the electrical connectors (2).
7. Remove the console bezel.
8. Place shifter in Park position.



2102039040

Fig. 256: Shifter Cable End & Adjustment Screw

Courtesy of CHRYSLER GROUP, LLC

9. Disconnect shifter cable (1) from the shifter (2).

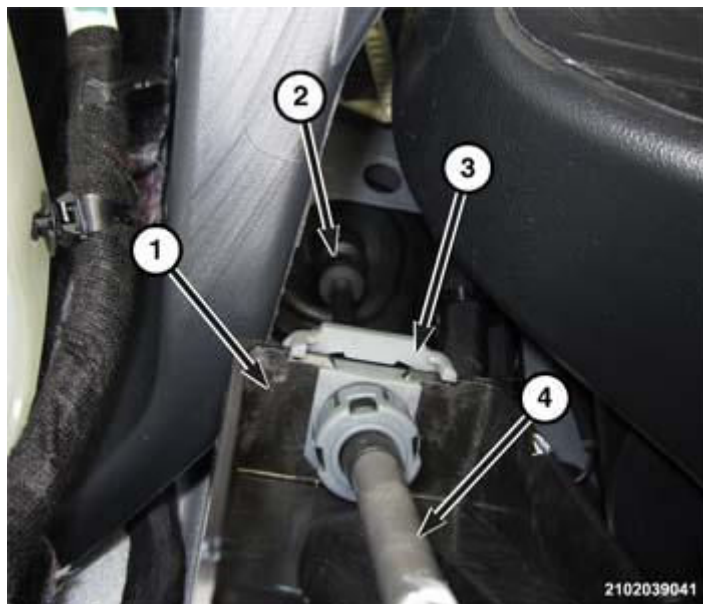


Fig. 257: Shifter Cable & Shifter Bracket
Courtesy of CHRYSLER GROUP, LLC

10. Release the lock (3) holding the shifter cable (4) to the shifter bracket (1).
11. Separate the shifter cable (4) from the shifter bracket (1).
12. Remove the Powertrain Control Module (PCM). Refer to **MODULE, POWERTRAIN CONTROL, REMOVAL**.
13. Remove the PCM bracket from the battery tray.

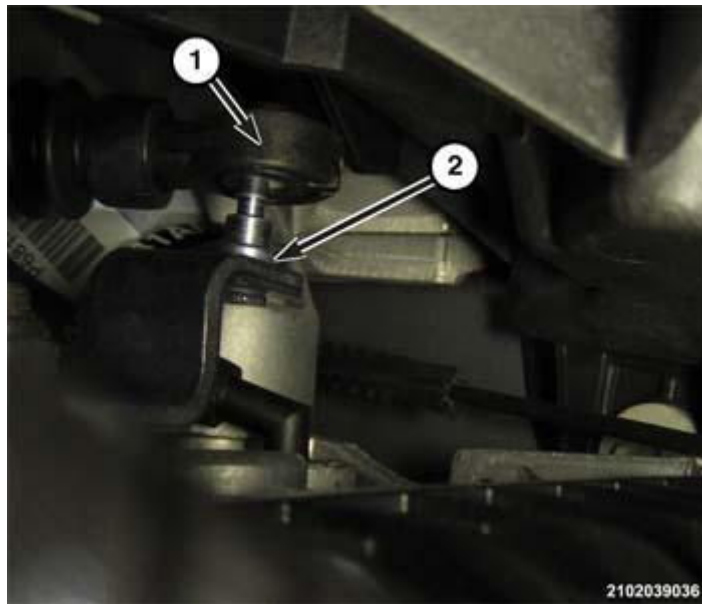


Fig. 258: Shifter Cable End & Manual Lever At Transmission
Courtesy of CHRYSLER GROUP, LLC

14. Separate the shifter cable end (1) from the manual lever (2) on the transmission.

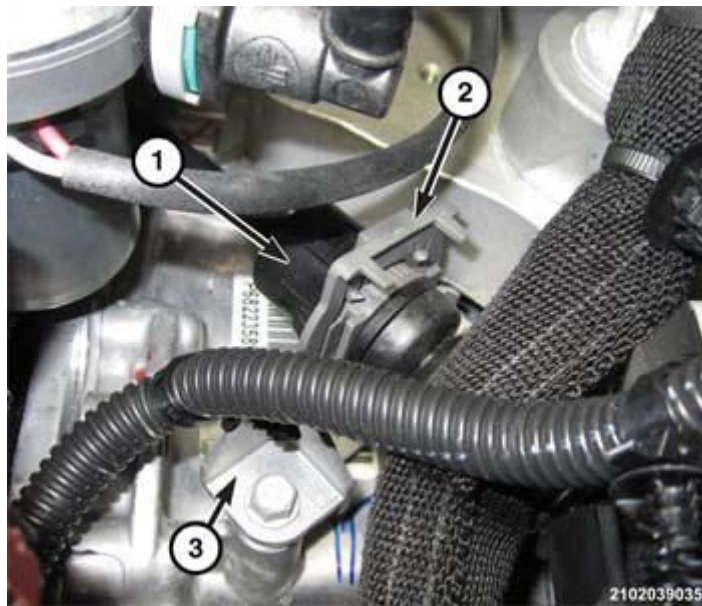


Fig. 259: Shifter Cable & Shift Cable Bracket On Transmission
Courtesy of CHRYSLER GROUP, LLC

15. Release the lock (2) holding the shifter cable (1) to the shift cable bracket (3) on the transmission.
16. Separate the shifter cable (1) from the shift cable bracket (3).
17. Raise and support the vehicle on a hoist. Refer to **HOISTING, STANDARD PROCEDURE** .

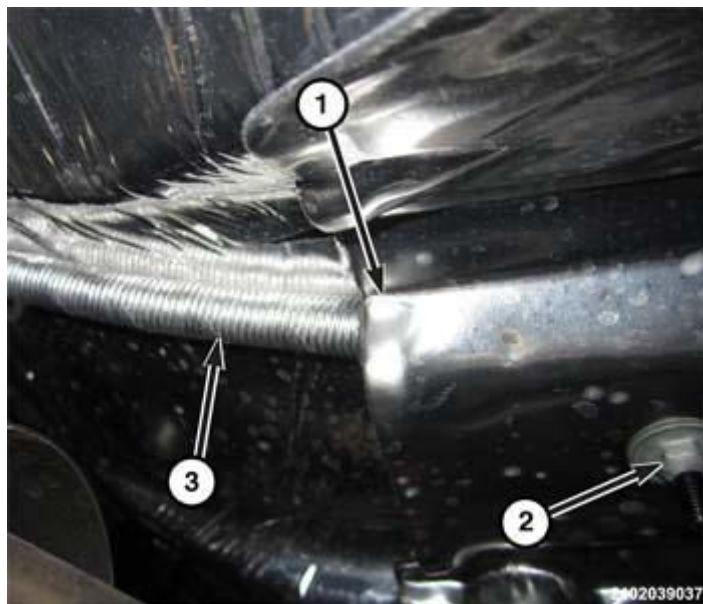


Fig. 260: Exhaust Heat Shield Nuts
Courtesy of CHRYSLER GROUP, LLC

18. Remove the exhaust heat shield (1) nuts (2) and lower heat shield to gain access to the shifter cable and grommet.

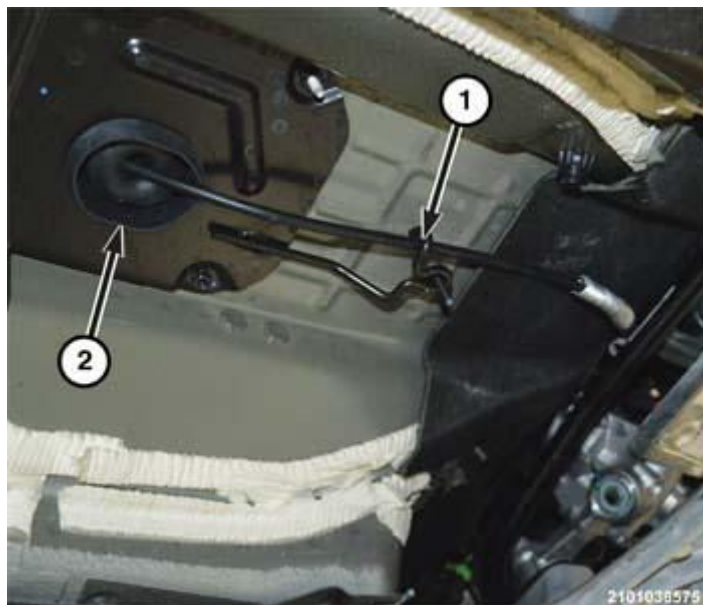


Fig. 261: Shifter Cable Support Bracket & Shifter Cable Grommet
Courtesy of CHRYSLER GROUP, LLC

NOTE: Exhaust and heat shield removed for clarity.

19. Detach the shifter cable from the support bracket (1).

20. Detach the shifter cable grommet (2) from the floor pan.



Fig. 262: Shifter Cable Clip
Courtesy of CHRYSLER GROUP, LLC

21. Detach the shifter cable from the clip (1) attached to the steering gear.



Fig. 263: Shifter Cable & Floor Pan Access Hole
Courtesy of CHRYSLER GROUP, LLC

22. Pull the shifter cable (1) through the floor pan.
23. Disconnect front sway bar links from the sway bar.

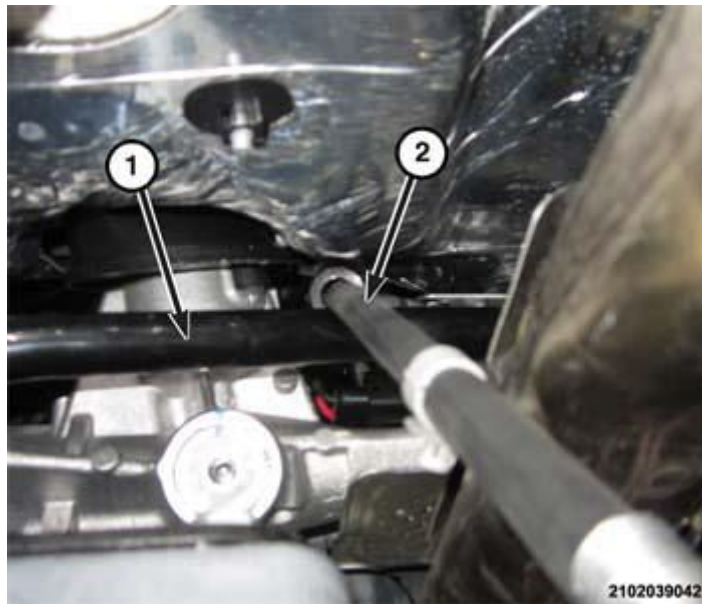


Fig. 264: Shifter Cable
Courtesy of CHRYSLER GROUP, LLC

24. Rotate the sway bar (1) for shifter cable (2) clearance.
25. Remove the shifter cable from the vehicle.

INSTALLATION

INSTALLATION

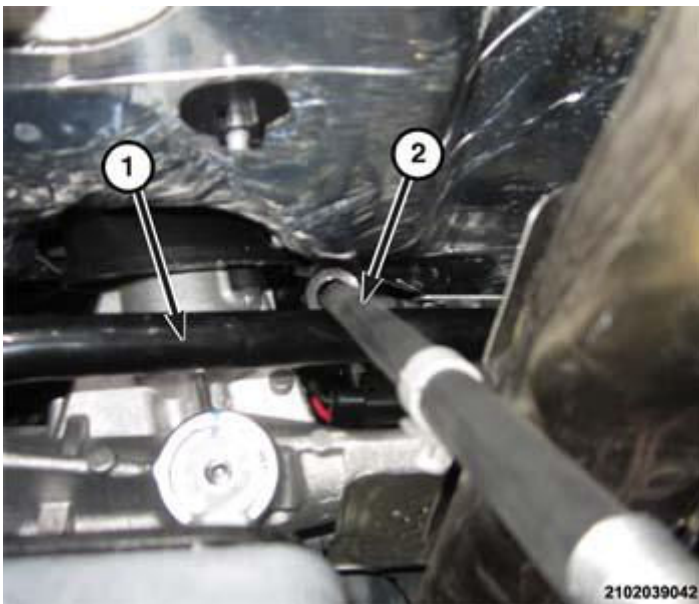


Fig. 265: Shifter Cable
Courtesy of CHRYSLER GROUP, LLC

NOTE: Exhaust and heat shield are removed for clarity.



Fig. 266: Shifter Cable & Floor Pan Access Hole
Courtesy of CHRYSLER GROUP, LLC

1. Position the shifter cable (2) into the vehicle.
2. Push the shifter cable (1) up through the floor pan.



Fig. 267: Shifter Cable Clip
Courtesy of CHRYSLER GROUP, LLC

3. Attach the shifter cable to the clip (1) attached to the steering gear.

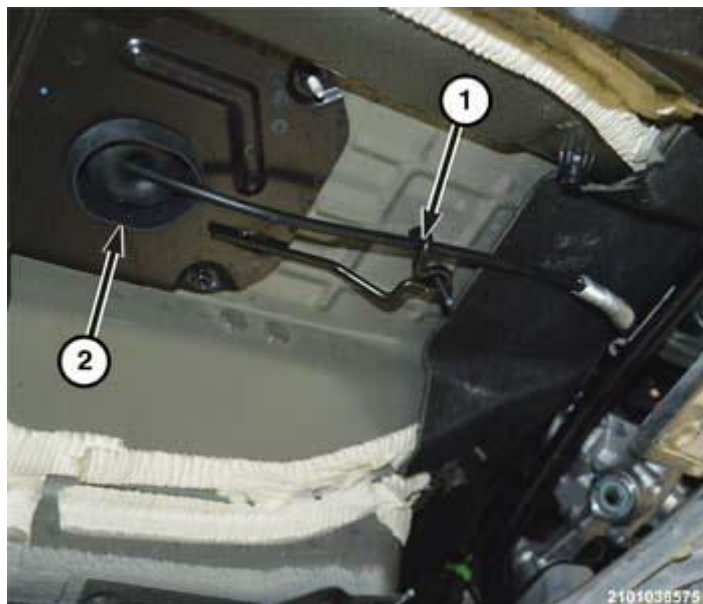


Fig. 268: Shifter Cable Support Bracket & Shifter Cable Grommet
Courtesy of CHRYSLER GROUP, LLC

4. Attach the shifter cable grommet (2) to the floor pan.
5. Attach the shifter cable to the support bracket (1).

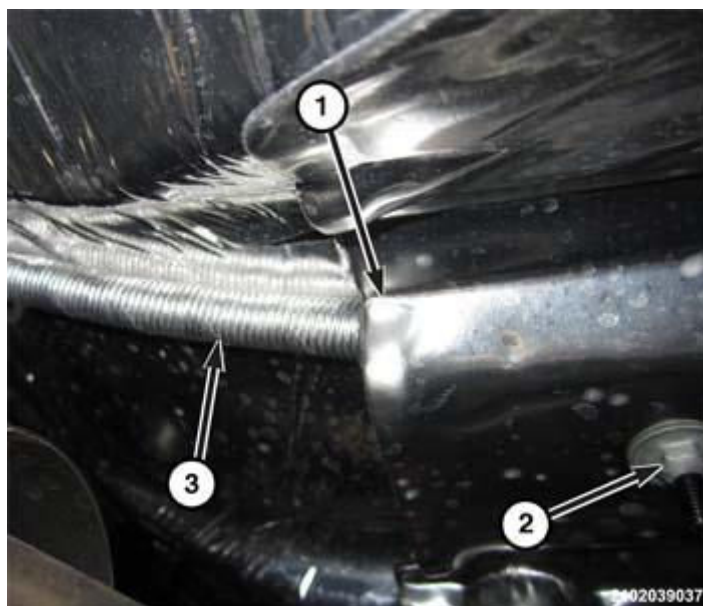


Fig. 269: Exhaust Heat Shield Nuts
Courtesy of CHRYSLER GROUP, LLC

6. Position the heat shield (1) in place and install the heat shield nuts (2).
7. Attach the front sway bar links to the sway bar and tighten to the proper specification. Refer to **FRONT, SPECIFICATIONS** .

8. Lower the vehicle.



Fig. 270: Shifter Cable & Shift Cable Bracket On Transmission
Courtesy of CHRYSLER GROUP, LLC

9. Attach the shifter cable (1) in the shifter cable bracket (3) on the transmission.

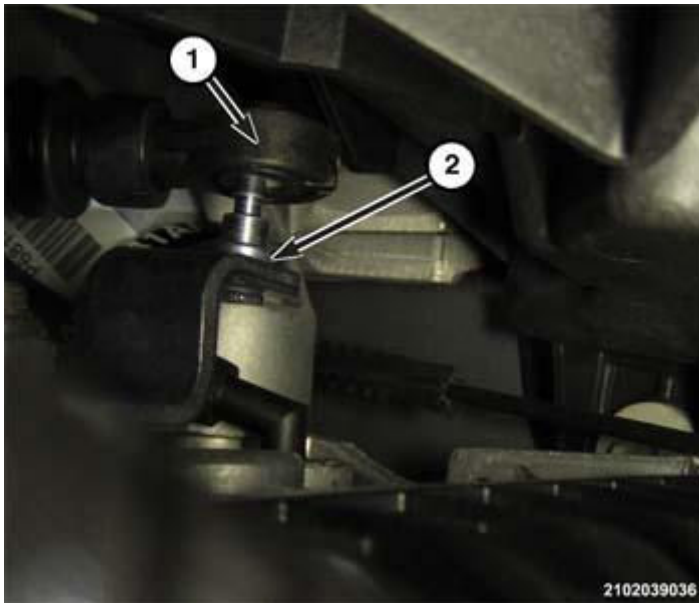


Fig. 271: Shifter Cable End & Manual Lever At Transmission
Courtesy of CHRYSLER GROUP, LLC

10. Attach the shifter cable end (1) to the manual lever (2).

NOTE: Make sure the transmission is in Park by rotating the manual lever to its forward most position.

11. Install the Powertrain Control Module (PCM) bracket to the battery tray.
12. Install the PCM. Refer to **MODULE, POWERTRAIN CONTROL, INSTALLATION** .

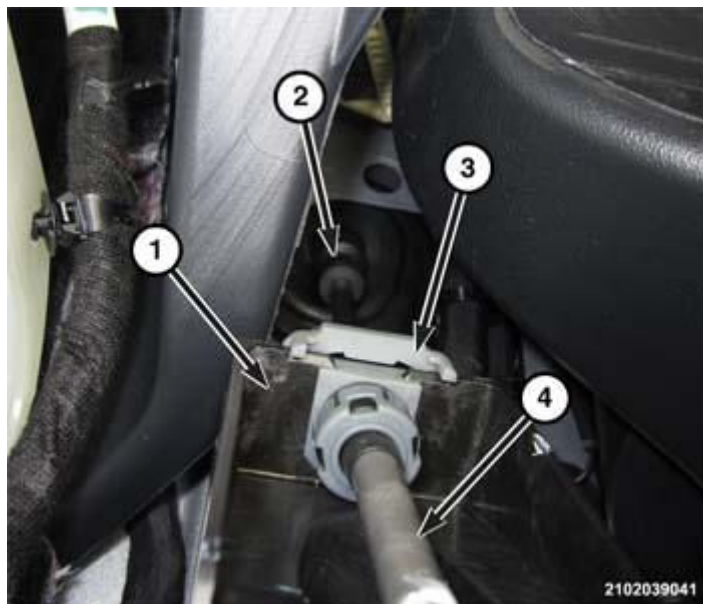


Fig. 272: Shifter Cable & Shifter Bracket
Courtesy of CHRYSLER GROUP, LLC

13. Attach the shifter cable (4) to the shifter bracket (1).

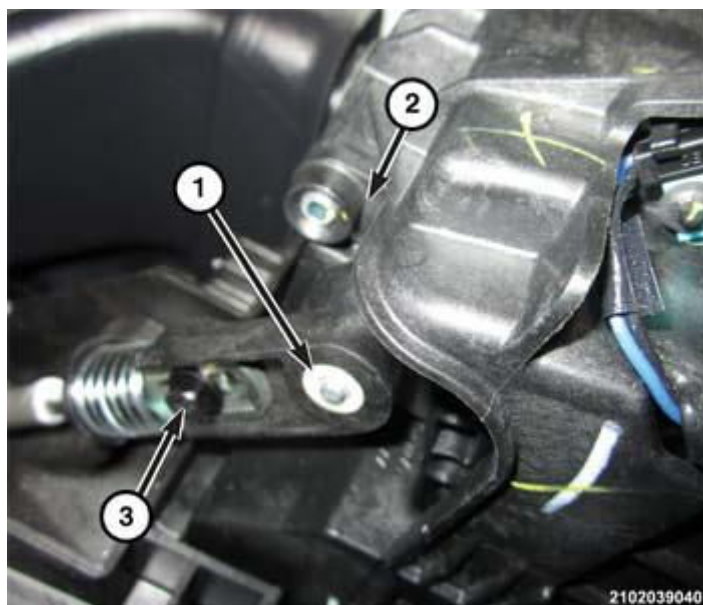
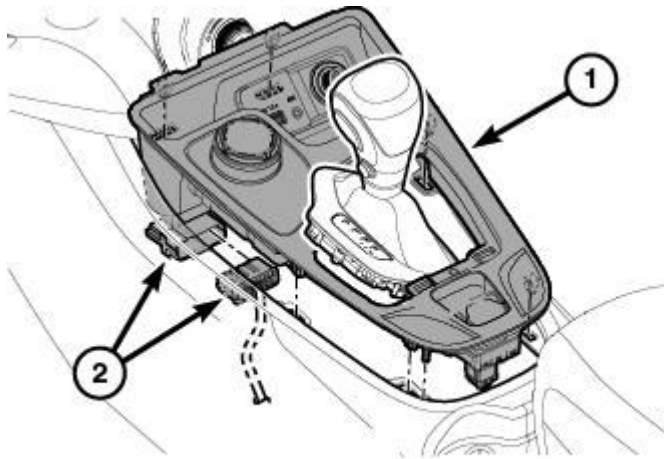


Fig. 273: Shifter Cable End & Adjustment Screw

Courtesy of CHRYSLER GROUP, LLC

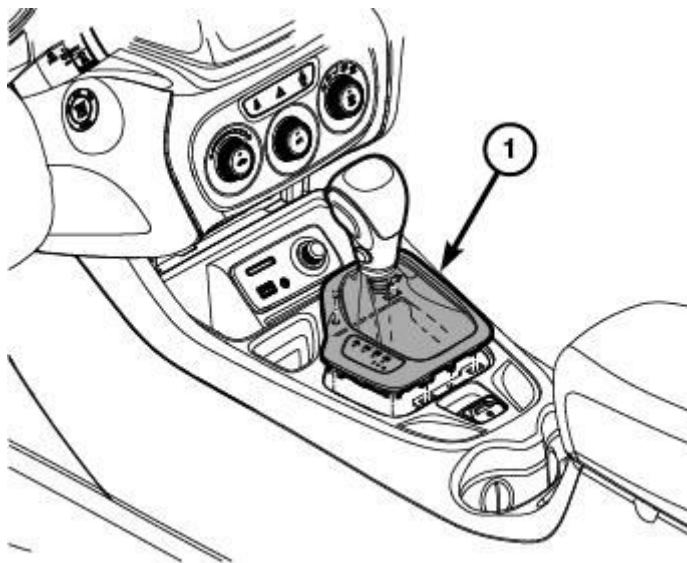
14. With shifter in the Park position, attach the shifter cable end (1) to the shifter (2).
15. If necessary, adjust the shifter cable. Refer to **CABLE, SHIFT, ADJUSTMENTS**.
16. Place the shifter in the Neutral position by manually releasing the Brake Ignition Transmission Shifter Interlock (BITSI). Refer to **SHIFT, BRAKE INTERLOCK, STANDARD PROCEDURE**.



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Fig. 274: Shifter Bezel, Console Bezel & Electrical Connectors
 Courtesy of CHRYSLER GROUP, LLC

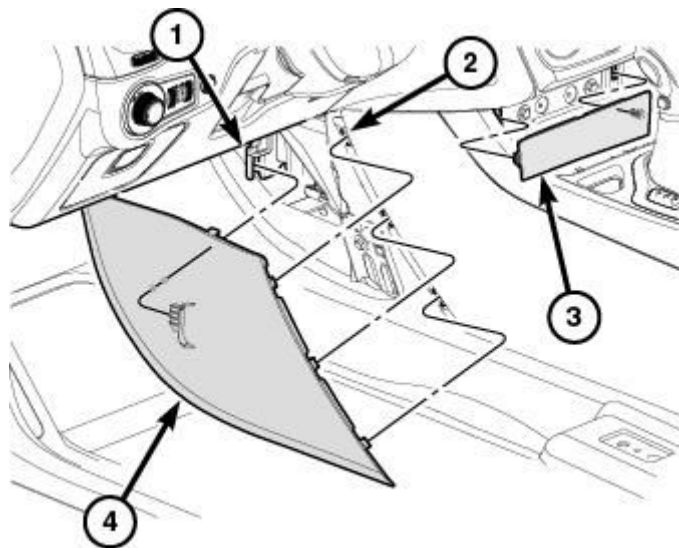
17. Insert the shifter bezel through the console bezel (1).
18. Connect the console bezel electrical connectors (2).
19. Install the console bezel (1) to the console.



2316004757

Fig. 275: Shifter Bezel & Console Bezel
Courtesy of CHRYSLER GROUP, LLC

20. Install the shifter bezel (1) to the console bezel.



2316004759

Fig. 276: Console Trim Pieces
Courtesy of CHRYSLER GROUP, LLC

21. Install the console front trim (3).
22. Connect the negative battery cable.

BEARINGS, DIFFERENTIAL

REMOVAL

DIFFERENTIAL BEARING

1. Remove the transmission from the vehicle. Refer to **INSTALLATION**.
2. Position the transmission on a suitable, clean work surface.
3. Drain the fluid from the transmission.

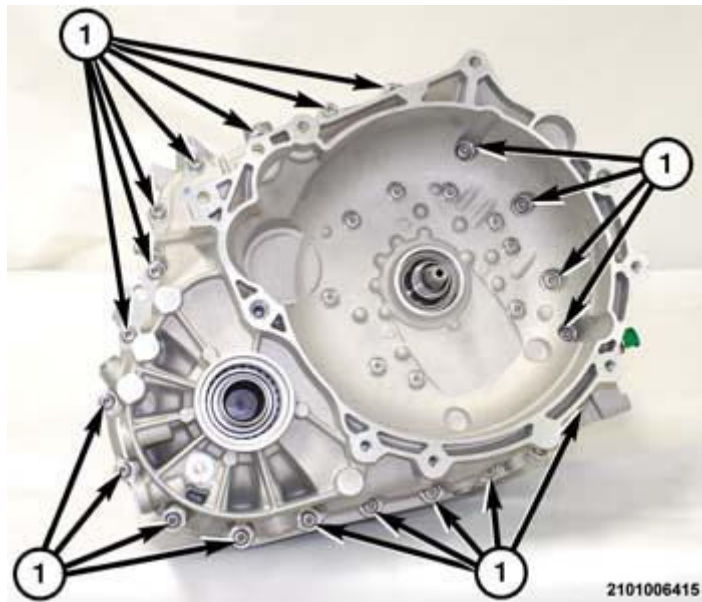


Fig. 277: Bellhousing To Transmission Housing Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Remove the bolts (1) from around the perimeter of the transmission, (1) holding the bellhousing to the transmission housing.

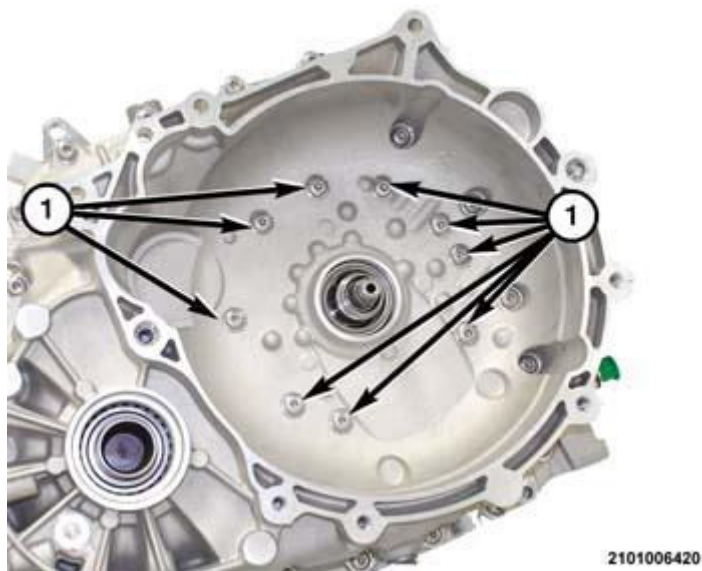


Fig. 278: Bellhousing To Output Gear Support Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Remove the bolts (1) holding the bellhousing to the output gear support.
6. Using wooden blocks to stabilize the transmission on the work surface, position the transmission on the bench with the bellhousing facing upward.
7. Using a suitable pry-bar in the pry point locations, pry upward to dislodge the bellhousing from the

transmission housing.

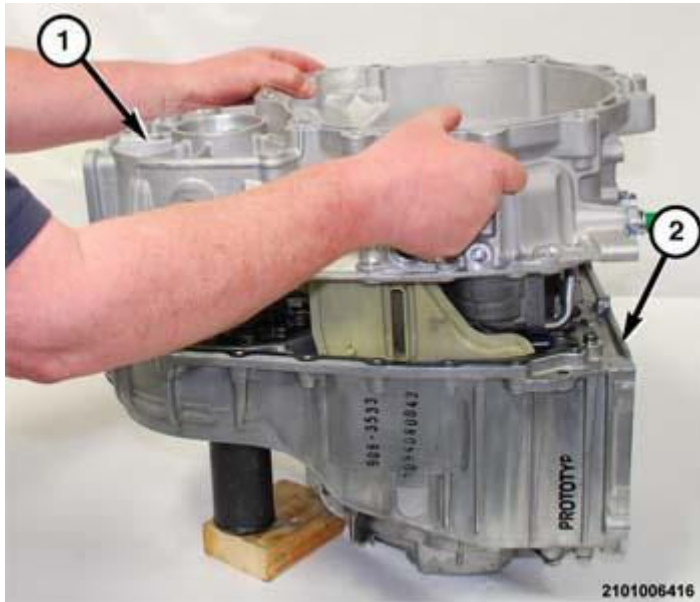


Fig. 279: Removing/Installing Bellhousing At Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

8. Lift the bellhousing (1) upward and separate the assembly from the transmission housing (2).
9. Remove the bellhousing from the transmission.

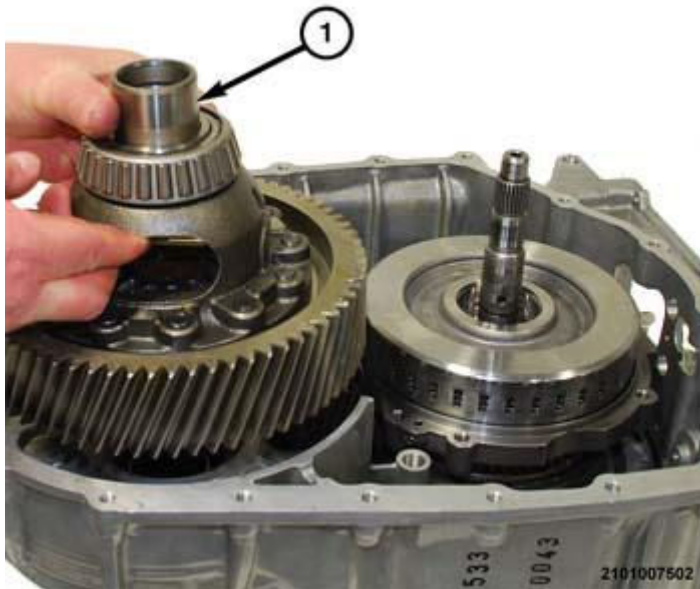


Fig. 280: Removing/Installing Differential Assembly
Courtesy of CHRYSLER GROUP, LLC

10. Remove the differential unit from the transmission

11. Clean the differential unit with solvent and blow it dry with regulated 344 kPa (50 psi) shop air.

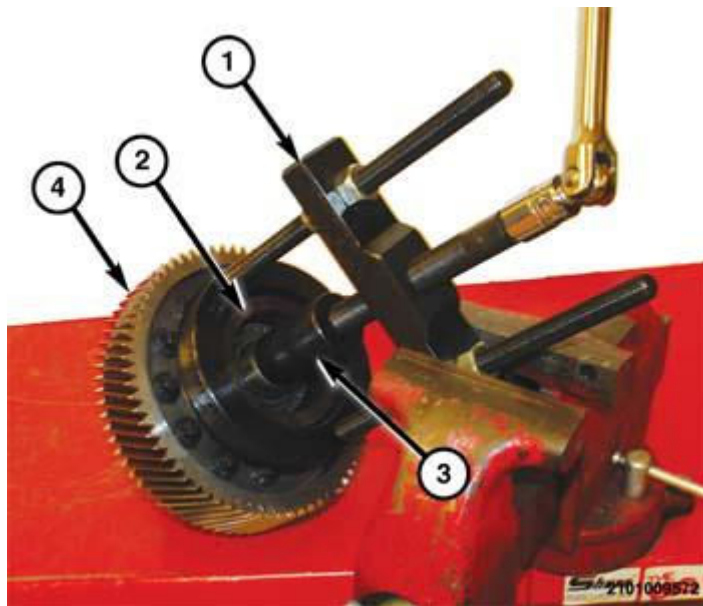


Fig. 281: Removing Differential Side Bearings (Differential is Assembled)
Courtesy of CHRYSLER GROUP, LLC

If the Differential is Assembled remove bearings using following tools and procedure.

1. Using tools (special tool #9738, Blocks, Adapter) (2), and (special tool #8513A, Insert, Crankshaft) (3), along with (special tool #C-293-PA, Puller, Press) (1) remove the side bearings.

If the Differential is Disassembled remove the bearings using following tools and procedure.

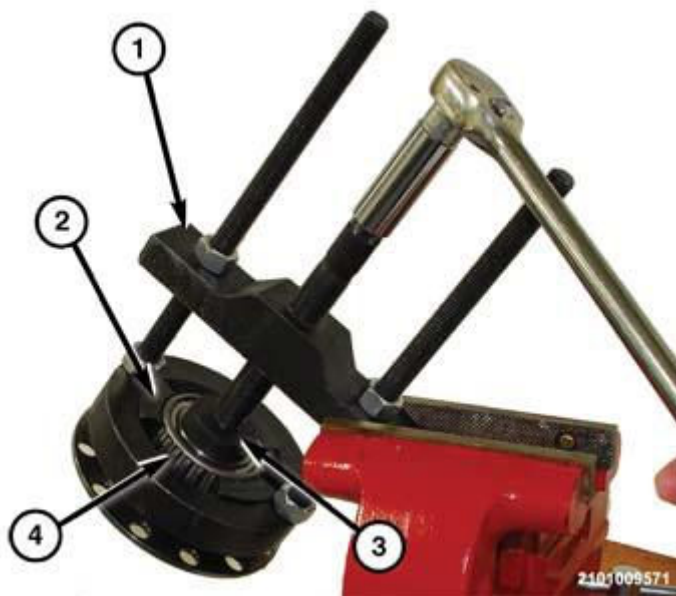


Fig. 282: Removing Differential Side Bearings (Differential is Disassembled)
 Courtesy of CHRYSLER GROUP, LLC

1. Using tools (special tool #C-293-37, Block Set, Puller) (2), and (special tool #9678, Press Plug) (3), along with (special tool #C-293-PA, Puller, Press) (1) remove the side bearing (4).

BEARING RACE

1. Remove the transmission from the vehicle. Refer to **REMOVAL**.
2. Position the transmission on a suitable, clean work surface.
3. Drain the fluid from the transmission.

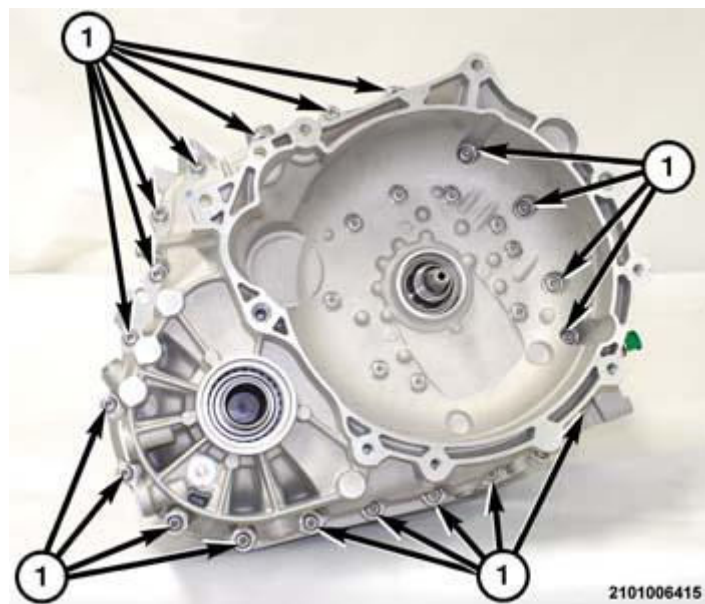


Fig. 283: Bellhousing To Transmission Housing Bolts

Courtesy of CHRYSLER GROUP, LLC

4. From around the perimeter of the transmission, remove the bolts (1) holding the bellhousing to the transmission housing.

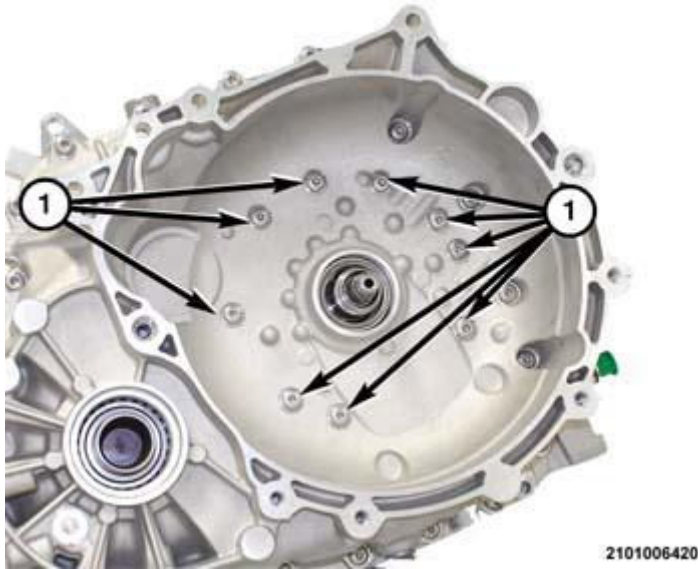


Fig. 284: Bellhousing To Output Gear Support Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Remove the bolts (1) holding the bellhousing to the output gear support.
6. Using wooden blocks to stabilize the transmission on the work surface, position the transmission on the bench with the bellhousing facing upward.
7. Using a suitable pry-bar in the pry point locations, pry upward to dislodge the bellhousing from the transmission housing.

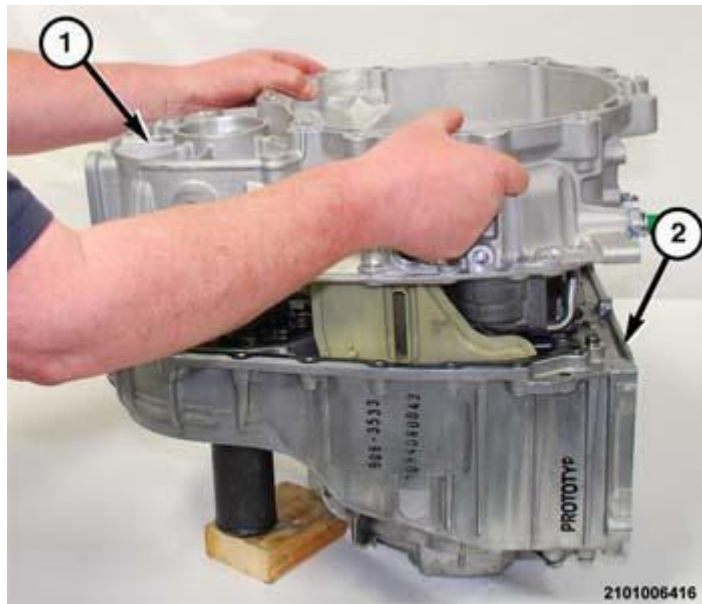


Fig. 285: Removing/Installing Bellhousing At Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

8. Lift the bellhousing (1) upward and separate the assembly from the transmission housing (2).
9. Remove the bellhousing from the transmission.



Fig. 286: Remove Bearing Race From Bellhousing
Courtesy of CHRYSLER GROUP, LLC

10. Using tool (special tool #9664, Remover, Bearing Cup) (2), (special tool #C-637, Slide Hammer, Universal) (1) and a suitable vise-grip pliers (3) to hold the expansion screw in position, remove the bearing race (4) from the bellhousing.

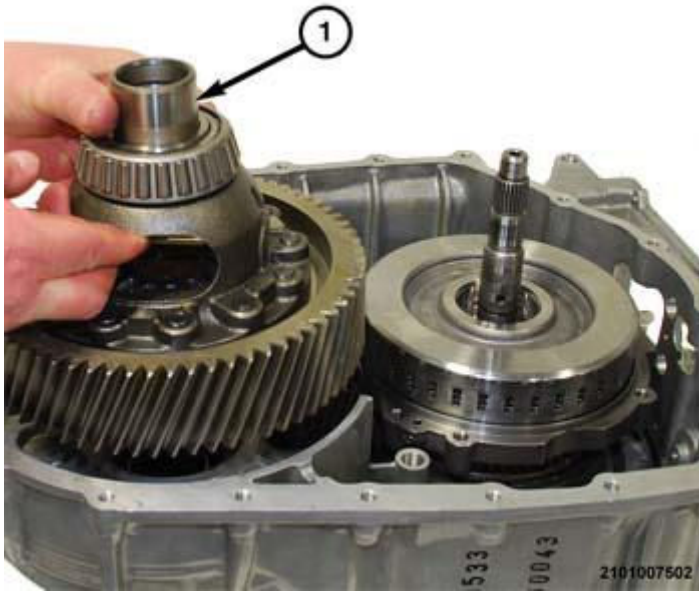


Fig. 287: Removing/Installing Differential Assembly
Courtesy of CHRYSLER GROUP, LLC

11. Remove the differential unit (1) from the transmission.

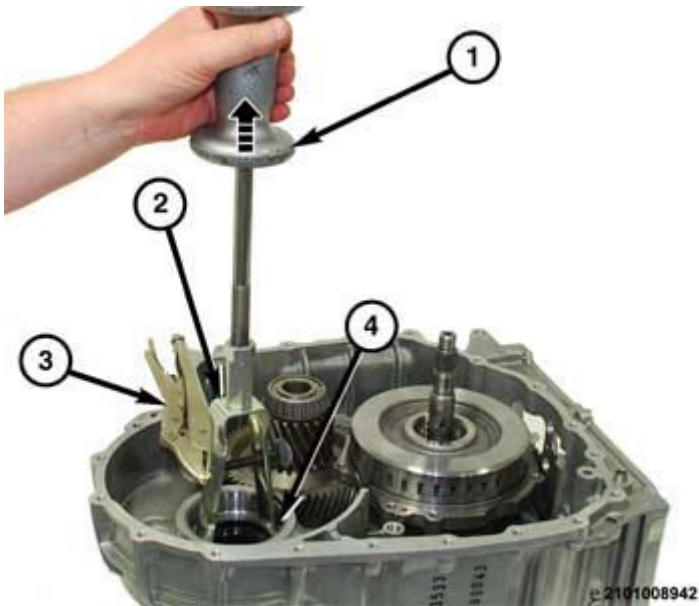


Fig. 288: Removing Bearing Race From The Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

12. Using tool (special tool #9664, Remover, Bearing Cup) (2), (special tool #C-637, Slide Hammer, Universal) (1) and a suitable vise-grip pliers (3) to hold the expansion screw in position, remove the bearing race (4) from the transmission housing.

INSTALLATION

DIFFERENTIAL BEARING

1. Clean the differential unit with solvent and blow it dry with regulated 344 kPa (50 psi) shop air.



Fig. 289: Installing Differential Side Bearing
Courtesy of CHRYSLER GROUP, LLC

2. Using a suitable hammer (1) tool (special tool #6888, Installer, Seal) (3) and (special tool #C-4171, Driver Handle, Universal)

install the side bearings.
3. If necessary, assemble the differential unit.

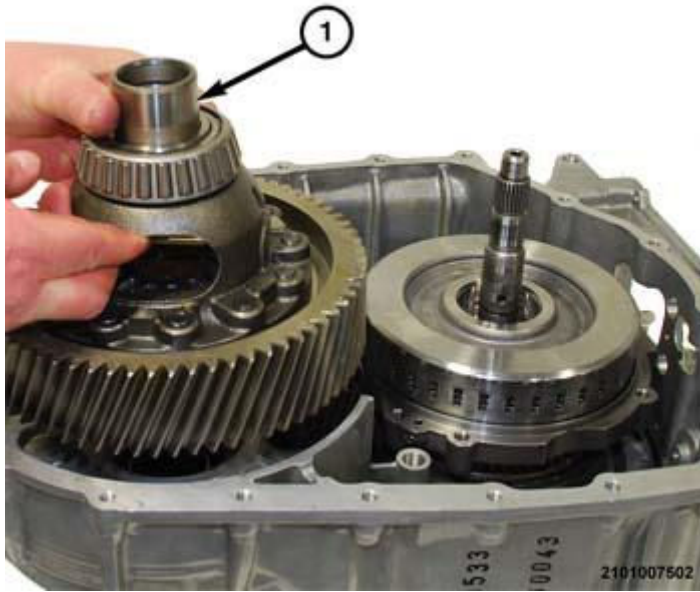


Fig. 290: Removing/Installing Differential Assembly
Courtesy of CHRYSLER GROUP, LLC

4. Install the differential unit (1) in the transmission.

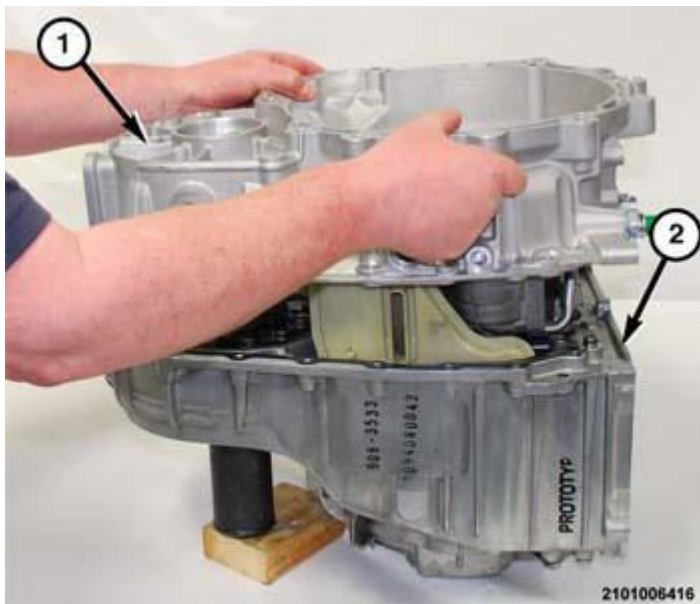


Fig. 291: Removing/Installing Bellhousing At Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

5. While guiding the bellhousing (1) downward over the input and output shafts, place the bellhousing (1) in position on the transmission housing (2).
6. Engage the guide pins in the transmission housing into the receptacle holes bellhousing to assure proper alignment.

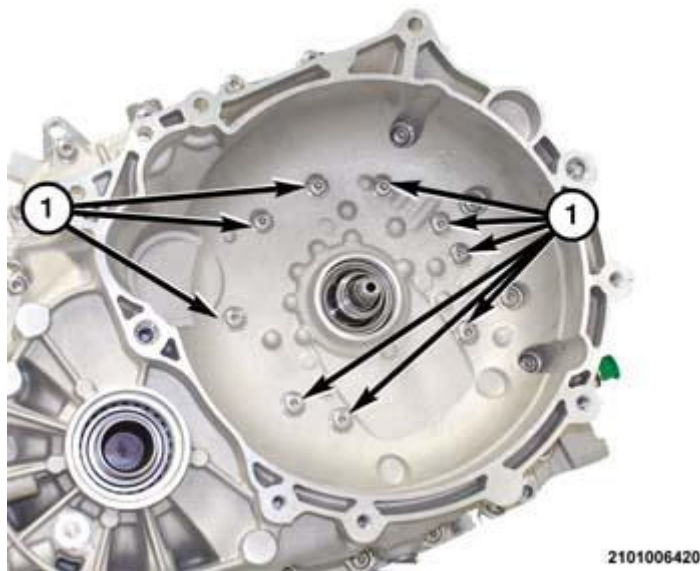


Fig. 292: Bellhousing To Output Gear Support Bolts
Courtesy of CHRYSLER GROUP, LLC

7. Install the bolts (1) with NEW seal washers to hold the bellhousing to the output gear support and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

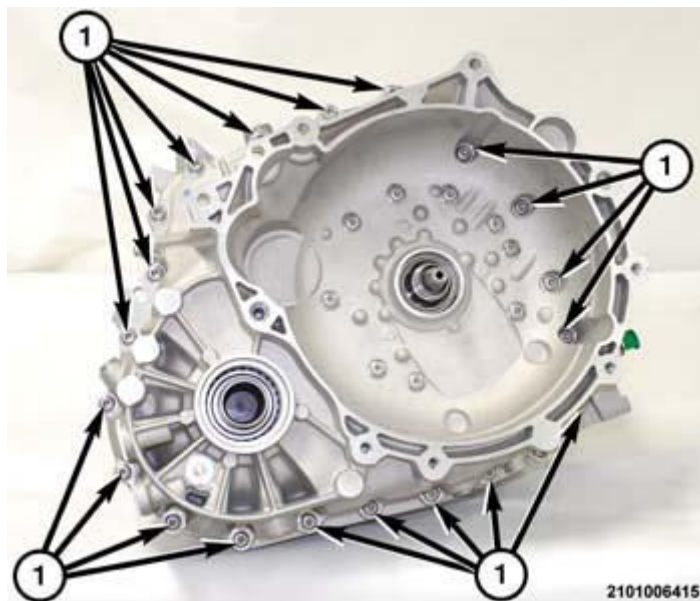


Fig. 293: Bellhousing To Transmission Housing Bolts
Courtesy of CHRYSLER GROUP, LLC

8. Install the bolts (1) to hold the bellhousing to the transmission housing and tighten to the proper specifications. Refer to **SPECIFICATIONS**.
9. Install the transmission in the vehicle. Refer to **INSTALLATION**.
10. Fill the transmission with the specified type and quantity fluid. Refer to **FLUID AND FILTER**.

STANDARD PROCEDURE.

11. Road test the vehicle to verify the repair.

BEARING RACE

If only the bearing are being replaced the bearing preload does not require selecting a new select shim. If the transmission housing, bellhousing or differential is replaced the proper thickness select shim will have to be determined. Refer to **STANDARD PROCEDURES.**

1. Wipe the bearing bores clean with a clean lint free cloth.
2. Inspect the bearing bores to damage or cracks in the casting.

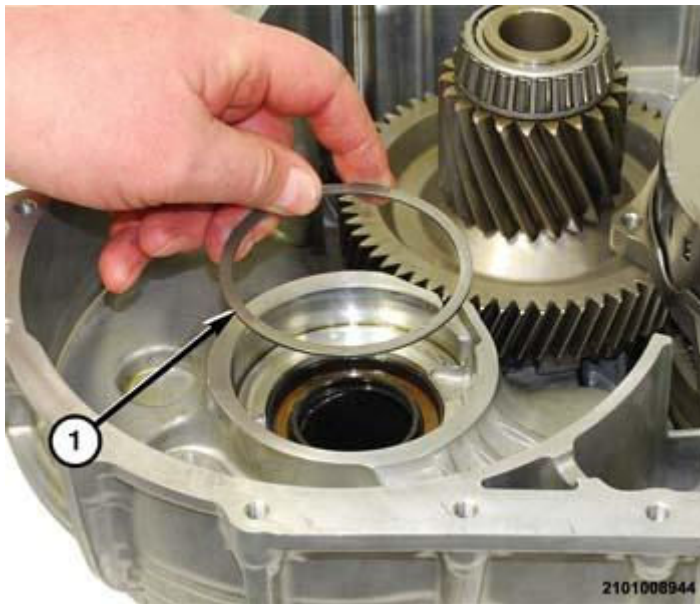


Fig. 294: Install Bearing Bore Shim
Courtesy of CHRYSLER GROUP, LLC

3. Install the original shim in the bearing bore of the transmission housing.



Fig. 295: Bearing Race
Courtesy of CHRYSLER GROUP, LLC

4. Place the NEW bearing race in the bearing bore of the transmission housing.



Fig. 296: Installing Bearing Race
Courtesy of CHRYSLER GROUP, LLC

5. Using tool (special tool #C-4310, Installer, Bearing) (2) and (special tool #C-4171, Driver Handle, Universal) (1) install the bearing race in the transmission housing.

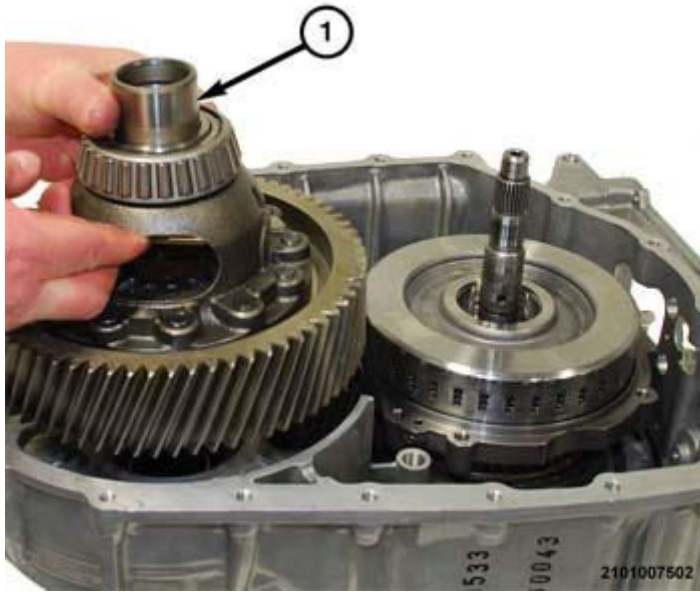


Fig. 297: Removing/Installing Differential Assembly
Courtesy of CHRYSLER GROUP, LLC

6. Install the differential unit in the transmission housing.
7. Place the NEW bearing race in the bearing bore of the bellhousing.
8. Using tool (special tool #C-4310, Installer, Bearing) and (special tool #C-4171, Driver Handle, Universal) install the bearing race in the bellhousing.

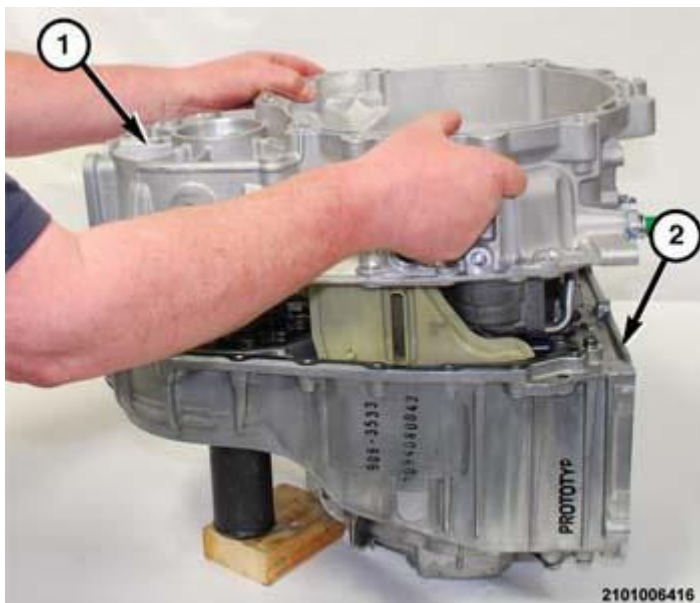


Fig. 298: Removing/Installing Bellhousing At Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

9. While guiding the bellhousing (1) downward over the input and output shafts, place the bellhousing (1) in position on the transmission housing (2).

10. Engage the guide pins in the transmission housing into the receptacle holes bellhousing to assure proper alignment.

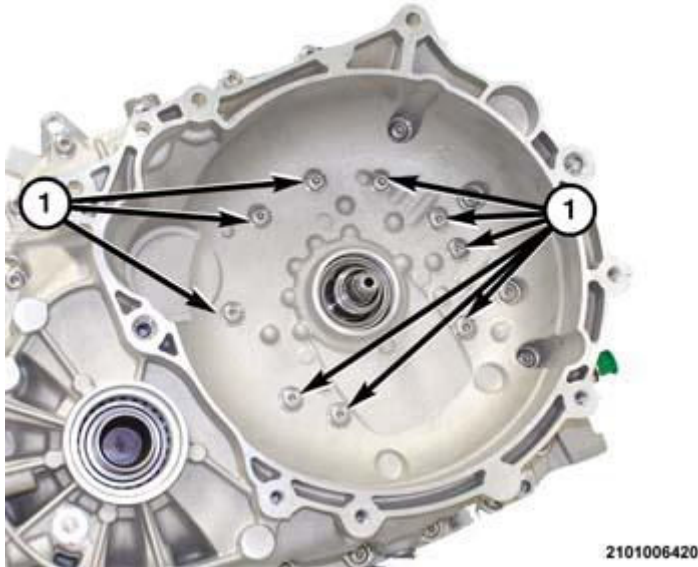


Fig. 299: Bellhousing To Output Gear Support Bolts
Courtesy of CHRYSLER GROUP, LLC

11. Install the bolts (1) with NEW seal washers to hold the bellhousing to the output gear support and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

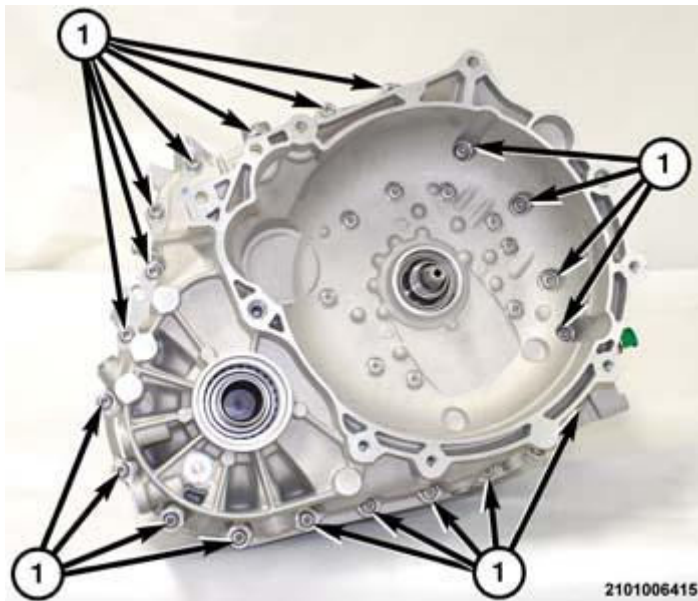


Fig. 300: Bellhousing To Transmission Housing Bolts
Courtesy of CHRYSLER GROUP, LLC

12. Install the bolts (1) to hold the bellhousing to the transmission housing and tighten to the proper

specifications. Refer to **SPECIFICATIONS**.

13. Install the transmission in the vehicle. Refer to **INSTALLATION**.
14. Fill the transmission with the specified type and quantity fluid. Refer to **FLUID AND FILTER, STANDARD PROCEDURE**.
15. Road test the vehicle to verify the repair.

BEARINGS, TRANSFER GEAR

REMOVAL

TRANSFER GEAR INNER BEARING

WARNING: Always wear safety glasses when cleaning, disassembling and assembling the transmission/transaxle. Contents of the transmission/transaxle can become projectiles (e.g., springs, snap-rings, as well as metal and other debris). Failure to wear safety glasses may result in severe personal injury.

Before disassembling the transmission, wash the transmission with a suitable solvent and a siphon pressure washer to remove oily grime and loose dirt. Place the transmission on a clean work surface with ample fluid drainage or absorbency.

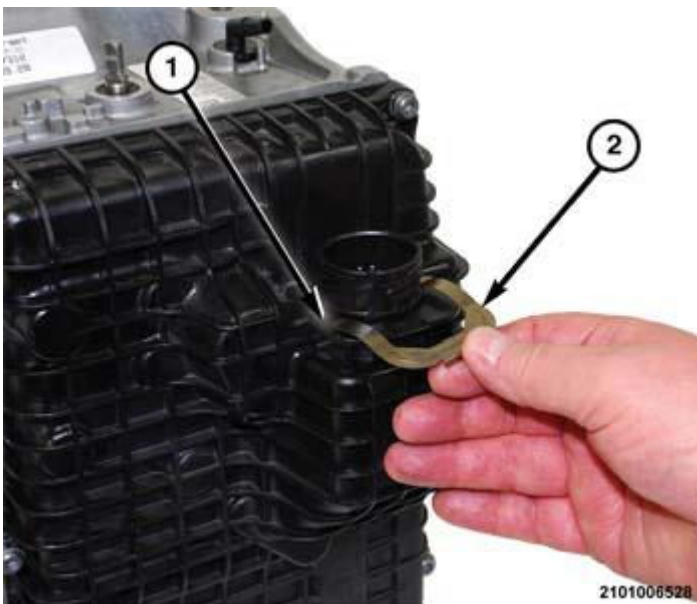


Fig. 301: Wire Connector Socket Clip
Courtesy of CHRYSLER GROUP, LLC

1. Remove the clip holding the wire connector socket in the valve body cover pan.

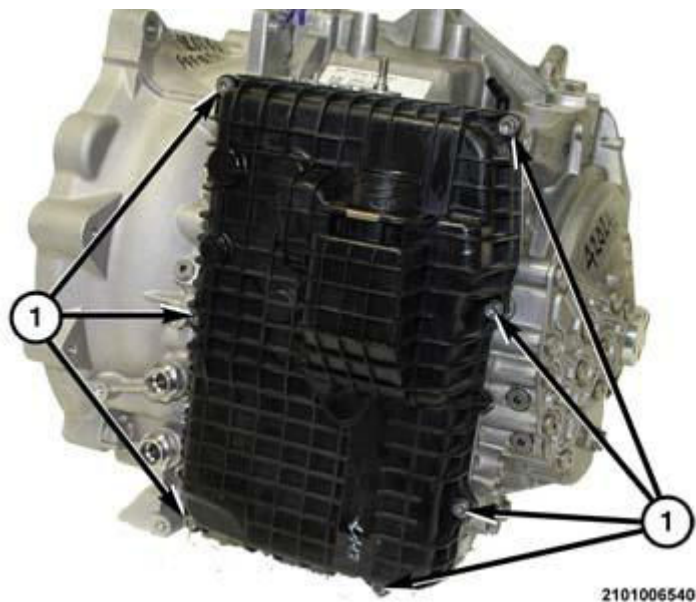


Fig. 302: Valve Body Cover Pan Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Remove the bolts holding the valve body cover pan to the transmission housing.
3. Remove the valve body cover pan from the transmission.

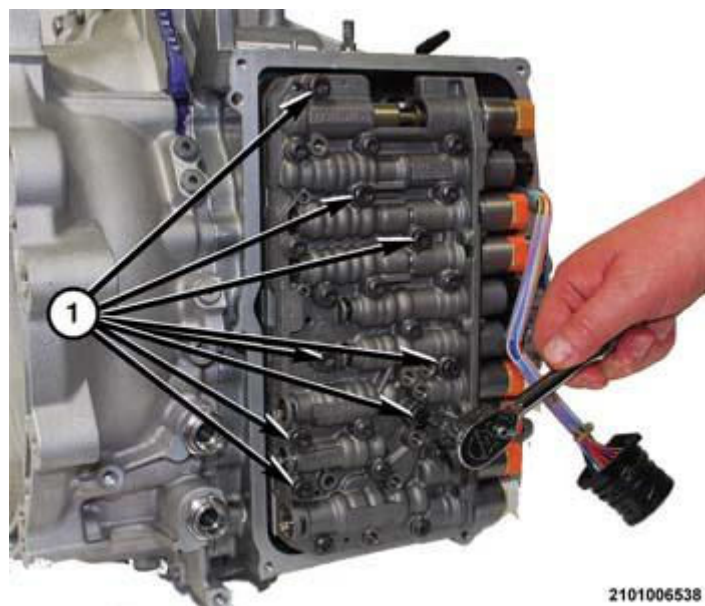


Fig. 303: Valve Body Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Remove the bolts holding the valve body to the transmission housing.
5. Using a suitable prying tool, pry the valve body away from the adapter tubes.
6. Turn the valve body over to gain access to wire harness connectors.

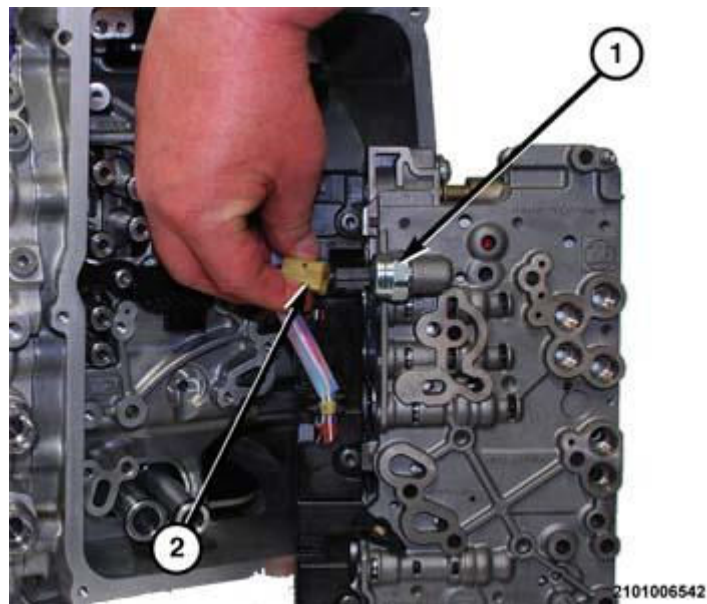


Fig. 304: Fluid Pressure Transducer Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

7. Release the lock (2) on the fluid pressure transducer wire connector.
8. Separate the wire connector from the fluid pressure transducer (1).

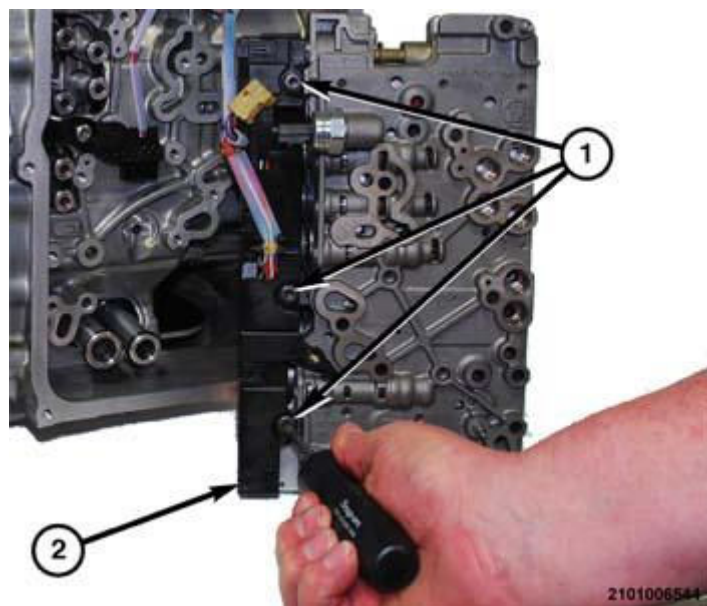


Fig. 305: Removing/Installing Wire Harness Connector At Valve Body Solenoids
Courtesy of CHRYSLER GROUP, LLC

9. Remove the bolts (1) holding the wire harness connector to the valve body and solenoids.
10. Using a suitable prying tool, Separate the wire harness connector (2) from the solenoids.
11. Separate the valve body from the transmission.

NOTE: If the valve body is to be reused without disassembling it, store the valve body in a clean area until it is installed.

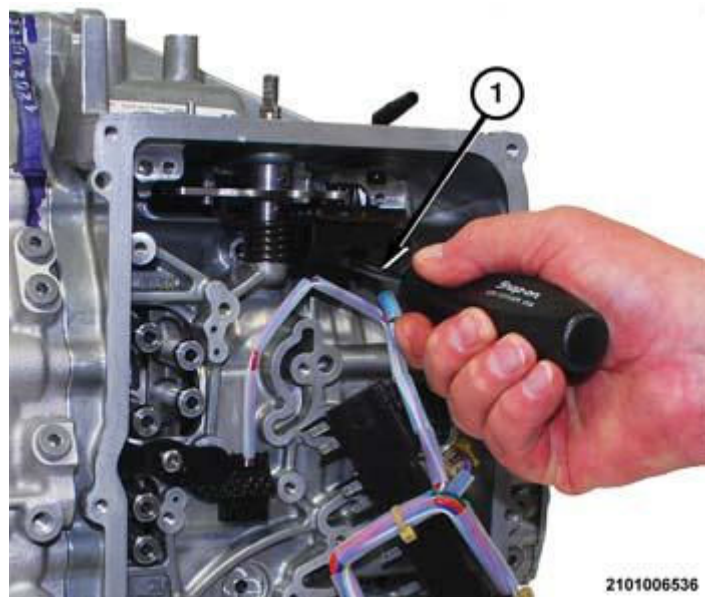


Fig. 306: Removing/Installing Transmission Range Sensor (TRS) Screw
Courtesy of CHRYSLER GROUP, LLC

12. Remove the screw (1) holding the TRS to the transmission housing.

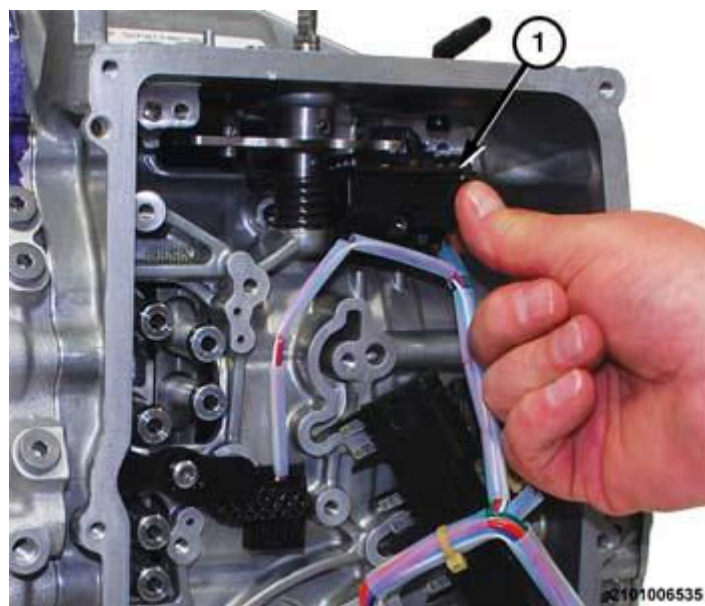


Fig. 307: Removing/Installing Transmission Range Sensor
Courtesy of CHRYSLER GROUP, LLC

13. Separate the TRS (1) from the transmission with the wire harness connected.

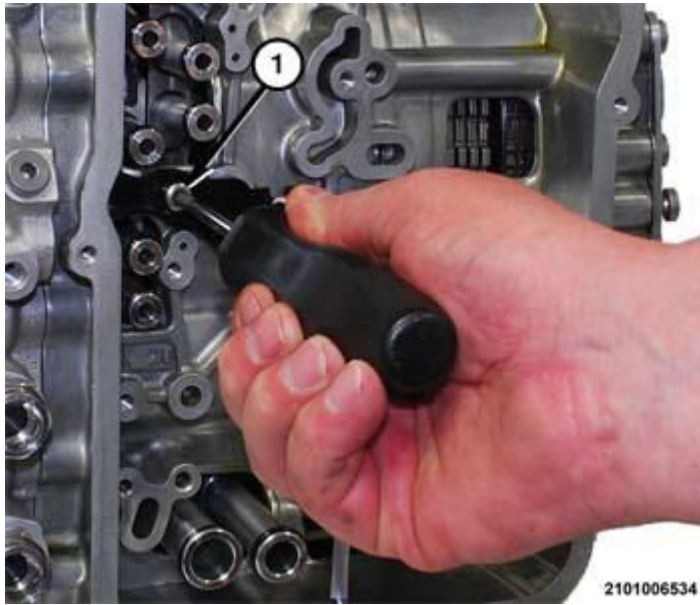


Fig. 308: Removing/Installing Speed Sensor Screw
Courtesy of CHRYSLER GROUP, LLC

14. Remove the screw (1) holding the speed sensors to the transmission housing.



Fig. 309: Removing/Installing Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

15. Separate the speed sensor (1) from the transmission with the wire harness connected.

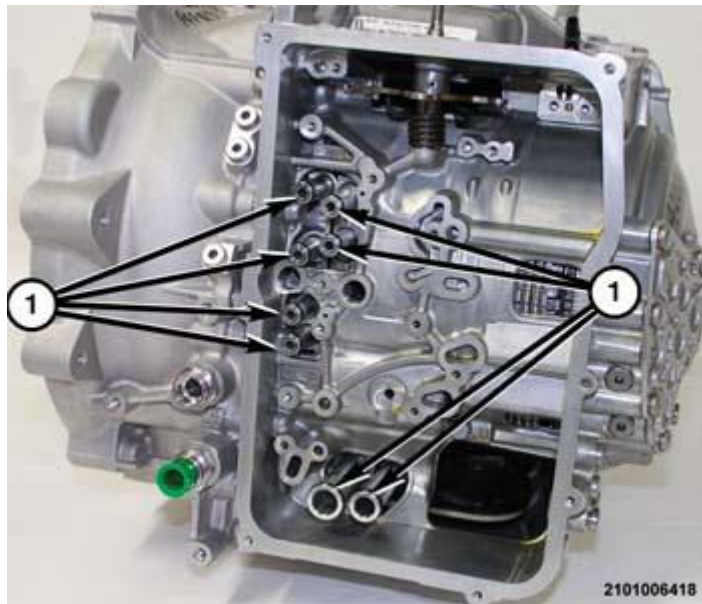


Fig. 310: Fluid Adapter Tubes & O-Ring Seals
Courtesy of CHRYSLER GROUP, LLC

16. Using suitable pliers, remove the fluid adapter tubes (1) from the transmission.

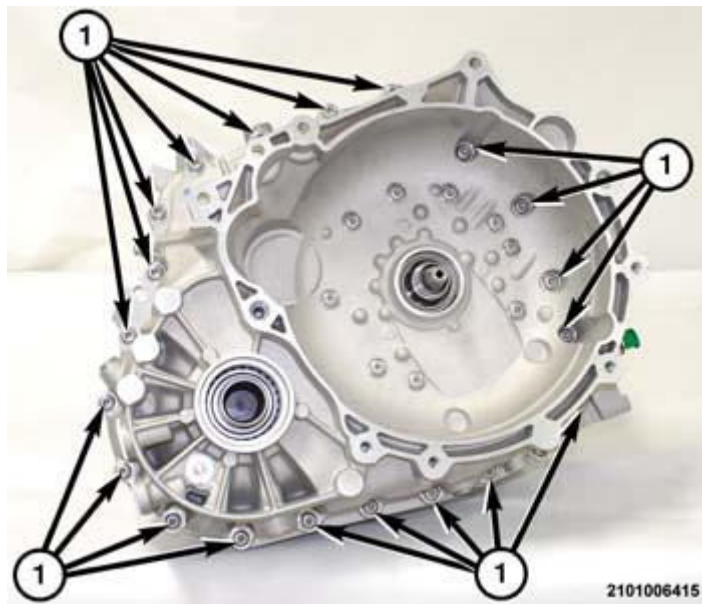


Fig. 311: Bellhousing To Transmission Housing Bolts
Courtesy of CHRYSLER GROUP, LLC

17. From around the perimeter of the transmission, remove the bolts (1) holding the bellhousing to the transmission housing.

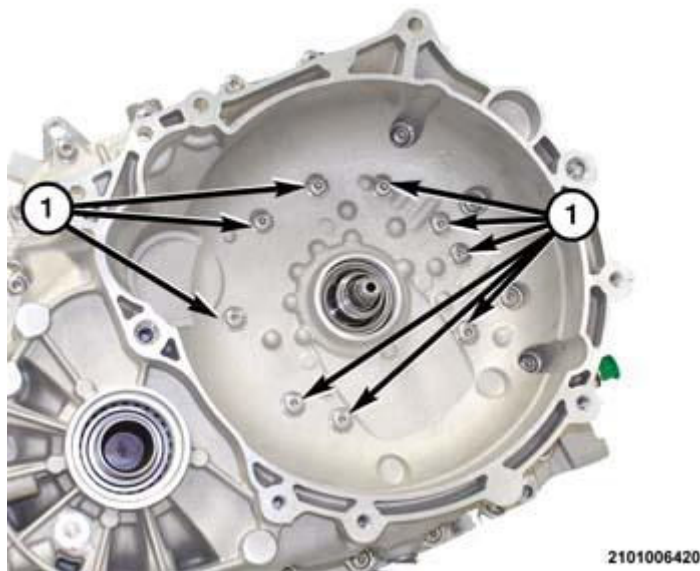


Fig. 312: Bellhousing To Output Gear Support Bolts
Courtesy of CHRYSLER GROUP, LLC

18. Remove the bolts (1) holding the bellhousing to the output gear support.
19. Using wooden blocks to stabilize the transmission on the work surface, position the transmission on the bench with the bellhousing facing upward.
20. Using a suitable pry-bar in the pry point locations, pry upward to dislodge the bellhousing from the transmission housing.

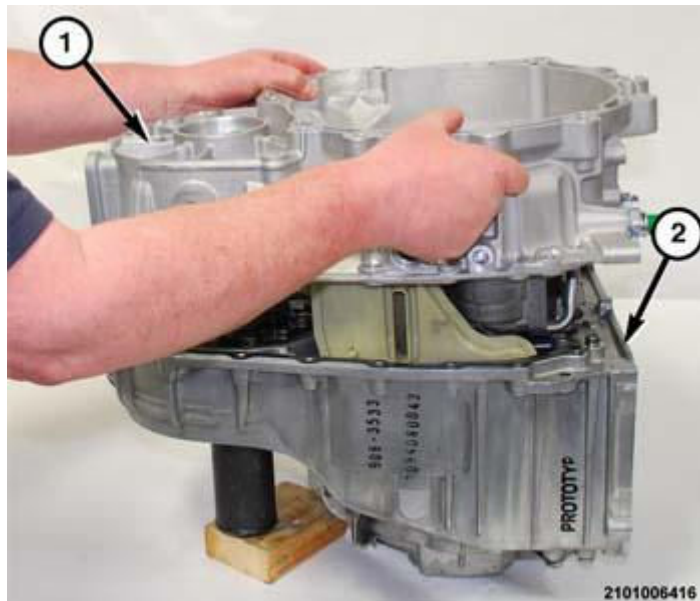


Fig. 313: Removing/Installing Bellhousing At Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

21. Lift the bellhousing (1) upward and separate the assembly from the transmission housing (2).

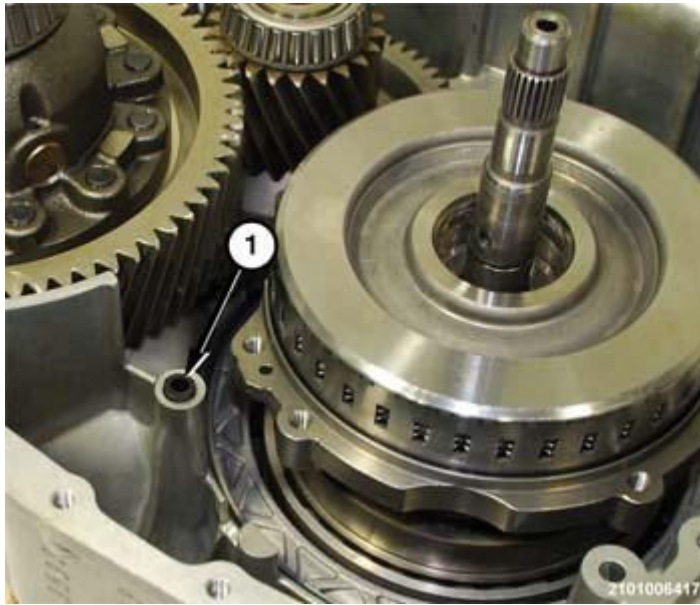


Fig. 314: Port Seal

Courtesy of CHRYSLER GROUP, LLC

22. Remove the seal (1) from the port in the transmission housing.



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Fig. 315: Sealing Surface Of Transmission Housing

Courtesy of CHRYSLER GROUP, LLC

23. Separate the gasket (1) from the sealing surface of the transmission housing (2).

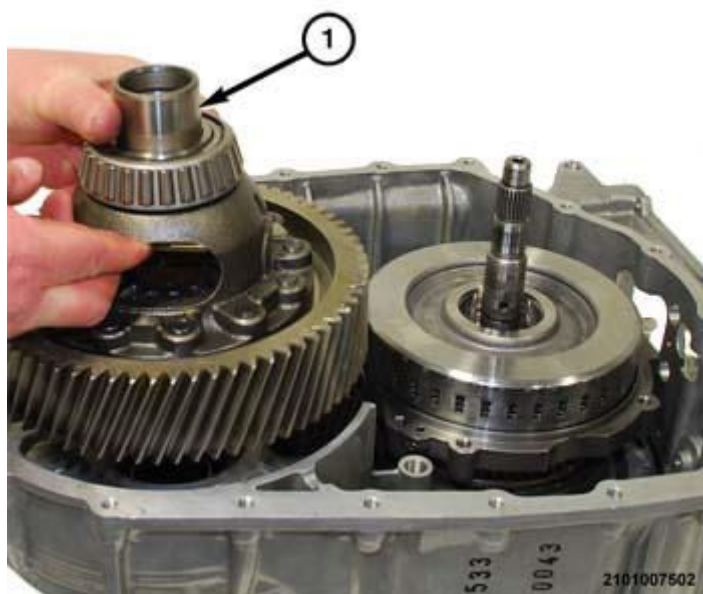


Fig. 316: Removing/Installing Differential Assembly
Courtesy of CHRYSLER GROUP, LLC

24. Remove the differential assembly (1) from the transmission housing.



Fig. 317: Removing/Installing E-Clutch At E-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

25. Separate the E-clutch from the E-clutch hub and shaft (2).

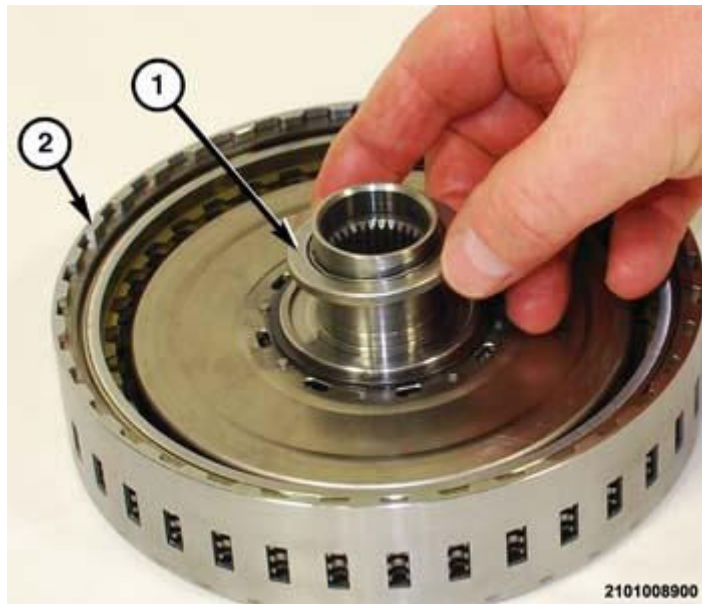


Fig. 318: Removing/Installing Thrust Bearing At E-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

26. Separate the thrust bearing (1) from the E-clutch (2) hub.

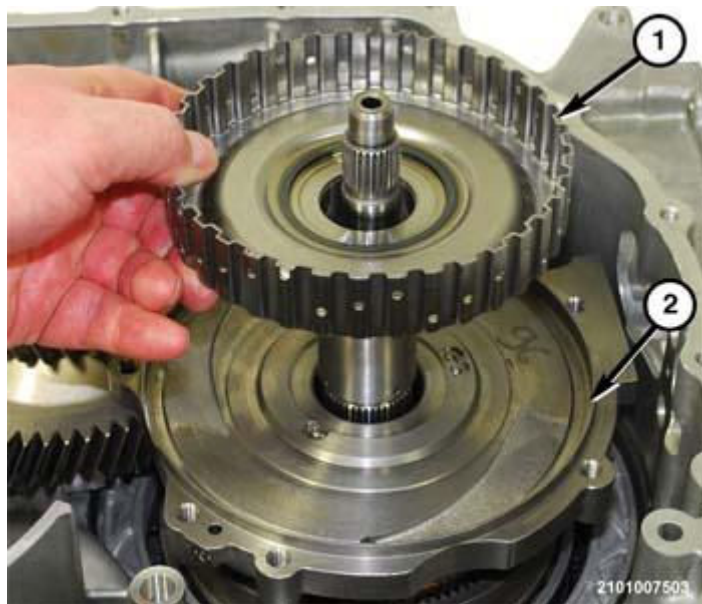


Fig. 319: E-Clutch Hub And Shaft
Courtesy of CHRYSLER GROUP, LLC

27. Separate the E-clutch hub and shaft (1) from the output gear support (2).



Fig. 320: Output Gear Support
Courtesy of CHRYSLER GROUP, LLC

28. Separate the output gear support (1) from the gear 4 planetary pinion carrier (2).



Fig. 321: Removing/Installing Transfer Gear
Courtesy of CHRYSLER GROUP, LLC

29. Remove the transfer gear from the transmission housing (1).

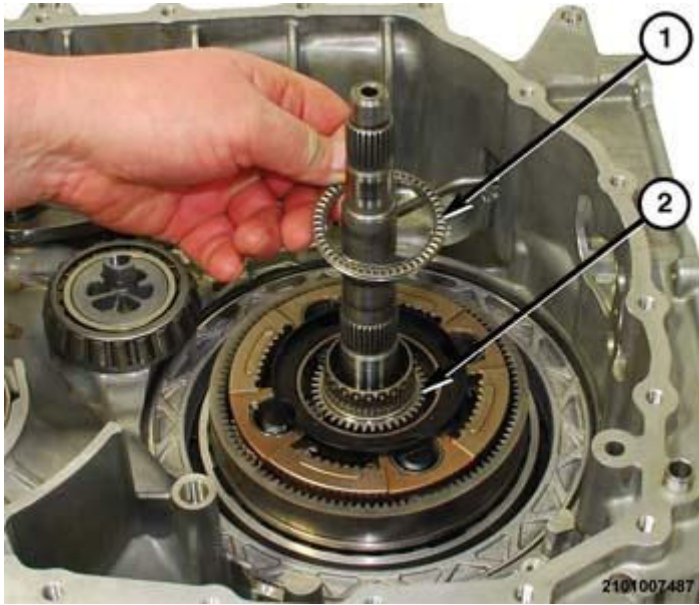


Fig. 322: Roller Type Thrust Bearing
Courtesy of CHRYSLER GROUP, LLC

30. Separate the roller type thrust bearing (1) from the sun gear 3 and 4 and Dog Clutch-F (2).



Fig. 323: Removing/Installing Sun Gear 3, 4 And Dog Clutch-F At Gear 4 Planetary Pinion Carrier
Courtesy of CHRYSLER GROUP, LLC

31. Separate the sun gear 3 and 4 and Dog Clutch-F (1) from the gear 4 planetary pinion carrier.



Fig. 324: Gear 4 Planetary Pinion Carrier
Courtesy of CHRYSLER GROUP, LLC

32. Separate the gear 4 planetary pinion carrier (1) from the annulus gear 4.

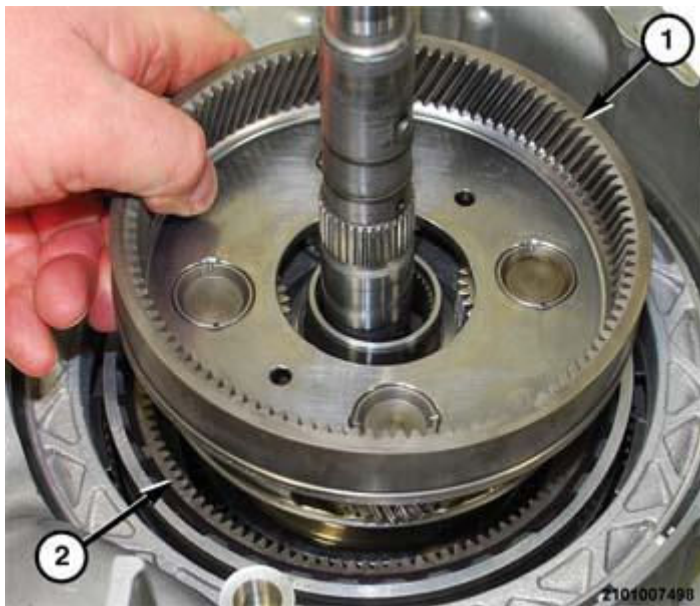


Fig. 325: Annulus Gear 4
Courtesy of CHRYSLER GROUP, LLC

33. Separate the annulus gear 4 from the annulus gear 3 (2).

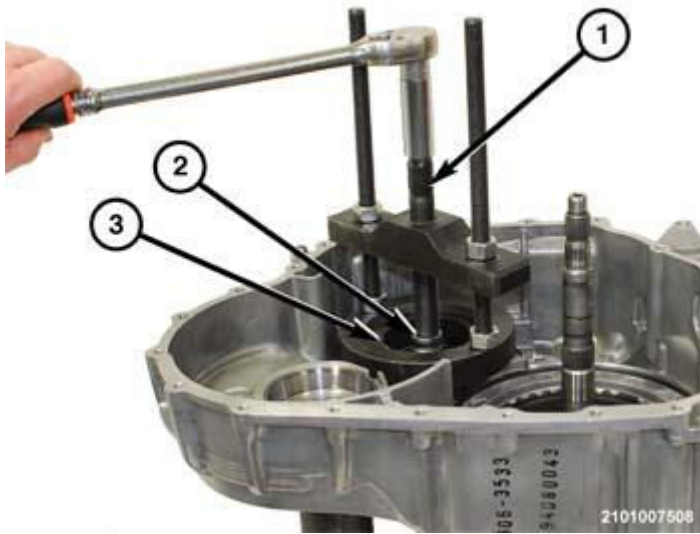


Fig. 326: Removing Transfer Gear Bearing Cone
Courtesy of CHRYSLER GROUP, LLC

34. Using Puller Press (special tool #C-293-PA, Puller, Press) (1), Adapter Blocks (special tool #9738, Blocks, Adapter) (3) and a suitable socket as a plug (2), remove the transfer gear bearing cone from the transmission housing.

TRANSFER GEAR INNER RACE

1. Clean the transfer gear with solvent and blow it dry with regulated 344 kPa (50 psi) shop air.

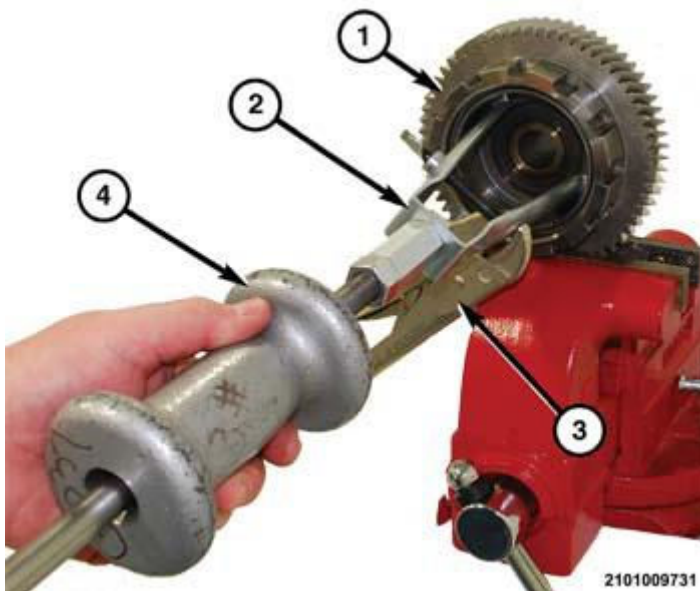


Fig. 327: Removing Bearing Race From Transfer Gear
Courtesy of CHRYSLER GROUP, LLC

2. Clamp the transfer gear (1) in a suitable bench vise with protective jaws.

NOTE: It may be necessary to clamp vise grips (3) on the seal remover to keep the expander screw in place.

3. Using tool (special tool #C-637, Slide Hammer, Universal) (4) and (special tool #7794-A, Remover, Seal) (2) with the jaws expanded out under the inner edge on the bearing race.
4. Knock outward with the slide hammer (4) until the bearing race comes out of the transfer gear (1).

TRANSFER GEAR OUTER BEARING

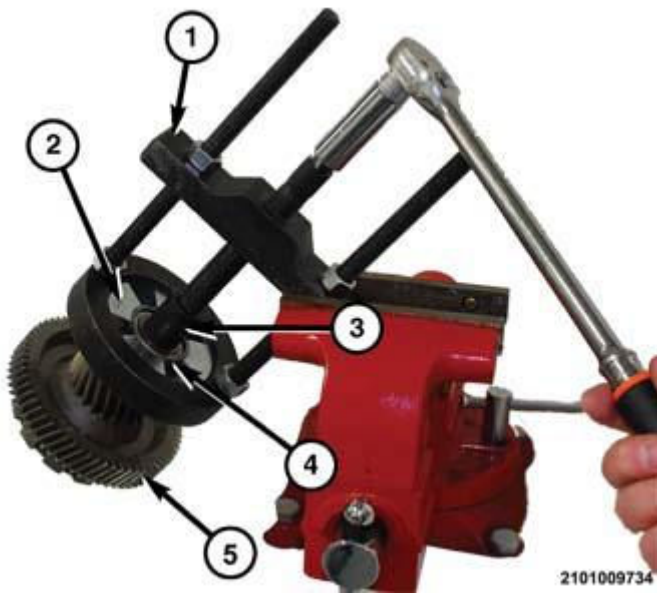


Fig. 328: Removing Transfer Gear Outer Bearing
Courtesy of CHRYSLER GROUP, LLC

1. Clamp tool (special tool #C-293-PA, Puller, Press) (1) in a suitable vise with the ram blot head upward.
2. Using tool (special tool #C-293-40, Block Set, Puller) (2) with the transfer gear bearing inserted under the puller press and engage the blocks evenly spaced around the bearing.
3. Insert tool (special tool #8513A, Insert, Crankshaft) (3) between the press ram and the transfer gear (5) and hand tighten the press (1) ram down to the Insert
4. While holding the transfer gear, use a suitable wrench to tighten the press (1) ram until the bearing (4) comes off the transfer gear.

TRANSFER GEAR OUTER RACE

1. Disassemble the transmission. Refer to **DISASSEMBLY**.
2. Position the bellhousing on a stable, clean work surface.

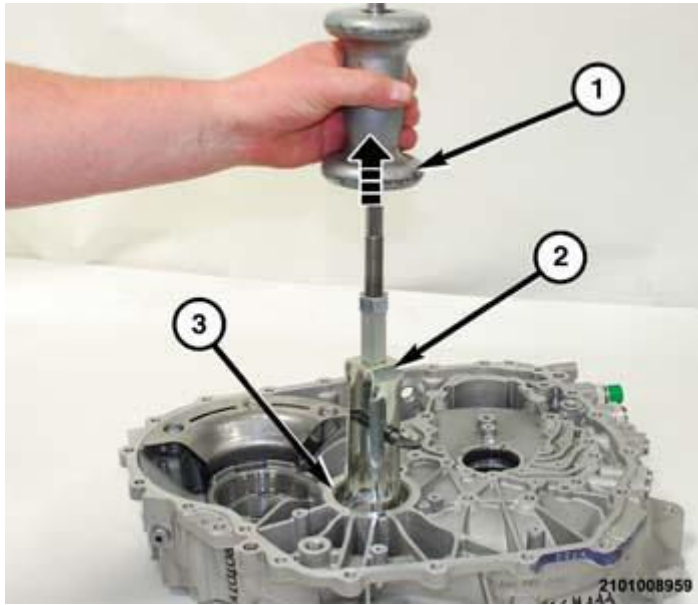


Fig. 329: Removing Transfer Gear Outer Bearing Race From Bellhousing
Courtesy of CHRYSLER GROUP, LLC

3. Using tool (special tool #C-637, Slide Hammer, Universal) (1) and (special tool #9664, Remover, Bearing Cup) (2) with the tool fingers inserted in the channels behind the transfer gear outer bearing race (3), remove the transfer gear outer bearing race (3) from the bellhousing bore.

INSTALLATION

TRANSFER GEAR INNER BEARING

The work area, counter surfaces and tools must be thoroughly cleaned before attempting to assemble the 948TE transmission. All of the sub assemblies should be disassembled, cleaned, and assembled with new sealing components where applicable. The transmission housing should be clean and oil free before beginning this procedure. If the transmission was contaminated with metallic material, all of the thrust bearings and roller bearings should be replaced. The bearing in the output gear support assembly is not serviceable. The output gear support assembly should be replaced if metal debris is present.

WARNING: Always wear safety glasses when cleaning, disassembling and assembling the transmission/transaxle. Contents of the transmission/transaxle can become projectiles (e.g., springs, snap-rings, as well as metal and other debris). Failure to wear safety glasses may result in severe personal injury.

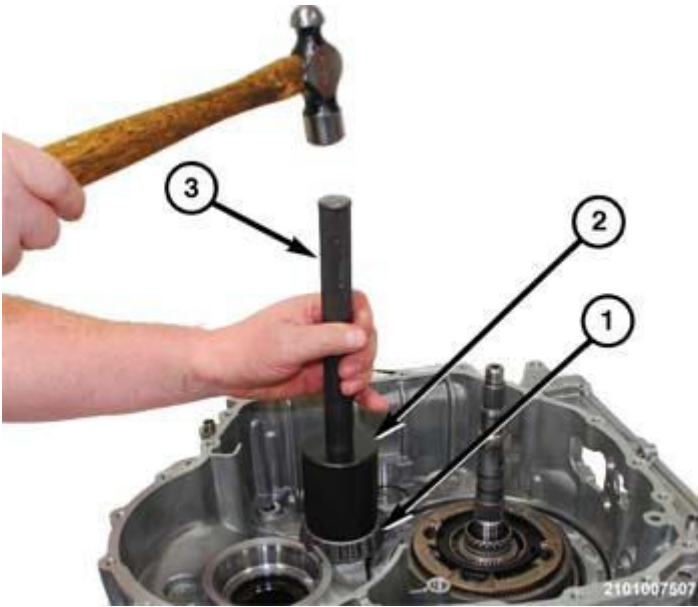


Fig. 330: Installing Transfer Gear Bearing Cone Onto Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

1. Using Bearing Installer (special tool #6888, Installer, Seal) (2), and handle (special tool #C-4171, Driver Handle, Universal) (3) install the transfer gear bearing cone (1) onto the transmission housing.

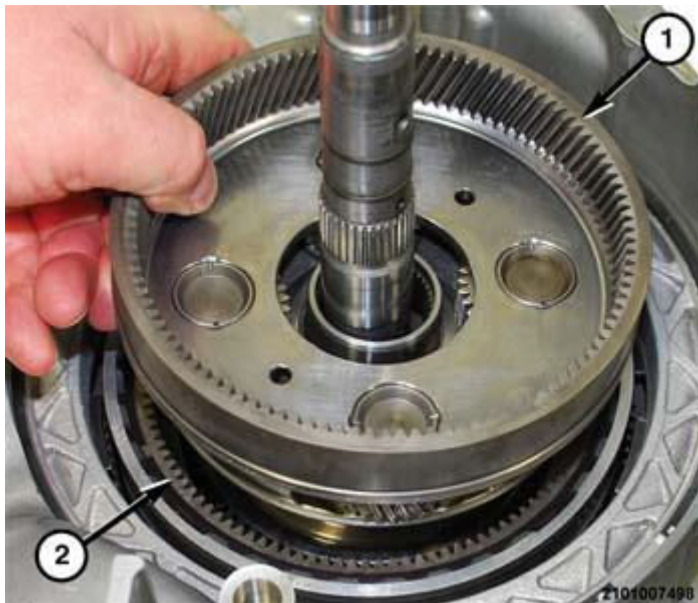


Fig. 331: Annulus Gear 4
Courtesy of CHRYSLER GROUP, LLC

2. Install the annulus gear 4 into the annulus gear 3 (2).



Fig. 332: Thrust Spacer & Underside Of Gear 4 Planetary Pinion Carrier
Courtesy of CHRYSLER GROUP, LLC

3. Install a NEW thrust spacer (1) on the underside of the gear 4 planetary pinion carrier (2).

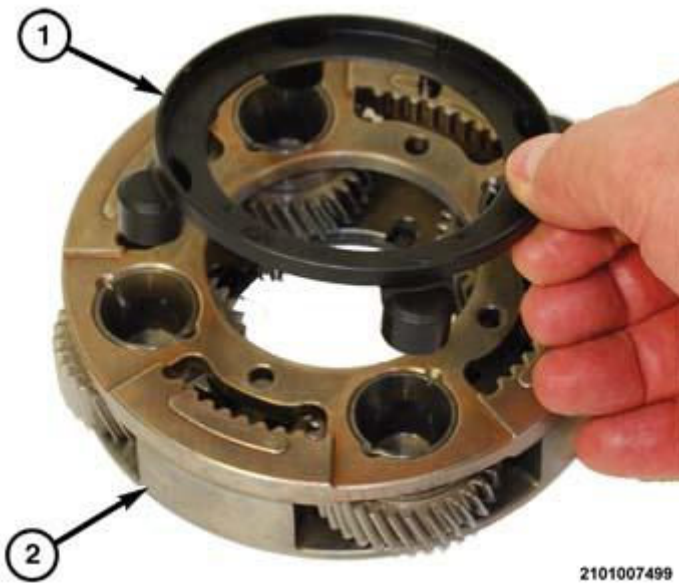


Fig. 333: Thrust Spacer & Topside Of Gear 4 Planetary Pinion Carrier
Courtesy of CHRYSLER GROUP, LLC

4. Install a NEW thrust spacer (1) on the topside of the gear 4 planetary pinion carrier (2).



Fig. 334: Gear 4 Planetary Pinion Carrier
Courtesy of CHRYSLER GROUP, LLC

5. Install the gear 4 planetary pinion carrier (1) into the annulus gear 4.



Fig. 335: Removing/Installing Sun Gear 3, 4 And Dog Clutch-F At Gear 4 Planetary Pinion Carrier
Courtesy of CHRYSLER GROUP, LLC

6. Install the sun gear 3 and 4 and Dog Clutch-F (1) into the gear 4 planetary pinion carrier.

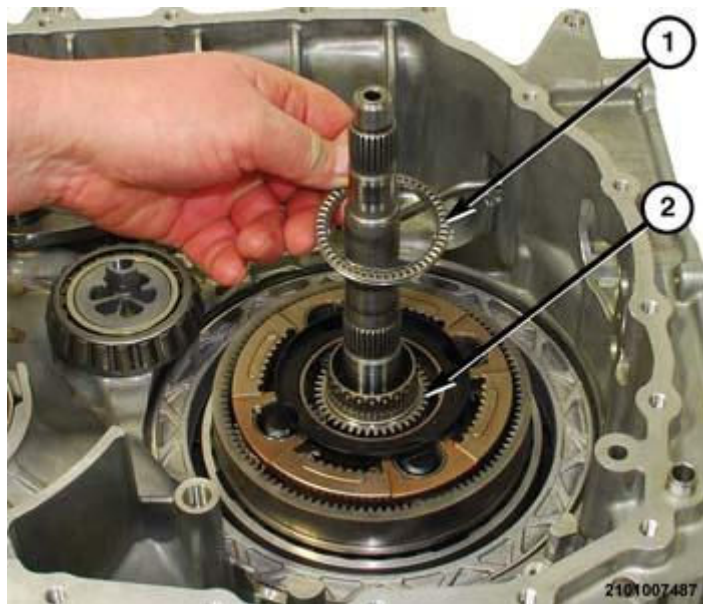


Fig. 336: Roller Type Thrust Bearing
Courtesy of CHRYSLER GROUP, LLC

7. Install the roller type thrust bearing (1) onto the sun gear 3 and 4 and Dog Clutch-F (2).



Fig. 337: Removing/Installing Transfer Gear
Courtesy of CHRYSLER GROUP, LLC

NOTE: If new transfer gear (1) or transmission housing are being replaced measurements must be preformed to determine correct thickness for the bearing preload shims. If the bearings and races are replaced the factory installed preload shims do not require replacement.

8. If necessary, replace the bearings and races on the transfer gear (1).
9. Install the transfer gear (1) into the transmission housing.

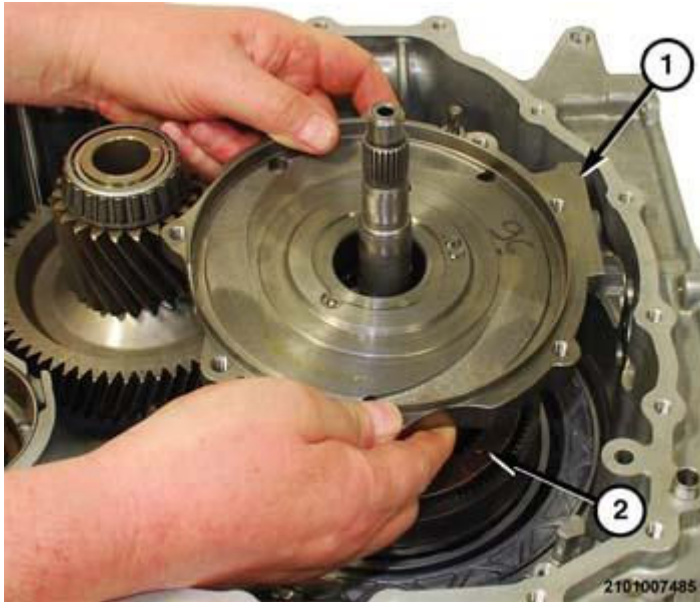


Fig. 338: Output Gear Support
Courtesy of CHRYSLER GROUP, LLC

10. Install the output gear support (1) into the gear 4 planetary pinion carrier (2).



Fig. 339: E-Clutch Hub And Shaft
Courtesy of CHRYSLER GROUP, LLC

11. Install the E-clutch hub and shaft (1) into the output gear support (2)

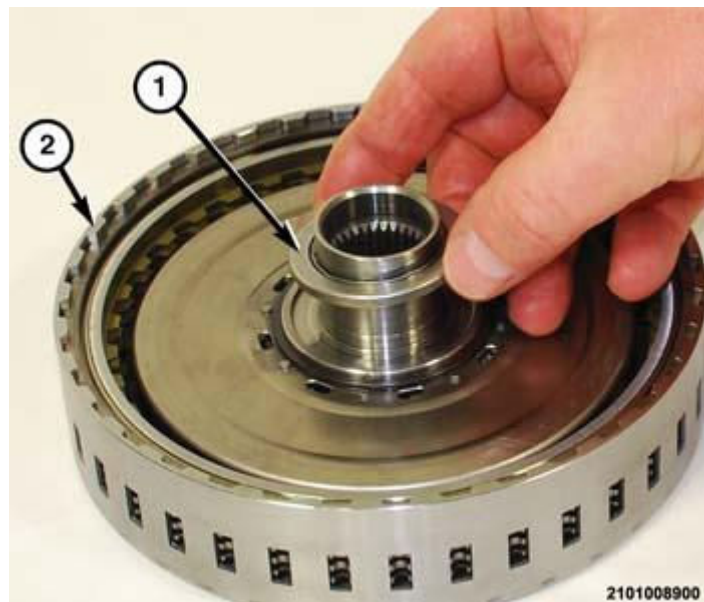


Fig. 340: Removing/Installing Thrust Bearing At E-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

12. Install the thrust bearing (1) on the E-clutch (2) hub.



Fig. 341: Removing/Installing E-Clutch At E-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

NOTE: Before installing the E-clutch, use a suitable screwdriver to align the grooves in the friction.

13. Install the E-clutch onto the E-clutch hub and shaft (2).

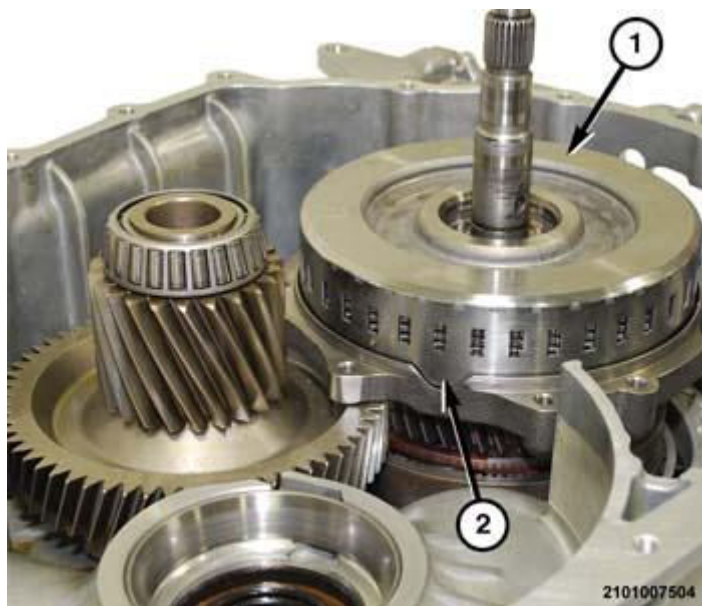


Fig. 342: E-Clutch Hub And Shaft
Courtesy of CHRYSLER GROUP, LLC

14. Wriggle the E-clutch (1) until all of the friction discs are fully engaged on the E-clutch hub and shaft.

NOTE: When the E-clutch (1) is fully seated the gap (2) will be very small between the E-clutch retainer and the output gear support.

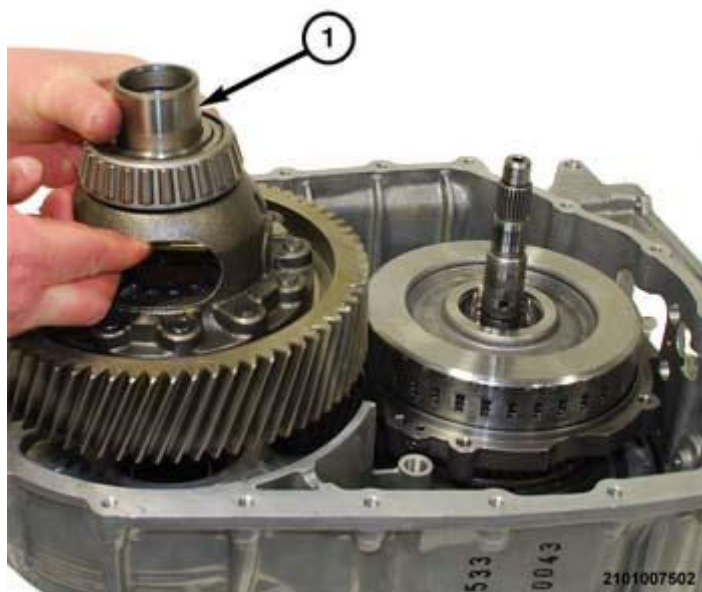


Fig. 343: Removing/Installing Differential Assembly
Courtesy of CHRYSLER GROUP, LLC

NOTE: If new differential (1) or transmission housing are being replaced

measurements must be preformed to determine correct thickness for the bearing preload shims. If the bearings and races are replaced the factory installed preload shims do not require replacement.

15. If necessary, replace the bearings and races on the differential (1).
16. Install the differential assembly (1) into the transmission housing.



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Fig. 344: Sealing Surface Of Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

17. Place a NEW gasket (1) in position on the sealing surface of the transmission housing (2).

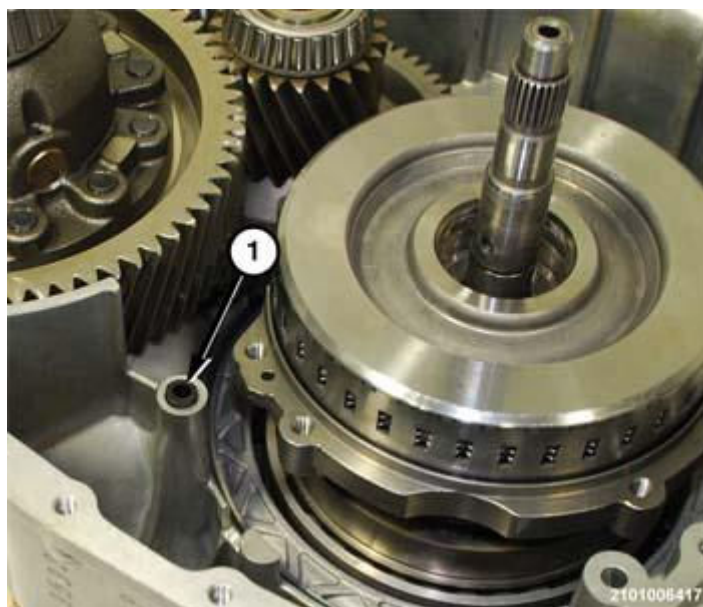
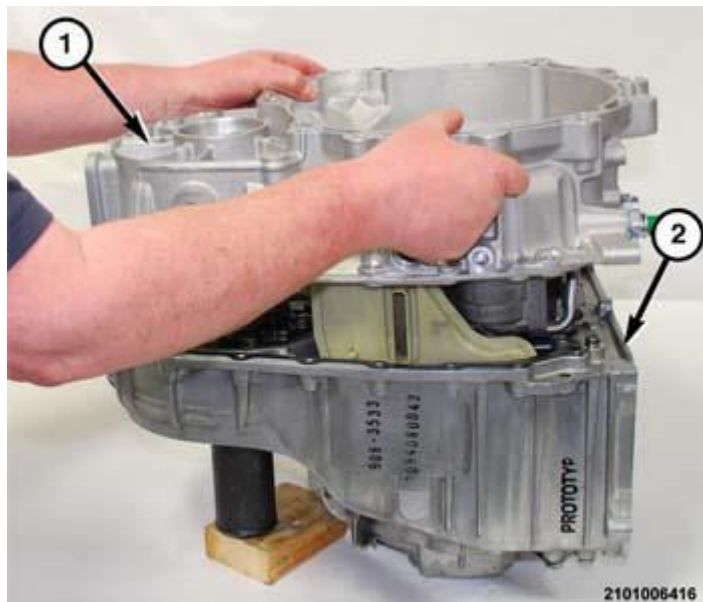


Fig. 345: Port Seal

Courtesy of CHRYSLER GROUP, LLC

18. Install a NEW seal (1) in the port in the transmission housing.
19. If necessary, replace the output seal and the impeller hub seal.

**Fig. 346: Removing/Installing Bellhousing At Transmission Housing**

Courtesy of CHRYSLER GROUP, LLC

20. While guiding the bellhousing (1) downward over the input and output shafts, place the bellhousing (1) in position on the transmission housing (2).

**Fig. 347: Checking Guide Pin Alignment**

Courtesy of CHRYSLER GROUP, LLC

21. Rotate the output gear clockwise to assure guide pin (1) alignment.

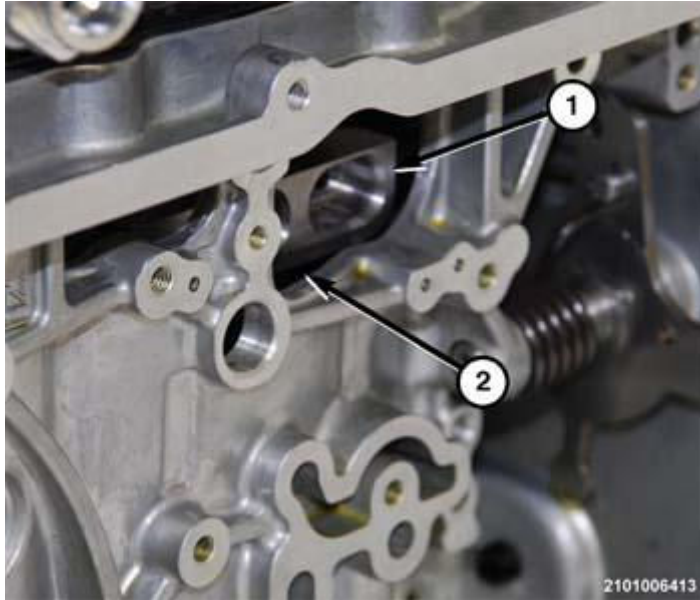


Fig. 348: Engaging Guide Pins In Transmission Housing Into Receptacle Holes
Courtesy of CHRYSLER GROUP, LLC

22. Rotate the output gear support (1) through the window (2) behind the valve body until the guide pin engages the receptacle hole in the bellhousing
23. Engage the guide pins in the transmission housing into the receptacle holes bellhousing to assure proper alignment.
24. Install several bolts to hold the bell housing to the transmission housing. Tighten the bolts hand tight.
25. Position the transmission on the bench with the bellhousing facing outward.

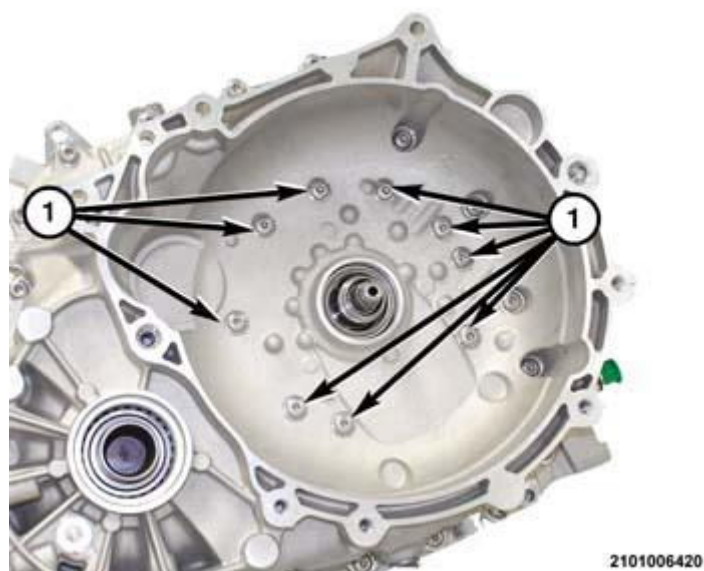


Fig. 349: Bellhousing To Output Gear Support Bolts
Courtesy of CHRYSLER GROUP, LLC

26. Install the bolts (1) with NEW seal washers to hold the bellhousing to the output gear support. Refer to **SPECIFICATIONS**.

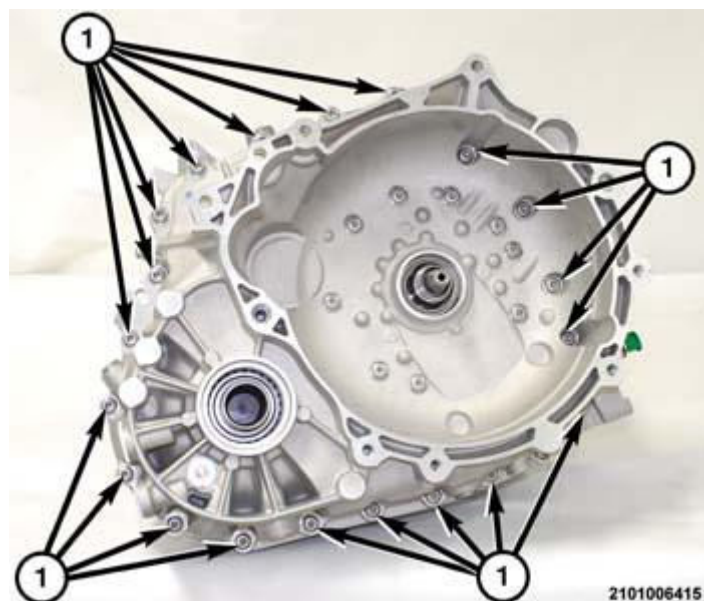


Fig. 350: Bellhousing To Transmission Housing Bolts
Courtesy of CHRYSLER GROUP, LLC

27. Install the bolts (1) to hold the bellhousing to the transmission housing. Refer to **SPECIFICATIONS**.

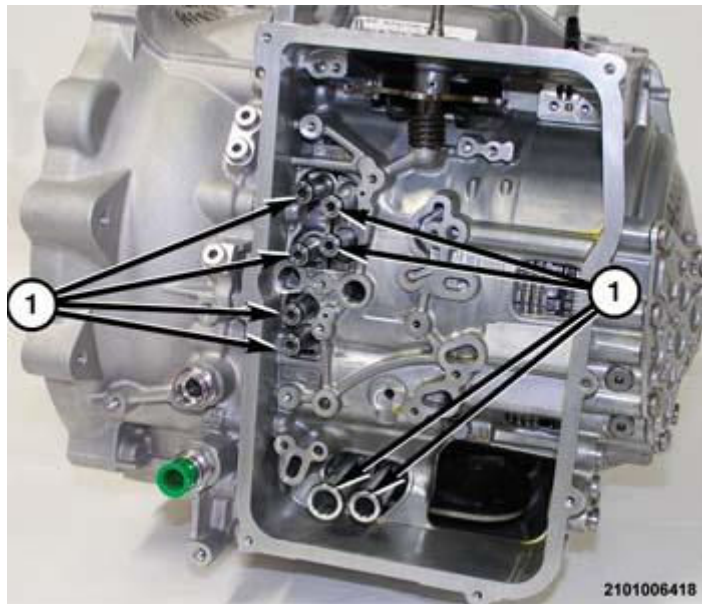


Fig. 351: Fluid Adapter Tubes & O-Ring Seals
Courtesy of CHRYSLER GROUP, LLC

28. Install NEW O-rings on both ends of the fluid transfer tubes.
29. Install the fluid adapter tubes (1) from the transmission.



Fig. 352: Removing/Installing Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

30. Insert the speed sensor (1) into the transmission with the wire harness connected.

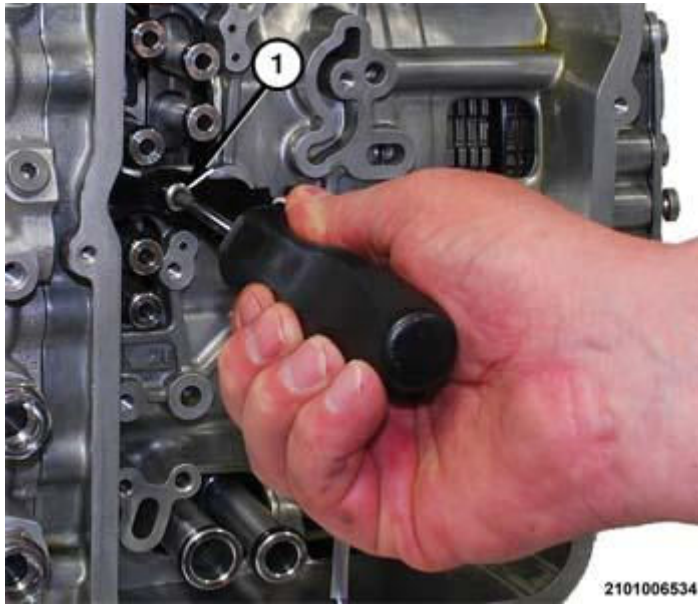


Fig. 353: Removing/Installing Speed Sensor Screw
Courtesy of CHRYSLER GROUP, LLC

31. Install the screw (1) to hold the speed sensors to the transmission housing.

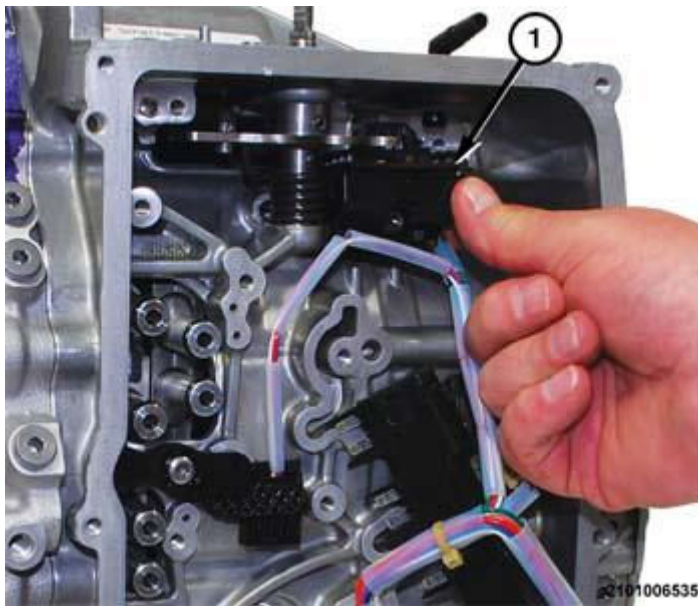


Fig. 354: Removing/Installing Transmission Range Sensor
Courtesy of CHRYSLER GROUP, LLC

32. Place the TRS (1) in position on the transmission with the wire harness connected.

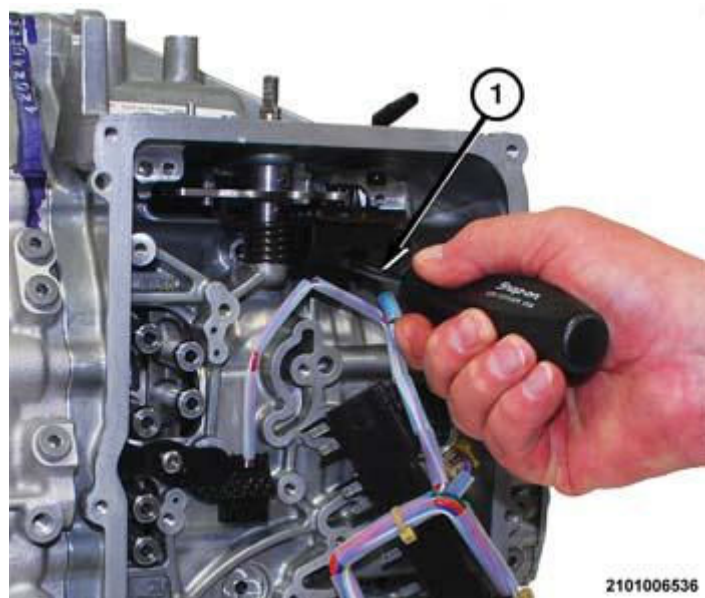


Fig. 355: Removing/Installing Transmission Range Sensor (TRS) Screw
Courtesy of CHRYSLER GROUP, LLC

33. Install the screw (1) to hold the TRS to the transmission housing. Refer to **SPECIFICATIONS**.

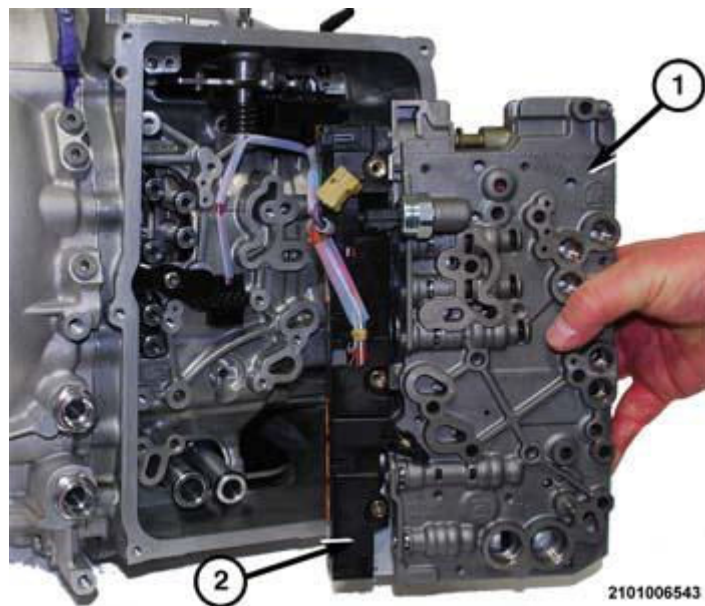


Fig. 356: Valve Body & Solenoids Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

34. Place the valve body (1) in position on the transmission.
35. Place the wire harness connector (2) in position on the solenoids.
36. Press the connector (2) inward to engage the terminals on the solenoids.

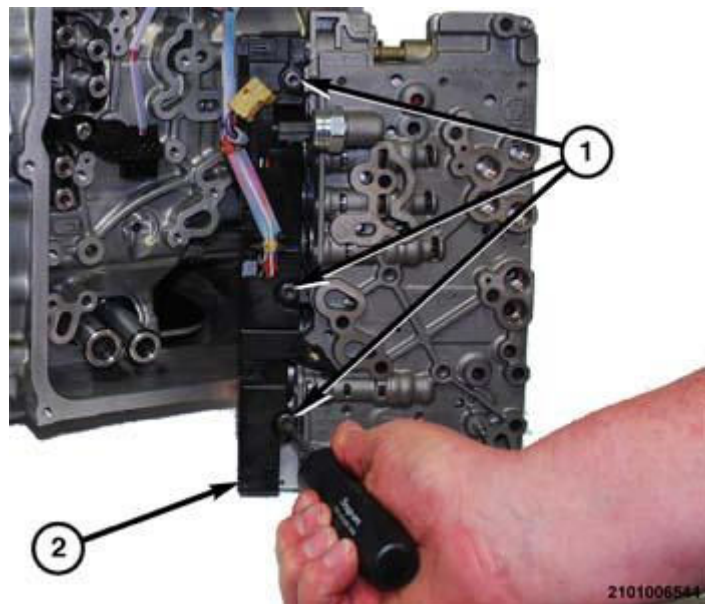


Fig. 357: Removing/Installing Wire Harness Connector At Valve Body Solenoids
Courtesy of CHRYSLER GROUP, LLC

37. Install the screws to hold the wire harness connector to the valve body and solenoids. Refer to **SPECIFICATIONS**.

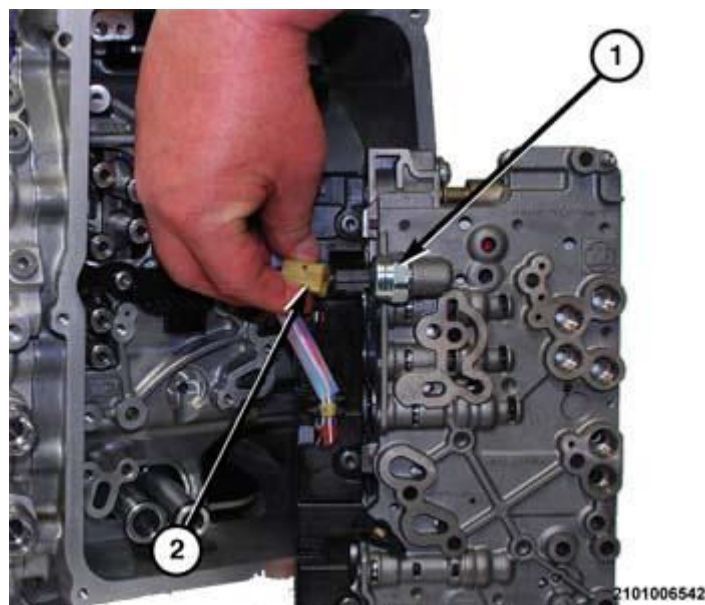


Fig. 358: Fluid Pressure Transducer Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

38. Insert the wire harness connector into the fluid pressure transducer connector
39. Press connector together until the lock engages.

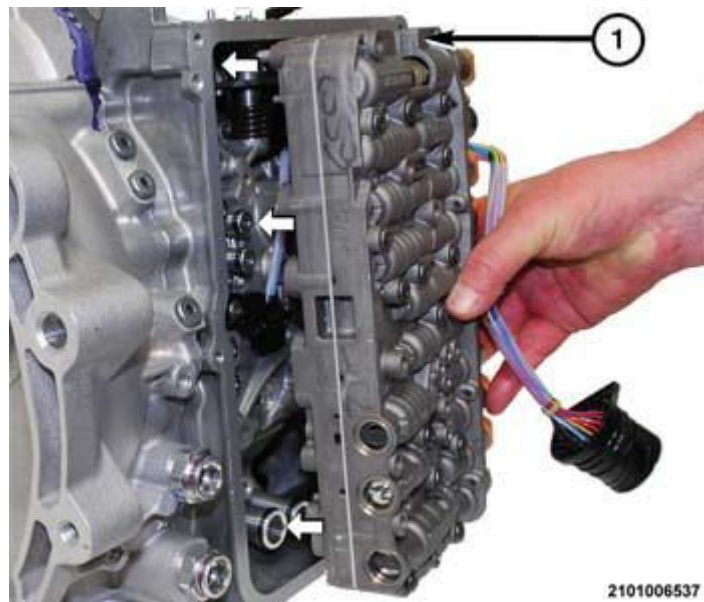


Fig. 359: Aligning Valve Body To Fluid Transfer Tubes
Courtesy of CHRYSLER GROUP, LLC

40. Turn the valve body (1) over and align the valve body (1) with the fluid transfer adapters.

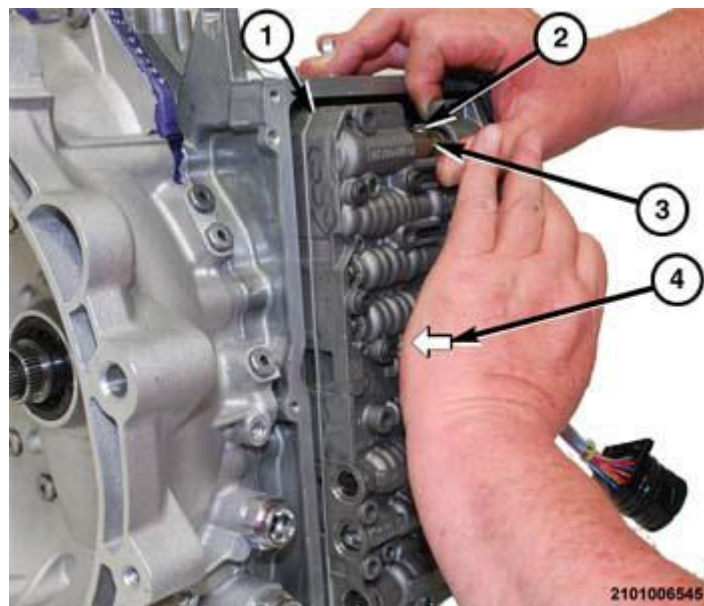


Fig. 360: Engaging Valve Body To Fluid Transfer Tubes
Courtesy of CHRYSLER GROUP, LLC

41. Guide the manual lever cam (2) into the slot (3) on the manual valve.
42. Firmly press (4) the valve body (1) inward until the O-rings on the fluid transfer adapters engage into receptacle holes on the valve body.

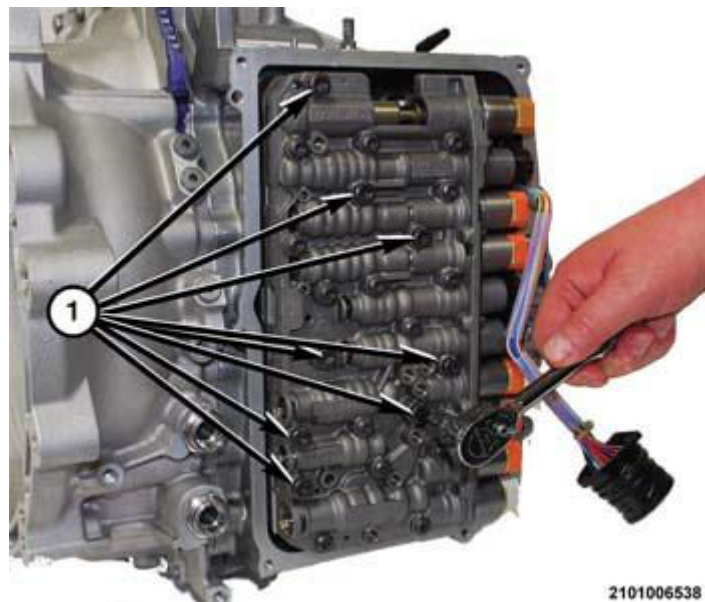


Fig. 361: Valve Body Bolts
Courtesy of CHRYSLER GROUP, LLC

43. Install the bolts (1) to hold the valve body to the transmission housing. Refer to **SPECIFICATIONS**.

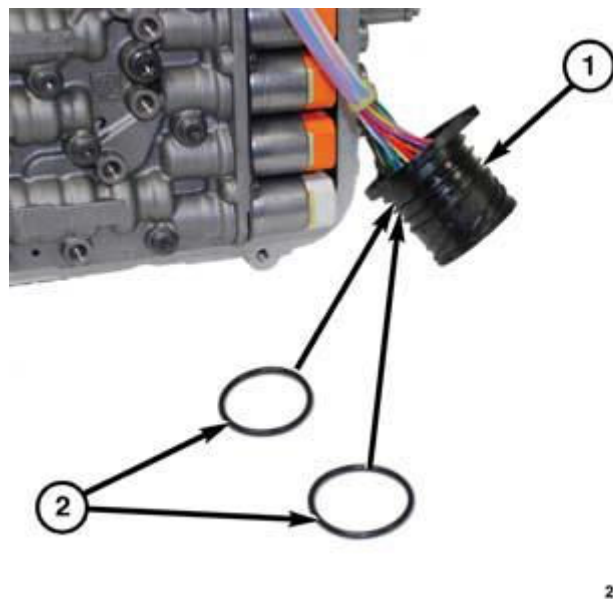


Fig. 362: Valve Body Solenoid Wire Harness Connector Socket O-Ring Seals
Courtesy of CHRYSLER GROUP, LLC

44. Install NEW O-ring seals (2) on the wire connector socket (1).

NOTE: A light coating of assembly lube can be applied to the O-ring seals (2) to ease installation.

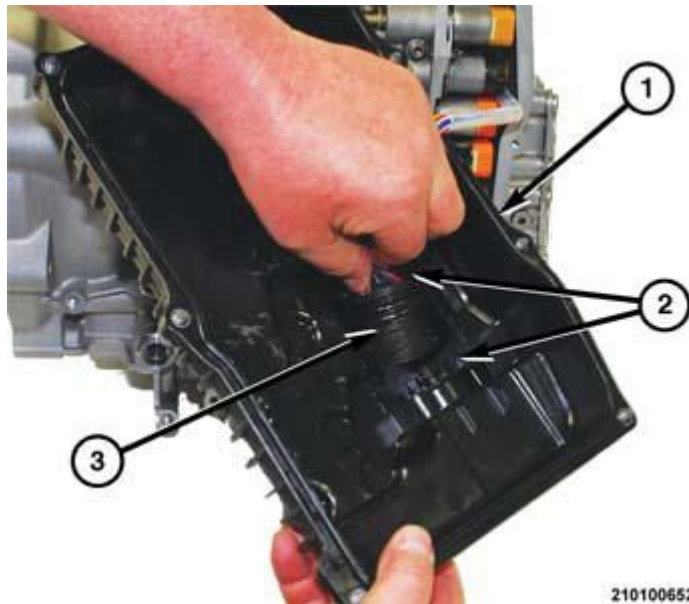


Fig. 363: Valve Body Cover Pan & Wire Connector Socket
Courtesy of CHRYSLER GROUP, LLC

45. Place the valve body cover pan (1) in position on the transmission.
46. Insert the wire connector socket (3) into the opening on the inside of valve body cover pan (1) with the flat side (2) of the socket on the left.

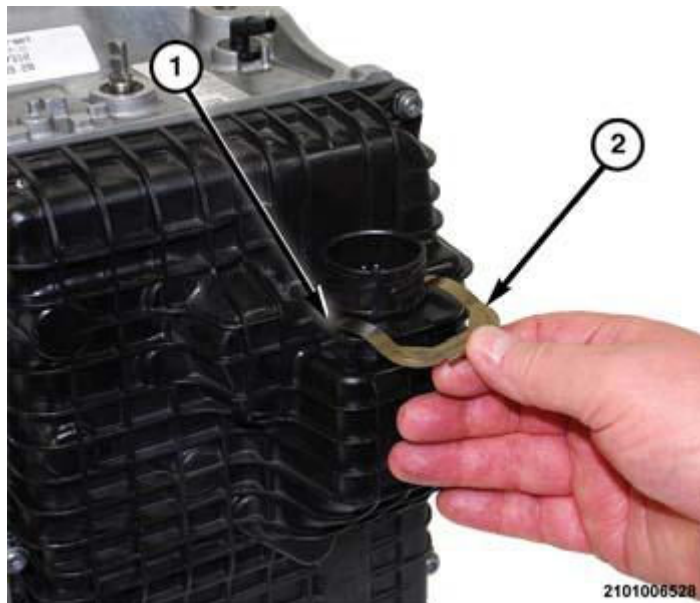


Fig. 364: Wire Connector Socket Clip
Courtesy of CHRYSLER GROUP, LLC

47. Press the wire connector socket inward until the retainer clip groove (1) is exposed on the outside of the valve body cover pan (1).
48. Install the clip (2) to hold the wire connector socket in the valve body cover pan.

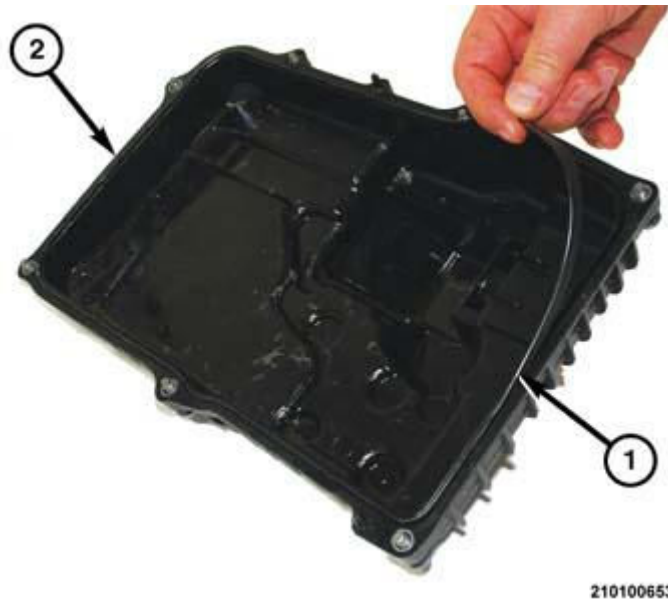


Fig. 365: Valve Body Cover Pan Gasket Seal
Courtesy of CHRYSLER GROUP, LLC

49. Install a NEW gasket seal (1) in the groove around the sealing surface of the valve body cover pan (2).

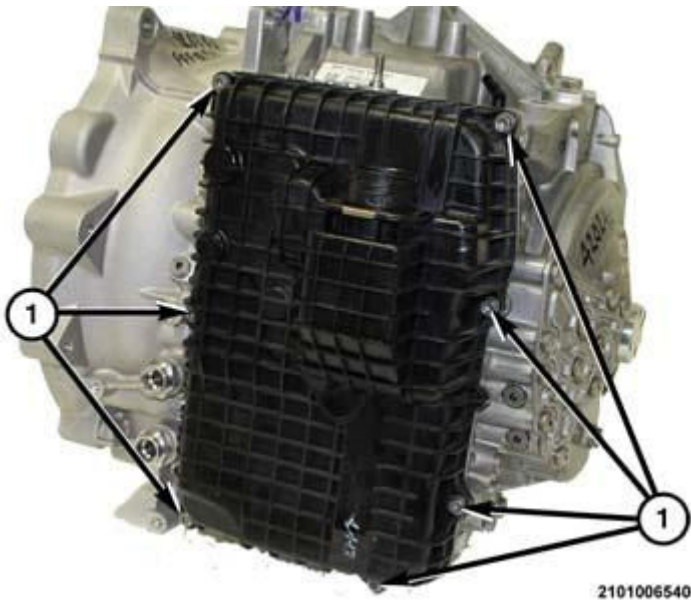


Fig. 366: Valve Body Cover Pan Bolts
Courtesy of CHRYSLER GROUP, LLC

50. Place the valve body cover pan gasket against the sealing surface of the transmission housing.
51. Install the bolts (1) to hold the valve body cover pan to the transmission housing. Refer to **SPECIFICATIONS**.
52. Install the transmission in the vehicle.

53. Road test the vehicle to verify the repair.

TRANSFER GEAR INNER RACE

1. Using a clean lint free cloth, wipe the transfer gear bore clean. Inspect the bore for burrs or other damage. Use crocus cloth the dress down burrs.
2. Place the transfer gear on the stable, clean work surface.



Fig. 367: Installing Bearing Race Into Transfer Gear Until
Courtesy of CHRYSLER GROUP, LLC

3. Place the NEW bearing race in the transfer gear bore.
4. Using a suitable hammer (1) and tool (special tool #9588, Installer, Bearing Cup)with (special tool #C-4171, Driver Handle, Universal), drive the bearing race into the transfer gear until it butts against the bottom surface.
5. Install the transfer gear in the transaxle.

TRANSFER GEAR OUTER BEARING

Clean the transfer gear with suitable solvent and blow it dry with 344 kPa (50psi) regulated shop air.

1. Place the transfer gear on a stable, clean work surface.

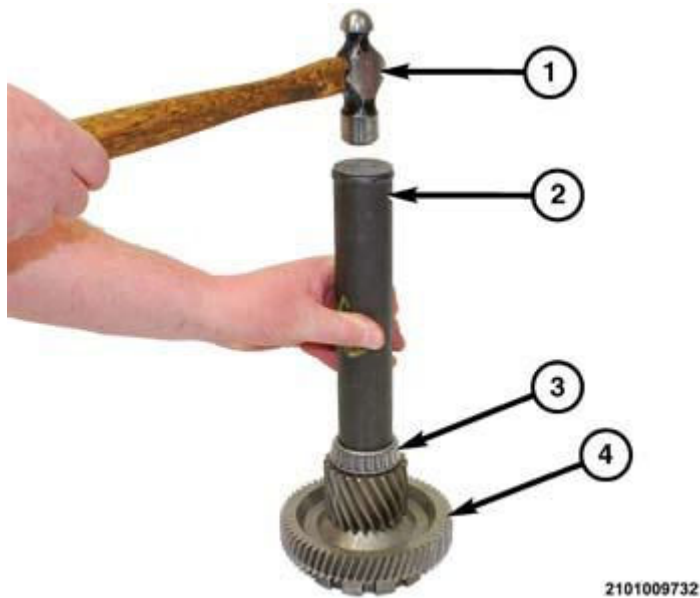


Fig. 368: Installing Transfer Gear Bearing Onto Transfer Gear
 Courtesy of CHRYSLER GROUP, LLC

2. Place the NEW transfer gear bearing (3) on the transfer gear (4).
3. Using a suitable hammer (1) and tool (special tool #6052, Installer, Bearing/Seal) (2), drive the transfer gear bearing (3) onto the transfer gear (4).
4. Assemble the transaxle and install it in the vehicle. Refer to **ASSEMBLY**. Refer to **INSTALLATION**.
5. Properly fill the transaxle with specified type and quantity fluid. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS**.
6. Road test the vehicle to verify the repair.

TRANSFER GEAR OUTER RACE

Clean the bearing bore with a lint free cloth and inspect for damage to the bellhousing casting. If the bellhousing is damaged the transmission will require replacement.

1. Place the NEW transfer gear outer bearing race in position in the bellhousing bore.

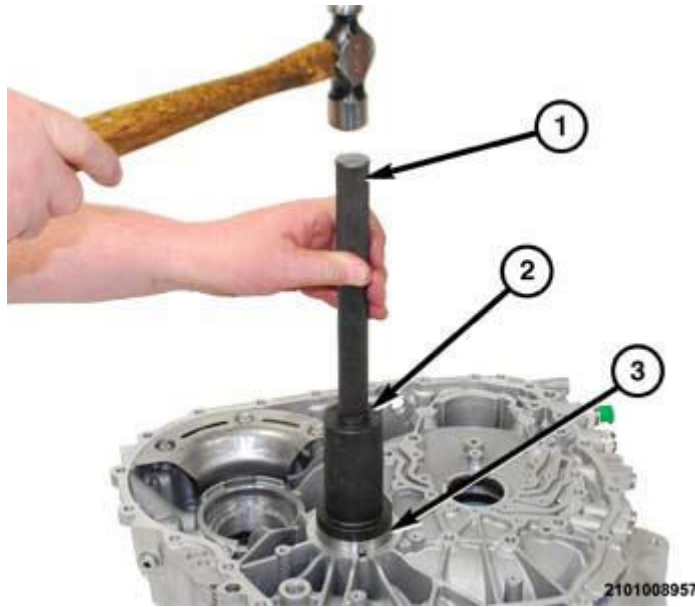


Fig. 369: Installing Transfer Gear Outer Bearing Race Into Bellhousing
Courtesy of CHRYSLER GROUP, LLC

2. Using and suitable hammer and tool (special tool #10036, Installer, Bearing Cup) (1) with (special tool #C-4171, Driver Handle, Universal) (2), drive the transfer gear outer bearing race (3) into the bellhousing bore until it seats down to the bottom stop.
3. Assemble the transmission and install the transmission in the vehicle. Refer to **ASSEMBLY**. Refer to **INSTALLATION**.
4. Fill the transmission with fluid. Refer to **FLUID AND FILTER, STANDARD PROCEDURE**.
5. Road test the vehicle to verify the repair.

BELLHOUSING

REMOVAL

REMOVAL

The following procedure is performed with the transmission drained and removed from the vehicle.

1. Place the transmission on a suitable, clean work surface.
2. Remove the torque converter.
3. Using a dial indicator, measure the input shaft end-play.

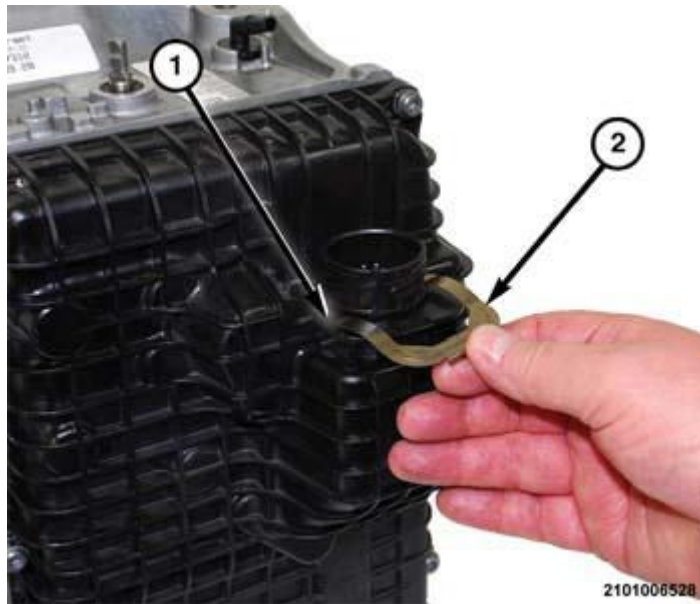


Fig. 370: Wire Connector Socket Clip
Courtesy of CHRYSLER GROUP, LLC

4. Remove the clip holding the wire connector socket in the valve body cover pan.

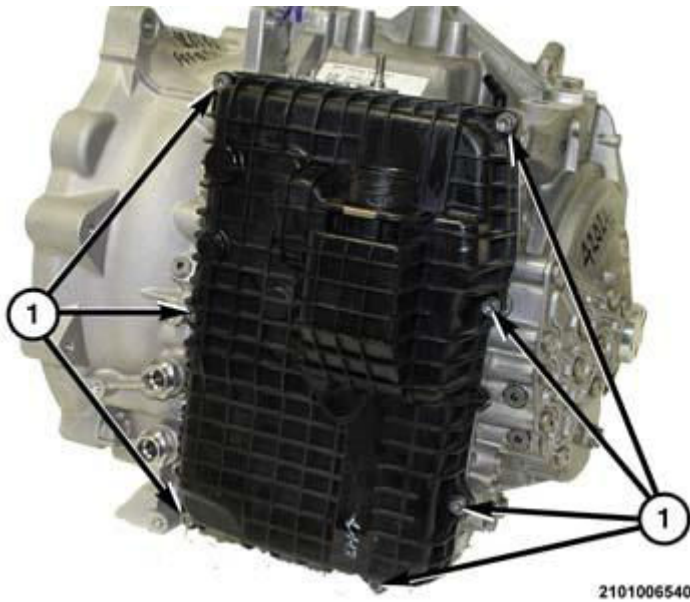


Fig. 371: Valve Body Cover Pan Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Remove the valve body cover pan bolts (1).
6. Remove the valve body cover pan from the transmission.

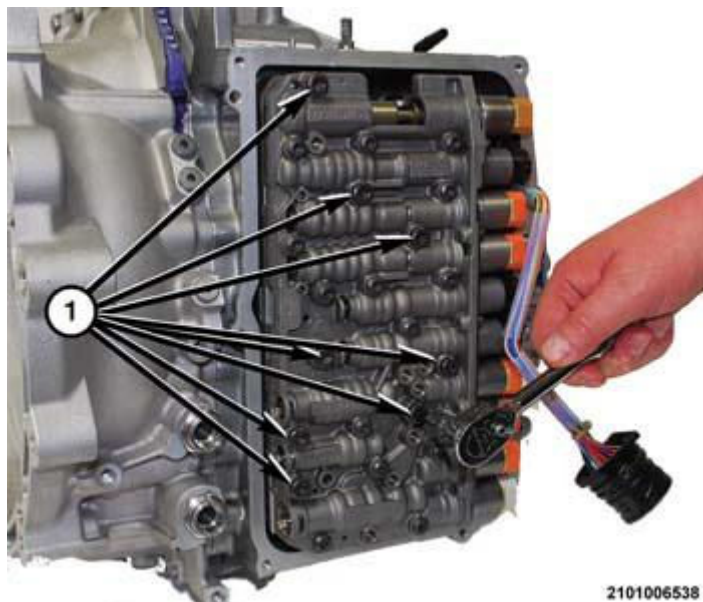


Fig. 372: Valve Body Bolts
Courtesy of CHRYSLER GROUP, LLC

7. Remove the valve body bolts (1).
8. Using a suitable prying tool, pry the valve body away from the adapter tubes.

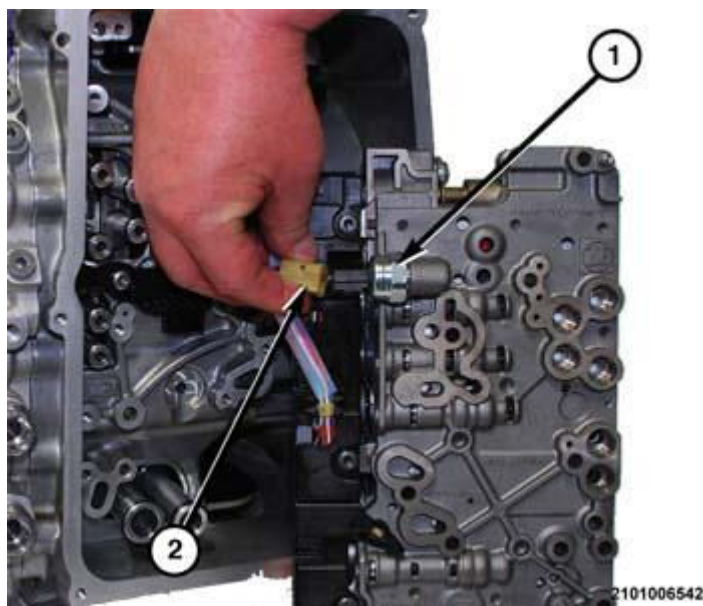


Fig. 373: Fluid Pressure Transducer Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

9. Turn the valve body over to gain access to wire harness connectors.
10. Release the lock (2) on the fluid pressure transducer wire connector and separate the wire connector (2) from the fluid pressure transducer (1).

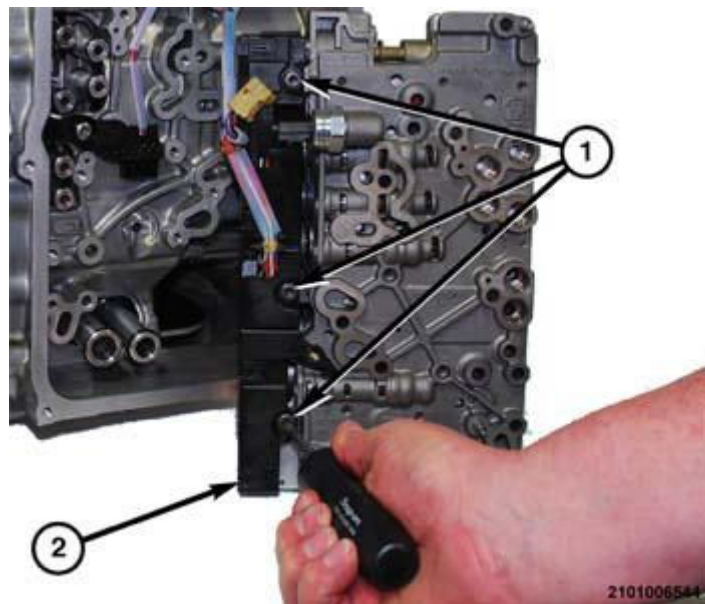


Fig. 374: Removing/Installing Wire Harness Connector At Valve Body Solenoids
Courtesy of CHRYSLER GROUP, LLC

11. Remove the bolts (1) holding the wire harness connector to the valve body and solenoids.
12. Using a suitable prying tool, Separate the wire harness connector (2) from the solenoids.
13. Separate the valve body from the transmission.

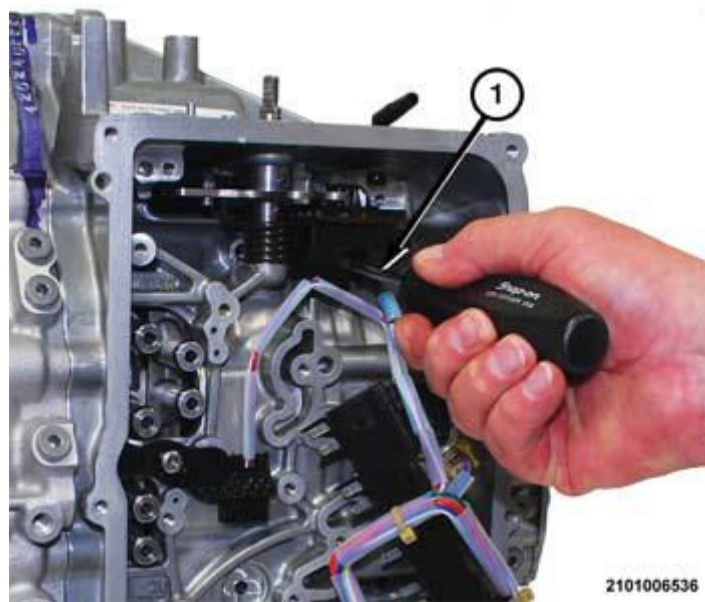


Fig. 375: Removing/Installing Transmission Range Sensor (TRS) Screw
Courtesy of CHRYSLER GROUP, LLC

14. Remove the Transmission Range Sensor (TRS) screw (1).

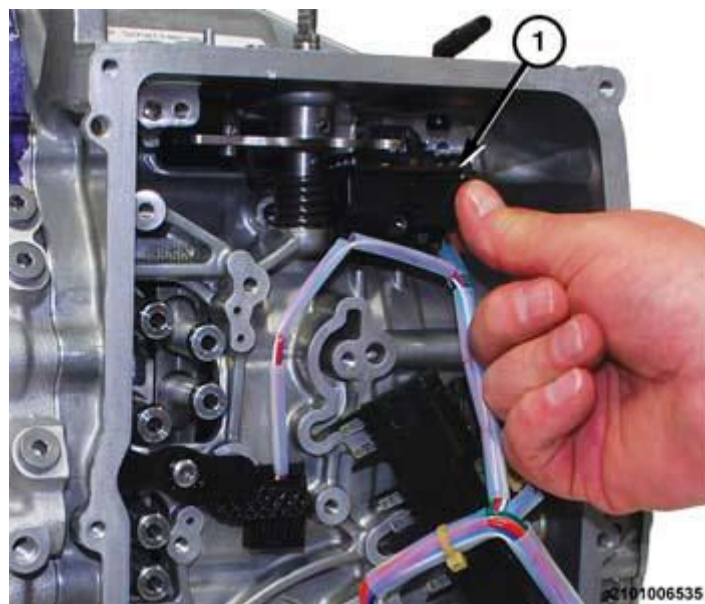


Fig. 376: Removing/Installing Transmission Range Sensor
Courtesy of CHRYSLER GROUP, LLC

15. Separate the TRS (1) from the transmission with the wire harness connected.

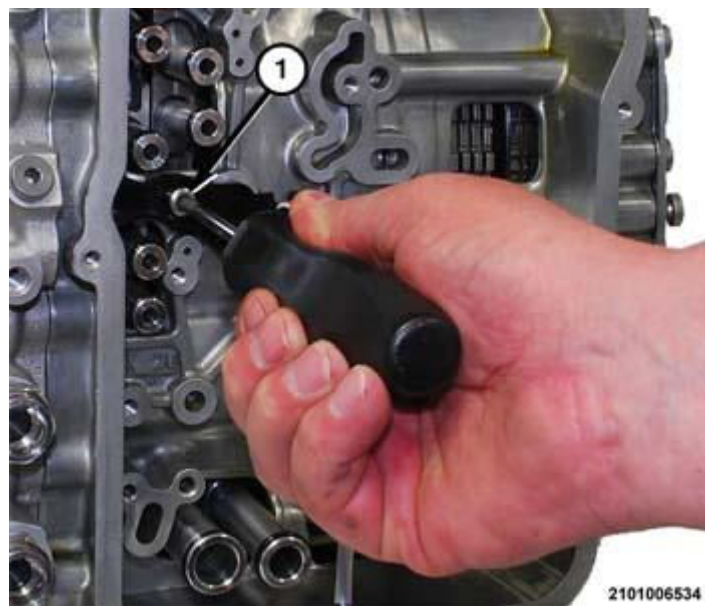


Fig. 377: Removing/Installing Speed Sensor Screw
Courtesy of CHRYSLER GROUP, LLC

16. Remove the speed sensor screw (1).



Fig. 378: Removing/Installing Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

17. Separate the speed sensor (1) from the from the transmission with the wiring harness connected.

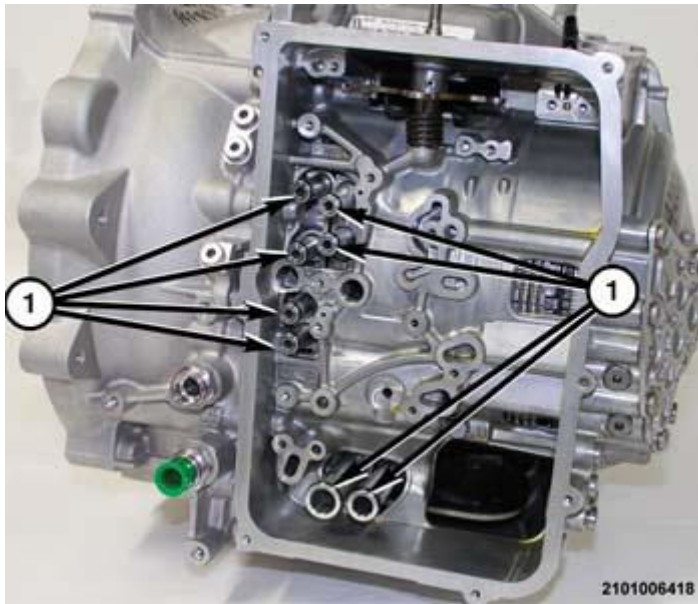


Fig. 379: Fluid Adapter Tubes & O-Ring Seals
Courtesy of CHRYSLER GROUP, LLC

18. Using suitable pliers, remove the fluid adapter tubes (1) from the transmission.

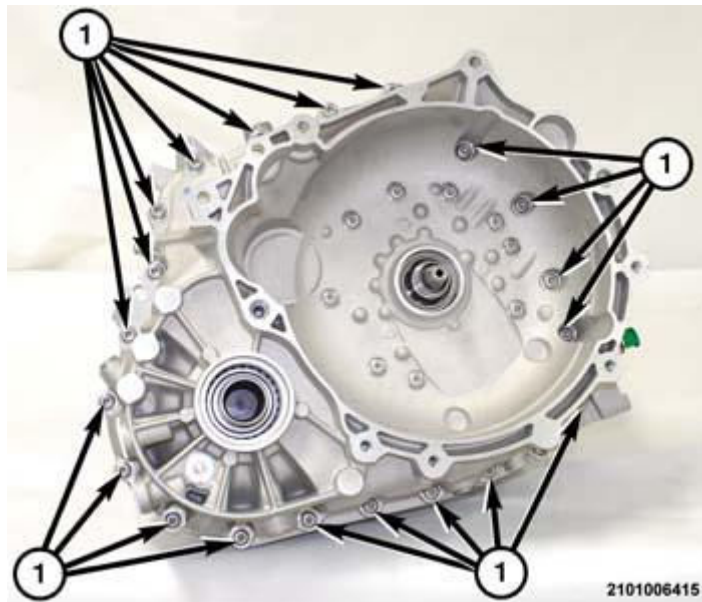


Fig. 380: Bellhousing To Transmission Housing Bolts
Courtesy of CHRYSLER GROUP, LLC

19. From around the perimeter of the transmission, remove the bellhousing bolts (1) holding the bellhousing to the transmission housing.

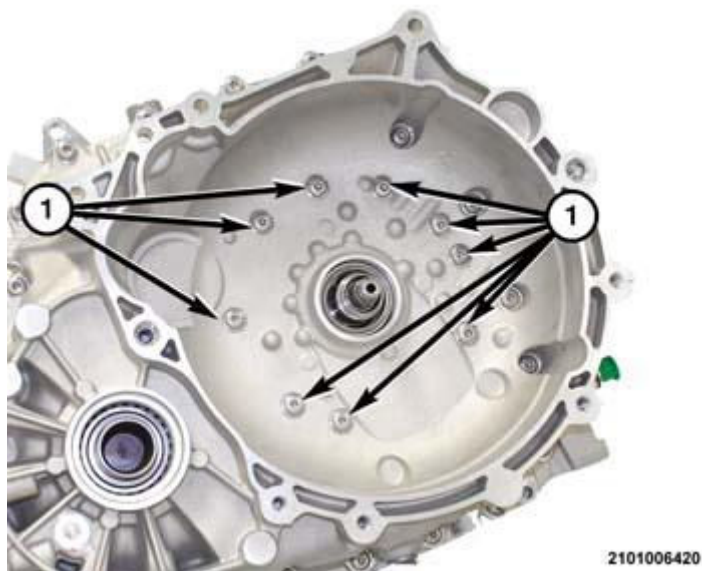


Fig. 381: Bellhousing To Output Gear Support Bolts
Courtesy of CHRYSLER GROUP, LLC

20. Remove the bellhousing bolts (1) holding the bellhousing to the output gear support.
21. Using wooden blocks to stabilize the transmission on the work surface, position the transmission on the bench with the bellhousing facing upward.
22. Using a suitable pry-bar in the pry point locations, pry upward to dislodge the bellhousing from the

transmission housing.

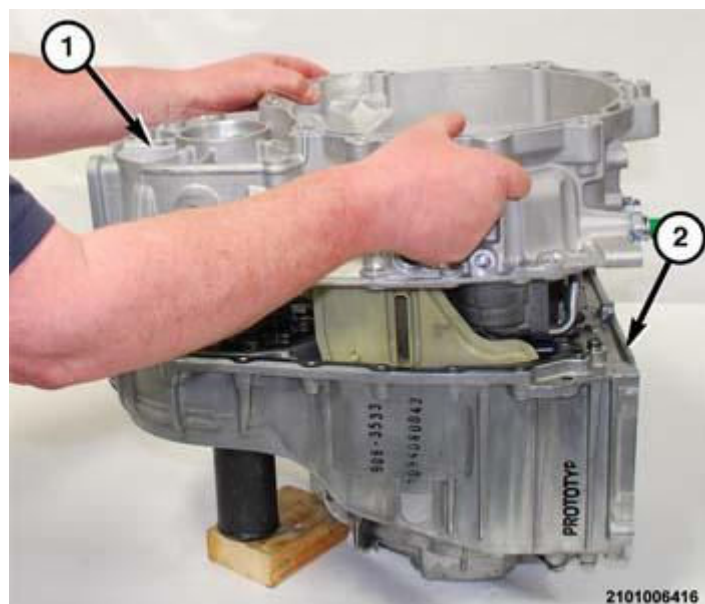


Fig. 382: Removing/Installing Bellhousing At Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

23. Lift the bellhousing (1) upward and separate the bellhousing from the transmission housing (2).

INSTALLATION

INSTALLATION

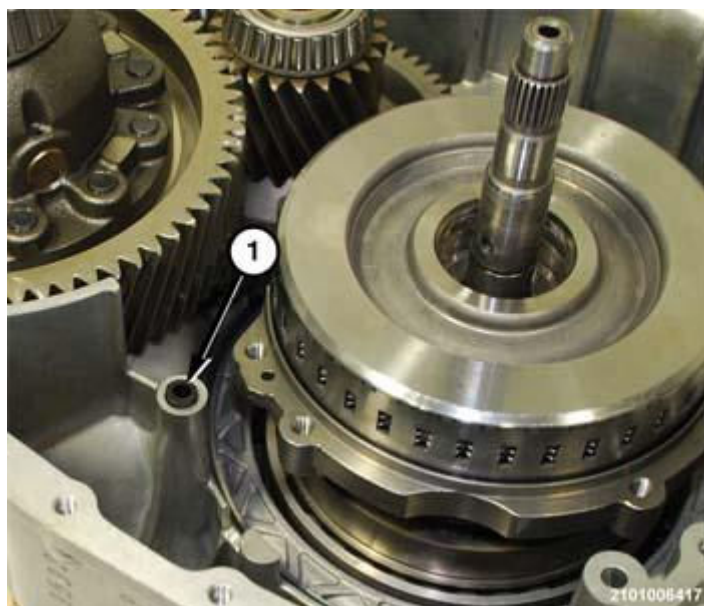


Fig. 383: Port Seal
Courtesy of CHRYSLER GROUP, LLC

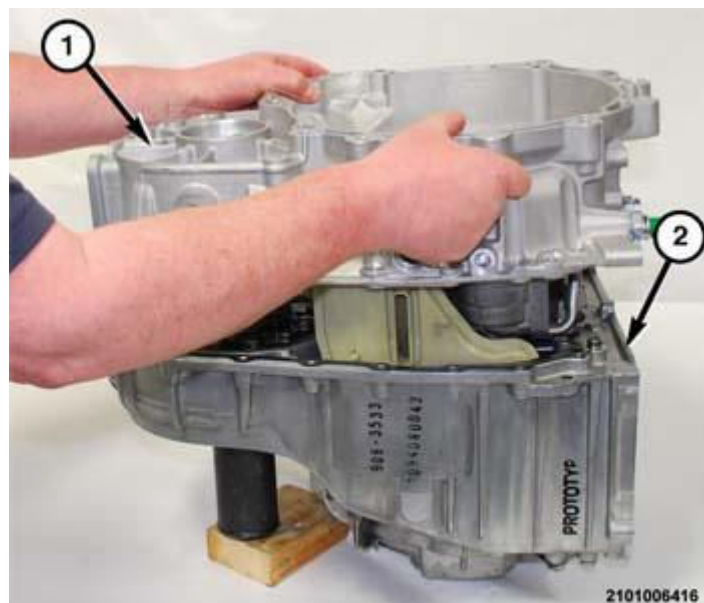
1. Install a NEW crossover port seal (1) in the transmission housing.



2101006419

Fig. 384: Sealing Surface Of Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

2. Place a NEW gasket (1) on the clean sealing surface of the transmission housing (2).
3. If necessary, replace the output seal and the impeller hub seal.



2101006416

Fig. 385: Removing/Installing Bellhousing At Transmission Housing
Courtesy of CHRYSLER GROUP, LLC

4. While guiding the bellhousing (1) downward over the input and output shafts, place the bellhousing (1) in position on the transmission housing (2).



Fig. 386: Checking Guide Pin Alignment
Courtesy of CHRYSLER GROUP, LLC

5. Rotate the output gear clockwise to assure guide pin (1) alignment.

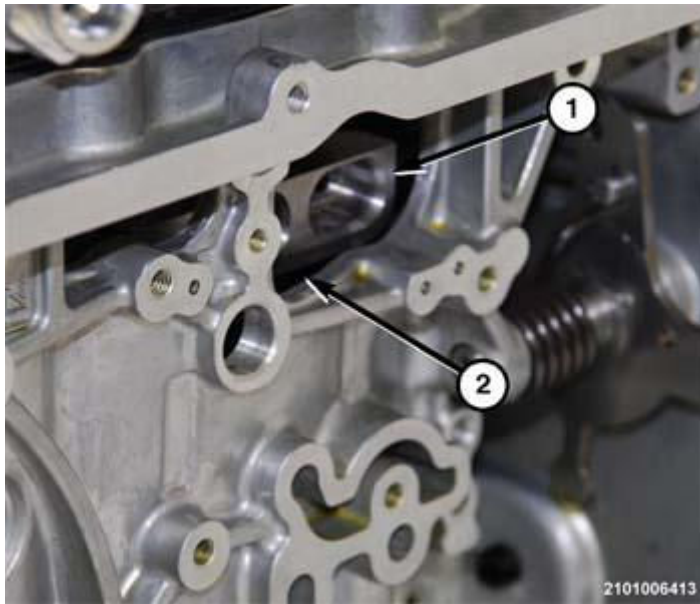


Fig. 387: Engaging Guide Pins In Transmission Housing Into Receptacle Holes
Courtesy of CHRYSLER GROUP, LLC

6. Rotate the output gear support (1) through the window (2) behind the valve body until the guide pin engages the receptacle hole in the bellhousing.
7. Engage the guide pins in the transmission housing into the receptacle holes bellhousing to assure proper alignment.
8. Install several bolts to hold the bellhousing to the transmission housing. Tighten hand tight.

9. Position the transmission on the bench with the bellhousing facing outward.

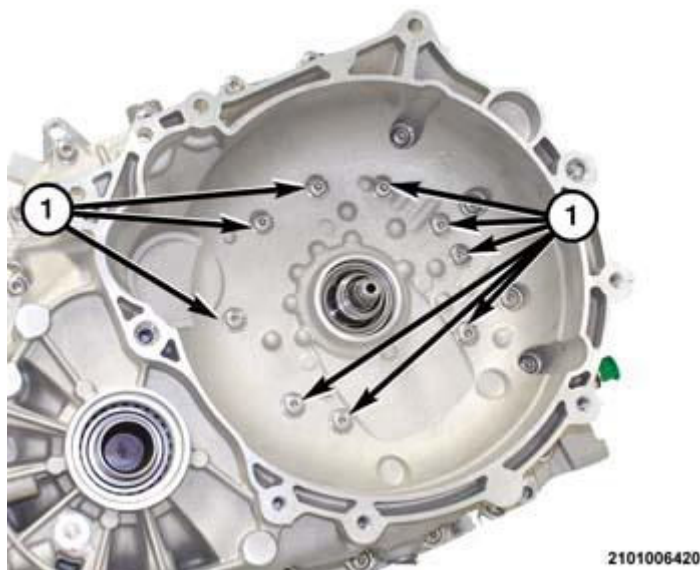


Fig. 388: Bellhousing To Output Gear Support Bolts
Courtesy of CHRYSLER GROUP, LLC

10. Install the output gear support bellhousing bolts (1) to hold the bellhousing and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

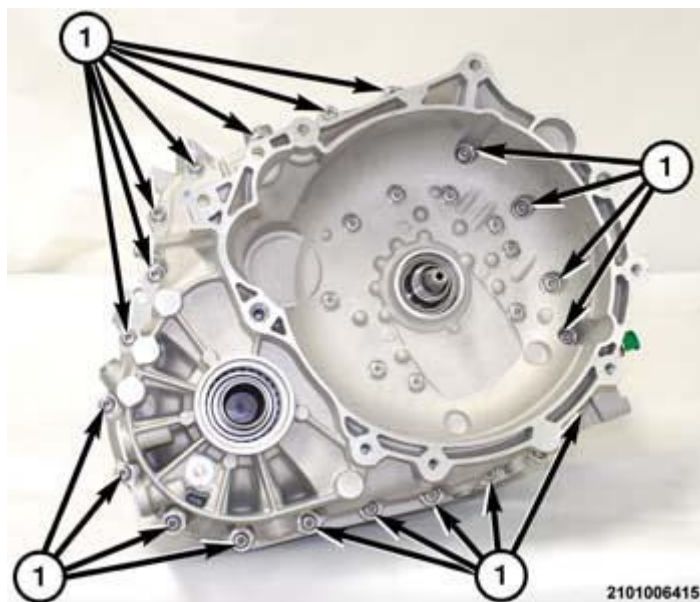


Fig. 389: Bellhousing To Transmission Housing Bolts
Courtesy of CHRYSLER GROUP, LLC

11. Install the bellhousing bolts (1) and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

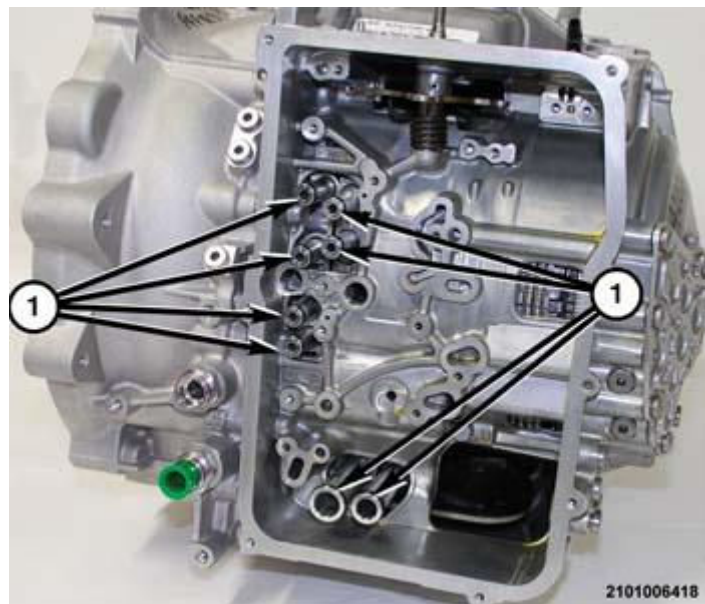


Fig. 390: Fluid Adapter Tubes & O-Ring Seals
Courtesy of CHRYSLER GROUP, LLC

12. Install NEW O-rings on both ends of the fluid transfer tubes.
13. Install the fluid adapter tubes (1) from the transmission.



Fig. 391: Removing/Installing Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

14. Insert the speed sensor (1) into the transmission with the wire harness connected.

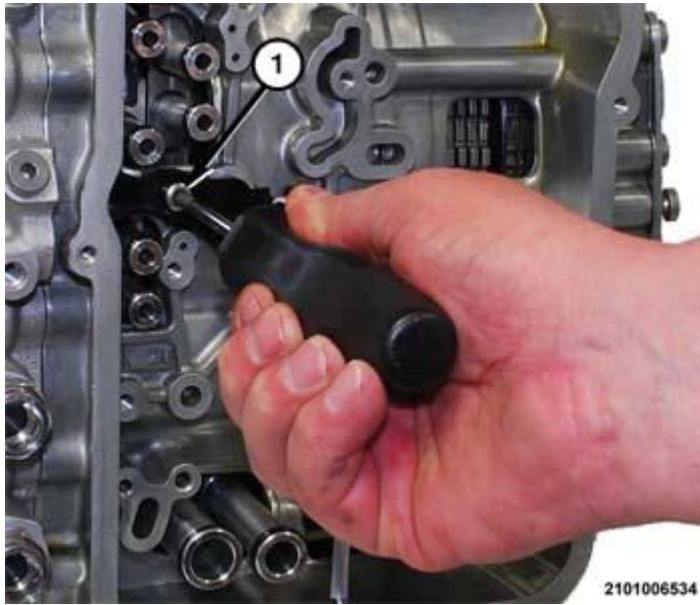


Fig. 392: Removing/Installing Speed Sensor Screw
Courtesy of CHRYSLER GROUP, LLC

15. Install the speed sensor screw (1) to hold the speed sensor to the transmission housing.

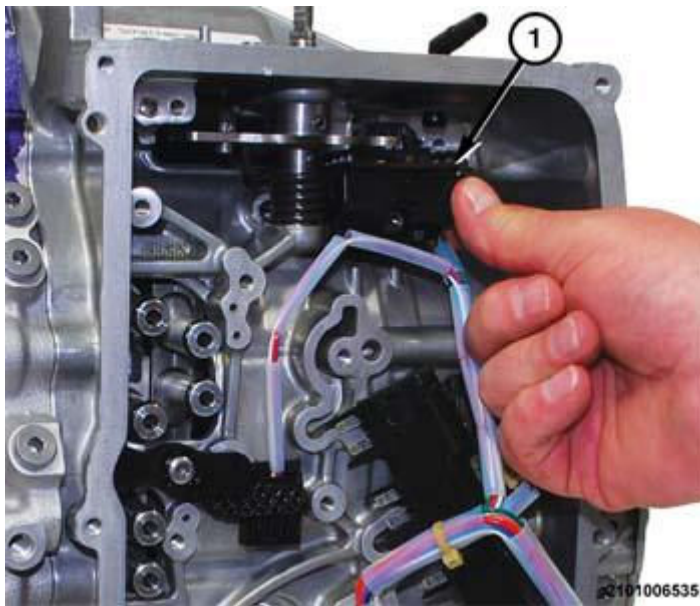


Fig. 393: Removing/Installing Transmission Range Sensor
Courtesy of CHRYSLER GROUP, LLC

16. Place the Transmission Range Sensor (TRS) (1) in position on the transmission with the wire harness connected.

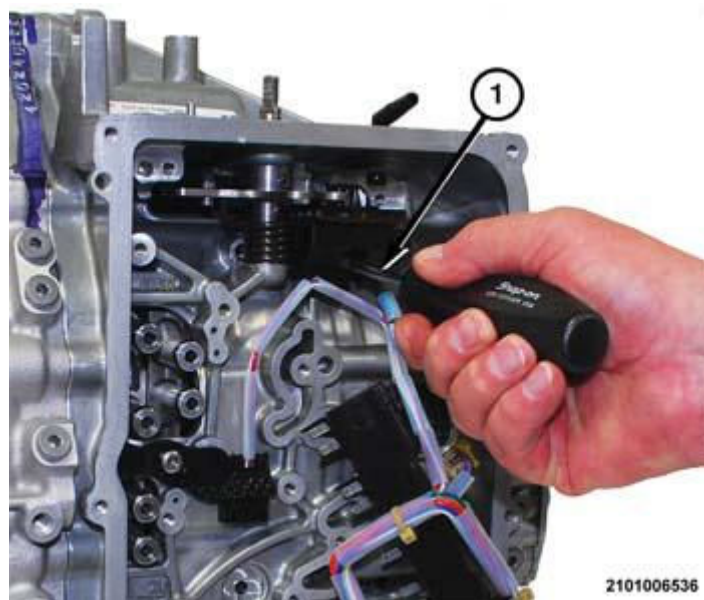


Fig. 394: Removing/Installing Transmission Range Sensor (TRS) Screw
Courtesy of CHRYSLER GROUP, LLC

17. Install the TRS screw (1) to hold the TRS to the transmission housing and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

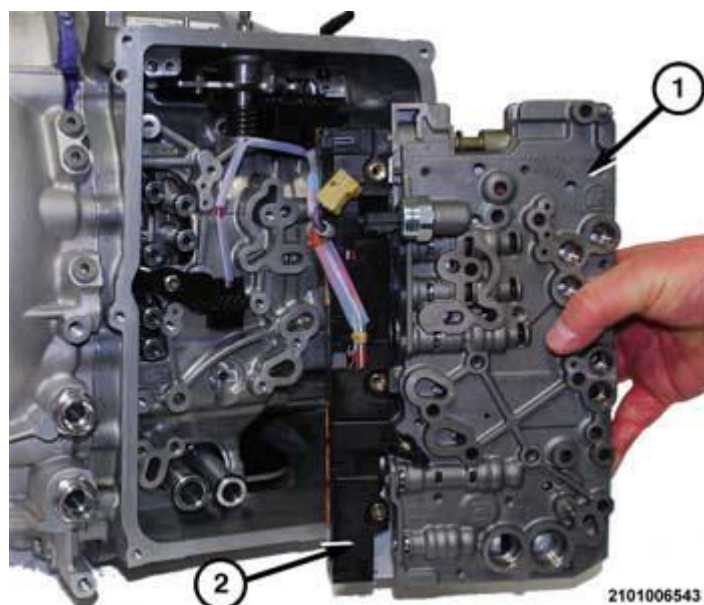


Fig. 395: Valve Body & Solenoids Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

18. Place the valve body (1) in position on the transmission.
19. Place the wire harness connector (2) in position on the solenoids.
20. Press the connector (2) inward to engage the terminals on the solenoids.

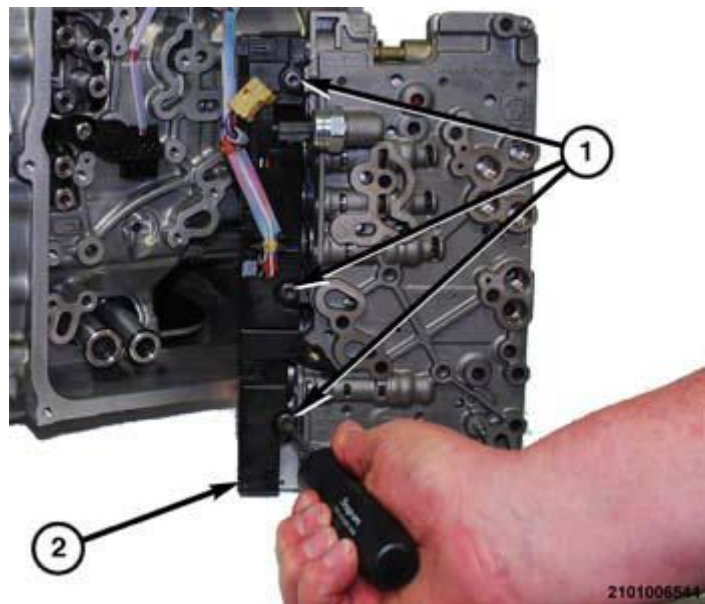


Fig. 396: Removing/Installing Wire Harness Connector At Valve Body Solenoids
Courtesy of CHRYSLER GROUP, LLC

21. Install the screws (1) to hold the wire harness connector to the valve body and solenoids and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

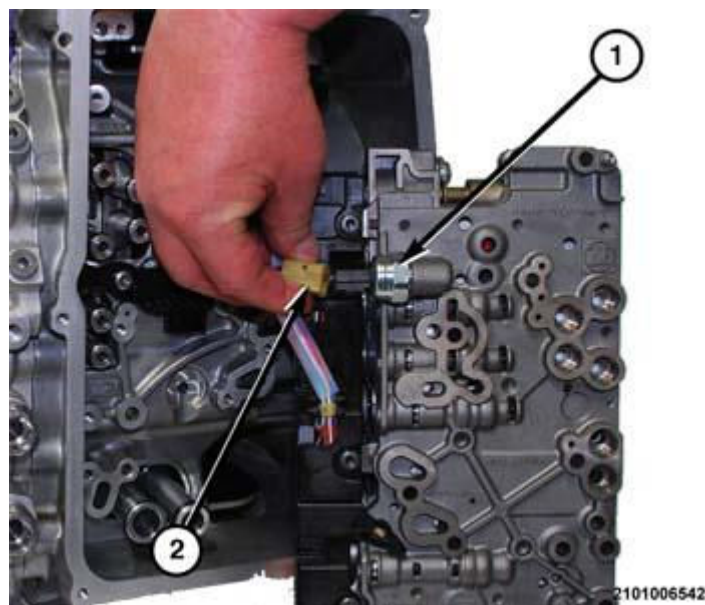


Fig. 397: Fluid Pressure Transducer Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

22. Insert the fluid pressure transducer connector (2) into the fluid pressure transducer (1).
23. Press connector together until the lock engages.

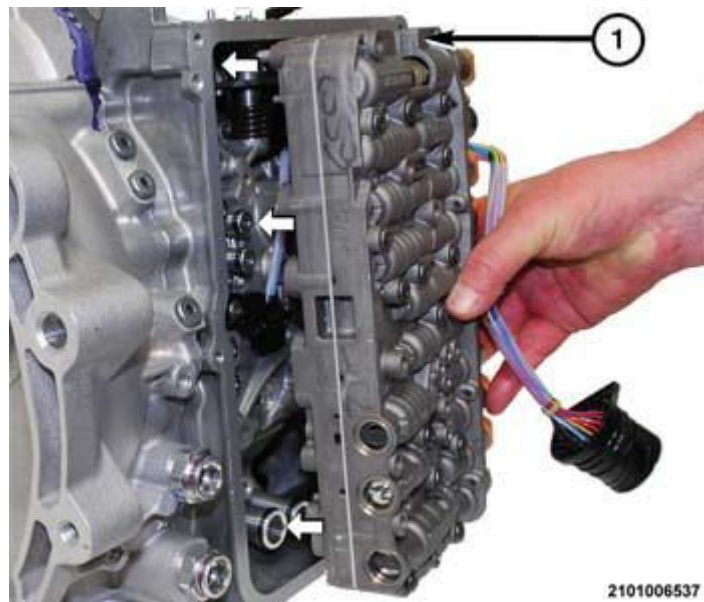


Fig. 398: Aligning Valve Body To Fluid Transfer Tubes
Courtesy of CHRYSLER GROUP, LLC

24. Turn the valve body (1) over and align the valve body (1) with the fluid transfer tubes.

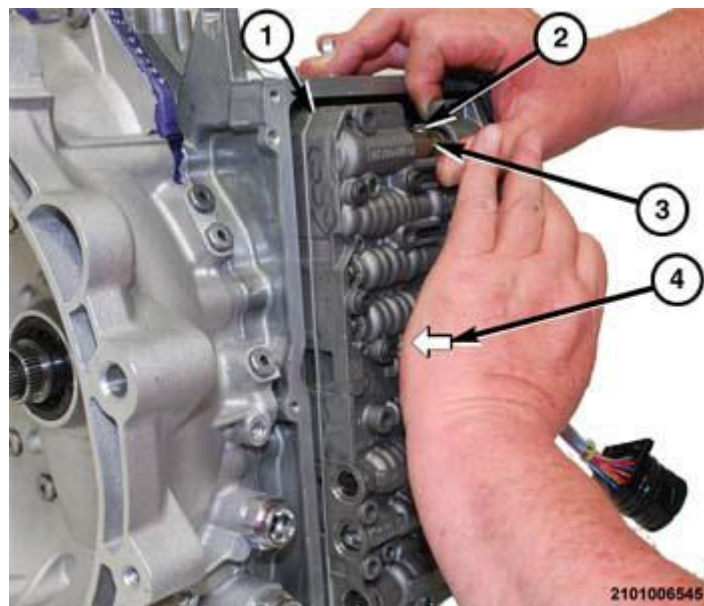


Fig. 399: Engaging Valve Body To Fluid Transfer Tubes
Courtesy of CHRYSLER GROUP, LLC

25. Guide the manual lever cam (2) into the slot (3) on the manual valve.
26. Firmly press (4) the valve body (1) inward until the O-rings on the fluid transfer adapters engage into receptacle holes on the valve body.

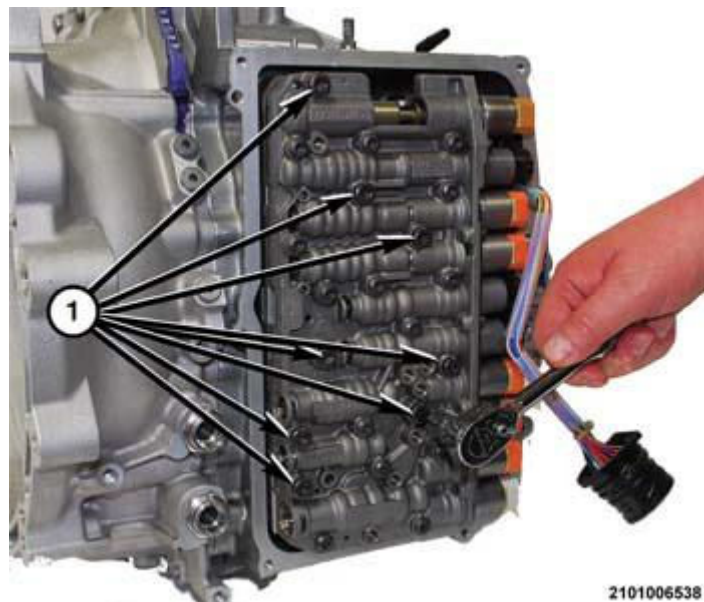


Fig. 400: Valve Body Bolts
Courtesy of CHRYSLER GROUP, LLC

27. Install the valve body bolts (1) and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

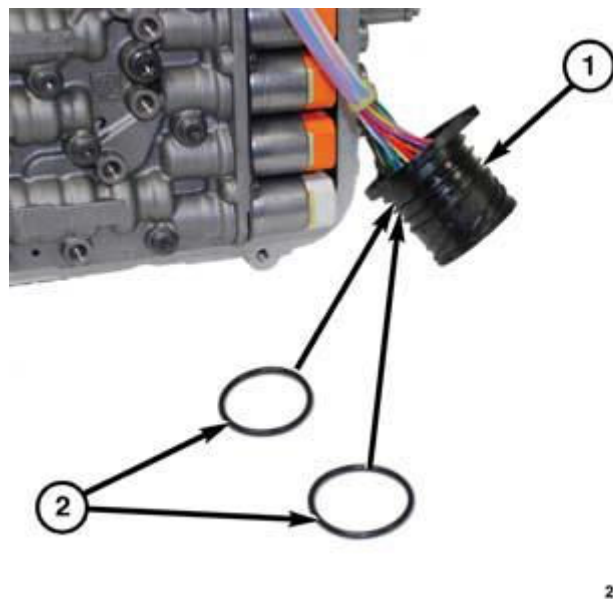


Fig. 401: Valve Body Solenoid Wire Harness Connector Socket O-Ring Seals
Courtesy of CHRYSLER GROUP, LLC

28. Install NEW O-ring seals (2) on the wire connector socket (1).

NOTE: A light coating of assembly lube can be applied to the O-ring seals (2) to ease installation.

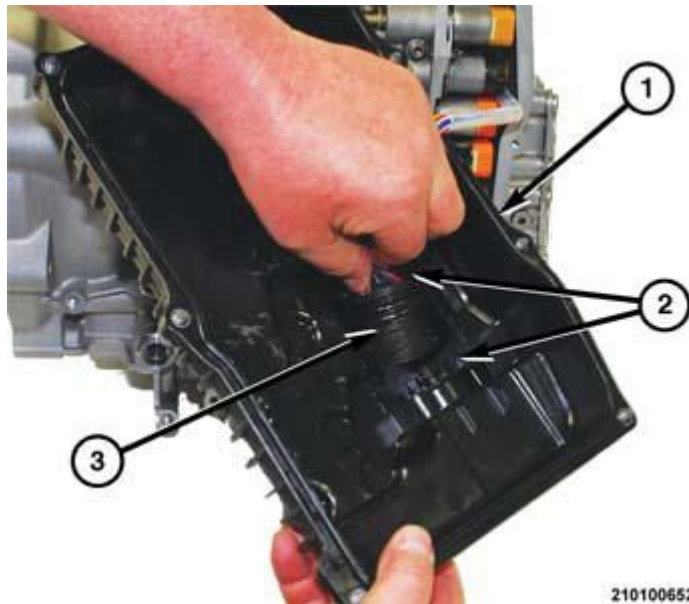


Fig. 402: Valve Body Cover Pan & Wire Connector Socket
Courtesy of CHRYSLER GROUP, LLC

29. Place the valve body cover pan (1) in position on the transmission.
30. Insert the wire connector socket (3) into the opening on the inside of valve body cover pan (1) with the flat side (2) of the socket on the left.

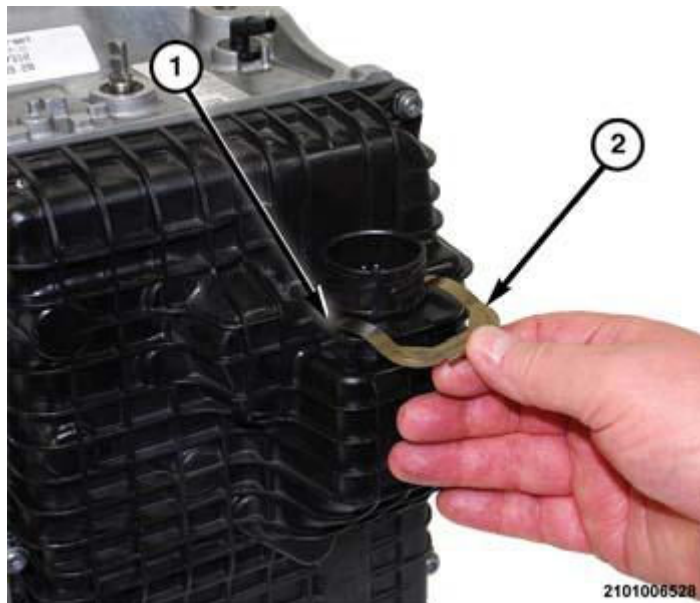


Fig. 403: Wire Connector Socket Clip
Courtesy of CHRYSLER GROUP, LLC

31. Press the wire connector socket inward until the retainer clip groove (1) is exposed on the outside of the valve body cover pan (1).
32. Install the clip (2) to hold the wire connector socket in the valve body cover pan.

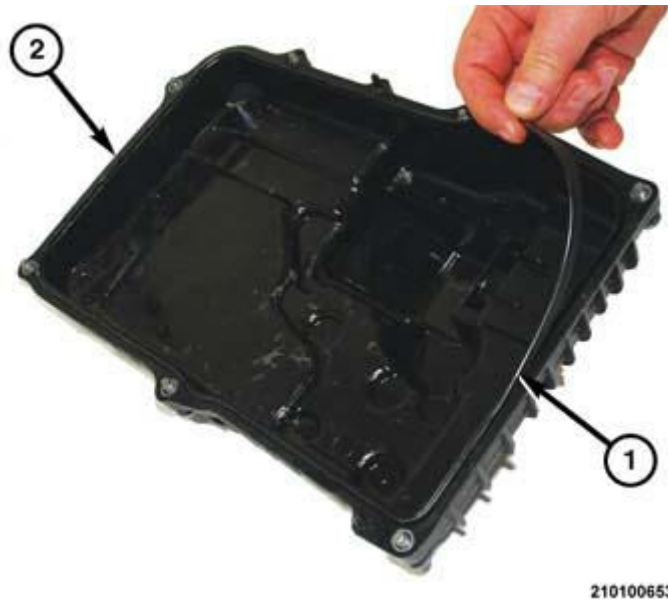


Fig. 404: Valve Body Cover Pan Gasket Seal
Courtesy of CHRYSLER GROUP, LLC

33. Install a NEW gasket seal (1) in the groove around the sealing surface of the valve body cover pan (2).

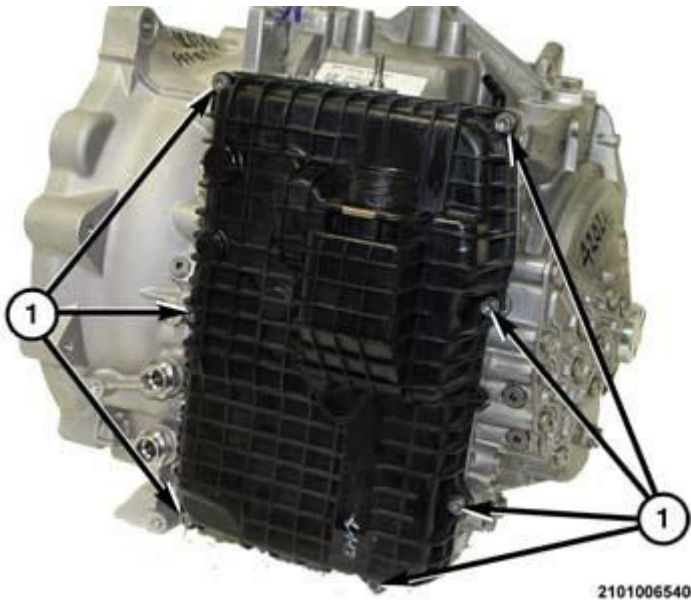


Fig. 405: Valve Body Cover Pan Bolts
Courtesy of CHRYSLER GROUP, LLC

34. Place the valve body cover pan gasket against the sealing surface of the transmission housing.
35. Install the valve body cover pan bolts (1) to hold the valve body cover pan to the transmission housing and tighten to the proper specifications. Refer to **SPECIFICATIONS**.
36. Install the torque converter.

37. Install the transmission in the vehicle. Refer to **INSTALLATION**.

CLUTCH, B

ADJUSTMENTS

B-CLUTCH MEASUREMENT

After the B-clutch is cleaned and assembled the end play must be measured to verify that the correct select reaction plate has been installed.

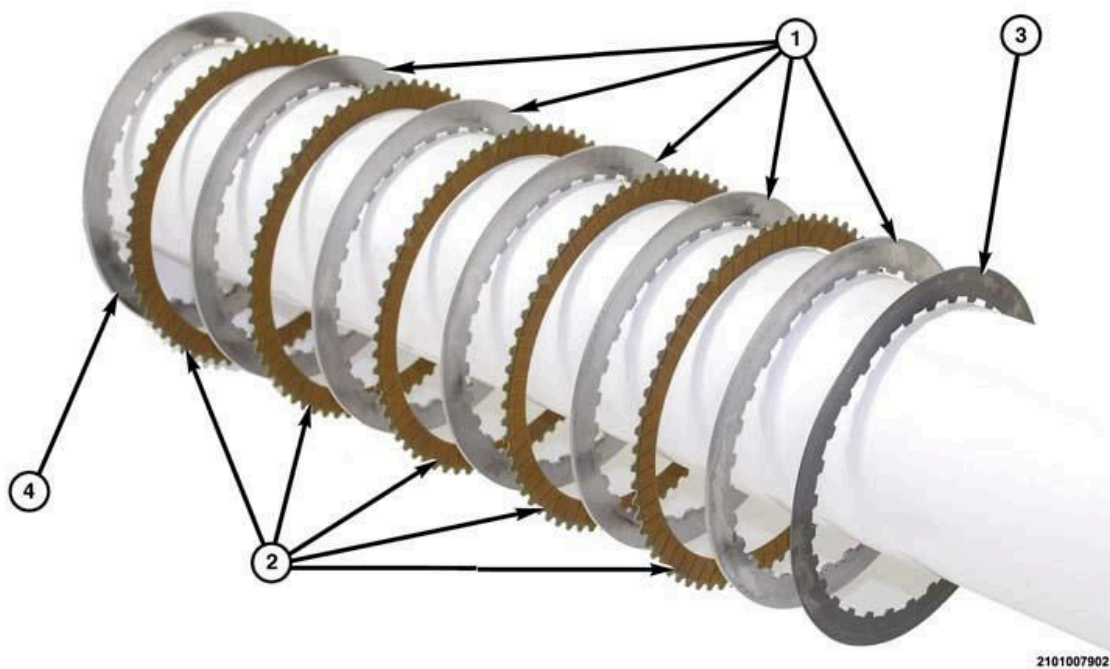


Fig. 406: Exploded View Of B-Clutch, Friction Discs & Steel Plates
Courtesy of CHRYSLER GROUP, LLC

1. Position the B-clutch on a arbor press with the reaction plate (4) facing upward.

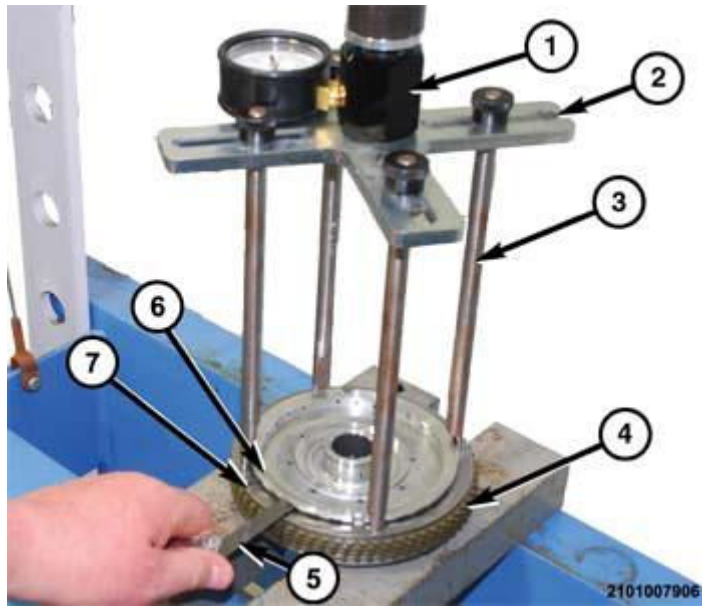


Fig. 407: Compressing B-Clutch
Courtesy of CHRYSLER GROUP, LLC

2. Using tool (special tool #10429, Gauge, Force) (special tool #8901A, Pressing Tool) (with pressure scale removed (1) and legs (special tool #10428, Adapter, Pressing Tool) (3), compress the B-clutch (4) to collapse wave plate to 68 kgf (150 lb. force) (1).
3. Using as suitable feeler gauge, measure the gap between the B-clutch hub and the reaction plate. Refer to **SPECIFICATIONS**.
4. If the measurement is not within specification, replace the reaction plate with the correct plate.

DISASSEMBLY

B-CLUTCH DISASSEMBLY

WARNING: Always wear safety glasses when cleaning, disassembling and assembling the transmission/transaxle. Contents of the transmission/transaxle can become projectiles (e.g., springs, snap-rings, as well as metal and other debris). Failure to wear safety glasses may result in severe personal injury.

NOTE: Clean the B-clutch components with suitable solvent and blow them dry with regulated 344 kPa (50 psi) shop air. Position all of the B-clutch components on a clean work surface in preparation for assembly.

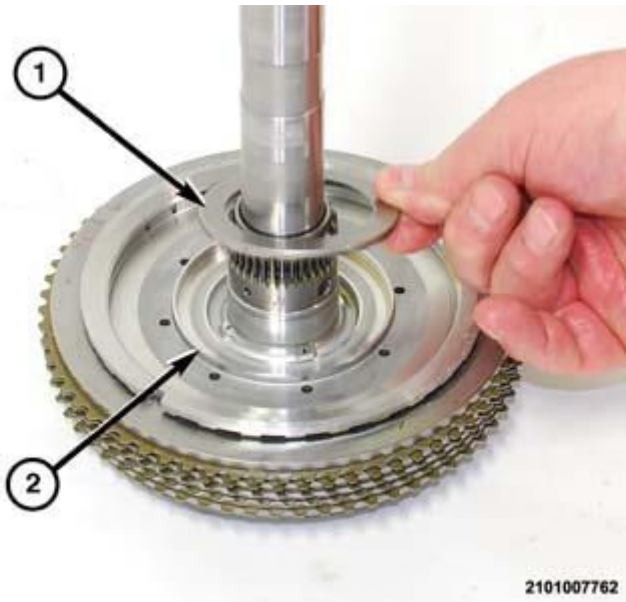


Fig. 408: Thrust Bearing & B-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

1. Remove the thrust bearing from B-clutch hub.

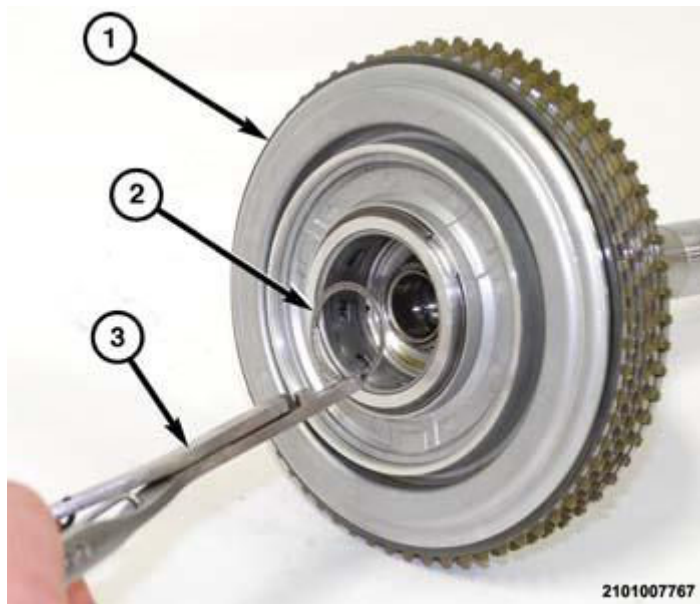


Fig. 409: Input Shaft/Dog Clutch A, B-Clutch Hub & Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

2. Remove the snap-ring holding the B-clutch hub to the input shaft Dog A-clutch.
3. Remove the input shaft from the B-clutch (1).

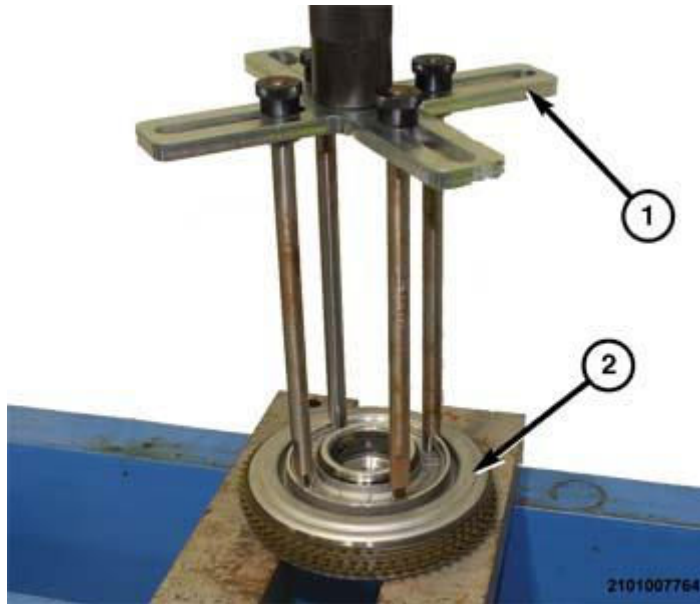


Fig. 410: Compressing B-Clutch Piston To Gain Access To Snap-Ring
 Courtesy of CHRYSLER GROUP, LLC

4. Place the B-clutch with piston up on a suitable arbor press.
5. Using tool (special tool #8901A, Pressing Tool) (with pressure scale removed (1) and legs (special tool #10428, Adapter, Pressing Tool), compress the B-clutch (2) piston to gain access to the snap-ring.

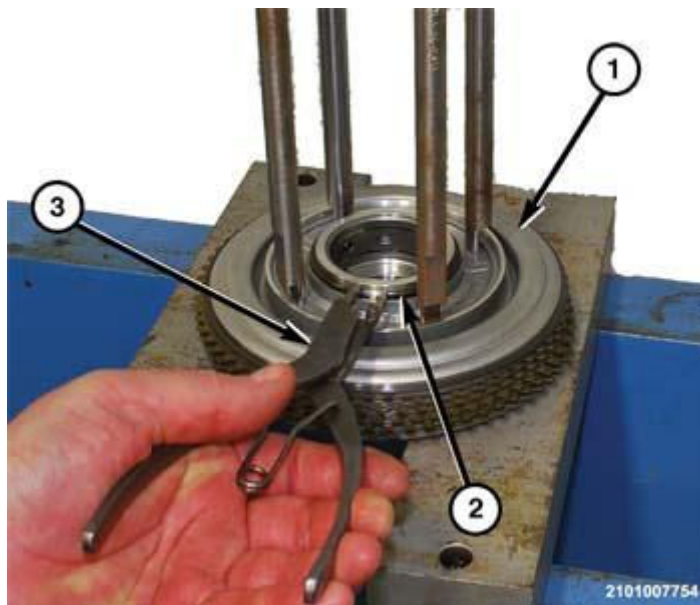


Fig. 411: Snap-Ring, B-Clutch Piston & B-Clutch Hub
 Courtesy of CHRYSLER GROUP, LLC

6. Using a suitable snap-ring pliers (3), remove the snap-ring (2) holding the B-clutch piston in the B-clutch (1) hub.
7. Remove the B-clutch from the arbor press.

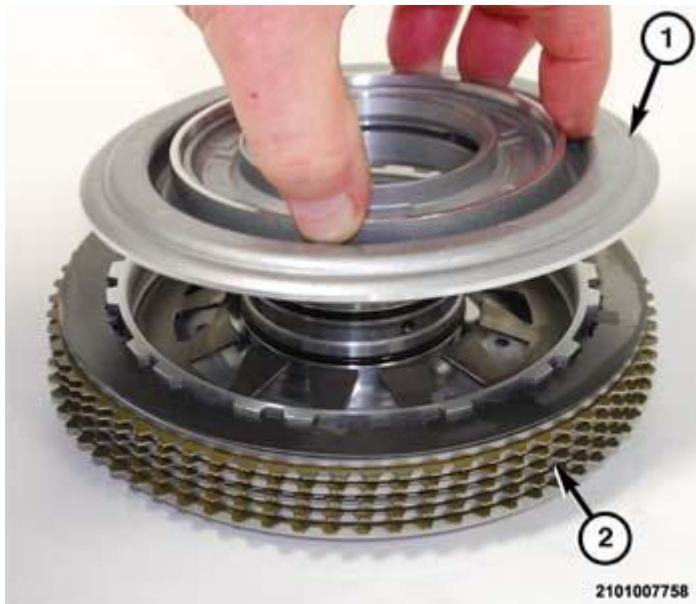


Fig. 412: B-Clutch Piston & B-Clutch
Courtesy of CHRYSLER GROUP, LLC

8. Remove the B-clutch piston (1) from the B-clutch (2).

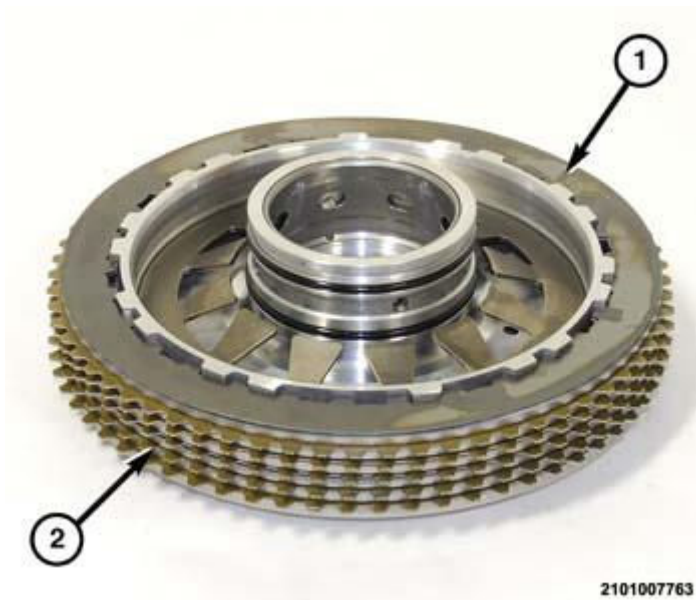


Fig. 413: B-Clutch & B-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

9. Remove the B-clutch (2) From the B-clutch hub (1).

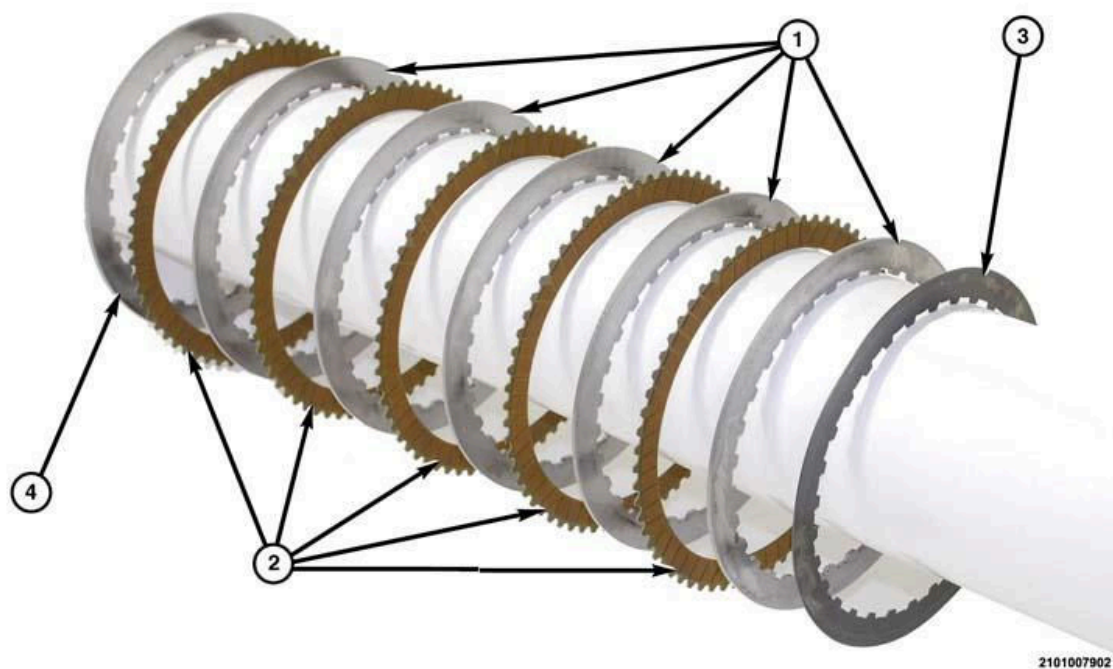


Fig. 414: Exploded View Of B-Clutch, Friction Discs & Steel Plates
Courtesy of CHRYSLER GROUP, LLC

10. Separate the friction discs (2) from the steel plates (1).

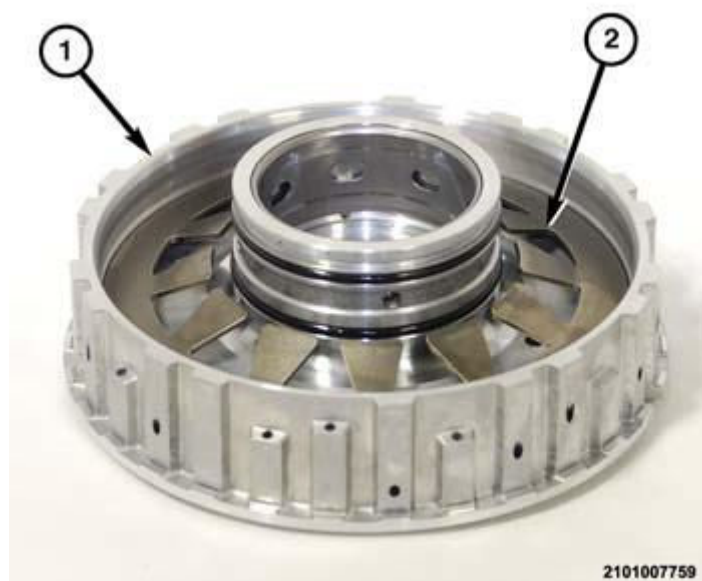


Fig. 415: Belleville Spring & B-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

11. Remove the belleville spring (2) from the B-clutch hub.

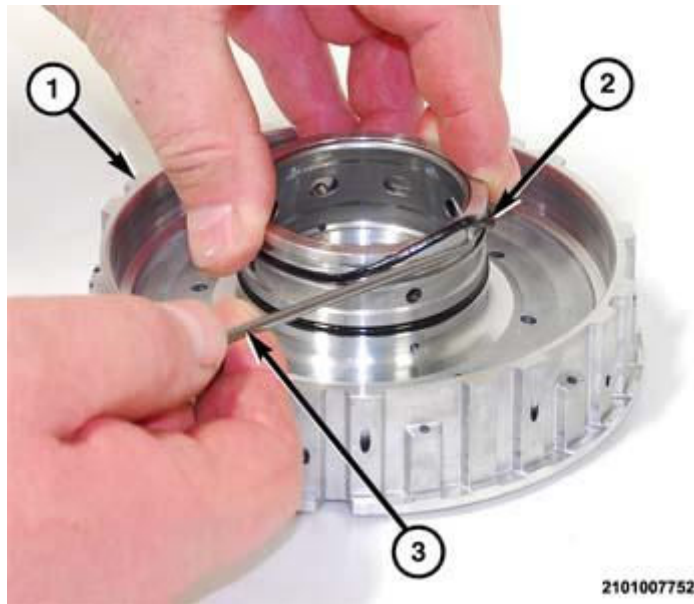


Fig. 416: Removing O-Ring Seals From B-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

12. Using a suitable hook tool (3) remove the O-ring seals (2) from the B-clutch hub (1).



Fig. 417: Remove/Install Balance Piston At B-Clutch Piston
Courtesy of CHRYSLER GROUP, LLC

13. Remove the balance piston (1) from the B-clutch piston (2).

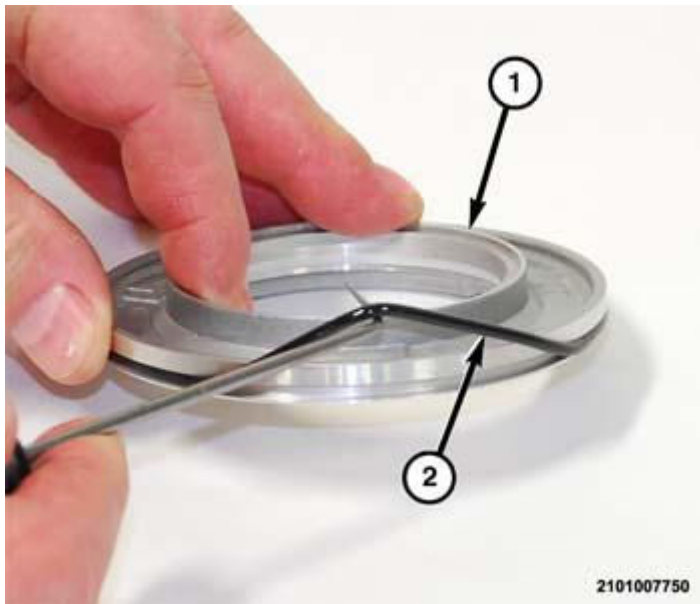


Fig. 418: Removing B-Clutch Balance Piston O-Ring
Courtesy of CHRYSLER GROUP, LLC

14. Using a suitable hook tool, remove the O-ring (2) from the balance piston (1).



Fig. 419: Removing B-Clutch Piston O-Ring
Courtesy of CHRYSLER GROUP, LLC

15. Using a suitable hook tool, remove the O-ring seal from the B-clutch piston.

ASSEMBLY

B-CLUTCH ASSEMBLY

WARNING: Always wear safety glasses when cleaning, disassembling and assembling the transmission/transaxle. Contents of the transmission/transaxle can become projectiles (e.g., springs, snap-rings, as well as metal and other debris). Failure to wear safety glasses may result in severe personal injury.

Clean the B-clutch components with suitable solvent and blow them dry with regulated 344 kPa (50 psi) shop air. Position all of the B-clutch components on a clean work surface in preparation for assembly.

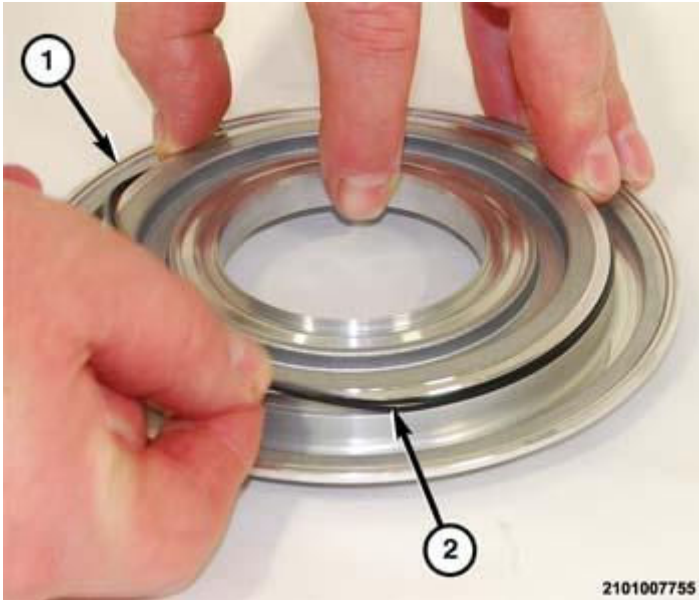


Fig. 420: Installing B-Clutch Piston O-Ring
Courtesy of CHRYSLER GROUP, LLC

1. Install the O-ring seal (2) on the B-clutch piston.

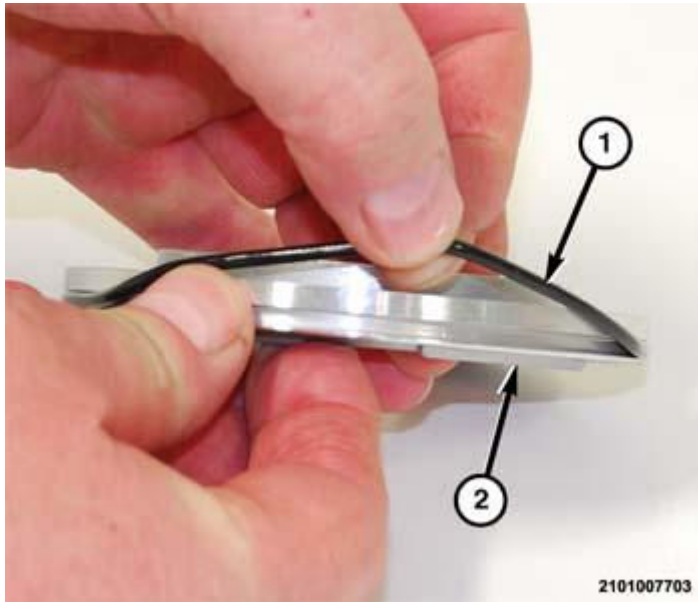


Fig. 421: Installing B-Clutch Balance Piston O-Ring
Courtesy of CHRYSLER GROUP, LLC

2. Install the O-ring seal (1) on the B-clutch balance piston (2).



Fig. 422: Remove/Install Balance Piston At B-Clutch Piston
Courtesy of CHRYSLER GROUP, LLC

3. Install the balance piston (1) in the B-clutch piston (2).

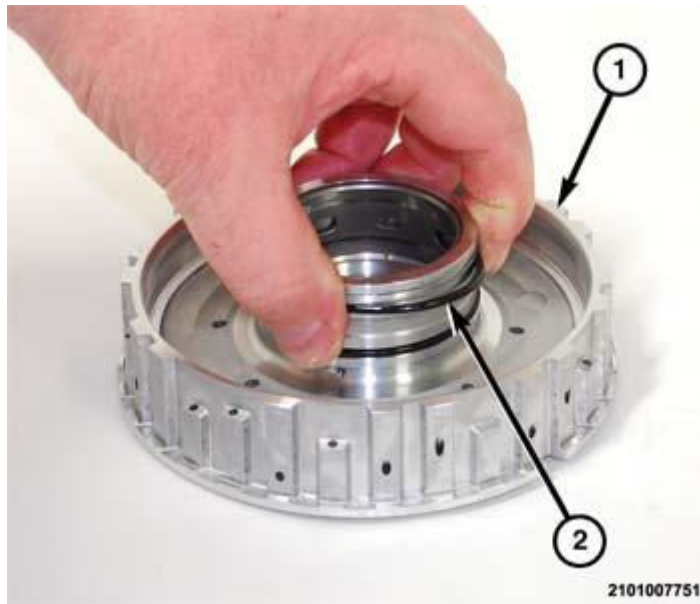


Fig. 423: B-Clutch Hub & O-Ring Seals
Courtesy of CHRYSLER GROUP, LLC

4. Install New O-ring seals (2) in the B-clutch hub (1).

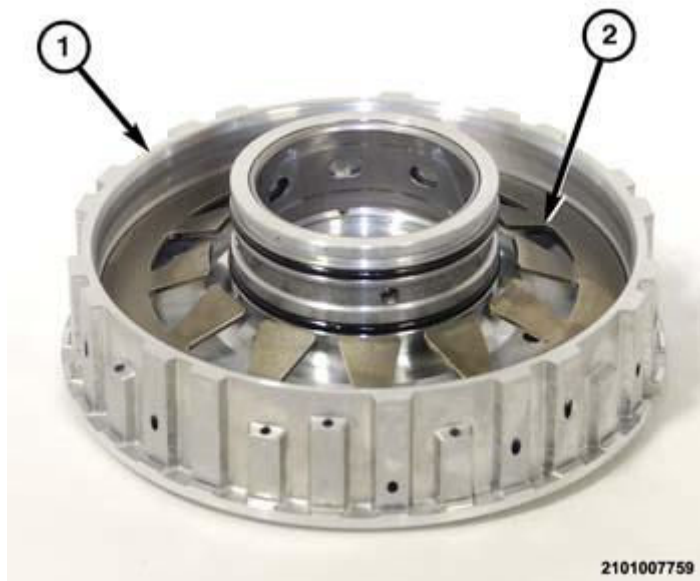


Fig. 424: Belleville Spring & B-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

5. Install the belleville spring (2) in the B-clutch hub (1).

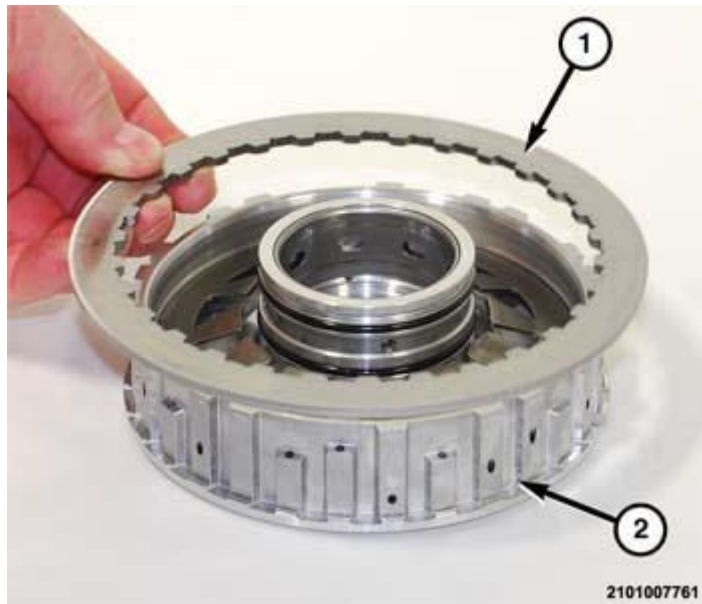


Fig. 425: Reaction Plate & B-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

6. Install the reaction plate (1) on the B-clutch hub (2).

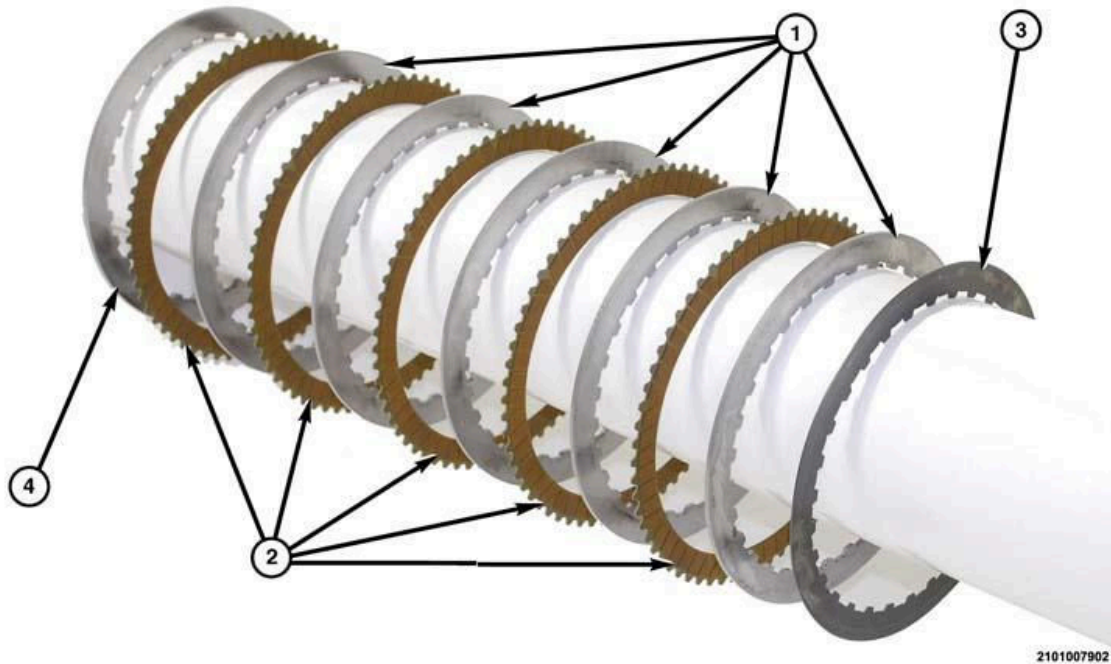


Fig. 426: Exploded View Of B-Clutch, Friction Discs & Steel Plates
Courtesy of CHRYSLER GROUP, LLC

7. In alternating sequence, Install the B-clutch friction plates (2) and steel plates (1) On the B-clutch hub.



Fig. 427: B-Clutch & B-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

8. Install the wave spring plate (1) on the B-clutch hub.

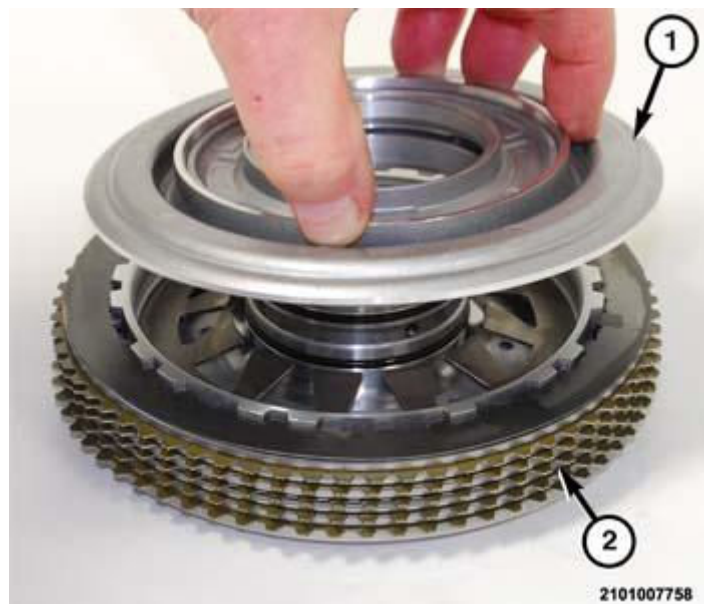


Fig. 428: B-Clutch Piston & B-Clutch
Courtesy of CHRYSLER GROUP, LLC

9. Install the piston (1) the B-clutch (2).

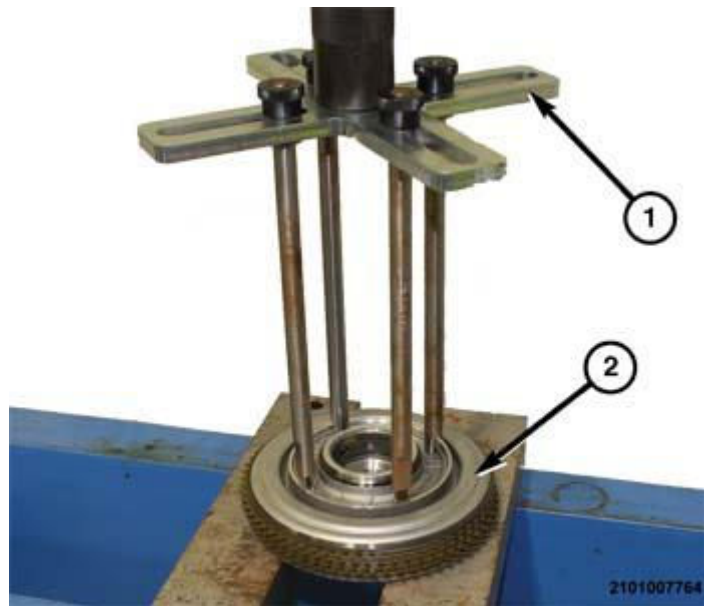


Fig. 429: Compressing B-Clutch Piston To Gain Access To Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

10. Using tool (special tool #8901A, Pressing Tool) (with pressure scale removed (1) and legs (special tool #10428, Adapter, Pressing Tool), compress the B-clutch (2) piston to gain access to the snap-ring.

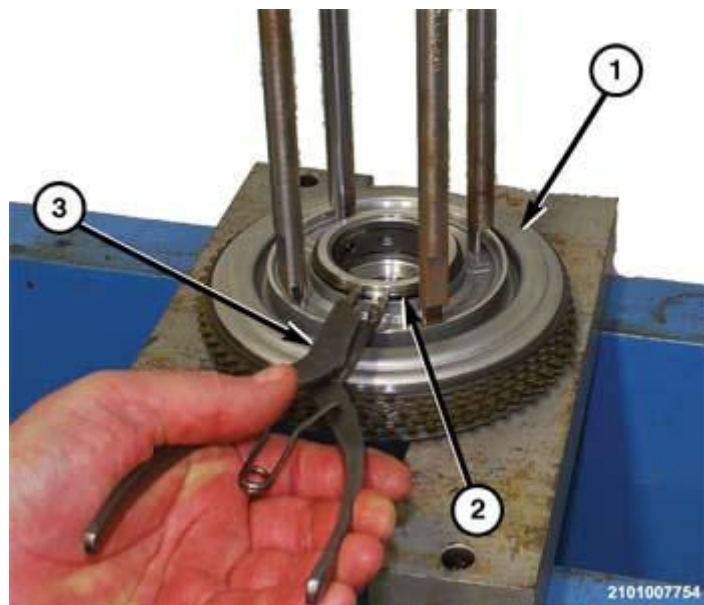


Fig. 430: Snap-Ring, B-Clutch Piston & B-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

11. Compress the B-clutch belleville spring and piston until the snap-ring groove is exposed.
12. Using a suitable snap-ring pliers (3), install the snap-ring (2) in the B-clutch (1) hub.

NOTE: Before installing the input shaft/Dog A-clutch, measure the B-clutch to determine if the proper select reaction plate was installed. Air test the dog A-clutch with shop air regulated to 344 kPa (50 psi), it fails the air test replace the input shaft.

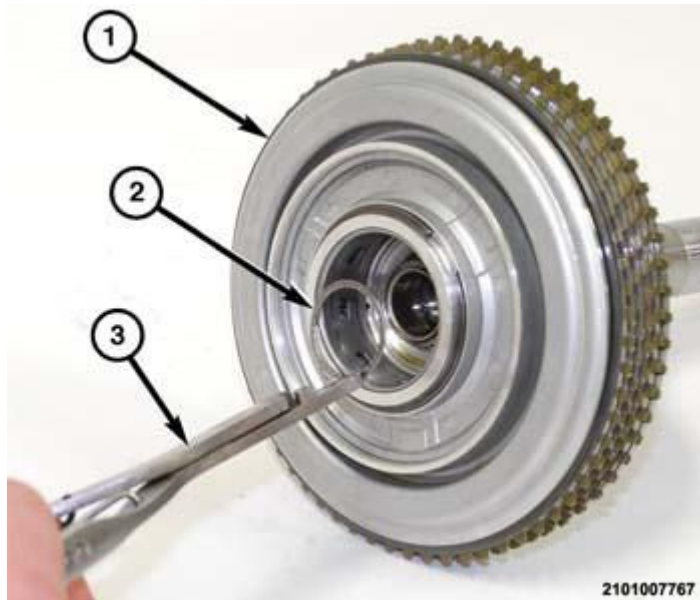


Fig. 431: Input Shaft/Dog Clutch A, B-Clutch Hub & Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

13. Insert the input shaft/dog A-clutch into the B-clutch hub.
14. Using a suitable snap-ring pliers, install the snap-ring to hold the input shaft in the B-clutch hub.

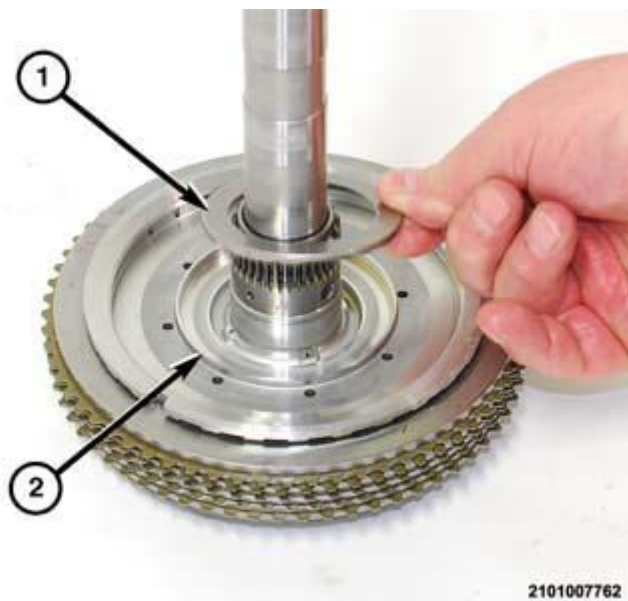


Fig. 432: Thrust Bearing & B-Clutch Hub
Courtesy of CHRYSLER GROUP, LLC

15. Install the thrust bearing on the B-clutch hub.

CLUTCH, C

ADJUSTMENTS

C-CLUTCH MEASUREMENT

After the C-clutch is cleaned and assembled the end play must be measured to verify that the correct select reaction plate (3) has been installed.

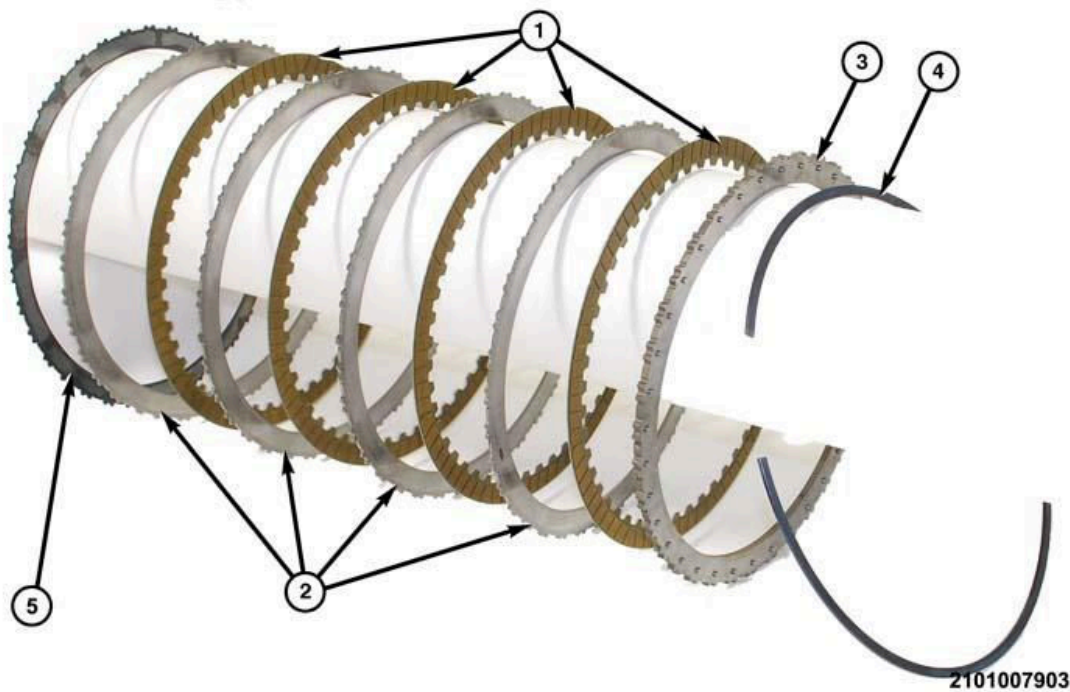


Fig. 433: Exploded View Of C-Clutch Wave Plate, Steel Plates, & Friction Discs
Courtesy of CHRYSLER GROUP, LLC

1. Position the transaxle housing on a suitable arbor press.

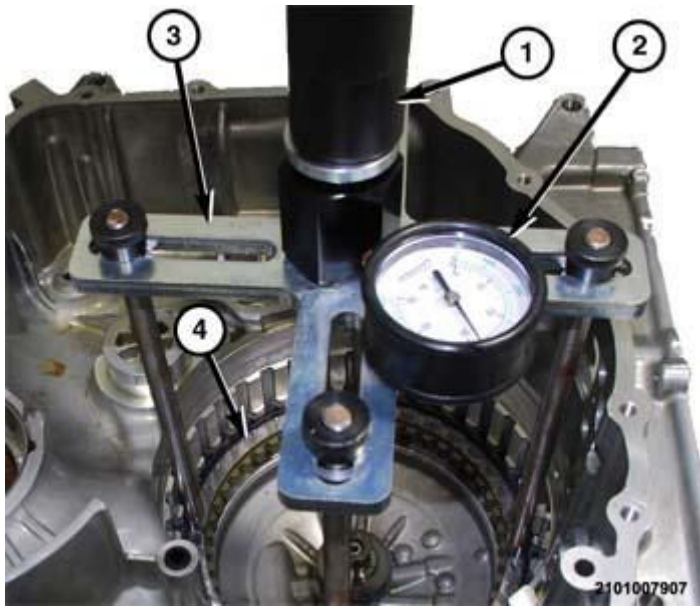


Fig. 434: Compressing C-Clutch To Collapse Wave Plate
Courtesy of CHRYSLER GROUP, LLC

2. Using tool (special tool #10429, Gauge, Force) (2), (special tool #8901A, Pressing Tool) (with pressure scale removed) (3) and legs (special tool #10428, Adapter, Pressing Tool), compress the C-clutch (4) to collapse wave plate (5, See **Fig. 433**) to 68 kgf (150 lb. force).

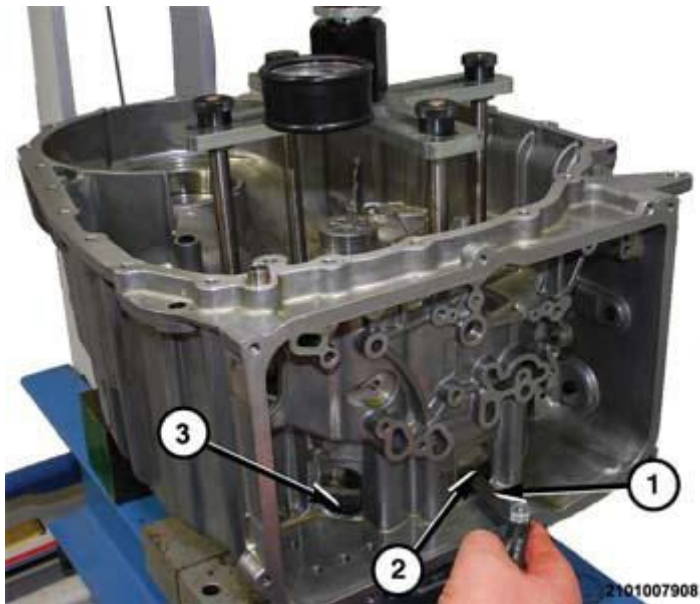


Fig. 435: Measuring Gap Between C-Clutch Snap-Ring & Reaction Plate
Courtesy of CHRYSLER GROUP, LLC

3. Using as suitable feeler gauge (1), measure the gap between the C-clutch snap-ring (2) and the reaction plate (2). Refer to **SPECIFICATIONS**.
4. If measurement does not match the specifications, replace the select reaction plate.

CLUTCH, D

ADJUSTMENTS

D-CLUTCH MEASUREMENT

After the D-clutch is cleaned and assembled the end play must be measured to verify that the correct select reaction plate has been installed.

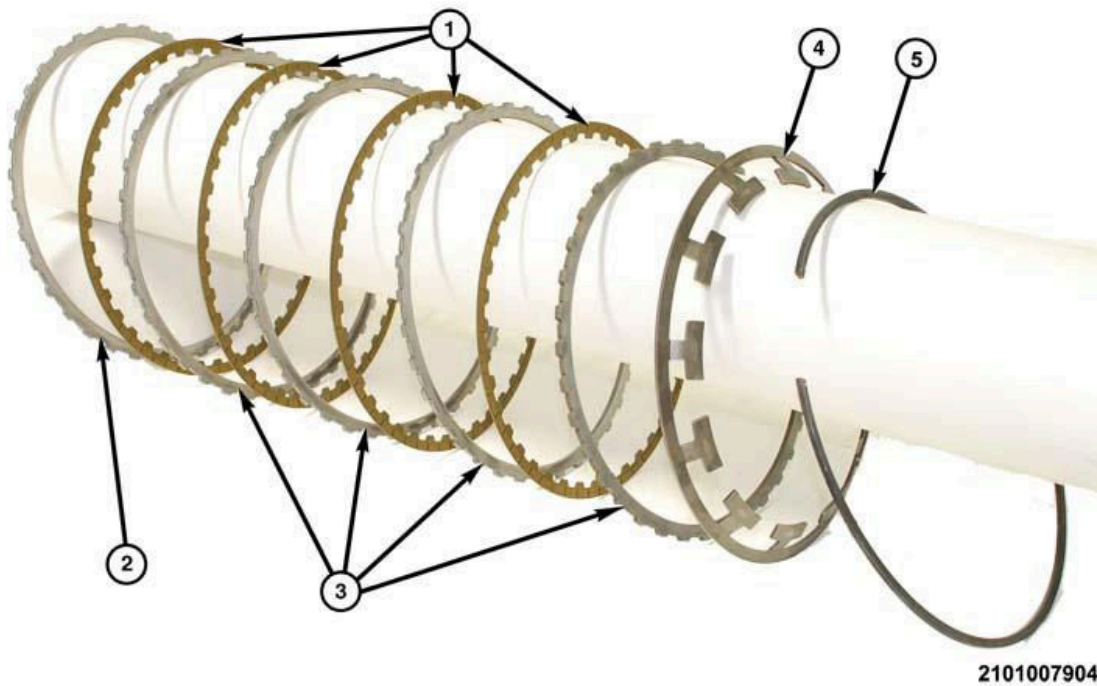


Fig. 436: Exploded View Of D-Clutch, Select Plate, Friction Plate & Steel Plates
Courtesy of CHRYSLER GROUP, LLC

1. Install the D-clutch snap-ring (5) in the groove in the transaxle housing.

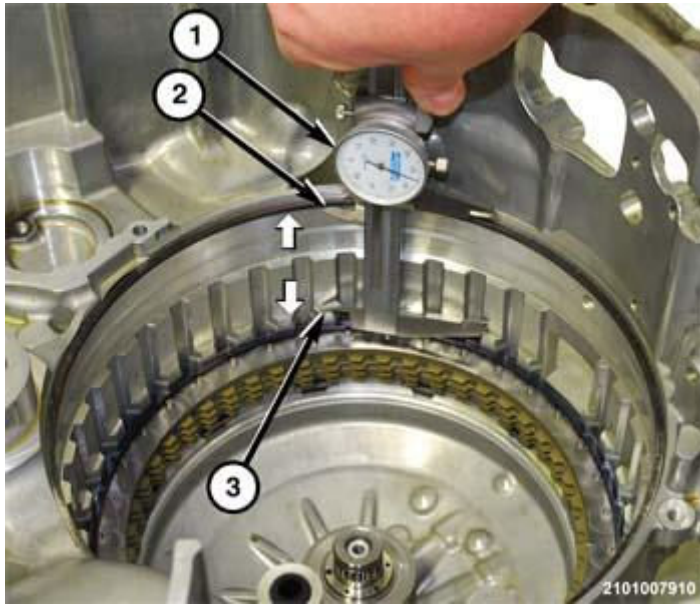


Fig. 437: Measuring Distance From The Bottom Of D-Clutch Snap-Ring To D-Clutch Shoulder
Courtesy of CHRYSLER GROUP, LLC

2. Using a suitable caliper (1), measure the distance from the bottom of the D-clutch snap-ring (2) to the D-clutch shoulder (3) in the transaxle housing. Record this number.

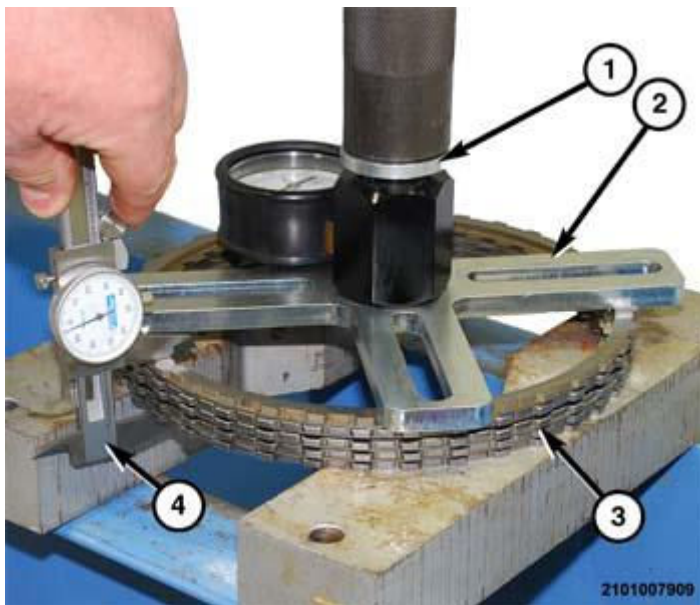


Fig. 438: Measuring Thickness Of D-Clutch
Courtesy of CHRYSLER GROUP, LLC

3. Place the D-clutch piston retainer/piston, belleville spring, and clutch stack on a suitable arbor press.
4. Using tool (special tool #10429, Gauge, Force) (1) and (special tool #8901A, Pressing Tool) (2) (with pressure scale and legs removed), compress the D-clutch (5) to 22.5 kgf (50 lb. force) (1).
5. Using a suitable caliper (1), measure the thickness from the snap-ring step in the D-clutch piston retainer

to the underside of the D-clutch reaction plate. Record this number.

6. Subtract the amount of step 5 from the amount of step 2. The difference is the amount of free-play in the D-clutch. Refer to **SPECIFICATIONS**.

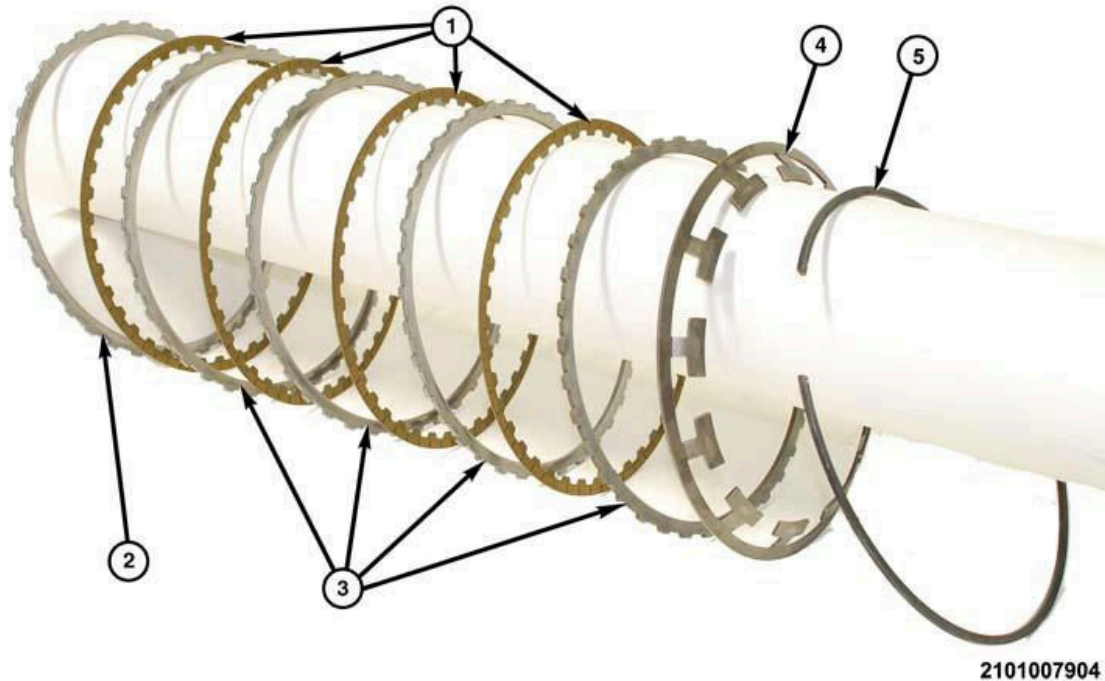


Fig. 439: Exploded View Of D-Clutch, Select Plate, Friction Plate & Steel Plates
Courtesy of CHRYSLER GROUP, LLC

7. If the remainder from step 6 does not match the specifications, replace the select reaction plate (2).

CLUTCH, E

ADJUSTMENTS

E-CLUTCH MEASUREMENT

After the E-clutch is cleaned and assembled the end play must be measured to verify that the correct select snap-ring has been installed.

1. Use a dial indicator and a magnetic base attached to the E-clutch retainer with the stylist tip resting on the reaction plate.

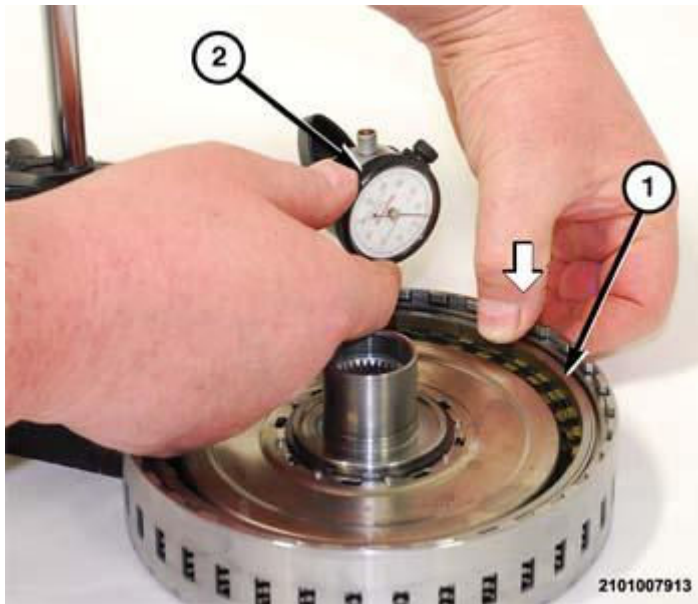


Fig. 440: Pressing Downward On Reaction Plate
Courtesy of CHRYSLER GROUP, LLC

2. Press downward on the reaction plate (1) and zero the dial indicator face (2).

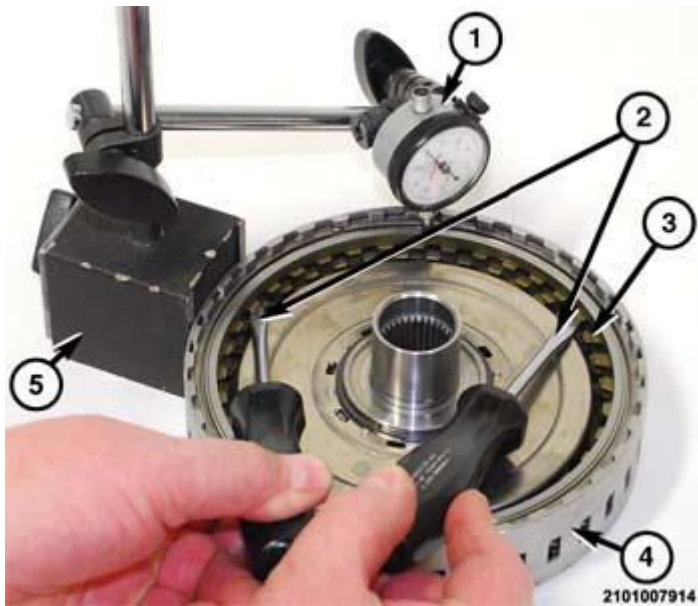


Fig. 441: Prying Center Friction Discs Upward
Courtesy of CHRYSLER GROUP, LLC

3. Using two suitable screw drivers (2), pry the center friction discs (3) upward while reading the dial indicator (1).

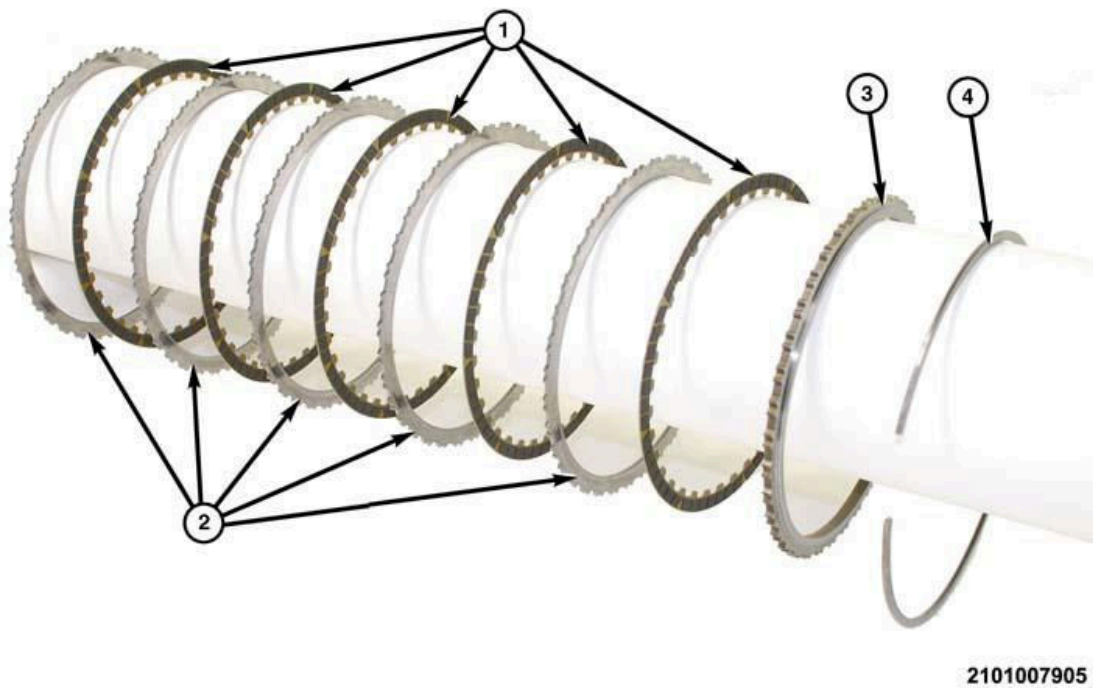


Fig. 442: Exploded View Of E-Clutch Components
Courtesy of CHRYSLER GROUP, LLC

4. The reading should be within specification. Refer to **SPECIFICATIONS**. If not, install the correct select snap-ring (4).

DISASSEMBLY

E-CLUTCH DISASSEMBLY

WARNING: Always wear safety glasses when cleaning, disassembling and assembling the transmission/transaxle. Contents of the transmission/transaxle can become projectiles (e.g., springs, snap-rings, as well as metal and other debris). Failure to wear safety glasses may result in severe personal injury.

NOTE: Clean the E-clutch components with suitable solvent and blow them dry with regulated 344 kPa (50 psi) shop air. If the E-clutch failed an air test and air is bypassing the piston seals, the piston will require replacement. The seals are integral to the piston.

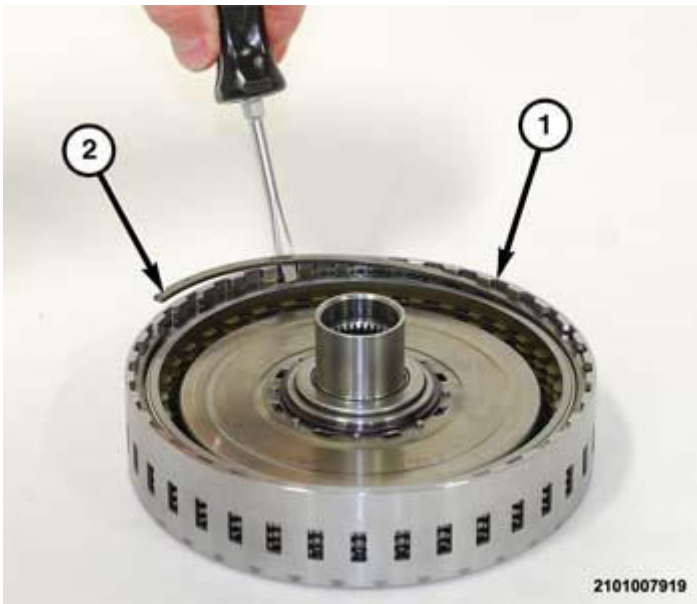


Fig. 443: Removing Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

1. Using a suitable screw driver, remove the snap-ring (2) holding the E-clutch thrust place in the E-clutch retainer (1).

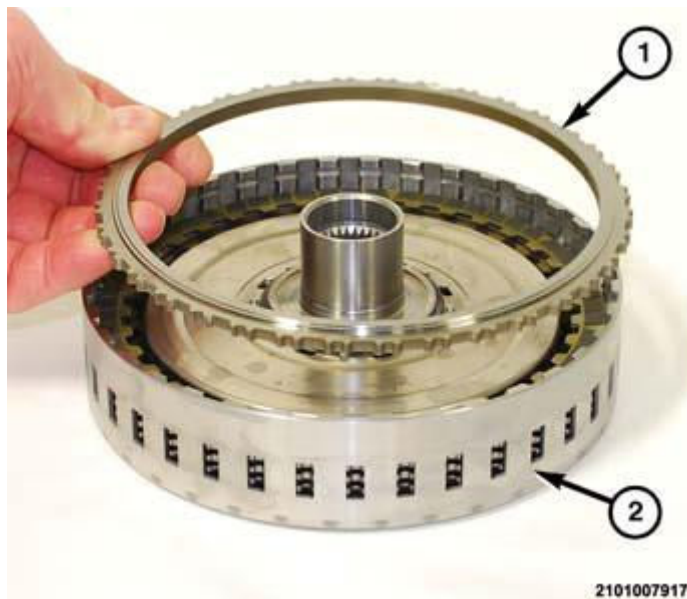


Fig. 444: Thrust Plate & E-Clutch Retainer
Courtesy of CHRYSLER GROUP, LLC

2. Remove the thrust plate (1) from the E-clutch retainer (2).

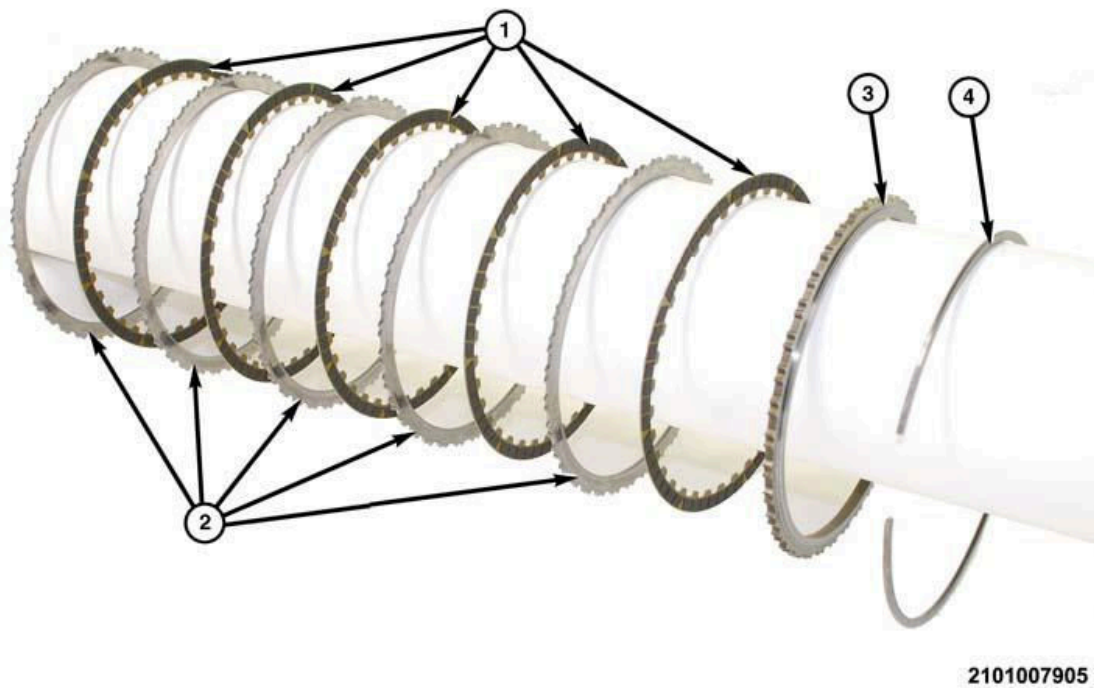


Fig. 445: Exploded View Of E-Clutch Components
Courtesy of CHRYSLER GROUP, LLC

3. Remove the E-clutch friction plates (1) and steel plates (2) from the E-clutch retainer.

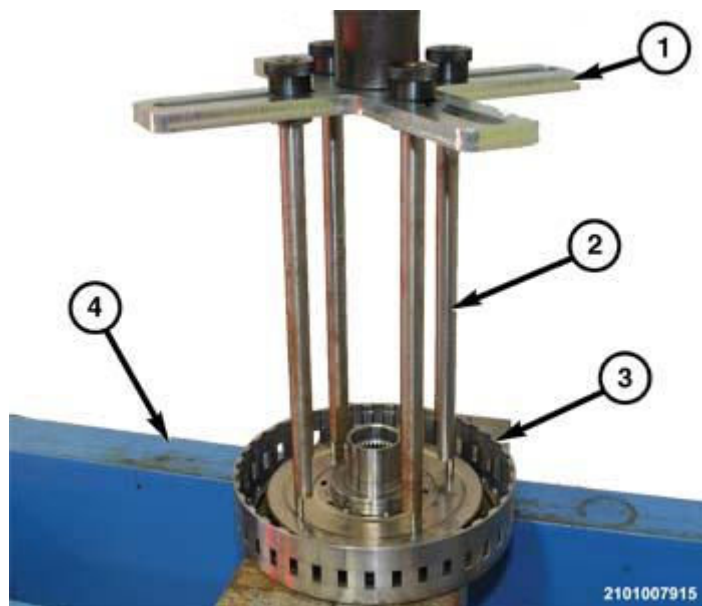


Fig. 446: E-Clutch Retainer & Arbor Press
Courtesy of CHRYSLER GROUP, LLC

4. Place the E-clutch retainer (3) on a suitable arbor press (4).
5. Using tool (special tool #8901A, Pressing Tool) (with pressure scale removed (1) and legs (special tool

#10428, Adapter, Pressing Tool) (2), compress the E-clutch spring retainer to gain access to the snap-ring.

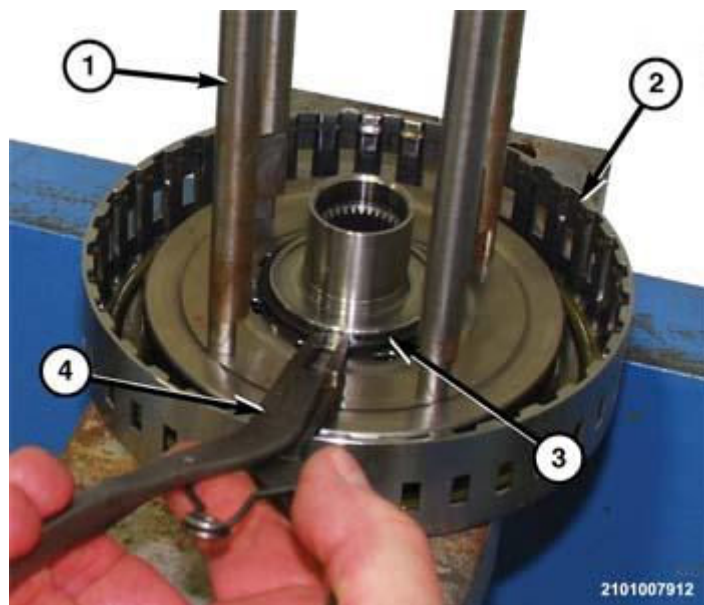


Fig. 447: Removing Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

6. Using a suitable snap-ring pliers (4), remove the snap-ring (3) holding the spring retainer to the E-clutch (2).
7. Remove the tools 8904 and 10428 (1) from the arbor press.

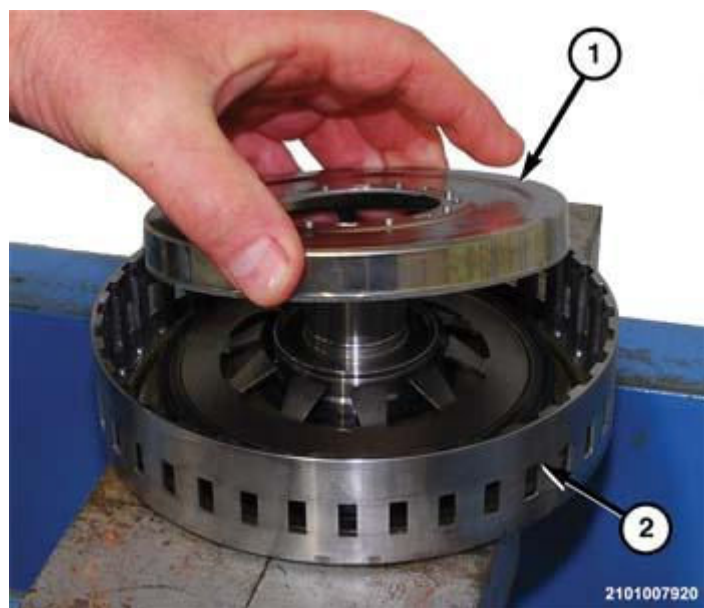


Fig. 448: Belleville Spring Retainer & E-Clutch
Courtesy of CHRYSLER GROUP, LLC

8. Remove the belleville spring retainer (1) from the E-clutch (2).

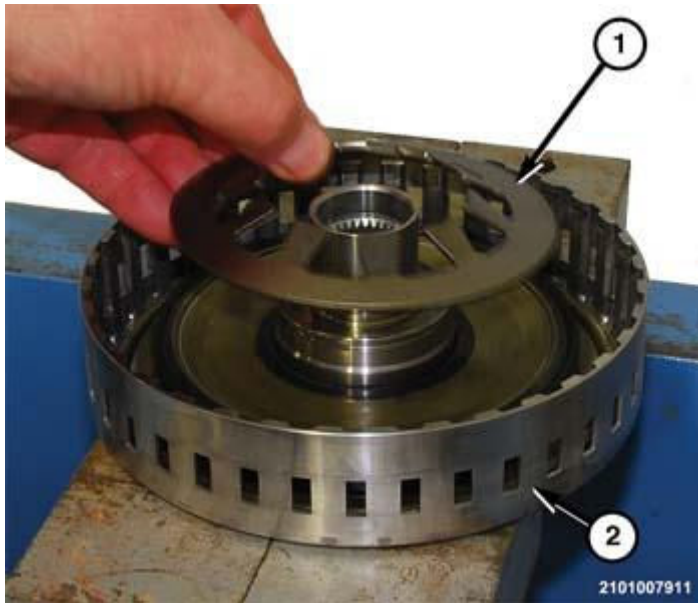


Fig. 449: Belleville Spring & E-Clutch
Courtesy of CHRYSLER GROUP, LLC

9. Remove the belleville spring (1) from the E-clutch (1).



Fig. 450: E-Clutch Retainer & Piston
Courtesy of CHRYSLER GROUP, LLC

10. Remove the piston (1) from the E-clutch retainer (2).

ASSEMBLY

E-CLUTCH ASSEMBLY

WARNING: Always wear safety glasses when cleaning, disassembling and assembling the transmission/transaxle. Contents of the transmission/transaxle can become projectiles (e.g., springs, snap-rings, as well as metal and other debris). Failure to wear safety glasses may result in severe personal injury.

NOTE: Clean the E-clutch components with suitable solvent and blow them dry with regulated 344 kPa (50 psi) shop air. Position all of the E-clutch components on a clean work surface in preparation for assembly. If the seals are damaged in any way clutch piston, retainer and belleville spring retainer will require replacement.

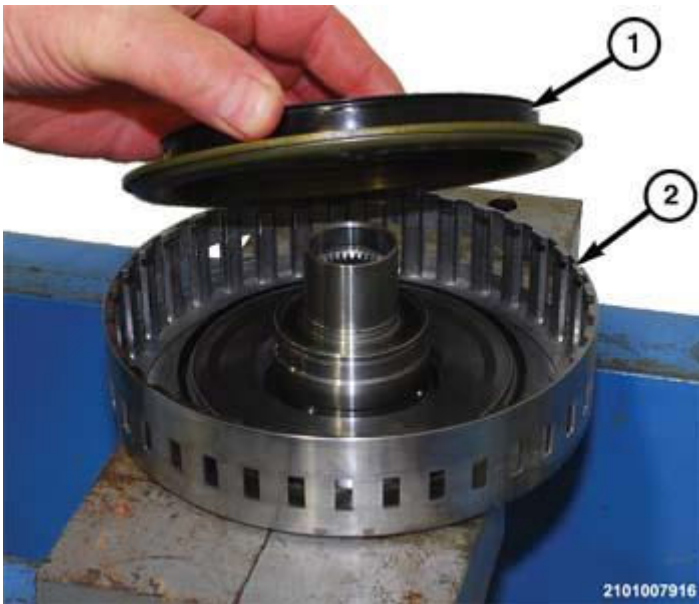


Fig. 451: E-Clutch Retainer & Piston
Courtesy of CHRYSLER GROUP, LLC

1. Install the piston (1) into the E-clutch retainer (2).

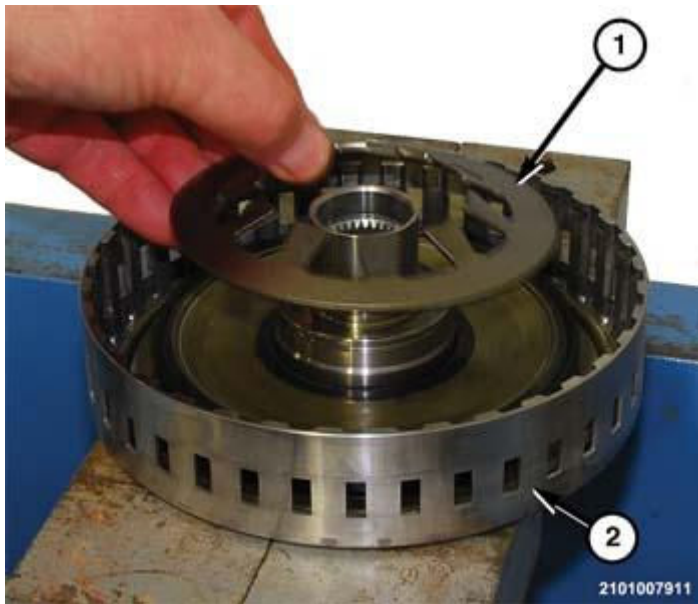


Fig. 452: Belleville Spring & E-Clutch
Courtesy of CHRYSLER GROUP, LLC

2. Install the belleville spring (1) into the E-clutch (1).

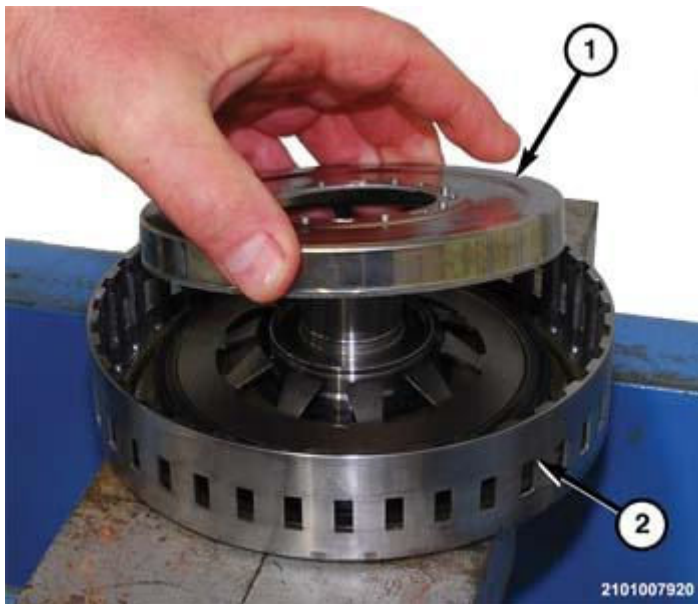


Fig. 453: Belleville Spring Retainer & E-Clutch
Courtesy of CHRYSLER GROUP, LLC

3. Install the belleville spring retainer (1) from the E-clutch (2).

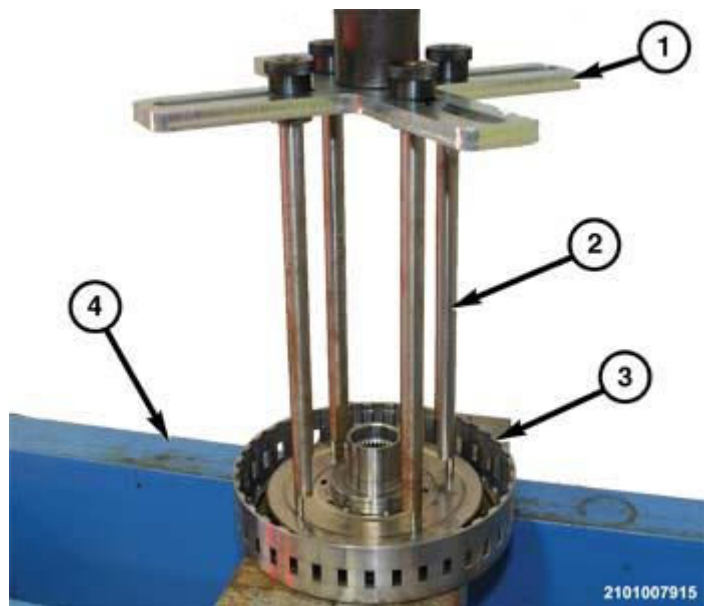


Fig. 454: E-Clutch Retainer & Arbor Press
Courtesy of CHRYSLER GROUP, LLC

4. Using tool (special tool #8901A, Pressing Tool) (with pressure scale removed (1) and legs (special tool #10428, Adapter, Pressing Tool) (2), compress the E-clutch spring retainer to until snap-ring groove is exposed.

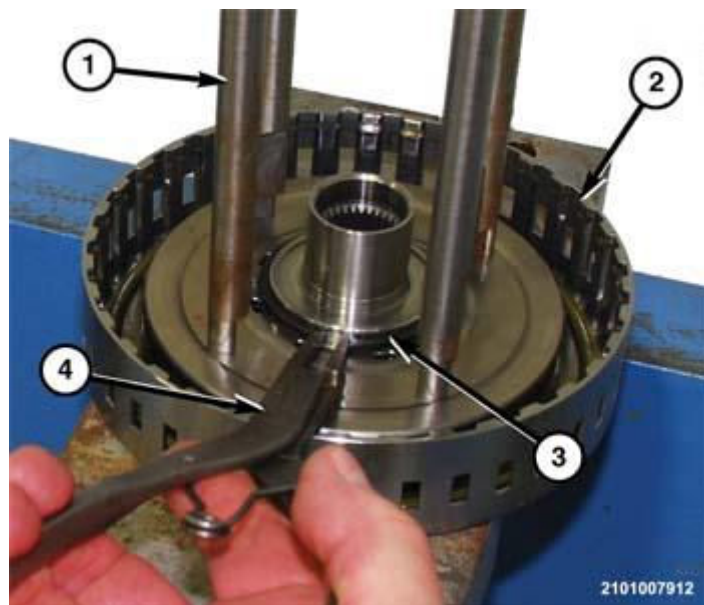


Fig. 455: Removing Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

5. Using a suitable snap-ring pliers (4), remove the snap-ring (3) holding the spring retainer to the E-clutch (2).
6. Remove the tools 8904 and 10428 (1) from the arbor press.

7. Place the E-clutch retainer on a suitable clean work surface.

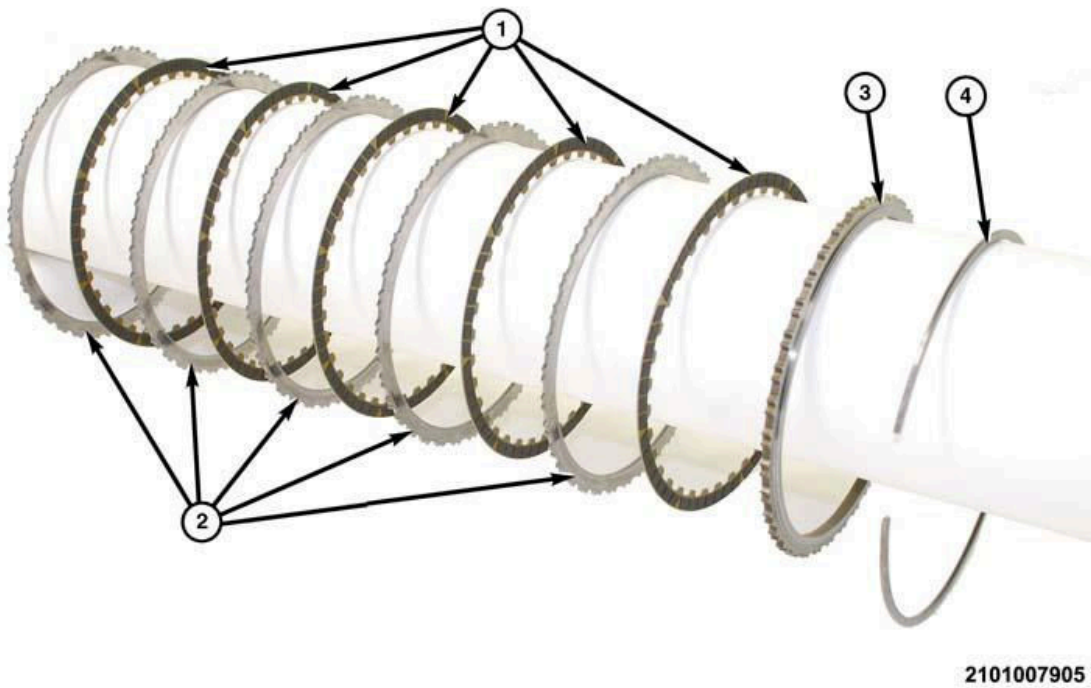


Fig. 456: Exploded View Of E-Clutch Components
Courtesy of CHRYSLER GROUP, LLC

8. In alternating sequence, Install the E-clutch friction plates (1) and steel plates (2) into the E-clutch retainer.

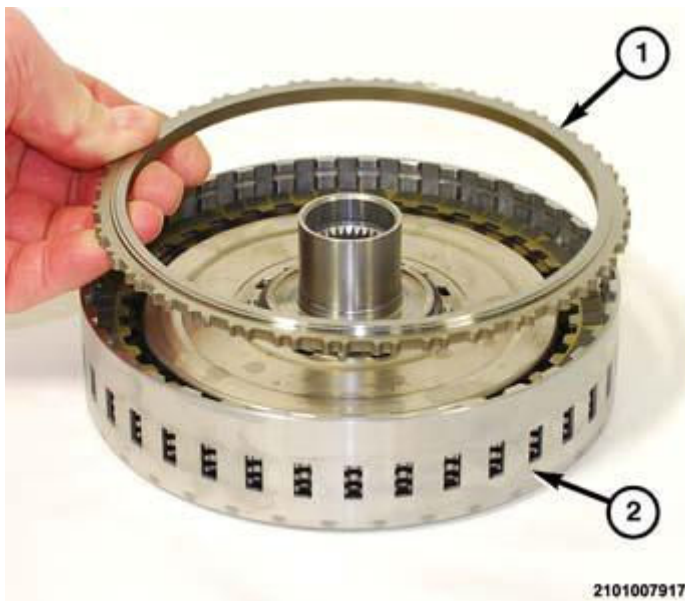


Fig. 457: Thrust Plate & E-Clutch Retainer
Courtesy of CHRYSLER GROUP, LLC

9. With stepped side up, install the thrust plate (1) into the E-clutch retainer (2).

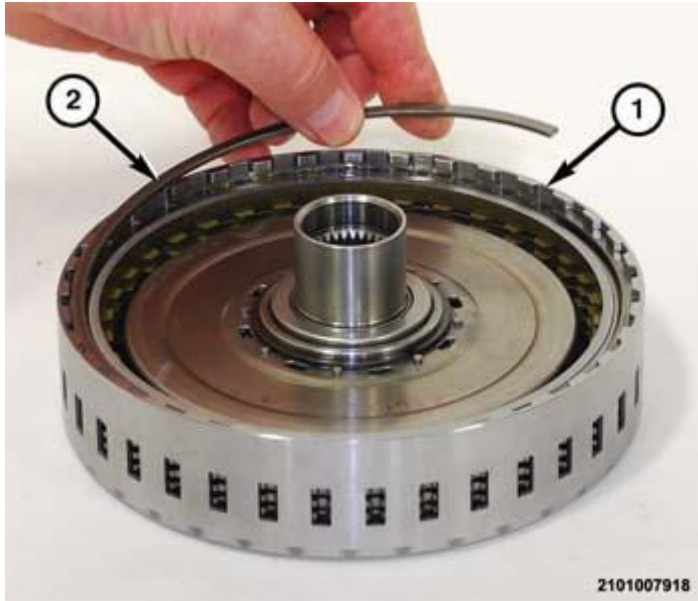


Fig. 458: Installing Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

10. Install the snap-ring (2) to hold the E-clutch thrust place in the E-clutch retainer (1).

CLUTCH, F DOG

DISASSEMBLY

DOG F-CLUTCH DISASSEMBLY

The Dog F-clutch is located in the output gear support.

1. Clamp the output gear support assembly in a suitable bench vise.

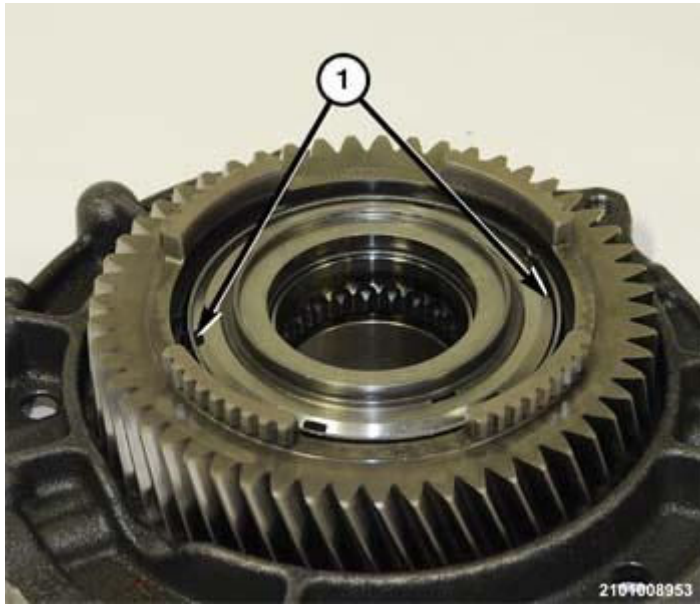


Fig. 459: Locking Plate
Courtesy of CHRYSLER GROUP, LLC

2. Using a suitable screw driver, pry the staking in the locking plate outward to allow to stake nut to rotate.

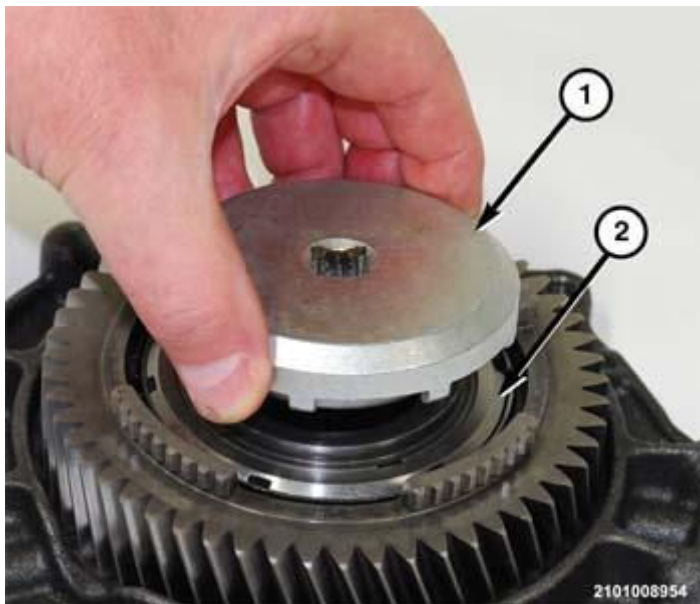


Fig. 460: Removing/Installing Stake Nut
Courtesy of CHRYSLER GROUP, LLC

3. Using tool (special tool #2012900210, Wrench, Spanner), remove the stake nut holding the output gear and bearing to the output gear support hub.

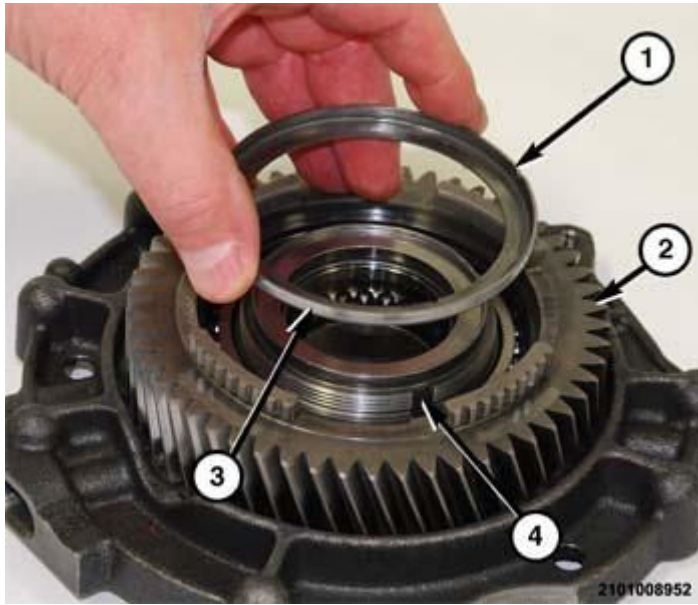


Fig. 461: Removing/Installing Lock Plate
Courtesy of CHRYSLER GROUP, LLC

4. Remove the lock plate from the output gear support.

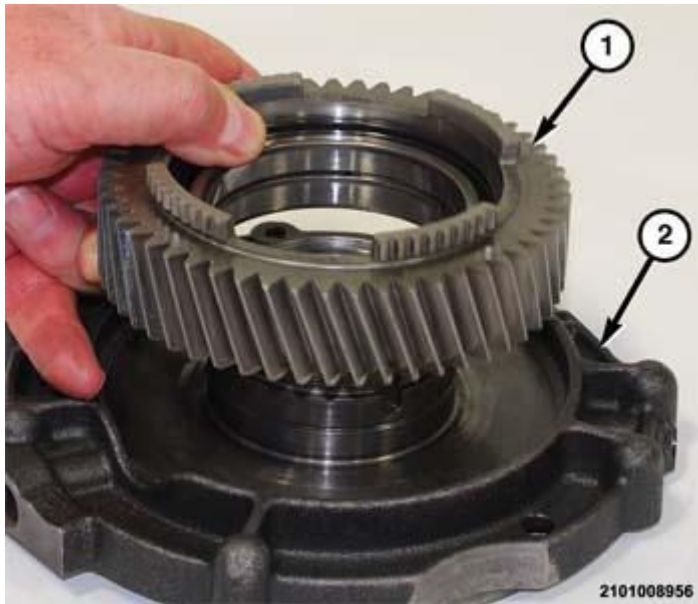


Fig. 462: Removing/Installing Output Gear
Courtesy of CHRYSLER GROUP, LLC

5. Remove the output gear from the output gear support.

NOTE: The double roller bearing in the output gear cannot be removed. If the bearing is damaged, replace the output gear as well.



Fig. 463: Removing Dog F-Clutch Thrust Plate
Courtesy of CHRYSLER GROUP, LLC

6. Using tool (special tool #C-637, Slide Hammer, Universal) (1) and (special tool #7794-A, Remover, Seal) (1), remove the dog F-clutch thrust plate (3) from the output gear support hub.

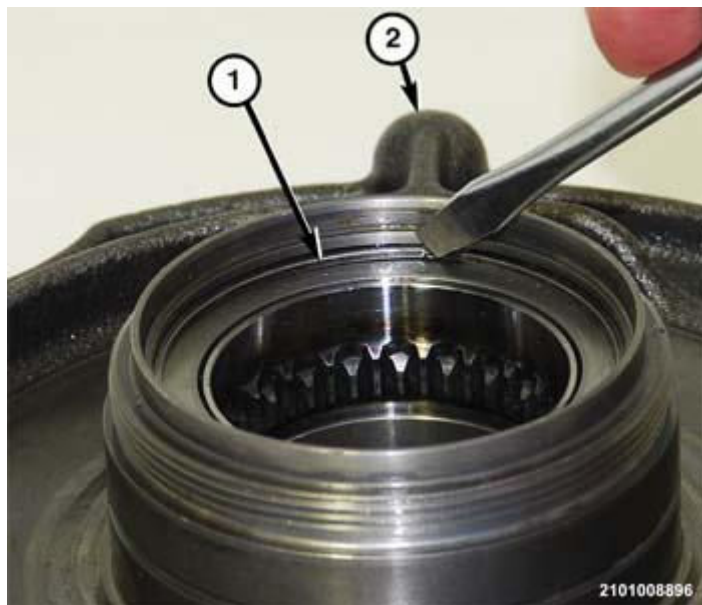


Fig. 464: Removing Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

7. Using a suitable screw driver, remove the snap-ring holding the dog F-clutch plug and piston in the output gear support hub.

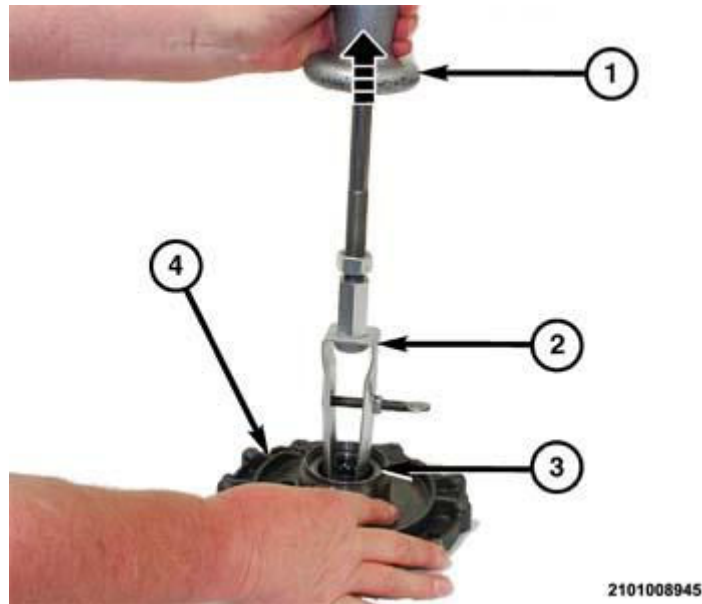


Fig. 465: Removing Dog F-Clutch From Output Gear Support Hub
Courtesy of CHRYSLER GROUP, LLC

8. Using tool (special tool #C-637, Slide Hammer, Universal) (1) and (special tool #7794-A, Remover, Seal) (2), remove the dog F-clutch (3) from the output gear support hub (4).
9. Remove the dog F-clutch plug from the dog F-clutch piston.

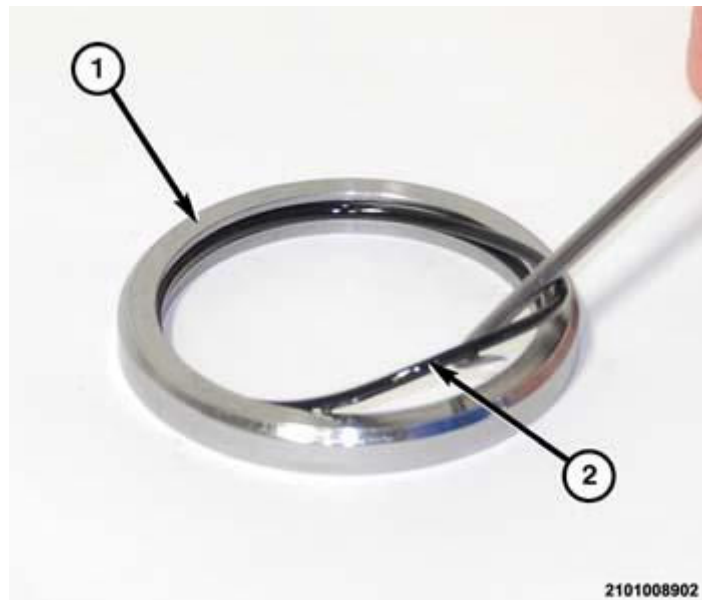


Fig. 466: Dog F-Clutch Plug & Inside O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

10. Remove the O-ring seal from the inside of the dog F-clutch plug.

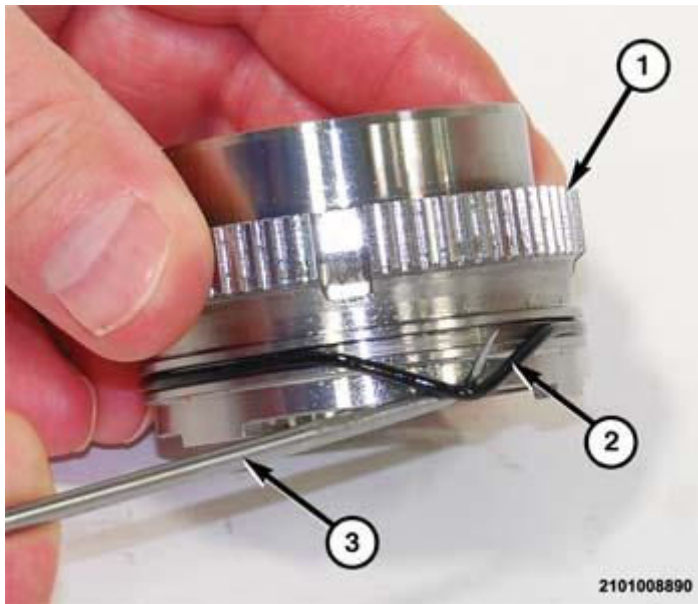


Fig. 467: Dog F-Clutch Piston & Inside O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

11. Remove the outer O-ring seal from the dog F-clutch piston.



Fig. 468: Dog F-Clutch Piston & Inner O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

12. Remove the inner O-ring seal from the dog F-clutch piston.

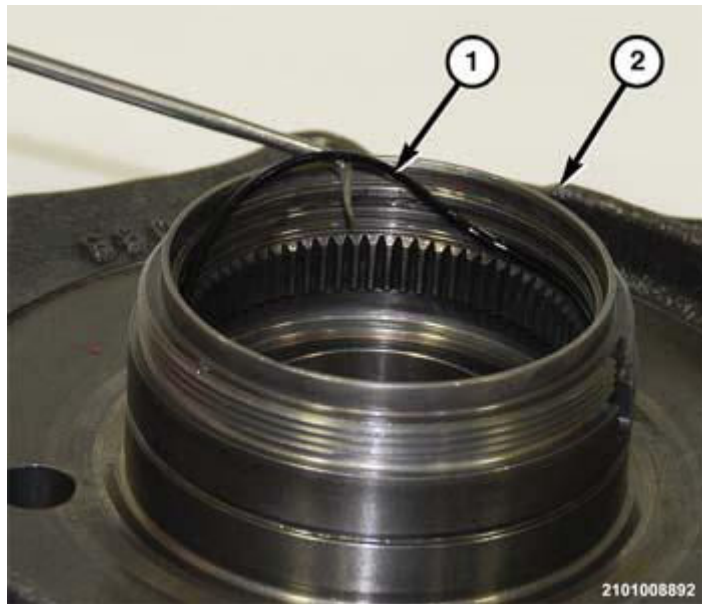


Fig. 469: Output Gear Support Hub & Upper O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

13. Remove the upper O-ring seal from the land inside the output gear support hub.

ASSEMBLY

DOG F-CLUTCH ASSEMBLY

Clean the dog F-clutch components with solvent and blow them dry with regulated 344 kPa (50 psi) shop air. Inspect the dog F-clutch components for damage or excessive wear. If dog F-clutch components are damaged the entire output gear support assembly will require replacement. Only the O-ring seals can be replaced. Apply assembly lubricant to the O-ring seals to aid installation.



Fig. 470: Installing A New Upper O-Ring Seal To Inside Land Of Output Gear Support Hub
Courtesy of CHRYSLER GROUP, LLC

1. Install a new upper O-ring seal (1) into the land inside the output gear support (2) hub.



Fig. 471: Installing New Inner O-Ring Seal Into The Dog F-Clutch Piston
Courtesy of CHRYSLER GROUP, LLC

2. Install a new inner O-ring seal (2) into the dog F-clutch piston (1).



Fig. 472: Installing New Outer O-Ring Seal Into The Dog F-Clutch Piston
Courtesy of CHRYSLER GROUP, LLC

3. Install a new outer O-ring seal (2) into the dog F-clutch piston (1).

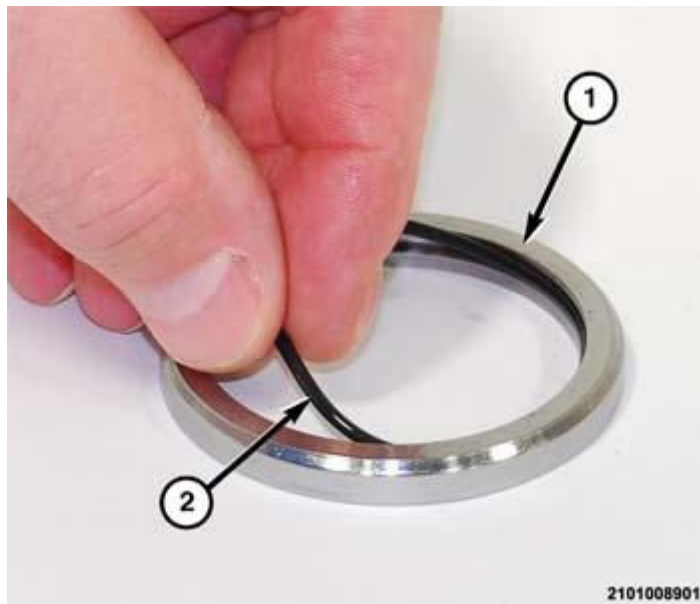


Fig. 473: Installing New O-Ring Seal Into The Inside Of Dog F-Clutch Plug
Courtesy of CHRYSLER GROUP, LLC

4. Install a new O-ring seal (2) into the inside of the dog F-clutch plug (1).

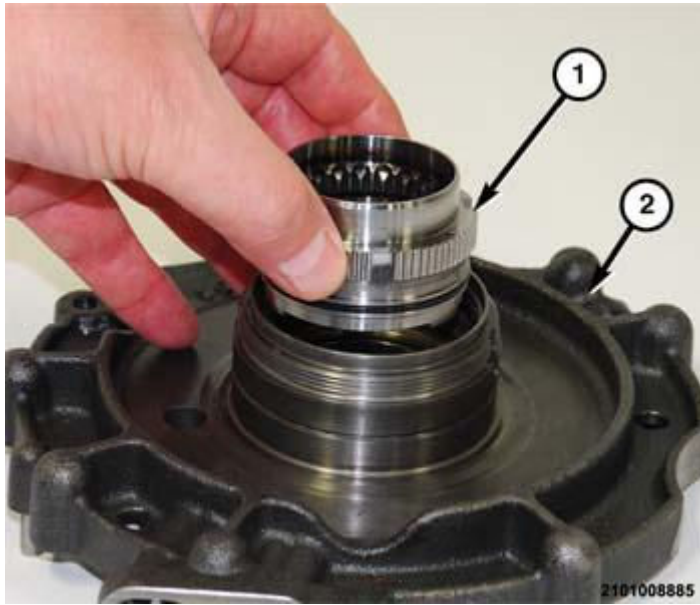


Fig. 474: Installing Dog F-Clutch Piston Into The Output Gear Support Hub
Courtesy of CHRYSLER GROUP, LLC

5. Install the dog F-clutch piston (1) into the output gear support hub (2).

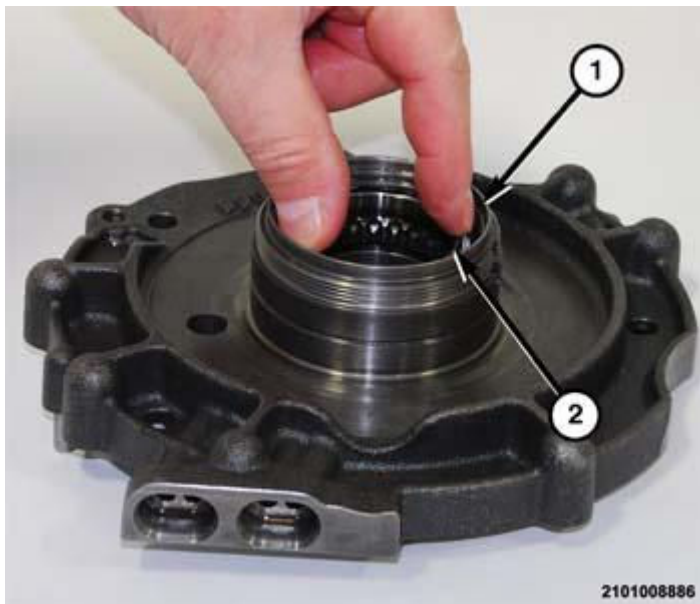


Fig. 475: Pushing Dog F-Clutch Piston To Bottom Of Bore In The Output Gear Support Hub
Courtesy of CHRYSLER GROUP, LLC

6. Push the dog F-clutch piston (2) to the bottom of the bore in the output gear support hub (1).

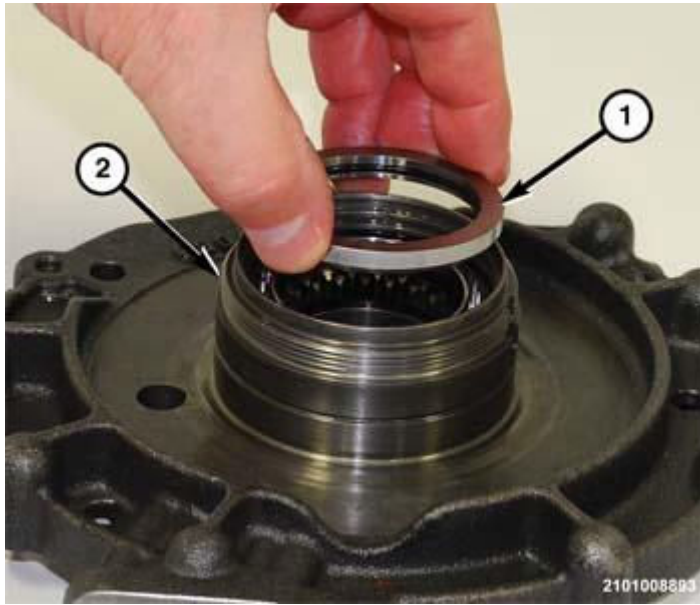


Fig. 476: Installing Dog F-Clutch Plug
Courtesy of CHRYSLER GROUP, LLC

7. Install the dog F-clutch plug (1) onto the dog F-clutch piston in the output gear support hub (2).

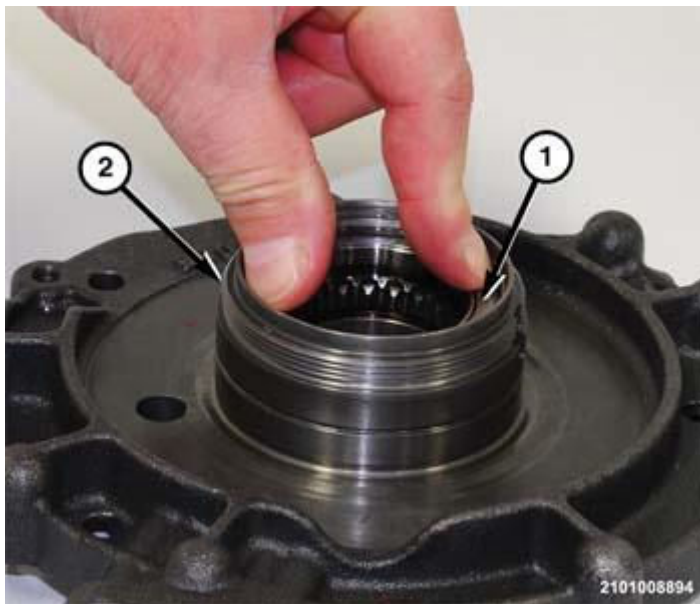


Fig. 477: Pushing Dog F-Clutch Plug To Bottom Of Bore
Courtesy of CHRYSLER GROUP, LLC

8. Push the dog F-clutch plug (1) to the bottom of the bore in the output gear support hub (2).

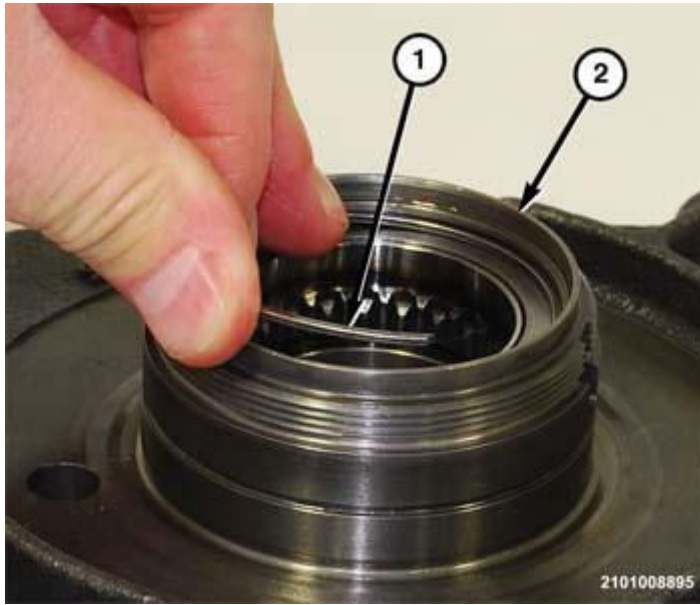


Fig. 478: Installing Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

9. Install the snap-ring (1) to hold the dog F-clutch plug and piston in the output gear support hub (2).

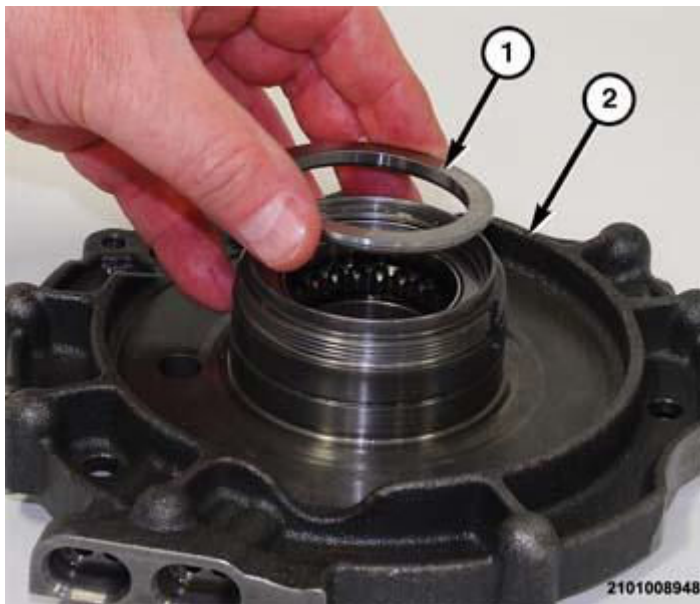


Fig. 479: Placing Dog F-Clutch Thrust Plate In Position On Output Gear Support Hub
Courtesy of CHRYSLER GROUP, LLC

10. Place the dog F-clutch thrust plate (1) in position on the output gear support (2) hub.



Fig. 480: Installing Dog F-Clutch Thrust Plate Into Output Gear Support Hub
Courtesy of CHRYSLER GROUP, LLC

11. Using tools (special tool #8148, Cup) (2) and (special tool #C-4171, Driver Handle, Universal) (1), install the dog F-clutch thrust plate into the output gear support (3) hub.



Fig. 481: Removing/Installing Output Gear
Courtesy of CHRYSLER GROUP, LLC

12. Install the output gear (1) onto the output gear support (2).

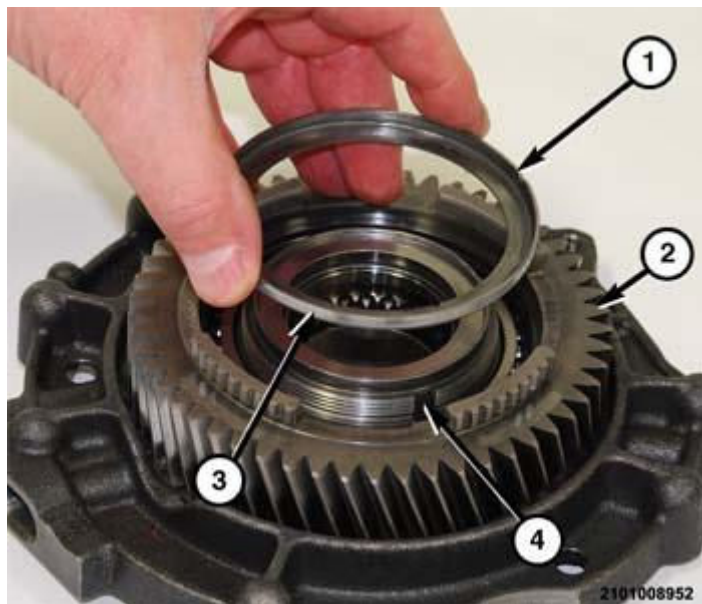


Fig. 482: Removing/Installing Lock Plate
Courtesy of CHRYSLER GROUP, LLC

13. Align the tab (3) on the lock plate (1) with the notch (4) on the output gear support hub and install the lock plate (3) onto the output gear (2) support.

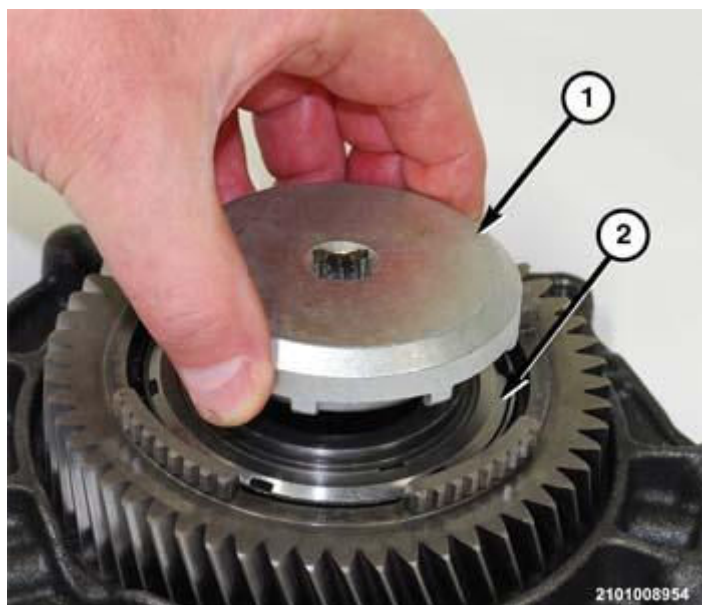


Fig. 483: Removing/Installing Stake Nut
Courtesy of CHRYSLER GROUP, LLC

14. Using tool (special tool #2012900210, Wrench, Spanner), install the stake nut (2) to hold the output gear and bearing to the output gear support hub. Refer to **SPECIFICATIONS**.

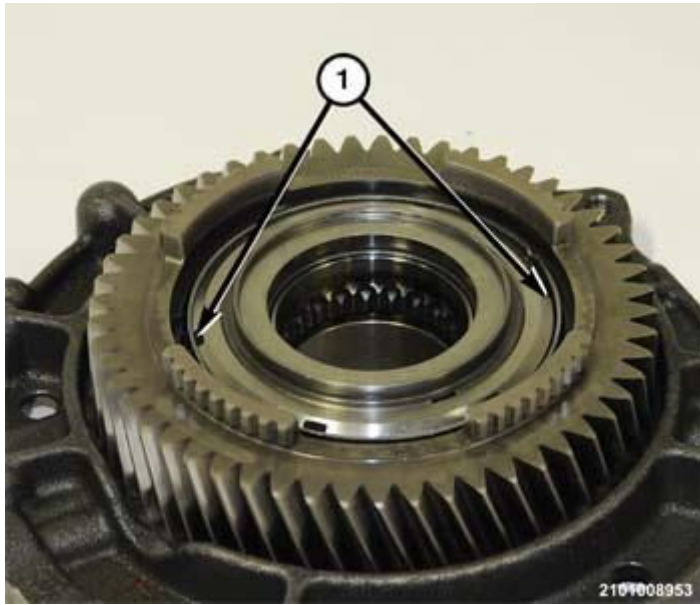


Fig. 484: Locking Plate

Courtesy of CHRYSLER GROUP, LLC

15. Using a suitable punch, stake (1) the locking plate inward to lock the stake nut in position.
16. Install the output gear support in the transaxle.

DIFFERENTIAL AND RING GEAR

DISASSEMBLY

2WD

NOTE: The differential unit can be placed on tool (special tool #6888, Installer, Seal) as a stable holding fixture.

1. Remove the transmission from the vehicle. Refer to **REMOVAL**.
2. Place the transmission on a suitable clean work surface.
3. Position a suitable drain pan under the transmission drain plug.
4. Remove the drain plug and allow the fluid to drain into the drain pan.
5. Remove the bellhousing from the transmission. Refer to **BELLHOUSING, REMOVAL**.

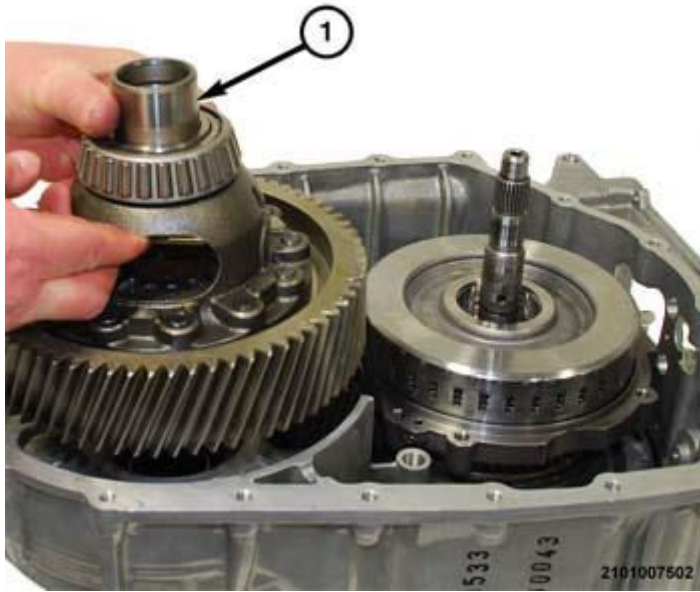


Fig. 485: Removing/Installing Differential Assembly
Courtesy of CHRYSLER GROUP, LLC

6. Separate the differential unit (1) from the transmission.



Fig. 486: View Of Ring Gear To Differential Unit & Bolts
Courtesy of CHRYSLER GROUP, LLC

7. Remove the bolts (2) holding the ring gear (1) to the differential unit.



Fig. 487: View Of Ring Gear & Differential Unit
Courtesy of CHRYSLER GROUP, LLC

8. Separate the ring gear (1) from the differential unit (2).



Fig. 488: View Of Upper Half Housing & Lower Differential Housing
Courtesy of CHRYSLER GROUP, LLC

9. Separate the two halves (1) of the differential housing (2) to gain access to the pinion shaft.



Fig. 489: Differential Side Gear & Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

10. Remove the differential side gear (1) and thrust washer (2) from the differential housing (3).

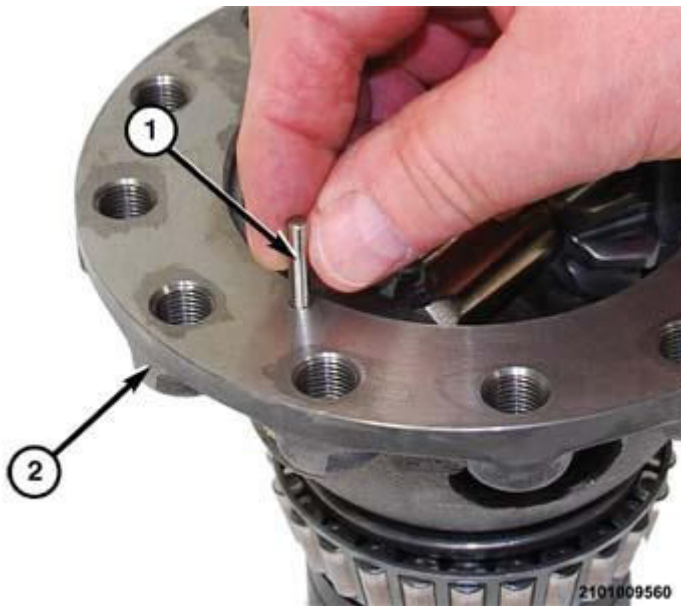


Fig. 490: Removing/Installing Pinion Shaft Lock-Pin
Courtesy of CHRYSLER GROUP, LLC

11. Using a suitable pencil magnet, remove the lock-pin (1) holding the pinion shaft in the differential housing (2).

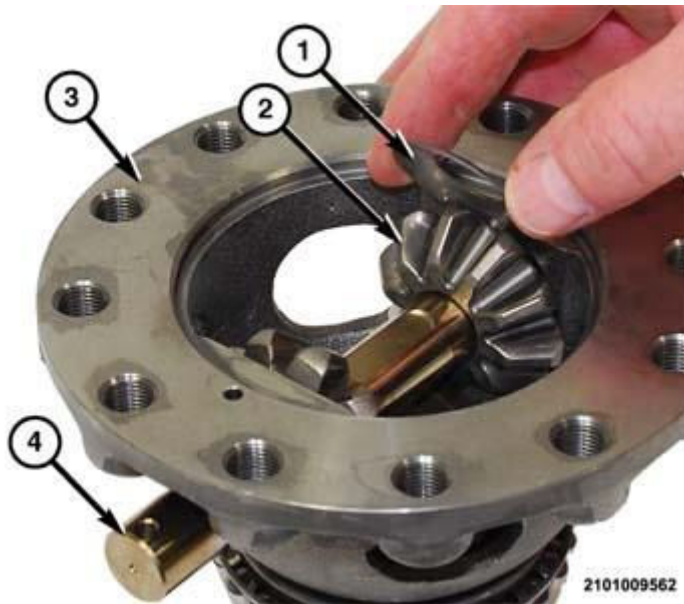


Fig. 491: Removing/Installing Conical Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

12. Slide the pinion shaft (4) outward and remove the conical thrust washer (1) from behind the pinion gear (2).



Fig. 492: Removing/Installing Pinion Gear 1
Courtesy of CHRYSLER GROUP, LLC

13. Slide the pinion shaft (2) outward and remove the pinion gear 1 (1).



Fig. 493: Removing/Installing Pinion Shaft & Pinion Gear 2
Courtesy of CHRYSLER GROUP, LLC

14. Slide the pinion shaft (2) outward and remove the pinion gear 2 (1).

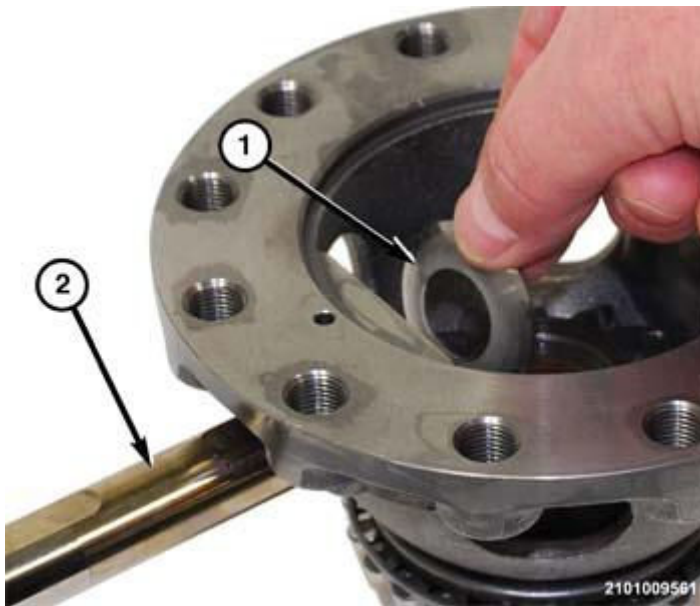


Fig. 494: Removing/Installing Pinion Shaft & Conical Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

15. Slide the pinion shaft (2) outward and remove the conical thrust washer (1) from behind the pinion gear 2.
16. Remove the pinion shaft (2) from the differential housing.

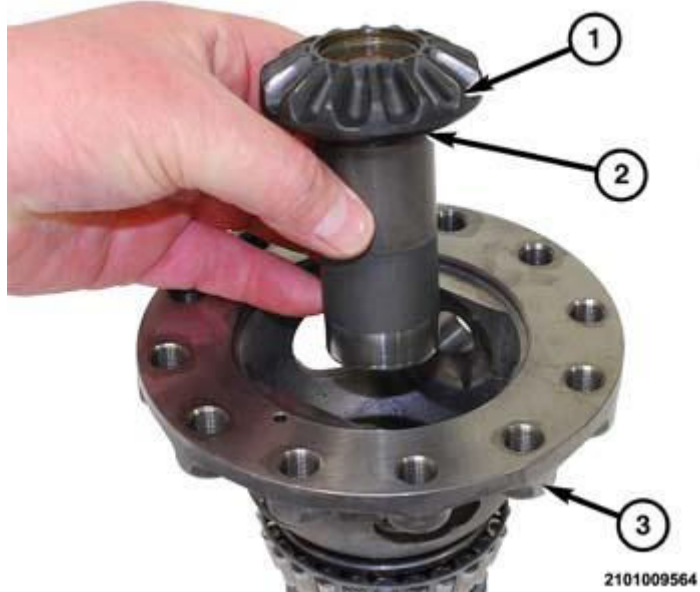


Fig. 495: Removing/Installing Differential Side Gear & Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

17. Remove the differential side gear (1) and thrust washer (2) from the differential housing (3).

4WD

NOTE: There are no differential gears in the carrier housing of the 948TE Four Wheel Drive version transmission. The 2 speed PTU is equipped with a differential for the front wheels.

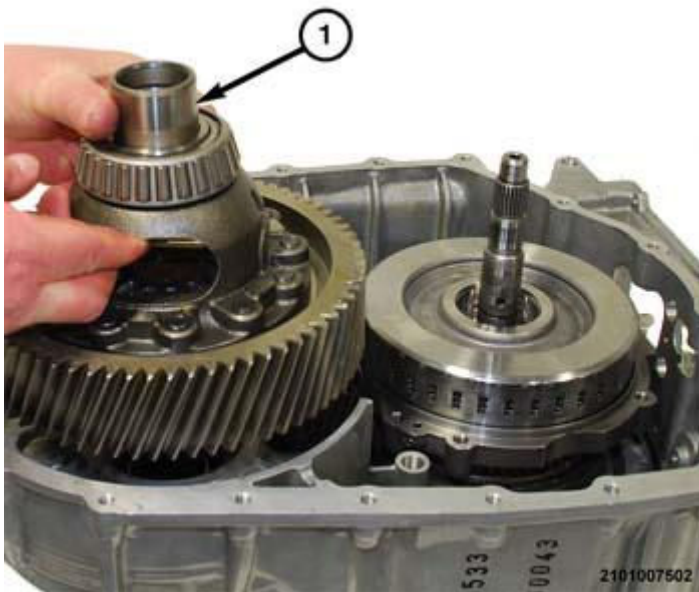
1. Remove the transmission from the vehicle. Refer to **REMOVAL**.
2. Place the transmission on a suitable clean work surface.
3. Position a suitable drain pan under the transmission drain plug.
4. Remove the drain plug and allow the fluid to drain into the drain pan.



2101009395

Fig. 496: Removing Differential Adapter Sleeve
Courtesy of CHRYSLER GROUP, LLC

5. Using tool (special tool #7794-A, Remover, Seal) and (special tool #C-637, Slide Hammer, Universal), remove the differential adapter sleeve.
6. Remove the bellhousing from the transmission. Refer to **BELLHOUSING, REMOVAL**.



2101007502

Fig. 497: Removing/Installing Differential Assembly
Courtesy of CHRYSLER GROUP, LLC

7. Separate the differential unit (1) from the transmission.



Fig. 498: View Of Ring Gear To Differential Unit & Bolts
Courtesy of CHRYSLER GROUP, LLC

8. Remove the bolts (2) holding the ring gear (1) to the differential unit.



Fig. 499: View Of Ring Gear & Differential Unit
Courtesy of CHRYSLER GROUP, LLC

9. Separate the ring gear (1) from the differential unit (2).



Fig. 500: View Of Upper Half Housing & Lower Differential Housing
Courtesy of CHRYSLER GROUP, LLC

10. Separate the two halves (1) of the differential housing (2) to gain access to the stub shaft that links the PTU to the left front wheel.



Fig. 501: Removing Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

11. Using a suitable screw driver, remove the snap-ring holding the stub shaft bearing in the differential housing.

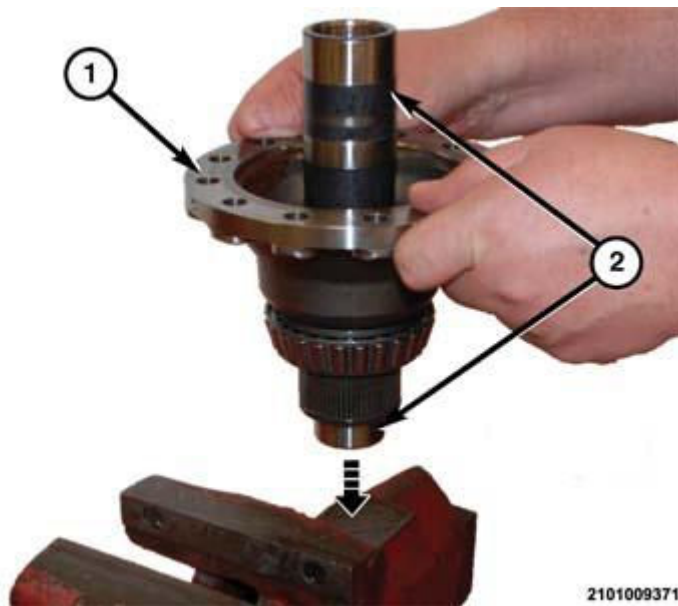


Fig. 502: Removing Stub Shaft & Bearing Out Of Differential Housing
Courtesy of CHRYSLER GROUP, LLC

12. Using a solid surface, drive the stub shaft (2) and bearing out of the differential housing (1).

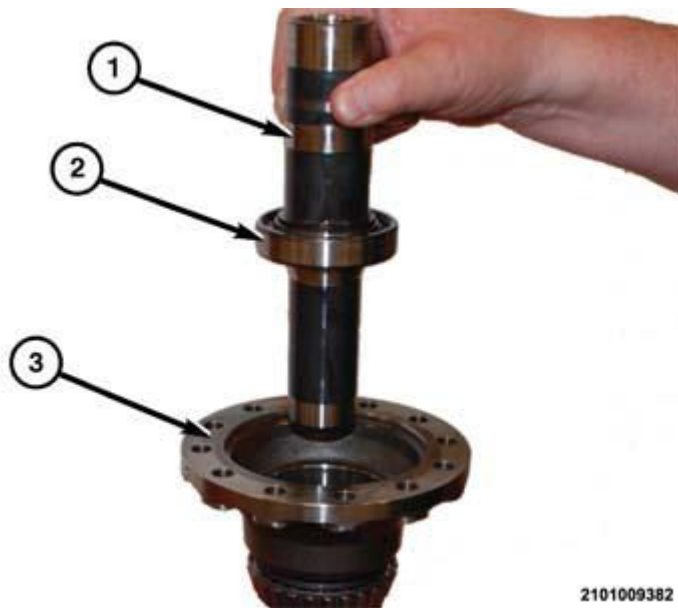


Fig. 503: Removing/Installing Stub Shaft
Courtesy of CHRYSLER GROUP, LLC

13. Separate the stub shaft from the differential housing.

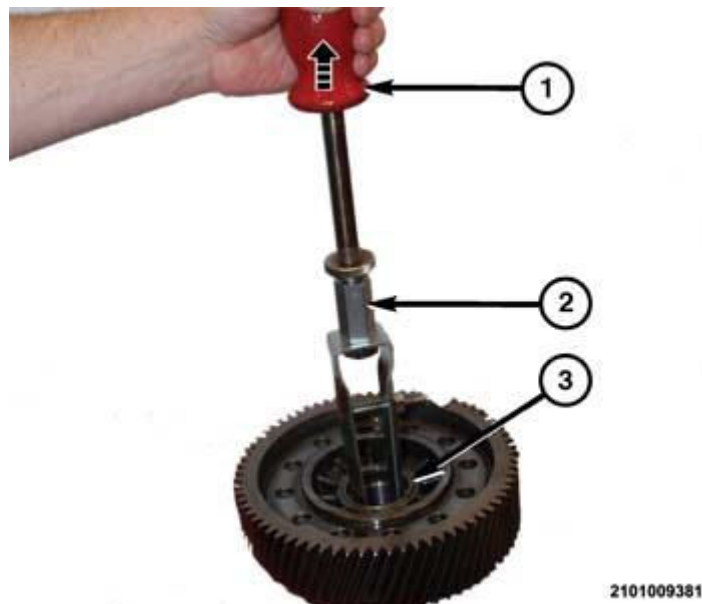


Fig. 504: Removing Stub Shaft Needle Roller Bearing
Courtesy of CHRYSLER GROUP, LLC

14. Using tool (special tool #7794-A, Remover, Seal) and (special tool #C-637, Slide Hammer, Universal), remove the stub shaft needle roller bearing from the differential housing.

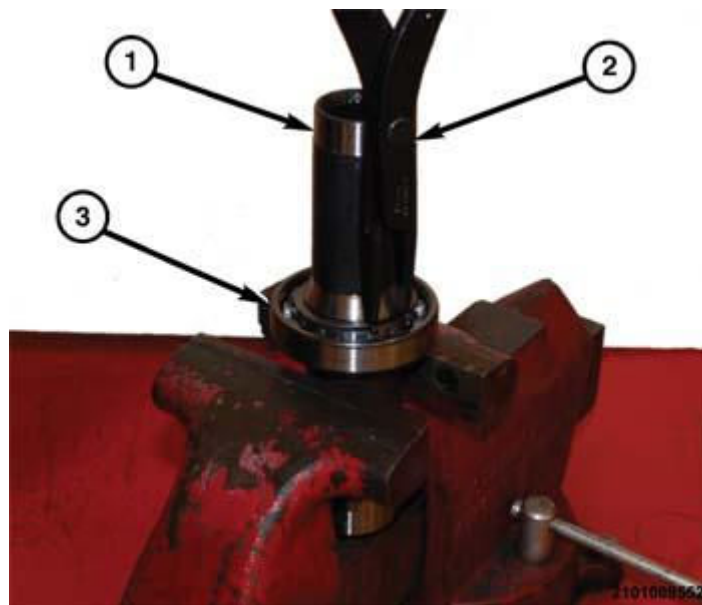


Fig. 505: Removing/Installing Snap-Ring At Ball Bearing On Stub Shaft
Courtesy of CHRYSLER GROUP, LLC

15. Using suitable snap-ring pliers (2), remove the snap-ring holding the ball bearing (3) on the stub shaft (1).

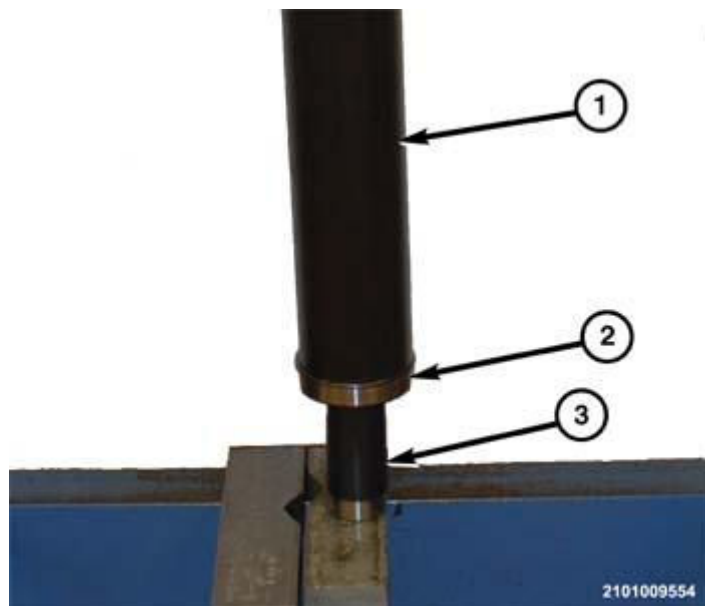


Fig. 506: Removing Ball Bearing From Stub Shaft
Courtesy of CHRYSLER GROUP, LLC

16. Using tool (special tool #8228, Installer, Bearing) (1) and an arbor press, remove the ball bearing (2) from the stub shaft (3).

AWD

NOTE: The differential unit can be placed on tool (special tool #6888, Installer, Seal) as a stable holding fixture.

1. Remove the transmission from the vehicle. Refer to **REMOVAL**.
2. Place the transmission on a suitable clean work surface.
3. Position a suitable drain pan under the transmission drain plug.
4. Remove the drain plug and allow the fluid to drain into the drain pan.



Fig. 507: Removing Differential Adapter Sleeve
Courtesy of CHRYSLER GROUP, LLC

5. Using tool (special tool #7794-A, Remover, Seal) and (special tool #C-637, Slide Hammer, Universal), remove the differential adapter sleeve.
6. Remove the bellhousing from the transmission. Refer to **BELLHOUSING, REMOVAL**.

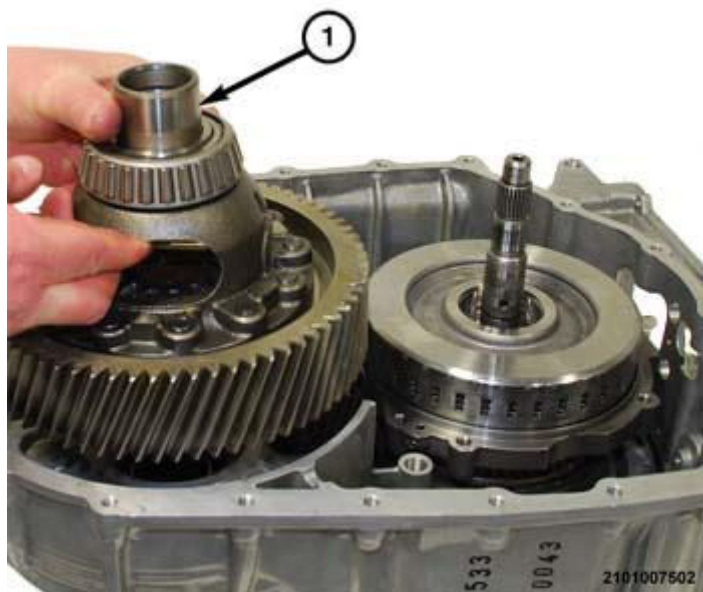


Fig. 508: Removing/Installing Differential Assembly
Courtesy of CHRYSLER GROUP, LLC

7. Separate the differential unit (1) from the transmission.

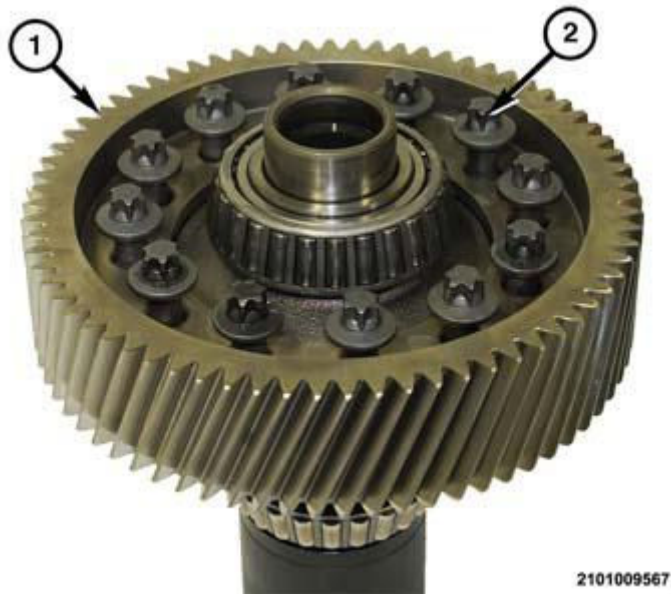


Fig. 509: View Of Ring Gear To Differential Unit & Bolts
Courtesy of CHRYSLER GROUP, LLC

8. Remove the bolts (2) holding the ring gear (1) to the differential unit.



Fig. 510: View Of Ring Gear & Differential Unit
Courtesy of CHRYSLER GROUP, LLC

9. Separate the ring gear (1) from the differential unit (2).



Fig. 511: View Of Upper Half Housing & Lower Differential Housing
Courtesy of CHRYSLER GROUP, LLC

10. Separate the two halves (1) of the differential housing (2) to gain access to the pinion shaft.



Fig. 512: Differential Side Gear & Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

11. Remove the differential side gear (1) and thrust washer (2) from the differential housing (3).

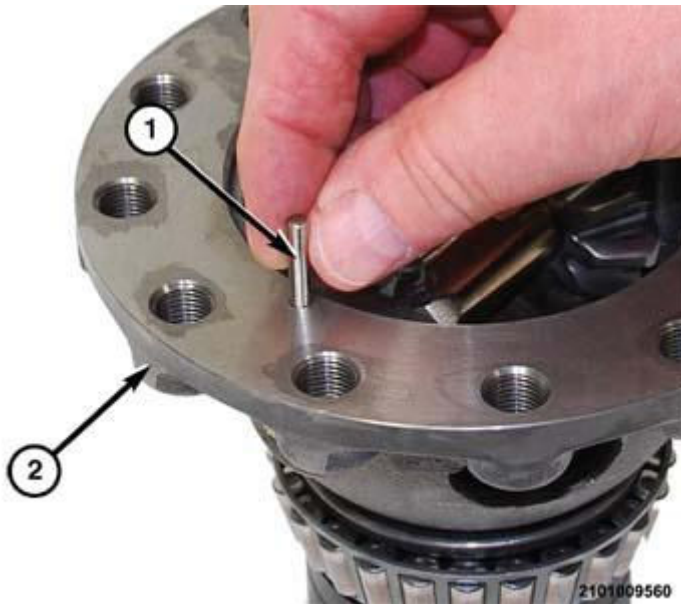


Fig. 513: Removing/Installing Pinion Shaft Lock-Pin
Courtesy of CHRYSLER GROUP, LLC

12. Using a suitable pencil magnet, remove the lock-pin (1) holding the pinion shaft in the differential housing (2).

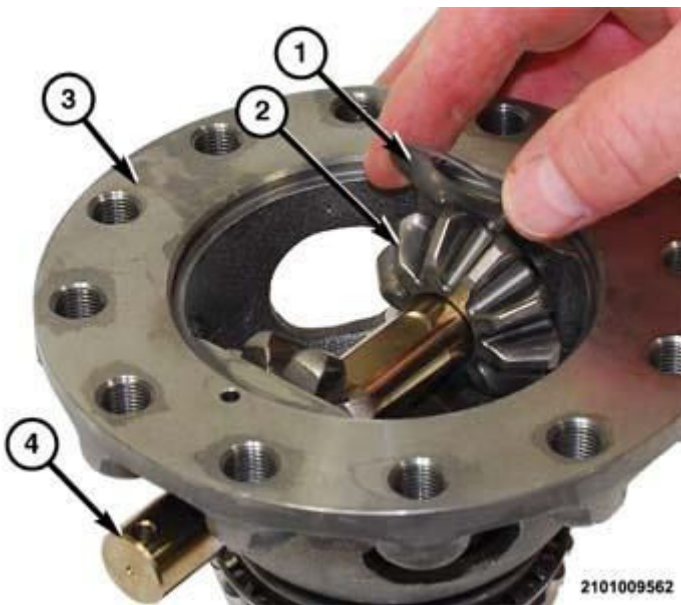


Fig. 514: Removing/Installing Conical Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

13. Slide the pinion shaft (4) outward and remove the conical thrust washer (1) from behind the pinion gear (2).

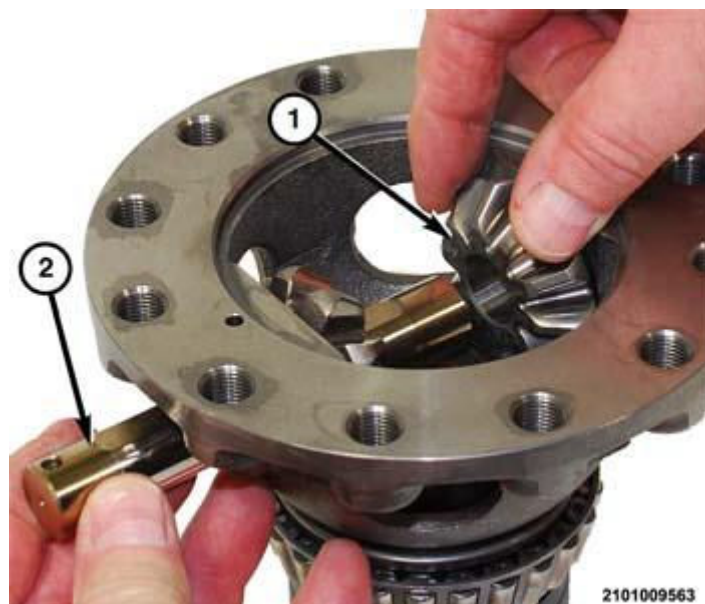


Fig. 515: Removing/Installing Pinion Gear 1
Courtesy of CHRYSLER GROUP, LLC

14. Slide the pinion shaft (2) outward and remove the pinion gear 1 (1).



Fig. 516: Removing/Installing Pinion Shaft & Pinion Gear 2
Courtesy of CHRYSLER GROUP, LLC

15. Slide the pinion shaft (2) outward and remove the pinion gear 2 (1).

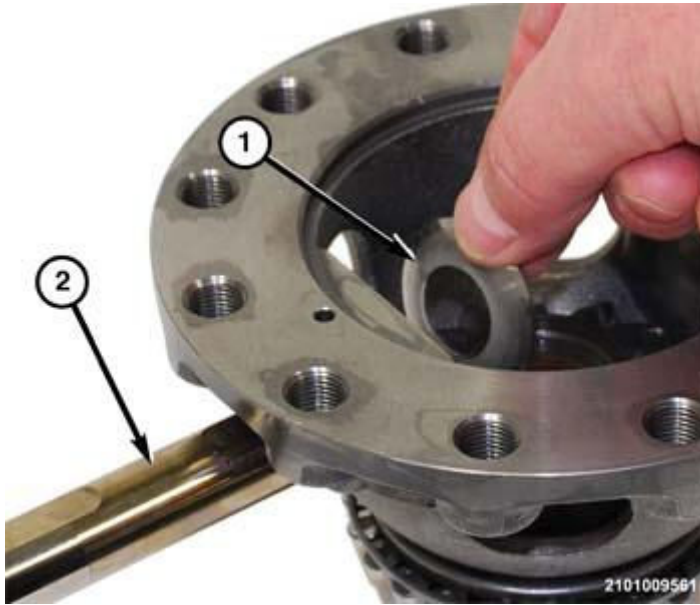


Fig. 517: Removing/Installing Pinion Shaft & Conical Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

16. Slide the pinion shaft (2) outward and remove the conical thrust washer (1) from behind the pinion gear 2.
17. Remove the pinion shaft (2) from the differential housing.

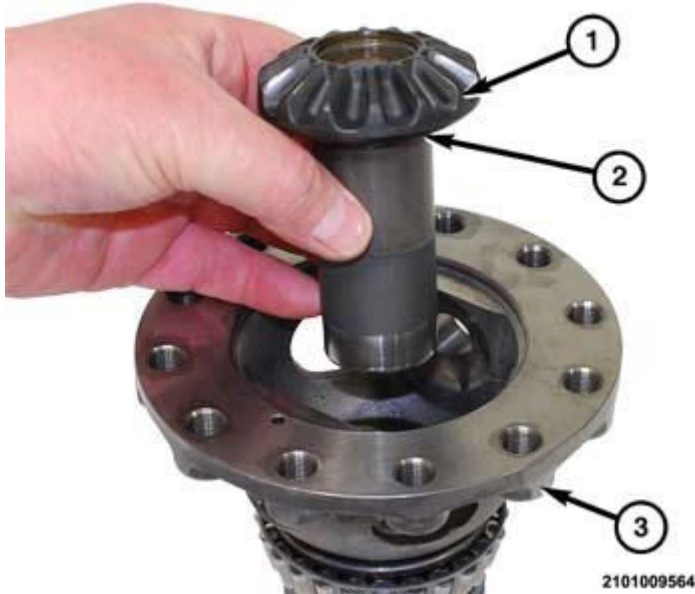


Fig. 518: Removing/Installing Differential Side Gear & Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

18. Remove the differential side gear (1) and thrust washer (2) from the differential housing (3).
19. Separate the two halves (1) of the differential housing (2) to gain access to the pinion shaft.



Fig. 519: Differential Side Gear & Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

20. Remove the differential side gear (1) and thrust washer (2) from the differential housing (3).

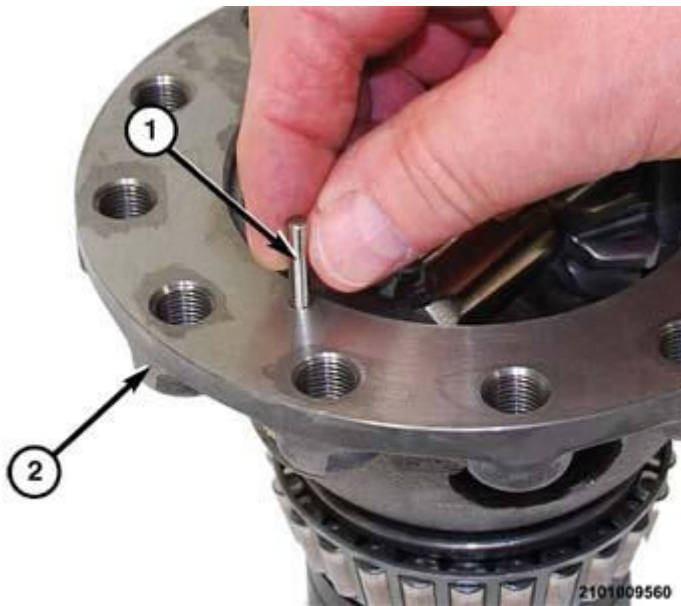


Fig. 520: Removing/Installing Pinion Shaft Lock-Pin
Courtesy of CHRYSLER GROUP, LLC

21. Using a suitable pencil magnet, remove the lock-pin (1) holding the pinion shaft in the differential housing (2).

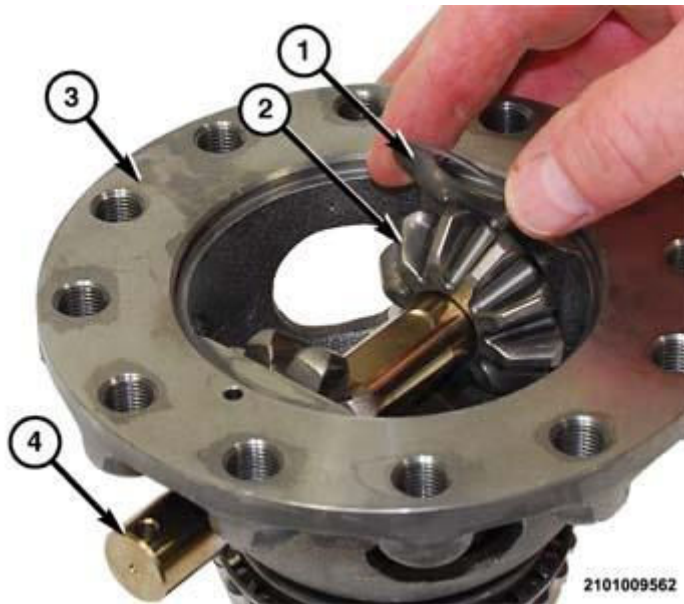


Fig. 521: Removing/Installing Conical Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

22. Slide the pinion shaft (4) outward and remove the conical thrust washer (1) from behind the pinion gear (2).



Fig. 522: Removing/Installing Pinion Gear 1
Courtesy of CHRYSLER GROUP, LLC

23. Slide the pinion shaft (2) outward and remove the pinion gear 1 (1).



Fig. 523: Removing/Installing Pinion Shaft & Pinion Gear 2
Courtesy of CHRYSLER GROUP, LLC

24. Slide the pinion shaft (2) outward and remove the pinion gear 2 (1).

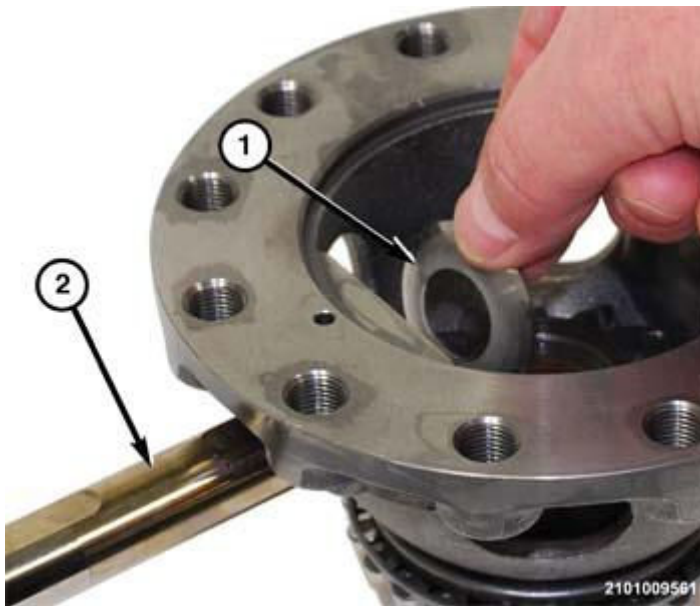


Fig. 524: Removing/Installing Pinion Shaft & Conical Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

25. Slide the pinion shaft (2) outward and remove the conical thrust washer (1) from behind the pinion gear 2.
26. Remove the pinion shaft (2) from the differential housing.



Fig. 525: Removing/Installing Differential Side Gear & Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

27. Remove the differential side gear (1) and thrust washer (2) from the differential housing (3).

ASSEMBLY

2WD

The differential unit can be placed on tool (special tool #6888, Installer, Seal) as a stable holding fixture.

1. Clean the differential components with suitable solvent and blow then dry with 344 kPa (50 psi) shop air. Inspect the differential components for excess wear or damage. Replace the differential if damage is apparent.

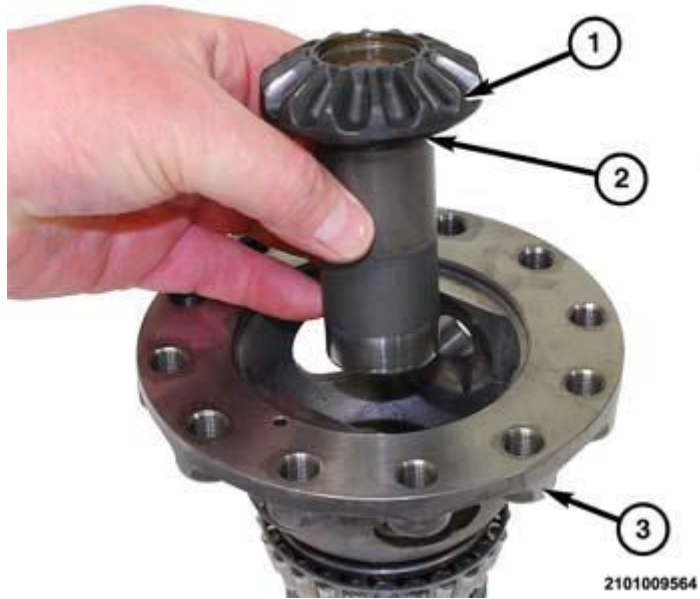


Fig. 526: Removing/Installing Differential Side Gear & Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

2. Install the differential side gear (1) and thrust washer (2) into the differential housing (3).

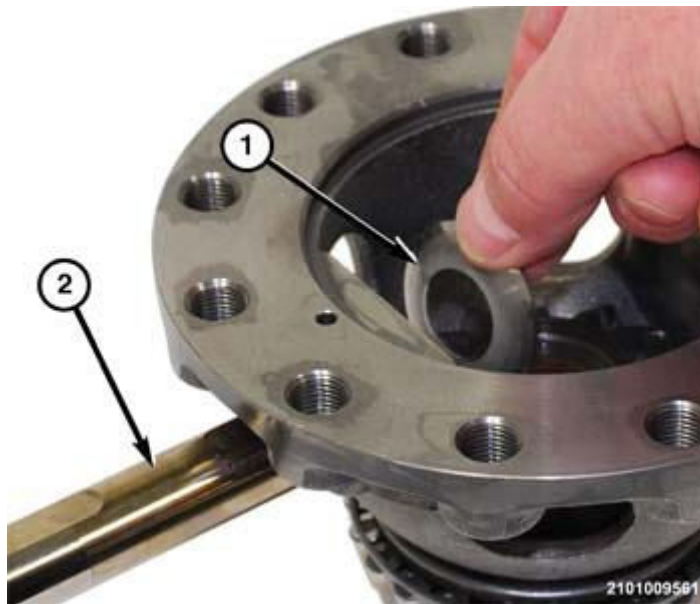


Fig. 527: Removing/Installing Pinion Shaft & Conical Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

3. Install the pinion shaft (2) in the differential housing.
4. Slide the pinion shaft (2) inward and install the conical thrust washer (1).



Fig. 528: Removing/Installing Pinion Shaft & Pinion Gear 2
Courtesy of CHRYSLER GROUP, LLC

5. Slide the pinion shaft (2) inward and install the pinion gear 2 (1).



Fig. 529: Removing/Installing Pinion Gear 1
Courtesy of CHRYSLER GROUP, LLC

6. Slide the pinion shaft (2) inward and install the pinion gear 1 (1).

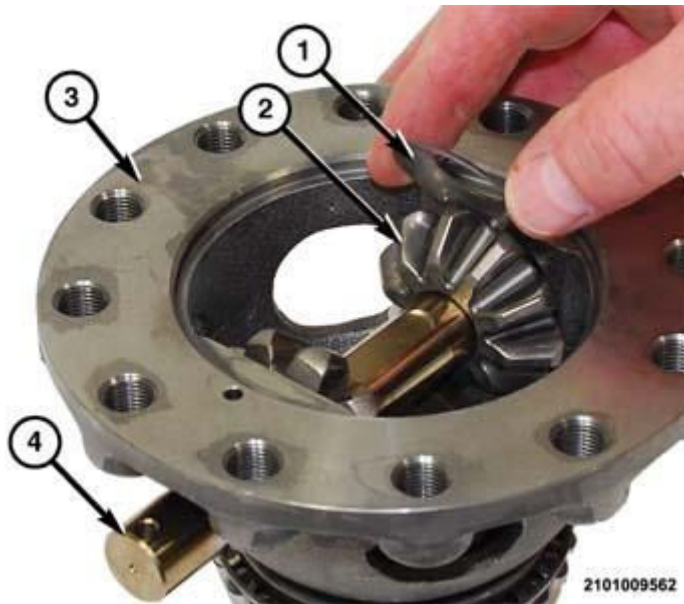


Fig. 530: Removing/Installing Conical Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

7. Slide the pinion shaft (4) inward and install the conical thrust washer (1) behind the pinion gear (2).

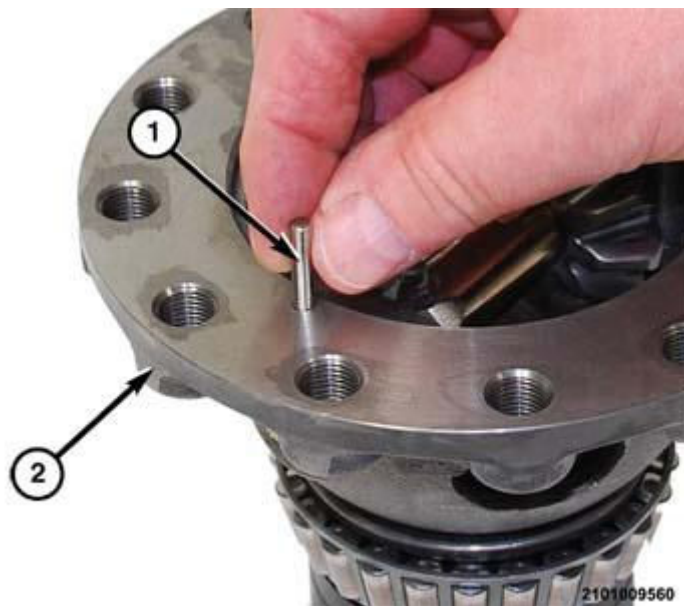


Fig. 531: Removing/Installing Pinion Shaft Lock-Pin
Courtesy of CHRYSLER GROUP, LLC

8. Align the hole in the pinion shaft with the hole in the differential housing (2) and install the lock-pin (1) to hold the pinion shaft in the differential housing (2).



Fig. 532: Differential Side Gear & Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

9. Install the differential side gear (1) and thrust washer (2) into the differential housing (3).



Fig. 533: View Of Upper Half Housing & Lower Differential Housing
Courtesy of CHRYSLER GROUP, LLC

10. Place the upper half (1) housing on the lower differential housing (2).



Fig. 534: View Of Ring Gear & Differential Unit
Courtesy of CHRYSLER GROUP, LLC

11. Place the ring gear (1) in position on the differential unit (2).



Fig. 535: View Of Ring Gear To Differential Unit & Bolts
Courtesy of CHRYSLER GROUP, LLC

12. Install the bolts (2) to hold the ring gear (1) to the differential unit.



Fig. 536: Tightening Ring Gear Bolts
Courtesy of CHRYSLER GROUP, LLC

13. Tighten the bolts to proper torque. Refer to **SPECIFICATIONS**.



Fig. 537: Removing/Installing Differential Assembly
Courtesy of CHRYSLER GROUP, LLC

14. Place the differential unit (1) in position in the transmission.
15. Install the bellhousing. Refer to **BELLHOUSING, INSTALLATION**.
16. Road test the vehicle to verify the repair.

NOTE: There are no differential gears in the carrier housing of the 948TE Four Wheel Drive version transmission. The 2 speed PTU is equipped with a differential for the front wheels.

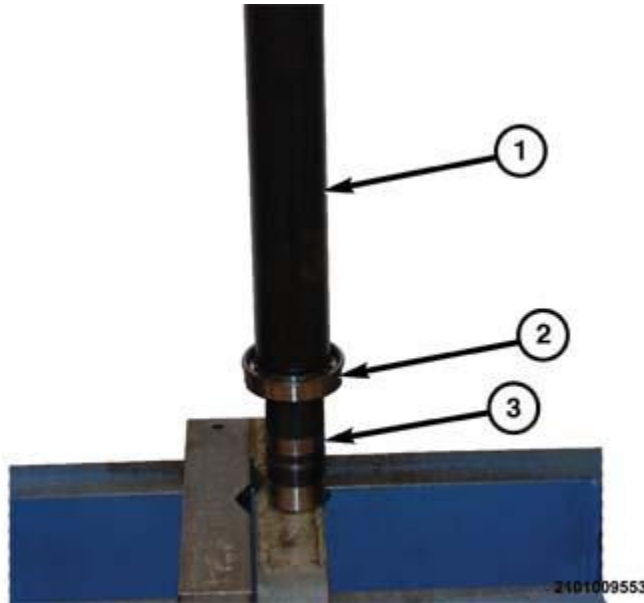


Fig. 538: Installing Ball Bearing To Stub Shaft
Courtesy of CHRYSLER GROUP, LLC

1. Using tool (special tool #MD998805, Installer, Seal) (1) and an arbor press, install the ball bearing (2) from the stub shaft (3).

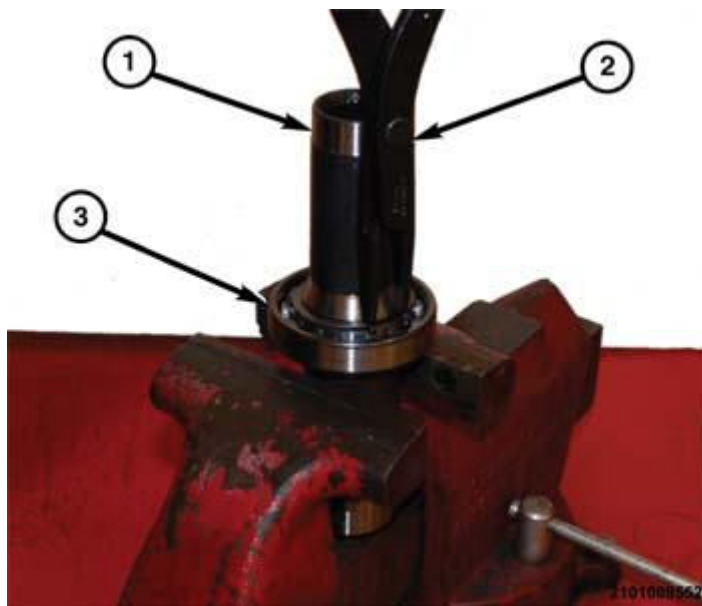


Fig. 539: Removing/Installing Snap-Ring At Ball Bearing On Stub Shaft
Courtesy of CHRYSLER GROUP, LLC

2. Using suitable snap-ring pliers (2), install the snap-ring to hold the ball bearing (3) on the stub shaft (1).

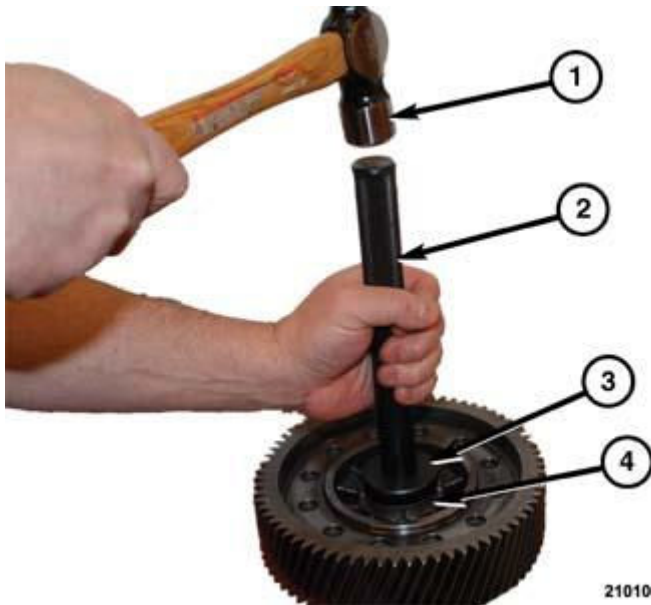


Fig. 540: Installing Stub Shaft Needle Roller Bearing
Courtesy of CHRYSLER GROUP, LLC

3. Using tool (special tool #8594, Installer, Bearing Cup) (3), (special tool #C-4171, Driver Handle, Universal) (2) and a suitable hammer (1), Install the stub shaft needle roller bearing (4) into the differential housing.

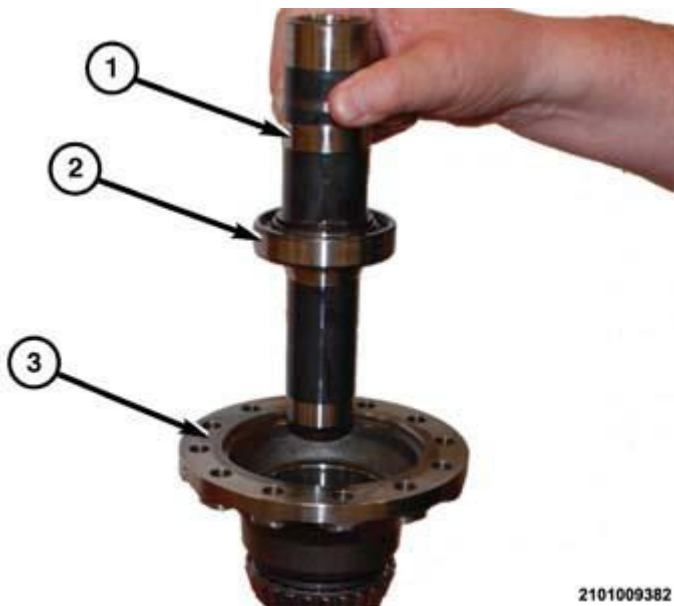


Fig. 541: Removing/Installing Stub Shaft
Courtesy of CHRYSLER GROUP, LLC

4. Insert the stub shaft into the differential housing.

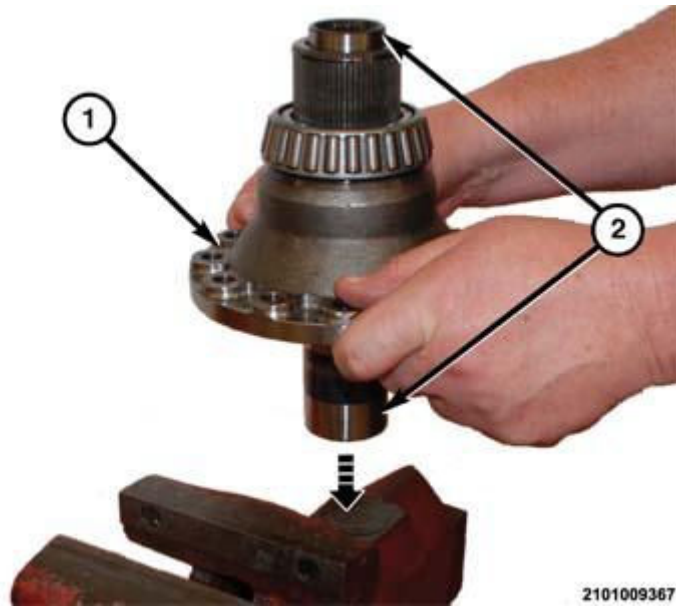


Fig. 542: Removing Stub Shaft & Bearing Into Of Differential Housing
Courtesy of CHRYSLER GROUP, LLC

5. Using a solid surface, drive the stub shaft (2) and bearing into of the differential housing (1).

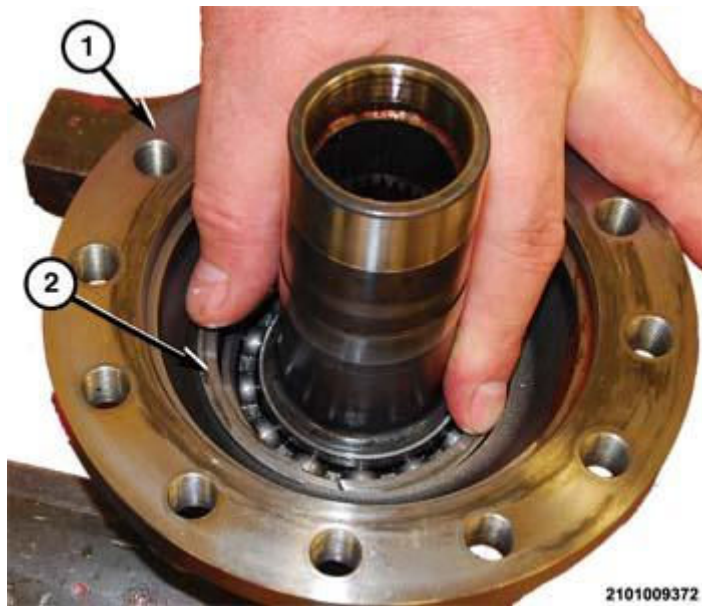


Fig. 543: Installing Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

6. Install the snap-ring (2) to hold the stub shaft bearing in the differential housing (1).



Fig. 544: View Of Upper Half Housing & Lower Differential Housing
Courtesy of CHRYSLER GROUP, LLC

7. Place the two halves (1) of the differential housing (2) together.



Fig. 545: View Of Ring Gear & Differential Unit
Courtesy of CHRYSLER GROUP, LLC

8. Place the ring gear (1) in position on the differential unit (2).

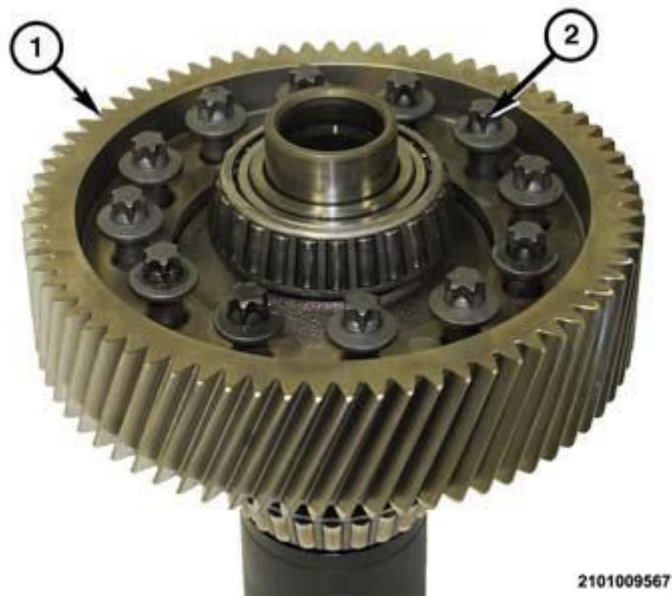


Fig. 546: View Of Ring Gear To Differential Unit & Bolts
Courtesy of CHRYSLER GROUP, LLC

9. Install the bolts (2) to hold the ring gear (1) to the differential unit.



Fig. 547: Tightening Ring Gear Bolts
Courtesy of CHRYSLER GROUP, LLC

10. Using a suitable torque wrench (1) and a pry bar (2), tighten the bolts (4) to hold the ring gear (3) to the differential unit. Refer to **SPECIFICATIONS**.

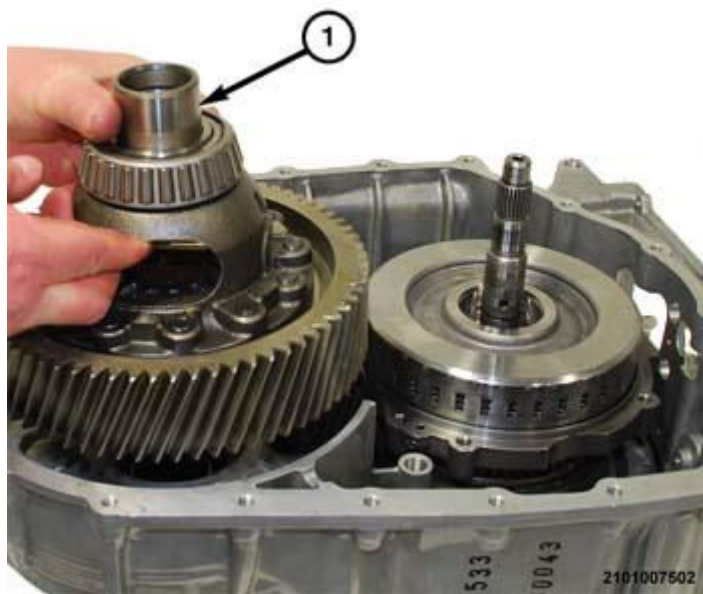


Fig. 548: Removing/Installing Differential Assembly
Courtesy of CHRYSLER GROUP, LLC

11. Place the differential unit in position in the transmission.
12. Install the bellhousing on the transmission. Refer to **BELLHOUSING, INSTALLATION**.

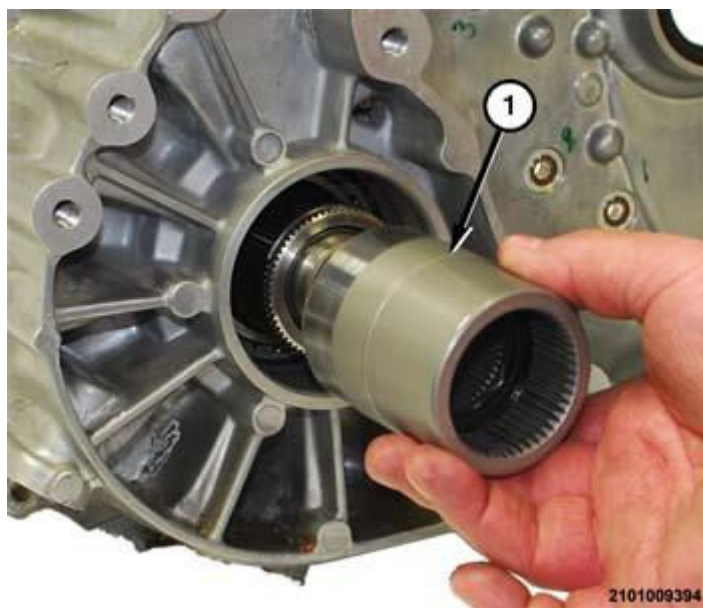


Fig. 549: All Wheel Drive (AWD) Adapter Sleeve
Courtesy of CHRYSLER GROUP, LLC

13. Install the differential adapter sleeve (1), AWD shown in illustration.
14. Install the transmission in the vehicle. Refer to **INSTALLATION**.
15. Road test the vehicle to verify the repair.

AWD

The differential unit can be placed on tool (special tool #6888, Installer, Seal) as a stable holding fixture.

1. Clean the differential components with suitable solvent and blow then dry with 344 kPa (50 psi) shop air. Inspect the differential components for excess wear or damage. Replace the differential if damage is apparent.



Fig. 550: Removing/Installing Differential Side Gear & Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

2. Install the differential side gear (1) and thrust washer (2) into the differential housing (3).

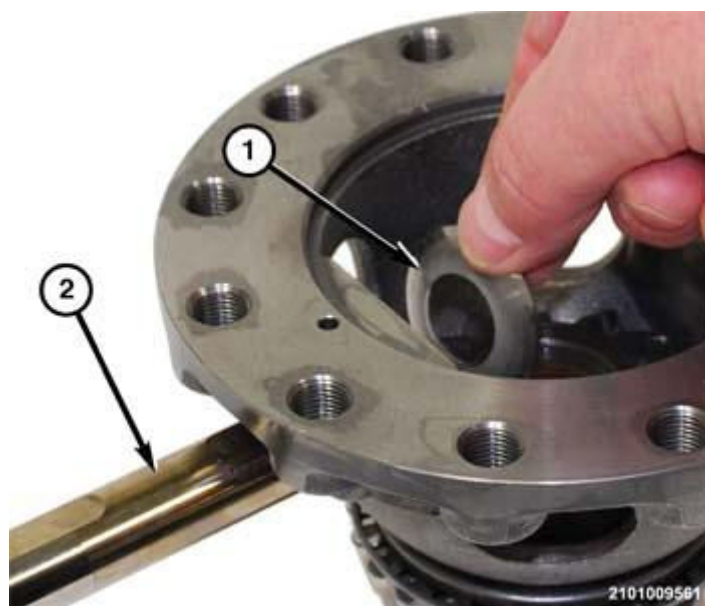


Fig. 551: Removing/Installing Pinion Shaft & Conical Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

3. Install the pinion shaft (2) in the differential housing.
4. Slide the pinion shaft (2) inward and install the conical thrust washer (1).



Fig. 552: Removing/Installing Pinion Shaft & Pinion Gear 2
Courtesy of CHRYSLER GROUP, LLC

5. Slide the pinion shaft (2) inward and install the pinion gear 2 (1).



Fig. 553: Removing/Installing Pinion Gear 1
Courtesy of CHRYSLER GROUP, LLC

6. Slide the pinion shaft (2) inward and install the pinion gear 1 (1).

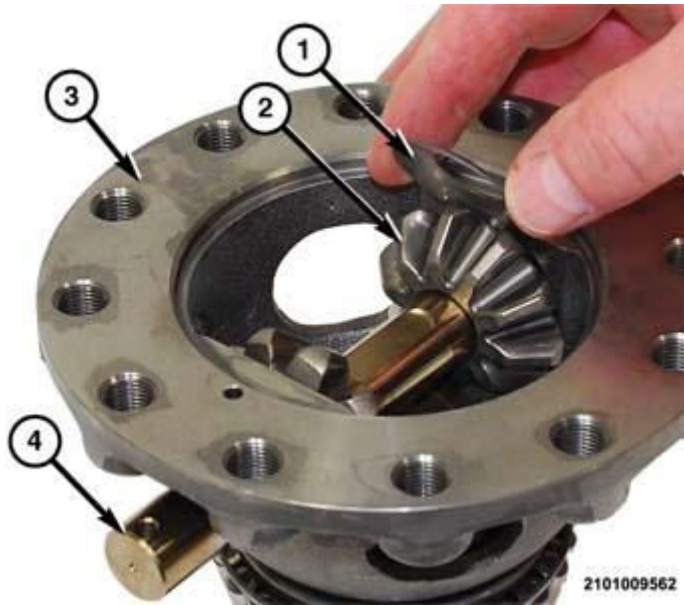


Fig. 554: Removing/Installing Conical Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

7. Slide the pinion shaft (4) inward and install the conical thrust washer (1) behind the pinion gear (2).

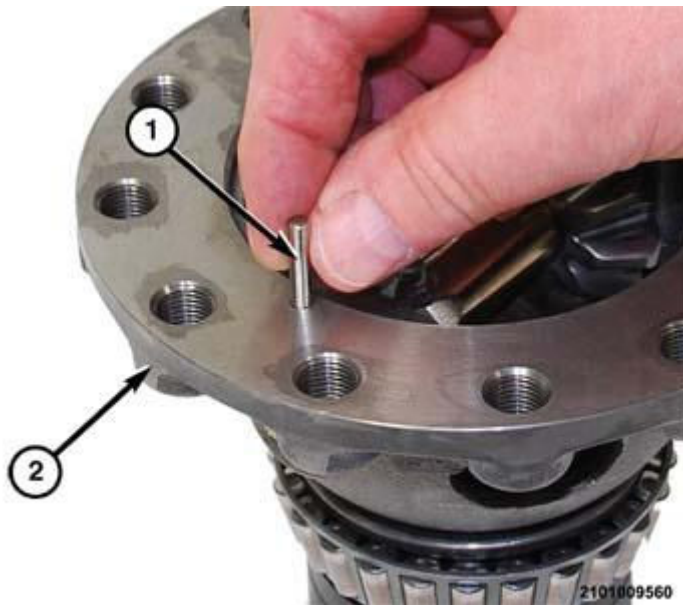


Fig. 555: Removing/Installing Pinion Shaft Lock-Pin
Courtesy of CHRYSLER GROUP, LLC

8. Align the hole in the pinion shaft with the hole in the differential housing (2) and install the lock-pin (1) to hold the pinion shaft in the differential housing (2).



Fig. 556: Differential Side Gear & Thrust Washer
Courtesy of CHRYSLER GROUP, LLC

9. Install the differential side gear (1) and thrust washer (2) into the differential housing (3).



Fig. 557: View Of Upper Half Housing & Lower Differential Housing
Courtesy of CHRYSLER GROUP, LLC

10. Place the upper half (1) housing on the lower differential housing (2).



Fig. 558: View Of Ring Gear & Differential Unit
Courtesy of CHRYSLER GROUP, LLC

11. Place the ring gear (1) in position on the differential unit (2).



Fig. 559: View Of Ring Gear To Differential Unit & Bolts
Courtesy of CHRYSLER GROUP, LLC

12. Install the bolts (2) to hold the ring gear (1) to the differential unit.



Fig. 560: Tightening Ring Gear Bolts
Courtesy of CHRYSLER GROUP, LLC

13. Tighten the bolts to proper torque. Refer to **SPECIFICATIONS**.

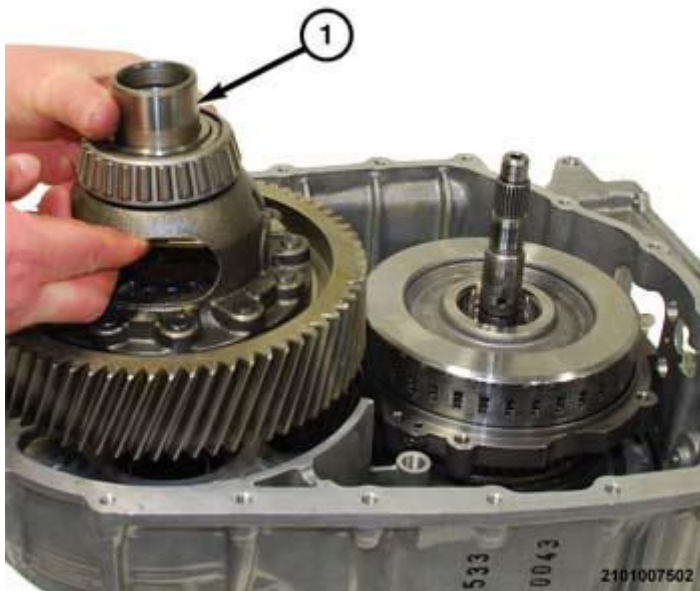


Fig. 561: Removing/Installing Differential Assembly
Courtesy of CHRYSLER GROUP, LLC

14. Place the differential unit (1) in position in the transmission.
15. Install the bell housing. Refer to **BELLHOUSING, INSTALLATION**.



Fig. 562: All Wheel Drive (AWD) Adapter Sleeve
Courtesy of CHRYSLER GROUP, LLC

16. Install the differential adapter sleeve (1).
17. Install the transmission in the vehicle. Refer to **INSTALLATION**.
18. Road test the vehicle to verify the repair.

FLUID AND FILTER

STANDARD PROCEDURE

FLUID LEVEL CHECK

2.4L

NOTE: It is not necessary to check the fluid level in the 948TE automatic transmission unless there are shifting issues and/or has evidence of a transmission fluid leak.

NOTE: Special Tool (special tool #10323A, Dipstick) Fluid level Indicator and a Scan-tool are required to accurately measure the fluid level (4) in the 948TE automatic transmission.

Checking the fluid level in the 948TE automatic transmission is to measure the distance from the upper lip of the fluid level check port, located on top of the transmission housing above the differential, down to the surface of the fluid. Tool 10323A fluid level indicator is marked in 5 mm increments with the base of the handle at 140 mm and the lower tip at "0". The engine must be running at idle with the transmission in park and the vehicle in a level position.

1. Connect a Scan Tool to the Diagnostic Connector under the instrument panel on the driver's side of the vehicle.
2. Navigate to a screen to display transmission fluid temperature.
3. Start the engine and allow it to run at idle with the transmission in Park.
4. Verify that the fluid temperature is above 50 °C.

NOTE: **Vehicle must be level for accurate transmission fluid level readings.**

5. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
6. Remove the left front tire and wheel assembly.
7. Turn the steering wheel to the full left position.

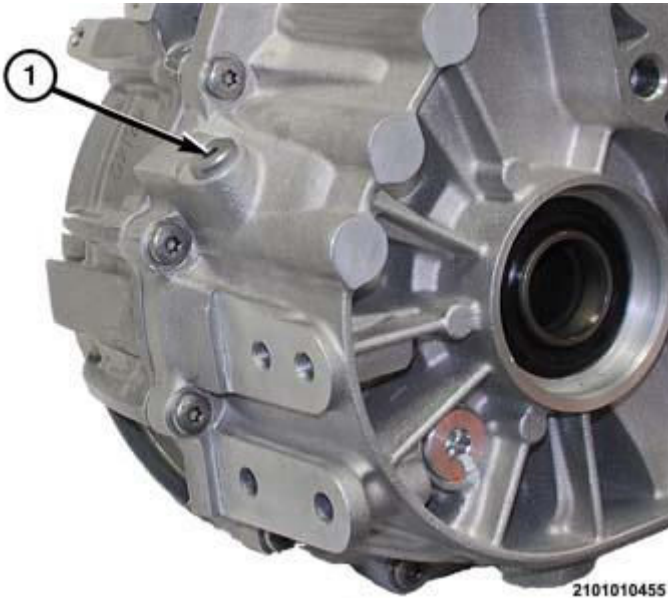


Fig. 563: Fluid Level Check Port
Courtesy of CHRYSLER GROUP, LLC

8. Remove the plug from the fluid level check port.

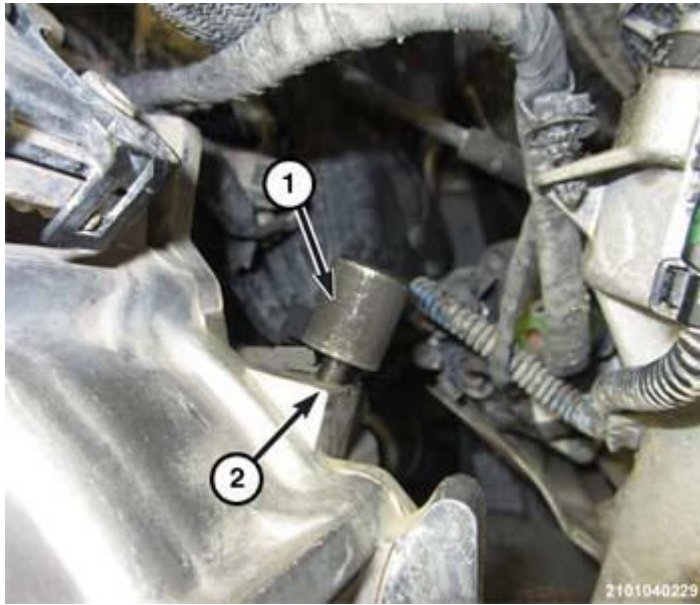
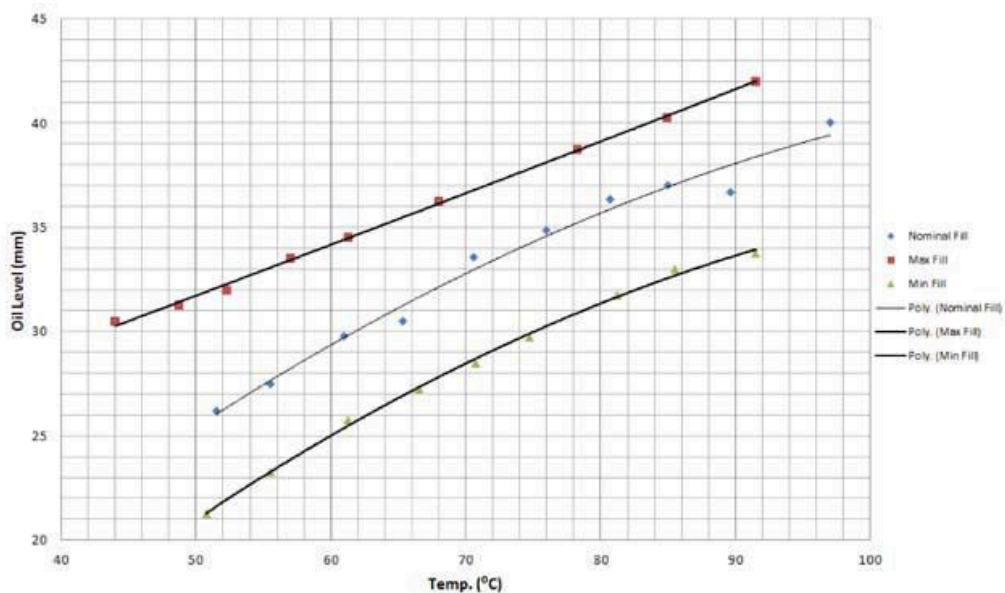


Fig. 564: Checking Trans Fluid Level Using Dipstick Special Tool
Courtesy of CHRYSLER GROUP, LLC

9. Insert tool (special tool #10323A, Dipstick) (1) into the fluid level check port and allow the handle of the tool to rest on the flat surface of the transmission housing (2) around the check port.
10. Remove the tool from the check port, keeping the handle above the tip so the level reading remains accurate.
11. Note the increment on the shaft of the tool where the fluid left a witness mark.



2101004346

Fig. 565: Fluid Level & Temperature Chart
Courtesy of CHRYSLER GROUP, LLC

12. Based on the temperature of the fluid and the measurement on the tool, refer to the graph or the table to determine the proper level.
13. Install the plug into the fluid level check port. Tighten to specification.
14. Install the left front tire and wheel assembly. Refer to **INSTALLATION**.

FLUID LEVEL TABLE

TEMP in °C	MIN LEVEL (mm)	NOMINAL LEVEL (mm)	MAX LEVEL (mm)
50°	21 mm	26 mm	31.5 mm
55°	23 mm	27.5 mm	33 mm
60°	25 mm	30 mm	34 mm
65°	27 mm	31 mm	35.5 mm
70°	28.5 mm	33 mm	36.5 mm
75°	30 mm	35 mm	38 mm
80°	31.5 mm	36 mm	39 mm
85°	32.5 mm	37 mm	40 mm
90°	34 mm	38 mm	41.5 mm

FLUID LEVEL CHECK



A multimedia supplement to the instructions contained in this article is available.

To view the multimedia example of the condition described go to;
<http://www.youtube.com/user/Mitchell1Tips>
 then type "A00641450.vid1" into the "Search Channel" box.

NOTE: It is not necessary to check the fluid level in the 948TE automatic transmission unless there are shifting issues and/or has evidence of a transmission fluid leak.

NOTE: Special Tool (special tool #10323A, Dipstick) Fluid level Indicator and a Scan-tool are required to accurately measure the fluid level (4) in the 948TE automatic transmission.

Checking the fluid level in the 948TE automatic transmission is to measure the distance from the upper lip of the fluid level check port, located on top of the transmission housing above the differential, down to the surface of the fluid. Tool 10323A fluid level indicator is marked in 5 mm increments with the base of the handle at 140 mm and the lower tip at "0". The engine must be running at idle with the transmission in park and the vehicle in a level position.

1. Connect a Scan Tool to the Diagnostic Connector under the instrument panel on the driver's side of the vehicle.
2. Navigate to a screen to display transmission fluid temperature.
3. Start the engine and allow it to run at idle with the transmission in Park.

4. Verify that the fluid temperature is above 50 °C.
5. Remove the engine cover.

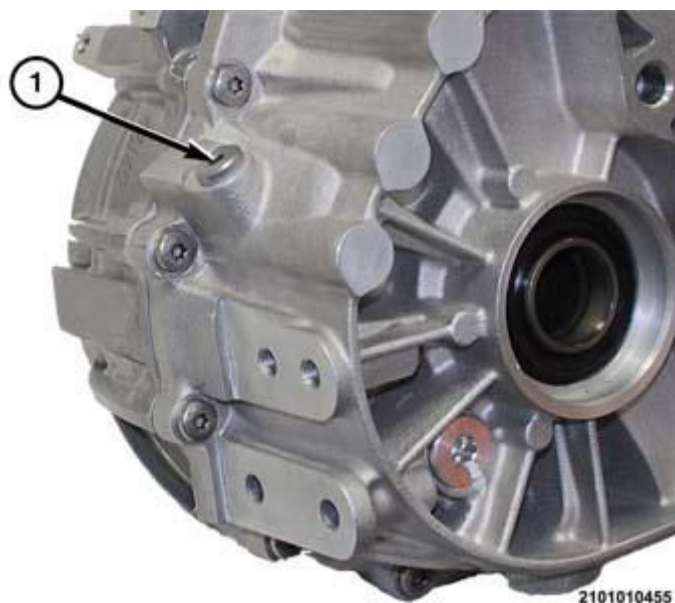


Fig. 566: Fluid Level Check Port
Courtesy of CHRYSLER GROUP, LLC

6. Remove the plug from the fluid level check port.

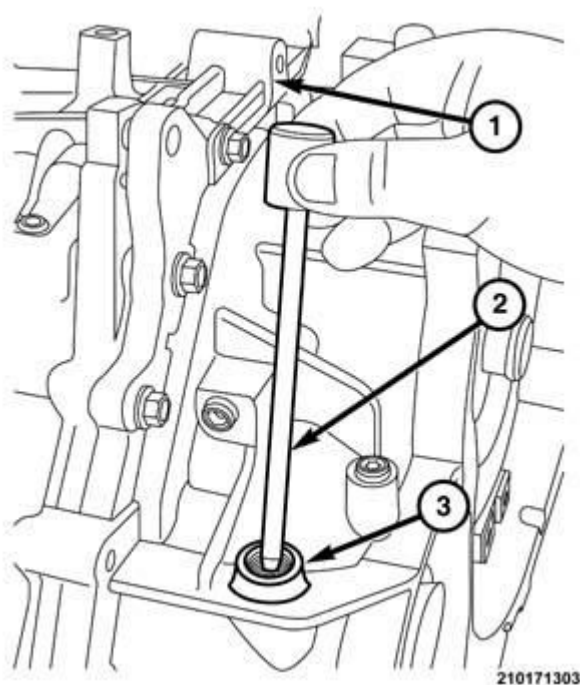


Fig. 567: Differential, Special Tool #10323A & Fluid Level Check Port
Courtesy of CHRYSLER GROUP, LLC

7. Insert tool (special tool #10323A, Dipstick) (2) into the fluid level check port (3) and allow the handle of the tool to rest on the flat surface of the transmission housing (1) around the check port.
8. Remove the tool from the check port, keeping the handle above the tip so the level reading remains accurate.
9. Note the increment on the shaft of the tool where the fluid left a witness mark.

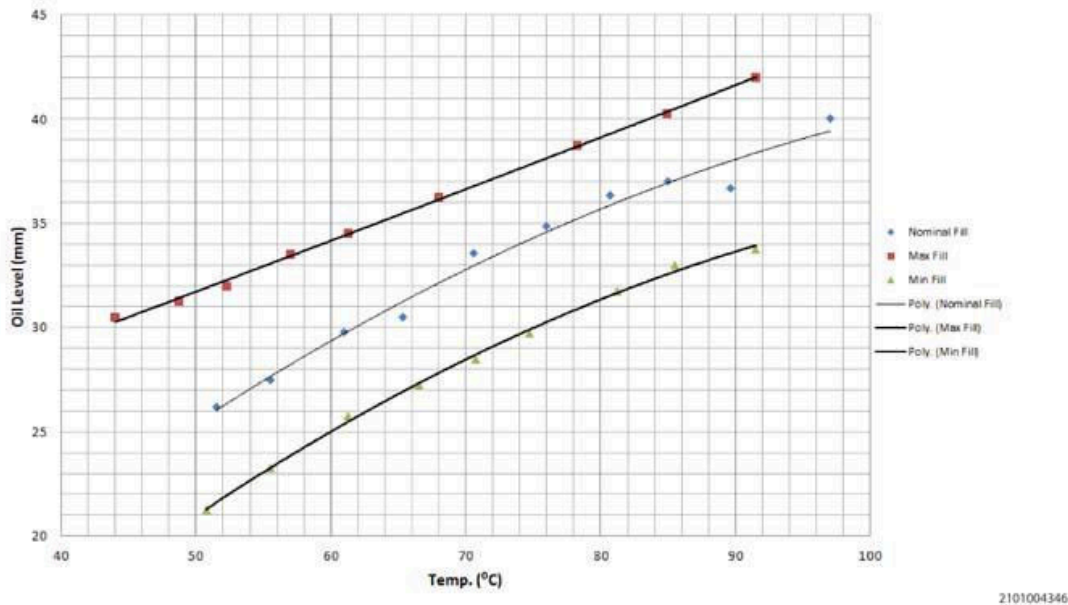


Fig. 568: Fluid Level & Temperature Chart
Courtesy of CHRYSLER GROUP, LLC

10. Based on the temperature of the fluid and the measurement on the tool, refer to the graph or the table to determine the proper level.
11. Install the plug into the fluid level check port. Tighten to specification.
12. Install the engine cover.

FLUID LEVEL TABLE

TEMP in °C	MIN LEVEL (mm)	NOMINAL LEVEL (mm)	MAX LEVEL (mm)
50°	21 mm	26 mm	31.5 mm
55°	23 mm	27.5 mm	33 mm
60°	25 mm	30 mm	34 mm
65°	27 mm	31 mm	35.5 mm
70°	28.5 mm	33 mm	36.5 mm
75°	30 mm	35 mm	38 mm
80°	31.5 mm	36 mm	39 mm
85°	32.5 mm	37 mm	40 mm
90°	34 mm	38 mm	41.5 mm

FLUID AND FILTER SERVICE

The 948TE automatic transmission is a sealed for life design and does not require periodic service. The only time the transmission fluid needs to be checked is when abnormal shifts frequently occur or evidence of a transmission fluid leak is present. The fluid filter is mounted internally and requires that the transmission be removed from the vehicle and disassembled to replace the filter. The fluid filter has a plastic body filled with polyester filter fleece.

NOTE: The fluid used in the 948TE automatic transmission is not compatible with other types of transmission fluid, use only Shell® L12108 Automatic Transmission Fluid or Mopar® equivalent after repairs have been completed. Refer to Star Parts for the part number.

Use of improper fluid will cause premature failure, poor shift quality and possible leaks.

REMOVAL

REMOVAL

NOTE: The fluid filter does not require periodic replacement. It should only be replaced in conjunction with a major failure that caused excessive fluid contamination or during an overhaul.

1. Remove the transmission from the vehicle. Refer to **REMOVAL**.
2. Drain the fluid from the transmission.
3. Remove the bellhousing from the transmission. Refer to **BELLHOUSING, REMOVAL**.



Fig. 569: Fluid Tube

Courtesy of CHRYSLER GROUP, LLC

4. Remove the fluid tube (1) from the intermediate support plate and bellhousing.

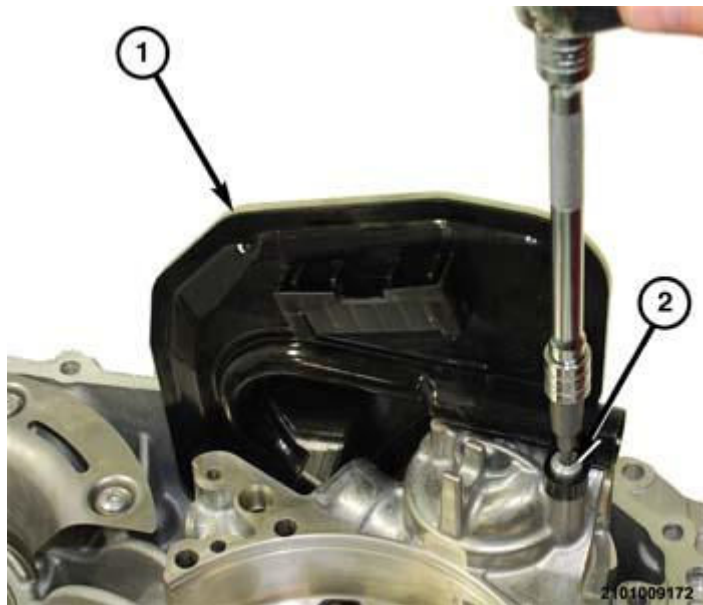


Fig. 570: Oil Filter, Intermediate Support Plate & Fastener
Courtesy of CHRYSLER GROUP, LLC

5. Remove the bolt (2) holding the oil filter (1) to the intermediate support plate.

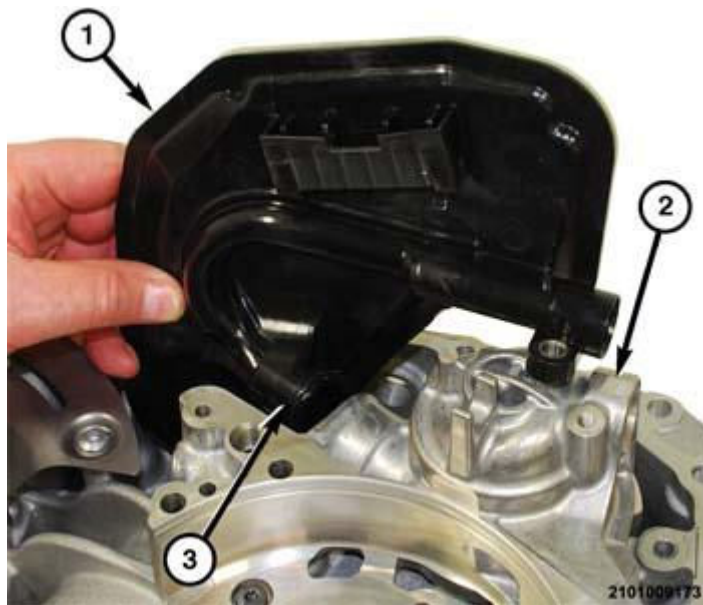


Fig. 571: Removing/Installing Transmission Oil Filter
Courtesy of CHRYSLER GROUP, LLC

6. Separate the oil filter (1) from the intermediate support plate (2).

INSTALLATION

INSTALLATION

1. Clean the intermediate support plate in preparation for the NEW filter.

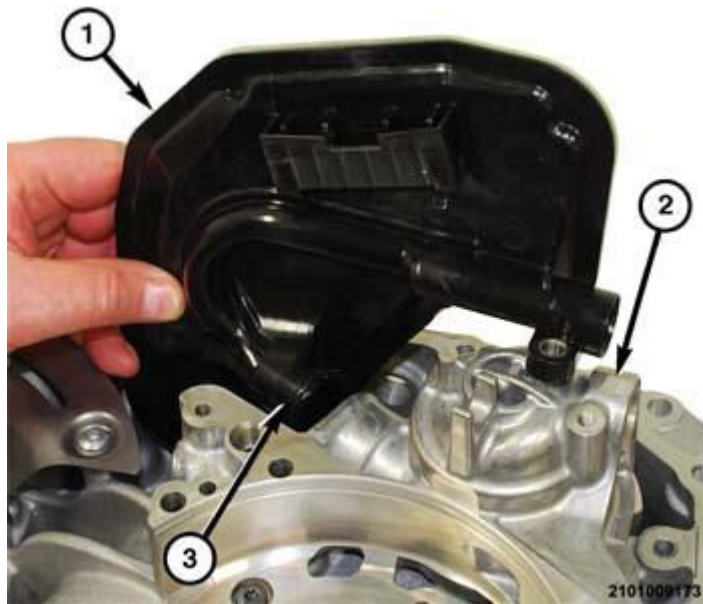


Fig. 572: Removing/Installing Transmission Oil Filter
Courtesy of CHRYSLER GROUP, LLC

2. Verify that the O-ring (3) is in good condition. Replace the O-ring (3) if damage is present.
3. Insert the oil filter neck (3) into the oil pump orifice and align the bolt hole with the bore in the intermediate support plate (2).

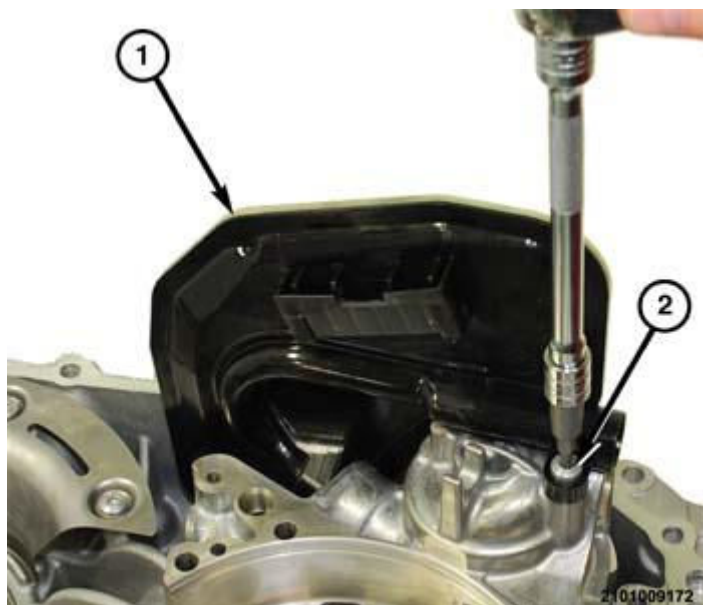


Fig. 573: Oil Filter, Intermediate Support Plate & Fastener
Courtesy of CHRYSLER GROUP, LLC

4. Install the bolt (2) to hold the oil filter (1) to the intermediate support plate and tighten to the proper specifications. Refer to **SPECIFICATIONS**.
5. Install the bellhousing on the transmission. Refer to **BELLHOUSING, INSTALLATION**.
6. Install the transmission in the vehicle. Refer to **INSTALLATION**.
7. Road test the vehicle to verify the repair.

MANUAL LEVER AND PARK ROD

REMOVAL

PARK DETENT AND MANUAL SHAFT

The transmission does not require removal to complete the following procedure.

1. Remove the valve body from the transmission. Refer to **VALVE BODY, REMOVAL**.



Fig. 574: View Of Ground Cable & Shift Cable
Courtesy of CHRYSLER GROUP, LLC

2. Using a suitable prying tool (1), separate the shift cable end (2) from the manual lever on the transmission.
3. Remove the nut holding the manual shift lever to the manual shaft.
4. Pry the manual shift lever upward and off the manual shaft.

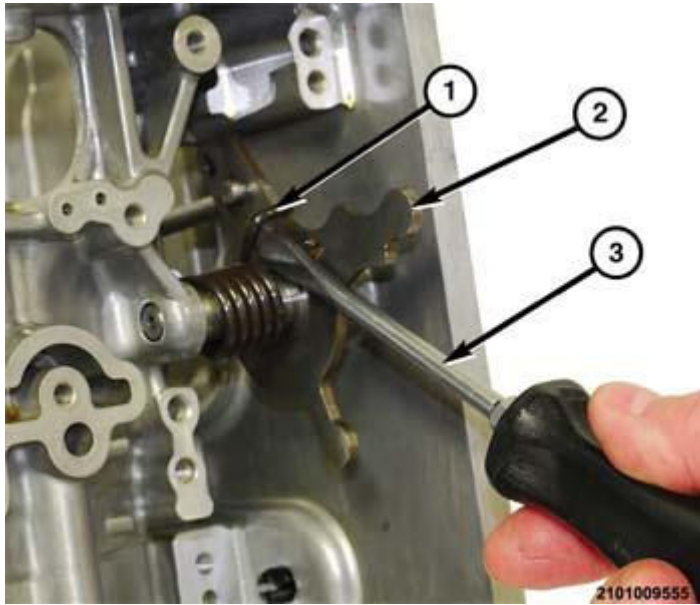


Fig. 575: Prying Spring Over Top Of Detent
Courtesy of CHRYSLER GROUP, LLC

5. Using a suitable screw driver (3), pry the spring (1) to the inside and off of the detent (2).

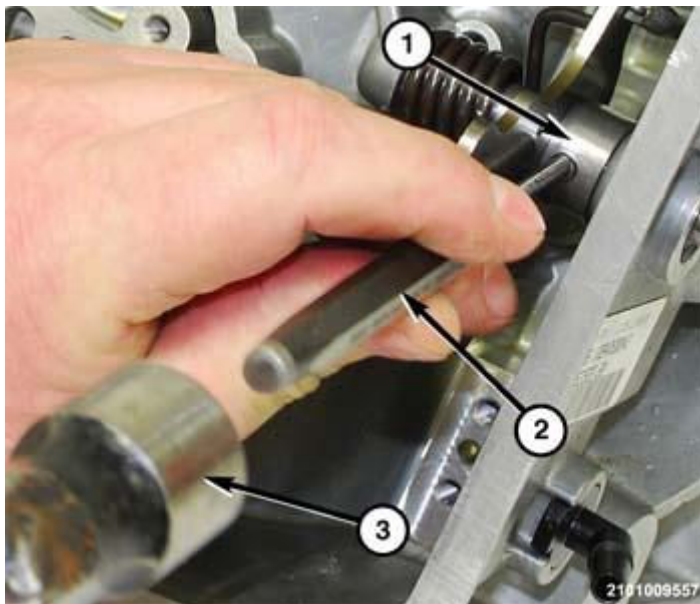


Fig. 576: Removing/Installing Detent Hub Roll Pin
Courtesy of CHRYSLER GROUP, LLC

6. Using a suitable hammer (3) and pin-punch (2), drive the roll-pin out of the detent hub (1).

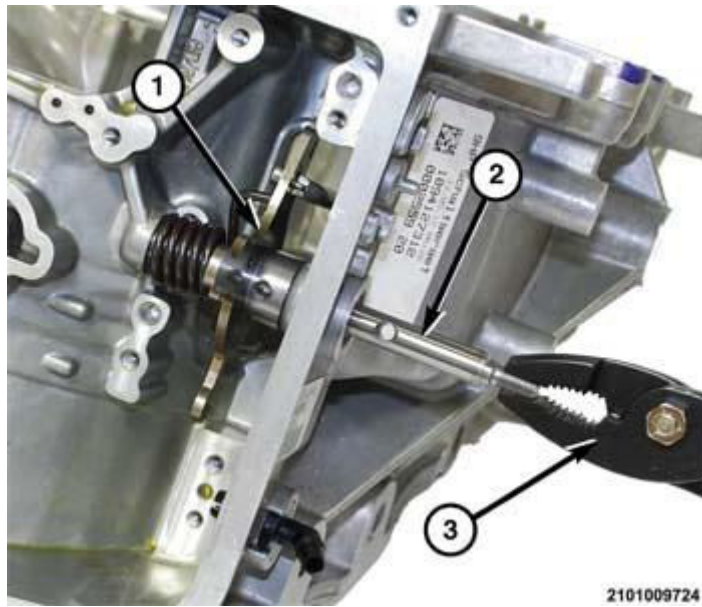


Fig. 577: Removing/Installing Manual Shaft
Courtesy of CHRYSLER GROUP, LLC

7. Using a suitable pliers (3), pull the manual shaft (2) out of the detent hub (1) and transmission housing.

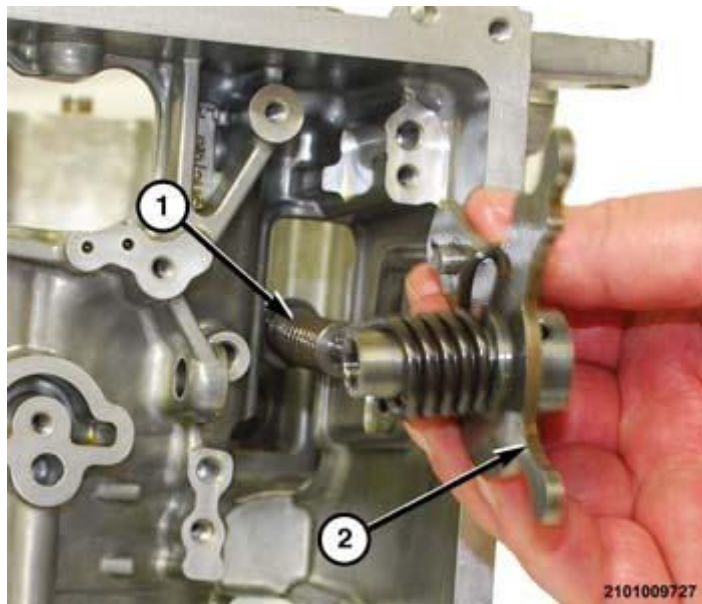


Fig. 578: Park Rod, Park Rod Guide And Detent
Courtesy of CHRYSLER GROUP, LLC

8. Separate the detent (2) and park rod (1) from the transmission.

INSTALLATION

PARK DETENT AND MANUAL SHAFT

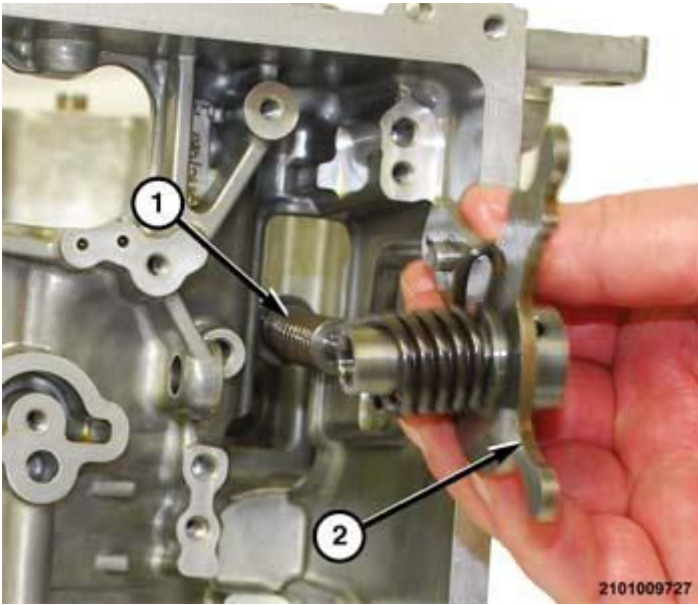


Fig. 579: Park Rod, Park Rod Guide And Detent
Courtesy of CHRYSLER GROUP, LLC

1. Insert the and park rod (1) into the Park rod guide and the detent (2) into the transmission.

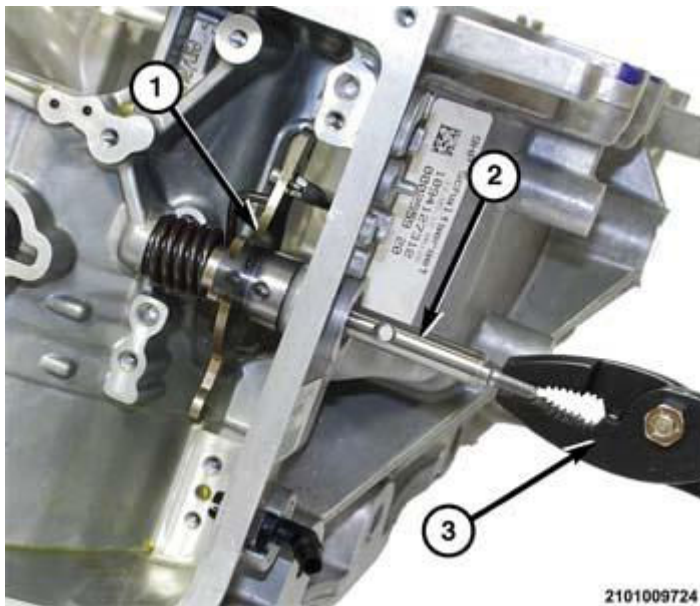


Fig. 580: Removing/Installing Manual Shaft
Courtesy of CHRYSLER GROUP, LLC

2. Insert the manual shaft (2) into the detent hub (1) and transmission housing and align the holes in the detent hub and the manual shaft.

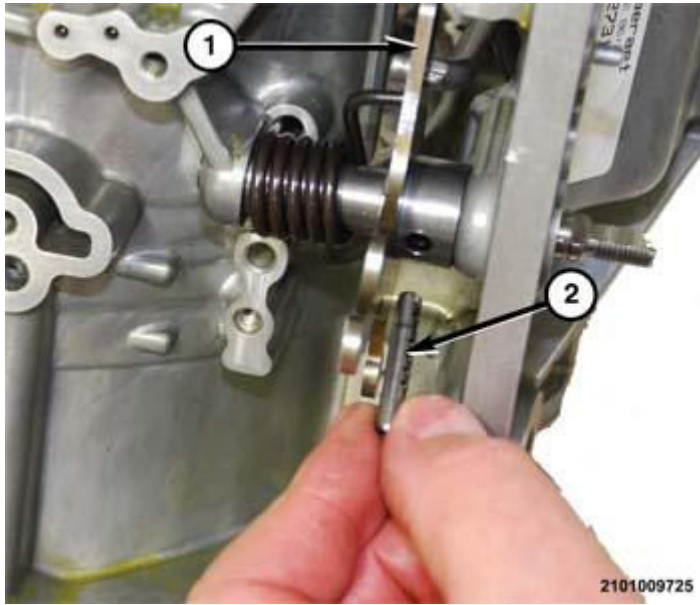


Fig. 581: Detent Hub Roll-Pin
Courtesy of CHRYSLER GROUP, LLC

3. Insert the tapered end of the roll-pin into the hole in the detent hub.

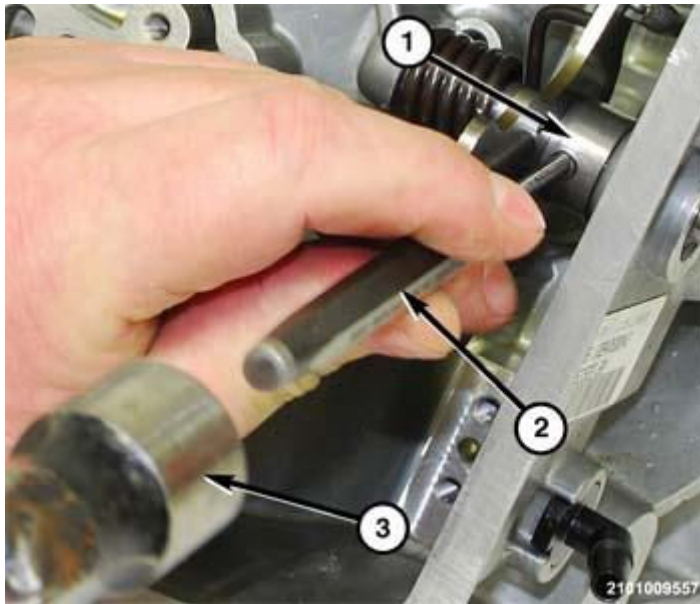


Fig. 582: Removing/Installing Detent Hub Roll Pin
Courtesy of CHRYSLER GROUP, LLC

4. Using a suitable hammer (3) and pin-punch (2), drive the roll-pin into of the detent hub (1) until the head is flush.

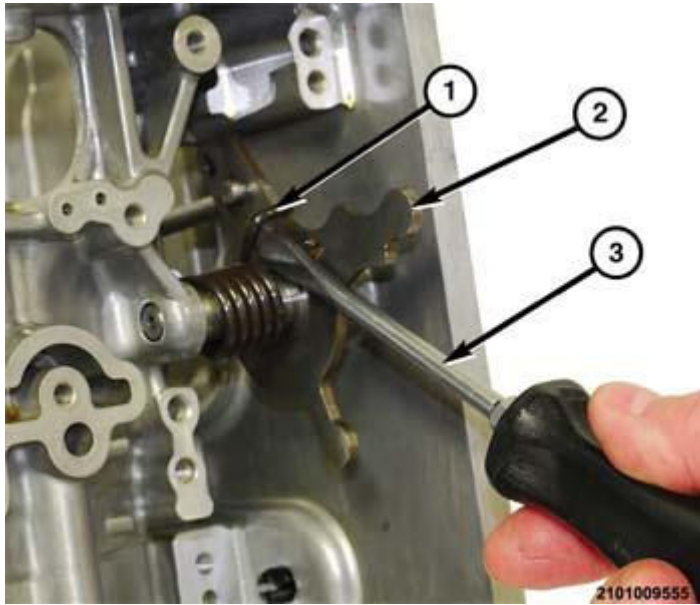


Fig. 583: Prying Spring Over Top Of Detent
Courtesy of CHRYSLER GROUP, LLC

5. Using a suitable screw driver (3), pry the spring (1) over the top of the detent (2).
6. Place the manual lever in position on the manual shift lever.
7. Install the nut to hold the manual shift lever to the manual shaft to the manual shaft. Refer to **SPECIFICATIONS**.
8. Snap the shift cable end onto the ball link on the manual shift lever.
9. Install the valve body into the transmission. Refer to **VALVE BODY, INSTALLATION**.

NEEDLE BEARING, OIL PUMP SPROCKET

REMOVAL

REMOVAL

1. Remove the transmission from the vehicle. Refer to **REMOVAL**.
2. Drain the fluid from the transmission.
3. Remove the bellhousing from the transmission. Refer to **BELLHOUSING, REMOVAL**.



Fig. 584: Fluid Tube

Courtesy of CHRYSLER GROUP, LLC

4. Remove the fluid tube (1) from the bellhousing.

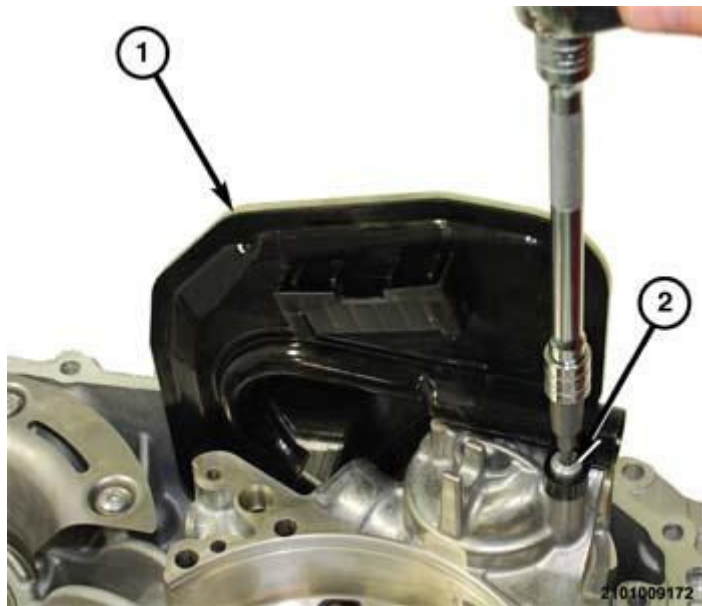


Fig. 585: Oil Filter, Intermediate Support Plate & Fastener

Courtesy of CHRYSLER GROUP, LLC

5. Remove the bolt (1) holding the oil filter (2) to the bellhousing.

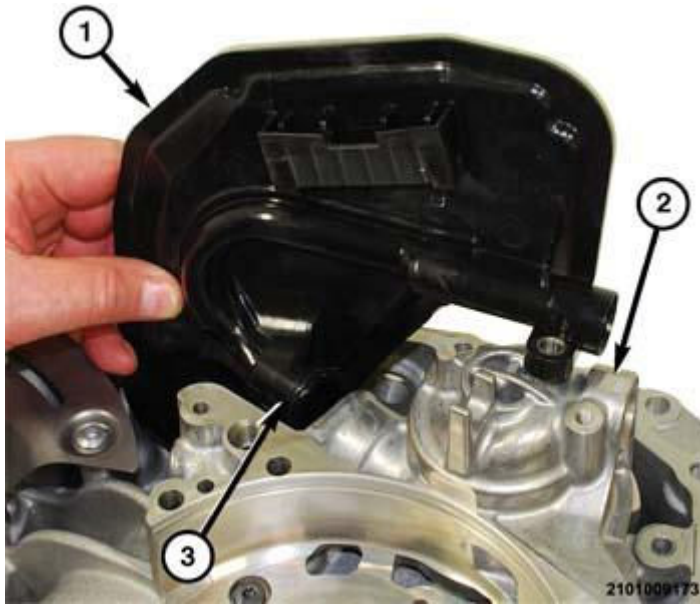


Fig. 586: Removing/Installing Transmission Oil Filter
Courtesy of CHRYSLER GROUP, LLC

6. Separate the oil filter (1) from the bellhousing (2).

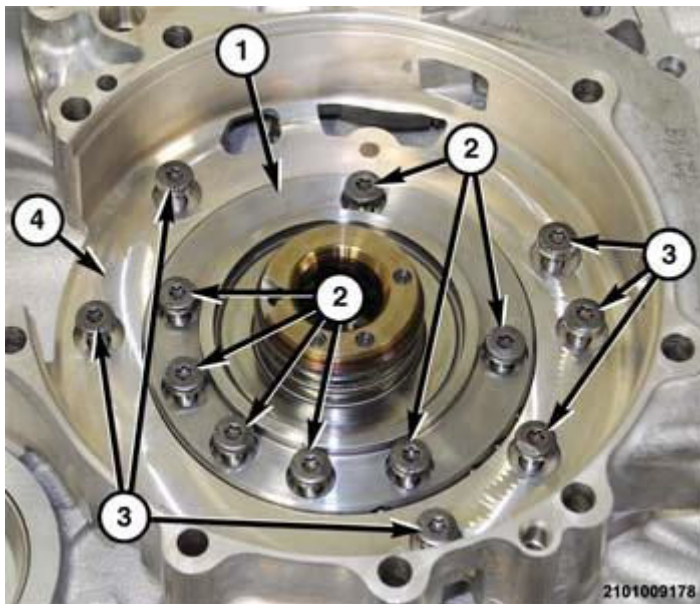


Fig. 587: Removing/Installing Bolts At Reaction Shaft To Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

7. Remove the bolts (2) holding the reaction shaft (1) to the intermediate support plate (4).

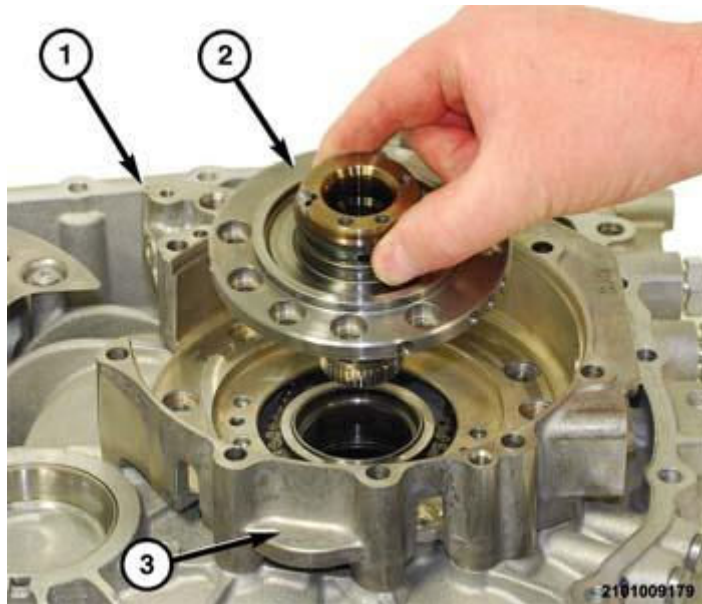


Fig. 588: Removing/Installing Reaction Shaft At Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

8. Separate the reaction shaft (2) from the intermediate support plate (1).

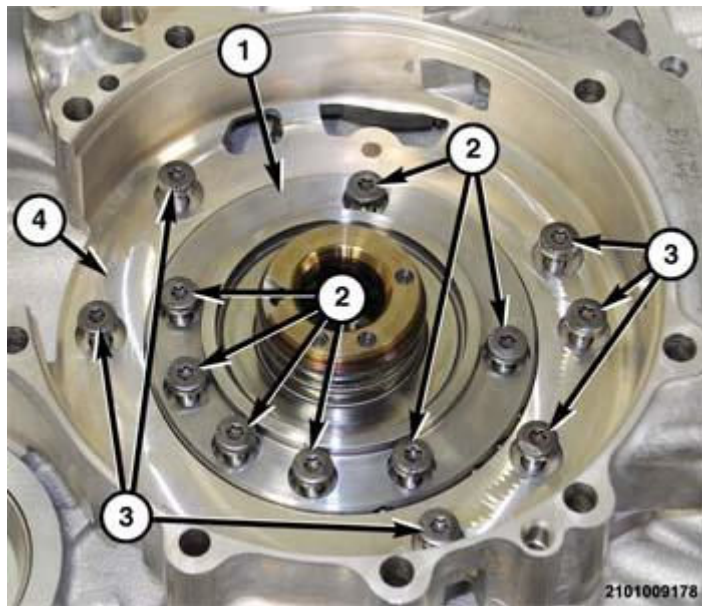


Fig. 589: Removing/Installing Bolts At Reaction Shaft To Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

9. Remove the bolts (3) holding the intermediate support plate and oil pump (1) to the bellhousing.

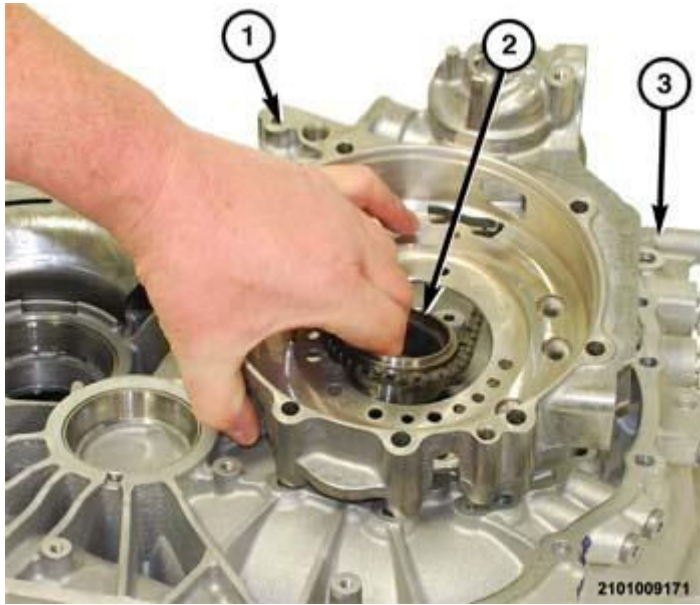


Fig. 590: Removing/Installing Intermediate Support Plate And Oil Pump
Courtesy of CHRYSLER GROUP, LLC

10. Separate the intermediate support plate and oil pump (1) from the bellhousing (3).
11. Using a suitable screw driver, remove the input shaft seal from the bellhousing.

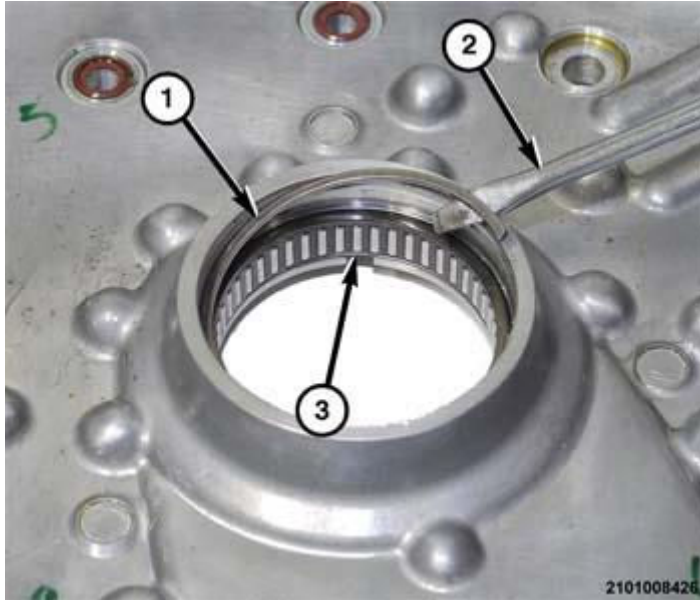


Fig. 591: View Of Snap-Ring Holding Oil Pump Sprocket Needle Bearing In Bellhousing
Courtesy of CHRYSLER GROUP, LLC

12. Using a suitable screw driver (2), remove the snap-ring (1) holding the oil pump sprocket needle bearing (3) in the bellhousing.

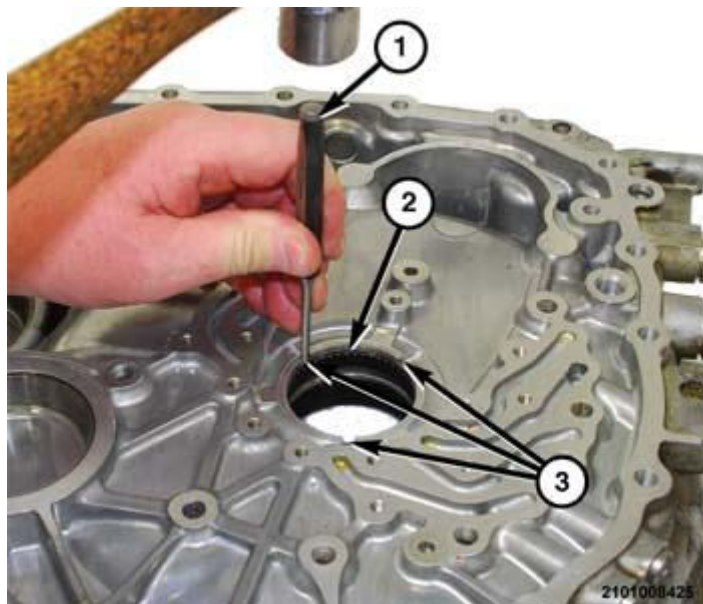


Fig. 592: Removing Oil Pump Sprocket Needle Bearing
Courtesy of CHRYSLER GROUP, LLC

13. Using a suitable punch tool, remove the oil pump sprocket needle bearing by tapping outward while alternating between the three notches in the bellhousing bore flange.

INSTALLATION

INSTALLATION

1. Clean the oil pump sprocket needle bearing and input shaft seal bore.



Fig. 593: Installing Oil Pump Sprocket Needle Bearing Into Bellhousing

Courtesy of CHRYSLER GROUP, LLC

2. Place the oil pump sprocket needle bearing (1) in position into the bore in the center of the bellhousing.

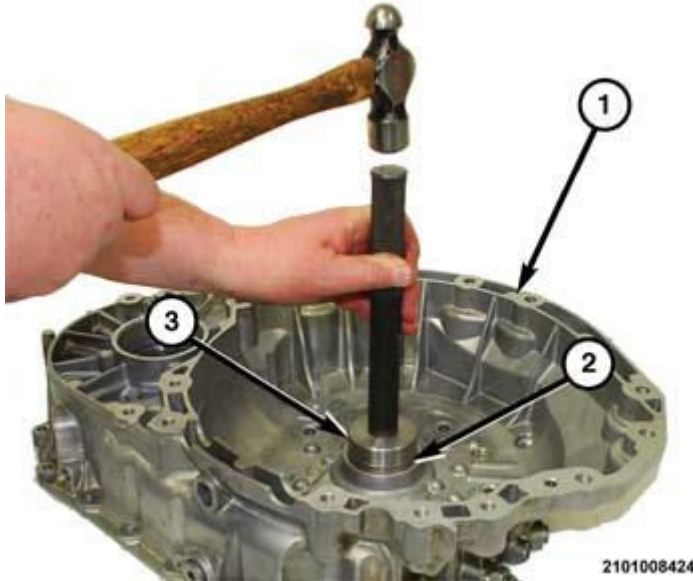


Fig. 594: Seating Oil Pump Sprocket Needle Bearing Against Flange
Courtesy of CHRYSLER GROUP, LLC

3. Using tool (special tool #10503, Installer, Bearing) (3) and (special tool #C-4171, Driver Handle, Universal), install the oil pump sprocket needle bearing (2) in the bellhousing (1) bore until the bearing butts against the flange.

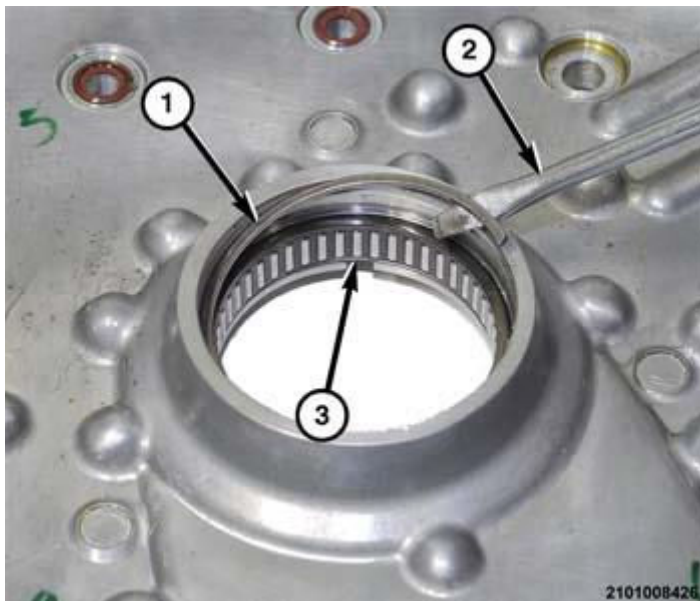


Fig. 595: View Of Snap-Ring Holding Oil Pump Sprocket Needle Bearing In Bellhousing
Courtesy of CHRYSLER GROUP, LLC

4. Install the snap-ring (1) to hold the oil pump sprocket needle bearing (3) in the bellhousing.
5. Apply assembly lube on the lip of the NEW seal.
6. Place the seal on tool (special tool #9677, Installer, Seal), with the tension spring away from the tool, and insert the seal into the bore in the bellhousing.

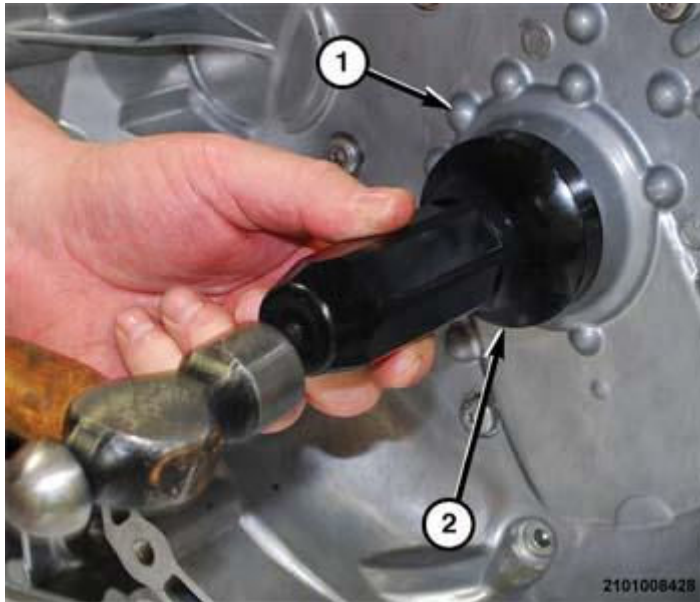


Fig. 596: Installing Seal Into Bellhousing
Courtesy of CHRYSLER GROUP, LLC

7. Using a suitable hammer, drive the seal into the bore in the center of the bellhousing until the tool seats against the bellhousing.

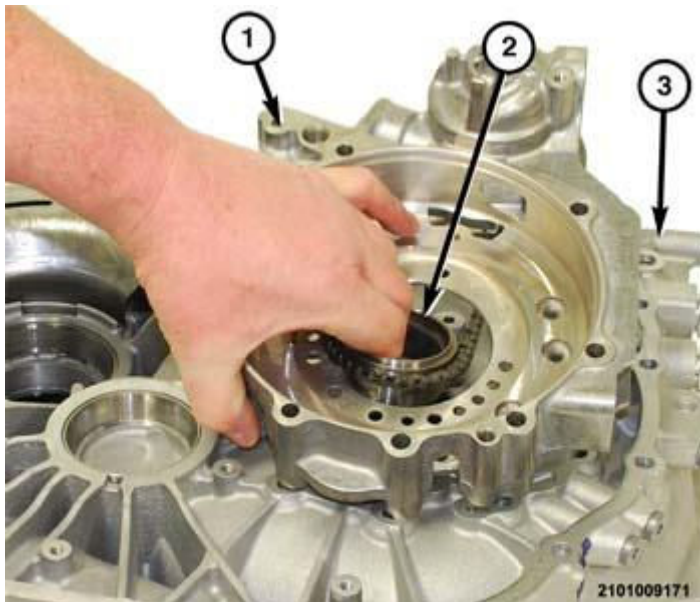


Fig. 597: Removing/Installing Intermediate Support Plate And Oil Pump

Courtesy of CHRYSLER GROUP, LLC

8. Place the intermediate support plate and oil pump (1) in position on the bellhousing (3) while guiding the oil pump sprocket into oil pump sprocket needle bearing.

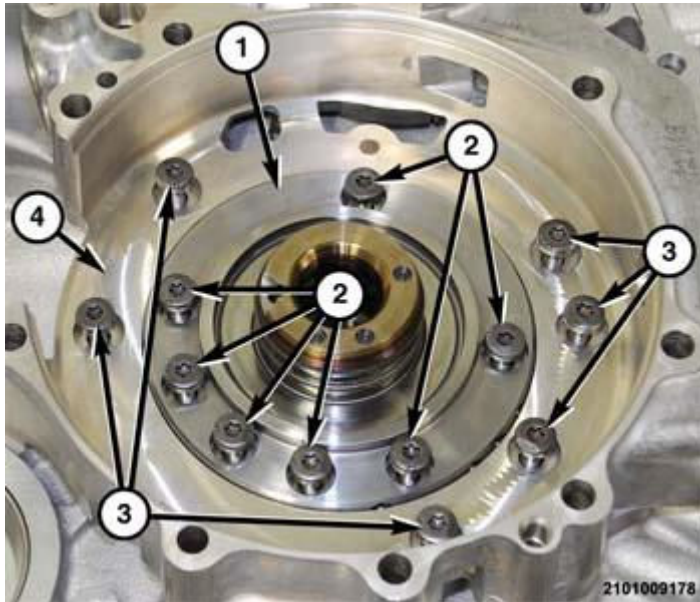


Fig. 598: Removing/Installing Bolts At Reaction Shaft To Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

9. Install the bolts (2) to hold the reaction shaft (1) to the intermediate support plate (4) and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

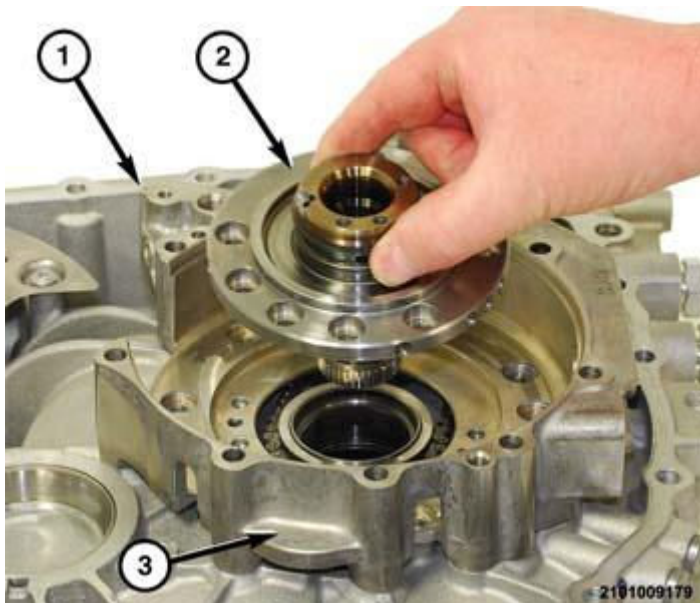


Fig. 599: Removing/Installing Reaction Shaft At Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

10. Place the reaction shaft (2) in position on the intermediate support plate (1).

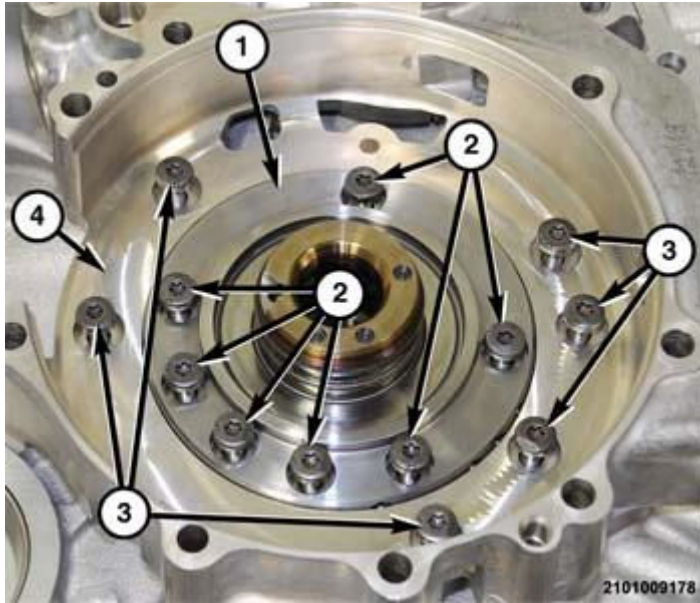


Fig. 600: Removing/Installing Bolts At Reaction Shaft To Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

11. Install the bolts (2) to hold the reaction shaft (1) to the intermediate support plate (4) and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

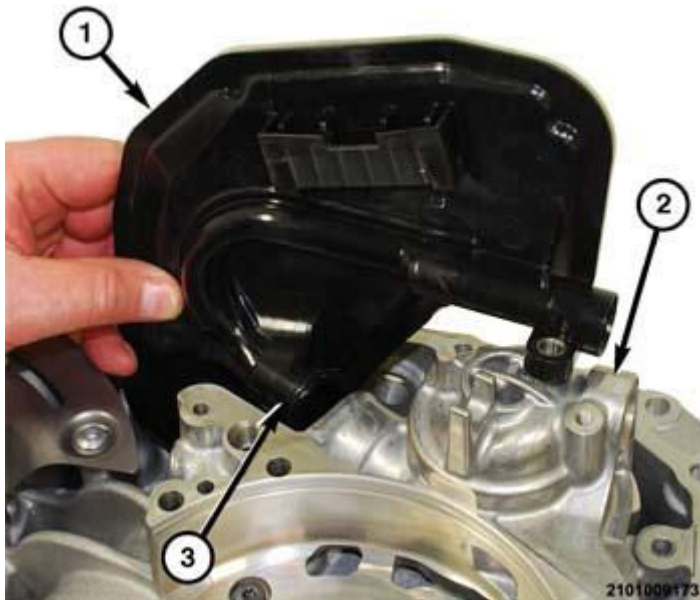


Fig. 601: Removing/Installing Transmission Oil Filter
Courtesy of CHRYSLER GROUP, LLC

12. Place the oil filter (1) in position on the bellhousing (2) and insert feed tube into the oil pump.

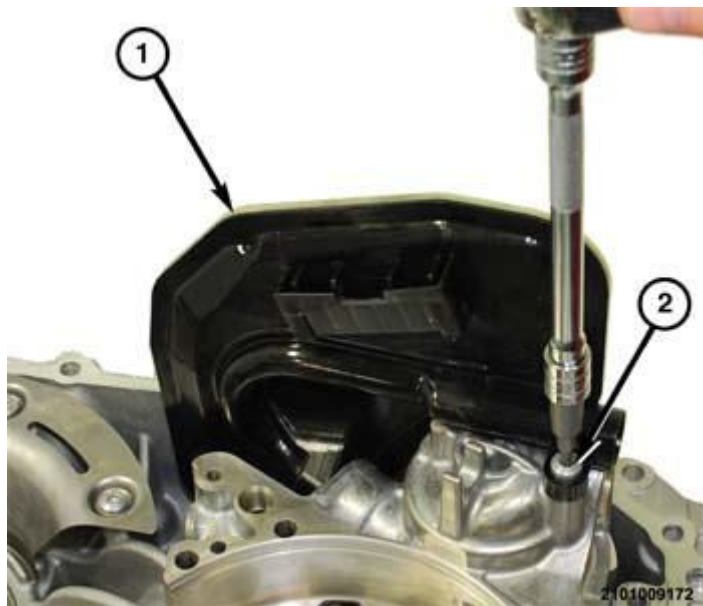


Fig. 602: Oil Filter, Intermediate Support Plate & Fastener
Courtesy of CHRYSLER GROUP, LLC

13. Install the bolt (1) to hold the oil filter (2) to the bellhousing and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

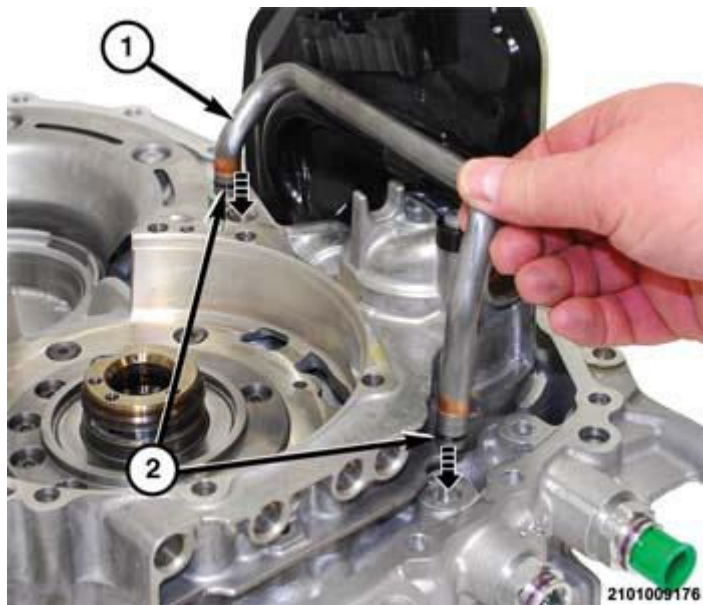


Fig. 603: Fluid Tube
Courtesy of CHRYSLER GROUP, LLC

14. Install the fluid tube (1) in the bellhousing.
15. Install the bellhousing on the transmission. Refer to **BELLHOUSING, INSTALLATION**.
16. Install the transmission in the vehicle. Refer to **INSTALLATION**.

17. Road test the vehicle to verify the repair.

PARKING SPRAG AND GUIDE

REMOVAL

REMOVAL

1. Remove the transmission from the vehicle. Refer to **REMOVAL**.
2. Position the transmission on the clean, stable work surface.
3. Remove the bellhousing from the transmission housing. Refer to **BELLHOUSING, REMOVAL**.

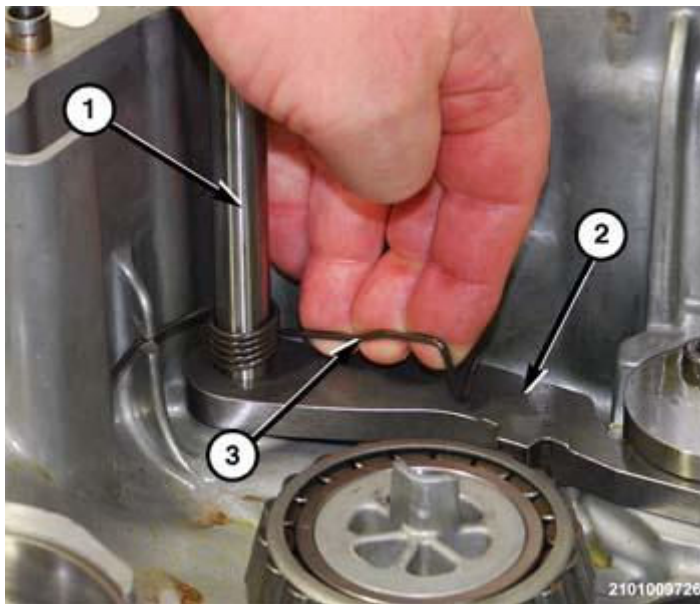


Fig. 604: Removing/Installing Park Pawl
Courtesy of CHRYSLER GROUP, LLC

4. Compress and release the park pawl (2) return spring (3).
5. Pull the reaction pin (1) outward and separate the reaction pin (1) from the park pawl (2).
6. Separate the park pawl (2) from the park rod guide.

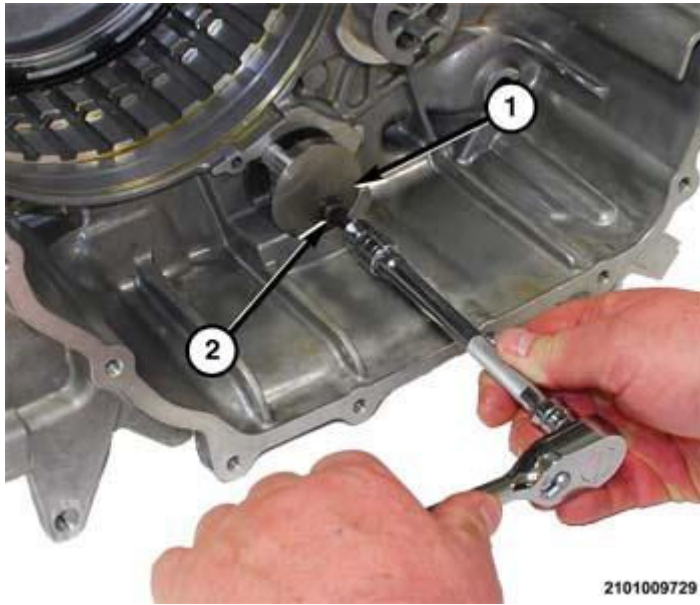


Fig. 605: Removing/Installing Park Rod Guide Bolt
Courtesy of CHRYSLER GROUP, LLC

7. Remove the bolt (2) holding the park rod guide (1) to the transmission housing.

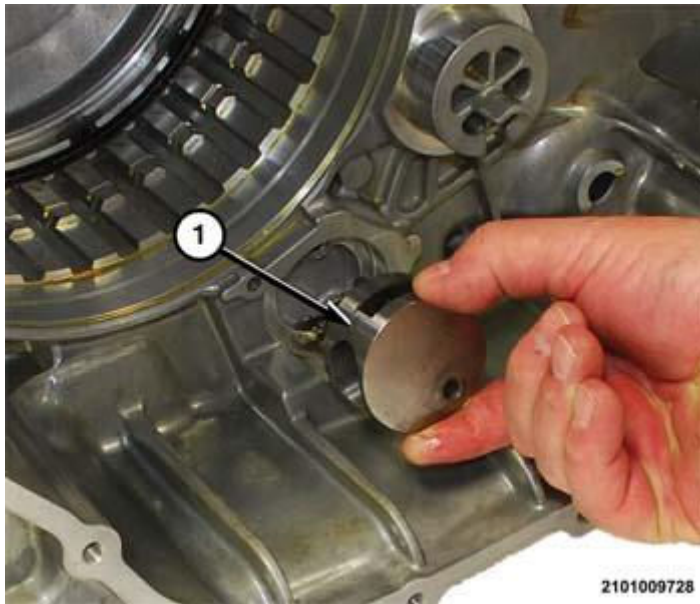


Fig. 606: Removing/Installing Park Rod Guide
Courtesy of CHRYSLER GROUP, LLC

8. Separate the park rod guide (1) from the transmission.

INSTALLATION

PARK ROD GUIDE AND PAWL

NOTE: If the park pawl is damaged the transfer gear may also be damaged. Replace the transfer gear if damage is present. If the transfer gear is replaced the proper thickness bearing preload select shim will have to be established.

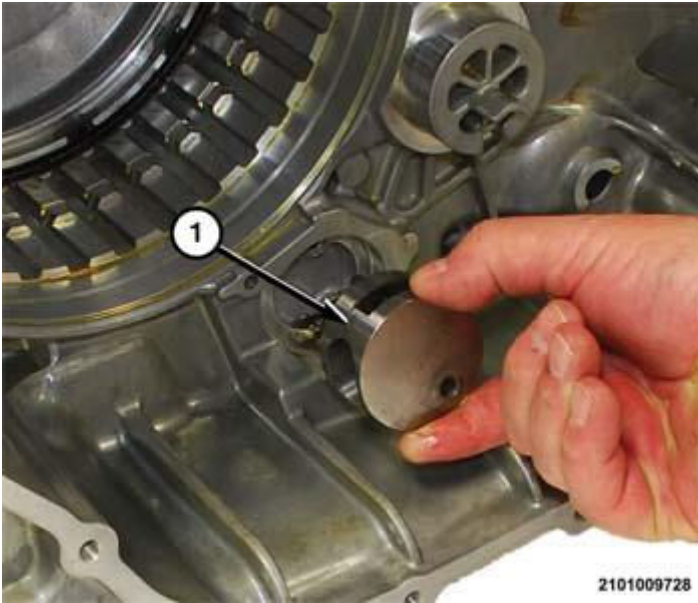


Fig. 607: Removing/Installing Park Rod Guide
Courtesy of CHRYSLER GROUP, LLC

1. Place the park rod guide (1) in position on the transmission.

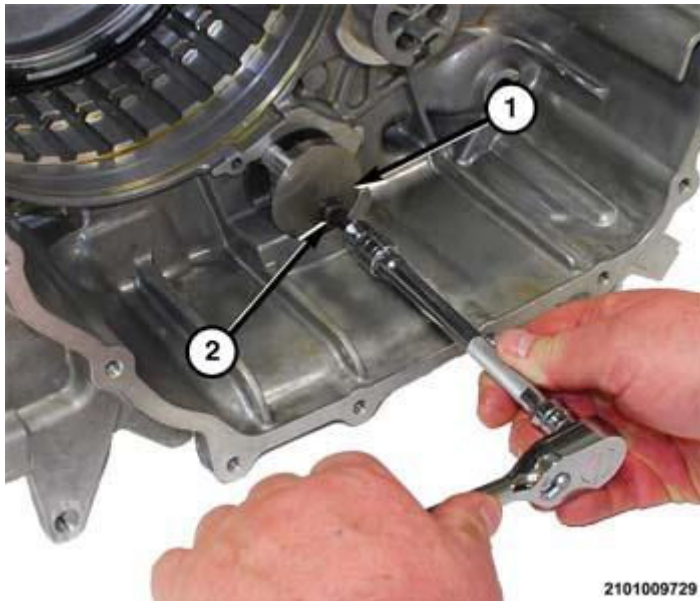


Fig. 608: Removing/Installing Park Rod Guide Bolt
Courtesy of CHRYSLER GROUP, LLC

2. Install the bolt (2) to hold the park rod guide (1) to the transmission housing and tighten to the proper

specifications. Refer to **SPECIFICATIONS**.

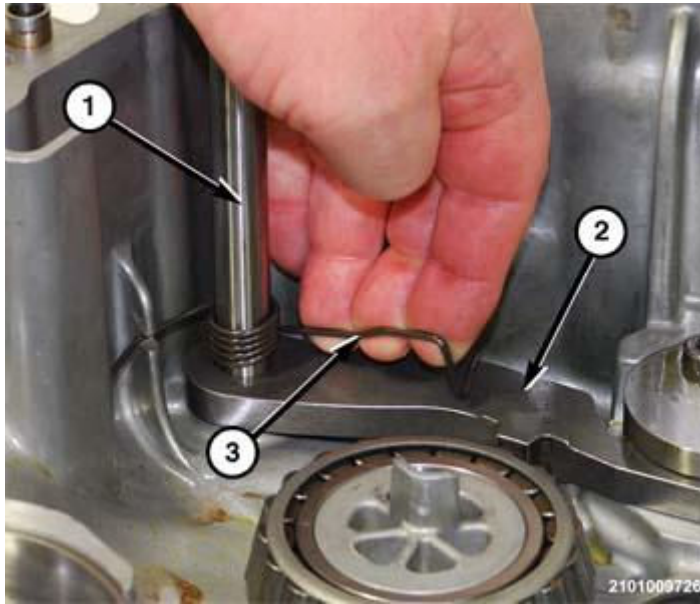


Fig. 609: Removing/Installing Park Pawl
Courtesy of CHRYSLER GROUP, LLC

3. Place the park pawl (2) in position in park rod guide.
4. Insert the reaction pin (1) through the park pawl (2) and into the transmission housing.
5. Slide the park pawl return spring (3) over the reaction pin (1) and insert the tail of the spring into the notch in the transmission housing.
6. Wind the park pawl return spring (3) counterclockwise and hook the bent end of the spring over the park pawl (2).
7. Install the bellhousing into the transmission housing. Refer to **BELLHOUSING, INSTALLATION**.
8. Install the torque converter.
9. Install the transmission into the vehicle. Refer to **INSTALLATION**.
10. Road test the vehicle to verify the repair.

PUMP, FLUID

REMOVAL

REMOVAL

1. Remove the transmission from the vehicle. Refer to **REMOVAL**.
2. Drain the fluid from the transmission.
3. Remove the bellhousing from the transmission. Refer to **BELLHOUSING, REMOVAL**.



Fig. 610: Fluid Tube
Courtesy of CHRYSLER GROUP, LLC

4. Remove the fluid tube (1) from the intermediate support plate and bellhousing.

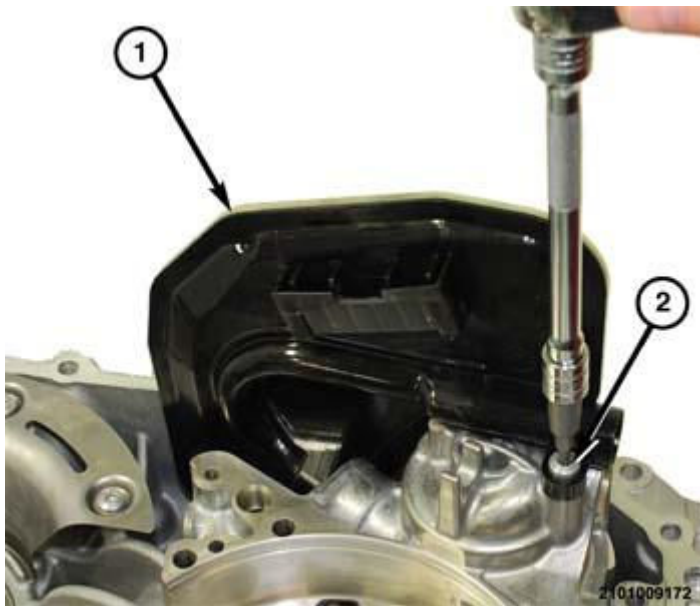


Fig. 611: Oil Filter, Intermediate Support Plate & Fastener
Courtesy of CHRYSLER GROUP, LLC

5. Remove the bolt (2) holding the oil filter (1) to the intermediate support plate.

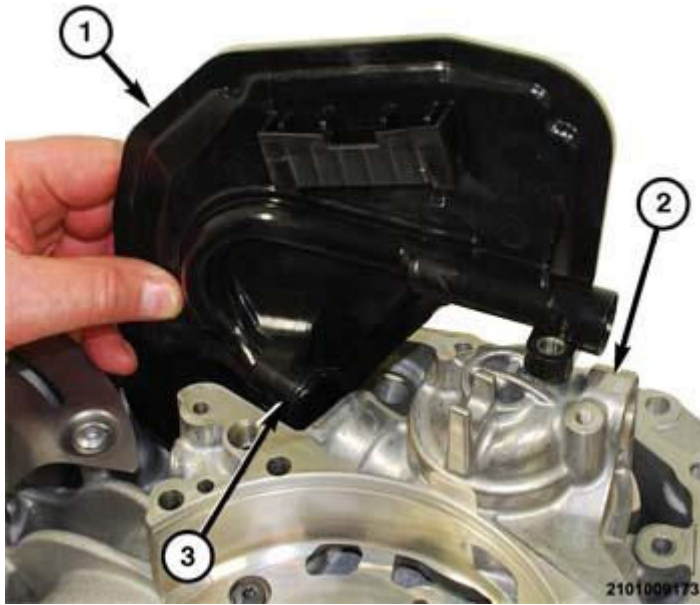


Fig. 612: Removing/Installing Transmission Oil Filter
Courtesy of CHRYSLER GROUP, LLC

6. Separate the oil filter (1) from the intermediate support plate (2).

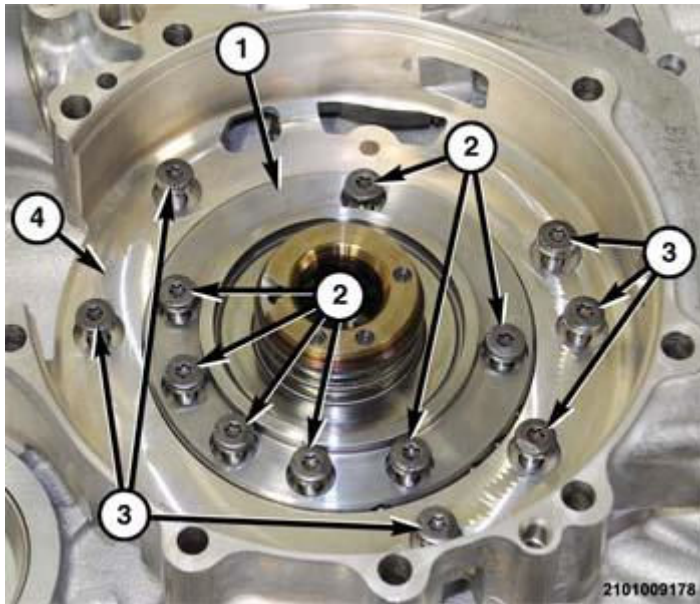


Fig. 613: Removing/Installing Bolts At Reaction Shaft To Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

7. Remove the bolts (2) holding the reaction shaft (1) to the intermediate support plate (4).

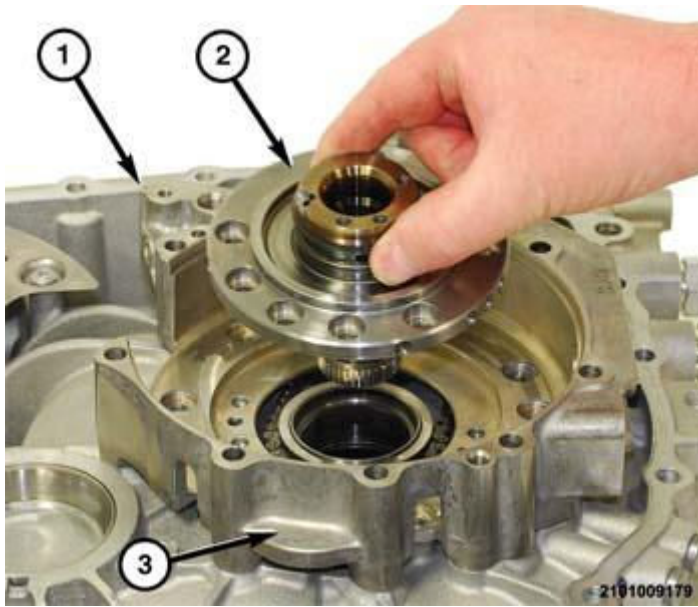


Fig. 614: Removing/Installing Reaction Shaft At Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

8. Separate the reaction shaft (2) from the intermediate support plate (1).

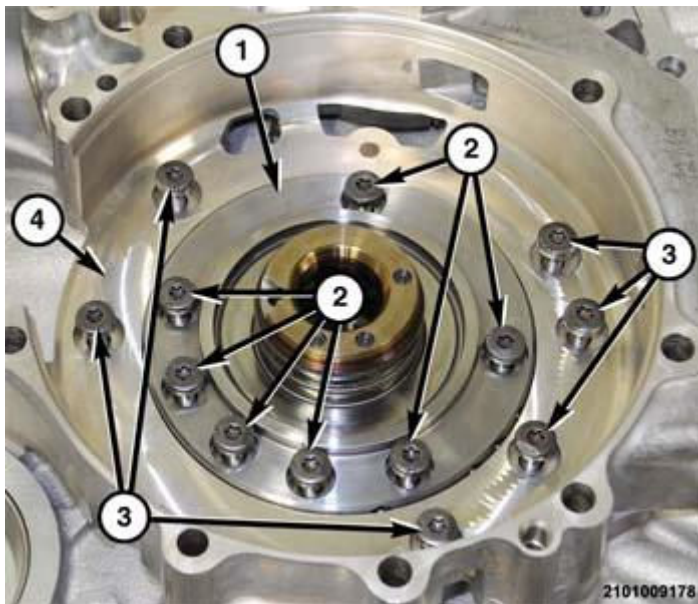


Fig. 615: Removing/Installing Bolts At Reaction Shaft To Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

9. Remove the bolts (3) holding the intermediate support plate and oil pump (1) to the bellhousing.

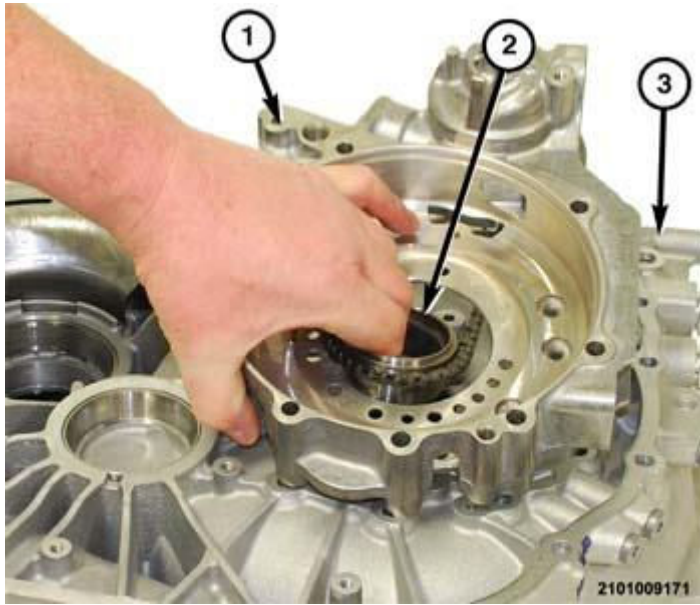


Fig. 616: Removing/Installing Intermediate Support Plate And Oil Pump
Courtesy of CHRYSLER GROUP, LLC

10. Separate the intermediate support plate and oil pump (1) from the bellhousing (3).
11. Turn the intermediate support plate and oil pump (1) outside up on the work surface.

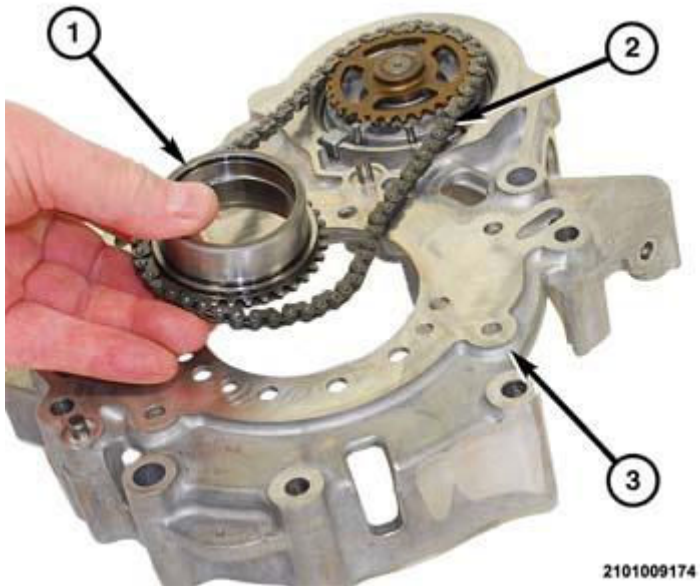


Fig. 617: View Of Oil Pump Drive Sprocket & Drive Chain
Courtesy of CHRYSLER GROUP, LLC

12. Separate the oil pump drive sprocket (1) from the drive chain (2).

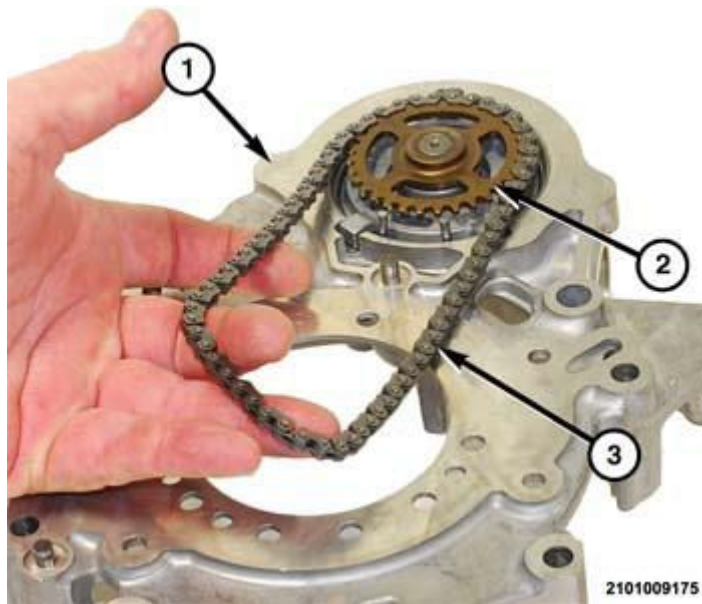


Fig. 618: View Of Oil Pump Drive Chain & Oil Pump Driven Sprocket
Courtesy of CHRYSLER GROUP, LLC

13. Separate the oil pump drive chain (3) from the oil pump driven sprocket (2).

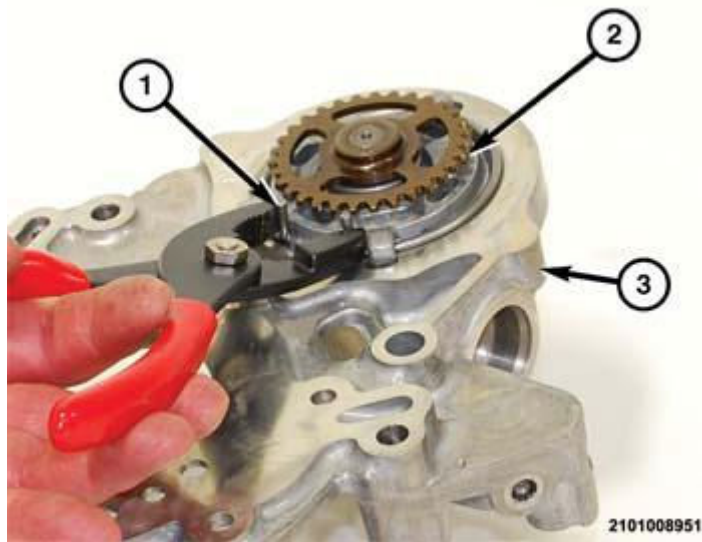


Fig. 619: Compressing Snap-Ring At Oil Pump
Courtesy of CHRYSLER GROUP, LLC

14. Using a suitable pliers (1), compress the snap-ring holding the oil pump (2) into the intermediate support plate (3).
15. While holding compression on the snap-ring (1), pry the oil pump out of the bore in the intermediate support plate (3).

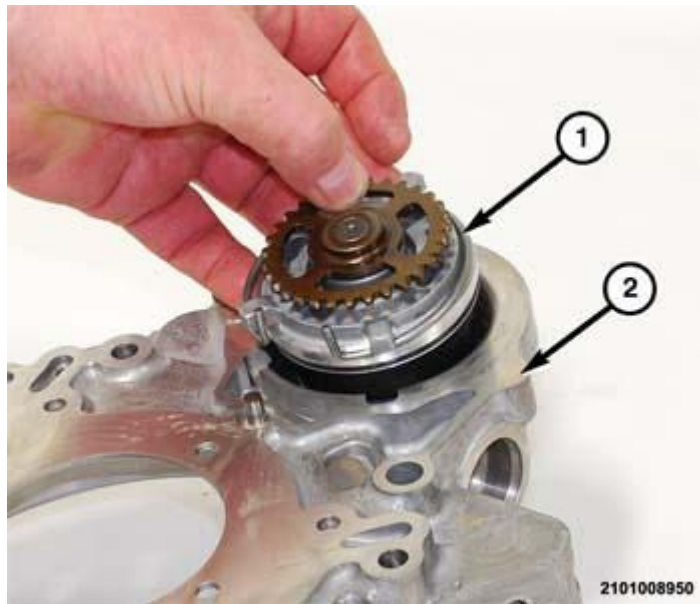


Fig. 620: Removing/Installing Oil Pump At Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

16. Separate the oil pump (1) from the intermediate support plate (2).

INSTALLATION

INSTALLATION

1. Clean the intermediate support plate and oil pump with suitable solvent and blow them dry with regulated 344 kPa (50 psi) shop air.
2. Inspect the intermediate support plate and oil pump for apparent damage or wear. If the intermediate support plate is damaged, the transmission will require replacement. If the oil pump is damaged, replace the oil pump.

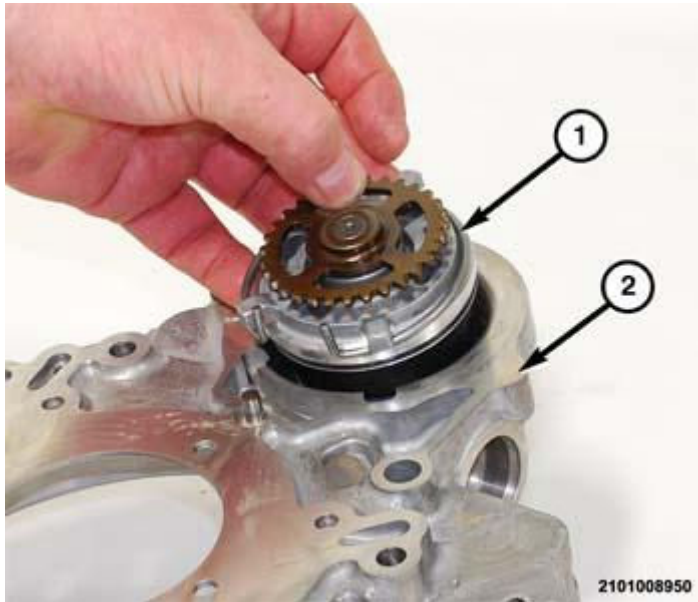


Fig. 621: Removing/Installing Oil Pump At Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

3. Insert the oil pump (1) into the intermediate support plate (2). Align the tabs on the pump with the notches on the intermediate support plate.

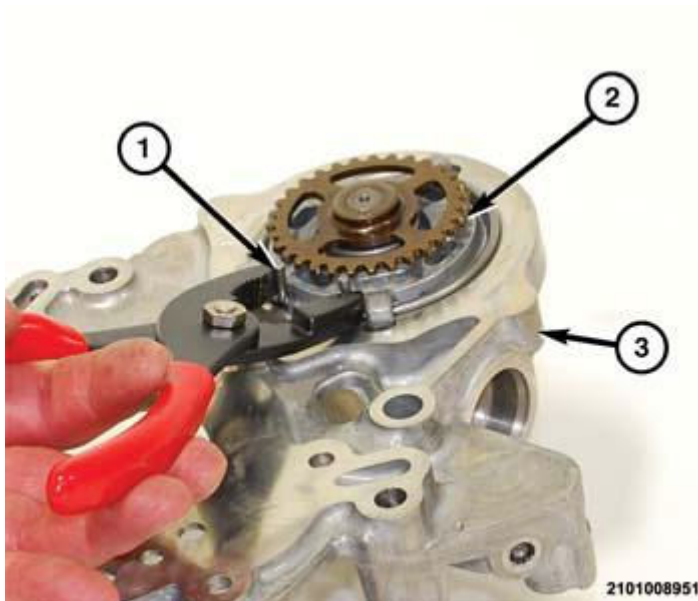


Fig. 622: Compressing Snap-Ring At Oil Pump
Courtesy of CHRYSLER GROUP, LLC

4. Using a suitable pliers (1), compress the snap-ring to hold the oil pump (2) into the intermediate support plate (3).
5. While holding compression on the snap-ring (1), tap the oil pump into the bore in the intermediate support plate (3) until it seats.

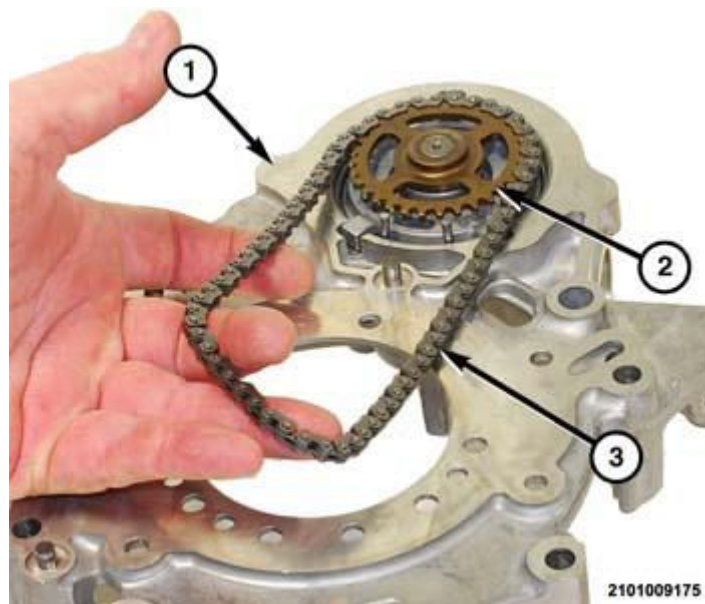


Fig. 623: View Of Oil Pump Drive Chain & Oil Pump Driven Sprocket
Courtesy of CHRYSLER GROUP, LLC

6. install the oil pump drive chain (3) onto the oil pump driven sprocket (2).

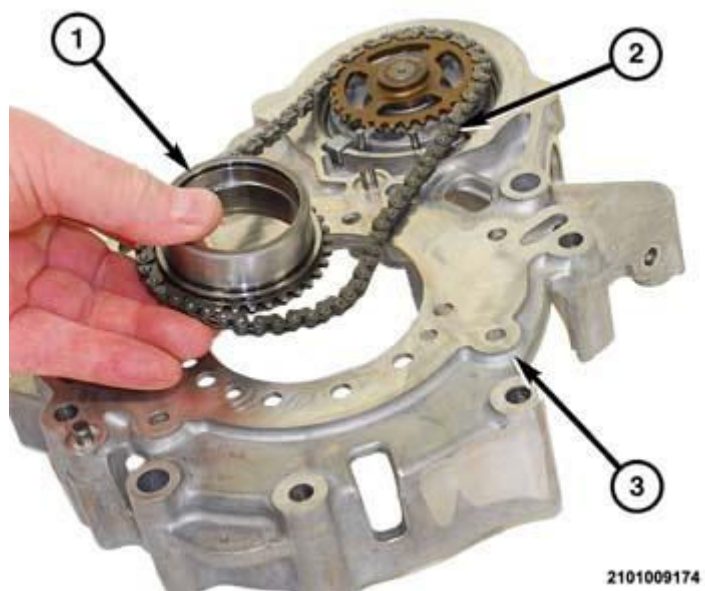


Fig. 624: View Of Oil Pump Drive Sprocket & Drive Chain
Courtesy of CHRYSLER GROUP, LLC

7. Install the oil pump drive sprocket (1) onto the drive chain (2).
8. While holding the chain on the drive sprocket, turn the intermediate support plate and oil pump (1) inside up on the work surface.

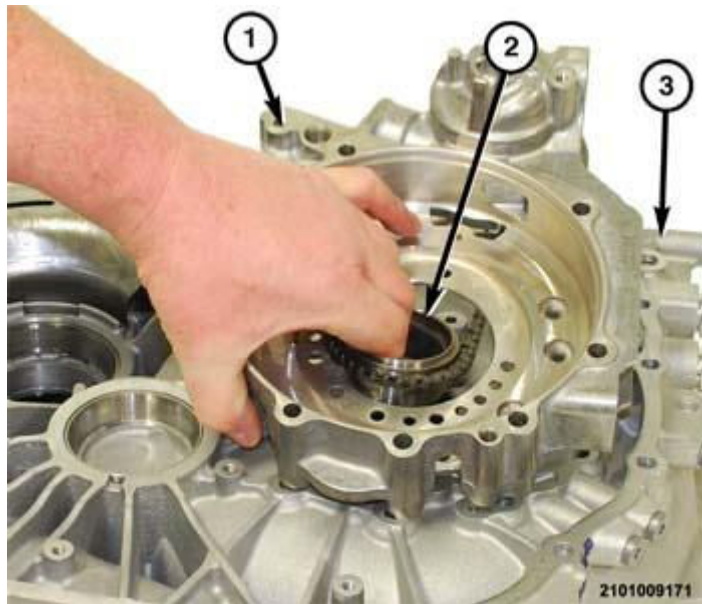


Fig. 625: Removing/Installing Intermediate Support Plate And Oil Pump
 Courtesy of CHRYSLER GROUP, LLC

9. Place the intermediate support plate and oil pump (1) in position on the bellhousing (3).
10. Insert the oil pump drive sprocket into the oil pump sprocket needle bearing.

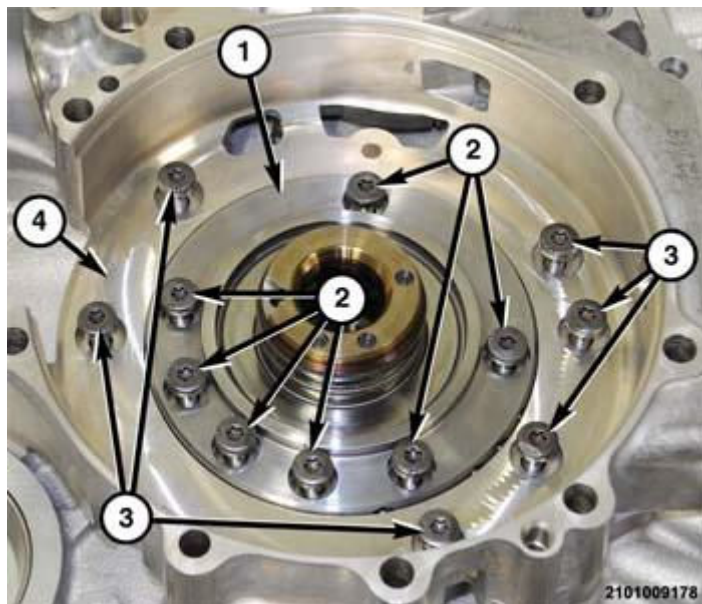


Fig. 626: Removing/Installing Bolts At Reaction Shaft To Intermediate Support Plate
 Courtesy of CHRYSLER GROUP, LLC

11. Install the bolts (3) to hold the intermediate support plate and oil pump (1) to the bellhousing and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

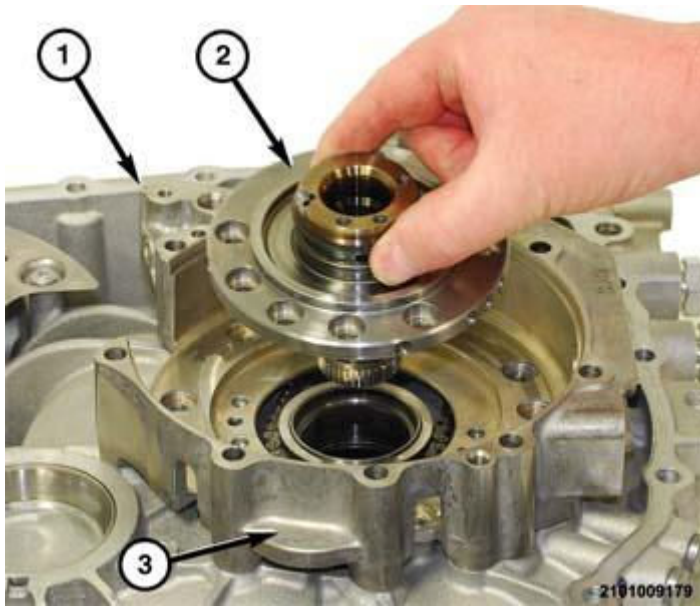


Fig. 627: Removing/Installing Reaction Shaft At Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

12. Place the reaction shaft (2) into the intermediate support plate (1).

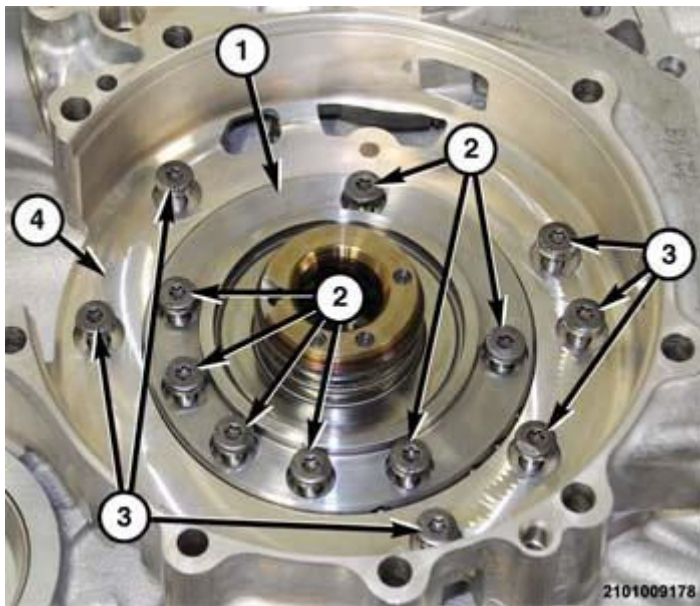


Fig. 628: Removing/Installing Bolts At Reaction Shaft To Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

13. Install the bolts (2) to hold the reaction shaft (1) to the intermediate support plate (4) and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

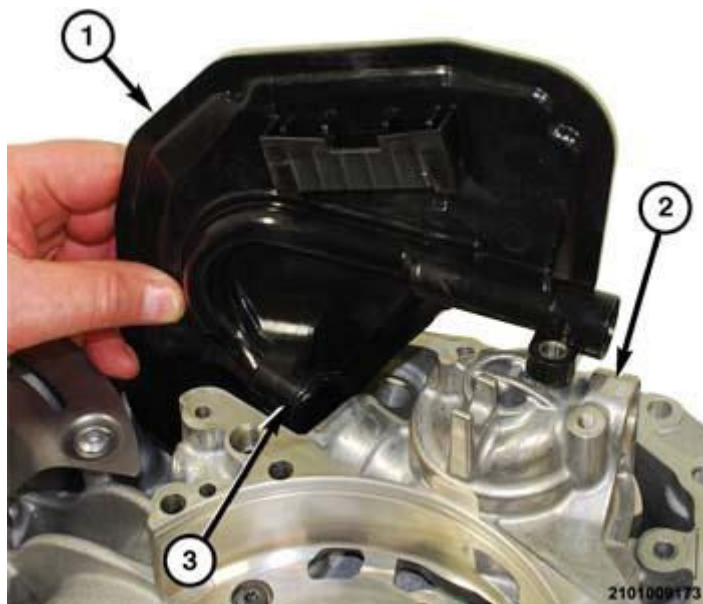


Fig. 629: Removing/Installing Transmission Oil Filter
Courtesy of CHRYSLER GROUP, LLC

14. Insert the oil filter neck (3) into the oil pump orifice and align the bolt hole with the bore in the intermediate support plate (2).

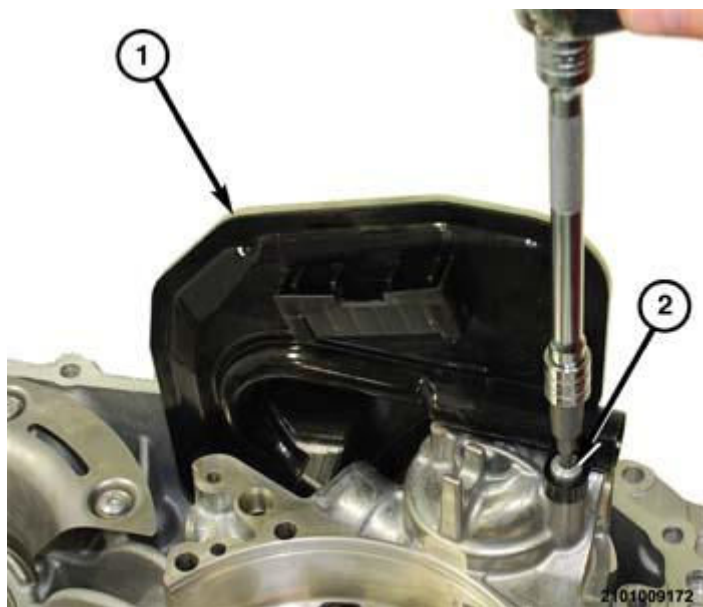


Fig. 630: Oil Filter, Intermediate Support Plate & Fastener
Courtesy of CHRYSLER GROUP, LLC

15. Install the bolt (2) to hold the oil filter (1) to the intermediate support plate and tighten to the proper specifications. Refer to **SPECIFICATIONS**.



Fig. 631: Fluid Tube

Courtesy of CHRYSLER GROUP, LLC

16. Replace the O-ring seals (2) on the fluid tube (1).
17. Install the fluid tube (1) into the bellhousing and intermediate support plate.
18. Install the bellhousing on the transmission. Refer to **BELLHOUSING, INSTALLATION**.
19. Install the transmission in the vehicle. Refer to **INSTALLATION**.
20. Road test the vehicle to verify the repair.

SENSOR, FLUID PRESSURE

REMOVAL

REMOVAL

1. Position the vehicle on a suitable hoist with the transmission in neutral. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove the valve body. Refer to **VALVE BODY, REMOVAL**.
3. Turn the valve body over to gain access to the pressure sensor.

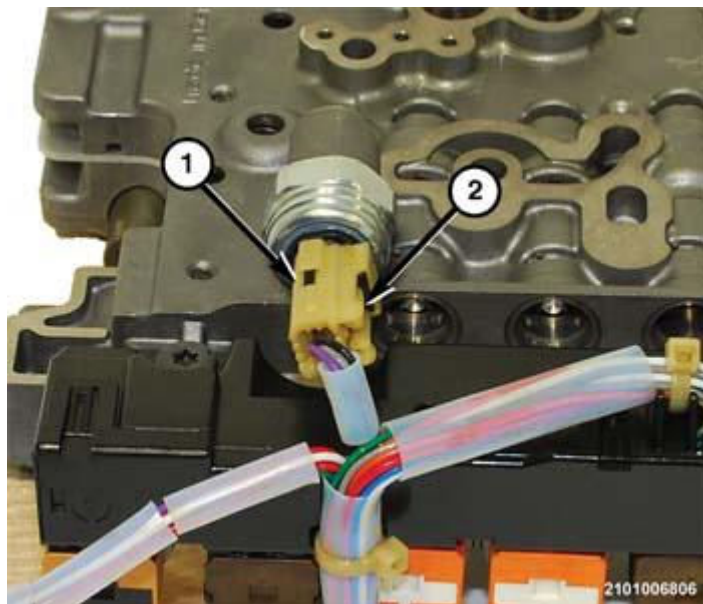


Fig. 632: Fluid Pressure Sensor Wire Connector
Courtesy of CHRYSLER GROUP, LLC

4. Release the lock on the pressure sensor wire connector.
5. Pull the wire connector from the pressure sensor.

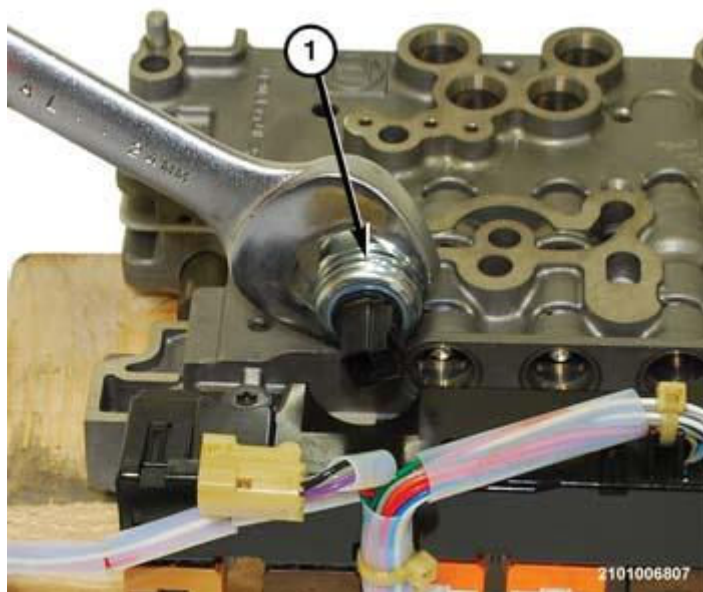


Fig. 633: Loosening/Tightening Fluid Pressure Sensor
Courtesy of CHRYSLER GROUP, LLC

6. Using a suitable wrench, loosen the pressure sensor.

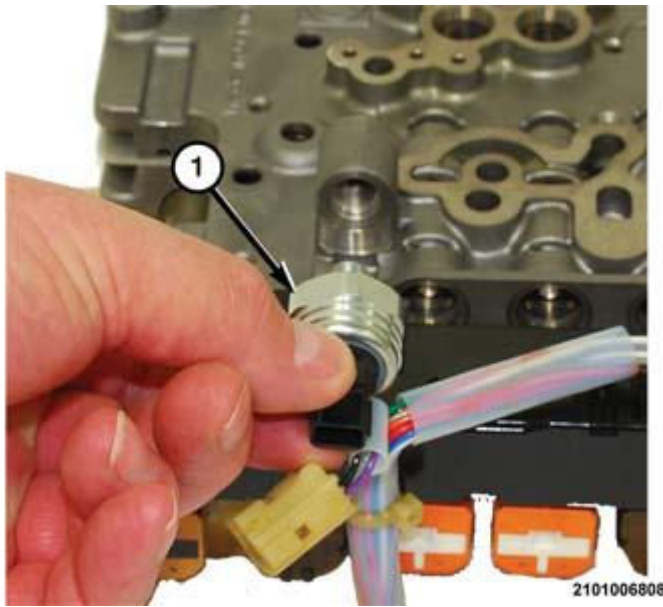


Fig. 634: Removing/Installing Fluid Pressure Sensor
Courtesy of CHRYSLER GROUP, LLC

7. Remove the pressure sensor from the valve body.

INSTALLATION

INSTALLATION

1. Remove the old O-ring from the pressure sensor if the old pressure sensor is reused.



Fig. 635: Fluid Pressure Sensor & O-Ring
Courtesy of CHRYSLER GROUP, LLC

2. Install a NEW O-ring (2) on the pressure sensor (1).

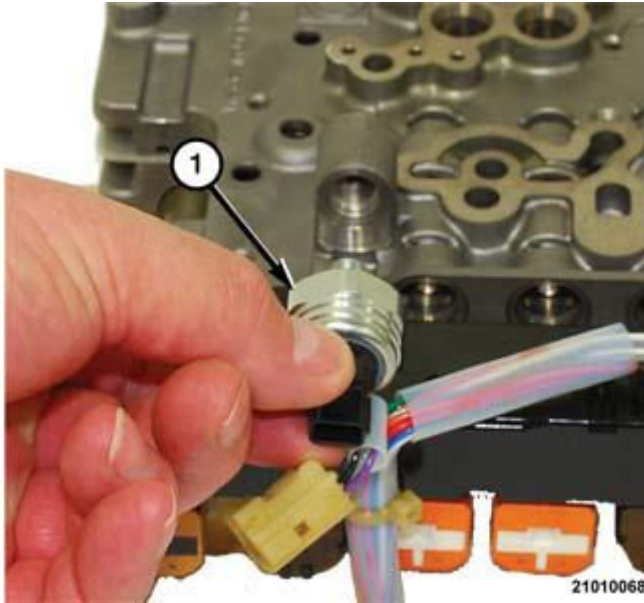


Fig. 636: Removing/Installing Fluid Pressure Sensor
Courtesy of CHRYSLER GROUP, LLC

3. Thread the pressure sensor (1) into the valve body.

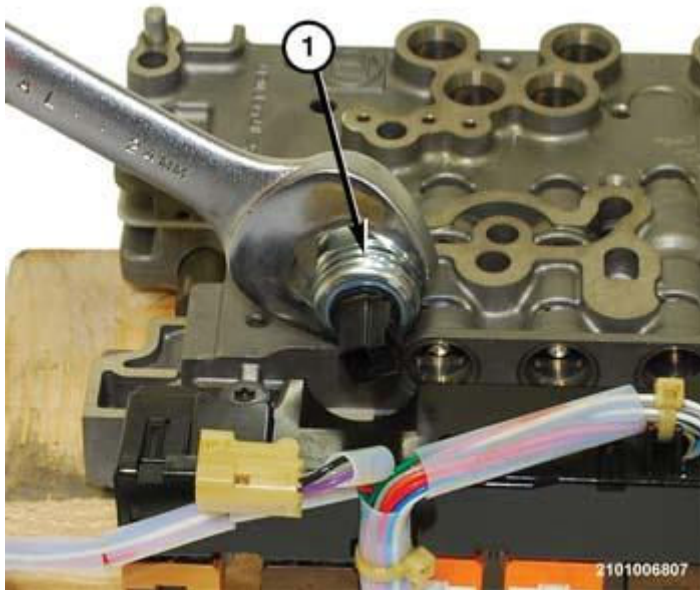


Fig. 637: Loosening/Tightening Fluid Pressure Sensor
Courtesy of CHRYSLER GROUP, LLC

4. Using a suitable wrench, tighten the pressure sensor (1).

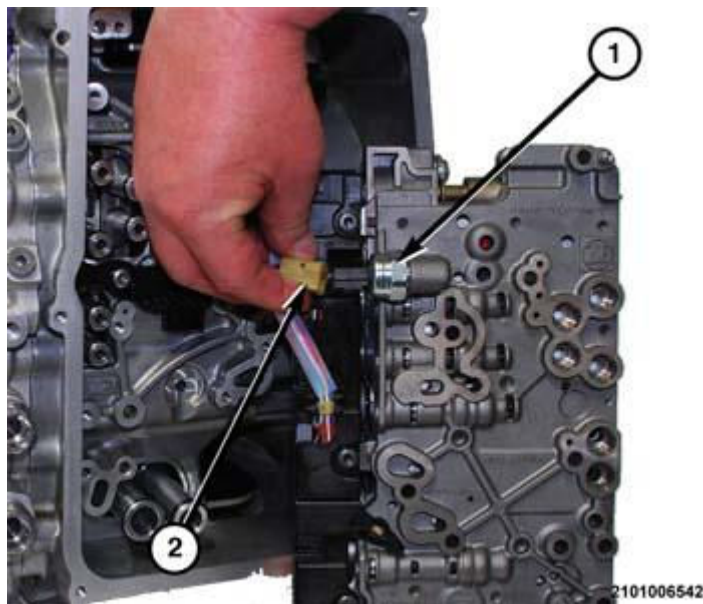


Fig. 638: Fluid Pressure Transducer Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

5. Push the pressure sensor wire connector (2) into the pressure sensor (1).
6. The lock on the pressure sensor wire connector will click when fully engaged.
7. Turn the valve body over into position on transmission.
8. Install the valve body. Refer to **VALVE BODY, INSTALLATION**.
9. Road test the vehicle to verify the repair.

SEAL, AXLE

REMOVAL

FWD BOTH SIDES - AWD AND 4WD LEFT SIDE

1. Remove the halfshaft from the vehicle. Refer to **REMOVAL** .

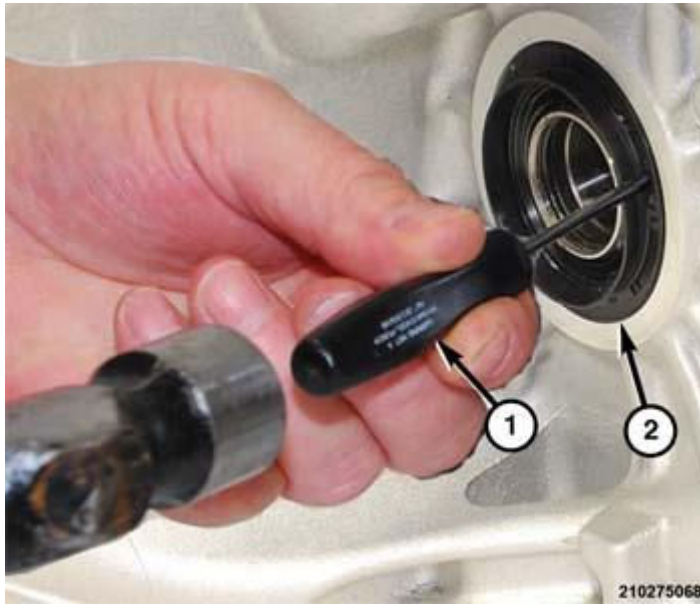


Fig. 639: Punching Hole In Differential Seal
Courtesy of CHRYSLER GROUP, LLC

NOTE: Keep the punch tool in the center of the seal to avoid damage to the transmission housing.

2. Using a suitable punch tool and hammer, punch a hole in the metal armature inside the seal.



Fig. 640: Slide Hammer & Differential Seal
Courtesy of CHRYSLER GROUP, LLC

3. Use a suitable Slide Hammer Dent Puller (2), to remove the seal (1).

4. Thread the sheet metal screw of the dent puller into the punched hole in the seal.
5. Tap outward on the slide hammer until the seal comes out of the seal bore.

RIGHT SIDE - 4WD

NOTE: The 948TE automatic transmission configured for Four Wheel Drive (4WD) utilizes an adapter sleeve to couple the Power Transfer Unit (PTU) to the differential. Lip seals are used to seal the inner and outer surfaces of the adapter sleeve.

1. Remove the Power Transfer Unit (PTU). Refer to **REMOVAL** .



2101009395

Fig. 641: Removing Differential Adapter Sleeve
Courtesy of CHRYSLER GROUP, LLC

2. Using tool (special tool #7794-A, Remover, Seal) and (special tool #C-637, Slide Hammer, Universal), Remove the adapter sleeve from the transmission.

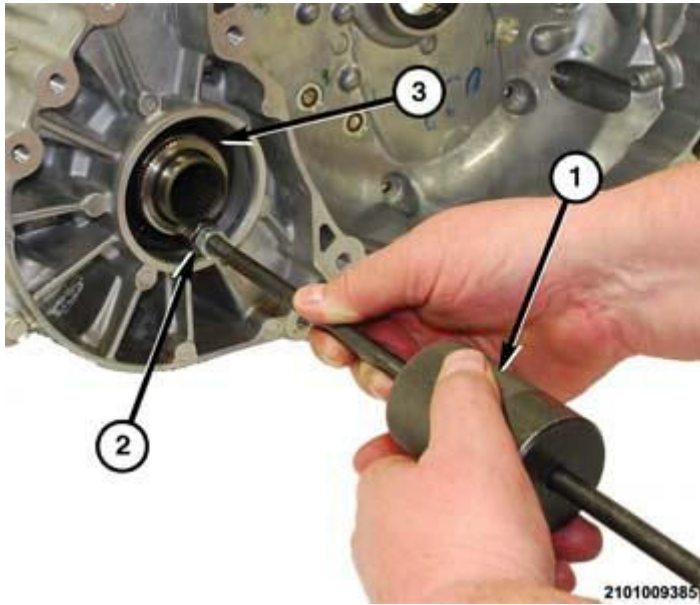


Fig. 642: Removing Seal From Transmission
Courtesy of CHRYSLER GROUP, LLC

3. Using tool (special tool #9667, Remover, Seal) (2) and (special tool #C-3752, Slide Hammers) (1), remove the seal from the transmission.



Fig. 643: View of Adapter Sleeve Seal Tension Spring
Courtesy of CHRYSLER GROUP, LLC

4. Position the adapter sleeve on the work surface with the seal tension spring down.

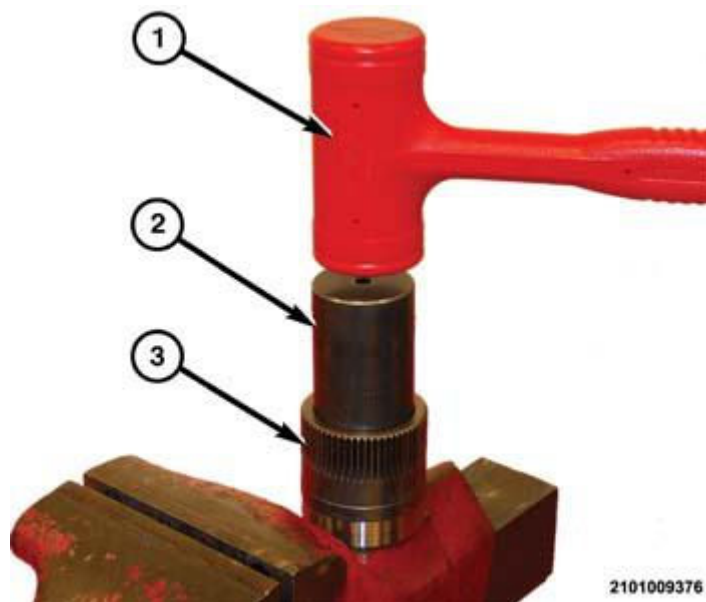


Fig. 644: Removing Seal From Inside Of Adapter Sleeve
Courtesy of CHRYSLER GROUP, LLC

5. Insert tool (special tool #9611, Plug, Differential End) (2) into the outer end of the adapter sleeve (3).
6. Using a suitable hammer (1), drive the seal from the inside of the adapter sleeve (3).

RIGHT SIDE - AWD

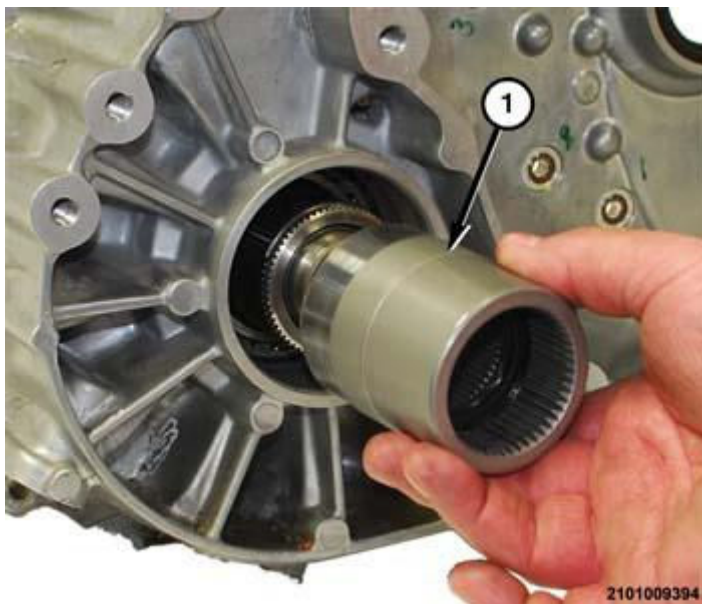


Fig. 645: All Wheel Drive (AWD) Adapter Sleeve
Courtesy of CHRYSLER GROUP, LLC

NOTE: The 948TE automatic transmission configured for All Wheel Drive (AWD) utilizes an adapter sleeve (1) to couple the Power Transfer Unit (PTU) to the differential.

Lip seals are used to seal the inner and outer surfaces of the adapter sleeve.

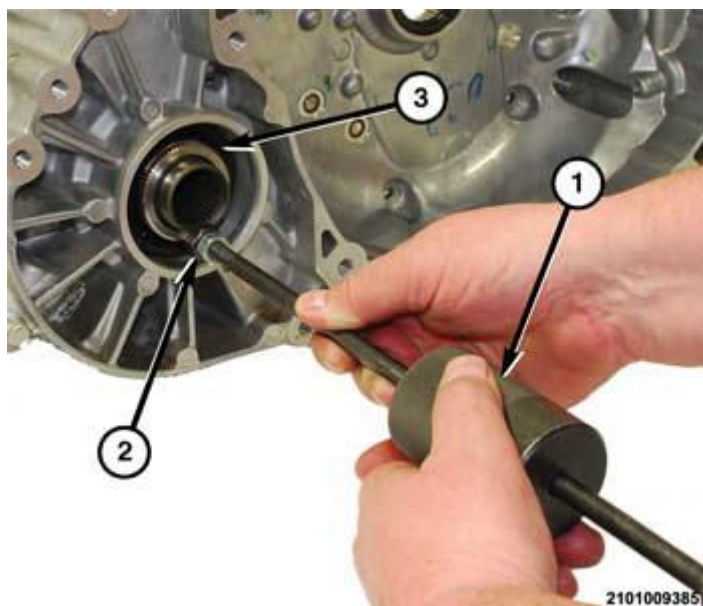
1. Remove the PTU from the vehicle. Refer to **REMOVAL** .



2101009395

Fig. 646: Removing Differential Adapter Sleeve
Courtesy of CHRYSLER GROUP, LLC

2. Using tool (special tool #7794-A, Remover, Seal) and (special tool #C-637, Slide Hammer, Universal), Remove the adapter sleeve from the transmission.



2101009385

Fig. 647: Removing Seal From Transmission
Courtesy of CHRYSLER GROUP, LLC

3. Using tool (special tool #9667, Remover, Seal) (2) and (special tool #C-3752, Slide Hammers) (1), remove the seal from the transmission.



Fig. 648: View of Adapter Sleeve Seal Tension Spring
Courtesy of CHRYSLER GROUP, LLC

4. Position the adapter sleeve on the work surface with the seal tension spring down.



Fig. 649: PTU Side Of Adapter Sleeve And Special Tool
Courtesy of CHRYSLER GROUP, LLC

5. Insert tool (special tool #9676, Adapter Plug) (1) into the outer, PTU side of the adapter sleeve (2).



Fig. 650: Removing Seal From Inside Of Adapter Sleeve
Courtesy of CHRYSLER GROUP, LLC

6. Using a suitable hammer (1), drive the seal from the inside of the adapter sleeve (3).

INSTALLATION

FWD BOTH SIDES - AWD AND 4WD LEFT SIDE

NOTE: Clean the seal bore in the transmission housing with a clean lint-free cloth.

1. Apply assembly lube on the lip of the NEW seal to avoid damage after installation.

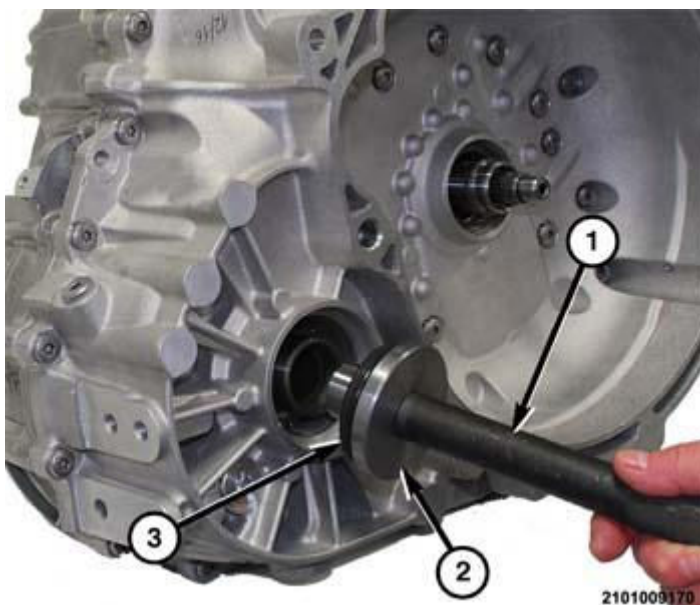


Fig. 651: Inserting Seal Into Transmission Bore

Courtesy of CHRYSLER GROUP, LLC

2. Using tool (special tool #10506, Installer, Oil Seal) (2) and (special tool #C-4171, Driver Handle, Universal) (1) with the seal (3) positioned on the installer, insert the seal in the transmission bore around the output shaft.

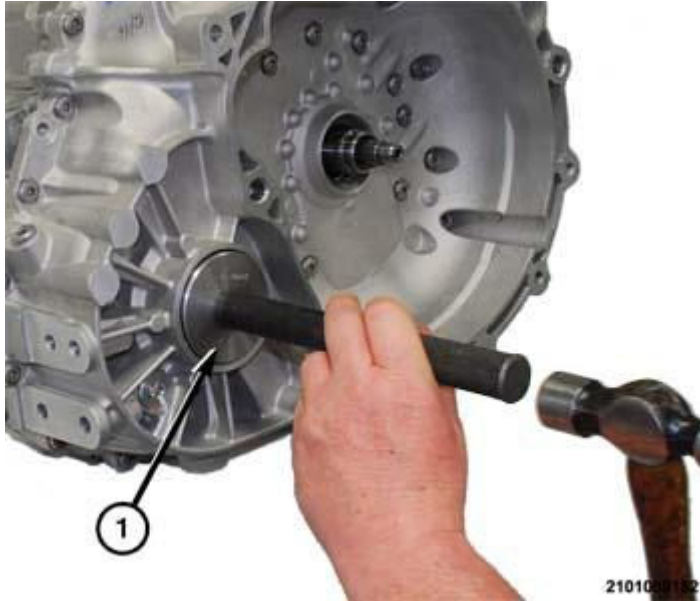


Fig. 652: Installing Seal Into Transmission

Courtesy of CHRYSLER GROUP, LLC

3. Using a suitable hammer, drive the seal into the transmission until it is seated.
4. Install the Left Hand (LH) halfshaft. Refer to **INSTALLATION**.
5. Verify that the transmission fluid is at the proper level. Refer to **FLUID AND FILTER, STANDARD PROCEDURE**.

RIGHT SIDE - 4WD

NOTE: Clean the adapter sleeve with suitable solvent and blow it dry with regulated 344 kPa (50 psi) shop air.

1. Apply assembly lube on the inner seal lip to avoid damaging the seal after installation.
2. Place the adapter sleeve on a suitable work surface with the transmission side up.



Fig. 653: Inserting Lip Seal Into Adapter Sleeve
Courtesy of CHRYSLER GROUP, LLC

3. Insert the **NEW** lip seal (1) into the adapter sleeve (2), (AWD Shown in illustration) with the tension spring up.



Fig. 654: Installing Seal Into Adapter Sleeve
Courtesy of CHRYSLER GROUP, LLC

4. Using tool (special tool #9611, Plug, Differential End) (2) and a hammer (1), install the seal in the adapter sleeve (3).



Fig. 655: Inserting Lip Seal Into Transmission
Courtesy of CHRYSLER GROUP, LLC

5. Apply assembly lube on the outer seal (1) lip to avoid damaging the seal after installation.
6. Insert the **NEW** lip seal (1) into the transmission (2).

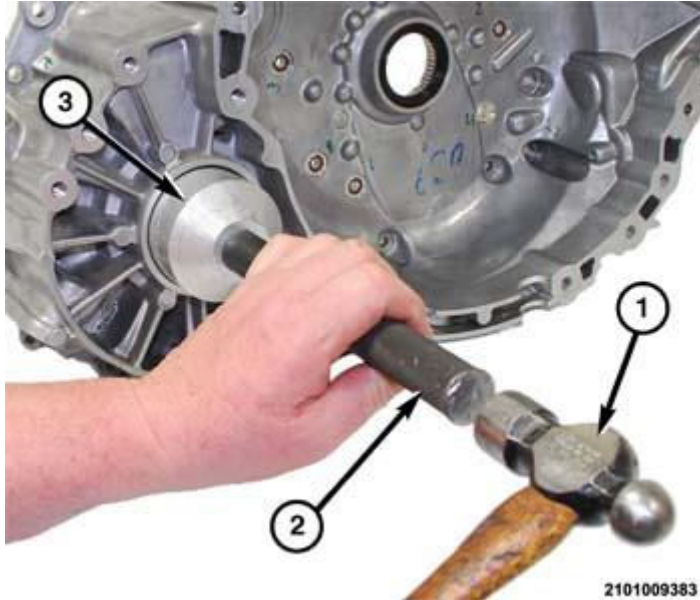


Fig. 656: Installing Outer Lip Seal Into Transmission
Courtesy of CHRYSLER GROUP, LLC

7. Using tool (special tool #C-3972-A, Installer, Seal) (3) and (special tool #C-4171, Driver Handle, Universal) (2) and a hammer (1), Install the outer lip seal in the transmission.
8. Install the Power Transfer Unit (PTU) into the vehicle. Refer to **INSTALLATION** .

9. Verify that the transmission fluid level is at the proper level. Refer to **FLUID AND FILTER, STANDARD PROCEDURE**.
10. Road test the vehicle to verify the repair.

RIGHT SIDE - AWD

NOTE: Clean the adapter sleeve with suitable solvent and blow it dry with regulated 344 kPa (50 psi) shop air.

1. Apply assembly lube on the inner seal lip to avoid damaging the seal after installation.
2. Place the adapter sleeve on a suitable work surface with the transmission side up.



Fig. 657: Inserting Lip Seal Into Adapter Sleeve
Courtesy of CHRYSLER GROUP, LLC

3. Insert the NEW lip seal (1) into the adapter sleeve (2) with the tension spring up.



Fig. 658: Installing Seal Into Adapter Sleeve
Courtesy of CHRYSLER GROUP, LLC

4. Using tool (special tool #8840, Installer, Oil Slinger) (2) and a hammer (1), install the seal in the adapter sleeve (3).



Fig. 659: Inserting Lip Seal Into Transmission
Courtesy of CHRYSLER GROUP, LLC

5. Apply assembly lube on the outer seal (1) lip to avoid damaging the seal after installation.
6. Insert the NEW lip seal (1) into the transmission (2).

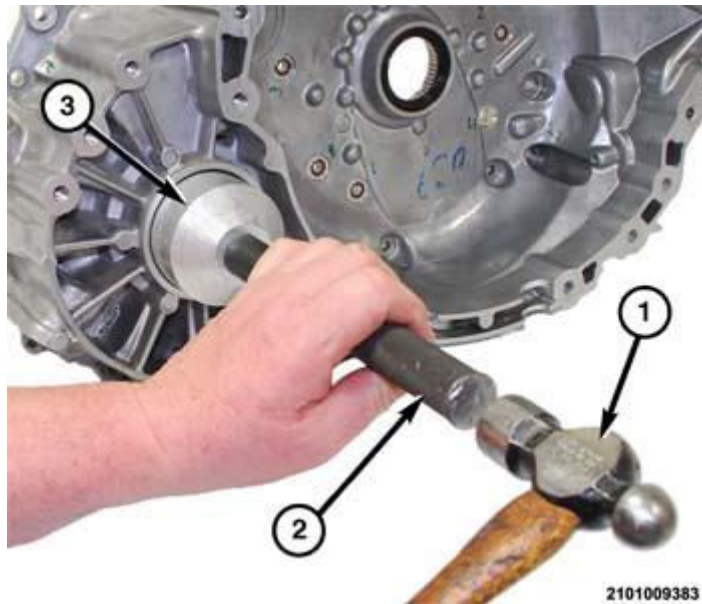


Fig. 660: Installing Outer Lip Seal Into Transmission
Courtesy of CHRYSLER GROUP, LLC

7. Using tool (special tool #C-3972-A, Installer, Seal) (3) and (special tool #C-4171, Driver Handle, Universal) (2) and a hammer (1), Install the outer lip seal in the transmission.
8. Install the Power Transfer Unit (PTU) into the vehicle. Refer to **INSTALLATION**.
9. Verify that the transmission fluid level is at the proper level. Refer to **FLUID AND FILTER, STANDARD PROCEDURE**.
10. Road test the vehicle to verify the repair.

SEAL, INPUT SHAFT

REMOVAL

REMOVAL

1. Remove the transmission from the vehicle, Refer to **REMOVAL**.
2. Drain the fluid from the transmission.
3. Remove the torque converter from the transmission.
4. Using a suitable punch tool, pierce a 3 mm (0.125 in.) hole in the center of the seals front surface through the metal armature.



Fig. 661: Removing Seal From Center Of Bellhousing
Courtesy of CHRYSLER GROUP, LLC

5. Using a suitable dent puller (2) threaded into the hole in the seal (1), remove the seal (1) from the bore in the center of the bellhousing.

INSTALLATION

INSTALLATION

1. Clean the seal bore in the center of the bellhousing.
2. Apply assembly lube on the lip of the NEW seal.
3. Place the seal on tool (special tool #9677, Installer, Seal), with the tension spring away from the tool, and insert the seal into the bore in the bellhousing.



Fig. 662: Installing Seal Into Bellhousing
Courtesy of CHRYSLER GROUP, LLC

4. Using a suitable hammer, drive the seal into the bore in the center of the bellhousing until the tool seats against the bellhousing.
5. Install the torque converter.
6. Install the transmission in the vehicle. Refer to **INSTALLATION**.
7. Fill the transmission to the proper level. Refer to **STANDARD PROCEDURES**.
8. Road test the vehicle to verify the repair.

SENSORS, SPEED

REMOVAL

REMOVAL

The speed sensors can be replaced with the transmission in the vehicle.

1. Position the vehicle on a suitable hoist with the transmission in neutral.
2. Remove the valve body. Refer to **VALVE BODY, REMOVAL**.

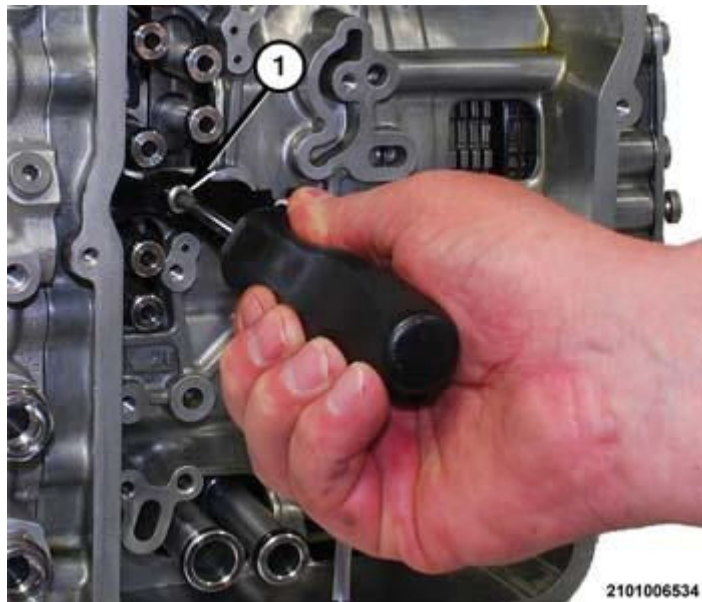


Fig. 663: Removing/Installing Speed Sensor Screw
Courtesy of CHRYSLER GROUP, LLC

3. Remove the screw (1) holding the speed sensors to the transmission housing.



Fig. 664: Removing/Installing Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

4. Separate the speed sensor (1) from the transmission.
5. Release the lock on the wire connector.
6. Separate the wire connector from the speed sensor.

INSTALLATION

INSTALLATION

1. Insert the wire connector into the speed sensor.
2. Engage the lock on the wire connector.



Fig. 665: Removing/Installing Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

3. Insert the speed sensor (1) into the transmission housing.

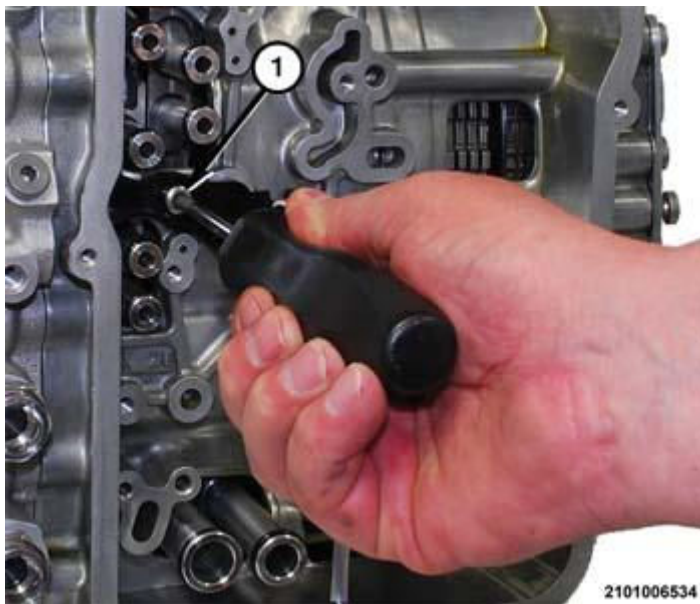


Fig. 666: Removing/Installing Speed Sensor Screw
Courtesy of CHRYSLER GROUP, LLC

4. Install the screw (1) to hold the speed sensors to the transmission housing.
5. Install the valve body. Refer to **VALVE BODY, INSTALLATION**.
6. Road test the vehicle to verify repair.

SENSOR, TRANSAXLE RANGE

REMOVAL

REMOVAL

The Transmission Range Sensor (TRS) can be replaced with the transmission in the vehicle

1. Position the vehicle on a suitable hoist with the transmission in neutral.
2. Remove the valve body. Refer to **VALVE BODY, REMOVAL**.

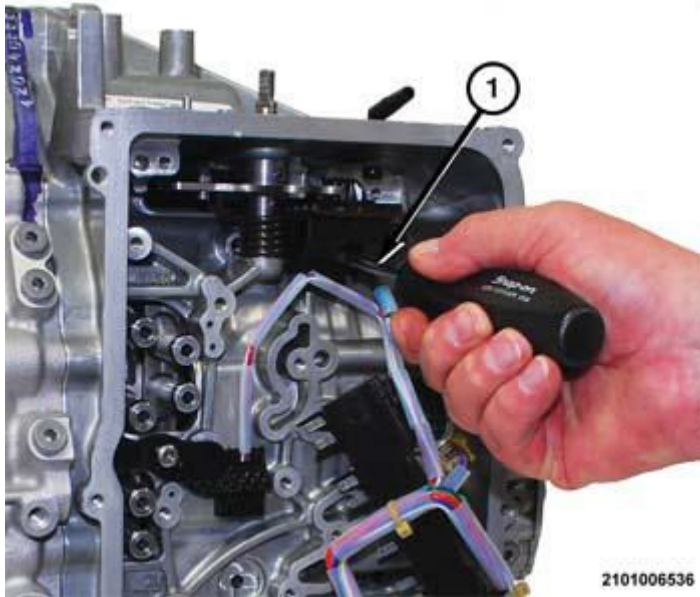


Fig. 667: Removing/Installing Transmission Range Sensor (TRS) Screw
Courtesy of CHRYSLER GROUP, LLC

3. Remove the screw (1) holding the TRS to the transmission housing.

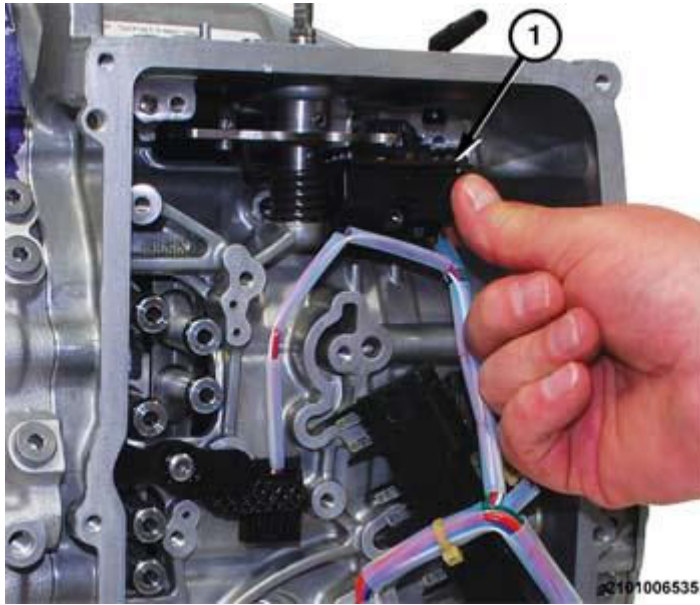


Fig. 668: Removing/Installing Transmission Range Sensor
Courtesy of CHRYSLER GROUP, LLC

4. Separate the TRS (1) from the transmission.
5. Release the lock on the wire connector.
6. Separate the wire connector from the TRS.

INSTALLATION

INSTALLATION

1. Insert the wire connector into the Transmission Range Sensor (TRS).
2. Engage the lock on the wire connector.

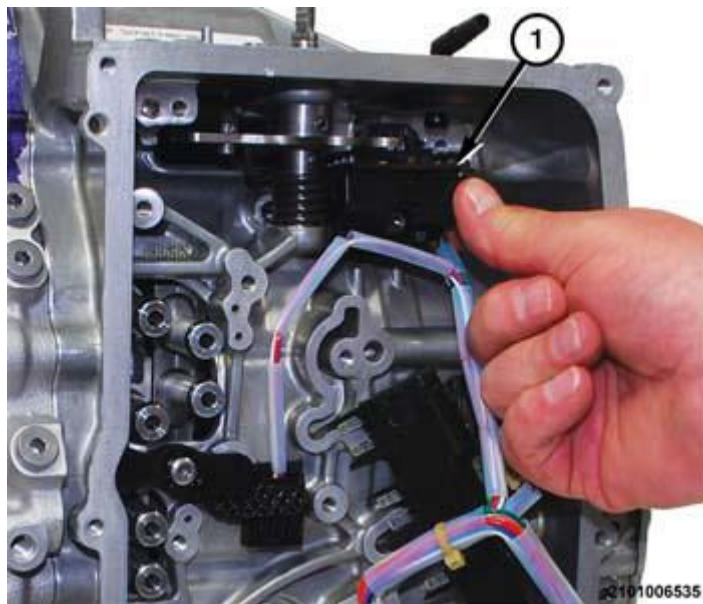


Fig. 669: Removing/Installing Transmission Range Sensor
Courtesy of CHRYSLER GROUP, LLC

3. Insert the TRS (1) into the transmission housing.

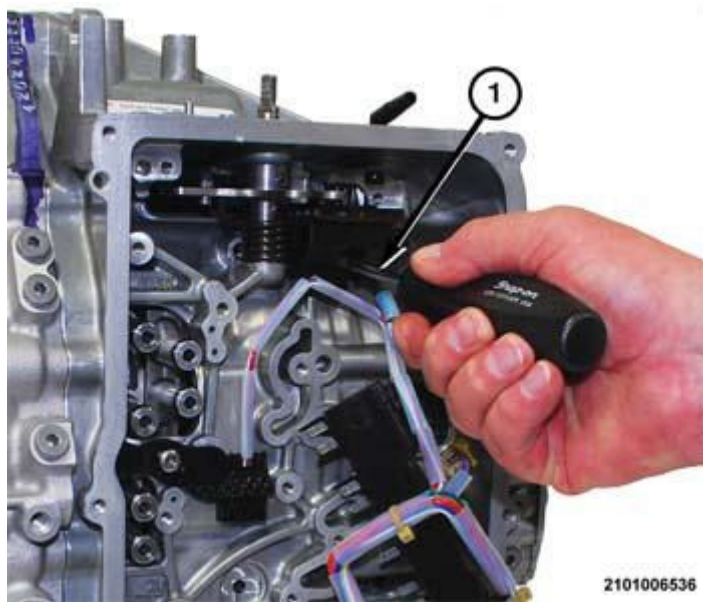


Fig. 670: Removing/Installing Transmission Range Sensor (TRS) Screw
Courtesy of CHRYSLER GROUP, LLC

4. Install the screw (1) to hold the TRS to the transmission housing.
5. Install the valve body. Refer to **VALVE BODY, INSTALLATION**.
6. Road test the vehicle to verify repair.

SHAFT, REACTION

REMOVAL

REMOVAL

1. Remove the transmission from the vehicle. Refer to **REMOVAL**.
2. Drain the fluid from the transmission.
3. Remove the bellhousing from the transmission. Refer to **BELLHOUSING, REMOVAL**.

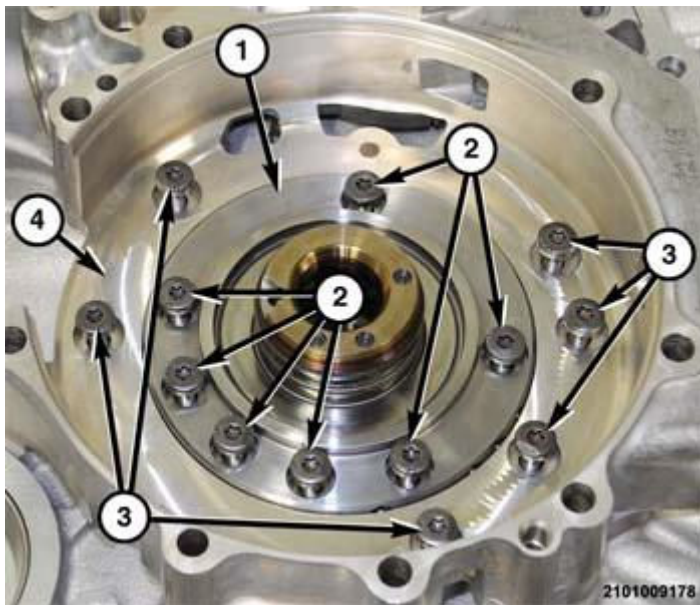


Fig. 671: Removing/Installing Bolts At Reaction Shaft To Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

4. Remove the bolts (2) holding the reaction shaft (1) to the intermediate support plate (4).

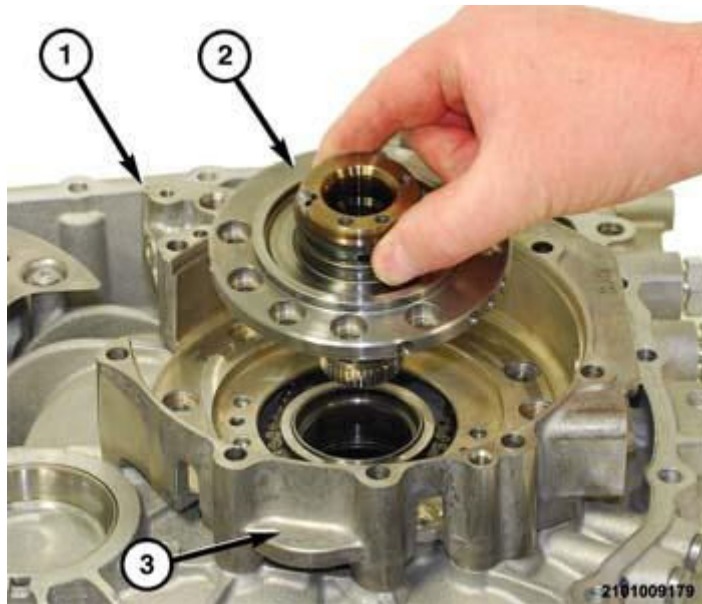


Fig. 672: Removing/Installing Reaction Shaft At Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

5. Separate the reaction shaft (2) from the intermediate support plate (1).



Fig. 673: Removing/Installing Seal Rings At Ring Land In Inner Reaction Shaft Hub
Courtesy of CHRYSLER GROUP, LLC

6. Remove the seal rings (1) from the ring lands in the inner reaction shaft hub (2).



Fig. 674: Removing/Installing Seal Ring At Ring Land In Outer Reaction Shaft Hub
Courtesy of CHRYSLER GROUP, LLC

7. Remove the seal ring (1) from the ring land in the outer reaction shaft hub (2).

INSTALLATION

INSTALLATION

1. Clean the reaction shaft with suitable solvent and blow it dry using regulated 344 kPa (50 psi) shop air.
2. Inspect the reaction shaft for excess damage or ware. Replace the reaction shaft if damage is present.



Fig. 675: Removing/Installing Seal Ring At Ring Land In Outer Reaction Shaft Hub

Courtesy of CHRYSLER GROUP, LLC

3. Install a New seal ring (1) in the land of the outer reaction shaft hub (2).



Fig. 676: Removing/Installing Seal Rings At Ring Land In Inner Reaction Shaft Hub
Courtesy of CHRYSLER GROUP, LLC

4. Install New seal rings (1) in the lands of the inner reaction shaft hub (2).

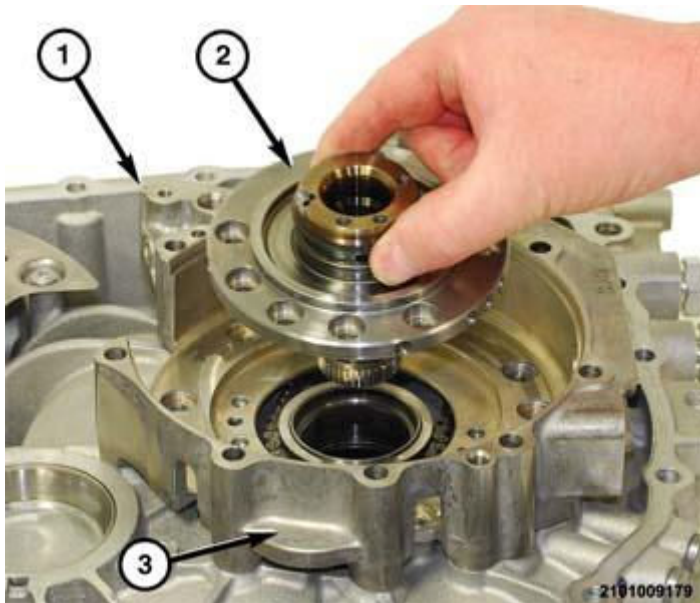


Fig. 677: Removing/Installing Reaction Shaft At Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

5. Place the reaction shaft (2) into the intermediate support plate (1).

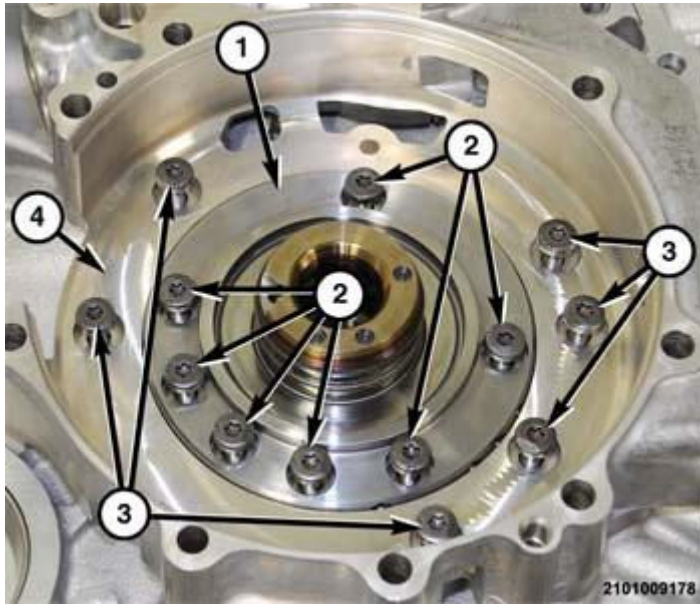


Fig. 678: Removing/Installing Bolts At Reaction Shaft To Intermediate Support Plate
Courtesy of CHRYSLER GROUP, LLC

6. Install the bolts (2) to hold the reaction shaft (1) to the intermediate support plate (4). Refer to **SPECIFICATIONS**.
7. Install the bellhousing on the transmission. Refer to **BELLHOUSING, INSTALLATION**.
8. Install the transmission in the vehicle. Refer to **INSTALLATION**.
9. Fill the transmission to the proper level. Refer to **FLUID AND FILTER, STANDARD PROCEDURE**.
10. Road test the vehicle to verify the repair.

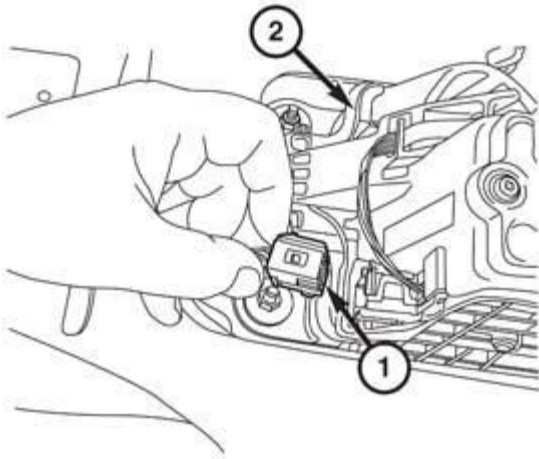
SHIFTER, FLOOR CONSOLE

REMOVAL

REMOVAL

1. Disconnect the battery negative cable.
2. Remove the center floor console

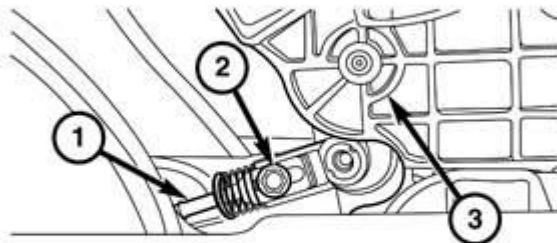
Refer to **CONSOLE, FLOOR, REMOVAL** .



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Fig. 679: PRND Wire Connector & Shifter Assembly
Courtesy of CHRYSLER GROUP, LLC

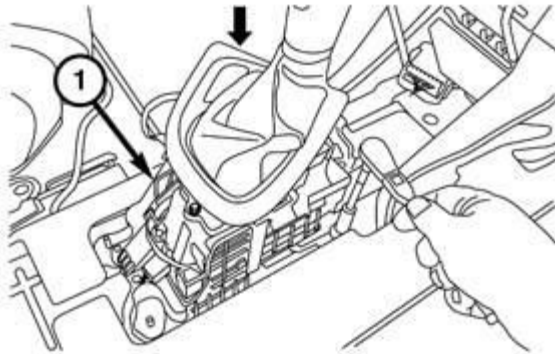
3. Release the wire connector lock and disconnect the PRND wire connector from the shifter assembly.



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Fig. 680: Shifter Assembly & Gear Shift Cable End
Courtesy of CHRYSLER GROUP, LLC

4. Pry the gear shift cable end (2) from the pin under the shifter assembly (3).
5. Release the shift cable housing retainer and disengage the cable from the shifter assembly.



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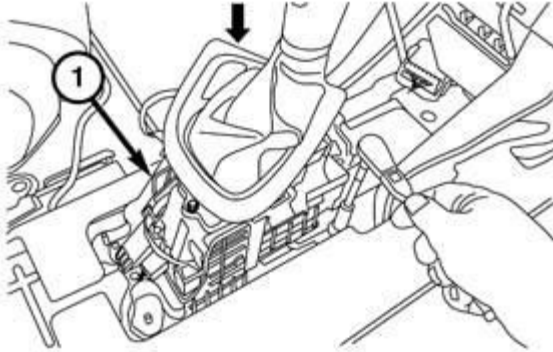
Fig. 681: Gear Shifter**Courtesy of CHRYSLER GROUP, LLC**

6. Remove the nuts holding the gear shifter to the floor.
7. Separate the gear shifter from the vehicle.

INSTALLATION

INSTALLATION

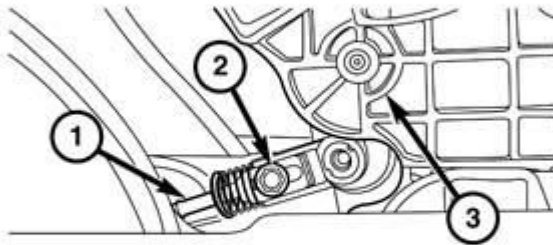
1. Place the gear shifter in position on the floor pan.



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Fig. 682: Gear Shifter**Courtesy of CHRYSLER GROUP, LLC**

2. Install nuts to hold the gear shifter assembly (1) to the floor pan.
3. Insert the shift cable into the access hole on the front of the shifter and lock the retainer into the shifter.

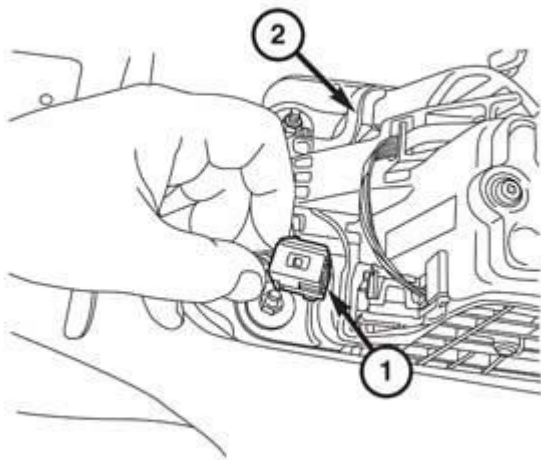


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Fig. 683: Shifter Assembly & Gear Shift Cable End

Courtesy of CHRYSLER GROUP, LLC

4. Push the gear shift cable end (2) onto the pin under the shifter assembly (3).



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Fig. 684: PRND Wire Connector & Shifter Assembly
Courtesy of CHRYSLER GROUP, LLC

5. Connect the PRND wire connector into the shifter assembly connector.
6. Install the center floor console

Refer to **CONSOLE, FLOOR, INSTALLATION** .

7. Connect the battery negative cable.

TUBE, OIL

REMOVAL

REMOVAL

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove the left front wheel and tire. Refer to **REMOVAL** .



Fig. 685: Oil Supply Tube
Courtesy of CHRYSLER GROUP, LLC

3. Remove the oil supply tube bolts (1, 3).
4. Remove the oil supply tube (1) from the transmission.

INSTALLATION

INSTALLATION



Fig. 686: O-Ring Seal Near Differential End For Oil Supply Tube
Courtesy of CHRYSLER GROUP, LLC

1. Replace the O-ring seal (1) near the differential end for the oil supply tube.

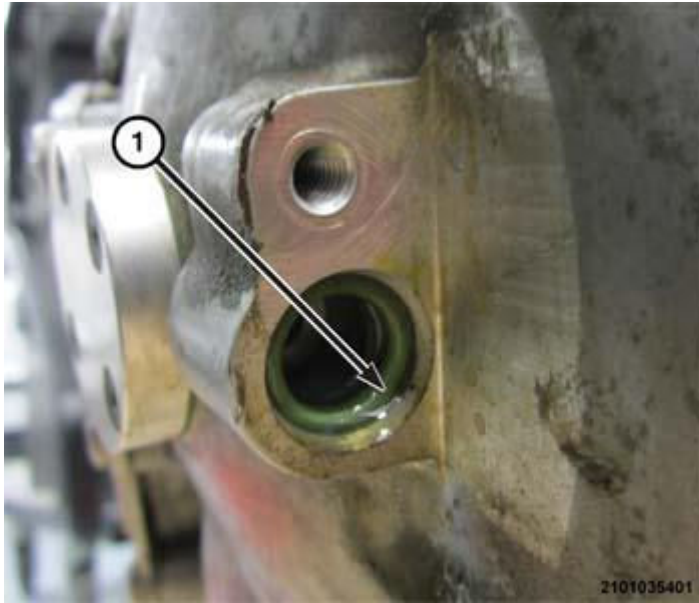


Fig. 687: O-Ring Seal Near Transmission For Oil Supply Tube
Courtesy of CHRYSLER GROUP, LLC

2. Replace the O-ring seal (1) near the end of the transmission for the oil supply tube.



Fig. 688: Oil Supply Tube
Courtesy of CHRYSLER GROUP, LLC

3. Install the oil supply tube (2) onto transmission.
4. Install the oil supply tube fasteners (3) and tighten to the proper specification. Refer to **SPECIFICATIONS**.

5. Install the left front wheel and tire. Refer to **INSTALLATION**.
6. Fill the transaxle to the proper level with the correct fluid. Refer to **FLUID AND FILTER, STANDARD PROCEDURE**.

VALVE BODY

REMOVAL

REMOVAL

1. Disconnect and isolate the negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
3. Remove the belly pan. Refer to **BELLY PAN, REMOVAL**.
4. Remove the drain plug and allow the fluid to drain from the transmission.
5. Install the drain plug.

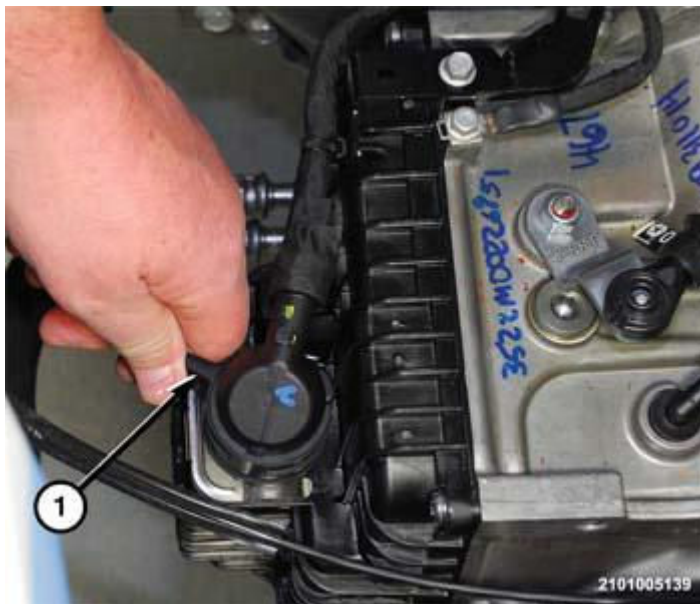


Fig. 689: Transmission Valve Body Solenoid Connector
Courtesy of CHRYSLER GROUP, LLC

6. Rotate the lock lever (2) counterclockwise on the transmission solenoid connector.
7. Disengage the wire connector from the socket on the transmission pan.

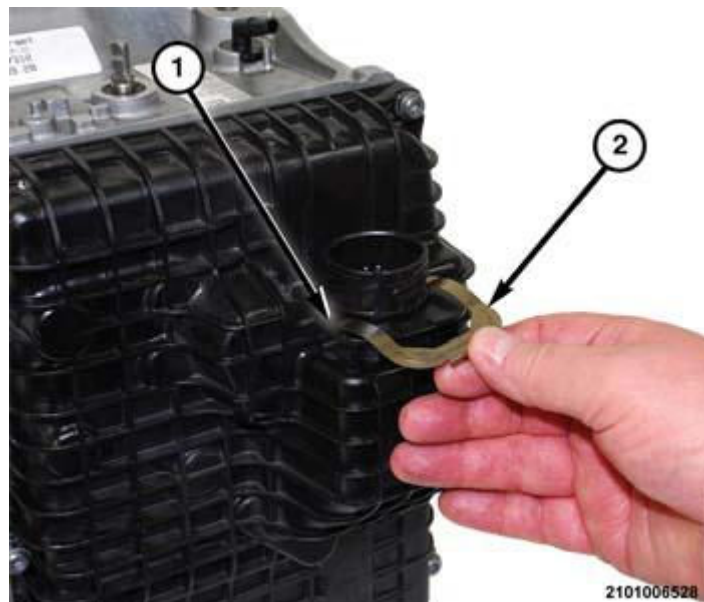


Fig. 690: Wire Connector Socket Clip
Courtesy of CHRYSLER GROUP, LLC

8. Using a suitable pry tool, remove the clip (2) holding the wire connector socket (1) in the valve body cover.
9. Press the wire connector socket inside the valve body cover.

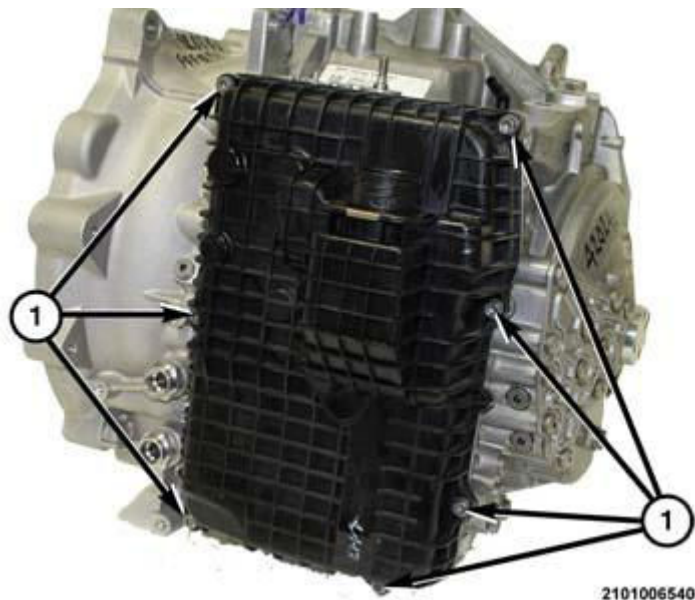


Fig. 691: Valve Body Cover Pan Bolts
Courtesy of CHRYSLER GROUP, LLC

10. Remove the bolts (1) holding the valve body cover to the transmission.
11. Remove the valve body cover from the transmission housing.

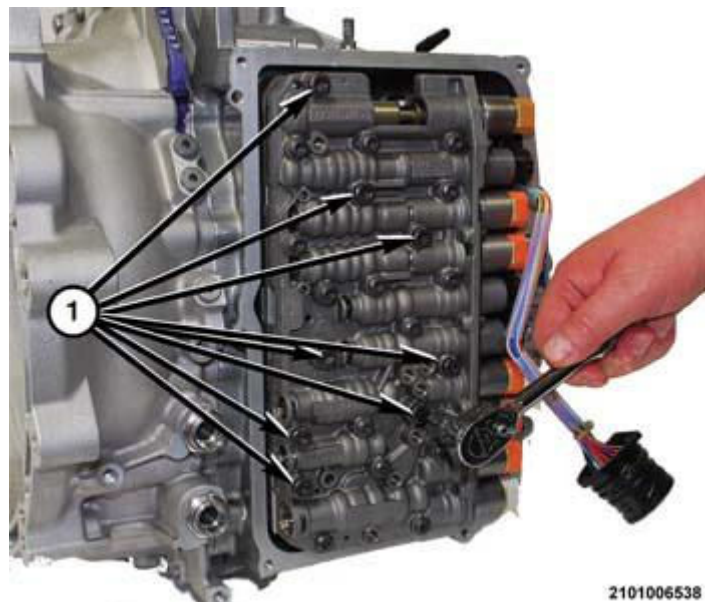


Fig. 692: Valve Body Bolts
Courtesy of CHRYSLER GROUP, LLC

12. Remove the larger (T45) bolts (1) holding the valve body to the transmission housing.
13. Using a suitable prying tool, separate the valve body from the fluid transfer adapter tubes.
14. Turn the valve body over to gain access to wire harness connectors.

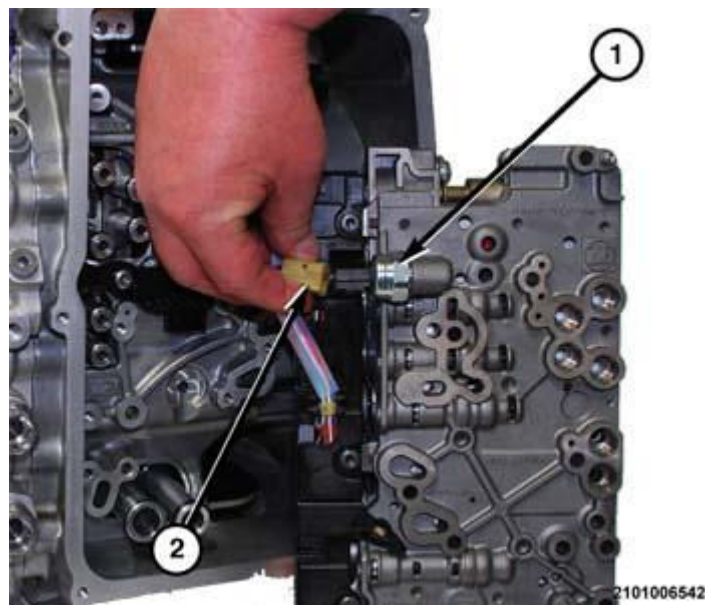


Fig. 693: Fluid Pressure Transducer Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

15. Release the lock (2) on the fluid pressure transducer wire connector.
16. Separate the wire connector from the fluid pressure transducer (1).

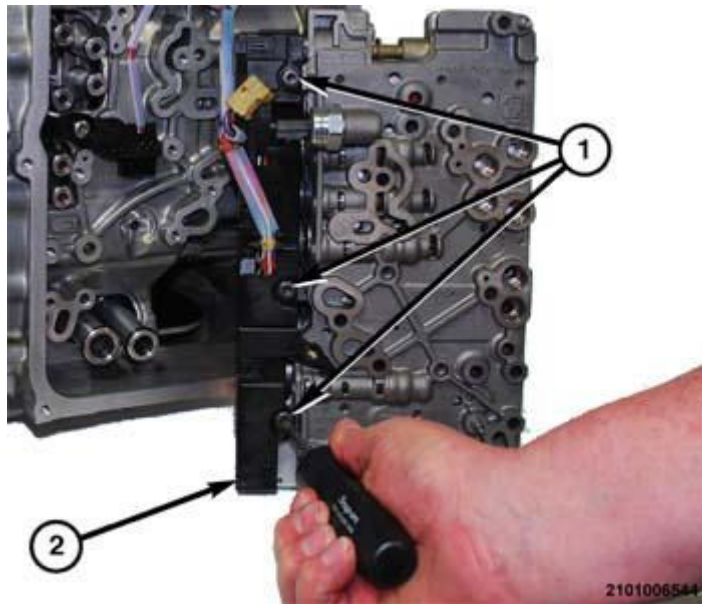


Fig. 694: Removing/Installing Wire Harness Connector At Valve Body Solenoids
Courtesy of CHRYSLER GROUP, LLC

17. Remove the bolts (1) holding the wire harness connector to the valve body and solenoids.
18. Using a suitable prying tool, Separate the wire harness connector (2) from the solenoids.
19. Separate the valve body from the vehicle.

NOTE: **If the valve body is to be reused without disassembling it, store the valve body in a clean area until it is installed.**

DISASSEMBLY

DISASSEMBLY

Remove the valve body from the transmission and place the valve body on a clean oil absorbent work surface. Position wood blocks at each end of the valve body to provide a stable work fixture.

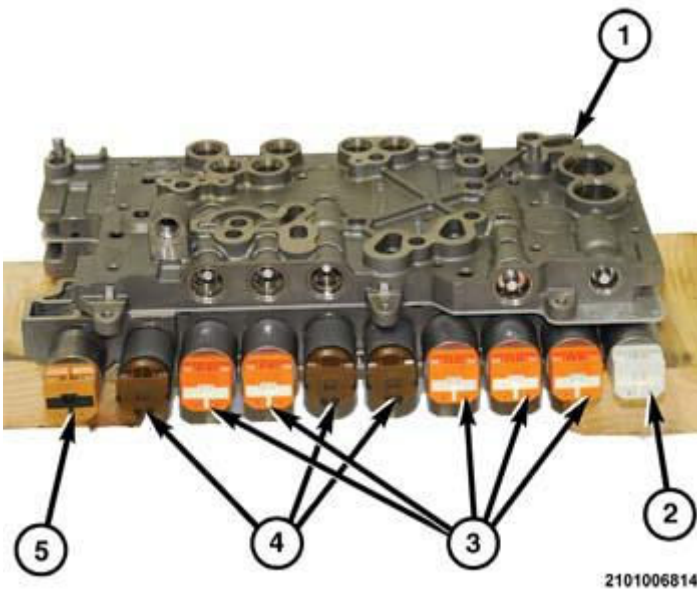


Fig. 695: View Of Valve Body & Solenoids
Courtesy of CHRYSLER GROUP, LLC

1. Remove the solenoids (2 - 5) from the valve body (1).

NOTE: Each type solenoid has a unique color end cover.

- 2 = System Pressure Regulator Solenoid
- 3 = Pressure Regulator Solenoids
- 4 = Dog Clutch Solenoids
- 5 = Parking Lock Solenoid

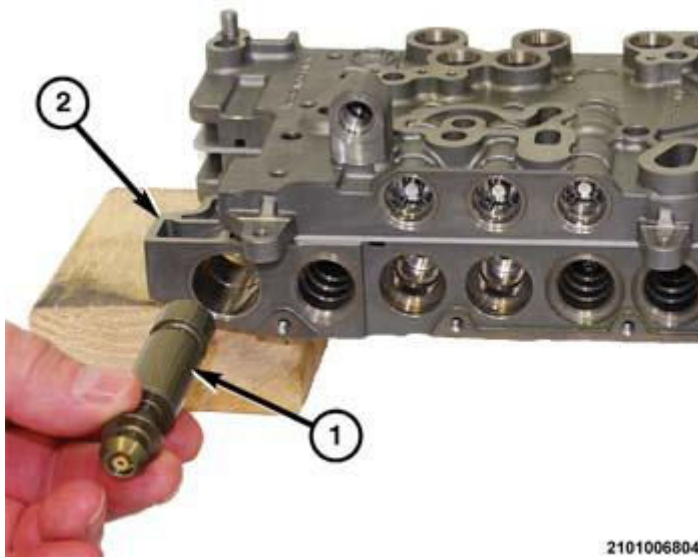


Fig. 696: Parking Lock Valve & Outer Valve Body
Courtesy of CHRYSLER GROUP, LLC

2. Remove the parking lock valve (1) from the park lock solenoid bore in the outer valve body (2).
3. Remove the pressure sensor from the valve body.
4. Position the valve body on the wooden blocks with outer side up.

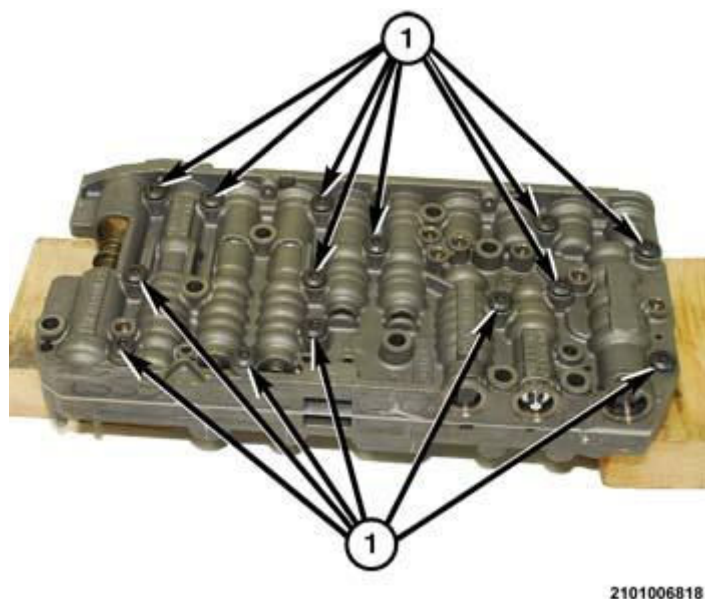


Fig. 697: Valve Body & 14 Screws
Courtesy of CHRYSLER GROUP, LLC

5. Remove the screws (1) holding the valve body halves together.

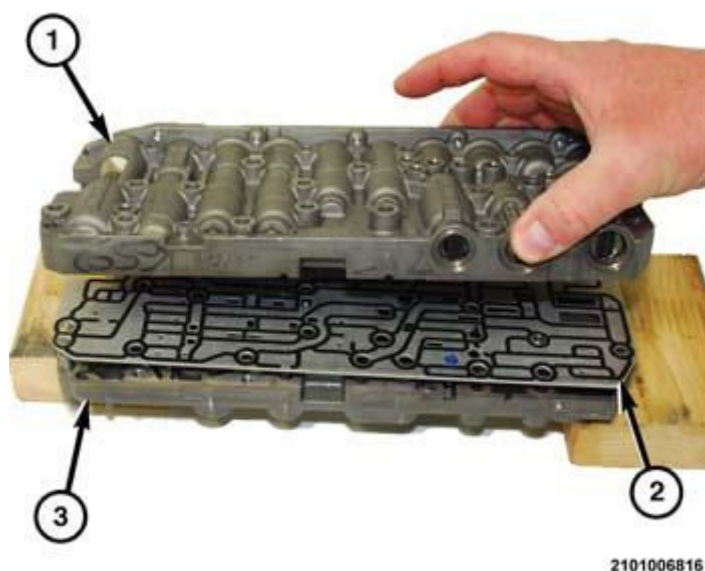


Fig. 698: Outer Valve Body & Separator Plate

Courtesy of CHRYSLER GROUP, LLC

6. Separate the outer valve body (1) from the separator plate (2).

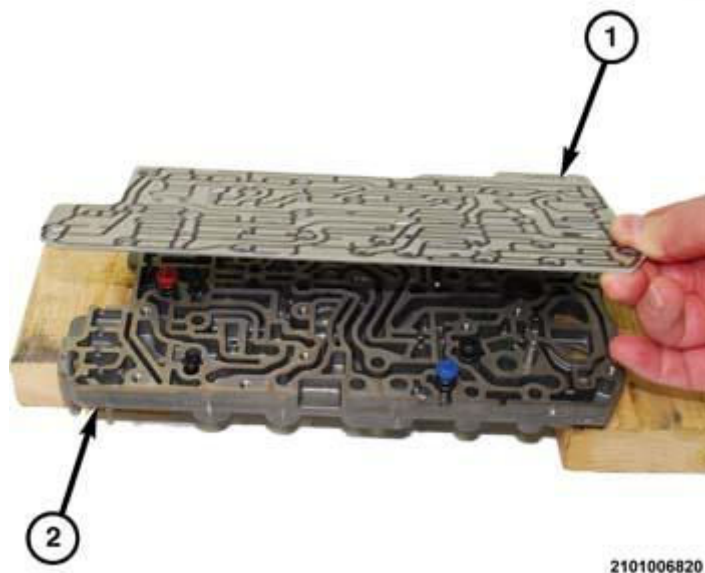


Fig. 699: Lifting Separator Plate Off Of Inner Valve Body
Courtesy of CHRYSLER GROUP, LLC

7. Lift the separator plate (1) upward and off of the inner valve body (2).

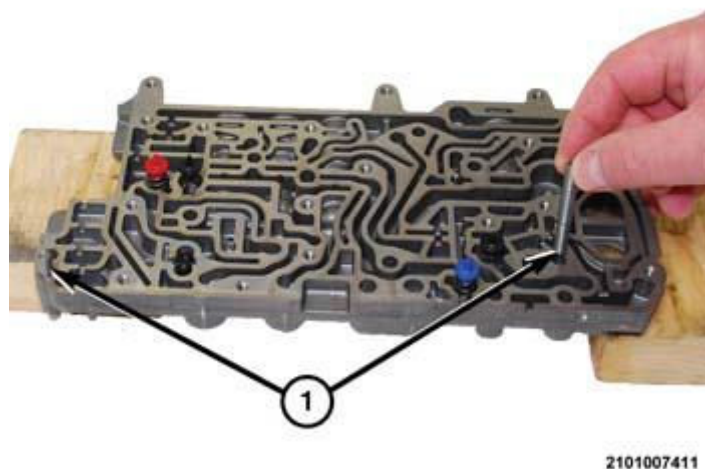


Fig. 700: Inner Valve Body & Guide Pins
Courtesy of CHRYSLER GROUP, LLC

8. Remove the guide pins (1) from the inner valve body.

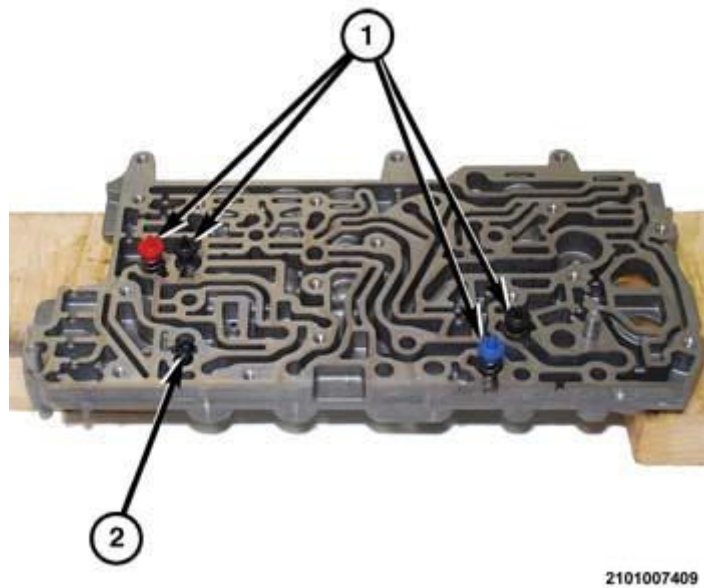
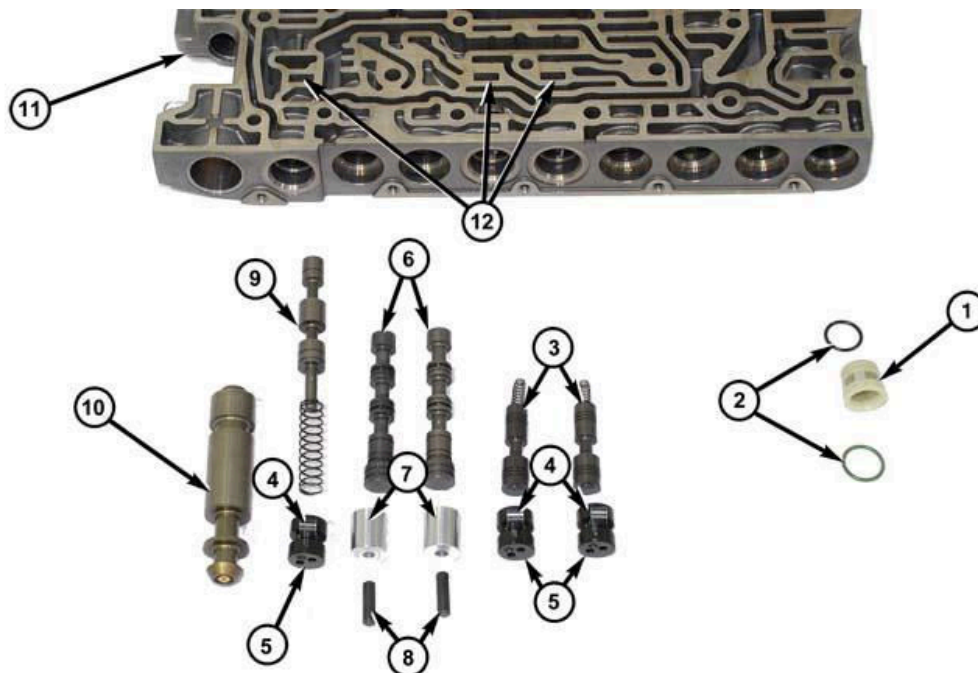


Fig. 701: Inner Valve Body, Color Coded Check Valves & Check-Balls
Courtesy of CHRYSLER GROUP, LLC

9. Remove the color coded check valves (1) from the inner valve body.
10. Remove the toggling, connected check-balls (2) from the inner valve body.
11. Position the outer valve body on the work surface inside up to gain access to the valve retaining spring clips.

NOTE: DO NOT damage the filter screen during removal.



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Fig. 702: Outer Valve Body Components
Courtesy of CHRYSLER GROUP, LLC

12. Using a suitable prying tool, remove the filter screen (1) from the bore in the outer valve body (11).
13. Remove the bullets (8), sleeves (7), and pressure regulator valves (6) from the bores in the outer valve body (11).
14. Remove the parking lock valve (10) from the bore in the outer valve body (11).
15. Using a suitable prying tool, remove the spring clips (12) holding the lubrication valve plugs in the bores in the outer valve body (11).
16. Remove the plugs (5), lubrication valves and springs (3) from the bores in the outer valve body (11).
17. Using a suitable prying tool, remove the spring clip (12) holding the MV park lock valve plug in the bore in the outer valve body (11).
18. Remove the spring and MV park lock valve (9) from the bore in the outer valve body (11).
19. Rotate the outer valve (11) body to gain access to the pressure and lubrication valves.

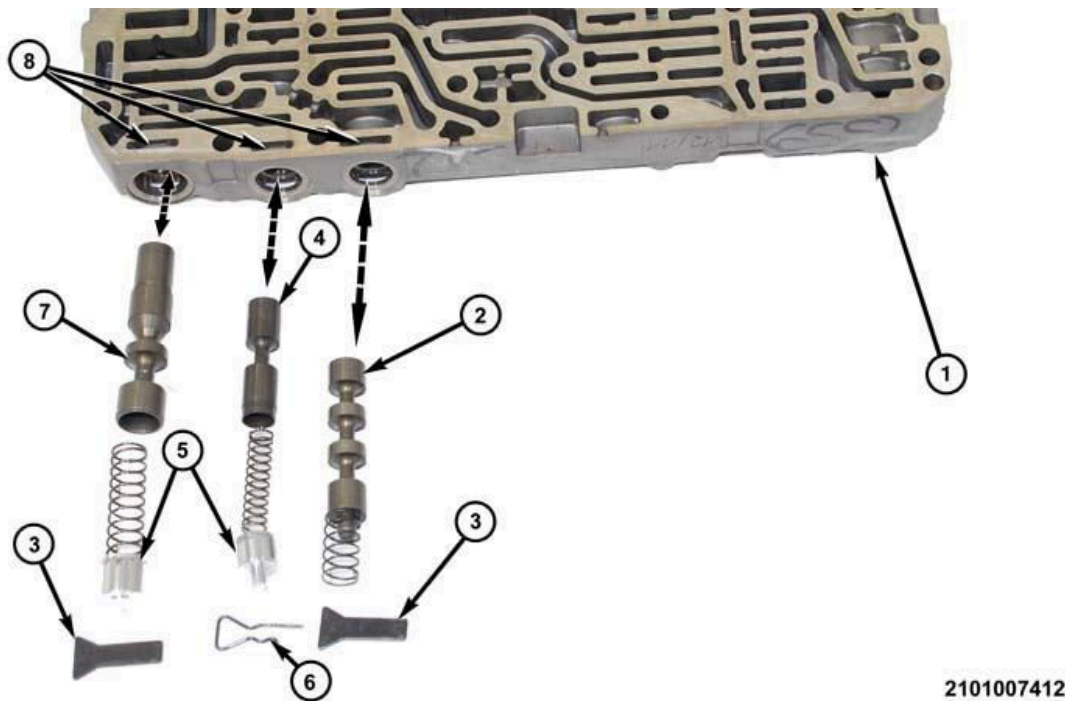


Fig. 703: Outer Valve Body & Pressure Valve
Courtesy of CHRYSLER GROUP, LLC

20. The support plates (3) and spring clip (6) are located in pockets (8) in the outer valve body (1).
21. Remove the support plate (3) holding the spring and converter pressure valve (2) in the bore in the outer valve body (1).
22. Remove the spring and converter pressure valve (2) from the bore in the outer valve body (1).
23. Remove the support plate (3) holding the plug (5), spring and system pressure valve (7) in the bore in the outer valve body (1).

24. Remove the plug (5), spring and system pressure valve (7) from the bore in the outer valve body (1).
25. Remove the spring clip (6) holding the plug (5), spring and lubrication valve (4) in the bore in the outer valve body (1).
26. Remove the plug (5), spring and lubrication valve (4) from the bore in the outer valve body (1).

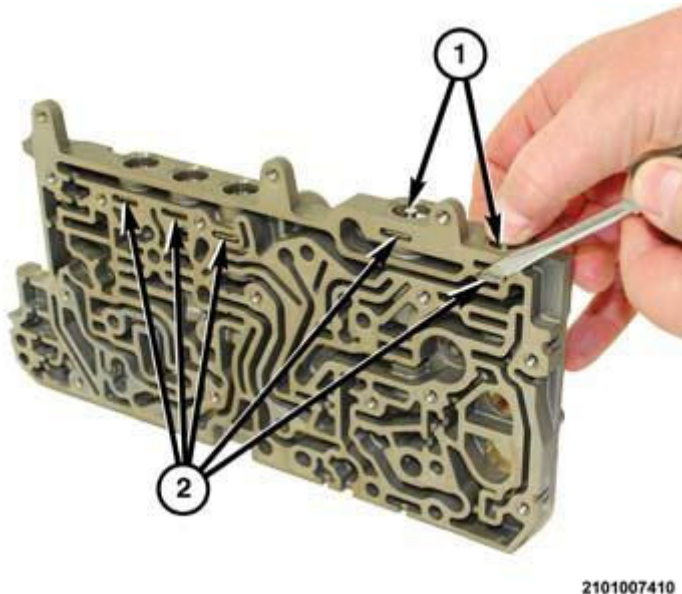


Fig. 704: Inner Valve Body With The Valves Bores Facing Up
 Courtesy of CHRYSLER GROUP, LLC

27. Place the inner valve body on the clean work surface with the valves bores facing up.

NOTE: The spring clips holding (2) the plugs (1) in the inner valve are located in pockets (2) on the separator plate side of the inner valve body.

28. Press each of the valve plugs (1) downward and remove the spring clips (2) holding the valves in the bores in the inner valve body.

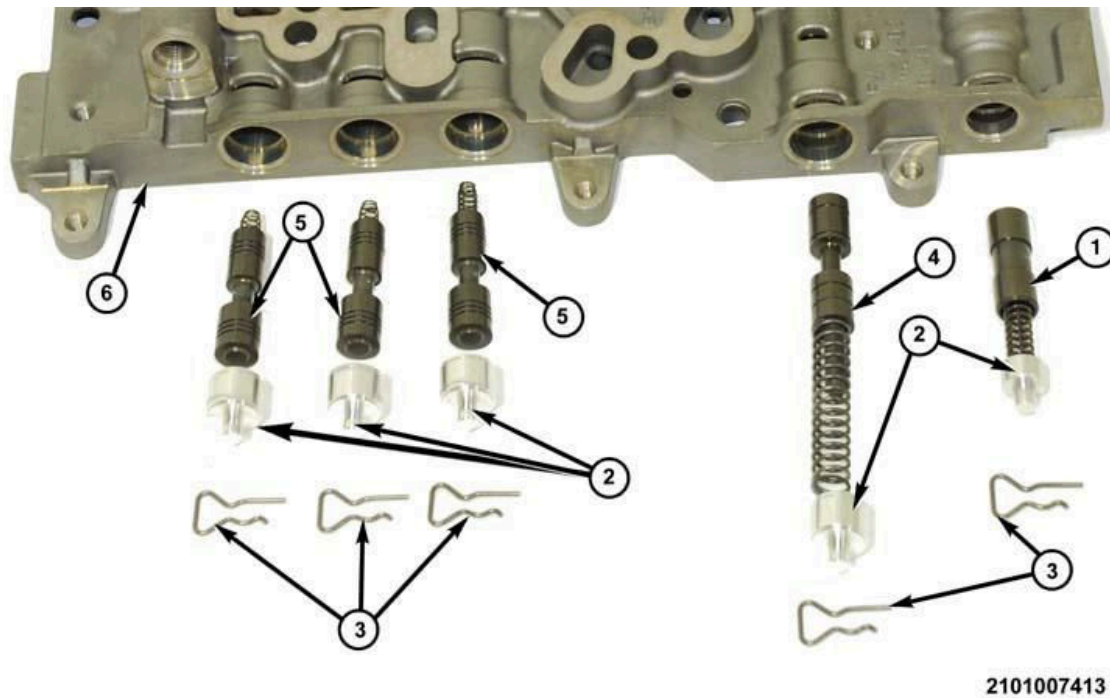


Fig. 705: Inner Valve Body Components
 Courtesy of CHRYSLER GROUP, LLC

29. Remove the plug (2), spring and boost valve (1) from the bore in the inner valve body (6).
30. Remove the plug (2), spring and solenoid limit valve (4) from the bore in the inner valve body (6).
31. Remove the plugs (2), springs and PCV valves (5) from the bores in the inner valve body (6).
32. Perform the cleaning and inspection procedures.

INSPECTION

VALVE BODY CLEANING AND INSPECTION

Clean the valve body components with a suitable clean solvent. The valve body components can be blown dry with compressed regulated 344 kPa (50 psi) shop air.

Inspect the valve components and bores for excessive scoring, porosity, warping or other damage that may cause the valves to bind or leak excessively. If damage is evident the complete valve body must be replaced.

ASSEMBLY

ASSEMBLY

Before assembling the valve body, thoroughly clean all of the components with a suitable solvent and blow them dry with 344 kPa (50 psi) **regulated** shop air. Clean the work surface and lay out a clean lint free cloth to avoid contaminating the clean valve body components. Lay the valve components out on the cloth in the order they will be installed in the valve body. The cloth will hold the valve components in place and keep them from rolling out of position. light lubricating oil can be applied to each component as the valve body is assembled.

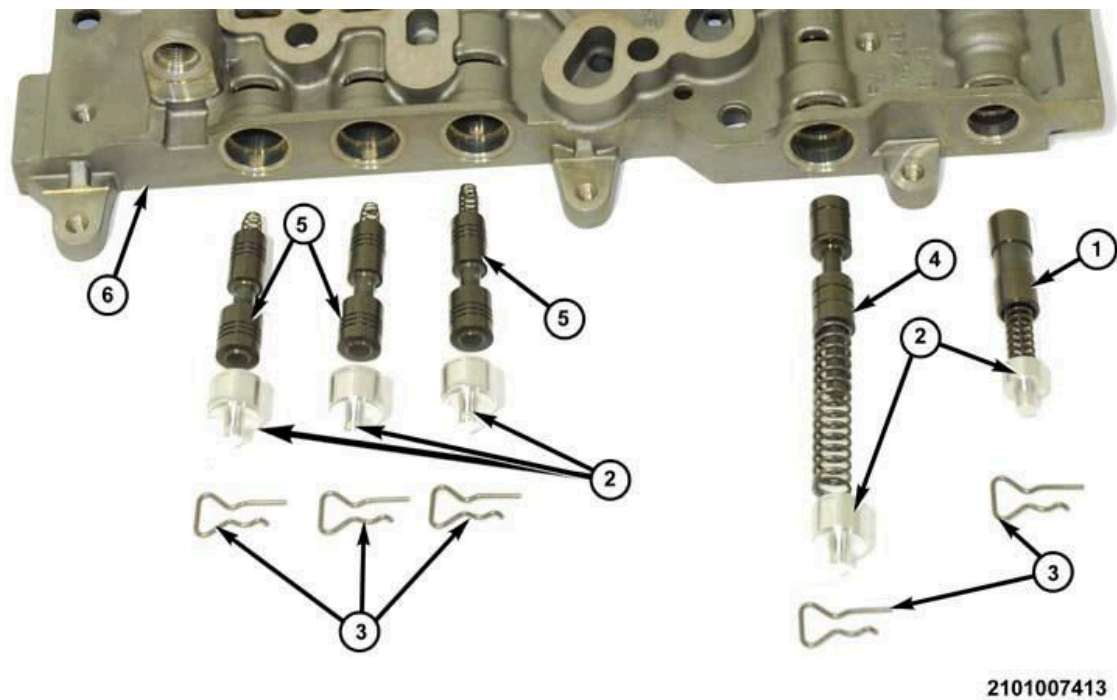


Fig. 706: Inner Valve Body Components
Courtesy of CHRYSLER GROUP, LLC

1. Install the springs, PCV valves, and (5) plugs (2), from the bores in the inner valve body (6).
2. Install the solenoid limit valve (4), spring, and plug (2) into the bore in the inner valve body (6).
3. Install the boost valve (1), spring, and plug (2) into the bore in the inner valve body (6).

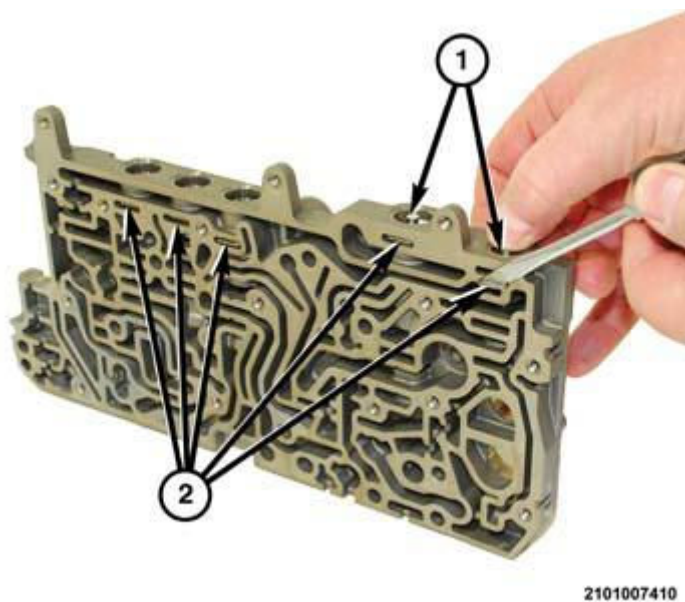


Fig. 707: Inner Valve Body With The Valves Bores Facing Up
Courtesy of CHRYSLER GROUP, LLC

4. Turn the inner valve body so the plugs (1) are facing upward
5. While pressing downward on the plugs (1), install the spring clips (2) to hold the plugs in the inner valve body.

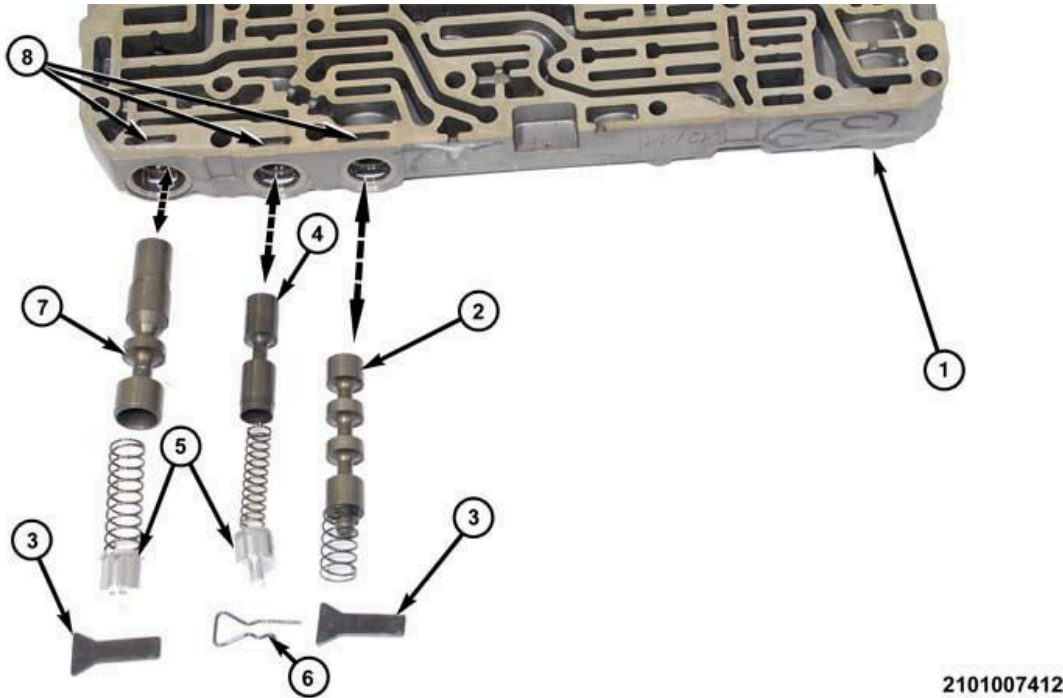
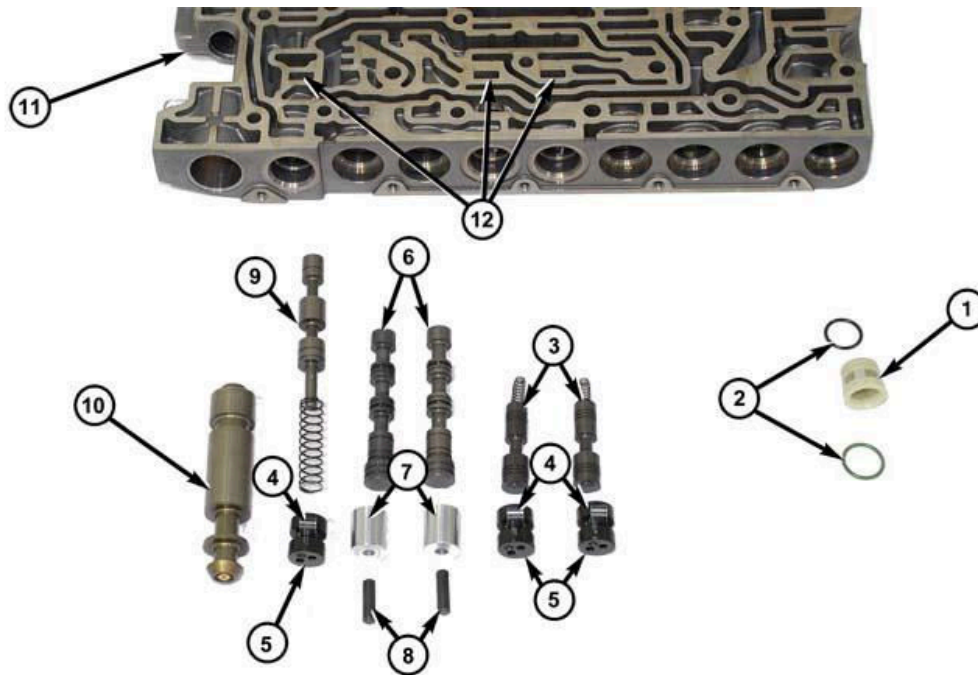


Fig. 708: Outer Valve Body & Pressure Valve
 Courtesy of CHRYSLER GROUP, LLC

6. The support plates (3) and spring clip (6) are go into pockets (8) in the outer valve body (1).
7. Install the lubrication valve (4), spring, and plug (5) into the bore in the outer valve body (1).
8. Install the spring clip (6) to hold the plug (5), spring and lubrication valve (4) in the bore in the outer valve body (1).
9. Install the system pressure valve (7), spring, and plug (5) in the bore in the outer valve body (1).
10. Install the support plate (3) to hold the plug (5), spring and system pressure valve (7) into the bore in the outer valve body (1).
11. Install the converter pressure valve (2) and spring into the bore in the outer valve body (1).
12. Install the support plate (3) to hold the spring and converter pressure valve (2) in the bore in the outer valve body (1).



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Fig. 709: Outer Valve Body Components
Courtesy of CHRYSLER GROUP, LLC

13. Position the outer valve body (11) on the work surface inside up to gain access to the valve retaining spring clips (12).
14. Install the MV park lock valve (9), spring, and plug into the bore in the outer valve body (11).
15. While pressing down on the plug to align the slot, install the spring clip (12) to hold the MV park lock valve and plug in the bore in the outer valve body (11).
16. Install the lubrication valves, springs (3), a plugs (5), into the bores in the outer valve body (11).
17. While pressing down on the plug to align the slot, install the spring clips (12) to hold the lubrication valve plugs in the bores in the outer valve body (11).
18. Install the parking lock valve (10) into the bore in the outer valve body (11).
19. Install the pressure regulator valves (6), sleeves (7), and bullets (8) into the bores in the outer valve body (11).
20. Install NEW O-rings (2) on the filter screen (1).
21. Install the filter screen (1) into the bore in the outer valve body (11).

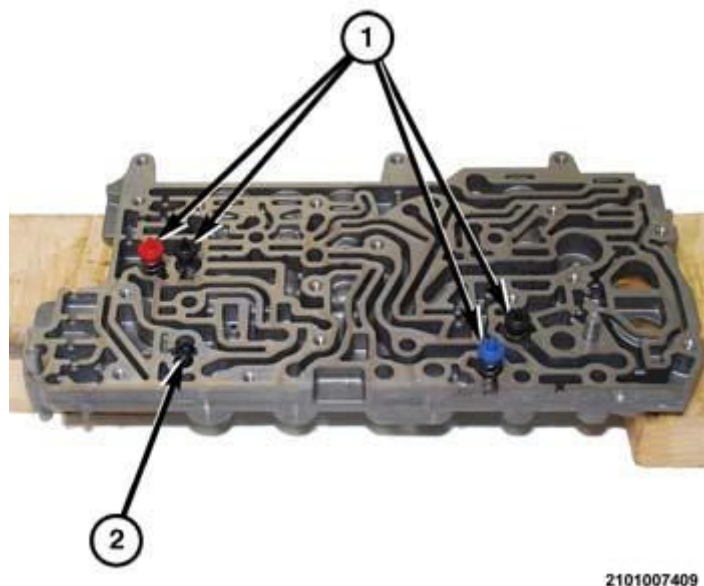


Fig. 710: Inner Valve Body, Color Coded Check Valves & Check-Balls
Courtesy of CHRYSLER GROUP, LLC

22. Place the inner valve body on the work surface resting on wood blocks to elevate the center for clearance underneath.
23. Install the toggling, connected check-balls (2) into the inner valve body.
24. Install the color coded check valves (1) into the inner valve body.

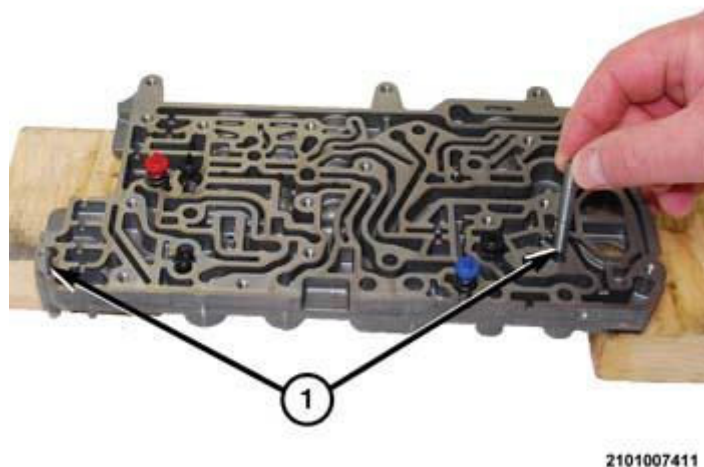


Fig. 711: Inner Valve Body & Guide Pins
Courtesy of CHRYSLER GROUP, LLC

25. With the smaller diameter end downward, install the guide pins (1) into the inner valve body.

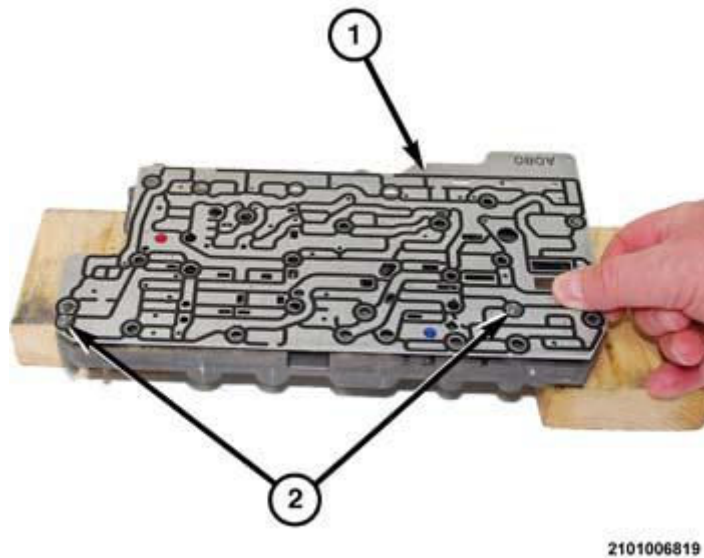


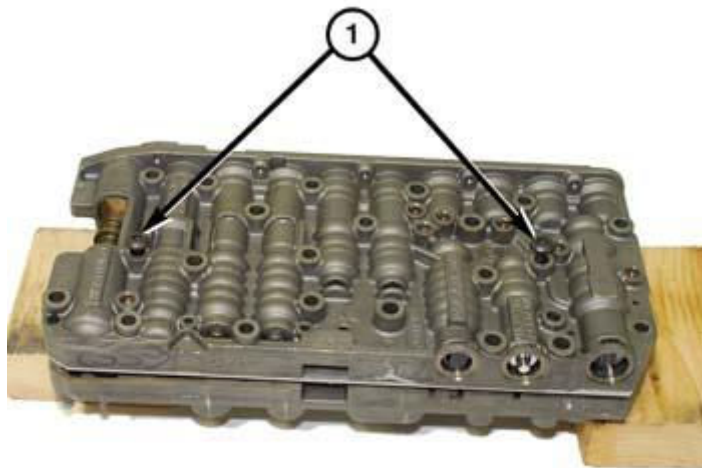
Fig. 712: Separator Plate & Inner Valve Body
Courtesy of CHRYSLER GROUP, LLC

26. Place the separator plate (1) in position on of the inner valve body over the guide pins (2).



Fig. 713: Outer Valve Body & Separator Plate
Courtesy of CHRYSLER GROUP, LLC

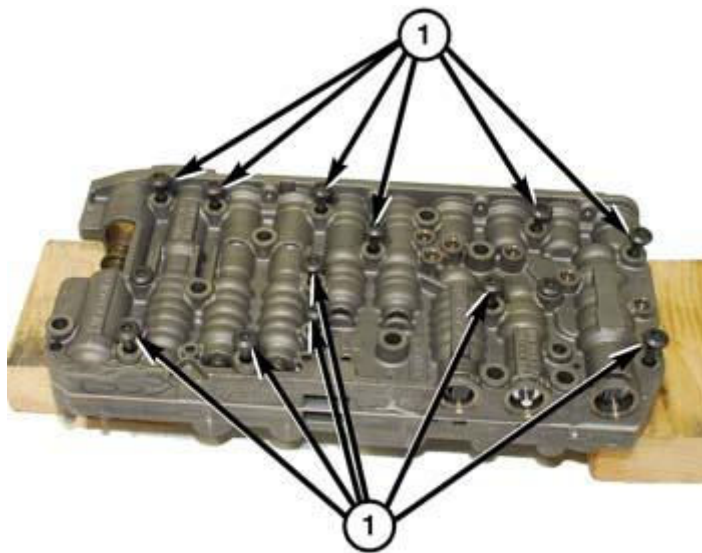
27. Place the outer valve body (1) in position on the separator plate (2).



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Fig. 714: Valve Body & 2 Screws
Courtesy of CHRYSLER GROUP, LLC

28. Install two screws (1) to hold the outer valve body to the inner valve body and separator plate. Tighten the screws snug with a suitable torx-drive screw driver.



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Fig. 715: Valve Body & 12 Screws
Courtesy of CHRYSLER GROUP, LLC

29. Install the remaining screws (1) to hold the inner valve body to the outer valve body.
30. Install the pressure sensor in the valve body.

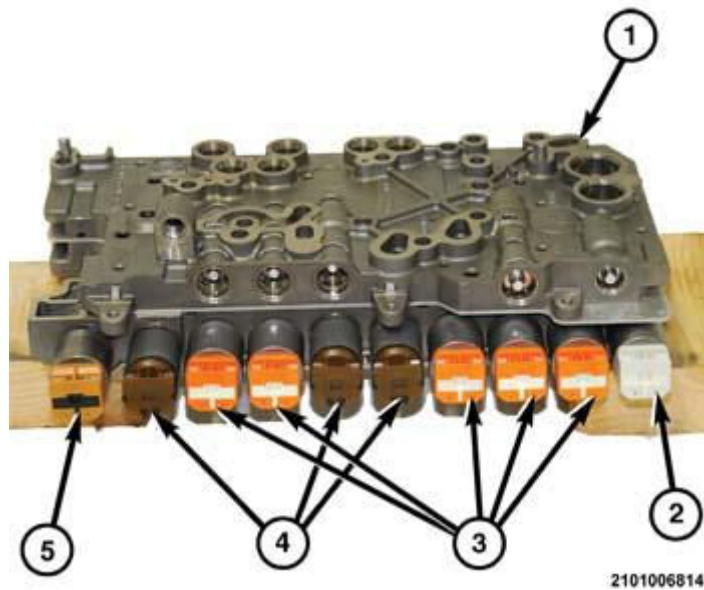


Fig. 716: View Of Valve Body & Solenoids
Courtesy of CHRYSLER GROUP, LLC

31. Install the solenoids (2 - 5) in the valve body (1).

NOTE: Each type solenoid has a unique color end cover.

- 2 = System Pressure Regulator Solenoid
- 3 = Pressure Regulator Solenoids
- 4 = Dog Clutch Solenoids
- 5 = Parking Lock Solenoid

32. Install the valve body in the transmission.
33. Finish assemble the vehicle.
34. Road test the vehicle to verify the repair.

INSTALLATION

INSTALLATION

NOTE: Before installing the valve body, replace the O-ring seals on the fluid transfer adapter tubes. Apply a light coating of assembly lube on the O-rings to ease valve body installation.

1. Clean the mating surfaces between the valve body and the transmission housing with a clean lint-free cloth.

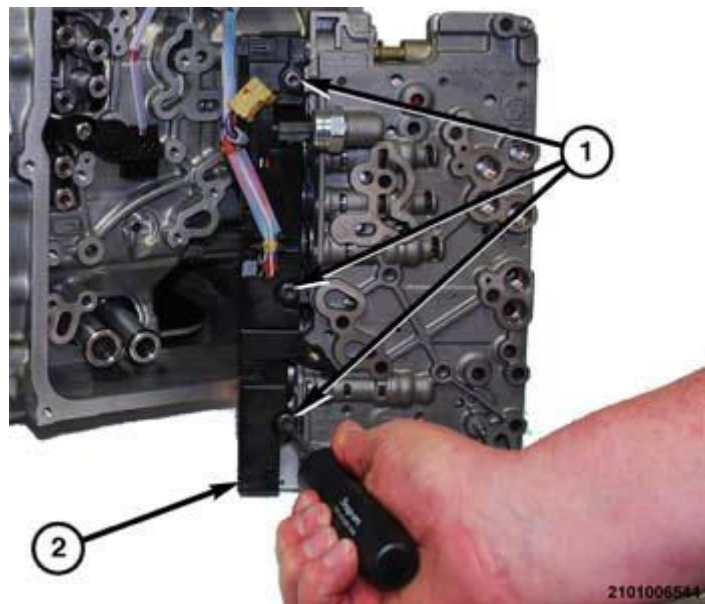


Fig. 717: Removing/Installing Wire Harness Connector At Valve Body Solenoids
Courtesy of CHRYSLER GROUP, LLC

2. Place the valve body in position on the transmission.
3. Place the wire harness connector in position on the solenoids.
4. Press the connector inward to engage the terminals on the solenoids.
5. Install the bolts to hold the wire harness connector to the valve body and solenoids and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

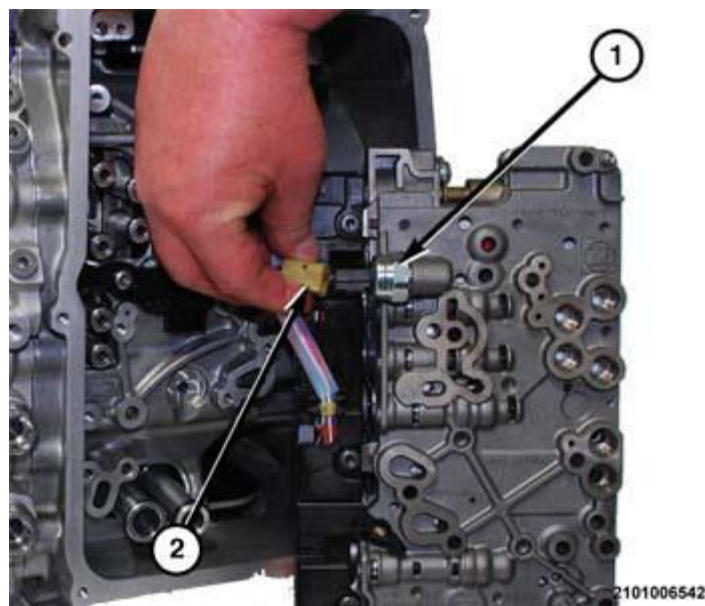


Fig. 718: Fluid Pressure Transducer Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

6. Insert the wire harness connector (2) into the fluid pressure transducer connector (1).
7. Press connector together until the lock engages.

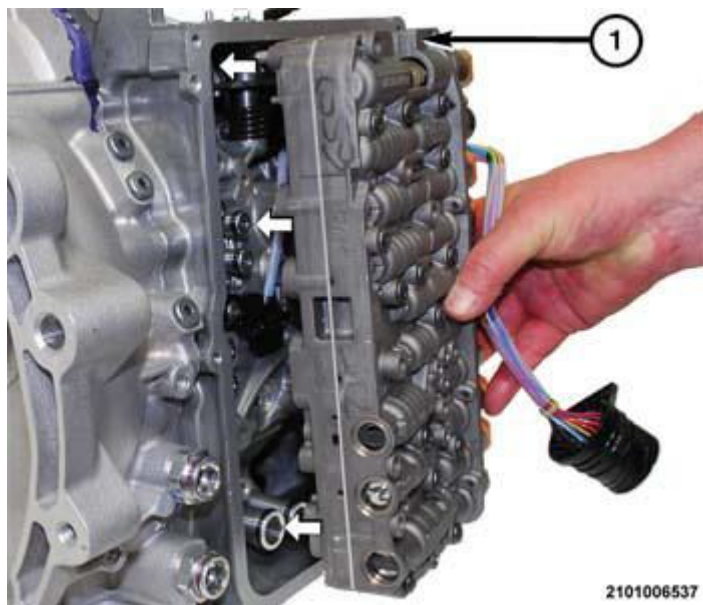


Fig. 719: Aligning Valve Body To Fluid Transfer Tubes
Courtesy of CHRYSLER GROUP, LLC

8. Turn the valve body (1) over and align the valve body (1) with the fluid transfer adapters.

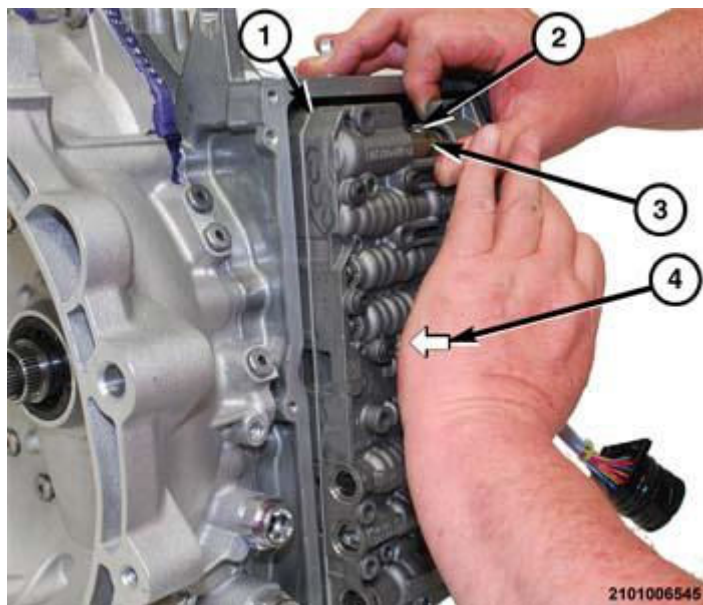


Fig. 720: Engaging Valve Body To Fluid Transfer Tubes
Courtesy of CHRYSLER GROUP, LLC

9. Guide the manual lever cam (2) into the slot (3) on the manual valve.

10. Firmly press (4) the valve body (1) inward until the O-rings on the fluid transfer adapters engage into receptacle holes on the valve body.

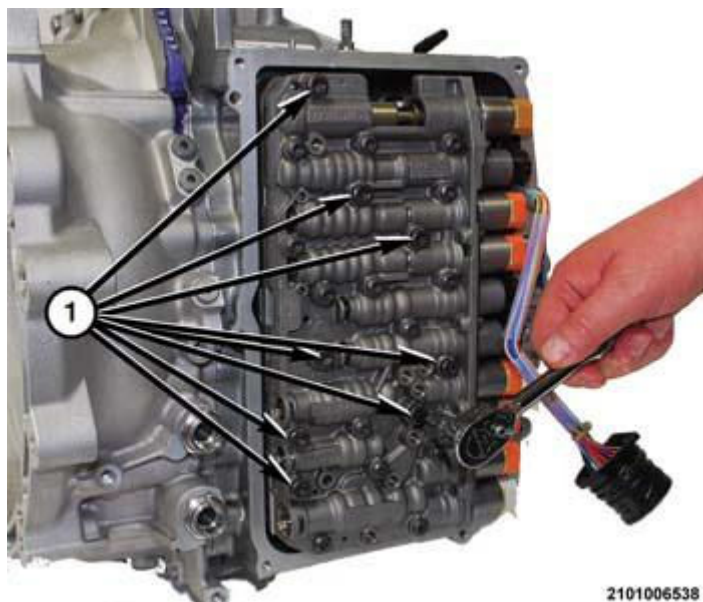


Fig. 721: Valve Body Bolts
Courtesy of CHRYSLER GROUP, LLC

11. Install the bolts (1) to hold the valve body to the transmission housing and tighten to the proper specifications. Refer to **SPECIFICATIONS**.

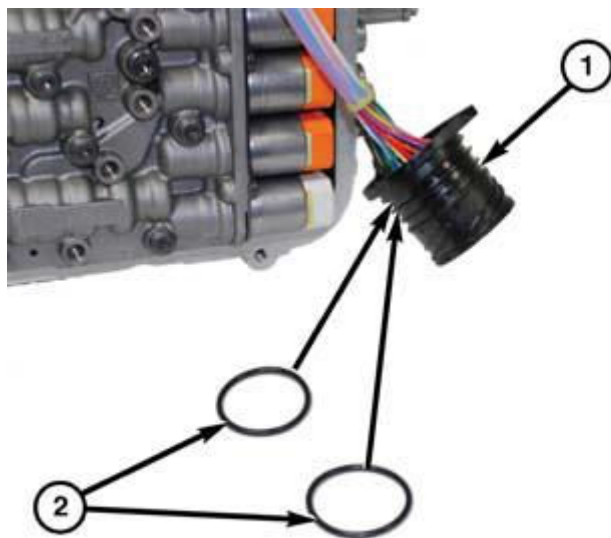


Fig. 722: Valve Body Solenoid Wire Harness Connector Socket O-Ring Seals
Courtesy of CHRYSLER GROUP, LLC

12. Install NEW O-ring seals (2) on the wire connector socket (1).

NOTE: A light coating of assembly lube can be applied to the O-ring seals (2) to ease installation.

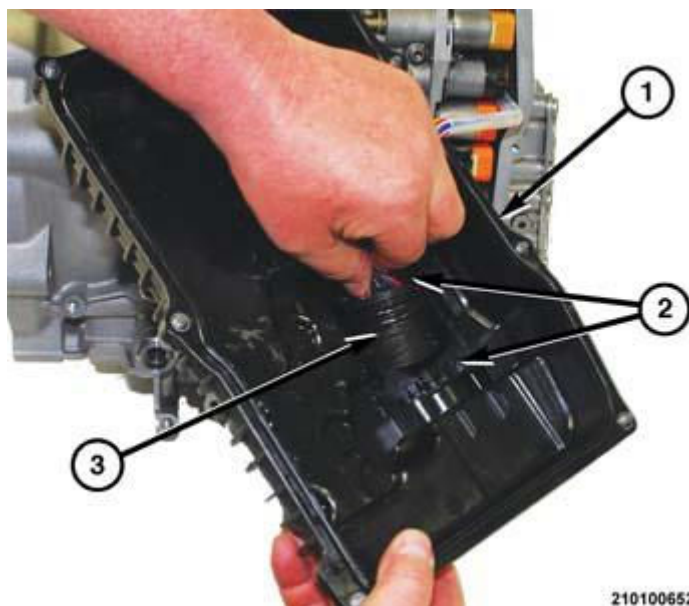


Fig. 723: Valve Body Cover Pan & Wire Connector Socket
Courtesy of CHRYSLER GROUP, LLC

13. Place the valve body cover (1) in position on the transmission.
14. Insert the wire connector socket (3) into the opening on the inside of valve body cover (1) with the flat side (2) of the socket on the left.

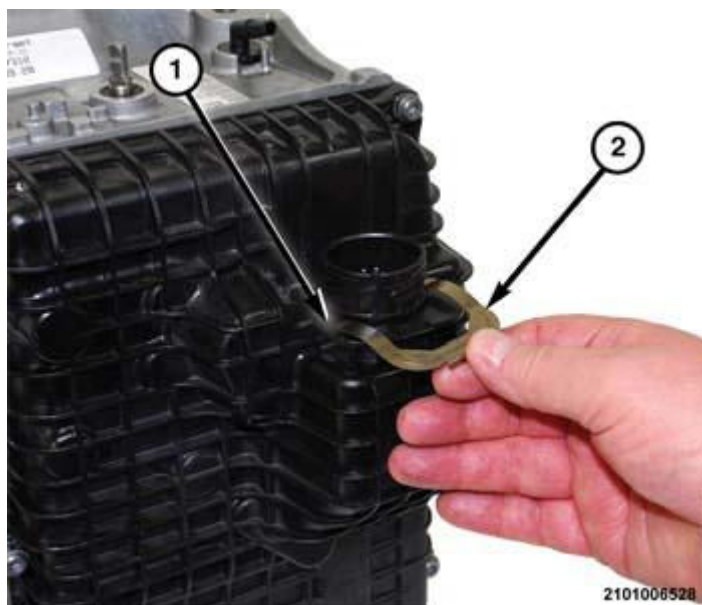


Fig. 724: Wire Connector Socket Clip
Courtesy of CHRYSLER GROUP, LLC

15. Press the wire connector socket inward until the retainer clip groove (1) is exposed on the outside of the valve body cover (1).
16. Install the clip (2) to hold the wire connector socket in the valve body cover.

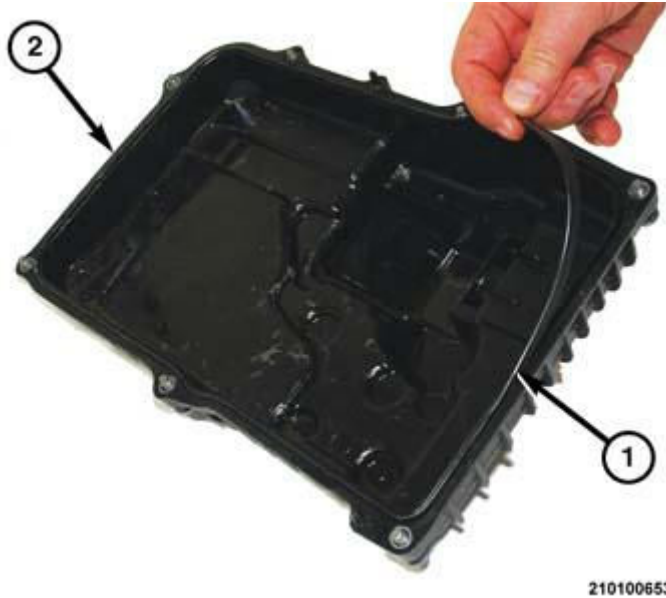


Fig. 725: Valve Body Cover Pan Gasket Seal
Courtesy of CHRYSLER GROUP, LLC

17. Install a NEW gasket seal (1) in the groove around the sealing surface of the valve body cover (2).

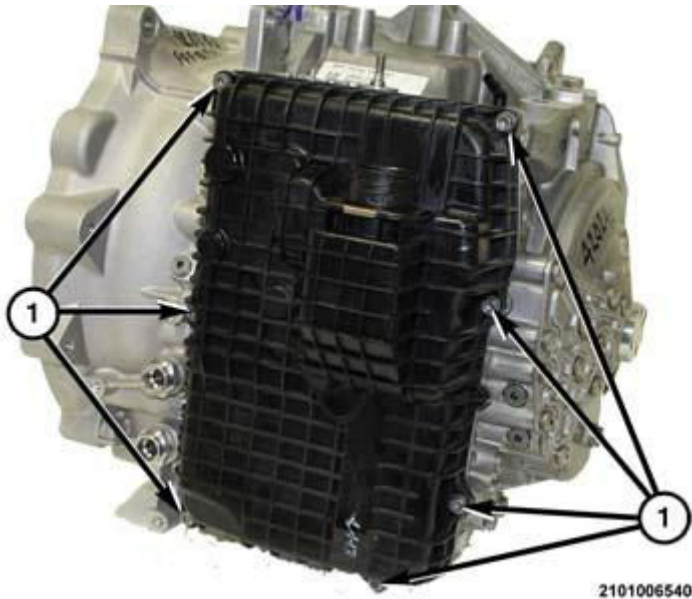


Fig. 726: Valve Body Cover Pan Bolts
Courtesy of CHRYSLER GROUP, LLC

18. Place the valve body cover pan gasket against the sealing surface of the transmission housing.

19. Install the bolts (1) to hold the valve body cover to the transmission housing and tighten to the proper specifications. Refer to **SPECIFICATIONS**.



Fig. 727: Transmission Valve Body Solenoid Connector
Courtesy of CHRYSLER GROUP, LLC

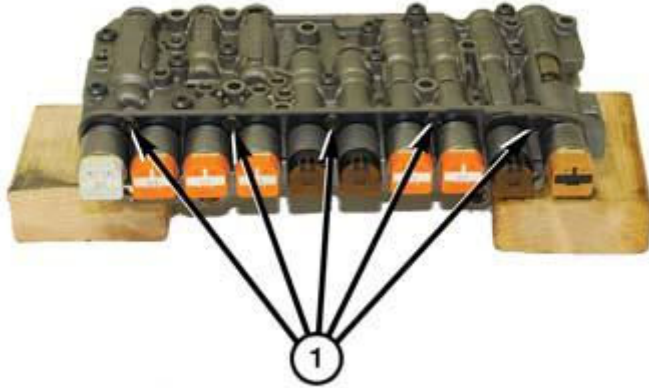
20. Engage the wire connector into the socket on the valve body cover.
21. Rotate the lock lever (1) clockwise onto the transmission solenoid connector.
22. Fill the transmission. Refer to **FLUID AND FILTER, STANDARD PROCEDURE**.
23. Install the belly pan.
24. Connect the negative battery cable.
25. Perform the Valve Body Solenoid Learn procedure if the valve body and/or the TCM was replaced during a repair.
26. Perform Transmission Verification Test-948TE. Refer to **STANDARD PROCEDURE**.

VALVES, SOLENOID

REMOVAL

REMOVAL

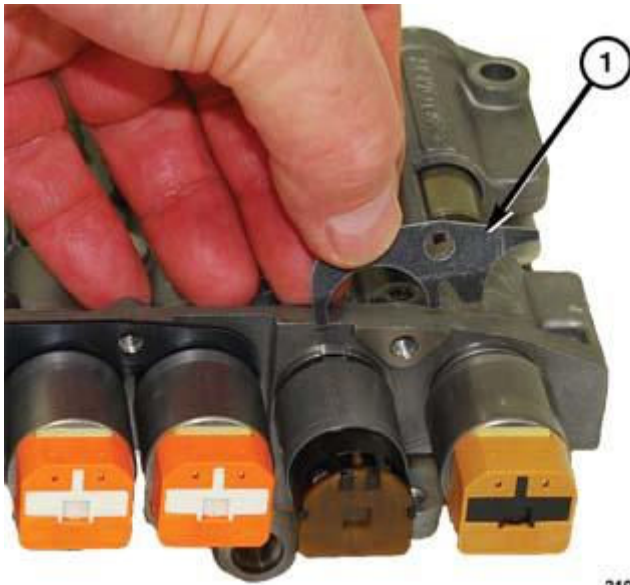
1. Position the vehicle on a suitable hoist with the transmission in neutral. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove the valve body from the transmission. Refer to **VALVE BODY, REMOVAL**.
3. Place the valve body on a clean work surface supported on each end by wooden blocks with the outer half facing upward.



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Fig. 728: View Of Solenoid Valve Retainer
Courtesy of CHRYSLER GROUP, LLC

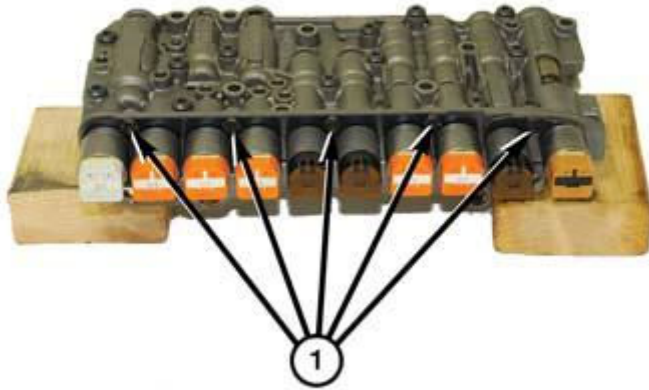
4. Remove the screws (1) holding the solenoid retainers to the outer valve body.



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Fig. 729: View Of Solenoid Valve Small Retainer
Courtesy of CHRYSLER GROUP, LLC

5. Separate the small retainer (1) from the valve body.



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Fig. 730: View Of Solenoid Valve Retainer
Courtesy of CHRYSLER GROUP, LLC

6. Separate the large retainer (1) from the valve body.



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Fig. 731: Solenoid Valves & Outer Valve Body
Courtesy of CHRYSLER GROUP, LLC

7. Turn the valve body over so the inner valve body (1) is on top.
8. Pull the solenoid valves (3) straight out of the outer valve body (2).

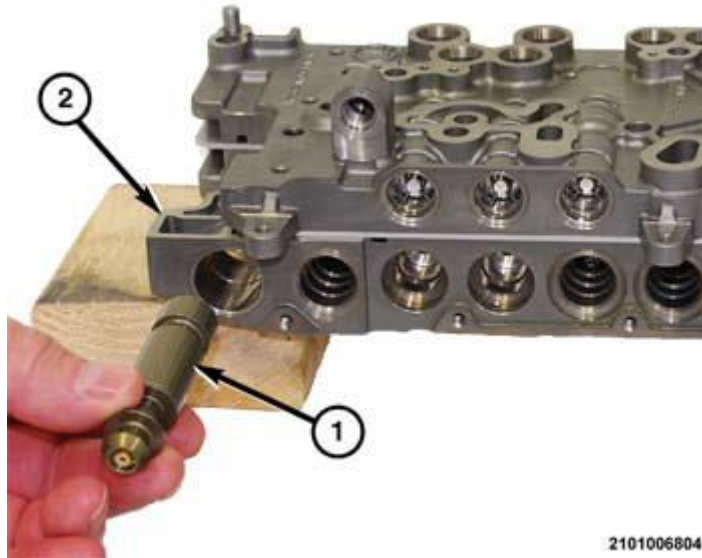


Fig. 732: Parking Lock Valve & Outer Valve Body
Courtesy of CHRYSLER GROUP, LLC

9. Remove the parking lock valve (1) from the outer valve body (2).

INSTALLATION

INSTALLATION

Place the valve body on a clean work surface supported on each end by wooden blocks with the upper half facing upward.

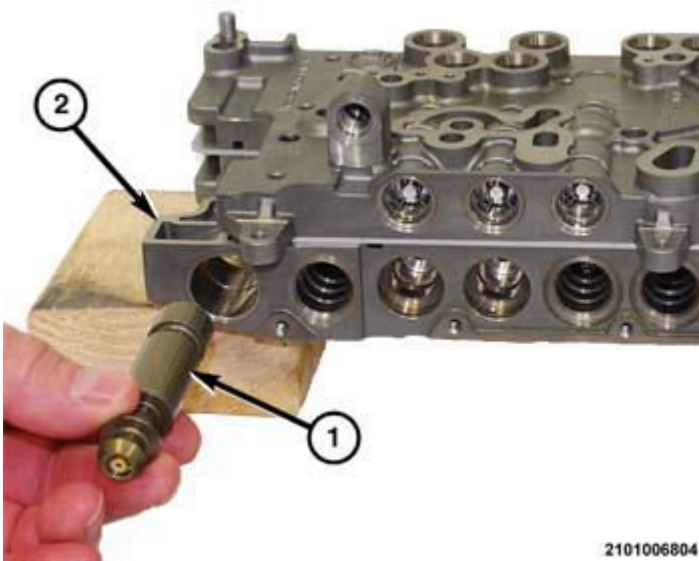


Fig. 733: Parking Lock Valve & Outer Valve Body

Courtesy of CHRYSLER GROUP, LLC

1. Insert the parking lock valve into the bore in the outer valve body.



Fig. 734: Solenoid Valves & Outer Valve Body
Courtesy of CHRYSLER GROUP, LLC

2. Insert the solenoids (3) straight into the outer valve body (2).

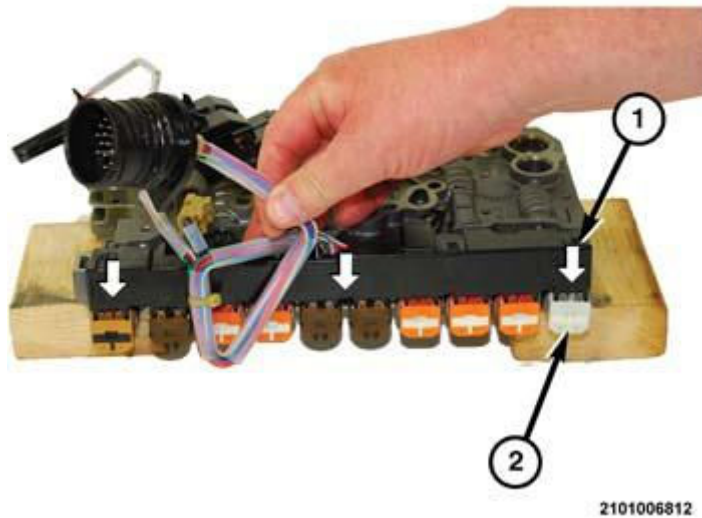


Fig. 735: Test Fitting Wire Connector
Courtesy of CHRYSLER GROUP, LLC

3. Test fit the wire connector (1) into the solenoid connectors (2) to assure alignment.

4. Remove the wire connector with care not to rotate the solenoids.

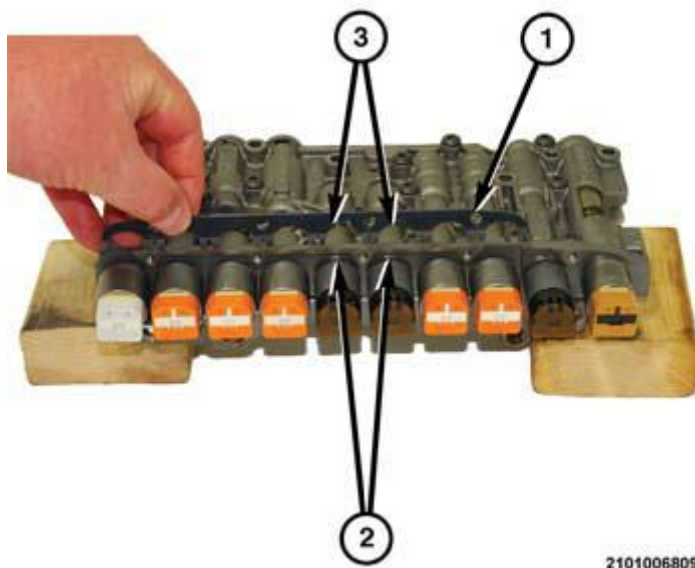


Fig. 736: Placing Large Retainer In Position On Valve Body
Courtesy of CHRYSLER GROUP, LLC

5. Turn the valve body over so the inner valve body (1) is on top.
6. Place the large retainer (1) in position on the valve body with the index tabs (3) on the retainer in the notches (2) on the center dog clutch solenoids.



Fig. 737: View Of Solenoid Valve Small Retainer
Courtesy of CHRYSLER GROUP, LLC

7. Place the small retainer (1) in position on the valve body.

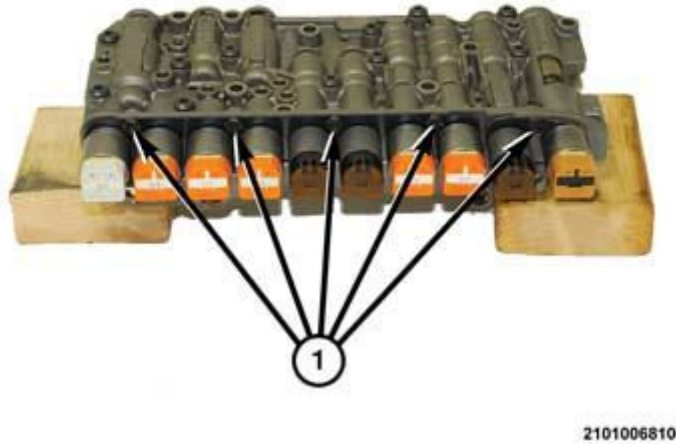


Fig. 738: View Of Solenoid Valve Retainer
Courtesy of CHRYSLER GROUP, LLC

8. Install the screws (1) to hold the solenoid retainers to the outer valve body.
9. Install the valve body in the transmission.
10. Perform the Valve Body Solenoid Learn procedure if the valve body and/or the TCM was replaced during a repair.
11. Perform Transmission Verification Test-948TE. Refer to **STANDARD PROCEDURE** .

SHIFT, BRAKE INTERLOCK

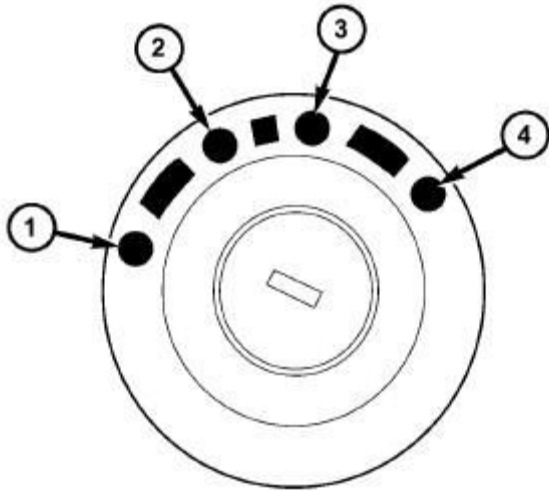
DESCRIPTION

DESCRIPTION

The Brake Transmission Shift Interlock (BTSI) system prevents the driver from shifting out of Park unless the service brake pedal is actuated. The BTSI system is a "Power to Release" shift mechanism. The system is mechanically locked in Park until power is applied to the solenoid contained within the shifter. No brake interlock adjustment is required. In the event of a solenoid problem or power loss, the shifter cannot be moved from Park unless a manual override is actuated. A BTSI override mechanism is provided with this shifter to allow the vehicle to be shifted out of PARK in the event of an electrical failure.

OPERATION

OPERATION



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Fig. 739: Ignition Key/Switch Positions
 Courtesy of CHRYSLER GROUP, LLC

- 1 - LOCK
- 2 - ACC
- 3 - ON
- 4 - START

The Brake Transmission Shifter/Ignition Interlock (BTISI) is engaged whenever the ignition switch is in the LOCK (1) position. An additional electrically activated feature will prevent shifting out of the PARK position unless the brake pedal is depressed at least one-half inch. A solenoid in the shifter assembly is energized when the ignition is in the ON position and the brake pedal is depressed. When the key is in the ON position and the brake pedal is depressed, the shifter is unlocked and will move into any position. The interlock system also prevents the ignition switch from being turned to the LOCK position, unless the shifter is in the gated PARK position.

The following chart describes the normal operation of the Brake Transmission Shift Interlock (BTISI) system. If the "expected response" differs from the vehicle's response, then system repair and/or adjustment is necessary.

ACTION	EXPECTED RESPONSE
1. Turn key to the "ACC" position and depress brake pedal.	1. Shifter CAN be shifted out of park.
2. Turn key to the "ON" position, with foot off of brake pedal.	2. Shifter CANNOT be shifted out of park.
3. Turn key to the "ON" position and depress the brake pedal.	3. Shifter CAN be shifted out of park.
4. Leave shifter in any gear, except "PARK", and try to return key to the "LOCK" position.	4. Key cannot be returned to the "LOCK" position.

2014 Jeep Cherokee Trailhawk

2014 AUTOMATIC TRANSMISSION 948TE - Service Information - Cherokee

5. Return shifter to "PARK" and try to remove the key.	5. Key can be removed (after returning to "LOCK" position).
6. With the key removed, and the brake depressed, try to shift out of "PARK".	6. Shifter cannot be shifted out of "PARK".
NOTE: Any failure to meet these expected responses requires system adjustment or repair.	

STANDARD PROCEDURE

BTSI OVERRIDE

If a malfunction occurs and the shift lever cannot be moved out of the PARK position, you can use the following procedure to temporarily move the shift lever.

1. Turn the engine OFF.
2. Apply the parking brake.



Fig. 740: Removing Shifter Bezel And Boot Assembly
Courtesy of CHRYSLER GROUP, LLC

3. Using a screwdriver (2) or similar tool, carefully separate the shifter bezel and boot assembly (1) from the center console bezel.
4. Press and maintain firm pressure on the brake pedal.



Fig. 741: Holding The Override Release Lever Down
Courtesy of CHRYSLER GROUP, LLC

5. Insert a small screwdriver (1) or similar tool down into the shift lever override access hole (2) (at the right front corner of the shift lever assembly), and push and hold the override release lever down.
6. Move the shift lever to the NEUTRAL position
7. The vehicle may then be started in NEUTRAL.
8. Reinstall the shift lever boot.

2014 BRAKES

Antilock Brake System (ABS) - Service Information - Cherokee

CAUTION

CAUTION

The antilock brake system uses an electronic control module known as the Antilock Brake Module (ABM). This module is designed to withstand normal current draws associated with vehicle operation. Care must be taken to avoid overloading the circuits.

CAUTION: In testing for open or short circuits, do not ground or apply voltage to any of the circuits unless instructed to do so for a diagnostic procedure.

CAUTION: These circuits should only be tested using a high impedance multi-meter or the designated scan tool as described in this service information . Power should never be removed or applied to any control module with the ignition in the ON position. Before removing or connecting battery cables, fuses, or connectors, always turn the ignition to the OFF position.

CAUTION: The ABM 47-way connector should never be connected or disconnected with the ignition switch in the ON position.

CAUTION: This vehicle utilizes active wheel speed sensors. Do not apply voltage to wheel speed sensors at any time.

CAUTION: Use only factory wiring harnesses. Do not cut or splice wiring to the brake circuits. The addition of aftermarket electrical equipment (car phone, radar detector, citizen band radio, trailer lighting, trailer brakes, etc.) on a vehicle equipped with antilock brakes may affect the function of the antilock brake system.

CAUTION: When performing any service procedure on a vehicle equipped with ABS, do not apply a 12-volt power source to the ground circuit of the pump motor in the HCU. Doing this will damage the pump motor and will require replacement of the entire HCU.

CAUTION: An attempt to remove or disconnect certain system components may result in improper system operation. Only those components with approved removal and installation procedures in this service information should be serviced.

CAUTION: If welding work is to be performed on the vehicle using an electric arc welder, the ABM connector should be disconnected during the welding operation.

CAUTION: Many components of the ABS are not serviceable and must be replaced as an assembly. Do not disassemble any component which is not designed to be serviced.

CAUTION: Brake fluid will damage painted surfaces. If brake fluid is spilled on any painted surface, wash off with water immediately.

CAUTION: Only the recommended jacking or hoisting positions for this vehicle are to be used whenever it is necessary to lift a vehicle.

DESCRIPTION

ANTILOCK BRAKE SYSTEM

This vehicle uses an antilock brake system standard with Electronic Stability Control (ESC) and All-Speed Traction Control.

This antilock brake system uses components of the base brake system, but also features the following components:

- Integrated Control Unit (ICU) - Hydraulic Control Unit (HCU) and Antilock Brake Module (ABM)
- Wheel Speed Sensors (WSS) - Four sensors (one at each wheel)
- Steering Angle Sensor - Part of the Electronic Power Steering (EPS) Module, located in the EPS steering gear
- Dynamics Sensor Module - Includes Yaw rate, longitudinal, and lateral acceleration sensors. Located in the Occupant Restraint Controller (ORC) Module.

The ABS system is made up of the Hydraulic Control Unit (HCU) and the Antilock Brake Module (ABM). For additional information on these components, refer to **HYDRAULIC CONTROL UNIT (HCU), DESCRIPTION** and **MODULE, ANTI-LOCK BRAKE SYSTEM, DESCRIPTION**.

ABS

The purpose of the antilock brake system (ABS) is to prevent wheel lockup under braking conditions on virtually any type of road surface. Antilock braking is desirable because a vehicle that is stopped without locking the wheels retains directional stability and some steering capability. This allows the driver to retain greater control of the vehicle during braking.

All vehicles use Electronic Variable Brake Proportioning (EVBP) to balance front-to-rear braking when the brakes are applied in the partial braking range. For more information on electronic brake distribution, refer to

DESCRIPTION.**ELECTRONIC STABILITY CONTROL**

For information on the Electronic Stability Control, refer to **DESCRIPTION.**

TRACTION CONTROL

For information on the All-Speed Traction Control, refer to **DESCRIPTION.**

ELECTRONIC STABILITY CONTROL

Electronic Stability Control (ESC), which includes Hydraulic Brake Assist, Traction Control, and Electronic Roll Mitigation, is standard on all vehicles. ESC aids the driver in maintaining vehicle directional stability. ESC will do whatever can be done, within the limits of available traction, to keep the car on course.

ESC uses the ABS with Traction Control along with the following components to operate:

- Dynamics (ESC) Sensor
- Steering Angle Sensor (SAS)

The Dynamics Sensor is incorporated with the Occupant Restraint Controller (ORC) Module. The ORC is mounted under the center console, which is near the center of gravity of the car for effective sensing. Refer to **MODULE, OCCUPANT RESTRAINT CONTROLLER, DESCRIPTION**. The Steering Angle Sensor is located in the Electric Power Steering (EPS) gear. Refer to **SENSOR, STEERING WHEEL ANGLE, DESCRIPTION.**

HYDRAULIC BRAKE ASSIST

Brake Assist is programmed into the ESC system. Brake assist helps the driver overcome the tendency to not apply the brakes hard enough or quick enough to achieve the minimum stopping distance during a panic stop. During this situation, the ESC system instantly applies the maximum available pressure to the brakes and the vehicle stops as quickly as available traction will allow.

TRACTION CONTROL

The traction control system that is part of the Electronic Stability Control (ESC), is an all-speed traction control. All-Speed Traction Control enhances mobility and prevents wheel slip when accelerating on slippery surfaces. It also provides a measure of directional stability control. Using the wheel-speed sensors, it can detect excessive yaw and help keep the car on the intended course, as for instance, when accelerating around a curve.

All-Speed Traction Control is effective up to 85 mph (137 km/h).

The traction control system may be turned off or on by depressing the ESC Off switch button, located near the middle of the dash.

ELECTRONIC VARIABLE BRAKE PROPORTIONING

Vehicles equipped with ABS use Electronic Variable Brake Proportioning (EVBP) to balance front-to-rear braking. The EVBP is used in place of a rear proportioning valve. The EVBP system uses the ABS system to control the slip of the rear wheels in partial braking range. The braking force of the rear wheels is controlled electronically by using the inlet and outlet valves located in the Integrated Control Unit (ICU).

OPERATION

ANTILOCK BRAKE SYSTEM

ABS

There are a few performance characteristics of the Antilock Brake System (ABS) that may at first seem abnormal, but in fact are normal. These characteristics are described below.

NORMAL BRAKING

Under normal braking conditions, the ABS functions the same as a standard base brake system with a diagonally split master cylinder and conventional vacuum assist.

ABS BRAKING

ABS operation is available at all vehicle speeds above 5-8 km/h (3-5 mph). If a wheel locking tendency is detected during a brake application, the brake system enters the ABS mode. During ABS braking, hydraulic pressure in the four wheel circuits is modulated to prevent any wheel from locking. Each wheel circuit is designed with a set of electric solenoids to allow modulation, although for vehicle stability, both rear wheel solenoids receive the same electrical signal. Wheel lockup may be perceived at the very end of an ABS stop and is considered normal.

During an ABS event, the Integrated Control Unit (ICU) regulates hydraulic pressure at all four of the vehicle's wheels.

The hydraulic pressure at each front wheel is controlled independently (relative to the amount of slip at each wheel) in order to maximize the braking force generated by the front brakes. The rear wheels are controlled such that the hydraulic pressure at either rear wheel does not exceed that of the highest slip rear wheel in order to maintain vehicle stability.

The system can build and release pressure at each wheel, depending on signals generated by the Wheel Speed Sensors (WSS) at each wheel and received at the Antilock Brake Module (ABM).

NOISE AND BRAKE PEDAL FEEL

During ABS braking, some brake pedal movement may be felt. In addition, ABS braking will create ticking, popping, or groaning noises heard by the driver. This is normal and is due to pressurized fluid being transferred between the master cylinder and the brakes. If ABS operation occurs during hard braking, some pulsation may be felt in the vehicle body due to fore and aft movement of the suspension as brake pressures are modulated.

At the end of an ABS stop, ABS is turned off when the vehicle is slowed to a speed of 5-6 km/h (3-4 mph).

There may be a slight brake pedal drop anytime that the ABS is deactivated, such as at the end of the stop when the vehicle speed is less than 3 mph (5 km/h) or during an ABS stop where ABS is no longer required. These conditions exist when a vehicle is being stopped on a road surface with patches of ice, loose gravel, or sand on it. Also, stopping a vehicle on a bumpy road surface activates ABS because of the wheel hop caused by the bumps.

TIRE NOISE AND MARKS

Although the ABS system prevents complete wheel lockup, some wheel slip is desired in order to achieve optimum braking performance. Wheel slip is defined as follows: 0 percent slip means the wheel is rolling freely and 100 percent slip means the wheel is fully locked. During brake pressure modulation, wheel slip is allowed to reach up to 25-30 percent. This means that the wheel rolling velocity is 25-30 percent less than that of a free rolling wheel at a given vehicle speed. This slip may result in some tire chirping, depending on the road surface. This sound should not be interpreted as total wheel lockup.

Complete wheel lockup normally leaves black tire marks on dry pavement. The ABS will not leave dark black tire marks since the wheel never reaches a fully locked condition. However, tire marks may be noticeable as light patched marks.

START-UP AND DRIVE-OFF CYCLES

When the ignition is turned on, a popping sound and a slight brake pedal movement may be noticed. The ABS warning lamp will also be on for up to 5 seconds after the ignition is turned on.

When the vehicle is first driven off, a humming may be heard or felt by the driver at approximately 12-25 mph (20-40 km/h). All of these conditions are a normal function of ABS as the system is performing a diagnosis check.

PREMATURE ABS CYCLING

Symptoms of premature ABS cycling include: clicking sounds from the solenoid valves; pump/motor running; and pulsations in the brake pedal. Premature ABS cycling can occur at any braking rate of the vehicle and on any type of road surface. Neither the red BRAKE indicator lamp, nor the amber ABS indicator lamp, illuminate and no faults are stored in the ABM.

Premature ABS cycling is a condition that needs to be correctly assessed when diagnosing problems with the antilock brake system. It may be necessary to use a scan tool to detect and verify premature ABS cycling.

Check the following common causes when diagnosing premature ABS cycling: damaged wheel bearings (causing tone wheel issues); damaged wheel speed sensor mounting bosses; and loose wheel speed sensor mounting screws.

After diagnosing the defective component, repair or replace it as required. When the component repair or replacement is completed, test drive the vehicle to verify that premature ABS cycling has been corrected.

ELECTRONIC STABILITY CONTROL

For information on the Electronic Stability Control, refer to **OPERATION**.

TRACTION CONTROL

For information on the All-Speed Traction Control, refer to **OPERATION**.

ELECTRONIC STABILITY CONTROL

To determine whether the car is responding properly to cornering commands, ESC uses steering wheel angle, yaw (turning) rate and lateral acceleration sensors (combined into Dynamics Sensor). Using signals from these sensors, in addition to individual wheel speed sensor signals, the system determines appropriate brake and throttle actions. Once initiated, ESC operates much like All-Speed Traction Control, except that the goal is directional stability. If the vehicle yaw response, or rate of turning, is inconsistent with the steering angle and vehicle speed indications, the ESC system applies the brakes and, if necessary closes the throttle, to restore control. This occurs whether the vehicle is turning too rapidly (oversteering) or not rapidly enough (understeering).

HYDRAULIC BRAKE ASSIST

Brake Assist is programmed into the ESC system. During a panic stop, a pressure sensor determines when the driver is doing so by measuring the brake pedal pressure application rate. A high rate of pedal pressure application causes the ESC system to apply maximum available pressure to the brakes and the vehicle stops as quickly as available traction will allow.

TRACTION CONTROL

For information on the All-Speed Traction Control, refer to **OPERATION**.

TRACTION CONTROL

Traction control systems sense impending wheel spin based on a model of the rate of change of wheel speed under normal traction conditions. The All-Speed Traction Control uses signals from the same wheel speed sensors as ABS to determine when to apply the brakes to one or more wheels and when to reduce engine torque output using the electronic throttle control (ETC) to prevent wheel slip during acceleration. Throttle control makes the vehicle less reliant on brake application alone to maintain traction, increasing the operating speed range and more closely modulates speed, resulting in smoother operation. With All-Speed Traction Control reducing engine torque as well as applying the brakes, it is possible to achieve almost seamless torque application at the wheels.

If the wheel slip is severe enough to require throttle intervention, All-Speed Traction Control will reduce engine torque and sometimes upshift the transmission to avoid the condition. In milliseconds, All-Speed Traction Control interrogates the engine control system to determine the current torque output, determines how much the torque output the current conditions will allow, and signals this requirement to the engine control system, which reduces the torque by partially closing the throttle. With execution of the torque reduction, the brake system reduces brake pressure to make the transition smooth, while maintaining forward progress. By reducing engine power, braking effectiveness is maintained and the system can operate throughout the normal vehicle speed range. That is why the system is identified as providing "all-speed" traction control.

The traction control system is enabled at each ignition cycle. It may be turned off by depressing the ESC OFF switch button. The ESC OFF lamp illuminates immediately upon depressing the button. Pressing this button again or turning off and restarting the vehicle will enable the traction control system.

ELECTRONIC VARIABLE BRAKE PROPORTIONING

Upon entry into EVBP, the inlet valve for the rear brake circuit is switched on so that the fluid supply from the master cylinder is shut off. In order to decrease the rear brake pressure, the outlet valve for the rear brake circuit is pulsed. This allows fluid to enter the Low Pressure Accumulator (LPA) in the Hydraulic Control Unit (HCU) resulting in a drop in fluid pressure to the rear brakes. In order to increase the rear brake pressure, the outlet valve is switched off and the inlet valve is pulsed. This increases the pressure to the rear brakes. This back-and-forth process will continue until the required slip difference is obtained. At the end of EVBP braking (brakes released) the fluid in the LPA is pumped back to the master cylinder by switching on the motor for ABS systems or by opening the ESVs for ESC systems. At the same time the inlet valve is switched on in case of another brake application.

The EVBP will remain functional during many ABS fault modes. If both the red BRAKE and amber ABS warning indicators are illuminated, the EVBP may not be functioning.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - INSPECTION AND ROAD TEST

1. Visually inspect the ABS for damaged or disconnected components and connectors.
2. Verify the brake lamps are operational. If they are not, repair them prior to continuing.
3. Connect a scan tool to the Data Link Connector located under the instrument panel to the left of the steering column. If the scan tool does not power-up, check the power and ground supplies to the connector.
4. Turn the ignition key to the ON position.
5. Using the scan tool, read and record any Diagnostic Trouble Codes (DTCs). If any DTCs are present, refer to the appropriate diagnostic information.

If no problems are observed, it will be necessary to road test the vehicle.

Many ABS conditions judged to be a problem by the driver may be normal operating conditions. To become familiarized with the normal operating characteristics of this antilock brake system, refer to **OPERATION**.

WARNING: Conditions that result in turning on the red brake warning indicator lamp may indicate reduced braking ability.

Before road testing a brake complaint vehicle, note whether the red BRAKE warning indicator lamp, amber ABS warning indicator lamp, or both are turned on. If it is the red BRAKE warning indicator, there is a brake hydraulic problem that must be corrected before driving the vehicle

Refer to **DIAGNOSIS AND TESTING** or **DIAGNOSIS AND TESTING** .

The following conditions will cause the red BRAKE lamp to illuminate:

- Low fluid in the brake reservoir
- Park Brake engaged
- Brake hydraulic problem
- ABS issue that will not allow the Brake Proportioning function

If the amber ABS warning indicator is on, road test the vehicle as described below. While only the amber ABS warning indicator is on, the ABS is not functional. The ability to stop the car using the base brake system should not be affected.

6. Turn the key to the OFF position and then back to the ON position. Note whether the amber ABS warning indicator lamp continues to stay on.
7. If the amber ABS warning indicator lamp stays on, shift into gear and drive the car to a speed of approximately 25 km/h (15 mph) to complete the ABS Start-Up and Drive-Off Cycles. Refer to **OPERATION**. If at this time the amber ABS warning indicator lamp stays on, refer to the appropriate diagnostic information.
8. If the amber ABS warning indicator lamp goes out at any time, drive the vehicle a short distance. Accelerate the vehicle to a speed of at least 64 km/h (40 mph). Bring the vehicle to a complete stop, braking hard enough to cause the ABS to cycle. Repeat this action several times. Using the scan tool, read and record any Diagnostic Trouble Codes (DTCs). If any DTCs are present, refer to the appropriate diagnostic information.

STANDARD PROCEDURE

BLEEDING

PRESSURE BLEEDING

- NOTE:** **Pressure bleeding is the preferred method after ICU replacement.**
- NOTE:** **Follow pressure bleeder manufacturer instructions for use of pressure bleeding equipment.**
- NOTE:** **ABS pressure bleeding is done with the use of power pressure brake bleed equipment**
- NOTE:** **To bleed the brakes with a pressure bleeder, the aid of a helper will be required.**

ABS system bleeding requires conventional bleeding methods plus use of a scan tool. The procedure involves performing a base brake bleeding, followed by use of the scan tool to cycle and bleed the HCU pump and solenoids.

1. Perform base brake bleeding. Refer to **STANDARD PROCEDURE** .
2. Install pressure bleeding equipment by following the pressure bleeder manufacturer instructions.
3. Connect scan tool to the Data Link Connector and navigate to the ABS menu to begin bleed process.
4. Starting at the LF wheel, following the scan tool on screen instructions, open the bleed screw and continue following scan tool process until cycle completes. Repeat this process for each remaining wheel going to RF, RR, LR.
5. Top off master cylinder fluid level and verify proper brake operation before moving vehicle.
6. Test drive the vehicle to be sure the brakes are operating correctly and that the brake pedal does not feel spongy.

MANUAL BLEEDING

NOTE: **ABS manual bleeding is done without the use of power pressure brake bleed equipment.**

NOTE: **To bleed the brakes manually, the aid of a helper will be required. It is critical that during this process that the master cylinder brake fluid remains within operating range.**

ABS system bleeding requires conventional bleeding methods plus use of a scan tool. The procedure involves performing a base brake bleeding, followed by use of the scan tool to cycle and bleed the HCU pump and solenoids.

1. Perform base brake bleeding. Refer to **STANDARD PROCEDURE** .
2. Connect scan tool to the Data Link Connector and navigate to the ABS menu to begin bleed process.
3. Starting at the LF wheel, following the scan tool prompts, open the bleed screw and begin stroking the brake pedal every two seconds while continuing to follow scan tool process until cycle is completed. Repeat this process for each remaining wheel going to RF, RR, LR.
4. Top off master cylinder fluid level and verify proper brake operation before moving vehicle.
5. Test drive the vehicle to be sure the brakes are operating correctly and that the brake pedal does not feel spongy.

SPECIFICATIONS

TORQUE

For ABS fastener torque specifications, see Brake Fastener Torque. Refer to **SPECIFICATIONS** .

ELECTRICAL

SENSOR, DYNAMICS

DESCRIPTION

DESCRIPTION

Fig. 1: Identifying Occupant Restraint Controller
Courtesy of CHRYSLER GROUP, LLC

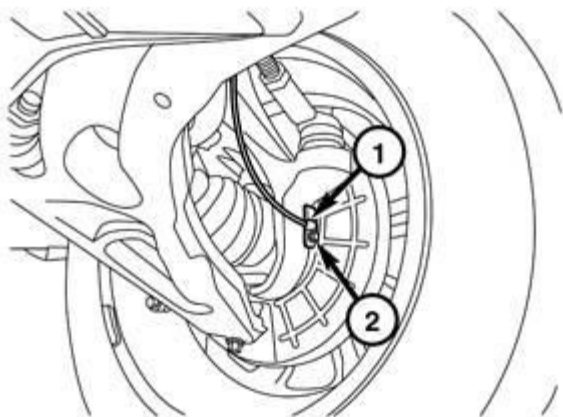
The Yaw Rate and Lateral Acceleration Sensors are referred to as the Dynamics Sensor and are housed within the Occupant Restraint Controller (ORC) (1). The sensors are used to measure side-to-side (Lateral) motion and vehicle rotational sensing (how fast the vehicle is turning - Yaw).

Yaw and Lateral Acceleration Sensors cannot be serviced separately. The Occupant Restraint Controller (ORC) must be replaced when necessary. Refer to **MODULE, OCCUPANT RESTRAINT CONTROLLER, REMOVAL** .

SENSOR, STEERING WHEEL ANGLE**DESCRIPTION****DESCRIPTION**

The steering angle sensor is an integral part of the Electric Power Steering (EPS) rack. If the steering angle sensor requires service, the EPS rack must be replaced. Refer to **GEAR, REMOVAL** .

SENSOR, WHEEL SPEED, FRONT**DESCRIPTION****DESCRIPTION**



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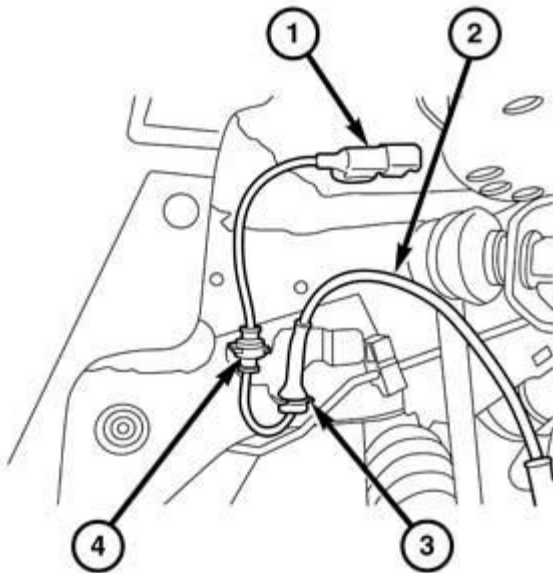
Fig. 2: Identifying Front Wheel Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

The antilock brake system uses two-wire wheel speed sensors, known as active wheel speed sensors. The sensors use an electronic principle known as magneto-resistive to help increase performance and durability. The sensors convert wheel speed into a small digital signal. A Wheel Speed Sensor (WSS) is used at each wheel. A magnetic pole encoder serves as the trigger mechanism for each sensor. At each wheel of the vehicle there is one wheel speed sensor and one encoder.

WSS air gaps are not adjustable.

REMOVAL

REMOVAL

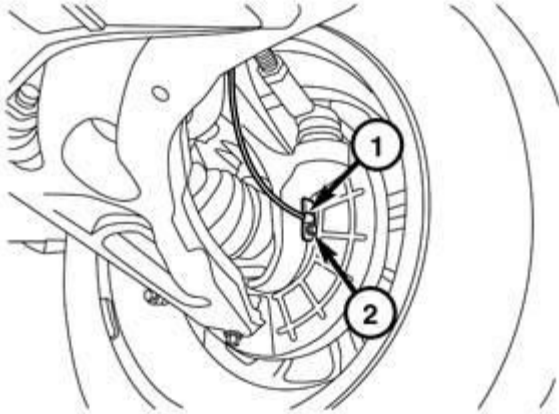


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Fig. 3: Wheel Speed Sensor Cable, Connector & Retainers
Courtesy of CHRYSLER GROUP, LLC

NOTE: Before proceeding, refer to **CAUTION** and **WARNING** .

1. Raise and support the vehicle. refer to **HOISTING, STANDARD PROCEDURE** .
2. Disconnect the wheel speed sensor harness (2) connector from the wiring harness connector (1) on the inner fender.
3. Separate sensor harness clips from retainers (3, 4).
4. Separate the wheel speed sensor harness from the strut bracket.



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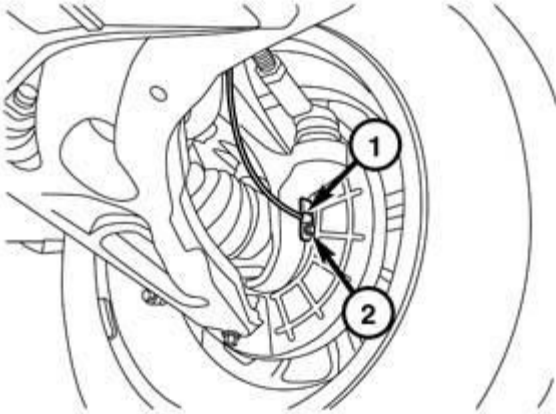
Fig. 4: Removing/Installing Screw Fastening The Wheel Speed Sensor Head
Courtesy of CHRYSLER GROUP, LLC

5. Remove the mounting screw (2) fastening the wheel speed sensor head (1) to the knuckle. Pull the sensor head out of the knuckle and remove the wheel speed cable from the vehicle.

INSTALLATION

INSTALLATION

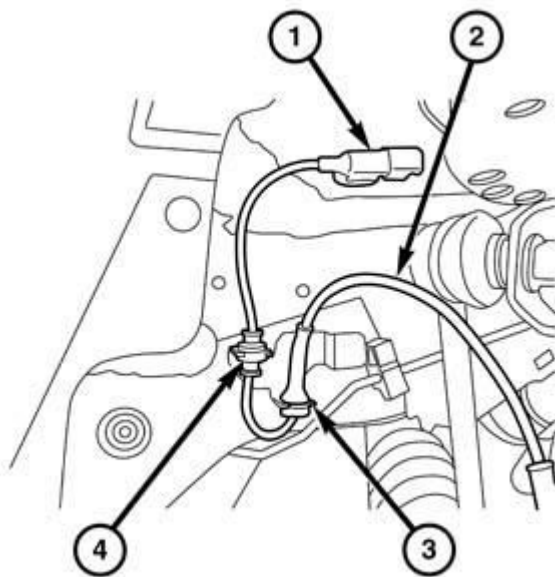
NOTE: Before proceeding, refer to **CAUTION** and **WARNING** .



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Fig. 5: Removing/Installing Screw Fastening The Wheel Speed Sensor Head
Courtesy of CHRYSLER GROUP, LLC

1. Install the wheel speed sensor head (1) into the knuckle. Install the mounting screw (2) and tighten it to 12 N.m (106 in. lbs.).



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Fig. 6: Wheel Speed Sensor Cable, Connector & Retainers
Courtesy of CHRYSLER GROUP, LLC

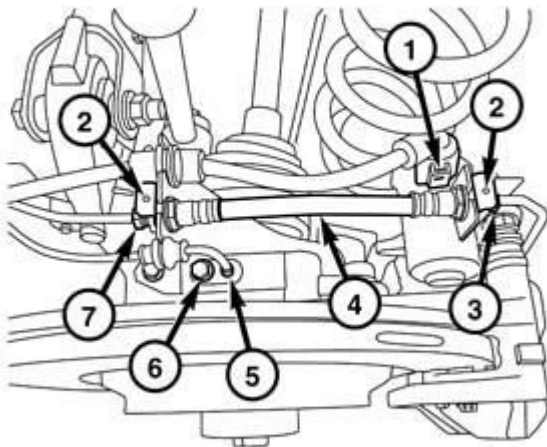
CAUTION: Failure to install speed sensor cables properly may result in contact with moving parts or an over extension of cables causing an open circuit. Be sure that cables are installed, routed, and clipped properly.

2. Connect the wheel speed sensor to the harness connector (1) on the inner fender well.
3. Connect the harness routing clips (3, 4) on the inner fender well.
4. Connect the sensor harness to the strut bracket.
5. Lower the vehicle.
6. Perform the Diagnostic Verification Test and clear any faults. Refer to **STANDARD PROCEDURE** .

SENSOR, WHEEL SPEED, REAR

DESCRIPTION

DESCRIPTION



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Fig. 7: Removing/Installing Rear Wheel Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

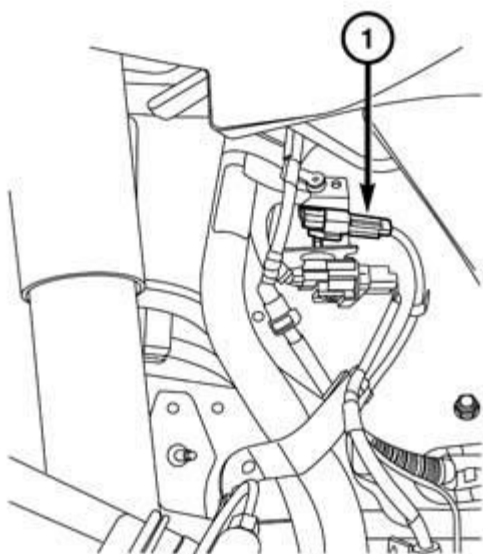
The antilock brake system uses two-wire wheel speed sensors, known as active wheel speed sensors. The sensors use an electronic principle known as magneto-resistive to help increase performance and durability. The sensors convert wheel speed into a small digital signal. A Wheel Speed Sensor (WSS) is used at each wheel. A magnetic pole encoder serves as the trigger mechanism for each sensor. At each wheel of the vehicle there is one wheel speed sensor and one encoder.

The rear wheel speed sensor head is secured to the knuckle assembly by a bolt (1). The encoder is integral to the hub and bearing assembly. The encoder is serviced as part of the rear hub and bearing.

The WSS air gaps are not adjustable.

REMOVAL

REMOVAL

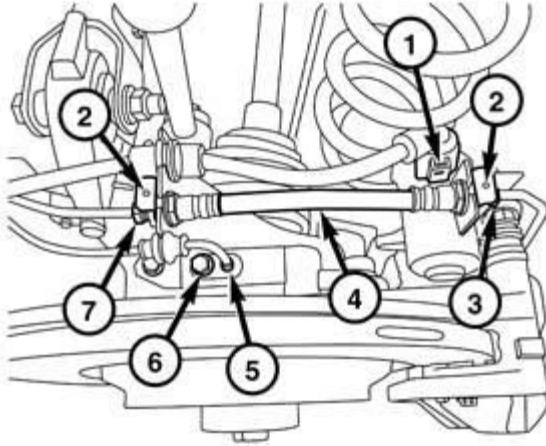


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Fig. 8: Wheel Speed Sensor Cable Connector
Courtesy of CHRYSLER GROUP, LLC

NOTE: Before proceeding, refer to **CAUTION** and **WARNING** .

1. Raise and support the vehicle Refer to **HOISTING, STANDARD PROCEDURE** .
2. Disconnect the wheel speed sensor cable connector (1) at the body wiring harness connector.



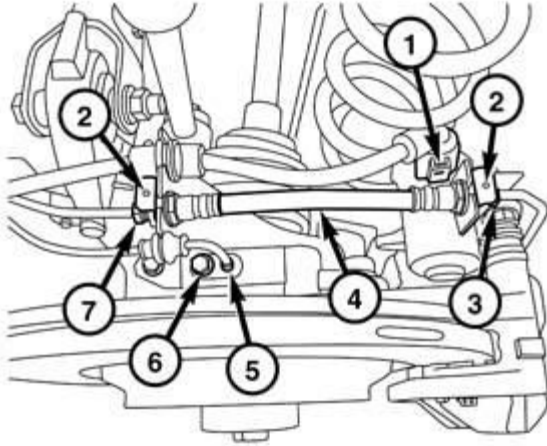
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Fig. 9: Removing/Installing Rear Wheel Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

3. Separate the wheel speed sensor cable from all retainers and clips.
4. Remove retaining bolt (6) and wheel speed sensor (5) from knuckle assembly.

INSTALLATION

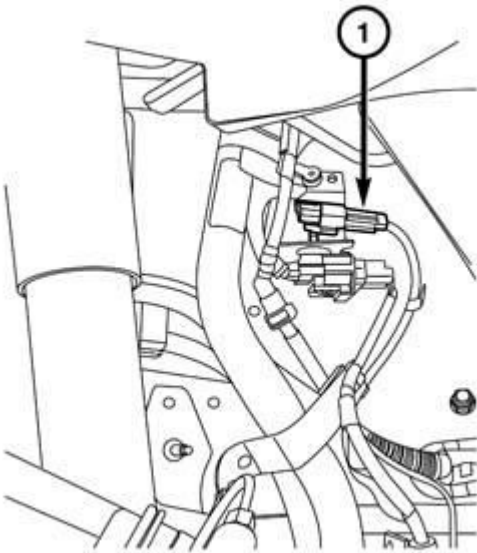
INSTALLATION



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Fig. 10: Removing/Installing Rear Wheel Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

1. Install the wheel speed sensor (5) into the knuckle.
2. Install the wheel speed sensor retaining bolt (6) and tighten to 12 N.m (106 in. lbs.).



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Fig. 11: Wheel Speed Sensor Cable Connector

Courtesy of CHRYSLER GROUP, LLC

3. Route wheel speed sensor cable and snap into clips and retainers.
4. Connect wheel speed sensor cable connector (1) to body wiring harness connector.
5. Lower the vehicle.

SWITCH, ELECTRONIC STABILITY PROGRAM (ESP)**DESCRIPTION****DESCRIPTION**

The Electronic Stability Control (ESC) switch is mounted in the switch bank assembly of the instrument panel.

The ESC Off switch turns the Electronic Stability Control off and back on. The system resets to ESC-on each time the ignition is cycled.

When the ESC Off switch is depressed and released, turning ESC off, it does not completely turn the system off. The ESC system reduces torque management to a lesser amount, but ESC function can still occur if the system perceives the need.

HYDRAULIC/MECHANICAL**HYDRAULIC CONTROL UNIT (HCU)****DESCRIPTION****DESCRIPTION**

The Hydraulic Control Unit (HCU) is mounted to the Antilock Brake Module (ABM) as part of the Integrated Control Unit (ICU). The HCU controls the flow of brake fluid to the brakes using a series of valves and accumulators. A pump/motor is mounted on the HCU to empty the accumulators during an ABS stop and supply build pressure to the brakes during a traction control or ESC event. If the HCU needs replacement it is removed as an assembly with the ABM and then disassembled. Refer to **INTEGRATED CONTROL UNIT (ICU), REMOVAL**.

VALVES AND SOLENOIDS

The valve block contains four inlet valves and four outlet solenoid valves. The inlet valves are spring-loaded in the open position and the outlet valves are spring-loaded in the closed position during normal braking. The fluid is allowed to flow from the master cylinder to the wheel brakes.

During an ABS stop, these valves cycle to maintain the proper slip ratio for each wheel. The inlet valve closes preventing further pressure increase and the outlet valve opens to provide a path from the wheel brake to the HCU accumulators and pump/motor. This releases (decays) pressure from the wheel brake, thus releasing the wheel from excessive slippage. Once the wheel is no longer slipping, the outlet valve is closed and the inlet valve is opened to reapply (build) pressure.

If the ABS includes the traction control feature, there are four other valves in the HCU. Two Traction Control (TC) (or ESC) valves, mounted in the HCU valve block, are normally in the open position and close only when the traction control is applied. There are also two normally closed shuttle valves which open during traction control and ESC events to provide a direct fluid path from the brake fluid reservoir to the inlet of the HCU pump.

These TC valves are used to isolate the rear (non-driving) wheels of the vehicle from the hydraulic pressure that the HCU pump/motor is sending to the front (driving) wheels when traction control is being applied. The rear brakes need to be isolated from the master cylinder when traction control is being applied so the rear wheels do not drag.

BRAKE FLUID ACCUMULATORS

There are two fluid accumulators in the HCU: one for the primary hydraulic circuit, and one for the secondary hydraulic circuit. Each hydraulic circuit uses a 3 cc accumulator.

The fluid accumulators temporarily store brake fluid that is removed from the wheel brakes during an ABS cycle. This stored fluid is used by the pump/motor to provide build pressure for the brake hydraulic system. When the antilock stop is complete, the accumulators are drained by the pump/motor.

There are two noise dampening chambers in the HCU on this vehicle equipped with traction control.

PUMP/MOTOR

There are two pump assemblies in the HCU: one for the primary hydraulic circuit, and one for the secondary hydraulic circuit. Both pumps are driven by a common electric motor. This DC-type motor is integral to the HCU and is controlled by the ABM.

Brake fluid is released to the accumulators when the outlet valve is opened during an antilock stop. The pump mechanism consists of two opposing pistons operated by an eccentric camshaft. In operation, these pistons are used to purge fluid from the accumulators back into the master cylinder circuits. When the antilock stop is complete, the pump/motor drains the accumulators.

The pump motor is also used to build pressure when the system goes into Electronic Stability Control (ESC) and traction control mode.

The ABM may turn on the pump/motor when an antilock stop is detected. The pump/motor continues to run during the antilock stop and is turned off after the stop is complete. Under some conditions, the pump/motor runs to drain the accumulators during the next drive-off.

The pump/motor is not a serviceable item; if it requires replacement, the HCU must be replaced.

INTEGRATED CONTROL UNIT (ICU)

DESCRIPTION

DESCRIPTION

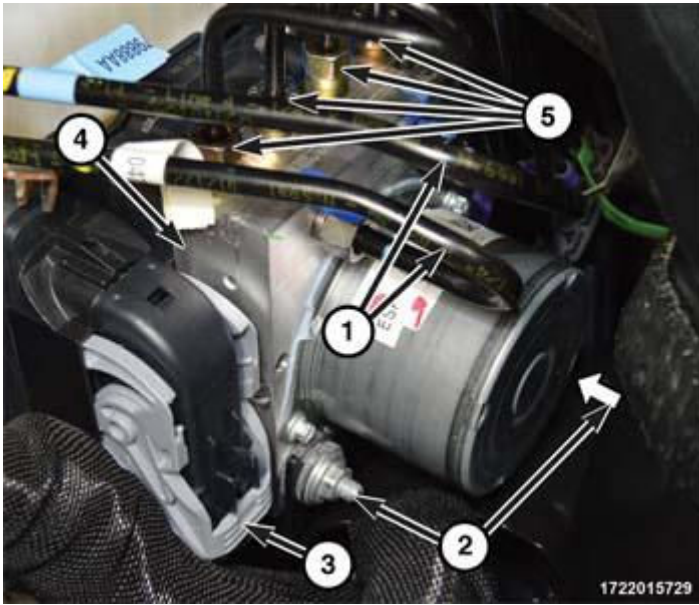


Fig. 12: Identifying Integrated Control Unit (ICU)
Courtesy of CHRYSLER GROUP, LLC

The Hydraulic Control Unit (HCU) and the Antilock Brake Module (ABM) used with this antilock brake system are combined (integrated) into one unit, which is called the Integrated Control Unit (ICU) (4).

The ICU (4) is located in the engine compartment, mounted to the left side body frame rail near the brake master cylinder.

The ABS with ESC and All-Speed Traction Control ICU consists of the following components: the ABM, solenoid valves, traction control solenoid valves, hydraulic shuttle valves, valve block, fluid accumulators, a pump, and an electric pump/motor.

The ICU can be disassembled to service either the HCU or the ABM. The HCU and ABM (ICU) should be removed from the vehicle as an assembly . Refer to INTEGRATED CONTROL UNIT (ICU), REMOVAL.

For additional information on the ABS, refer to **MODULE, ANTI-LOCK BRAKE SYSTEM, DESCRIPTION** .

OPERATION

OPERATION

For information of the ICU, refer to these individual components of the ICU:

- ANTILOCK BRAKE MODULE (ABM). Refer to **MODULE, ANTI-LOCK BRAKE SYSTEM, DESCRIPTION** .
- HYDRAULIC CONTROL UNIT (HCU). Refer to **HYDRAULIC CONTROL UNIT (HCU), DESCRIPTION**.

REMOVAL

REMOVAL

NOTE: Before proceeding, refer to CAUTION and WARNING .

CAUTION: Before disassembling the ICU, the ICU must be thoroughly cleaned. This must be done to prevent dirt particles and debris from entering into vital areas of the ICU.

1. Install the brake pedal holding tool.
2. Disconnect and isolate battery negative cable from battery post.

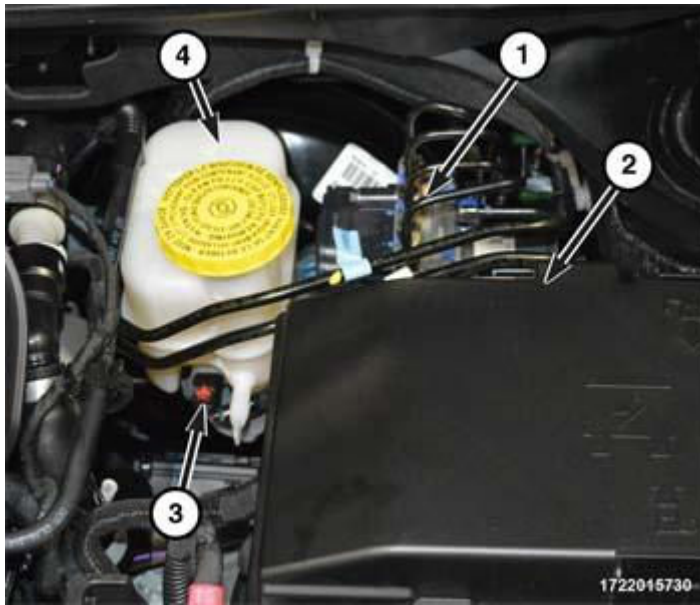
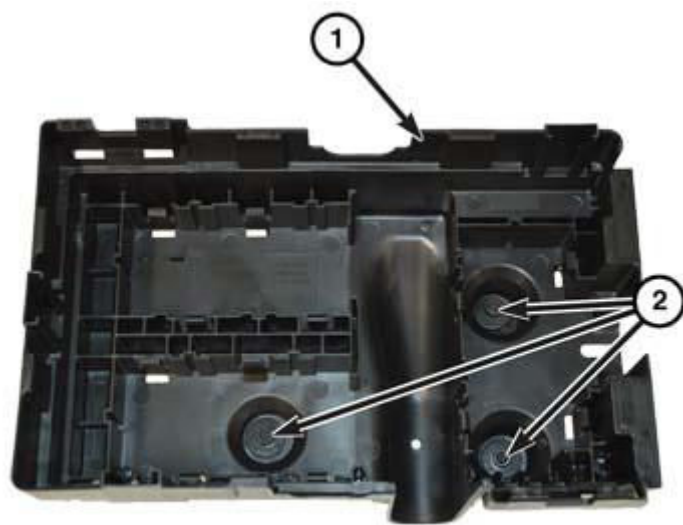


Fig. 13: Power Distribution Center (PDC)
Courtesy of CHRYSLER GROUP, LLC

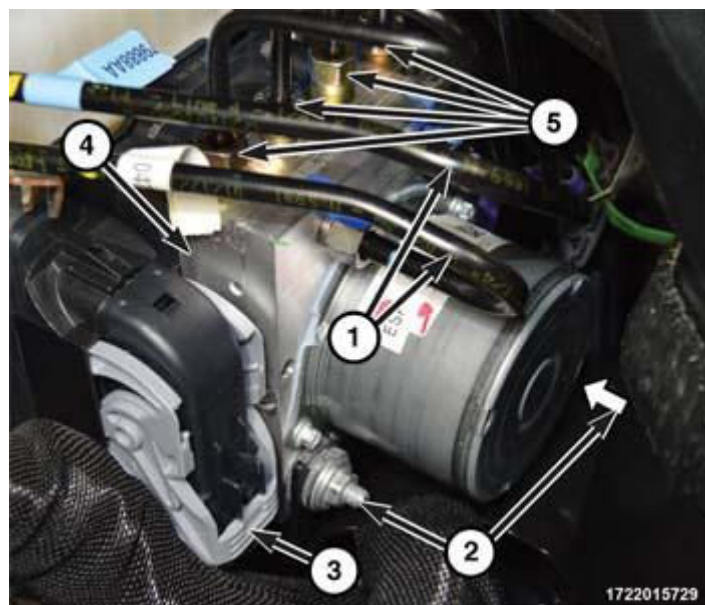
3. Remove the Power Distribution Center (PDC) (2). Refer to CENTER, POWER DISTRIBUTION (PDC), REMOVAL .



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Fig. 14: Power Distribution Center (PDC) Mount
Courtesy of CHRYSLER GROUP, LLC

4. Remove the bolts (2) from the PDC mount (1), lift up and disconnect the wire harness retaining clips from the underside of the PDC mount and set the mount aside.



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Fig. 15: Identifying Integrated Control Unit (ICU)
Courtesy of CHRYSLER GROUP, LLC

5. Disconnect the ABM connector (3) from the ICU (4).
6. Remove the brake lines (1, 5) at the ICU.
7. Loosen the two nuts (2) securing the ICU (4) to the bracket and remove the ICU.

8. If removing the brake booster, remove the ICU bracket mounting bolts and remove the bracket from the vehicle.

INSTALLATION**INSTALLATION**

1. If removed, place ICU bracket into position on body, then install mounting bolts and tighten to 25 N.m (18 ft. lbs.).

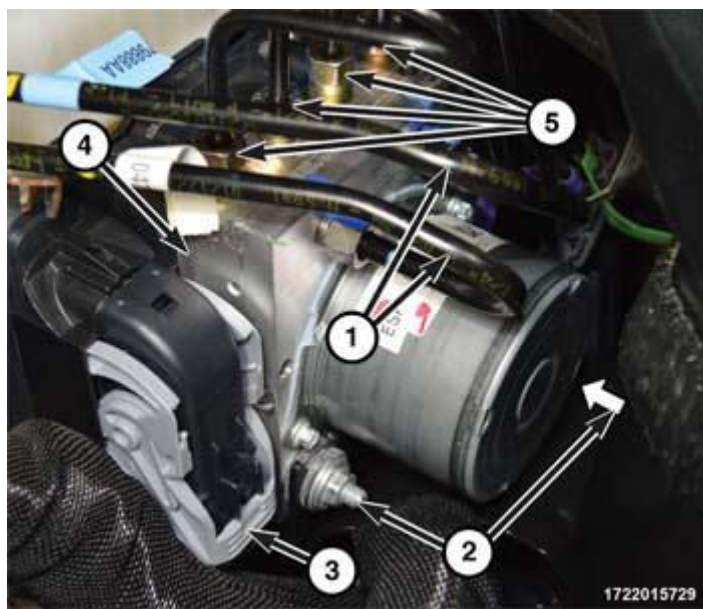
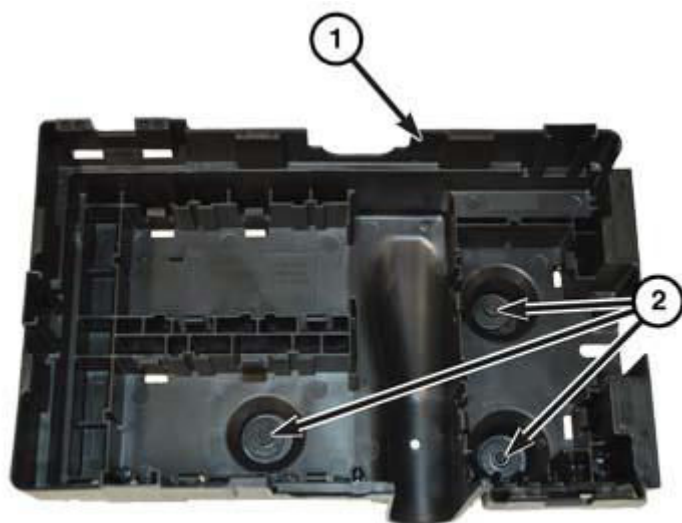


Fig. 16: Identifying Integrated Control Unit (ICU)
Courtesy of CHRYSLER GROUP, LLC

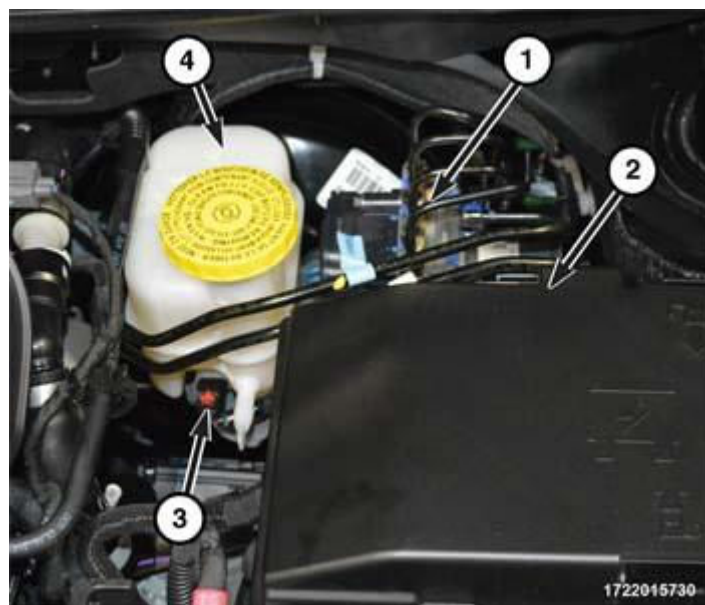
2. Install ICU (4) to mounting bracket, then install retaining nuts (2) and tighten to 8 N.m (71 in. lbs.).
3. Install the brake lines (1, 5) to the ICU. Torque to specifications. Refer to **SPECIFICATIONS** .
4. Install the ABM connector (3) to the ICU (4).



1722015732

Fig. 17: Power Distribution Center (PDC) Mount
Courtesy of CHRYSLER GROUP, LLC

5. Install the PDC mount, route the wire harness retaining clips under the mount and install and tighten the bolts (2).



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Fig. 18: Identifying Power Distribution Center (PDC)
Courtesy of CHRYSLER GROUP, LLC

6. Install the PDC (2). Refer to **CENTER, POWER DISTRIBUTION (PDC), INSTALLATION**.
7. Reconnect the negative battery cable.
8. Remove the brake pedal holding tool.

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2014 BRAKES Antilock Brake System (ABS) - Service Information - Cherokee

9. Install a scan tool to initialize the ABS module and perform the following:
 - a. Clear any faults.
 - b. Fill the master cylinder to the proper fill level and bleed the base and hydraulic system. Refer to **STANDARD PROCEDURE** .
10. Perform the Verification Test and clear any faults. Refer to **STANDARD PROCEDURE** .

NOTE: If this Electronic Control Unit (ECU) is being replaced with a new unit, a diagnostic scan tool **MUST** be used to align the PROXI configuration data into the new ECU. Follow the routine outlined in the diagnostic scan tool for PROXI Configuration Alignment under Body Control Module (BCM) Miscellaneous Functions menu.

2014 BRAKES

Base - Service Information - Cherokee

WARNING

WARNING

WARNING: Chrysler LLC does not manufacture any vehicles or replacement parts that contain asbestos. Aftermarket products may or may not contain asbestos. Refer to aftermarket product packaging for product information.

Whether the product contains asbestos or not, dust and dirt can accumulate on brake parts during normal use. Follow practices prescribed by appropriate regulations for the handling, processing and disposing of dust and debris.

CAUTION

CAUTION

CAUTION: If the electric park brake (EPB) switch is actuated with the caliper removed from the caliper bracket and still connected electrically, the EPB motor will fully extend causing damage to the caliper piston. Disconnect and isolate the negative battery cable before servicing any EPB component.

CAUTION: Use only Mopar® Brake Fluid DOT 3 Motor Vehicle or equivalent from a tightly sealed container. Do not use petroleum-based fluid because seal damage in the brake system will result.

CAUTION: Brake fluid will damage painted surfaces. If brake fluid is spilled on any painted surfaces, wash it off immediately with water.

CAUTION: Never use gasoline, kerosene, alcohol, motor oil, transmission fluid, or any fluid containing mineral oil to clean system components. These fluids damage rubber cups and seals.

CAUTION: During service procedures, grease or any other foreign material must be kept off the caliper assembly, brake linings, brake rotor and external surfaces of the hub.

CAUTION: When handling the brake rotor and caliper, be careful to avoid damaging

the brake rotor and caliper, and scratching or nicking the brake shoe lining.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - BASE BRAKE SYSTEM DIAGNOSIS CHARTS

NOTE: There are three diagnosis charts following that cover the **RED BRAKE WARNING INDICATOR, BRAKE NOISE** and **OTHER BRAKE CONDITIONS**.

RED BRAKE WARNING INDICATOR

CONDITION	POSSIBLE CAUSES	CORRECTION
RED BRAKE WARNING INDICATOR ON	1. Electric park brake is not released.	Refer to DIAGNOSIS AND TESTING
	2. Park brake warning switch.	Refer to DIAGNOSIS AND TESTING
	3. Brake fluid level low in reservoir.	3. Fill reservoir. Check entire system for leaks. Repair or replace as required.
	4. Brake fluid level switch.	4. Disconnect switch wiring connector. If lamp goes out, replace switch.
	5. Mechanical instrument cluster (MIC) problem.	5. Refer to appropriate diagnostic information.
	6. ABS EVBP malfunction.	6. Refer to the appropriate ABS diagnostic service information.

BRAKE NOISE

CONDITION	POSSIBLE CAUSES	CORRECTION
DISC BRAKE CHIRP	1. Excessive brake rotor runout.	1. Diagnose and correct as necessary. Refer to ROTOR, BRAKE, DIAGNOSIS AND TESTING .
DISC BRAKE MOAN OR HOWL WHILE BRAKING IN REVERSE	1. Rear disc brake caliper guide pin bolts installed in incorrect locations.	1. Remove lower guide pin bolt and inspect for special sleeve on tip. If sleeve is present, remove upper and lower guide pin bolts and install special sleeved bolt in upper location and standard guide pin bolt in lower location. Refer to CALIPER, DISC BRAKE, FRONT, REMOVAL or CALIPER, DISC BRAKE, REAR, REMOVAL . Perform on both sides of vehicle as necessary.
DISC BRAKE RATTLE OR CLUNK	1. Broken or missing spring clips. 2. Caliper guide pin bolts loose. 3. Missing	1. Replace brake pads. 2. Tighten guide pin bolts. 3. Replace missing abutment shims.

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	abutment shims.	
DISC BRAKE SQUEAK AT LOW SPEED (WHILE APPLYING LIGHT BRAKE PEDAL EFFORT)	1. Brake pad linings.	1. Replace brake pads.
SCRAPING (METAL-TO-METAL).	1. Foreign object interference with brakes. 2. Brake pads worn out.	1. Inspect brakes and remove foreign object. 2. Replace brake pads. Inspect rotors. Reface or replace as necessary.
SCRAPING OR WHIRRING	1. ABS wheel speed sensor hitting tone wheel.	1. Inspect, correct or replace faulty component(s).

OTHER BRAKE CONDITIONS

CONDITION	POSSIBLE CAUSES	CORRECTION
BRAKES CHATTER	1. Disc brake rotor has excessive thickness variation.	1. Isolate condition as rear or front. Reface or replace brake rotors as necessary.
BRAKES DRAG (FRONT OR ALL)	1. Contaminated brake fluid.	1. Check for swollen seals. Replace all system components containing rubber.
	2. Binding caliper pins or bushings.	2. Replace pins and bushings
	3. Misadjusted brake lamp switch.	3. Replace brake lamp switch. Refer to <u>SWITCH, STOP LAMP, REMOVAL</u> .
	4. Master cylinder not fully returning.	4. Inspect master cylinder and replace as necessary.
	5. Binding brake pedal.	5. Replace brake pedal/bushings.
BRAKES DRAG (REAR ONLY)	1. Operator error.	1. Describe operation of electric park brake.
	2. Electric park brake does not release.	2. Refer to <u>DIAGNOSIS AND TESTING</u>
BRAKES GRAB	1. Contaminated brake pad.	1. Inspect and clean, or replace pads. Repair source of contamination.
	2. Improper power brake booster assist.	2. Refer to POWER BRAKE BOOSTER in this service information .
EXCESSIVE PEDAL EFFORT	1. Obstruction of brake pedal.	1. Inspect, remove or move

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		obstruction.
	2. Low power brake booster assist.	2. Refer to POWER BRAKE BOOSTER in this service information .
	3. Glazed brake linings.	3. Reface or replace brake rotors as necessary.
	4. Brake pad lining transfer to brake rotor.	4. Reface or replace brake rotors as necessary. Replace brake pads.
EXCESSIVE PEDAL EFFORT (HARD PEDAL - CAN'T SKID WHEELS)	1. Power brake booster runout (vacuum assist).	1. Check booster vacuum hose and engine tune for adequate vacuum supply. Refer to POWER BRAKE BOOSTER.
EXCESSIVE PEDAL TRAVEL (VEHICLE STOPS OK)	1. Air in brake lines.	1. Bleed brakes.
	2. Brake fluid low in reservoir	2. Fill reservoir. Check entire system for leaks; repair or replace as required.
EXCESSIVE PEDAL TRAVEL (ONE FRONT WHEEL LOCKS UP DURING HARD BRAKING)	1. One of the two hydraulic circuits is malfunctioning.	1. Inspect system for leaks. Check master cylinder for internal malfunction.
PEDAL PULSATES/SURGES DURING BRAKING	1. Disc brake rotor has excessive thickness variation.	1. Isolate condition as rear or front. Reface or replace brake rotors as necessary.
PEDAL IS SPONGY	1. Air in brake lines.	1. Bleed brakes.
	2. ABS EVBP not functioning.	2. Refer to the appropriate ABS diagnostic service information.
STOP LAMPS STAY ON	1. Brake lamp switch out of adjustment.	1. Replace brake lamp switch. Refer to SWITCH, STOP LAMP, REMOVAL .
	2. Brake pedal binding.	2. Inspect and replace as necessary.
	3. Power brake booster not allowing pedal to return completely.	3. Replace power brake booster.
VEHICLE PULLS TO RIGHT OR LEFT ON BRAKING	1. Frozen brake caliper piston.	1. Replace frozen piston or caliper. Bleed brakes.
	2. Contaminated brake pad lining (most likely front lining).	2. Inspect and clean, or replace pads. Repair source of contamination.
	3. Pinched brake lines.	3. Replace pinched line.
	4. Leaking piston seal.	4. Replace piston seal or brake caliper.
	5. Suspension problem.	5. Refer to the appropriate Suspension service information .

STANDARD PROCEDURE

STANDARD PROCEDURE - BASE BRAKE BLEEDING

CAUTION: Before removing the master cylinder cap, wipe it clean to prevent dirt and other foreign matter from dropping into the master cylinder reservoir.

CAUTION: Use only Mopar® brake fluid or an equivalent from a fresh, tightly sealed container. Brake fluid must conform to DOT 3 specifications.

Do not pump the brake pedal at any time while having a bleeder screw open during the bleeding process. This will only increase the amount of air in the system and make additional bleeding necessary.

Do not allow the master cylinder reservoir to run out of brake fluid while bleeding the system. An empty reservoir will allow additional air into the brake system. Check the fluid level frequently and add fluid as needed.

The following wheel circuit sequence for bleeding the brake hydraulic system should be used to ensure adequate removal of all trapped air from the hydraulic system.

- Left rear wheel
- Right front wheel
- Right rear wheel
- Left front wheel

MANUAL BLEEDING

NOTE: To bleed the brakes manually, the aid of a helper will be required.

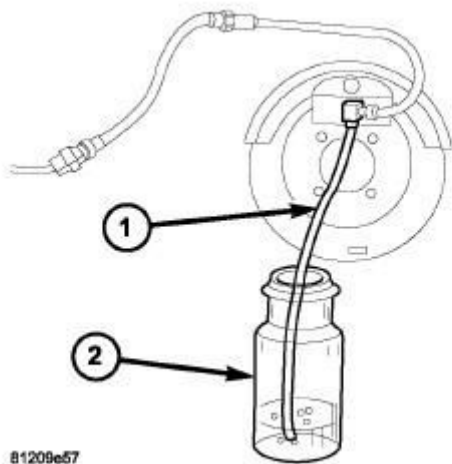


Fig. 1: Bleeding Brakes

Courtesy of CHRYSLER GROUP, LLC

1. Attach, (special tool #8358-1, Bleed Tube) (1) to the bleeder screw and feed the hose into a clear jar (2) containing enough fresh brake fluid to submerge the end of the hose.
2. Have a helper pump the brake pedal three or four times and hold it in the down position.
3. With the pedal in the down position, open the bleeder screw at least one full turn.
4. Once the brake pedal has dropped, close the bleeder screw. After the bleeder screw is closed, release the brake pedal.
5. Repeat the above steps until all trapped air is removed from that wheel circuit (usually four or five times).
6. Bleed the remaining wheel circuits in the same manner until all air is removed from the brake system. Monitor the fluid level in the master cylinder reservoir to make sure it does not go dry.
7. Check and adjust brake fluid level to the FULL mark.
8. Check the brake pedal travel. If pedal travel is excessive or has not been improved, some air may still be trapped in the system. Re-bleed the brakes as necessary.
9. Test drive the vehicle to verify the brakes are operating properly and pedal feel is correct.

PRESSURE BLEEDING

NOTE: Follow pressure bleeder manufacturer's instructions for use of pressure bleeding equipment.

1. Attach the pressure bleeding equipment to the Master Cylinder.

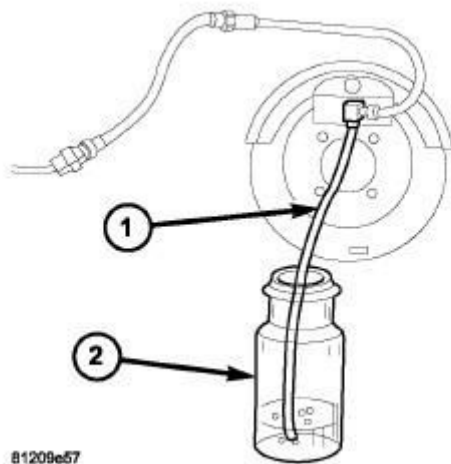


Fig. 2: Bleeding Brakes

Courtesy of CHRYSLER GROUP, LLC

2. Attach, (special tool #8358-1, Bleed Tube) (1) to the bleeder screw and feed the hose into a clear jar (2) containing enough fresh brake fluid to submerge the end of the hose.
3. Open the bleeder screw at least one full turn or more to obtain a steady stream of brake fluid.
4. After approximately 120-240 ml (4-8 ounces) of fluid have been bled through the brake circuit and an air-

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free flow is maintained in the clear plastic hose and jar, close the bleeder screw.

5. Repeat this procedure at all the remaining bleeder screws.
6. Check and adjust brake fluid level to the FULL mark on the reservoir.
7. Check the brake pedal travel. If pedal travel is excessive or has not been improved, some air may still be trapped in the system. Re-bleed the brakes as necessary.
8. Test drive the vehicle to verify the brakes are operating properly and pedal feel is correct.

SPECIFICATIONS

SPECIFICATIONS

DESCRIPTION	SPECIFICATIONS
Front	
Front Disc Brake Caliper Type	Single Piston Sliding
Front Disc Brake Caliper	1 x 60 mm (2.362 in.)
Front Disc Brake Rotor Diameter	305 mm (12.01 in.)
Front Disc Brake Rotor Thickness	28 mm (1.102 in.)
Front Disc Brake Rotor Maximum Runout	0.020 mm (0.0008 in.)
Front Disc Brake Rotor Maximum Thickness Variation	0.008 mm (0.0003 in.)
Front Disc Brake Rotor Minimum Thickness	26 mm (1.024 in.)
Rear	
Rear Disc Brake Caliper Type	Single Piston Sliding
Rear Disc Brake Caliper	1 x 38 mm (1.496 in.)
Rear Disc Brake Rotor Diameter	264 mm (10.39 in.)
Rear Disc Brake Rotor Thickness	10 mm (0.3937 in.)
Rear Disc Brake Rotor Maximum Runout	0.020 mm (0.0008 in.)
Rear Disc Brake Rotor Maximum Thickness Variation	0.009 mm (0.0004 in.)
Rear Disc Brake Rotor Minimum Thickness	8 mm (0.3150 in.)

TORQUE

TORQUE SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
ABS ICU Mounting Bolt (To Bracket)	8	-	71
ABS ICU Mounting Bracket Screws (To Frame)	25	18	221
ABS Wheel Speed Sensor Head Mounting Screw - Front	12	-	106
ABS Wheel Speed Sensor Head Mounting Screw - Rear	12	-	106
ABS Wheel Speed Sensor Routing Bracket Mounting Screw	12	-	106
Brake Flex Hose Fitting - Front Caliper	18	-	159

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Brake Flex Hose Fitting- Rear Caliper	18	-	159
Brake Pedal/Booster Mounting Nuts	20	15	-
Brake Tube Nuts	25	18	-
Disc Brake Caliper Adapter Bracket - Front	175	129	-
Disc Brake Caliper Adapter Bracket - Rear	120	89	-
Disc Brake Caliper Guide Pin Bolts - Front	43	32	-
Disc Brake Caliper Guide Pin Bolts - Rear	43	32	-
Front Rotor Retaining Bolt	20	15	-
Rear Rotor Retaining Bolt	20	15	-
Master Cylinder Mounting Nuts	25	-	216
Parking Brake Lever Mounting Nuts	35	26	-

SPECIAL TOOLS

SPECIAL TOOLS

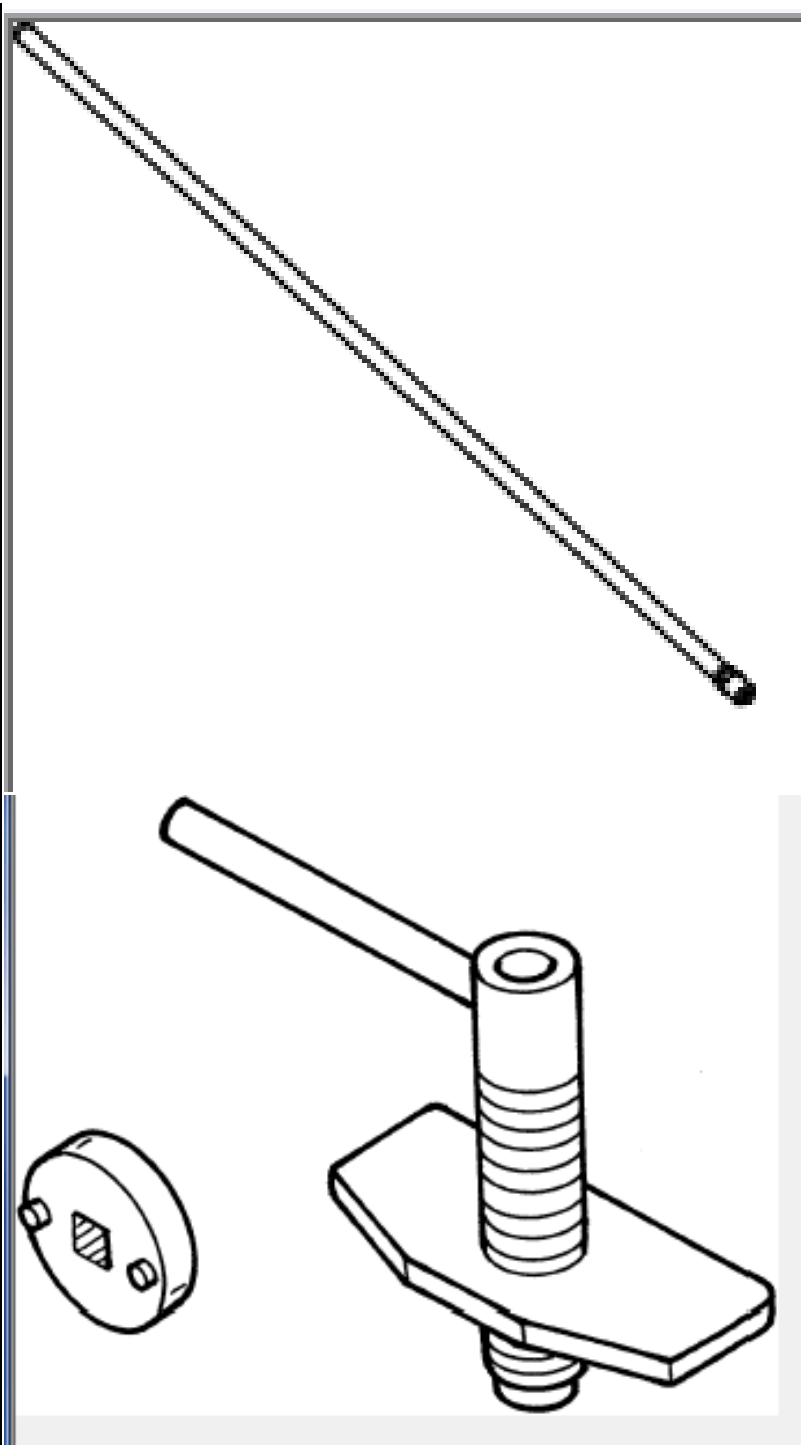


25-W - Roller Contact Point

8358-1 - Bleed Tube
(Originally Shipped In Kit Number(s)
8646, 8647, 8648.)

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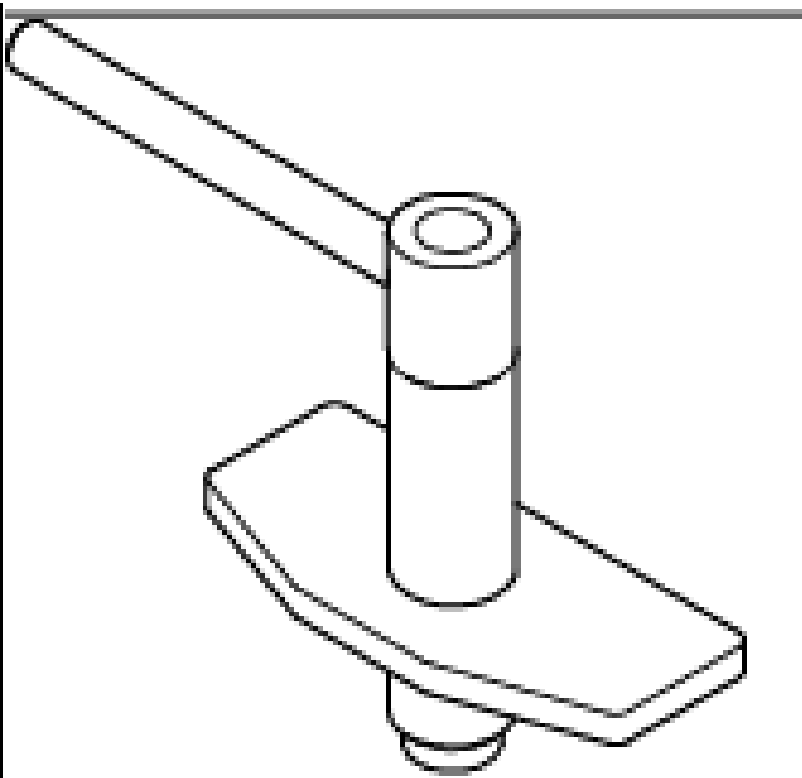
2014 BRAKES Base - Service Information - Cherokee



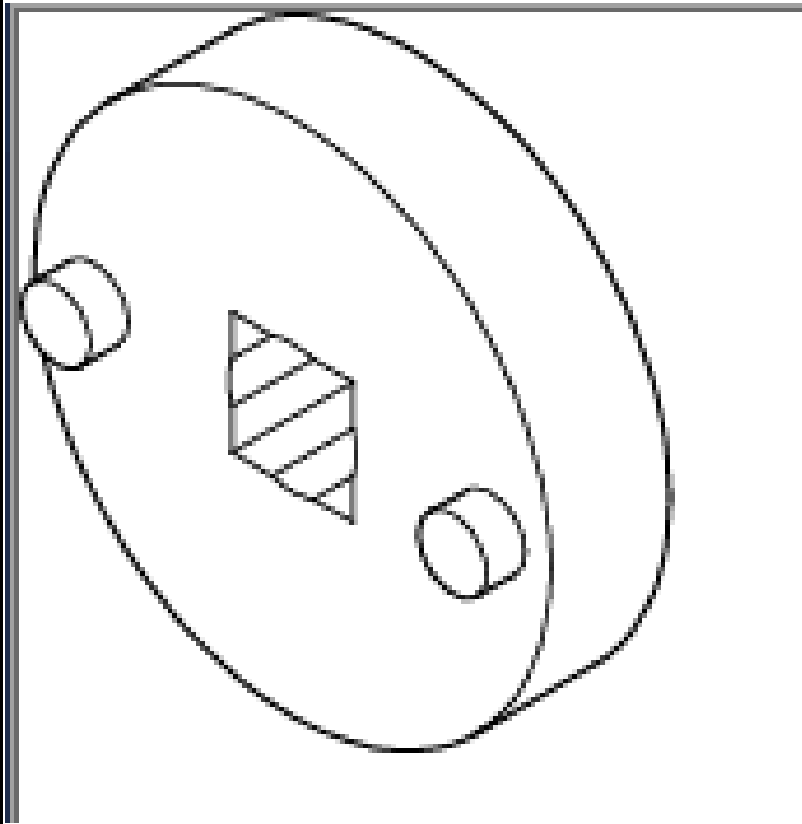
8807 - Retractor, Rear Caliper Piston
(Originally Shipped In Kit Number(s)
10105, 8632.)

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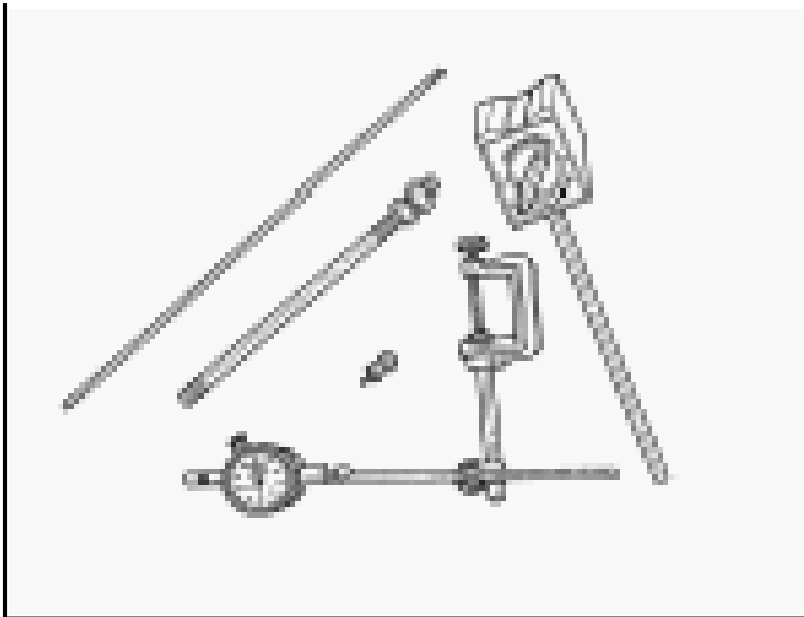
2014 BRAKES Base - Service Information - Cherokee



8807-1 - Assembly, Forcing Screw
(Originally Shipped In Kit Number(s)
10105, 8632.)



8807-2 - Adapter
(Originally Shipped In Kit Number(s)
10105, 8632.)



C-3339A - Set, Dial Indicator
(Originally Shipped In Kit Number(s)
9202.)

ELECTRICAL

PUMP, ELECTRIC VACUUM

DESCRIPTION

DESCRIPTION

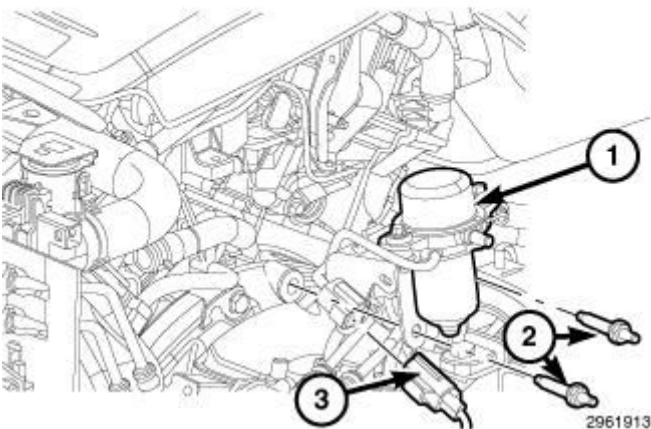


Fig. 3: Electric Vacuum Pump, Connector & Two Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: Only the 3.6L engine has an electric vacuum pump.

On the 3.6L engine there is an electric vacuum pump (1) located on the left side of the engine. The vacuum pump (1) has one electrical connector (3) on a pigtail connected to the mounting bracket. The mounting bracket is secured to the engine with two bolts (2).

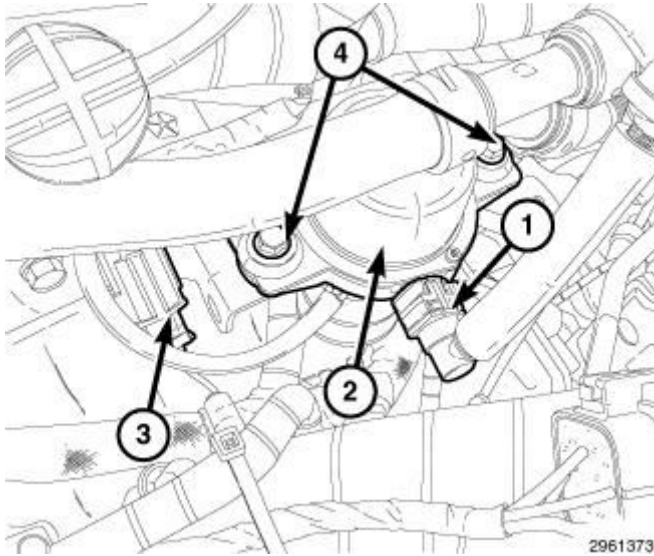


Fig. 4: Vacuum Pump, Two Rubber Insulated Studs, Quick-Connect Type End & Vacuum Pump
 Courtesy of CHRYSLER GROUP, LLC

The vacuum pump (2) mounts to the bracket with two rubber insulated studs (4) to reduce vibration. The vacuum hose has a quick-connect type end (1) with a locking tab at the vacuum pump (2).

OPERATION

OPERATION

The Electric Vacuum Pump (EVP) system is installed to provide supplemental vacuum to the brake booster when the engine vacuum supply is low. The vacuum pump is connected to the engine and the brake booster through a series of hoses and one-way flow check valves. A pressure sensor, mounted in the brake booster, provides information to the Antilock Brake System (ABS) module, then the vacuum level is sent over CAN to the Powertrain Control Module (PCM). The PCM modulates the EVP operation to maintain the brake booster vacuum within a given range. This system ensures that the customer experiences a consistent brake pedal feel under all driving conditions.

A two wire electrical connector is used to supply power and ground for the vacuum pump. Operating voltage is between 9V - 16V. Control of the vacuum pump is provided by the Powertrain Control Module (PCM) using a low side driver to a normally open relay (coil side). The relay coil side power is from a fuse in the under hood PDC. The switched power circuit to the vacuum pump relay is wired directly from the battery through an inline fuse holder located below the remote battery post connection on the RH side in the engine compartment. The relay is located on the LH shock tower in the engine compartment.

The PCM monitors the Manifold Absolute Pressure (MAP) sensor and when the signal indicates low engine vacuum the PCM will cycle the vacuum pump as necessary to add vacuum to the power brake booster. The vacuum hoses are connected between the vacuum pump, the engine manifold (for MAP sensor signal), and the

power brake booster vacuum sensor (on the brake booster). When the PCM cycles the vacuum pump on, the PCM monitors the MAP sensor and if the vacuum signal does not indicate a rising vacuum then DTCs will be set. Additionally, the Antilock Brake System (ABS) module monitors the vacuum at the brake booster vacuum sensor and DTCs will also set in the ABS module.

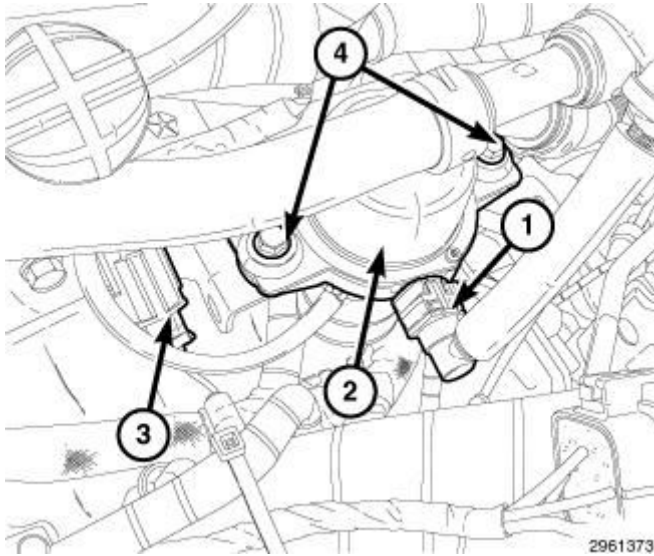
REMOVAL**REMOVAL**

Fig. 5: Vacuum Pump, Two Rubber Insulated Studs, Quick-Connect Type End & Vacuum Pump
Courtesy of CHRYSLER GROUP, LLC

1. Remove the engine appearance cover.
2. Disconnect the electrical connector (3) and remove the harness connector from the back side of the mounting bracket.
3. Release the locking tab and disconnect the quick connect vacuum hose (1) from the vacuum pump (2).

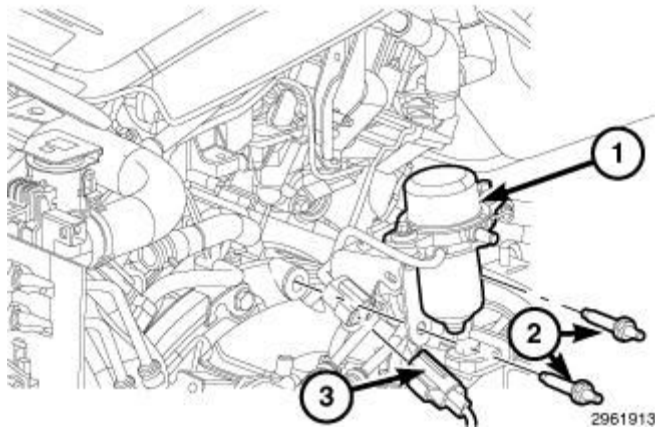


Fig. 6: Electric Vacuum Pump, Connector & Two Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Remove the vacuum pump bracket bolts (2) and remove the vacuum pump assembly (1) from the vehicle.

INSTALLATION

INSTALLATION

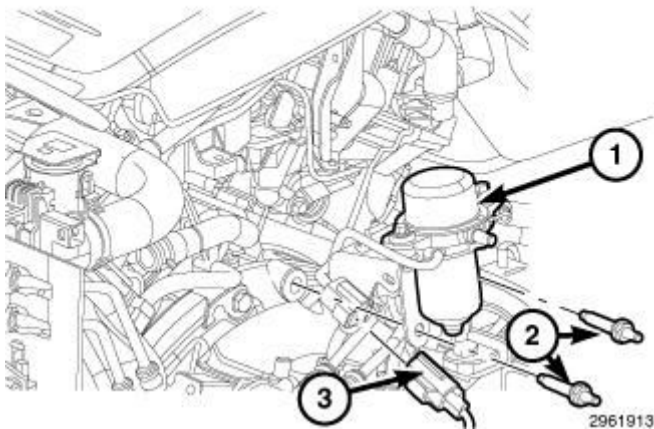


Fig. 7: Electric Vacuum Pump, Connector & Two Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Position the vacuum pump assembly (1), ensuring that the two ground leads are in place while installing bracket mounting bolts (2).
2. Attach the harness connector to the bracket and connect the electrical connector (3).

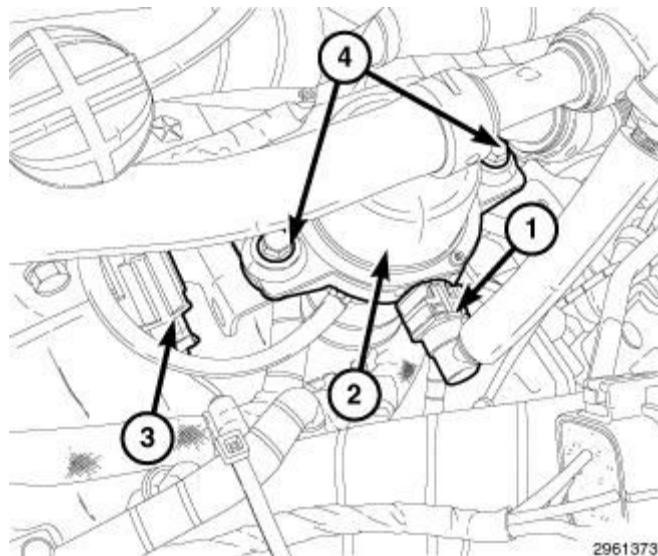


Fig. 8: Vacuum Pump, Two Rubber Insulated Studs, Quick-Connect Type End & Vacuum Pump
Courtesy of CHRYSLER GROUP, LLC

3. Connect the quick-connect vacuum hose (1) to the vacuum pump (2) and seat the locking tab.
4. Install the engine appearance cover.

SWITCH, BRAKE FLUID LEVEL

DESCRIPTION

DESCRIPTION

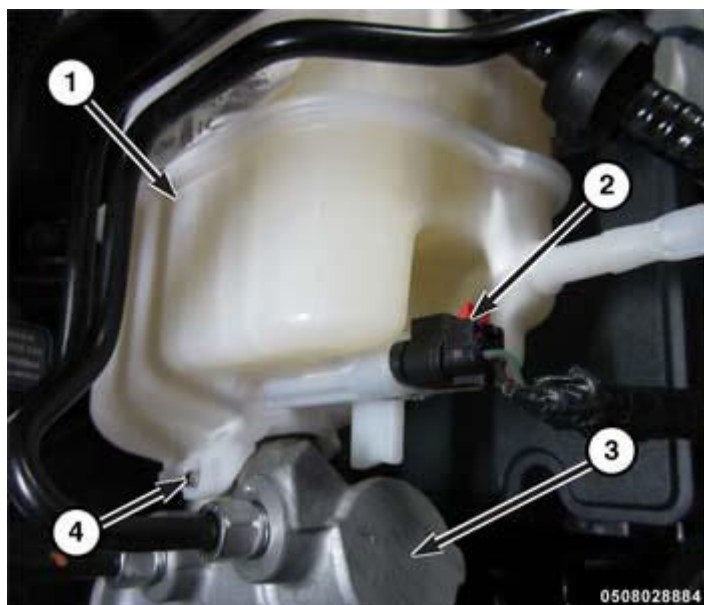


Fig. 9: Identifying Brake Master Cylinder Fluid Reservoir Components
Courtesy of CHRYSLER GROUP, LLC

The brake fluid level switch (2) is an internal part of the master cylinder brake fluid reservoir (1). The switch **cannot** be serviced separately from the brake master cylinder fluid reservoir (1). Refer to **RESERVOIR, BRAKE MASTER CYLINDER, REMOVAL**.

HYDRAULIC/MECHANICAL

DESCRIPTION

DESCRIPTION

Each disc brake assembly consists of the following major components:

- Caliper
- Caliper adapter bracket
- Pads
- Rotor
- Electric Park Brake (rear calipers)

REAR DISC CALIPER The rear brake caliper features an Electric Park Brake (EPB) which combines a electromechanical motor and gear unit (EPB actuator) with a conventional rear caliper. Refer to **PARKING BRAKE, DESCRIPTION**. The EPB actuator can be removed and serviced separately from the caliper.

CAUTION: If the electric park brake (EPB) switch is actuated with the caliper removed from the caliper bracket and still connected electrically, the EPB motor will fully extend causing damage to the caliper piston. Disconnect and isolate the negative battery cable before servicing any EPB component.

BOOSTER, POWER BRAKE

DESCRIPTION

DESCRIPTION

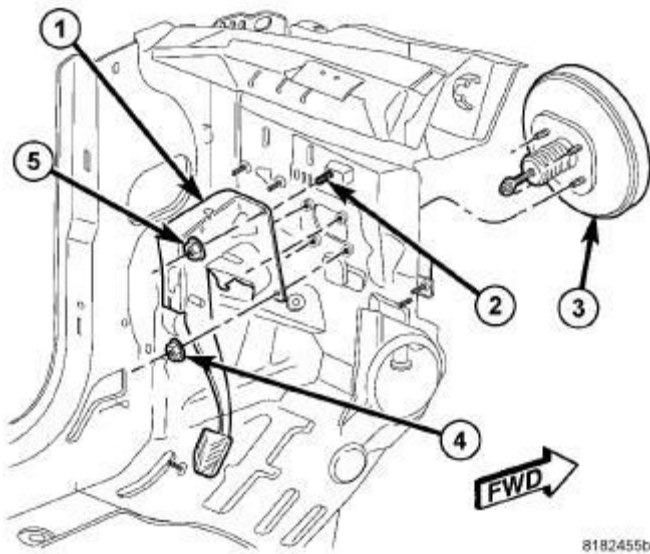


Fig. 10: Pedal And Booster Mounting - LHD
Courtesy of CHRYSLER GROUP, LLC

The power brake booster (3) is mounted to the engine side of the dash panel. The master cylinder is bolted to the front of the booster. A vacuum check valve is also mounted on the front of the booster. A vacuum line connects the check valve to engine source vacuum. The booster input rod extends through the dash panel and connects to the brake pedal.

This vehicle uses a single diaphragm, single rate vacuum power brake booster with 279 mm (11 in.) diaphragm.

The power brake booster can be identified by the tag attached to the body of the booster. This tag contains the following information:

- The production part number
- The date it was built, and
- The booster manufacturer.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - MASTER CYLINDER/POWER BOOSTER

1. Start the engine and check the booster vacuum hose connections. A hissing noise indicates a vacuum leak. Correct any vacuum leaks before proceeding.
2. Stop the engine and pump the brake pedal until all vacuum reserve in the booster is depleted.
3. Press and hold the brake pedal under light foot pressure. The pedal should hold firm. If the pedal falls away, there may be an external leak or the master cylinder is faulty (internal leakage).
4. Start the engine and note pedal action. It should fall away slightly under light foot pressure, then hold firm. If no pedal action is discernible, the power booster, vacuum supply or vacuum check valve is faulty, proceed to the POWER BOOSTER VACUUM TEST.

5. If the POWER BOOSTER VACUUM TEST passes, rebuild the booster vacuum reserve as follows:
Release the brake pedal. Increase engine speed to 1500 RPM, close the throttle and immediately turn off the ignition to stop the engine.
6. Wait a minimum of 90 seconds and try brake action again. The booster should provide two or more vacuum assisted pedal applications. If the vacuum assist is not provided, the booster is faulty.

POWER BOOSTER VACUUM TEST

1. Connect a vacuum gauge to the booster check valve with a short length of hose and T-fitting.
2. Start and run the engine at curb idle for one minute.
3. Observe the vacuum supply. If the vacuum supply is less than 12 inches HG (406 millibars), repair the vacuum supply.
4. Clamp the hose shut between the intake vacuum source and the check valve.
5. Stop the engine and observe the vacuum gauge.
6. If the vacuum drops more than one inch HG (33 millibars) within 15 seconds, the booster diaphragm or check valve is faulty.

POWER BOOSTER CHECK VALVE TEST

1. Remove the power booster check valve from the power booster.
2. Using a hand operated vacuum pump, apply 15-20 inches HG (508-677 millibars) vacuum at the booster side of the check valve.
3. The vacuum should hold steady. If the gauge on the pump indicates vacuum loss, the check valve is faulty and should be replaced.

REMOVAL**REMOVAL**

NOTE: Before proceeding, refer to **CAUTION** and **WARNING**.

1. Disconnect and isolate the battery negative cable from its post on the battery.
2. Remove the Power Distribution Center (PDC) from the mounting location and position aside. Refer to **CENTER, POWER DISTRIBUTION (PDC), REMOVAL**.
3. Remove the ICU. Refer to **INTEGRATED CONTROL UNIT (ICU), REMOVAL**.
4. Remove the ICU mounting bracket.
5. Remove the master cylinder and reservoir assembly. Refer to **MASTER CYLINDER, BRAKE, REMOVAL**.
6. Disconnect the vacuum sensor and remove the vacuum hose from the booster.

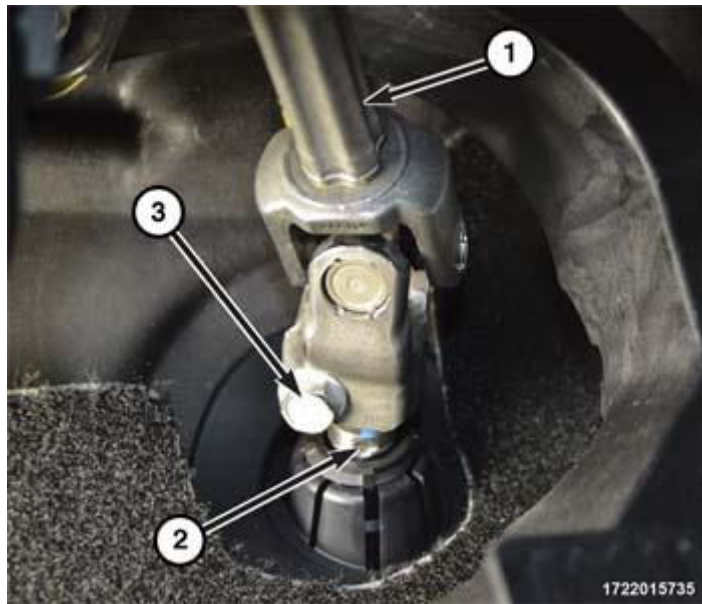


Fig. 11: Identifying Intermediate Shaft, Pinch Bolt And Steering Gear Pinion Shaft
Courtesy of CHRYSLER GROUP, LLC

7. Remove intermediate shaft pinch bolt (3) and separate the intermediate shaft (1) at the base of the column from the steering gear pinion shaft (2). Discard the pinch bolt (3); it is not to be reused.
8. Position the intermediate shaft (1) so that the pedal assembly can be accessed.
9. Remove the stop lamp switch. Refer to **SWITCH, STOP LAMP, REMOVAL** .

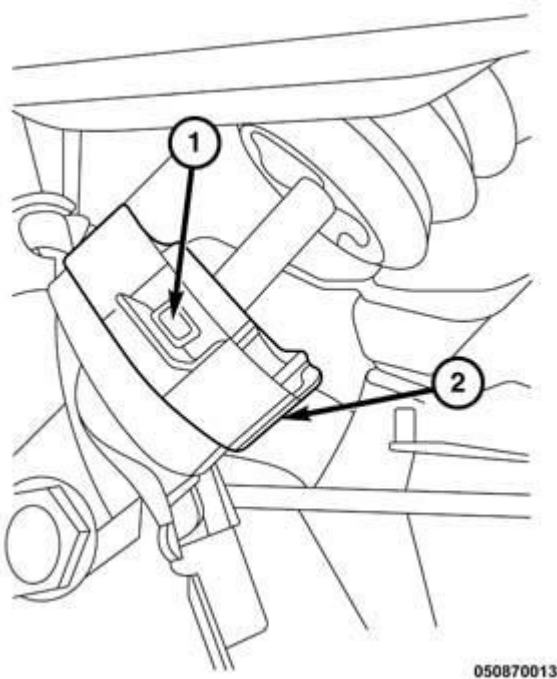
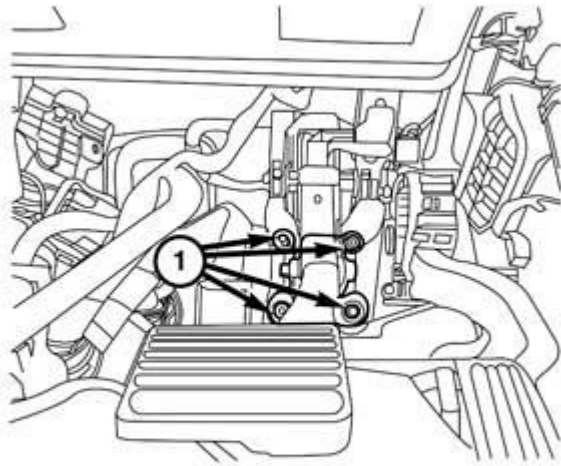


Fig. 12: Retainer & Clips
Courtesy of CHRYSLER GROUP, LLC

10. Disengage clips (1) on booster rod keeper assembly retainer (2). Position retainer (2) up to remove booster rod from pedal assembly.



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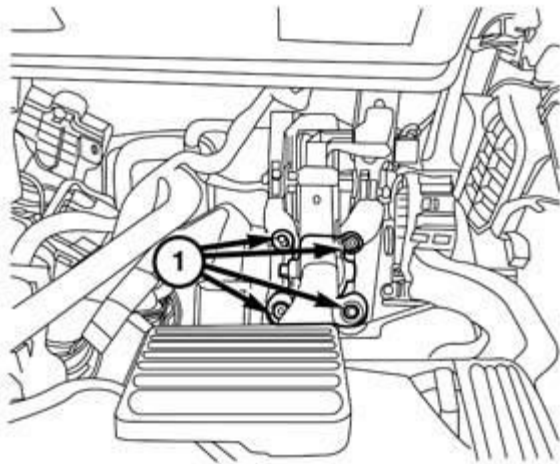
Fig. 13: Remove/Install Power Brake Booster Nuts
Courtesy of CHRYSLER GROUP, LLC

11. Remove the four nuts (1) attaching the power brake booster to the dash panel.
12. Slide the power brake booster forward until its mounting studs clear the dash panel, then remove it through the engine compartment.

INSTALLATION

INSTALLATION

1. Install the power brake booster by sliding the push rod and studs through the dash panel and into mounting position. Insure vacuum check valve opening on front shell of booster is at approximately 9 o'clock.



0508007146

Fig. 14: Remove/Install Power Brake Booster Nuts
Courtesy of CHRYSLER GROUP, LLC

2. Install the four power brake booster mounting nuts (1) in following sequence: Top inboard, bottom outboard, top outboard, bottom inboard. Failure to do so may result in damage to the booster. Tighten to the proper specification

Refer to **TORQUE SPECIFICATIONS** .

NOTE: Make sure the cup that the booster push rod reacts against is still in place in the pedal before installing the new booster rod keeper.

NOTE: The brake pedal booster rod keeper (2) cannot be reused. Always install a new keeper if the brake pedal push rod was separated from the keeper.

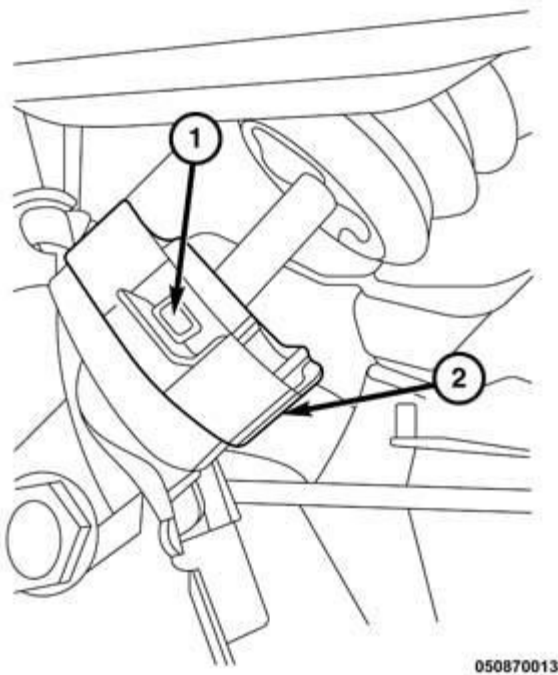


Fig. 15: Retainer & Clips

Courtesy of CHRYSLER GROUP, LLC

3. Install the power brake booster push rod and retainer (2) into NEW booster rod keeper, ensuring that the clips (1) are engaged.
4. Install and adjust the stop lamp switch in the brake pedal bracket. Refer to **SWITCH, STOP LAMP, INSTALLATION** .

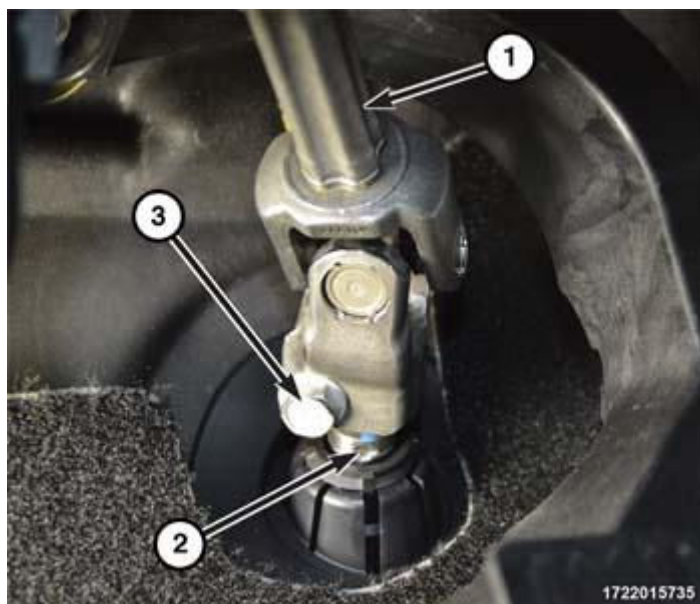


Fig. 16: Identifying Intermediate Shaft, Pinch Bolt And Steering Gear Pinion Shaft

Courtesy of CHRYSLER GROUP, LLC

5. Verify the front wheels of vehicle are in the STRAIGHT-AHEAD position.
6. Install the intermediate shaft (1) onto the steering gear input shaft (2).

NOTE: **A new pinch bolt (3) must be installed every time the pinch bolt is removed.**

7. Install a **NEW** pinch bolt (3) and tighten to the proper specification. Refer to **COLUMN, SPECIFICATIONS** .
8. Connect the vacuum sensor and install the vacuum hose in the booster.
9. Install the master cylinder and reservoir assembly. Refer to **MASTER CYLINDER, BRAKE, INSTALLATION**.
10. Install the ICU mounting bracket and tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
11. Install the ICU. Refer to **INTEGRATED CONTROL UNIT (ICU), INSTALLATION** .
12. Install the PDC. Refer to **CENTER, POWER DISTRIBUTION (PDC), INSTALLATION** .
13. Connect the battery negative cable to its post on the battery.
14. Bleed the base brake system. Refer to **STANDARD PROCEDURE** .
15. Road test the vehicle to ensure proper operation of the brakes.

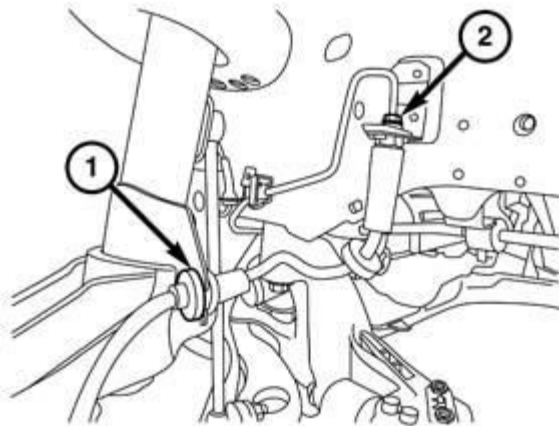
CALIPER, DISC BRAKE, FRONT

REMOVAL

REMOVAL

NOTE: **Before proceeding, Refer to CAUTION and WARNING.**

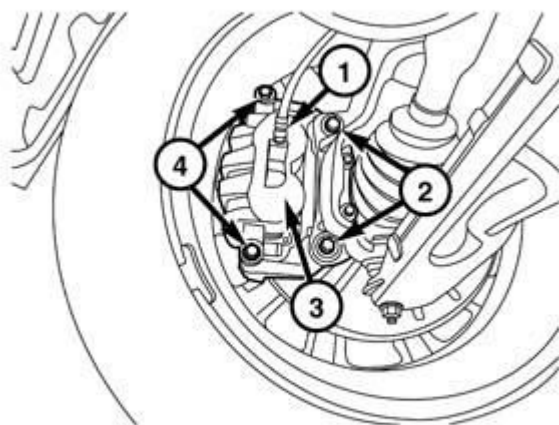
1. Using a brake pedal holding tool, depress the brake pedal past its first 25 mm (1 inch) of travel and hold it in this position. This will isolate the master cylinder from the brake hydraulic system and will not allow the brake fluid to drain out of the master cylinder reservoir when the lines are opened.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Remove the wheel mounting bolts, then the tire and wheel assembly.



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Fig. 17: Brake Line Connector & Clip
Courtesy of CHRYSLER GROUP, LLC

4. Remove the brake line connector (2) from the junction on the inner fender.
5. Separate the clip (1) from the strut and remove the brake hose from the strut.



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Fig. 18: Identifying Brake Hose Connector And Pin Bolts

Courtesy of CHRYSLER GROUP, LLC

6. Remove the brake hose connector (1) from the brake caliper.
7. Remove the two brake caliper guide pin bolts (4).
8. Slide the disc brake caliper from the disc brake adapter bracket and remove.

DISASSEMBLY**DISASSEMBLY**

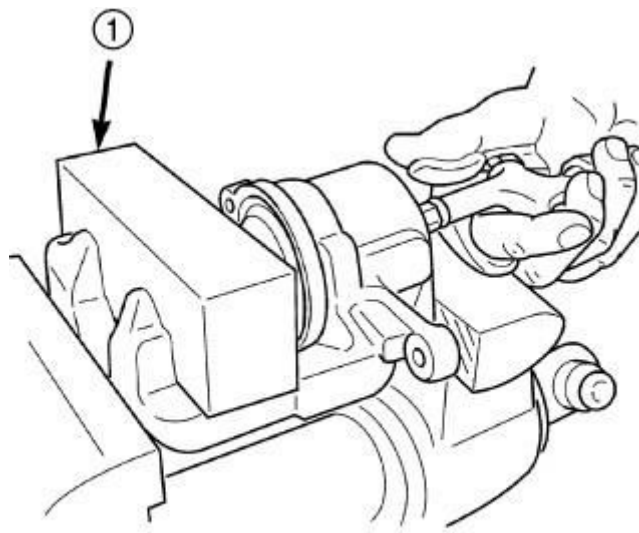
NOTE: Before disassembling the brake caliper, remove it from the vehicle. Refer to CALIPER, DISC BRAKE, FRONT, REMOVAL or CALIPER, DISC BRAKE, REAR, REMOVAL.

NOTE: Before disassembling the brake caliper, clean and inspect it. Refer to CALIPER, DISC BRAKE, FRONT, INSPECTION and CALIPER, DISC BRAKE, FRONT, CLEANING.

WARNING: Under no condition should high pressure air ever be used to remove a piston from a caliper bore. Personal injury could result from such a practice.

CAUTION: Do not use excessive force when clamping caliper in vise. Excessive vise pressure will cause bore distortion.

1. Mount the caliper in a vise equipped with protective jaws.



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Fig. 19: Identifying Wooden Block Placed In Brake Caliper

Courtesy of CHRYSLER GROUP, LLC

1 - WOOD BLOCK

WARNING: Do not place face or hands near caliper and piston if using compressed air pressure to remove piston. Do not use high pressure.

2. Place a wooden block (1) in the caliper as shown in the illustration.
3. If necessary, apply low pressure compressed air to the caliper fluid inlet in short spurts to force the piston out.
4. Remove the piston from the caliper.
5. Remove the dust boot from the piston and discard it.

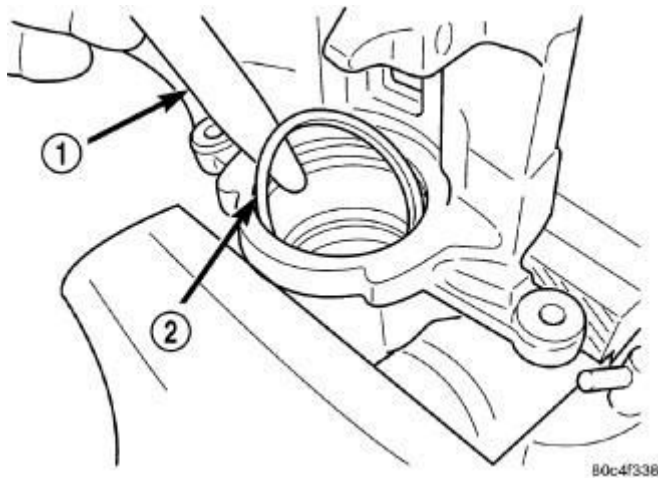


Fig. 20: Piston Seal Removal

Courtesy of CHRYSLER GROUP, LLC

1 - TRIM STICK

2 - SEAL

CAUTION: Do not use a screw driver or other metal tool for seal removal. Using such tools can scratch the bore or leave burrs on the seal groove edges.

6. Using a soft tool such as a plastic trim stick (1), work the piston seal (2) out of its groove in caliper piston bore. Discard the used seal.
7. Clean the piston bore and drilled passage ways with alcohol or a suitable solvent. Wipe it dry using only a lint-free cloth.
8. Inspect both the piston and bore for scoring or pitting. Bores that show light scratches or corrosion can usually be cleared of the light scratches or corrosion using crocus cloth.

CLEANING

CLEANING

WARNING: Chrysler LLC does not manufacture any vehicles or replacement parts that contain asbestos. Aftermarket products may or may not contain asbestos. Refer to aftermarket product packaging for product information.

Whether the product contains asbestos or not, dust and dirt can accumulate on brake parts during normal use. Follow practices prescribed by appropriate regulations for the handling, processing and disposing of dust and debris.

To clean or flush the internal passages of the brake caliper, use fresh brake fluid or Mopar® Non-Chlorinated Brake Parts Cleaner. Never use gasoline, kerosene, alcohol, oil, transmission fluid or any fluid containing mineral oil to clean the caliper. These fluids will damage rubber cups and seals.

INSPECTION

INSPECTION

Inspect the disc brake caliper for the following:

- Brake fluid leaks in and around piston boot area
- Ruptures, brittleness or damage to the piston dust boot

If caliper fails inspection, disassemble and recondition caliper, replacing the seals and dust boots.

ASSEMBLY

ASSEMBLY

NOTE: Always have clean hands when assembling a brake caliper.

NOTE: Always use fresh, clean brake fluid when assembling a brake caliper.

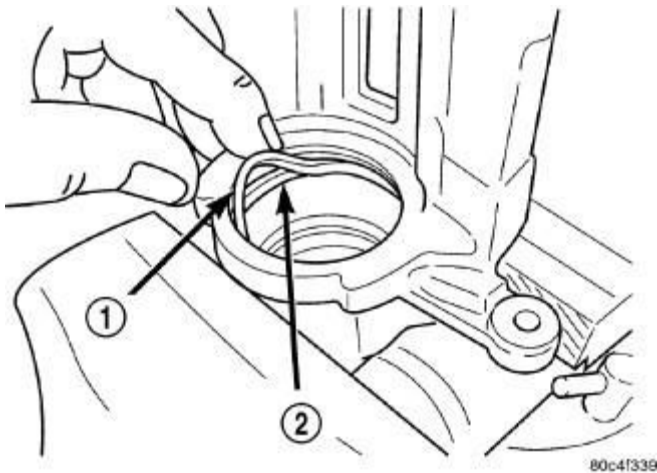


Fig. 21: New Piston Seal Installation

Courtesy of CHRYSLER GROUP, LLC

- | |
|-----------------------------------|
| <p>1 - SEAL</p> <p>2 - GROOVE</p> |
|-----------------------------------|

NOTE: **Never use an old piston seal.**

1. Dip the NEW piston seal in clean brake fluid and install it in the groove (2) of the caliper bore. The seal (1) should be started at one area of the groove and gently worked around into the groove using only your clean fingers to seat it.

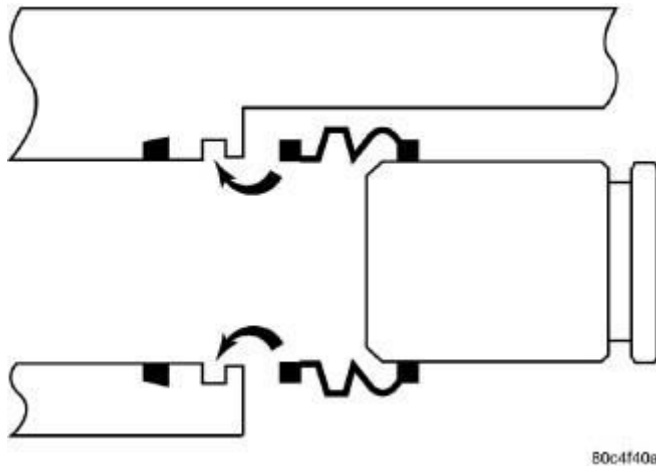


Fig. 22: Boot Installation

Courtesy of CHRYSLER GROUP, LLC

2. Coat the NEW piston with clean brake fluid.
3. Coat the NEW piston boot with clean brake fluid leaving a generous amount inside the boot.
4. Position the dust boot over the lower section of the piston.
5. Extend the dust boot below the bottom of the piston and guide the lip seal into the groove in the caliper

piston bore.

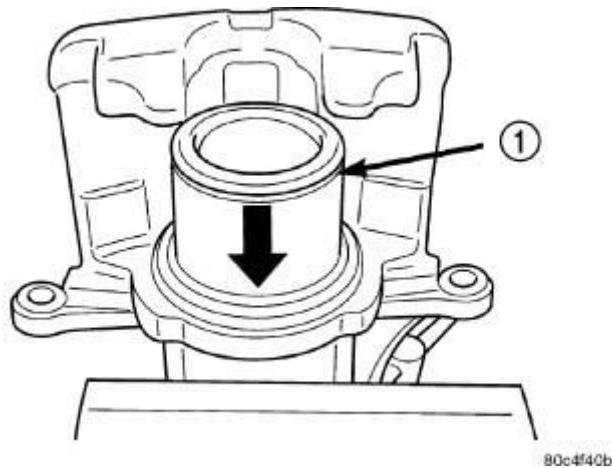


Fig. 23: Piston Installation

Courtesy of CHRYSLER GROUP, LLC

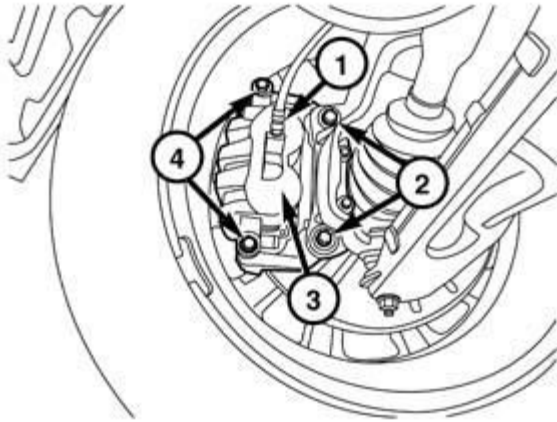
1 - PISTON GROOVE

CAUTION: Force applied to the piston (1) to seat it in the bore must be applied uniformly to avoid cocking and binding of the piston.

6. Install the piston (1) into the bore, carefully pushing it past the piston seal using **hand pressure**. Push the piston in until it bottoms in the caliper bore and the dust boot lip seal falls into the groove near the top of the piston.
7. Install the caliper on the vehicle and bleed the brakes as necessary. Refer to **CALIPER, DISC BRAKE, FRONT, INSTALLATION** or **CALIPER, DISC BRAKE, REAR, INSTALLATION**.

INSTALLATION

INSTALLATION

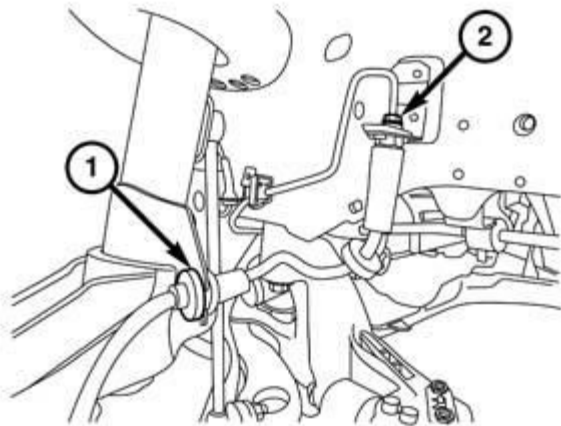


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Fig. 24: Identifying Brake Hose Connector And Pin Bolts
 Courtesy of CHRYSLER GROUP, LLC

CAUTION: Use care when installing the caliper onto the adapter bracket to avoid damaging the guide pin boots.

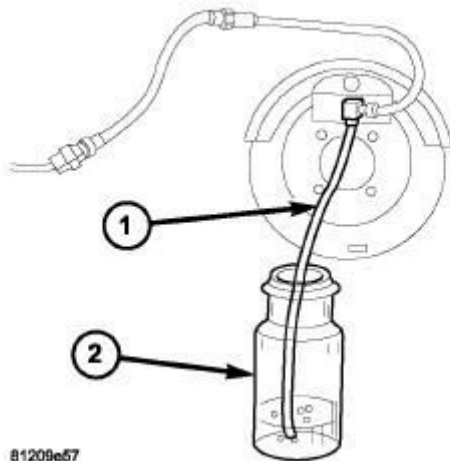
1. Completely retract the caliper piston back into the bore of the caliper. Use a C-clamp to retract the piston. Place a wood block over the piston before installing the C-clamp to avoid damaging the piston.
2. Install the disc brake caliper over the brake pads on the brake caliper adapter bracket.
3. Align the caliper guide pin bolt holes with the adapter bracket. Install the caliper guide pin bolts (4) and tighten to 43 N.m (32 ft. lbs.).
4. Install the brake hose (1) connector to the brake caliper and tighten to 18 N.m (159 in. lbs.).



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Fig. 25: Brake Line Connector & Clip
Courtesy of CHRYSLER GROUP, LLC

5. Install brake hose fitting to brake line connector (2) and tighten to 18 N.m (159 in. lbs.).
6. Install brake hose to mounting location on strut (1) and secure with the clip.
7. Install the tire and wheel assembly. Refer to **INSTALLATION**.
8. Lower the vehicle.



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Fig. 26: Bleeding Brakes
Courtesy of CHRYSLER GROUP, LLC

9. Remove the brake pedal holding tool.

10. Bleed the caliper as necessary. Refer to **STANDARD PROCEDURE** .
11. Road test the vehicle and make several stops to wear off any foreign material on the brakes and to seat the brake pads.

CALIPER, DISC BRAKE, REAR

REMOVAL

REMOVAL

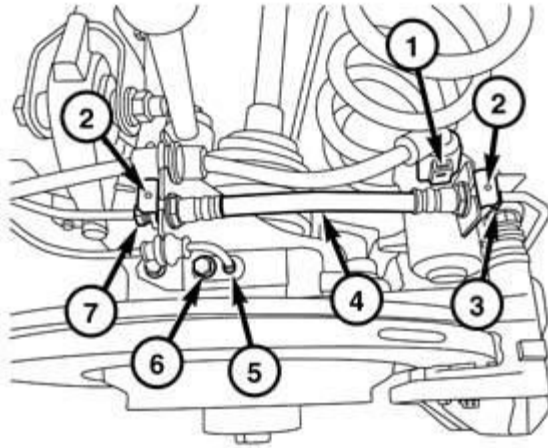
NOTE: Before proceeding, refer to **CAUTION** and **WARNING**.

The electronic park brake (EPB) actuator must be retracted prior to removing the brake caliper assembly. This can be done in two ways:

- A diagnostic scan tool (Service Mode position).
- Through Uconnect

CAUTION: If the electric park brake (EPB) switch is actuated with the caliper removed from the caliper bracket and still connected electrically, the EPB motor will fully extend causing damage to the caliper piston. Disconnect and isolate the negative battery cable before servicing any EPB component.

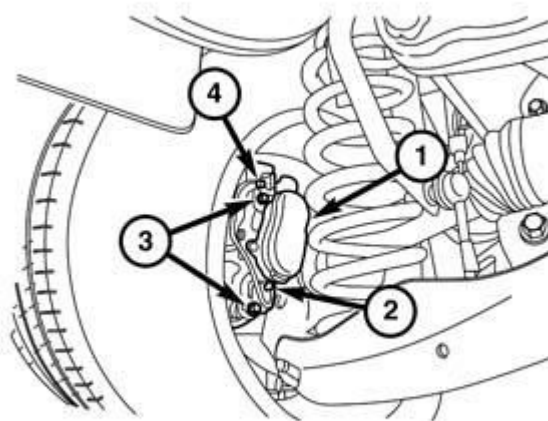
1. Using a brake pedal holding tool, depress the brake pedal past its first one inch of travel and hold it in this position. This will isolate the master cylinder from the brake hydraulic system and will not allow the brake fluid to drain out of the master cylinder reservoir while the lines are disconnected.
2. Disconnect and isolate the negative battery cable.
3. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
4. Remove the wheel mounting bolts, then the rear tire and wheel assembly.



1715005817

Fig. 27: Identifying Brake Line Bracket, Brake Line, Flex Hose And Wheel Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

5. Remove the nut and brake line bracket (2) from the brake caliper.
6. Remove the brake line (3) from the flex hose (4).



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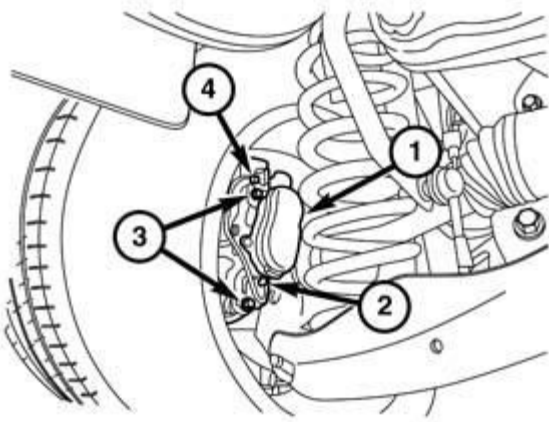
Fig. 28: Caliper Guide Pin Bolts

Courtesy of CHRYSLER GROUP, LLC

7. While holding guide pins from turning, remove caliper guide pin bolts (3).
8. Slide and remove the disc brake caliper from the disc brake adapter bracket.

INSTALLATION**INSTALLATION**

CAUTION: Use care when installing the caliper onto the disc brake adapter to avoid damaging the guide pin boots.

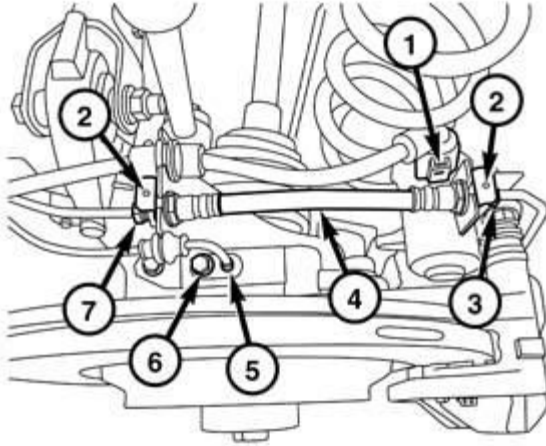


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Fig. 29: Caliper Guide Pin Bolts

Courtesy of CHRYSLER GROUP, LLC

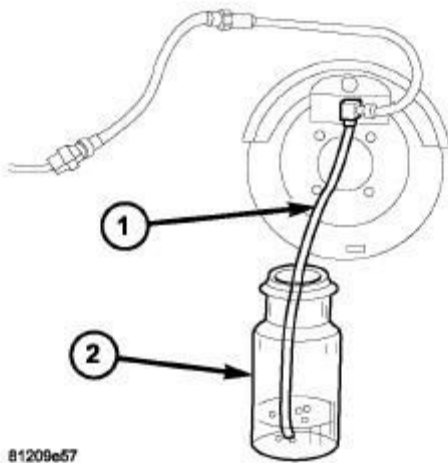
1. Install the disc brake caliper with outboard brake pad attached over the inboard brake pad and rotor, onto the brake caliper adapter bracket.
2. Align the caliper guide pin bolt holes with the adapter bracket. Install the caliper guide pin bolts (3) and tighten the guide pin bolts to 43N.m (32 ft. lbs.).



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Fig. 30: Identifying Brake Line Bracket, Brake Line, Flex Hose And Wheel Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

3. Install brake line fitting (3) to the flex hose (4) and tighten to 18 N.m (159 in. lbs.).
4. Install the brake line bracket and nut (2) to the brake caliper.
5. Install the tire and wheel assembly. Refer to **INSTALLATION**.
6. Lower the vehicle.
7. Remove the brake pedal holding tool.



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Fig. 31: Bleeding Brakes
Courtesy of CHRYSLER GROUP, LLC

8. Bleed the caliper as necessary. Refer to **STANDARD PROCEDURE** .
9. Pump the brake pedal several times to ensure the vehicle has a firm brake pedal before moving the vehicle.
10. Exit the Service Mode prior to road testing the vehicle. This can be done in two ways:
 - Exit the Service Mode with diagnostic scan tool.
 - While depressing the brake pedal, press the EPB switch.
11. Road test the vehicle and make several stops to wear off any foreign material on the brakes and to seat the brake pads.

FLUID

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - BRAKE FLUID CONTAMINATION

Indications of fluid contamination are swollen or deteriorated rubber parts. Swelling indicates the presence of petroleum in the brake fluid.

To test for contamination, put a small amount of drained brake fluid in clear glass jar. If the fluid separates into layers, there is mineral oil or other fluid contamination of the brake fluid.

If the brake fluid is contaminated, drain and thoroughly flush the brake system. Replace all the rubber parts or components containing rubber coming into contact with the brake fluid including: the master cylinder and reservoir; caliper seals; ABS hydraulic control unit; and all hydraulic fluid hoses.

SPECIFICATIONS

SPECIFICATIONS

The brake fluid used in this vehicle must conform to DOT 3 specifications and SAE J1703 standards. No other type of brake fluid is recommended or approved for usage in the vehicle brake system. Use only Mopar® Brake Fluid DOT 3 Motor Vehicle or equivalent from a tightly sealed container.

CAUTION: Never use reclaimed brake fluid or fluid from a container which has been left open. An open container will absorb moisture from the air and contaminate the fluid.

CAUTION: Never use any type of a petroleum-based fluid in the brake hydraulic system. Use of such type fluids will result in seal damage of the vehicle brake hydraulic system causing a failure of the vehicle brake system. Petroleum based fluids would be items such as engine oil, transmission fluid, power steering fluid, etc.

MASTER CYLINDER, BRAKE

DESCRIPTION**DESCRIPTION**

All master cylinders are a two-outlet design and the brake tubes from these primary and secondary outlet ports lead directly to the Integrated Control Unit (ICU) before going to each wheel brake.

The master cylinder body is an anodized aluminum casting. It has a machined bore to accept the master cylinder pistons and also has threaded ports with seats for hydraulic brake tube connections.

The master cylinder has the brake fluid reservoir mounted on top of it which gravity feeds brake fluid to the master cylinder when it is required. On manual transmission model vehicles the brake fluid reservoir also feeds the clutch hydraulic circuit. The reservoir is made of see-through plastic and it houses the brake fluid level switch.

DIAGNOSIS AND TESTING**DIAGNOSIS AND TESTING - MASTER CYLINDER/POWER BOOSTER**

1. Start the engine and check the booster vacuum hose connections. A hissing noise indicates a vacuum leak. Correct any vacuum leaks before proceeding.
2. Stop the engine and pump the brake pedal until all vacuum reserve in the booster is depleted.
3. Press and hold the brake pedal under light foot pressure. The pedal should hold firm. If the pedal falls away, there may be an external leak or the master cylinder is faulty (internal leakage).
4. Start the engine and note pedal action. It should fall away slightly under light foot pressure, then hold firm. If no pedal action is discernible, the power booster, vacuum supply or vacuum check valve is faulty, proceed to the POWER BOOSTER VACUUM TEST.
5. If the POWER BOOSTER VACUUM TEST passes, rebuild the booster vacuum reserve as follows: Release the brake pedal. Increase engine speed to 1500 RPM, close the throttle and immediately turn off the ignition to stop the engine.
6. Wait a minimum of 90 seconds and try brake action again. The booster should provide two or more vacuum assisted pedal applications. If the vacuum assist is not provided, the booster is faulty.

POWER BOOSTER VACUUM TEST

1. Connect a vacuum gauge to the booster check valve with a short length of hose and T-fitting.
2. Start and run the engine at curb idle for one minute.
3. Observe the vacuum supply. If the vacuum supply is less than 12 inches HG (406 millibars), repair the vacuum supply.
4. Clamp the hose shut between the intake vacuum source and the check valve.
5. Stop the engine and observe the vacuum gauge.
6. If the vacuum drops more than one inch HG (33 millibars) within 15 seconds, the booster diaphragm or check valve is faulty.

POWER BOOSTER CHECK VALVE TEST

1. Remove the power booster check valve from the power booster.
2. Using a hand operated vacuum pump, apply 15-20 inches HG (508-677 millibars) vacuum at the booster side of the check valve.
3. The vacuum should hold steady. If the gauge on the pump indicates vacuum loss, the check valve is faulty and should be replaced.

STANDARD PROCEDURE

STANDARD PROCEDURE - MASTER CYLINDER BLEEDING

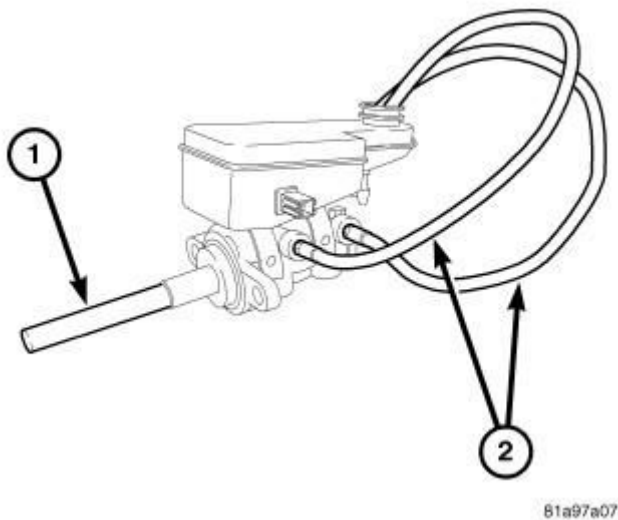


Fig. 32: Bleeding Master Cylinder With ABS
 Courtesy of CHRYSLER GROUP, LLC

1. Clamp the master cylinder in a vise with soft-jaw caps.
2. Attach the special tools for bleeding the master cylinder in the following fashion:
 - a. Thread a Bleeder Tube (2) (special tool #8358-1, Bleed Tube), into the primary and secondary ports. Tighten bleeder tube nuts to 20 N.m (177 in. lbs.).
 - b. Flex each Bleeder Tube and place the open ends into the neck of the master cylinder reservoir. Position the open ends of the tubes into the reservoir so their outlets are below the surface of the brake fluid in the reservoir when filled.

NOTE: **Make sure the ends of the Bleeder Tubes stay below the surface of the brake fluid in the reservoir at all times during the bleeding procedure.**

3. Fill the brake fluid reservoir with fresh Mopar® Brake Fluid DOT 3 Motor Vehicle, or equivalent. Refer to **FLUID, SPECIFICATIONS**.
4. Using an appropriately sized wooden dowel as a pushrod, slowly press the pistons inward discharging brake fluid through the Bleeder Tubes, then release the pressure, allowing the pistons to return to the released position. Repeat this several times until all air bubbles are expelled from the master cylinder bore.

and Bleeder Tubes.

5. Remove the Bleeder Tubes from the master cylinder and plug the master cylinder outlet ports.
6. Install the fill cap on the reservoir.
7. Remove the master cylinder from the vise.
8. Install the master cylinder on the vehicle. Refer to **MASTER CYLINDER, BRAKE, INSTALLATION**.

REMOVAL

REMOVAL

CAUTION: The vacuum in the power brake booster must be pumped down before removing the master cylinder to prevent the booster from sucking in any contamination. This can be done by pumping the brake pedal while the engine is not running until a firm brake pedal is achieved.

NOTE: Before proceeding, refer to **CAUTION** and **WARNING**.

1. With the engine not running, pump the brake pedal 4-5 strokes until the pedal feel is firm.
2. Remove the engine cover, if equipped.
3. Disconnect and isolate the battery negative cable from its post on the battery.

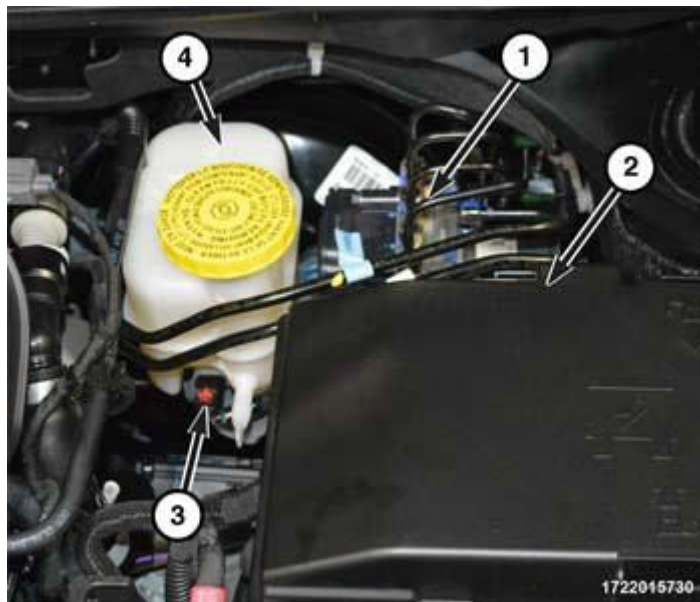
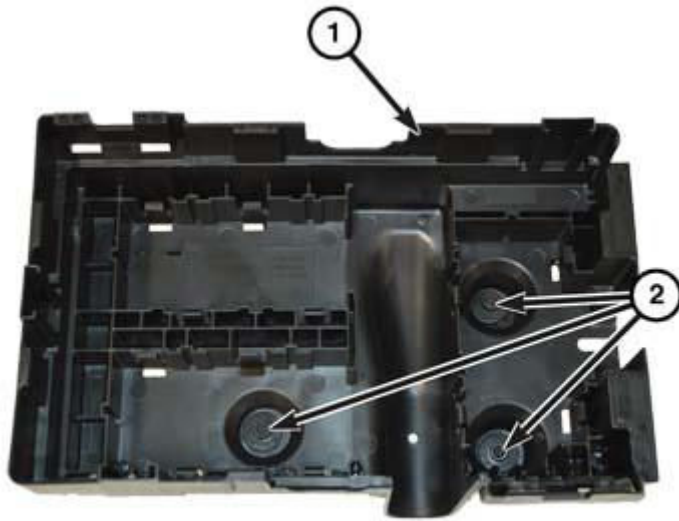


Fig. 33: Identifying Power Distribution Center (PDC)
 Courtesy of CHRYSLER GROUP, LLC

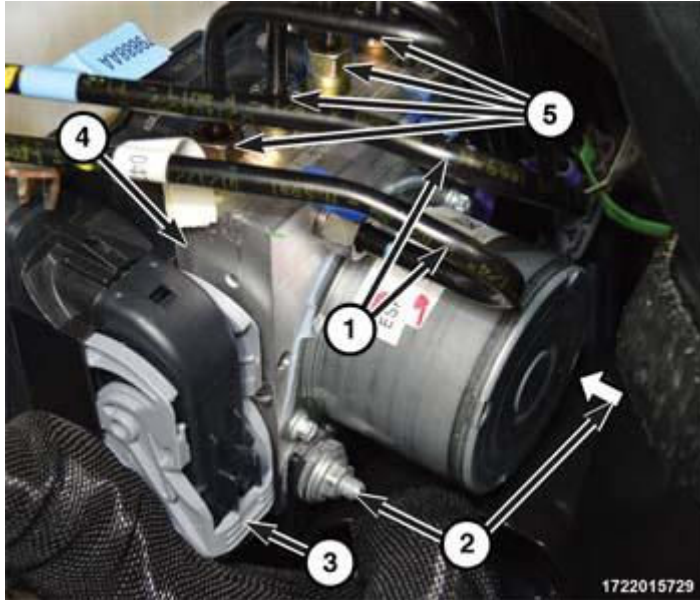
4. Remove the PDC (2) from the vehicle. Refer to **CENTER, POWER DISTRIBUTION (PDC), REMOVAL**.



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Fig. 34: Power Distribution Center (PDC) Mount
Courtesy of CHRYSLER GROUP, LLC

5. Remove the bolts (2) from the PDC mounting bracket (1) and remove from the vehicle.
6. Siphon as much fluid as possible from master cylinder reservoir.



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Fig. 35: Identifying Integrated Control Unit (ICU)
Courtesy of CHRYSLER GROUP, LLC

7. Remove the primary and secondary brake tubes (1) from the Integrated Control Unit (ICU) to the master cylinder.

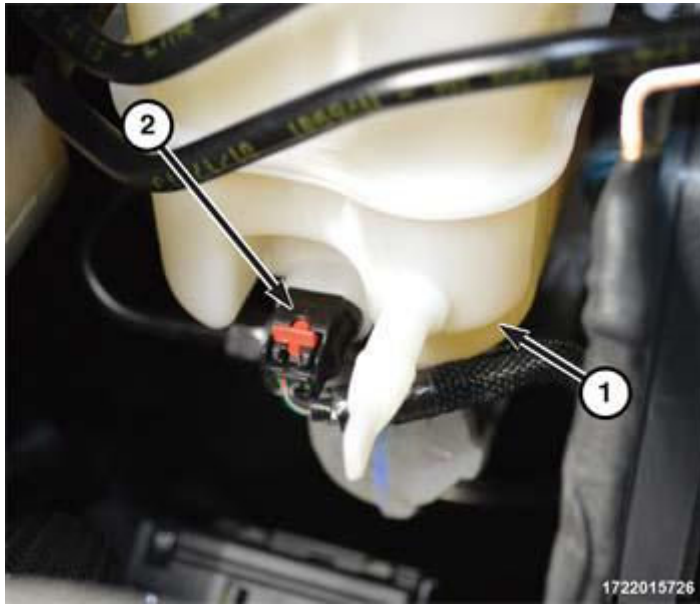


Fig. 36: Removing/Installing Wire Harness From Brake Fluid Level Switch
 Courtesy of CHRYSLER GROUP, LLC

8. Disconnect wire harness (2) from brake fluid level switch on master cylinder reservoir.
9. Disconnect wire harness from brake vacuum check valve. Remove vacuum tube from power brake booster.
10. Remove master cylinder retaining nuts. Taking care not to lose o-ring seal between power brake booster and master cylinder, remove master cylinder from vehicle.

INSTALLATION

INSTALLATION

NOTE: The master cylinder must be bled before installing it on the vehicle.

1. Bench bleed the master cylinder. Refer to **MASTER CYLINDER, BRAKE, STANDARD PROCEDURE**.
2. Wipe the face of the power brake booster clean where the vacuum seal on the rear of the master cylinder comes in contact when it's installed. Do not get any cleaner or debris inside the booster.
3. Line up the master cylinder mounting holes with the mounting studs on the power brake booster. Ensure o-ring seal is located on rear of master cylinder before installing into the booster. Ensure the master cylinder piston push rod lines up with the booster push rod, then carefully slide the master cylinder into the power brake booster until it contacts the face of the booster.
4. Install two **NEW** master cylinder mounting nuts (1). Tighten each nut to 25 N.m (18 ft. lbs.).

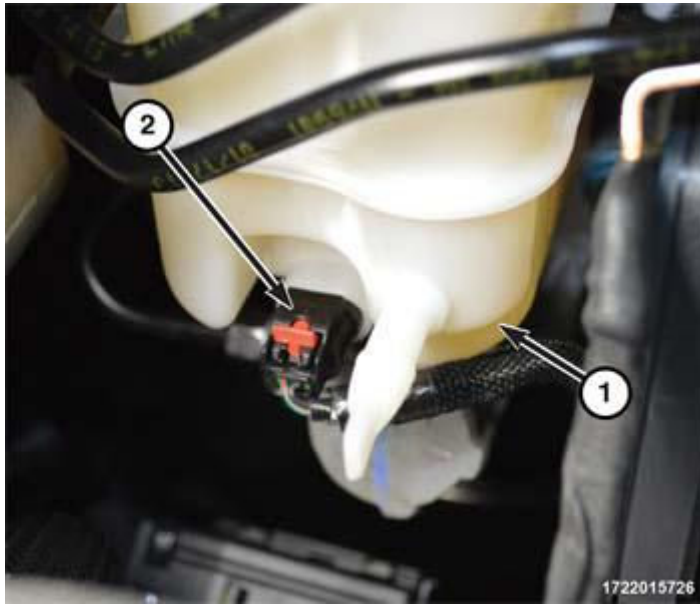


Fig. 37: Removing/Installing Wire Harness From Brake Fluid Level Switch
Courtesy of CHRYSLER GROUP, LLC

5. Connect the wiring harness connector (2) to the brake fluid level switch.

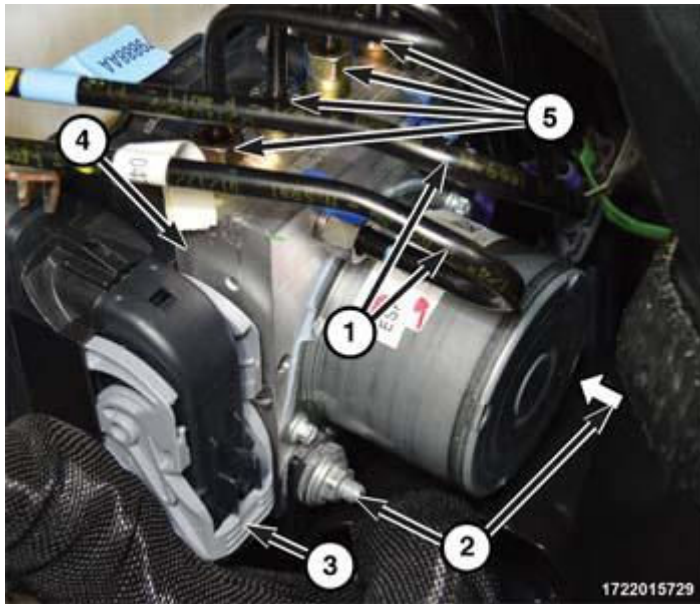
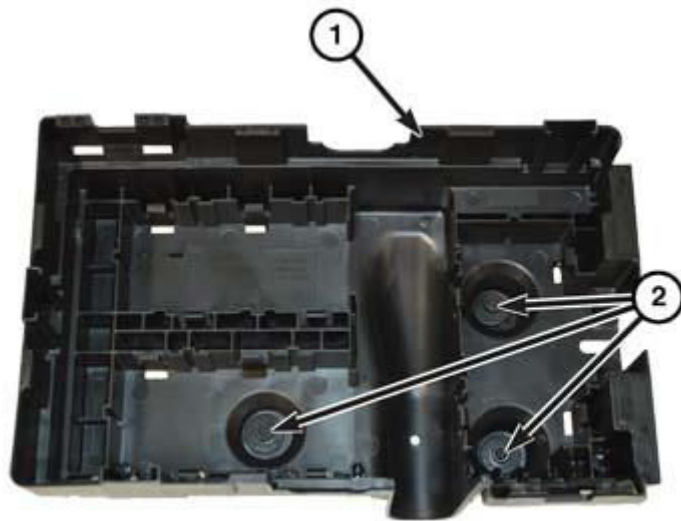


Fig. 38: Identifying Integrated Control Unit (ICU)
Courtesy of CHRYSLER GROUP, LLC

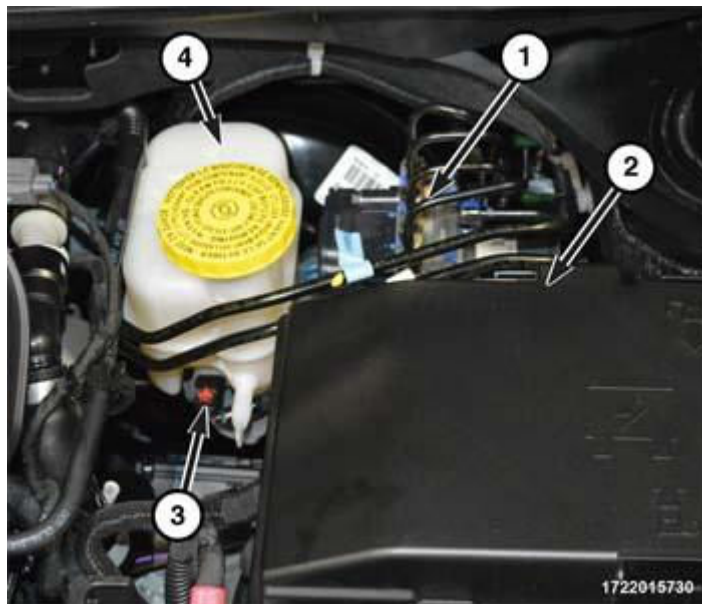
6. Connect the primary and secondary brake tubes (1) from the ICU to the master cylinder. Tighten the tube nuts to 25 N.m (18 ft. lbs.).
7. Connect the wiring harnesses to the brake vacuum sensor and connect the vacuum tube to the brake booster.



1722015732

Fig. 39: Power Distribution Center (PDC) Mount
Courtesy of CHRYSLER GROUP, LLC

8. Install the PDC mount (1) and tighten the bolts (2).



1722015730

Fig. 40: Identifying Power Distribution Center (PDC)
Courtesy of CHRYSLER GROUP, LLC

9. Install the PDC (2). Refer to **CENTER, POWER DISTRIBUTION (PDC), INSTALLATION**.
10. Connect the negative (ground) cable on the battery.
11. Fill the master cylinder reservoir to the proper level.
12. Install the engine cover, if equipped.

13. Install a scan tool to initialize the ABS and perform the following:
 - a. Clear any faults.
 - b. Fill the master cylinder to the proper fill level and bleed the base hydraulic system. Refer to **STANDARD PROCEDURE** .
 - c. Check for leaks.
 - d. Perform the ABS Verification Test. Refer to **STANDARD PROCEDURE**
14. Road test the vehicle to ensure proper operation of the brakes.

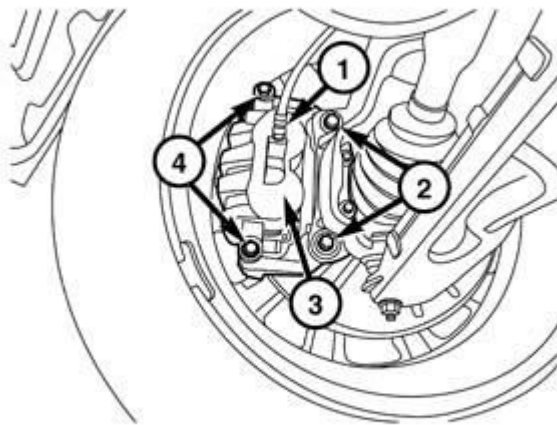
PADS, BRAKE, FRONT

REMOVAL

REMOVAL

NOTE: Before proceeding, refer to **CAUTION** and **WARNING**.

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove the wheel mounting bolts, then the tire and wheel assembly.



1715005815

Fig. 41: Identifying Brake Hose Connector And Pin Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Remove the two brake caliper guide pin bolts (4).
4. Remove the disc brake caliper from the disc brake adapter bracket and hang it out of the way using wire or a bungee cord. Use care not to overextend the brake hose when doing this.

5. Remove the brake pads from the caliper adapter bracket.

CLEANING

CLEANING

WARNING: Chrysler LLC does not manufacture any vehicles or replacement parts that contain asbestos. Aftermarket products may or may not contain asbestos. Refer to aftermarket product packaging for product information.

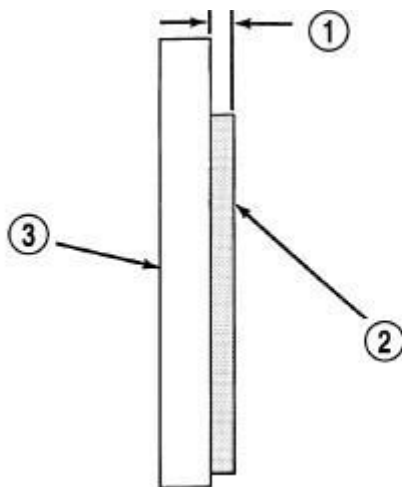
Whether the product contains asbestos or not, dust and dirt can accumulate on brake parts during normal use. Follow practices prescribed by appropriate regulations for the handling, processing and disposing of dust and debris.

INSPECTION

INSPECTION

Visually inspect brake pads for uneven lining wear. Also inspect for excessive lining deterioration. Check the clearance between the tips of the wear indicators (if equipped) on the pads and the brake rotors.

If a visual inspection does not adequately determine the condition of the lining, a physical check will be necessary. To check the amount of lining wear, remove the disc brake pads from the vehicle.



9205-315

Fig. 42: Brake Pad Friction Material Thickness Measurement
Courtesy of CHRYSLER GROUP, LLC

1 - BRAKE SHOE ASSEMBLY FRICTION MATERIAL THICKNESS IS TO BE MEASURED AT THE THINNEST POINT.

2 - BRAKE SHOE ASSEMBLY FRICTION MATERIAL

3 - BRAKE SHOE ASSEMBLY BACKING PLATE

Measure brake pad minimum thickness (1). Brake pads must be replaced when usable material on a brake pad lining (2) measured at its **thinnest point** measures 1.5 mm (0.06 inches) or less.

If a brake pad fails inspection, replace **both** disc brake pads (inboard and outboard) at each caliper. It is also necessary to replace the pads on the opposite side of the vehicle as well as the pads failing inspection to maintain proper braking characteristics.

If the brake pad assemblies do not require replacement, be sure to reinstall the brake pads in the original position they were removed from.

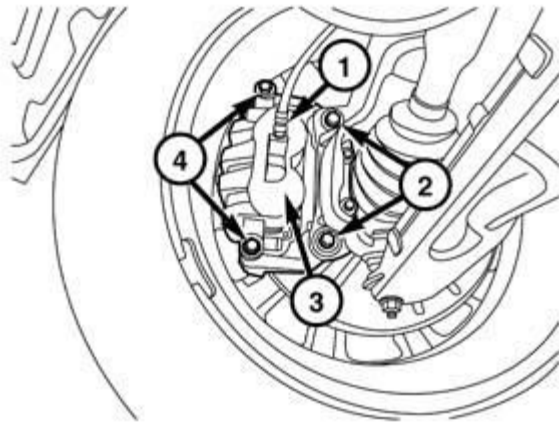
NOTE: **It is important to inspect both front and rear brake pads during the same inspection.**

INSTALLATION

INSTALLATION

NOTE: **Make sure that the audible wear indicators (if equipped) are placed toward the top side nearest the bleeder screw when the inboard brake pads are installed on each side of the vehicle.**

1. Place the brake pads in the abutment shims clipped into the disc brake caliper adapter bracket. Place the pad with the wear indicator attached on the inboard side.
2. Completely retract the caliper piston back into the bore of the caliper.



1715005815

Fig. 43: Identifying Brake Hose Connector And Pin Bolts
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Use care when installing the caliper onto the adapter bracket to avoid damaging the guide pin boots.

3. Install the disc brake caliper over the brake pads on the brake caliper adapter bracket.
4. Align the caliper guide pin bolt holes with the adapter bracket. Install the caliper guide pin bolts (4) and tighten to 43 N.m (32 ft. lbs.).
5. Install the tire and wheel assembly. Refer to **INSTALLATION**.
6. Lower the vehicle.
7. Pump the brake pedal several times before moving the vehicle to set the pads to the brake rotor.
8. Check and adjust the brake fluid level in the reservoir as necessary.
9. Road test the vehicle and make several stops to wear off any foreign material on the brakes and to seat the brake pads.

PADS, BRAKE, REAR

REMOVAL

REMOVAL

NOTE: Before proceeding, refer to **CAUTION** and **WARNING**.

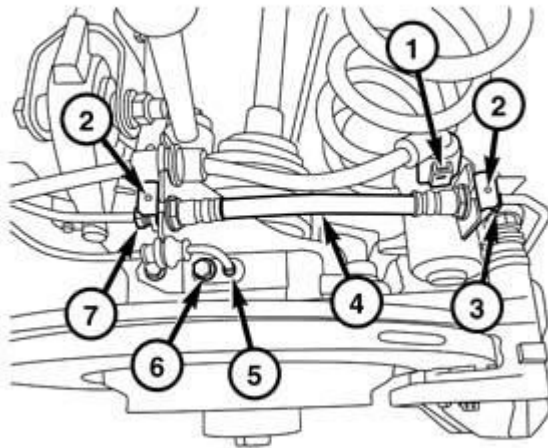
The electronic parking brake actuator (EPB) must be retracted prior to removing the brake caliper assembly.

This can be done in two ways:

- A diagnostic scan tool (Service Mode position)
- Through Uconnect

CAUTION: If the electric park brake (EPB) switch is actuated with the caliper removed from the caliper bracket and still connected electrically, the EPB motor will fully extend causing damage to the caliper piston. Disconnect and isolate the negative battery cable before servicing any EPB component.

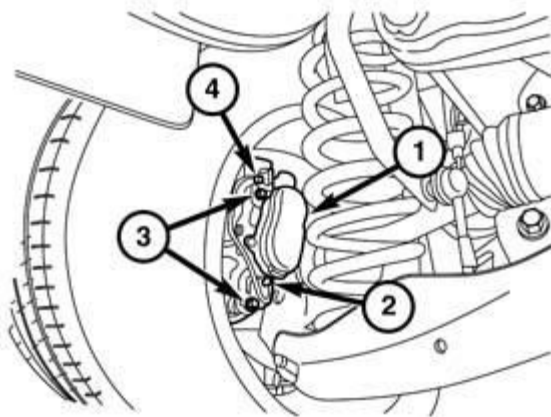
1. Disconnect and isolate the negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
3. Remove the wheel mounting bolts, then the rear tire and wheel assembly.



1715005817

Fig. 44: Identifying Brake Line Bracket, Brake Line, Flex Hose And Wheel Speed Sensor
 Courtesy of CHRYSLER GROUP, LLC

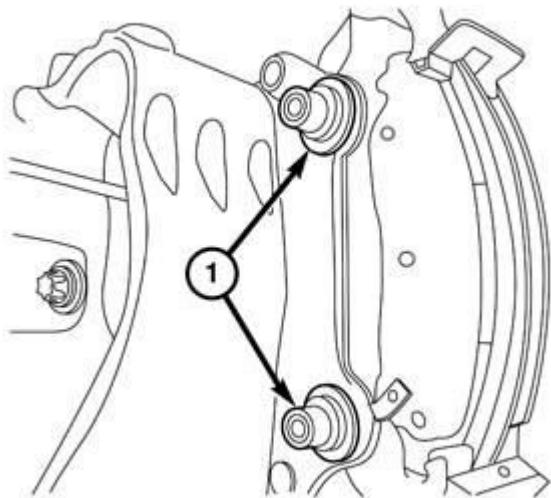
4. Remove the nut and brake line bracket (2).



1715005819

Fig. 45: Caliper Guide Pin Bolts
Courtesy of CHRYSLER GROUP, LLC

5. While holding guide pins from turning, remove caliper guide pin bolts (3).
6. Slide and remove the disc brake caliper from the disc brake adapter bracket.



050868487

Fig. 46: Removing Brake Pads From The Caliper Adapter Bracket

Courtesy of CHRYSLER GROUP, LLC

7. Remove the brake pads from the caliper adapter bracket.

CLEANING**CLEANING**

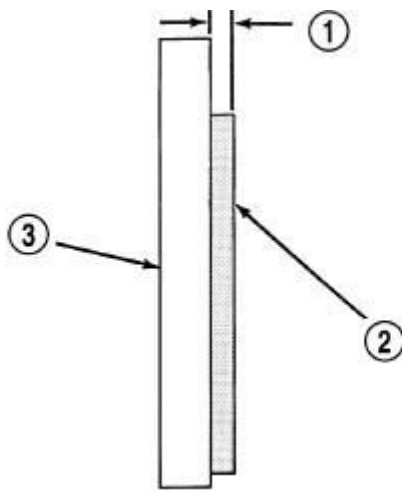
WARNING: Chrysler LLC does not manufacture any vehicles or replacement parts that contain asbestos. Aftermarket products may or may not contain asbestos. Refer to aftermarket product packaging for product information.

Whether the product contains asbestos or not, dust and dirt can accumulate on brake parts during normal use. Follow practices prescribed by appropriate regulations for the handling, processing and disposing of dust and debris.

INSPECTION**INSPECTION**

Visually inspect brake pads for uneven lining wear. Also inspect for excessive lining deterioration. Check the clearance between the tips of the wear indicators (if equipped) on the pads and the brake rotors.

If a visual inspection does not adequately determine the condition of the lining, a physical check will be necessary. To check the amount of lining wear, remove the disc brake pads from the vehicle.



9205-315

Fig. 47: Brake Pad Friction Material Thickness Measurement
Courtesy of CHRYSLER GROUP, LLC

1 - BRAKE SHOE ASSEMBLY FRICTION MATERIAL THICKNESS IS TO BE MEASURED AT THE THINNEST POINT.

2 - BRAKE SHOE ASSEMBLY FRICTION MATERIAL

3 - BRAKE SHOE ASSEMBLY BACKING PLATE

Measure brake pad minimum thickness (1). Brake pads must be replaced when usable material on a brake pad lining (2) measured at its **thinnest point** measures 1.5 mm (0.06 inches) or less.

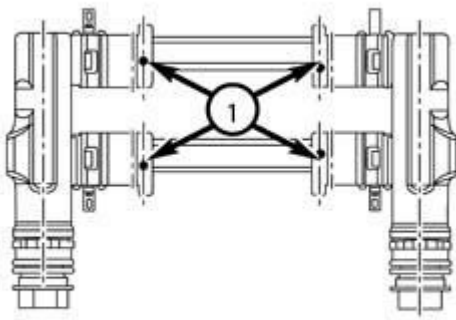
If a brake pad fails inspection, replace **both** disc brake pads (inboard and outboard) at each caliper. It is also necessary to replace the pads on the opposite side of the vehicle as well as the pads failing inspection to maintain proper braking characteristics.

If the brake pad assemblies do not require replacement, be sure to reinstall the brake pads in the original position they were removed from.

NOTE: It is important to inspect both front and rear brake pads during the same inspection.

INSTALLATION

INSTALLATION



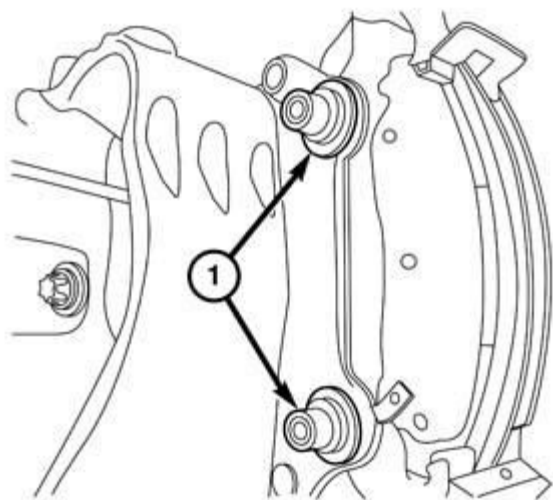
0508012591

Fig. 48: Identifying Lubricant Application Areas

Courtesy of CHRYSLER GROUP, LLC

1. Before installing the brake pads, apply WOLFRACOA[®]T C (1) or equivalent lubricant to the abutment clips as shown in the illustration.

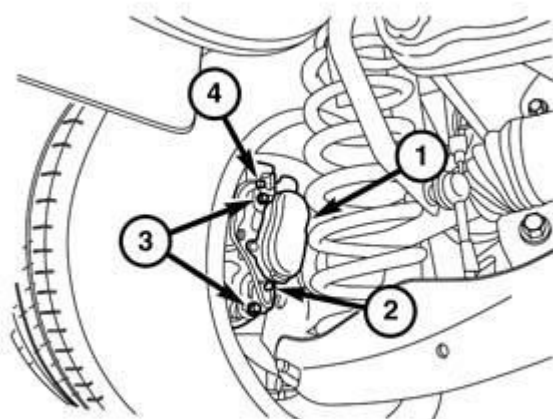
NOTE: WOLFRACOA[®]T C or equivalent lubricant must be applied to prevent noise.



050868487

Fig. 49: Caliper Bracket Mounting Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Install the pads to the caliper adapter bracket making sure the wear indicators are on the bottom side opposite of the bleeder screw.

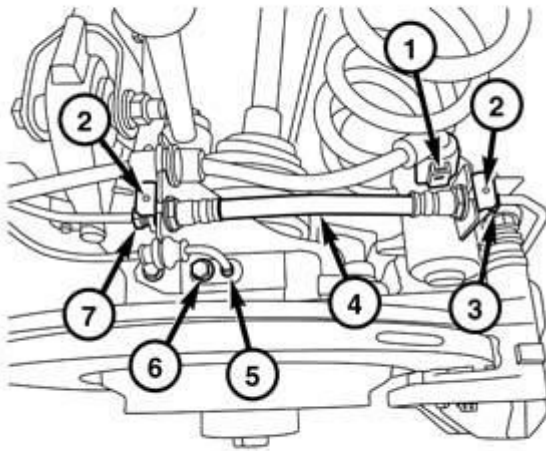


1715005819

Fig. 50: Caliper Guide Pin Bolts
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Use care when installing the caliper onto the disc brake adapter to avoid damaging the guide pin boots.

3. Align the caliper guide pin bolt holes with the adapter bracket. Install the caliper guide pin bolts (3) and tighten the guide pin bolts to 43 N.m (32 ft. lbs.).



1715005817

Fig. 51: Identifying Brake Line Bracket, Brake Line, Flex Hose And Wheel Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

4. Install the brake line bracket and nut (2).
5. Install the tire and wheel assembly Refer to **INSTALLATION**.
6. Lower the vehicle.
7. Pump the brake pedal several times to ensure the vehicle has a firm brake pedal before moving the vehicle.
8. Exit the Service Mode prior to road testing the vehicle. This can be done in two ways:
 - Exit the Service Mode with diagnostic scan tool.
 - While depressing the brake pedal, press the EPB switch.
9. Road test the vehicle and make several stops to wear off any foreign material on the brakes and to seat the brake pads.

PEDAL(S), BRAKE AND/OR ACCELERATOR

REMOVAL

REMOVAL

NOTE: Before proceeding, refer to **CAUTION** and **WARNING**.

1. Disconnect and isolate the battery negative cable from its post on the battery.

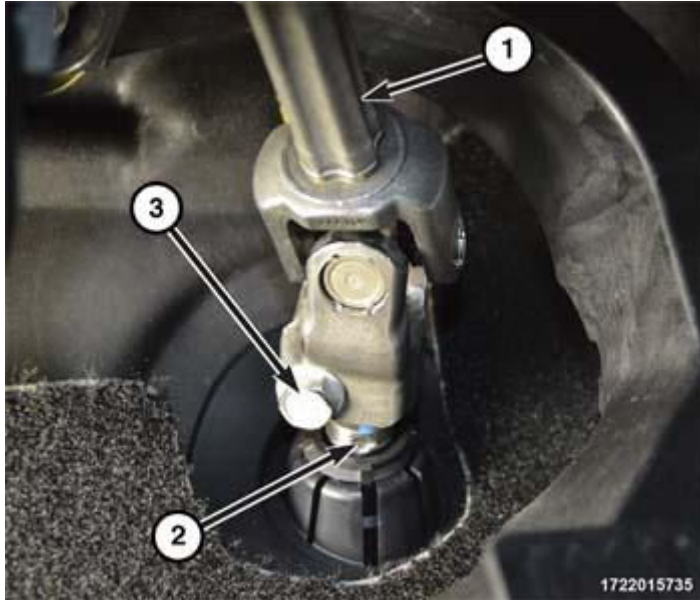
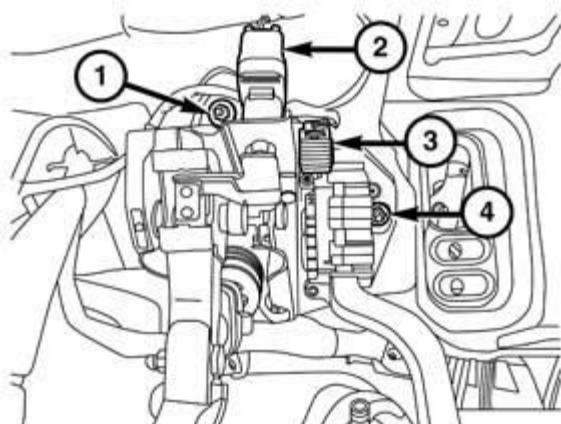


Fig. 52: Identifying Intermediate Shaft, Pinch Bolt And Steering Gear Pinion Shaft
Courtesy of CHRYSLER GROUP, LLC

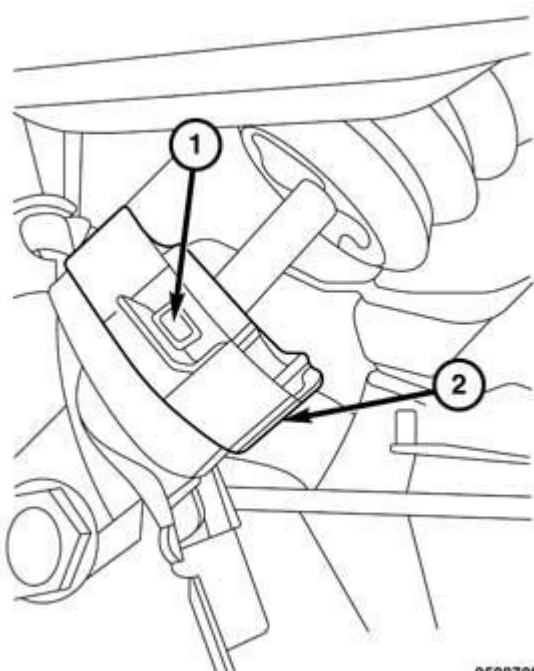
2. Remove intermediate shaft pinch bolt (3) and separate the intermediate shaft (1) at the base of the column from the steering gear pinion shaft (2). Discard the pinch bolt (3); it is not to be reused.
3. Position the intermediate shaft (1) so that the pedal assembly can be accessed.



050868753

Fig. 53: Stop Lamp Switch, Connector & Nuts
Courtesy of CHRYSLER GROUP, LLC

4. Remove the stop lamp switch (2). Refer to **SWITCH, STOP LAMP, REMOVAL** .
5. Disconnect accelerator pedal electrical connector (3).

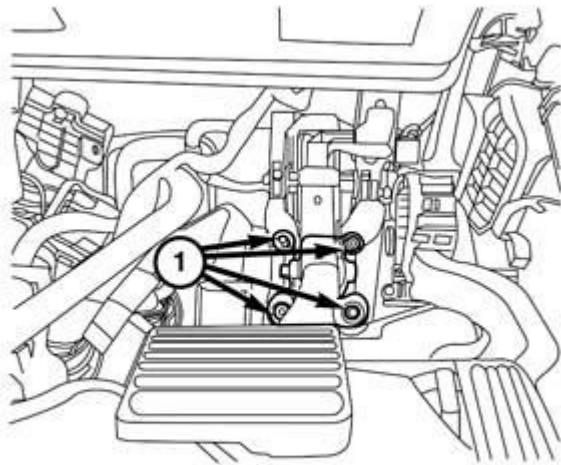


050870013

Fig. 54: Retainer & Clips

Courtesy of CHRYSLER GROUP, LLC

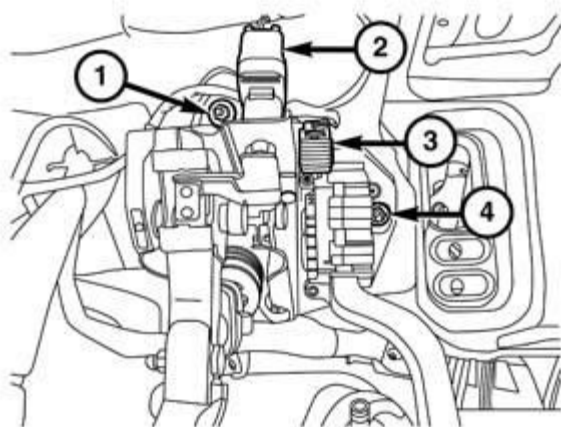
6. Disengage clips (1) on booster rod keeper assembly retainer (2). Position retainer (2) up to remove booster rod from pedal assembly.
7. Disconnect the clutch safety switch electrical connector and disengage clutch rod from clutch pedal, if equipped. Refer to **PEDAL AND PAD, CLUTCH, REMOVAL** .



0508007146

Fig. 55: Remove/Install Power Brake Booster Nuts**Courtesy of CHRYSLER GROUP, LLC**

8. Remove the four nuts (1) attaching the brake pedal sled (and power brake booster) to the dash panel.



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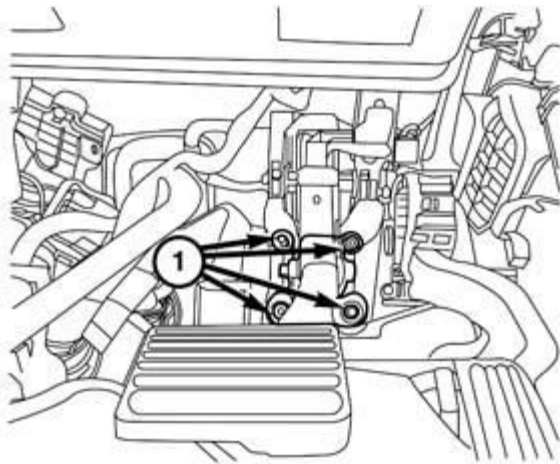
Fig. 56: Stop Lamp Switch, Connector & Nuts
Courtesy of CHRYSLER GROUP, LLC

9. Remove the remaining two nuts (1, 4) attaching the brake pedal sled to the dash panel.
10. Remove the brake pedal and bracket assembly from vehicle.

INSTALLATION

INSTALLATION

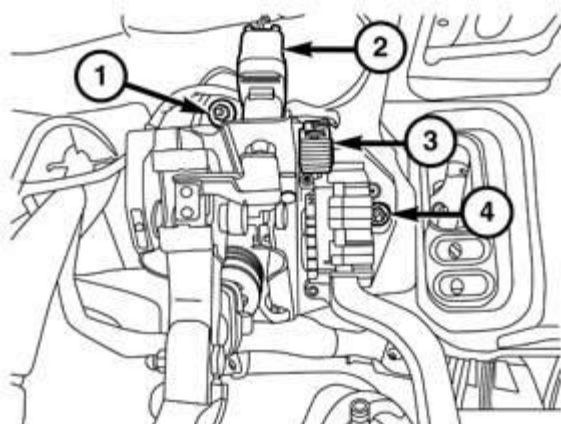
1. Carefully install the brake pedal and bracket assembly in the vehicle lining up the bracket with the power brake booster mounting studs and the studs on the dash panel.



0508007146

Fig. 57: Remove/Install Power Brake Booster Nuts
Courtesy of CHRYSLER GROUP, LLC

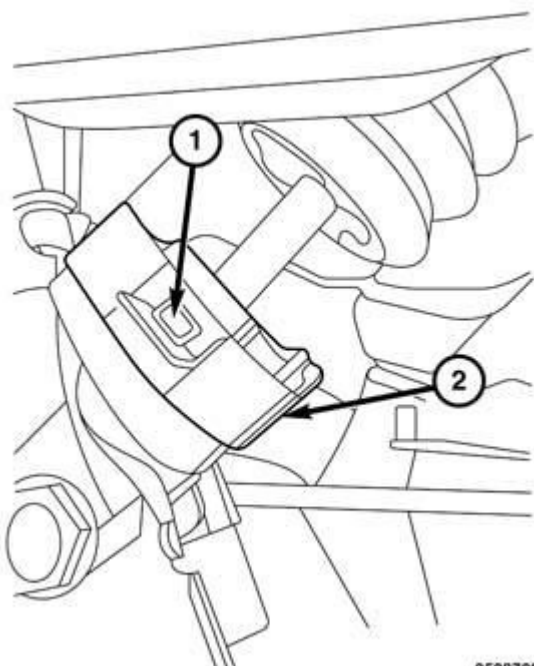
2. Install the four nuts (1) attaching the brake pedal (and power brake booster) to the dash panel. **Do not tighten the nuts at this time.**
3. Tighten the nuts in the following sequence: Top inboard, bottom outboard, top outboard, bottom inboard to the proper specifications. Refer to **SPECIFICATIONS** . Failure to do so may result in damage to the booster.



050868753

Fig. 58: Stop Lamp Switch, Connector & Nuts
Courtesy of CHRYSLER GROUP, LLC

4. Install the two remaining nuts (1, 4) attaching the brake pedal sled to the dash panel and tighten to the proper specifications. Refer to **SPECIFICATIONS** .



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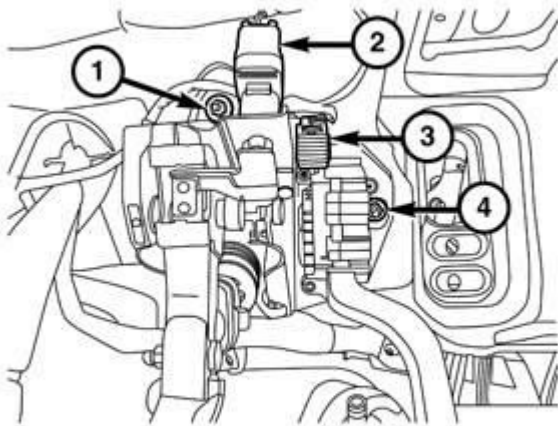
Fig. 59: Retainer & Clips
Courtesy of CHRYSLER GROUP, LLC

NOTE: The brake pedal booster rod keeper (2) cannot be reused. Always install a new keeper if the brake pedal push rod was separated from the keeper.

5. Install the power brake booster push rod and retainer (2) into a NEW booster rod keeper, ensuring that the clips (1) are engaged.

NOTE: Make sure the cup that the booster push rod reacts against is still in place in the pedal before installing the new booster rod keeper.

Connect the clutch safety switch electrical connector and engage clutch rod to clutch pedal, if equipped. Refer to **PEDAL AND PAD, CLUTCH, INSTALLATION** .



050868753

Fig. 60: Stop Lamp Switch, Connector & Nuts
Courtesy of CHRYSLER GROUP, LLC

6. Install and adjust the stop lamp switch (2) in the brake pedal bracket. Refer to **SWITCH, STOP LAMP, INSTALLATION** .
7. Connect accelerator pedal electrical connector (3).

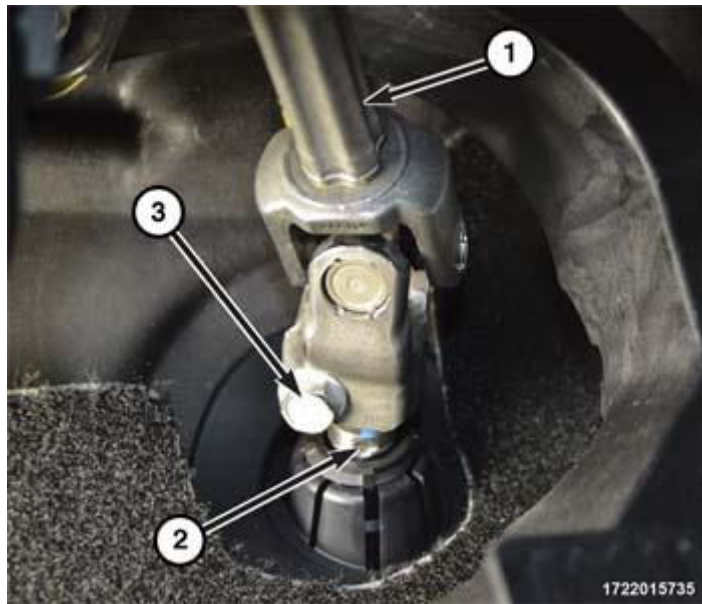


Fig. 61: Identifying Intermediate Shaft, Pinch Bolt And Steering Gear Pinion Shaft
Courtesy of CHRYSLER GROUP, LLC

NOTE: A new pinch bolt (3) must be installed every time the pinch bolt is removed.

8. Verify the front wheels of vehicle are in the STRAIGHT-AHEAD position.
9. Install the intermediate shaft (1) onto the steering gear pinion shaft (2).
10. Install a **NEW** pinch bolt (3) and tighten to specifications. Refer to **COLUMN, SPECIFICATIONS** .
11. If equipped, install the silencer pad below the instrument panel.
12. Connect the battery negative cable to its post on the battery.
13. Check the stop lamps to verify they are operating properly and not staying on when the pedal is in the released position.
14. Road test the vehicle to ensure proper operation of the brakes.

RESERVOIR, BRAKE MASTER CYLINDER

REMOVAL

REMOVAL

1. Remove the brake master cylinder and brake master cylinder reservoir assembly. Refer to **MASTER CYLINDER, BRAKE, REMOVAL**.

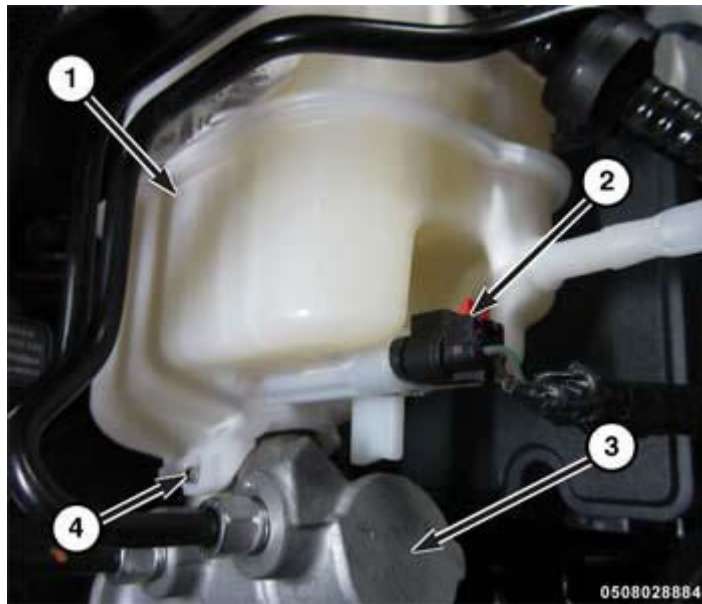


Fig. 62: Identifying Brake Master Cylinder Fluid Reservoir Components
Courtesy of CHRYSLER GROUP, LLC

2. Thoroughly clean all surfaces of brake fluid reservoir (1) and master cylinder (3). Use only Mopar® Brake Parts Cleaner or equivalent.

CAUTION: When removing fluid reservoir from the master cylinder, do not pry off using any type of tool. This can damage the fluid reservoir or master cylinder housing.

3. Using the appropriate tool, remove the roll pin (4) retaining the brake master cylinder reservoir (1) to the brake master cylinder (3).
4. Rock the brake fluid reservoir (1) side-to-side while pulling up to remove it from the seal grommets in master cylinder housing (3).

INSTALLATION

INSTALLATION

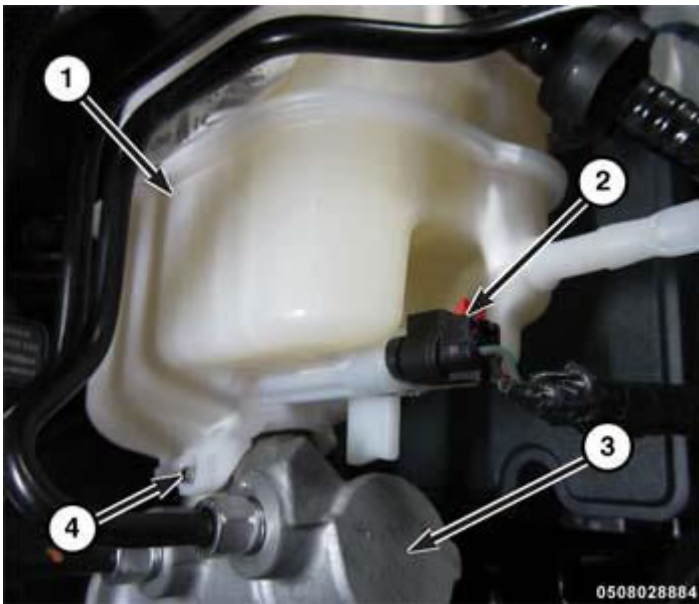


Fig. 63: Identifying Brake Master Cylinder Fluid Reservoir Components
Courtesy of CHRYSLER GROUP, LLC

1. Install **NEW** brake master cylinder reservoir (1) sealing grommets in brake master cylinder housing (3).
2. Lubricate reservoir mounting area with fresh clean brake fluid. Place reservoir (1) in position over sealing grommets. Seat reservoir into sealing grommets using a rocking motion while firmly pressing down on fluid reservoir. Once installed, make sure fluid reservoir is touching the top of both sealing grommets or reservoir is not properly installed.
3. Using the appropriate tool, install the roll pin (4) retaining the brake master cylinder reservoir (1) to the brake master cylinder (3).
4. Install the brake master cylinder and brake master cylinder reservoir assembly. Refer to **MASTER CYLINDER, BRAKE, INSTALLATION**.

ROTOR, BRAKE

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - BRAKE ROTOR

Any servicing of the rotor requires extreme care to maintain the rotor within service tolerances to ensure proper brake action.

Excessive runout or wobble in a rotor can increase pedal travel due to piston knock-back. This increases guide pin sleeve wear due to the tendency of the caliper to follow the rotor wobble.

When diagnosing a brake noise or pulsation, the machined disc braking surface should be inspected.

BRAKING SURFACE INSPECTION

Light braking surface scoring and wear is acceptable. If heavy scoring or warping is evident, the rotor must be

refaced or replaced.

Excessive wear and scoring of the rotor can cause improper lining contact on the rotor's braking surface. If the ridges on the rotor are not removed before new brake shoes are installed, improper wear of the shoes will result.

If a vehicle has not been driven for a period of time, the rotor's braking surface will rust in the areas not covered by the brake shoes at that time. Once the vehicle is driven, noise and chatter from the disc brakes can result when the brakes are applied.

Some discoloration or wear of the rotor surface is normal and does not require resurfacing when linings are replaced. If cracks or burned spots are evident, the rotor must be replaced.

ROTOR MINIMUM THICKNESS

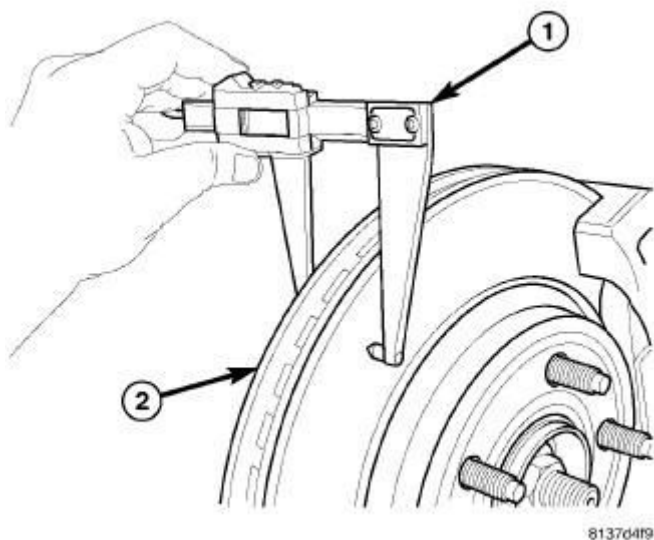


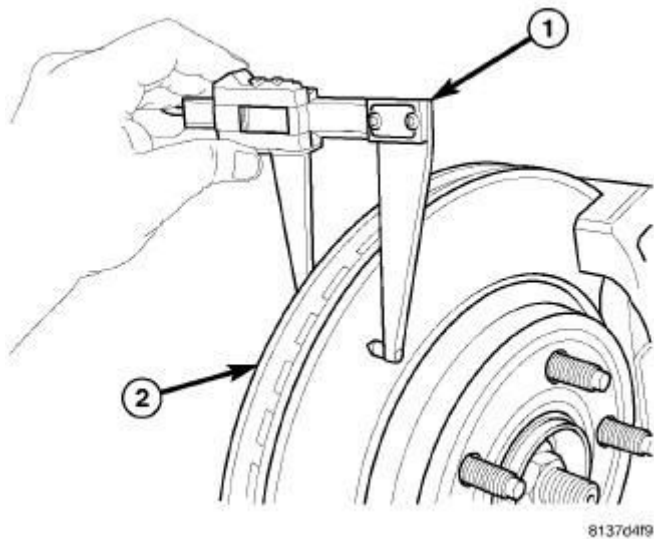
Fig. 64: Measuring Rotor Thickness
 Courtesy of CHRYSLER GROUP, LLC

Measure rotor thickness (1) at the center of the brake pad contact surface. Replace the rotor if it is worn below minimum thickness or if machining the rotor will cause its thickness to fall below specifications.

CAUTION: Do not machine the rotor if it will cause the rotor to fall below minimum thickness.

On front rotors, Minimum thickness specifications are cast on the rotor's unmachined surface on the OD of the brake plate.

On rear rotors, Minimum thickness specifications are cast into the rotor's unmachined surface on the side of the hub mounting face. This area also shows the maximum thickness specifications for the hat section of the rotor.

ROTOR THICKNESS VARIATION**Fig. 65: Measuring Rotor Thickness****Courtesy of CHRYSLER GROUP, LLC**

Thickness variation in a rotor's braking surface can result in pedal pulsation, chatter and surge. This can also be caused by excessive runout in the rotor or the hub.

Rotor thickness variation measurements should be made in conjunction with measuring runout. Measure thickness of the brake rotor (2) at 12 equal points around the rotor braking surface with a micrometer (1) at a radius approximately 25 mm (1 inch) from edge of rotor.

1. If excessive rotor thickness variation is found, reface or replace brake rotor. Refer to **ROTOR, BRAKE, STANDARD PROCEDURE**.

ROTOR RUNOUT

On-vehicle rotor runout is the combination of the individual runout of the hub face and the runout of the brake rotor (hub runout can be measured separately). To measure rotor runout on the vehicle:

1. Raise and support the vehicle.
2. Remove the tire and wheel assembly. Refer to **REMOVAL**.
3. Install wheel mounting (lug) bolts and spacers (washers) to secure rotor onto the hub assembly. Progressively tighten the (lug) bolts to specifications.
4. Mount Dial Indicator (special tool #C-3339A, Set, Dial Indicator) with Wheel (special tool #25-W, Roller Contact Point), or equivalent, to the knuckle. Position the dial indicator wheel to contact the rotor braking surface approximately 10 mm (0.39 in.) from the outer edge of the rotor.
5. Slowly rotate the brake rotor checking lateral runout, marking the low and high spots. Record these measurements.

6. Check and record the runout on the opposite side of the rotor in the same fashion, marking the low and high spots.
7. Compare runout measurement to specifications. Refer to **SPECIFICATIONS**.
8. If runout is in excess of specifications, check the lateral runout of the hub face. Before removing the rotor from the hub, place a chalk mark across both the rotor and the one wheel stud closest to where the high runout measurement was taken. This way, the original mounting spot of the rotor on the hub is indexed.
9. Remove the rotor from the hub. Refer to **ROTOR, BRAKE, REMOVAL**.

NOTE: Before measuring hub runout, clean the hub face surface with an appropriate cleaner. This provides a clean surface to get an accurate indicator reading.

10. Mount Dial Indicator (special tool #C-3339A, Set, Dial Indicator) to the knuckle. Position the dial indicator stem so it contacts the hub face near the outer diameter. Care must be taken to position the stem outside of the stud circle, but inside of the chamfer on the hub rim.
11. Slowly rotate the hub measuring runout. Hub runout should not exceed 0.040 mm (0.0016 inch). If runout exceeds this specification, the hub must be replaced. Refer to **HUB AND BEARING, REMOVAL** and **KNUCKLE, STEERING, REMOVAL**.
12. If hub runout does not exceed this specification, install the original rotor back on the hub, aligning the chalk mark on the rotor with a wheel mounting stud, two studs apart from the original stud.
13. Install wheel mounting (lug) bolts and spacers (washers) to secure rotor onto the hub assembly. Progressively tighten the (lug) bolts to specifications.
14. Mount the Dial Indicator (special tool #C-3339A, Set, Dial Indicator) (1) and remeasure runout on both sides of the brake rotor as explained in earlier steps to see if runout is now within specifications.
15. If runout is still not within specifications, reface or replace brake rotor. Refer to **ROTOR, BRAKE, STANDARD PROCEDURE**.

STANDARD PROCEDURE

STANDARD PROCEDURE - BRAKE ROTOR MACHINING

NOTE: Refacing the rotor is not required each time the brake pads are replaced, only when the need is foreseen.

Any servicing of the rotor requires extreme care to maintain the rotor within service tolerances to ensure proper brake action.

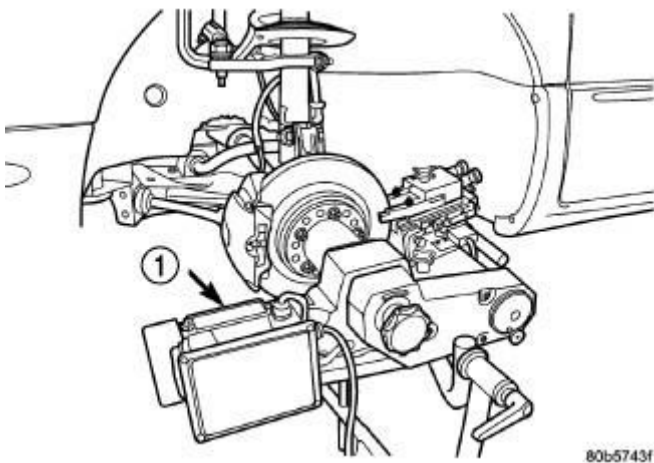


Fig. 66: On-Car Brake Lathe
Courtesy of CHRYSLER GROUP, LLC

1 - ON-CAR BRAKE LATHE

If the rotor surface is deeply scored or warped, or there is a complaint of brake roughness or brake pedal pulsation, the rotor should be refaced using a hub-mounted on-car brake lathe (1), or replaced.

The use of a hub-mounted on-car brake lathe (1) is highly recommended to eliminate the possibility of excessive runout. It trues the brake rotor to the vehicle's hub and bearing.

NOTE: All brake rotors have markings for minimum allowable thickness cast on an unmachined surface of the rotor or stamped into the hat section. On this vehicle, the minimum thickness specification for the front brake rotor is located on the OD of the brake plate. The minimum thickness specification for the rear brake rotor is located on the side of the hub mounting face.

Minimum allowable thickness is the minimum thickness which the brake rotor machined surface may be cut to.

CAUTION: Do not machine the rotor if it will cause the rotor to fall below minimum thickness.

Before lathe installation, verify the brake rotor face and the hub adapters are free of any chips, rust, or contamination.

When mounting and using the brake lathe, strict attention to the brake lathe manufacturer's operating instructions is required.

Machine both sides of the brake rotor at the same time. Cutting both sides at the same time minimizes the possibility of a tapered or uneven cut.

When refacing a rotor, the required TIR (Total Indicator Reading) and thickness variation limits MUST BE _____

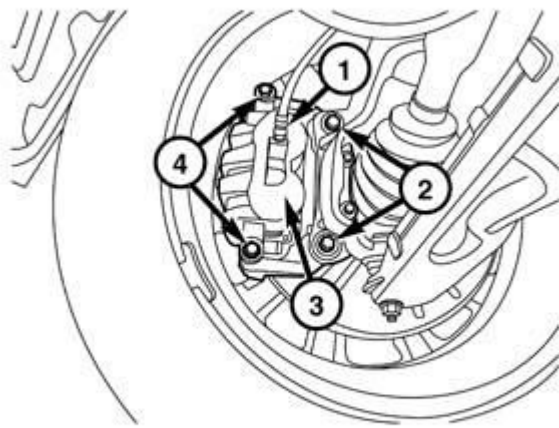
MAINTAINED. Extreme care in the operation of rotor turning equipment is required.

REMOVAL

FRONT BRAKE ROTOR

NOTE: Before proceeding, refer to **CAUTION** and **WARNING**.

1. Raise and support the vehicle, refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove the wheel mounting bolts, then the tire and wheel assembly.



1715005815

Fig. 67: Identifying Brake Hose Connector And Pin Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Remove the two brake caliper adapter bolts (2).

NOTE: The bolts are one time use and need to be discarded.

4. Remove the disc brake caliper and adapter as an assembly and hang it out of the way using wire or a bungee cord. Use care not to overextend the brake hose when doing this.
5. Remove the rotor retaining bolt and remove the rotor from the hub and bearing.

REAR BRAKE ROTOR

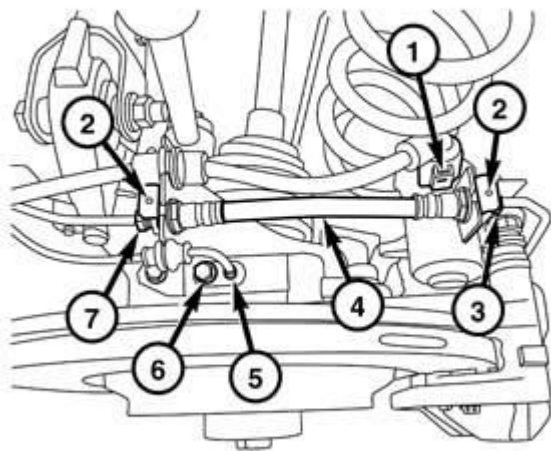
NOTE: Before proceeding, refer to **CAUTION** and **WARNING**.

The electronic parking brake actuator (EPB) must be retracted prior to removing the brake caliper assembly. This can be done in two ways:

- A diagnostic scan tool (Service Mode position)
- Through Uconnect

CAUTION: If the electric park brake (EPB) switch is actuated with the caliper removed from the caliper bracket and still connected electrically, the EPB motor will fully extend causing damage to the caliper piston. Disconnect and isolate the negative battery cable before servicing any EPB component.

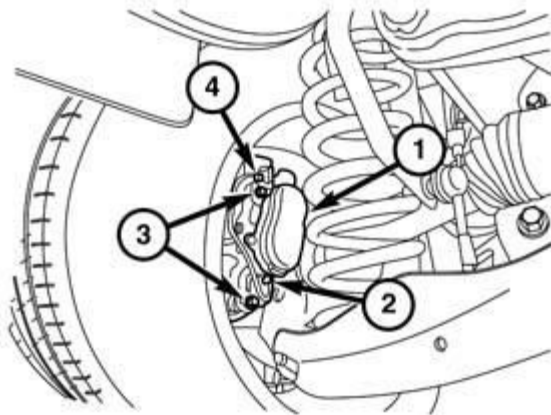
1. Disconnect and isolate the negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Remove the wheel mounting bolts, then the tire and wheel assembly.



1715005817

Fig. 68: Identifying Brake Line Bracket, Brake Line, Flex Hose And Wheel Speed Sensor
 Courtesy of CHRYSLER GROUP, LLC

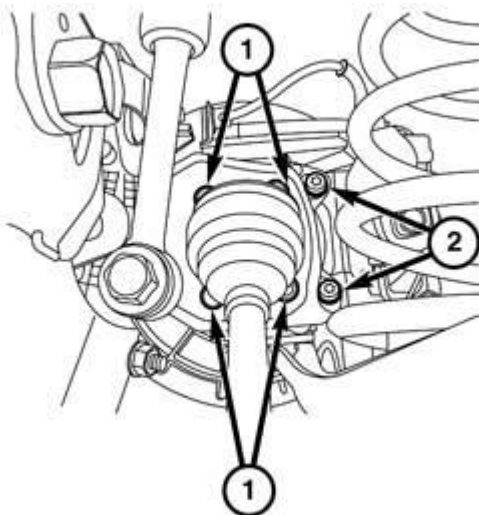
4. Remove the nut and brake line bracket (2).



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Fig. 69: Removing/Installing Guide Pin Bolts
Courtesy of CHRYSLER GROUP, LLC

5. While holding the hex fitting on the caliper slides, remove caliper guide pin bolts (3).

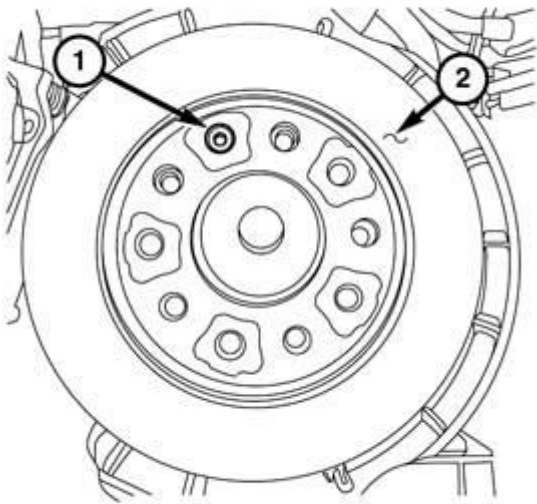


1715005821

Fig. 70: Removing Caliper Bracket Mounting Bolts And Mounting Bracket
Courtesy of CHRYSLER GROUP, LLC

6. Remove caliper from mounting bracket and support with a bungee cord or wire. Do not let it hang from the brake hose.
7. Remove caliper bracket mounting bolts (2) and remove caliper mounting bracket.

NOTE: **The bolts are one time use and need to be discarded.**



050870142

Fig. 71: Rotor & Retaining Bolt
Courtesy of CHRYSLER GROUP, LLC

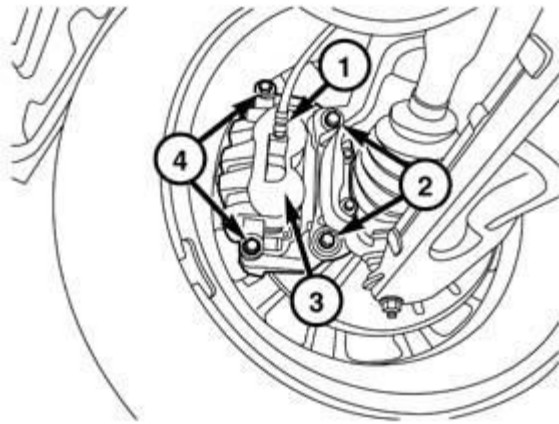
8. Remove retaining bolt (1) and slide brake rotor (2) off the hub and bearing.

INSTALLATION

FRONT BRAKE ROTOR

NOTE: **Inspect disc brake pads before installation. Refer to INSPECTION .**

1. Clean the hub face to remove any dirt or corrosion where the rotor mounts.
2. Install the brake rotor on the hub and bearing.
3. Install the brake rotor retaining bolt and tighten to 20 N.m (177 in. lbs.).

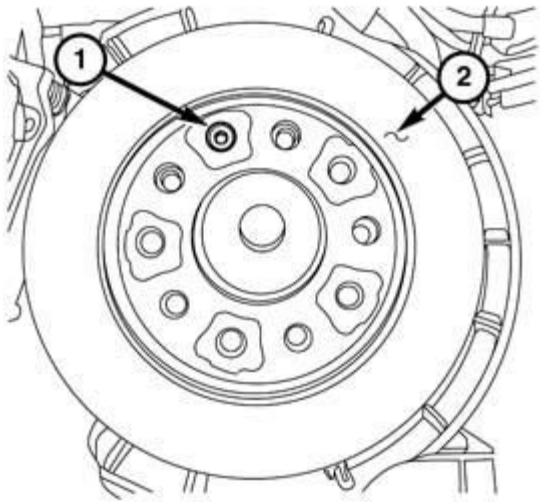


1715005815

Fig. 72: Identifying Brake Hose Connector And Pin Bolts
 Courtesy of CHRYSLER GROUP, LLC

4. Install the disc brake caliper and adapter bracket assembly over the brake rotor and knuckle.
5. Install **NEW** mounting bolts (2) securing the caliper adapter bracket to the knuckle and tighten to 175 N.m (129 ft. lbs.).
6. Install the tire and wheel assembly. Refer to **INSTALLATION** .
7. Lower the vehicle.
8. Pump the brake pedal several times before moving the vehicle to set the pads to the brake rotor.
9. Check and adjust the brake fluid level in the reservoir as necessary.
10. Road test the vehicle and make several stops to seat the brake pads to the rotor.

REAR BRAKE ROTOR



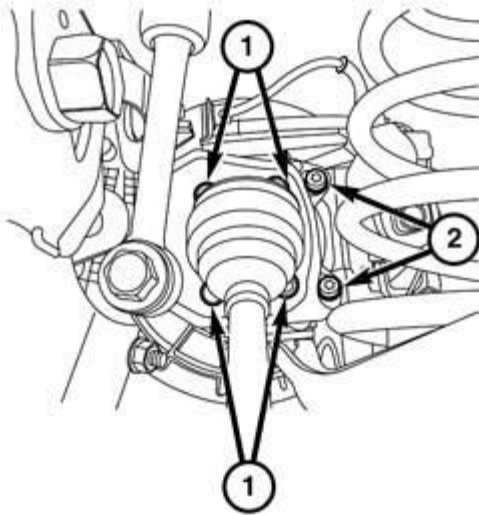
050870142

Fig. 73: Rotor & Retaining Bolt

Courtesy of CHRYSLER GROUP, LLC

NOTE: **Inspect disc brake pads before installation. Refer to INSPECTION .**

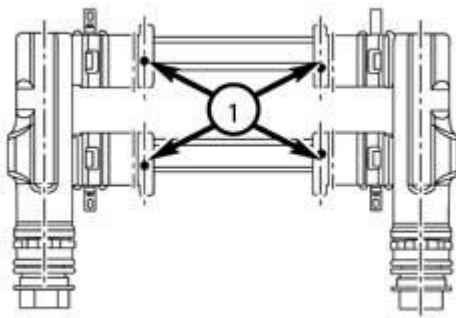
1. Clean the hub face to remove any dirt or corrosion where the rotor mounts.
2. Install the brake rotor (2) on the hub and bearing.
3. Install rotor retaining bolt (1) and tighten to 20 N.m (177 in. lbs.).



1715005821

Fig. 74: Installing Caliper Mounting Bracket And Two New Mounting Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Install caliper mounting bracket and install two **NEW** mounting bolts (2) and tighten to 120 N.m (89 ft. lbs.).



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Fig. 75: Identifying Lubricant Application Areas
Courtesy of CHRYSLER GROUP, LLC

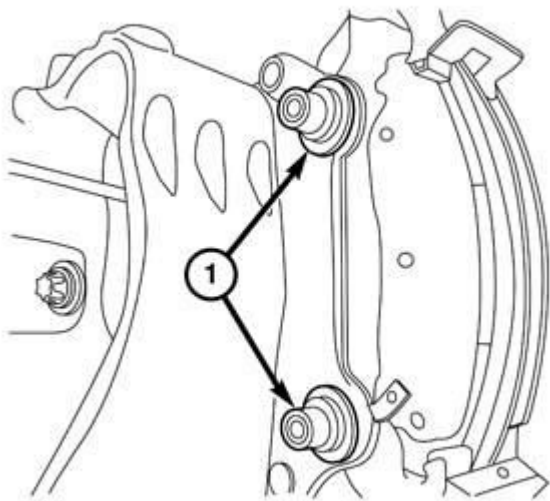
5. Before installing the brake pads, apply WOLFRACOA[®]T C (1) or equivalent lubricant to the abutment clips as shown in the illustration.

NOTE: **WOLFRACOA[®]T C or equivalent lubricant must be applied to prevent**

noise.

6. There is a small post on the lower backside of the inboard pad. Make sure that this post lines up with one of the slots on the piston to ensure the pad interfaces with the piston correctly.

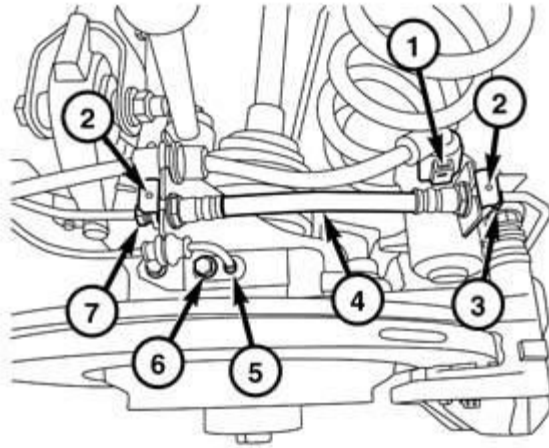
CAUTION: Use care when installing the caliper onto the adapter bracket to avoid damaging the guide pin boot.



050868487

Fig. 76: Installing The Brake Pads To The Adapter Bracket
Courtesy of CHRYSLER GROUP, LLC

7. Install the brake pads to the adapter bracket and install the caliper to the adapter bracket.
8. Install the disc brake caliper guide pin bolts (3). While holding the hex fitting on the caliper slides, tighten the guide pin bolts (1) to 43 N.m (32 ft. lbs.).



1715005817

Fig. 77: Identifying Brake Line Bracket, Brake Line, Flex Hose And Wheel Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

9. Install the brake line bracket and nut (2).
10. Install tire and wheel assembly. Refer to **INSTALLATION**.
11. Lower the vehicle.
12. Pump the brake pedal several times before moving the vehicle to set the pads to the brake rotor.
13. Check and adjust the brake fluid level in the reservoir as necessary.
14. Exit the Service Mode prior to road testing the vehicle. This can be done in two ways:
 - Exit the Service Mode with diagnostic scan tool.
 - While depressing the brake pedal, press the EPB switch.
15. Road test the vehicle and make several stops to seat the brake pads to the rotor.

PARKING BRAKE

DESCRIPTION

DESCRIPTION

The electric park brakes consist of the following components:

- Electric park brake switch and indicator
- Electric park brake control module
- Two electromechanical motor gear units attached to conventional sliding calipers

- Communication to other modules allowing seamless operation of the electric parking brake

The electromechanical motor gear units attach directly to the rear brake calipers and provide clamp load through the caliper transferred to the brake rotor.

The motors are controlled by a bi-directional 12-volt feed and ground through the electric brake control module.

The module does not maintain voltage to the motors to keep the parking brake applied. Once engaged, the parking brake remains engaged even if the motors are disconnected.

For information on Service Mode and normal operating conditions. Refer to **MODULE, ELECTRIC PARK BRAKE, OPERATION**.

CAUTION: If the electric park brake (EPB) switch is actuated with the caliper removed from the caliper bracket and still connected electrically, the EPB motor will fully extend causing damage to the caliper piston. Disconnect and isolate the negative battery cable before servicing any EPB component.

SWITCH, ELECTRIC PARK BRAKE

DESCRIPTION

DESCRIPTION

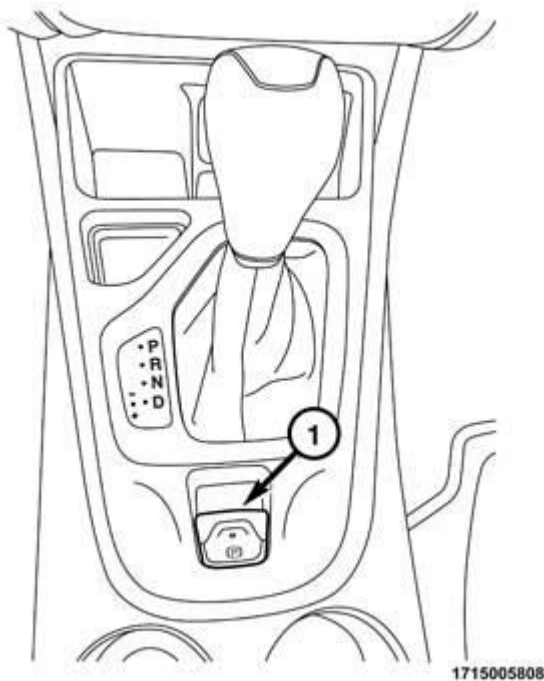


Fig. 78: Identifying Electric Park Brake (EPB) Switch
Courtesy of CHRYSLER GROUP, LLC

All vehicles are equipped with a center-mounted, electric park brake (EPB) switch mounted between the front seats.

The EPB switch is a three-position switch that can be pulled up to apply or pressed down to release. The switch communicates with the EPB module through hard-wired circuits. The switch housing also includes an indicator to let the driver know when the parking brake is applied. If the vehicle is turned off, the indicator will extinguish after ten seconds.

CAUTION: If the electric park brake (EPB) switch is actuated with the caliper removed from the caliper bracket and still connected electrically, the EPB motor will fully extend causing damage to the caliper piston. Disconnect and isolate the negative battery cable before servicing any EPB component.

OPERATION

OPERATION

The EPB switch sends an on/off request signal to the EPB module to apply or release the EPB.

At any time, the EPB switch can be actuated. Depending on the speed of the vehicle when the EPB switch is actuated, the EPB module will output different commands to request the EPB to apply under the following conditions:

Static Apply (under 5 kph) - Retracts the EPB motors attached to the rear calipers to release the rear brakes.

Dynamic Apply (over 5 kph) - Actuates the hydraulic braking system.



0507012520

Fig. 79: Identifying Brake Warning And EPB Fault Lamp
Courtesy of CHRYSLER GROUP, LLC

There are two indicators in the instrument cluster to give feedback for the electric parking brake system. The

traditional red BRAKE warning lamp is illuminated when the EPB is applied. If there is a fault in the EPB system, an amber EPB fault lamp is illuminated.

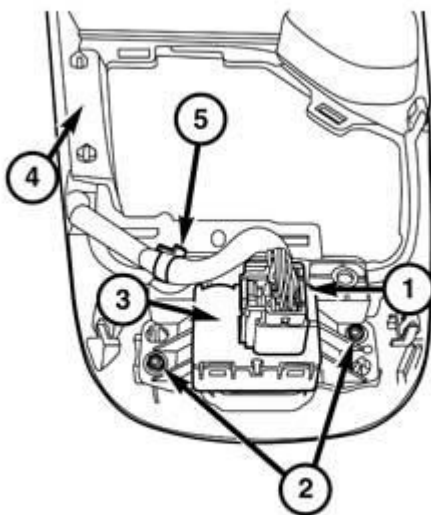
NOTE: To remove the vehicle from Service Mode, press the EPB switch while also depressing the brake pedal.

For information on Service Mode and normal operating conditions. Refer to MODULE, ELECTRIC PARK BRAKE, OPERATION .

CAUTION: If the electric park brake (EPB) switch is actuated with the caliper removed from the caliper bracket and still connected electrically, the EPB motor will fully extend causing damage to the caliper piston. Disconnect and isolate the negative battery cable before servicing any EPB component.

REMOVAL

REMOVAL



0508007143

Fig. 80: Identifying Electric Park Brake (EPB) Switch, Shift Bezel And Screws

Courtesy of CHRYSLER GROUP, LLC

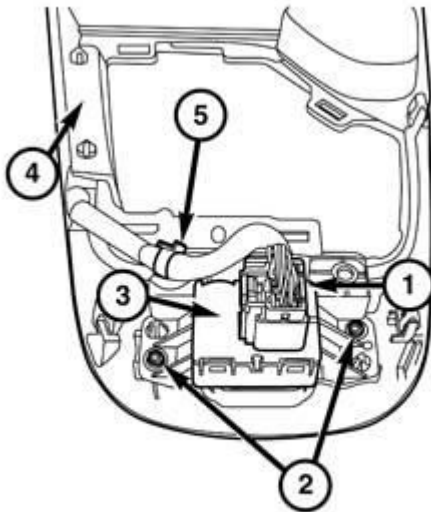
CAUTION: If the electric park brake (EPB) switch is actuated with the caliper removed from the caliper bracket and still connected electrically, the EPB motor will fully extend causing damage to the caliper piston. Disconnect and isolate the negative battery cable before servicing any EPB component.

NOTE: If the EPB switch is removed while power is still applied to the vehicle, it will set a General Switch Fault (DTC) in the EPB module. The EPB switch is monitored by the EPB module to confirm it's availability at all times.

1. Disconnect negative (ground) cable from the battery and isolate it.
2. Remove the shift bezel (4). Refer to **BEZEL, SHIFTER, REMOVAL**.
3. Disconnect the electrical connector (1) from the EPB switch (3).
4. Remove the screws (2) from the EPB switch.

INSTALLATION

INSTALLATION



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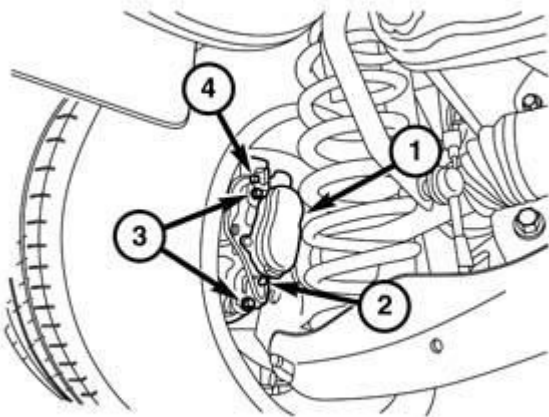
Fig. 81: Identifying Electric Park Brake (EPB) Switch, Shift Bezel And Screws
Courtesy of CHRYSLER GROUP, LLC

1. Install the EPB switch (3) to the shift bezel (4).
2. Install the screws (2) securing the EPB switch (3) to the shift bezel (4).
3. Connect the electrical connector (1).
4. Install the shift bezel. Refer to **BEZEL, SHIFTER, INSTALLATION**.
5. Connect negative (ground) cable to the battery.

ACTUATOR, ELECTRIC PARK BRAKE

DESCRIPTION

DESCRIPTION



1715005819

Fig. 82: Identifying Guide Pin Bolts
Courtesy of CHRYSLER GROUP, LLC

CAUTION: If the electric park brake (EPB) switch is actuated with the caliper removed from the caliper bracket and still connected electrically, the EPB motor will fully extend causing damage to the caliper piston. Disconnect and isolate the negative battery cable before servicing any EPB component.

The electromechanical motor gear units (1) attach directly to the conventional hydraulic rear brake calipers with two fasteners and provide clamp load through the caliper transferred to the brake rotor.

NOTE: If the electric park brake actuator is found to be defective or needs to be replaced, it can only be replaced as an assembly. There are no serviceable parts inside and is non-repairable.

OPERATION

OPERATION

CAUTION: If the electric park brake (EPB) switch is actuated with the caliper removed from the caliper bracket and still connected electrically, the EPB motor will fully extend causing damage to the caliper piston. Disconnect and isolate the negative battery cable before servicing any EPB component.

The electric park brake (EPB) actuator is driven by the EPB module. It is a bi-directional motor that receives 12

volt power and ground through the EPB module to apply or release clamp load to the brake rotor. Once applied, it does not need voltage to maintain clamp load.

For information on Service Mode and normal operating conditions. Refer to **MODULE, ELECTRIC PARK BRAKE, OPERATION** .

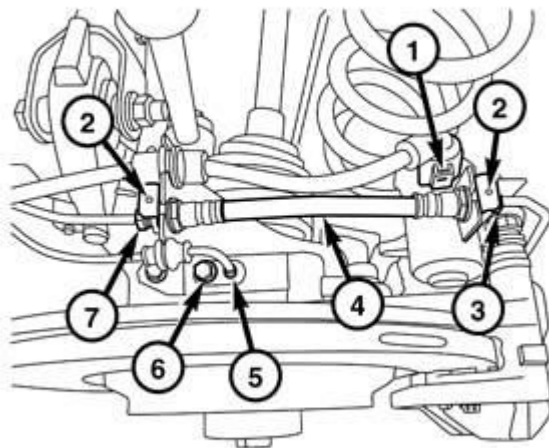
REMOVAL

REMOVAL

NOTE: Release the electric park brake (EPB) before proceeding.

CAUTION: If the electric park brake (EPB) switch is actuated with the caliper removed from the caliper bracket and still connected electrically, the EPB motor will fully extend causing damage to the caliper piston. Disconnect and isolate the negative battery cable before servicing any EPB component.

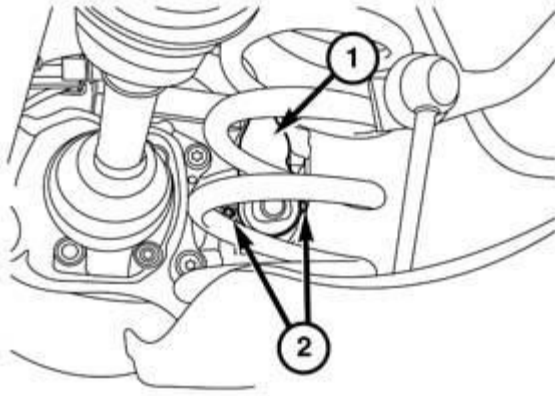
1. Disconnect and isolate battery negative cable from battery post.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .



1715005817

Fig. 83: Identifying Brake Line Bracket, Brake Line, Flex Hose And Wheel Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect electrical connector (1) at the electric park brake actuator (EPB).



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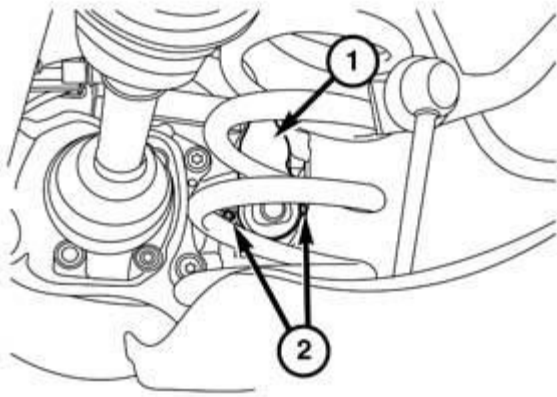
Fig. 84: Identifying EPB Actuator
Courtesy of CHRYSLER GROUP, LLC

4. Remove the two bolts (2) attaching the EPB actuator (1) from the brake caliper.

INSTALLATION

INSTALLATION

NOTE: Using an appropriate lubricant, lightly lubricate the O-ring on the body of the new EPB actuator before installing it.

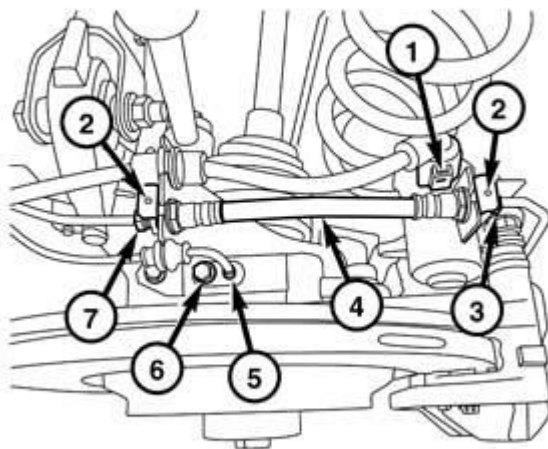


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Fig. 85: Identifying EPB Actuator

Courtesy of CHRYSLER GROUP, LLC

1. Position the electric park brake (EPB) actuator (1) to the brake caliper and install the two bolts (2). Tighten the bolts to 12 N.m (106 in. lbs.).



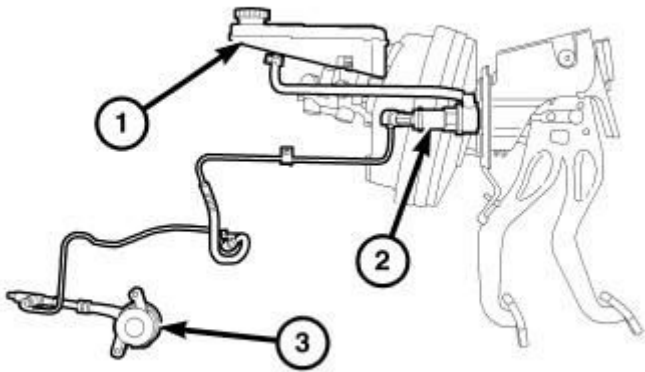
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Fig. 86: Identifying Brake Line Bracket, Brake Line, Flex Hose And Wheel Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

2014 Jeep Cherokee Trailhawk

2014 BRAKES Base - Service Information - Cherokee

2. Connect the electrical connector (1) to the EPB actuator.
3. Lower the vehicle.
4. Connect negative (ground) cable to the battery.
5. Using the EPB switch, release the EPB, followed by an EPB apply and then another EPB release. Only in that order, even if the EPB is already in the released state. This will make sure the new actuator is working, recognized by the EPB module and there is correlation between the left and right sides.

2014 CLUTCH**Clutch System - Cherokee****DESCRIPTION****DESCRIPTION**

8114a710

Fig. 1: Clutch Hydraulic System - Typical
Courtesy of CHRYSLER GROUP, LLC

The typical clutch hydraulic system consists of a clutch master cylinder (2), slave cylinder (3), and an interconnecting hydraulic line. Clutch hydraulic fluid is supplied by the brake system via the brake master cylinder reservoir (1).

FLUID

CAUTION: Never use any type of petroleum-based fluid (engine oil, transmission oil, power steering fluid, etc.) in the clutch hydraulic system. Use of such fluids will result in master/slave cylinder seal damage, and cause a failure of the hydraulic clutch release system.

NOTE: Under normal operating conditions, the clutch hydraulic system does not require additional fluid for the life of the vehicle. Since the clutch shares the brake reservoir, the fluid level will be maintained whenever the brake system is checked.

The fluid required for use in the clutch hydraulic system is brake fluid conforming to DOT 3 specifications and J1703 standards. No other type of fluid is recommended or approved for use in the clutch hydraulic system. Use only MOPAR® brake fluid or equivalent from a tightly sealed container.

OPERATION

OPERATION

The clutch hydraulic system is responsible for engaging and disengaging the clutch. Depressing the clutch pedal develops hydraulic pressure in the clutch master cylinder. Hydraulic pressure is transmitted to the release bearing that is in contact with the pressure plate diaphragm spring. As hydraulic force is applied the bearing depresses the diaphragm spring inward on the fulcrums that pushes the pressure plate rearward releasing clamping force on the clutch disc.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - CLUTCH SYSTEM

Clutch problem diagnosis will generally require a road test to determine the type of fault. Component inspection will then determine the problem after road testing.

Drive the vehicle at normal speeds during road test. Shift the transaxle through all gear ranges and observe clutch action. If chatter, grab, slip, or improper release is experienced, remove and inspect the clutch components. If the problem is noise or hard shifting, further diagnosis may be needed. The transaxle or other driveline components may actually be at fault.

CLUTCH GRAB/CHATTER

CONDITION	POSSIBLE CAUSES	CORRECTION
CLUTCH DISC FACING COVERED WITH OIL OR GREASE	Oil leak at engine rear main or transaxle input shaft seal.	Correct leak and replace modular clutch assembly.
	Too much grease applied to splines of disc and input shaft.	Apply lighter coating of grease to splines.
NO FAULT FOUND WITH CLUTCH COMPONENTS	Problem actually related to suspension or driveline component.	Further diagnosis required. Check engine/transmission mounts, suspension attaching parts and other driveline components as needed.
	Engine	Check EFI and

2014 Jeep Cherokee Trailhawk

2014 CLUTCH Clutch System - Cherokee

	related problems.	ignition systems.
PARTIAL ENGAGEMENT OF CLUTCH DISC	Clutch cover, spring, or release fingers bent, distorted (rough handling, improper assembly).	Replace clutch assembly.
	Clutch disc damaged or distorted.	Replace clutch assembly.
	Clutch Misalignment	Check clutch housing to engine dowels and dowel holes for damage. Correct as necessary.

CLUTCH SLIPS

CONDITION	POSSIBLE CAUSES	CORRECTION
DISC FACING WORN OUT	Normal wear.	Replace clutch assembly.
	Driver frequently rides (slips) clutch, results in rapid wear, overheating.	Replace clutch assembly.
	Insufficient clutch cover diaphragm spring tension	Replace clutch assembly.
CLUTCH DISC FACING CONTAMINATED WITH OIL OR GREASE	Leak at rear main oil seal or transaxle input shaft seal	Replace leaking seals. Replace clutch assembly.
	Excessive amount of	Apply less grease to input

2014 Jeep Cherokee Trailhawk

2014 CLUTCH Clutch System - Cherokee

	grease applied to input shaft splines	shaft. Replace clutch assembly. -
	Road splash, water entering housing	Seal housing. Inspect clutch assembly.
	Concentric Slave Cylinder leaking hydraulic fluid	Replace Concentric Slave Cylinder (CSC)
CLUTCH IS RUNNING PARTIALLY DISENGAGED	Release bearing sticking or binding, does not return to normal running position.	Verify that bearing is actually binding. Then, replace bearing and transmission front bearing retainer if sleeve surface is damaged.
	Concentric Slave cylinder (CSC) binding	Replace Concentric Slave cylinder (CSC)
CLUTCH DISC FACINGS HAVE FRACTURED INTO SMALL PIECES	Driver performs a 5-1 downshift at vehicle speed in excess of 60 miles per hour	Alert driver to problem cause. Replace clutch assembly. Inspect slave cylinder and bearing for damage.
	Leak at rear main or transaxle input shaft seal	Replace seal. Replace clutch assembly. -
	Excessive heat from	Replace Clutch Assembly

2014 Jeep Cherokee Trailhawk**2014 CLUTCH Clutch System - Cherokee**

slippage

IMPROPER CLUTCH RELEASE

CONDITION	POSSIBLE CAUSES	CORRECTION
CLUTCH DISC BINDS ON INPUT SHAFT SPLINES	Clutch disc hub splines damaged during installation	Clean, smooth, and lubricate disc and shaft splines. Replace modular clutch assembly, or clutch disc, and/or input shaft if splines are severely damaged.
	Input shaft splines rough, damaged.	Clean input shaft splines. Then lube.
	Corrosion or rust formations on splines of input shaft and disc	Clean input shaft splines and disc splines, then lube
CLUTCH DISC RUSTED TO FLYWHEEL AND/OR PRESSURE PLATE	Occurs in vehicles stored or not driven for extended period of time. Also occurs after steam cleaning if vehicle is not used for extended period.	Replace clutch assembly.
CLUTCH WILL NOT DISENGAGE PROPERLY	Disc bent, distorted during transaxle	Replace clutch assembly.

2014 Jeep Cherokee Trailhawk**2014 CLUTCH Clutch System - Cherokee**

	installation	
	Clutch cover diaphragm spring damaged during transaxle installation	Replace clutch assembly.
	Air in clutch hydraulic system.	Bleed clutch hydraulic system to purge air.
	Clutch master cylinder or slave cylinder leaking	Check and replace master and/or slave cylinder

CLUTCH PEDAL NOISE

CONDITION	POSSIBLE CAUSES	CORRECTION
CLUTCH PEDAL SQUEAKS WHEN DEPRESSED TO FLOOR	Pedal bushings worn out or inadequate lubrication	Replace the Pedal assembly
	Push rod ball joint worn out	Lubricate or replace the push rod
	Clutch pedal return spring worn out	Replace the Pedal assembly

DIAGNOSIS AND TESTING - CLUTCH CHATTER COMPLAINTS

For all clutch chatter complaints, perform the following:

1. Check for loose, misaligned, or broken engine and transmission mounts. If present, they should be corrected at this time. Test vehicle for chatter. If chatter is gone, there is no need to go any further.
2. If chatter persists, check hydraulic clutch release system is functioning properly.
3. Check for loose connections in drivetrain. Correct any problems and determine if clutch chatter complaints have been satisfied. If not:

- a. Remove transaxle.
- b. Check to see if the release bearing is sticky or binding. Replace bearing, if needed.
- c. Check clutch assembly for contamination (dirt, oil). Replace clutch assembly, if required.
- d. Check to see if the clutch disc hub splines are damaged. Replace with new clutch assembly, if necessary.
- e. Check input shaft splines for damage. Replace, if necessary.
- f. Check for uneven wear on clutch fingers.
- g. Check for broken clutch cover diaphragm spring fingers. Replace with new clutch assembly, if necessary.

DIAGNOSIS AND TESTING - CLASH-INTO-REVERSE

Manual transaxles are equipped with a reverse synchronizer that reduces gear train spin down time after the clutch pedal is depressed. It prevents gear clash while shifting into reverse, when the vehicle is not moving.

1. Depress clutch pedal to floor and hold. After three seconds, shift to reverse. If clash is present, clutch has excessive spin time, and the reverse brake may not be functioning.
2. Remove transaxle.
3. Check the input shaft spline, clutch disc splines, and release bearing for dry rust. If present, clean rust off and apply a light coat of bearing grease to the input shaft splines. Apply grease on the input shaft splines only where the clutch disc slides. Verify that the clutch disc slides freely along the input shaft spline.
4. Check to see if the clutch disc hub splines are damaged, and replace with new clutch assembly if required.
5. Check the input shaft for damaged splines. Replace as necessary.
6. Check for broken clutch cover diaphragm spring fingers.
7. Install clutch assembly and transaxle.

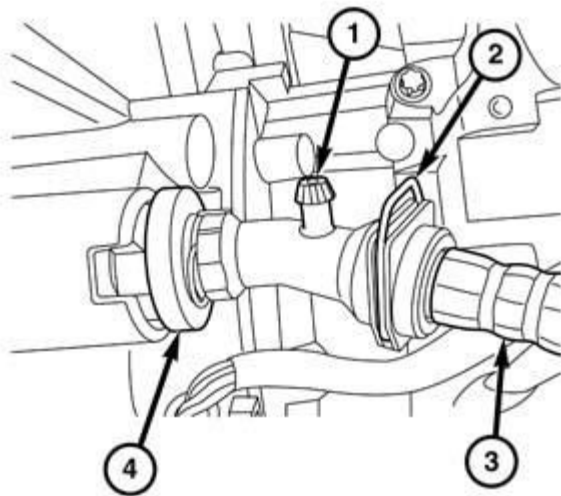
STANDARD PROCEDURE

STANDARD PROCEDURE - BLEEDING CLUTCH HYDRAULIC CIRCUIT

MANUAL BLEEDING

NOTE: **A helper is required to perform this procedure.**

1. Verify fluid level in clutch/brake cylinder. Top off with DOT 3 brake fluid as necessary. Leave cap off.
2. Raise vehicle on a suitable hoist.
3. Remove the belly pan, if equipped.



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Fig. 2: Clutch Slave Cylinder Union & Nipple
Courtesy of CHRYSLER GROUP, LLC

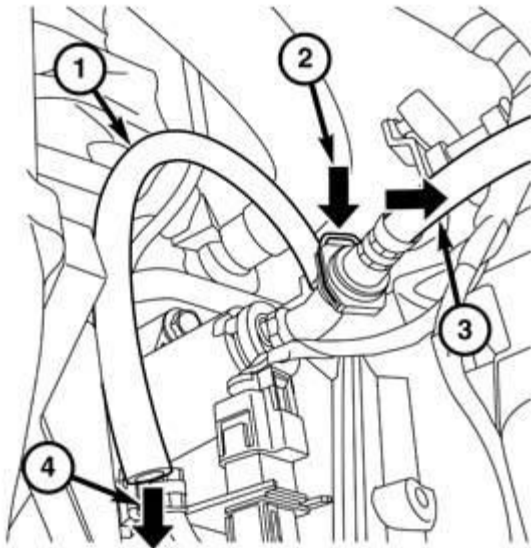
4. Remove the cap from the nipple (1) on top of the clutch slave cylinder union (4).

NOTE: Do not allow clutch/brake fluid reservoir to run dry while bleeding the clutch. If the reservoir runs dry during this procedure,

It must be refilled and the process must be repeated .

5. Have a helper depress and hold the clutch pedal to the floor.

NOTE: Verify the helper understands not release the clutch pedal from the floor until the technician closes the bleed port and signals the helper to cycle the clutch pedal to avoid inadvertently drawing air back into the system.



210273641

Fig. 3: Hydraulic Hose, Retainer Clip & Transparent Tubing
Courtesy of CHRYSLER GROUP, LLC

6. Connect a length of transparent tubing (1) to the bleeder nipple on the slave cylinder union. Insert the lower end of the transparent tube (1) into a clean container to catch the flow (4).
7. Press downward on the retainer clip (2) holding the hydraulic line to the slave cylinder union while pulling outward on the hydraulic hose (3) to open the bleeder flow (4). This allows the line to pop out about 1/8 in (3 mm) which opens the bleeder. Any air in the system will escape at this time.
8. Push the line (3) inward until the clip (2) snaps in place to stop the bleeder flow.
9. Repeat steps 5 through 8 at least fifteen times or until air bubbles are no longer visible in the transparent tube (1).
10. Slowly actuate the clutch pedal ten up/down cycles.
11. **Apply the brakes**

Start engine and verify clutch operation and pedal feel. If the clutch pedal feels fine and the transaxle can be easily shifted from neutral to any gear, the clutch is operating correctly. If pedal still feels spongy or clutch does not fully disengage, excessive air is still trapped within the system, most likely at the master cylinder.

12. Remove the transparent tube (1) from the nipple on the slave cylinder union.
13. Install the belly pan, if removed.
14. Lower the vehicle.
15. Top off brake master cylinder fluid level with DOT 3 brake fluid as necessary.

POWER BLEEDING CLUTCH HYDRAULIC CIRCUIT

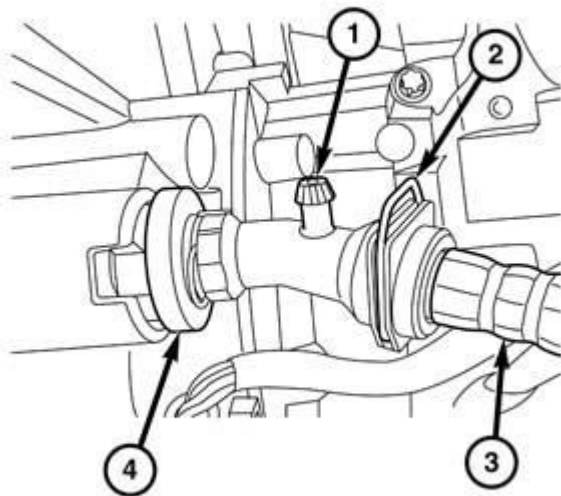
1. Remove reservoir cap and connect bleeder cap to clutch/brake fluid reservoir.

NOTE: **Use Bleeder Cap/Modified reservoir cap adapter Snap-on #901-059 or equivalent.**

2. Connect power bleeding machine to bleeder cap.

NOTE: **Use Service Filling Machine/Brake power bleeder or equivalent.**

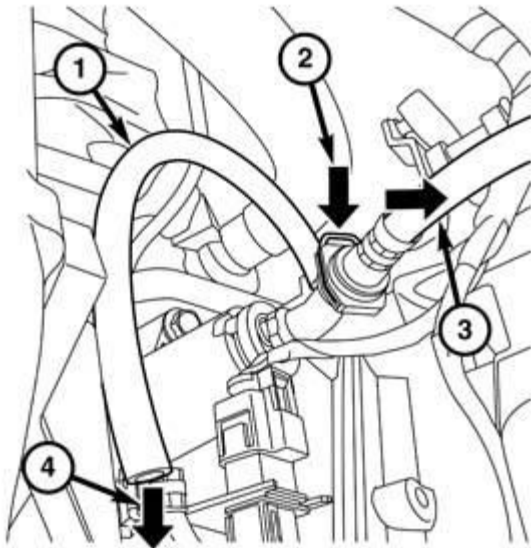
3. Service filling machine should be pressurized between 2.0 and 2.5 bar (29 - 36 PSI).
4. Raise vehicle on a suitable hoist.
5. Remove the belly pan, if equipped.



210273640

Fig. 4: Clutch Slave Cylinder Union & Nipple
Courtesy of CHRYSLER GROUP, LLC

6. Remove the dust cover from the nipple (1) on the hydraulic slave cylinder union (4).



210273641

Fig. 5: Hydraulic Hose, Retainer Clip & Transparent Tubing
Courtesy of CHRYSLER GROUP, LLC

7. Connect a length of transparent tubing (1) to the bleeder nipple. Insert the open end of the transparent tube (1) into a clean container to catch the fluid flow (4) during bleeding procedure.
8. Turn ON the power bleeding machine.

NOTE: While bleeding the system, do not allow the clutch fluid reservoir to completely to run dry. If this happens, refill the clutch fluid reservoir, and repeat the procedure.

9. Press downward on the retainer clip (2) holding the hydraulic line to the slave cylinder union while pulling outward on the hydraulic hose (3) to open the bleeder flow (4). This allows the line to pop out about 1/8 in (3 mm) which opens the bleeder. Any air in the system will escape at this time.
10. Allow fluid to flow (4) out of bleed port until no air bubbles are visible in the transparent tube (1).
11. Push the line (3) inward until the clip (2) snaps in place to stop the bleeder flow.
12. If necessary, lower the vehicle.
13. Slowly actuate the clutch pedal fifteen up/down cycles.
14. If necessary, hoist the vehicle.
15. Repeat steps 9 through 11 to verify air is NOT trapped in the system.
16. Turn OFF power bleeder machine.
17. If necessary, lower the vehicle.
18. **Apply brakes**

2014 Jeep Cherokee Trailhawk

2014 CLUTCH Clutch System - Cherokee

Start engine and verify clutch operation and pedal feel. If the clutch pedal feels fine and the transaxle can be easily shifted from neutral to any gear, the clutch is operating correctly. If pedal still feels spongy or clutch does not fully disengage, excessive air is still trapped in the system.

19. If clutch function is normal, disconnect bleeder machine and install reservoir cap.
20. If necessary, hoist the vehicle.
21. Remove the transparent tube (1) from the nipple on the slave cylinder union and install the dust cover.
22. Install the belly pan, if removed.
23. Lower the vehicle.

SPECIFICATIONS

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Pressure Plate to Flywheel Bolts	20	15	177
Flywheel to Crankshaft Bolts	110	81	-
Slave Cylinder to Transmission	10	-	88
Clutch pipe to Transmission Mounting Bolts	18	-	159

CYLINDER, CLUTCH SLAVE

REMOVAL

MANUAL

WARNING: Chrysler LLC does not manufacture any vehicles or replacement parts that contain asbestos. Aftermarket products may or may not contain asbestos. Refer to aftermarket product packaging for product information. Whether the product contains asbestos or not, dust and dirt can accumulate on manual clutch parts during normal use. Follow practices prescribed by appropriate regulations for the handling, processing and disposing of dust and debris.

NOTE: To prevent drainage of clutch master cylinder assembly upon slave cylinder removal, it is necessary to make sure brake master cylinder fluid level is full and reservoir cap is installed tight.

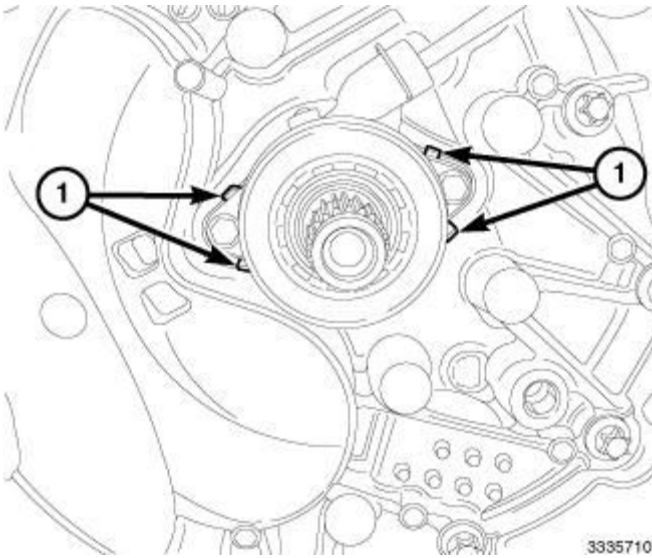


Fig. 6: Concentric Slave Cylinder Retention Tabs
Courtesy of CHRYSLER GROUP, LLC

1. Remove transmission from vehicle. Refer to **REMOVAL** .
2. Release the retention tabs from the Concentric Slave Cylinder (CSC) (1).

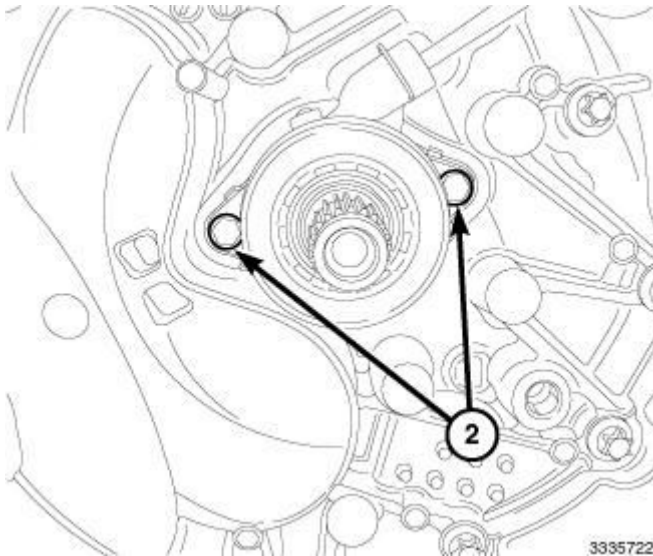


Fig. 7: CSC Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Remove the CSC bolts (2).

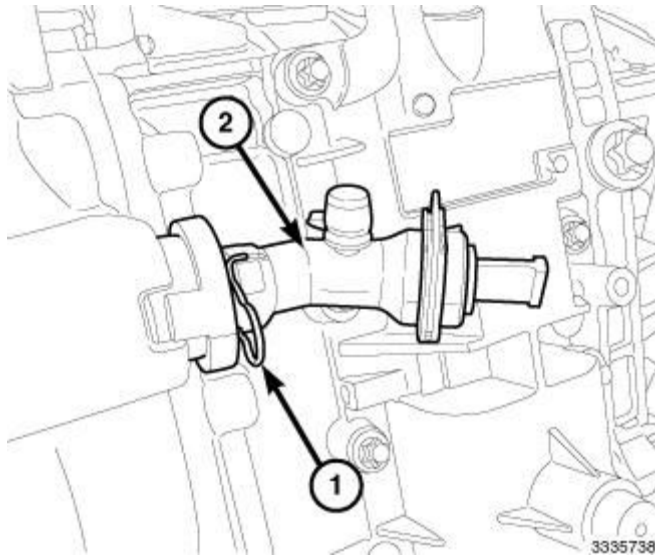


Fig. 8: Retention Clip & Connection
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the hydraulic connection at the case. Release the retention clip (1), then separate the connection (2).

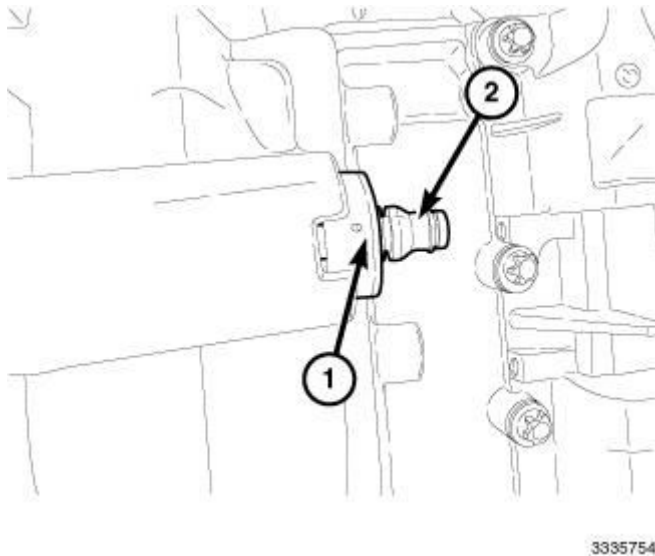


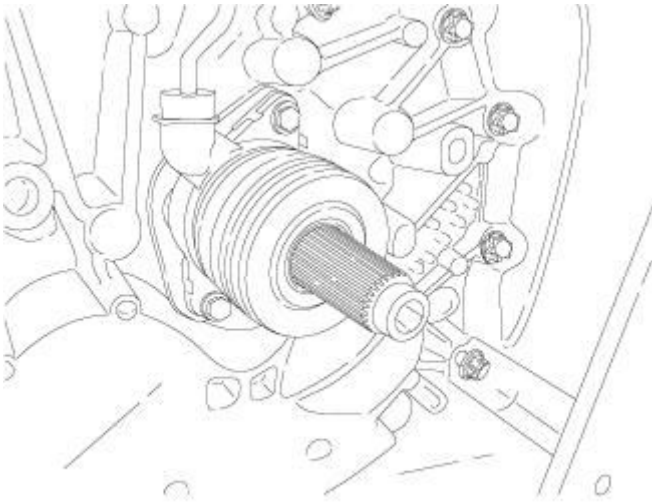
Fig. 9: Hydraulic Fitting & Plastic Retainer
Courtesy of CHRYSLER GROUP, LLC

5. Disconnect the hydraulic fitting (2) from the plastic retainer (1).
6. Remove the CSC.

INSTALLATION

MANUAL

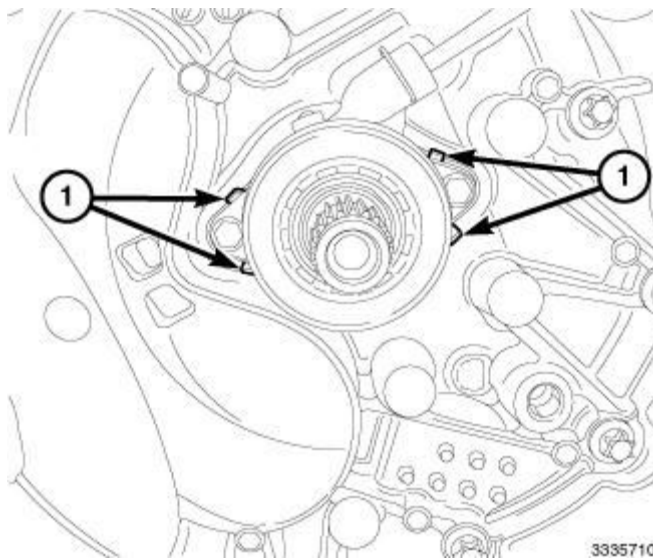
WARNING: Chrysler LLC does not manufacture any vehicles or replacement parts that contain asbestos. Aftermarket products may or may not contain asbestos. Refer to aftermarket product packaging for product information. Whether the product contains asbestos or not, dust and dirt can accumulate on manual clutch parts during normal use. Follow practices prescribed by appropriate regulations for the handling, processing and disposing of dust and debris.



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Fig. 10: Concentric Slave Cylinder (CSC) and Bolts
Courtesy of CHRYSLER GROUP, LLC

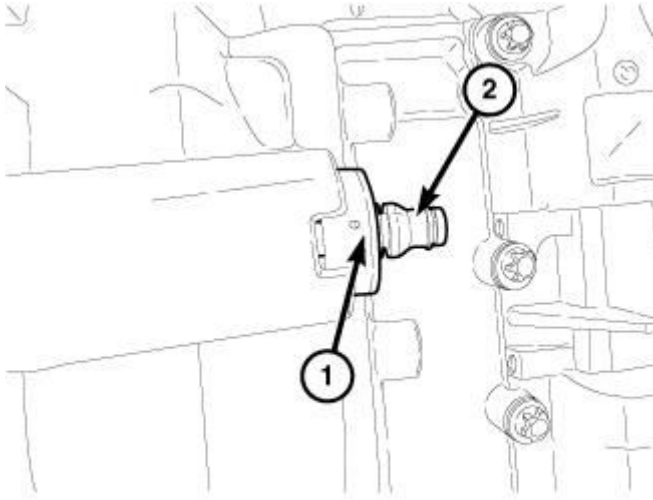
1. Install the Concentric Slave Cylinder (CSC) and bolts to the transmission. Tighten the bolts to 10 N.m (89 in. lb.).



3335710

Fig. 11: Concentric Slave Cylinder Retention Tabs
Courtesy of CHRYSLER GROUP, LLC

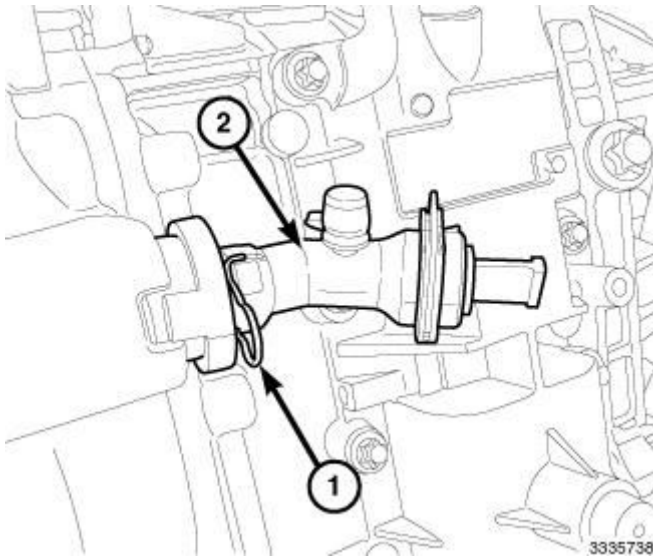
2. Engage the retention tabs to the CSC (1).



3335754

Fig. 12: Hydraulic Fitting & Plastic Retainer
Courtesy of CHRYSLER GROUP, LLC

3. Connect the hydraulic fitting (2) to the plastic retainer (1).



3335738

Fig. 13: Retention Clip & Connection
Courtesy of CHRYSLER GROUP, LLC

4. Connect the hydraulic connection at the case.
5. Install the transmission. Refer to **INSTALLATION**.
6. Bleed the hydraulic clutch system.

Refer to **STANDARD PROCEDURE**.

DISC, CLUTCH

REMOVAL

MANUAL

WARNING: Chrysler LLC does not manufacture any vehicles or replacement parts that contain asbestos. Aftermarket products may or may not contain asbestos. Refer to aftermarket product packaging for product information. Whether the product contains asbestos or not, dust and dirt can accumulate on manual clutch parts during normal use. Follow practices prescribed by appropriate regulations for the handling, processing and disposing of dust and debris.

1. Remove the transaxle. Refer to **REMOVAL**.

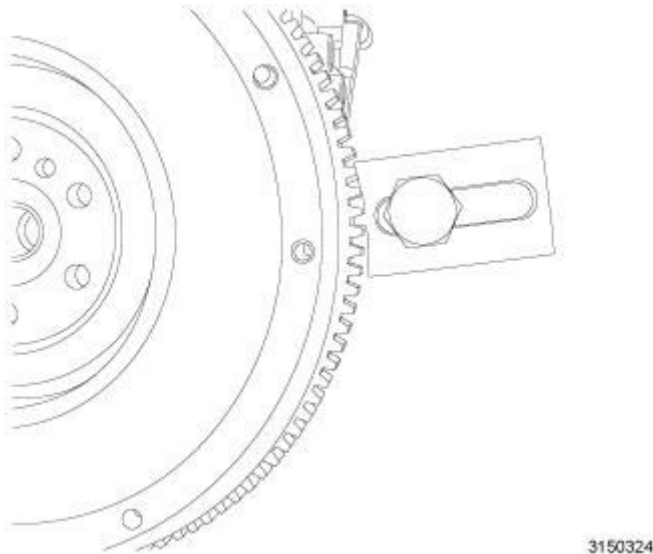


Fig. 14: Flywheel Locking Tool
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical installation of 10272 shown in illustration.

NOTE: It may be necessary to install an appropriate length 10 MM bolt, washer and nut in place of the supplied 12 MM fastener.

2. Install the (special tool #10272, Tool, Flywheel Locking).
3. Prior to removal, mark the position of the pressure plate to the flywheel with paint or scribe line for assembly reference.

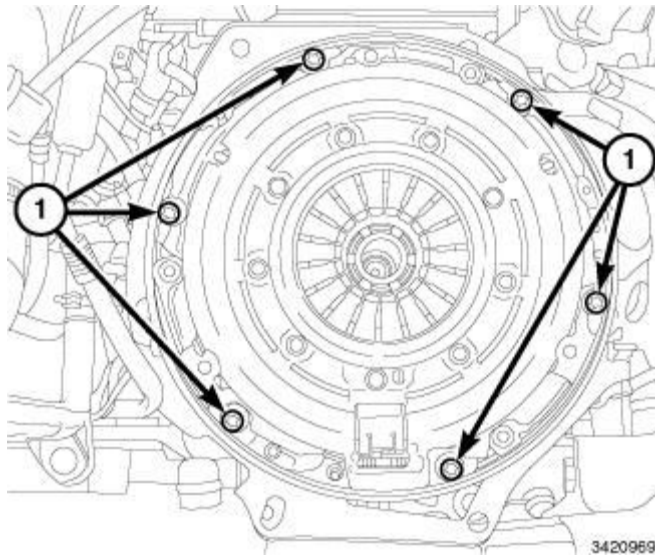


Fig. 15: Pressure Plate-To-Flywheel Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Loosen pressure plate bolts (1) evenly, a few threads at a time and in a diagonal pattern to prevent warping the plate.
5. While holding the clutch and disc against the flywheel, remove the bolts (1) holding the pressure plate to the flywheel.
6. While securely holding the disc to the clutch plate, separate the clutch from the flywheel.

INSTALLATION

MANUAL

WARNING: Chrysler LLC does not manufacture any vehicles or replacement parts that contain asbestos. Aftermarket products may or may not contain asbestos. Refer to aftermarket product packaging for product information. Whether the product contains asbestos or not, dust and dirt can accumulate on manual clutch parts during normal use. Follow practices prescribed by appropriate regulations for the handling, processing and disposing of dust and debris.

1. Inspect clutch release bearing and the Concentric Slave Cylinder (CSC) for excessive wear and replace if necessary.
2. Clean the surfaces of the flywheel and pressure plate to make certain that all oil, grease, and rust have been removed.

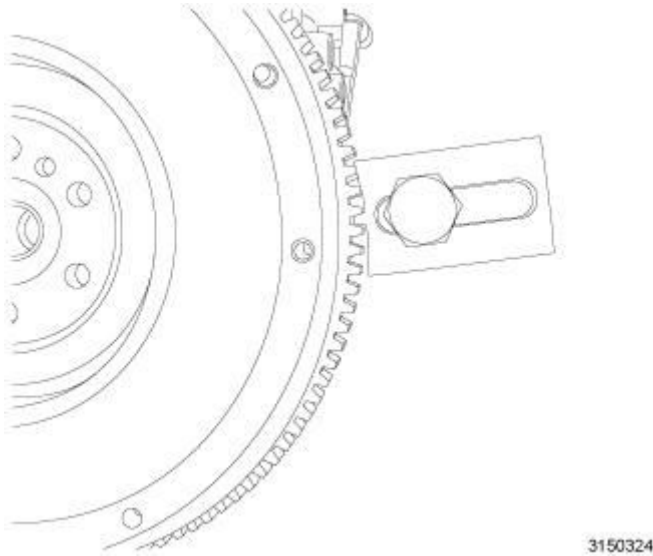


Fig. 16: Flywheel Locking Tool
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical installation of 10272 shown in illustration.

3. Install the (special tool #10272, Tool, Flywheel Locking).

NOTE: It may be necessary to install an appropriate length 10 MM bolt, washer and nut in place of the supplied 12 MM fastener.

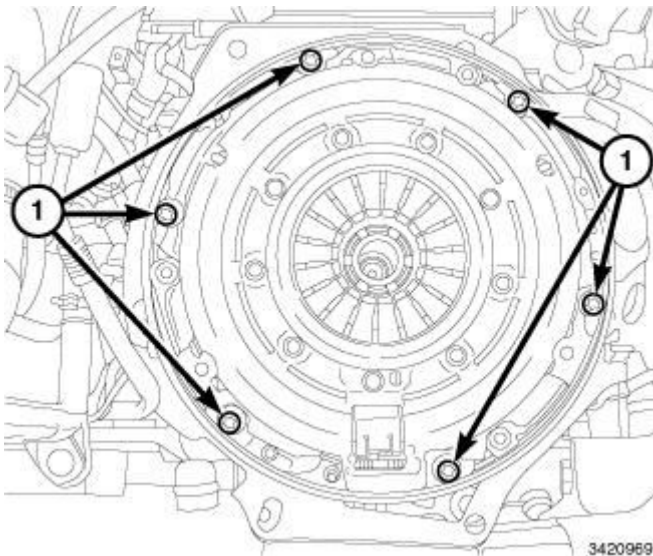


Fig. 17: Pressure Plate-To-Flywheel Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Install the clutch pressure plate to the flywheel and clutch disc. Finger tighten the pressure plate-to-flywheel bolts.

5. Use a suitable clutch alignment tool to position the clutch disc to the center of the flywheel.
6. Tighten pressure plate bolts (1) evenly and in rotation a few threads at a time. **The bolts must be tightened evenly and to specified torque to avoid distorting the pressure plate.**
7. Using a "star" torque pattern, tighten the pressure plate bolts (1). Refer to **SPECIFICATIONS**.
8. Remove the clutch alignment tool.
9. Apply light coat of Mopar® High Temperature Bearing Grease or equivalent to clutch disc hub and splines of transmission input shaft.

CAUTION: Do not over lubricate shaft splines. This will result in grease contamination of disc.

10. Install the transaxle.

FLYWHEEL

OPERATION

OPERATION

The flywheel serves to dampen the engine firing pulses. The heavy weight of the flywheel relative to the rotating mass of the engine components serves to stabilize the flow of power to the remainder of the drivetrain. The crankshaft has the tendency to attempt to speed up and slow down in response to the cylinder firing pulses. The flywheel dampens these impulses by absorbing energy when the crankshaft speeds and releasing the energy back into the system when the crankshaft slows down.

REMOVAL

MANUAL

WARNING: Chrysler LLC does not manufacture any vehicles or replacement parts that contain asbestos. Aftermarket products may or may not contain asbestos. Refer to aftermarket product packaging for product information. Whether the product contains asbestos or not, dust and dirt can accumulate on manual clutch parts during normal use. Follow practices prescribed by appropriate regulations for the handling, processing and disposing of dust and debris.

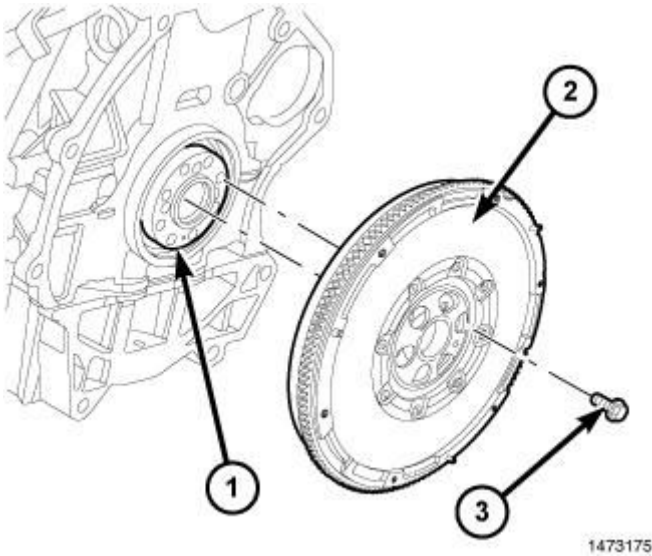


Fig. 18: Removing/Installing Flywheel-To-Crankshaft Bolts And Flywheel Assembly
Courtesy of CHRYSLER GROUP, LLC

1. Remove transmission.
2. Remove clutch pressure plate and disc.

Refer to **DISC, CLUTCH, REMOVAL**.

3. While holding the flywheel against the engine, remove the bolts (3) holding the flywheel to the crankshaft flange (1).
4. Separate the flywheel (2) from the engine.

INSTALLATION

MANUAL

WARNING: Chrysler LLC does not manufacture any vehicles or replacement parts that contain asbestos. Aftermarket products may or may not contain asbestos. Refer to aftermarket product packaging for product information. Whether the product contains asbestos or not, dust and dirt can accumulate on manual clutch parts during normal use. Follow practices prescribed by appropriate regulations for the handling, processing and disposing of dust and debris.

1. Place the flywheel (2) in position on the engine.
2. While holding the flywheel against the engine, install the bolts (3) to hold the flywheel to the crankshaft flange (1).

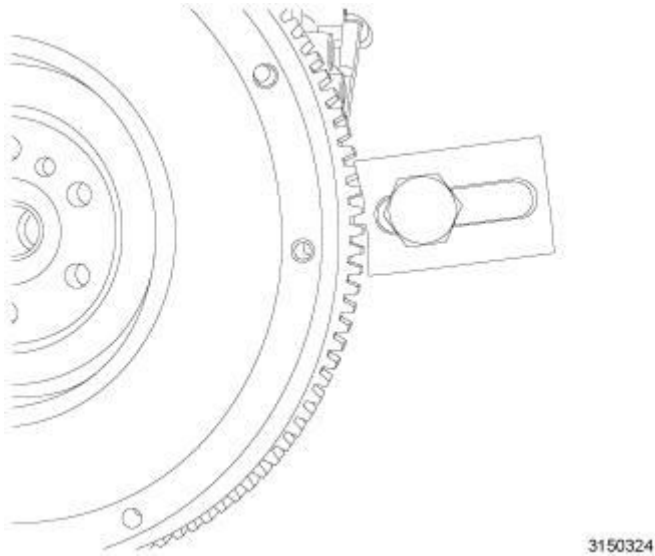


Fig. 19: Flywheel Locking Tool
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical installation of 10272 shown in illustration.

3. Install (special tool #10272, Tool, Flywheel Locking).

NOTE: It may be necessary to install an appropriate length 10 MM bolt, washer and nut in place of the supplied 12 MM fastener.

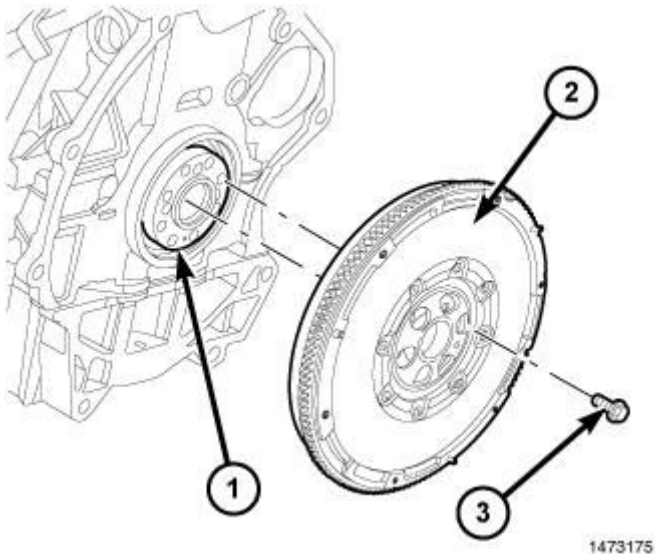


Fig. 20: Removing/Installing Flywheel-To-Crankshaft Bolts And Flywheel Assembly
Courtesy of CHRYSLER GROUP, LLC

4. Tighten the flywheel bolts to specification. Refer to **SPECIFICATIONS**.
5. Install clutch pressure plate and disc. Refer to **DISC, CLUTCH, REMOVAL**.

6. Install transmission.
7. Road test vehicle to verify repair.

PEDAL AND PAD, CLUTCH

REMOVAL

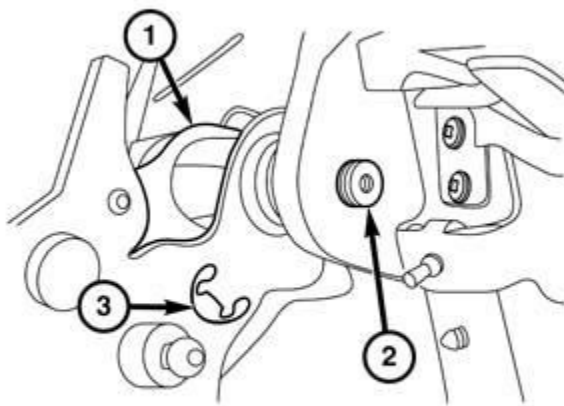
REMOVAL

CAUTION: Brake fluid will damage painted surfaces. If brake fluid is spilled on any painted surfaces, wash it off immediately with water.

NOTE: Before proceeding, refer to WARNING .

Refer to CAUTION .

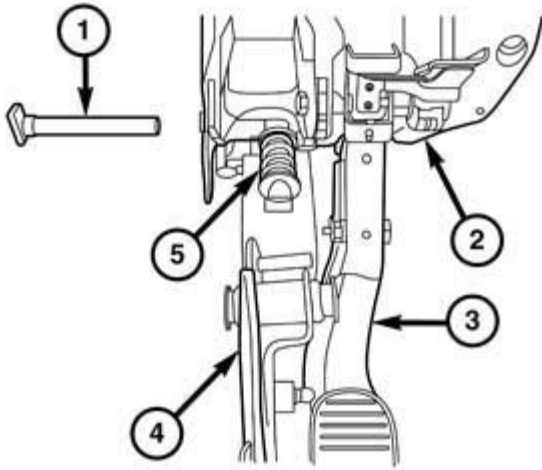
NOTE: To remove brake/clutch/throttle pedal armature assembly from the vehicle, refer to PEDAL(S), BRAKE AND/OR ACCELERATOR, REMOVAL .



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Fig. 21: Clevis Pin & E-Clip
Courtesy of CHRYSLER GROUP, LLC

1. Remove E-clip (3) holding the clevis pin (2) in the pedal armature.



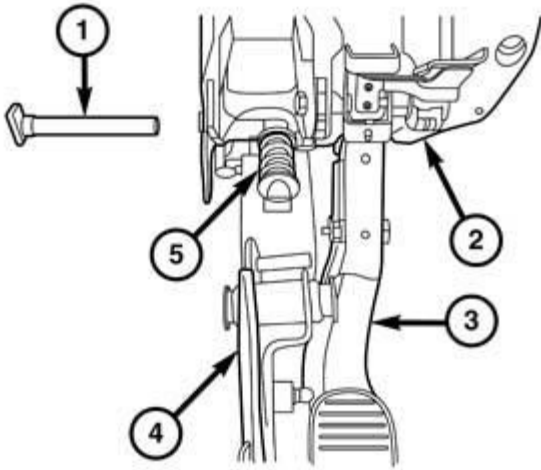
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Fig. 22: Clevis Pin, Armature, Clutch Pedal & Return Spring
Courtesy of CHRYSLER GROUP, LLC

2. Using a suitable pry bar, pry the clevis pin (1) from the left side of the armature (2) while holding the clutch pedal (4) in place.
3. As clevis (1) is pulled free of the armature (2) apply pressure to force the pedal inward to keep the return spring (5) from falling out of the assembly.
4. With one hand positioned under the return spring (5) to catch it, withdraw the clutch pedal (4) from the armature.

INSTALLATION

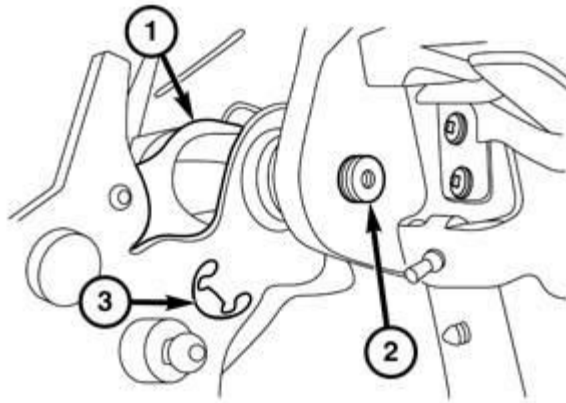
INSTALLATION



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Fig. 23: Clevis Pin, Armature, Clutch Pedal & Return Spring
Courtesy of CHRYSLER GROUP, LLC

1. Position the return spring (5) over the pivot pin on the clutch pedal and into the notch on the plastic armature (2) while holding clutch pedal inward.
2. Align the clutch pedal (3) pivot bushings with the pass through holes in the armature (2).
3. Insert the clevis pin (1) into the left side of the armature (2) while holding the clutch pedal (3) in place. Align the head of the clevis with the inset on the armature and push the clevis all-the-way into the armature.



060868951

Fig. 24: Clevis Pin & E-Clip
Courtesy of CHRYSLER GROUP, LLC

4. Install the E-clip (3) to hold the clevis pin (2) in the pedal armature.

NOTE: To install brake/clutch/throttle pedal armature assembly in the vehicle, refer to PEDAL(S), BRAKE AND/OR ACCELERATOR, INSTALLATION .

SWITCH, CLUTCH STARTER INTERLOCK

DESCRIPTION

DESCRIPTION

The clutch pedal position switch is attached to the side of the brake/throttle/clutch pedal armature assembly. It is secured with an integral locking lever. A pin on the clutch pedal lever cycles the switch. A three pin electrical connector plugs into the switch.

OPERATION

OPERATION

The clutch pedal position switch is used to prevent starter motor engagement until the clutch pedal is fully depressed. An input from this switch is also used to either shut down or prevent operation of the speed control system when the clutch pedal is depressed. When the clutch pedal is depressed the switch contacts are closed and creates a complete circuit to allow the starter relay to energize the starter motor. When the clutch pedal is released, the switch contacts open and will not allow the starter relay to energize the starter motor.

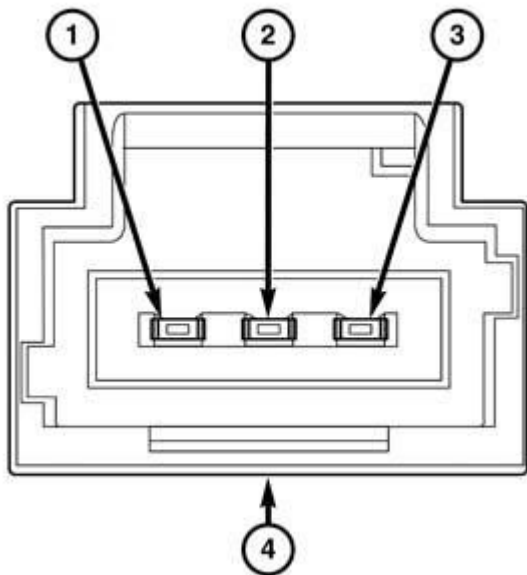
DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - CLUTCH PEDAL POSITION SWITCH

The Clutch Pedal Position Switch consists of two open or closed style switches.

When the switch lever is at the rearward end of its swing (pedal released) the downstop or interlock switch is open and should not have continuity through the connector pins 1 and 2. The upstop switch is closed and should have continuity between pins 1 and 3.

When the switch lever is at the forward end of its swing (pedal depressed) the downstop or interlock switch is closed and should have continuity through the connector pins 1 and 2. The upstop switch is open and should not have continuity between pins 1 and 3.



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Fig. 25: Clutch Pedal Position Switch Connector Terminal Identification

Courtesy of CHRYSLER GROUP, LLC

To test the switch, unplug the wire harness connector and connect a continuity tester or OHM meter to the pins in the switch connector (1).

CLUTCH PEDAL POSITION SWITCH TEST

SYMPTOM	TEST RESULT	REPAIR
Engine will not crank with clutch depressed.	1. No continuity is detected from pin 1 to pin 2 or continuity is detected from pin 1 to pin 3 with clutch pedal depressed.	1. Switch needs to be replaced. 2. Repair electrical fault in

2014 Jeep Cherokee Trailhawk

2014 CLUTCH Clutch System - Cherokee

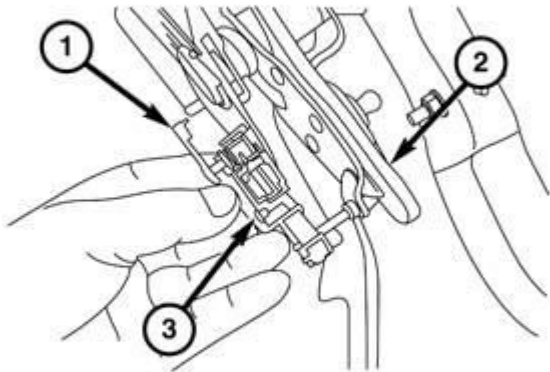
	2. If switch tests OK with the clutch pedal depressed.	system.
Engine cranks with clutch released.	1. Continuity is detected from pin 1 to pin 2 or no continuity is detected from pin 1 to pin 2 with clutch pedal depressed. 2. If switch tests OK with the clutch pedal depressed.	1. Switch needs to be replaced. 2. Repair electrical fault in system.

REMOVAL

REMOVAL

1. Disconnect and isolate the battery negative cable from its post on the battery.
2. If equipped, remove the knee blocker air bag to gain access to the brake/clutch/throttle pedal assembly.

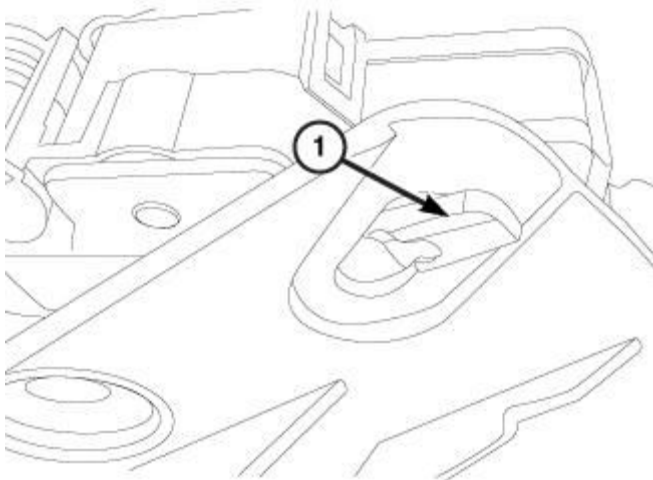
Refer to **AIR BAG, KNEE BLOCKER, REMOVAL** .



060868953

Fig. 26: Pedal Arm Bracket & Lock-Levers
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect wire harness connector from clutch pedal position switch.
4. Disengage and rotate lock-lever (1) counterclockwise and pull the base of the lock-lever (3) outward.



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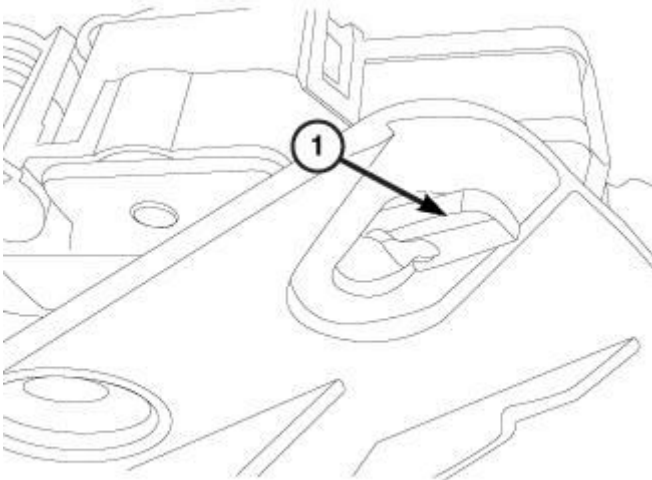
Fig. 27: Locating Tab

Courtesy of CHRYSLER GROUP, LLC

5. Unhook retainer from slotted hole in pedal armature and separate the clutch pedal position switch from the clutch pedal arm.

INSTALLATION

INSTALLATION

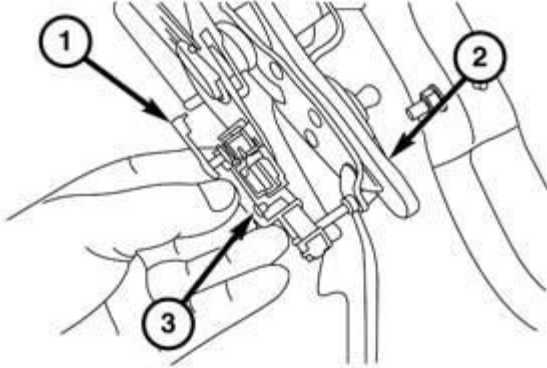


3760133

Fig. 28: Locating Tab

Courtesy of CHRYSLER GROUP, LLC

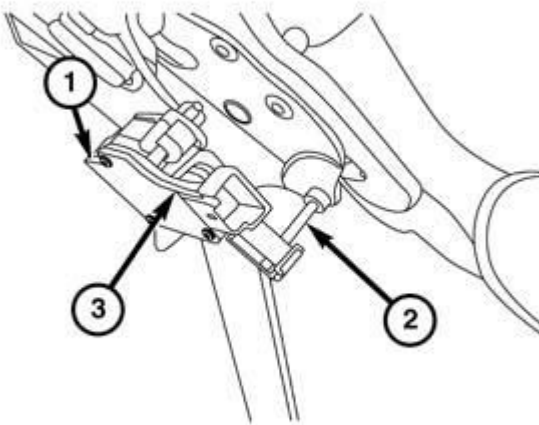
1. Place the clutch pedal position switch onto the pin on the clutch pedal arm.
2. Hook (1) retainer on back of switch into the slotted hole in the clutch pedal armature.



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Fig. 29: Pedal Arm Bracket & Lock-Levers
Courtesy of CHRYSLER GROUP, LLC

3. Insert the pin on the clutch pedal arm (2) into the switch lever and push the base of the lock-lever inward to engage the bracket (2).



060868952

Fig. 30: Clutch Pedal Position Switch & Lock-Lever
Courtesy of CHRYSLER GROUP, LLC

2014 Jeep Cherokee Trailhawk
2014 CLUTCH Clutch System - Cherokee

4. Rotate lock-lever (3) clockwise until lever is seated.
5. Connect wire harness connector into clutch pedal position switch (1).
6. If equipped, install the knee blocker air bag.

Refer to **AIR BAG, KNEE BLOCKER, INSTALLATION** .

7. Connect the battery cable onto the negative post of the battery.

2014 DRIVELINE/AXLES

Front Half Shaft - Cherokee

DESCRIPTION

DESCRIPTION

This vehicle is equipped with an unequal length halfshaft system consisting of short left and long right halfshafts. The halfshafts consist of a fixed constant velocity (CV) joint at the outboard end connected by a solid shaft to a plunging CV joint on the inboard end. The inner (CV) joint has a splined connection into the transmission. The outer joint has a spline connection to the wheel hub and is retained with a steel lock nut.

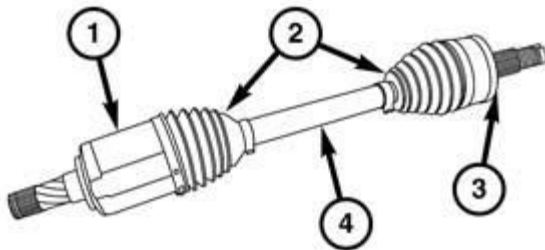
All the halfshaft assemblies use the same type of inner and outer joints. The inner joint is a tripod joint that allows for the changes in halfshaft length through the jounce and rebound travel of the front suspension. The outer joint is a Rzeppa joint that allows articulation during front suspension travel and steering. Both tripod joints and Rzeppa joints are true constant velocity (CV) joint assemblies.

The inner tripod joints are designed with a retention feature that prevents the tripod rollers from coming out of the inner joint housing up to a specific load. If this feature is overcome and any of the rollers are pulled past the retention feature the joint will lock up and no longer function properly. The entire halfshaft assembly must be replaced if it locks up.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - HALFSHAFT

VEHICLE INSPECTION



030369459

Fig. 1: C/V Joint, Tripod Joint, Halfshaft & Inner/Outer Boots
Courtesy of CHRYSLER GROUP, LLC

The general appearance of the Halfshafts should be clean and oil free around the CV (3) and tripod (1) boots (2). Grease on or around the boots is a sign of leakage and the boots or halfshaft should be replaced.

NOISE OR VIBRATION IN TURNS

Vibration associated with the CV joints in the halfshafts occur in the 3rd and 8th order. Use a vibration analyzer to determine the frequency of the vibration.

SYMPTOM	POSSIBLE CAUSE	REPAIR
Clicking noise while turning.	Lack of lube in CV joint boots.	Replace halfshaft
Chuckling or snap noise while turning.	Loose wheel or hub nut.	Tighten wheel or hub nut. Replace damaged components.
Loud knocking noise centering on inner CV tripod joints.	Damaged Differential side/pinion gears.	Remove halfshaft and rotate side gears by hand. Replaced damaged transaxle components.

Noise may also be caused by another component of the vehicle coming in contact with the half shaft, brake or wheel assemblies.

CLUNKING NOISE DURING ACCELERATION

SYMPTOM	POSSIBLE CAUSE	REPAIR
		1. Replace hub nut and

2014 Jeep Cherokee Trailhawk

2014 DRIVELINE/AXLES Front Half Shaft - Cherokee

Clunk/snap noise during launch or shifting into drive or reverse.	1. Loose hub nut. 2. Damaged hub splines.	properly tighten. 2. Replace hub bearing and halfshaft.
Clunking noise at low speed.	Severely worn or damaged tripod or CV joint.	Replace halfshaft.
Rattle/clunk over bumps. Grease slung around undercarriage.	Loss of lube in CV joint boots.	Replace halfshaft.

SHUDDER OR VIBRATION DURING ACCELERATION

SYMPTOM	POSSIBLE CAUSE	REPAIR
Shudder or vibration on acceleration.	1. Engine rotating beyond limits. 2. Worn or damaged half shaft inner tripod joint 3. Severely worn or damaged suspension or steering component. 4. Front end severely out of alignment.	1. Replaced damaged or worn engine/transaxle mounts. 2. Replace halfshaft. 3. Replace worn or damaged suspension or steering component. 4. Align front end. Refer to WHEEL ALIGNMENT, STANDARD PROCEDURE .

VIBRATION AT HIGHWAY SPEEDS

Vibration associated with the CV joints in the halfshafts occur in the 3rd and 8th order (3 or 8 events for each rotation). The inner tripod joint with three pivot axis has three events in each rotation of the halfshaft. This will produce a 3rd order vibration of the wheel rotation speed. The outer CV joint with 8 pivot axis balls has eight events in each rotation of the halfshaft. This will produce a 8th order vibration of the wheel rotation speed. An 8th order vibration will create a high pitch sound, like gear noise. Use a vibration analyzer to determine the frequency of the vibration before replacing components.

SYMPTOM	POSSIBLE CAUSE	REPAIR
Low frequency vibration, matching wheel speed. Wheel balance and runout is OK.	Foreign material (plastic bags, organic sinew and road debris) fouling the halfshaft.	Clean debris from around halfshaft.
High frequency vibration matching 3rd order wheel speed.	1. Faulty inner tripod joint. 2. Vehicle ride height is modified.	1. Replace halfshaft. 2. Return vehicle to proper ride height.
High pitch whine sound with possible high frequency vibration in the floor matching 8th order wheel speed.	1. Faulty outer CV joint. 2. Vehicle ride height is modified.	1. Replace halfshaft. 2. Return vehicle to proper ride height.

SPECIFICATIONS

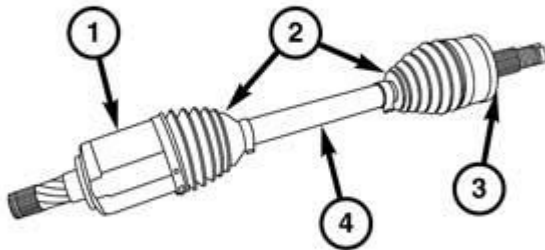
SPECIFICATIONS

TORQUE SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.
Bolts, Bearing Plate to Intermediate Bracket	24	17
Bolts, Intermediate Bracket to Engine Block and Oil Pan	65	48

REMOVAL

WITHOUT INTERMEDIATE SHAFT



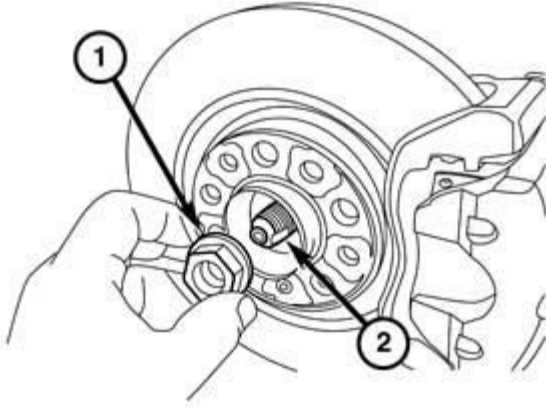
030369459

Fig. 2: C/V Joint, Tripod Joint, Halfshaft & Inner/Outer Boots

Courtesy of CHRYSLER GROUP, LLC

NOTE: Never handle the halfshaft assembly by the inner or outer boots (2). This can cause damage to the boot, which will allow contaminants to enter the C/V joint.

NOTE: The inner tripod joint (1) is designed with a retention feature that prevents the tripod rollers from coming out of the inner joint housing up to a specific load. If this feature is overcome and the rollers are pulled past the retention feature the joint will lock up and no longer function properly. The entire halfshaft assembly (4) must be replaced if this occurs.



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Fig. 3: Hub Nut & Halfshaft
Courtesy of CHRYSLER GROUP, LLC

1. Raise vehicle on a suitable hoist.
2. Remove the wheel and tire assembly from the vehicle. Refer to **REMOVAL**.
3. Using a suitable punch, lift the two staked areas in the hub nut to avoid damaging the halfshaft.
4. While a helper applies the brakes to keep the hub from rotating, remove the hub nut (1) from the halfshaft (2) and discard it.

The used hub nut is not reusable.

5. If equipped, remove the engine belly pan. Refer to **BELLY PAN, REMOVAL**

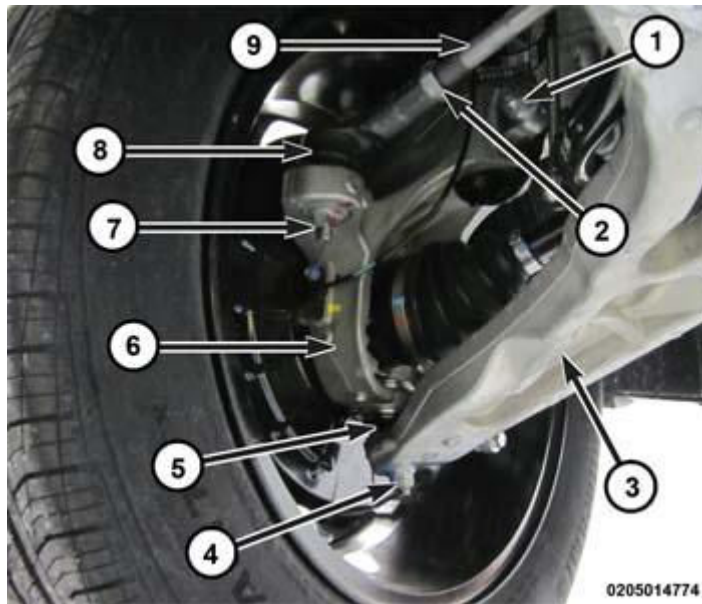


Fig. 4: Removing/Installing The Lower Ball Joint Nut To Control Arm
Courtesy of CHRYSLER GROUP, LLC

6. Remove the lower ball joint nut (4) to control arm.

NOTE: Use care when separating the ball joint stud from the knuckle so the ball joint boot does not get cut.

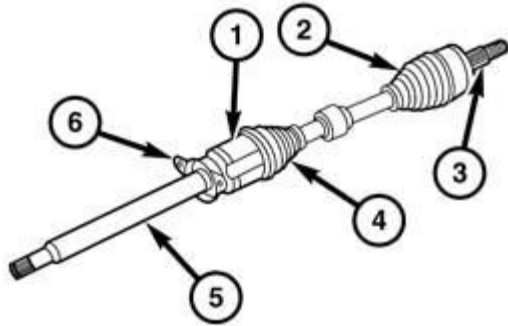
NOTE: After separating the control arm from the knuckle, do not let it swing rapidly back up, this can tear the ball joint dust boot.

7. Pry the lower control arm (3) downward until ball joint stud clears the knuckle.

NOTE: The halfshaft may stick in the hub bearing during removal. A dead-blow or plastic hammer can be used to tap the halfshaft inward and out of the hub bearing.

8. Swing the steering knuckle (1) outward and off the halfshaft end.
9. Place a drain pan under the transaxle to catch fluid that may spill from differential seal when the halfshaft is removed.
10. Hold the halfshaft up and remove support stand.
11. Slip the halfshaft shaft from the differential seal.
12. Separate the halfshaft from the vehicle.

WITH INTERMEDIATE SHAFT



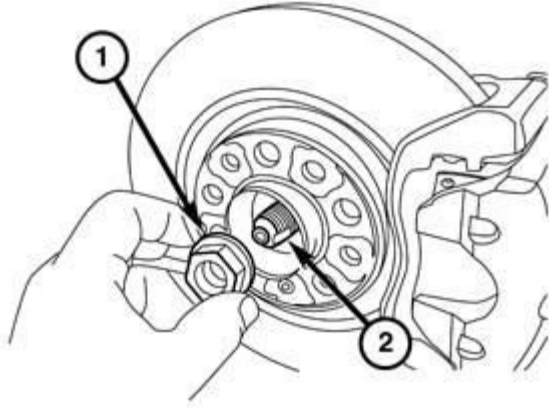
030369426

Fig. 5: C/V Joint, Tripod Joint, Halfshaft, Intermediate Shaft & Inner/Outer Boots
Courtesy of CHRYSLER GROUP, LLC

NOTE: Never handle the halfshaft assembly by the inner or outer boots (2 and 4). This can cause damage to the boot, which will allow contaminants to enter the C/V joint.

NOTE: The inner tripod joint (1) is designed with a retention feature that prevents the tripod rollers from coming out of the inner joint housing up to a specific load. If this feature is overcome and the rollers are pulled past the retention feature the joint will lock up and no longer function properly. The entire halfshaft assembly (3) must be replaced if this occurs.

1. Raise vehicle on a suitable hoist.
2. Remove the wheel and tire assembly from the vehicle. Refer to **REMOVAL**.



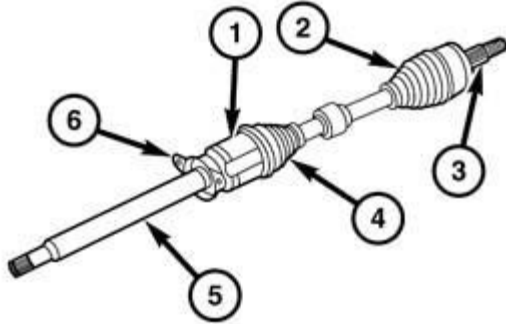
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Fig. 6: Hub Nut & Halfshaft
Courtesy of CHRYSLER GROUP, LLC

3. Using a suitable punch, lift the two staked areas in the hub nut to avoid damaging the halfshaft.
4. While a helper applies the brakes to keep the hub from rotating, remove the hub nut (1) from the halfshaft (2) and discard it.

The used hub nut is not reusable.

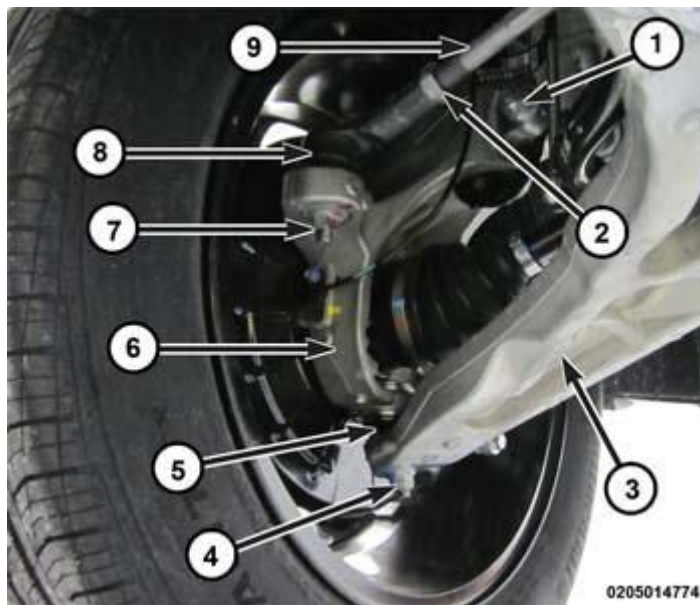
5. If equipped, remove the engine belly pan. Refer to **BELLY PAN, REMOVAL** .



030369426

Fig. 7: C/V Joint, Tripod Joint, Halfshaft, Intermediate Shaft & Inner/Outer Boots
Courtesy of CHRYSLER GROUP, LLC

6. Remove bolts holding intermediate support bearing (6) to the engine bracket.
7. Separate the bearing bracket (6) from the engine support bracket and support the halfshaft on a suitable stand.



0205014774

Fig. 8: Removing/Installing The Lower Ball Joint Nut To Control Arm
Courtesy of CHRYSLER GROUP, LLC

8. Remove the lower ball joint nut (4) to control arm.

NOTE: Use care when separating the ball joint stud from the knuckle so the ball joint boot does not get cut.

NOTE: After separating the control arm from the knuckle, do not let it swing rapidly back up, this can tear the ball joint dust boot.

9. Pry the lower control arm (3) downward until ball joint stud clears the knuckle.

NOTE: The halfshaft may stick in the hub bearing during removal. A dead-blow or plastic hammer can be used to tap the halfshaft inward and out of the hub bearing.

10. Swing the steering knuckle (1) outward and off the halfshaft end.
11. Place a drain pan under the transaxle to catch fluid that may spill from differential seal when the halfshaft is removed.
12. Hold the halfshaft up and remove support stand.
13. Slip the halfshaft shaft from the differential seal.
14. Separate the halfshaft from the vehicle.

INSTALLATION

WITHOUT INTERMEDIATE SHAFT

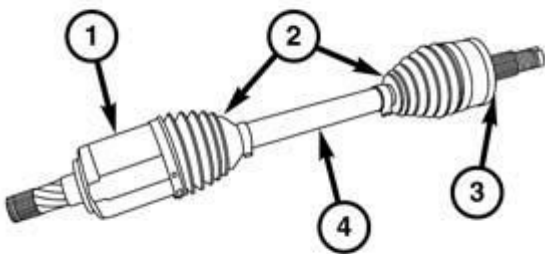


Fig. 9: C/V Joint, Tripod Joint, Halfshaft & Inner/Outer Boots

Courtesy of CHRYSLER GROUP, LLC

NOTE: Never handle the halfshaft (4) assembly by the inner or outer boots (2). This can cause damage to the boot, which will allow contaminants to enter the C/V joint (3).

NOTE: The inner tripod joint (1) is designed with a retention feature that prevents the tripod rollers from coming out of the inner joint housing up to a specific load. If this feature is overcome and the rollers are pulled past the retention feature the joint will lock up and no longer function properly. The entire halfshaft assembly (3) must be replaced if this occurs.

1. Raise vehicle on a suitable hoist.
2. Position the halfshaft under the vehicle and over the lower control arm.

NOTE: Lightly apply a light grease to the splines prior to installation.

NOTE: When installing the right halfshaft on All Wheel Drive vehicles with a single speed Power Transfer Unit and manual transmission, use care when installing the halfshaft as the shaft must pass through multiple oil seals.

3. Slip the halfshaft shaft into the differential seal and lightly twist until intermediate shaft slides all the way into the differential.

NOTE: Attempt to remove tripod joint by hand to verify that the snap ring is fully engaged. If snap ring is fully engaged, tripod joint will not be removable from transmission by hand.

4. Swing the steering knuckle outward and engage the halfshaft end into the hub bearing spline.
5. Push the lower control arm downward until ball joint stud can enter the bottom of the knuckle.
6. Insert the ball joint stud into the control arm.

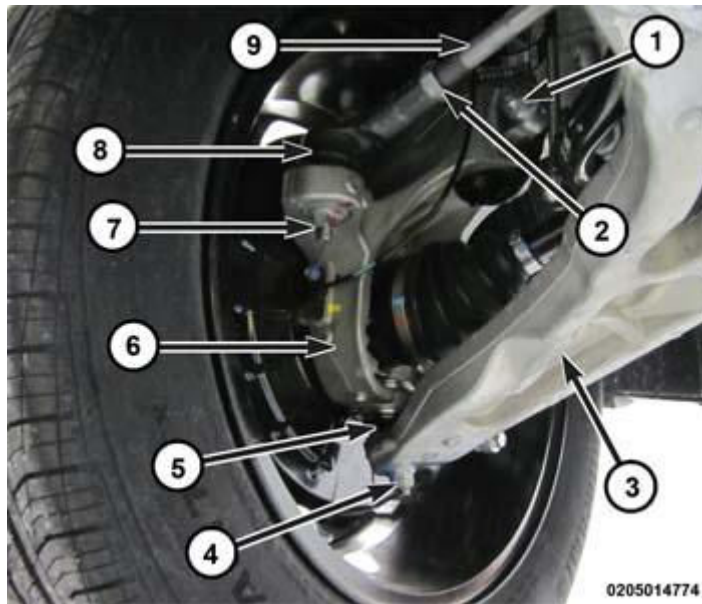
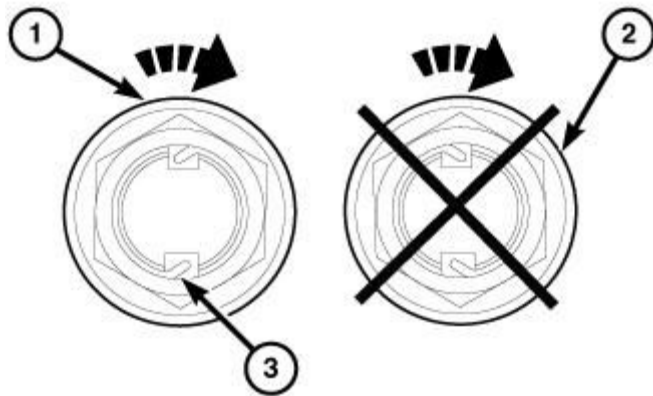


Fig. 10: Removing/Installing The Lower Ball Joint Nut To Control Arm
Courtesy of CHRYSLER GROUP, LLC

7. Install a **NEW** lower ball joint to control arm nut (4) and tighten to 25 Nm Plus 175° (18 ft. lbs. Plus 175°). Refer to **FRONT, SPECIFICATIONS**.
8. Remove support stand from under the halfshaft.
9. If equipped, install the engine belly pan. Refer to **BELLY PAN, INSTALLATION**

NOTE: Always install a new hub nut. The original hub nut is one-time use only and must be discarded when removed.

10. Install a **NEW** hub nut and while a helper applies the brakes, tighten the nut to 200 N.m (148 ft. lbs.)



3112889

Fig. 11: Correct Hub Nut Staking
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not use air tools on staking tool while staking hub nut.

11. Using the staking tool (special tool #10287, Tool, Front Hub Staking), align the leading cutting edge of tool with the top left side channel on axle as shown in the illustration (1). Tighten fastener on staking tool with hand tools until the threads bottom out completely.

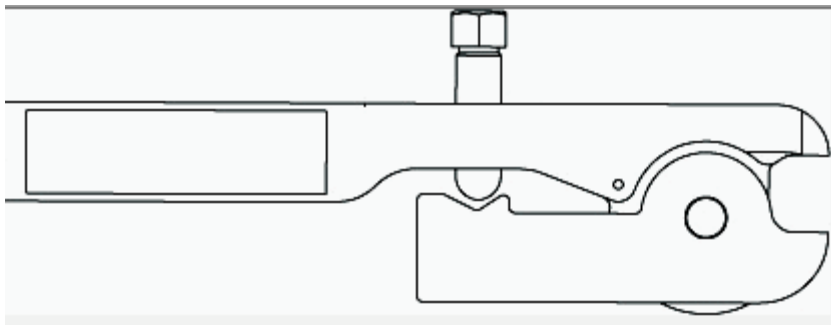
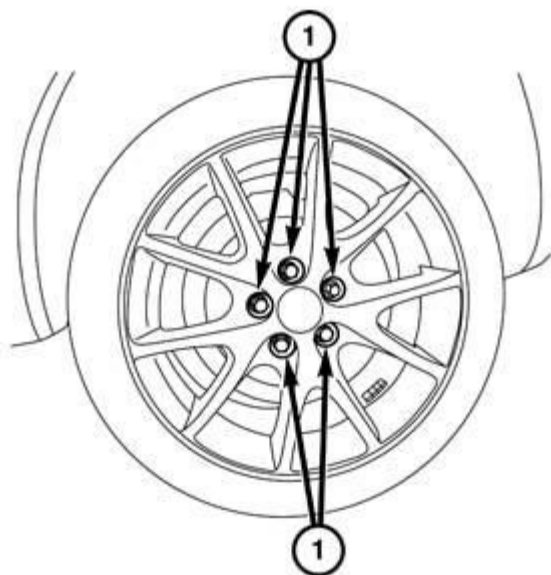


Fig. 12: Special Tool #10287
Courtesy of CHRYSLER GROUP, LLC

NOTE: The hub nut must be staked so that it looks similar to **Fig. 11**. Both edges must be split and bent into the shape shown in the illustration (3). The staking must be in the opposite direction from the forward rotation of the wheel.

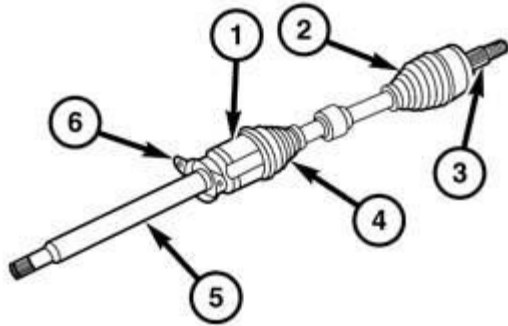


050768828

Fig. 13: Wheel Mounting Bolts
Courtesy of CHRYSLER GROUP, LLC

12. Install the wheel and tire assembly on the vehicle. Refer to **INSTALLATION** .
13. Lower the vehicle and road test to verify the repair.

WITH INTERMEDIATE SHAFT



030369426

Fig. 14: C/V Joint, Tripod Joint, Halfshaft, Intermediate Shaft & Inner/Outer Boots
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Never handle the halfshaft assembly by the inner or outer boots (2 and 4). This can cause damage to the boot, which will allow contaminants to enter the C/V joint.

NOTE: The inner tripod joint (1) is designed with a retention feature that prevents the tripod rollers from coming out of the inner joint housing up to a specific load. If this feature is overcome and the rollers are pulled past the retention feature the joint will lock up and no longer function properly. The entire halfshaft assembly (3) must be replaced if this occurs.

1. Raise vehicle on a suitable hoist.
2. Position the halfshaft under the vehicle and over the lower control arm.

NOTE: Lightly apply a light grease to the splines prior to installation.

3. Slip the halfshaft shaft into the differential seal and lightly twist until intermediate shaft slides all the way into the differential.
4. Hold the halfshaft up and place a support stand under the halfshaft to avoid damaging the halfshaft.
5. Swing the steering knuckle outward and engage the halfshaft end into the hub bearing spline.
6. Insert the ball joint stud into the control arm.

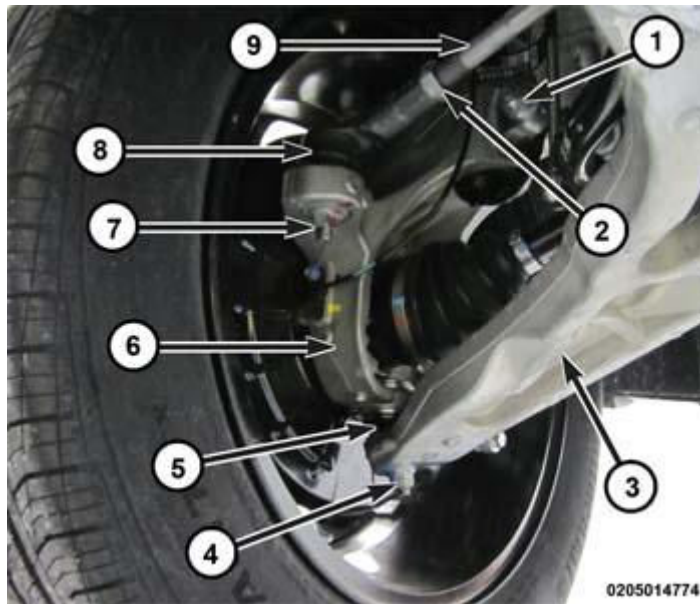


Fig. 15: Removing/Installing The Lower Ball Joint Nut To Control Arm
Courtesy of CHRYSLER GROUP, LLC

7. Install a **NEW** nut (4) to lower ball joint stud to control arm and tighten to 25 Nm Plus 175° (18 ft. lbs. Plus 175°). Refer to **FRONT, SPECIFICATIONS**.

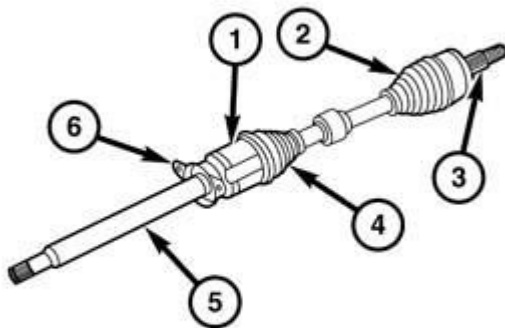


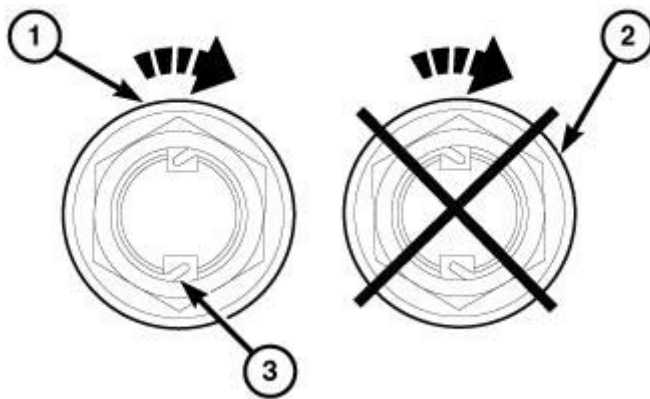
Fig. 16: C/V Joint, Tripod Joint, Halfshaft, Intermediate Shaft & Inner/Outer Boots
Courtesy of CHRYSLER GROUP, LLC

8. Position the intermediate bearing bracket (6) onto the engine support bracket and align the bolt holes.

9. Install bolts to hold intermediate support bearing (6) to the engine bracket. Refer to **SPECIFICATIONS**
10. Remove support stand from under the halfshaft.
11. If equipped, install the engine belly pan. Refer to **BELLY PAN, INSTALLATION** .

NOTE: Always install a new hub nut. The original hub nut is one-time use only and must be discarded when removed.

12. Install a **NEW** hub nut and while a helper applies the brakes, tighten the nut to 200 N.m (148 ft. lbs.)



3112889

Fig. 17: Correct Hub Nut Staking
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not use air tools on staking tool while staking hub nut.

13. Using the staking tool (special tool #10287, Tool, Front Hub Staking), align the leading cutting edge of tool with the top left side channel on axle as shown in the illustration (1). Tighten fastener on staking tool with hand tools until the threads bottom out completely.

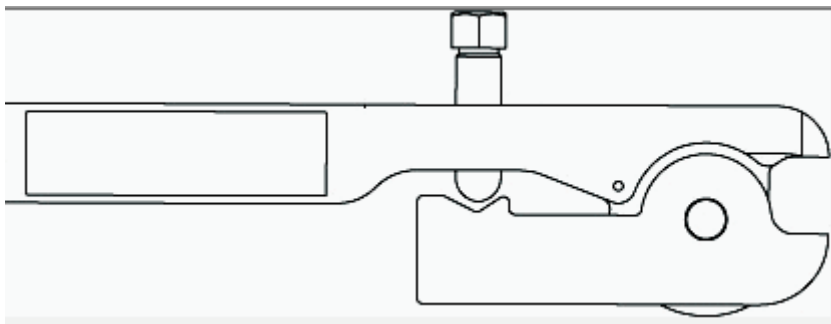
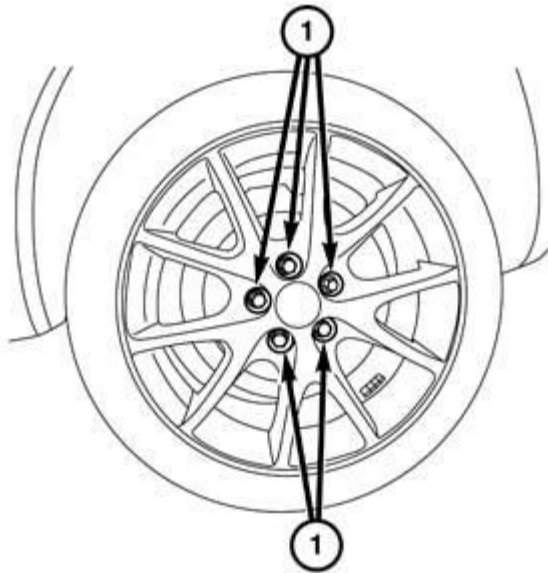


Fig. 18: Special Tool #10287
Courtesy of CHRYSLER GROUP, LLC

NOTE: The hub nut must be staked so that it looks similar to **Fig. 17**. Both edges must be split and bent into the shape shown in the illustration (3). The staking must be in the opposite direction from the forward rotation of the wheel.



050768828

Fig. 19: Wheel Mounting Bolts
Courtesy of CHRYSLER GROUP, LLC

14. Install the wheel and tire assembly on the vehicle. Refer to **INSTALLATION**.
15. Lower the vehicle and road test to verify the repair.

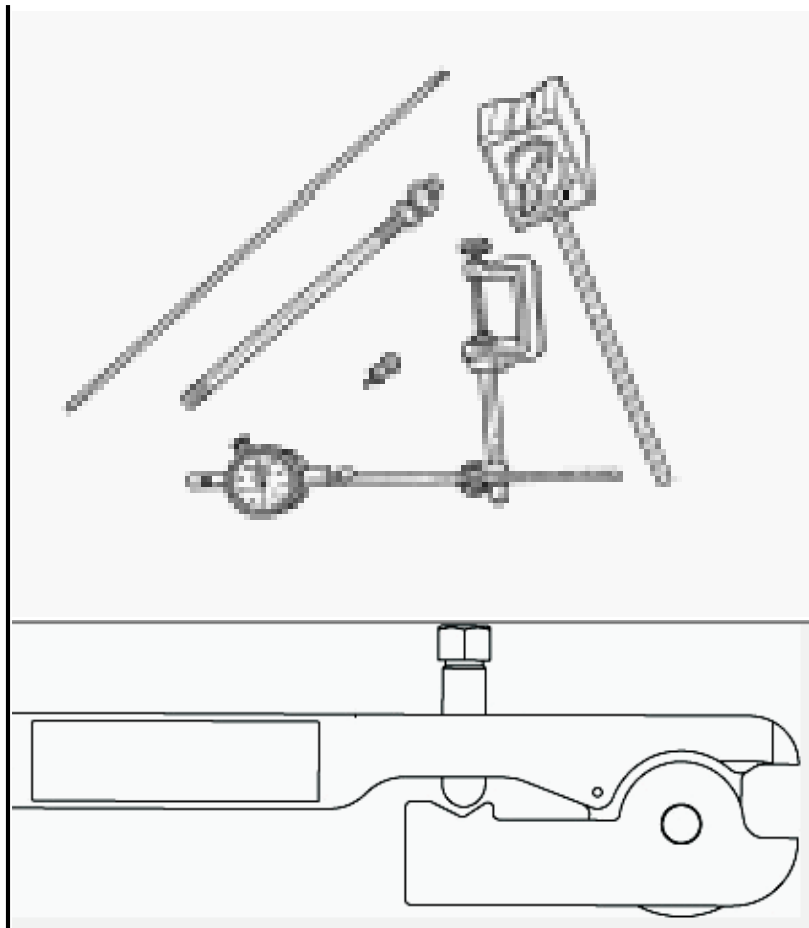
SPECIAL TOOLS

SPECIAL TOOLS

	C-4975A - Installer, Axle Clamp
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2014 Jeep Cherokee Trailhawk

2014 DRIVELINE/AXLES Front Half Shaft - Cherokee



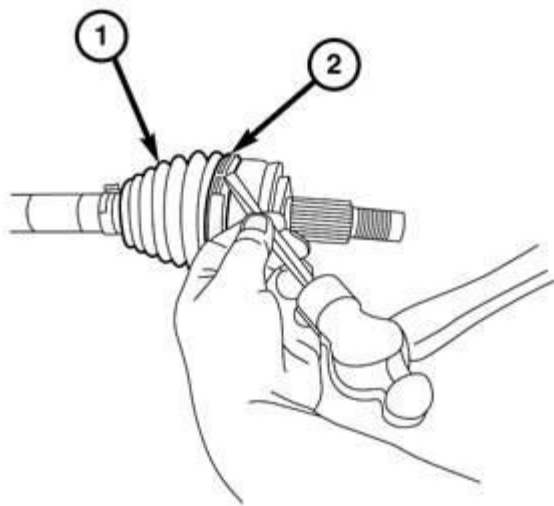
10287 - Tool, Front Hub Staking
(Originally Shipped In Kit Number(s)
10324-UPD2, 10409-UPD3.)

BOOT, DRIVE SHAFT, OUTER

REMOVAL

REMOVAL

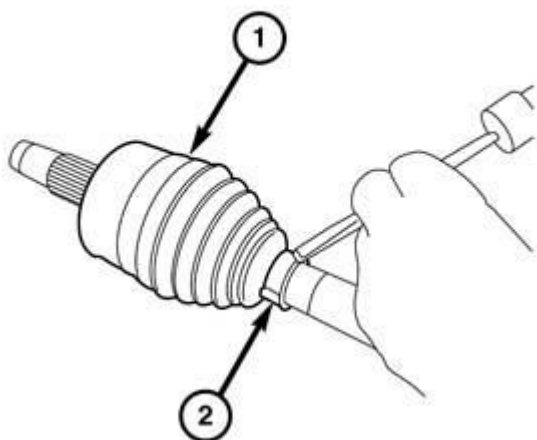
1. Remove halfshaft assembly from vehicle. Refer to **REMOVAL**.



030370922

Fig. 20: Removing Large Clamp
Courtesy of CHRYSLER GROUP, LLC

2. Remove the large clamp (2) retaining CV joint sealing boot (1) to CV joint housing and discard clamp.



030370915

Fig. 21: Removing Small Clamp
Courtesy of CHRYSLER GROUP, LLC

3. Remove small clamp (2) holding CV joint boot (1) to interconnecting shaft and discard clamp.
4. Remove boot from CV joint housing and slide it down interconnecting shaft to expose the CV joint.
5. Wipe away grease to expose outer CV joint and interconnecting shaft.
6. Using a suitable vise with brass jaw insulators, secure the interconnecting shaft to prepare to remove the CV joint from the interconnecting shaft.

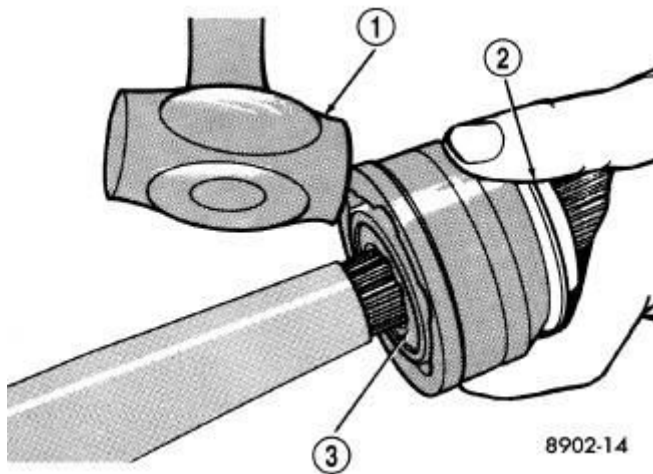


Fig. 22: Outer C/V Joint Removal From Interconnecting Shaft
Courtesy of CHRYSLER GROUP, LLC

7. Using a dead-blow hammer (1), sharply strike the outer edge of the CV joint (2) to disengage the spider (3) from the circlip on interconnecting shaft.
8. Slide outer CV joint (2) off end of interconnecting shaft.
9. Remove the circlip from the end of the interconnecting shaft.
10. Slide the boot off interconnecting shaft.
11. Wipe excess lubricant from CV joint and inspect CV joint and interconnecting shaft for damage or excessive wear.

If the CV joint shows signs of excessive wear, the halfshaft assembly must be replaced.

INSTALLATION

INSTALLATION

1. Install a NEW circlip into the groove on the interconnecting shaft.

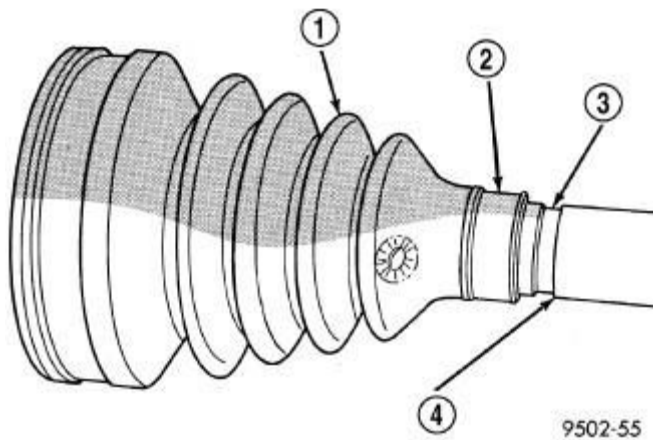


Fig. 23: Sealing Boot Installation On Interconnecting Shaft
Courtesy of CHRYSLER GROUP, LLC

2. Position clamps in the grooves on the new CV joint boot (1).
3. Slide the new CV boot (1) onto the interconnecting shaft (4) until the boot seats is in the groove (3) on interconnecting shaft.

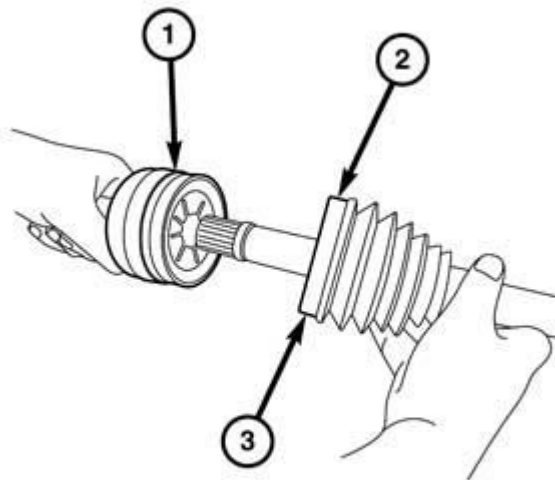
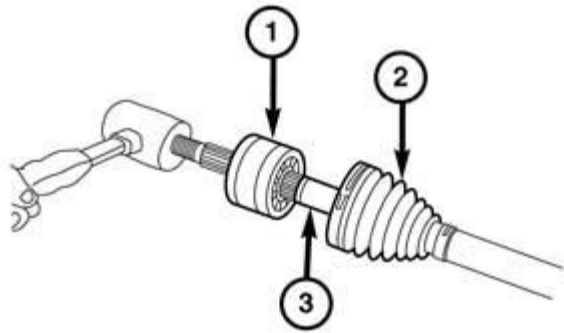


Fig. 24: Aligning CV Joint Hub
Courtesy of CHRYSLER GROUP, LLC

4. Align splines on interconnecting shaft with splines on CV joint hub (1) and push the CV joint onto interconnecting shaft.



030370923

Fig. 25: Installing CV Joint Hub
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Verify that the circlip compresses into the groove in the interconnecting shaft as the CV joint is installed on to the interconnecting shaft.

5. Using a brass hammer, drive the CV joint (1) onto the interconnecting shaft (3) until CV joint (1) is fully seated on the interconnecting shaft (3).

NOTE: Use **ONLY** the lubricant provided with the **NEW** boot during the assembly of the CV joint boot.

6. Apply 1/2 of the tube of lubricant, provided with the new boot, into the CV joint while articulating the joint in the housing. Apply the remaining amount inside the CV joint boot.
7. Position the small clamp (3) into CV joint boot recess (4).

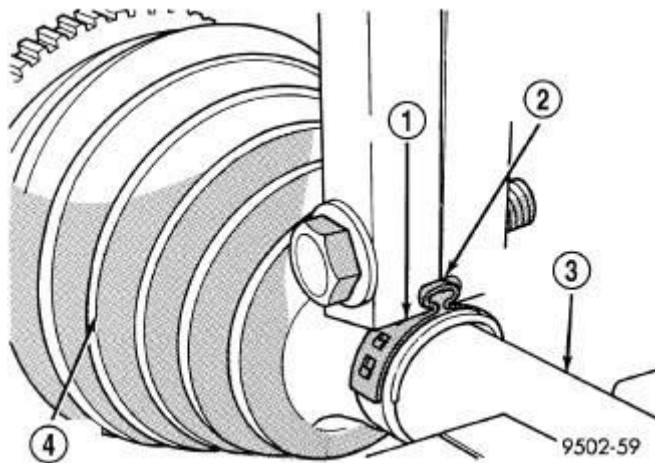


Fig. 26: Sealing Boot Retaining Clamp Installed
 Courtesy of CHRYSLER GROUP, LLC

8. Using Special Tool (special tool #C-4975A, Installer, Axle Clamp), crimp (2) the small clamp (1) to hold the small end of the tripod boot (4) onto the interconnecting shaft (3).

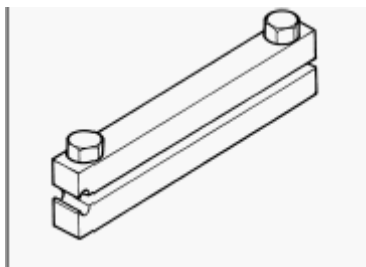


Fig. 27: C-4975A - Installer, Axle Clamp
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Tighten tool until the jaws are closed and the clamp is fully crimped (2).

9. Seat the large end of the CV joint Boot onto the CV joint housing.
10. Inspect the CV joint boot to verify that it is not distorted or wrinkled in any way.

NOTE: It may be necessary to equalize the air inside boot to gain the proper shape.

11. An awl or trim stick can be inserted under the boot lip to equalize the air inside the boot.
12. Wrap new large "latching type boot clamp" around the CV joint boot large end and snap the ends of the clamp together in preparation for compressing the clamp.

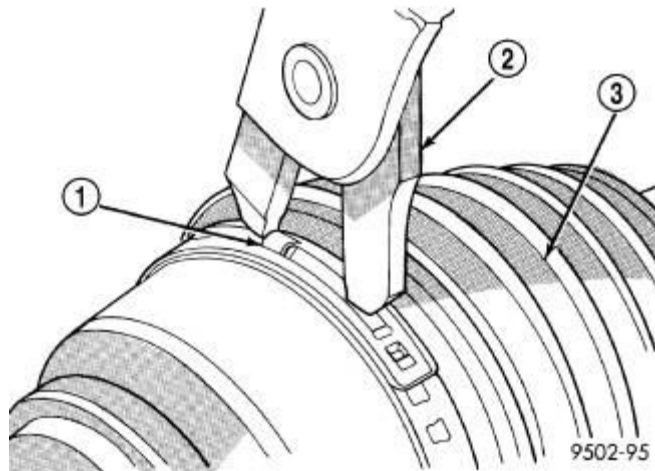


Fig. 28: Clamping Tool Installed On Sealing Boot Clamp
Courtesy of CHRYSLER GROUP, LLC

13. Insert the prongs of Clamp Locking Tool (2) in the raised holes (1) on the clamp.

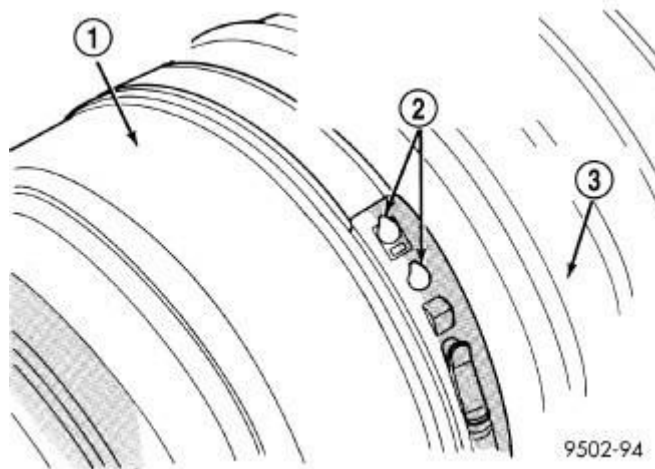


Fig. 29: Sealing Boot Clamp Correctly Installed
Courtesy of CHRYSLER GROUP, LLC

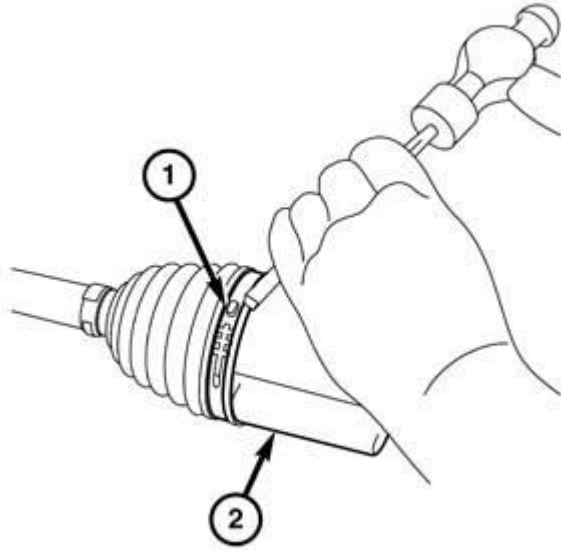
14. Squeeze tool together until the barbs (2) on underside of the clamp, lock into the windows in the topside of the clamp.
15. Install the halfshaft in the vehicle. Refer to **INSTALLATION** .

BOOT, DRIVE SHAFT, INNER

REMOVAL

REMOVAL

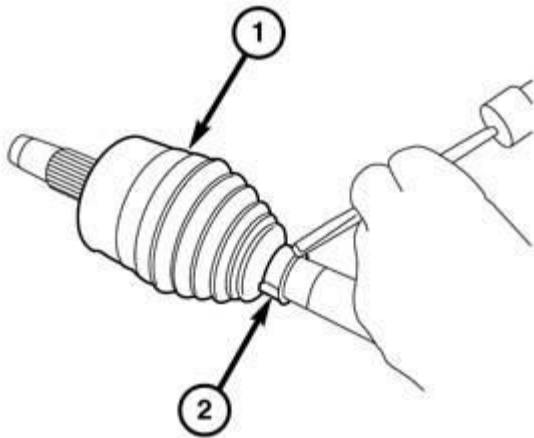
1. Remove the halfshaft from the vehicle. Refer to **REMOVAL**.



030370919

Fig. 30: Removing Large Boot Clamp
Courtesy of CHRYSLER GROUP, LLC

2. Remove large boot clamp (1) holding the inner tripod joint sealing boot (1) to tripod joint housing (2) and discard.



030370915

Fig. 31: Removing Small Clamp
Courtesy of CHRYSLER GROUP, LLC

3. Remove small clamp (2) holding the inner tripod joint boot to interconnecting shaft and discard.
4. Push the boot down the interconnecting shaft to expose the tripod housing and tripod joint.
5. Slide the tripod joint housing off the spider assembly (2) and the interconnecting shaft.

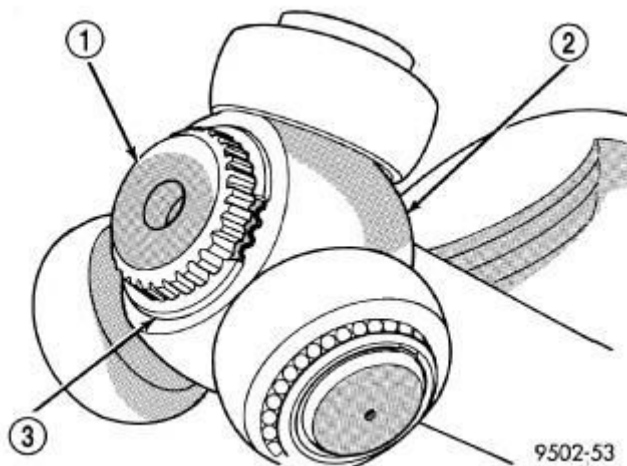


Fig. 32: Spider Assembly Retaining Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

6. Remove snap-ring (3) holding the spider assembly to the interconnecting shaft.

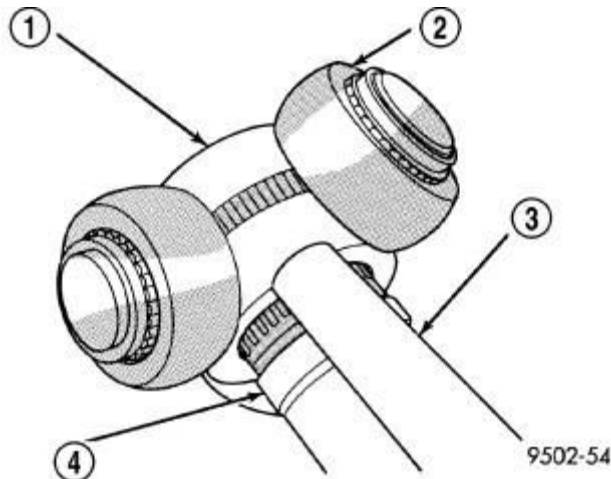


Fig. 33: Spider Assembly Removal From Interconnecting Shaft
 Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not hit spider assembly bearings when removing spider assembly.

7. Slide the spider assembly (1) from interconnecting shaft (4). If spider assembly (1) will not come off interconnecting shaft by hand, it can be removed by tapping spider assembly with a brass drift (3).
8. Slide sealing boot off interconnecting shaft.
9. Thoroughly clean and inspect spider assembly, tripod joint housing, and interconnecting shaft for any signs of excessive wear.

If any parts show signs of excessive wear, the halfshaft assembly will require replacement. Component parts of these halfshaft assemblies are not serviceable.

INSTALLATION

INSTALLATION

NOTE: If the tripod joint bearings or housing is damaged due to loss of lubricant

1. Place new small clamp on Tripod boot.

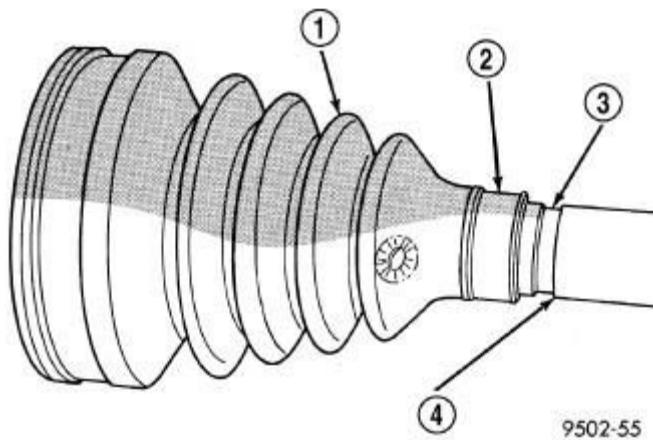


Fig. 34: Sealing Boot Installation On Interconnecting Shaft
Courtesy of CHRYSLER GROUP, LLC

2. Insert end of interconnecting shaft (4) into small end (2) of tripod boot (1).
3. Slide tripod boot up the interconnecting shaft (4) to gain access to the splined end of the interconnecting shaft.

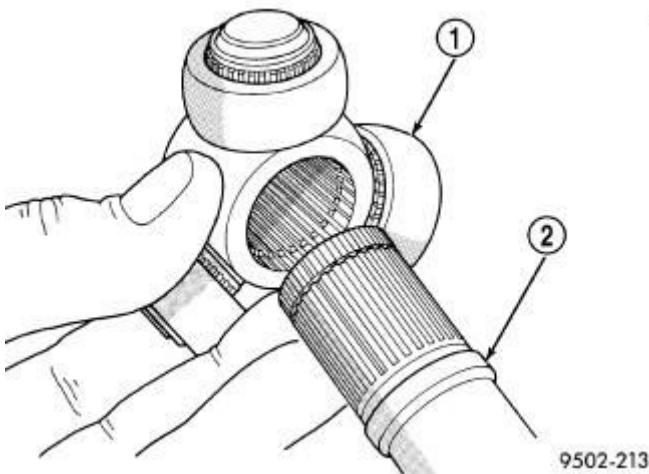


Fig. 35: Spider Assembly Installation On Interconnecting Shaft
Courtesy of CHRYSLER GROUP, LLC

4. Engage spline of interconnecting shaft (2) into the center on the tripod spider (1).

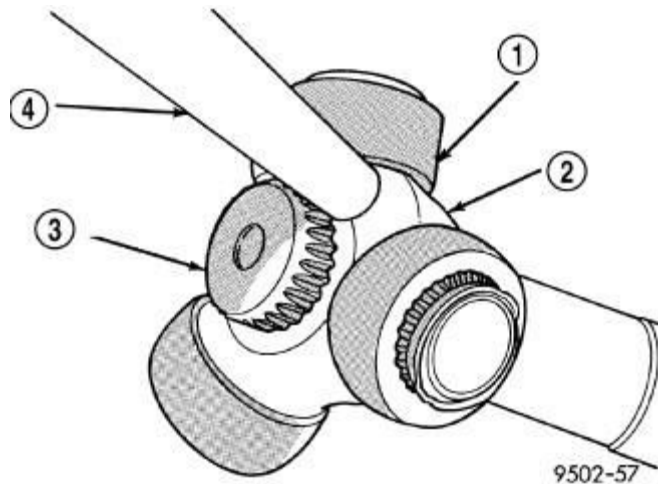


Fig. 36: Installing Spider Assembly On Interconnecting Shaft
Courtesy of CHRYSLER GROUP, LLC

5. Using a brass drift (4), tap tripod spider (2) onto the interconnecting shaft (3) until it seats and the snap-ring groove is exposed.

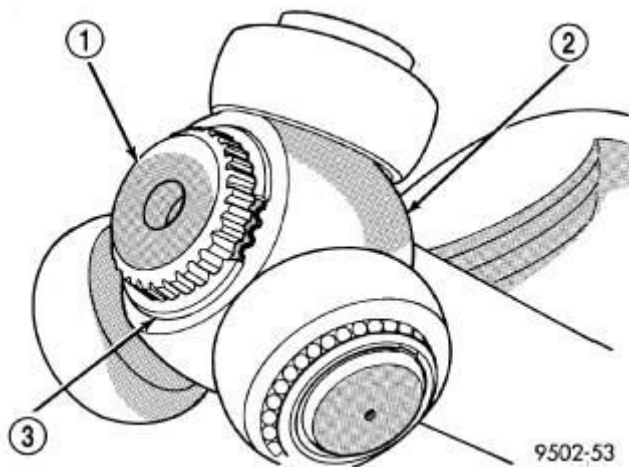


Fig. 37: Spider Assembly Retaining Snap-Ring
Courtesy of CHRYSLER GROUP, LLC

6. Install the snap-ring (3) to hold the spider assembly to the interconnecting shaft.

NOTE: Use **ONLY** the lubricant provided with the **NEW** boot during the assembly of the tripod boot.

7. Apply 1/2 of the tube of lubricant, provided with the new boot, into tripod housing. Apply the remaining amount inside the tripod boot.

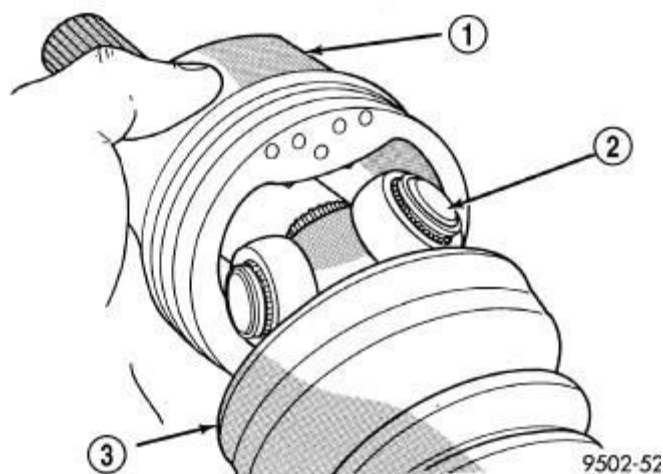


Fig. 38: Installing Tripod Housing On Spider Assembly
Courtesy of CHRYSLER GROUP, LLC

8. Engage the spider bearings (2) into the tripod housing (1).
9. Slide the spider into the tripod housing (1) until it seats.

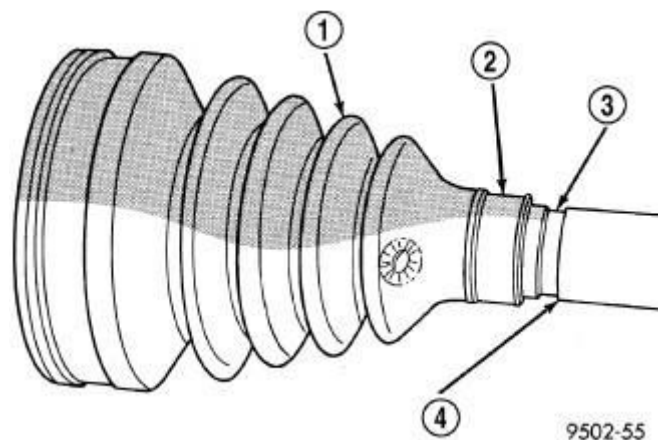


Fig. 39: Sealing Boot Installation On Interconnecting Shaft
Courtesy of CHRYSLER GROUP, LLC

10. Slide boot (1) toward the tripod joint until the small end (2) seats in the recess (3) in the interconnecting shaft (4).
11. Insert tripod housing into the large end of the tripod boot.

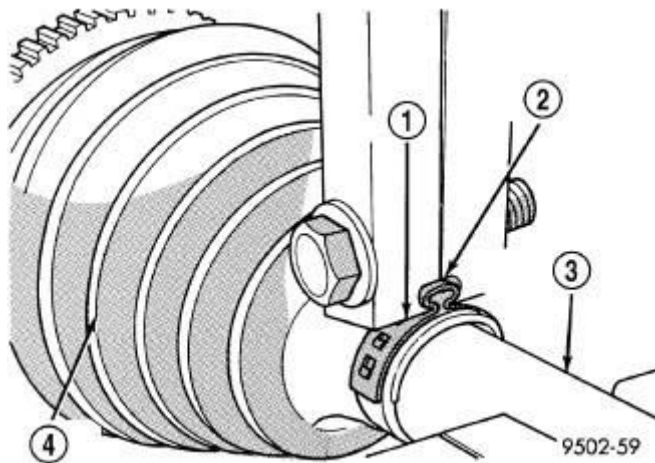


Fig. 40: Sealing Boot Retaining Clamp Installed
Courtesy of CHRYSLER GROUP, LLC

12. Using Special Tool (special tool #C-4975A, Installer, Axle Clamp), crimp (2) the small clamp (1) to hold the small end of the tripod boot (4) onto the interconnecting shaft (3).

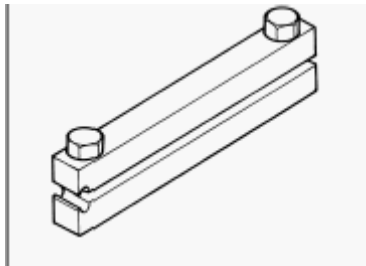


Fig. 41: C-4975A - Installer, Axle Clamp
Courtesy of CHRYSLER GROUP, LLC

NOTE: Tighten tool until the jaws are closed and the clamp is fully crimped (2).

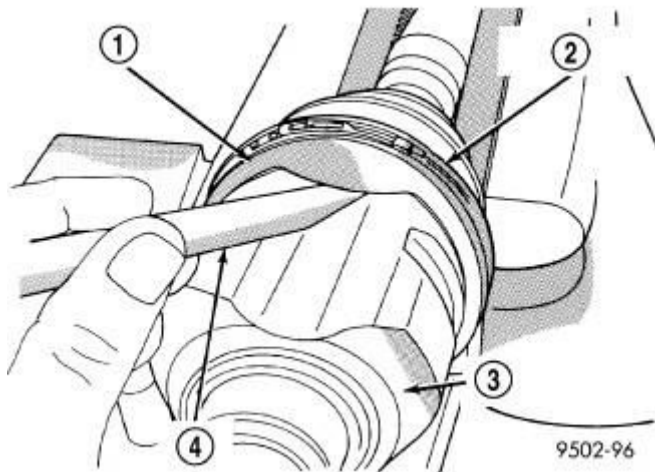


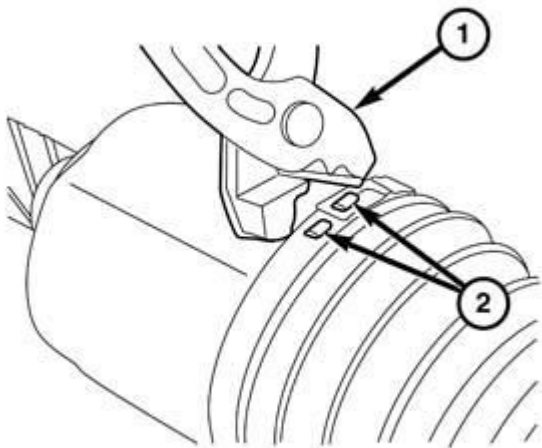
Fig. 42: Trim Stick Inserted For Venting Tripod Joint

Courtesy of CHRYSLER GROUP, LLC

13. Inspect the tripod boot to verify that it is not distorted or wrinkled in any way.

NOTE: It may be necessary to equalize the air inside boot to gain the proper shape.

14. An awl or trim stick (4) can be inserted under the boot lip to equalize the air inside the boot (1).
15. Center the clamp in the groove in the tripod joint boot.

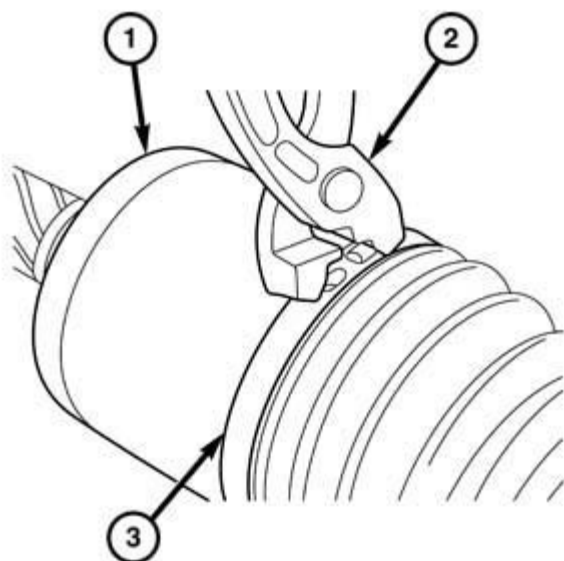


030370916

Fig. 43: Locking Pliers & Lock Tabs

Courtesy of CHRYSLER GROUP, LLC

16. Engage the clamp locking pliers (1) into the lock tabs (2) on the tripod joint boot clamp.



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Fig. 44: Squeezing Clamp

Courtesy of CHRYSLER GROUP, LLC

17. Squeeze the clamp (3) to engage the lock tabs to hold the tripod joint boot in position on the tripod joint housing (1).

2014 DRIVELINE/AXLES

Propeller Shaft - Cherokee

REMOVAL

REMOVAL

CAUTION: Propeller shaft removal is a two-person operation. Never allow propeller shaft to hang from the center bearing, or while only connected to power transfer unit (PTU) or rear driveline module flanges. A helper is required. If a propeller shaft section is hung unsupported, damage may occur to the joint, boot, and/or center bearing from over-angulation. This may result in driveline vibrations.

1. Place transmission in neutral.
2. Raise and support the vehicle. Refer to HOISTING, STANDARD PROCEDURE .

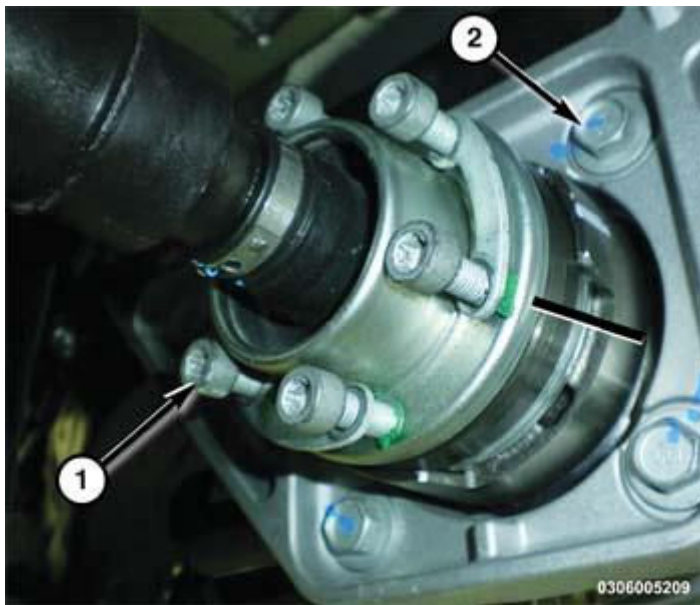


Fig. 1: Removing Bolts Holding Rear Propeller Shaft To Rear Pinion Flange
Courtesy of CHRYSLER GROUP, LLC

3. Apply index marks on the rear pinion flange and the rear prop shaft.

NOTE: Be sure a helper is holding the propeller shaft in place.

4. Remove the bolts holding the rear propeller shaft to the rear pinion flange.

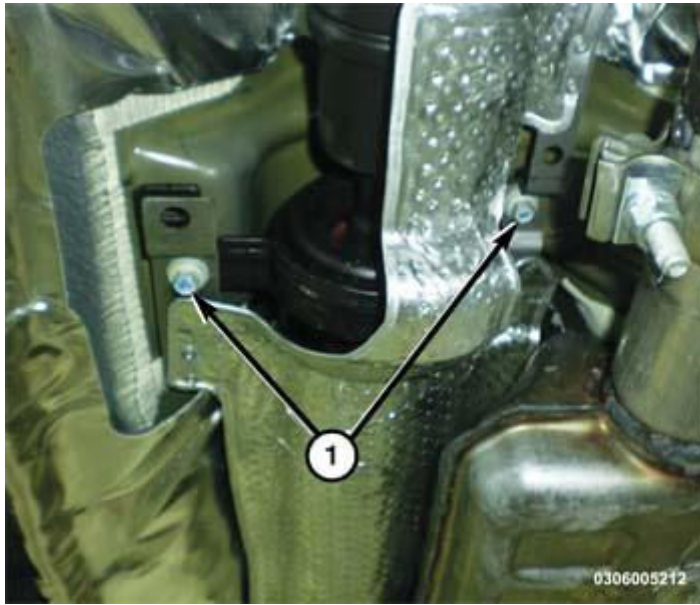


Fig. 2: Front Center Bearing Mounting Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Remove the front center bearing mounting bolts (1).

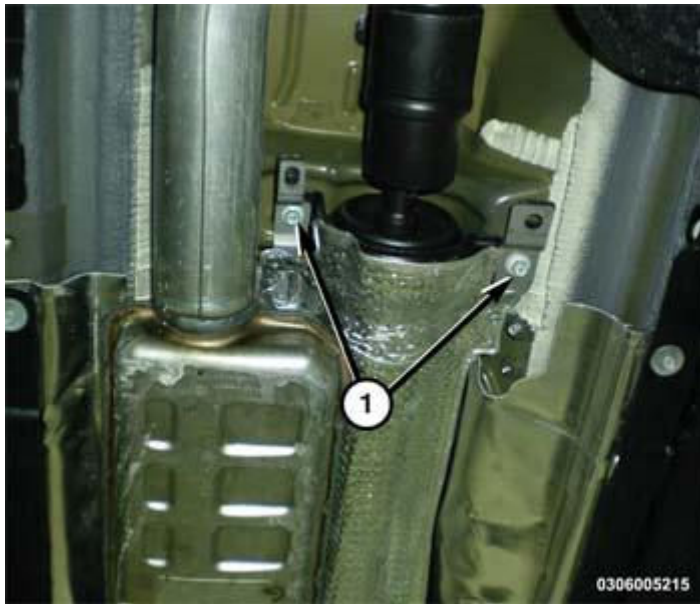
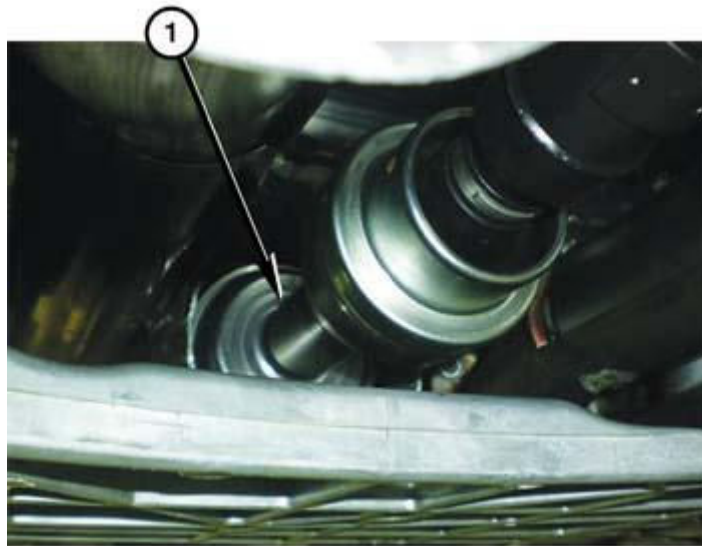


Fig. 3: Rear Center Bearing Mounting Bolts
Courtesy of CHRYSLER GROUP, LLC

6. Remove the rear center bearing mounting bolts (1).



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Fig. 4: Sliding Propeller Shaft Off Power Transfer Unit
Courtesy of CHRYSLER GROUP, LLC

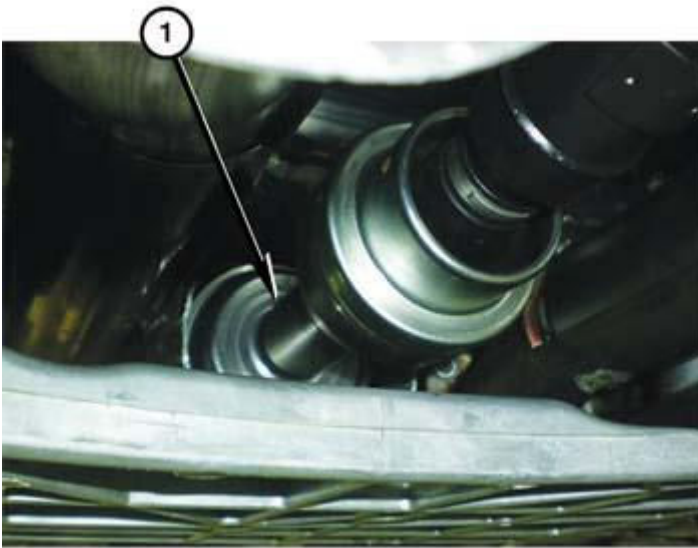
7. Slide the propeller shaft (1) off the Power Transfer Unit (PTU).

INSTALLATION

INSTALLATION

CAUTION: Propeller shaft removal is a two-person operation. Never allow propeller shaft to hang from the center bearing, or while only connected to power transfer unit (PTU) or rear driveline module flanges. A helper is required. If a propeller shaft section is hung unsupported, damage may occur to the joint, boot, and/or center bearing from over-angulation. This may result in driveline vibrations.

NOTE: Lightly apply a light grease to the splines prior to installation.



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Fig. 5: Installing Propeller Shaft Into Power Transfer Unit
Courtesy of CHRYSLER GROUP, LLC

1. With the aid of a helper, install the propeller shaft (1) into the Power Transfer Unit (PTU).

NOTE: Attempt to remove propeller shaft joint by hand to verify that the snap ring is fully engaged. If snap ring is fully engaged, propeller shaft joint will not be removable from PTU by hand.



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Fig. 6: Rear Center Bearing Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Align the center bearing mounts in place.

3. Install the rear center bearing bolts (1) and torque to 23 N.m (17 ft. lbs.).

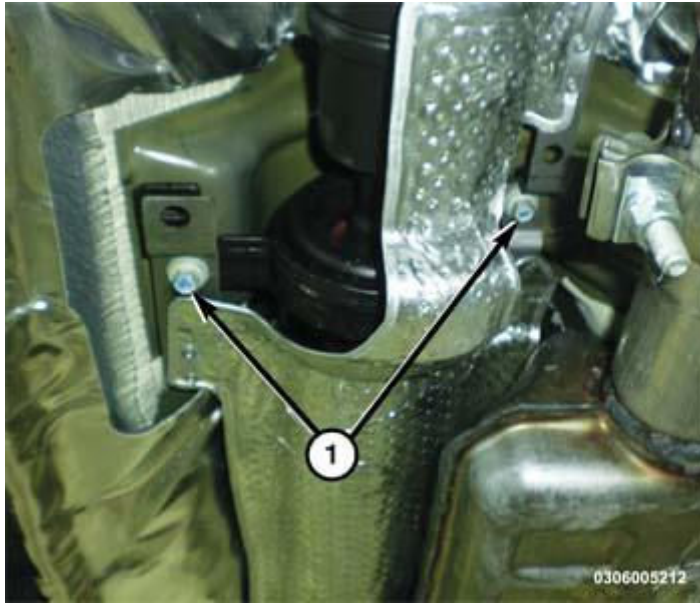


Fig. 7: Front Center Bearing Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Install the front center bearing bolts (1) and torque to 23 N.m (17 ft. lbs.).

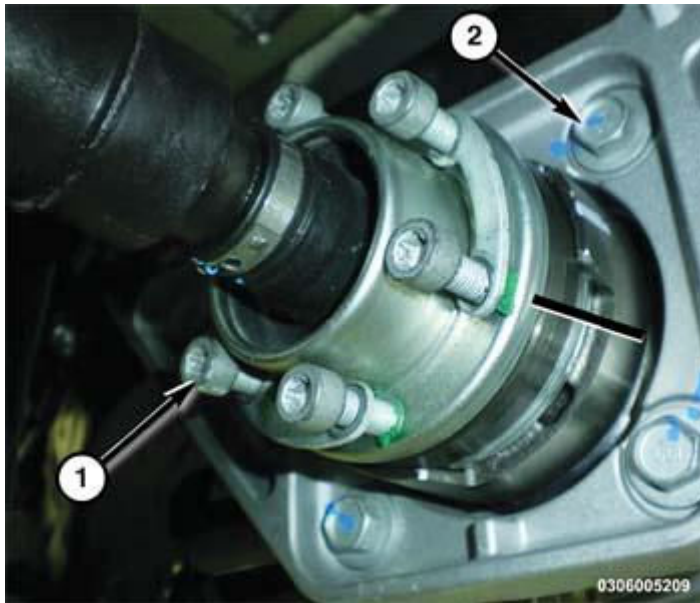


Fig. 8: Aligning Index Marks On Propeller Shaft To Pinion Flange
Courtesy of CHRYSLER GROUP, LLC

5. Align index marks on the propeller shaft to the pinion flange.
6. Replace propeller shaft bolts (1) and torque to 21 N.m (15 ft. lbs.).

2014 DRIVELINE/AXLES**Rear Driveline Module - Cherokee****OPERATION****OPERATION**

The primary benefits of All Wheel Drive are:

- Superior straight line acceleration, and cornering on all surfaces
- Better traction and handling under adverse conditions, resulting in improved hill climbing ability and safer driving.

ECU (Inside vehicle) uses throttle position, wheel speeds and steering angle (if equipped) to control clutch.

DIAGNOSIS AND TESTING**REAR DRIVELINE MODULE OPERATION**

Driveline module operation requires relatively straight-forward diagnosis. Refer to the following chart:

CONDITION	POSSIBLE CAUSES	CORRECTION
No AWD in forward or reverse directions, propeller shaft turning	1. Check Drivetrain Control Module for DTC's.	1. Review Drivetrain Control Module diagnostic service information
	2. Power Transfer Unit (PTU) failure	2. Replace the PTU assembly
No AWD in forward or reverse directions, propeller shaft not turning	1. Check Drivetrain Control Module for DTC's.	1. Review Drivetrain Control Module diagnostic service information
	2. Differential, Rear Axle component failure.	2. Diagnose and repair or replace as necessary.
Vibration at all speeds, continuous torque transfer	1. Mis-matched tires, worn tires on front axle.	1. Replace worn or incorrect (mis-matched) tires with same make and size

REAR DRIVELINE MODULE NOISE

Different sources can be the cause of noise that the rear driveline module assembly is suspected of making. Refer to the following causes for noise diagnosis.

DRIVELINE MODULE ASSEMBLY NOISE

The most important part of driveline module service is properly identifying the cause of failures and noise

complaints. The cause of most driveline module failures is relatively easy to identify. The cause of driveline module noise is more difficult to identify.

If vehicle noise becomes intolerable, an effort should be made to isolate the noise. Many noises that are reported as coming from the driveline module may actually originate at other sources. For example:

- Tires
- Road surfaces
- Wheel bearings
- Engine
- Transmission
- Exhaust
- Propeller shaft (vibration)
- Vehicle body (drumming)

Driveline module noises are normally divided into two categories: gear noise or bearing noise. A thorough and careful inspection should be completed to determine the actual source of the noise before replacing the driveline module. Other sources of noise from the rear driveline module are the pump, actuator, and low hydraulic fluid level.

The rubber mounting bushings help to dampen-out driveline module noise when properly installed. Inspect to confirm that no metal contact exists between the driveline module case and the body or suspension cradle. The complete isolation of noise to one area requires expertise and experience. Identifying certain types of vehicle noise baffles even the most capable technicians. Often such practices as:

- Increase tire inflation pressure to eliminate tire noise.
- Listen for noise at varying speeds with different driveline load conditions
- Swerving the vehicle from left to right to detect wheel bearing noise.

All driveline module assemblies produce noise to a certain extent. Slight carrier noise that is noticeable only at certain speeds or isolated situations should be considered normal. Carrier noise tends to peak at a variety of vehicle speeds. The pump and actuator may be audible in certain situations that may be normal. Noise is **NOT ALWAYS** an indication of a problem within the carrier or rear driveline module components.

TIRE NOISE

Tire noise is often mistaken for driveline module noise. Tires that are unbalanced, worn unevenly or are worn in a saw-tooth manner are usually noisy. They often produce a noise that appears to originate in the driveline module.

Tire noise changes with different road surfaces, but driveline module noise does not. Inflate all four tires with approximately 20 psi (138 kPa) more than the recommended inflation pressure (for test purposes only). This will alter noise caused by tires, but will not affect noise caused by the differential. Rear axle noise usually ceases when coasting at speeds less than 30 mph (48 km/h); however, tire noise continues, but at a lower frequency, as the speed is reduced.

After test has been completed lower tire pressure back to recommended pressure.

GEAR NOISE (DRIVE PINION AND RING GEAR)

Abnormal gear noise is rare and is usually caused by scoring on the ring gear and drive pinion. Scoring is the result of insufficient or incorrect lubricant in the carrier housing.

Abnormal gear noise can be easily recognized. It produces a cycling tone that will be very pronounced within a given speed range. The noise can occur during one or more of the following drive conditions:

- Drive
- Road load
- Float
- Coast

Abnormal gear noise usually tends to peak within a narrow vehicle speed range or ranges. It is usually more pronounced between 30 to 40 mph (48 to 64 km/h) and 50 to 60 mph (80 to 96 km/h). When objectionable gear noise occurs, note the driving conditions and the speed range.

BEARING NOISE (DRIVE PINION AND DIFFERENTIAL)

Defective bearings produce a rough growl that is constant in pitch and varies with the speed of vehicle. Being aware of this will enable a technician to separate bearing noise from gear noise.

Drive pinion bearing noise that results from defective or damaged bearings can usually be identified by its constant, rough sound. Drive pinion front bearing is usually more pronounced during a coast condition. Drive pinion rear bearing noise is more pronounced during a drive condition. The drive pinion bearings are rotating at a higher rate of speed than either the differential side bearings or the axle shaft bearing.

Differential side bearing noise will usually produce a constant, rough sound. The sound is much lower in frequency than the noise caused by drive pinion bearings.

Bearing noise can best be detected by road testing the vehicle on a smooth road (black top). However, it is easy to mistake tire noise for bearing noise. If a doubt exists, the tire treads should be examined for irregularities that often causes a noise that resembles bearing noise.

ENGINE AND TRANSMISSION NOISE

Sometimes noise that appears to be in the driveline module assembly is actually caused by the engine or the transmission. To identify the true source of the noise, note the approximate vehicle speed and/or RPM when the noise is most noticeable. Stop the vehicle next to a flat brick or cement wall (this will help reflect the sound). Place the transaxle in **NEUTRAL** . Accelerate the engine slowly up through the engine speed that matches the vehicle speed noted when the noise occurred. If the same noise is produced, it usually indicates that the noise is being caused by the engine or transaxle.

SPECIFICATIONS

2014 Jeep Cherokee Trailhawk

2014 DRIVELINE/AXLES Rear Driveline Module - Cherokee

TORQUE SPECIFICATIONS**TORQUE SPECIFICATIONS**

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Bolts, Rear Drive Module Mounting	130	96	-
Bracket, Differential to RDM	60	44	-
Bolt, Rear Propeller Shaft	21	15	-
Bolt, Pump	12	-	106
Sensor, Pressure	21	15	-
Bolt, Hydraulic Fluid Cover	6	-	53
Nut, Hub	175	129	-

1-SPEED RDM SPECIFICATIONS

DESCRIPTION	SPECIFICATION
GEAR RATIO	2.73:1
RING GEAR DIAMETER	165 mm (6.5 in.)
DIFFERENTIAL FLUID FILL CAPACITY	0.89 Liters
HYDRAULIC FLUID FILL CAPACITY	0.439 Liters

2-SPEED RDM SPECIFICATIONS

DESCRIPTION	SPECIFICATION
GEAR RATIO	2.73:1
LOW RANGE PLANETARY GEAR RATIO	2.91:1
RING GEAR DIAMETER	165 mm (6.5 in.)
DIFFERENTIAL FLUID FILL CAPACITY STANDARD	1.15 Liters
DIFFERENTIAL FLUID FILL CAPACITY WITH LOCKER	1.23 Liters
HYDRAULIC FLUID FILL CAPACITY	0.439 Liters

REMOVAL**REMOVAL**

CAUTION: Never grasp half shaft assembly by the boots. This may cause the boot to pucker or crease and reduce the service life of the boot.

Avoid over angulating or stroking the C/V joints when handling the half shaft.

Half shafts exposed to battery acid, transmission fluid, brake fluid, differential fluid or gasoline may cause the boots to deteriorate. Failure to

following these instructions will result in damage.

CAUTION: Propeller shaft installation is a two-person operation. Never allow propeller shaft to hang from the center bearing, or while only connected to the transmission or rear axle flanges. A helper is required. If a propeller shaft section is hung unsupported, damage may occur to the shaft, coupler, and/or center bearing from over-angulation. This may result in driveline vibrations and/or component failure.

1. Disconnect the battery negative cable.
2. Lift and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
3. Remove the muffler. Refer to **MUFFLER, EXHAUST, REMOVAL**.

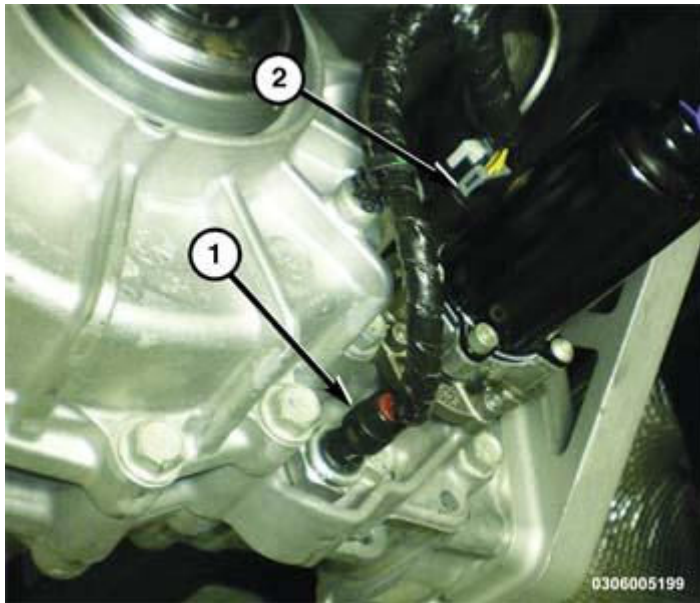


Fig. 1: Identifying Pressure Sensor And Pump Motor Electrical Connectors
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the pressure sensor electrical connector (1).
5. Disconnect the pump motor electrical connector (2).
6. Disconnect the vent hose.

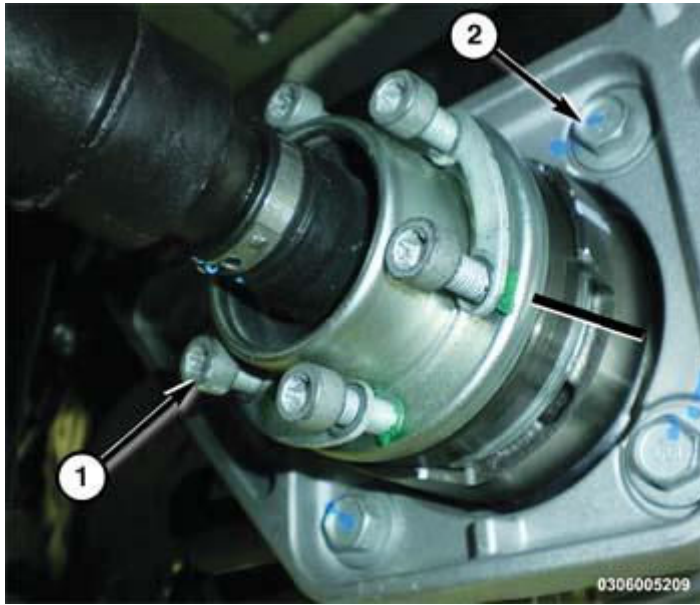


Fig. 2: Aligning Index Marks On Propeller Shaft To Pinion Flange
Courtesy of CHRYSLER GROUP, LLC

7. Apply alignment index marks to the rear propeller shaft and rear pinion flange.
8. Remove the bolts (1) holding the rear propeller shaft to the rear pinion flange.
9. Separate the rear propeller shaft from the rear pinion flange and secure the shaft to the side.

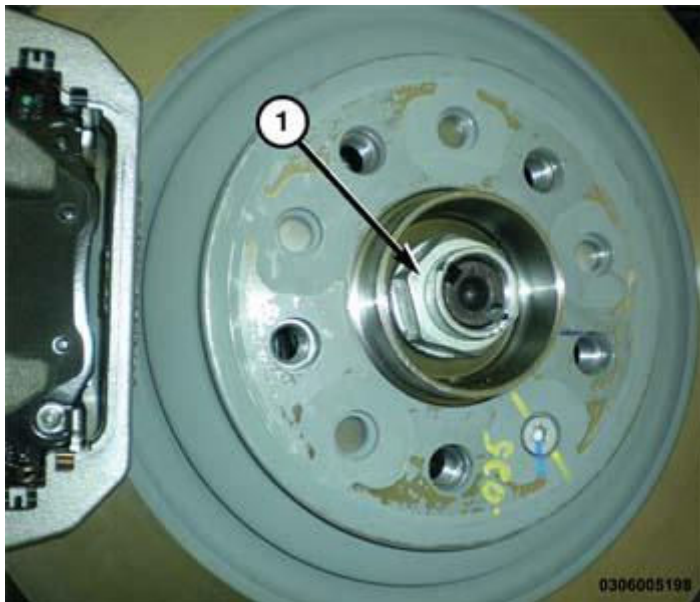
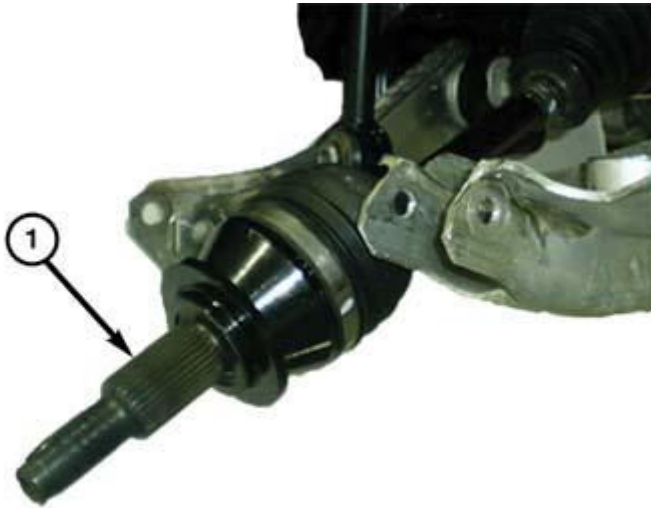


Fig. 3: Axle Shaft Nut
Courtesy of CHRYSLER GROUP, LLC

10. Using a suitable punch, remove the staking from the right side axle shaft nut (1).
11. Remove the right side axle shaft nut (1).

12. Remove the left rear knuckle. Refer to **KNUCKLE, REAR, REMOVAL**

NOTE: Mark the axle shaft for location.



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Fig. 4: Identifying Rear Half Shaft
Courtesy of CHRYSLER GROUP, LLC

13. Remove the left axle shaft (1) from the Rear drive Module.

NOTE: It may be necessary to hold the stub shafts in place when removing the axle shaft.

NOTE: Tag the axle shaft shims for location.

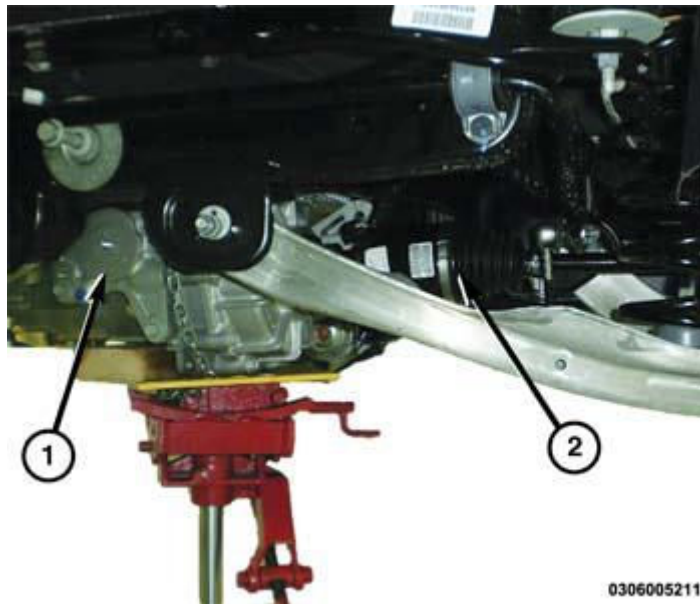


Fig. 5: Identifying Axle Shaft And Rear Drive Module
Courtesy of CHRYSLER GROUP, LLC

14. Support the Rear Drive Module (1) with a suitable jack and secure it with chains.

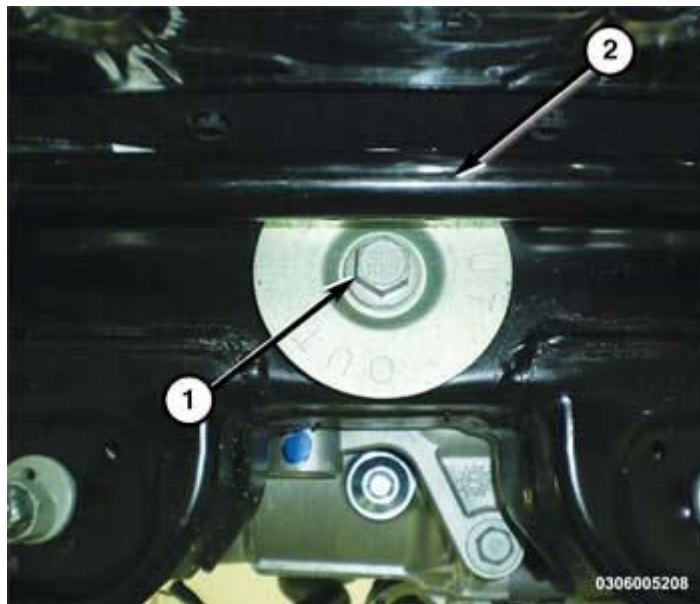


Fig. 6: Rear Mount Bolt
Courtesy of CHRYSLER GROUP, LLC

15. Remove the rear mount bolt (1) from the Rear Drive Module.

NOTE: The rear sway bar (2) may need to be repositioned out of the way to remove RDM bolt (1).

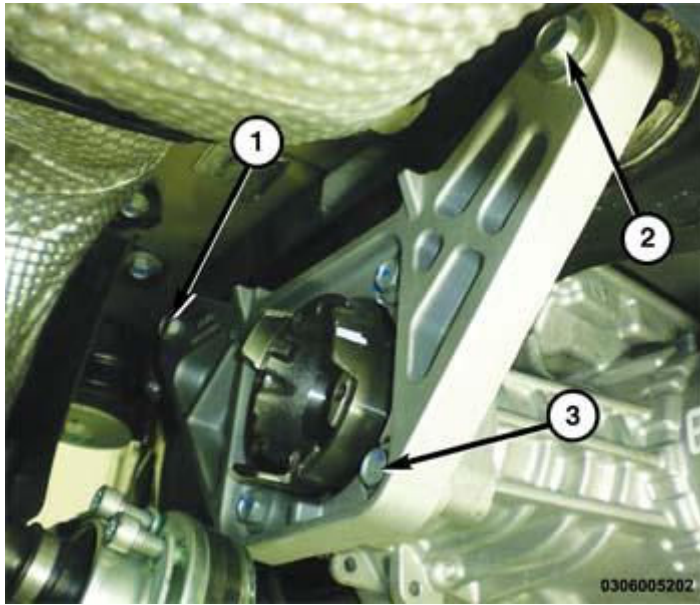


Fig. 7: Front Mount Bolts

Courtesy of CHRYSLER GROUP, LLC

16. Remove the front mount bolts (1 and 2) from the Rear Drive Module.
17. Lower the Rear Drive Module with the right axle shaft (1) attached to the Rear Drive Module.

NOTE: The right side axle shaft may need to be tapped out with a suitable tool from the right hub.

18. If necessary remove the right axle shaft.

INSTALLATION

INSTALLATION

CAUTION: Never grasp half shaft assembly by the boots. This may cause the boot to pucker or crease and reduce the service life of the boot.

Avoid over angulating or stroking the C/V joints when handling the half shaft.

Half shafts exposed to battery acid, transmission fluid, brake fluid, differential fluid or gasoline may cause the boots to deteriorate. Failure to follow these instructions will result in damage.

CAUTION: Propeller shaft installation is a two-person operation. Never allow propeller shaft to hang from the center bearing, or while only connected to the transmission or rear axle flanges. A helper is required. If a propeller

shaft section is hung unsupported, damage may occur to the shaft, coupler, and/or center bearing from over-angulation. This may result in driveline vibrations and/or component failure.

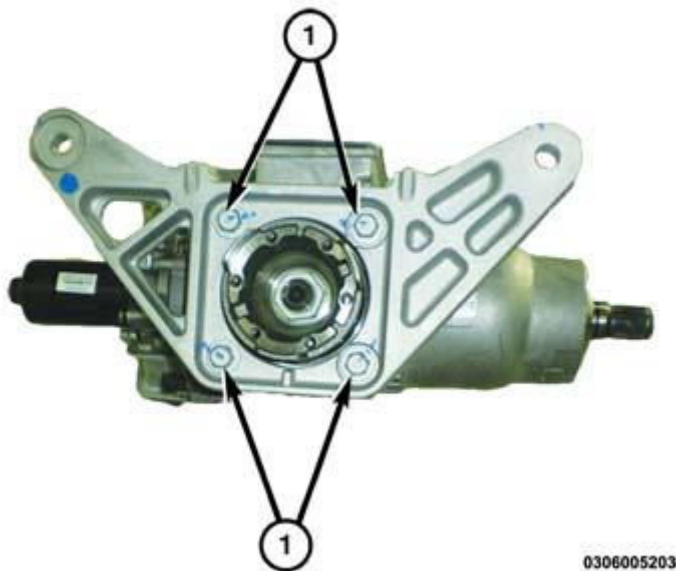


Fig. 8: Installing The Rear Drive Module (RDM) Mount Bracket And Torque Bolts
Courtesy of CHRYSLER GROUP, LLC

1. If removed, install the Rear Drive Module (RDM) mount bracket and torque bolts (1) to 60 N.m (44 ft. lbs.).

NOTE: Clean the splined mating surfaces and apply a light grease to the internal splines prior to installing halfshaft.

2. If removed, install the right axle shaft onto the RDM. Clean any residual excess grease from RDM output shaft.
3. Install the right axle shaft shim onto hub end of shaft.
4. Secure the RDM on a suitable jack and secure it with chains.
5. If service was performed to the RDM and hydraulic fluid needs to be added, refer to **FLUID, HYDRAULIC, STANDARD PROCEDURE**.
6. Raise the Rear Drive Module with the right axle shaft into position.

NOTE: There are locating pins on the RDM mount bracket. Make sure the RDM mount bracket is in the correct location.

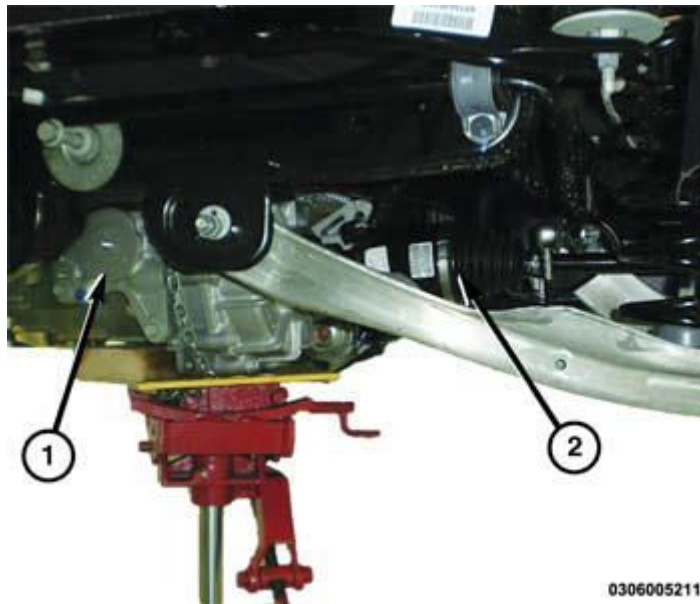


Fig. 9: Identifying Axle Shaft And Rear Drive Module
Courtesy of CHRYSLER GROUP, LLC

7. Guide the right axle shaft (2) into the right side hub.
8. Connect the vent hose.

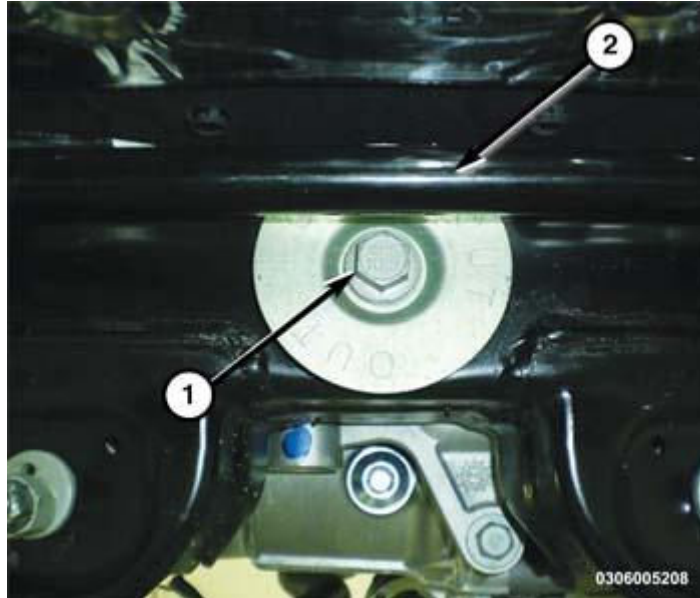


Fig. 10: Rear Mount Bolt
Courtesy of CHRYSLER GROUP, LLC

9. Install rear mount bolt into RDM.

NOTE: Do not tighten at this time.

NOTE: The rear sway bar (2) may need to be repositioned to install the RDM bolt (1).

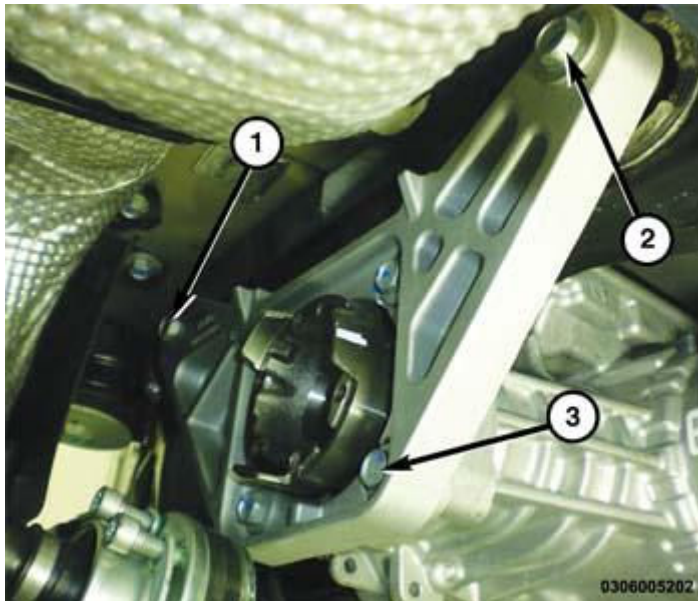


Fig. 11: Front Mount Bolts
Courtesy of CHRYSLER GROUP, LLC

10. Install the front mount bolts into the RDM.
11. Torque all RDM mount bolts to 130 N.m (96 ft.lbs.).



Fig. 12: Identifying Rear Axle Shaft
Courtesy of CHRYSLER GROUP, LLC

12. If service was performed the RDM and differential fluid needs to be added, refer to **FLUID, DIFFERENTIAL, STANDARD PROCEDURE**.

NOTE: **Clean the splined mating surfaces and apply a light grease to the internal splines prior to installing halfshaft.**

13. Install the left axle shaft onto the RDM. Clean any residual excess grease from RDM output shaft.
14. Install the axle shaft shim onto hub end of the shaft.
15. Install the left rear knuckle. Refer to **KNUCKLE, REAR, INSTALLATION** .

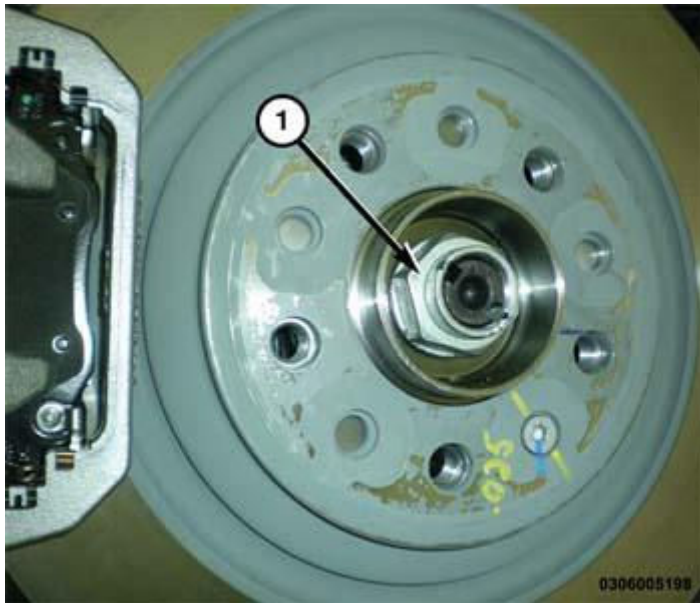
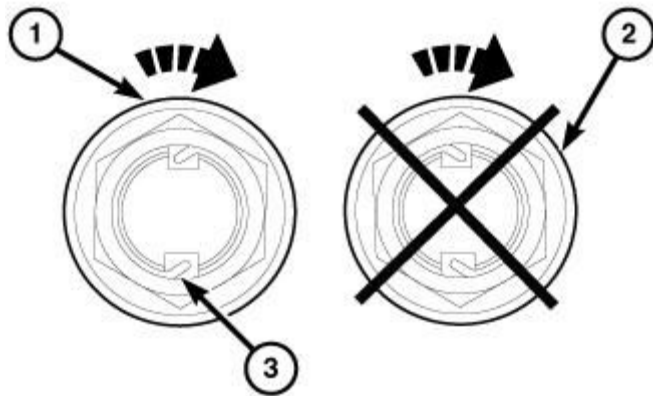


Fig. 13: Axle Shaft Nut
Courtesy of CHRYSLER GROUP, LLC

NOTE: **Always install a new hub nut. The original hub nut is one-time use only and must be discarded when removed.**

16. Install a **new** right axle shaft nut (1) and torque to 200 N.m (148 ft. lbs.).



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Fig. 14: Correct Hub Nut Staking
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not use air tools while staking hub nut.

17. Using the staking tool (special tool #10287, Tool, Front Hub Staking), align the leading cutting edge of tool with the top left side channel on axle as shown in the illustration (1). Tighten fastener on staking tool with hand tools until the threads bottom out completely.

NOTE: The hub nut must be staked so that it looks similar to **Fig. 14**. Both edges must be split and bent into the shape shown in the illustration (3). The staking must be in the opposite direction from the forward rotation of the wheel.

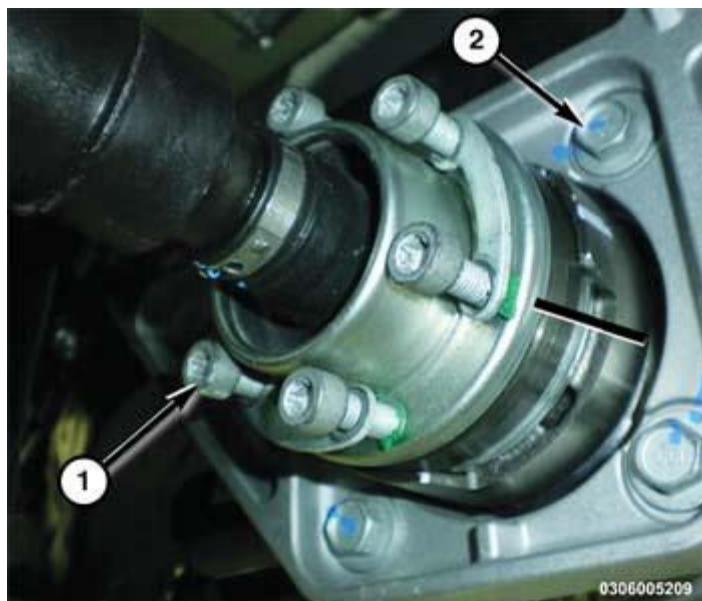


Fig. 15: Aligning Index Marks On Propeller Shaft To Pinion Flange
Courtesy of CHRYSLER GROUP, LLC

18. Connect the rear prop shaft to the alignment mark and torque bolts (1) to 21 N.m (15 ft. lbs.).

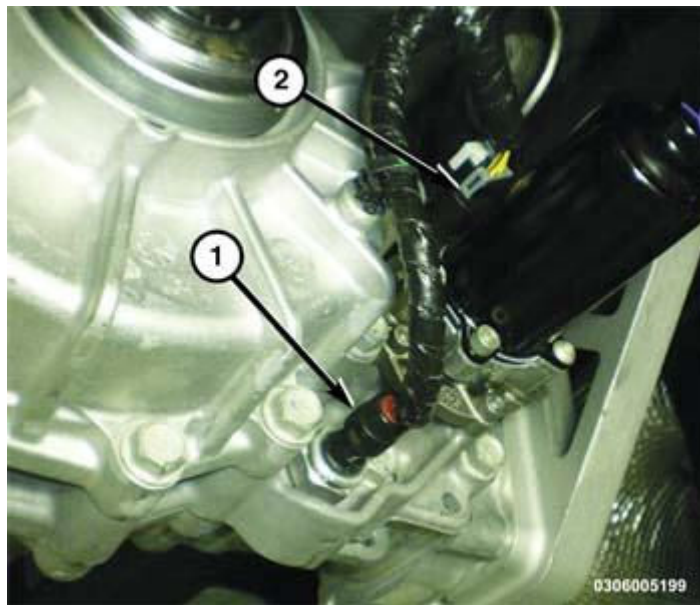


Fig. 16: Identifying Pressure Sensor And Pump Motor Electrical Connectors
Courtesy of CHRYSLER GROUP, LLC

19. Connect the pump motor electrical connector (2).
20. Connect the pressure sensor electrical connector (1).
21. Install the muffler. Refer to **MUFFLER, EXHAUST, INSTALLATION** .

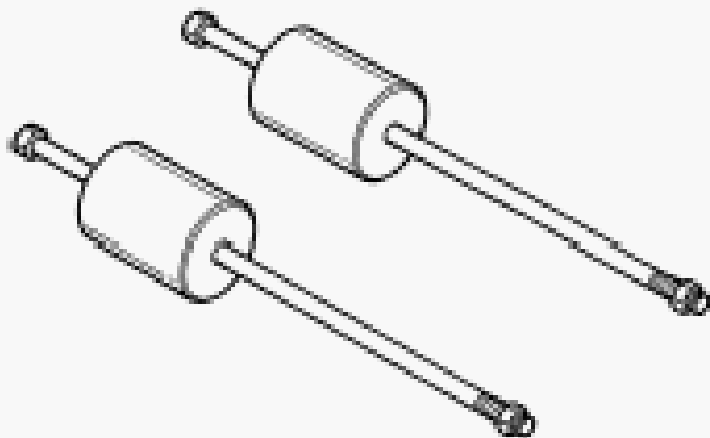
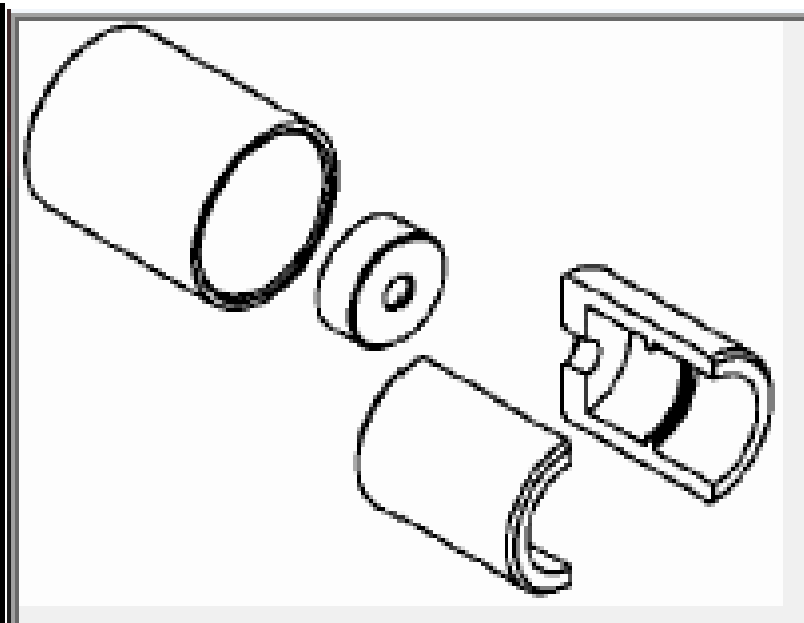
SPECIAL TOOLS

SPECIAL TOOLS

	8420B - Remover, Shaft (Originally Shipped In Kit Number(s) 8660CC, 8662CC, 8660, 8662, 8664, 8668, 8710, 8710CC.)
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2014 Jeep Cherokee Trailhawk

2014 DRIVELINE/AXLES Rear Driveline Module - Cherokee

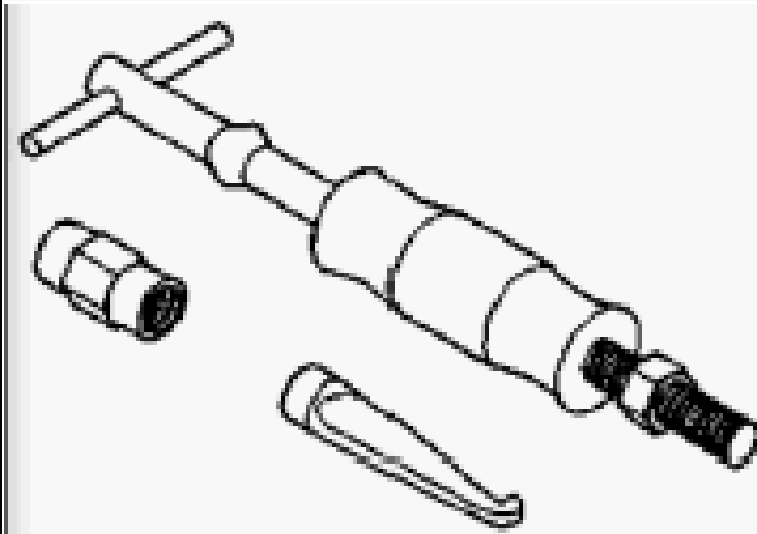
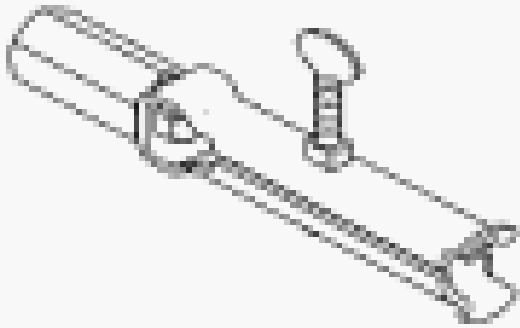


C-3752 - Slide Hammers
(Originally Shipped In Kit Number(s)
9202, 9202A-CAN, 9202-CAN, 9202CC.)

9585 - Remover, Bearing Cup
(Originally Shipped In Kit Number(s)
9691.)

2014 Jeep Cherokee Trailhawk

2014 DRIVELINE/AXLES Rear Driveline Module - Cherokee

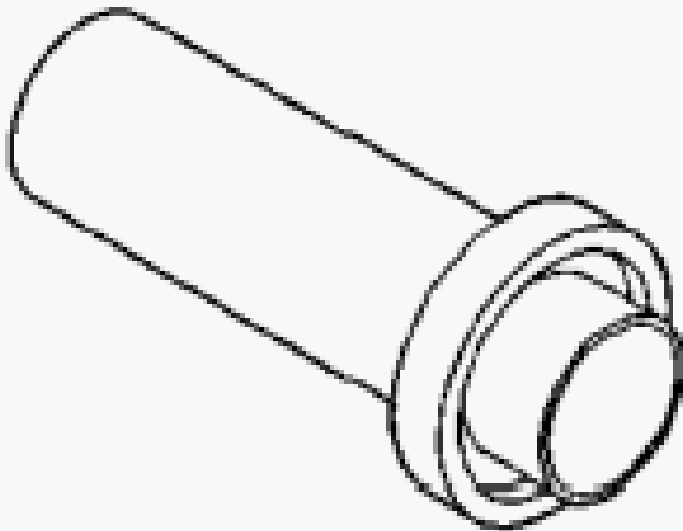
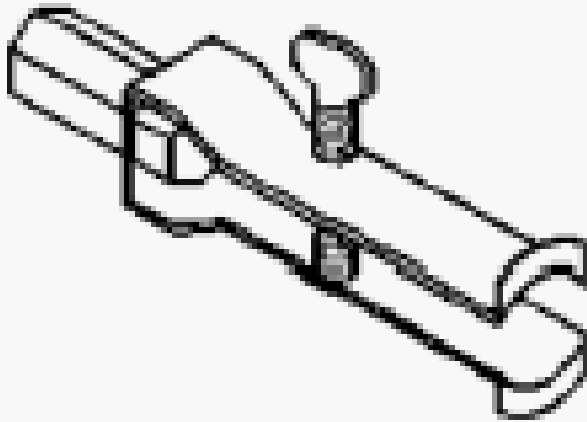


C-637 - Slide Hammer, Universal
(Originally Shipped In Kit Number(s)
9202.)

7794-A - Remover, Seal
(Originally Shipped In Kit Number(s)
6645.)

2014 Jeep Cherokee Trailhawk

2014 DRIVELINE/AXLES Rear Driveline Module - Cherokee

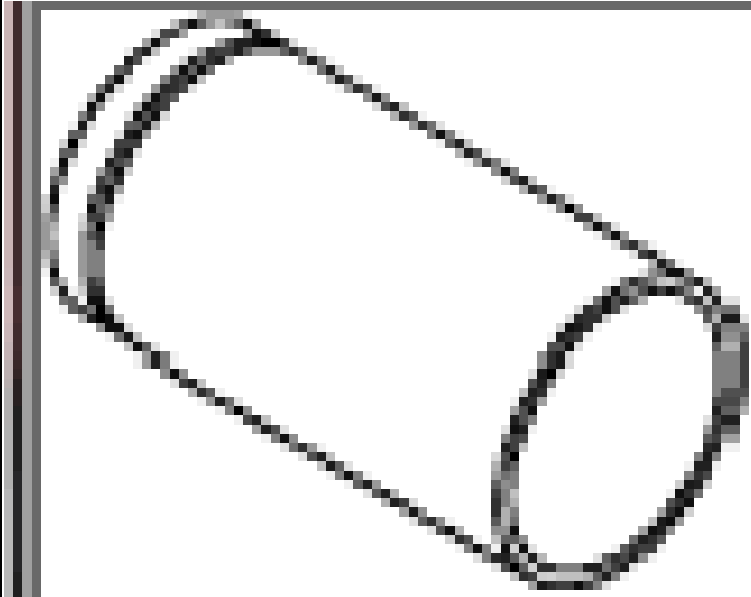
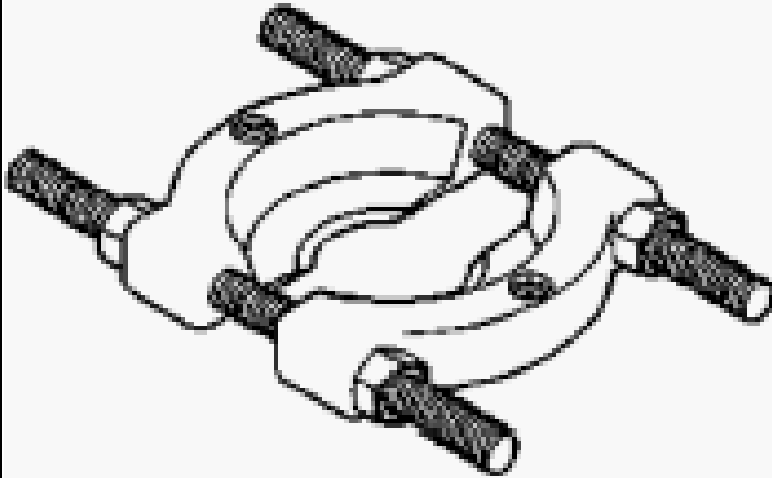


6952A - Installer, Seal
(Originally Shipped In Kit Number(s)
6945, 6947, 6949.)

P-334 - Splitter, Bearing

2014 Jeep Cherokee Trailhawk

2014 DRIVELINE/AXLES Rear Driveline Module - Cherokee

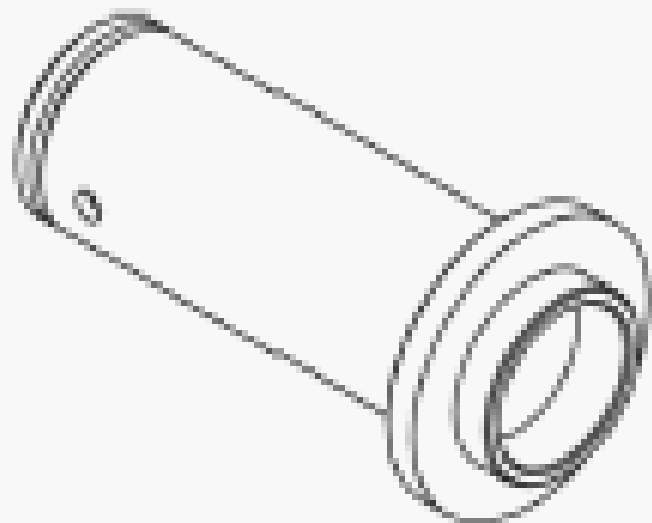
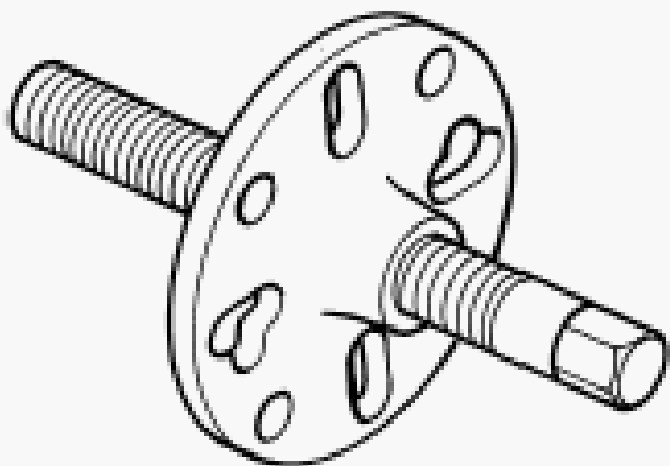


8975-2 - Cup, Remover
(Originally Shipped In Kit Number(s)
8887, 8887CC.)

C-452 - Puller, Companion Flange

2014 Jeep Cherokee Trailhawk

2014 DRIVELINE/AXLES Rear Driveline Module - Cherokee

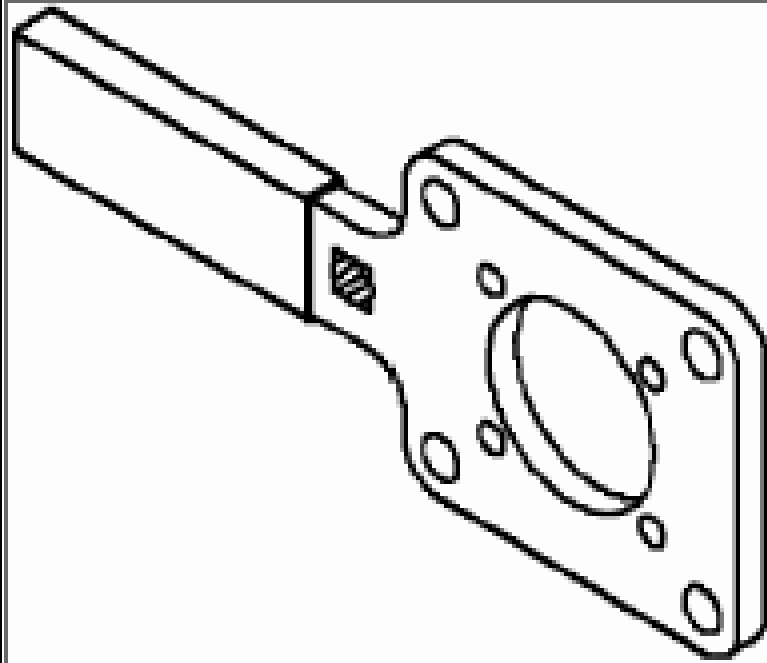
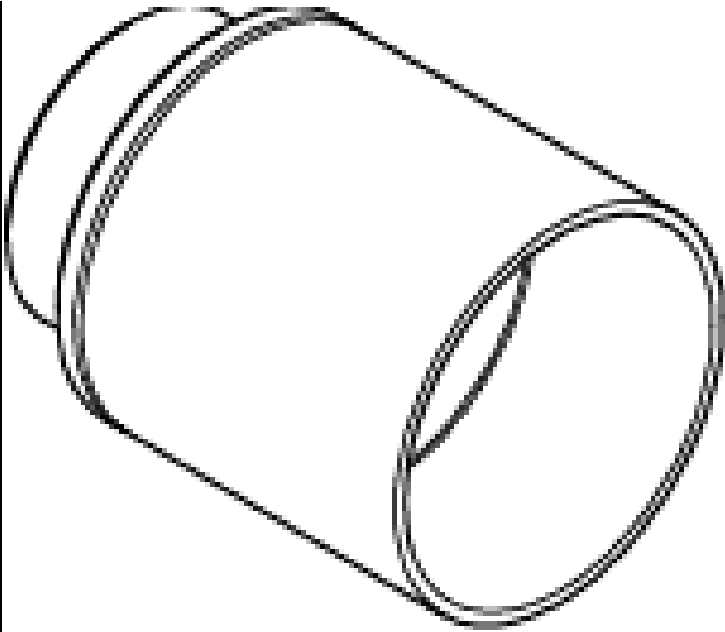


9987 - Installer, Seal
(Originally Shipped In Kit Number(s)
10006, 9978.)

9776-2 - Cup, Receiver
(Originally Shipped In Kit Number(s).)

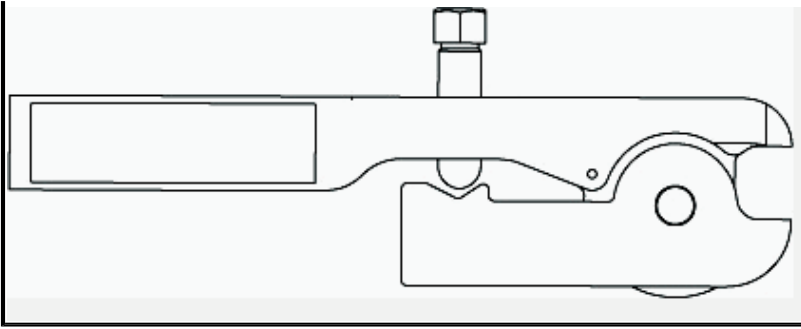
2014 Jeep Cherokee Trailhawk

2014 DRIVELINE/AXLES Rear Driveline Module - Cherokee



8979 - Wrench, Pinion Flange
(Originally Shipped In Kit Number(s)
8999.)

10287-1 - Tool, Staking
(Originally Shipped In Kit Number(s).)



CASE ASSEMBLY, DIFFERENTIAL

DESCRIPTION

DESCRIPTION

The differential gear system divides the torque between the axle shafts. It allows the axle shafts to rotate at different speeds when turning corners.

Each differential side gear is splined to an axle shaft. The pinion gears are mounted on a pinion mate shaft and are free to rotate on the shaft. The pinion gear is fitted in a bore in the differential case and is positioned at a right angle to the axle shafts.

OPERATION

OPERATION

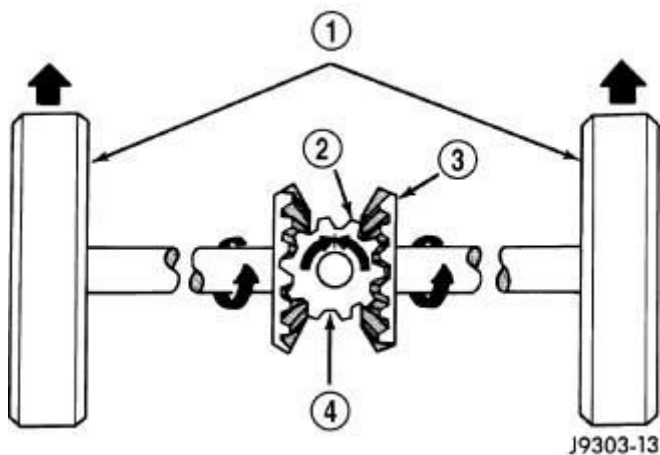


Fig. 17: Differential Operation-Straight Ahead Driving
Courtesy of CHRYSLER GROUP, LLC

- 1 - IN STRAIGHT AHEAD DRIVING EACH WHEEL ROTATES AT 100% OF CASE SPEED
- 2 - PINION GEAR
- 3 - SIDE GEAR

4 - PINION GEARS ROTATE WITH CASE

In operation, power flow occurs as follows:

- The pinion gear (2) rotates the ring gear
- The ring gear (bolted to the differential case) rotates the case
- The differential pinion gears (mounted on the pinion mate shaft in the case) rotate the side gears
- The side gears (splined to the axle shafts) rotate the shafts

During straight-ahead driving, the differential pinion gears do not rotate on the pinion mate shaft. This occurs because input torque applied to the gears is divided and distributed equally between the two side gears. As a result, the pinion gears revolve with the pinion mate shaft but do not rotate around it.

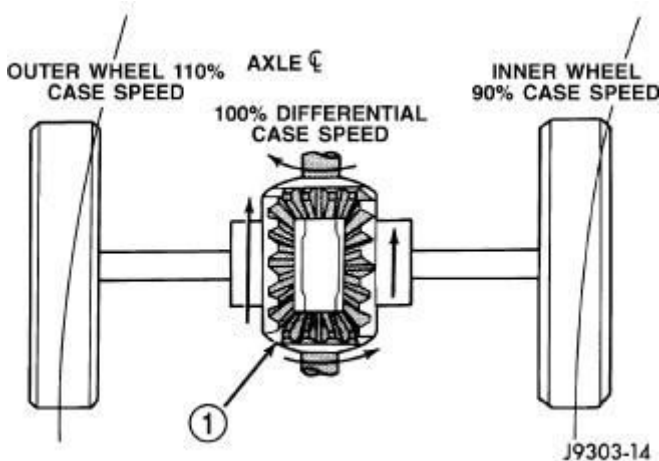


Fig. 18: Differential Operation-On Turns
Courtesy of CHRYSLER GROUP, LLC

1 - PINION GEARS ROTATE ON PINION SHAFT

When turning corners, the outside wheel must travel a greater distance than the inside wheel to complete a turn. The difference must be compensated for to prevent the tires from scuffing and skidding through turns. To accomplish this, the differential allows the axle shafts to turn at unequal speeds. In this instance, the input torque applied to the pinion gears is not divided equally. The pinion gears now rotate around the pinion mate shaft in opposite directions. This allows the side gear and axle shaft attached to the outside wheel to rotate at a faster speed.

FLUID, DIFFERENTIAL

STANDARD PROCEDURE

STANDARD PROCEDURE-DIFFERENTIAL FLUID FILL

The differential is fluid is fill for life.

The fill plug (1) for the differential assembly is located on rear of the Rear Drive Module (RDM).

The correct fill level is to the bottom of the fill plug hole. Be sure the vehicle is on a level surface, or is hoisted in a level manner, in order to obtain the correct fill level.

Differential fluid must be equalized though out differential. It may take a couple of minutes for the fluid to equalize.

1. Raise and support the vehicle on a hoist. Refer to **HOISTING, STANDARD PROCEDURE** .

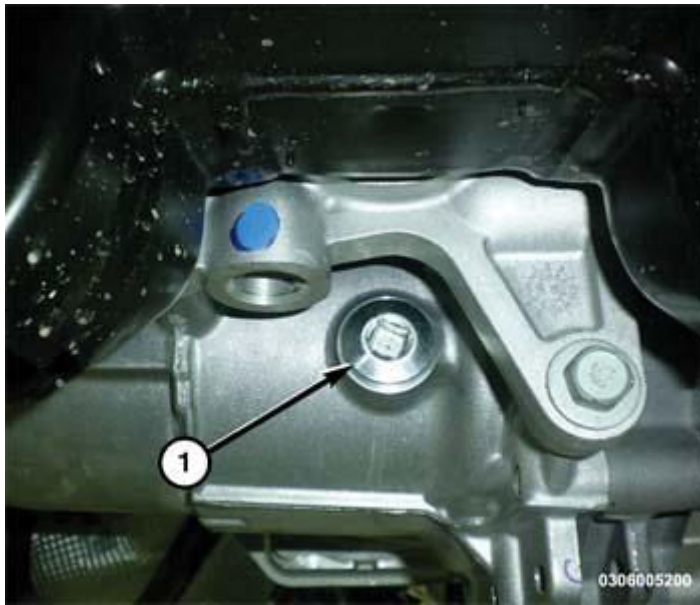


Fig. 19: Differential Fill Plug

Courtesy of CHRYSLER GROUP, LLC

2. Position a drain pan under the differential fill plug (1).
3. Remove the differential fill plug (1).

NOTE: When filling the differential, it may take several minutes for the fluid to equalize, it is necessary to allow for fluid equalization to determine if the fluid level is correct when filling.

4. Using a suction gun or equivalent, fill the differential assembly to the bottom of the fill plug. If removed for service the fluid capacities are 89L (.94 Quarts) if single speed, 1.15 L (1.2 Quarts) if two speed standard, 1.23 L (1.3 Quarts) if two speed with locker of Mopar® specified MS-2395 fluid (70W-80). Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** .

CAUTION: RDM fluid contains a special modifier package for the wet clutch. Use of any other fluid not meeting the manufacturer specifications will cause damage to the RDM.

5. Install the fill plug (1) and torque to 35 N.m (26 ft. lbs.).

SEAL, INPUT FLANGE

REMOVAL

REMOVAL

NOTE: The pinion turning torque must be measured before the pinion flange is removed, for correct installation.

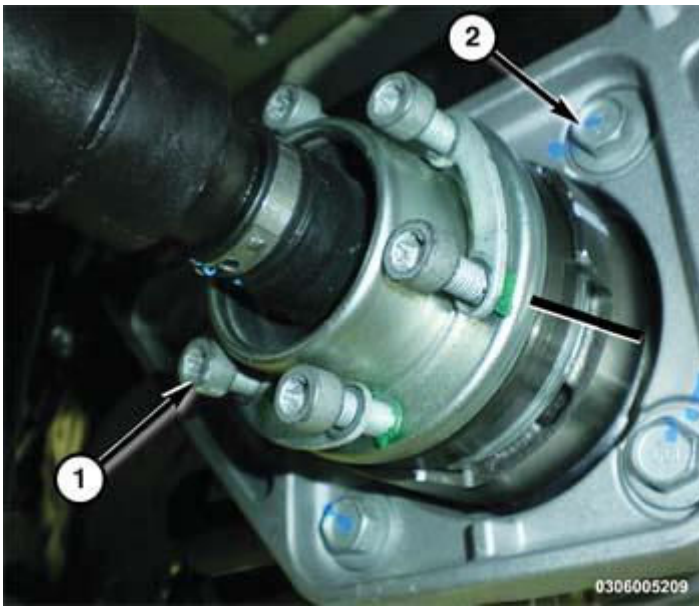
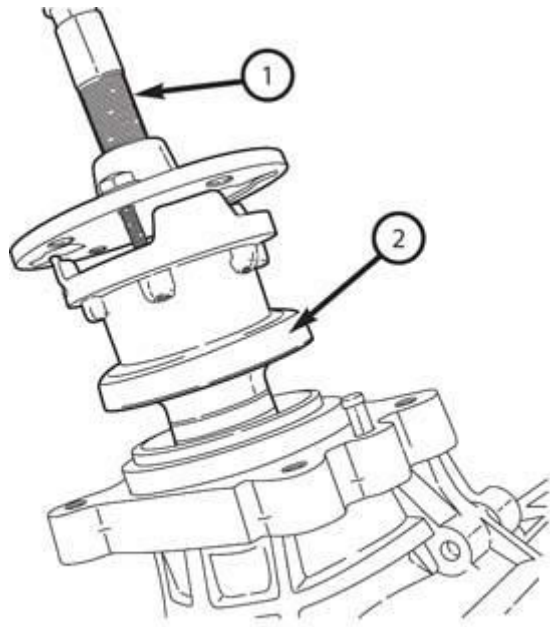


Fig. 20: Aligning Index Marks On Propeller Shaft To Pinion Flange
Courtesy of CHRYSLER GROUP, LLC

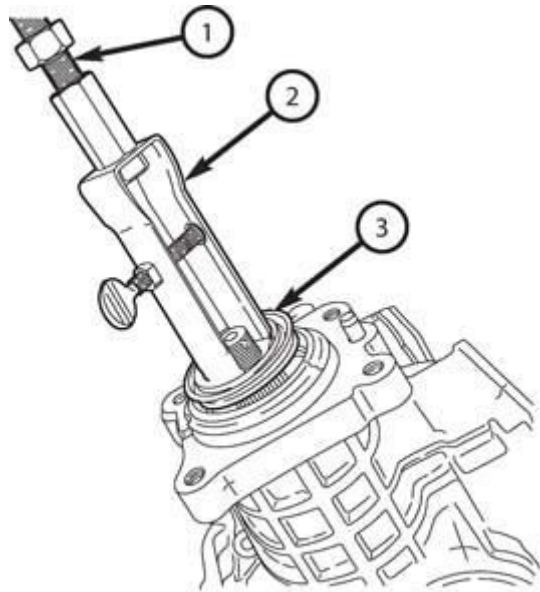
1. Apply alignment index marks to the rear propeller shaft and rear pinion flange.
2. Remove the bolts (1) holding the rear propeller shaft to the rear pinion flange.
3. Separate the rear propeller shaft from the rear pinion flange and secure the shaft to the side.
4. Measure and record pinion turning torque.
5. Using suitable chisel, remove the staking from the pinion nut.
6. Remove the pinion nut.



030674758

Fig. 21: Removing The Pinion Flange
Courtesy of CHRYSLER GROUP, LLC

7. Using (special tool #C-452, Puller, Companion Flange) (1), remove the pinion flange (2).

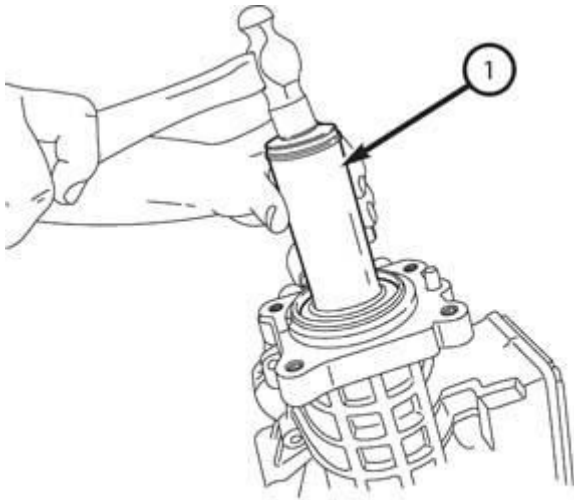


030674759

Fig. 22: Removing The Pinion Seal Using Special Tool
Courtesy of CHRYSLER GROUP, LLC

8. Remove the pinion seal (3) using (special tool #7794-A, Remover, Seal) (2) and (special tool #C-637, Slide Hammer, Universal) (1).

9. Clean and inspect the sealing surface on the pinion flange, if damaged install a **NEW** pinion flange. If the pinion seal bore is damaged it will be necessary to replace the Differential, Rear Axle assembly.

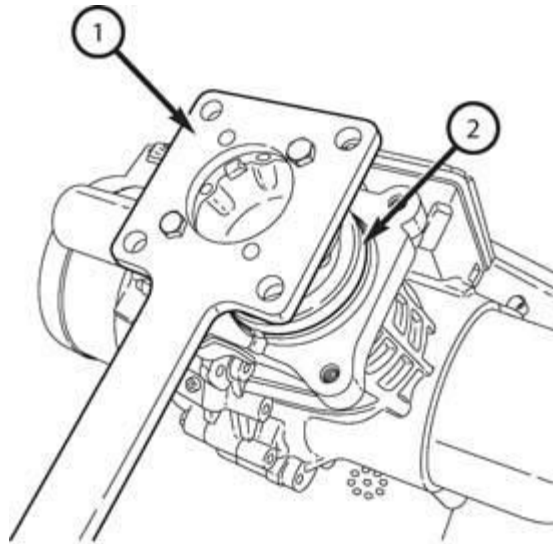
INSTALLATION**INSTALLATION**

030674760

Fig. 23: Installing Pinion Seal Using Special Tool**Courtesy of CHRYSLER GROUP, LLC**

1. Install the pinion seal using (special tool #9987, Installer, Seal) (1).
2. Clean splines, apply Mopar® thread sealant meeting MS-CD95A or equivalent to the splines in the flange.

NOTE: For pinion flange installation 3-5 (in. lbs.) must be added to the original measured pinion turning torque.



030674751

Fig. 24: Installing Pinion Nut Using Special Tool
Courtesy of CHRYSLER GROUP, LLC

3. Place the pinion flange on the splines of the pinion.
4. Install a **NEW** pinion nut and tighten using (special tool #8979, Wrench, Pinion Flange) (1).

NOTE: **Do not over tighten pinion nut. The turning torque must be 3-5 (in lbs.) more than the turning torque before removal.**

5. Measure the pinion turning torque, adding 3-5 (in. lbs.) to pinion nut measurement that was measured before pinion flange removal.
6. Using a suitable chisel, stake the pinion nut on both sides of the nut.

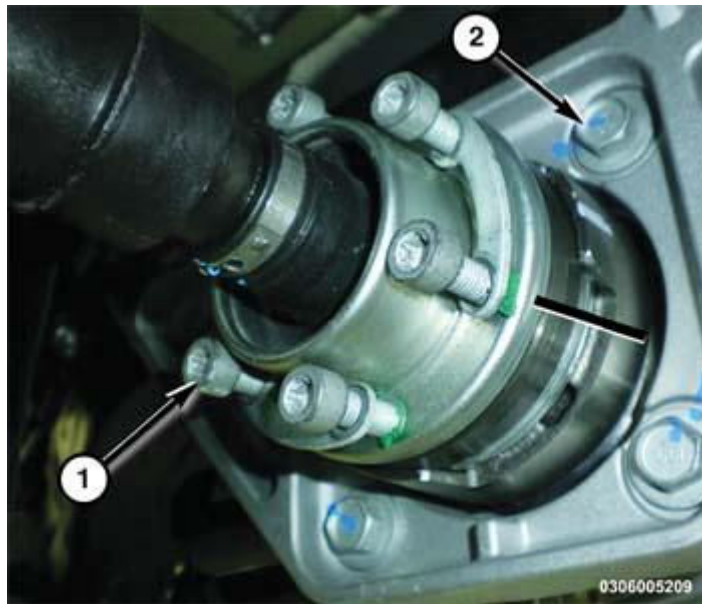


Fig. 25: Aligning Index Marks On Propeller Shaft To Pinion Flange
Courtesy of CHRYSLER GROUP, LLC

7. Connect the rear prop shaft with the alignment marks lined up.
8. Torque rear prop shaft bolts (1) to 21 N.m 15 (ft. lbs.).
9. Fill the differential, rear axle. Refer to **FLUID, DIFFERENTIAL, STANDARD PROCEDURE**.

SEAL, OUTPUT FLANGE

REMOVAL

ONE SPEED

1. Disconnect battery negative cable.
2. Raise and support vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Remove rear knuckle. Refer to **KNUCKLE, REAR, REMOVAL** .



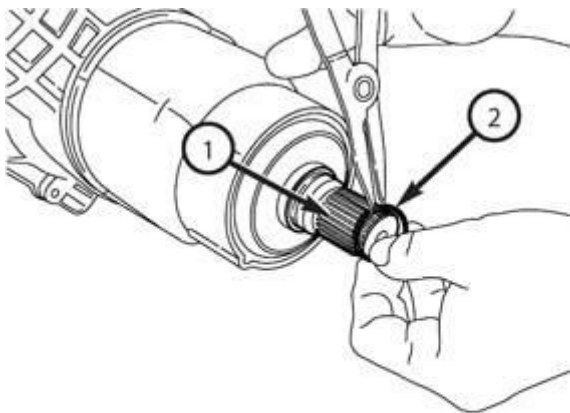
0306005204

Fig. 26: Identifying Rear Axle Shaft
Courtesy of CHRYSLER GROUP, LLC

4. Remove the axle shaft (1) from the Differential, Rear Axle.

NOTE: The output shaft may need to be held in place when removing the axle shaft.

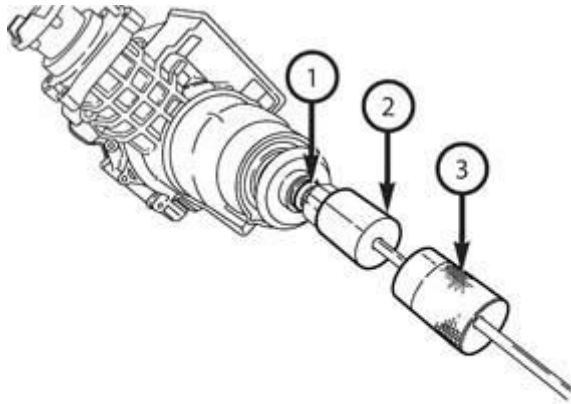
NOTE: Tag the axle shaft shim for location.



030674756

Fig. 27: Removing Clip From Output Shaft
Courtesy of CHRYSLER GROUP, LLC

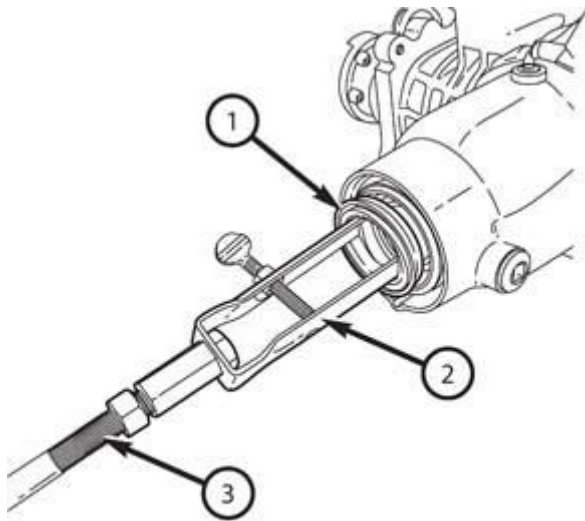
5. Remove clip (2) from output shaft (1).



030674757

Fig. 28: Removing Output Shaft Using Special Tools
Courtesy of CHRYSLER GROUP, LLC

6. Using (special tool #8420B, Remover, Shaft) (2) and (special tool #C-637, Slide Hammer, Universal) (3) remove the output shaft (1).



030674754

Fig. 29: Removing The Output Shaft Seal
Courtesy of CHRYSLER GROUP, LLC

7. Remove the output shaft seal (1) using (special tool #7794-A, Remover, Seal) (2) and (special tool #C-637, Slide Hammer, Universal) (3).
8. Clean and inspect the sealing surface on the output shaft, if damaged install a **NEW** output shaft. If the pinion seal bore is damaged it will be necessary to replace the Differential, Rear Axle assembly.

TWO SPEED - LEFT

1. Disconnect battery negative cable.
2. Raise and support vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Remove rear knuckle. Refer to **KNUCKLE, REAR, REMOVAL** .

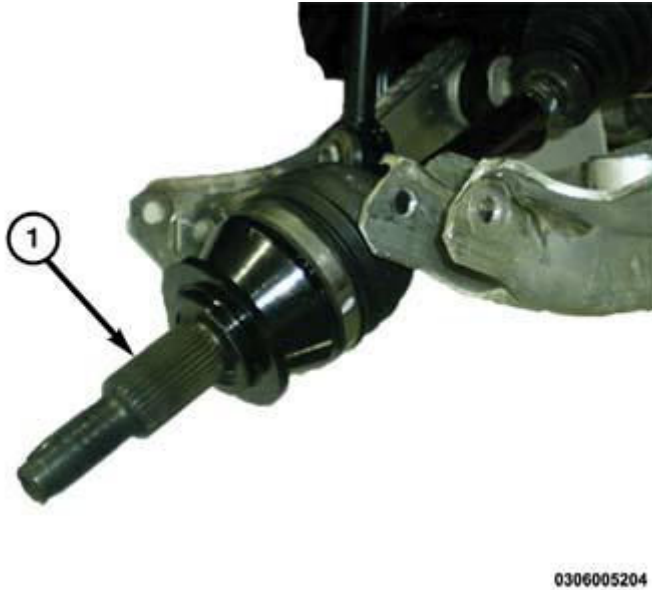
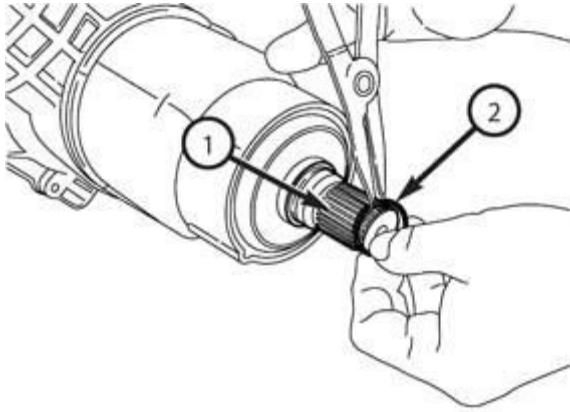


Fig. 30: Identifying Axle Half Shaft
Courtesy of CHRYSLER GROUP, LLC

4. Remove the axle shaft (1) from Rear Axle Differential.

NOTE: The output shaft may need to be held in place when removing the axle shaft.

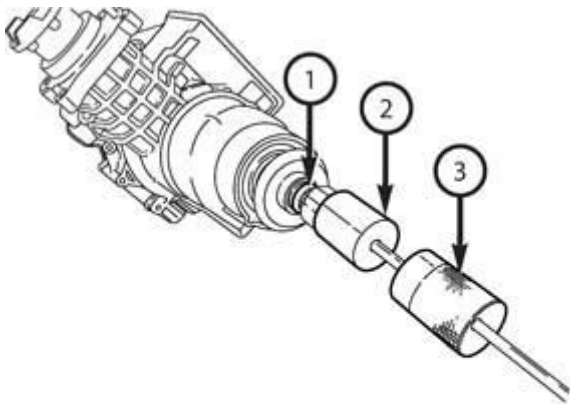
NOTE: Tag the axle shaft shim for location.



030674756

Fig. 31: Removing Clip From Output Shaft
Courtesy of CHRYSLER GROUP, LLC

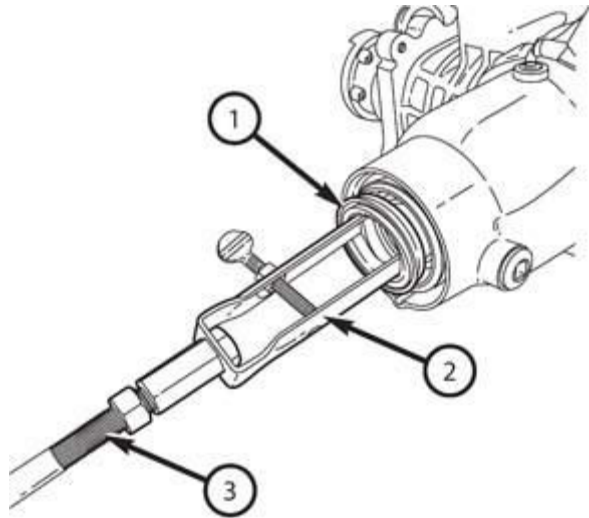
5. Remove clip (2) from output shaft (1).



030674757

Fig. 32: Removing Output Shaft Using Special Tools
Courtesy of CHRYSLER GROUP, LLC

6. Using (special tool #8420B, Remover, Shaft) (2) and (special tool #C-637, Slide Hammer, Universal) (3) remove the output shaft (1).



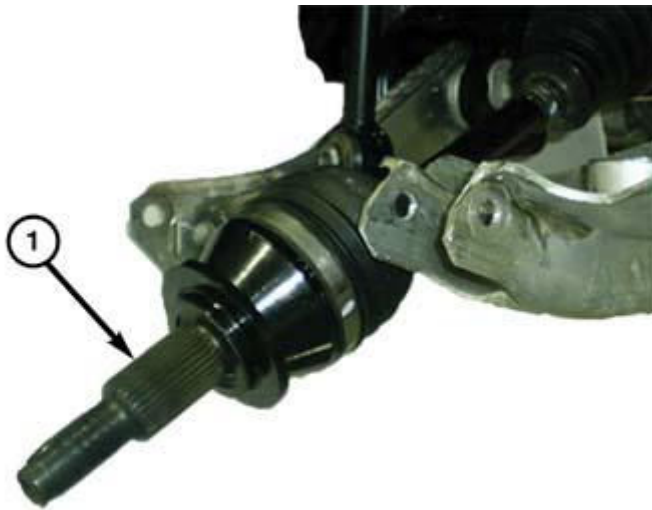
030674754

Fig. 33: Removing The Output Shaft Seal
Courtesy of CHRYSLER GROUP, LLC

7. Remove the output shaft seal (1) using (special tool #7794-A, Remover, Seal) (2) and (special tool #C-637, Slide Hammer, Universal) (3).
8. Clean and inspect the sealing surface on the output shaft, if damaged install a **NEW** output shaft. If the pinion seal bore is damaged it will be necessary to replace the Differential, Rear Axle assembly.

TWO SPEED - RIGHT

1. Disconnect battery negative cable.
2. Raise and support vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Remove rear knuckle. Refer to **KNUCKLE, REAR, REMOVAL** .

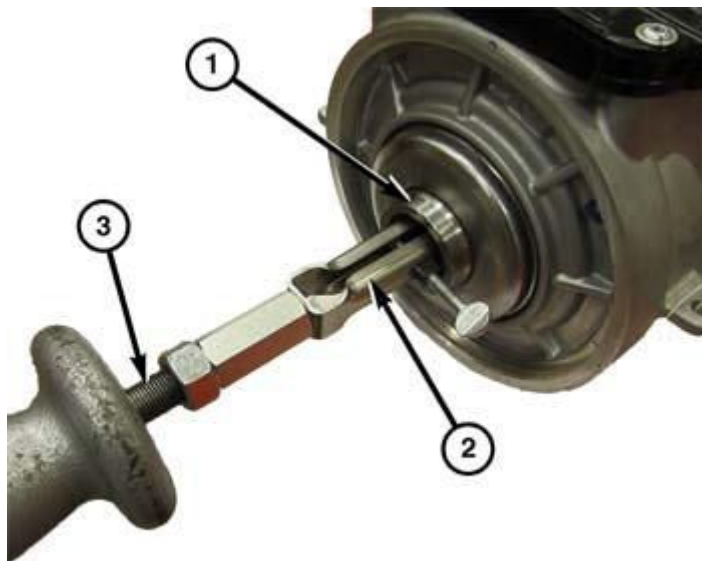


0306005204

Fig. 34: Removing The Axle Shaft From Rear Axle Differential
Courtesy of CHRYSLER GROUP, LLC

4. Remove the axle shaft (1) from Rear Axle Differential.

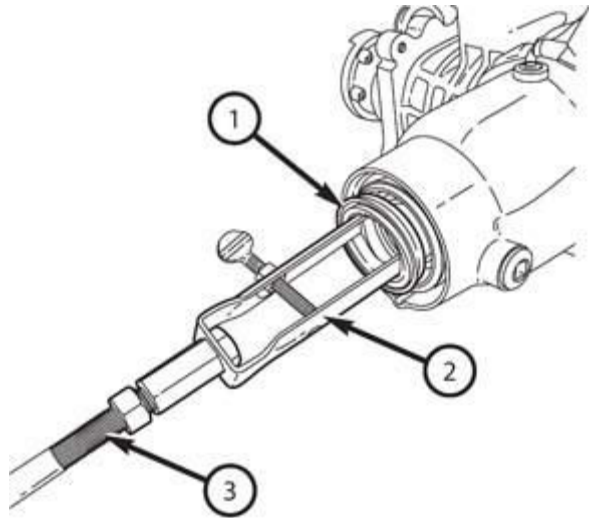
NOTE: Tag the axle shaft shim for location.



1722017968

Fig. 35: Removing The Output Shaft
Courtesy of CHRYSLER GROUP, LLC

5. If equipped with two speed with locker, carefully remove the dust deflector using a slide hammer. If equipped with a two speed non locking differential, using (special tool #9585, Remover, Bearing Cup) (2) and (special tool #C-637, Slide Hammer, Universal) (3) remove the output shaft (1).



030674754

Fig. 36: Removing The Output Shaft Seal
Courtesy of CHRYSLER GROUP, LLC

6. If equipped with a two speed locking differential, pry the seal out with an appropriate screwdriver being careful not to damage the seal bore. If equipped with a two speed non locking differential, remove the output shaft seal (1) using (special tool #7794-A, Remover, Seal) (2) and (special tool #C-637, Slide Hammer, Universal) (3).

NOTE: Left side shown in the illustration, right side similar.

7. Clean and inspect the sealing surface on the output shaft, if damaged install a **NEW** output shaft. If the pinion seal bore is damaged it will be necessary to replace the Differential, Rear Axle assembly.

INSTALLATION

ONE SPEED

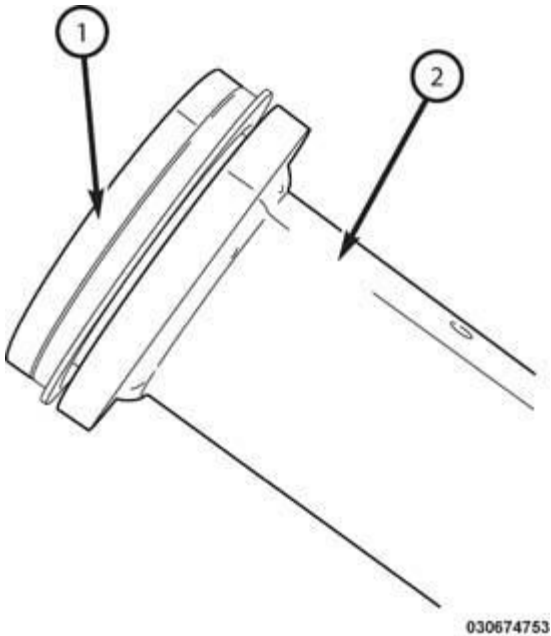


Fig. 37: Installing The Output Seal Onto Special Tool
Courtesy of CHRYSLER GROUP, LLC

1. Install the output seal (1) onto (special tool #6952A, Installer, Seal) (2).

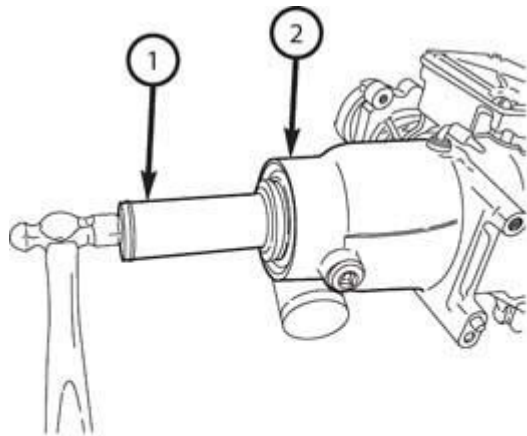
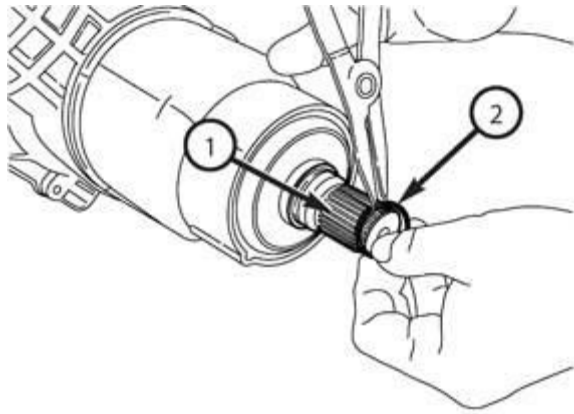


Fig. 38: Installing The Output Seal Using Special Tool
Courtesy of CHRYSLER GROUP, LLC

2. Install the output seal using (special tool #6952A, Installer, Seal) (1).
3. Install the output shaft into the Rear Axle Differential.

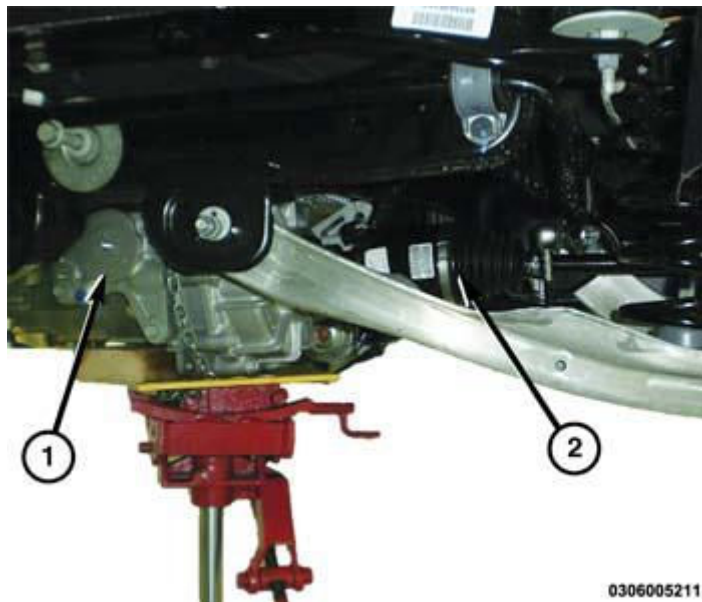


030674756

Fig. 39: Installing Clip Onto Output Shaft
Courtesy of CHRYSLER GROUP, LLC

4. Install a new circlip (2) onto output shaft (1).
5. Install the axle shaft shim on the hub end of the shaft.

NOTE: Use care when installing halfshaft to axle assembly. The halfshaft installation angle should be minimized to avoid damage to the seal upon installation.



0306005211

Fig. 40: Installing The Half Shaft Onto The Rear Drive Module
Courtesy of CHRYSLER GROUP, LLC

NOTE: Lightly apply a light grease to the splines prior to installing halfshaft.

6. Install the axle shaft (2) onto the Rear Axle Differential (1).

NOTE: Be sure the axle shaft is installed fully into circlip.

7. Install the rear knuckle. Refer to **KNUCKLE, REAR, INSTALLATION** .
8. Fill the differential fluid. Refer to **FLUID, DIFFERENTIAL, STANDARD PROCEDURE**.

TWO SPEED - LEFT

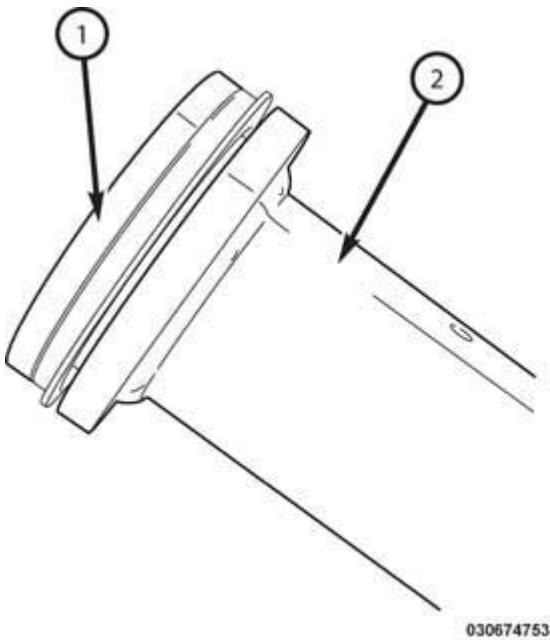
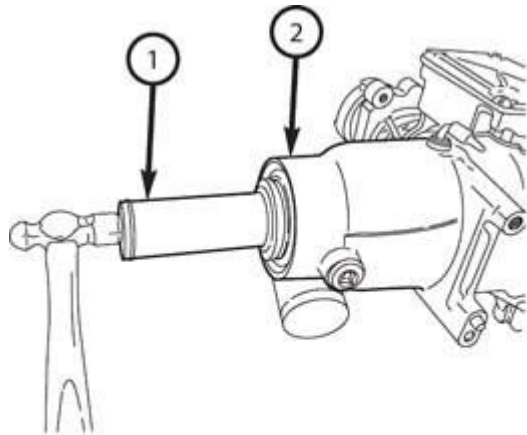


Fig. 41: Installing The Output Seal Onto Special Tool
Courtesy of CHRYSLER GROUP, LLC

1. Install the output seal (1) onto (special tool #10117, Installer, Seal) (2).

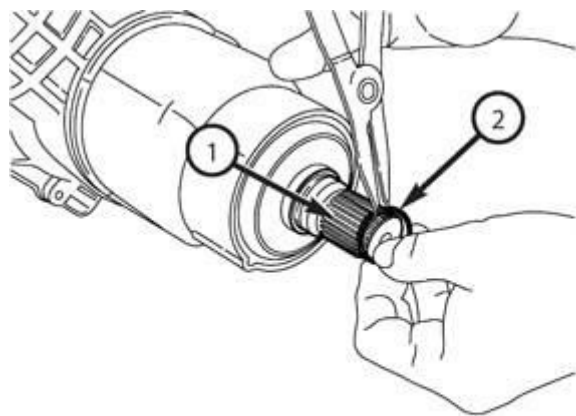


030674755

Fig. 42: Installing The Output Seal Using Special Tool
Courtesy of CHRYSLER GROUP, LLC

2. Install the output seal using (special tool #10117, Installer, Seal) (1).
3. Install the output shaft into the Differential, Rear Axle.

NOTE: Always use (special tool #9099, Seal Protector, Differential Output) when installing shaft into Rear Axle Differential. If Seal Protector is new, split at the seam before using.



030674756

Fig. 43: Installing A New Circlip Onto Output Shaft
Courtesy of CHRYSLER GROUP, LLC

4. Install a new circlip (2) onto output shaft (1).

5. Install the axle shaft shim on the hub end of the shaft.

NOTE: Use care when installing halfshaft to axle assembly. The halfshaft installation angle should be minimized to avoid damage to the seal upon installation.

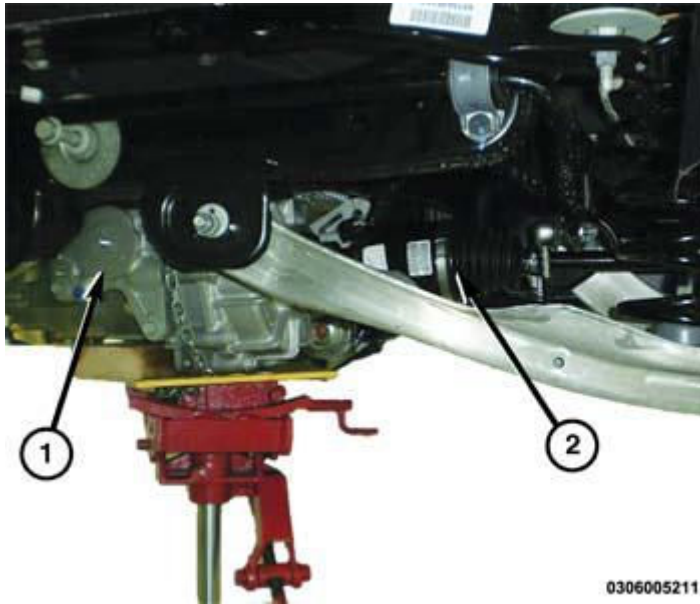


Fig. 44: Installing The Half Shaft Onto The Rear Drive Module
Courtesy of CHRYSLER GROUP, LLC

NOTE: Lightly apply a light grease to the splines prior to installing halfshaft.

6. Install the axle shaft (2) onto the output shaft.

NOTE: Be sure the axle shaft is installed fully into circlip.

7. Install the rear knuckle. Refer to **KNUCKLE, REAR, INSTALLATION** .
8. Fill the differential fluid. Refer to **FLUID, DIFFERENTIAL, STANDARD PROCEDURE**.

TWO SPEED - RIGHT



0303026982

Fig. 45: Installing The Output Seal Using Special Tool
Courtesy of CHRYSLER GROUP, LLC

1. Install the output seal using (special tool #D-163, Installer, Seal) and (special tool #C-4171-2, Extension, Drive Handle).
2. If equipped with a two speed with locker, install dust deflector onto shaft. If equipped with a two speed non locking differential install the output shaft into the Rear Axle Differential.

NOTE: Always use (special tool #9099, Seal Protector, Differential Output) when installing shaft into the Differential, Rear Axle. If seal protector is new, split at the seam before using.

3. Install a new circlip to the output shaft.
4. Install the axle shaft shim on the hub end of the shaft.

NOTE: Use care when installing halfshaft to axle assembly. The halfshaft installation angle should be minimized to avoid damage to the seal upon installation.

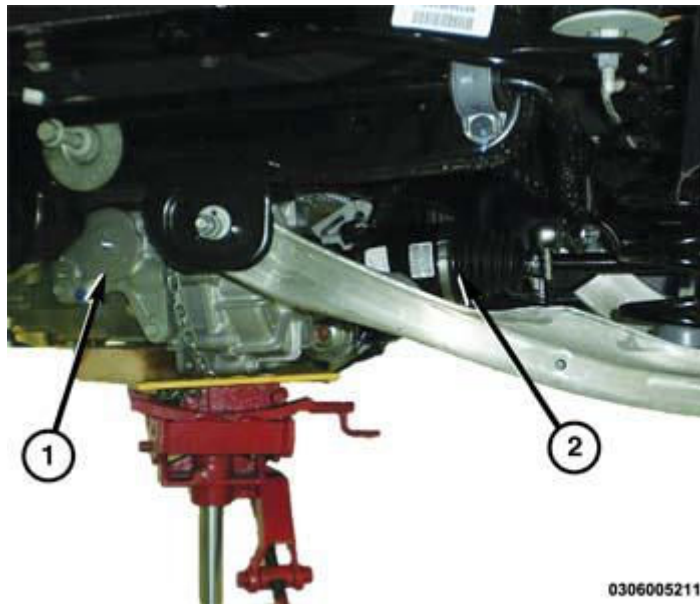


Fig. 46: Installing The Half Shaft Onto The Rear Drive Module
Courtesy of CHRYSLER GROUP, LLC

NOTE: Lightly apply a light grease to the splines prior to installing halfshaft.

5. Install the axle shaft (2) onto the Rear Axle Differential, Rear Axle (1).

NOTE: Be sure the axle shaft is installed fully and circlip is seated onto output shaft.

6. Install the rear knuckle. Refer to **KNUCKLE, REAR, INSTALLATION** .
7. Fill the differential fluid. Refer to **FLUID, DIFFERENTIAL, STANDARD PROCEDURE**.

SENSOR, PRESSURE

REMOVAL

REMOVAL

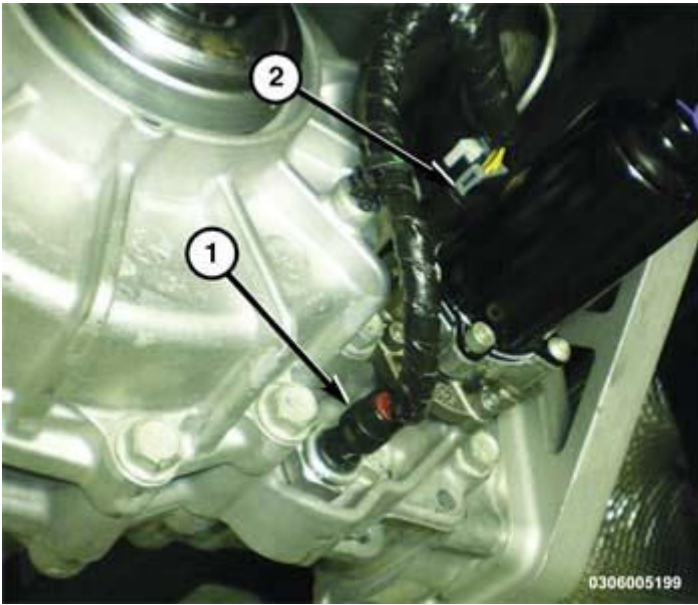


Fig. 47: Removing The Pressure Sensor From The Rear Drive Module Housing
Courtesy of CHRYSLER GROUP, LLC

1. Place a drain pan under the (RDM) Rear Drive Module.
2. Disconnect the electrical connector from the pressure sensor.
3. Remove the pressure sensor (1) from the Rear Drive Module housing.
4. Allow fluid to drain from the housing.

INSTALLATION

INSTALLATION

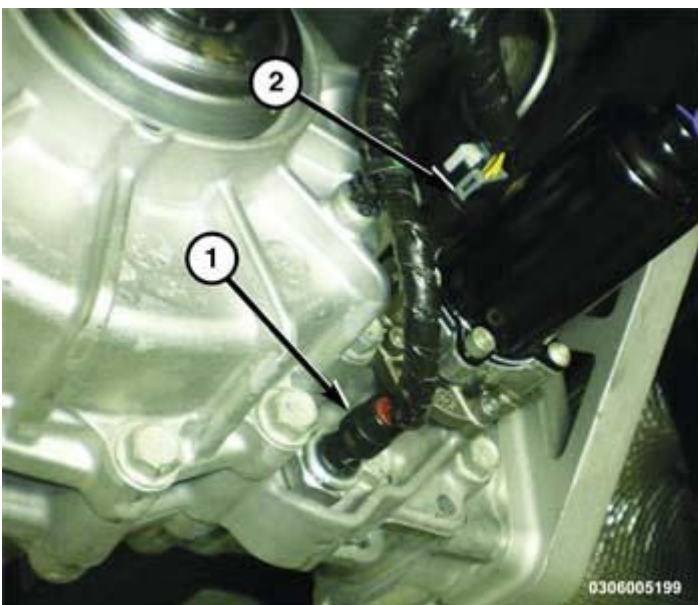


Fig. 48: Replacing The Pressure Sensor With Pre-Applied Sealant To The Threads

Courtesy of CHRYSLER GROUP, LLC

1. Replace the pressure sensor (1) with pre-applied sealant to the threads.
2. Torque the pressure sensor (1) to 21 Nm (15 ft. lbs.).
3. Check and adjust the Rear Drive Module (RDM) hydraulic fluid level and bleed hydraulic system. Refer to **FLUID, HYDRAULIC, STANDARD PROCEDURE**.

CAUTION: Do not mix hydraulic fluid and the RDM lubricant. Use only recommended fluid to prevent damage to Rear Driveline Module components. Fluid must meet material specification MS-2155.

MOTOR, PUMP

REMOVAL

REMOVAL

NOTE: Some hydraulic fluid will be lost when removing the motor and pump assembly.

NOTE: The Rear Drive Module (RDM) must be topped off with proper hydraulic fluid if motor and pump assembly is being serviced. The hydraulic system then must be bled.

CAUTION: Do not mix hydraulic fluid and the RDM lubricant. Use only recommended fluid to prevent damage to Rear Driveline Module components. Fluid must meet material specification MS-2155.

1. With the scan tool park the RDM.
2. Position a drain under the RDM.

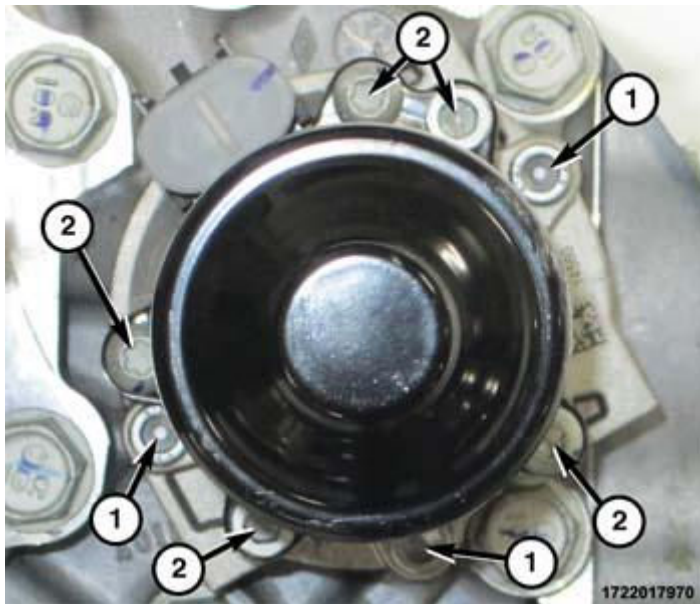


Fig. 49: Removing Three Fasteners From The RDM Motor And Pump Assembly
Courtesy of CHRYSLER GROUP, LLC

3. Remove the three fasteners (1) from the RDM motor and pump assembly. **Do not remove the fasteners securing the motor to the pump (2) .**

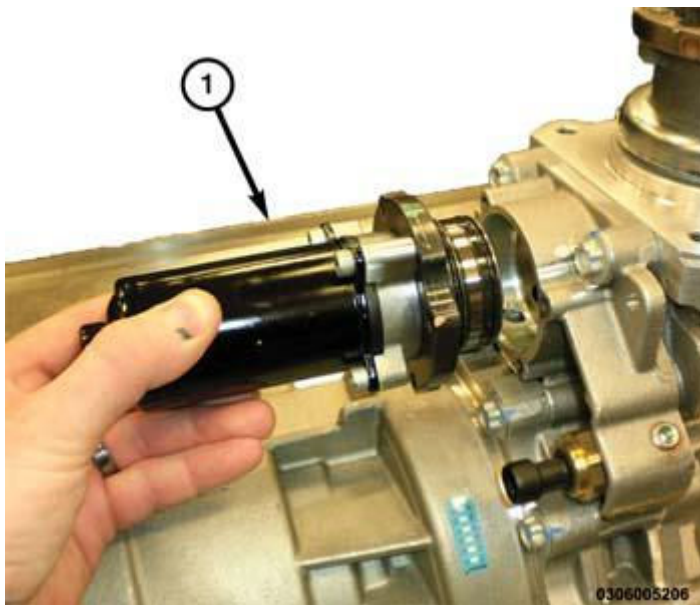


Fig. 50: Removing The Motor And Pump Assembly From The RDM
Courtesy of CHRYSLER GROUP, LLC

4. Remove the motor and pump assembly (1) from the RDM.

CAUTION: Do not use motor housing as a lever or handle when removing pump and motor assembly, damage to the pump or motor may result.

INSTALLATION

INSTALLATION



1722017966

Fig. 51: Identifying Motor And Pump Assembly O-Rings
Courtesy of CHRYSLER GROUP, LLC

1. Park the Rear Drive Module motor and pump assembly using a scan tool.

NOTE: The motor and pump assembly O-rings must be replaced. The O-rings are of different size and must not be interchanged. the red O-ring (3) goes on first and is nearest the pump flange, followed by the blue O-ring (4) that sits nearest the outboard edge.

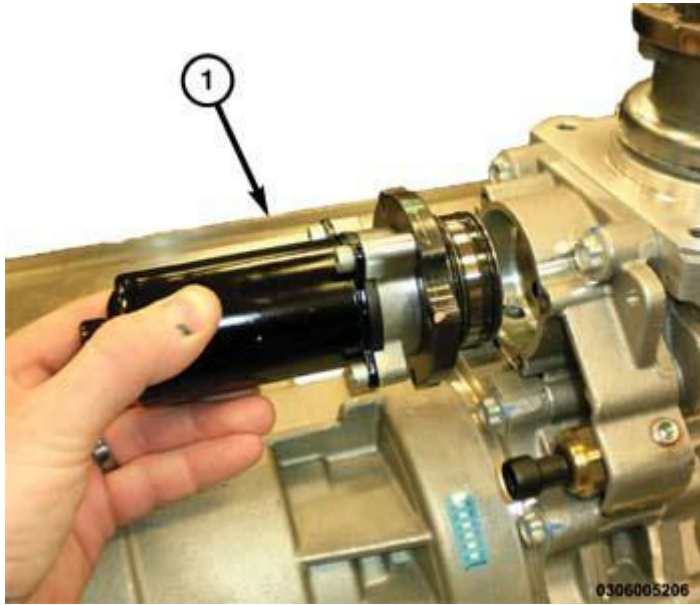


Fig. 52: Installing The Motor And Pump Assembly From The RDM
Courtesy of CHRYSLER GROUP, LLC

2. Install the motor and pump assembly (1) onto the Rear Drive Module.

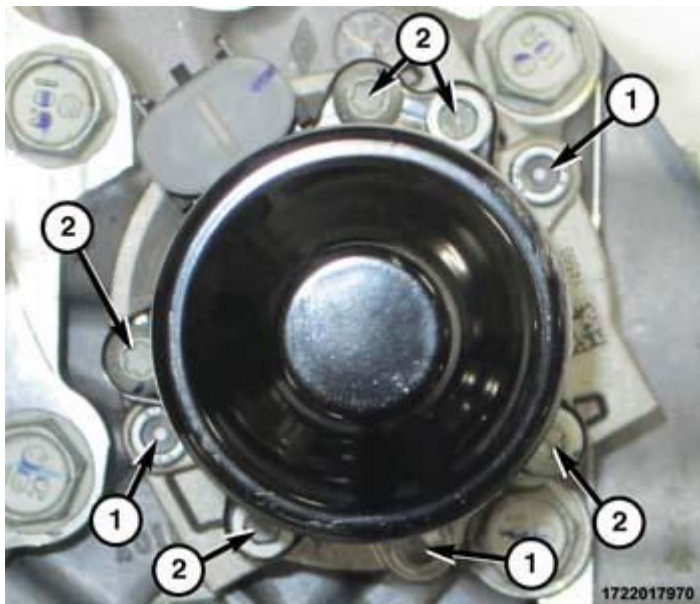


Fig. 53: Installing Three Fasteners From The RDM Motor And Pump Assembly
Courtesy of CHRYSLER GROUP, LLC

3. Install the three motor and pump assembly fasteners (1) and uniformly finger tighten until the motor and pump assembly are fully seated to housing. Torque to 12 N.m (106 in. lbs.).

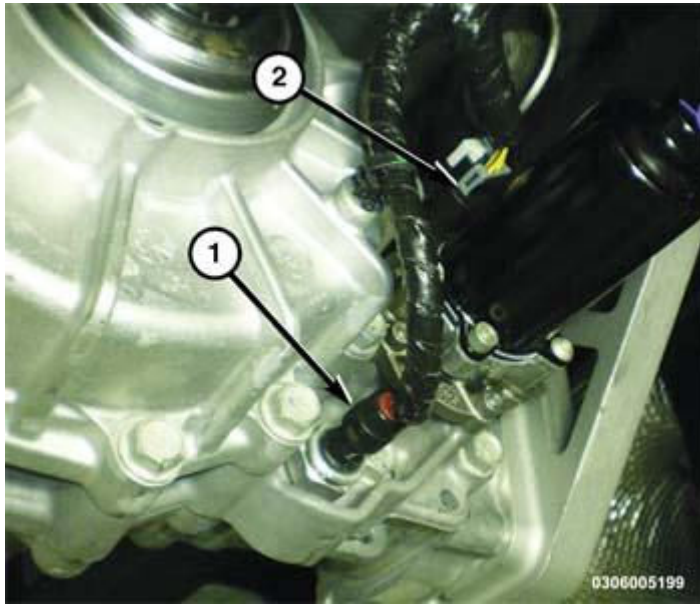


Fig. 54: Identifying Pressure Sensor And Pump Motor Electrical Connectors
Courtesy of CHRYSLER GROUP, LLC

4. Connect the electrical connector (2).
5. Top off hydraulic fluid and bleed the hydraulic system. Refer to **FLUID, HYDRAULIC, STANDARD PROCEDURE**.

CAUTION: Do not mix hydraulic fluid and the RDM lubricant. Use only recommended fluid to prevent damage to Rear Driveline Module components. Fluid must meet material specification MS-2155.

FLUID, HYDRAULIC

STANDARD PROCEDURE

STANDARD PROCEDURE-HYDRAULIC FLUID FILL



A multimedia supplement to the instructions contained in this article is available.

To view the multimedia example of the condition described go to;
<http://www.youtube.com/user/Mitchell1Tips>
then type "A00641401.vid1" into the "Search Channel" box.

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove the muffler. Refer to **MUFFLER, EXHAUST, REMOVAL** .
3. Disengage the wire harness clips from the rear cross-member to gain length in the wire harness.

NOTE: The wire harness connectors must be left plugged in to the Rear Drive

Module (RDM), they will be needed in the filling process.

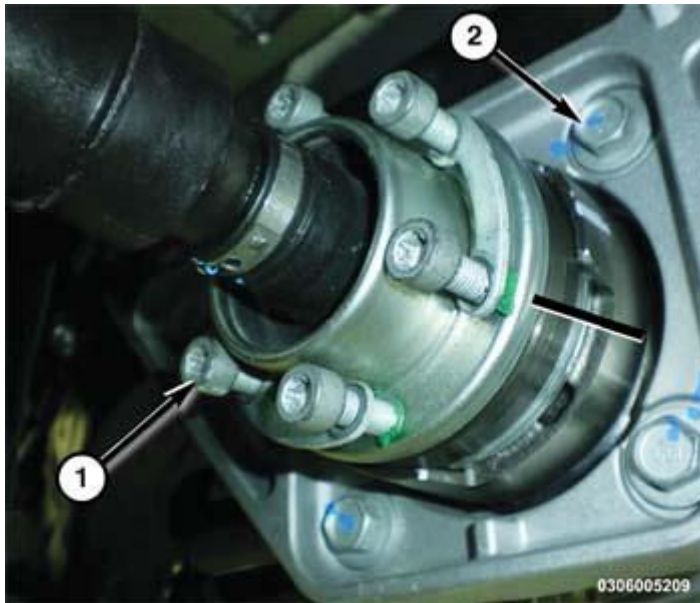


Fig. 55: Aligning Index Marks On Propeller Shaft To Pinion Flange
Courtesy of CHRYSLER GROUP, LLC

4. Apply alignment index marks to the rear propeller shaft and the rear pinion flange.
5. Remove the bolts (1) holding the rear propeller shaft to the rear pinion flange.
6. Separate the rear propeller shaft from the rear pinion flange and secure the shaft to the side.

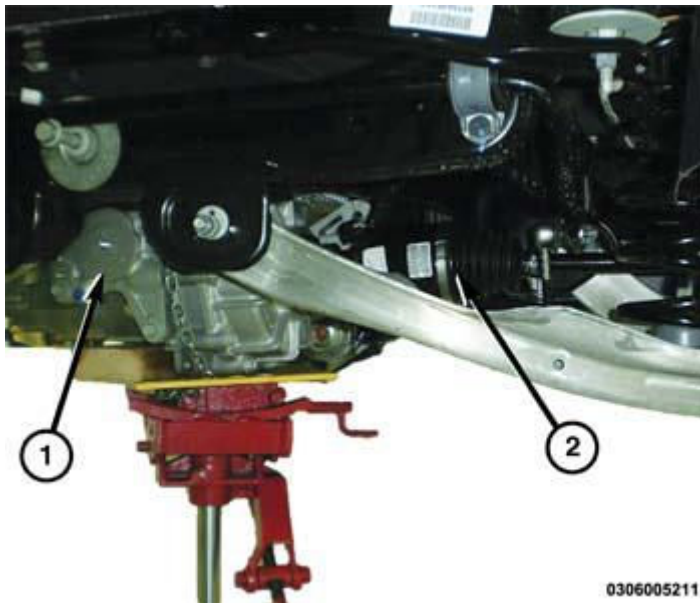


Fig. 56: Identifying Axle Shaft And Rear Drive Module
Courtesy of CHRYSLER GROUP, LLC

7. Using a suitable jack, support and secure the Rear Drive Module (RDM) (1).

NOTE: **The RDM must be
level
on the jack.**

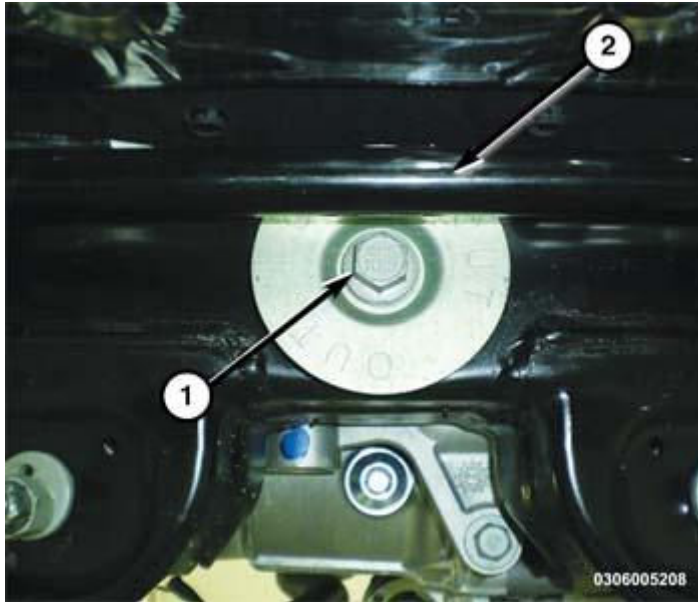


Fig. 57: Rear Mount Bolt
Courtesy of CHRYSLER GROUP, LLC

8. Remove the rear RDM mount bolt (1).

NOTE: **It may be necessary to position the rear sway bar (2) of the way to gain
clearance for rear mount bolt (1).**

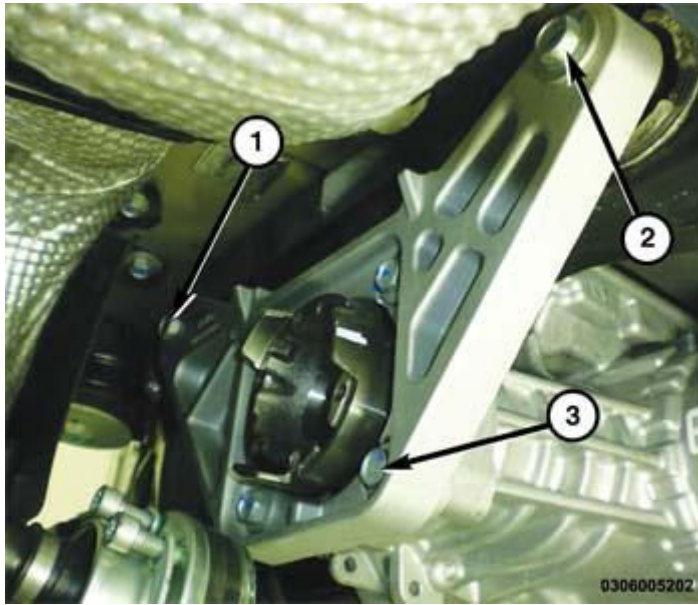


Fig. 58: Front Mount Bolts

Courtesy of CHRYSLER GROUP, LLC

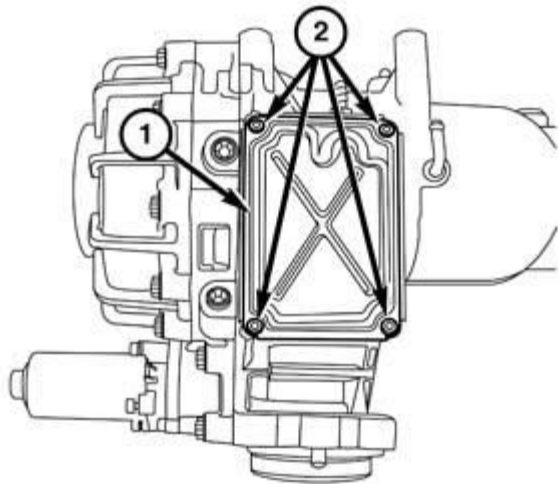
9. Remove the front RDM mount bolts (1 and 2).

NOTE: RDM must be level on jack when filling with fluid.

10. Lower the RDM evenly until there is approximately 4 in. of clearance between the body and the RDM hydraulic fluid cover.

NOTE: Make sure the wire harness and vent hose is not damaged.

11. Place a drain pan under the RDM.

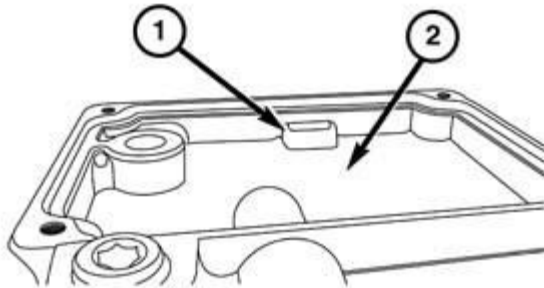


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Fig. 59: Identifying Hydraulic Fluid Cover Bolts And Gaskets
Courtesy of CHRYSLER GROUP, LLC

12. Remove the hydraulic fluid cover (1) bolts (2).
13. Remove the hydraulic fluid cover (1) and gasket.

NOTE: Do not allow any debris to fall into hydraulic reservoir.



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Fig. 60: Identifying Reservoir And Fill Level Indicator
Courtesy of CHRYSLER GROUP, LLC

14. Fill the reservoir (2) with hydraulic fluid so that the fluid is level with the cast Fill Level Indicator (1). Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS**

NOTE: Do not mix hydraulic fluid and the RDM lubricant. Use only recommended fluid to prevent damage to Rear Driveline Module components. Fluid must meet material specification MS-2155.

NOTE: A mirror may be required to see the fluid level.

15. Using the scan tool actuate the Rear Differential Bleed procedure in the Misc. Functions menu and follow the prompts.



Fig. 61: Identifying Diaphragm Gasket And Hydraulic Fluid Cover
Courtesy of CHRYSLER GROUP, LLC

16. Install a new diaphragm gasket (1) and install hydraulic fluid cover (2). Torque bolts to 6 N.m (53 in. lbs.).

NOTE: Be sure that the diaphragm gasket is properly orientated By ensuring the vent holes (3) align.

17. Raise the RDM in place and install the mounting bolts.
18. Torque the mounting bolts to 130 N.m (96 ft. lbs.).
19. Clip the wiring harness into the rear cross-member.

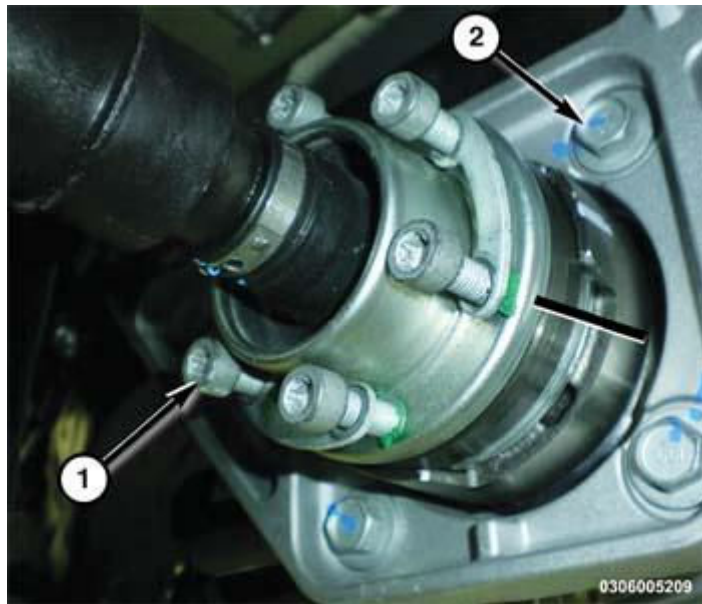


Fig. 62: Aligning Index Marks On Propeller Shaft To Pinion Flange
Courtesy of CHRYSLER GROUP, LLC

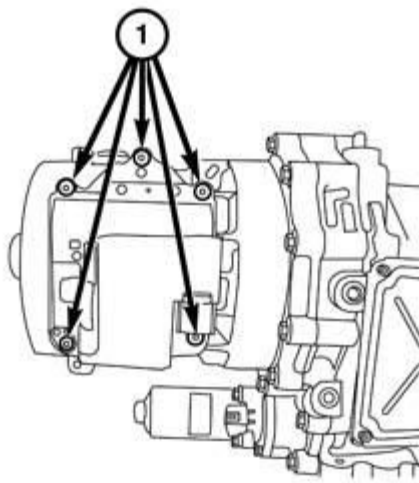
20. Align reference marks on propeller shaft and pinion flange. Tighten bolts to 21 N.m (15 ft. lbs.)
21. Install the muffler. Refer to **MUFFLER, EXHAUST, INSTALLATION** .

ACTUATOR, AXLE SHAFT

REMOVAL

REMOVAL

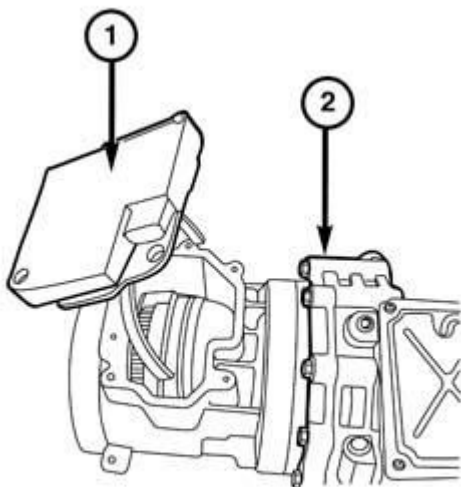
1. Using diagnostic scan tool, place Rear Axle Differential in the 4-HI position.
2. Remove the Rear Axle Differential assembly from the vehicle. Refer to **REMOVAL**.
3. Clean area around the actuator to prevent debris from entering housing.



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Fig. 63: Removing Actuator Retaining Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Remove the actuator retaining fasteners and discard (1).



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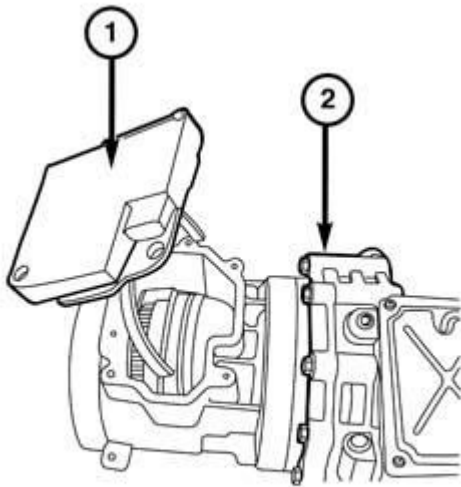
Fig. 64: Removing The Actuator Assembly
Courtesy of CHRYSLER GROUP, LLC

5. Remove the actuator assembly (1) up and off the housing (2).

INSTALLATION

INSTALLATION

1. Clean mating surfaces.
2. Install new gasket if necessary.

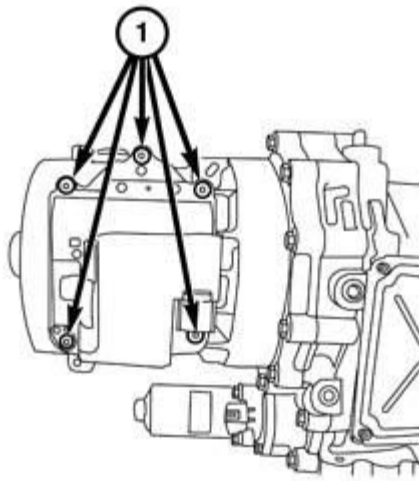


0322008596

Fig. 65: Positioning Actuator Onto Housing
Courtesy of CHRYSLER GROUP, LLC

3. Position actuator (1) onto housing (2), ensure the shift fork engages the sliding collar grooves.

NOTE: If replacing the actuator, check to make sure the two locating dowel pins are removed from the rear Axle Differential housing, the locating dowels come pre-installed in the actuator.



0322008595

Fig. 66: Installing New Actuator Retaining Fasteners
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not reuse the actuator mounting screws.

4. Install new actuator retaining fasteners (1) and tighten. Refer to **SPECIFICATIONS**.
5. Install the Rear Axle Differential into vehicle. Refer to **INSTALLATION**.
6. Check and add fluid as necessary. Refer to **FLUID, DIFFERENTIAL, STANDARD PROCEDURE**.

2014 DRIVELINE/AXLES

Rear Half Shaft - Cherokee

REMOVAL

REMOVAL

CAUTION: Never grasp half shaft assembly by the boots. This may cause the boot to pucker or crease and reduce the service life of the boot.

Avoid over angulating or stroking the C/V joints when handling the half shaft.

Half shafts exposed to battery acid, transmission fluid, brake fluid, differential fluid or gasoline may cause the boots to deteriorate. Failure to follow these instructions will result in damage.

1. Disconnect battery negative cable.
2. Raise and support vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Remove rear knuckle. Refer to **KNUCKLE, REAR, REMOVAL** .

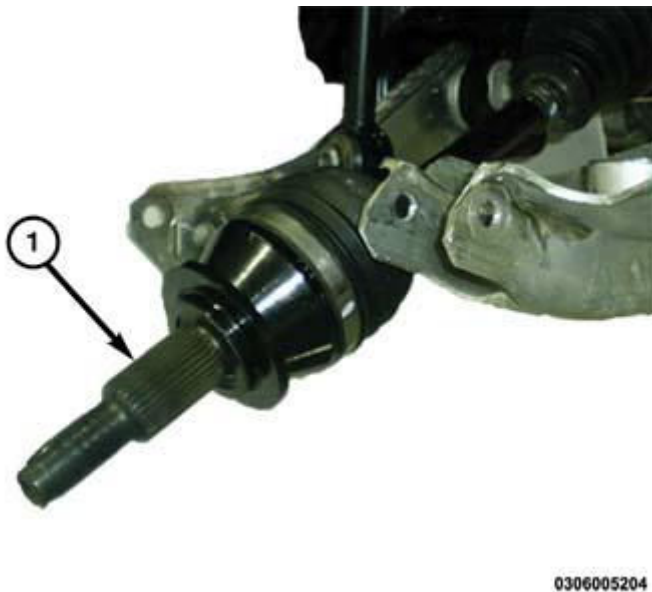


Fig. 1: Identifying Rear Half Shaft
Courtesy of CHRYSLER GROUP, LLC

4. Using appropriate tool, partially dislodge the half shaft from the differential. Install (special tool #9099, Seal Protector, Differential Output) to protect seal upon removal.

NOTE: The stub shaft may need to be held in place when removing the half shaft.

NOTE: Tag the half shaft shim for location.

5. Completely remove the half shaft from the differential. Make sure the seal protector engages seal.

INSTALLATION

INSTALLATION

CAUTION: Never grasp half shaft assembly by the boots. This may cause the boot to pucker or crease and reduce the service life of the boot.

Avoid over angulating or stroking the C/V joints when handling the half shaft.

Half shafts exposed to battery acid, transmission fluid, brake fluid, differential fluid or gasoline may cause the boots to deteriorate. Failure to follow these instructions will result in damage.

1. Install the half shaft shim on the hub end of the shaft.

NOTE: Lightly apply a light grease to the splines prior to installation.

NOTE: Use care when installing half shaft to axle assembly. The half shaft installation angle should be minimized to avoid damage to the seal upon installation.

2. Install new circlip(s) on half shaft(s).

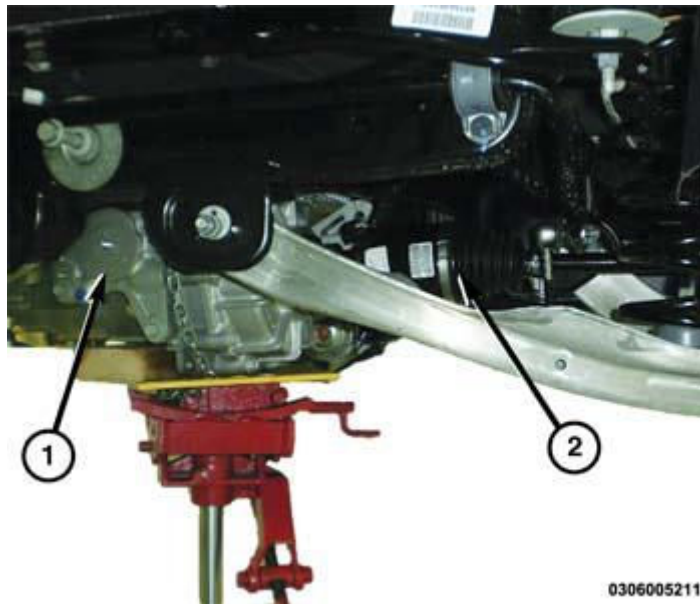


Fig. 2: Installing The Half Shaft Onto The Rear Drive Module
Courtesy of CHRYSLER GROUP, LLC

3. Install the half shaft (2) onto the Rear Drive Module (1).

NOTE: **Attempt to remove tripod joint by hand to verify that the snap ring is fully engaged. If snap ring is fully engaged, tripod joint will not be removable from rear drive module by hand.**

4. Install the rear knuckle. Refer to **KNUCKLE, REAR, INSTALLATION** .
5. If necessary, fill the differential fluid.

2014 ELECTRICAL**Battery System - Service Information - Cherokee****DESCRIPTION****DESCRIPTION**

This vehicle is equipped with a single 12-volt battery. All of the components of the battery system are located within the engine compartment of the vehicle. The battery system for this vehicle contains the following components:

- **Battery** - The storage battery provides a reliable means of storing a renewable source of electrical energy within the vehicle.
- **Battery Cables** - The battery cables connect the positive and negative charged battery terminal posts to the vehicle electrical system.
- **Battery, Intelligent Sensor** - The Intelligent Battery Sensor (IBS) serves to record and process measured battery variable values (current, voltage, temperature) for the vehicle power net management system.
- **Battery Hold-down** - The battery hold-down hardware secures the battery in the battery tray.
- **Battery Thermal Guard** - The battery thermal guard insulates the battery to protect it from engine compartment temperature extremes.
- **Battery Tray** - The battery tray provides a secure mounting location in the vehicle for the battery and an anchor point for the battery hold-down hardware.

For battery system maintenance schedules, refer to **MAINTENANCE SCHEDULES, DESCRIPTION**.

DIAGNOSIS AND TESTING**DIAGNOSIS AND TESTING - BATTERY SYSTEM**

The battery, starting, and charging systems in the vehicle operate with one another and must be tested as a complete system. In order for the engine to start and the battery to maintain its charge properly, all of the components that are used in these systems must perform within specifications. It is important that the battery, starting, and charging systems be thoroughly tested and inspected any time a battery needs to be charged or replaced. The cause of abnormal battery discharge, overcharging or early battery failure must be diagnosed and corrected before a battery is replaced and before a vehicle is returned to service. The service information for these systems has been separated within this Service Information to make it easier to locate the specific information you are seeking. However, when attempting to diagnose any of these systems, it is important that you keep their interdependency in mind.

The diagnostic procedures used for the battery, starting, and charging systems include the most basic conventional diagnostic methods, to the more sophisticated On-Board Diagnostics (OBD) built into the Powertrain Control Module (PCM). Use of an induction-type milliampere ammeter, a volt/ohmmeter, a battery charger, a carbon pile rheostat (load tester) and a 12-volt test lamp may be required. All OBD-sensed systems are monitored by the PCM. Each monitored circuit is assigned a Diagnostic Trouble Code (DTC). The PCM

2014 Jeep Cherokee Trailhawk

2014 ELECTRICAL Battery System - Service Information - Cherokee

will store a DTC in electronic memory for any failure it detects. Refer to **DIAGNOSIS AND TESTING** for the proper charging system on-board diagnostic test procedures.

BATTERY SYSTEM DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
THE BATTERY SEEMS WEAK OR DEAD WHEN ATTEMPTING TO START THE ENGINE.	1. The electrical system ignition-off draw is excessive.	1. Refer to BATTERY, STANDARD PROCEDURE for the proper test procedures. Repair the excessive ignition-off draw, as required.
	2. The charging system is inoperative.	2. Determine if the charging system is performing to specifications. Refer to DIAGNOSIS AND TESTING . Repair the inoperative charging system, as required.
	3. The battery is discharged.	3. Determine the battery state-of-charge using the Midtronics GR8 battery tester. Refer to BATTERY, STANDARD PROCEDURE . Charge the battery as required.
	4. The battery terminal connections are loose or corroded.	4. Refer to CABLES, BATTERY, DIAGNOSIS AND TESTING . Clean and tighten the battery terminal connections, as required.
	5. The battery has an incorrect size or rating for this vehicle.	5. Refer to SPECIFICATIONS for the proper size and rating. Replace an incorrect battery, as required.
	6. The battery is inoperative.	6. Determine the battery cranking capacity using the Midtronics GR8 battery tester. Refer to BATTERY, STANDARD PROCEDURE . Replace the inoperative battery, as required.
	7. The starting system is inoperative.	7. Determine if the starting system is performing to specifications. Refer to DIAGNOSIS AND TESTING . Repair the inoperative starting system, as required.
	8. The battery is physically damaged.	8. Inspect the battery for loose terminal posts or a cracked and leaking case. Replace the damaged battery, as required.
THE BATTERY STATE OF CHARGE CANNOT BE MAINTAINED.	1. The battery has an incorrect size or rating for this vehicle.	1. Refer to SPECIFICATIONS for the proper size and rating. Replace an incorrect battery, as required.
	2. The battery terminal connections are loose or corroded.	2. Refer to CABLES, BATTERY, DIAGNOSIS AND TESTING . Clean and tighten the battery terminal connections, as required.
	3. The electrical system ignition-off draw is	3. Refer to BATTERY, STANDARD PROCEDURE for the proper test

2014 Jeep Cherokee Trailhawk

2014 ELECTRICAL Battery System - Service Information - Cherokee

	excessive.	procedures. Repair the inoperative electrical system, as required.
	4. The battery is inoperative.	4. Test the battery using the Midtronics GR8 battery tester. Refer to BATTERY, STANDARD PROCEDURE . Replace the inoperative battery, as required.
	5. The starting system is inoperative.	5. Determine if the starting system is performing to specifications. Refer to DIAGNOSIS AND TESTING . Repair the inoperative starting system, as required.
	6. The charging system is inoperative.	6. Determine if the charging system is performing to specifications. Refer to DIAGNOSIS AND TESTING . Repair the inoperative charging system, as required.
	7. Electrical loads exceed the output of the charging system.	7. Inspect the vehicle for aftermarket electrical equipment which might cause excessive electrical loads.
	8. Slow driving or prolonged idling with high-amperage draw systems in use.	8. Advise the vehicle operator, as required.
THE BATTERY WILL NOT ACCEPT A CHARGE.	1. The battery is inoperative.	1. Test the battery using the Midtronics GR8 battery tester. Refer to BATTERY, STANDARD PROCEDURE . Replace the inoperative battery, as required.

GR8 ELECTRICAL SYSTEM TESTER

The Midtronics GR8 battery system tester is designed to help diagnose the cause of a defective battery. Refer to **BATTERY, STANDARD PROCEDURE** for directions on using the Midtronics GR8 battery tester.

STANDARD PROCEDURE

STANDARD PROCEDURE - SHIPPING MODE

When a new vehicle is delivered, the Body Control Module (BCM) is set to shipping mode. The BCM has a mode that takes the place of pulling the IOD fuse called "Shipping Mode". Shipping mode deactivates several vehicle accessories to prevent normal ignition OFF draw from depleting the battery over time. Removing the vehicle from shipping mode activates all vehicle systems.

You can enable/disable the vehicle from "Shipping Mode" by using the scan tool, go to BCM >> Misc. function >> Exit Shipping Mode.

SPECIFICATIONS

BATTERY

The battery Group Size number, the Cold Cranking Amperage (CCA) rating, and the Reserve Capacity (RC) rating or Ampere-Hours (AH) rating can be found on the original equipment battery label. Be certain that a replacement battery has the correct Group Size number, as well as CCA, and RC or AH ratings that equal or exceed the original equipment specification for the vehicle being serviced. Battery sizes and ratings are discussed in more detail below.

NOTE: Vehicles equipped with a diesel engine utilize a unique battery. The specifications for this battery may differ from the standards shown here. Refer to the battery manufacturer for detailed specifications.

- **Group Size** - The outside dimensions and terminal placement of the battery conform to standards established by the Battery Council International (BCI). Each battery is assigned a BCI Group Size number to help identify a correctly-sized replacement.
- **Cold Cranking Amperage** - The Cold Cranking Amperage (CCA) rating specifies how much current (in amperes) the battery can deliver for thirty seconds at -18° C (0° F). Terminal voltage must not fall below 7.2 volts during or after the thirty second discharge period. The CCA required is generally higher as engine displacement increases, depending also upon the starter current draw requirements.
- **Reserve Capacity** - The Reserve Capacity (RC) rating specifies the time (in minutes) it takes for battery terminal voltage to fall below 10.5 volts, at a discharge rate of 25 amperes. RC is determined with the battery fully-charged at 26.7° C (80° F). This rating estimates how long the battery might last after a charging system failure, under minimum electrical load.
- **Ampere-Hours** - The Ampere-Hours (AH) rating specifies the current (in amperes) that a battery can deliver steadily for twenty hours, with the voltage in the battery not falling below 10.5 volts. This rating is also sometimes identified as the twenty-hour discharge rating.
- **Load Test Amperage** - The Load Test Amperage rating specifies the current (in amperes) that a battery should be tested at with the battery load test equipment. This value should always be 50 percent of the CCA. For example: if the CCA for this battery is 700 amps, the Load Test Amperage is 50 percent of that or 350 amps.

BATTERY CLASSIFICATIONS AND RATINGS TABLE

BATTERY CLASSIFICATIONS AND RATINGS				
BCI Group Size Classification	Cold Cranking Amperage	Reserve Capacity	Ampere - Hours	Load Test Amperage
34	700	90 Minutes	50	350
86	525	100 Minutes	60	265

TORQUE**TORQUE SPECIFICATIONS**

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Battery Terminal Clamp Pinch-Bolt Hex Nut	5	-	45

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2014 ELECTRICAL Battery System - Service Information - Cherokee

Negative Battery Cable Remote Terminal Nut	16.5	-	145
Positive Battery Cable Remote Terminal Nut	16.5	-	145
Battery Hold Down Bolt	16	-	142
Starter Solenoid B(+) Terminal Stud Nut	13	-	115
Battery Negative Cable Ground Eyelet Terminal To Engine Block Bolt	16.5	-	145
PDC B(+) Terminal Stud Nut	10	-	90
Battery Tray Support Bolt	16	-	142
Battery Tray Bolt	16	-	142

CLEANING

CLEANING

The following information details the recommended cleaning procedures for the battery and related components. In addition to the maintenance schedules found in this Service Information and the owners manual, it is recommended that these procedures be performed any time the battery or related components must be removed for vehicle service.

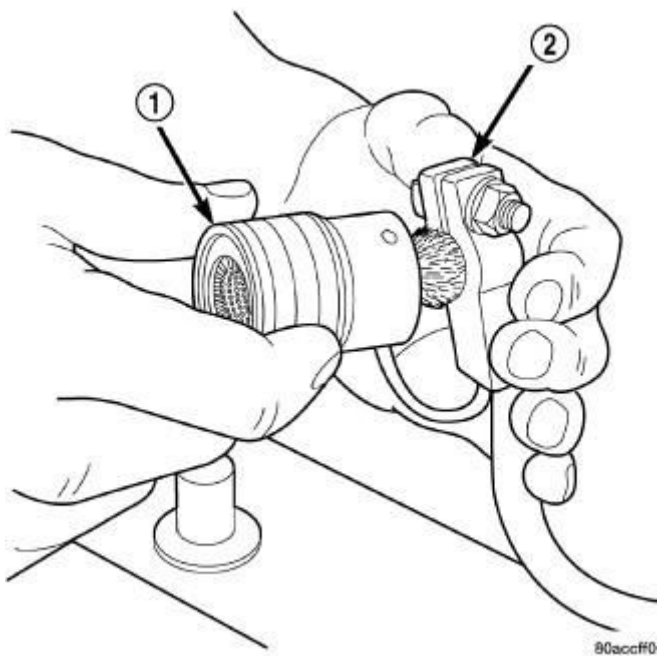


Fig. 1: Cleaning Battery Cable Terminal Clamps Using Terminal Cleaning Tool
Courtesy of CHRYSLER GROUP, LLC

1. Clean the battery cable terminal clamps (2) of all corrosion. Remove any corrosion using a wire brush (1) or a post and terminal cleaning tool, and a sodium bicarbonate (baking soda) and warm water cleaning solution.
2. Clean the battery tray and battery hold-down hardware of all corrosion. Remove any corrosion using a wire brush and a sodium bicarbonate (baking soda) and warm water cleaning solution. Paint any exposed bare metal.

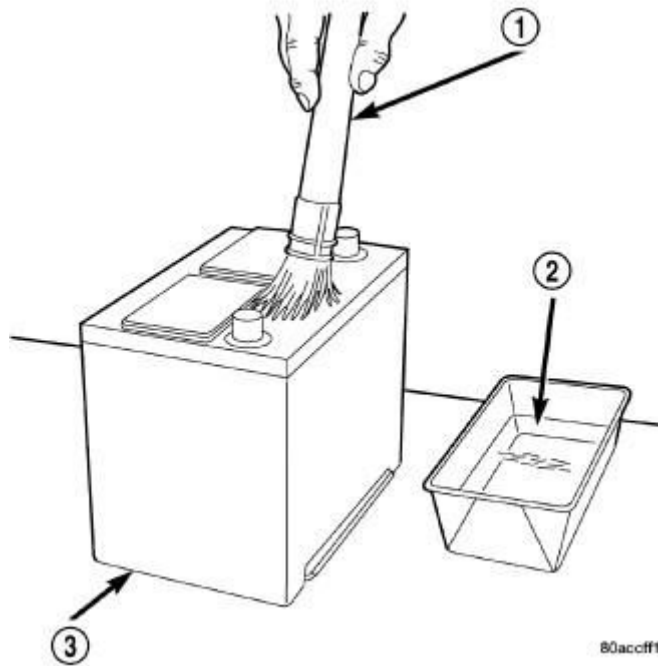


Fig. 2: Cleaning Outside Of Battery Case
Courtesy of CHRYSLER GROUP, LLC

3. If the removed battery is to be reinstalled, clean the outside of the battery case (3) and the top cover with a sodium bicarbonate (baking soda) and warm water cleaning solution using a stiff bristle parts cleaning brush (1) to remove any acid film. Rinse the battery with clean water. Ensure that the cleaning solution does not enter the battery cells through the vent holes. If the battery is being replaced, refer to **SPECIFICATIONS** for the factory-installed battery specifications. Confirm that the replacement battery is the correct size and has the correct ratings for the vehicle.
4. Clean the battery thermal guard with a sodium bicarbonate (baking soda) and warm water cleaning solution using a stiff bristle parts cleaning brush to remove any acid film.



Fig. 3: Cleaning Battery Terminal Post Using Terminal Cleaner
Courtesy of CHRYSLER GROUP, LLC

5. Clean any corrosion from the battery terminal posts with a wire brush or a post and terminal cleaner, and a sodium bicarbonate (baking soda) and warm water cleaning solution.

INSPECTION

INSPECTION

The following information details the recommended inspection procedures for the battery and related components. In addition to the maintenance schedules found in this Service Information and the owner's manual, it is recommended that these procedures be performed any time the battery or related components must be removed for vehicle service.

1. Inspect the battery cable terminal clamps for damage. Replace any battery cable that has a damaged or deformed terminal clamp.
2. Inspect the battery tray and battery hold-down hardware for damage. Replace any damaged parts.
3. Slide the thermal guard off of the battery case (if equipped). Inspect the battery case for cracks or other damage that could result in electrolyte leaks. Also, check the battery terminal posts for looseness. Batteries with damaged cases or loose terminal posts must be replaced.
4. Inspect the battery thermal guard for tears, cracks, deformation or other damage (if equipped). Replace any battery thermal guard that has been damaged.
5. Inspect the battery built-in test indicator sight glass (if equipped) for an indication of the battery condition. If the battery is discharged, charge as required. Refer to **STANDARD PROCEDURE** for detailed instructions.

BATTERY

DESCRIPTION

DESCRIPTION

Low-maintenance conventional batteries are used on this vehicle. These batteries have non-removable battery cell caps. Under normal service, the composition of this battery reduces gassing and water loss at normal charge rates.

Conventional batteries are made up of six individual cells that are connected in series. Each cell contains positive charged cell groups made of lead oxide, and negatively charged cell groups made of sponge lead. The cells are submerged in a sulfuric acid and water solution called electrolyte.

The battery performs the function of a chemical storage device for electrical energy generated by the alternator. It must be capable of supplying high current for starting and powering other electrical loads. The battery function is also to serve as a stabilizing component in the charging system by providing energy when the system demands exceed the output of the alternator.

OPERATION

OPERATION

The battery is designed to store electrical energy in a chemical form. When an electrical load is applied to the terminals of the battery, an electrochemical reaction occurs. This reaction causes the battery to discharge electrical current from its terminals. As the battery discharges, a gradual chemical change takes place within each cell. The sulfuric acid in the electrolyte combines with the plate materials, causing both plates to slowly change to lead sulfate. At the same time, oxygen from the positive plate material combines with hydrogen from the sulfuric acid, causing the electrolyte to become mainly water. The chemical changes within the battery are caused by the movement of excess or free electrons between the positive and negative plate groups. This movement of electrons produces a flow of electrical current through the load device attached to the battery terminals.

As the plate materials become more similar chemically, and the electrolyte becomes less acid, the voltage potential of each cell is reduced. However, by charging the battery with a voltage higher than that of the battery itself, the battery discharging process is reversed. Charging the battery gradually changes the sulfated lead plates back into sponge lead and lead dioxide, and the water back into sulfuric acid. This action restores the difference in the electron charges deposited on the plates, and the voltage potential of the battery cells. For a battery to remain useful, it must be able to produce high-amperage current over an extended period. A battery must also be able to accept a charge, so that its voltage potential may be restored.

The battery is vented to release excess hydrogen gas that is created when the battery is being charged or discharged. However, even with these vents, hydrogen gas can collect in or around the battery. If hydrogen gas is exposed to flame or sparks, it may ignite. If the electrolyte level is low, the battery may arc internally and explode. If the battery is equipped with removable cell caps, add distilled water whenever the electrolyte level is below the top of the plates. If the battery cell caps cannot be removed, the battery must be replaced if the electrolyte level becomes low.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - BATTERY

WARNING: IF THE BATTERY SHOWS SIGNS OF FREEZING, LEAKING OR LOOSE POSTS, DO NOT TEST, ASSIST-BOOST, OR CHARGE. THE BATTERY MAY ARC INTERNALLY AND EXPLODE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: EXPLOSIVE HYDROGEN GAS FORMS IN AND AROUND THE BATTERY. DO NOT SMOKE, USE FLAME, OR CREATE SPARKS NEAR THE BATTERY. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: THE BATTERY CONTAINS SULFURIC ACID, WHICH IS POISONOUS AND CAUSTIC. AVOID CONTACT WITH THE SKIN, EYES, OR CLOTHING. IN THE EVENT OF CONTACT, FLUSH WITH WATER AND CALL A PHYSICIAN IMMEDIATELY. KEEP OUT OF THE REACH OF CHILDREN.

A battery that will not accept a charge is inoperative, and must be replaced. Further testing is not required. A fully-charged battery must be load tested to determine its cranking capacity. A battery that is fully-charged, but does not pass the load test, is inoperative and must be replaced.

NOTE: Completely discharged batteries may take several hours to accept a charge. Refer to STANDARD PROCEDURE for the proper battery charging procedures.

MIDTRONICS GR8 BATTERY TESTER

The Midtronics GR8 battery tester is designed to help diagnose the cause of an inoperative battery. Refer to BATTERY, STANDARD PROCEDURE for instructions on the use of the Midtronics GR8 battery tester.

STANDARD PROCEDURE

CONVENTIONAL BATTERY CHARGING

CAUTION: Vehicles equipped with a diesel engine utilize a unique spiral cell battery. This battery has a maximum charging voltage that must be used in order to restore the battery to its full potential, failure to use the spiral cell battery charging procedure could result in damage to the battery or personal injury. for the appropriate procedure.

Battery charging is the means by which the battery can be restored to its full voltage potential. A battery is fully-charged when:

- Midtronics (special tool #GR8-1220KIT-CHRY, AGM Battery Tester/Charger Station) tester indicates

battery is OK.

- Open-circuit voltage of the battery is 12.65 volts or above.
- Battery passes Load Test multiple times.

WARNING: If the battery shows signs of freezing, leaking, loose posts, do not test, assist-boost, or charge. The battery may arc internally and explode. Personal injury and/or vehicle damage may result.

WARNING: EXPLOSIVE HYDROGEN GAS FORMS IN AND AROUND THE BATTERY. DO NOT SMOKE, USE FLAME, OR CREATE SPARKS NEAR THE BATTERY. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: THE BATTERY CONTAINS SULFURIC ACID, WHICH IS POISONOUS AND CAUSTIC. AVOID CONTACT WITH THE SKIN, EYES, OR CLOTHING. IN THE EVENT OF CONTACT, FLUSH WITH WATER AND CALL A PHYSICIAN IMMEDIATELY. KEEP OUT OF THE REACH OF CHILDREN.

WARNING: If the battery is equipped with removable cell caps, be certain that each of the cell caps is in place and tight before the battery is returned to service. Personal injury and/or vehicle damage may result from loose or missing cell caps.

CAUTION: Always disconnect and isolate the battery negative cable before charging a battery. Do not exceed sixteen volts while charging a battery. Damage to the vehicle electrical system components may result.

CAUTION: Battery electrolyte will bubble inside the battery case during normal battery charging. Electrolyte boiling or being discharged from the battery vents indicates a battery overcharging condition. Immediately reduce the charging rate or turn off the charger to evaluate the battery condition. Damage to the battery may result from overcharging.

CAUTION: The battery should not be hot to the touch. If the battery feels hot to the touch, turn off the charger and let the battery cool before continuing the charging operation. Damage to the battery may result.

After the battery has been charged to an open-circuit voltage reading of 12.4 volts or greater, retest the battery with the Midtronics (special tool #GR8-1220KIT-CHRY, AGM Battery Tester/Charger Station) tester indicates battery is OK or perform a load test to determine the battery cranking capacity.

Refer to **BATTERY, STANDARD PROCEDURE**.

Clean and inspect the battery hold downs, tray, terminals, posts, and top before completing battery service.

Refer to **CLEANING** for the proper battery system cleaning procedures. Refer to **INSPECTION** for the proper battery system inspection procedures.

CHARGING A COMPLETELY DISCHARGED CONVENTIONAL BATTERY

The following procedure should be used to recharge a completely discharged battery. Unless this procedure is properly followed, a good battery may be needlessly replaced.

1. Measure the voltage at the battery posts with a voltmeter, accurate to 1/10 (0.10) volt. If the reading is below ten volts, the battery charging current will be low. It could take some time before the battery accepts a current greater than a few milliamperes. Such low current may not be detectable on the ammeters built into many battery chargers.
2. Disconnect and isolate the battery negative cable. Connect the Midtronics (special tool #GR8-1220KIT-CHRY, AGM Battery Tester/Charger Station).

NOTE: Some battery chargers are equipped with polarity-sensing circuitry. This circuitry protects the battery charger and the battery from being damaged if they are improperly connected. If the battery state-of-charge is too low for the polarity-sensing circuitry to detect, the battery charger will not operate. This makes it appear that the battery will not accept charging current. See the instructions provided by the manufacturer of the battery charger for details on how to bypass the polarity-sensing circuitry.

3. Battery chargers vary in the amount of voltage and current they provide. The amount of time required for a battery to accept measurable charging current at various voltages is shown in the Charge Rate Table. If the charging current is still not measurable at the end of the charging time, the battery is faulty and must be replaced. If the charging current is measurable during the charging time, the battery may be good and the charging should be completed in the normal manner.

CONVENTIONAL BATTERY CHARGE RATE TABLE

Voltage	Minutes
16.0 volts maximum	up to 10 min.
14.0 to 15.9 volts	up to 20 min.
13.9 volts or less	up to 30 min.

CHARGING TIME REQUIRED

The time required to charge a battery will vary, depending upon the following factors:

- **Battery Capacity** - A completely discharged heavy-duty battery requires twice the charging time of a small capacity battery.
- **Temperature** - A longer time will be needed to charge a battery at -18° C (0° F) than at 27° C (80° F). When a fast battery charger is connected to a cold battery, the current accepted by the battery will be very low at first. As the battery warms, it will accept a higher charging current rate (amperage).
- **Charger Capacity** - A battery charger that supplies only five amperes will require a longer charging

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2014 ELECTRICAL Battery System - Service Information - Cherokee

time. A battery charger that supplies twenty amperes or more will require a shorter charging time.

- **State-Of-Charge** - A completely discharged battery requires more charging time than a partially discharged battery. Electrolyte is nearly pure water in a completely discharged battery. At first, the charging current (amperage) will be low. As the battery charges, the specific gravity of the electrolyte will gradually rise.

The Conventional Battery Charging Time Table gives an indication of the time required to charge a typical battery at room temperature based upon the battery state-of-charge and the charger capacity.

CONVENTIONAL BATTERY CHARGING TIME TABLE

Charging Amperage	5 Amps	10 Amps	20 Amps
Open Circuit Voltage	Hours Charging @ 21° C (70° F)		
12.25 to 12.49	6 hours	3 hours	1.5 hours
12.00 to 12.24	10 hours	5 hours	2.5 hours
10.00 to 11.99	14 hours	7 hours	3.5 hours
Below 10.00	18 hours	9 hours	4.5 hours

GR8 BATTERY TESTER / CHARGER

Always use the Midtronics GR8 Instruction Manual that was supplied with the tester as a reference. If the Instruction Manual is not available the following procedure can be used:

WARNING: Always wear appropriate eye protection and use extreme caution when working with batteries.

BATTERY TESTING

CAUTION: Never connect the GR8 to the remote battery posts. Connecting the GR8 to the remote battery posts will give a false test reading indicating that the battery is bad.

1. If testing the battery OUT-OF-VEHICLE, clean the battery terminals with a wire brush before testing. Refer to **CLEANING**. If the battery is equipped with side post terminals, install and tighten the supplied lead terminal stud adapters. Do not use steel bolts. Failure to properly install the stud adapters, or using stud adapters that are dirty or worn-out may result in false test readings.
2. If testing the battery IN-THE-VEHICLE, make certain all of the vehicle accessory loads are OFF, including the ignition. Connect the GR8 to directly to the battery posts.

NOTE: Multiple batteries connected in parallel must have the ground cable disconnected to perform a battery test. Failure to disconnect may result in false battery test readings.

3. Using the ARROW key select **in** or **out** of vehicle testing and press ENTER to make a selection.
4. If not selected, choose the Cold Cranking Amp (CCA) battery rating. Or select the appropriate battery

rating for your area (see menu). The tester will then run its self programmed test of the battery and display the results. Refer to the test result table noted below.

5. While viewing the battery test result, press the CODE button and the tester will prompt you for the last 4 digits of the VIN. Use the UP/DOWN arrow buttons to scroll to the correct character; then press ENTER to select and move to the next digit. Then press the ENTER button to view the SERVICE CODE. Pressing the CODE button a second time will return you to the test results.

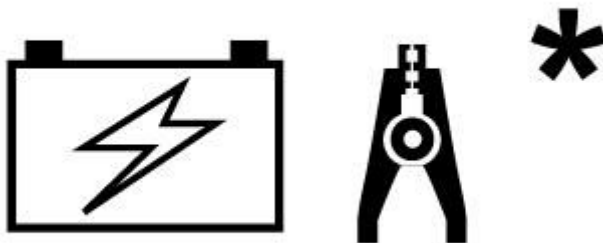
NOTE: The **SERVICE CODE** is required on every warranty claim submitted for battery replacement.

QUICK REFERENCE GUIDE

Inspect the battery for damages and check the electrolyte level. Always use the necessary safety precautions when working with batteries to prevent severe injury or death. Follow all manufacturers' instructions and BCI (Battery Council International) safety recommendations, which include the following precautions:

MAIN MENU

The Main Menu is the starting point for all tools and utilities, which are depicted as icons. Some icons lead directly to the function they represent, while others are menu icons that lead to two or more options.



2906815

Fig. 4: Battery Tester Main Menu Icon 1
Courtesy of CHRYSLER GROUP, LLC

Automatically tests, charges, and provides battery decision using the information you select in a series of screens. Start here to generate warranty codes.



2907015

Fig. 5: Battery Tester Main Menu Icon 2
Courtesy of CHRYSLER GROUP, LLC

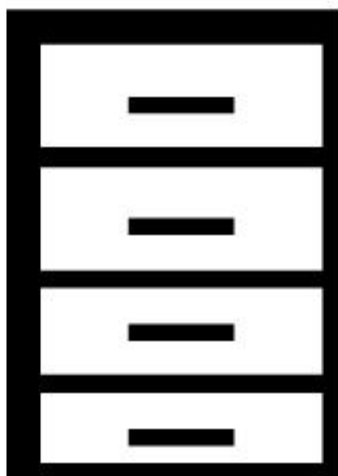
Tests the starting and charging systems.



2906976

Fig. 6: Battery Tester Main Menu Icon 3
Courtesy of CHRYSLER GROUP, LLC

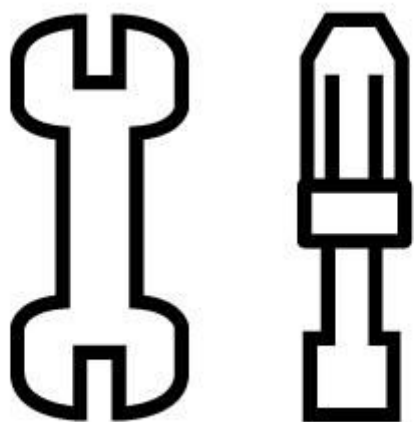
Maintains battery voltage at 13.5 volts to provide uninterrupted reprogramming of ECUs and retain vehicle system settings.



2906894

Fig. 7: Battery Tester Main Menu Icon 4
Courtesy of CHRYSLER GROUP, LLC

Includes a utility to view and print a test counter, a data transfer utility, the software version and date, the GR8 serial number for the control module, and current wireless channel.



2907001

Fig. 8: Battery Tester Main Menu Icon 5
Courtesy of CHRYSLER GROUP, LLC

The Setup Menu lets you customize options in the GR8 to suit your needs.

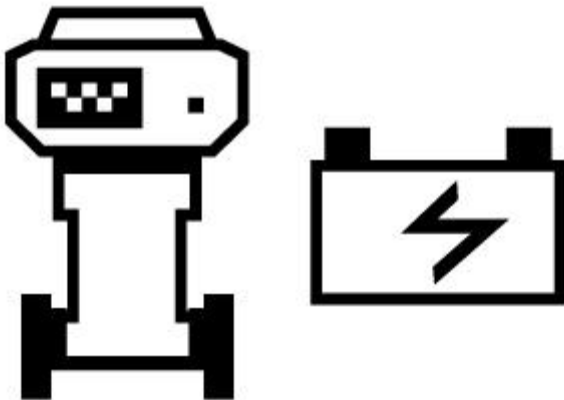


2906883

Fig. 9: Battery Tester Main Menu Icon 6
Courtesy of CHRYSLER GROUP, LLC

Provides a list of topics and definitions. Also includes Midtronics Customer Service phone numbers.

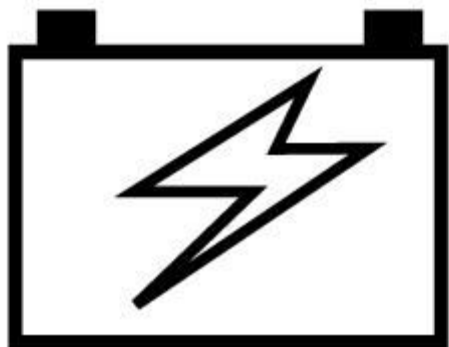
CHARGE/TEST MENU



2906844

Fig. 10: Charge/Test Menu Icon 1
Courtesy of CHRYSLER GROUP, LLC

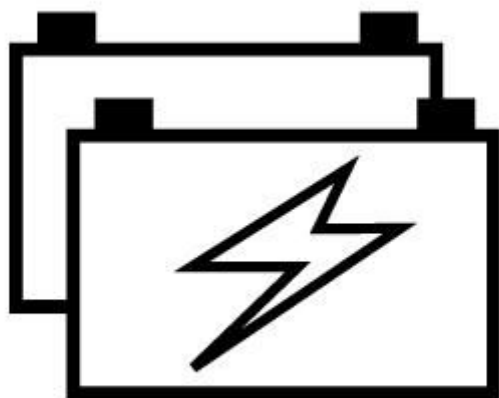
Automatically tests and charges battery, starting, and charging system. Generates a warranty code for Replace and Bad Cell decisions.



2906951

Fig. 11: Charge/Test Menu Icon 2**Courtesy of CHRYSLER GROUP, LLC**

Pre Delivery Inspection (PDI): For testing delivered vehicles and lot maintenance. Uses the same inputs as a diagnostic charge.



2906860

Fig. 12: Charge/Test Menu Icon 3**Courtesy of CHRYSLER GROUP, LLC**

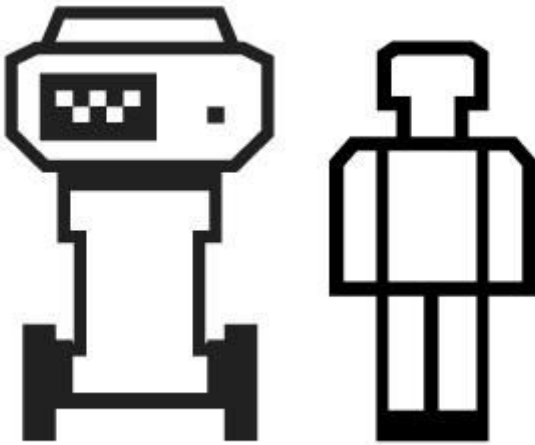
Dual Battery Charge mode allows the charger to be used with dual battery systems.



2906906

Fig. 13: Charge/Test Menu Icon 4**Courtesy of CHRYSLER GROUP, LLC**

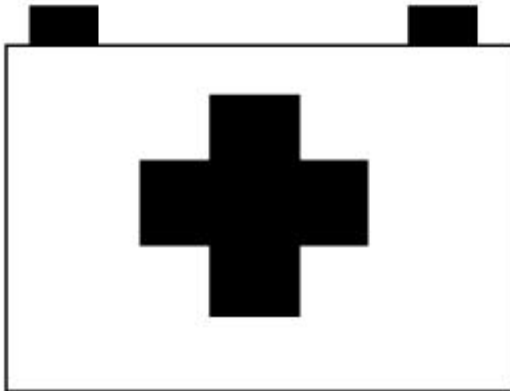
Makes high output current available to boost charge an in-vehicle battery and assist in starting the engine.



2906933

Fig. 14: Charge/Test Menu Icon 5**Courtesy of CHRYSLER GROUP, LLC**

Provides a timed charge that ranges from 5 to 120 minutes or a continuous charge that ends when you press the STOP key.



2906991

Fig. 15: Charge/Test Menu Icon 6**Courtesy of CHRYSLER GROUP, LLC**

In this mode the charger can provide a trickle charge for long term, low amp battery charging.



2906871

Fig. 16: Charge/Test Menu Icon 7**Courtesy of CHRYSLER GROUP, LLC**

Generates 15-digit warranty codes for physically defective batteries or customer good will.

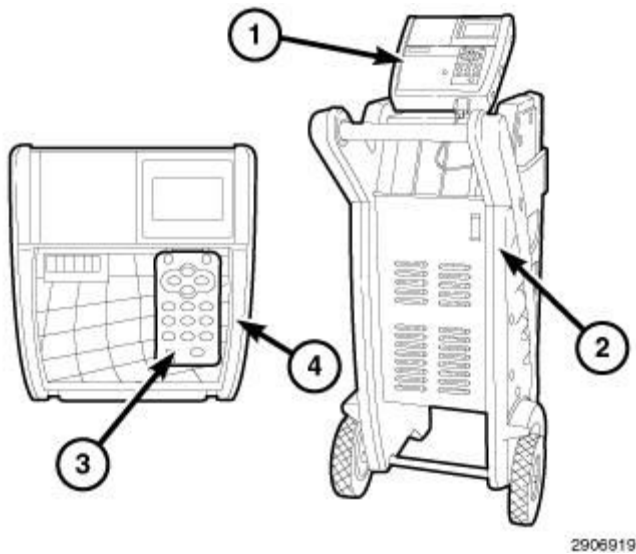


Fig. 17: Identifying GR8 Battery Tester
Courtesy of CHRYSLER GROUP, LLC

1. **Control module:** Backlit graphical display and keypad for data entry.
2. **ON/OFF switch:** ON/OFF switch Turns power on and off to the GR8.
3. **STATUS light:** Lights in conjunction with beeping alarm to indicate transitions and warnings.
4. **Data card slot:** For future upgrades via a data card. The slot contains a plastic filler card for protection.

REPLACE BATTERY DECISIONS

BATTERY DECISIONS

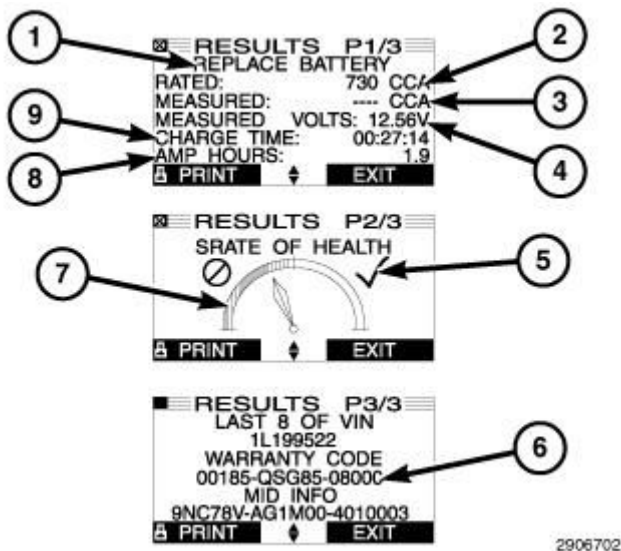


Fig. 18: Battery Test Screen - Example
Courtesy of CHRYSLER GROUP, LLC

1. Battery Decisions
2. Select Rating
3. Measured capacity
4. Measured voltage
5. Good Range

NOTE: The warranty code screen will only be displayed for REPLACE BATTERY and BAD CELL-REPLACE decisions.

6. Enter this number into wiTech
7. Replace range
8. Replaced AMP Hours
9. Charging Time

TEST RESULTS-CHARGING SYSTEM

A REPLACE BATTERY or BAD CELL-REPLACE decision gives you the option of generating a warranty code. For Chrysler vehicles model year 2011 or later, enter that warranty code into your wiTECH in the Midtronics warranty code validation routine.

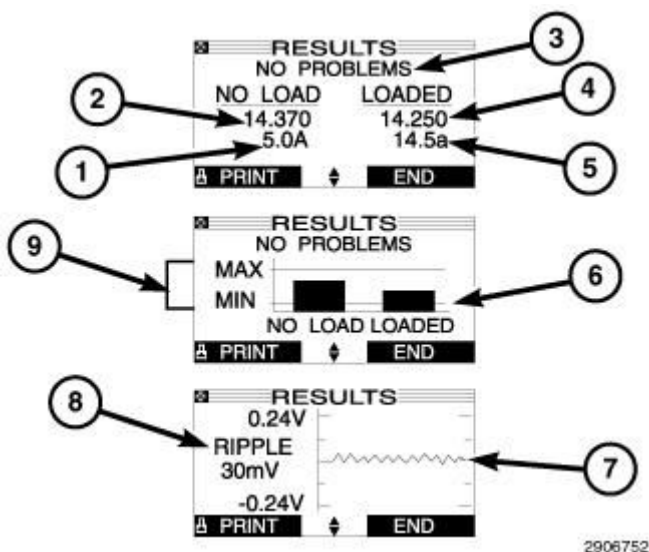
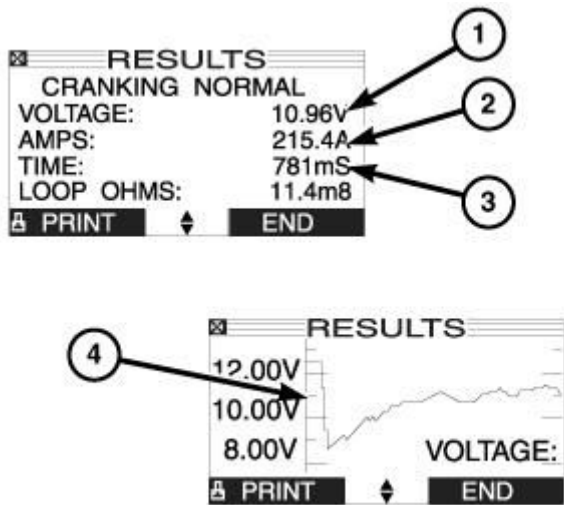


Fig. 19: Battery Tester Test Results Screen - Example
 Courtesy of CHRYSLER GROUP, LLC

1. Loads-off current at rev if amp clamp is used
2. Loads-off DC voltage at rev
3. Decision
4. Loads-on DC voltage at rev
5. Loads-on current at rev if amp clamp is used

6. Bar graph of DC voltage within normal range (loads on and off)
7. Graph of diode waveform
8. Peak-to-peak AC voltage
9. Normal DC voltage range

TEST RESULTS-STARTER SYSTEM



2906793

Fig. 20: Test Results-Starter System Example
 Courtesy of CHRYSLER GROUP, LLC

1. Average cranking voltage
2. Average cranking current if amp clamp is used
3. Cranking time in seconds
4. Y axis = System performance: cranking voltage

IGNITION-OFF DRAW TEST

The term Ignition-Off Draw (IOD) identifies a normal condition where power is being drained from the battery with the ignition switch in the Off position. A normal vehicle electrical system will draw from five to thirty-five milliamperes (0.005 to 0.035 ampere) with the ignition switch in the Off position, and all non-ignition controlled circuits in proper working order. Up to thirty-five milliamperes are needed to enable the memory functions for the Powertrain Control Module (PCM), digital clock, electronically tuned radio, and other modules which may vary with the vehicle equipment.

Excessive IOD can be caused by:

- Electrical items left on.
- Inoperative or improperly adjusted switches.
- Inoperative or shorted electronic modules and components.

- An internally shorted generator.
- Intermittent shorts in the wiring.

If the IOD is over thirty-five milliamperes, the problem must be found and corrected before replacing a battery. In most cases, the battery can be charged and returned to service after the excessive IOD condition has been corrected.

1. Verify that all electrical accessories are off. Turn off all lamps, remove the ignition key, and close all doors. If the vehicle is equipped with an illuminated entry system or an electronically tuned radio, allow the electronic timer function of these systems to automatically shut off (time out). This may take up to ten minutes. See the Electronic Module Ignition-Off Draw Table for more information.

ELECTRONIC MODULE IGNITION-OFF DRAW TABLE

Module	Time Out? (If Yes, Interval And Wake-Up Input)	IOD	IOD After Time Out
Radio	No	1 to 3 milliamperes	N/A
Audio Power Amplifier	No	up to 1 milliampere	N/A
Powertrain Control Module (PCM)	No	0.95 milliampere	N/A
Instrument Cluster	No	0.44 milliampere	N/A

2. Determine that the underhood lamp is operating properly, then disconnect the lamp wire harness connector or remove the lamp bulb.
3. Turn off all electrical accessories.
4. Disconnect the battery negative cable.

CAUTION: Do not open any doors, or turn on any electrical accessories with the lowest milliampere scale selected, or the multi-meter may be damaged.

5. Connect a 10 amp fused jumper wire between the negative battery cable and the negative battery post.
6. Turn the ignition key ON and then OFF and wait 10 minutes for all systems to enter sleep mode.

NOTE: Do not break the connection between the 10 amp fused jumper wire and the battery. If the connection between the battery negative terminal post and the negative cable terminal clamp is lost during any part of the IOD test, the electronic timer function will be activated and all of the tests will

have to be repeated.

7. Set an electronic digital multi-meter to its highest amperage scale. Connect the multi-meter to the battery negative cable terminal clamp and the battery negative terminal post, but not on the jumper connection.
8. Remove the 10 amp jumper wire without breaking the digital multi-meter connection.
9. The multi-meter leads must be securely clamped to the battery negative cable terminal clamp and the battery negative terminal post, but not the 10 amp jumper wire.
10. The high-amperage IOD reading on the multi-meter should be very low or nonexistent, depending upon the electrical equipment in the vehicle. If the amperage reading remains high, remove and replace each fuse or circuit breaker in the BCM and PDC, one at a time until the amperage reading becomes very low, or nonexistent. Refer to the appropriate wiring information for complete BCM and PDC, circuit breaker, and circuit identification. This will isolate each circuit and identify the circuit that is the source of the high-amperage IOD. If the amperage reading remains high after removing and replacing each fuse, disconnect the wire harness from the generator. If the amperage reading now becomes very low or nonexistent, diagnose and repair the Charging System as necessary. After the high-amperage IOD has been corrected, switch the multi-meter to progressively lower amperage scales and, if necessary, repeat the fuse and circuit breaker remove-and-replace process to identify and correct all sources of excessive IOD. It is now safe to select the lowest milliampere scale of the multi-meter to check the low-amperage IOD.
11. Observe the multi-meter reading. The low-amperage IOD should not exceed thirty-five milliamperes (0.035 ampere). If the current draw exceeds thirty-five milliamperes, isolate each circuit using the fuse and circuit breaker remove-and-replace process in Step 10. The multi-meter reading will drop to within the acceptable limit when the source of the excessive current draw is disconnected. Repair this circuit as required; whether a wiring short, incorrect switch adjustment, or an inoperative component is the cause.

OPEN-CIRCUIT VOLTAGE TEST

A battery open-circuit voltage (no load) test will show the approximate state-of-charge of a battery.

Before proceeding with this test, completely charge the battery, refer to the appropriate battery charging procedure.

1. Before measuring the open-circuit voltage, the surface charge must be removed from the battery. Turn on the headlamps for fifteen seconds, then allow up to five minutes for the battery voltage to stabilize.
2. Disconnect and isolate both battery cables, negative cable first.
3. Using a voltmeter connected to the battery posts (see the instructions provided by the manufacturer of the voltmeter), measure the open-circuit voltage.

See the Open-Circuit Voltage Table. This voltage reading will indicate the battery state-of-charge, but will not reveal its cranking capacity. If a battery has an open-circuit voltage reading of 12.4 volts or greater, it may be load tested to reveal its cranking capacity.

OPEN-CIRCUIT VOLTAGE TABLE

Open Circuit Voltage	Charge Percentage
11.7 volts or less	0%

2014 Jeep Cherokee Trailhawk

2014 ELECTRICAL Battery System - Service Information - Cherokee

12.0 volts	25%
12.2 volts	50%
12.4 volts	75%
12.6 volts or more	100%

REMOVAL

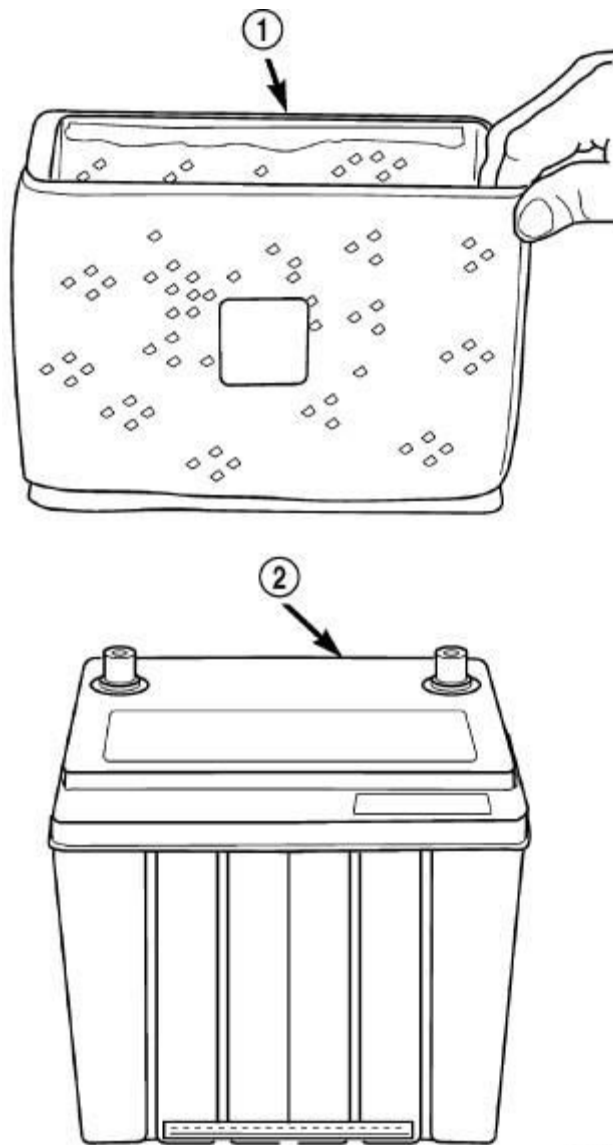
REMOVAL



Fig. 21: Battery & Cables

Courtesy of CHRYSLER GROUP, LLC

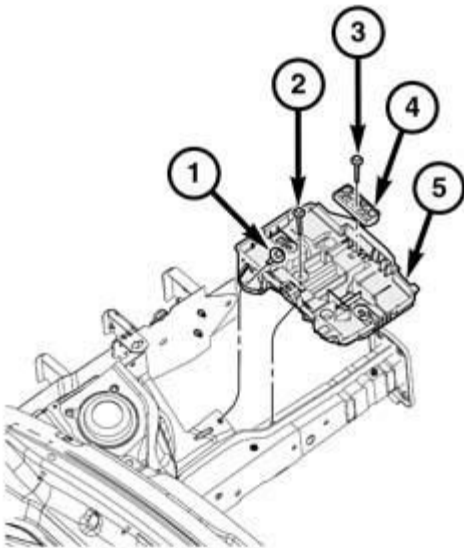
1. Disconnect the battery negative cable (3).
2. Disconnect the battery positive side cable (1).



80bdbceec

Fig. 22: Identifying Battery Case & Thermal Guard
Courtesy of CHRYSLER GROUP, LLC

3. Remove the thermal cover (1) by lifting upwards.



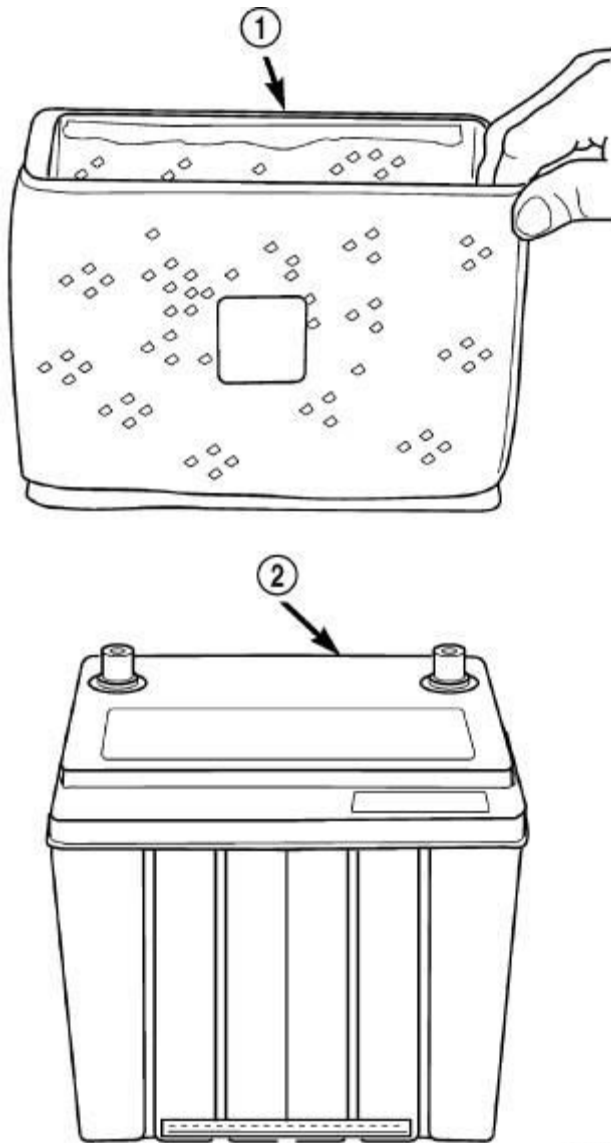
0909005837

Fig. 23: Identifying Battery Tray & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Remove the clamp (4) that secures the battery to the battery tray.
5. Remove the battery (2) from the vehicle.

INSTALLATION

INSTALLATION



80bdbceec

Fig. 24: Identifying Battery Case & Thermal Guard
Courtesy of CHRYSLER GROUP, LLC

1. Position the battery (2) onto the battery tray.
2. Install the battery hold down clamp. Tighten the bolt to 6 N.m (53 in. lbs.).
3. Install the battery thermal cover (1).

**Fig. 25: Battery & Cables**

Courtesy of CHRYSLER GROUP, LLC

4. Connect the battery positive cable (1). Tighten to 9 N.m (80 in. lbs.).
5. Connect the negative battery cable (3). Tighten the nut to 9 N.m (80 in. lbs.).

CABLES, BATTERY

DESCRIPTION

DESCRIPTION

The standard battery cables are large gauge, stranded copper wires sheathed within a heavy plastic or synthetic rubber insulating jacket. The battery cables for Stop/Start applications are a higher durability cable capable of withstanding the increased cycling that stop/start vehicles will experience. The wire used in the battery cables combines excellent flexibility and reliability with high electrical current carrying capacity. The battery cables feature a clamping type female battery terminal made of stamped sheet metal that is die cast onto one end of the battery cable wire. A pinch-bolt and nut are installed at the open end of the female battery terminal clamp. Large eyelet type terminals are crimped onto the opposite end of the battery cable wire and then soldered. The battery positive cable wires feature a larger female battery terminal clamp to allow connection to the larger battery positive terminal post. The battery negative cable wires have a smaller female battery terminal clamp.

The battery harness includes both the battery positive and negative cables to the remote battery connection and may include portions of the wiring circuits for other components on some vehicles. The starter harness includes both the battery positive and negative cables from the remote battery connection to the starter and engine ground location. The battery cables are part of the engine wiring harness. If the cables need to be serviced. The engine harness will need to be replaced as an assembly.

OPERATION

OPERATION

The battery cables connect the battery terminal posts to the vehicle electrical system. These cables also provide a path back to the battery for electrical current generated by the charging system for restoring the voltage potential of the battery. The female battery terminal clamps on the ends of the battery cable wires provide a strong and reliable connection of the battery cable to the battery terminal posts. The terminal pinch bolts allow the female terminal clamps to be tightened around the male terminal posts on the top of the battery. The eyelet terminals secured to the opposite ends of the battery cable wires from the female battery terminal clamps provide secure and reliable connection of the battery cables to the vehicle electrical system.

One wire has an eyelet terminal that connects the battery positive cable to the B(+) terminal stud of the Body Control Module (BCM), and the other wire has an eyelet terminal that connects the battery positive cable to the B(+) terminal stud of the engine starter motor solenoid. The battery negative cable terminal clamp has one wire as an eyelet terminal that connects the battery negative cable to the vehicle powertrain through a ground connection, typically on the engine cylinder block.

DIAGNOSIS AND TESTING**DIAGNOSIS AND TESTING - BATTERY CABLES**

A voltage drop test will determine if there is excessive resistance in the battery cable terminal connections or the battery cable. If excessive resistance is found in the battery cable connections, the connection point should be disassembled, cleaned of all corrosion or foreign material, then reassembled. Following reassembly, check the voltage drop for the battery cable connection and the battery cable again to confirm repair.

When performing the voltage drop test, it is important to remember that the voltage drop is giving an indication of the resistance between the two points at which the voltmeter probes are attached. **EXAMPLE:** When testing the resistance of the battery positive cable, touch the voltmeter leads to the battery positive cable terminal clamp and to the battery positive cable eyelet terminal at the starter solenoid B(+) terminal stud. If you probe the battery positive terminal post and the battery positive cable eyelet terminal at the starter solenoid B(+) terminal stud, you are reading the combined voltage drop in the battery positive cable terminal clamp-to-terminal post connection and the battery positive cable.

VOLTAGE DROP TEST

The following operation will require a voltmeter accurate to 1/10 (0.10) volt. Before performing this test, be certain that the following procedures are accomplished:

- The battery is fully-charged and load tested. Refer to **STANDARD PROCEDURE** for the proper battery charging and load test procedures.
- Fully engage the parking brake.
- If the vehicle is equipped with an automatic transmission, place the gearshift selector lever in the Park position. If the vehicle is equipped with a manual transmission, place the gearshift selector lever in the Neutral position and block the clutch pedal in the fully depressed position.
- Verify that all lamps and accessories are turned off.
- To prevent the engine from starting, remove the Automatic Shut Down (ASD) relay. The ASD relay can

be found in the Junction Block located in the left front engine compartment area. See the layout label affixed to the underside of the Junction Block cover for ASD relay identification and location.

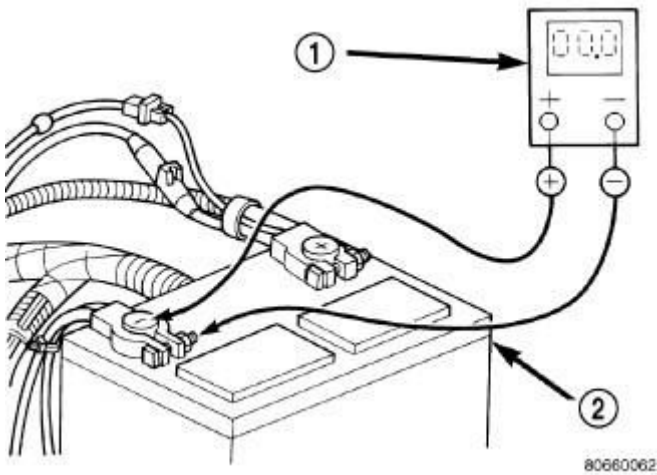


Fig. 26: Connecting Voltmeter Leads To Battery Negative Terminal
 Courtesy of CHRYSLER GROUP, LLC

1. Connect the positive lead of the voltmeter (1) to the battery (2) negative terminal post. Connect the negative lead of the voltmeter (1) to the battery (2) negative cable terminal clamp. Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If voltage is detected, correct the poor connection between the battery negative cable terminal clamp and the battery negative terminal post.

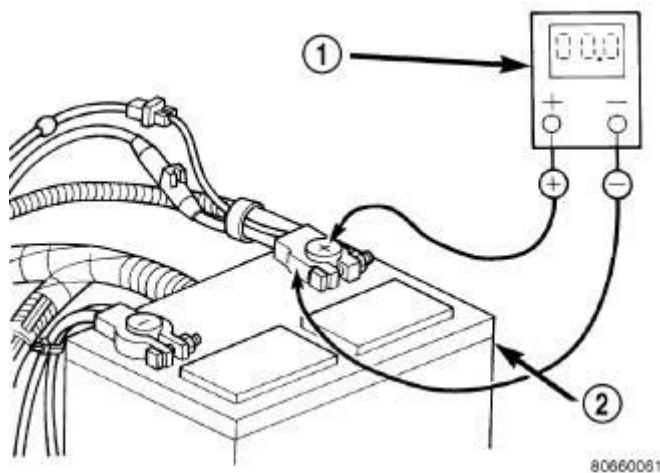


Fig. 27: Connecting Voltmeter Leads To Battery Positive Terminal
 Courtesy of CHRYSLER GROUP, LLC

2. Connect the positive lead of the voltmeter (1) to the battery (2) positive terminal post. Connect the negative lead of the voltmeter (1) to the battery (2) positive cable terminal clamp. Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If voltage is detected, correct the poor connection between the battery positive cable terminal clamp and the battery positive terminal post.

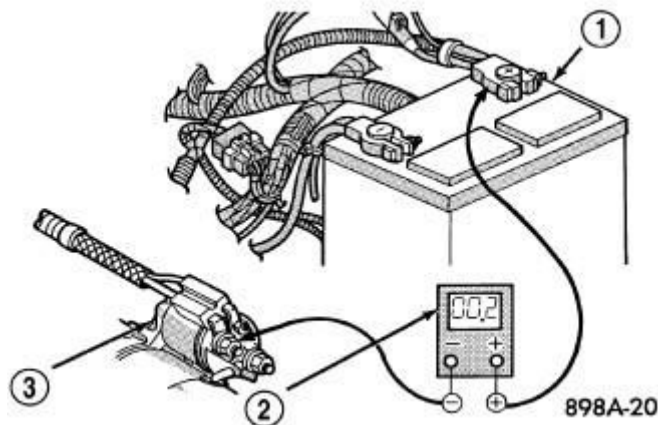


Fig. 28: Connecting Voltmeter To Terminal Clamp And Stud
 Courtesy of CHRYSLER GROUP, LLC

3. Connect the voltmeter (2) to measure between the battery positive cable terminal clamp (1) and the starter solenoid B(+) terminal stud (3). Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If the reading is above 0.2 volt, clean and tighten the battery positive cable eyelet terminal connection at the starter solenoid B(+) terminal stud. Repeat the test. If the reading is still above 0.2 volt, replace the faulty battery positive cable.

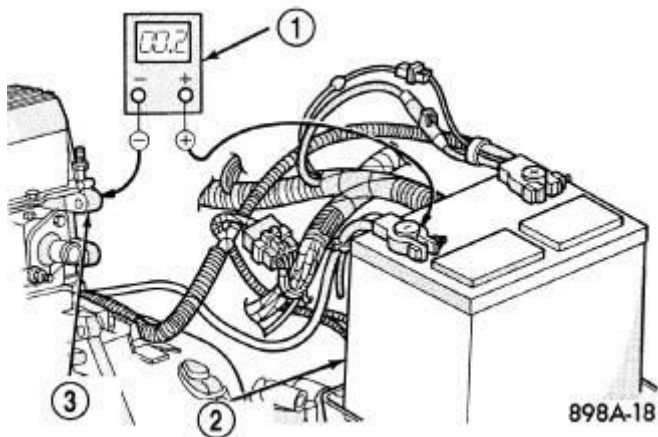


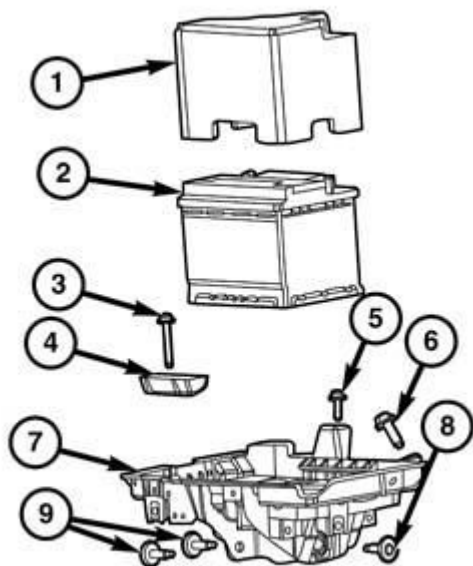
Fig. 29: Connecting Voltmeter To Battery And Engine Block
 Courtesy of CHRYSLER GROUP, LLC

4. Connect the voltmeter (1) to measure between the battery (2) negative cable terminal clamp and a good clean ground on the engine block (3). Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If the reading is above 0.2 volt, clean and tighten the battery negative cable eyelet terminal connection to the engine block. Repeat the test. If the reading is still above 0.2 volt, replace the faulty battery negative cable.

TRAY, BATTERY

DESCRIPTION

DESCRIPTION



080770037

Fig. 30: Battery, Battery Tray And Related Components
 Courtesy of CHRYSLER GROUP, LLC

The battery (2) is placed and secured in a plastic molded battery tray (7). The battery tray is located in the left front side of the vehicle, just ahead of the left front wheel and tire assembly. The battery tray is secured to the left front frame rail.

REMOVAL

DIESEL



Fig. 31: Battery & Cables

Courtesy of CHRYSLER GROUP, LLC

1. Remove the battery. Refer to **BATTERY, REMOVAL**.

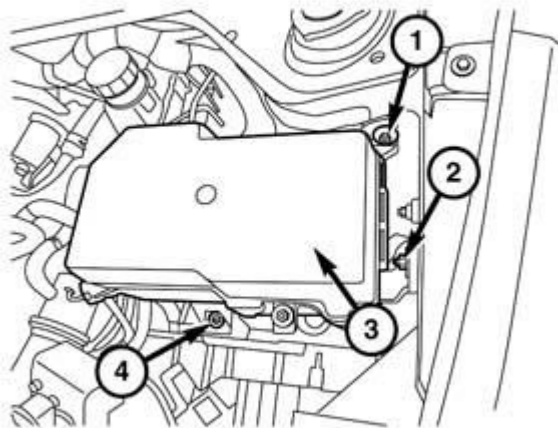


Fig. 32: Power Distribution Center

Courtesy of CHRYSLER GROUP, LLC

2. Remove the Power Distribution Center (PDC) (3) and position aside.

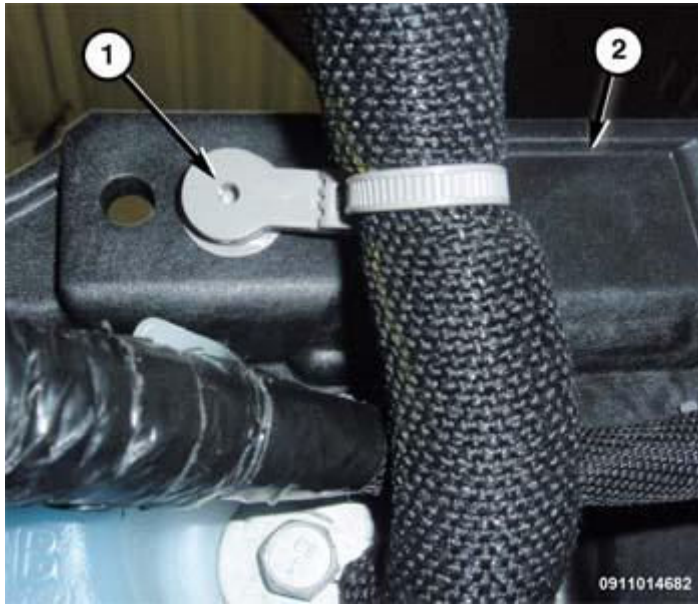
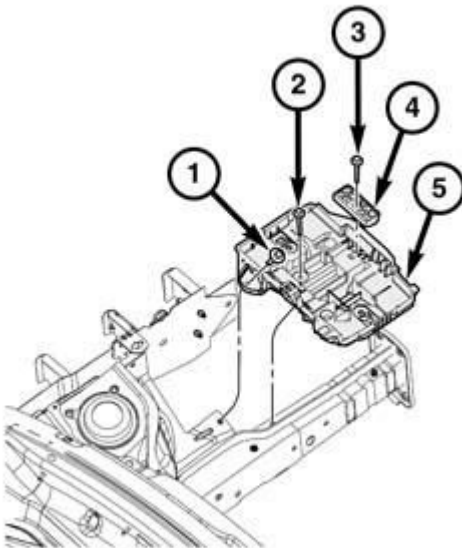


Fig. 33: Battery Tray & Engine Wire Harness Retainer
Courtesy of CHRYSLER GROUP, LLC

3. Detach the hood release cable from battery tray.
4. Remove the wiring harness retainer (1) from the battery tray (2).



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Fig. 34: Identifying Battery Tray & Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. Remove the upper battery tray bolt (2).

6. Partially raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
7. Remove the front left side tire.

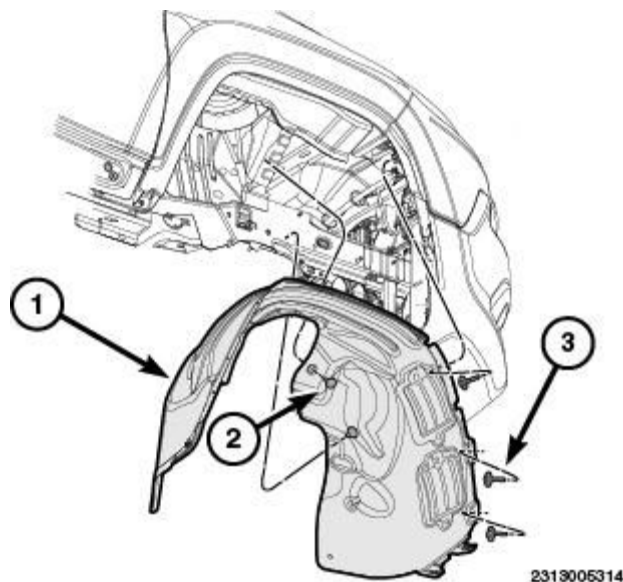


Fig. 35: Identifying Inner Wheel Splash Shield & Fasteners
Courtesy of CHRYSLER GROUP, LLC

8. Remove the inner wheel splash shield (1).
9. Remove the battery tray outer side rail bolt.
10. Remove the bolt (2) that secures the washer solvent bottle to the battery tray (1).
11. Raise the vehicle.

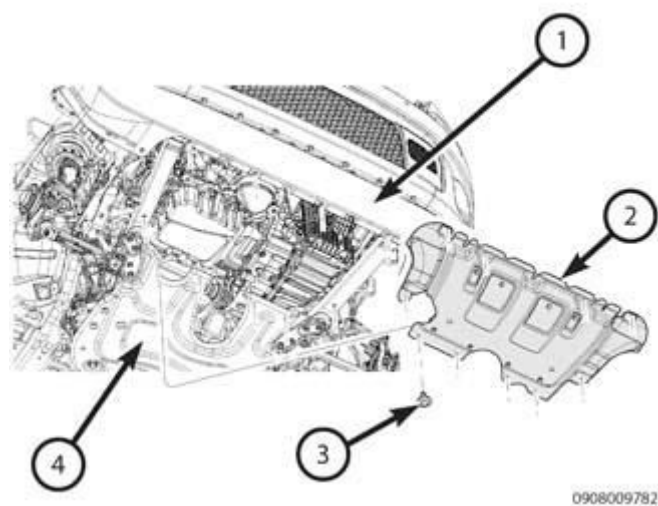
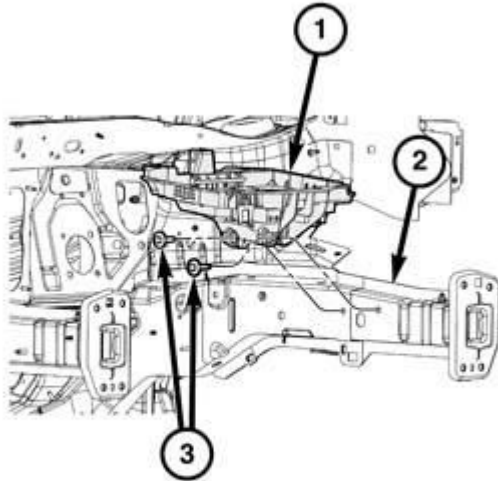


Fig. 36: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

12. Remove the lower belly pan.



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Fig. 37: Identifying Battery Tray, Inner Frame Rail & Bolts
Courtesy of CHRYSLER GROUP, LLC

13. Remove the bolts (3) that secure the battery tray (1) to the inner frame rail (2).
14. Lower the vehicle.
15. Using care, remove the battery tray from the vehicle by rotating the tray.

REMOVAL



Fig. 38: Battery & Cables

Courtesy of CHRYSLER GROUP, LLC

1. Remove the battery. Refer to **BATTERY, REMOVAL**.
2. Remove the Power Distribution Center (PDC) and position aside.
3. Remove the Powertrain Control Module (PCM) from the mount.

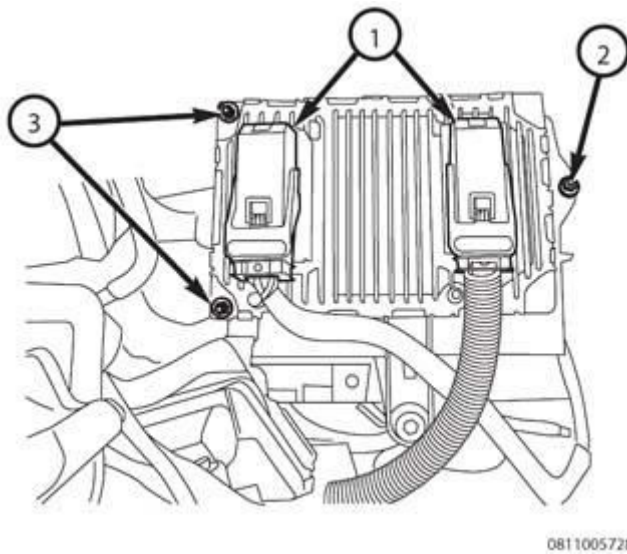
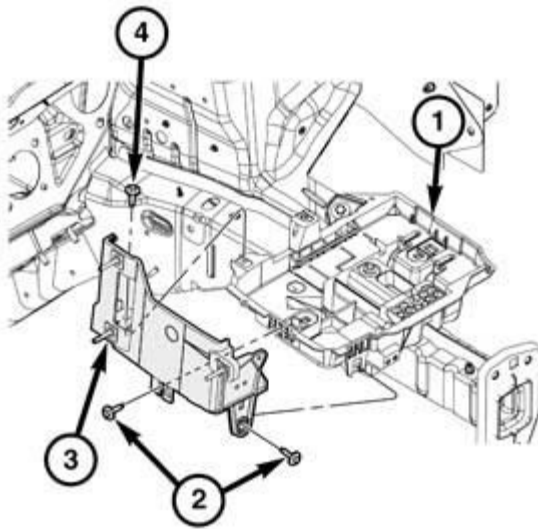


Fig. 39: Powertrain Control Module Electrical Connectors & Nuts

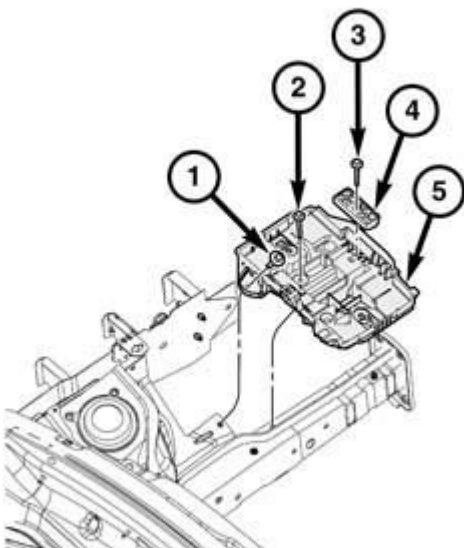
Courtesy of CHRYSLER GROUP, LLC



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Fig. 40: Battery Tray, PCM Mount & Bolts
Courtesy of CHRYSLER GROUP, LLC

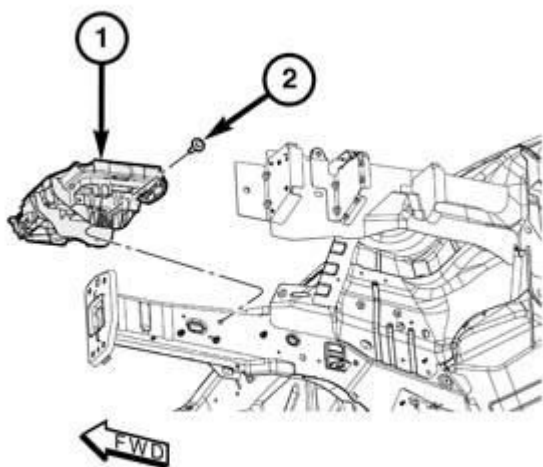
4. If required, remove the PCM mount.



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Fig. 41: Identifying Battery Tray & Fasteners
Courtesy of CHRYSLER GROUP, LLC

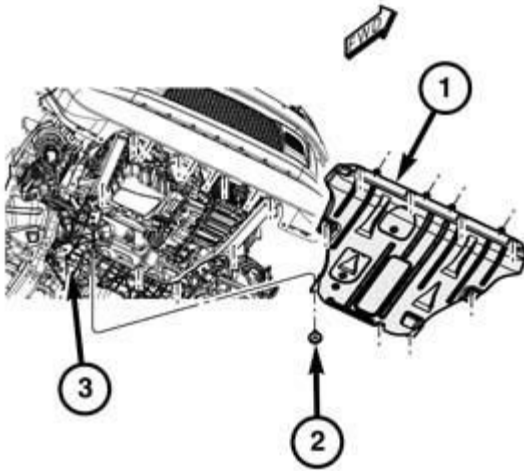
5. Remove the wiring harness retainers from the battery tray (5).
6. Remove the upper battery tray bolt (2).
7. Partially lift vehicle.
8. Remove the front left side tire.
9. Remove the inner wheel splash shield (1).



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Fig. 42: Identifying Battery Tray & Bolt
Courtesy of CHRYSLER GROUP, LLC

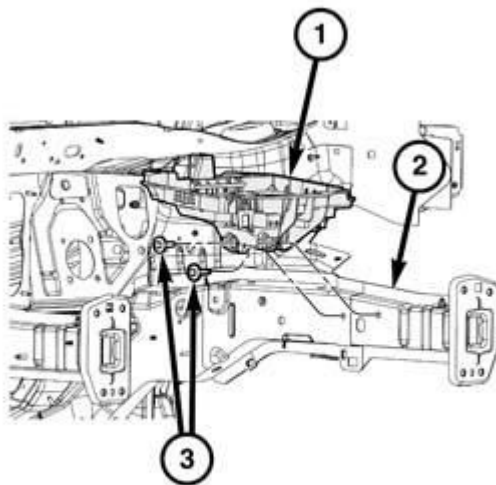
10. Remove the bolt (2) that secures the washer solvent bottle to the battery tray (1).
11. Remove the wiring harness from the battery tray.
12. Lift the vehicle.



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Fig. 43: Removing/Installing Belly Pans
Courtesy of CHRYSLER GROUP, LLC

13. Remove the lower belly pan.



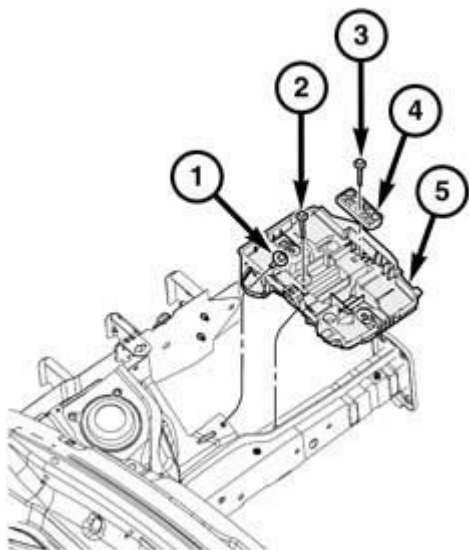
0909005828

Fig. 44: Identifying Battery Tray, Inner Frame Rail & Bolts
Courtesy of CHRYSLER GROUP, LLC

14. Remove the bolts (3) that secure the battery tray (1) to the inner frame rail (2).
15. Lower the vehicle.
16. Using care, remove the battery tray from the vehicle by rotating the tray.

INSTALLATION

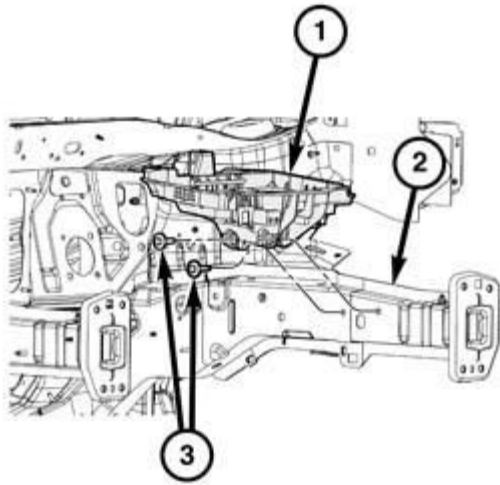
DIESEL



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Fig. 45: Identifying Battery Tray & Fasteners
Courtesy of CHRYSLER GROUP, LLC

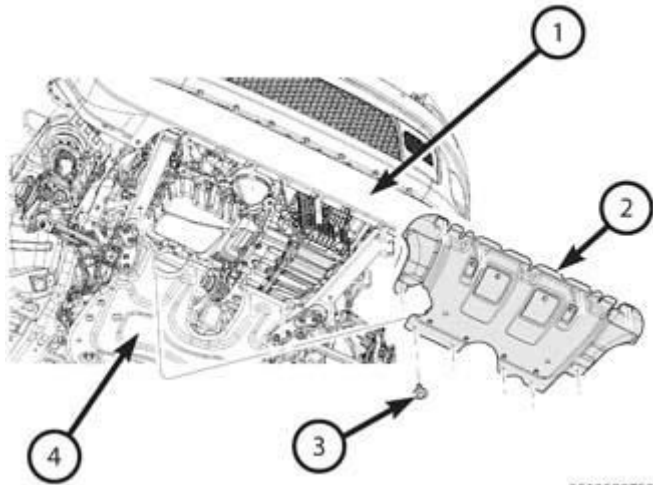
1. Position the battery tray (5) onto the frame rail.
2. Loosely install the upper battery tray bolt (1, 2).
3. Partially lift the vehicle.
4. Install the bolt (2) that secures the washer solvent bottle to the battery tray (1) and tighten to 12 N.m (106 in. lbs.).
5. Install the outer side rail bolt (2). Tighten bolt to 12 N.m (106 in. lbs.).



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Fig. 46: Identifying Battery Tray, Inner Frame Rail & Bolts
Courtesy of CHRYSLER GROUP, LLC

6. Install the inner battery tray to frame rail bolts (3). Tighten bolt to 12 N.m (106 in. lbs.).



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Fig. 47: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

7. Raise the vehicle.
8. Install the belly pan. Tighten bolts (2) to 10 N.m (89 in. lbs.).
9. Lower the vehicle.

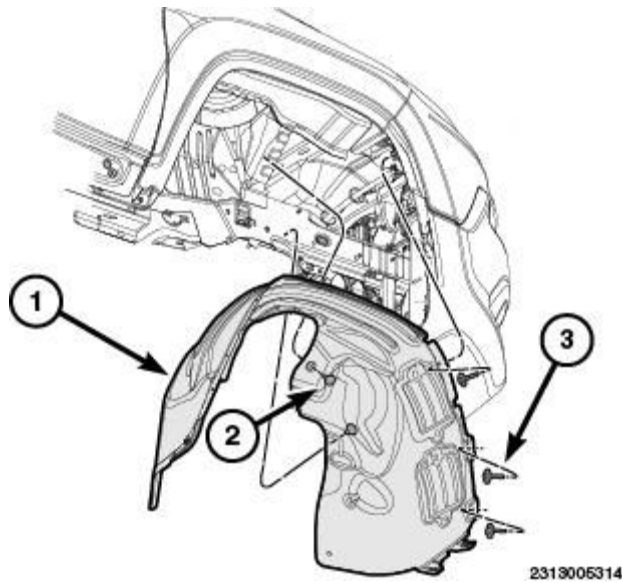


Fig. 48: Identifying Inner Wheel Splash Shield & Fasteners
Courtesy of CHRYSLER GROUP, LLC

10. Install the inner splash shield (1).
11. Install the wheel.

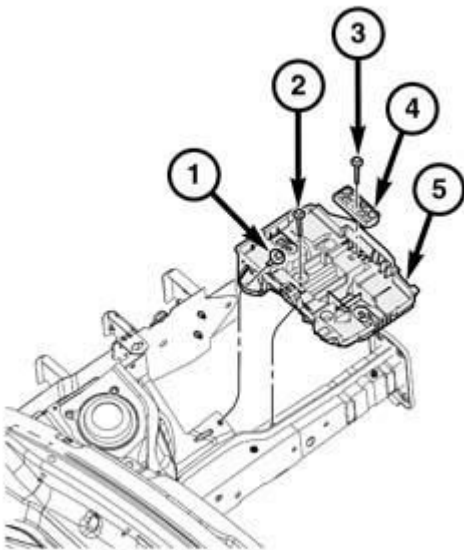


Fig. 49: Identifying Battery Tray & Fasteners
Courtesy of CHRYSLER GROUP, LLC

12. Tighten the upper battery tray bolts. Tighten bolt to 12 N.m (106 in. lbs.).

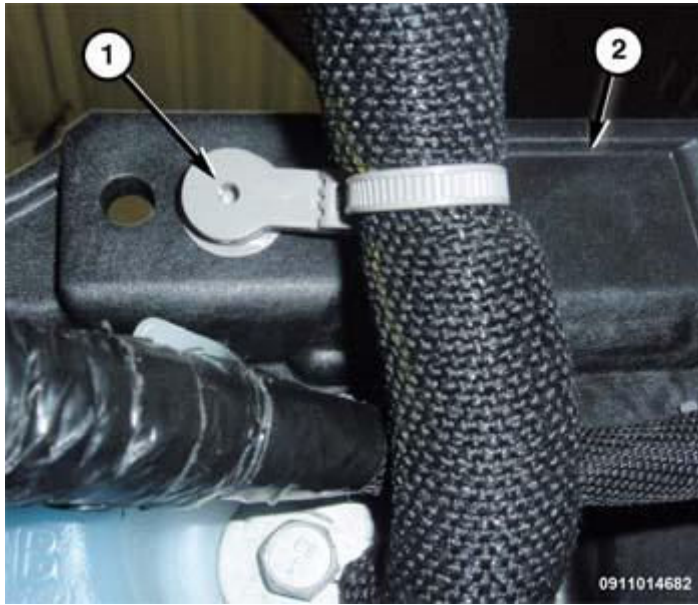


Fig. 50: Battery Tray & Engine Wire Harness Retainer
Courtesy of CHRYSLER GROUP, LLC

13. Attach the hood release cable from battery tray.
14. Install the wiring harness (1) onto the battery tray (2).

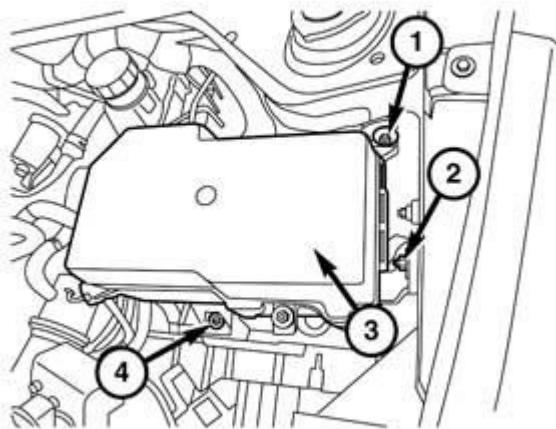


Fig. 51: Power Distribution Center
Courtesy of CHRYSLER GROUP, LLC

15. Install the PDC (3).

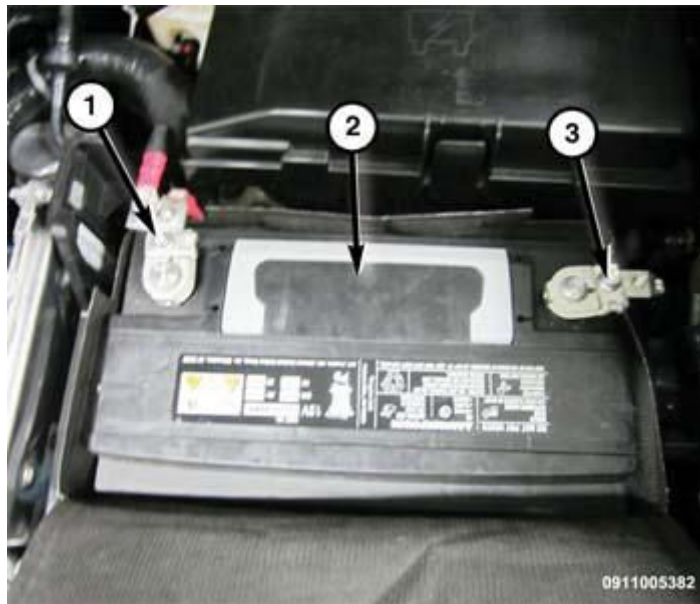
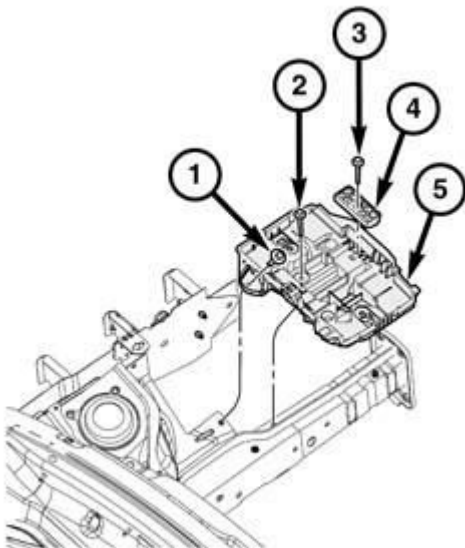


Fig. 52: Battery & Cables
Courtesy of CHRYSLER GROUP, LLC

16. Install the battery. Refer to **BATTERY, INSTALLATION**.

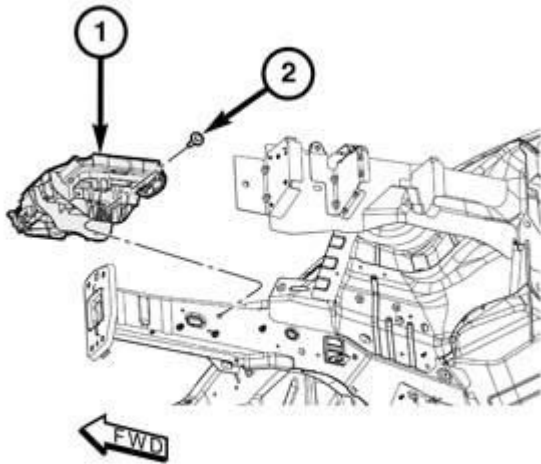
INSTALLATION



0909005837

Fig. 53: Identifying Battery Tray & Fasteners
Courtesy of CHRYSLER GROUP, LLC

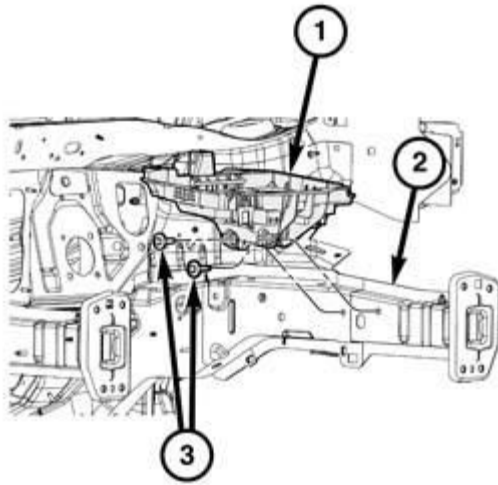
1. Position the battery tray onto the frame rail.
2. Loosely install the upper battery tray bolt (1, 2).
3. Partially lift the vehicle.



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Fig. 54: Identifying Battery Tray & Bolt
Courtesy of CHRYSLER GROUP, LLC

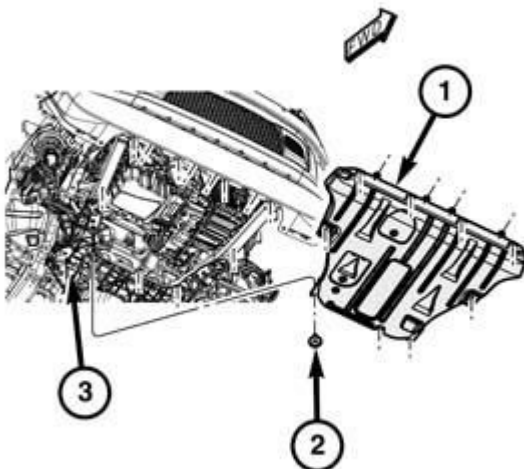
4. Install the outer side rail bolt (2). Tighten bolt to 12 N.m (106 in. lbs.).
5. Install the inner splash shield (1).
6. Install the wiring harness onto the battery tray.
7. Install the wheel.
8. Raise the vehicle.



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Fig. 55: Identifying Battery Tray, Inner Frame Rail & Bolts
Courtesy of CHRYSLER GROUP, LLC

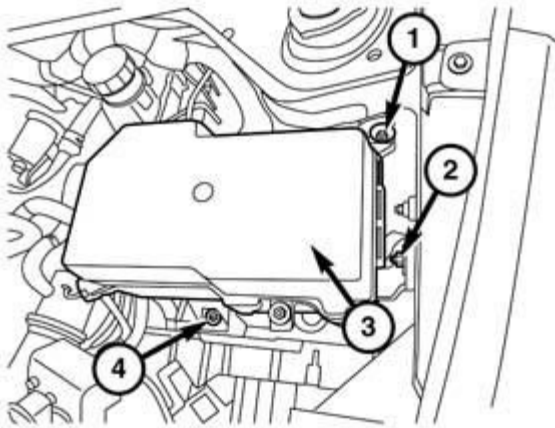
9. Install the inner battery tray to frame rail bolts (3). Tighten bolt to 12 N.m (106 in. lbs.).



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Fig. 56: Removing/Installing Belly Pans
Courtesy of CHRYSLER GROUP, LLC

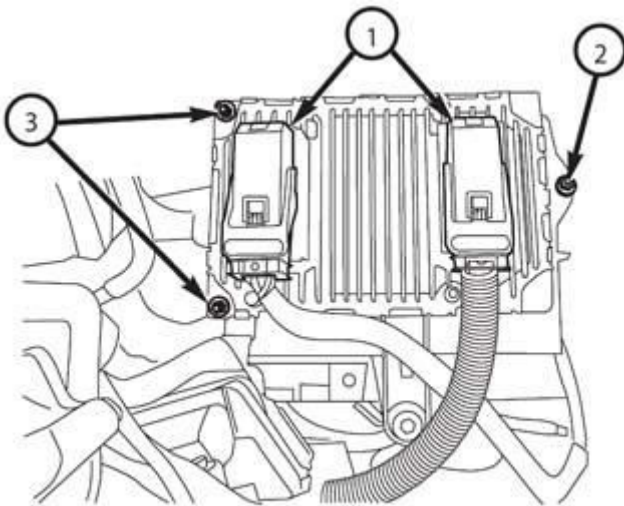
10. Install the belly pan. Tighten bolts (2) to 10 N.m (89 in. lbs.).
11. Lower the vehicle.



080770040

Fig. 57: Power Distribution Center
Courtesy of CHRYSLER GROUP, LLC

12. Tighten the upper battery tray bolts. Tighten bolt to 12 N.m (106 in. lbs.).
13. Install the PDC.
14. Install the wiring harness onto the battery tray.



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Fig. 58: Powertrain Control Module Electrical Connectors & Nuts

Courtesy of CHRYSLER GROUP, LLC

15. If removed, install the PCM.
16. Connect the electrical connectors (1).

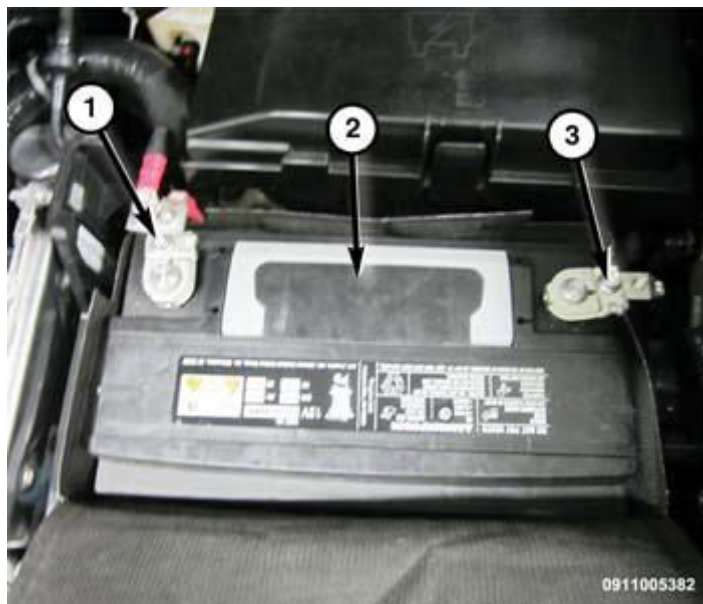


Fig. 59: Battery & Cables

Courtesy of CHRYSLER GROUP, LLC

17. Position the battery (2) onto the battery tray.
18. Install the battery hold down clamp. Tighten bolt to 6 N.m (53 in. lbs.).
19. Install the battery thermal cover.
20. Install the battery positive cable (1). Tighten bolt to 9 N.m (80 in. lbs.).
21. Install the negative battery cable (3). Tighten bolt to 9 N.m (80 in. lbs.).

MODULE, VOLTAGE STABILITY (VSM)

DESCRIPTION

DESCRIPTION

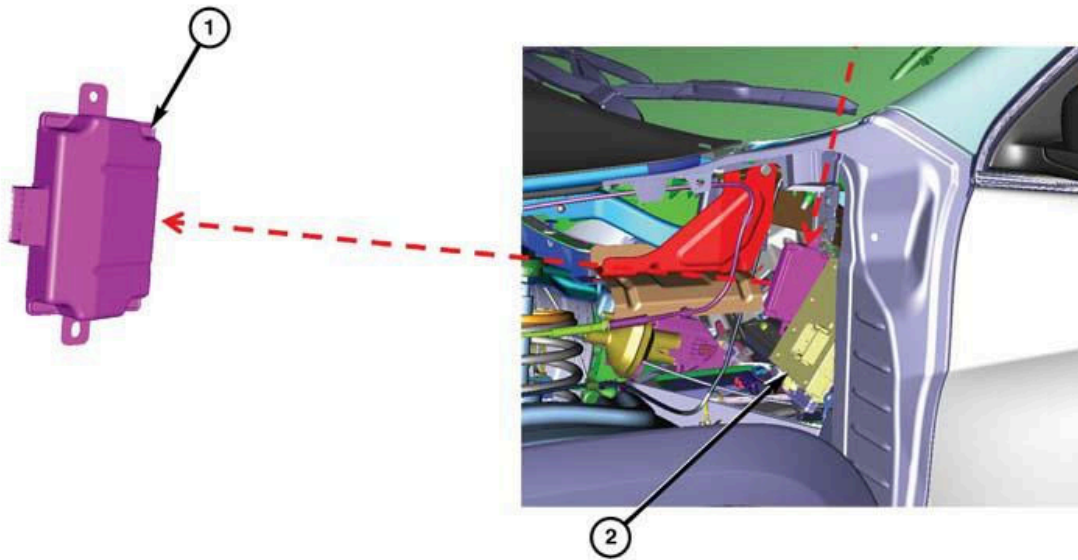


Fig. 60: Identifying Voltage Stability Module (VSM) & Body Control Module (BCM)
Courtesy of CHRYSLER GROUP, LLC

A Voltage Stability Module (VSM) (1) is an electronic module which converts a source of direct current (DC) from one voltage level to another. This model will use dual VSM setup located next to the BCM (2).

OPERATION

OPERATION

The Voltage Stability Module (VSM) supports the following items:

1. Exterior Lights
2. Radio
3. Display (Integrated center stack, various button and switch illuminations)
4. Instrument Cluster
5. HVAC electronic display and operation
6. Integrated Trailer Tow Module (ITBM)
7. Parktronics (PTS)

These components should work as designed and behave as if the engine is running during stop mode.

The AC compressor will not work during stop mode, but HVAC settings will be preserved. Under certain conditions, HVAC will force the engine to restart so that the blower will operate. The heated seats and windows will continue to run during a Stop event, however during period the vehicle restarts, heated seats will turn off temporarily to prevent draw on voltage. The windows will turn off temporarily during restart as well, due to anti-pinch algorithm. The indicator for the seats will remain on to the customer. Heated mirrors are unaffected.

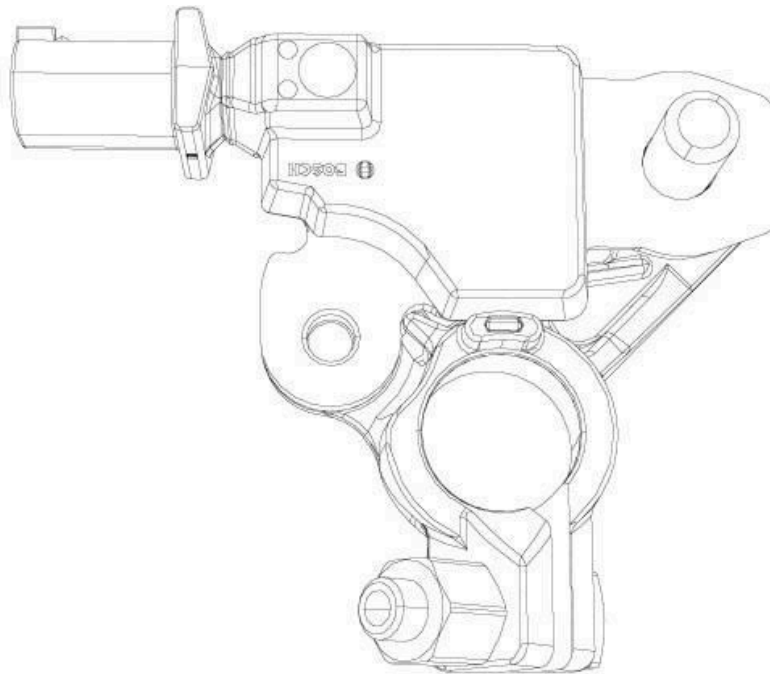
The power outlets will experience a voltage dip during restart and depending what is currently plugged in, there will be different responses: resets, beeps, etc or in some cases no response noted. The 115V AC inverter will reset and may not immediately return to normal operation (depending on what is connected) and manually plugging out and back in of the device may be required.

All motors (e.g. windows, blowers, etc) running during stop will slow down but all should continue to operate normally after restart.

SENSOR, INTELLIGENT BATTERY (IBS)

DESCRIPTION

DESCRIPTION



3108689

Fig. 61: Intelligent Battery Sensor (IBS) Component Location
Courtesy of CHRYSLER GROUP, LLC

The Intelligent Battery Sensor (IBS) serves to record and process measured battery variable values (current, voltage, temperature) for the vehicle power net management system. The Intelligent Battery Sensor (IBS) will calculate the Battery 'state of charge', 'state of health', and 'state of function'.

The mechanical part of the IBS is comprised of the battery clamp for the negative terminal and a captured bolt to attach the ground cable to. The functional tasks include establishing the electrical contact between the body and the negative battery post, housing the electronic module (actual sensor element) and the provision of an adequate thermal contact between the sensor system temperature sensor and the negative battery post. The mechanical part of the IBS also protects the sensitive electronic components from external influences.

The IBS is mounted directly on the 12 VDC battery's negative post. The battery post clamp nut is a captive nut and the stud will break if the nut is removed.

OPERATION

OPERATION

The battery sensor measures, calculates and reports battery: voltage, current, temperature, state of charge and other parameters via a LIN (Local Interconnect Network) bus to a master control module (engine controller, body controller etc). The battery sensor is used to optimize vehicle performance (maintain battery charge, fuel economy etc) via the vehicles electrical system

The battery sensor is readable/diagnosable via a "scan tool" that can display all of the available parameters needed for vehicle servicing or trouble shooting.

Information the Intelligent Battery Sensor (IBS) send out on the CAN Bus is

- SOC = Battery State of Charge: Percentage the residual charge of the battery in respect to its nominal capacity. In few words represents how much the battery is charged.
- SOH = Battery State of Health: Send a percentage of the real capacity of the battery in respect to the nominal capacity of the battery. It's so called because during the functioning, the battery is subject to irreversible processes that reduce its capacity to be recharged and to give energy (battery ageing).
- SOF = Battery State of Function: The prediction of the minimum voltage that will be reached during a cranking phase

When the IBS is powered up for the first time or is powered after a power disconnection, it goes into a so called "recalibration" phase, where the IBS must recognize the type of battery and its characteristics and state. So in this phase the tolerances on the state functions (SOC, SOF, SOH) are greater than in normal working condition.

REMOVAL

REMOVAL

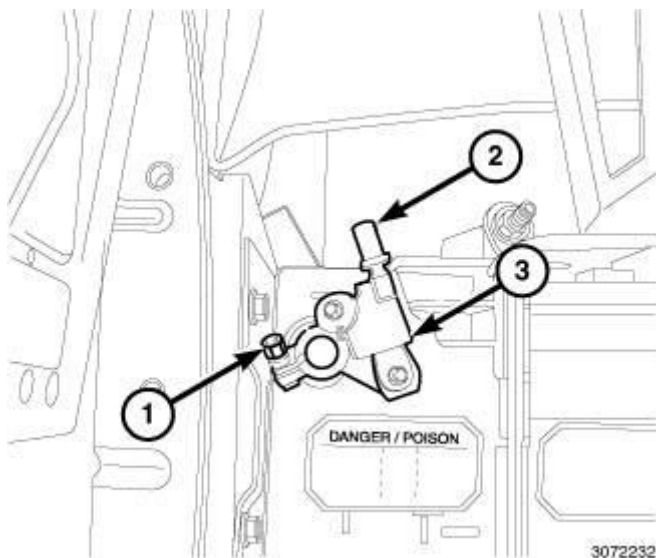


Fig. 62: Intelligent Battery Sensor (IBS) Component Location
Courtesy of CHRYSLER GROUP, LLC

1. Remove the components to access the battery. Refer to **BATTERY, REMOVAL**.

WARNING: Do not remove the captive nut, doing so will cause the stud to break.

2. Loosen the captive nut (1).
3. Disconnect the harness from the Intelligent Battery Sensor (IBS) (2).
4. Remove the IBS (3) from the negative battery post.
5. Remove the negative battery cable retainer to the IBS.
6. Remove the IBS.

INSTALLATION

INSTALLATION

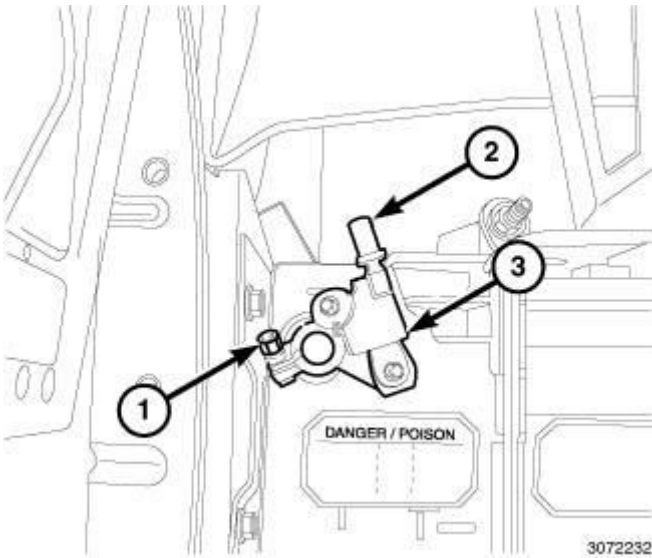


Fig. 63: Intelligent Battery Sensor (IBS) Component Location
Courtesy of CHRYSLER GROUP, LLC

NOTE: Connecting the negative battery cable to the Intelligent Battery Sensor (IBS) must be done before installing on the battery post.

1. Place the IBS onto the negative battery post and push the IBS (3) down until properly seated on the cone of the post.
2. Fasten Ground terminal to M8 (max 20Nm +/-2Nm).

NOTE: M8 has much higher torque than the M6 clamp and can break IBS free if the M6 is tightened prior.

3. Secure the M6 pole clamp (max 6Nm +/- 1.5Nm).
4. Install amp 2 pin connector (Power & LIN) making sure there is no stress on the wires.
5. Install the components removed to access the battery. Refer to **BATTERY, INSTALLATION**.

2014 ELECTRICAL**Charging - Service Information - Cherokee****DESCRIPTION****DESCRIPTION**

The charging system consists of:

- Generator
- Electronic Voltage Regulator (EVR) circuitry within the Powertrain Control Module (PCM)
- Ignition switch (refer to the **IGNITION SYSTEM - SERVICE INFORMATION** article for information)
- Battery (refer to the **BATTERY SYSTEM - SERVICE INFORMATION** article for information)
- Inlet Air Temperature (calculated battery temperature) (If equipped)
- Voltmeter (refer to the **INSTRUMENT CLUSTER - SERVICE INFORMATION** article for information if equipped)
- Wiring harness and connections (refer to the appropriate Wiring Information for information)
- Accessory drive belt (refer to the **ENGINE COOLING SYSTEM** article for more information)

DIAGNOSIS AND TESTING**DIAGNOSIS AND TESTING - ON-BOARD DIAGNOSTIC SYSTEM**

The Powertrain Control Module (PCM) monitors critical input and output circuits of the charging system, making sure they are operational. A Diagnostic Trouble Code (DTC) is assigned to each input and output circuit monitored by the OBD system. Some circuits are checked continuously and some are checked only under certain conditions.

If the OBD system senses that a monitored circuit is bad, it will put a DTC into electronic memory. The DTC will stay in electronic memory as long as the circuit continues to be bad. The PCM is programmed to clear the memory after 40 good trips if the problem does not occur again.

The following procedures may be used to diagnose the charging system if:

- the check gauges lamp or battery lamp is illuminated with the engine running
- the voltmeter (if equipped) does not register properly
- an undercharged or overcharged battery condition occurs.

Remember that an undercharged battery is often caused by:

- accessories being left on with the engine not running

- a faulty or improperly adjusted switch that allows a lamp to stay on. Refer to Ignition-Off Draw Test. Refer to **BATTERY, STANDARD PROCEDURE**.
- loose generator belt.

DIAGNOSTIC TROUBLE CODES

A DTC description can be read using the scan tool. Refer to the appropriate ELECTRICAL DIAGNOSTICS article for information.

A DTC does not identify which component in a circuit is bad. Thus, a DTC should be treated as a symptom, not as the cause for the problem. In some cases, because of the design of the diagnostic test procedure, a DTC can be the reason for another DTC to be set. Therefore, it is important that the test procedures be followed in sequence, to understand what caused a DTC to be set.

ERASING DIAGNOSTIC TROUBLE CODES

The scan tool must be used to erase a DTC.

INSPECTION

The Powertrain Control Module (PCM) monitors critical input and output circuits of the charging system, making sure they are operational. A Diagnostic Trouble Code (DTC) is assigned to each input and output circuit monitored by the On-Board Diagnostic (OBD) system. Some charging system circuits are checked continuously, and some are checked only under certain conditions.

Refer to Diagnostic Trouble Codes in **DTC INDEX** for more DTC information. This will include a complete list of DTCs including DTCs for the charging system.

To perform a complete test of the charging system, refer to the appropriate ELECTRICAL DIAGNOSTICS article and the scan tool. Perform the following inspections before attaching the scan tool.

1. Inspect the battery condition. Refer to the **BATTERY SYSTEM - SERVICE INFORMATION** article for procedures. Refer to **DIAGNOSIS AND TESTING**.
2. Inspect condition of battery cable terminals, battery posts, connections at engine block, starter solenoid and relay. They should be clean and tight. Repair as required.
3. Inspect all fuses in the fuse block for tightness in receptacles. They should be properly installed and tight. Repair or replace as required.
4. Inspect generator mounting bolts for tightness. Replace or tighten bolts if required. Refer to the **GENERATOR** Removal/Installation for torque specifications. Refer to **SPECIFICATIONS**.
5. Inspect generator drive belt condition and tension. Tighten or replace belt as required.
6. Inspect decoupler pulley (if equipped). Ensure decoupler pulley is driving the alternator rotor.
7. Inspect automatic belt tensioner (if equipped). Refer to **ENGINE COOLING SYSTEM** article for more information.
8. Inspect generator electrical connections at generator field, battery output, and ground terminal (if equipped). Also check generator ground wire connection at engine (if equipped). They should all be clean

2014 Jeep Cherokee Trailhawk

2014 ELECTRICAL Charging - Service Information - Cherokee

and tight. Repair as required.

SPECIFICATIONS

GENERATOR

MANUFACTURER	ENGINE	NOMINAL RATING	MINIMUM OUTPUT (AMPS) (@ SPECIFIED TEST CONDITIONS)
mitsubishi electric	2.0L, 2.4L	160A	120A
DENSO	3.2L Light Duty Cooling	160A	120A
DENSO	3.2L Heavy Duty Cooling	180A	130A
TEST CONDITIONS			
1. Engine RPM : 2500 RPM (ENGINE HOT)			
2. Voltage Output : 13.0 - 16.0 V			

TORQUE-DIESEL

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Battery Terminal Nut	9	-	80
Generator Mounting Bolts	70	52	-
Generator B+ Cable Terminal Nut	10	-	89

TORQUE

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Battery Hold Down Clamp Bolt	16	-	142
Battery Terminal Nut	16.5	-	145
Generator B+ nut	4	-	36
Generator Mounting Bolt	25	18	-
Negative Battery Cable Remote Terminal Nut	16.5	-	145

GENERATOR

REMOVAL

2.4L

1. Remove the engine cover.

2. Disconnect the negative battery cable.

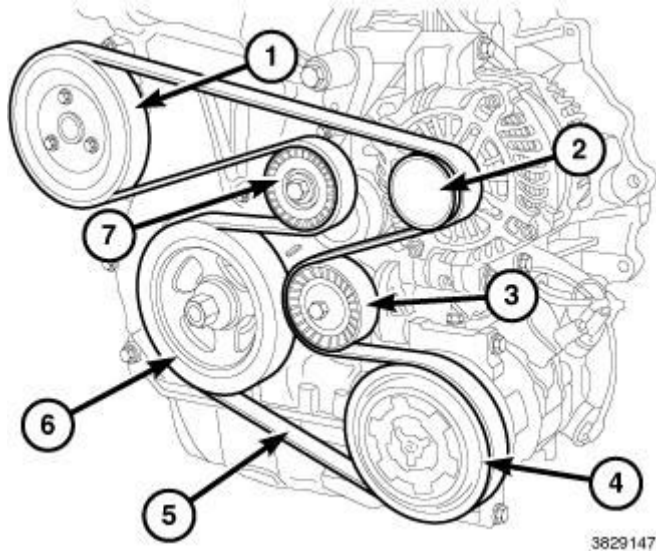


Fig. 1: Accessory Drive Belt Routing
Courtesy of CHRYSLER GROUP, LLC

3. Remove the accessory drive belt. Refer to **BELT, SERPENTINE, REMOVAL**.

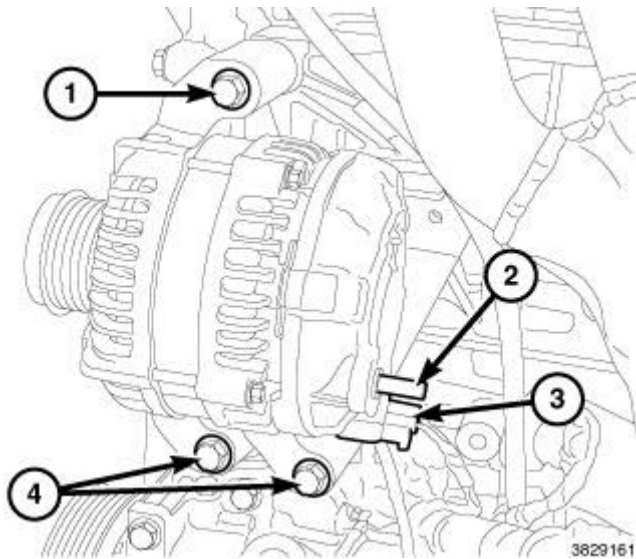
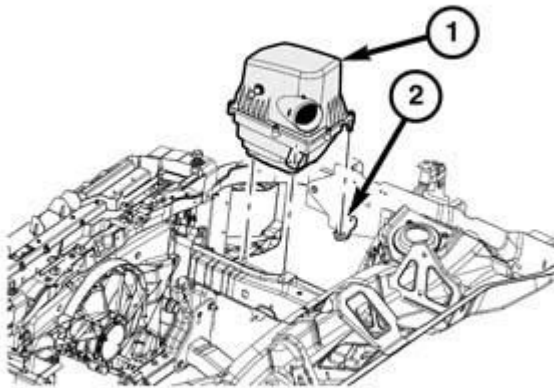


Fig. 2: Generator Stud, Bolts & Connector
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the field generator harness connector (3).
5. Remove the B+ cable from the generator stud (2).
6. Remove the upper generator bolt (1).
7. Remove the lower generator bolts (4).

3.2L

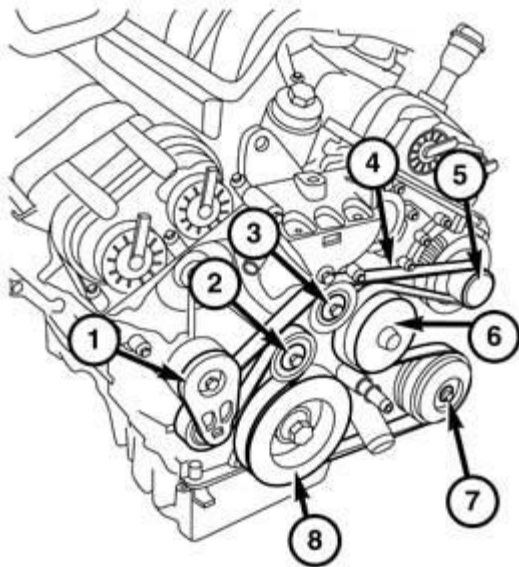
1. Perform the fuel system pressure release. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE** .
2. Disconnect and isolate the battery negative cable.



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Fig. 3: Air Filter Housing Body
Courtesy of CHRYSLER GROUP, LLC

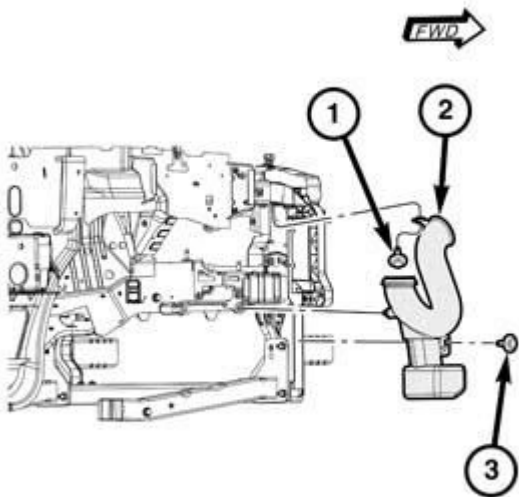
3. Remove the air filter housing body (1). Refer to **BODY, AIR CLEANER, REMOVAL** .
4. Raise and support the vehicle.



0708003948

Fig. 4: Removing/Installing Accessory Drive Belt
Courtesy of CHRYSLER GROUP, LLC

5. Remove the right side front wheel.
6. Remove the accessory drive belt. Refer to **BELT, SERPENTINE, REMOVAL** .

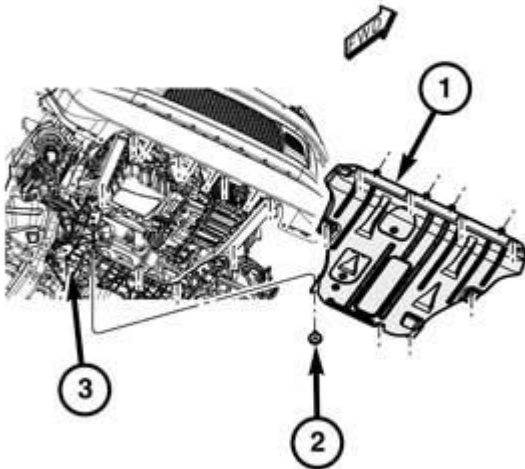


0909005840

Fig. 5: Air Intake Inlet Tube

Courtesy of CHRYSLER GROUP, LLC

7. Remove the air intake inlet tube (2).
8. Raise the vehicle.



0909005829

Fig. 6: Removing/Installing Belly Pans
Courtesy of CHRYSLER GROUP, LLC

9. Remove the belly pan (1).

NOTE: The A/C compressor bolts are removed to allow for extra clearance for the generator to pass between the upper and lower frame.

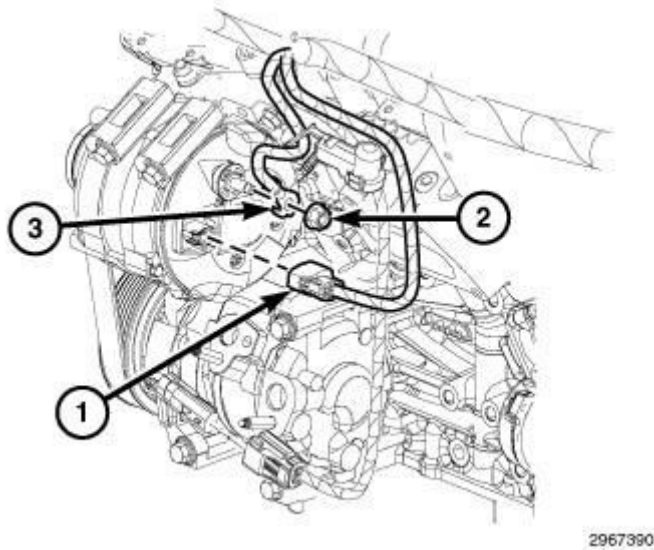


Fig. 7: Generator Field Electrical Connector & B+ Retainer
Courtesy of CHRYSLER GROUP, LLC

10. Remove the A/C compressor bolts.
11. Disconnect the field generator harness connector (1).
12. Remove the B+ cable (3) from the generator.
13. Lower the vehicle.
14. Using a suitable jack. Support the engine.

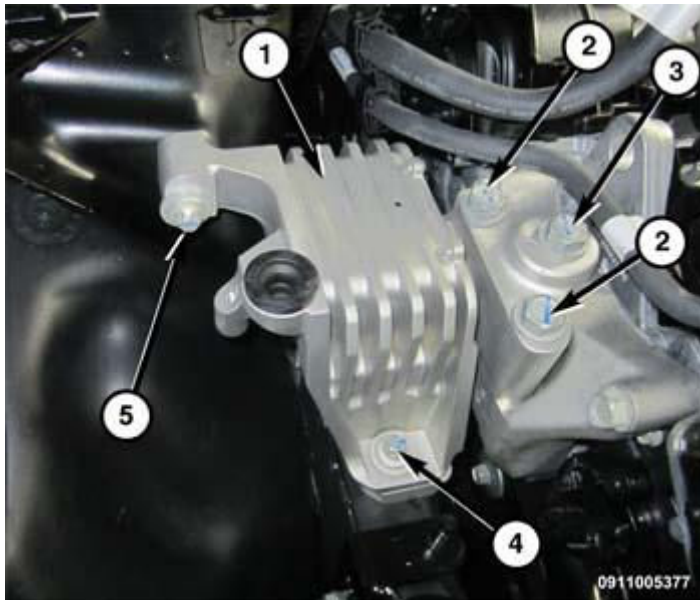


Fig. 8: Removing/Installing Right Engine Mount Assembly
Courtesy of CHRYSLER GROUP, LLC

15. Remove the upper engine mount bolts to engine mount bracket (2, 3).

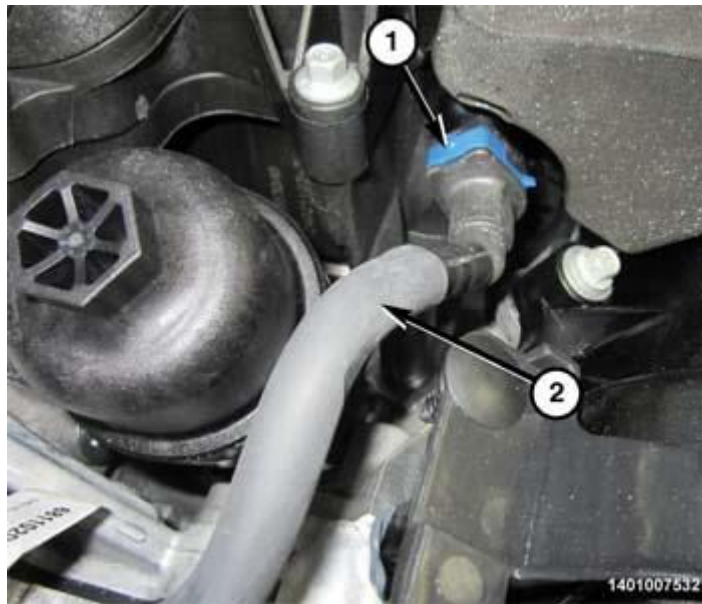


Fig. 9: Fuel Line At Fuel Rail

Courtesy of CHRYSLER GROUP, LLC

16. Remove the fuel line (2) at the fuel rail.

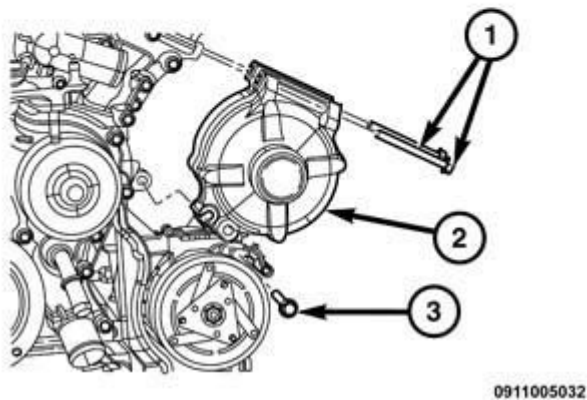


Fig. 10: Generator & Mounting Bolts

Courtesy of CHRYSLER GROUP, LLC

17. Remove the lower generator mounting bolt (3).
18. Remove the top two generator mounting bolts (1).

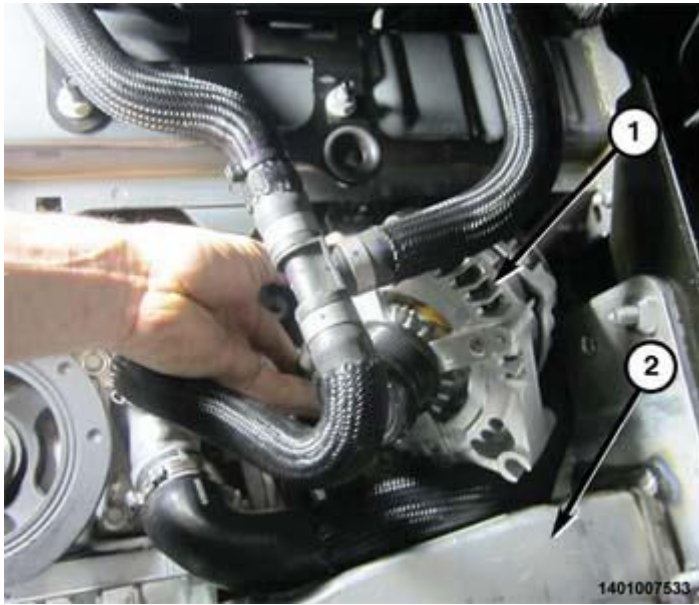


Fig. 11: Generator & Frame Rails
Courtesy of CHRYSLER GROUP, LLC

19. Carefully remove the generator (1) between the upper and lower frame rail (2).

2.0L DIESEL

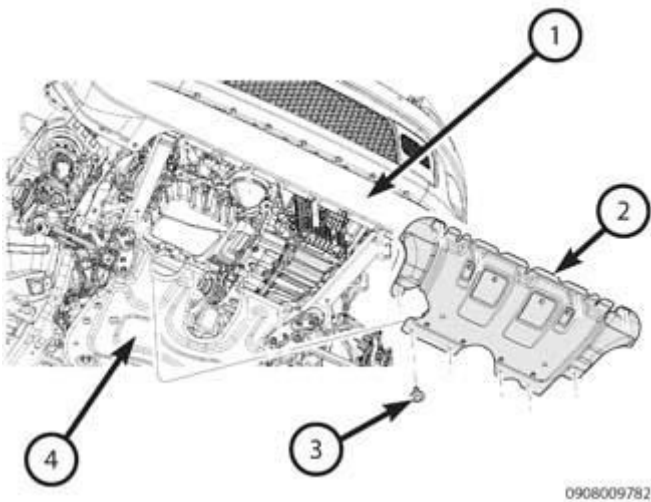


Fig. 12: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove bolts (3) and the belly pan (2).

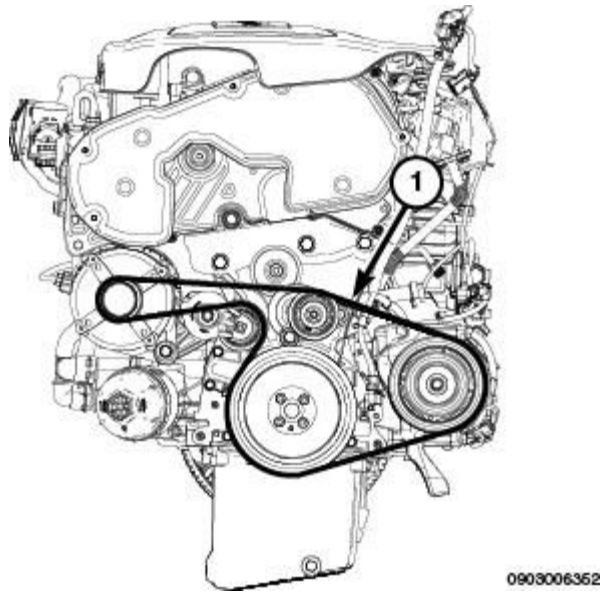


Fig. 13: Accessory Drive Belt Routing - 2.0L Diesel
Courtesy of CHRYSLER GROUP, LLC

3. Remove the accessory drive belt (1). Refer to **BELT, SERPENTINE, REMOVAL** .

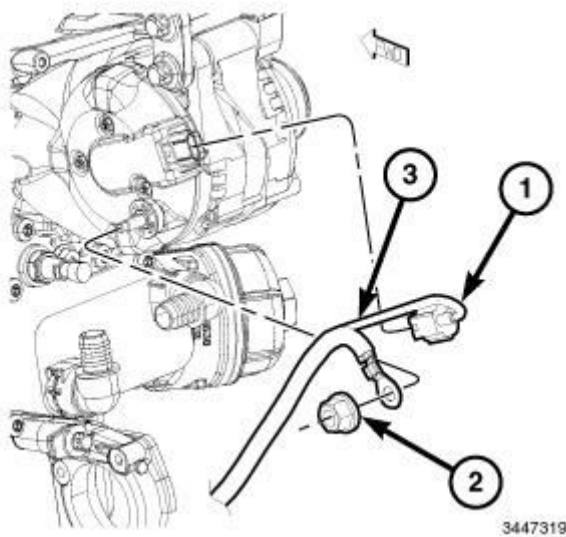


Fig. 14: B+ Retainer, Generator Field Connector & B+ Cable
Courtesy of CHRYSLER GROUP, LLC

4. Remove the B+ nut (2).
5. Disconnect the generator field connector (1) and position aside the B+ cable (3).

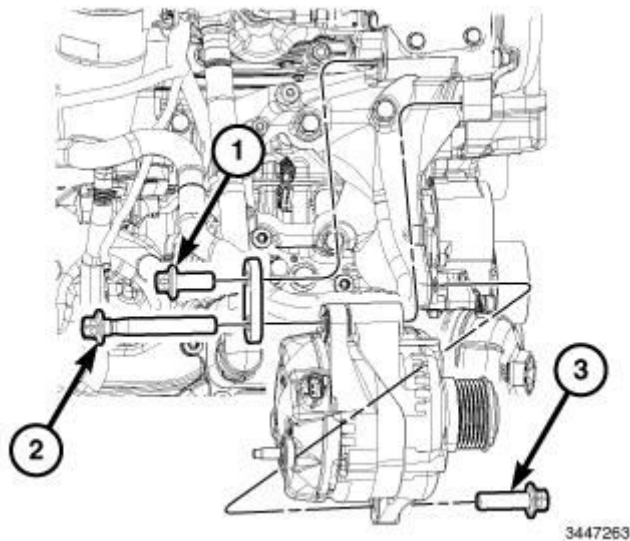


Fig. 15: Generator Rear Support Bracket Retainer, Upper Generator Mounting Retainer & Lower Generator Mounting Retainer
Courtesy of CHRYSLER GROUP, LLC

6. Loosen the upper generator rear support bracket bolt (1) (not necessary to remove).
7. Remove bolts (2, 3) and the generator.

INSTALLATION

2.4L

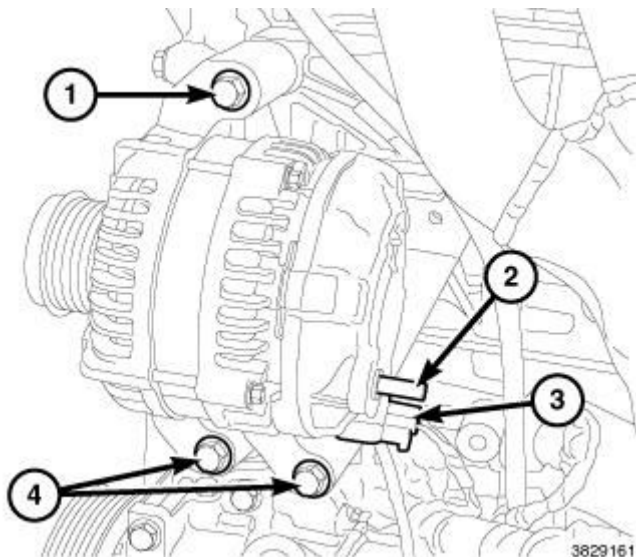


Fig. 16: Generator Stud, Bolts & Connector
Courtesy of CHRYSLER GROUP, LLC

1. Install the generator to the engine block. Tighten the bolts to 25 N.m (18 ft. lbs.).

2. Install the positive cable to the rear of the generator stud. Tighten the nut to 4 N.m (36 In. lbs.).
3. Connect the field generator harness connector.

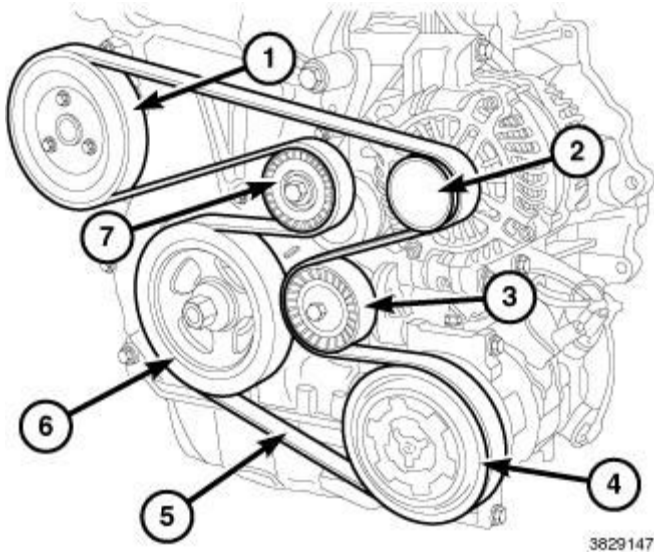


Fig. 17: Accessory Drive Belt Routing
Courtesy of CHRYSLER GROUP, LLC

4. Install the accessory drive belt. Refer to **BELT, SERPENTINE, INSTALLATION**.
5. Connect the negative battery cable.
6. Install the engine cover.

3.2L

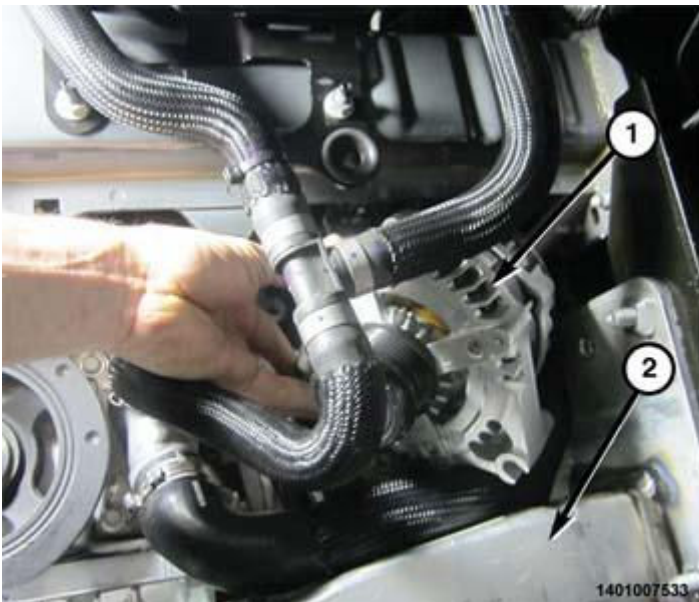


Fig. 18: Generator & Frame Rails

Courtesy of CHRYSLER GROUP, LLC

1. Carefully position the generator (1) up to the engine block.

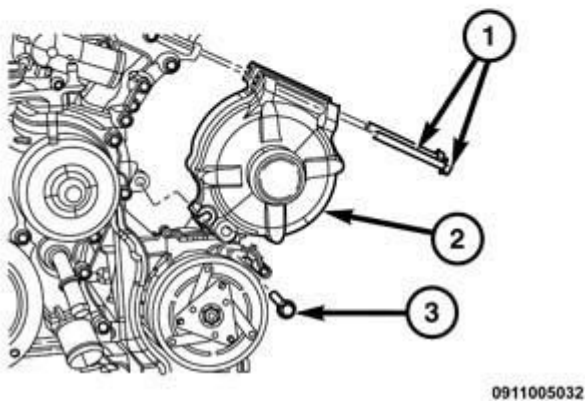


Fig. 19: Generator & Mounting Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Loosely install the top two generator mounting retainers (2).
3. Install the lower generator mounting bolt (3).

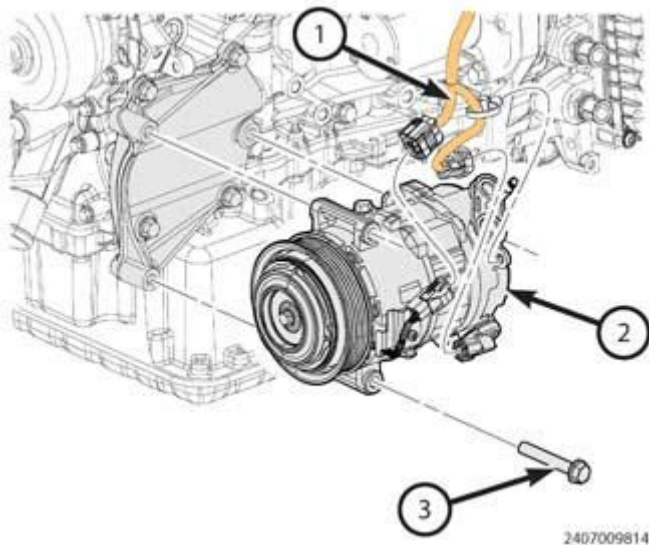


Fig. 20: Removing/Installing A/C Compressor

Courtesy of CHRYSLER GROUP, LLC

4. Position the A/C compressor (2) to the engine. Tighten the bolts to 28 N.m (21 ft. lbs.).
5. Lower the vehicle.

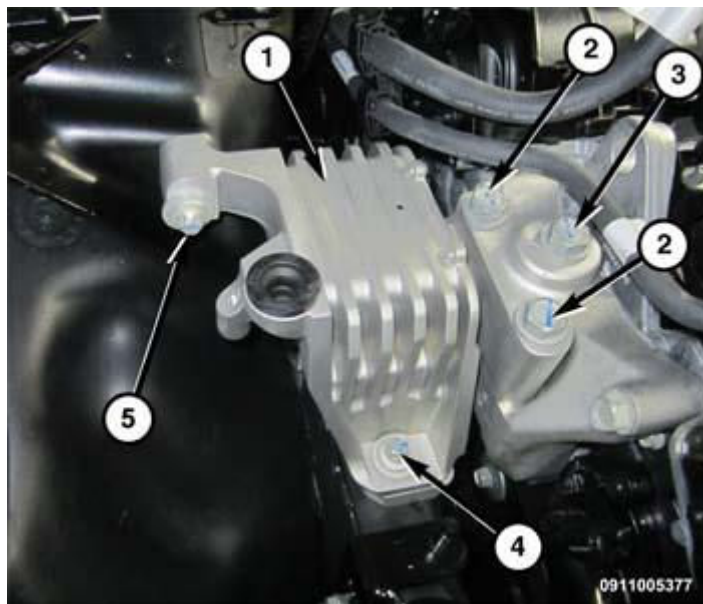


Fig. 21: Removing/Installing Right Engine Mount Assembly
Courtesy of CHRYSLER GROUP, LLC

6. Install the upper engine mount bolts (2, 3). Tighten mount to mount bracket bolts (2, 3) to 72 N.m (53 ft. lbs.).

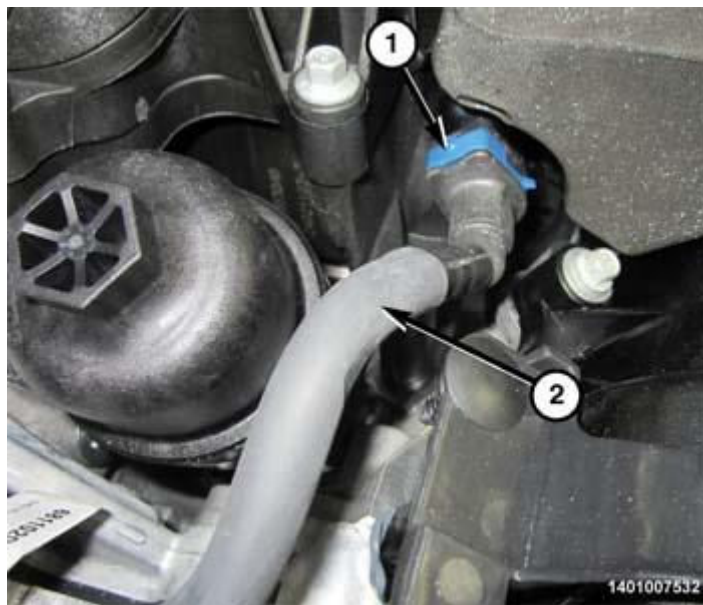
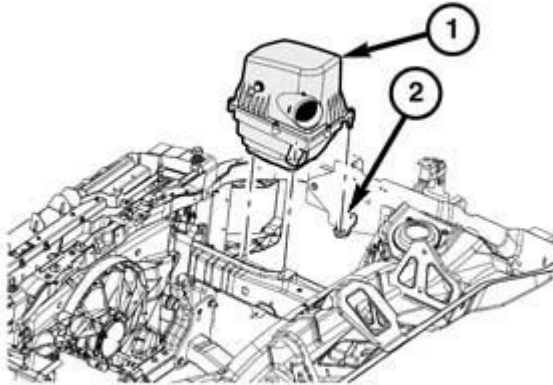


Fig. 22: Fuel Line At Fuel Rail
Courtesy of CHRYSLER GROUP, LLC

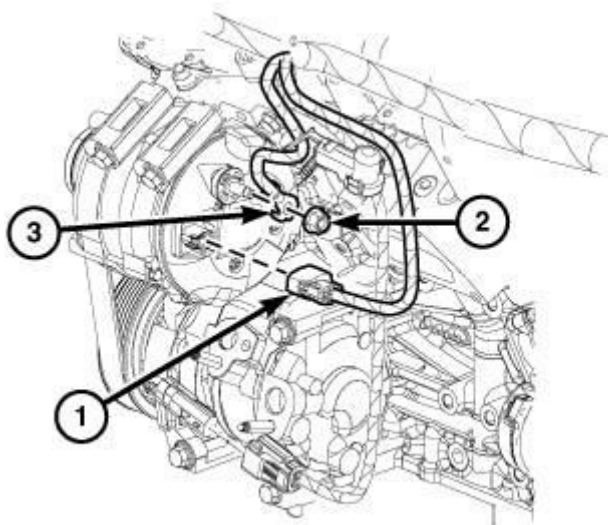
7. Install the fuel line (2) at the fuel rail.



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Fig. 23: Air Filter Housing Body
Courtesy of CHRYSLER GROUP, LLC

8. Install the air filter housing body (1). Refer to **BODY, AIR CLEANER, INSTALLATION** .

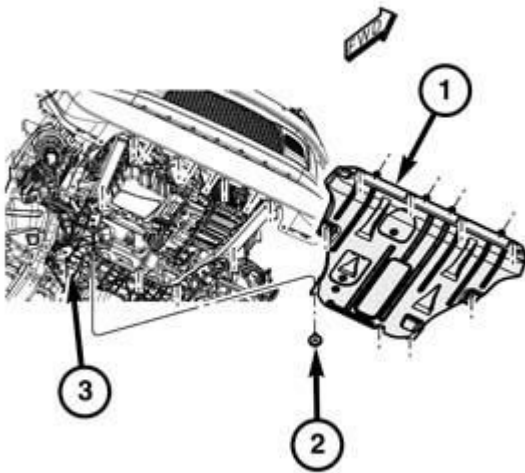


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Fig. 24: Generator Field Electrical Connector & B+ Retainer
Courtesy of CHRYSLER GROUP, LLC

9. Raise the vehicle.

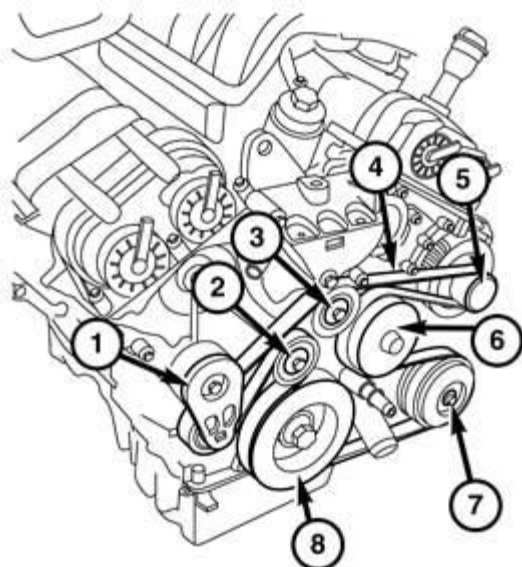
10. Tighten the generator mounting retainers to 25 N.m (18 ft. lbs.).
11. Install the generator B+ cable (3) on the generator stud.
12. Install the B+ cable nut (2), and tighten to 4 N.m (36 In. lbs.).
13. Connect the field generator harness Connector (1).



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Fig. 25: Removing/Installing Belly Pans
Courtesy of CHRYSLER GROUP, LLC

14. Install the belly pan (1).
15. Partially lower the vehicle.

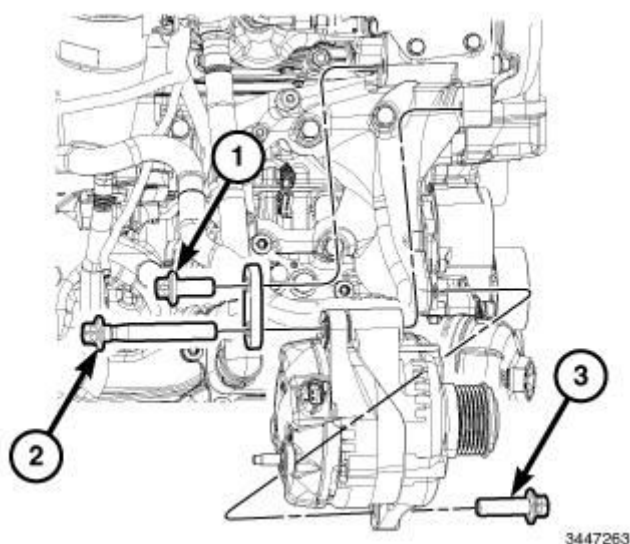


0708003948

Fig. 26: Removing/Installing Accessory Drive Belt
Courtesy of CHRYSLER GROUP, LLC

16. Install the accessory drive belt. Refer to **BELT, SERPENTINE, INSTALLATION** .
17. Install the wheel.
18. Lower the vehicle.
19. Connect the battery negative cable.
20. Start the engine and verify the generator is operating properly.

2.0L DIESEL



3447263

Fig. 27: Generator Rear Support Bracket Retainer, Upper Generator Mounting Retainer & Lower Generator Mounting Retainer
 Courtesy of CHRYSLER GROUP, LLC

1. Install the generator. Tighten bolts (2 and 3) to 70 N.m (52 ft. lbs.).
2. Tighten bracket bolt (1) to 70 N.m (52 ft. lbs.).

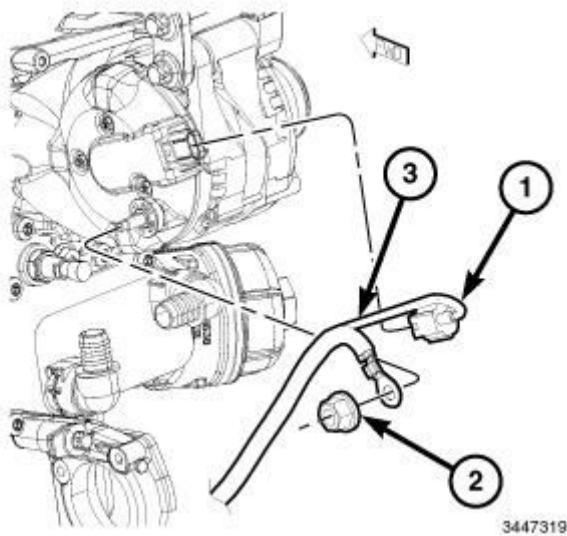


Fig. 28: B+ Retainer, Generator Field Connector & B+ Cable
 Courtesy of CHRYSLER GROUP, LLC

3. Connect the generator field connector (1) and position the B+ cable (3) to the generator stud.
4. Install the B+ nut (2). Tighten nut to 10 N.m (89 in. lbs.).

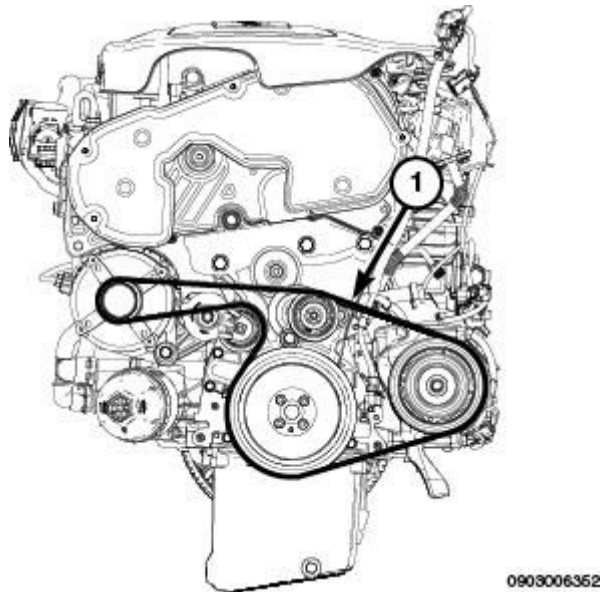


Fig. 29: Accessory Drive Belt Routing - 2.0L Diesel

Courtesy of CHRYSLER GROUP, LLC

5. Install the accessory drive belt (1). Refer to **BELT, SERPENTINE, INSTALLATION** .

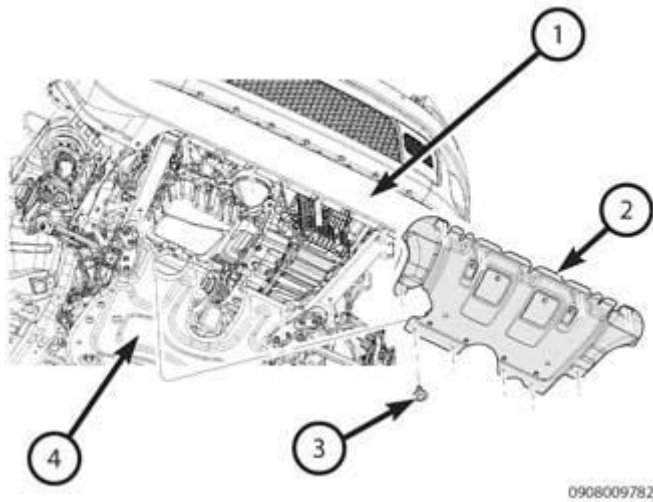


Fig. 30: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

6. Install the belly pan (2) and securely tighten bolts (3).
7. Connect the negative battery cable.

2014 ELECTRICAL

Power Distribution - Cherokee

CENTER, POWER DISTRIBUTION (PDC)

DESCRIPTION

DESCRIPTION - POWER DISTRIBUTION CENTER



Fig. 1: Power Distribution Center (PDC)
Courtesy of CHRYSLER GROUP, LLC

This group covers the various standard and optional power distribution components used on this model. The power distribution system for this vehicle consists of the following components:

- Body Control Module (BCM)
- Power Distribution Center (PDC)
- Auxiliary PDC for vehicles equipped with a diesel engine
- Z Fuse Array attached to the PDC.
- 12 Volt Power Outlets
- Power Inverter Module
- NAFTA model 115 Volt Power Outlet.
- BUX model 220 Volt Power Outlet

The PDC also incorporates various types of circuit control and protection features, including:

- Automatic resetting circuit breakers

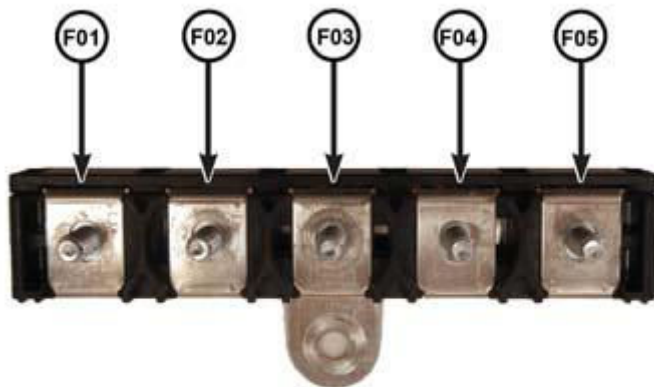
- Blade-type fuses
- Cartridge fuses
- Fusible links
- Standard and Micro-Relays

Following are general descriptions of the major components in the power distribution system. See the owner's manual in the vehicle glove box for more information on the features and use of all of the power distribution system components. Refer to **SYSTEM WIRING DIAGRAMS** for complete circuit diagrams.

For specific fuse location and types. Refer to **FUSE - RELAY LOCATIONS AND TYPES, SPECIFICATIONS** .

The PDC is serviced as part of the engine compartment body harness.

EXTERNALLY MOUNTED Z-CASE FUSE ARRAY



0822027501

Fig. 2: High Current Z-Case Fuse Assembly
Courtesy of CHRYSLER GROUP, LLC

A high-current Z-case fuse assembly (1) bolted to the outside of the Power Distribution Center (PDC) is used to direct battery power to high current devices. The assembly contains four fuses numbered F01, F03, F04, and F05. The connection at F02 is to attach the battery cable to the fuse array. The electric power steering (EPS) unit, generator, and PWM radiator fan controller receive battery power through the high-current fuses. The high-current fuses protect the wiring and devices from damage caused by unplanned over-current conditions. This component is serviced separate from the PDC.

Z Case Fuse Array	
F01	Electric Power Steering (EPS)

2014 Jeep Cherokee Trailhawk

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F02	Battery Cable to Fuse Array
F03	Auxiliary PDC - Diesel Only
F04	Generator (180 or 160 amperes)
F05	Pulse-Width Modulated (PWM) Radiator Fan Controller.

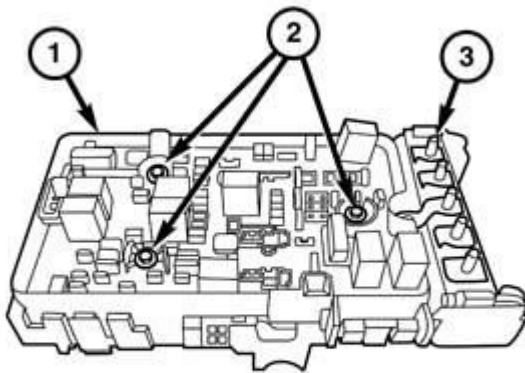
OPERATION

OPERATION

The power distribution system for this vehicle is designed to provide safe, reliable, and centralized distribution points for the electrical current required to operate all of the standard and optional factory-installed electrical and electronic powertrain, chassis, safety, security, comfort and convenience systems. At the same time, the power distribution system was designed to provide ready access to these electrical distribution points for the vehicle technician to use when conducting diagnosis and repair of faulty circuits. The power distribution system can also prove useful for the sourcing of additional electrical circuits that may be required to provide the electrical current needed to operate accessories that the vehicle owner may choose to have installed in the aftermarket.

REMOVAL

REMOVAL - PDC ASSEMBLY



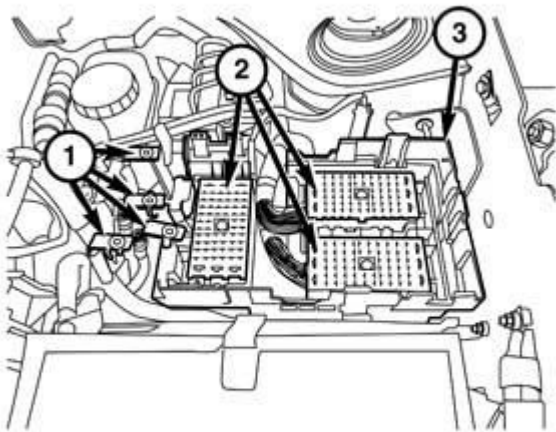
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Fig. 3: Identifying Power Distribution Center, Power Feed Connections & Bolts
Courtesy of CHRYSLER GROUP, LLC

For complete circuit diagrams, refer to **SYSTEM WIRING DIAGRAMS**. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and

retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

1. **Disconnect and isolate the battery negative cable.**
2. Remove the PDC cover.
3. Disconnect the power feed connections from the PDC (3).
4. Loosen the three bolts (2) that secure top section of the PDC in place. These bolts are captured and cannot be completely removed.



0822008651

Fig. 4: Power Distribution Center, Power Feed Connections & Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Release the plastic clips that secure the PDC to the tray.
6. The PDC top will now lift upward. Carefully lift and disconnect the three bulkhead connectors (2) from the PDC.
7. Remove the PDC from the vehicle.

REMOVAL - POWER DISTRIBUTION Z-CASE FUSE ARRAY

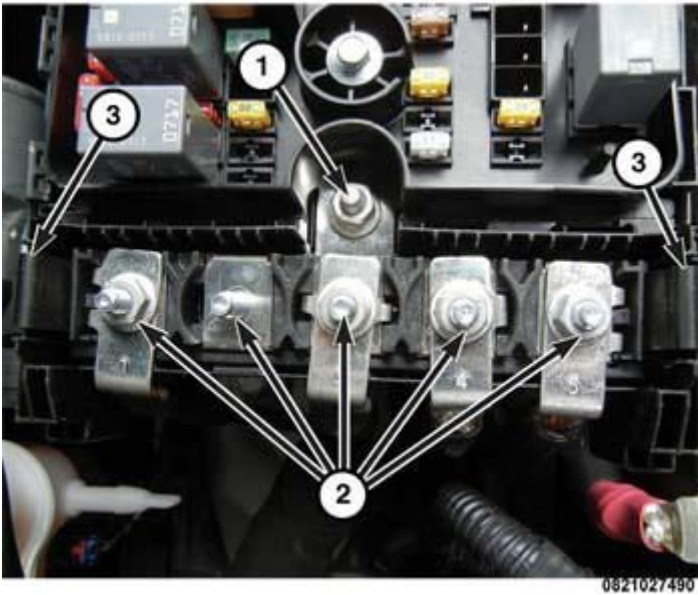


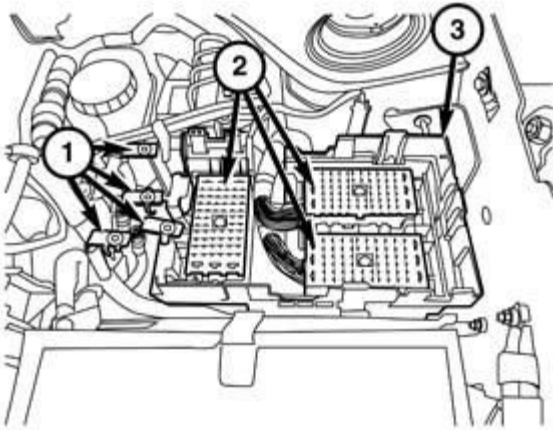
Fig. 5: Identifying Power Distribution Z-Case Fuse Array, Tabs & Nuts
Courtesy of CHRYSLER GROUP, LLC

For complete circuit diagrams, refer to **SYSTEM WIRING DIAGRAMS** . The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

1. **Disconnect and isolate the battery negative cable.**
2. Remove the cover from the Power Distribution Center (PDC).
3. Remove the nuts (2) from Z case fuse array and move the eyelet connectors off and away from the Z case fuse array.
4. Remove the nut (1) attaching the fuse array to the PDC.
5. Press on the tabs (3) on the side of the fuse array to separate the array from the PDC.
6. Lift the fuse array away from the PDC.

INSTALLATION

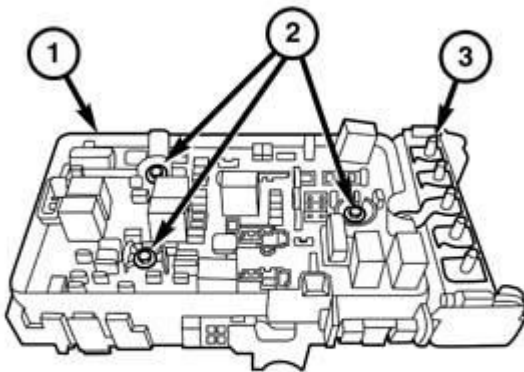
INSTALLATION - PDC ASSEMBLY



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Fig. 6: Power Distribution Center, Power Feed Connections & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Position the upper PDC component to the PDC base (3) in the engine compartment.
2. Connect the three bulkhead connectors (2) located in the base of the PDC to the upper PDC component.



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Fig. 7: Identifying Power Distribution Center, Power Feed Connections & Bolts

Courtesy of CHRYSLER GROUP, LLC

3. Tighten three bolts (2) through the upper PDC component top until secure. Be sure to not over tighten and crack the base or upper tray.
4. Connect all power feeds to their PDC posts.
5. Install the PDC enclosure cover onto the assembled PDC assembly.
6. Connect the negative battery cable to the negative battery post.

INSTALLATION

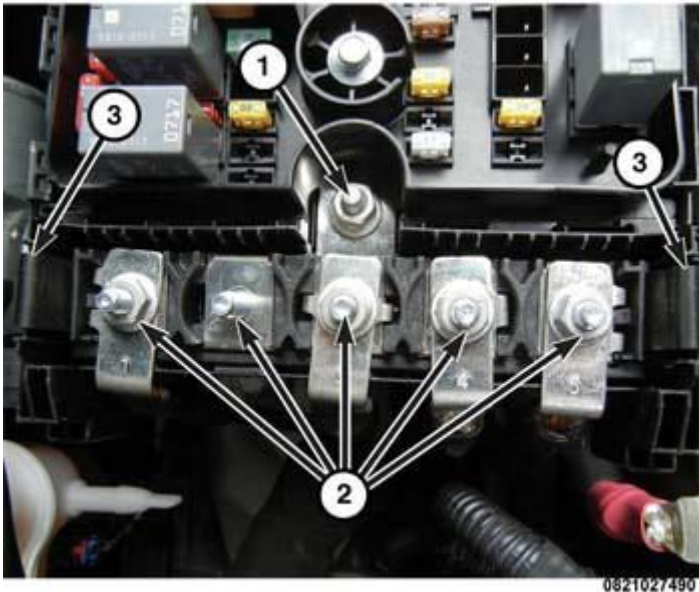


Fig. 8: Identifying Power Distribution Z-Case Fuse Array, Tabs & Nuts
Courtesy of CHRYSLER GROUP, LLC

1. Position the Z-case fuse array to the Power Distribution Center (PDC).
2. Press the Z-case down into position until the tabs (3) snap around the outer edges of the array indicating the array is firmly seated.
3. Install and tighten the nut (1) that secures the fuse array to the PDC case.
4. Connect all power feeds to their proper locations.
5. Secure the connectors to their posts using a nut (2).
6. Install the PDC cover into proper position on the assembled PDC assembly.
7. Connect the negative battery cable to the negative battery post.

OUTLET, POWER

DESCRIPTION

DESCRIPTION

This vehicle is equipped with 12 Volt (13 Amp) power outlets that can be used to power cellular phones, small electronics and other low powered electrical accessories. The power outlets are labeled with either a "key" or a "battery" symbol to indicate how the outlet is powered. Power outlets labeled with a "key" are powered when the ignition switch is in the ON or ACC position, while the outlets labeled with a "battery" are connected directly to the battery and powered at all times.

The outlets are located in the following locations:

- One outlet in the rear cargo area left quarter trim panel.
- One outlet in the instrument panel center stack under the heat/air conditioning controller.
- One outlet in the center console assembly.

OPERATION

12 VOLT POWER

The 12v power outlet consists of two major components: a knob and heating element unit, and a cigar lighter base or receptacle shell. The receptacle shell is connected to ground, and an insulated contact in the bottom of the shell is connected to battery current.

The cigar lighter knob and heating element are encased within a spring-loaded housing, which also features a sliding protective heat shield. When the knob and heating element are inserted in the receptacle shell, the heating element resistor coil is grounded through its housing to the receptacle shell. If the cigar lighter knob is pushed inward, the heat shield slides up toward the knob exposing the heating element, and the heating element extends from the housing toward the insulated contact in the bottom of the receptacle shell.

Two small spring-clip retainers are located on either side of the insulated contact inside the bottom of the receptacle shell. These clips engage and hold the heating element against the insulated contact long enough for the resistor coil to heat up. When the heating element is engaged with the contact, battery current can flow through the resistor coil to ground, causing the resistor coil to heat.

When the resistor coil becomes sufficiently heated, excess heat radiates from the heating element causing the spring-clips to expand. Once the spring-clips expand far enough to release the heating element, the spring-loaded housing forces the knob and heating element to pop back outward to their relaxed position. When the cigar lighter knob and element are pulled out of the receptacle shell, the protective heat shield slides downward on the housing so that the heating element is recessed and shielded around its circumference for safety.

The power outlet base or receptacle shell is connected to ground, and an insulated contact in the bottom of the shell is connected to battery current. The power outlet receives battery voltage from a fuse in the Power Distribution Center (PDC) when the ignition is in the ON or ACC positions.

REMOVAL

12 VOLT POWER

1. Disconnect and isolate the battery negative cable.

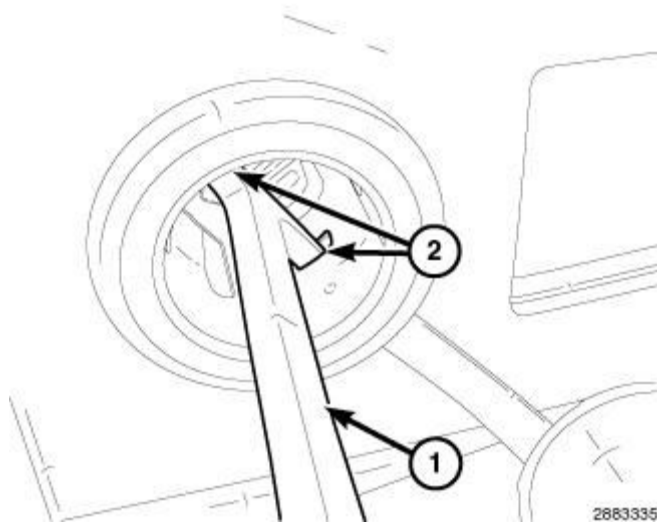


Fig. 9: Inserting Power Outlet Remover
Courtesy of CHRYSLER GROUP, LLC

2. Look inside and note position of the retaining bosses (2).
3. Insert Remover, Power Outlet (special tool #10246, Remover, Power Outlet) (1) into the retaining bosses (2) of the power outlet.
4. Pull out the base through the mounting ring by gently rocking the tool.

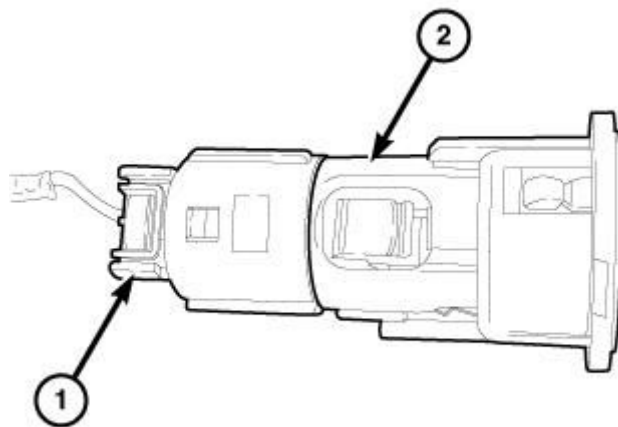
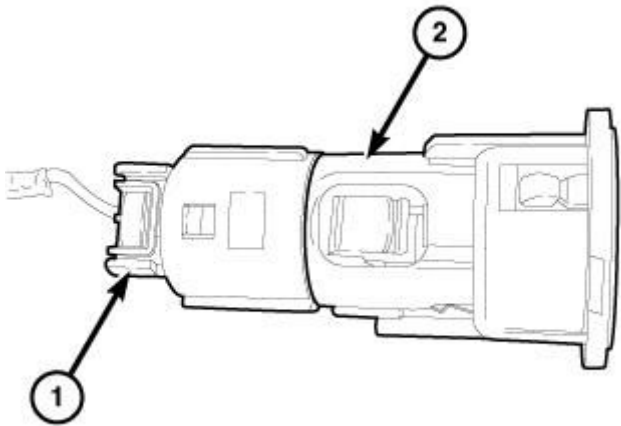


Fig. 10: Power Outlet & Connector
Courtesy of CHRYSLER GROUP, LLC

5. Disconnect the harness (1) from the power outlet (2).
6. Set the base aside and remove the base mount ring.

INSTALLATION

12 VOLT POWER

2883346

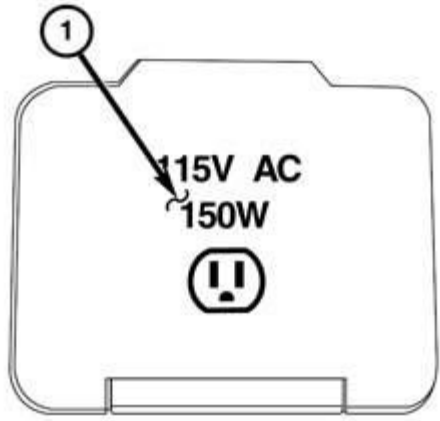
Fig. 11: Power Outlet & Connector

Courtesy of CHRYSLER GROUP, LLC

1. Connect the wire connector (1) to the power outlet receptacle (2).
2. Install the power outlet mount into the panel.
3. Align the splines on the outside of the power outlet receptacle base connector receptacle with the grooves on the inside of the mount.
4. Press firmly on the power outlet receptacle base until the retaining bosses of the mount are fully engaged in their receptacles.
5. Connect the battery negative cable.

OUTLET, POWER, 115 V**DESCRIPTION****DESCRIPTION**

NOTE: The 115-volt outlet is used in NAFTA models. A 220-volt is used in BUX models.



0811003271

Fig. 12: 115 Volt AC Outlet
Courtesy of CHRYSLER GROUP, LLC

The DC/AC Inverter is an electrical device that converts direct current (DC) to alternating current (AC). This can only be used to supply small appliances. The output voltage of the inverter can be a full sine wave or a modified sine wave. The 115-volt AC outlet is used in NAFTA models. A 220-volt is used in BUX models. The AC outlet (3) is mounted in the rear of the center floor console (2). The vehicle is able to supply AC power through the use of a inverter module. The inverter module is located under the right rear seat cushion. The inverter converts the 12 Volt DC from the vehicle battery system to a 115 Volt AC output for NAFTA vehicles. The BUX model converts the 12 Volt DC from the battery system to a 220 Volt AC output.

OPERATION

OPERATION

The AC power outlet switch receives 12 volts from the Integrated Power Module (IPM) and passes it as an enable signal to the inverter module. The inverter module also receives 12 volts via the IPM and inverts this to a 115 volt AC output (220 for BUX models). The IPM sends a signal over the switch sense circuit advising the cluster that the outlet is active. The enable signal received from the power outlet switch enables the inverter to convert the received voltage and pass it to the power outlet to power external devices.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - INVERTER MODULE

For complete circuit diagrams, refer to **SYSTEM WIRING DIAGRAMS** .

WARNING: Disable the airbag system before attempting any steering wheel, steering column, seat belt tensioner, side airbag or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable. Wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

115 VOLT POWER OUTLET DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
NO POWER AT THE 115 VOLT POWER OUTLET. (220 VOLT POWER OUTLET FOR BUX MODEL)	1. Fuse inoperative.	1. Check Power Distribution Center (PDC) fuse. Replace fuse, if required.
	2. Power outlet connector damaged.	2. Check for loose or corroded power outlet connector. Repair, if required.
	3. Inverter module connector damaged.	3. Check for loose or corroded inverter module connector. Repair, if required.
	4. Wiring damaged.	4. Check for shorted or open wires. Repair wiring, if required.
	5. Inverter module ground damaged.	5. Check for continuity between the inverter module and a known good ground. There should be continuity. Repair ground, if required.
	6. Power outlet inoperative.	6. Replace the power outlet.
	7. Inverter module inoperative.	7. Replace the inverter module.
	8. Power outlet switch inoperative.	6. Replace the switch.

REMOVAL

REMOVAL

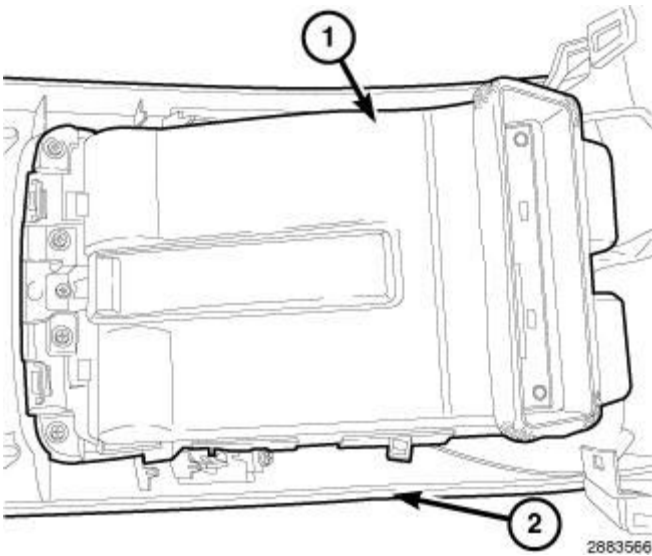


Fig. 13: Rear Center Console Bezel & Retainers
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Using a trim stick remove the rear center console bezel.
3. Remove the retainers securing the duct work to the rear center console panel.

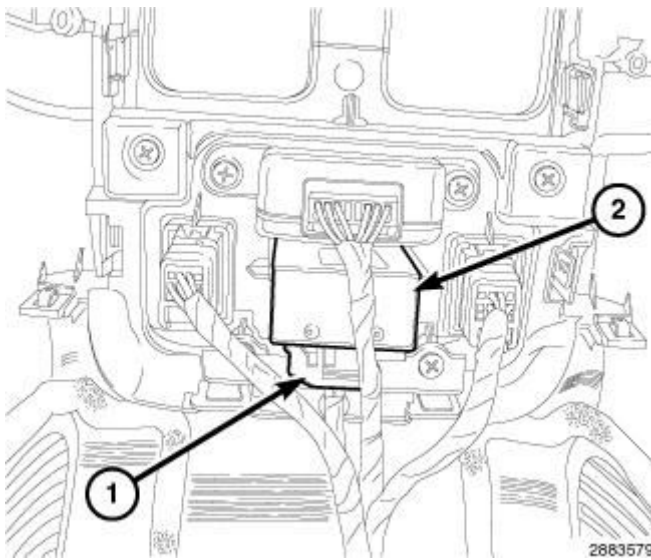


Fig. 14: Electrical Connector & 115v Power Outlet
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the electrical connector (1) for the 115v power outlet (2).
5. Release the clips holding the 115v power outlet and push through the panel.

INSTALLATION

INSTALLATION

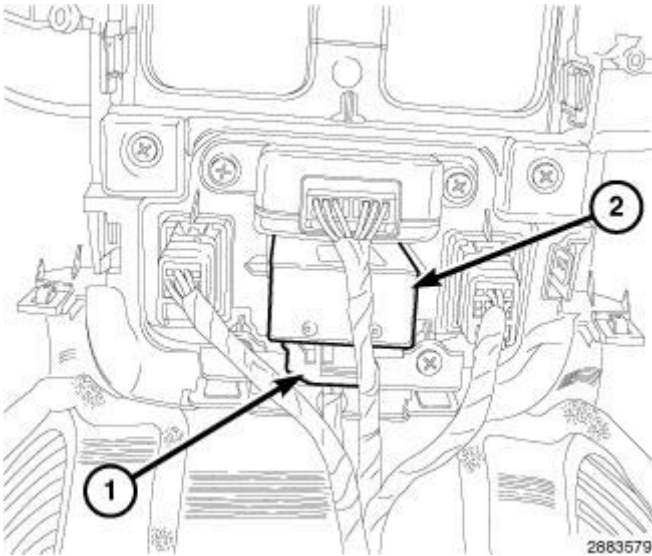


Fig. 15: Electrical Connector & 115v Power Outlet
Courtesy of CHRYSLER GROUP, LLC

1. Insert the 115v outlet into the panel.
2. Connect the electrical connector (1) to the 115v power outlet (2).

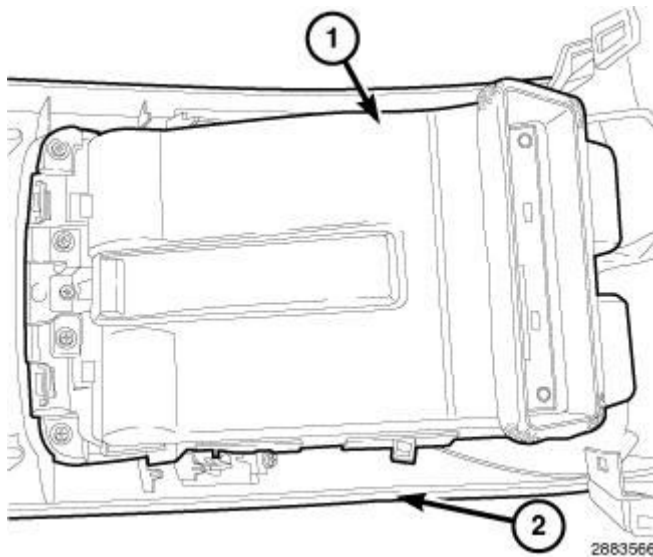


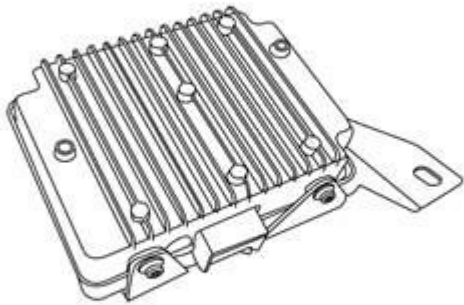
Fig. 16: Rear Center Console Bezel & Retainers
Courtesy of CHRYSLER GROUP, LLC

3. Install the duct to the trim panel.
4. Install the rear console trim panel.
5. Connect the negative battery cable.

MODULE, POWER INVERTER

DESCRIPTION

DESCRIPTION



0821006695

Fig. 17: Power Inverter Module

Courtesy of CHRYSLER GROUP, LLC

The DC-to-AC Inverter Module provides 115V AC/220 V AC power for customer use. Such Inverters are intended to power user loads that are not essential to vehicle control or safety (e.g. battery chargers for mobile phones or laptop computers, audio and entertainment equipment, etc.).

The power inverter module is located beneath the instrument panel inboard of the steering column where it is concealed behind the instrument panel steering column opening cover.

The inverter module is rated at 150 watts. It will momentarily supply 300 watts to account for surges as devices are plugged in. This is true of the NAFTA 110-volt inverter and the BUX 220-volt inverter.

OPERATION

OPERATION

The AC power outlet receives 12 volts from the Power distribution Center (PDC) and passes it as an enable signal to the inverter module. The inverter module also receives 12 volts via the PDC and inverts this to a 115 volt AC output (220 volt for BUX models). The enable signal received from the power outlet enables the inverter to convert the received voltage and pass it to the power outlet to power external devices.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - INVERTER MODULE

For complete circuit diagrams, refer to **SYSTEM WIRING DIAGRAMS** .

WARNING: Disable the airbag system before attempting any steering wheel, steering column, seat belt tensioner, side airbag or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable. Wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

115 VOLT POWER OUTLET DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
NO POWER AT THE 115 VOLT POWER OUTLET	1. Fuse inoperative.	1. Replace fuse, if required. Refer to <u>FUSE - RELAY LOCATIONS AND TYPES, SPECIFICATIONS</u> .
	2. Power outlet connector or pin loose or damaged.	2. Check for loose or corroded power outlet connector. Repair, if required.
	3. Inverter module connector or pin loose or damaged.	3. Check for loose or corroded inverter module connector. Repair, if required.
	4. Wiring damaged.	4. Check for shorted or open wires. Repair wiring, if required. This includes power, ground, and return sense from the IPM. Refer to wiring diagrams for complete wiring and check all relative circuits for loose pins and/or damaged wiring.
	5. Inverter module ground damaged.	5. Check for continuity between the inverter module and a known good ground. There should be continuity. Repair ground, if required.
	6. Power outlet inoperative.	6. Replace the power outlet.
	7. Inverter module inoperative.	7. Check relative wiring, pins and connections to the IPM before replacing the inverter module.

REMOVAL

REMOVAL

1. Disconnect and isolate the negative battery cable.

2. Unsnap the upper end of the floor duct from the outlet (2) on the left end of the heater and air conditioner distribution housing. Refer to **DUCT, FLOOR DISTRIBUTION, REMOVAL**.
3. Remove the electrical connector from the Power Inverter Module (PIM).
4. Remove the two fasteners holding the PIM bracket in position.
5. Remove the PIM from the vehicle.

INSTALLATION

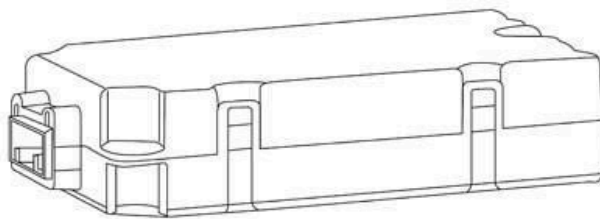
REMOVAL

1. Position the PIM and bracket to the proper position and install using two fasteners.
2. Connect the electrical connector to the PIM once the PIM has been secured in position by fasteners.
3. Position the duct into position and snap/secure in place. Refer to **DUCT, FLOOR DISTRIBUTION, INSTALLATION**.
4. Connect the battery cable to the negative battery post.

MODULE, WIRELESS CHARGING PAD

DESCRIPTION

DESCRIPTION



0821008033

Fig. 18: Wireless Charging Pad Module
Courtesy of CHRYSLER GROUP, LLC

The wireless charging pad will charge a cell phone up to 5W through inductive charging. It follows the WPC (Wireless Power Consortium) Standard. The wireless charging pad is located within the top tray of the center

console.

This optional feature enables wireless charging of any cell phone that is Qi-wireless charging capable or has a Qi sleeve or backplate.

The wireless charging pad comes with a "phone retention feature" that holds that phone in place throughout up or down console movement and ensures efficient charge. The device must be aligned with the pad in order to charge correctly. An serviceable LED light will blink green to show the phone is charging and aligned correctly.

OPERATION

OPERATION

Wireless Charging Requirements - Wireless charging requires a transmitting coil (built into the charging pad tray) and a receiver coil which is integrated in the phone. The received coil gets aligned to the transmitting coil, and power is then transmitted.

Retention Feature - The retention feature is in place to hold the phone during vehicle and console movement. This also used to align the phone with the transmitting coil that is internal to the module. (Tolerance is +/- 10mm). This retention feature is designed to accommodate all WPC phones, larger and smallest, and all receiving coil replacement.

The Wireless Charging Module is capable of setting two Diagnostic Trouble Codes (DTC); Loss of communication and internal error faults. The module itself is not repairable and will need to be replaced if diagnostics lead to module failure.

Communication - The WCP communicates with the BCM over the LIN bus. The WCP outputs to the BCM if a device has been detected. If a valid device is detected, charging begins.

Timers - The WCP has a watch dog timer for two modes; the pad will automatically go into OFF mode after 5 minutes if no device is charging, and it will go into sleep mode 30 minutes after key off if a device has been left to charge with the ignition off. The WCP also has an idle mode where it will be continuously searching for a consumer device with the ignition ON.

Wireless Charging Pad Electrical Requirements

- Power to the Wireless Charging Pad (WCP) should be no greater than 10 watts.
- The WCP will transfer up to 5W to the receiver.
- The WCP has the capability to shut itself off if the system voltage drops below 12 volts with ignition off for a duration of 30 seconds.
- The WCP has an idle mode where it constantly searches for consumer devices with the ignition transitioned to the ON position.
- The nominal operating voltage of the WCP is 13.5v.

REMOVAL

REMOVAL

1. Remove the tray assembly from the center console.
2. Set the end stops to full out positions.



0821020289

Fig. 19: Prying Anti-Slip Mat
Courtesy of CHRYSLER GROUP, LLC

3. Using a flathead mini screwdriver gently pry one side of anti-slip mat.



0821020290

Fig. 20: Removing Anti Slip Mat
Courtesy of CHRYSLER GROUP, LLC

4. Proceed to remove the anti slip mat.



Fig. 21: Removing Screws Using A Phillips #2 Screwdriver
Courtesy of CHRYSLER GROUP, LLC

5. Remove four screws using a Phillips #2 screwdriver.



Fig. 22: Identifying Bottom Cover
Courtesy of CHRYSLER GROUP, LLC

6. The bottom cover should be free to come off now.



0821020294

Fig. 23: Identifying Tyco Connector
Courtesy of CHRYSLER GROUP, LLC

7. Remove the Tyco connector to separate the Lower Tray from the Upper tray assembly.



0821020297

Fig. 24: Identifying Lower & Upper Tray
Courtesy of CHRYSLER GROUP, LLC

8. Remove the rigid and flexible end stops by pressing down on the paddles and sliding them off each side.



0821020298

Fig. 25: Removing Screws Using Robertson #S2 Screwdriver
Courtesy of CHRYSLER GROUP, LLC

9. Remove three screws using the Robertson #S2 screwdriver that secure the wireless charging module to the upper tray.



0821020299

Fig. 26: Lifting Wireless Charging Module From Tray Assembly
Courtesy of CHRYSLER GROUP, LLC

10. The wireless charging module can now be lifted from the tray assembly.



0821020300

Fig. 27: Squeezing LED Lens Tabs Using Needle Nose Pliers
Courtesy of CHRYSLER GROUP, LLC

11. Using needle nose pliers, squeeze the tabs of the LED lens to pull the Lens out of its nest.



0821020303

Fig. 28: Squeezing LED Lens Legs
Courtesy of CHRYSLER GROUP, LLC

12. Squeeze the legs of the LED Lens to pull the LED out from the Lens.



Fig. 29: Peeling Harness Out Of Channel
Courtesy of CHRYSLER GROUP, LLC

13. Peel the harness out of the channel as shown in **Fig. 9** .

INSTALLATION

INSTALLATION



Fig. 30: Removing Screws Using Robertson #S2 Screwdriver
Courtesy of CHRYSLER GROUP, LLC

1. Attach wireless charging module to the upper tray with three screws using #S2 screwdriver.



0821020305

Fig. 31: Attaching Wireless Charging Module
Courtesy of CHRYSLER GROUP, LLC



0821020306

Fig. 32: Attaching Wireless Charging Module
Courtesy of CHRYSLER GROUP, LLC

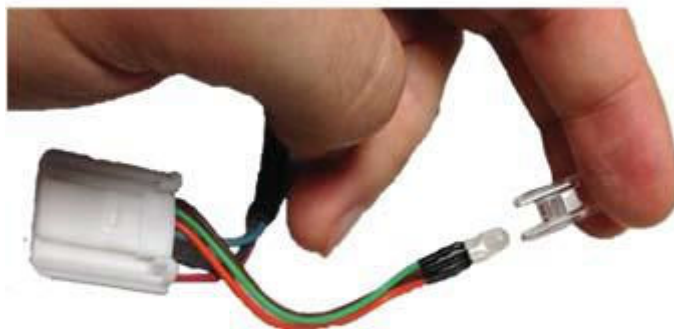
2. Attach one end stop by pivoting it into the tray.



0621020307

Fig. 33: Installing Other End Stop To Tray
Courtesy of CHRYSLER GROUP, LLC

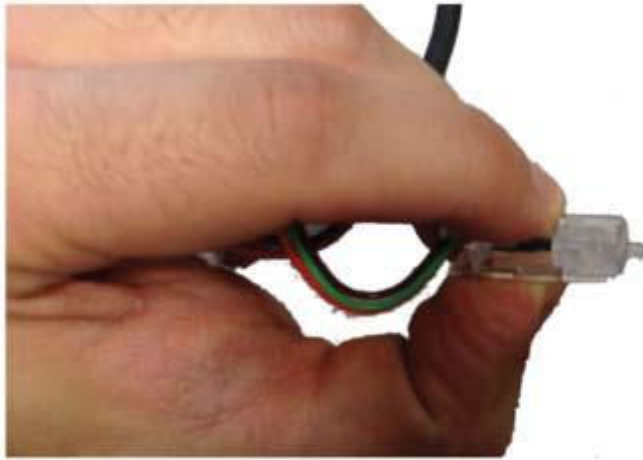
3. Repeat step 2 to install the other end stop to the tray.



0621020308

Fig. 34: Inserting LED Into LED Lens
Courtesy of CHRYSLER GROUP, LLC

4. Insert the LED into the LED lens.



0821020309

Fig. 35: Squeezing LED Lens Retaining Clips
Courtesy of CHRYSLER GROUP, LLC

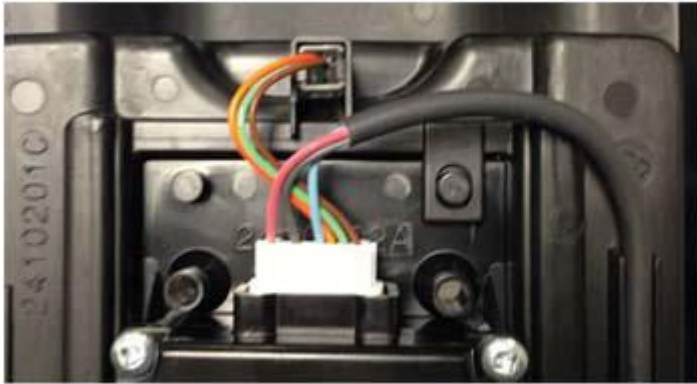
5. Squeeze on the LED lens retaining clips to make sure they are engaged. Tug on the LED harness to confirm the LED is seated.



0821020310

Fig. 36: Inserting LED Lens Into Lower Tray
Courtesy of CHRYSLER GROUP, LLC

6. Insert the LED Lens into the Lower Tray ensuring that the round portion of the Lens faces the opening in the Lower Tray.



0821020311

Fig. 37: Identifying Upper Tray Assembly & Tyco Connector
Courtesy of CHRYSLER GROUP, LLC

7. Place upper tray assembly into lower tray and insert the Tyco connector into module and wire harness in the channel ensuring the routing of the harness mimics the related graphic exactly.



0821020312

Fig. 38: Identifying Distance From Connector To Channel Entry Point
Courtesy of CHRYSLER GROUP, LLC

8. The distance from the connector to channel entry point has to be $88\text{mm} \pm 3\text{mm}$. The distance from the exit of the tray to connector needs to be exactly $328 \pm 5\text{mm}$.



0821020313

Fig. 39: Holding Down Harness In Channel
Courtesy of CHRYSLER GROUP, LLC

9. Ensure also to hold down the harness in the channel at the back of the part while putting on bottom cover.



0821020291

Fig. 40: Removing Screws Using A Phillips #2 Screwdriver
Courtesy of CHRYSLER GROUP, LLC

10. Attach bottom cover to upper tray with four screws using Phillips #2 screwdriver.



0821020290

Fig. 41: Removing Anti Slip Mat
Courtesy of CHRYSLER GROUP, LLC

11. Ensure end stops are at the full out positions.



0821020314

Fig. 42: Ensuring End Stops Are At Full Positions
Courtesy of CHRYSLER GROUP, LLC

12. Wedge the edge of the anti-slip mat under the rigid end stop bumper.



0821020315

Fig. 43: Identifying Edge Of Anti-Slip Mat Is Under Rigid End Stop Bumper
Courtesy of CHRYSLER GROUP, LLC

13. Slide the Bumper over the mat.



0821020316

Fig. 44: Sliding Bumper Over Mat
Courtesy of CHRYSLER GROUP, LLC

14. Push down the two pins into blind bosses.



0821020324

Fig. 45: Pushing Two Pins On Mat Into Blind Bosses
Courtesy of CHRYSLER GROUP, LLC

15. Push down the two pins on the other side of the mat into blind bosses to fully seat anti slip mat.
16. Reconnect the negative battery cable.

2014 ENGINE**2.0L Diesel - Service Information - Cherokee****DESCRIPTION****DESCRIPTION**

This engine is equipped with a high pressure electronic injection system from Bosch Common Rail ECD 16 C39 fast diesel engine, fully managed by an Powertrain Control Module (PCM). The engine respects the Euro 5 regulation and is equipped with the following emission components:

- Exhaust system with Diesel Oxidation Catalyst (DOC)/Diesel Particulate Filter (DPF).
- Exhaust Gas Recirculation System (EGR).
- Crankcase oil vapor recirculation system.

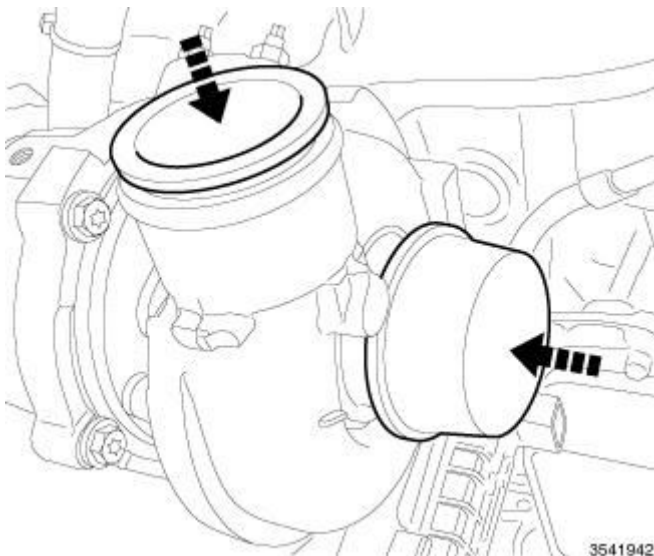
STANDARD PROCEDURE**DUST COVERS AND CAPS**

Fig. 1: Covers/Caps

Courtesy of CHRYSLER GROUP, LLC

Due to the high amounts of failures caused by dust, dirt, moisture and other foreign debris being introduced to the engine during service. Covers or caps are needed to reduce the possible damage that can be caused or created.

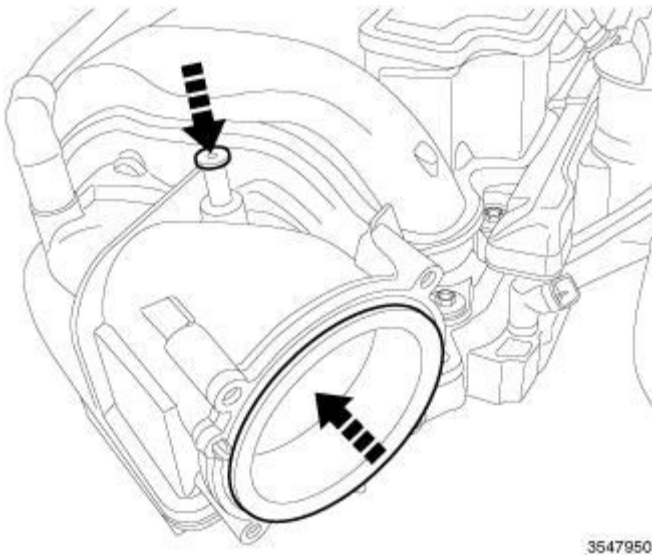


Fig. 2: Opening Cover

Courtesy of CHRYSLER GROUP, LLC

Covers over openings will reduce any possibilities for foreign materials to enter the engine systems. Using miller tool (special tool #10368, Set, Universal Protective Cap), Select the appropriated cover needed to the procedure.

FORM-IN-PLACE GASKETS AND SEALERS

There are numerous places where form-in-place gaskets are used on the engine. Care must be taken when applying form-in-place gaskets to assure obtaining the desired results. **Do not use form-in-place gasket material unless specified.** Bead size, continuity, and location are of great importance. Too thin a bead can result in leakage while too much can result in spill-over which can break off and obstruct fluid feed lines. A continuous bead of the proper width is essential to obtain a leak-free gasket.

There are numerous types of form-in-place gasket materials that are used in the engine area. Mopar® Engine RTV, Mopar® ATF-RTV, and Mopar® Gasket Maker gasket materials, each have different properties and can not be used in place of the other.

MOPAR® ENGINE RTV MS-GF44B

Mopar® Engine RTV is used to seal components exposed to engine oil. This material is a specially designed black silicone rubber RTV that retains adhesion and sealing properties when exposed to engine oil. Moisture in the air causes the material to cure. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® ATF RTV MS-GF41B

Mopar® ATF RTV is a specifically designed black silicone rubber RTV that retains adhesion and sealing properties to seal components exposed to automatic transmission fluid, engine coolants, and moisture. This

material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® GASKET MAKER MS-CD98D

Mopar® Gasket Maker is an anaerobic type gasket material. The material cures in the absence of air when squeezed between two metallic surfaces. It will not cure if left in the uncovered tube. The anaerobic material is for use between two machined surfaces. Do not use on flexible metal flanges.

MOPAR® GASKET SEALANT MS-CD78D

Mopar® Gasket Sealant is a slow drying, permanently soft sealer. This material is recommended for sealing threaded fittings and gaskets against leakage of oil and coolant. Can be used on threaded and machined parts under all temperatures. This material is used on engines with multi-layer steel (MLS) cylinder head gaskets. This material also will prevent corrosion. Mopar® Gasket Sealant is available in a 13 oz. aerosol can or 4oz./16 oz. can with applicator.

MOPAR® THREEBOND ENGINE RTV SEALANT

MOPAR® THREEBOND ENGINE RTV SEALANT is a unique gasket material that is specially made to retain adhesion and sealing properties when used to seal components exposed to engine oil.

FORM-IN-PLACE GASKET AND SEALER APPLICATION

Assembling parts using a form-in-place gasket requires care but it's easier than using precut gaskets.

Mopar® Gasket Maker material should be applied sparingly 1 mm (0.040 in.) diameter or less of sealant to one gasket surface. Be certain the material surrounds each mounting hole. Excess material can easily be wiped off. Components should be torqued in place within 15 minutes. The use of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Engine RTV MS-GF44B or ATF RTV MS-GF41B gasket material should be applied in a continuous bead approximately 3 mm (0.120 in.) in diameter. All mounting holes must be circled. For corner sealing, a 3.17 or 6.35 mm (1/8 or 1/4 in.) drop is placed in the center of the gasket contact area. Uncured sealant may be removed with a shop towel. Components should be torqued in place while the sealant is still wet to the touch (within 10 minutes). The usage of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Gasket Sealant in an aerosol can should be applied using a thin, even coat sprayed completely over both surfaces to be joined, and both sides of a gasket. Then proceed with assembly. Material in a can with applicator can be brushed on evenly over the sealing surfaces. Material in an aerosol can should be used on engines with multi-layer steel gaskets.

ENGINE GASKET SURFACE PREPARATION

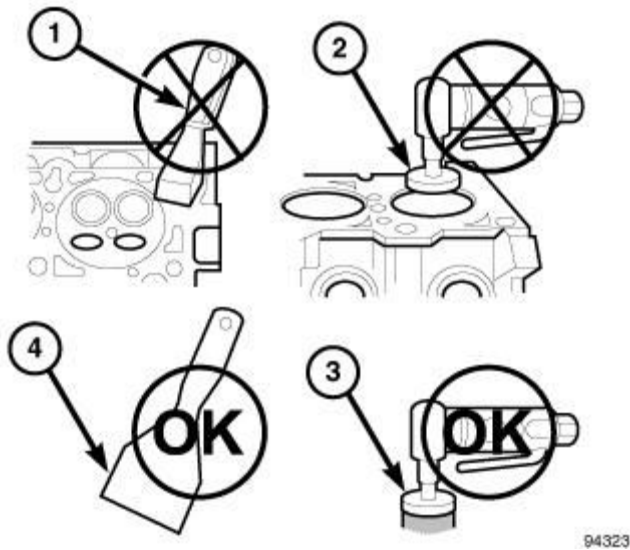


Fig. 3: Proper Tool Usage For Surface Preparation
 Courtesy of CHRYSLER GROUP, LLC

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

Never use the following to clean gasket surfaces:

- Metal scraper (1).
- High speed power tool with an abrasive pad or paper to clean the cylinder block and head (2).

NOTE: **Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.**

Only use the following for cleaning gasket surfaces:

- Solvent or a commercially available gasket remover.
- High speed power tool with 3M Roloc™ Bristle Disc (white or yellow) (3).
- Plastic or wood scraper (4).

COMPRESSION TEST

1. Warm up engine to operating temperature (approximately 80 °C, 176 °F).
2. Shut off the engine.
3. Disable the low pressure fuel pump.
4. Remove the fuel injectors. Refer to **INJECTOR(S), FUEL, REMOVAL**.
5. Crank engine several times with the starter to eliminate combustion residues in the cylinders.

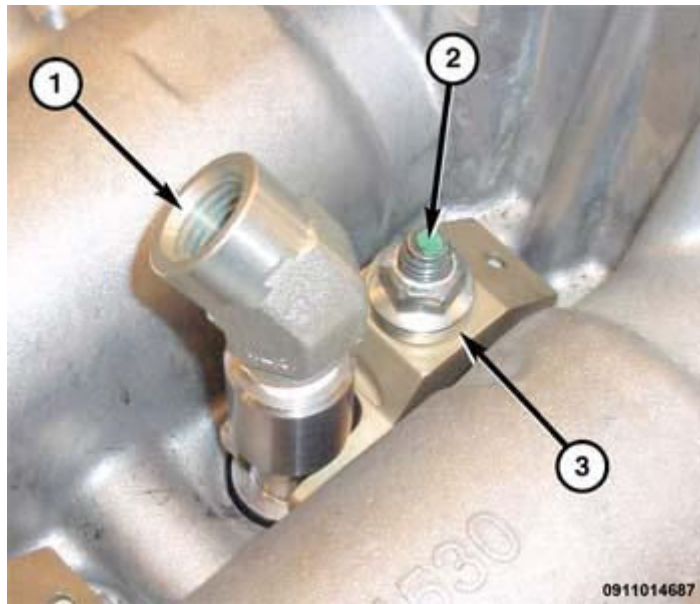


Fig. 4: Inserting Compression Test Adapter
Courtesy of CHRYSLER GROUP, LLC

6. Insert the (special tool #10497, Adapter, Compression Test) (1) into injector hole of cylinder to be tested. Install injector clamp, nut and securely tighten.
7. Test compression pressure by cranking engine with starter for at least 8 revolutions.

Cylinder compression Difference Between Cylinders	25 %
--	------

8. Carry out test procedure at the remaining cylinders in the same way.
9. Remove nut, injector clamp, and the (special tool #10497, Adapter, Compression Test) (1) from cylinder head.
10. Install the injectors. Refer to **INJECTOR(S), FUEL, INSTALLATION** .

REMOVAL

REMOVAL

CAUTION: When removing or disconnecting components, plug all inlet/outlet and fluid lines to prevent residual leakage and contamination.

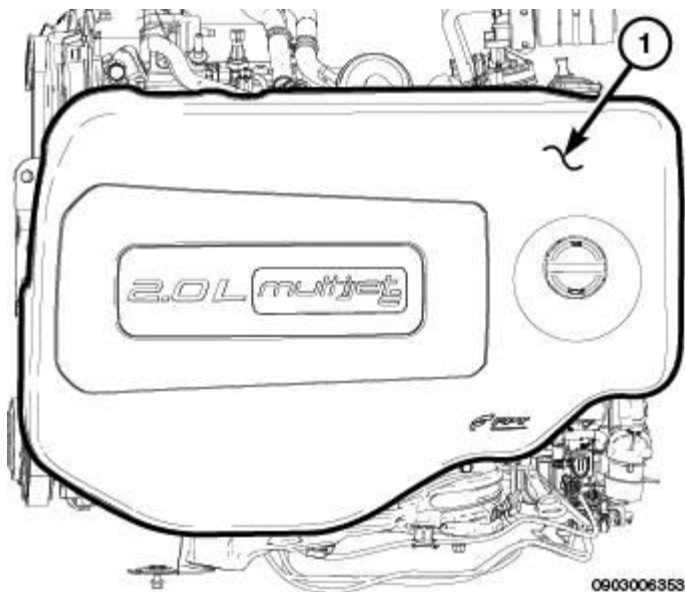


Fig. 5: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative and positive battery cable.
2. Remove the engine cover (1).
3. Remove air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL** .

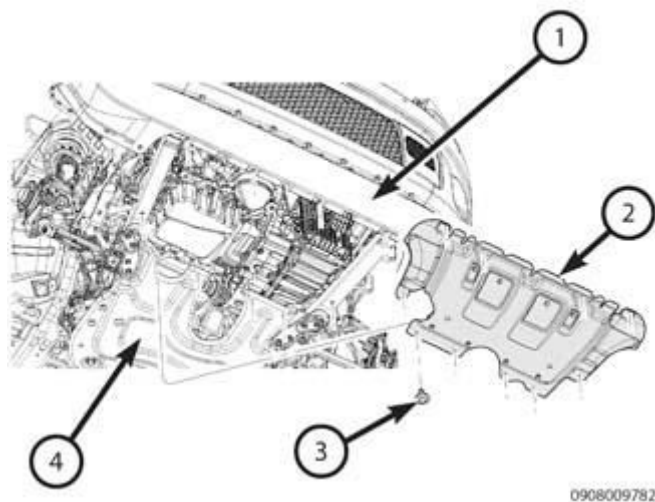


Fig. 6: Removing/Installing Starter

Courtesy of CHRYSLER GROUP, LLC

4. Raise the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
5. Remove bolts (3) and the belly pan (2).
6. Drain the cooling system. Refer to **STANDARD PROCEDURE** .
7. Drain the engine oil. Using a new sealing washer tighten drain plug to 20 N.m (177 in. lbs.)

8. Drain the transaxle fluid.



Fig. 7: Reverse Lamp Sensor & Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

9. On MTX models, disconnect the reverse lamp sensor wire harness connector (2).
10. Lower the vehicle.

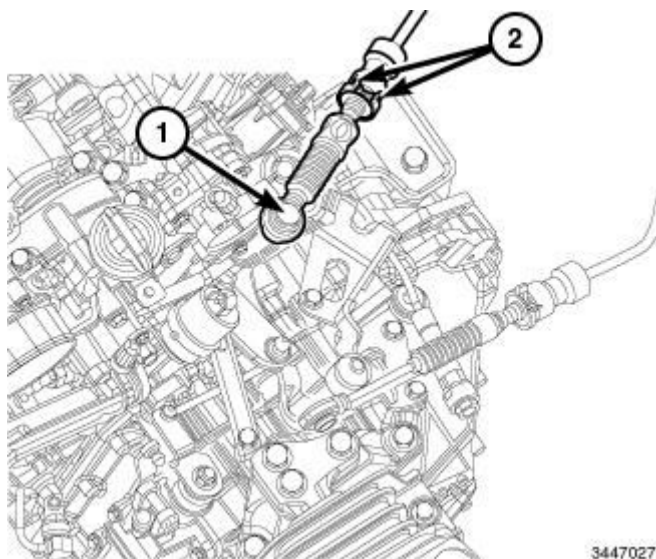


Fig. 8: Cable Connector & Release Tabs
Courtesy of CHRYSLER GROUP, LLC

11. On MTX models, pry up on the cable connector (1) to disengage from the lever.
12. On MTX models, disconnect the gear shift range cable at the bracket by squeezing the release tabs (2) while pulling upward.

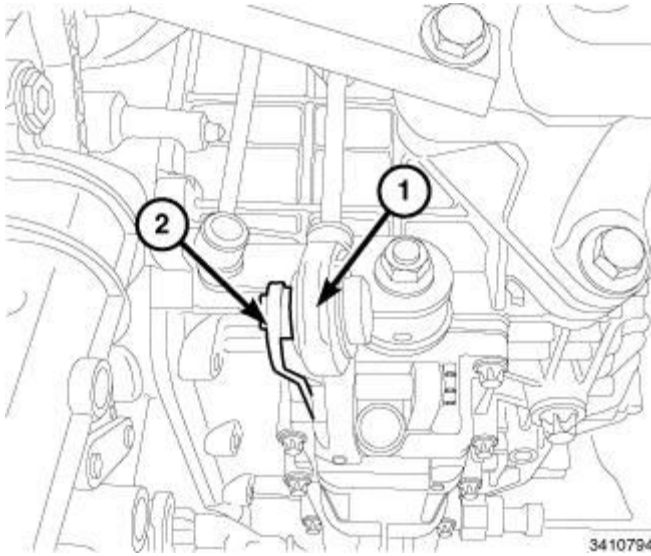


Fig. 9: Gear Shift Selector Cable & Manual Lever
Courtesy of CHRYSLER GROUP, LLC

13. On MTX models, disconnect the gear shift selector cable (1) at the manual lever (2).

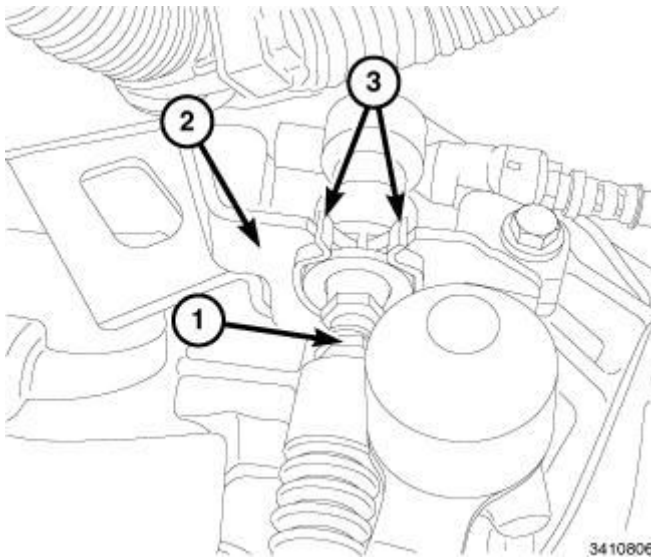


Fig. 10: Gear Shift Selector Cable & Bracket
Courtesy of CHRYSLER GROUP, LLC

14. On MTX models, disconnect the gear shift selector cable (1) at the bracket (2) by squeezing the release tabs while pulling upward.

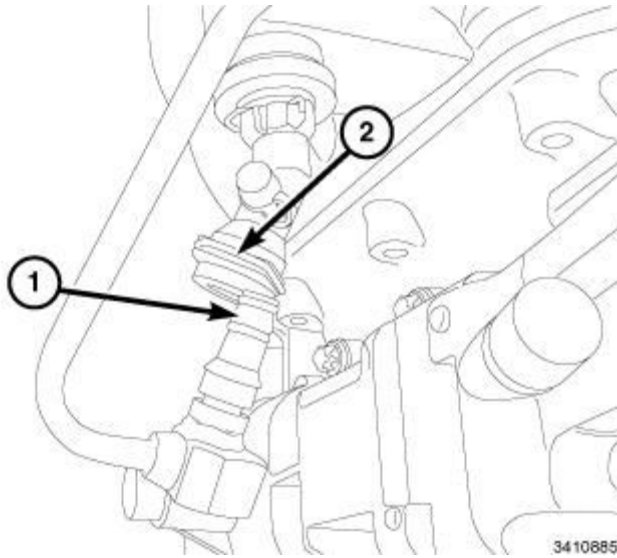


Fig. 11: Hydraulic Supply Pipe & Concentric Slave Cylinder
Courtesy of CHRYSLER GROUP, LLC

15. On MTX models, disconnect the hydraulic supply pipe for the concentric slave cylinder.

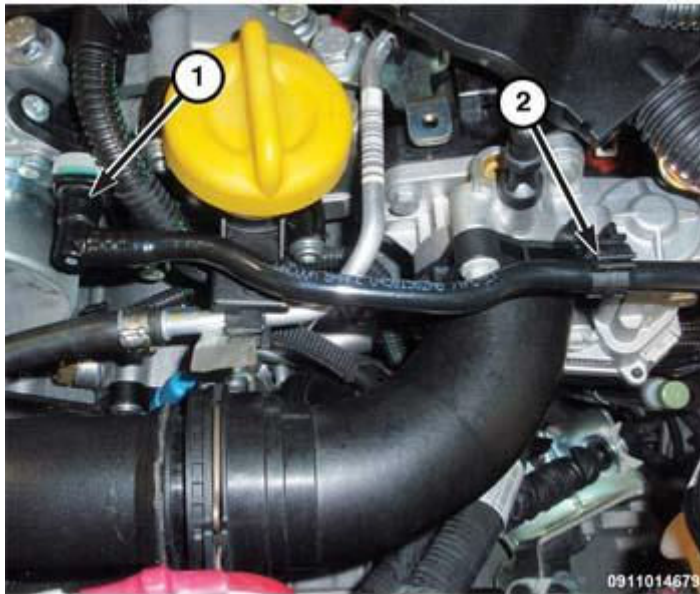


Fig. 12: Brake Booster Hose & Retainer Clip
Courtesy of CHRYSLER GROUP, LLC

16. Disconnect the brake booster hose (1) at vacuum pump and retainer clip (2).

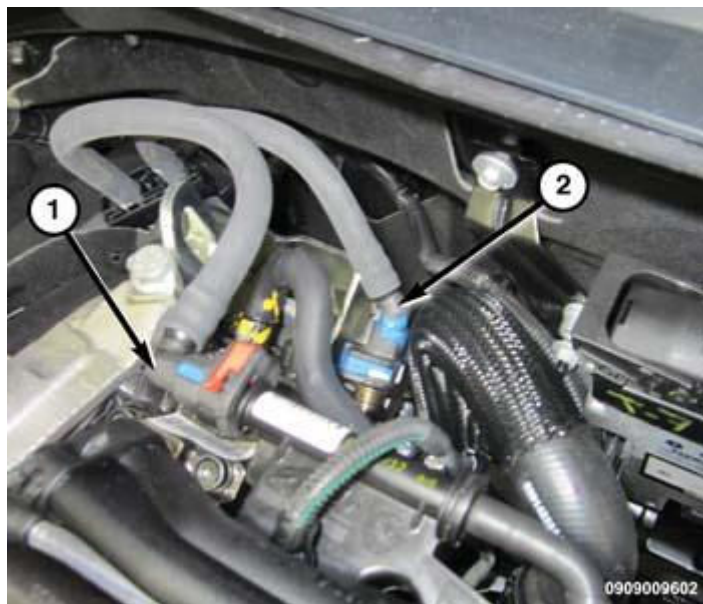


Fig. 13: Fuel Supply & Return Line Quick-Connect Fittings
Courtesy of CHRYSLER GROUP, LLC

17. Disconnect the fuel supply (2) line quick-connect fittings at fuel injection pump. Refer to **FITTING, QUICK CONNECT**.
18. Disconnect the fuel return line (1) near the fuel injection pump. Refer to **FITTING, QUICK CONNECT**.
19. Detach the fuel line routing clips.

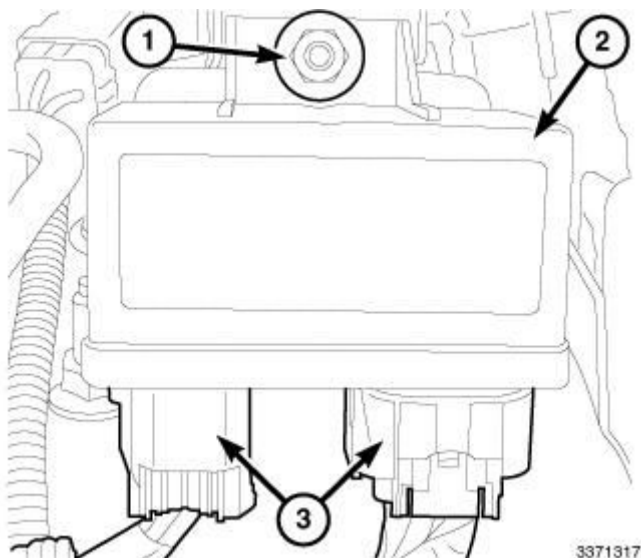


Fig. 14: Glow Plug Module & Connectors
Courtesy of CHRYSLER GROUP, LLC

20. Disconnect the two glow plug harness connector (3).

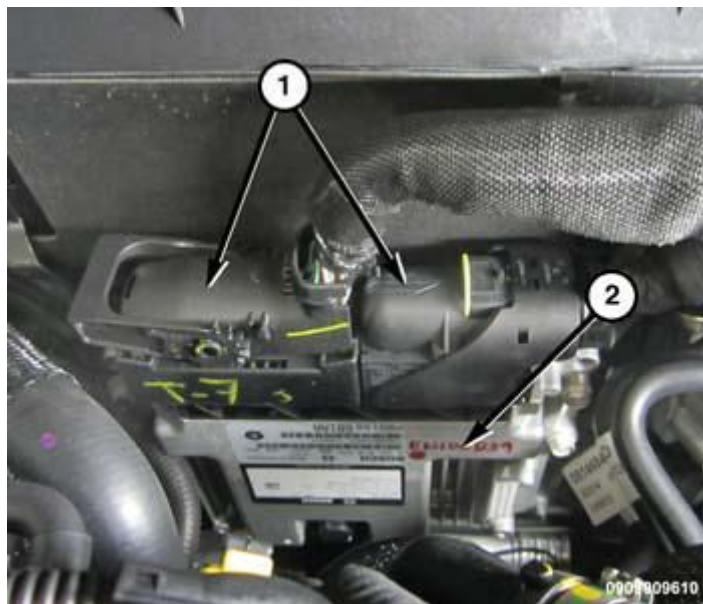


Fig. 15: Powertrain Control Module (PCM) & Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

21. Unlock and disconnect the two PCM harness connectors (1) at the PCM (2).

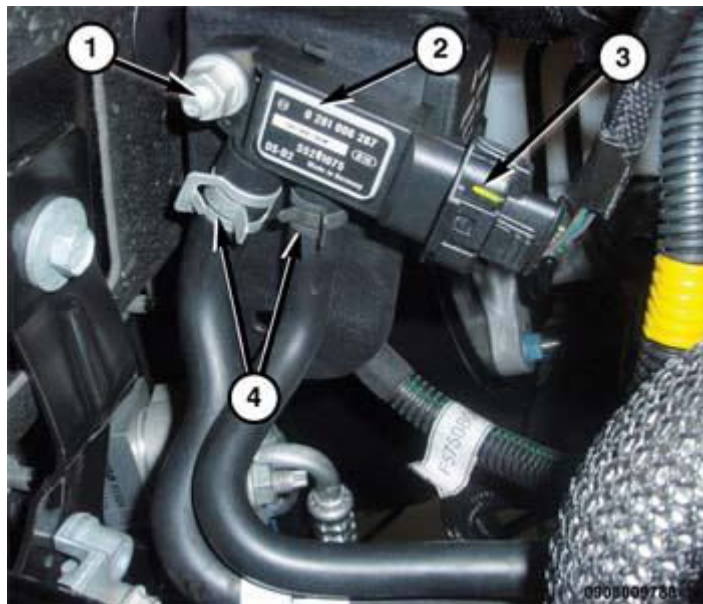


Fig. 16: Differential Pressure Sensor
Courtesy of CHRYSLER GROUP, LLC

22. Disconnect the differential pressure sensor wire harness connector (3).
23. Remove nut (1) and position aside the differential pressure sensor (2) from bracket.



Fig. 17: Right PDC Cover
Courtesy of CHRYSLER GROUP, LLC

24. Remove the right PDC cover (1).

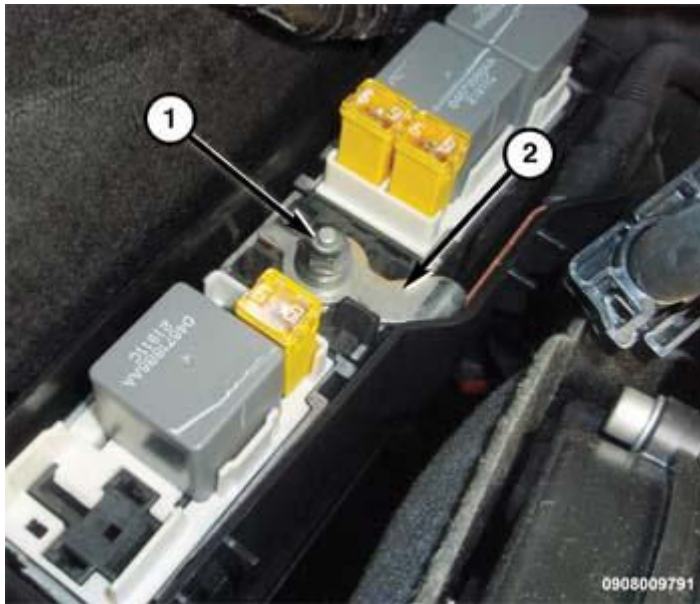


Fig. 18: B+ Cable & Nut
Courtesy of CHRYSLER GROUP, LLC

25. Remove nut (1) and the B+ cable (2) from the right PDC.
26. Remove retainers and the right and left lower splash shield.
27. Remove the lower front closeout panel. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL** .

28. Remove the accessory drive belt. Refer to **BELT, SERPENTINE, REMOVAL** .
29. Remove the right and left half shafts. Refer to **REMOVAL** .
30. Remove the exhaust crossunder pipe. Refer to **PIPE, EXHAUST CROSSUNDER, REMOVAL** .
31. Remove the diesel particulate filter. Refer to **FILTER, DIESEL PARTICULATE, REMOVAL** .

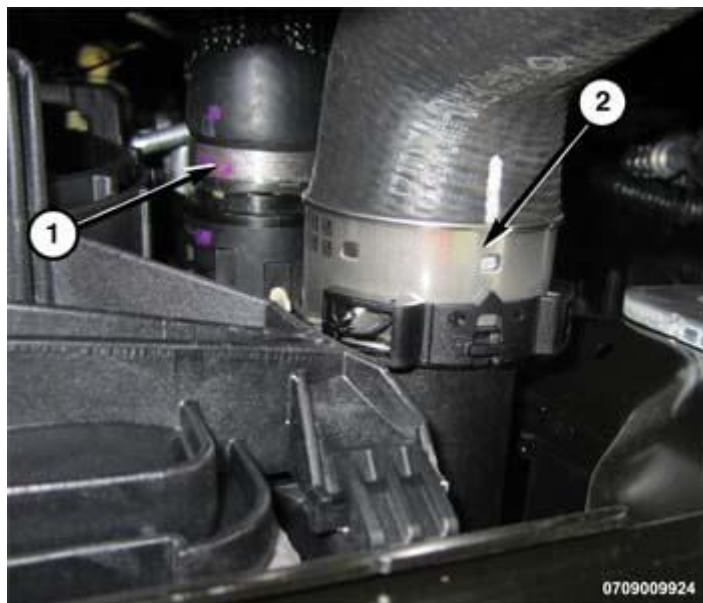


Fig. 19: Lower CAC Hoses
Courtesy of CHRYSLER GROUP, LLC

32. Remove the right lower CAC hose (2).

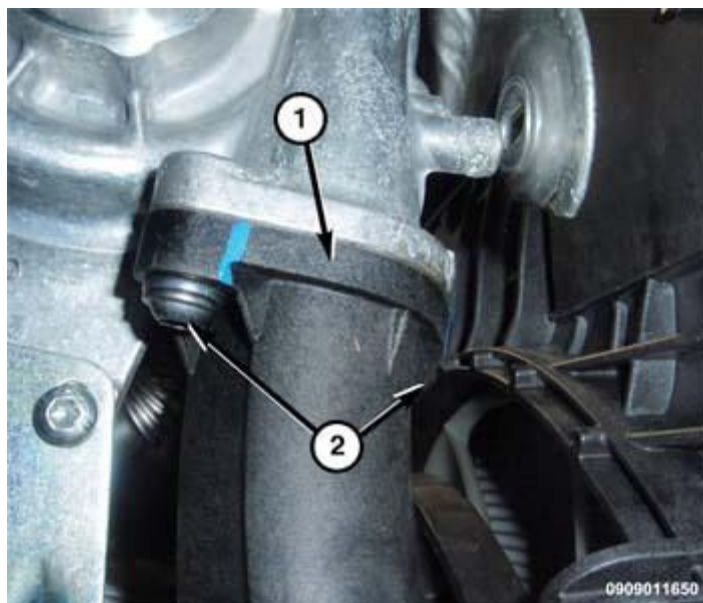


Fig. 20: Right CAC Tube & Bolts
Courtesy of CHRYSLER GROUP, LLC

33. Remove bolts (2) and the right CAC tube (1) from turbocharger.

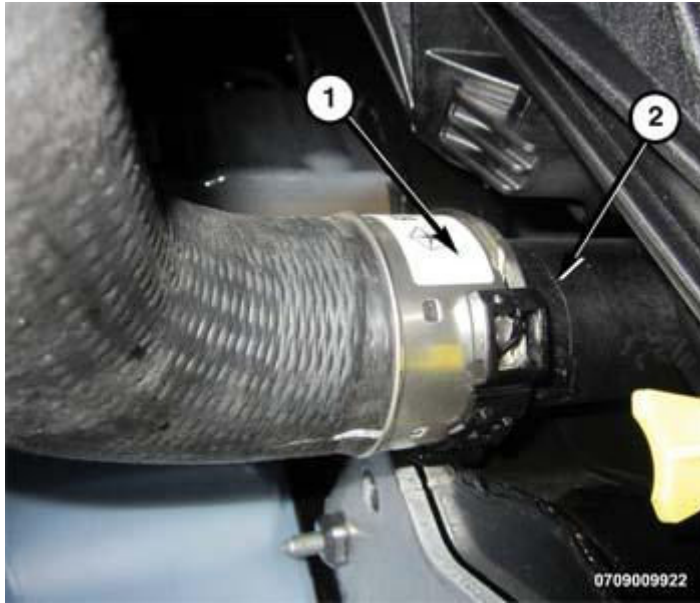


Fig. 21: Left Charge Air Cooler (CAC) & Hose
Courtesy of CHRYSLER GROUP, LLC

34. Remove the left side Charge Air Cooler (CAC) hose (1).

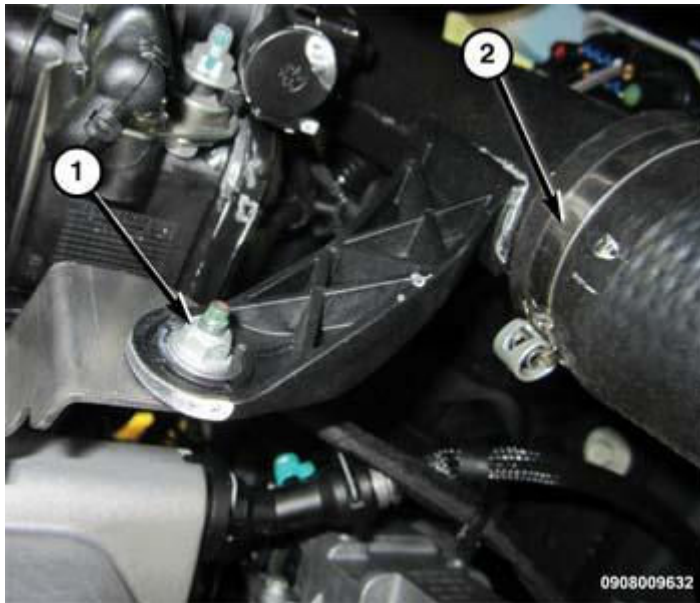


Fig. 22: CAC Air Tube & Nut
Courtesy of CHRYSLER GROUP, LLC

35. Remove the left CAC tube support bracket nut (1).

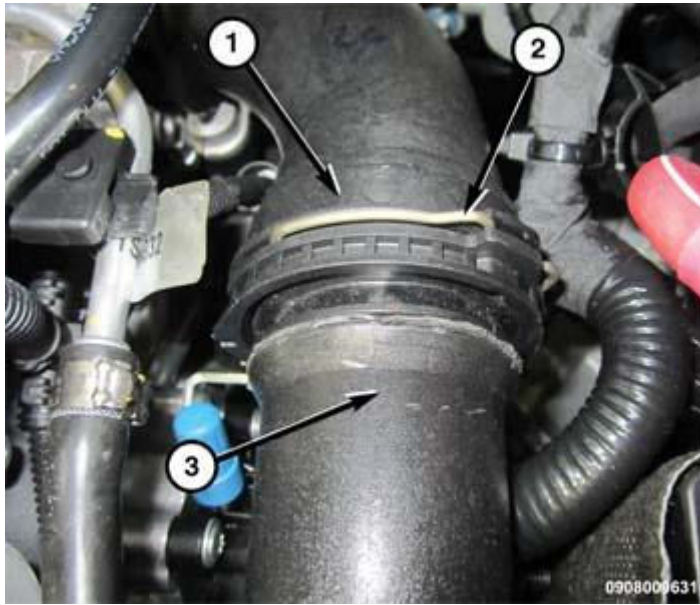


Fig. 23: EGR Air Flow Control Valve Inlet Tube, CAC Tube Wire Retainer & CAC Hose
Courtesy of CHRYSLER GROUP, LLC

36. Release spring clip (2) and disconnect the left side CAC tube (3).

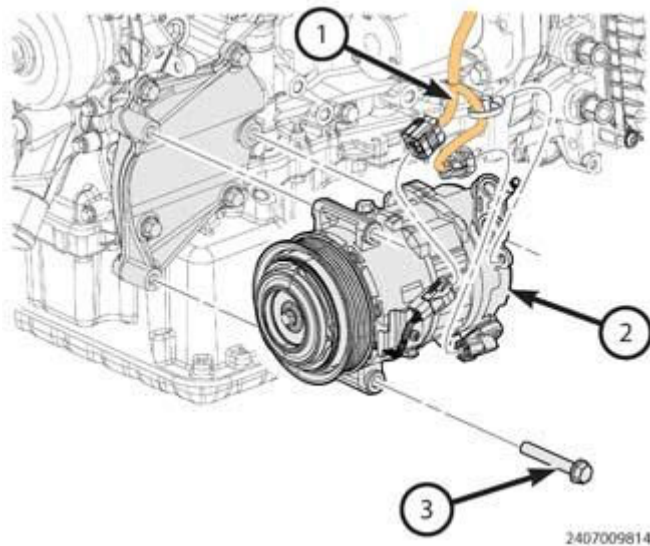


Fig. 24: Removing/Installing A/C Compressor
Courtesy of CHRYSLER GROUP, LLC

37. Disconnect the two A/C compressor wire harness connector (1).

NOTE: The A/C compressor for 2.0L diesel models uses three bolts to secure the A/C compressor to the engine.

38. Support the A/C compressor (2) and remove the three bolts (3) that secure the compressor to the engine

and position aside.

39. Lower the vehicle.



Fig. 25: Thermostat Housing & Hoses
Courtesy of CHRYSLER GROUP, LLC

40. Using the (special tool #10288, Pliers, Hose Clamp) to release clamp (1) and remove the upper radiator hose at engine.



Fig. 26: Lower Radiator Hose
Courtesy of CHRYSLER GROUP, LLC

41. Using the (special tool #10288, Pliers, Hose Clamp) to release clamp and remove the lower radiator hose

(1) at engine.

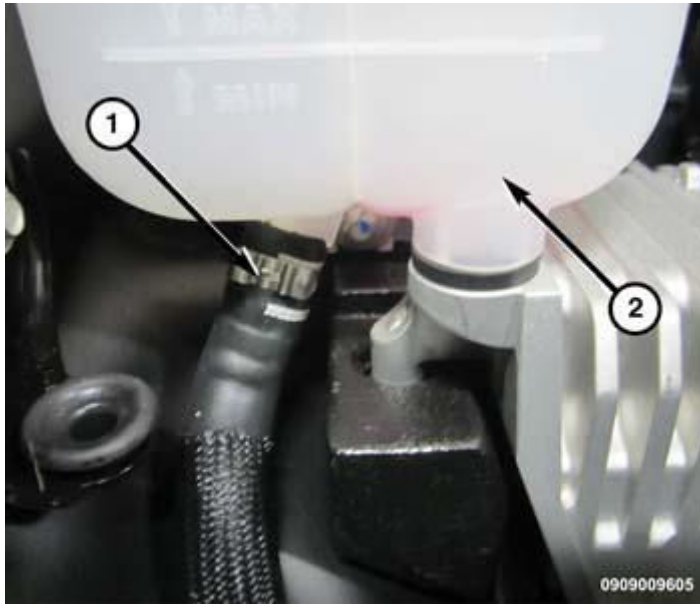


Fig. 27: Coolant Bottle & Lower Hose
Courtesy of CHRYSLER GROUP, LLC

42. Using the (special tool #10288, Pliers, Hose Clamp) to release clamp and remove the coolant hose from pressurized coolant bottle.



Fig. 28: Heater Hose
Courtesy of CHRYSLER GROUP, LLC

43. Disconnect the Heater Hose (1) at heater core.
44. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.

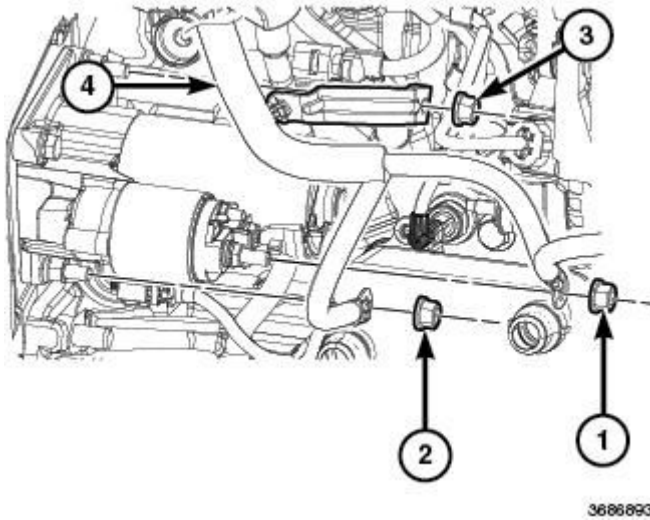


Fig. 29: B+ Cable Retainer
Courtesy of CHRYSLER GROUP, LLC

45. Remove nut (2) and the solenoid wire from starter.
46. Remove nut (1) and the B+ cable (4) from starter.

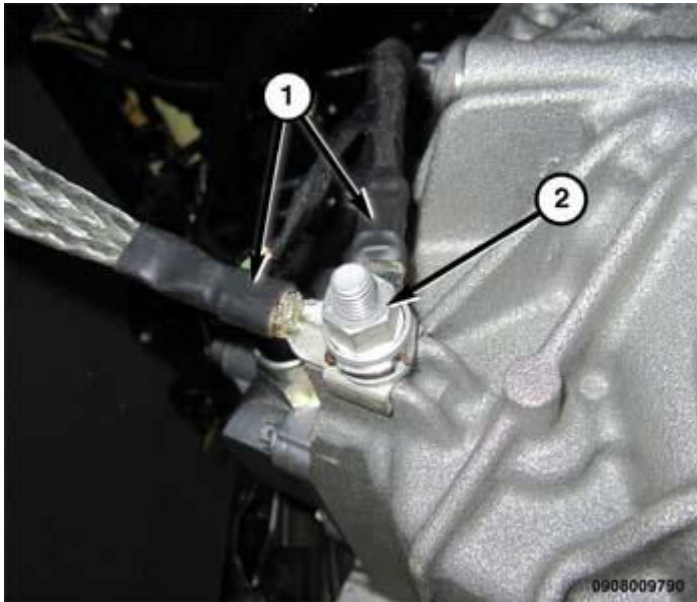


Fig. 30: Ground Cables & Nut
Courtesy of CHRYSLER GROUP, LLC

47. Remove nut (2) and the ground cables (1).

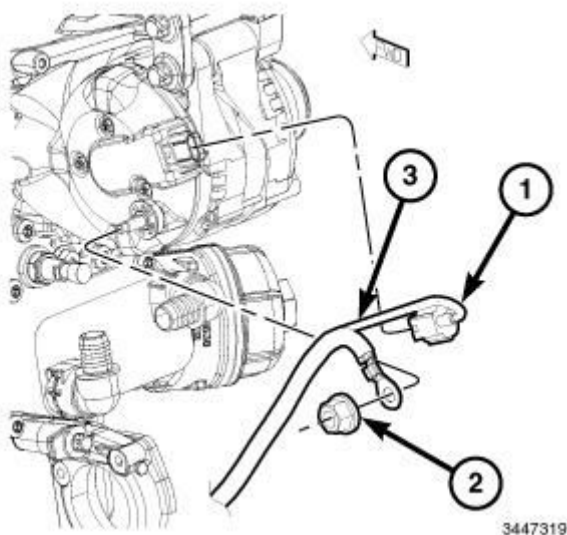


Fig. 31: B+ Retainer, Generator Field Connector & B+ Cable
Courtesy of CHRYSLER GROUP, LLC

48. Remove nut (2) and the B+ cable from generator.
49. Disconnect the generator field wire harness connector (1) from generator.
50. Remove the lower DPF mounting bracket.
51. Remove the rear mount assembly. Refer to **INSULATOR, ENGINE MOUNT, REAR, REMOVAL** .
52. Remove the coolant crossover tube.



Fig. 32: Battery Tray & Engine Wire Harness Retainer
Courtesy of CHRYSLER GROUP, LLC

53. Detach the engine wire harness retainer (1) from battery tray (2).



Fig. 33: Nut & Wire Harness
Courtesy of CHRYSLER GROUP, LLC

54. Remove nut securing wire harness by battery.

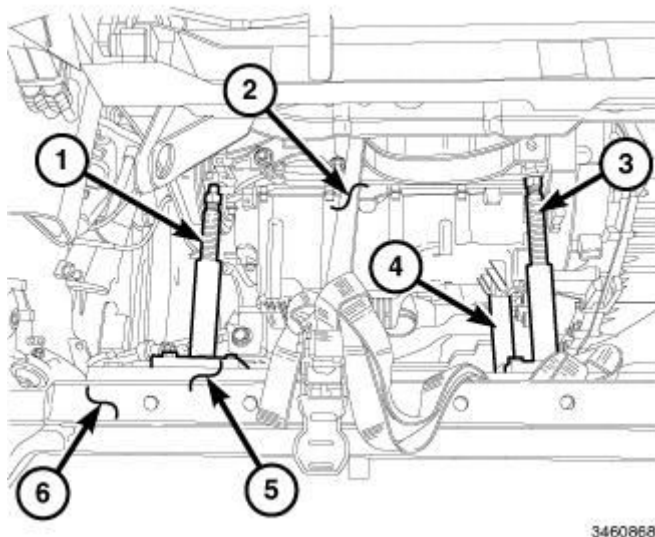


Fig. 34: Engine Support Cradle, Cradle Posts, Safety Strap & Power Train Dolly
Courtesy of CHRYSLER GROUP, LLC

55. Assemble the Dolly (special tool #6135, Dolly, Power Train), Cradle (special tool #6710A, Cradle, Engine Support).
56. Lower vehicle and position Dolly (special tool #6135, Dolly, Power Train) (6), and Cradle (special tool #6710A, Cradle, Engine Support) (5) under engine.
57. Adjust the Cradle Posts (special tool #6848, Posts, Cradle) (1, 3, 4) to seat engine on Cradle Posts.

WARNING: Safety straps must be used to secure engine to the dolly fixture.

58. Install, tighten and lock safety strap (2) around engine and attach them to the cradle.
59. Lower vehicle so that only the weight of the engine and transaxle assembly is on dolly fixture.

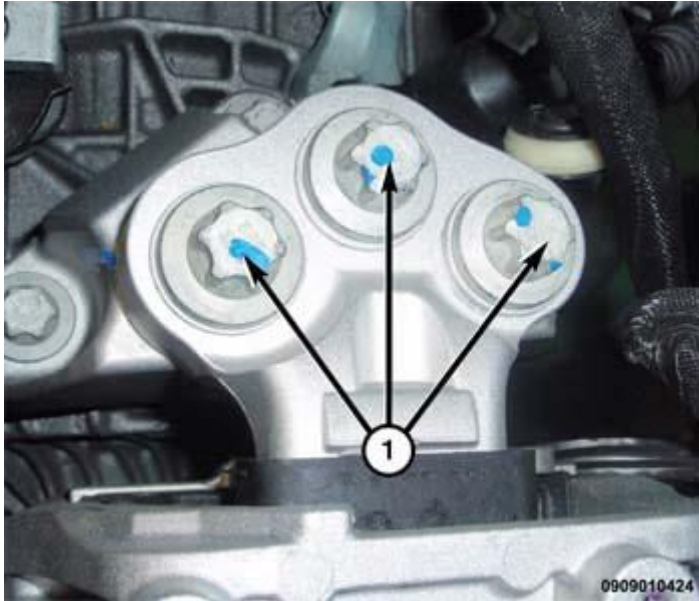


Fig. 35: Left Transaxle Mount Bolts
Courtesy of CHRYSLER GROUP, LLC

60. Remove left mount to transaxle bolts (1).

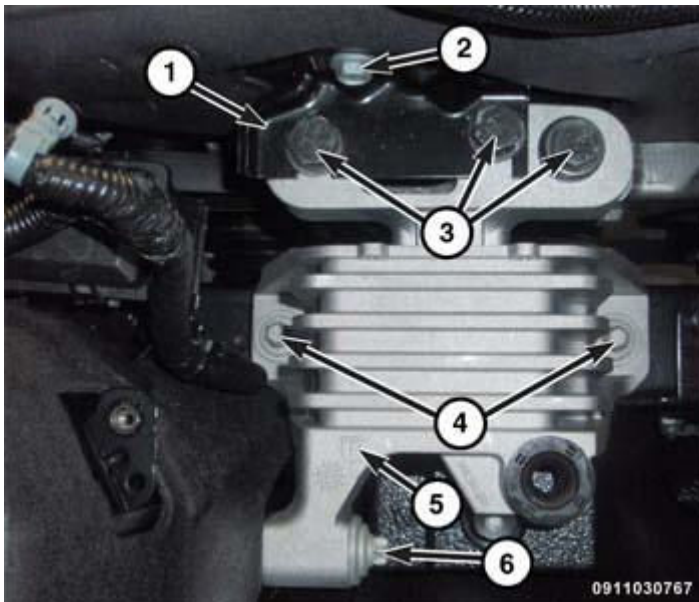


Fig. 36: Right Transaxle Mount Bolts

Courtesy of CHRYSLER GROUP, LLC

61. Remove the right engine mount bracket bolt (2).
62. Remove the three engine mount bolts (3) and the mount bracket (1).

CAUTION: It may be necessary to adjust the engine and transmission assembly, with the dolly fixture attached, to successfully clear the engine compartment.

63. While watching for obstructions, slowly raise the vehicle until the engine and transmission assembly clear the engine compartment.
64. Separate engine and transmission.

INSTALLATION

INSTALLATION

1. On MTX models, install the transmission and tighten bolts to. Refer to **SPECIFICATIONS** .

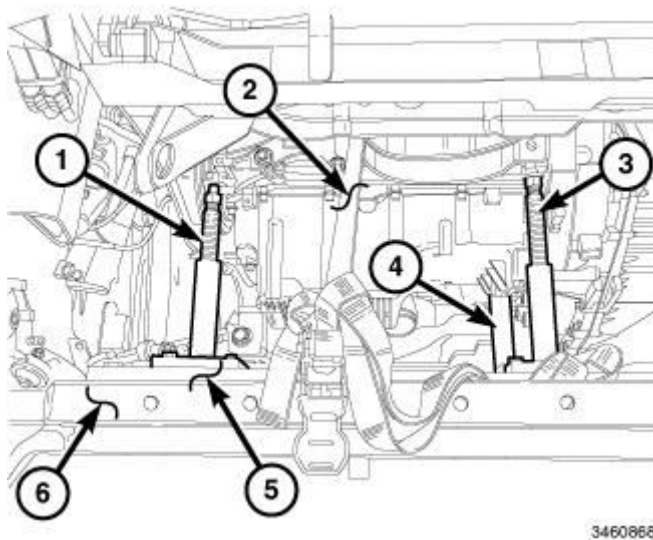


Fig. 37: Engine Support Cradle, Cradle Posts, Safety Strap & Power Train Dolly
Courtesy of CHRYSLER GROUP, LLC

WARNING: Safety straps must be used to secure engine to the dolly fixture.

NOTE: The fourth post is hidden behind the support strap.

2. Position the engine onto Cradle Post (special tool #6848, Posts, Cradle) (1, 3, 4), Engine Support (special tool #6710A, Cradle, Engine Support), and Dolly (special tool #6135, Dolly, Power Train) then install

safety strap (2) around engine, securing it to the Dolly (6).

3. Position the engine and transmission assemblies below vehicle engine compartment.

CAUTION: It may be necessary to adjust the engine and transmission assembly, with the dolly fixture attached, to successfully clear the engine compartment.

4. While watching for obstructions, slowly lower the vehicle until the engine and transaxle assembly clearly fit the engine compartment.

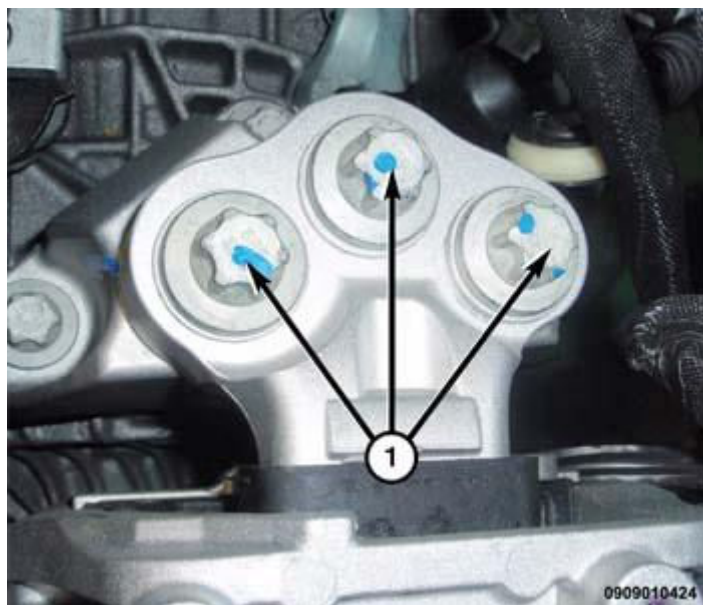


Fig. 38: Left Transaxle Mount Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Install left mount to transaxle bolts (1). Tighten bolts 157 N.m (116 ft. lbs.).

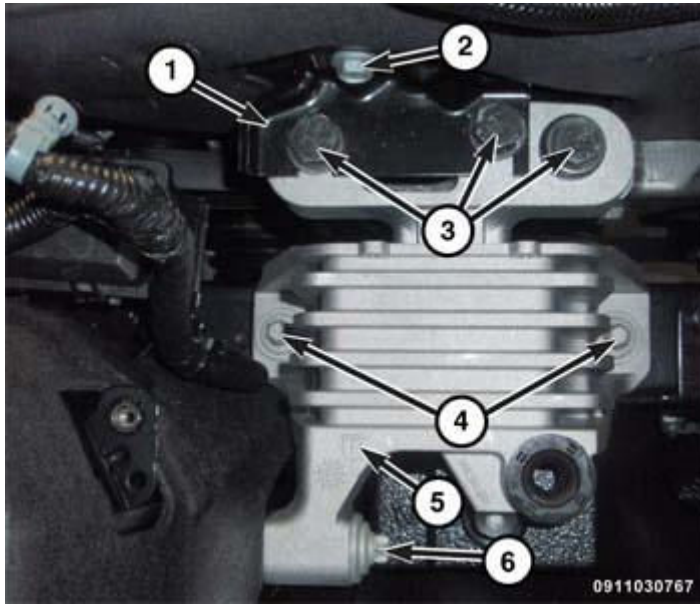


Fig. 39: Right Transaxle Mount Bolts
Courtesy of CHRYSLER GROUP, LLC

6. Install right mount bracket (1) to frame rail retaining bolts and tighten to 90 N.m (66 ft. lbs.).

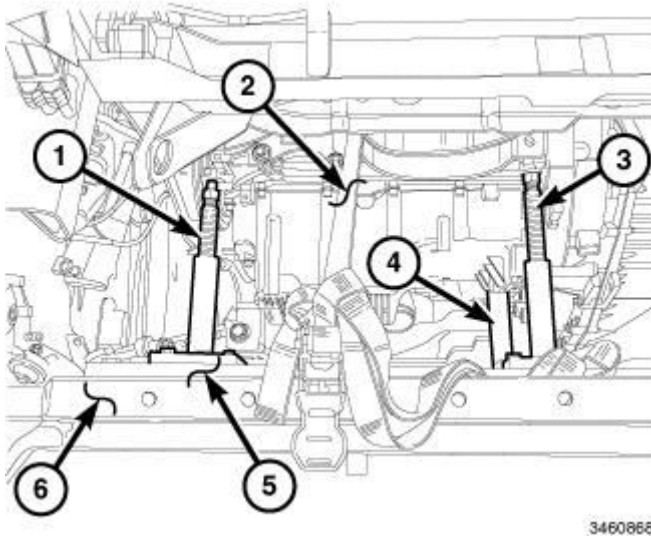


Fig. 40: Engine Support Cradle, Cradle Posts, Safety Strap & Power Train Dolly
Courtesy of CHRYSLER GROUP, LLC

7. Remove safety strap (2) and the Dolly (special tool #6135, Dolly, Power Train) (6).

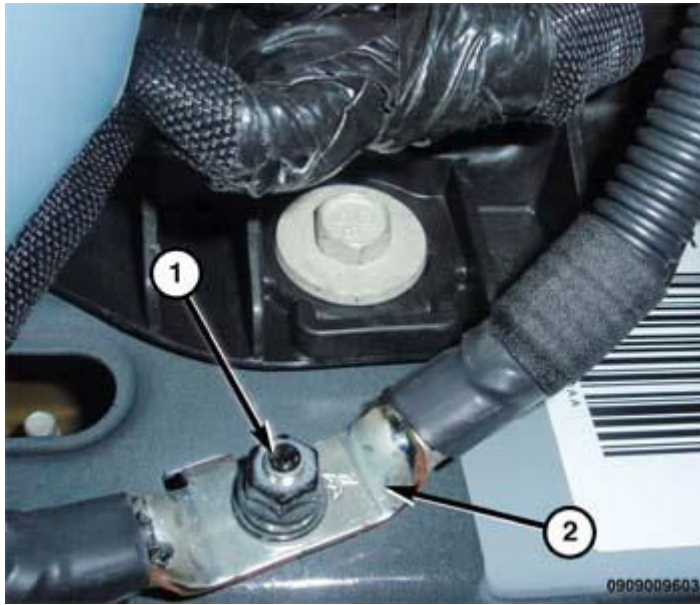


Fig. 41: Nut & Wire Harness
Courtesy of CHRYSLER GROUP, LLC

8. Install nut securing engine wire harness by battery.



Fig. 42: Battery Tray & Engine Wire Harness Retainer
Courtesy of CHRYSLER GROUP, LLC

9. Attach the engine wire harness retainer (1) to battery tray (2).
10. Install the coolant crossover tube.
11. Install the rear mount assembly. Refer to **INSULATOR, ENGINE MOUNT, REAR, INSTALLATION**.

12. Install the lower DPF mounting bracket.

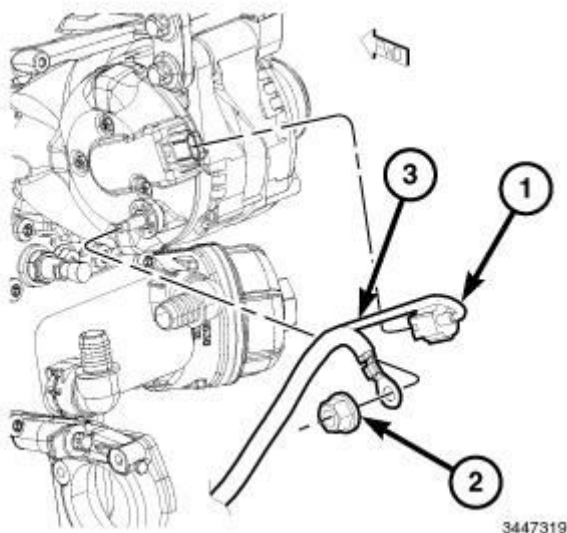


Fig. 43: B+ Retainer, Generator Field Connector & B+ Cable
Courtesy of CHRYSLER GROUP, LLC

13. Connect the generator field wire harness connector (1).
14. Install the B+ cable. Tighten nut (2) to 10 N.m (89 in. lbs.).

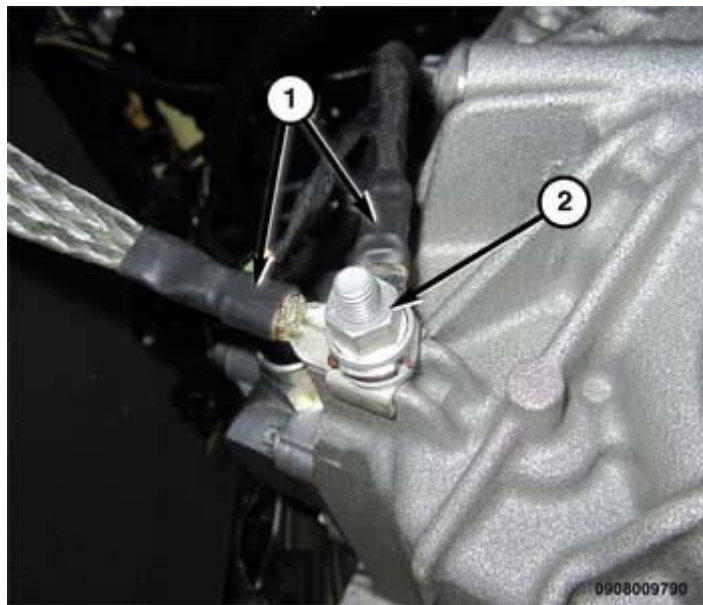
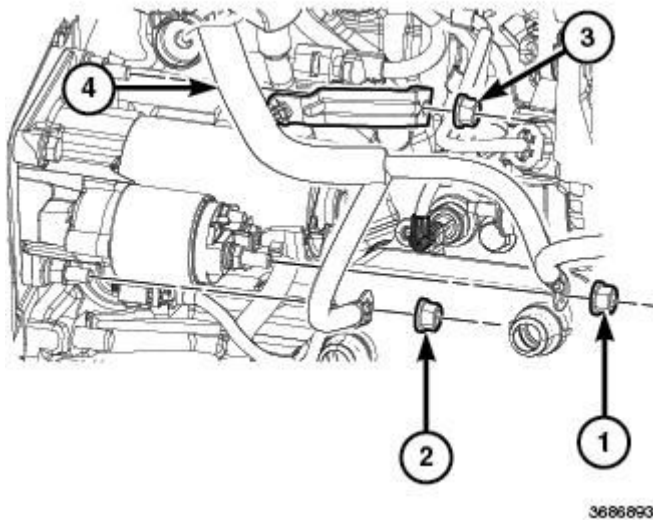


Fig. 44: Ground Cables & Nut
Courtesy of CHRYSLER GROUP, LLC

15. Install the ground cables (1). Tighten nut (2) to 20 N.m (177 in. lbs.).

**Fig. 45: B+ Cable Retainer**

Courtesy of CHRYSLER GROUP, LLC

16. Install the B+ cable (4) to starter. Tighten nut (1) to 10 N.m (89 in. lbs.).
17. Install the solenoid wire to starter and securely tighten nut (2).
18. Lower the vehicle.

**Fig. 46: Heater Hose**

Courtesy of CHRYSLER GROUP, LLC

19. Install the heater hoses (1) at heater core.
20. Connect the heater hose at intake manifold.

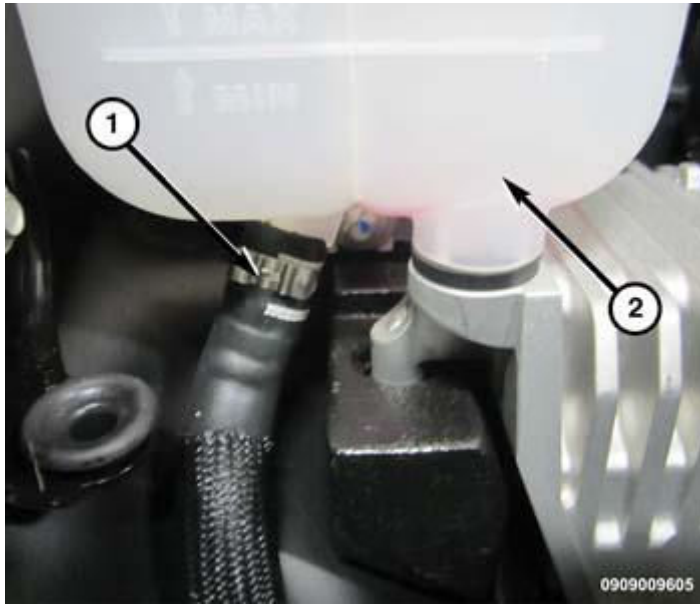


Fig. 47: Coolant Bottle & Lower Hose
Courtesy of CHRYSLER GROUP, LLC

21. Install the pressurized coolant reservoir hose (1). Using the (special tool #10288, Pliers, Hose Clamp) lock the clamp.



Fig. 48: Lower Radiator Hose
Courtesy of CHRYSLER GROUP, LLC

22. Install the lower radiator hose (1) at engine. Using the (special tool #10288, Pliers, Hose Clamp) lock the clamp.

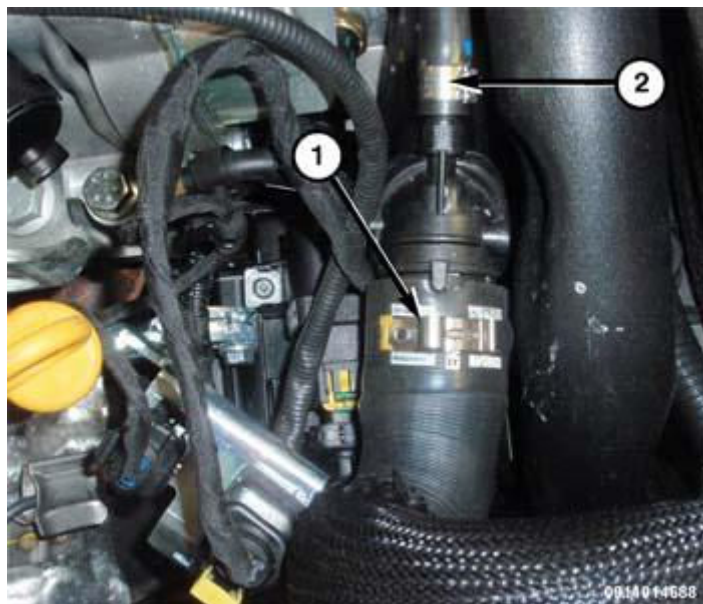


Fig. 49: Thermostat Housing & Hoses
Courtesy of CHRYSLER GROUP, LLC

23. Install the upper radiator (2) hose at engine. Using the (special tool #10288, Pliers, Hose Clamp) lock the clamp (1).
24. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .

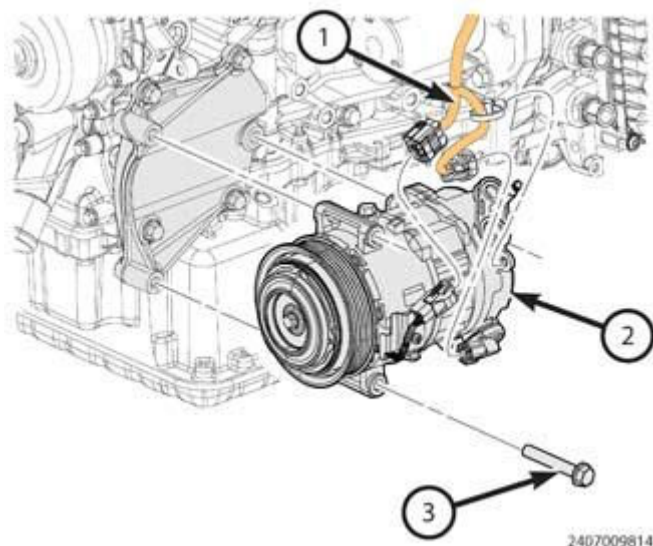


Fig. 50: Removing/Installing A/C Compressor
Courtesy of CHRYSLER GROUP, LLC

NOTE: The A/C compressor for 2.0L diesel models uses three bolts to secure the A/C compressor to the engine.

25. Install the A/C compressor (2). Tighten the three bolts (3) to 25 N.m (18 ft. lbs.).

26. Connect the two A/C compressor wire harness connector (1).



Fig. 51: O-Ring & EGR Air Flow Control Valve Inlet Tube
Courtesy of CHRYSLER GROUP, LLC

27. Install a new Inlet tube O-ring seal (2).

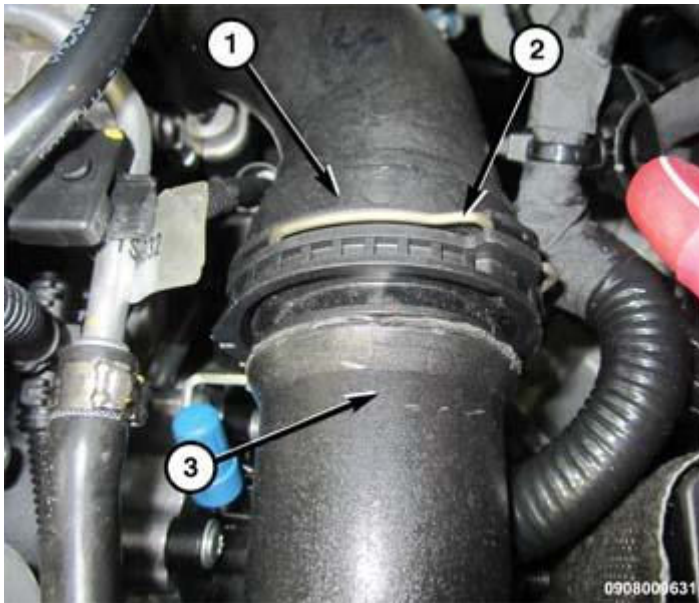


Fig. 52: EGR Air Flow Control Valve Inlet Tube, CAC Tube Wire Retainer & CAC Hose
Courtesy of CHRYSLER GROUP, LLC

28. Connect the left side Charge Air Cooler (CAC) tube (3) and install spring clip (2).

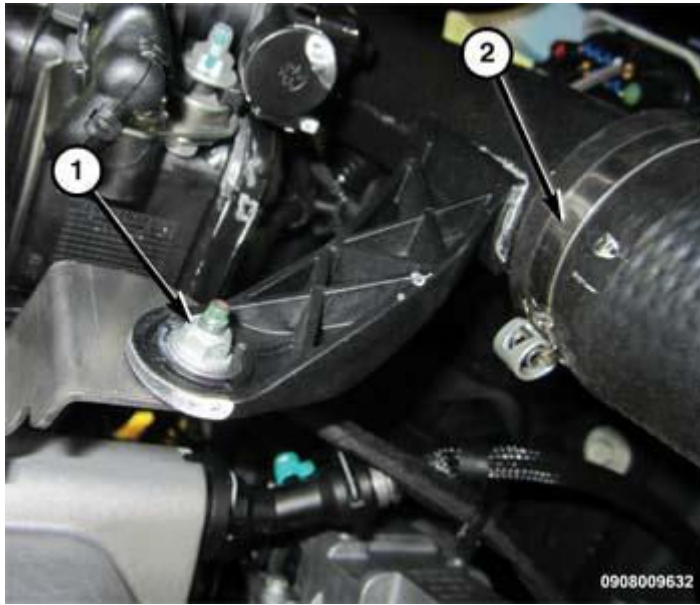


Fig. 53: CAC Air Tube & Nut
Courtesy of CHRYSLER GROUP, LLC

29. Install the left CAC tube support bracket nut (1). Tighten nut to 9 N.m (80 in. lbs.).

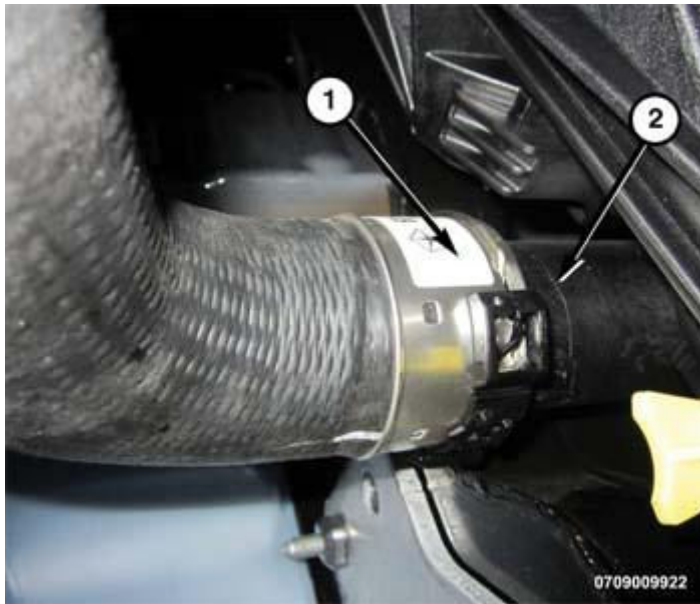


Fig. 54: Left Charge Air Cooler (CAC) & Hose
Courtesy of CHRYSLER GROUP, LLC

30. Install the right side CAC hose (3).



Fig. 55: CAC Tube & O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

31. Install the CAC tube O-ring seal (1).

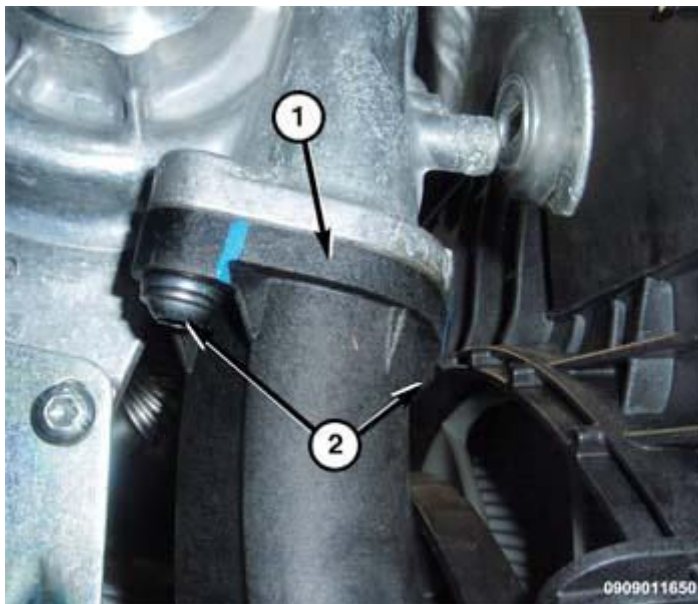


Fig. 56: Right CAC Tube & Bolts
Courtesy of CHRYSLER GROUP, LLC

32. Install the right CAC tube (1) to turbocharger flange. Tighten the bolts (2) to 10 N.m (89 in. lbs.).
33. Install the diesel particulate filter. Refer to **FILTER, DIESEL PARTICULATE, INSTALLATION** .
34. Install the exhaust crossunder pipe. Refer to **PIPE, EXHAUST CROSSUNDER, INSTALLATION** .
35. Install the right and left halfshafts. Refer to **INSTALLATION** .

36. Install the accessory drive belt. Refer to **BELT, SERPENTINE, INSTALLATION**.
37. Install the right and left lower splash shield and retainers.

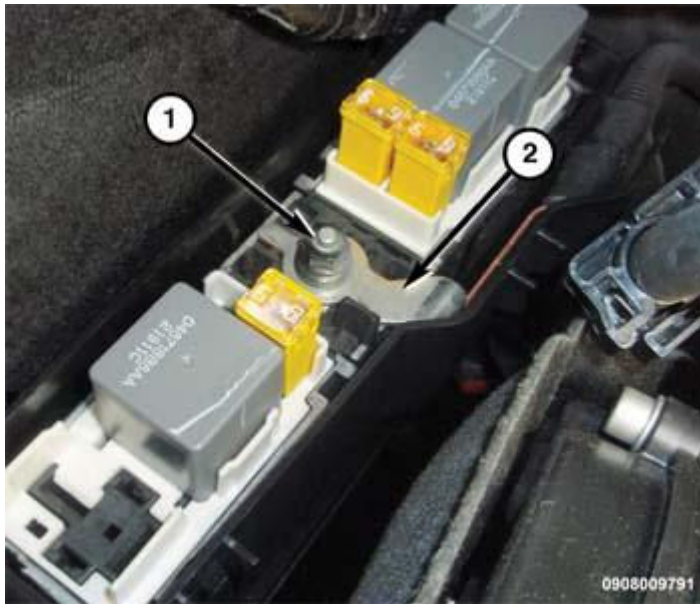


Fig. 57: B+ Cable & Nut
Courtesy of CHRYSLER GROUP, LLC

38. Install the B+ cable (2) to the right PDC and securely tighten nut (1).



Fig. 58: Right PDC Cover
Courtesy of CHRYSLER GROUP, LLC

39. Install the right PDC cover (1).

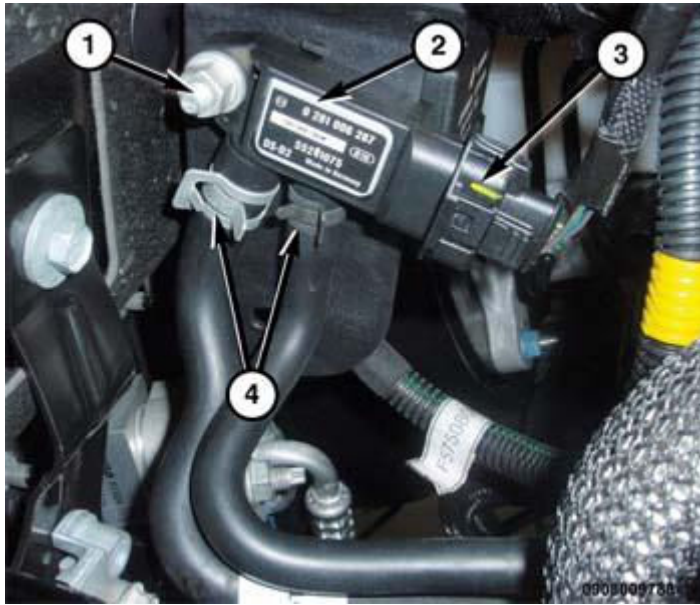


Fig. 59: Differential Pressure Sensor
Courtesy of CHRYSLER GROUP, LLC

40. Install the differential pressure sensor (2) and securely tighten nut (1).
41. Connect the differential pressure sensor wire harness connector (3).

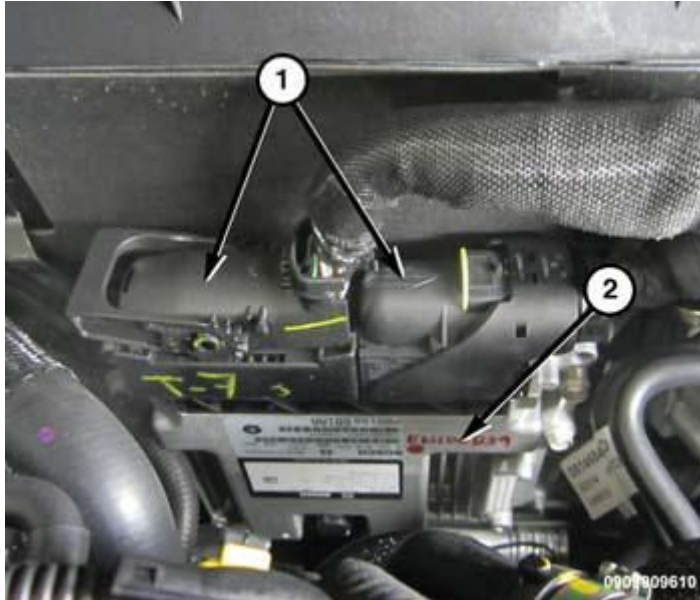


Fig. 60: Powertrain Control Module (PCM) & Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

42. Connect and lock the two PCM harness connectors (1) at the PCM (2).

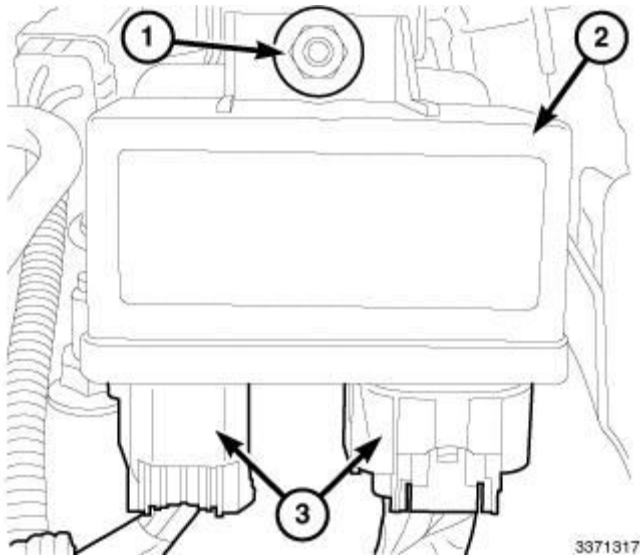


Fig. 61: Glow Plug Module & Connectors
Courtesy of CHRYSLER GROUP, LLC

43. Connect the two glow plug harness connector (3).

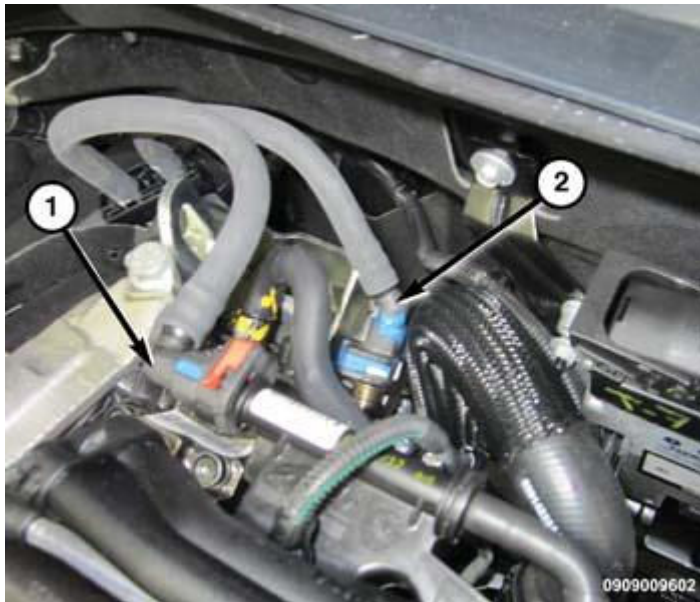


Fig. 62: Fuel Supply & Return Line Quick-Connect Fittings
Courtesy of CHRYSLER GROUP, LLC

44. Attach the fuel line routing clips.
45. Connect the fuel return line (1) near the fuel injection pump.
46. Connect the fuel supply (2) line quick-connect fitting at fuel injection pump.

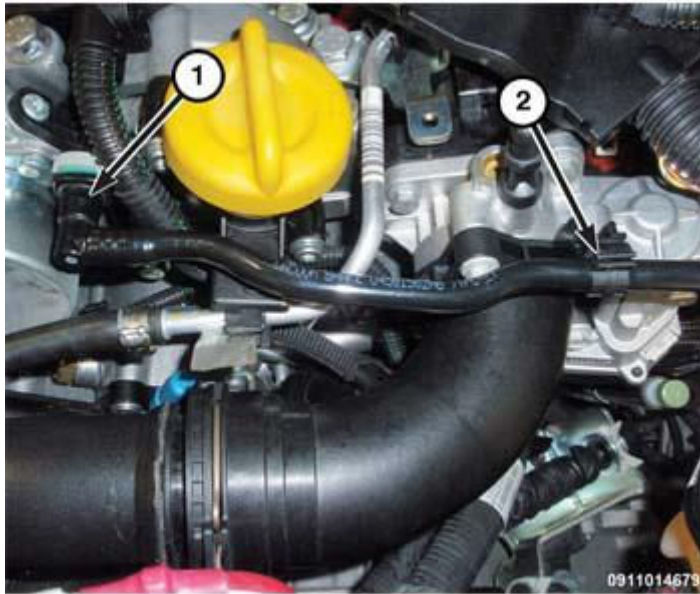


Fig. 63: Brake Booster Hose & Retainer Clip
Courtesy of CHRYSLER GROUP, LLC

47. Connect the brake booster hose (1) at vacuum pump and retainer clip (2).

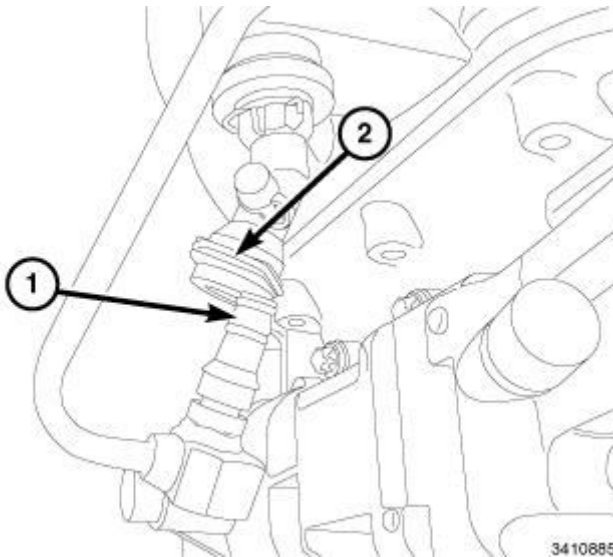


Fig. 64: Hydraulic Supply Pipe & Concentric Slave Cylinder
Courtesy of CHRYSLER GROUP, LLC

48. Connect the hydraulic supply pipe for the concentric slave cylinder.

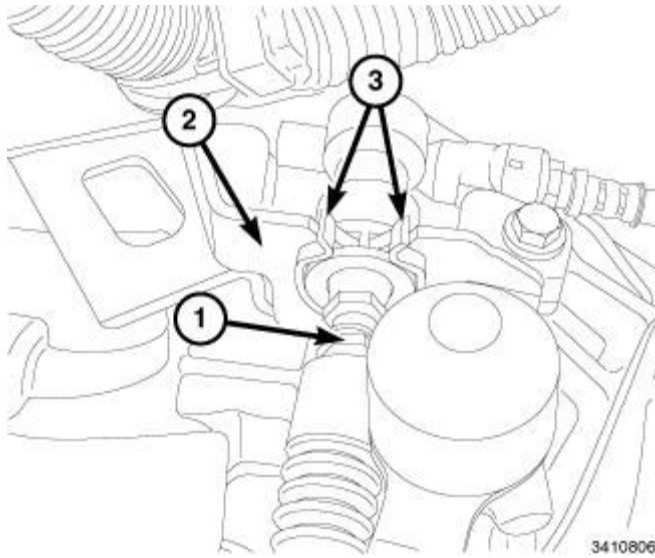


Fig. 65: Gear Shift Selector Cable & Bracket
Courtesy of CHRYSLER GROUP, LLC

49. Connect the gear shift selector cable (1) to the bracket (2).

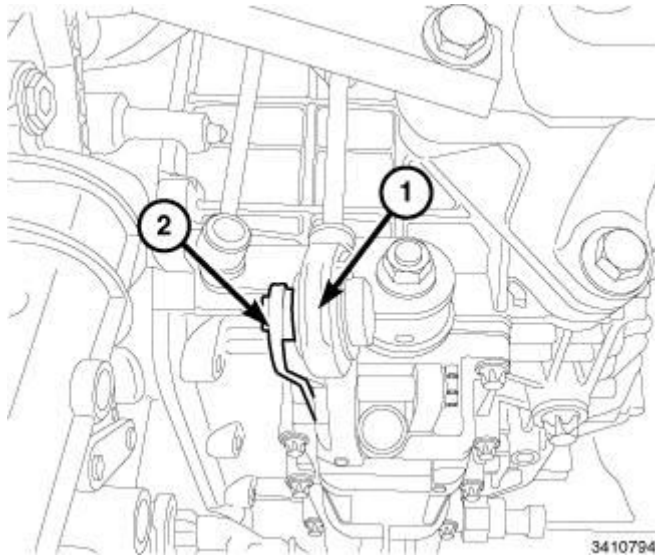


Fig. 66: Gear Shift Selector Cable & Manual Lever
Courtesy of CHRYSLER GROUP, LLC

50. Connect the gear shift selector cable (1) to the manual lever (2).

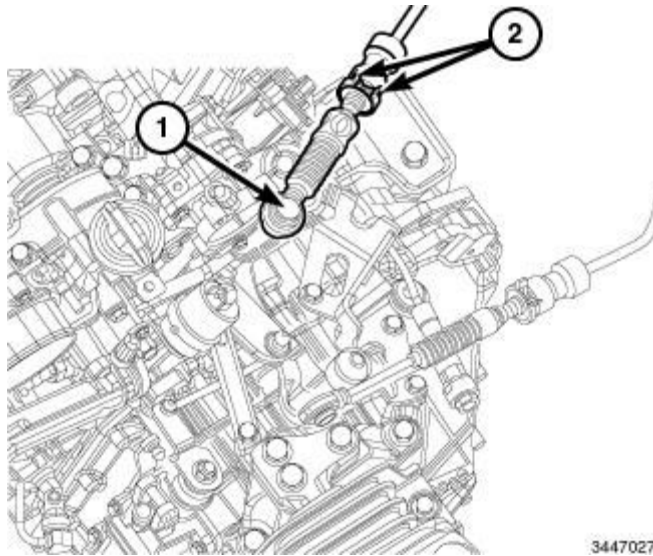


Fig. 67: Cable Connector & Release Tabs
Courtesy of CHRYSLER GROUP, LLC

51. Push the cable connector (1) to the lever.
52. Connect the gear shift range cable at the bracket.



Fig. 68: Reverse Lamp Sensor & Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

53. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
54. Connect the reverse lamp wire harness connector (2).

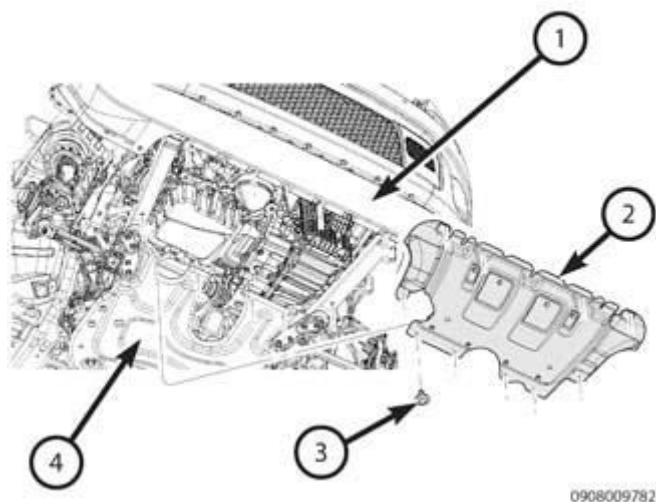


Fig. 69: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

55. Install the belly pan (2) and securely tighten bolts (3).
56. Lower the vehicle.
57. Install the air cleaner body. Refer to **BODY, AIR CLEANER, INSTALLATION** .
58. Fill the transaxle with the recommended oil. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** .
59. Fill the cooling system. Refer to **STANDARD PROCEDURE** .
60. Install a new oil filter and fill the engine with recommended oil. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** .

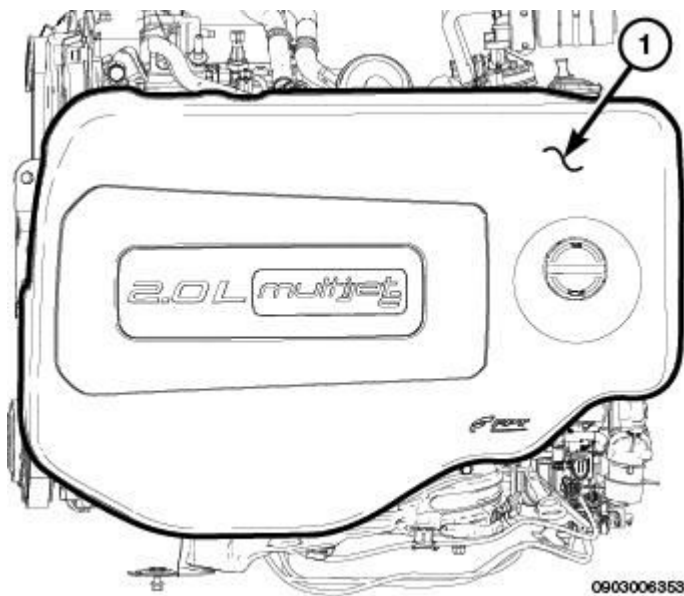


Fig. 70: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

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61. Connect the negative and positive battery cable.
62. Start engine and check for leaks.
63. Install engine cover (1).

SPECIFICATIONS**SPECIFICATIONS - 2.0L DIESEL ENGINE****GENERAL**

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Type	In-Line OHV, DOHC	
Number of Cylinders	4	
Firing Order	1 - 3 - 4 - 2	
Compression Ratio	16.5:1	
Max. Variation Between Cylinders	25%	
Displacement	2.0 L	122 CID

CYLINDER BLOCK

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Material	Cast Iron	
Cylinder Liner Inner Diameter		
Grade A	83.000 - 83.010 mm	3.2677 - 3.2681 in.
Grade B	83.010 - 83.020 mm	3.2681 - 3.2684 in.
Grade C	83.020 - 83.030 mm	3.2684 - 3.2688 in.
Cylinder Liner Taper	< 0.005 mm	0.0002 in.
Cylinder Liner Out-of-Round	< 0.050 mm	0.002 in.
Cylinder Liner Inner Diameter Oversize	0.10 mm	0.0004 in.

CYLINDER HEAD

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Engine Cylinder Head Lower Surface Flatness	< 0.1 mm	0.0039 in.
Cylinder Head Nominal Height	107 mm $\pm$ 0.05 mm	4.213 $\pm$ 0.002 mm
Cylinder Head Gasket Size With Maximum Piston Projection		
Projection	+0.110 - +0.230 mm	+0.004 - +0.009 in.
Thickness (No Opening)	0.95 $\pm$ 0.05 mm	+0.037 $\pm$ 0.002 in.
Cylinder Head Gasket Size With		

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Maximum Piston Projection		
Projection	+0.331 ± 0.425 mm	+0.013 - +0.017 in.
Thickness (Two Opening)	1.15 ± 0.05 mm	+0.045 ± 0.002 in.

PISTONS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Permitted Weight Difference Between Pistons	± 5 Grams	
Piston Outer Diameter - Grade A	82.930 - 82.940	3.2649 - 3.2653 in.
Piston Outer Diameter - Grade B	82.940 - 82.950	3.2653 - 3.2657 in.
Piston Outer Diameter - Grade C	82.950 - 82.960	3.2657 - 3.2661 in.
Piston Outer Diameter Oversize	0.1	0.0039

CONNECTING RODS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Permitted Difference in Weight Between Connecting Rod Assemblies	± 2.5 Grams	
Small End Bush Inner Diameter	30.006 - 30.014	1.1813 - 1.1817 in.
Big End Inner Diameter	53.897 - 53.909	2.1220 - 2.1224 in.

PISTONS PINS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Piston Pin Outer Diameter	29.975 - 29.980	1.1801 - 1.1803 in.
Piston Pin Outer Diameter	29.985 - 29.990	1.1805 - 1.1807 in.

PISTON RINGS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Cylinder Compression 1st Sealing Ring Gap	0.20 - 0.35 mm	0.0080 - 0.0140 in.
Cylinder Compression 2nd Sealing Ring Gap	0.60 - 0.80	0.0240 - 0.0314 in.
Engine Piston Oil Scraper Ring Gap	0.25 - 0.50 mm	0.0100 - 0.0200 in.
Sealing Ring Seat in Piston - 1st Groove	1.620 - 1.640 mm	0.0638 - 0.0645 in.
Sealing Ring Seat in Piston - 2nd Groove	1.550 - 1.570 mm	0.0610 - 0.0618 in.
Sealing Ring Seat in Piston - 3rd Groove	2.020 - 2.040 mm	0.07952 - 0.0803 in.

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Cylinder Compression 1st Sealing Ring Thickness	1.470 - 1.495 mm	0.0579 - 0.0589 in.
Cylinder Compression 2nd Sealing Ring Thickness	1.470 - 1.495 mm	0.0579 - 0.0589 in.
Engine Piston Oil Scraper Ring Thickness	1.970 - 1.990 mm	0.0776 - 0.0783 in.
Cylinder Compression 1st Sealing Ring End Float	0.125 - 0.170 mm	0.0049 - 0.0067 in.
Cylinder Compression 2nd Sealing Ring End Float	0.055 - 0.100 mm	0.0022 - 0.0039 in.
Engine Piston Oil Scraper Ring End Float	0.030 - 0.070 mm	0.0012 - 0.0028 in.

CONNECTING RODS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Bearing Clearance	0.03 - 0.08 mm	0.001 - 0.003 in.
Side Clearance	0.37 mm	0.014 in.

CRANKSHAFT / MAIN JOURNALS / CRANKPINS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Crankshaft End Float	0.049 - 0.211 mm	0.0019 - 0.0083 in.
Main Journal Seat Diameter	63.705 - 63.718 mm	2.508 - 2.509 in.
Main Journal Diameter - Grade A	59.995 - 60.002 mm	2.3620 - 2.3623 in.
Main Journal Diameter - Grade B	59.988 - 59.995 mm	2.3617 - 2.3620 in.
Main Journal Diameter - Grade C	59.981 - 59.988 mm	2.3615 - 2.3617 in.
Main Journal Diameter Undersized	0.127 mm	0.005 in.
Crankpin Diameter - Grade A	50.800 - 50.807 mm	1.9999 - 2.0002 in.
Crankpin Diameter - Grade B	50.793 - 50.800 mm	1.9997 - 1.9999 in.
Crankpin Diameter - Grade C	50.786 - 50.793 mm	1.9994 - 1.9997 in.
Crankpin Diameter Undersized	0.127 mm	0.005 in.
Main journal half-bearings - Grade A (Red)	1.832 - 1.836 mm	0.0721 - 0.0723 in.
Main Journal Half-Bearings - Grade B (Blue)	1.835 - 1.839 mm	0.0722 - 0.0724 in.
Main Journal Half-Bearings - Grade C (Yellow)	1.838 - 1.842 mm	0.0724 - 0.0725 in.
Main Journal/Crankpin Half-Bearings oversize - Grade A (Brown)	0.127 mm	0.005 in.
Main Journal/Crankpin Half-Bearings Oversize - Grade B (Green)	0.127 mm	0.005 in.

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Main Journal/Crankpin Half-Bearings Oversize - Grade C (Black)	0.127 mm	0.005 in.
Main Journal/Crankpin Half-Bearing Oversize	0.254 mm	0.010 in.
Clearance Between Main Bearings - Crankshaft Main Journals	0.031 - 0.051 mm	0.0012 - 0.0020 in.
Crankpin Half-Bearings - Grade A (Red)	1.528 - 1.532 mm	0.0602 - 0.0603 in.
Crankpin Half-Bearings - Grade B (Blue)	1.532 - 1.536 mm	0.0603 - 0.0605 in.
Crankpin Half-Bearings - Grade C (Yellow)	1.535 - 1.539 mm	0.0604 - 0.0606 in.
Clearance Between Connecting Rod Bearings - Crankpin Bearings	0.030 - 0.056 mm	0.0012 - 0.0022 in.

CAMSHAFT

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Camshaft First Journal Diameter	43.600 - 43.615	1.7165 - 1.7171 in.
Camshaft Second Journal Diameter	43.400 - 43.415	1.7087 - 1.7092 in.
Camshaft Third Journal Diameter	43.200 - 43.215	1.7010 - 1.7014 in.
Camshaft Fourth Journal Diameter	43.000 - 43.015	1.6930 - 1.6935 in.
Camshaft Fifth Journal Diameter	30.000 - 30.015	1.1811 - 1.1817 in.
Nominal Exhaust Cam Lift	8.0	0.3150 in.
Nominal Intake Cam Lift	8.0	0.3150 in.
Camshaft First Support Diameter	43.646 - 43.671	1.7183 - 1.7193 in.
Camshaft Second Mounting Diameter	43.446 - 43.471	1.7105 - 1.7115 in.
Camshaft Third Support Diameter	43.246 - 43.271	1.7026 - 1.7036 in.
Camshaft Fourth Support Diameter	43.046 - 43.071	1.6947 - 1.6957 in.
Camshaft Fifth Support Diameter	30.045 - 30.070	1.1829 - 1.1839 in.
Camshaft End Float	0.100 - 0.230	0.0039 - 0.0091 in.

VALVES

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Intake Valve Stem Diameter	4.982 - 5.000 mm	0.1961 - 0.1968 in.
Exhaust Valve Stem Diameter	4.972 - 5.990 mm	0.1957 - 0.2358 in.

VALVE GUIDE

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Valve Guide Inner Diameter	5.015 - 5.033 mm	0.051 in.

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Valve Guide Inner Diameter	10.010 - 10.030 mm	0.3941 - 0.3950 in.
Valve Guide Outer Diameter Oversize	0.05 - 0.10 - 0.25 mm	0.002 - 0.004 - 0.010 in.

VALVES SPRINGS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Valve Spring Free Length	44.1 mm	1.736 in.
Length of Valve Springs Under a Load of 228 - 252 N.m	34.0 mm	1.339 in.
Length of Valve Springs Under a Load of 439 - 481 N.m	25.5	1.004 in.

ENGINE OIL PUMP

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Clearance Between Pump Casing Support Plane and Top of Gears	0.080 - 0.186 mm	0.0031 - 0.0073 in.
Endfloat Between Pump Casing Support Plane and Top of Gears	0.025 - 0.070 mm	0.0010 - 0.0028 in.
Height of Engine Oil Pressure Limit Valve Spring Under Load of 88 - 97 N.m	36.0 mm	1.4173 in.

VALVES SEATS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Intake Valve Seat Outer Diameter	29.600 - 29.611	1.1653 - 1.1660 in.
Exhaust Valve Seat Outer Diameter	26.100 - 26.111	1.0275 - 1.0280 in.
Valve Seat Band Angle in Contact With Valves - Inlet	45° 30' ± 1°	
Valve Seat Band Angle in Contact With Valves - Exhaust	45° 0' ± 1°	

OIL PRESSURE

DESCRIPTION	SPECIFICATION	
	Metric	Standard
At Curb Idle Speed*	1.0 bar	14.50 psi
At 4000 RPM*	4.5 bar	65.27 psi
CAUTION: *If pressure is ZERO at curb idle, DO NOT run engine at 4000 RPM.		

TORQUE SPECIFICATIONS

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ENGINE BLOCK

DESCRIPTIONS	N.m	In. Lbs.	Ft. Lbs.
A/C Compressor Bolts	25	-	18
A/C Compressor Bracket Bolts	45	-	33
Connecting Rod Caps Bolts	25 + 60°	18 + 60°	-
Crankcase Vent (CCV) Tube Bolt	9	-	80
Crankshaft Bearing Caps Bolts	25 + 100°	18 + 100°	-
Crankshaft Position Sensor Bolt	9	-	80
Dipstick Tube Bolt (head)	11	97	-
Dipstick Tube Bolt (sump)	9	80	-
Generator Bolts	70	-	52
Generator Bracket Bolts	70	-	52
Generator B+ Cable Nut	10	89	-
Ground Cable Nut (starter).	20	177	-
Ground Cable (transaxle)	10	89	-
Oil Cooler Bolts	30	-	22
Oil Drain Plug	25	-	18
Oil Filter Cap	25	-	18
Oil Filter Housing Bolts	30	-	22
Oil Pan Bolt (M6)	8	71	-
Oil Pan Bolts (M8)	25	-	18
Oil Pan-to-Transmission Bolts	55	-	41
Oil Pressure Regulator Bolt	25	-	18
Oil Pressure Sensor	23	-	17
Starter Bolts	24	-	18
Starter B + Cable Nut	10	89	-
Windage Tray	11	97	-

CYLINDER HEAD

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Camshaft Gear Bolt	30 + 40°	22 + 40°	-
Camshaft Housing Plug	15	-	133
Camshaft Housing Bolt	25	18	-
Camshaft Position Sensor Bolt	9	-	80
Camshaft Sprocket Bolt	30 + 40°	22 + 40°	-
Cylinder Head Bolts	Refer to CYLINDER HEAD, INSTALLATION .		
Cylinder Head Cover Bolts	25	18	-
Exhaust Manifold Nuts	21	15	-
Fuel Injection Pump Mounting Bracket Bolt	25	18	-
Intake Manifold Fasteners	25	18	-
Thermostat Bolts	25	18	-

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Vacuum Pump Bolts	18	-	159
Water Pump Bolts	25	18	-

FRONT ENGINE

DESCRIPTIONS	N.m	Ft. Lbs.	In. Lbs.
Crankshaft Sprocket Bolt	340	251	-
Front Engine Cover Bolts	9	-	80
Serpentine Belt Tensioner Bolt	50	37	-
Timing Chain Cover Bolts (lower) (M8)	25	18	-
Timing Chain Cover Bolts (lower) (M10)	54	40	-
Timing Chain Cover Bolts (upper)	6	-	53
Timing Belt Tensioner Bolt	28 + 40°	21 + 40°	-
Vacuum Pump Bolts	30	22	-
Vibration Damper Bolt	30	22	-

REAR ENGINE

DESCRIPTION	N.m	In. Lbs.	Ft. Lbs.
Crankshaft Position Sensor Bolts	6	53	-
Rear Crankshaft Oil Seal Carrier Bolts	9	-	80
Torque Converter Bolts	37	-	27
Transmission Bolts (MTX)	Refer to SPECIFICATIONS .		

TURBOCHARGER

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Charge Air Cooler (CAC) Bolts	35	18	-
Charge Air Cooler (CAC) Tube-to-Turbocharger Flange Bolts	10	-	89
Diesel Particulate Filter Clamp Bolt	25	18	-
Turbocharger Heat Shield Bolts	12	-	106
Turbocharger Heat Shield Nuts	8	-	71
Turbocharger Nuts	24	18	-
Turbocharger Oil Return Line Bolt	9	-	80
Turbocharger Oil Supply Line Banjo Bolt	15	-	133

ENGINE MOUNTS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Left Mount Bolts	157	116	-

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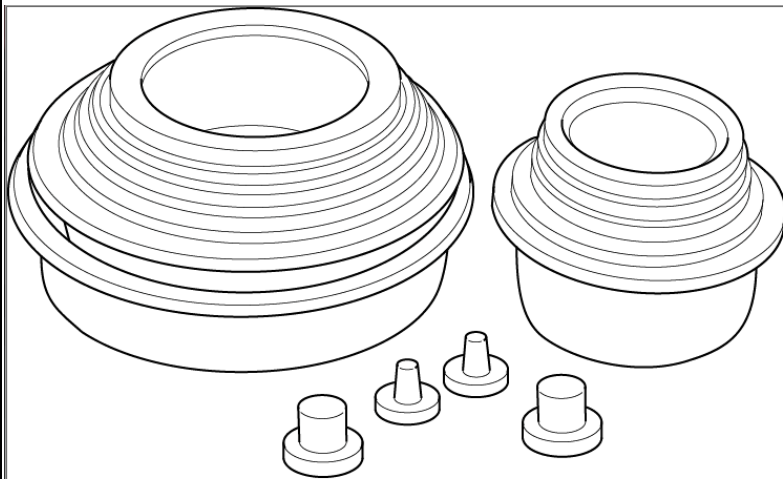
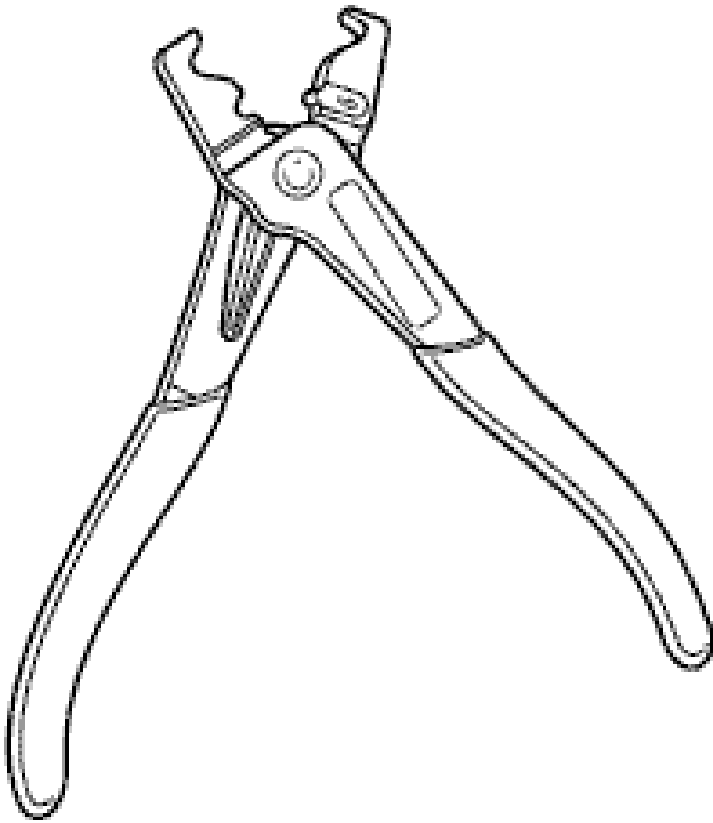
Left Mount-to-Frame Rail Bolts	105	77	-
Left Mount-to-Shock Tower Bolt	64	47	-
Left Mount Bracket-to-Transaxle Bolts	105	77	-
Rear Engine Mount-to-Transaxle Bracket Bolts (MTX)	147	108	-
Rear Engine Mount Nut	220	162	-
Rear Engine Mount-to-Rear Mount Bracket Nut (Cradle)	105	77	-
Rear Mount Bracket-to-Cradle Nuts	75	55	-
Rear Engine Mount Bracket-to-Transaxle Bolt	40	30	-
Rear Engine Mount-to-Transmission Bracket Bolts	125	92	-
Rear Engine Mount Bolt	110	81	-
Right Engine Mount Bracket Bolt	25	18	-
Right Engine Mount Bolts	90	66	-
Right Engine Mount-to-Frame Rail Bolts	70	52	-
Right Engine Mount-to-Shock Tower Bolt	65	48	-

SPECIAL TOOLS**SPECIAL TOOLS**

10288 - Pliers, Hose Clamp

2014 Jeep Cherokee Trailhawk

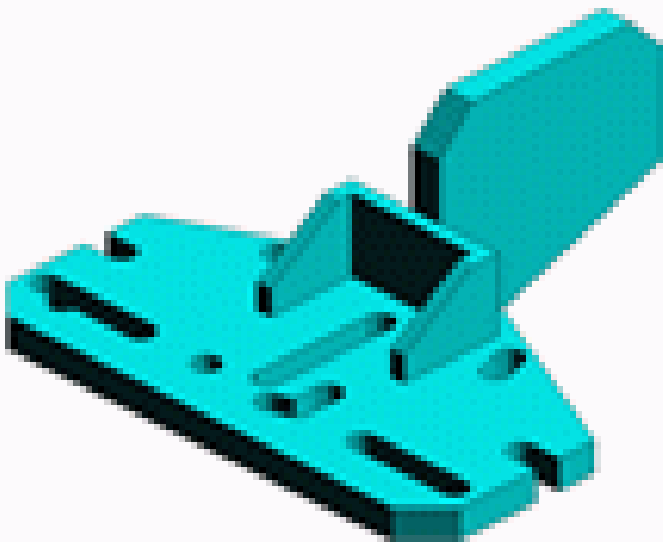
2014 ENGINE 2.0L Diesel - Service Information - Cherokee



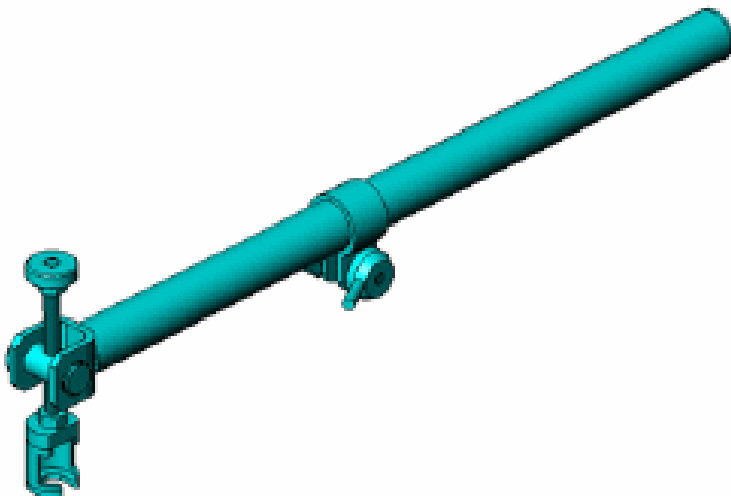
10368 - Set, Universal Protective Cap

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20106 - Fixture, Cylinder Head Holding

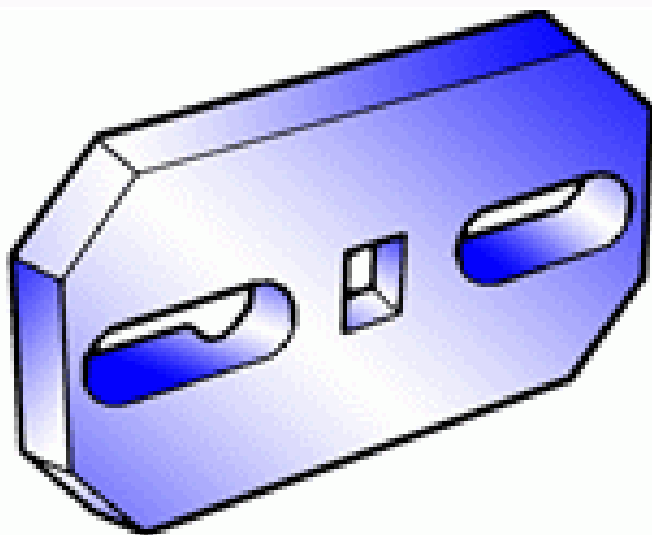


20107 - Compressor, Valve Spring

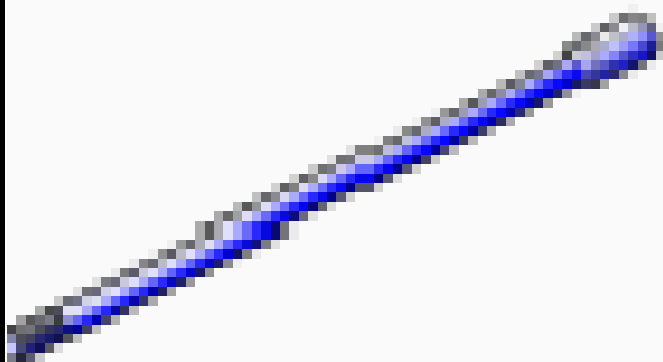
20108 - Support, Cylinder Head Bench Valve

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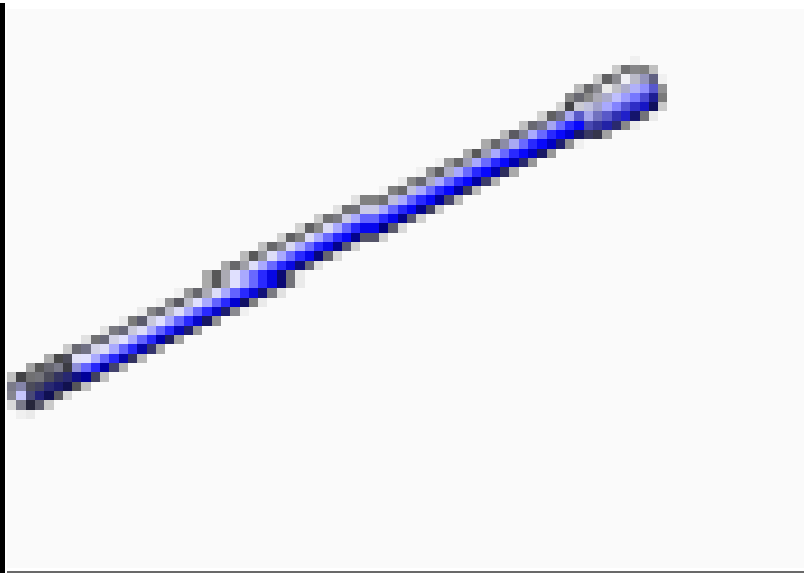
20109 - Tool, Crankshaft Rotation



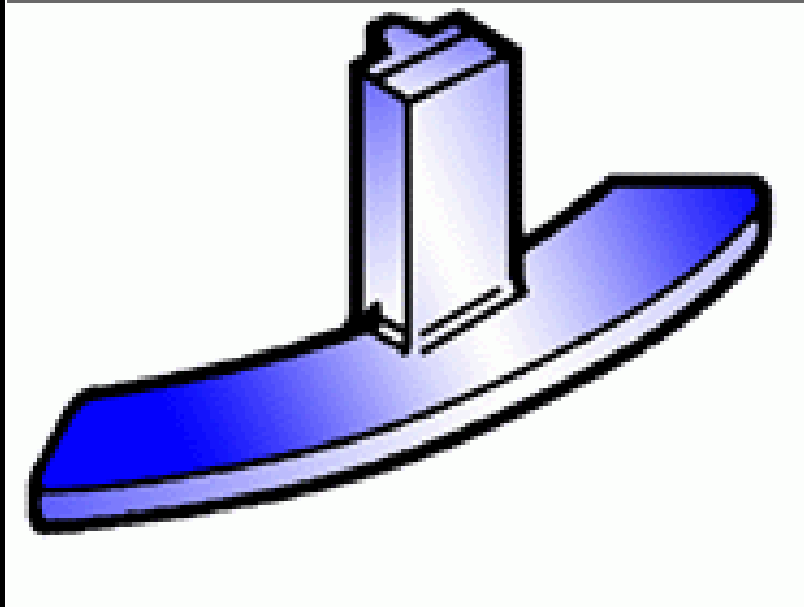
20110 - Remover/Installer, Crankshaft Sump

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20111 - Remover/Installer, Cylinder Head Bolt

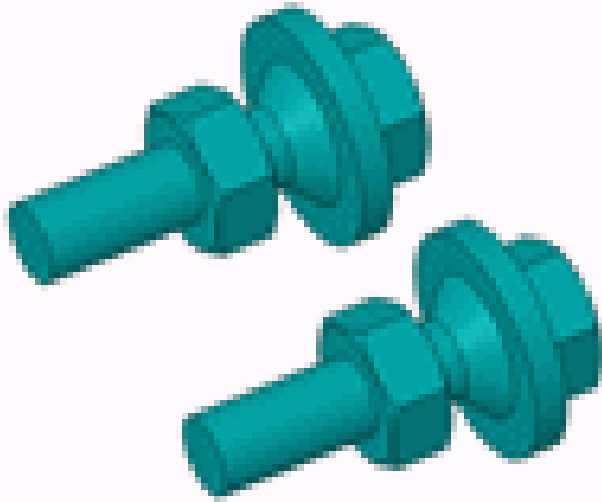
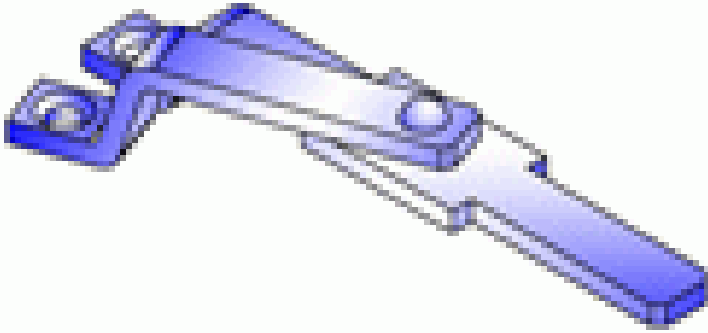


20115 - Tool, Flywheel Locking

20126 - Remover/Installer, Camshaft Pulley

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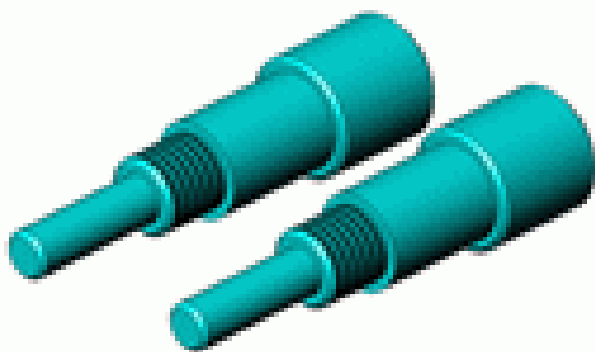
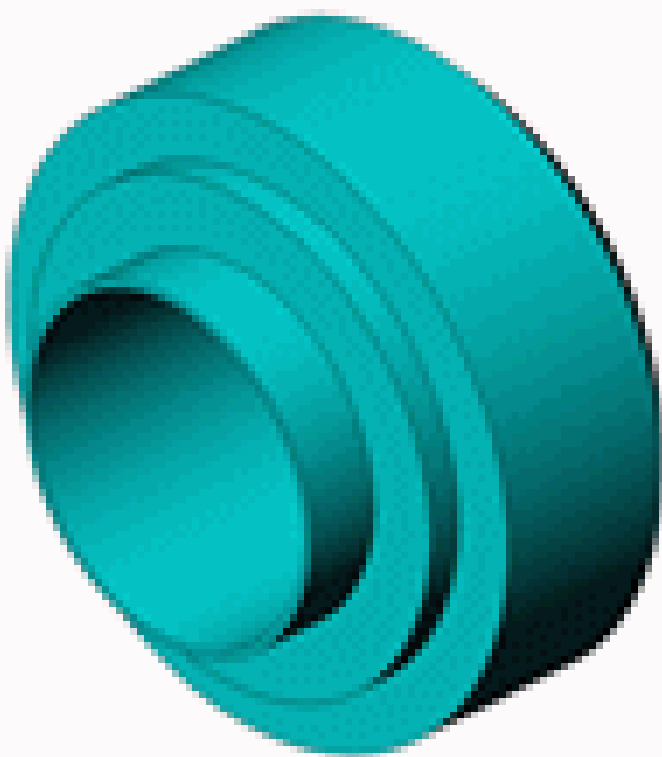


20127 - Pins, Camshaft Pulley
Remover/Installer

20131 - Installer, Camshaft Oil Seal

2014 Jeep Cherokee Trailhawk

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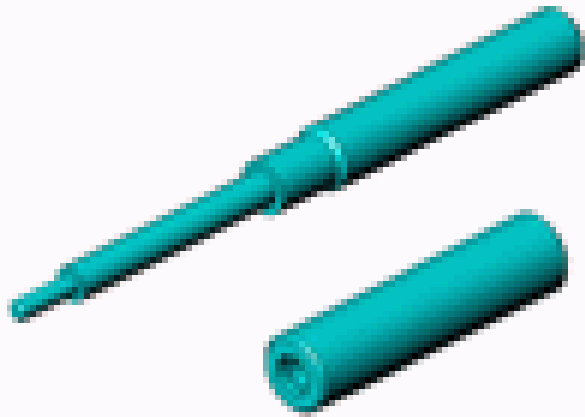


20132 - Tool, Timing Belt Locking

20133 - Remover/Installer, Valve Guide Oil Seal

2014 Jeep Cherokee Trailhawk

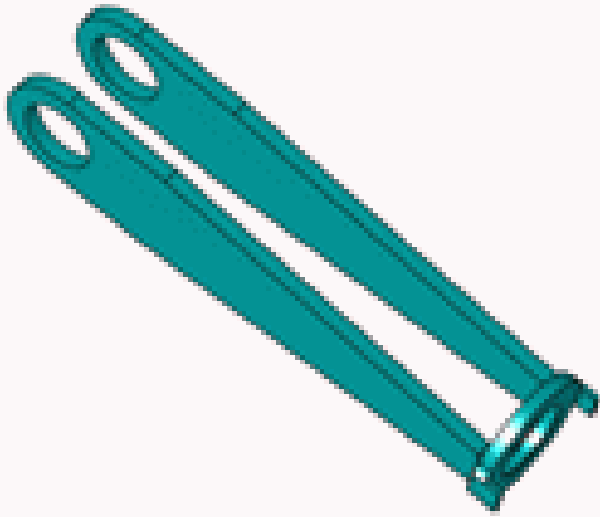
2014 ENGINE 2.0L Diesel - Service Information - Cherokee



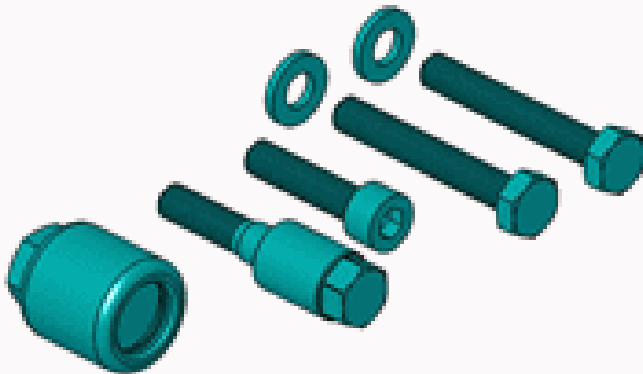
20145 - Installer, Crankshaft Front Oil Seal

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20149 - Adapter, Valve Spring Compressor

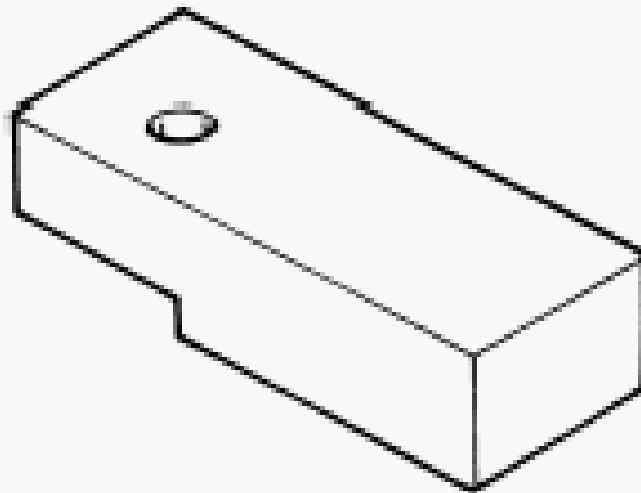


20150 - Remover/Installer, High Pressure Fuel Pump

20164 - Tool, Crankshaft Timing Locking

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D-115-2A - Block, Scooter
(Originally Shipped In Kit Number(s)
9329-SUP, 9515-SUP, 9516-SUP, 9517-
SUP, 9518, 9519, 9540-SUP, 9541-SUP,
9694, 9926.)

COVER, ENGINE

REMOVAL

REMOVAL

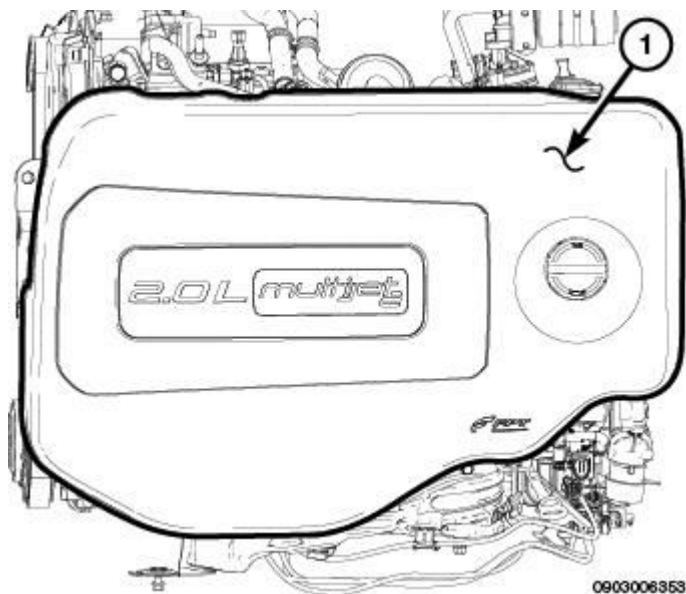


Fig. 71: Engine Cover

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1. Remove engine cover (1) by lifting upwards.

INSTALLATION

INSTALLATION

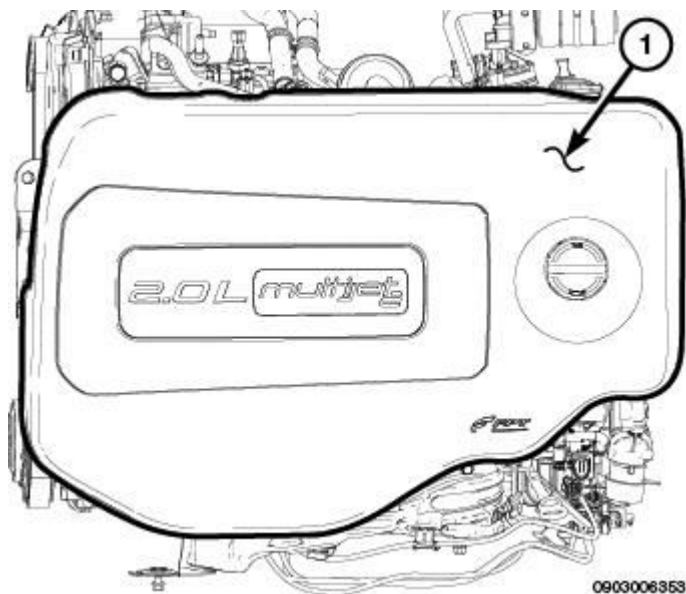


Fig. 72: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Align engine cover (1) with mounting retainers.
2. Firmly press cover onto mounting studs.

CYLINDER HEAD**DESCRIPTION****DESCRIPTION**

The cylinder head is a one-piece design and is made from aluminum alloy and silicon.

Two, ductile cast iron, overhead camshafts in a camshaft housing; they are operated by a belt and gears.

The four valves per cylinder, parallel and vertical, are positioned in the valve guides and are controlled by rocker arms operated by camshaft cams and kept in contact with the valves through hydraulic tappets.

Valve guides are press-fitted in the cylinder head seats. A special reamer is used to produce the inner diameter after fitting.

Unlike cylinder heads with ante-chambers, the entire combustion process takes place in the combustion chamber on the piston.

The gasket between the cylinder head and crankcase is made of metal. No cylinder head tightening is required throughout the life of the engine.

REMOVAL**REMOVAL**

1. Disconnect the negative battery cable.
2. Remove air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL** .

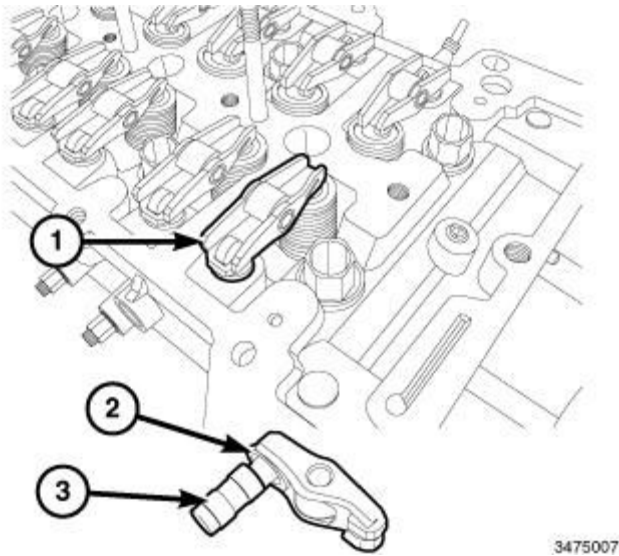


Fig. 73: Rocker Arm, Retaining Clip & Lifter
Courtesy of CHRYSLER GROUP, LLC

3. Remove the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, REMOVAL** .

NOTE: **Number the position of each rocker arm and lifter as it is removed.**

4. Remove all the rocker arm (1) and lifters (3).
5. Remove the intake manifold. Refer to **MANIFOLD, INTAKE, REMOVAL** .
6. Remove the exhaust manifold. Refer to **MANIFOLD, EXHAUST, REMOVAL** .
7. Remove the EGR cooler manifold assembly. Refer to **COOLER, EGR, REMOVAL** .

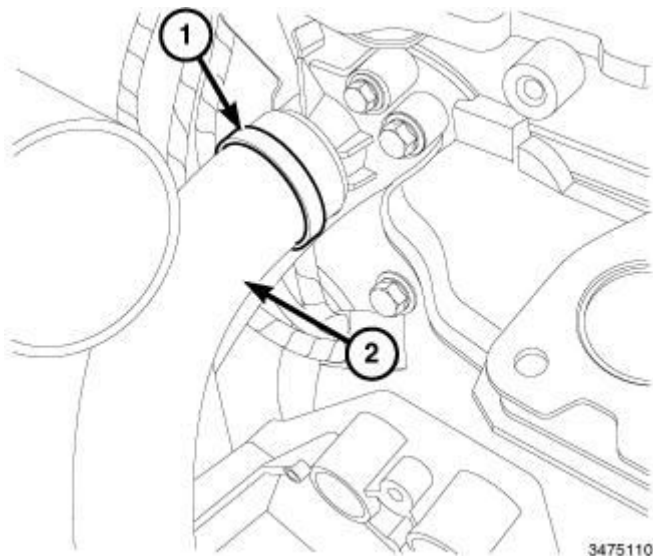


Fig. 74: Upper Radiator Hose & Clamp
Courtesy of CHRYSLER GROUP, LLC

8. Using the (special tool #10288, Pliers, Hose Clamp) to release clamp (1) and remove the upper radiator hose (2) at engine.

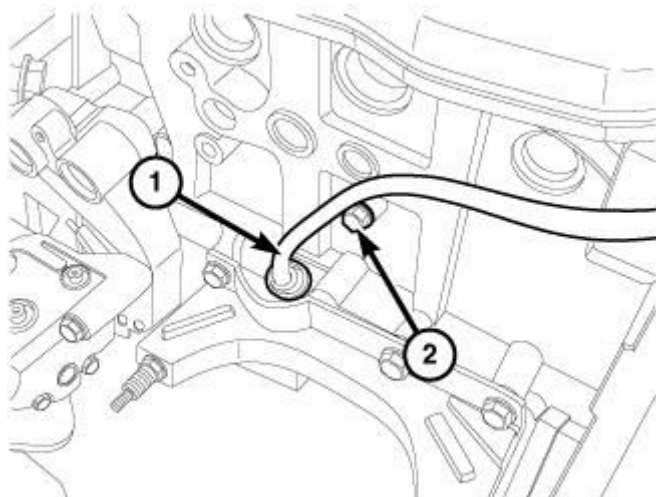


Fig. 75: Engine Oil Dipstick Tube & Bolt
Courtesy of CHRYSLER GROUP, LLC

9. Remove bolt (2) and the engine oil dipstick tube (1).

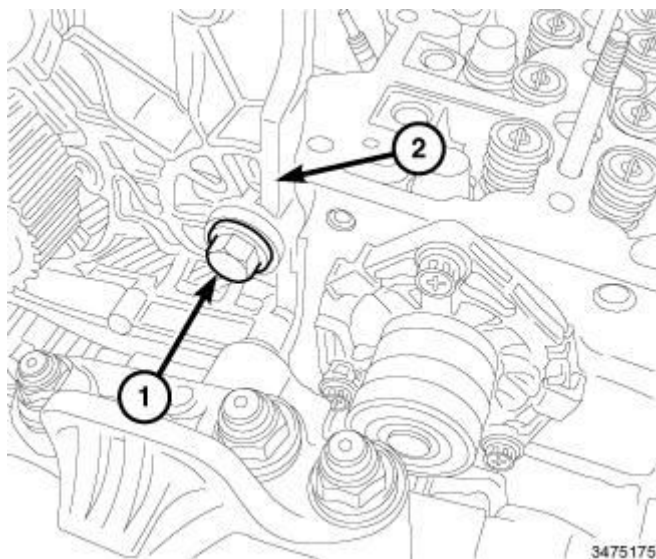


Fig. 76: Fuel Injection Pump Mounting Bracket & Bolt
Courtesy of CHRYSLER GROUP, LLC

10. Remove bolt (1) and the fuel injection pump mounting bracket (2) from the cylinder head.
11. Remove power steering pump and support bracket.

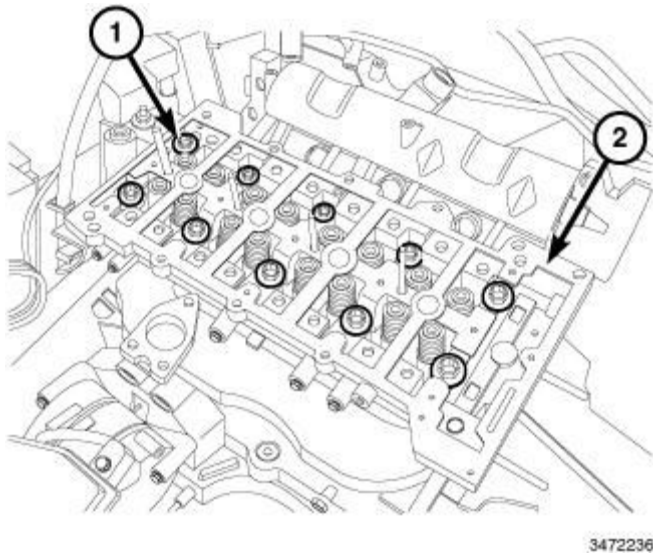


Fig. 77: Cylinder Head Assembly & Bolts
Courtesy of CHRYSLER GROUP, LLC

12. Remove bolts (1) and the cylinder head assembly (2).

CLEANING

CLEANING

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Remove all gasket material from cylinder head and block. Refer to ENGINE - STANDARD PROCEDURE . Be careful not to gouge or scratch the aluminum head sealing surface.

Clean all engine oil passages.

INSPECTION

INSPECTION

NOTE: Cylinder head cannot be resurfaced.

NOTE: Replacement cylinder heads will come complete with valves, seals, springs, retainers, keepers.

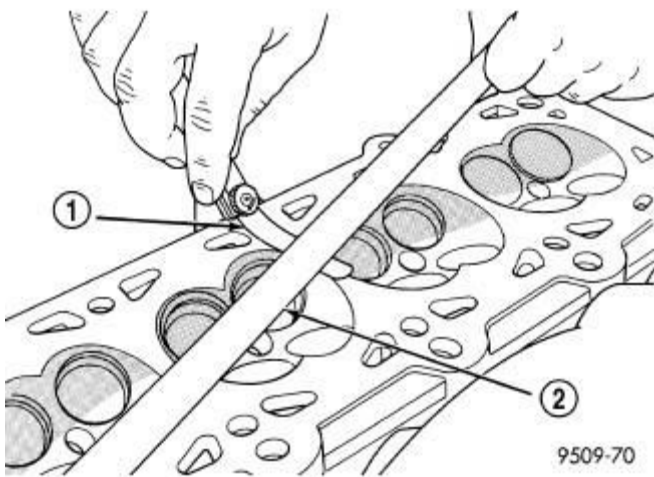


Fig. 78: Checking Cylinder Head Flatness
Courtesy of CHRYSLER GROUP, LLC

- 1 - FEELER GAUGE
2 - STRAIGHT EDGE

1. Cylinder head must be flat within 0.1 mm (0.004 in.).

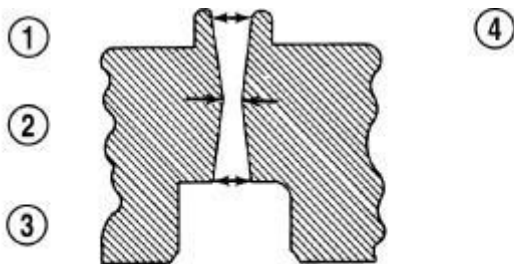


Fig. 79: Checking Wear on Valve Guide-Typical
Courtesy of CHRYSLER GROUP, LLC

- 1 - TOP
2 - MIDDLE
3 - BOTTOM
4 - CUT AWAY VIEW OF VALVE GUIDE MEASUREMENT LOCATIONS

2. Inspect camshaft bearing journals for scoring.
3. Remove carbon and varnish deposits from inside of valve guides with a reliable guide cleaner.
4. Using a small hole gauge and a micrometer, measure valve guides in 3 places top (1), middle (2), and bottom (3). Replace guides if they are not within specification. Refer to **SPECIFICATIONS - 2.0L DIESEL ENGINE**.
5. Check valve guide height.

6. Prior to installing cylinder head, the cylinder block should be checked for flatness.

INSTALLATION

INSTALLATION

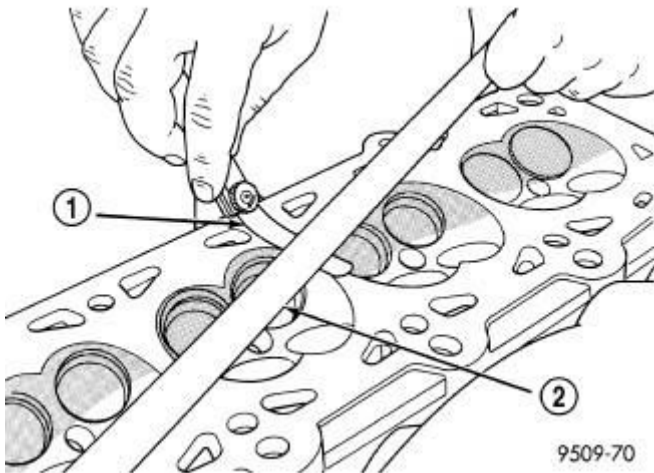


Fig. 80: Checking Cylinder Head Flatness
Courtesy of CHRYSLER GROUP, LLC

NOTE: If piston or connecting rods have been replaced, measure piston projection to ensure proper head gasket selection. Refer to **ENGINE BLOCK - STANDARD PROCEDURE**.

1. Clean the old gasket from the cylinder head and engine block. Refer to **ENGINE - STANDARD PROCEDURE**.
2. Check that the flatness of the cylinder head lower surface corresponds to the recommended values.

Cylinder Head	Value
Engine cylinder head lower surface flatness	0.1 mm (0.004 in.)
Cylinder head nominal height	107 +/- 0.05

NOTE: The locating dowel pins between the engine block and cylinder head are shorter (12.5 mm) than the dowel pins between the cylinder head and the camshaft housing. Take great care not to reverse them as this could impair engine operation.

3. If removed, install the engine block dowel pins.
4. Use a new gasket that is the same thickness as the one removed. If this is not the case, the thickness of the new cylinder head gasket must be determined by checking piston protrusion. Refer to **ENGINE BLOCK - STANDARD PROCEDURE**.

5. Position the first cylinder at TDC; rotate the crankshaft a further two teeth of the toothed drive pulley to lower the pistons, thereby preventing any resistance of the valves while fitting the cylinder head.

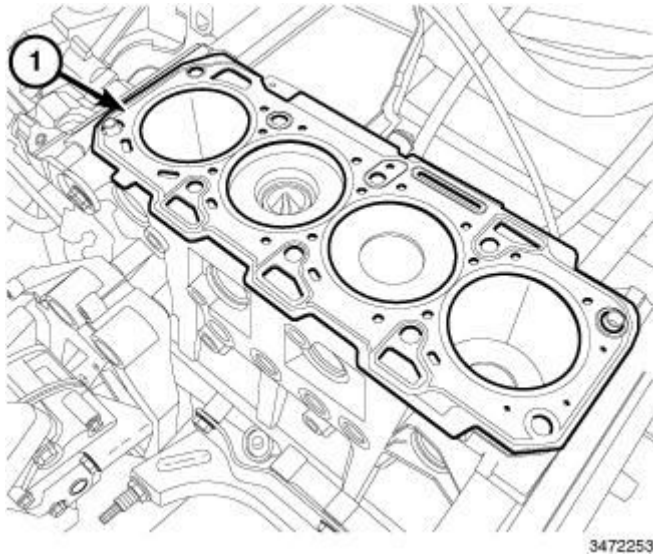


Fig. 81: Cylinder Head Gasket
Courtesy of CHRYSLER GROUP, LLC

6. Install the cylinder head assembly (1).

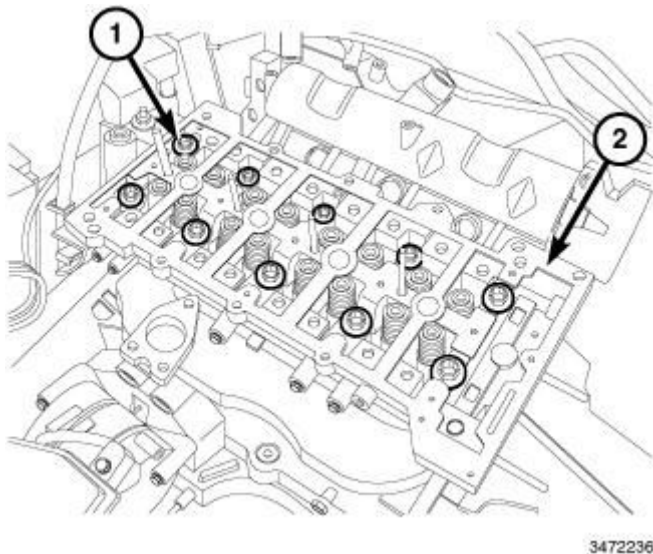


Fig. 82: Cylinder Head Assembly & Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not reuse the cylinder head bolts more than four times because they undergo permanent lengthening whenever they are tightened. If the previous tightening torque is unknown, a replacement is necessary.

7. Install the cylinder head (2) onto the engine block and tighten the bolts (1) finger tight.

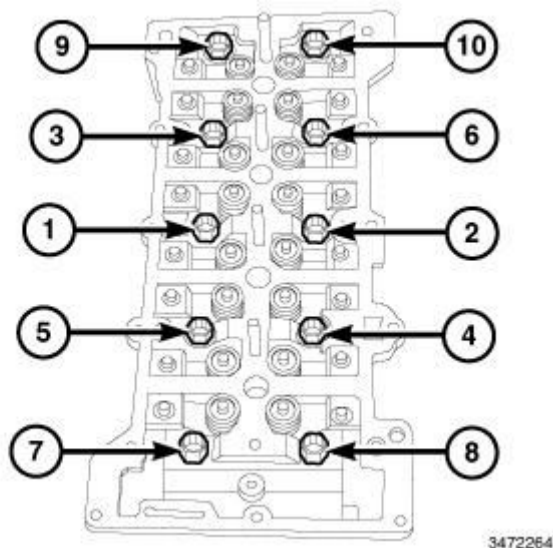


Fig. 83: Cylinder Head Bolt Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

8. Tighten the cylinder head bolts in the following order shown in illustration to:
 - a. Tighten bolts to 62 N.m (46 ft. lbs.).
 - b. Tighten bolts to 69 N.m (51 ft. lbs.).
 - c. Tighten bolts an additional 90° turn.
 - d. Tighten bolts an additional 90° turn.
 - e. Tighten bolts an additional 90° turn.

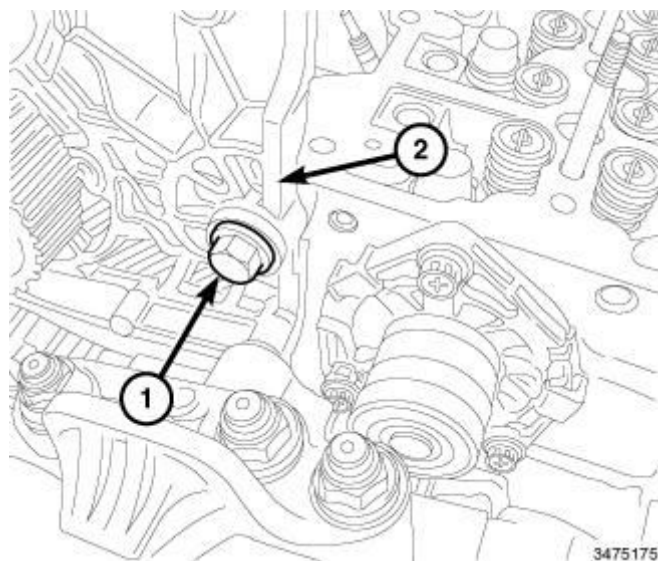


Fig. 84: Fuel Injection Pump Mounting Bracket & Bolt
Courtesy of CHRYSLER GROUP, LLC

9. Install the power steering pump support bracket. Tighten bolts to 30 N.m (22 ft. lbs.).
10. Install the fuel injection pump and mounting bracket (2) to the cylinder head. Tighten bolt (1) to 25 N.m (18 ft. lbs.).

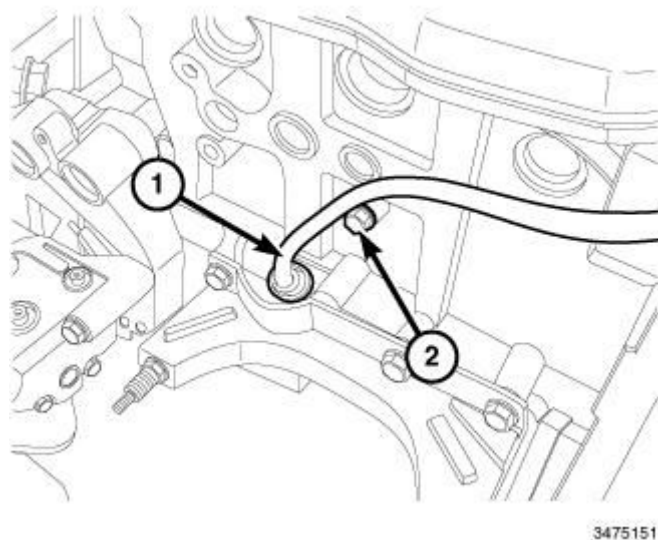


Fig. 85: Engine Oil Dipstick Tube & Bolt
Courtesy of CHRYSLER GROUP, LLC

11. Install the oil dipstick tube (1). Tighten bolt (2) to 9 N.m (80 in. lbs.).

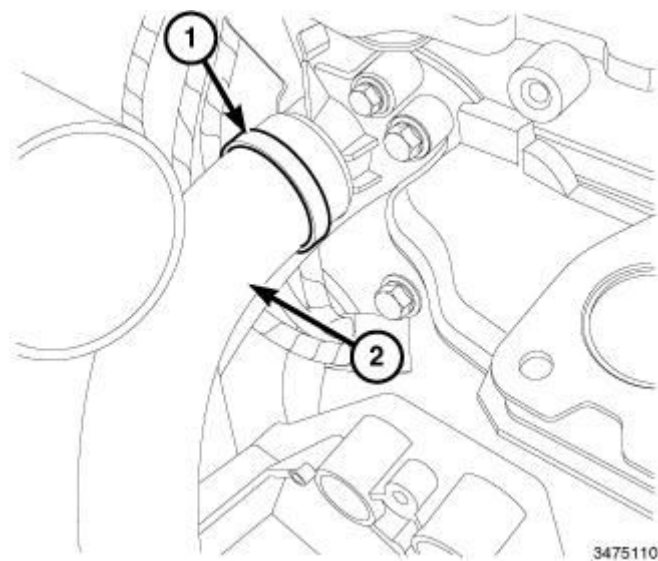


Fig. 86: Upper Radiator Hose & Clamp
Courtesy of CHRYSLER GROUP, LLC

12. Install the upper radiator (2) hose at engine. Using the (special tool #10288, Pliers, Hose Clamp) lock the clamp (1).
13. Install the EGR cooler manifold. Refer to **COOLER, EGR, INSTALLATION** .

14. Install exhaust manifold. Refer to **MANIFOLD, EXHAUST, INSTALLATION** .
15. Install intake manifold. Refer to **MANIFOLD, INTAKE, INSTALLATION** .

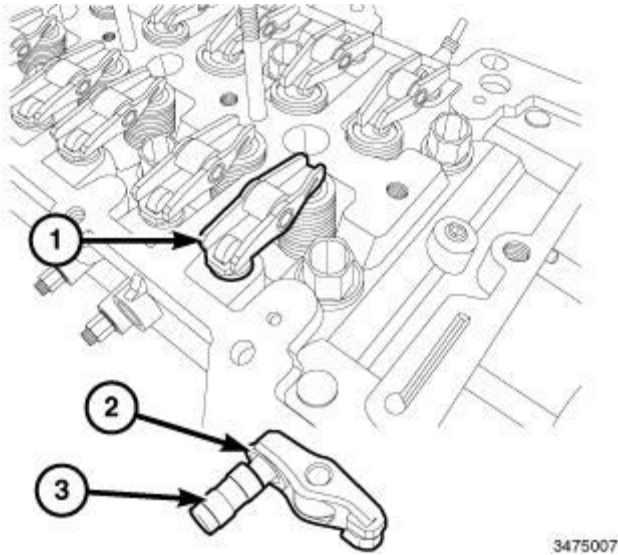


Fig. 87: Rocker Arm, Retaining Clip & Lifter
Courtesy of CHRYSLER GROUP, LLC

NOTE: **Install the lifters and rocker arm into the original location as noted from removal.**

16. Install all the lifters (3) and rocker arms (1) back into their original location.
17. Install the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, INSTALLATION** .
18. Fill the cooling system. Refer to **STANDARD PROCEDURE** .
19. Install new oil filter and fill with oil. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** .
20. Install air cleaner body. Refer to **BODY, AIR CLEANER, INSTALLATION** .
21. Connect the negative battery cable.
22. Start engine and check for leaks.

CAMSHAFT, ENGINE

DESCRIPTION

DESCRIPTION

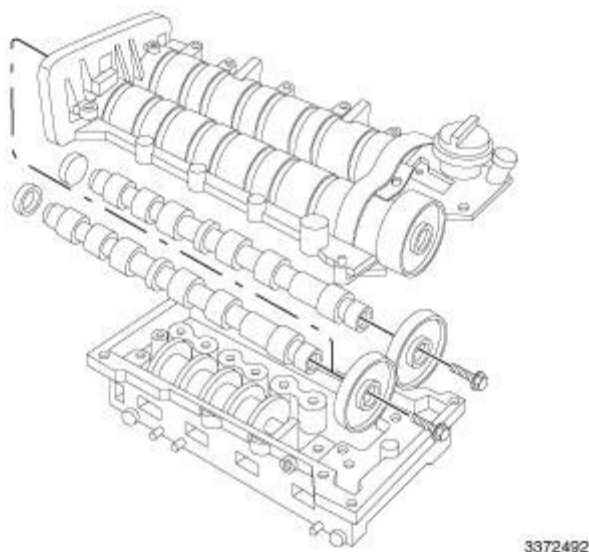


Fig. 88: Camshaft Assembly
Courtesy of CHRYSLER GROUP, LLC

The exhaust camshaft is controlled directly by the timing belt and transmits power to the inlet camshaft by means of a pair of straight toothed gears.

The exhaust camshaft also controls the vacuum unit fitted on the gears side.

REMOVAL

REMOVAL

1. Disconnect the negative battery cable.
2. Remove the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, REMOVAL** .

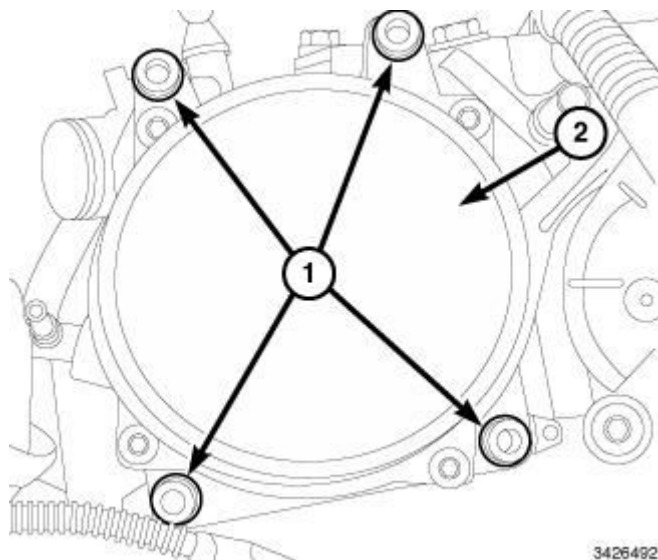


Fig. 89: Vacuum Pump & Bolts

Courtesy of CHRYSLER GROUP, LLC

3. Remove bolts (1) and the vacuum pump (2).

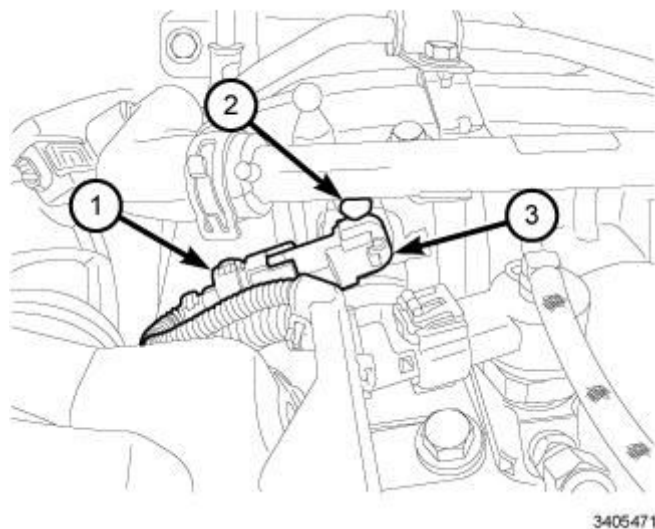


Fig. 90: Camshaft Position Sensor, Connector & Bolt
Courtesy of CHRYSLER GROUP, LLC

4. Remove bolt (2) and the camshaft position sensor (3).

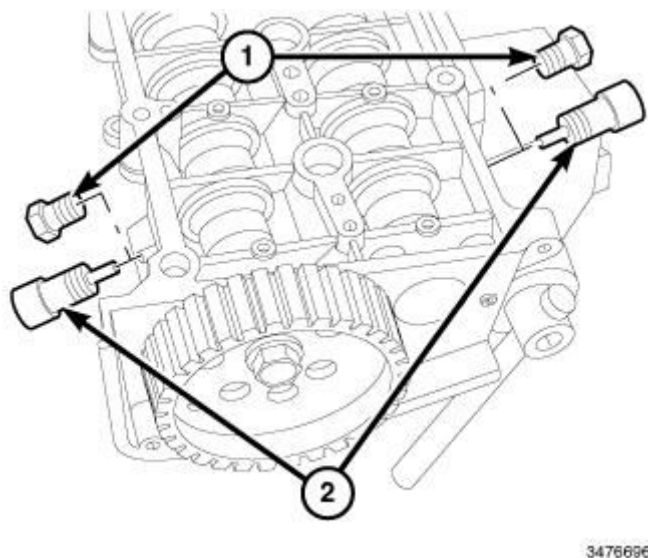
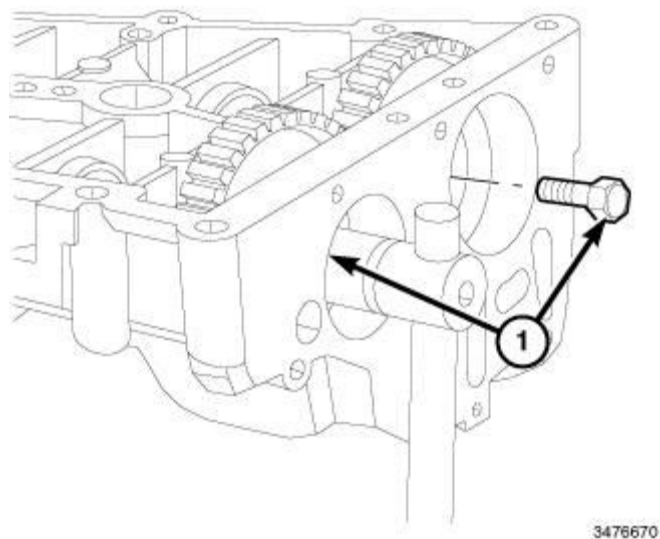


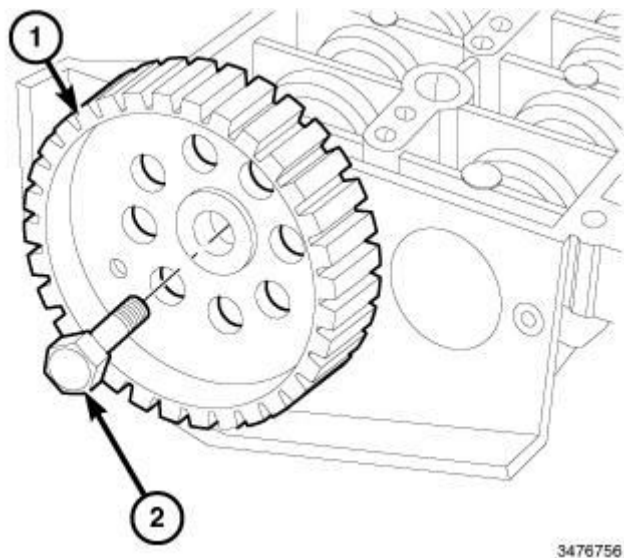
Fig. 91: Plugs & Camshaft Timing Tools
Courtesy of CHRYSLER GROUP, LLC

5. Remove plugs (1) and install the Camshaft Timing Tools (2) (special tool #20132, Tool, Timing Belt Locking) into the camshaft housing.

**Fig. 92: Camshaft Gear Bolts**

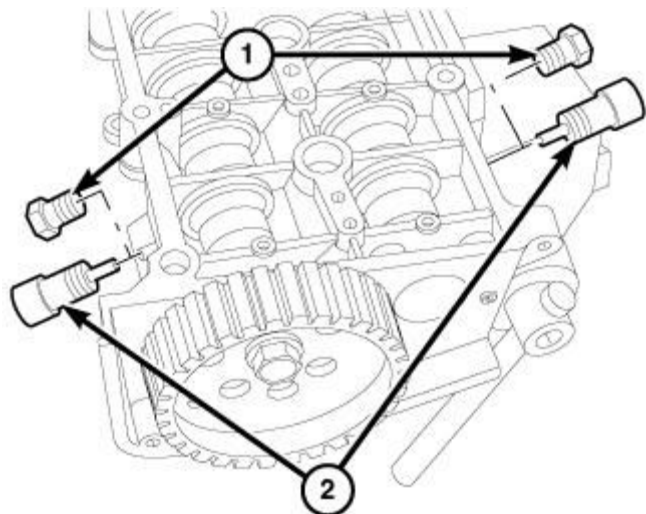
Courtesy of CHRYSLER GROUP, LLC

6. Remove the bolts (1) securing the camshaft gears.

**Fig. 93: Camshaft Timing Belt Sprocket & Bolt**

Courtesy of CHRYSLER GROUP, LLC

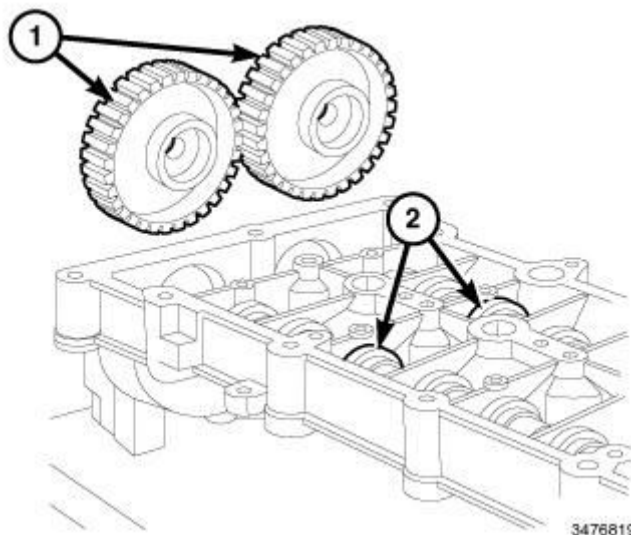
7. Using the Counter Torque Tool (3) (special tool #6847, Holder, Camshaft Sprocket) and Pins (2) (special tool #20127, Pins, Camshaft Pulley Remover/Installer) to hold camshaft sprocket (1) remove bolt (2) and the camshaft timing belt sprocket (1).



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Fig. 94: Plugs & Camshaft Timing Tools
Courtesy of CHRYSLER GROUP, LLC

8. Remove the Camshaft Timing Tools (2) (special tool #20132, Tool, Timing Belt Locking).



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Fig. 95: Camshaft Gears & Camshafts
Courtesy of CHRYSLER GROUP, LLC

9. Withdraw the camshafts (2) as far as necessary and remove the camshaft gears (1).

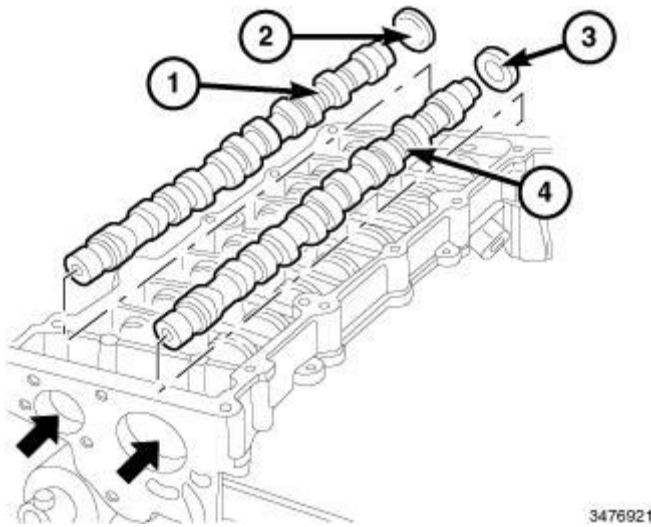


Fig. 96: Intake Camshaft, Plug, Exhaust Camshaft & Oil Seal
Courtesy of CHRYSLER GROUP, LLC

10. Using a suitable drift, extract the intake camshaft (1) and plug (2).
11. Using a suitable drift, extract the exhaust camshaft (4) and the oil seal (3).

INSTALLATION

INSTALLATION

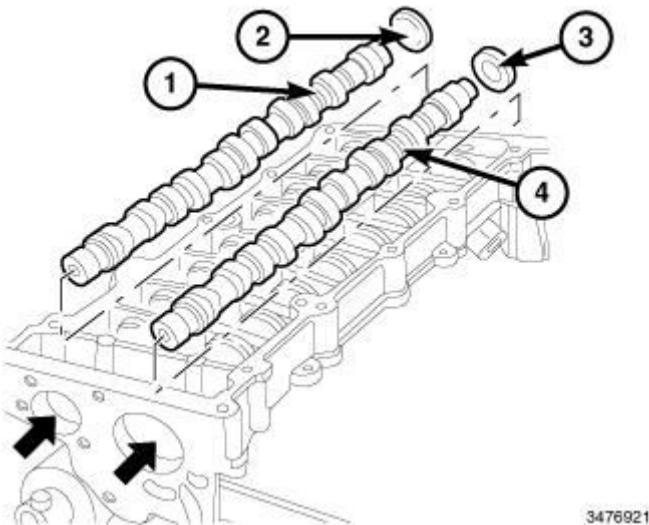


Fig. 97: Intake Camshaft, Plug, Exhaust Camshaft & Oil Seal
Courtesy of CHRYSLER GROUP, LLC

1. Lubricate the camshaft bearings with clean engine oil.
2. Install the camshafts (1 and 4) in their housings.

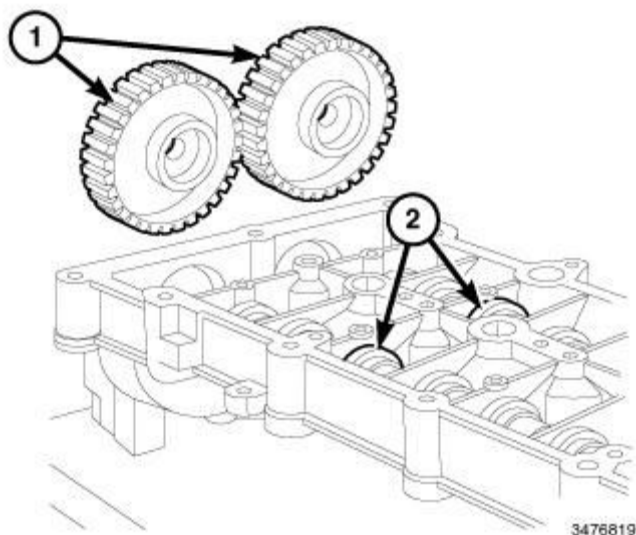


Fig. 98: Camshaft Gears & Camshafts
Courtesy of CHRYSLER GROUP, LLC

3. Install the camshaft gears (1) in their housings and secure them without tightening the bolts.

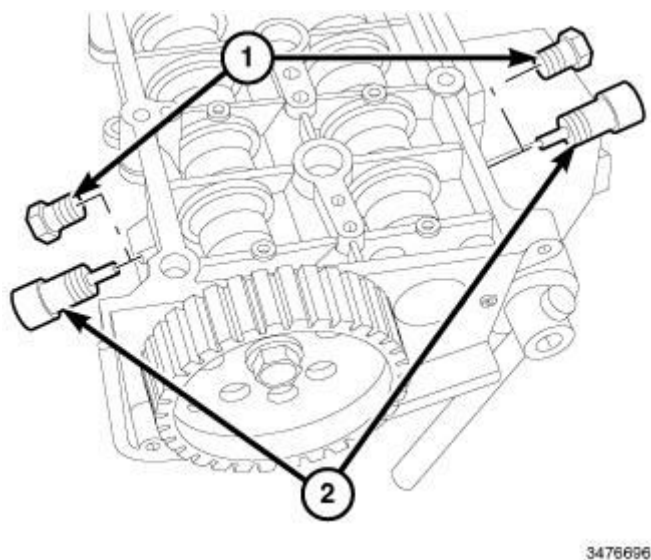


Fig. 99: Plugs & Camshaft Timing Tools
Courtesy of CHRYSLER GROUP, LLC

NOTE: Check that the tools are correctly fitted in the housings in the camshafts.

4. Install the Camshaft Timing Shaft Tools (2) (special tool #20132, Tool, Timing Belt Locking) into the camshaft housing.

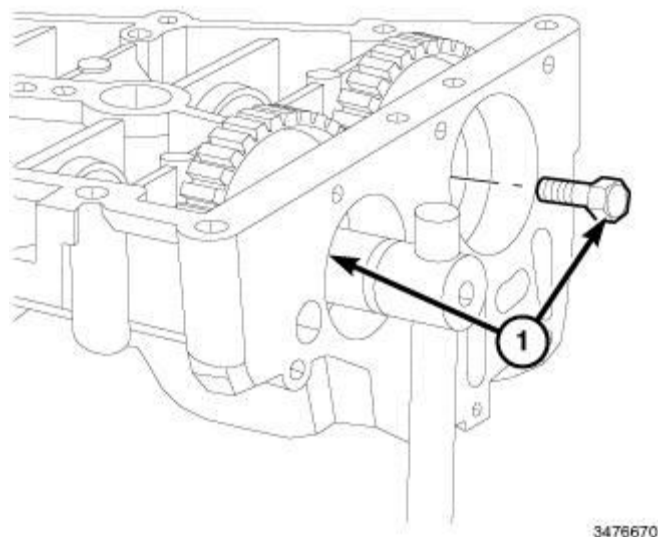


Fig. 100: Camshaft Gear Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Tighten the camshaft gear bolts to 30 N.m (22 ft. lbs.) plus an additional 40° turn.

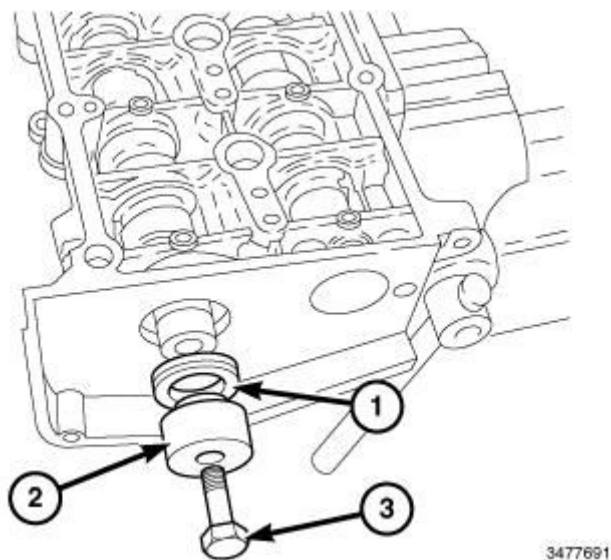
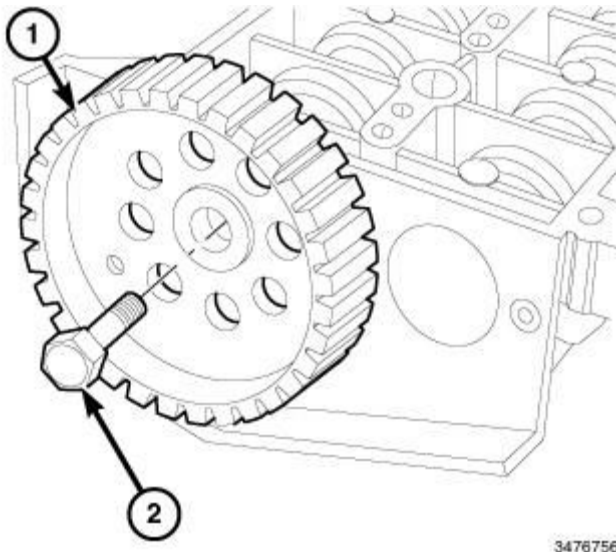


Fig. 101: Camshaft Oil Seal, Fitting Tool & Bolt
Courtesy of CHRYSLER GROUP, LLC

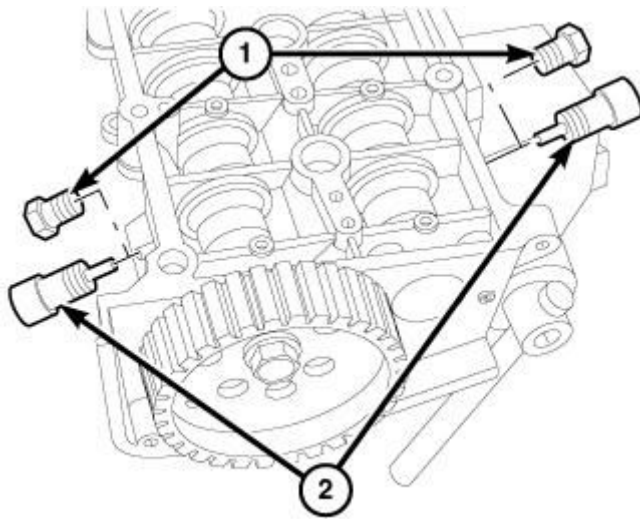
6. Using the Fitting Tool (2) (special tool #20131, Installer, Camshaft Oil Seal) position new camshaft seal (1) onto Fitting Tool (2) and install the camshaft oil seal (1) by drawing in the seal using the bolt (3).
7. Remove the Fitting Tool (2).



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Fig. 102: Camshaft Timing Belt Sprocket & Bolt
Courtesy of CHRYSLER GROUP, LLC

8. Install the camshaft sprocket (1) and tighten bolt finger tight (2).
9. Using the Counter Torque Tool (3) (special tool #6847, Holder, Camshaft Sprocket) and Pins (2) (special tool #20127, Pins, Camshaft Pulley Remover/Installer) to hold camshaft sprocket (1) and tighten the bolt (4) to 30 N.m (22 ft. lbs.) plus an additional 40° turn.



3476696

Fig. 103: Plugs & Camshaft Timing Tools
Courtesy of CHRYSLER GROUP, LLC

10. Install the inlet side camshaft plug (1).
11. Place the exhaust side camshaft timing belt sprocket in its housing and secure it without tightening the bolt.
12. Remove the Camshaft Timing Shaft Tools (2) (special tool #20132, Tool, Timing Belt Locking).

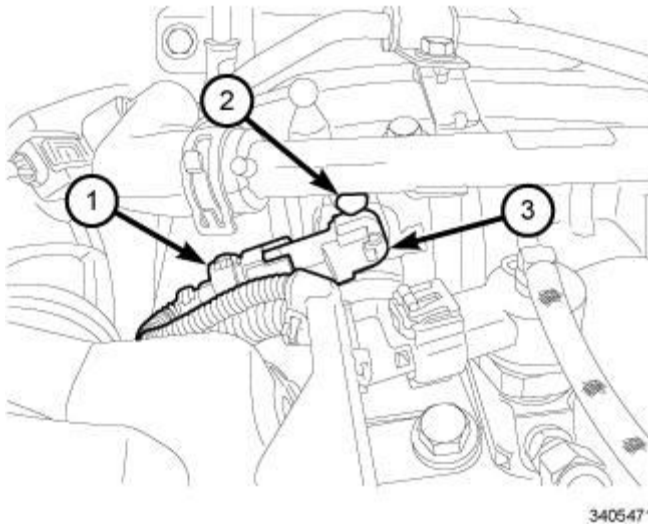


Fig. 104: Camshaft Position Sensor, Connector & Bolt
 Courtesy of CHRYSLER GROUP, LLC

13. Install the camshaft position sensor (3). Tightening bolt (2) to 9 N.m (80 in. lbs.).

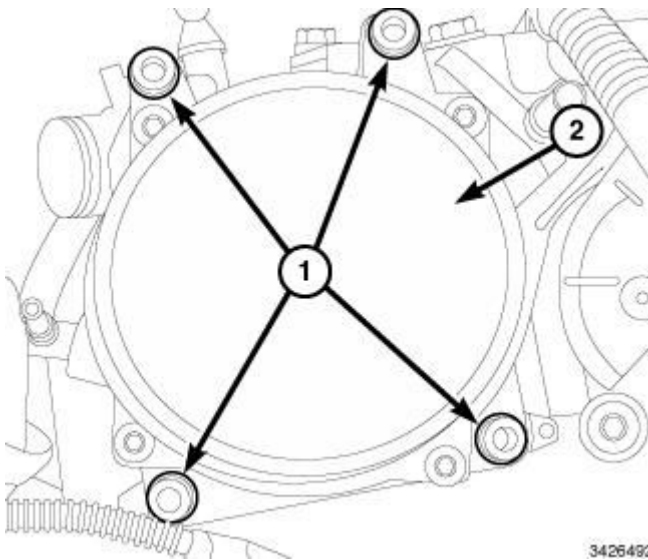


Fig. 105: Vacuum Pump & Bolts
 Courtesy of CHRYSLER GROUP, LLC

14. Using a new gasket, position driver gear on rear of pump and install vacuum pump (2). Tighten bolts (1) to 18 N.m (159 in. lbs.).
15. Using a new gasket, install the engine oil filler. Tighten the bolts to 8 N.m 71 in. lbs.).
16. Install the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, INSTALLATION** .
17. Connect negative battery cable.

COVER(S), CYLINDER HEAD

REMOVAL

REMOVAL

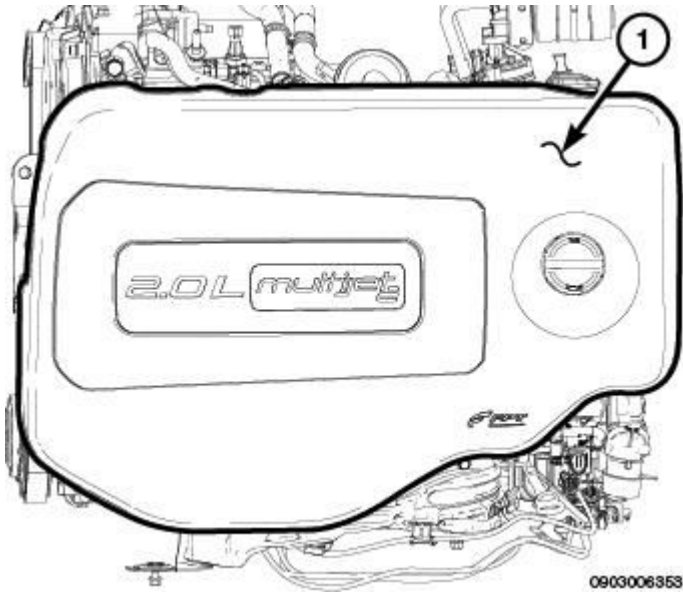


Fig. 106: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

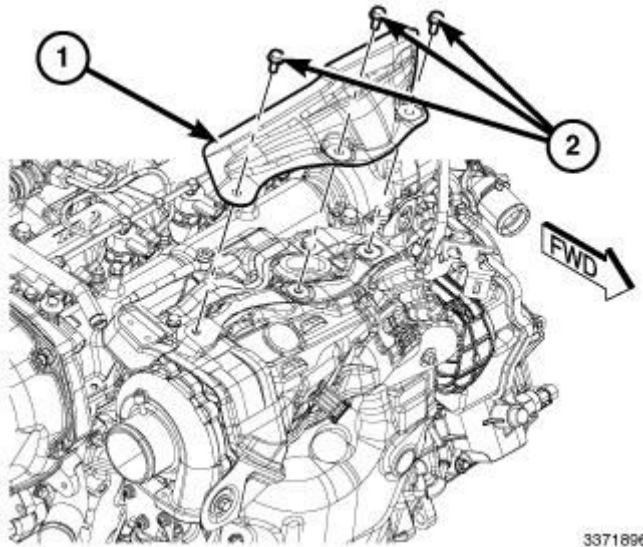


Fig. 107: Upper Turbocharger Heat Shield & Mid Upper Turbocharger Heat Shield

Courtesy of CHRYSLER GROUP, LLC

3. Remove the upper turbocharger heat shield (1).

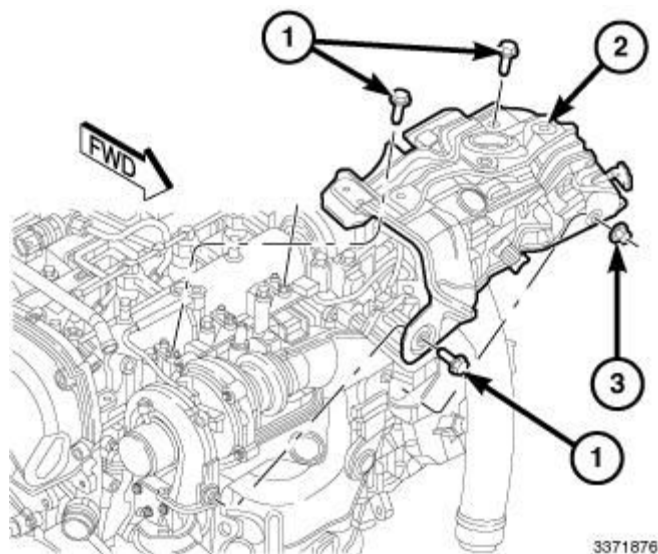


Fig. 108: Turbocharger Heat Shield & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Remove the bolts (1), the nut (3), and the turbocharger heat shield (2).

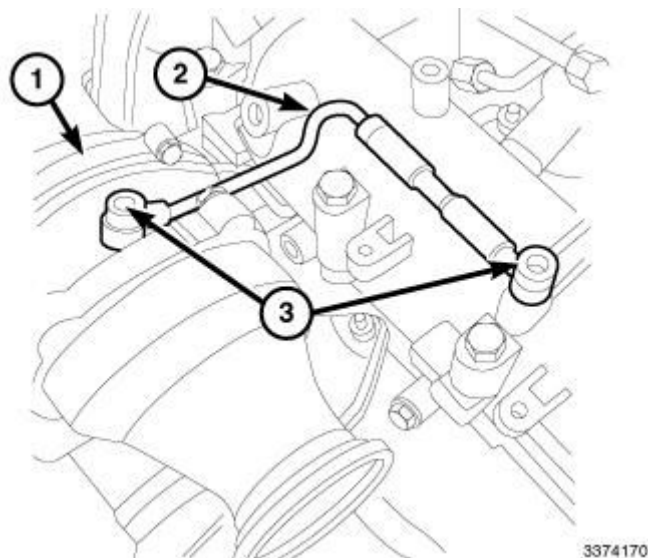
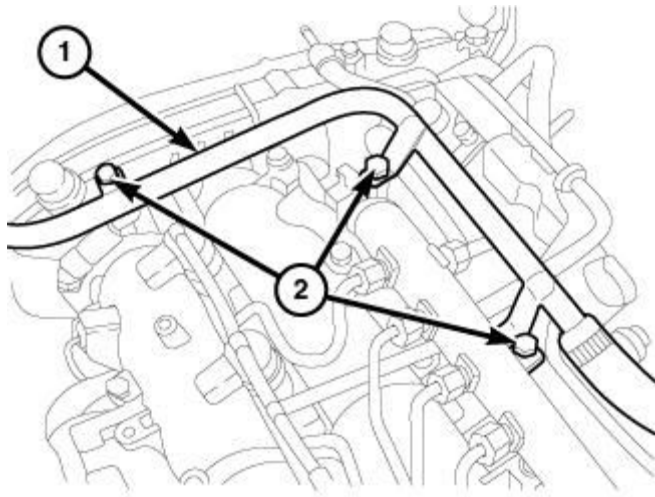


Fig. 109: Turbocharger, Oil Feed Line & Banjo Bolts
Courtesy of CHRYSLER GROUP, LLC

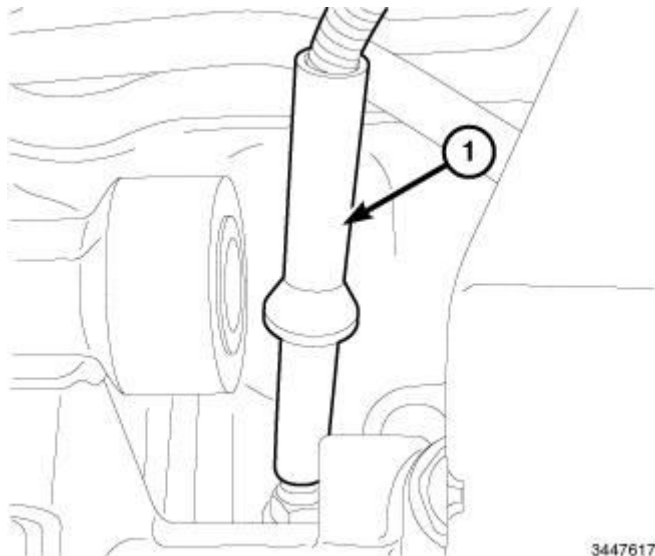
5. Remove Banjo bolts (3) and the engine oil feed line (2) to the turbocharger (3).
6. Remove the timing belt. Refer to **BELT, TIMING, REMOVAL**.



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Fig. 110: Oil Vapor Recovery Pipe & Bolts
Courtesy of CHRYSLER GROUP, LLC

7. Using the (special tool #10288, Pliers, Hose Clamp) loosen band clamp and disconnect hose from vapor recovery pipe.
8. Remove bolts (2) securing the engine oil vapor recovery pipe (1) to the camshaft housing.
9. Remove the screws securing the engine oil recovery pipe to the air chamber.



3447617

Fig. 111: Glow Plug Harness Connector
Courtesy of CHRYSLER GROUP, LLC

10. Disconnect the glow plug wire harness connector (1) from each glow plug.
11. Remove the bolts, and release the degassing pipe retaining clip and remove the intake chamber reinforcement bracket.

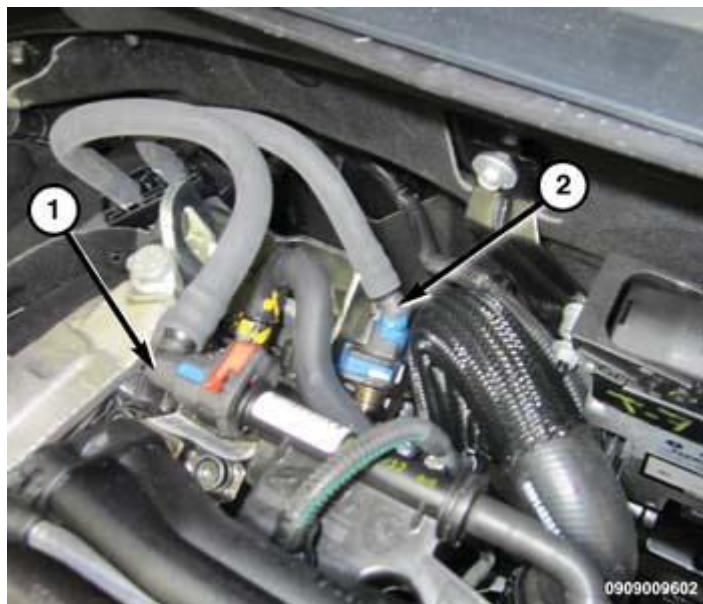


Fig. 112: Fuel Supply & Return Line Quick-Connect Fittings
Courtesy of CHRYSLER GROUP, LLC

12. Disconnect the fuel supply (2) line quick-connect fittings at fuel injection pump. Refer to **FITTING, QUICK CONNECT**.
13. Disconnect the fuel return line (1) near the fuel injection pump.
14. Detach the fuel line routing clips.
15. Remove the fuel injectors. Refer to **INJECTOR(S), FUEL, REMOVAL**.

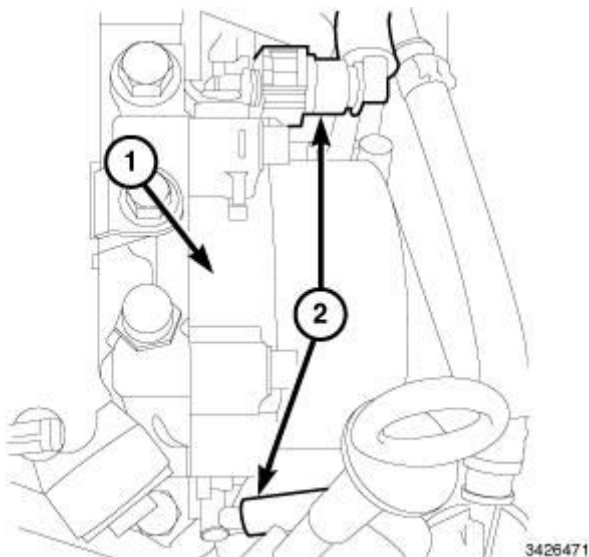


Fig. 113: Vacuum Pump & Vacuum Lines
Courtesy of CHRYSLER GROUP, LLC

16. Remove the vacuum lines (2) at vacuum pump (1).

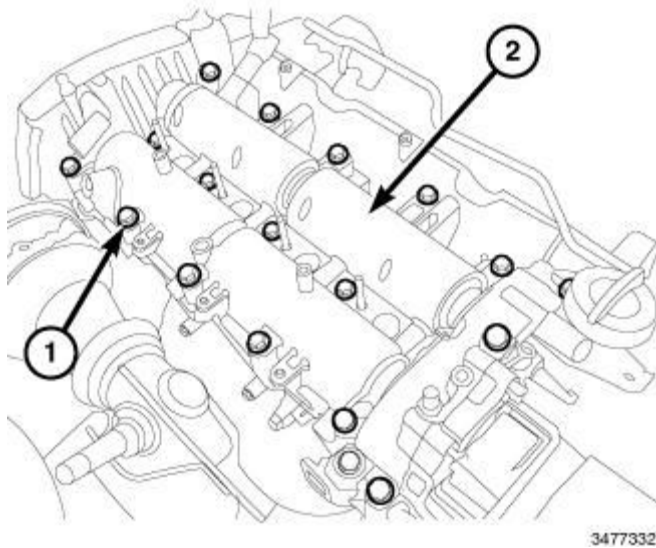


Fig. 114: Cylinder Head Cover & Bolts
Courtesy of CHRYSLER GROUP, LLC

17. Remove the bolts (1) and the cylinder head cover (2).
18. Remove and discard the gasket.

INSTALLATION

INSTALLATION

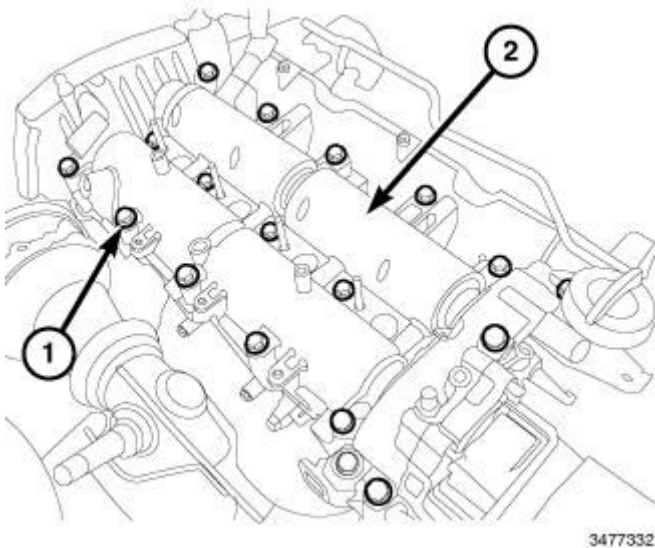


Fig. 115: Cylinder Head Cover & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Clean sealing surfaces. Refer to **ENGINE - STANDARD PROCEDURE**.
2. Install new cylinder head cover gasket.

3. Install cylinder head cover (2). Tighten bolts (1) to 25 N.m (18 ft. lbs.).

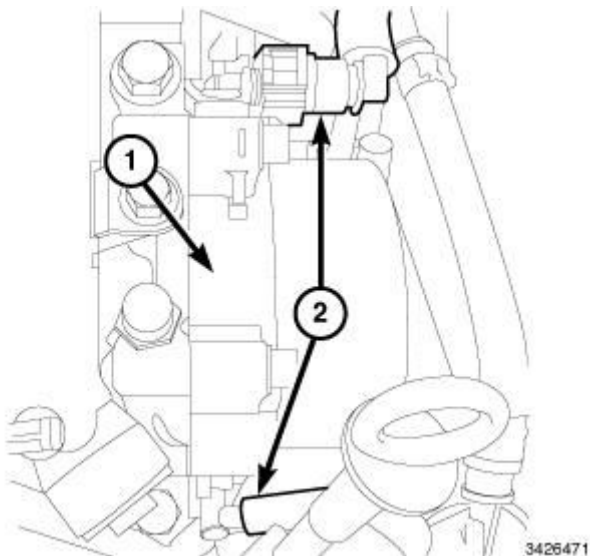


Fig. 116: Vacuum Pump & Vacuum Lines
Courtesy of CHRYSLER GROUP, LLC

4. Install the vacuum lines (2) to the vacuum pump (1).

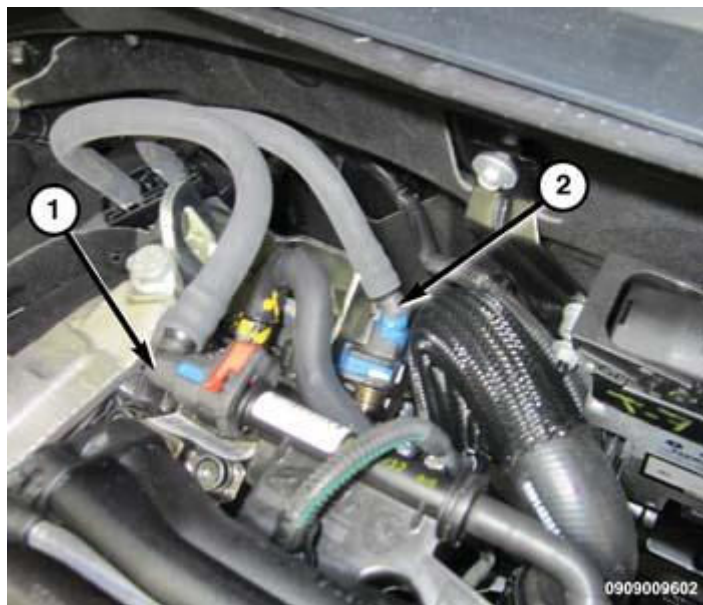


Fig. 117: Fuel Supply & Return Line Quick-Connect Fittings
Courtesy of CHRYSLER GROUP, LLC

5. Install the fuel injectors. Refer to **INJECTOR(S), FUEL, INSTALLATION**.
6. Attach the fuel line routing clips.
7. Connect the fuel return line (1) near the fuel injection pump.

8. Connect the fuel supply (2) line quick-connect fittings at fuel injection pump.

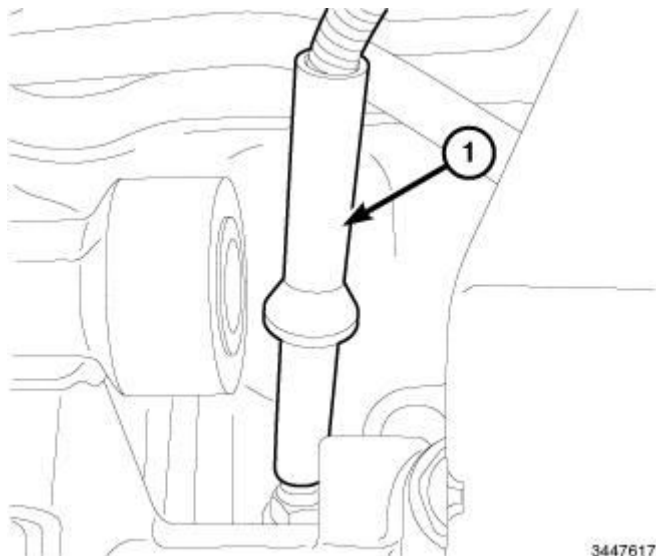


Fig. 118: Glow Plug Harness Connector
Courtesy of CHRYSLER GROUP, LLC

9. Install the intake chamber reinforcement bracket and the degassing pipe retaining clip and securely tighten bolt.
10. Disconnect the glow plug wire harness connector (1) from each glow plug.

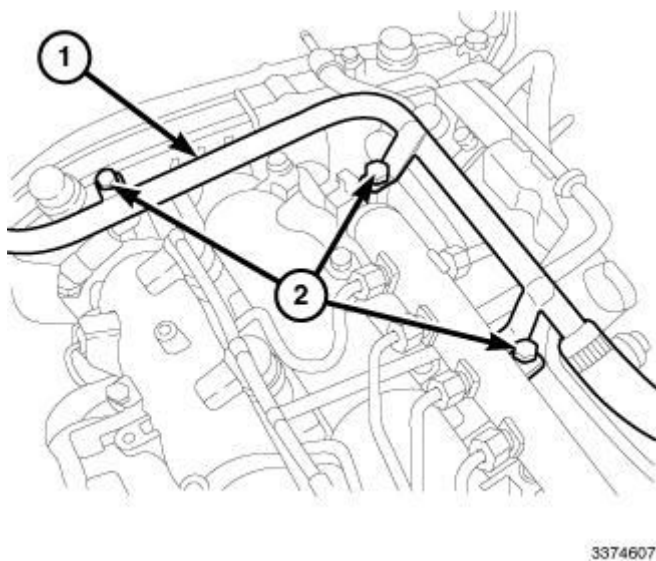


Fig. 119: Oil Vapor Recovery Pipe & Bolts
Courtesy of CHRYSLER GROUP, LLC

11. Install the screws securing the engine oil recovery pipe to the air chamber and securely tighten.
12. Install the bolts (2) securing the engine oil vapor recovery pipe (1) to the camshaft housing.
13. Connect the hose to the vapor recovery pipe

14. Using the (special tool #10288, Pliers, Hose Clamp) to crimp band clamp.

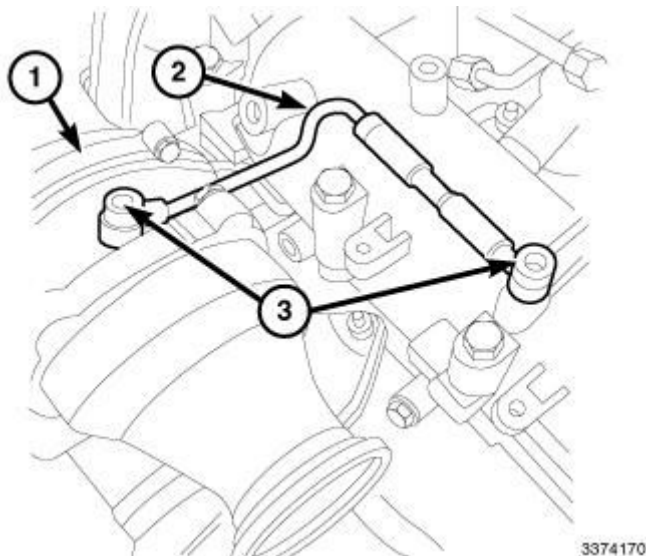


Fig. 120: Turbocharger, Oil Feed Line & Banjo Bolts
Courtesy of CHRYSLER GROUP, LLC

15. Install the timing belt. Refer to **BELT, TIMING, INSTALLATION**.
16. Install the engine oil feed line (2) to the turbocharger (3). Tighten the Banjo bolts (3) to 18 N.m (159 in. lbs.).

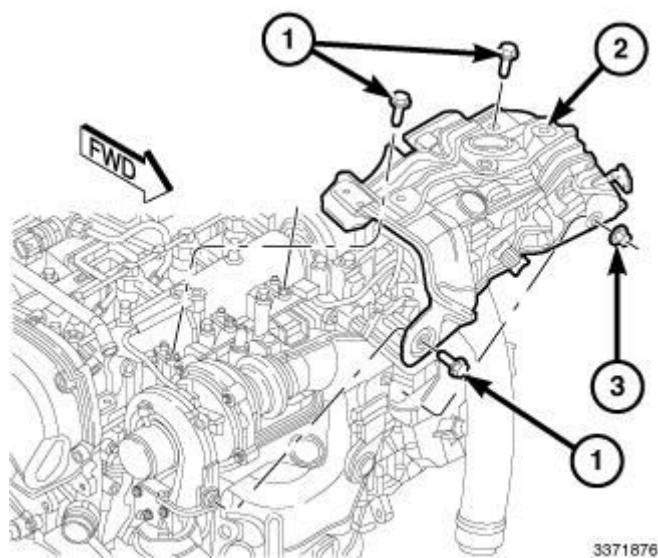


Fig. 121: Turbocharger Heat Shield & Fasteners
Courtesy of CHRYSLER GROUP, LLC

17. Install the turbo heat shield. Tighten the bolts (1) to 12 N.m (106 in. lbs.) and the nut (3) to 8 N.m (71 in. lbs.).

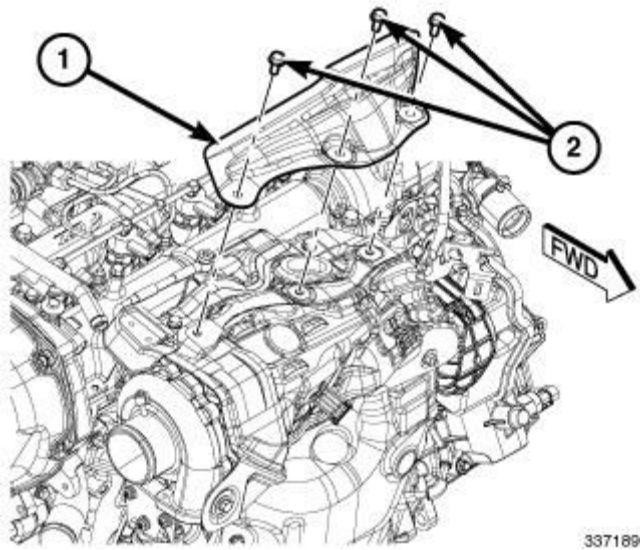


Fig. 122: Upper Turbocharger Heat Shield & Mid Upper Turbocharger Heat Shield
Courtesy of CHRYSLER GROUP, LLC

18. Install the upper turbo heat shield (2) Tighten the bolts (1) to 12 N.m (106 in. lbs.).

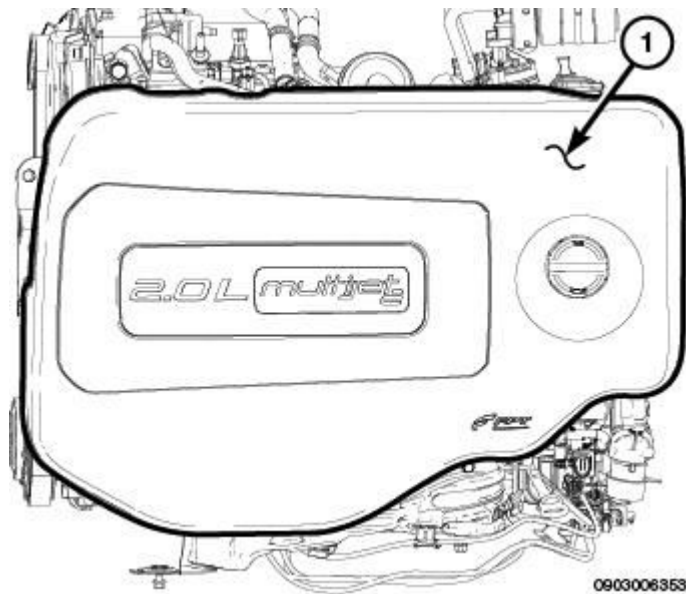


Fig. 123: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

19. Install the engine cover (1).
20. Connect the negative battery cable.

LIFTER(S), HYDRAULIC

REMOVAL

REMOVAL

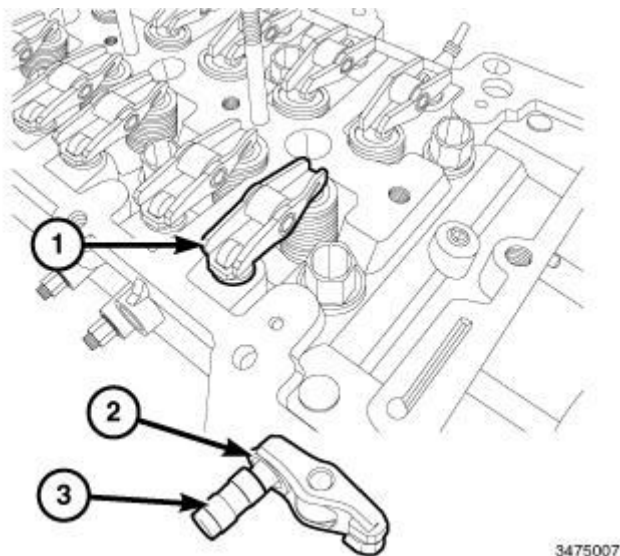


Fig. 124: Rocker Arm, Retaining Clip & Lifter
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the rocker arm and lifter. Refer to **ROCKER ARM, VALVE, REMOVAL** .
3. Remove retaining clip (2) and separate the rocker arm (1) from lifter (3).

INSTALLATION

INSTALLATION

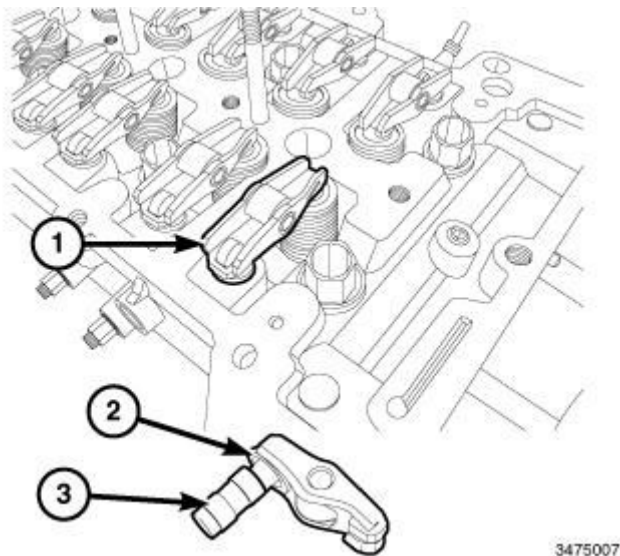


Fig. 125: Rocker Arm, Retaining Clip & Lifter
Courtesy of CHRYSLER GROUP, LLC

1. Assemble the rocker arm (1) to the lifter (3) and install the retaining clip (2).
2. Install the rocker arm and lifter. Refer to **ROCKER ARM, VALVE, INSTALLATION** .
3. Connect the negative battery cable.

ROCKER ARM, VALVE**REMOVAL****REMOVAL**

1. Disconnect the negative battery cable.
2. Remove the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, REMOVAL** .

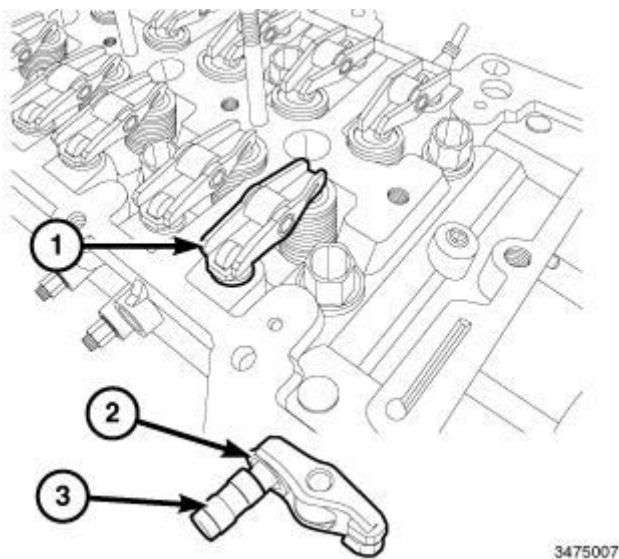
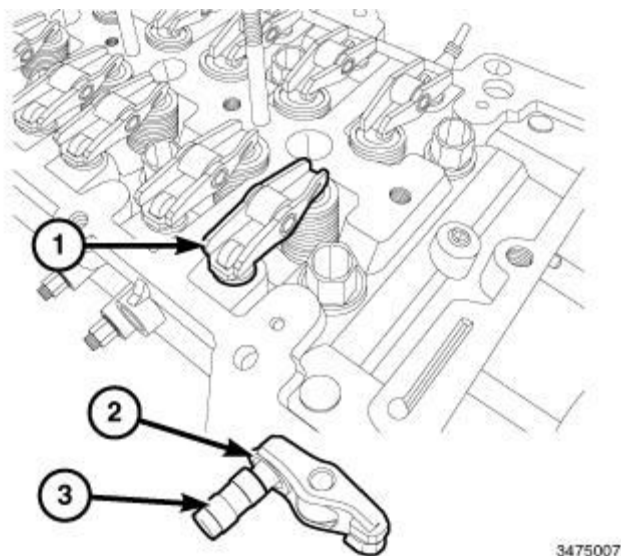


Fig. 126: Rocker Arm, Retaining Clip & Lifter
Courtesy of CHRYSLER GROUP, LLC

NOTE: **Label the order in which the rocker arms were removed.**

3. Remove the rocker arm and lifter assembly (1).

INSTALLATION**INSTALLATION**



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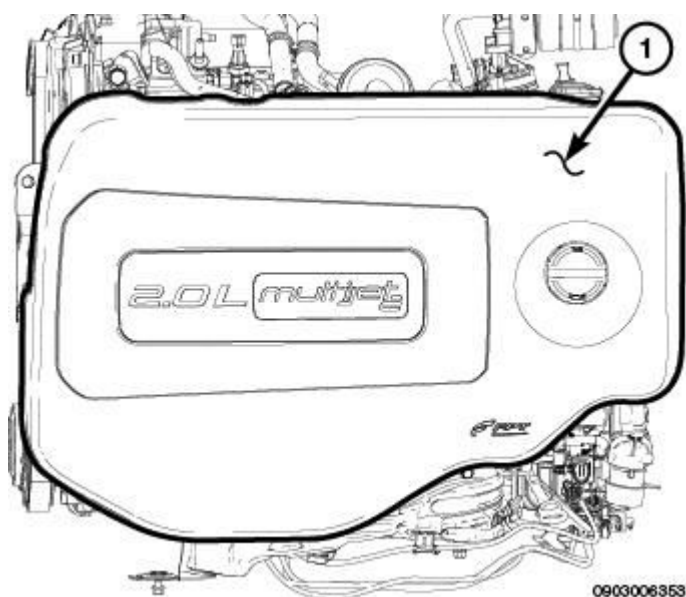
Fig. 127: Rocker Arm, Retaining Clip & Lifter
Courtesy of CHRYSLER GROUP, LLC

1. Install the rocker arm and lifter assembly back to its original location as noted during the removal process.
2. Install the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, INSTALLATION** .
3. Connect the negative battery cable.

SEAL(S), CAMSHAFT

REMOVAL

REMOVAL



0903006353

Fig. 128: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Remove the engine cover (1).
2. Remove the camshaft timing belt sprocket. Refer to **BELT AND SPROCKETS, TIMING, REMOVAL**.

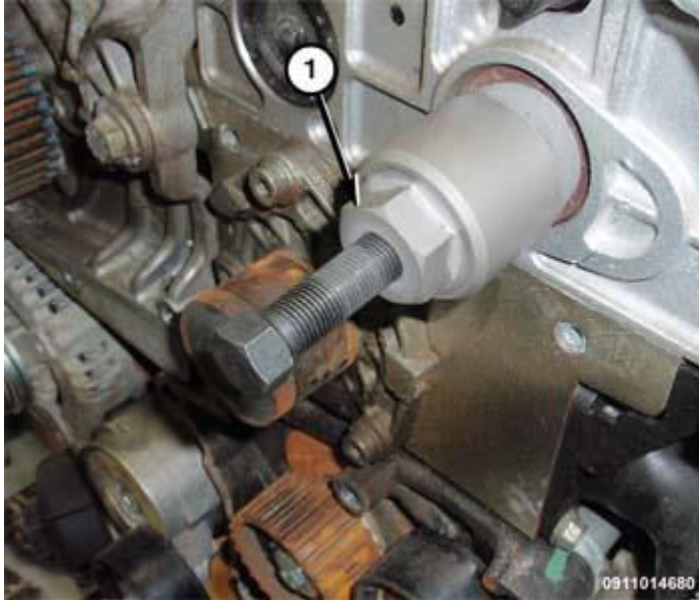


Fig. 129: Seal Remover Tool

Courtesy of CHRYSLER GROUP, LLC

3. Using the (special tool #10498, Remover, Seal) Tool (1), remove the camshaft oil seals.

INSTALLATION

INSTALLATION

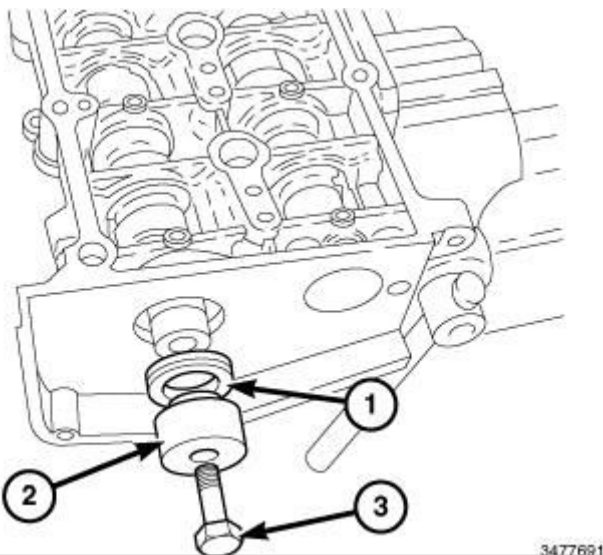


Fig. 130: Camshaft Oil Seal, Fitting Tool & Bolt

Courtesy of CHRYSLER GROUP, LLC

1. Using the Fitting Tool (2) (special tool #20131, Installer, Camshaft Oil Seal), position new camshaft seal (1) onto Fitting Tool (2) and install the camshaft oil seal (1) by drawing in the seal using the bolt (3).
2. Remove the Fitting Tool.
3. Install the camshaft timing belt sprocket. Refer to **BELT AND SPROCKETS, TIMING, INSTALLATION**.

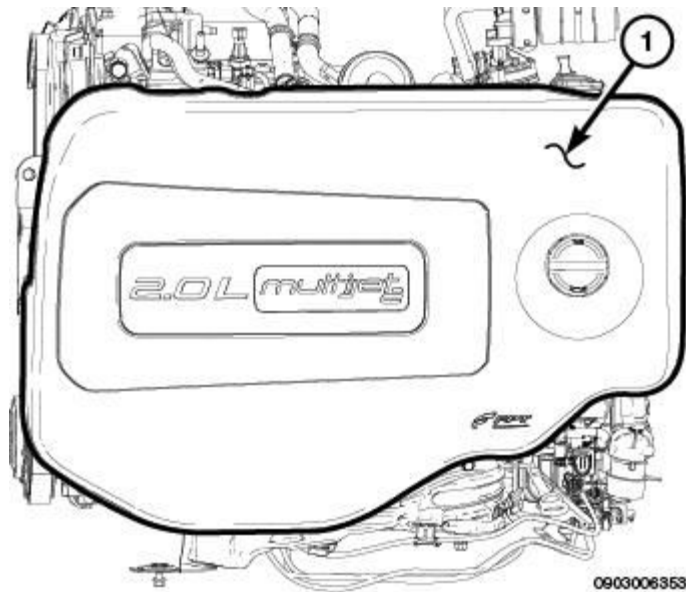


Fig. 131: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

4. Install the engine cover (1).

SPRING(S), VALVE

REMOVAL

REMOVAL

1. Disconnect negative battery cable.
2. Remove the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, REMOVAL**.
3. Assemble the (special tool #MD998772A, Compressor, Valve Spring) to the (special tool #10224, Adapter, Valve Spring) and install onto cylinder head.

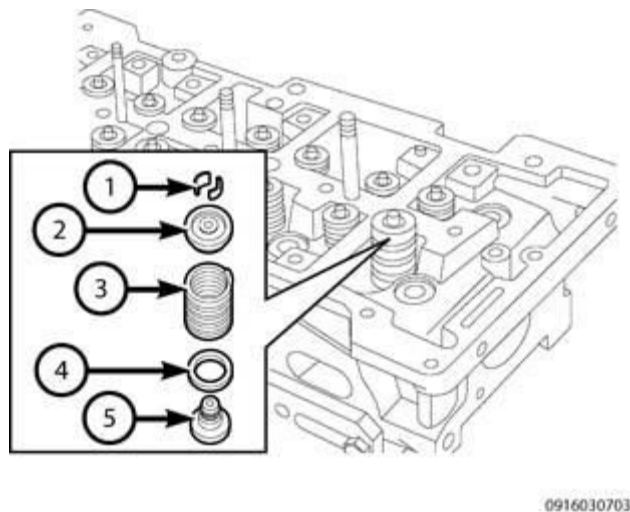


Fig. 132: Valve Spring Components
Courtesy of CHRYSLER GROUP, LLC

4. Compress the valve spring (3) and remove the valve keepers (1).
5. Remove the valve upper shim (2).
6. Remove the valve spring (3).
7. Remove the lower shim (4) (exhaust valve only).
8. Repeat procedure for each cylinder as necessary.

INSTALLATION

INSTALLATION

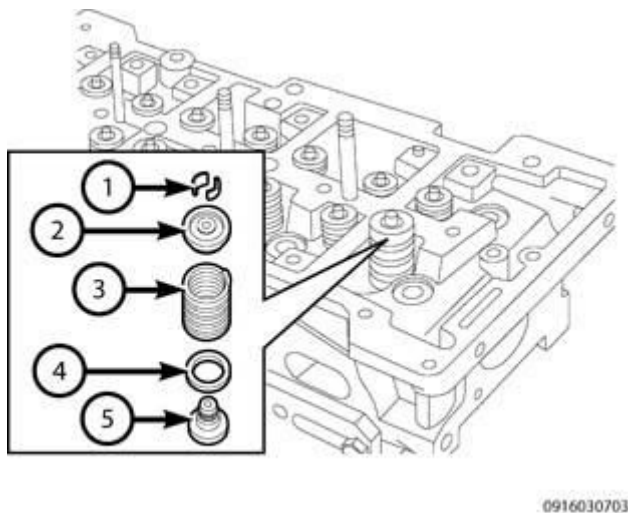


Fig. 133: Valve Spring Components
Courtesy of CHRYSLER GROUP, LLC

NOTE: **Inspect all valve springs and retainers for wear or damage. Replace as necessary.**

1. Install the lower shim (4) (exhaust valve only).
2. Install valve spring (3).
3. Install valve upper shim (2).
4. Assemble the (special tool #MD998772A, Compressor, Valve Spring) to the (special tool #10224, Adapter, Valve Spring) and install onto cylinder head.

NOTE: **Ensure that the valve keepers are seated properly.**

5. Compress valve spring (3) and install valve keepers (1).
6. Repeat procedure for each cylinder as necessary.
7. Install the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, INSTALLATION** .
8. Connect negative battery cable.

VALVES, INTAKE AND EXHAUST

REMOVAL

REMOVAL

NOTE: **As a good practice, determine if the valve faces or valve seats require servicing. Measuring the valve height on a known good valve. If the replacement or refinished valve height is greater than the measurement of the known good valve height, machine enough material from the stem of the valves to give you the valve height of the good valve.**

NOTE: **Valves can not be ground, only lapping is permitted.**

1. Disconnect the negative battery cable.
2. Remove the cylinder head. Refer to **CYLINDER HEAD, REMOVAL** .
3. Assemble the (special tool #MD998772A, Compressor, Valve Spring) to the (special tool #10224, Adapter, Valve Spring) and install onto cylinder head.

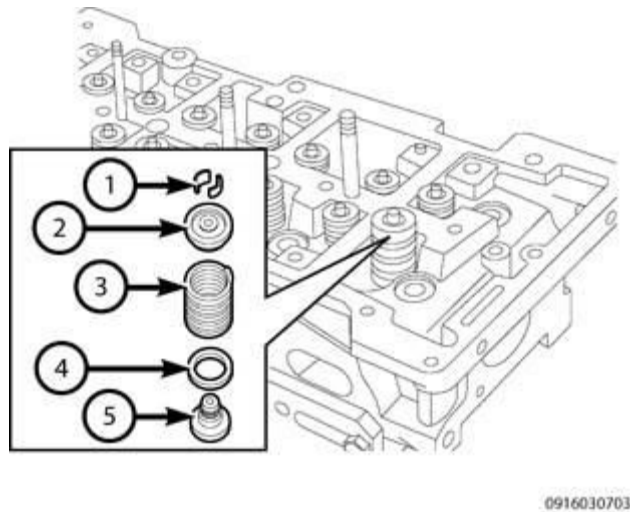


Fig. 134: Valve Spring Components
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Valves, springs and retainers must be kept in order of the cylinder they were removed.

4. Compress the valve spring (3) and remove the valve keepers (1).
5. Remove the valve upper shim (2).
6. Remove the valve spring (3).
7. Remove the lower shim (4) (exhaust valve only).

CAUTION: Suitably mark the valve and the position in the cylinder head before removal. Failure to do so will result in improperly seated valves and possible engine damage after reassembly.

8. Remove valve stem seal (5).
9. Repeat steps 3 through 7 for each valve as necessary.
10. Remove the valves and replace as necessary.

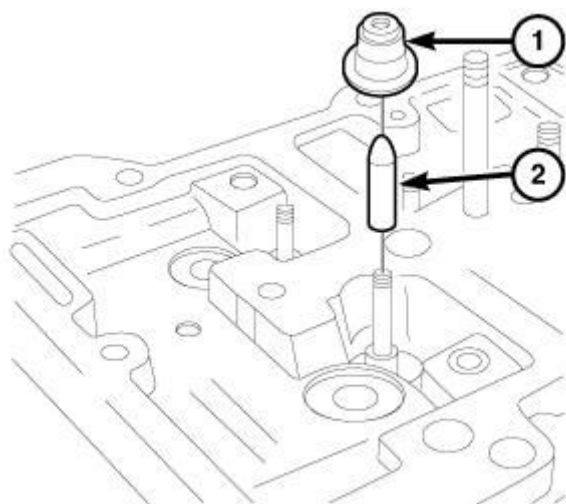
INSTALLATION

INSTALLATION

WARNING: Valves must be kept in their original positions in cylinder head. Failure to do so will result in engine damage.

NOTE: Inspect all valves, springs and retainers for wear or damage. Replace as necessary.

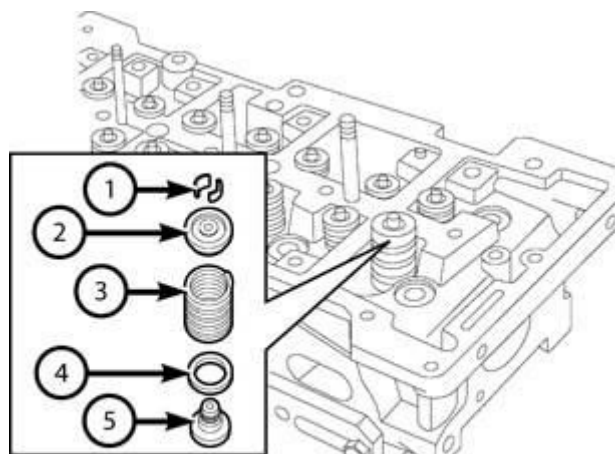
1. Install valves in their original position in the cylinder head.



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Fig. 135: Valve Stem Seal & Fitting Tool
Courtesy of CHRYSLER GROUP, LLC

2. Install the valve seal Fitting Tool (2) onto valve stem.
3. Install valve stem seal (1).
4. Remove the valve seal Fitting Tool (2) from the valve stem.



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Fig. 136: Valve Spring Components
Courtesy of CHRYSLER GROUP, LLC

5. Install the lower shim (4) (exhaust valve only).
6. Install the valve spring (3).
7. Install the valve upper shim (2).

8. Assemble the (special tool #MD998772A, Compressor, Valve Spring) to the (special tool #10224, Adapter, Valve Spring) and install onto cylinder head.

NOTE: Ensure that the valve keepers are seated properly.

9. Compress the valve spring (3) and install the valve keepers (1).
10. Repeat steps 3 through 10 for each valve as necessary.
11. Install the cylinder head. Refer to **CYLINDER HEAD, INSTALLATION**.
12. Connect the negative battery cable.

ENGINE BLOCK

DESCRIPTION

DESCRIPTION

This engine is equipped with a high pressure electronic injection system from Bosch Common Rail ECD 16 C39 fast diesel engine, fully managed by an Powertrain Control Module (PCM). The engine respects the Euro 5 regulation and is equipped with the following emission components:

- Exhaust system with Diesel Oxidation Catalyst (DOC)/Diesel Particulate Filter (DPF).
- Exhaust Gas Recirculation System (EGR).
- Crankcase oil vapor recirculation system.

STANDARD PROCEDURE

BEARING SELECTION CHARTS

CRANKSHAFT BEARINGS

Crankshaft Main Journal Diameter	
Bearing Size	Specification
Main journal half-bearings - Grade A (Red) numerical code 1 (94 00)	1.832 - 1.836 mm (0.0721 - 0.0722 in.)
Main journal half-bearings - Grade B (Blue) numerical code 2 (88 94)	1.835 - 1.839 mm (0.0722 - 0.0724 in.)
Main journal half-bearings - Grade C (Yellow) numerical code 3 (82 88)	1.838 - 1.842 mm (0.0723 - 0.0725 in.)
Crankshaft Main Journal Diameter (Oversize)	
Main journal/crankpin half-bearings oversize - Grade A (brown)	0.127 mm (0.0049 in.)
Main journal/crankpin half-bearings oversize - Grade B (green)	0.127 mm (0.0049 in.)
Clearance between connecting rod bearings -	0.030 - 0.056 mm (0.0011 - 0.0022 in.)

2014 Jeep Cherokee Trailhawk

2014 ENGINE 2.0L Diesel - Service Information - Cherokee

crankpin bearings	
Main Journal Identification	
Main journal grade A (normal), RED paint mark, numerical code 1 (94 00)*	52.994 - 53.000 mm (2.0863 - 20.866 in.)
Main journal grade B (normal), BLUE paint mark, numerical code 2 (88 94)*	52.982 - 52.994 mm (2.0858 - 2.0863 in.)
Main journal grade C (normal), YELLOW paint mark, numerical code 3 (82 88)*	52.982 - 52.998 mm (2.0858 - 2.0865 in.)
Main journal grade D (0.127 mm undersize), BROWN paint mark, numerical code 6 (67 73)*	52.867- 52.873 mm (2.0813 - 2.0816 in.)
Main journal grade E (0.127 mm undersize), GREEN paint mark, numerical code 7 (61 67)*	52.861 - 52.867 mm (2.0811 - 2.0813 in.)
Main journal grade F (0.127 mm undersize), BLACK paint mark, numerical code 8 (55 61)*	52.855 - 52.861 mm (2.0808 in.)

NOTE: (*) Last two numbers (thousandth part) of the main journal dimensions.

NOTE: If using a crankshaft where the maximum undersize for the bearings is 0.127 mm through grindings, the grade should be selected by measuring the diameter of the bearing using the above as a reference.

NOTE: Having defined the grade and the color of each new or reground crankshaft bearing, it is necessary to select the bearing pair or thickness; these should be the same color as the corresponding journal; the pair of half-bearings required can be ordered from the Parts Dept. by quoting the order number.

NOTE: The above is designed to guarantee the optimum operational clearances for all pins.

NOTE: Lastly, we wish to point out that, in general, the clearance between the main journal and the half-bearing, produced through the selection method described above, should be min. 0.011 - max; 0.071 mm; this figure can be measured, as part of the final check, using the calibrated wire (Plastigage) following the instructions described below.

ROD BEARINGS

Connecting Rod Journal Diameter	
Bearing Size	Specification
Crankpin half-bearings - Grade A (red)	1.525 - 1.532 mm (0.0600 - 0.0603 in.)
Crankpin half-bearings - Grade B (blue)	1.532 - 1.536 mm (0.0603 - 0.0605 in.)
Crankpin half-bearings - Grade C (yellow)	1.535 - 1.539 mm (0.0604 - 0.0606 in.)
Connecting Rod Journal Diameter (Oversize)	
Main journal/crankpin half-bearings oversize - Grade	

A (brown)	0.127 mm (0.0049 in.)
Main journal/crankpin half-bearings oversize - Grade B (green)	0.127 mm (0.0049 in.)
Clearance between connecting rod bearings - crankpin bearings	0.030 - 0.056 mm (0.0011 - 0.0022 in.)
Main journal/crankpin half-bearing oversize	0.254 mm (0.0099 in.)

REPLACING ENGINE CORE AND OIL GALLERY PLUGS

Using a blunt tool such as a drift and a hammer, strike the bottom edge of the cup plug. With the cup plug rotated, grasp firmly with pliers or other suitable tool and remove plug .

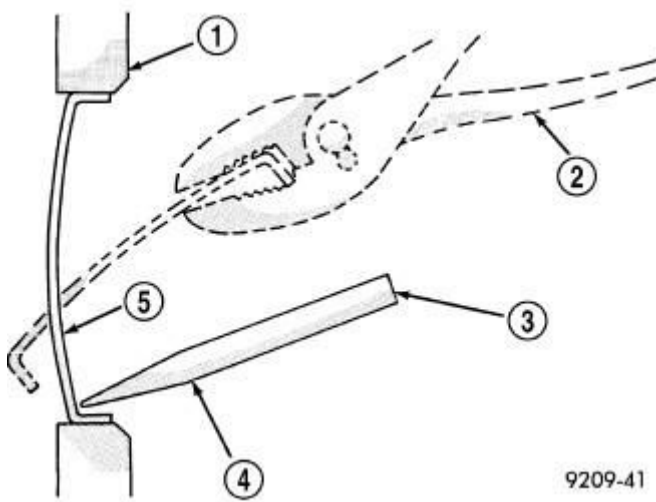


Fig. 137: Core Hole Plug Removal
Courtesy of CHRYSLER GROUP, LLC

- 1 - CYLINDER BLOCK
- 2 - REMOVE PLUG WITH PLIERS
- 3 - STRIKE HERE WITH HAMMER
- 4 - DRIFT PUNCH
- 5 - CUP PLUG

CAUTION: Do not drive cup plug into the casting as restricted cooling can result and cause serious engine problems.

Thoroughly clean inside of cup plug hole in cylinder block or head. Be sure to remove old sealer. Lightly coat inside of cup plug hole with Mopar® Stud and Bearing Mount. Make certain the new plug is cleaned of all oil or grease. Using proper drive plug, drive plug into hole so that the sharp edge of the plug is at least 0.5 mm (0.020 in.) inside the lead-in chamfer.

It is not necessary to wait for curing of the sealant. The cooling system can be refilled and the vehicle placed in

service immediately.

MEASURING CYLINDER BORES

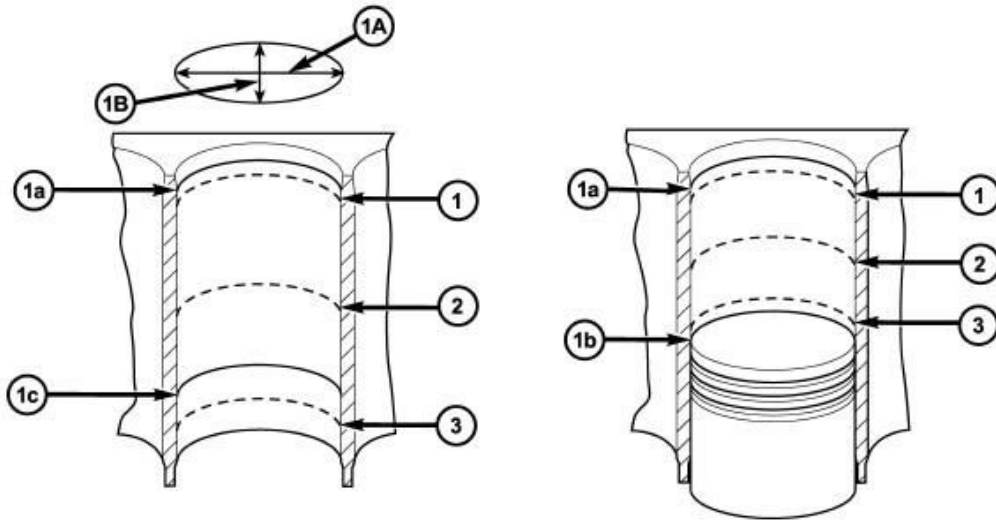


Fig. 138: Measuring Cylinder Bores
Courtesy of CHRYSLER GROUP, LLC

- 1 - MEASURING POINT OF CYLINDER BORE
- 2 - MEASURING POINT OF CYLINDER BORE
- 3 - MEASURING POINT OF CYLINDER BORE
- 1a - UPPER REVERSAL POINT OF #1 PISTON RING
- 1b - BOTTOM DEAD CENTER OF PISTON
- 1c - BOTTOM REVERSAL POINT OF OIL SCRAPER RING
- 1A - LONGITUDINAL DIRECTION
- 1B - TRANSVERSE DIRECTION

NOTE: This must be done with engine completely disassembled.

1. Thoroughly clean all cylinder bores with appropriate cleaning solvent.
2. Measure each cylinder at the three measuring points shown in illustration.
3. Using the three measurement points, measure cylinder in the longitudinal and in the transverse direction.

PISTON PROTRUSION

NOTE: Any time a rod or piston is replaced, the piston protrusion must be checked.

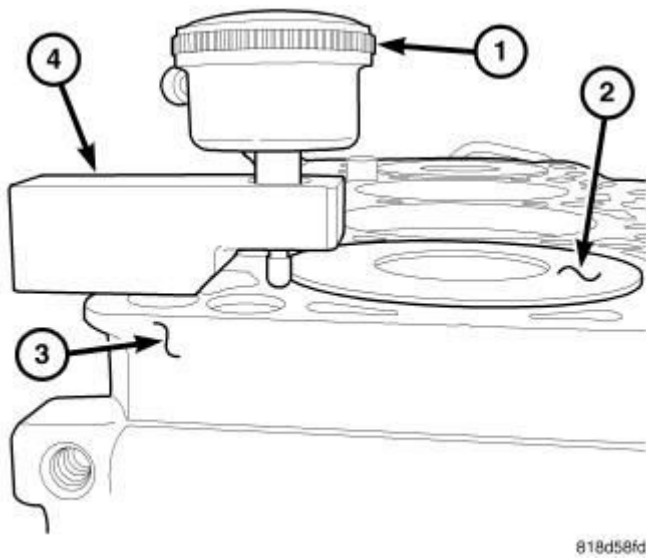


Fig. 139: Zero Dial Indicator

Courtesy of CHRYSLER GROUP, LLC

1. Position scooter block (special tool #D-115-2A, Block, Scooter) (4) and a dial indicator flat on the cylinder block (3) head surface and zero the dial indicator.

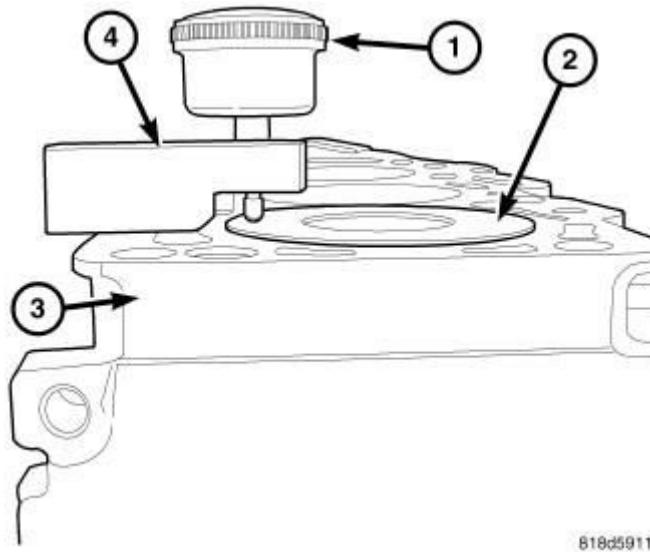


Fig. 140: Piston Height

Courtesy of CHRYSLER GROUP, LLC

2. Slide Scooter block (special tool #D-115-2A, Block, Scooter) (4) so that the dial indicator (1) is now on the piston (2).
3. Read measurement and refer to the chart below for the correct head gasket:

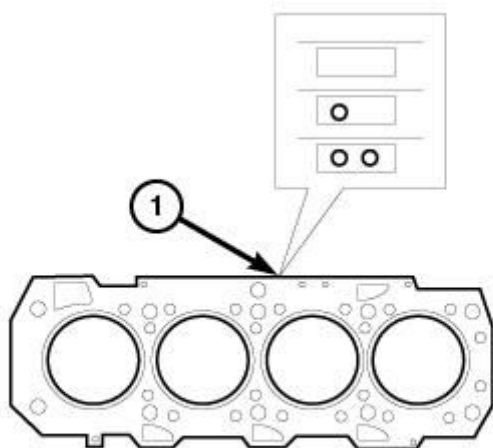
HEAD GASKET SELECTION

Piston Protrusion	Head Gasket Identification

2014 Jeep Cherokee Trailhawk

2014 ENGINE 2.0L Diesel - Service Information - Cherokee

0.110 - 0.203 mm	0.035 - 0.039 in.	No Hole
0.231 - 0.330 mm	0.040 - 0.043 in.	One Hole
0.331 - 0.425 mm	0.044 - 0.047 in.	Two Hole



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Fig. 141: Head Gasket Identification
Courtesy of CHRYSLER GROUP, LLC

4. Look up piston protrusion measurement in the table to find the correct head gasket. The head gasket is marked round holes (1).

COVER, ENGINE, FRONT

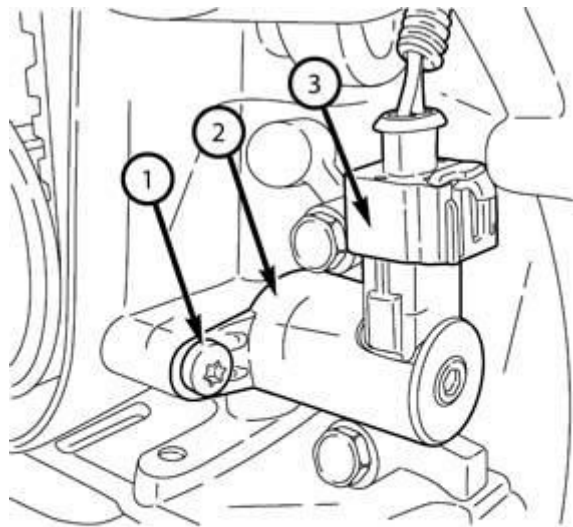
REMOVAL

REMOVAL

1. Disconnect the negative battery cable.

NOTE: The crankshaft sprocket bolt is a left handed thread.

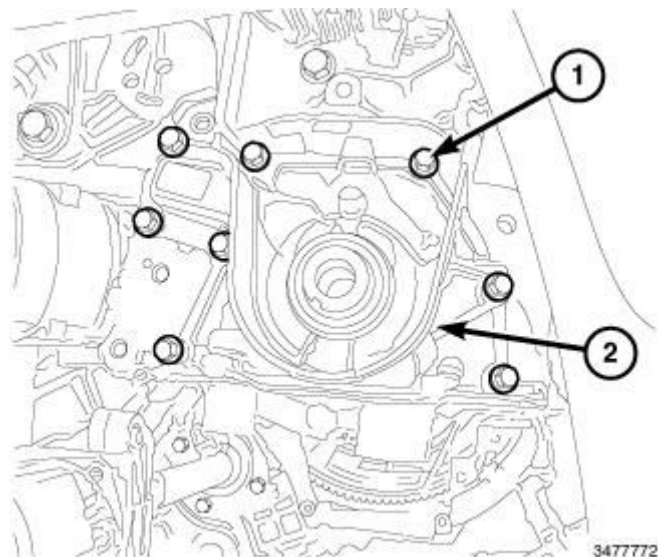
2. Remove the crankshaft sprocket. Refer to **BELT AND SPROCKETS, TIMING, REMOVAL**.



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Fig. 142: Oil Pressure Regulator, Bolt & Connector
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the oil pressure regulator wire harness connector (3).
4. Remove the oil pan. Refer to **PAN, OIL, REMOVAL** .



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Fig. 143: Front Cover & Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Remove bolts (1) and the front cover (2).

INSTALLATION

INSTALLATION

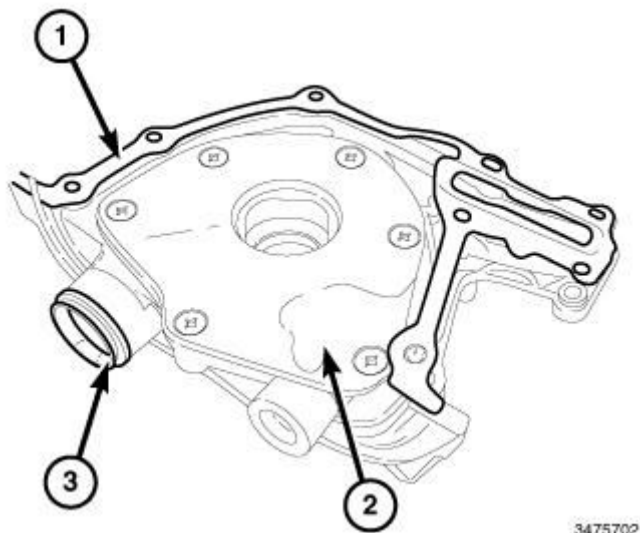


Fig. 144: Front Cover, Gasket & Seal
Courtesy of CHRYSLER GROUP, LLC

1. Clean all gasket mating surfaces. Refer to **ENGINE - STANDARD PROCEDURE** .
2. Install the front cover gasket (1) and seal (3).

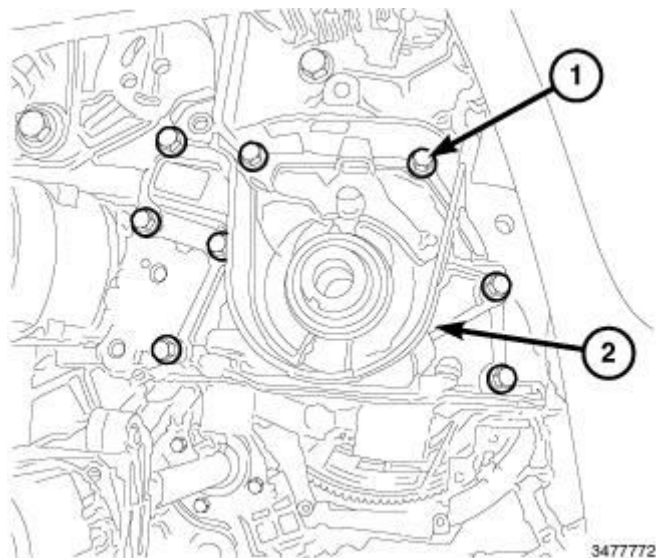
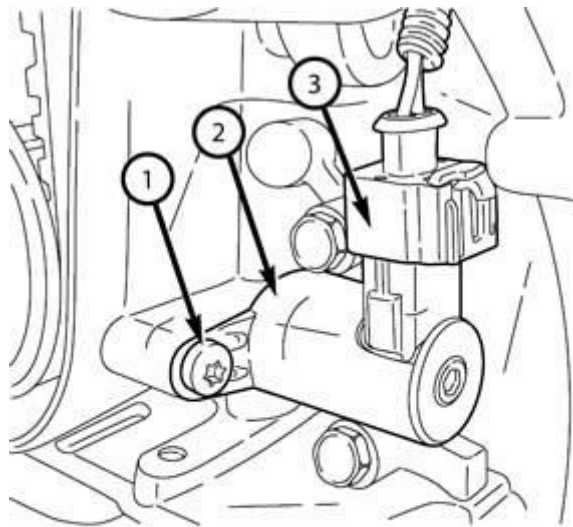


Fig. 145: Front Cover & Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Install the oil pan. Refer to **PAN, OIL, INSTALLATION** .
4. Install the front cover assembly (2). Tighten bolts (1) 9 N.m (80 in. lbs.).



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Fig. 146: Oil Pressure Regulator, Bolt & Connector
Courtesy of CHRYSLER GROUP, LLC

5. Connect the oil pressure regulator wire harness connector (3).
6. If necessary, install a new front crankshaft oil seal. Refer to **SEAL, CRANKSHAFT OIL, FRONT, INSTALLATION**.

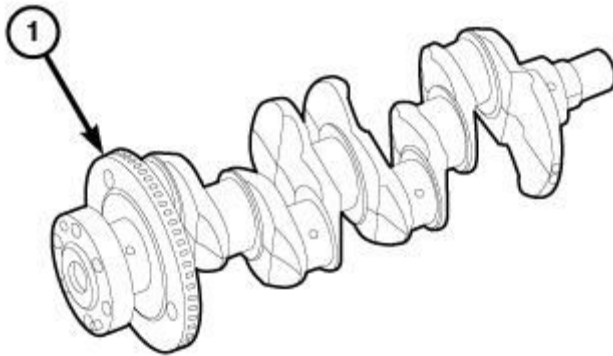
NOTE: The crankshaft sprocket bolt is a left handed thread.

7. Install the crankshaft sprocket. Refer to **BELT AND SPROCKETS, TIMING, INSTALLATION**.
8. Connect the negative battery cable.

CRANKSHAFT

DESCRIPTION

DESCRIPTION



3372268

Fig. 147: Crankshaft Tone Wheel
Courtesy of CHRYSLER GROUP, LLC

- The crankshaft is made of cast iron and rests on five main bearings. Shaft axial clearance is governed by two half-rings housed in the rear main bearing.
- Eight counterweights accurately balance the crankshaft rotating masses.
- A set of ducts runs along the crankshaft to lubricate the main journals and crankpins.
- A tone wheel (1) is fitted at the rear of the crankshaft and is used for the RPM sensor.

STANDARD PROCEDURE

STANDARD PROCEDURE - MEASURE CRANKSHAFT AND BLOCK JOURNALS

NOTE: After bearing damage has occurred, remove all debris which is present in the main oil gallery, connecting rod bores, and in the crankshaft and oil galleries. Include removal of the inserting steel ball of the main oil gallery before cleaning.

1. Remove crankshaft. Refer to **CRANKSHAFT, REMOVAL**.
2. Clean all engine parts thoroughly.

CAUTION: After bearing damage has occurred, replace connecting rods which have suffered overheating because of bearing damage. The connecting rod must not have any cross scores and notches.

3. Inspect connecting rod. If damage is present, inspect crankshaft, replace as necessary.
4. Inspect crankcase.
5. Inspect standard size of crankshaft bearing shells.
6. Inspect crankshaft bearing cap.

7. Mount crankshaft radially.
8. Inspect crankshaft bearing play.

NOTE: Radial mounting of the main bearings of standard size crankshaft is possible by assigning the color-coded bearing shells.

9. Assign crankshaft bearing shells.
10. Mount crankshaft axially.
11. Inspect crankshaft bearing play.

ASSIGN CRANKSHAFT BEARING SHELLS

The oil pan rail of the cylinder block is marked with chisel punches indicating which bearing shells are used.

REMOVAL

REMOVAL

NOTE: The engine must be removed from the vehicle to service crankshaft.

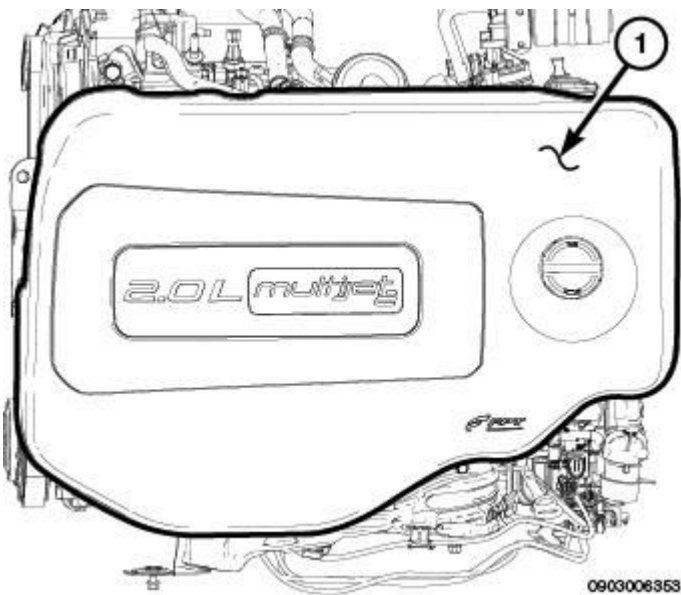


Fig. 148: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect negative battery cable.
2. Remove the engine cover (1).
3. Remove the engine from the vehicle and place on an overhaul stand. Refer to **REMOVAL**.
4. Unscrew the drain plug from the engine oil pan and drain the engine oil. Tighten drain plug to 20 N.m (177 in. lbs.).

5. Remove the cylinder head assembly. Refer to **CYLINDER HEAD, REMOVAL** .
6. Remove the oil pan. Refer to **PAN, OIL, REMOVAL** .
7. Remove the catalytic converter DPF support.
8. Remove the wiring retaining bracket.

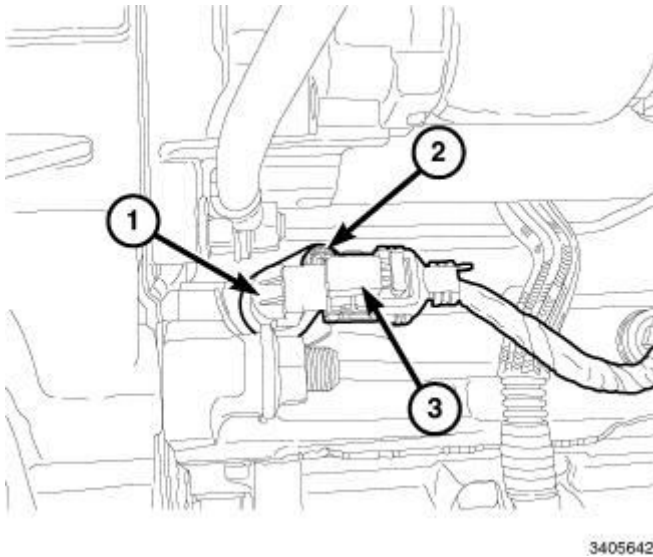


Fig. 149: Crankshaft Position Sensor, Connector & Bolt
Courtesy of CHRYSLER GROUP, LLC

9. Remove the crankshaft position sensor.
10. Remove the engine oil cooler.
11. Remove the alternator.
12. Remove the front cover. Refer to **COVER, ENGINE, FRONT, REMOVAL**.

NOTE: Mark piston and rod location prior to removal with paint pen. Do not use a punch.

13. Rotate the crankshaft until connecting rod number one is at bottom dead center.
14. Remove piston and connecting rod assemblies. Refer to **ROD, PISTON AND CONNECTING, REMOVAL** .
15. Remove rear crankshaft oil seal cover. Refer to **SEAL, CRANKSHAFT OIL, REAR, REMOVAL** .

NOTE: Crankshaft end play specification is 0.049 mm. If the value for the crankshaft end play does not correspond with the specification, when refitting, regrind the engine block seat and use suitable oversize thrust half-washers.

16. Check the amount of end play in the crankshaft using a dial indicator.

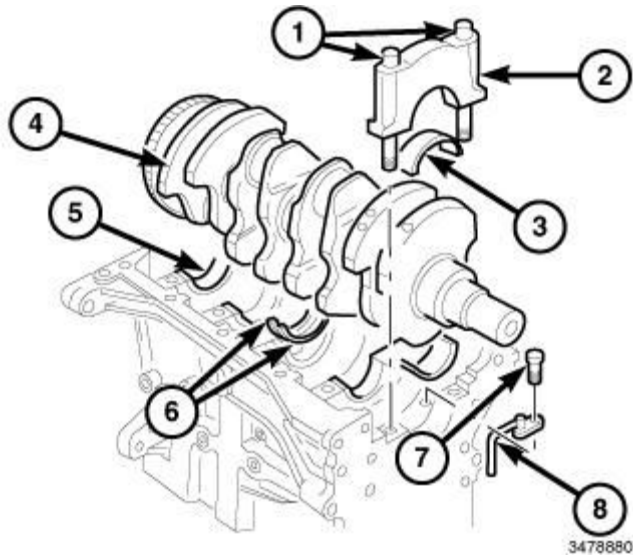


Fig. 150: Crankshaft Assembly
Courtesy of CHRYSLER GROUP, LLC

17. Unbolt crankshaft bearing caps (10).
18. Remove the bearing caps (2).
19. Remove the lower main half-bearings (3).
20. Inspect crankshaft bearing caps and bolts for wear and stretching.
21. Remove crankshaft (4) from engine block.
22. Remove the upper main half-bearings (5).
23. Remove the thrust half-washers (6).
24. Undo the bolts (7) and remove the oil jets (8) from the engine block.
25. Remove the engine block from the overhaul stand, and place it on a workbench.
26. Drill and remove the water/oil sealing plugs from the engine block to allow for washing the ducts.
27. Wash the dismantled components.
28. Fit the water/oil sealing plugs in the engine block using suitable fitting tools.

INSTALLATION

INSTALLATION

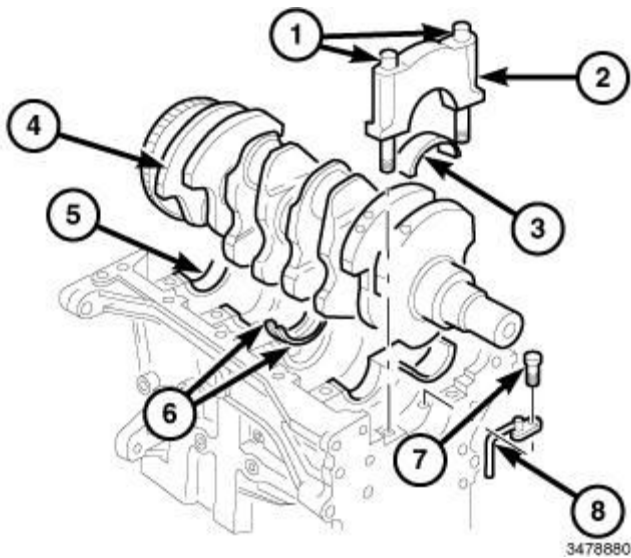


Fig. 151: Crankshaft Assembly
 Courtesy of CHRYSLER GROUP, LLC

1. Replace the engine block on the overhaul stand using the mounting bracket.
2. Install the oil jets (8) in the engine block and securely tighten bolts (7).
3. Fit the main bearing caps into the block.
4. Torque the main bearing caps to specification. 25 N.m (18 ft. lbs), then an additional 100° turn.
5. Check that there are no deposits or blockages in the crankshaft lubrication ducts.
6. Measure the diameter of the main journals and compare them to the specifications. (Class A - 59.995 mm, Class B - 59.998 mm, Class C - 59.981 mm).

NOTE: **If the diameter of the main journals is not correct, stop reassembly and replace the engine assembly.**

7. Remove the main bearing caps (1).

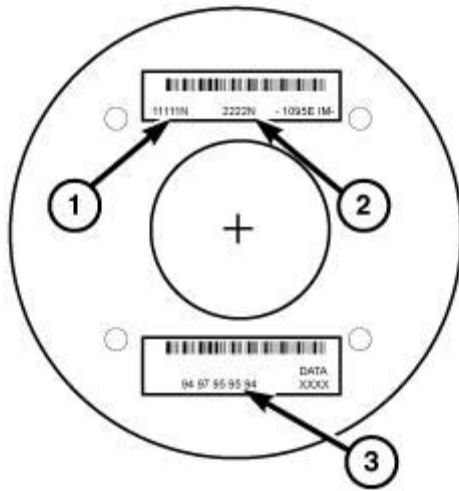


Fig. 152: Crankshaft Bearing Identification & Size Identification
Courtesy of CHRYSLER GROUP, LLC

8. Locate the crankshaft journal letter class stamp on the toothed wheel at the rear of the crankshaft.

NOTE: In the case of the example, the numbers 11111N indicate that all five main bearings are Grade A (red) as indicated (1). Numerical code of main journal identification: the first number on the left refers to the first timing side bearing; the final "N" has no value.

NOTE: In the case of the example, the numbers 2222N indicate that all four connecting rod bearings as indicated (2). Numerical code of main journal identification: the first number on the left refers to the first timing side bearing; the final "N" has no value.

NOTE: In the case of the example, the number 94 (first on the left) (3) corresponds to the dimensions 52.994 for the first timing side bearing which identifies Grade A (red); the same method should be applied for other groups of two digits for the same reference 3 (97 -95 -95 -94).

9. Select the proper bearing sizes for the main bearings and connecting rod bearings. Refer to **ENGINE BLOCK - STANDARD PROCEDURE**.

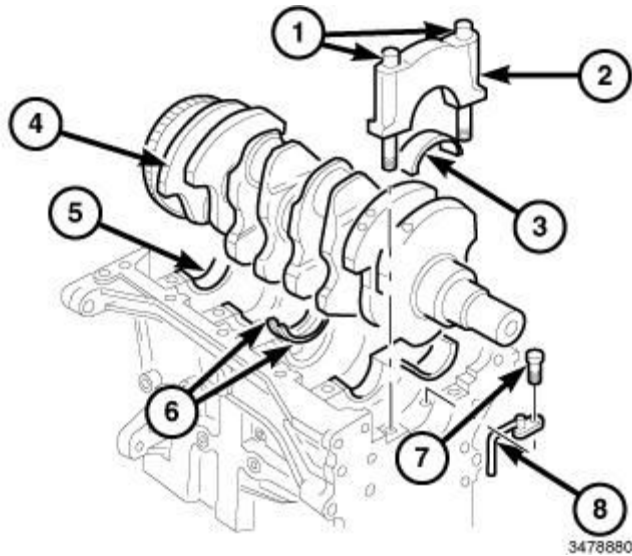


Fig. 153: Crankshaft Assembly
 Courtesy of CHRYSLER GROUP, LLC

10. Install the upper bearing halves (5) into the engine block.
11. Lubricate the upper bearing halves with engine oil.
12. Install the upper thrust bearing (7) into the engine block.
13. Install the crankshaft (4) into the engine block.
14. Install the lower thrust bearing.
15. Install the lower main bearing halves into the main bearing caps.
16. Lubricate the lower bearing halves with engine oil
17. Install the main bearing caps into the block. Tighten bolts to 25 N.m (18 ft. lbs), then 100° additional turn.
18. Install the piston and connecting rod assemblies. Refer to **ROD, PISTON AND CONNECTING, INSTALLATION** .
19. Place the front engine cover in its seat complete with gasket and tighten the bolts to 9 N.m (80 in lbs.).
20. Place the front crank seal in its seat on the crankshaft oil seal front cover using the (special tool #20145, Installer, Crankshaft Front Oil Seal).
21. Install the crankshaft position sensor and tighten bolt to 9 N.m (80 in lbs.).
22. Place the timing belt tensioner mounting assembly in position and tighten the bolts to 25 N.m (18 ft. lbs.).
23. Install rear crankshaft oil seal and cover. Refer to **SEAL, CRANKSHAFT OIL, REAR, INSTALLATION** .
24. Apply silicone sealant to the entire perimeter of the engine oil pan assembly.
25. Position oil pan and install bolts. Tighten bolts to 25 N.m (18 ft. lbs.).
26. Install the two oil pan-to-rear oil seal carrier bolts and tighten bolts to 9 N.m (80 in. lbs.).
27. Install the crankshaft sprocket. Tighten bolt to 340 N.m (251 ft. lbs.).
28. Install cylinder head. Refer to **CYLINDER HEAD, INSTALLATION** .
29. Install the engine. Refer to **INSTALLATION** .

30. Fill crankcase with the correct engine oil, to the proper level.
31. Fill cooling system with the proper coolant, to the proper level. Refer to **STANDARD PROCEDURE** .
32. Connect negative battery cable.

WARNING: Use extreme caution when the engine is operating. Do not stand in a direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothes.

33. Start engine and inspect for leaks.

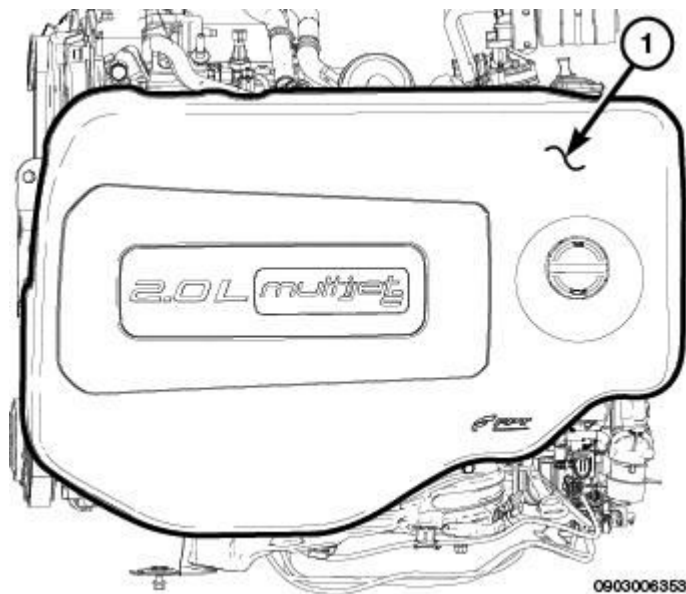


Fig. 154: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

34. Install engine cover (1). Refer to **INSTALLATION** .

DAMPER, VIBRATION

REMOVAL

REMOVAL

1. Disconnect negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Remove the accessory drive belt. Refer to **BELT, SERPENTINE, REMOVAL** .

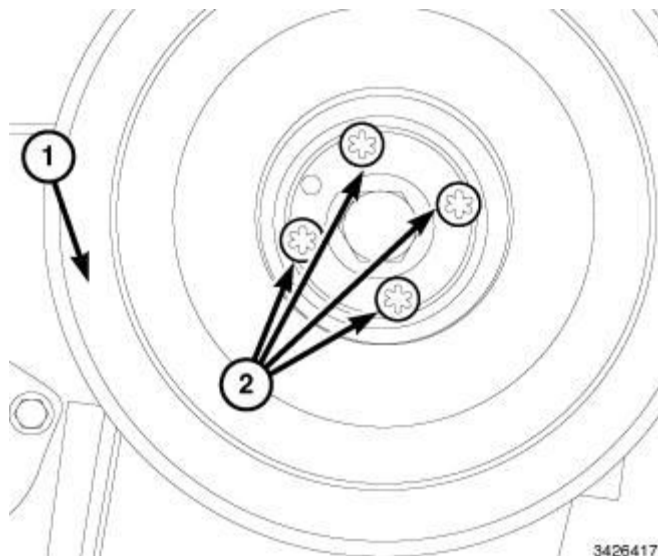


Fig. 155: Vibration Damper & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Remove bolts (2) and the vibration damper (1).

INSTALLATION

INSTALLATION

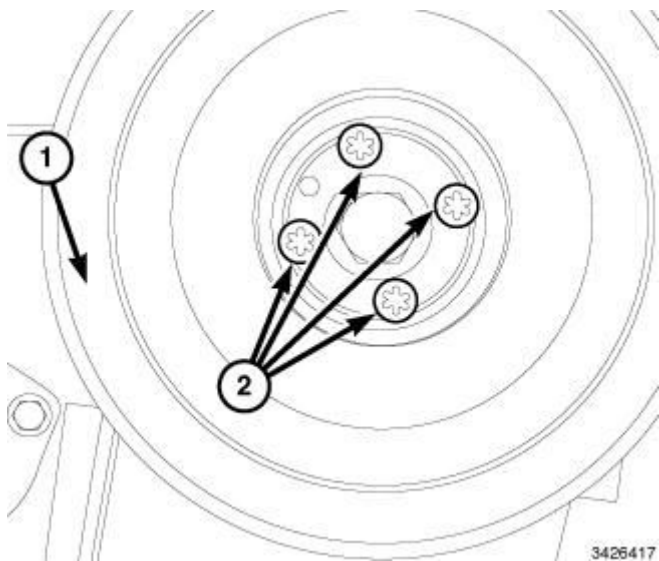
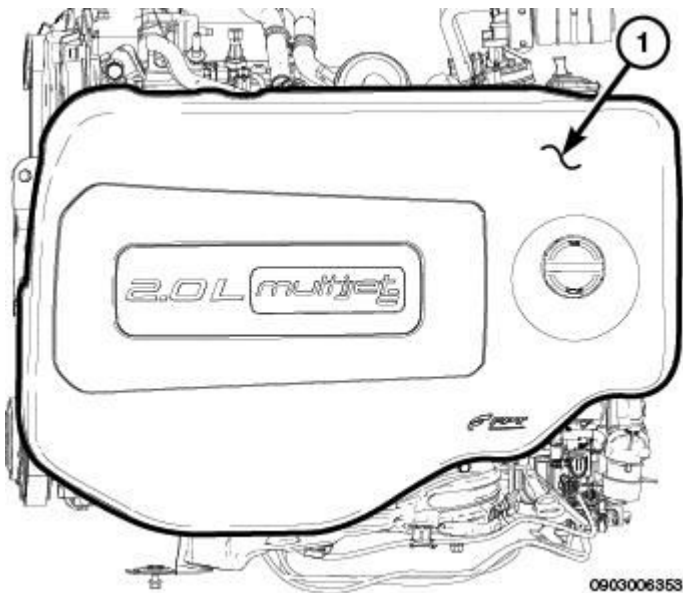


Fig. 156: Vibration Damper & Bolts
Courtesy of CHRYSLER GROUP, LLC

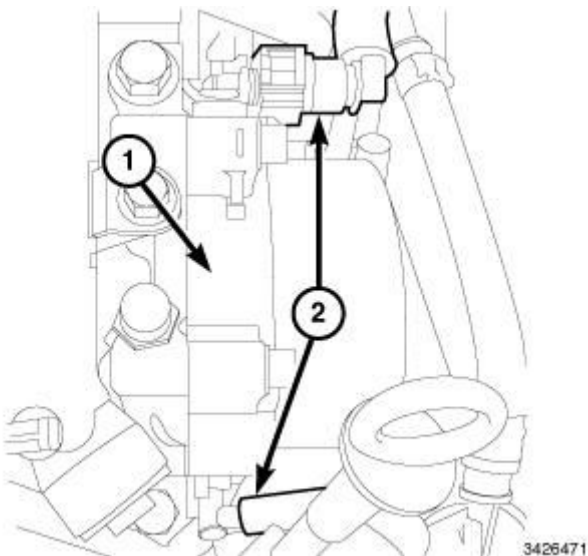
1. Install the vibration damper (1). Tighten bolts (2) to 30 N.m (22 ft. lbs.).
2. Installed the accessory drive belt. Refer to **BELT, SERPENTINE, INSTALLATION** .
3. Lower the vehicle.

4. Connect the negative battery cable.

PUMP, VACUUM**REMOVAL****REMOVAL****Fig. 157: Engine Cover**

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect negative battery cable.
2. Remove the engine cover (1).

**Fig. 158: Vacuum Pump & Vacuum Lines**

Courtesy of CHRYSLER GROUP, LLC

3. Remove the vacuum line (2) at vacuum pump (1).
4. Remove the thermostat housing. Refer to **THERMOSTAT, REMOVAL** .

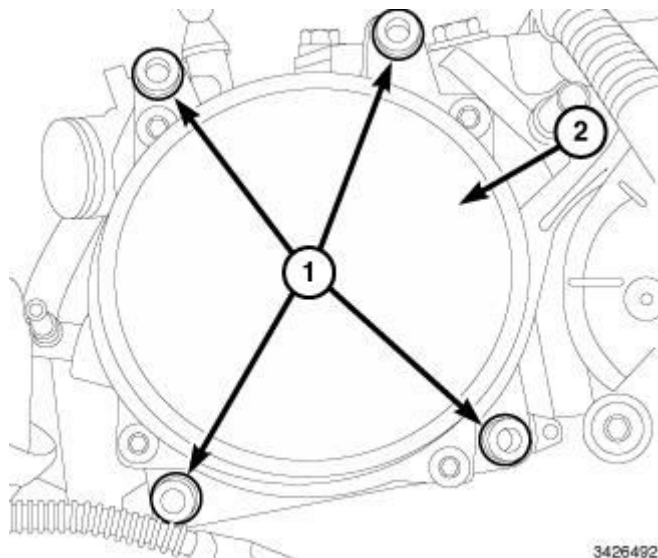


Fig. 159: Vacuum Pump & Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: **Observe the position of drive gear on rear of pump upon removal.**

5. Remove bolts (1) and the vacuum pump (2).
6. Remove and discard gasket.

INSTALLATION

INSTALLATION

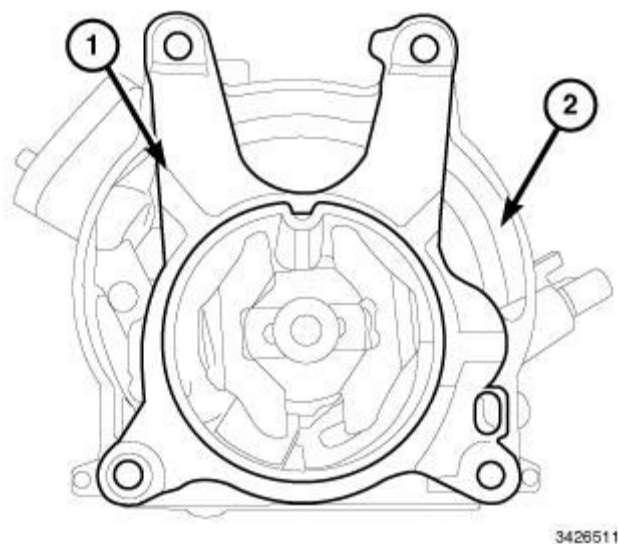


Fig. 160: Vacuum Pump & Gasket
Courtesy of CHRYSLER GROUP, LLC

1. Clean all gasket sealing surfaces.
2. Install new gasket (1) onto the vacuum pump (2).

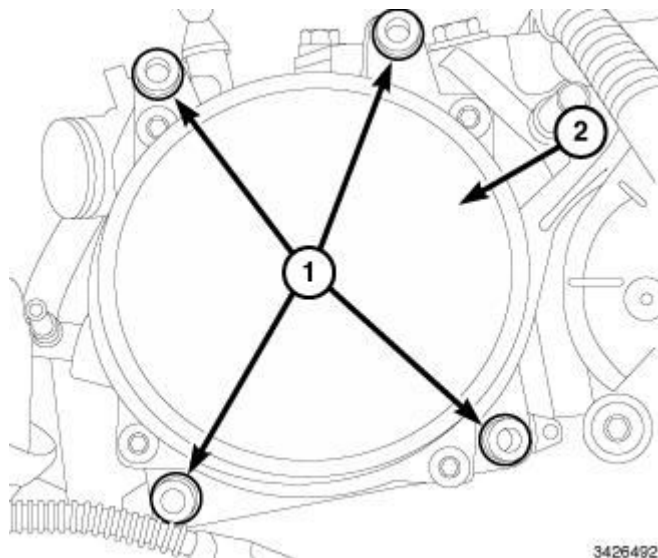


Fig. 161: Vacuum Pump & Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Position driver gear on rear of pump and install vacuum pump (2) and securely tighten bolts.
4. Install the thermostat. Refer to **THERMOSTAT, INSTALLATION**.

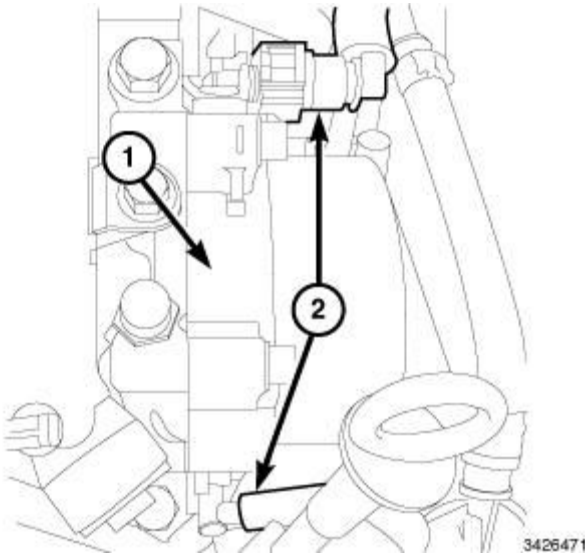


Fig. 162: Vacuum Pump & Vacuum Lines
Courtesy of CHRYSLER GROUP, LLC

5. Install vacuum lines (2) onto the vacuum pump (1).

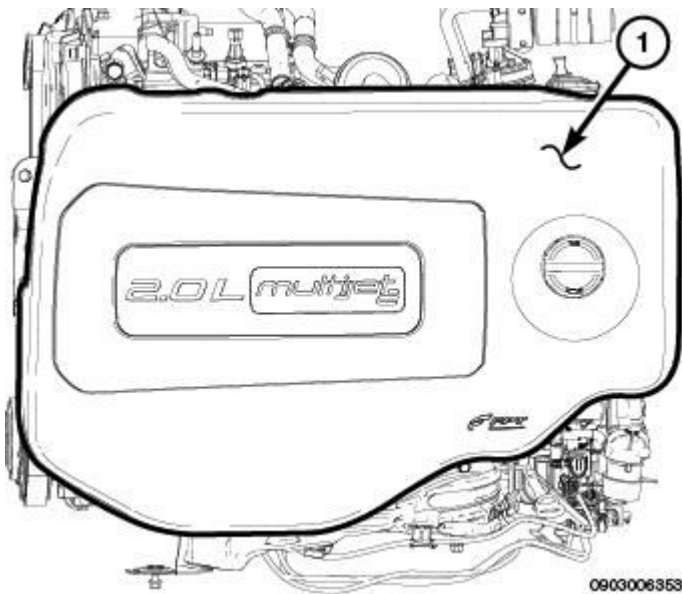


Fig. 163: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

6. Install the engine cover (1).
7. Connect the negative battery cable.

ROD, PISTON AND CONNECTING

DESCRIPTION

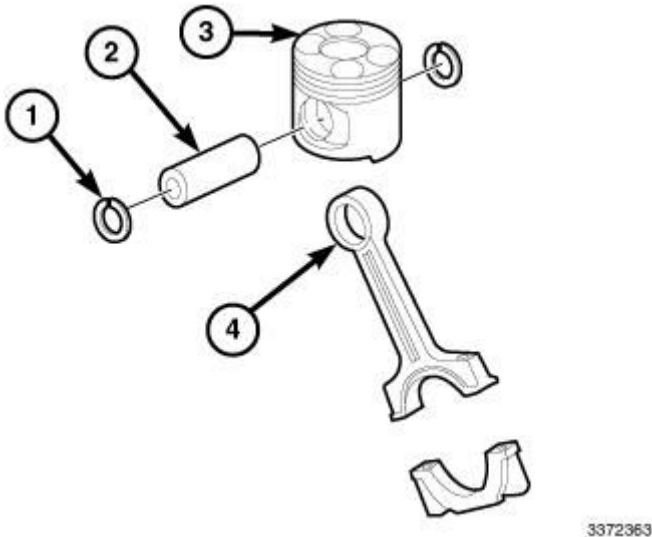
DESCRIPTION

Fig. 164: Piston & Connecting Rod Assembly
Courtesy of CHRYSLER GROUP, LLC

The pistons (3) are made of silicon aluminium alloy with self-heating inserts and are divided into three size categories.

An OMEGA-shaped combustion chamber in the piston crown improves combustion efficiency.

There is a channel inside the piston through which the oil, sent by the jet, flows, ensuring improved piston cooling.

The piston (3) is coupled to the pin by means of two copper alloy bushes.

The connecting rods (4) are made of hardened and tempered steel with a copper bush fitted for matching with the pin (2).

The floating pins are held in place by two expansion retaining rings (1) that are housed in the grooves in the piston hubs.

REMOVAL**REMOVAL**

1. Remove the engine from the vehicle. Refer to **REMOVAL** .
2. Remove the cylinder head. Refer to **CYLINDER HEAD, REMOVAL** .
3. Remove the oil pan. Refer to **PAN, OIL, REMOVAL** .

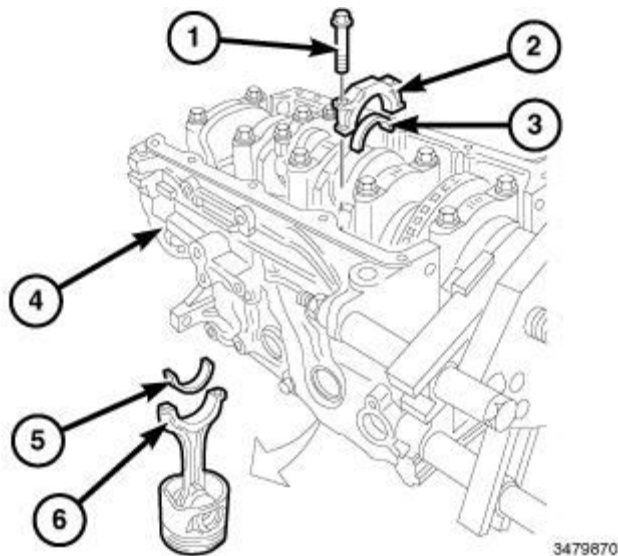


Fig. 165: Piston-Connecting Rods Assembly
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not use a punch to mark connecting rods.

4. Mark connecting rods with paint marker.
5. Remove the bolts (1) and remove the connecting rod caps (2) complete with bearings (3).
6. Withdraw and remove the piston-connecting rods assemblies (6) with bearings (5).

PISTON RINGS

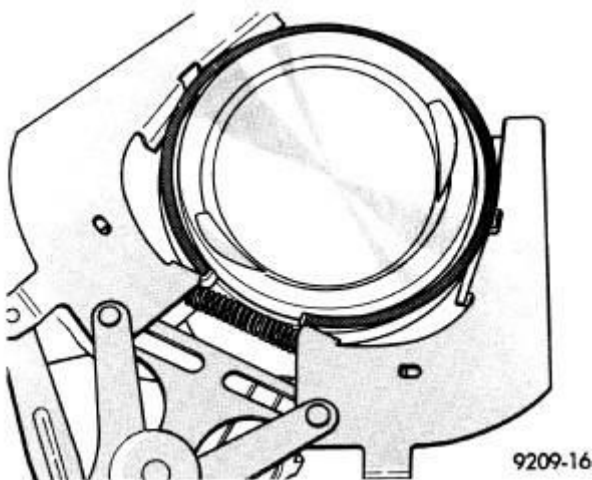


Fig. 166: Piston Rings - Removal/Installation
Courtesy of CHRYSLER GROUP, LLC

1. Using a suitable ring expander, remove the top and second piston rings.
2. Remove the upper oil ring side rail, lower oil ring side rail and then the oil expander from the piston.

3. Carefully clean carbon from the piston crowns, skirts and ring grooves.
4. Repeat this procedure for the remaining pistons and connecting rod assemblies.

PISTON PIN

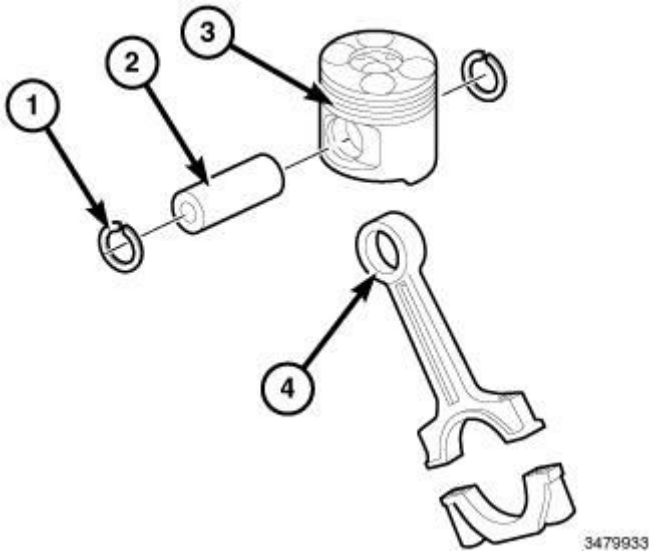


Fig. 167: Piston & Connecting Rod Assembly
Courtesy of CHRYSLER GROUP, LLC

1. Secure the connecting rod (4) in a soft jawed vice.
2. Remove the two snap rings (1) securing the piston pin (2).
3. Push the piston pin (2) out of the piston (3) and the connecting rod (4).
4. Remove the piston (3) from the connecting rod (4).
5. Measure the diameter of the piston pin in the center and on both ends. Refer to **SPECIFICATIONS - 2.0L DIESEL ENGINE**.
6. Repeat this procedure for the remaining pistons and connecting rod assemblies.

INSTALLATION

INSTALLATION

NOTE: The piston-connecting rod assemblies should be fitted in the cylinder block/crankcase so that the drain on the piston skirt is aligned with the oil jet on the crankcase.

1. Make sure the ring end gaps are properly staggered.
2. Lubricate the piston and rings with clean engine oil.
3. Compress piston rings with a ring compressor.

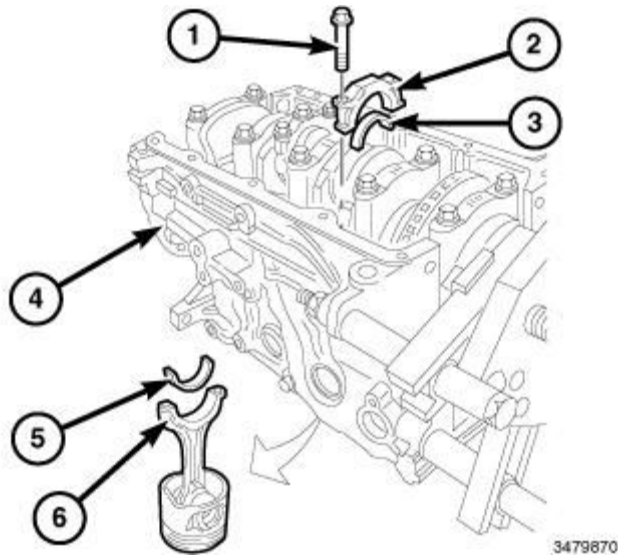


Fig. 168: Piston-Connecting Rods Assembly
 Courtesy of CHRYSLER GROUP, LLC

4. Install the upper rod bearing shell (5) into connecting rod (6) and oil bearing shell.

NOTE: The piston-connecting rod assemblies should be fitted in the cylinder block/crankcase so that the drain on the piston skirt is aligned with the oil jet on the crankcase.

5. Push piston into cylinder.

NOTE: Be careful when guiding rod into place not to nick the crankshaft journals.

NOTE: Fit the connecting rod caps so that the number stamped on each rod faces toward the same side as the number stamped on the big end (inlet side).

6. Install lower bearing shell (3) into connecting rod cap (2).
7. Lubricate lower bearing shell and position rod cap.
8. Install new rod bolts and tighten to 25 N.m (18 ft. lbs.) plus an additional 60° turn.
9. Install oil pan. Refer to **PAN, OIL, INSTALLATION**.
10. Install cylinder head. Refer to **CYLINDER HEAD, INSTALLATION**.
11. Install engine into vehicle. Refer to **INSTALLATION**.
12. Replace oil filter and fill with oil. Refer to **FILTER, ENGINE OIL, INSTALLATION**.
13. Fill cooling system. Refer to **STANDARD PROCEDURE**.
14. Start engine and check for leaks.

PISTON RINGS

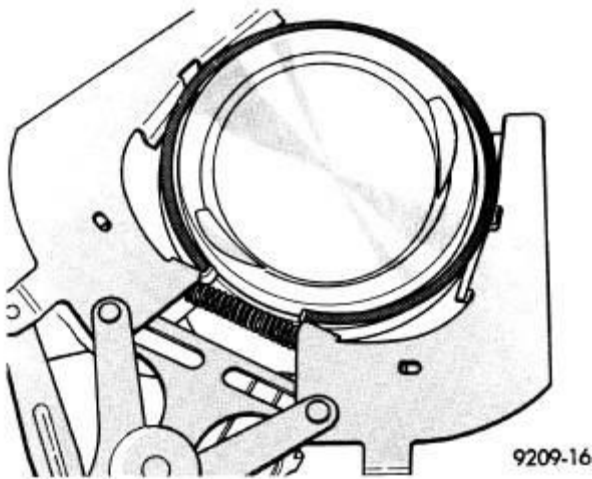


Fig. 169: Piston Rings - Removal/Installation
Courtesy of CHRYSLER GROUP, LLC

1. Install rings on the pistons using a suitable ring expander.

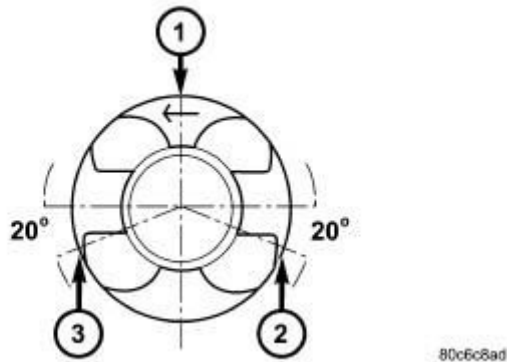


Fig. 170: Piston Ring Gap Location
Courtesy of CHRYSLER GROUP, LLC

- | |
|---|
| <p>1 - SECOND COMPRESSION RING GAP POSITION</p> <p>2 - OIL CONTROL RING GAP POSITION</p> <p>3 - TOP COMPRESSION RING GAP POSITION</p> |
|---|

2. Top compression ring is tapered and chromium plated. The second ring is of the scraper type and must be installed with scraping edge facing bottom of the piston. The third is an oil control ring. Ring gaps must be positioned, before inserting piston into the liners, as follows.
3. Top ring gap must be positioned at the No. 3 position (looking at the piston crown from above).
4. Second piston ring gap should be positioned at the No. 1 position.
5. Oil control ring gap should be positioned at the No. 2 position.

PISTON PIN

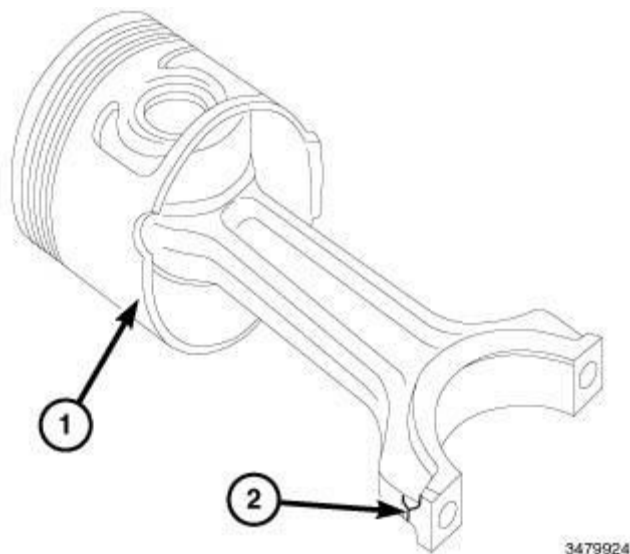


Fig. 171: Piston & Connecting Rod
Courtesy of CHRYSLER GROUP, LLC

1. Join the connecting rods to the pistons so that the number printed on connecting rod head (2) is facing notch (1) on the piston skirt for the oil jet housing.

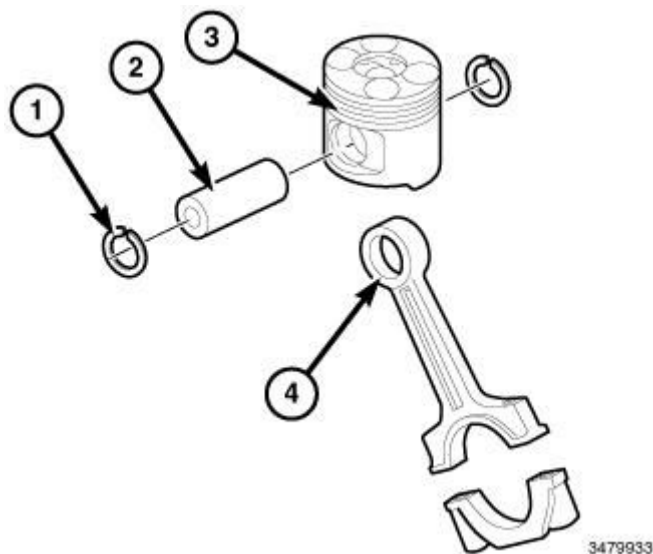


Fig. 172: Piston & Connecting Rod Assembly
Courtesy of CHRYSLER GROUP, LLC

2. Install the pins (2) into the piston (3) and rod (4) assembly and secure them using the retaining rings (1).

SEAL, CRANKSHAFT OIL, FRONT

REMOVAL

REMOVAL

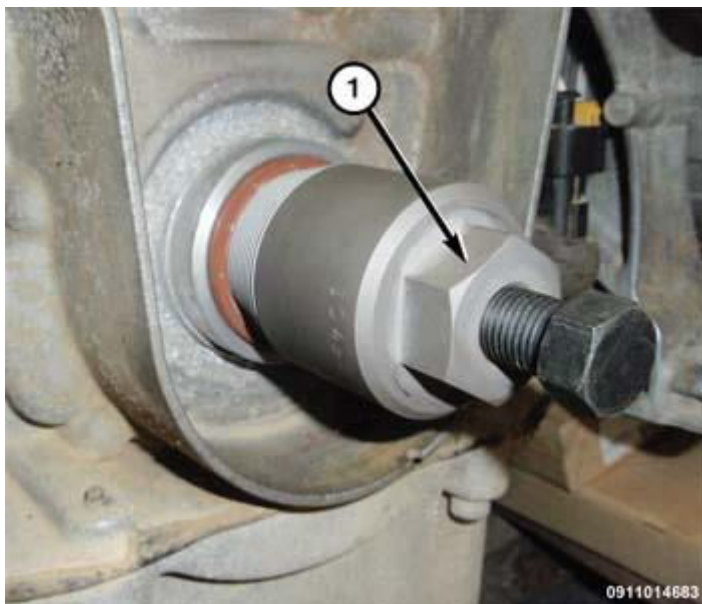


Fig. 173: Seal Remover Tool

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect negative battery cable.
2. Remove the vibration damper. Refer to **DAMPER, VIBRATION, REMOVAL** .
3. Using the (special tool #10498, Remover, Seal) (1), remove the front crankshaft seal.

INSTALLATION

INSTALLATION

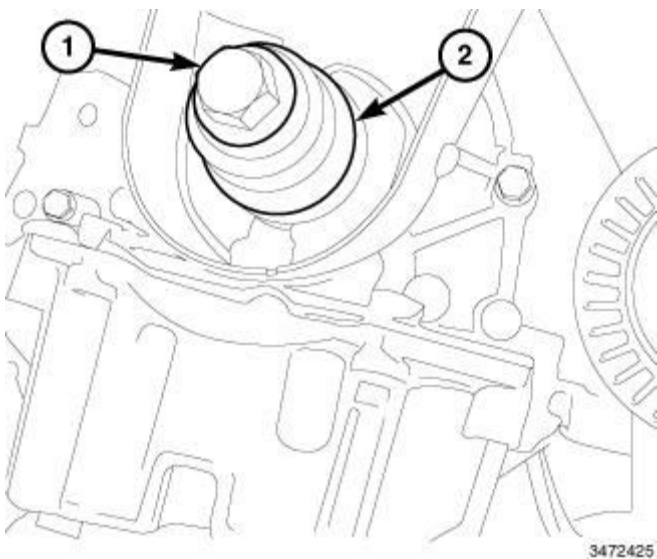


Fig. 174: Crankshaft Sprocket Bolt & Oil Seal

Courtesy of CHRYSLER GROUP, LLC

1. Position the new front crankshaft oil seal onto (special tool #20145, Installer, Crankshaft Front Oil Seal) tool.
2. Using the (special tool #20145, Installer, Crankshaft Front Oil Seal), install the front crankshaft oil seal (2) using the crankshaft sprocket bolt (1) to draw the seal in place.
3. Remove bolt (1) and the (special tool #20145, Installer, Crankshaft Front Oil Seal).
4. Install the vibration damper. Refer to **DAMPER, VIBRATION, INSTALLATION** .
5. Connect the negative battery cable.

SEAL, CRANKSHAFT OIL, REAR

REMOVAL

REMOVAL

1. Disconnect the negative battery cable.
2. On MTX models, remove the flywheel. Refer to **FLYWHEEL, REMOVAL** .

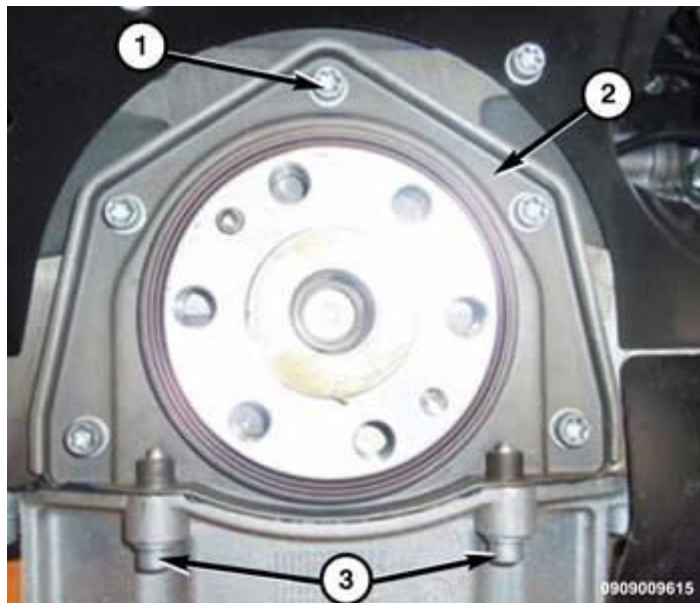


Fig. 175: Rear Crankshaft Oil Seal Carrier & Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Remove the five rear crankshaft oil seal carrier bolts (1).
4. Remove the two oil pan-to-rear crankshaft oil seal carrier bolts (3).
5. Using a suitable pry bar, remove the rear crankshaft oil seal (2).

INSTALLATION

INSTALLATION

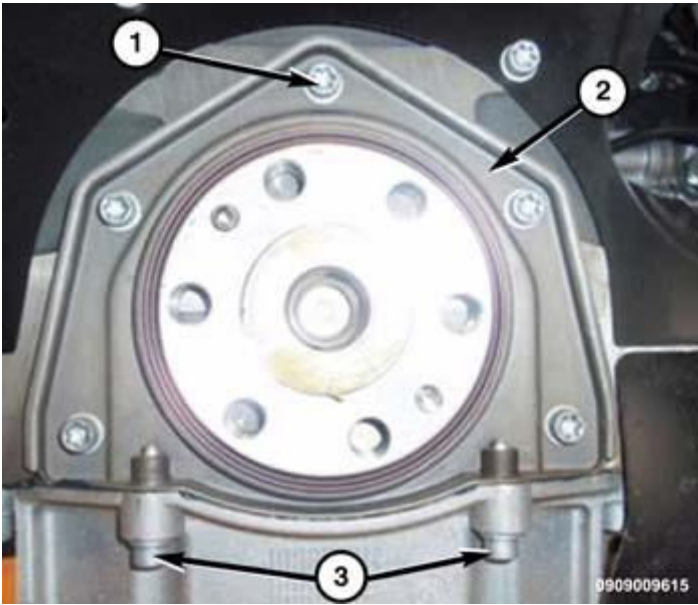


Fig. 176: Rear Crankshaft Oil Seal Carrier & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Clean any residues of sealant from the mating surface between the flywheel side oil seal cover and the crankcase oil pan.
2. Apply MS-GF-44B or equivalent RTV silicone sealant to the mating surface of the crankcase oil pan and the flywheel side oil seal cover. Refer to **ENGINE - STANDARD PROCEDURE** .
3. Install the rear crankshaft oil seal carrier (2). Tighten bolts (1, 3) to 9 N.m (80 in. lbs.).
4. On MTX models, install the flywheel. Refer to **FLYWHEEL, INSTALLATION** .
5. Connect the negative battery cable.

LUBRICATION

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - CHECKING ENGINE OIL PRESSURE

1. Disconnect and remove oil pressure switch. Refer to **SENSOR, OIL PRESSURE, REMOVAL** .
2. Install oil pressure gauge.
3. Start engine and record oil pressure. Refer to Specifications for correct oil pressure requirements. Refer to **SPECIFICATIONS - 2.0L DIESEL ENGINE** .

CAUTION: *If pressure is ZERO at curb idle, DO NOT run engine at 4000 RPM.

4. If oil pressure is 0 at idle, shut off engine. Check for a failed oil pressure regulator, a clogged oil pickup screen or a damaged oil pickup tube gasket.

5. Remove the oil pressure regulator and inspect the regulator and wire harness. Refer to **REGULATOR, OIL PRESSURE, REMOVAL**.
6. Remove oil pan and inspect for debris and repair as necessary. Refer to **PAN, OIL, REMOVAL**.
7. After test is complete, remove test gauge and fitting.
8. Install oil pressure switch. Refer to **SENSOR, OIL PRESSURE, INSTALLATION**.

FILTER, ENGINE OIL

REMOVAL

REMOVAL

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove the bellypan. Refer to **BELLY PAN, REMOVAL**.

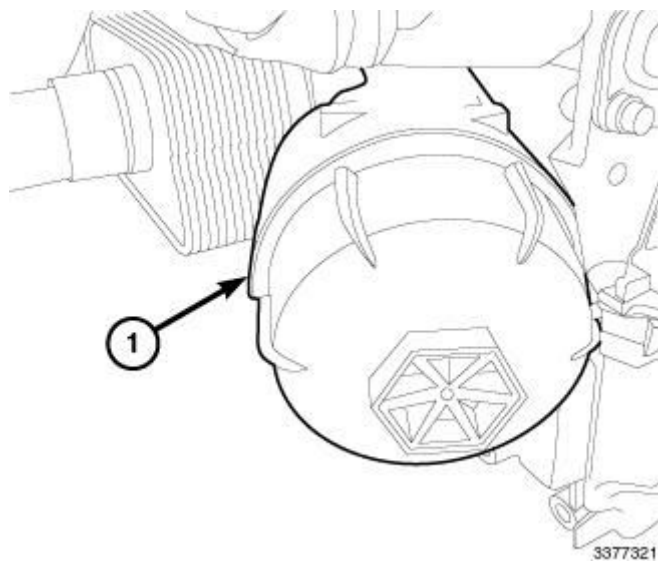
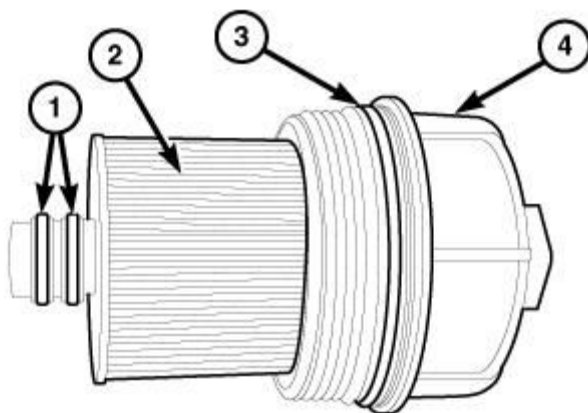


Fig. 177: Oil Filter Housing
Courtesy of CHRYSLER GROUP, LLC

3. Remove oil filter housing cover (1).



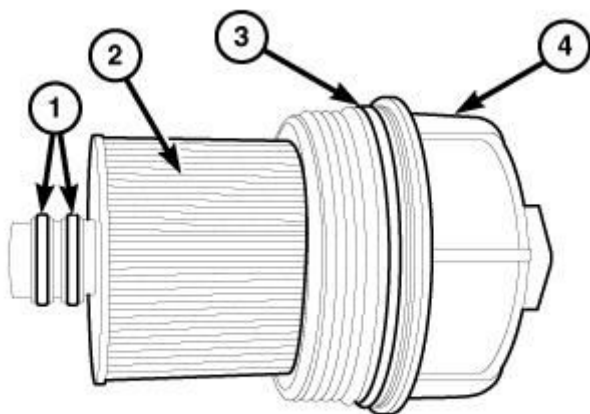
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Fig. 178: O-Ring Seals, Oil Filter Cartridge, O-Ring & Cover
Courtesy of CHRYSLER GROUP, LLC

4. Pull the oil filter cartridge (2) out of the filter housing cover (4) and discard.

INSTALLATION

INSTALLATION



3458264

Fig. 179: O-Ring Seals, Oil Filter Cartridge, O-Ring & Cover
Courtesy of CHRYSLER GROUP, LLC

1. Lubricate and install new O-ring (3) onto cover (4).
2. position the oil filter cartridge (2) into cover and lubricate O-ring seals (1).

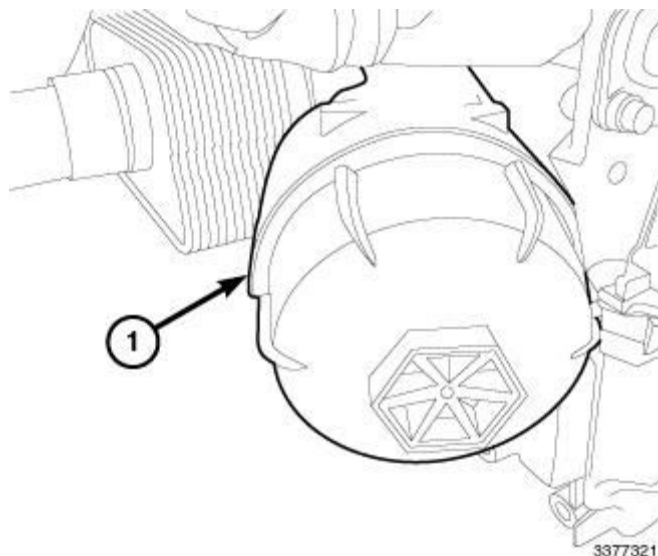


Fig. 180: Oil Filter Housing

Courtesy of CHRYSLER GROUP, LLC

3. Install oil filter housing cover. Tighten cover to 25 N.m (18 ft. lbs.).
4. Install the bellypan. Refer to **BELLY PAN, INSTALLATION** .
5. Lower the vehicle.

HOUSING, OIL FILTER

REMOVAL

REMOVAL

1. Disconnect the negative battery cable.
2. Raise and support the vehicle Refer to **HOISTING, STANDARD PROCEDURE** .
3. Drain the cooling system. Refer to **STANDARD PROCEDURE** .

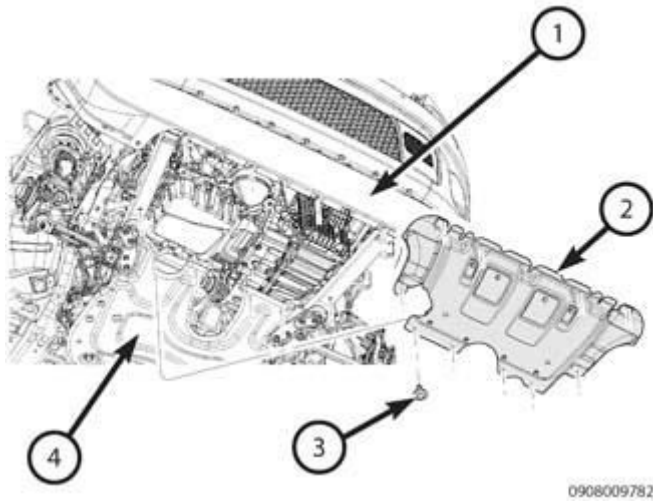


Fig. 181: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

4. Remove bolts (3) and the belly pan (2).
5. Remove the serpentine belt. Refer to **BELT, SERPENTINE, REMOVAL** .
6. Remove the right front half shaft and intermediate shaft. Refer to **REMOVAL** .

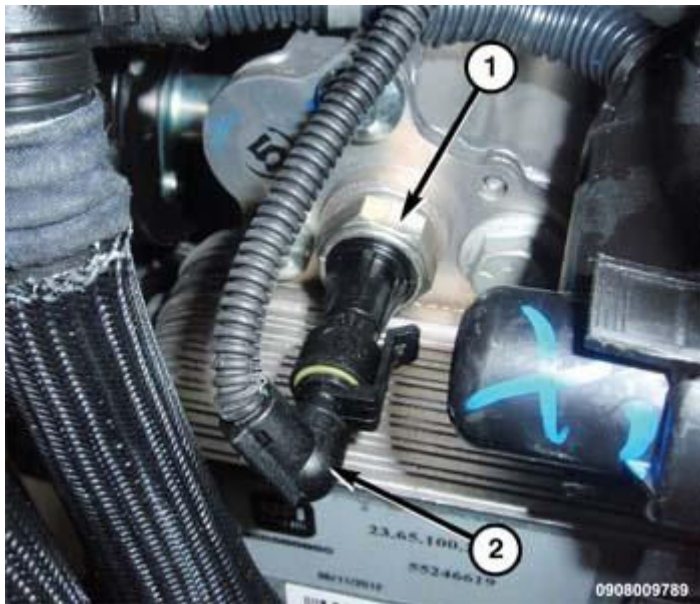


Fig. 182: Oil Pressure Sensor 1/1 & Wire Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

7. Disconnect oil pressure sensor 1/1 wire harness connectors (2).

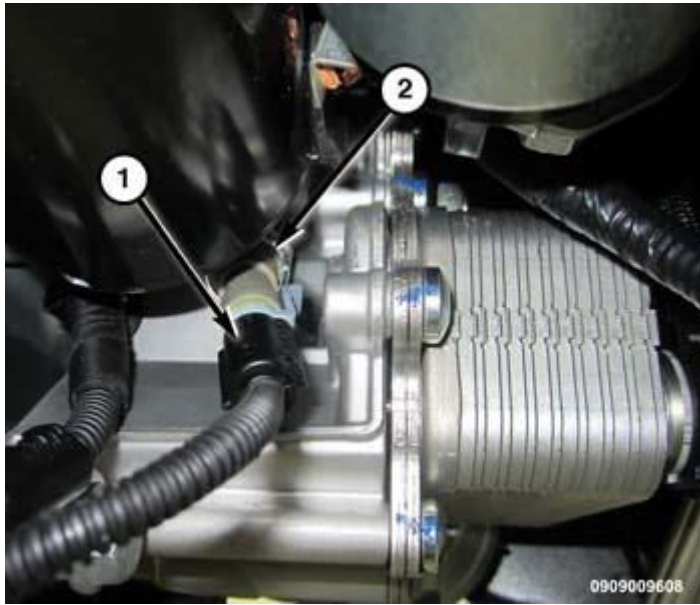


Fig. 183: Oil Pressure Sensor 1/2 & Wire Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

8. Disconnect oil pressure sensor 1/2 wire harness connectors (1).

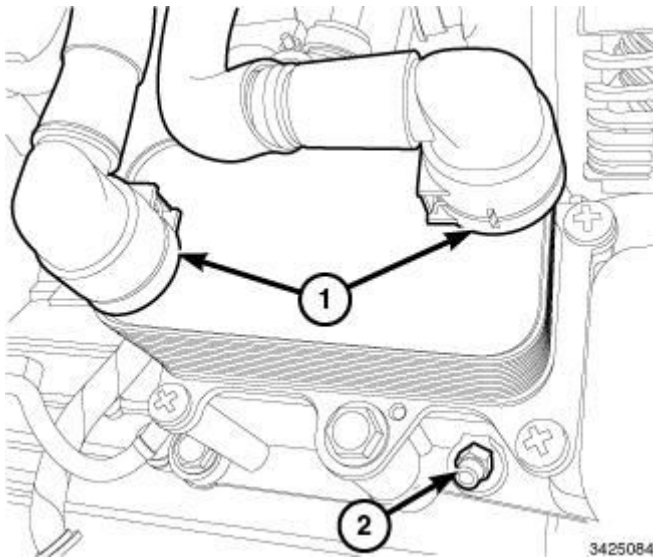


Fig. 184: Oil Cooler Hoses & Drain Valve
Courtesy of CHRYSLER GROUP, LLC

9. Disconnect both oil cooler hoses (1).
10. Open drain valve (2) to drain the oil filter housing and securely tighten drain valve.

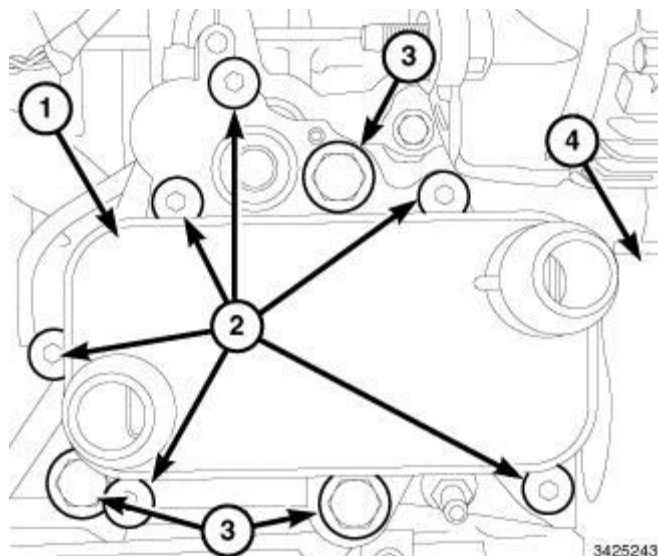


Fig. 185: Engine Oil Cooler, Oil Filter Housing & Bolts
Courtesy of CHRYSLER GROUP, LLC

11. Remove bolts (3) and the oil filter/cooler housing (1).

INSTALLATION

INSTALLATION

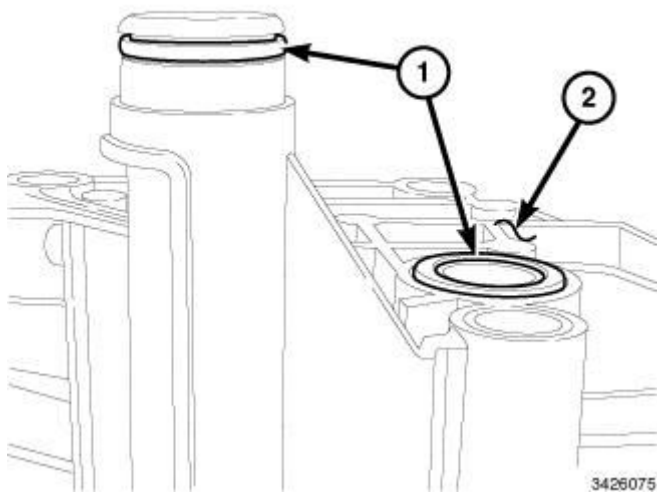


Fig. 186: Oil Filter Housing & O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

1. Clean the gasket sealing surfaces.
2. Install new O-ring seal (1) onto the oil filter housing (2).

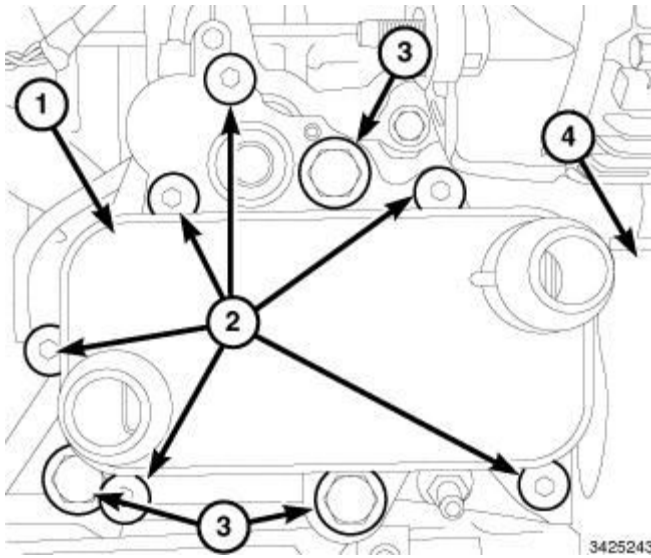


Fig. 187: Engine Oil Cooler, Oil Filter Housing & Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Install oil filter/cooler housing (1). Tighten bolts (3) to 30 N.m (22 ft. lbs.).

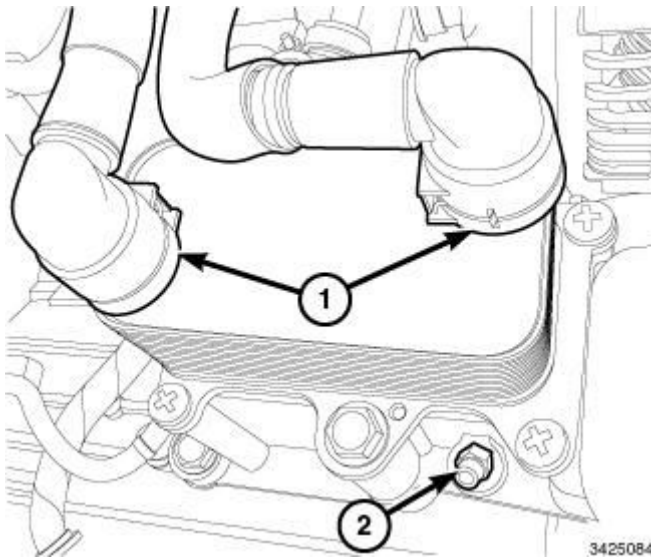


Fig. 188: Oil Cooler Hoses & Drain Valve
Courtesy of CHRYSLER GROUP, LLC

4. Connect both oil cooler hoses (1).

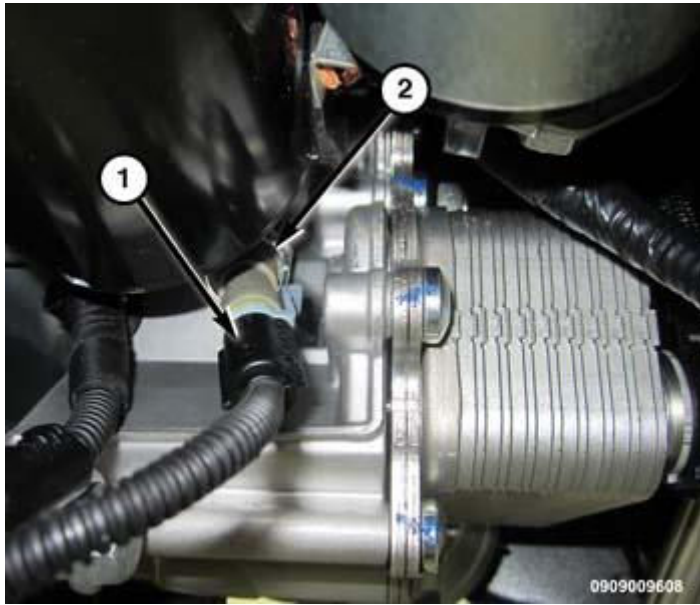


Fig. 189: Oil Pressure Sensor 1/2 & Wire Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

5. Connect oil pressure sensor 1/2 wire harness connectors (1).

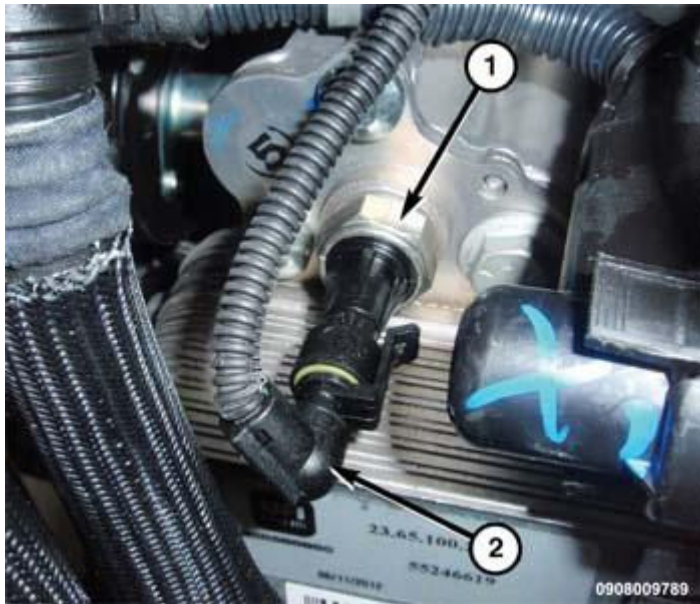


Fig. 190: Oil Pressure Sensor 1/1 & Wire Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

6. Connect oil pressure sensor 1/1 wire harness connectors (2).
7. Install the right front half shaft and intermediate shaft. Refer to **INSTALLATION** .
8. Install the serpentine belt. Refer to **BELT, SERPENTINE, INSTALLATION** .

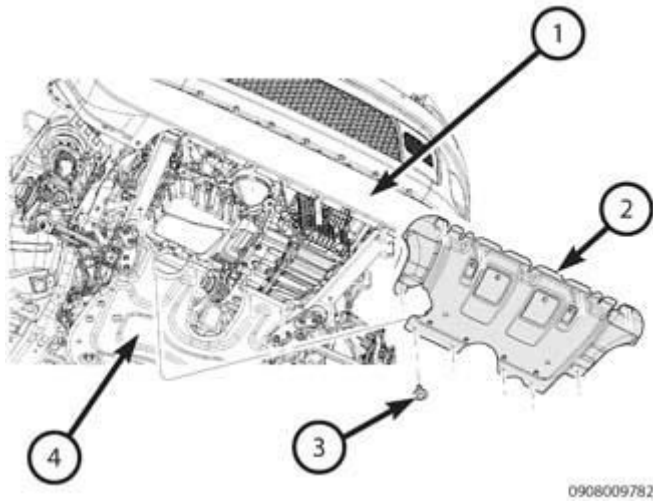


Fig. 191: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

9. Install the belly pan (2) and securely tighten bolts (3).
10. Fill the cooling system. Refer to **STANDARD PROCEDURE** .
11. Lower the vehicle.
12. Connect the negative battery cable.

OIL

STANDARD PROCEDURE

STANDARD PROCEDURE - ENGINE OIL AND FILTER CHANGE

WARNING: New or used engine oil can be irritating to the skin. Avoid prolonged or repeated skin contact with engine oil. Contaminants in used engine oil, caused by internal combustion, can be hazardous to your health. Thoroughly wash exposed skin with soap and water. Do not wash skin with gasoline, diesel fuel, thinner, or solvents, health problems can result. Do not pollute, dispose of used engine oil properly. Contact your dealer or government agency for location of collection center in your area.

Change engine oil at mileage and time intervals described in the Maintenance Schedule. Refer to **MAINTENANCE SCHEDULES, DESCRIPTION** .

1. Run engine until achieving normal operating temperature.
2. Position the vehicle on a level surface and turn engine off.
3. Remove oil fill cap.
4. Raise vehicle on hoist. Refer to **HOISTING, STANDARD PROCEDURE** .

5. Place a suitable oil collecting container under oil pan drain plug.

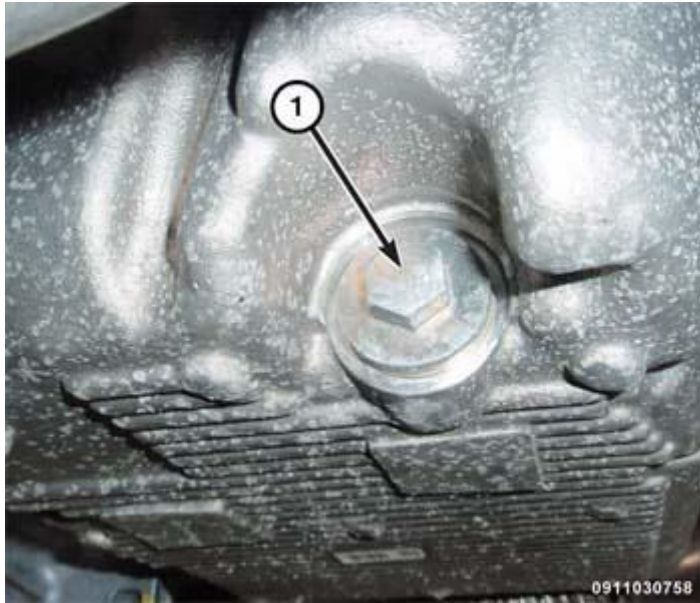


Fig. 192: Oil Pan Drain Plug
Courtesy of CHRYSLER GROUP, LLC

6. Remove oil pan drain plug (1) or and allow oil to drain into collecting container. Inspect drain plug threads for stretching or other damage. Replace drain plug and gasket if damaged.
7. Remove the oil filter. Refer to **FILTER, ENGINE OIL, REMOVAL** .
8. Install oil pan drain plug (1) and tighten to 25 N.m (18 ft. lbs.).
9. Install new oil filter. Refer to **FILTER, ENGINE OIL, INSTALLATION** .
10. Lower vehicle and fill crankcase with specified type and amount of engine oil . Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** and **CAPACITIES AND RECOMMENDED FLUIDS, DESCRIPTION** .
11. Install oil fill cap.
12. Start engine and inspect for leaks.
13. Stop engine and inspect oil level.

OIL FILTER SPECIFICATION

All engines are equipped with a high quality full-flow, disposable type oil filter. Replace oil filter with a Mopar® oil filter or the equivalent.

USED ENGINE OIL DISPOSAL

Care should be exercised when disposing used engine oil after it has been drained from a vehicle engine. Refer to the WARNING under **STANDARD PROCEDURE - ENGINE OIL AND FILTER CHANGE**.

PAN, OIL

REMOVAL

REMOVAL

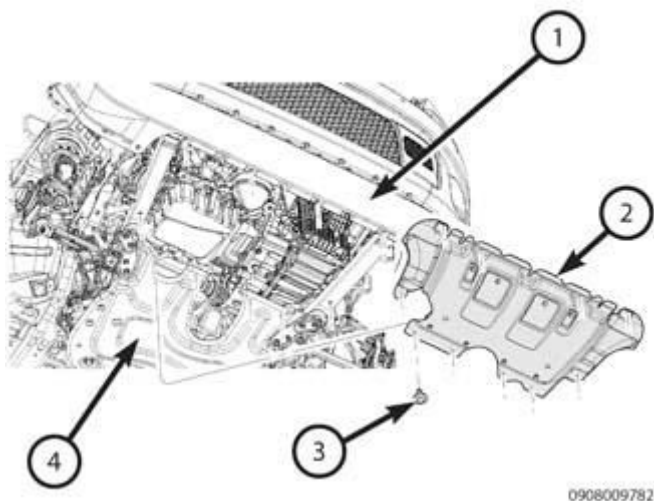


Fig. 193: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Raise vehicle on hoist. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Remove bolts (3) and the belly pan (2).
4. Drain engine oil using a new sealing washer tighten drain plug to 25 N.m (18 ft. lbs.).
5. Remove fasteners and the oil dipstick.

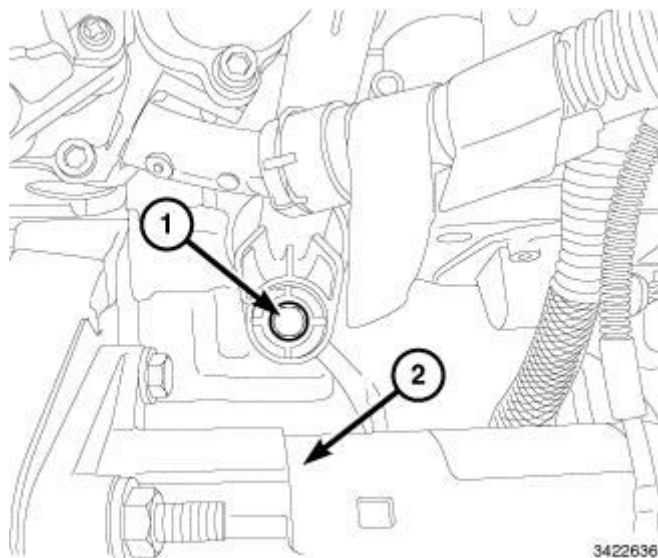


Fig. 194: CCV Housing Lower Bolt & Starter
Courtesy of CHRYSLER GROUP, LLC

6. Remove the starter (2). Refer to **STARTER, REMOVAL**.

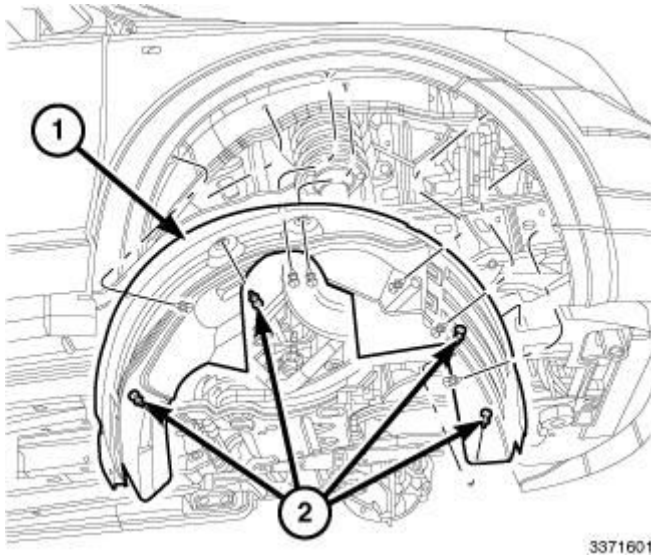


Fig. 195: Inner Fender Splash Shield
Courtesy of CHRYSLER GROUP, LLC

7. Remove retainers (2) and the right inner fender splash shield (1).
8. Remove the right halfshafts and intermediate shaft. Refer to **REMOVAL**.

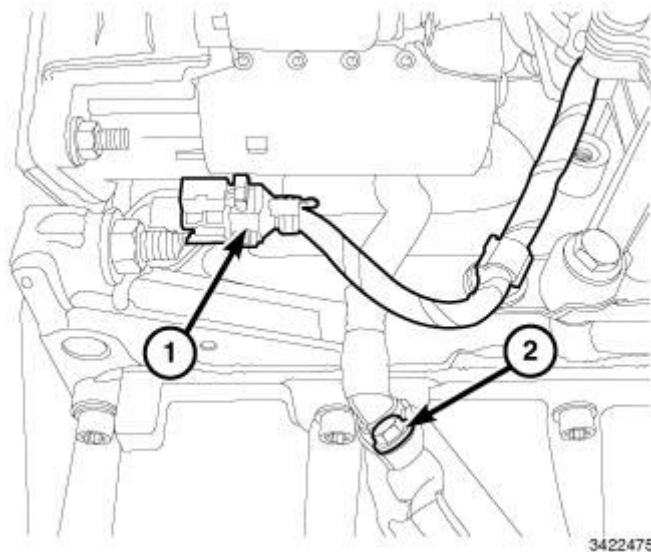


Fig. 196: Crankshaft Position Sensor Harness Connector & CCV Tube Bolt
Courtesy of CHRYSLER GROUP, LLC

9. Disconnect the Crankshaft Position (CKP) Sensor wire harness connector (1).
10. Remove bolt (2) and the lower CCV tube.
11. Remove the rear mount (2). Refer to **INSULATOR, ENGINE MOUNT, REAR, REMOVAL**.
12. Remove the cowl panel cover. Refer to **COVER, COWL PANEL, REMOVAL**.

13. Support the engine using the (special tool #8534B, Fixture, Driveline Support).
14. On MTX models, remove the flywheel. Refer to **FLYWHEEL, REMOVAL** .

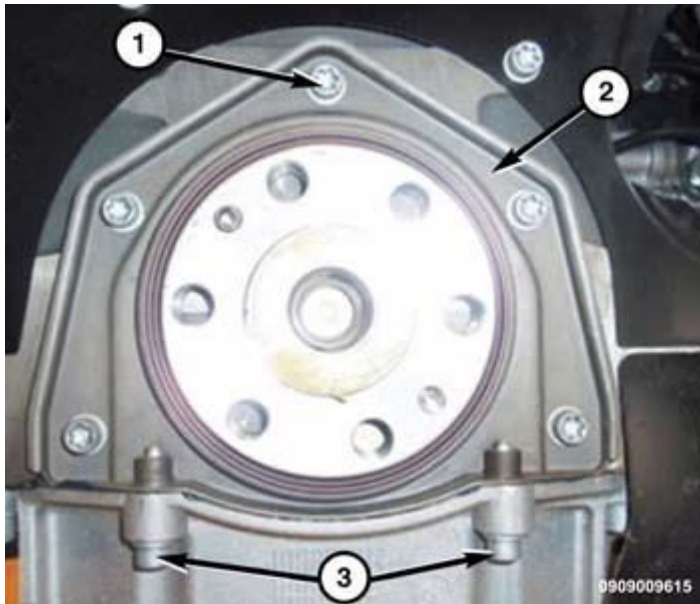


Fig. 197: Rear Crankshaft Oil Seal Carrier & Bolts
Courtesy of CHRYSLER GROUP, LLC

15. Remove the oil pan-to-front cover bolts.
16. Remove the two oil pan-to-rear oil seal carrier bolts (3).

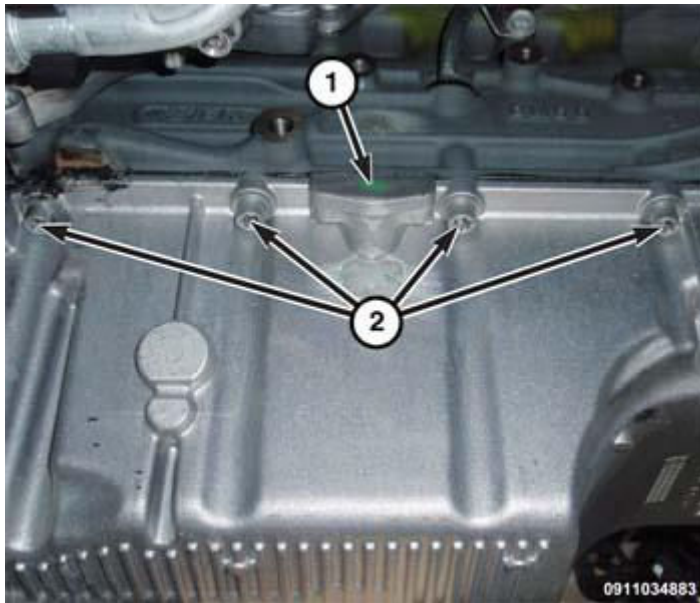


Fig. 198: Oil Pan & Bolts
Courtesy of CHRYSLER GROUP, LLC

17. Remove the oil pan bolts (2).
18. Remove oil pan by prying off with suitable pry bar.

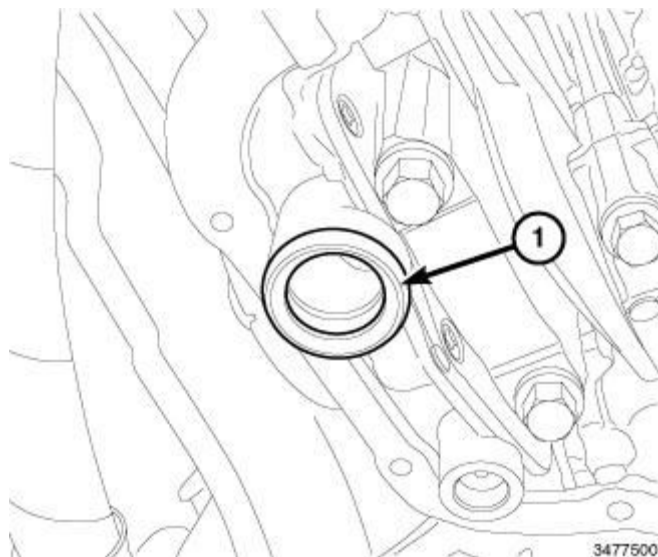


Fig. 199: Oil Pump Intake Gasket
Courtesy of CHRYSLER GROUP, LLC

19. Remove the oil pump intake connector gasket.
20. Clean oil pan and engine block sealing surfaces.

INSTALLATION

INSTALLATION

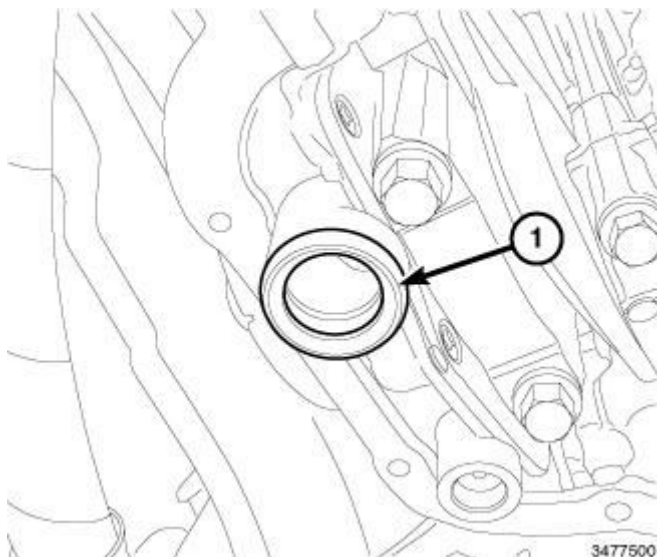
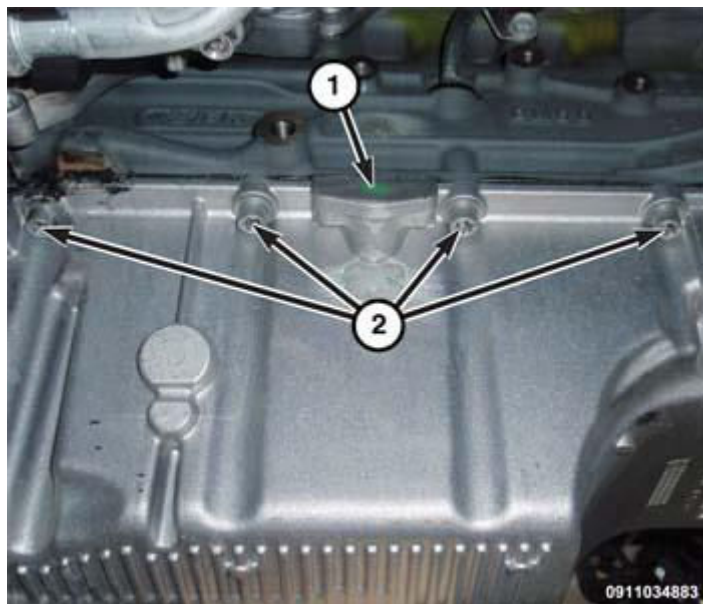


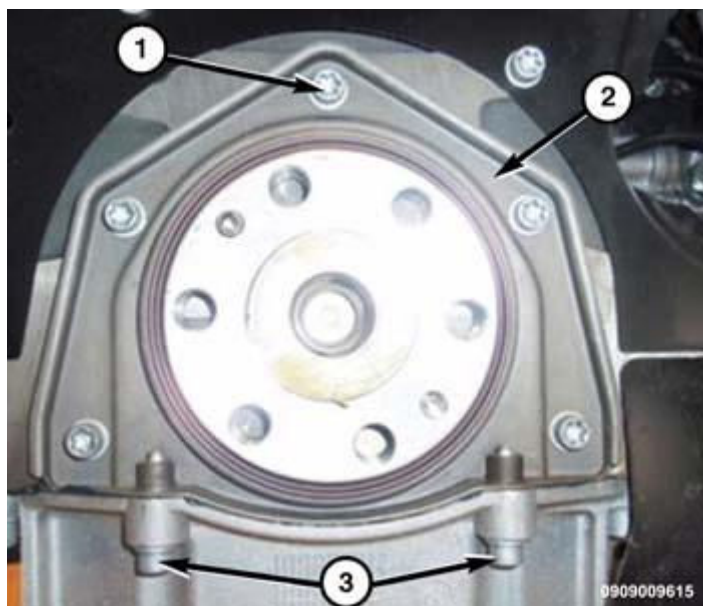
Fig. 200: Oil Pump Intake Gasket
Courtesy of CHRYSLER GROUP, LLC

1. Clean oil pan and all sealing surfaces. Refer to **ENGINE - STANDARD PROCEDURE** .
2. Install a new gasket (1) onto the oil pump intake.
3. Apply a 3 mm bead of Engine Sealant RTV MS-GF-44B or equivalent to oil pan. Refer to **ENGINE - STANDARD PROCEDURE** .

**Fig. 201: Oil Pan & Bolts**

Courtesy of CHRYSLER GROUP, LLC

4. Install the oil pan (1). Tighten bolts (2) to 25 N.m (18 ft. lbs.).

**Fig. 202: Rear Crankshaft Oil Seal Carrier & Bolts**

Courtesy of CHRYSLER GROUP, LLC

5. Install the two oil pan-to-rear oil seal carrier bolts (3) and tighten to 8 N.m (71 in. lbs.).
6. Install the oil pan-to-front cover bolts and tighten to 8 N.m (71 in. lbs.).
7. On MTX models, install the flywheel. Refer to **FLYWHEEL, INSTALLATION** .
8. Remove the (special tool #8534B, Fixture, Driveline Support).
9. Install the cowl panel cover. Refer to **COVER, COWL PANEL, INSTALLATION** .
10. Install the rear mount (2). Refer to **INSULATOR, ENGINE MOUNT, REAR, INSTALLATION** .

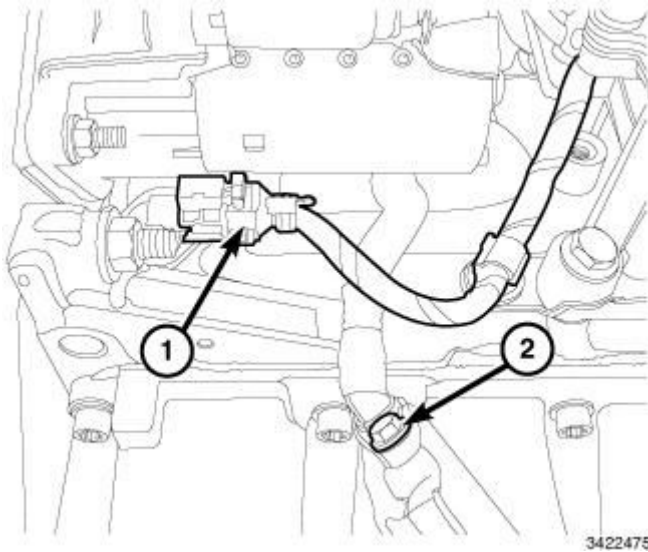


Fig. 203: Crankshaft Position Sensor Harness Connector & CCV Tube Bolt
Courtesy of CHRYSLER GROUP, LLC

11. Install the lower CCV tube. Tighten bolt (2) to 9 N.m 80 in. lbs.).
12. Connect the Crankshaft Position (CKP) Sensor wire harness connector (1).

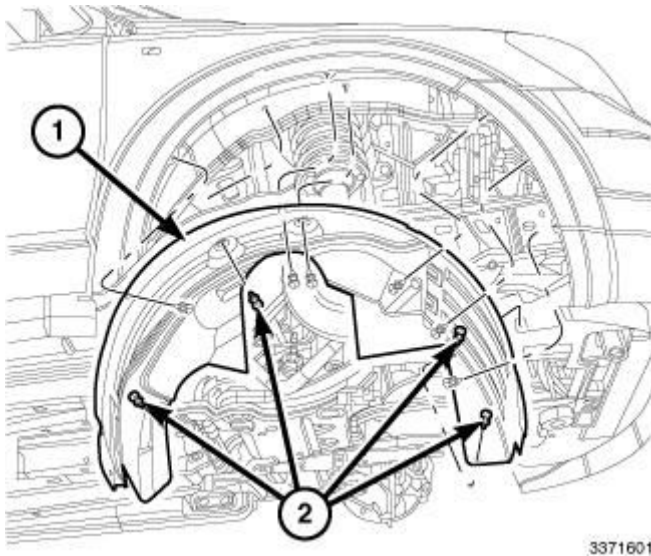


Fig. 204: Inner Fender Splash Shield

Courtesy of CHRYSLER GROUP, LLC

13. Install the right intermediate shaft and halfshafts. Refer to **INSTALLATION** .
14. Position the right inner fender splash shield (1) and install retainers (2).

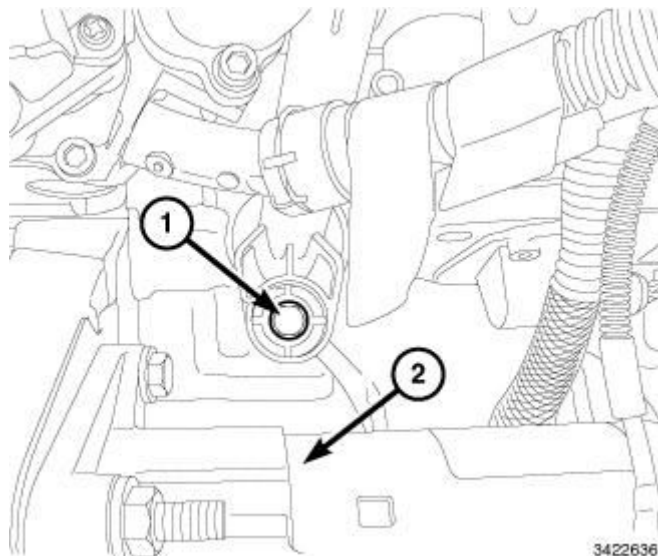


Fig. 205: CCV Housing Lower Bolt & Starter
Courtesy of CHRYSLER GROUP, LLC

15. Install the starter (2). Refer to **STARTER, INSTALLATION** .

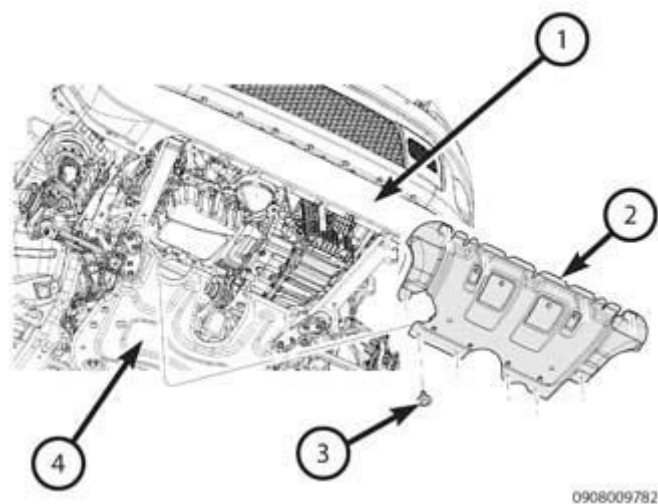


Fig. 206: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

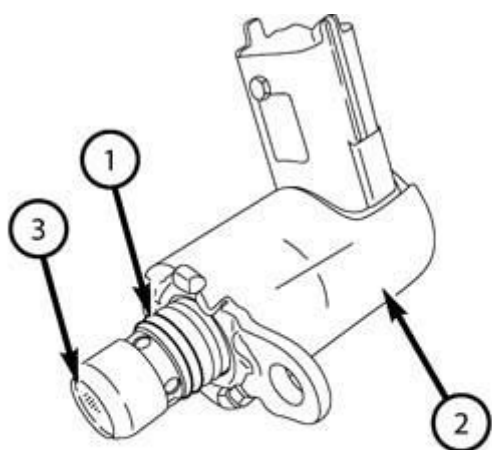
16. Install the oil dipstick tube and securely tighten fasteners.
17. Install the belly pan (2) and securely tighten bolts (3).

18. Lower the vehicle.
19. Fill the engine with recommended oil. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS**.
20. Connect the negative battery cable.
21. Start engine and check for leaks.

REGULATOR, OIL PRESSURE

DESCRIPTION

DESCRIPTION



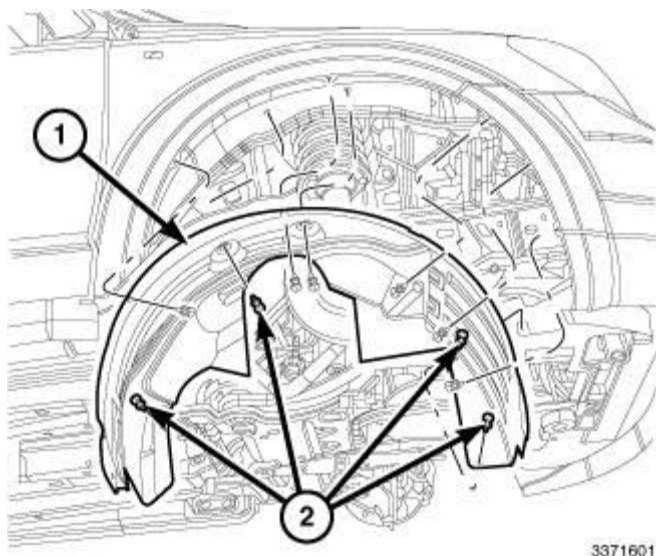
091174655

Fig. 207: Oil Pressure Regulator
Courtesy of CHRYSLER GROUP, LLC

The oil pressure regulator (2) regulates oil pressure at the variable rate oil pump and is located on the engine front cover. The PCM energize the Variable Oil Pump Solenoid to increase the oil pressure to the upper limit.

REMOVAL

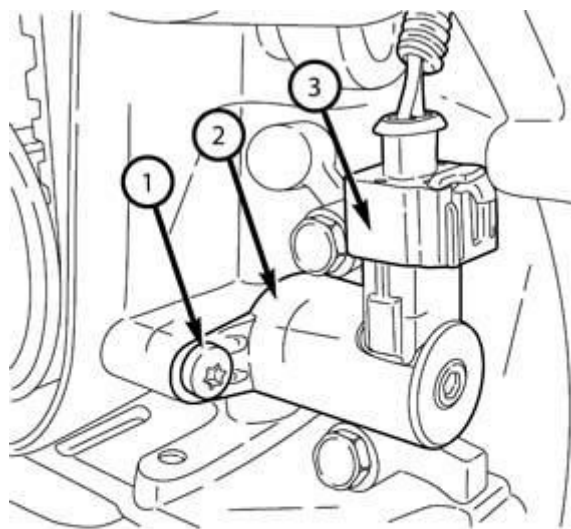
REMOVAL



3371601

Fig. 208: Inner Fender Splash Shield
Courtesy of CHRYSLER GROUP, LLC

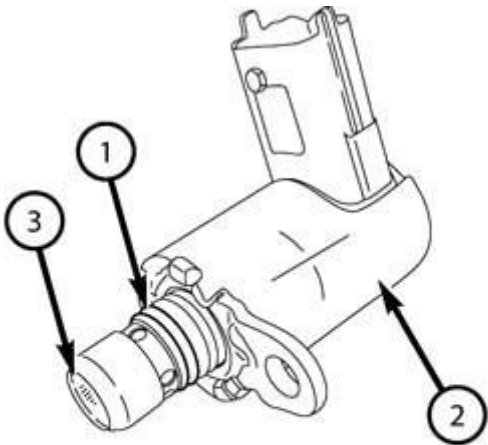
1. Disconnect and isolate the negative battery cable.
2. Remove the right front wheel and tire Refer to **REMOVAL** .
3. Remove fasteners (2) and the right inner fender splash shield (2).



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Fig. 209: Oil Pressure Regulator, Bolt & Connector
Courtesy of CHRYSLER GROUP, LLC

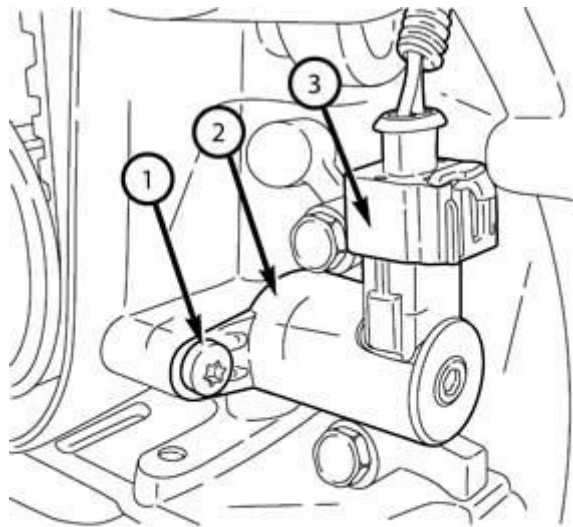
4. Disconnect oil pressure regulator wire harness connector (3).
5. Remove bolt (1) and oil pressure regulator (2).

INSTALLATION**INSTALLATION**

091174655

Fig. 210: Oil Pressure Regulator**Courtesy of CHRYSLER GROUP, LLC**

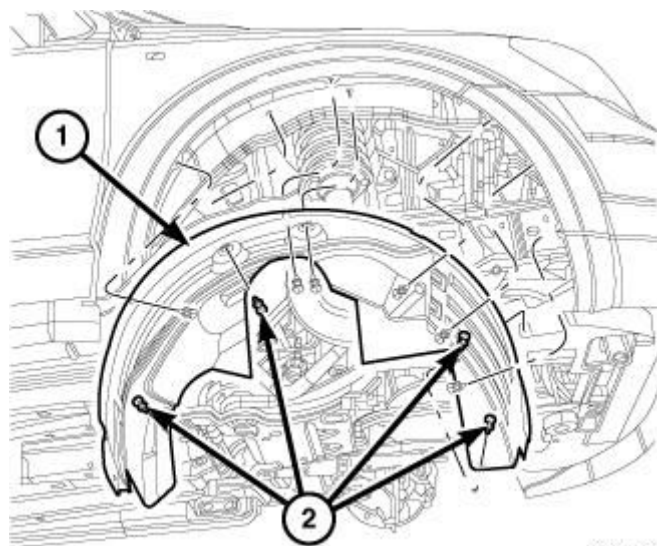
1. Replace the oil pressure regulator O-ring seal (1) and clean and inspect the inlet screen (3).



091174654

Fig. 211: Oil Pressure Regulator, Bolt & Connector
Courtesy of CHRYSLER GROUP, LLC

2. Install oil pressure regulator (3) and tighten bolt (1) to 25 N.m (18 ft. lbs.).
3. Connect oil pressure regulator wire harness connector (3).



3371601

Fig. 212: Inner Fender Splash Shield
Courtesy of CHRYSLER GROUP, LLC

4. Install the right inner fender splash shield (1) and fasteners (2).
5. Install the right front wheel and tire. Refer to **INSTALLATION**.

6. Connect the negative battery cable.

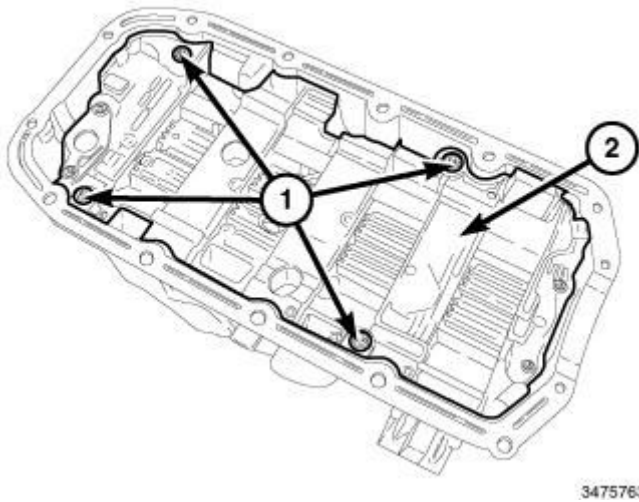
PICK-UP, OIL PUMP**REMOVAL****REMOVAL**

Fig. 213: Crankcase Oil Pickup Tube/Anti-Splash Shield & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the oil pan. Refer to **PAN, OIL, REMOVAL**.
3. Remove bolts (1) and the crankcase oil pickup tube/anti-splash shield (2) from oil pan.

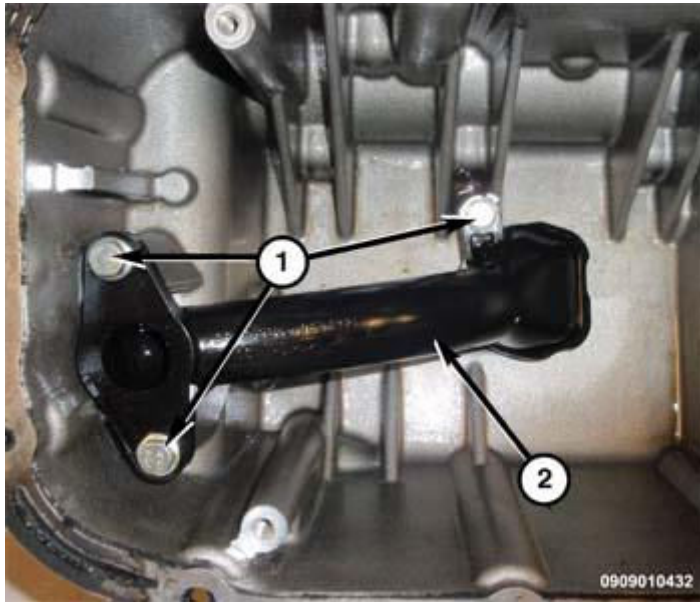


Fig. 214: Oil Pickup Tube & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Remove bolts (1) and the oil pickup tube (2).

INSTALLATION

INSTALLATION

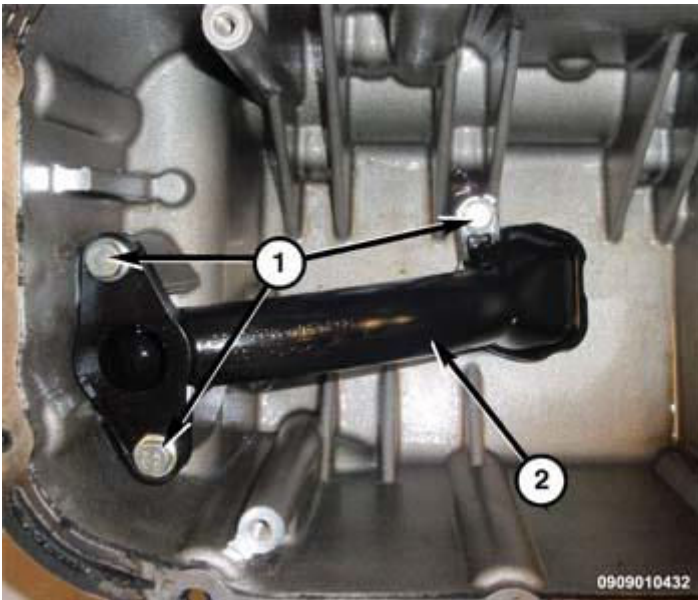


Fig. 215: Oil Pickup Tube & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Clean the gasket mating surfaces.

2. Install the oil pickup tube (2) and securely tighten bolts (1).

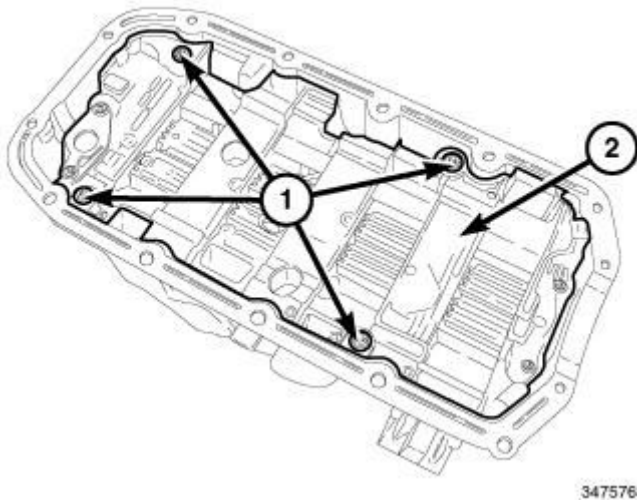


Fig. 216: Crankcase Oil Pickup Tube/Anti-Splash Shield & Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Install the crankcase oil pickup tube/anti-splash shield (2) into oil pan and securely tighten bolts (1).
4. Install the oil pan. Refer to **PAN, OIL, INSTALLATION**.
5. Connect the negative battery cable.

PUMP, ENGINE OIL

REMOVAL

REMOVAL

NOTE: The oil pump is part of the front engine cover and if diagnosis has lead you to replace the oil pump then the front engine cover needs to be replaced.

1. Disconnect the negative battery cable.
2. Remove the front engine cover. Refer to **COVER, ENGINE, FRONT, REMOVAL**.

INSTALLATION

INSTALLATION

1. Install the front engine cover. Refer to **COVER, ENGINE, FRONT, INSTALLATION**.
2. Connect the negative battery cable.

SENSOR, OIL PRESSURE

DESCRIPTION

DESCRIPTION

There are two oil pressure switch is located on the backside of the engine attached to the oil cooler housing. The oil pressure switch is a pressure sensitive switch that is activated by the engine's oil pressure (in the main oil gallery). The switch is a single terminal device.

OPERATION

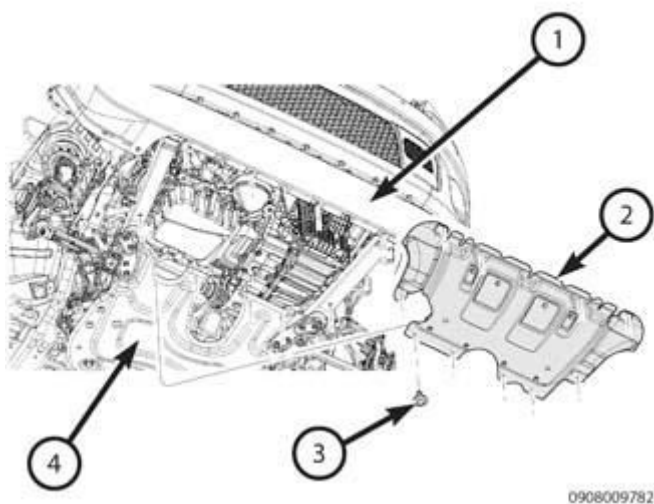
OPERATION

The Powertrain Control Module sends a pull up signal to both Oil Pressure Switches. The Oil Pressure Switches are normally closed (connected to ground) with no oil pressure. When oil pressure surpasses a certain threshold for each switch, the switch becomes open. The PCM interprets the Oil Pressure Switch inputs as follows in the chart below.

Oil Pressure Switch inputs to PCM		
Oil Pressure Switch 1	Oil Pressure Switch 2	PCM INTERPRETATION
Closed	Closed	Oil Pressure below 0.5 bar (7.25 psi)
Open	Closed	Oil pressure between 0.5 bar (7.25 psi) and 1.5 bar (21.75 psi)
Open	Open	Oil pressure above 1.5 bar (21.75 psi)
Closed	Open	switches implausible

REMOVAL

OIL PRESSURE SWITCH 1



0908009782

Fig. 217: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

NOTE: Engine Oil Cooler Hoses Removed for Clarity.

1. Disconnect the negative battery cable.
2. Remove bolts (3) and the belly pan (2).

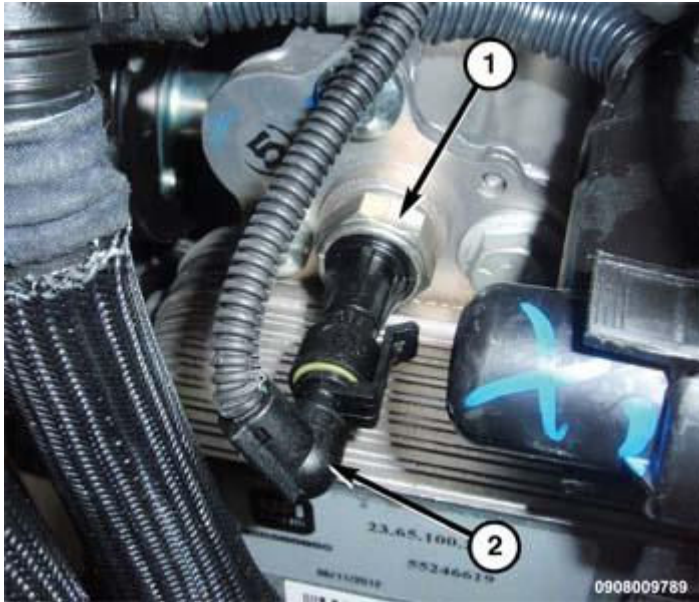


Fig. 218: Oil Pressure Sensor 1/1 & Wire Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect oil pressure sensor harness connector (2).
4. Remove oil pressure sensor (1).

OIL PRESSURE SWITCH 2

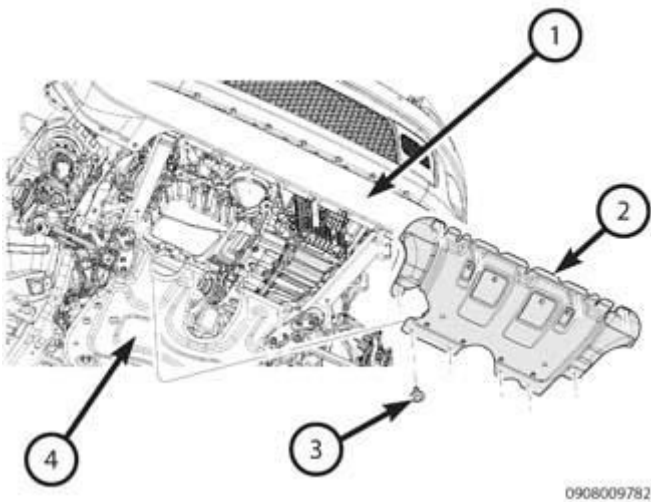


Fig. 219: Removing/Installing Starter

Courtesy of CHRYSLER GROUP, LLC

NOTE: **Engine Oil Cooler Hoses Removed for Clarity.**

1. Disconnect the negative battery cable.
2. Remove bolts (3) and the belly pan (2).

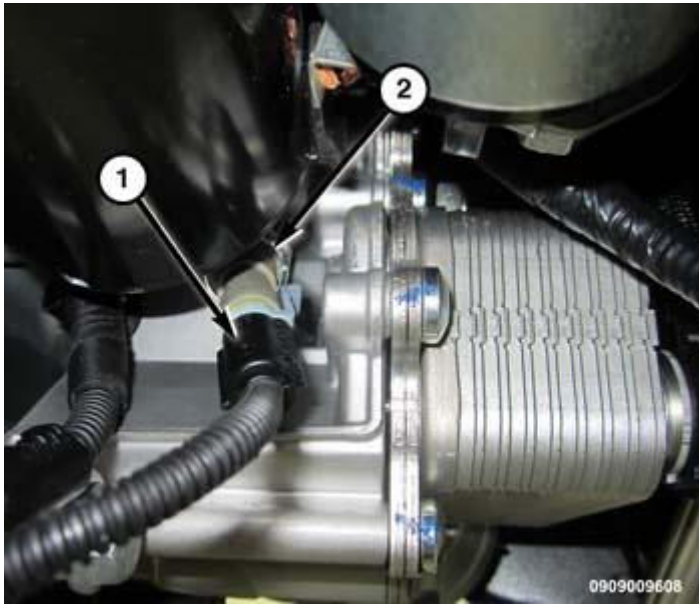


Fig. 220: Oil Pressure Sensor 1/2 & Wire Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect oil pressure sensor wire harness connector (1).
4. Remove the oil pressure sensor (2).

INSTALLATION

OIL PRESSURE SWITCH 1

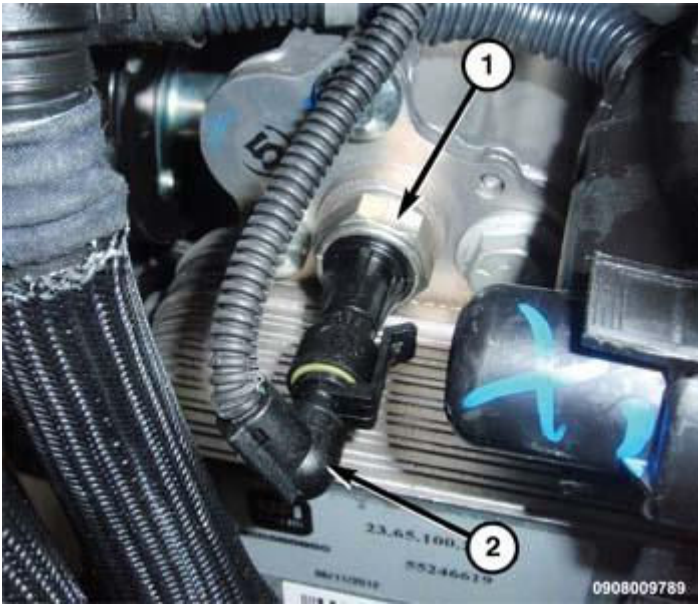


Fig. 221: Oil Pressure Sensor 1/1 & Wire Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

NOTE: Engine Oil Cooler Hoses Removed for Clarity.

1. Install oil pressure sensor (1) and tighten to 23 N.m (17 ft. lbs.).
2. Connect oil pressure sensor harness connector (2).

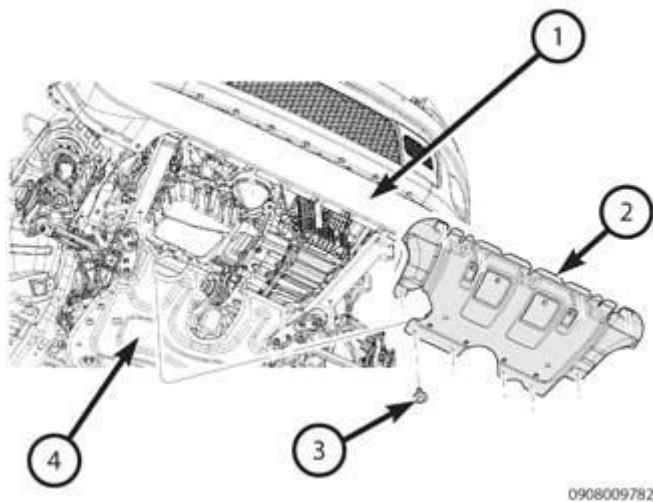


Fig. 222: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

3. Install the belly pan (2) and securely tighten bolts (3).
4. Connect the negative battery cable.

OIL PRESSURE SWITCH 2

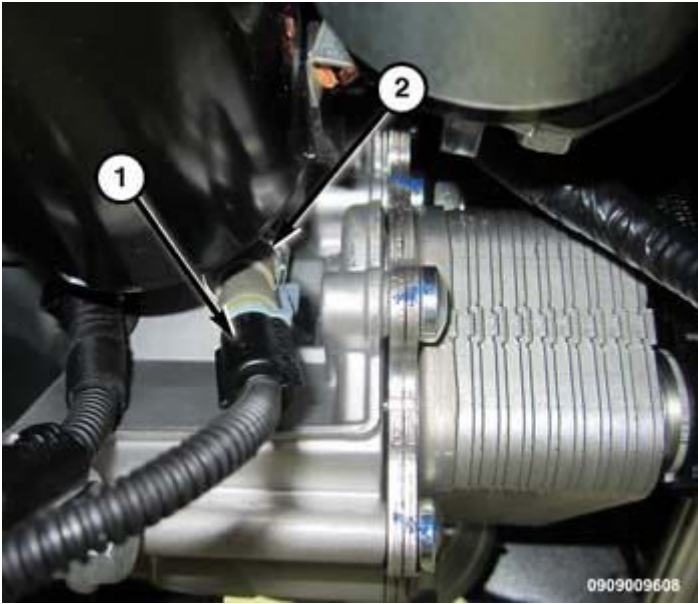


Fig. 223: Oil Pressure Sensor 1/2 & Wire Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

NOTE: Engine Oil Cooler Hoses Removed for Clarity.

1. Install oil pressure sensor (2) and tighten to 23 N.m (17 in. lbs.).
2. Connect oil pressure sensor wire harness connector (1).

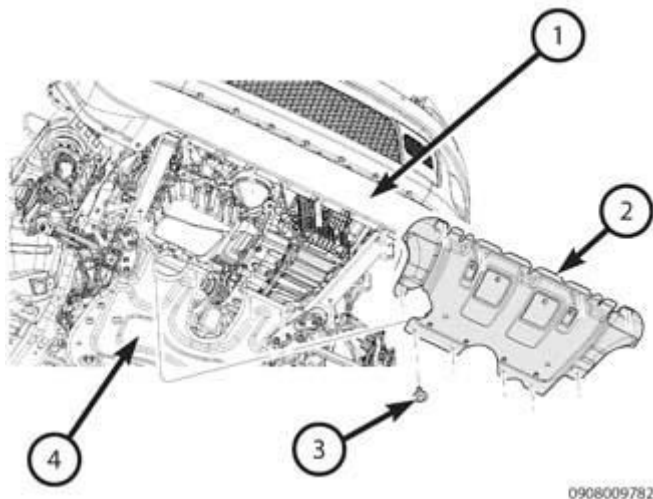


Fig. 224: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

3. Install the belly pan (2) and securely tighten bolt (3).

4. Connect the negative battery cable.

VALVE TIMING

BELT AND SPROCKETS, TIMING

REMOVAL

CAMSHAFT SPROCKET

1. Disconnect the negative battery cable.
2. Remove timing belt (1). Refer to **BELT, TIMING, REMOVAL**.
3. Assemble the (special tool #6847, Holder, Camshaft Sprocket) and (special tool #10494, Pins, Holding).

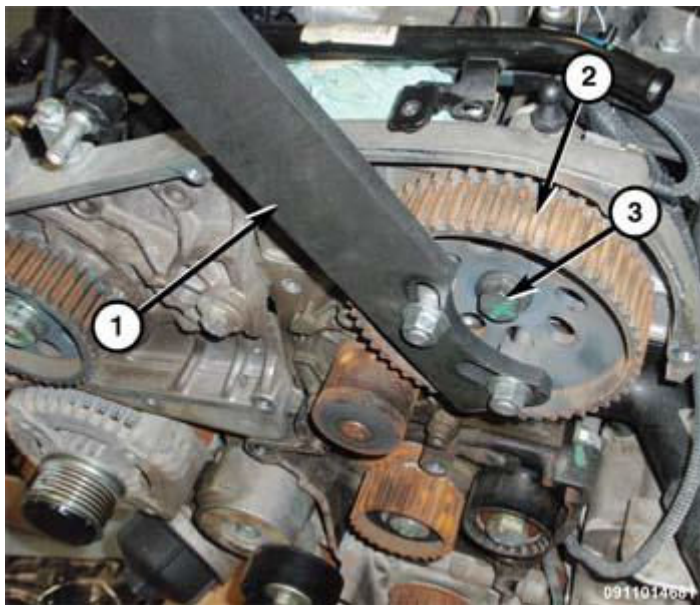


Fig. 225: Camshaft Sprocket Holder Tool, Camshaft Sprocket & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Using the Camshaft Sprocket Holder Tool 6847 and Pins 104294 (1) to hold camshaft sprocket, remove bolt (3) and the camshaft sprocket (2).

CRANKSHAFT SPROCKET

1. Disconnect the negative battery cable.
2. Remove the timing belt (1). Refer to **BELT, TIMING, REMOVAL**.
3. Remove the nuts and the flywheel lower guard.

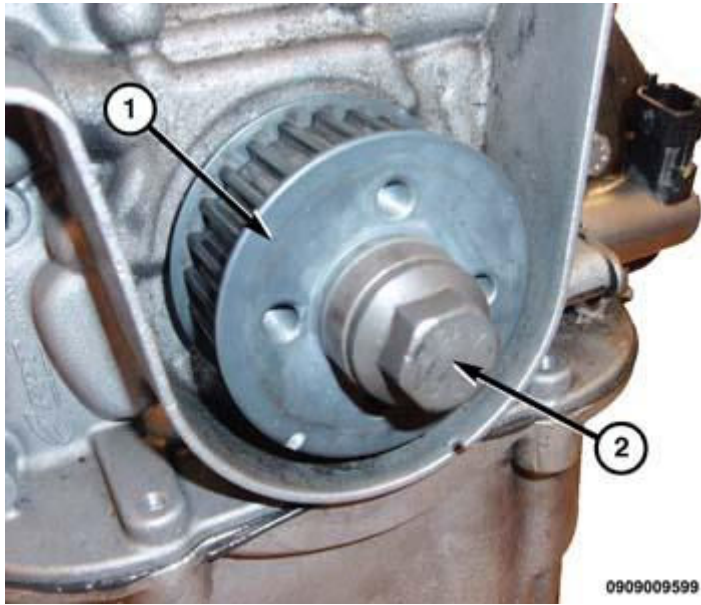


Fig. 226: Camshaft Sprocket & Bolt
Courtesy of CHRYSLER GROUP, LLC

NOTE: The crankshaft sprocket bolt is a left handed thread.

4. Remove bolt (2) and the crankshaft sprocket (1).

INSTALLATION

CAMSHAFT SPROCKET

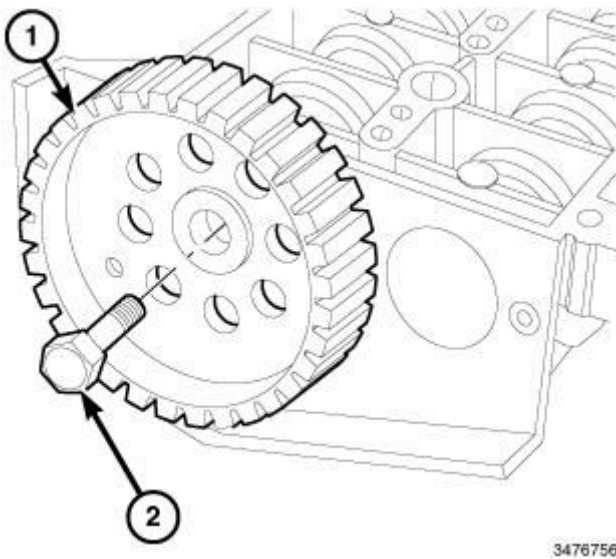


Fig. 227: Camshaft Timing Belt Sprocket & Bolt
Courtesy of CHRYSLER GROUP, LLC

1. Install the camshaft (1) sprocket and tighten bolt (2) finger tight.

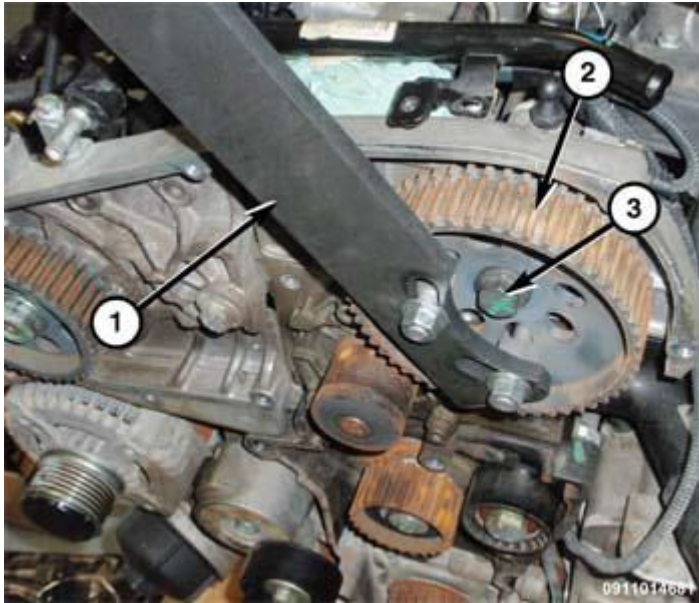


Fig. 228: Camshaft Sprocket Holder Tool, Camshaft Sprocket & Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Using the Camshaft Sprocket Holder Tool (special tool #6847, Holder, Camshaft Sprocket) and (special tool #10494, Pins, Holding) (1) to hold camshaft sprocket (2) and tighten the bolt (3) to 30 N.m (22 ft. lbs.) plus an additional 40° turn.
3. Install the timing belt (1). Refer to **BELT, TIMING, INSTALLATION**.
4. Connect the negative battery cable.

CRANKSHAFT SPROCKET

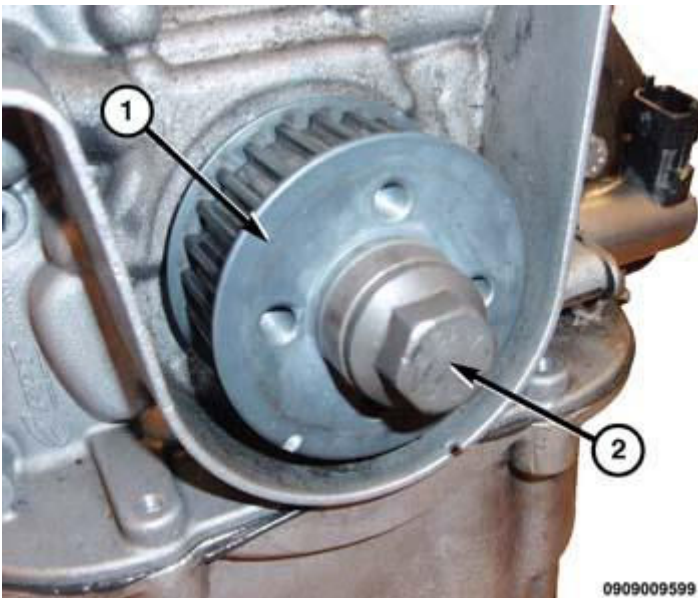


Fig. 229: Camshaft Sprocket & Bolt

Courtesy of CHRYSLER GROUP, LLC

NOTE: The crankshaft sprocket bolt is a left handed thread.

1. Install the crankshaft sprocket (1). Tighten bolt (2) to 340 N.m (251 ft. lbs.).
2. Install the flywheel lower guard and securely tighten the nuts.
3. Install the timing belt (1). Refer to **BELT, TIMING, INSTALLATION**.
4. Connect the negative battery cable.

BELT, TIMING

REMOVAL

REMOVAL

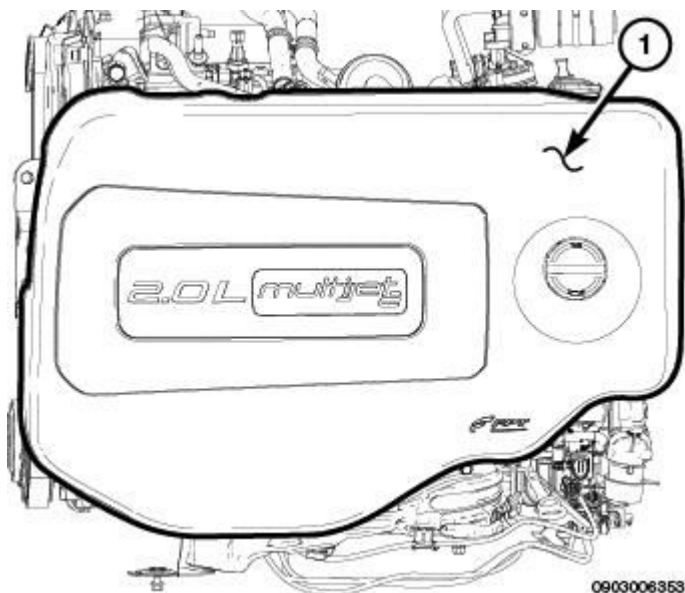


Fig. 230: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).
3. Remove the vibration damper. Refer to **DAMPER, VIBRATION, REMOVAL**.



Fig. 231: Upper Timing Cover Insulator
Courtesy of CHRYSLER GROUP, LLC

4. Remove the upper timing cover insulator (1).

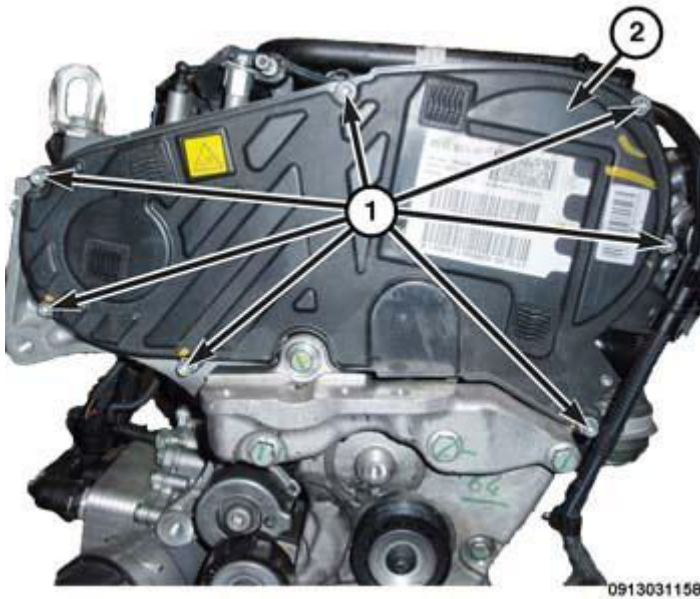


Fig. 232: Upper Timing Cover Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. Remove the seven upper timing cover fasteners.
6. Remove the lower timing belt cover. Refer to **COVER(S), ENGINE TIMING, REMOVAL** .

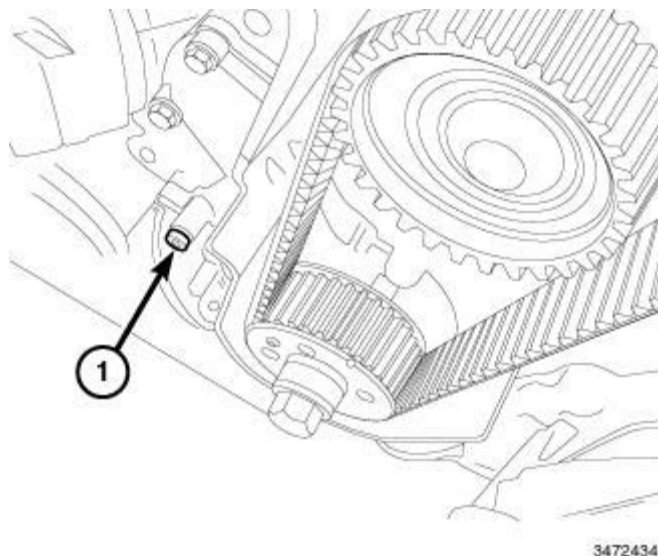


Fig. 233: Engine Block Front Cover Left Lower Bolt
Courtesy of CHRYSLER GROUP, LLC

NOTE: The crankshaft must be rotated, with small movements, to allow the locating dowel on the toothed timing drive belt pulley to be inserted in the opening in the tool.

7. Remove the left lower bolt (1) from the engine block front cover.

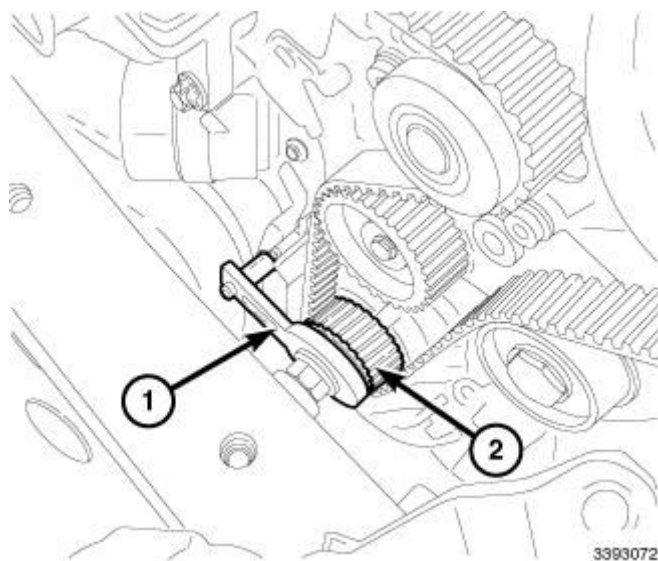


Fig. 234: Crankshaft Locking Tool & Sprocket
Courtesy of CHRYSLER GROUP, LLC

NOTE: The timing marks are located on the timing belt. Proper positioning of the timing marks is required before installation of a new belt can be performed.

8. Rotate engine to TDC and verify the timing marks on the belt are aligned to their respective gear. Insert the (special tool #10496, Tool, Crankshaft Timing Locking) (1) temporarily to check crankshaft timing.
9. Disconnect the fuel pressure sensor wire harness connector.

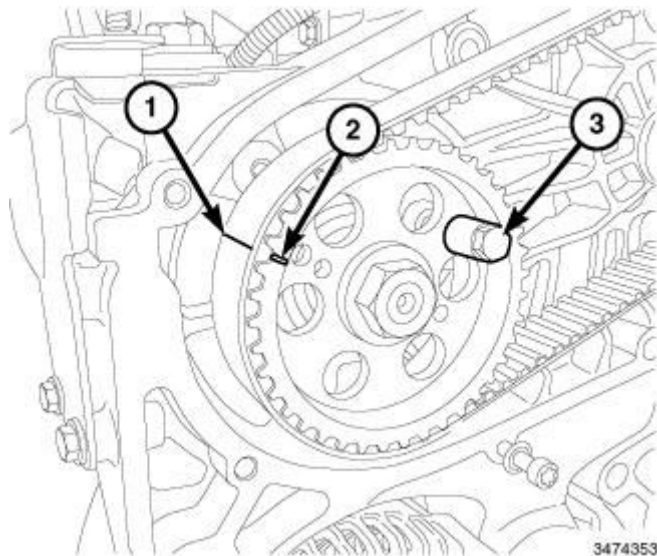


Fig. 235: Aligning Timing Marks On Belt & Sprocket Using Removal/Refitting Tool
Courtesy of CHRYSLER GROUP, LLC

10. Install the Removal/Refitting Tool (3) (special tool #20150, Remover/Installer, High Pressure Fuel Pump) to lock the pressure pump sprocket.

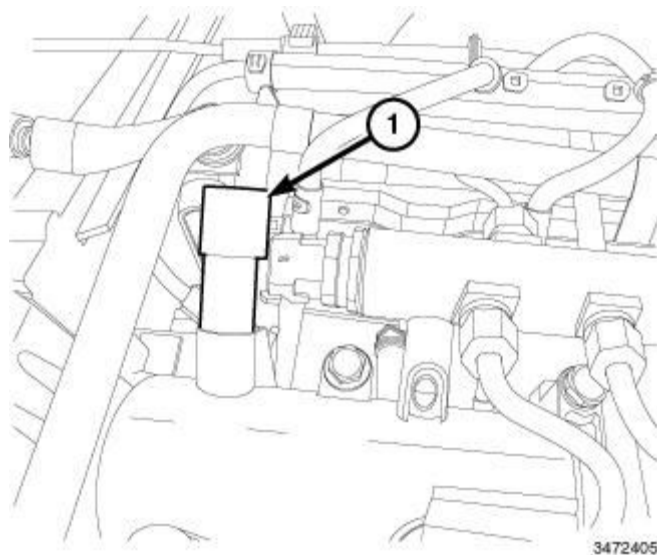


Fig. 236: Camshaft Timing Tool
Courtesy of CHRYSLER GROUP, LLC

11. Remove the threaded plug from the camshaft housing.

NOTE: Check that the tool is correctly inserted in the housing in the inlet side camshaft, rotating the crankshaft until the pin for the tool can be heard engaging correctly in the housing in the camshaft.

12. Install the Camshaft Timing Tool (1) (special tool #20132, Tool, Timing Belt Locking), (intake side).
13. Remove the Crankshaft Timing Tool.

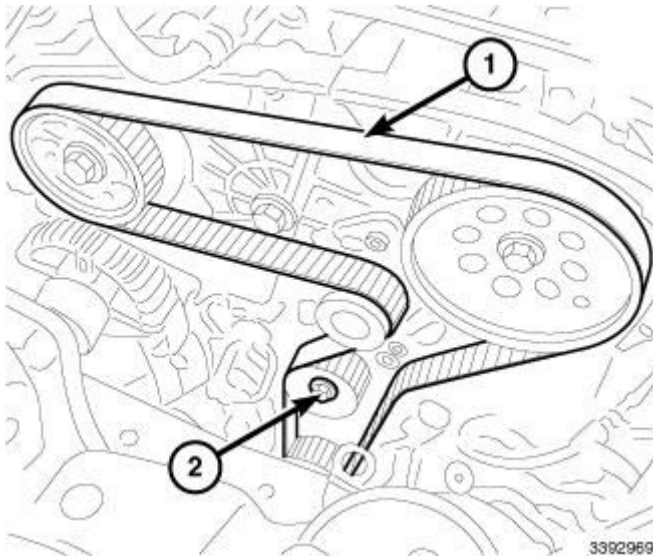


Fig. 237: Timing Belt & Tensioner Retaining Nut
Courtesy of CHRYSLER GROUP, LLC

14. Loosen tensioner retaining nut (2).
15. Remove timing belt (1).

INSTALLATION

INSTALLATION

CAUTION: IT IS ESSENTIAL that the installation procedure is followed exactly. Failure to do so will result in severe engine damage.

NOTE: The timing marks are located on the timing belt. Proper positioning of the timing marks is required before installation of a new belt can be performed.

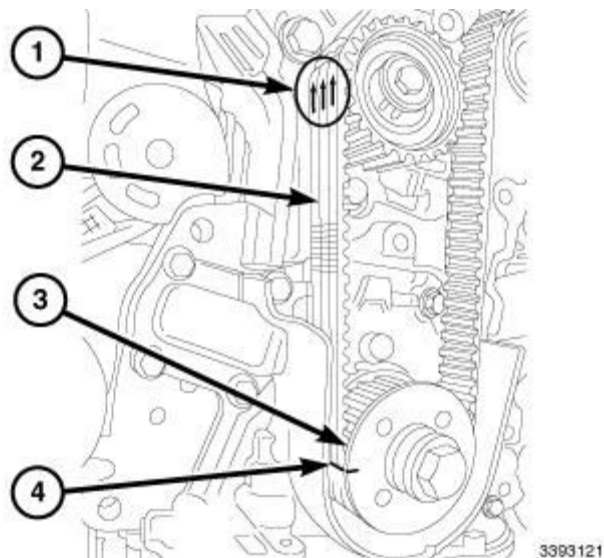


Fig. 238: Rotation Arrows, Timing Belt, Crankshaft Sprocket & Timing Mark On Belt
 Courtesy of CHRYSLER GROUP, LLC

1. Start the timing belt (2) around the crankshaft sprocket (3) with the rotation arrows (1) pointing clockwise.
2. Align the timing mark on the belt (4) with the mark on the crankshaft gear.
3. Wrap belt around water pump pulley and tensioner.

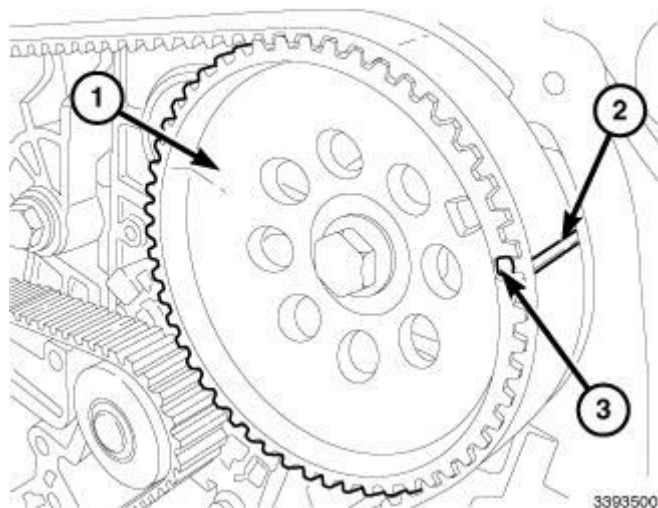


Fig. 239: Camshaft Sprocket, Timing Marks On Belt & Camshaft Drive Gears
 Courtesy of CHRYSLER GROUP, LLC

4. Position belt over camshaft sprocket (1) and align the timing marks on the belt (2) with the marks on the camshaft drive gears (3).

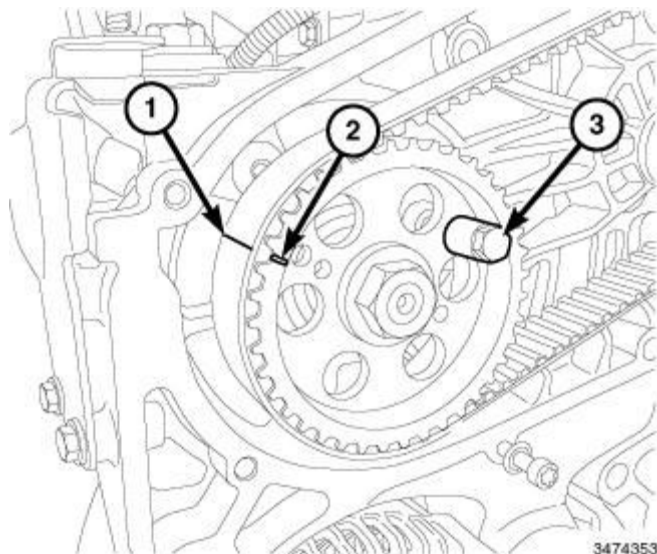


Fig. 240: Aligning Timing Marks On Belt & Sprocket Using Removal/Refitting Tool
Courtesy of CHRYSLER GROUP, LLC

5. Position belt over pressure pump sprocket and align the timing marks on the belt (1) with the marks on the pressure pump sprocket (2).

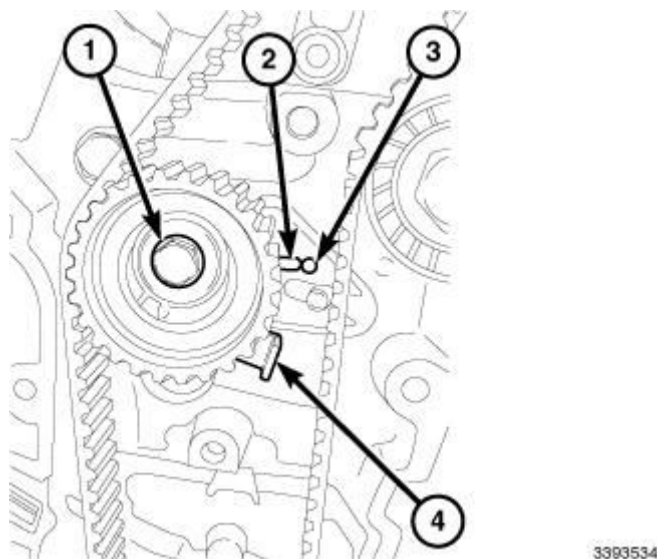


Fig. 241: Bolt, Tensioner Arrow, Mark & Tensioner Tab
Courtesy of CHRYSLER GROUP, LLC

6. Using a screwdriver, pry down on the tensioner tab (4) till the tensioner arrow (3) aligns with the mark (3).
7. Tighten tensioner nut to 28 N.m (21 ft. lbs.) plus an additional 40° turn.

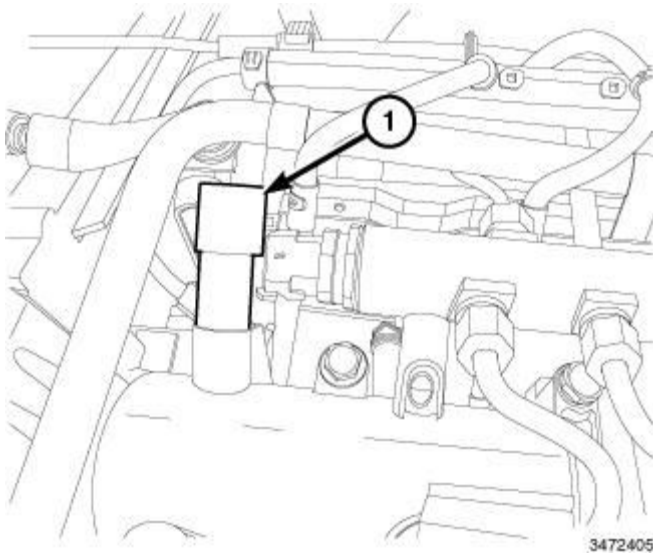


Fig. 242: Camshaft Timing Tool
Courtesy of CHRYSLER GROUP, LLC

8. Remove the Camshaft Timing Tool 20132, (intake side).

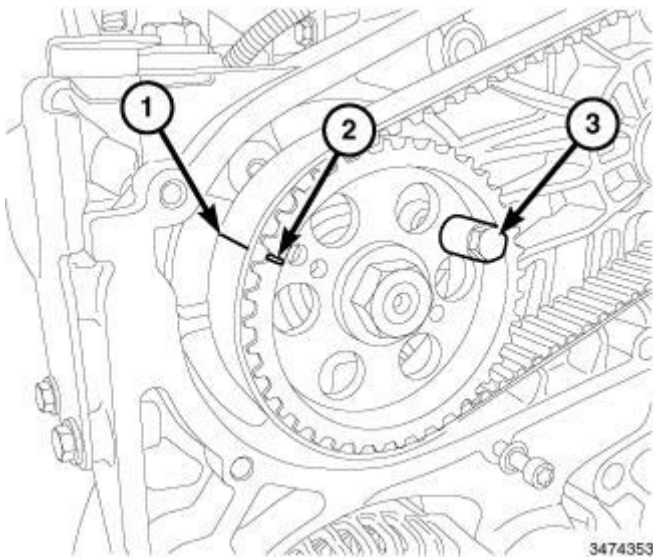


Fig. 243: Aligning Timing Marks On Belt & Sprocket Using Removal/Refitting Tool
Courtesy of CHRYSLER GROUP, LLC

9. Remove the Removal/Refitting Tool (3)

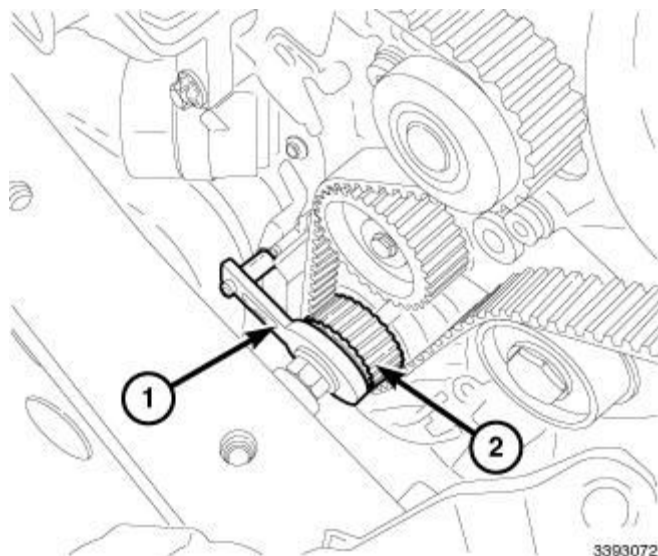


Fig. 244: Crankshaft Locking Tool & Sprocket
Courtesy of CHRYSLER GROUP, LLC

10. Remove Crankshaft Locking Tool (1).
11. Rotate the crankshaft two full revolutions to allow for the timing belt to settle.
12. Loosen the timing belt tensioner and repeat step **5 and 6** .
13. Install the right lower screw for the engine block front cover and tighten to 9 N.m (80 in. lbs.).
14. Install the threaded plug from the camshaft housing and securely tighten.
15. Connect the fuel pressure sensor wire harness connector.
16. Install lower timing belt cover. Refer to **COVER(S), ENGINE TIMING, INSTALLATION** .

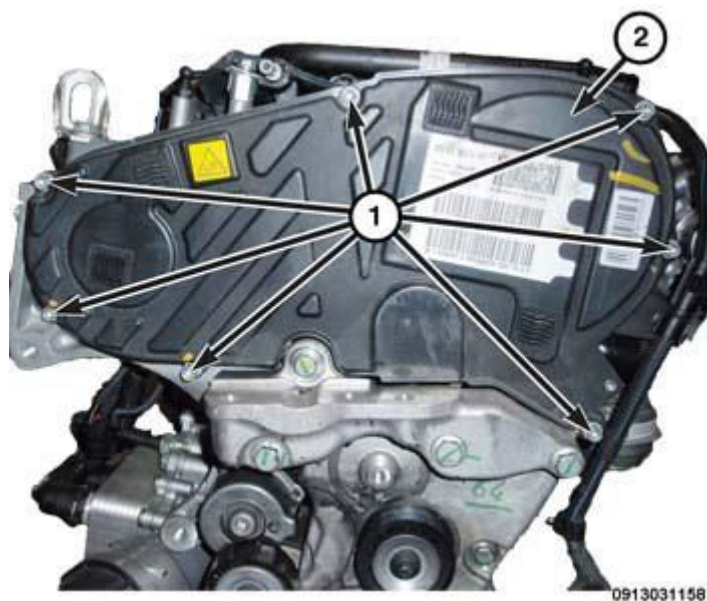


Fig. 245: Upper Timing Cover Fasteners
Courtesy of CHRYSLER GROUP, LLC

17. Install upper timing belt cover (2). Tighten the seven fasteners (1) securely.



Fig. 246: Upper Timing Cover Insulator
Courtesy of CHRYSLER GROUP, LLC

18. Install the upper timing cover insulator (1).
19. Install the vibration damper. Refer to **DAMPER, VIBRATION, INSTALLATION** .

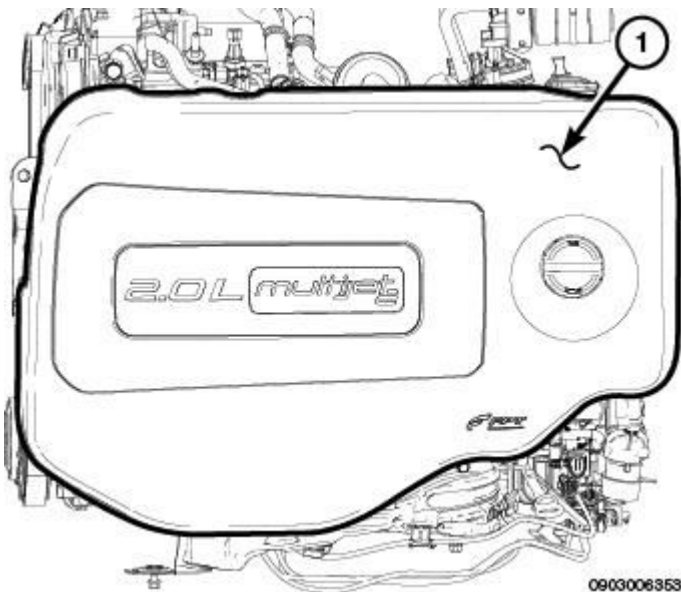


Fig. 247: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

20. Install the engine cover (1).
21. Connect the negative battery cable.

COVER(S), ENGINE TIMING

REMOVAL

UPPER TIMING COVER

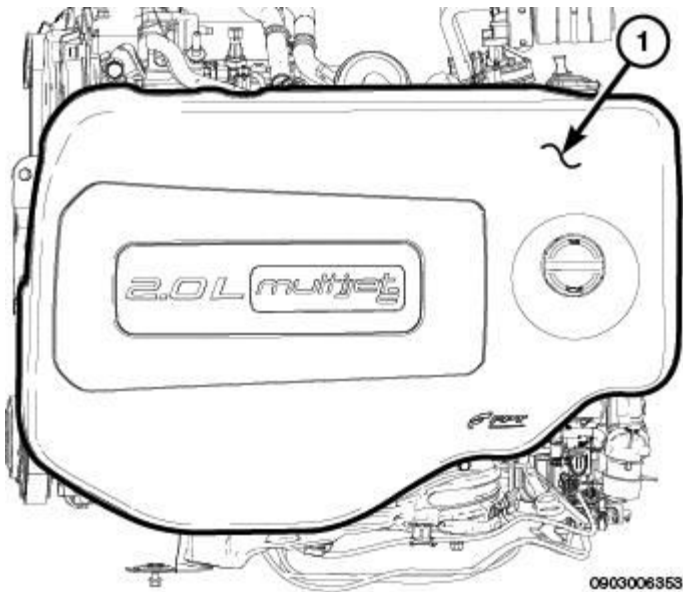


Fig. 248: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

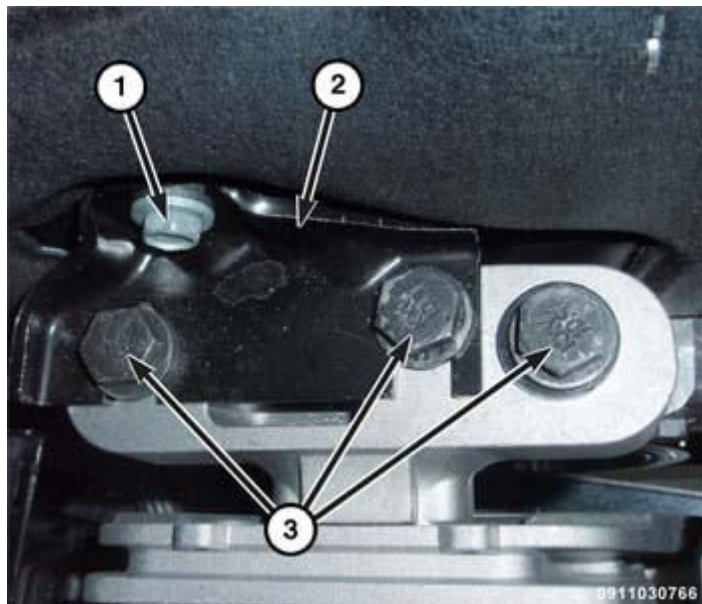
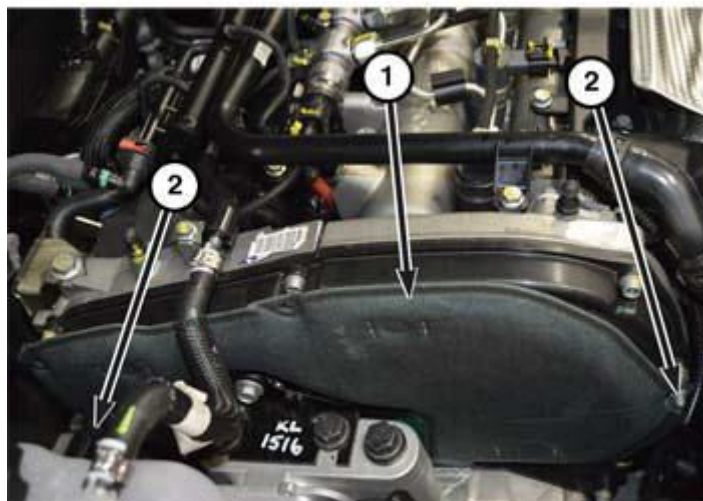


Fig. 249: Right Mount Bracket Bolt

Courtesy of CHRYSLER GROUP, LLC

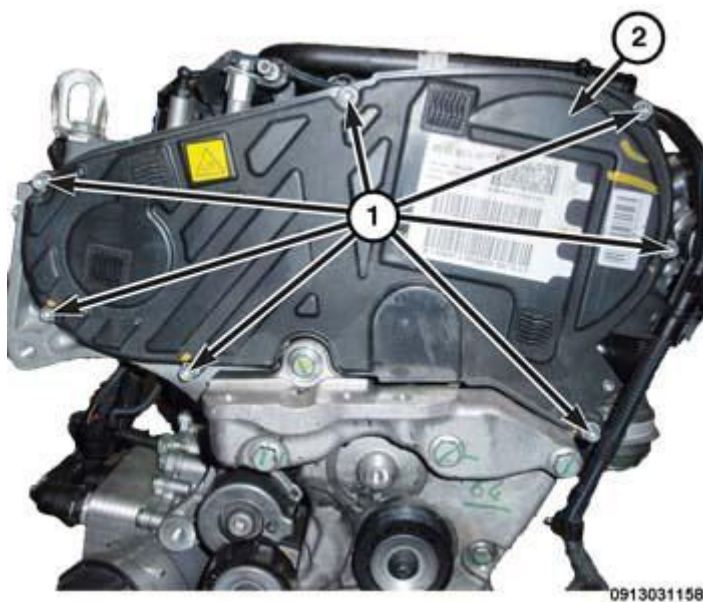
3. Remove the right mount bracket bolt (1).
4. Remove the left and middle right mount bracket bolts (3) and remove the mount bracket (2).



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Fig. 250: Upper Timing Cover Insulator & Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. Remove fasteners (2) and the upper timing cover insulator (1).



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Fig. 251: Upper Timing Cover Fasteners
Courtesy of CHRYSLER GROUP, LLC

6. Remove bolts (1) and the upper timing belt cover (2).

LOWER TIMING COVER

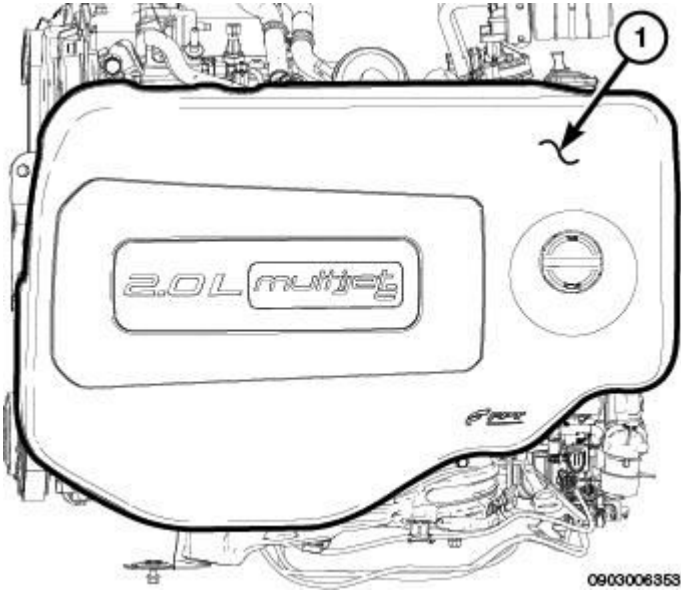


Fig. 252: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

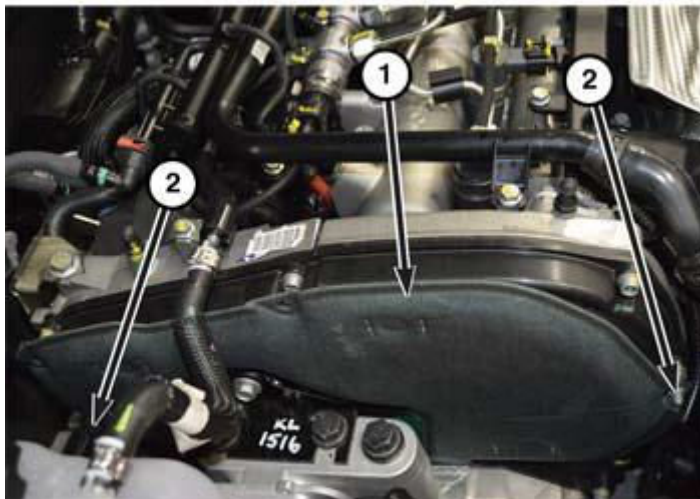


Fig. 253: Upper Timing Cover Insulator & Fasteners

Courtesy of CHRYSLER GROUP, LLC

3. Remove fasteners (2) and the upper timing cover insulator (1).

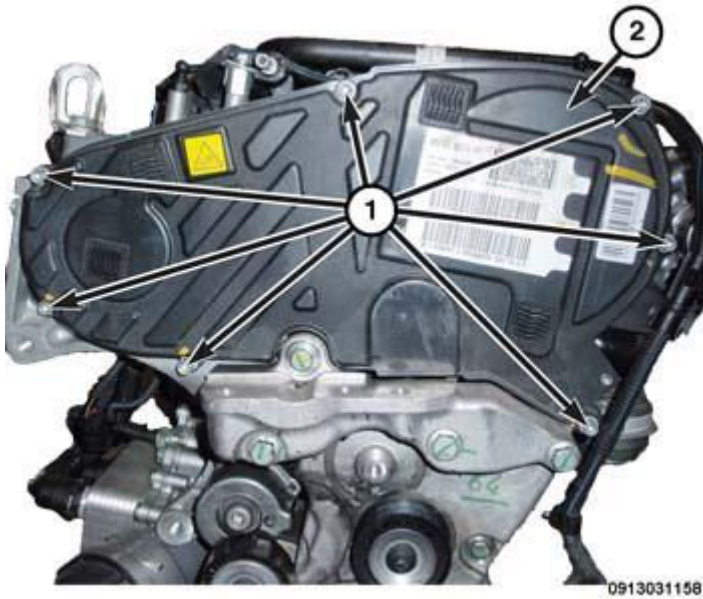


Fig. 254: Upper Timing Cover Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Remove bolts (1) and the upper timing belt cover (2).

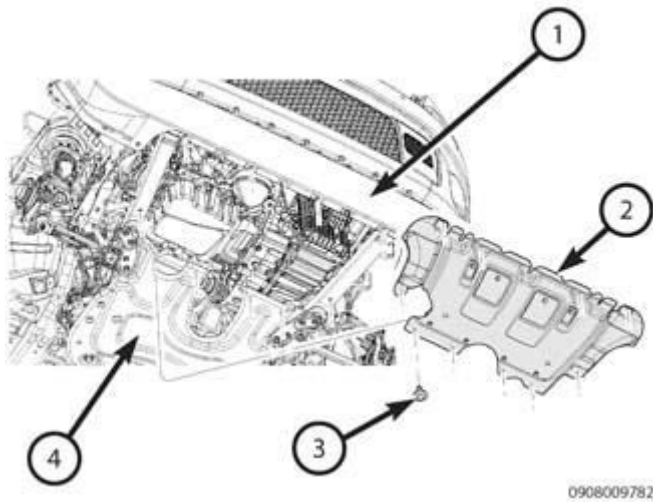
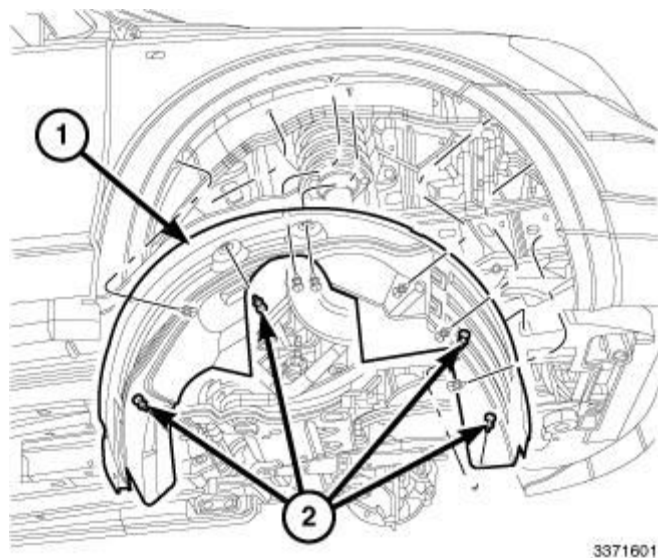


Fig. 255: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

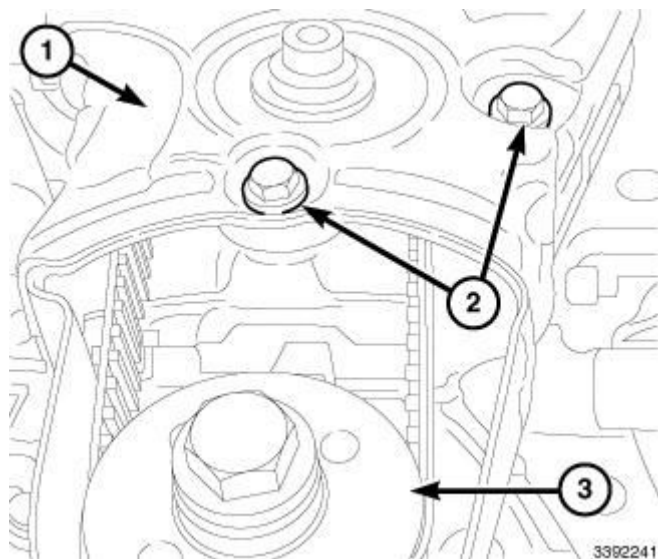
5. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
6. Remove bolts (3) and the bellypan (2).



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Fig. 256: Inner Fender Splash Shield
Courtesy of CHRYSLER GROUP, LLC

7. Remove the right side wheel and tire.
8. Remove the inner fender splash shield (1).
9. Remove the vibration dampener. Refer to **DAMPER, VIBRATION, REMOVAL** .



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Fig. 257: Lower Timing Belt Cover & Bolts
Courtesy of CHRYSLER GROUP, LLC

10. Remove the lower timing belt cover bolts (2).
11. Lower the vehicle.
12. Remove the right side engine mount. Refer to **INSULATOR, ENGINE MOUNT, RIGHT, REMOVAL** .

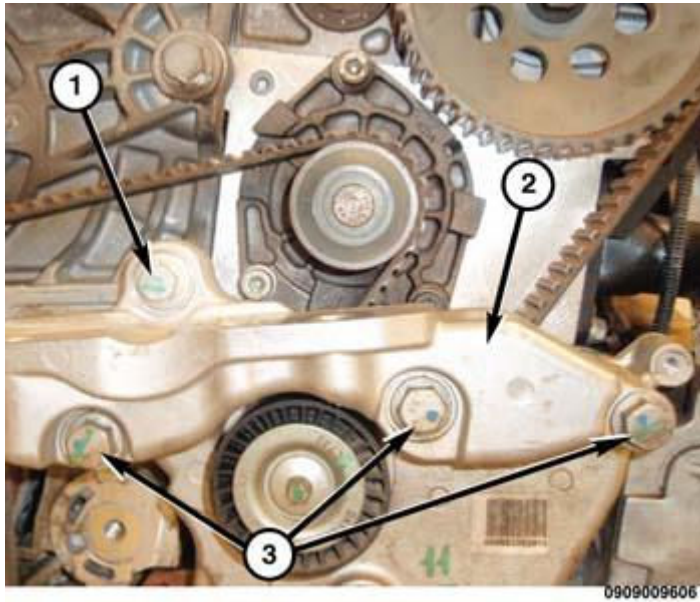


Fig. 258: Lower Timing Belt Cover & Bolts
Courtesy of CHRYSLER GROUP, LLC

13. Remove bolts (1, 3) and the lower timing belt cover.

INSTALLATION

UPPER TIMING COVER

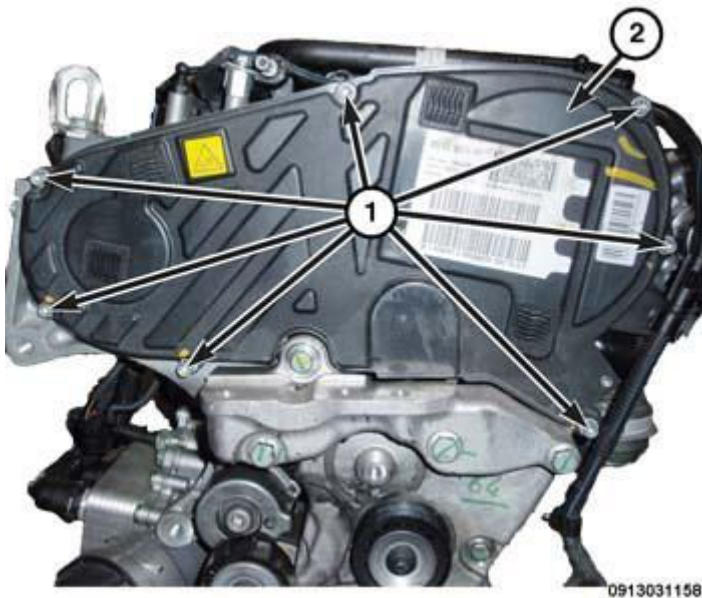
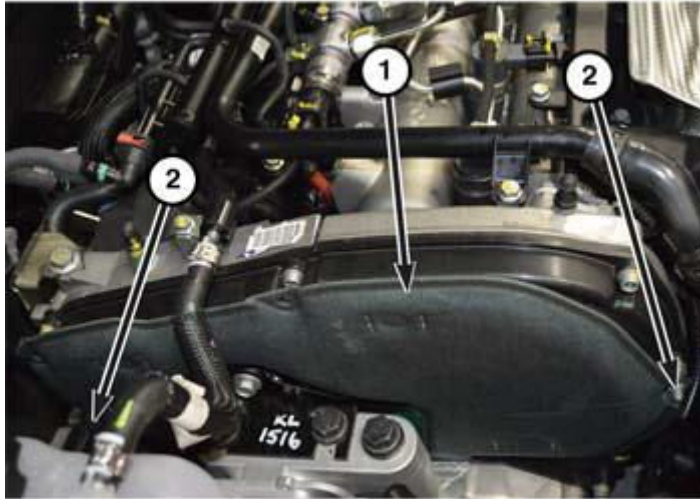


Fig. 259: Upper Timing Cover Fasteners
Courtesy of CHRYSLER GROUP, LLC

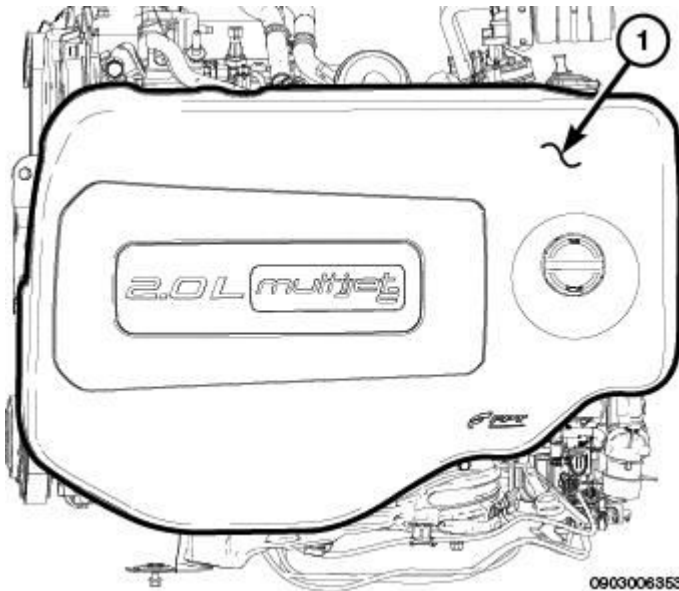
1. Install the upper timing belt cover (1). Tighten the seven bolts (1) to 6 N.m (53 in. lbs.).



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Fig. 260: Upper Timing Cover Insulator & Fasteners
Courtesy of CHRYSLER GROUP, LLC

2. Install the upper timing cover insulator (1) and securely tighten fasteners.



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Fig. 261: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

3. Install the engine cover (1).
4. Connect the negative battery cable.

LOWER TIMING COVER

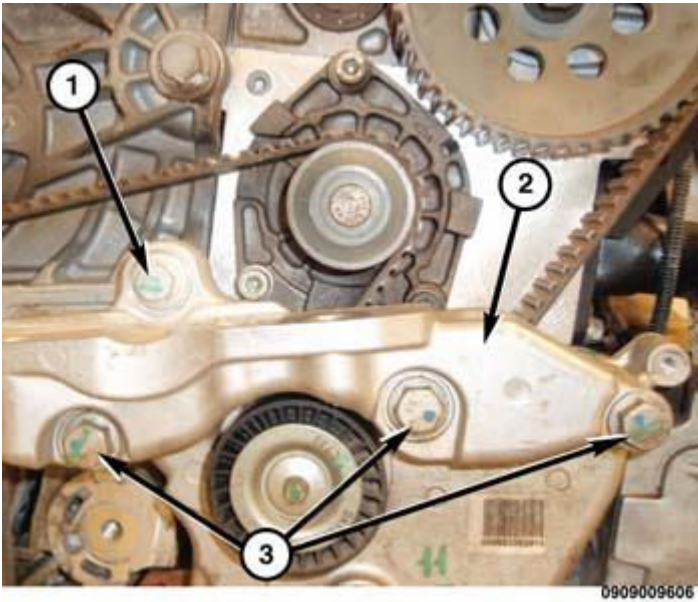


Fig. 262: Lower Timing Belt Cover & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Position the lower timing belt cover onto the engine.
2. Install the four bolts (2) into the cover (1).
 - Tighten the M8 bolts (1) to 25 N.m (18 ft. lbs.).
 - Tighten the M10 bolts (3) to 54 N.m (40 ft. lbs.).

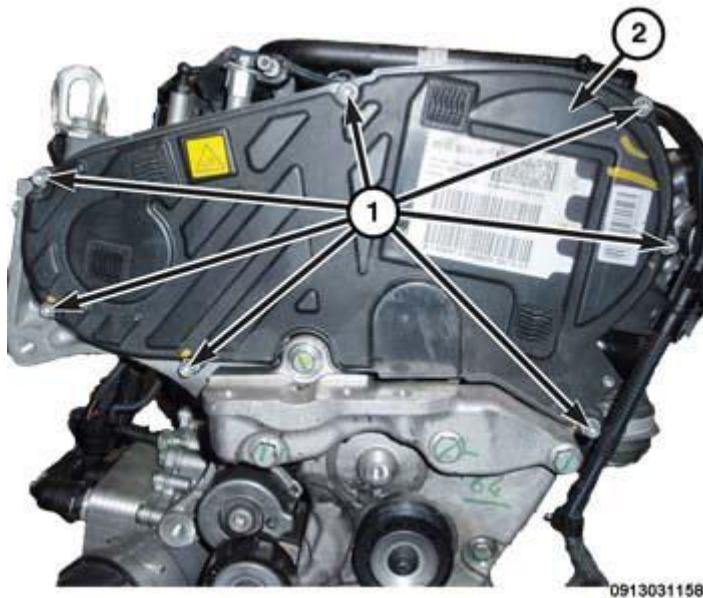
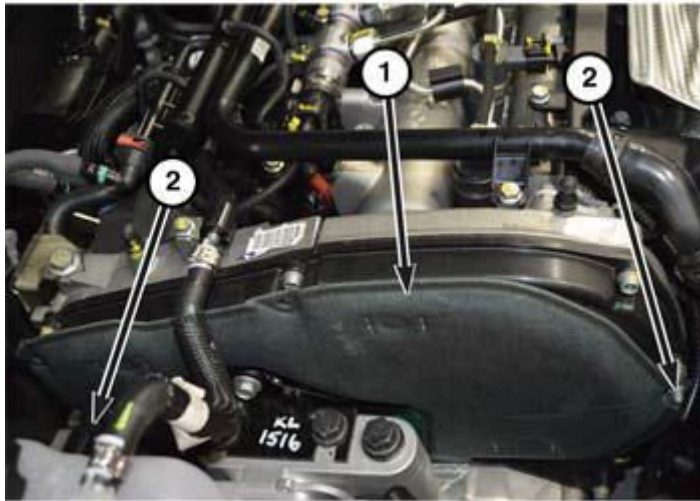


Fig. 263: Upper Timing Cover Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Install the upper timing belt cover (2). Tighten bolts (1) to 6 N.m (53 in. lbs.).



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Fig. 264: Upper Timing Cover Insulator & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Install the upper timing cover insulator (1) and securely tighten fasteners (2).
5. Install the right side engine mount. Refer to **INSULATOR, ENGINE MOUNT, RIGHT, INSTALLATION** .
6. Raise and support vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .

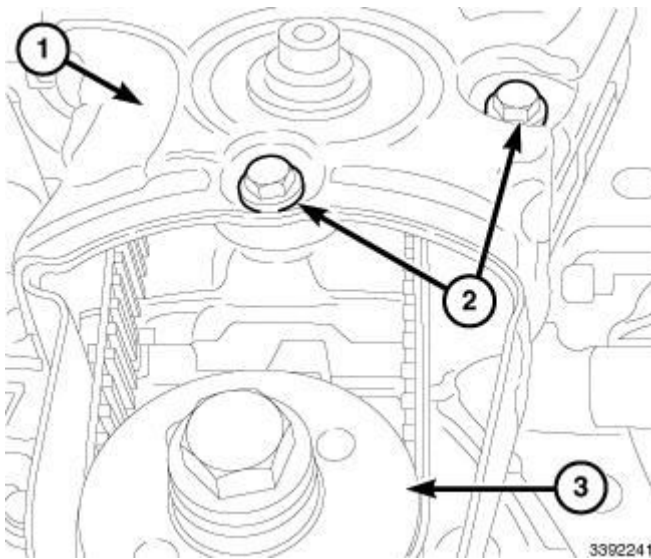


Fig. 265: Lower Timing Belt Cover & Bolts
Courtesy of CHRYSLER GROUP, LLC

7. Install the lower timing belt cover bolts (2). Tighten the bolts to 25 N.m (18 ft. lbs.).
8. Install the vibration dampener. Refer to **DAMPER, VIBRATION, INSTALLATION** .

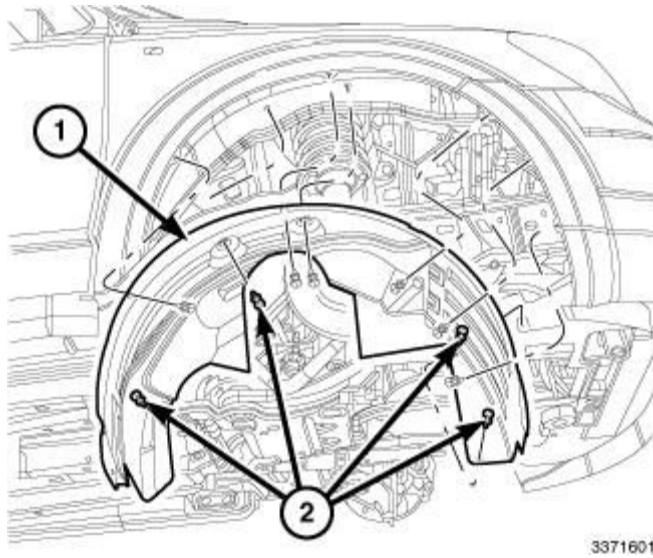


Fig. 266: Inner Fender Splash Shield
Courtesy of CHRYSLER GROUP, LLC

9. Install the inner fender splash shield (1).
10. Install the right front wheel.

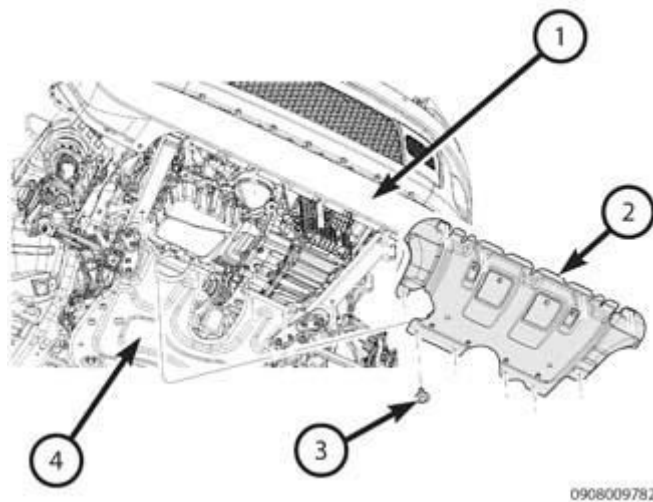


Fig. 267: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

11. Install the belly pan (2) and securely tighten bolts (3).
12. Lower the vehicle.

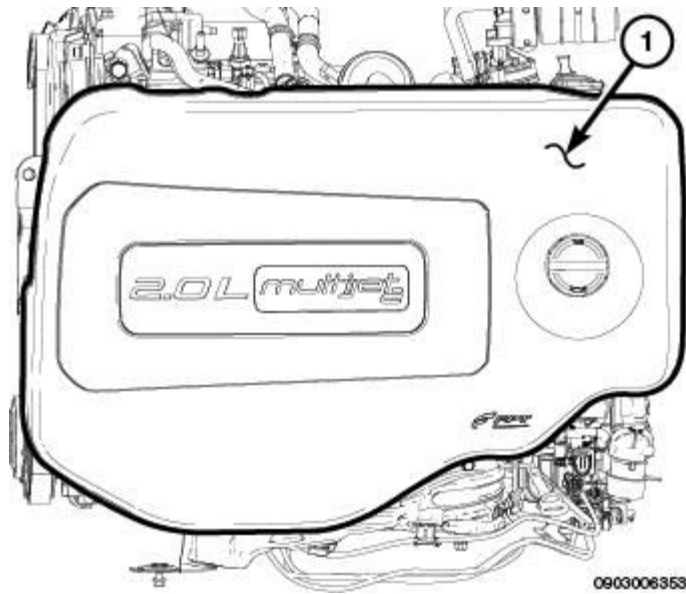


Fig. 268: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

13. Install the engine cover (1).
14. Connect the negative battery cable.

TENSIONER, ENGINE TIMING

REMOVAL

REMOVAL

1. Disconnect the negative battery cable.
2. Remove the timing belt. Refer to **BELT, TIMING, REMOVAL**.

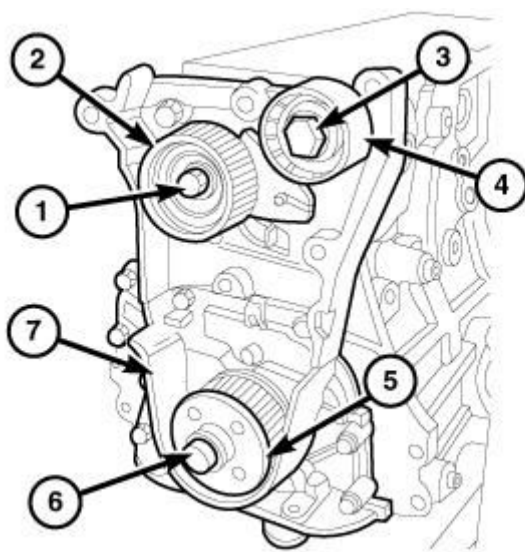


Fig. 269: Timing Belt Tensioner, Pulley & Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Remove bolt (1) and the timing belt tensioner (2).

INSTALLATION

INSTALLATION

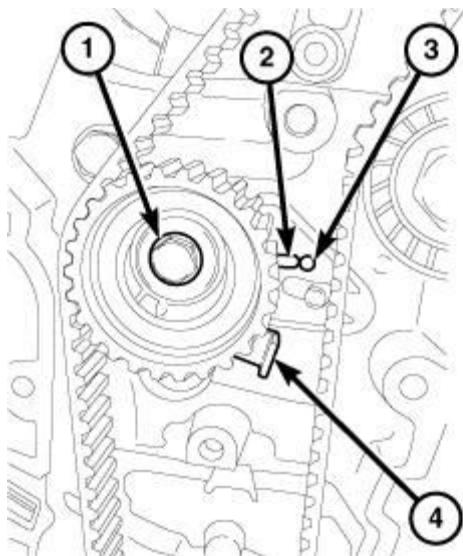


Fig. 270: Bolt, Tensioner Arrow, Mark & Tensioner Tab
Courtesy of CHRYSLER GROUP, LLC

1. Position timing belt tensioner so the guide finger (3) is in slot (2) and tighten bolt (1) finger tight.
2. Install the timing belt. Refer to **BELT, TIMING, INSTALLATION**.
3. Connect the negative battery cable.

MANIFOLDS

MANIFOLD, EXHAUST

REMOVAL

REMOVAL

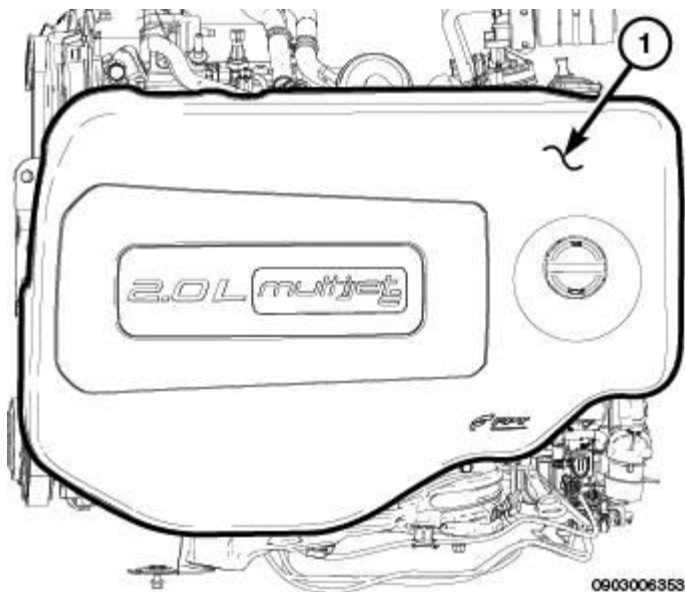


Fig. 271: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).
3. Remove the turbocharger. Refer to **TURBOCHARGER, REMOVAL**.

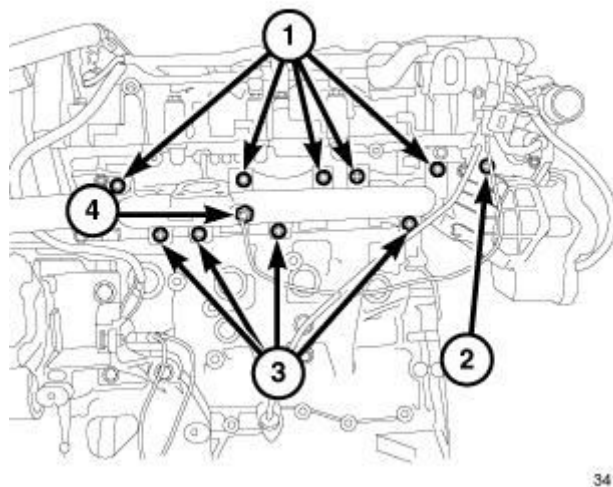


Fig. 272: Upper And Bottom Exhaust Manifold Nuts, Upper Oil Indicator Tube Bolt & Temperature Sensor

Courtesy of CHRYSLER GROUP, LLC

4. Remove the temperature sensor (4).
5. Remove the upper exhaust manifold nuts (1).
6. Remove the upper oil indicator tube bolt (2).

7. Remove the bottom exhaust manifold nuts (3).
8. Remove the exhaust manifold and discard the gasket.

INSTALLATION

INSTALLATION

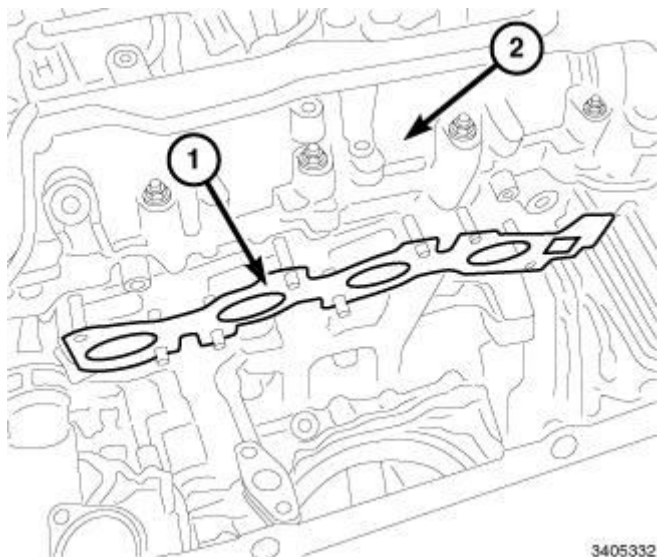


Fig. 273: Exhaust Manifold Gasket & Manifold Assembly
Courtesy of CHRYSLER GROUP, LLC

1. Install a new exhaust manifold gasket.
2. Position the exhaust manifold assembly in place.

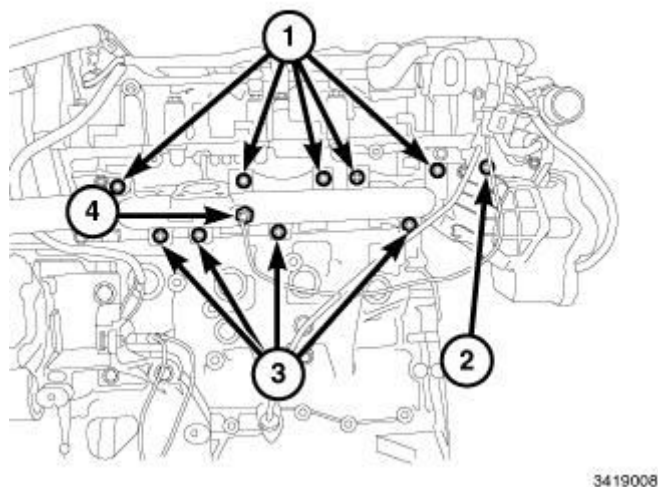


Fig. 274: Upper And Bottom Exhaust Manifold Nuts, Upper Oil Indicator Tube Bolt & Temperature Sensor

Courtesy of CHRYSLER GROUP, LLC

3. Install the exhaust manifold. Tighten nuts (1 and 3) to 21 N.m (15 ft. lbs.).
4. Install the temperature sensor (4).
5. Install the oil indicator tube upper bolt (2). Tighten the nuts to 10 N.m (89 in. lbs.).
6. Install the turbocharger. Refer to **TURBOCHARGER, INSTALLATION**.

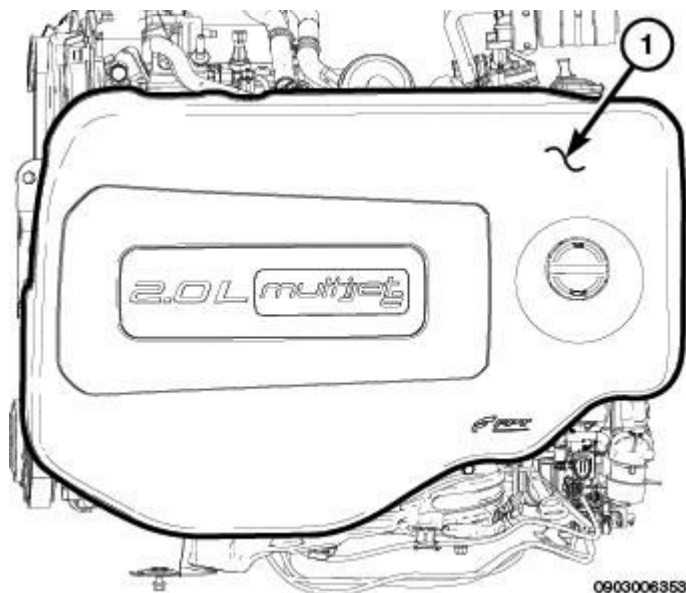


Fig. 275: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

7. Install the engine cover (1).
8. Connect the negative battery cable.

MANIFOLD, INTAKE

REMOVAL

REMOVAL

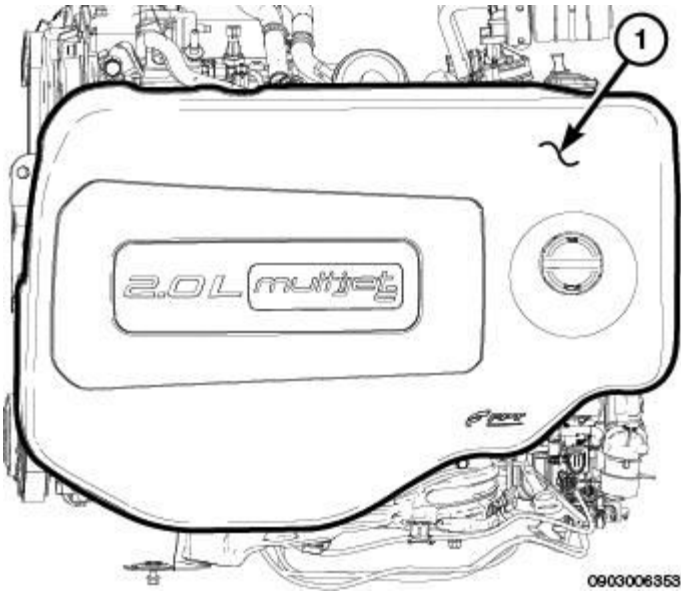


Fig. 276: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).
3. Partially drain the cooling system. Refer to **STANDARD PROCEDURE**.

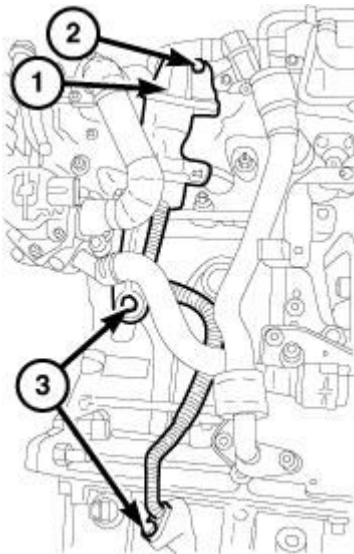
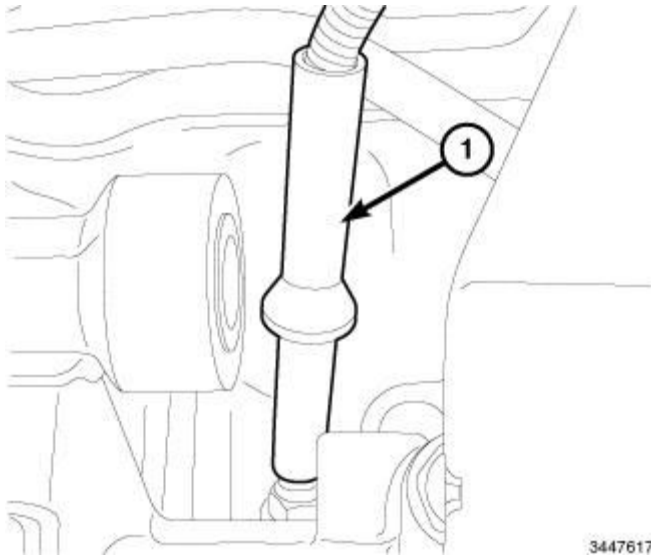


Fig. 277: Oil Vapor Separator & Bolts

Courtesy of CHRYSLER GROUP, LLC

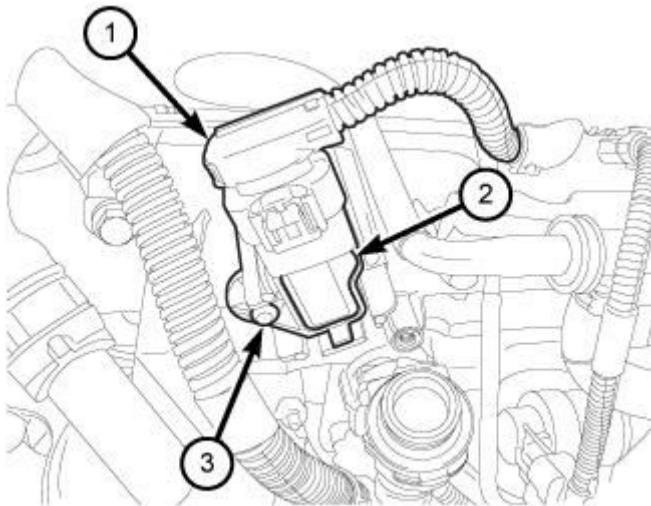
4. Remove bolts (2, 3) and the oil vapor separator (1) complete with pipes.



3447617

Fig. 278: Glow Plug Harness Connector
Courtesy of CHRYSLER GROUP, LLC

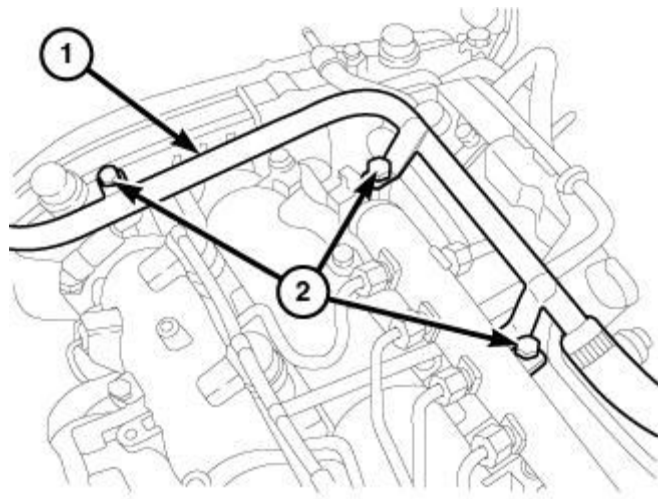
5. Disconnect the glow plug wire harness connector from each glow plug.



3405406

Fig. 279: Fuel Quantity Solenoid Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

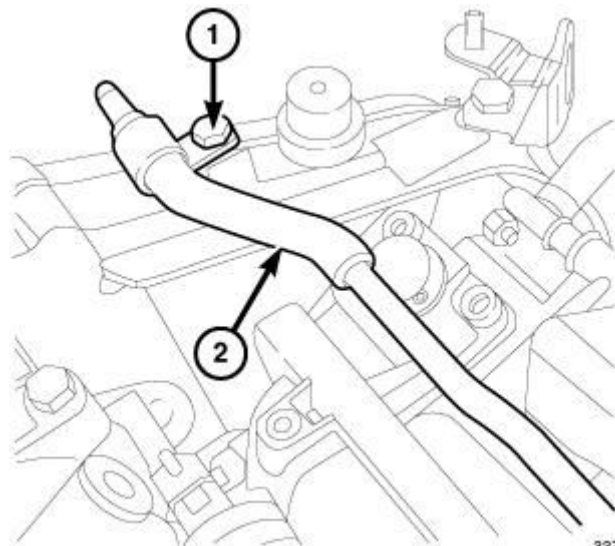
6. Disconnect the boost pressure wire harness connector.



3374607

Fig. 280: Oil Vapor Recovery Pipe & Bolts
 Courtesy of CHRYSLER GROUP, LLC

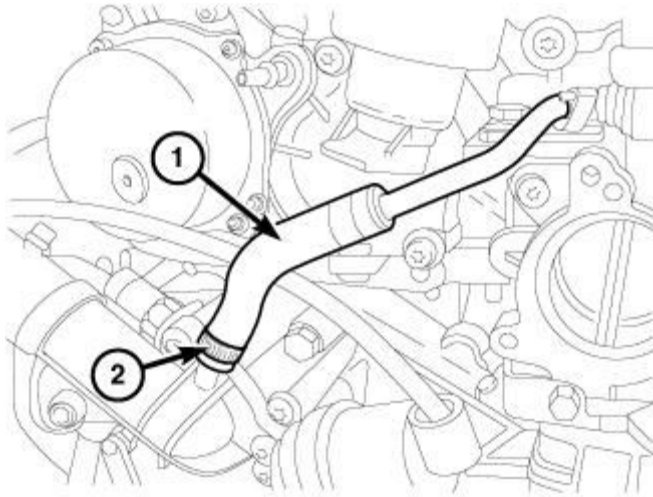
7. Remove bolts (2) securing the engine oil vapor recovery pipe (1) to the camshaft housing.
8. Remove fasteners and position aside the engine wire harness.
9. Remove the fuel injection pump. Refer to **PUMP, FUEL INJECTION, HIGH PRESSURE, REMOVAL**.
10. Remove the EGR air flow control valve. Refer to **VALVE, EXHAUST GAS RECIRCULATION (EGR) AIRFLOW CONTROL, REMOVAL**.



3374623

Fig. 281: Degassing Pipe & Bolt
 Courtesy of CHRYSLER GROUP, LLC

11. Remove bolt (1) securing the degassing pipe (2) to the pressure pump mounting.



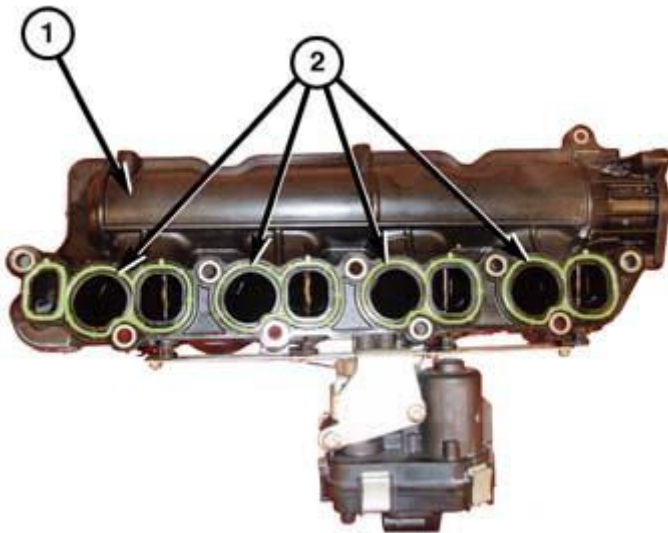
3374821

Fig. 282: Degassing Pipe, Clamp & Support Bracket
Courtesy of CHRYSLER GROUP, LLC

12. Loosen the gear clamp (2) and remove the degassing pipe (1).
13. Disconnect the swirl valve wire harness connector.
14. Remove fasteners and the support bracket.
15. Remove fasteners and the intake manifold.

INSTALLATION

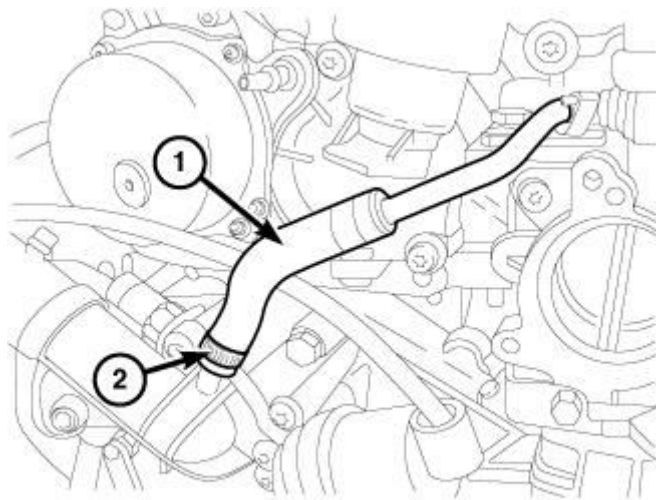
INSTALLATION



0909009604

Fig. 283: Intake Manifold & Gasket
Courtesy of CHRYSLER GROUP, LLC

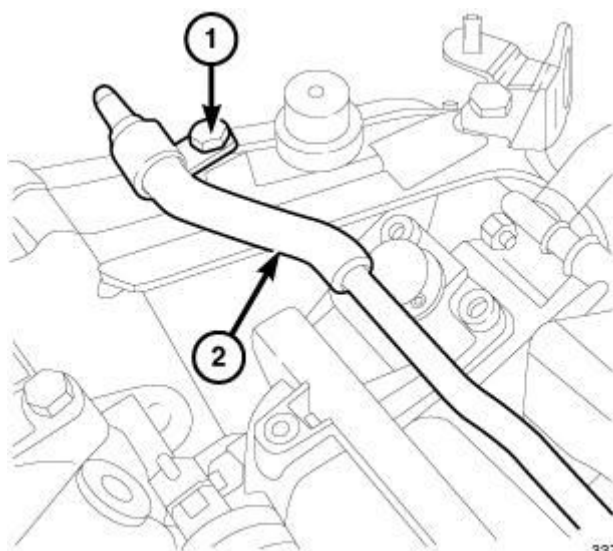
1. Clean gasket mating surfaces. Refer to **ENGINE - STANDARD PROCEDURE**.
2. Install new gasket (2) onto the intake manifold (1).
3. Install the intake manifold (1). Tighten fasteners to 25 N.m (18 ft. lbs.).
4. Install the support bracket and securely tighten fasteners.
5. Connect the swirl valve wire harness connector.



3374821

Fig. 284: Degassing Pipe, Clamp & Support Bracket
Courtesy of CHRYSLER GROUP, LLC

6. Install the degassing pipe (1) and tighten the gear clamp (2).

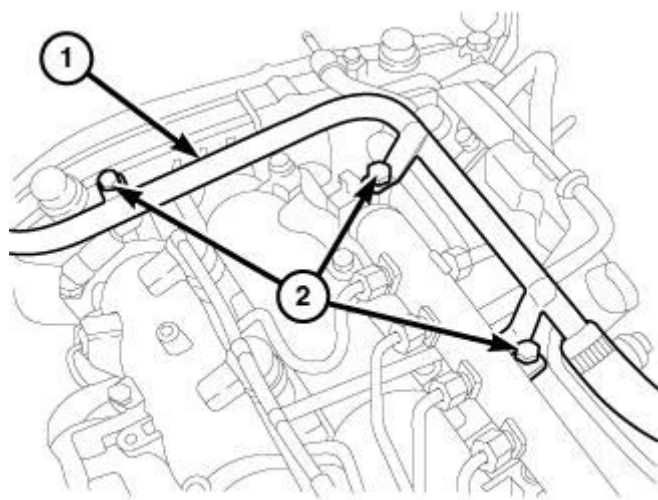


3374623

Fig. 285: Degassing Pipe & Bolt
Courtesy of CHRYSLER GROUP, LLC

7. Install bolt (1) securing the degassing pipe (2) to the pressure pump mounting and securely tighten.

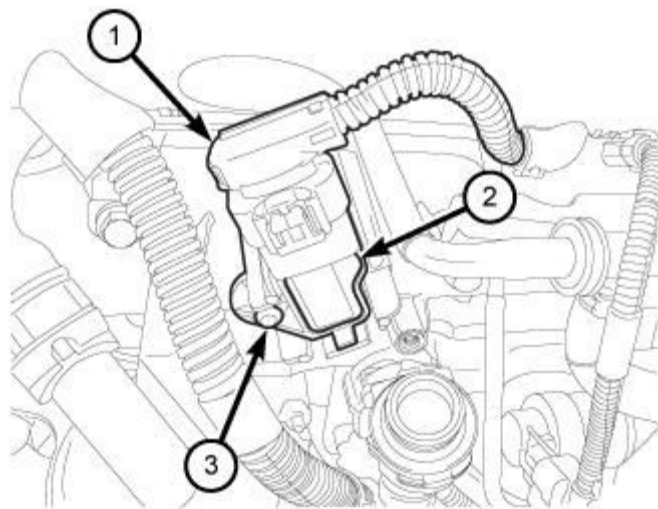
8. Install EGR air flow control valve. Refer to **VALVE, EXHAUST GAS RECIRCULATION (EGR) AIRFLOW CONTROL, INSTALLATION** .
9. Install right and left engine cover brackets.
10. Install the fuel injection pump. Refer to **PUMP, FUEL INJECTION, HIGH PRESSURE, INSTALLATION** .
11. Position the engine wire harness and securely tighten fasteners.



3374607

Fig. 286: Oil Vapor Recovery Pipe & Bolts
Courtesy of CHRYSLER GROUP, LLC

12. Install the engine oil vapor recovery pipe (1) to the camshaft housing and securely tighten bolts (2).



3405406

Fig. 287: Fuel Quantity Solenoid Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

13. Disconnect the boost pressure wire harness connector.

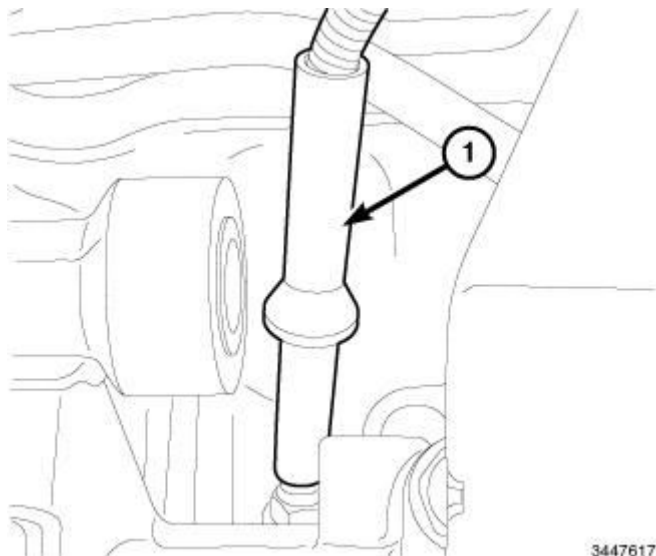


Fig. 288: Glow Plug Harness Connector
 Courtesy of CHRYSLER GROUP, LLC

14. Connect the glow plug wire harness connector from each glow plug.

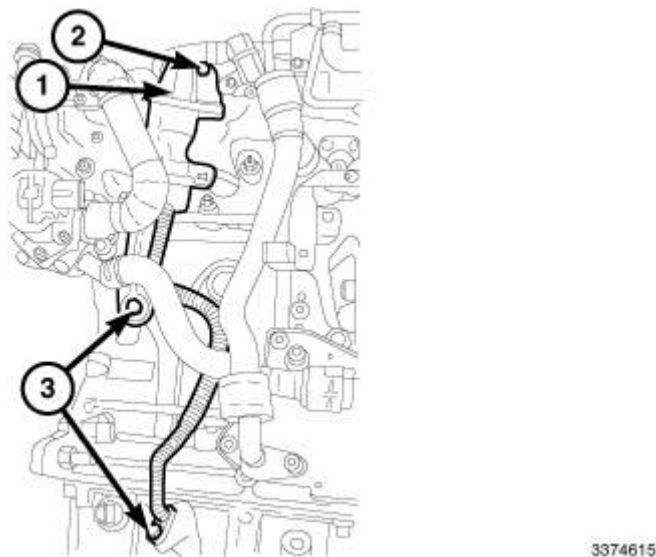


Fig. 289: Oil Vapor Separator & Bolts
 Courtesy of CHRYSLER GROUP, LLC

15. Remove bolts (2, 3) and the oil vapor separator (1) complete with pipes.
16. Install EGR pipe support bracket.
17. Fill the cooling system. Refer to **STANDARD PROCEDURE**.
18. Connect the negative battery cable (1).
19. Start the engine and check for leaks.

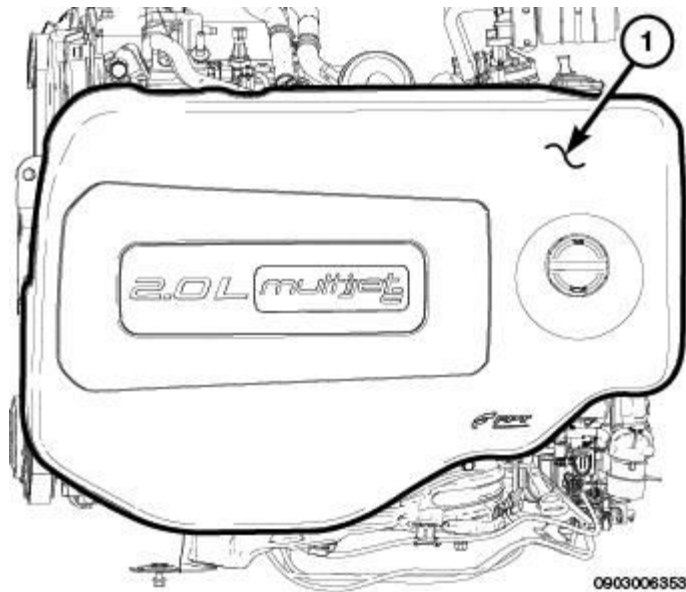


Fig. 290: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

20. Install the engine cover (1).
21. Connect the negative battery cable.

AIR INTAKE SYSTEM

AIR CLEANER

REMOVAL

REMOVAL

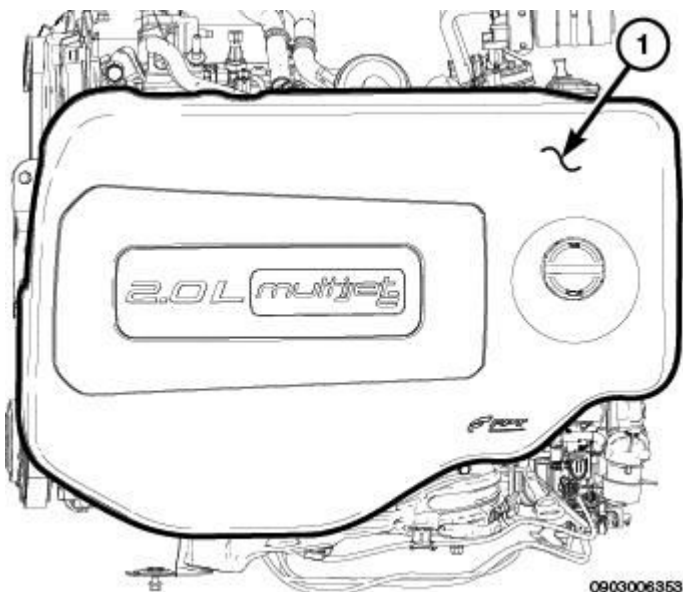


Fig. 291: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

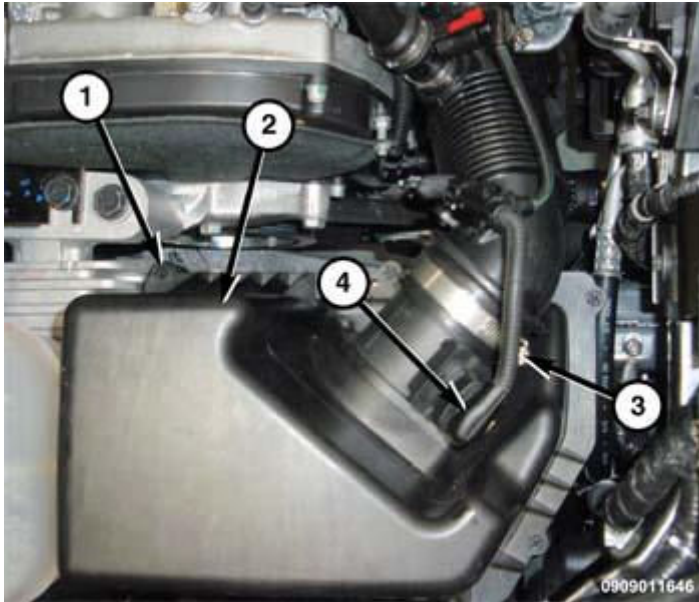


Fig. 292: Fasteners, Air Cleaner Cover, Clamp & MAF Sensor Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the Mass Air Flow (MAF) sensor wire harness connector (4).
4. Loosen clamp (3) and remove hose.
5. Loosen the four fasteners (1) and position aside the air cleaner cover (2).

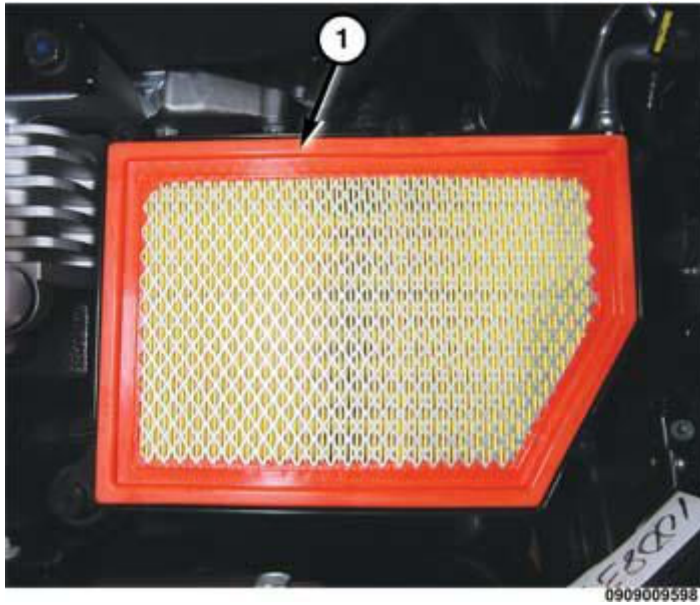


Fig. 293: Air Filter Element

Courtesy of CHRYSLER GROUP, LLC

6. Remove the air filter element (1).
7. If necessary, clean the inside of the air cleaner housing.

INSTALLATION

INSTALLATION

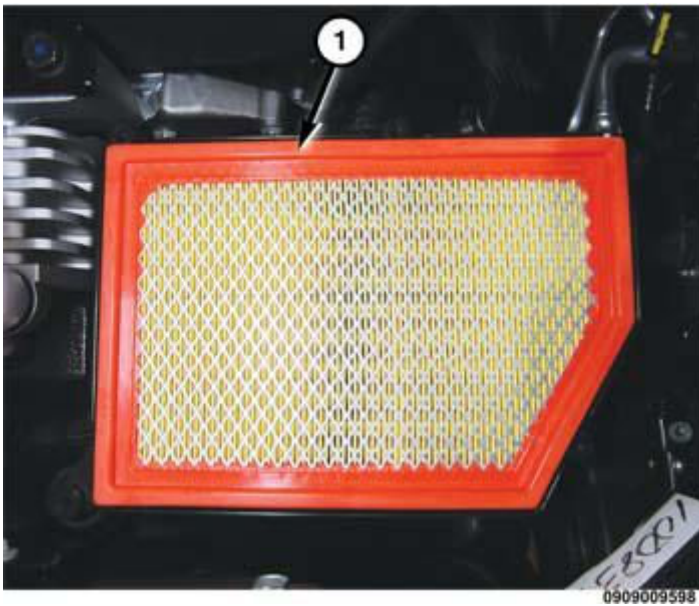


Fig. 294: Air Filter Element

Courtesy of CHRYSLER GROUP, LLC

1. Clean out any dirt or debris from bottom of air cleaner body.
2. Install the new air filter element (1).

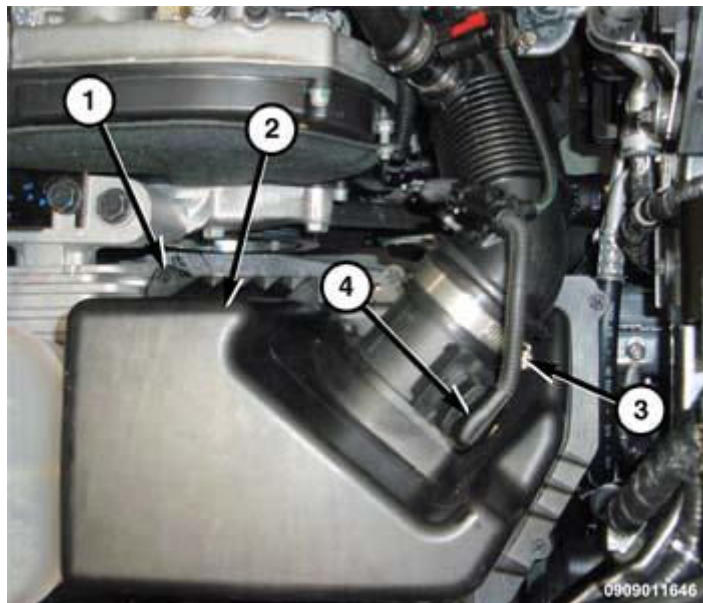


Fig. 295: Fasteners, Air Cleaner Cover, Clamp & MAF Sensor Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

3. Position the air cleaner cover (2) and securely tighten fasteners (1).
4. Install hose and securely tighten clamp (3).
5. Connect the Mass Air Flow (MAF) sensor wire harness connector (4).

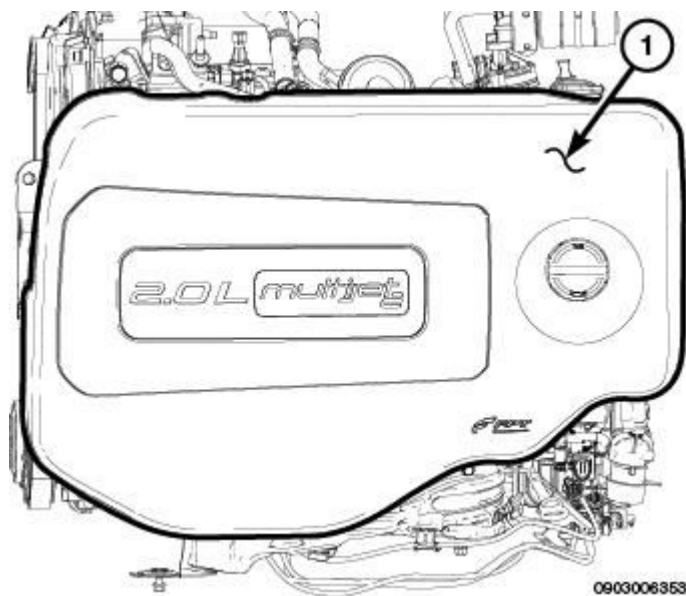
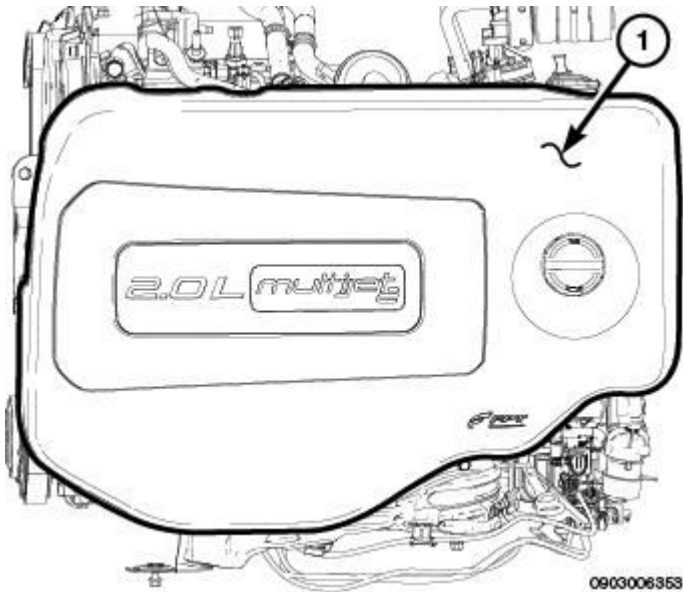


Fig. 296: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

6. Install the engine cover (1).
7. Connect the negative battery cable.

BODY, AIR CLEANER**REMOVAL****REMOVAL****Fig. 297: Engine Cover**

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Removal the engine cover (1).

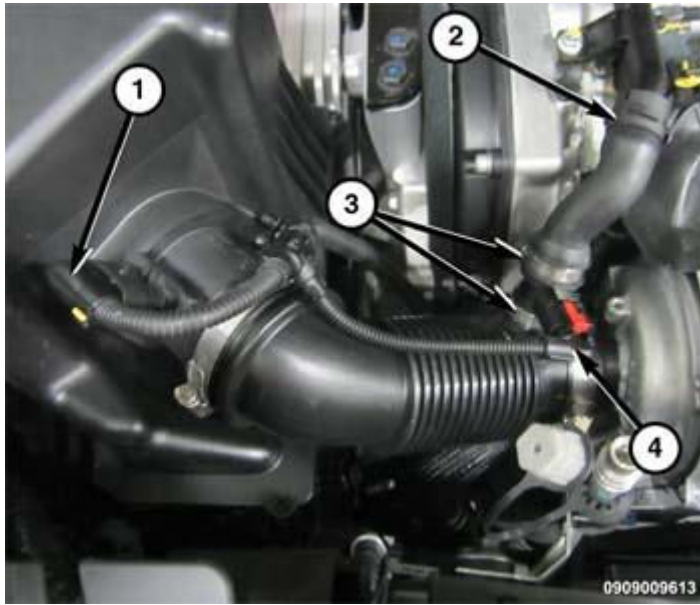


Fig. 298: MAF Sensor Harness Connector
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect MAF sensor harness connector (2).

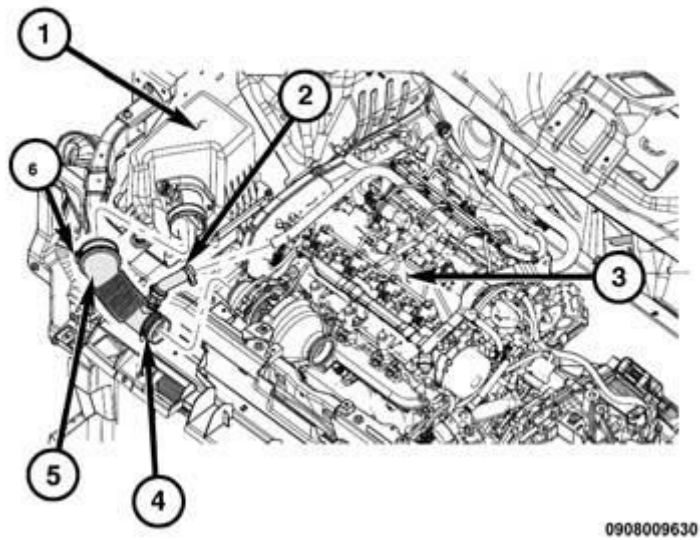
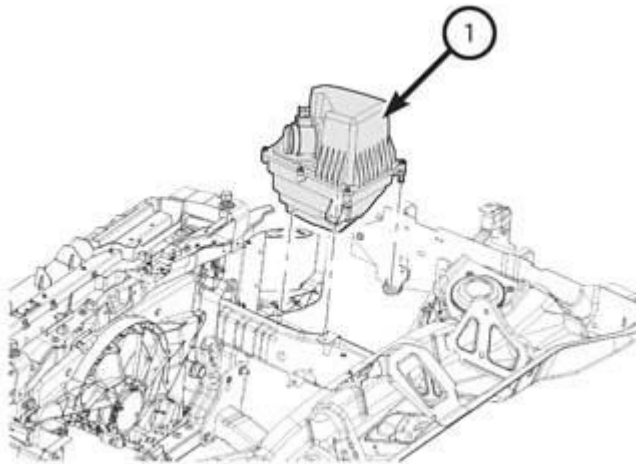


Fig. 299: Turbocharger Inlet Hose & Clamp
Courtesy of CHRYSLER GROUP, LLC

4. Loosen clamp (6) and disconnect turbocharger inlet hose (5) from the Mass Air Flow (MAF) sensor.



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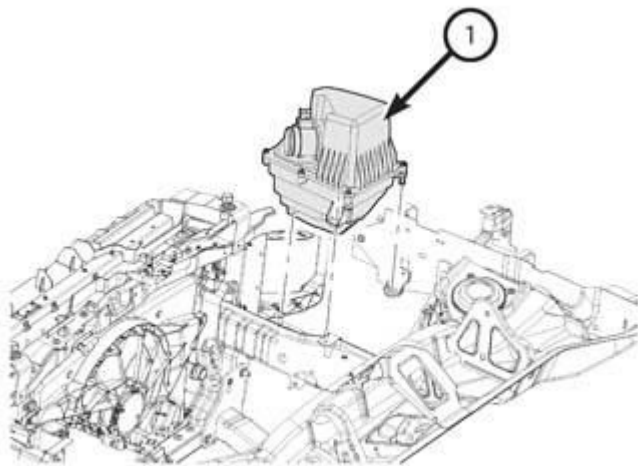
Fig. 300: Air Cleaner Body

Courtesy of CHRYSLER GROUP, LLC

5. Pull air cleaner body (1) straight up to remove.

INSTALLATION

INSTALLATION



0909010420

Fig. 301: Air Cleaner Body

Courtesy of CHRYSLER GROUP, LLC

1. Position the air cleaner body into the grommets and push the air cleaner body (1) down until fully seated.

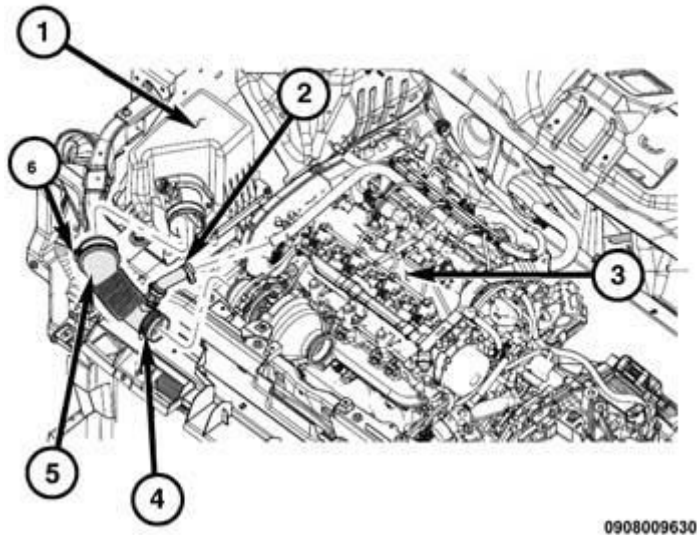


Fig. 302: Turbocharger Inlet Hose & Clamp
Courtesy of CHRYSLER GROUP, LLC

2. Connect turbocharger inlet hose (5) to the (MAF) sensor and securely tighten clamp (6).

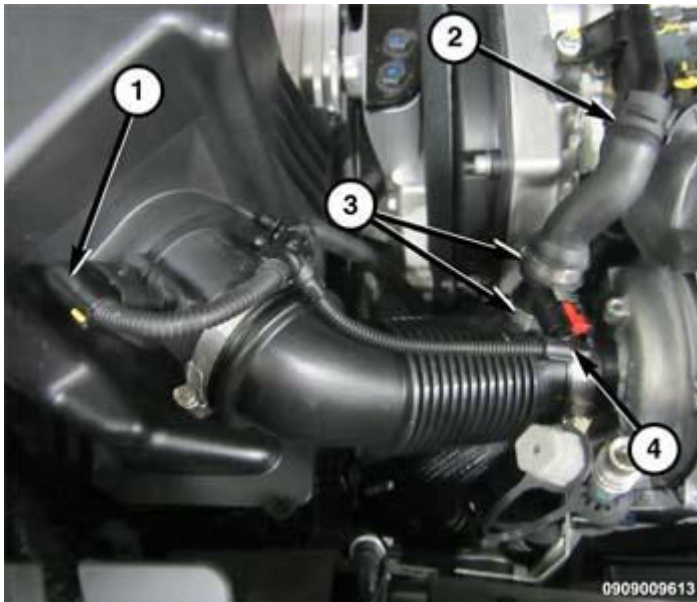


Fig. 303: MAF Sensor Harness Connector
Courtesy of CHRYSLER GROUP, LLC

3. Connect Mass Air Flow (MAF) sensor connector (2).
4. Install the engine cover (1).
5. Connect the negative battery cable.

ENGINE MOUNTING

DESCRIPTION

DESCRIPTION

The engine mounting system consists of a three-point system utilizing two load-carrying mounts and one torque controlling mounts. The load-carrying mounts are located on each frame rail. The right and left mounts are hydro-elastic mounts. The one torque controlling mounts are attached to rear of the engine.

OPERATION

OPERATION

The three-point engine mounting system minimizes the transmission of structure-borne engine noise to the passenger compartment. The load-carrying right and left mounts dampen and isolate vertical motion and vibration. The rear mounts absorb torque reaction forces and torsional vibrations.

BRACKET, ENGINE MOUNT, LEFT

REMOVAL

REMOVAL

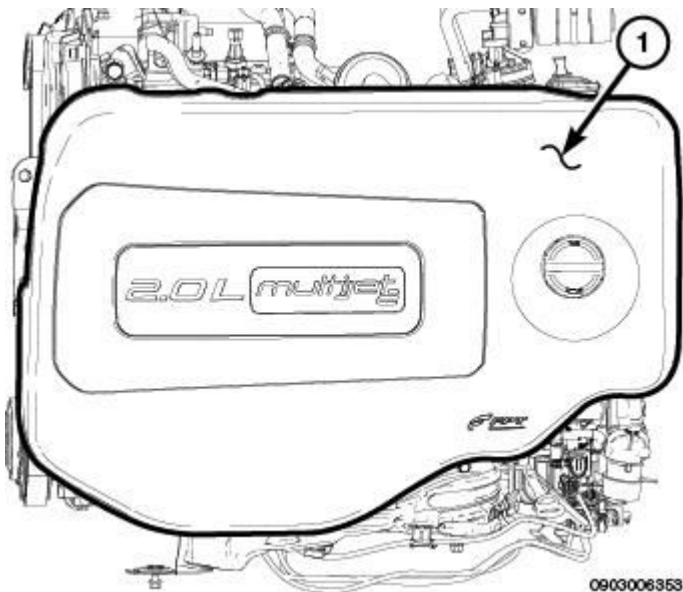


Fig. 304: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Remove the engine cover (1).

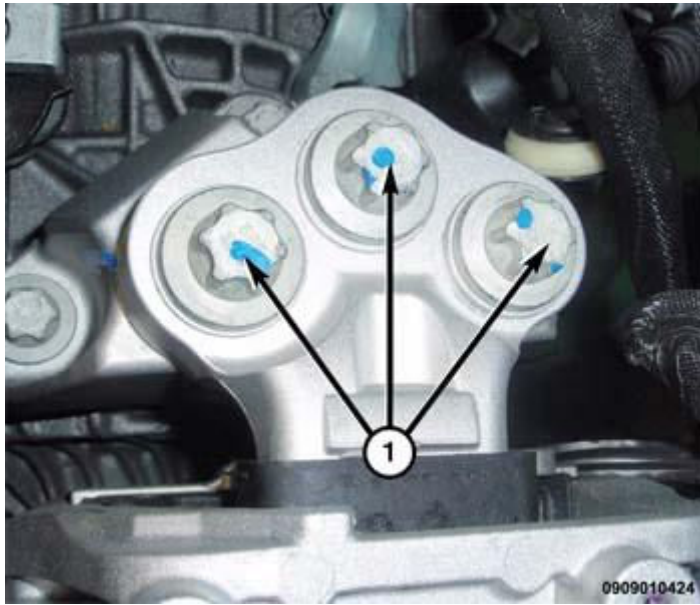


Fig. 305: Left Transaxle Mount Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Using a suitable jack. Support the transaxle.
3. Remove left mount to transaxle retaining bolts (1).

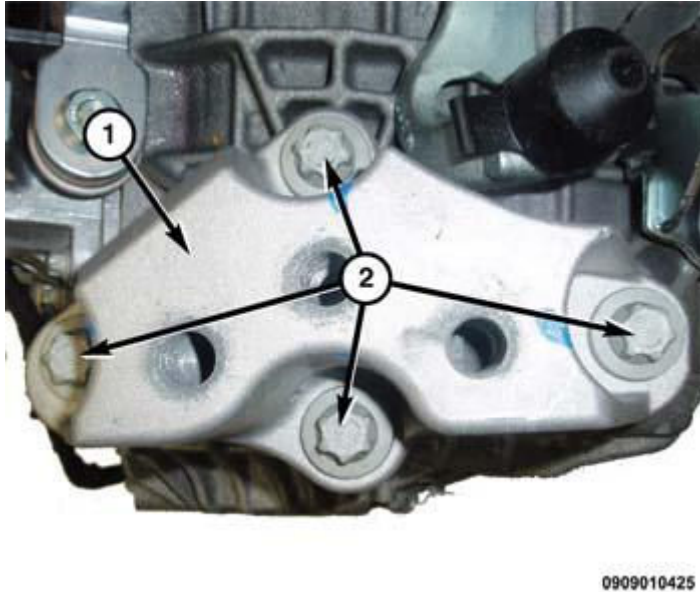
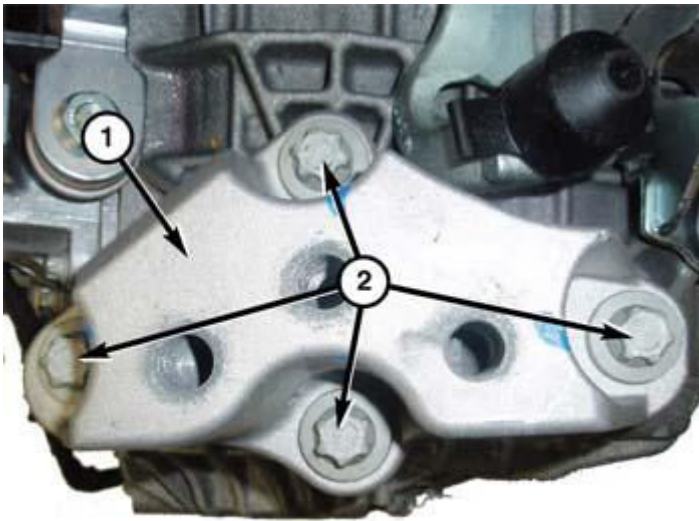


Fig. 306: Left Transaxle Mount Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Lower the transaxle.
5. Remove bolts (2) and the left transaxle mount bracket (1).

INSTALLATION

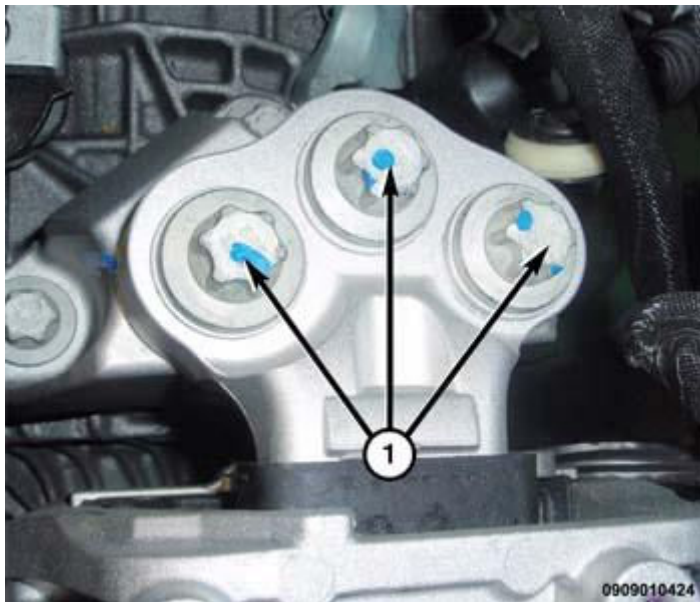
INSTALLATION

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Fig. 307: Left Transaxle Mount Bracket & Bolts

Courtesy of CHRYSLER GROUP, LLC

1. Install the left transaxle mount bracket (1). Tighten bolts (2) to 105 N.m (77 ft. lbs.).
2. Using a suitable jack, raise the transaxle.



0909010424

Fig. 308: Left Transaxle Mount Bolts

Courtesy of CHRYSLER GROUP, LLC

3. Install the left mount to transaxle retaining bolts (1) and tighten to 157 N.m (116 ft. lbs.).
4. Remove the jack.

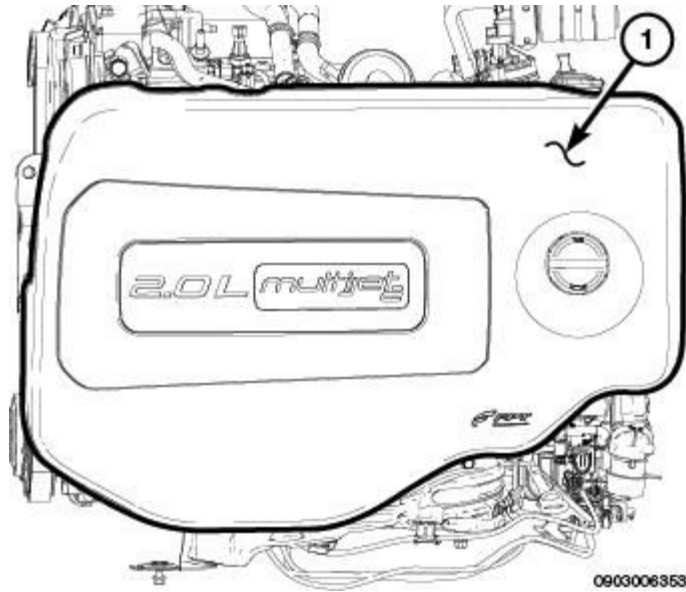


Fig. 309: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

5. Install the engine cover (1).

BRACKET, ENGINE MOUNT, REAR MOUNT

REMOVAL

REMOVAL

1. Remove the rear mount. Refer to **INSULATOR, ENGINE MOUNT, REAR, REMOVAL** .

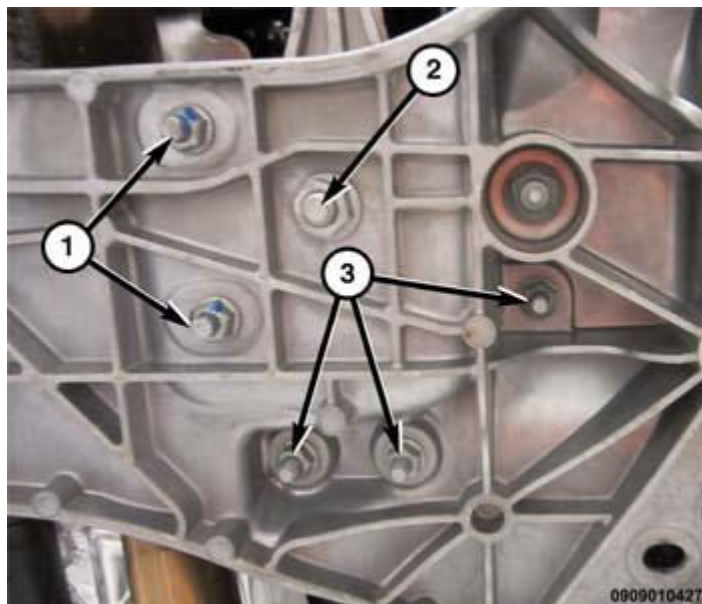


Fig. 310: Rear Mount Bracket Nuts

Courtesy of CHRYSLER GROUP, LLC

2. Remove the rear mount bracket nuts (1).
3. Using a wrench to hold bolt, remove the rear mount nuts (2, 3).

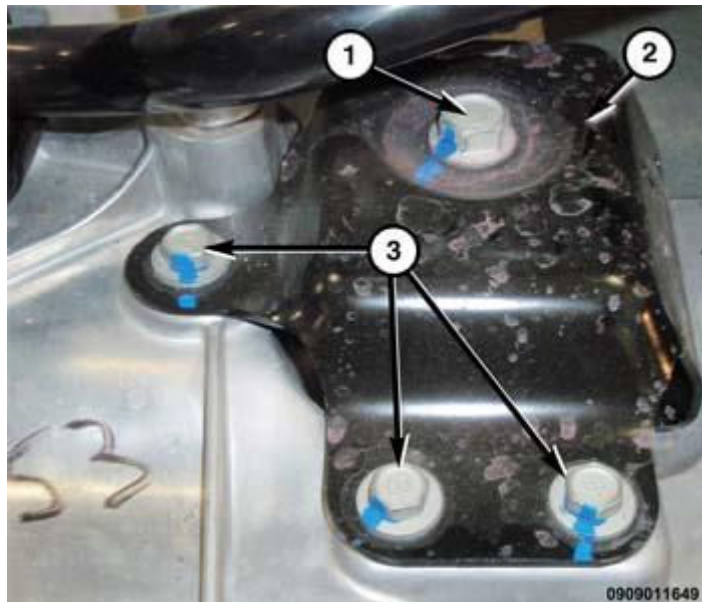


Fig. 311: Rear Mount Bracket Bolts

Courtesy of CHRYSLER GROUP, LLC

4. Remove bolts (1, 3) and the rear mount bracket (2).

INSTALLATION

INSTALLATION

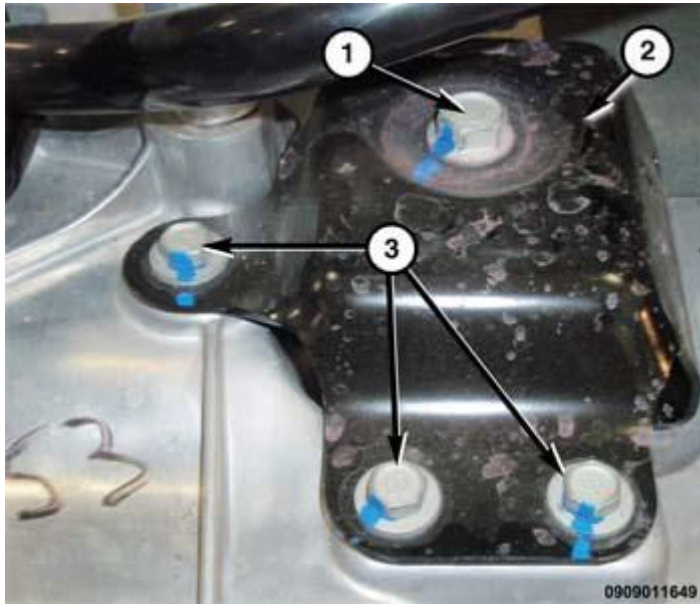


Fig. 312: Rear Mount Bracket Bolts
Courtesy of CHRYSLER GROUP, LLC

- 1.
2. Position the rear mount bracket and install bolts (1, 3).

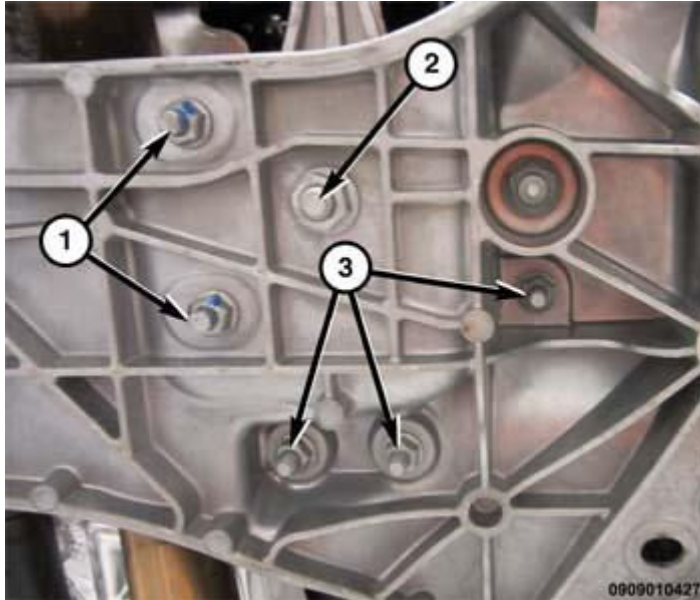


Fig. 313: Rear Mount Bracket Nuts
Courtesy of CHRYSLER GROUP, LLC

3. Install the rear mount bracket nuts (1, 3). Using a backing wrench to hold bolt, and tighten nuts (1, 3) to 75 N.m (55 ft. lbs.).
4. Using a backing wrench to hold bolt, and tighten nut (2) to 135 N.m (81 ft. lbs.).

5. Install the rear mount. Refer to **INSULATOR, ENGINE MOUNT, REAR, INSTALLATION** .

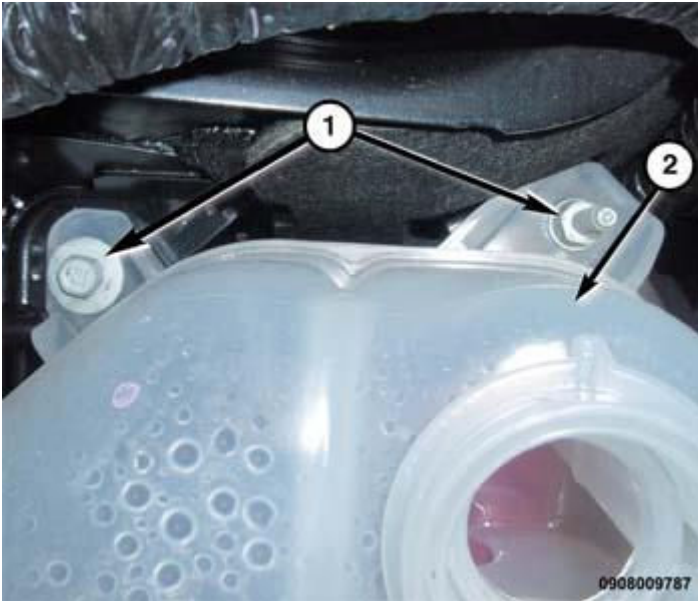
INSULATOR, ENGINE MOUNT, RIGHT**REMOVAL****REMOVAL**

Fig. 314: Coolant Bottle & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Remove bolt and nut (1) and position aside the coolant bottle (2).

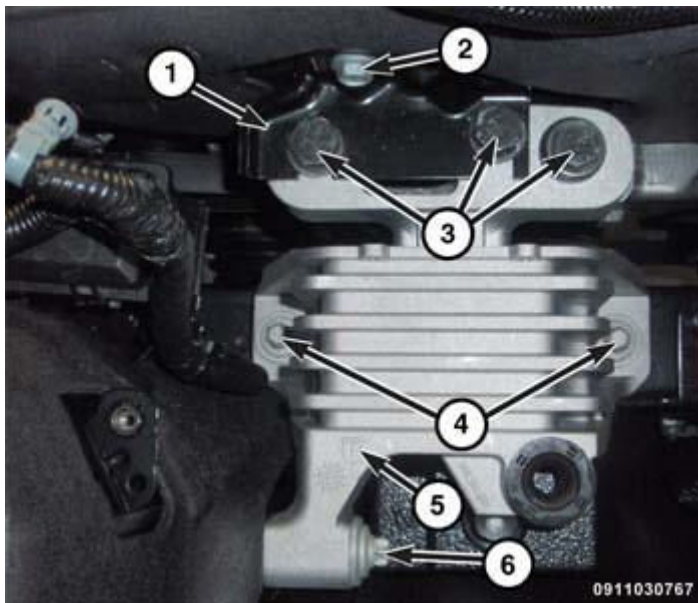


Fig. 315: Right Transaxle Mount Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .
3. Using a suitable jack. Support the engine.
4. Remove the right engine mount bracket bolt (2).
5. Remove the three engine mount bolts (3) and mount bracket (1).
6. Remove bolts (4, 6) and the right engine mount (5).

INSTALLATION

INSTALLATION

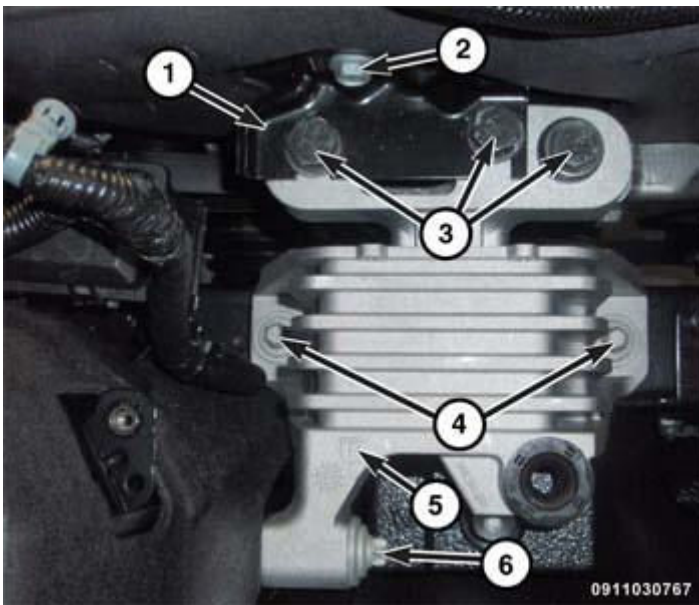


Fig. 316: Right Transaxle Mount Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Install the right engine mount (5). Tighten bolts (3, 4) finger tight.
2. Install the right mount bracket (1) and tighten bolt (2) finger tight.
3. Install the right mount bolts (3) finger tight.
4. Tighten engine mount bolts to:
 - Tighten bolts (4) to 70 N.m (52 ft. lbs.).
 - Tighten bolt (6) to 65 N.m (48 ft. lbs.).
 - Tighten bolts (3) to 90 N.m (66 ft. lbs.).
 - Tighten bolt (2) to 25 N.m (18 ft. lbs.).
5. Remove the jack.
6. Install the bellypan. Refer to **BELLY PAN, INSTALLATION** .

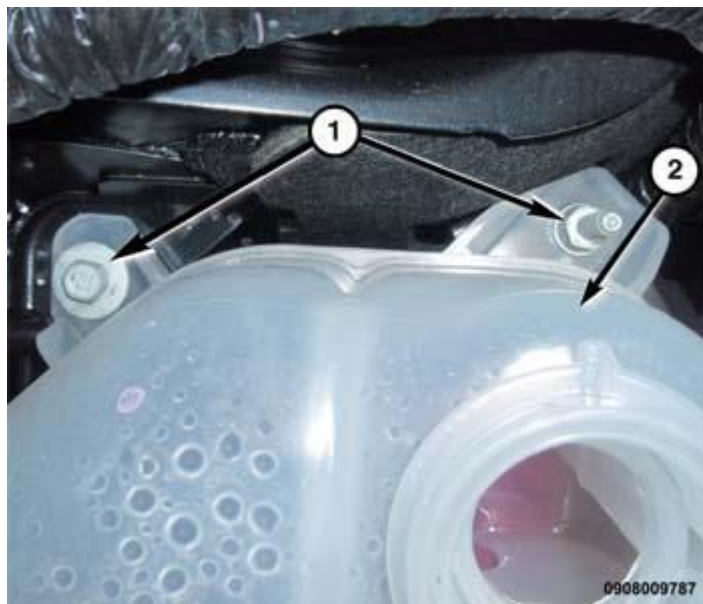


Fig. 317: Coolant Bottle & Fasteners
Courtesy of CHRYSLER GROUP, LLC

7. Install the coolant bottle (1). Tighten nuts and bolts (1) to 8 N.m (71 in. lbs.).

INSULATOR, ENGINE MOUNT, LEFT

REMOVAL

REMOVAL

1. Remove the battery tray. Refer to **TRAY, BATTERY, REMOVAL** .
2. Remove the PDC (1) assembly. Refer to **CENTER, POWER DISTRIBUTION (PDC), REMOVAL** .
3. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .
4. Position a jack under transaxle to support the transaxle.

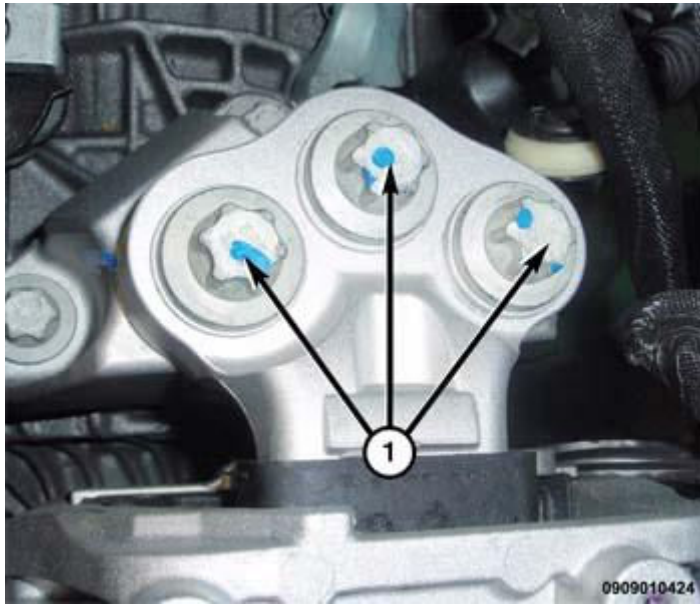


Fig. 318: Left Transaxle Mount Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Remove the left mount bolts (1).

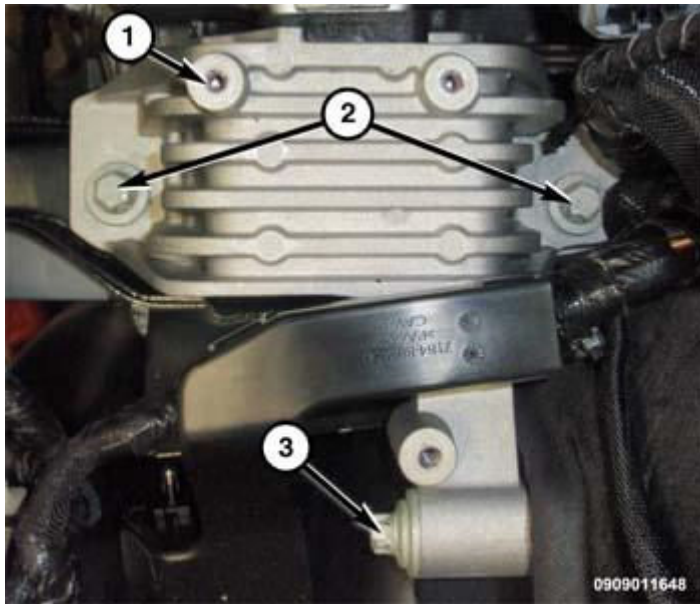
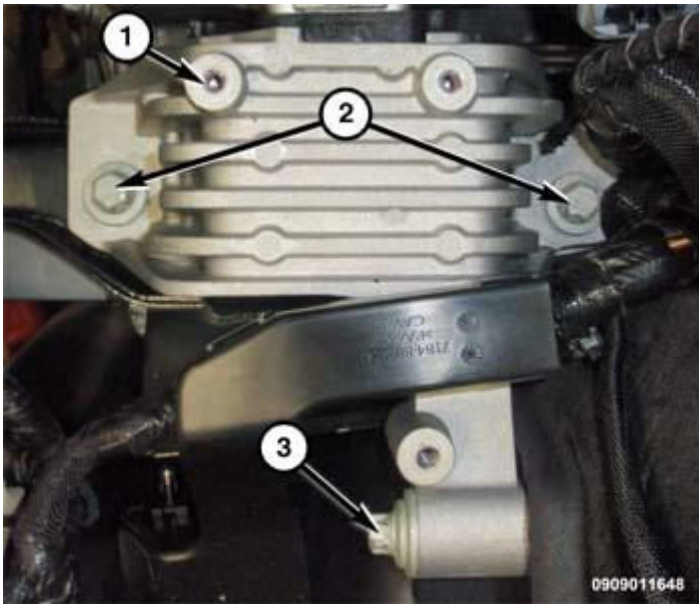


Fig. 319: Left Mount Bolts
Courtesy of CHRYSLER GROUP, LLC

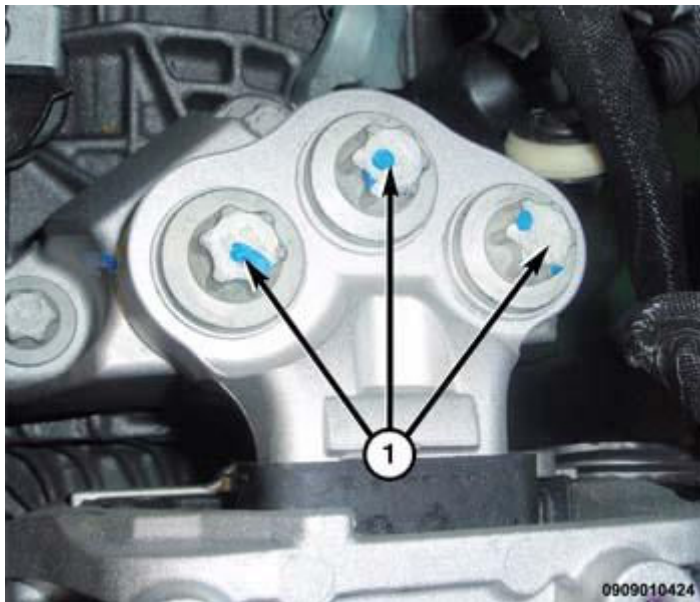
6. Remove left mount to shock tower bolt (3).
7. Remove bolts (2) and the left mount (1).

INSTALLATION

INSTALLATION**Fig. 320: Left Mount Bolts**

Courtesy of CHRYSLER GROUP, LLC

1. Install the left mount (1) on frame rail. Tighten bolts (2) to 105 N.m (77 ft. lbs.).
2. Install left mount to shock tower bolt (3) and tighten to 64 N.m (47 ft. lbs.).

**Fig. 321: Left Transaxle Mount Bolts**

Courtesy of CHRYSLER GROUP, LLC

3. Install left mount bolts (1). Tighten bolt 157 N.m (116 ft. lbs.).
4. Remove the jack.

5. Install the belly pan Refer to **BELLY PAN, INSTALLATION** .
6. Install the PDC. Refer to **CENTER, POWER DISTRIBUTION (PDC), INSTALLATION** .
7. Install the battery tray. Refer to **TRAY, BATTERY, INSTALLATION** .

INSULATOR, ENGINE MOUNT, REAR

REMOVAL

MTX

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .
3. Remove the exhaust crossunder pipe. Refer to **PIPE, EXHAUST CROSSUNDER, REMOVAL** .

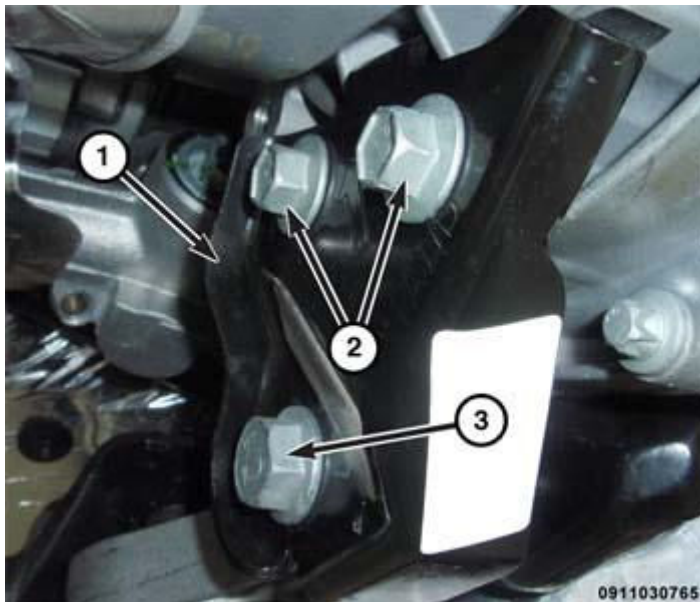


Fig. 322: Rear Mount Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Remove the rear mount bolt (3).
5. Remove bolts (2) and the rear mount bracket (1).

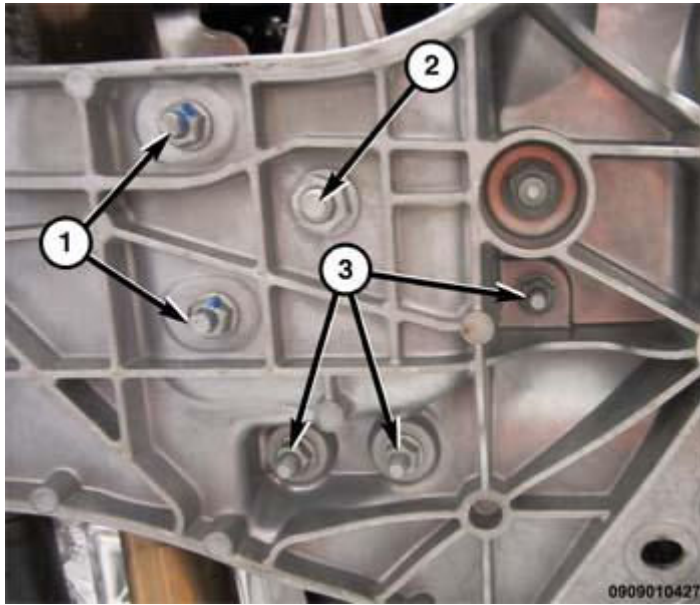


Fig. 323: Rear Mount Bracket Nuts
Courtesy of CHRYSLER GROUP, LLC

6. Using a wrench to hold bolt, remove the rear mount nut (2).

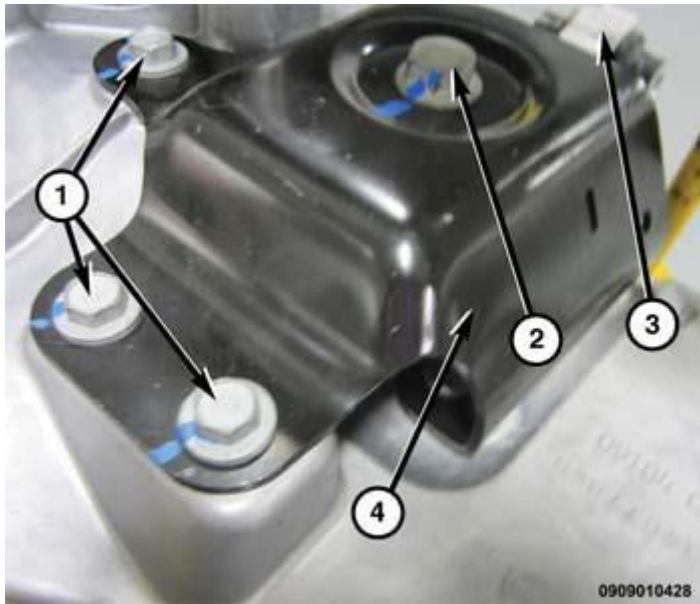
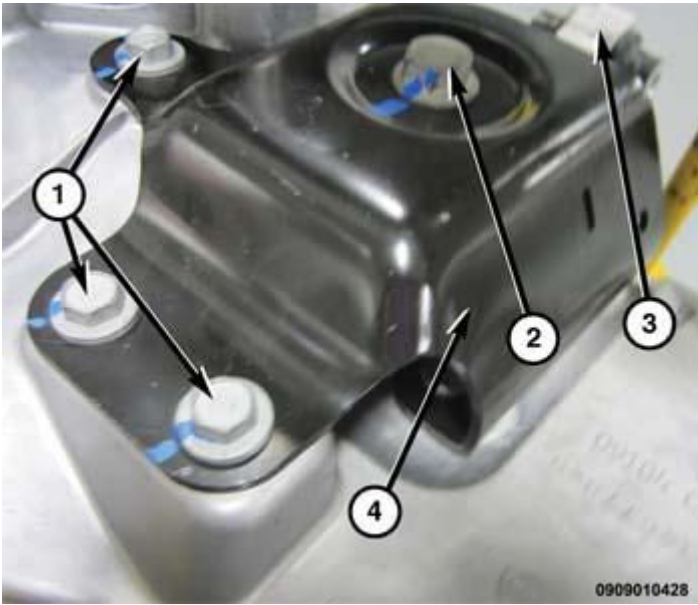


Fig. 324: Rear Mount & Bolts
Courtesy of CHRYSLER GROUP, LLC

7. Remove bolt (2) and the rear mount (3).

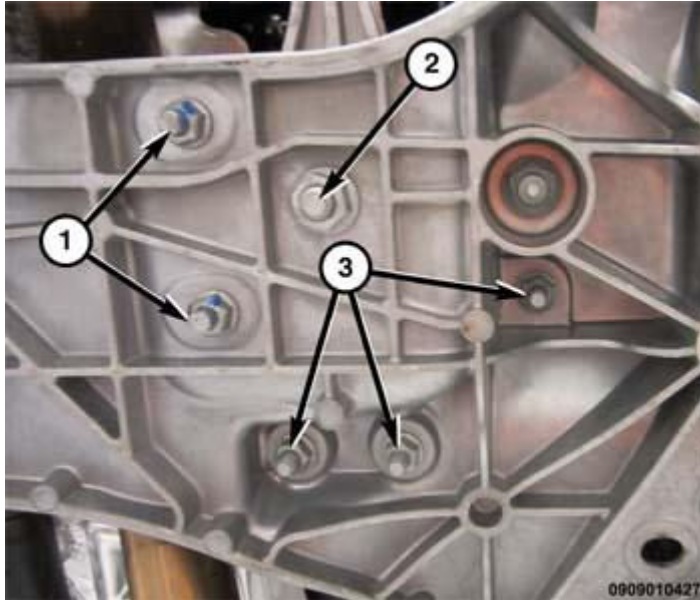
INSTALLATION

MTX

**Fig. 325: Rear Mount & Bolts**

Courtesy of CHRYSLER GROUP, LLC

1. Install the rear mount (3) into the engine mount bracket (4).
2. Install the rear engine mount bolt (2) and nut.

**Fig. 326: Rear Mount Bracket Nuts**

Courtesy of CHRYSLER GROUP, LLC

3. Using a backing wrench to hold bolt, Tighten nut (2) to 115 N.m (85 ft. lbs.).

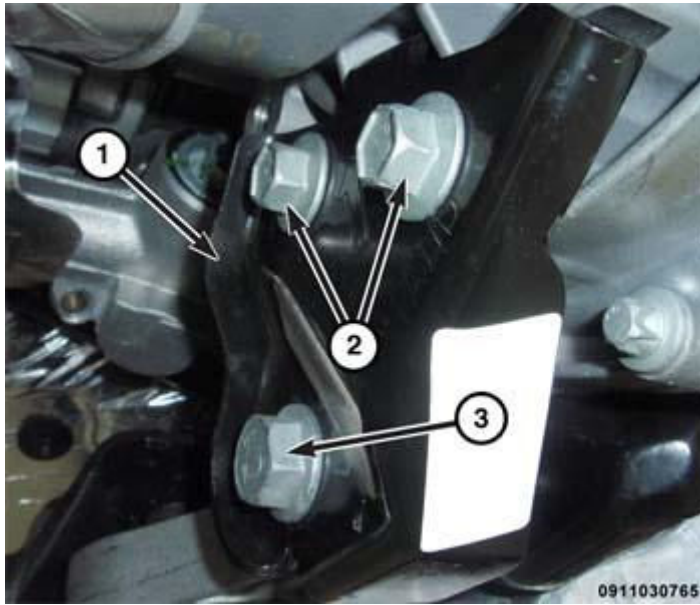


Fig. 327: Rear Mount Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Install the rear engine mount-to-transaxle bracket (1). Tighten bolt (2) to 147 N.m (108 ft. lbs.).
5. Install the rear engine mount bolt (3). Tighten bolt to 220 N.m (162 ft. lbs.).

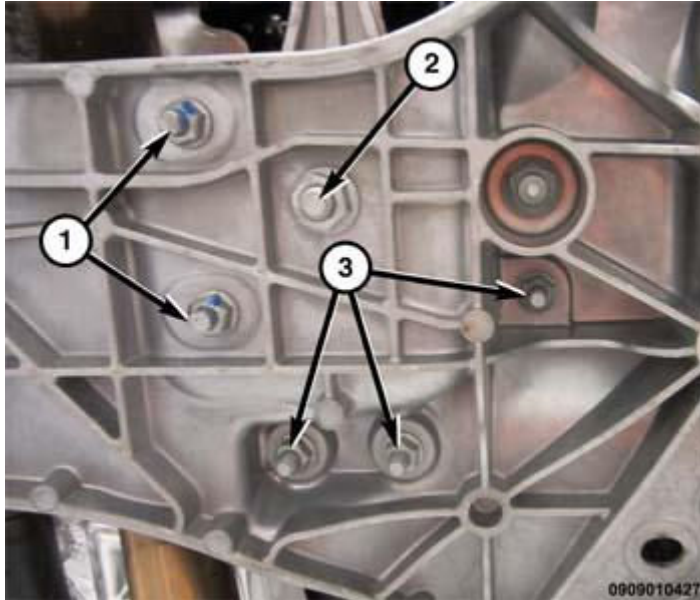


Fig. 328: Rear Mount Bracket Nuts
Courtesy of CHRYSLER GROUP, LLC

6. Tighten nuts (1) to 75 N.m (55 ft. lbs.).
7. Using a backing wrench to hold bolt, Tighten nuts (3) to 75 N.m (55 ft. lbs.).

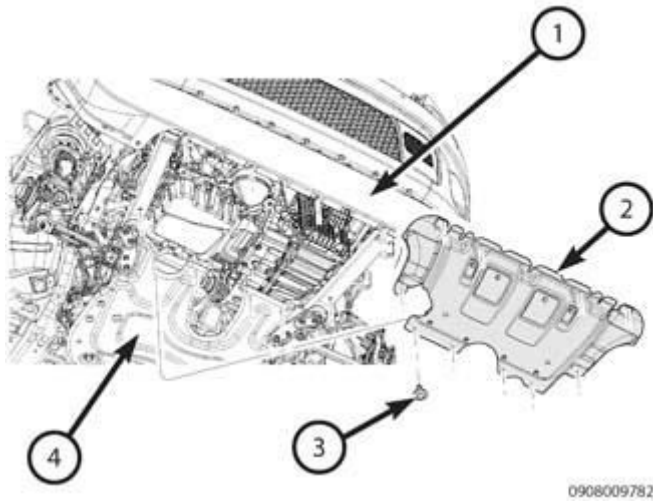


Fig. 329: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

8. Install the exhaust crossunder pipe. Refer to **PIPE, EXHAUST CROSSUNDER, INSTALLATION** .
9. Install the belly pan. Refer to **BELLY PAN, INSTALLATION** .
10. Lower the vehicle.

TURBOCHARGER SYSTEM

COOLER AND HOSES, CHARGE AIR

REMOVAL

COOLER

CAUTION: Do not use any tools to remove the rubber isolators-remove by hand only. Soapy water or silicone based lubricant spray may be used to assist removal/installation of isolators. **DO NOT** use a petroleum based lubricant on the isolators, as damage to the rubber material can occur.

1. Raise and support vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .
3. Remove the front fascia. Refer to **FASCIA, FRONT, REMOVAL** .

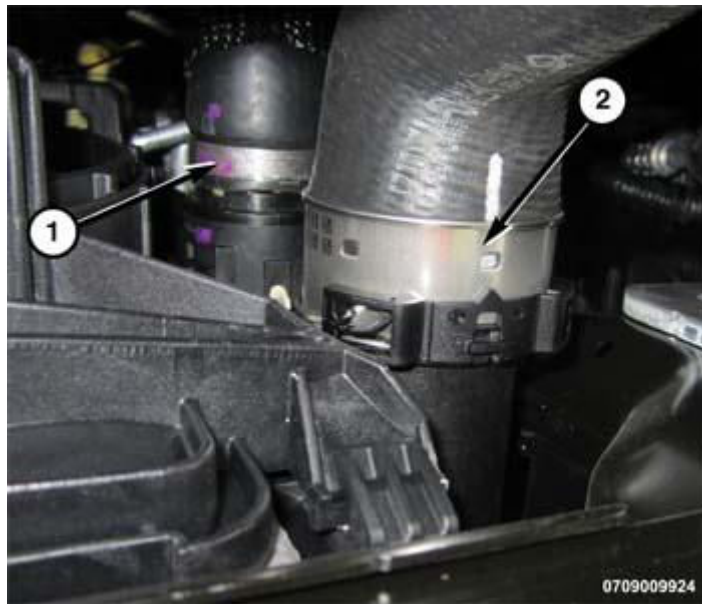


Fig. 330: Lower CAC Hoses
Courtesy of CHRYSLER GROUP, LLC

4. Remove the right side Charge Air Cooler (CAC) hose (2).

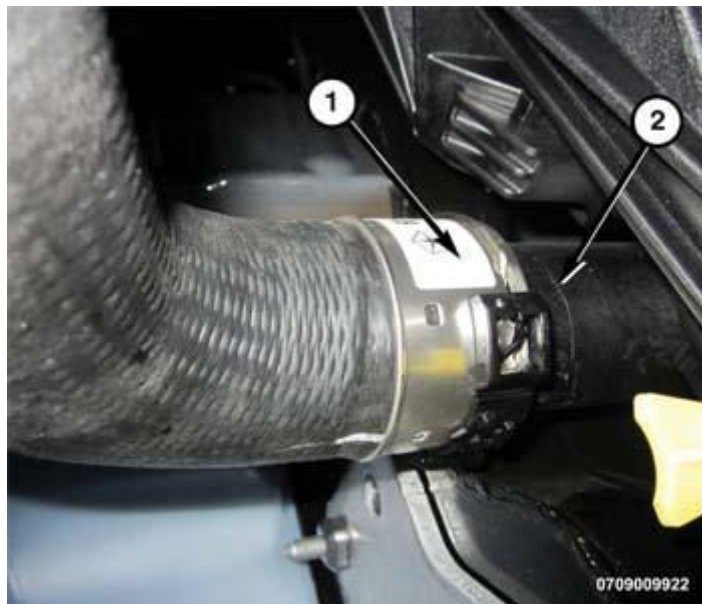


Fig. 331: Left Charge Air Cooler (CAC) & Hose
Courtesy of CHRYSLER GROUP, LLC

5. Remove the left side Charge Air Cooler (CAC) hose (1).



Fig. 332: Right Side Air Deflector Pushpin Retainers
Courtesy of CHRYSLER GROUP, LLC

6. Remove the two right side air deflector pushpin retainers (1).



Fig. 333: Left Side Air Deflector Pushpin Retainers
Courtesy of CHRYSLER GROUP, LLC

7. Remove the two left side air deflector pushpin retainers (1).

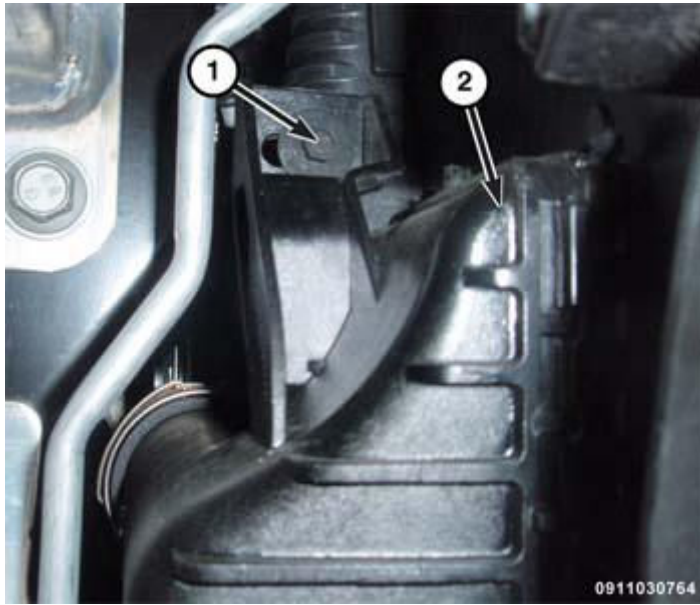


Fig. 334: Right Side Charge Air Cooler Bolt
Courtesy of CHRYSLER GROUP, LLC

8. Remove the right side charge air cooler (CAC) bolt (1).

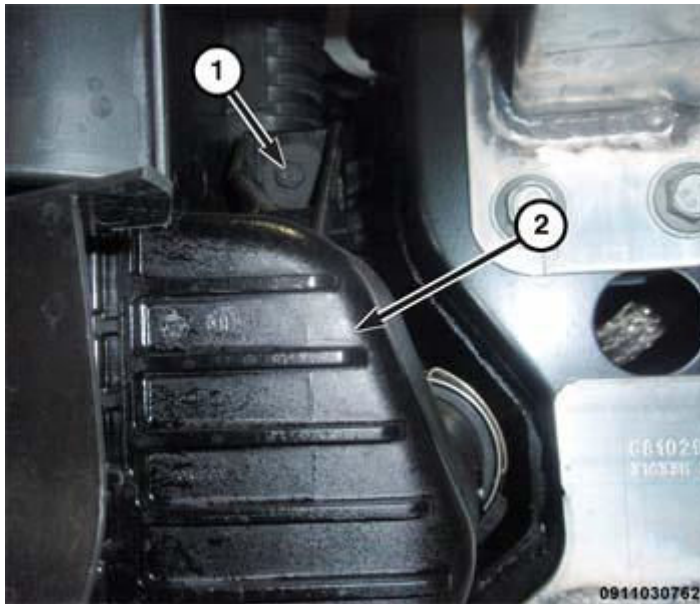


Fig. 335: Left Side Charge Air Cooler Bolt
Courtesy of CHRYSLER GROUP, LLC

9. Remove left side bolt (1) and the CAC (2).

HOSES

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .

2. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .

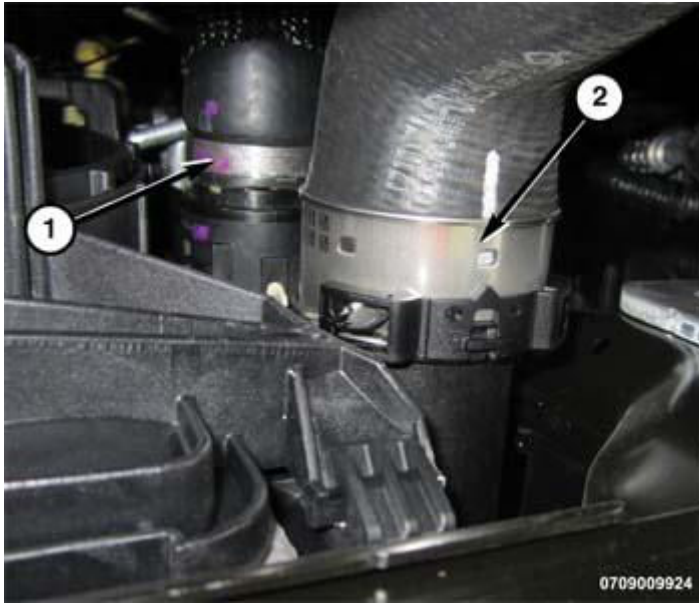


Fig. 336: Lower CAC Hoses
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the right side Charge Air Cooler (CAC) hose (2).

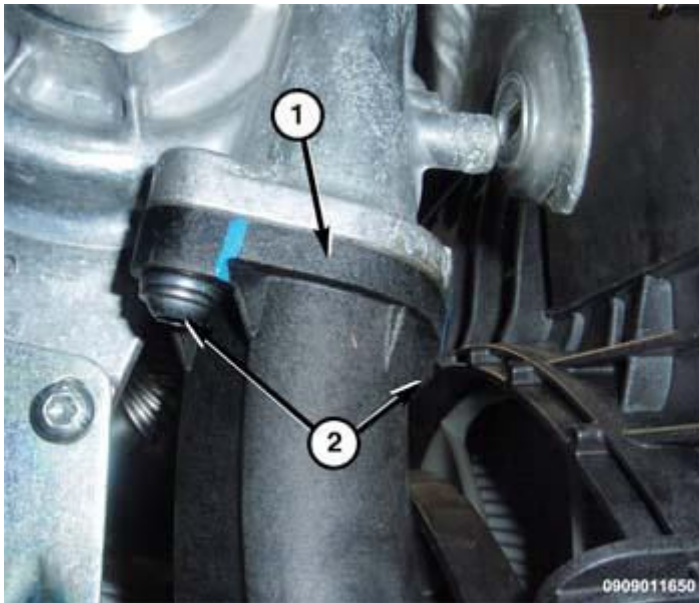


Fig. 337: Right CAC Tube & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Remove bolts (2) and the right side CAC tube (1).

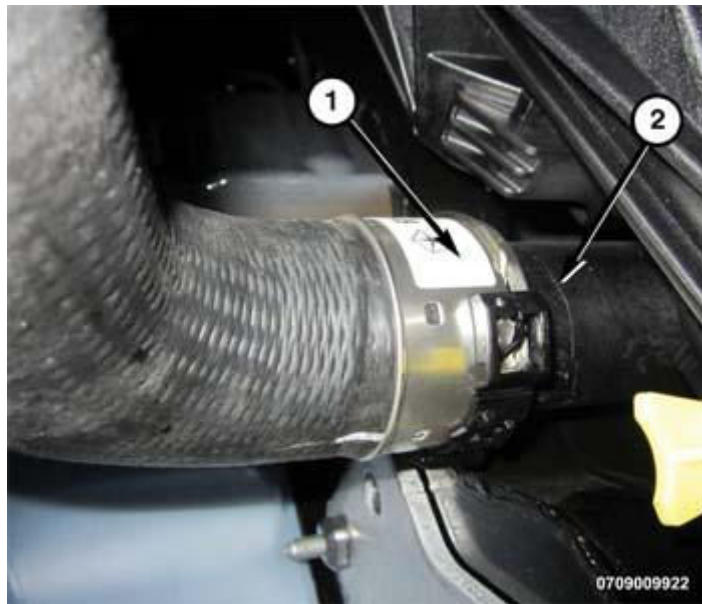


Fig. 338: Left Charge Air Cooler (CAC) & Hose
Courtesy of CHRYSLER GROUP, LLC

5. Disconnect the left side CAC hose (1).

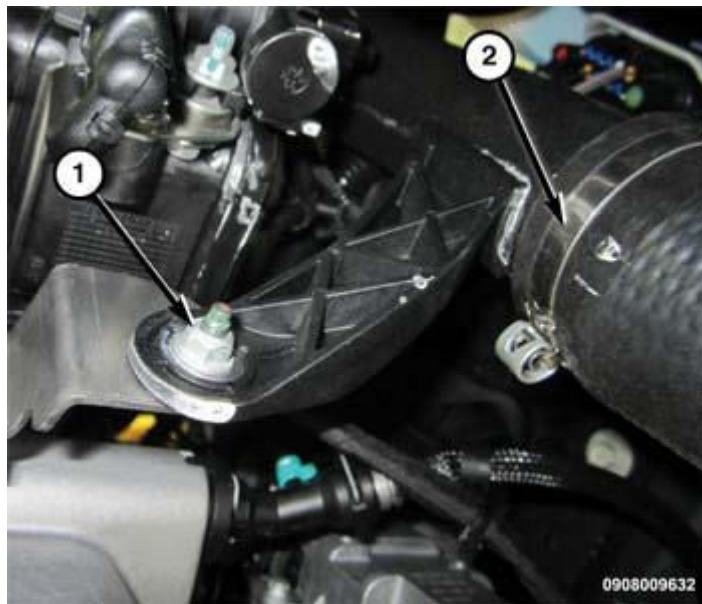


Fig. 339: CAC Air Tube & Nut
Courtesy of CHRYSLER GROUP, LLC

6. Remove the left CAC tube support bracket nut (1).

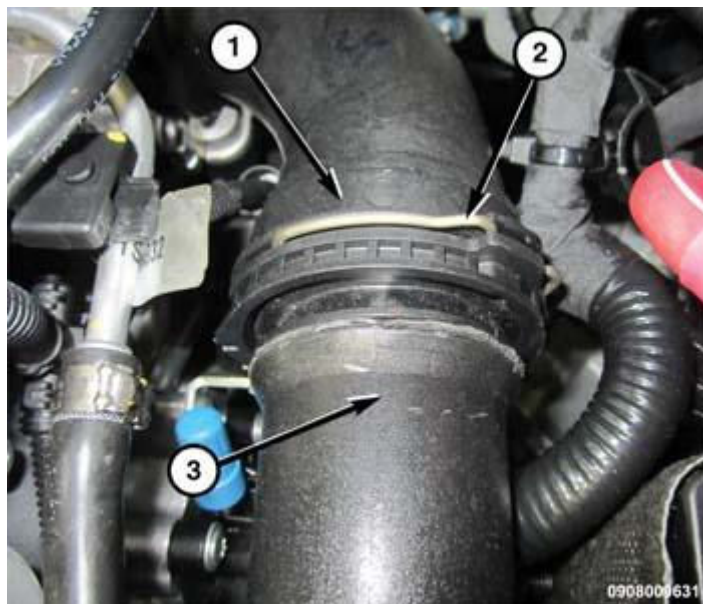


Fig. 340: EGR Air Flow Control Valve Inlet Tube, CAC Tube Wire Retainer & CAC Hose
Courtesy of CHRYSLER GROUP, LLC

7. Release spring clip (2) and disconnect the left side CAC tube (3) from elbow and remove tube.

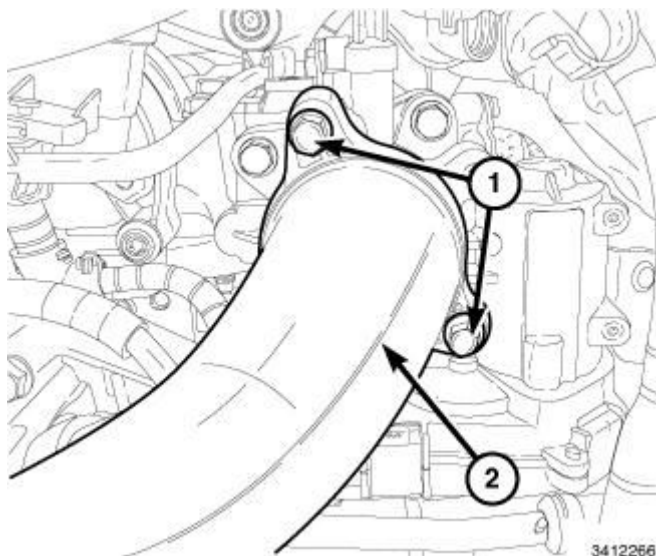


Fig. 341: Bolts & Charge Air Cooler (CAC) Air Tube
Courtesy of CHRYSLER GROUP, LLC

8. Remove bolts (1) and the left side CAC air tube (2).

INSTALLATION

COOLER

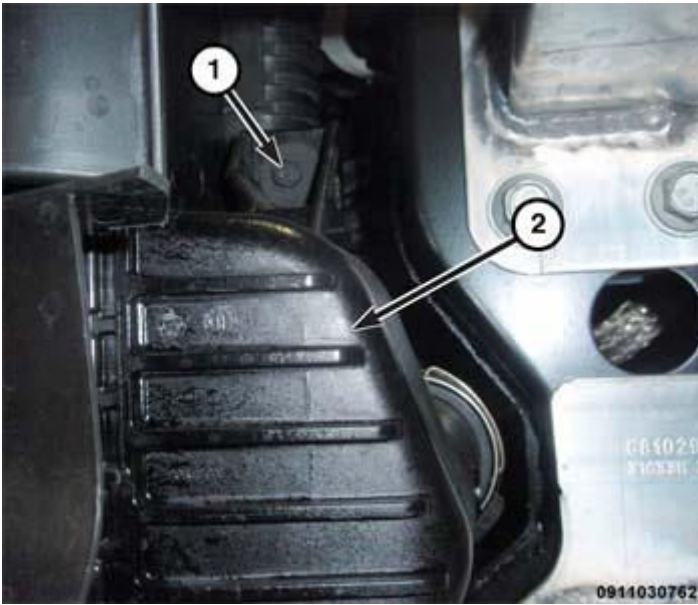


Fig. 342: Left Side Charge Air Cooler Bolt
Courtesy of CHRYSLER GROUP, LLC

1. Position Charge Air Cooler (CAC) (2) and install the left bolt (1). Tighten bolt to 35 N.m (25 ft. lbs.).

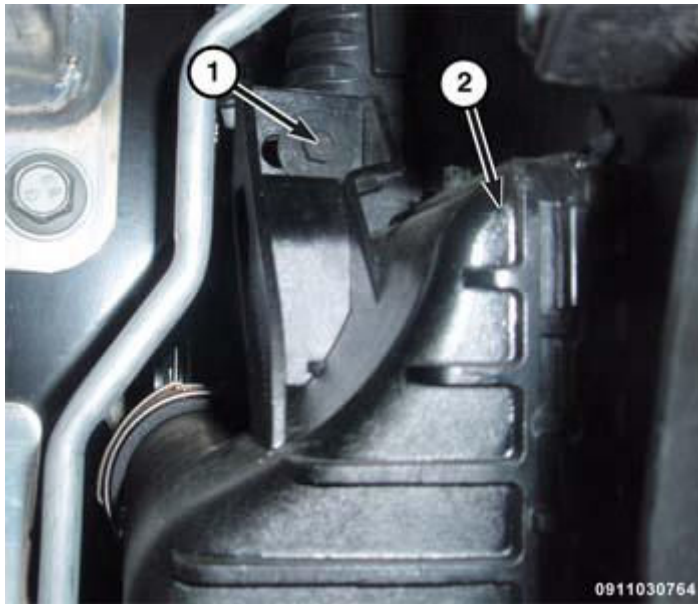


Fig. 343: Right Side Charge Air Cooler Bolt
Courtesy of CHRYSLER GROUP, LLC

2. Install the left CAC bolt (1). Tighten bolt to 35 N.m (25 ft. lbs.).



Fig. 344: Left Side Air Deflector Pushpin Retainers
Courtesy of CHRYSLER GROUP, LLC

3. Install the two left side air deflector pushpin retainers (1).



Fig. 345: Right Side Air Deflector Pushpin Retainers
Courtesy of CHRYSLER GROUP, LLC

4. Install the two right side air deflector pushpin retainers (1).

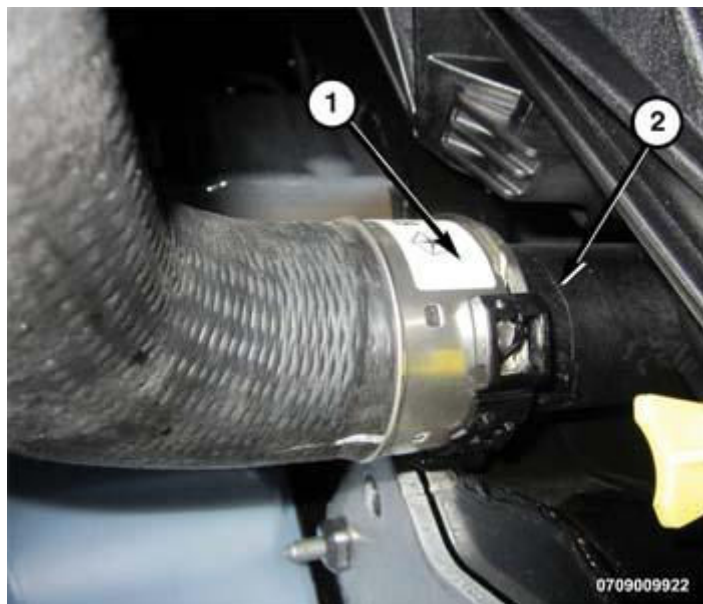


Fig. 346: Left Charge Air Cooler (CAC) & Hose
Courtesy of CHRYSLER GROUP, LLC

5. Install the left side Charge Air Cooler (CAC) hose (1).

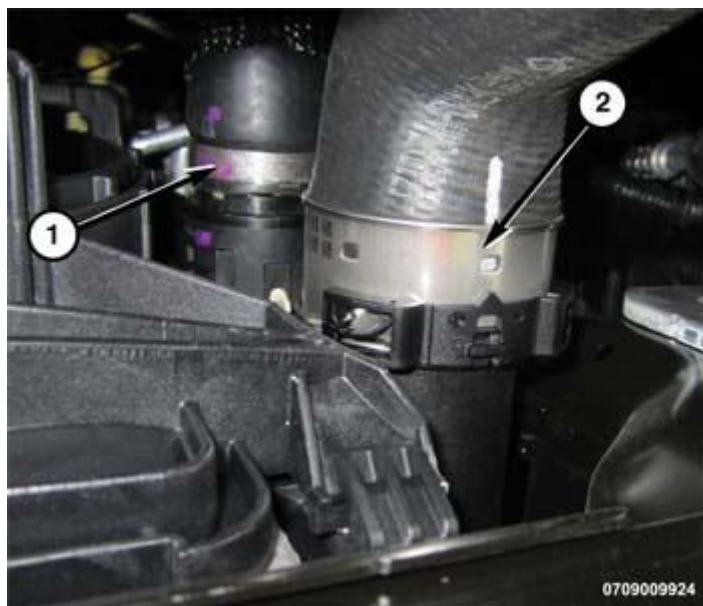


Fig. 347: Lower CAC Hoses
Courtesy of CHRYSLER GROUP, LLC

6. Install the right side Charge Air Cooler (CAC) hose (2).
7. Install the front fascia. Refer to **FASCIA, FRONT, INSTALLATION** .
8. Install the belly pan. Refer to **BELLY PAN, INSTALLATION** .
9. Lower the vehicle.

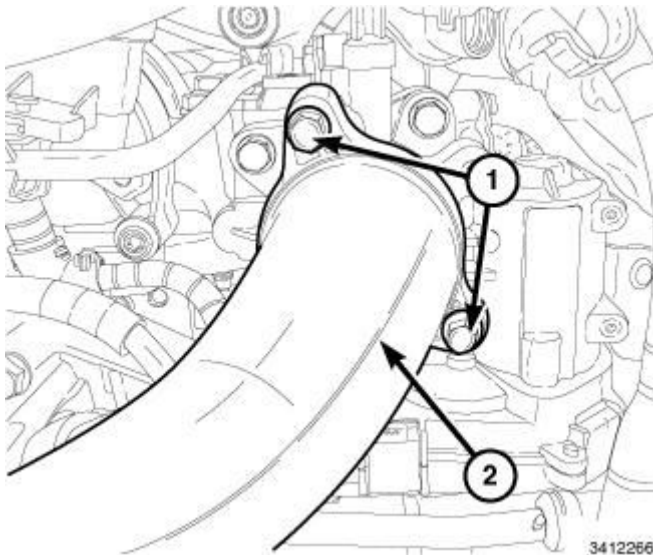
HOSES



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Fig. 348: Charge Air Cooler Air Tube & O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

1. Inspect the Charge Air Cooler (CAC) air tube (1) O-ring seal (2) and replace as necessary.



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Fig. 349: Bolts & Charge Air Cooler (CAC) Air Tube
Courtesy of CHRYSLER GROUP, LLC

2. Install the CAC air tube (2) to the EGR air flow control valve. Tighten bolts (1) to 9 N.m (80 in. lbs.).

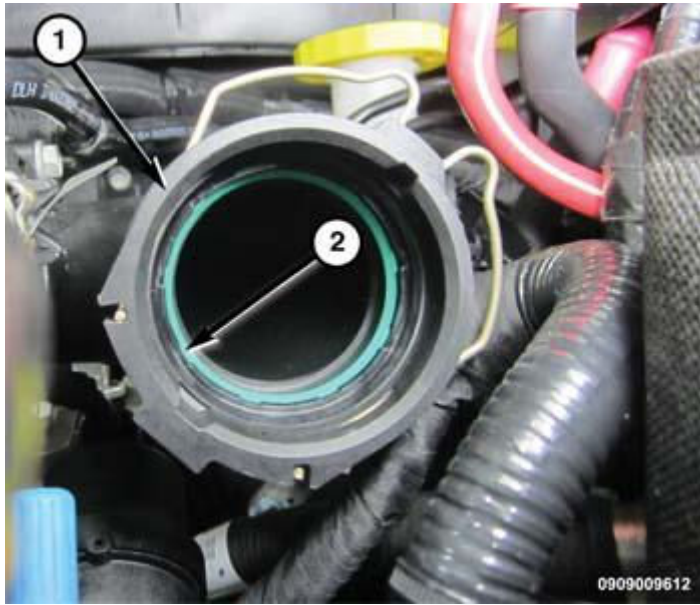


Fig. 350: O-Ring & EGR Air Flow Control Valve Inlet Tube
Courtesy of CHRYSLER GROUP, LLC

3. Inspect the CAC air tube (1) O-ring seal (2) and replace as necessary.

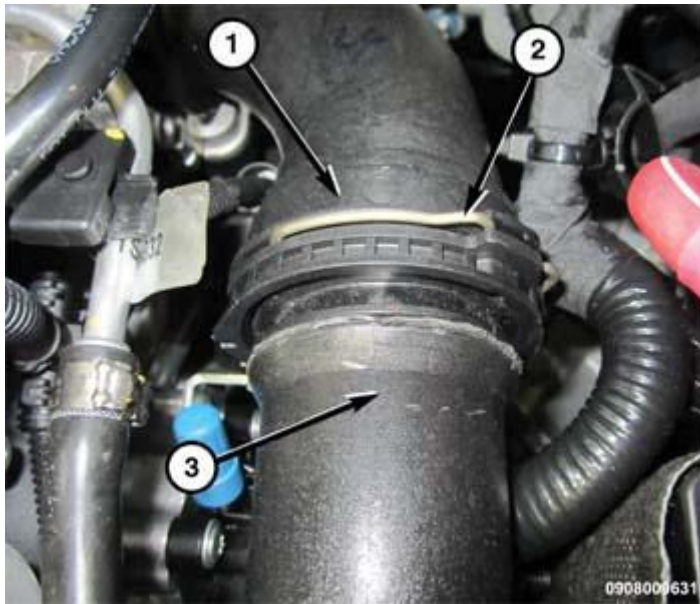


Fig. 351: EGR Air Flow Control Valve Inlet Tube, CAC Tube Wire Retainer & CAC Hose
Courtesy of CHRYSLER GROUP, LLC

4. Install the left side CAC air tube (3) and install clip (2).

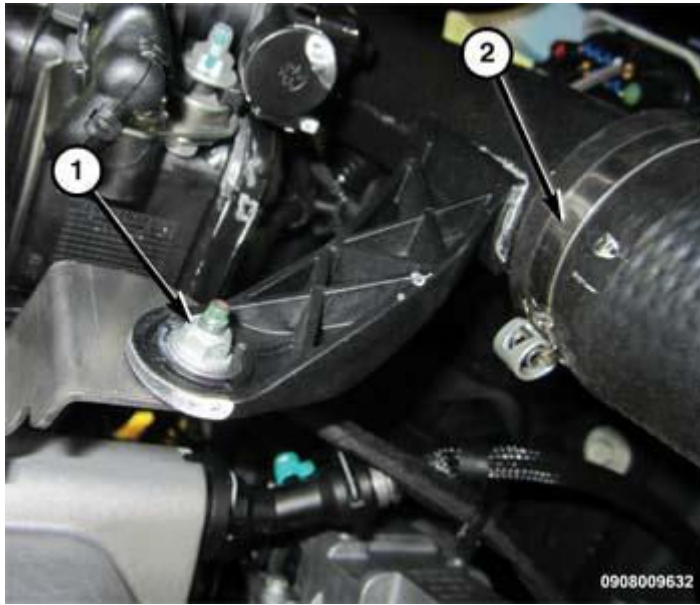


Fig. 352: CAC Air Tube & Nut
Courtesy of CHRYSLER GROUP, LLC

5. Install the left CAC air tube nut (1) and tighten to 9 N.m (80 in. lbs.).

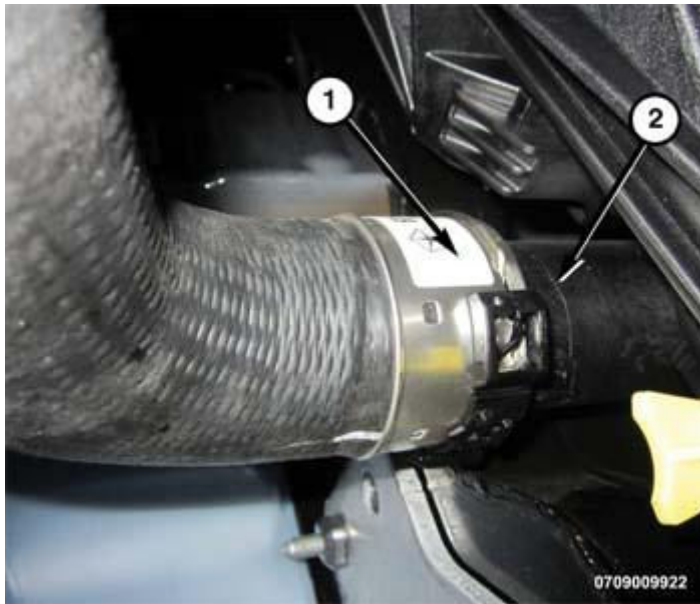


Fig. 353: Left Charge Air Cooler (CAC) & Hose
Courtesy of CHRYSLER GROUP, LLC

6. Connect the left lower CAC hose (1).



Fig. 354: CAC Tube & O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

7. Install a new O-ring seal (1) on the CAC tube (2).

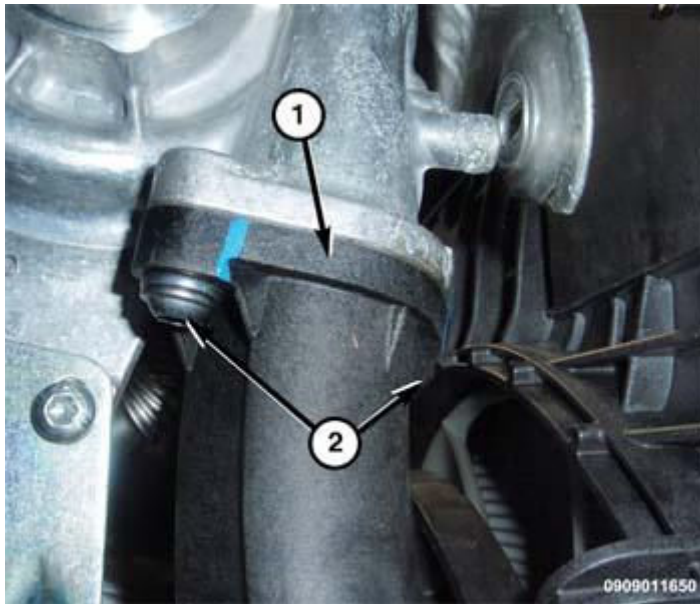


Fig. 355: Right CAC Tube & Bolts
Courtesy of CHRYSLER GROUP, LLC

8. Install the CAC tube (1) to the turbocharger flange. Tighten bolts (2) to 10 N.m (89 in. lbs.).

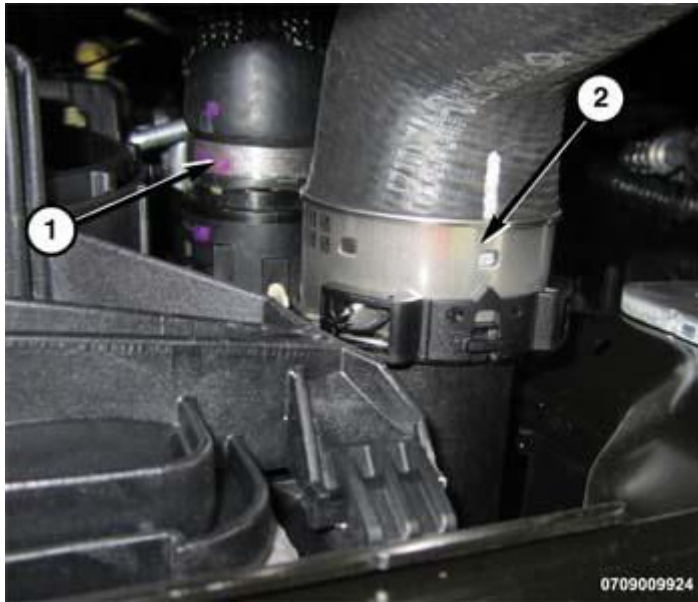


Fig. 356: Lower CAC Hoses
Courtesy of CHRYSLER GROUP, LLC

9. Install the right side CAC hose (2).

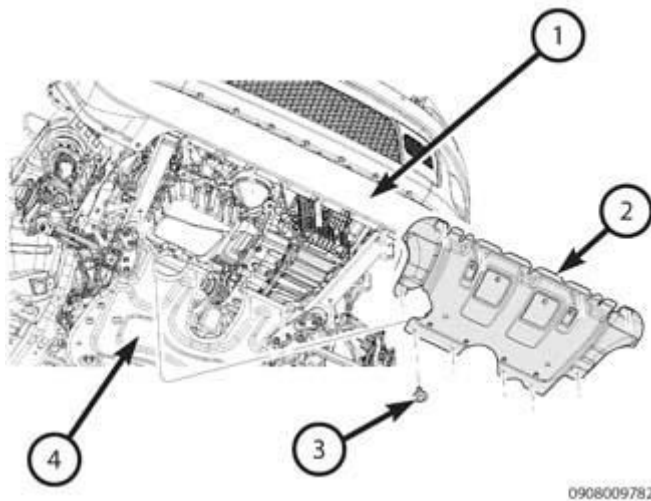
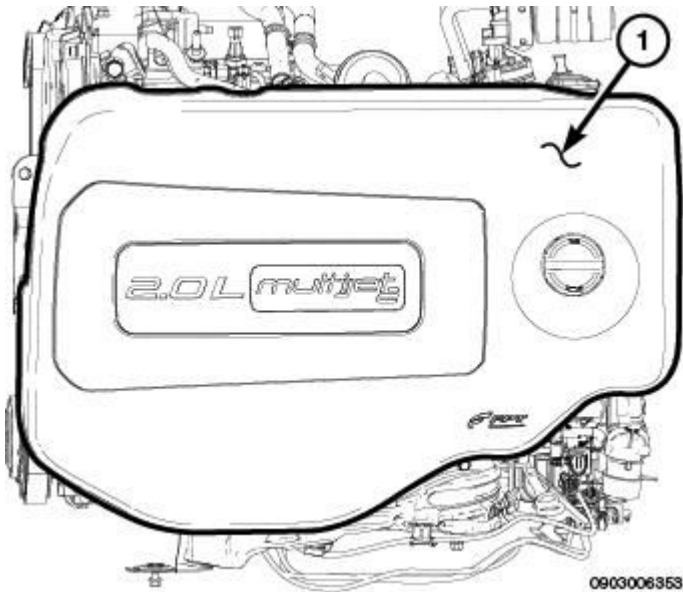


Fig. 357: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

10. Install the belly pan (2) and securely tighten bolts (3).
11. Lower the vehicle

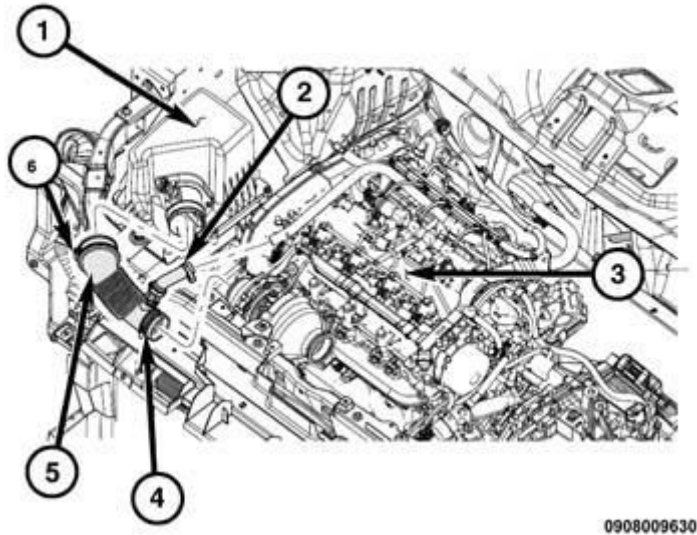
TURBOCHARGER

REMOVAL

REMOVAL**Fig. 358: Engine Cover**

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

**Fig. 359: Turbocharger Inlet Hose & Clamp**

Courtesy of CHRYSLER GROUP, LLC

3. Loosen clamps (4, 6) and remove the air clean to turbocharger air tube (5).

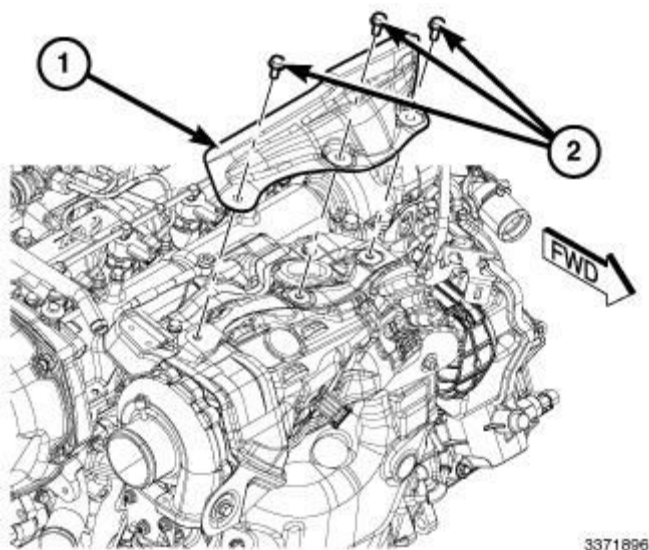


Fig. 360: Upper Turbocharger Heat Shield & Mid Upper Turbocharger Heat Shield
Courtesy of CHRYSLER GROUP, LLC

4. Remove the upper turbocharger heat shield (1).

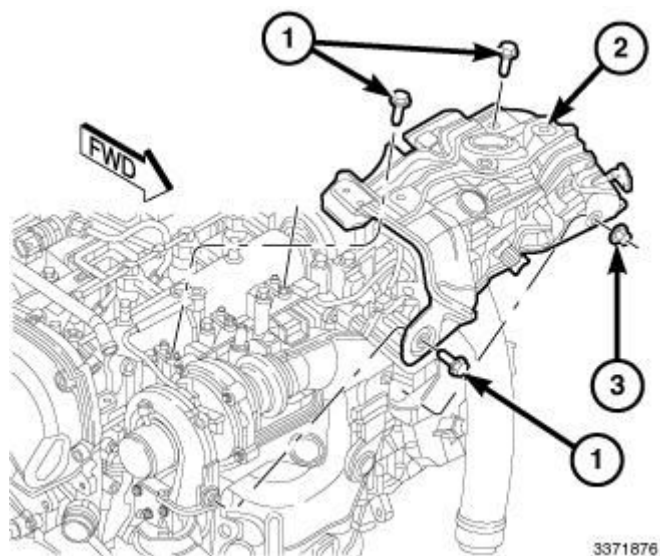
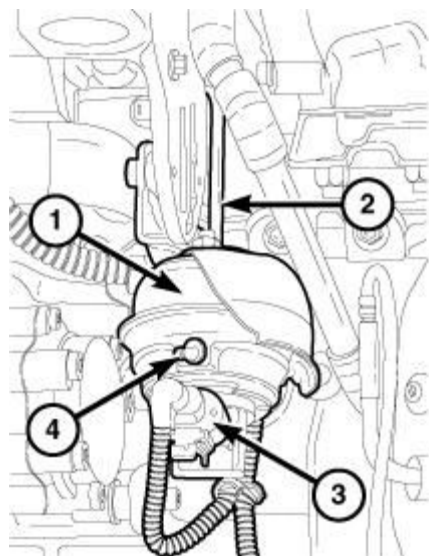


Fig. 361: Turbocharger Heat Shield & Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. Remove the turbocharger heat shield (2).



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Fig. 362: Turbocharger Actuator, Bracket, Connector & Vacuum Line
 Courtesy of CHRYSLER GROUP, LLC

6. Disconnect the vacuum line (4).
7. Disconnect the turbocharger actuator (1) wire harness connector (3).
8. Remove the Diesel Particulate Filter (DPF). Refer to **FILTER, DIESEL PARTICULATE, REMOVAL** .
9. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
10. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .

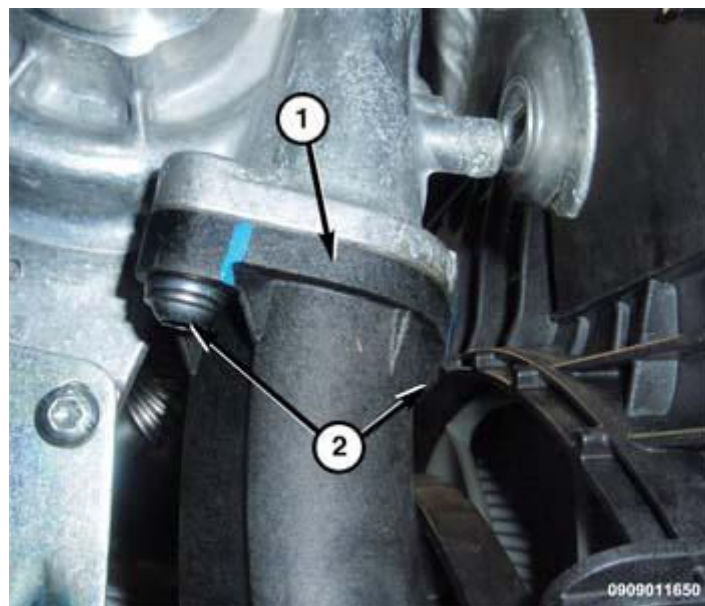


Fig. 363: Right CAC Tube & Bolts
 Courtesy of CHRYSLER GROUP, LLC

11. Remove the turbocharger to CAC tube bolts (2) and position aside.
12. Lower the vehicle.

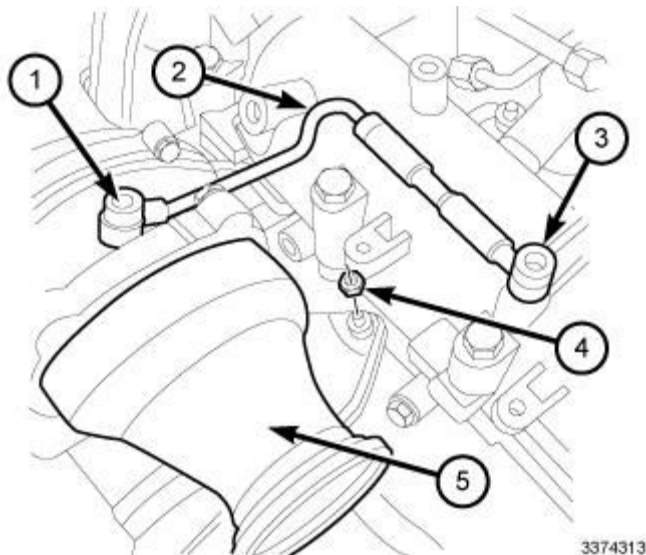


Fig. 364: Turbocharger, Oil Supply Line & Fasteners
Courtesy of CHRYSLER GROUP, LLC

13. Remove the turbocharger oil supply line (2) at the turbocharger (1).
14. Remove the upper turbocharger flange nut (4).

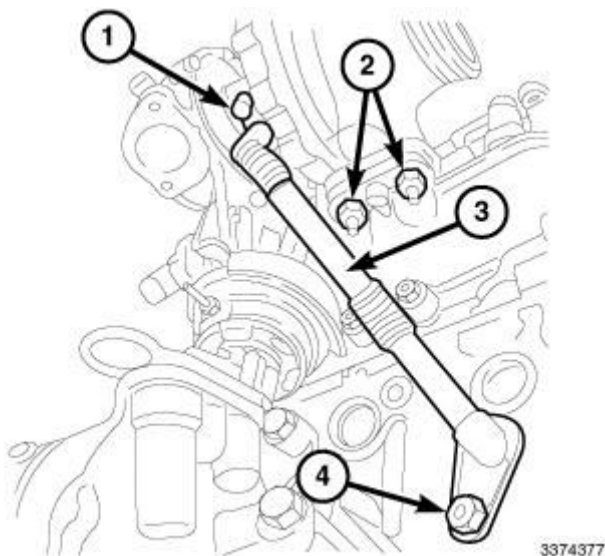


Fig. 365: Turbocharger, Oil Send And Return Line & Fasteners
Courtesy of CHRYSLER GROUP, LLC

15. Remove the turbocharger oil return line (3) from the turbocharger (1).
16. Remove the turbocharger-to-exhaust manifold nuts (2).
17. Remove the turbocharger from the vehicle.

INSTALLATION

INSTALLATION

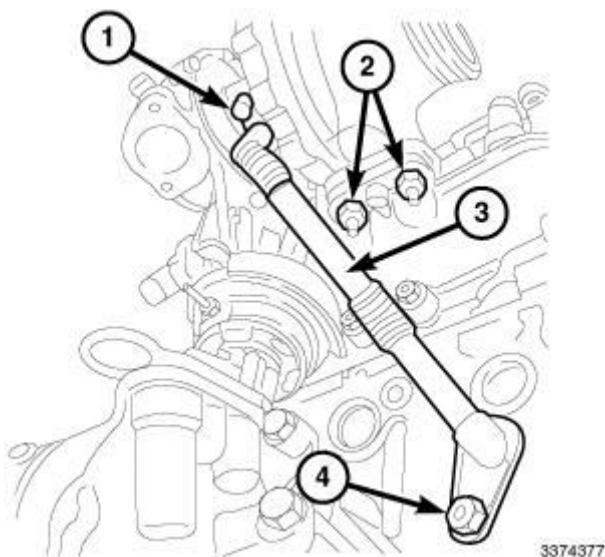


Fig. 366: Turbocharger, Oil Send And Return Line & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Clean the gasket sealing surface.
2. Using a new gasket, install the turbocharger. Tighten nuts (2) to 24 N.m (18 ft. lbs.).
3. Install the turbocharger oil return line (2) to the turbocharger (1). Tighten the bolts to 9 N.m (80 in. lbs.).

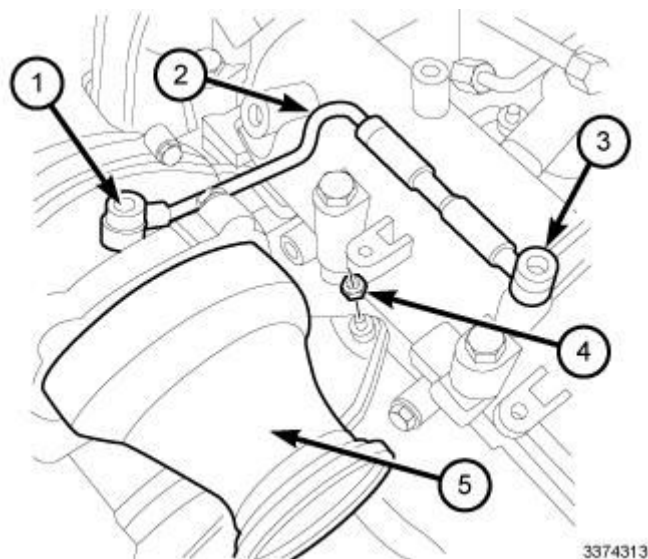
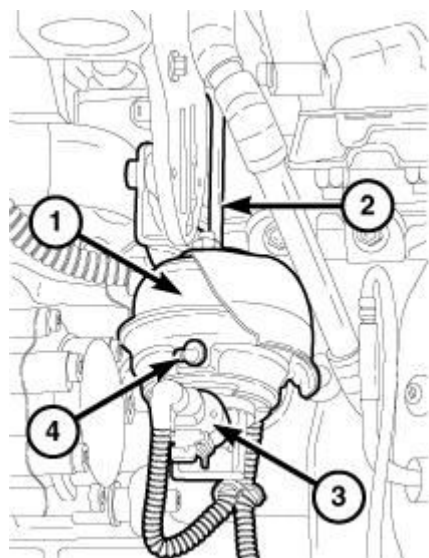


Fig. 367: Turbocharger, Oil Supply Line & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Install the upper turbocharger flange nut (4). Tighten nut to 24 N.m (18 ft. lbs.).

5. Install new copper washers to the turbocharger oil feed line (2). Tighten the banjo bolt (1) to 24 N.m (18 ft. lbs.).
6. Install the Diesel Particulate Filter (DPF). Refer to **FILTER, DIESEL PARTICULATE, INSTALLATION**.



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Fig. 368: Turbocharger Actuator, Bracket, Connector & Vacuum Line
 Courtesy of CHRYSLER GROUP, LLC

7. Install the vacuum line to the actuator (4).
8. Connect the turbocharger actuator (1) wire harness connector (3).
9. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.



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Fig. 369: CAC Tube & O-Ring Seal

Courtesy of CHRYSLER GROUP, LLC

10. Install a new O-ring seal (1) on the Charge Air Cooler (CAC) tube (2).

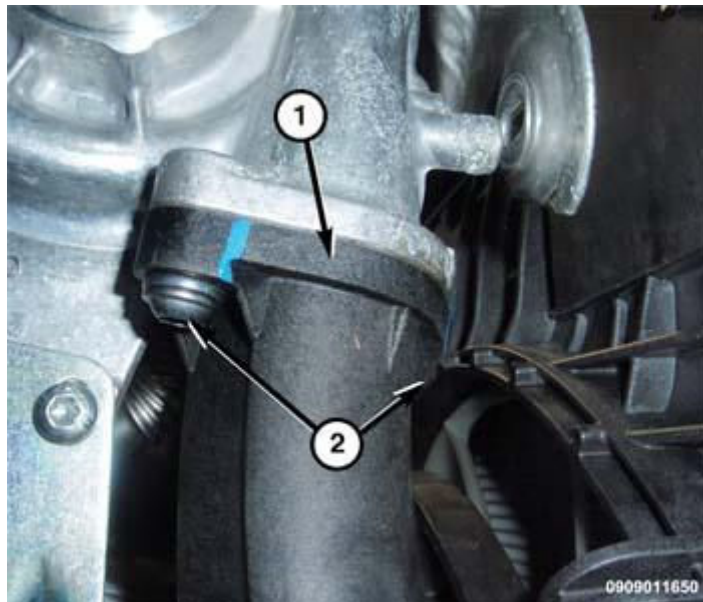


Fig. 370: Right CAC Tube & Bolts
Courtesy of CHRYSLER GROUP, LLC

11. Install the CAC tube (1) to the turbocharger flange. Tighten bolts (2) to 10 N.m (89 in. lbs.).
12. Install the bellypan. Refer to **BELLY PAN, INSTALLATION**.
13. Lower the vehicle.

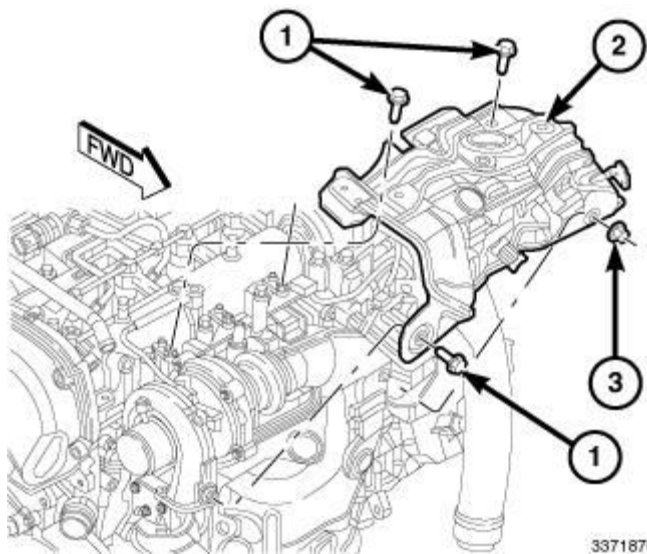


Fig. 371: Turbocharger Heat Shield & Fasteners
Courtesy of CHRYSLER GROUP, LLC

14. Install the turbocharger heat shield:

- Tighten the bolts (1) to 12 N.m (106 in. lbs.).
- Tighten the nut (3) to 8 N.m (71 in. lbs.).

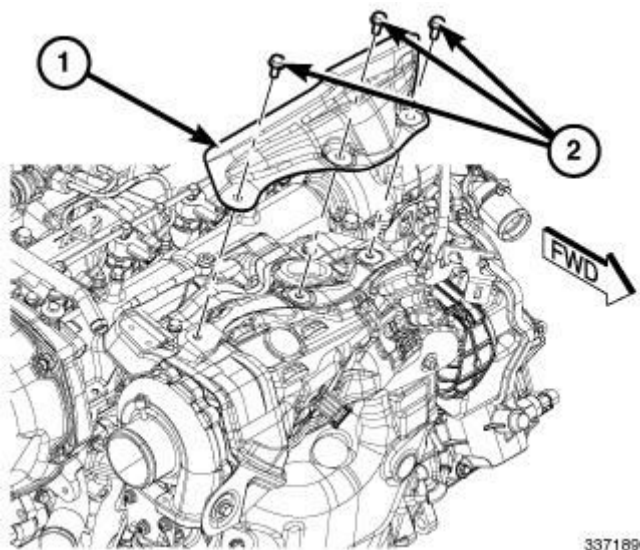


Fig. 372: Upper Turbocharger Heat Shield & Mid Upper Turbocharger Heat Shield
Courtesy of CHRYSLER GROUP, LLC

15. Install the upper turbo heat shield (2) Tighten the bolts (1) to 12 N.m (106 in. lbs.).

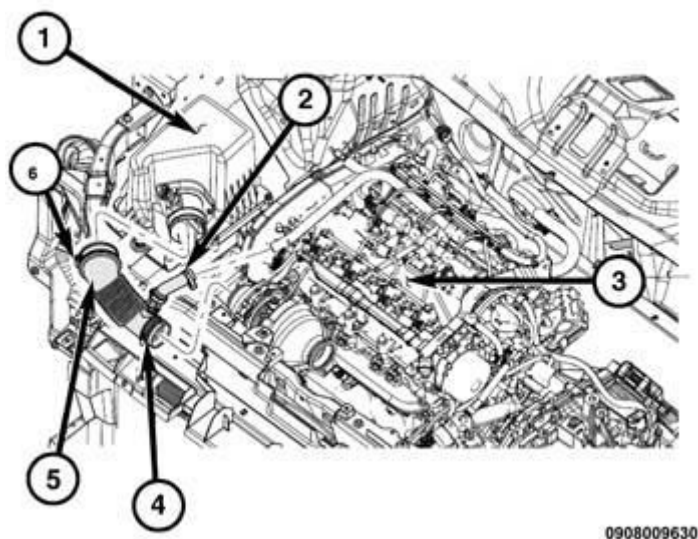


Fig. 373: Turbocharger Inlet Hose & Clamp
Courtesy of CHRYSLER GROUP, LLC

16. Install the turbocharger to air clean air tube (5) and securely tighten clamp (4, 6).

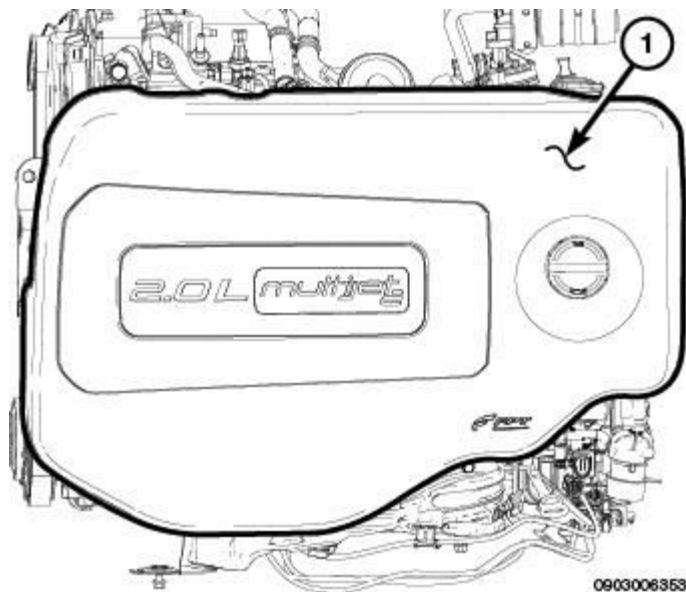


Fig. 374: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

17. Install the engine cover (1).
18. Connect the negative battery cable.

2014 ENGINE**2.4L - Service Information - Cherokee****DESCRIPTION****DESCRIPTION**

The 2.4 Liter (146 cu. in.) Tigershark in-line four cylinder engine is a single over head camshaft with mechanical lash adjusters and four valves per cylinder design. This engine is NOT free-wheeling; meaning that the pistons will contact the valves in the event of a timing chain failure.

The cylinders are numbered from front of the engine to the rear. The firing order is 1-3-4-2.

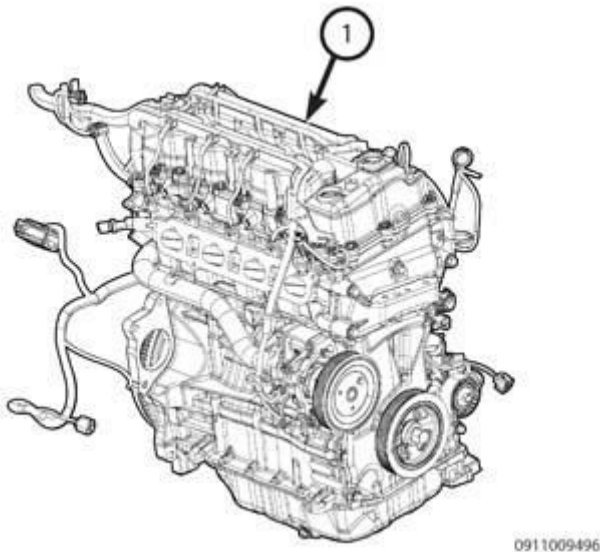


Fig. 1: 2.4 Liter (146 Cu. In.) Engine
Courtesy of CHRYSLER GROUP, LLC

The cylinder head is designed with a variable valve actuator assembly (VVAA) that takes the place of a conventional intake camshaft assembly. The cylinder block and cylinder head are cast aluminum. The engine is mounted in the vehicle transversely.

DIAGNOSIS AND TESTING**ENGINE DIAGNOSIS - INTRODUCTION**

Engine diagnosis is helpful in determining the causes of malfunctions not detected and remedied by routine maintenance.

These malfunctions may be classified as either performance (e.g., engine idles rough and stalls) or mechanical (e.g., a strange noise).

Refer to the Engine Mechanical and the Engine Performance diagnostic charts, for possible causes and corrections of malfunctions. Refer to **PERFORMANCE** and **ENGINE MECHANICAL DIAGNOSTIC TABLE** for possible causes and corrections of malfunctions. . Refer to **FUEL SYSTEM** article for the fuel system diagnosis.

Additional tests and diagnostic procedures may be necessary for specific engine malfunctions that can not be isolated with the Service Diagnosis charts. Information concerning additional tests and diagnosis is provided within the following diagnosis:

- Cylinder Compression Pressure Test. Refer to **CYLINDER COMPRESSION PRESSURE LEAKAGE** .
- Cylinder Combustion Pressure Leakage Test. Refer to **CYLINDER COMBUSTION PRESSURE LEAKAGE** .
- Engine Cylinder Head Gasket Failure Diagnosis. Refer to **CYLINDER HEAD GASKET - DIAGNOSIS AND TESTING** .
- Intake Manifold Leakage Diagnosis. Refer to **MANIFOLD, INTAKE, DIAGNOSIS AND TESTING** .

PERFORMANCE

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE WILL NOT START	1. Weak battery.	1. Test battery. Charge or replace as necessary. Refer to DIAGNOSIS AND TESTING .
	2. Corroded or loose battery connections.	2. Clean and tighten battery connections. Apply a coat of light mineral grease to terminals.
	3. Faulty starter.	3. Test starting system. Check for codes. (Refer to DIAGNOSIS AND TESTING)
	4. Faulty coil(s) or control unit.	4. Test and replace as needed. (Refer to Appropriate Diagnostic Information)
	5. Incorrect spark plug gap.	5. Set gap. Refer to SPECIFICATIONS .
	6. Contamination in fuel system.	6. Clean system and replace fuel filter.
	7. Faulty fuel pump.	7. Test fuel pump and replace as needed. (Refer to Appropriate Diagnostic Information)
	8. Incorrect engine timing.	8. Check for a skipped timing belt/chain.
ENGINE STALLS OR IDLES ROUGH	1. Idle speed too low.	1. Test minimum air flow. (Refer to Appropriate Diagnostic Information)
	2. Incorrect fuel mixture.	2. (Refer to Appropriate Diagnostic Information)

2014 Jeep Cherokee Trailhawk

2014 ENGINE 2.4L - Service Information - Cherokee

	3. Intake manifold leakage.	3. Inspect intake manifold, manifold gasket, and vacuum hoses.
	4. Faulty ignition coil(s).	4. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	5. Contamination in Oil Control Valve (OCV). ECK Only	5. Remove OCV and inspect for contamination. Replace OCV if contaminated. ECK Only
ENGINE LOSS OF POWER	1. Dirty or incorrectly gapped plugs.	1. Clean plugs and set gap.
	2. Contamination in fuel system.	2. Clean system and replace fuel filter.
	3. Faulty fuel pump.	3. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	4. Incorrect valve timing.	4. Correct valve timing.
	5. Leaking cylinder head gasket.	5. Replace cylinder head gasket.
	6. Low compression.	6. Test compression of each cylinder.
	7. Burned, warped, or pitted valves.	7. Replace valves.
	8. Plugged or restricted exhaust system.	8. Perform exhaust restriction test. Install new parts, as necessary. Refer to DIAGNOSIS AND TESTING .
	9. Faulty ignition coil(s).	9. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
ENGINE MISSES ON ACCELERATION	1. Dirty or incorrectly gapped spark plugs.	1. Clean spark plugs and set gap.
	2. Contamination in Fuel System.	2. Clean fuel system and replace fuel filter.
	3. Burned, warped, or pitted valves.	3. Replace valves.
	4. Faulty ignition coil(s).	4. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
ENGINE MISSES AT HIGH SPEED	1. Dirty or incorrect spark plug gap.	1. Clean spark plugs and set gap.
	2. Faulty ignition coil(s).	2. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	3. Dirty fuel injector(s).	3. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)

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4. Contamination in fuel system.

4. Clean system and replace fuel filter.

ENGINE MECHANICAL DIAGNOSTIC TABLE

CONDITION	POSSIBLE CAUSES	CORRECTIONS
NOISY VALVES	1. High or low oil level in crankcase.	1. Refer to <u>OIL - STANDARD PROCEDURE</u> .
	2. Thin or diluted oil.	2. Change oil and filter.
	3. Low oil pressure.	3. Check oil pump, if Ok, check rod and main bearings for excessive wear.
	4. Dirt in lash adjusters.	4. Replace as necessary.
	5. Worn rocker arms.	5. Replace as necessary.
	6. Worn lash adjusters	6. Replace as necessary.
	7. Worn valve guides.	7. Inspect the valve guides for wear, cracks or looseness. If either condition exists, replace the cylinder head. Refer to <u>CYLINDER HEAD, REMOVAL</u> .
	8. Excessive runout of valve seats on valve faces.	8. Refer to <u>VALVES, INTAKE AND EXHAUST - STANDARD PROCEDURE</u> .
CONNECTING ROD NOISE	1. Insufficient oil supply.	1. Refer to <u>OIL - STANDARD PROCEDURE</u> .
	2. Low oil pressure.	2. Check oil pump, if OK, check rod and main bearings for excessive wear.
	3. Thin or diluted oil.	3. Change oil and filter.
	4. Excessive bearing clearance.	4. Replace as necessary.
	5. Connecting rod journal out-of-round.	5. Service or replace crankshaft.
	6. Misaligned connecting rods.	6. Replace bent connecting rods.
MAIN BEARING NOISE	1. Insufficient oil supply.	1. Refer to <u>OIL - STANDARD PROCEDURE</u> .
	2. Low oil pressure.	2. Check oil pump, if OK, check rod and main bearings for excessive wear.
	3. Thin or diluted oil.	3. Change oil and filter.
	4. Excessive bearing clearance.	4. Replace as necessary.
	5. Excessive end play.	5. Check thrust washers for wear.
	6. Crankshaft journal out-of round.	6. Service or replace crankshaft.

7. Loose flywheel or torque converter.

7. Tighten to correct torque

CYLINDER COMPRESSION PRESSURE LEAKAGE

NOTE: To perform a compression test on a MULTI-AIR equipped engine, the ignition **MUST** remain in the "key on" position. If the ignition is in the "off" position, the intake valves will not actuate and the result will be no compression.

NOTE: The results of a cylinder compression pressure test can be utilized to diagnose several engine malfunctions.

NOTE: Be certain the battery is completely charged and the engine starter motor is in good operating condition. Otherwise the indicated compression pressures may not be valid for diagnosis purposes.

1. Clean the spark plug recesses with compressed air.
2. Remove the spark plugs and record the cylinder number of each spark plug for future reference.
3. Inspect the spark plug electrodes for abnormal firing indicators such as fouled, hot, oily, etc.
4. Disable the fuel system and perform the fuel system pressure release procedure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE** .
5. Insert a compression pressure gauge and rotate the engine with the engine starter motor for three revolutions.
6. Record the compression pressure on the 3rd revolution. Continue the test for the remaining cylinders.

NOTE: The recommended compression pressures are to be used only as a guide to diagnosing engine problems. An engine should not be disassembled to determine the cause of low compression unless some malfunction is present.

7. Compression should not be less than 689 kPa (100 psi) and not vary more than 25 percent from cylinder to cylinder.
8. If one or more cylinders have abnormally low compression pressures, repeat the compression test.

NOTE: If the same cylinder or cylinders repeat an abnormally low reading on the second compression test, it could indicate the existence of a problem in the cylinder in question.

9. If one or more cylinders continue to have abnormally low compression pressures, perform the cylinder combustion pressure leakage test. Refer to **CYLINDER COMBUSTION PRESSURE LEAKAGE** .

CYLINDER COMBUSTION PRESSURE LEAKAGE

The combustion pressure leakage test provides an accurate means for determining engine condition.

Combustion pressure leakage testing will detect:

- Exhaust and intake valve leaks (improper seating).
 - Leaks between adjacent cylinders or into water jacket.
 - Any causes for combustion/compression pressure loss.
1. Check the coolant level and fill as required. DO NOT install the radiator cap.
 2. Start and operate the engine until it attains normal operating temperature, then turn the engine OFF.
 3. Remove the spark plugs.
 4. Remove the oil filler cap.
 5. Remove the air cleaner hose.
 6. Calibrate the tester according to the manufacturer's instructions. The shop air source for testing should maintain 483 kPa (70 psi) minimum, 1,379 kPa (200 psi) maximum and 552 kPa (80 psi) recommended.
 7. Perform the test procedures on each cylinder according to the tester manufacturer's instructions. Set piston of cylinder to be tested at TDC compression. While testing, listen for pressurized air escaping through the throttle body, tailpipe and oil filler cap opening. Check for bubbles in the radiator coolant.

All gauge pressure indications should be equal, with no more than 25% leakage.

FOR EXAMPLE: At 552 kPa (80 psi) input pressure, a minimum of 414 kPa (60 psi) should be maintained in the cylinder.

CYLINDER COMBUSTION PRESSURE LEAKAGE DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSE	CORRECTION
AIR ESCAPES THROUGH THROTTLE BODY	Intake valve bent, burnt, or not seated properly	Inspect valve and valve seat. Reface or replace, as necessary. Inspect valve springs. Replace as necessary.
AIR ESCAPES THROUGH TAILPIPE	Exhaust valve bent, burnt, or not seated properly	Inspect valve and valve seat. Reface or replace, as necessary. Inspect valve springs. Replace as necessary.
AIR ESCAPES THROUGH RADIATOR	Head gasket leaking or cracked cylinder head or block	Remove cylinder head and inspect. Replace defective part
MORE THAN 50% LEAKAGE FROM ADJACENT CYLINDERS	Head gasket leaking or crack in cylinder head or block between adjacent cylinders	Remove cylinder head and inspect. Replace gasket, head, or block as necessary
MORE THAN 25% LEAKAGE AND AIR ESCAPES THROUGH OIL FILLER CAP OPENING ONLY	Stuck or broken piston rings; cracked piston; worn rings and/or cylinder wall	Inspect for broken rings or piston. Measure ring gap and cylinder diameter, taper and out-of-round. Replace defective part as necessary

OIL CONSUMPTION TEST AND DIAGNOSIS

The following diagnostic procedures are used to determine the source of excessive internal oil Consumption, these procedures and tests apply to vehicles with 50, 000 miles or less.

NOTE: **Engine oil consumption may be greater than normal during engine break-in. Repairs should be delayed until vehicle has been driven at least 7, 500 miles.**

Severe service (high ambient temperature, short trips, heavy loading, trailer towing, taxi, off-road, or law enforcement use) may result in greater oil consumption than normal.

Sustained high speed driving and high engine RPM operation may result in increased oil consumption.

Failure to comply with the recommended oil type and viscosity rating, as outlined in the Owner's Manual, may impact oil economy as well as fuel economy.

Oil consumption may increase with vehicle age and mileage due to normal engine wear.

NOTE: **Because a few drops of external oil leakage per mile can quickly account for the loss of one quart of oil in a few hundred miles, ensure no external engine oil leaks are present.**

- Oil leakage is not the same as oil consumption and all external leakage must be eliminated before any action can be taken to verify and/or correct oil consumption complaints.
- Verify that the engine has the correct oil level dipstick and dipstick tube installed.
- Verify that the engine is not being run in an overfilled condition. Check the oil level 15 minutes after a hot shutdown with the vehicle parked on a level surface. In no case should the level be above MAX or the FULL mark on the dipstick.

OIL CONSUMPTION TEST

1. Check the oil level at least 15 minutes after a hot shutdown.
2. If the oil level is low, top off with the proper viscosity and API service level engine oil. Add one bottle of MOPAR® 4-In-1 Leak Detection Dye into the engine oil.
3. Tamper proof the oil pan drain plug, oil filter, dipstick and oil fill cap.
4. Record the vehicle mileage.
5. Instruct the customer to drive the vehicle as usual.
6. Ask the customer to return to the servicing dealer after accumulating 500 miles, Check the oil level at least 15 minutes after a hot shutdown. If the oil level is half way between the "FULL" and "ADD" mark continue with the next step.
7. Using a black light, re-check for any external engine oil leaks, repair as necessary, if no external engine oil leaks are present, continue with oil consumption diagnosis.

OIL CONSUMPTION DIAGNOSIS

1. Check the positive crankcase ventilation (PCV) system. Make sure the system is not restricted and the

PCV valve has the correct part number and correct vacuum source (18-20 in. Hg at idle below 3000 ft. above sea level is considered normal).

2. Perform a cylinder compression test and cylinder leak down test using the standard leak down gauge following manufacturers suggested best practices.

NOTE: **Verify the spark plugs are not oil saturated. If the spark plugs are oil saturated and compression is good it can be assumed the valve seals or valve guides are at fault.**

3. If one or more cylinders have more than 15% leak down further engine tear down and inspection will be required.

TOP 19 REASONS THAT MAY LEAD TO ENGINE OIL CONSUMPTION

1. Tapered and Out-of-Round Cylinders

The increased piston clearances permit the pistons to rock in the worn cylinders. While tilted momentarily, an abnormally large volume of oil is permitted to enter on one side of the piston. The rings, also tilted in the cylinder, permit oil to enter on one side. Upon reversal of the piston on each stroke, some of this oil is passed into the combustion chamber.

2. Distorted Cylinders

This may be caused by unequal heat distribution or unequal tightening of cylinder head bolts. This condition presents a surface which the rings may not be able to follow completely. In this case, there may be areas where the rings will not remove all of the excess oil. When combustion takes place, this oil will be burned and cause high oil consumption.

3. Improper operation of "PCV" system

The main purpose of the Positive Crankcase Ventilation (PCV) valve is to recirculate blow-by gases back from the crankcase area through the engine to consume unburned hydrocarbons. The PCV system usually has a one way check valve and a make up air source. The system uses rubber hoses that route crankcase blow by gases to the intake manifold. Vacuum within the engine intake manifold pulls the blow by gases out of the crankcase into the combustion chamber along with the regular intake air and fuel mixture.

The PCV system can become clogged with sludge and varnish deposits and trap blow by gases in the crankcase. This degrades the oil, promoting additional formation of deposit material. If left uncorrected, the result is plugged oil rings, oil consumption, rapid ring wear due to sludge buildup, ruptured gaskets and seals due to crankcase pressurization.

If equipped with an engine driven vacuum pump, high oil consumption can be caused by unchecked airflow into the pump. This can be caused by anything that opens the vacuum pump intake port up to the atmosphere such as a faulty vacuum pump, hose fitting, hose and brake booster. If there is not a restriction (normally caused by the pump pulling vacuum on the brake booster), then the vacuum pump will pump a high volume of air. This high volume of air will pressurize the crankcase and cause excessive

oil burning and oil flow through the PCV system.

4. Worn Piston Ring Grooves

For piston rings to form a good seal, the sides of the ring grooves must be true and flat - not flared or shouldered. Piston rings in tapered or irregular grooves will not seal properly and, consequently, oil will pass around behind the rings into the combustion chamber.

5. Worn, Broken or Stuck Piston Rings

When piston rings are broken, worn or stuck to such an extent that the correct tension and clearances are not maintained, this will allow oil to be drawn into the combustion chamber on the intake stroke and hot gases of combustion to be blown down the cylinder past the piston on the power stroke. All of these conditions will result in burning and carbon build up of the oil on the cylinders, pistons and rings.

6. Cracked or Broken Ring Lands

Cracked or broken ring lands prevent the rings from seating completely on their sides and cause oil pumping. This condition will lead to serious damage to the cylinders as well as complete destruction of the pistons and rings. Cracked or broken ring lands cannot be corrected by any means other than piston replacement.

7. Worn Valve Stems and Guides

When wear has taken place on valve stems and valve guides, the vacuum in the intake manifold will draw oil and oil vapor between the intake valve stems and guides into the intake manifold and then into the cylinder where it will be burned.

8. Bent or Misaligned Connecting Rods

Bent or misaligned connecting rods will not allow the pistons to ride straight in the cylinders. This will prevent the pistons and rings from forming a proper seal with the cylinder walls and promote oil consumption. In addition, it is possible that a bearing in a bent connect rod will not have uniform clearance on the connecting rod wrist pin. Under these conditions, the bearing will wear rapidly and throw off an excessive amount of oil into the cylinder.

9. Fuel Dilution

If raw fuel is allowed to enter the lubrication system, the oil will become thinner and more volatile and will result in higher oil consumption. The following conditions will lead to higher oil consumption;

- Excess fuel can enter and mix with the oil via a leaking fuel injector
- Gasoline contaminated with diesel fuel
- Restricted air intake
- Excessive idling

10. Contaminated Cooling Systems

Corrosion, rust, scale, sediment or other formations in the water jacket and radiator will prevent a cooling system from extracting heat efficiently. This is likely to cause cylinder distortion thus leading to higher oil consumption.

11. Oil Viscosity

The use of oil with a viscosity that is too light may result in high oil consumption. Refer to the vehicle Owner's Manual for the proper oil viscosity to be used under specific driving conditions and/or ambient temperatures.

12. Dirty Engine Oil

Failure to change the oil and filter at proper intervals may cause the oil to be so dirty that it will promote accumulation of sludge and varnish and restrict oil passages in the piston rings and pistons. This will increase oil consumption; dirty oil by nature is also consumed at a higher rate than clean oil.

13. Crankcase Overfull

Due to an error in inserting the oil dip stick so that it does not come to a seat on its shoulder, a low reading may be obtained. Additional oil may be added to make the reading appear normal with the stick in this incorrect position which will actually make the oil level too high. If the oil level is so high that the lower ends of the connecting rods touch the oil in the oil pan excessive quantities of oil will be thrown on the cylinder walls and some of it will work its way up into the combustion chamber.

14. Excessively High Oil Pressure

A faulty oil pressure relief valve may cause the oil pressure to be too high. The result will be that the engine will be flooded with an abnormally large amount of oil in a manner similar to that which occurs with worn bearings. This condition may also cause the oil filter to burst.

15. Aftermarket Performance Chips and Modification

Increasing performance through the use of performance/power enhancement products to a stock or factory engine will increase the chance of excessive oil consumption.

16. Lugging Engine

Lugging is running the engine at a lower RPM in a condition where a higher RPM (more power/torque) should be implemented. Especially susceptible on vehicles equipped with a manual transmission. This driving habit causes more stress loading on the piston and can lead to increases in engine oil consumption.

17. Turbocharged Engines

There is a possibility for PCV "push-over" due to higher crankcase pressure (as compared to naturally aspirated engines) which is normal for turbocharged engines. This condition causes varying amounts of engine oil to enter the intake manifold, charge air cooler and associated plumbing to and from the charge

air cooler, also a leaking turbocharger seal will draw oil into the combustion chamber where it will burn (blue smoke from tail pipe may be present) and form carbon deposits which contribute to further oil consumption as they interfere with proper engine function.

18. Restricted Air Intake

Excessive restriction in the air intake system will increase engine vacuum and can increase oil consumption, an extremely dirty air filter would be one example of this situation.

19. Intake Manifold port seals

Engines that have a "V" configuration and a "wet valley" (3.3/3.8L) could draw oil into the intake ports due to improper sealing between the intake manifold ports and cylinder head. Causes may include improper torque of intake manifold bolts, corrosion (aluminum intake manifold) and or warped sealing surface.

ENGINE LUBRICATION DIAGNOSTIC TABLE

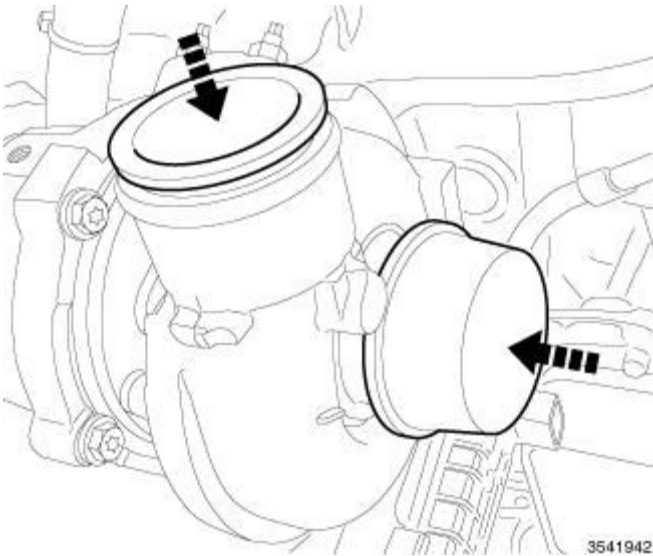
CONDITION	POSSIBLE CAUSES	CORRECTION
OIL LEAKS	1. Gaskets and O-rings. Misaligned or damaged.	1. Replace as necessary.
	(a) Loose fasteners, broken or porous metal parts.	(a) Tighten fasteners, Repair or replace metal parts.
	2. Crankshaft rear oil seal.	2. Replace rear crankshaft oil seal. Refer to <u>SEAL, CRANKSHAFT OIL, REAR, REMOVAL</u> .
	3. Crankshaft rear oil seal surface. Scratched, nicked or grooved.	3. Polish or replace crankshaft.
	4. Oil pan flange cracked.	4. Replace oil pan. Refer to <u>PAN, OIL, REMOVAL</u> .
	5. Crankshaft front oil seal.	5. Replace front crankshaft oil seal. Refer to <u>SEAL, CRANKSHAFT OIL, FRONT, REMOVAL</u> .
OIL PRESSURE DROP	6. Crankshaft front oil seal surface. Scratched, nicked or grooved.	6. Polish or replace crankshaft.
	1. Low oil level.	1. Check and correct oil level.
	2. Faulty oil pressure switch.	2. Replace switch (Refer to <u>SENSOR, OIL PRESSURE</u>).
	3. Low oil pressure.	3. Check main bearing clearance. Refer to <u>BEARING(S), CRANKSHAFT, MAIN - STANDARD PROCEDURE</u> . 3. Check rod bearing clearance.

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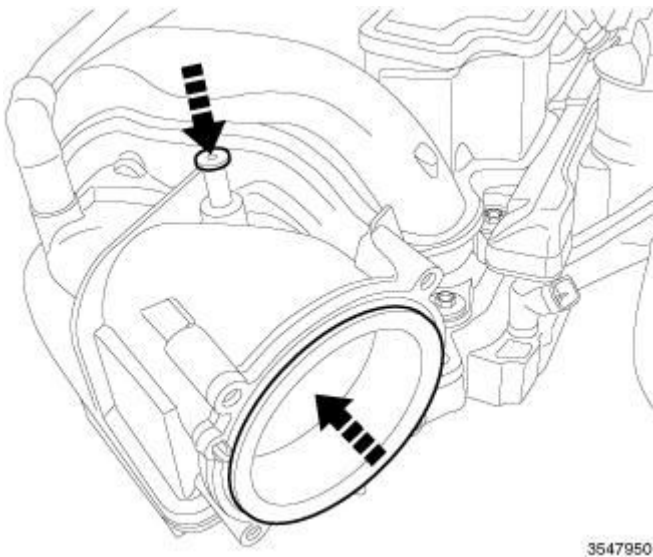
		Refer to <u>BEARING(S), CONNECTING ROD - STANDARD PROCEDURE</u> .
	4. Clogged oil filter.	4. Replace oil filter. Refer to <u>FILTER, ENGINE OIL, REMOVAL</u> .
	5. Worn oil pump.	5. Replace oil pump. Refer to <u>PUMP, ENGINE OIL, REMOVAL</u> .
	6. Thin or diluted oil.	6. Change oil and filter. Refer to <u>OIL - STANDARD PROCEDURE</u> .
	7. Excessive bearing clearance.	7. Replace crankshaft bearings. Refer to <u>BEARING(S), CRANKSHAFT, MAIN - STANDARD PROCEDURE</u> . 7. Replace rod bearings. Refer to <u>BEARING(S), CONNECTING ROD - STANDARD PROCEDURE</u> .
	8. Oil pump relief valve stuck.	8. Replace oil pump. Refer to <u>PUMP, ENGINE OIL, REMOVAL</u> .
OIL PUMPING AT RINGS; SPARK PLUGS FOULING	9. Oil pump pick-up tube loose, damaged or clogged.	9. Replace oil pump pick-up. .
	1. Worn or damaged rings.	1. Hone cylinder bores and replace rings. Refer to <u>RING(S), PISTON - STANDARD PROCEDURE</u> .
	2. Carbon in oil ring slots.	2. Replace rings. Refer to <u>ROD, PISTON AND CONNECTING, REMOVAL</u> .
	3. Worn valve guides.	3. Replace cylinder heads. Refer to <u>CYLINDER HEAD, REMOVAL</u> .
	4. Leaking valve guide seals.	4. Replace valve guide seals. Refer to <u>SEAL(S), VALVE GUIDE, REMOVAL</u> .

STANDARD PROCEDURE**DUST COVERS AND CAPS**

**Fig. 2: Covers/Caps**

Courtesy of CHRYSLER GROUP, LLC

Due to the high amounts of failures caused by dust, dirt, moisture and other foreign debris being introduced to the engine during service. Covers or caps are needed to reduce the possible damage that can be caused or created.

**Fig. 3: Opening Cover**

Courtesy of CHRYSLER GROUP, LLC

Covers over openings will reduce any possibilities for foreign materials to enter the engine systems. Using miller tool (special tool #10368, Set, Universal Protective Cap), Select the appropriated cover needed to the procedure.

ENGINE GASKET SURFACE PREPARATION

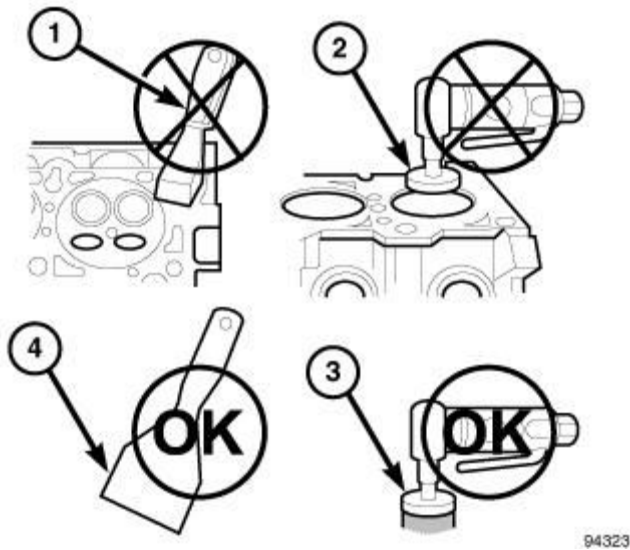


Fig. 4: Proper Tool Usage For Surface Preparation
Courtesy of CHRYSLER GROUP, LLC

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

Never use the following to clean gasket surfaces:

- Metal scraper (1).
- Abrasive pad or paper to clean cylinder block and head.
- High speed power tool with an abrasive pad or a wire brush (2).

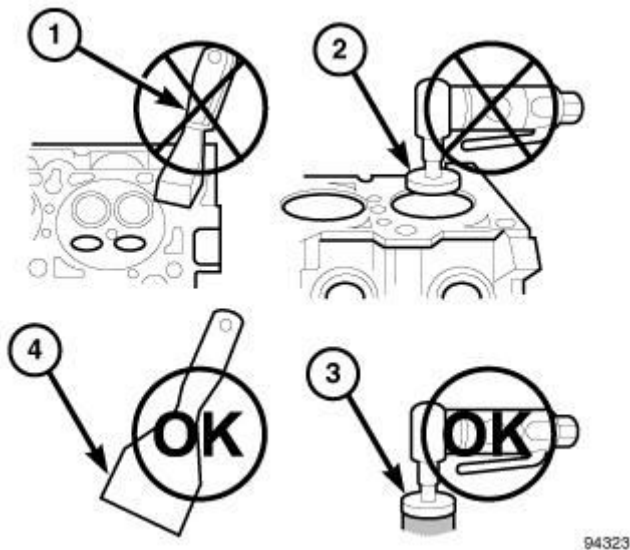


Fig. 5: Proper Tool Usage For Surface Preparation
Courtesy of CHRYSLER GROUP, LLC

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Only use the following for cleaning gasket surfaces:

- Solvent or a commercially available gasket remover
- Plastic or wood scraper (4).
- High speed power tool with a plastic bristle brush style disc (3).

Sealing surfaces must be free of grease or oil residue. Clean surfaces with Mopar® brake parts cleaner (or equivalent).

FORM-IN-PLACE GASKETS AND SEALERS

NOTE: All of the sealants mentioned below are not used on every engine, they are listed as general reference guide. See appropriate Service Information for specific sealer usage.

There are numerous places where form-in-place gaskets are used on the engine. Care must be taken when applying form-in-place gaskets to assure obtaining the desired results. **Do not use form-in-place gasket material unless specified.** Bead size, continuity, and location are of great importance. Too thin a bead can result in leakage while too much can result in spill-over which can break off and obstruct fluid feed lines. A continuous bead of the proper width is essential to obtain a leak-free gasket. All sealing surfaces that use form-in-place gaskets and sealers **must** free of grease or oil. Surfaces should be cleaned with Mopar® brake parts cleaner prior to sealer application. After the sealer is applied, the parts should be assembled in no more than 10 minutes.

There are numerous types of form-in-place gasket materials that are used in the engine area. Mopar® Engine RTV GEN II, Mopar® ATF-RTV, and Mopar® Gasket Maker gasket materials, each have different properties and can not be used in place of the other.

MOPAR® ENGINE RTV GEN II is used to seal components exposed to engine oil. This material is a specially designed black silicone rubber RTV that retains adhesion and sealing properties when exposed to engine oil. Moisture in the air causes the material to cure. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® ATF RTV is a specifically designed black silicone rubber RTV that retains adhesion and sealing properties to seal components exposed to automatic transmission fluid, engine coolants, and moisture. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® GASKET MAKER is an anaerobic type gasket material. The material cures in the absence of air when squeezed between two metallic surfaces. It will not cure if left in the uncovered tube. The anaerobic material is for use between two machined surfaces. Do not use on flexible metal flanges.

MOPAR® BED PLATE SEALANT is a unique (green-in-color) anaerobic type gasket material that is

specially made to seal the area between the bed plate and cylinder block without disturbing the bearing clearance or alignment of these components. The material cures slowly in the absence of air when torqued between two metallic surfaces, and will rapidly cure when heat is applied.

MOPAR® GASKET SEALANT is a slow drying, permanently soft sealer. This material is recommended for sealing threaded fittings and gaskets against leakage of oil and coolant. Can be used on threaded and machined parts under all temperatures. This material also will prevent corrosion. Mopar® Gasket Sealant is available in a 13 oz. aerosol can or 4oz./16 oz. can w/applicator.

SEALER APPLICATION

Mopar® Gasket Maker material should be applied sparingly 1 mm (0.040 in.) diameter or less of sealant to one gasket surface. Be certain the material surrounds each mounting hole. Excess material can easily be wiped off. Components should be torqued in place within 15 minutes. The use of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Engine RTV GEN II or ATF RTV gasket material should be applied in a continuous bead approximately 3 mm (0.120 in.) in diameter. All mounting holes must be circled. For corner sealing and "T" joint locations, a 3.17 or 6.35 mm (1/8 or 1/4 in.) drop is placed in the center of the gasket contact area. Uncured sealant may be removed with a shop towel. Components should be torqued in place while the sealant is still wet to the touch (within 10 minutes). The usage of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Gasket Sealant in an aerosol can should be applied using a thin, even coat sprayed completely over both surfaces to be joined, and both sides of a gasket. Then proceed with assembly. Material in a can w/applicator can be brushed on evenly over the sealing surfaces.

MEASURING BEARING CLEARANCE USING PLASTIGAGE

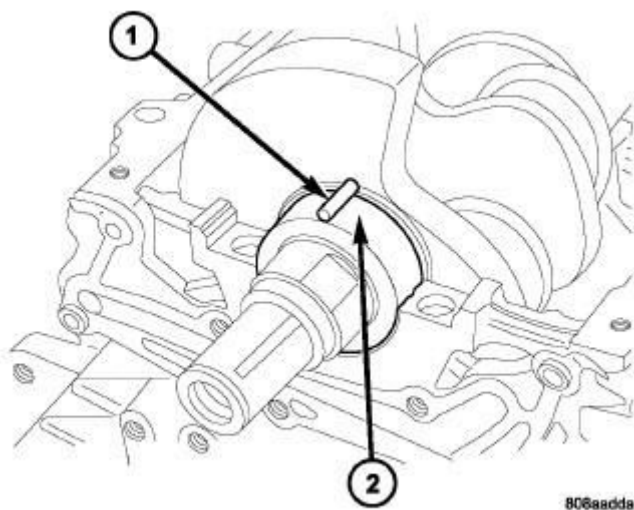


Fig. 6: Plastigage Placed In Lower Shell-Typical

Courtesy of CHRYSLER GROUP, LLC

Engine crankshaft bearing clearances can be determined by use of Plastigage or equivalent. The following is the recommended procedure for the use of Plastigage:

1. Remove oil film from surface to be checked. Plastigage is soluble in oil.
2. Place a piece of Plastigage (1) across the entire width of the journal. (In addition, suspected areas can be checked by placing the Plastigage in the suspected area). Torque the bearing cap bolts of the bearing being checked to the proper specifications.
3. Remove the bearing cap and compare the width of the flattened Plastigage with the scale provided on the package. Locate the band closest to the same width. This band shows the amount of clearance. Differences in readings between the ends indicate the amount of taper present. Record all readings taken. Compare clearance measurements to specs found in engine specifications. Refer to **ENGINE SPECIFICATIONS** . Plastigage generally is accompanied by two scales. One scale is in inches, the other is a metric scale.

NOTE: Plastigage is available in a variety of clearance ranges. Use the most appropriate range for the specifications you are checking.

4. Install the proper crankshaft bearings to achieve the specified bearing clearances.

SPECIFICATIONS

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Type	In-Line OHV, SOHC	
Number of Cylinders	4	
Firing Order	1-3-4-2	
Compression Ratio	10.0:1	
Displacement	2.4 L	146 cu. in.
Bore	88 mm	3.465 in.
Stroke	97 mm	3.819 in.
Compression Pressure	1172 - 1551 kPa	170 - 225 psi
Max. Variation Between Cylinders	25%	

CYLINDER BLOCK

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Material	Cast Aluminum	
Cylinder Bore Diameter		

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A	88.000 - 88.010 mm	3.4645 - 3.4649 in.
B	88.010 - 88.020 mm	3.4649 - 3.4653 in.
C	88.020 - 88.030 mm	3.4653 - 3.4657 in.
Cylinder Bore Out-of-Round (Max.)	0.020 mm	0.0008 in.
Cylinder Bore Taper (Max.)	0.028 mm	0.001 in.
Deck Surface Flatness (Max.)	0.0254 mm	.001 in.
Main Bearing Bore Diameter		
1	56.000 - 56.006 mm	2.2047 - 2.2049 in.
2	56.006 - 56.012 mm	2.2049 - 2.2051 in.
3	56.012 - 56.018 mm	2.2051 - 2.2054 in.
Main Bearing Bore Diameter Taper (Max.)	0.0082 mm	0.0003 in.

PISTONS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Piston Diameter		
A	87.995 - 88.015 mm	3.4644 - 3.4652 in.
B	88.005 - 88.025 mm	3.4648 - 3.4656 in.
C	88.015 - 88.035 mm	3.4652 - 3.4659 in.
Clearance to Bore	(-0.015) - 0.015 mm	(-0.0006) - 0.0006 in.
Weight	345 - 355 grams	12.17 - 12.52 oz.
Land Clearance (Diametrical)	0.60 - 0.73 mm	0.0236 - 0.0287 in.
Piston Length	51.5 mm	2.028 in.
Piston Ring Groove Depth No. 1	3.51 - 3.68 mm	0.1382 - 0.0256 in.
Piston Ring Groove Depth No. 2	4.05 - 4.25 mm	0.1594 - 0.1673 in.
Piston Ring Groove Depth No. 3	2.70 - 2.90 mm	0.1063 - 0.1142 in.

PISTON RINGS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Ring Gap-Top Compression Ring	0.15 - 0.30 mm	0.0059 - 0.0118 in.
Wear Limit	0.8 mm	0.031 in.
Ring Gap-2nd Compression Ring	0.30 - 0.45 mm	0.0118 - 0.0177 in.
Wear Limit	0.8 mm	0.031 in.
Ring Gap-Oil Control Steel Rails	0.20 - 0.70 mm	0.0079 - 0.0276 in.
Wear Limit	1.0 mm	0.039 in.
Ring Side Clearance-Compression Rings	0.03 - 0.07 mm	0.1182 - 0.0028 in.
Wear Limit	0.10 mm	0.004 in.
Ring Side Clearance-Oil Ring Pack	0.06 - 0.15 mm	0.0024 - 0.0059 in.

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Ring Width-Top Compression Ring	2.95 - 3.25 mm	0.1161 - 0.1280 in.
Ring Width-2nd Compression Ring	3.45 - 3.75 mm	0.1358 - 0.1476 in.
Ring Width-Oil Ring Pack	2.30 - 2.60 mm	0.0906 - 0.1024 in.
Ring Thickness-Top Compression Ring	1.17 - 1.19 mm	0.0461 - 0.0469 in.
Ring Thickness-2nd Compression Ring	1.17 - 1.19 mm	0.0461 - 0.0469 in.
Ring Thickness-Oil Ring Pack	1.88 - 1.95 mm	0.0740 - 0.0768 in.

CONNECTING ROD

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Bearing Clearance	0.032 - 0.060 mm	0.001 - 0.002 in.
Wear Limit	0.070 mm	0.0027 in.
Bore Diameter-Piston Pin	20.974 - 20.985 mm	0.8257 - 0.8261 in.
Bore Diameter-Crankshaft End	51 - 51.015 mm	2.0078 - 2.0084 in.
Side Clearance	0.1 - 0.25 mm	0.0039 - 0.00098 in.
Wear Limit	0.27 mm	0.0106 in.
Weight-Total (Less Bearing)	484 grams	17.07 oz.

CRANKSHAFT

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Connecting Rod Journal Diameter		
Journal Grade		
1	47.966 - 47.972 mm	1.8884 - 1.8886 in.
2	47.960 - 47.966 mm	1.8884 - 1.8881 in.
3	47.954 - 47.960 mm	1.8879 - 1.8881 in.
Rod Journal- Taper (Max)	0.005 mm	0.0001 in.
Main Bearing Journal Diameter		
Journal Grade		
0	51.985 - 51.988 mm	2.0466 - 2.0467 in.
1	51.982 - 51.985 mm	2.0465 - 2.0466 in.
2	51.979 - 51.982 mm	2.0464 - 2.0465 in.
3	51.976 - 51.979 mm	2.0462 - 2.0464 in.
4	51.973 - 51.976 mm	2.0461 - 2.0462 in.
Journal Out-of-Round (Max.)	0.005 mm	0.0001 in.
Journal Taper (Max.)	0.006 mm	0.0002 in.
End Play	0.05 - 0.25 mm	0.0019 - 0.0098 in.
Wear Limit	0.30 mm	0.0118 in.
Main Bearing Diametrical Clearance	0.028 - 0.048 mm	0.0011 - 0.0018 in.

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Main Bearing Diametrical Clearance (Max)	0.058 mm	0.0022 in.
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CYLINDER HEAD CAMSHAFT BEARING BORE DIAMETER

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Cam Bearing Bore		
Cam Bearing Bore	24.000 - 24.021 mm	0.9448 - 0.9457 in.

CAMSHAFT

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Cam Journal Diameter		
Cam Journal Diameter	23.954 - 23.970 mm	0.943 - 0.944 in.
Bearing Clearance - Diametrical		
Cam Journal Clearance	0.020 - 0.067 mm	0.0008 - 0.0026 in.
End Play	0.11 - 0.25 mm	0.004 - 0.009 in.
Max Lift @ 0.2mm (0.007 in.) lash		
Intake	9.2 mm	0.362 in.
Max Lift @ 0.28mm (0.011 in.) lash		
Exhaust	8.42 mm	0.331 in.
Intake Valve Timing		
Closes (ABDC)	Control By VVAA	
Opens (ATDC)	Control By VVAA	
Duration	Control By VVAA	
Exhaust Valve Timing		
Closes (BTDC)	8.45°	
Opens (BBDC)	45°	
Duration	216.55°	
Valve Overlap @ 0.5mm (0.019 in.) w/ VVT in lock-pin position	18.75°	
* All reading in crankshaft degrees at 0.5 mm (0.019 in.) valve lift.		

CYLINDER HEAD

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Material	Cast Aluminum - Heat treated	
Gasket Thickness (Compressed)	0.54 mm	0.021 in.
Valve Tappet Bore I.D.	32.000 - 32.025 mm	1.2598 - 1.2608 in.
Valve Tappet O.D	31.964 - 31.980 mm	1.2584 - 1.2590 in.
Flatness (Head Gasket Surface)	.05 mm	.002 in.

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VALVE SEAT

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Angle	44.75° - 45.10°	
Seat Outer Diameter - Intake	34.45 - 34.61 mm	1.3562 - 1.3625 in.
Seat Outer Diameter - Exhaust	28.04 - 28.20 mm	1.1039 - 1.1102 in.
Runout (Max.)	0.05 mm	0.002 in.
Valve Seat Width		
Intake	1.16 - 1.46 mm	0.0456 - 0.0574 in.
Service Limit	2.0 mm	0.079 in.
Exhaust	1.35 - 1.65 mm	0.0531 - 0.0649 in.
Service Limit	2.5 mm	0.098 in.

VALVE GUIDE

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Diameter I.D.	5.500 - 5.518 mm	0.2165 - 0.2172 in.
Guide Bore Diameter	10.983 - 11.001 mm	0.432 - 0.4331 in.
Guide Height (spring seat to guide tip)	14.6 - 15.2 mm	0.5748 - 0.5984 in.

VALVES

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Face Angle - Intake and Exhaust	45.25° - 45.75°	
Head Diameter - Intake	34.9 - 35.1 mm	1.374 - 1.3818 in.
Head Diameter - Exhaust	28.9 - 29.1 mm	1.1377 - 1.1456 in.
Valve Lash		
Intake	0.17 - 0.23 mm	0.006 - 0.009 in.
Exhaust	0.27 - 0.33 mm	0.010 - 0.012 in.
Valve Length (Overall)		
Intake	113.18 mm	4.455 in.
Exhaust	105.887 mm	4.168 in.
Valve Stem Diameter		
Intake	5.465 - 5.480 mm	0.2151 - 0.2157 in.
Exhaust	5.458 - 5.470 mm	0.2148 - 0.2153 in.

VALVE MARGIN

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Intake	0.672 mm	0.0264 in.
Exhaust	0.744 mm	0.02929 in.

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VALVE STEM TIP

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Intake	48.04 mm	1.891 in.
Exhaust	47.99 mm	1.889 in.

VALVE STEM TO GUIDE CLEARANCE

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Intake	0.020 - 0.053 mm	0.0008 - 0.0021 in.
Max. Allowable	0.076 mm	0.003 in.
Exhaust	0.030 - 0.060 mm	0.0012 - 0.0024 in.
Max. Allowable	0.101 mm	0.004 in.

VALVE SPRINGS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Free Length (Approx.)	47.0 mm	1.850 in.
Nominal Force (Valve Closed)	179.5 N $\pm$ 9 @ 35.0 mm	40.35 lbs. @ 1.38 in.
Nominal Force (Valve Open)	364.8 N $\pm$ 17 N @ 29.25 mm	82.01 lbs. $\pm$ 3.82 lbs. @ 1.152 in.
Installed Height	35.00 mm	1.378 in.
Number of Coils	8.5 $\pm$ 0.1	
Wire Diameter	2.90 mm $\pm$ 0.03	0.114 in $\pm$ 0.001 in.

OIL PRESSURE

DESCRIPTION	SPECIFICATION	
	Metric	Standard
At Curb Idle Speed*	25 kPa	4 psi. min.
At 3000 RPM	170 - 550 kPa	25 - 80 psi.

CAUTION:

*If pressure is ZERO at curb idle, DO NOT run engine at 3000 RPM.

TORQUE SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
AIR BOX LID TO LOWER A/BOX	4		35
ALTERNATOR TO ALTERNATOR BRACKET & ENGINE BLOCK	23	17	
BALANCE SHAFT MODULE	Refer to PUMP, ENGINE OIL - INSTALLATION Procedure		

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BALANCE SHAFT CHAIN GUIDE TO LADDER	12	-	106
BATTERY POSITIVE TO TERMINAL POST	9	-	80
B+ CABLE TO STARTER	10	-	89
Camshaft Bearing Cap-Bolts CAMSHAFT BEARING CAPS FRONT EXHAUST CAMSHAFT CAP	15	11	-
REMAINING EXHAUST CAMSHAFT CAPS CAMSHAFT SPROCKET	9.5 59	- 44	85 -
CONNECTING ROD CAPS	20 + 90°	15 + 90°	-
COOLANT TEMPERATURE SENSOR	50	36	-
CRANKSHAFT MAIN BEARING CAPS	Refer to CRANKSHAFT - INSTALLATION Procedure		
CRANKSHAFT POSITION SENSOR TO CYLINDER BLOCK	9		80
CRANKSHAFT DAMPER	210	155	-
CYLINDER HEAD	Refer to CYLINDER HEAD - INSTALLATION Procedure		
DUCT TO FEM	4		35
ENGINE COVER BALL STUD TO VALVE COVER	3	-	27
ENGINE OIL COOLER SHIELD TO COOLER	8		71
ENGINE OIL COOLER TO ADAPTOR	49	36	-
ENGINE OIL COOLER TUBE TO CYLINDER BLOCK	25	18	-
ENGINE SUPPORT BRACKET	Refer to ENGINE - INSTALLATION Procedure		
ENGINE TO TRANSMISSION	50	37	-
EXHAUST MANIVERTER TO CYLINDER HEAD	34	25	-
EXHAUST MANIFOLD HEAT SHIELD	12		105
EXHAUST PIPE TO OIL PAN	25	18	
FLEX PLATE TO CRANKSHAFT	95	70	-
HEATER RETURN TO LEFT (TRANS) MOUNT BRACKET	8		71
IGNITION COILS	8	-	71

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INTAKE MANIFOLD TO CYLINDER HEAD	12	9	-
INTAKE MANIFOLD SILENCER COVER	2.5	-	22
INTAKE MANIFOLD SUPPORT TO PTU BRACKET	12	-	106
INTERMEDIATE SHAFT BRACKET TO ENGINE BLOCK	55	41	
KNOCK SENSOR TO ENGINE BLOCK	28	21	
LADDER FRAME TO BLOCK	Refer to FRAME, LADDER - INSTALLATION Procedure		
LEFT ENGINE MOUNT TO FRAME RAIL	105	77	-
LEFT ENGINE MOUNT TO STRUT TOWER	64	47	-
LEFT ENGINE MOUNT TO ADAPTER BRACKET	157	115	-
MANIVERTER TO SUPPORT BRACKET	20	15	
MASS AIRFLOW SENSOR TO AIRBOX LID	4		35
MULTIAIR FILL PORT PLUG TO CYLINDER HEAD COVER	21	15	-
OIL COOLER TO ADAPTOR	49	36	-
OIL COOLER TO BLOCK	49	36	-
OIL FILTER	14	10	-
OIL JET FASTENER	12	-	105
OIL LEVEL INDICATOR TUBE TO CYLINDER BLOCK	22	16	
OIL PAN TO BLOCK			
M6 BOLTS	12	-	105
M8 BOLTS	22	-	195
OIL PAN DRAIN PLUG	40	30	-
OIL PRESSURE SENSOR	48	35	-
OIL TEMPERATURE SENSOR	48	35	-
OXYGEN SENSOR	50	37	-
PCV VALVE	135	100	-
RIGHT ENGINE MOUNT TO FRAME RAIL	70	52	-
RIGHT ENGINE MOUNT TO STRUT TOWER	65	48	-
RIGHT ENGINE MOUNT TO			

2014 Jeep Cherokee Trailhawk

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TIMING COVER	75	55	-
SPARK PLUGS	27	20	-
STARTER MOTOR TO BLOCK	36	27	-
TENSIONER TO ACCESSORY DRIVE BRACKET	26	19	
THROTTLE BODY BRACKET TO THROTTLE BODY	12		106
THROTTLE BODY BRACKET TO THERMOSTAT HOUSING	9		80
THROTTLE BODY SUPPORT TO CYLINDER HEAD	24	18	
THROTTLE BODY TO INTAKE MANIFOLD	5.4		48
TIMING CHAIN COVER			
M10 BOLTS	65	48	-
M6 BOLTS	9	-	80
M8 BOLTS	26	19	-
TIMING CHAIN TENSIONER ASSEMBLY	12	-	105
TIMING CHAIN GUIDE	12	-	106
TORQUE STRUT (REAR ENGINE MOUNT) TO CRADLE *See Note	150	111	-
TORQUE STRUT (REAR ENGINE MOUNT) TO PIVOT BRACKET	220	162	-
TORQUE STRUT BRACKET TO CRADLE	73	54	-
TRANSMISSION TO ENGINE	50	37	-
VACUUM PUMP TO CYLINDER HEAD	23	17	
VALVE COVER TO CYLINDER HEAD	10	-	89
WATER INLET TUBE TO CYLINDER BLOCK	24	18	

NOTE: *** READ THE TORQUE VALUE AT THE NUT ONLY.**

REMOVAL

REMOVAL

CAUTION: If the original engine has experienced a catastrophic failure or an individual failure with the piston, cylinder bore, engine block, valve or valve seat, the intake manifold **MUST** be replaced with a new manifold.

1. Release the fuel pressure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE**.

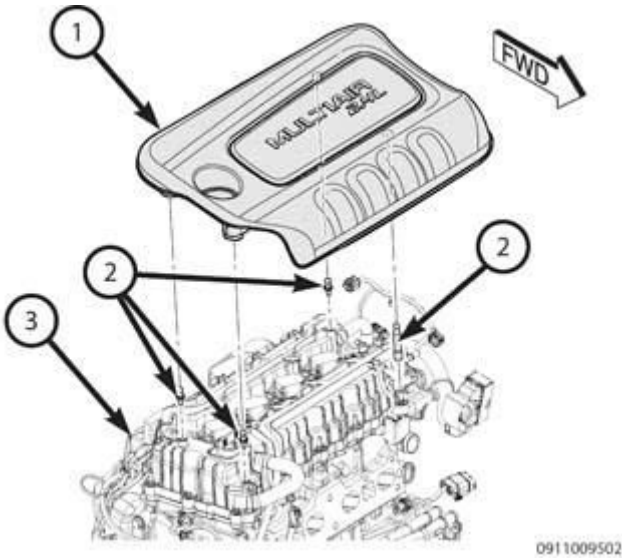


Fig. 7: Engine Cover & Pins
Courtesy of CHRYSLER GROUP, LLC

2. Remove the engine cover (1) from the ball studs (2).
3. Secure the steering wheel.

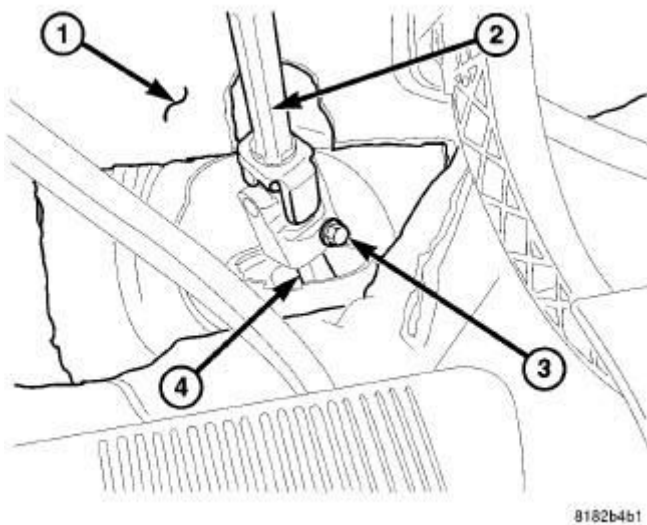


Fig. 8: Lower Coupling Bolt
Courtesy of CHRYSLER GROUP, LLC

4. Remove the steering coupler bolt (3). Position the shaft out of the way.
5. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
6. Drain the coolant.
7. Lower the vehicle.



Fig. 9: Battery Cover

Courtesy of CHRYSLER GROUP, LLC

8. Remove the battery cover (1)

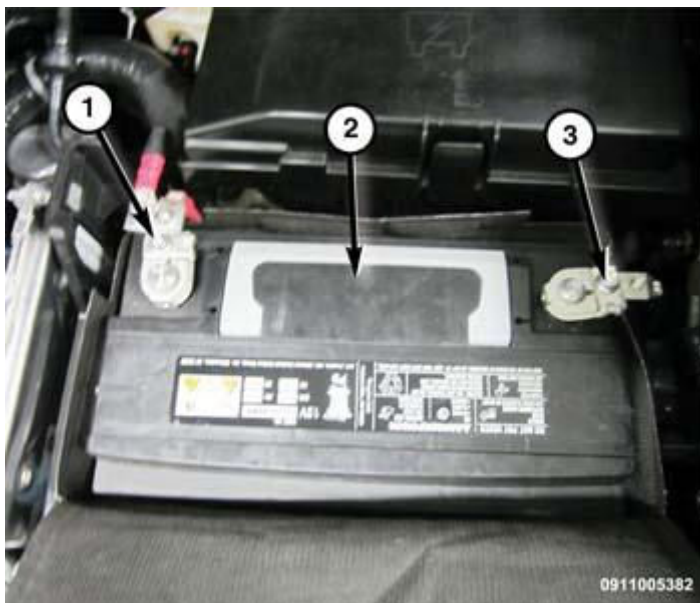
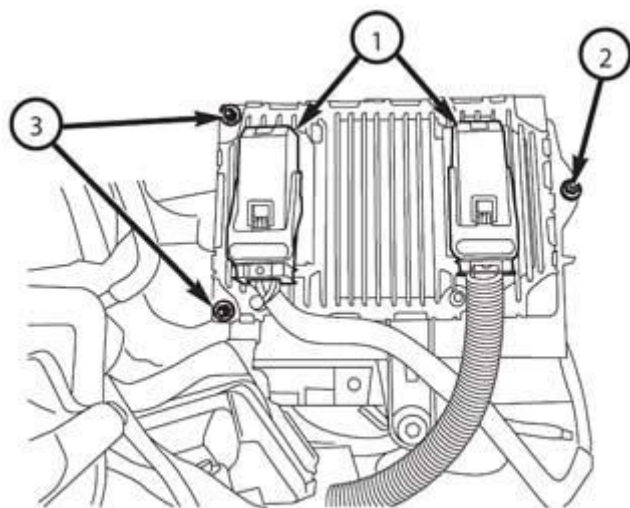


Fig. 10: Battery & Cables

Courtesy of CHRYSLER GROUP, LLC

9. Disconnect the battery connectors (1 & 3).
10. Remove the battery (2). Refer to **BATTERY, REMOVAL**.

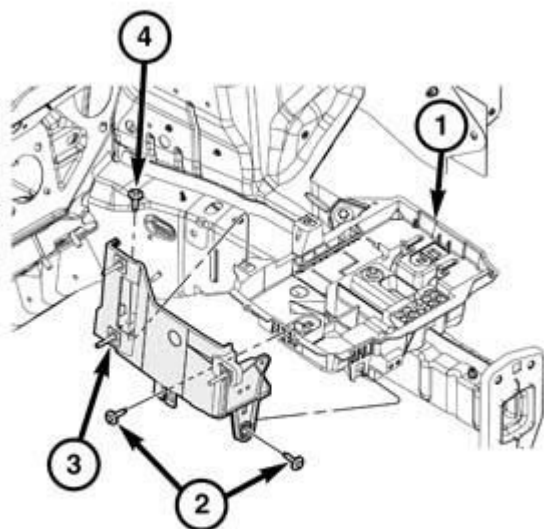


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Fig. 11: Powertrain Control Module Electrical Connectors & Nuts

Courtesy of CHRYSLER GROUP, LLC

11. Remove the PCM. Refer to **MODULE, POWERTRAIN CONTROL, REMOVAL**.



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Fig. 12: Battery Tray, PCM Mount & Bolts
Courtesy of CHRYSLER GROUP, LLC

12. Remove the PCM mount bracket bolts (2 & 4). Remove the bracket (3) from the battery tray (1).
13. Disconnect the heater core supply and return hoses at the fittings nearest the thermostat housing.
14. Remove the bolt securing the heater supply pipe at the left engine mount bracket.
15. Disconnect the heater hose at the thermostat outlet connector.
16. Separate the wire harness retainers at the transmission bell housing.
17. Loosen the upper starter bolt completely.

NOTE: **The upper bolt will not back out completely due to lack of clearance. Leave the bolt in the bell housing.**

18. Release the two harness retainers that are secured to the PDC bracket.
19. Remove the PDC. Refer to **CENTER, POWER DISTRIBUTION (PDC), REMOVAL**.
20. Unlock and separate engine harness connectors at the front of the battery tray.
21. Release the connectors from the battery tray.

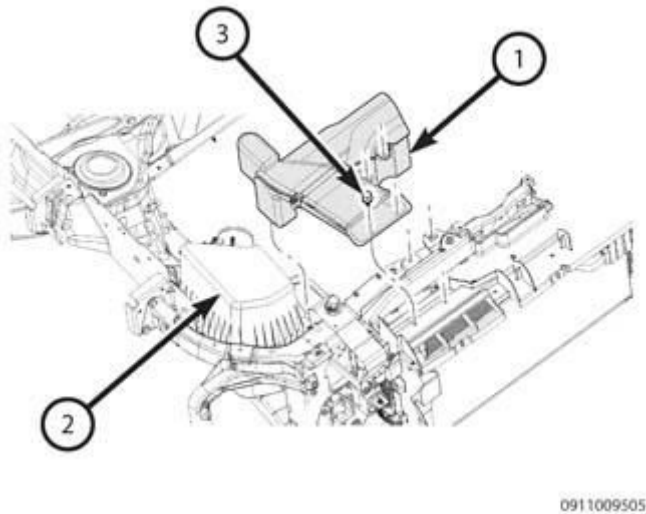


Fig. 13: Removing/Installing Inlet Assembly
Courtesy of CHRYSLER GROUP, LLC

22. Remove the fresh air hose from valve cover.
23. Remove the air cleaner inlet snorkel push pins (3). Remove the inlet assembly (1).

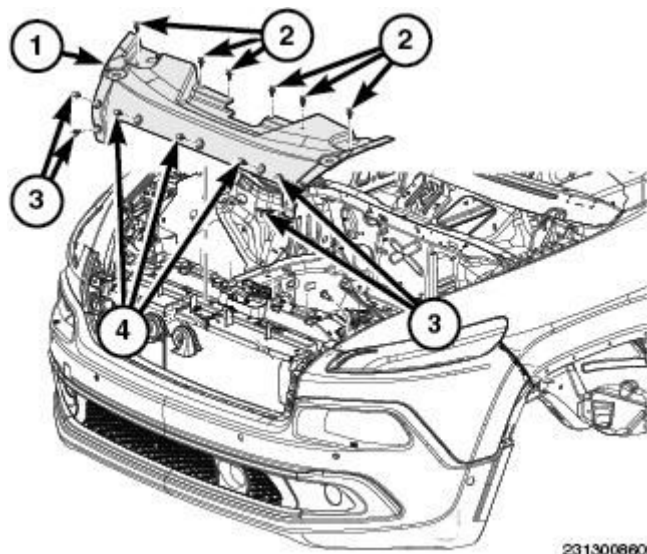


Fig. 14: Upper Close Out Panel Cover Components
Courtesy of CHRYSLER GROUP, LLC

24. Remove the radiator upper closeout panel push pins (2).
25. Remove the radiator upper closeout panel bolts (4).
26. Remove the radiator upper closeout panel bolts (3).

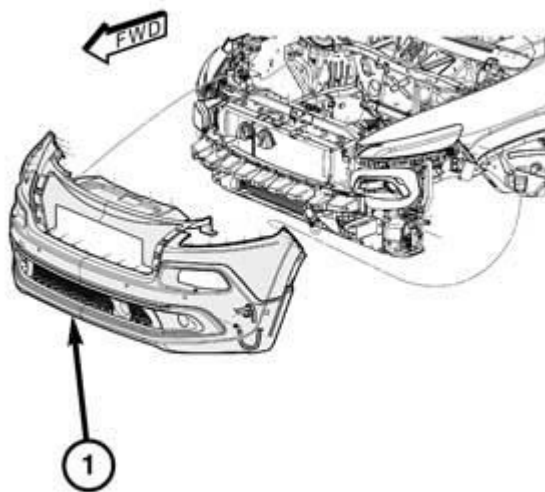
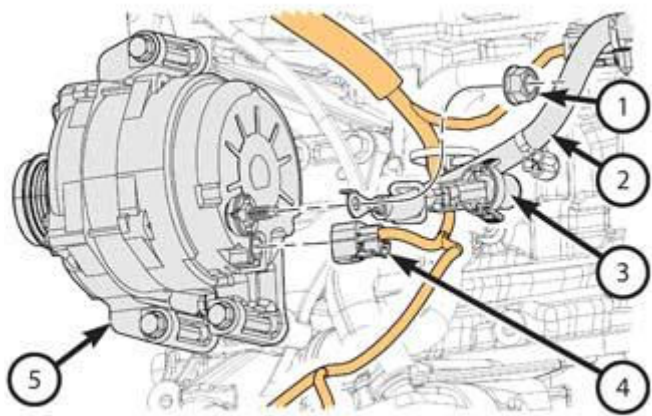


Fig. 15: Front Fascia Assembly
Courtesy of CHRYSLER GROUP, LLC

27. Remove the front fascia assembly (1). Refer to **FASCIA, FRONT, REMOVAL**.

28. Remove the radiator inlet hose clamp.
29. Remove the radiator outlet hose clamp.
30. Remove the oil cooler inlet and outlet hose clamps at the tubes.
31. Remove the serpentine belt.



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Fig. 16: Removing/Installing Generator
Courtesy of CHRYSLER GROUP, LLC

32. Open the 12 volt protective cover (3).
33. Remove the generator 12 volt connector nut (1).
34. Disconnect the generator fielding connector (4).
35. Reposition the harness (2) aside.
36. Remove the generator bolts.
37. Remove the generator (5).

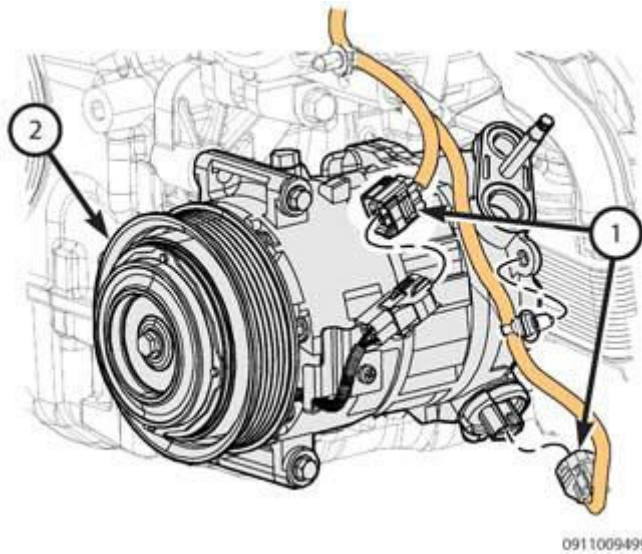


Fig. 17: Air Conditioning Compressor Electrical Connectors
Courtesy of CHRYSLER GROUP, LLC

38. Disconnect the air conditioning compressor electrical connectors (1).

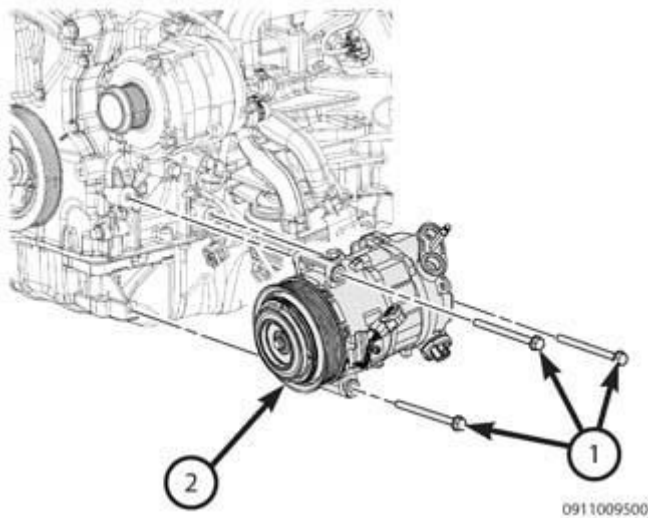
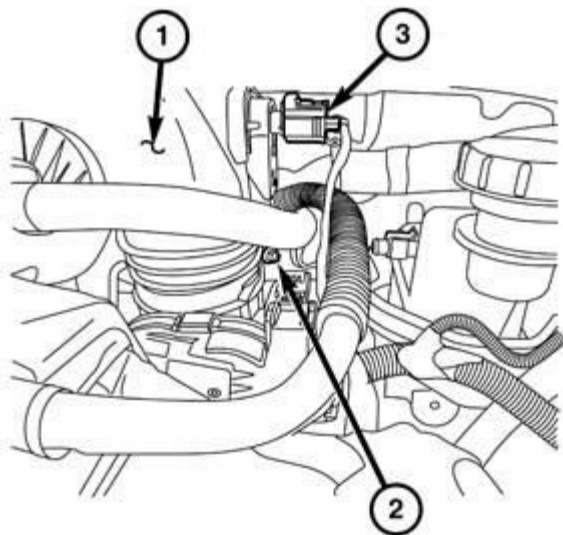


Fig. 18: Air Conditioning Compressor & Bolts
Courtesy of CHRYSLER GROUP, LLC

39. Remove the air conditioning compressor bolts (1). Position the compressor (2) aside and secure with a strap.

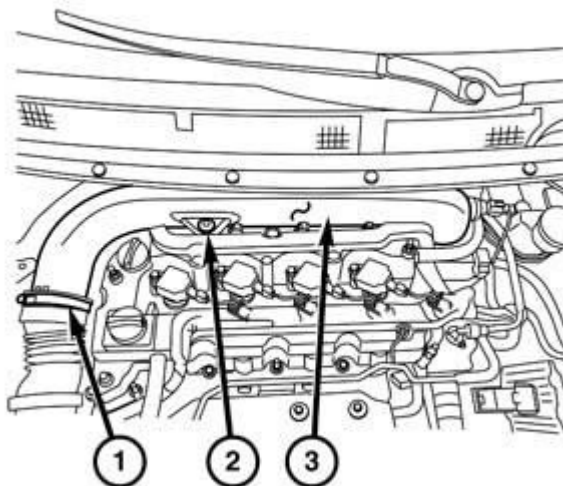
NOTE: The is no need to separate the lines from the compressor.



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Fig. 19: Resonator, Clamp & Connector
Courtesy of CHRYSLER GROUP, LLC

40. Loosen the snorkel to throttle body clamp (2).
41. Disconnect the IAT sensor (3).

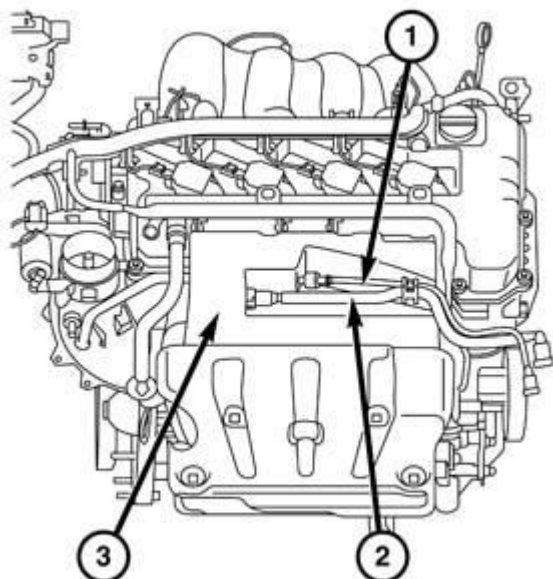


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Fig. 20: Resonator, Bolt & Clamp

Courtesy of CHRYSLER GROUP, LLC

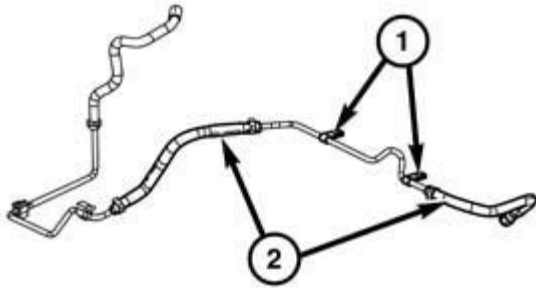
42. Loosen the snorkel clamp (1).
43. Remove the air intake snorkel bolt (2) and remove the snorkel (3).



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Fig. 21: Foam Insulator, Fuel Line & Purge Line
Courtesy of CHRYSLER GROUP, LLC

44. Disconnect the fuel line (1) and the purge line (2) quick connects.
45. Disconnect the MAP sensor connector.
46. Disconnect the oil temperature sensor connector.

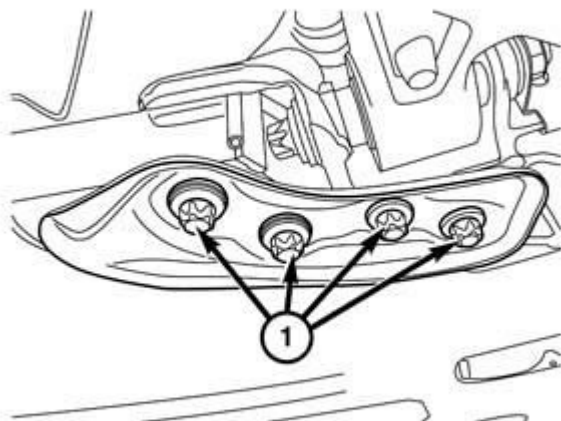


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Fig. 22: Hose Assembly & Hot Bottle Return Pipe Bolts
Courtesy of CHRYSLER GROUP, LLC

47. Remove the coolant reservoir return hose bolts (1). Disconnect both ends of the pipe. Remove the hose assembly (2).
48. Release the engine wire harness retainers.
49. Disconnect the transmission cooler hoses at the transmission fittings. Install plugs to limit the fluid loss.
50. Raise and support the vehicle.
51. Remove the forward skid plate fasteners (if equipped).
52. Remove the rearward skid plate fasteners (if equipped)
53. Remove both skid plates (if equipped)
54. Remove the front wheels.
55. Remove the left wheel well liner.
56. Remove the bolt holding the windshield washer reservoir to the battery tray.
57. Release the retainer from the harness at the bottom of the battery tray.
58. Remove the battery tray. Refer to **TRAY, BATTERY, REMOVAL** .
59. Raise and support the vehicle.
60. Remove the left and right axle shafts. Refer to **REMOVAL** .
61. Remove the left and right wheel well liners.
62. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .
63. Remove the upper radiator hose.
64. Remove the lower radiator hose.
65. Remove the front tow hooks. Refer to **HOOK(S), TOW, FRONT, REMOVAL** .

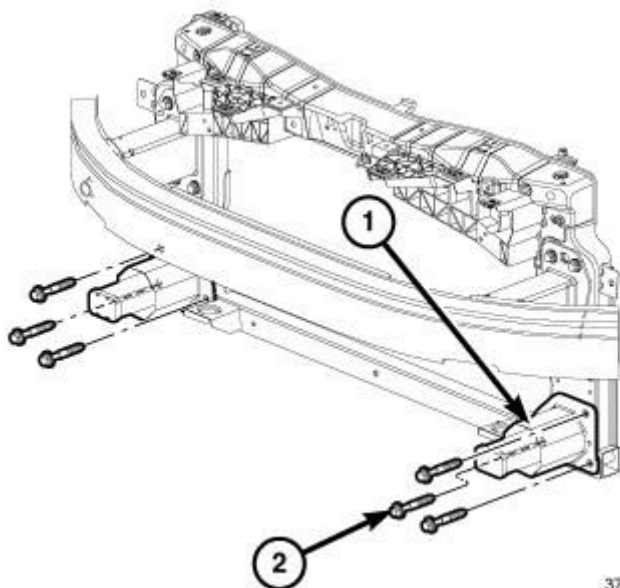
66. Remove the radiator fan assembly. Refer to **FAN, COOLING, REMOVAL** .



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Fig. 23: Crossmember To Fascia Support Beams Bracket Retaining Bolts
Courtesy of CHRYSLER GROUP, LLC

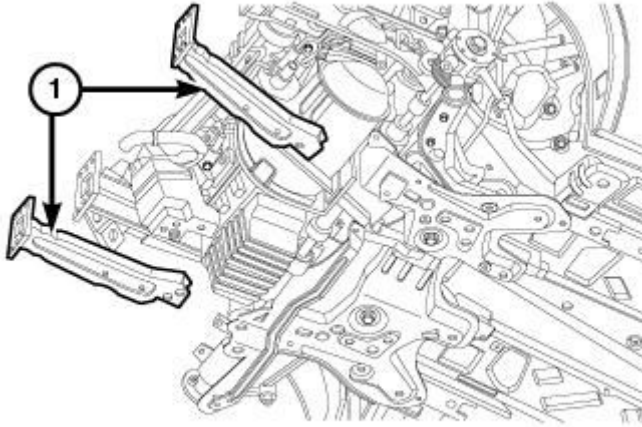
67. Remove the four bracket retaining bolts (1) from the cross member to fascia support beams bracket, then remove the bracket.



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Fig. 24: Lower Bumper Reinforcements & Fasteners
Courtesy of CHRYSLER GROUP, LLC

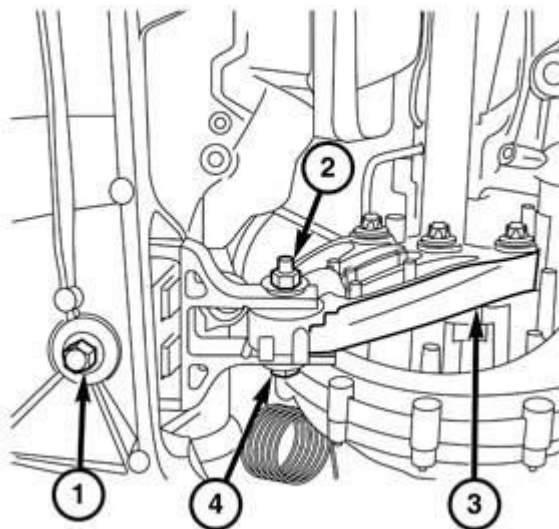
68. Remove the fasteners (2) securing the lower bumper reinforcement (1) and front fascia support beams to the frame/front end module.



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Fig. 25: Front Fascia Support Beams
Courtesy of CHRYSLER GROUP, LLC

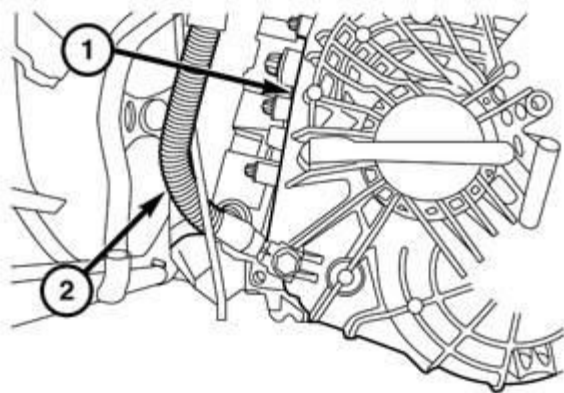
69. Remove the front fascia support beams (1).



081569486

Fig. 26: Rear Engine Isolator To Engine Mount Bracket Bolt
Courtesy of CHRYSLER GROUP, LLC

70. Remove the rear engine mount to bracket through bolt (4) and nut (2).
71. Remove the rear engine mount to crossmember through bolt (1).
72. Reposition the engine forward to allow the mount to be removed from the pocket past the engine bracket (3).
73. Remove the front suspension crossmember. Refer to **CROSSMEMBER, FRONT SUSPENSION, REMOVAL**.
74. Remove the exhaust cross-under pipe assembly. Refer to **PIPE, EXHAUST CROSSUNDER, REMOVAL**.



210269678

Fig. 27: Transaxle & Ground Cable
Courtesy of CHRYSLER GROUP, LLC

75. Remove the bolt holding the ground cable (2) to transaxle and separate cable from transaxle (1).
76. Remove the bolt holding the ground strap to left frame rail.
77. Disconnect the shifter cables from the transmission. Refer to **CABLE, GEARSHIFT CONTROL, REMOVAL**.
78. Reposition the main wire harness away from the engine.

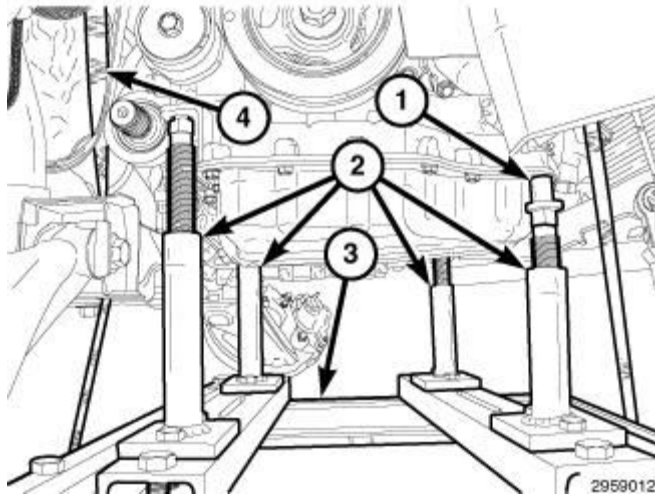


Fig. 28: Adapter, Engine Support Cradle, Power Train Dolly & Safety Straps
 Courtesy of CHRYSLER GROUP, LLC

79. Raise and position the vehicle height to allow Power Train Dolly (special tool #6135, Dolly, Power Train) (3) and Engine Support Cradle (special tool #6710A, Cradle, Engine Support) (2) to be installed under the engine/transaxle assembly.
80. Loosen the cradle engine mounts to allow movement for positioning onto the engine locating holes on the engine block and oil pan rail. Place Adapter (special tool #6848-3, Adapter) (1) on the front post and align to the oil pan mounting stud. Lower the vehicle and position cradle until the engine is resting on the posts. Tighten the post mounts to the cradle frame. Secure the engine/transaxle assembly to the dolly/cradle with safety straps (4).
81. Remove the left engine mount. Refer to **INSULATOR, ENGINE MOUNT, LEFT, REMOVAL** .
82. Remove the right engine mount. Refer to **INSULATOR, ENGINE MOUNT, RIGHT** .
83. Slowly raise the vehicle to allow the it to clear the powertrain assembly.

CAUTION: Make sure that all components are clear of obstructions while raising the vehicle off of the powertrain assembly.

84. On vehicles equipped with an automatic transaxle, remove torque converter bolts.

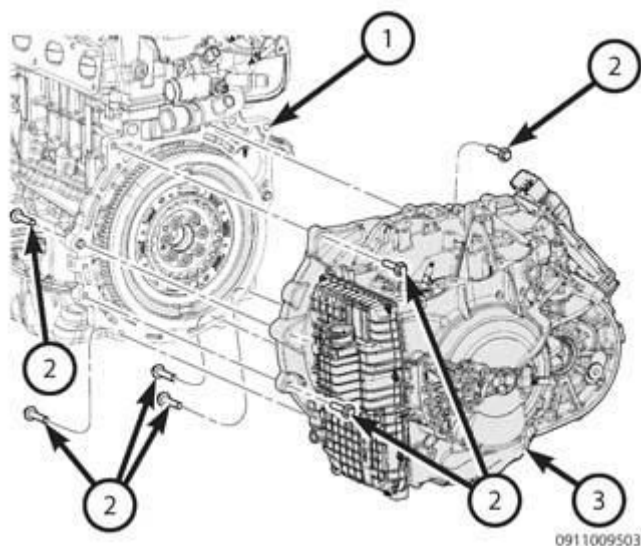


Fig. 29: Removing/Installing Bell-Housing
Courtesy of CHRYSLER GROUP, LLC

85. Affix a chain to the transmission mount bracket to be used as a lifting point.
86. Using an engine hoist, remove the slack from the lifting chain.
87. Remove the bell-housing bolts (2).
88. Separate engine (1) and transmission (2).

INSTALLATION

INSTALLATION

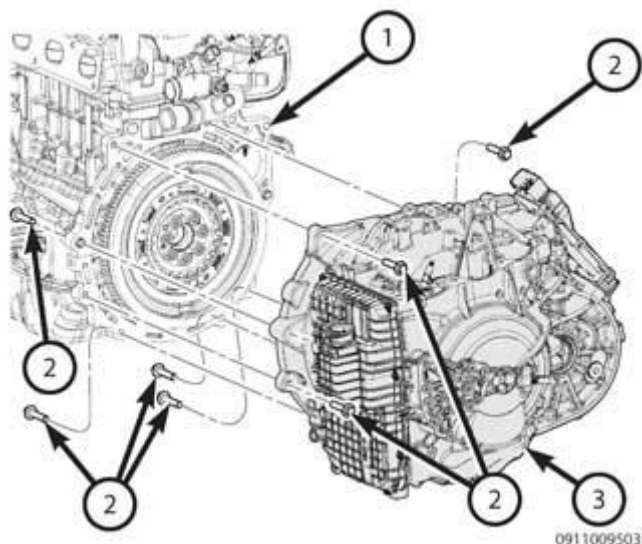


Fig. 30: Removing/Installing Bell-Housing
Courtesy of CHRYSLER GROUP, LLC

1. Push the bell housing against the engine block until the guide pins engage.
2. Install transmission bolts (2). Refer to **SPECIFICATIONS**.
3. On vehicles equipped with an automatic transaxle, install torque converter bolts.

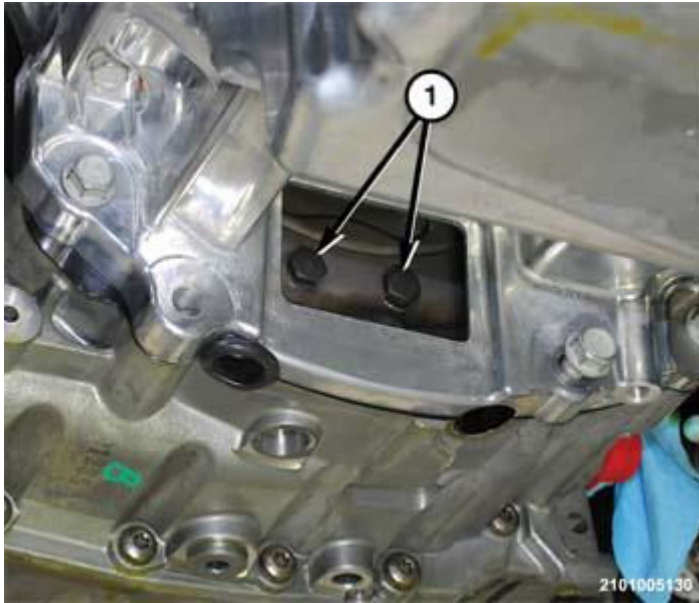


Fig. 31: Flexplate-To-Torque Converter Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Through the access door opening, Install the bolts (1) to hold the flexplate to the torque converter. Refer to **SPECIFICATIONS**. Apply Mopar® Lock & Seal Adhesive or replace the bolts on the threads. Rotate the crankshaft to bring each set of bolts into view through the access door.

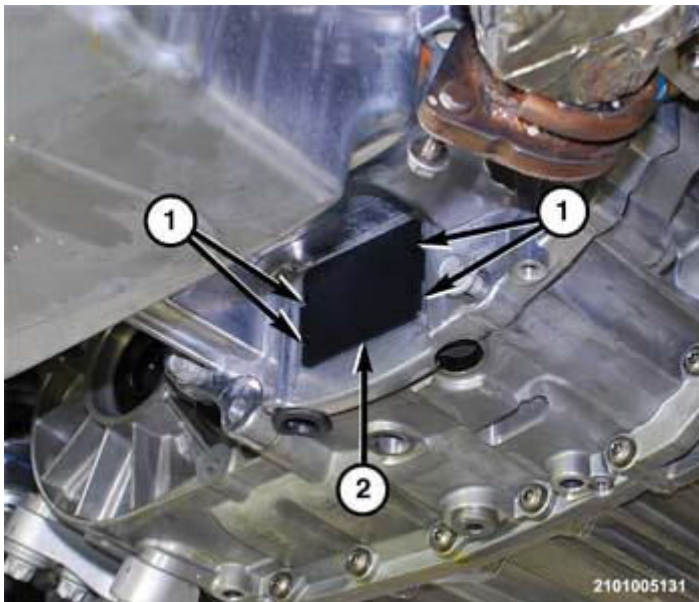


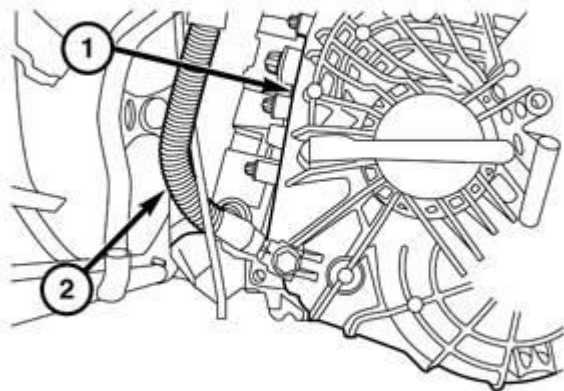
Fig. 32: Access Door In Splash Shield

Courtesy of CHRYSLER GROUP, LLC

5. Install the access door in the splash shield on the bellhousing.
6. Slowly lower the vehicle to allow it to clear the powertrain assembly.

CAUTION: Make sure that all components are clear of obstructions while raising the vehicle off of the powertrain assembly.

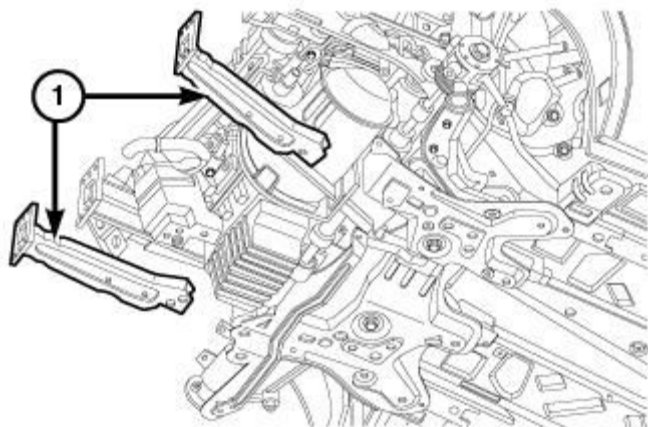
7. Install the left engine mount. Refer to INSULATOR, ENGINE MOUNT, LEFT, INSTALLATION .
8. Install the right engine mount. Refer to INSULATOR, ENGINE MOUNT, RIGHT, INSTALLATION .
9. Remove the Power Train Dolly.
10. Connect the shifter cables from the transmission.



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Fig. 33: Transaxle & Ground Cable
Courtesy of CHRYSLER GROUP, LLC

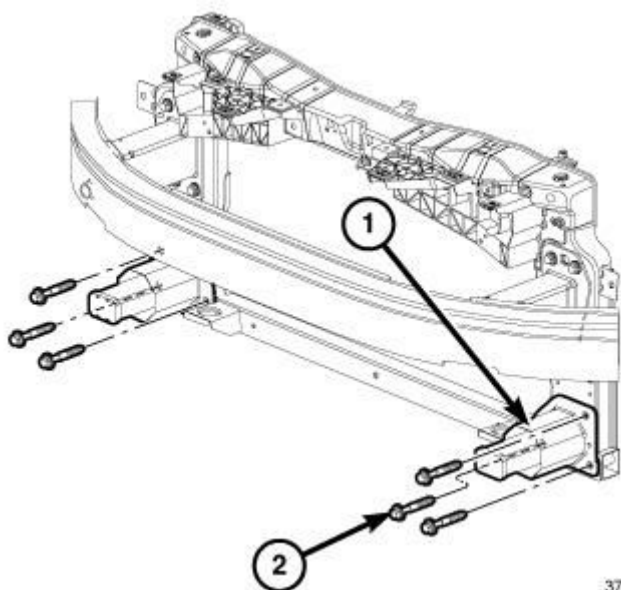
11. Install the bolt holding the ground cable (2) to transaxle (1). Refer to SPECIFICATIONS .
12. Install the exhaust cross-under pipe assembly. Refer to PIPE, EXHAUST CROSSUNDER, INSTALLATION .
13. Install the front suspension crossmember. Refer to CROSSMEMBER, FRONT SUSPENSION, INSTALLATION .
14. Install the rear engine mount. Refer to INSULATOR, ENGINE MOUNT, REAR, INSTALLATION .



3140748

Fig. 34: Front Fascia Support Beams
 Courtesy of CHRYSLER GROUP, LLC

15. Install the front fascia support beams (1). Refer to **FRAME, SPECIFICATIONS** .



3772580

Fig. 35: Lower Bumper Reinforcements & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

- 16.
17. Install the fasteners (2) securing the lower bumper reinforcement (1) and front fascia support beams to the frame/front end module. Refer to **FRAME, SPECIFICATIONS** .

18. Install the radiator fan assembly. Refer to **FAN, COOLING, INSTALLATION** .
- .
19. Install the front tow hooks. Refer to **HOOK(S), TOW, FRONT, INSTALLATION** .
20. Install the upper radiator hose.
21. Install the lower radiator hose.
22. Install the belly pan. Refer to **BELLY PAN** .
23. Install the left and right axle shafts. Refer to **INSTALLATION** .

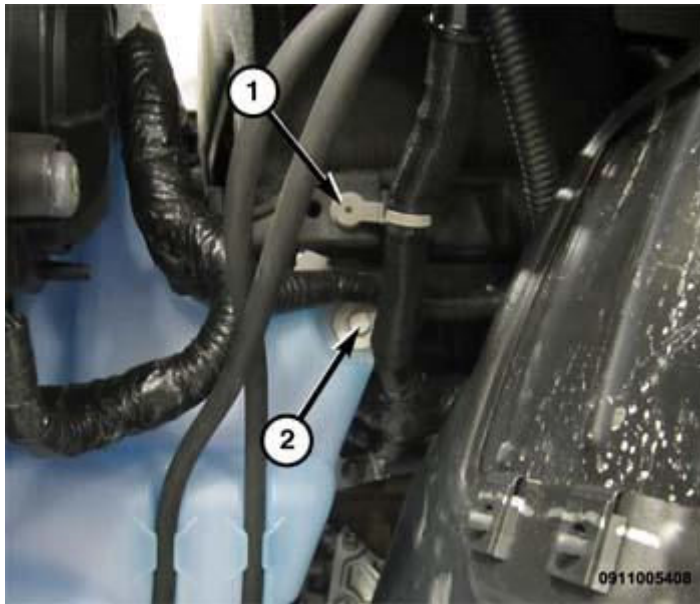
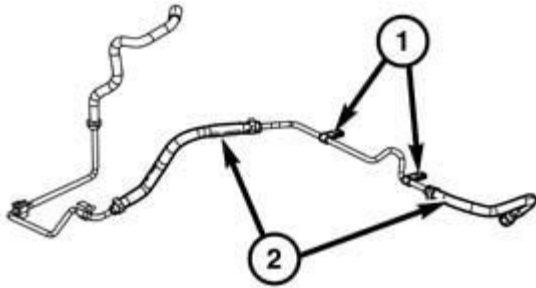


Fig. 36: Windshield Washer Reservoir-To-Battery Tray Bolt
Courtesy of CHRYSLER GROUP, LLC

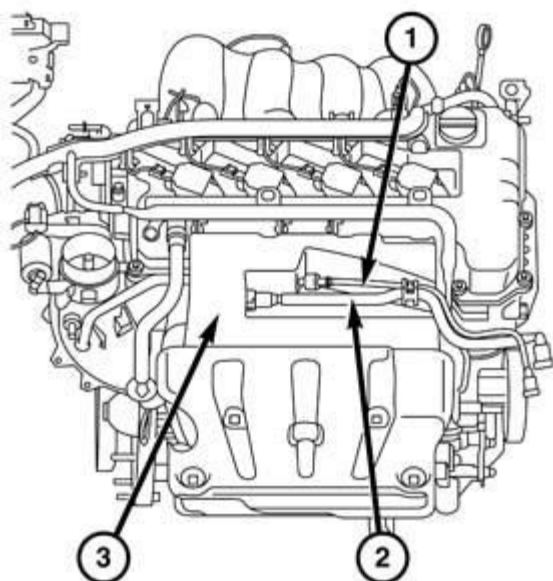
24. Install the bolt (2) holding the windshield washer reservoir to the battery tray.
25. Insert the harness retainer to the battery tray.
26. Install the left wheel well liner.
27. Install both skid plates (if equipped).
28. Install the forward skid plate fasteners (if equipped).
29. Install the rearward skid plate fasteners (if equipped).
30. Install the front wheels.
31. Install the engine wire harness retainers.
32. Connect the transmission cooler hoses at the transmission fittings.



090974919

Fig. 37: Hose Assembly & Hot Bottle Return Pipe Bolts
Courtesy of CHRYSLER GROUP, LLC

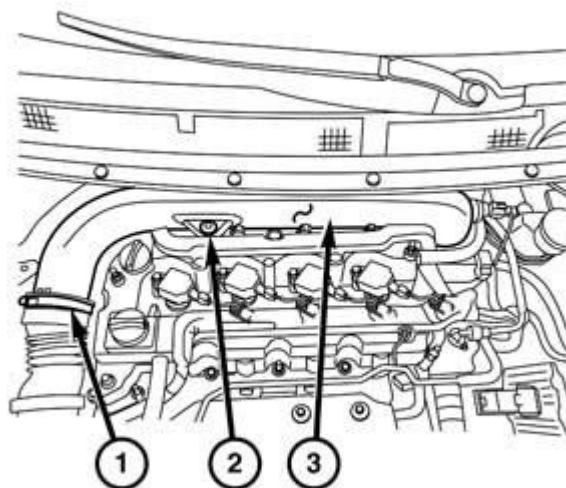
33. Install the coolant reservoir return hose assembly (2) Install the hose bolts (1). Connect both ends of the pipe.
34. Connect the MAP sensor connector.
35. Connect the oil temperature sensor connector.



081569483

Fig. 38: Foam Insulator, Fuel Line & Purge Line
Courtesy of CHRYSLER GROUP, LLC

36. Install the fuel injector insulator (3).
37. Connect the fuel line (1) and the purge line (2) quick connects.

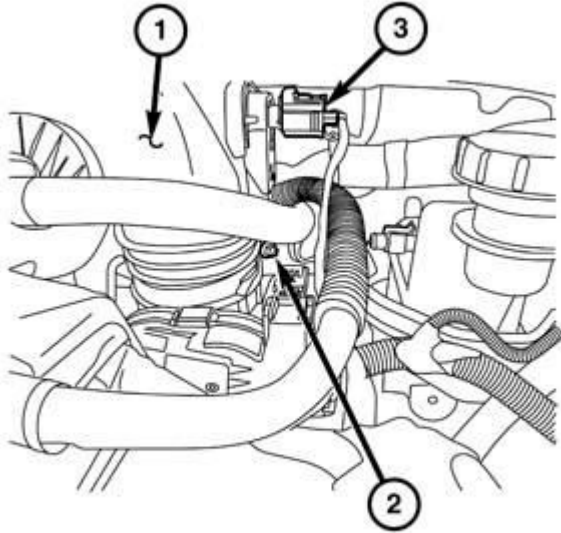


090772119

Fig. 39: Resonator, Bolt & Clamp

Courtesy of CHRYSLER GROUP, LLC

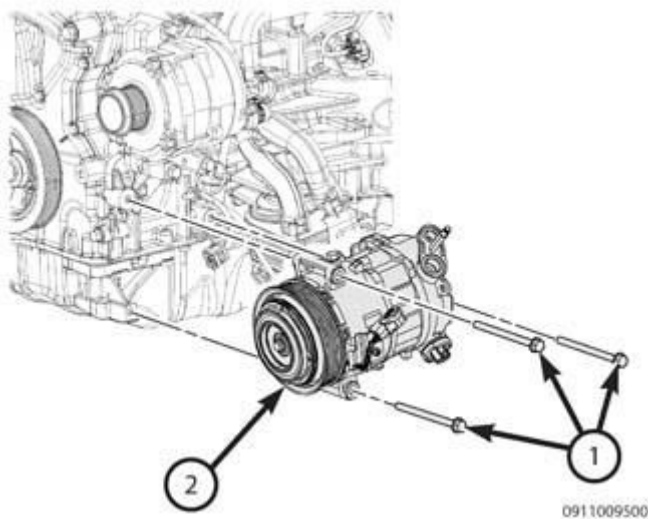
38. Install the air intake snorkel (3) and snorkel bolt (2). Refer to **ENGINE SPECIFICATIONS** .
39. Tighten the snorkel clamp (1).



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Fig. 40: Resonator, Clamp & Connector
Courtesy of CHRYSLER GROUP, LLC

40. Connect the IAT sensor (3).
41. Tighten the snorkel to throttle body clamp (2).



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Fig. 41: Air Conditioning Compressor & Bolts
Courtesy of CHRYSLER GROUP, LLC

42. Install the air conditioning compressor (2).
43. Install the compressor bolts (1). Refer to **SPECIFICATIONS** .

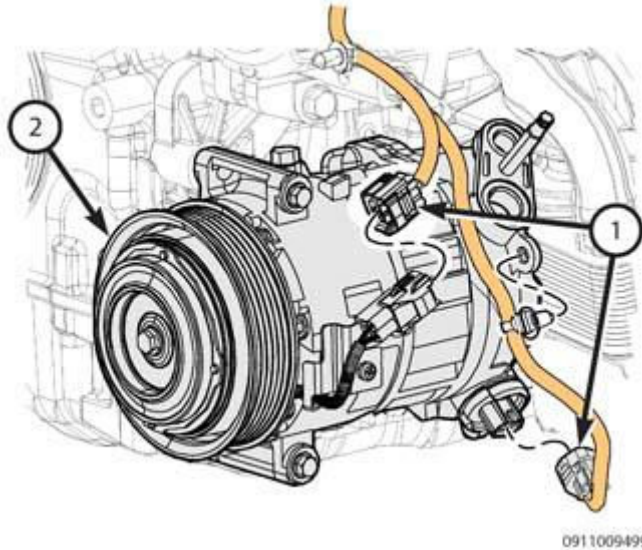


Fig. 42: Air Conditioning Compressor Electrical Connectors
Courtesy of CHRYSLER GROUP, LLC

44. Disconnect the air conditioning compressor electrical connectors (1).

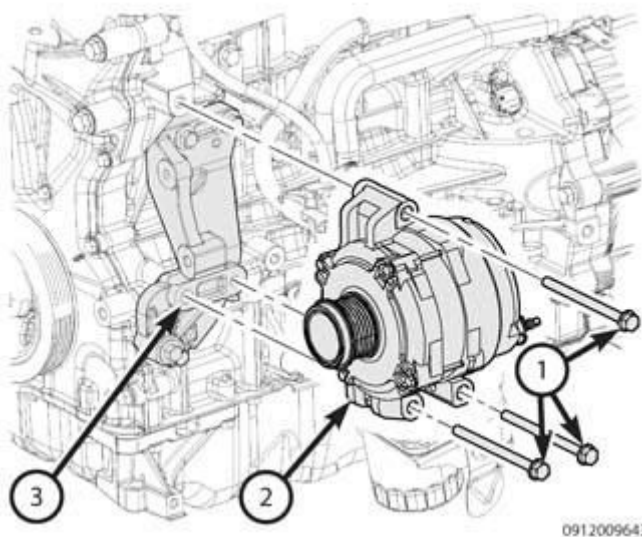
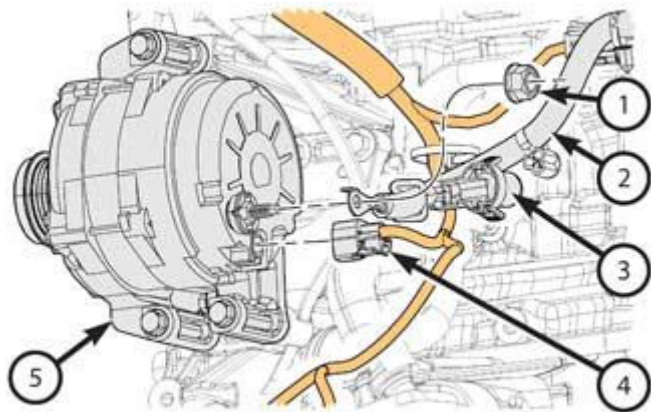


Fig. 43: Generator, Bolts & Bracket
Courtesy of CHRYSLER GROUP, LLC

45. Install the generator (2) to the bracket (3).

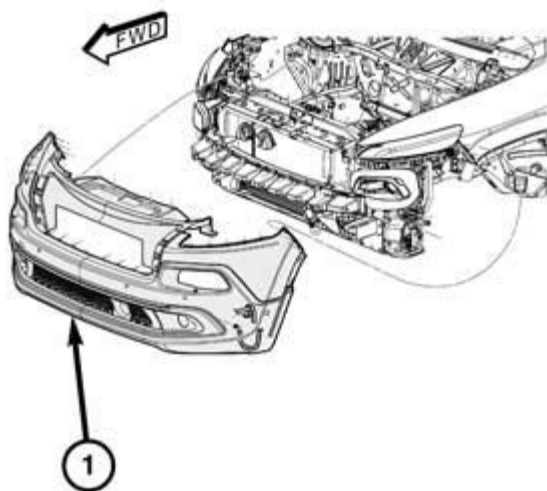
46. Install the generator bolts (1). Refer to **ENGINE SPECIFICATIONS** .



0912009645

Fig. 44: Removing/Installing Generator
Courtesy of CHRYSLER GROUP, LLC

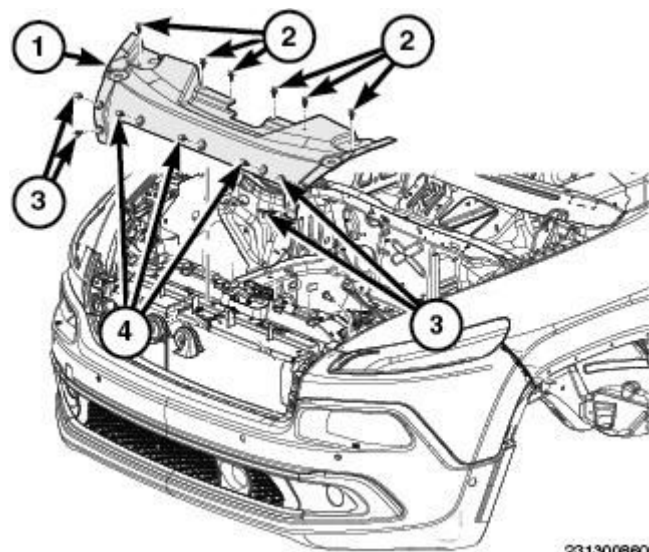
47. Install the generator electrical connectors (1 & 2).
48. Install the nut (1). Tighten to 12 N.m (106 in. lbs.).
49. Close the 12 volt protective cover (3).
50. Install the serpentine belt.
51. Install the radiator inlet hose clamp.
52. Install the radiator outlet hose clamp.
53. Install the oil cooler inlet and outlet hose clamps at the tubes.



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Fig. 45: Front Fascia Assembly
Courtesy of CHRYSLER GROUP, LLC

54. Install the front fascia. Refer to **FASCIA, FRONT, INSTALLATION** .



2313008802

Fig. 46: Upper Close Out Panel Cover Components
Courtesy of CHRYSLER GROUP, LLC

55. Install the radiator upper closeout panel push pins (2).
56. Install the radiator upper closeout panel bolts (4).
57. Install the radiator upper closeout panel bolts (3).

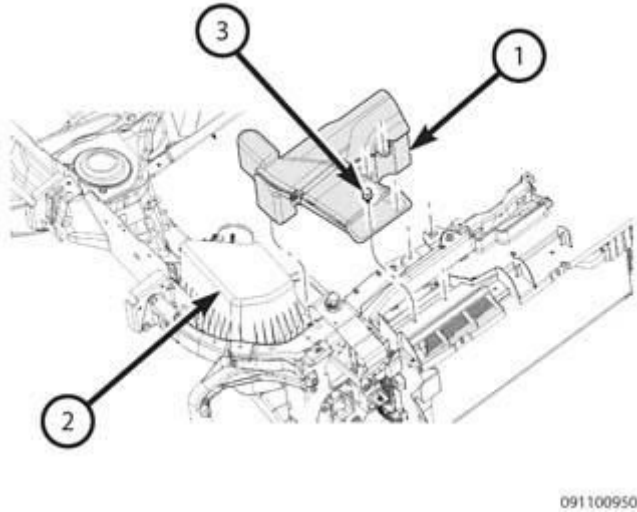
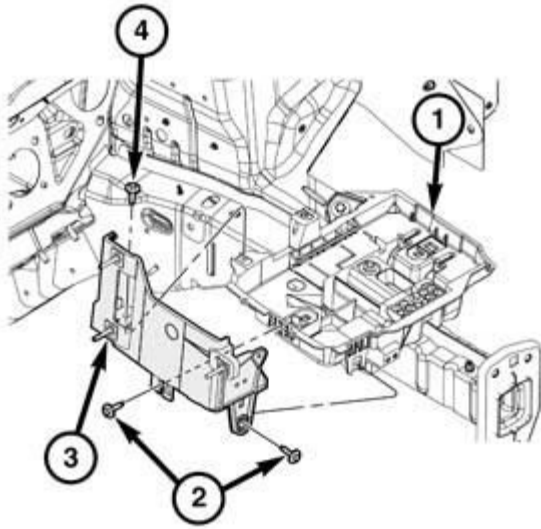


Fig. 47: Removing/Installing Inlet Assembly
Courtesy of CHRYSLER GROUP, LLC

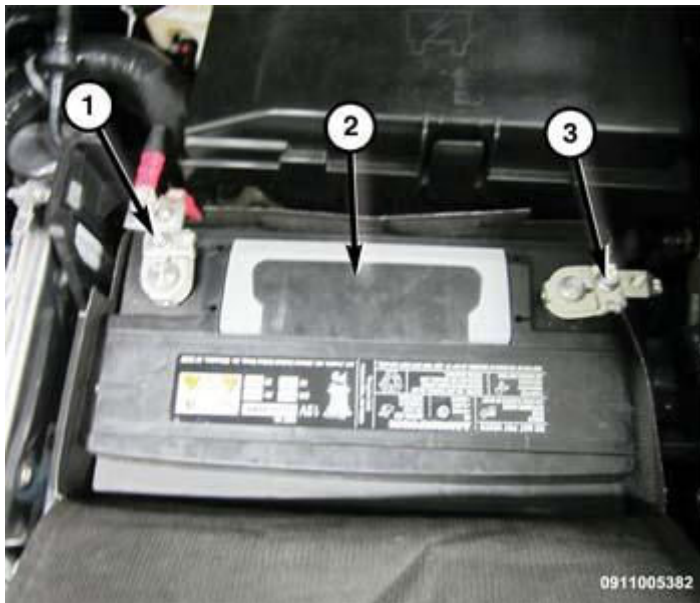
58. Install the fresh air hose to the valve cover.
59. Install the air cleaner inlet assembly (1). Install the inlet snorkel push pins (3).
60. Install the inline connectors at the front of the battery tray.
61. Lock the engine harness connectors at the front of the battery tray.
62. Install the PDC. Refer to **CENTER, POWER DISTRIBUTION (PDC), INSTALLATION**.
- .
63. Install the two harness retainers that are secured to the PDC bracket.
64. Separate the wire harness retainers at the transmission bell housing.
65. Connect the heater core supply and return hoses at the fittings nearest the thermostat housing.



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Fig. 48: Battery Tray, PCM Mount & Bolts
Courtesy of CHRYSLER GROUP, LLC

66. Install the PCM bracket (3) to the battery tray (1). Install the PCM mount bracket bolts (2 & 4).
67. Install the PCM. Refer to **MODULE, POWERTRAIN CONTROL, INSTALLATION**.



0911005382

Fig. 49: Battery & Cables
Courtesy of CHRYSLER GROUP, LLC

68. Install the battery (2).
69. Connect the battery connectors (1 & 3).



Fig. 50: Battery Cover
Courtesy of CHRYSLER GROUP, LLC

70. Install the battery cover (1)
71. Fill the cooling system.

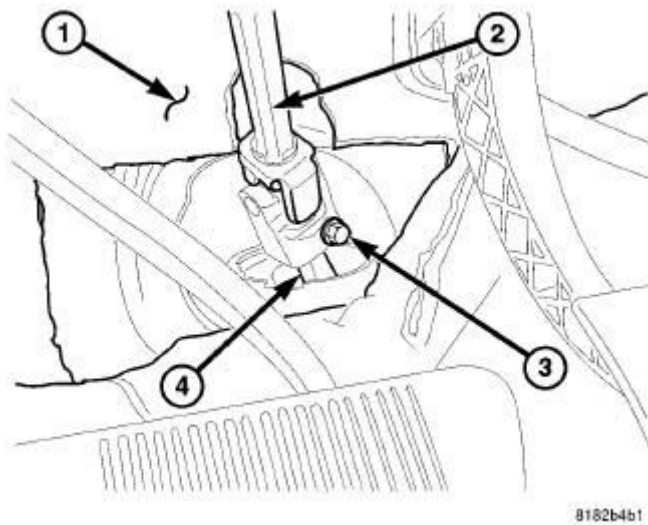


Fig. 51: Lower Coupling Bolt
Courtesy of CHRYSLER GROUP, LLC

72. Install the steering coupler bolt (3). Refer to **SPECIFICATIONS** .

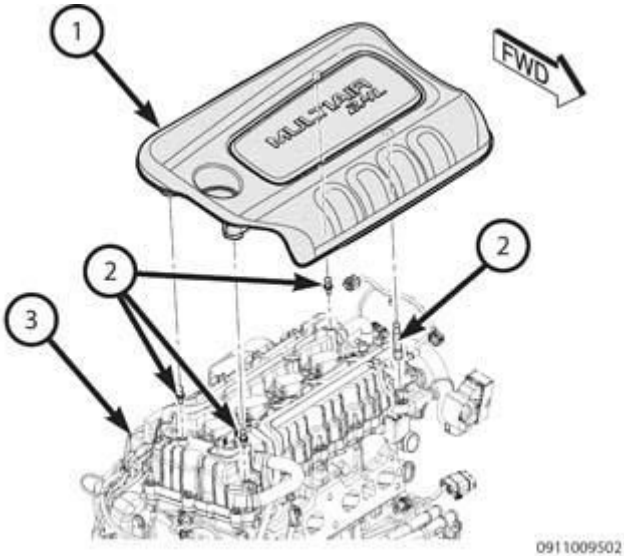


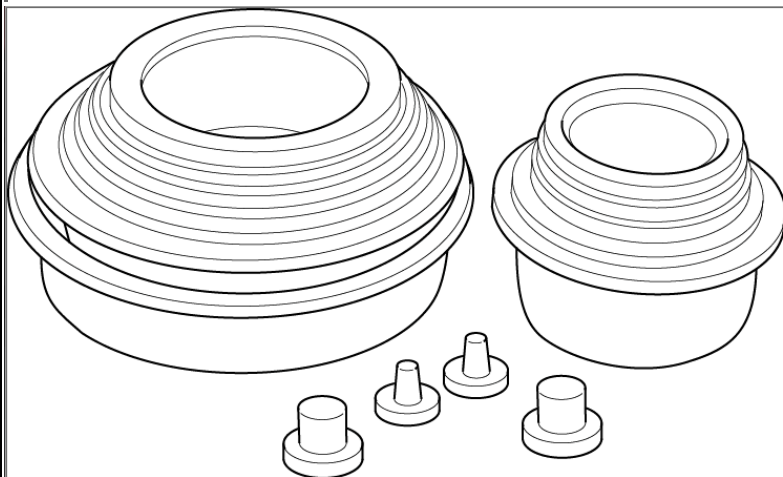
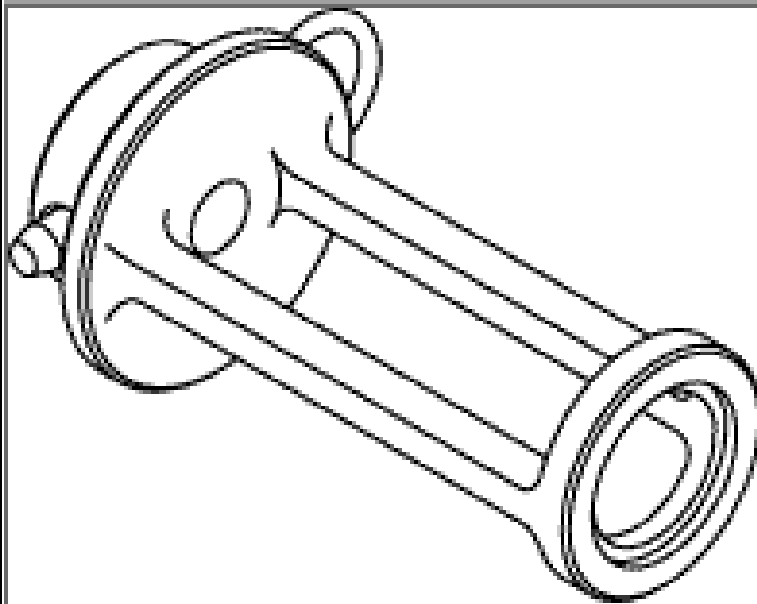
Fig. 52: Engine Cover & Pins
Courtesy of CHRYSLER GROUP, LLC

73. Install the engine cover (1) to the ball studs (2).
74. Add engine oil and transmission fluid as necessary.
75. Start engine, check for leaks.
76. Bleed the cooling system. Refer to **STANDARD PROCEDURE** .

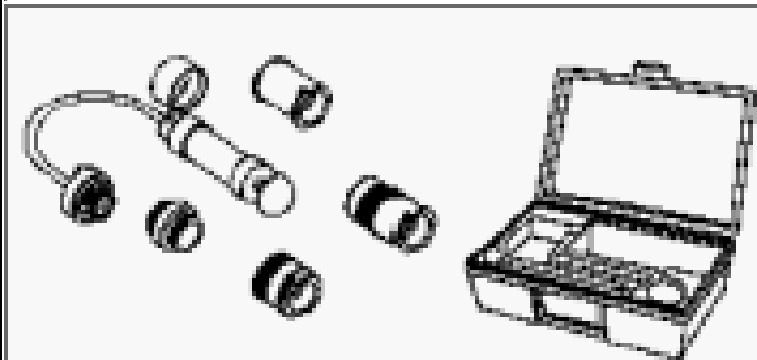
SPECIAL TOOLS

SPECIAL TOOLS

10224 - Adapter, Valve Spring
(Originally Shipped In Kit Number(s)
10223.)



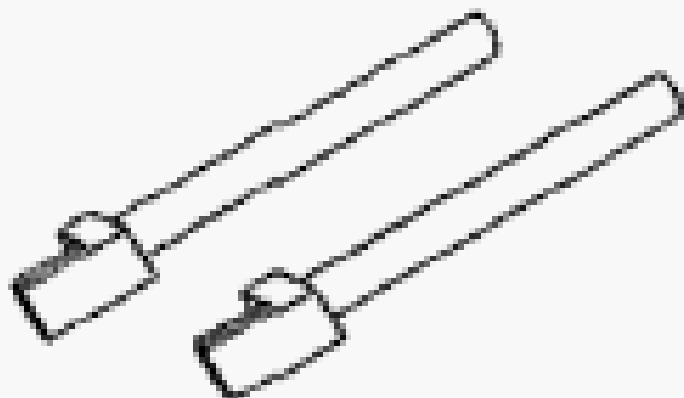
10368 - Set, Universal Protective Cap



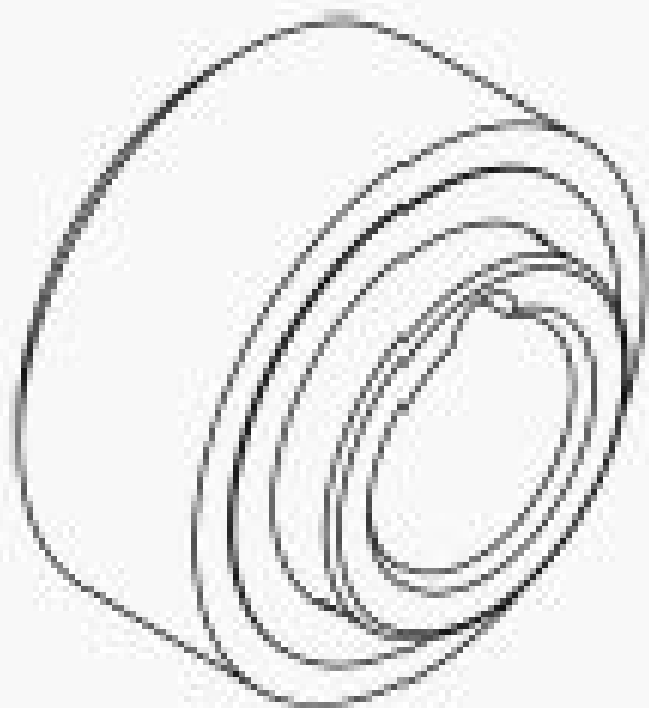
7700-A - Tester, Cooling System

2014 Jeep Cherokee Trailhawk

2014 ENGINE 2.4L - Service Information - Cherokee



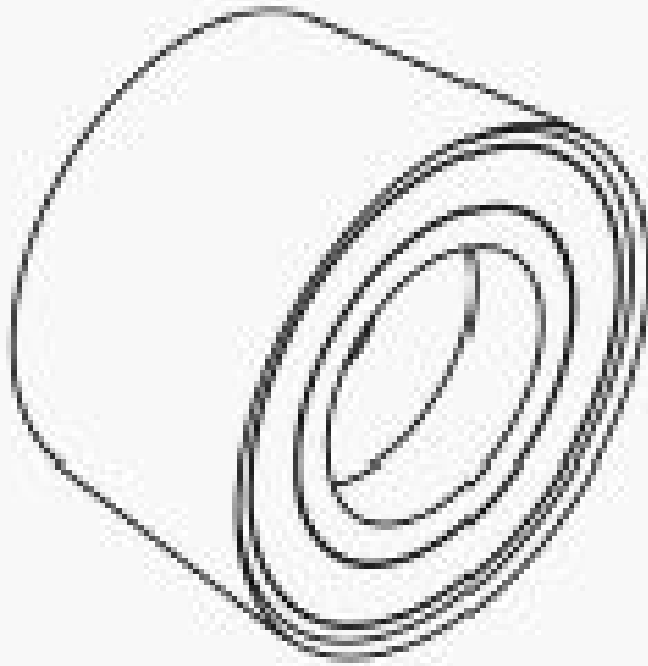
8189 - Guide Pins
(Originally Shipped In Kit Number(s)
8180, 8180CC, 8263, 8263CC.)



9506 - Installer, Oil Seal
(Originally Shipped In Kit Number(s)
9610, 9970.)

2014 Jeep Cherokee Trailhawk

2014 ENGINE 2.4L - Service Information - Cherokee



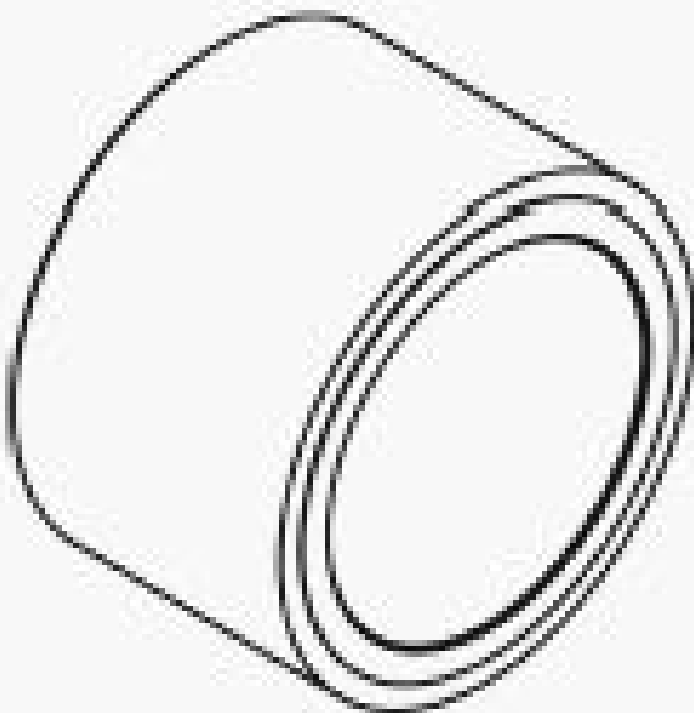
9509 - Installer, Oil Seal
(Originally Shipped In Kit Number(s)
9610, 9970.)



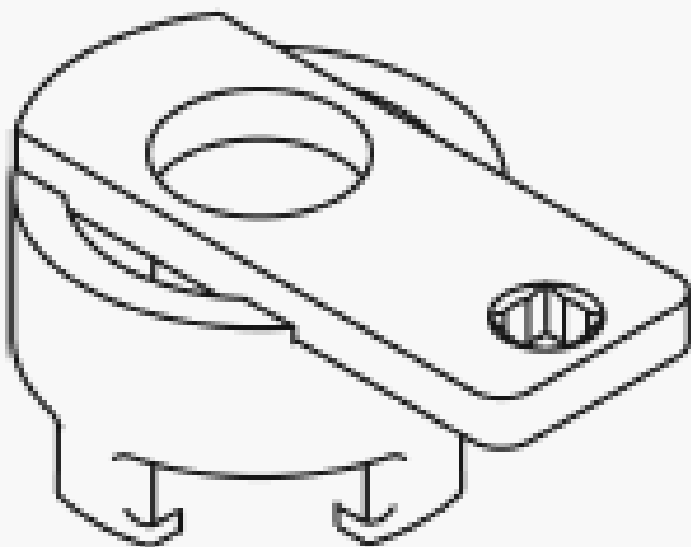
9703 - Pin, Tensioner
(Originally Shipped In Kit Number(s)
9610, 9970.)

2014 Jeep Cherokee Trailhawk

2014 ENGINE 2.4L - Service Information - Cherokee



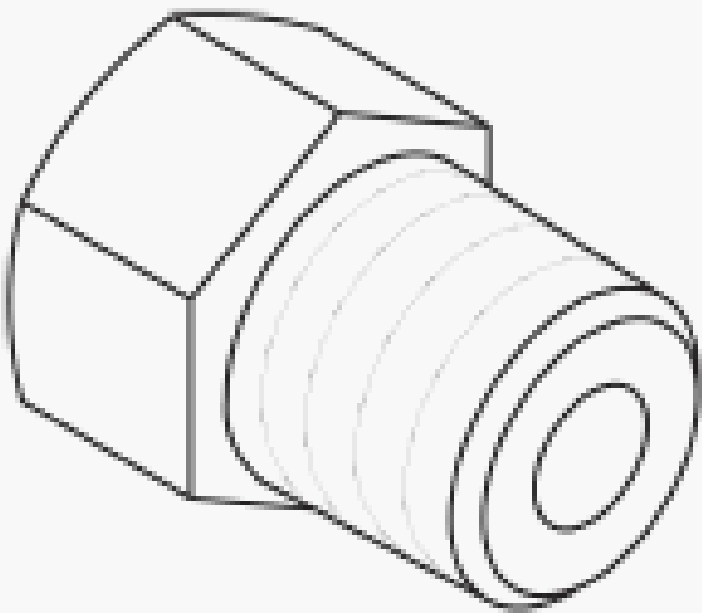
9706 - Installer, Crankshaft Rear Oil Seal
(Originally Shipped In Kit Number(s)
9610, 9970.)



9707 - Holder, Vibration Damper
(Originally Shipped In Kit Number(s)
9610, 9970.)

2014 Jeep Cherokee Trailhawk

2014 ENGINE 2.4L - Service Information - Cherokee



9879 - Adapter, Oil Pressure Test
(Originally Shipped In Kit Number(s)
9998.)

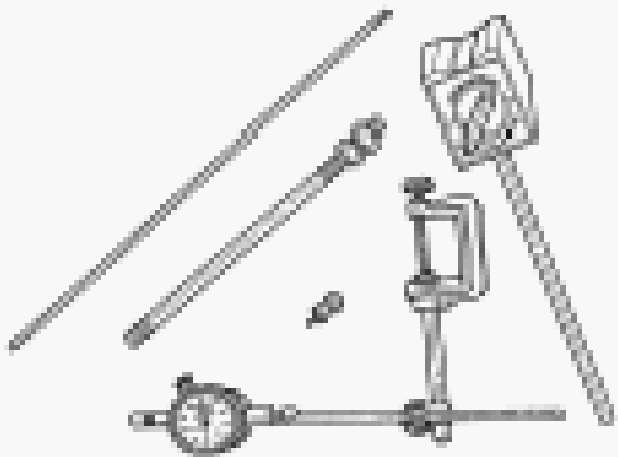


C-119 - Cylinder Indicator

C-3339A - Set, Dial Indicator
(Originally Shipped In Kit Number(s)
9202.)

2014 Jeep Cherokee Trailhawk

2014 ENGINE 2.4L - Service Information - Cherokee

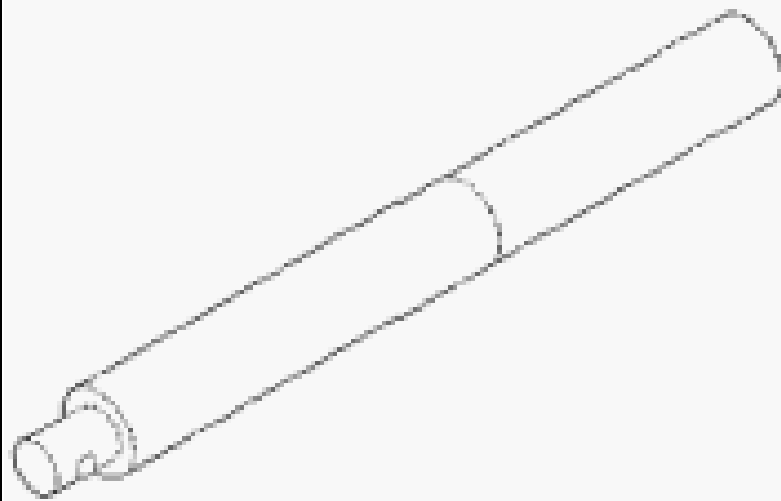
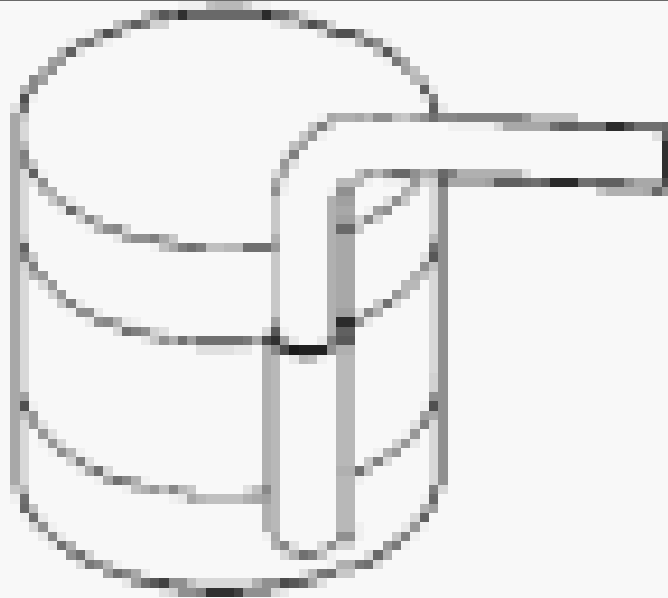


C-3685-A - Bloc-Chek Kit

C-385 - Compressor, Piston

2014 Jeep Cherokee Trailhawk

2014 ENGINE 2.4L - Service Information - Cherokee

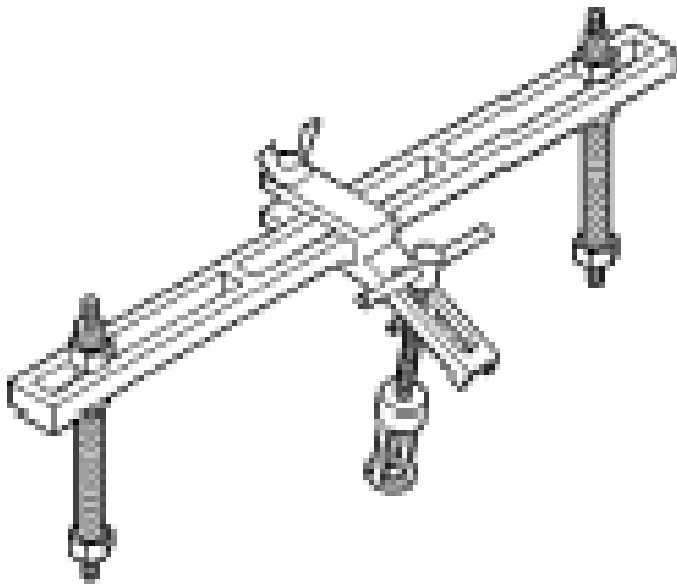
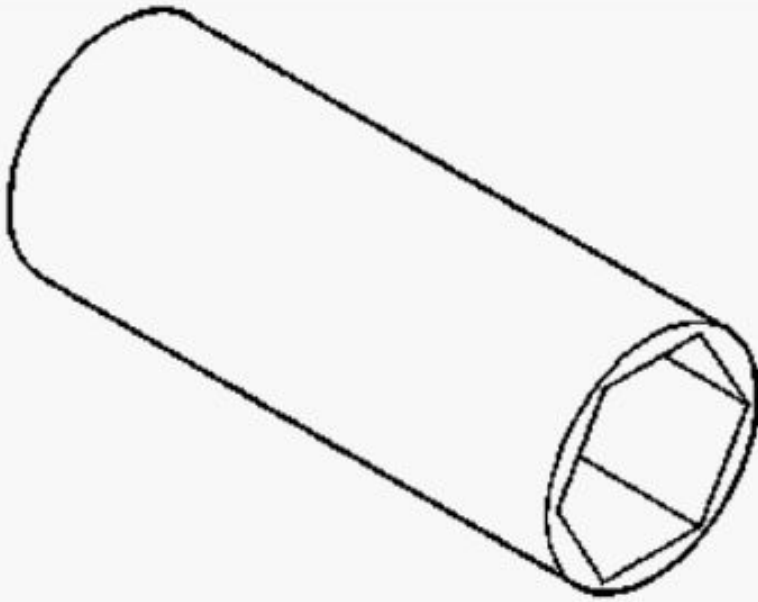


C-4171 - Driver Handle, Universal
(Originally Shipped In Kit Number(s)
9202, 9202A-CAN, 9202CC, 9299,
9299CC, 9299CC, 9300A-CAN.)

C-4597 - Socket, Oil Pressure

2014 Jeep Cherokee Trailhawk

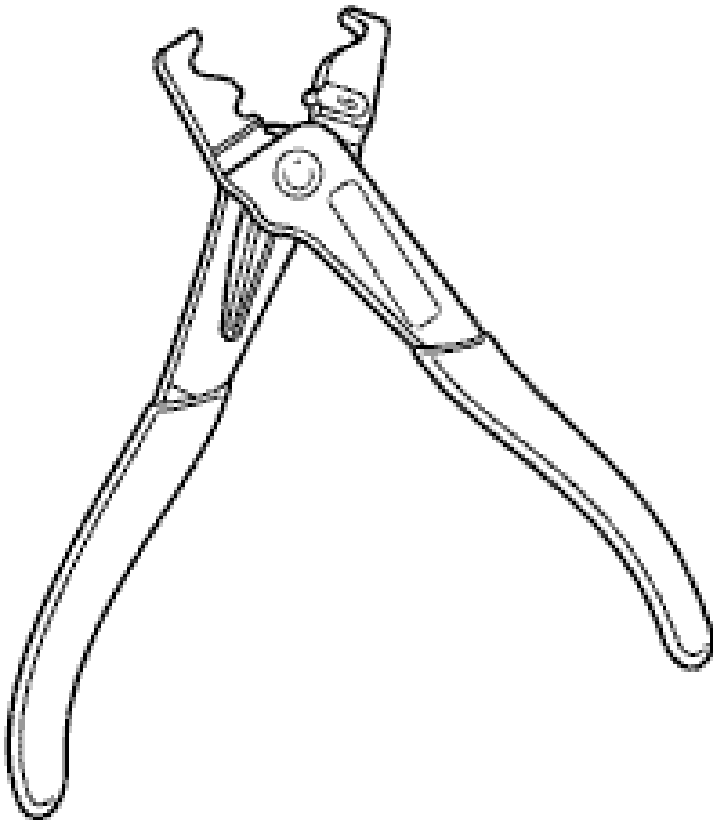
2014 ENGINE 2.4L - Service Information - Cherokee



MD998772A - Compressor, Valve Spring
(Originally Shipped In Kit Number(s)
8678, 8853, 8854.)

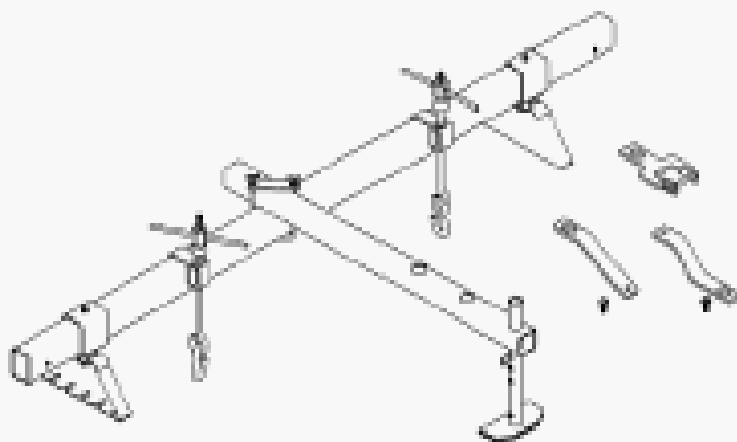
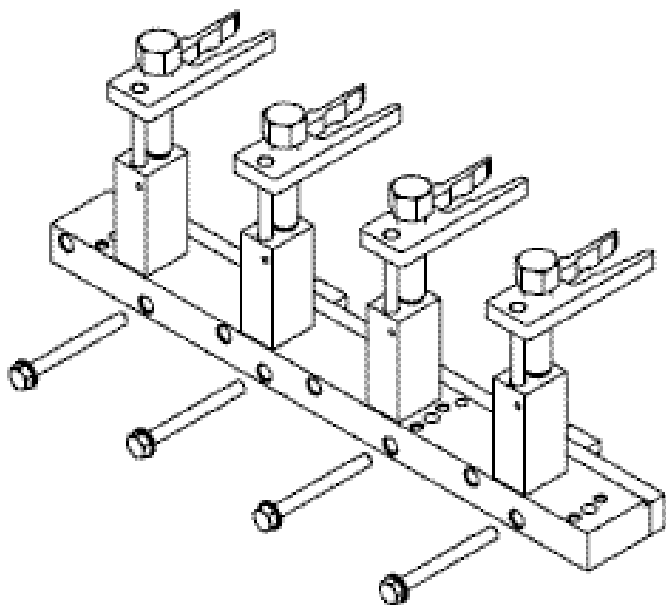
2014 Jeep Cherokee Trailhawk

2014 ENGINE 2.4L - Service Information - Cherokee



10288 - Pliers, Hose Clamp

10259B - Compressor, MultiAir® Spring



8534B - Fixture, Driveline Support
(Originally Shipped In Kit Number(s)
8534, 8534B, 8849, 9565.)

AIR INTAKE SYSTEM

AIR CLEANER

REMOVAL

REMOVAL

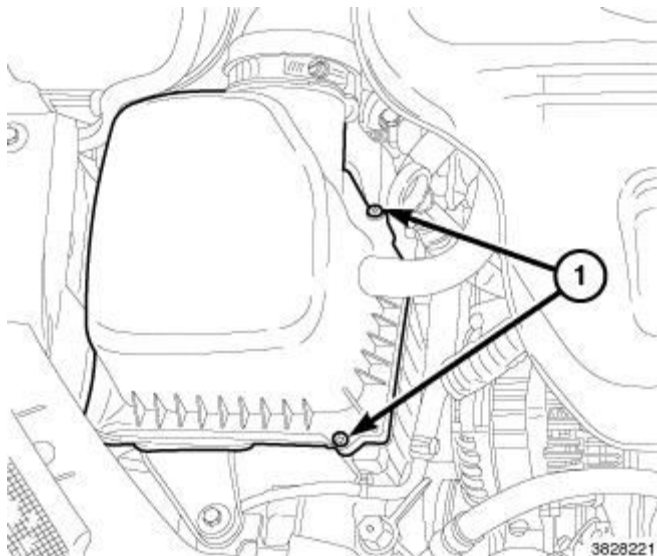


Fig. 53: Air Cleaner Housing Cover Screws
Courtesy of CHRYSLER GROUP, LLC

1. Remove two screws (1) from the air cleaner housing cover.

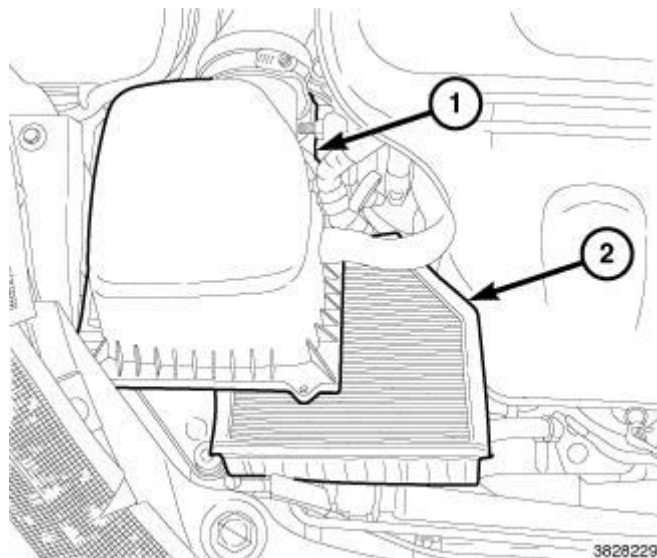


Fig. 54: Air Cleaner Housing Cover & Air Filter
Courtesy of CHRYSLER GROUP, LLC

2. Lift the air cleaner housing cover (1).
3. Pull the cover to disengage the rear tabs.
4. Remove the air filter element (2).

INSTALLATION

INSTALLATION

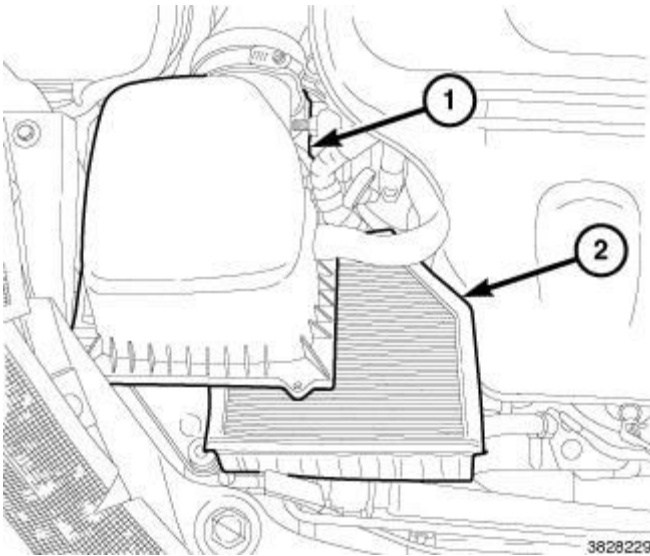


Fig. 55: Air Cleaner Housing Cover & Air Filter
Courtesy of CHRYSLER GROUP, LLC

1. Install the air filter element (2) into the air cleaner housing.
2. Install the cover (1) so that the rear tabs insert into the lower air box.

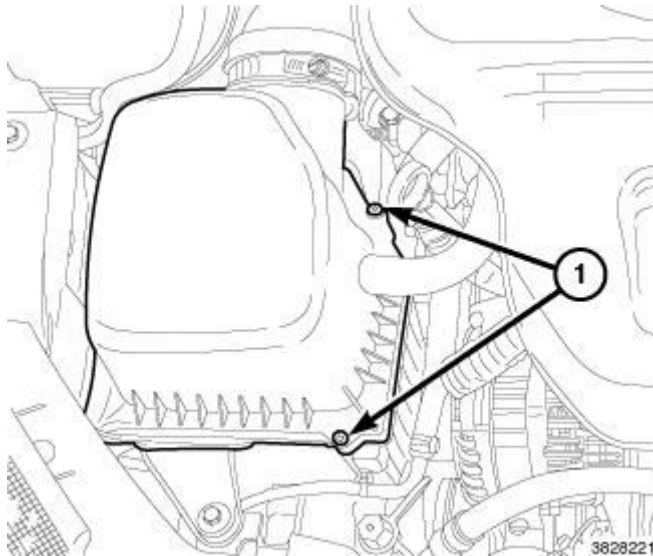


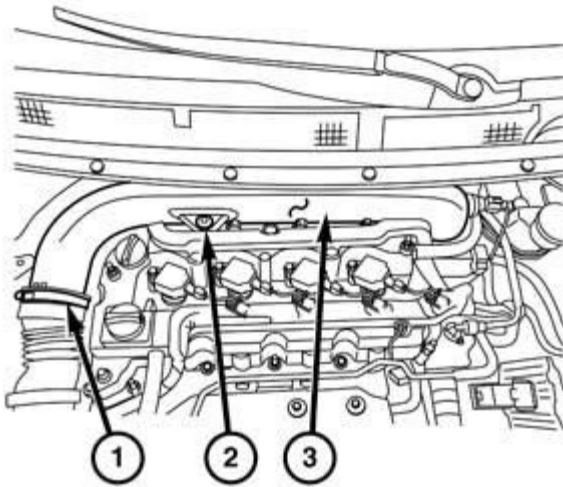
Fig. 56: Air Cleaner Housing Cover Screws
Courtesy of CHRYSLER GROUP, LLC

3. Seat the cover onto the housing and tighten the two housing cover screws (1).

BODY, AIR CLEANER

REMOVAL

REMOVAL

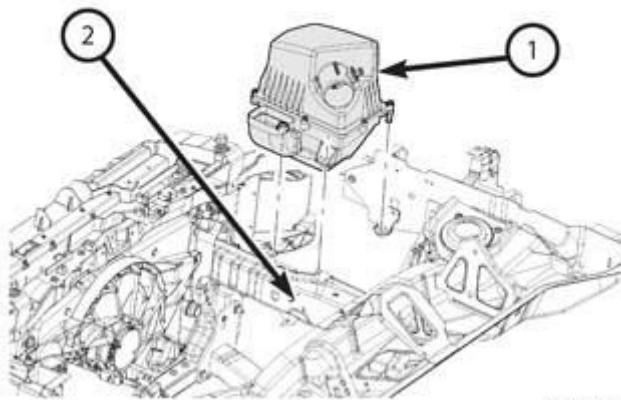


090772119

Fig. 57: Resonator, Bolt & Clamp

Courtesy of CHRYSLER GROUP, LLC

1. Loosen the clamp (1) and disengage the hose from the resonator (3).
2. Remove the make up air hose from the air cleaner body.



0911009498

Fig. 58: Removing/Installing Air Cleaner Body

Courtesy of CHRYSLER GROUP, LLC

3. Lift the air cleaner body (1) straight up off of the locating pins at frame rail (2).

INSTALLATION

INSTALLATION

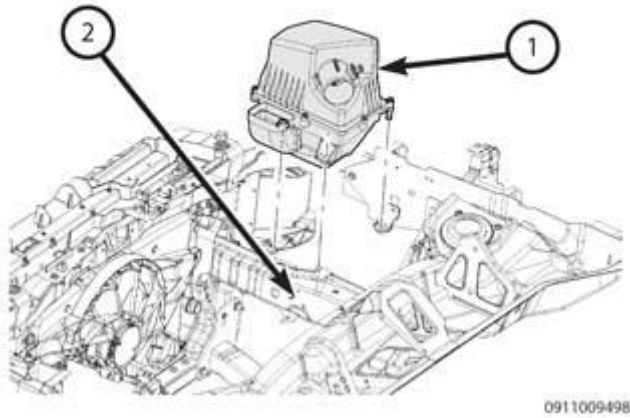


Fig. 59: Removing/Installing Air Cleaner Body
Courtesy of CHRYSLER GROUP, LLC

1. Install the air cleaner body (1) straight down on the locating pins.

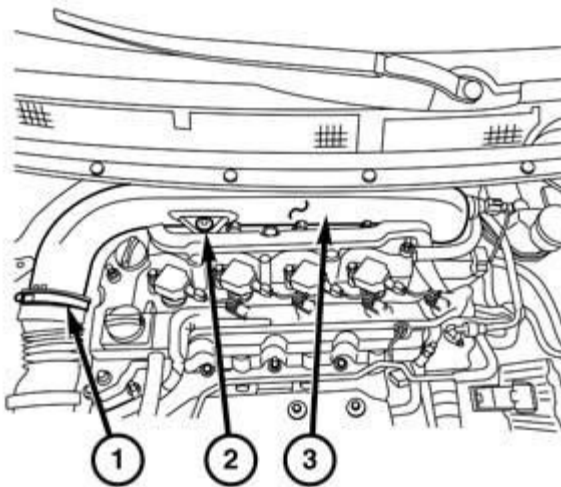
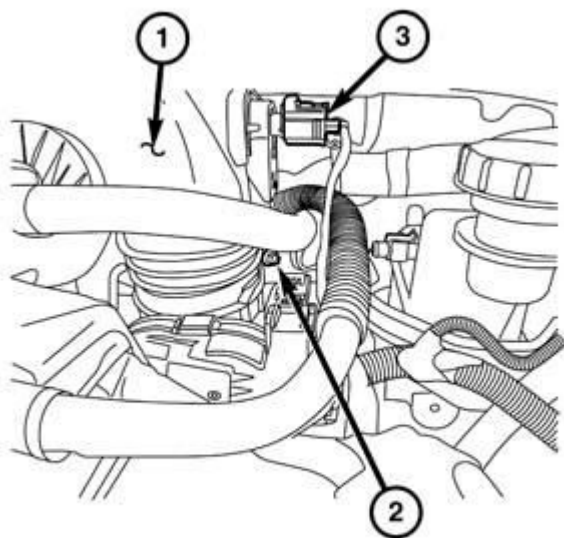


Fig. 60: Resonator, Bolt & Clamp
Courtesy of CHRYSLER GROUP, LLC

2. Install the hose to the resonator and tighten the clamp (1) to 4 N.m (35 in. lbs.).
3. Install the make up air hose.

RESONATOR, AIR CLEANER**REMOVAL****REMOVAL**

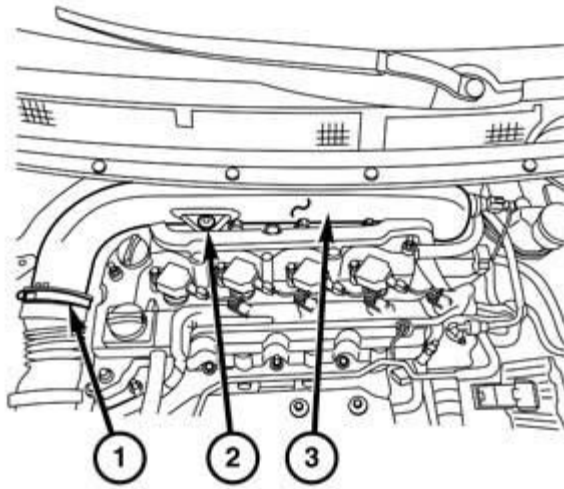
1. Remove the engine cover.



090772118

Fig. 61: Resonator, Clamp & Connector
Courtesy of CHRYSLER GROUP, LLC

2. Disconnect the electrical connector (2) from the Inlet Air Temperature (IAT) sensor.
3. Loosen the clamp (2) that secures the resonator (1) to the throttle body inlet.



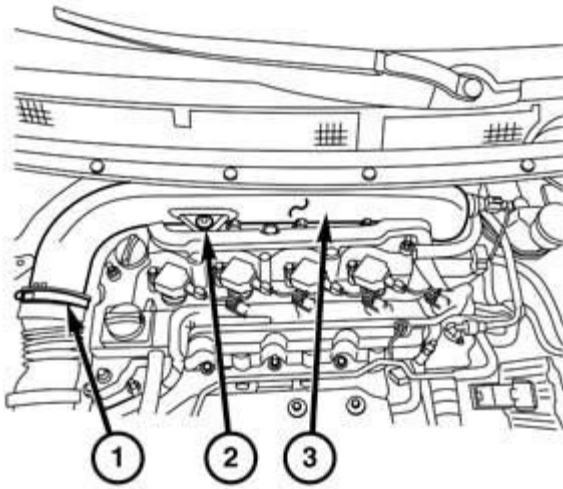
090772119

Fig. 62: Resonator, Bolt & Clamp
Courtesy of CHRYSLER GROUP, LLC

4. Loosen the clamp (1) and remove the air inlet hose from the resonator (3).
5. Remove the bolt (2) that secures the resonator to the cylinder head cover.
6. Pull the resonator (3) up while tipping the top edge of the resonator slightly forward and remove from the vehicle.

INSTALLATION

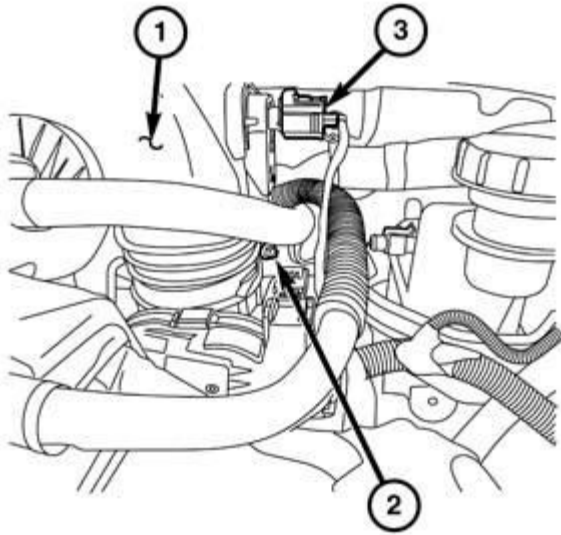
INSTALLATION



090772119

Fig. 63: Resonator, Bolt & Clamp**Courtesy of CHRYSLER GROUP, LLC**

1. Position the resonator (3) between the forward edge of the cowl and the cylinder head cover. Align the openings with the throttle body intake and the airbox flex hose.
2. Install the bolt. Tighten the bolt to 9 N.m (81 in. lbs.).
3. Tighten the hose clamp (1).



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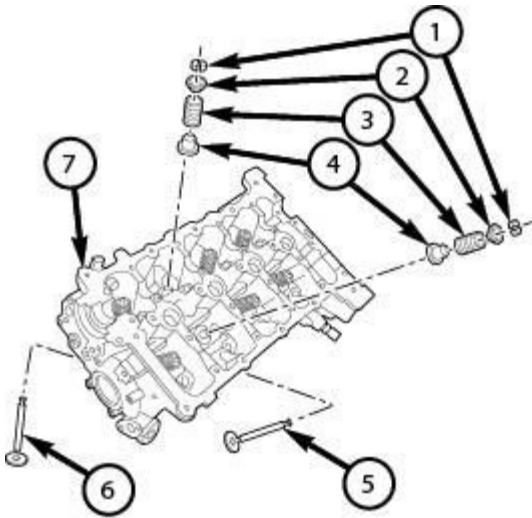
Fig. 64: Resonator, Clamp & Connector
Courtesy of CHRYSLER GROUP, LLC

4. Tighten the clamp (2) at the resonator outlet (1).
5. Connect the IAT connector (3).
6. Install the engine cover. Push downward to make sure all four rubber mounts are secure.

CYLINDER HEAD

DESCRIPTION

DESCRIPTION



091072939

Fig. 65: Cylinder Head, Valves & Springs
Courtesy of CHRYSLER GROUP, LLC

The MultiAir, aluminum cylinder head (7) contains an exhaust camshaft and a variable valve actuator assembly (VVAA) with four valves per cylinder. The valves are arranged in two in-line banks. The exhaust valves (6) face toward the front of the vehicle. The intake valves face the dash panel (5). The valvetrain uses roller rocker arms with hydraulic lifters. The cylinder head incorporates pressed in powdered metal valve guides. The valve guides are not serviceable. The cylinder head is sealed to the block using a multi-layer steel head gasket and retaining bolts. The valves contain a stem seal (4), spring (3), spring retainer (2) and three groove keepers (1).

Integral oil galleries provide lubrication passages to the VVAA, camshaft, and valve mechanisms.

DIAGNOSIS AND TESTING

CYLINDER HEAD GASKET

A cylinder head gasket leak can be located between adjacent cylinders or between a cylinder and the adjacent water jacket.

Possible indications of the cylinder head gasket leaking between adjacent cylinders are:

- Loss of engine power
- Engine misfiring
- Poor fuel economy

Possible indications of the cylinder head gasket leaking between a cylinder and an adjacent water jacket are:

- Engine overheating
- Loss of coolant

- Excessive steam (white smoke) emitting from exhaust
- Coolant foaming

CYLINDER-TO-CYLINDER LEAKAGE TEST

To determine if an engine cylinder head gasket is leaking between the cylinders located next to each other, follow the procedures in Cylinder Compression Pressure Test. Refer to **CYLINDER COMPRESSION PRESSURE LEAKAGE** . An engine cylinder head gasket leaking between the cylinders will result in approximately a 50 - 70% reduction in compression pressure.

CYLINDER-TO-WATER JACKET LEAKAGE TEST

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING WITH COOLANT PRESSURE CAP REMOVED.

VISUAL TEST METHOD

With the engine cool, remove the coolant pressure cap. Start the engine and allow it to warm up until thermostat opens.

If a large combustion/compression pressure leak exists, bubbles will be visible in the coolant.

COOLING SYSTEM TESTER METHOD

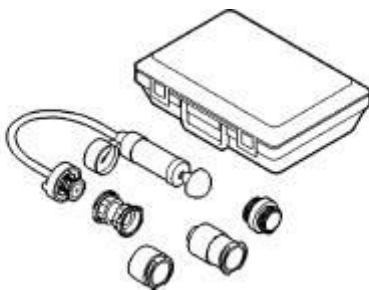


Fig. 66: Cooling System Pressure Tester - 7700-A
Courtesy of CHRYSLER GROUP, LLC

WARNING: WITH THE COOLING SYSTEM TESTER IN PLACE, PRESSURE WILL BUILD UP FAST. EXCESSIVE PRESSURE BUILT UP BY CONTINUOUS ENGINE OPERATION MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT THE PRESSURE TO EXCEED 138 kPa (20 psi).

Install Cooling System Tester (special tool #7700-A, Tester, Cooling System) or equivalent to pressure cap neck. Start the engine and observe the tester's pressure gauge. If gauge pulsates with every power stroke of a cylinder a combustion pressure leak is evident.

CHEMICAL TEST METHOD



Fig. 67: Bloc-Chek-Kit - C-3685-A
Courtesy of CHRYSLER GROUP, LLC

Combustion leaks into the cooling system can also be checked by using a (special tool #C-3685-A, Bloc-Chek Kit) or equivalent. Perform the test following the procedures supplied with the tool kit.

HYDRAULIC LASH ADJUSTER

A tappet-like noise may be produced from several items. Check the following items.

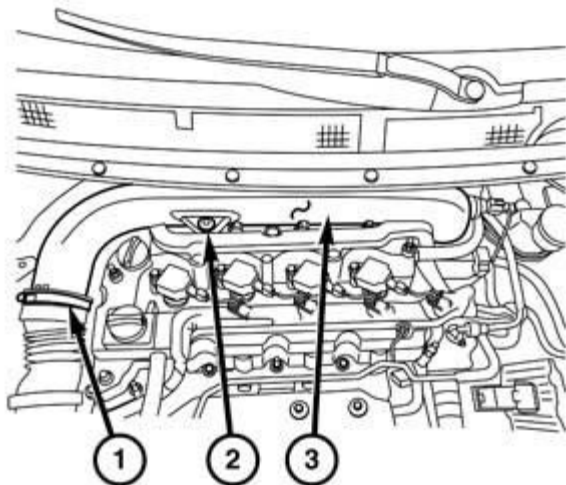
1. Engine oil level too high or too low. This may cause aerated oil to enter the adjusters and cause them to be spongy.
2. Insufficient running time after rebuilding the cylinder head. Low speed running up to one hour may be required.
3. Turn engine off and let set for a few minutes before restarting. Repeat this several times after engine has reached normal operating temperature.
4. Low oil pressure.
5. The oil screen in cylinder head or the oil passage to the cylinder head is plugged with debris.
6. Air ingested into oil due to broken or cracked oil pump pick-up.
7. Worn valve guides.
8. Rocker arm ears contacting valve spring retainer.
9. Rocker arm loose, adjuster stuck or at maximum extension and still leaves lash in the system.
10. Oil leak or excessive cam bore wear in the cylinder head.
11. Faulty lash adjuster.
 - Check lash adjusters for "sponginess" while installed in the cylinder head and cam lobe at base circle. Depress part of rocker arm over the adjuster. Normal adjusters should feel firm when pressed quickly. When pressed very slowly, lash adjusters should collapse.
 - Remove suspected lash adjusters, and replace.
 - Before installation, make sure adjusters are full of oil. This can be verified by little plunger travel when lash adjuster is depressed quickly.

REMOVAL

REMOVAL

1. Perform the fuel system pressure release procedure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE** .

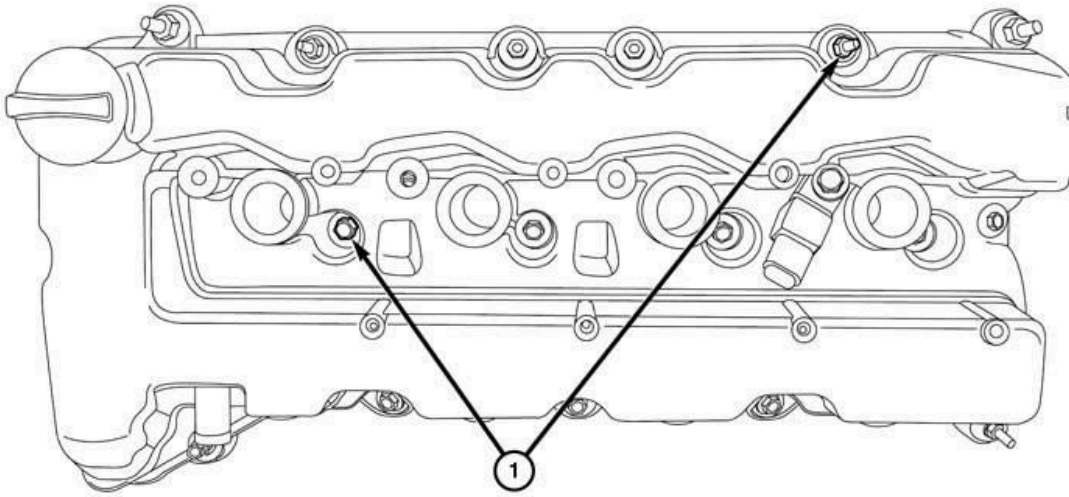
2. Disconnect and isolate the battery negative cable.
3. Remove the engine cover.



090772119

Fig. 68: Resonator, Bolt & Clamp
Courtesy of CHRYSLER GROUP, LLC

4. Remove the resonator (3). Refer to **RESONATOR, AIR CLEANER, REMOVAL** .
5. Remove the air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL** .
6. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
7. Drain the cooling system. Refer to **STANDARD PROCEDURE** .

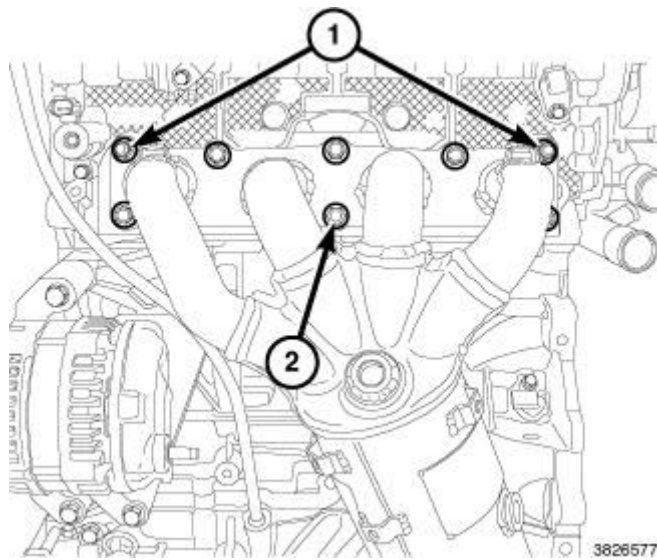


091071574

Fig. 69: Cylinder Head Cover Bolts

Courtesy of CHRYSLER GROUP, LLC

8. Remove the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, REMOVAL** .



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Fig. 70: Exhaust Manifold Bolts

Courtesy of CHRYSLER GROUP, LLC

9. Remove the maniverter. Refer to **MANIFOLD, EXHAUST, REMOVAL**.

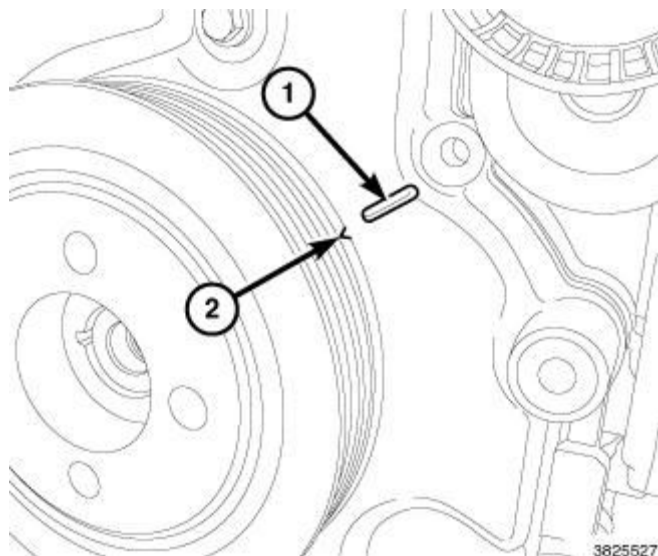


Fig. 71: Timing Cover Mark & Notch
Courtesy of CHRYSLER GROUP, LLC

10. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .

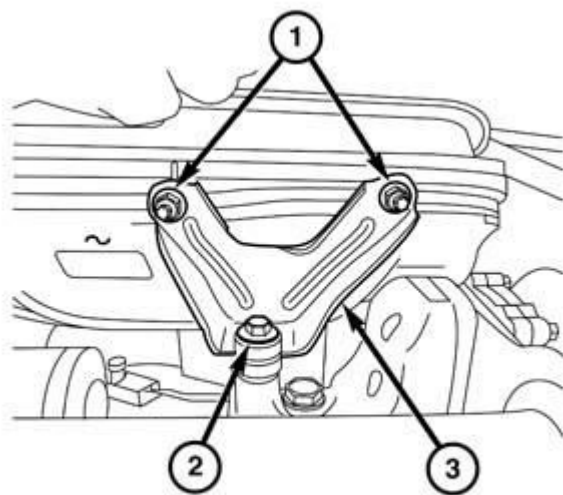


Fig. 72: Intake Manifold Lower Bracket, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

11. Drain the coolant.
12. Remove the two nuts (1), the bolt (2) and the intake manifold lower bracket (3).
13. Remove the frame cover portion of the right splash shield. Refer to **SHIELD, SPLASH, FRONT**

WHEELHOUSE, REMOVAL .

CAUTION: When aligning timing marks, always rotate engine by turning the crankshaft. Failure to do so will result in valve and/or piston damage.

14. Rotate the crankshaft clockwise (as viewed from the front) to align the timing cover mark (1) with the damper notch (2) to place the number one cylinder piston at top-dead-center on the compression stroke.

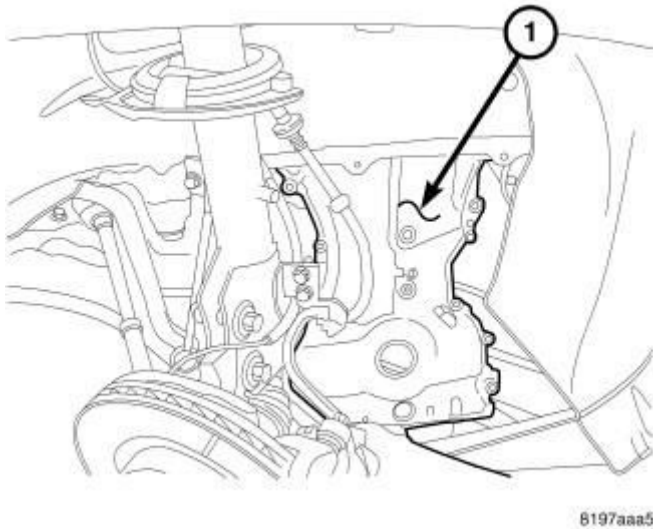
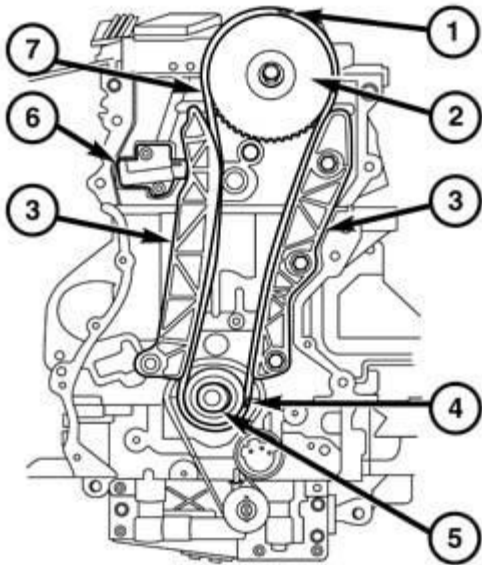


Fig. 73: Timing Chain Cover Removal/Installation
Courtesy of CHRYSLER GROUP, LLC

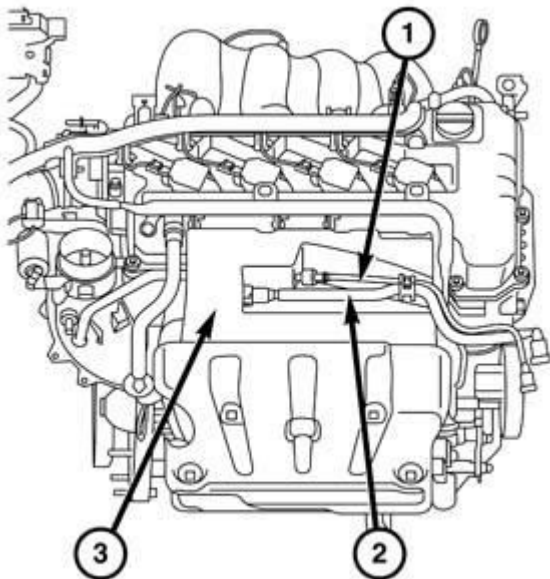
15. Remove the engine timing cover (1). Refer to **COVER(S), ENGINE TIMING, REMOVAL .**



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Fig. 74: Timing Chain, Sprockets, Tensioner & Guides
Courtesy of CHRYSLER GROUP, LLC

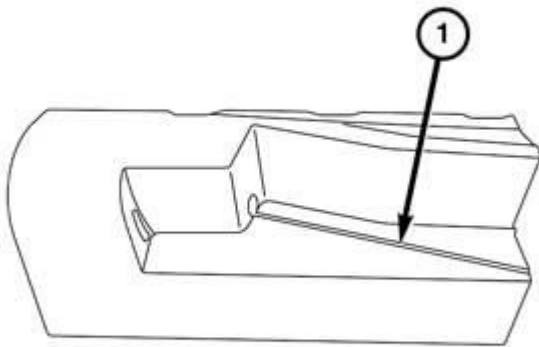
16. Remove the tensioner (6) and timing chain (7). Refer to **CHAIN AND SPROCKETS, TIMING, REMOVAL**.
17. Remove the timing chain guides (3).



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Fig. 75: Foam Insulator, Fuel Line & Purge Line
 Courtesy of CHRYSLER GROUP, LLC

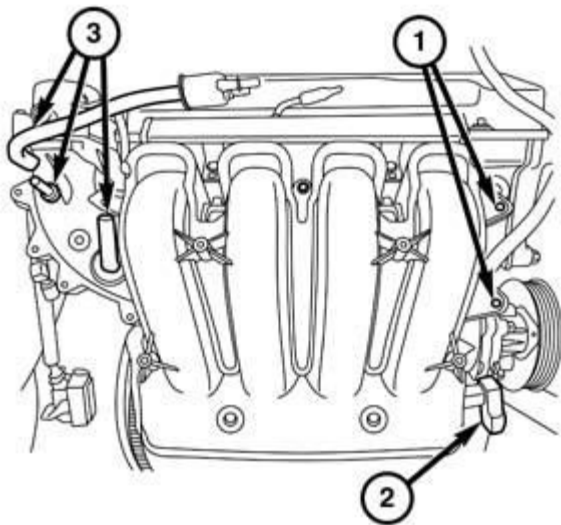
18. Disconnect the vapor line (2) at the purge vapor solenoid end of the line.
19. Remove the NVH foam pad (3) prior to disconnecting the fuel line (1).



081569482

Fig. 76: Score Line
 Courtesy of CHRYSLER GROUP, LLC

20. To remove the foam pad, cut the pad along the score line (1). Make sure care is taken to not make contact with any other components while cutting the pad. **Do not cut beyond the line** . Remove the pad from the fuel rail once split.
21. Disconnect the fuel line from the fuel rail. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE** .
22. Unplug the Electronic Throttle Control (ETC) connector.
23. Disconnect the VVAA solenoids.
24. Unplug the purge solenoid.



091466688

Fig. 77: MAP Sensor Connector & Fittings
Courtesy of CHRYSLER GROUP, LLC

25. Disconnect the three hoses from the intake manifold fittings (3).
26. Using a permanent ink or paint marker, identify the location and position on each camshaft bearing cap.

**CAUTION: DO NOT STAMP OR STRIKE THE CAMSHAFT BEARING CAPS.
SEVERE DAMAGE WILL OCCUR TO THE BEARING CAPS.**

27. Loosen the camshaft bearing cap bolts and remove the camshaft bearing caps.
28. Remove the camshafts.

NOTE: If the rocker arms are to be reused, identify their positions so that they can be reassembled into their original locations.

29. Remove the rocker arm(s).

NOTE: If the hydraulic lifters are to be reused, identify their positions so that they can be reassembled into their original locations.

30. Remove the hydraulic lifter(s).

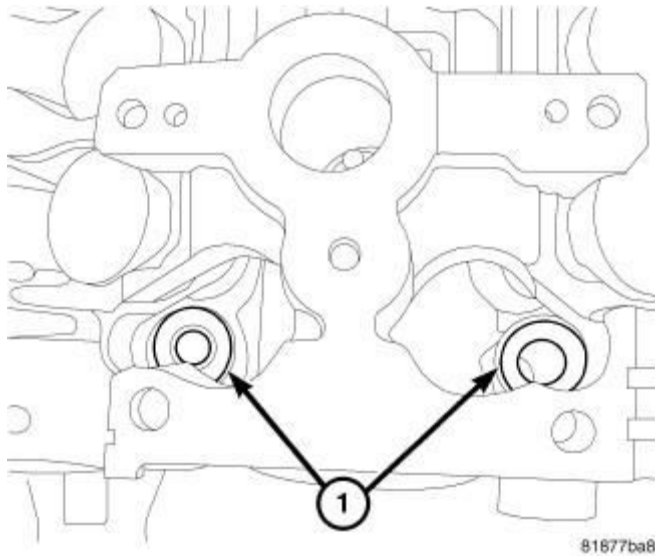
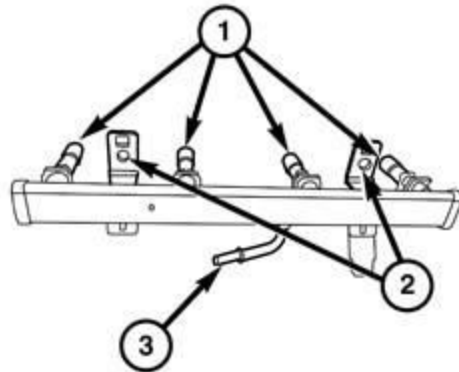


Fig. 78: Front Head Bolt Washers
Courtesy of CHRYSLER GROUP, LLC

NOTE: All of the cylinder head bolts have captured washers EXCEPT the front two (1).

31. Remove the cylinder head bolts and two uncaptured washers (1).
32. Remove the cylinder head from the engine block.

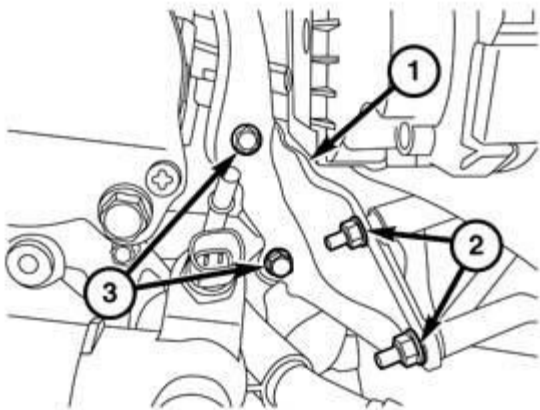
NOTE: There is a foam insulator that is sandwiched between the intake manifold and the engine block that may fall off when the cylinder head is removed. The foam pad must be reinstalled during assembly.



091469530

Fig. 79: Fuel Injectors & Rail
Courtesy of CHRYSLER GROUP, LLC

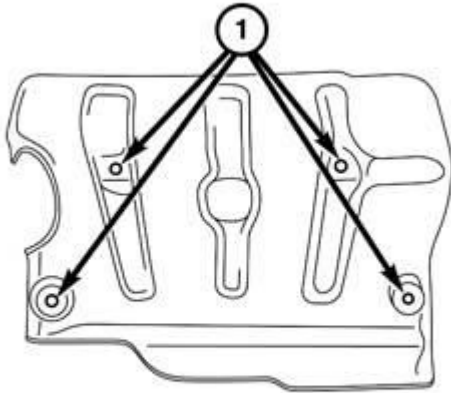
33. Disconnect the fuel injector electrical connectors (1). Remove the two bolts at the fuel rail (2).



091468958

Fig. 80: Intake Manifold Upper Support Bracket, Bolts & Nuts
Courtesy of CHRYSLER GROUP, LLC

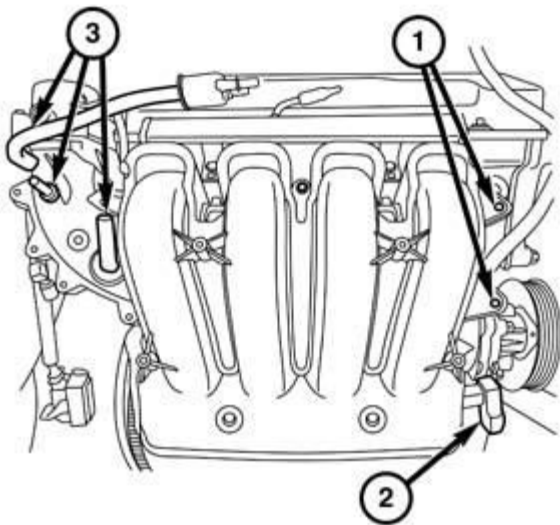
34. Remove the throttle body bracket bolts (3), loosen the nuts (2). Allow the throttle body bracket bolts to remain with the intake manifold.



091468686

Fig. 81: Intake Manifold Silencer Pad Screws
Courtesy of CHRYSLER GROUP, LLC

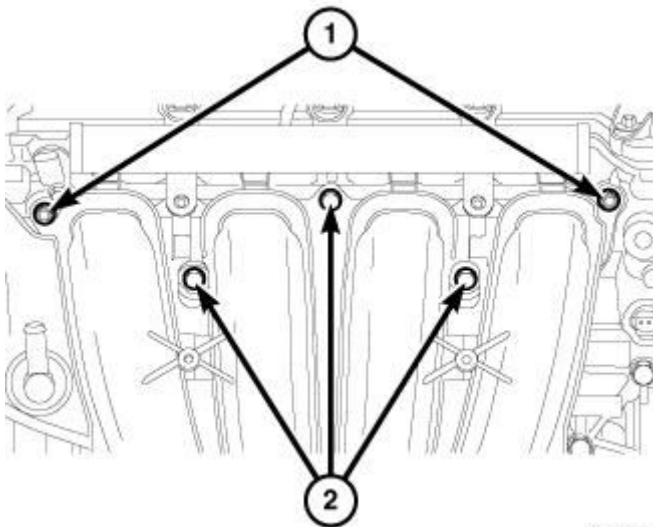
35. Remove the four screws that secure the intake manifold silencer to the manifold (1).



091468688

Fig. 82: MAP Sensor Connector & Fittings
Courtesy of CHRYSLER GROUP, LLC

36. Remove wiring harness retainer from the intake manifold eyelets (1)
37. Unplug the MAP sensor connector (2).



3826632

Fig. 83: Intake Manifold Retaining Bolts & Nuts
Courtesy of CHRYSLER GROUP, LLC

38. Remove intake manifold retaining bolts (2) and nuts (1).
39. Remove the intake manifold from the cylinder head.

40. Inspect the cylinder head and cylinder head components. Refer to **CYLINDER HEAD - INSPECTION**.

NOTE: Ensure cylinder head bolt holes in the block are clean, dry (free of residual oil or coolant), and threads are not damaged.

CLEANING

CLEANING

CAUTION: When cleaning cylinder head and cylinder block surfaces, **DO NOT** use a metal scraper because the surfaces could be cut or ground. Use **ONLY** a wooden or plastic scraper.

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

1. Remove all gasket material from cylinder head and block. Refer to **ENGINE - STANDARD PROCEDURE**. Be careful not to gouge or scratch the aluminum head sealing surface.
2. Clean all engine oil passages.
3. Clean out the cylinder head bolt holes in the engine block.

INSPECTION

INSPECTION

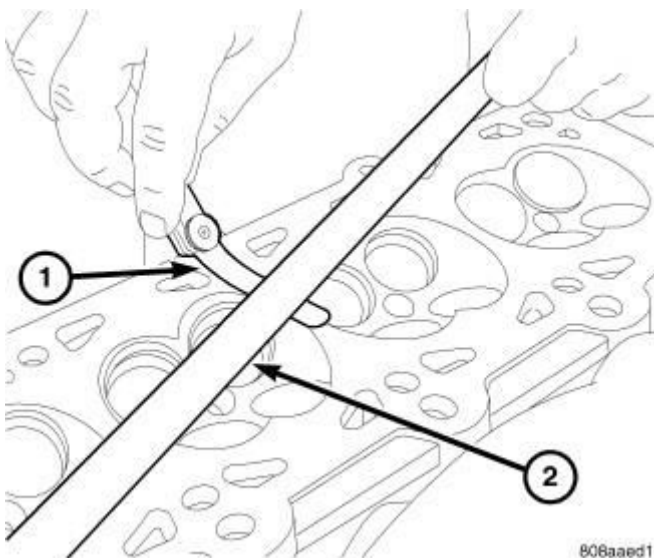


Fig. 84: Checking Cylinder Head Flatness
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical Cylinder Head shown in illustration.

1. Check for cylinder head warping with a straight edge (2) and feeler gauge (1).
2. Cylinder head must be flat within specification. Refer to **ENGINE SPECIFICATIONS**.
3. Remove carbon and varnish deposits from inside of valve guides with a reliable guide cleaner.
4. Inspect the following components and verify that they are within specification. Refer to **ENGINE SPECIFICATIONS**.
 - Springs
 - Valve Seats
 - Valve Guides
 - Valves

INSTALLATION

INSTALLATION

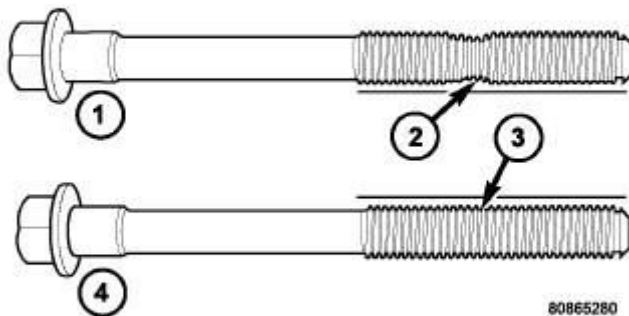


Fig. 85: Checking Cylinder Head Bolts For Stretching (Necking)
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The cylinder head bolts are tightened using a torque plus angle procedure. The bolts must be examined **BEFORE** reuse. If the threads are necked down the bolts must be replaced.

1. Check the cylinder head bolts for necking by holding a scale or straight edge against the threads. If all the threads do not contact the scale (2) the bolt must be replaced.

NOTE: Ensure cylinder head bolt holes in the block are clean, dry (free of residual

oil or coolant), and threads are not damaged.

NOTE: Prior to installing the cylinder head to the block, the intake manifold must be installed onto the cylinder head.

2. Replace the variable valve timing filter screen (3).
3. Clean all gasket surfaces.
4. Replace intake manifold gasket seals.
5. Position the foam pad over the coolant transfer tube.
6. **Apply 3-5 dabs of RTV to the foam pad where it makes contact with the coolant transfer tube prior to setting the foam pad in position. This will aid in holding the pad in the proper position while setting the head on the block.**

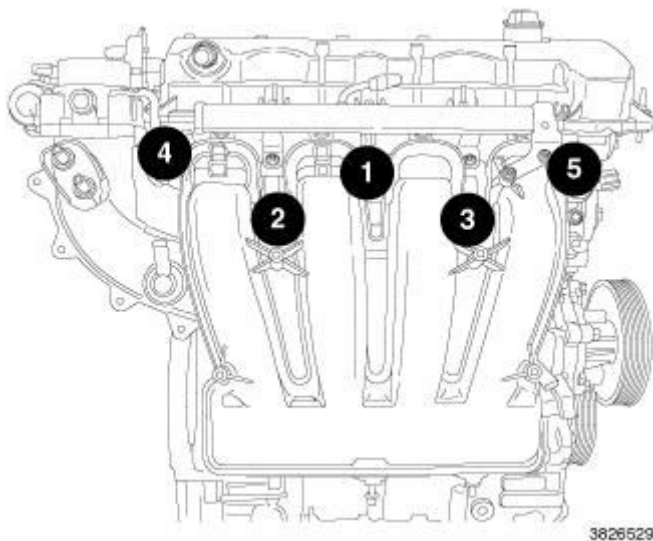
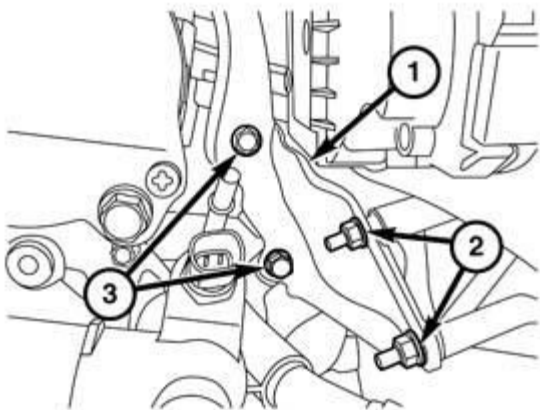


Fig. 86: Intake Manifold Bolts Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

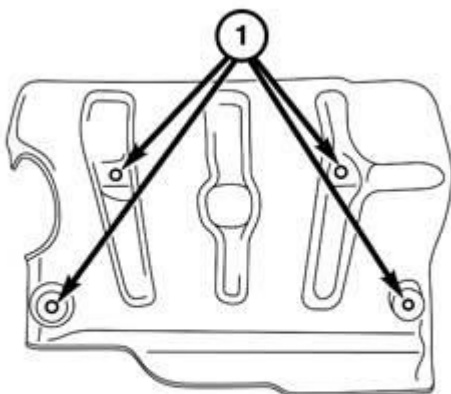
7. Position the intake manifold onto the cylinder head.
8. Install the three bolts and two nuts. Using the torque sequence pattern as a guide, tighten the bolts and nuts to 25 N.m (18 ft. lbs.).



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Fig. 87: Intake Manifold Upper Support Bracket, Bolts & Nuts
 Courtesy of CHRYSLER GROUP, LLC

9. Install the manifold to head bracket (1). Tighten the nuts (2) and bolts to 9 N.m (81 in. lbs.)
10. Install the fuel rail assembly. Refer to **RAIL, FUEL, INSTALLATION** .



091468686

Fig. 88: Intake Manifold Silencer Pad Screws

Courtesy of CHRYSLER GROUP, LLC

11. Install the intake manifold silencer pad and screws. Tighten the screws to 2.5 N.m (22 in. lbs.).

NOTE: When using RTV, components should be assembled within 10 minutes and tighten to specification within 45 minutes.

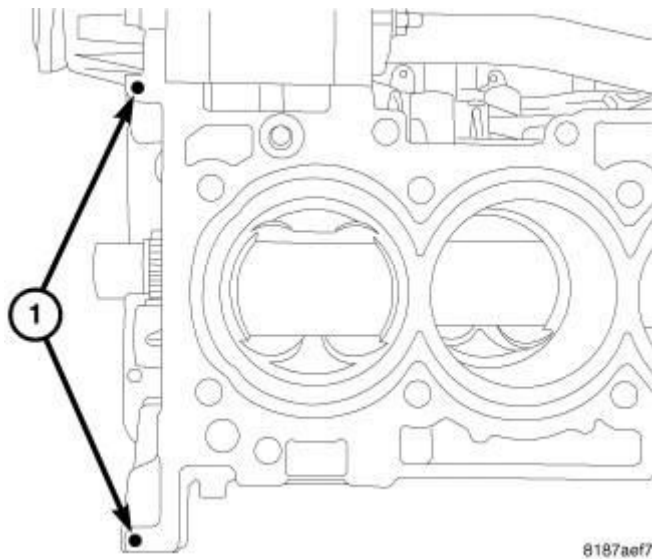
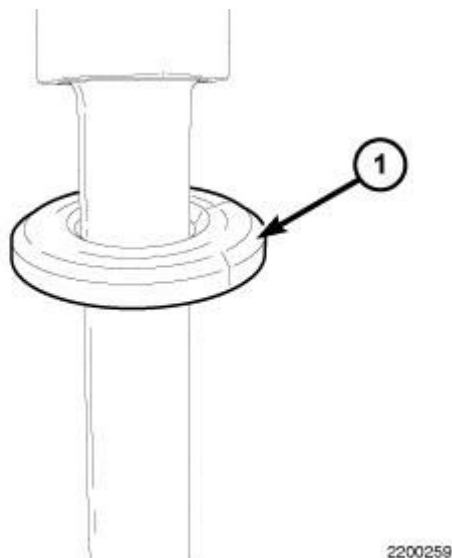


Fig. 89: Engine Sealant RTV Location
Courtesy of CHRYSLER GROUP, LLC

12. Place two pea size dots of Mopar® engine sealant RTV or equivalent (1) on the cylinder block as shown in illustration.
13. Position the new cylinder head gasket on the engine block with the part number facing up. Ensure gasket is seated over the locating dowels in the block.
14. Route the knock sensor wiring harness between the coolant transfer tube and the engine block. Insert the harness retainer into the holder.
15. Position the cylinder head onto the engine block.

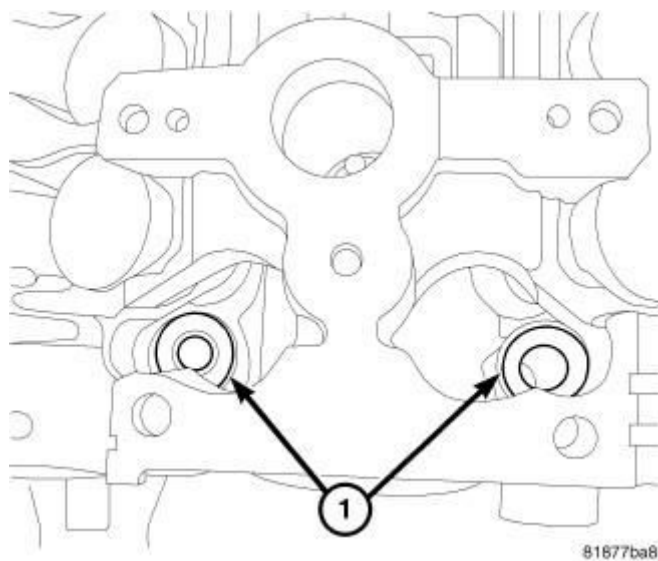
NOTE: Make sure the foam pad is not out of position. Inspect the positioning of the pad from below to make sure that no part of the pad is between the cylinder head and the engine block surface.



2200259

Fig. 90: Washers Must Be Installed With Bevel Edge Up Towards Bolt Head
Courtesy of CHRYSLER GROUP, LLC

NOTE: The front two cylinder head bolts do not have captured washers. The washers must be installed with the bevel edge (1) up towards the bolt head.



81877ba8

Fig. 91: Front Head Bolt Washers
Courtesy of CHRYSLER GROUP, LLC

16. Install washers (1) for the front two cylinder head bolts with the beveled edge facing up.

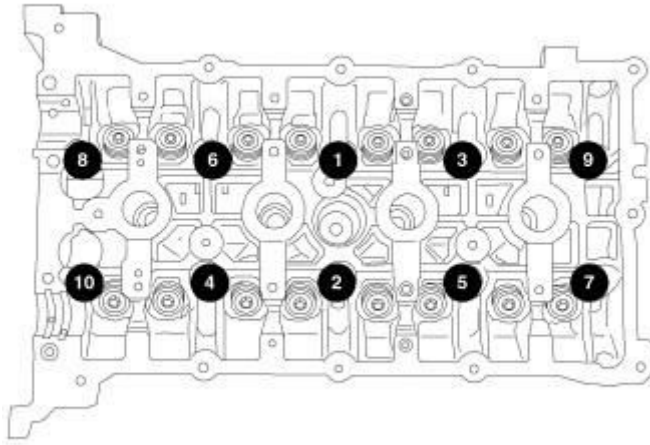


Fig. 92: Cylinder Head Bolt Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

NOTE: DOHC shown in illustration, SOHC same sequence.

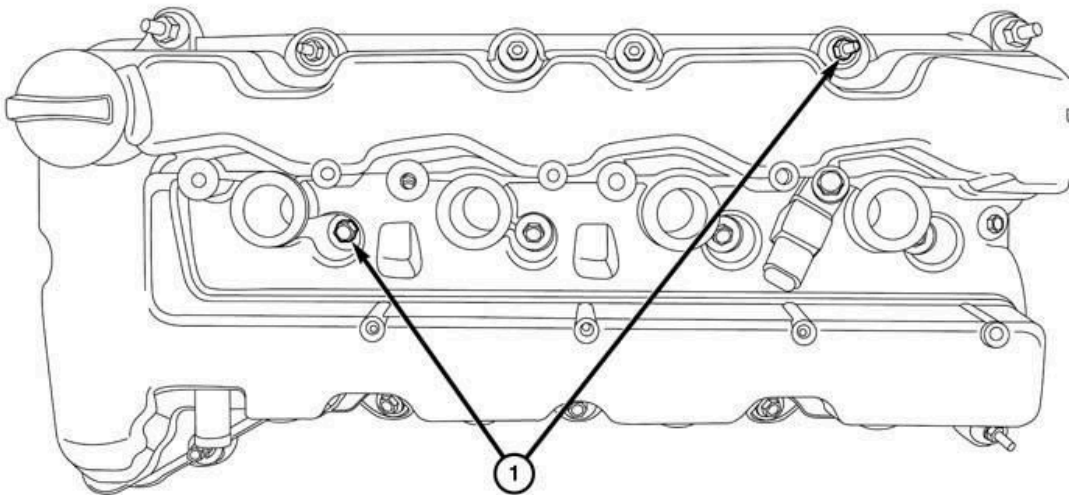
NOTE: Before installing the cylinder head bolts, lubricate the threads with clean engine oil.

17. Install the ten cylinder head bolts finger tight.
18. Tighten the cylinder head bolts in the sequence shown in illustration, following this 4 step torque plus angle method. Tighten according to the following torque values:
 - Step 1: All to 30 N.m (22 ft. lbs.)
 - Step 2: All to 73 N.m (54 ft. lbs.)
 - Step 3: All again to 73 N.m (54 ft. lbs.)
 - Step 4: All an additional 90° Turn. **Do not use a torque wrench for this step.**
19. If the hydraulic lifters are being reused, reassemble them into their original locations.
20. Install the exhaust hydraulic lifters.

NOTE: If the rocker arms are being reused, reassemble them into their original locations.

21. Install the exhaust rocker arms.
22. Oil all of the camshaft journals with clean engine oil.
23. Install the camshaft. Refer to CAMSHAFT, ENGINE, INSTALLATION .
24. Install the VVAA. Refer to ASSEMBLY, VARIABLE VALVE ACTUATION, INSTALLATION.
25. Install timing chain and tensioner. Refer to CHAIN AND SPROCKETS, TIMING, INSTALLATION .

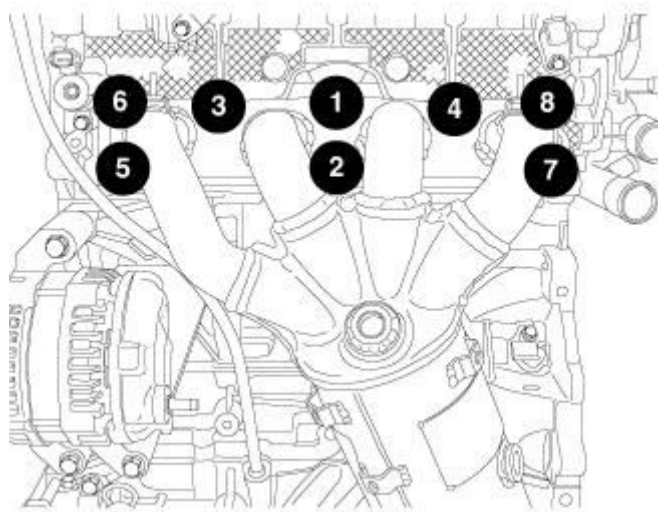
26. Install timing chain cover, engine mount, pulleys and accessory drive belt. Refer to **COVER(S), ENGINE TIMING, INSTALLATION** .



091071574

Fig. 93: Cylinder Head Cover Bolts
Courtesy of CHRYSLER GROUP, LLC

27. Install the cylinder head cover and ignition coils. Refer to **COVER(S), CYLINDER HEAD, INSTALLATION** .

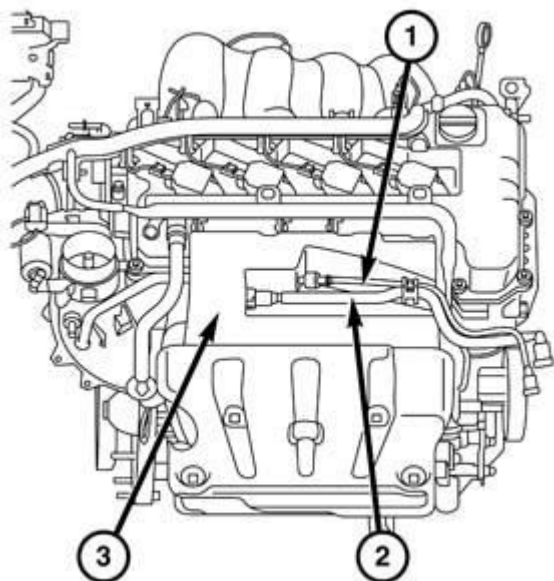


3826514

Fig. 94: Exhaust Manifold Bolts Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

28. Install the exhaust manifold. Refer to **MANIFOLD, EXHAUST, INSTALLATION**.

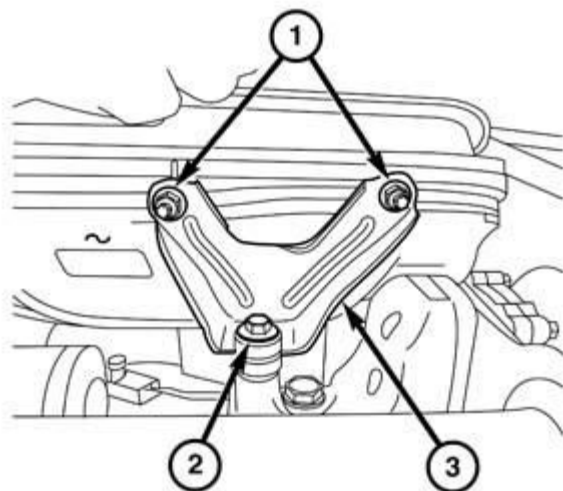
29. Connect the electrical connectors to the ignition coils and fuel injectors.



081569483

Fig. 95: Foam Insulator, Fuel Line & Purge Line
Courtesy of CHRYSLER GROUP, LLC

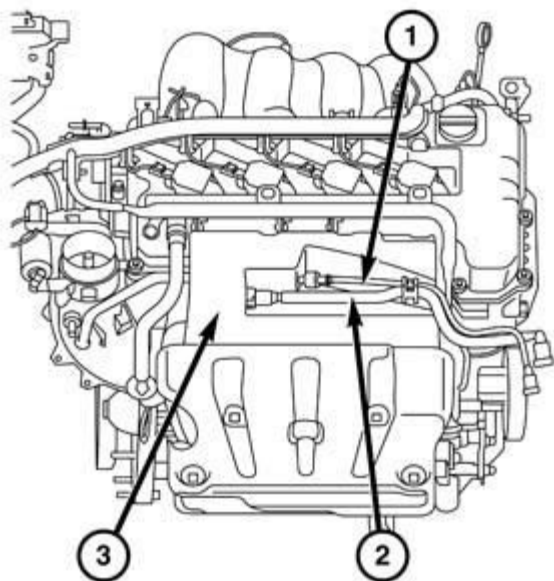
30. Insert the foam insulator (3) over the fuel rail.
31. Connect fuel line (1).
32. Connect the purge vapor line (2). Remove wiring harness retainer from the intake manifold eyelets (1).
33. Connect the three hose connectors (3).
34. Connect the knock sensor connector.



081569485

Fig. 96: Intake Manifold Lower Bracket, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

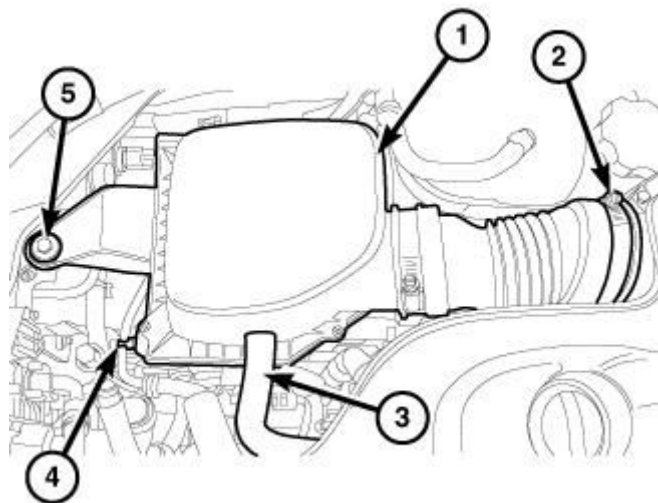
35. Install the intake manifold lower bracket (3). Install the nuts (1) and bolt (2). Tighten to 9 N.m (81 in. lbs.)
36. Connect the VVAA solenoids.
37. Connect the MAP sensor connector (2).



081569483

Fig. 97: Foam Insulator, Fuel Line & Purge Line
Courtesy of CHRYSLER GROUP, LLC

38. Inspect quick connect fittings for damage, replace if necessary. Refer to **FITTING, QUICK CONNECT** .



3828269

Fig. 98: Air Cleaner Body, Clamp, Make Up Air Hose, Retainer & Bolt
Courtesy of CHRYSLER GROUP, LLC

39. Install the air cleaner body (1). Refer to **BODY, AIR CLEANER, INSTALLATION** .

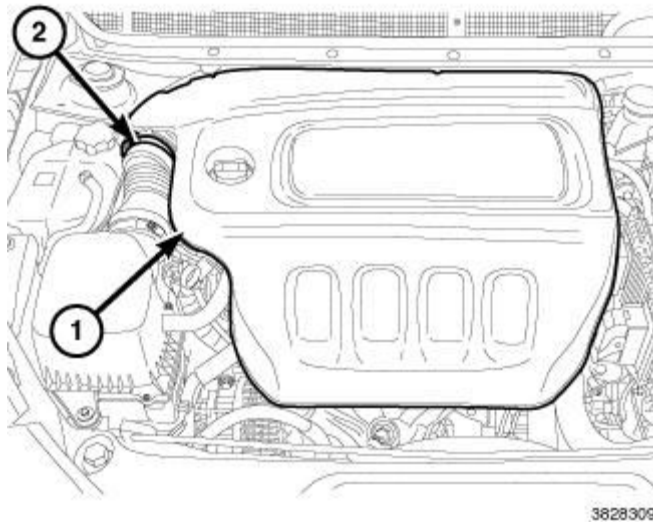


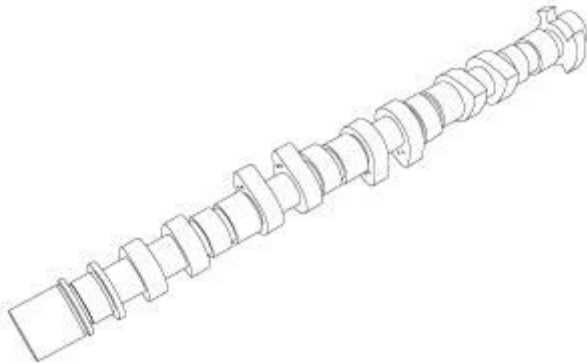
Fig. 99: Engine Cover & Air Resonator Clamp
Courtesy of CHRYSLER GROUP, LLC

40. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL - STANDARD PROCEDURE** .
41. Fill the cooling system. Refer to **STANDARD PROCEDURE** .
42. Recharge the air conditioning system. Refer to **PLUMBING, STANDARD PROCEDURE** .
43. Install the resonator. Refer to **RESONATOR, AIR CLEANER, INSTALLATION** .
44. Connect the battery negative cable and tighten nut to 5 N.m (45 in. lbs.).
45. Run the engine until it reaches normal operating temperature. Check cooling system for correct fluid level. Refer to **STANDARD PROCEDURE** .
46. The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components. .

CAMSHAFT, ENGINE

DESCRIPTION

DESCRIPTION



3178689

Fig. 100: Engine Camshaft**Courtesy of CHRYSLER GROUP, LLC**

The 2.4L engine uses a Single Over Head Camshaft (SOHC) to provide valve actuation but the camshaft is in the standard position of an exhaust camshaft in a Dual Over Head Camshaft (DOHC) engine. The camshaft has five bearing journal surfaces and three cam lobes per cylinder. The camshaft is built up on a hollow tube with cam lobes, bearing journals and end caps pressed into position. The front end cap includes the camshaft sprocket mounting. The middle (number three) bearing surface has thrust walls machined into it to control end play. The rear has a camshaft position sensor pick-up wheel and also drives the vacuum pump.

OPERATION**OPERATION**

The camshaft is driven by the crankshaft via a drive sprocket and a chain. The camshaft has precisely machined lobes to provide accurate valve timing and duration.

STANDARD PROCEDURE**STANDARD PROCEDURE - CAMSHAFT END PLAY**

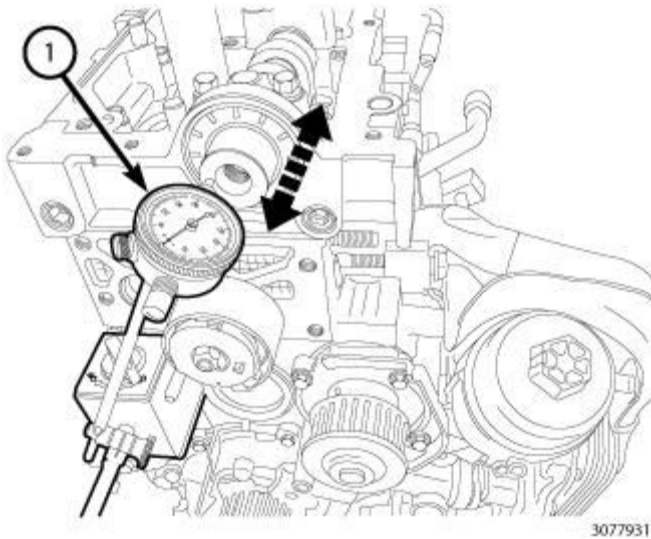


Fig. 101: Measuring Camshaft End Play
 Courtesy of CHRYSLER GROUP, LLC

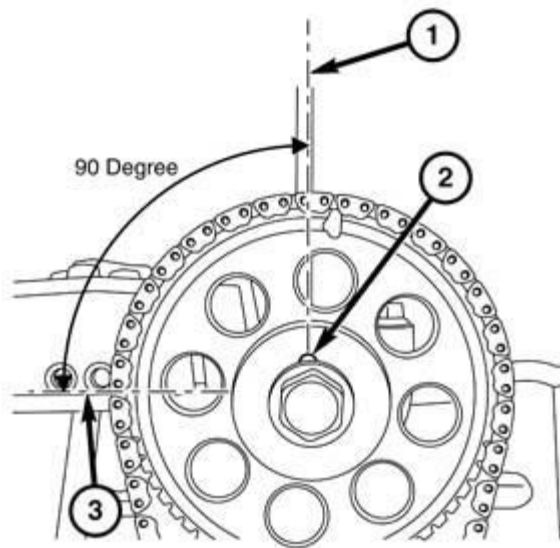
STANDARD PROCEDURE - CAMSHAFT ENDPLAY

1. Remove the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, REMOVAL** .
2. Mount Dial Indicator Set (special tool #C-3339A, Set, Dial Indicator) (1) to a stationary point at the front of the engine. Locate the probe perpendicular against the nose of the camshaft.
3. Move the camshaft all the way to the rear of its travel.
4. Zero the dial indicator.
5. Move the camshaft forward to the limit of travel and read the dial indicator. Compare the measured end play to the specification. Refer to **ENGINE SPECIFICATIONS** .

REMOVAL

REMOVAL

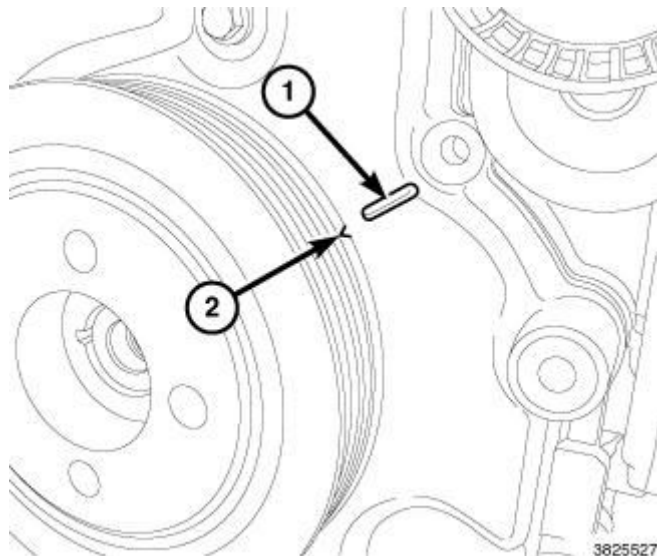
1. Disconnect and isolate the battery negative cable.
2. Remove the cylinder head cover . Refer to **COVER(S), CYLINDER HEAD, REMOVAL** .
3. Remove the spark plugs. Refer to **SPARK PLUG, REMOVAL** .
4. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .



091673425

Fig. 102: Vertical Center Line Of Camshaft, Dowel & Cylinder Head
Courtesy of CHRYSLER GROUP, LLC

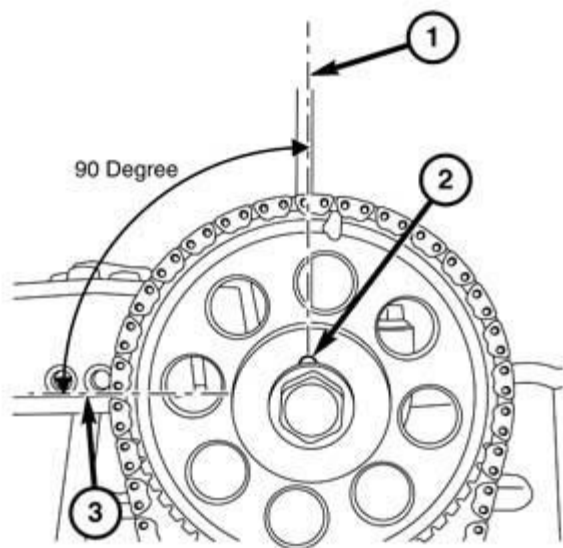
5. Remove the frame cover portion of the right splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL**.



3825527

Fig. 103: Timing Cover Mark & Notch
Courtesy of CHRYSLER GROUP, LLC

6. Rotate the crankshaft clockwise (as viewed from the front) to align the timing cover mark (1) with the damper notch (2) to place the number one cylinder piston at top-dead-center on the compression stroke.



091673425

Fig. 104: Vertical Center Line Of Camshaft, Dowel & Cylinder Head
Courtesy of CHRYSLER GROUP, LLC

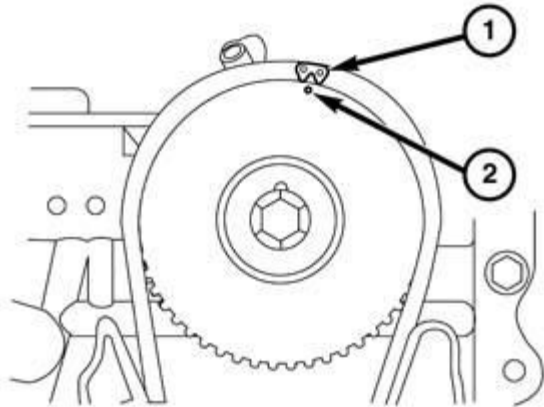
7. Verify that the camshaft timing is correct as viewed above. The vertical center line of the camshaft (1) and the horizontal surface of the top of the cylinder head (3)

MUST be

90° from each other.

NOTE: The camshaft dowel (2) is slightly visible above the camshaft center bolt and should be at 12 o'clock when set.

8. Lower the vehicle and support the engine with a jack stand.



091073257

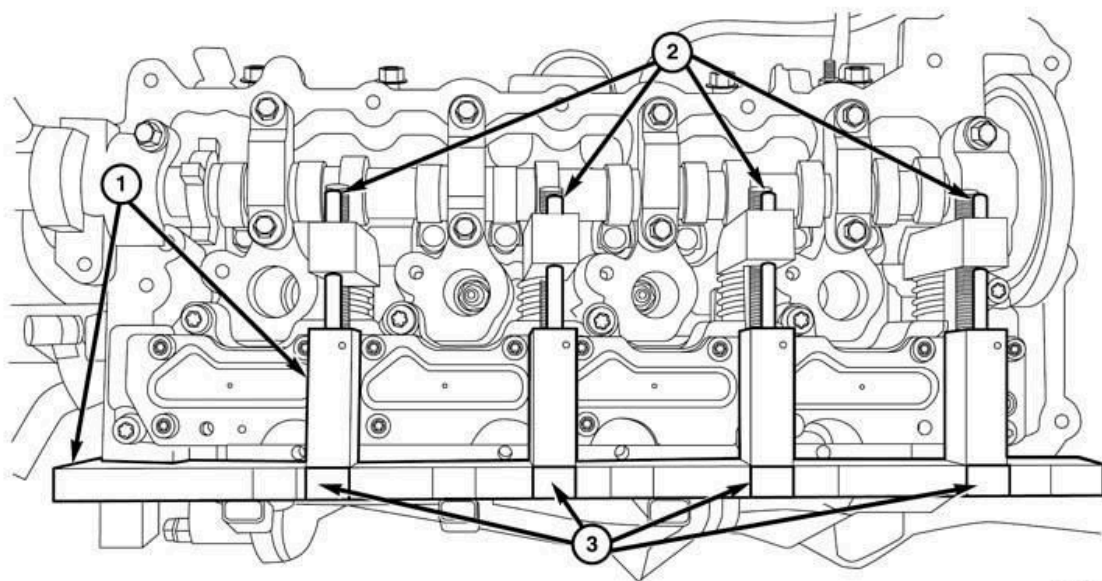
Fig. 105: Sprocket Mark & Painted Link
 Courtesy of CHRYSLER GROUP, LLC

9. Using a paint pen or equivalent, mark both camshaft sprockets and corresponding chain links (1 and 2) to aid in reassembly.

NOTE: Camshaft bearing caps should have been marked during engine manufacturing. For example, number one exhaust camshaft bearing is marked "E1>".

**CAUTION: DO NOT STAMP OR STRIKE THE CAMSHAFT BEARING CAPS.
 SEVERE DAMAGE WILL OCCUR TO THE BEARING CAPS.**

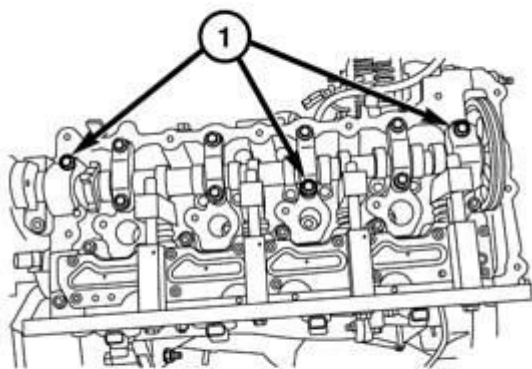
10. Remove the vacuum pump.
11. Remove the right engine mount. Refer to **INSULATOR, ENGINE MOUNT, RIGHT, REMOVAL** .
12. Remove the timing cover. Refer to **COVER(S), ENGINE TIMING, REMOVAL** .
13. Using a permanent ink or paint marker, identify the location and position on each camshaft bearing cap.



091071570

Fig. 106: Special Tool, Spring Compressor & Indicators
 Courtesy of CHRYSLER GROUP, LLC

14. Using special tool 10259A (1), loosen the spring compressors (2) to fit over the valve and spring assemblies. Adjust the tool to align with the 2.4L indicators (3).
15. Install the (special tool #10259B, Compressor, MultiAir® Spring) spring compressor
16. Rotate the spring compressors counterclockwise until the springs are fully seated.



091073332

Fig. 107: Bearing Cap Bolts

Courtesy of CHRYSLER GROUP, LLC

17. **Slowly** remove the exhaust camshaft bearing cap bolts (1) one turn at a time. Remove the camshaft bearing caps.

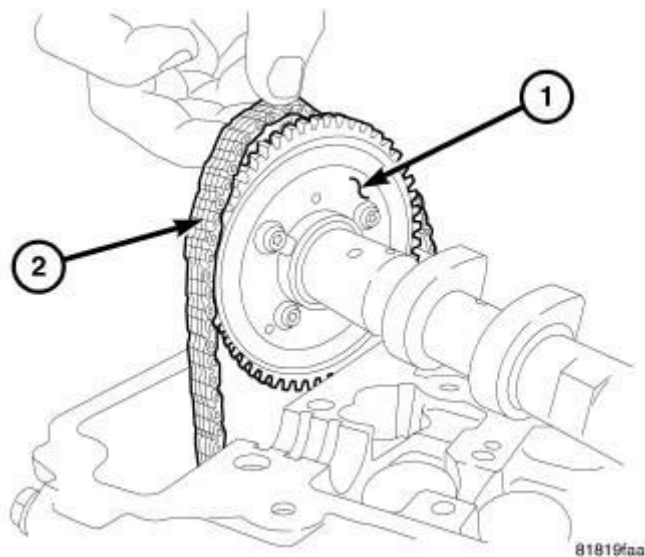


Fig. 108: Chain Removal

Courtesy of CHRYSLER GROUP, LLC

18. Lift the timing chain (2) off of the sprocket (1).
19. Remove the camshaft.
20. Remove the sprocket from the camshaft.

INSPECTION

INSPECTION

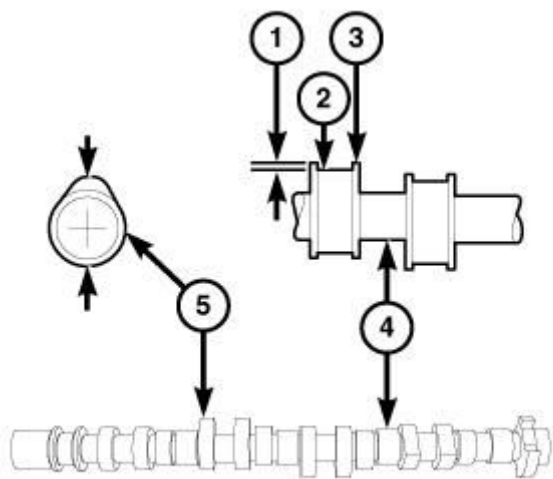


Fig. 109: Inspecting Camshaft Wear Areas

Courtesy of CHRYSLER GROUP, LLC

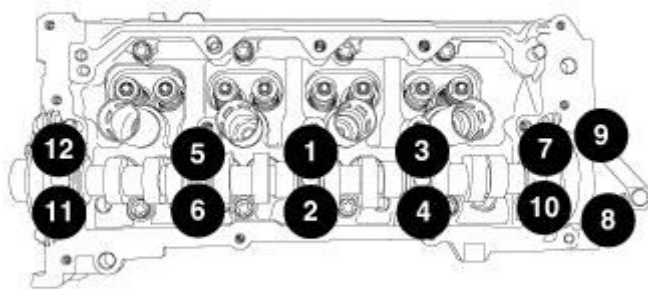
1. Inspect the camshaft bearing journals (4) for damage and binding. If the journals are binding, check the camshaft bearing housing for damage. Also check the oil supply holes for clogging.
2. Check the surface of the cam lobes (5) for abnormal wear (1). Measure and compare the unworn area (3) to the worn area (2). Replace the camshaft if it is not within specification. Refer to **ENGINE SPECIFICATIONS** .

INSTALLATION**INSTALLATION**

NOTE: Camshaft bearing caps are marked during engine manufacturing. For example, the front camshaft bearing cap is marked 1, the rear cap is marked with a 5. The markings on the caps must be read while looking from the left bank of the engine (closest to the front of the vehicle).

NOTE: Following the installation of each camshaft bearing cap, visually verify that the camshaft has some endplay.

1. Lubricate camshaft journals with clean engine oil.
2. Apply a seam of Anaerobic Loctite® 518 Sealant on the camshaft housing in the contact area of the front and rear camshaft caps.



3078190

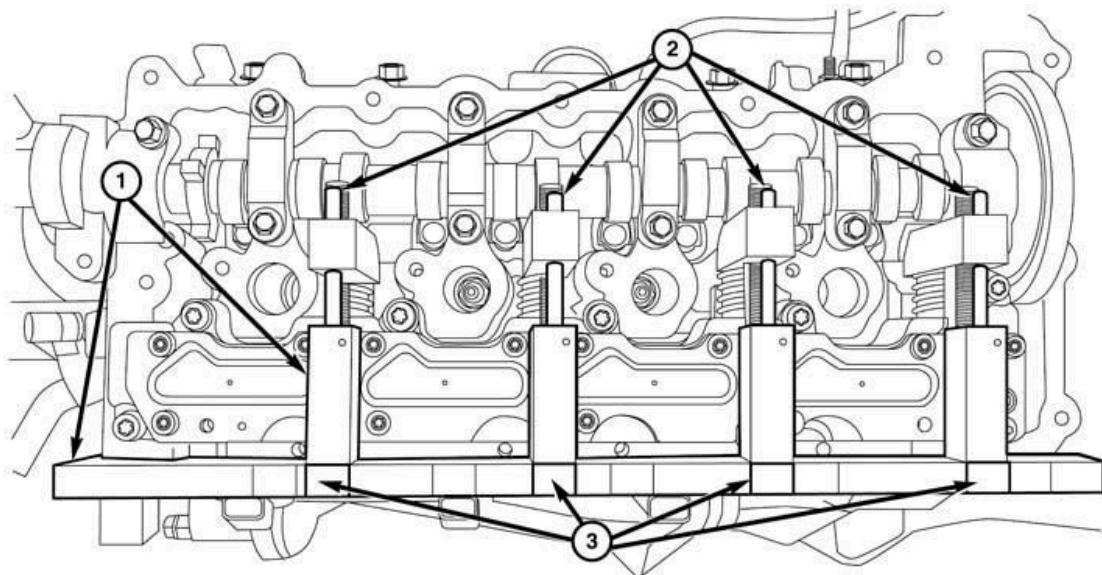
Fig. 110: Camshaft Bearing Cap Tightening Sequence

Courtesy of CHRYSLER GROUP, LLC

Torque Sequence

NOTE: VVAA removed for clarity

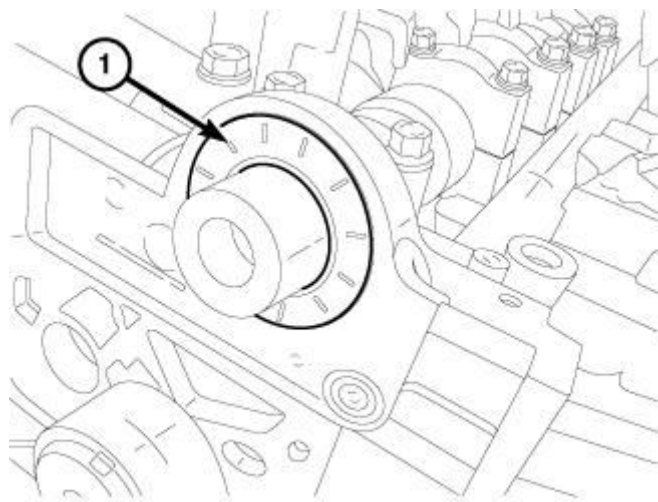
3. Install the camshaft and camshaft bearing caps. Tighten the twelve bolts in two steps following the sequence shown in illustration:
- Step 1: All to 5 N.m (44 in. lbs.).
 - Step 2: All to 10 N.m (89 in. lbs.).



091071570

Fig. 111: Special Tool, Spring Compressor & Indicators
Courtesy of CHRYSLER GROUP, LLC

4. Loosen the spring compressors (2), remove the tool (special tool #10259B, Compressor, MultiAir® Spring) (1).



3079876

Fig. 112: Camshaft Seal

Courtesy of CHRYSLER GROUP, LLC

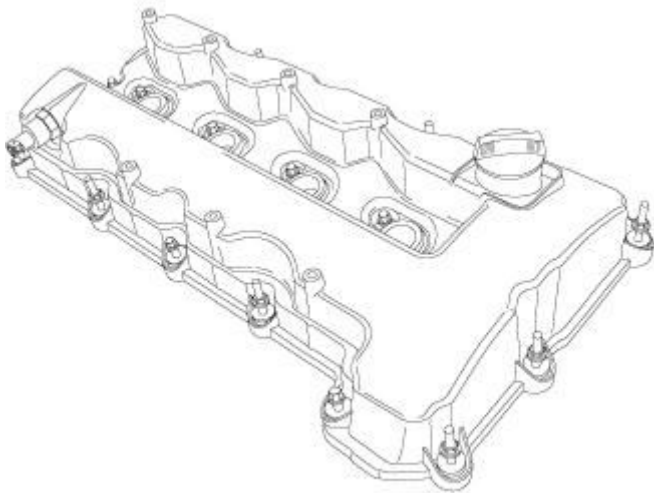
5. If required, install a new camshaft seal (1). Refer to SEAL(S), CAMSHAFT, INSTALLATION .
6. Install the camshaft sprocket and timing chain. Refer to CHAIN AND SPROCKETS, TIMING, INSTALLATION .
7. Install the timing cover. Refer to COVER(S), ENGINE TIMING, INSTALLATION .
8. Install the cylinder head cover. Refer to COVER(S), CYLINDER HEAD, INSTALLATION .

NOTE: The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components.

COVER(S), CYLINDER HEAD

DESCRIPTION

DESCRIPTION



3824889

Fig. 113: Cylinder Head Cover

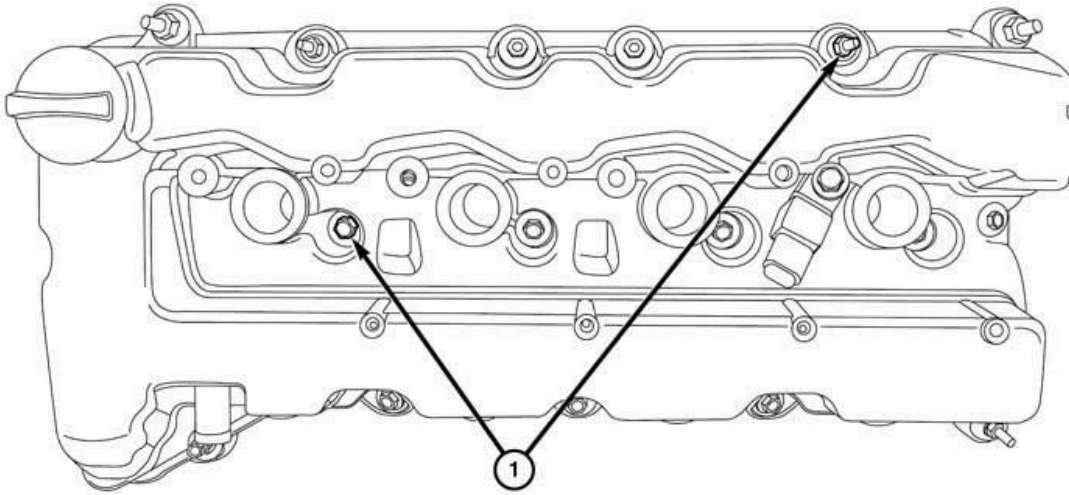
Courtesy of CHRYSLER GROUP, LLC

The cylinder head cover is made of die cast aluminum. The cylinder head cover is sealed with press-in-place gaskets at the cylinder head and spark plug ports. RTV is used to seal the T-joint at the cylinder head cover, front timing cover and cylinder head. RTV is also used to seal the cylinder head cover to the rear camshaft bearing cap at the vacuum pump.

REMOVAL

REMOVAL

1. Remove the engine cover assembly.
2. Disconnect and isolate the battery negative cable.
3. Remove the make up air hose from the cylinder head cover fitting.
4. Remove the positive crankcase ventilation (PCV) hose.
5. Disconnect and remove the ignition coils. Refer to **COIL, IGNITION, REMOVAL** .



091071574

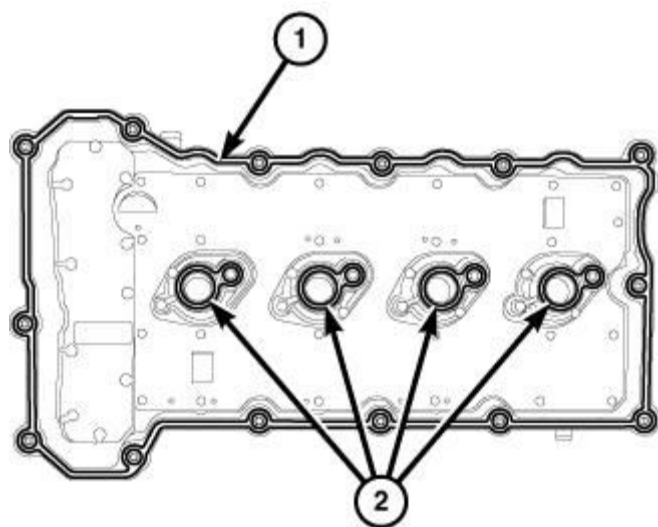
Fig. 114: Cylinder Head Cover Bolts
 Courtesy of CHRYSLER GROUP, LLC

6. Use compressed air to blow dirt and debris off of the cylinder head cover prior to removal.
7. Remove the push pins that secure the coil harness to the cover.

NOTE: If any of the push pins break off in the cover, use a pick to rotate the lodged portion counterclockwise to back the portion out of the hole.

8. Loosen twelve cylinder head cover mounting bolts and six stud bolts (1).
9. Remove the cylinder head cover from the cylinder head.

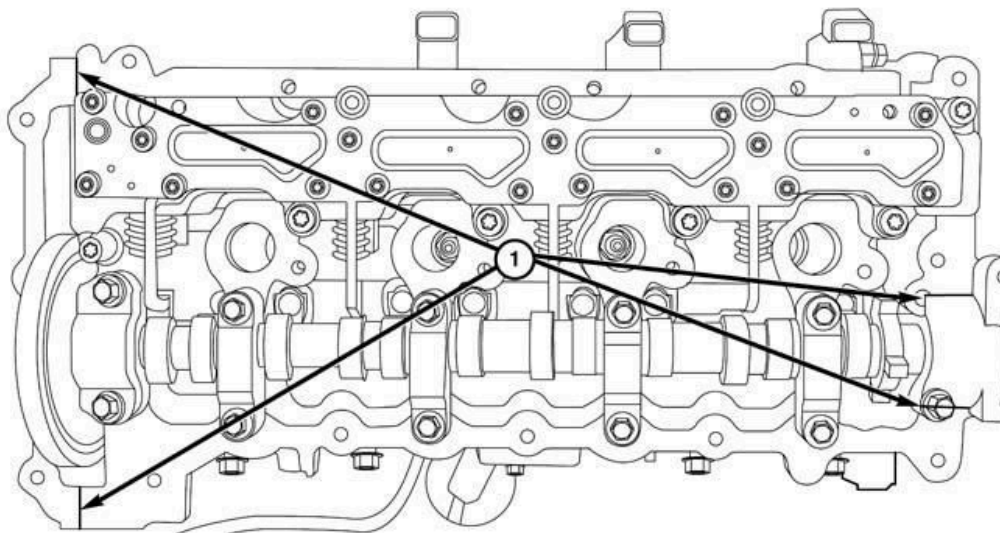
NOTE: With the help of an assistant, hold the coil harness up and spread open as the cover is removed through the area between the left and right harness runs.



3825223

Fig. 115: Cylinder Head Cover Gaskets
 Courtesy of CHRYSLER GROUP, LLC

10. Remove and discard the cylinder head cover gaskets (1 and 2).



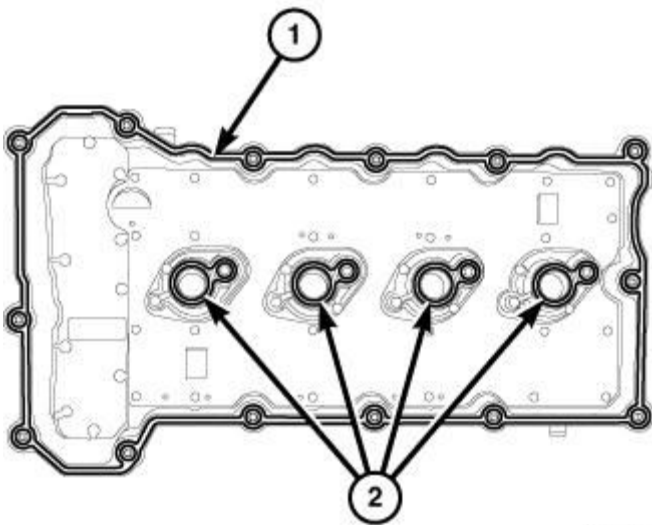
091071569

Fig. 116: Sealant Application Areas
 Courtesy of CHRYSLER GROUP, LLC

11. Remove all residual sealant (1) from the cylinder head, timing chain cover, rear exhaust camshaft bearing cap and cylinder head cover mating surfaces. Refer to **ENGINE - STANDARD PROCEDURE**.

INSTALLATION

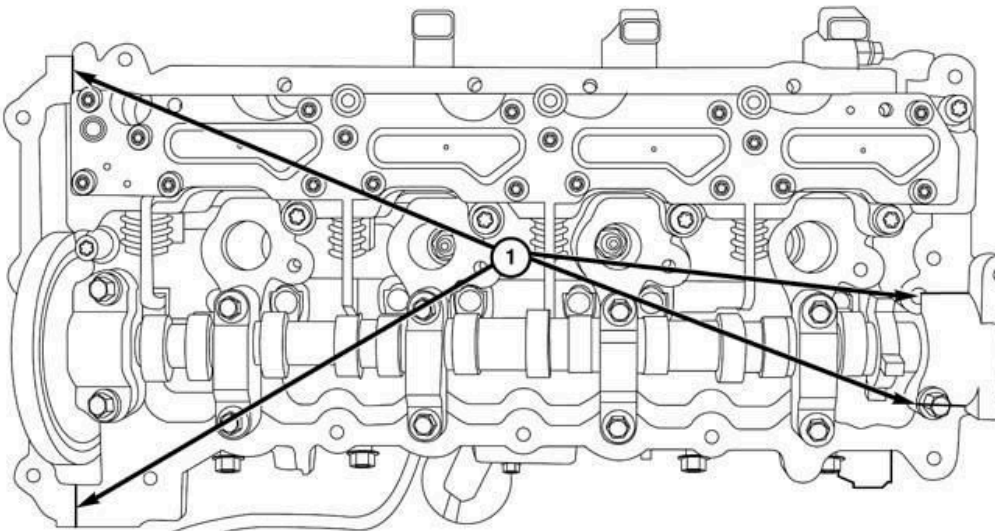
INSTALLATION



3825223

Fig. 117: Cylinder Head Cover Gaskets
Courtesy of CHRYSLER GROUP, LLC

1. Install new cylinder head cover gaskets (1 and 2).



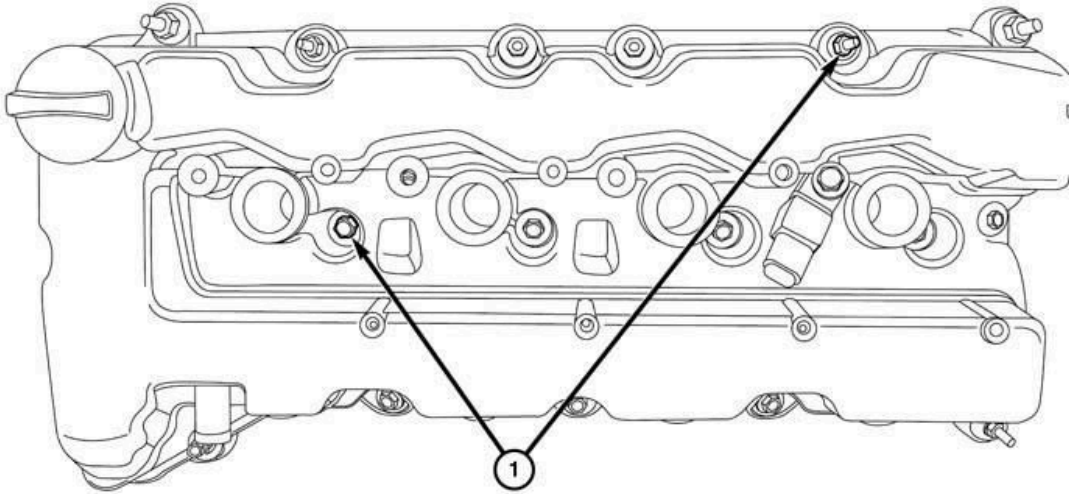
091071569

Fig. 118: Sealant Application Areas
Courtesy of CHRYSLER GROUP, LLC

NOTE: When using RTV, the sealing surfaces must be clean and free from grease and oil.

NOTE: When using RTV, components should be assembled within 10 minutes and tighten to specification within 45 minutes.

2. Apply a 2 to 3 mm wide bead of Mopar® engine sealant RTV or equivalent to the cylinder head/front cover T-joint (1) and the rear exhaust camshaft bearing cap/cylinder head T-joint (1).



091071574

Fig. 119: Cylinder Head Cover Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Install the cylinder head cover to the cylinder head with twelve bolts and six stud bolts (1). Tighten all eighteen fasteners to 10 N.m (90 in. lbs.).
4. Install the cylinder cover ground strap and nut. Tighten the nut to 10 N.m (90 in. lbs.)
5. Install and connect the ignition coils. Refer to **COIL, IGNITION, INSTALLATION**.
6. If removed, install the positive crankcase ventilation (PCV) valve and tighten to 4 N.m (37 in. lbs.).

NOTE: Make sure the O-ring is seated on the shoulder of the opening prior to reading the torque.

7. Connect the PCV hose to the PCV valve.
8. Connect the make up air hose.
9. Connect the battery negative cable and tighten nut to 5 N.m (45 in. lbs.).
10. Install the engine cover assembly.

LIFTER(S), HYDRAULIC

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - LASH ADJUSTER (TAPPET) NOISE

Proper noise diagnosis is essential in locating the source of an NVH complaint. Locating a lash adjuster (tappet)

type noise can sometimes be difficult. As a result, an initial misdiagnosis may occur.

Refer to the following chart for possible causes and correction of a lash adjuster (tappet) type noise:

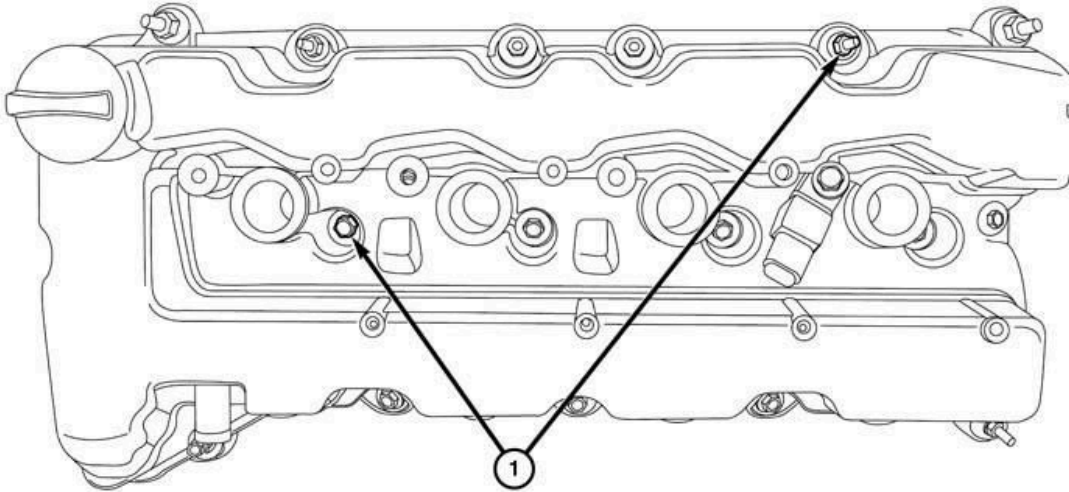
LASH ADJUSTER (TAPPET) NOISE CHART

POSSIBLE CAUSES	CORRECTION
1. Engine oil level-too high or too low. This may allow aerated oil to enter the adjusters and cause them to be spongy.	1. Check and correct the engine oil level.
2. Insufficient running time after rebuilding a cylinder head.	2. Low speed running of up to 1 hour may be required to fully evacuate trapped air from the valve train system. During this time, turn engine off and let set for a few minutes before restarting. Repeat this several times after engine has reached normal operating temperature.
3. Air trapped in the lash adjuster (after 1 hour of run time).	3. See below: (a) Check lash adjusters for sponginess while installed in the cylinder head. Depress the lash adjuster. Normal adjusters should feel very firm. Very spongy adjusters can be bottomed out easily. (b) If the lash adjuster(s) are still spongy, replace the lash adjuster(s). Refer to <u>LIFTER(S), HYDRAULIC, REMOVAL</u> .
4. Low oil pressure.	4. See below: (a) Check and correct the engine oil level. (b) Check the engine oil pressure. Refer to <u>LUBRICATION - DIAGNOSIS AND TESTING</u> . (c) Check for excessive main bearing clearance and correct. Refer to <u>BEARING(S), CRANKSHAFT, MAIN - STANDARD PROCEDURE</u> . (d) Check for a worn oil pump.
5. Oil passage to the cylinder head(s) plugged with debris.	5. Check cylinder head oil passages for blockage. Clean or replace as necessary.
6. Worn valve guide(s).	6. Measure valve stem-to-guide clearance. Refer to <u>VALVES, INTAKE AND EXHAUST - STANDARD PROCEDURE</u> .
7. Air ingested into oil due to broken or cracked oil pump pickup tube.	7. Inspect pickup tube and replace as necessary.
8. Collapsed lash adjuster due to debris ingestion.	8. Clean debris from engine and replace lash adjuster (s). Refer to <u>LIFTER(S), HYDRAULIC, REMOVAL</u> .

REMOVAL

REMOVAL

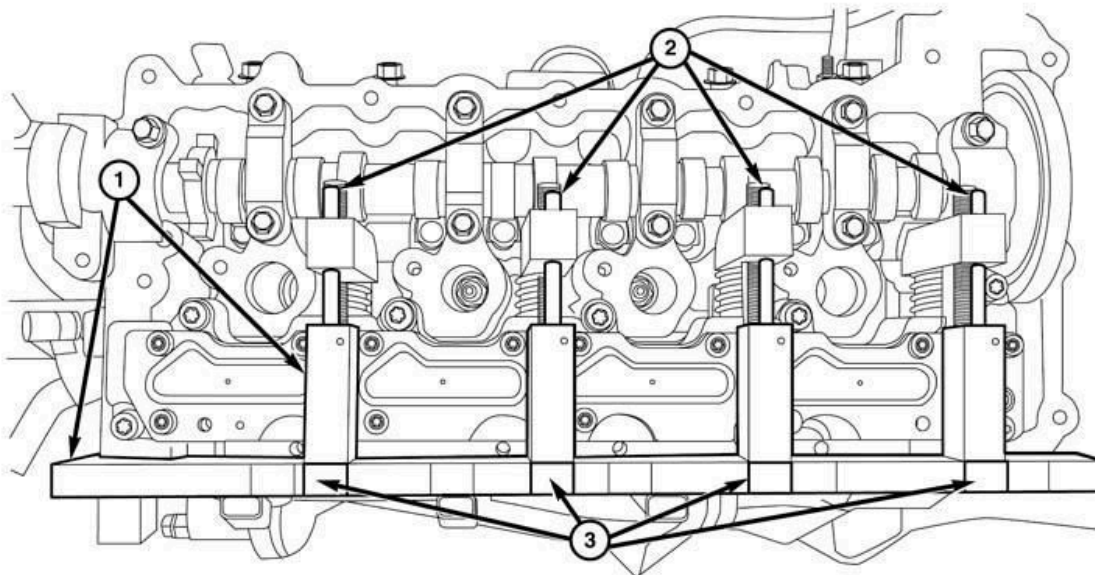
1. Disconnect and isolate the negative battery cable.



091071574

Fig. 120: Cylinder Head Cover Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Remove the cylinder head cover assembly bolts (1) and remove the cover from the cylinder head.



091071570

Fig. 121: Special Tool, Spring Compressor & Indicators
Courtesy of CHRYSLER GROUP, LLC

3. Install special (1) tool to the cylinder head. With the spring compressors lined up in the 2.4L position of the bridge (3), rotate the screw jacks counterclockwise to compress the springs enough to allow slight

movement of the rockers.

4. Remove the camshaft(s). Refer to CAMSHAFT, ENGINE, REMOVAL .

NOTE: **If the rocker arms are to be reused, identify their positions so that they can be reassembled into their original locations.**

5. Remove the rocker arm(s). Refer to ROCKER ARM, VALVE, REMOVAL .

NOTE: **If the hydraulic lifters are to be reused, identify their positions so that they can be reassembled into their original locations.**

6. Remove the hydraulic lifter(s).

INSTALLATION

INSTALLATION

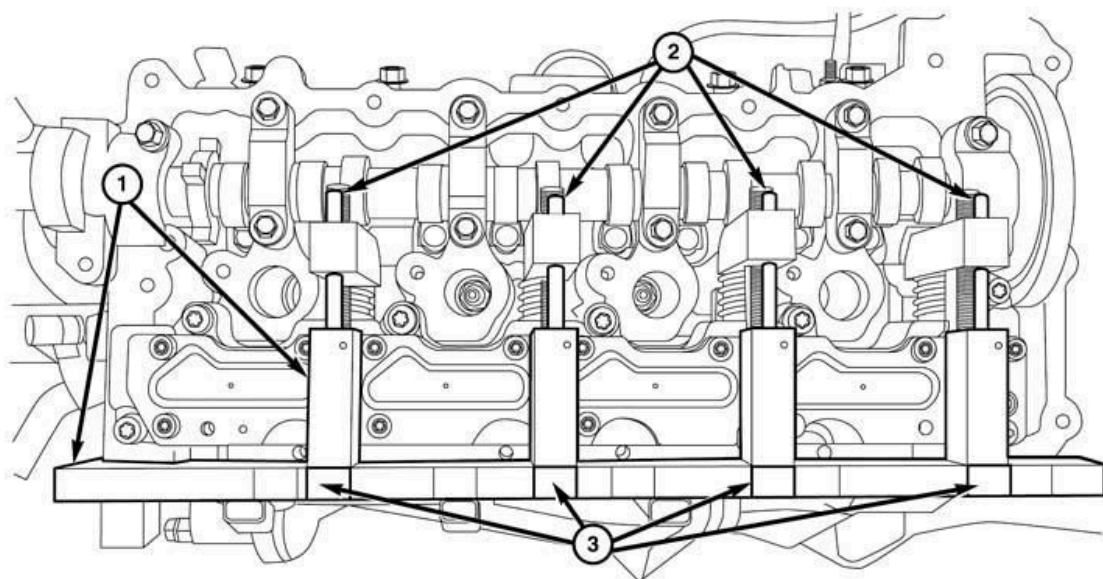
1. Verify that the hydraulic lifters are at least partially full of oil. There should be little or no plunger travel when the hydraulic lifter is depressed.

NOTE: **If the hydraulic lifters are being reused, reassemble them into their original locations.**

2. Install the hydraulic lifter(s)

NOTE: **If the rocker arms are being reused, reassemble them into their original locations.**

3. Install the rocker arm(s). Refer to ROCKER ARM, VALVE, INSTALLATION .
4. Install the camshaft. Refer to CAMSHAFT, ENGINE, INSTALLATION .



091071570

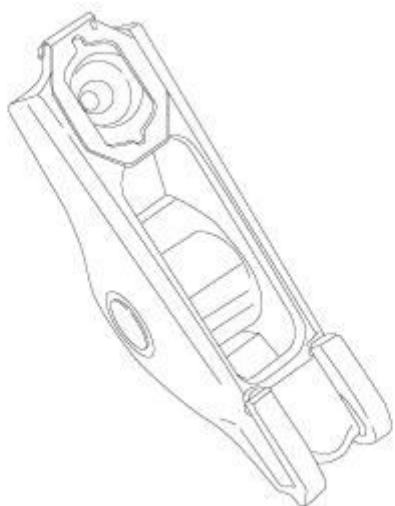
Fig. 122: Special Tool, Spring Compressor & Indicators
Courtesy of CHRYSLER GROUP, LLC

5. Install the VVAA. Refer to **ASSEMBLY, VARIABLE VALVE ACTUATION, INSTALLATION**.
6. Install the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, INSTALLATION**.
7. Connect the battery negative cable and tighten nut to 5 N.m (45 in. lbs.).

ROCKER ARM, VALVE

DESCRIPTION

DESCRIPTION



3175529

Fig. 123: Valve Rocker Arm

Courtesy of CHRYSLER GROUP, LLC

The valve rocker arms are steel stampings with an integral roller bearing. A spring clip helps to hold the rocker arm in position on the ball socket when removing or installing the variable valve actuation assembly. The rocker arm ball socket also incorporates a 0.5 mm oil hole for roller and camshaft lubrication.

REMOVAL

REMOVAL

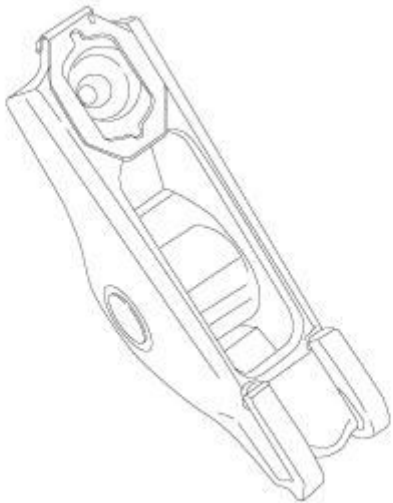
1. Disconnect and isolate the battery negative cable.
2. If the exhaust rockers are to be serviced, remove the exhaust camshaft. Refer to **CAMSHAFT, ENGINE, REMOVAL**.

NOTE: If the rocker arms are to be reused, identify their positions so that they can be reassembled into their original locations.

3. If the intake rockers are to be serviced, remove the Variable Valve Actuator Assembly (VVAA). Refer to **ASSEMBLY, VARIABLE VALVE ACTUATION, REMOVAL**.
4. Remove the rocker arm(s).

INSPECTION

INSPECTION



3175529

Fig. 124: Valve Rocker Arm
Courtesy of CHRYSLER GROUP, LLC

Inspect the valve rocker arm for wear or damage. Replace as necessary.

INSTALLATION

INSTALLATION

1. Lubricate the rocker arms with clean engine oil before installation.

NOTE: **If the rocker arms are being reused, reassemble them into their original locations.**

2. Install the rocker arm(s).
3. If the intake rockers were serviced, install the VVAA. Refer to ASSEMBLY, VARIABLE VALVE ACTUATION, INSTALLATION.
4. If the exhaust rockers were serviced, Install the camshaft and cylinder head cover. Refer to CAMSHAFT, ENGINE, INSTALLATION.
5. Connect the battery negative cable and tighten nut to 5 N.m (45 in. lbs.).

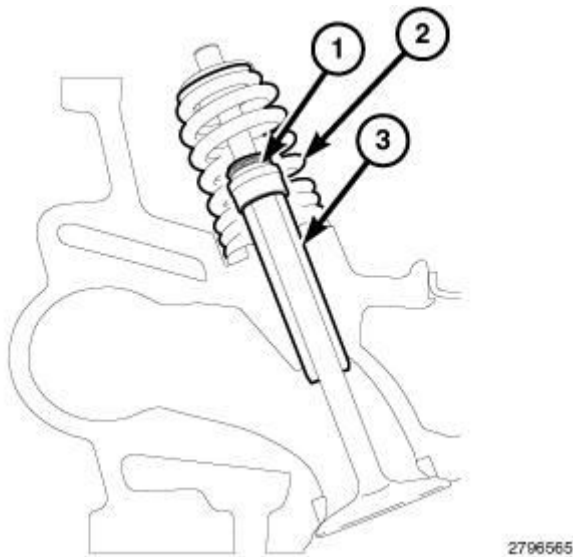
SEAL(S), VALVE GUIDE**DESCRIPTION****DESCRIPTION**

Fig. 125: Valve Stem Oil Seal, Valve Spring & Valve Guide
Courtesy of CHRYSLER GROUP, LLC

NOTE: **Typical valve configuration shown in illustration.**

The valve stem oil seals (1) are made of elastomer over-molded steel in a non-integrated type guide mounted configuration. The seal is not held in place by the valve spring (2). The valve stem seals are not reusable if removed from the valve guides (3), they must be replaced. Always coat the valve seals with clean engine oil before installing the valves.

REMOVAL

REMOVAL

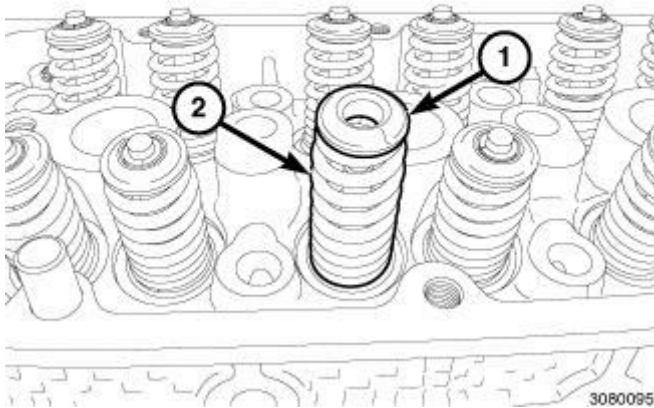


Fig. 126: Valve Spring & Retainer
Courtesy of CHRYSLER GROUP, LLC

NOTE: If the springs are to be reused, identify their positions so that they can be reassembled into their original locations. Number 2 cylinder exhaust valve spring shown in illustration, all other valve springs similar.

1. Remove the valve spring(s) (2). Refer to **SPRING(S), VALVE, REMOVAL** .

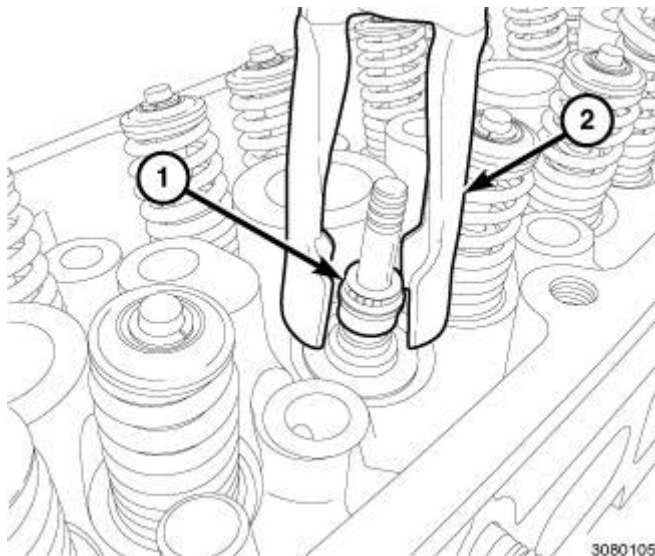


Fig. 127: Valve Guide Seal & Valve Seal Tool
Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 2 cylinder exhaust valve guide seal shown in illustration, all other valve guide seals similar.

2. Remove the valve guide seal (1) using a valve seal tool (2). Discard the removed seal.

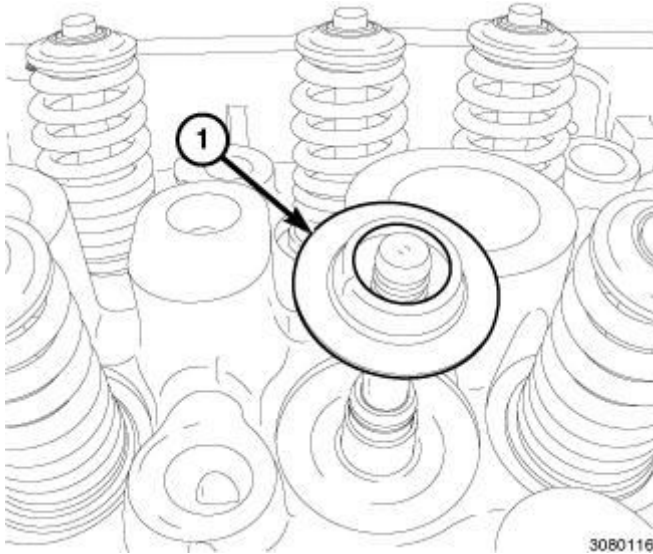


Fig. 128: Valve Spring Seat

Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 2 cylinder exhaust valve spring seat shown in illustration. Exhaust valve spring seats are marked with the letter "S" and have a thickness of 0.8 mm (0.031 in.). Intake valve spring seats are marked with the letter "A" and have a thickness of 3.2 mm (0.126 in.).

3. If required, remove the valve spring seat (1).
4. If required, remove the valve(s). Refer to VALVES, INTAKE AND EXHAUST, REMOVAL.

INSTALLATION

INSTALLATION

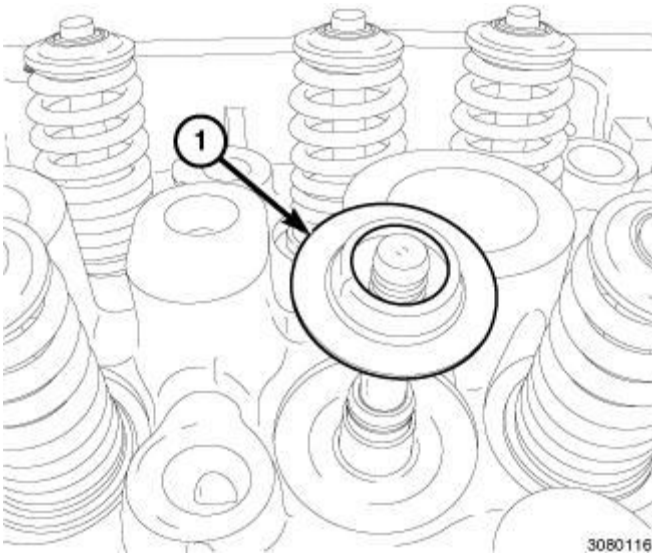


Fig. 129: Valve Spring Seat

Courtesy of CHRYSLER GROUP, LLC

NOTE: Reassemble the valves into their original locations. If the valves or valve seats have been refinished, verify that the valve stem tip height is within specification. Refer to **ENGINE SPECIFICATIONS** .

1. If removed, install the valve(s). Refer to **VALVES, INTAKE AND EXHAUST, INSTALLATION** .

NOTE: Number 2 cylinder exhaust valve spring seat shown in illustration. Exhaust valve spring seats are marked with the letter "S" and have a thickness of 0.8 mm (0.031 in.). Intake valve spring seats are marked with the letter "A" and have a thickness of 3.2 mm (0.126 in.).

2. If removed, install the spring seat (1) over the valve guide.

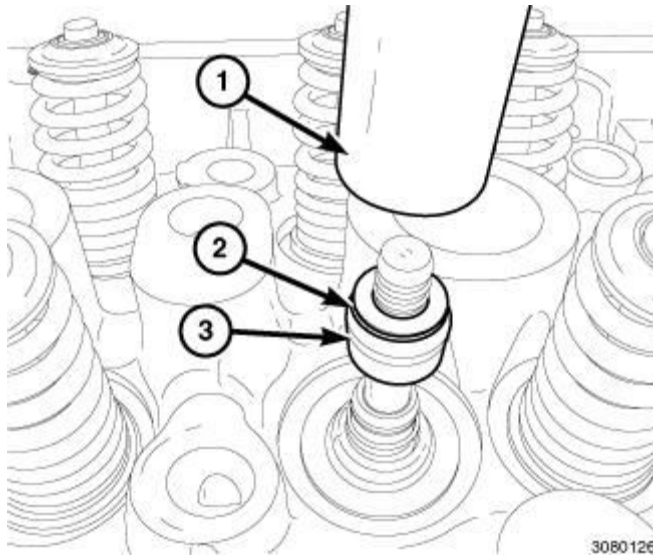


Fig. 130: Driver, Garter Spring & Valve Guide Seal
Courtesy of CHRYSLER GROUP, LLC

3. Apply engine oil to the lip of the valve guide seal (3). Install the valve guide seal (3) over the valve stem. Using an appropriate driver (1), push the seal firmly and squarely over the valve guide. **Do Not Force** the seal against the top of guide.

NOTE: Make sure that the garter spring (2) is intact around the top of the valve guide seal (3). Number 2 cylinder exhaust valve guide seal shown in illustration, all other valves similar.

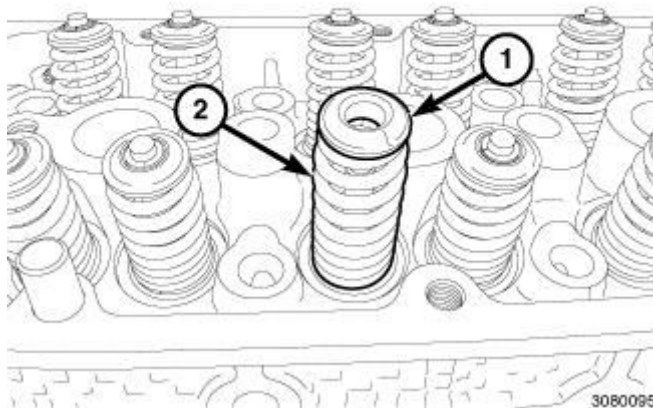


Fig. 131: Valve Spring & Retainer
Courtesy of CHRYSLER GROUP, LLC

NOTE: If the valve springs are being reused, reassemble them into their original

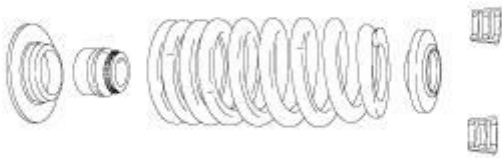
locations. Number 2 cylinder exhaust valve spring shown in illustration, all other valves similar.

4. Install the valve spring(s) (2). Refer to SPRING(S), VALVE, INSTALLATION .

SPRING(S), VALVE

DESCRIPTION

DESCRIPTION



3176201

Fig. 132: Valve Springs Assembly

Courtesy of CHRYSLER GROUP, LLC

The valve springs are a beehive design and made from high strength chrome silicon steel. The springs are common for intake and exhaust applications. Valve guide seals are rubber overmolded on a steel support cylinder with a garter spring at the seal lip. The seals are not integrated with the valve spring seat. The steel valve spring retainers are designed for use with beehive springs and the valve spring retainer locks are a three bead Butt type design to promote valve rotation.

REMOVAL

ON VEHICLE

NOTE: The intake and exhaust springs are NOT interchangeable. Make sure the springs are marked if reused. If they are being replaced, correctly identify the part numbers prior to installation.

1. Remove the variable valve actuator assembly. Refer to ASSEMBLY, VARIABLE VALVE ACTUATION, REMOVAL.
2. Remove the exhaust camshaft. Refer to CAMSHAFT, ENGINE, REMOVAL .

NOTE: If the rocker arms are to be reused, identify their positions so that they can be reassembled into their original locations.

3. Remove the rocker arm(s). Refer to **ROCKER ARM, VALVE, REMOVAL** .
4. Install the (special tool #10224, Adapter, Valve Spring) (2) on the (special tool #MD998772A, Compressor, Valve Spring) (1).

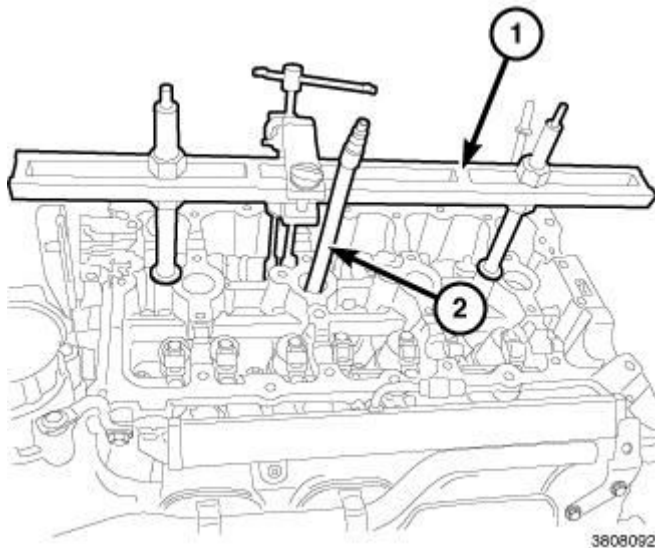


Fig. 133: Valve Spring Compressor & Air Hose
Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 3 cylinder exhaust valve spring compression shown in illustration, all other valves similar.

5. Remove the spark plug. Refer to **SPARK PLUG, REMOVAL** .
6. Install the (special tool #MD998772A, Compressor, Valve Spring) (1) onto the cylinder head.
7. Install a spark plug adapter attached to a regulated shop air supply (2). Pressurize the cylinder being serviced to 620.5 - 689 kPa (90 - 100 psi) to hold the valves in place.

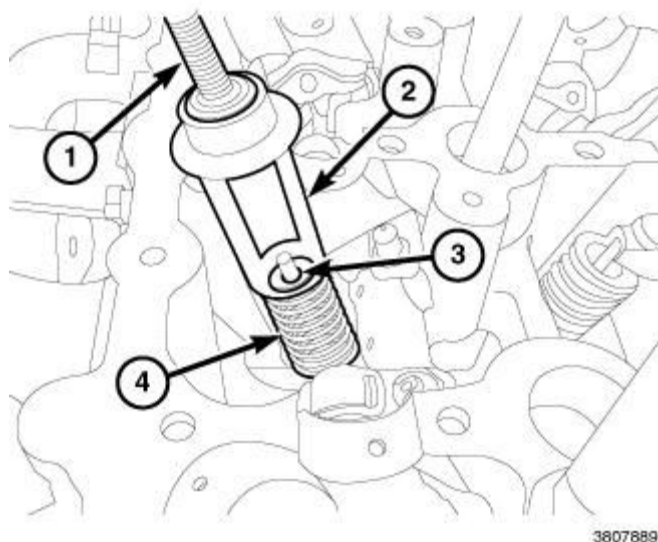


Fig. 134: Compressing Valve Spring
Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 3 cylinder exhaust valve spring compression shown in illustration, all other valves similar.

CAUTION: Air pressure must be maintained as long as the valve springs are removed to prevent the valves from dropping into the cylinders.

8. Using the (special tool #10224, Adapter, Valve Spring) (2), compress valve spring (4) and remove valve retaining locks (3).

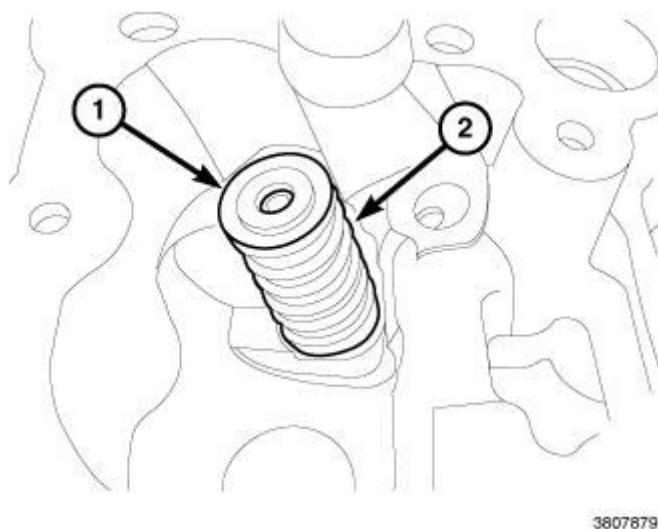


Fig. 135: Valve Spring & Retainer
Courtesy of CHRYSLER GROUP, LLC

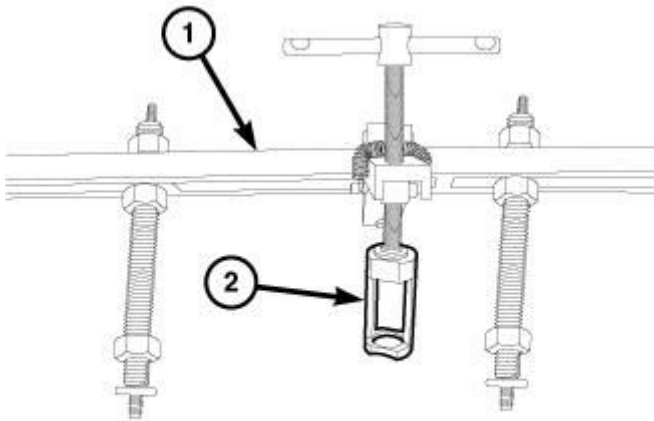
NOTE: The intake and exhaust springs are NOT interchangeable. Make sure the springs are marked if reused. If they are being replaced, correctly identify the part numbers prior to installation.

NOTE: If the springs are to be reused, identify their positions so that they can be reassembled into their original locations. Number 2 cylinder exhaust valve spring shown in illustration, all other valve springs similar.

9. Release the valve spring compression and remove the valve spring retainer (1) and valve spring (2).
10. If required, remove the valve guide seal. Refer to SEAL(S), VALVE GUIDE, REMOVAL.

OFF VEHICLE

NOTE: The intake and exhaust springs are NOT interchangeable. Make sure the springs are marked if reused. If they are being replaced, correctly identify the part numbers prior to installation.



3080080

Fig. 136: Valve Spring Compressor & Adapter
Courtesy of CHRYSLER GROUP, LLC

1. Remove the variable valve actuator assembly. Refer to ASSEMBLY, VARIABLE VALVE ACTUATION, REMOVAL.
2. Install the (special tool #10224, Adapter, Valve Spring) (2) on the (special tool #MD998772A, Compressor, Valve Spring) (1).

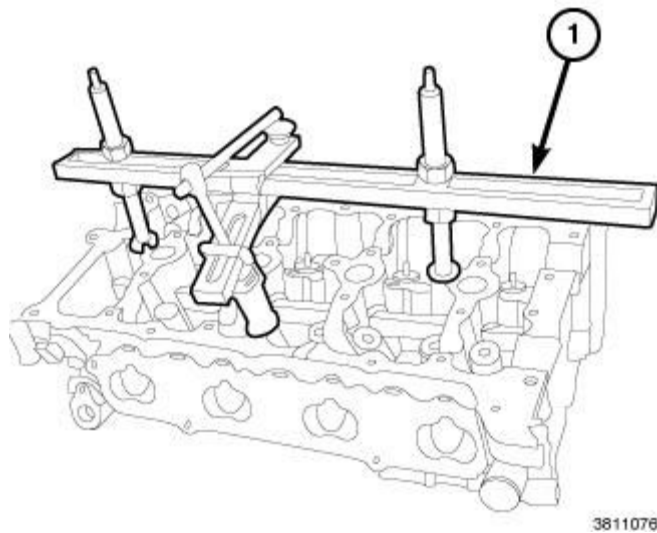


Fig. 137: Valve Spring Compressor
Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 3 intake valve spring compression shown in illustration, all other valves similar.

3. Install the (special tool #MD998772A, Compressor, Valve Spring) (1) onto the cylinder head.
4. Place a cushion of foam padding or a ball of rags in the dome area of the cylinder head to hold the valves in place during the retaining lock removal process.

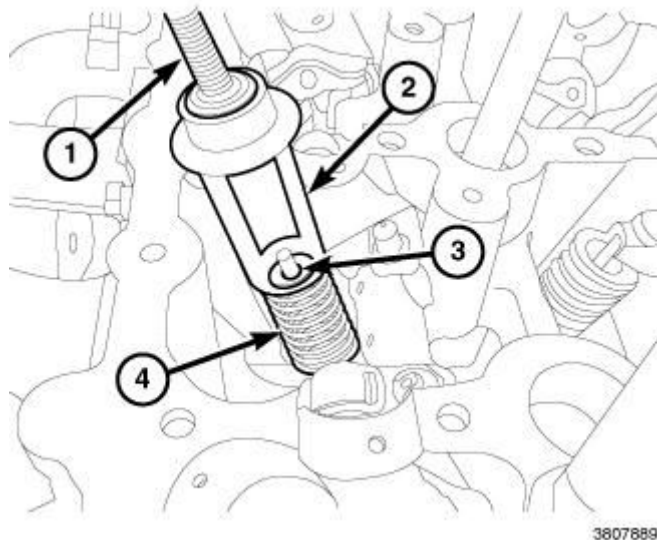
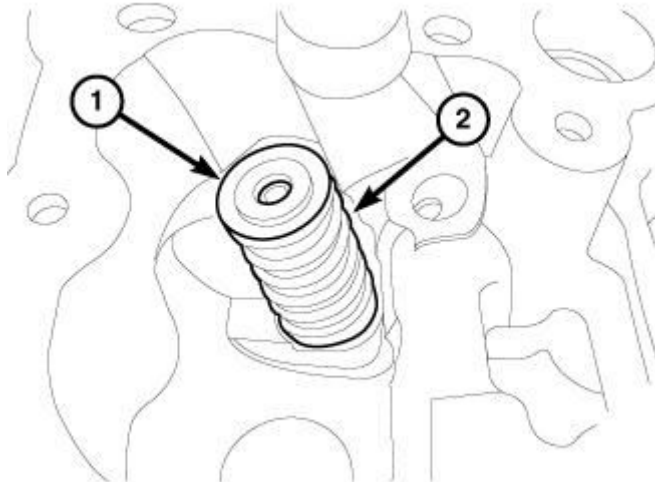


Fig. 138: Compressing Valve Spring
Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 3 cylinder exhaust valve spring compression shown in illustration, all other valves similar.

5. Using the (special tool #10224, Adapter, Valve Spring) (2), compress valve spring (4) and remove valve retaining locks (3).



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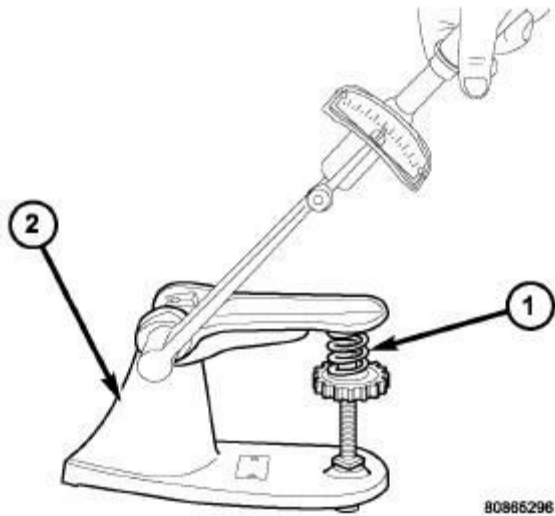
Fig. 139: Valve Spring & Retainer
Courtesy of CHRYSLER GROUP, LLC

- NOTE:** The intake and exhaust springs are NOT interchangeable. Make sure the springs are marked if being reused. If they are being replaced, correctly identify the part numbers prior to installation.
- NOTE:** If the springs are to be reused, identify their positions so that they can be reassembled into their original locations. Number 2 cylinder exhaust valve spring shown in illustration, all other valve springs similar.

6. Release the valve spring compression and remove the valve spring retainer (1) and valve spring (2).
7. If required, remove the valve guide seal. Refer to SEAL(S), VALVE GUIDE, REMOVAL .

INSPECTION

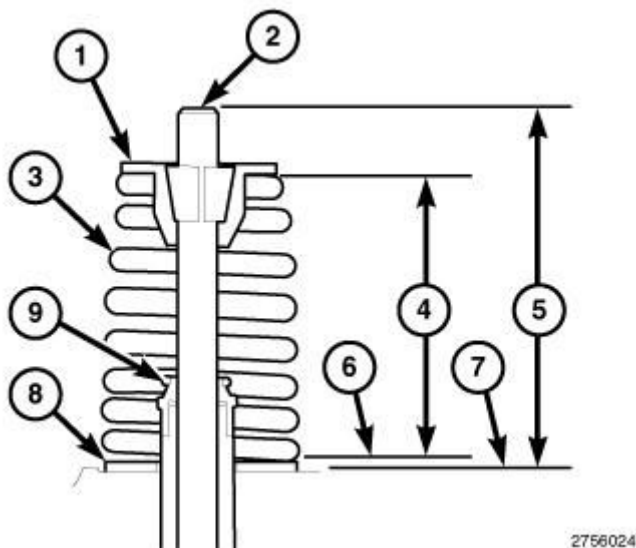
INSPECTION

**Fig. 140: Testing Valve Spring**

Courtesy of CHRYSLER GROUP, LLC

When valves have been removed for inspection, reconditioning or replacement, valve springs should be checked against specifications for free-length, spring force and spring installed height. Refer to **ENGINE SPECIFICATIONS**.

Spring force can be measured with a test fixture (2). Follow the tool manufactures instructions. Replace any springs that do not meet specifications.

**Fig. 141: Checking Valve Spring Installed Height**

Courtesy of CHRYSLER GROUP, LLC

Installed height of the valve spring must be checked with the valve assembled into the cylinder head. Refer to **SPRING(S), VALVE, INSTALLATION**.

If the valves or valve seats have been refinished, check the installed height of the valve springs (4). Make sure the measurement is taken from the top of spring seat (6) to the bottom surface of spring retainer (1). Refer to **ENGINE SPECIFICATIONS**.

INSTALLATION

ON VEHICLE

NOTE: The intake and exhaust springs are NOT interchangeable. Make sure the springs are marked if reused. If they are being replaced, correctly identify the part numbers prior to installation.

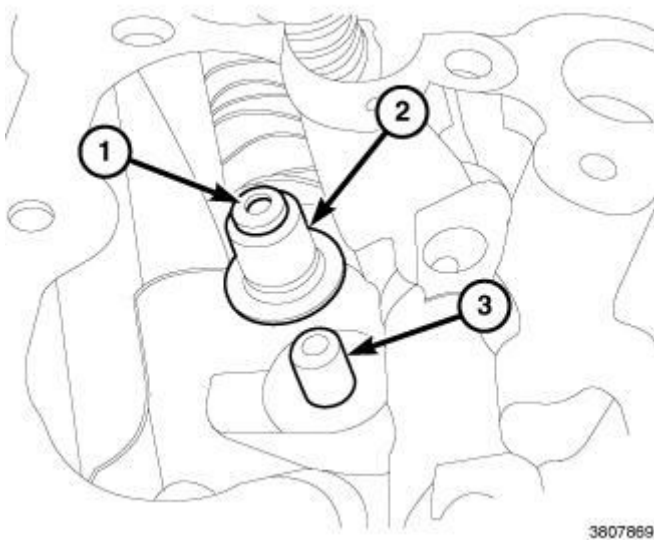
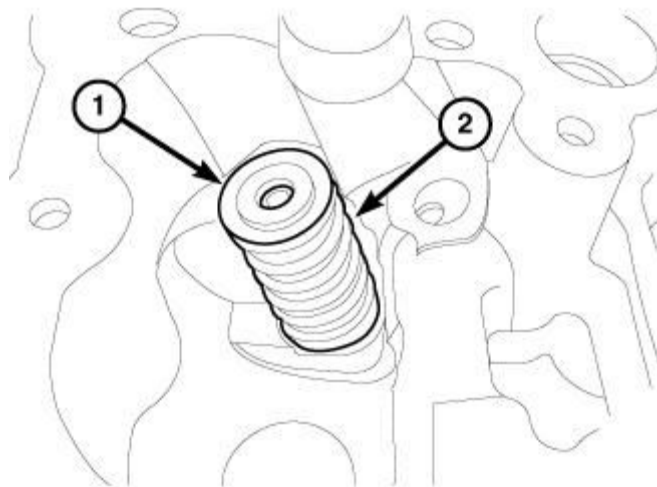


Fig. 142: Valve Guide Seal & Valve
Courtesy of CHRYSLER GROUP, LLC

1. If removed, install the valve guide seal (2) over the valve guide (3). Refer to **SEAL(S), VALVE GUIDE, INSTALLATION**.

NOTE: Make sure that the garter spring (1) is intact around the top of the valve guide seal (2). Number 2 cylinder exhaust valve guide seal shown in illustration, all other valves similar.



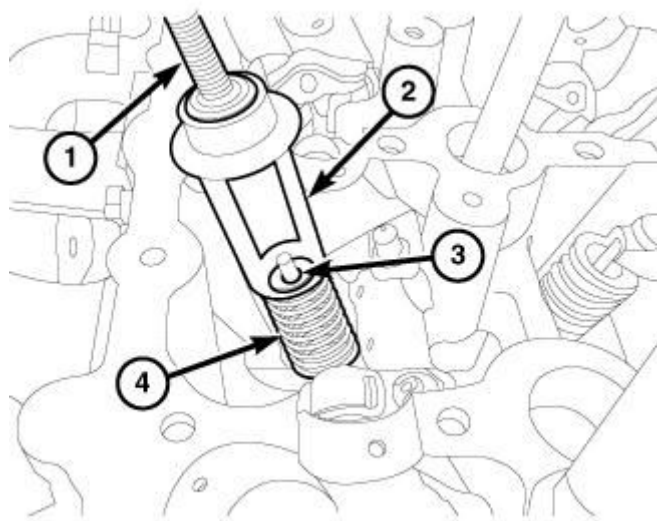
3807879

Fig. 143: Valve Spring & Retainer
Courtesy of CHRYSLER GROUP, LLC

NOTE: The intake and exhaust springs are NOT interchangeable. Make sure the springs are marked if reused. If they are being replaced, correctly identify the part numbers prior to installation.

NOTE: If the valve springs are being reused, reassemble them into their original locations. Number 2 cylinder exhaust valve spring shown in illustration, all other valves similar.

2. Install the valve spring (2) and valve spring retainer (1).



3807889

Fig. 144: Compressing Valve Spring
Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 3 cylinder exhaust valve spring compression shown in illustration, all other valves similar.

3. Using the (special tool #10224, Adapter, Valve Spring) (2) with the (special tool #MD998772A, Compressor, Valve Spring) (1), compress the valve spring (4) **only enough** to install the valve retaining locks (3).
4. Relieve the air pressure and remove the spark plug adapter.
5. Install the spark plug and tighten to 19 N.m (14 ft. lbs.). Refer to **SPARK PLUG, INSTALLATION**.

NOTE: If the rocker arms are being reused, reassemble them into their original locations.

6. Install the rocker arm(s). Refer to **ROCKER ARM, VALVE, INSTALLATION**.
7. Install the camshaft. Refer to **CAMSHAFT, ENGINE, INSTALLATION**.
8. Connect the battery negative cable and tighten nut to 5 N.m (45 in. lbs.).

OFF VEHICLE

NOTE: The intake and exhaust springs are NOT interchangeable. Make sure the springs are marked if reused. If they are being replaced, correctly identify the part numbers prior to installation.

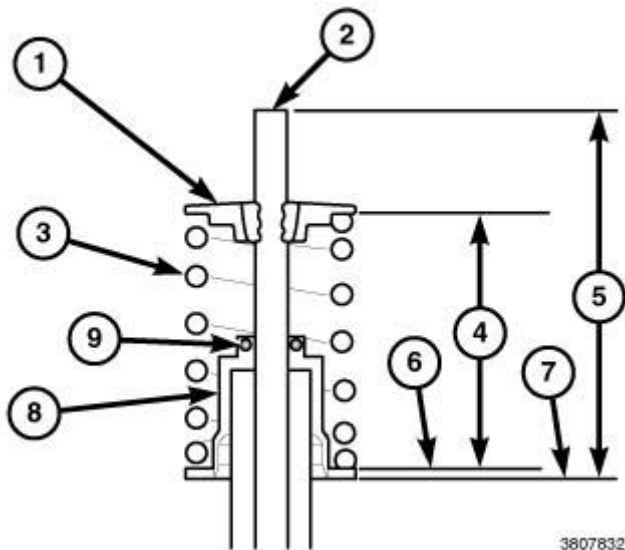


Fig. 145: Valve Spring Component Measurements
Courtesy of CHRYSLER GROUP, LLC

1. If removed, install the valve(s). Refer to **VALVES, INTAKE AND EXHAUST, INSTALLATION**.

NOTE: Reassemble the valves into their original locations. If the valves or valve seats have been refinished, verify that the valve stem tip height (5) is

within specification. Refer to **ENGINE SPECIFICATIONS** .

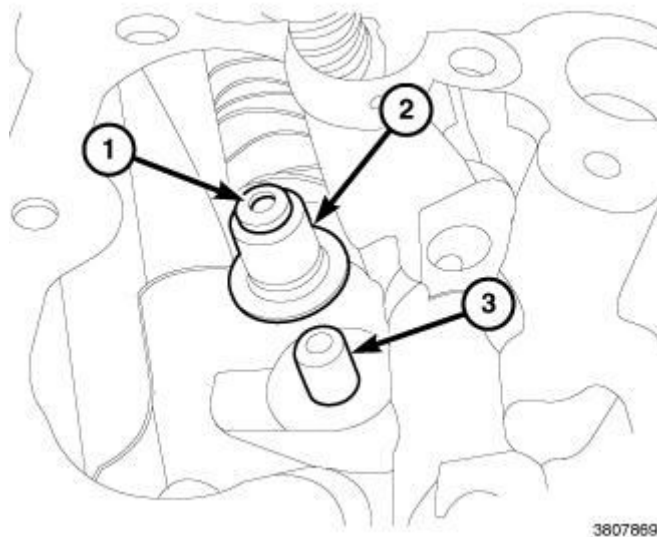


Fig. 146: Valve Guide Seal & Valve
Courtesy of CHRYSLER GROUP, LLC

2. If removed, install the valve guide seal (2) over the valve guide (3). Refer to **SEAL(S), VALVE GUIDE, INSTALLATION** .

NOTE: Make sure that the garter spring (1) is intact around the top of the valve guide seal (2). Number 2 cylinder exhaust valve guide seal shown in illustration, all other valves similar.

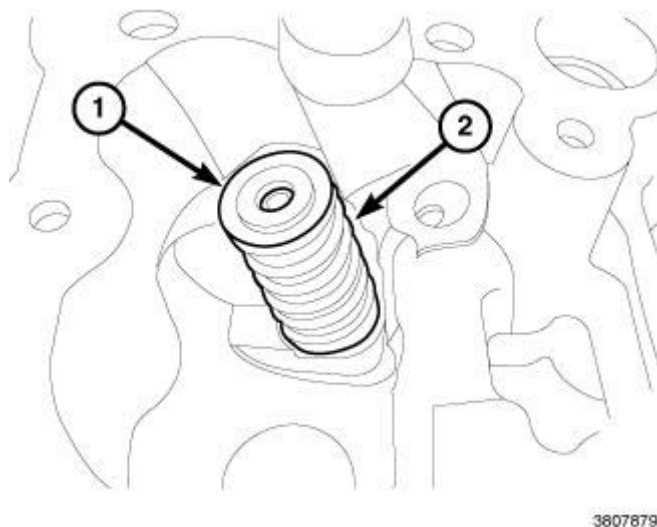
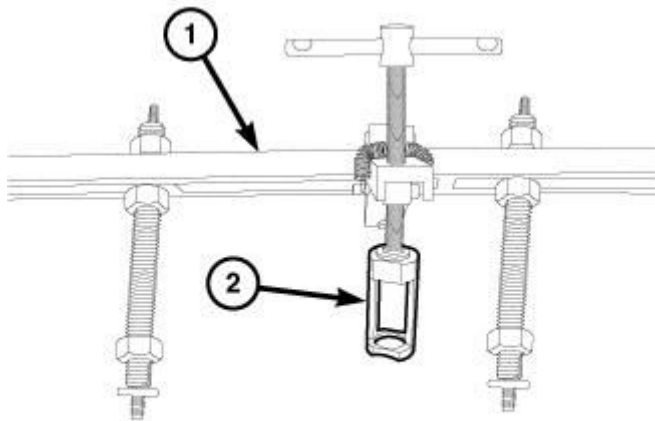


Fig. 147: Valve Spring & Retainer
Courtesy of CHRYSLER GROUP, LLC

NOTE: The intake and exhaust springs are NOT interchangeable. Make sure the springs are marked if reused. If they are being replaced, correctly identify the part numbers prior to installation.

NOTE: If the valve springs are being reused, reassemble them into their original locations. Number 2 cylinder exhaust valve spring shown in illustration, all other valves similar.

3. Install the valve spring (2) and valve spring retainer (1).



3080080

Fig. 148: Valve Spring Compressor & Adapter
Courtesy of CHRYSLER GROUP, LLC

4. Install the (special tool #10224, Adapter, Valve Spring) (2) on the (special tool #MD998772A, Compressor, Valve Spring) (1).

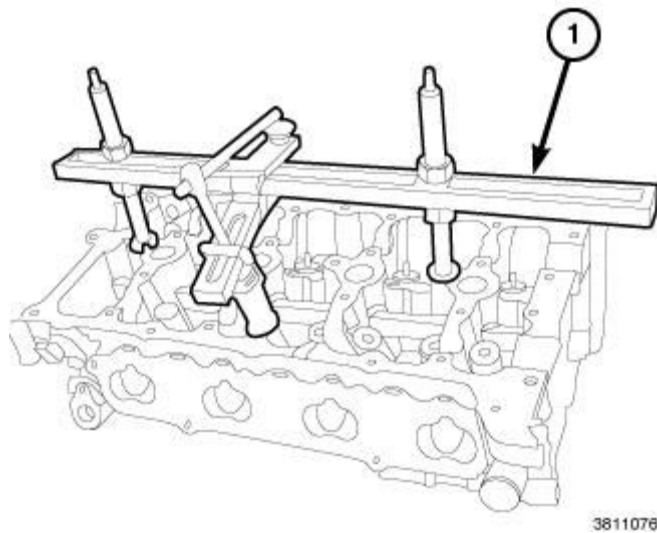


Fig. 149: Valve Spring Compressor
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 3 intake valve spring compression shown in illustration, all other valves similar.

5. Install the (special tool #MD998772A, Compressor, Valve Spring) (1) onto the cylinder head.
6. Place a ball of rags in the combustion chamber to hold the valves in place.

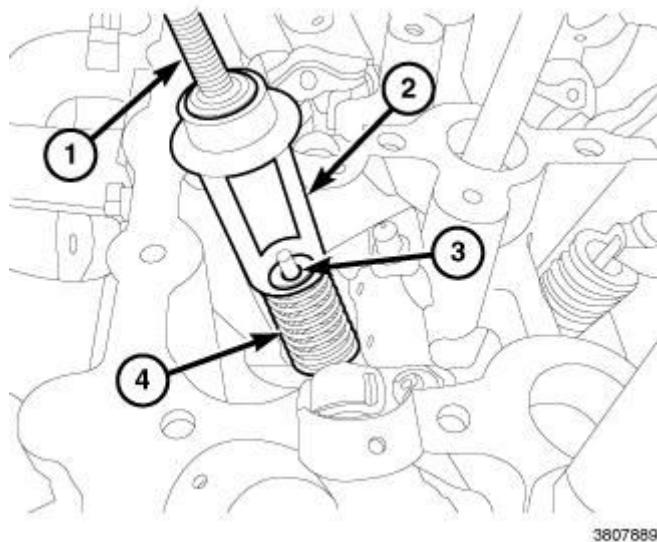


Fig. 150: Compressing Valve Spring
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 3 cylinder exhaust valve spring compression shown in illustration, all other valves similar.

7. Using the (special tool #10224, Adapter, Valve Spring) (2) with the (special tool #MD998772A, Compressor, Valve Spring) (1), compress the valve spring (4) **only enough** to install the valve retaining locks (3).

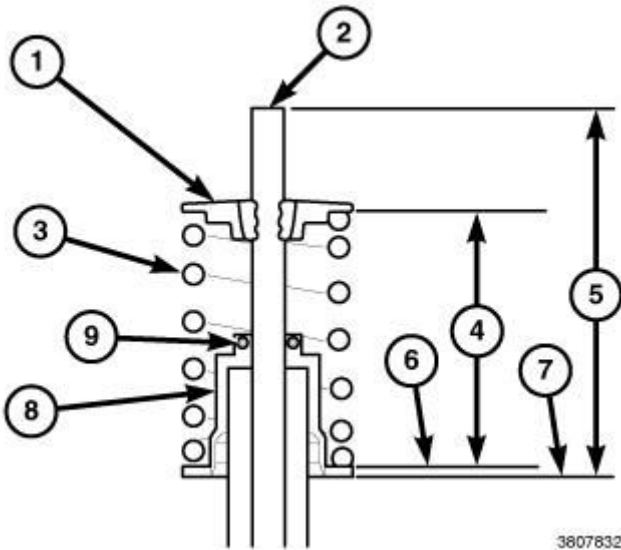


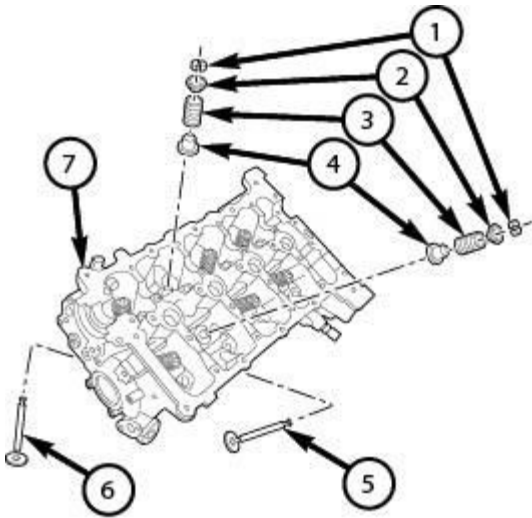
Fig. 151: Valve Spring Component Measurements
Courtesy of CHRYSLER GROUP, LLC

8. If the valves or valve seats have been refinished, verify that the installed height of the valve springs (4) are within specification. Make sure the measurement is taken from the top of spring seat (6) to the bottom surface of spring retainer (1). Refer to **ENGINE SPECIFICATIONS**.
9. Install the cylinder head. Refer to **CYLINDER HEAD, INSTALLATION**.

VALVES, INTAKE AND EXHAUST

DESCRIPTION

DESCRIPTION



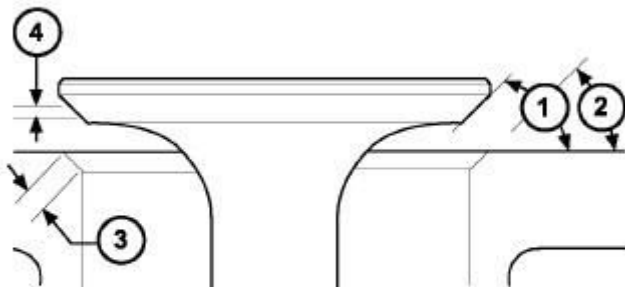
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Fig. 152: Cylinder Head, Valves & Springs
 Courtesy of CHRYSLER GROUP, LLC

Each of the four combustion chambers contains four valves, two intake and two exhaust, for a total of 16 valves. The valves are made of heat resistant steel. They have nitrided stems to prevent scuffing. Viton rubber valve stem seals are integral with the spring seats. All valves use three bead lock keepers (1) to retain springs (3) and to promote valve rotation.

STANDARD PROCEDURE

STANDARD PROCEDURE - REFACING - INTAKE AND EXHAUST VALVES



809c3e96

Fig. 153: Valve Face & Seat
 Courtesy of CHRYSLER GROUP, LLC

- 1 - SEAT WIDTH
- 2 - FACE ANGLE
- 3 - SEAT ANGLE
- 4 - SEAT CONTACT AREA

The intake and exhaust valves have a 44.5 to 45 degree face angle (1). The valve seats (2) have a 45 to 45.5 degree face angle.

VALVES

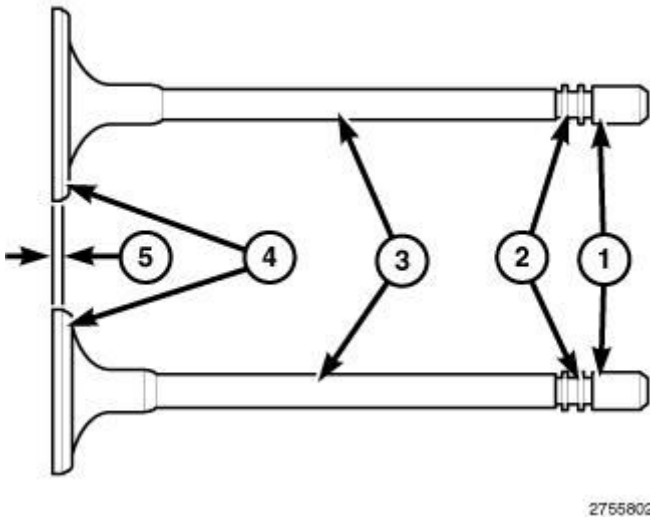
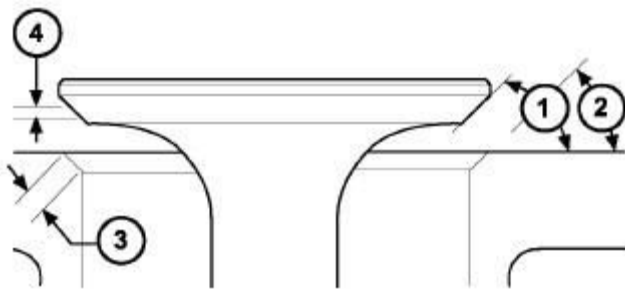


Fig. 154: Inspecting Valve Margin
Courtesy of CHRYSLER GROUP, LLC

Inspect the remaining margin (5) after the valves are refaced. Refer to **ENGINE SPECIFICATIONS** .

VALVE SEATS



809c3e98

Fig. 155: Valve Face & Seat

Courtesy of CHRYSLER GROUP, LLC

- | |
|---|
| 1 - SEAT WIDTH
2 - FACE ANGLE
3 - SEAT ANGLE
4 - SEAT CONTACT AREA |
|---|

NOTE: When refacing the valve seats, it is important that the correct size valve guide pilot be used for the reseating stones. A true and complete surface must be obtained.

1. Measure the concentricity of the valve seat using a dial indicator. Refer to **ENGINE SPECIFICATIONS**.
2. Inspect the valve seat (3) with Prussian blue to determine where the valve contacts the seat. To do this, coat the valve seat (3) **LIGHTLY** with Prussian blue then set the valve in place. Rotate the valve with light pressure. If the blue is transferred to the center of the valve face (4), contact is satisfactory. If the blue is transferred to the top edge of the valve face, then lower the valve seat with a 15 degree stone. If the blue is transferred to the bottom edge of the valve face, then raise the valve seat with a 65 degree stone.

NOTE: Valve seats which are worn or burned can be reworked, provided that the correct angle and seat width are maintained. Otherwise the cylinder head must be replaced.

3. When the seat is properly positioned the width of the intake and exhaust seats should be within specification. Refer to **ENGINE SPECIFICATIONS**.

VALVE AND SPRING INSTALLED HEIGHT

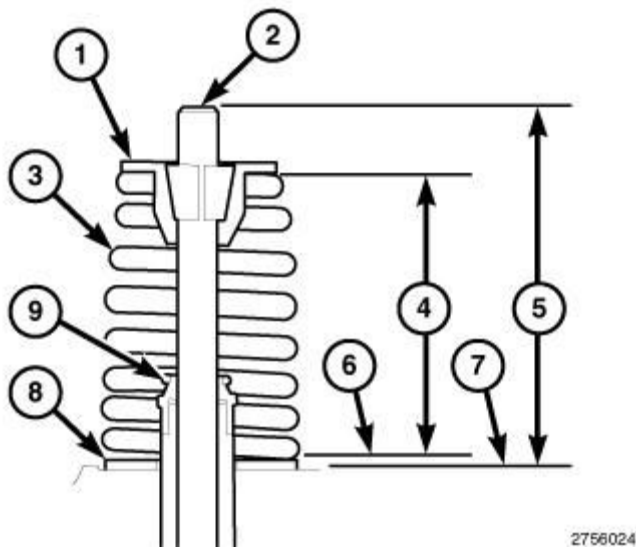


Fig. 156: Checking Valve Spring Installed Height
Courtesy of CHRYSLER GROUP, LLC

1. Coat the valve stems (2) with clean engine oil and install the valves into the cylinder head.

NOTE: If the valves are being reused, reassemble them into their original locations.

2. If the valves or valve seats have been refinished, check the valve tip height (5). If the valve tip height (5) exceeds the specification, grind the valve tip until it is within specification. Refer to **ENGINE SPECIFICATIONS**. Make sure the measurement is taken from the cylinder head surface (7) to the top of the valve stem (2).

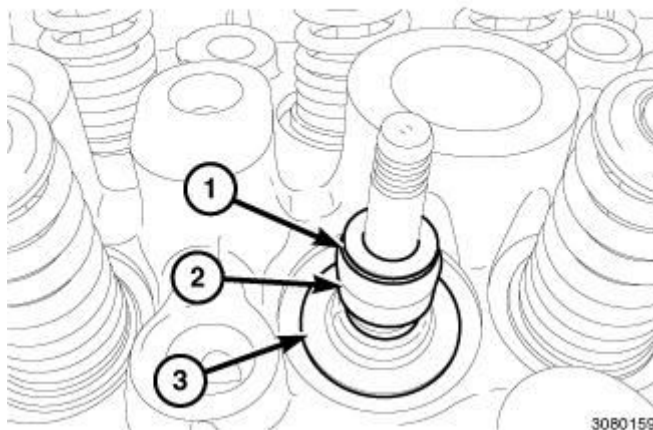


Fig. 157: Garter Spring, Valve Guide Seal & Spring Seat
Courtesy of CHRYSLER GROUP, LLC

3. If removed, install the spring seat (3) and valve guide seal (2) over the valve guide. Refer to **SEAL(S), VALVE GUIDE, INSTALLATION** .

NOTE: **Ensure that the garter spring (1) is intact around the top of the valve guide seal (2). Number 2 cylinder exhaust valve guide seal shown in illustration, all other valves similar.**

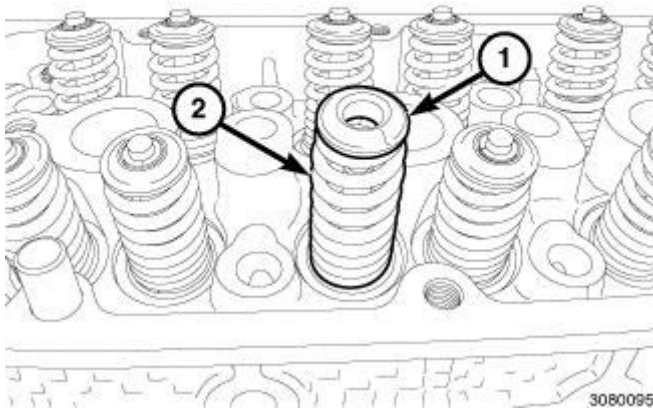


Fig. 158: Valve Spring & Retainer
Courtesy of CHRYSLER GROUP, LLC

NOTE: **If the valve springs are being reused, reassemble them into their original locations. Number 2 cylinder exhaust valve spring shown in illustration, all other valves similar.**

4. Install the valve spring (2) and valve spring retainer (1).

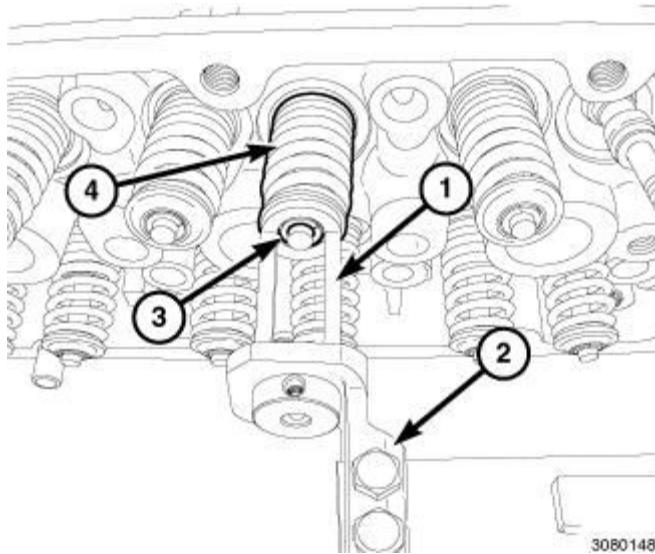


Fig. 159: Valve Spring Adapter, Valve Spring Compressor, Retaining Locks & Valve Springs
Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 3 cylinder exhaust valve spring compression shown in illustration, all other valves similar.

5. Compress valve springs (4) with the Valve Spring Compressor Adapter (special tool #10224, Adapter, Valve Spring) (1) mounted in the Valve Spring Compressor (special tool #C-3422-D, Compressor, Valve Spring) (2). Install the retaining locks (3) and release the valve spring compression.

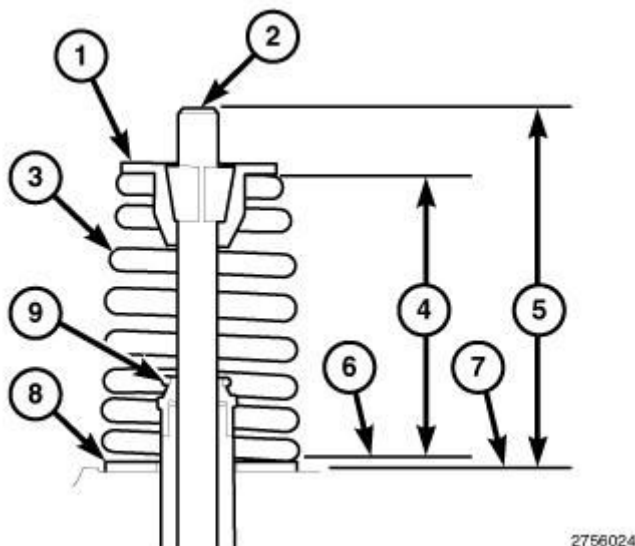


Fig. 160: Checking Valve Spring Installed Height
Courtesy of CHRYSLER GROUP, LLC

6. If the valves or valve seats have been refinished, check the installed height of the valve springs (4). Make sure the measurement is taken from the top of spring seat (6) to the bottom surface of spring retainer (1). Refer to **ENGINE SPECIFICATIONS**.

REMOVAL

REMOVAL

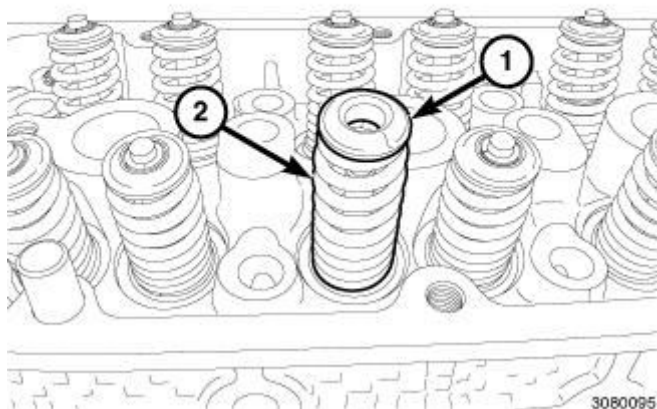


Fig. 161: Valve Spring & Retainer
Courtesy of CHRYSLER GROUP, LLC

1. Remove the cylinder head. Refer to CYLINDER HEAD, REMOVAL .

NOTE: If the springs are to be reused, identify their positions so that they can be reassembled into their original locations. Number 2 cylinder exhaust valve spring shown in illustration, all other valve springs similar.

2. Remove the valve spring(s) (2). Refer to SPRING(S), VALVE, REMOVAL .

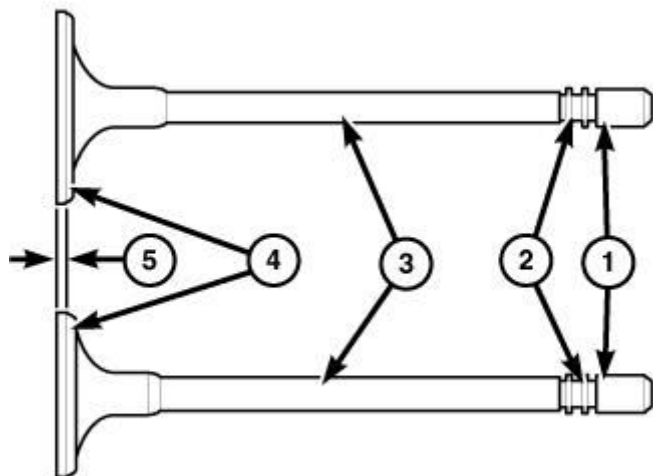


Fig. 162: Inspecting Valve Margin

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Before removing the valves, remove any burrs from the valve stem retainer lock grooves (2) and stem tip (1) to prevent damage to the valve guides.

3. Remove the valve(s). Identify each valve to ensure installation in the original location.

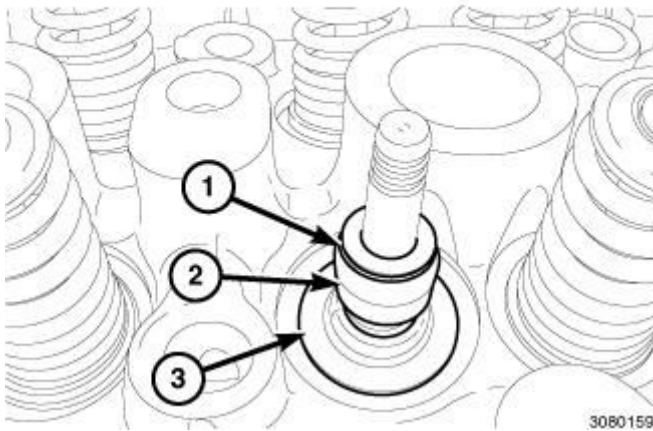


Fig. 163: Garter Spring, Valve Guide Seal & Spring Seat
Courtesy of CHRYSLER GROUP, LLC

4. If required, remove the valve guide seal (2) and spring seat (3). Refer to **SEAL(S), VALVE GUIDE, REMOVAL**.

INSPECTION

INSPECTION

VALVES

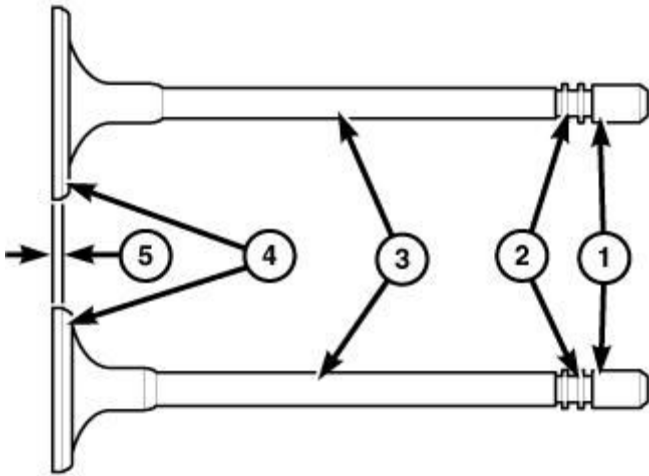


Fig. 164: Inspecting Valve Margin
Courtesy of CHRYSLER GROUP, LLC

1. Clean and inspect the valves thoroughly. Replace burned, warped and cracked valves.
2. Inspect the retainer lock grooves for wear or damage (2).
3. Inspect the valve face (4) for wear and pitting.
4. Measure the valve stems (3) and margins (5) for wear. Refer to **ENGINE SPECIFICATIONS**.

VALVE GUIDES

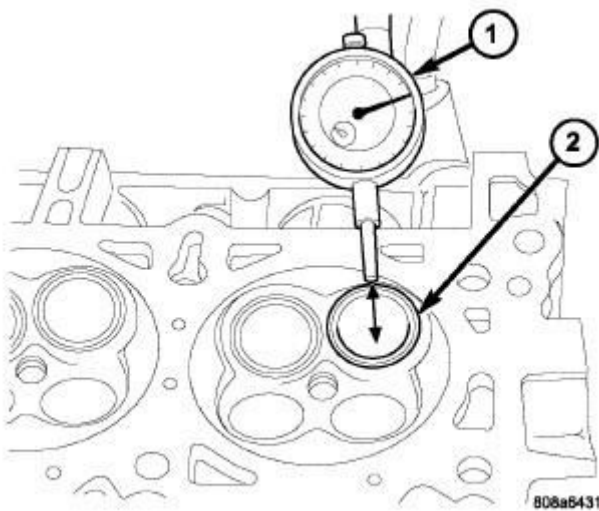


Fig. 165: Measuring Valve Guide Wear
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical cylinder head shown in illustration.

1. Remove carbon and varnish deposits from inside of the valve guides with a reliable guide cleaner.
2. Measure valve stem-to-guide clearance as follows:
3. Install the valve (2) into the cylinder head so that it is 15 mm (0.590 inch.) off of the valve seat. A small piece of hose may be used to hold the valve in place.
4. Attach the Dial Indicator Set (special tool #C-3339A, Set, Dial Indicator) (1) to the cylinder head and set it at a right angle to the valve stem being measured.
5. Move the valve to and from the indicator. Compare this reading to the specification. Refer to **ENGINE SPECIFICATIONS**.

NOTE: If stem-to-guide clearance exceeds specifications, you must measure the valve stem. If the valve stem is within specification or if the valve guide is loose in the cylinder head, replace the cylinder head.

INSTALLATION

INSTALLATION

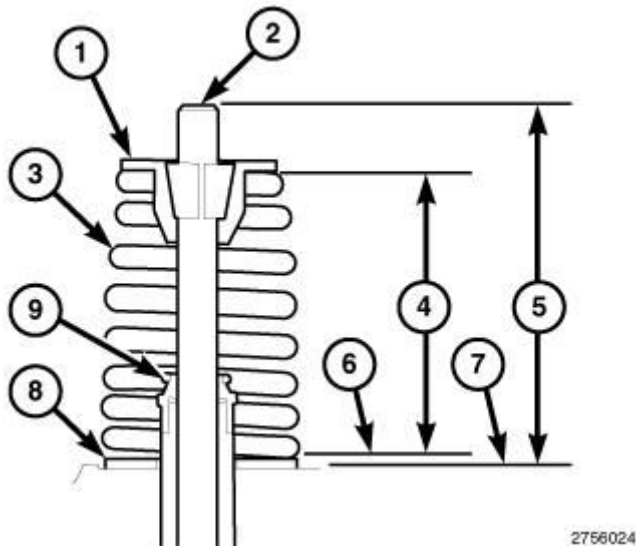


Fig. 166: Checking Valve Spring Installed Height
Courtesy of CHRYSLER GROUP, LLC

1. Coat the valve stems (2) with clean engine oil and install the valves into the cylinder head.

NOTE: If the valves are being reused, reassemble them into their original locations.

2. If the valves or valve seats have been refinished, check the valve tip height (5). If the valve tip height (5) exceeds the specification, grind the valve tip until it is within specification. Refer to **ENGINE SPECIFICATIONS**. Make sure the measurement is taken from the cylinder head surface (7) to the top of the valve stem (2).

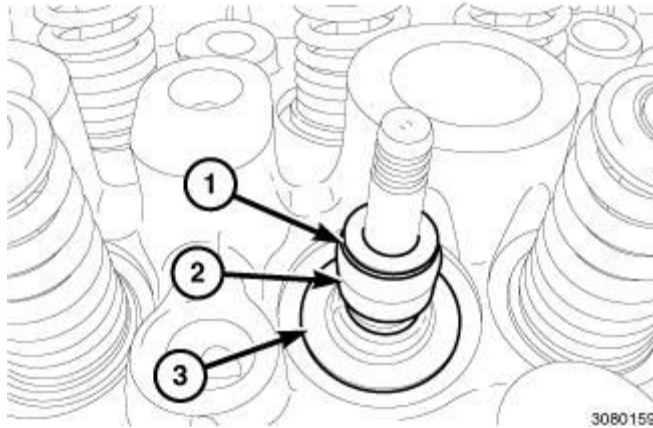


Fig. 167: Garter Spring, Valve Guide Seal & Spring Seat
Courtesy of CHRYSLER GROUP, LLC

3. If removed, install the spring seat (3) and valve guide seal (2) over the valve guide. Refer to SEAL(S), VALVE GUIDE, INSTALLATION .

NOTE: Make sure that the garter spring (1) is intact around the top of the valve guide seal (2). Number 2 cylinder exhaust valve guide seal shown in illustration, all other valves similar.

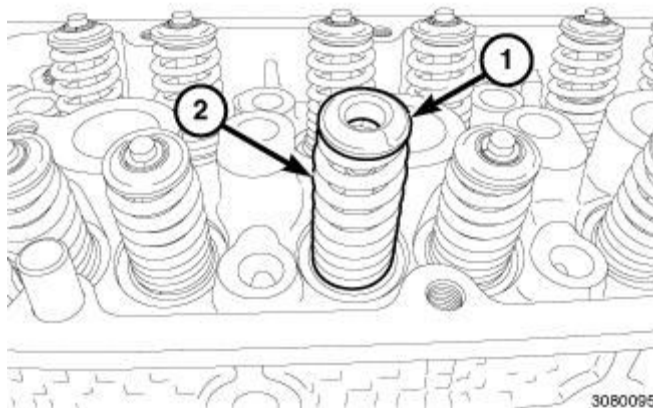


Fig. 168: Valve Spring & Retainer
Courtesy of CHRYSLER GROUP, LLC

4. Install the valve spring(s) (2). Refer to SPRING(S), VALVE, INSTALLATION .

NOTE: Reassemble the valves springs into their original locations. If the valves or valve seats have been refinished, verify that the valve spring installed height is within specification. Refer to **ENGINE SPECIFICATIONS** . Number 2 cylinder exhaust valve spring shown in illustration, all other valves springs similar.

5. Install the cylinder head. Refer to **CYLINDER HEAD, INSTALLATION** .

PUMP, VACUUM

DESCRIPTION

DESCRIPTION

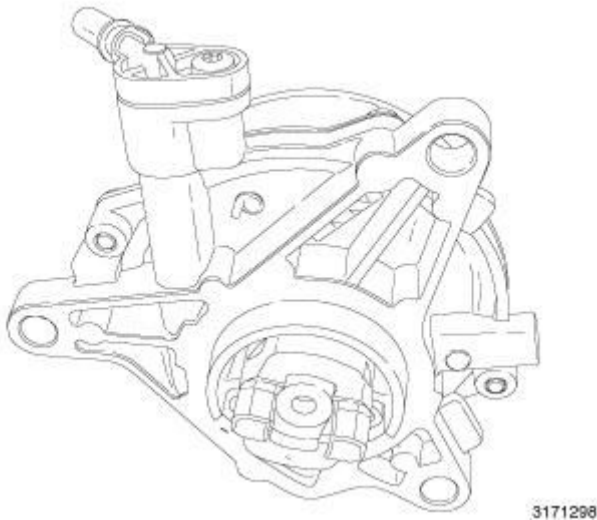


Fig. 169: Vacuum Pump
Courtesy of CHRYSLER GROUP, LLC

The vane-type vacuum pump is mounted to the rear of the cylinder head and is driven by the camshaft. The vacuum pump supplies vacuum to the brake booster.

REMOVAL

REMOVAL

1. Remove the engine cover. Refer to **RESONATOR, AIR CLEANER, REMOVAL** .
2. Remove the battery. Refer to **BATTERY, REMOVAL** .

NOTE: Oil may leak from the vacuum pump drive when the pump is removed. Place a shop towel under the pump to prevent oil leakage onto the engine or transmission assembly.

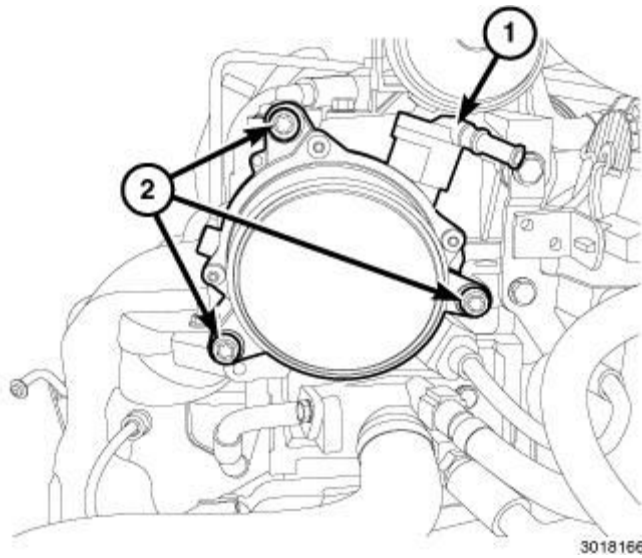


Fig. 170: Vacuum Pump & Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the vacuum line at the pump (1).
4. Remove the vacuum pump mounting bolts (2) and the vacuum pump.

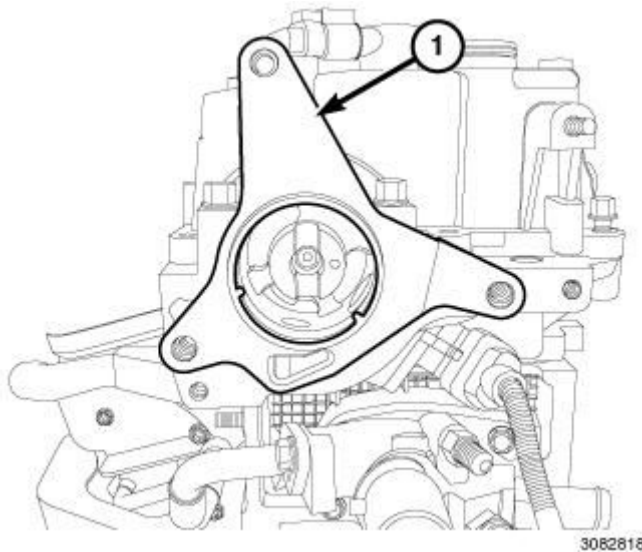


Fig. 171: Vacuum Pump Gasket
Courtesy of CHRYSLER GROUP, LLC

5. Remove and discard the vacuum pump gasket (1). Note the location of the pump drive tab.

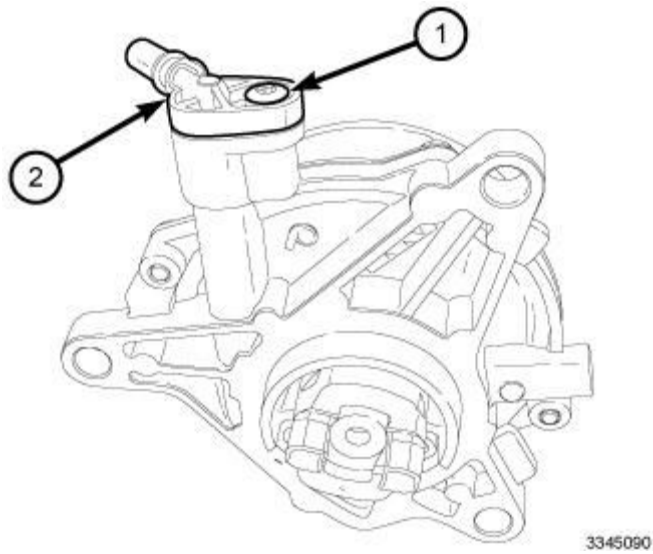


Fig. 172: Vacuum Fitting & Screw
Courtesy of CHRYSLER GROUP, LLC

6. If required, remove the screw (1) and the vacuum fitting (2).

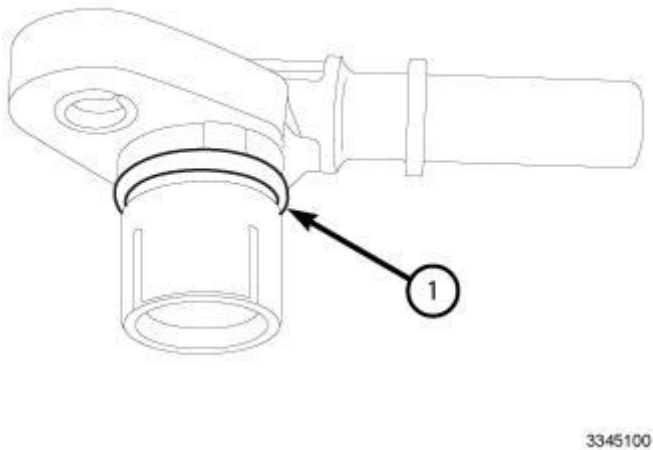
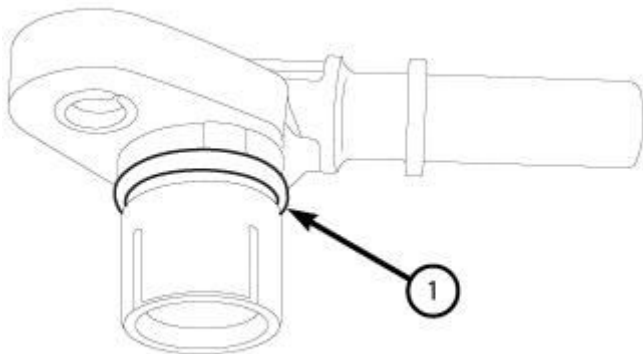


Fig. 173: Vacuum Fitting O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

7. The vacuum fitting O-ring seal (1) can be reused if not damaged.

INSTALLATION

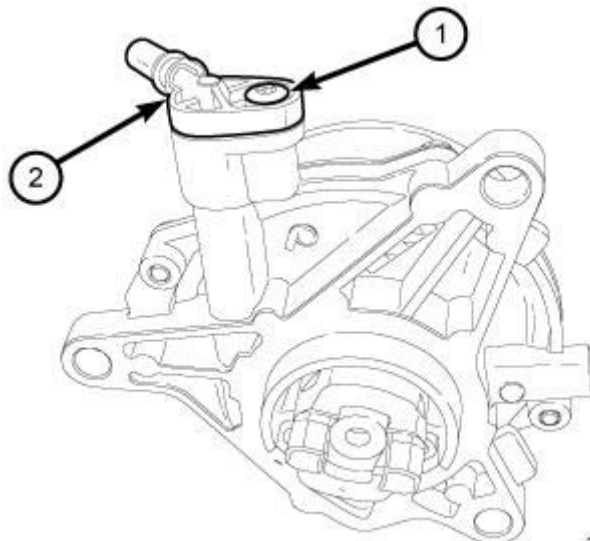
INSTALLATION



3345100

Fig. 174: Vacuum Fitting O-Ring Seal
 Courtesy of CHRYSLER GROUP, LLC

1. The vacuum fitting O-ring seal (1) can be reused if not damaged. If removed, lightly lubricate the O-ring seal (1) with clean engine oil and install on the vacuum fitting.



3345090

Fig. 175: Vacuum Fitting & Screw
 Courtesy of CHRYSLER GROUP, LLC

2. If removed, install the vacuum fitting (2) to the vacuum pump with the screw (1) tightened to 8 N.m (71 in. lbs.).
3. Clean the mating surfaces of the cylinder head and the vacuum pump. Install a new vacuum pump gasket.
4. Align the pump drive tab with the pump drive slot located on the cam shaft.
5. Install the vacuum pump mounting bolts. Tighten the bolts to 20 N.m (15 ft. lbs.).
6. Connect the vacuum supply line to the pump.

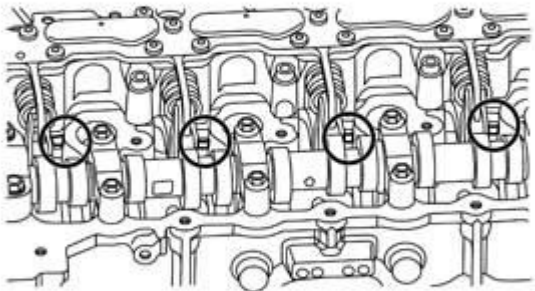
CAUTION: When servicing components near the vacuum pump, avoid contact with the plastic nipple that connects the vacuum pump to the brake booster hose. It is possible to crack the plastic nipple resulting in a brake booster vacuum leak.

7. Install the battery (4). Refer to **BATTERY, INSTALLATION**.
8. Install the engine cover. Refer to **RESONATOR, AIR CLEANER, INSTALLATION**.
9. Run the engine a check the vacuum pump for proper operation.

ASSEMBLY, VARIABLE VALVE ACTUATION

DESCRIPTION

DESCRIPTION



091072144

Fig. 176: Intake Valve Tips

Courtesy of CHRYSLER GROUP, LLC

The primary component of variable valve actuation is the variable valve actuation module. The variable valve actuation module is bolted to the top of the camshaft bearing housing above the intake valves, next to the camshaft. The intake lobes on the camshaft operate hydraulic pumping elements instead of directly acting on the valves. The pumping elements provide high-pressure oil to open the intake valves. The relationship between the camshaft lobe and the intake valves is controlled by a solenoid operated hydraulic port. By varying the solenoid operation, the Powertrain Control Module (PCM) is able to control intake valve lift and duration. The actuators sit directly on top of the intake valve tips (circled).

OPERATION

OPERATION

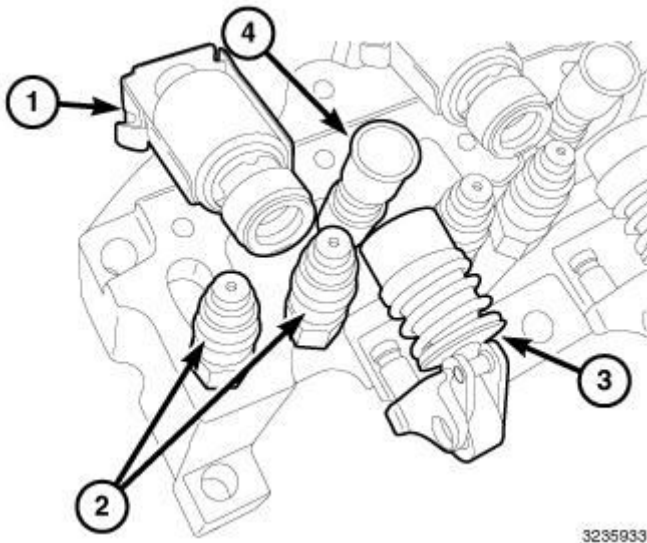


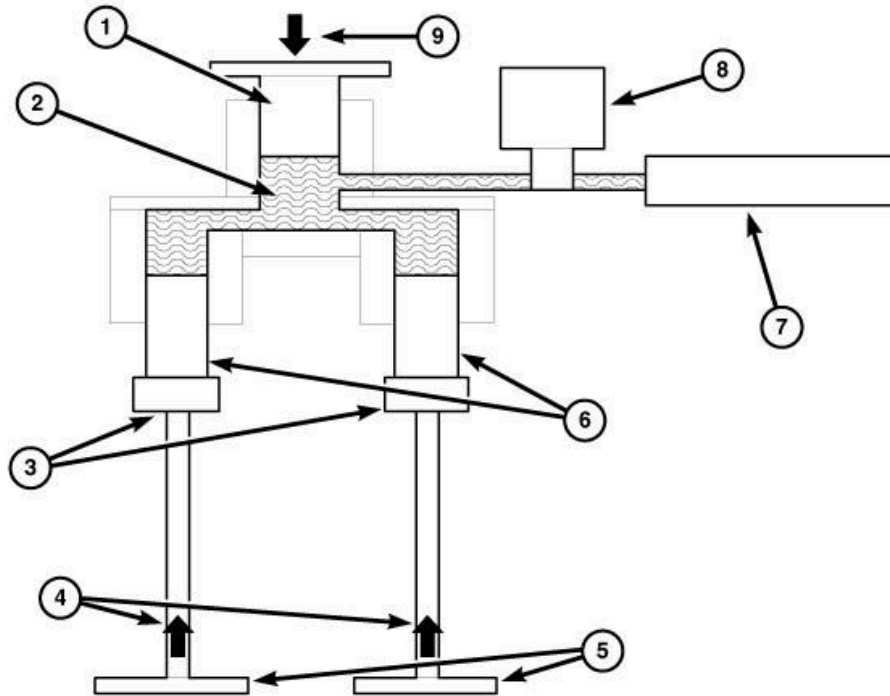
Fig. 177: Solenoid Valve, Hydraulic Brake Pumping Element/Hydraulic Lash Adjusters, Upper Pumping Element & Oil Accumulator

Courtesy of CHRYSLER GROUP, LLC

Variable valve actuation controls the operation of the intake valves. By using a hydraulic link between the camshaft and the intake valves, the valve lift and timing can be adjusted infinitely.

The main components of variable valve actuation are the Powertrain Control Module (PCM) programming and the variable valve actuation module. The variable valve actuation module contains one set of the following components for each cylinder:

- Upper Pumping Element (3)
- Solenoid Valve (1)
- Hydraulic Brake Pumping Element/Hydraulic Lash Adjusters (2)
- Oil Accumulator (4)



3296116

Fig. 178: Variable Valve Actuation Assembly Operating Description
Courtesy of CHRYSLER GROUP, LLC

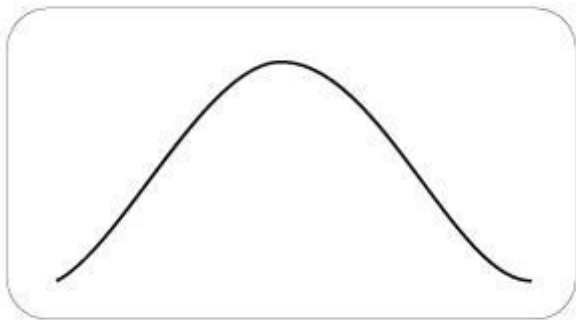
The upper pumping elements (1) in the variable valve actuator are filled with oil from the engine lubrication system. The upper pumping elements (1) are driven by the rocker arms through camshaft motion (9) to create high-pressure oil inside the oil chamber (2). As the camshaft continues to rotate and the camshaft lobe ramps down, a spring in the upper pumping element returns the piston and the rocker arm to their home positions.

The high-pressure oil in the oil chamber passageway is delivered to the solenoid valve (8) from the upper pumping element. The solenoid valve (8) is a normally open hydraulic control valve. Therefore, the high-pressure oil is vented from the oil chamber to the accumulator (7) unless the solenoid valve is powered. When the solenoid valve is supplied 12 volts, the valve closes and high pressure oil instead acts upon the hydraulic brake pumping elements (6) to operate the intake valves (5).

The hydraulic brake pumping element (6) is essentially a piston that is operated by the high-pressure oil to open the intake valves (5). It also functions as a brake to stop the movement of the pumping element and intake valves. The braking function is the result of vent holes around the perimeter of the element's cylinder. When the piston approaches full stroke, the lower perimeter vent holes bleed off oil. This stops the piston from moving any farther. When the pressure from the solenoid is taken away, the upper supply holes in the cylinder become bleed holes that allow the piston to return to the home position. The piston is pushed back to the home position by the force of the intake valve springs. As the piston approaches the home position, some of the bleed holes are covered and the speed of the piston is regulated as it approaches the final resting position. This also controls the valve speed as it seats in the cylinder head. The hydraulic brake pumping element also functions as a hydraulic lash adjuster (3) because the valve stem clearance is hydraulically taken up by the piston. This occurs because the hydraulic brake pumping element/hydraulic lash adjuster is always under some oil pressure from the engine oil lubrication system. This creates enough pressure to take up valve clearance.

The variable valve actuator features three areas that function together as an oil reservoir so that the actuator always has a ready supply of engine oil. The engine lubrication system provides oil to the lower reservoir area and keeps it full of oil. To flow from the lower reservoir to the upper reservoir, the oil must pass through very small holes. This helps to purge air from the lower reservoir and to maintain engine oil pressure in the lower reservoir. The third reservoir area, the oil accumulator (7), is filled by oil vented from the oil chamber by the solenoid valve (8). The oil accumulator is a spring loaded accumulator that absorbs the hydraulic shock that would otherwise be created when the solenoid valves are opened. This helps to increase the durability of the system, maintains higher pressure in the lower pressure side of the system and lowers the overall load on the engine oil pump.

Variable valve actuation provides five possible phases of operation. Each phase offers unique advantages compared to normal camshaft operation. The five phases are:

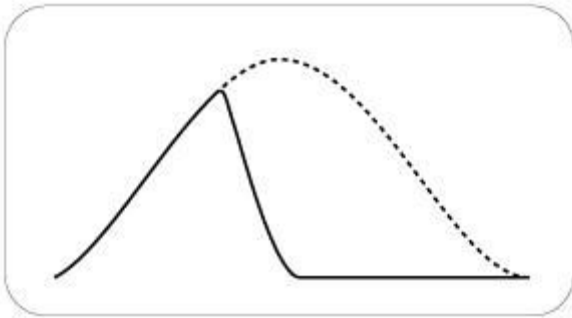


3250421

Fig. 179: Full Lift

Courtesy of CHRYSLER GROUP, LLC

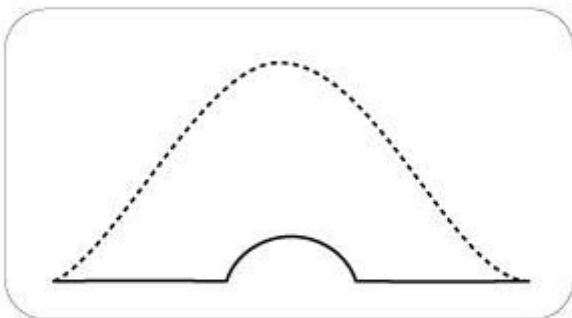
- Full Lift. When variable valve actuation functions in the full lift phase, all of the camshaft lobe lift is transferred to the intake valves. The intake camshaft lobe is designed with a very aggressive lift and duration profile. This results in good power in the upper RPM ranges with high loads. This profile would rarely be used in everyday driving.



3250433

Fig. 180: Early Intake Valve Closing (EIVC)
Courtesy of CHRYSLER GROUP, LLC

- Early intake valve closing (EIVC). When variable valve actuation functions in the EIVC phase, the camshaft lobe lift is transferred to the intake valves at the beginning of the lift duration cycle. However, the hydraulic connection between the camshaft lobe and the valves is taken away before the lobe reaches full lift. The exact timing and lift can be infinitely varied to meet driver requirements. EIVC provides smooth engine performance and more torque at lower engine speeds.

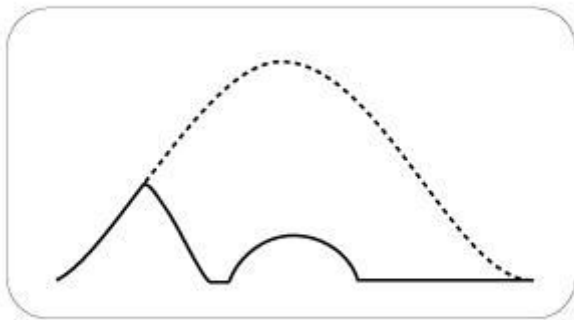


3250447

Fig. 181: Late Intake Valve Opening (LIVO)
Courtesy of CHRYSLER GROUP, LLC

- Late intake valve opening (LIVO). When variable valve actuation functions in the LIVO phase, the camshaft lobe lift is NOT transferred to the intake valves at the beginning of the lift duration cycle. The hydraulic connection between the camshaft lobe and the valves is completed after the rocker arm has already begun riding the ramp of the camshaft lobe. When the hydraulic connection is completed, the

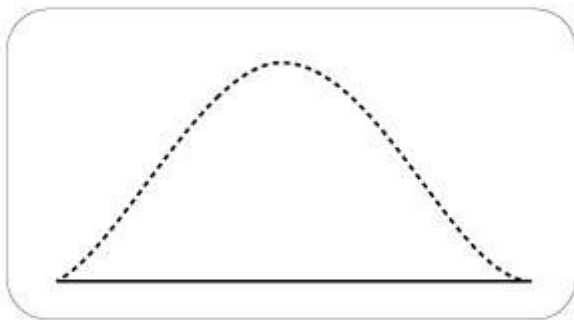
intake valves will begin to open. The valve lift timing can be varied infinitely within the full profile of the camshaft lobe. Therefore, as long as the hydraulic connection is completed before the camshaft lobe reaches its maximum lift, some valve lift will result. The lift profile will follow the camshaft lobe profile for the time that the hydraulic link is complete. Like EIVC, the exact timing and lift can be infinitely varied to meet driver requirements. LIVO provides lower emissions and a higher efficiency at lower loads or idle conditions.



3250458

Fig. 182: Multi-Lift**Courtesy of CHRYSLER GROUP, LLC**

- **Multi-Lift.** Multi-Lift is a combination of EIVC and LIVO because the hydraulic connection between the camshaft lobe and the intake valves is closed early and then re-opened later in the cycle. This creates a longer duration valve lift with a smaller amount of lift. The result is a higher velocity of air flow into the cylinder over a longer period of time. Multi-Lift may be used in mixed driving of acceleration and deceleration with moderate engine speeds.

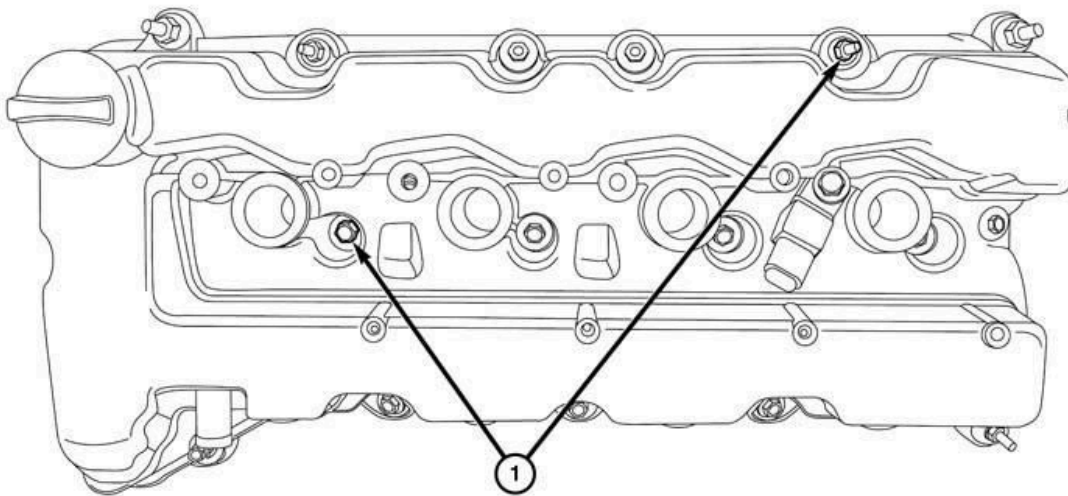


3250466

Fig. 183: Closed

Courtesy of CHRYSLER GROUP, LLC

- Closed. The closed phase simply leaves the intake valves closed by not utilizing the camshaft lobe to lift the intake valves.

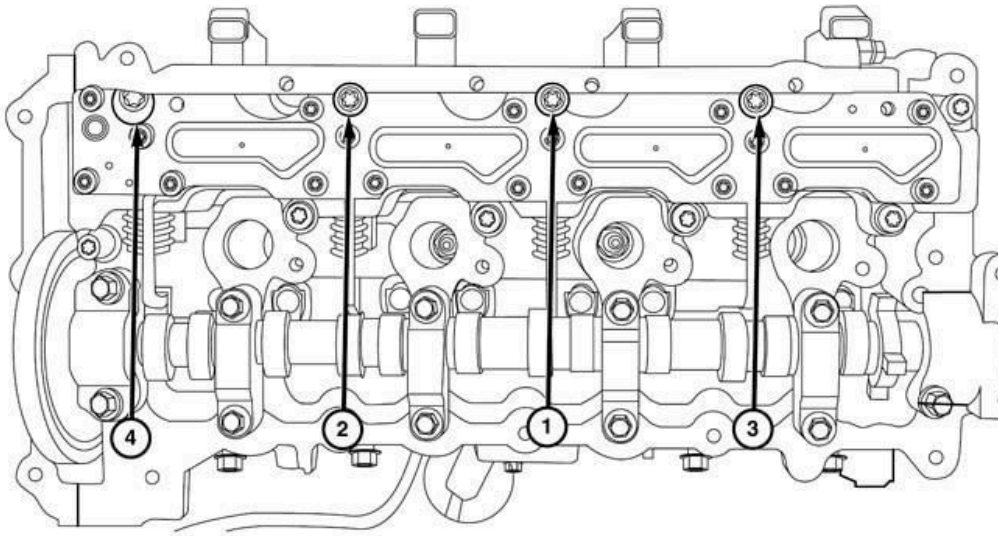
REMOVAL**REMOVAL**

091071574

Fig. 184: Cylinder Head Cover Bolts

Courtesy of CHRYSLER GROUP, LLC

1. Remove the cylinder head cover bolts (1). Remove the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, REMOVAL** .
2. Unlock and disconnect the four variable valve timing actuator electrical connectors.



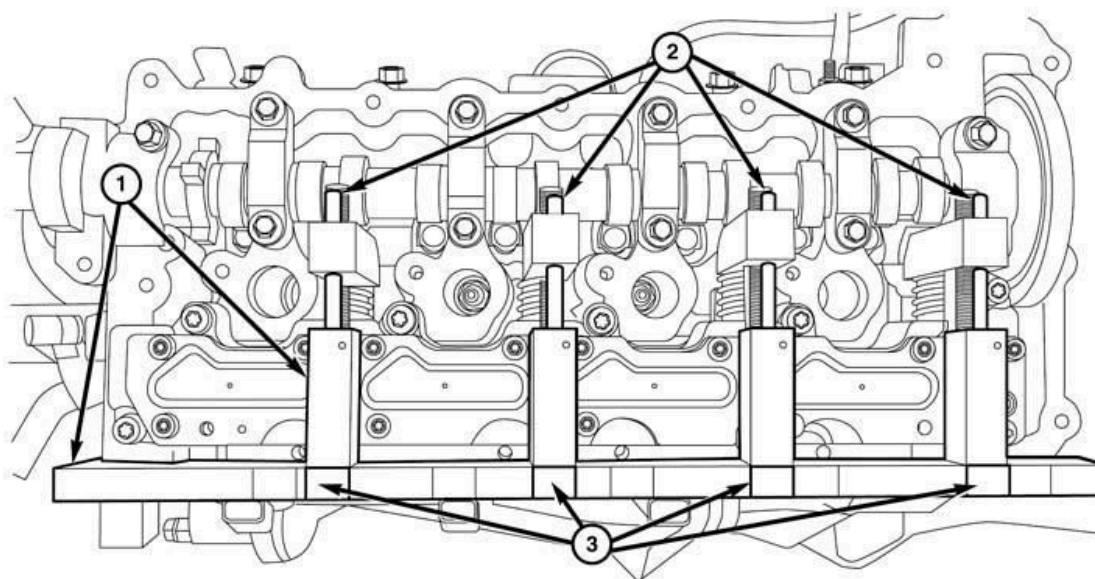
091071569

Fig. 185: VVAA Block Removal Sequence (1 Of 2)
Courtesy of CHRYSLER GROUP, LLC

3. Remove four bolts from the VVAA block.

NOTE: The bolts need to be removed prior to the installation of the compressor tool due to the tool obstructs access to these bolts once the tool is installed.

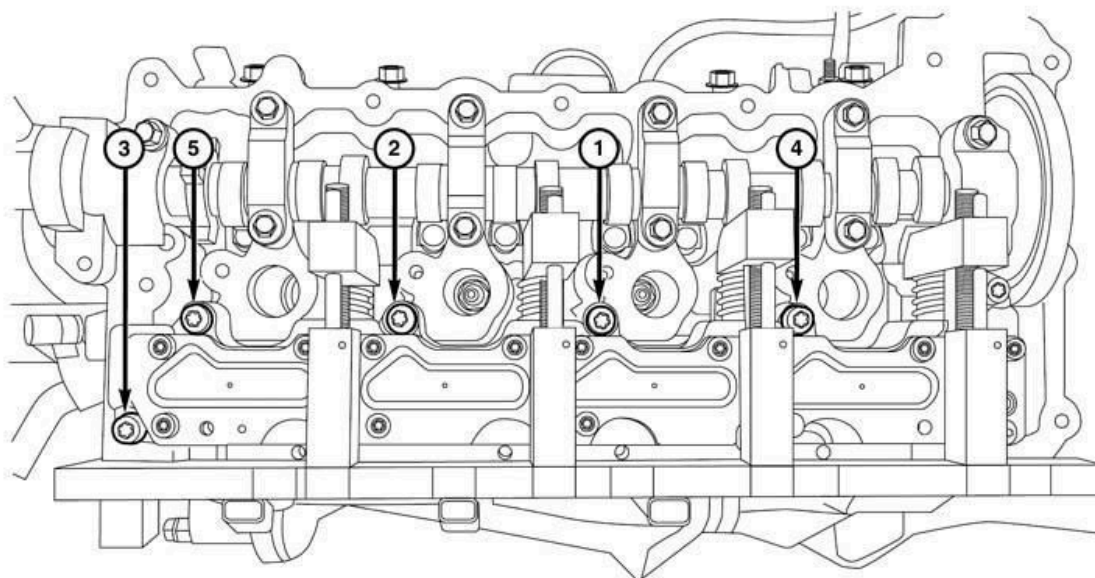
NOTE: Be sure to follow the sequence shown in illustration above when removing the bolts.



091071570

Fig. 186: Special Tool, Spring Compressor & Indicators
Courtesy of CHRYSLER GROUP, LLC

4. Using special tool 10259A (1), loosen the spring compressors (2) to fit over the valve and spring assemblies. Adjust the tool to align with the 2.4L indicators (3).
5. Install the (special tool #10259B, Compressor, MultiAir® Spring) spring compressor.
6. Rotate the spring compressors counterclockwise until the springs are fully seated.



091071572

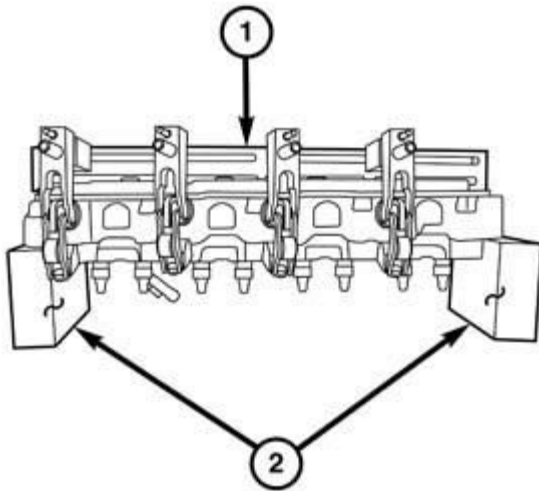
Fig. 187: VVAA Block Removal Sequence (2 Of 2)
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not invert the variable valve actuation assembly when it is removed from the engine. Oil will drain from the assembly and excessive engine cranking will be required to refill the assembly and start the engine.

7. Remove the remaining five bolts from the VVAA.

NOTE: Be sure to follow the sequence shown in illustration above when removing the bolts.

8. Remove the variable valve timing actuation assembly, with the spring compressor attached, from the camshaft bearing housing.



090772120

Fig. 188: VVAA Assembly On Blocks Of Wood
Courtesy of CHRYSLER GROUP, LLC

9. Set the assembly (1) onto two blocks of wood (2) to store during repairs.

NOTE: Be sure to store the assembly in the upright position
AT ALL TIMES
to prevent oil related issues within the assembly.

NOTE: There are two locating pins/dowels that properly position the VVAA. Be careful that both dowels remain installed in cylinder head after removing

the VVAA. If a dowel comes loose,

locate the missing dowel and discard it

A new dowel will need to be used upon installation.

DO NOT REUSE A DOWEL THAT HAS BEEN REMOVED FROM THE CYLINDER HEAD.

10. Remove and discard the variable valve actuation assembly gasket.

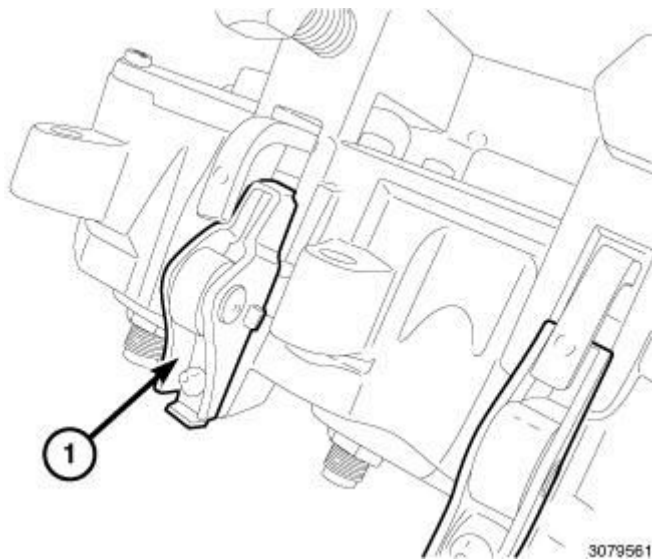


Fig. 189: Rocker Arms

Courtesy of CHRYSLER GROUP, LLC

11. If required, remove the rocker arms. Refer to **ROCKER ARM, VALVE, REMOVAL** .

INSPECTION

INSPECTION

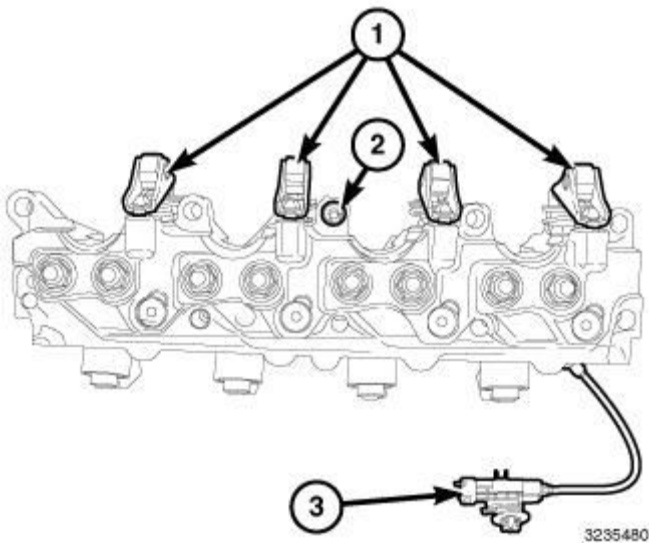


Fig. 190: Valve Rocker Arms, Oil Supply O-Ring & Oil Temperature Sensor
Courtesy of CHRYSLER GROUP, LLC

Because variable valve actuation is so closely monitored, the diagnostics of the system are strongly Diagnostic Trouble Code (DTC) driven. If the system does not perform according to design, many DTC's may be produced from a condition in the variable valve actuation system.

The variable valve actuation module includes very few serviceable components. The module has no internal components that are serviceable. The following components are serviceable:

- Valve rocker arms (1)
- Oil supply O-ring (2)
- Oil temperature sensor (3)

INSTALLATION

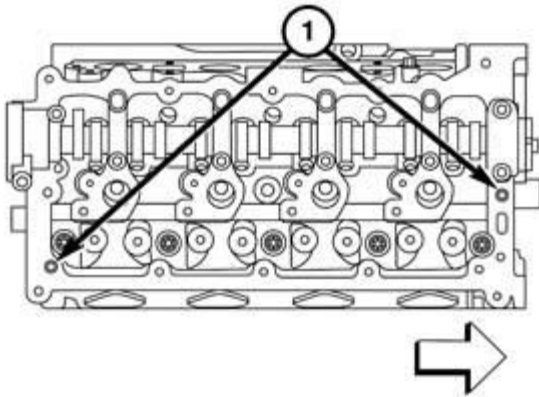
INSTALLATION



A multimedia supplement to the instructions contained in this article is available.

To view the multimedia example of the condition described go to;

<http://www.youtube.com/user/Mitchell1Tips>
then type "A00641417.vid1" into the "Search Channel" box.

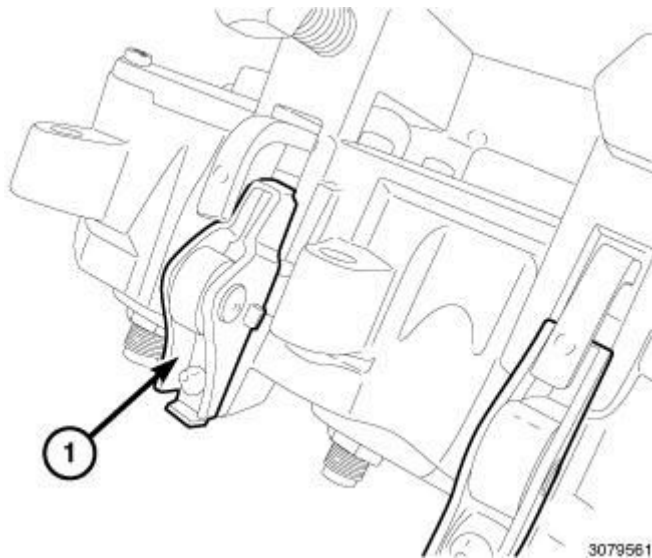


090772121

Fig. 191: Locating Pins

Courtesy of CHRYSLER GROUP, LLC

1. If the dowel/locating pins were removed, install two **NEW** variable valve actuation assembly locating pins (1).

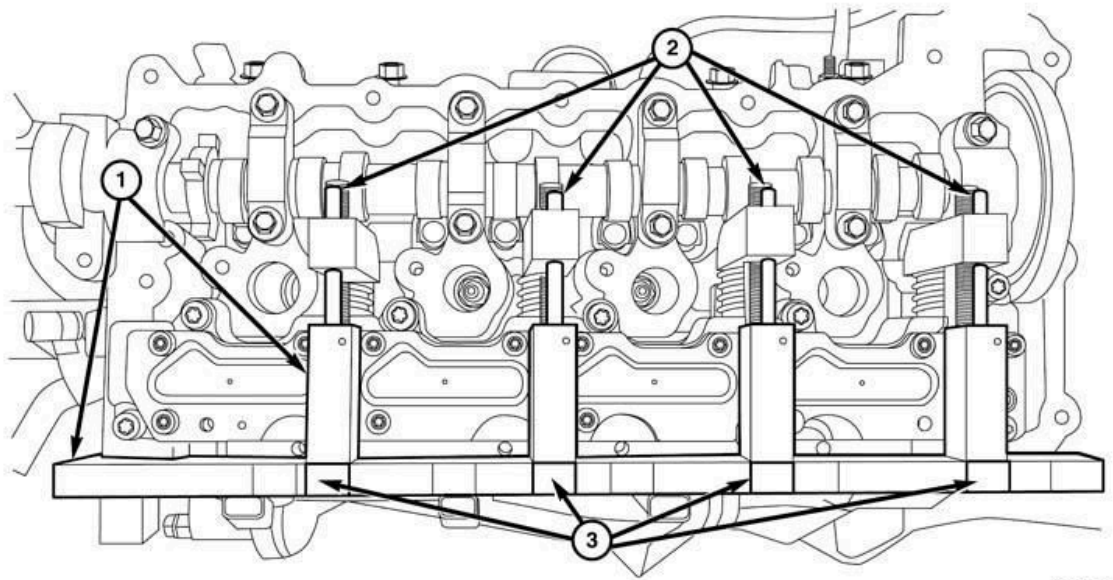


3079561

Fig. 192: Rocker Arms

Courtesy of CHRYSLER GROUP, LLC

2. If removed, install the rocker arms (1). Refer to **ROCKER ARM, VALVE, INSTALLATION** .



091071570

Fig. 193: Special Tool, Spring Compressor & Indicators
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not invert the variable valve actuation assembly when it is removed from the engine. Oil will drain from the assembly and excessive engine cranking will be required to refill the assembly and start the engine.

3. Rotate the spring compressors (2) counterclockwise until fully seated.
4. Install a **new** gasket.

NOTE: To assist in the proper placement of the assembly, it is recommended to apply **NEW/CLEAN MS-272** white grease or similar like Vaseline® onto the tips of the plungers to hold them in the retracted position. This will help to locate the assembly correctly while preventing the plunger tips from interfering with the valve stem tips. Use just enough to hold the plungers retracted.

5. Set the VVAA into position onto the two dowels.

NOTE: It is very important that the plungers of the VVAA are centered over the valve stem tips. When properly aligned, the VVAA will set down onto the cylinder head evenly and will not have a tendency to wobble when set onto the head.

NOTE: The VVAA should sit relatively flush to cylinder head with no more than a 1 to 2 mm gap between the mating surfaces. An excessive gap indicates the VVAA is not seated properly.

6. Visually inspect the alignment of the VVAA plungers.

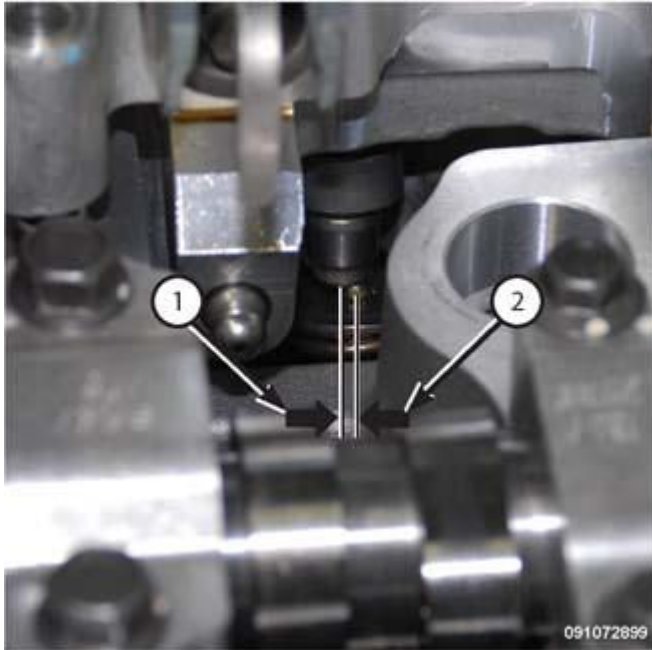


Fig. 194: Improperly Aligned VVAA
Courtesy of CHRYSLER GROUP, LLC

7. This is a visual indication of an IMPROPERLY aligned VVAA. The centerline of the plunger (1) and the centerline of the valve stem (2) are misaligned.

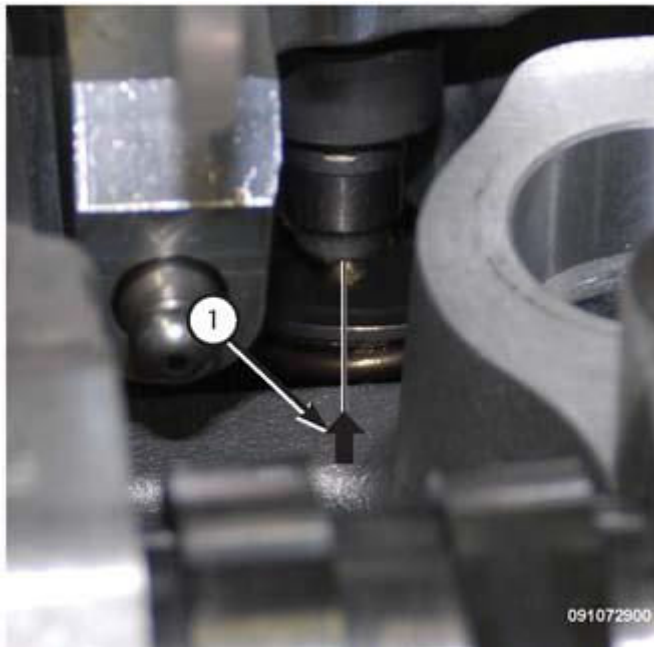
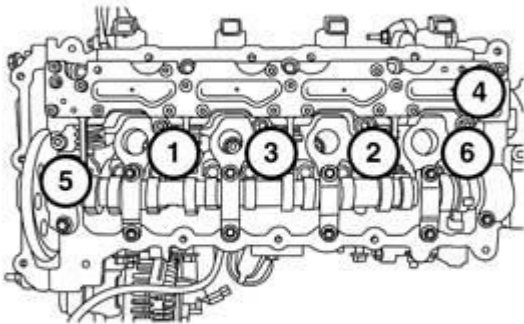


Fig. 195: Properly Aligned VVAA
Courtesy of CHRYSLER GROUP, LLC

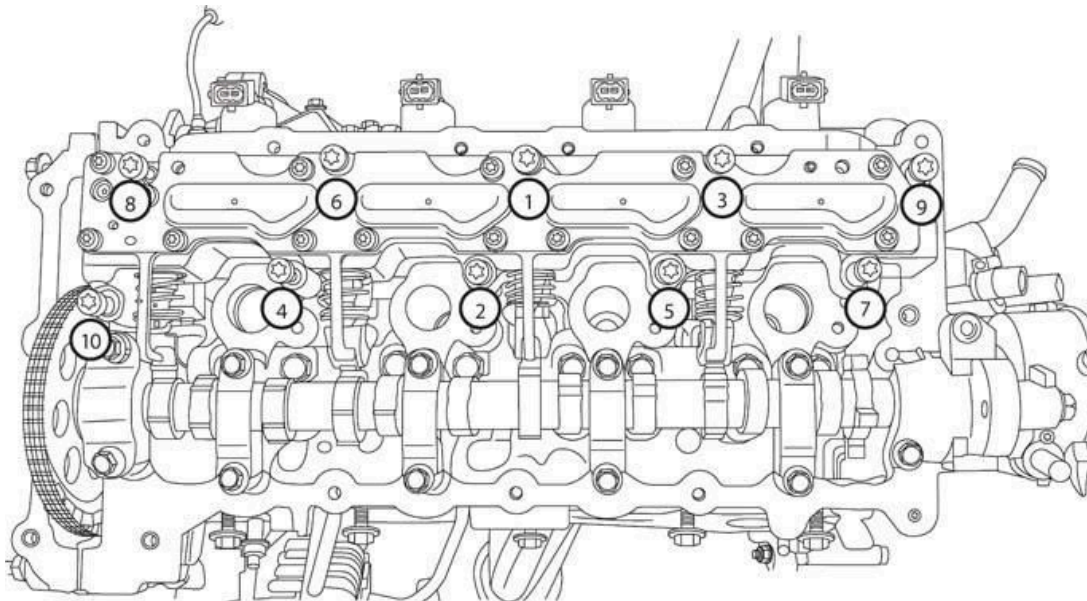
8. This is a visual indication of a PROPERLY aligned VVAA. The centerline (1) of both the plunger and the valve stem are aligned.



091072145

Fig. 196: Six VVAA Retaining Bolts Hand Tightening Sequence
 Courtesy of CHRYSLER GROUP, LLC

9. Install the six accessible bolts. Hand tighten the VVAA retaining bolts.

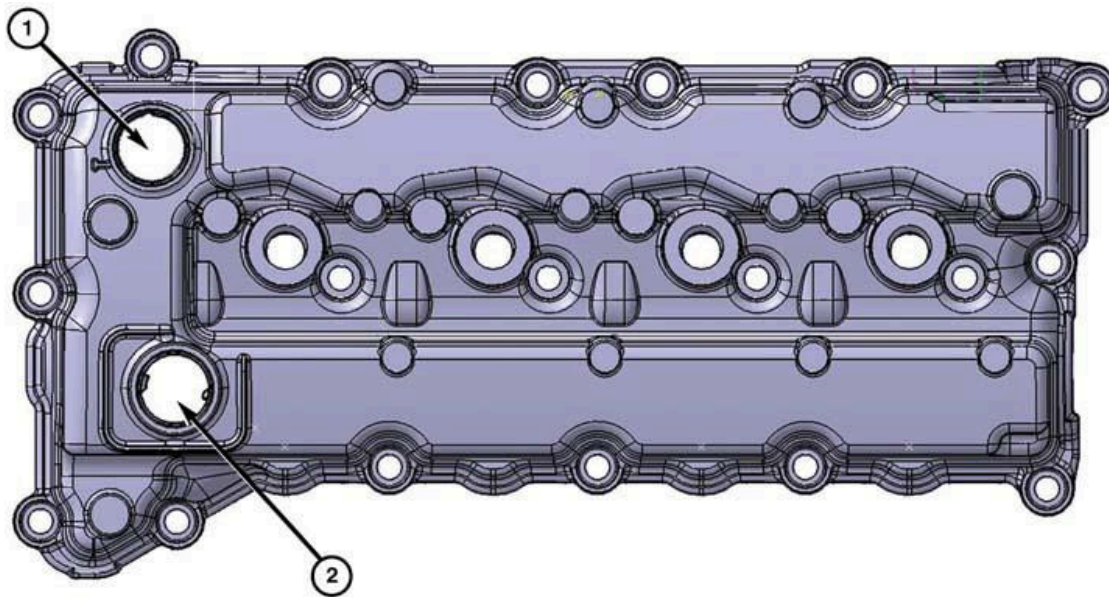


0910021157

Fig. 197: Variable Valve Actuation Assembly Tightening Sequence

Courtesy of CHRYSLER GROUP, LLC

10. Remove the spring compressor and tighten the ten bolts in three steps following the sequence shown in illustration:
 - Step 1: All to 10 N.m (89 in. lbs.).
 - Step 2: All to 22 N.m (16 ft. lbs.).
 - Step 3: All again to 22 N.m (16 ft. lbs.).
11. Connect and lock the four variable valve timing actuator electrical connectors.
12. Connect and lock the oil temperature sensor electrical connector.
13. Engage the oil temperature electrical connector to the bracket.



0910021156

Fig. 198: Cylinder Head Cover
Courtesy of CHRYSLER GROUP, LLC

14. Install the cylinder head cover. Refer to COVER(S), CYLINDER HEAD, INSTALLATION .

NOTE: If the VVAA is being replaced (new part), it is recommended that the VVAA be primed with NEW/CLEAN oil after installation. This will limit the amount of time it takes for the assembly to fill while cranking the engine. If the cylinder head cover is installed the service port can be accessed through the opening at the rear of the cover (1).

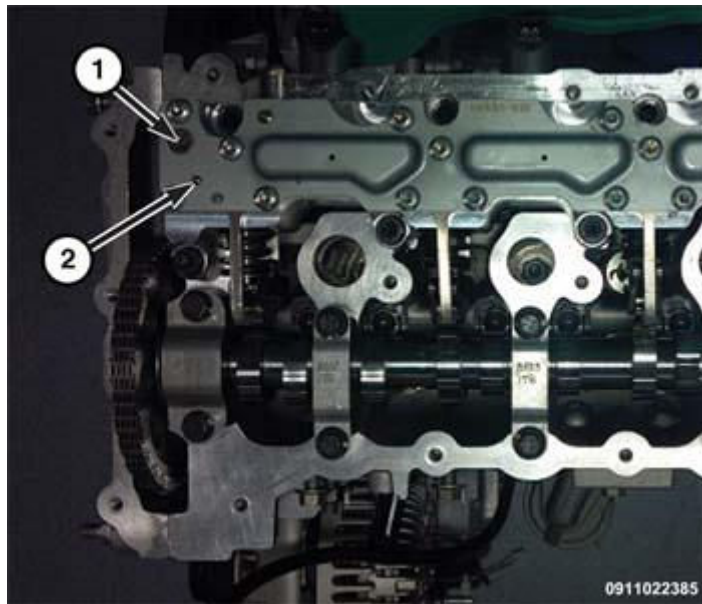


Fig. 199: Service Port & Bleed Port
Courtesy of CHRYSLER GROUP, LLC

15. Using an oil can with a **CLEAN** soft tip or similar tool like a **NEW** plastic syringe, force **CLEAN, UNUSED** oil into the service port (1). Continue to inject oil until oil flows continuously from the bleed port (2) or until a maximum of 200 mL has been injected.
16. The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components. .

ENGINE BLOCK

DESCRIPTION

DESCRIPTION

The die cast aluminum cylinder block is a two-piece assembly, consisting of the cylinder block and ladder frame. The block is an open deck design with cast in place cast iron cylinder liners. The cast iron cylinder liners are recessed below the aluminum deck surface. The ladder frame bolts to the cylinder block and does not incorporate the main bearing caps. This design offers a much stronger lower end and increased cylinder block and transaxle rigidity. The rear oil seal retainer is integral with the block and ladder frame. The ladder frame and block are serviced as an assembly.

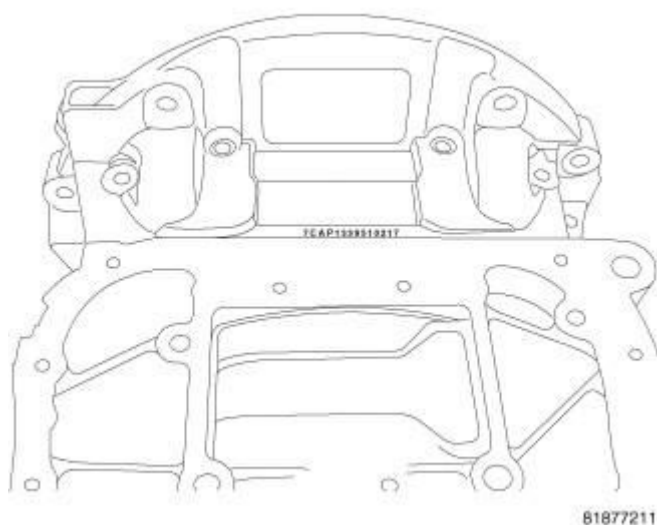


Fig. 200: Serial Number Location
Courtesy of CHRYSLER GROUP, LLC

The engine serial number is located on the bottom of the ladder frame just behind the oil pan. The date can be seen with the oil pan in place.

STANDARD PROCEDURE

CYLINDER BORE DEGLAZING

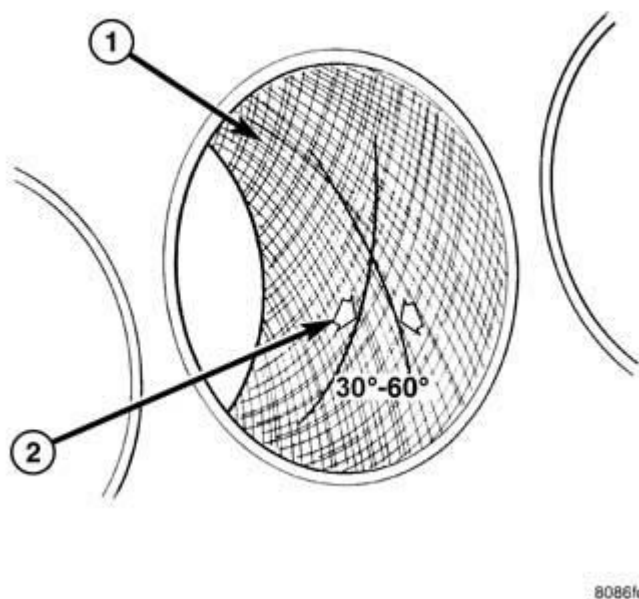


Fig. 201: Cylinder Bore Crosshatch Pattern
Courtesy of CHRYSLER GROUP, LLC

Before deglazing, mask the crankcase area to keep abrasive materials from entering the engine lower end. Tape off any openings to prevent abrasive material from entering the coolant and oil circuits.

CAUTION: DO NOT use rigid type hones to remove cylinder wall glaze.

1. Select an appropriate size flexible ball hone.
2. Deglazing of the cylinder walls may be done if the cylinder bore is straight and round. About 20-60 strokes, depending on the condition of the cylinder bore, will be sufficient to provide a satisfactory surface. Use a light **honing** oil, available from major oil distributors.

CAUTION: DO NOT use engine or transmission oil, mineral spirits, or kerosene.

3. Deglazing should be done by moving the hone up and down fast enough to get a crosshatch pattern. The hone marks should intersect at 30° to 60° inclusive angle for proper seating of rings.
4. A controlled hone motor speed between 200 and 300 RPM is necessary to obtain the proper crosshatch angle (1). The number of up and down strokes per minute can be regulated to get the desired 30° to 60° inclusive angle (2). Faster up and down strokes increase the crosshatch angle.
5. After deglazing, it is necessary that the block be cleaned to remove all traces of abrasive. Use a brush to wash parts with a solution of hot water and detergent. Dry parts thoroughly. Use a clean, white, lint-free cloth to check that the bore is clean. Oil the bores after cleaning to prevent rusting. Upon completion, perform a visual inspection of the cylinder block passages to inspect for abrasive debris. If any debris is found, repeat the cleaning process.

NOTE: **Cylinder bore diameter should not increase more than 20 microns during deglazing process from original nominal bore diameter, if the maximum of 20 microns is exceeded, the cylinder block must be replaced. If deglazing the cylinder bore cannot remove the light scratches and scuffs the cylinder block should be replaced.**

MEASURING BEARING CLEARANCE USING PLASTIGAGE

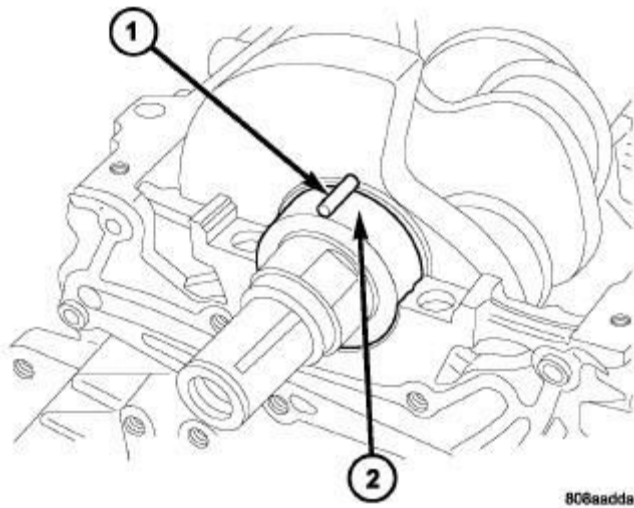


Fig. 202: Plastigage Placed In Lower Shell
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical crankshaft journal shown in illustration.

Engine crankshaft and connecting rod bearing clearances can be determined by the use of Plastigage or equivalent. The following is the recommended procedure for the use of Plastigage:

1. Remove the oil film from surface to be checked. Plastigage is soluble in oil.
2. Place a piece of Plastigage (1) across the entire width of the journal (In addition, suspected areas can be checked by placing the Plastigage in the suspected area). Plastigage must not crumble in use. If brittle, obtain fresh stock.
3. Torque the bearing cap bolts of the bearing being checked to the proper specification. Refer to **TORQUE SPECIFICATIONS** .

NOTE: **DO NOT rotate the crankshaft. Plastigage will smear, causing inaccurate results.**

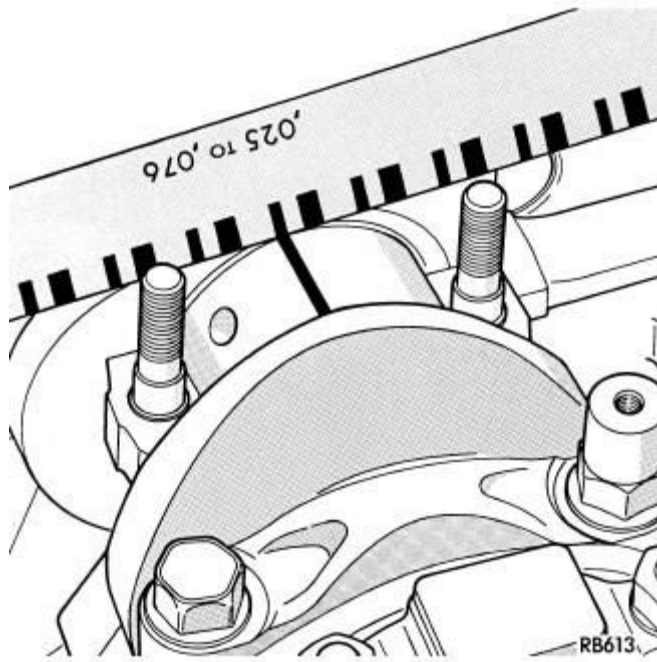


Fig. 204: Checking Connecting Rod Bearing Clearance With Plastigage
Courtesy of CHRYSLER GROUP, LLC

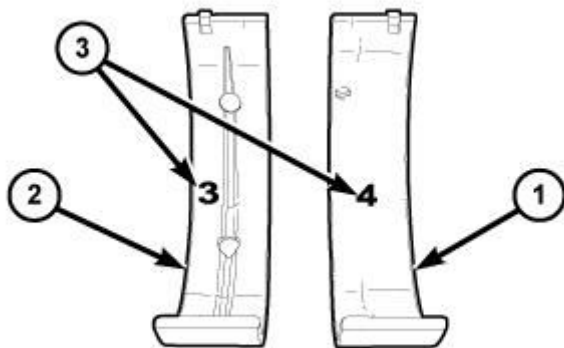
NOTE: Typical connecting rod journal shown in illustration.

NOTE: Plastigage is available in a variety of clearance ranges. Use the most appropriate range for the specifications you are checking. Plastigage generally is accompanied by two scales. One scale is in inches, the other is a metric scale.

6. Install the proper bearings to achieve the specified bearing clearances.
7. Repeat the Plastigage measurement to verify your bearing selection prior to final assembly.

INSPECTION

INSPECTION



2767936

Fig. 205: Main Bearing Inserts

Courtesy of CHRYSLER GROUP, LLC

1. Wipe the bearing inserts (1, 2) clean.
2. Inspect the inserts for abnormal wear patterns, scoring, grooving, fatigue, pitting and for metal or other foreign material imbedded in the lining.
3. Inspect the back of the inserts for fractures, scrapes, or irregular wear patterns.
4. Inspect the insert locking tabs for damage.
5. Inspect the crankshaft thrust washers for scoring, scratches, wear or blueing.
6. Replace any bearing that shows abnormal wear. Refer to **BEARING(S), CRANKSHAFT, MAIN - STANDARD PROCEDURE** .
7. Inspect the main bearing bores for signs of scoring, nicks and burrs.
8. If the cylinder block main bearing bores show damage the engine block must be replaced.

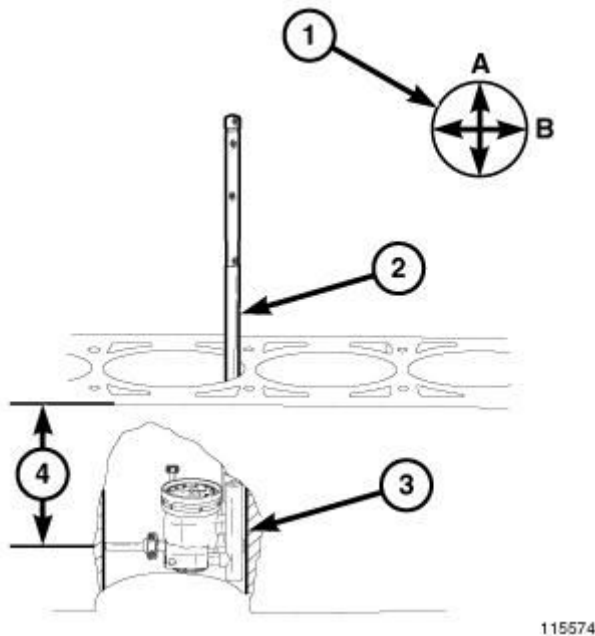


Fig. 206: Measuring Cylinder Bore Diameter
 Courtesy of CHRYSLER GROUP, LLC

9. Use the Cylinder Indicator (special tool #C-119, Cylinder Indicator) (2) to correctly measure the inside diameter of the cylinder bore (3). A cylinder bore gauge capable of reading in 0.003 mm (0.0001 in.) INCREMENTS is required. If a bore gauge is not available, do not use an inside micrometer.
10. Measure the inside diameter of the cylinder bore at three levels below the top of the bore (4). Start at the top of the bore, perpendicular (across or at 90 degrees) to the axis of the crankshaft at point A (1).
11. Repeat the measurement near the middle of the bore, then repeat the measurement near the bottom of the bore.
12. Determine taper by subtracting the smaller diameter from the larger diameter.
13. Rotate the Cylinder Indicator 90° to point B (1) and repeat the three measurements. Verify that the maximum taper is within specification. Refer to **ENGINE SPECIFICATIONS**.
14. Determine out-of-roundness by comparing the difference between A and B at each of the three levels. Verify that the maximum out of round is within specification. Refer to **ENGINE SPECIFICATIONS**.
15. If cylinder bore taper and out-of-roundness are within specification, the cylinder bore can be honed. Refer to **ENGINE BLOCK - STANDARD PROCEDURE**. If the cylinder bore taper or out-of-round condition exceeds the maximum limits, the cylinder block must be replaced.

NOTE: A slight amount of taper always exists in the cylinder bore after the engine has been in use for a period of time.

BEARING(S), CONNECTING ROD

STANDARD PROCEDURE

STANDARD PROCEDURE - CONNECTING ROD - FITTING

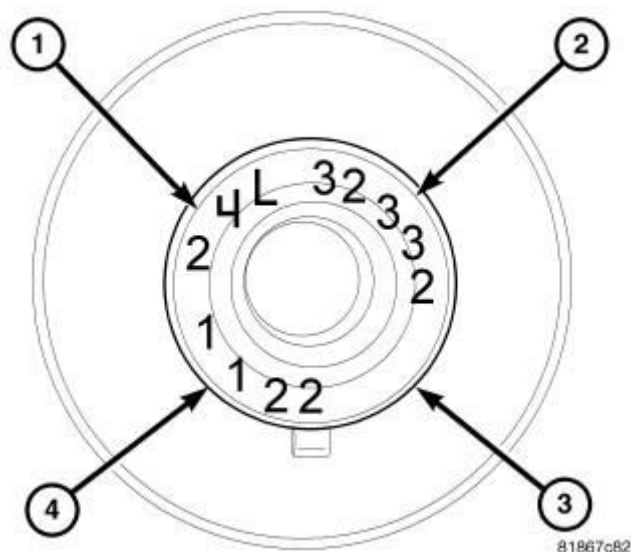


Fig. 207: Bearing Selection

Courtesy of CHRYSLER GROUP, LLC

There are three different sizes of rod bearings available. Connecting rod bearing identification (4) can be found on the nose of the crankshaft (3). Use the table below for proper bearing selection:

CONNECTING ROD BEARING SELECTION

CRANKSHAFT PIN DIAMETER GRADE	DIMENSION	CONNECTING ROD BEARING CLASSIFICATION	CONNECTING ROD BEARING DIMENSION
1	48 mm	1 (Black)	1.5 mm
2	48 mm	2 (No Color)	1.5 mm
3	48 mm	3 (Green)	1.5 mm

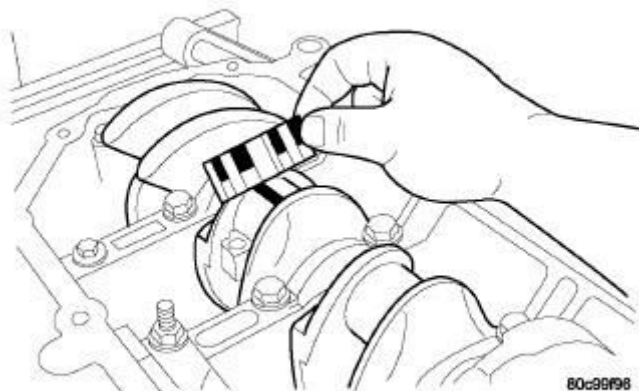


Fig. 208: Connecting Rod Bearing Clearance - Typical
Courtesy of CHRYSLER GROUP, LLC

1. For measuring connecting rod bearing clearance procedure and use of Plastigage, refer to **ENGINE - STANDARD PROCEDURE** . For bearing clearance, refer to **ENGINE SPECIFICATIONS** .

NOTE: **The rod bolts should not be reused.**

2. Before installing the **NEW** rod bolts the threads and under the bolt head should be oiled with clean engine oil.
3. Install each bolt finger tight then alternately tighten each bolt to assemble the cap properly.
4. Tighten the connecting rod bolts using the 2 step torque-turn method. Tighten according to the following values:

CAUTION: Do not use a torque wrench for the second step.

- Tighten the bolts to 20 N.m (15 ft. lbs.).
- Tighten the connecting rod bolts an additional 90°.

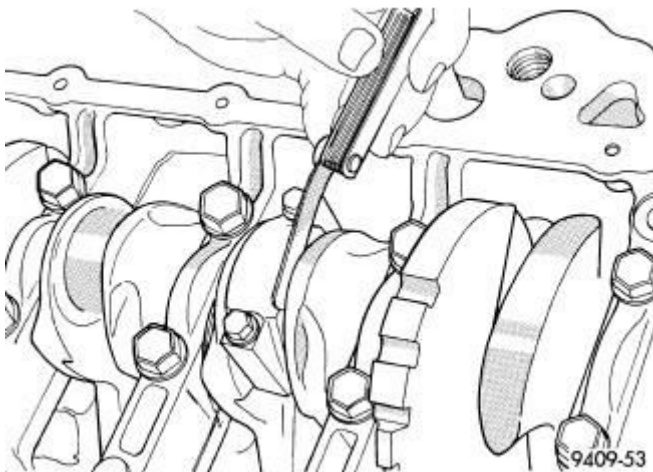
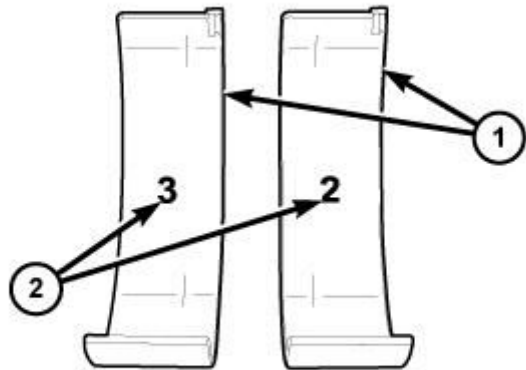


Fig. 209: Connecting Rod Side Clearance
Courtesy of CHRYSLER GROUP, LLC

5. Using a feeler gauge, check connecting rod side clearance. For clearance specifications, refer to **ENGINE SPECIFICATIONS** .

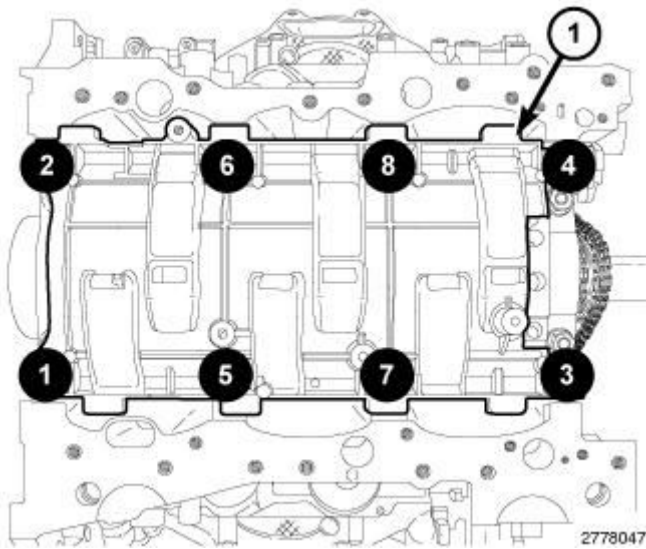
CONNECTING ROD BEARING REPLACEMENT



2769568

Fig. 210: Connecting Rod Bearing Shells & Bearing Size
 Courtesy of CHRYSLER GROUP, LLC

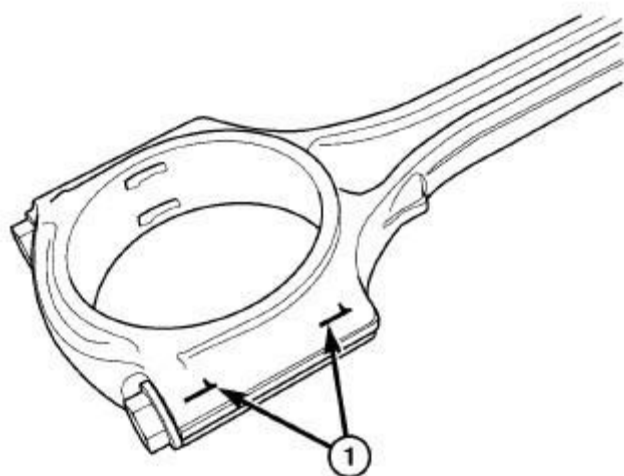
The connecting rod bearings (1) are serviced in-vehicle. They must be replaced one-at-a-time in order to prevent the pistons from contacting the valves. The connecting rod bearings are "select fit" to achieve proper oil clearances. Refer to **BEARING(S), CONNECTING ROD - STANDARD PROCEDURE** .



2778047

Fig. 211: Main Bearing Cap Bolts From Windage Tray Removal Sequence
 Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the spark plugs. Refer to **SPARK PLUG, REMOVAL** .
3. Remove the oil pan, oil pump pick-up and engine oil pump. Refer to **PUMP, ENGINE OIL, REMOVAL** .
4. Remove the eight main bearing cap bolts in the sequence shown.



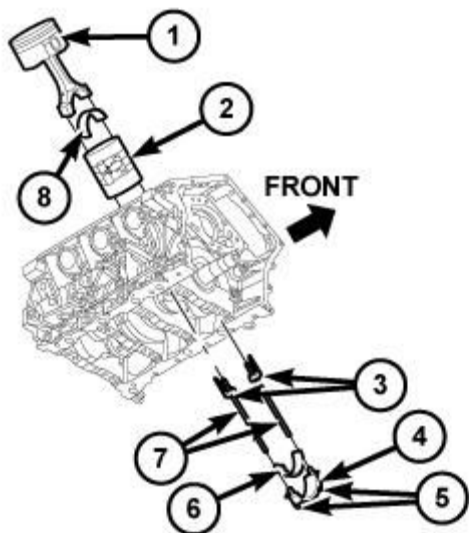
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Fig. 212: Connecting Rod To Cylinder Identification
Courtesy of CHRYSLER GROUP, LLC

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods or caps, as damage to connecting rods could occur

NOTE: Connecting rods and bearing caps are not interchangeable and should be marked before removing to ensure correct reassembly.

5. Mark connecting rod and bearing cap positions (1) using a permanent ink marker or scribe tool.



2778313

Fig. 213: Piston, Connecting Rod Cap, Bolts, Plastic Guide Plates & Guide Pins
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical V6 engine configuration shown.

CAUTION: Replace only one connecting rod bearing at a time while all other connecting rod bearing caps remain properly tightened. If all connecting rod bearing caps are removed, crankshaft rotation will result in valve and/or piston damage.

CAUTION: Care must be taken not to damage the fractured rod and cap joint face surfaces, as engine damage may occur.

6. Remove the connecting rod cap bolts (5) and the connecting rod cap (4). Discard the cap bolts.
7. Remove the plastic guide plates (3) from the Guide Pins (special tool #8189, Guide Pins) (7) and install the Guide Pins to the connecting rod being removed.

CAUTION: Care must be taken not to nick crankshaft journals, as engine damage may occur.

8. Rotate the crankshaft away from the connecting rod and remove the bearing shell.
9. If required, select and fit new bearings to the connecting rod. Refer to **BEARING(S), CONNECTING ROD - STANDARD PROCEDURE**.
10. Install the bearing shell (8) on the connecting rod with the tang inserted into the machined groove in the rod. Lubricate the bearing surface with clean engine oil.
11. Rotate the crankshaft while guiding the connecting rod into position over the rod journal.

CAUTION: The connecting rod bolts must not be reused. Always replace the connecting rod bolts whenever they are loosened or removed.

12. Install the bearing shell (6) on the connecting rod cap (4) with the tang inserted into the machined groove in the cap. Lubricate the bearing surface with clean engine oil.

NOTE: Do not lubricate the threads of the connecting rod cap bolts (5).

13. Install the connecting rod cap and bearing with the tang on the same side as the rod. Tighten the **NEW** connecting rod cap bolts (5) to 20 N.m (15 ft. lbs.) plus 90°.
14. If required, check the connecting rod side clearance. Refer to **ROD, PISTON AND CONNECTING - STANDARD PROCEDURE**.
15. Repeat the previous steps for each connecting rod bearing being replaced.

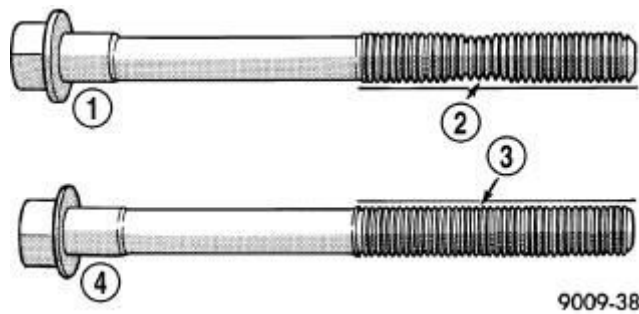


Fig. 214: Checking Cylinder Head Bolts For Stretching (Necking)
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The main bearing cap bolts are tightened using a torque plus angle procedure. The bolts must be examined **BEFORE** reuse. If the threads are necked down the bolts must be replaced.

16. Check the main bearing cap bolts for necking by holding a scale or straight edge against the threads. If all the threads do not contact the scale (2) the bolt must be replaced.

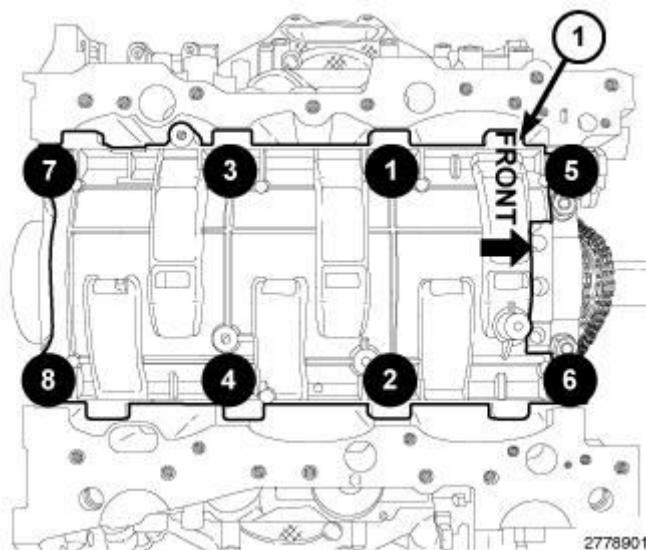


Fig. 215: Windage Tray With Main Bearing Cap Bolts Installation Sequence
Courtesy of CHRYSLER GROUP, LLC

17. Install the eight main bearing cap bolts. Tighten the bolts in the sequence shown to 21 N.m (16 ft. lbs.) plus 90°.
18. Install the engine oil pump, oil pump pick-up and oil pan. Refer to **PUMP, ENGINE OIL, INSTALLATION**.
19. Install the spark plugs and ignition coils. Refer to **SPARK PLUG, INSTALLATION**.
20. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL - STANDARD PROCEDURE**.
21. Connect the battery negative cable and tighten nut to 5 N.m (45 in. lbs.).

22. Operate the engine until it reaches normal operating temperature.

BEARING(S), CRANKSHAFT, MAIN

STANDARD PROCEDURE

STANDARD PROCEDURE - CONNECTING ROD - FITTING

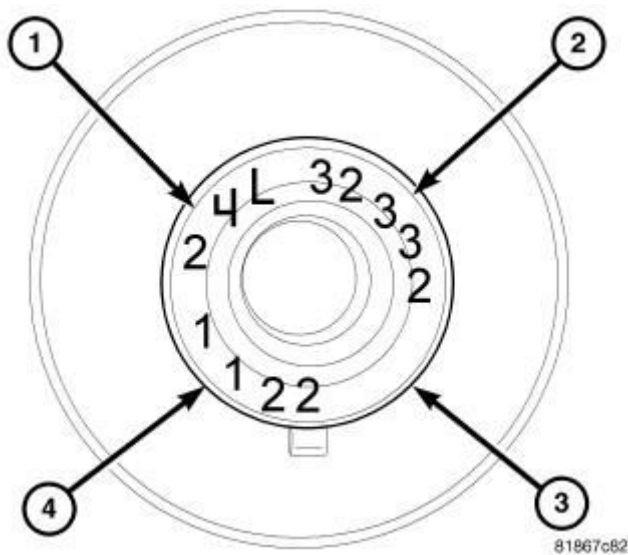


Fig. 216: Bearing Selection

Courtesy of CHRYSLER GROUP, LLC

There are three different sizes of rod bearings available. Connecting rod bearing identification (4) can be found on the nose of the crankshaft (3). Use the table below for proper bearing selection:

CONNECTING ROD BEARING SELECTION

CRANKSHAFT PIN DIAMETER GRADE	DIMENSION	CONNECTING ROD BEARING CLASSIFICATION	CONNECTING ROD BEARING DIMENSION
1	48 mm	1 (Black)	1.5 mm
2	48 mm	2 (No Color)	1.5 mm
3	48 mm	3 (Green)	1.5 mm

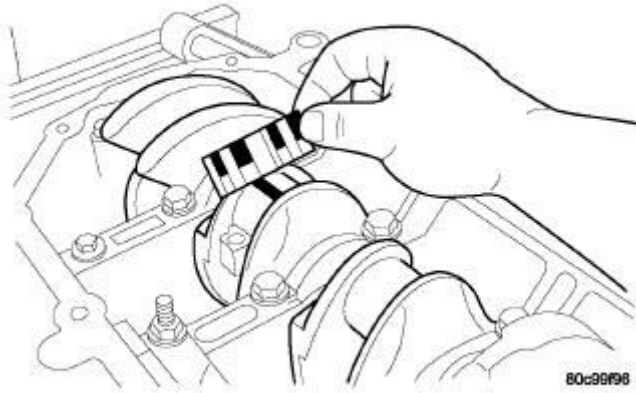


Fig. 217: Connecting Rod Bearing Clearance - Typical
Courtesy of CHRYSLER GROUP, LLC

1. For measuring connecting rod bearing clearance procedure and use of Plastigage, refer to **ENGINE - STANDARD PROCEDURE** . For bearing clearance, refer to **ENGINE SPECIFICATIONS** .

NOTE: **The rod bolts should not be reused.**

2. Before installing the **NEW** rod bolts the threads and under the bolt head should be oiled with clean engine oil.
3. Install each bolt finger tight then alternately tighten each bolt to assemble the cap properly.
4. Tighten the connecting rod bolts using the 2 step torque-turn method. Tighten according to the following values:

CAUTION: Do not use a torque wrench for the second step.

- Tighten the bolts to 20 N.m (15 ft. lbs.).
- Tighten the connecting rod bolts an additional 90°.

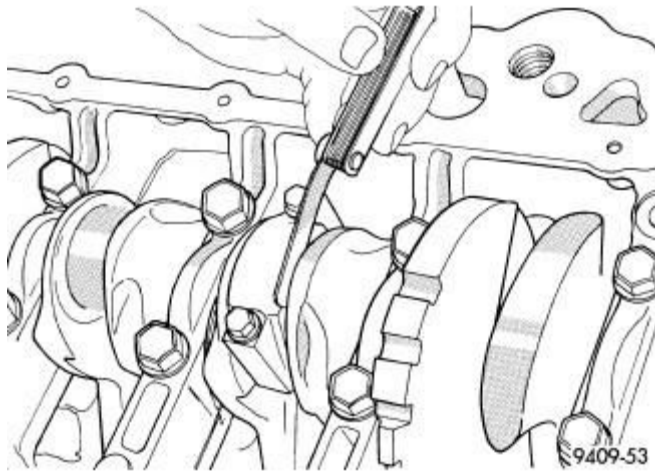
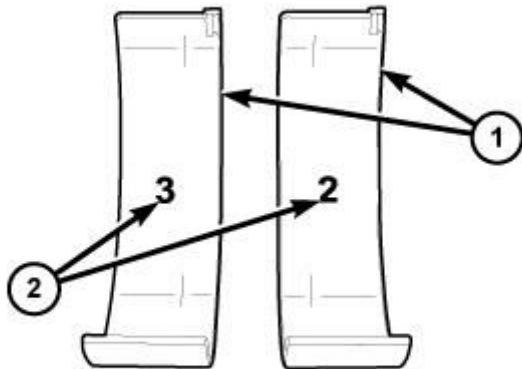


Fig. 218: Connecting Rod Side Clearance
Courtesy of CHRYSLER GROUP, LLC

5. Using a feeler gauge, check connecting rod side clearance. For clearance specifications, refer to **ENGINE SPECIFICATIONS**.

CONNECTING ROD BEARING REPLACEMENT



2789568

Fig. 219: Connecting Rod Bearing Shells & Bearing Size
Courtesy of CHRYSLER GROUP, LLC

The connecting rod bearings (1) are serviced in-vehicle. They must be replaced one-at-a-time in order to prevent the pistons from contacting the valves. The connecting rod bearings are "select fit" to achieve proper oil clearances. Refer to **BEARING(S), CONNECTING ROD - STANDARD PROCEDURE**.

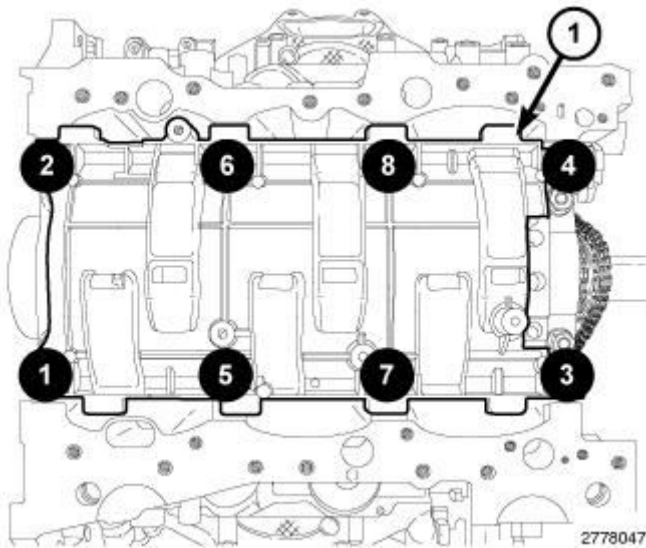


Fig. 220: Main Bearing Cap Bolts From Windage Tray Removal Sequence
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the battery negative cable.
2. Remove the spark plugs. Refer to **SPARK PLUG, REMOVAL** .
3. Remove the oil pan, oil pump pick-up and engine oil pump. Refer to **PUMP, ENGINE OIL, REMOVAL** .
4. Remove the eight main bearing cap bolts in the sequence shown.

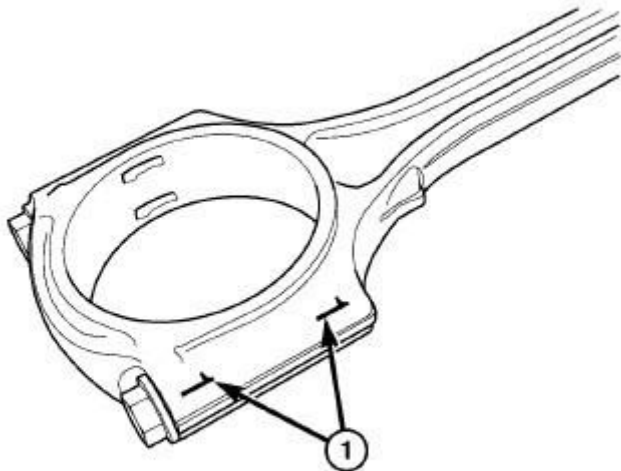


Fig. 221: Connecting Rod To Cylinder Identification
Courtesy of CHRYSLER GROUP, LLC

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods or caps, as damage to connecting rods could occur

NOTE: Connecting rods and bearing caps are not interchangeable and should be marked before removing to ensure correct reassembly.

5. Mark connecting rod and bearing cap positions (1) using a permanent ink marker or scribe tool.

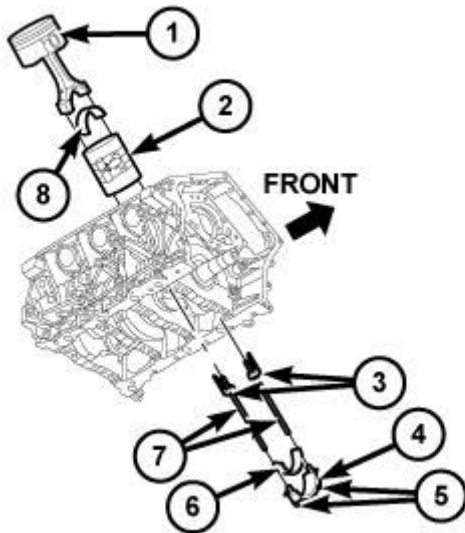


Fig. 222: Piston, Connecting Rod Cap, Bolts, Plastic Guide Plates & Guide Pins
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical V6 engine configuration shown.

CAUTION: Replace only one connecting rod bearing at a time while all other connecting rod bearing caps remain properly tightened. If all connecting rod bearing caps are removed, crankshaft rotation will result in valve and/or piston damage.

CAUTION: Care must be taken not to damage the fractured rod and cap joint face surfaces, as engine damage may occur.

6. Remove the connecting rod cap bolts (5) and the connecting rod cap (4). Discard the cap bolts.
7. Remove the plastic guide plates (3) from the Guide Pins (special tool #8189, Guide Pins) (7) and install the Guide Pins to the connecting rod being removed.

CAUTION: Care must be taken not to nick crankshaft journals, as engine damage may occur.

8. Rotate the crankshaft away from the connecting rod and remove the bearing shell.
9. If required, select and fit new bearings to the connecting rod. Refer to **BEARING(S), CONNECTING ROD - STANDARD PROCEDURE**.
10. Install the bearing shell (8) on the connecting rod with the tang inserted into the machined groove in the rod. Lubricate the bearing surface with clean engine oil.
11. Rotate the crankshaft while guiding the connecting rod into position over the rod journal.

CAUTION: The connecting rod bolts must not be reused. Always replace the connecting rod bolts whenever they are loosened or removed.

12. Install the bearing shell (6) on the connecting rod cap (4) with the tang inserted into the machined groove in the cap. Lubricate the bearing surface with clean engine oil.

NOTE: Do not lubricate the threads of the connecting rod cap bolts (5).

13. Install the connecting rod cap and bearing with the tang on the same side as the rod. Tighten the **NEW** connecting rod cap bolts (5) to 20 N.m (15 ft. lbs.) plus 90°.
14. If required, check the connecting rod side clearance. Refer to **ROD, PISTON AND CONNECTING - STANDARD PROCEDURE**.
15. Repeat the previous steps for each connecting rod bearing being replaced.

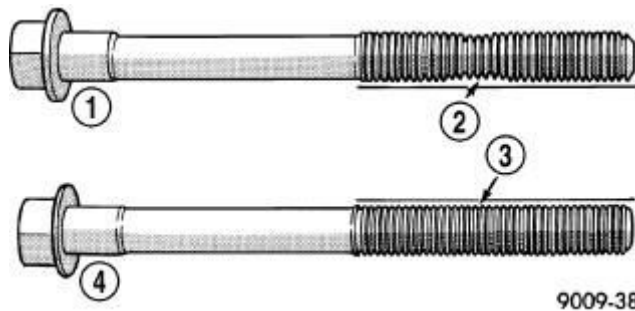


Fig. 223: Checking Cylinder Head Bolts For Stretching (Necking)
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The main bearing cap bolts are tightened using a torque plus angle procedure. The bolts must be examined BEFORE reuse. If the threads are necked down the bolts must be replaced.

16. Check the main bearing cap bolts for necking by holding a scale or straight edge against the threads. If all the threads do not contact the scale (2) the bolt must be replaced.

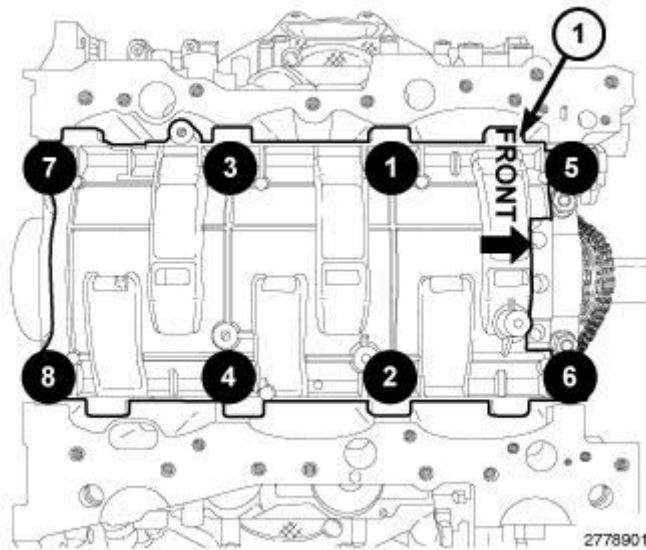


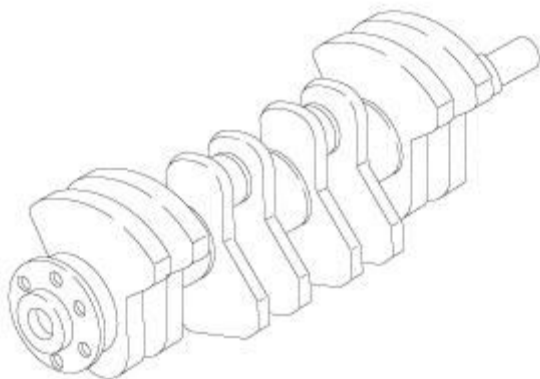
Fig. 224: Windage Tray With Main Bearing Cap Bolts Installation Sequence
Courtesy of CHRYSLER GROUP, LLC

17. Install the eight main bearing cap bolts. Tighten the bolts in the sequence shown to 21 N.m (16 ft. lbs.) plus 90°.
18. Install the engine oil pump, oil pump pick-up and oil pan. Refer to **PUMP, ENGINE OIL, INSTALLATION**.
19. Install the spark plugs and ignition coils. Refer to **SPARK PLUG, INSTALLATION**.
20. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL - STANDARD PROCEDURE**.
21. Connect the battery negative cable and tighten nut to 5 N.m (45 in. lbs.).
22. Operate the engine until it reaches normal operating temperature.

CRANKSHAFT

DESCRIPTION

DESCRIPTION



3120702

Fig. 225: Crankshaft

Courtesy of CHRYSLER GROUP, LLC

The crankshaft is made from induction hardened forged steel. Eight counterweights at 180° balance the crankshaft rotary mass. The main journals are cross drilled for rod bearing lubrication. The crankshaft is supported by five select fit main bearings with the center bearing serving as the thrust washer location. Both the front and rear seals are a single piece design and are mounted to the oil pump and cylinder block.

STANDARD PROCEDURE

STANDARD PROCEDURE - MEASURING CRANKSHAFT END PLAY

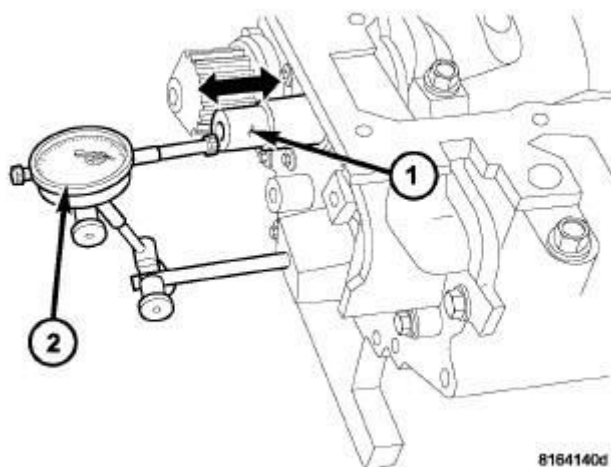


Fig. 226: Checking Crankshaft End Play

Courtesy of CHRYSLER GROUP, LLC

- 1 - Crankshaft
- 2 - DIAL INDICATOR

1. Mount a dial indicator (2) to front of engine with the locating probe on nose of crankshaft (1).
2. Move crankshaft all the way to the rear of its travel.
3. Zero the dial indicator.
4. Move crankshaft all the way to the front and read the dial indicator. for end play specification. Refer to **ENGINE SPECIFICATIONS** .

REMOVAL

REMOVAL

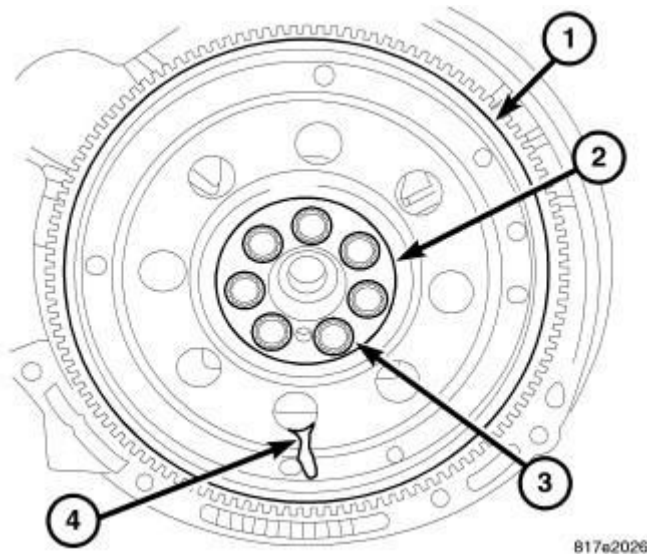


Fig. 227: Flex Plate

Courtesy of CHRYSLER GROUP, LLC

NOTE: Crankshaft can not be removed when engine is in vehicle.

1. Remove engine assembly from vehicle. Refer to **REMOVAL** .
2. Remove flex plate/flywheel (1).
3. Remove crankshaft rear oil seal. Refer to **SEAL, CRANKSHAFT OIL, REAR, REMOVAL** .

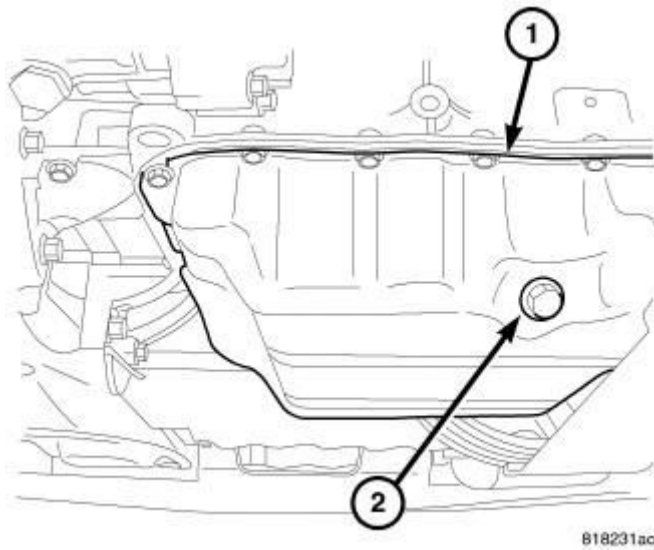


Fig. 228: Oil Drain Plug & Oil Pan
Courtesy of CHRYSLER GROUP, LLC

4. Install engine on suitable stand.
5. Drain engine oil (2).

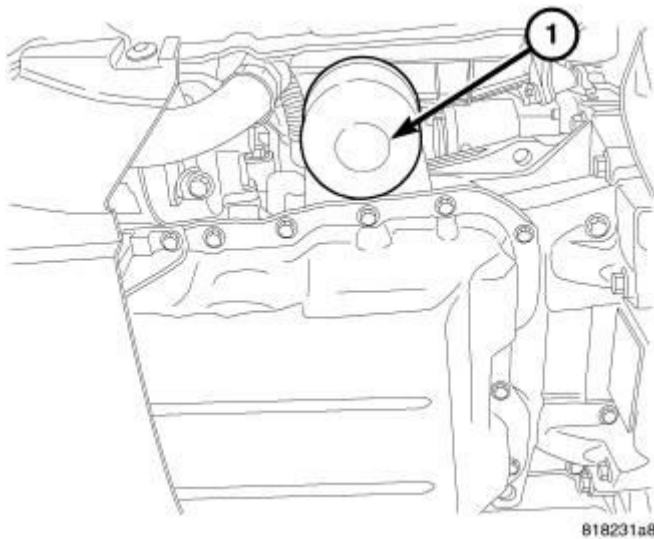


Fig. 229: Oil Filter
Courtesy of CHRYSLER GROUP, LLC

6. Remove oil filter (1).
7. Remove crankshaft vibration damper. Refer to **DAMPER, VIBRATION, REMOVAL**.
8. Remove water pump pulley.

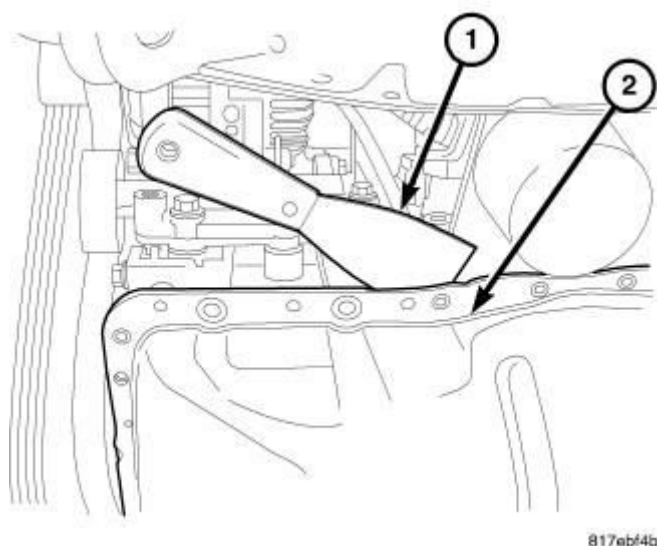


Fig. 230: Using Putty Knife To Loosen Seal Around Oil Pan
 Courtesy of CHRYSLER GROUP, LLC

9. Remove the oil pan (2). Refer to **PAN, OIL, REMOVAL** .
10. Remove timing chain cover. Refer to **COVER(S), ENGINE TIMING, REMOVAL** .
11. Remove the timing chain. Refer to **CHAIN AND SPROCKETS, TIMING, REMOVAL** .
12. Remove balance shaft module.

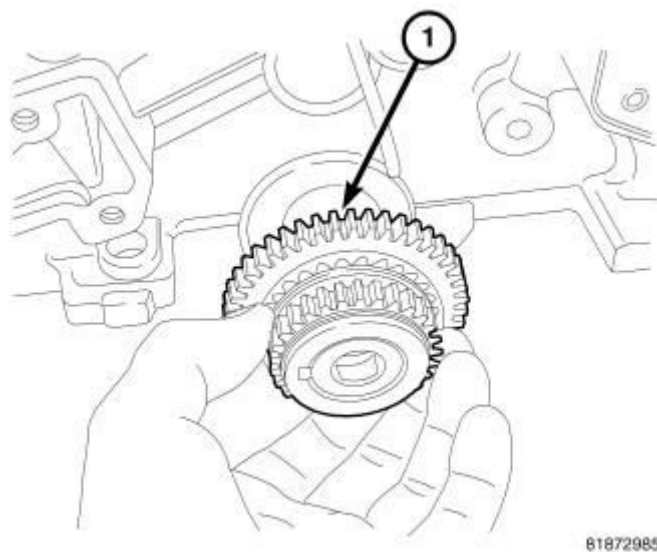
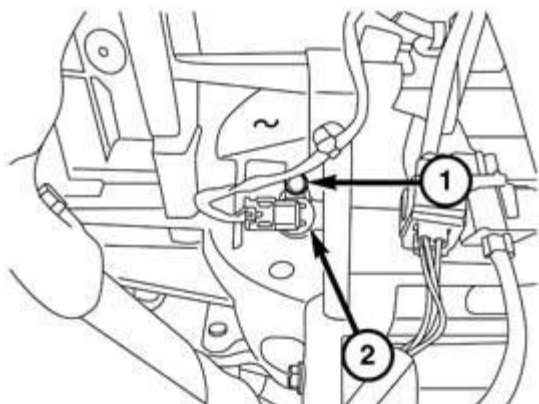


Fig. 231: Crankshaft Sprocket
 Courtesy of CHRYSLER GROUP, LLC

13. Remove the crankshaft sprocket (1).



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Fig. 232: Crankshaft Position Sensor & Bolt
Courtesy of CHRYSLER GROUP, LLC

14. Remove crankshaft position sensor retaining bolt (1) and remove sensor (2).
15. Remove ladder frame. Refer to **FRAME, LADDER, REMOVAL**.

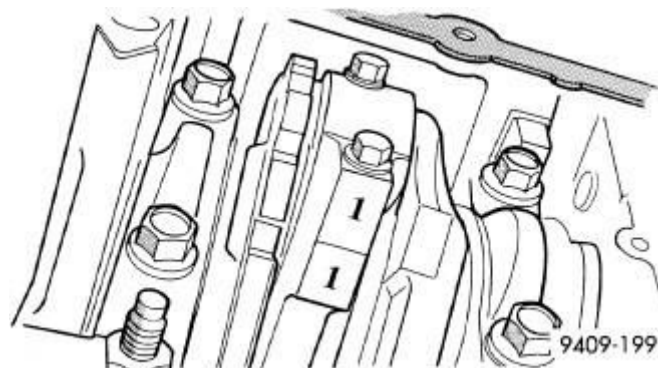


Fig. 233: Identify Connecting Rod To Cylinder-Typical
Courtesy of CHRYSLER GROUP, LLC

NOTE: If piston/connecting rod replacement is necessary, remove cylinder head.
Refer to **CYLINDER HEAD, REMOVAL** .

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods.
Damage to connecting rod could occur.

16. Using a permanent ink or paint marker, identify cylinder number on each connecting rod and cap.
17. Remove all connecting rod bolts and caps. Care should be taken not to damage the fracture rod and cap surfaces.

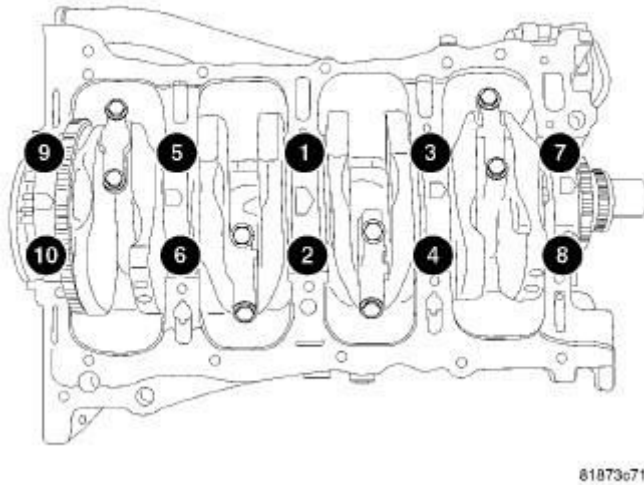


Fig. 234: Main Bearing Cap Removal/Installation Sequence
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not reuse connecting rod bolts.

18. Remove main bearing caps.

CAUTION: Use extreme care when handling crankshaft. Tone wheel damage can occur if crankshaft is mis-handled.

19. Lift out crankshaft from cylinder block. Do not damage the main bearings or journals when removing the crankshaft.

INSPECTION

INSPECTION

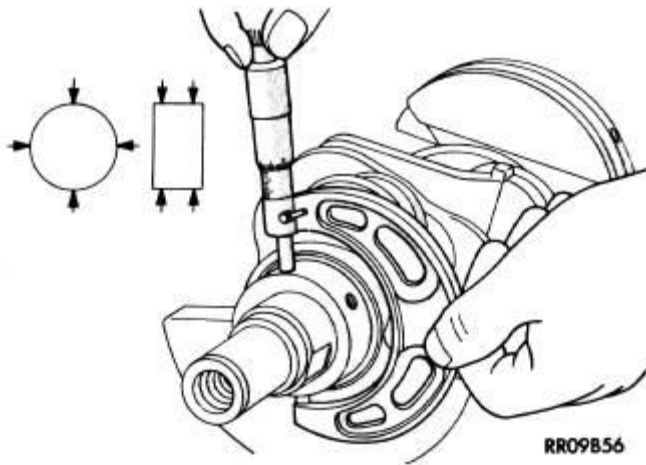


Fig. 235: Measuring Crankshaft Journal
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical crankshaft journal measurements shown.

1. Clean the oil off the bearing journals.
2. Determine the maximum diameter of the journals with a micrometer. Measure at two locations 90° apart at each end of the journals.
3. Compare the measured rod journal diameter to the crankshaft connecting rod bearing journal diameter grade marking chart. Refer to **BEARING(S), CONNECTING ROD - STANDARD PROCEDURE** . Select the bearing size that corresponds to the crankshaft markings for each rod bearing journal that will provide the proper oil clearance.
4. Compare the measured main bearing journal diameter to the crankshaft main bearing journal diameter grade marking chart. Refer to **BEARING(S), CRANKSHAFT, MAIN - STANDARD PROCEDURE** . Obtain the main bearing journal grade identification marks from the engine block and select the upper and lower main bearing sizes that will provide the proper oil clearance.
5. For connecting rod journals, verify that the maximum taper and maximum out of round are within specifications. Refer to **ENGINE SPECIFICATIONS** .
6. For main bearing journals, verify that the maximum taper and maximum out of round are within specifications. Refer to **ENGINE SPECIFICATIONS** .

INSTALLATION

INSTALLATION

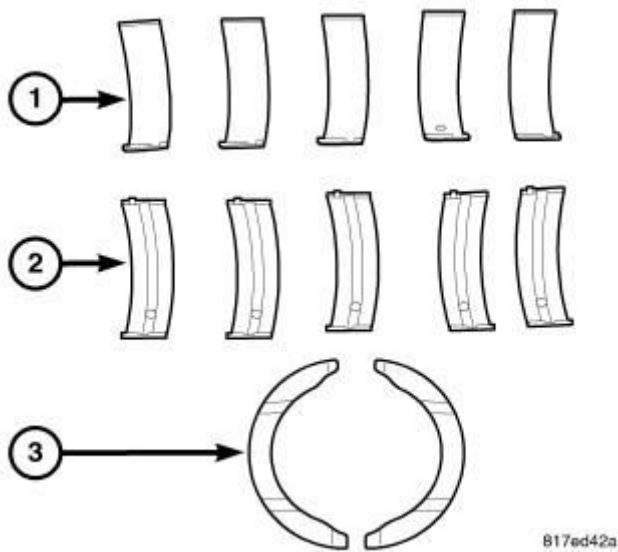


Fig. 236: Bearing Identification
Courtesy of CHRYSLER GROUP, LLC

The crankshaft is supported in five main bearings. All upper bearing shells (2) in the crankcase have oil grooves and holes. All lower bearing shells (1) are smooth. Crankshaft end play is controlled by a two piece thrust bearing (3) on the number three main bearing journal.

1. Clean main bearing cap bolt holes with Mopar® brake parts cleaner or equivalent and blow out with compressed air.
2. Install the main bearing upper (2) shells with the lubrication groove and oil hole in the engine block.
3. Make certain oil holes in block line up with oil hole in bearings and bearing tabs seat in the block tab slots.

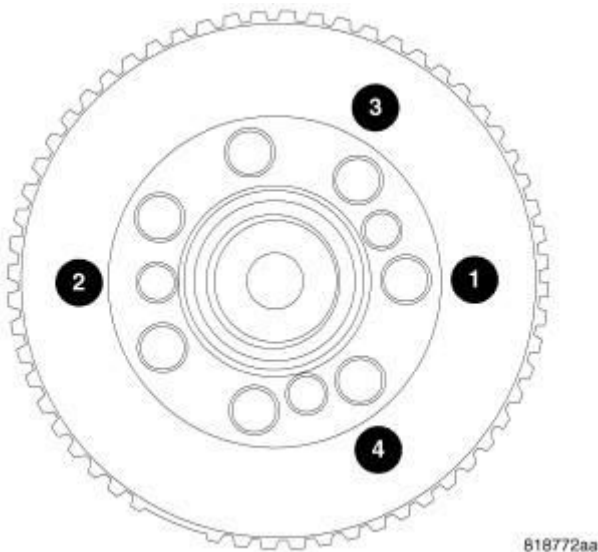


Fig. 237: Target Wheel
Courtesy of CHRYSLER GROUP, LLC

NOTE: If the crankshaft is sent out for machine work, it must be balanced as an assembly with the target ring installed.

4. Clean crankshaft and target ring with Mopar® brake parts cleaner or equivalent and dry with compressed air to ensure that the crankshaft mating surface and target ring mounting holes are free from oil and lock patch debris.

NOTE: Always use **NEW** mounting screws whether installing original or new target ring.

5. Install **NEW** mounting screws finger tight starting with the #1 location. Make sure engagement occurs with the shoulder of the screws and mounting hole before starting all other screws.
6. Tighten all mounting screws to 13 N.m (110 in. lbs.) in the sequence shown.

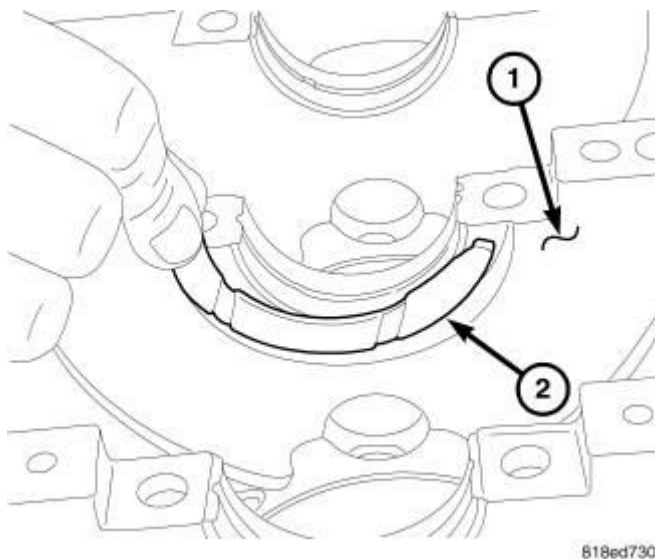


Fig. 238: Installing Thrust Bearing
Courtesy of CHRYSLER GROUP, LLC

NOTE: Lightly apply trans gel to thrust bearings to hold bearings in block.

NOTE: The thrust bearings must be installed with the notches facing the crankshaft.

7. Install thrust bearings (2) in block (1).

CAUTION: Do not get oil on the ladder frame mating surface. It will affect the ability of the RTV to seal the ladder frame to cylinder block.

NOTE: Ensure main bearing cap bolt holes in the block are clean, dry (free of

residual oil or coolant), and threads are not damaged.

8. Oil the bearings and journals. Install crankshaft in engine block.

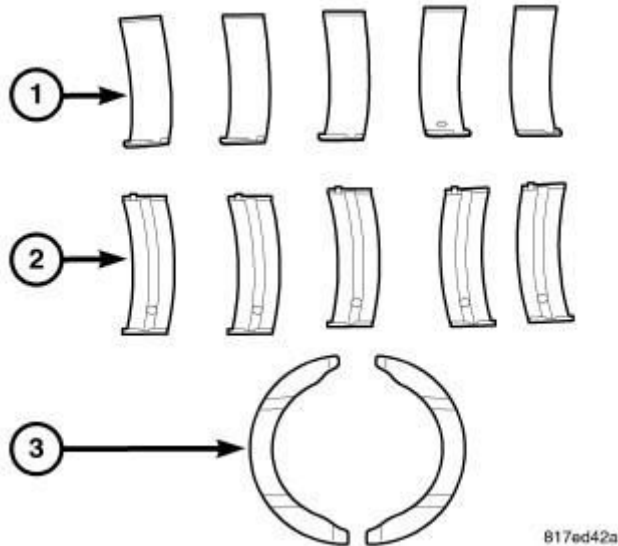


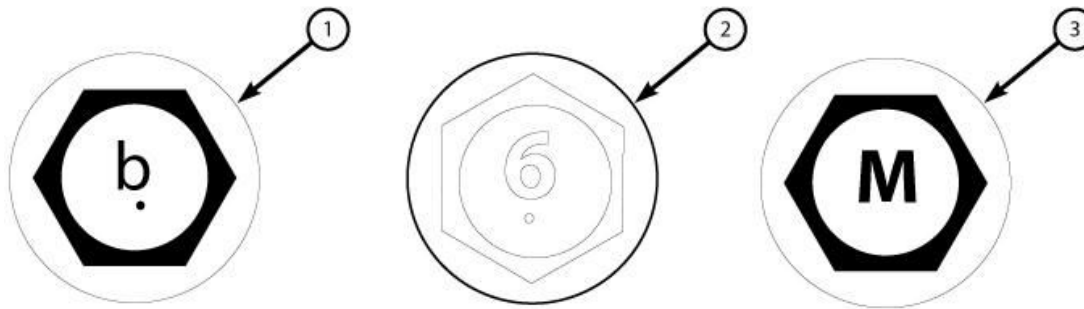
Fig. 239: Bearing Identification
Courtesy of CHRYSLER GROUP, LLC

9. Install lower main bearings (1) into main bearing cap. Make certain the bearing tabs are seated into the bearing cap slots.

NOTE: Main bearing caps are stamped 1 - 5 front to rear. Arrows on the caps must point towards the front of the engine.

10. Install main bearing caps to engine block.
11. Before installing the bolts the threads should be clean and dry.
12. Loosely install main bearing cap bolts.
13. To ensure correct thrust bearing alignment, perform the following steps:
 - Step 1: Rotate crankshaft until number 4 piston is at TDC.
 - Step 2: Move crankshaft rearward to limits of travel.
 - Step 3: Then, move crankshaft forward to limits of travel.
 - Step 4: Wedge an appropriate tool between the rear of the cylinder block and the rear crankshaft counterweight. This will hold the crankshaft in its furthest forward position.

CAUTION: There are different sets main bolts supplied with this engine. Each bolt set has a different torque value and engine damage could result if bolts are not torqued correctly. The bolts are not interchangeable.

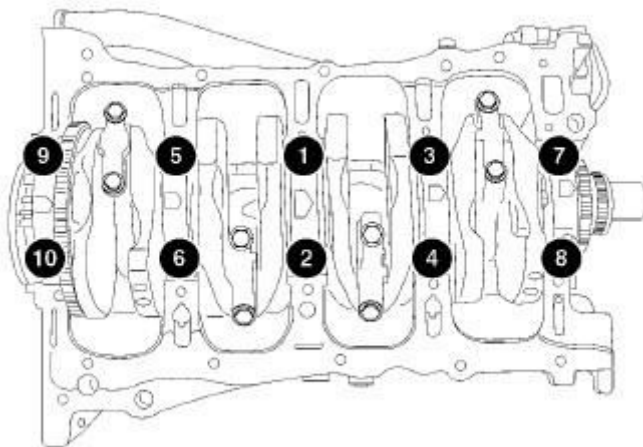


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Fig. 240: Main Bolt Identification

Courtesy of CHRYSLER GROUP, LLC

14. If your bolt heads are marked with **b** (1) or **6** (2), go to step 15. If your bolt heads are marked with **M** (3) or any other marking, go to step 16.



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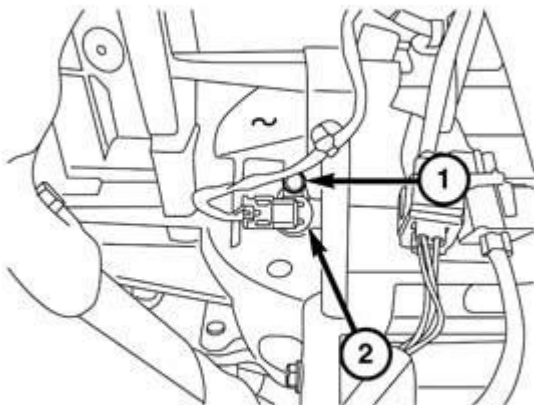
Fig. 241: Main Bearing Cap Removal/Installation Sequence

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Before tightening bolts, you must identify the bolt head to obtain the correct torque value. Failure to identify the bolts correctly, could result in improperly tightened bolts which could result in engine damage.

15. Tighten bolts marked with **b** or **6** using the following three step method, in the sequence shown in illustration:
- Tighten all bolts to 15 N.m (11 ft. lbs.)

- Tighten all bolts to 27 N.m (20 ft. lbs.)
 - Tighten all bolts an additional 45°.
16. Tighten bolts marked with **M** using the following three step method, in the sequence shown in illustration:
 - Tighten all bolts to 15 N.m (11 ft. lbs.)
 - Tighten all bolts to 45 N.m (33 ft. lbs.)
 - Tighten all bolts an additional 45°.
 17. Remove wedge tool used to hold crankshaft.
 18. Check the crankshaft turning torque, it should not exceed 5.6 N.m (50 in. lbs.).
 19. Check crankshaft end play. Refer to **CRANKSHAFT - STANDARD PROCEDURE** .
 20. Install connecting rod bearings and caps. **Do Not Reuse Connecting Rod Bolts.** Tighten connecting rod bolts to 20 N.m + 90° (15 ft. lbs.) + 90°. Refer to **ROD, PISTON AND CONNECTING, INSTALLATION** .
 21. Install the ladder frame assembly. Refer to **FRAME, LADDER, INSTALLATION** .
 22. Install the balance shaft module. Refer to **PUMP, ENGINE OIL, INSTALLATION** .



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Fig. 242: Crankshaft Position Sensor & Bolt
 Courtesy of CHRYSLER GROUP, LLC

23. Install crankshaft position sensor (2) and bolt (1). Tighten the bolt to 9 N.m (80 in. lbs.)
24. Install cylinder head if it was removed. Refer to **CYLINDER HEAD, INSTALLATION** .

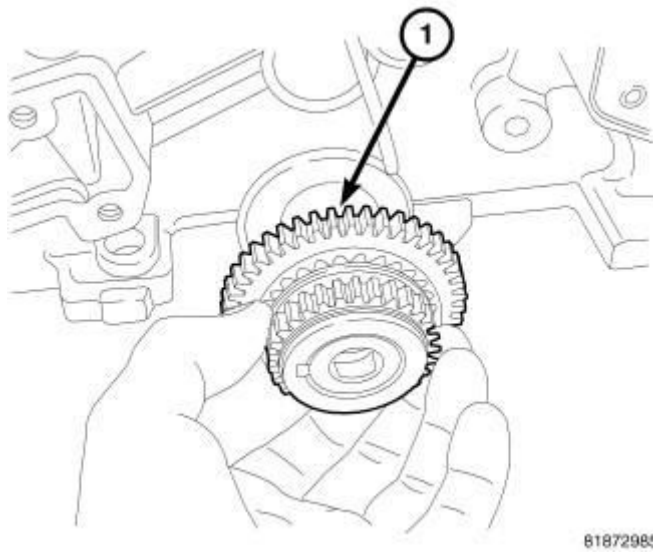
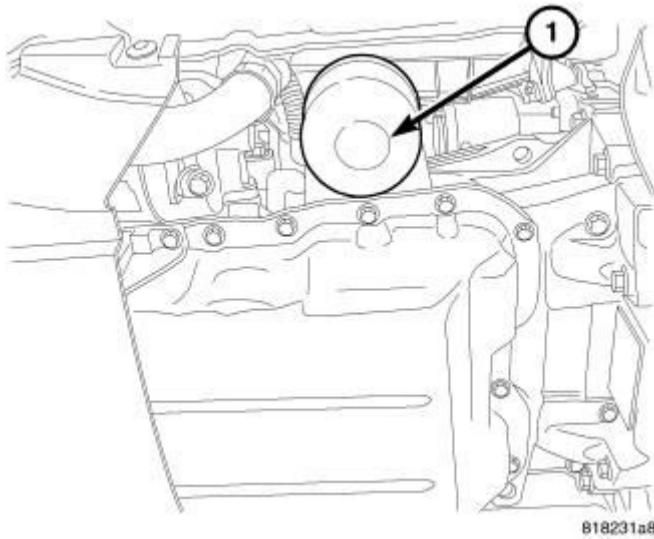


Fig. 243: Crankshaft Sprocket
 Courtesy of CHRYSLER GROUP, LLC

25. Install front crankshaft sprocket (1).
26. Install the timing chain. Refer to **CHAIN AND SPROCKETS, TIMING, INSTALLATION** .
27. Install the timing chain front cover . Refer to **COVER(S), ENGINE TIMING, INSTALLATION** .
28. Install the oil pan. Refer to **PAN, OIL, INSTALLATION** .
29. Install rear crankshaft oil seal. Refer to **SEAL, CRANKSHAFT OIL, REAR, INSTALLATION** .
30. Install front crankshaft oil seal. Refer to **SEAL, CRANKSHAFT OIL, FRONT, INSTALLATION** .
31. Install crankshaft vibration damper. Refer to **DAMPER, VIBRATION, INSTALLATION** .
32. Install water pump pulley. Refer to **PUMP, WATER, INSTALLATION** .
33. Install crankshaft rear oil seal. Refer to **SEAL, CRANKSHAFT OIL, REAR, INSTALLATION** .
34. Install drive plate/flex plate using **new** bolts. Tighten bolts to 95 N.m (70 ft. lbs.).
35. Attach transaxle to engine. Tighten bellhousing bolts to 101 N.m (75 ft. lbs.).
36. Install the engine assembly into the vehicle. Refer to **INSTALLATION** .

**Fig. 244: Oil Filter**

Courtesy of CHRYSLER GROUP, LLC

37. Install new oil filter (1) and fill with oil.
38. Fill with coolant. Refer to **STANDARD PROCEDURE** .
39. Start engine and check for leaks.
40. Install engine cover.

DAMPER, VIBRATION

REMOVAL

REMOVAL

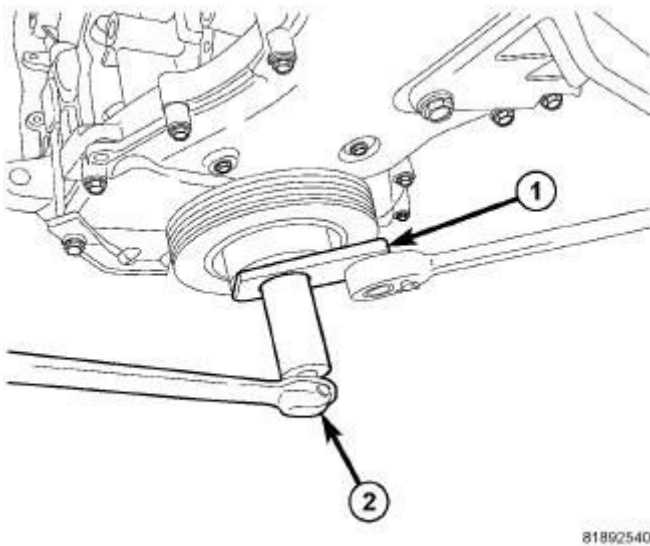


Fig. 245: Removing/Installing Crankshaft Damper Bolt
Courtesy of CHRYSLER GROUP, LLC

1. Remove accessory drive belts. Refer to **BELT, SERPENTINE, REMOVAL** .
2. Install Damper holder (special tool #9707, Holder, Vibration Damper) (1).
3. Remove crankshaft damper bolt.
4. Pull damper off crankshaft.

INSTALLATION

INSTALLATION

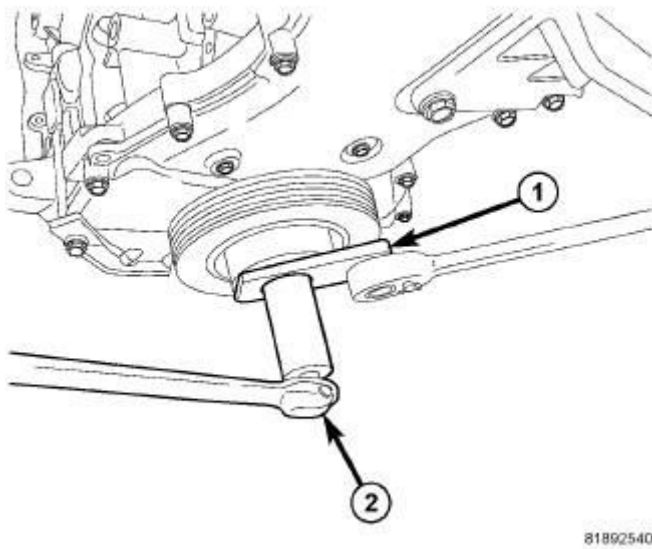


Fig. 246: Removing/Installing Crankshaft Damper Bolt
Courtesy of CHRYSLER GROUP, LLC

1. Install crankshaft damper.
2. Apply clean engine oil crankshaft damper bolt threads and between bolt head and washer. Tighten bolt to 210 N.m (155 ft. lbs.).
3. Install accessory drive belts. Refer to **BELT, SERPENTINE, INSTALLATION** .

FLEX PLATE

REMOVAL

REMOVAL

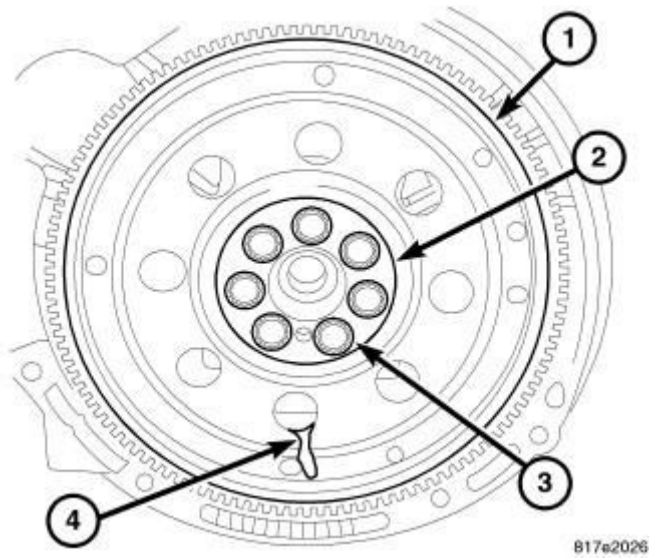


Fig. 247: Flex Plate

Courtesy of CHRYSLER GROUP, LLC

1. Remove transmission.
2. Remove flex plate bolts (3) and discard.
3. Remove washer (2).
4. Remove flex plate (1).

INSTALLATION

INSTALLATION

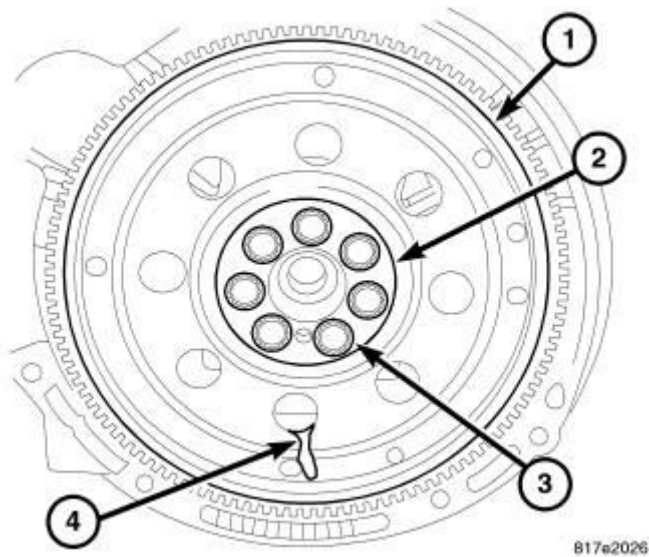
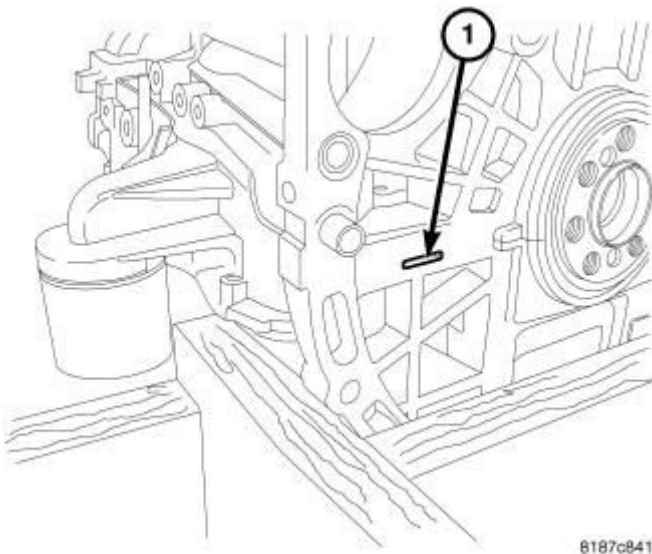


Fig. 248: Flex Plate

Courtesy of CHRYSLER GROUP, LLC

1. Install flex plate (1).
2. Install washer (2).
3. Install **new** flex plate bolts (3) and tighten in a criss-cross pattern to 95 N.m (70 ft. lbs.).
4. Install transaxle.

FRAME, LADDER**REMOVAL****REMOVAL**

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Fig. 249: Pry Point 1**Courtesy of CHRYSLER GROUP, LLC**

1. Remove oil pan. Refer to **PAN, OIL, REMOVAL** .
2. Remove balance shaft assembly. Refer to **PUMP, ENGINE OIL, REMOVAL** .
3. Remove ladder frame retaining bolts.
4. Remove ladder frame using pry point cast in the rear of the block (1).

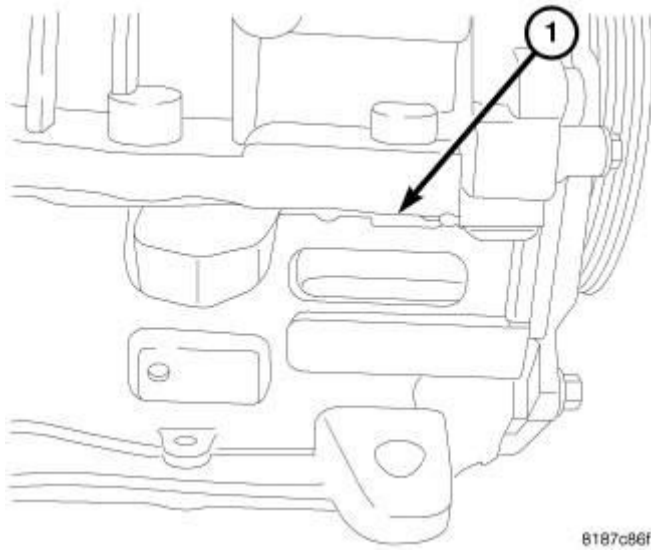


Fig. 250: Pry Point 2
Courtesy of CHRYSLER GROUP, LLC

5. To assist in removing the ladder frame another (1) pry point cast in the right side of the block.

INSTALLATION

INSTALLATION

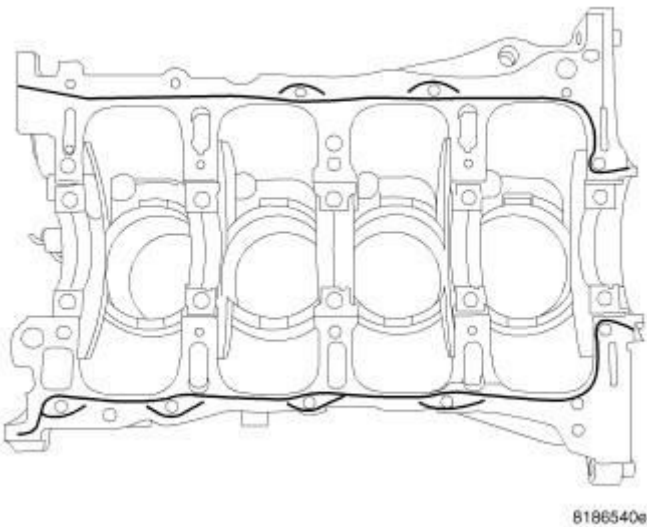


Fig. 251: Sealing Ladder Frame
Courtesy of CHRYSLER GROUP, LLC

NOTE: When using RTV, the sealing surfaces must be clean and free from grease and oil.

NOTE: When using RTV, parts should be assembled in 10 minutes and tighten to final torque within 45 minutes.

1. Apply a 2 mm bead of Mopar® engine sealant RTV or equivalent as shown in illustration.

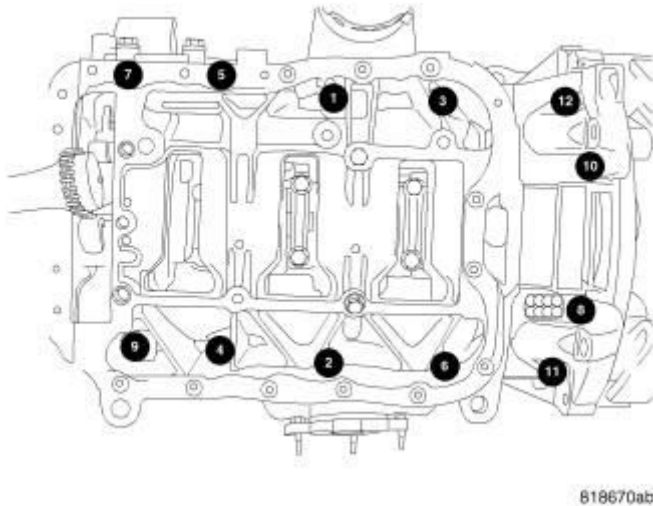


Fig. 252: Ladder Frame Bolts Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

2. Install bolts and tighten as shown in illustration following a two step method.
 - First: All to 10 N.m (89 in. lbs.).
 - Second: All to 26 N.m (19 ft. lbs.).
3. Install balance shaft module. Refer to **PUMP, ENGINE OIL, INSTALLATION** .
4. Install oil pan. Refer to **PAN, OIL, INSTALLATION** .

RING(S), PISTON

STANDARD PROCEDURE

STANDARD PROCEDURE - PISTON RING FITTING

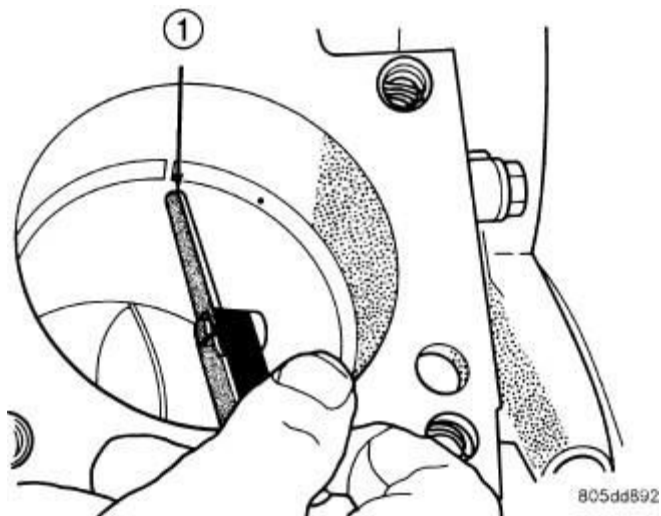


Fig. 253: Measuring Piston Ring End Gap
Courtesy of CHRYSLER GROUP, LLC

1. Wipe the cylinder bore clean.
2. Using a piston, to ensure that the ring is squared in the cylinder bore, slide the ring downward into the cylinder to a position 12 mm (0.50 in.) from the bottom of the cylinder bore.
3. Using a feeler gauge (1), check the ring end gap. Replace any rings not within specification.

Ring Position	Ring End Gap
No. 1 (top) Ring	0.25 - 0.40 mm (0.010 - 0.016 in.)
No. 2 (center) Ring	0.30 - 0.45 mm (0.012 - 0.018 in.)
Oil Control Ring (Steel Rail)	0.15 - 0.66 mm (0.006- 0.26 in.)

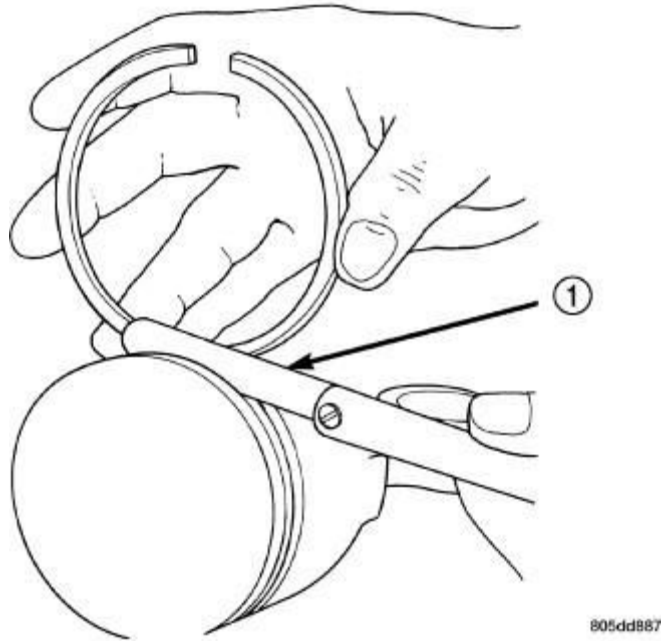


Fig. 254: Checking Piston Ring Grooves Clearances
Courtesy of CHRYSLER GROUP, LLC

4. Clean the piston ring grooves. Remove any nicks or burrs.
5. Measure the ring side clearance as shown in illustration. Make sure the feeler gauge (1) fits snugly between the ring land and the ring. Replace any ring not within specification.

Ring Position	Ring Side Clearance
No. 1 (top) Ring	0.025 - 0.033 mm (0.0010 - 0.0013 in.)
No. 2 (center) Ring	0.030 - 0.078 mm (0.0012 - 0.0031 in.)
Oil Control Ring (Steel Rails)	0.007 - 0.173 mm (.0003 - 0.0068 in.)

REMOVAL

REMOVAL

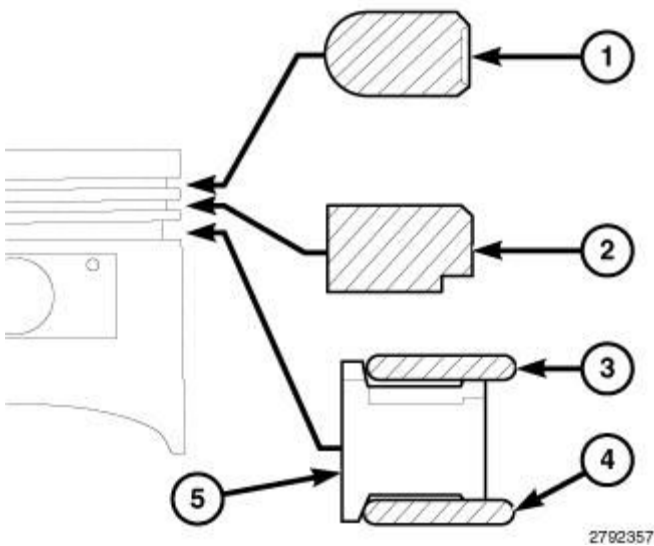


Fig. 255: Piston Ring Removal/Installation Sequence

Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical piston shown in illustration.

1. Remove the piston and connecting rod(s). Refer to **ROD, PISTON AND CONNECTING, REMOVAL**.

CAUTION: To avoid damage to the piston rings, they must be removed in the following order:

- No. 1 (upper) piston ring (1)
- No. 2 (intermediate) piston ring (2)
- Oil ring upper side rail (3)
- Oil ring lower side rail (4)
- Oil ring expander (5)

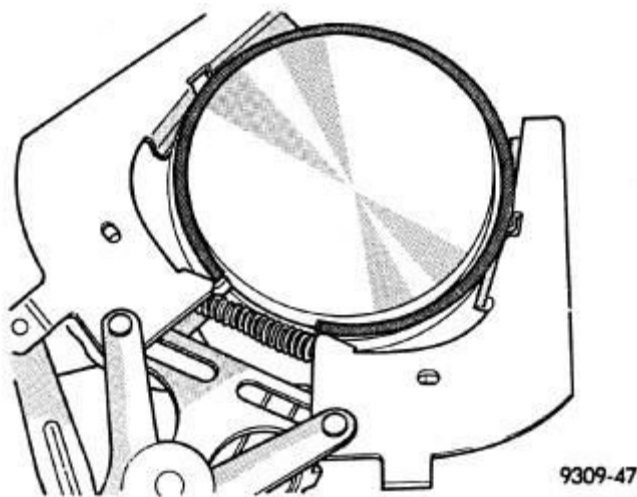


Fig. 256: Removing/Installing Upper & Intermediate Rings
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical piston shown in illustration.

2. Remove the No. 1 (upper) piston ring using a ring expander tool.
3. Remove the No. 2 (intermediate) piston ring using a ring expander tool.



Fig. 257: Removing/Installing Piston Ring Side Rail
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical piston shown in illustration. Do not use a piston ring expander to remove the oil ring side rails.

4. Remove the oil ring upper side rail.
5. Remove the oil ring lower side rail.
6. Remove the oil ring expander (1).

INSTALLATION

INSTALLATION

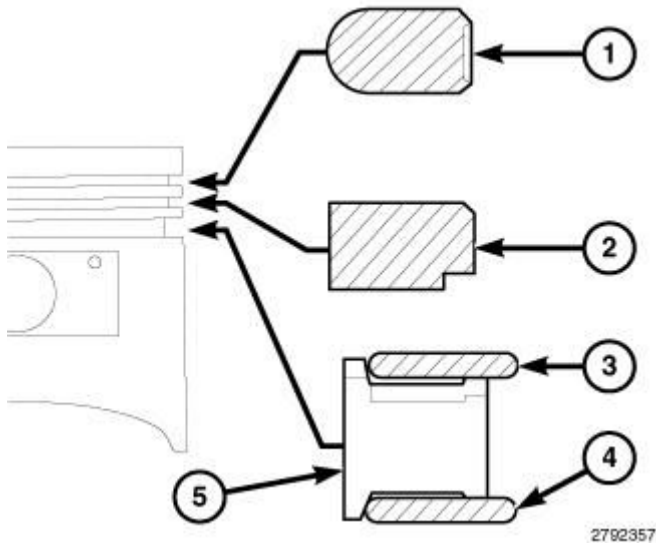


Fig. 258: Piston Ring Removal/Installation Sequence
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical piston shown in illustration.

1. If required, fit new rings to the piston. Refer to **RING(S), PISTON - STANDARD PROCEDURE** .

CAUTION: To avoid damage to the piston rings, they must be installed in the following order:

- Oil ring expander (5)
- Oil ring lower side rail (4)
- Oil ring upper side rail (3)
- No. 2 (intermediate) piston ring (2)
- No. 1 (upper) piston ring (1)

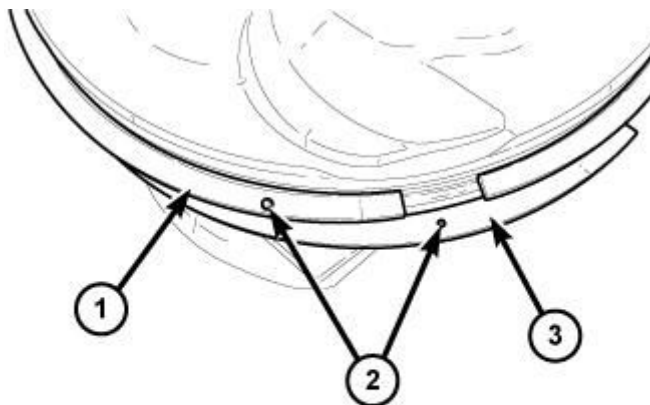


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Fig. 259: Removing/Installing Piston Ring Side Rail
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical piston shown in illustration. Do not use a piston ring expander to install the oil ring side rails.

2. Install the oil ring expander (1).
3. Install the oil ring lower side rail by placing one end between the piston ring groove and the oil ring expander. Hold this end firmly and press down the portion to be installed until the side rail is in position.
4. Install the oil ring upper side rail in the same manner as the lower side rail.



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Fig. 260: Dot Marks On Piston Rings
Courtesy of CHRYSLER GROUP, LLC

NOTE: The No. 1 (upper) piston ring (1) and No. 2 (intermediate) piston ring (3) have a different cross section. Install the rings with manufacturers I.D.

mark (dot) (2) facing up, towards the top of the piston.

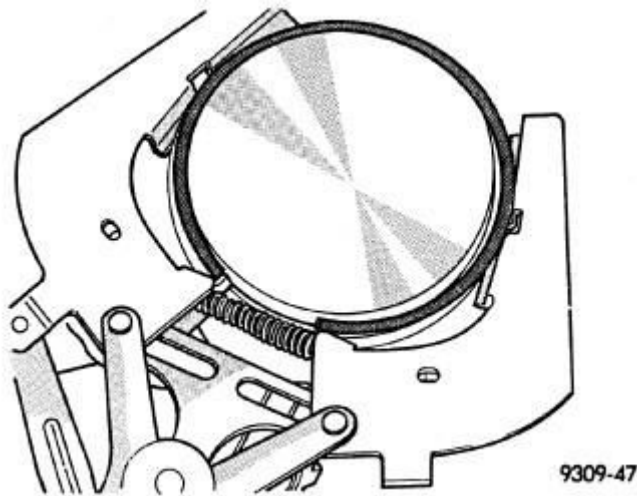


Fig. 261: Removing/Installing Upper & Intermediate Rings
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical piston shown in illustration.

5. Install the No. 2 (intermediate) piston ring using a ring expander tool.
6. Install the No. 1 (upper) piston ring using a ring expander tool.
7. Rotate the rings around the piston, the rings must rotate in the grooves with out binding.

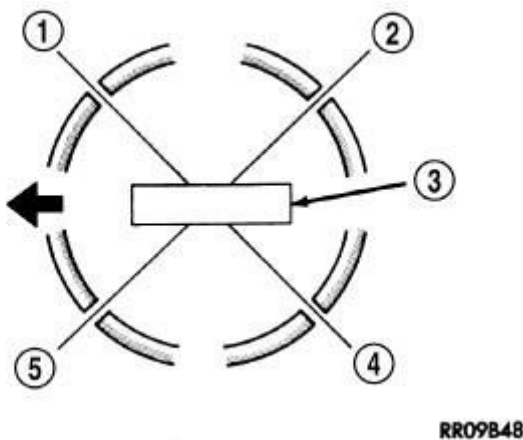


Fig. 262: Piston Ring End Gap Position
Courtesy of CHRYSLER GROUP, LLC

8. Position the piston ring end gaps as follows:
 - Oil ring expander gap (5)
 - Oil ring lower side rail end gap (4)

- Oil ring upper side rail end gap (1)
 - No. 2 (intermediate) ring end gap (5)
 - No. 1 (upper) ring end gap (2)
9. Install the piston and connecting rod(s). Refer to **ROD, PISTON AND CONNECTING, INSTALLATION** .

ROD, PISTON AND CONNECTING

DESCRIPTION

DESCRIPTION



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Fig. 263: Piston & Connecting Rod
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not use a metal stamp to mark connecting rods as damage may result, instead use ink or a scratch awl.

The pistons are a lightweight design with ultra low tension piston rings for improved fuel economy. The pistons are made of a high strength aluminum alloy and the piston skirt has a Moly® coating. The top piston ring land has an anodized coating for improved wear. The piston is connected to the rod using a full floating pin with two locking clips. The connecting rod is forged steel with a bolted cracked cap design. The connecting rod bolts are not reusable. Pistons are available in two different diameters with grade markings for each bore indicated on the side of the cylinder block. The upper compression ring is a 1.2 mm steel ring with a spray coating. The intermediate compression ring is 1.2 mm micro napier design. Both compression rings have a dot or a mark on the piston ring. The marked side of the ring must face the top of the piston. The 2 mm three piece oil control ring is very thin. These are chrome plated rings and have a stainless steel expander.



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Fig. 264: Piston Components

Courtesy of CHRYSLER GROUP, LLC

- 1 - Head
- 2 - Valve Relief
- 3 - Upper or Top Land
- 4 - Second Land
- 5 - Third Land
- 6 - Moly® Coating
- 7 - Wrist Pin
- 8 - Locking Ring
- 9 - Skirt
- 10 - Oil Ring
- 11 - Secondary Compression Ring
- 12 - Top Compressor Ring

STANDARD PROCEDURE

PISTON FITTING

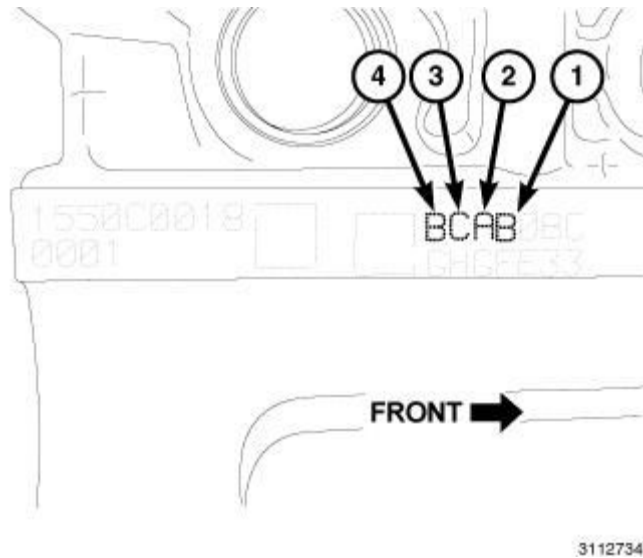
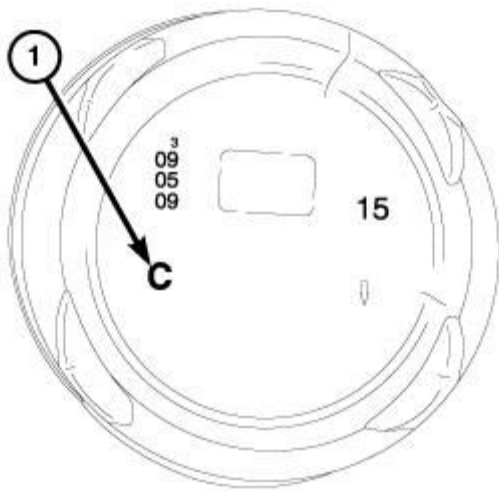


Fig. 265: Engine Block Cylinder Bore Diameter Grade Markings
 Courtesy of CHRYSLER GROUP, LLC

The pistons are "select fit" to achieve proper oil clearance. Engine block cylinder bore diameter grade markings are stamped into the right side of the engine block. These marks are read from front to rear, corresponding with cylinder number 1, 2, 3, 4.

Engine block cylinder bore diameter grade markings correspond to specific cylinder bore diameters. The chart below identifies the three engine block grade markings and their associated cylinder bore diameters.

Engine Block Marking	Cylinder Bore Size mm (in.)	
	Metric	Standard
A	72.000 - 72.010 mm	2.8346 - 2.8350 in.
B	72.010 - 72.020 mm	2.8350 - 2.8354 in.
C	72.020 - 72.030 mm	2.8354 - 2.8358 in.



3110362

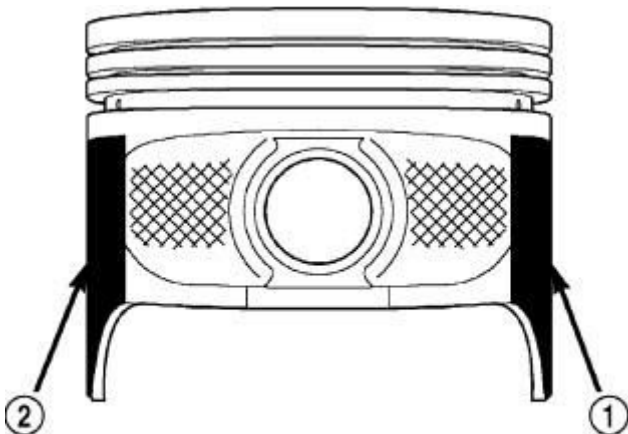
Fig. 266: Piston Size Mark

Courtesy of CHRYSLER GROUP, LLC

The piston is marked with the piston size (1) on the piston crown. The pistons are available in three different sizes in order to achieve the desired oil clearance. Select the piston size that corresponds to the engine block cylinder bore diameter grade markings for each cylinder.

Pistons are available in three sizes. The chart below identifies the three piston sizes.

Piston Marking	Piston Size mm (in.)	
	Metric	Standard
A	71.960 - 71.970 mm	2.8331 - 2.8835 in.
B	71.970 - 71.980 mm	2.8835 - 2.8339 in.
C	71.980 - 71.990 mm	2.8339 - 2.8342 in.



808ac2ao

Fig. 267: Coating Material On Piston

Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical coated piston shown in illustration.

The coated pistons are serviced with the piston pin and connecting rod pre-assembled. The coating material (1 and 2) is applied to the piston after the final piston machining process. Piston installation into the cylinder bore requires slightly more pressure than that required for non-coated pistons. The bonded coating on the piston will give the appearance of a line-to-line fit with the cylinder bore.

CONNECTING ROD SIDE CLEARANCE

DIAL INDICATOR

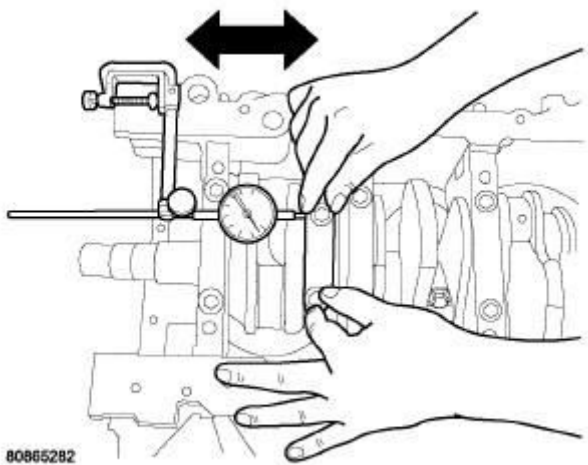


Fig. 268: Measuring Connecting Rod Side Clearance

Courtesy of CHRYSLER GROUP, LLC

1. Mount Dial Indicator Set (special tool #C-3339A, Set, Dial Indicator) to a stationary point on the engine. Locate the probe perpendicular to and resting against the connecting rod cap being checked.
2. Move the connecting rod all the way to the rear of its travel.
3. Zero the dial indicator.
4. Move the connecting rod forward to the limit of travel and read the dial indicator. Compare the measured side clearance to the specification. Refer to **ENGINE SPECIFICATIONS**.
5. Repeat this procedure for each connecting rod. Rotate the crankshaft for connecting rod accessibility.

FEELER GAUGE

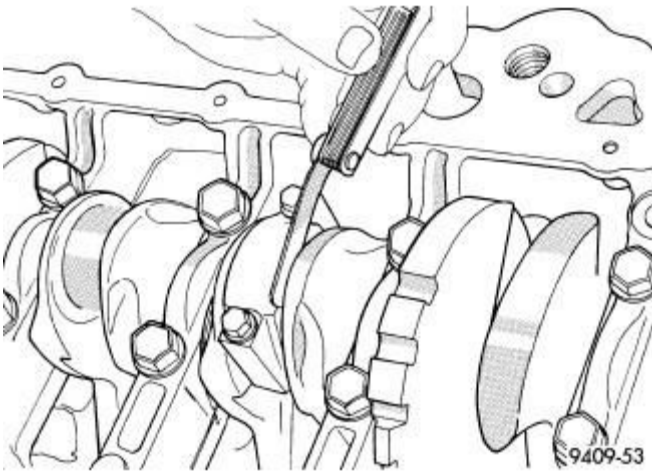


Fig. 269: Connecting Rod Side Clearance
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical four cylinder engine shown in illustration.

1. Slide a snug-fitting feeler gauge between the connecting rod and crankshaft journal flange. Compare the measured side clearance to the specification. Refer to **ENGINE SPECIFICATIONS**.
2. Repeat this procedure for each connecting rod. Rotate the crankshaft for connecting rod accessibility.

REMOVAL

REMOVAL

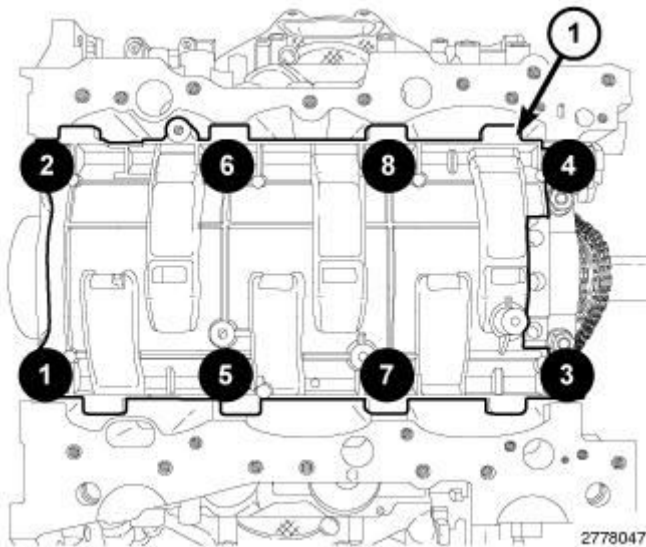
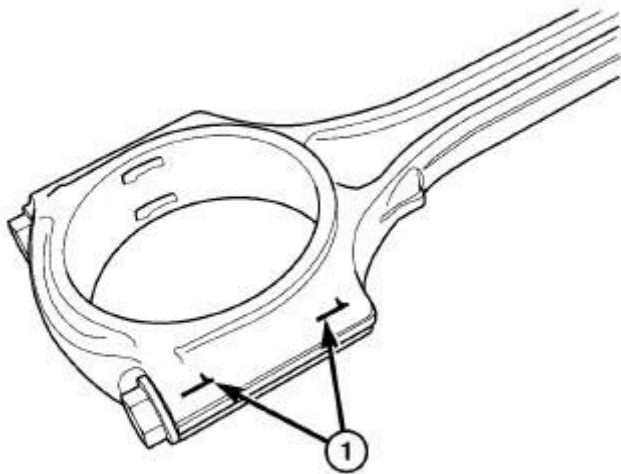


Fig. 270: Main Bearing Cap Bolts From Windage Tray Removal Sequence
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.

2. Remove the oil pans, engine timing cover and cylinder heads. Refer to **CYLINDER HEAD, REMOVAL**.
3. Remove the engine oil pump. Refer to **PUMP, ENGINE OIL, REMOVAL**.
4. Remove the eight main bearing cap bolts from the windage tray in the sequence shown in illustration and remove the windage tray (1).



811318c8

Fig. 271: Connecting Rod To Cylinder Identification

Courtesy of CHRYSLER GROUP, LLC

5. If necessary, remove the top ridge of the cylinder bores with a reliable ridge reamer before removing the pistons from the engine block. **Be sure to keep the tops of pistons covered during this operation.** Pistons and connecting rods must be removed from the top of the engine block. When removing piston and connecting rod assemblies from the engine, rotate the crankshaft CW so that each connecting rod is centered in the cylinder bore.

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods or caps, as damage to connecting rods could occur

NOTE: Connecting rods and bearing caps are not interchangeable and should be marked before removing to ensure correct reassembly.

6. Mark connecting rod and bearing cap positions (1) using a permanent ink marker or scribe tool.

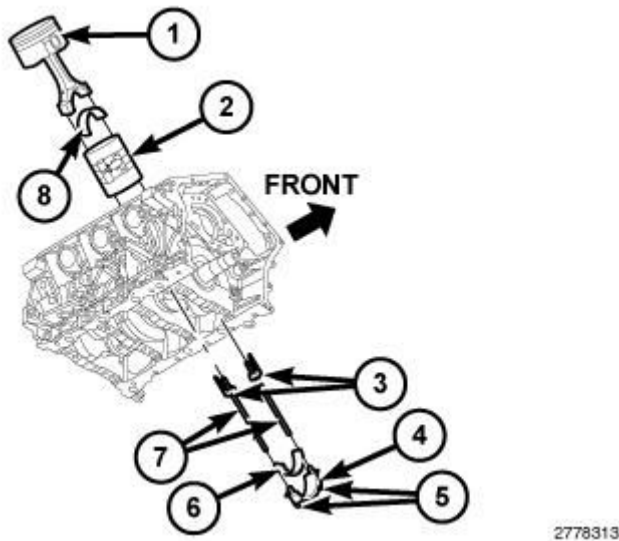


Fig. 272: Piston, Connecting Rod Cap, Bolts, Plastic Guide Plates & Guide Pins
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical V6 engine configuration shown in illustration.

CAUTION: Care must be taken not to damage the fractured rod and cap joint face surfaces, as engine damage may occur.

7. Remove the connecting rod cap bolts (5) and the connecting rod cap (4). Discard the cap bolts.

CAUTION: Care must be taken not to nick crankshaft journals, as engine damage may occur.

8. Remove the plastic guide plates (3) from the Guide Pins (special tool #8189, Guide Pins) (7) and install the Guide Pins to the connecting rod being removed.

CAUTION: Avoid contact with the piston oil cooler jet(s). Positioning of the oil cooler jet(s) is critical for proper engine operation.

9. Remove the piston and connecting rod (1) from cylinder bore.
10. Repeat the previous steps for each piston being removed.
11. Immediately after piston and connecting rod removal, reinstall the bearing cap (4) on the mating connecting rod to prevent damage to the fractured cap and rod surfaces.
12. If required, remove the piston rings. Refer to **RING(S), PISTON, REMOVAL**.
13. Repeat the previous steps for each piston being removed.

CLEANING

CLEANING

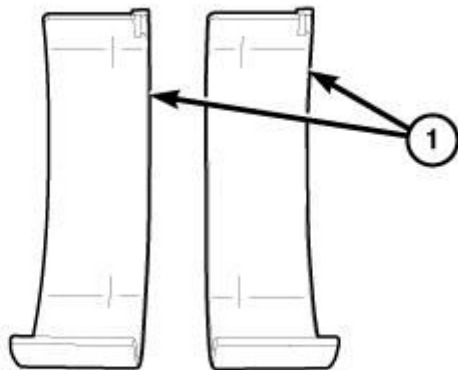
CAUTION: DO NOT use a wire wheel or other abrasive cleaning device to clean the pistons or connecting rods. The pistons have a Moly coating, this coating must not be damaged.

CAUTION: Do not remove the piston pin from the piston and connecting rod assembly.

1. Using a suitable cleaning solvent clean the pistons in warm water and towel dry.
2. Use a wood or plastic scraper to clean the ring land grooves.

INSPECTION

INSPECTION

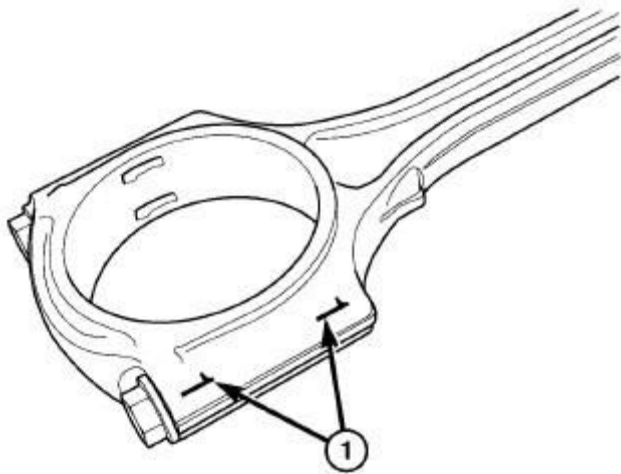


3170166

Fig. 273: Inserts

Courtesy of CHRYSLER GROUP, LLC

1. Wipe the inserts (1) clean.
2. Inspect the inserts for abnormal wear patterns, scoring, grooving, fatigue, pitting and for metal or other foreign material imbedded in the lining.
3. Inspect the back of the inserts for fractures, scrapes, or irregular wear patterns.
4. Inspect the insert locking tabs for damage.
5. Replace any bearing that shows abnormal wear. Refer to **BEARING(S), CONNECTING ROD - STANDARD PROCEDURE**.



811318c8

Fig. 274: Connecting Rod To Cylinder Identification
Courtesy of CHRYSLER GROUP, LLC

6. Inspect the connecting rod bearing bores for signs of scoring, nicks and burrs.

NOTE: Misaligned or bent connecting rods can cause abnormal wear on pistons, piston rings, cylinder walls, connecting rod bearings and crankshaft connecting rod journals. If wear patterns or damage to any of these components indicate the probability of a misaligned connecting rod, inspect it for correct rod alignment.

7. Replace misaligned, bent or twisted connecting rods.

NOTE: Connecting rods are serviced with the piston pre-assembled. The pistons are "select fit" to achieve proper oil clearance. Refer to ROD, PISTON AND CONNECTING - STANDARD PROCEDURE .

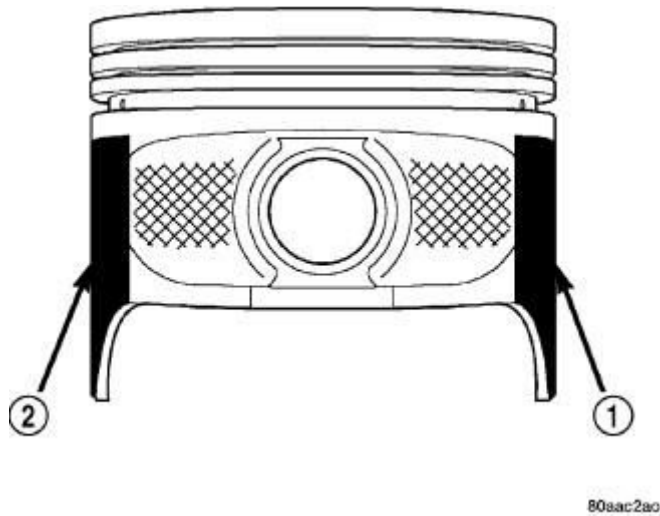


Fig. 275: Coating Material On Piston
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical coated piston shown in illustration.

8. Inspect the piston for scoring or scraping marks in the piston skirts. Check the ring lands for cracks and/or deterioration.

NOTE: The coating material (1 and 2) is applied to the piston after the final piston machining process. This coating may affect the outside diameter measurement of a coated piston may not provide accurate results.

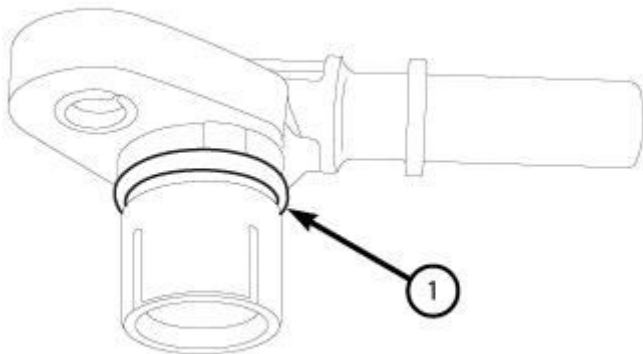
9. Check the piston for taper and out of round shape.

NOTE: Piston installation into the cylinder bore may require slightly more pressure than that required for non-coated pistons. The bonded coating on the piston will give the appearance of a line-to-line fit with the cylinder bore.

NOTE: The coated pistons will be serviced with the piston pin and connecting rod pre-assembled.

INSTALLATION

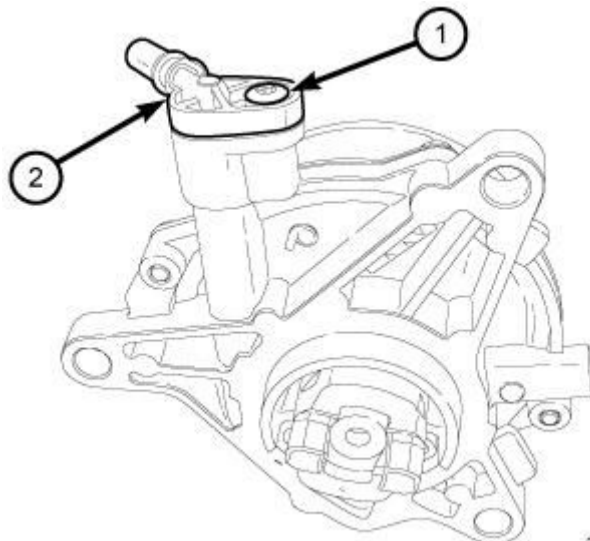
INSTALLATION



3345100

Fig. 276: Vacuum Fitting O-Ring Seal
 Courtesy of CHRYSLER GROUP, LLC

1. The vacuum fitting O-ring seal (1) can be reused if not damaged. If removed, lightly lubricate the O-ring seal (1) with clean engine oil and install on the vacuum fitting.



3345090

Fig. 277: Vacuum Fitting & Screw
 Courtesy of CHRYSLER GROUP, LLC

2. If removed, install the vacuum fitting (2) to the vacuum pump with the screw (1) tightened to 8 N.m (71 in. lbs.).
3. Clean the mating surfaces of the cylinder head and the vacuum pump. Install a new vacuum pump gasket.
4. Align the pump drive tab with the pump drive slot located on the cam shaft.
5. Install the vacuum pump mounting bolts. Tighten the bolts to 20 N.m (15 ft. lbs.).
6. Connect the vacuum supply line to the pump.

CAUTION: When servicing components near the vacuum pump, avoid contact with the plastic nipple that connects the vacuum pump to the brake booster hose. It is possible to crack the plastic nipple resulting in a brake booster vacuum leak.

7. Install the battery (4). Refer to **BATTERY, INSTALLATION** .
8. Install the engine cover. Refer to **RESONATOR, AIR CLEANER, INSTALLATION** .
9. Run the engine a check the vacuum pump for proper operation.

SEAL, CRANKSHAFT OIL, FRONT

REMOVAL

REMOVAL

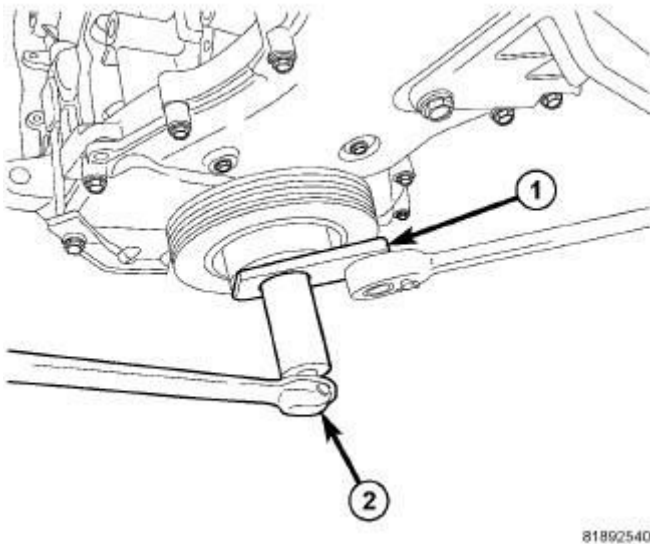


Fig. 278: Removing/Installing Crankshaft Damper
Courtesy of CHRYSLER GROUP, LLC

1. Remove accessory drive belt.
2. Install Damper Holder (special tool #9707, Holder, Vibration Damper) (1) and remove damper retaining bolt.
3. Pull damper off crankshaft.

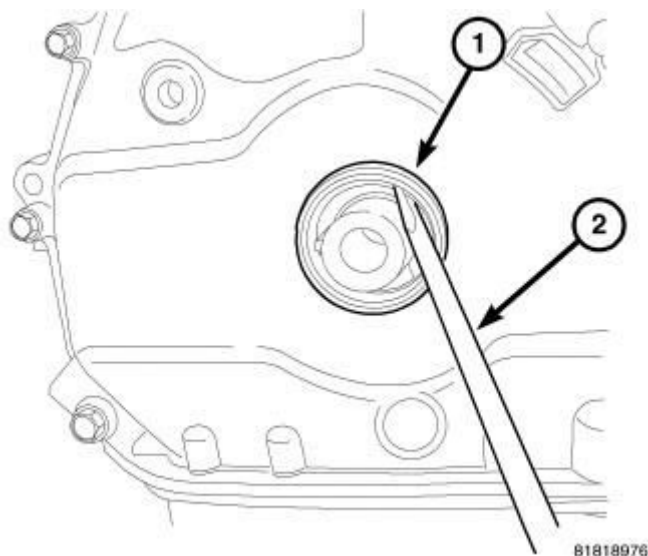


Fig. 279: Removing Front Crankshaft Oil Seal By Prying Out With Screwdriver
 Courtesy of CHRYSLER GROUP, LLC

4. Remove front crankshaft oil seal (1) by prying out with a screw driver (2). Be careful not to damage the cover seal surface.

INSTALLATION

INSTALLATION

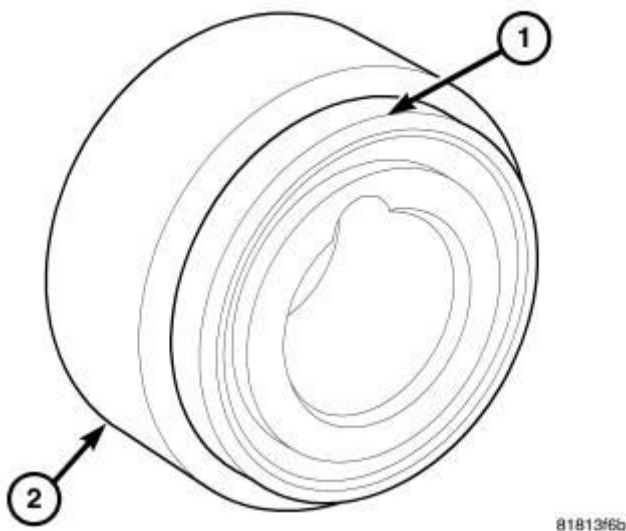


Fig. 280: Crankshaft Oil Seal & Seal Installer 9506
 Courtesy of CHRYSLER GROUP, LLC

1. Place seal (1) onto Front Crankshaft Seal Installer (special tool #9506, Installer, Oil Seal) (2) with seal spring towards the inside of engine.

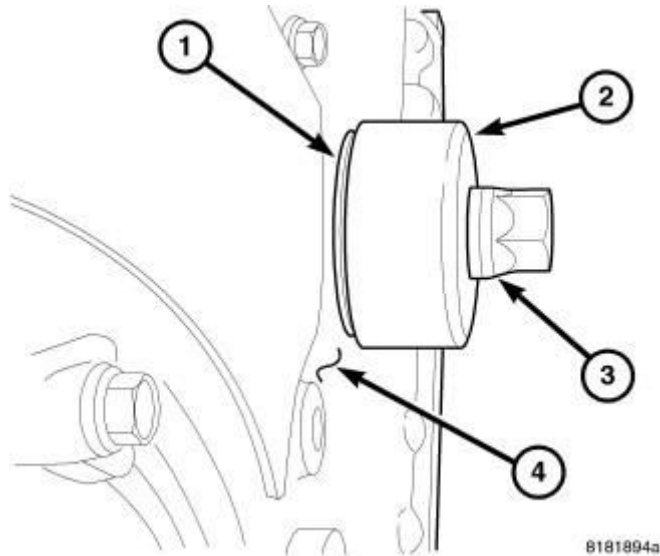


Fig. 281: Installing New Seal By Using Seal Installer 9506 & Crankshaft Damper Bolt
 Courtesy of CHRYSLER GROUP, LLC

2. Install new seal (1) by using Front Crankshaft Seal Installer (special tool #9506, Installer, Oil Seal) (2) and crankshaft damper bolt (3).

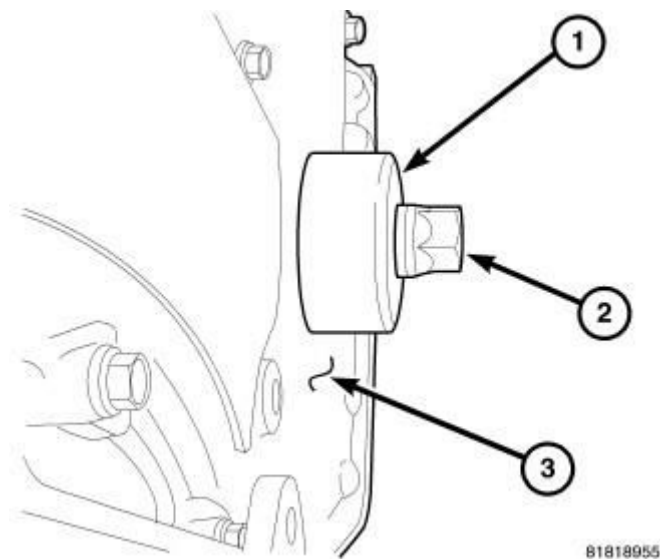


Fig. 282: Pressing Seal Into Front Cover Until Seal Installer
 Courtesy of CHRYSLER GROUP, LLC

3. Press seal into front cover until Front Crankshaft Seal Installer (special tool #9506, Installer, Oil Seal) (1) seats against timing chain cover (3).
4. Remove Front Crankshaft Seal Installer (special tool #9506, Installer, Oil Seal) (1).

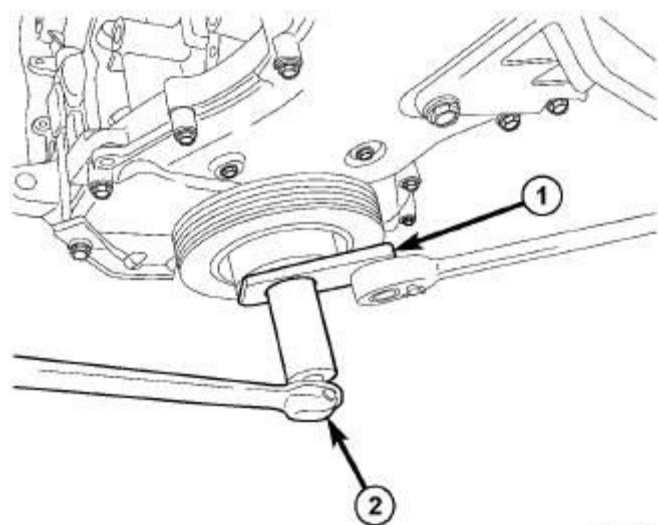


Fig. 283: Installing Damper Holder 9707
 Courtesy of CHRYSLER GROUP, LLC

5. Install crankshaft vibration damper.
6. Oil the bolt threads and between the bolt head and washer.
7. Install damper retaining bolt and Damper Holder (special tool #9707, Holder, Vibration Damper) (1). Tighten bolt to 210 N.m (155 ft. lbs.).

SEAL, CRANKSHAFT OIL, REAR

REMOVAL

REMOVAL

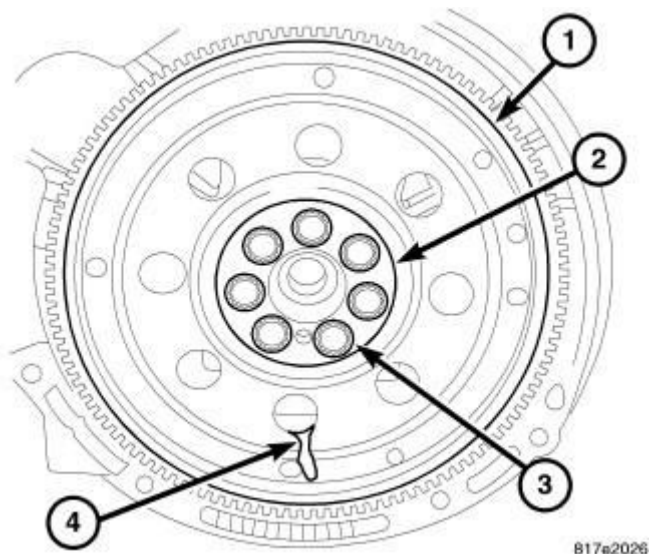
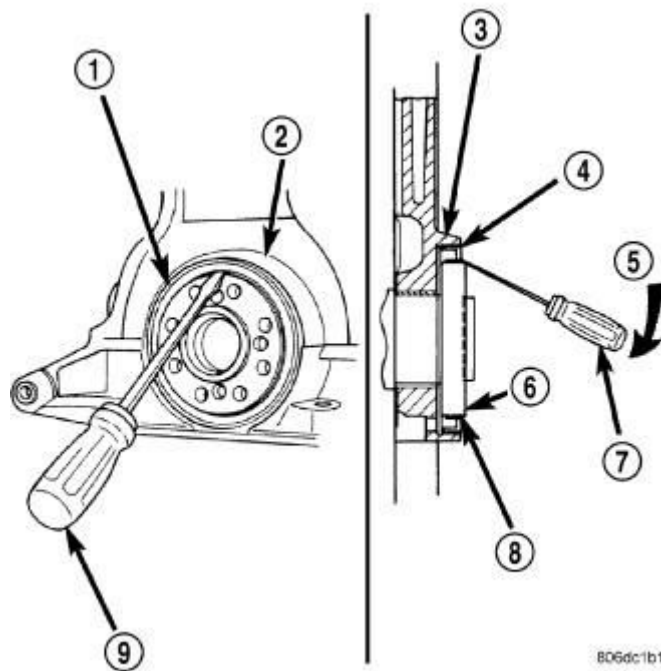


Fig. 284: Flex Plate

Courtesy of CHRYSLER GROUP, LLC

1. Remove transmission and flexplate (1). Refer to **FLEXPLATE, REMOVAL** .

**Fig. 285: Rear Crankshaft Oil Seal - Removal**

Courtesy of CHRYSLER GROUP, LLC

2. Insert a 3/16 flat bladed screwdriver (7) between the dust lip (8) and the metal case (4) of the crankshaft seal (1). Angle the screwdriver through the dust lip against metal case of the seal. Pry out seal.

CAUTION: Do not permit the screwdriver blade to contact crankshaft seal surface. Contact of the screwdriver blade against crankshaft edge (chamfer) is permitted.

3. Check to make sure the seals garter spring is not on the crankshaft.

INSTALLATION

INSTALLATION

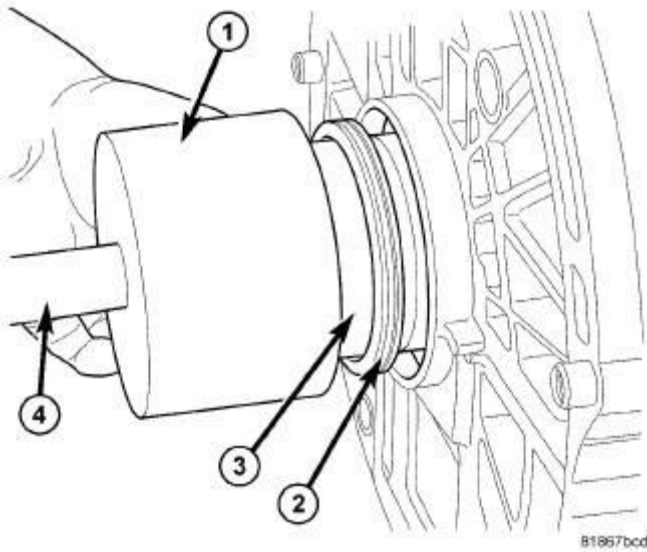


Fig. 286: Rear Main Seal Installation
Courtesy of CHRYSLER GROUP, LLC

CAUTION: If a burr or scratch is present on the crankshaft edge (chamfer), cleanup with 800 emery cloth to prevent seal damage during installation of new seal. If emery cloth is used, the crankshaft must be cleaned off Mopar® brake parts cleaner.

NOTE: When installing seal, lubricate Seal Guide (special tool #9509, Installer, Oil Seal) with clean engine oil.

1. Place Seal Guide (special tool #9509, Installer, Oil Seal) (3) on crankshaft.
2. Position seal (2) over guide tool. Guide tool should remain on crankshaft during installation of seal. Ensure that the lip of the seal is facing towards the crankcase during installation.
3. Drive the seal into the block using Seal Driver (special tool #9706, Installer, Crankshaft Rear Oil Seal) (1) and Driver Handle (special tool #C-4171, Driver Handle, Universal) (4) until Seal Driver (special tool #9706, Installer, Crankshaft Rear Oil Seal) bottoms out against the block.

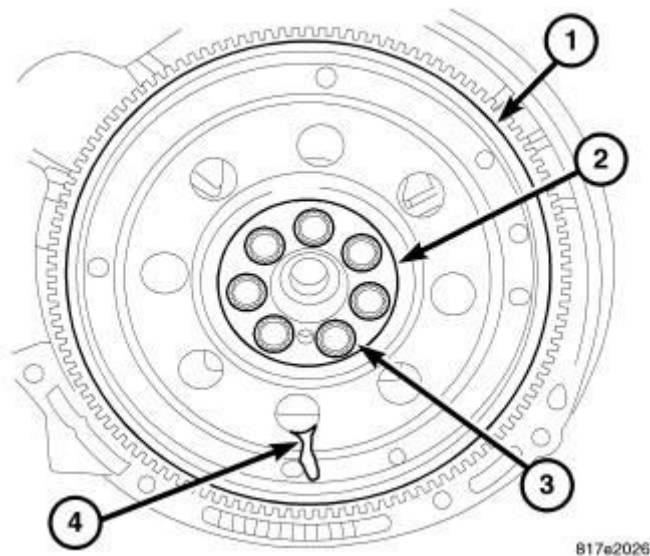


Fig. 287: Flex Plate

Courtesy of CHRYSLER GROUP, LLC

4. Install the flexplate (1) and transmission. Refer to **FLEXPLATE, INSTALLATION** .

ENGINE MOUNTING

INSULATOR, ENGINE MOUNT, LEFT

REMOVAL

REMOVAL

1. Raise and support the vehicle
2. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .
3. Lower the vehicle.
4. Remove the engine cover to prevent contact with the cowl.
5. Remove the battery and tray. Refer to **TRAY, BATTERY, REMOVAL** .
6. Support transaxle with a suitable jack.

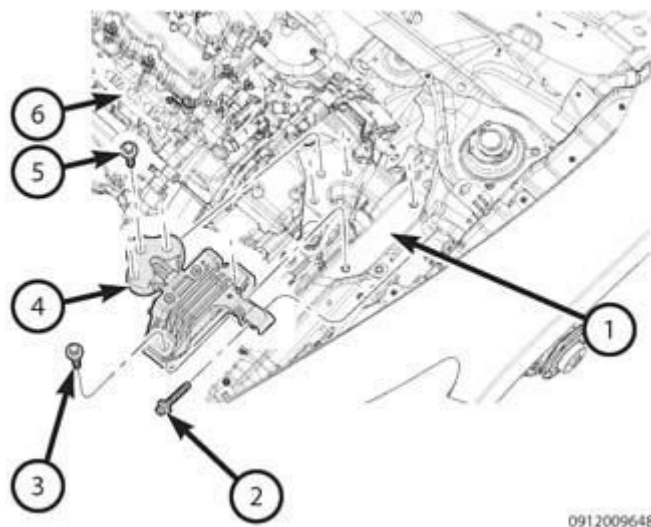


Fig. 288: Removing/Installing Left Engine Mount Insulator
Courtesy of CHRYSLER GROUP, LLC

7. Remove the two mount to frame rail bolts (3).
8. Remove the three mount to transaxle bracket bolts (5).

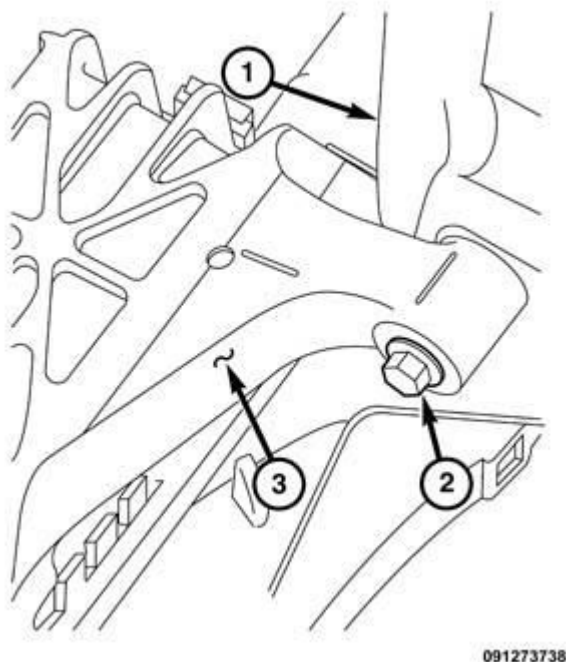


Fig. 289: Strut Tower, Trans Mount & Bolt
Courtesy of CHRYSLER GROUP, LLC

9. Loosen, **but do not remove** the bolt (2) for the trans mount (3) to strut tower (1) attachment.
10. Remove the mount (4).

INSTALLATION

INSTALLATION

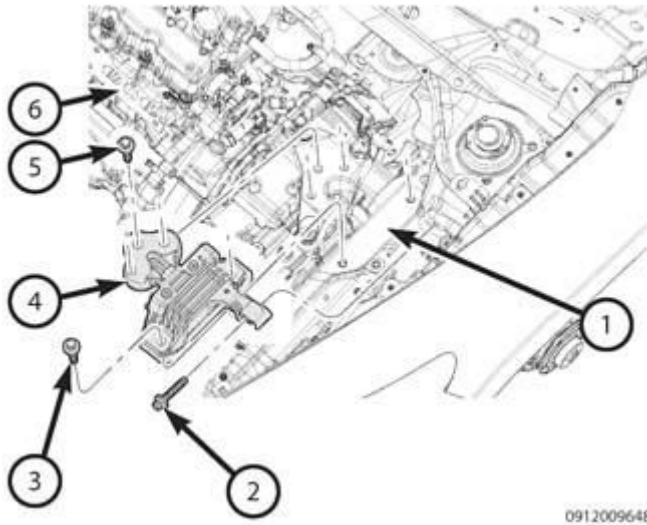


Fig. 290: Removing/Installing Left Engine Mount Insulator
Courtesy of CHRYSLER GROUP, LLC

1. Set the mount (4) into position between the engine block (6) and the frame rail (1).

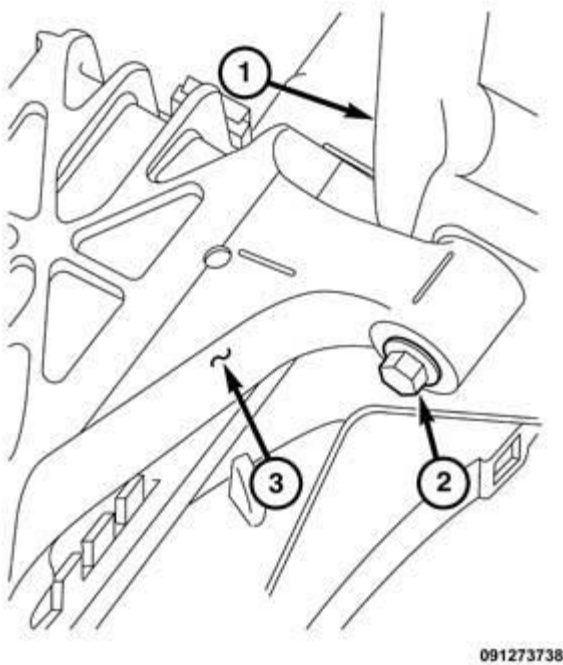


Fig. 291: Strut Tower, Trans Mount & Bolt
Courtesy of CHRYSLER GROUP, LLC

2. Tighten the left mount to strut tower bolt (2) finger tight.

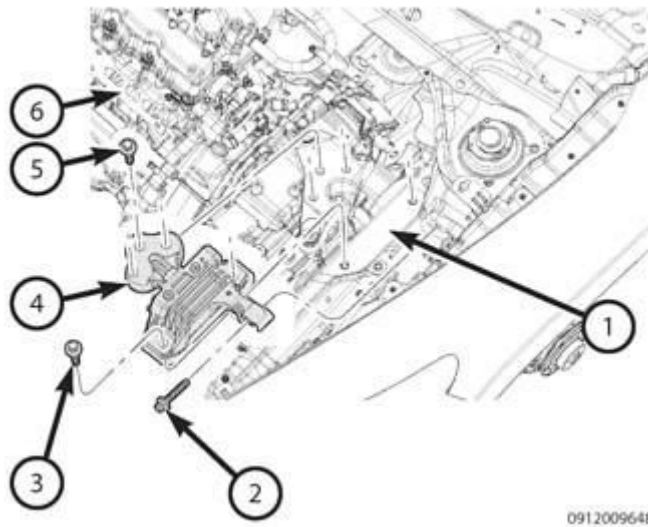


Fig. 292: Removing/Installing Left Engine Mount Insulator
 Courtesy of CHRYSLER GROUP, LLC

3. Install the left mount to frame rail bolts (3). Finger tighten the bolts.
4. Install the left mount to transmission bracket bolts (5). Finger tighten the bolts.
5. Tighten the left mount to strut tower bolt (2) to 64 N.m (47 ft. lbs.).
6. Tighten the left mount to transmission bracket bolts (5) to 157 N.m (115 ft. lbs.).
7. Tighten the left mount to frame rail bolts to 70 N.m (52 ft. lbs.).
8. Remove the jack.
9. Install the battery tray. Refer to **TRAY, BATTERY, INSTALLATION** .
10. Install the belly pan. Refer to **BELLY PAN, INSTALLATION** .
11. Install the engine cover assembly.

INSULATOR, ENGINE MOUNT, REAR

REMOVAL

REMOVAL

1. Raise and support the vehicle.
2. If equipped, remove the front skid plate

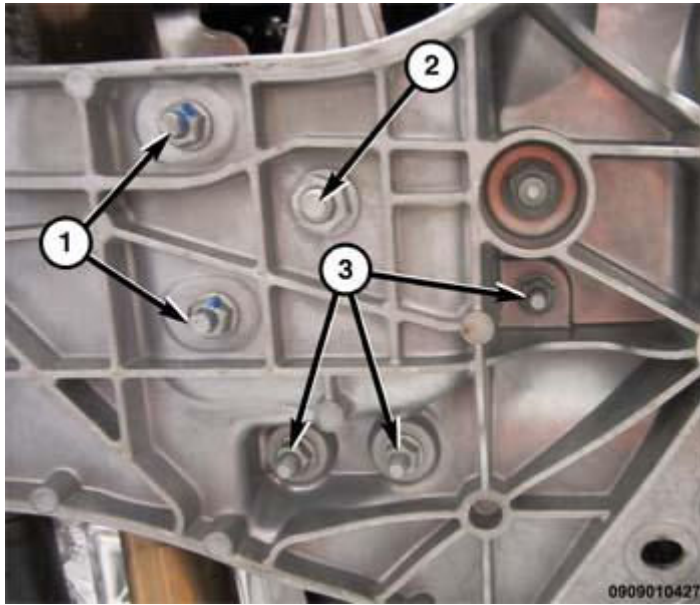


Fig. 293: Rear Mount Bracket Nuts
Courtesy of CHRYSLER GROUP, LLC

3. Remove the mount to bracket through bolt nut (2).

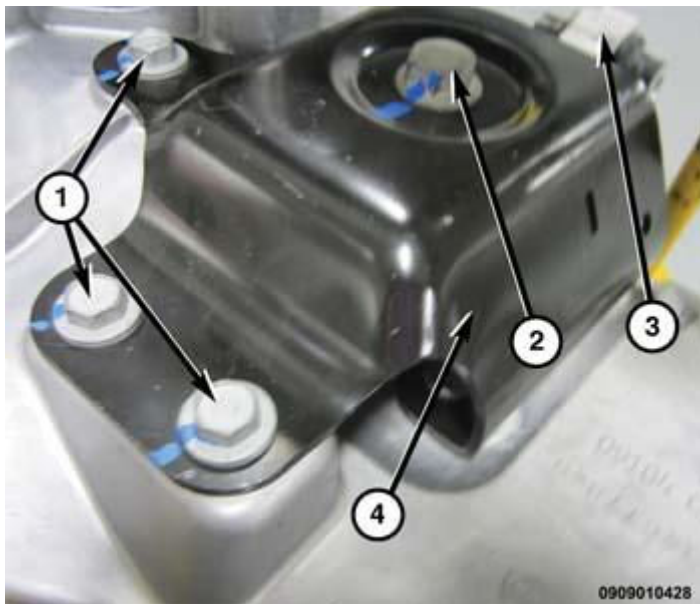


Fig. 294: Rear Mount & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Remove the mount to through bolt (2).

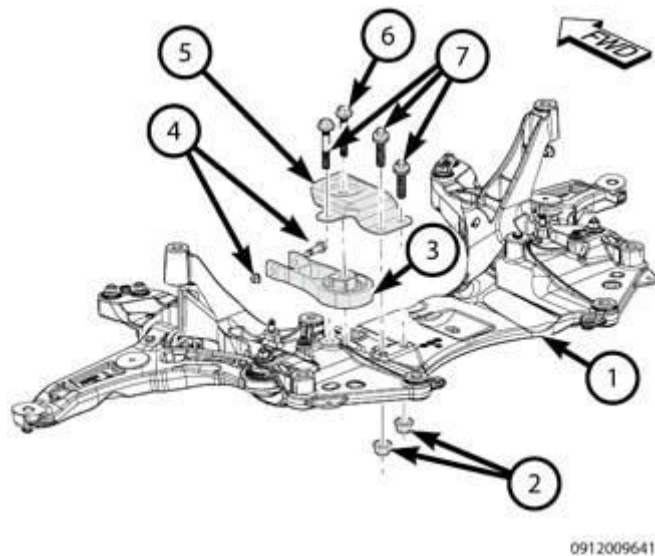


Fig. 295: Removing/Installing Rear Engine Mount Insulator
Courtesy of CHRYSLER GROUP, LLC

5. Remove the mount to bracket through bolt and nut (4).
6. Reposition the engine forward to allow the mount to be removed from the pocket past the mount bracket (5).

NOTE: The exhaust system can remain intact. Carefully pry the engine forward enough to clear the bracket but not to overextend the exhaust hangers.

7. Remove rear mount (3).

INSTALLATION

INSTALLATION

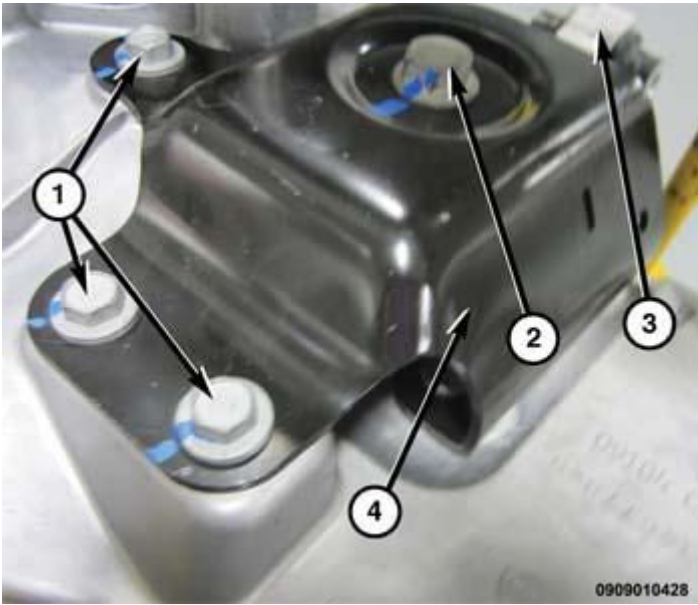


Fig. 296: Rear Mount & Bolts

Courtesy of CHRYSLER GROUP, LLC

1. Position rear mount (3) into the crossmember pocket (4).
2. Install the through bolt (2) into the cradle portion of the mount.

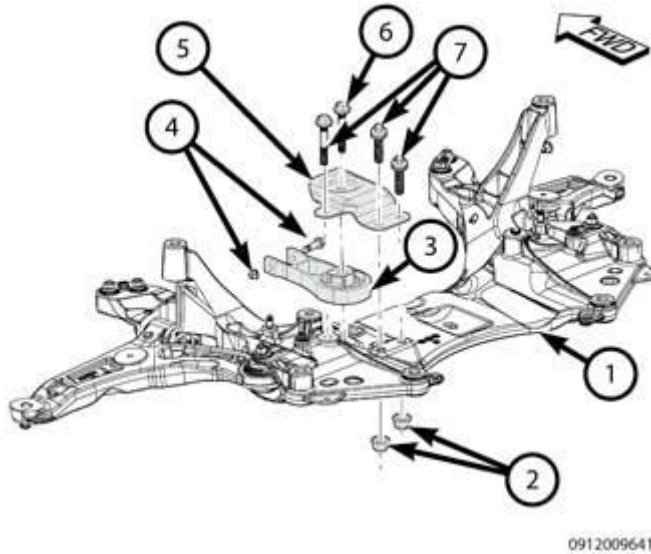


Fig. 297: Removing/Installing Rear Engine Mount Insulator

Courtesy of CHRYSLER GROUP, LLC

3. Position the front arm of the mount around the bracket and install the through bolt and nut (4).

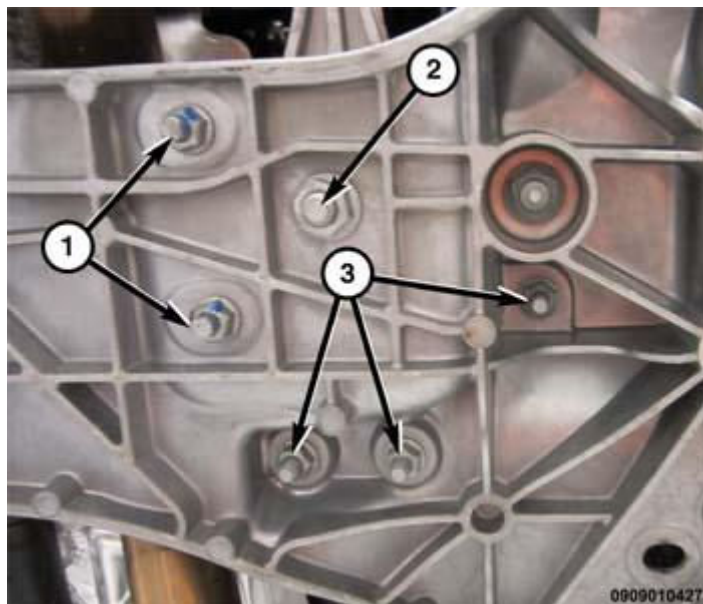


Fig. 298: Rear Mount Bracket Nuts
Courtesy of CHRYSLER GROUP, LLC

4. Tighten the nut (2) to 150 N.m (111 ft. lbs.).

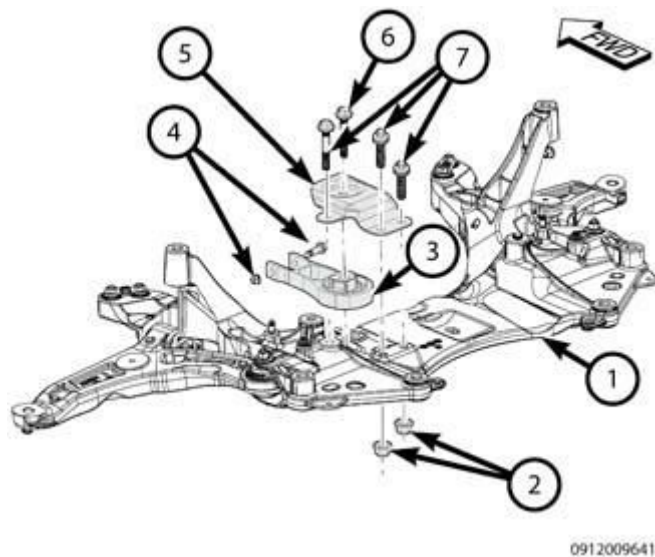


Fig. 299: Removing/Installing Rear Engine Mount Insulator
Courtesy of CHRYSLER GROUP, LLC

5. Tighten the rear mount to engine bracket through bolt and nut (4) to 220 N.m (162 ft. lbs.).
6. If equipped, install the front skid plate.

INSULATOR, ENGINE MOUNT, RIGHT

REMOVAL

REMOVAL

1. Remove the engine cover.
2. Remove the air cleaner assembly. Refer to **BODY, AIR CLEANER, REMOVAL**.
3. Remove the coolant reservoir bolts. Set the reservoir aside.
4. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
5. Remove the belly pan. Refer to **BELLY PAN, REMOVAL**.
6. Support the powertrain with a suitable jack.

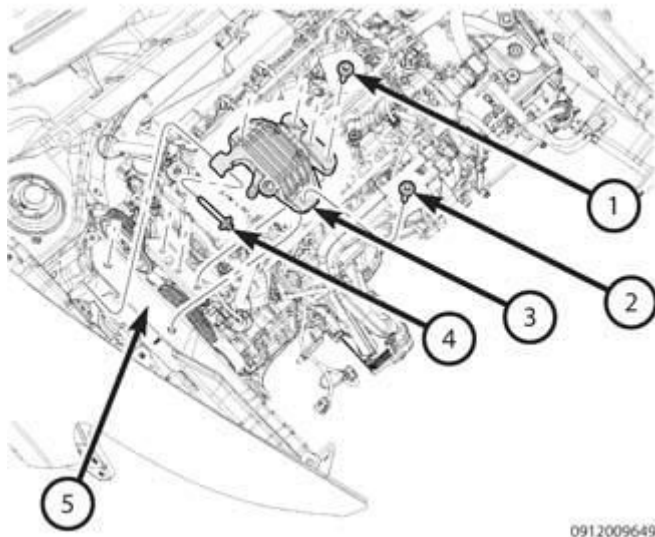
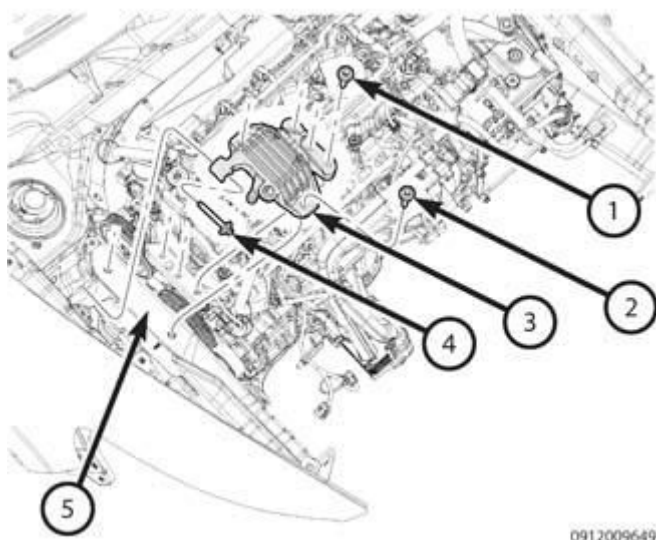


Fig. 300: Removing/Installing Right Engine Mount Insulator
Courtesy of CHRYSLER GROUP, LLC

7. Remove the three mount to timing cover bolts (1).
8. Remove the two mount to frame bolts (2).
9. Loosen, **but do not remove** the mount to strut tower bolt (4).
10. Lift the mount off of the frame rail (5).
11. Remove the engine mount (3).

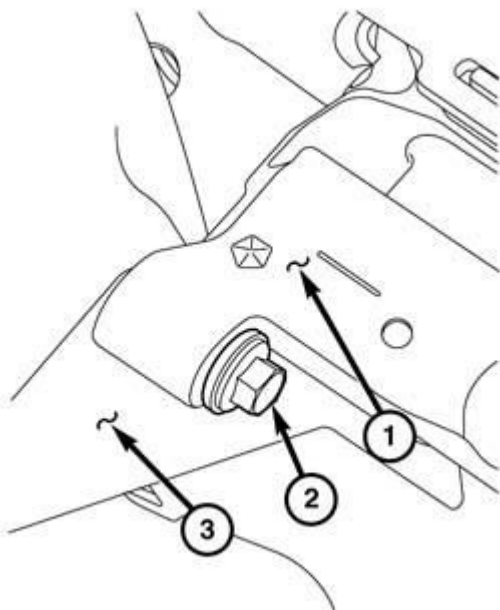
INSTALLATION**INSTALLATION**



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Fig. 301: Removing/Installing Right Engine Mount Insulator
Courtesy of CHRYSLER GROUP, LLC

1. Set the mount into position.
2. Tighten the right mount to strut tower bolt (4) finger tight.
3. Install engine mount to frame retaining bolts (2). Finger tighten the bolts.
4. Install the right mount to timing cover bolts (1). Finger tighten the bolts.



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Fig. 302: Strut Tower, Mount & Bolt
Courtesy of CHRYSLER GROUP, LLC

5. Tighten the right mount to strut tower bolt to 65 N.m (48 ft. lbs.).

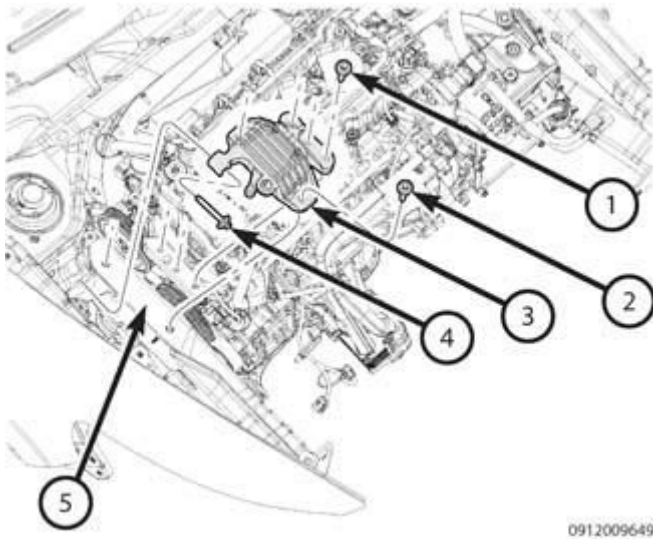


Fig. 303: Removing/Installing Right Engine Mount Insulator
Courtesy of CHRYSLER GROUP, LLC

6. Tighten the right mount to frame rail bolts (2) to 70 N.m (52 ft. lbs.).

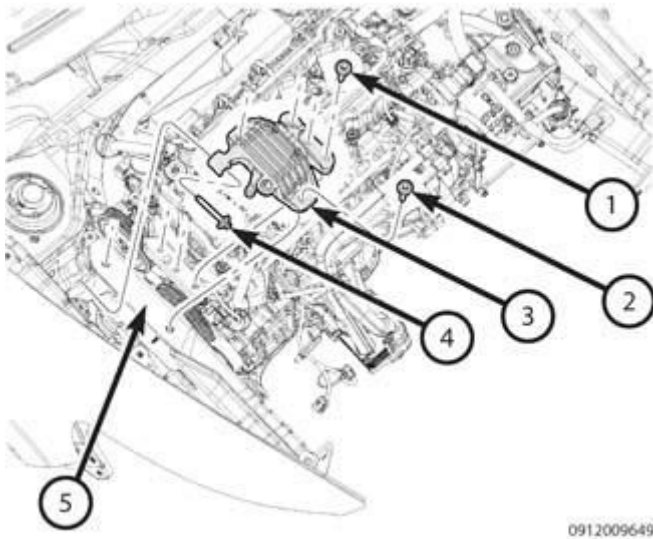


Fig. 304: Removing/Installing Right Engine Mount Insulator
Courtesy of CHRYSLER GROUP, LLC

7. Tighten the engine mount to timing cover bolts (1). Tighten to 63 N.m (46 ft. lbs.).
8. Remove the jack stand.
9. Install the coolant reservoir bottle. Tighten bolt to 9 N.m (80 in. lbs.).
10. Install the air cleaner assembly. Refer to **BODY, AIR CLEANER, REMOVAL**.

11. Install the engine cover.
12. Refer to **BELLY PAN, INSTALLATION** .

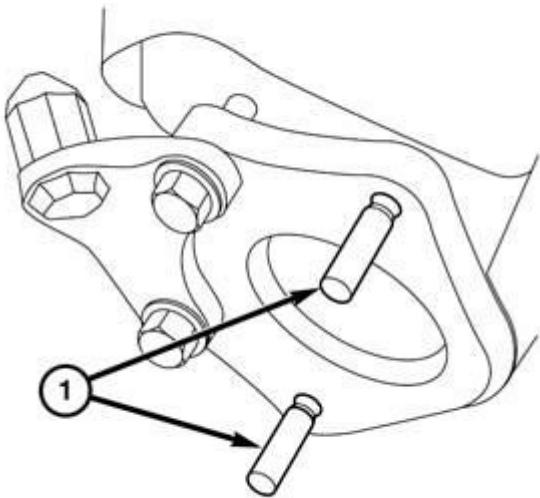
MANIFOLDS

MANIFOLD, EXHAUST

REMOVAL

REMOVAL

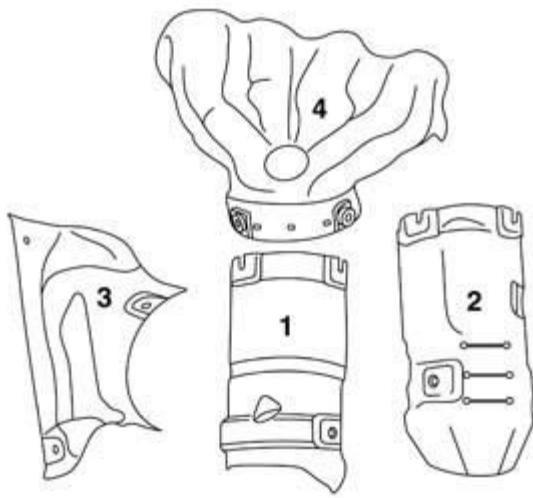
1. Remove engine cover.
2. Disconnect battery negative cable.
3. Disconnect the upstream and downstream oxygen sensors.
4. Raise and support the vehicle.
5. Remove the belly pan.



070969661

Fig. 305: Converter Outlet Studs
Courtesy of CHRYSLER GROUP, LLC

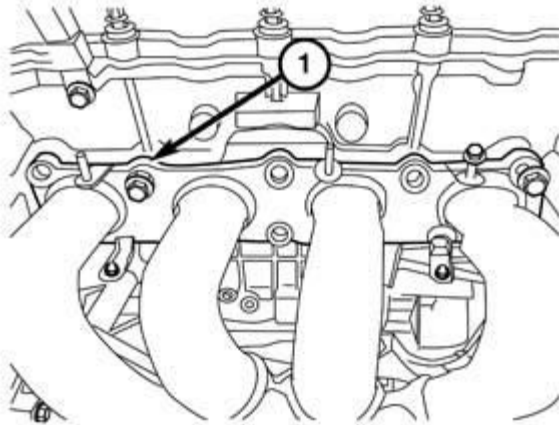
6. Remove the two nuts from the converter outlet. Discard the gasket .
7. Lower the vehicle.



091468689

Fig. 306: Exhaust Manifold Heat Shields
Courtesy of CHRYSLER GROUP, LLC

8. Remove the four bolts from the upper shield (2)
- .
9. Remove the upper shield (2).



091470025

Fig. 307: Exhaust Manifold Bolt
Courtesy of CHRYSLER GROUP, LLC

10. Remove the exhaust manifold bolts (1).
11. Remove the manifold out the top of the vehicle.
12. Remove and discard manifold gasket.

INSTALLATION

INSTALLATION

1. Install a new exhaust manifold gasket. **DO NOT APPLY SEALER .**
2. Set the manifold into position. Install the manifold bolts.

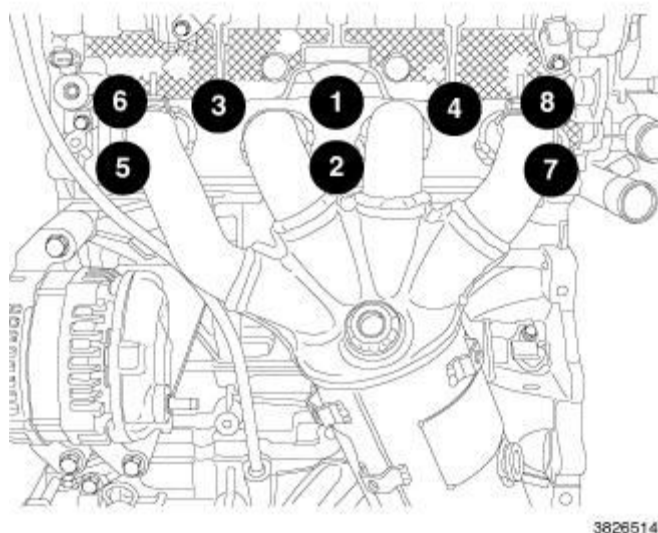


Fig. 308: Exhaust Manifold Bolts Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

3. Following the torque sequence, tighten the exhaust manifold bolts to 34 N.m (25 ft. lbs.).

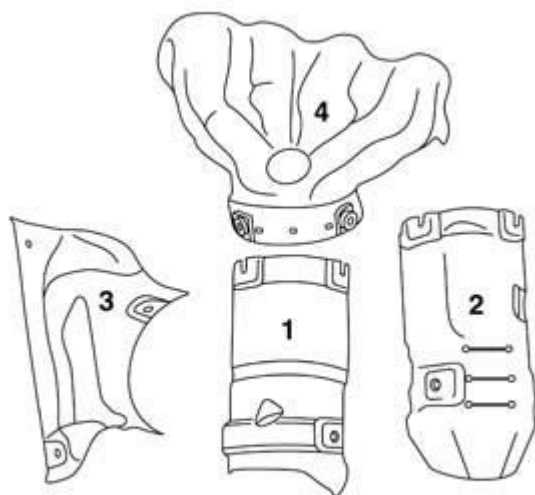


Fig. 309: Exhaust Manifold Heat Shields
Courtesy of CHRYSLER GROUP, LLC

4. Install the four shields in the proper sequence. Tighten bolts to 12 N.m (105 in. lbs.).
5. Install a new manifold lower gasket.
6. Install flange nuts. Tighten nuts to 28 N.m (21 ft. lbs.)

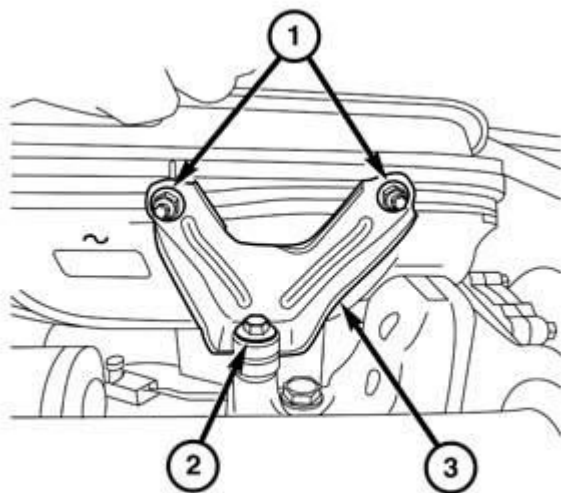
7. Install exhaust pipe to manifold (1). Tighten fasteners to (250 in. lbs.).
8. Install the oxygen sensors. Tighten to 50 N.m (37 ft. lbs.).
9. Connect the oxygen sensor connectors.
10. Install belly pan.
11. Lower vehicle.
12. Connect oxygen sensor electrical connector (3).
13. Connect negative cable to battery.
14. Install the engine cover.

MANIFOLD, INTAKE

REMOVAL

REMOVAL

1. Remove the engine cover.
2. Perform the fuel pressure release procedure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE** .
3. Disconnect the battery negative cable.
4. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
5. **If equipped:** remove the skid plates



081569485

Fig. 310: Intake Manifold Lower Bracket, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

6. Remove the intake manifold lower bracket nuts (1).
7. Remove the intake manifold lower bracket bolt (2).
8. Remove the intake manifold lower bracket (3).
9. Lower the vehicle.

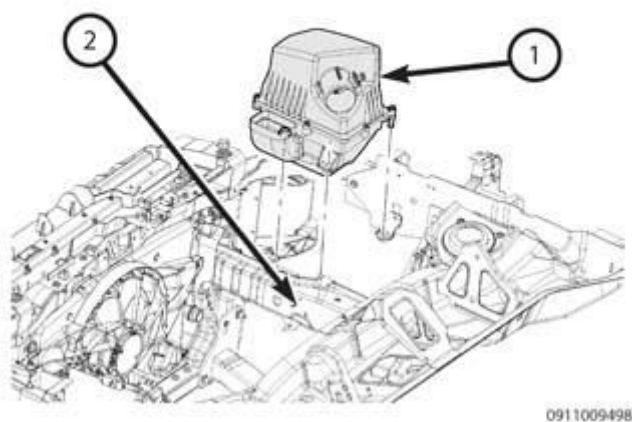
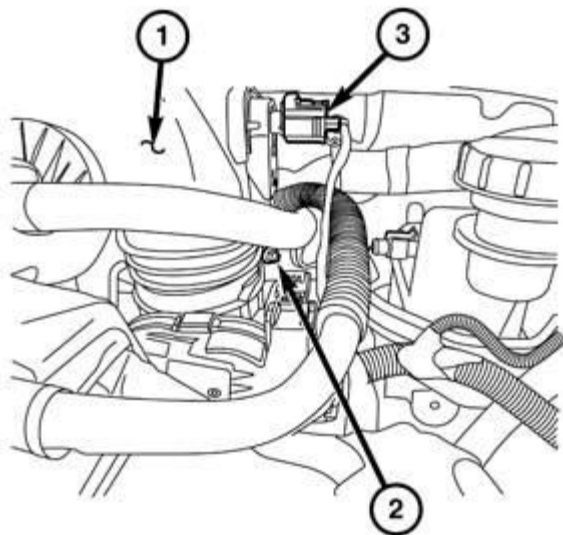


Fig. 311: Removing/Installing Air Cleaner Body
Courtesy of CHRYSLER GROUP, LLC

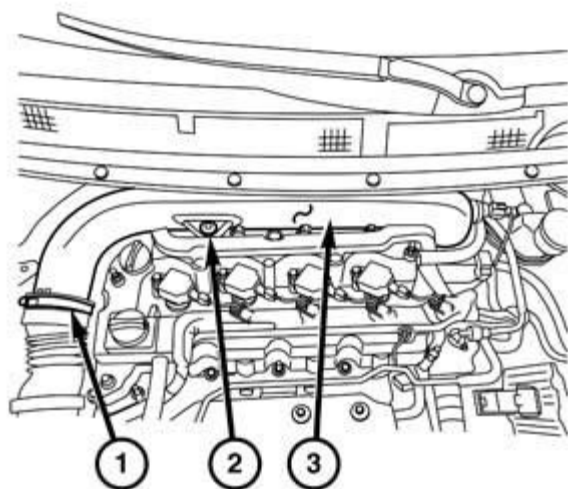
10. Remove the airbox assembly



090772118

Fig. 312: Resonator, Clamp & Connector
Courtesy of CHRYSLER GROUP, LLC

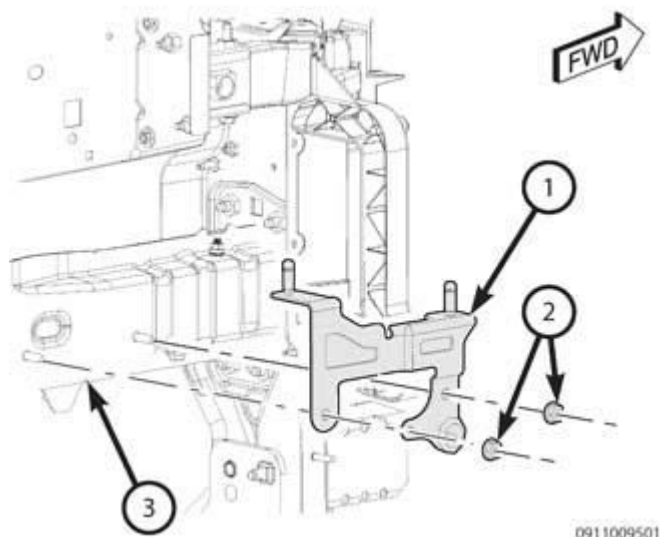
11. Loosen the snorkel clamp (2).
12. Disconnect the intake temperature sensor (IAT) connector (3).



090772119

Fig. 313: Resonator, Bolt & Clamp
Courtesy of CHRYSLER GROUP, LLC

13. Remove the snorkel bolt (2) and the snorkel clamp (1).
14. Remove the snorkel (3).
15. Remove the coolant reservoir bottle bolts. Position the bottle aside.



0911009501

Fig. 314: Removing/Installing Airbox Bracket
Courtesy of CHRYSLER GROUP, LLC

16. Remove the airbox bracket nuts (2) from the right frame rail (3). Remove the bracket (1).

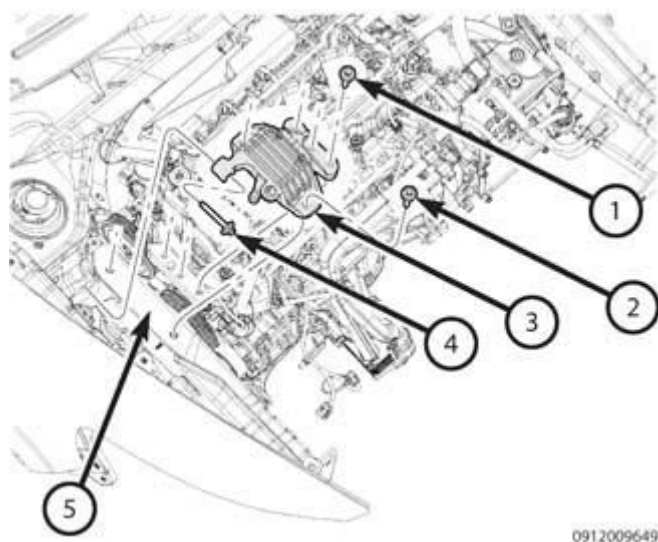


Fig. 315: Removing/Installing Right Engine Mount Insulator
Courtesy of CHRYSLER GROUP, LLC

17. Remove the 2 frame rail bolts from the right engine mount (2).
18. Remove the right engine mount to strut tower bolt (4).
19. Position a floor jack under the air conditioning compressor bracket.

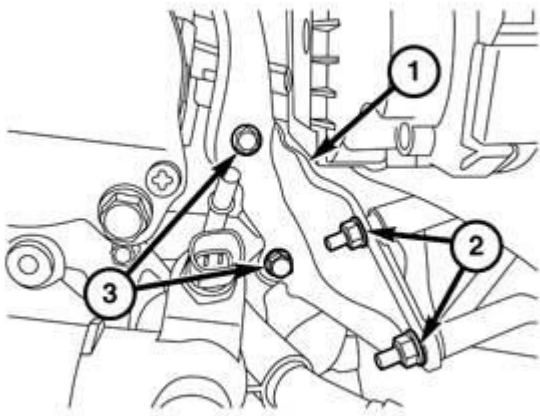
NOTE: Use a block of wood or similar between the jack pad and the bracket.

20. Raise the engine enough to remove the load from the right engine mount



Fig. 316: Measuring Three Inches
Courtesy of CHRYSLER GROUP, LLC

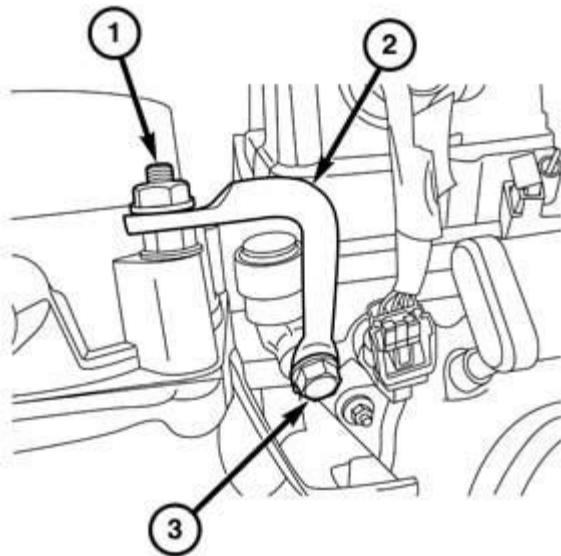
21. With the help of an assistant, pull the engine forward until 3 inches are between the strut tower bolt ear and the strut tower (1).



091468958

Fig. 317: Intake Manifold Upper Support Bracket, Bolts & Nuts
Courtesy of CHRYSLER GROUP, LLC

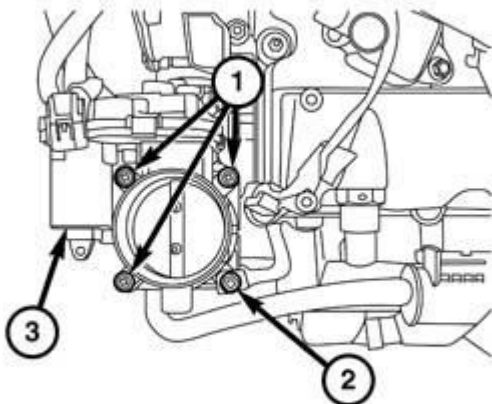
22. Remove the intake manifold upper support bracket bolts (3) and loosen the nuts to allow for ample movement.



081569489

Fig. 318: Throttle Body Support Bracket, Nut & Bolt
Courtesy of CHRYSLER GROUP, LLC

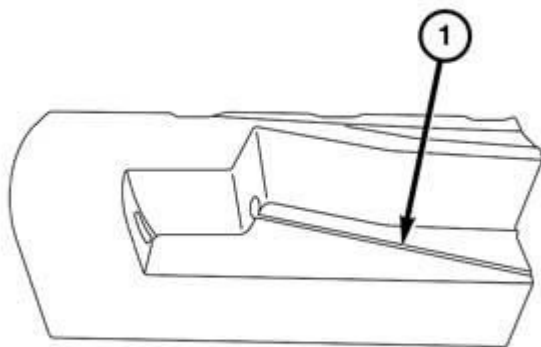
23. Remove the throttle body bracket (2).



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Fig. 319: Throttle Body, Gasket & Bolts
Courtesy of CHRYSLER GROUP, LLC

24. Remove the throttle body fasteners (1 & 2). Remove the throttle body (3).

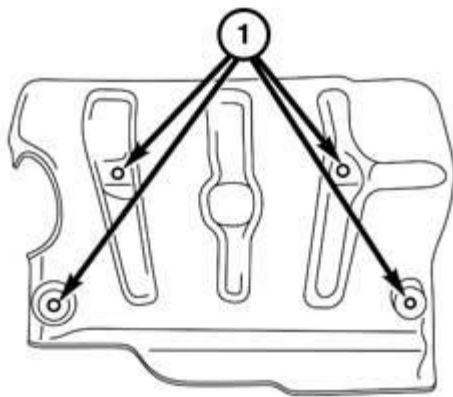


081569482

Fig. 320: Score Line

Courtesy of CHRYSLER GROUP, LLC

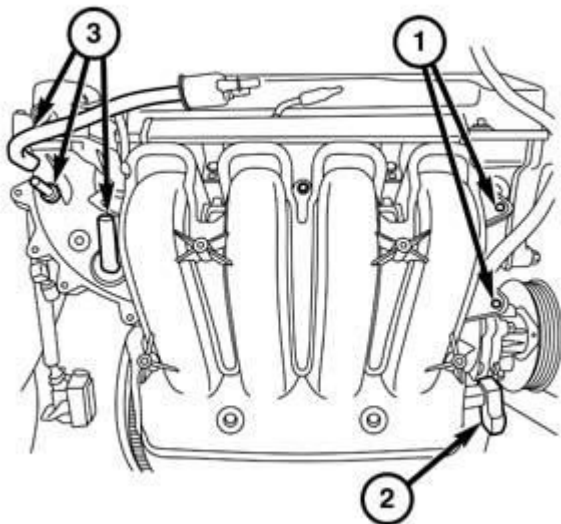
25. Cut the injector silencer pad at the score line (1).
26. Remove the injector silencer pad.
27. Disconnect the VVAA solenoids.



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Fig. 321: Intake Manifold Silencer Pad Screws
Courtesy of CHRYSLER GROUP, LLC

28. Remove the intake silencer cover screws (1). Remove the cover.
29. Disconnect the fuel injectors.



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Fig. 322: MAP Sensor Connector & Fittings

Courtesy of CHRYSLER GROUP, LLC

30. Disconnect the vacuum hoses at the intake manifold (3).
31. Disconnect the MAP sensor (2).
32. Release the harness from the manifold eyelets (1).

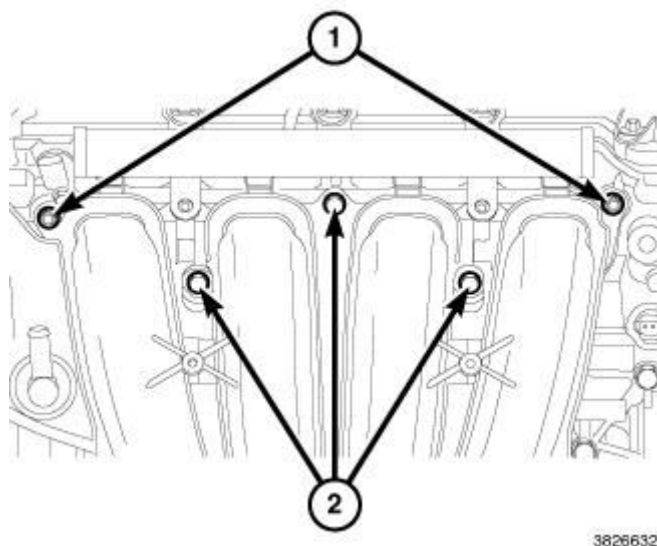
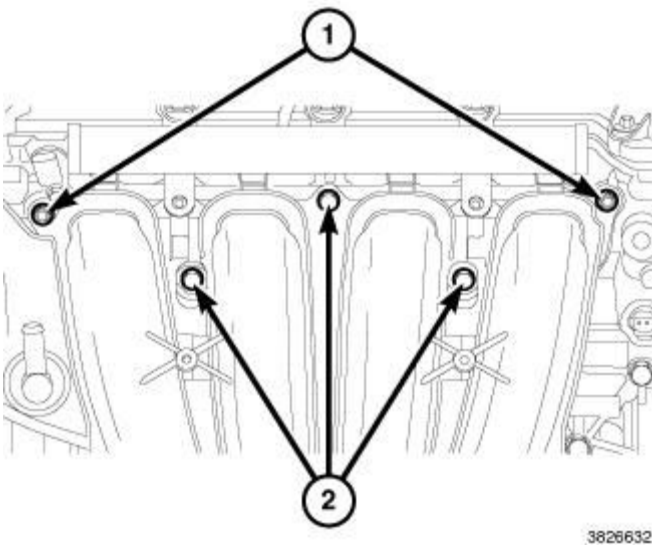


Fig. 323: Intake Manifold Retaining Bolts & Nuts
Courtesy of CHRYSLER GROUP, LLC

- 33.
34. Remove the intake manifold nuts (1).
35. Remove the intake manifold bolts (2).
36. Remove the intake manifold by lifting upward and out of the engine bay.

INSTALLATION

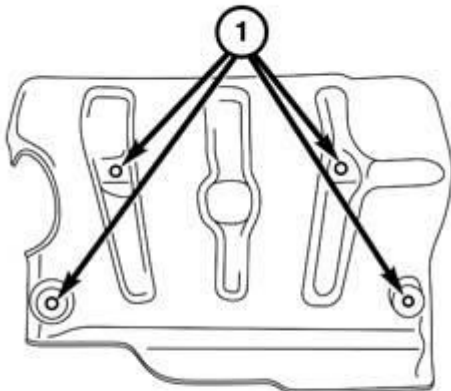
INSTALLATION



3826632

Fig. 324: Intake Manifold Retaining Bolts & Nuts
Courtesy of CHRYSLER GROUP, LLC

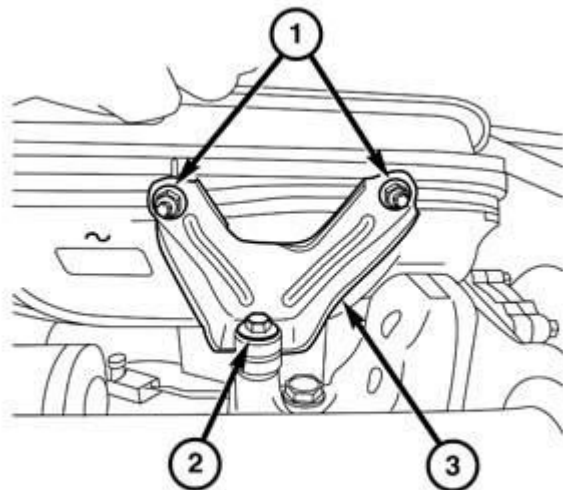
1. Clean all gasket surfaces.
2. Replace intake manifold gasket seals.
3. Position the foam pad over the coolant transfer tube.
4. Position the manifold onto the two studs.
5. Install intake manifold, tighten the fasteners (1 & 2) to 12 N.m (9 ft. lbs.).



091468686

Fig. 325: Intake Manifold Silencer Pad Screws
Courtesy of CHRYSLER GROUP, LLC

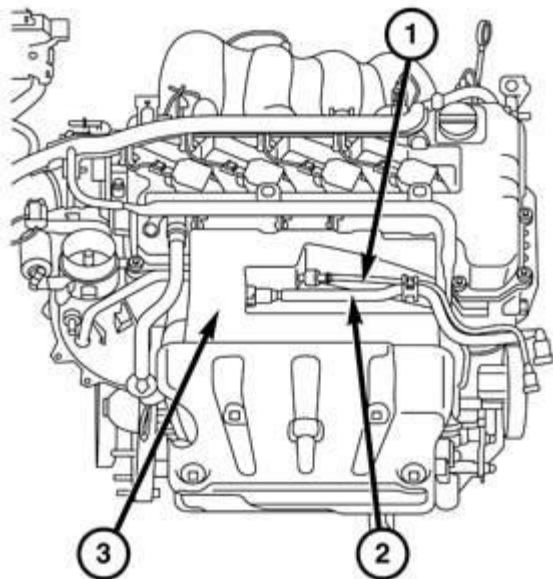
6. Install the intake manifold silencer cover and screws. Tighten the screws to 2.5 N.m (22 in. lbs.).



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Fig. 326: Intake Manifold Lower Bracket, Nuts & Bolts
 Courtesy of CHRYSLER GROUP, LLC

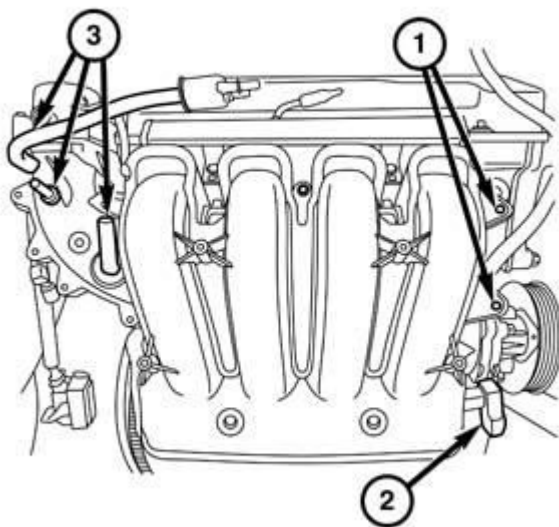
7. Install the intake manifold lower bracket (3). Install the two nuts (1) and one bolt (2). Tighten to 9 N.m (80 in. lbs.).
8. Connect fuel injector electrical connectors.
9. Inspect quick connect fittings for damage, replace if necessary. Refer to **FITTING, QUICK CONNECT**.
10. Connect the purge solenoid electrical connector.



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Fig. 327: Foam Insulator, Fuel Line & Purge Line
Courtesy of CHRYSLER GROUP, LLC

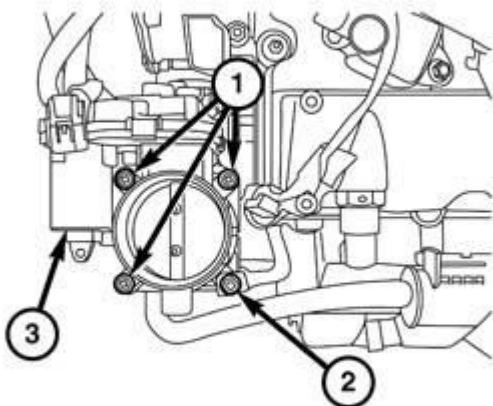
11. Insert the foam insulator over the fuel rail (3).
12. Connect fuel line (1).
13. Connect the purge vapor line (2).



091468688

Fig. 328: MAP Sensor Connector & Fittings
Courtesy of CHRYSLER GROUP, LLC

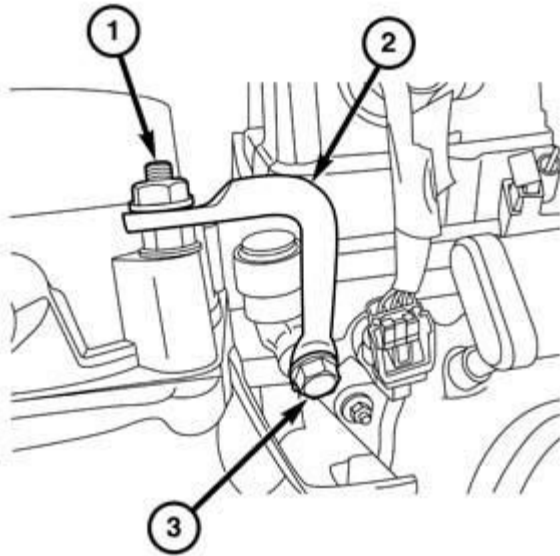
14. Insert the harness retainers to the intake manifold eyelets (1).
15. Connect the three hose connectors (3).
16. Connect the MAP sensor connector (2).



091468957

Fig. 329: Throttle Body, Gasket & Bolts
Courtesy of CHRYSLER GROUP, LLC

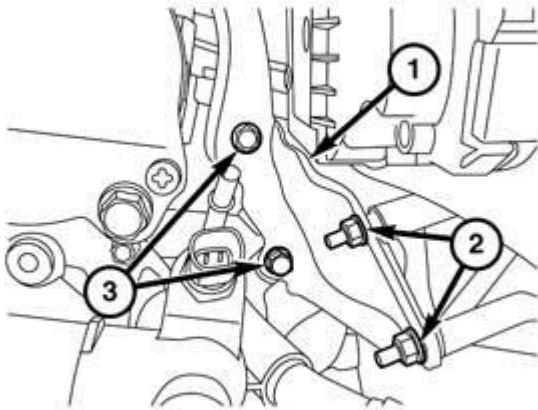
17. Install throttle body (3) onto the intake manifold.
18. Install the three throttle body screws (1) and one throttle body bolt (2). Tighten to 8 N.m (71 in. lbs.).



081569489

Fig. 330: Throttle Body Support Bracket, Nut & Bolt
Courtesy of CHRYSLER GROUP, LLC

19. Install the throttle body upper support (2). Tighten the fasteners to 8 N.m (71 in. lbs.).



091468958

Fig. 331: Intake Manifold Upper Support Bracket, Bolts & Nuts
Courtesy of CHRYSLER GROUP, LLC

20. Install the intake manifold upper bracket (1). Install bolts (3) and nuts (2). Tighten to 9 N.m (80 in. lbs.).
21. Connect the PCV valve hose.
22. With assistance, slide the engine rearward back into its proper position. **Make sure the mount is not against the frame while being moved.**

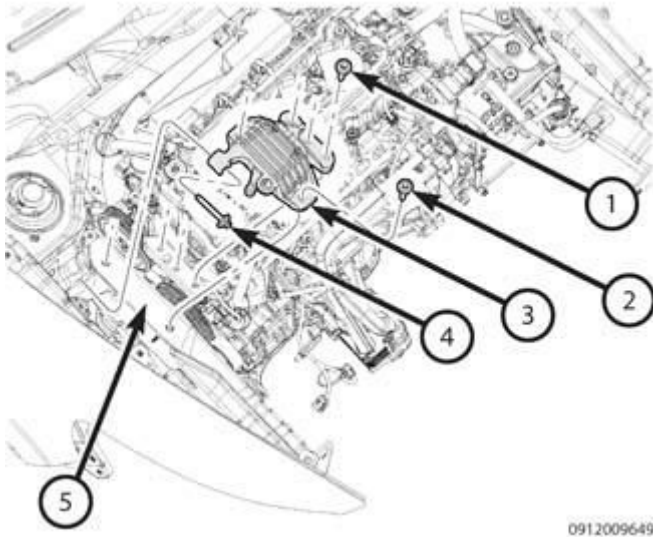


Fig. 332: Removing/Installing Right Engine Mount Insulator
Courtesy of CHRYSLER GROUP, LLC

23. Lower the floor jack once the mount is in proper alignment.
24. Install the 2 engine mount to frame rail bolts (2).
25. Install the right engine mount to strut tower bolt (4).
26. Tighten the mount to strut tower bolt to 65 N.m (48 ft. lbs.).
27. Tighten the mount to frame rail bolts to 105 N.m (77 ft. lbs.)

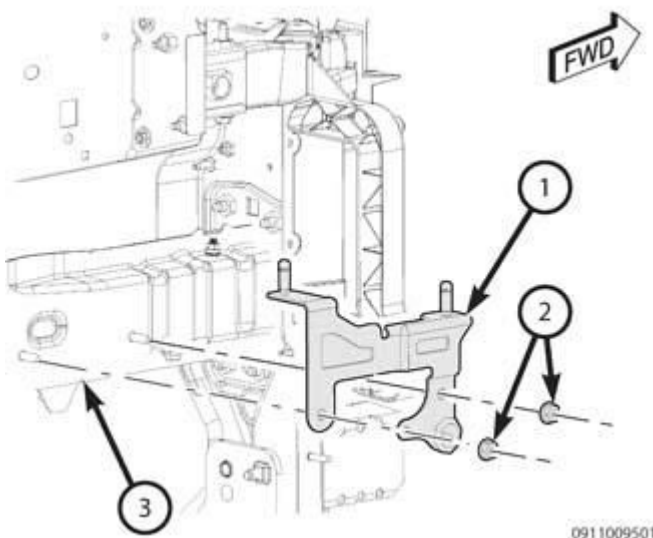
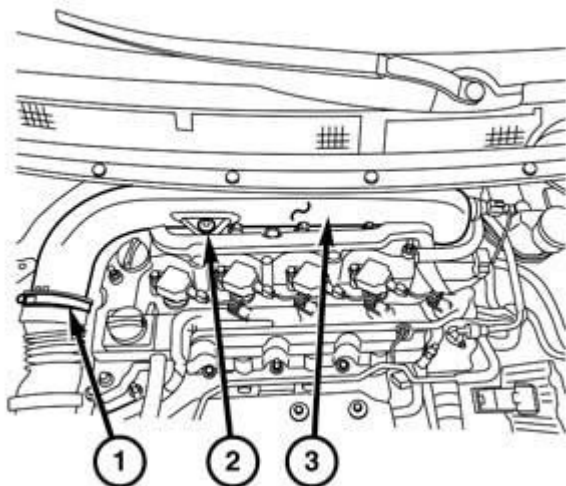


Fig. 333: Removing/Installing Airbox Bracket
Courtesy of CHRYSLER GROUP, LLC

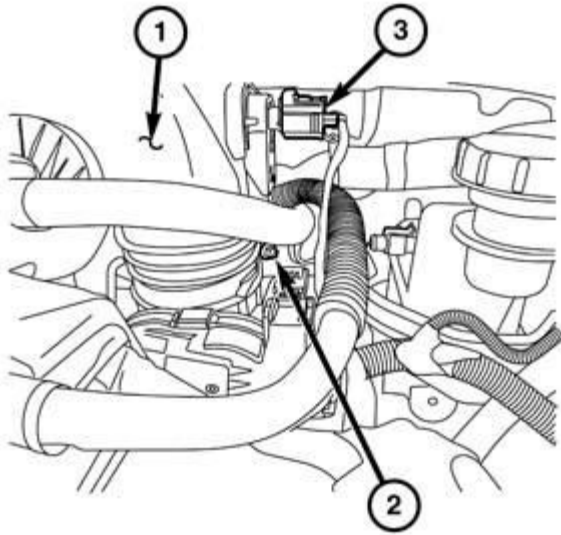
28. Install the air cleaner bracket (1). Install the nuts (2).
29. Tighten the nuts to 8 N.m (71 in. lbs.).



090772119

Fig. 334: Resonator, Bolt & Clamp
Courtesy of CHRYSLER GROUP, LLC

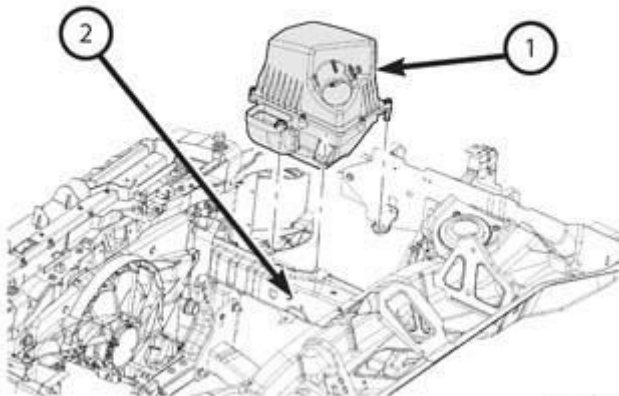
30. Install the intake snorkel (3).
31. Install the snorkel fastener (2). Tighten to 8 N.m (71 in. lbs.).



090772118

Fig. 335: Resonator, Clamp & Connector
 Courtesy of CHRYSLER GROUP, LLC

32. Connect the IAT sensor (3).
33. Tighten the clamp (2) to 4 N.m (35 in. lbs.).
34. Install the engine cover.



0911009498

Fig. 336: Removing/Installing Air Cleaner Body
 Courtesy of CHRYSLER GROUP, LLC

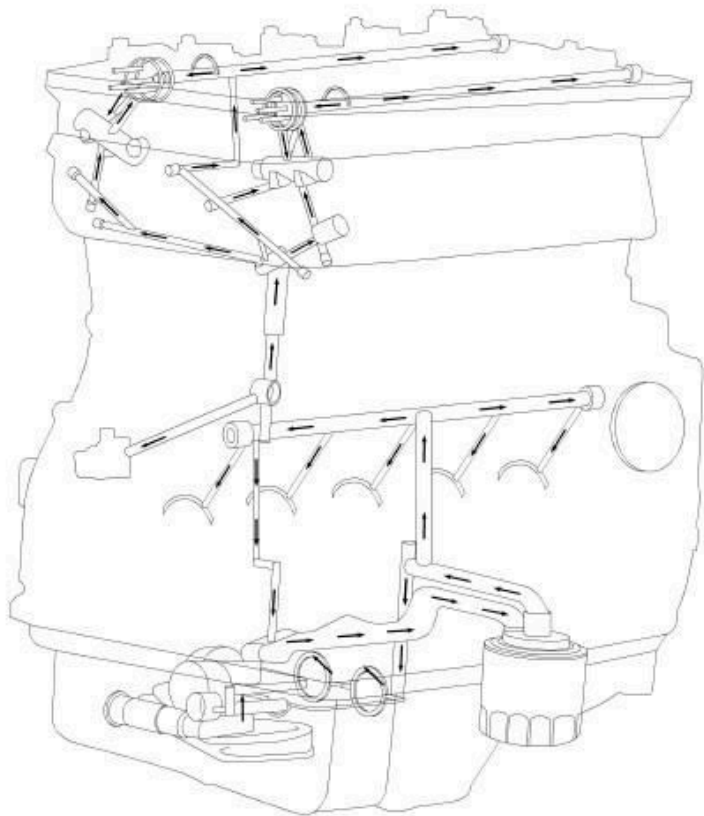
35. Install the air cleaner assembly (1). Refer to **BODY, AIR CLEANER, INSTALLATION**.

36. Connect negative cable to battery.

LUBRICATION

DESCRIPTION

DESCRIPTION



81867bc9

Fig. 337: Oil Flow Diagram

Courtesy of CHRYSLER GROUP, LLC

The lubrication system is a full-flow filtration, pressure feed type. The balance shaft module (BSM) is mounted below the ladder frame and chain driven by the crankshaft. The BSM consists of a non-serviceable pump, oil pressure relief valve, and a non-serviceable balance assembly.

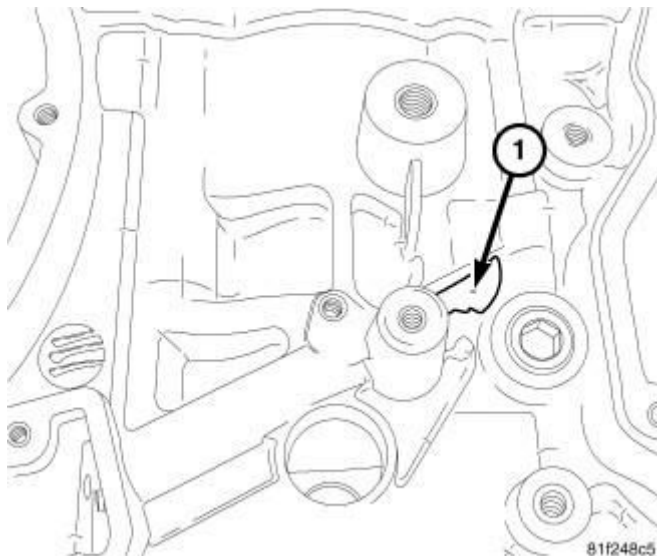


Fig. 338: Oil Hole

Courtesy of CHRYSLER GROUP, LLC

NOTE: Not all blocks have the bolt on timing chain oil squirter. Engine blocks either have a bolt-on oil squirter or a 1.0 mm hole (1) drilled into the oil gallery passage. Engine blocks with the 1.0 mm hole no longer use an oil squirter even though the threaded mounting hole may still be present.

OPERATION

OPERATION

Engine oil is drawn up through the pickup tube and is pressurized by the oil pump and routed through the full-flow filter to the main oil gallery running the length of the cylinder block. A diagonal hole in each bulkhead feeds oil to each main bearing. Drilled passages within the crankshaft route oil from main bearing journals to connecting rod journals. Balance shaft lubrication is provided through an internal oil passage at the #3 bearing location around the balance shaft module (BSM) mounting bolt. A vertical hole at the number one bulkhead routes pressurized oil through a filter screen and head gasket up to the cylinder head. The oil then divides into two passages; one to the variable valve actuator assembly (VVAA) and one to the exhaust camshaft. The passage to the camshaft feeds the hollow exhaust camshaft at the second cam journal. The rest of the cam journals are feed oil through the hollow camshaft. Oil returning to the pan from pressurized components supplies lubrication to the valve stems, cam lobes, and tappets. Cylinder bores and wrist pins are splash lubricated from directed slots on the connecting rod thrust collars.

DIAGNOSIS AND TESTING

ENGINE OIL LEAK

Begin with a thorough visual inspection of the engine, particularly at the area of the suspected leak. If an oil leak source is not readily identifiable, the following steps should be followed:

1. Do not clean or de-grease the engine at this time because some solvents may cause rubber to swell, temporarily stopping the leak.
2. Add an oil soluble dye (use as recommended by the manufacturer). Start the engine and let idle for approximately 15 minutes. Check the oil dipstick to make sure the dye is thoroughly mixed as indicated with a bright yellow color under a black light.
3. Using a black light, inspect the entire engine for fluorescent dye, particularly at the suspected area of the oil leak. If the oil leak is found and identified, repair per Service Information instructions.
4. If dye is not observed, drive the vehicle at various speeds for approximately 24 km (15 miles), and repeat the inspection.

If the oil leak source is not positively identified at this time, proceed with the **AIR LEAK DETECTION TEST METHOD**.

AIR LEAK DETECTION TEST METHOD

1. Disconnect the fresh air make-up hose from the oil filler neck. Cap or plug the make-up air hose nipple.
2. Remove the PCV hose from the PCV valve. Cap or plug the PCV valve nipple.
3. Attach an air hose with a pressure gauge and regulator to the dipstick tube.

CAUTION: Do not subject the engine assembly to more than 20.6 kPa (3 PSI) of test pressure.

4. Gradually increase air pressure from 7 kPa (1 psi) to 17 kPa (2.5 psi) maximum while applying soapy water at the suspected leak source. Adjust the regulator to a suitable test pressure within this range that provides the best bubble generation which will pinpoint the leak source. If the oil leak is detected and identified, repair per Service Information procedures.
5. If the leakage occurs at the rear crankshaft oil seal area, follow the procedures for rear seal area leaks. Refer to **LUBRICATION - DIAGNOSIS AND TESTING**.
6. If no leaks are detected, turn off the air supply and remove the air hose and all plugs and caps. Install the PCV valve and make-up air hoses.
7. Clean the oil off of the suspect oil leak area using a suitable solvent. Drive the vehicle at various speeds approximately 24 km (15 miles). Inspect the engine for signs of an oil leak by using a black light.

CHECKING ENGINE OIL PRESSURE

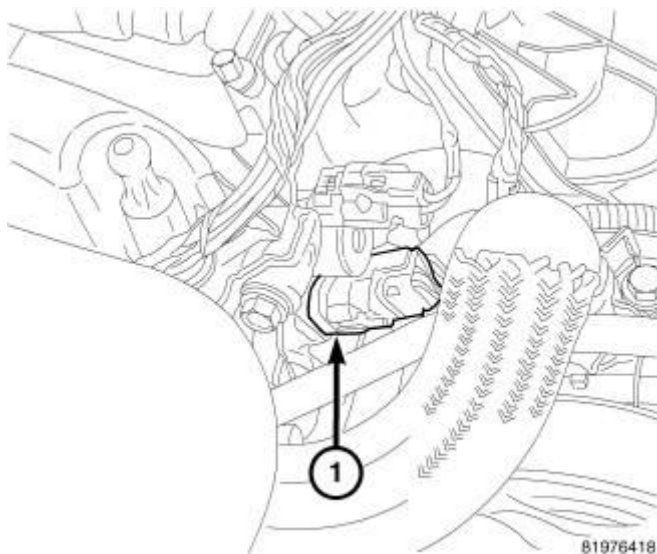


Fig. 339: Oil Temperature Sensor

Courtesy of CHRYSLER GROUP, LLC

NOTE: Anytime the oil temperature sensor is removed, it should be replaced with a new sensor.

1. Disconnect and remove oil temperature sensor (1).

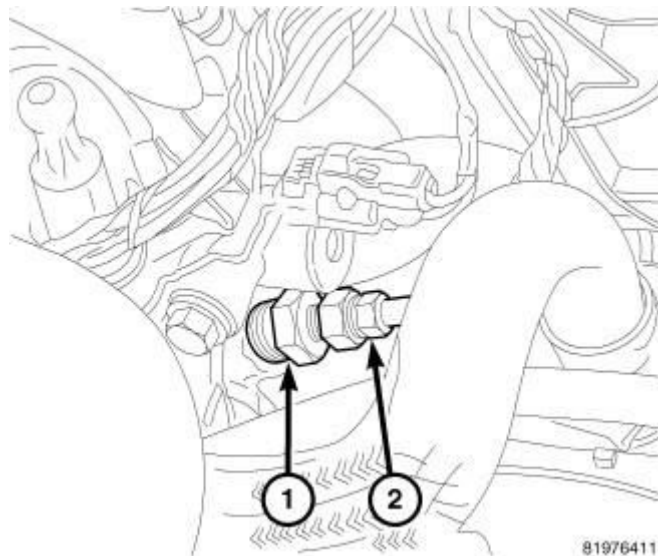


Fig. 340: Oil Pressure Adapter 9879

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Threads in cylinder head are British Standard Pipe (BSP). Do not install a NPT threaded adapter, this could crack the cylinder block.

2. Install threaded adapter (special tool #9879. Adapter. Oil Pressure Test) (1).

3. Install oil pressure gauge (2).

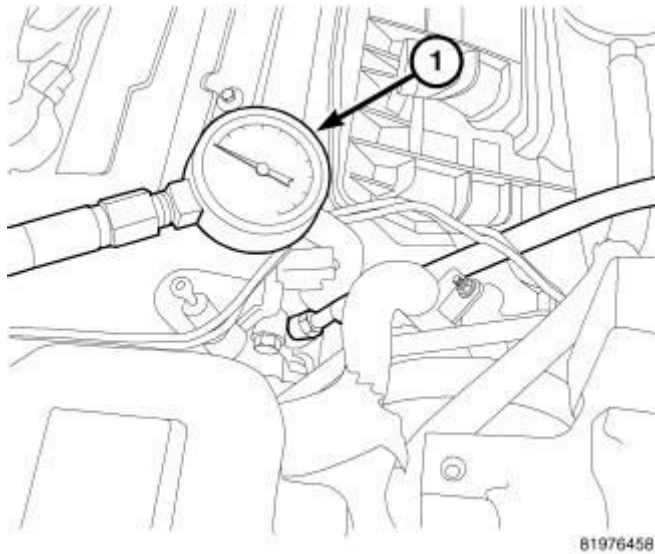
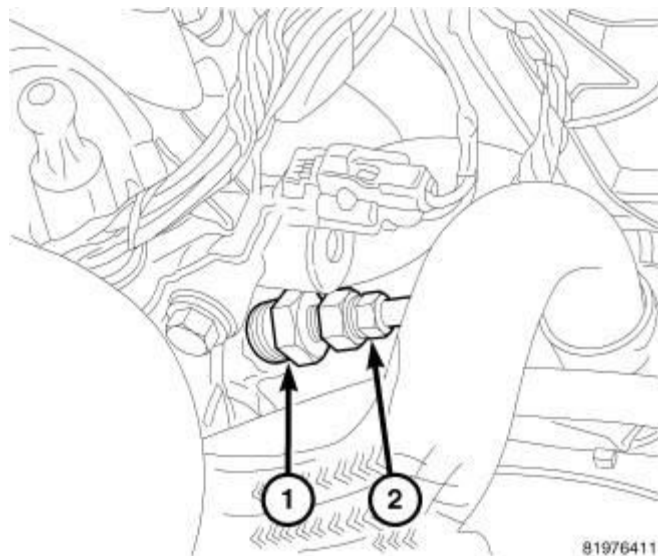


Fig. 341: Oil PSI Gauge
Courtesy of CHRYSLER GROUP, LLC

4. Start engine and record reading on oil pressure gauge (1).

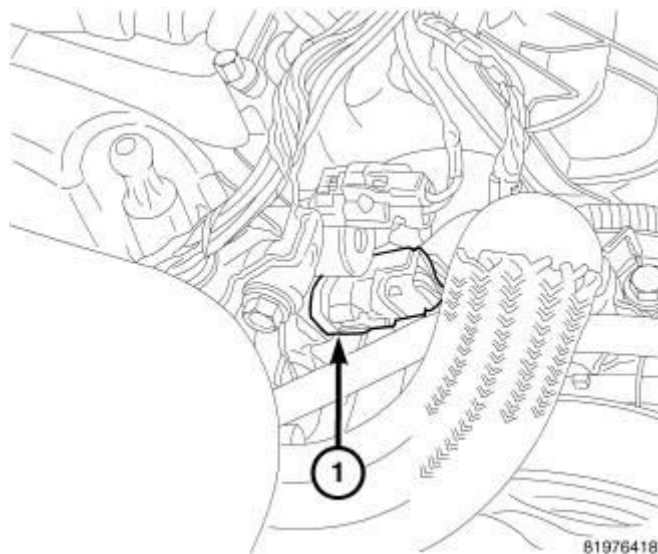
CAUTION: If oil pressure is 0 at idle, do not perform the 3000 RPM test

5. If oil pressure is 0 at idle, shut off engine. Check for pressure relief valve stuck open or a clogged oil pick-up screen.
6. Remove oil pan and inspect for debris. Refer to **PAN, OIL, REMOVAL** .
7. Remove oil pressure relief valve. Refer to **VALVE, OIL PRESSURE RELIEF, REMOVAL**. and
8. Inspect oil pressure relief valve if damaged replace. Refer to **VALVE, OIL PRESSURE RELIEF, INSPECTION**.
9. If pressure relief valve is Ok, replace balance shaft module assembly. Refer to **PUMP, ENGINE OIL, REMOVAL** .

**Fig. 342: Oil Pressure Adapter 9879**

Courtesy of CHRYSLER GROUP, LLC

10. After test is complete, remove oil pressure gauge (2) and adapter (special tool #9879, Adapter, Oil Pressure Test) (1).

**Fig. 343: Oil Temperature Sensor**

Courtesy of CHRYSLER GROUP, LLC

11. Install a new oil pressure temperature sensor (1) and connect electrical connector.

CHECKING VVT OIL PRESSURE

This test can be used to help diagnose VVT faults.

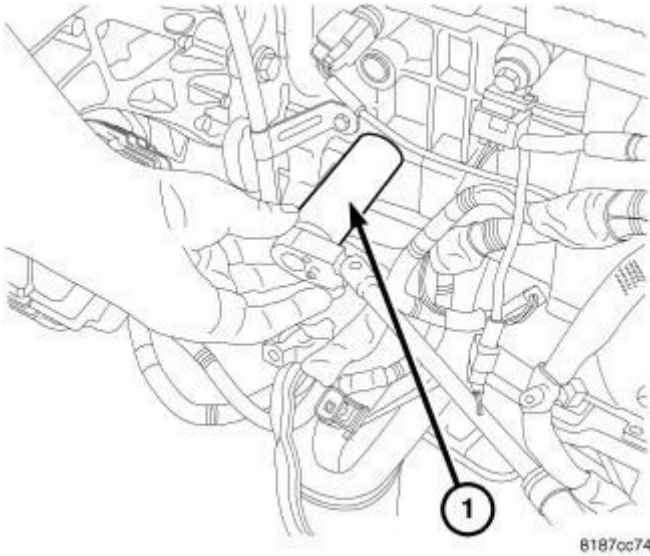


Fig. 344: Oil Sender

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and remove oil pressure sensor (1).

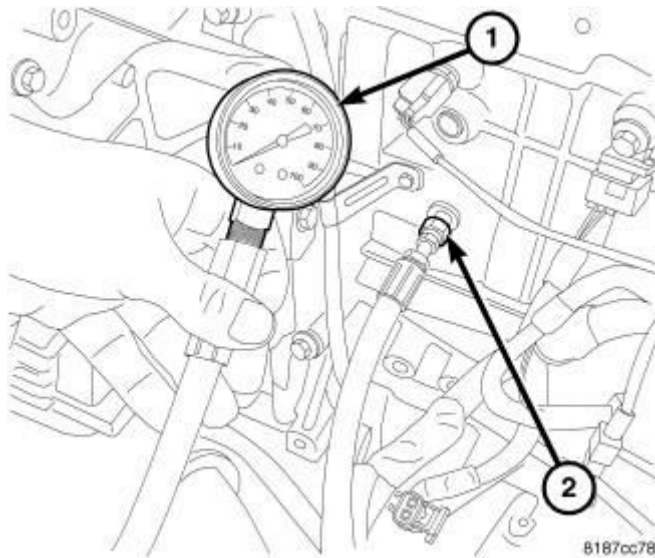


Fig. 345: Oil Pressure Gauge

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Threads in block are 1/8"-28 British Standard Pipe (BSP). Do not install a National Pipe Thread (NPT) threaded adapter, this could crack the cylinder block.

2. Install an 1/8-28 BSP male to 1/8-27 female threaded adapter (2).
3. Install oil pressure gauge (1).
4. Start engine and record oil pressure.

CAUTION: If oil pressure is 0 at idle, do not perform the 3000 RPM test

5. If oil pressure is 0 at idle, shut off engine. Check for pressure relief valve stuck open or a clogged oil pick-up screen.
6. Remove oil pan and inspect for debris. Refer to **PAN, OIL, REMOVAL** .
7. Remove oil pressure relief valve and inspect, if damaged replace pressure relief valve. Refer to **VALVE, OIL PRESSURE RELIEF, REMOVAL**.
8. If pressure relief valve is Ok, replace balance shaft module assembly. Refer to **PUMP, ENGINE OIL, REMOVAL** .

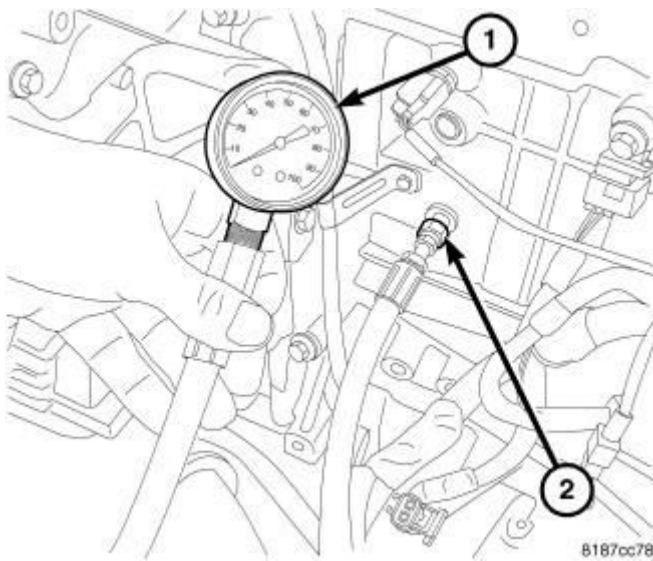
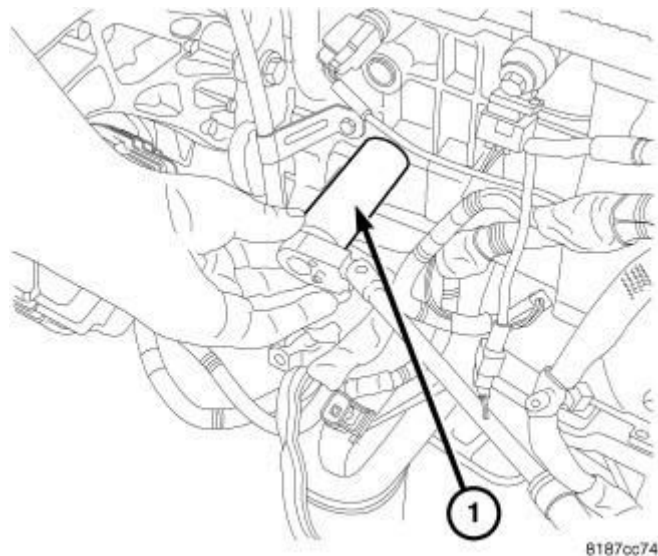


Fig. 346: Oil Pressure Gauge
Courtesy of CHRYSLER GROUP, LLC

9. After test is complete, remove test gauge (1) and fitting (2).

**Fig. 347: Oil Sender**

Courtesy of CHRYSLER GROUP, LLC

10. Install oil pressure sensor and electrical connector.

COOLER, OIL

DESCRIPTION

DESCRIPTION

An engine oil cooler is used on some engine packages. The cooler is a coolant-to-oil type and mounted between the oil filter and oil filter adapter.

REMOVAL

REMOVAL

NOTE: The oil cooler can not be cleaned out. In the event that the engine requires rebuilding or replacement, the oil cooler should be replaced.

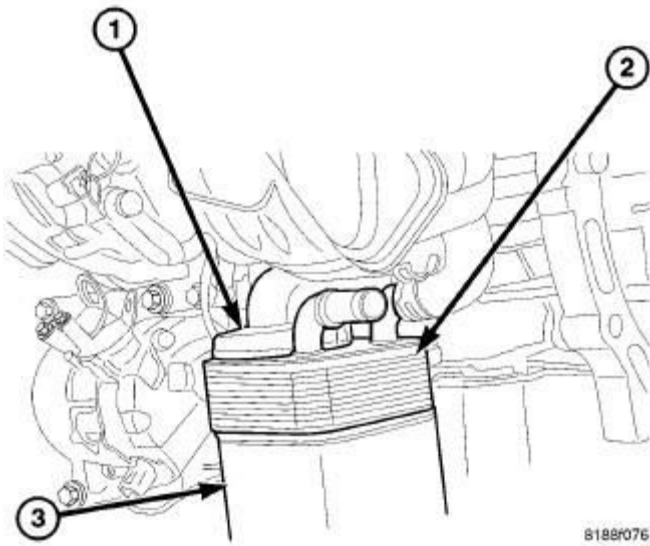


Fig. 348: Identifying Oil Cooler

Courtesy of CHRYSLER GROUP, LLC

1. Raise vehicle on hoist.
2. Drain cooling system. Refer to **STANDARD PROCEDURE**.
3. Disconnect oil cooler coolant hoses.
4. Remove oil filter (3).

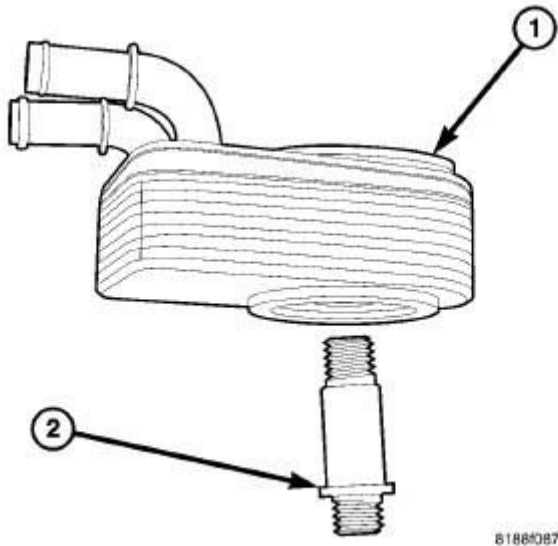


Fig. 349: Oil Cooler Mounting

Courtesy of CHRYSLER GROUP, LLC

5. Remove oil cooler connector bolt (2).

6. Remove oil cooler (1).

INSTALLATION

INSTALLATION

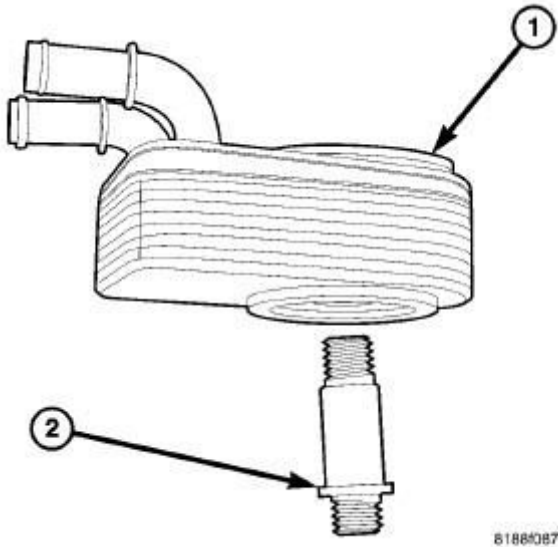


Fig. 350: Oil Cooler Mounting

Courtesy of CHRYSLER GROUP, LLC

1. Replace oil cooler seal (1).
2. Lubricate seal and position oil cooler to oil filter adapter, aligning notch to tab.
3. Install oil cooler connector bolt (2). Tighten connector bolt to 49 N.m (36 ft. lbs.).

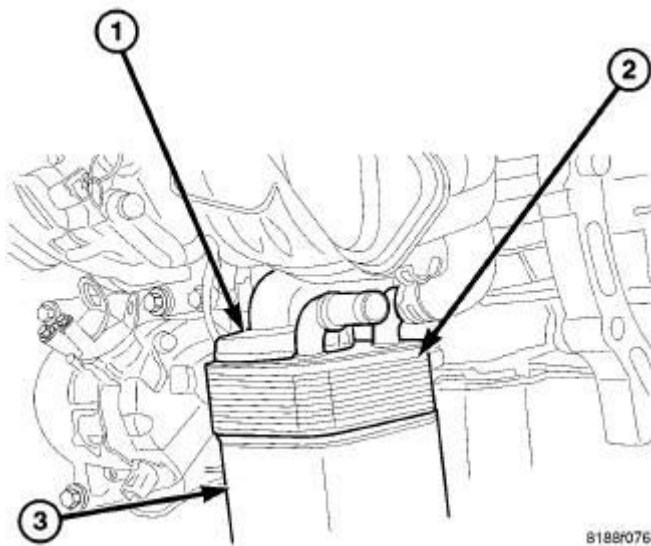


Fig. 351: Identifying Oil Cooler
Courtesy of CHRYSLER GROUP, LLC

4. Install oil filter (3).
5. Connect oil cooler coolant hose.
6. Lower vehicle.
7. Fill cooling system. Refer to **STANDARD PROCEDURE** .

FILTER, ENGINE OIL

REMOVAL

REMOVAL

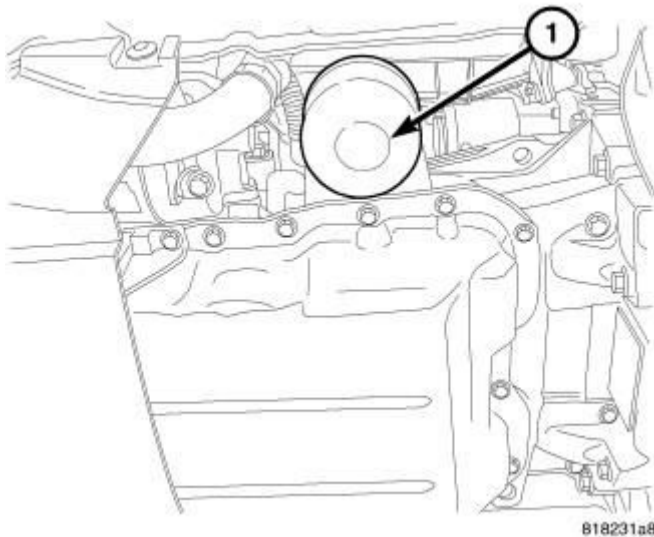


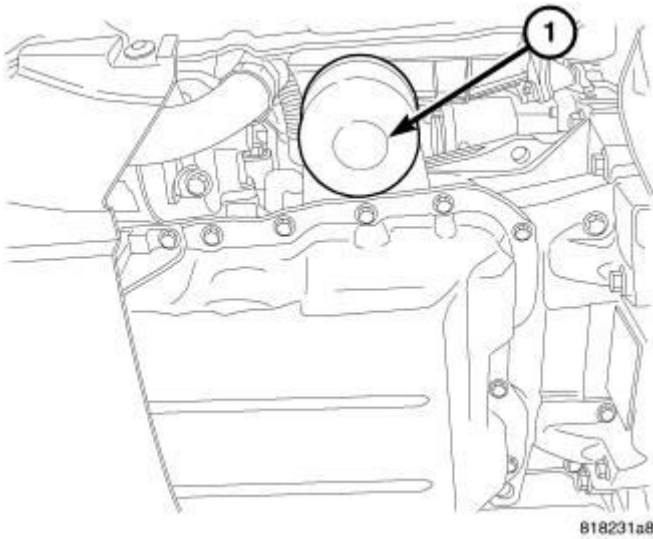
Fig. 352: Oil Filter
Courtesy of CHRYSLER GROUP, LLC

CAUTION: When servicing the oil filter, avoid deforming the filter can by installing the remove/install tool band strap against the can to base lock seam. The lock seam joining the can to the base is reinforced by the base plate.

1. Using a suitable filter wrench, turn oil filter (1) counterclockwise to remove.

INSTALLATION

INSTALLATION

**Fig. 353: Oil Filter**

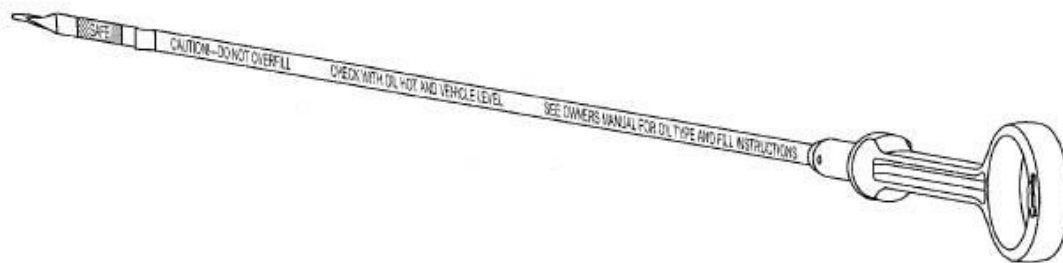
Courtesy of CHRYSLER GROUP, LLC

1. Clean and check filter mounting surface. The surface must be smooth, flat and free of debris or pieces of gasket.
2. Lubricate new oil filter gasket.
3. Screw oil filter (1) on until the gasket contacts base. Tighten to 14 N.m (124 in. lbs.).

OIL

STANDARD PROCEDURE

ENGINE OIL LEVEL CHECK



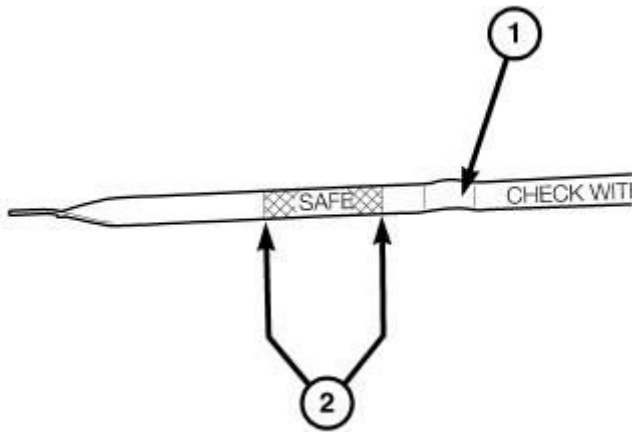
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Fig. 354: Oil Level Indicator

Courtesy of CHRYSLER GROUP, LLC

NOTE: The engine must be **HOT** when checking oil level.

The best time to check engine oil level is after the engine is at operating temperature. Allow the engine to be shut off for at least 5 minutes before checking oil level.



818220bb

Fig. 355: Dip Stick

Courtesy of CHRYSLER GROUP, LLC

Checking the oil while the vehicle is on level ground will improve the accuracy of the oil level reading. Remove dipstick (1), and observe oil level. Add oil only when the level is at or below the SAFE mark. If the oil level is in the safe (2) range, do not add oil.

CAUTION: Do not operate engine if the oil level is above the MAX mark on the dipstick. Excessive oil volume can cause oil aeration which can lead to engine failure due to loss of oil pressure or increase in oil temperature.

ENGINE OIL AND FILTER CHANGE

WARNING: New or used engine oil can be irritating to the skin. Avoid prolonged or repeated skin contact with engine oil. Contaminants in used engine oil, caused by internal combustion, can be hazardous to your health. Thoroughly wash exposed skin with soap and water. Do not wash skin with gasoline, diesel fuel, thinner, or solvents, health problems can result. Do not pollute, dispose of used engine oil properly. Contact your dealer or government agency for location of collection center in your area.

CAUTION: On export vehicles, refer to the Owner's Manual for the correct grade of oil.

Change engine oil at mileage and time intervals described in the Maintenance Schedule. Refer to

MAINTENANCE SCHEDULES, DESCRIPTION .

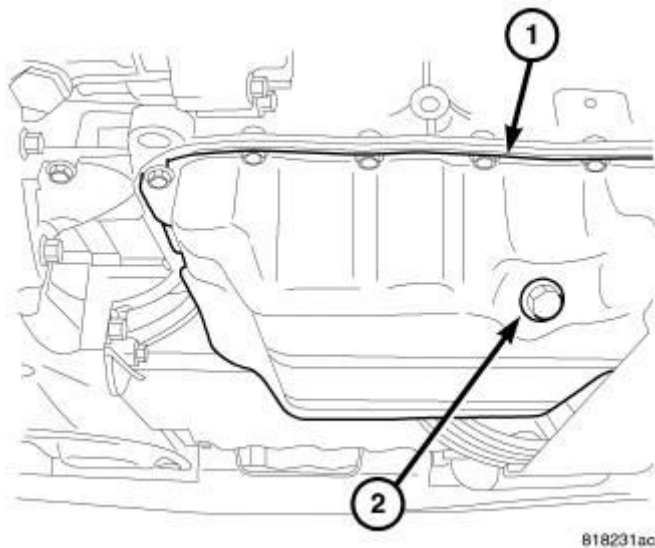


Fig. 356: Oil Drain Plug & Oil Pan

Courtesy of CHRYSLER GROUP, LLC

1. Run engine until achieving normal operating temperature.
2. Position the vehicle on a level surface and turn engine off.
3. Remove oil fill cap.
4. Raise vehicle on hoist.
5. Place a suitable oil collecting container under oil pan drain plug (2).
6. Remove oil pan drain plug (2) or and allow oil to drain into collecting container. Inspect drain plug threads for stretching or other damage. Replace drain plug and gasket if damaged.

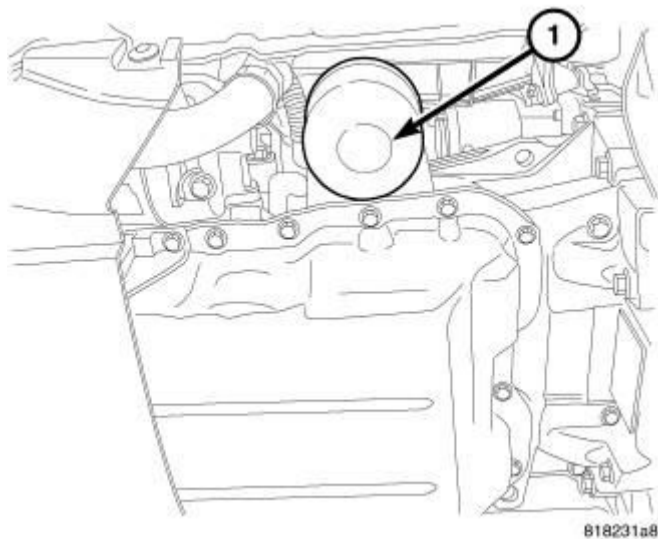


Fig. 357: Oil Filter

Courtesy of CHRYSLER GROUP, LLC

7. Remove oil filter (1). Refer to **FILTER, ENGINE OIL, REMOVAL** .

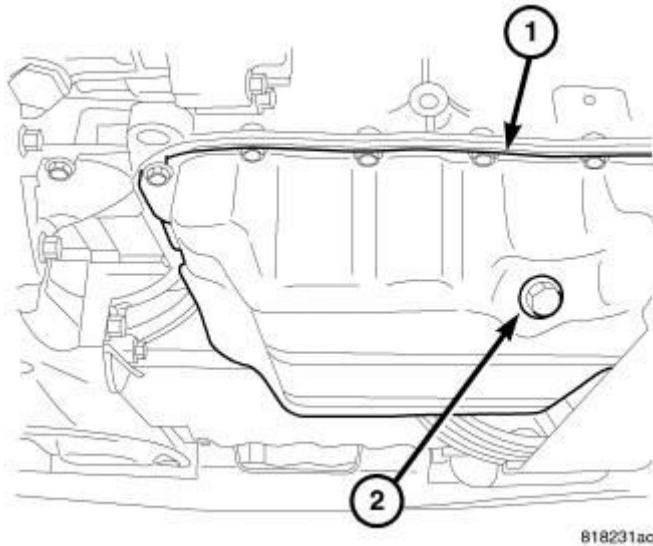


Fig. 358: Oil Drain Plug & Oil Pan
 Courtesy of CHRYSLER GROUP, LLC

8. Install oil pan drain plug (2) and tighten drain plug to 40 N.m (30 ft. lbs.).

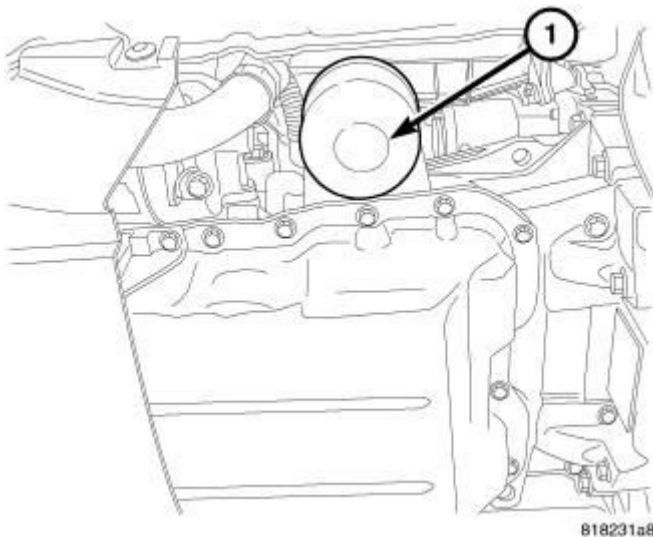


Fig. 359: Oil Filter
 Courtesy of CHRYSLER GROUP, LLC

9. Install new oil filter (1). Refer to **FILTER, ENGINE OIL, INSTALLATION** .
10. Lower vehicle and fill crankcase with specified type and amount of engine oil . Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** and **CAPACITIES AND**

RECOMMENDED FLUIDS, DESCRIPTION .

11. Install oil fill cap.
12. Start engine and inspect for leaks.
13. Stop engine and inspect oil level.

OIL FILTER SPECIFICATION

All engines are equipped with a high quality full-flow, disposable type oil filter. Replace oil filter with a Mopar® or the equivalent.

USED ENGINE OIL DISPOSAL

Care should be exercised when disposing used engine oil after it has been drained from a vehicle engine. Refer to WARNING under **ENGINE OIL AND FILTER CHANGE .**

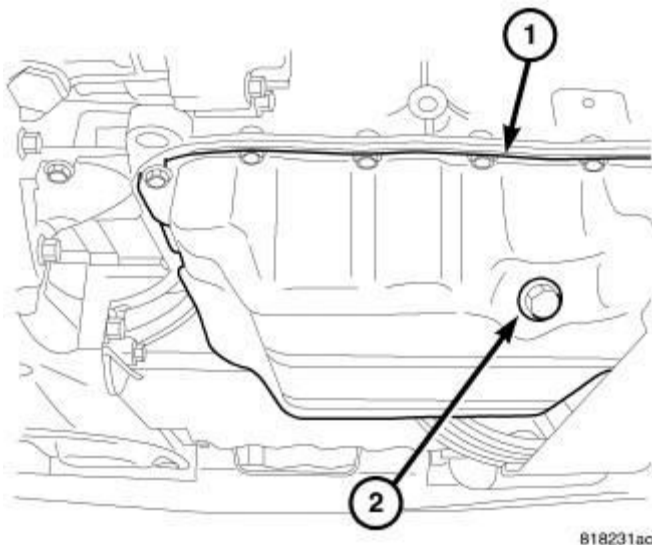
PAN, OIL**REMOVAL****REMOVAL**

Fig. 360: Oil Drain Plug & Oil Pan
Courtesy of CHRYSLER GROUP, LLC

1. Raise vehicle on hoist.
2. Remove oil drain plug (2) and drain the engine oil.
3. Remove accessory drive belt splash shield.

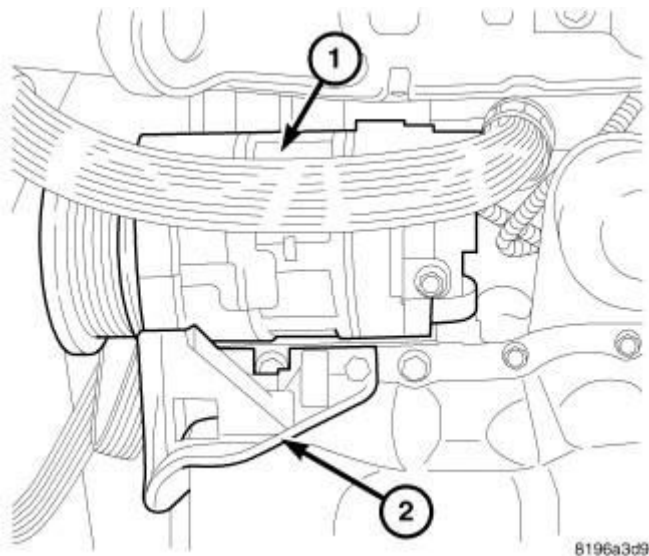


Fig. 361: Locating A/C Compressor
Courtesy of CHRYSLER GROUP, LLC

4. Remove lower A/C compressor mounting bolt (if equipped).
5. Remove A/C mounting bracket (2).

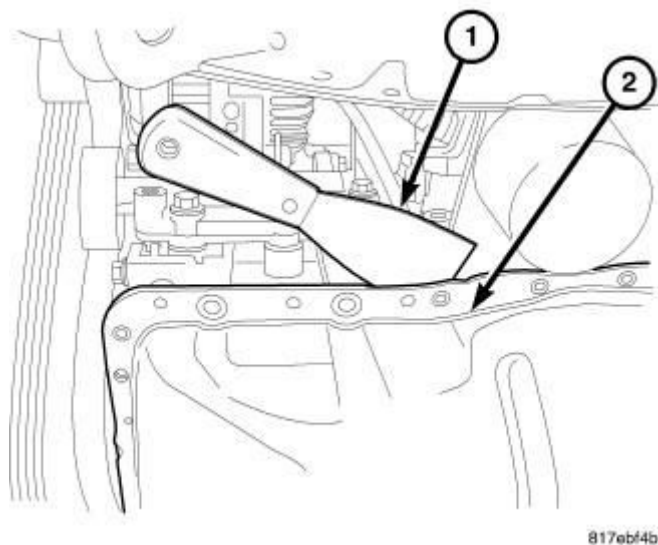


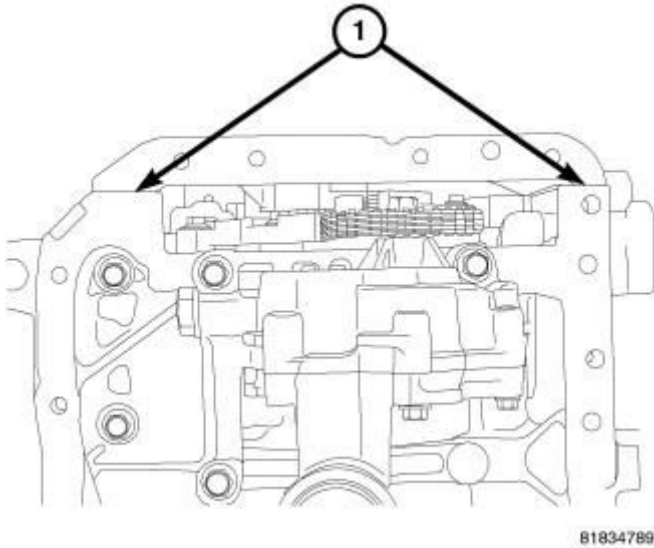
Fig. 362: Using Putty Knife To Loosen Seal Around Oil Pan
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not use pry points in block to remove oil pan.

6. Remove oil pan retaining bolts.
7. Using a putty knife (1), loosen seal around oil pan (2).
8. Remove oil pan (2).

INSTALLATION

INSTALLATION



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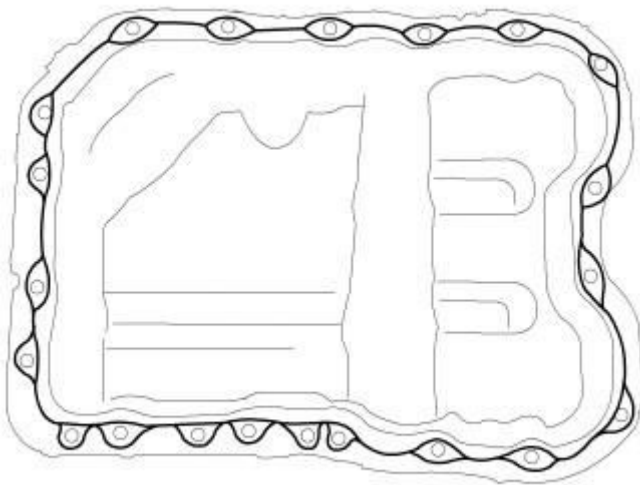
Fig. 363: Sealer Location

Courtesy of CHRYSLER GROUP, LLC

NOTE: Oil pan sealing surfaces must be free of grease or oil.

NOTE: Parts must be assembled within 10 minutes of applying RTV.

1. Apply Mopar® Engine RTV GEN II at the front cover to engine block parting lines (1).



81834782

Fig. 364: Sealing Oil Pan

Courtesy of CHRYSLER GROUP, LLC

2. Apply a 2 mm bead of Mopar® Engine RTV GEN II around the oil pan as shown in illustration.
3. Position oil pan and install bolts. Tighten bolts to 12 N.m (105 in. lbs.).

NOTE: The 2 long bolts must be tightened to 22 N.m (195 in. lbs.).

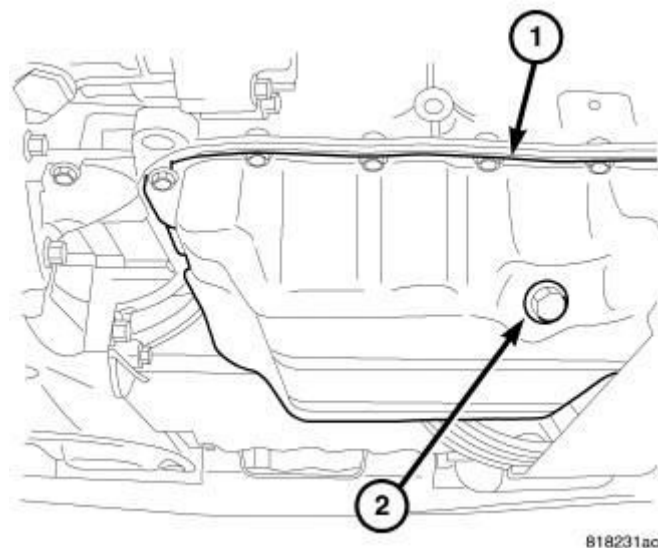


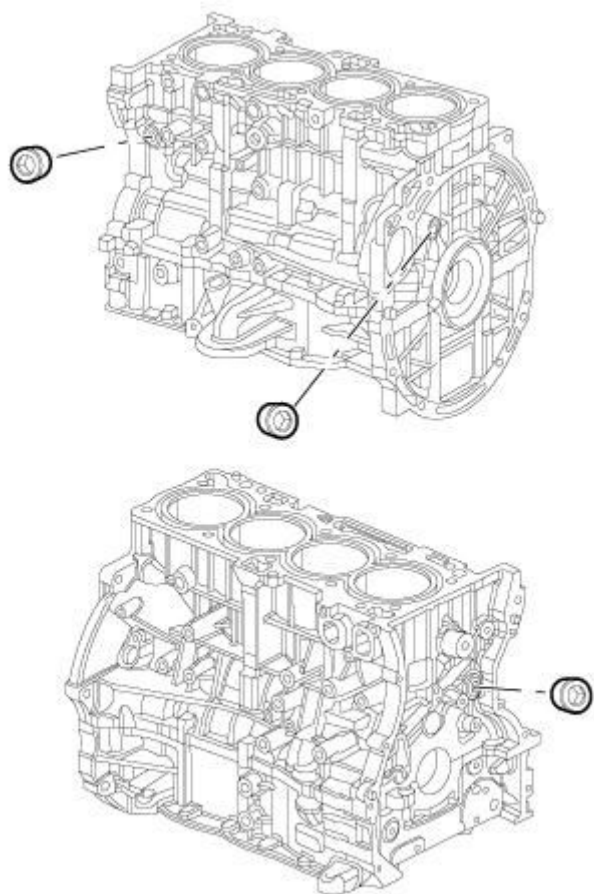
Fig. 365: Oil Drain Plug & Oil Pan
Courtesy of CHRYSLER GROUP, LLC

4. Install oil drain plug (2).
5. Lower vehicle and fill engine crankcase with proper oil to correct level.
6. Start engine and check for leaks.

PLUG, OIL

DESCRIPTION

DESCRIPTION

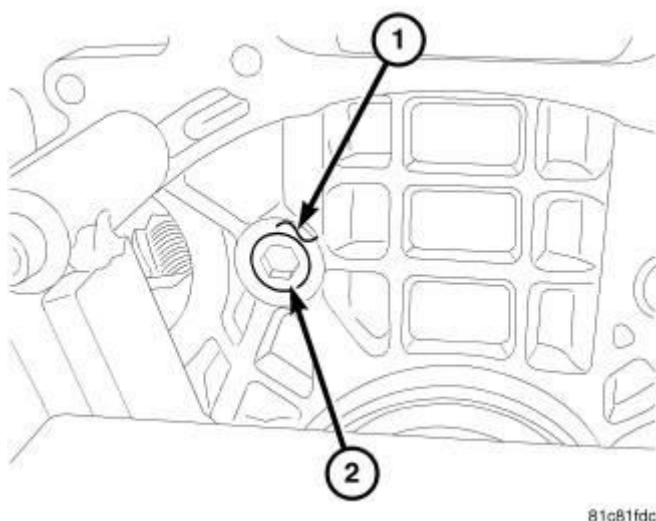


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Fig. 366: Tapered Plugs**Courtesy of CHRYSLER GROUP, LLC**

The engine block has three tapered plugs sealing the high pressure oil gallery. These threaded plugs do not have a torque specification but instead are installed to a specific depth. Do not attempt to further tighten these plugs, damage to the engine block could result. Whenever these plugs are removed they must be replaced. Service plugs have a lock patch and do not require the application of additional sealant.

REMOVAL**REMOVAL**



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Fig. 367: Gallery Plug

Courtesy of CHRYSLER GROUP, LLC

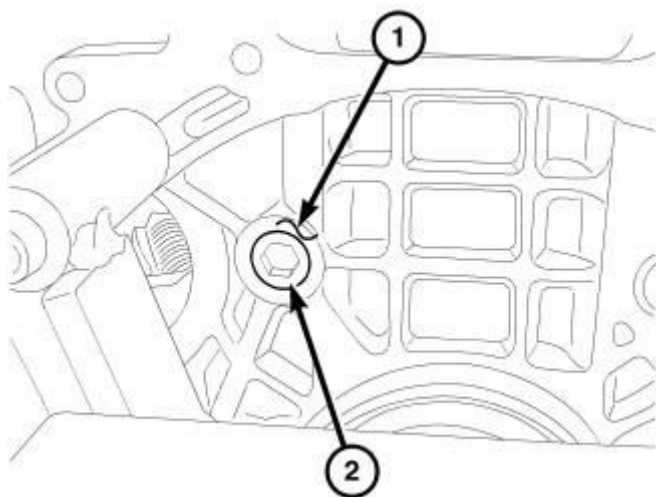
CAUTION: Excessive use of brake parts cleaner to clean threads in block could cause #5 main bearing failure.

NOTE: Rear plug shown in illustration, other plugs are similar.

1. Remove the plug (2) from the engine block.
2. Use Mopar® Brake Parts Cleaner (or equivalent) sparingly to clean the block.

INSTALLATION

INSTALLATION



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Fig. 368: Gallery Plug

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Excessive use of brake parts cleaner to clean threads in block could cause #5 main bearing failure.

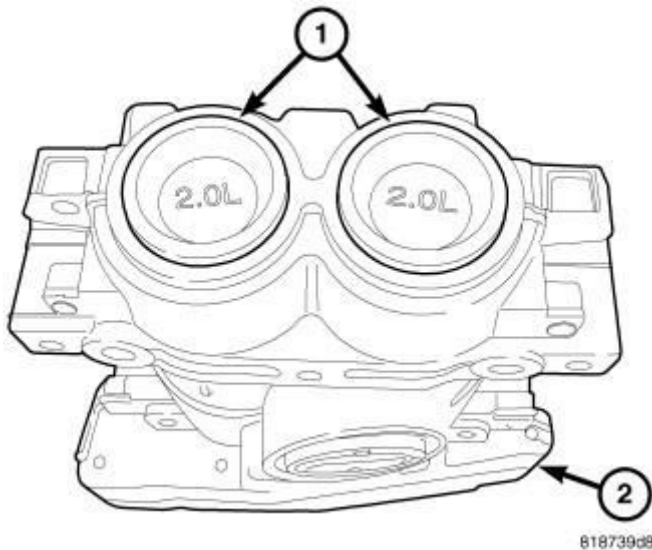
NOTE: Rear plug shown in illustration, other plugs are similar.

1. Use Mopar® Brake Parts Cleaner (or equivalent) sparingly to clean the block.
2. Install the plug (2) flush with the block boss face (1). The plug (2) is correctly installed when it is flush or protruding no more than 1 mm from the block boss face (1).

PUMP, ENGINE OIL

DESCRIPTION

DESCRIPTION

**Fig. 369: Balance Shaft Module & End Caps**

Courtesy of CHRYSLER GROUP, LLC

The oil pump is integral to the balance shaft module (BSM) (2). The oil pump cannot be disassembled for inspection. The pressure relief valve is serviceable and can be removed and inspected. The BSM can be identified by the plastic end caps (1).

REMOVAL

REMOVAL

	A multimedia supplement to the instructions contained in this article is
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available.

To view the multimedia example of the condition described go to;
<http://www.youtube.com/user/Mitchell1Tips>
then type "A00641417.vid2" into the "Search Channel" box.

When removing and installing the Balance Shaft/Oil Pump assembly in the vehicle, it is not necessary to align the plated links on the drive chain as long as the reference marks are created during the procedure.

1. Remove the oil pan. Refer to **PAN, OIL, REMOVAL** .



Fig. 370: Aligning Balance Shaft/Oil Pump Drive Gear And Housing Indicator
Courtesy of CHRYSLER GROUP, LLC

2. Rotate the engine clockwise until the balance shaft/oil pump drive gear and the housing indicator are aligned.

NOTE: IT IS VERY IMPORTANT THAT THE CRANKSHAFT STAYS STATIONARY DURING THE FOLLOWING STEPS. DO NOT MOVE THE CRANKSHAFT UNTIL THE INSTALLATION PROCEDURE IS COMPLETED.

3. Clean the balance shaft/oil pump assembly drive gear with Mopar® brake cleaner or similar.

NOTE: Make sure the gear is clear of any oil to allow for marking.

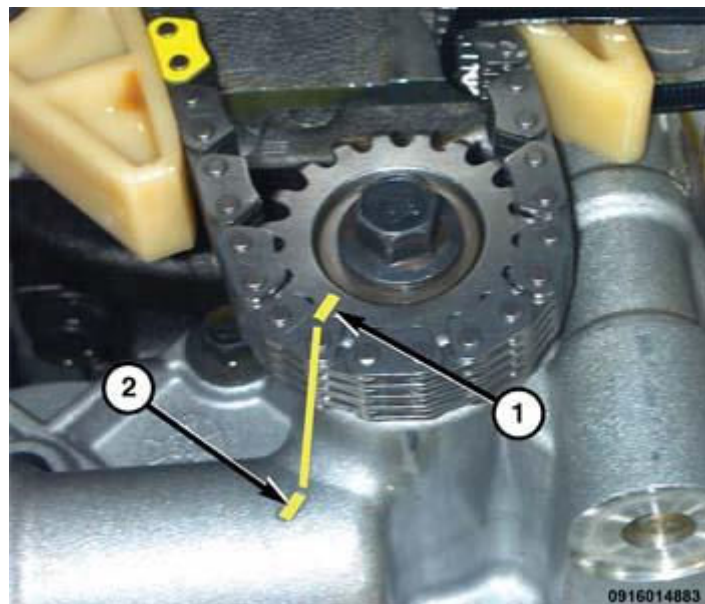


Fig. 371: Oil Pump Chain And Sprocket To Module Body Marks
Courtesy of CHRYSLER GROUP, LLC

4. If the balance shaft/oil pump assembly is being reused, mark the oil pump chain and the sprocket (1) to the module body (2) for reassembly.
5. Install one air-conditioning compressor bracket bolt into the left forward corner thread boss.

NOTE: The bolt will provide a sturdy point to secure a tie strap to hold the tensioner in the compressed position.

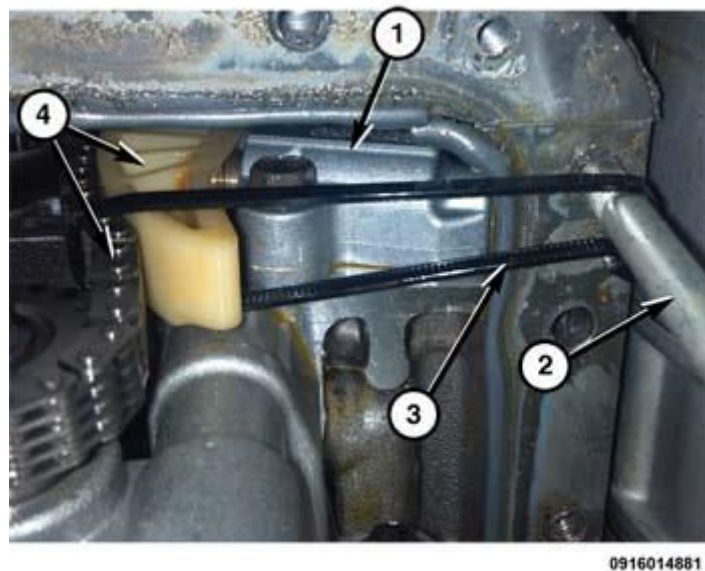


Fig. 372: Positioning Plastic Tie Strap
Courtesy of CHRYSLER GROUP, LLC

6. Position a plastic tie strap (3) around the chain, tensioner (4) and bolt (2) that was previously installed.
7. Push the chain, guide and tensioner (1) to the compressed position.
8. Tighten the tie strap to hold the components together.

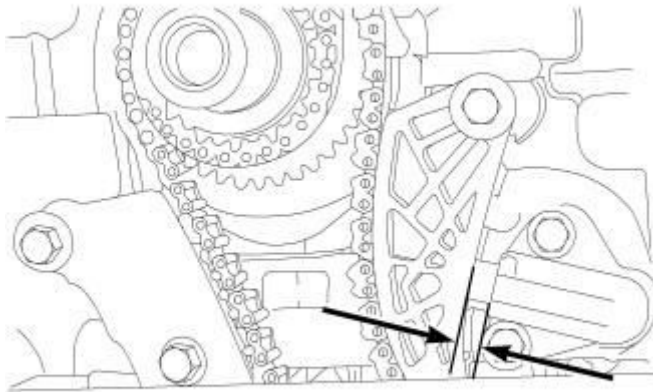
NOTE: **The tighter the strap, the more room for removal and installation.**

9. Remove the balance shaft/oil pump assembly mounting bolts.
10. Remove assembly from the engine by tilting the rear of the balance shaft/oil pump assembly downward while lifting the drive gear out of the chain links.

INSPECTION

INSPECTION

1. Remove timing chain cover . Refer to **COVER(S), ENGINE TIMING, REMOVAL** .
2. Remove oil pan. Refer to **PAN, OIL, REMOVAL** .



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Fig. 373: Measuring Distance Between Tensioner Body & Guide Shoe
Courtesy of CHRYSLER GROUP, LLC

3. Measure the distance between the tensioner body and the guide shoe as shown in illustration.
4. If the distance is 10.1 mm (0.397 in.) or greater, replace the chain.

INSTALLATION

INSTALLATION



A multimedia supplement to the instructions contained in this article is available.

To view the multimedia example of the condition described go to;
<http://www.youtube.com/user/Mitchell1Tips>
then type "A00641417.vid3" into the "Search Channel" box.

CAUTION: There are two different Balance Shaft Module (BSM) to engine block bolts used. 180 mm bolts with a lock-patch on the threads or 185 mm bolts without lock-patch. Do not reuse the 180 mm bolts. Always discard 180 mm bolts after removing. Failure to replace these bolts can result in engine damage. The 185 mm bolts are reusable. Install the same length bolts that were removed and use either four new 180 mm bolts or four 185 mm bolts.

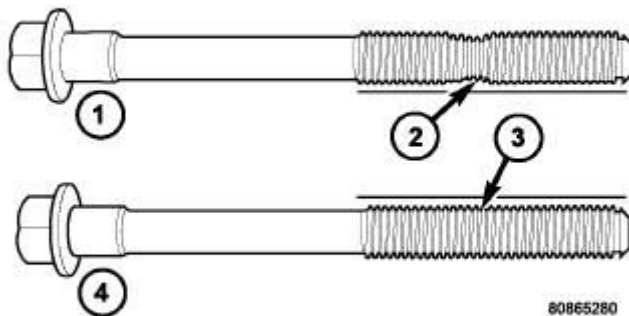


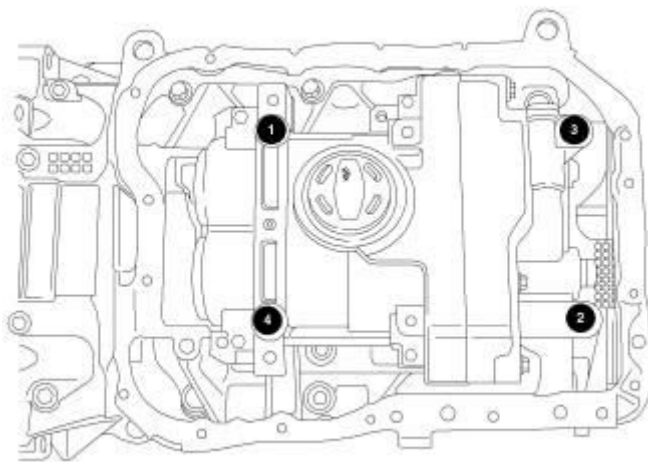
Fig. 374: Checking Cylinder Head Bolts For Stretching (Necking)
Courtesy of CHRYSLER GROUP, LLC

1. The 185 mm (7.283 in.) length bolts must be checked for stretching. Check the bolts with a straight edge for necking (2). If the bolts are necked down, they must be replaced.
2. Clean the balance shaft/oil pump assembly mounting holes with Mopar® brake parts cleaner.
3. Align the marks on the balance shaft/oil pump assembly and drive sprocket.



Fig. 375: Aligning Balance Shaft/Oil Pump Drive Gear And Housing Indicator
Courtesy of CHRYSLER GROUP, LLC

4. With the rear of the balance shaft/oil pump assembly on a slight downward angle, position the gear into the chain links. Make sure the paint marks are aligned.
5. Pivot balance shaft/oil pump assembly upwards and position on ladder frame.



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Fig. 376: BSM Mounting Bolts Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

6. Start balance shaft/oil pump assembly mounting bolts by hand.

NOTE: Use a three step procedure when tightening balance shaft/oil pump assembly mounting bolts. For new 180 mm bolts, go to step 7. For 185 mm

bolts, go to step 8.

7. Tighten new 180 mm balance shaft/oil pump assembly mounting bolts as follows:
 - a. Tighten to 15 N.m (11 ft. lbs.) in the sequence shown in illustration.
 - b. Tighten to 33 N.m (24 ft. lbs.) in the sequence shown in illustration.
 - c. Rotate bolts an additional 90° in the sequence shown in illustration.
8. Tighten 185 mm balance shaft/oil pump assembly mounting bolts as follows:
 1. Tighten to 15 N.m (11 ft. lbs.) in the sequence shown in illustration.
 2. Tighten to 29 N.m (22 ft. lbs.) in the sequence shown in illustration.
 3. Rotate bolts an additional 90° in the sequence shown in illustration.

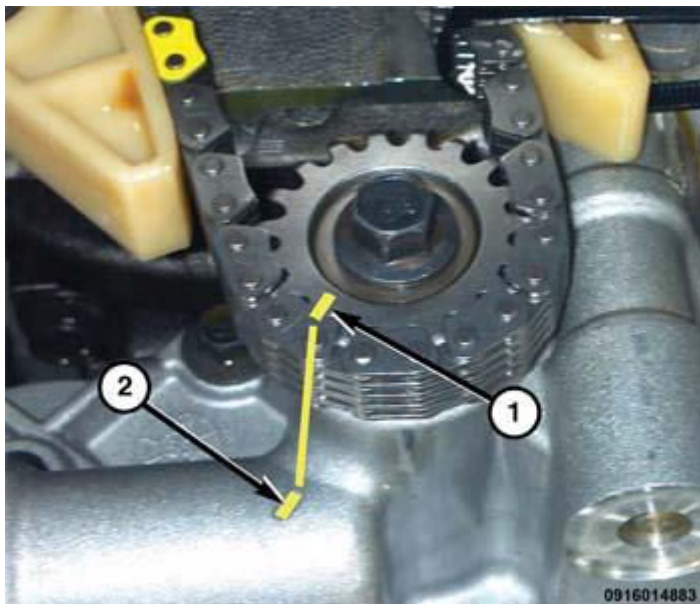
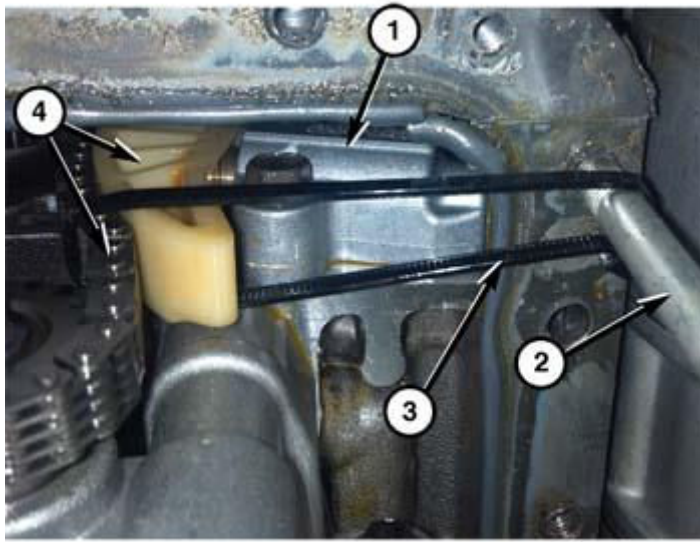


Fig. 377: Oil Pump Chain And Sprocket To Module Body Marks
Courtesy of CHRYSLER GROUP, LLC

9. Double check the alignment marks to ensure the gear (1) and balance shaft/oil pump assembly indicator (2) is aligned.



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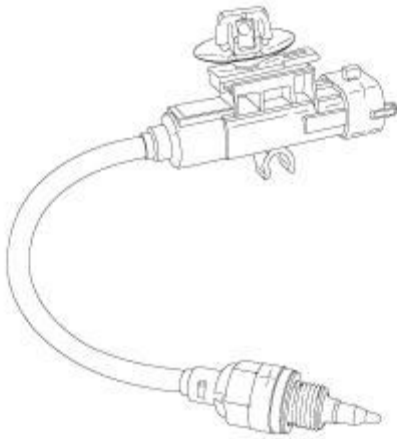
Fig. 378: Positioning Plastic Tie Strap
Courtesy of CHRYSLER GROUP, LLC

10. Remove the tie strap (3).
11. Remove the bracket bolt (2).
12. Inspect that the tensioner (1) has fully extended and applied pressure to the guide and chain (4).
13. Install the oil pan. Refer to **PAN, OIL, INSTALLATION** .
14. Fill engine with oil.
15. Start engine and check for leaks.

SENSOR, OIL TEMPERATURE

DESCRIPTION

DESCRIPTION



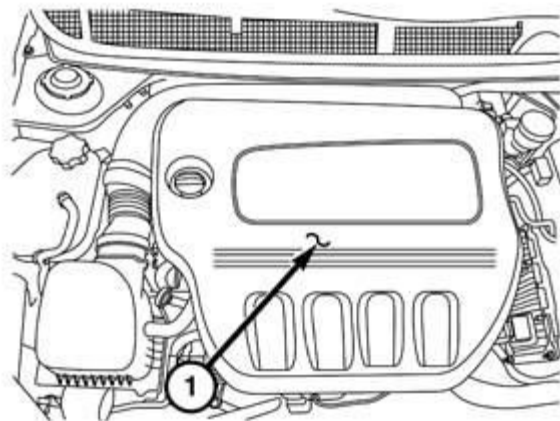
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Fig. 379: Oil Temperature Sensor**Courtesy of CHRYSLER GROUP, LLC**

The oil temperature sensor is a two wire sensor located on the variable valve actuation assembly at the cylinder head. The sensor probe is mounted to the variable valve actuation assembly through an access hole. A compression washer seals the oil temperature sensor to the variable valve actuation assembly.

REMOVAL**REMOVAL**

1. Disconnect the battery negative cable.

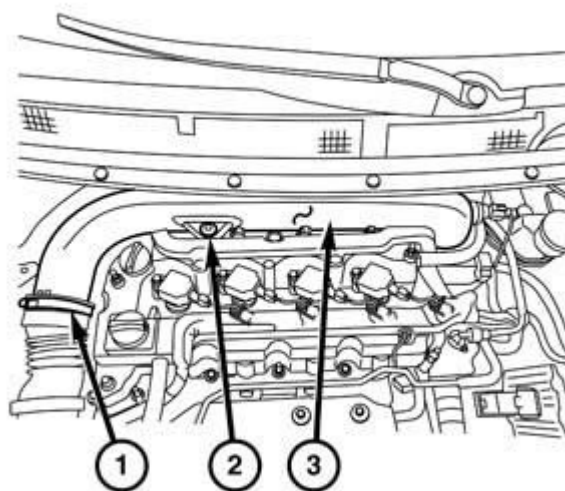


090772122

Fig. 380: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

2. Remove the engine cover (1).



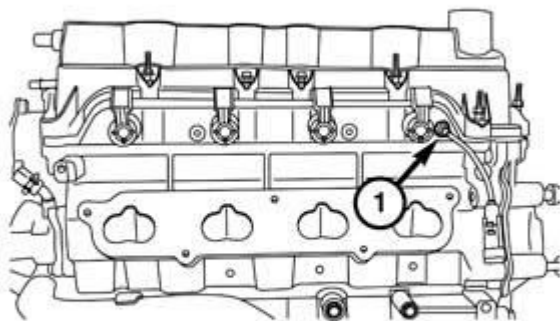
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Fig. 381: Resonator, Bolt & Clamp

Courtesy of CHRYSLER GROUP, LLC

Loosen the intake clamp (1), remove the resonator bolt (2) and resonator (3).

3. Remove the engine cover (1).
4. Remove the wiring harness fastener from the intake manifold.
5. Disconnect oil temperature sensor electrical connector.



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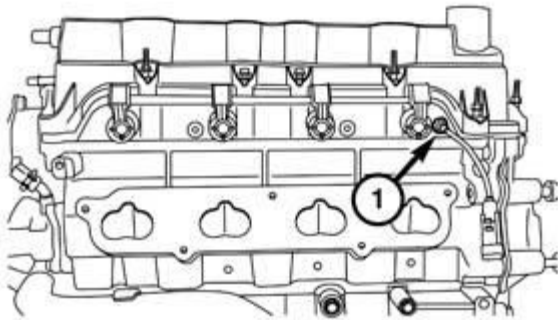
Fig. 382: Oil Temperature Sensor Location
Courtesy of CHRYSLER GROUP, LLC

6. Remove sensor (1).

INSTALLATION

INSTALLATION

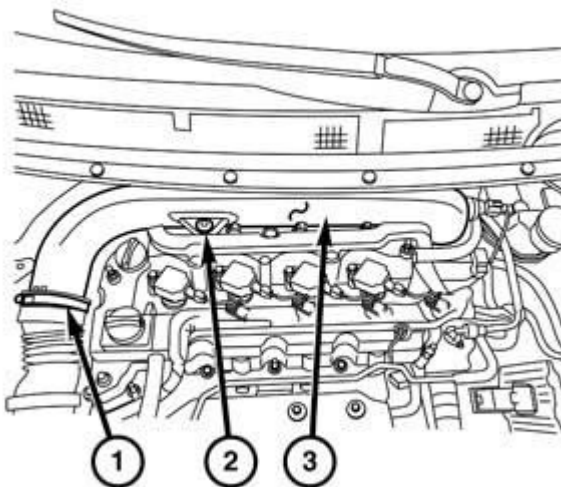
1. If re-using the oil temperature sensor, coat the threads with Mopar® thread sealant.



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Fig. 383: Oil Temperature Sensor Location
Courtesy of CHRYSLER GROUP, LLC

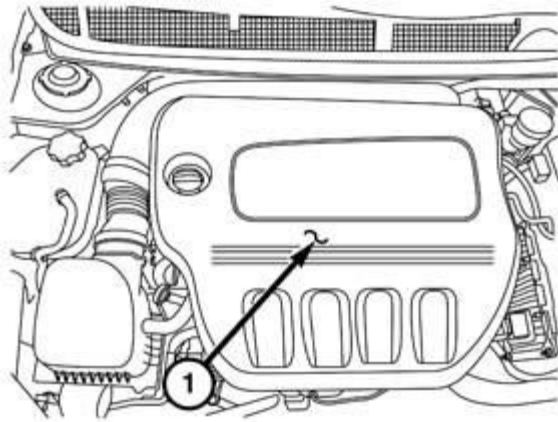
2. Install oil temperature sensor (1). Tighten to 18 N.m (160 in. lbs.).



090772119

Fig. 384: Resonator, Bolt & Clamp
Courtesy of CHRYSLER GROUP, LLC

3. Install the resonator (3), bolt (2) and clamp (1). Tighten the bolt to 5 N.m (81 in. lbs.). Tighten the clamp.
4. Connect electrical connector.



090772122

Fig. 385: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

5. Install the engine cover (1).

SENSOR, OIL PRESSURE

DESCRIPTION

DESCRIPTION

The oil pressure sensor is located on the right front side of the engine block. The oil pressure sensor is a pressure sensitive switch that is activated by the engine's oil pressure (in the main oil galley). The sensor is a three terminal device.

OPERATION

OPERATION

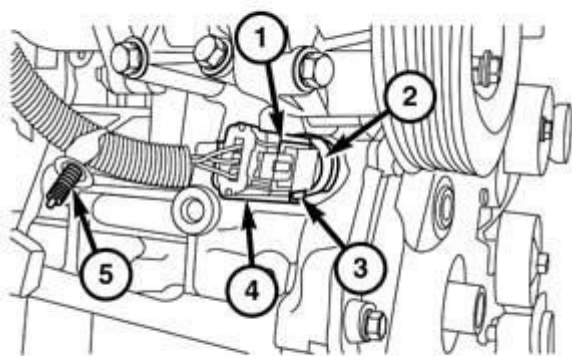
The oil pressure sending unit returns a voltage signal back to the PCM relating oil pressure. Ground for the sensor is supplied by the PCM.

REMOVAL

REMOVAL

NOTE: The oil pressure sensor is screwed into the cylinder block below the water pump.

1. Raise and support the vehicle.
2. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .



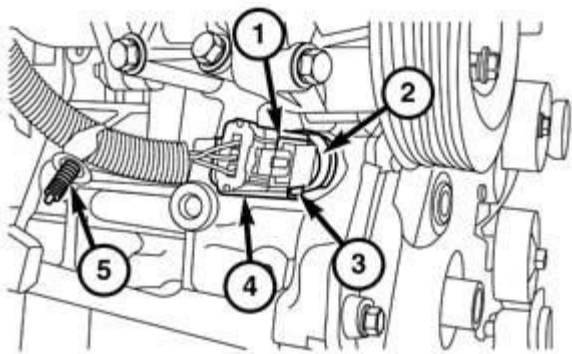
091370511

Fig. 386: Oil Temperature Sensor & Connector
Courtesy of CHRYSLER GROUP, LLC

3. Disengage the sensor harness at the block (5).
4. Unlock the connector (3).
5. Disconnect oil temperature sensor electrical connector (4).
6. Unscrew the sensor (2) from the cylinder block.
7. Remove sensor.

INSTALLATION

INSTALLATION



091370511

Fig. 387: Oil Temperature Sensor & Connector
Courtesy of CHRYSLER GROUP, LLC

1. Screw the sensor (2) into the block.
2. Tighten the sensor to 48 N.m (35 ft. lbs.).
3. Install the connector (4).
4. Lock the connector (3).
5. Engage the harness retainer (5) into the block.
6. Install the belly pan. Refer to **BELLY PAN, INSTALLATION** .

VALVE, OIL PRESSURE RELIEF

REMOVAL

REMOVAL

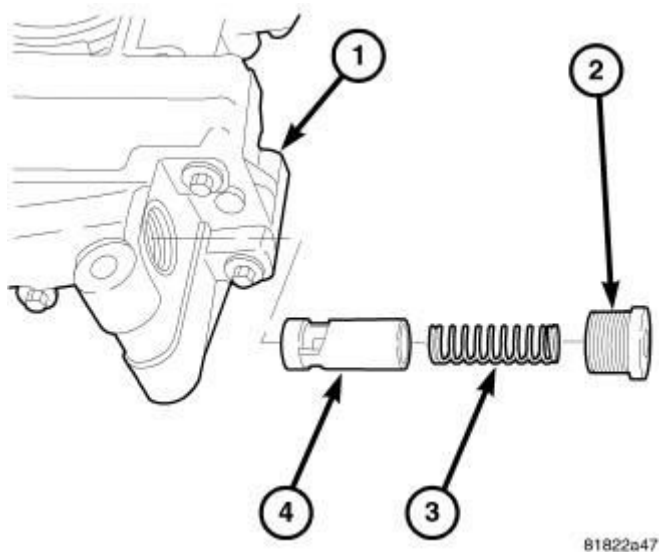


Fig. 388: Oil Pressure Relief Valve

Courtesy of CHRYSLER GROUP, LLC

1. Remove oil pan. Refer to **PAN, OIL, REMOVAL**.
2. Remove pressure regulating valve cap (2).
3. Remove pressure regulating valve spring (3) and valve (4).

INSPECTION

INSPECTION

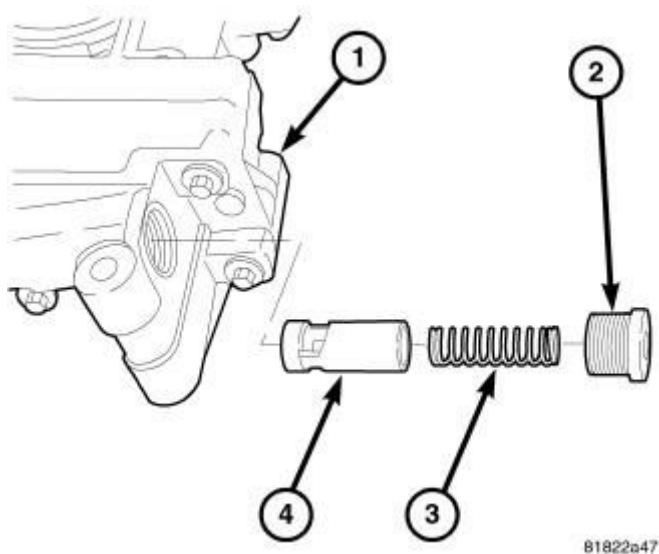


Fig. 389: Oil Pressure Relief Valve

Courtesy of CHRYSLER GROUP, LLC

NOTE: Pressure regulating valve (4) can be serviced separately from the oil pump

assembly.

1. Inspect pressure relief valve (4) scoring, gouging, or debris. Replace as needed.
2. Inspect the pressure relief valve bore in the pump for scoring, gouging, or debris.
3. If pump bore is damaged, replace balance shaft module.

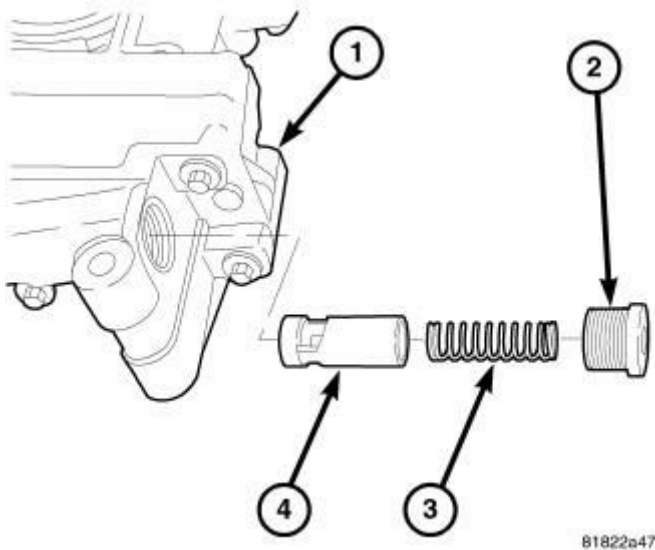
INSTALLATION**INSTALLATION**

Fig. 390: Oil Pressure Relief Valve
Courtesy of CHRYSLER GROUP, LLC

1. Lightly coat pressure regulating valve with clean engine oil and install valve (4).
2. Install spring (3) and cap (2).
3. Tighten cap to 44 N.m (32 lbs. ft.).

VALVE TIMING**STANDARD PROCEDURE****STANDARD PROCEDURE - VALVE TIMING VERIFICATION**

CAUTION: Painted or colored chain links are used during initial engine assembly and can not be relied upon for valve timing verification. Only use top-dead-center marks, cylinder head cover mounting surface and camshaft sprocket marks to verify valve timing or engine damage may result.

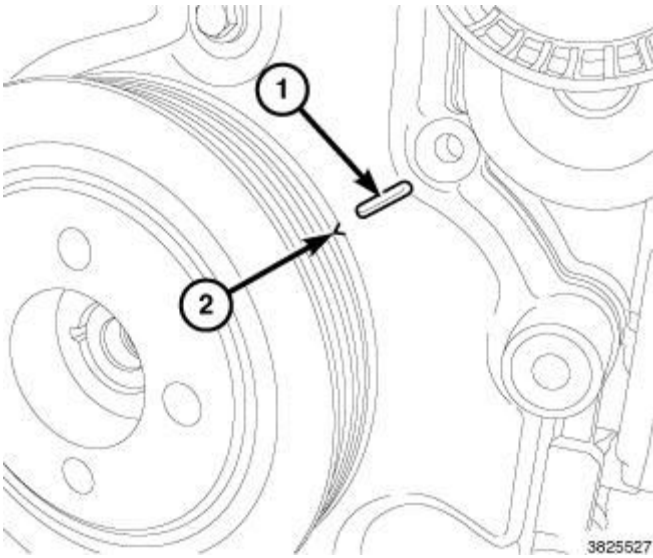


Fig. 391: Timing Cover Mark & Notch
Courtesy of CHRYSLER GROUP, LLC

Correct timing is critical for the NON free-wheeling designed engine. Engine timing can be verified by using the following procedures:

1. Remove the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, REMOVAL** .
2. Remove the spark plugs. Refer to **SPARK PLUG, REMOVAL** .

CAUTION: When aligning timing marks, always rotate engine by turning the crankshaft. Failure to do so will result in valve and/or piston damage.

3. Rotate the crankshaft clockwise (as viewed from the front) to align the timing cover mark (1) with the damper notch (2) to place the number one cylinder piston at top-dead-center on the compression stroke.

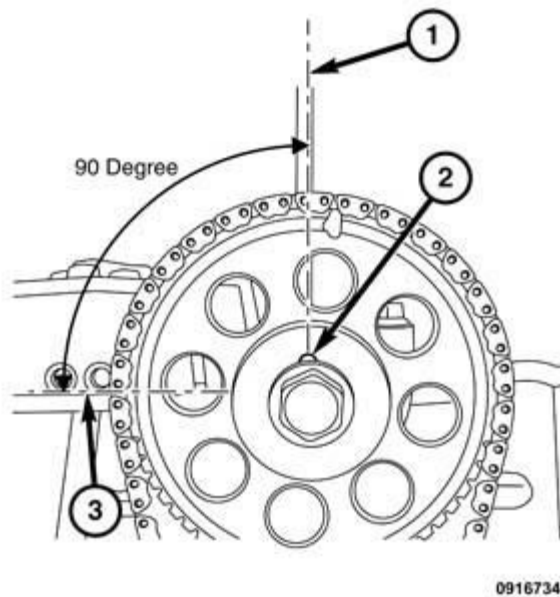


Fig. 392: Vertical Center Line Of Camshaft, Dowel & Cylinder Head
Courtesy of CHRYSLER GROUP, LLC

4. While maintaining this alignment, verify that the **dowel window** (2) on the camshaft sprocket point toward 12 o'clock.
5. Using a straightedge tool (1), place the tool vertically at the center of the cam gear. Using the top edge of the cylinder head (3) as a reference point, the angle between the straightedge and the cylinder head needs to be 90°.
6. If the engine timing is not correct, proceed to Timing Chain and Sprockets for service procedures. Refer to **CHAIN AND SPROCKETS, TIMING, REMOVAL** .

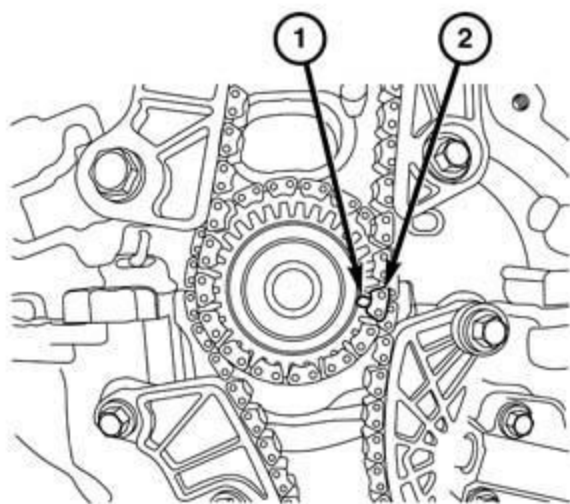
CHAIN AND SPROCKETS, TIMING

REMOVAL

TIMING CHAIN

1. Remove the timing chain cover. Refer to **COVER(S), ENGINE TIMING, REMOVAL** .
2. Verify that the number one cylinder piston is still set to top-dead-center on the compression stroke.

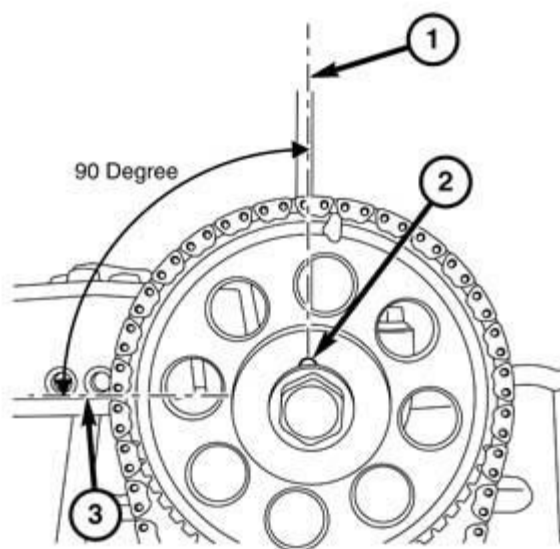
NOTE: If the timing chain plated links can no longer be seen, the timing chain links corresponding to the timing marks must be marked prior to removal if the chain is to be reused.



0911003131

Fig. 393: Chain Link & Crankshaft Timing Mark
Courtesy of CHRYSLER GROUP, LLC

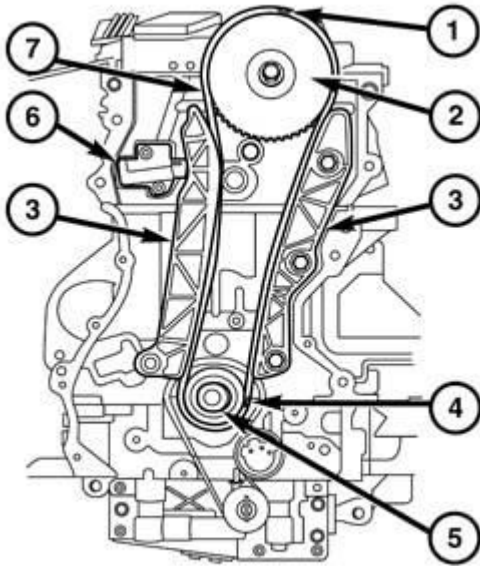
3. Mark chain link (2) corresponding to crankshaft timing mark (1).



091673425

Fig. 394: Vertical Center Line Of Camshaft, Dowel & Cylinder Head
Courtesy of CHRYSLER GROUP, LLC

4. While maintaining this alignment, verify that the camshaft dowel (2) is at the 12 o'clock position. The dowel center line (1) will be 90° from the horizontal surface line at the top of the cylinder head (3).
5. Mark the chain links corresponding to camshaft and crankshaft timing marks.



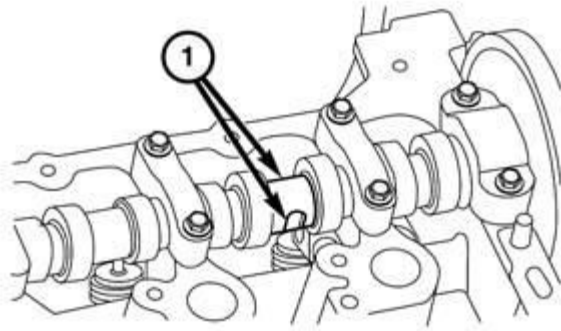
091073256

Fig. 395: Timing Chain, Sprockets, Tensioner & Guides
Courtesy of CHRYSLER GROUP, LLC

6. Remove timing chain tensioner (6). Refer to **TENSIONER, ENGINE TIMING, REMOVAL**.
7. Rotate the tensioner guide (3) away from the chain.
8. Remove timing chain (7).

CAMSHAFT SPROCKET

1. Set the timing at TDC. Refer to **VALVE TIMING - STANDARD PROCEDURE**.

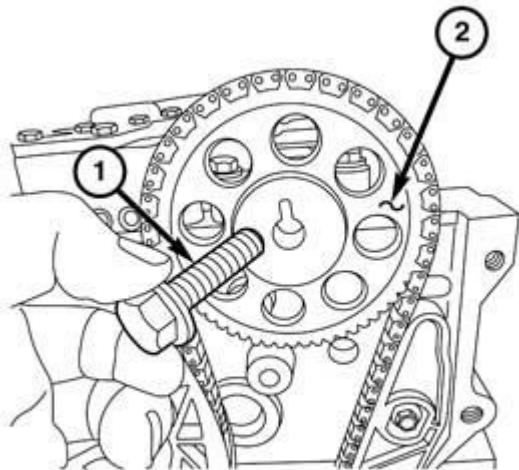


091073258

Fig. 396: Wrench Flats

Courtesy of CHRYSLER GROUP, LLC

2. Remove the timing cover. Refer to **COVER(S), ENGINE TIMING, REMOVAL** .
3. Hold the camshaft stationary by the wrench flats (1).



091673427

Fig. 397: Camshaft Center Bolt & Sprocket

Courtesy of CHRYSLER GROUP, LLC

4. Remove the camshaft center bolt (1) from the sprocket (2).
5. Once the sprocket is clear of the alignment dowel, lower the sprocket to allow chain to slacken, then remove the chain from the sprocket.
6. Remove the sprocket from the engine.

CRANKSHAFT SPROCKET

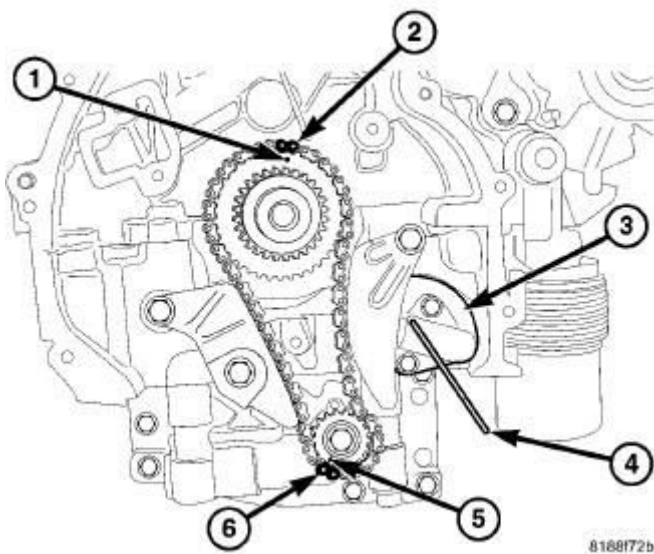
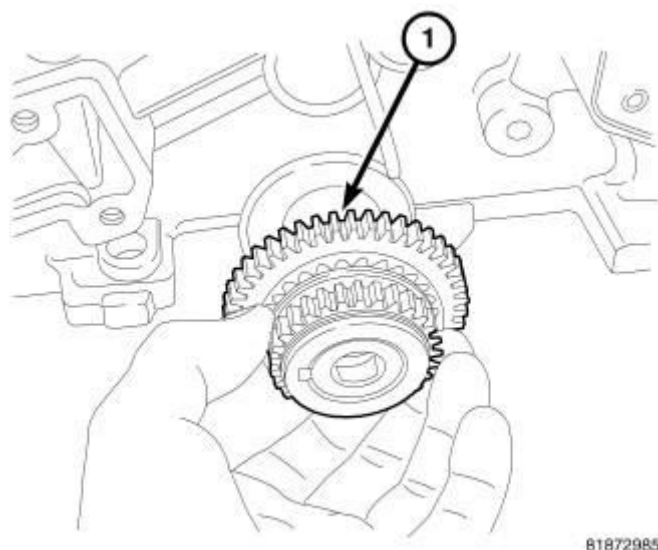


Fig. 398: BSM Timing Chain Marks

Courtesy of CHRYSLER GROUP, LLC

1. Remove the timing chain. Refer to **CHAIN AND SPROCKETS, TIMING, REMOVAL** .
2. Remove the oil pan. Refer to **PAN, OIL, REMOVAL** .
3. Remove the oil pump drive chain tensioner (3).
4. Remove the oil pump drive chain.



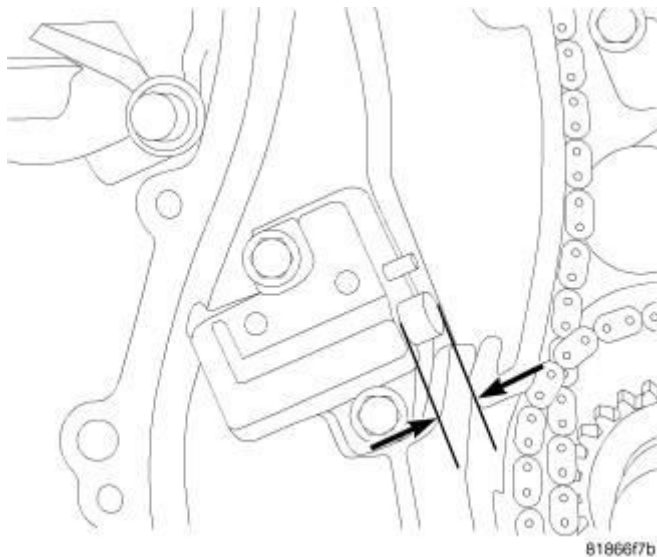
81872985

Fig. 399: Crankshaft Sprocket
Courtesy of CHRYSLER GROUP, LLC

5. Remove the crankshaft sprocket (1).

INSPECTION

INSPECTION



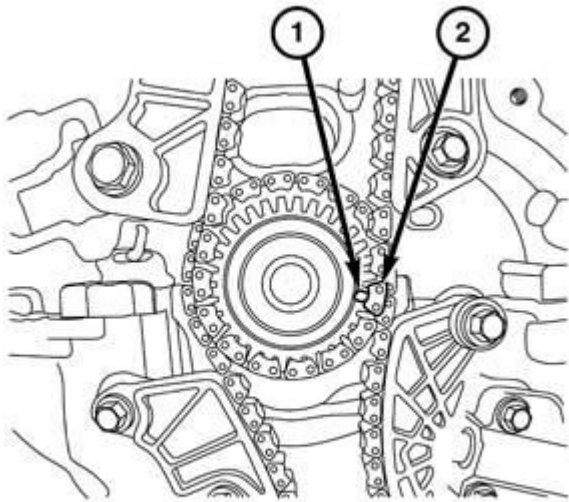
81866f7b

Fig. 400: Measuring Distance From Tensioner Body To Edge Of Chain Guide
Courtesy of CHRYSLER GROUP, LLC

Inspect timing chain for stretching prior to removal.

1. Rotate engine while watching timing chain tensioner plunger. When the plunger reaches its maximum travel stop rotating engine.

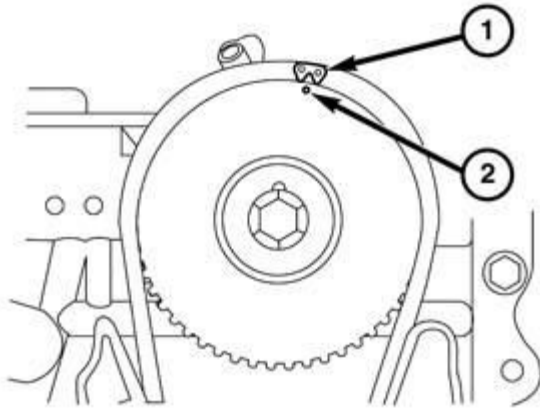
2. Measure the distance from the tensioner body and the edge of the chain guide as shown in illustration.
3. If the distance is greater than 20.5 mm (0.81 in.) inspect guide shoes for excessive wear.
4. If guides are okay, replace timing chain.

INSTALLATION**TIMING CHAIN**

0911003131

Fig. 401: Chain Link & Crankshaft Timing Mark
Courtesy of CHRYSLER GROUP, LLC

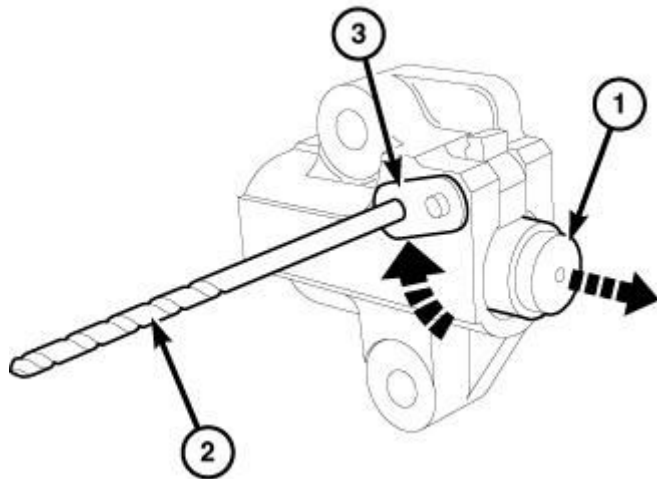
1. Align the timing chain onto the crank sprocket mark (1) using the painted link (2) as a guide.



091073257

Fig. 402: Sprocket Mark & Painted Link
Courtesy of CHRYSLER GROUP, LLC

2. Align the timing chain onto the camshaft sprocket mark (2) using the painted link (1) as a guide.



3825668

Fig. 403: Piston, Ratchet Arm & Drill Bit
Courtesy of CHRYSLER GROUP, LLC

3. Reset the cam chain tensioner. Refer to **VALVE TIMING - STANDARD PROCEDURE** .

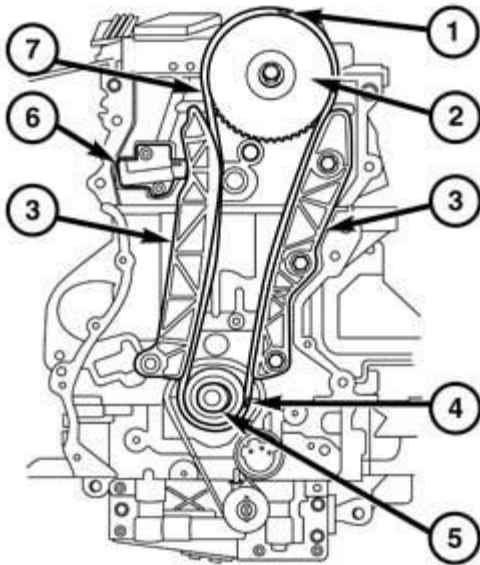


Fig. 404: Timing Chain, Sprockets, Tensioner & Guides
Courtesy of CHRYSLER GROUP, LLC

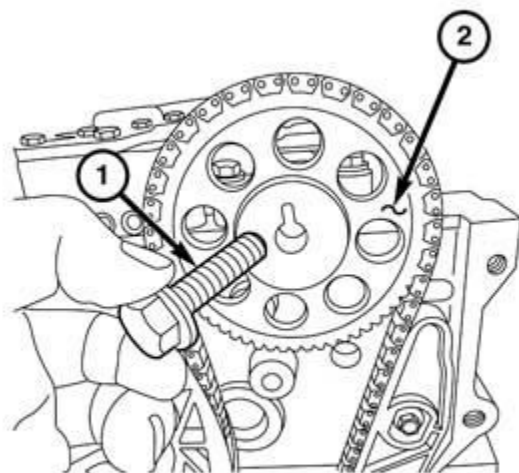
NOTE: Keep the slack in the timing chain on the tensioner side.

4. Install timing chain tensioner (6) and tighten bolts to 12 N.m (105 in. lbs.).
5. Remove the pin (1/8 in. drill bit) from the timing chain tensioner.
6. Verify that the valve timing is correct. Refer to **VALVE TIMING - STANDARD PROCEDURE**.
7. Install the engine timing cover. Refer to **COVER(S), ENGINE TIMING, INSTALLATION**.
8. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL - STANDARD PROCEDURE**.
9. Connect the battery negative cable and tighten nut to 5 N.m (45 in. lbs.).
10. Install the resonator. Refer to **RESONATOR, AIR CLEANER, INSTALLATION**.
11. Install the engine cover.
12. Run the engine until it reaches normal operating temperature. Check cooling system for correct fluid level. Refer to **STANDARD PROCEDURE**.

NOTE: The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components.

CAMSHAFT SPROCKET(S)

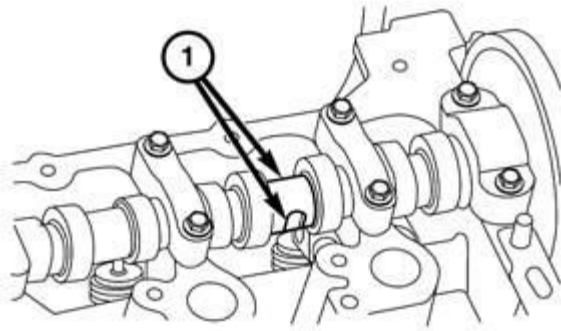
NOTE: Do not use an impact wrench to tighten the camshaft sprocket bolt. Damage to the camshaft dowel pin and camshaft may occur.



091673427

Fig. 405: Camshaft Center Bolt & Sprocket
Courtesy of CHRYSLER GROUP, LLC

1. Install the chain onto the sprocket (2), insert the bolt (1).



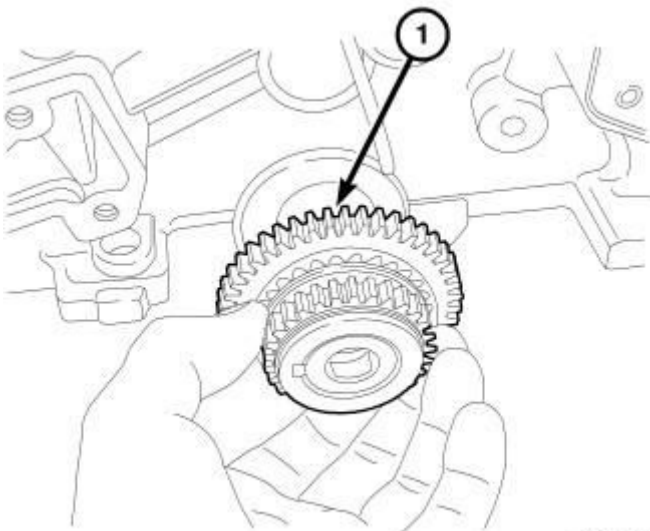
091073258

Fig. 406: Wrench Flats

Courtesy of CHRYSLER GROUP, LLC

2. Using a wrench to hold the camshaft flats (1) tighten the sprocket bolt to 10 N.m + 65° (88 in. lbs. + 65°).
3. Verify correct timing. Refer to **VALVE TIMING - STANDARD PROCEDURE** .
4. Install the timing cover. Refer to **COVER(S), ENGINE TIMING, INSTALLATION** .
5. Install the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, INSTALLATION** .
6. Install engine cover.

CRANKSHAFT SPROCKET

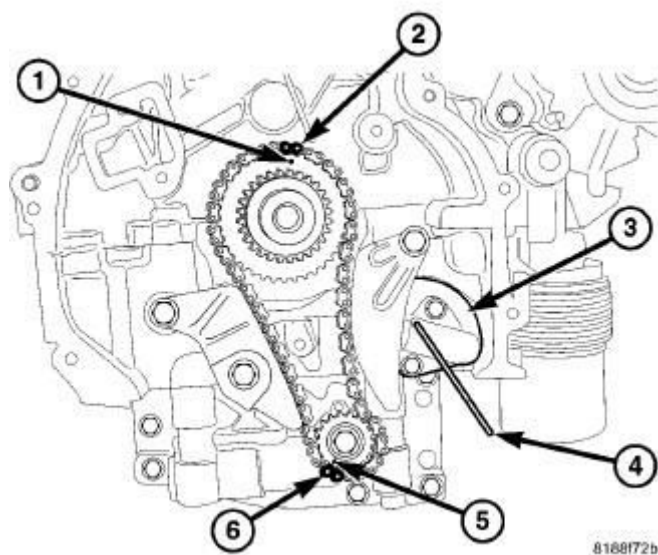


81872985

Fig. 407: Crankshaft Sprocket

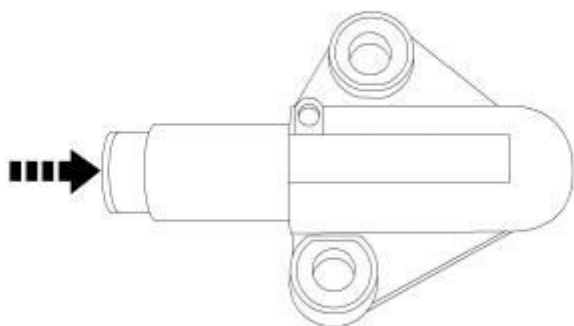
Courtesy of CHRYSLER GROUP, LLC

1. Install the crankshaft sprocket (1) onto the crankshaft.

**Fig. 408: BSM Timing Chain Marks**

Courtesy of CHRYSLER GROUP, LLC

2. Install the oil pump drive chain. Verify that the oil pump is correctly timed (1, 2, 5, 6).

**Fig. 409: Pushing Tensioner Piston Back Into Tensioner Body**

Courtesy of CHRYSLER GROUP, LLC

3. Reset the oil pump drive chain tensioner by pushing the plunger inward and installing (special tool #9703,

Pin, Tensioner).

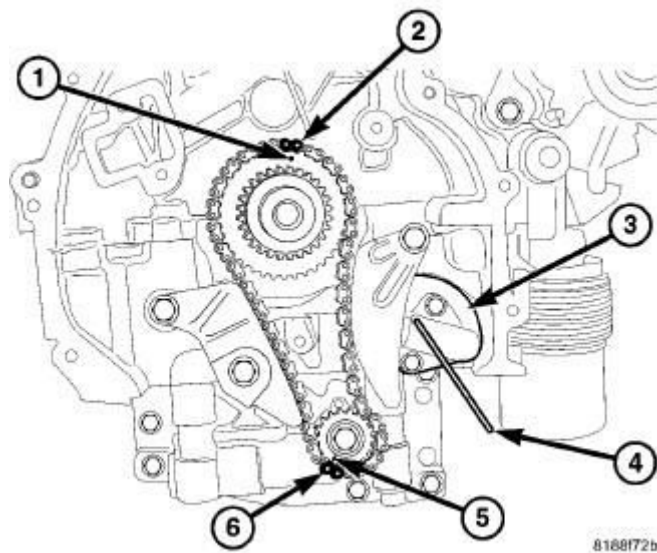


Fig. 410: BSM Timing Chain Marks
Courtesy of CHRYSLER GROUP, LLC

4. Install the oil pump drive chain tensioner (3) and remove (special tool #9703, Pin, Tensioner) (4).
5. Install the timing chain and timing chain cover. Refer to **CHAIN AND SPROCKETS, TIMING, INSTALLATION** .
6. Install the oil pan. Refer to **PAN, OIL, INSTALLATION** .
7. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL - STANDARD PROCEDURE** .
8. Connect the negative battery cable and tighten nut to 5 N.m (45 in. lbs.).
9. Run the engine until it reaches normal operating temperature. Check cooling system for correct fluid level. Refer to **STANDARD PROCEDURE** .

NOTE: **The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components.**

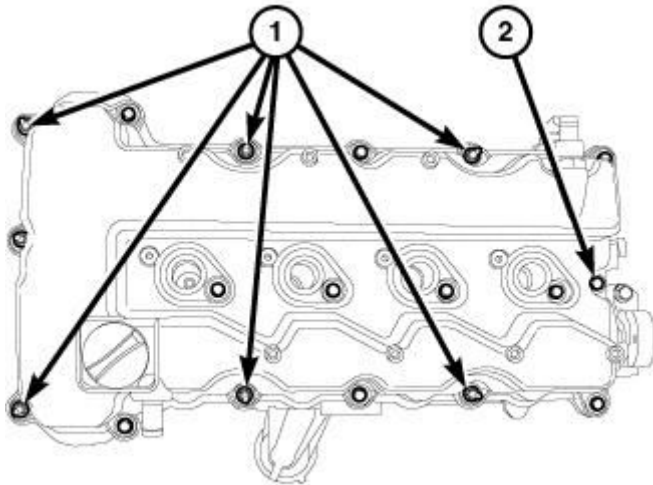
COVER(S), ENGINE TIMING

REMOVAL

REMOVAL

1. Perform the fuel pressure release procedure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE** .

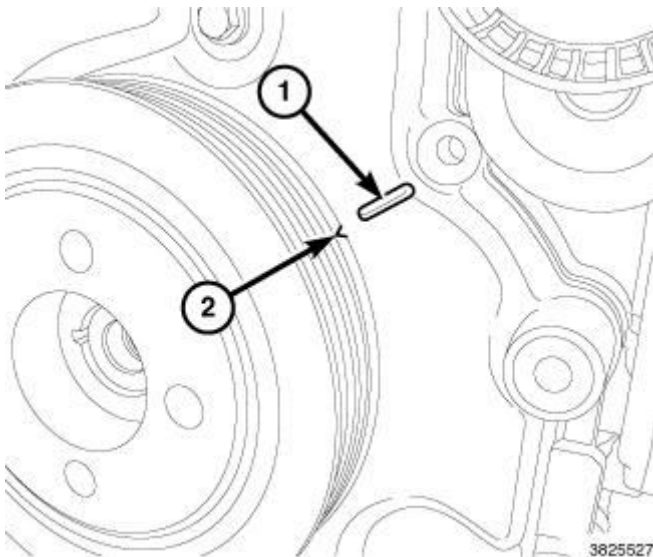
2. Disconnect and isolate the battery negative cable.
3. Remove the resonator. Refer to **RESONATOR, AIR CLEANER, REMOVAL** .
4. Remove the air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL** .
5. Remove the coolant recovery bottle. Refer to **BOTTLE, PRESSURIZED COOLANT, REMOVAL** .



3825205

Fig. 411: Identifying Six Stud Bolts
 Courtesy of CHRYSLER GROUP, LLC

6. Remove the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, REMOVAL** .



3825527

Fig. 412: Timing Cover Mark & Notch
 Courtesy of CHRYSLER GROUP, LLC

7. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
8. Remove the frame cover portion of the right splash shield. Refer to **SHIELD, SPLASH, FRONT** .

WHEELHOUSE, REMOVAL .

CAUTION: When aligning timing marks, always rotate engine by turning the crankshaft. Failure to do so will result in valve and/or piston damage.

9. Rotate the crankshaft clockwise (as viewed from the front) to align the timing cover mark (1) with the damper notch (2) to place the number one cylinder piston at top-dead-center on the compression stroke.

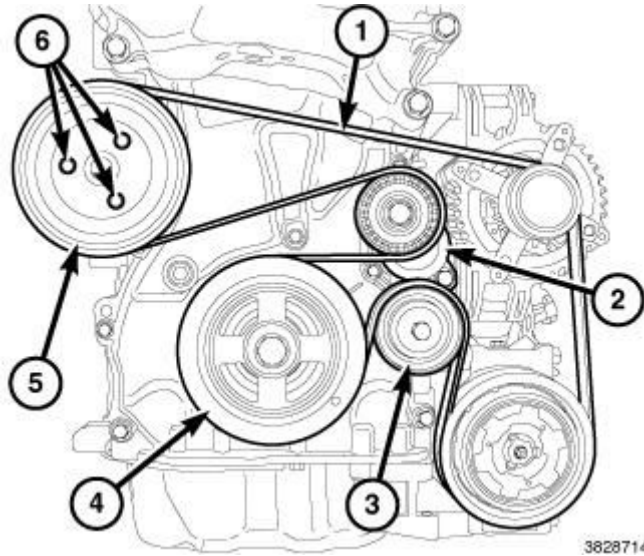


Fig. 413: Accessory Drive Components & Belt Routing
Courtesy of CHRYSLER GROUP, LLC

10. Remove the accessory drive belt (1). Refer to **BELT, SERPENTINE, REMOVAL** .
11. Remove the accessory drive belt idler pulley (3).
12. Remove the accessory drive belt tensioner (2).
13. Remove the crankshaft damper (4). Refer to **DAMPER, VIBRATION, REMOVAL** .
14. Remove three bolts (6) and the water pump pulley (5) from the water pump.

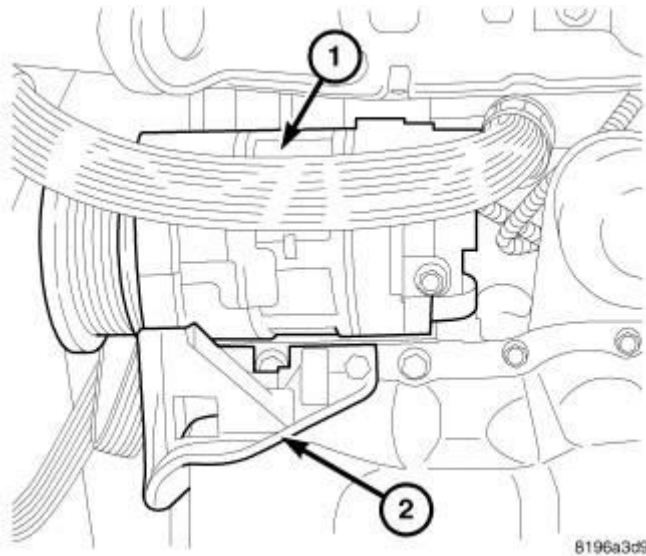


Fig. 414: A/C Compressor & Bracket
Courtesy of CHRYSLER GROUP, LLC

NOTE: The oil pan will need to be removed and immediately reinstalled. This procedure is necessary because the oil pan sealant must be broken to allow the timing cover to be removed without damage to the oil pan. The reason the pan is to be reinstalled is to allow for a support surface when the timing cover is removed.

15. Remove the oil pan. Refer to **PAN, OIL, REMOVAL** .
16. Temporarily reinstall the oil pan.
17. Install the oil pan bolts finger tight. **Do not install** the four oil pan to timing cover bolts (1) at this time.
18. Lower the vehicle.
19. Support the engine with a suitable jack.
20. Remove the right engine mount insulator. Refer to **INSULATOR, ENGINE MOUNT, RIGHT, REMOVAL** .
21. Remove one M8 studbolt (1), six M6 bolts (2), two M8 bolts (3) and five M10 bolts (4).

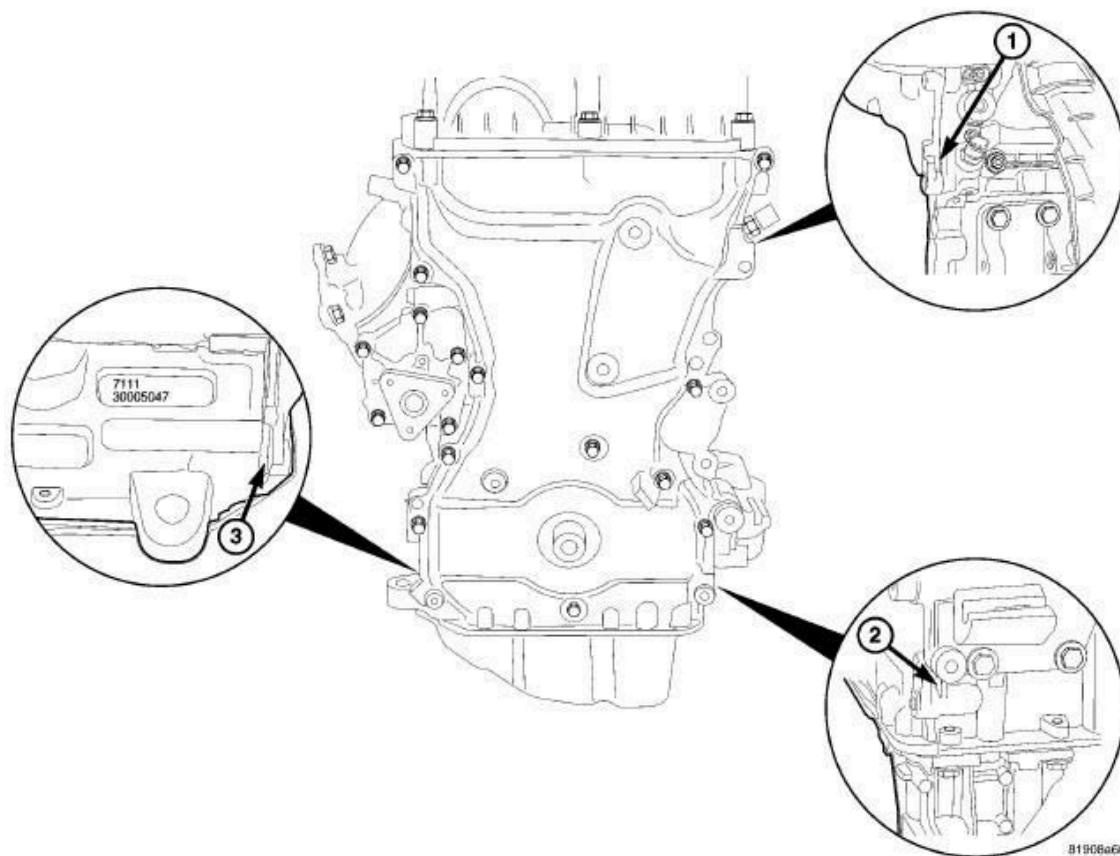


Fig. 415: Timing Chain Cover Pry Points
Courtesy of CHRYSLER GROUP, LLC

22. Remove the engine timing cover using pry points (1, 2 and 3).

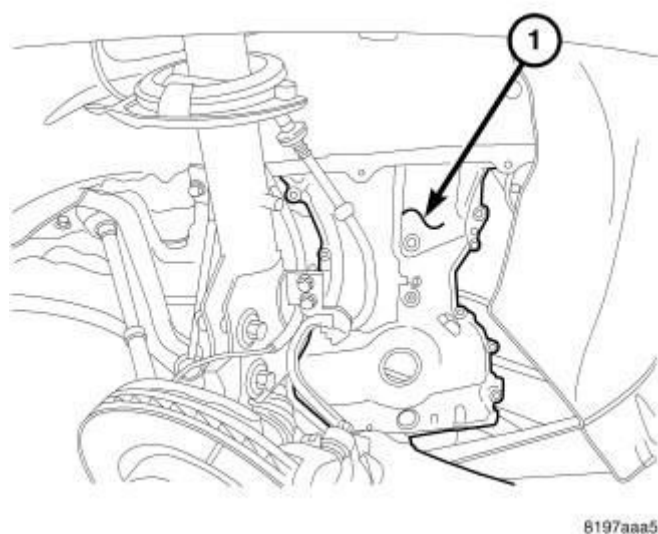


Fig. 416: Timing Chain Cover Removal/Installation
Courtesy of CHRYSLER GROUP, LLC

23. Remove the engine timing cover (1) out through the bottom of the vehicle.

INSTALLATION

INSTALLATION

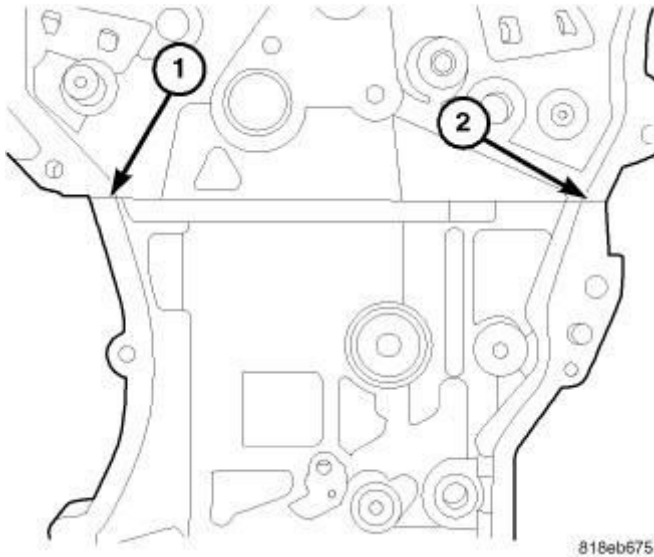


Fig. 417: Applying Engine Sealant RTV (Or Equivalent) At Cylinder Head To Block Parting Line
Courtesy of CHRYSLER GROUP, LLC

NOTE: When using RTV, the sealing surfaces must be clean and free from grease and oil.

NOTE: When using RTV, parts should be assembled in 10 minutes and tighten to final torque within 45 minutes.

1. Install a new crankshaft seal if necessary.
2. Clean all sealing surfaces. Refer to **ENGINE - STANDARD PROCEDURE**.
3. Apply Mopar® engine sealant RTV (or equivalent) as shown in illustration at the cylinder head to block parting line (1 and 2).

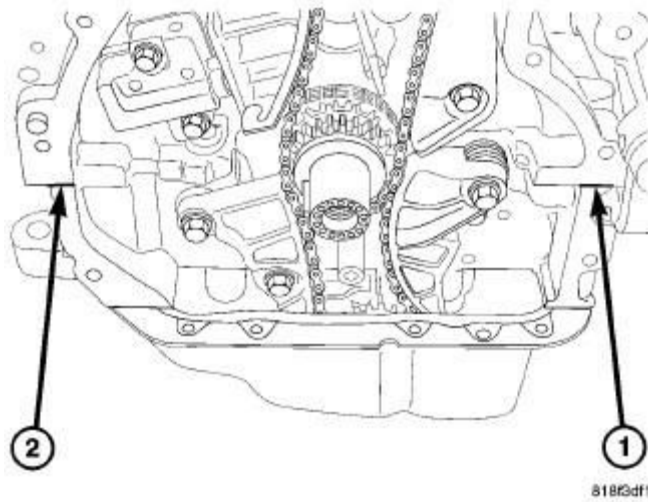


Fig. 418: Applying Engine Sealant RTV (Or Equivalent) At Ladder Frame To Block Parting Line
Courtesy of CHRYSLER GROUP, LLC

4. Apply Mopar® engine sealant RTV (or equivalent) as shown in illustration at the ladder frame to block parting line (1 and 2).

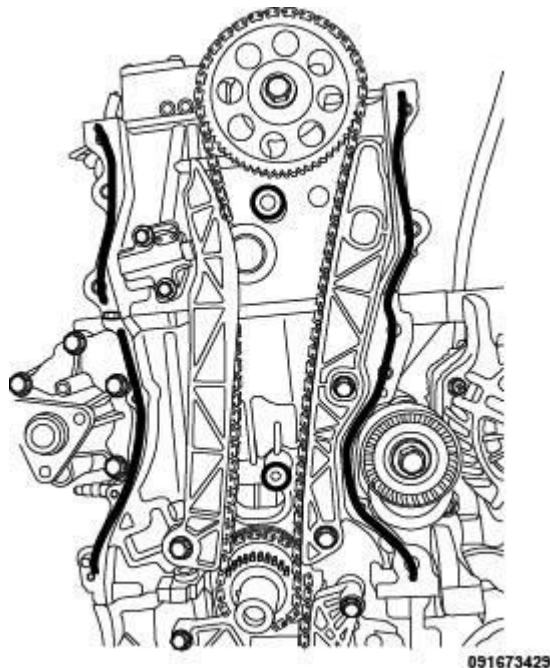


Fig. 419: Engine Block And Cylinder Head To Timing Cover Sealant Application Points
Courtesy of CHRYSLER GROUP, LLC

5. Apply 2 mm bead of Mopar® MS-GF-46 (or equivalent) to the engine block and cylinder head to timing cover mating surfaces as shown in illustration. Be sure to apply a bead at the two center bolt lands that are

between the timing chain.

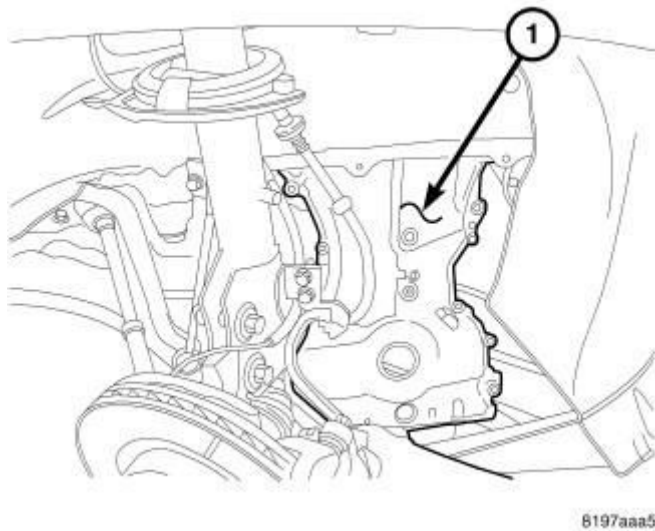


Fig. 420: Timing Chain Cover Removal/Installation
Courtesy of CHRYSLER GROUP, LLC

6. Install timing chain cover (1) upwards from under the vehicle.
7. Install the timing chain cover retaining bolts. Tighten six M6 bolts (2) to 9 N.m (80 in. lbs.), two M8 bolts (3) and one studbolt (1) to 26 N.m (19 ft. lbs.) and five M10 bolts (4) to 65 N.m (48 ft. lbs.).
8. Install the right engine mount. Refer to **INSULATOR, ENGINE MOUNT, RIGHT, INSTALLATION**.
9. Install the coolant reservoir bottle. Tighten bolt to 9 N.m (80 in. lbs.).

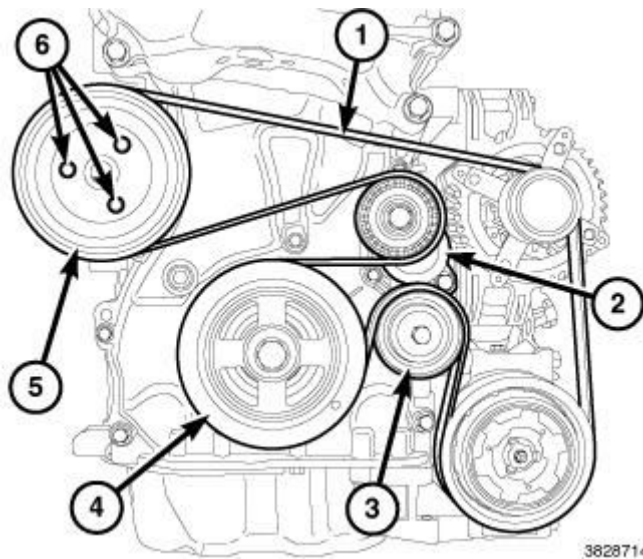
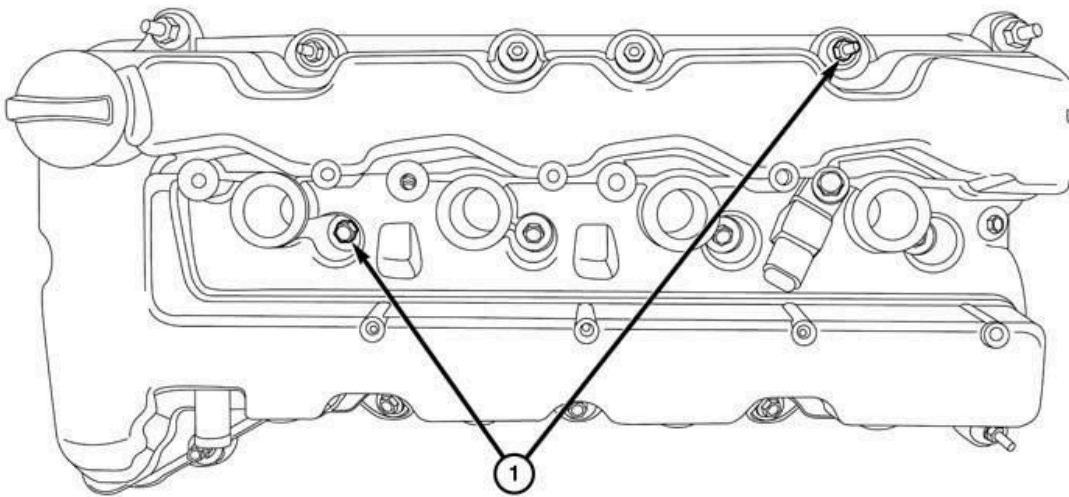


Fig. 421: Accessory Drive Components & Belt Routing
Courtesy of CHRYSLER GROUP, LLC

10. Install the water pump pulley (5) and tighten three bolts (6) to 9 N.m (80 in. lbs.).
11. Install the crankshaft damper (4). Refer to **DAMPER, VIBRATION, INSTALLATION** .
12. Install the accessory drive belt tensioner (2).
13. Install the accessory drive belt idler pulley (3). Tighten bolt to 25 N.m (18 ft. lbs.).
14. Install the accessory drive belt (1). Refer to **BELT, SERPENTINE, INSTALLATION** .
15. Reseal the oil pan. Refer to **PAN, OIL, INSTALLATION** .
16. Install the right lower splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION** .



091071574

Fig. 422: Cylinder Head Cover Bolts
Courtesy of CHRYSLER GROUP, LLC

17. Install the cylinder head cover and ignition coils . Refer to **COVER(S), CYLINDER HEAD, INSTALLATION** .
18. Install the air cleaner body. Refer to **BODY, AIR CLEANER, INSTALLATION** .

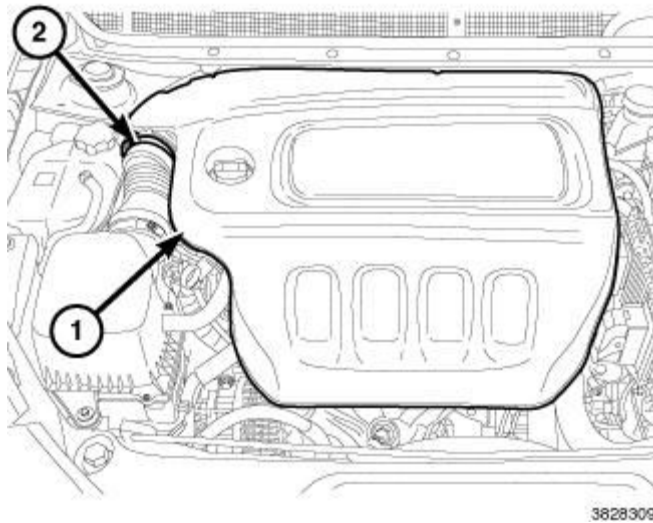


Fig. 423: Engine Cover & Air Resonator Clamp
Courtesy of CHRYSLER GROUP, LLC

19. Install the engine cover (1).
20. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL - STANDARD PROCEDURE**.
21. Install the resonator (1). Refer to **RESONATOR, AIR CLEANER, INSTALLATION**.
22. Connect the battery negative cable and tighten nut to 5 N.m (45 in. lbs.).
23. Run the engine until it reaches normal operating temperature. Check cooling system for possible leaks and correct fluid level. Refer to **STANDARD PROCEDURE**.

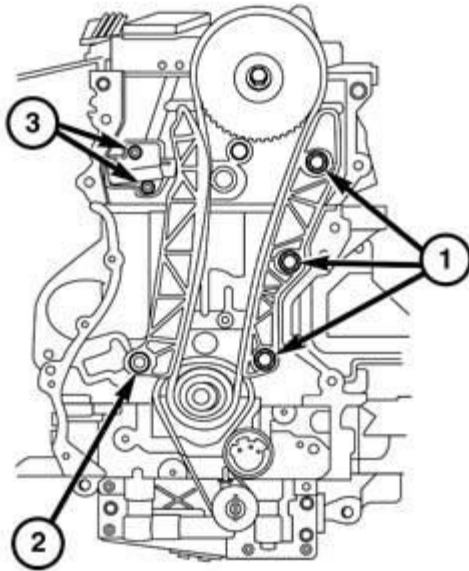
NOTE: The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components.

TENSIONER, ENGINE TIMING

REMOVAL

REMOVAL

1. Remove the engine timing cover. Refer to **COVER(S), ENGINE TIMING, REMOVAL**.



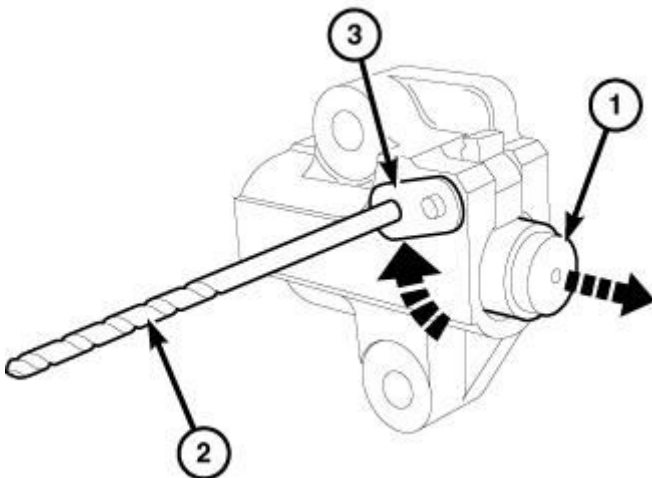
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Fig. 424: Timing Chain Tensioner Retaining Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Remove timing chain tensioner retaining bolts (3).
3. Remove the tensioner.

INSTALLATION

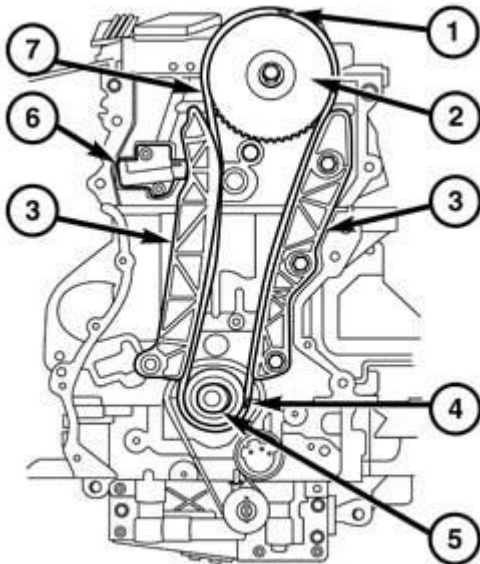
INSTALLATION



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Fig. 425: Piston, Ratchet Arm & Drill Bit
Courtesy of CHRYSLER GROUP, LLC

1. Reset the cam chain tensioner. Refer to **VALVE TIMING - STANDARD PROCEDURE** .



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Fig. 426: Timing Chain, Sprockets, Tensioner & Guides
Courtesy of CHRYSLER GROUP, LLC

NOTE: Keep the slack in the timing chain on the tensioner side.

2. Install timing chain tensioner (6) and tighten bolts to 12 N.m (105 in. lbs.).
3. Remove the pin (1/8 in. drill bit) from the timing chain tensioner.
4. Verify that the valve timing is correct. Refer to **VALVE TIMING - STANDARD PROCEDURE** .
5. Install the engine timing cover. Refer to **COVER(S), ENGINE TIMING, INSTALLATION** .
6. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL - STANDARD PROCEDURE** .
7. Connect the battery negative cable and tighten nut to 5 N.m (45 in. lbs.).
8. Install the resonator. Refer to **RESONATOR, AIR CLEANER, INSTALLATION** .
9. Install the engine cover.
10. Run the engine until it reaches normal operating temperature. Check cooling system for correct fluid level. Refer to **STANDARD PROCEDURE** .

NOTE: The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components.

2014 ENGINE**3.2L - Service Information - Cherokee****DESCRIPTION****DESCRIPTION**

CAUTION: If the engine has experienced a catastrophic failure, **THE INTAKE MANIFOLD MUST BE REPLACED!**



Fig. 1: 3.2 Liter (195.3 CID) Flexible Fuel V-6 Engine
Courtesy of CHRYSLER GROUP, LLC

NOTE: RWD engine configuration shown in illustration, FWD similar.

The 3.2 liter (195.3 CID) flexible fuel V-6 engine features Variable Valve Timing (VVT), Dual Overhead Camshafts (DOHC) and a high-pressure die-cast aluminum cylinder block with steel liners in a 60° configuration. The 3.2 liter engine has a chain driven variable discharge oil pump with a two-stage pressure regulator for improved fuel economy. The exhaust manifolds are integrated into the cylinder heads for reduced weight. The cylinders are numbered from front to rear. The right bank is numbered 1, 3, 5 and the left bank is numbered 2, 4, 6. The firing order is 1-2-3-4-5-6. The engine serial number is located on the left side of the cylinder block at the transmission flange.

DIAGNOSIS AND TESTING**ENGINE DIAGNOSIS - INTRODUCTION**

This Service Information can be helpful in determining the causes of malfunctions not detected and remedied by routine maintenance.

These malfunctions are classified as Performance (e.g., engine idles rough and stalls) or Mechanical (e.g., a strange noise).

Refer to **ENGINE PERFORMANCE DIAGNOSTIC TABLE** and **ENGINE MECHANICAL DIAGNOSTIC TABLE** for possible causes and corrections of malfunctions. Refer to **FUEL SYSTEM** article for the fuel system diagnosis.

Additional diagnosis and testing procedures may be necessary for specific engine malfunctions that can not be isolated with the Service Diagnosis charts. Information concerning additional tests and diagnosis is provided within the following diagnosis:

- Cylinder Compression Pressure Test. Refer to **CYLINDER COMPRESSION PRESSURE LEAKAGE** .
- Cylinder Combustion Pressure Leakage Test. Refer to **CYLINDER COMBUSTION PRESSURE LEAKAGE** .
- Engine Cylinder Head Gasket Failure Diagnosis. Refer to **CYLINDER HEAD, DIAGNOSIS AND TESTING** .
- Intake Manifold Leakage Diagnosis. Refer to **MANIFOLD, INTAKE, DIAGNOSIS AND TESTING** .

ENGINE PERFORMANCE DIAGNOSTIC TABLE

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE WILL NOT START	1. Weak battery	1. Charge or replace as necessary. Refer to <u>BATTERY, DIAGNOSIS AND TESTING</u> .
	2. Corroded or loose battery connections.	2. Clean and tighten battery connections. Refer to <u>CLEANING</u> .
	3. Faulty engine starting system.	3. Diagnose engine starting system. Refer to <u>DIAGNOSIS AND TESTING</u> .
	4. Faulty coil or control unit.	4. Replace ignition coil. Refer to <u>COIL, IGNITION, REMOVAL</u> .
	5. Incorrect spark plug gap.	5. Correct as necessary.
	6. Incorrect cam timing.	6. Verify cam timing. Refer to <u>VALVE TIMING - STANDARD PROCEDURE</u> .
	7. Dirt or water in fuel system.	7. Clean fuel system.
	8. Faulty fuel pump or wiring.	8. Repair or replace as necessary.
	9. Faulty Camshaft Position (CMP) sensor.	9. Replace sensor. Refer to <u>SENSOR, CAMSHAFT POSITION, REMOVAL</u> .

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	10. Faulty Crankshaft Position (CKP) sensor.	10. Replace sensor. Refer to <u>SENSOR, CRANKSHAFT POSITION, REMOVAL</u> .
ENGINE STALLS OR ROUGH IDLE	1. Vacuum leak.	1. Inspect intake manifold and vacuum hoses, repair or replace as necessary.
	2. Faulty Crankshaft Position (CKP) sensor.	2. Replace sensor. Refer to <u>SENSOR, CRANKSHAFT POSITION, REMOVAL</u> .
	3. Faulty ignition coil.	3. Replace ignition coil. Refer to <u>COIL, IGNITION, REMOVAL</u> .
	4. Incorrect cam timing.	4. Verify cam timing. Refer to <u>VALVE TIMING - STANDARD PROCEDURE</u> .
ENGINE LOSS OF POWER	1. Dirty or incorrectly gapped spark plugs.	1. Correct as necessary. Refer to <u>SPARK PLUG, REMOVAL</u> .
	2. Dirt or water in fuel system.	2. Clean fuel system.
	3. Faulty fuel pump.	3. Replace fuel pump. Refer to <u>MODULE, FUEL PUMP, REMOVAL</u> .
	4. Leaking cylinder head gasket.	4. Replace cylinder head gasket. Refer to <u>CYLINDER HEAD, REMOVAL</u> .
	5. Low compression.	5. Determine the cause and repair as necessary. Refer to <u>ENGINE, DIAGNOSIS AND TESTING</u> .
	6. Burned, warped or pitted valves.	6. Replace as necessary. Refer to <u>VALVES, INTAKE AND EXHAUST, REMOVAL</u> .
	7. Plugged or restricted exhaust system.	7. Inspect and replace as necessary.
	8. Faulty ignition coil.	8. Replace ignition coil. Refer to <u>COIL, IGNITION, REMOVAL</u> .
	9. Incorrect cam timing.	9. Verify cam timing. Refer to <u>VALVE TIMING - STANDARD PROCEDURE</u> .
ENGINE MISSES ON ACCELERATION	1. Dirty or incorrectly gapped spark plugs.	1. Correct as necessary. Refer to <u>SPARK PLUG, REMOVAL</u> .
	2. Dirt in fuel system.	2. Clean fuel system.
	3. Burned, warped or pitted valves.	3. Replace as necessary. Refer to <u>VALVES, INTAKE AND EXHAUST, REMOVAL</u> .
	4. Faulty ignition coil.	4. Replace ignition coil. Refer to <u>COIL, IGNITION, REMOVAL</u> .

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ENGINE MISSES AT HIGH SPEED	1. Dirty or incorrectly gapped spark plugs.	1. Correct as necessary. Refer to <u>SPARK PLUG, REMOVAL</u> .
	4. Faulty ignition coil.	2. Replace ignition coil. Refer to <u>COIL, IGNITION, REMOVAL</u> .
	3. Dirt or water in fuel system.	3. Clean fuel system.

ENGINE MECHANICAL DIAGNOSTIC TABLE

CONDITION	POSSIBLE CAUSES	CORRECTIONS
NOISY VALVES	1. High or low oil level in crankcase.	1. Refer to <u>OIL, STANDARD PROCEDURE</u> .
	2. Thin or diluted oil.	2. Change oil and filter.
	3. Low oil pressure.	3. Check oil pump, if Ok, check rod and main bearings for excessive wear.
	4. Dirt in lash adjusters.	4. Replace as necessary.
	5. Worn rocker arms.	5. Replace as necessary.
	6. Worn lash adjusters	6. Replace as necessary.
	7. Worn valve guides.	7. Inspect the valve guides for wear, cracks or looseness. If either condition exists, replace the cylinder head. Refer to <u>CYLINDER HEAD, REMOVAL</u> .
	8. Excessive runout of valve seats on valve faces.	8. Refer to <u>VALVES, INTAKE AND EXHAUST, STANDARD PROCEDURE</u> .
CONNECTING ROD NOISE	1. Insufficient oil supply.	1. Refer to <u>OIL, STANDARD PROCEDURE</u> .
	2. Low oil pressure.	2. Check oil pump, if OK, check rod and main bearings for excessive wear.
	3. Thin or diluted oil.	3. Change oil and filter.
	4. Excessive bearing clearance.	4. Replace as necessary.
	5. Connecting rod journal out-of-round.	5. Service or replace crankshaft.
	6. Misaligned connecting rods.	6. Replace bent connecting rods.
MAIN BEARING NOISE	1. Insufficient oil supply.	1. Refer to <u>OIL, STANDARD PROCEDURE</u> .
	2. Low oil pressure.	2. Check oil pump, if OK, check rod and main bearings for excessive wear.
	3. Thin or diluted oil.	3. Change oil and filter.
	4. Excessive bearing clearance.	4. Replace as necessary.

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5. Excessive end play.	5. Check thrust washers for wear.
6. Crankshaft journal out-of-round.	6. Service or replace crankshaft.
7. Loose flywheel or torque converter.	7. Tighten to correct torque

CYLINDER COMPRESSION PRESSURE LEAKAGE

NOTE: To perform a compression test on a MULTI-AIR equipped engine, the ignition **MUST** remain in the "key on" position. If the ignition is in the "off" position, the intake valves will not actuate and the result will be no compression.

NOTE: The results of a cylinder compression pressure test can be utilized to diagnose several engine malfunctions.

NOTE: Be certain the battery is completely charged and the engine starter motor is in good operating condition. Otherwise the indicated compression pressures may not be valid for diagnosis purposes.

1. Clean the spark plug recesses with compressed air.
2. Remove the spark plugs and record the cylinder number of each spark plug for future reference.
3. Inspect the spark plug electrodes for abnormal firing indicators such as fouled, hot, oily, etc.
4. Disable the fuel system and perform the fuel system pressure release procedure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE**.
5. Insert a compression pressure gauge and rotate the engine with the engine starter motor for three revolutions.
6. Record the compression pressure on the 3rd revolution. Continue the test for the remaining cylinders.

NOTE: The recommended compression pressures are to be used only as a guide to diagnosing engine problems. An engine should not be disassembled to determine the cause of low compression unless some malfunction is present.

7. Compression should not be less than 689 kPa (100 psi) and not vary more than 25 percent from cylinder to cylinder.
8. If one or more cylinders have abnormally low compression pressures, repeat the compression test.

NOTE: If the same cylinder or cylinders repeat an abnormally low reading on the second compression test, it could indicate the existence of a problem in the cylinder in question.

9. If one or more cylinders continue to have abnormally low compression pressures, perform the cylinder combustion pressure leakage test. Refer to **CYLINDER COMBUSTION PRESSURE LEAKAGE**.

CYLINDER COMBUSTION PRESSURE LEAKAGE

The combustion pressure leakage test provides an accurate means for determining engine condition.

Combustion pressure leakage testing will detect:

- Exhaust and intake valve leaks (improper seating).
 - Leaks between adjacent cylinders or into water jacket.
1. Check the coolant level and fill as required. DO NOT install the radiator cap.
 2. Start and operate the engine until it attains normal operating temperature.
 3. Turn the engine OFF.
 4. Remove the spark plugs.
 5. Remove the oil filler cap.
 6. Remove the air cleaner hose.
 7. **Calibrate the tester according to the manufacturer's instructions.** The shop air source for testing should maintain a regulated air pressure at 552 kPa (80 psi).
 8. Perform the test procedures on each cylinder according to the tester manufacturer's instructions. Set the piston of the cylinder to be tested at TDC on the compression stroke.
 9. As each cylinder is pressurized, listen for the air escaping through the throttle body, tailpipe and oil filler cap opening. Check for bubbles in the radiator coolant.

All gauge pressure indications should be equal, with **no more** than 25% leakage. Refer to **CYLINDER COMBUSTION PRESSURE LEAKAGE DIAGNOSIS CHART**.

CYLINDER COMBUSTION PRESSURE LEAKAGE DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSE	CORRECTION
AIR ESCAPES THROUGH THROTTLE BODY	Intake valve bent, burnt, or not seated properly	Inspect valve and valve seat. Reface or replace, as necessary. Inspect valve springs. Replace as necessary.
AIR ESCAPES THROUGH TAILPIPE	Exhaust valve bent, burnt, or not seated properly	Inspect valve and valve seat. Reface or replace, as necessary. Inspect valve springs. Replace as necessary.
AIR ESCAPES THROUGH RADIATOR	Head gasket leaking or cracked cylinder head or block	Remove cylinder head and inspect. Replace defective part
MORE THAN 50% LEAKAGE FROM ADJACENT CYLINDERS	Head gasket leaking or crack in cylinder head or block between adjacent cylinders	Remove cylinder head and inspect. Replace gasket, head, or block as necessary
MORE THAN 25% LEAKAGE AND AIR ESCAPES THROUGH OIL FILLER CAP OPENING ONLY	Stuck or broken piston rings; cracked piston; worn rings and/or cylinder wall	Inspect for broken rings or piston. Measure ring gap and cylinder diameter, taper and out-of-round. Replace defective part as necessary

OIL CONSUMPTION TEST AND DIAGNOSIS

The following diagnostic procedures are used to determine the source of excessive internal oil consumption, these procedures and tests apply to vehicles with 50,000 miles or less.

NOTE: Engine oil consumption may be greater than normal during engine break-in. Repairs should be delayed until vehicle has been driven at least 7,500 miles.

Severe service (high ambient temperature, short trips, heavy loading, trailer towing, taxi, off-road, or law enforcement use) may result in greater oil consumption than normal.

Sustained high speed driving and high engine RPM operation may result in increased oil consumption.

Failure to comply with the recommended oil type and viscosity rating, as outlined in the Owner's Manual, may impact oil economy as well as fuel economy.

Oil consumption may increase with vehicle age and mileage due to normal engine wear.

NOTE: Because a few drops of external oil leakage per mile can quickly account for the loss of one quart of oil in a few hundred miles, be certain there is no external engine oil leaks present.

- Oil leakage is not the same as oil consumption and all external leakage must be eliminated before any action can be taken to verify and/or correct oil consumption complaints.
- Verify that the engine has the correct oil level dipstick and dipstick tube installed.
- Verify that the engine is not being run in an overfilled condition. Check the oil level 15 minutes after a hot shutdown with the vehicle parked on a level surface. In no case should the level be above MAX or the FULL mark on the dipstick.

OIL CONSUMPTION TEST

1. Check the oil level at least 15 minutes after a hot shutdown.
2. If the oil level is low, top off with the proper viscosity and API service level engine oil. Add one bottle of MOPAR® 4-In-1 Leak Detection Dye into the engine oil.
3. Tamper proof the oil pan drain plug, oil filter, dipstick and oil fill cap.
4. Record the vehicle mileage.
5. Instruct the customer to drive the vehicle as usual.
6. Ask the customer to return to the servicing dealer after accumulating 500 miles. Check the oil level at least 15 minutes after a hot shutdown. If the oil level is half way between the "FULL" and "ADD" mark continue with the next step.
7. Using a black light, re-check for any external engine oil leaks, repair as necessary, if no external engine oil leaks are present, continue with oil consumption diagnosis.

OIL CONSUMPTION DIAGNOSIS

1. Check the positive crankcase ventilation (PCV) system. Make sure the system is not restricted and the PCV valve has the correct part number and correct vacuum source (18-20 in. Hg at idle below 3000 ft. above sea level is considered normal).
2. Perform a cylinder compression test and cylinder leak down test using the standard leak down gauge following manufacturers suggested best practices.

NOTE: **Verify the spark plugs are not oil saturated. If the spark plugs are oil saturated and compression is good it can be assumed the valve seals or valve guides are at fault.**

3. If one or more cylinders have more than 15% leak down further engine tear down and inspection will be required.

TOP 19 REASONS THAT MAY LEAD TO ENGINE OIL CONSUMPTION

1. Tapered and Out-of-Round Cylinders

The increased piston clearances permit the pistons to rock in the worn cylinders. While tilted momentarily, an abnormally large volume of oil is permitted to enter on one side of the piston. The rings, also tilted in the cylinder, permit oil to enter on one side. Upon reversal of the piston on each stroke, some of this oil is passed into the combustion chamber.

2. Distorted Cylinders

This may be caused by unequal heat distribution or unequal tightening of cylinder head bolts. This condition presents a surface which the rings may not be able to follow completely. In this case, there may be areas where the rings will not remove all of the excess oil. When combustion takes place, this oil will be burned and cause high oil consumption.

3. Improper operation of "PCV "system

The main purpose of the Positive Crankcase Ventilation (PCV) valve is to recirculate blow-by gases back from the crankcase area through the engine to consume unburned hydrocarbons. The PCV system usually has a one way check valve and a make up air source. The system uses rubber hoses that route crankcase blow by gases to the intake manifold. Vacuum within the engine intake manifold pulls the blow by gases out of the crankcase into the combustion chamber along with the regular intake air and fuel mixture.

The PCV system can become clogged with sludge and varnish deposits and trap blow by gases in the crankcase. This degrades the oil, promoting additional formation of deposit material. If left uncorrected, the result is plugged oil rings, oil consumption, rapid ring wear due to sludge buildup, ruptured gaskets and seals due to crankcase pressurization.

4. Worn Piston Ring Grooves

For piston rings to form a good seal, the sides of the ring grooves must be true and flat - not flared or shouldered. Piston rings in tapered or irregular grooves will not seal properly and, consequently, oil will

pass around behind the rings into the combustion chamber.

5. Worn, Broken or Stuck Piston Rings

When piston rings are broken, worn or stuck to such an extent that the correct tension and clearances are not maintained, this will allow oil to be drawn into the combustion chamber on the intake stroke and hot gases of combustion to be blown down the cylinder past the piston on the power stroke. All of these conditions will result in burning and carbon build up of the oil on the cylinders, pistons and rings.

6. Cracked or Broken Ring Lands

Cracked or broken ring lands prevent the rings from seating completely on their sides and cause oil pumping. This condition will lead to serious damage to the cylinders as well as complete destruction of the pistons and rings. Cracked or broken ring lands cannot be corrected by any means other than piston replacement.

7. Worn Valve Stems and Guides

When wear has taken place on valve stems and valve guides, the vacuum in the intake manifold will draw oil and oil vapor between the intake valve stems and guides into the intake manifold and then into the cylinder where it will be burned.

8. Bent or Misaligned Connecting Rods

Bent or misaligned connecting rods will not allow the pistons to ride straight in the cylinders. This will prevent the pistons and rings from forming a proper seal with the cylinder walls and promote oil consumption. In addition, it is possible that a bearing in a bent connect rod will not have uniform clearance on the connecting rod wrist pin. Under these conditions, the bearing will wear rapidly and throw off an excessive amount of oil into the cylinder.

9. Fuel Dilution

If raw fuel is allowed to enter the lubrication system, the oil will become thinner and more volatile and will result in higher oil consumption. The following conditions will lead to higher oil consumption;

- Excess fuel can enter and mix with the oil via a leaking fuel injector
- Gasoline contaminated with diesel fuel
- Restricted air intake
- Excessive idling

10. Contaminated Cooling Systems

Corrosion, rust, scale, sediment or other formations in the water jacket and radiator will prevent a cooling system from extracting heat efficiently. This is likely to cause cylinder distortion thus leading to higher oil consumption.

11. Oil Viscosity

The use of oil with a viscosity that is too light may result in high oil consumption. Refer to the vehicle Owner's Manual for the proper oil viscosity to be used under specific driving conditions and/or ambient temperatures.

12. Dirty Engine Oil

Failure to change the oil and filter at proper intervals may cause the oil to be so dirty that it will promote accumulation of sludge and varnish and restrict oil passages in the piston rings and pistons. This will increase oil consumption; dirty oil by nature is also consumed at a higher rate than clean oil.

13. Crankcase Overfull

Due to an error in inserting the oil dip stick so that it does not come to a seat on its shoulder, a low reading may be obtained. Additional oil may be added to make the reading appear normal with the stick in this incorrect position which will actually make the oil level too high. If the oil level is so high that the lower ends of the connecting rods touch the oil in the oil pan excessive quantities of oil will be thrown on the cylinder walls and some of it will work its way up into the combustion chamber.

14. Excessively High Oil Pressure

A faulty oil pressure relief valve may cause the oil pressure to be too high. The result will be that the engine will be flooded with an abnormally large amount of oil in a manner similar to that which occurs with worn bearings. This condition may also cause the oil filter to burst.

15. Aftermarket Performance Chips and Modification

Increasing performance through the use of performance/power enhancement products to a stock or factory engine will increase the chance of excessive oil consumption.

16. Lugging Engine

Lugging is running the engine at a lower RPM in a condition where a higher RPM (more power/torque) should be implemented. Especially susceptible on vehicles equipped with a manual transmission. This driving habit causes more stress loading on the piston and can lead to increases in engine oil consumption.

17. Turbocharged Engines

There is a possibility for PCV "push-over" due to higher crankcase pressure (as compared to naturally aspirated engines) which is normal for turbocharged engines. This condition causes varying amounts of engine oil to enter the intake manifold, charge air cooler and associated plumbing to and from the charge air cooler, also a leaking turbocharger seal will draw oil into the combustion chamber where it will burn (blue smoke from tail pipe may be present) and form carbon deposits which contribute to further oil consumption as they interfere with proper engine function.

18. Restricted Air Intake

Excessive restriction in the air intake system will increase engine vacuum and can increase oil consumption, an extremely dirty air filter would be one example of this situation.

19. Intake Manifold port seals

Engines that have a "V" configuration and a "wet valley" (3.3/3.8L) could draw oil into the intake ports due to improper sealing between the intake manifold ports and cylinder head. Causes may include improper torque of intake manifold bolts, corrosion (aluminum intake manifold) and or warped sealing surface.

ENGINE LUBRICATION DIAGNOSTIC TABLE

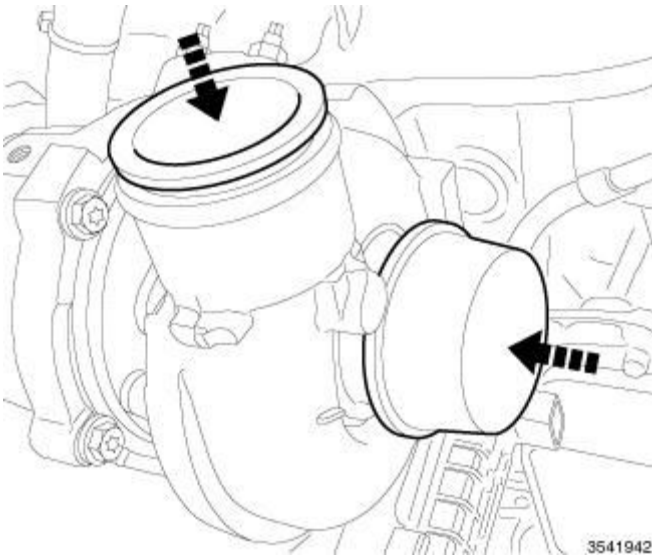
CONDITION	POSSIBLE CAUSES	CORRECTION
OIL LEAKS	1. Gaskets and O-rings. Misaligned or damaged.	1. Replace as necessary.
	(a) Loose fasteners, broken or porous metal parts.	(a) Tighten fasteners, Repair or replace metal parts.
	2. Crankshaft rear oil seal.	2. Replace rear crankshaft oil seal. Refer to <u>SEAL, CRANKSHAFT OIL, REAR, REMOVAL</u> .
	3. Crankshaft seal flange. Scratched, nicked or grooved.	3. Polish or replace crankshaft.
	4. Oil pan flange cracked.	4. Replace oil pan. Refer to <u>PAN, OIL, REMOVAL</u> .
	5. Engine timing cover seal, damaged or misaligned.	5. Replace seal. Refer to <u>SEAL, CRANKSHAFT OIL, FRONT, REMOVAL</u> .
	6. Scratched or damaged vibration damper hub.	6. Polish or replace damper.
OIL PRESSURE DROP	1. Low oil level.	1. Check and correct oil level.
	2. Faulty oil pressure sensor.	2. Replace sensor. Refer to <u>SENSOR, OIL PRESSURE, REMOVAL</u> .
	3. Low oil pressure.	3. Check main bearing clearance. Refer to <u>BEARING(S), CRANKSHAFT, STANDARD PROCEDURE</u> . 3. Check rod bearing clearance. Refer to <u>BEARING(S), CONNECTING ROD, STANDARD PROCEDURE</u> .
	4. Clogged oil filter.	4. Replace oil filter. Refer to <u>FILTER, ENGINE OIL, REMOVAL</u> .
	5. Worn oil pump.	5. Replace oil pump. Refer to

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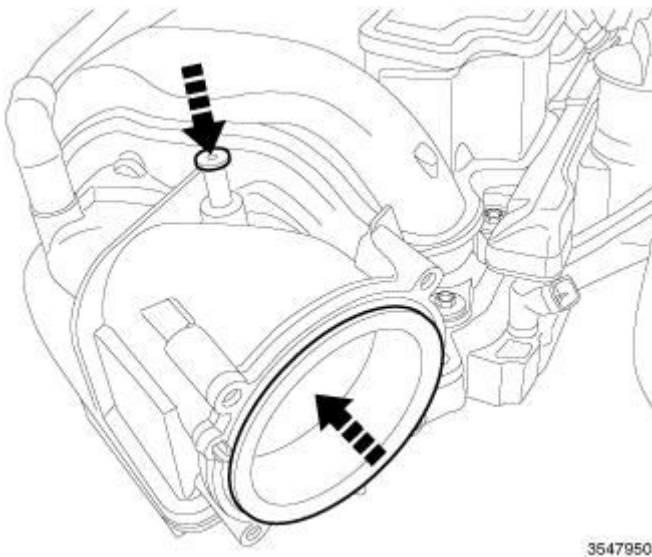
		<u>PUMP, ENGINE OIL, REMOVAL.</u>
	6. Thin or diluted oil.	6. Change oil and filter. Refer to <u>OIL, STANDARD PROCEDURE</u> .
	7. Excessive bearing clearance.	7. Replace crankshaft bearings. Refer to <u>BEARING(S), CRANKSHAFT, STANDARD PROCEDURE</u> . 7. Replace rod bearings. Refer to <u>BEARING(S), CONNECTING ROD, STANDARD PROCEDURE</u> .
	8. Oil pump relief valve stuck.	8. Replace oil pump. Refer to <u>PUMP, ENGINE OIL, REMOVAL.</u>
	9. Oil pump pick-up tube loose, damaged or clogged.	9. Replace oil pump pick-up. Refer to <u>PICK-UP, OIL PUMP, REMOVAL.</u>
OIL PUMPING AT RINGS	1. Worn or damaged rings.	1. Hone cylinder bores and replace rings. Refer to <u>RING(S), PISTON, STANDARD PROCEDURE</u> .
	2. Carbon in oil ring slots.	2. Replace rings. Refer to <u>ROD, PISTON AND CONNECTING, REMOVAL.</u>
	3. Worn valve guides.	3. Replace cylinder heads. Refer to <u>CYLINDER HEAD, REMOVAL.</u>
	4. Leaking valve guide seals.	4. Replace valve guide seals. Refer to <u>SEAL(S), VALVE GUIDE, REMOVAL.</u>

STANDARD PROCEDURE**DUST COVERS AND CAPS**

**Fig. 2: Covers/Caps**

Courtesy of CHRYSLER GROUP, LLC

Due to the high amounts of failures caused by dust, dirt, moisture and other foreign debris being introduced to the engine during service. Covers or caps are needed to reduce the possible damage that can be caused or created.

**Fig. 3: Opening Cover**

Courtesy of CHRYSLER GROUP, LLC

Covers over openings will reduce any possibilities for foreign materials to enter the engine systems. Using miller tool (special tool #10368, Set, Universal Protective Cap), Select the appropriated cover needed to the procedure.

REPAIR DAMAGED OR WORN THREADS

CAUTION: Be sure that the tapped holes maintain the original center line.

Damaged or worn threads can be repaired. Essentially, this repair consists of:

- Drilling out worn or damaged threads.
- Tapping the hole with a special Heli-Coil Tap, or equivalent.
- Installing an insert into the tapped hole to bring the hole back to its original thread size.

FORM-IN-PLACE GASKETS AND SEALERS

NOTE: All of the sealants mentioned below are not used on every engine, they are listed as a general reference guide. See appropriate Service Information for specific sealer usage.

There are numerous places where form-in-place gaskets are used on the engine. Care must be taken when applying form-in-place gaskets to assure obtaining the desired results. **Do not use form-in-place gasket material unless specified.** Bead size, continuity, and location are of great importance. Too thin a bead can result in leakage while too much can result in spill-over which can break off and obstruct fluid feed lines. A continuous bead of the proper width is essential to obtain a leak-free gasket. All sealing surfaces that use form-in-place gaskets and sealers **must** be free of grease or oil. Surfaces should be cleaned with Mopar® brake parts cleaner prior to sealer application. After the sealer is applied, the parts should be assembled within 10 minutes.

There are numerous types of form-in-place gasket materials that are used in the engine area. Mopar® Engine RTV GEN II, Mopar® ATF-RTV, and Mopar® Gasket Maker gasket materials, each have different properties and can not be used in place of the other.

MOPAR® ENGINE RTV GEN II is used to seal components exposed to engine oil. This material is a specially designed black silicone rubber RTV that retains adhesion and sealing properties when exposed to engine oil. Moisture in the air causes the material to cure. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® ATF RTV is a specifically designed black silicone rubber RTV that retains adhesion and sealing properties to seal components exposed to automatic transmission fluid, engine coolants, and moisture. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® GASKET MAKER is an anaerobic type gasket material. The material cures in the absence of air when squeezed between two metallic surfaces. It will not cure if left in the uncovered tube. The anaerobic material is for use between two machined surfaces. Do not use on flexible metal flanges.

MOPAR® BED PLATE SEALANT is a unique (green-in-color) anaerobic type gasket material that is specially made to seal the area between the bed plate and cylinder block without disturbing the bearing clearance or alignment of these components. The material cures slowly in the absence of air when torqued

between two metallic surfaces, and will rapidly cure when heat is applied.

MOPAR® THREEBOND ENGINE RTV SEALANT is a unique gasket material that is specially made to retain adhesion and sealing properties when used to seal components exposed to engine oil.

SEALER APPLICATION

Mopar® Gasket Maker material should be applied sparingly 1 mm (0.040 in.) diameter or less of sealant to one gasket surface. Be certain the material surrounds each mounting hole. Excess material can easily be wiped off. Components should be torqued in place within 15 minutes. The use of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Engine RTV GEN II or ATF RTV gasket material should be applied in a continuous bead approximately 3 mm (0.120 in.) in diameter. All mounting holes must be circled. For corner sealing and "T" joint locations, a 3.17 or 6.35 mm (1/8 or 1/4 in.) drop is placed in the center of the gasket contact area. Uncured sealant may be removed with a shop towel. Components should be torqued in place while the sealant is still wet to the touch (within 10 minutes). The usage of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Threebond Engine RTV Sealant gasket material should be applied in a continuous bead approximately 3 mm (0.120 in.) in diameter. The gasket surfaces should be cleaned with isopropyl alcohol wipes in preparation for sealant application. All mounting holes must be circled. For corner sealing and "T" joint locations, a 3.17 or 6.35 mm (1/8 or 1/4 in.) drop is placed in the center of the gasket contact area. Uncured sealant may be removed with a shop towel. Components should be assembled within 20 minutes and torqued in place within 45 minutes. The usage of a locating dowel is recommended during assembly to prevent smearing material off the location.

ENGINE GASKET SURFACE PREPARATION

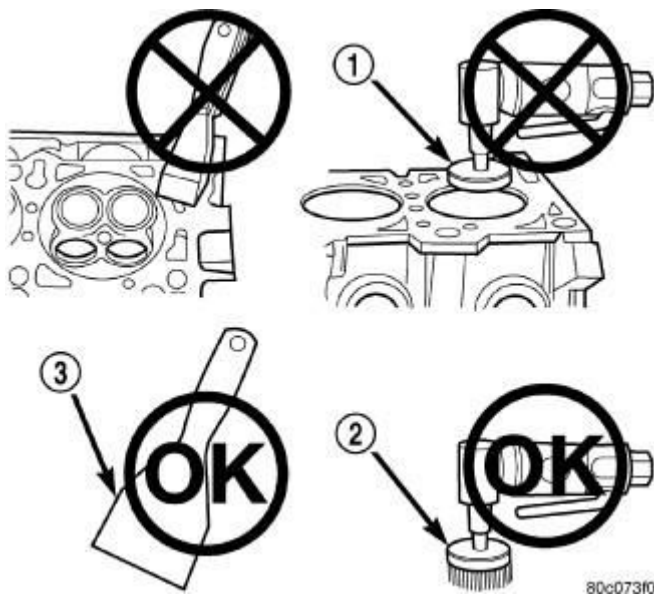


Fig. 4: Proper Tool Usage For Surface Preparation
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- 1 - ABRASIVE PAD
- 2 - 3M ROLOC™ BRISTLE DISC
- 3 - PLASTIC/WOOD SCRAPER

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

Never use the following to clean gasket surfaces:

- Metal scraper.
- Abrasive pad or paper to clean cylinder block and head.
- High speed power tool with an abrasive pad or a wire brush (1).

NOTE: **Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.**

Only use the following for cleaning gasket surfaces:

- Solvent or a commercially available gasket remover
- Plastic or wood scraper (3).
- Drill motor with 3M Roloc™ Bristle Disc (white or yellow) (2).

CAUTION: Excessive pressure or high RPM (beyond the recommended speed), can damage the sealing surfaces. The mild (white, 120 grit) bristle disc is recommended. If necessary, the medium (yellow, 80 grit) bristle disc may be used on cast iron surfaces with care.

SPECIFICATIONS

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

Description	Specification
Type	60° DOHC V-6 24-Valve
Compression Ratio	10.7:1
Lead Cylinder	#1 Right Bank
Firing Order	1-2-3-4-5-6

Description	Metric	Standard
Displacement	3.2 Liters	195 Cubic Inches
Bore and Stroke	91.0 x 83.0 mm	3.583 in. x 3.268 in.

CYLINDER BLOCK

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Description	Specification	
	Metric	Standard
Cylinder Bore Diameter - Grade 1	90.995 mm $\pm$ 0.005 mm	3.5825 in. $\pm$ 0.0002 in.
Cylinder Bore Diameter - Grade 2	91.005 mm $\pm$ 0.005 mm	3.5829 in. $\pm$ 0.0002 in.
Cylinder Bore Out-of-Round (Max.)	0.009 mm	0.00035 in.
Cylinder Bore Cylindricity	0.014 mm	0.0006 in.
Crankshaft Bore Taper* (Max.)	0.006 mm	0.0002 in.
Engine Oil Galley Plug**	0.0 mm - 2.0 mm	0.0 in - 0.0787 in
*Measured over length of bulkhead		
**Measured proud of machined surface		

PISTONS

Description	Specification	
	Metric	Standard
Material	Cast Aluminum Alloy	
Piston Diameter (Metal to Metal) - Grade 1	90.955 mm $\pm$ 0.005 mm	3.5809 in. $\pm$ 0.0002 in.
Piston Diameter (Metal to Metal) - Grade 2	90.965 mm $\pm$ 0.005 mm	3.5813 in. $\pm$ 0.0002 in.
Piston Diameter (Metal to Coating) - Grade 1	90.970 - 91.000 mm	3.5815 - 3.5827 in.
Piston Diameter (Metal to Coating) - Grade 2	90.980 - 91.010 mm	3.5819 - 3.5831 in.
Clearance at Size Location (Metal to Metal)	0.030 - 0.050 mm	0.0012 - 0.0020 in.
Clearance at Size Location (Metal to Coating)	-0.010 - 0.030 mm	-0.0004 - 0.0012 in.
Piston Weight	351.4 - 361.4 grams	12.395 - 12.748 oz.
Piston Pin Offset	0.8 mm	0.031 in.
Piston Ring Groove Diameter - No. 1	83.85 - 83.65 mm	3.301 - 3.293 in.
Piston Ring Groove Diameter - No. 2	82.05 - 81.85 mm	3.230 - 3.222 in.
Piston Ring Groove Diameter - No. 3	84.20 - 84.00 mm	3.315 - 3.307 in.

PISTON PINS

Description	Specification	
	Metric	Standard
Type	Full Floating	
Pin Diameter	21.9985 $\pm$ 0.0015 mm	0.86608 $\pm$ 0.00006 in.
Clearance in Piston	0.003 - 0.012 mm	0.0001 - 0.0005 in.

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Clearance in Rod	0.011 - 0.024 mm	0.0004 - 0.0009 in.
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PISTON RINGS

Description	Specification	
	Metric	Standard
Ring Gap - Number 1 Ring (Top)	0.22 - 0.37 mm	0.009 - 0.015 in.
Ring Gap - Number 2 Ring (Center)	0.27 - 0.42 mm	0.011 - 0.017 in.
Ring Gap - Oil Control Ring (Steel Rails)	0.15 - 0.66 mm	0.006 - 0.026 in.

PISTON RING SIDE CLEARANCE

Description	Specification	
	Metric	Standard
Number 1 Ring (Top)	0.025 - 0.083 mm	0.0010 - 0.0033 in.
Number 2 Ring (Center)	0.030 - 0.078 mm	0.0012 - 0.0031 in.
Oil Control Ring (Steel Rails)	0.061 - 0.210 mm	0.0024 - 0.0083 in.

PISTON RING WIDTH

Description	Specification	
	Metric	Standard
Number 1 Ring (Top)	2.80 - 3.00 mm	0.110 - 0.118 in.
Number 2 Ring (Center)	3.37 - 3.67 mm	0.133 - 0.144 in.
Oil Control Ring (Steel Rails)	1.930 - 2.083 mm	0.076 - 0.082 in.

CONNECTING RODS

Description	Specification	
	Metric	Standard
Bearing Clearance (With Crush)	0.023 - 0.064 mm	0.0009 - 0.0025 in.
Side Clearance	0.070 - 0.370 mm	0.0028 - 0.0146 in.
Side Clearance (Max.)	0.370 mm	0.0146 in.
Piston Pin Bore Diameter	22.016 ± 0.005 mm	0.8668 ± 0.0002 in.
Bearing Bore Out of Round (Max.)	0.008 mm	0.0003 in.
Total Weight (Less Bearing)	512.6 ± 8 grams	18.08 ± 0.28 oz.

CRANKSHAFT MAIN BEARING JOURNALS

Description	Specification	
	Metric	Standard
Diameter	67.996 ± 0.011 mm	2.677 ± 0.0004 in.
Bearing Clearance	0.024 - 0.050 mm	0.0009 - 0.0020 in.
Bearing Clearance (Max.)	0.050 mm	0.0020 in.
Out of Round (Max.)	0.005 mm	0.0002 in.

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Taper (Max.)	0.005 mm	0.0002 in.
End Play	0.050 - 0.290 mm	0.0020 - 0.0114 in.
End Play (Max.)	0.290 mm	0.0114 in.

CONNECTING ROD JOURNALS

Description	Specification	
	Metric	Standard
Diameter	59.0 ± 0.009 mm	2.3228 ± 0.0035 in.
Bearing Clearance	0.023 - 0.064 mm	0.0009 - 0.0025 in.
Out of Round (Max.)	0.005 mm	0.0002 in.
Taper (Max.)	0.005 mm	0.0002 in.

CAMSHAFT

Description	Specification	
	Metric	Standard
Bore Diameter - No. 1 Cam Towers	32.020 - 32.041 mm	1.2606 - 1.2615 in.
Bore Diameter - No. 2, 3, 4 Cam Towers	24.020 - 24.041 mm	0.9457 - 0.9465 in.
Bearing Journal Diameter - No. 1	31.976 - 31.995 mm	1.2589 - 1.2596 in.
Bearing Journal Diameter - No. 2, 3, 4	23.977 - 23.996	0.9440 - 0.9447 in.
Bearing Clearance - No. 1	0.025 - 0.065 mm	0.00010 - 0.0026 in.
Bearing Clearance - No. 2, 3, 4	0.024 - 0.064 mm	0.0009 - 0.0025 in.
End Play	0.114 - 0.214 mm	0.004 - 0.008 in.

VALVE TIMING-INTAKE VALVES

Description	Specification
Opens	5.4° (ATDC)
Closes	79.4° (ABDC) or 259.4° (ATDC)
Duration	254°
Centerline	131.4°
Note: Units are in crank degrees, using 0.1524 mm (0.006 in.) valve lift as the threshold.	

VALVE TIMING-EXHAUST VALVES

Description	Specification
Opens	84° (BBDC) or 264° (BTDC)
Centerline	129°
Closes	11° (ATDC)
Duration	275°
Valve Overlap	56°
Note: Units are in crank degrees, using 0.1524 mm (0.006 in.) valve lift as the threshold.	

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CYLINDER HEAD

Description	Specification	
	Metric	Standard
Gasket Thickness* (Compressed)	0.52 - 0.62 mm	0.020 - 0.024 in.
Flatness (Head Gasket Surface)	0.09 mm	0.0035 in.
Valve Seat Angle	44.75° ± 0.25° from the valve guide axis	
Valve Seat Runout (relative to the valve guide axis) - Intake and Exhaust	0.050 mm	0.002 in.
Intake Valve Seat Width	0.95 - 1.25 mm	0.04 - 0.05 in.
Exhaust Valve Seat Width	1.36 - 1.66 mm	0.054 - 0.065 in.
Guide Bore Diameter (Std.)	6.00 - 6.02 mm	0.236 - 0.237 in.
Valve Guide Height** - Intake and Exhaust	16.05 - 16.55 mm	0.632 - 0.652 in.
*Measured at the fire ring, not at the outer edge		
**Measured from cylinder head valve spring seat surface to top of guide		

VALVES

Description	Specification	
	Metric	Standard
Face Angle	45.25° ± 0.25°	
Head Diameter - Intake	37.3 ± 0.100 mm	1.469 ± 0.004 in.
Head Diameter - Exhaust	30.0 ± 0.100 mm	1.181 ± 0.004 in.
Length-Intake (Overall)	115.269 ± 0.23 mm	4.538 ± 0.009 in.
Length-Exhaust (Overall)	115.6 ± 0.23 mm	4.551 ± 0.009 in.
Stem Diameter - Intake	5.968 ± 0.009 mm	0.2350 ± 0.0004 in.
Stem Diameter - Exhaust	5.961 ± 0.009 mm	0.2347 ± 0.0004 in.
Stem-to-Guide Clearance - Intake (New)	0.023 - 0.061 mm	0.0009 - 0.0024 in.
Stem-to-Guide Clearance - Exhaust (New)	0.030 - 0.068 mm	0.0012 - 0.0027 in.
Stem-to-Guide Clearance-Intake (Max., Rocking Method)	0.29 mm	0.011 in.
Stem-to-Guide Clearance - Exhaust (Max., Rocking Method)	0.37 mm	0.015 in.
Valve Lift-Intake (Zero Lash)	10.6 mm	0.417 in.
Valve Lift-Exhaust (Zero Lash)	9.67 mm	0.381 in.
Valve Stem Tip Height* - Intake	52.4 - 53.5 mm	2.063 - 2.106 in.
Valve Stem Tip Height* - Exhaust	51.8 - 52.9 mm	2.039 - 2.083 in.
*Valve tip to aluminum spring seat boss		

VALVE SPRING

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Description	Specification	
	Metric	Standard
Free Length - Intake AND Exhaust (Approx.)	52.5 mm	2.067 in.
Spring Force - Intake AND Exhaust (Valve Closed)	295 ± 13 N @ 40.0 mm	66 ± 3 lbs. @ 1.57 in.
Spring Force - Intake (Valve Open)	699 ± 31 N @ 10.6 mm	150.4 ± 7 lbs. @ 0.4173 in.
Spring Force - Exhaust (Valve Open)	663 ± 31 N @ 9.67 mm	149 ± 7 lbs. @ 0.3807 in.
Number of Coils - Intake AND Exhaust	9.35	
Wire Diameter - Intake AND Exhaust	3.18 x 3.99 mm (ovate)	0.125 x 0.157 in. (ovate)
Installed Height - Intake AND Exhaust (Spring seat top to bottom of retainer)	40.0 mm	1.575 in.

OIL PRESSURE

Description	Specification	
	Metric	Standard
(Note: At Normal Operating Temperatures)		
Pressure @ Curb Idle Speed*	34.7 kPa Min.	5 psi Min.
Pressure @ 600 - 1200 RPM	34.7 (warm) - 958.0 (cold) kPa	5 (warm) - 139 (cold) psi
Pressure @ 1201 - 3500 RPM	206.8 (warm) - 958.0 (cold) kPa	30 (warm) - 139 (cold) psi
Pressure @ 3501 - 6400 RPM	427.0 (warm) - 958.0 (cold) kPa	62 (warm) - 139 (cold) psi
*CAUTION: If oil pressure is zero at idle, DO NOT run engine at 3000 RPM.		

TORQUE SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.	NEW FASTENER
Camshaft Chain Tensioner (Primary) - M6 T30	12	-	106	
Camshaft Chain Guide (Primary) - M6 T30	12	-	106	
Camshaft Chain Idler Sprocket - M8 T45	26	18	-	
Camshaft Chain LH Tensioner (Secondary) - M6 T30	12	-	106	
Camshaft Chain LH Guide (Secondary) - M6 T30	12	-	106	
Camshaft Chain RH Tensioner (Secondary) - M6 T30	12	-	106	
Camshaft Chain RH Guide				

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(Secondary) - M6 T30	12	-	106	
Camshaft Position (CMP) Sensor to Cylinder Head - M6 T30	9	-	80	
Camshaft Bearing Cap - M6 T30	10	-	89	
Connecting Rod Cap - M9 Bolts	20 + 90° Turn	15 + 90° Turn	-	
Coolant Pump to Engine Timing Cover - M10 Bolt	55	40	-	
Crankshaft Target Wheel to Counterweight - M6 T30	11	-	97	
Crankshaft Outer Main Bearing Cap and Windage Tray - M8 Bolts	21 + 90° Turn	16 + 90° Turn	-	
Crankshaft Inner Main Bearing Cap - M11 Bolts	20 + 90° Turn	15 + 90° Turn	-	
Crankshaft Side Main Bearing Cap (Tie Bolt) - M8 Bolts	30	-	266	
Crankshaft Vibration Damper - M16 Bolt	40 + 105° Turn	30 + 105° Turn	-	
Crankshaft Position (CKP) Sensor to Engine Block - M6 Bolt	12	-	106	
Crankshaft Rear Oil Seal Retainer - M6 T30	10	-	89	
Cylinder Head Oil Galley Plugs	18	9	-	
Cylinder Head Oil Restrictor - M8 Plug	15	-	133	
Cylinder Head to Engine Block - M12 Bolts in Sequence	See INSTALLATION Procedure			
Cylinder Head Cover - M6 Bolts	12	-	106	
Catalytic Converter to Cylinder Head Flange Bolts - M8 Bolts	23	17	-	
Flexplate to Crankshaft - M10 Bolts	95	70	-	
Left Engine Mount Bracket to Transaxle	105	77	-	
Left Engine Mount to Strut Tower	64	47	-	
Left Engine Mount to Mount Bracket	185	136	-	
Left Engine Mount to Frame Rail	105	77	-	
Front Right Engine Mount Bracket to Timing Cover				
M8	25	18	-	
M12	72	53	-	
Right Engine Mount to Engine Mount Bracket	72	53	-	
Right Engine Mount Isolator to Frame Rail	65	48	-	

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Right Engine Mount Isolator to Strut Tower	65	48	-	
Fuel Rail to Lower Intake Manifold - M6 Bolts	7	-	62	
Ground Cable to Transaxle	12	-	106	
Heater Core Supply Tube to Cylinder Head - M8 Bolt	12	-	106	
Idle Pulley to Engine Timing Cover - Accessory Drive Bolts	27	20	-	
Ignition Capacitor to Cylinder Head - M6 Bolts	10	-	89	
Ignition Coil to Cylinder Head Cover - M6 Bolts	8	-	71	
Intake Manifold (Upper) - M6 Bolts	10	-	89	
Intake Manifold (Lower) - M6 Bolts	12	-	106	
Intermediate Shaft Support Bracket	23	17	-	
Knock Sensor to Engine Block - M8 T40	21	16	-	
Oil Control Valve - Cam Phaser M18	150	111	-	
Oil Pan to Engine Block	23	17	-	
Lower Oil Pan to Upper Oil Pan	9	-	80	
Transaxle to Upper Oil Pan - M10 Bolts	50	37	-	
Oil Cooler to Oil Filter Housing Screws	12	-	106	
Oil Pan to Rear Seal Retainer Bolts	12	-	106	
Oil Pan Drain - Plug M14	23	17	-	
Oil Pressure Sensor to Oil Filter Housing	23	17	-	
Oil Temperature Sensor to Oil Filter Housing	30	22	-	
Piston Oil Cooler Jet to Engine Block - M5	6	-	53	
Oil Filter Housing/Oil Cooler to Engine Block - M6 Bolts	12	-	106	
Oil Filter Housing Cap	25	18	-	
Oil Pump to Engine Block - M6 Bolts	12	-	106	
Oil Level Indicator to Engine Block - M10 Bolt	35	26	-	
Oil Level Indicator to Cylinder Head - M6 Bolt	17	-	151	

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Oil Pump Sprocket - M8 T45	26	18	-	
Oil Pump Pick Up Tube Bracket to Windage Tray - M6 Bolt	12	-	106	
Oil Pump Pick Up Tube to Oil Pump - M6 Bolt	12	-	106	
Oxygen Sensor to Exhaust Pipe - M18	50	37	-	
PCV Valve - M5 T25	4	-	35	
Spark Plug to Cylinder Head - M12	18	13	-	
Starter Mounting - M10 Bolts	47	35	-	
Tensioner to Engine Timing Cover - Accessory Drive M10 Bolt	55	41	-	
Throttle Body - M6 Bolts	9	-	80	
Engine Timing Cover - M6 Bolts	12	-	106	
Engine Timing Cover - M8 Bolt	25	18	-	
Engine Timing Cover - M10 Bolts	55	41	-	
Transaxle to Engine Block - M10 Bolts	50	37	-	
Torque Converter - M8 Bolts	95	70	-	
Upper Intake Manifold Support Bracket to Cylinder Head - M8 Bolt	17	-	177	
Upper Intake Manifold Support Bracket to Upper Intake Manifold - M6 Nuts	9	-	80	
Variable Valve Timing Solenoid to Cylinder Head Cover - M5 T25	4	-	35	
Wire Harness Retainer Bracket to LH Cylinder Head - M6 T30	10	-	89	
Rear Transmission Strut to Crossmember	150	111	-	
Rear Transmission Strut mount to Crossmember Bracket Nuts	73	54	-	
Rear Transmission Strut to Transmission Pivot	220	162	-	
Rear Transmission Pivot	160	118	-	

*NEW FASTENER: Do not reuse these fasteners. If removed, a new fastener must be installed and tightened to the proper specification torque specification.

REMOVAL**REMOVAL**

CAUTION: If the original engine has experienced a catastrophic failure or an

individual failure with the piston, cylinder bore, engine block, valve or valve seat, the intake manifold **MUST** be replaced with a new manifold.

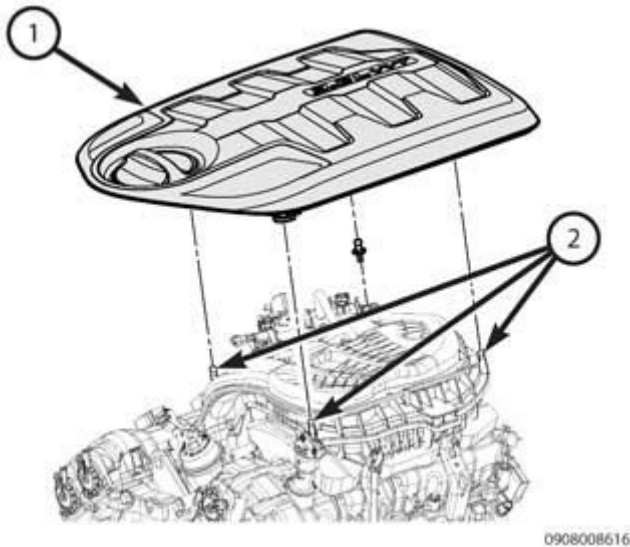


Fig. 5: Engine Cover & Ball Studs
 Courtesy of CHRYSLER GROUP, LLC

1. Remove the engine cover (1).
2. Perform the fuel system pressure release procedure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE** .
3. Remove the battery. Refer to **BATTERY, REMOVAL** .

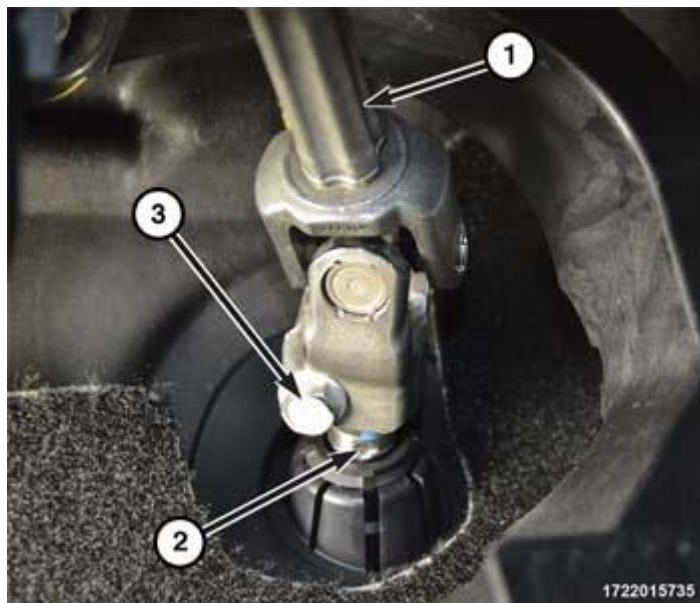


Fig. 6: Identifying Intermediate Shaft, Pinch Bolt And Steering Gear Pinion Shaft
 Courtesy of CHRYSLER GROUP, LLC

4. Remove the pinch bolt (3) from the intermediate shaft (1).
5. Separate the intermediate shaft from the steering gear shaft (2).

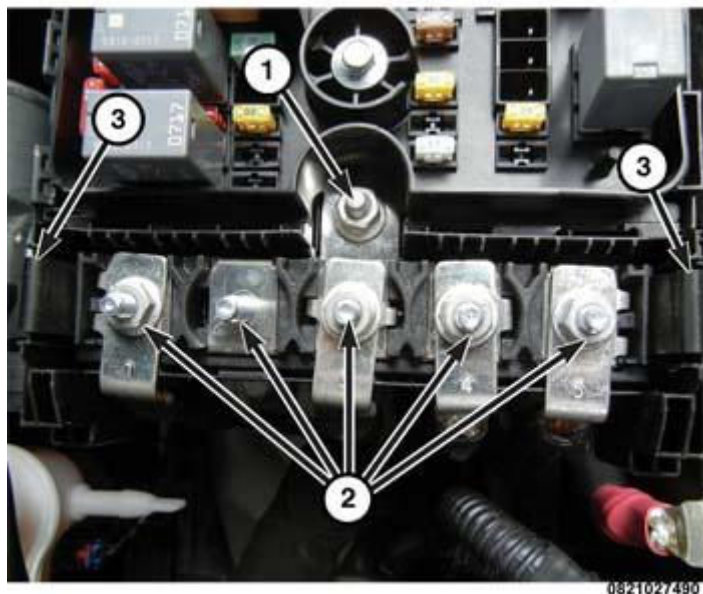


Fig. 7: Identifying Power Distribution Z-Case Fuse Array, Tabs & Nuts
Courtesy of CHRYSLER GROUP, LLC

6. Remove the cover from the Power Distribution Center (PDC).
7. Remove the nuts (2) from Z case fuse array and move the eyelet connectors off and away from the Z case fuse array.

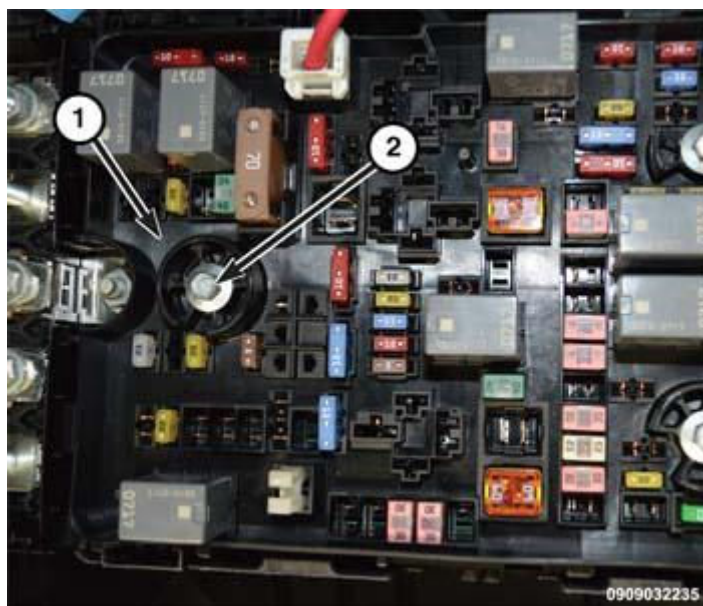


Fig. 8: PDC & Engine Harness Connector
Courtesy of CHRYSLER GROUP, LLC

8. Remove the bolt (2) that secures the engine harness connector to the PDC (1).
9. Release the plastic clips that secure the PDC to the lower cover.
10. Using care, lift the PDC away from the lower cover.
11. Separate the engine harness from the base of the PDC and position aside.

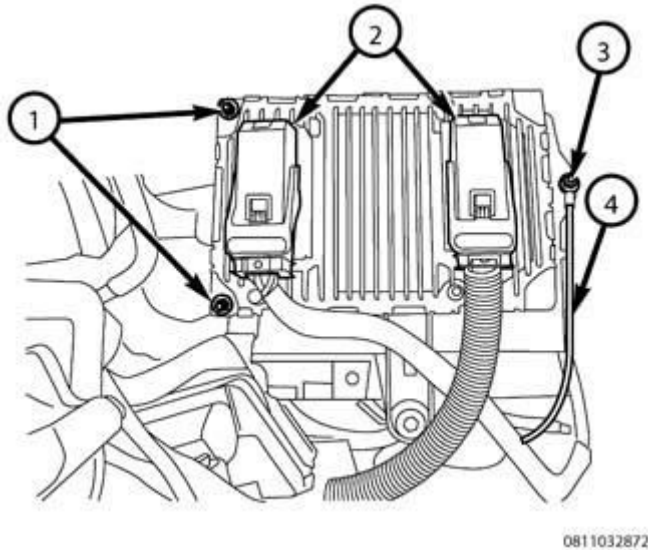


Fig. 9: PCM, Connectors, Strap & Nuts
Courtesy of CHRYSLER GROUP, LLC

12. Disconnect the Powertrain Control Module (PCM) harness connectors (2).
13. Remove the nut (3) that secures the ground strap (4) to the PCM.
14. Recover the refrigerant from the A/C system. Refer to **PLUMBING, STANDARD PROCEDURE** .
15. Remove the purge control valve from the intake manifold (Refer to **VALVE, PURGE CONTROL** /Removal).

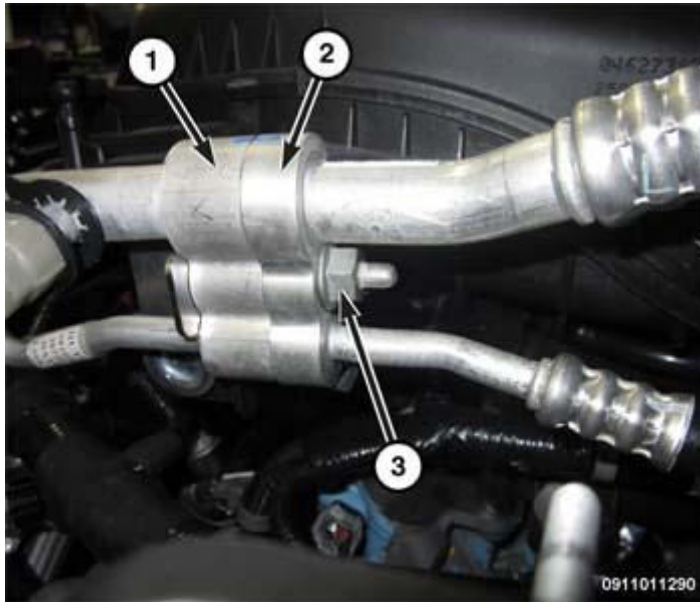


Fig. 10: IHX, Suction/Liquid Line Manifold & Nut
Courtesy of CHRYSLER GROUP, LLC

16. Remove the nut (3) and separate the suction/liquid line manifold (2) from the Internal Heat Exchanger (IHX) (1).
17. Separate the air cleaner body from the air cleaner tray. Refer to **BODY, AIR CLEANER, REMOVAL**.
18. Remove the air resonator. Refer to **RESONATOR, AIR CLEANER, REMOVAL**.

NOTE: Removal of the Intake Resonator will allow access to the rear O2 Sensors and the upper Catalytic Converter bolts.

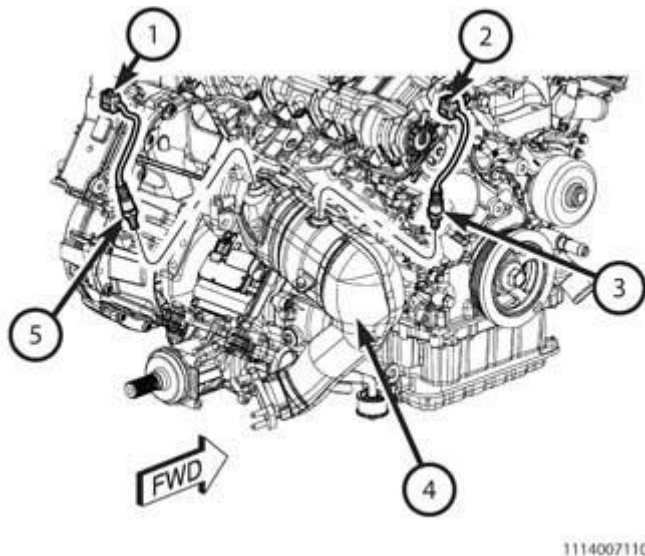


Fig. 11: Removing/Installing Oxygen Sensors
Courtesy of CHRYSLER GROUP, LLC

19. Disconnect both rear side O2 Sensor harness connectors (1, 2).

NOTE: The catalytic converter is removed from under the vehicle.

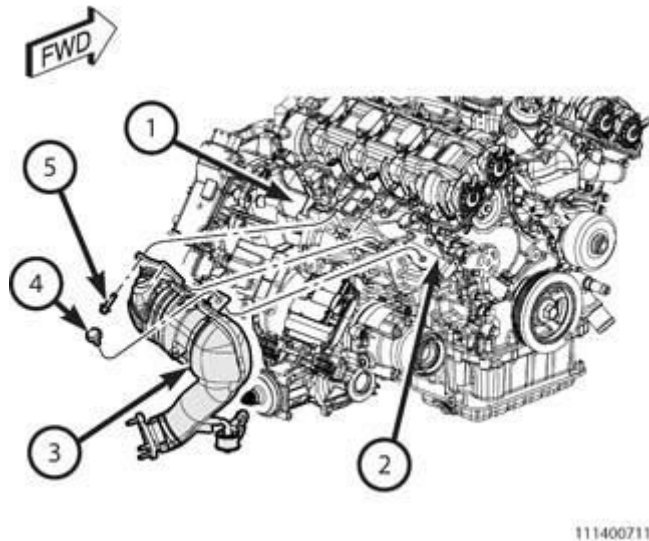


Fig. 12: Removing/Installing Catalytic Converter
Courtesy of CHRYSLER GROUP, LLC

20. Remove the rear side catalytic converter support bracket bolt (4).
21. Remove the catalytic converter upper flange bolts (5).

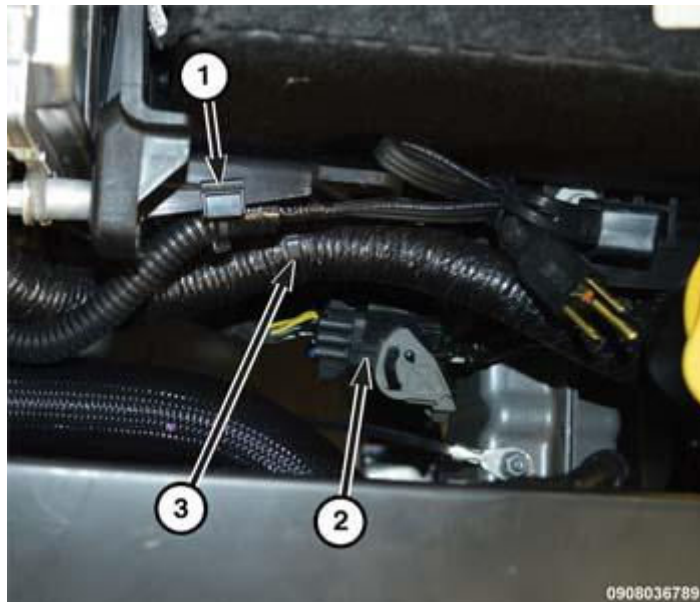


Fig. 13: Block Heater Electrical Cord Clip, Engine Harness Connector & Engine Wiring Harness Retainer
Courtesy of CHRYSLER GROUP, LLC

22. If equipped, separate the block heater electrical cord clip (1) from the battery tray.
23. Separate the engine wiring harness retainer (3) from the battery tray.
24. Separate the engine harness connector (2) from the battery tray.

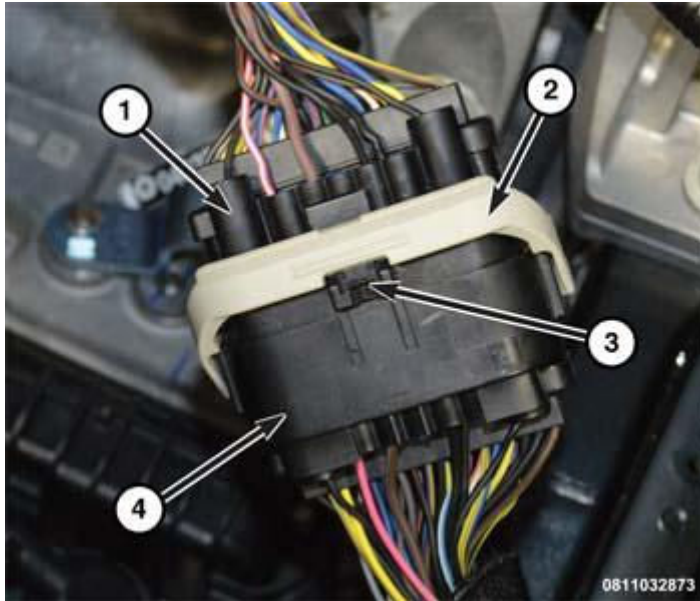


Fig. 14: Body Side Harness Connector & Engine Side Harness Connector
Courtesy of CHRYSLER GROUP, LLC

25. Disconnect the engine side harness connector (4) from the body side harness connector (1).

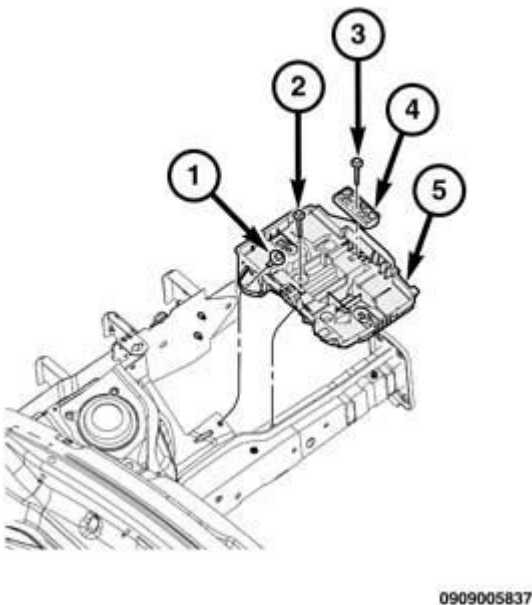
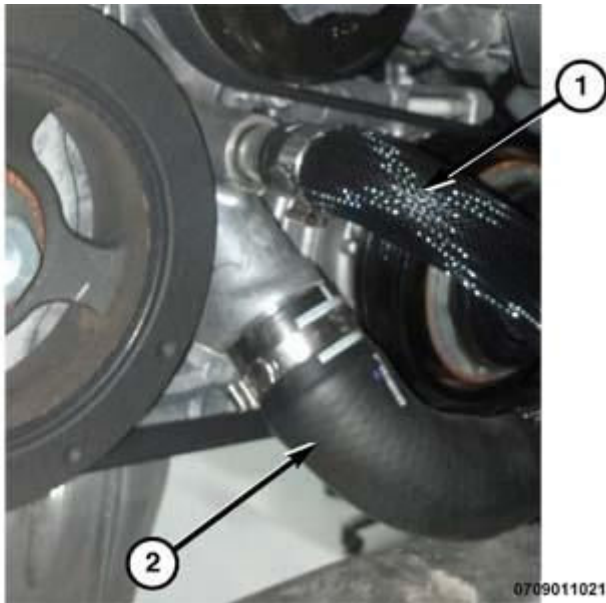


Fig. 15: Belly Pan & Bolts**Courtesy of CHRYSLER GROUP, LLC**

26. Remove the upper battery tray bolts (1, 2).
27. Raise and support the vehicle.
28. Remove the belly pan (3). Refer to **BELLY PAN, REMOVAL** .
29. Drain the cooling system. Refer to **STANDARD PROCEDURE** .
30. Partially lower the vehicle.
31. Remove the front bumper fascia. Refer to **FASCIA, FRONT, REMOVAL** .
32. Remove both front wheel assemblies. Refer to **REMOVAL** .
33. Remove both axle shafts. Refer to **REMOVAL** .
34. Remove both front wheel house splash shields. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL** .

**Fig. 16: Installing Lower Radiator Hose & Heater Core Return Hose****Courtesy of CHRYSLER GROUP, LLC**

35. Remove the heater hose (1) from the water pump.
36. Remove the lower radiator hose (2) from the water pump.

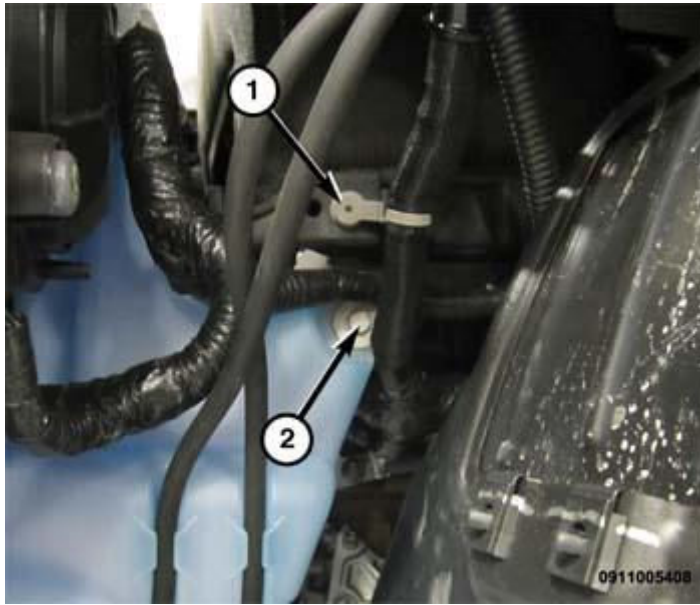
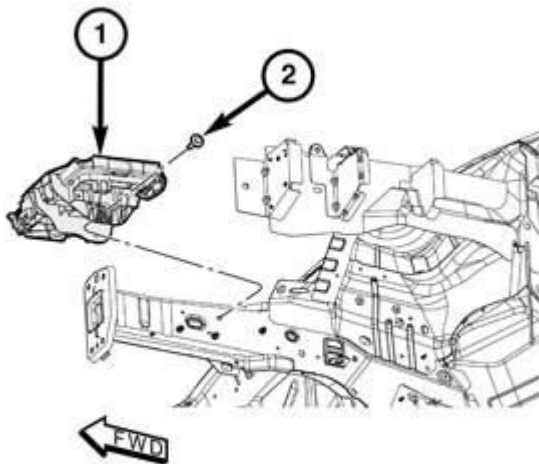


Fig. 17: Windshield Washer Reservoir-To-Battery Tray Bolt
Courtesy of CHRYSLER GROUP, LLC

37. Separate the wiring harness retainer (1) from the battery tray.
38. Remove the bolt (2) that secures the washer reservoir bottle to the battery tray.

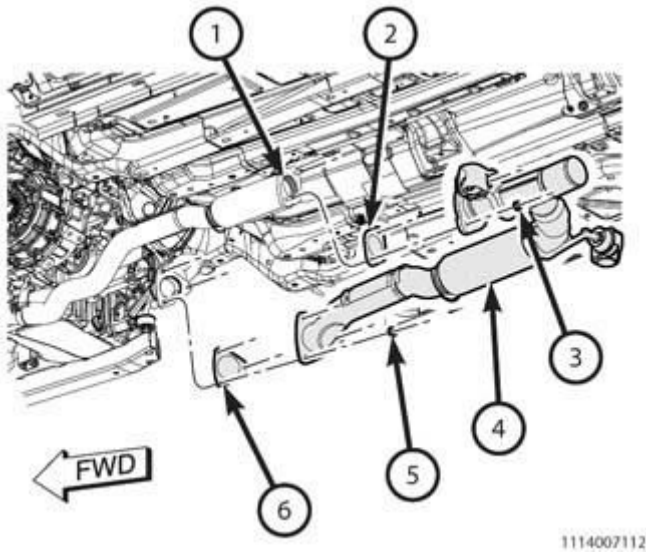


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Fig. 18: Battery Tray & Bolt
Courtesy of CHRYSLER GROUP, LLC

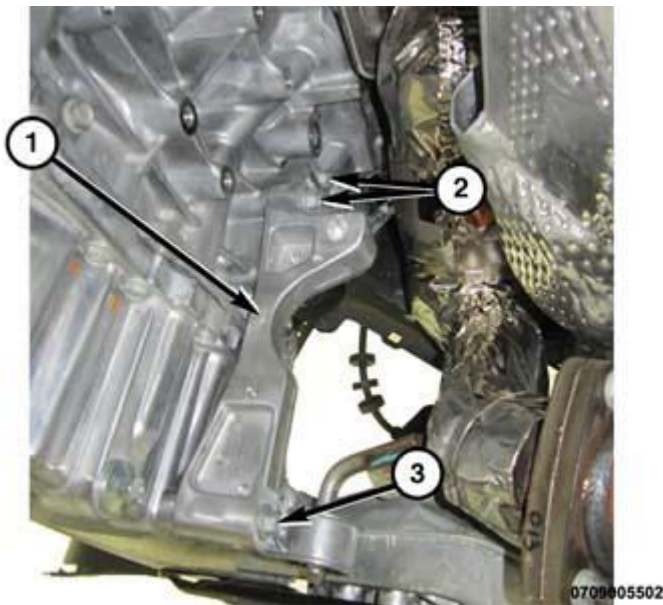
39. Remove the outer battery tray bolt (2).

40. Raise and secure the vehicle.
41. Remove the exhaust crossunder pipe. Refer to **PIPE, EXHAUST CROSSUNDER, REMOVAL** .

**Fig. 19: Y-Pipe**

Courtesy of CHRYSLER GROUP, LLC

42. Separate the Y-pipe (4) from the rear catalytic converter.

**Fig. 20: Removing/Installing Lower Intermediate Shaft Support Bracket**

Courtesy of CHRYSLER GROUP, LLC

NOTE: FWD

intermediate shaft bracket shown in illustration.

AWD

intermediate shaft bracket similar.

43. If equipped, remove the Power Transfer Unit (PTU). Refer to **REMOVAL** .
44. Remove the catalytic converter from its mount and position aside.
45. Remove the bolts (2, 3) that secure the intermediate shaft support bracket (1).
46. Remove the rear catalytic converter from the vehicle.

NOTE: **If the transmission is to be separated from the engine, removal of the torque converter bolts and lower transmission mounting bolts are best accomplished at this time.**

Replacement Components

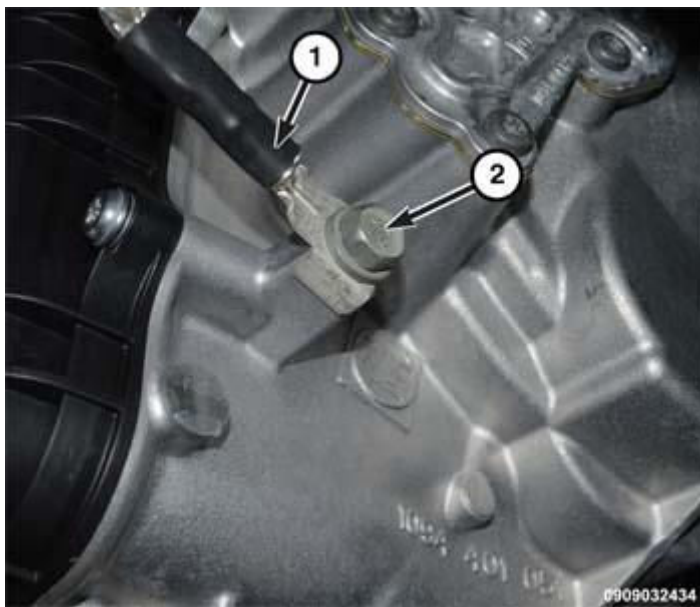


Fig. 21: Ground Strap & Bolt
Courtesy of CHRYSLER GROUP, LLC

47. Remove the bolt (2) that secures the ground wire (1) to the transmission.

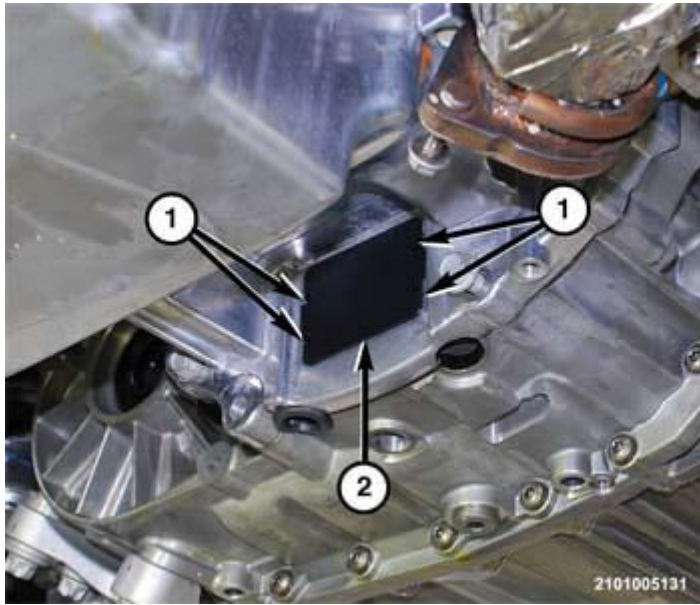


Fig. 22: Bellhousing Access Door
Courtesy of CHRYSLER GROUP, LLC

48. If required, remove the transaxle torque converter housing dust cover (2) and the lower rubber plugs.

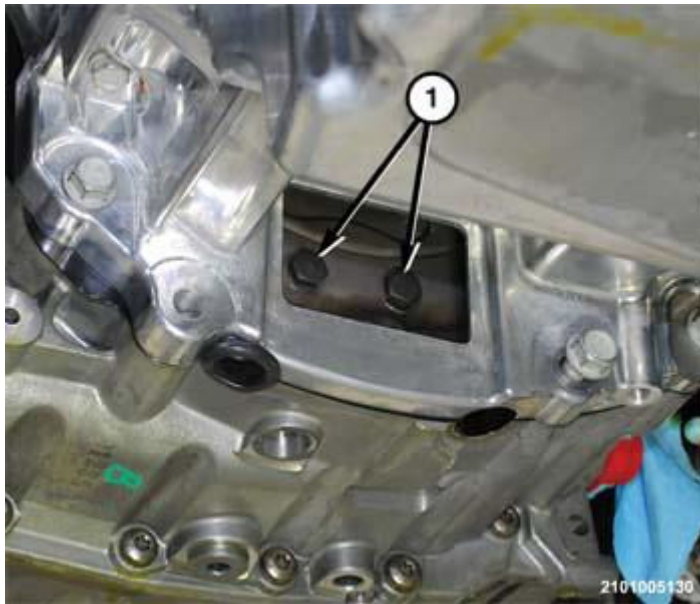


Fig. 23: Torque Converter Bolts
Courtesy of CHRYSLER GROUP, LLC

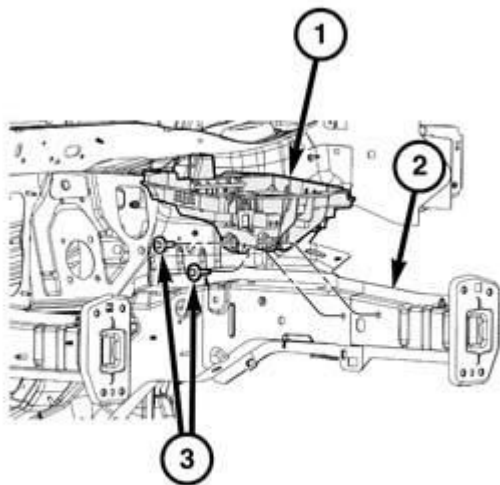
49. If required, remove the torque converter-to-flexplate bolts (1).
50. If required, remove the lower engine oil pan-to-transmission bolts.



Fig. 24: Transmission Cooler Lines

Courtesy of CHRYSLER GROUP, LLC

51. Disconnect the oil cooler lines (1) from transmission using the (special tool #9546, Disconnect Tool).
52. Remove the front suspension crossmember. Refer to **CROSSMEMBER, FRONT SUSPENSION, REMOVAL**.



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Fig. 25: Identifying Battery Tray, Inner Frame Rail & Bolts

Courtesy of CHRYSLER GROUP, LLC

53. Remove the lower bolts (3) that secure the battery tray (1) to the upper frame (2).
54. Lower the vehicle.
55. Remove the battery tray from the vehicle.
56. If required, remove the electric vacuum pump and mounting bracket. Refer to **PUMP, ELECTRIC VACUUM, REMOVAL** .

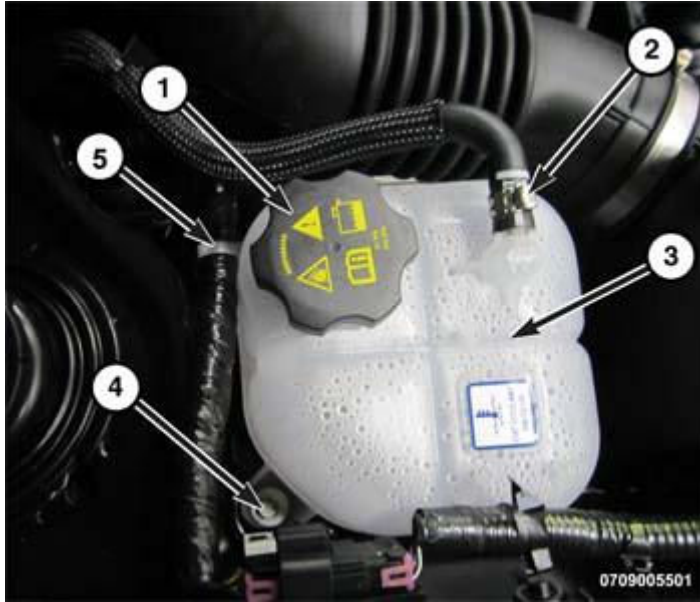
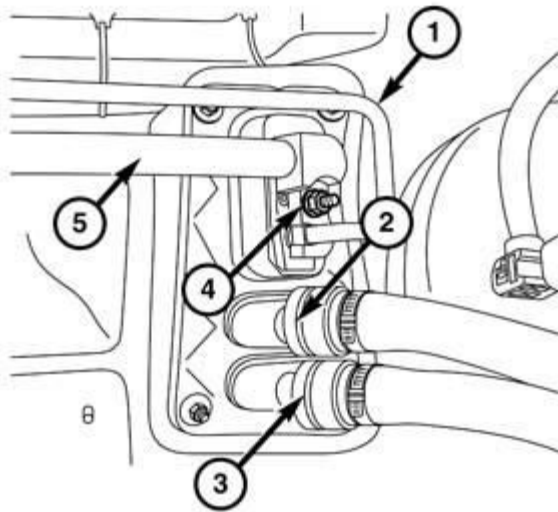


Fig. 26: Coolant Bottle & Components
Courtesy of CHRYSLER GROUP, LLC

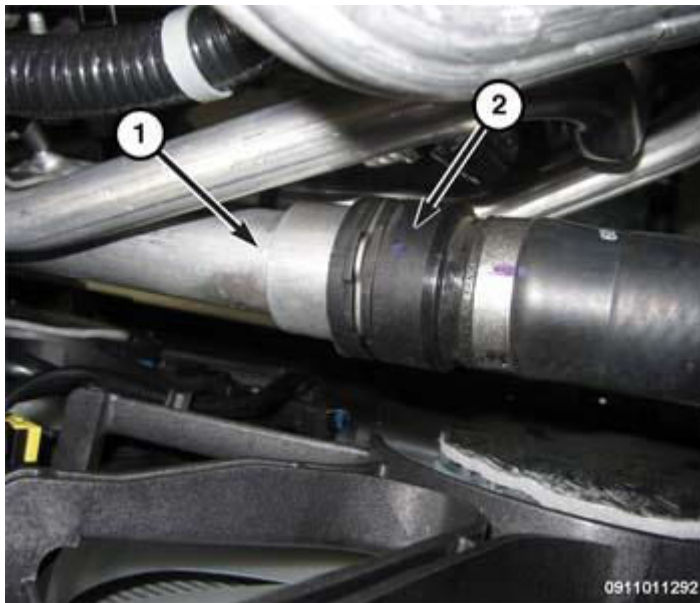
57. Remove the coolant return line (2) from the coolant bottle (3).



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Fig. 27: Refrigerant Lines, Heater Core Hoses & Fastener
Courtesy of CHRYSLER GROUP, LLC

- 58. Disconnect the heater core supply hose (2).
- 59. Disconnect the heater core return hose (3).



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Fig. 28: Radiator Inlet Pipe & Upper Radiator Hose
Courtesy of CHRYSLER GROUP, LLC

- 60. Separate the upper radiator hose (2) from the radiator inlet pipe (1).

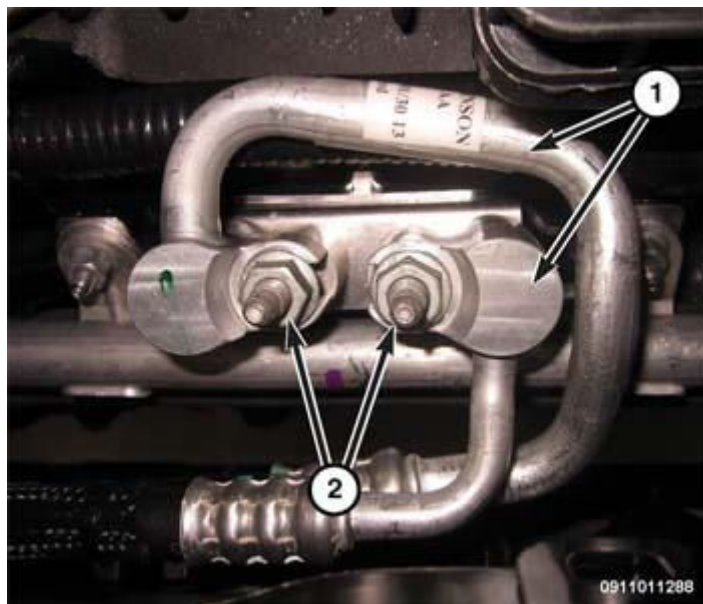


Fig. 29: A/C-To-IHX Lines

Courtesy of CHRYSLER GROUP, LLC

61. Remove the nuts that secure the A/C lines (1) to the IHX.

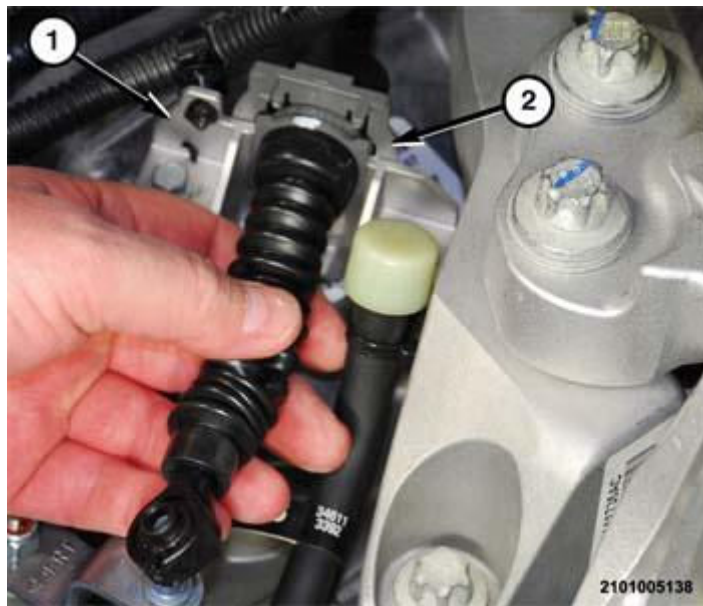


Fig. 30: View Of Shift Cable Housing & Mount Bracket

Courtesy of CHRYSLER GROUP, LLC

62. Disconnect the shift cable end from the manual valve lever on the transmission.
63. Release the locks holding the shift cable housing (2) to the mount bracket (1) on the transmission.
64. Separate the shift cable from the mount bracket.
65. Disconnect the fuel line from the fuel rail inlet. Refer to **FITTING, QUICK CONNECT**.



Fig. 31: Ground Wire, Nut & Right Side Upper Frame
Courtesy of CHRYSLER GROUP, LLC

66. Remove the nut (2) that secures the ground wire (1) to the right side upper frame (3).

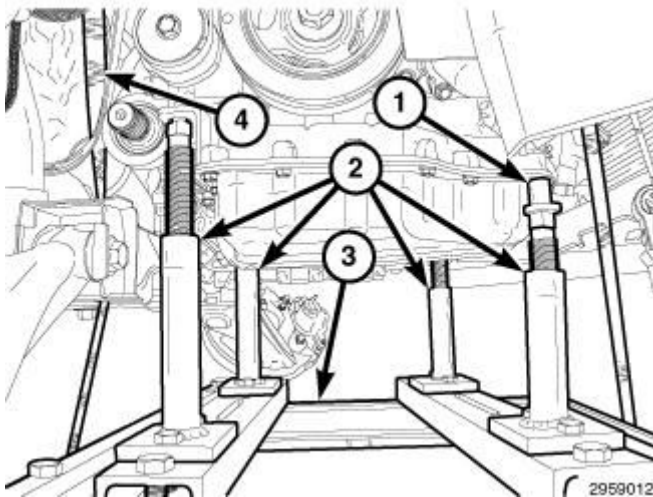


Fig. 32: Adapter, Engine Support Cradle, Power Train Dolly & Safety Straps
Courtesy of CHRYSLER GROUP, LLC

67. Raise and position vehicle height to allow the Dolly, Power Train (special tool #6135, Dolly, Power Train) (3) and the Cradle, Engine Support (special tool #6710A, Cradle, Engine Support) (2) to be installed under the engine/transmission assembly.
68. Loosen the cradle assembly from the power train dolly to allow for adjustment.
69. Position the Adapter (special tool #6848-3, Adapter) to the engine locating holes (1) on the engine block and oil pan rail.

70. Lower the vehicle and position the cradle/dolly fixture until the engine is resting on the adapters.
71. Tighten the engine cradle adapter to the cradle frame.
72. Secure the engine/transmission assembly to the dolly/cradle with safety straps (4).
73. Using care, lower the vehicle so that all of the weight of the engine and transmission is on the cradle/dolly fixture.

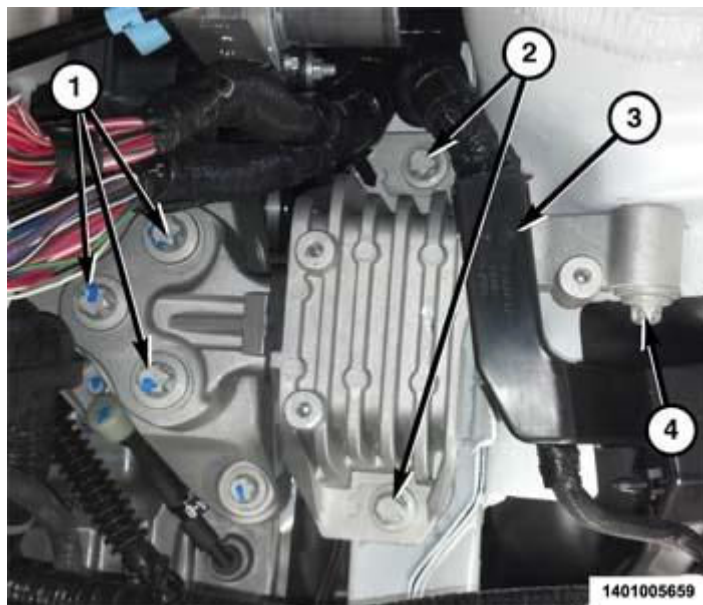


Fig. 33: Left Engine Mount-To-Transmission Mount Bracket Bolts
Courtesy of CHRYSLER GROUP, LLC

74. Remove the bolts (1) that secure the left engine mount to transmission mount bracket.

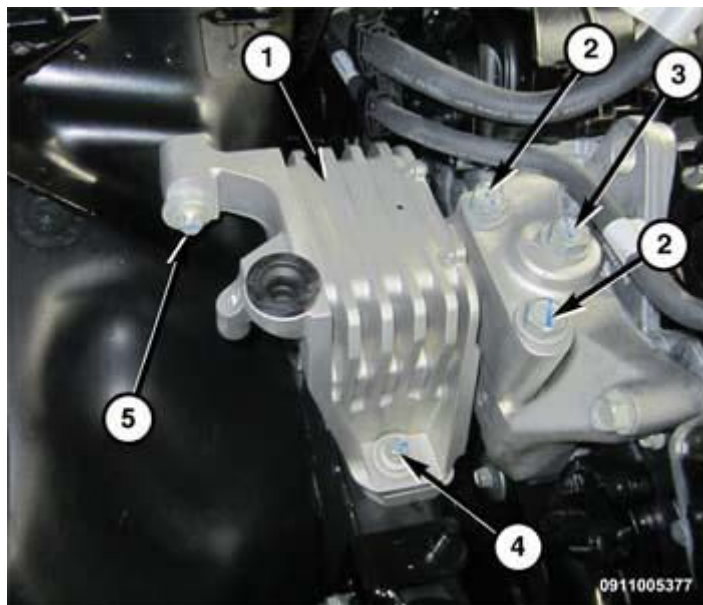


Fig. 34: Removing/Installing Right Engine Mount Assembly

Courtesy of CHRYSLER GROUP, LLC

75. Remove the bolts (2, 3) that secure the right engine mount to engine mount bracket.
76. Slowly raise the vehicle in small increments while inspecting each interval for potential engine or transmission contact to vehicle components.
77. Move the cradle/dolly fixture as necessary to allow for removal clearance.

NOTE: Perform the following steps to remove the transmission from the engine if required:

78. Position and secure a transmission jack under the transmission.
79. Remove the starter. Refer to **STARTER, REMOVAL**.

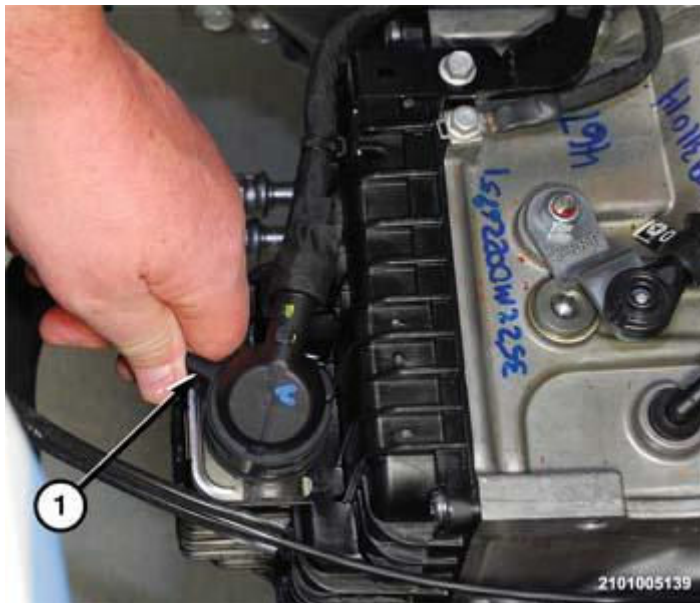
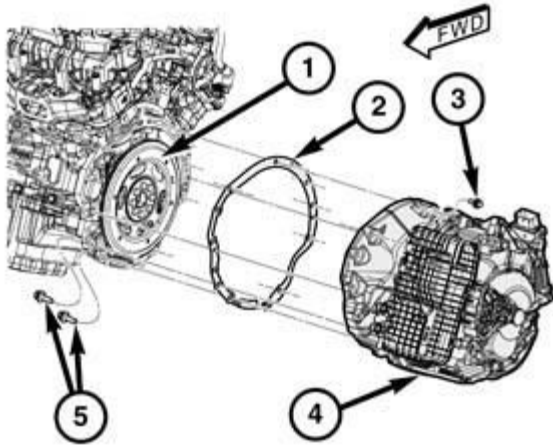


Fig. 35: Transmission Valve Body Solenoid Connector

Courtesy of CHRYSLER GROUP, LLC

80. Rotate the lock lever (1) counterclockwise on the transmission harness connector.
81. Separate the transmission harness connector from the transmission.



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Fig. 36: Removing/Installing Bellhousing
Courtesy of CHRYSLER GROUP, LLC

82. Remove the remaining transmission upper bellhousing-to-block bolts (3).
83. Separate the transmission (4) and the spacer plate (2) from the engine.
84. Remove the bolts that secure the drive plate (1) to the crankshaft.

NOTE: Perform the following steps to remove the engine from the cradle/dolly fixture if required:



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Fig. 37: Engine Assembly On Cradle/Dolly Fixture
Courtesy of CHRYSLER GROUP, LLC

85. If required, remove all the necessary components from the engine.
86. Position an engine hoist to the engine assembly (1).
87. Affix a chain to the engine.
88. Using care, separate the engine from the cradle/dolly fixture (2, 3).
89. Secure the engine to a engine stand.

INSTALLATION

INSTALLATION

CAUTION: If the original engine has experienced a catastrophic failure or an individual failure with the piston, cylinder bore, engine block, valve or valve seat, the intake manifold **MUST** be replaced with a new manifold.

NOTE: If installing a replacement engine, transfer all the components to the replacement engine.

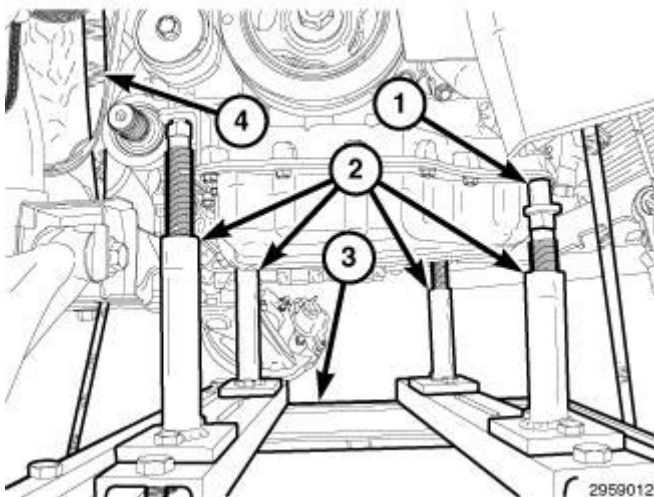
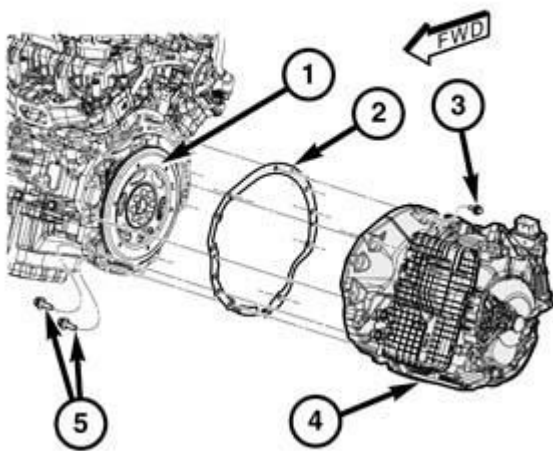


Fig. 38: Adapter, Engine Support Cradle, Power Train Dolly & Safety Straps
Courtesy of CHRYSLER GROUP, LLC

1. Position the engine to the Dolly, Power Train (special tool #6135, Dolly, Power Train) (3) and the Cradle, Engine Support (special tool #6710A, Cradle, Engine Support).
2. If required, loosen the cradle assembly from the power train dolly to allow for adjustment.
3. Position the Adapter (special tool #6848-3, Adapter) post (2) to the engine locating holes (1) on the engine block and oil pan rail.

4. Lower the engine until it is resting on the posts of the adapters.
5. If required, tighten the engine cradle adapter to the cradle frame.
6. Secure the engine assembly to the dolly/cradle with safety straps (4).

NOTE: Perform the following steps to install the transmission to the engine if required:



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Fig. 39: Removing/Installing Bellhousing
Courtesy of CHRYSLER GROUP, LLC

7. If removed, position the flexplate (1) to the crankshaft. Tighten the bolts to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
8. Position the spacer plate (2) to the engine.
9. Align the transmission (4) to the engine.
10. Install the upper transmission to engine bolts (3). Tighten the bolts to the proper specification. Refer to **SPECIFICATIONS**.
11. Position the engine/transmission assembly under the vehicle.
12. Slowly lower the vehicle in small increments while inspecting each interval for potential engine or transmission contact to vehicle components. Move the cradle/dolly fixture as necessary to allow for clearance.

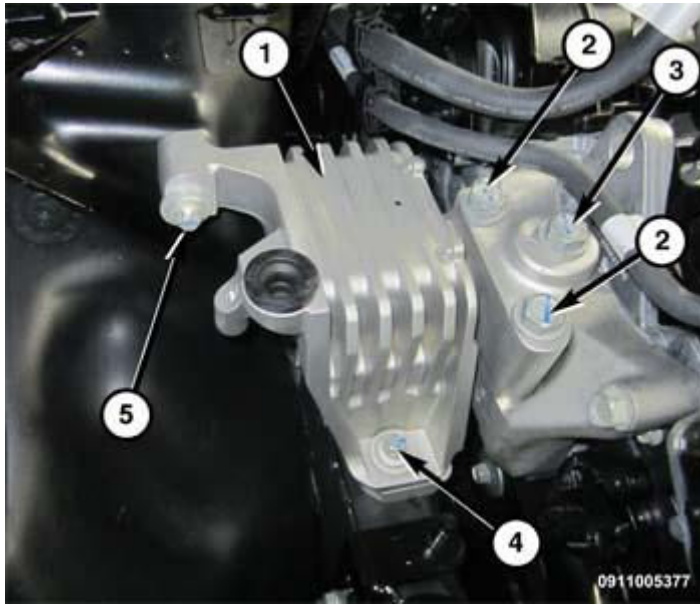


Fig. 40: Removing/Installing Right Engine Mount Assembly
Courtesy of CHRYSLER GROUP, LLC

13. Hand start the right side engine mount bolts (2, 3) to engine mount bracket. Tighten the bolt to the proper specification. Refer to **TORQUE SPECIFICATIONS** .

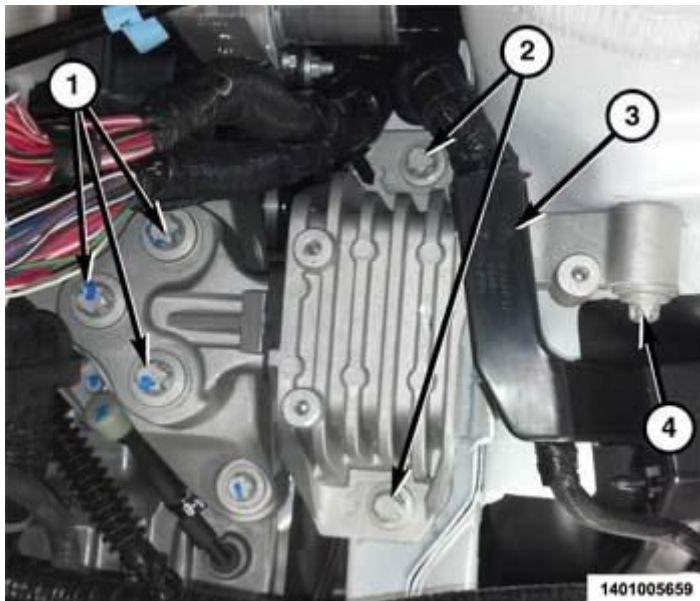


Fig. 41: Left Engine Mount-To-Transmission Mount Bracket Bolts
Courtesy of CHRYSLER GROUP, LLC

14. Hand start the left side engine mount bolts (1) to transmission mount bracket. Tighten the bolt to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
15. Remove the dolly/cradle safety straps.
16. Raise vehicle enough to allow the dolly/cradle fixture to be removed from under the vehicle.

17. Lower the vehicle.



Fig. 42: Transmission Valve Body Solenoid Connector
Courtesy of CHRYSLER GROUP, LLC

18. Connect the transmission harness connector (1) into transmission.
19. Rotate the lock lever (1) clockwise on the transmission connector.



Fig. 43: View Of Shift Cable Housing & Mount Bracket
Courtesy of CHRYSLER GROUP, LLC

20. Press the shift cable (2) onto the mount bracket (1).

21. Press the shift cable onto the transmission manual shift valve lever.
22. If removed, install the electric vacuum pump and mounting bracket. Refer to **PUMP, ELECTRIC VACUUM, INSTALLATION**.



Fig. 44: Ground Wire, Nut & Right Side Upper Frame
Courtesy of CHRYSLER GROUP, LLC

23. Install the ground strap (1) to right side upper frame (3). Tighten the nut (2) to proper specification. Refer to **TORQUE SPECIFICATIONS**.
24. Install the wiring harness retainers (2) to the lower air box housing.

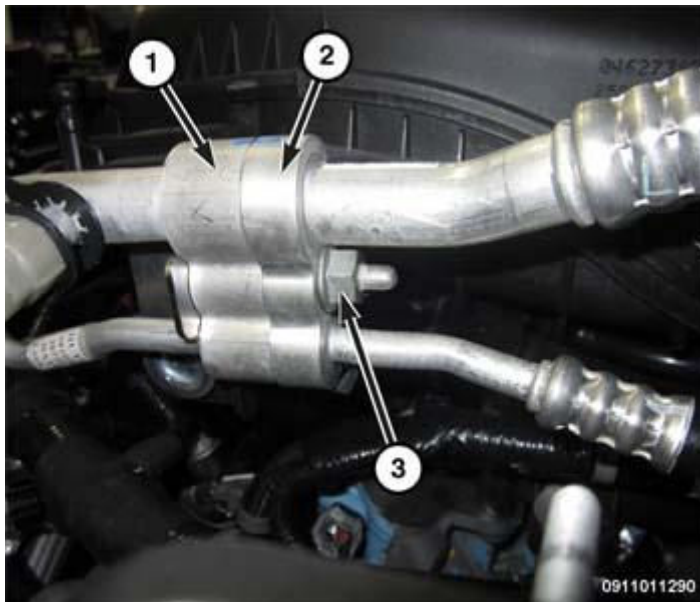
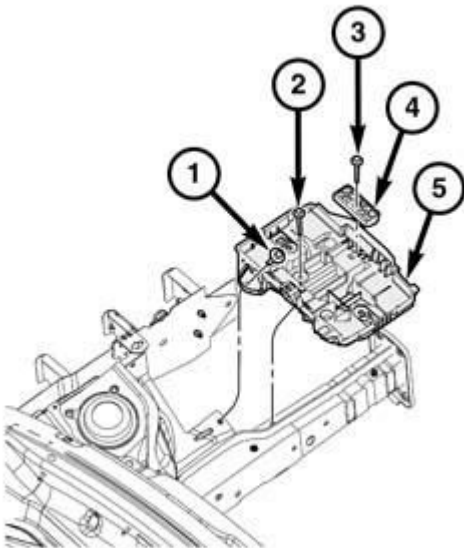


Fig. 45: IHX, Suction/Liquid Line Manifold & Nut

Courtesy of CHRYSLER GROUP, LLC

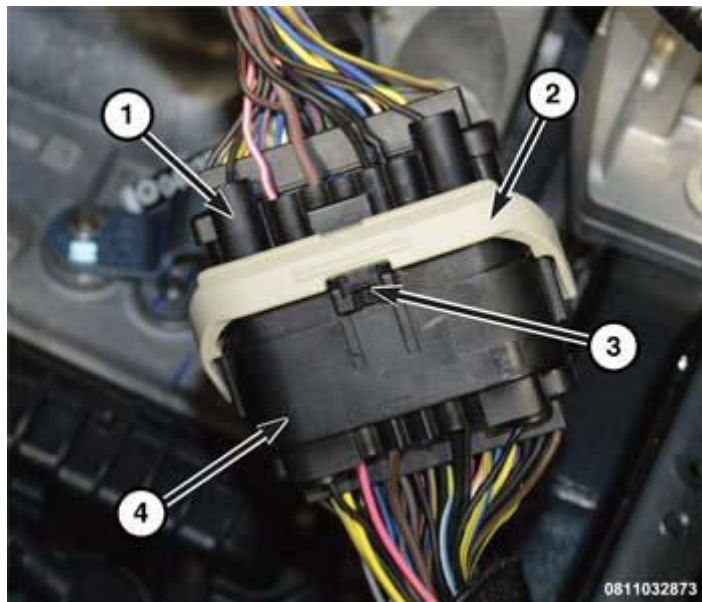
25. Install the suction/liquid line manifold (2) to the Internal Heat Exchanger (IHX) (1) and install the nut (3). Tighten the nut to the proper specification. Refer to **SPECIFICATIONS** .



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Fig. 46: Belly Pan & Bolts**Courtesy of CHRYSLER GROUP, LLC**

26. Install the battery tray. Tighten the bolts (1, 2) to the proper specification. Refer to **SPECIFICATIONS** .



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Fig. 47: Body Side Harness Connector & Engine Side Harness Connector
Courtesy of CHRYSLER GROUP, LLC

27. Connect the main engine harness connector (4) to the body side harness at the left front upper frame.

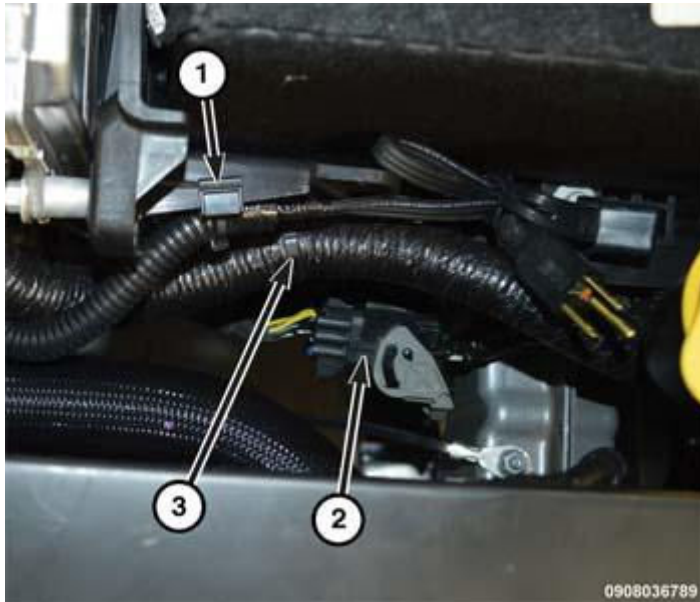


Fig. 48: Block Heater Electrical Cord Clip, Engine Harness Connector & Engine Wiring Harness Retainer
Courtesy of CHRYSLER GROUP, LLC

28. Install the main engine harness connector (2) to the battery tray.
29. Install the engine harness retainer (3) onto the battery tray.
30. If equipped, install the engine block heater electrical cord clip (1) to the battery tray.

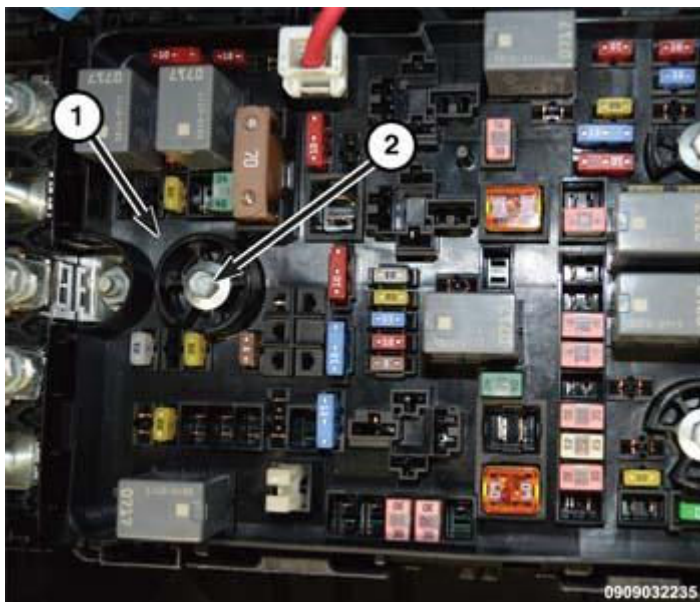


Fig. 49: PDC & Engine Harness Connector

Courtesy of CHRYSLER GROUP, LLC

31. Connect the engine harness to the Power Distribution Center (PDC) base. Hand tighten the bolt (2).
32. Install the PDC (1) into proper position on the lower cover.
33. Press down on the PDC until the tabs lock.

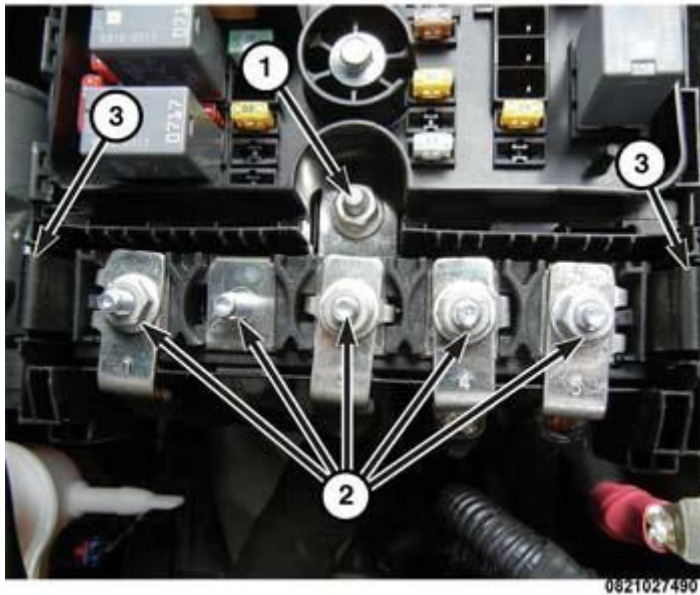


Fig. 50: Identifying Power Distribution Z-Case Fuse Array, Tabs & Nuts

Courtesy of CHRYSLER GROUP, LLC

34. Position the positive cables onto the Z-case fuse array at the PDC.
35. Install and hand tighten the nuts (2) that secure the cables to the PDC case.
36. Install the PDC cover into proper position on the PDC assembly.

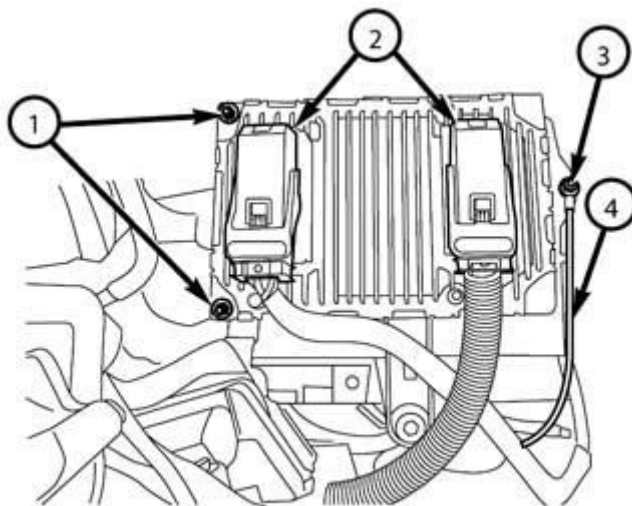
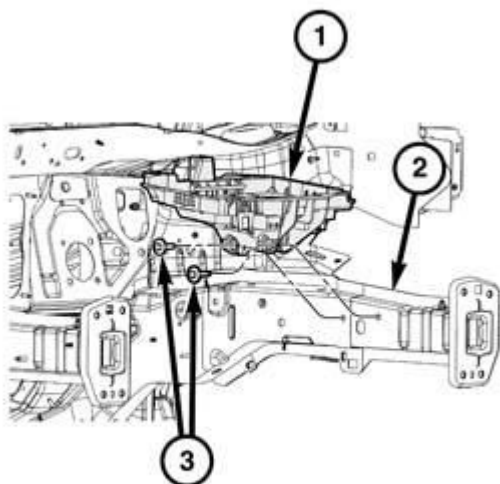


Fig. 51: PCM, Connectors, Strap & Nuts
Courtesy of CHRYSLER GROUP, LLC

37. Connect the engine harness connectors (2) to the Powertrain Control Module (PCM).
38. Position the ground cable (4) to the PCM mounting stud. Hand tighten the nut (3).
39. Raise and support the vehicle.



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Fig. 52: Identifying Battery Tray, Inner Frame Rail & Bolts
Courtesy of CHRYSLER GROUP, LLC

40. Install the lower battery tray bolts (3). Tighten the bolt to the proper specification. Refer to **SPECIFICATIONS** .



Fig. 53: Transmission Cooler Lines
Courtesy of CHRYSLER GROUP, LLC

41. Connect the oil cooler lines (1) to transmission.

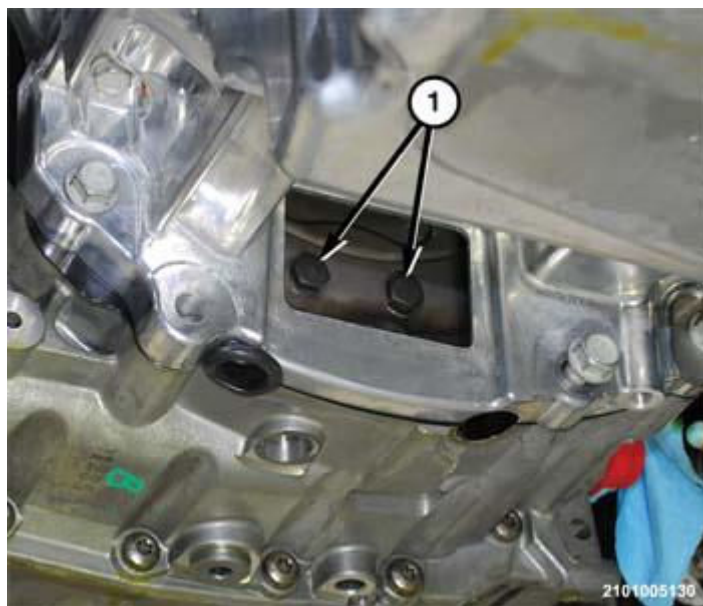


Fig. 54: Torque Converter Bolts
Courtesy of CHRYSLER GROUP, LLC

42. If required, install the torque converter-to-flexplate bolts (1). Tighten the bolts to the proper specification. Refer to **SPECIFICATIONS** .

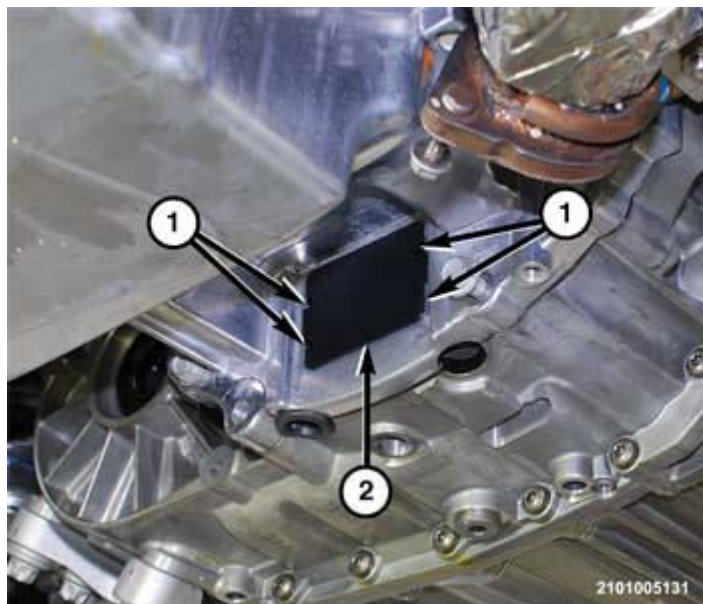


Fig. 55: Bellhousing Access Door
Courtesy of CHRYSLER GROUP, LLC

43. If required, install the transaxle torque converter housing dust cover (2) and rubber plugs.
44. If required, install the lower transmission-to-engine bolts and tighten to proper specification. Refer to **SPECIFICATIONS**.

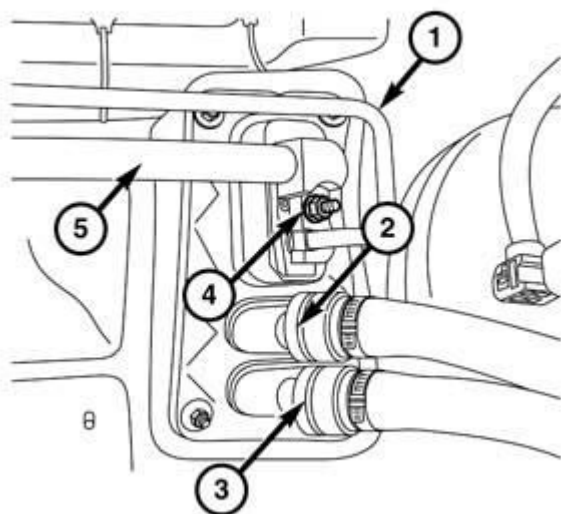


Fig. 56: Refrigerant Lines, Heater Core Hoses & Fastener
Courtesy of CHRYSLER GROUP, LLC

45. Connect the heater core supply hose (2).
46. Connect the heater core return hose (3).

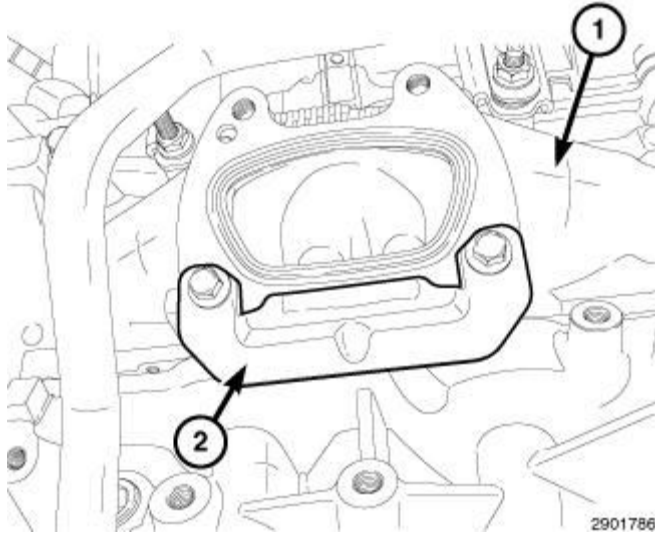


Fig. 57: Retainer Plate & Exhaust Manifold Flange
Courtesy of CHRYSLER GROUP, LLC

47. If the gaskets need replacing, position new gasket onto the manifold flange and install the lower retainer plate (2). Loosely install all four bolts to align the gasket. Tighten the lower retainer (2) bolts to the proper specification. Refer to **SPECIFICATIONS** .
48. Remove the upper catalytic converter flange bolts.
49. Install the crossmember assembly. Refer to **CROSSMEMBER, FRONT SUSPENSION, INSTALLATION** .
50. Position the rear catalytic converter to the cylinder head.
51. If equipped, install the PTU to the transmission. Refer to **INSTALLATION** .

NOTE: FWD support bracket shown in illustration; AWD support bracket similar.

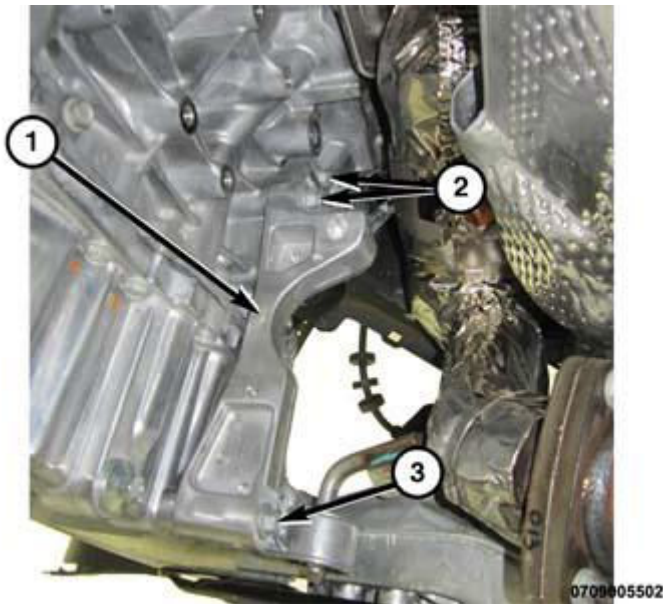


Fig. 58: Removing/Installing Lower Intermediate Shaft Support Bracket
Courtesy of CHRYSLER GROUP, LLC

52. Install the intermediate shaft support bracket (1). Tighten the bolts (2, 3) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
53. Install the cross under pipe. Refer to **PIPE, EXHAUST CROSSUNDER, INSTALLATION** .

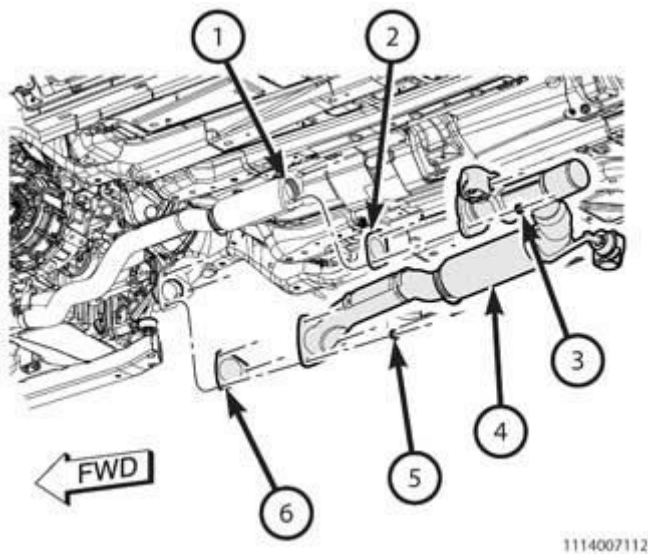


Fig. 59: Y-Pipe
Courtesy of CHRYSLER GROUP, LLC

54. Align the Y-pipe (4) to the rear catalytic converter. Tighten the nuts (5) to the proper specification. Refer to **SPECIFICATIONS** .



Fig. 60: Ground Strap & Bolt
Courtesy of CHRYSLER GROUP, LLC

55. Install the ground strap (1) to the transmission. Tighten the bolt (2) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
56. Partially lower the vehicle.

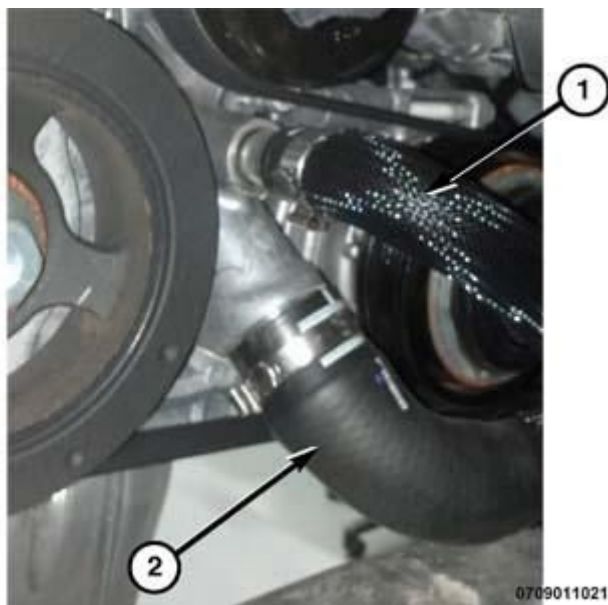
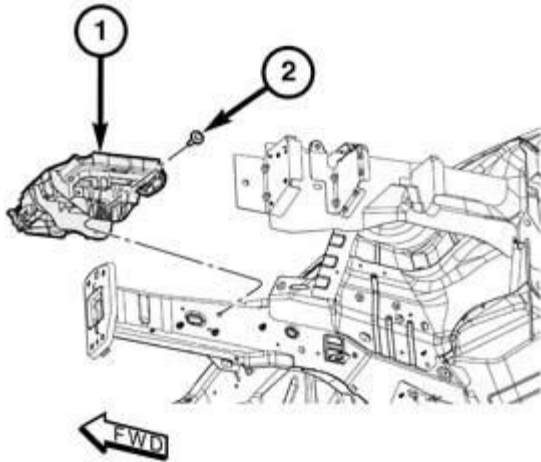


Fig. 61: Installing Lower Radiator Hose & Heater Core Return Hose
Courtesy of CHRYSLER GROUP, LLC

57. Install the lower radiator hose (2) to the water pump.
58. Install the heater hose (1) to the water pump.

59. Install both axle shafts. Refer to **INSTALLATION** .
60. Install both front tire and wheel assemblies. Refer to **INSTALLATION** .



0909005827

Fig. 62: Battery Tray & Bolt
Courtesy of CHRYSLER GROUP, LLC

61. Install the outer battery tray (1) to frame. Tighten the bolt (2) to the proper specification. Refer to **SPECIFICATIONS** .

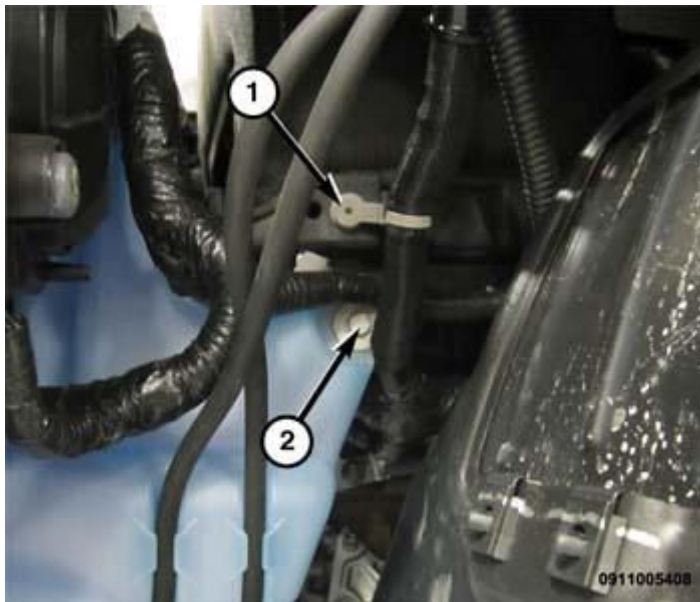


Fig. 63: Windshield Washer Reservoir-To-Battery Tray Bolt

Courtesy of CHRYSLER GROUP, LLC

62. Install the bolt (2) that secures the washer solvent bottle to the battery tray. Tighten the bolt to the proper specification. Refer to **SPECIFICATIONS** .
63. Install the wiring harness retainer (1) onto the battery tray.
64. Install the inner wheel house splash shields. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION** .
65. Install the front bumper fascia . Refer to **FASCIA, FRONT, INSTALLATION** .
66. Raise the vehicle.
67. Install the engine belly pan (3). Refer to **BELLY PAN, INSTALLATION** .
68. Lower the vehicle.

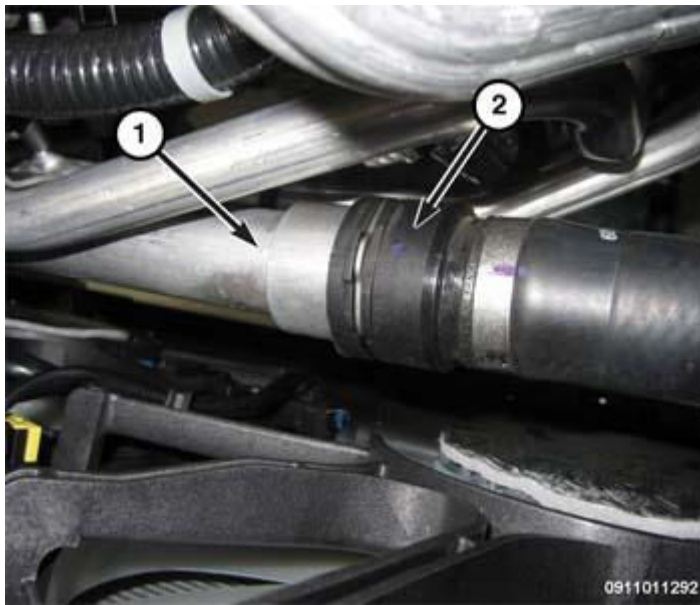


Fig. 64: Radiator Inlet Pipe & Upper Radiator Hose
Courtesy of CHRYSLER GROUP, LLC

69. Install the upper radiator hose (2) to the radiator inlet pipe (1).

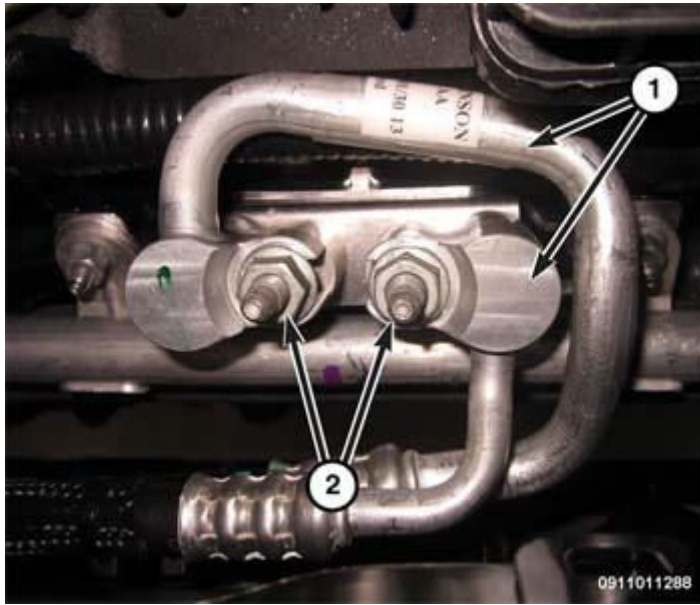


Fig. 65: A/C-To-IHX Lines

Courtesy of CHRYSLER GROUP, LLC

70. Install the A/C lines (1) to the IHX. Tighten the nuts (2) to the proper specification. Refer to **SPECIFICATIONS** .

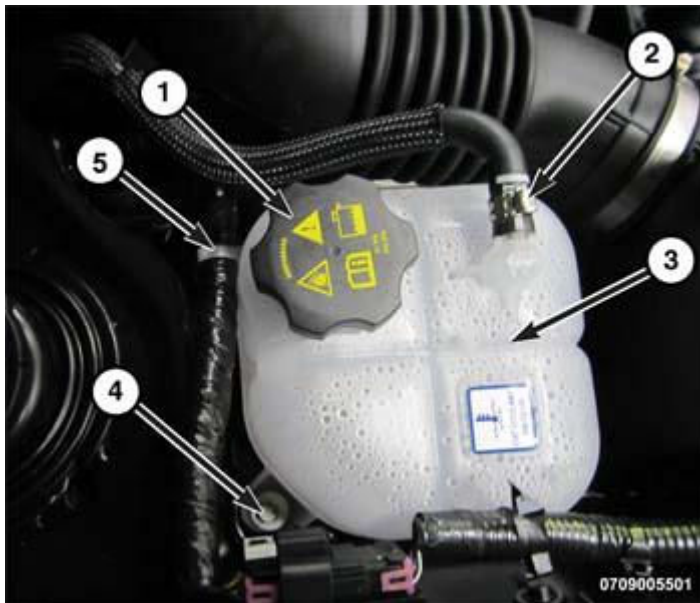


Fig. 66: Coolant Bottle & Components

Courtesy of CHRYSLER GROUP, LLC

71. Install the coolant return line. Tighten the clamp (2).

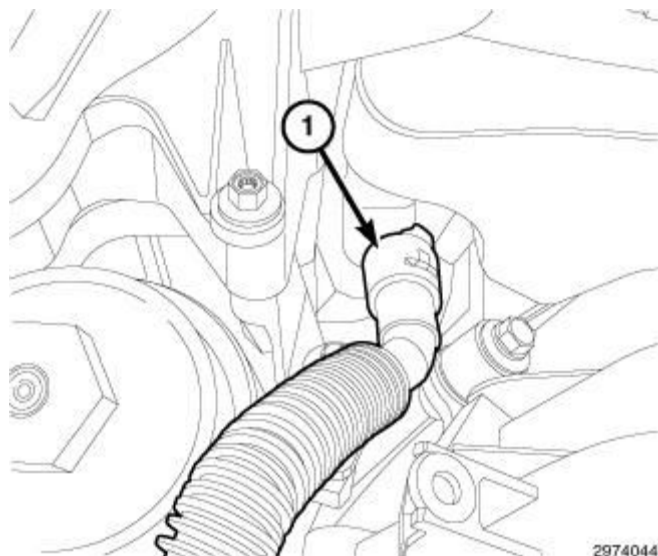


Fig. 67: Fuel Line Inlet
Courtesy of CHRYSLER GROUP, LLC

72. Connect the fuel line (1) to the fuel rail inlet.

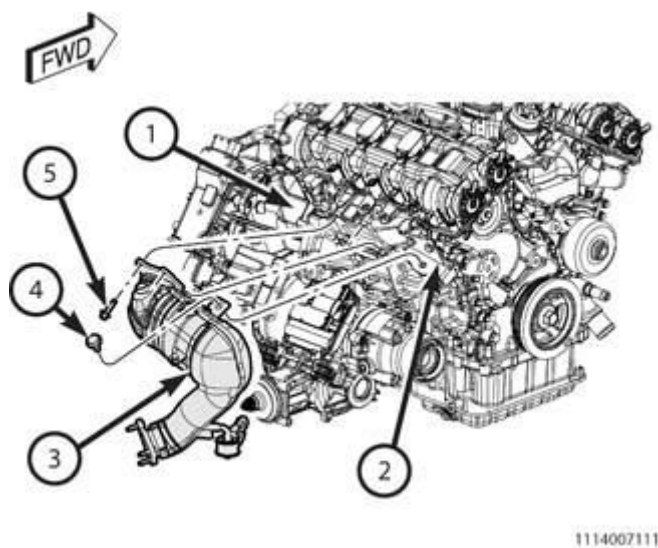


Fig. 68: Removing/Installing Catalytic Converter
Courtesy of CHRYSLER GROUP, LLC

73. Install the upper catalytic converter flange bolts (5). Tighten the bolts to the proper specification. Refer to **TORQUE SPECIFICATIONS** .

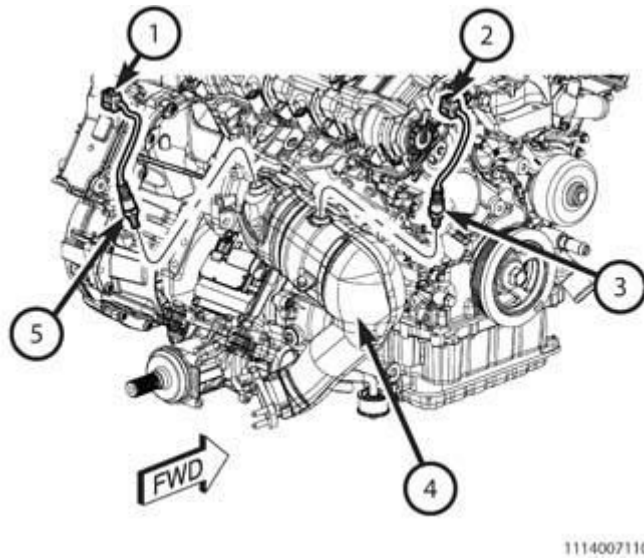


Fig. 69: Removing/Installing Oxygen Sensors
Courtesy of CHRYSLER GROUP, LLC

74. Connect both rear side O2 sensor harness connectors (1, 2).
75. Install the air intake resonator. Refer to **RESONATOR, AIR CLEANER, INSTALLATION**.
76. Install the air cleaner body. Refer to **BODY, AIR CLEANER, INSTALLATION**.
77. Install the purge control valve (Refer to **VALVE, PURGE CONTROL /Installation**).

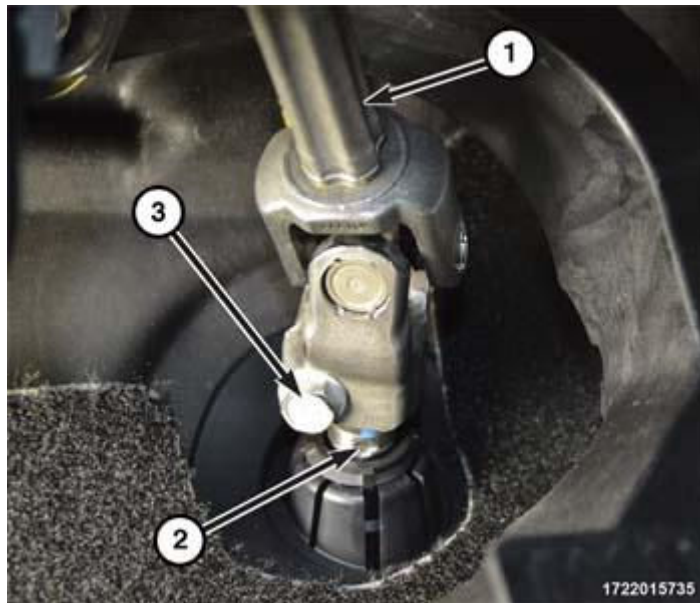


Fig. 70: Identifying Intermediate Shaft, Pinch Bolt And Steering Gear Pinion Shaft
Courtesy of CHRYSLER GROUP, LLC

78. Align the intermediate shaft (1) to the steering gear shaft (2).
79. Install a **NEW** pinch bolt (3). Tighten the bolt to the proper specification. Refer to **FRAME**,

SPECIFICATIONS .

80. Fill the engine crankcase with proper oil to correct level.
81. Evacuate and recharge the A/C system. Refer to **PLUMBING, STANDARD PROCEDURE .**
82. Fill the cooling system. Refer to **STANDARD PROCEDURE .**
83. Install the battery. Refer to **BATTERY, INSTALLATION .**

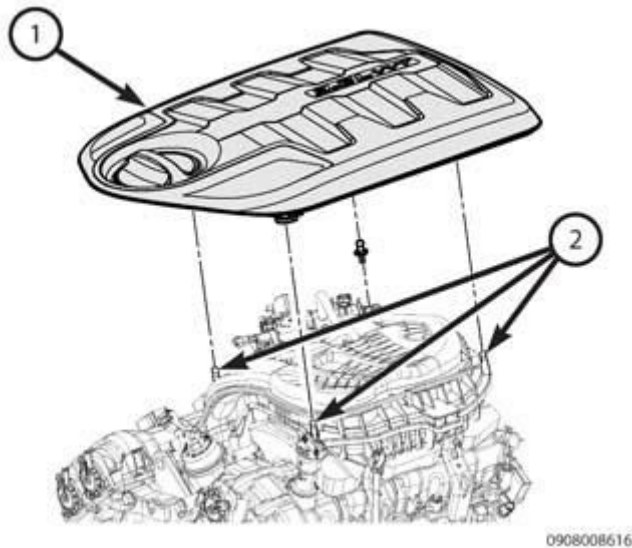


Fig. 71: Engine Cover & Ball Studs
 Courtesy of CHRYSLER GROUP, LLC

84. Install the engine cover (1) onto the tabs (2).
85. Run the engine until it reaches normal operating temperature. Check cooling system for correct fluid level. Refer to **STANDARD PROCEDURE .**

NOTE: The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components.

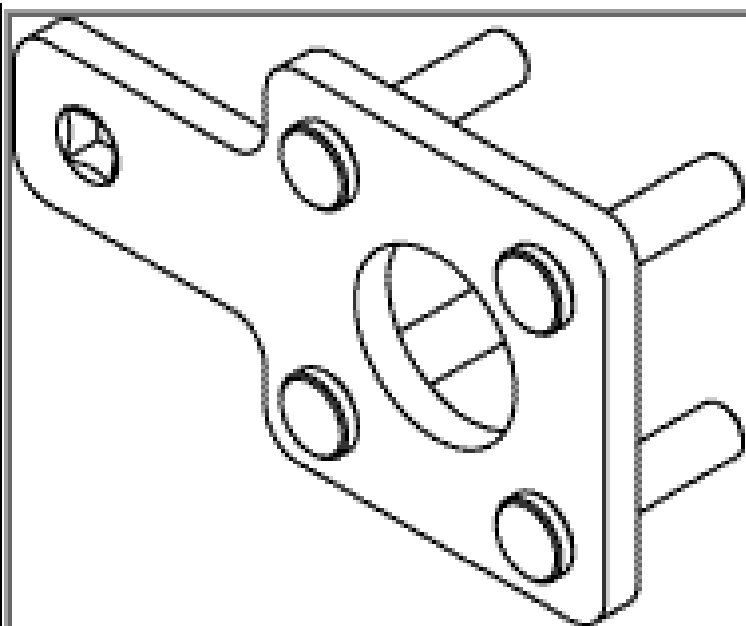
SPECIAL TOOLS

SPECIAL TOOLS

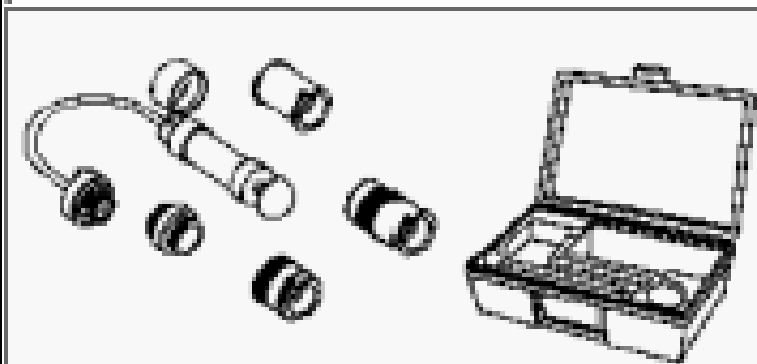
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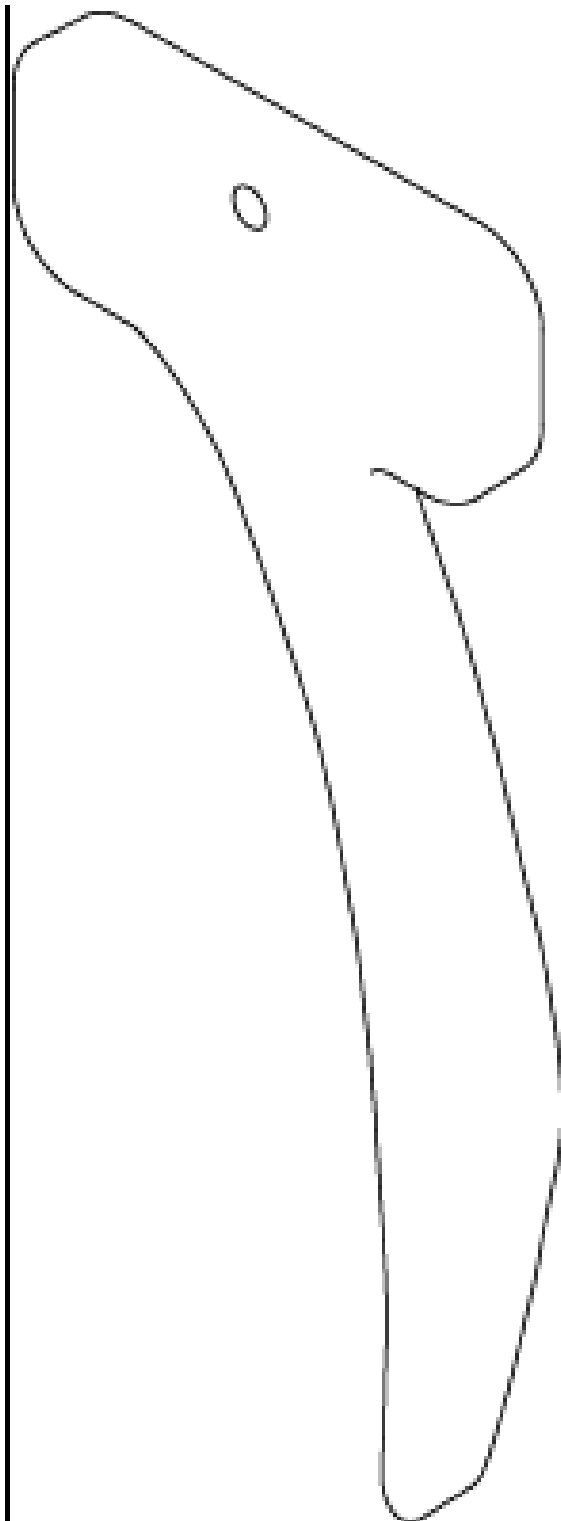
10198 - Holder, Vibration Damper
(Originally Shipped In Kit Number(s)
10223.)



10199 - Installer, Crankshaft Front Oil
Seal
(Originally Shipped In Kit Number(s)
10223.)

2014 Jeep Cherokee Trailhawk

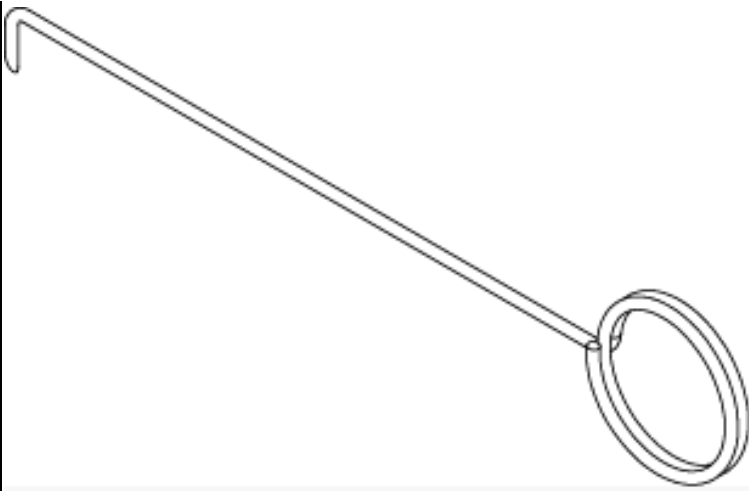
2014 ENGINE 3.2L - Service Information - Cherokee



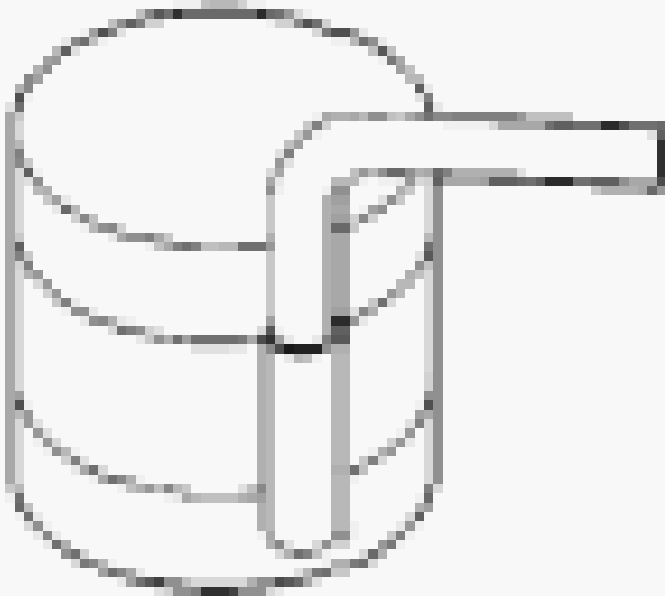
10200-1 - Holder, Timing Chain, Left Side

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10200-3 - Pin

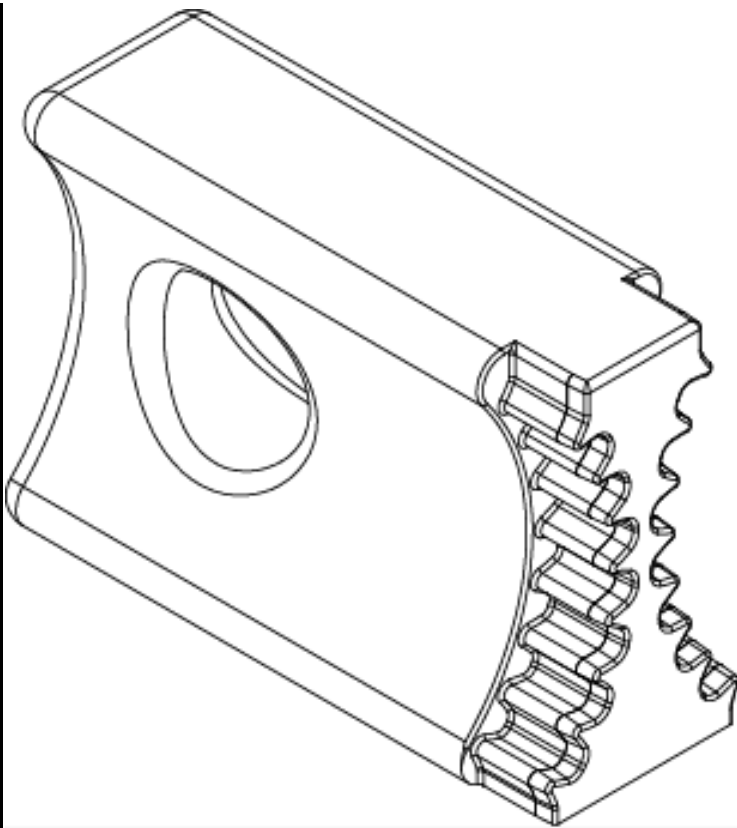


10202 - Locks, Camshaft/Phaser

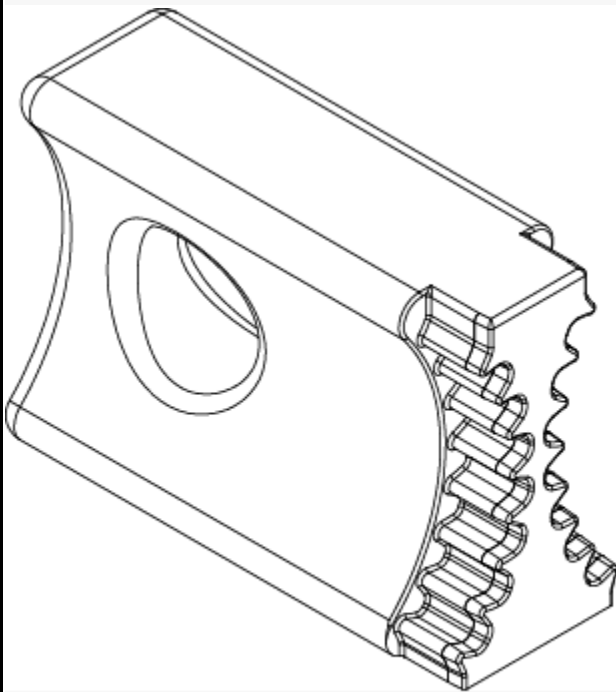
10202-1 - Lock, Camshaft/Phaser, Right

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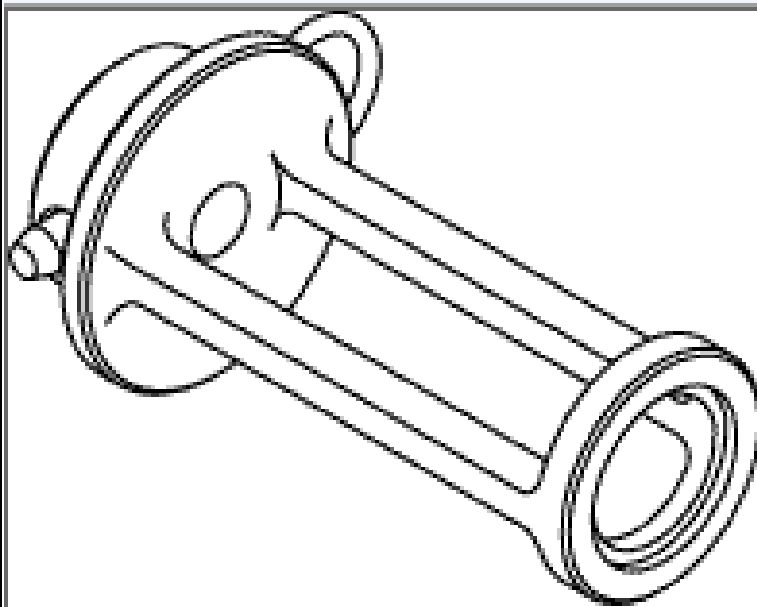
Side



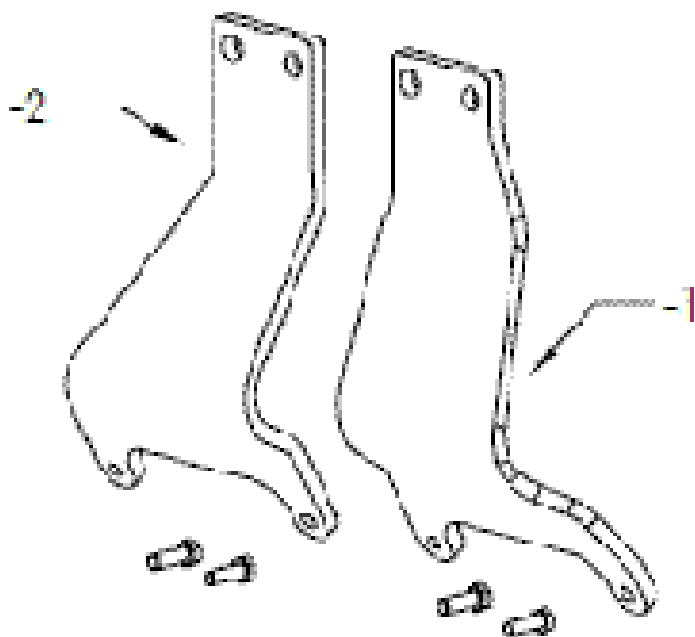
10202-2 - Lock, Camshaft/Phaser, Left
Side

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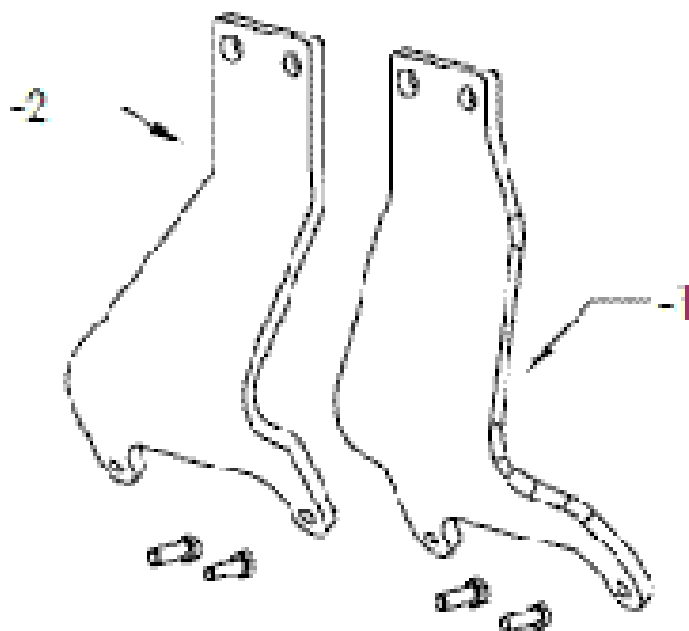
10224 - Adapter, Valve Spring
(Originally Shipped In Kit Number(s)
10223.)



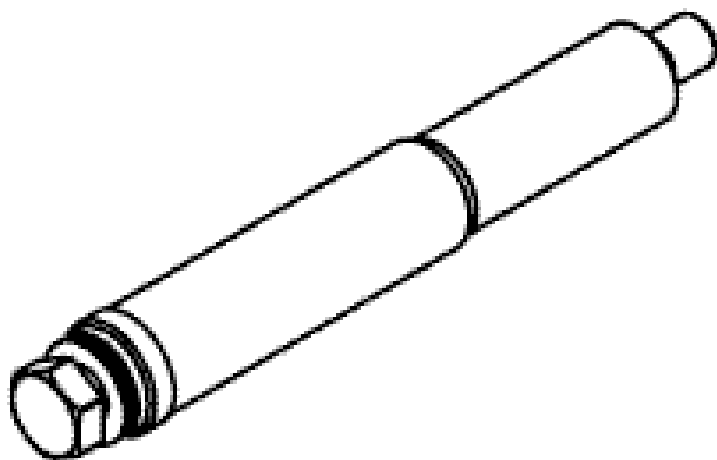
10242-1 - Brackets, Engine Lifting, Left
Side
(Originally Shipped In Kit Number(s)
10223.)

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10242-2 - Brackets, Engine Lifting, Right Side
(Originally Shipped In Kit Number(s) 10223.)

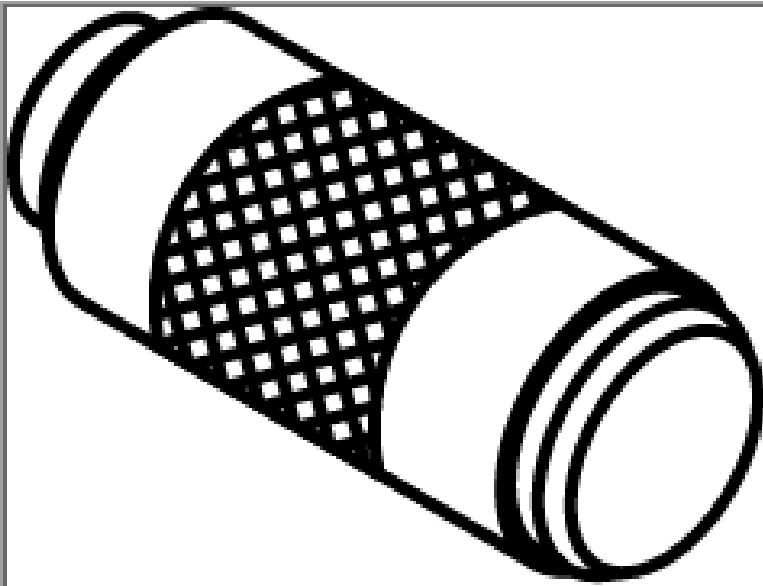


10255 - Installer, Spark Plug Tube

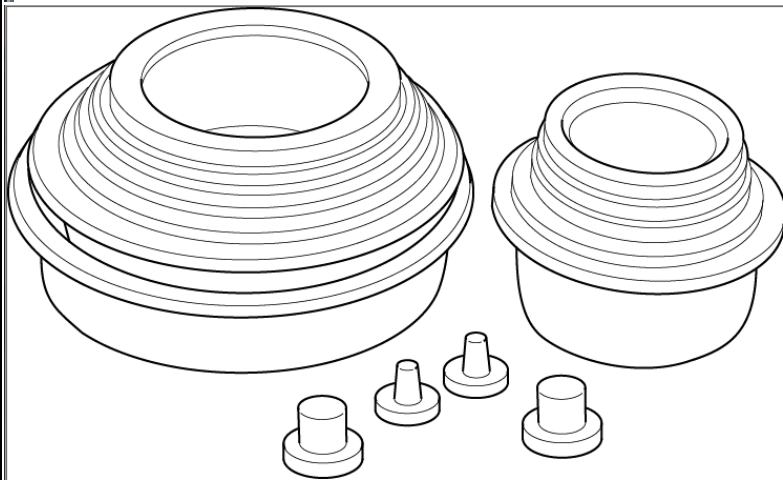
10256 - Installer, Cam Installer, Cam Sensor/Spark Plug Tube Seal

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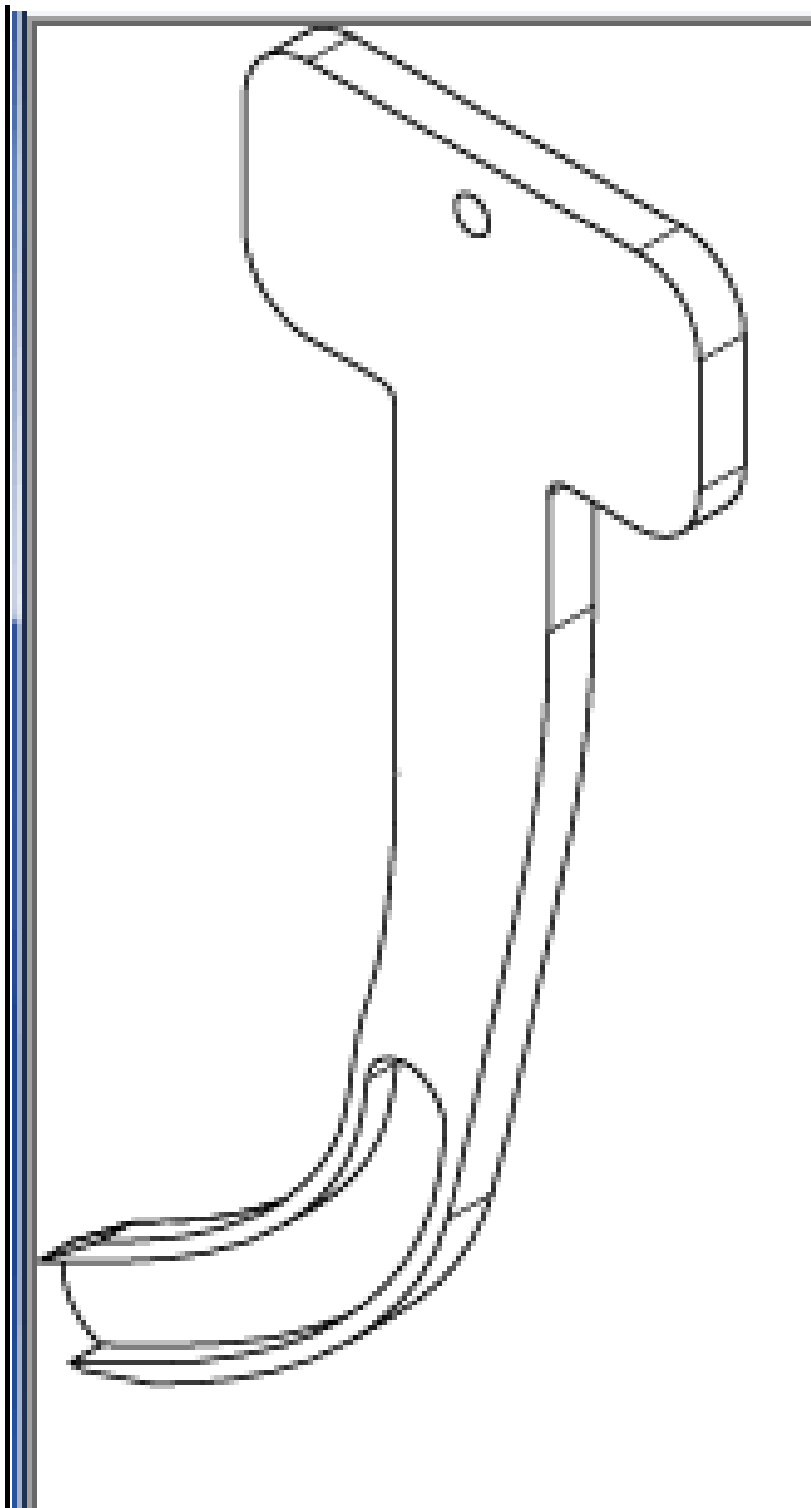
(Originally Shipped In Kit Number(s)
10256.)



10368 - Set, Universal Protective Cap

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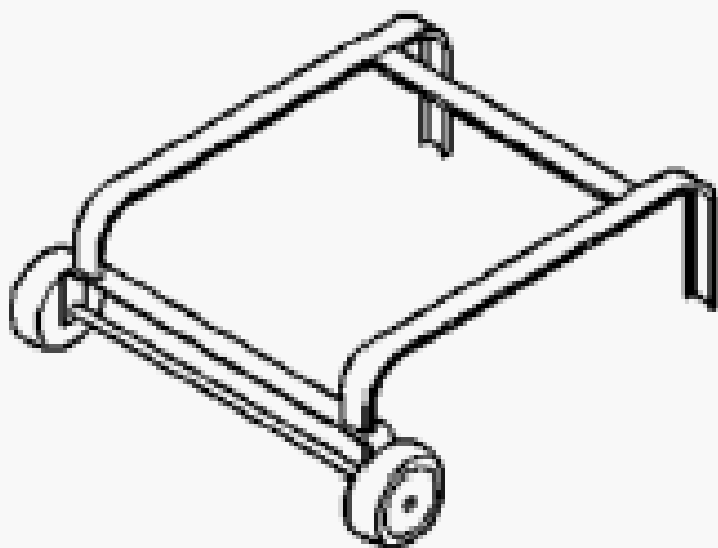
2014 ENGINE 3.2L - Service Information - Cherokee



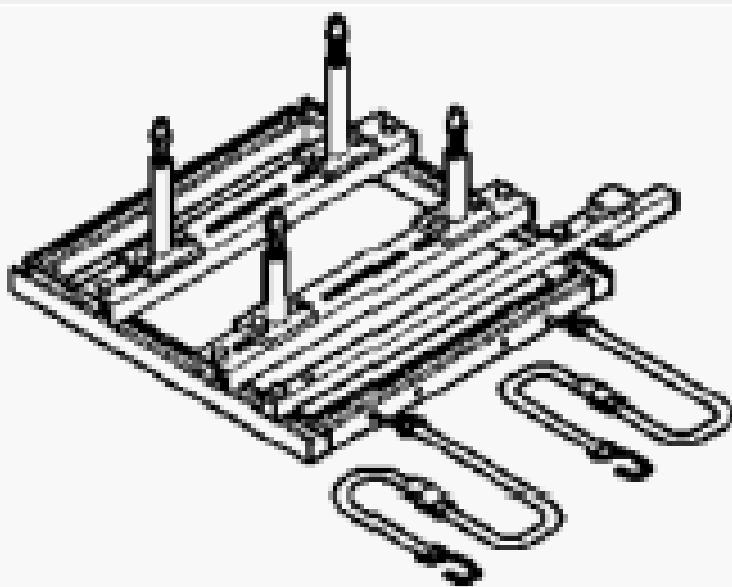
10369 - Holder, Timing Chain

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6135 - Dolly, Power Train
(Originally Shipped In Kit Number(s)
6784C.)

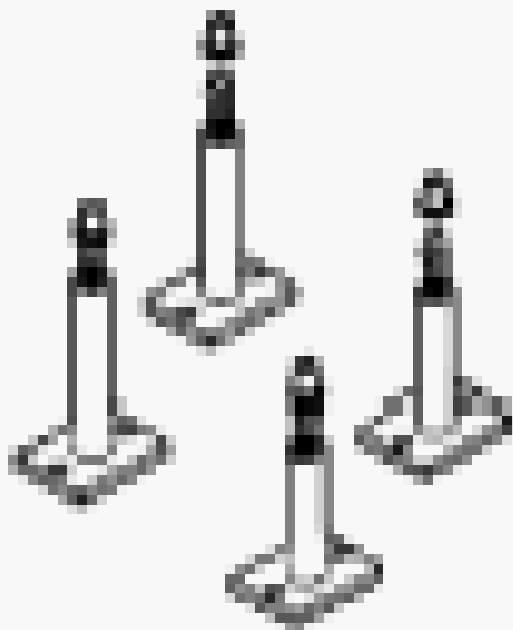


6710A - Cradle, Engine Support
(Originally Shipped In Kit Number(s)
6784, 6809.)

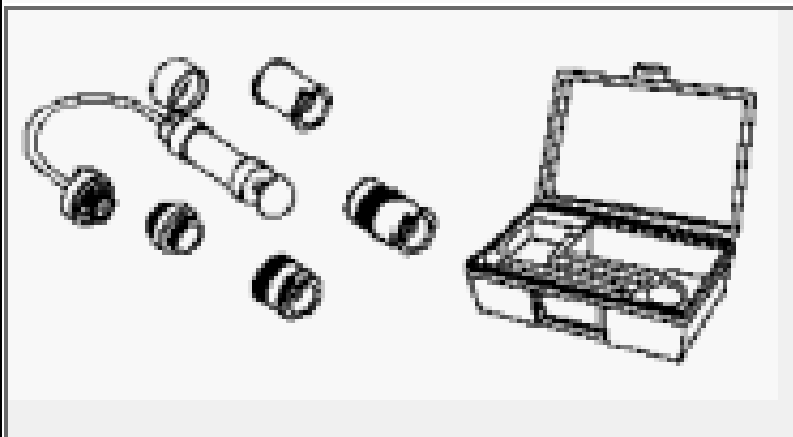
6848-3 - Adapter

2014 Jeep Cherokee Trailhawk

2014 ENGINE 3.2L - Service Information - Cherokee



(Originally Shipped In Kit Number(s)
6880, 6881, 6882, 6883.)

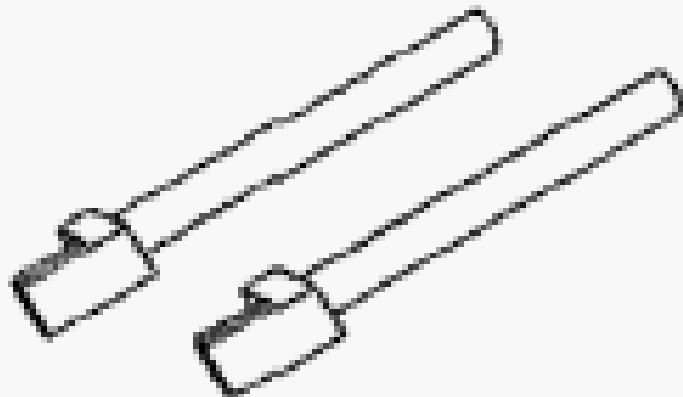


7700-A - Tester, Cooling System

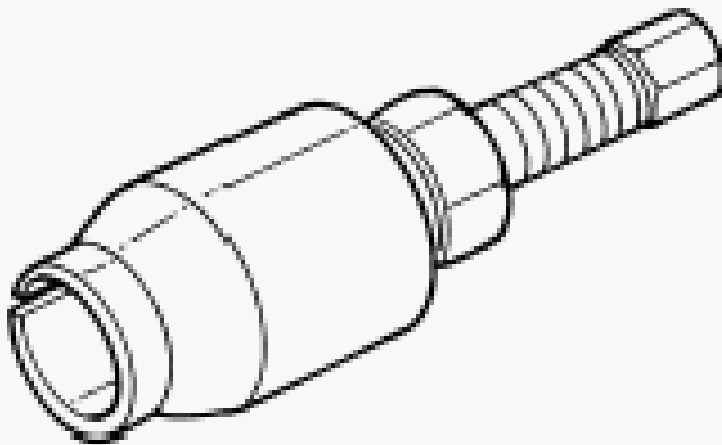
8189 - Guide Pins
(Originally Shipped In Kit Number(s)

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8180, 8180CC, 8263, 8263CC.)

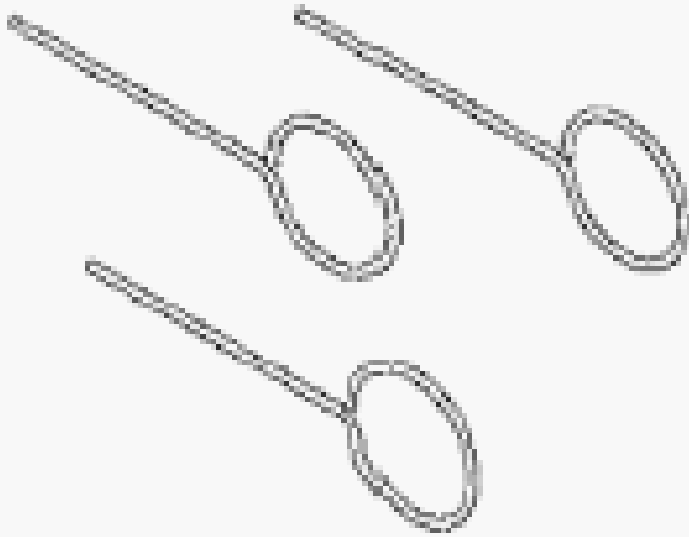


8511 - Remover, Seal
(Originally Shipped In Kit Number(s)
8283, 8283CC, 8527, 8527CC, 8575,
8575CC, 9975.)

8514 - Pins, Tensioner
(Originally Shipped In Kit Number(s)
8283, 8283CC, 8527, 8527CC, 8575,
8575CC, 9975.)

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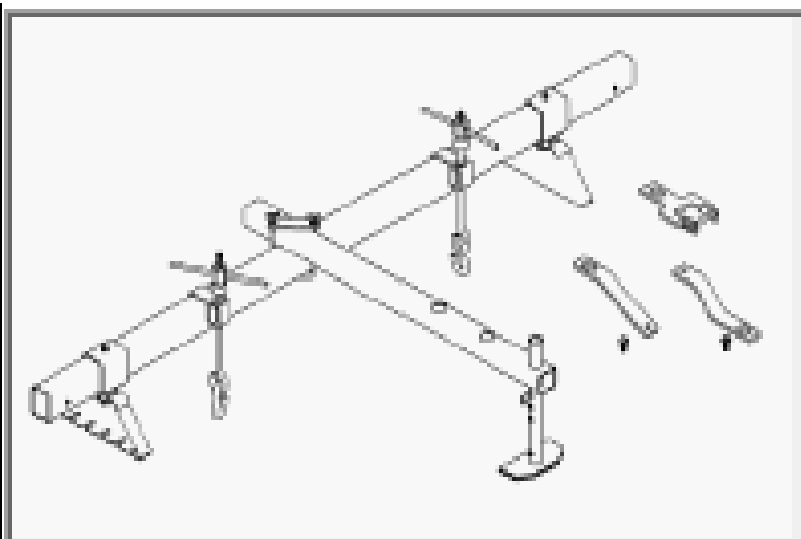
2014 ENGINE 3.2L - Service Information - Cherokee



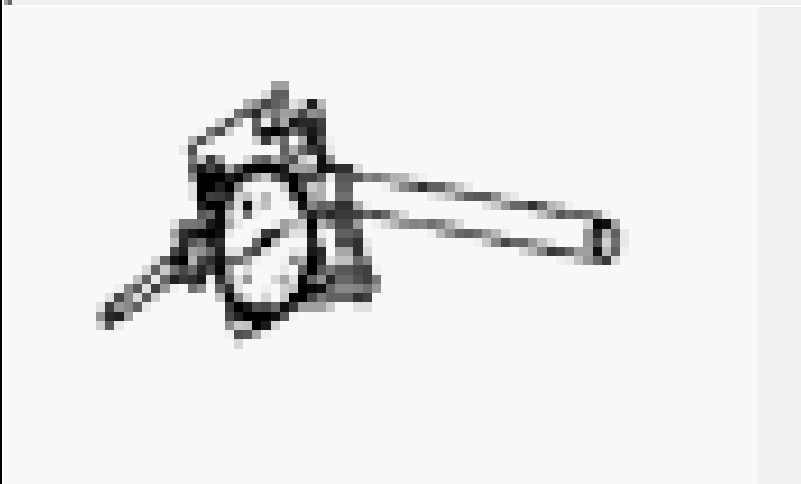
8875A - Disconnect, Transmission Cooler Line
(Originally Shipped In Kit Number(s)
9202, 9328, 9328-CAN, 9329, 9516,
9575.)

2014 Jeep Cherokee Trailhawk

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C-119 - Cylinder Indicator



C-3292A - Gauge, Pressure



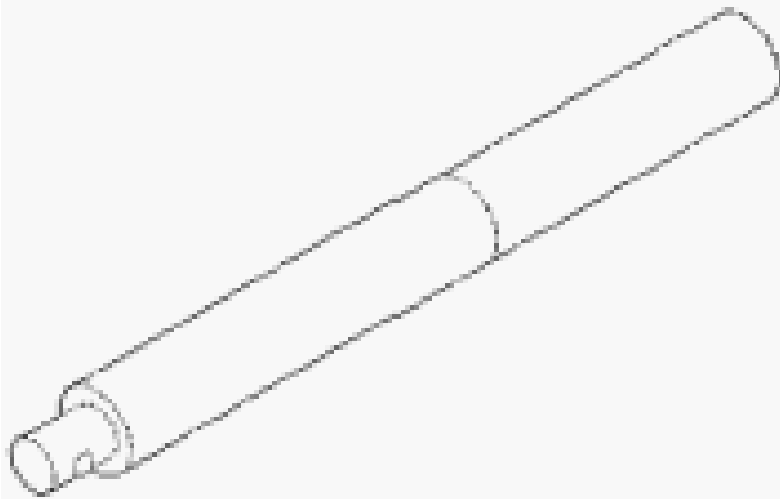
C-3339A - Set, Dial Indicator
(Originally Shipped In Kit Number(s)
9202.)

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2014 ENGINE 3.2L - Service Information - Cherokee

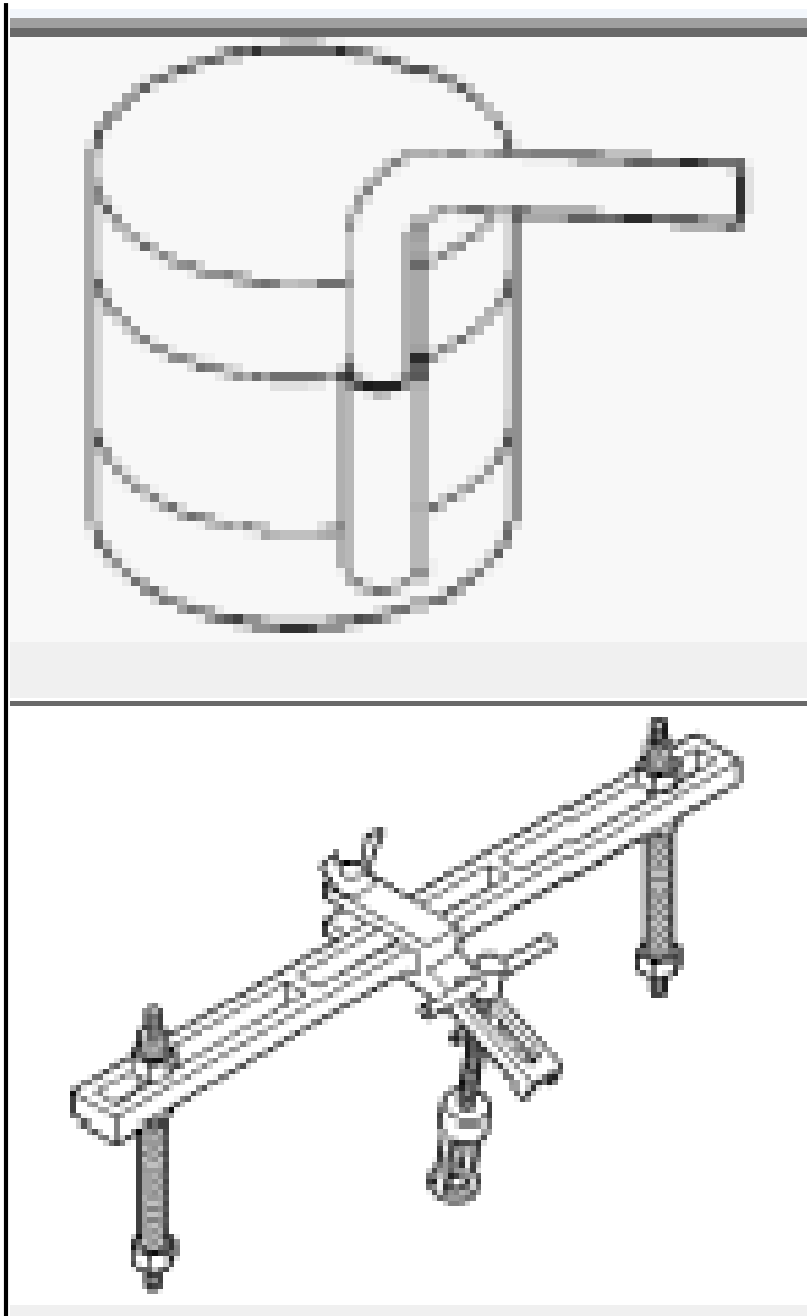


C-3422-D - Compressor, Valve Spring



C-3685-A - Bloc-Chek Kit

C-385 - Compressor, Piston



MD998772A - Compressor, Valve Spring
(Originally Shipped In Kit Number(s)
8678, 8853, 8854.)

AIR INTAKE SYSTEM

AIR CLEANER

REMOVAL

REMOVAL

1. Remove the screws that secures the air filter housing cover to the lower housing.

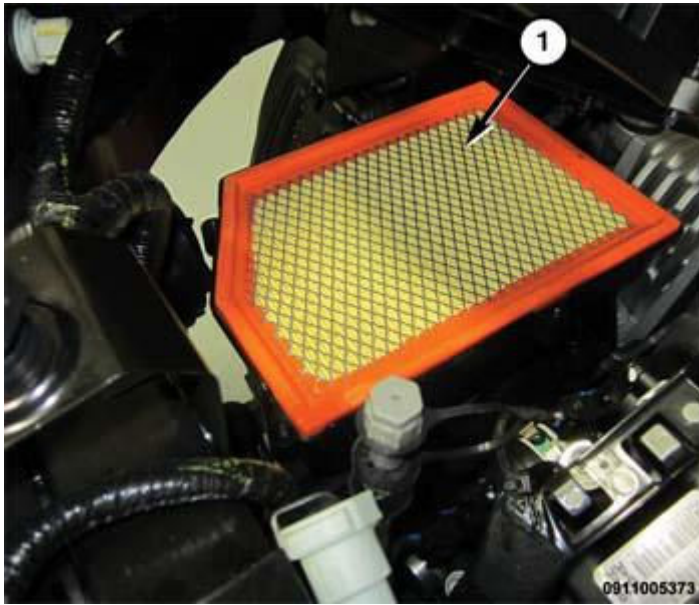


Fig. 72: Air Cleaner Element
Courtesy of CHRYSLER GROUP, LLC

2. Lift the cover and remove the air cleaner element (1).

CAUTION: Do not use compressed air to clean out the air cleaner housing without first covering the air inlet to the throttle body. Dirt or foreign objects could enter the intake manifold causing engine damage.

3. Remove any dirt or debris from the bottom of the air cleaner housing.

INSTALLATION

INSTALLATION

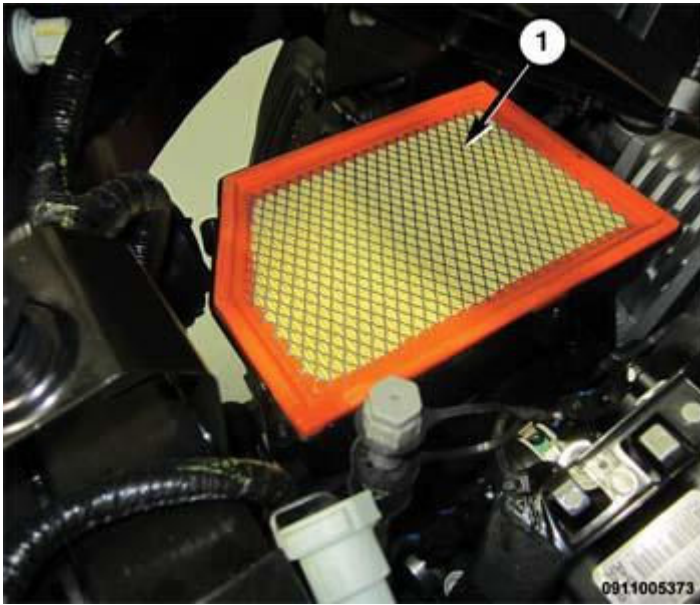


Fig. 73: Air Cleaner Element

Courtesy of CHRYSLER GROUP, LLC

1. Install the air cleaner element (1) into the air cleaner housing.
2. Seat the cover onto the housing and secure the screws.

BODY, AIR CLEANER

REMOVAL

REMOVAL

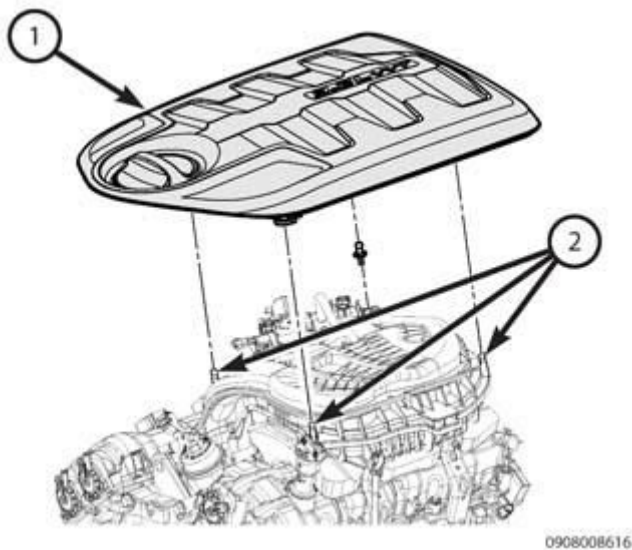


Fig. 74: Engine Cover & Ball Studs

Courtesy of CHRYSLER GROUP, LLC

1. Remove the engine cover (1).

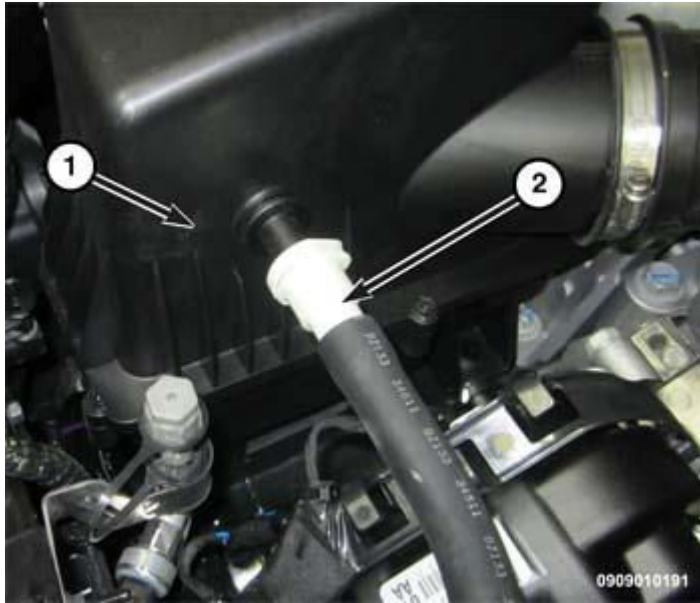
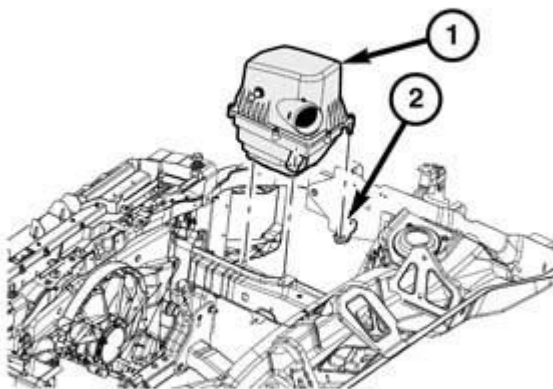


Fig. 75: Air Filter Body Cover & Breather Hose
Courtesy of CHRYSLER GROUP, LLC

2. Separate the breather hose (2) from the air filter body cover (1).
3. Loosen the clamp and remove the hose from the air cleaner body (1).



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Fig. 76: Air Cleaner Body
Courtesy of CHRYSLER GROUP, LLC

4. Pull the air cleaner body (1) straight up to disengage the locating pins from the rubber mount sockets (2).

INSTALLATION**INSTALLATION**

NOTE: Upper air filter body has been removed for clarity of the installation of the intake tube and seal to the air filter body.



Fig. 77: Air Filter Body, Seal & Air Filter Body
Courtesy of CHRYSLER GROUP, LLC

1. Lubricate the three rubber mount sockets (2) with Mopar® Rubber Bushing Installation Lube.
2. Install the air cleaner housing body.
3. Align the intake tube (3) to the air filter body (1) making sure the seal (2) is centered.
4. Engage the air inlet tube and install the air cleaner body straight down on the locating pins until the rubber mount sockets are fully seated.
5. Install the hose to the air cleaner body and tighten the clamp (3) to 5 N.m (44 in. lbs.).

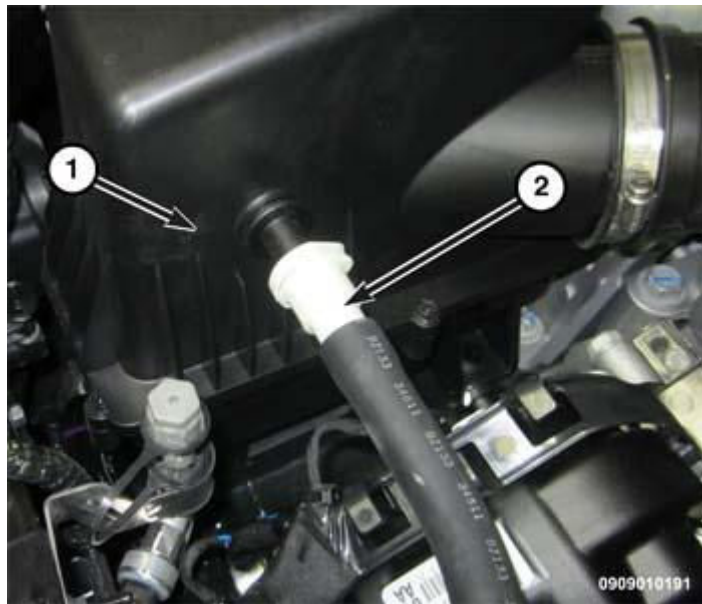


Fig. 78: Air Filter Body Cover & Breather Hose
Courtesy of CHRYSLER GROUP, LLC

6. Connect the breather hose (2) to the air cleaner body cover (1).
7. Install the engine cover (1).

RESONATOR, AIR CLEANER

REMOVAL

REMOVAL

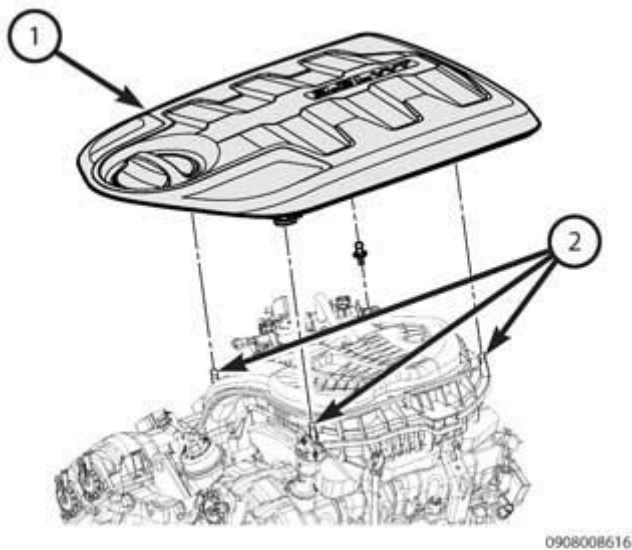


Fig. 79: Engine Cover & Ball Studs
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove the engine cover (1).



Fig. 80: Air Cleaner Resonator & IAT Sensor
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the harness connector (2) from the Inlet Air Temperature (IAT) sensor (3).

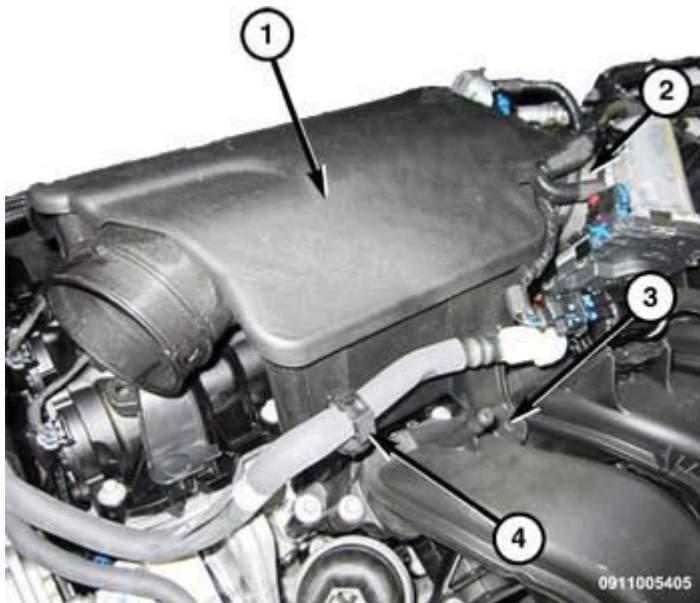
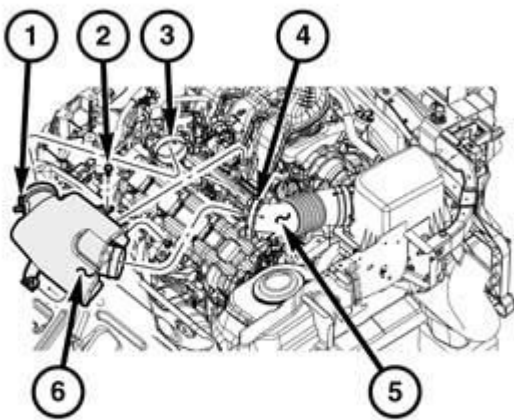


Fig. 81: Intake Resonator
Courtesy of CHRYSLER GROUP, LLC

4. Separate the clean air hose from the resonator (1).

5. Remove the vapor line retainer (4) from the resonator.
6. Remove the push pin (3) that secures the resonator to the intake manifold.
7. Pull the resonator straight up off of the two locating pins on the right cylinder head cover. Disengage and remove the resonator from the throttle body inlet.

INSTALLATION**INSTALLATION**

0909005845

Fig. 82: IAT Sensor Connector, Throttle Body & Air Inlet Hose Housing
Courtesy of CHRYSLER GROUP, LLC

1. Lubricate the rubber mount sockets on the resonator (6) with Mopar® Rubber Bushing Installation Lube.
2. Install the resonator to the throttle body inlet (3). Push the resonator down onto the locating pins until the rubber mount sockets are fully seated.
3. Install the clean air hose (5) to the resonator. Hand tighten the clamp (4).
4. Install the push pin (2).

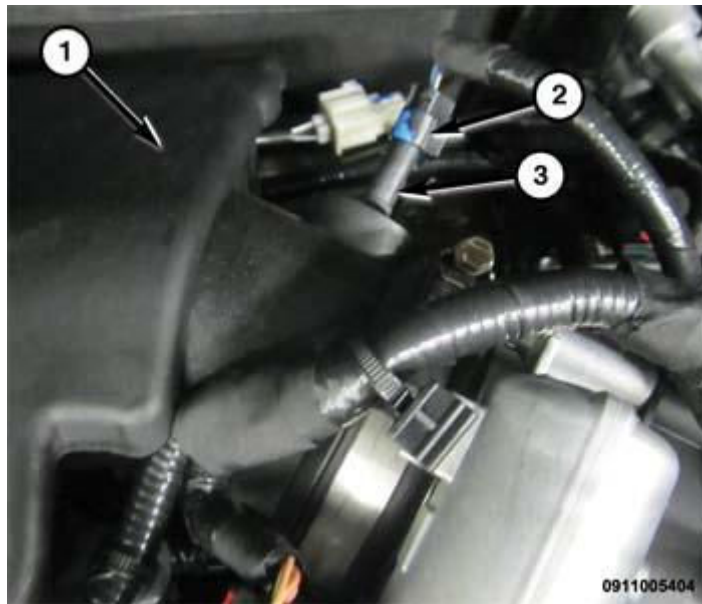


Fig. 83: Air Cleaner Resonator & IAT Sensor
Courtesy of CHRYSLER GROUP, LLC

5. Connect the harness connector (2) to the Intake Air Temperature (IAT) Sensor (1).

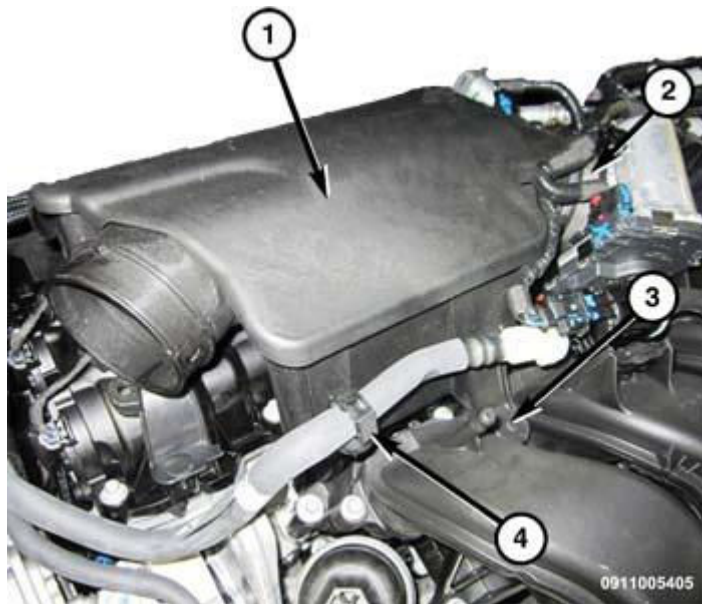


Fig. 84: Intake Resonator
Courtesy of CHRYSLER GROUP, LLC

Engage the vapor line retainer (4) to the resonator (1).

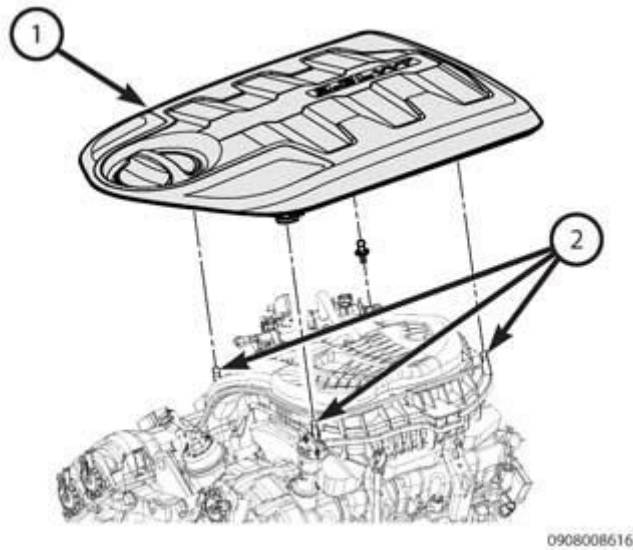


Fig. 85: Engine Cover & Ball Studs
Courtesy of CHRYSLER GROUP, LLC

6. Install engine cover (1).
7. Connect the negative battery cable and tighten nut to 5 N.m (44 in. lbs.).

CYLINDER HEAD

DESCRIPTION

DESCRIPTION

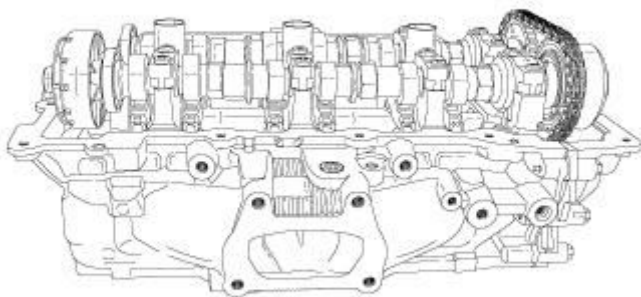


Fig. 86: Aluminum Cylinder Head
Courtesy of CHRYSLER GROUP, LLC

The aluminum cylinder heads are a unique design with left and right castings. The exhaust manifolds are integrated into the cylinder heads. The cylinder head features four valves per cylinder with pressed in powdered metal valve guides. The valve guides are not serviceable. The DOHC valvetrain uses roller rocker arms with hydraulic lifters. The cylinder head's camshaft bearing caps are made of powdered metal and the location and direction of each cap is marked on the side of the caps. The spark plug tubes are pressed into the cylinder heads and sealed in place. The tubes are a thin wall design and caution must be taken when working in the spark plug tube area.

DIAGNOSIS AND TESTING

CYLINDER HEAD GASKET

A cylinder head gasket leak can be located between adjacent cylinders or between a cylinder and the adjacent water jacket.

Possible indications of the cylinder head gasket leaking between adjacent cylinders are:

- Loss of engine power
- Engine misfiring
- Poor fuel economy

Possible indications of the cylinder head gasket leaking between a cylinder and an adjacent water jacket are:

- Engine overheating
- Loss of coolant
- Excessive steam (white smoke) emitting from exhaust
- Coolant foaming

CYLINDER-TO-CYLINDER LEAKAGE TEST

To determine if an engine cylinder head gasket is leaking between the cylinders located next to each other, follow the procedures in Cylinder Compression Pressure Test. Refer to **CYLINDER COMPRESSION PRESSURE LEAKAGE** . An engine cylinder head gasket leaking between the cylinders will result in approximately a 50 - 70% reduction in compression pressure.

CYLINDER-TO-WATER JACKET LEAKAGE TEST

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING WITH COOLANT PRESSURE CAP REMOVED.

VISUAL TEST METHOD

With the engine cool, remove the coolant pressure cap. Start the engine and allow it to warm up until thermostat opens.

If a large combustion/compression pressure leak exists, bubbles will be visible in the coolant.

COOLING SYSTEM TESTER METHOD

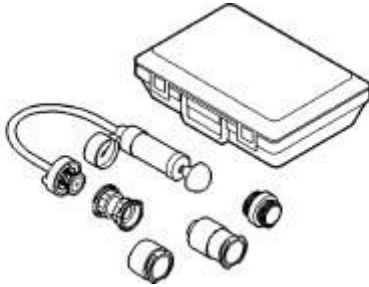


Fig. 87: Cooling System Pressure Tester - 7700-A
Courtesy of CHRYSLER GROUP, LLC

WARNING: WITH THE COOLING SYSTEM TESTER IN PLACE, PRESSURE WILL BUILD UP FAST. EXCESSIVE PRESSURE BUILT UP BY CONTINUOUS ENGINE OPERATION MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT THE PRESSURE TO EXCEED 138 kPa (20 psi).

Install Cooling System Tester (special tool #7700-A, Tester, Cooling System) or equivalent to pressure cap neck. Start the engine and observe the tester's pressure gauge. If gauge pulsates with every power stroke of a cylinder a combustion pressure leak is evident.

CHEMICAL TEST METHOD



Fig. 88: Bloc-Chek-Kit - C-3685-A
Courtesy of CHRYSLER GROUP, LLC

Combustion leaks into the cooling system can also be checked by using a (special tool #C-3685-A, Bloc-Chek Kit) or equivalent. Perform the test following the procedures supplied with the tool kit.

HYDRAULIC LASH ADJUSTER

A tappet-like noise may be produced from several items. Check the following items.

1. Engine oil level too high or too low. This may cause aerated oil to enter the adjusters and cause them to be spongy.
2. Insufficient running time after rebuilding cylinder head. Low speed running up to 1 hour may be required.
3. Turn engine off and let set for a few minutes before restarting. Repeat this several times after engine has reached normal operating temperature.

4. Low oil pressure.
 5. The oil restrictor in cylinder head gasket or the oil passage to the cylinder head is plugged with debris.
 6. Air ingested into oil due to broken or cracked oil pump pick up.
 7. Worn valve guides.
 8. Rocker arm ears contacting valve spring retainer.
 9. Rocker arm loose, adjuster stuck or at maximum extension and still leaves lash in the system.
 10. Oil leak or excessive cam bore wear in cylinder head.
 11. Faulty lash adjuster.
- Check lash adjusters for "sponginess" while installed in cylinder head and cam on camshaft at base circle. Depress part of rocker arm over adjuster. Normal adjusters should feel firm when pressed quickly. When pressed very slowly, lash adjusters should collapse.
 - Remove suspected lash adjusters, and replace.
 - Before installation, make sure adjusters are full of oil. This can be verified by little plunger travel when lash adjuster is depressed quickly.

REMOVAL

LEFT CYLINDER HEAD

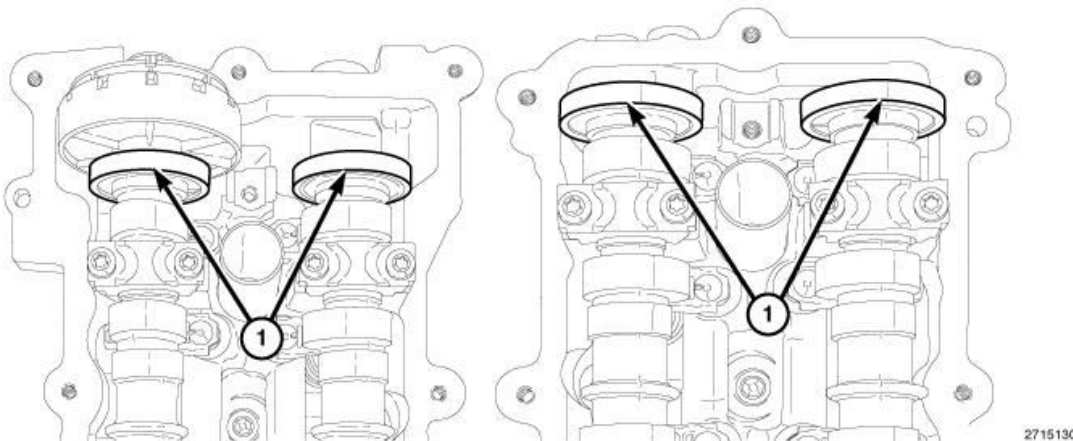


Fig. 89: Magnetic Timing Wheels
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.

1. Perform the fuel system pressure release procedure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE** .
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .

3. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .
4. Drain the cooling system. Refer to **STANDARD PROCEDURE** .
5. Drain the engine oil. Refer to **OIL, STANDARD PROCEDURE** .
6. Lower the vehicle.

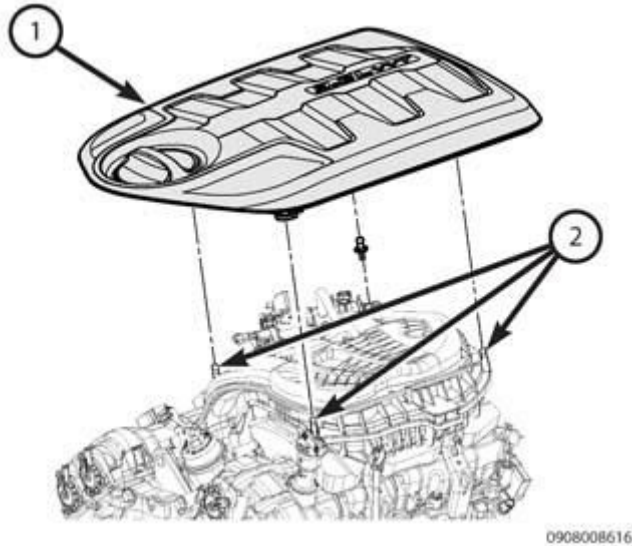
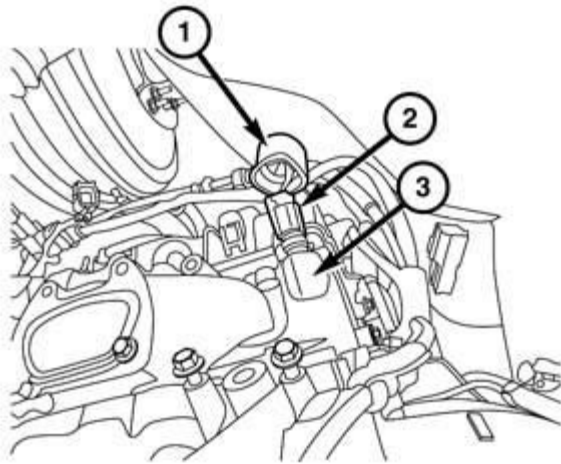


Fig. 90: Engine Cover & Ball Studs
Courtesy of CHRYSLER GROUP, LLC

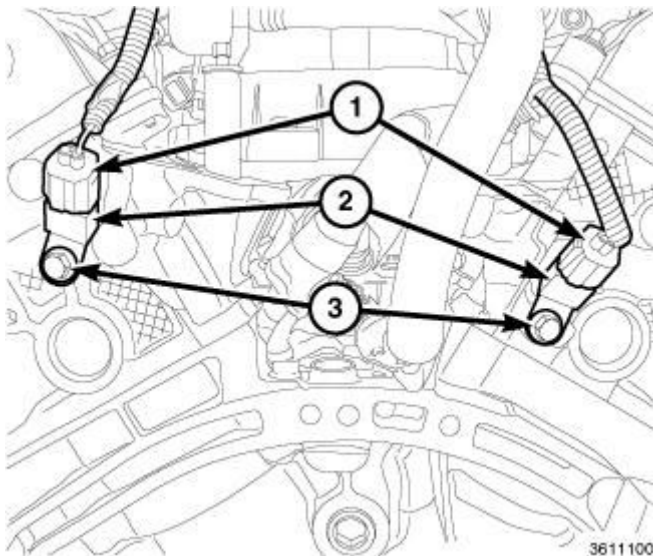
7. Remove the engine cover (1).
8. Recover the refrigerant from the A/C system. Refer to **PLUMBING, STANDARD PROCEDURE** .
9. Remove the air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL**.
10. Remove the air cleaner resonator. Refer to **RESONATOR, AIR CLEANER, REMOVAL**.
11. Remove the upper and lower intake manifolds and insulator. Refer to **MANIFOLD, INTAKE, REMOVAL**.
12. Remove the spark plugs. Refer to **SPARK PLUG, REMOVAL** .
13. Remove the PCM. Refer to **MODULE, POWERTRAIN CONTROL, REMOVAL** .



090873114

Fig. 91: Identifying Engine Coolant Temperature Sensor
Courtesy of CHRYSLER GROUP, LLC

14. Disconnect the Engine Coolant Temperature (ECT) sensor harness connector (2).



3611100

Fig. 92: Electrical Connector, Mounting Bolt & Ignition Capacitor
Courtesy of CHRYSLER GROUP, LLC

15. Disconnect the ignition coil capacitor harness connector (1).

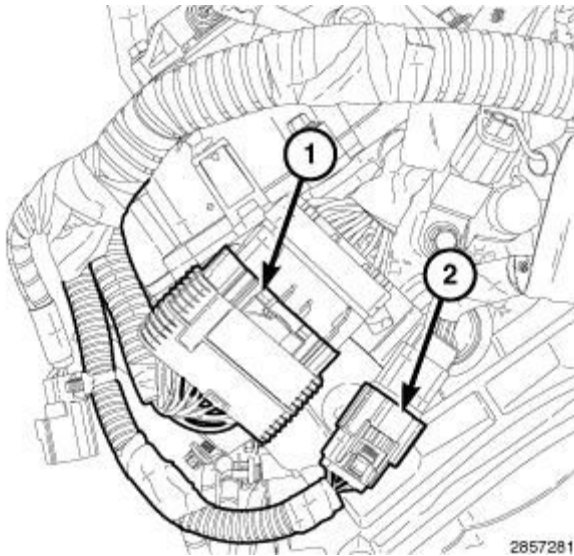
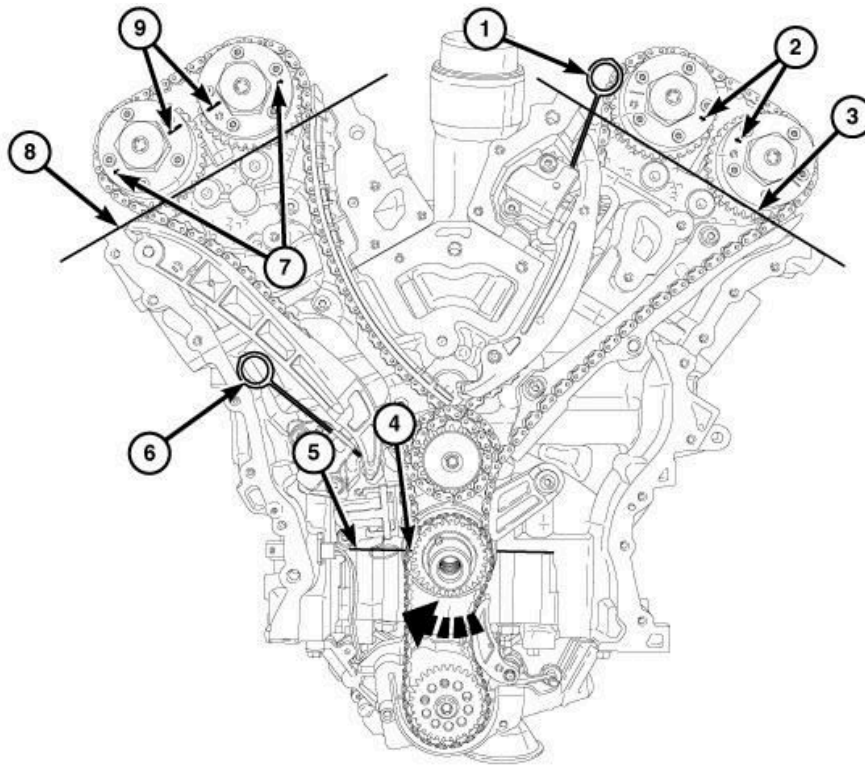


Fig. 93: Engine Injection/Ignition Harness & Engine Oil Pressure/Temperature Harness
Courtesy of CHRYSLER GROUP, LLC

16. Disconnect the main harness from the engine injection/ignition harness (1) at the rear of the left cylinder head.
17. Disconnect the main harness from the engine oil pressure/temperature harness (2) at the rear of the left cylinder head.
18. Remove the thermostat housing assembly. Refer to **THERMOSTAT, REMOVAL** .
19. Remove the engine timing cover. Refer to **COVER(S), ENGINE TIMING, REMOVAL**.
20. Remove the generator. Refer to **GENERATOR, REMOVAL** .

CAUTION: When aligning timing marks, always rotate engine by turning the crankshaft. Failure to do so will result in valve and/or piston damage.



2661245

Fig. 94: Rotating Crankshaft Clockwise To Position No. 1 Piston At TDC On Exhaust Stroke
Courtesy of CHRYSLER GROUP, LLC

21. Rotate the crankshaft clockwise to place the number one piston at TDC on the exhaust stroke by aligning the dimple (4) on the crankshaft with the block/bearing cap junction (5). The left side cam phaser arrows (2) should point toward each other and be parallel to the valve cover sealing surface (3). The right side cam phaser arrows (7) should point away from each other and the scribe lines (9) should be parallel to the valve cover sealing surface (8).

CAUTION: Always reinstall timing chains so that they maintain the same direction of rotation. Inverting a previously run chain on a previously run sprocket will result in excessive wear to both the chain and sprocket.

22. Mark the direction of rotation on the timing chain using a paint pen or equivalent to aid in reassembly.

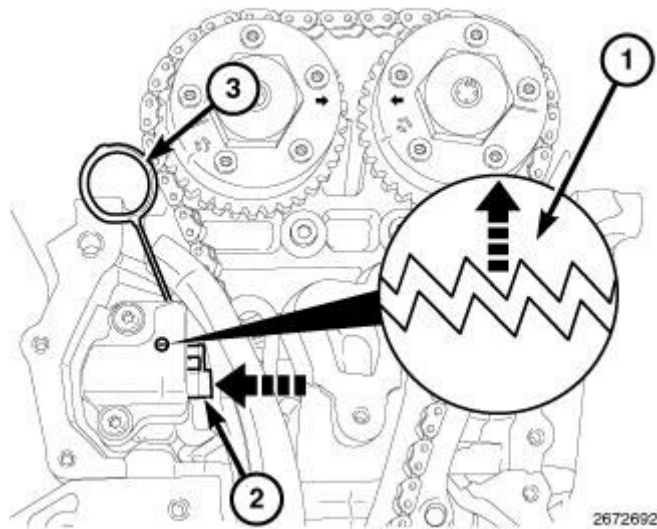


Fig. 95: Resetting Left Cam Chain Tensioner
Courtesy of CHRYSLER GROUP, LLC

CAUTION: When the timing chains are removed and the cylinder heads are still installed, **DO NOT** rotate the camshafts or crankshaft without first locating the proper crankshaft position. Failure to do so will result in valve and/or piston damage.

23. Reset the LH cam chain tensioner by lifting the pawl (1), pushing back the piston (2) and installing Tensioner Pin (special tool #8514, Pins, Tensioner) (3). Refer to **VALVE TIMING - STANDARD PROCEDURE** .

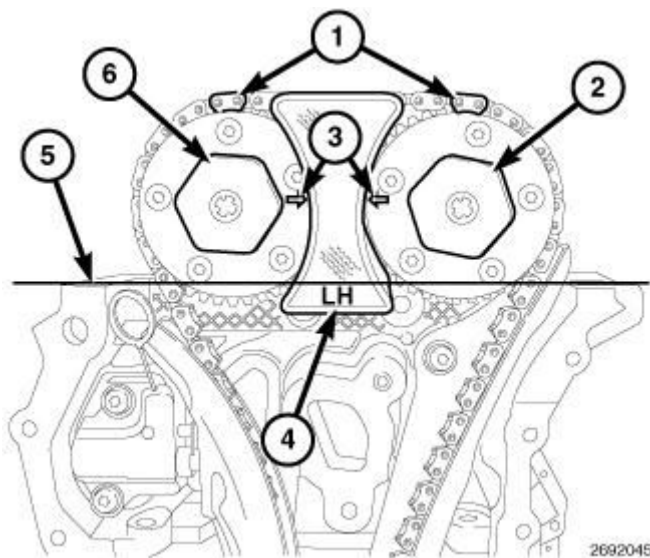
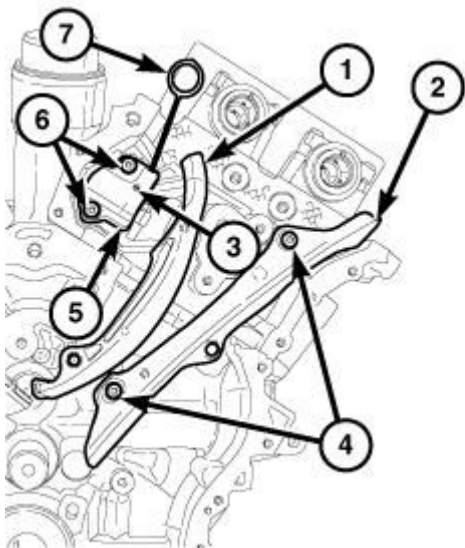


Fig. 96: Phaser Timing Marks, Oil Control Valves & LH Camshaft Phaser Lock
Courtesy of CHRYSLER GROUP, LLC

NOTE: Minor rotation of a camshaft (a few degrees) may be required to install the camshaft phaser lock.

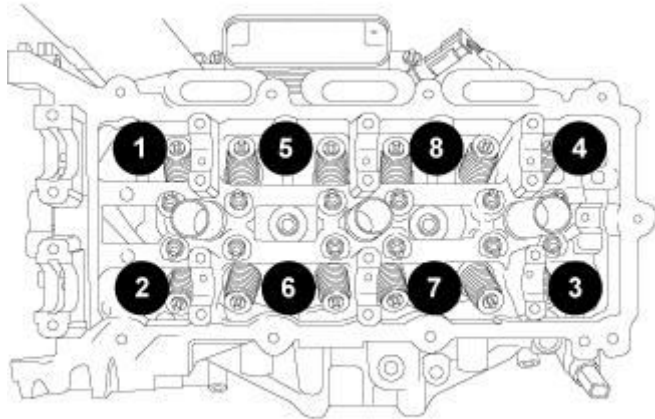
24. Install the LH Camshaft Phaser Lock (special tool #10202, Locks, Camshaft/Phaser) (4).
25. Loosen the intake oil control valve (6) and exhaust oil control valve (2).
26. Remove the LH Camshaft Phaser Lock (special tool #10202, Locks, Camshaft/Phaser) (4).
27. Remove the oil control valve (2) from the left side exhaust cam phaser and pull the phaser off of the camshaft.
28. Remove the oil control valve (6) from the left side intake cam phaser and pull the phaser off of the camshaft.



2659731

Fig. 97: Left Cam Chain Tensioner, Arm, Guide & Bolts
Courtesy of CHRYSLER GROUP, LLC

29. Remove the LH cam chain tensioner arm (1).
30. Remove two T30 bolts (6) and the LH cam chain tensioner (5).
31. Remove two T30 bolts (4) and the LH cam chain guide (2).



2692295

Fig. 98: Cylinder Head Retaining Bolt Removal Sequence - Left
Courtesy of CHRYSLER GROUP, LLC

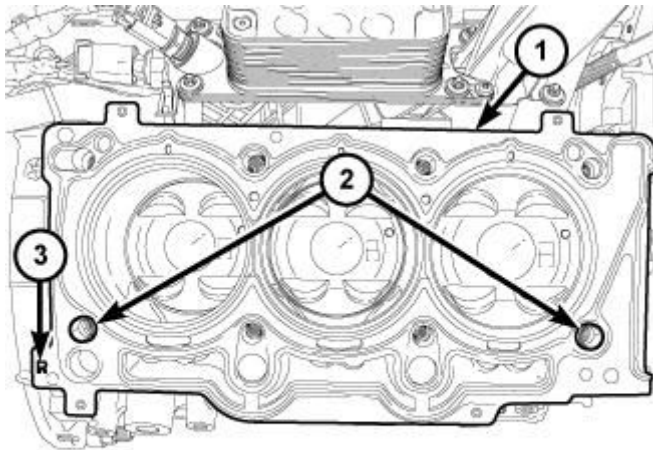
32. Remove the left camshafts. Refer to CAMSHAFT, ENGINE, REMOVAL.

NOTE: If the rocker arms are to be reused, identify their positions so that they can be reassembled into their original locations.

33. Remove the rocker arms. Refer to ROCKER ARM, VALVE, REMOVAL.

NOTE: If the hydraulic lifters are to be reused, identify their positions so that they can be reassembled into their original locations.

34. If required, remove the hydraulic lifters. Refer to LIFTER(S), HYDRAULIC, REMOVAL.
35. Using the sequence shown in illustration, remove the cylinder head retaining bolts.



2800384

Fig. 99: Head Gasket & Locating Dowels
Courtesy of CHRYSLER GROUP, LLC

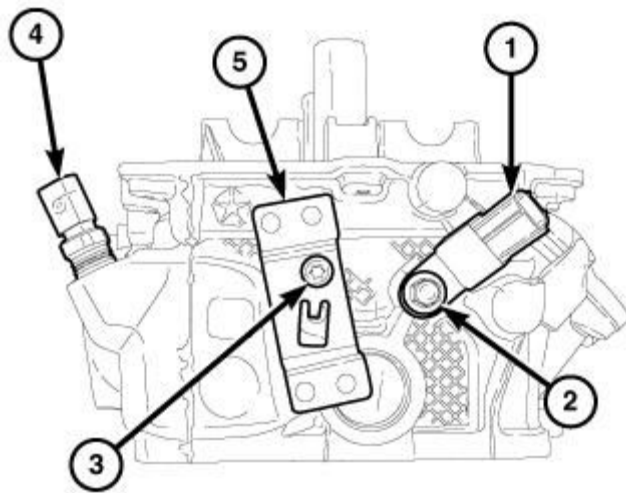
NOTE: Right head gasket shown in illustration, left head gasket similar.

WARNING: The multi-layered steel head gaskets have very sharp edges that could cause personal injury if not handled carefully.

NOTE: The head gasket (1) crimps the locating dowels (2) and the dowels may pull out of the engine block when the head gasket is removed.

CAUTION: Do not lay the cylinder head on its gasket sealing surface, due to the design of the cylinder head gasket, any distortion to the cylinder head sealing surface may prevent the gasket from properly sealing resulting in leaks.

36. Remove the cylinder head and gasket (1). Discard the gasket.

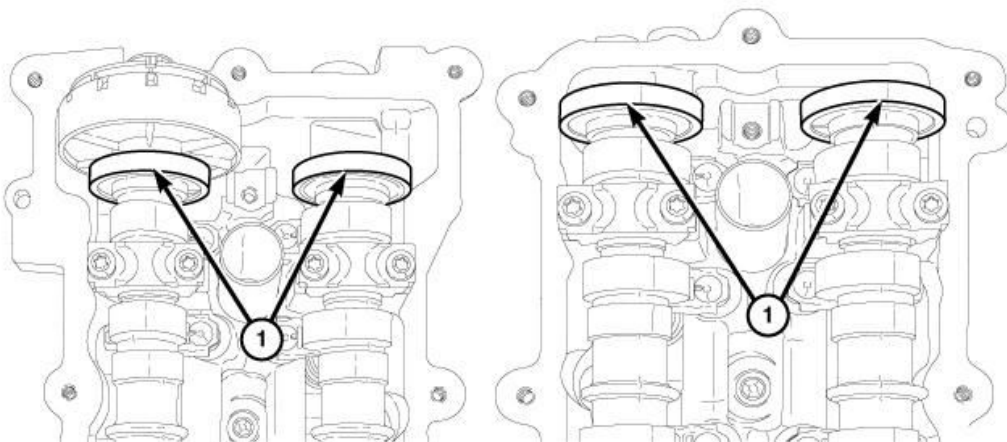


2876978

Fig. 100: ECT Sensor, Ignition Coil Capacitor, Engine Wire Harness Retainer Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

37. If required, remove the Engine Coolant Temperature (ECT) sensor (4).
38. If required, remove the bolt (2) and the ignition coil capacitor (1).
39. If required, remove the bolt (3) and the engine wire harness retainer bracket (5).

RIGHT CYLINDER HEAD



2715130

Fig. 101: Magnetic Timing Wheels
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.

1. Perform the fuel system pressure release procedure. Refer to **FUEL SYSTEM PRESSURE RELEASE**

PROCEDURE .

2. Disconnect and isolate the negative battery cable.
3. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
4. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .
5. Drain the cooling system. Refer to **STANDARD PROCEDURE** .
6. Drain the engine oil. Refer to **OIL, STANDARD PROCEDURE** .
7. Remove the right side catalytic converter. Refer to **CONVERTER, CATALYTIC , REMOVAL** .
8. Lower the vehicle.

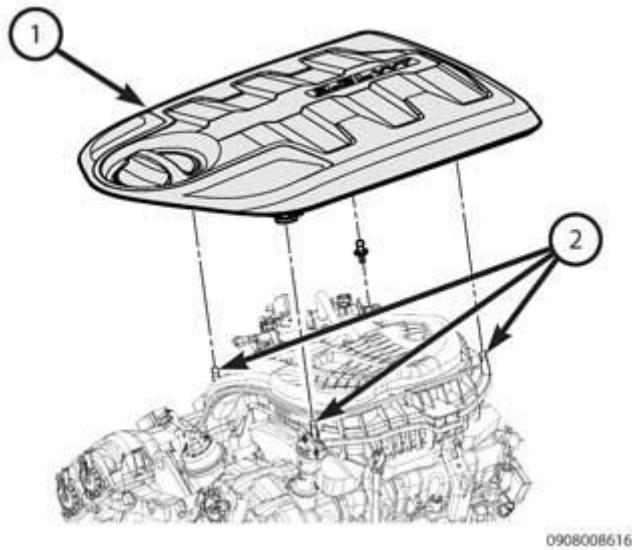


Fig. 102: Engine Cover & Ball Studs
 Courtesy of CHRYSLER GROUP, LLC

9. Remove the engine cover (1).
10. Recover the refrigerant from the A/C system. Refer to **PLUMBING, STANDARD PROCEDURE** .
11. Remove the air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL** .
12. Remove the air cleaner resonator. Refer to **RESONATOR, AIR CLEANER, REMOVAL** .
13. Remove the upper and lower intake manifolds and insulator. Refer to **MANIFOLD, INTAKE, REMOVAL** .
14. Remove the spark plugs. Refer to **SPARK PLUG, REMOVAL** .

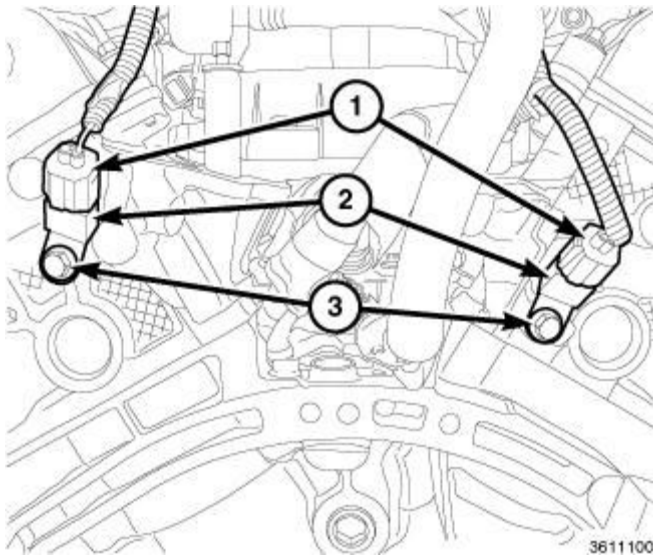


Fig. 103: Electrical Connector, Mounting Bolt & Ignition Capacitor
 Courtesy of CHRYSLER GROUP, LLC

15. Disconnect the ignition coil capacitor harness connector (1).
16. Remove the engine timing cover. Refer to **COVER(S), ENGINE TIMING, REMOVAL**.

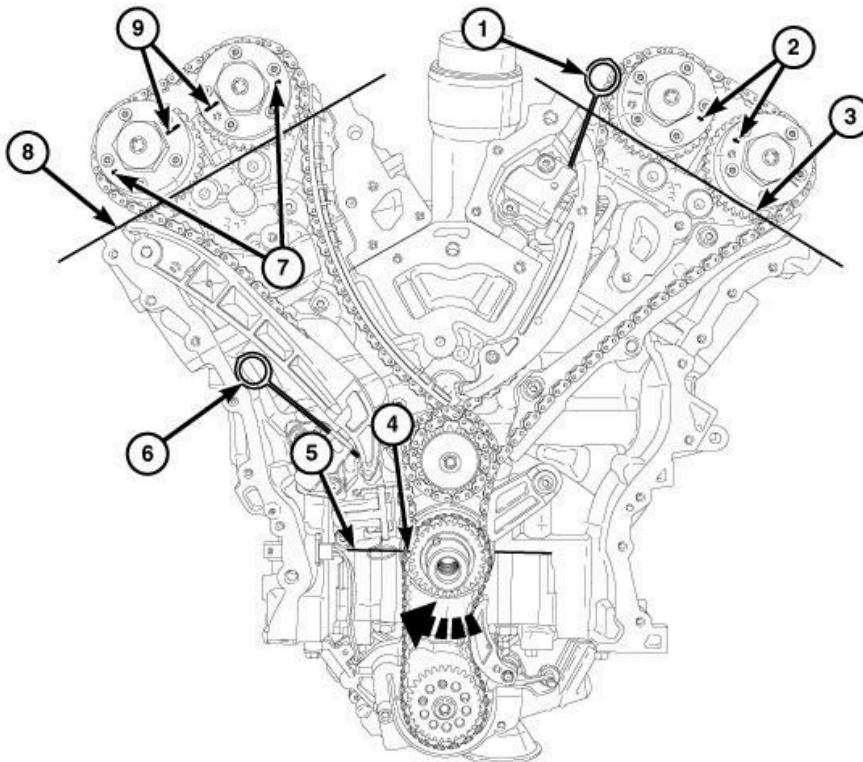


Fig. 104: Rotating Crankshaft Clockwise To Position No. 1 Piston At TDC On Exhaust Stroke
 Courtesy of CHRYSLER GROUP, LLC

CAUTION: When aligning timing marks, always rotate engine by turning the crankshaft. Failure to do so will result in valve and/or piston damage.

17. Rotate the crankshaft clockwise to place the number one piston at TDC on the exhaust stroke by aligning the dimple (4) on the crankshaft with the block/bearing cap junction (5). The left side cam phaser arrows (2) should point toward each other and be parallel to the valve cover sealing surface (3). The right side cam phaser arrows (7) should point away from each other and the scribe lines (9) should be parallel to the valve cover sealing surface (8).

CAUTION: Always reinstall timing chains so that they maintain the same direction of rotation. Inverting a previously run chain on a previously run sprocket will result in excessive wear to both the chain and sprocket.

18. Mark the direction of rotation on the timing chain using a paint pen or equivalent to aid in reassembly.

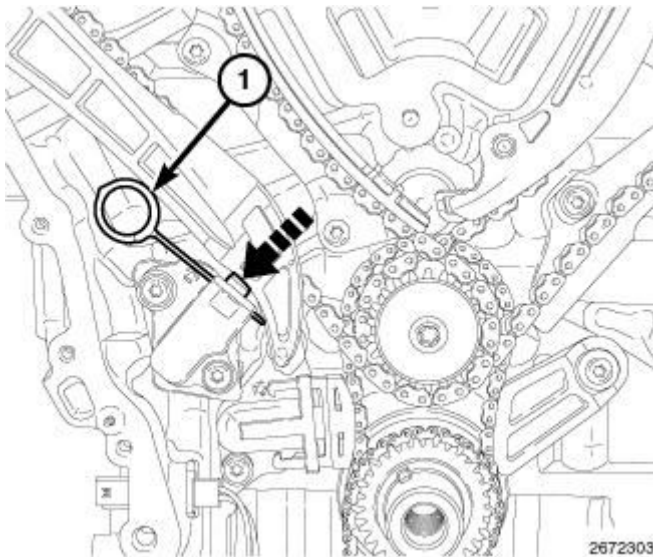


Fig. 105: Resetting Right Cam Chain Tensioner
Courtesy of CHRYSLER GROUP, LLC

CAUTION: When the timing chains are removed and the cylinder heads are still installed, DO NOT rotate the camshafts or crankshaft without first locating the proper crankshaft position. Failure to do so will result in valve and/or piston damage.

19. Reset the RH cam chain tensioner by pushing back the tensioner piston and installing Tensioner Pin (special tool #8514, Pins, Tensioner) (1).

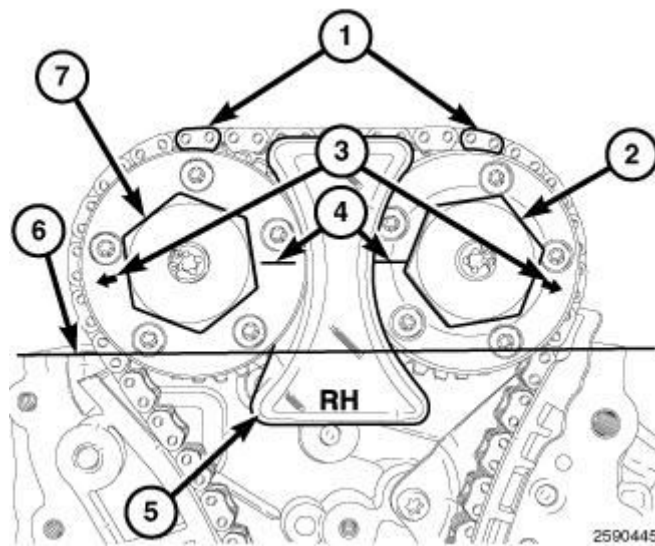


Fig. 106: Phaser Timing Marks, Oil Control Valves & RH Camshaft Phaser Lock
Courtesy of CHRYSLER GROUP, LLC

NOTE: Minor rotation of a camshaft (a few degrees) may be required to install the camshaft phaser lock.

20. Install the RH Camshaft Phaser Lock (special tool #10202, Locks, Camshaft/Phaser) (5).
21. Loosen the intake oil control valve (2) and exhaust oil control valve (7).
22. Remove the RH Camshaft Phaser Lock (special tool #10202, Locks, Camshaft/Phaser) (5).
23. Remove the oil control valve (2) from the right side intake cam phaser and pull the phaser off of the camshaft.
24. Remove the oil control valve (7) from the right side exhaust cam phaser and pull the phaser off of the camshaft.

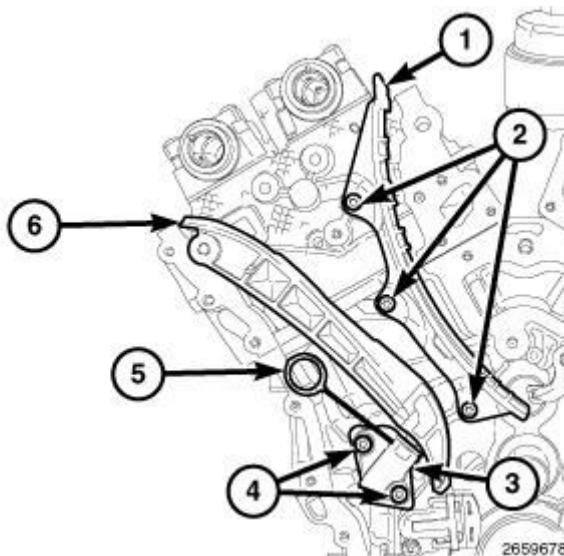


Fig. 107: Right Cam Chain Tensioner, Arm, Guide & Bolts
Courtesy of CHRYSLER GROUP, LLC

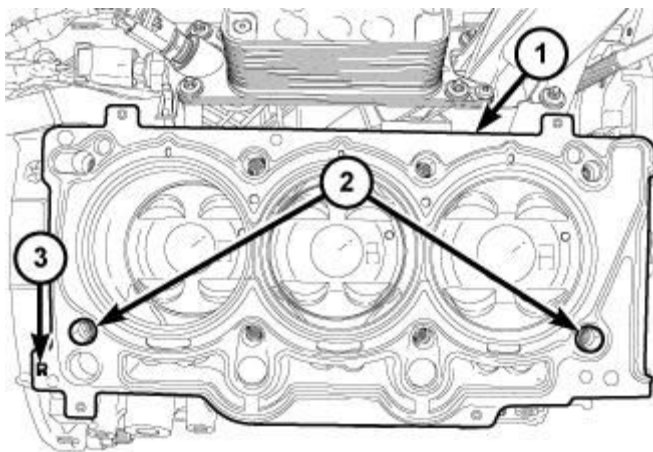
25. Remove the RH cam chain tensioner arm (6).
26. Remove two T30 bolts (4) and the RH cam chain tensioner (3).
27. Remove three T30 bolts (2) and the RH cam chain guide (1).
28. Remove the right camshafts. Refer to CAMSHAFT, ENGINE, REMOVAL.

NOTE: If the rocker arms are to be reused, identify their positions so that they can be reassembled into their original locations.

29. Remove the rocker arms. Refer to ROCKER ARM, VALVE, REMOVAL.

NOTE: If the hydraulic lifters are to be reused, identify their positions so that they can be reassembled into their original locations.

30. If required, remove the hydraulic lifters. Refer to LIFTER(S), HYDRAULIC, REMOVAL.
31. Using the sequence shown in illustration, remove the cylinder head retaining bolts.



2800384

Fig. 108: Head Gasket & Locating Dowels
Courtesy of CHRYSLER GROUP, LLC

WARNING: The multi-layered steel head gaskets have very sharp edges that could cause personal injury if not handled carefully.

NOTE: The head gasket (1) crimps the locating dowels (2) and the dowels may pull out of the engine block when the head gasket is removed.

32. Remove the cylinder head and gasket. Discard the gasket.

CAUTION: Do not lay the cylinder head on its gasket sealing surface, due to the design of the cylinder head gasket, any distortion to the cylinder head sealing surface may prevent the gasket from properly sealing resulting in leaks.

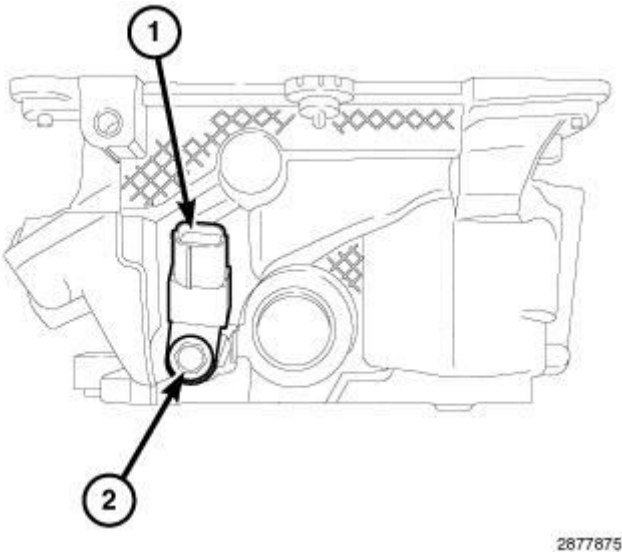


Fig. 109: Ignition Coil Capacitor & Bolt
Courtesy of CHRYSLER GROUP, LLC

33. If required, remove the bolt (2) and the ignition coil capacitor (1).

CLEANING

CLEANING

CAUTION: When cleaning cylinder head and cylinder block surfaces, DO NOT use a metal scraper because the surfaces could be cut or ground. Use ONLY a wooden or plastic scraper.

To ensure engine gasket sealing, proper surface preparation must be performed, especially with aluminum engine components and multi-layer steel cylinder head gaskets.

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

1. Remove all gasket material from cylinder head and block. Refer to **ENGINE, STANDARD PROCEDURE**. Be careful not to gouge or scratch the aluminum head sealing surface.
2. Clean all engine oil passages.

CAUTION: Non-compressible debris such as oil, coolant or RTV sealants that are not removed from bolt holes can cause the aluminum casting to crack when tightening the bolts.

3. Clean out the cylinder head bolt holes in the engine block.

DO NOT USE any adhesives when installing the MLS head gaskets. The use of adhesives may cause the gasket not to seal properly and may leak. MLS gaskets are to be installed on a surface free of debris and oils.

INSPECTION

INSPECTION

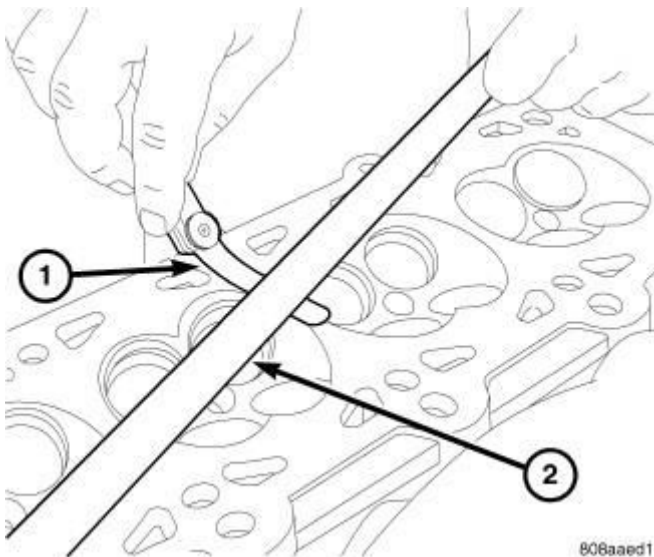


Fig. 110: Checking Cylinder Head Flatness
Courtesy of CHRYSLER GROUP, LLC

1. Check the cylinder head for warping with a straight edge (2) and feeler gauge (1).
2. Cylinder head must be flat within specification. Refer to **ENGINE SPECIFICATIONS**.
3. Verify that the valve tappets move freely in their bores and that they have been rotating.
4. Inspect camshaft bearing journals for scoring.
5. Remove carbon and varnish deposits from inside of valve guides with a reliable guide cleaner.
6. Inspect the following components and verify that they are within specification. Refer to **ENGINE SPECIFICATIONS**.
 - Camshafts
 - Valve Tappets
 - Springs
 - Valve Seats

- Valve Guides
- Valves

INSTALLATION

LEFT CYLINDER HEAD

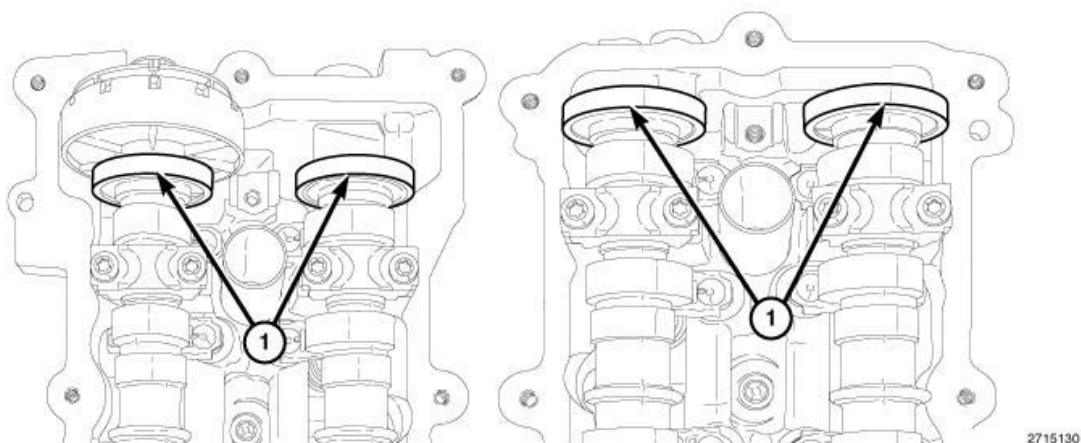


Fig. 111: Magnetic Timing Wheels
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.

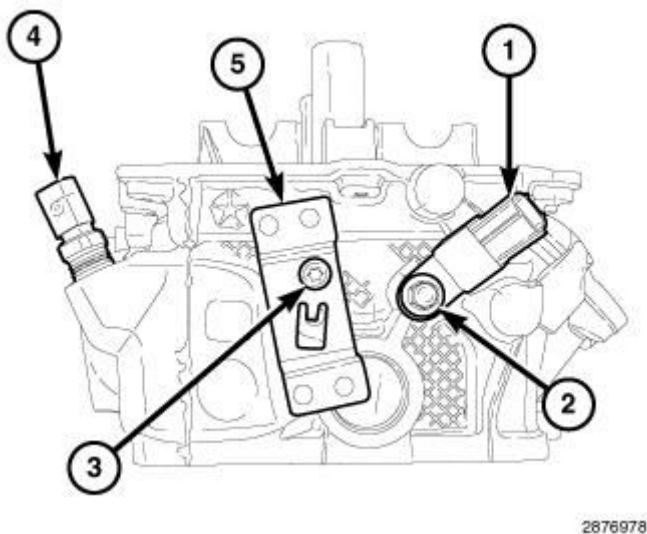


Fig. 112: ECT Sensor, Ignition Coil Capacitor, Engine Wire Harness Retainer Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. If removed, install the Engine Coolant Temperature (ECT) sensor (4) and tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
2. If removed, install the ignition coil capacitor (1). Tighten the bolt (2) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
3. If removed, install the engine wire harness retainer bracket (5). Tighten the bolt (3) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .

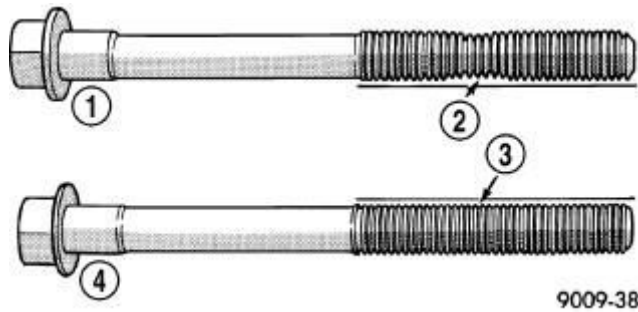


Fig. 113: Checking Cylinder Head Bolts For Stretching (Necking)
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The cylinder head bolts are tightened using a torque plus angle procedure. The bolts must be examined **BEFORE** reuse. If the threads are necked down the bolts must be replaced.

NOTE: Typical cylinder head bolt shown in illustration.

4. Check cylinder head bolts for necking by holding a scale or straight edge against the threads. If all of the threads do not contact the scale (2) the bolt must be replaced.

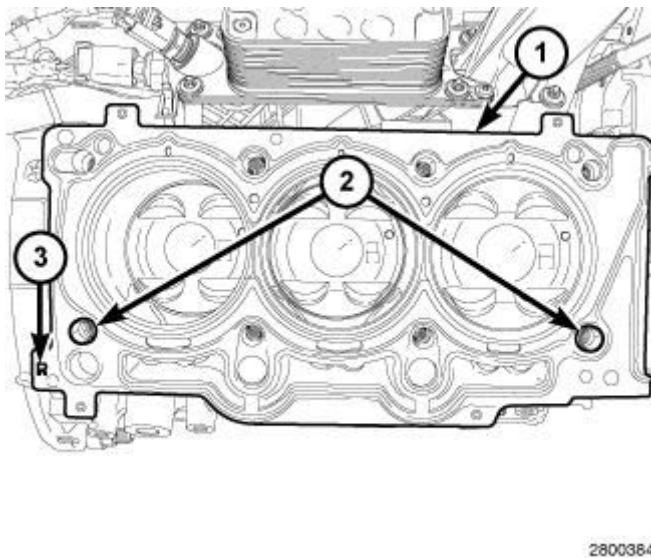


Fig. 114: Head Gasket & Locating Dowels
Courtesy of CHRYSLER GROUP, LLC

NOTE: Right head gasket shown in illustration, left head gasket similar.

CAUTION: When cleaning cylinder head and cylinder block surfaces, **DO NOT** use a metal scraper because the surfaces could be cut or ground. Use **ONLY** a wooden or plastic scraper.

5. Clean and prepare the gasket sealing surfaces of the cylinder head and block. Refer to **ENGINE, STANDARD PROCEDURE**.

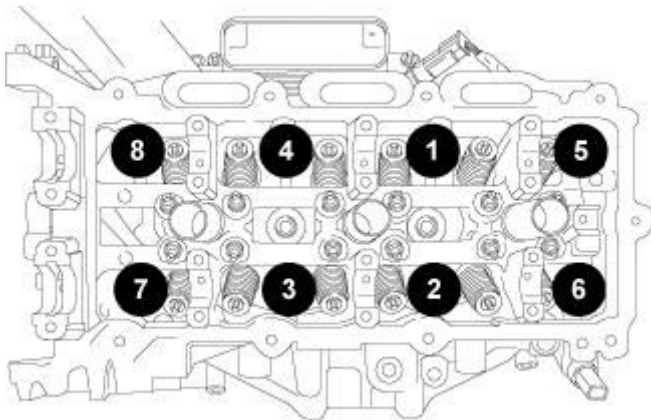
CAUTION: Non-compressible debris such as oil, coolant or RTV sealants that are not removed from bolt holes can cause the aluminum casting to crack when tightening the bolts.

6. Clean out the cylinder head bolt holes in the engine block.

WARNING: The multi-layered steel head gaskets have very sharp edges that could cause personal injury if not handled carefully.

CAUTION: The installation of the cylinder head gaskets are not interchangeable between the left and right cylinder heads. They are clearly marked (3) with "R" for right and "L" for left. They must be applied on a dry surface, without the use of any adhesives.

7. Position the new cylinder head gasket (1) on the locating dowels (2).



2692178

Fig. 115: Cylinder Head Retaining Bolt Tightening Sequence - Left
Courtesy of CHRYSLER GROUP, LLC

8. Using care, position the cylinder head onto the engine block.

NOTE: Do not apply any oil to the bolt threads.

9. Install the eight head bolts finger tight.
10. Tighten the cylinder head bolts in the sequence shown in illustration, following this 9-step torque plus angle method. Tighten according to the following torque values:
 - Step 1: All to 30 N.m (22 ft. lbs.)
 - Step 2: All to 45 N.m (33 ft. lbs.)
 - Step 3: All + 75° Turn **Do not use a torque wrench for this step.**
 - Step 4: All + 50° Turn **Do not use a torque wrench for this step.**
 - Step 5: Loosen all fasteners in reverse of sequence shown in illustration
 - Step 6: All to 30 N.m (22 ft. lbs.)
 - Step 7: All to 45 N.m (33 ft. lbs.)
 - Step 8: All + 70° Turn **Do not use a torque wrench for this step.**
 - Step 9: All + 70° Turn **Do not use a torque wrench for this step.**

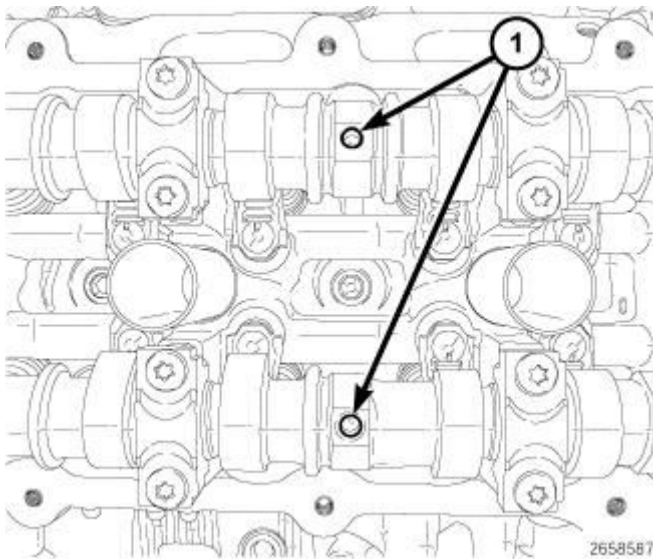


Fig. 116: Positioning Camshaft Alignment Holes Vertically
Courtesy of CHRYSLER GROUP, LLC

NOTE: If the hydraulic lifters are being reused, reassemble them into their original locations.

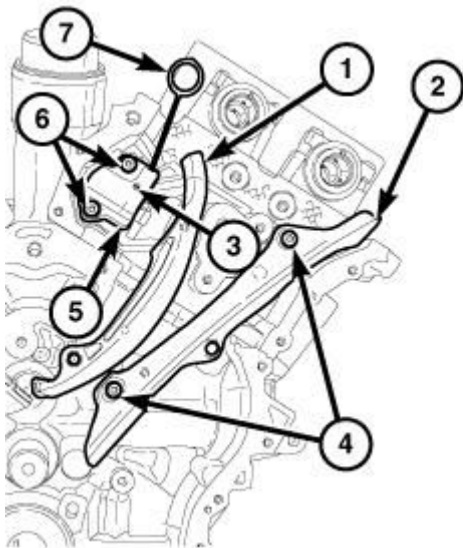
11. If removed, install the hydraulic lifters. Refer to LIFTER(S), HYDRAULIC, INSTALLATION.

NOTE: If the rocker arms are being reused, reassemble them into their original locations.

CAUTION: Do not rotate the camshafts more than a few degrees independently

of the crankshaft. Valve to piston contact could occur resulting in possible valve damage. If the camshafts need to be rotated more than a few degrees, first move the pistons away from the cylinder heads by rotating the crankshaft counterclockwise to a position 30° before-top-dead-center. Once the camshafts are returned to their top-dead-center position, rotate the crankshaft clockwise to return the crankshaft to top-dead-center.

12. Install the rocker arms and camshafts. Refer to CAMSHAFT, ENGINE, INSTALLATION.



2659731

Fig. 117: Left Cam Chain Tensioner, Arm, Guide & Bolts
Courtesy of CHRYSLER GROUP, LLC

13. Install the LH cam chain guide (2) with two bolts (4). Tighten the bolts to the proper specification. Refer to TORQUE SPECIFICATIONS.
14. Install the LH cam chain tensioner (5) to the cylinder head with two bolts (6). Tighten the bolts to the proper specification. Refer to TORQUE SPECIFICATIONS.
15. Reset the LH cam chain tensioner (5) by lifting the pawl (3), pushing back the piston and installing Tensioner Pin (special tool #8514, Pins, Tensioner) (7). Refer to VALVE TIMING - STANDARD PROCEDURE.
16. Install the LH tensioner arm (1).

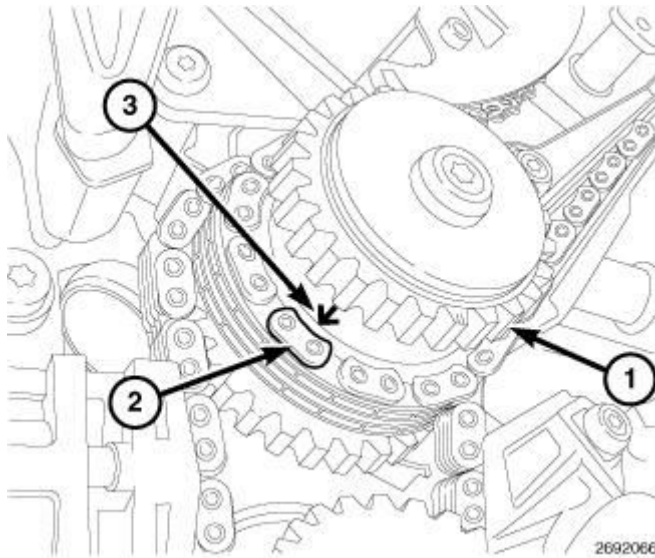


Fig. 118: Idler Sprocket, Plated Link & Arrow
 Courtesy of CHRYSLER GROUP, LLC

17. Press the LH intake cam phaser onto the intake camshaft. Install and hand tighten the oil control valve.

CAUTION: Always reinstall timing chains so that they maintain the same direction of rotation. Inverting a previously run chain on a previously run sprocket will result in excessive wear to both the chain and sprocket.

18. Drape the left side cam chain over the LH intake cam phaser and onto the idler sprocket (1) so that the arrow (3) is aligned with the plated link (2) on the cam chain.

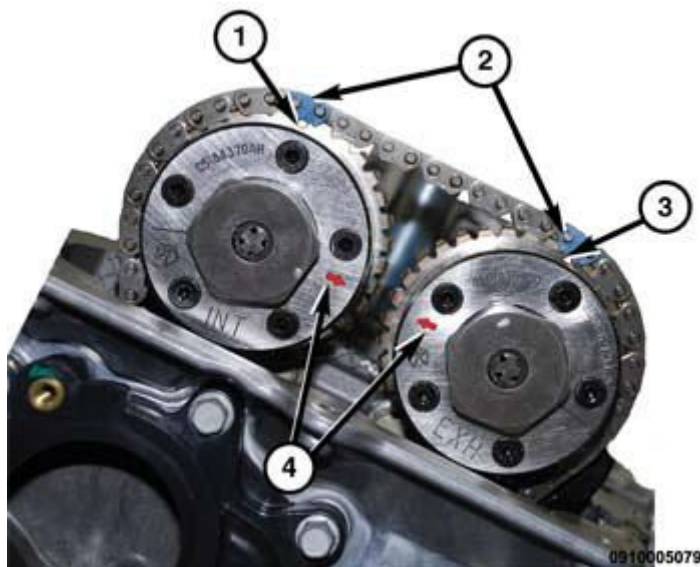


Fig. 119: Aligning Timing Marks

Courtesy of CHRYSLER GROUP, LLC

19. While maintaining this alignment, route the cam chain around the exhaust and intake cam phasers so that the plated links (2) are aligned with the phaser timing marks (1, 3). Position the cam phasers so that the arrows (4) point toward each other and are parallel to the valve cover sealing surface. Press the exhaust cam phaser onto the exhaust cam, install and hand tighten the oil control valve.

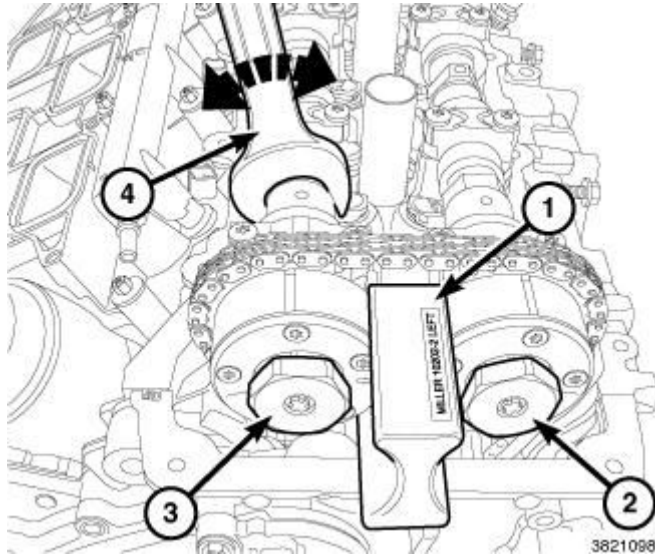
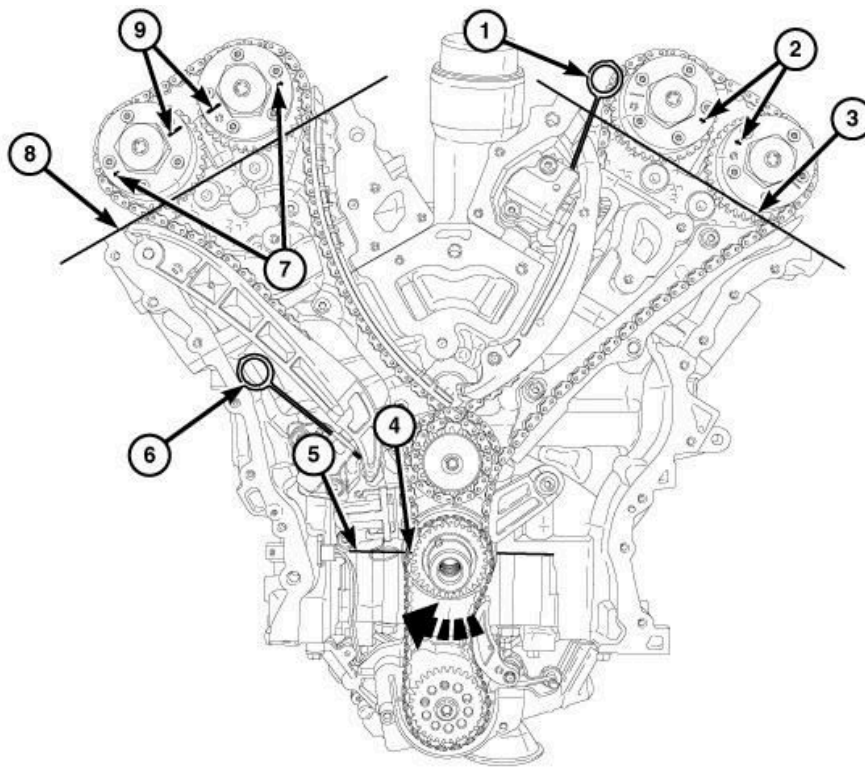


Fig. 120: Camshaft Phaser Lock, Oil Control Valves & Wrench
Courtesy of CHRYSLER GROUP, LLC

NOTE: Minor rotation of a camshaft (a few degrees) may be required to install the camshaft phaser or phaser lock.

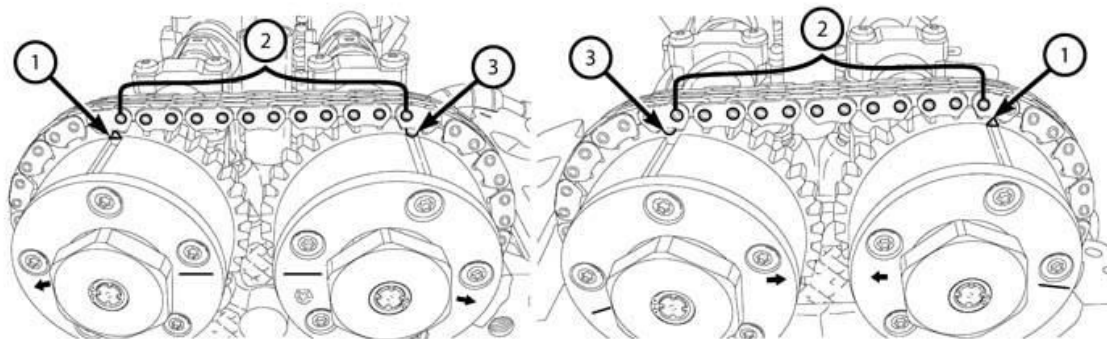
20. Install the LH Camshaft Phaser Lock (special tool #10202, Locks, Camshaft/Phaser) (1) and tighten the oil control valves (2, 3) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .



2661245

Fig. 121: Rotating Crankshaft Clockwise To Position No. 1 Piston At TDC On Exhaust Stroke
Courtesy of CHRYSLER GROUP, LLC

21. Remove the LH Camshaft Phaser Lock (special tool #10202, Locks, Camshaft/Phaser).
22. Remove the Tensioner Pin (special tool #8514, Pins, Tensioner) (1) from the LH cam chain tensioner.
23. Rotate the crankshaft clockwise two complete revolutions stopping when the dimple (4) on the crankshaft is aligned the with the block/bearing cap junction (5).
24. While maintaining this alignment, verify that the arrows on the left side cam phasers (2) point toward each other and are parallel to the valve cover sealing surface (3) and that the right side cam phaser arrows (7) point away from each other and the scribe lines (9) are parallel to the valve cover sealing surface (8).



2714685

Fig. 122: Chain Pins, Exhaust Cam Phaser Triangle Marking & Circle Marking

Courtesy of CHRYSLER GROUP, LLC

25. There should be 12 chain pins (2) between the exhaust cam phaser triangle marking (1) and the intake cam phaser circle marking (3).
26. If the engine timing is not correct, loosen the timing chain by resetting the cam chain tensioner and repeat the camshaft alignment procedure. Refer to **VALVE TIMING - STANDARD PROCEDURE** .
27. Install the generator. Refer to **GENERATOR, INSTALLATION** .
28. Install the engine timing cover. Refer to **COVER(S), ENGINE TIMING, INSTALLATION** .
29. Install the spark plugs. Refer to **SPARK PLUG, INSTALLATION** .

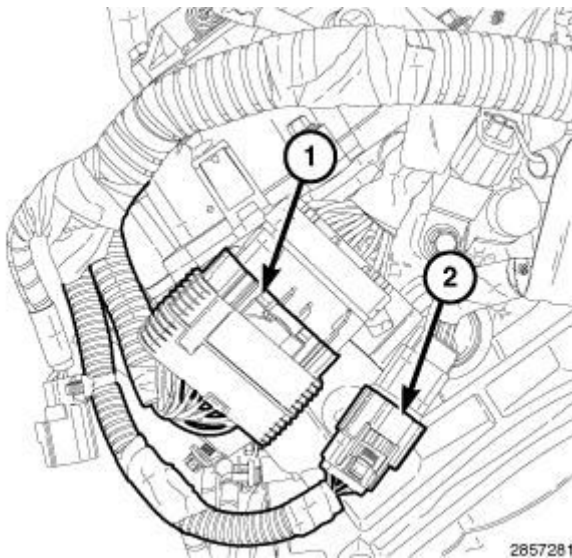


Fig. 123: Engine Injection/Ignition Harness & Engine Oil Pressure/Temperature Harness
Courtesy of CHRYSLER GROUP, LLC

30. Connect the main harness to the engine oil pressure/temperature harness (2) at the rear of the left cylinder head.
31. Connect the main harness to the engine injection/ignition harness (1) at the rear of the left cylinder head.

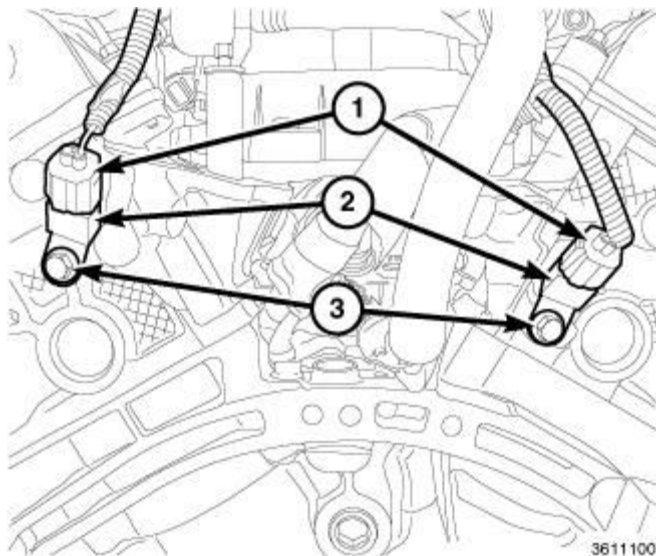


Fig. 124: Electrical Connector, Mounting Bolt & Ignition Capacitor
Courtesy of CHRYSLER GROUP, LLC

32. Connect the ignition coil capacitor harness connector (1).

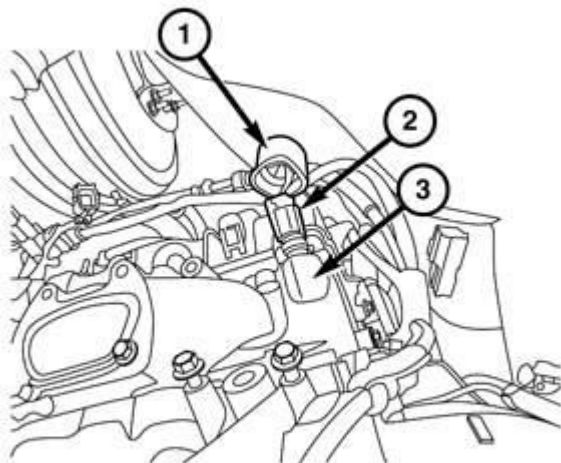


Fig. 125: Identifying Engine Coolant Temperature Sensor
Courtesy of CHRYSLER GROUP, LLC

33. Connect the Engine Coolant Temperature (ECT) sensor harness connector (2).
34. Install the lower and upper intake manifolds and insulator. Refer to **MANIFOLD, INTAKE, INSTALLATION**.

35. Install the Powertrain Control Module (PCM). Refer to **MODULE, POWERTRAIN CONTROL, INSTALLATION** .
36. Install the air resonator. Refer to **RESONATOR, AIR CLEANER, INSTALLATION**.
37. Install the air cleaner body. Refer to **BODY, AIR CLEANER, INSTALLATION**.
38. Evacuate and charge the A/C system. Refer to **PLUMBING, STANDARD PROCEDURE** .

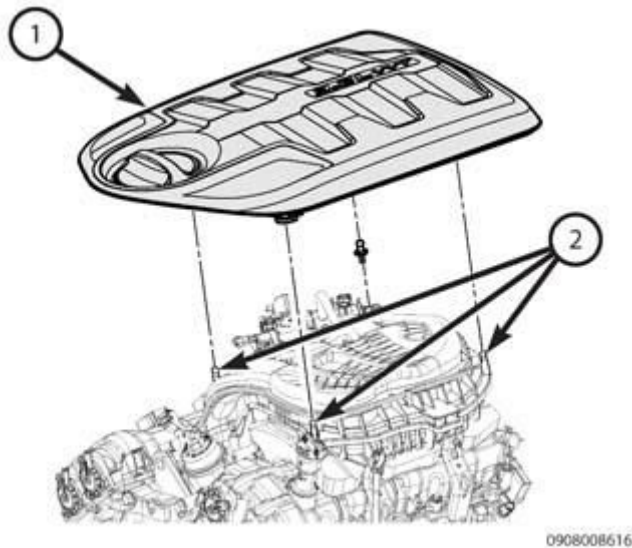


Fig. 126: Engine Cover & Ball Studs
Courtesy of CHRYSLER GROUP, LLC

39. Install the engine cover (1).
40. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL, STANDARD PROCEDURE** .
41. Fill the cooling system. Refer to **STANDARD PROCEDURE** .
42. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
43. Install the belly pan. Refer to **BELLY PAN, INSTALLATION** .
44. Lower the vehicle.
45. Connect the negative battery cable and tighten nut to the proper specification. Refer to **SPECIFICATIONS** .
46. Run the engine until it reaches normal operating temperature. Check cooling system for correct fluid level. Refer to **STANDARD PROCEDURE** .

NOTE: The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components.

RIGHT CYLINDER HEAD

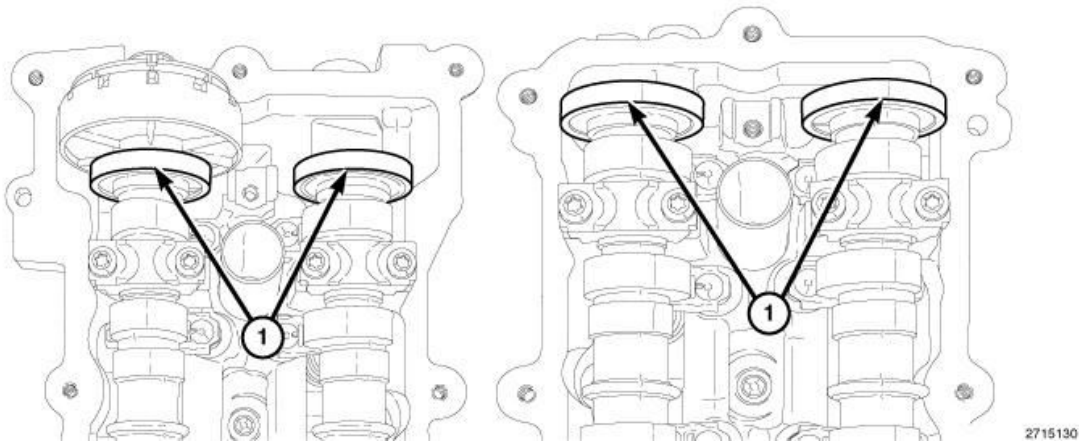


Fig. 127: Magnetic Timing Wheels
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.

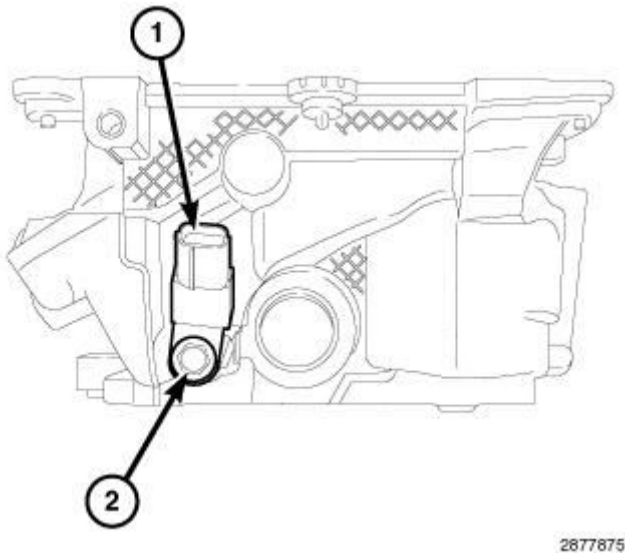


Fig. 128: Ignition Coil Capacitor & Bolt
Courtesy of CHRYSLER GROUP, LLC

1. If removed, install the ignition coil capacitor (1). Tighten the bolt (2) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .

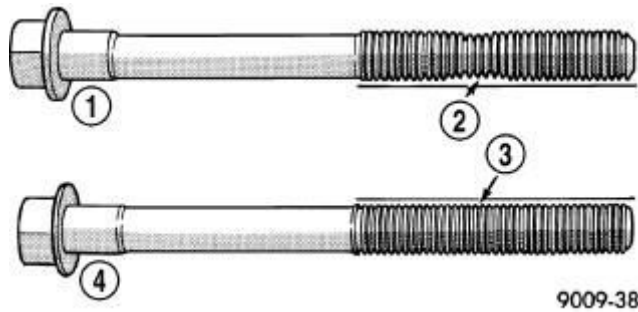


Fig. 129: Checking Cylinder Head Bolts For Stretching (Necking)
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The cylinder head bolts are tightened using a torque plus angle procedure. The bolts must be examined **BEFORE** reuse. If the threads are necked down the bolts must be replaced.

NOTE: Typical cylinder head bolt shown in illustration.

2. Check cylinder head bolts for necking by holding a scale or straight edge against the threads. If all the threads do not contact the scale (2) the bolt must be replaced.

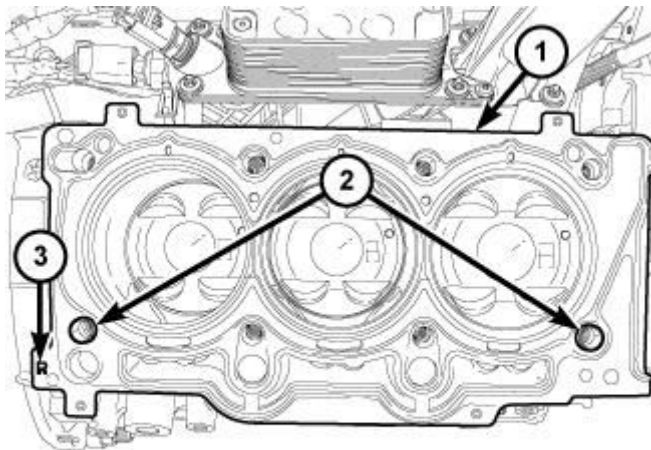


Fig. 130: Head Gasket & Locating Dowels
Courtesy of CHRYSLER GROUP, LLC

CAUTION: When cleaning cylinder head and cylinder block surfaces, **DO NOT** use a metal scraper because the surfaces could be cut or ground. Use **ONLY** a wooden or plastic scraper.

3. Clean and prepare the gasket sealing surfaces of the cylinder head and block. Refer to **ENGINE, STANDARD PROCEDURE**.

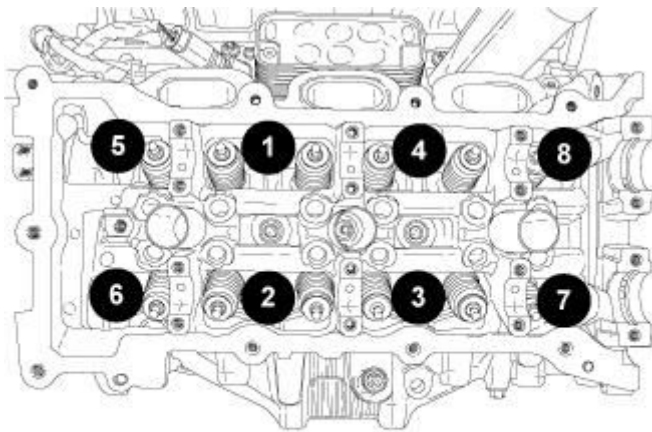
CAUTION: Non-compressible debris such as oil, coolant or RTV sealants that are not removed from bolt holes can cause the aluminum casting to crack when tightening the bolts.

4. Clean out the cylinder head bolt holes in the engine block.

WARNING: The multi-layered steel head gaskets have very sharp edges that could cause personal injury if not handled carefully.

CAUTION: The installation of the cylinder head gaskets are not interchangeable between the left and right cylinder heads. They are clearly marked (3) with "R" for right and "L" for left. They must be applied on a dry surface, without the use of any adhesives.

5. Position the new cylinder head gasket (1) on the locating dowels (2).



2719043

Fig. 131: Cylinder Head Retaining Bolt Tightening Sequence - Right
Courtesy of CHRYSLER GROUP, LLC

6. Position the cylinder head onto the cylinder block.

NOTE: Do not apply any oil to the bolt threads.

7. Install the eight head bolts finger tight.
8. Tighten the cylinder head bolts in the sequence shown in illustration, following this 9-step torque plus angle method. Tighten according to the following torque values:
 - Step 1: All to 30 N.m (22 ft. lbs.)
 - Step 2: All to 45 N.m (33 ft. lbs.)

- Step 3: All + 75° Turn **Do not use a torque wrench for this step.**
- Step 4: All + 50° Turn **Do not use a torque wrench for this step.**
- Step 5: Loosen all fasteners in reverse of sequence shown in illustration
- Step 6: All to 30 N.m (22 ft. lbs.)
- Step 7: All to 45 N.m (33 ft. lbs.)
- Step 8: All + 70° Turn **Do not use a torque wrench for this step.**
- Step 9: All + 70° Turn **Do not use a torque wrench for this step.**

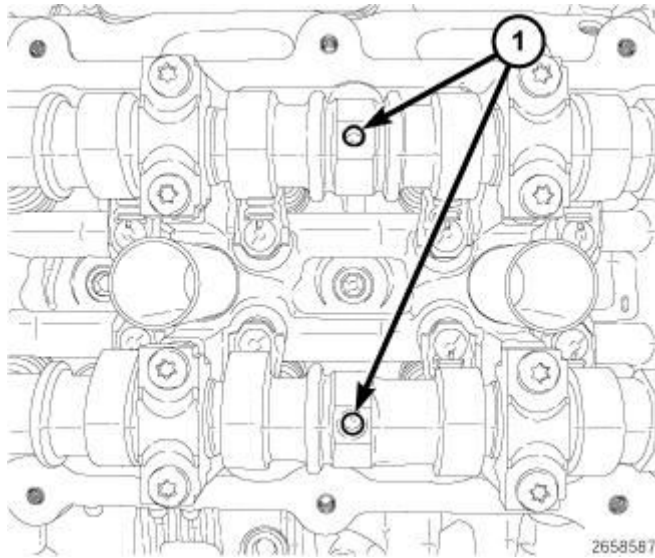


Fig. 132: Positioning Camshaft Alignment Holes Vertically
Courtesy of CHRYSLER GROUP, LLC

NOTE: If the hydraulic lifters are being reused, reassemble them into their original locations.

9. If removed, install the hydraulic lifters. Refer to **LIFTER(S), HYDRAULIC, INSTALLATION**.

NOTE: If the rocker arms are being reused, reassemble them into their original locations.

CAUTION: Do not rotate the camshafts more than a few degrees independently of the crankshaft. Valve to piston contact could occur resulting in possible valve damage. If the camshafts need to be rotated more than a few degrees, first move the pistons away from the cylinder heads by rotating the crankshaft counterclockwise to a position 30° before-top-dead-center. Once the camshafts are returned to their top-dead-center position, rotate the crankshaft clockwise to return the crankshaft to top-dead-center.

10. Install the rocker arms and camshafts. Refer to **CAMSHAFT, ENGINE, INSTALLATION**.

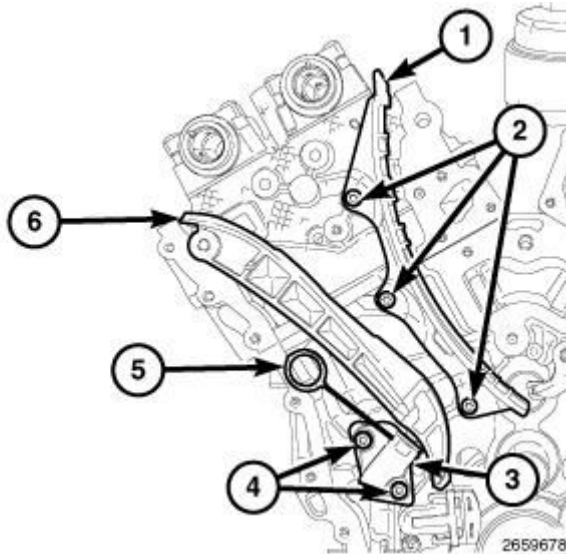


Fig. 133: Right Cam Chain Tensioner, Arm, Guide & Bolts
 Courtesy of CHRYSLER GROUP, LLC

11. Install the RH cam chain guide (1) with three bolts (2). Tighten the bolts to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
12. Install the RH cam chain tensioner (3) to the engine block with two bolts (4). Tighten the bolts to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
13. Reset the RH cam chain tensioner (3) by pushing back the tensioner piston and installing Tensioner Pin (special tool #8514, Pins, Tensioner) (5).
14. Install the RH tensioner arm (6).

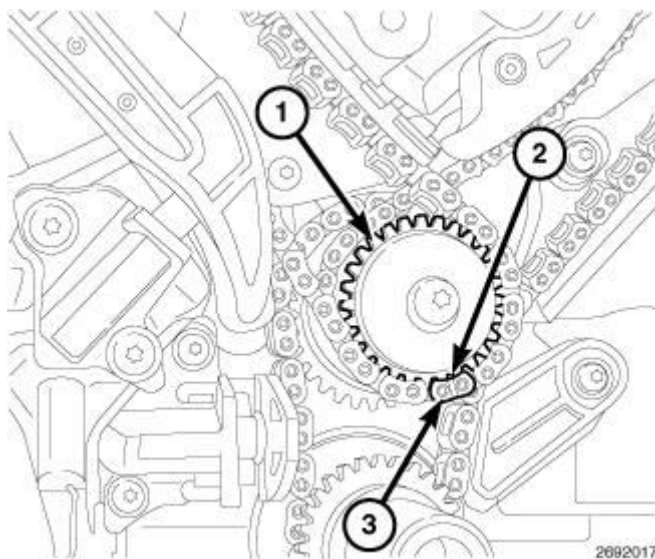


Fig. 134: Idler Sprocket, Dimple & Plated Link
 Courtesy of CHRYSLER GROUP, LLC

15. Press the RH exhaust cam phaser onto the exhaust camshaft. Install and hand tighten the oil control valve.

CAUTION: Always reinstall timing chains so that they maintain the same direction of rotation. Inverting a previously run chain on a previously run sprocket will result in excessive wear to both the chain and sprocket.

16. Drape the right side cam chain over the RH exhaust cam phaser and onto the idler sprocket (1) so that the dimple (2) is aligned with the plated link (3) on the cam chain.

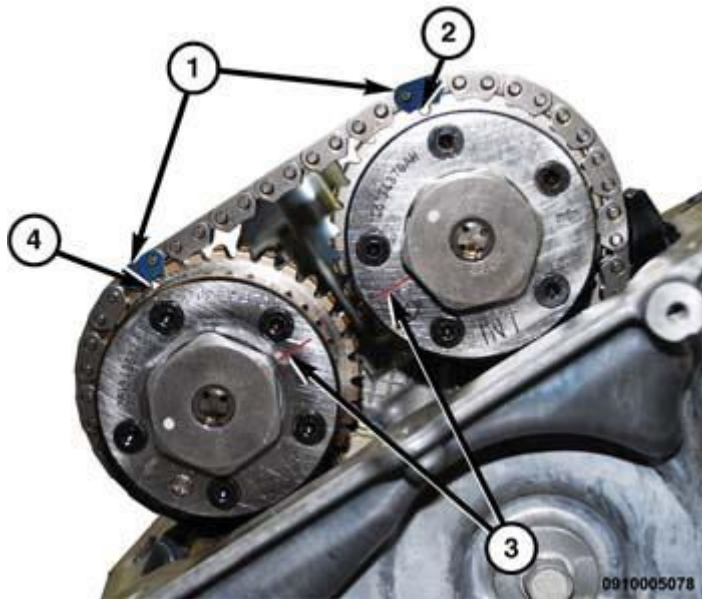


Fig. 135: Aligning Timing Marks
Courtesy of CHRYSLER GROUP, LLC

17. While maintaining this alignment, route the cam chain around the exhaust and intake cam phasers so that the plated links are aligned with the phaser timing marks (2, 4). Position the cam phasers so that the scribe lines (3) are parallel to the valve cover sealing surface. Press the intake cam phaser onto the intake cam, install and hand tighten the oil control valve.

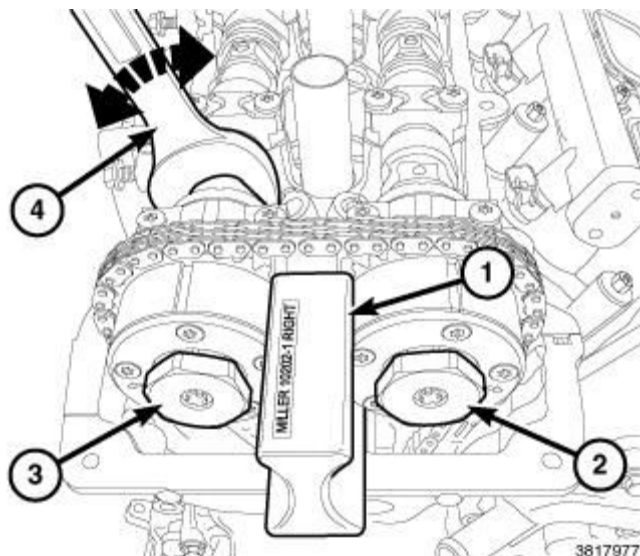


Fig. 136: Camshaft Phaser Lock, Oil Control Valves & Wrench
Courtesy of CHRYSLER GROUP, LLC

NOTE: Minor rotation of a camshaft (a few degrees) may be required to install the camshaft phaser or phaser lock.

18. Install the RH Camshaft Phaser Lock (special tool #10202, Locks, Camshaft/Phaser) (1) and tighten the oil control valves (2, 3) to the proper specification. Refer to **TORQUE SPECIFICATIONS**.

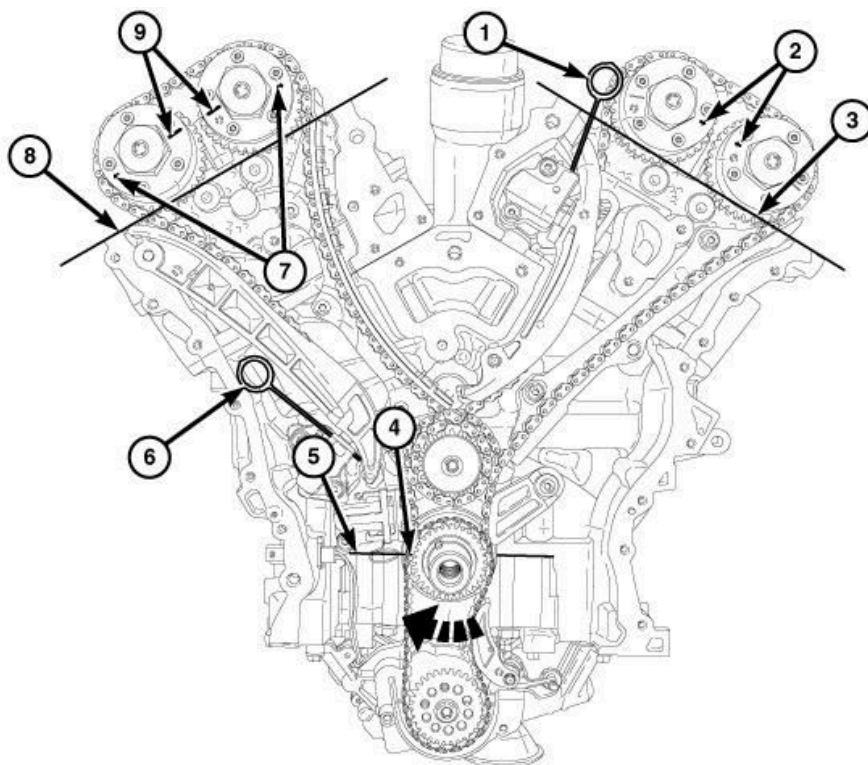
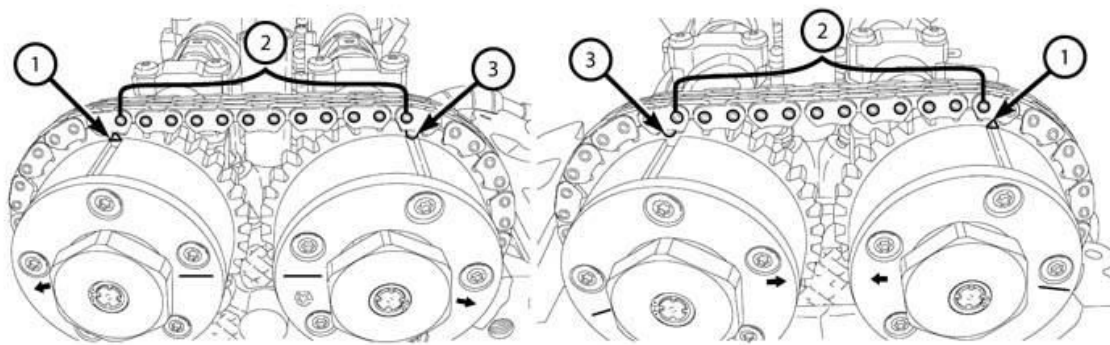


Fig. 137: Rotating Crankshaft Clockwise To Position No. 1 Piston At TDC On Exhaust Stroke

Courtesy of CHRYSLER GROUP, LLC

19. Remove the RH Camshaft Phaser Lock (special tool #10202, Locks, Camshaft/Phaser).
20. Remove the Tensioner Pin (special tool #8514, Pins, Tensioner) (6) from the RH cam chain tensioner.
21. Rotate the crankshaft clockwise two complete revolutions stopping when the dimple (4) on the crankshaft is aligned with the block/bearing cap junction (5).
22. While maintaining this alignment, verify that the arrows on the left side cam phasers (2) point toward each other and are parallel to the valve cover sealing surface (3) and that the right side cam phaser arrows (7) point away from each other and the scribe lines (9) are parallel to the valve cover sealing surface (8).



2714685

Fig. 138: Chain Pins, Exhaust Cam Phaser Triangle Marking & Circle Marking
Courtesy of CHRYSLER GROUP, LLC

23. There should be 12 chain pins (2) between the exhaust cam phaser triangle marking (1) and the intake cam phaser circle marking (3).
24. If the engine timing is not correct, loosen the timing chain by resetting the right side cam chain tensioner and repeat the camshaft alignment procedure.
25. Install the engine timing cover. Refer to **COVER(S), ENGINE TIMING, INSTALLATION**.
26. Install the spark plugs. Refer to **SPARK PLUG, INSTALLATION**.
27. Install the upper intake manifold support bracket (2) with the studbolt (3) hand tight.
28. Engage the wire harness retainer (3) from the intake manifold support bracket.

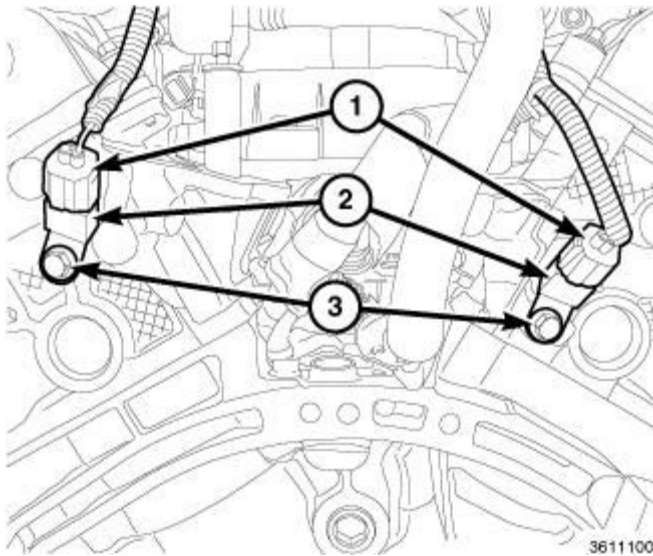


Fig. 139: Electrical Connector, Mounting Bolt & Ignition Capacitor
 Courtesy of CHRYSLER GROUP, LLC

29. Connect the ignition coil capacitor harness connector (1).
30. Install the upper and lower intake manifolds and insulator. Refer to **MANIFOLD, INTAKE, INSTALLATION**.
31. Install the resonator. Refer to **RESONATOR, AIR CLEANER, INSTALLATION**.
32. Install the air cleaner body. Refer to **BODY, AIR CLEANER, INSTALLATION**.

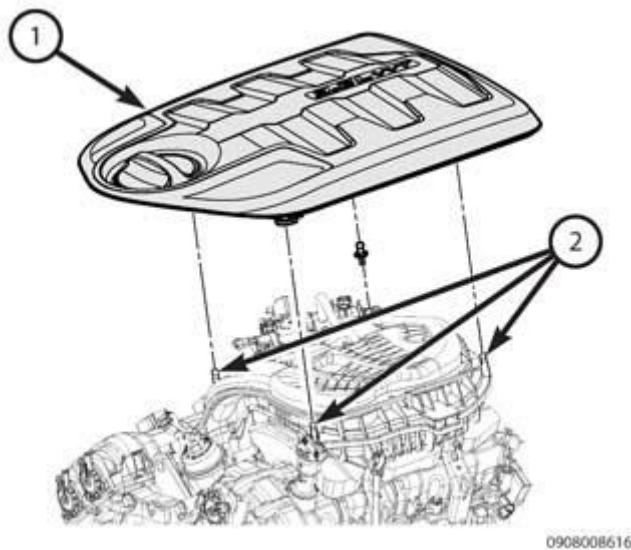


Fig. 140: Engine Cover & Ball Studs
 Courtesy of CHRYSLER GROUP, LLC

33. Evacuate and charge the A/C system. Refer to **PLUMBING, STANDARD PROCEDURE**.
34. Install the engine cover (1).
35. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer

to **OIL, STANDARD PROCEDURE** .

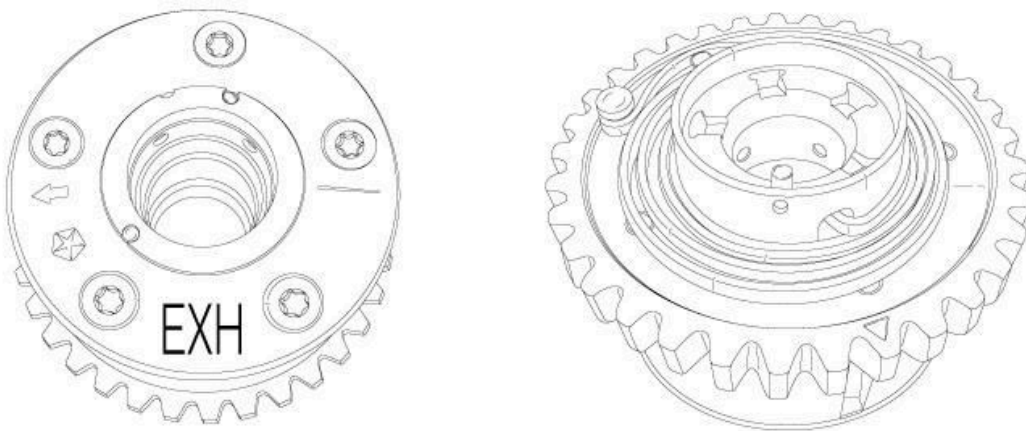
36. Fill the cooling system. Refer to **STANDARD PROCEDURE** .
37. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
38. Install the belly pan. Refer to **BELLY PAN, INSTALLATION** .
39. Lower the vehicle.
40. Connect the negative battery cable and tighten nut to the proper specification. Refer to **SPECIFICATIONS** .
41. Run the engine until it reaches normal operating temperature. Check cooling system for correct fluid level. Refer to **STANDARD PROCEDURE** .

NOTE: The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components.

ASSEMBLY, VARIABLE VALVE TIMING, PHASER/OIL CONTROL VALVE

DESCRIPTION

DESCRIPTION



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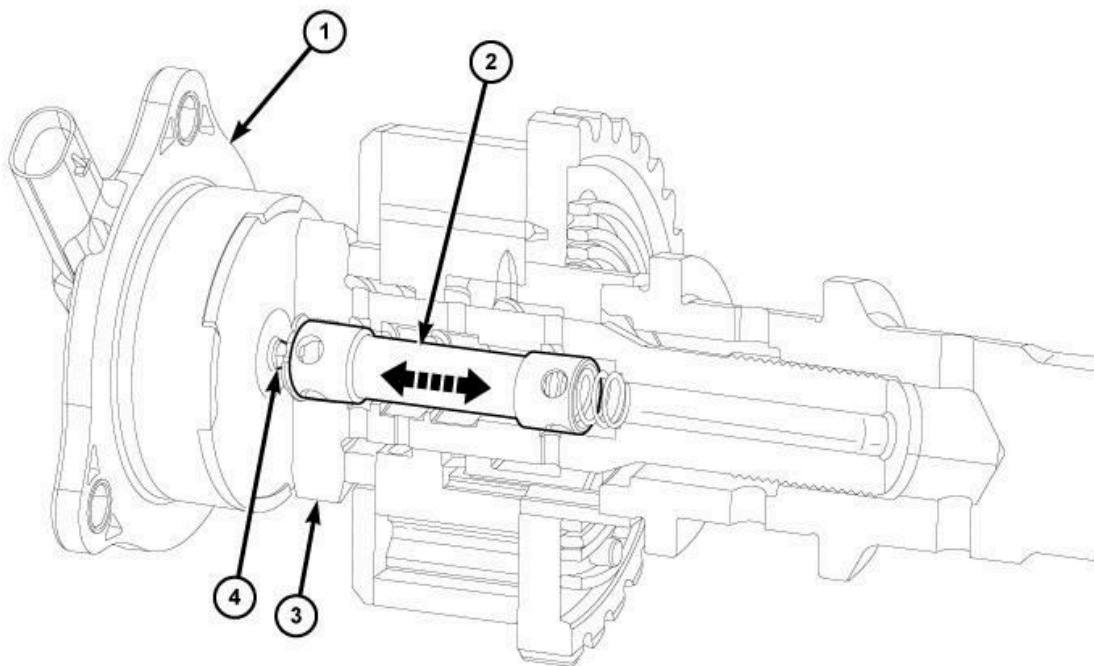
Fig. 141: Exhaust Phaser Assembly
Courtesy of CHRYSLER GROUP, LLC

The engine is equipped with Variable Valve Timing (VVT). This system adjusts the timing of all four camshafts independently using solenoids and oil control valves to direct oil pressure into the camshaft phaser assemblies. The camshaft phaser assembly advances and/or retards camshaft timing to improve engine performance, mid-range torque, idle quality, fuel economy, and reduce emissions. The four phasers are located on the front of the camshafts, behind the VVT solenoids, inside of the engine timing cover. The exhaust phasers are identified with EXH and the intake phasers are identified with INT. The exhaust phaser has a clockspring, the intake phaser does not. The camshaft sprockets are integrated with the camshaft phaser and are serviced as an assembly. Do not attempt to disassemble the phasers, they are not serviceable. Phasers are interchangeable between the right and left cylinder heads but should be installed in the same location as removed.

The engine has an Oil Control Valve (OCV) for each phaser. The OCV also acts as a bolt for mounting the Phaser to the camshaft. The OCVs spool valve is spring loaded and should move freely within the OCV body. The four OCVs are identical but should be installed in the same location as removed.

OPERATION

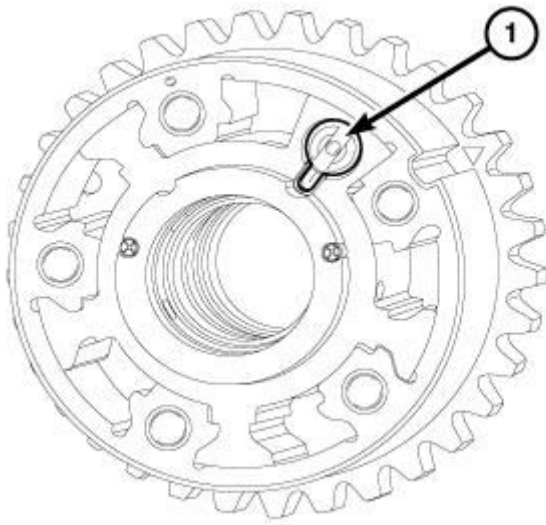
OPERATION



2811799

Fig. 142: Oil Control Valve (OCV), VVT Solenoid, Solenoid Pintle & Internal Spool Valve
 Courtesy of CHRYSLER GROUP, LLC

Each phaser position is adjusted using regulated oil pressure through the Oil Control Valve (OCV) (3). To begin phaser movement, a voltage signal is applied to the VVT solenoid (1) to extend or retract the solenoid pintle (4). The pintle pushes against an internal spool valve (2) within the OCV moving the valve forward and backward to direct oil flow.

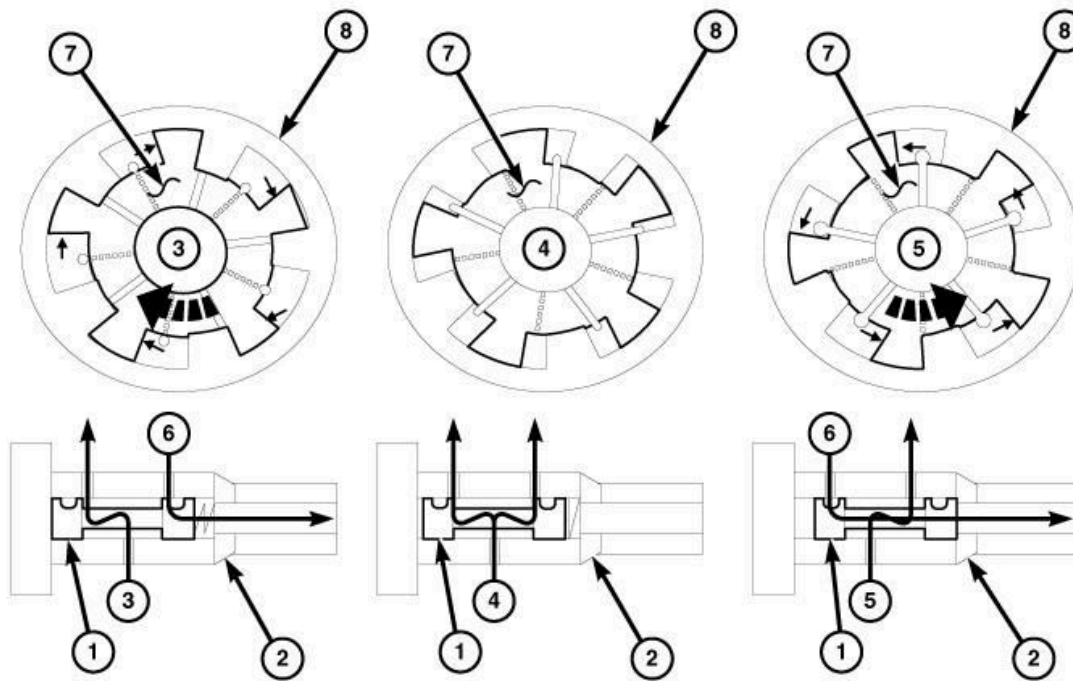


2813724

Fig. 143: Phasers In Lock-Pin Position
Courtesy of CHRYSLER GROUP, LLC

At engine startup, system oil pressure overcomes spring pressure and unlocks the phaser lock-pin (1) in preparation for phasing. The phasers remain in this position until a PCM signal is given to pulse-width modulate the VVT solenoid. At engine shutdown, as oil pressure is reduced, both Phasers return to their lock-pin position.

Because the exhaust Phaser needs to travel to a position above and beyond the standard camshaft clockwise rotation, the assistance of a clock spring is required. The intake Phaser on the other hand, simply relies on the torsional resistance from the valvetrain to push it back towards lock-pin position.



2813615

Fig. 144: Spool Valve, Vanes, OCV & Advance, Hold Or Retard Position
Courtesy of CHRYSLER GROUP, LLC

The position of the spool valve (1) inside the OCV (2) determines which ports and chambers inside the phaser are being fed, either to advance (3), hold (4) or retard (5) the timing of the phaser sprocket relative to the camshaft. The spool valve also returns oil from the chambers to the sump (6). The Camshaft Position (CMP) sensor monitors the position of the camshaft with respect to the crankshaft and provides feedback to the PCM. As oil pressure pushes against the vanes (6) of the phaser rotor, the rotor begins to move. Since this rotor is physically attached to the camshaft, rotor rotation causes the camshaft position to rotate relative to the standard sprocket (7) position.

REMOVAL

LEFT OIL CONTROL VALVES



A multimedia supplement to the instructions contained in this article is available.

To view the multimedia example of the condition described go to;

<http://www.youtube.com/user/Mitchell1Tips>
then type "A00641418.vid1" into the "Search Channel" box.

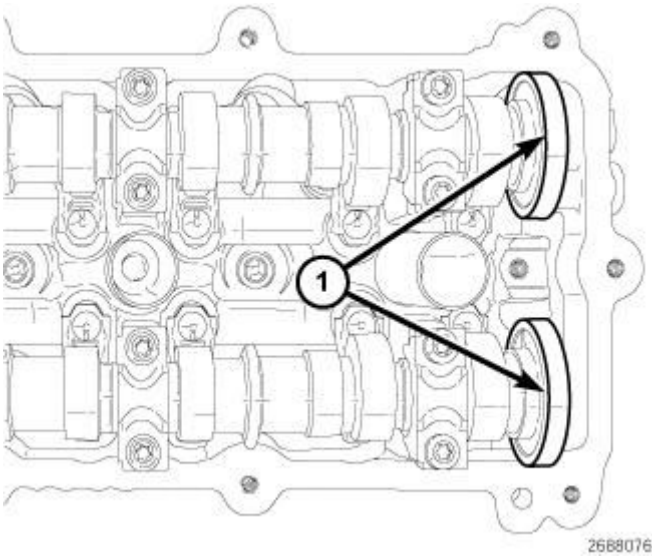
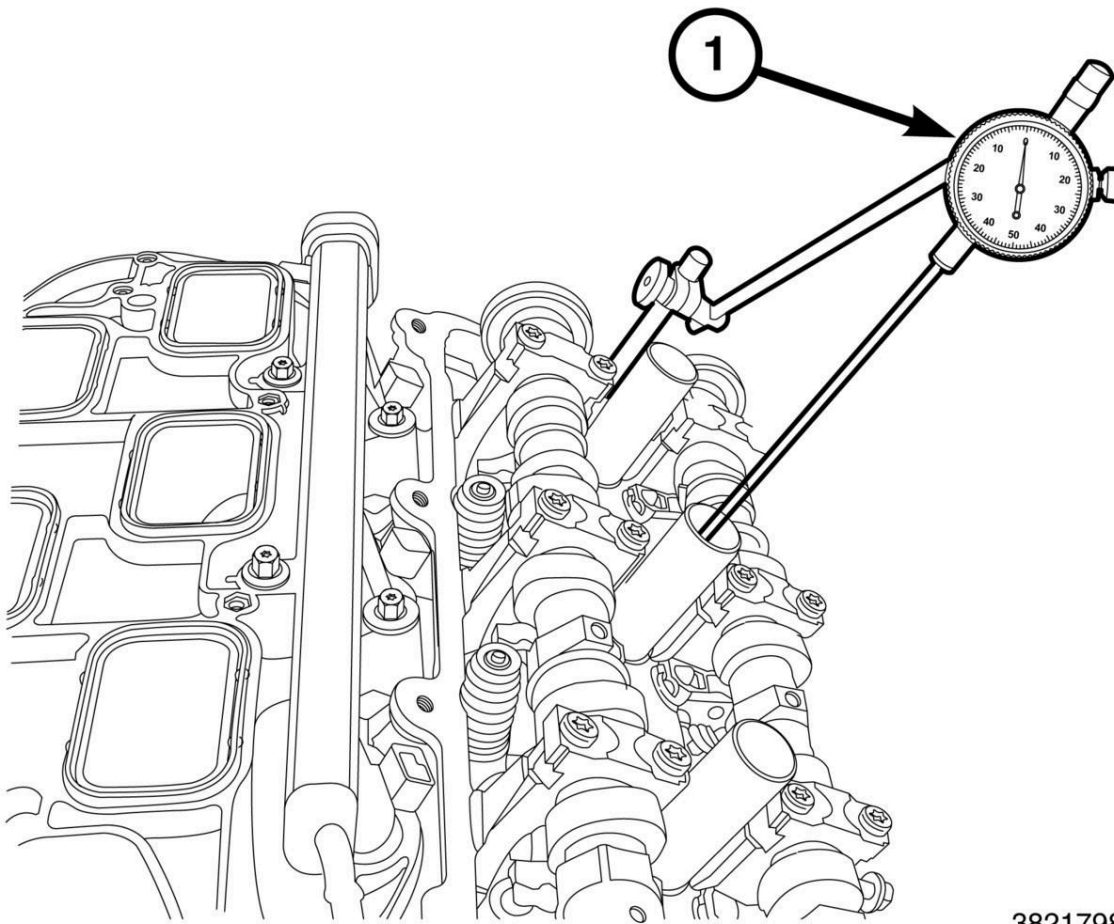


Fig. 145: Magnetic Timing Wheels

Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.



3821798

Fig. 146: Positioning Dial Indicator & Setting #4 Cylinder At Top-Dead-Center Compression Stroke
Courtesy of CHRYSLER GROUP, LLC

1. Remove the left cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, REMOVAL**.
2. Remove the right ignition coils and all spark plugs. Refer to **SPARK PLUG, REMOVAL**.

CAUTION: When aligning timing marks, always rotate engine by turning the crankshaft. Failure to do so will result in valve and/or piston damage.

3. Mount Dial Indicator Set (special tool #C-3339A, Set, Dial Indicator) (1) to a stationary point on the engine, such as the left camshaft position (CMP) sensor mount. Position the indicator probe into the number four cylinder, rotate the crankshaft clockwise (as viewed from the front) to place the number four cylinder piston at top-dead-center on the compression stroke and set the indicator dial to zero.

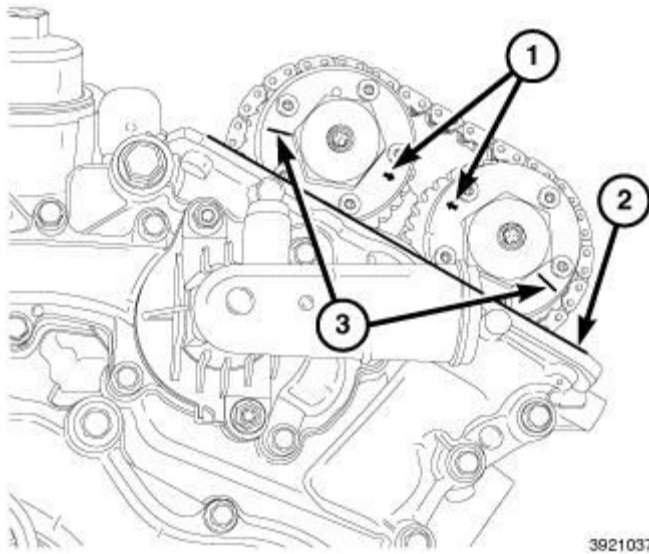


Fig. 147: Arrows, Scribe Lines & Cylinder Head Cover Mounting Surface
 Courtesy of CHRYSLER GROUP, LLC

4. The left side cam phaser **SCRIBE LINES** (3) should face away from each other and the **ARROWS** (1) should point toward each other and be parallel to the cylinder head cover mounting surface (2) when the number four cylinder piston is positioned at top-dead-center on the compression stroke.

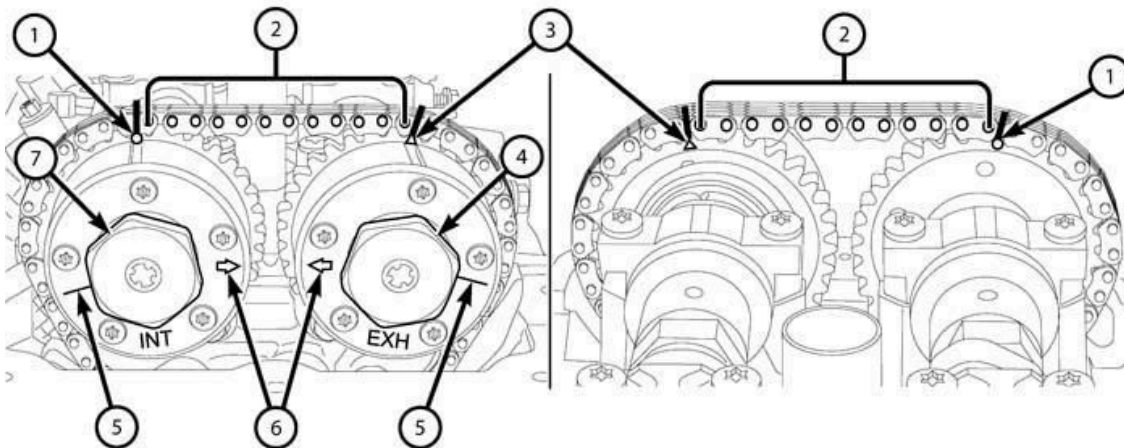


Fig. 148: Phaser Timing Mark, Chain Pins, Exhaust Cam Phaser Triangle Marking, Oil Control Valve, Scribe Lines & Arrows
 Courtesy of CHRYSLER GROUP, LLC

NOTE: The phaser markings (1 and 3) could align with either an external or internal chain link. Either alignment is acceptable as long as there are twelve chain pins between the markings.

5. There should be twelve chain pins (2) **BETWEEN** the exhaust cam phaser triangle marking (3) and the intake cam phaser circle marking (1) as viewed from either the front or rear of the cam phasers.
6. Mark both sides of the cam chain at the phaser timing marks (1 and 3) using a paint pen or equivalent to aid in reassembly.

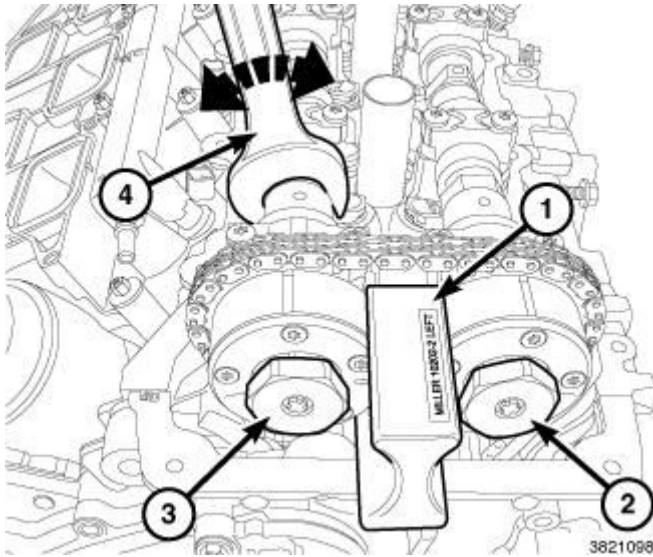


Fig. 149: Camshaft Phaser Lock, Oil Control Valves & Wrench
 Courtesy of CHRYSLER GROUP, LLC

NOTE: It may be necessary to rock the camshaft slightly (a few degrees) with a wrench (4) when installing the camshaft phaser lock.

7. Install the (special tool #10202-2, Lock, Camshaft/Phaser, Left Side) (1) against the cylinder head cover mounting surface with the tool number facing up.
8. Loosen, but do not remove, the exhaust oil control valve (2) and the intake oil control valve (3).
9. Remove the (special tool #10202-2, Lock, Camshaft/Phaser, Left Side) (1).

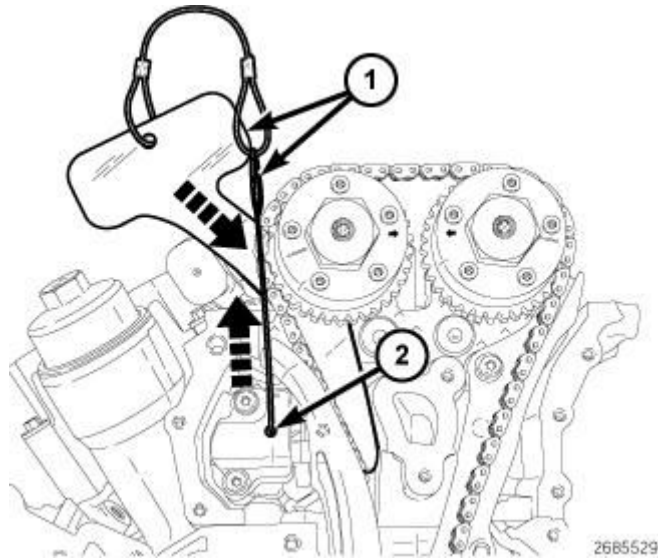


Fig. 150: Pin, Rack & Timing Chain Holder
Courtesy of CHRYSLER GROUP, LLC

NOTE: Graphic shows engine timing cover removed for clarity.

10. Insert the (special tool #10200-3, Pin) (2) into to hole located on the side of the tensioner housing, lift the pawl off of the rack (3). While holding the pawl off of the rack, push (special tool #10200-1, Holder, Timing Chain, Left Side) (1) into place between the cylinder head boss and the tensioner arm to force the rack and piston back into the tensioner body. The Timing Chain Holder remains in place while the phasers are removed.

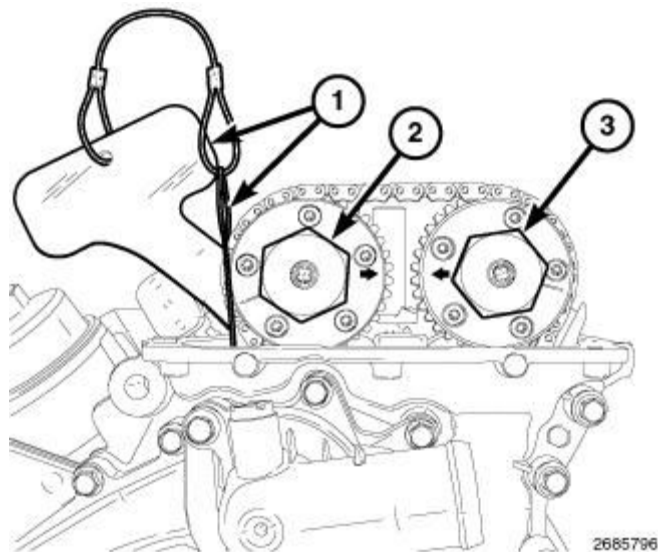


Fig. 151: Pin, Rack, Timing Chain Holder & Oil Control Valves
Courtesy of CHRYSLER GROUP, LLC

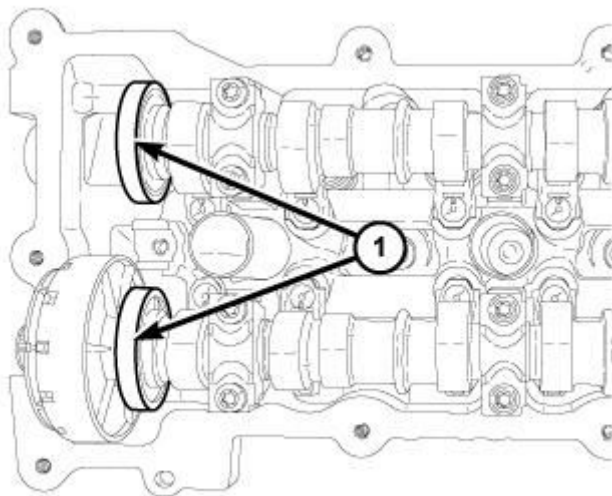
11. If required, remove the oil control valve (4) and pull the left side exhaust cam phaser off of the camshaft.

12. If required, remove the oil control valve (3) and pull the left side intake cam phaser off of the camshaft.

RIGHT OIL CONTROL VALVES

A multimedia supplement to the instructions contained in this article is available.

To view the multimedia example of the condition described go to;
<http://www.youtube.com/user/Mitchell1Tips>
then type "A00641418.vid2" into the "Search Channel" box.



2691700

Fig. 152: Magnetic Timing Wheels

Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.

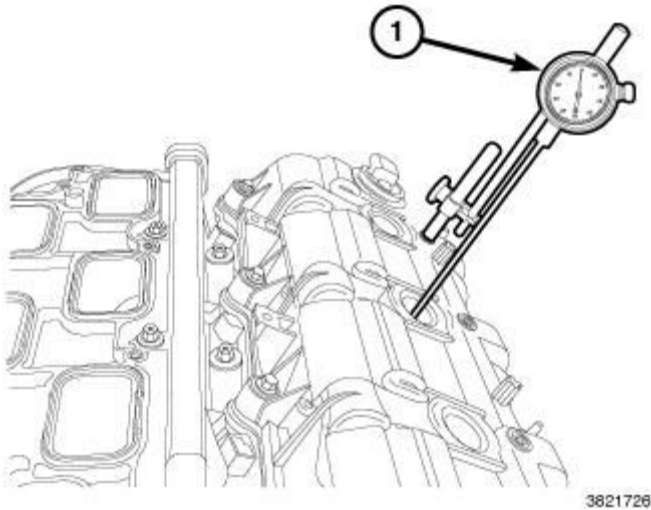


Fig. 153: Positioning Dial Indicator & Setting #4 Cylinder At Top-Dead-Center Compression Stroke
Courtesy of CHRYSLER GROUP, LLC

1. Remove the upper intake manifold, right ignition coils and right cylinder head cover. Refer to **COVER (S), CYLINDER HEAD, REMOVAL**.
2. Remove the left ignition coils and all spark plugs. Refer to **SPARK PLUG, REMOVAL**.

CAUTION: When aligning timing marks, always rotate engine by turning the crankshaft. Failure to do so will result in valve and/or piston damage.

3. Mount Dial Indicator Set (special tool #C-3339A, Set, Dial Indicator) (1) to a stationary point on the engine, such as the number six cylinder ignition coil mount. Position the indicator probe into the number four cylinder, rotate the crankshaft clockwise (as viewed from the front) to place the number four cylinder piston at top-dead-center on the compression stroke and set the indicator dial to zero.

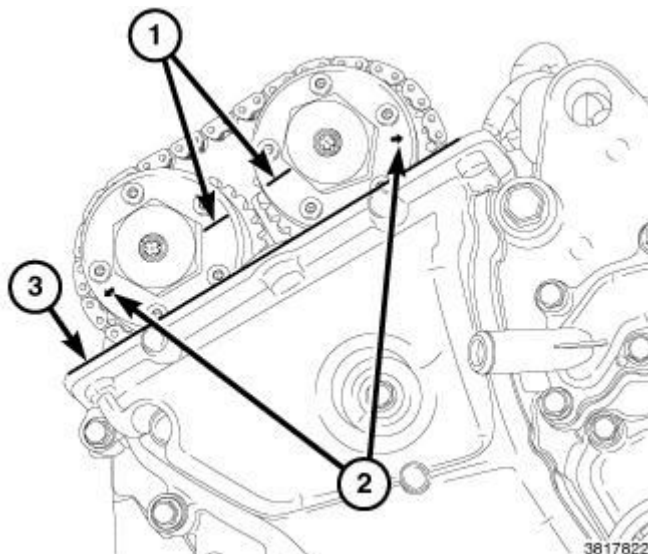
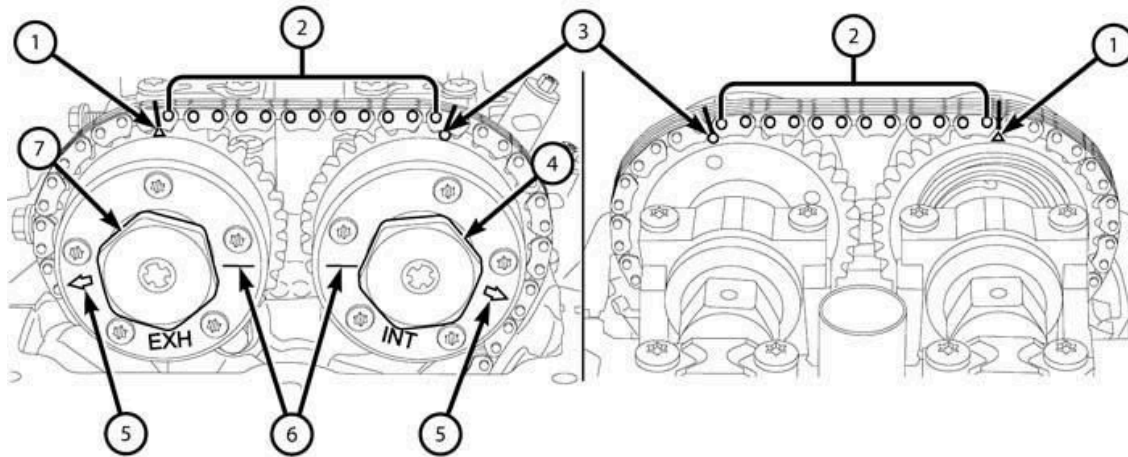


Fig. 154: Arrows, Scribe Lines & Cylinder Head Cover Mounting Surface
 Courtesy of CHRYSLER GROUP, LLC

4. The right side cam phaser **ARROWS** (2) should point away from each other and the **SCRIBE LINES** (1) should be parallel to the cylinder head cover mounting surface (3) when the left side number four cylinder piston is positioned at top-dead-center on the compression stroke.



3817937

Fig. 155: Phaser Timing Mark, Chain Pins, Exhaust Cam Phaser Triangle Marking, Oil Control Valve, Scribe Lines & Arrows
 Courtesy of CHRYSLER GROUP, LLC

NOTE: The phaser markings (1 and 3) could align with either an external or internal chain link. Either alignment is acceptable as long as there are twelve chain pins between the markings.

5. There should be twelve chain pins (2) **BETWEEN** the exhaust cam phaser triangle marking (1) and the intake cam phaser circle marking (3) as viewed from either the front or rear of the cam phasers.
6. Mark both sides of the cam chain at the phaser timing marks (1 and 3) using a paint pen or equivalent to aid in reassembly.

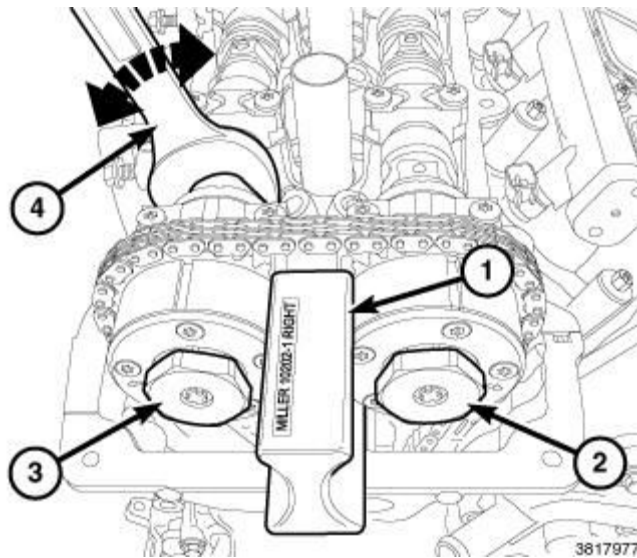


Fig. 156: Camshaft Phaser Lock, Oil Control Valves & Wrench
Courtesy of CHRYSLER GROUP, LLC

NOTE: It may be necessary to rock the camshaft slightly (a few degrees) with a wrench (4) when installing the camshaft phaser lock.

7. Install the (special tool #10202-1, Lock, Camshaft/Phaser, Right Side) (1) against the cylinder head cover mounting surface with the tool number facing up.
8. Loosen, but do not remove, the exhaust oil control valve (3) and the intake oil control valve (2).
9. Remove the (special tool #10202-1, Lock, Camshaft/Phaser, Right Side) (1).

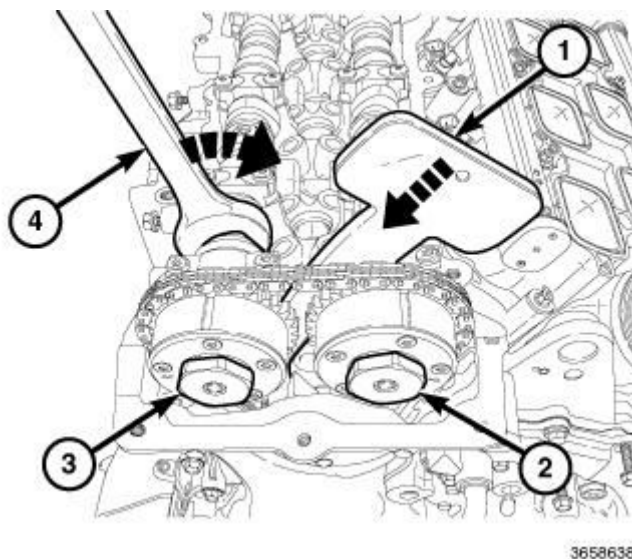


Fig. 157: Compressing Tensioner By Slightly Rotating Exhaust Camshaft Clockwise
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not insert the Timing Chain Holder into position without first

compressing the tensioner. The Timing Chain Holder is not designed to compress the tensioner and excessive force can damage the timing chain tensioner arm.

10. Use the timing chain to compress the tensioner by slightly rotating the exhaust camshaft clockwise (4). Insert (special tool #10369, Holder, Timing Chain) (1) into place between the cylinder head boss and the tensioner arm to hold the tensioner in the compressed position. The Timing Chain Holder remains in place while the phasers are removed.

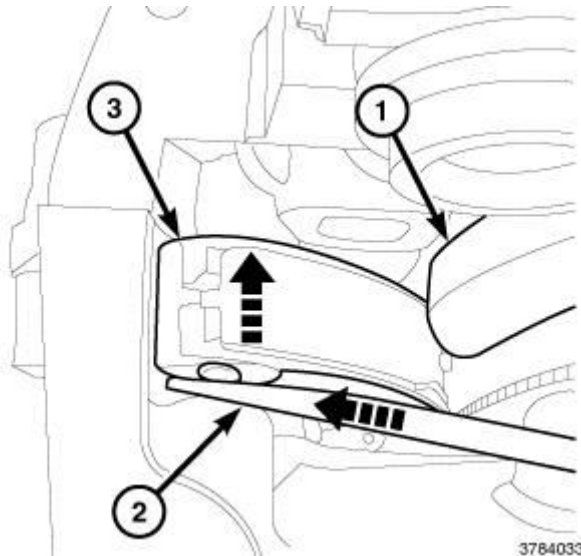


Fig. 158: Timing Chain Holder, Trim Stick & Tensioner Arm
Courtesy of CHRYSLER GROUP, LLC

NOTE: If the Timing Chain Holder (1) does not engage or slips from position, wedge a trim stick (2) or equivalent between the front cover and the tensioner arm (3) to push the tensioner arm towards the rear of the engine and then repeat the previous step.

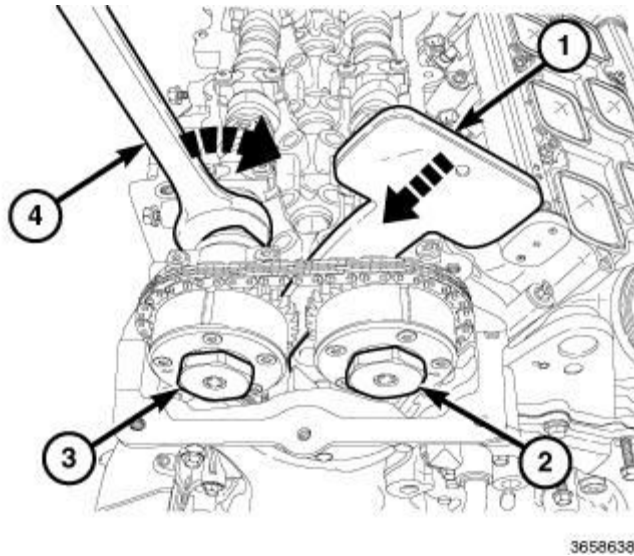


Fig. 159: Compressing Tensioner By Slightly Rotating Exhaust Camshaft Clockwise
Courtesy of CHRYSLER GROUP, LLC

11. If required, remove the oil control valve (3) and pull the right side exhaust cam phaser off of the camshaft.
12. If required, remove the oil control valve (2) and pull the right side intake cam phaser off of the camshaft.

INSTALLATION

LEFT OIL CONTROL VALVES



A multimedia supplement to the instructions contained in this article is available.

To view the multimedia example of the condition described go to;
<http://www.youtube.com/user/Mitchell1Tips>
then type "A00641418.vid3" into the "Search Channel" box.

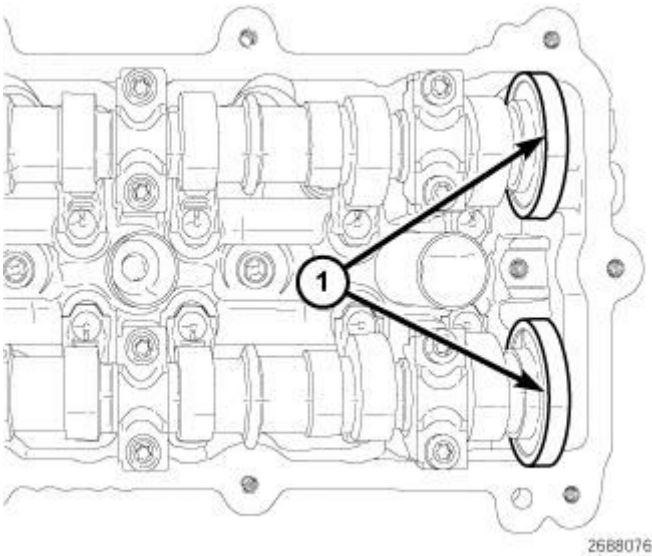
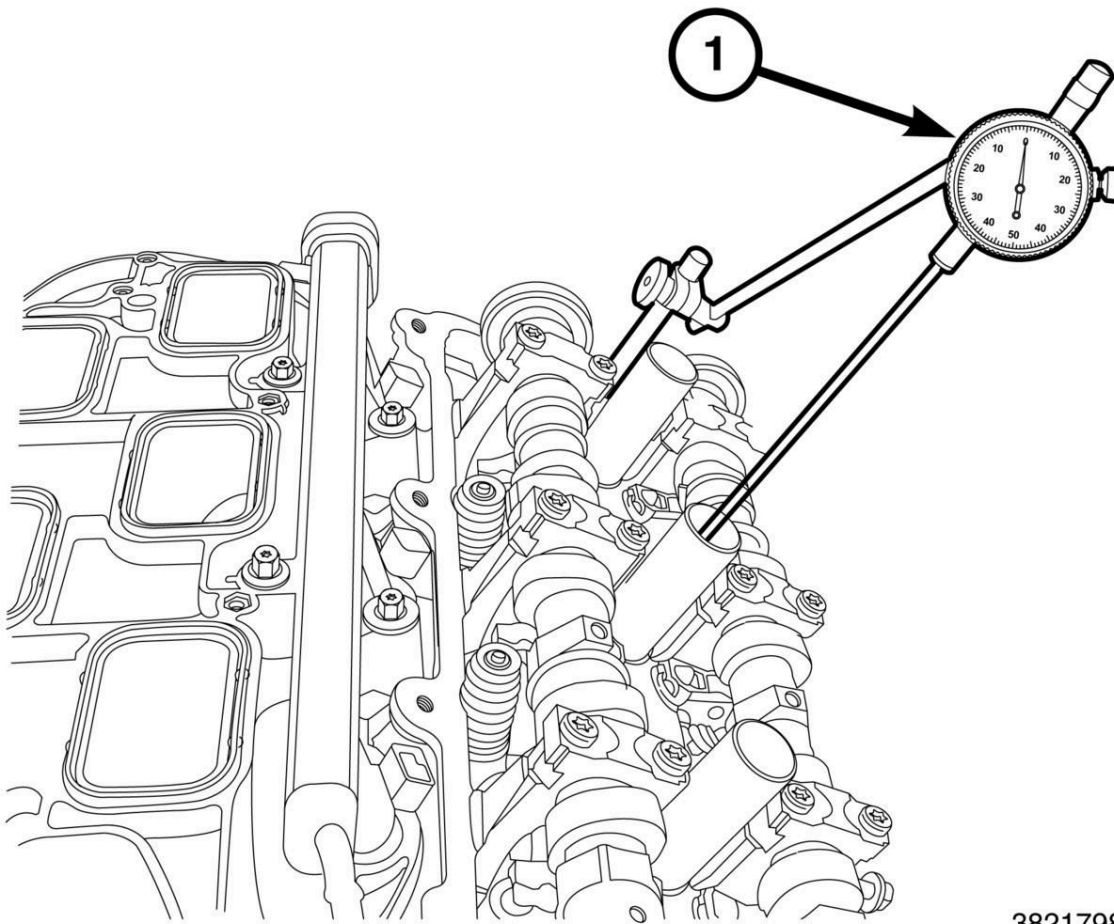


Fig. 160: Magnetic Timing Wheels

Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.



3821798

Fig. 161: Positioning Dial Indicator & Setting #4 Cylinder At Top-Dead-Center Compression Stroke
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not rotate the crankshaft more than a few degrees independently of the camshafts. Piston to valve contact could occur resulting in possible valve damage. If the crankshaft needs to be rotated more than a few degrees, first remove the camshafts.

1. Verify that the indicator dial (1) is set to zero when the left side number four cylinder piston is positioned at top-dead-center on the compression stroke.

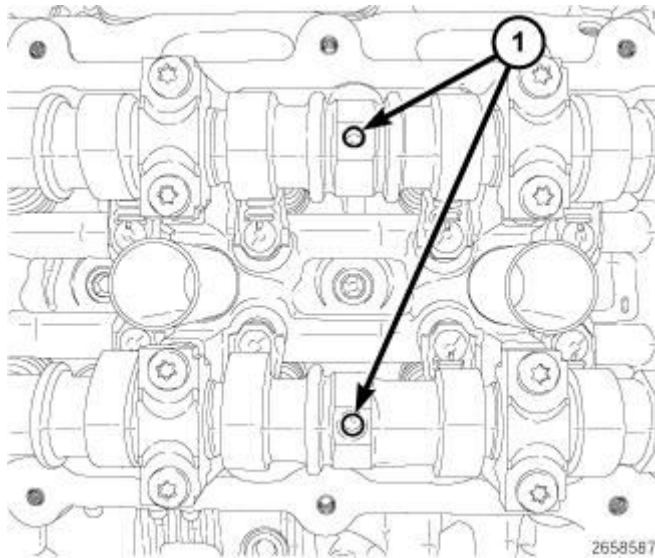


Fig. 162: Positioning Camshaft Alignment Holes Vertically
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not rotate the camshafts more than a few degrees independently of the crankshaft. Valve to piston contact could occur resulting in possible valve damage.

- 2.
3. Verify that the camshafts are set at top-dead-center by positioning the alignment holes (1) vertically.

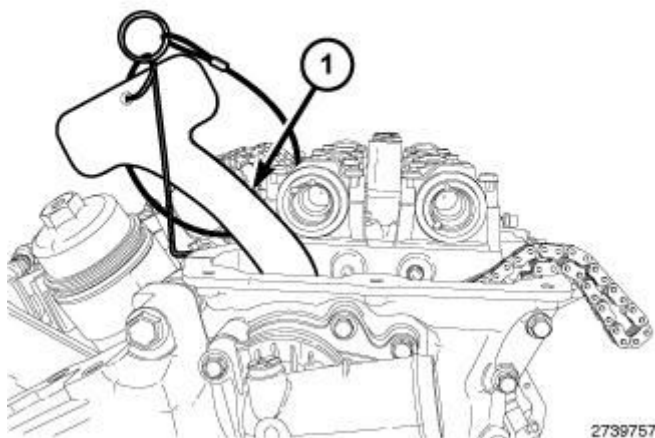
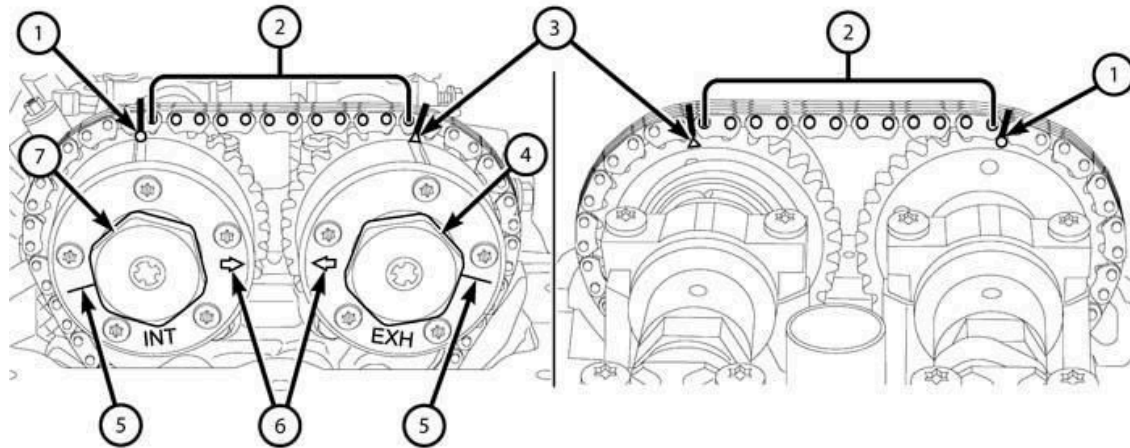


Fig. 163: Timing Chain Holder
Courtesy of CHRYSLER GROUP, LLC

NOTE: The Timing Chain Holder (1) should still be in place as inserted during the Removal procedure. If required, the Timing Chain Holder can be reinserted

by repeating Step 10 of the Removal procedure. Refer to **ASSEMBLY, VARIABLE VALVE TIMING, PHASER / OIL CONTROL VALVE, REMOVAL.**



3821049

Fig. 164: Phaser Timing Mark, Chain Pins, Exhaust Cam Phaser Triangle Marking, Oil Control Valve, Scribe Lines & Arrows

Courtesy of CHRYSLER GROUP, LLC

NOTE: Minor rotation of a camshaft (a few degrees) may be required to install the camshaft phaser.

4. Route the cam chain around the left intake cam phaser while aligning the paint mark with the phaser timing mark (1). Press the left intake cam phaser onto the intake camshaft. Install and hand tighten the oil control valve (7).
5. While maintaining this alignment, route the cam chain around the exhaust cam phaser so that the paint mark is aligned with the phaser timing mark (3). Press the exhaust cam phaser onto the exhaust cam, install and hand tighten the oil control valve (4).
6. The **SCRIBE LINES** (5) on the cam phasers should face away from each other and the **ARROWS** (6) should point toward each other and be parallel to the cylinder head cover mounting surface. There should be twelve chain pins (2) **BETWEEN** the exhaust cam phaser triangle marking (3) and the intake cam phaser circle marking (1).

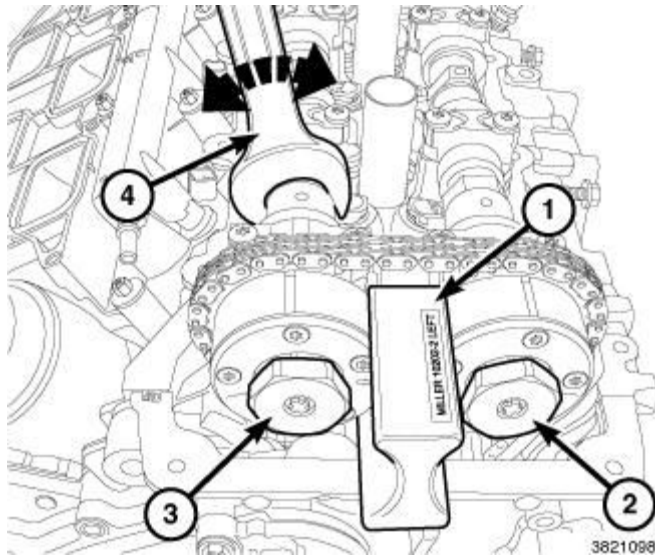


Fig. 165: Camshaft Phaser Lock, Oil Control Valves & Wrench
Courtesy of CHRYSLER GROUP, LLC

NOTE: It may be necessary to rock the camshaft slightly (a few degrees) with a wrench (4) when installing the camshaft phaser lock.

7. Install the Camshaft Phaser Lock (special tool #10202-2, Lock, Camshaft/Phaser, Left Side) (1) against the cylinder head cover mounting surface with the tool number facing up.
8. Tighten the oil control valves (2, 3) to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
9. Remove the Camshaft Phaser Lock (1) and the Timing Chain Holder.

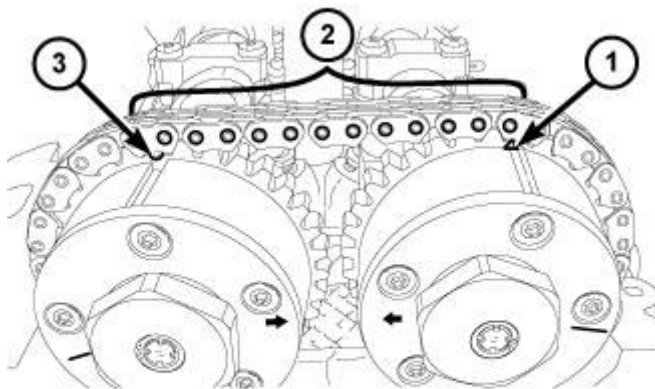


Fig. 166: Chain Pins, Arrows, Scribe Lines, Cam Phaser Triangle Marking & Circle Marking
Courtesy of CHRYSLER GROUP, LLC

10. Rotate the crankshaft clockwise two complete revolutions stopping when the left side number four cylinder piston is again positioned at top-dead-center on the compression stroke. To assure correct engine timing, verify the following;
 - The indicator dial is set to **ZERO** when the left side number four cylinder piston is positioned at top-dead-center on the compression stroke.
 - The **SCRIBE LINES** (3) on the left side cam phasers face away from each other.
 - The **ARROWS** (4) on the left side cam phasers point toward each other and are parallel to the cylinder head cover mounting surface.
 - There are twelve chain pins (2) **BETWEEN** the exhaust cam phaser triangle marking (1) and the intake cam phaser circle marking (3).
11. If the engine timing is not correct, repeat this procedure.
12. Install all of the spark plugs. Refer to **SPARK PLUG, INSTALLATION** .
13. Install the right ignition coils. Refer to **COIL, IGNITION, INSTALLATION** .
14. Install the left cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, INSTALLATION** .
15. Install the upper intake manifold. Refer to **MANIFOLD, INTAKE, INSTALLATION** .
16. Connect the negative battery cable and tighten nut to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
17. Start the engine and perform the following Powertrain Verification Tests. Refer to appropriate Diagnostic Information .
 - Cam/Crank Variation Relearn
 - Target Coefficient Relearn

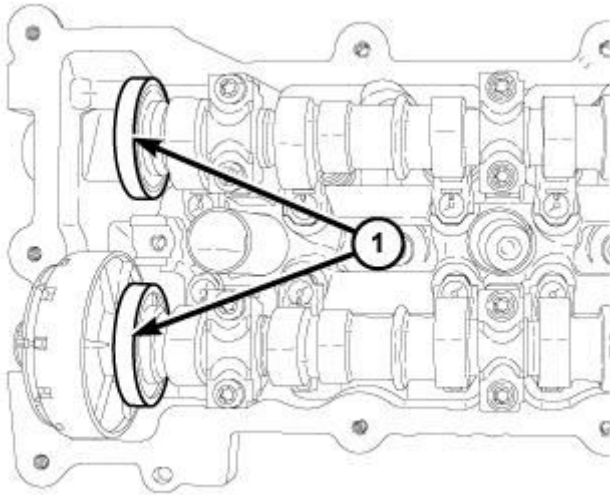
NOTE: **Following the first restart after a DTC driven phaser replacement, clear all DTCs and verify that subsequent restarts do not set any additional codes. For any DTCs that reset, refer to DTC INDEX article .**

RIGHT OIL CONTROL VALVES



A multimedia supplement to the instructions contained in this article is available.

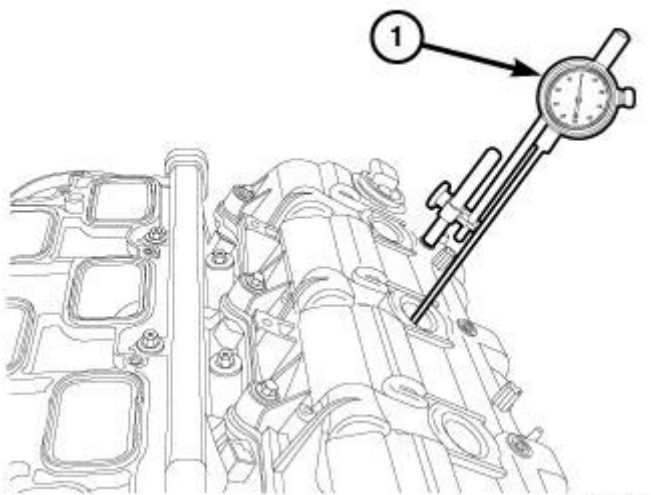
To view the multimedia example of the condition described go to;
<http://www.youtube.com/user/Mitchell1Tips>
 then type "A00641418.vid4" into the "Search Channel" box.



2691700

Fig. 167: Magnetic Timing Wheels
 Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.



3821728

Fig. 168: Positioning Dial Indicator & Setting #4 Cylinder At Top-Dead-Center Compression Stroke
 Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not rotate the crankshaft more than a few degrees independently of the camshafts. Piston to valve contact could occur resulting in possible valve damage. If the crankshaft needs to be rotated more than a few degrees, first remove the camshafts.

1. Verify that the indicator dial (1) is set to zero when the left side number four cylinder piston is positioned at top-dead-center on the compression stroke.

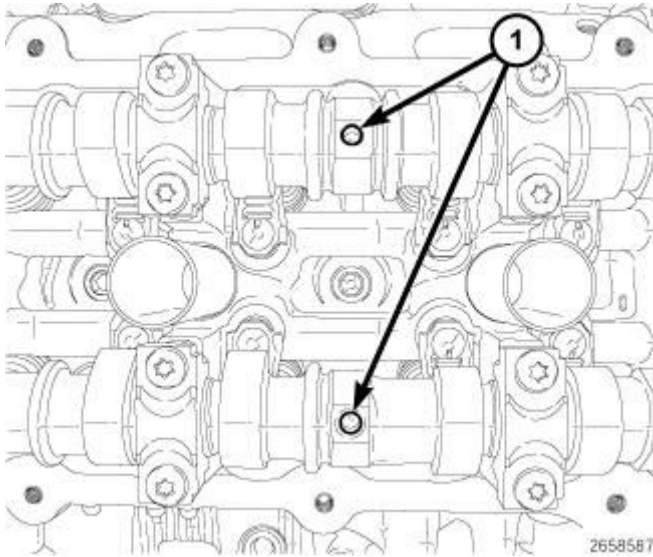


Fig. 169: Positioning Camshaft Alignment Holes Vertically
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not rotate the camshafts more than a few degrees independently of the crankshaft. Valve to piston contact could occur resulting in possible valve damage.

- 2.
3. Verify that the camshafts are set at top-dead-center by positioning the alignment holes (1) vertically.

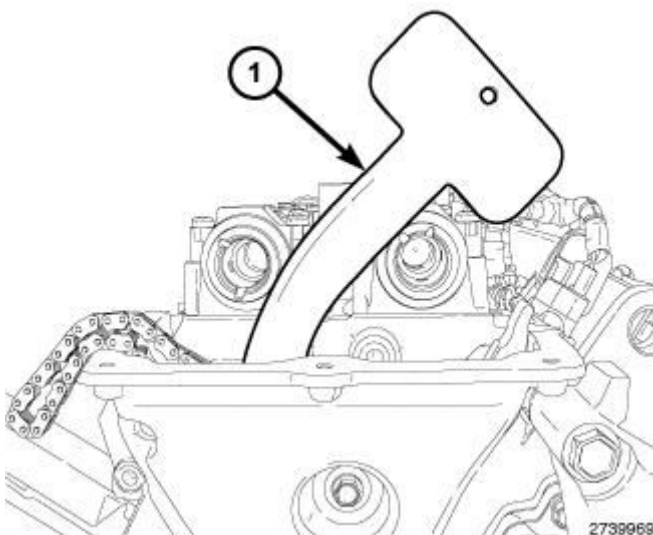
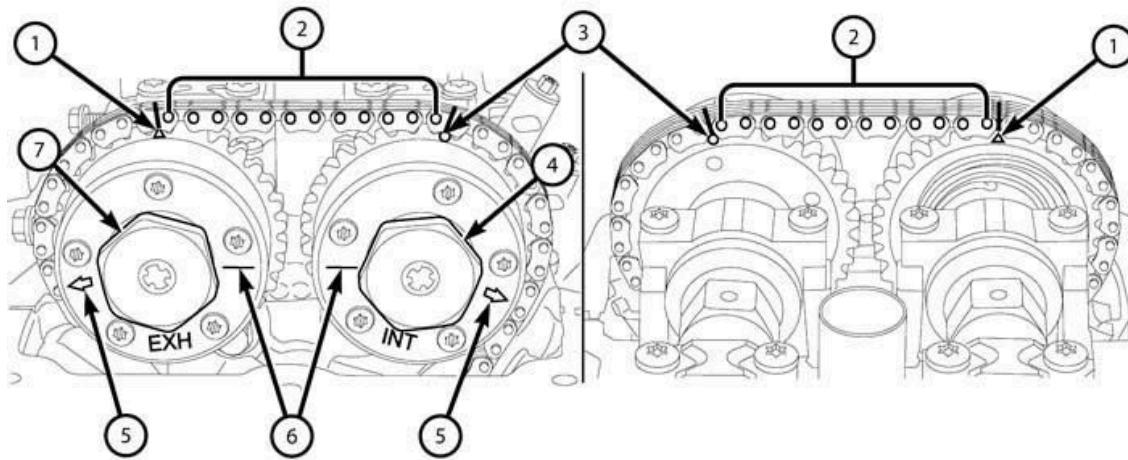


Fig. 170: Timing Chain Holder
Courtesy of CHRYSLER GROUP, LLC

NOTE: The Timing Chain Holder (1) should still be in place as inserted during the Removal procedure. If required, the Timing Chain Holder can be reinserted by installing the exhaust cam phaser and repeating Step 10 of the Removal procedure. Refer to ASSEMBLY, VARIABLE VALVE TIMING, PHASER / OIL CONTROL VALVE, REMOVAL.



3817937

Fig. 171: Phaser Timing Mark, Chain Pins, Exhaust Cam Phaser Triangle Marking, Oil Control Valve, Scribe Lines & Arrows

Courtesy of CHRYSLER GROUP, LLC

NOTE: Minor rotation of a camshaft (a few degrees) may be required to install the camshaft phaser.

4. Route the cam chain around the right exhaust cam phaser while aligning the paint mark with the phaser timing mark (1). Press the right exhaust cam phaser onto the exhaust camshaft. Install and hand tighten the oil control valve (7).
5. While maintaining this alignment, route the cam chain around the intake cam phaser so that the paint mark is aligned with the phaser timing mark (3). Press the intake cam phaser onto the intake cam, install and hand tighten the oil control valve (4).
6. The **ARROWS** (5) on the cam phasers should point away from each other and the **SCRIBE LINES** (6) should be parallel to the cylinder head cover mounting surface. There should be twelve chain pins (2) **BETWEEN** the exhaust cam phaser triangle marking (1) and the intake cam phaser circle marking (3).

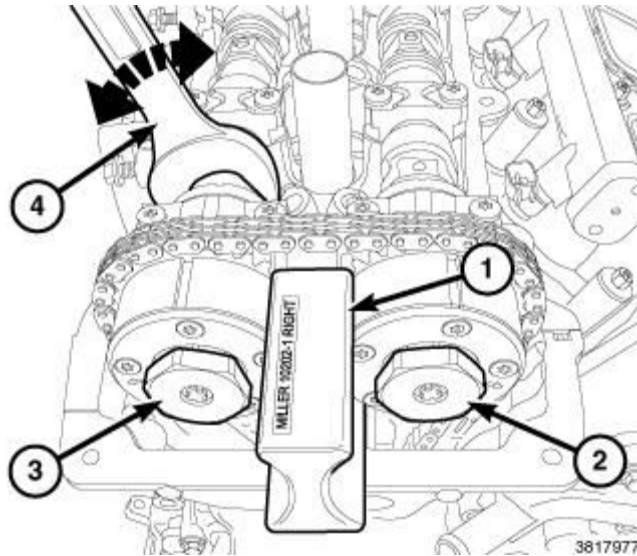


Fig. 172: Camshaft Phaser Lock, Oil Control Valves & Wrench
Courtesy of CHRYSLER GROUP, LLC

NOTE: It may be necessary to rock the camshaft slightly (a few degrees) with a wrench (4) when installing the camshaft phaser lock.

7. Install the Camshaft Phaser Lock (special tool #10202-1, Lock, Camshaft/Phaser, Right Side) (1) against the cylinder head cover mounting surface with the tool number facing up.
8. Tighten the oil control valves (2) and (3) to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
9. Remove the Camshaft Phaser Lock (1) and the Timing Chain Holder.

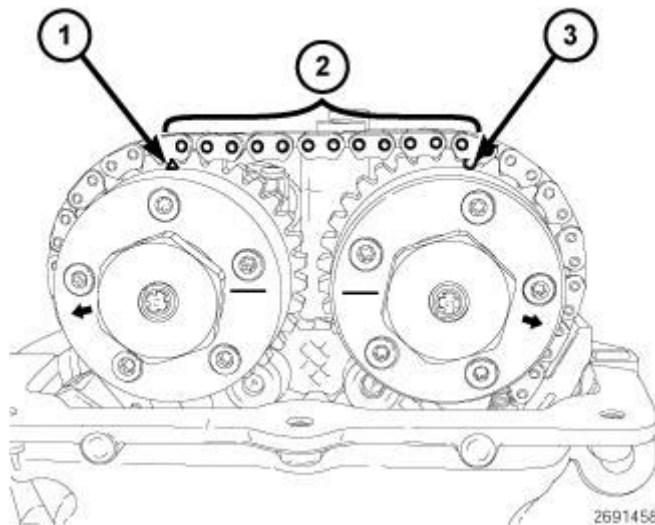


Fig. 173: Chain Pins, Arrows, Scribe Lines, Cam Phaser Triangle Marking & Circle Marking
Courtesy of CHRYSLER GROUP, LLC

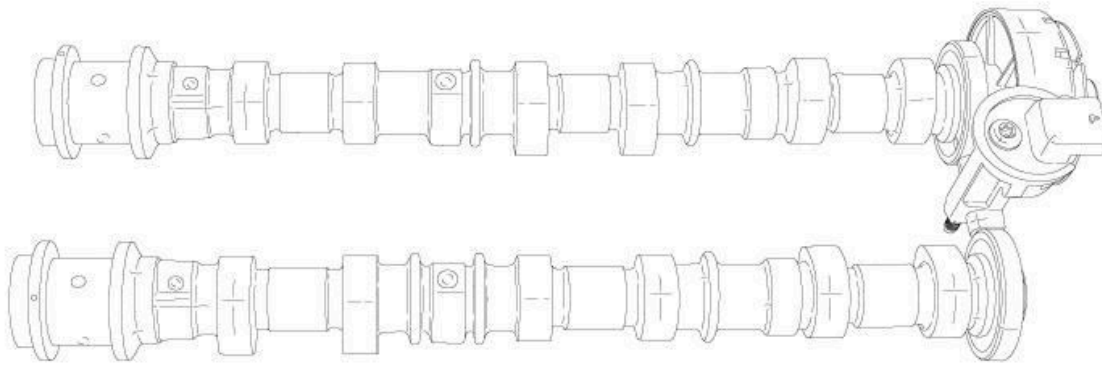
10. Rotate the crankshaft clockwise two complete revolutions stopping when the left side number four cylinder piston is again positioned at top-dead-center on the compression stroke. To assure correct engine timing, verify the following;
 - The indicator dial is set to **ZERO** when the left side number four cylinder piston is positioned at top-dead-center on the compression stroke.
 - The **ARROWS** (4) on the right side cam phasers point away from each other.
 - The **SCRIBE LINES** (5) on the right side cam phasers are parallel to the cylinder head cover mounting surface.
 - There are twelve chain pins (2) **BETWEEN** the exhaust cam phaser triangle marking (1) and the intake cam phaser circle marking (3).
11. If the engine timing is not correct, repeat this procedure.
12. Install all of the spark plugs. Refer to **SPARK PLUG, INSTALLATION** .
13. Install the left ignition coils. Refer to **COIL, IGNITION, INSTALLATION** .
14. Install the right cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, INSTALLATION**.
15. Install the upper intake manifold. Refer to **MANIFOLD, INTAKE, INSTALLATION**.
16. Connect the negative battery cable and tighten nut to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
17. Start the engine and perform the following Powertrain Verification Tests. Refer to appropriate Diagnostic Information .
 - Cam/Crank Variation Relearn
 - Target Coefficient Relearn

NOTE: **Following the first restart after a DTC driven phaser replacement, clear all DTCs and verify that subsequent restarts do not set any additional codes. For any DTCs that reset, refer to DTC INDEX article .**

CAMSHAFT, ENGINE

DESCRIPTION

DESCRIPTION



2820031

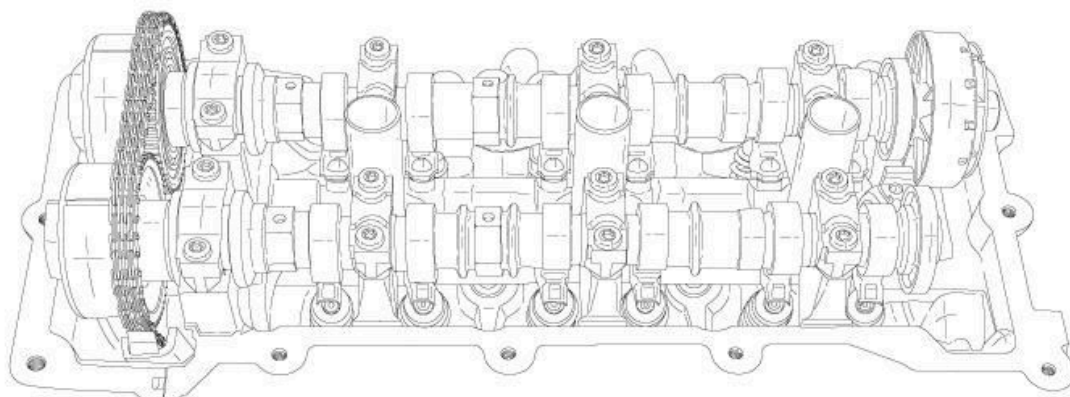
Fig. 174: Dual Over Head Camshaft (DOHC) Configuration
Courtesy of CHRYSLER GROUP, LLC

The Pentastar engine uses a Dual Over Head Camshaft (DOHC) configuration. The camshafts are a nodular cast iron design. Each camshaft has a pressed on magnetic timing wheel that is magnetically encoded. The two Camshaft Position (CMP) sensors are located between the timing wheels. Attached to the rear of the right exhaust camshaft is a centrifuge which is part of the crankcase ventilation system.

The centrifuge is used to separate oil droplets from the crankcase gases before they enter the PCV valve. Four bearing journals are machined into the camshaft. Camshaft end play is controlled by two thrust walls that border the nose piece journal.

OPERATION

OPERATION



2820145

Fig. 175: Right Hand Camshafts

Courtesy of CHRYSLER GROUP, LLC

NOTE: RH camshafts shown in illustration, LH camshafts similar.

The camshaft has precisely machined (egg shaped) lobes to provide accurate valve timing and duration. The camshaft is driven by the crankshaft via drive sprockets and chains.

STANDARD PROCEDURE

CAMSHAFT END PLAY

1. Remove the cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, REMOVAL**.

NOTE: Cylinder #1 or #4 must be used when checking for Top Dead Center (TDC).

NOTE: Right intake camshaft shown in illustration, other camshafts similar.

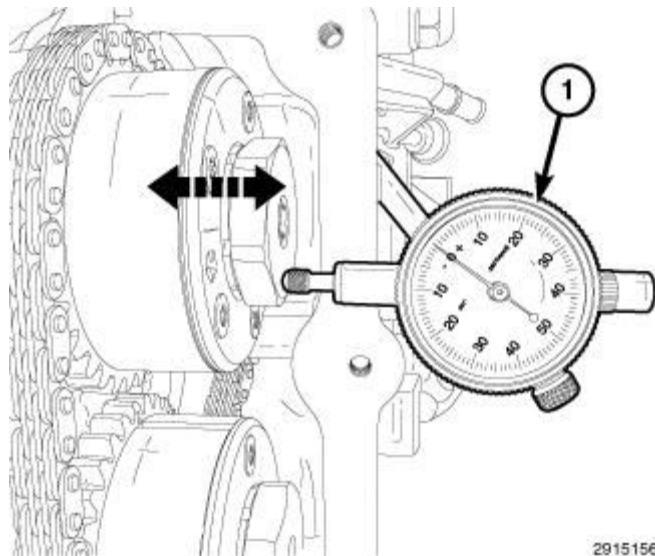


Fig. 176: Measuring Camshaft End Play Using Dial Indicator
Courtesy of CHRYSLER GROUP, LLC

2. Mount Dial Indicator Set (special tool #C-3339A, Set, Dial Indicator) (1) to a stationary point at the front of the engine. Place the probe perpendicular against the Oil Control Valve of the camshaft.
3. Move the camshaft all the way to the rear of its travel.
4. Zero the dial indicator.
5. Move the camshaft forward to the limit of travel and read the dial indicator. Compare the measured end play to the specification. Refer to **ENGINE SPECIFICATIONS**.

REMOVAL

LEFT

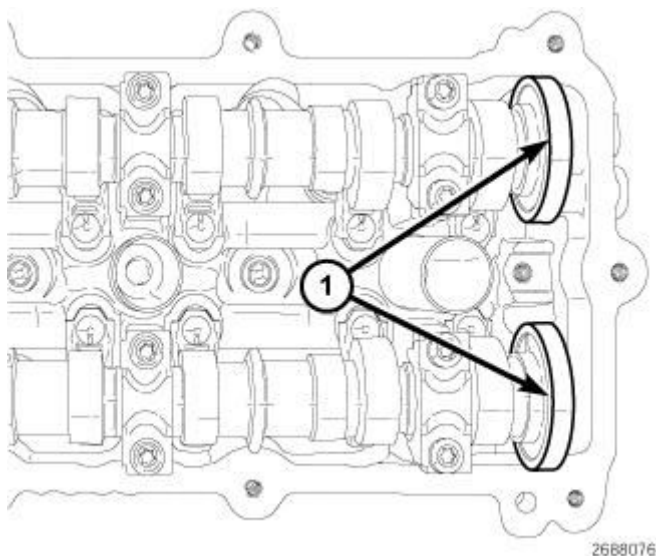


Fig. 177: Magnetic Timing Wheels

Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.

CAUTION: When the timing chain is removed and the cylinder heads are still installed, Do not forcefully rotate the camshafts or crankshaft independently of each other. Severe valve and/or piston damage can occur.

CAUTION: DO NOT STAMP OR STRIKE THE CAMSHAFT BEARING CAPS. SEVERE DAMAGE WILL OCCUR TO THE BEARING CAPS.

1. Remove the upper intake manifold, all ignition coils, all spark plugs and left cylinder head cover. Refer to COVER(S), CYLINDER HEAD, REMOVAL.

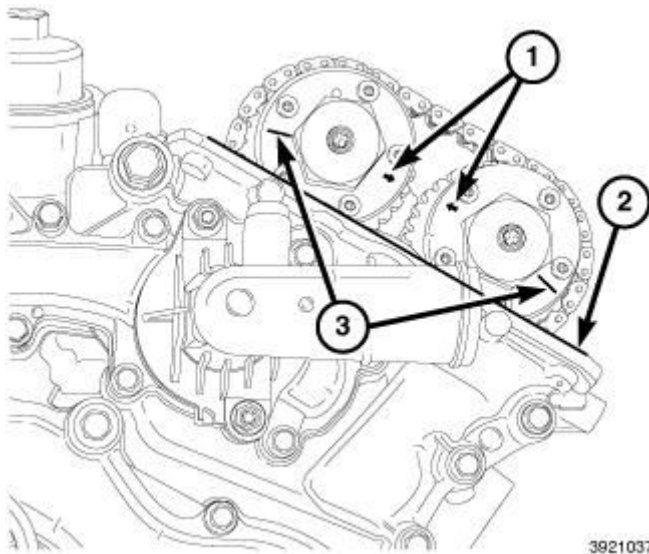


Fig. 178: Arrows, Scribe Lines & Cylinder Head Cover Mounting Surface
Courtesy of CHRYSLER GROUP, LLC

2. The left side cam phaser **SCRIBE LINES** (3) should face away from each other and the **ARROWS** (1) should point toward each other and be parallel to the cylinder head cover mounting surface (2). The number one cylinder piston is positioned at top-dead-center on the exhaust stroke.
3. Mark the camshaft phasers to the timing chain with a paint pen or equivalent.

NOTE: Graphic shows engine timing cover removed for clarity.

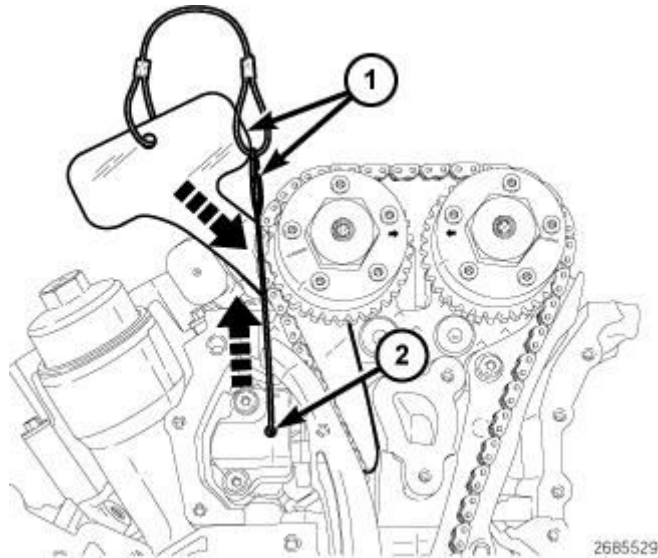


Fig. 179: Pin, Rack & Timing Chain Holder
Courtesy of CHRYSLER GROUP, LLC

4. Using the (special tool #10200-3, Pin) (2), lift the pawl off of the rack (3). While holding the pawl off of the rack, push (special tool #10200-1, Holder, Timing Chain, Left Side) (1) into place between the cylinder head and the cam chain guide to force the rack and piston back into the tensioner body.

NOTE: The holder remains in place while the phasers are removed.

NOTE: Minor rotation of a camshaft (a few degrees) may be required when installing the LH Camshaft/Phaser Lock.

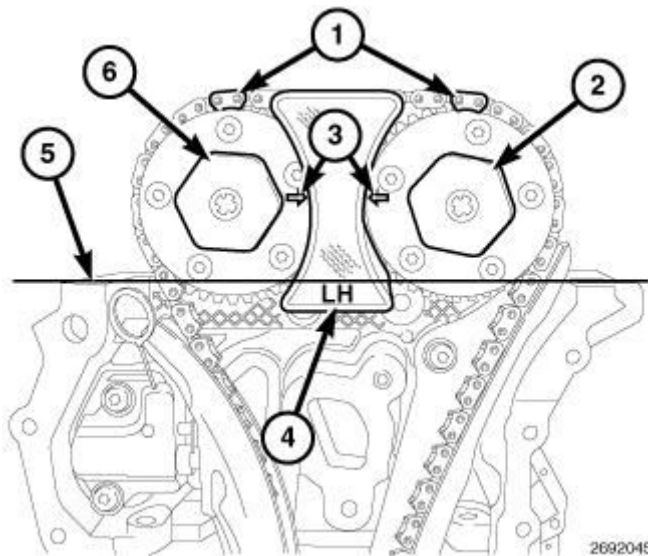
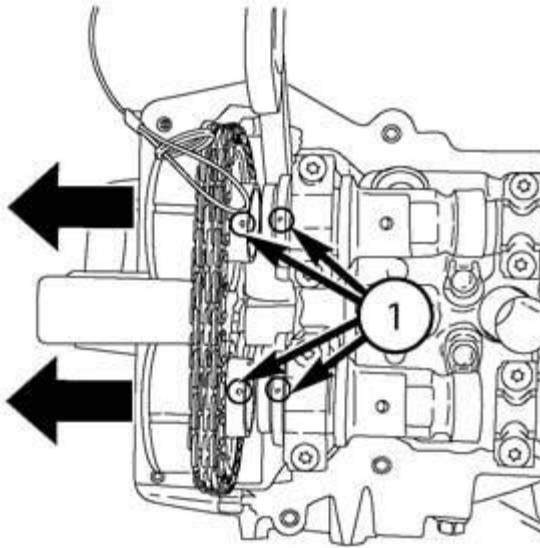


Fig. 180: Phaser Timing Marks, Oil Control Valves & LH Camshaft Phaser Lock
Courtesy of CHRYSLER GROUP, LLC

5. Install the (special tool #10202, Locks, Camshaft/Phaser) (4).
6. Remove the exhaust oil control valve (2) and the intake oil control valve (6).



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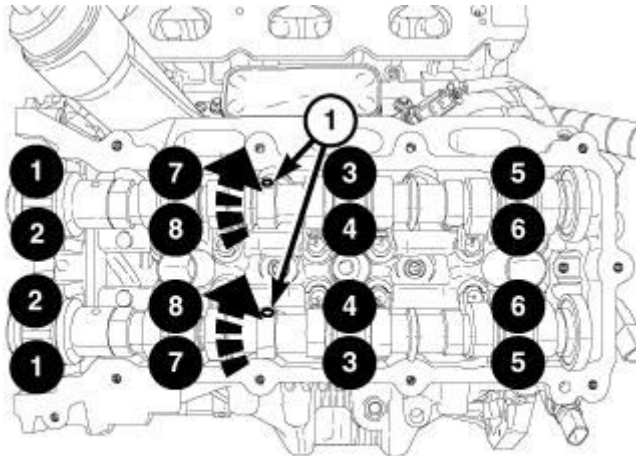
Fig. 181: Alignment Marks
Courtesy of CHRYSLER GROUP, LLC

NOTE: The alignment marks located on the camshaft specifies the location of the drive pin in reference to the phaser alignment mark.

7. Using care. Remove both the intake and exhaust oil control valves simultaneously.

NOTE: DO NOT REMOVE THE PHASER LOCK.

NOTE: Camshaft bearing caps should have been marked during engine manufacturing. For example, the number one exhaust camshaft bearing cap is marked "1E->". The caps should be installed with the notch forward.



2676491

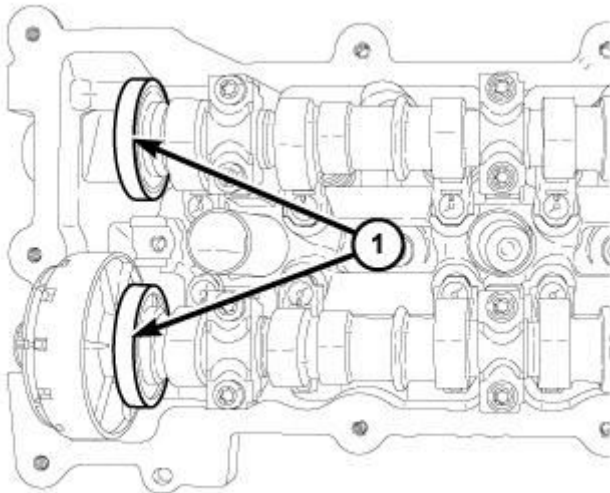
Fig. 182: Camshaft Bearing Cap Bolts Removal Sequence - Left
 Courtesy of CHRYSLER GROUP, LLC

8. Rotate the camshafts counterclockwise to position the alignment holes (1) **approximately 30° before top-dead-center** . This places the camshafts in the neutral position (no valve load).
9. Loosen the camshaft bearing cap bolts in the sequence shown in illustration.

NOTE: When the camshaft is removed the rocker arms may slide downward, mark the rocker arms before removing the camshaft.

10. Remove the camshaft bearing caps and the camshafts.

RIGHT



2691700

Fig. 183: Magnetic Timing Wheels

Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.

CAUTION: When the timing chain is removed and the cylinder heads are still installed, Do not forcefully rotate the camshafts or crankshaft independently of each other. Severe valve and/or piston damage can occur.

CAUTION: DO NOT STAMP OR STRIKE THE CAMSHAFT BEARING CAPS. SEVERE DAMAGE WILL OCCUR TO THE BEARING CAPS.

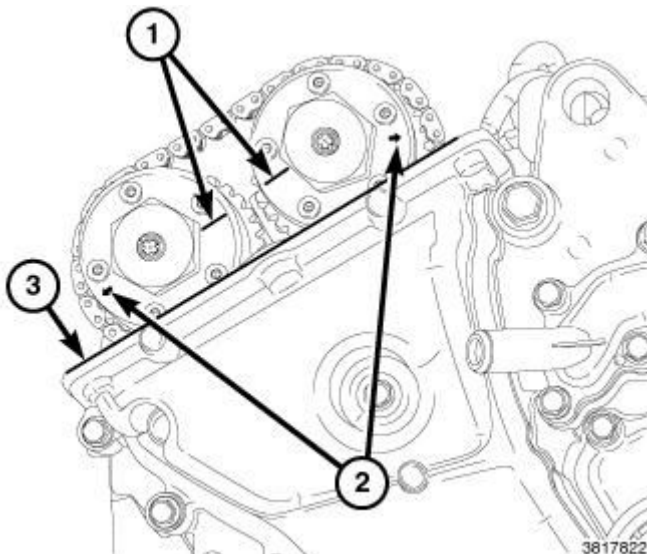


Fig. 184: Arrows, Scribe Lines & Cylinder Head Cover Mounting Surface

Courtesy of CHRYSLER GROUP, LLC

1. Remove the upper intake manifold, all ignition coils, all spark plugs, right cylinder head cover. Refer to **COVER(S), CYLINDER HEAD, REMOVAL**.
2. The right side cam phaser **ARROWS** (2) should point away from each other and the **SCRIBE LINES** (1) should be parallel to the cylinder head cover mounting surface (3) when the right side number one cylinder piston is positioned at top-dead-center on the exhaust stroke.
3. Mark the camshaft phasers to the timing chain with a paint pen or equivalent.

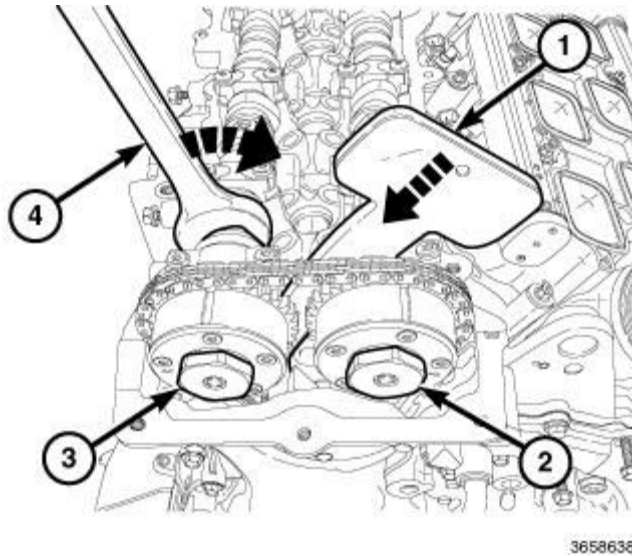


Fig. 185: Compressing Tensioner By Slightly Rotating Exhaust Camshaft Clockwise
Courtesy of CHRYSLER GROUP, LLC

4. Use the timing chain to compress the tensioner by slightly rotating the exhaust camshaft clockwise (4). Insert the (special tool #10369, Holder, Timing Chain) (1) into place between the cylinder head boss and the tensioner arm to hold the tensioner in the compressed position. The Timing Chain Holder remains in place while the phasers are removed.

NOTE: Minor rotation of a camshaft (a few degrees) may be required when installing the RH Camshaft/Phaser Lock.

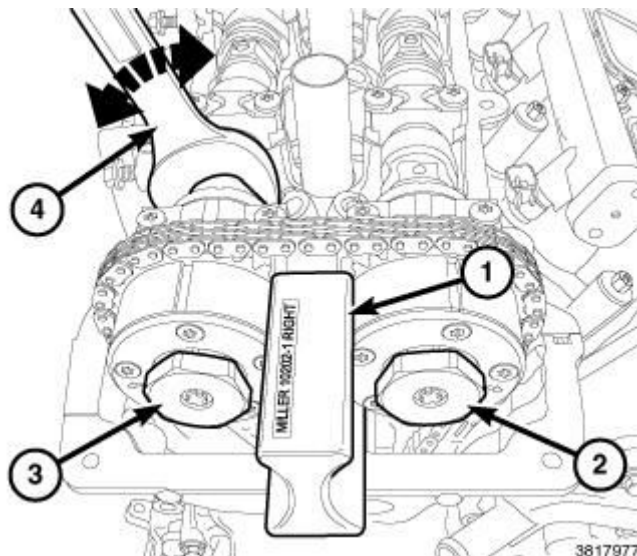
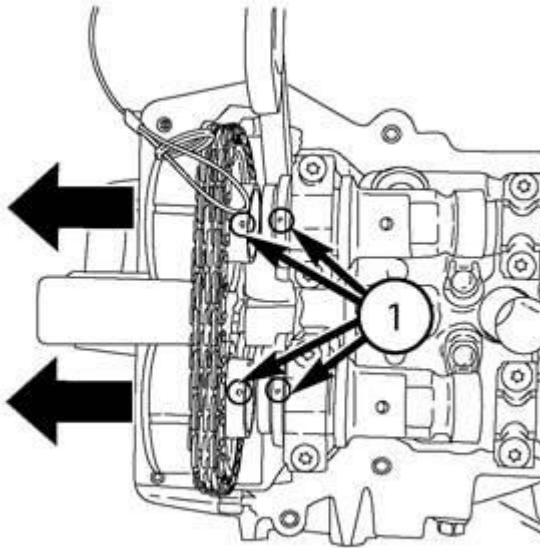


Fig. 186: Camshaft Phaser Lock, Oil Control Valves & Wrench
Courtesy of CHRYSLER GROUP, LLC

5. Install (special tool #10202-1, Lock, Camshaft/Phaser, Right Side) (1).

6. Remove both the intake (2) and exhaust (3) oil control valves.

NOTE: Left side shown in illustration. Right side similar.

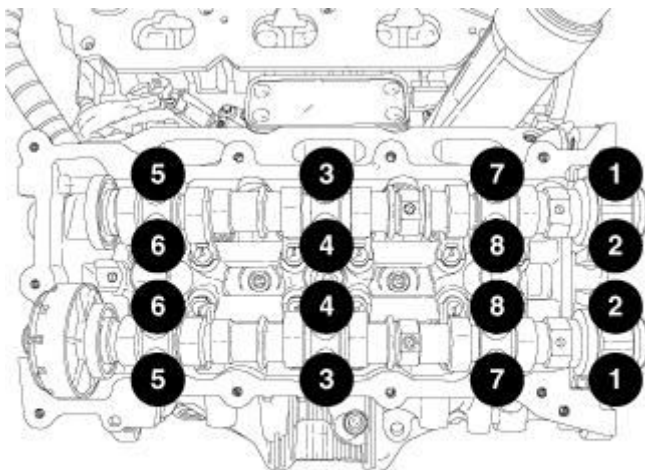


091074341

Fig. 187: Alignment Marks
Courtesy of CHRYSLER GROUP, LLC

7. Using care. Remove both the intake and exhaust oil control valves simultaneously.

NOTE: DO NOT REMOVE THE PHASER LOCK



2688694

Fig. 188: Camshaft Bearing Cap Bolts Removal Sequence - Right
Courtesy of CHRYSLER GROUP, LLC

- Camshaft bearing caps should have been marked during engine manufacturing. For example, the number one exhaust camshaft bearing cap is marked "1E->". The caps should be installed with the notch forward.

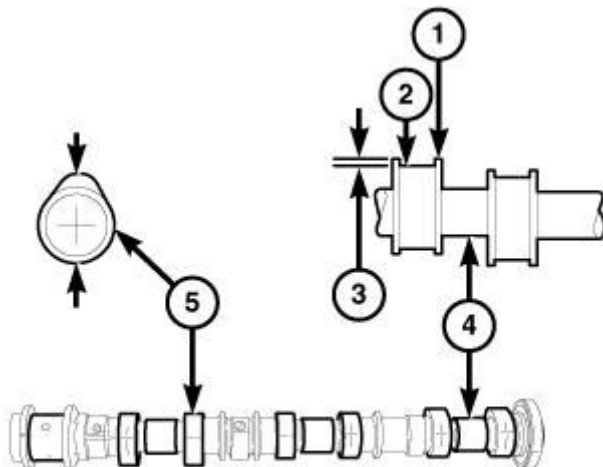
NOTE: Loosen the camshaft bearing cap bolts in the sequence shown in illustration.

NOTE: When the camshaft is removed the rocker arms may slide downward, mark the rocker arms before removing the camshaft.

- Remove the camshaft bearing caps and the camshafts.

INSPECTION

INSPECTION



2819808

Fig. 189: Inspecting Camshaft Bearing Journals & Cam Lobes
Courtesy of CHRYSLER GROUP, LLC

NOTE: RH intake camshaft shown in illustration, other camshafts similar.

- Inspect camshaft bearing journals (4) for damage and binding. If journals are binding, check the cylinder head for damage. Also check cylinder head oil holes for clogging.
- Check the surface of the cam lobes (5) for abnormal wear (3). Measure and compare the unworn area (1) to the worn area (2). Replace camshafts that are not within specification. Refer to **ENGINE SPECIFICATIONS**.

INSTALLATION

LEFT

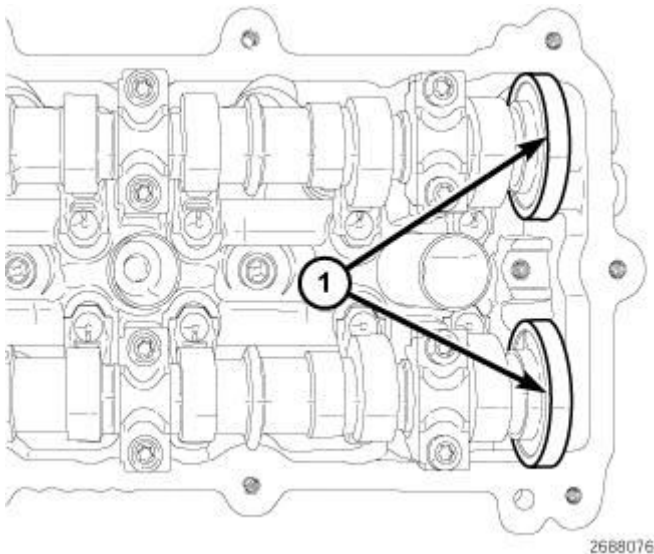


Fig. 190: Magnetic Timing Wheels
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.

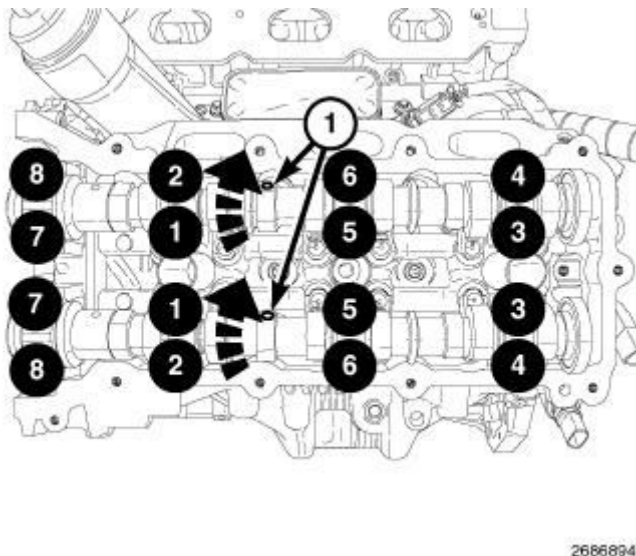


Fig. 191: Bearing Cap Retaining Bolts Tightening Sequence - Left
Courtesy of CHRYSLER GROUP, LLC

1. Lubricate the camshaft journals with clean engine oil.

CAUTION: Do not rotate the camshafts more than a few degrees independently of the crankshaft. Valve to piston contact could occur resulting in possible valve damage. If the camshafts need to be rotated more than a few degrees, first move the pistons away from the cylinder heads by rotating the crankshaft counterclockwise to a position 30° before-top-dead-center. Once the camshafts are returned to their top-dead-center position, rotate the crankshaft clockwise to return the crankshaft to top-dead-center.

2. Install the left side camshaft(s) with the alignment holes (1) positioned approximately 30° before top-dead-center. This will place the camshafts at the neutral position (no valve load) easing the installation of the camshaft bearing caps.

Caps are identified numerically (1 through 4), intake or exhaust (I or E) and should be installed from the front to the rear of the engine. All caps should be installed with the notch forward so that the stamped arrows (<) on the caps point toward the front of the engine.

3. Verify the rocker arms are aligned to the cam lobe. Refer to **ROCKER ARM, VALVE, INSTALLATION**.
4. Install the camshaft bearing caps and hand tighten the retaining bolts to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
5. Tighten the bearing cap retaining bolts in the sequence shown in illustration to the proper specification. Refer to **TORQUE SPECIFICATIONS**.

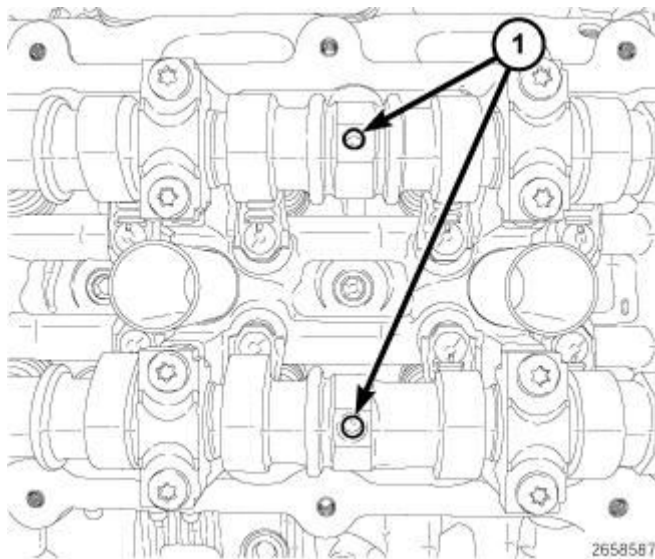


Fig. 192: Positioning Camshaft Alignment Holes Vertically
Courtesy of CHRYSLER GROUP, LLC

6. Rotate the camshafts clockwise to top-dead-center by positioning the alignment holes (1) vertically.

7. Install the timing chain tensioner holder.

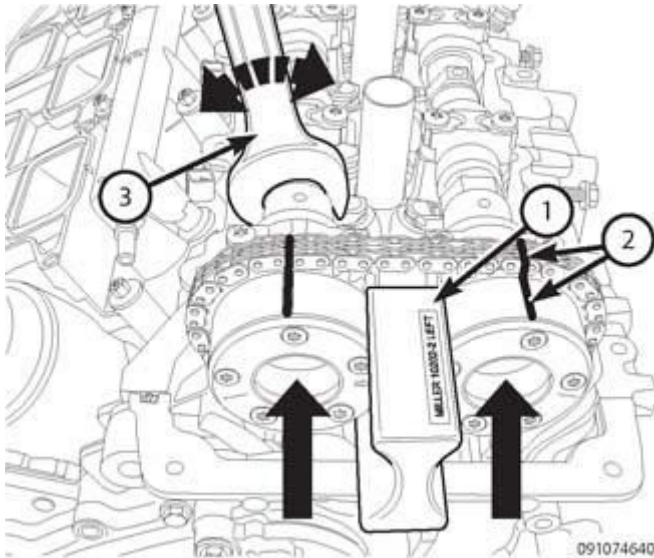


Fig. 193: Marks On Timing Chain
Courtesy of CHRYSLER GROUP, LLC

NOTE: Minor rotation of a camshaft (a few degrees) may be required when installing the LT Camshaft/Phasers to the camshaft alignment pins.

8. Verify the cam phasers are aligned with the marks (2) made on the timing chain.
9. Install the camshaft phasers onto the camshafts.

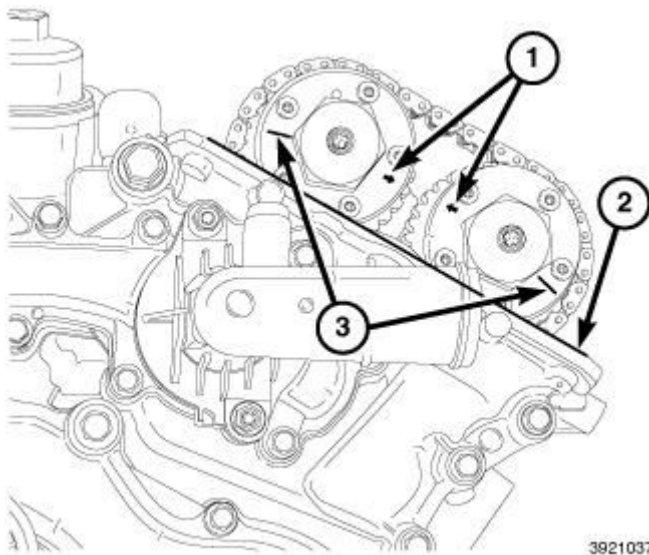


Fig. 194: Arrows, Scribe Lines & Cylinder Head Cover Mounting Surface
Courtesy of CHRYSLER GROUP, LLC

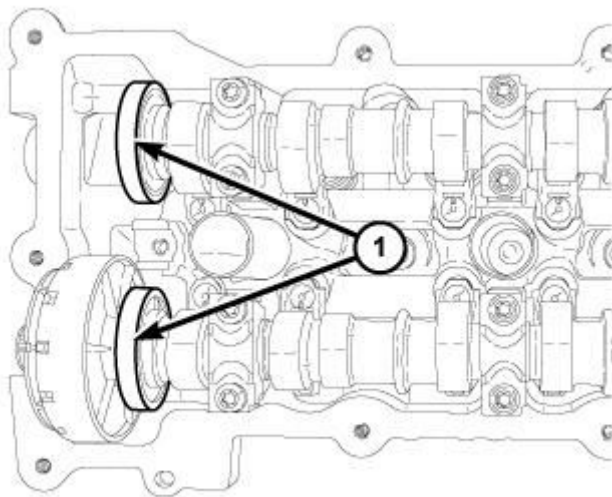
10. Using care, slowly rotate the engine four revolutions to verify the valve to piston clearance and camshaft

phaser timing mark alignment (1).

11. Install the cylinder head cover, spark plugs, ignition coils and the upper intake manifold. Refer to **ASSEMBLY, VARIABLE VALVE TIMING, PHASER/OIL CONTROL VALVE, INSTALLATION**.

NOTE: The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components.

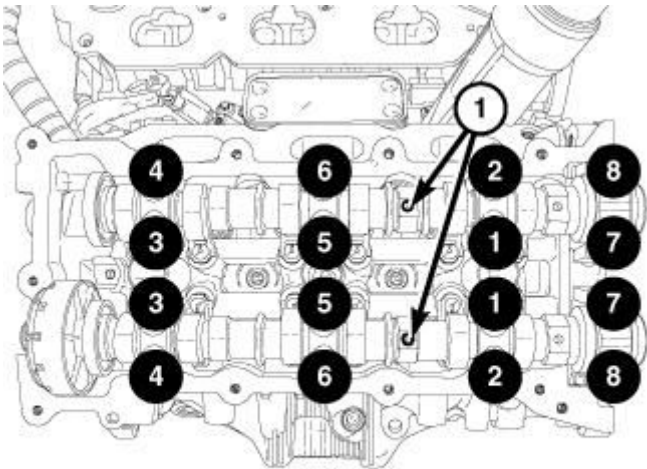
RIGHT



2691700

Fig. 195: Magnetic Timing Wheels
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.



2668733

Fig. 196: Bearing Cap Retaining Bolts Tightening Sequence - Right
Courtesy of CHRYSLER GROUP, LLC

1. Lubricate camshaft journals with clean engine oil.

CAUTION: Do not rotate the camshafts more than a few degrees independently of the crankshaft. Valve to piston contact could occur resulting in possible valve damage. If the camshafts need to be rotated more than a few degrees, first move the pistons away from the cylinder heads by rotating the crankshaft counterclockwise to a position 30° before-top-dead-center. Once the camshafts are returned to their top-dead-center position, rotate the crankshaft clockwise to return the crankshaft to top-dead-center.

2. Install the right side camshaft(s) at top-dead-center by positioning the alignment holes (1) vertically. This will place the camshafts at the neutral position (no valve load) easing the installation of the camshaft bearing caps.

NOTE: Caps are identified numerically (1 through 4), intake or exhaust (I or E) and should be installed from the front to the rear of the engine. All caps should be installed with the notch forward so that the stamped arrows (<) on the caps point toward the front of the engine.

3. Install the camshaft bearing caps and hand tighten the retaining bolts to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
4. Verify the rocker arms are aligned to the cam lobe

Refer to **ROCKER ARM, VALVE, INSTALLATION**.

5. Tighten the bearing cap retaining bolts in the sequence shown in illustration to the proper specification.

Refer to **TORQUE SPECIFICATIONS** .

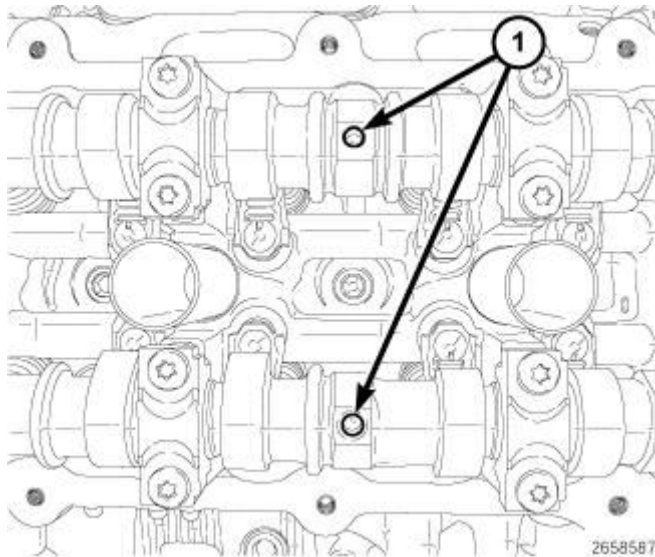


Fig. 197: Positioning Camshaft Alignment Holes Vertically
Courtesy of CHRYSLER GROUP, LLC

6. Verify the alignment holes are vertical to the cylinder head surface.

NOTE: Minor rotation of a camshaft (a few degrees) may be required when installing the RT Camshaft/Phasers to the camshaft alignment pins.

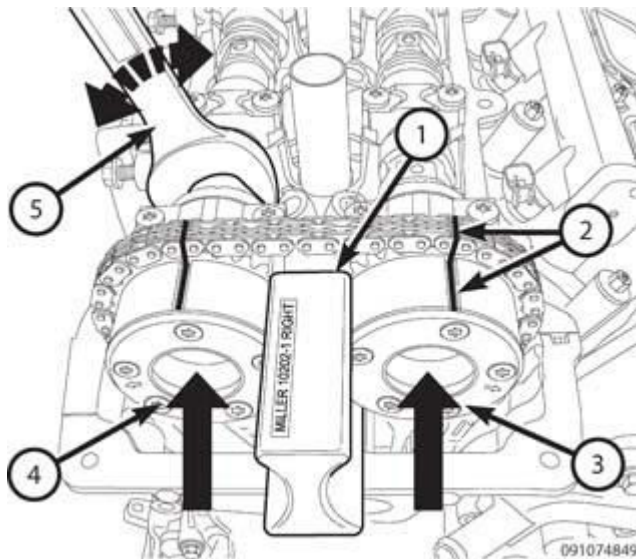


Fig. 198: Marks On Timing Chain
Courtesy of CHRYSLER GROUP, LLC

7. Verify the cam phasers (3 and 4) are aligned to the marks (2) made on the timing chain.
8. Install the phasers (3 and 4) onto the camshafts.

9. Install the oil control valves. Tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS**.

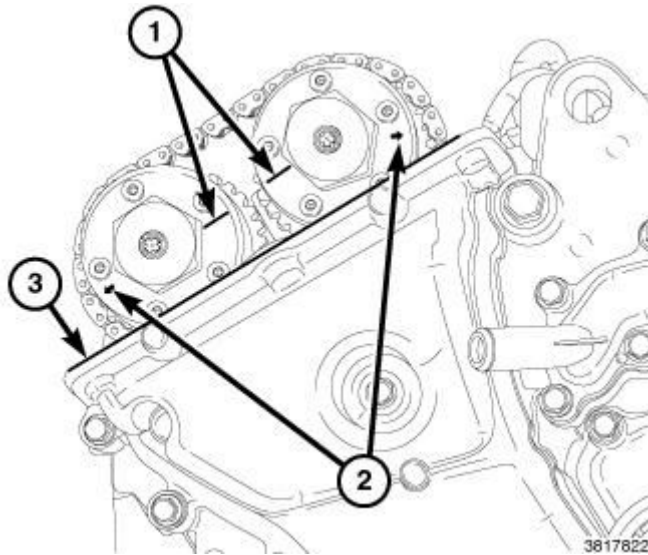


Fig. 199: Arrows, Scribe Lines & Cylinder Head Cover Mounting Surface
Courtesy of CHRYSLER GROUP, LLC

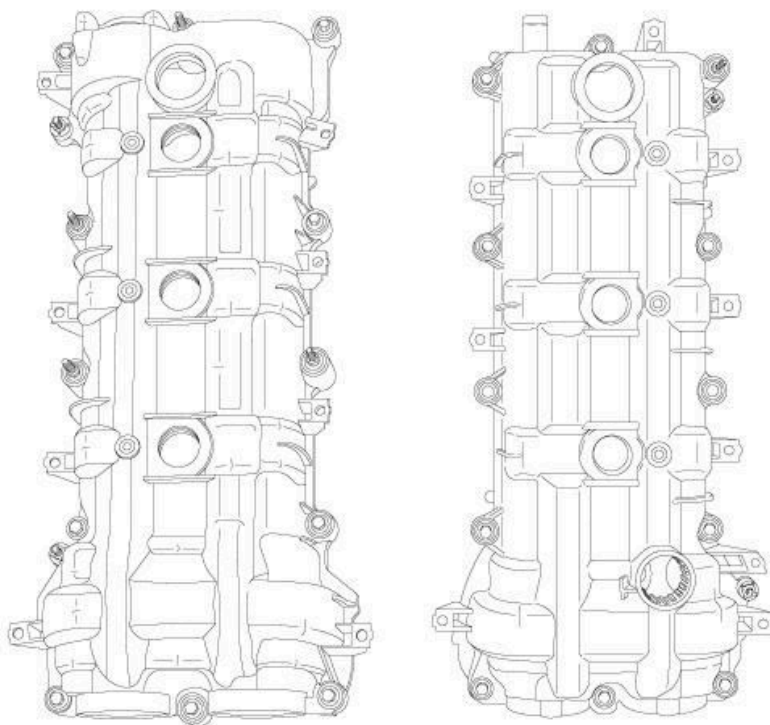
10. Using care, slowly rotate the engine four revolutions to verify the valve to piston clearance and camshaft phaser timing mark alignment (1).
11. Install the cylinder head cover, spark plugs, ignition coils and the upper intake manifold. Refer to **ASSEMBLY, VARIABLE VALVE TIMING, PHASER/OIL CONTROL VALVE, INSTALLATION**.

NOTE: The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components.

COVER(S), CYLINDER HEAD

DESCRIPTION

DESCRIPTION



2819308

Fig. 200: Cylinder Head Covers**Courtesy of CHRYSLER GROUP, LLC**

The cylinder head covers are made of a carbon and fiberglass composite. The cylinder head covers are not interchangeable from side-to-side. The cylinder head covers are sealed with a press-in-place gasket that is designed to isolate the cover from the cylinder head for improved NVH. There are two dowel pins on the outboard side of the cover flange to locate the cover to holes in the cylinder head. RTV is used to seal the T-joint at the timing cover, cylinder head and cylinder head cover.

REMOVAL**LEFT**

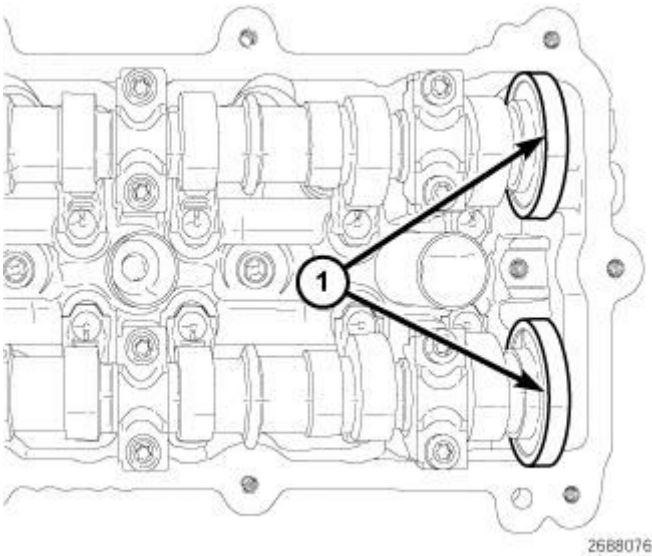


Fig. 201: Magnetic Timing Wheels
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.

1. Remove the engine cover.
2. Evacuate the A/C system. Refer to **STANDARD PROCEDURE** .
3. Disconnect and isolate the negative battery cable.
4. Drain the cooling system.
5. Remove the air cleaner body, resonator and upper intake manifold. Refer to **MANIFOLD, INTAKE, REMOVAL**.

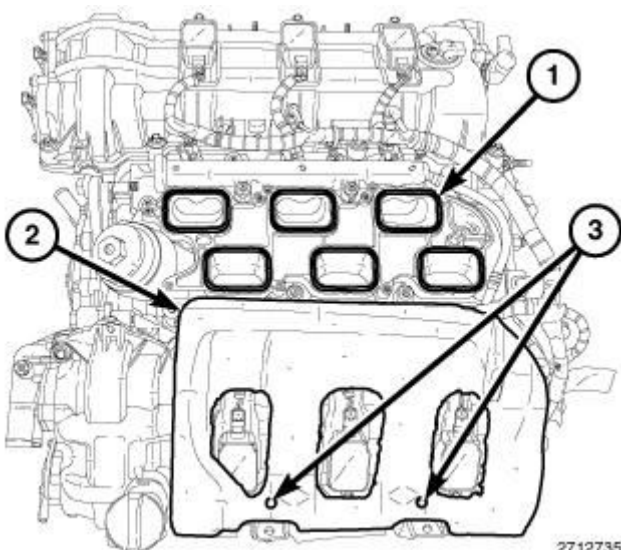
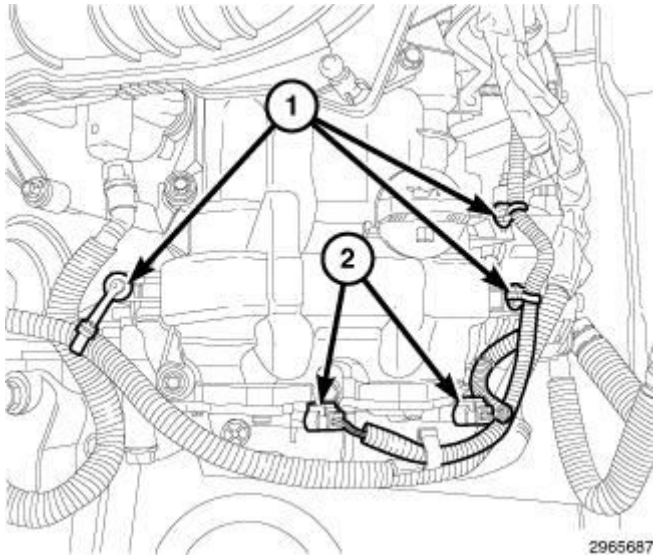


Fig. 202: Intake Ports, Insulator & Alignment Posts

Courtesy of CHRYSLER GROUP, LLC

6. Cover the open intake ports (1) to prevent debris from entering the engine.
7. Remove the insulator (2) from the LH cylinder head cover.

**Fig. 203: Wire Harness Retainers & Variable Valve Timing Solenoid Connectors**

Courtesy of CHRYSLER GROUP, LLC

NOTE: Mark the variable valve timing solenoid connectors (2) with a paint pen or equivalent so that they may be reinstalled in their original locations.

8. Disconnect the electrical connectors (2) from the variable valve timing solenoids on the left cylinder head cover.
9. Disengage three wire harness retainers (1) from the left cylinder head cover.

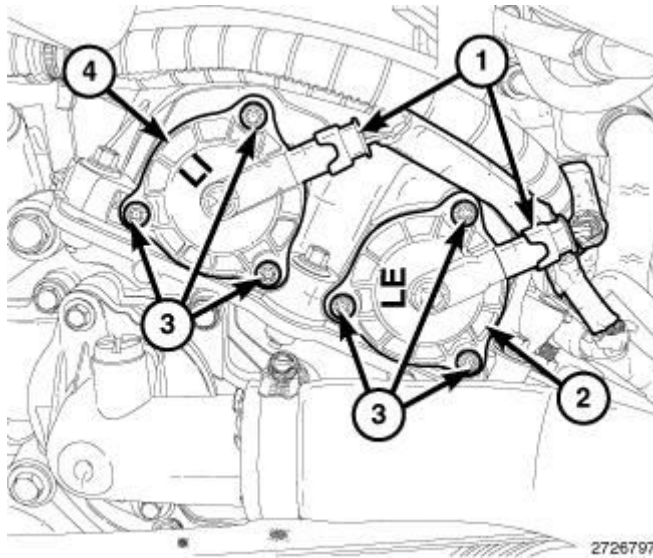


Fig. 204: Variable Valve Timing Solenoids, Connectors & Bolts
Courtesy of CHRYSLER GROUP, LLC

10. Mark the variable valve timing solenoids (2 and 4) with a paint pen or equivalent so that they may be reinstalled in their original locations.
11. Remove the variable valve timing solenoids.

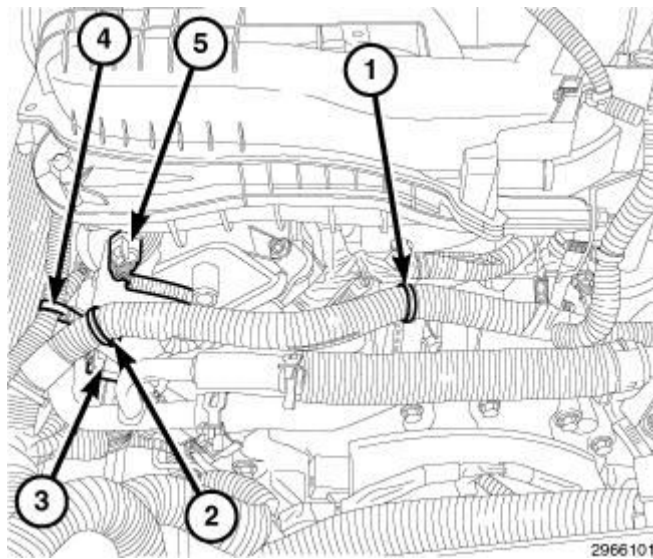


Fig. 205: Engine Coolant Temperature (ECT) Sensor Connector, Camshaft Position (CMP) Sensor & Harness Retainers
Courtesy of CHRYSLER GROUP, LLC

12. Disconnect the left Camshaft Position (CMP) sensor (5).
13. Disengage one main wire harness retainer (2) from the cylinder head cover and one main wire harness retainer (4) from the cylinder head cover mounting stud.

NOTE: The RH CMP sensor is shown in illustration, the LH CMP sensor is similar. If removing both RH and LH CMP sensors, mark the sensors so they can be installed in their original locations.

14. Remove the camshaft position sensor. Refer to **SENSOR, CAMSHAFT POSITION, REMOVAL** .

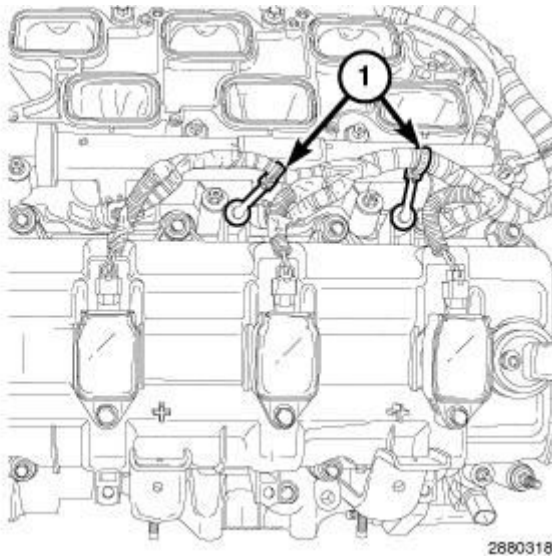


Fig. 206: Injection/Ignition Harness Retainers
Courtesy of CHRYSLER GROUP, LLC

15. Disengage two injection/ignition harness retainers (1) from the left cylinder head cover.

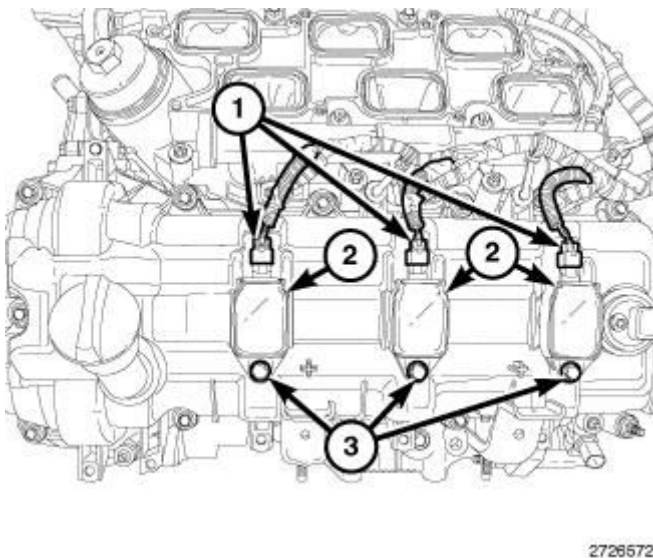


Fig. 207: Electrical Connector, Ignition Coils & Ignition Coil Retaining Bolts
Courtesy of CHRYSLER GROUP, LLC

16. Remove the ignition coils (2). Refer to **COIL, IGNITION, REMOVAL** .

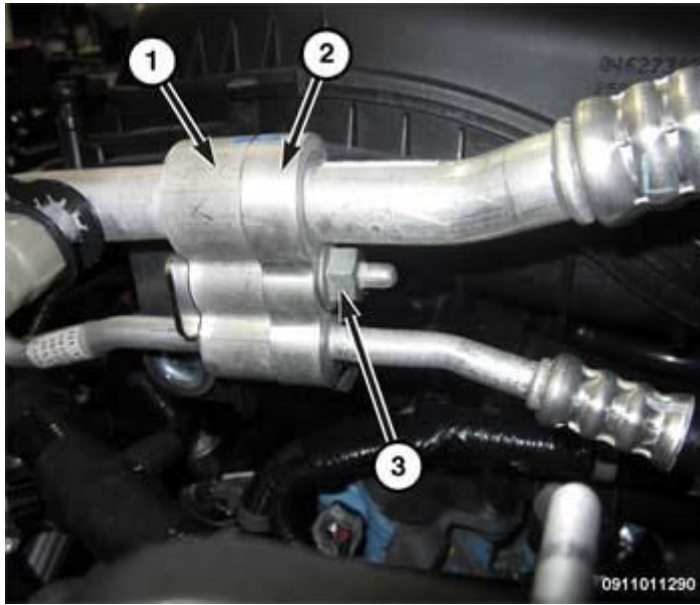


Fig. 208: IHx, Suction/Liquid Line Manifold & Nut
Courtesy of CHRYSLER GROUP, LLC

17. Remove the nut (3) and separate the suction/liquid line manifold (2) from the Internal Heat Exchanger (IHx) (1).

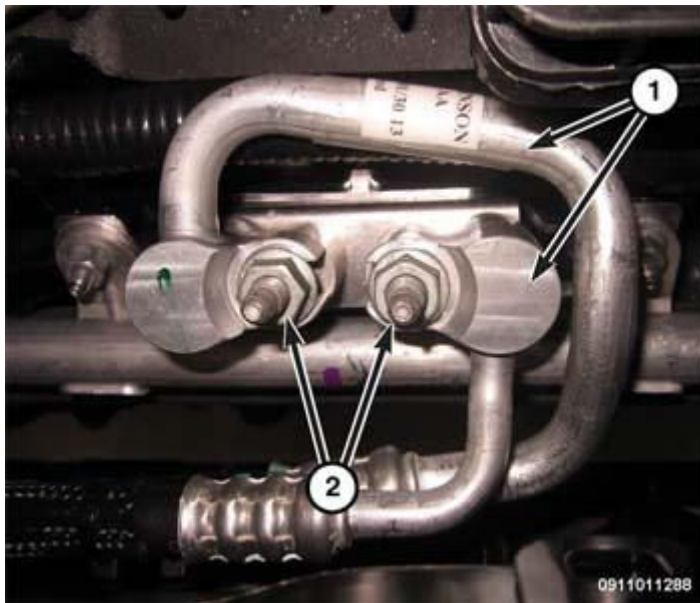


Fig. 209: A/C-To-IHX Lines
Courtesy of CHRYSLER GROUP, LLC

18. Remove the nuts that secure the A/C lines (1) to the IHx.

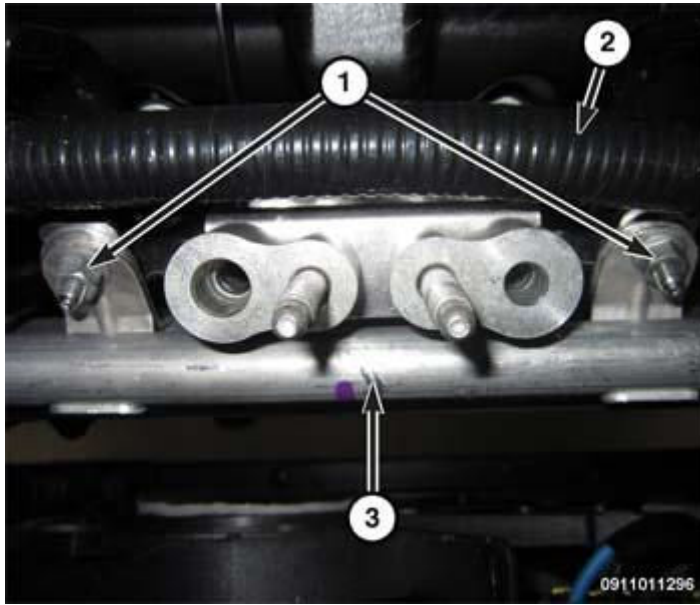


Fig. 210: Support Nuts, Upper Radiator Hose & Heater Line
Courtesy of CHRYSLER GROUP, LLC

19. Remove the heater line (3) support nuts (1).
20. Disengage the wiring harness (2) and position aside.

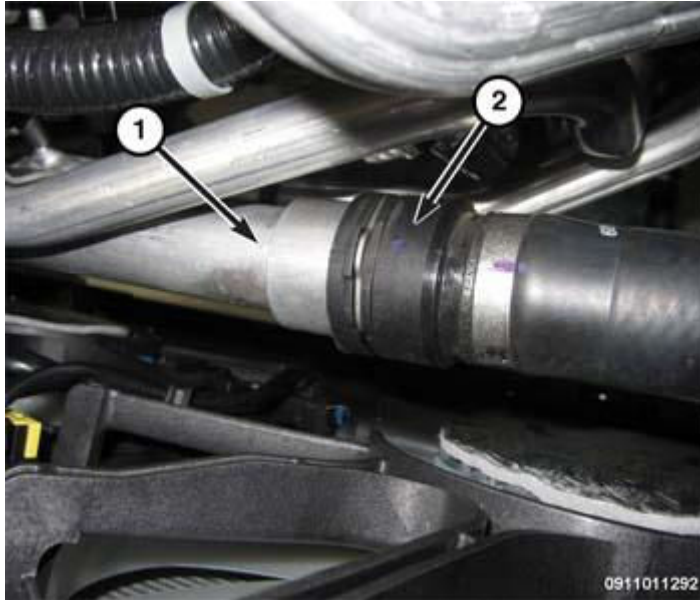


Fig. 211: Radiator Inlet Pipe & Upper Radiator Hose
Courtesy of CHRYSLER GROUP, LLC

21. Separate the upper radiator hose (2) from the radiator inlet pipe (1).
22. Remove the front bumper fascia. Refer to **FASCIA, FRONT, REMOVAL**.
23. Raise the vehicle.

24. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .
25. Remove the left side catalytic converter. Refer to **CONVERTER, CATALYTIC , REMOVAL** .

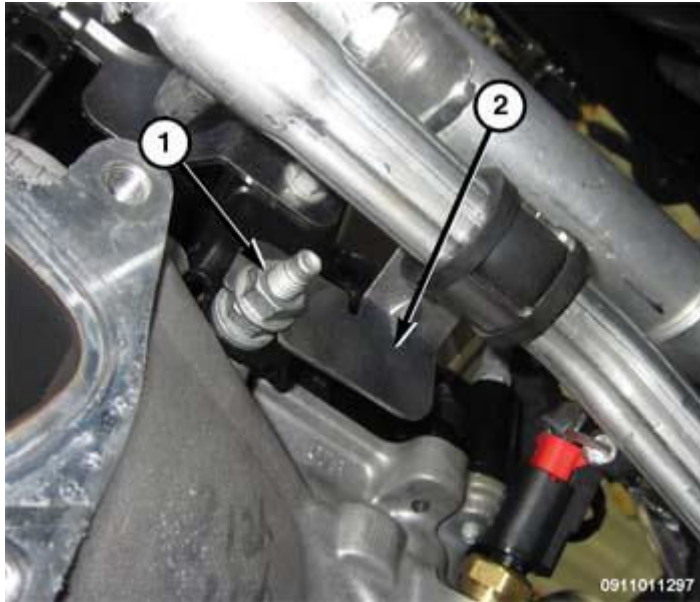


Fig. 212: A/C Line Support Brace Nut & Brace
Courtesy of CHRYSLER GROUP, LLC

26. Remove the A/C line support brace nut (1) and position the brace (2) away.

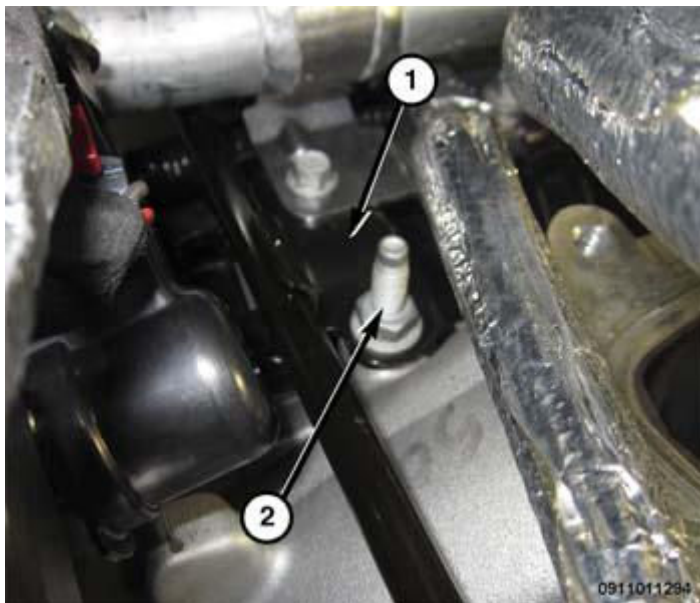


Fig. 213: Intake Manifold Left/Forward Support Bracket & Stud Bolt
Courtesy of CHRYSLER GROUP, LLC

27. Remove the intake manifold left/forward support bracket stud bolt (2).



Fig. 214: Intake Manifold Left/Rearward Support Bracket & Stud Bolt
Courtesy of CHRYSLER GROUP, LLC

28. Remove the intake manifold left/rearward support bracket stud bolt (2).

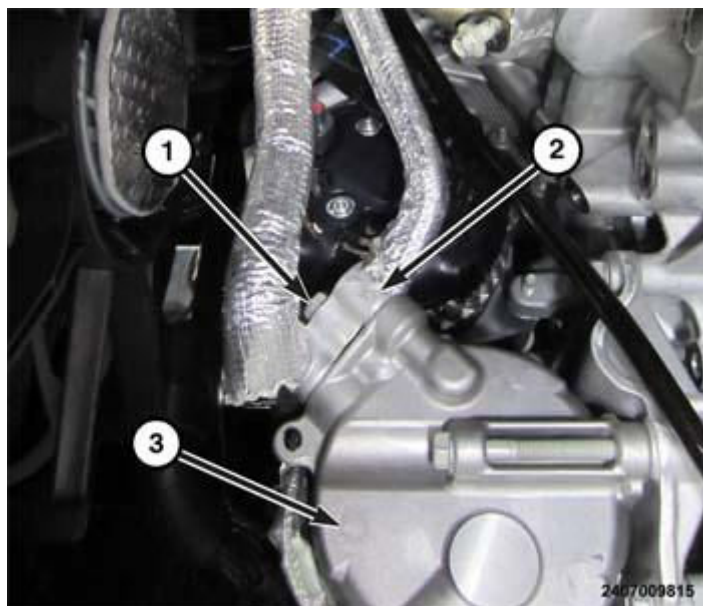


Fig. 215: A/C Compressor, IHX Manifold Line & Fasteners
Courtesy of CHRYSLER GROUP, LLC

29. Remove the A/C lines (2) at the A/C compressor (3).
30. Lower the vehicle.

NOTE: The intake manifold support brackets are fastened to the A/C line bracket

and is removed as an assembly.

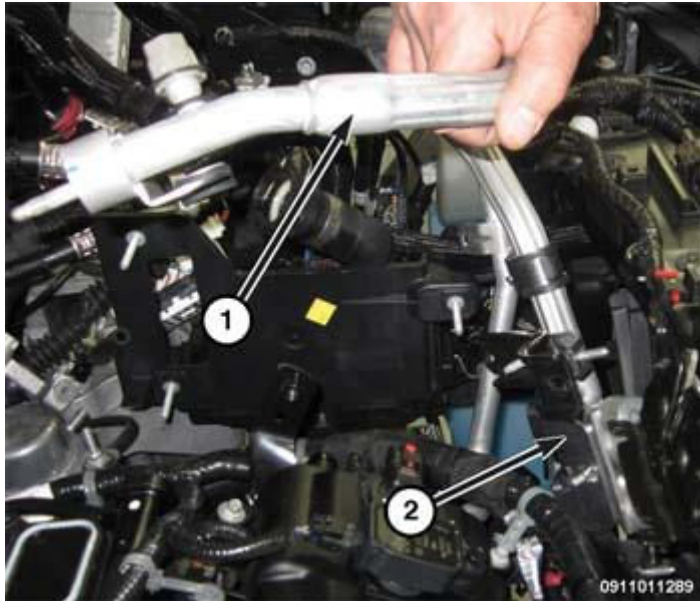


Fig. 216: A/C Line

Courtesy of CHRYSLER GROUP, LLC

31. Using care. Remove the A/C line (1) from the vehicle.
32. Position the heater line and the cooling system pipe aside.

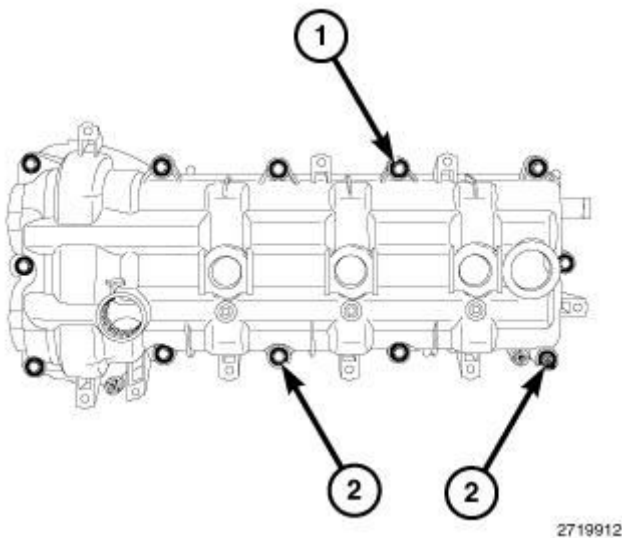
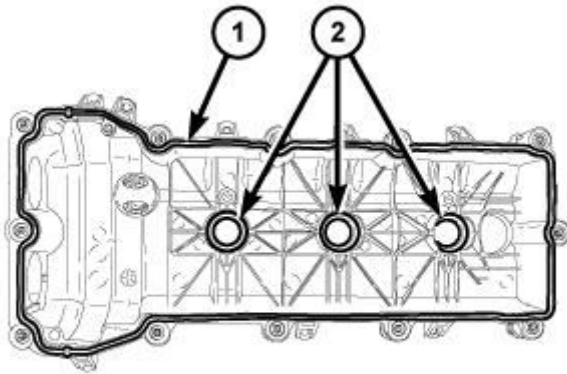


Fig. 217: Cylinder Head Cover Mounting Bolts & Studbolts

Courtesy of CHRYSLER GROUP, LLC

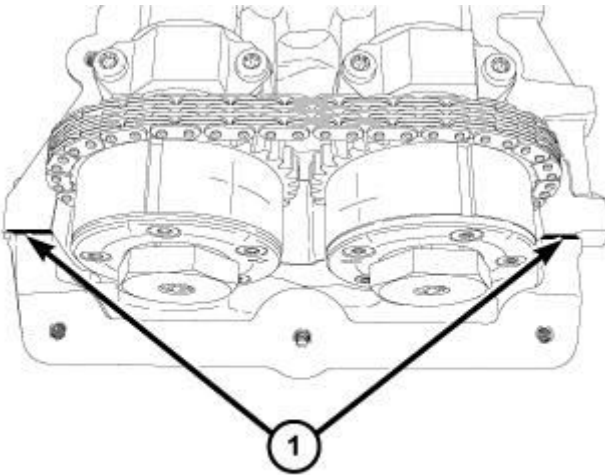
33. Loosen ten cylinder head cover mounting bolts (1) and two studbolts (2) and remove the cylinder head cover.



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Fig. 218: Cylinder Head Cover Gasket & Spark Plug Tube Seals
 Courtesy of CHRYSLER GROUP, LLC

34. Remove and discard the cylinder head cover gasket (1).
35. The spark plug tube seals (2) can be reused if not damaged.



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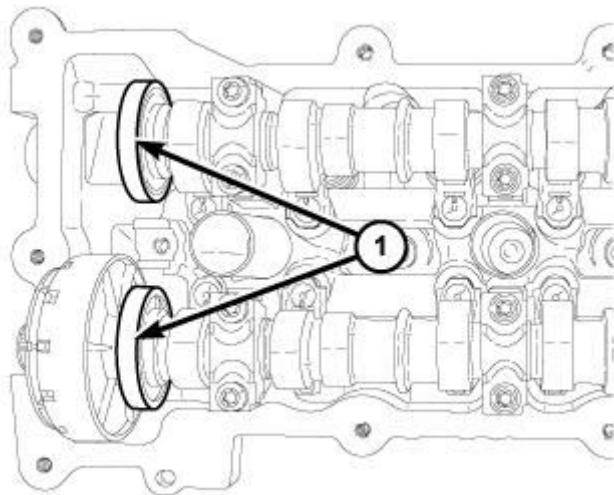
Fig. 219: RTV Sealant Locations
 Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not use oil based liquids, wire brushes, abrasive wheels or metal scrapers to clean the engine gasket surfaces. Use only isopropyl (rubbing) alcohol, along with plastic or wooden scrapers. Improper gasket surface preparation may result in engine fluid leakage.

36. Remove all residual sealant (1) from the cylinder head, timing chain cover and cylinder head cover

mating surfaces. Refer to **ENGINE, STANDARD PROCEDURE** .

RIGHT

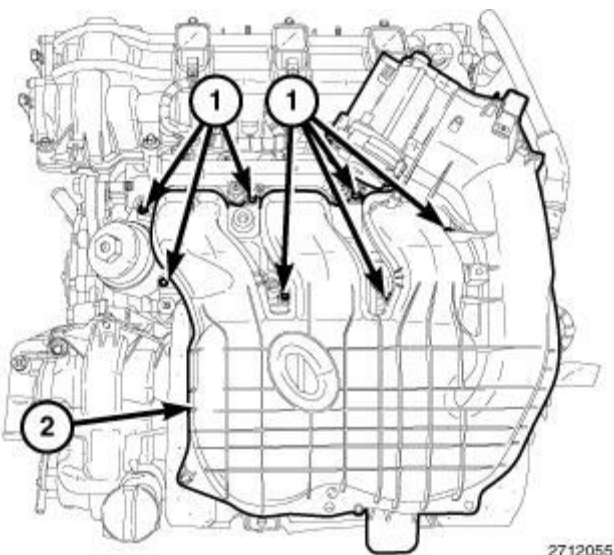


2691700

Fig. 220: Magnetic Timing Wheels

Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.



2712055

Fig. 221: Upper Intake Manifold & Bolts

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.

2. Remove the air cleaner body, resonator and upper intake manifold (2). Refer to **MANIFOLD, INTAKE, REMOVAL**.

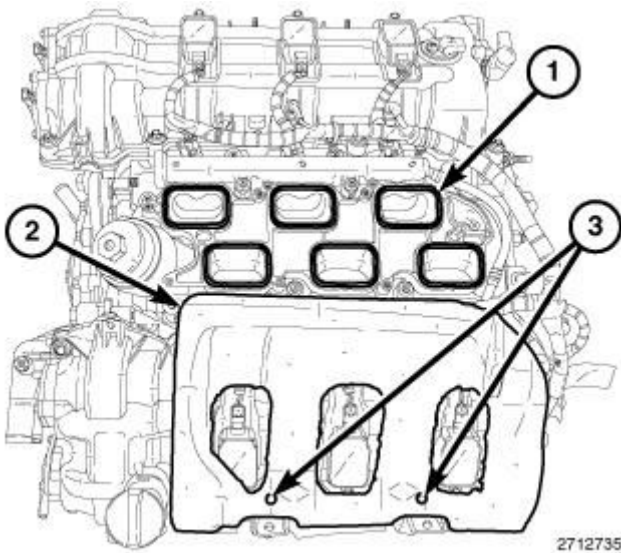


Fig. 222: Intake Ports, Insulator & Alignment Posts
 Courtesy of CHRYSLER GROUP, LLC

3. Cover the open intake ports (1) to prevent debris from entering the engine.

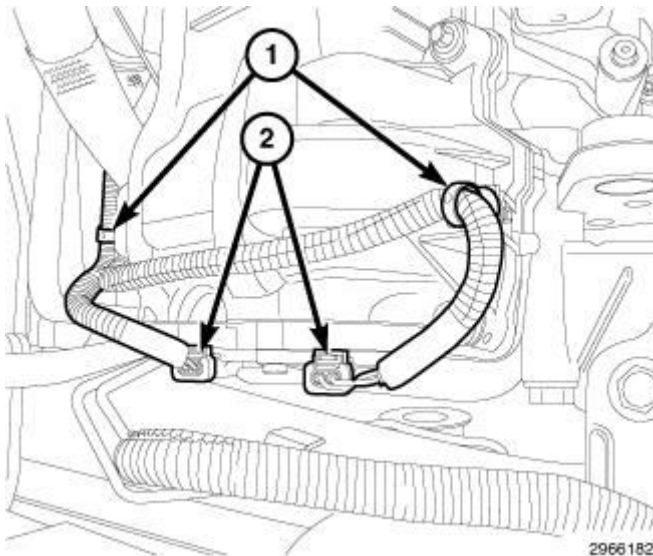


Fig. 223: Wire Harness Retainers & Variable Valve Timing Solenoid Connectors
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Mark the variable valve timing solenoid connectors (2) with a paint pen or equivalent so that they may be reinstalled in their original locations.

4. Disconnect the electrical connectors (2) from the variable valve timing solenoids on the right cylinder

head.

5. Disengage two wire harness retainers (1) from the right cylinder head cover.

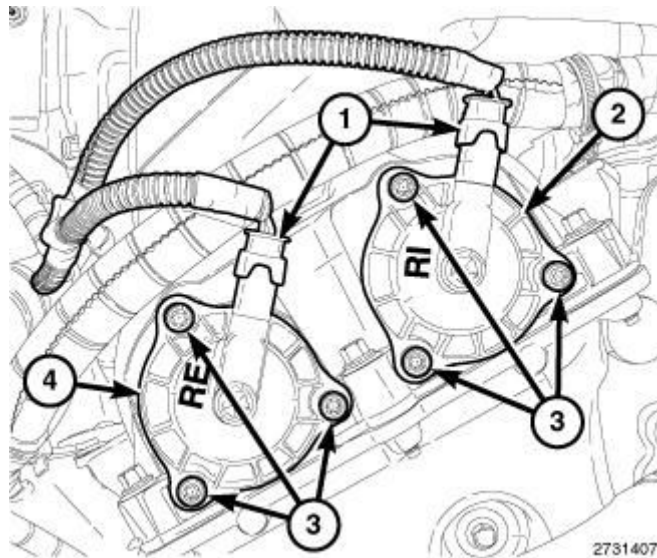


Fig. 224: Variable Valve Timing Solenoids, Connectors & Bolts
Courtesy of CHRYSLER GROUP, LLC

6. Mark the variable valve timing solenoids (2 and 4) with a paint pen or equivalent so that they may be reinstalled in their original locations.
7. Remove the variable valve timing solenoids.

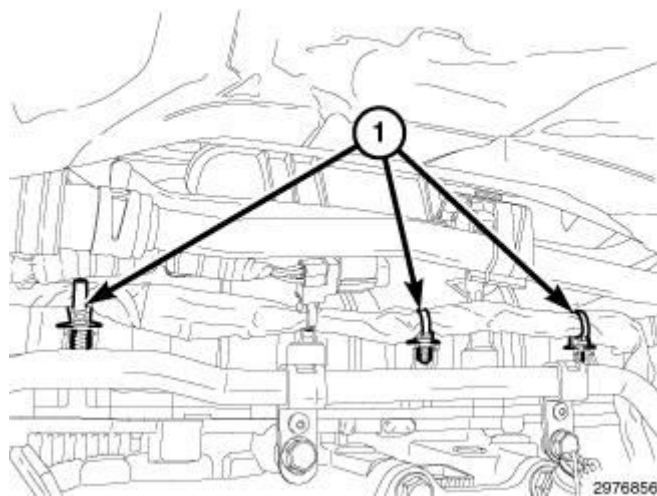


Fig. 225: Main Wire Harness Retainers
Courtesy of CHRYSLER GROUP, LLC

8. Disengage three main wire harness retainers (1) from the right cylinder head cover.

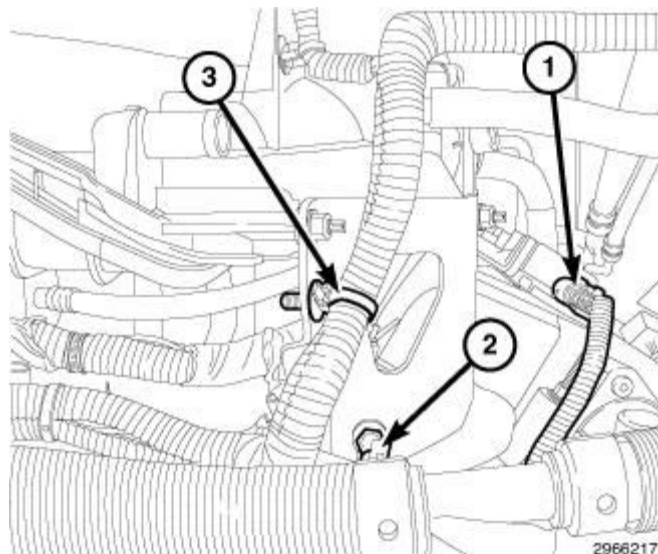


Fig. 226: Camshaft Position (CMP) Sensor Connector & Harness Retainers
Courtesy of CHRYSLER GROUP, LLC

9. Disconnect the electrical connector (1) from the right Camshaft Position (CMP) sensor.

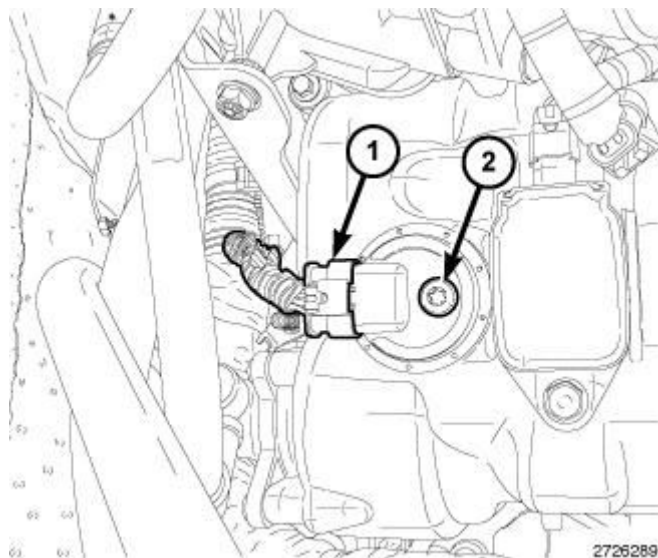


Fig. 227: CMP Sensor & Bolt
Courtesy of CHRYSLER GROUP, LLC

NOTE: If removing both RH and LH CMP sensors, mark the sensors so they can be installed in their original locations.

10. Remove the camshaft position sensor. Refer to **SENSOR, CAMSHAFT POSITION, REMOVAL**.

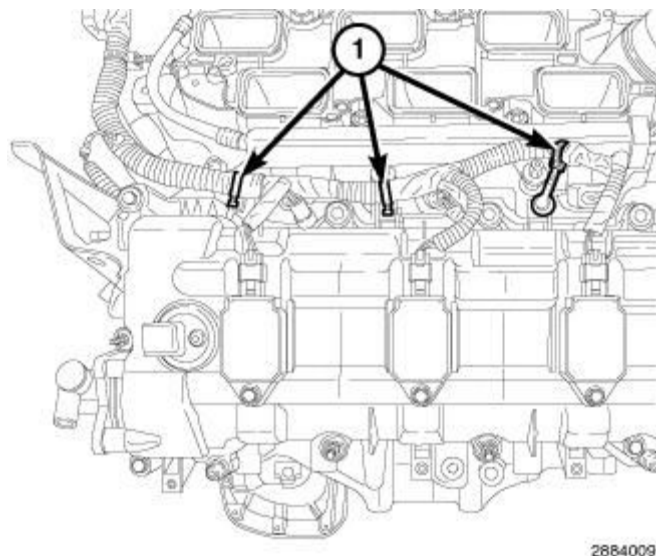


Fig. 228: Injection/Ignition Harness Retainers
Courtesy of CHRYSLER GROUP, LLC

11. Disengage three injection/ignition harness retainers (1) from the right cylinder head cover.

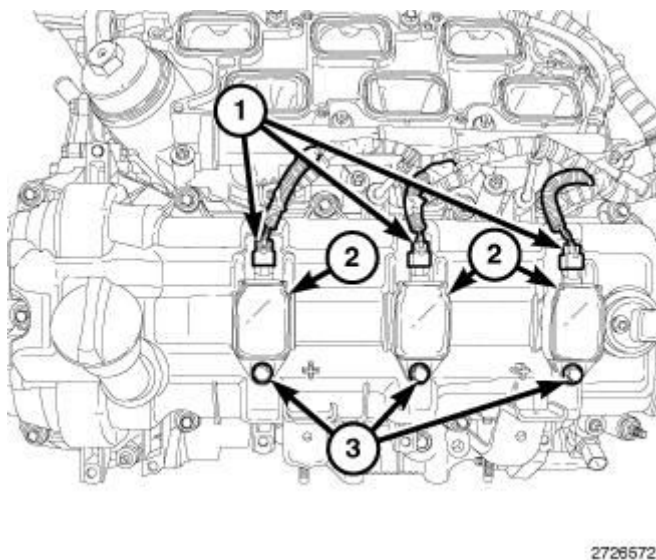
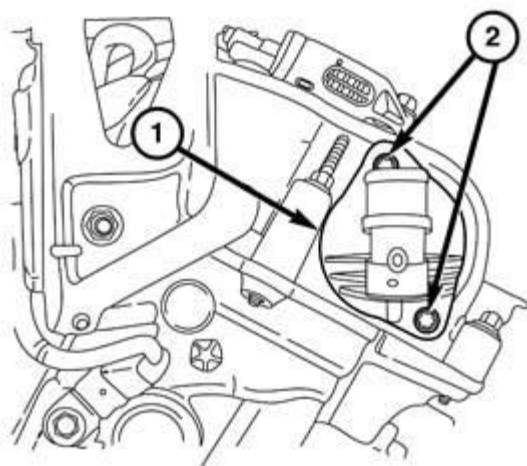


Fig. 229: Electrical Connector, Ignition Coils & Ignition Coil Retaining Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: The LH ignition coils are shown in illustration, the RH ignition coils are similar.

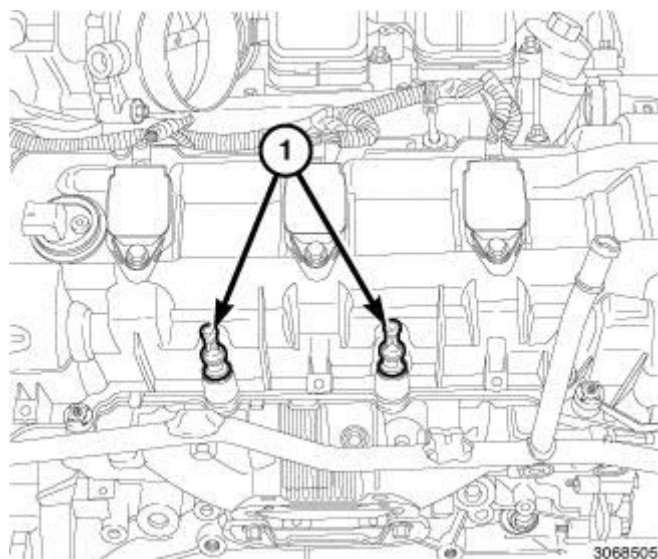
12. Remove the ignition coils (2). Refer to COIL, IGNITION, REMOVAL.



250673866

Fig. 230: PCV Valve & Screws
 Courtesy of CHRYSLER GROUP, LLC

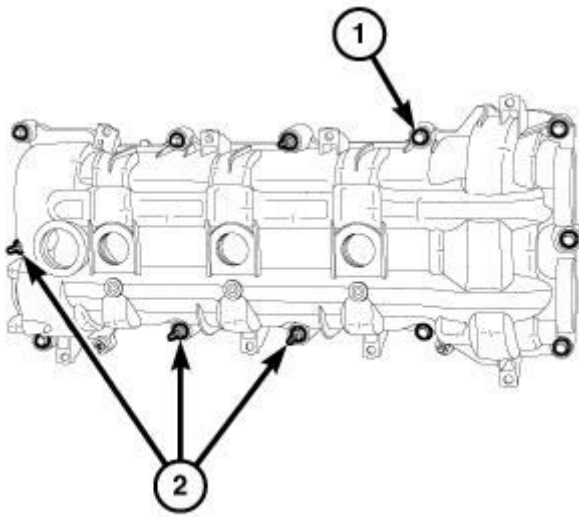
13. Remove the PCV valve (1). Refer to **VALVE, POSITIVE CRANKCASE VENTILATION (PCV), REMOVAL** .



3068505

Fig. 231: Resonator Mounts
 Courtesy of CHRYSLER GROUP, LLC

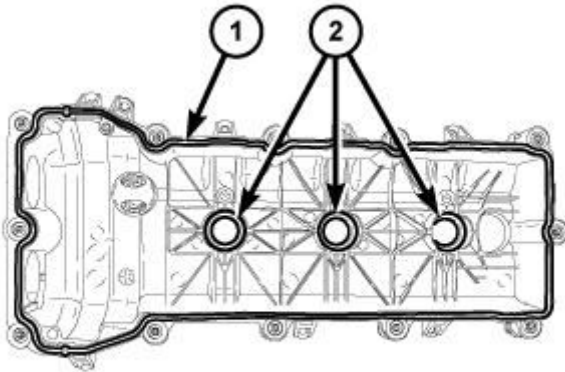
14. Remove the two resonator mounts (1) from the studbolts.



2719872

Fig. 232: Cylinder Head Cover Mounting Bolts & Studbolts
 Courtesy of CHRYSLER GROUP, LLC

15. Loosen nine cylinder head cover mounting bolts (1) and three studbolts (2) and remove the cylinder head cover.

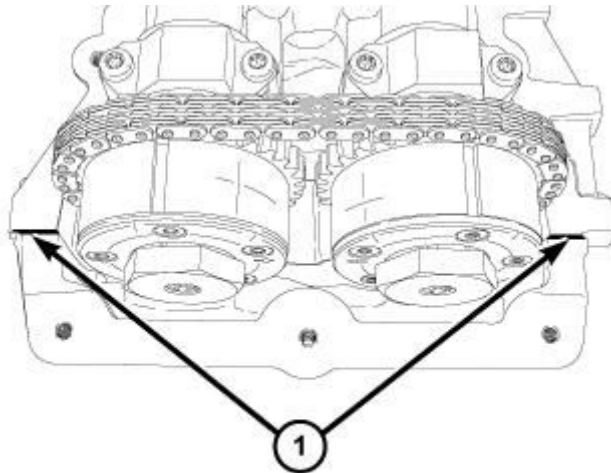


2776066

Fig. 233: Cylinder Head Cover Gasket & Spark Plug Tube Seals
 Courtesy of CHRYSLER GROUP, LLC

NOTE: The LH cylinder head cover is shown in illustration, the RH cylinder head cover is similar.

16. Remove and discard the cylinder head cover gasket (1).
17. The spark plug tube seals (2) can be reused if not damaged.



2776075

Fig. 234: RTV Sealant Locations
Courtesy of CHRYSLER GROUP, LLC

NOTE: The LH cylinder head cover T-joints are shown in illustration, the RH cylinder head cover T-joints are similar.

CAUTION: Do not use oil based liquids, wire brushes, abrasive wheels or metal scrapers to clean the engine gasket surfaces. Use only isopropyl (rubbing) alcohol, along with plastic or wooden scrapers. Improper gasket surface preparation may result in engine fluid leakage.

18. Remove all residual sealant (1) from the cylinder head, timing chain cover and cylinder head cover mating surfaces. Refer to **ENGINE, STANDARD PROCEDURE** .

INSTALLATION

LEFT

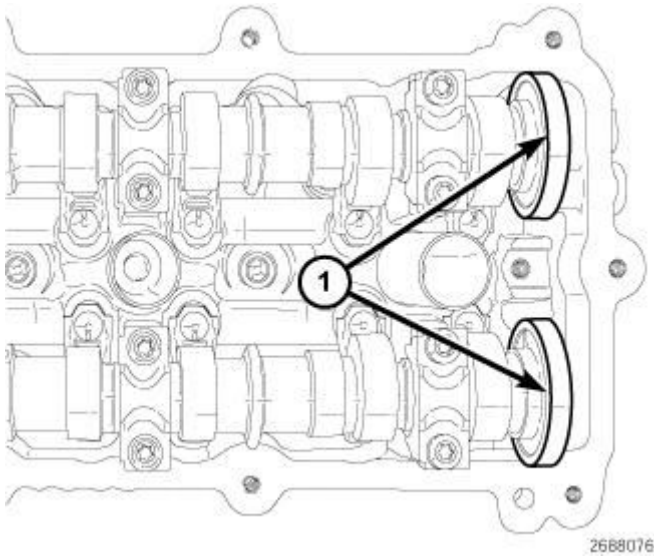


Fig. 235: Magnetic Timing Wheels
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.

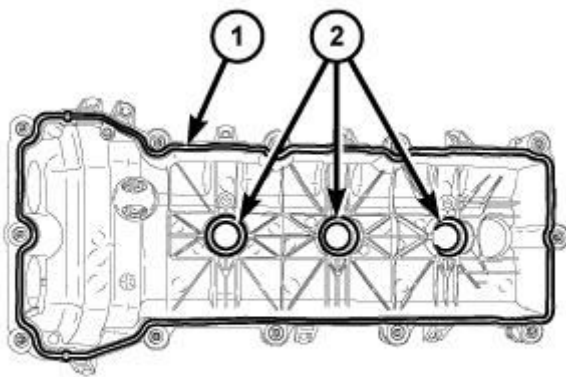


Fig. 236: Cylinder Head Cover Gasket & Spark Plug Tube Seals
Courtesy of CHRYSLER GROUP, LLC

1. Install the cylinder head cover gasket (1).
2. The spark plug tube seals (2) can be reused if not damaged.

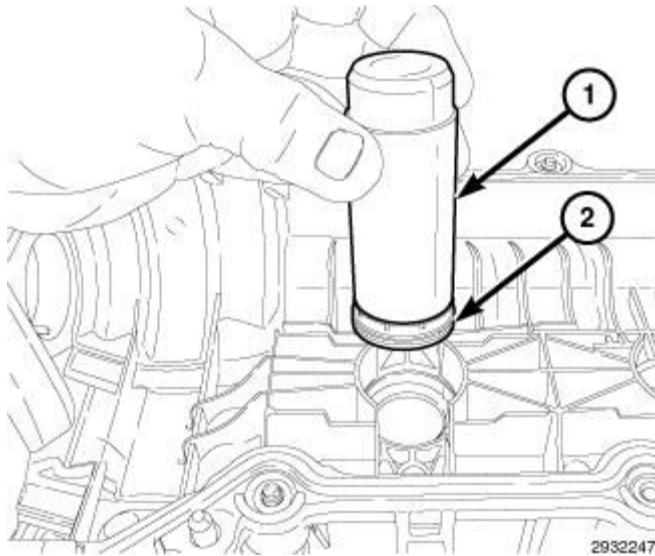


Fig. 237: Spark Plug Tube Seal & Installer
 Courtesy of CHRYSLER GROUP, LLC

3. If required, install new spark plug tube seals (2) in the cylinder head cover:
 - Lubricate the spark plug tube seal inner and outer diameters with clean engine oil.
 - Place the spark plug tube seal (2) on the Cam Sensor/Spark Plug Tube Seal Installer (special tool #10256, Installer, Cam Installer, Cam Sensor/Spark Plug Tube Seal) (1).
 - Push the seal into the cylinder head cover until the base of the seal is seated.
 - Remove the tool.

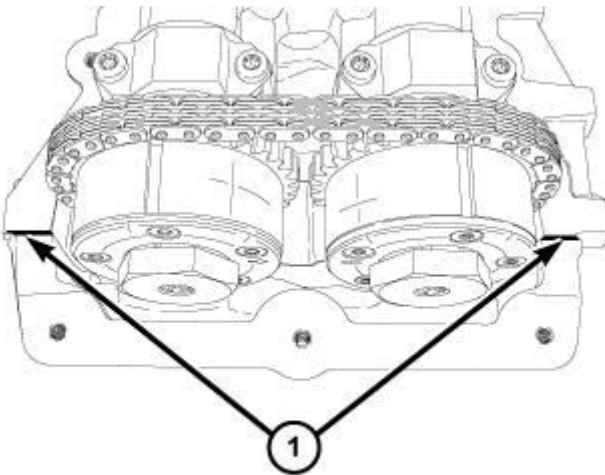


Fig. 238: RTV Sealant Locations
 Courtesy of CHRYSLER GROUP, LLC

4. Clean the timing engine timing cover, cylinder head and cylinder head cover mating surfaces with isopropyl alcohol in preparation for sealant application.

CAUTION: Engine assembly requires the use of a unique sealant that is compatible with engine oil. Using a sealant other than Mopar® Threebond Engine RTV Sealant may result in engine fluid leakage.

CAUTION: Following the application of Mopar® Threebond Engine RTV Sealant to the gasket surfaces, the components must be assembled within 20 minutes and the attaching fasteners must be tightened to specification within 45 minutes. Prolonged exposure to the air prior to assembly may result in engine fluid leakage.

5. Apply a 2 to 3 mm wide bead of Mopar® Threebond Engine RTV Sealant (1) to the two engine timing cover to cylinder head T-joints as shown in illustration.

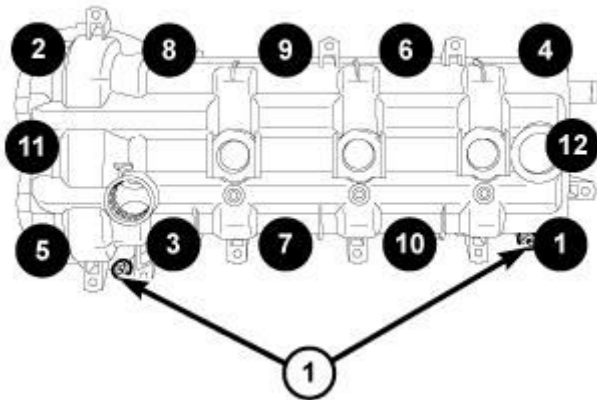


Fig. 239: Cylinder Head Cover Bolts & Double Ended Studs Tightening Sequence - Left
Courtesy of CHRYSLER GROUP, LLC

6. Align the locator pins (1) to the cylinder head and install the cylinder head cover.
7. Tighten the cylinder head cover bolts and double ended studs in the sequence shown in illustration to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
8. If removed, install the spark plugs. Refer to **SPARK PLUG, INSTALLATION** .
9. Install the ignition coils. Refer to **COIL, IGNITION, INSTALLATION** .

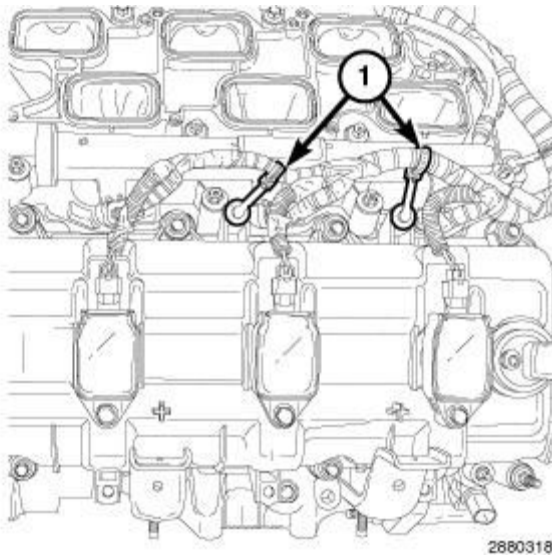


Fig. 240: Injection/Ignition Harness Retainers
Courtesy of CHRYSLER GROUP, LLC

10. Engage two injection/ignition harness retainers (1) to the left cylinder head cover.

NOTE: If both RH and LH CMP sensors were removed, install them into their original locations.

11. Install the camshaft position sensor. Refer to **SENSOR, CAMSHAFT POSITION, INSTALLATION**.

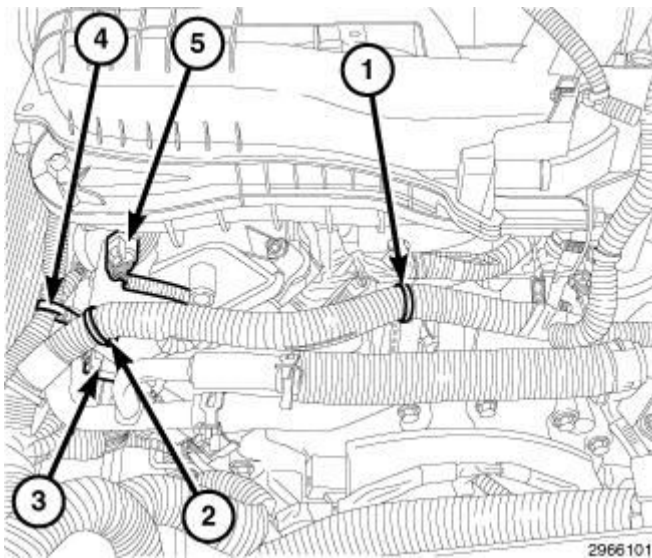


Fig. 241: Engine Coolant Temperature (ECT) Sensor Connector, Camshaft Position (CMP) Sensor & Harness Retainers
Courtesy of CHRYSLER GROUP, LLC

12. Connect the electrical connector (5) to the left Camshaft Position (CMP) sensor.

13. Engage one main wire harness retainer (2) to the cylinder head cover and one main wire harness retainer (4) to the cylinder head cover mounting stud.

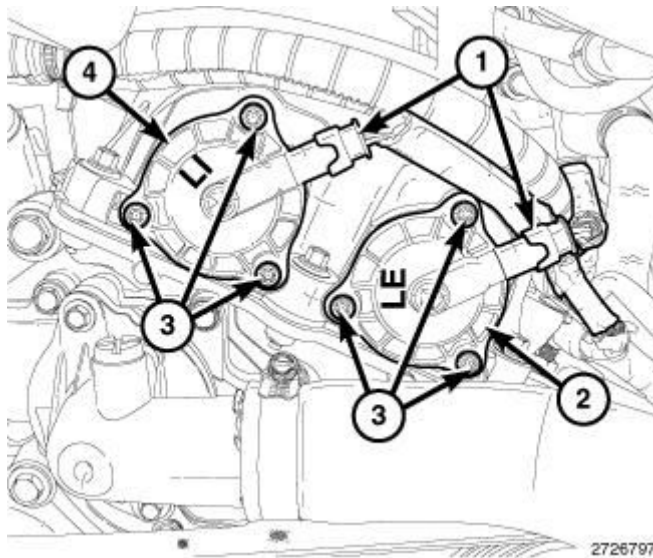


Fig. 242: Variable Valve Timing Solenoids, Connectors & Bolts
Courtesy of CHRYSLER GROUP, LLC

14. Refer to the markings made at disassembly and install the variable valve timing solenoids (2 and 4) in their original locations.

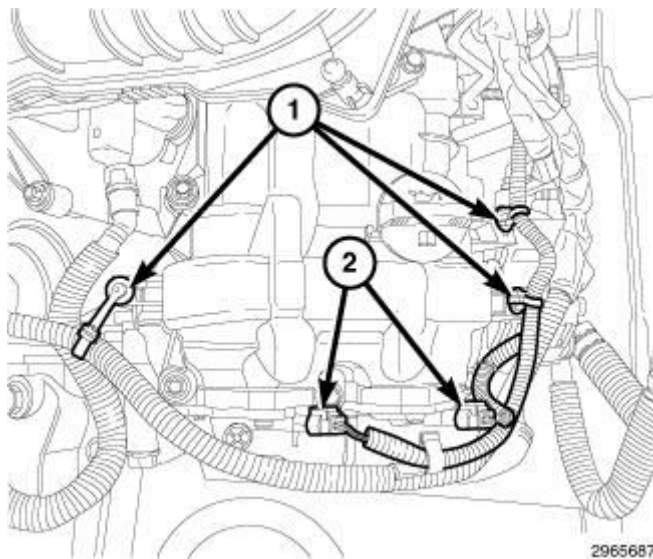


Fig. 243: Wire Harness Retainers & Variable Valve Timing Solenoid Connectors
Courtesy of CHRYSLER GROUP, LLC

15. Engage three wire harness retainers (1) to the left cylinder head cover.
16. Connect the electrical connectors (2) to the left variable valve timing solenoids.



Fig. 244: A/C Line

Courtesy of CHRYSLER GROUP, LLC

17. Position the A/C line into the vehicle.
18. Raise the vehicle.

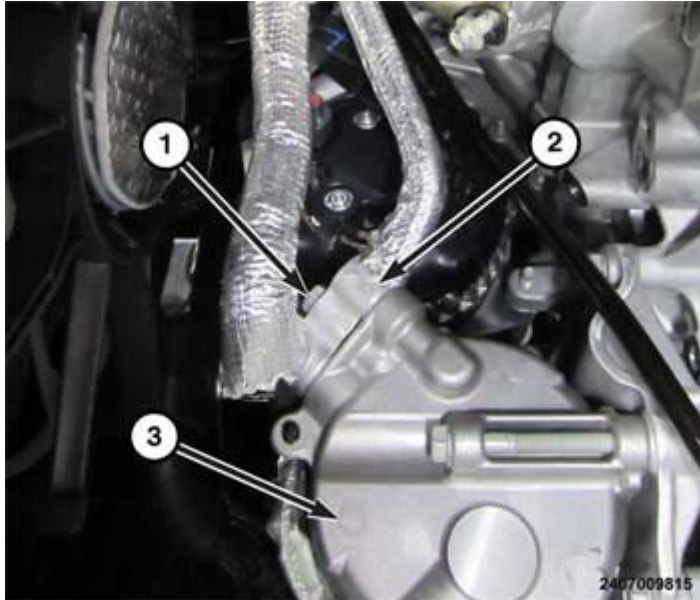


Fig. 245: A/C Compressor, IHX Manifold Line & Fasteners

Courtesy of CHRYSLER GROUP, LLC

19. Install the A/C lines (2) onto the compressor (3). Tighten the bolt (1) to the proper specification. Refer to **SPECIFICATIONS** .



Fig. 246: Intake Manifold Left/Rearward Support Bracket & Stud Bolt
Courtesy of CHRYSLER GROUP, LLC

20. Install the intake manifold left/rearward support bracket stud bolt (2).

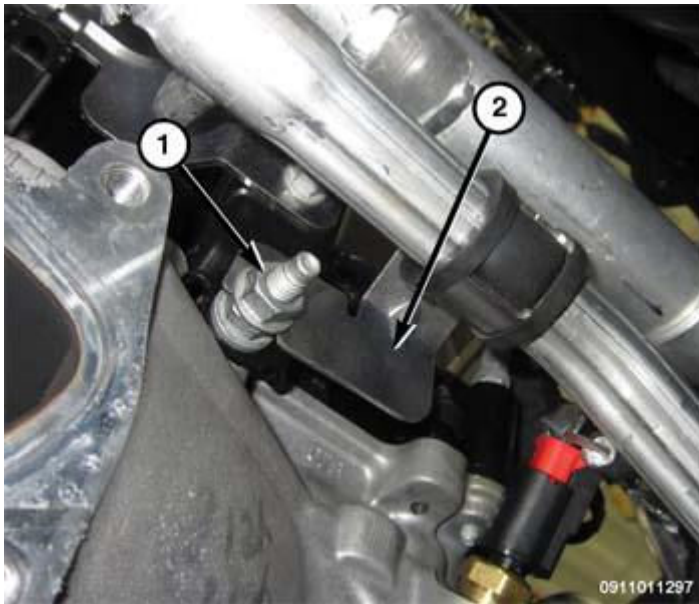


Fig. 247: A/C Line Support Brace Nut & Brace
Courtesy of CHRYSLER GROUP, LLC

21. Position the A/C line support brace (2) onto the stud bolt. Tighten the nut (1) to the proper specification. Refer to **SPECIFICATIONS** .



Fig. 248: Intake Manifold Left/Forward Support Bracket & Stud Bolt
Courtesy of CHRYSLER GROUP, LLC

22. Install the intake manifold left/forward support bracket stud bolt (2).
23. Install the left side catalytic converter. Refer to CONVERTER, CATALYTIC , INSTALLATION .
24. Install the front bumper fascia. Refer to FASCIA, FRONT, INSTALLATION .
25. Install the belly pan. Refer to BELLY PAN, INSTALLATION .
26. Lower the vehicle.

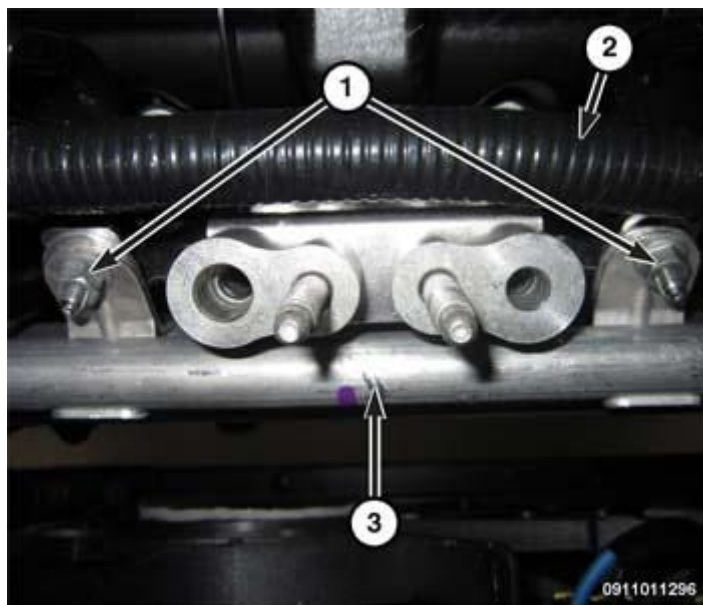


Fig. 249: Support Nuts, Upper Radiator Hose & Heater Line
Courtesy of CHRYSLER GROUP, LLC

27. Position the heater pipe (3) and the cooling system pipe onto the A/C line support bracket. Tighten the nuts (1) to the proper specification. Refer to **SPECIFICATIONS**.
28. Position the wiring harness (2) to the cylinder head cover stud bolts.

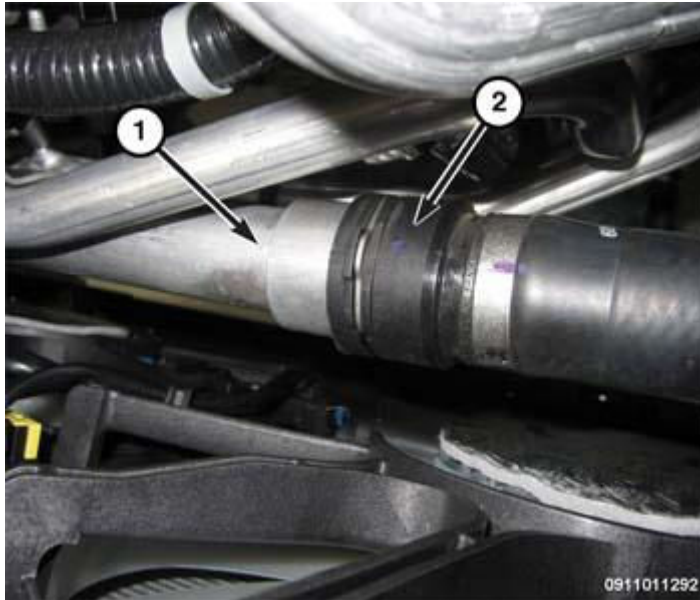


Fig. 250: Radiator Inlet Pipe & Upper Radiator Hose
Courtesy of CHRYSLER GROUP, LLC

29. Install the upper radiator hose (2) to the cooling pipe (1).

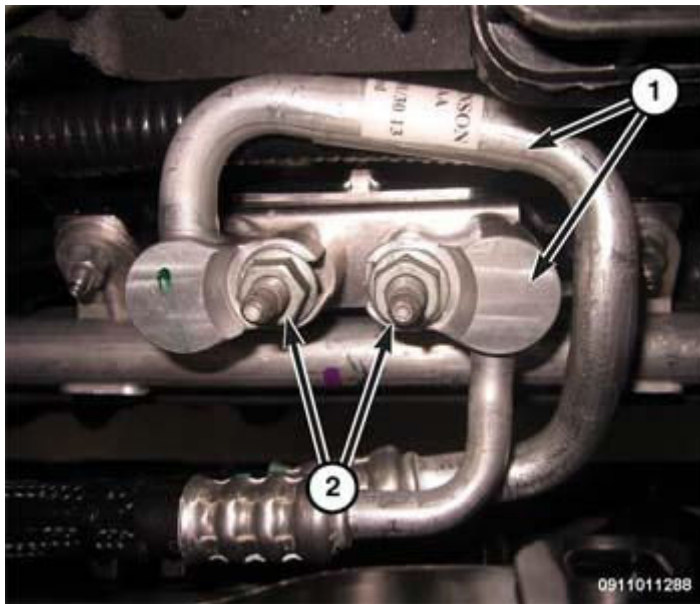


Fig. 251: A/C-To-IHX Lines
Courtesy of CHRYSLER GROUP, LLC

30. Install the A/C lines (1) to the Internal Heat Exchanger (IHX). Tighten the nuts (2) to the proper

specification. Refer to **SPECIFICATIONS** .

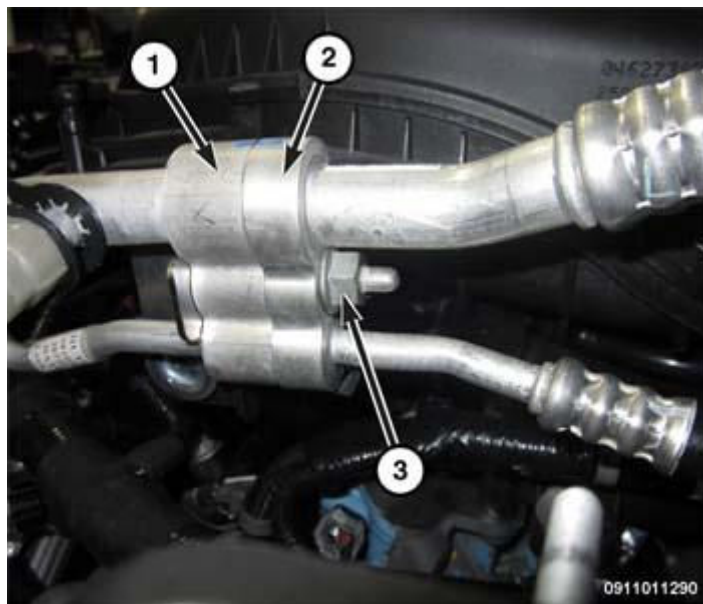


Fig. 252: IHX, Suction/Liquid Line Manifold & Nut
Courtesy of CHRYSLER GROUP, LLC

31. Install the A/C lines (2) to the IHX (1). Tighten the nut (3) to the proper specification. Refer to **SPECIFICATIONS** .

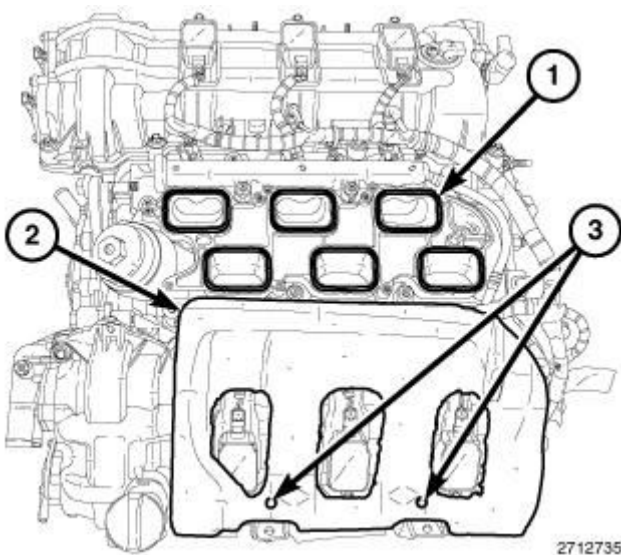


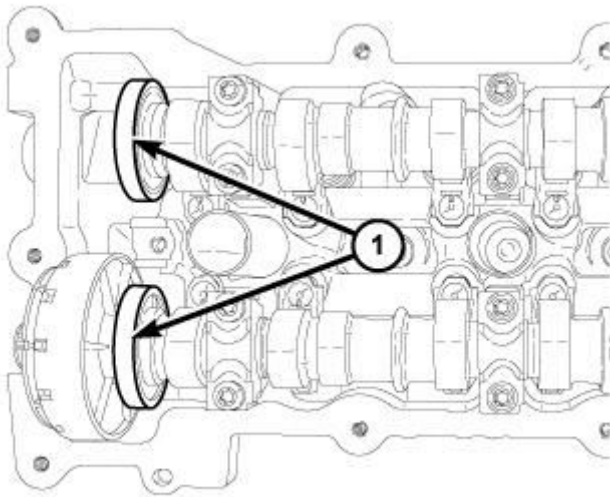
Fig. 253: Intake Ports, Insulator & Alignment Posts
Courtesy of CHRYSLER GROUP, LLC

32. Install the insulator (2) to the two alignment posts (3) on top of the LH cylinder head cover.
33. Install the upper intake manifold, support brackets, resonator and air cleaner body. Refer to **MANIFOLD, INTAKE, INSTALLATION**.

34. Connect the negative battery cable and tighten nut to the proper specification. Refer to **SPECIFICATIONS**.
35. Install the engine cover.

NOTE: The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components.

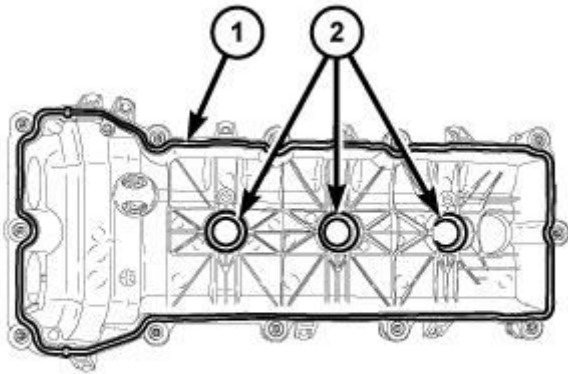
RIGHT



2691700

Fig. 254: Magnetic Timing Wheels
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.

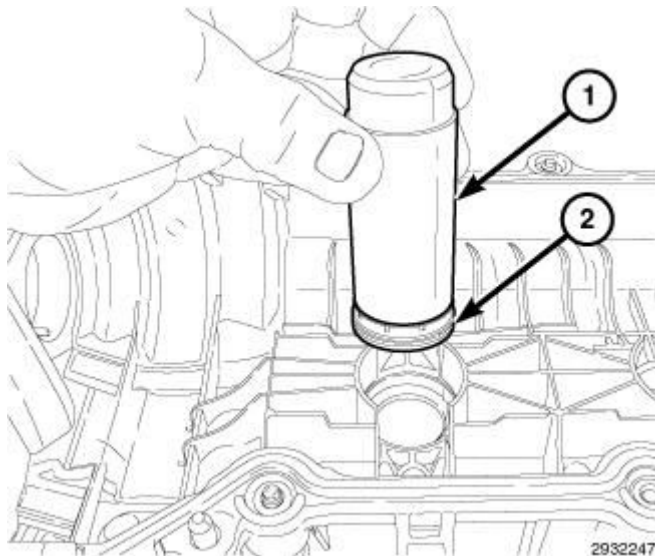


2776066

Fig. 255: Cylinder Head Cover Gasket & Spark Plug Tube Seals
 Courtesy of CHRYSLER GROUP, LLC

NOTE: The LH cylinder head cover is shown in illustration, the RH cylinder head cover is similar.

1. Install the cylinder head cover gasket (1).
2. The spark plug tube seals (2) can be reused if not damaged.



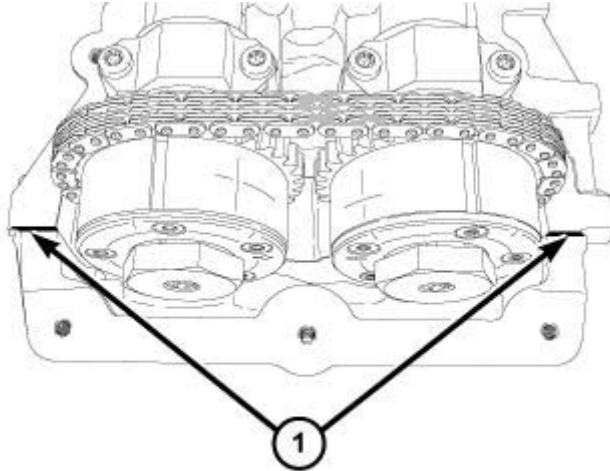
2932247

Fig. 256: Spark Plug Tube Seal & Installer
 Courtesy of CHRYSLER GROUP, LLC

3. If required, install new spark plug tube seals (2) in the cylinder head cover:
 - Lubricate the spark plug tube seal inner and outer diameters with clean engine oil.
 - Place the spark plug tube seal (2) on the Cam Sensor/Spark Plug Tube Seal Installer (special tool

#10256, Installer, Cam Installer, Cam Sensor/Spark Plug Tube Seal) (1).

- Push the seal into the cylinder head cover until the base of the seal is seated.
- Remove the tool.



2776075

Fig. 257: RTV Sealant Locations
Courtesy of CHRYSLER GROUP, LLC

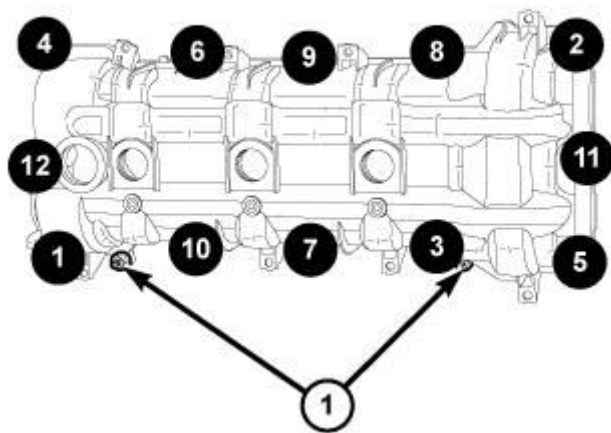
NOTE: The LH cylinder head cover T-joint is shown in illustration, the RH cylinder head cover T-joint is similar.

4. Clean the engine timing cover, cylinder head and cylinder head cover mating surfaces with isopropyl alcohol in preparation for sealant application.

CAUTION: Engine assembly requires the use of a unique sealant that is compatible with engine oil. Using a sealant other than Mopar® Threebond Engine RTV Sealant may result in engine fluid leakage.

CAUTION: Following the application of Mopar® Threebond Engine RTV Sealant to the gasket surfaces, the components must be assembled within 20 minutes and the attaching fasteners must be tightened to specification within 45 minutes. Prolonged exposure to the air prior to assembly may result in engine fluid leakage.

5. Apply a 2 to 3 mm wide bead of Mopar® Threebond Engine RTV Sealant (1) to the two engine timing cover to cylinder head T-joints as shown in illustration.



2719834

Fig. 258: Cylinder Head Cover Bolts & Double Ended Studs Tightening Sequence - Right
Courtesy of CHRYSLER GROUP, LLC

6. Align the locator pins (1) to the cylinder head and install the cylinder head cover.
7. Tighten the cylinder head cover bolts and double ended studs in the sequence shown in illustration to 12 N.m (106 in. lbs.).

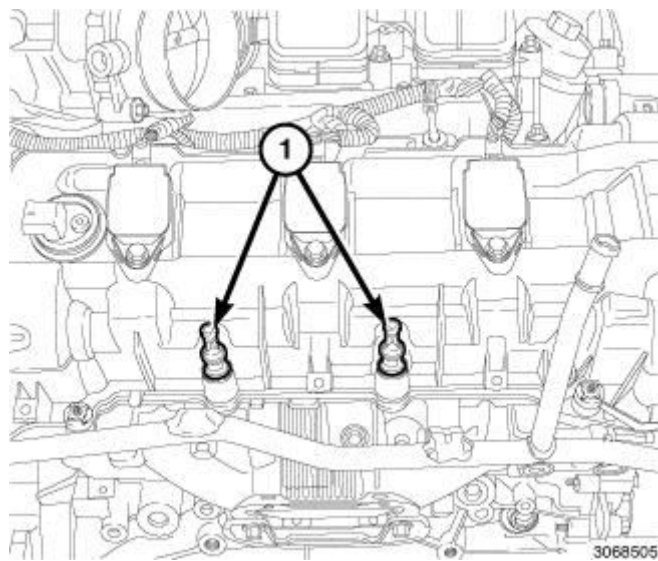
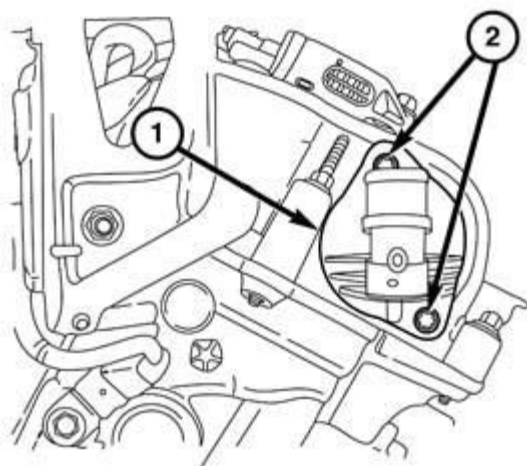


Fig. 259: Resonator Mounts
Courtesy of CHRYSLER GROUP, LLC

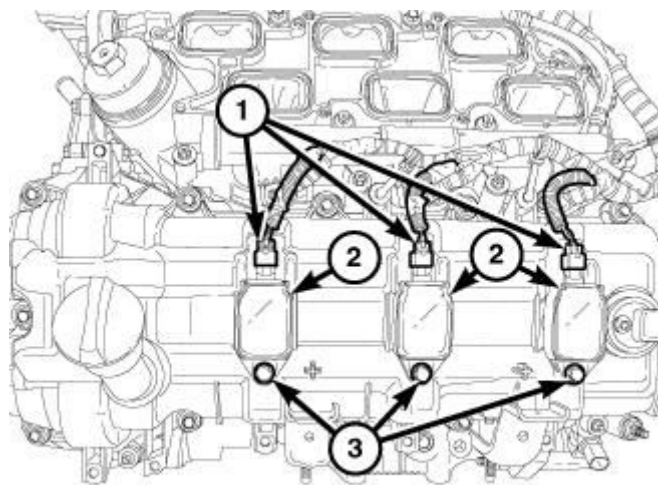
8. Install the two resonator mounts (1) to the studbolts.



250673866

Fig. 260: PCV Valve & Screws
 Courtesy of CHRYSLER GROUP, LLC

9. Install the PCV valve (1). Refer to **VALVE, POSITIVE CRANKCASE VENTILATION (PCV), REMOVAL** .



2726572

Fig. 261: Electrical Connector, Ignition Coils & Ignition Coil Retaining Bolts
 Courtesy of CHRYSLER GROUP, LLC

NOTE: The LH ignition coils are shown in illustration, the RH ignition coils are similar.

10. If removed, install the spark plugs. Refer to **SPARK PLUG, INSTALLATION** .
11. Install the ignition coils (2). Refer to **COIL, IGNITION, INSTALLATION** .

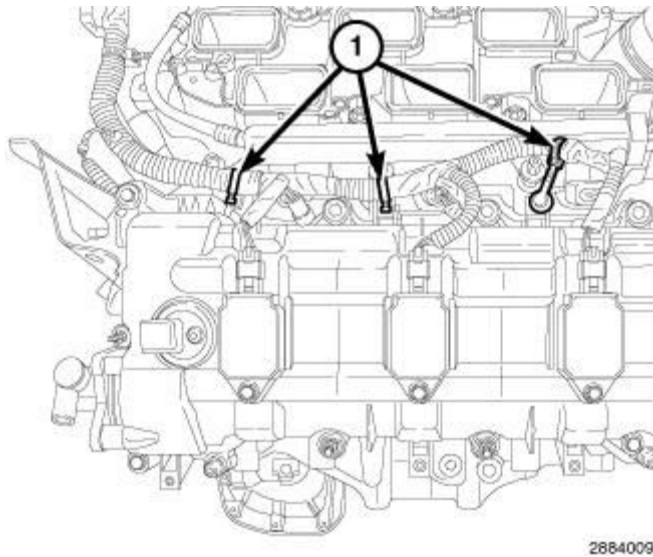


Fig. 262: Injection/Ignition Harness Retainers
Courtesy of CHRYSLER GROUP, LLC

12. Engage three injection/ignition harness retainers (1) to the right cylinder head cover.

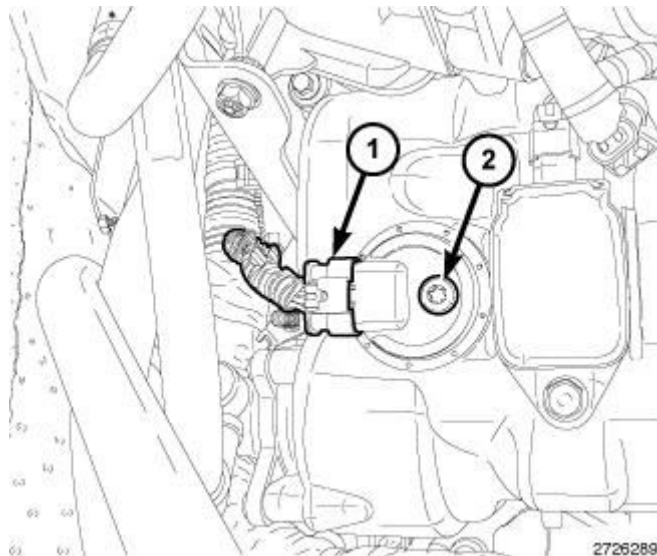


Fig. 263: CMP Sensor & Bolt
Courtesy of CHRYSLER GROUP, LLC

NOTE: If both RH and LH CMP sensors were removed, install them into their original locations.

13. Install the camshaft position sensor. Refer to **SENSOR, CAMSHAFT POSITION, INSTALLATION** .

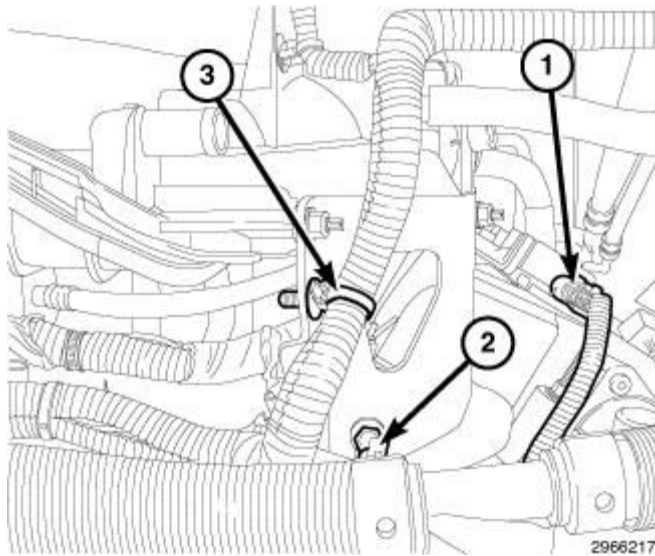


Fig. 264: Camshaft Position (CMP) Sensor Connector & Harness Retainers
Courtesy of CHRYSLER GROUP, LLC

14. Connect the electrical connector (1) to the right Camshaft Position (CMP) sensor.

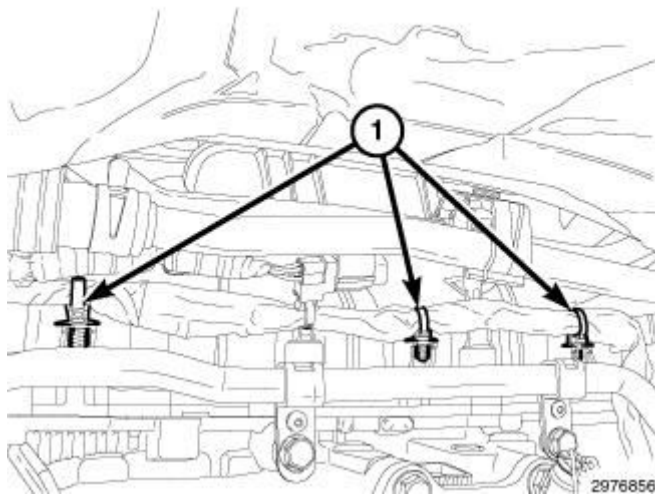


Fig. 265: Main Wire Harness Retainers
Courtesy of CHRYSLER GROUP, LLC

15. Engage three main wire harness retainers (1) to the right cylinder head cover.

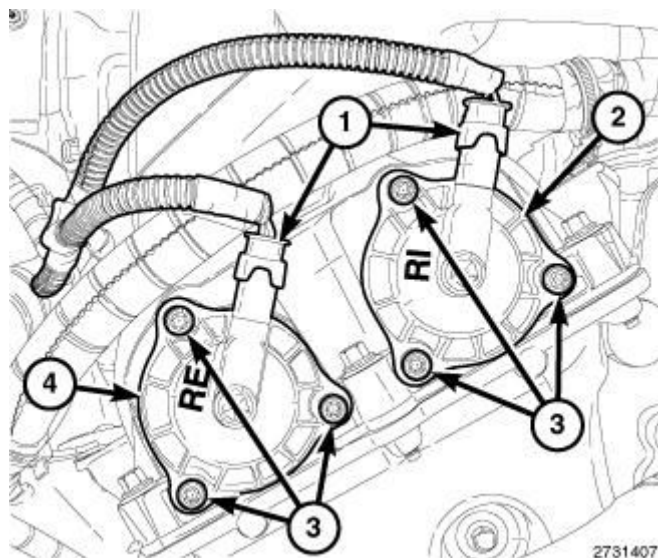


Fig. 266: Variable Valve Timing Solenoids, Connectors & Bolts
Courtesy of CHRYSLER GROUP, LLC

16. Refer to the markings made at disassembly and install the variable valve timing solenoids (2 and 4) in their original locations.

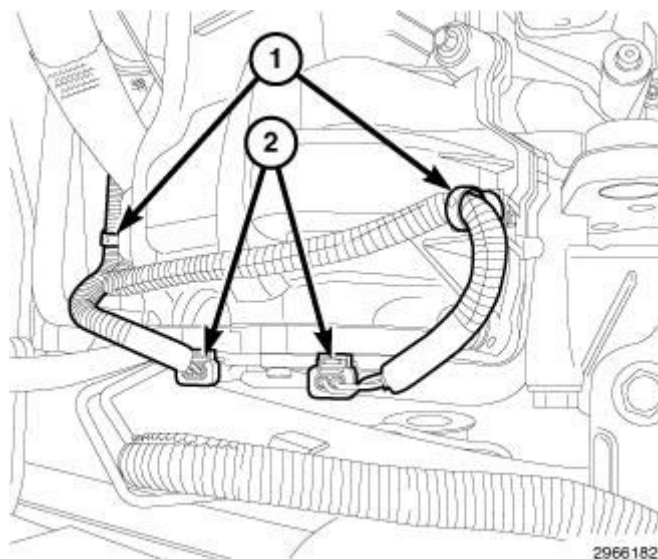


Fig. 267: Wire Harness Retainers & Variable Valve Timing Solenoid Connectors
Courtesy of CHRYSLER GROUP, LLC

17. Connect the electrical connectors (2) to the variable valve timing solenoids on the right cylinder head.
18. Engage two wire harness retainers (1) to the right cylinder head cover.

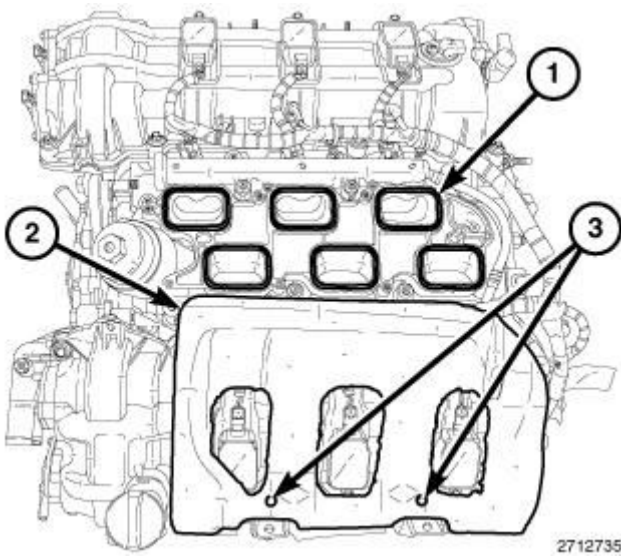


Fig. 268: Intake Ports, Insulator & Alignment Posts
Courtesy of CHRYSLER GROUP, LLC

19. If removed, install the insulator (2) to the two alignment posts (3) on top of the LH cylinder head cover.

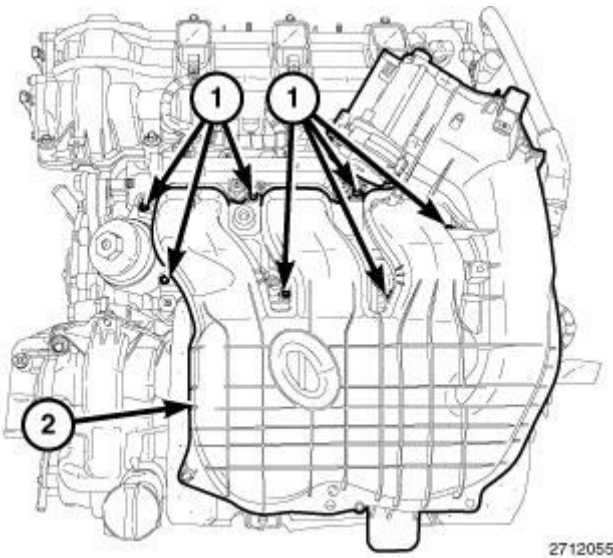


Fig. 269: Upper Intake Manifold & Bolts
Courtesy of CHRYSLER GROUP, LLC

20. Install the upper intake manifold (1), support brackets, resonator and air cleaner body. Refer to **MANIFOLD, INTAKE, INSTALLATION**.
21. Connect the negative battery cable and tighten nut to 5 N.m (45 in. lbs.).

NOTE: The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or

components.

LIFTER(S), HYDRAULIC

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - HYDRAULIC LIFTER(S) NOISE DIAGNOSIS

Proper noise diagnosis is essential in locating the source of an NVH complaint. Locating a lash adjuster (tappet) type noise can sometimes be difficult. As a result, an initial misdiagnosis may occur. Refer to the following chart for possible causes and correction of a lash adjuster (tappet) type noise.

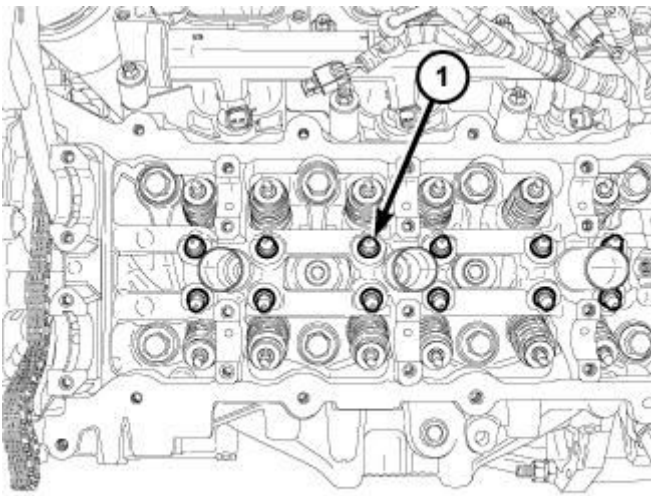
LASH ADJUSTER (TAPPET) NOISE CHART

POSSIBLE CAUSES	CORRECTION
1. Engine oil level-too high or too low. This may allow aerated oil to enter the adjusters and cause them to be spongy.	1. Check and correct the engine oil level.
2. Insufficient running time after rebuilding a cylinder head.	2. Low speed running of up to 1 hour may be required to fully evacuate trapped air from the valve train system. During this time, turn engine off and let set for a few minutes before restarting. Repeat this several times after engine has reached normal operating temperature.
3. Air trapped in the lash adjuster (after 1 hour of run time).	3. See below: (a) Check the lash adjusters for sponginess while installed in the cylinder head. Press down on the rocker arm in a manner that could collapse the lash adjuster. Normal adjusters should feel very firm. Very spongy adjusters can be bottomed out easily. (b) If the lash adjuster(s) are still spongy, replace the lash adjuster(s). Refer to LIFTER(S), HYDRAULIC, REMOVAL .
4. Low oil pressure.	4. See below: (a) Check and correct the engine oil level. (b) Check the engine oil pressure. Refer to LUBRICATION, DIAGNOSIS AND TESTING . (c) Check for excessive main bearing clearance and correct. Refer to BEARING(S), CRANKSHAFT, STANDARD PROCEDURE . (d) Check for a worn oil pump. Refer to PUMP, ENGINE OIL, INSPECTION . Check the camshaft journals and the bearing bores for abnormal wear patterns, scoring, grooving, fatigue, pitting or a foreign material. Refer to CAMSHAFT, ENGINE, REMOVAL .

5. A plugged oil restrictor in the oil passages to the cylinder head(s).	5. Check the cylinder head oil passages for blockage. Clean or replace as necessary.
6. Worn valve guide(s).	6. Measure the valve stem-to-guide clearance. Refer to VALVES, INTAKE AND EXHAUST, INSPECTION .
7. Rocker arm loose, adjuster stuck or at maximum extension and still leaves lash in the system.	7. See below: (a) Check the camshaft journal and lobe for abnormal wear patterns, scoring, grooving, fatigue, pitting or a foreign material Refer to CAMSHAFT, ENGINE, REMOVAL . (b) Check the rocker arm(s) for proper alignment to the camshaft lobe(s) and valve stem(s) Refer to ROCKER ARM, VALVE, REMOVAL . (c) Check the lash adjuster(s) for proper operation and replace as necessary Refer to LIFTER(S), HYDRAULIC, REMOVAL .
8. Air ingested into the engine oil due to a broken or cracked oil pump pickup tube.	8. Check the pickup tube and replace as necessary. Refer to PICK-UP, OIL PUMP, REMOVAL .
9. Faulty lash adjuster.	9. Replace the lash adjuster(s). Refer to LIFTER(S), HYDRAULIC, REMOVAL .

REMOVAL

REMOVAL



2742108

Fig. 270: Hydraulic Lifters

Courtesy of CHRYSLER GROUP, LLC

NOTE: The LH cylinder head hydraulic lifters are shown in illustration, the RH cylinder head hydraulic lifters are similar.

1. Disconnect and isolate the negative battery cable.
2. Remove the camshaft(s). Refer to CAMSHAFT, ENGINE, REMOVAL.

NOTE: If the rocker arms are to be reused, identify their positions so that they can be reassembled into their original locations.

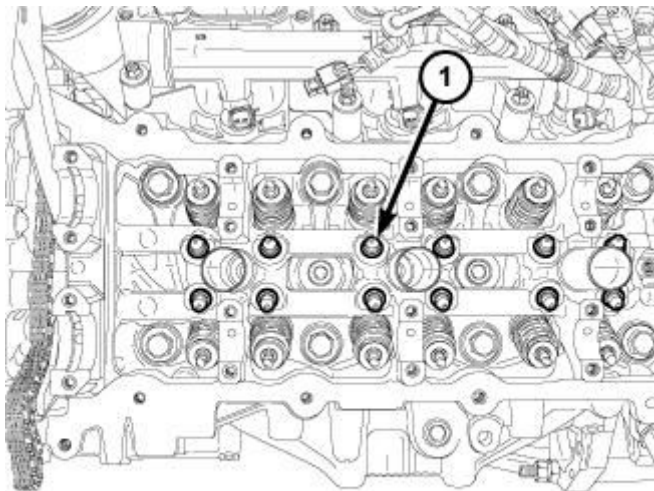
3. Remove the rocker arm(s). Refer to ROCKER ARM, VALVE, REMOVAL.

NOTE: If the hydraulic lifters are to be reused, identify their positions so that they can be reassembled into their original locations.

4. Remove the hydraulic lifter(s) (1).

INSTALLATION

INSTALLATION



2742108

Fig. 271: Hydraulic Lifters

Courtesy of CHRYSLER GROUP, LLC

NOTE: The LH cylinder head hydraulic lifters are shown in illustration, the RH cylinder head hydraulic lifters are similar. If the hydraulic lifters are being reused, reassemble them into their original locations.

1. Verify that the hydraulic lifters are at least partially full of oil. There should be little or no plunger travel when the hydraulic lifter is depressed.

2. Install the hydraulic lifter(s) (1).

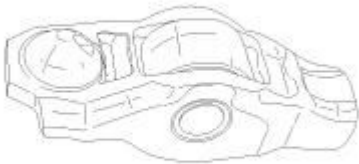
NOTE: If the rocker arms are being reused, reassemble them into their original locations.

3. Install the rocker arm(s). Refer to **ROCKER ARM, VALVE, INSTALLATION**.
4. Install the camshaft(s), phasers, cylinder head cover(s) and upper intake manifold. Refer to **CAMSHAFT, ENGINE, INSTALLATION**.
5. Connect the negative battery cable and tighten nut to the proper specification. Refer to **SPECIFICATIONS**.

ROCKER ARM, VALVE

DESCRIPTION

DESCRIPTION



2804759

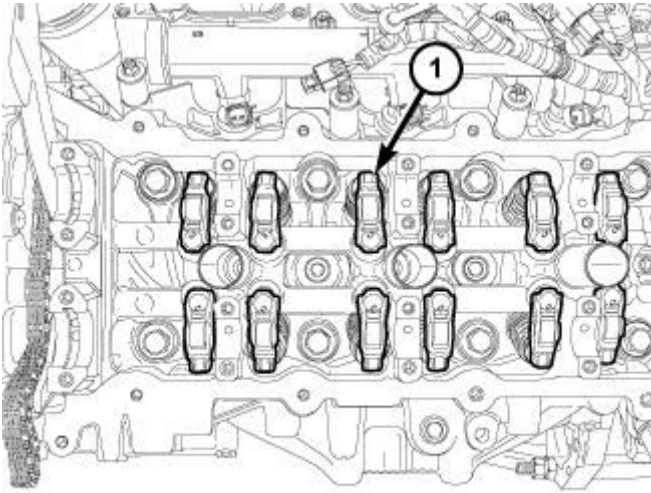
Fig. 272: Rocker Arm

Courtesy of CHRYSLER GROUP, LLC

The rocker arms are steel stampings with an integral roller bearing. The rocker arms incorporate a 0.5 mm oil hole in the lash adjuster socket for roller and camshaft lubrication.

REMOVAL

REMOVAL



2741091

Fig. 273: Locating Rocker Arms
Courtesy of CHRYSLER GROUP, LLC

NOTE: The LH cylinder head rocker arms are shown in illustration, the RH cylinder head rocker arms are similar.

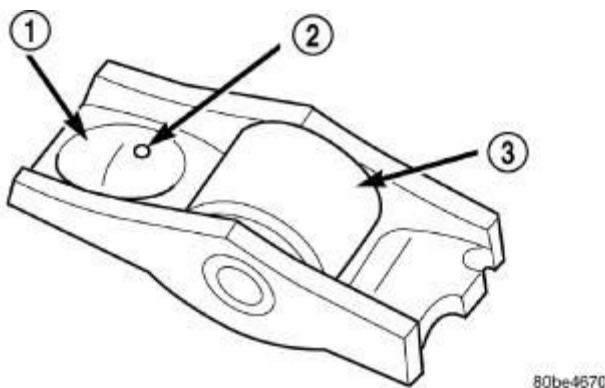
1. Disconnect and isolate the negative battery cable.
2. Remove the camshaft(s). Refer to CAMSHAFT, ENGINE, REMOVAL.

NOTE: If the rocker arms are to be reused, identify their positions so that they can be reassembled into their original locations.

3. Remove the rocker arm(s) (1).

INSPECTION

INSPECTION



80be4670

Fig. 274: Rocker Arm
Courtesy of CHRYSLER GROUP, LLC

Inspect the cam follower assembly for wear or damage. Replace as necessary.

INSTALLATION

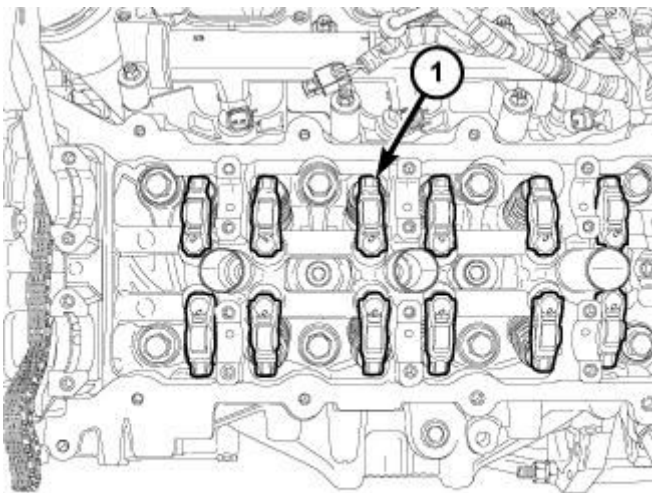
INSTALLATION



A multimedia supplement to the instructions contained in this article is available.

To view the multimedia example of the condition described go to;
<http://www.youtube.com/user/Mitchell1Tips>
then type "A00641418.vid5" into the "Search Channel" box.

CAUTION: Proper inspection of the rocker arms is required to ensure proper installation. Inspection from the top and also side view is critical to verify the proper seated position of each and every rocker arm. Failure to install the rocker arms correctly may cause severe engine damage.



2741091

Fig. 275: Locating Rocker Arms

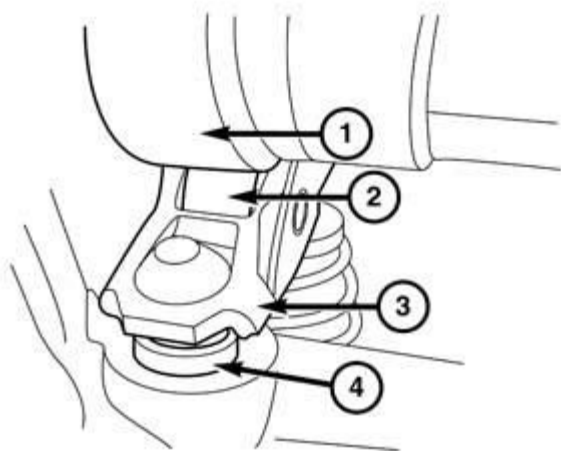
Courtesy of CHRYSLER GROUP, LLC

NOTE: The LH cylinder head rocker arms are shown in illustration, the RH cylinder head rocker arms are similar. If the rocker arms are being reused, reassemble them into their original locations.

1. Lubricate the rocker arms with clean engine oil before installation.

NOTE: When placing the rocker arms. The valve stem should fit securely into the rocker arm guides.

2. Position the rocker arm(s) (1) onto the lifter(s) and valve stem(s).



210171394

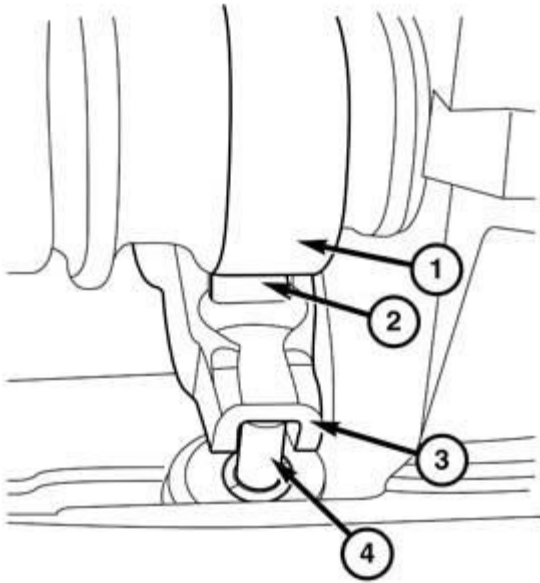
Fig. 276: Rocker Arm & Lifter

Courtesy of CHRYSLER GROUP, LLC

3. Position the camshaft(s) onto the mounts and install the camshaft caps. Hand tighten the cap retaining bolts to the proper specification. Refer to **TORQUE SPECIFICATIONS**.

NOTE: **If any of the rocker arms are not installed properly. Loosen the camshaft caps and reposition the rocker arms.**

4. Verify that the rocker arm (3) is positioned over the lifter (4).
5. Verify that the rocker arm roller (2) is seated to the camshaft lobe (1).



091673879

Fig. 277: Camshaft Lobe, Rocker Arm Roller, Rocker Arm Guide & Valve Stem
Courtesy of CHRYSLER GROUP, LLC

6. Use a mirror to verify the valve stem (4) is centered between the rocker arm guides (3).
7. Verify the camshaft lobe (1) is centered over the rocker arm roller (2).
8. Tighten the camshaft caps. Refer to **CAMSHAFT, ENGINE, INSTALLATION**.

SEAL(S), VALVE GUIDE

DESCRIPTION

DESCRIPTION

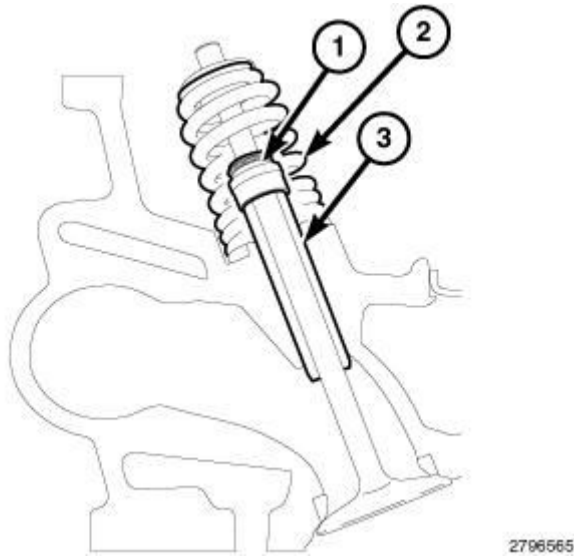


Fig. 278: Valve Stem Oil Seal, Valve Spring & Valve Guide
Courtesy of CHRYSLER GROUP, LLC

The valve stem oil seals (1) are made of elastomer over-molded steel in a non-integrated type guide mounted configuration. The seal is not held in place by the valve spring (2). The valve stem seals are not reusable if removed from the valve guides (3), they must be replaced. Always coat the valve seals with clean engine oil before installing the valves.

REMOVAL

REMOVAL

NOTE: If the springs are to be reused, identify their positions so that they can be reassembled into their original locations.

1. Remove the valve spring(s) (2). Refer to SPRING(S), VALVE, REMOVAL.

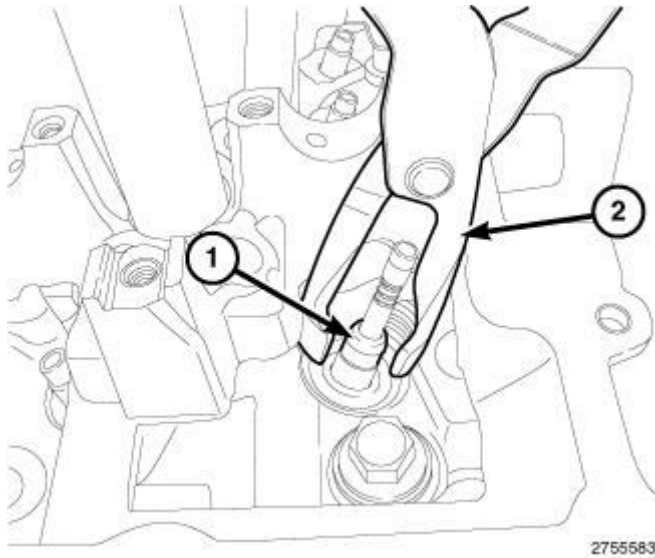


Fig. 279: Valve Guide Seal & Valve Seal Tool
Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 5 cylinder exhaust valve guide seal shown in illustration, all other valve guide seals similar.

2. Remove the valve guide seal (1) using a valve seal tool (2). Discard the removed seal.

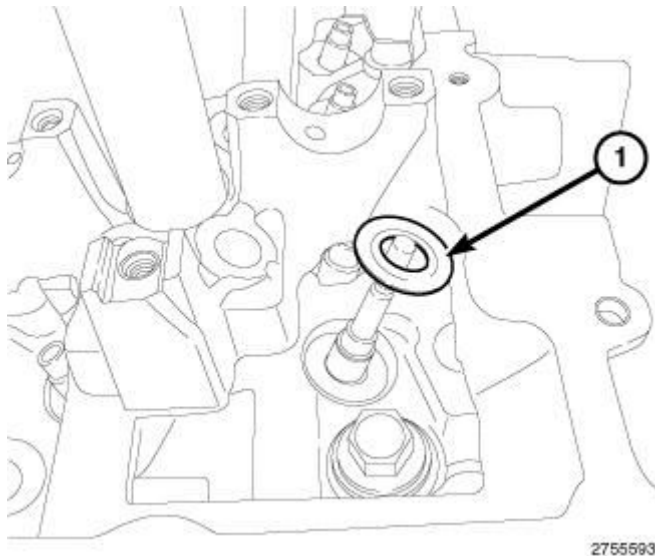
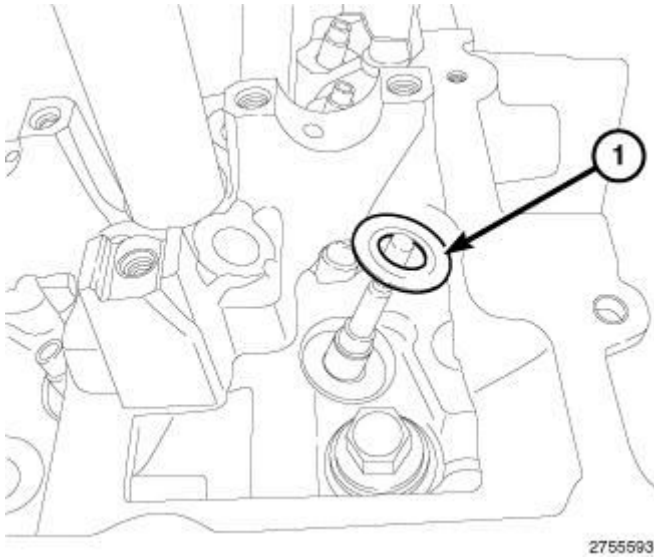


Fig. 280: Valve Spring Seat
Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 5 cylinder exhaust valve spring seat shown in illustration, all other valve spring seats similar.

3. If required, remove the valve spring seat (1).

4. If required, remove the valve(s). Refer to **VALVES, INTAKE AND EXHAUST, REMOVAL**.

INSTALLATION**INSTALLATION****Fig. 281: Valve Spring Seat**

Courtesy of CHRYSLER GROUP, LLC

1. If removed, install the valve(s). Refer to **VALVES, INTAKE AND EXHAUST, INSTALLATION**.

NOTE: Reassemble the valves into their original locations. If the valves or valve seats have been refinished, verify that the valve stem tip height is within specification. Refer to **ENGINE SPECIFICATIONS** . Number 5 cylinder exhaust valve shown in illustration, all other valves similar.

2. If removed, install the spring seat (1) over the valve guide.

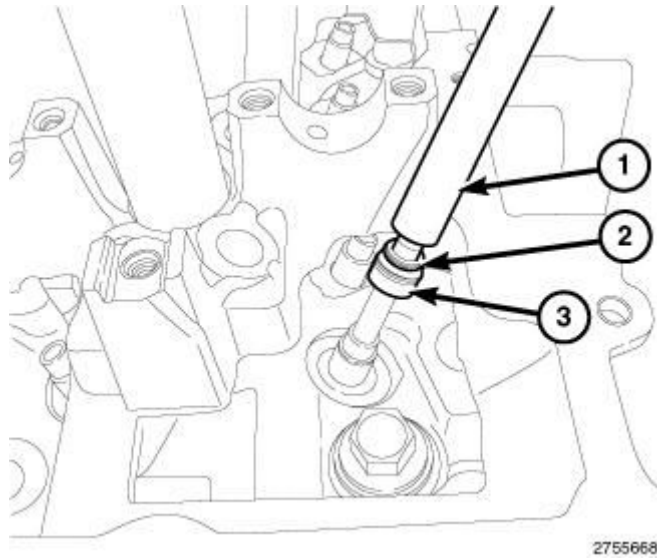


Fig. 282: Installing Valve Guide Seal
Courtesy of CHRYSLER GROUP, LLC

3. Apply engine oil to the lip of the valve guide seal (3). Install the valve guide seal (3) over the valve stem. Using an appropriate driver (1), push the seal firmly and squarely over the valve guide. **Do Not Force** the seal against the top of guide.

NOTE: Ensure that the garter spring (2) is intact around the top of the valve guide seal (3). Number 5 cylinder exhaust valve guide seal shown in illustration, all other valves similar.

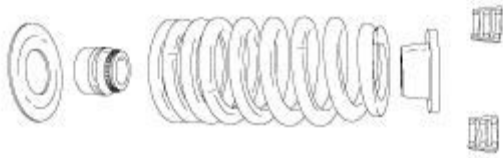
NOTE: If the valve springs are being reused, reassemble them into their original locations.

4. Install the valve spring(s). Refer to **SPRING(S), VALVE, INSTALLATION**.

SPRING(S), VALVE

DESCRIPTION

DESCRIPTION



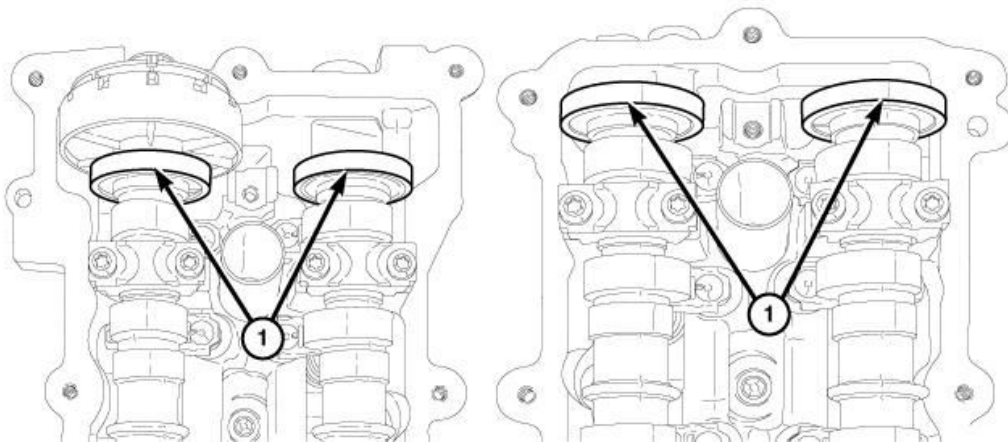
2814925

Fig. 283: Valve Spring Components
Courtesy of CHRYSLER GROUP, LLC

The valve springs are a beehive design and made from high strength chrome silicon steel. The springs are common for intake and exhaust applications. Valve guide seals are rubber overmolded on a steel support cylinder with a garter spring at the seal lip. The seals are not integrated with the valve spring seat. The valve spring seat is a flat steel washer. The steel valve spring retainers are designed for use with beehive springs and the valve spring retainer locks are a three bead Butt type design.

REMOVAL

ON VEHICLE



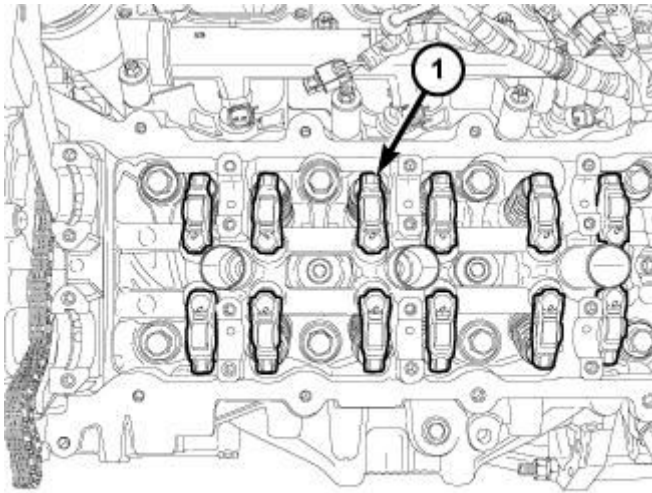
2715130

Fig. 284: Magnetic Timing Wheels
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to

the camshaft position sensor.

1. Disconnect and isolate the negative battery cable.
2. Remove both cylinder head covers. Refer to **COVER(S), CYLINDER HEAD, REMOVAL**.



2741091

Fig. 285: Locating Rocker Arms

Courtesy of CHRYSLER GROUP, LLC

NOTE: The LH cylinder head rocker arms are shown in illustration, the RH cylinder head rocker arms are similar.

NOTE: Only remove the camshafts from one head at a time. The opposite head must remain assembled in order to lock the crankshaft against rotation.

NOTE: If the rocker arms are to be reused, identify their positions so that they can be reassembled into their original locations.

3. Remove the rocker arm(s) (1). Refer to **ROCKER ARM, VALVE, REMOVAL**.

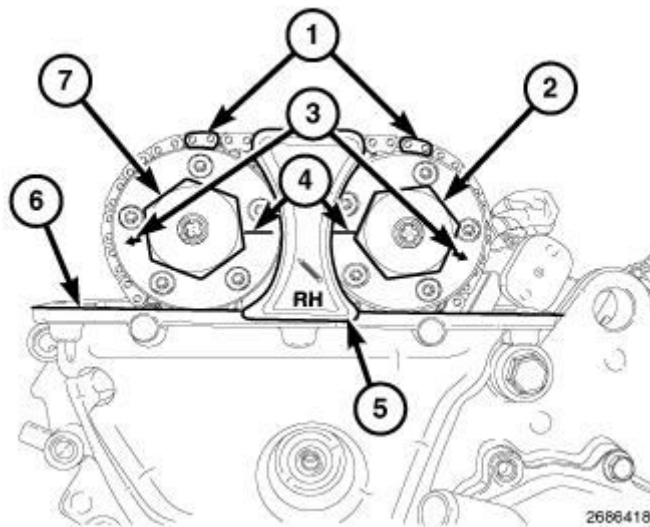


Fig. 286: Phaser Timing Marks, Oil Control Valves & RH Camshaft Phaser Lock
Courtesy of CHRYSLER GROUP, LLC

NOTE: RH camshaft phaser lock shown in illustration, LH camshaft phaser lock similar.

CAUTION: Air pressure applied to the cylinder holds the valves in place. This air pressure also has a tendency to force the piston down and rotate the crankshaft. Do not allow the crankshaft to rotate. Crankshaft rotation may damage the timing chain or front timing cover and affect camshaft timing.

4. If removing the LH camshafts, install the RH Camshaft Phaser Lock (special tool #10202, Locks, Camshaft/Phaser) (5) to lock the crankshaft against rotation. If removing the RH camshafts, install the LH Camshaft Phaser Lock (special tool #10202, Locks, Camshaft/Phaser) to lock the crankshaft against rotation.

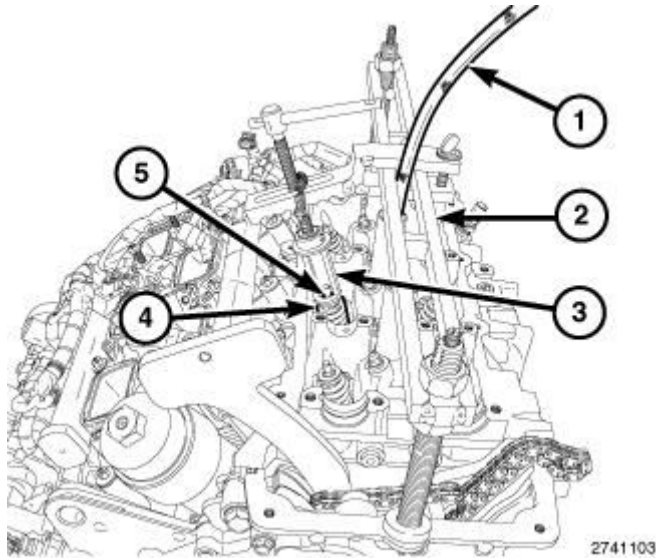


Fig. 287: Shop Air Supply & Valve Spring Compressor
Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 4 cylinder intake valve spring compression shown in illustration, all other valves similar.

5. Remove the spark plug. Refer to **SPARK PLUG, REMOVAL** .
6. Install Valve Spring Compressor (special tool #MD998772A, Compressor, Valve Spring) (2) onto the cylinder head.

CAUTION: Air pressure must be maintained as long as the valve springs are removed to prevent the valves from dropping into the cylinders.

7. Install a spark plug adapter attached to a regulated shop air supply (1). Pressurize the cylinder being serviced to 620.5 - 689 kPa (90 - 100 psi) to hold the valves in place.
8. Using Valve Spring Compressor Adapter (special tool #10224, Adapter, Valve Spring) (3), compress valve spring (4) and remove valve retaining locks (5).

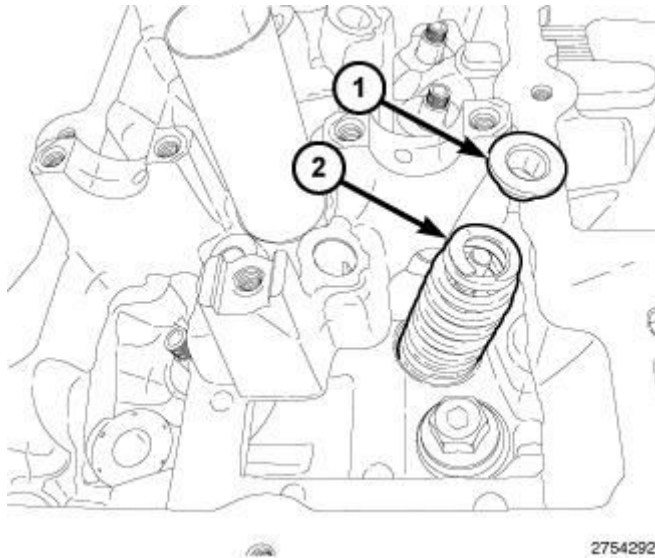


Fig. 288: Valve Spring & Valve Spring Retainer
Courtesy of CHRYSLER GROUP, LLC

NOTE: If the springs are to be reused, identify their positions so that they can be reassembled into their original locations. Number 5 cylinder exhaust valve spring shown in illustration, all other valve springs similar.

9. Release the valve spring compressor and remove the valve spring retainer (1) and valve spring (2).
10. If required, remove the valve guide seal and spring seat. Refer to **SEAL(S), VALVE GUIDE, REMOVAL**.

OFF VEHICLE

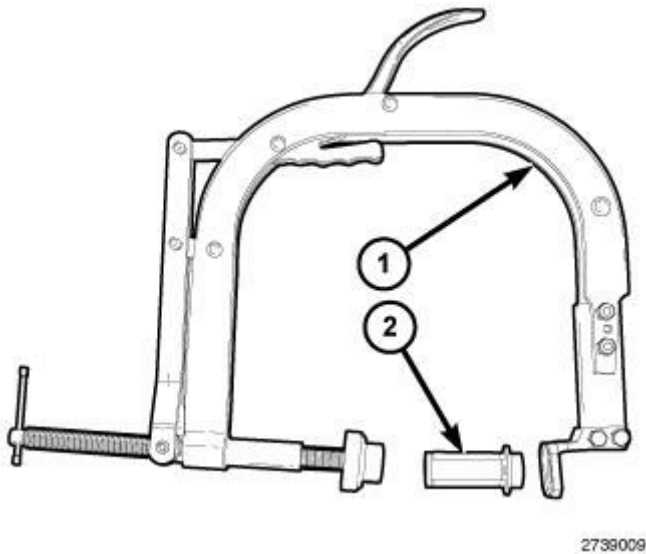


Fig. 289: Valve Spring Compressor Components
Courtesy of CHRYSLER GROUP, LLC

1. Remove the cylinder head(s). Refer to **CYLINDER HEAD, REMOVAL**.
2. Position the Valve Spring Compressor Adapter (special tool #10224, Adapter, Valve Spring) (2) in the Valve Spring Compressor (special tool #C-3422-D, Compressor, Valve Spring) (1).

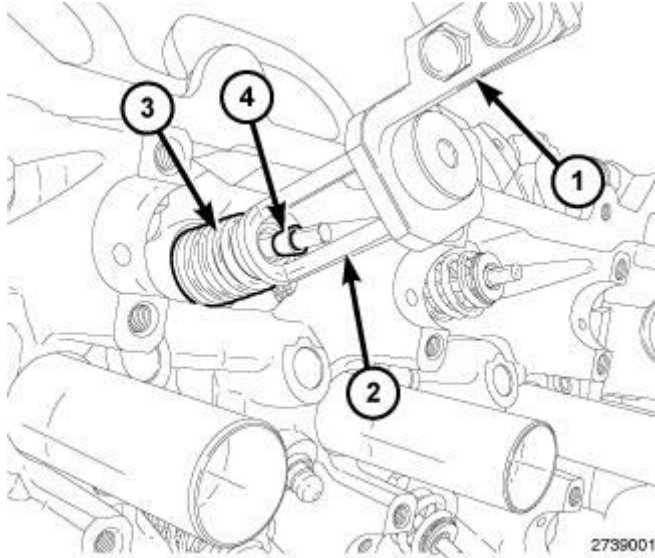


Fig. 290: Compressing Valve Spring & Locating Valve Retaining Locks
Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 3 cylinder intake valve spring compression shown in illustration, all other valves similar.

3. Compress the valve spring (3) and remove the valve retaining locks (4).

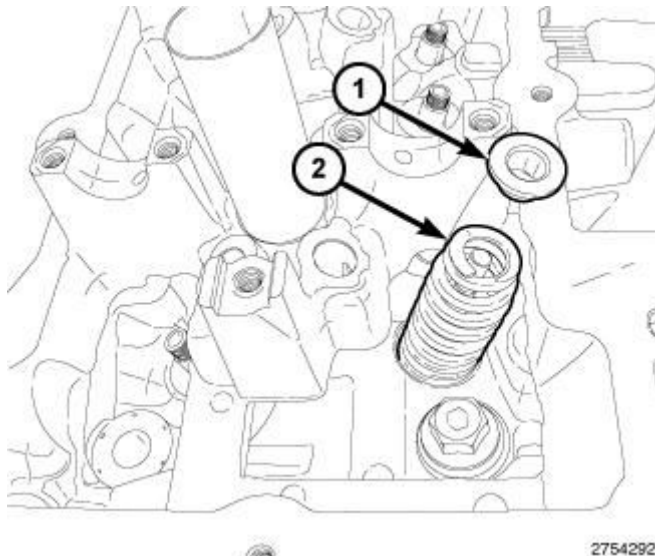


Fig. 291: Valve Spring & Valve Spring Retainer
Courtesy of CHRYSLER GROUP, LLC

NOTE: If the springs are to be reused, identify their positions so that they can be reassembled into their original locations. Number 5 cylinder exhaust valve spring shown in illustration, all other valves similar.

4. Release the valve spring compressor and remove the valve spring retainer (1) and valve spring (2).
5. If required, remove the valve(s). Refer to **VALVES, INTAKE AND EXHAUST, REMOVAL**.
6. If required, remove the valve guide seal and spring seat. Refer to **SEAL(S), VALVE GUIDE, REMOVAL**.

INSPECTION

INSPECTION

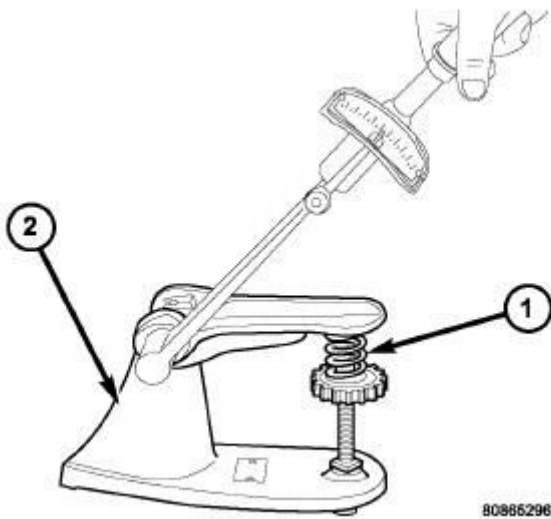
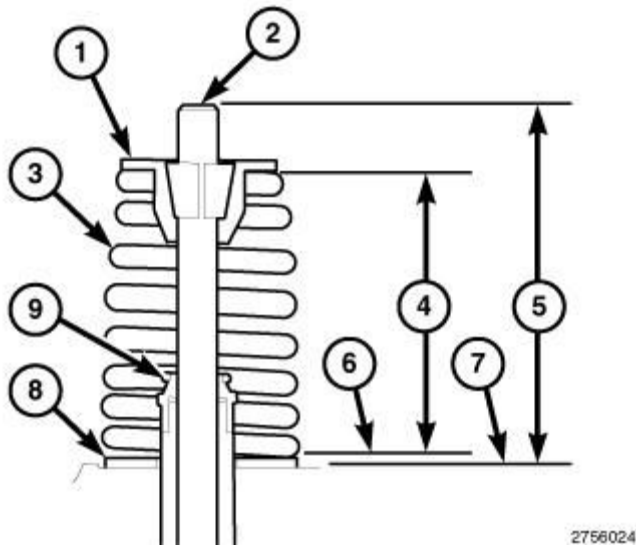


Fig. 292: Testing Valve Spring
Courtesy of CHRYSLER GROUP, LLC

When valves have been removed for inspection, reconditioning or replacement, valve springs should be checked against specifications for free-length, spring force and spring installed height. Refer to **ENGINE SPECIFICATIONS**.

Spring force can be measured with a test fixture (2). Follow the tool manufactures instructions. Replace any springs that do not meet specifications.



2756024

Fig. 293: Checking Valve Spring Installed Height

Courtesy of CHRYSLER GROUP, LLC

Installed height of the valve spring must be checked with the valve assembled into the cylinder head. Refer to **SPRING(S), VALVE, INSTALLATION**.

If the valves or valve seats have been refinished and the installed valve spring height (4) is greater than 40.0 mm (1.575 in.). Install a second spring seat (8) in the head counter bore under the original valve spring seat to bring the spring height within specification. Make sure the measurement is taken from the top of spring seat (6) to the bottom surface of spring retainer (1).

INSTALLATION

ON VEHICLE

1. If removed, install the spring seat and valve guide seal over the valve guide. Refer to **SEAL(S), VALVE GUIDE, INSTALLATION**.

NOTE: Make sure that the valve spring is intact around the top of the valve guide seal.

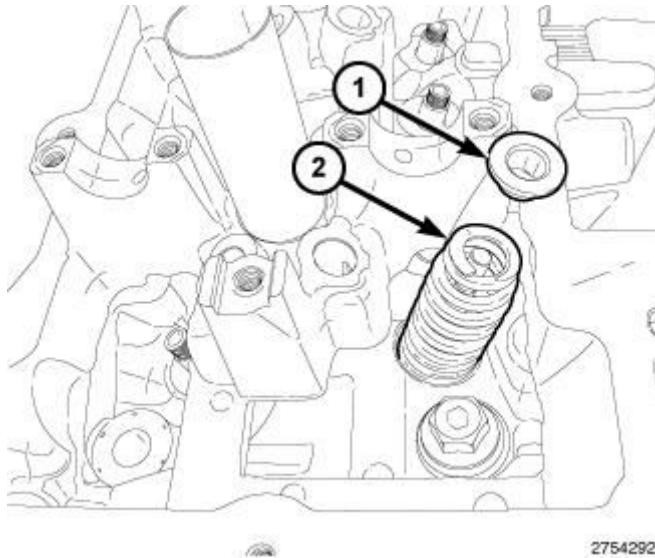


Fig. 294: Valve Spring & Valve Spring Retainer
Courtesy of CHRYSLER GROUP, LLC

NOTE: If the valve springs are being reused, reassemble them into their original locations. Number 5 cylinder exhaust valve spring shown in illustration, all other valves similar.

2. Install the valve spring (2) and valve spring retainer (1).

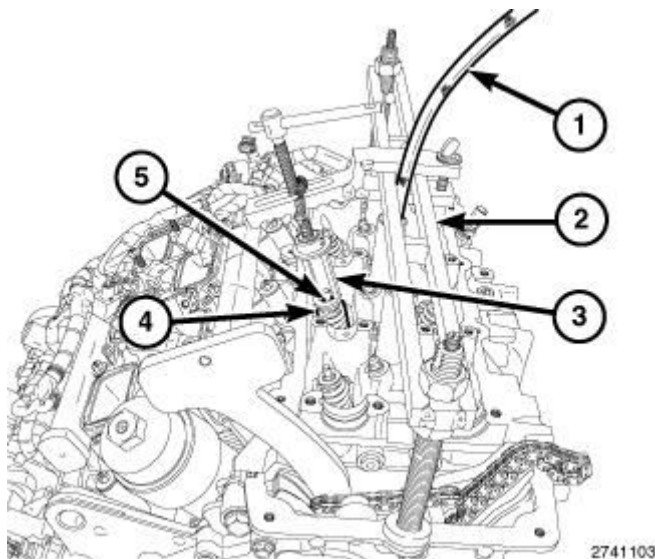


Fig. 295: Shop Air Supply & Valve Spring Compressor
Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 4 cylinder intake valve spring compression shown in illustration, all other valves similar.

3. Compress the valve springs (4) with the Valve Spring Compressor Adapter 10224 (3) mounted in the Valve Spring Compressor C-3422-D (2).
4. Install the valve retaining locks (5) and release the valve spring compressor.
5. Relieve the air pressure from the combustion chamber and remove the spark plug adapter (1).
6. Install the spark plug. Refer to **SPARK PLUG, INSTALLATION** .

NOTE: If the rocker arms are being reused, reassemble them into their original locations.

7. Install the rocker arm(s). Refer to **ROCKER ARM, VALVE, INSTALLATION**.
8. Connect the negative battery cable and tighten the nut to the proper specification. Refer to **SPECIFICATIONS** .

OFF VEHICLE

1. If removed, install the valve(s). Refer to **VALVES, INTAKE AND EXHAUST, INSTALLATION**.

NOTE: Reassemble the valves into their original locations. If the valves or valve seats have been refinished, verify that the valve stem tip height is within specification. Refer to **ENGINE SPECIFICATIONS** .

2. If removed, install the spring seat (3) and valve guide seal (1) over the valve guide. Refer to **SEAL(S), VALVE GUIDE, INSTALLATION**.

NOTE: Ensure that the garter spring (2) is intact around the top of the valve guide seal (1). Number 5 cylinder exhaust valve guide seal shown in illustration, all other valves similar.

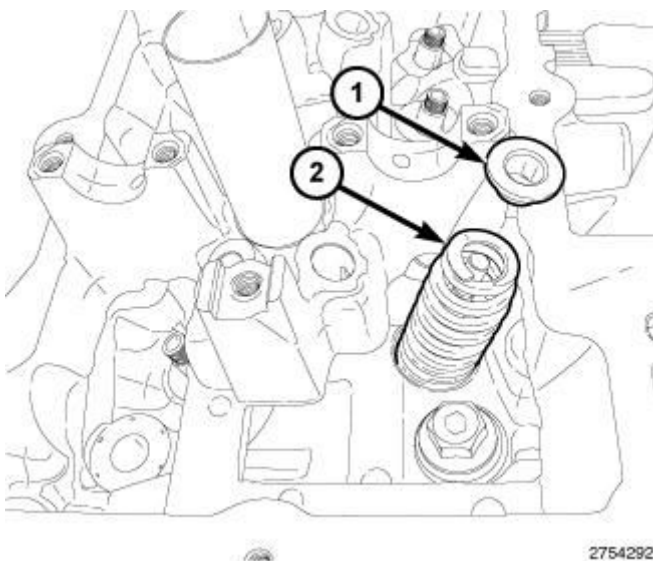


Fig. 296: Valve Spring & Valve Spring Retainer

Courtesy of CHRYSLER GROUP, LLC

NOTE: If the valve springs are being reused, reassemble them into their original locations. Number 5 cylinder exhaust valve spring shown in illustration, all other valves similar.

3. Install the valve spring (2) and valve spring retainer (1).

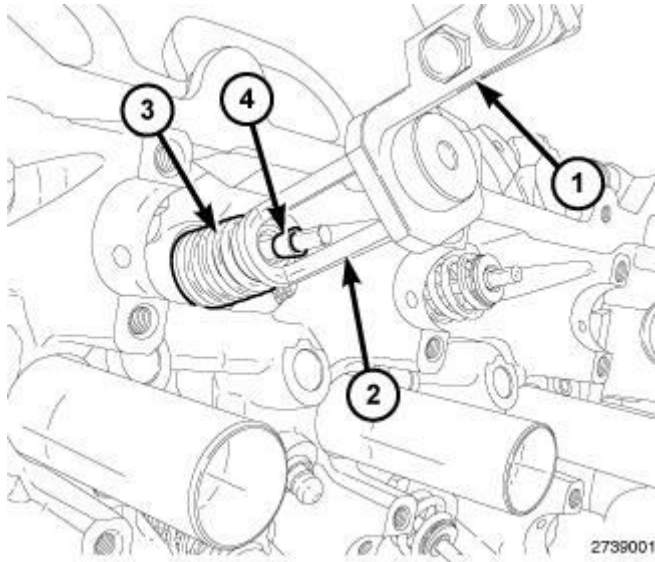
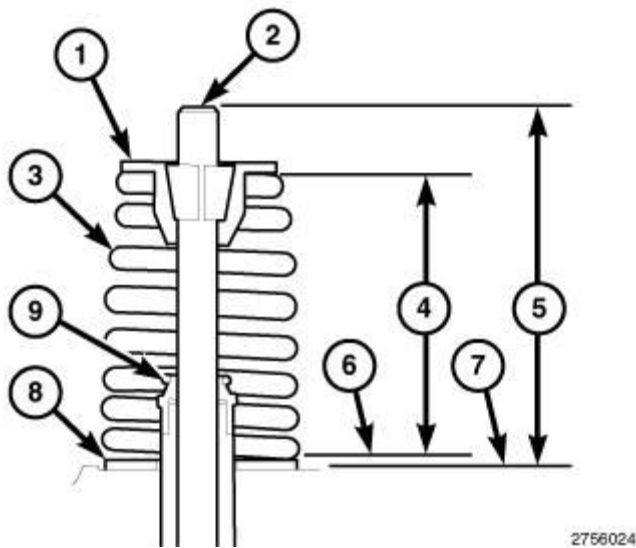


Fig. 297: Compressing Valve Spring & Locating Valve Retaining Locks
Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 3 cylinder intake valve spring compression shown in illustration, all other valves similar.

4. Compress valve springs (3) with the Valve Spring Compressor Adapter (special tool #10224, Adapter, Valve Spring) (2) mounted in the Valve Spring Compressor (special tool #C-3422-D, Compressor, Valve Spring) (1). Install the retaining locks (4) and release the valve spring compression.



2756024

Fig. 298: Checking Valve Spring Installed Height

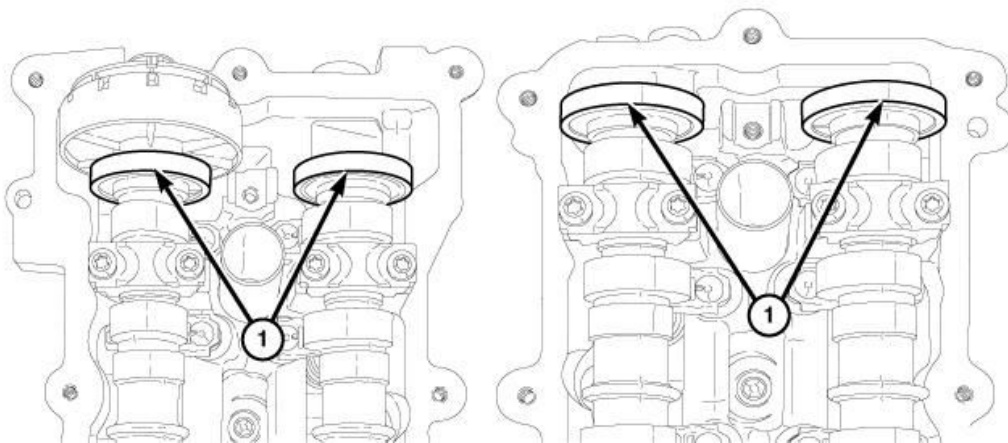
Courtesy of CHRYSLER GROUP, LLC

5. If the valves or valve seats have been refinished, check the installed height of the valve springs (4). If the installed valve spring height (4) is greater than 40.0 mm (1.575 in.), install an additional spring seat (8) in the head counterbore under the original valve spring seat (8) to bring the spring height back within specification. Make sure the measurement is taken from the top of spring seat (6) to the bottom surface of spring retainer (1).
6. Install the cylinder head(s). Refer to **CYLINDER HEAD, INSTALLATION**.

TUBE, SPARK PLUG

REMOVAL

REMOVAL



2715130

Fig. 299: Magnetic Timing Wheels

Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.

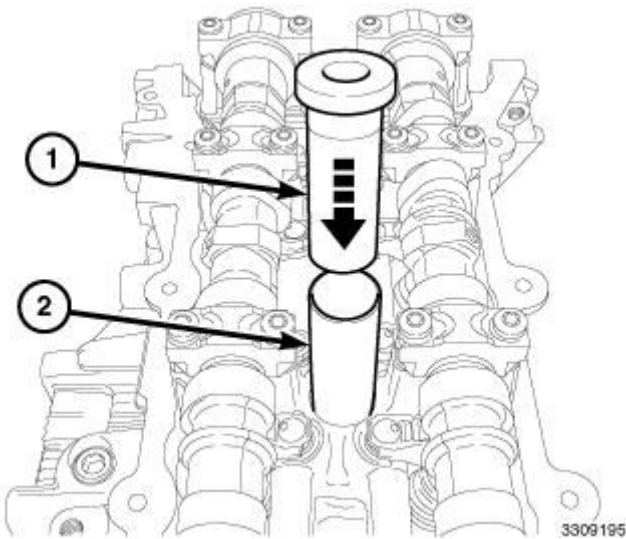


Fig. 300: Spark Plug Tube Installer & Spark Plug Tube
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove the ignition coils. Refer to **COIL, IGNITION, REMOVAL**.
3. Using compressed air, blow out any dirt or contaminants from around the top of the spark plugs.
4. Remove the cylinder head cover(s). Refer to **COVER(S), CYLINDER HEAD, REMOVAL**.
5. Install the top half of Spark Plug Tube Installer (special tool #10255, Installer, Spark Plug Tube) (1) into the spark plug tube to be removed (2).

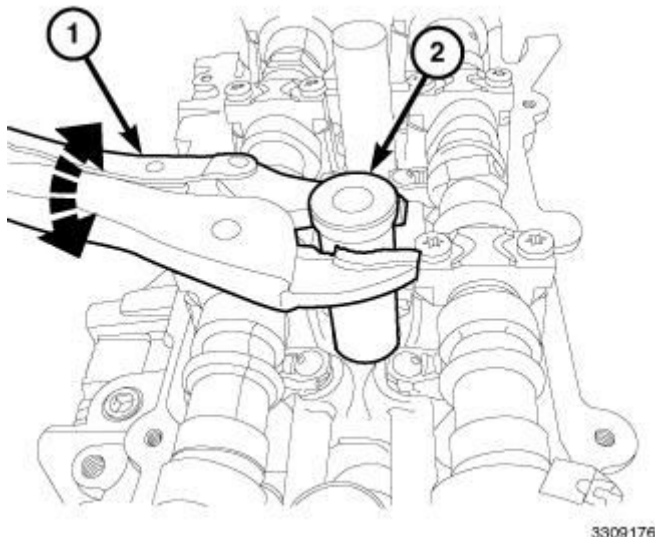
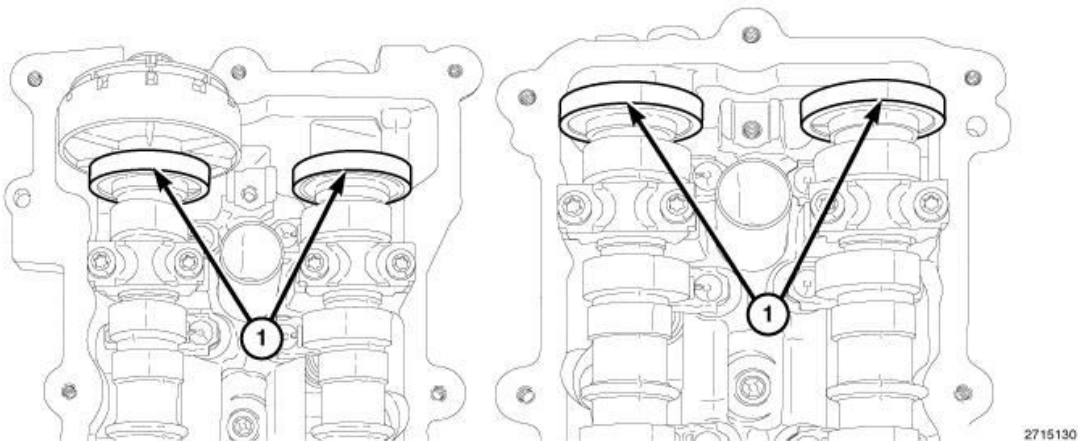


Fig. 301: Locking Pliers & Spark Plug Tube

Courtesy of CHRYSLER GROUP, LLC

6. Using suitable locking pliers (1), remove the spark plug tube (2) from the cylinder head and discard the tube.
7. Clean the area around the spark plug tube mounting with Mopar® Parts Cleaner or equivalent.

INSTALLATION**INSTALLATION****Fig. 302: Magnetic Timing Wheels**

Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.

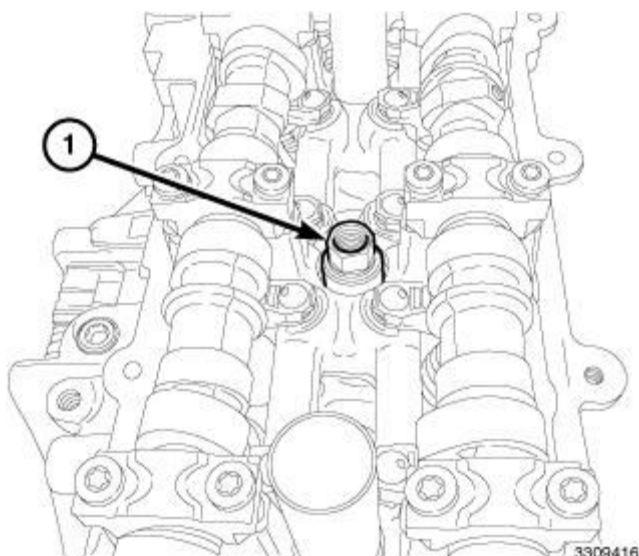
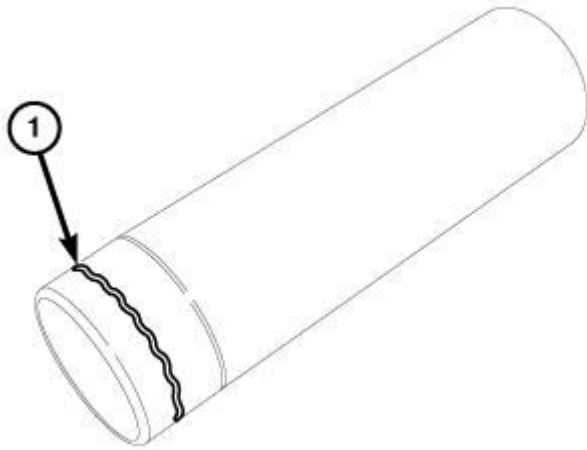


Fig. 303: Spark Plug Tube Installer

Courtesy of CHRYSLER GROUP, LLC

1. Remove the spark plug. Refer to **SPARK PLUG, REMOVAL**.
2. Install the lower half of Spark Plug Tube Installer (special tool #10255, Installer, Spark Plug Tube) (1) into the cylinder head and tighten to 17.5 N.m (13 ft. lbs.).

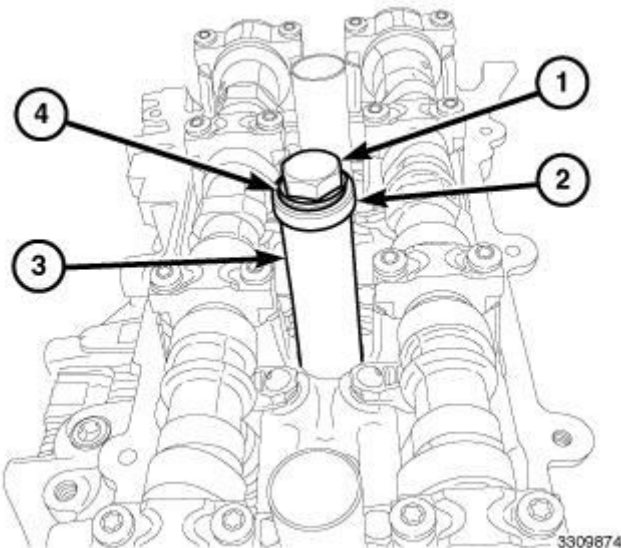


3309595

Fig. 304: Applying Stud & Bearing Mount Bead To Spark Plug Tube

Courtesy of CHRYSLER GROUP, LLC

3. Apply Mopar® Stud and Bearing Mount to the new spark plug tube approximately 3 mm (0.118 in.) from the end of the tube, in a 2 mm (0.078 in.) wide bead (1).



3309874

Fig. 305: Spark Plug Tube, Thrust Washers, Spark Plug Tube Installer & Bolt

Courtesy of CHRYSLER GROUP, LLC

4. Position the spark plug tube (3) on the top half of Spark Plug Tube Installer (special tool #10255, Installer, Spark Plug Tube) (2) and assemble the tool on the cylinder head. Make sure there are two thrust washers (4) installed.

CAUTION: Do not overtighten the bolt (1). Overtightening can damage the cylinder head spark plug threads.

5. Tighten the bolt (1) to draw the spark plug tube into position. When the top half of the tool contacts the bottom half of the tool, the tube is installed.

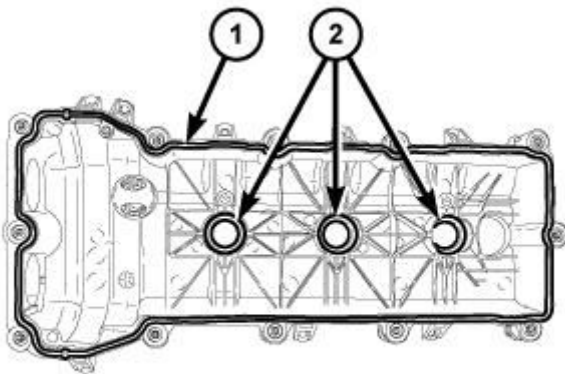


Fig. 306: Cylinder Head Cover Gasket & Spark Plug Tube Seals
Courtesy of CHRYSLER GROUP, LLC

NOTE: LH cylinder head cover shown in illustration, RH cylinder head cover similar.

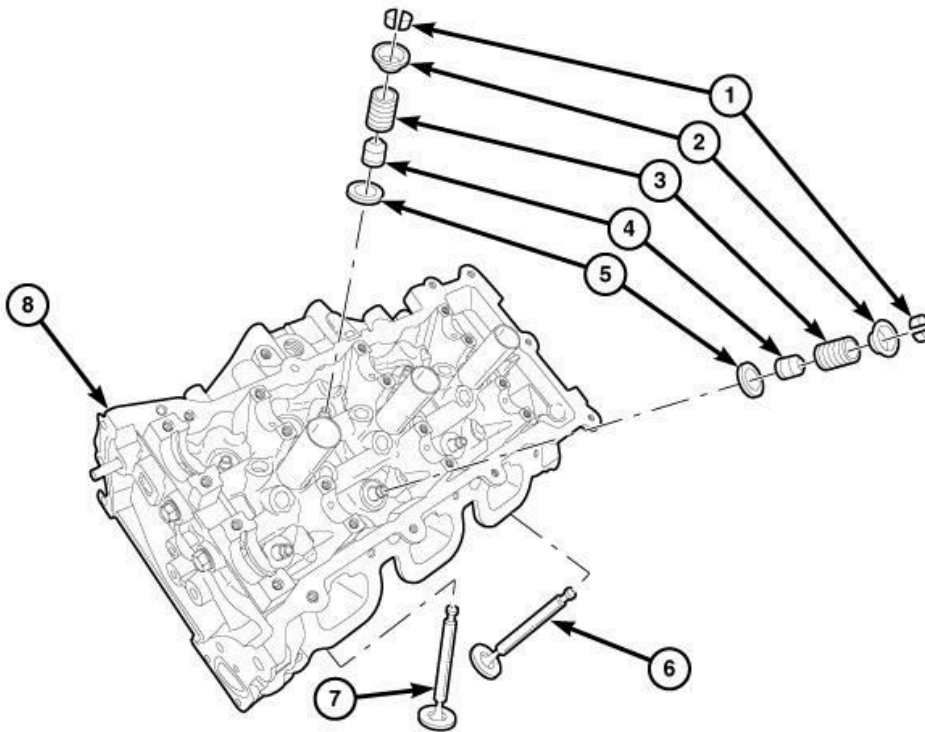
CAUTION: Spark plug torque is critical and must not exceed the specified value. Overtightening stretches the spark plug shell reducing its heat transfer capability resulting in possible catastrophic engine failure.

6. Install the spark plug. Refer to **SPARK PLUG, INSTALLATION** .
7. If required, install a new spark plug tube seal (2).
8. Install the cylinder head cover(s). Refer to **COVER(S), CYLINDER HEAD, INSTALLATION**. Connect the negative battery cable and tighten the nut to proper specification. Refer to **SPECIFICATIONS** .

VALVES, INTAKE AND EXHAUST

DESCRIPTION

DESCRIPTION



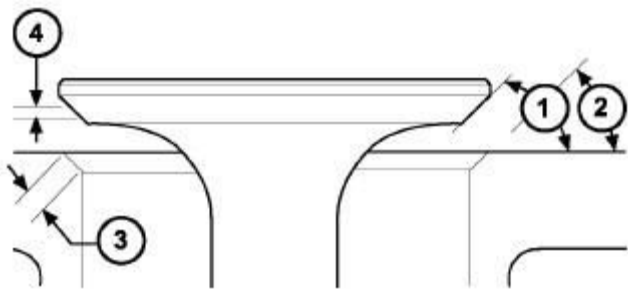
2819682

Fig. 307: Intake Valve & Exhaust Valve Component Configuration
Courtesy of CHRYSLER GROUP, LLC

The intake valve (6) is made from a one piece forged heat resistant (martensitic) steel. The exhaust valve (7) is a two piece construction with a forged (austenitic) head welded to the (martensitic) stem. Both valves have a nitrided surface treatment to prevent scuffing except at the tip and lock grooves. The four valves per cylinder are actuated by roller rocker arms, which pivot on stationary lash adjusters. All valves use three bead lock keepers (1) to retain springs (3) and to promote valve rotation.

STANDARD PROCEDURE

REFACING INTAKE AND EXHAUST VALVES



809c3e98

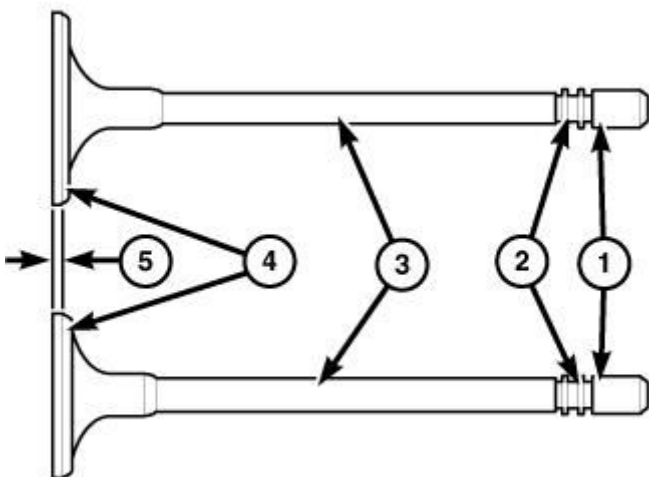
Fig. 308: Valve Face & Seat

Courtesy of CHRYSLER GROUP, LLC

- 1 - SEAT WIDTH
- 2 - FACE ANGLE
- 3 - SEAT ANGLE
- 4 - SEAT CONTACT AREA

The intake and exhaust valves have a 45.25 ± 0.25 degree face angle (1). The valve seats (2) have a 44.75 ± 0.25 degree face angle.

VALVES



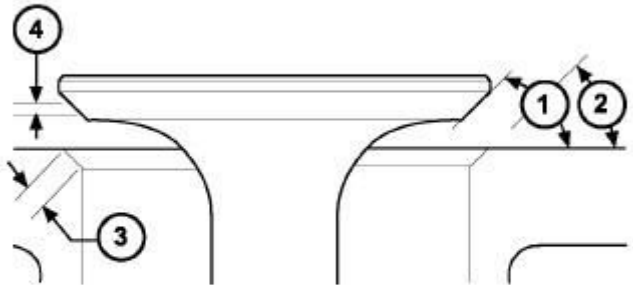
2755802

Fig. 309: Inspecting Valve Margin

Courtesy of CHRYSLER GROUP, LLC

Inspect the remaining margin (5) after the valves are refaced. Refer to **ENGINE SPECIFICATIONS**.

VALVE SEATS



809c3e98

Fig. 310: Valve Face & Seat

Courtesy of CHRYSLER GROUP, LLC

- | |
|---|
| 1 - SEAT WIDTH
2 - FACE ANGLE
3 - SEAT ANGLE
4 - SEAT CONTACT AREA |
|---|

NOTE: When refacing the valve seats, it is important that the correct size valve guide pilot be used for the reseating stones. A true and complete surface must be obtained.

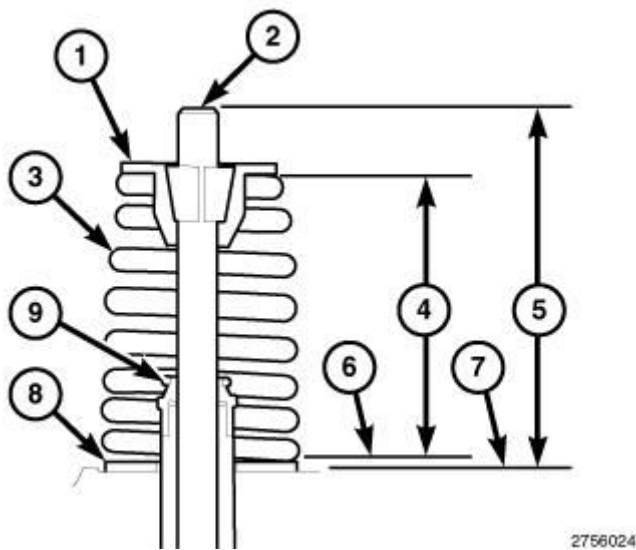
1. Measure the concentricity of the valve seat using a dial indicator. Total runout should not exceed 0.050 mm (0.002 inch.) total indicator reading.

NOTE: Valve seats which are worn or burned can be reworked, provided that the correct angle and seat width are maintained. Otherwise the cylinder head must be replaced.

2. Check the sealing of the valve(s) to the valve seat(s) on the cylinder head(s):
 - Coat the valve seat (3) **LIGHTLY** with Prussian blue.
 - Install the valve into the cylinder head.

- Rotate the valve onto the valve seat using light pressure.
 - Using care not to wipe the Prussian blue. Remove the valve from the cylinder head.
 - If the blue is transferred to the center of the valve face (4), contact is within specifications.
 - If the blue is transferred to the top edge of the valve face, then lower the valve seat with a 15 degree stone.
 - If the blue is transferred to the bottom edge of the valve face, then raise the valve seat with a 65 degree stone.
3. When the seat is properly positioned. The width of the intake seat should be 1.0 - 1.2 mm (0.04 - 0.05 in.) and the exhaust seats should be 1.41 - 1.61 mm (0.055 - 0.063 in.).

VALVE AND SPRING INSTALLED HEIGHT



2756024

Fig. 311: Checking Valve Spring Installed Height
Courtesy of CHRYSLER GROUP, LLC

NOTE: If the valves are being reused, reassemble them into their original locations.

1. Coat the valve stems (2) with clean engine oil and install the valves onto the cylinder head.
2. If the valves or valve seats have been refinished, check the valve tip height (5). If the valve tip height (5) exceeds the specification, grind the valve tip until it is within specification. Refer to **ENGINE SPECIFICATIONS**. Make sure the measurement is taken from the cylinder head surface (7) to the top of the valve stem (2).
3. If removed, install the spring seat and valve guide seal over the valve guide. Refer to **SEAL(S), VALVE GUIDE, INSTALLATION**.

NOTE: Make sure that the garter spring is intact around the top of the valve guide seal.

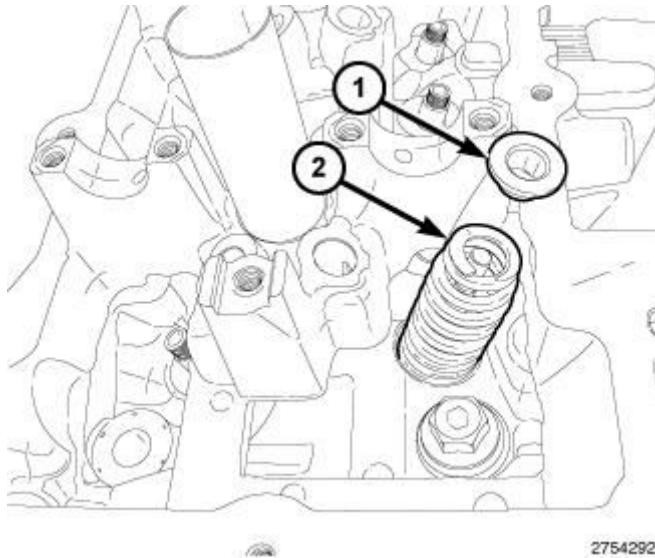


Fig. 312: Valve Spring & Valve Spring Retainer
Courtesy of CHRYSLER GROUP, LLC

NOTE: If the valve springs are being reused, reassemble them into their original locations. Number 5 cylinder exhaust valve spring shown in illustration, all other valves similar.

4. Install the valve spring (2) and valve spring retainer (1).

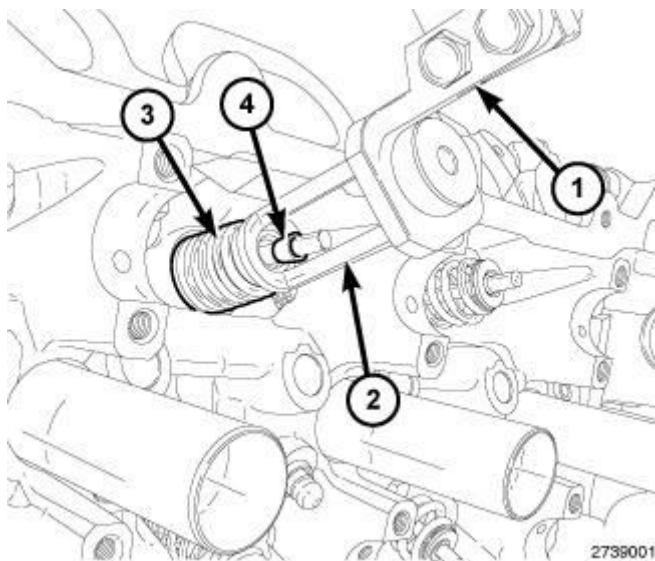


Fig. 313: Compressing Valve Spring & Locating Valve Retaining Locks
Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 3 cylinder intake valve spring compression shown in illustration, all other valves similar.

5. Compress the valve spring (3) with the Valve Spring Compressor Adapter (special tool #10224, Adapter, Valve Spring) (2) mounted in the Valve Spring Compressor (special tool #C-3422-D, Compressor, Valve Spring) (1). Install the retaining locks (4) and release the valve spring compressor.

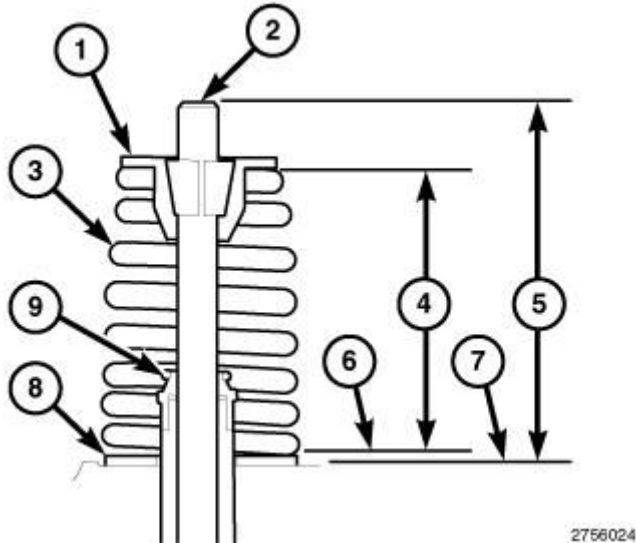


Fig. 314: Checking Valve Spring Installed Height
Courtesy of CHRYSLER GROUP, LLC

6. If the valves or valve seats have been refinished and the installed valve spring height (4) is greater than 40.0 mm (1.575 in.). Install a second spring seat (8) in the head counter bore under the original valve spring seat to bring the spring height within specification. Make sure the measurement is taken from the top of spring seat (6) to the bottom surface of spring retainer (1).

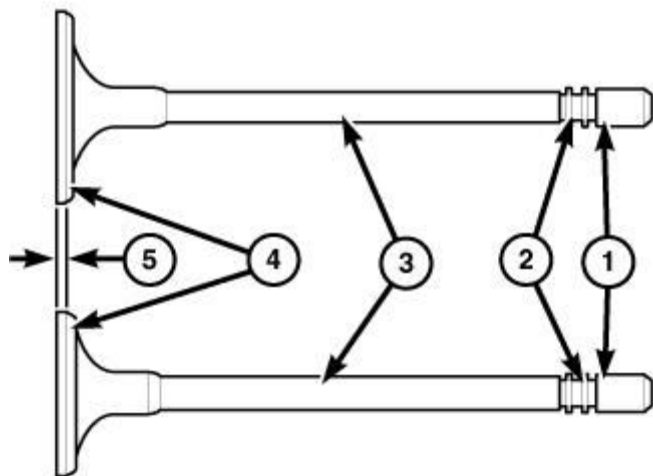
REMOVAL

REMOVAL

1. Remove the cylinder head(s). Refer to **CYLINDER HEAD, REMOVAL**.

NOTE: If the springs are to be reused, identify their positions so that they can be reassembled into their original locations.

2. Remove the valve spring(s). Refer to **SPRING(S), VALVE, REMOVAL**.



2755802

Fig. 315: Inspecting Valve Margin
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Before removing the valves, remove any burrs from the valve stem retainer lock grooves (2) and stem tip (1) to prevent damage to the valve guides.

3. Remove the valve(s) (3). Identify each valve to ensure installation in the original location.
4. If required, remove the valve guide seal and spring seat. Refer to **SEAL(S), VALVE GUIDE, REMOVAL**.

INSPECTION

INSPECTION

VALVES

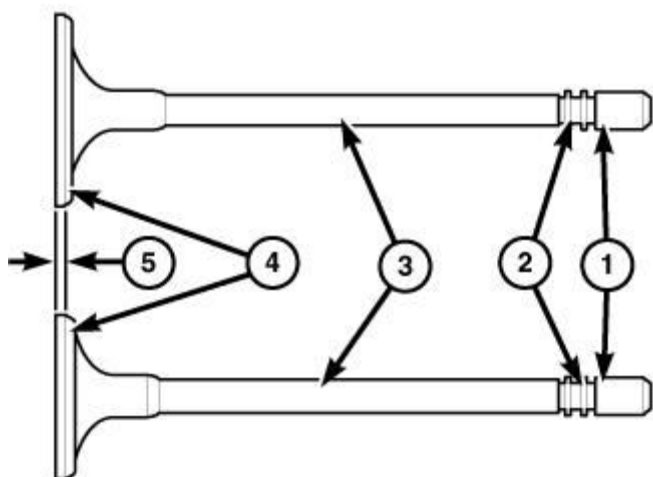


Fig. 316: Inspecting Valve Margin
Courtesy of CHRYSLER GROUP, LLC

1. Clean and inspect the valves thoroughly. Replace burned, warped and cracked valves.
2. Inspect the retainer lock grooves for wear or damage (2).
3. Inspect the valve face (4) for wear and pitting.
4. Measure the valve stems (3) and margins (5) for wear. Refer to **ENGINE SPECIFICATIONS** .

VALVE GUIDES

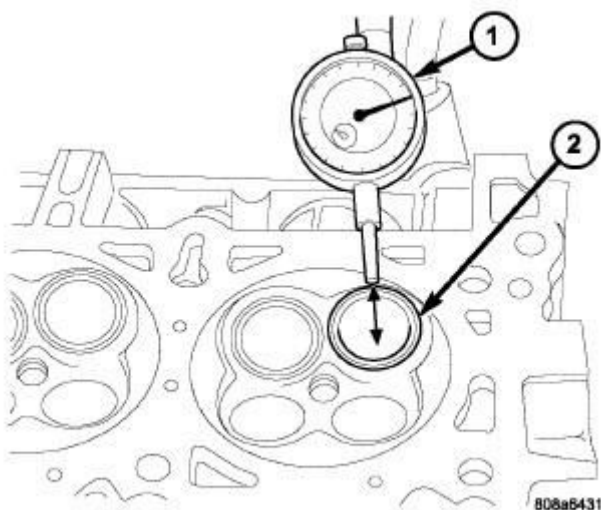


Fig. 317: Measuring Valve Guide Wear
Courtesy of CHRYSLER GROUP, LLC

1. Remove carbon and varnish deposits from inside of the valve guides with a reliable guide cleaner.

2. Measure valve stem-to-guide clearance as follows:
3. Install the valve (2) into the cylinder head so that it is 15 mm (0.590 inch.) off of the valve seat. A small piece of hose may be used to hold the valve in place.
4. Attach the Dial Indicator Set (special tool #C-3339A, Set, Dial Indicator) (1) to the cylinder head and set it at a right angle to the valve stem being measured.
5. Move the valve to and from the indicator. Compare this reading to the specification. Refer to **ENGINE SPECIFICATIONS**.

NOTE: If stem-to-guide clearance exceeds specifications, you must measure the valve stem. If the valve stem is within specification or if the valve guide is loose in the cylinder head, replace the cylinder head.

INSTALLATION

INSTALLATION

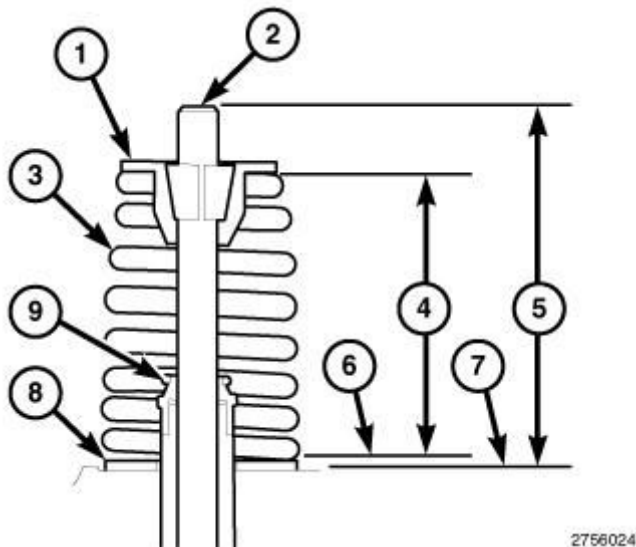


Fig. 318: Checking Valve Spring Installed Height
Courtesy of CHRYSLER GROUP, LLC

1. Coat the valve stems (2) with clean engine oil and install the valves into the cylinder head.

NOTE: If the valves are being reused, reassemble them into their original locations.

2. If the valves or valve seats have been refinished, check the valve tip height (5). If the valve tip height (5) exceeds the specification, grind the valve tip until it is within specification. Refer to **ENGINE SPECIFICATIONS**. Make sure the measurement is taken from the cylinder head surface (7) to the top of the valve stem (2).
3. If removed, install the spring seat and valve guide seal over the valve guide. Refer to **SEAL(S), VALVE GUIDE, INSTALLATION**.

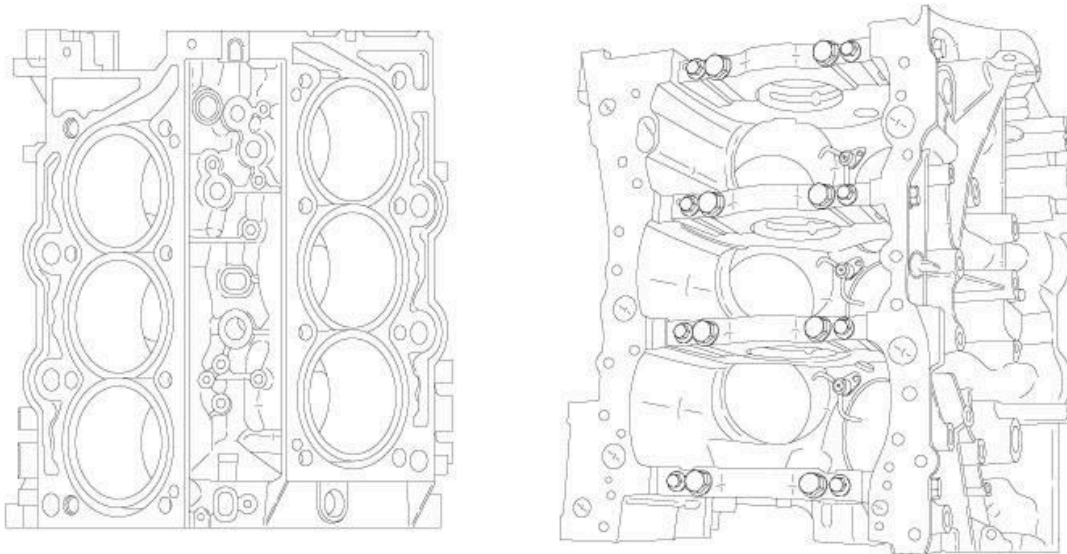
NOTE: Reassemble the valves springs into their original locations. If the valves or valve seats have been refinished, verify that the valve spring installed height is within specification. Refer to **ENGINE SPECIFICATIONS** .

4. Install the valve spring(s). Refer to **SPRING(S), VALVE, INSTALLATION**.
5. Install the cylinder head(s). Refer to **CYLINDER HEAD, INSTALLATION**.

ENGINE BLOCK

DESCRIPTION

DESCRIPTION



2824104

Fig. 319: Cylinder Block & Main Bearing Caps
Courtesy of CHRYSLER GROUP, LLC

The cylinder block is a 60 degree high-pressure die cast aluminum design with cast steel cylinder liners. The leading side of the block is on the right side and houses cylinders 1, 3 and 5. The cylinder block is an open deck design with cut slots between each cylinder. Two knock sensors are located in the block valley. The cylinder block has three sets of piston cooling jets which are attached to the main oil gallery. The four powdered metal main bearing caps are a cross-bolted design and have directional arrows molded into the caps. The number 2 main bearing is the location for the two piece upper half thrust bearings. The thrust bearings are installed with the oil grooves facing outward. The main bearing caps are a 6-bolt design and cross-bolted for improved lower end strength. There are three oil drain back drillings located on each of the cylinder banks.

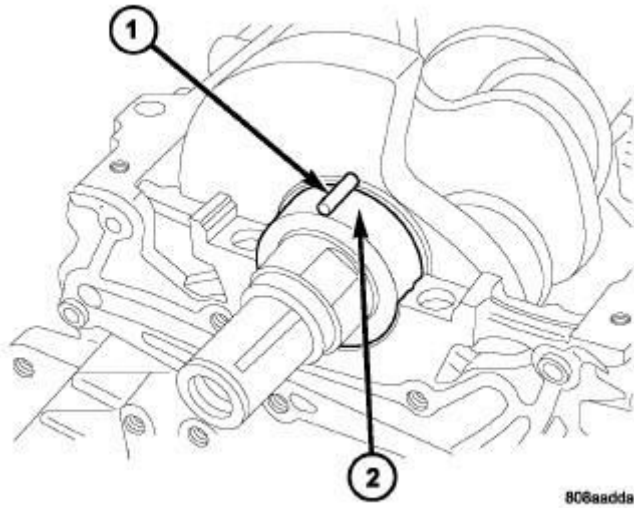
STANDARD PROCEDURE**MEASURING BEARING CLEARANCE USING PLASTIGAGE**

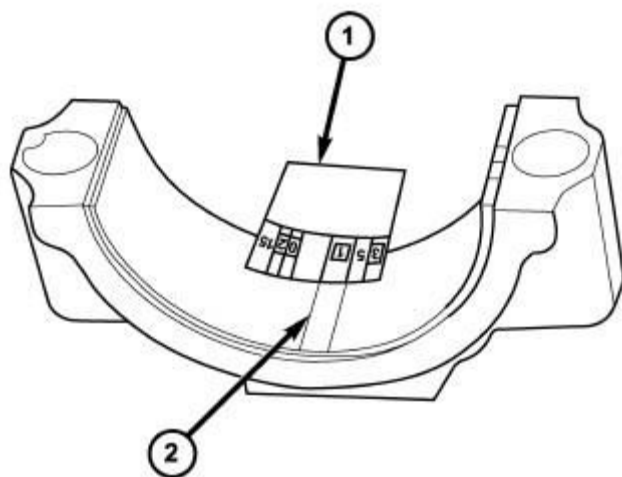
Fig. 320: Plastigage Placed In Lower Shell
Courtesy of CHRYSLER GROUP, LLC

NOTE: **Typical crankshaft journal shown in illustration.**

Engine crankshaft and connecting rod bearing clearances can be determined by the use of Plastigage or equivalent. The following is the recommended procedure for the use of Plastigage:

1. Remove the oil film from surface to be checked. Plastigage is soluble in oil.
2. Place a piece of Plastigage (1) across the entire width of the journal (In addition, suspected areas can be checked by placing the Plastigage in the suspected area). Plastigage must not crumble in use. If brittle, obtain fresh stock.
3. Torque the bearing cap bolts of the bearing being checked to the proper specification. Refer to **TORQUE SPECIFICATIONS** .

NOTE: **DO NOT rotate the crankshaft. Plastigage will smear, causing inaccurate results.**



801777cc

Fig. 321: Measuring Bearing Clearance With Plastigage
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical connecting rod cap shown in illustration.

4. Remove the bearing cap and compare the width of the flattened Plastigage (2) with the scale provided on the package (1). Locate the band closest to the same width. This band shows the amount of clearance. Differences in readings between the ends indicate the amount of taper present or the possibility of foreign material trapped under the bearing insert.
5. Record all readings taken. Compare clearance measurements to. Refer to **ENGINE SPECIFICATIONS** .

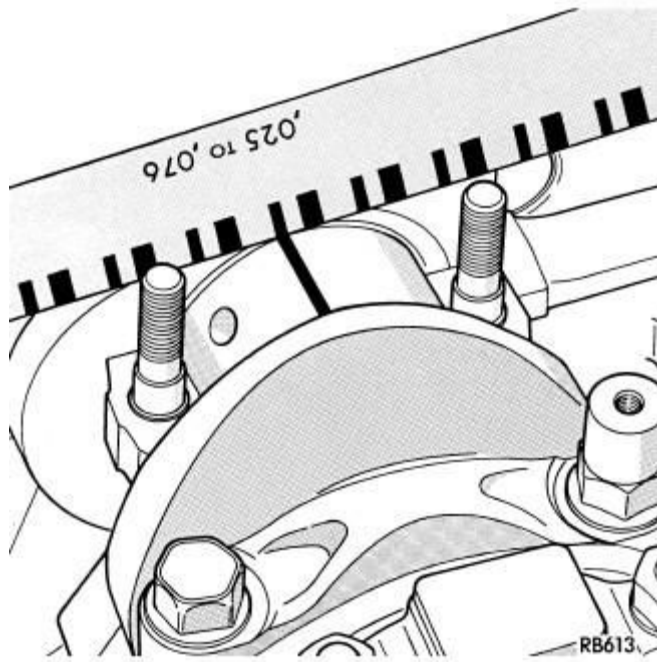


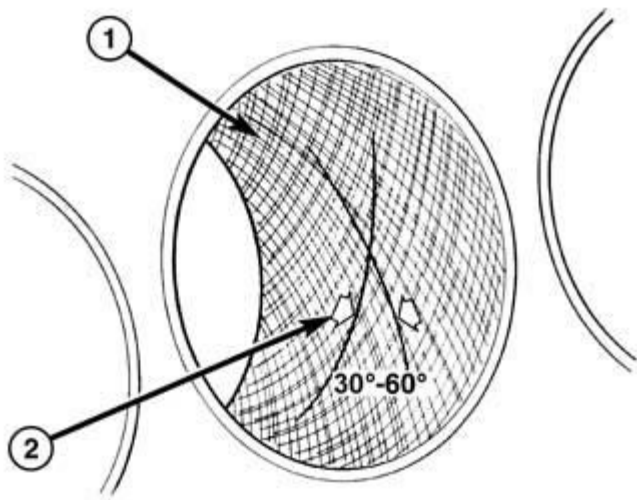
Fig. 322: Checking Connecting Rod Bearing Clearance With Plastigage
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical connecting rod journal shown in illustration.

NOTE: Plastigage is available in a variety of clearance ranges. Use the most appropriate range for the specifications you are checking. Plastigage generally is accompanied by two scales. One scale is in inches, the other is a metric scale.

6. Install the proper bearings to achieve the specified bearing clearances.
7. Repeat the Plastigage measurement to verify your bearing selection prior to final assembly.

CYLINDER BORE DEGLAZING



8086fd41

Fig. 323: Cylinder Bore Crosshatch Pattern
Courtesy of CHRYSLER GROUP, LLC

Before deglazing, mask the crankcase area to keep abrasive materials from entering the engine lower end. Tape off any openings to prevent abrasive material from entering the coolant and oil circuits.

CAUTION: DO NOT use rigid type hones to remove cylinder wall glaze.

1. Select an appropriate size flexible ball hone.
2. Deglazing of the cylinder walls may be done if the cylinder bore is straight and round. About 20-60 strokes, depending on the condition of the cylinder bore, will be sufficient to provide a satisfactory surface. Use a light **honing** oil, available from major oil distributors.

CAUTION: DO NOT use engine or transmission oil, mineral spirits, or kerosene.

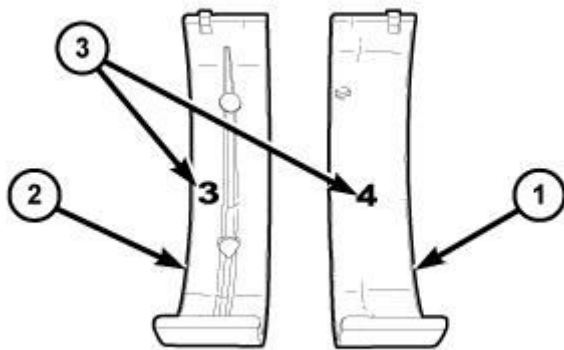
3. Deglazing should be done by moving the hone up and down fast enough to get a crosshatch pattern. The hone marks should intersect at 30° to 60° inclusive angle for proper seating of rings.
4. A controlled hone motor speed between 200 and 300 RPM is necessary to obtain the proper crosshatch angle (1). The number of up and down strokes per minute can be regulated to get the desired 30° to 60° inclusive angle (2). Faster up and down strokes increase the crosshatch angle.
5. After deglazing, it is necessary that the block be cleaned to remove all traces of abrasive. Use a brush to wash parts with a solution of hot water and detergent. Dry parts thoroughly. Use a clean, white, lint-free cloth to check that the bore is clean. Oil the bores after cleaning to prevent rusting. Upon completion,

perform a visual inspection of the cylinder block passages to inspect for abrasive debris. If any debris is found, repeat the cleaning process.

NOTE: Cylinder bore diameter should not increase more than 20 microns during deglazing process from original nominal bore diameter, if the maximum of 20 microns is exceeded, the cylinder block must be replaced. If deglazing the cylinder bore cannot remove the light scratches and scuffs the cylinder block should be replaced.

INSPECTION

INSPECTION



2767936

Fig. 324: Main Bearing Inserts
Courtesy of CHRYSLER GROUP, LLC

1. Wipe the bearing inserts (1, 2) clean.
2. Inspect the inserts for abnormal wear patterns, scoring, grooving, fatigue, pitting and for metal or other foreign material imbedded in the lining.
3. Inspect the back of the inserts for fractures, scrapes, or irregular wear patterns.
4. Inspect the insert locking tabs for damage.
5. Inspect the crankshaft thrust washers for scoring, scratches, wear or blueing.
6. Replace any bearing that shows abnormal wear. Refer to **BEARING(S), CRANKSHAFT, STANDARD PROCEDURE**.
7. Inspect the main bearing bores for signs of scoring, nicks and burrs.
8. If the cylinder block main bearing bores show damage the engine block must be replaced.

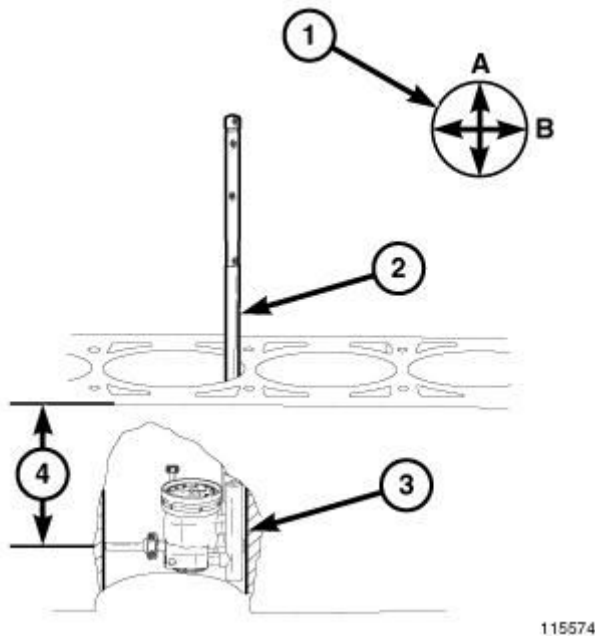


Fig. 325: Measuring Cylinder Bore Diameter
 Courtesy of CHRYSLER GROUP, LLC

9. Use the Cylinder Indicator (special tool #C-119, Cylinder Indicator) (2) to correctly measure the inside diameter of the cylinder bore (3). A cylinder bore gauge capable of reading in 0.003 mm (0.0001 in.) INCREMENTS is required. If a bore gauge is not available, do not use an inside micrometer.
10. Measure the inside diameter of the cylinder bore at three levels below the top of the bore (4). Start at the top of the bore, perpendicular (across or at 90 degrees) to the axis of the crankshaft at point A (1).
11. Repeat the measurement near the middle of the bore, then repeat the measurement near the bottom of the bore.
12. Determine taper by subtracting the smaller diameter from the larger diameter.
13. Rotate the Cylinder Indicator 90° to point B (1) and repeat the three measurements. Verify that the maximum taper is within specification. Refer to **ENGINE SPECIFICATIONS**.
14. Determine out-of-roundness by comparing the difference between A and B at each of the three levels. Verify that the maximum out of round is within specification. Refer to **ENGINE SPECIFICATIONS**.
15. If cylinder bore taper and out-of-roundness are within specification, the cylinder bore can be honed. Refer to **ENGINE SPECIFICATIONS**. If the cylinder bore taper or out-of-round condition exceeds the maximum limits, the cylinder block must be replaced.

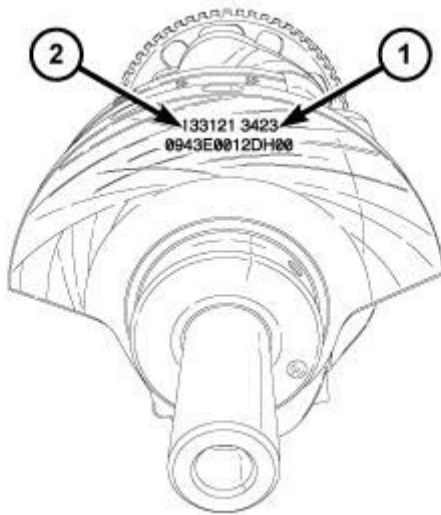
NOTE: A slight amount of taper always exists in the cylinder bore after the engine has been in use for a period of time.

BEARING(S), CONNECTING ROD

STANDARD PROCEDURE

CONNECTING ROD BEARING FITTING

Bearing oil clearance can also be determined by using Plastigage or equivalent. Refer to **ENGINE BLOCK, STANDARD PROCEDURE**.



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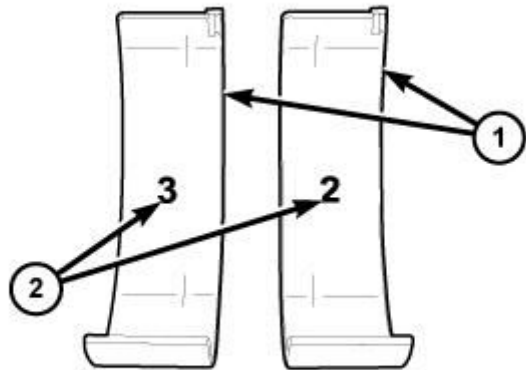
Fig. 326: Crankshaft Main Bearing Journal Diameter Grade Markings & Connecting Rod Bearing Journal Diameter Grade Markings

Courtesy of CHRYSLER GROUP, LLC

The connecting rod bearings are "select fit" to achieve proper oil clearance. Connecting rod bearing journal diameter grade markings (2) are stamped into the front crankshaft counterweight. These marks are read from left to right, corresponding with journal number 1, 2, 3, 4, 5, 6. Select the bearing size that corresponds to the crankshaft markings for each rod bearing journal.

Connecting rod bearing journal diameter grade markings correspond to specific journal diameters. The chart below identifies the three crankshaft grade markings and their associated journal diameters.

Crankshaft Marking	Journal Size mm (in.)
1	58.9910 - 58.9969 mm (2.3225 - 2.3227 in.)
2	58.9970 - 59.0029 mm (2.3227 - 2.3229 in.)
3	59.0030 - 59.0090 mm (2.3229 - 2.3232 in.)



2789568

Fig. 327: Connecting Rod Bearing Shells & Bearing Size

Courtesy of CHRYSLER GROUP, LLC

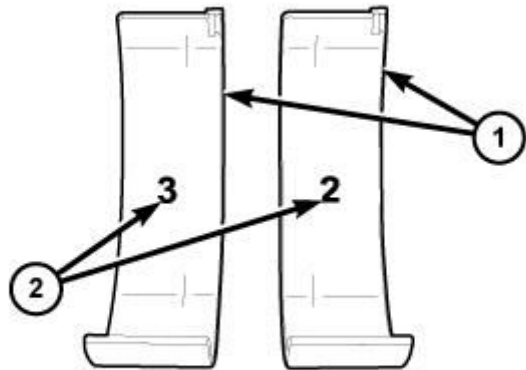
NOTE: Install the rod bearings in pairs. Do not mix sizes or use a new bearing half with an old bearing half.

The connecting rod bearing shells (1) are marked with the bearing size (2) on the bearing lining surface. The bearings are available in three different sizes in order to achieve the desired oil clearance.

Rod bearing shells are available in three sizes. The chart below identifies the three bearing sizes.

Bearing Marking	Size mm (in.)
1	1.583 - 1.580 mm (0.0623 - 0.0622 in.)
2	1.580 - 1.577 mm (0.0622 - 0.0621 in.)
3	1.577 - 1.574 mm (0.0621 - 0.0620 in.)

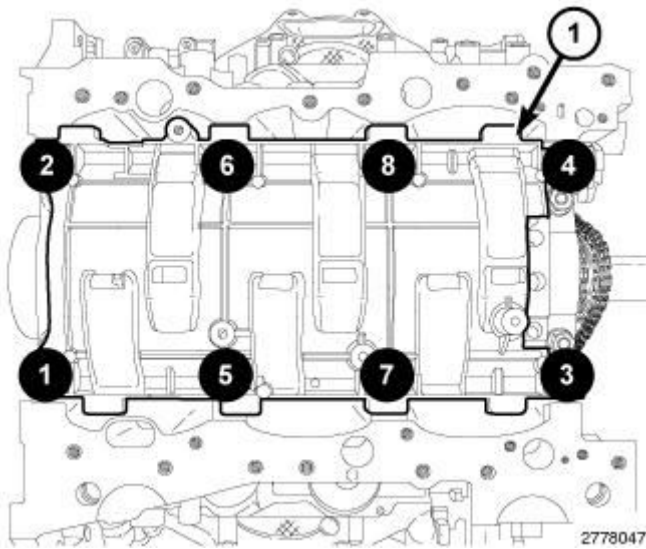
CONNECTING ROD BEARING REPLACEMENT



2769568

Fig. 328: Connecting Rod Bearing Shells & Bearing Size
 Courtesy of CHRYSLER GROUP, LLC

The connecting rod bearings (1) can be serviced in-vehicle. They must be replaced one-at-a-time in order to prevent the pistons from contacting the valves. The connecting rod bearings are "select fit" to achieve proper oil clearances. Refer to **BEARING(S), CONNECTING ROD, STANDARD PROCEDURE** .

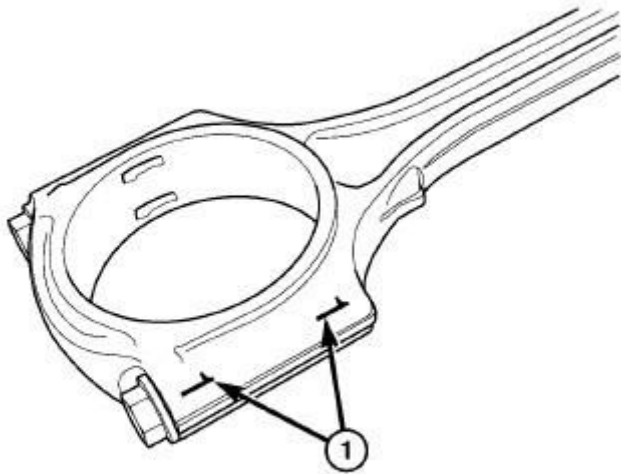


2778047

Fig. 329: Main Bearing Cap Bolts From Windage Tray Removal Sequence
 Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove the spark plugs. Refer to **SPARK PLUG, REMOVAL** .
3. Remove the oil pan, oil pump pick-up and engine oil pump. Refer to **PUMP, ENGINE OIL, REMOVAL**.
4. Remove the eight main bearing cap bolts from the windage tray in the sequence shown in illustration and

remove the windage tray (1).



811318c8

Fig. 330: Connecting Rod To Cylinder Identification
Courtesy of CHRYSLER GROUP, LLC

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods or caps, as damage to connecting rods could occur

NOTE: Connecting rods and bearing caps are not interchangeable and should be marked before removing to ensure correct reassembly.

5. Mark connecting rod and bearing cap positions (1) using a permanent ink marker or scribe tool.

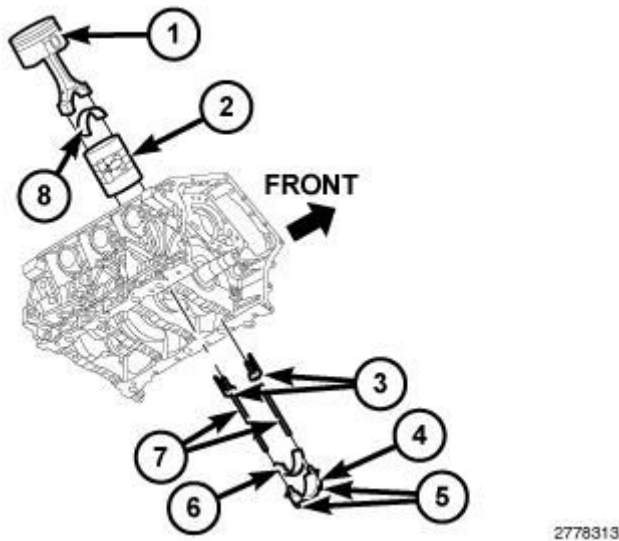


Fig. 331: Piston, Connecting Rod Cap, Bolts, Plastic Guide Plates & Guide Pins
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical V6 engine configuration shown in illustration.

CAUTION: Replace only one connecting rod bearing at a time while all other connecting rod bearing caps remain properly tightened. If all connecting rod bearing caps are removed, crankshaft rotation will result in valve and/or piston damage.

CAUTION: Care must be taken not to damage the fractured rod and cap joint face surfaces, as engine damage may occur.

6. Remove the connecting rod cap bolts (5) and the connecting rod cap (4). Discard the cap bolts.
7. Remove the plastic guide plates (3) from the Guide Pins (special tool #8189, Guide Pins) (7) and install the Guide Pins to the connecting rod being removed.

CAUTION: Care must be taken not to nick crankshaft journals, as engine damage may occur.

8. Rotate the crankshaft away from the connecting rod and remove the bearing shell.
9. Inspect the rods and bearings for abnormal wear patterns, scoring, grooving, fatigue, pitting and for metal or other foreign material imbedded in the lining. Refer to **ENGINE BLOCK, INSPECTION**.
10. If required, check the connecting rod bearing clearances by the use of Plastigage or equivalent. Refer to **ENGINE BLOCK, STANDARD PROCEDURE**.
11. If required, select and fit new bearings to the connecting rod. Refer to **BEARING(S), CONNECTING ROD, STANDARD PROCEDURE**.
12. Install the bearing shell (8) on the connecting rod with the tang inserted into the machined groove in the

rod. Lubricate the bearing surface with clean engine oil.

13. Rotate the crankshaft while guiding the connecting rod into position over the rod journal.

CAUTION: The connecting rod bolts must not be reused. Always replace the connecting rod bolts whenever they are loosened or removed.

14. Install the bearing shell (6) on the connecting rod cap (4) with the tang inserted into the machined groove in the cap. Lubricate the bearing surface with clean engine oil.

NOTE: Do not lubricate the threads of the connecting rod cap bolts (5).

15. Install the connecting rod cap and bearing with the tang on the same side as the rod. Tighten the **NEW** connecting rod cap bolts (5) to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
16. If required, check the connecting rod side clearance. Refer to **ROD, PISTON AND CONNECTING, STANDARD PROCEDURE**.
17. Repeat the previous steps for each connecting rod bearing being replaced.

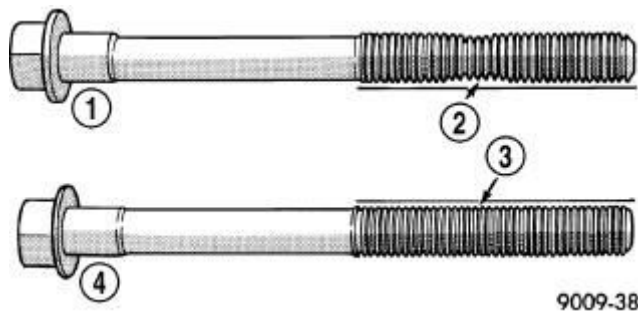


Fig. 332: Checking Cylinder Head Bolts For Stretching (Necking)
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The main bearing cap bolts are tightened using a torque plus angle procedure. The bolts must be examined **BEFORE** reuse. If the threads are necked down the bolts must be replaced.

18. Check the main bearing cap bolts for necking by holding a scale or straight edge against the threads. If all the threads do not contact the scale (2) the bolt must be replaced.

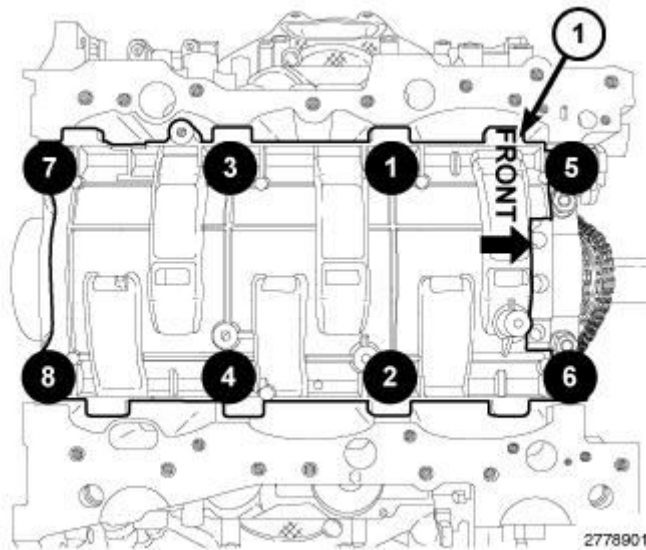


Fig. 333: Windage Tray With Main Bearing Cap Bolts Installation Sequence
Courtesy of CHRYSLER GROUP, LLC

19. Install the windage tray with eight main bearing cap bolts. Tighten the bolts in the sequence shown in illustration to 21 N.m (16 ft. lbs.) plus 90°.
20. Install the engine oil pump, oil pump pick-up and oil pan. Refer to **PUMP, ENGINE OIL, INSTALLATION**.
21. Install the spark plugs and ignition coils. Refer to **SPARK PLUG, INSTALLATION**.
22. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL, STANDARD PROCEDURE**.
23. Connect the negative battery cable and tighten nut to the proper specification. Refer to **SPECIFICATIONS**.
24. Operate the engine until it reaches normal operating temperature.

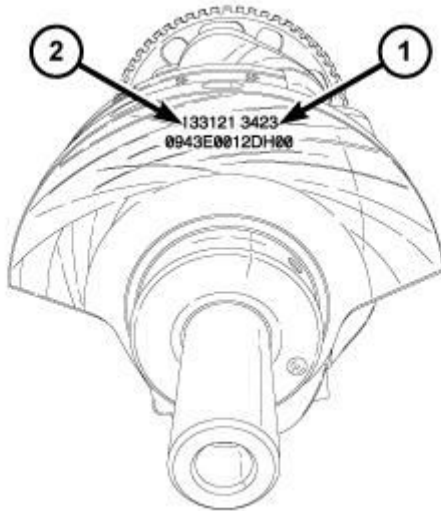
BEARING(S), CRANKSHAFT

STANDARD PROCEDURE

MAIN BEARING FITTING

NOTE: Crankshaft thrust washers are not selectable and are only available in a single thickness.

Bearing oil clearance can also be determined by using Plastigage or equivalent. Refer to **ENGINE BLOCK, STANDARD PROCEDURE**.



2767957

Fig. 334: Crankshaft Main Bearing Journal Diameter Grade Markings & Connecting Rod Bearing Journal Diameter Grade Markings
 Courtesy of CHRYSLER GROUP, LLC

The upper and lower main bearings are "select fit" to achieve proper oil clearances. Crankshaft main bearing journal diameter grade markings (1) are stamped into the front crankshaft counterweight. These marks are read from left to right, corresponding with journal number 1, 2, 3, 4.

Crankshaft main bearing journal diameter grade markings correspond to specific journal diameters. The chart below identifies the five crankshaft grade markings and their associated journal diameters.

Crankshaft Marking	Journal Size mm (in.)
1	71.9870 - 71.9905 mm (2.8341 - 2.8343 in.)
2	71.9906 - 71.9941 mm (2.8343 - 2.8344 in.)
3	71.9942 - 71.9977 mm (2.8344 - 2.8345 in.)
4	71.9978 - 72.0013 mm (2.8346 - 2.8347 in.)
5	72.0014 - 72.0050 mm (2.8347 - 2.8348 in.)

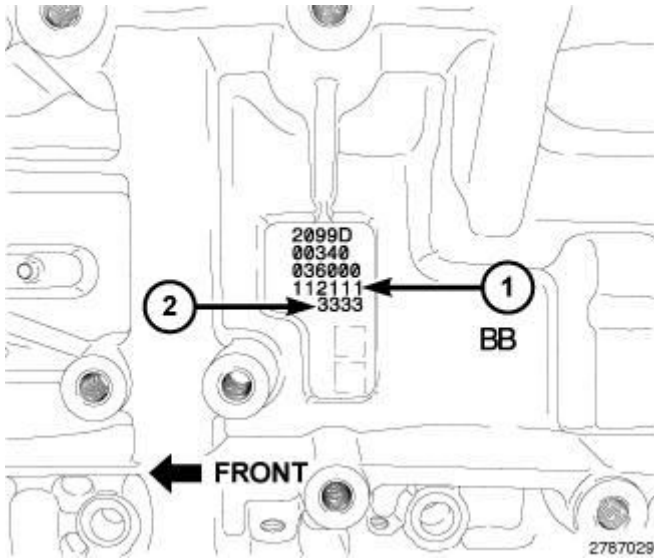


Fig. 335: Engine Block Main Bearing Journal Diameter Grade Markings
Courtesy of CHRYSLER GROUP, LLC

Engine block main bearing journal diameter grade markings (2) are stamped into the left side of the engine block. These marks are read from left to right, corresponding with journal number 1, 2, 3, 4.

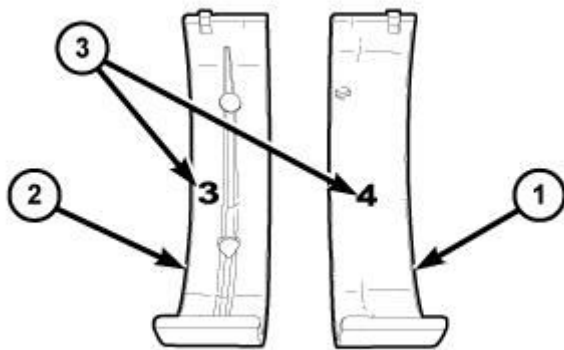
Engine block main bearing journal grade markings correspond to specific journal diameters. The chart below identifies the five engine block grade markings and their associated journal diameters.

Engine Block Marking	Journal Size mm (in.)
1	77.0055 - 77.0090 mm (3.0317 - 3.0318 in.)
2	77.0019 - 77.0054 mm (3.0316 - 3.0317 in.)
3	76.9983 - 77.0018 mm (3.0314 - 3.0316 in.)
4	76.9947 - 76.9982 mm (3.0313 - 3.0314 in.)
5	76.9910 - 76.9946 mm (3.0311 - 3.0313 in.)

For upper and lower main bearing selection, obtain the grade identification marks from the crankshaft and engine block. Main bearings are available in five sizes. Upper and lower sizes can be mixed on a journal in order to achieve the desired oil clearance. The chart below identifies the five sizes available and how they should be selected based on crankshaft and engine block grade markings.

Engine Block Marking	Crankshaft Marking				
	1	2	3	4	5
1	1/1	1/2	2/2	2/3	3/3
2	1/2	2/2	2/3	3/3	3/4
3	2/2	2/3	3/3	3/4	4/4
4	2/3	3/3	3/4	4/4	4/5
5	3/3	3/4	4/4	4/5	5/5
UPPER/LOWER Main Bearings to Achieve 0.024 - 0.050 mm (0.0009 - 0.0020)					

in.) Oil Clearance



2787936

Fig. 336: Main Bearing Inserts

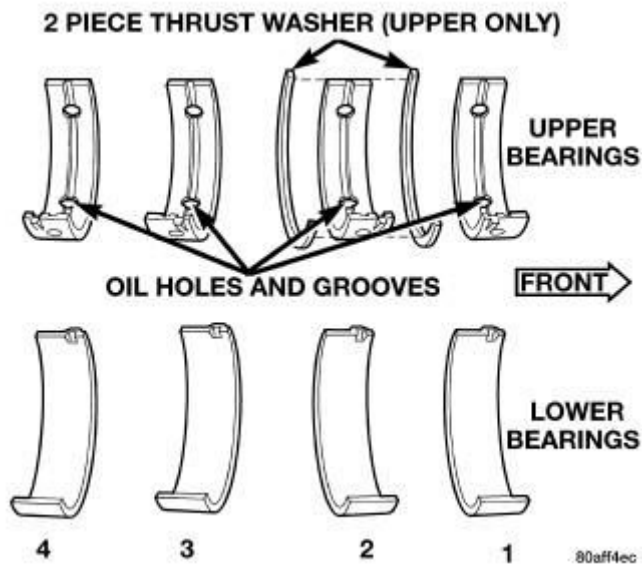
Courtesy of CHRYSLER GROUP, LLC

The upper main bearing shell (2) and lower main bearing shell (1) are marked with the bearing size (3) on the bearing lining surface. The upper and lower bearings are available in five different sizes and can be mixed on a journal in order to achieve the proper oil clearance.

Upper and lower main bearing shells are available in five sizes. The chart below identifies the five bearing sizes.

Bearing Marking	Size mm (in.)
1	2.4951 - 2.4987 mm (0.0982 - 0.0984 in.)
2	2.4915 - 2.4951 mm (0.0981 - 0.0982 in.)
3	2.4879 - 2.4915 mm (0.0979 - 0.0981 in.)
4	2.4843 - 2.4879 mm (0.0978 - 0.0979 in.)
5	2.4807 - 2.4843 mm (0.0977 - 0.0978 in.)

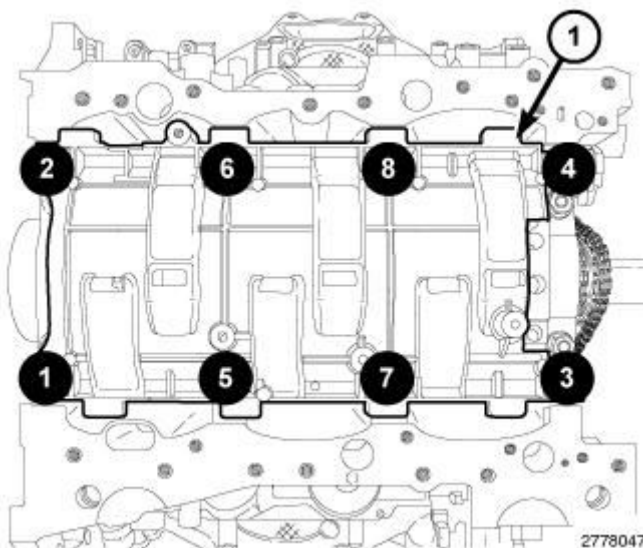
MAIN BEARING REPLACEMENT

**Fig. 337: Main Bearing Identification**

Courtesy of CHRYSLER GROUP, LLC

The main bearings are serviced in-vehicle. They must be replaced one-at-a-time in order to properly support the crankshaft. The upper and lower main bearing shells are NOT interchangeable. The upper and lower main bearings are "select fit" to achieve proper oil clearances. Refer to **BEARING(S), CRANKSHAFT, STANDARD PROCEDURE**.

1. Disconnect and isolate the negative battery cable.

**Fig. 338: Main Bearing Cap Bolts From Windage Tray Removal Sequence**

Courtesy of CHRYSLER GROUP, LLC

2. Remove the oil pan, oil pump pick-up and engine oil pump. Refer to **PUMP, ENGINE OIL,**

REMOVAL.

3. Remove the eight main bearing cap bolts from the windage tray in the sequence shown in illustration and remove the windage tray (1).

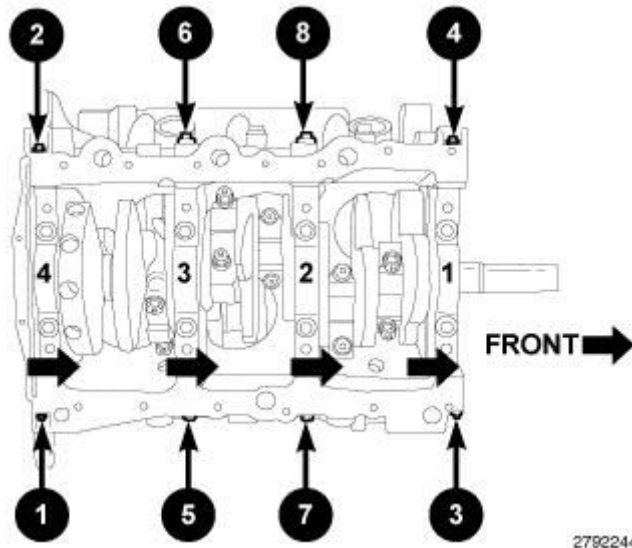


Fig. 339: Main Bearing Tie Bolts Removal Sequence
Courtesy of CHRYSLER GROUP, LLC

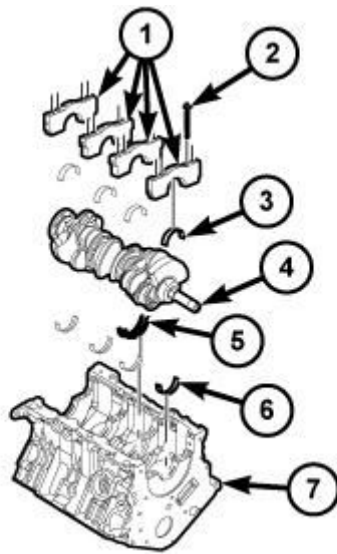
NOTE: Typical V6 engine configuration shown in illustration.

4. Remove the eight main bearing tie bolts in the sequence shown in illustration.

CAUTION: DO NOT use a number stamp or a punch to mark main bearing caps, as damage to main bearings could occur.

NOTE: Main bearing caps are not interchangeable and are marked to insure correct assembly.

5. Mark the main bearing cap positions using a permanent ink marker or a scribe tool.



NOTE: Typical V6 engine configuration shown in illustration.

CAUTION: Replace only one main bearing at a time while all other main bearing caps remain properly tightened. If all main bearing caps are removed, the weight of the unsupported crankshaft will damage the crankshaft oil seals.

NOTE: Replace the main bearings in the following order; 2, 3, 1, 4.

6. Remove the two cap bolts (2) and remove the main bearing cap (1).
7. When removing the No. 2 bearing cap, also remove the thrust washers (5).
8. Slide the upper main bearing half (6) out from between the crankshaft and the engine block.
9. Inspect the crankshaft and bearings for abnormal wear patterns, scoring, grooving, fatigue, pitting and for metal or other foreign material imbedded in the lining. Refer to **ENGINE BLOCK, INSPECTION** .
10. If required, check the crankshaft bearing clearances by the use of Plastigage or equivalent. Refer to **ENGINE BLOCK, INSPECTION** .
11. If required, select fit new main bearings to the engine block. Refer to **BEARING(S), CRANKSHAFT, STANDARD PROCEDURE** .
12. Lubricate the upper main bearing half (6) with clean engine oil and slide the bearing into position.

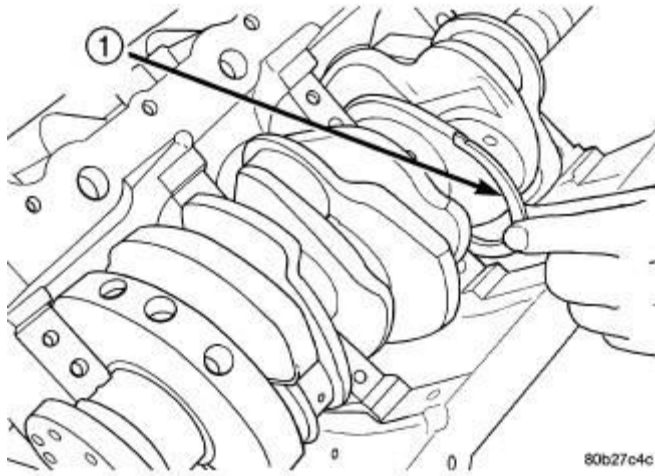


Fig. 341: Thrust Washer Installation
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical V6 engine configuration shown in illustration.

13. When installing the thrust washers (1) at the No. 2 main bearing location, use the following procedure:
 - a. Move the crankshaft forward to the limit of travel. Lubricate and install the front thrust washer (1) by rolling the washer onto the machined shelf between the No. 2 upper main bulk head and crankshaft thrust surface.
 - b. Move the crankshaft rearward to the limit of travel. Lubricate and install the rear thrust washer by rolling the washer onto the machined shelf between the No. 2 upper main bulk head and crankshaft thrust surface.

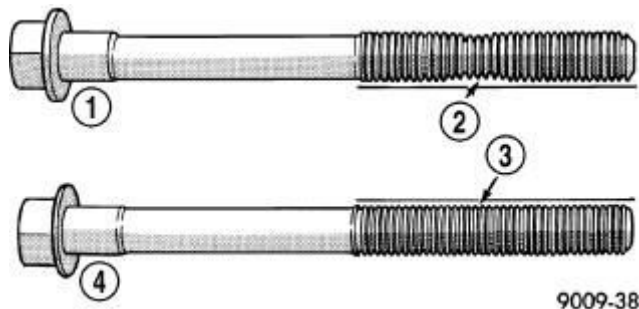


Fig. 342: Checking Cylinder Head Bolts For Stretching (Necking)
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The main bearing cap bolts are tightened using a torque plus angle procedure. The bolts must be examined **BEFORE** reuse. If the threads are necked down the bolts must be replaced.

14. Check the main bearing cap bolts for necking by holding a scale or straight edge against all of the threads. If all of the threads do not contact the scale (2) the bolt must be replaced.

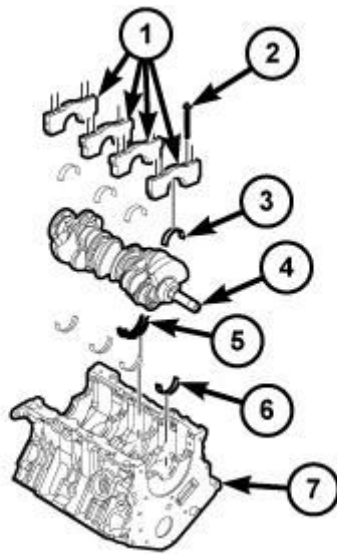


Fig. 343: Main Bearing Caps, Bolts, Crankshaft & Engine Block
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical V6 engine configuration shown in illustration.

15. Lubricate and install the lower bearing half (3) onto the main cap (1).
16. Install the main bearing cap (1) with two inner main bearing cap bolts (2). Tightened to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
17. Repeat the previous steps for main bearings 3, 1 and 4.
18. Measure crankshaft end play. Refer to **CRANKSHAFT, STANDARD PROCEDURE**.

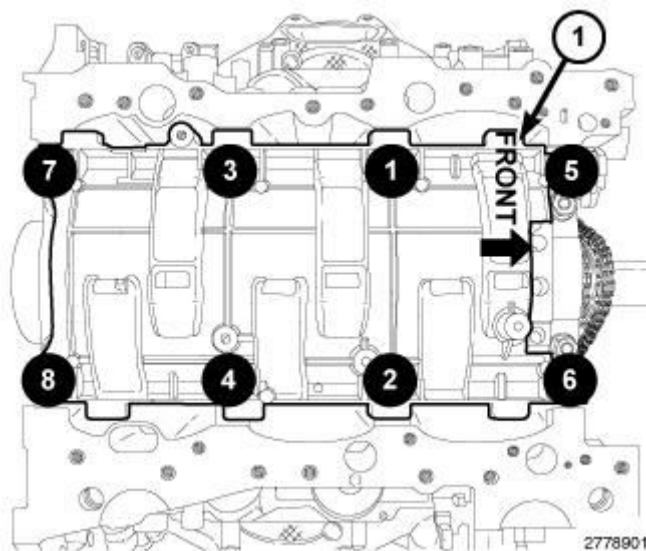


Fig. 344: Windage Tray With Main Bearing Cap Bolts Installation Sequence
 Courtesy of CHRYSLER GROUP, LLC

19. Position the windage tray on to the engine block.

20. Install the windage tray with eight main bearing cap bolts. Tighten the bolts in the sequence shown in illustration to the proper specification. Refer to **TORQUE SPECIFICATIONS** .

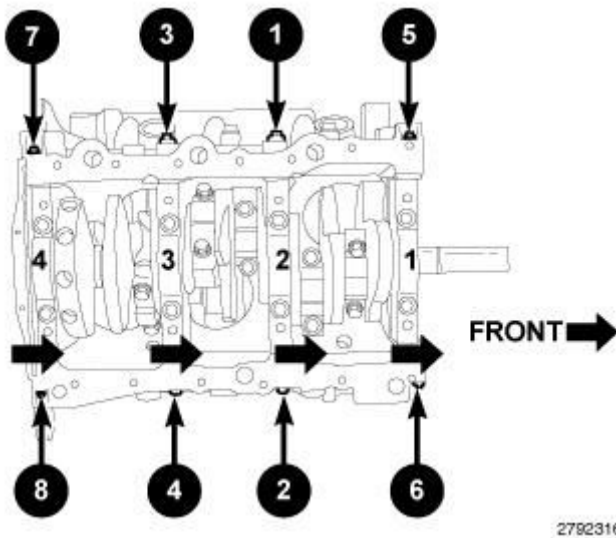


Fig. 345: Main Bearing Tie Bolts Installation Sequence
 Courtesy of CHRYSLER GROUP, LLC

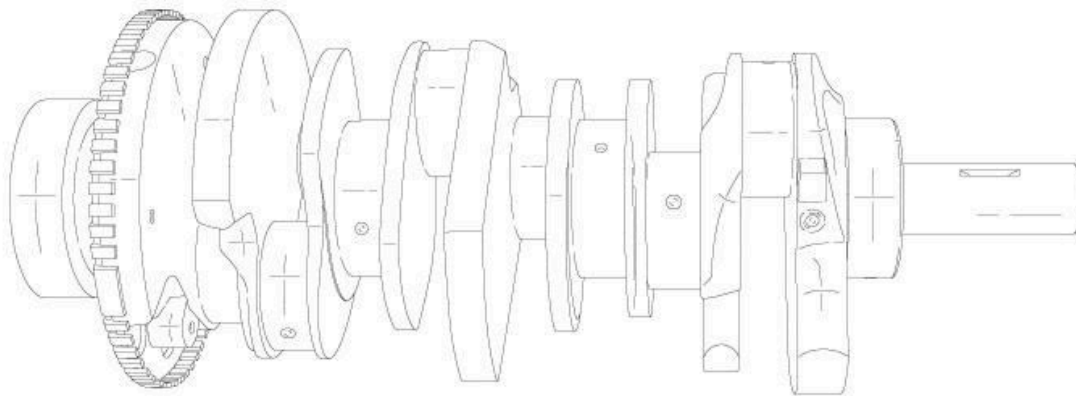
NOTE: Typical V6 engine configuration shown in illustration.

21. Install the eight main bearing tie bolts. Tighten the bolts in the sequence shown in illustration to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
22. Install the engine oil pump, oil pump pick-up and oil pan. Refer to **PUMP, ENGINE OIL, INSTALLATION** .
23. Install the spark plugs and ignition coils. Refer to **SPARK PLUG, INSTALLATION** .
24. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL, STANDARD PROCEDURE** .
25. Connect the negative battery cable and tighten nut to the proper specification. Refer to **SPECIFICATIONS** .
26. Operate the engine until it reaches normal operating temperature.

CRANKSHAFT

DESCRIPTION

DESCRIPTION



2824124

Fig. 346: Crankshaft**Courtesy of CHRYSLER GROUP, LLC**

The crankshaft is a cast design and is constructed using ductile iron. The crankshaft is a three throw split pin design with counterweights for balancing purposes. The main journals are cross drilled for rod bearing lubrication. The crankshaft is supported by four select fit main bearings with number 2 serving as the thrust washer location. The rear counterweight has provisions for crankshaft position sensor target wheel mounting. Both the front and rear seals are a single piece design and are mounted to the timing cover and cylinder block.

STANDARD PROCEDURE**STANDARD PROCEDURE - END PLAY**

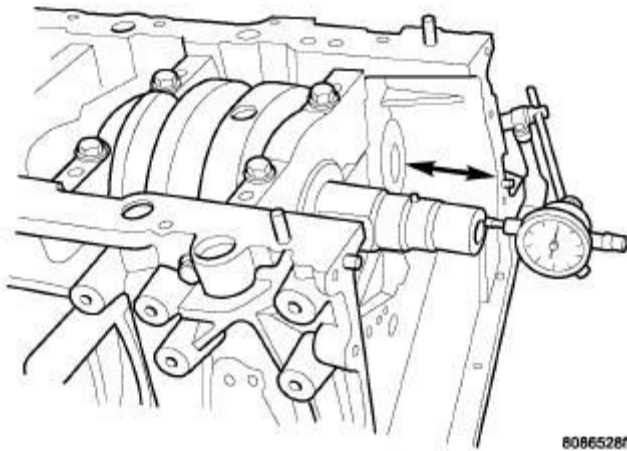


Fig. 347: Checking Crankshaft End Play
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical V6 engine shown in illustration.

1. Mount Dial Indicator Set (special tool #C-3339A, Set, Dial Indicator) to a stationary point at the front of the engine. Locate the probe perpendicular against the nose of the crankshaft.
2. Move the crankshaft all the way to the rear of its travel.
3. Zero the dial indicator.
4. Move the crankshaft forward to the limit of travel and read the dial indicator. Compare the measured end play to the specification. Refer to **ENGINE SPECIFICATIONS**.

NOTE: Crankshaft thrust washers are not selectable and are only available in a single thickness.

REMOVAL

REMOVAL

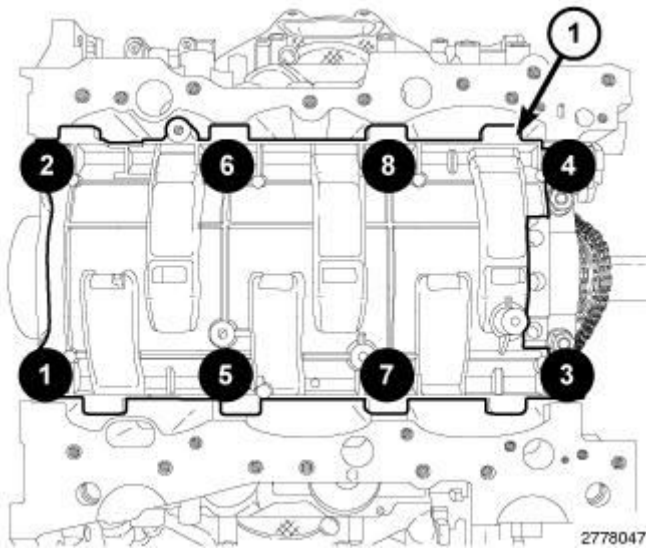
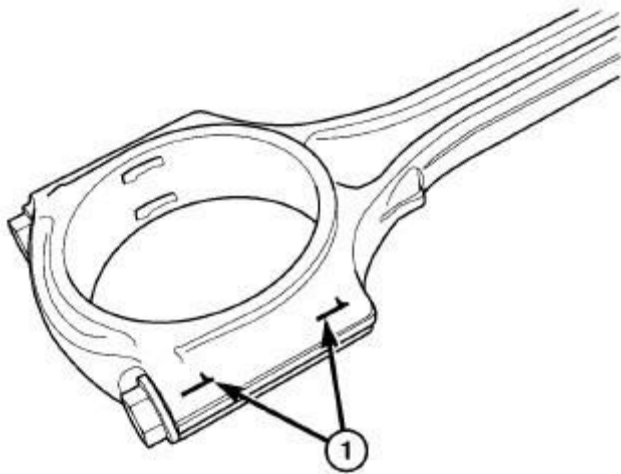


Fig. 348: Main Bearing Cap Bolts From Windage Tray Removal Sequence
 Courtesy of CHRYSLER GROUP, LLC

NOTE: To remove the crankshaft from the engine, the engine must be removed from the vehicle.

1. Remove the engine. Refer to **REMOVAL**.
2. Remove the cylinder head covers, spark plugs, oil pan, engine timing cover, timing chain and sprockets. Refer to **CHAIN AND SPROCKETS, TIMING, REMOVAL**.
3. Remove the flexplate and the rear crankshaft oil seal. Refer to **SEAL, CRANKSHAFT OIL, REAR, REMOVAL**.
4. Remove the oil pump pick-up and engine oil pump. Refer to **PUMP, ENGINE OIL, REMOVAL**.
5. Remove the eight main bearing cap bolts from the windage tray in the sequence shown in illustration and remove the windage tray (1).



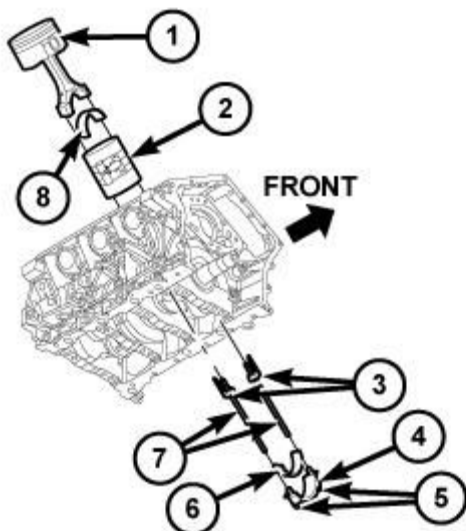
811318c8

Fig. 349: Connecting Rod To Cylinder Identification
Courtesy of CHRYSLER GROUP, LLC

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods or caps, as damage to connecting rods could occur

NOTE: Connecting rods and bearing caps are not interchangeable and should be marked before removing to ensure correct reassembly.

6. Mark connecting rod and bearing cap positions (1) using a permanent ink marker or scribe tool.



2778313

Fig. 350: Piston, Connecting Rod Cap, Bolts, Plastic Guide Plates & Guide Pins
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical V6 engine configuration shown in illustration.

CAUTION: Care must be taken not to damage the fractured rod and cap joint face surfaces, as engine damage may occur.

7. Remove the connecting rod cap bolts (5) and the connecting rod caps (4). Discard the cap bolts.
8. Remove the plastic guide plates (3) from the Guide Pins (special tool #8189, Guide Pins) (7) and install the Guide Pins to the connecting rod.

CAUTION: Care must be taken not to nick crankshaft journals, as engine damage may occur.

9. Push the connecting rod and piston into the cylinder until the connecting rod is clear of the crankshaft journal. Remove the guide pins. Repeat this procedure at each cylinder until all of the connecting rods are clear of the crankshaft.

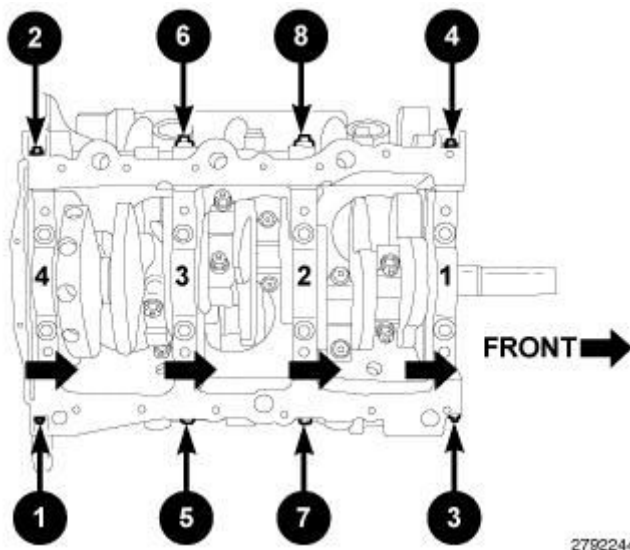


Fig. 351: Main Bearing Tie Bolts Removal Sequence
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical V6 engine configuration shown in illustration.

Remove the main bearing cross bolts in the sequence shown in illustration.

CAUTION: DO NOT use a number stamp or a punch to mark main bearing caps, as damage to main bearings could occur.

NOTE: Main bearing caps are not interchangeable and are marked to insure correct assembly.

10. Mark the main bearing cap positions using a permanent ink marker or a scribe tool.

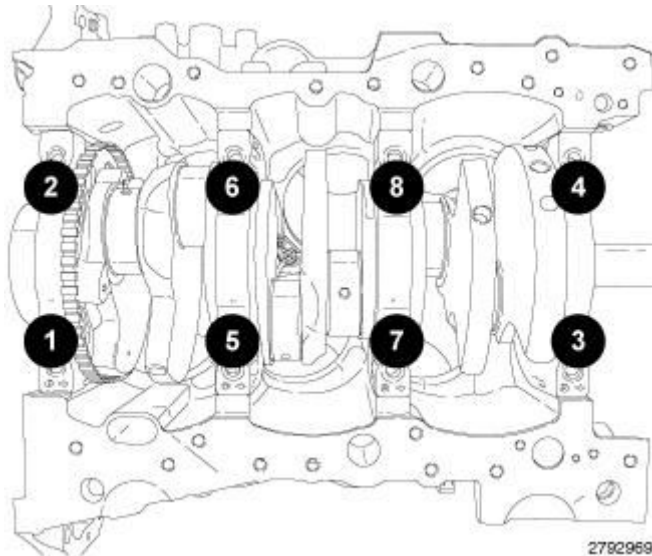


Fig. 352: Main Bearing Cap Bolts Removal Sequence
Courtesy of CHRYSLER GROUP, LLC

11. Remove the eight main bearing cap bolts in the sequence shown in illustration and remove the main bearing caps.

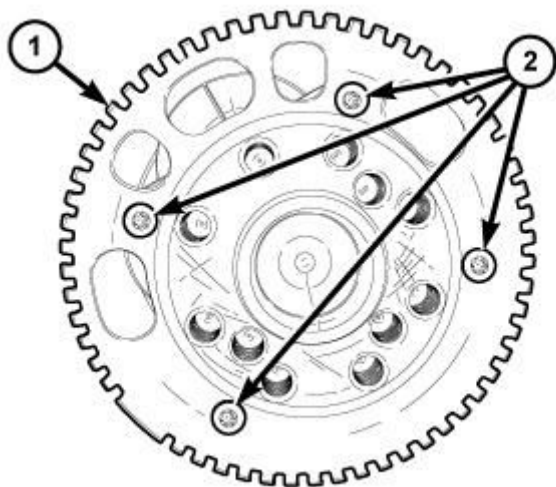


Fig. 353: Target Wheel & Bolts
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not rest the crankshaft on the target wheel (1). Damaged or bent

target wheel teeth will destroy the target wheels ability to correctly relay crankshaft position to the crankshaft position sensor.

12. Remove the crankshaft from the engine block.
13. If required, remove the four bolts (2) and the target wheel (1). Discard the four bolts.

INSPECTION

INSPECTION

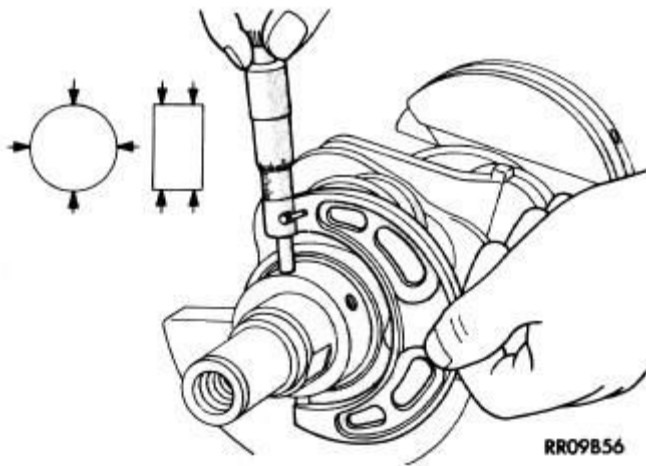


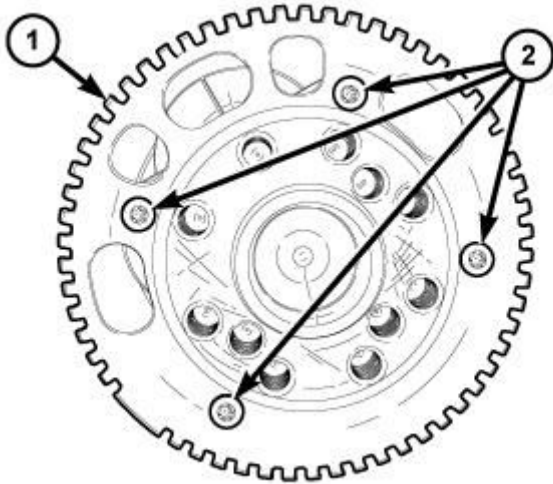
Fig. 354: Measuring Crankshaft Journal
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical crankshaft journal measurements shown in illustration.

1. Clean the oil off the bearing journals.
2. Determine the maximum diameter of the journals with a micrometer. Measure at two locations 90° apart at each end of the journals.
3. Compare the measured rod journal diameter to the crankshaft connecting rod bearing journal diameter grade marking chart. Refer to **BEARING(S), CONNECTING ROD, STANDARD PROCEDURE**. Select the bearing size that corresponds to the crankshaft markings for each rod bearing journal that will provide the proper oil clearance.
4. Compare the measured main bearing journal diameter to the crankshaft main bearing journal diameter grade marking chart. Refer to **BEARING(S), CRANKSHAFT, STANDARD PROCEDURE**. Obtain the main bearing journal grade identification marks from the engine block and select the upper and lower main bearing sizes that will provide the proper oil clearance.
5. For connecting rod journals, verify that the maximum taper and maximum out of round are within specifications. Refer to **ENGINE SPECIFICATIONS**.
6. For main bearing journals, verify that the maximum taper and maximum out of round are within specifications. Refer to **ENGINE SPECIFICATIONS**.

INSTALLATION

INSTALLATION

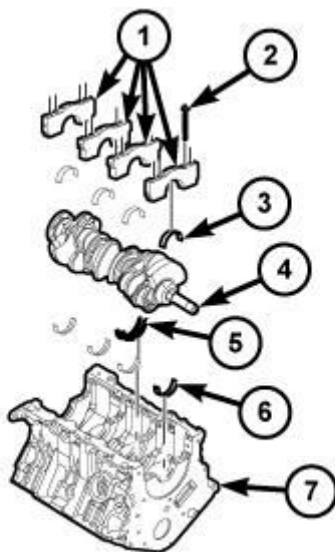


2792895

Fig. 355: Target Wheel & Bolts

Courtesy of CHRYSLER GROUP, LLC

1. If required, select and fit new crankshaft main bearings to the engine block. Refer to **BEARING(S), CRANKSHAFT, STANDARD PROCEDURE** .
2. If required, select and fit new bearings to the connecting rod. Refer to **BEARING(S), CONNECTING ROD, STANDARD PROCEDURE** .
3. If removed, install the target wheel (1) to the crankshaft with four new bolts (2). Ensure the threaded holes in the crankshaft are free of residual thread lock adhesive. Tighten the bolts to the proper specification. Refer to **TORQUE SPECIFICATIONS** .



2792286

Fig. 356: Main Bearing Caps, Bolts, Crankshaft & Engine Block

Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical V6 engine configuration shown in illustration.

4. If removed, lubricate and install the upper main bearing halves (6) into the engine block (7).

CAUTION: When installing the crankshaft, use care not to damage bearing surfaces on the crankshaft.

5. Install the crankshaft (4) into the engine block (7).

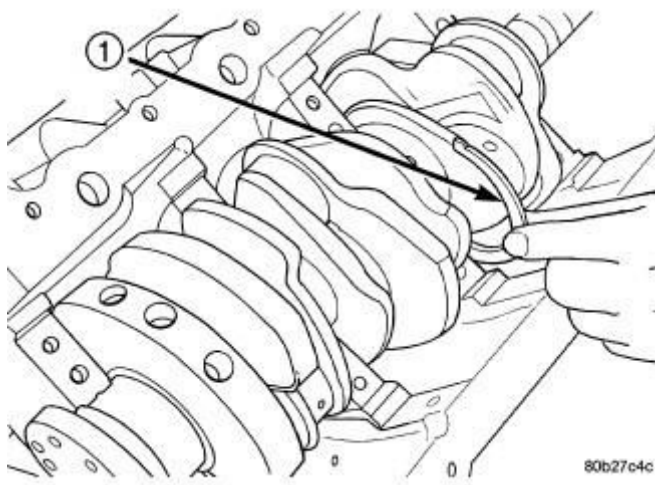


Fig. 357: Thrust Washer Installation
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical V6 engine configuration shown in illustration.

6. Installing thrust washers (1) at the No. 2 main bearing location, using the following procedure:
 - a. Move the crankshaft forward to the limit of travel. Lubricate and install the front thrust washer (1) by rolling the washer onto the machined shelf between the No. 2 upper main bulk head and crankshaft thrust surface.
 - b. Move the crankshaft rearward to the limit of travel. Lubricate and install the rear thrust washer by rolling the washer onto the machined shelf between the No. 2 upper main bulk head and crankshaft thrust surface.

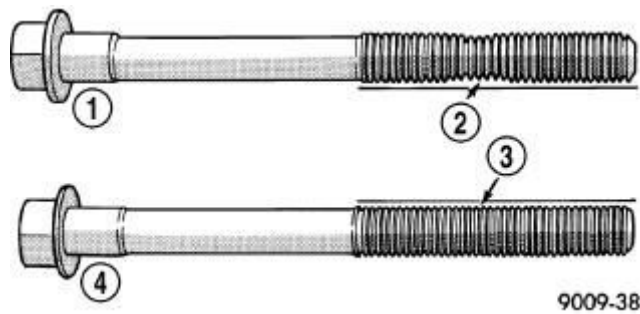


Fig. 358: Checking Cylinder Head Bolts For Stretching (Necking)
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The main bearing cap bolts are tightened using a torque plus angle procedure. The bolts must be examined **BEFORE** reuse. If the threads are necked down the bolts must be replaced.

7. Check the main bearing cap bolts for necking by holding a scale or straight edge against the threads. If all the threads do not contact the scale (2) the bolt must be replaced.

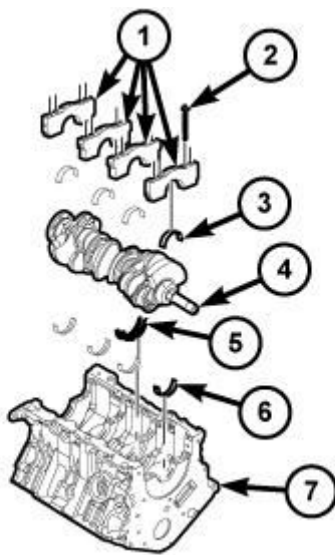


Fig. 359: Main Bearing Caps, Bolts, Crankshaft & Engine Block
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical V6 engine configuration shown in illustration.

8. If removed, lubricate and install the lower main bearing halves (3) onto the main caps (1).
9. Install the main bearing caps (1) with two inner main bearing cap bolts (2).

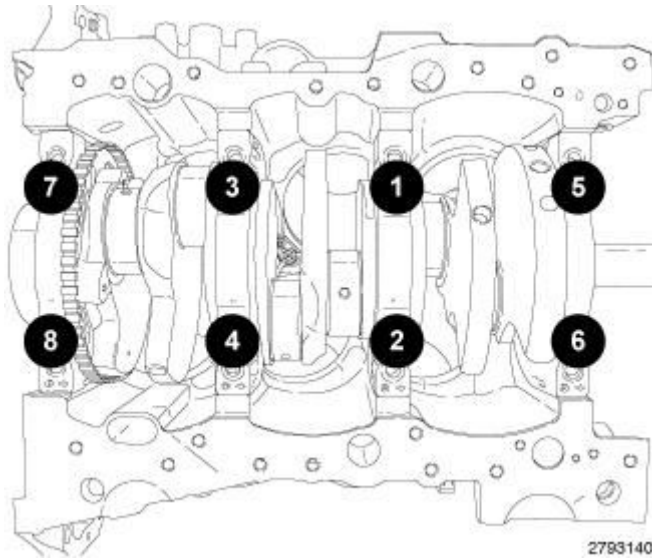


Fig. 360: Inner Main Bearing Cap Bolts Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

10. Tighten the inner main bearing cap bolts in the sequence shown in illustration to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
11. Measure crankshaft end play. Refer to **CRANKSHAFT, STANDARD PROCEDURE**.

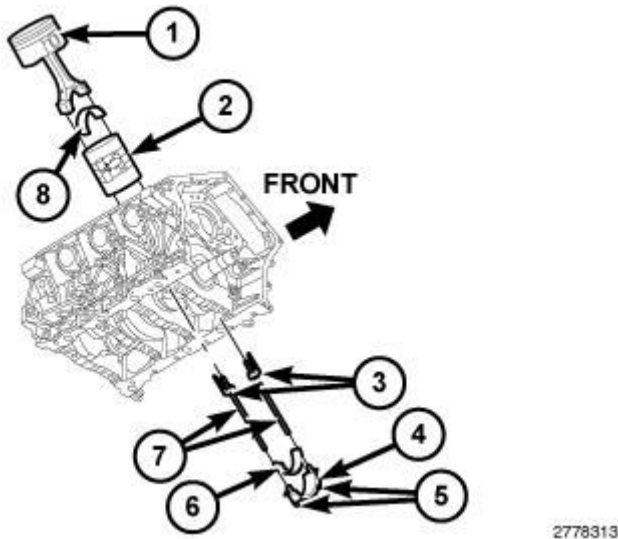


Fig. 361: Piston, Connecting Rod Cap, Bolts, Plastic Guide Plates & Guide Pins
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical V6 engine configuration shown in illustration.

12. If removed, install the bearing shell (8) on the connecting rod with the tang inserted into the machined groove in the rod. Lubricate the bearing surface with clean engine oil.
13. Remove the plastic guide plates (3) from the Guide Pins (special tool #8189, Guide Pins) (7) and install

the Guide Pins to the connecting rod.

CAUTION: Care must be taken not to nick crankshaft journals, as engine damage may occur.

14. Pull the connecting rod and piston toward the crankshaft until the connecting rod is seated on the crankshaft journal. Remove the guide pins.

CAUTION: The connecting rod bolts must not be reused. Always replace the connecting rod bolts whenever they are loosened or removed.

15. If removed, install the bearing shell (6) on the connecting rod cap (4) with the tang inserted into the machined groove in the cap. Lubricate the bearing surface with clean engine oil.

NOTE: Do not lubricate the threads of the connecting rod cap bolts (5).

16. Install the connecting rod cap and bearing with the tang on the same side as the rod. Tighten the **NEW** connecting rod cap bolts (5) to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
- 17.
18. If required, check the connecting rod side clearance. Refer to **ROD, PISTON AND CONNECTING, STANDARD PROCEDURE**.
19. Repeat the previous steps for the remaining connecting rods.

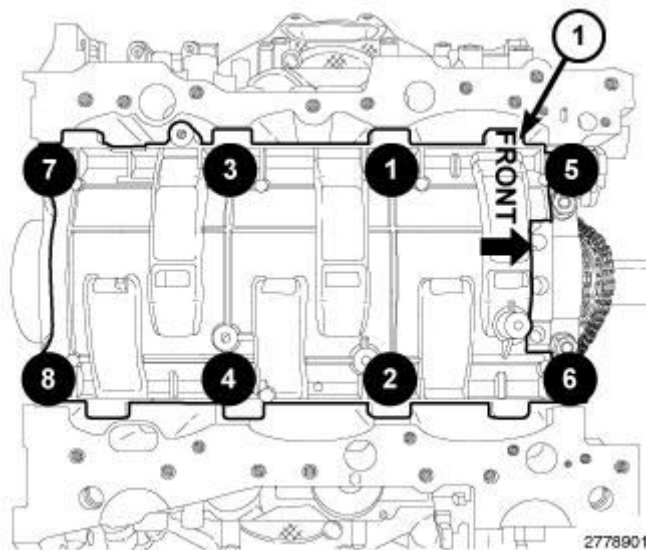


Fig. 362: Windage Tray With Main Bearing Cap Bolts Installation Sequence
Courtesy of CHRYSLER GROUP, LLC

20. Install the windage tray (1) with eight main bearing cap bolts. Tighten the bolts in the sequence shown in illustration to the proper specification. Refer to **TORQUE SPECIFICATIONS**.

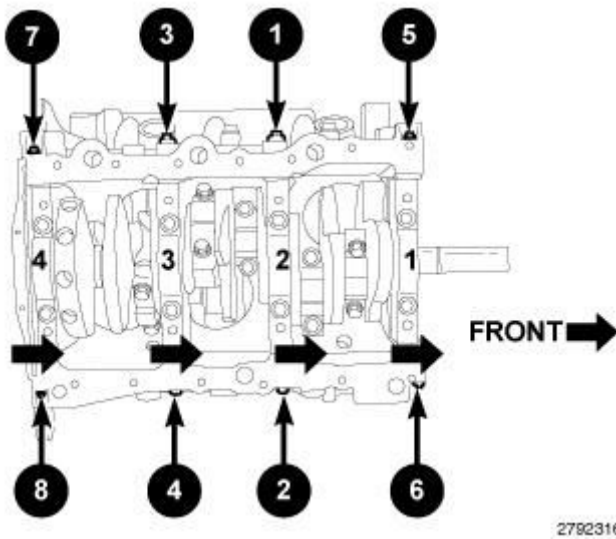


Fig. 363: Main Bearing Tie Bolts Installation Sequence
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical V6 engine configuration shown in illustration.

21. Install the eight main bearing tie bolts. Tighten the bolts in the sequence shown in illustration to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
22. Install the engine oil pump and oil pump pick-up. Refer to **PUMP, ENGINE OIL, INSTALLATION**.
23. Install the rear crankshaft oil seal and flexplate. Refer to **SEAL, CRANKSHAFT OIL, REAR, INSTALLATION**.
24. Install the timing chain and sprockets, engine timing cover, oil pans, spark plugs and cylinder head covers. Refer to **CHAIN AND SPROCKETS, TIMING, INSTALLATION**.
25. Install the engine. Refer to **INSTALLATION**.
26. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL, STANDARD PROCEDURE** .
27. Connect the negative battery cable and tighten nut to the proper specification. Refer to **SPECIFICATIONS** .
28. Fill the cooling system. Refer to **STANDARD PROCEDURE** .
29. Operate the engine until it reaches normal operating temperature. Check cooling system for correct fluid level. Refer to **STANDARD PROCEDURE** .

NOTE: The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components.

DAMPER, VIBRATION

REMOVAL

REMOVAL

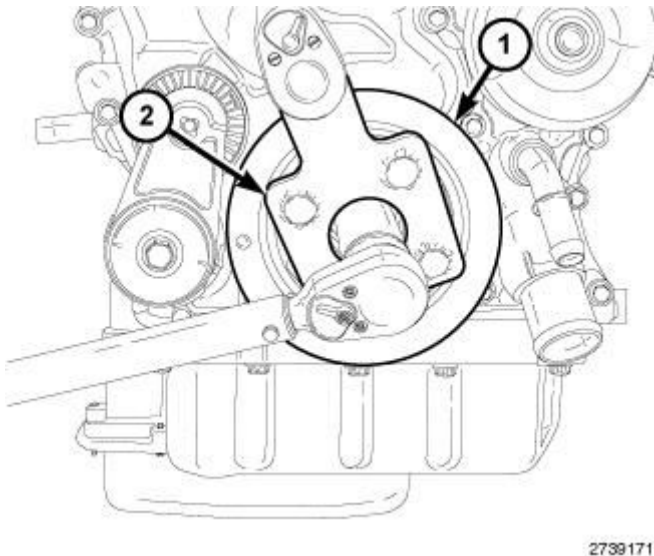


Fig. 364: Crankshaft Vibration Damper & Vibration Damper Holder
Courtesy of CHRYSLER GROUP, LLC

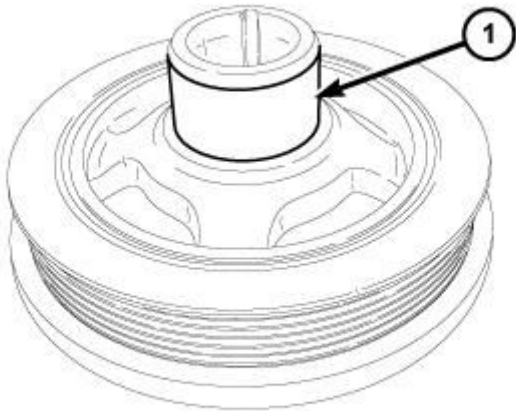
1. Remove the accessory drive belt. Refer to **BELT, SERPENTINE, REMOVAL** .

NOTE: **A force greater than 350 N.m (260 ft. lbs.) may be required to remove the crankshaft vibration damper bolt.**

2. Hold the crankshaft vibration damper (1) with Vibration Damper Holder (special tool #10198, Holder, Vibration Damper) (2) and remove the crankshaft vibration damper bolt.
3. Pull the crankshaft vibration damper (1) off of the crankshaft.

INSTALLATION

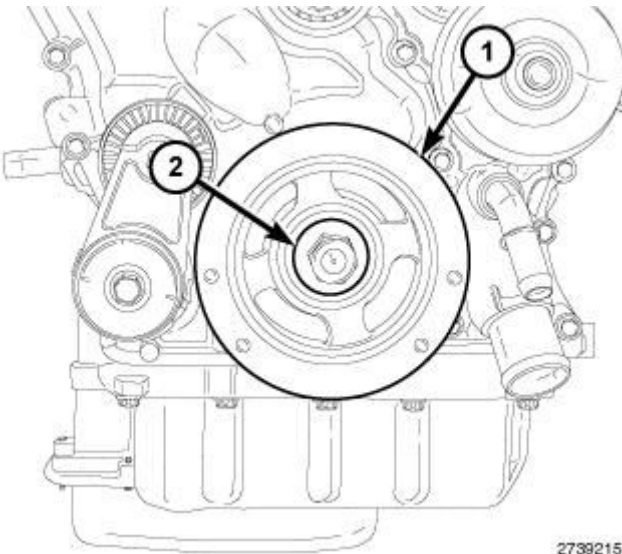
INSTALLATION



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Fig. 365: Front Crankshaft Seal Surface
Courtesy of CHRYSLER GROUP, LLC

1. Apply a light coating of engine oil to the front crankshaft seal surface (1).



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Fig. 366: Crankshaft Vibration Damper & Bolt
Courtesy of CHRYSLER GROUP, LLC

2. Align the crankshaft vibration damper (1) to the flywheel key on the crankshaft and install the damper. Seat the damper on the crankshaft sprocket.
3. Install and hand tighten the crankshaft vibration damper bolt (2).

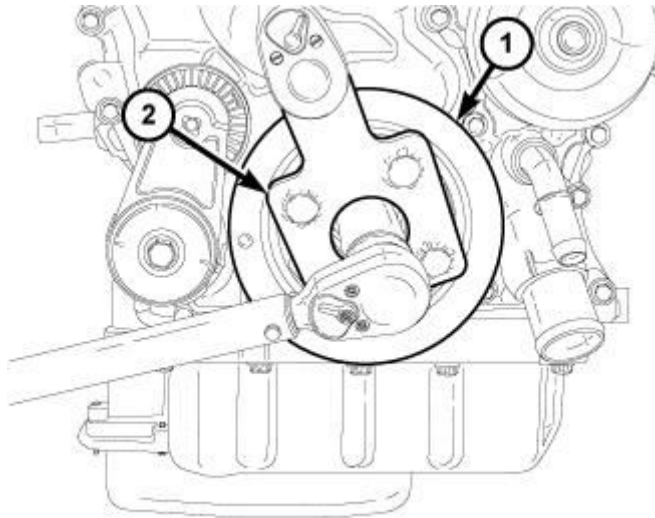


Fig. 367: Crankshaft Vibration Damper & Vibration Damper Holder
 Courtesy of CHRYSLER GROUP, LLC

4. Hold the crankshaft vibration damper (1) with Vibration Damper Holder (special tool #10198, Holder, Vibration Damper) (2) and tighten the crankshaft vibration damper bolt to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
5. Install the accessory drive belt. Refer to **BELT, SERPENTINE, INSTALLATION** .

FLEXPLATE

REMOVAL

REMOVAL

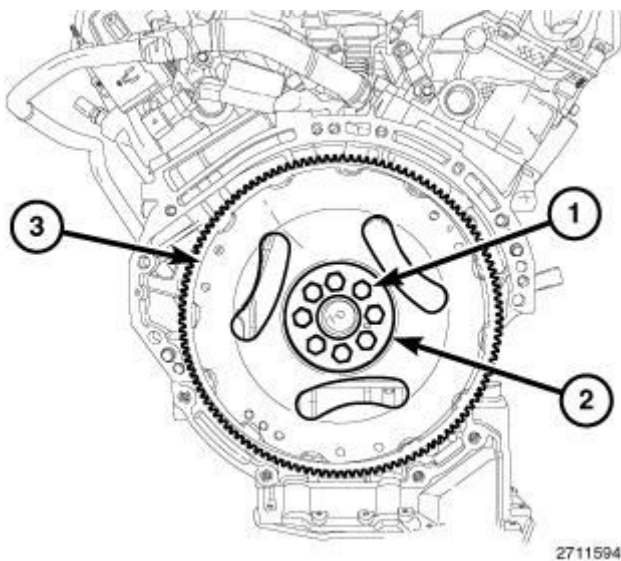


Fig. 368: Flexplate, Spacer Plate & Bolts
 Courtesy of CHRYSLER GROUP, LLC

1. Remove the transmission. Refer to **REMOVAL** .
2. Remove the bolts (1) that secure the flexplate to the crankshaft.
3. Remove the flexplate (3).

INSTALLATION

INSTALLATION

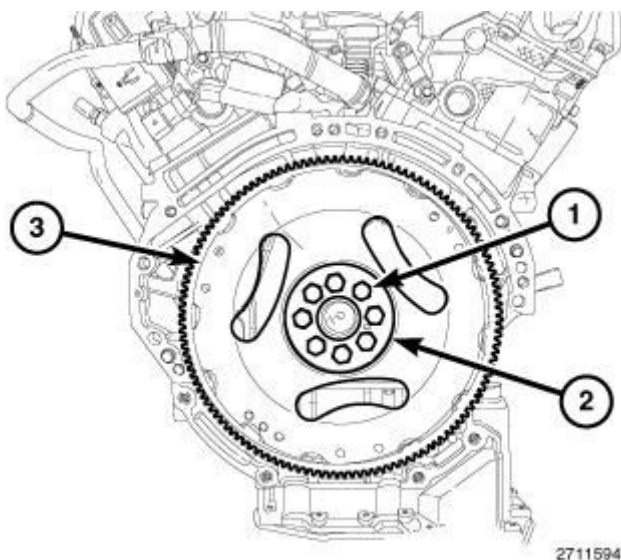


Fig. 369: Flexplate, Spacer Plate & Bolts
 Courtesy of CHRYSLER GROUP, LLC

1. Position the flexplate (3) onto the crankshaft.
2. Install the bolts (1) hand tight.
3. Tighten the flexplate retaining bolts to the proper specification in a criss-cross pattern. Refer to **TORQUE SPECIFICATIONS** .
4. Install the transmission. Refer to **INSTALLATION** .

RING(S), PISTON

STANDARD PROCEDURE

STANDARD PROCEDURE-PISTON RING FITTING

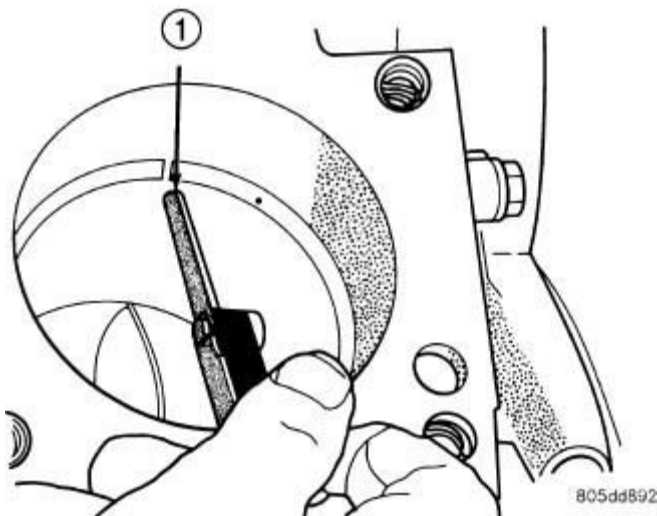


Fig. 370: Measuring Piston Ring End Gap
Courtesy of CHRYSLER GROUP, LLC

1. Wipe the cylinder bore clean.
2. Using a piston, to ensure that the ring is squared in the cylinder bore, slide the ring downward into the cylinder to a position 12 mm (0.50 in.) from the bottom of the cylinder bore.
3. Using a feeler gauge (1), check the ring end gap. Replace any rings not within specification.

Ring Position	Ring End Gap
No. 1 (top) Ring	0.22 - 0.37 mm (0.009 - 0.015 in.)
No. 2 (center) Ring	0.27 - 0.42 mm (0.011 - 0.017 in.)
Oil Control Ring (Steel Rail)	0.15 - 0.66 mm (0.006- 0.26 in.)

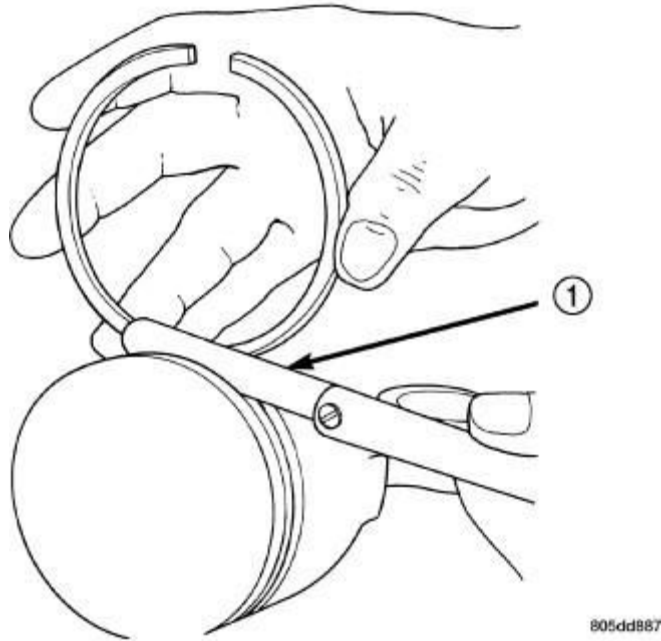


Fig. 371: Checking Piston Ring Grooves Clearances
Courtesy of CHRYSLER GROUP, LLC

4. Clean the piston ring grooves. Remove any nicks or burrs.
5. Measure the ring side clearance as shown in illustration. Make sure the feeler gauge (1) fits snugly between the ring land and the ring. Replace any ring not within specification.

Ring Position	Ring Side Clearance
No. 1 (top) Ring	0.025 - 0.033 mm (0.0010 - 0.0013 in.)
No. 2 (center) Ring	0.030 - 0.078 mm (0.0012 - 0.0031 in.)
Oil Control Ring (Steel Rails)	0.007 - 0.173 mm (.0003 - 0.0068 in.)

REMOVAL

REMOVAL

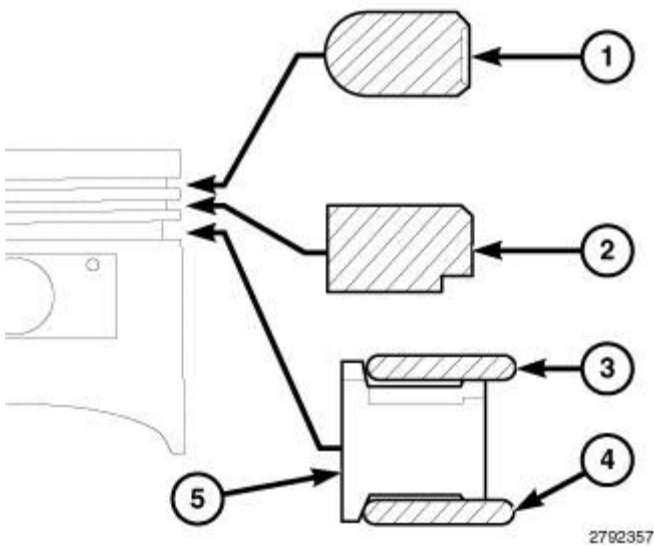


Fig. 372: Piston Ring Removal/Installation Sequence
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical piston shown in illustration.

1. Remove the piston and connecting rod(s). Refer to **ROD, PISTON AND CONNECTING, REMOVAL**.

CAUTION: To avoid damage to the piston rings, they must be removed in the following order:

- No. 1 (upper) piston ring (1)
- No. 2 (intermediate) piston ring (2)
- Oil ring upper side rail (3)
- Oil ring lower side rail (4)
- Oil ring expander (5)

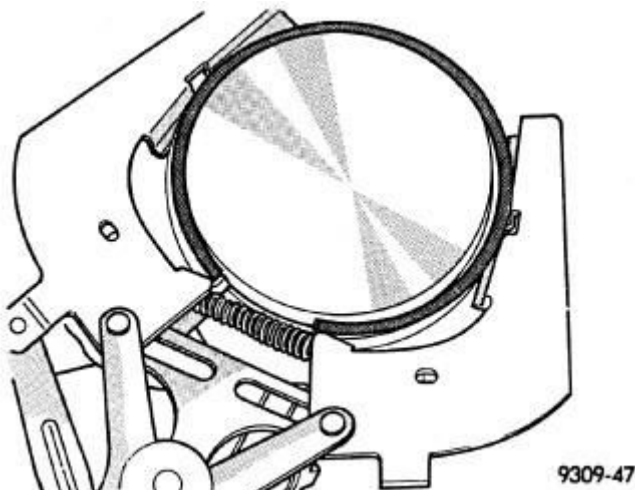


Fig. 373: Removing/Installing Upper & Intermediate Rings
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical piston shown in illustration.

2. Remove the No. 1 (upper) piston ring using a ring expander tool.
3. Remove the No. 2 (intermediate) piston ring using a ring expander tool.



Fig. 374: Removing/Installing Piston Ring Side Rail
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical piston shown in illustration. Do not use a piston ring expander to remove the oil ring side rails.

4. Remove the oil ring upper side rail.
5. Remove the oil ring lower side rail.
6. Remove the oil ring expander (1).

INSTALLATION

INSTALLATION

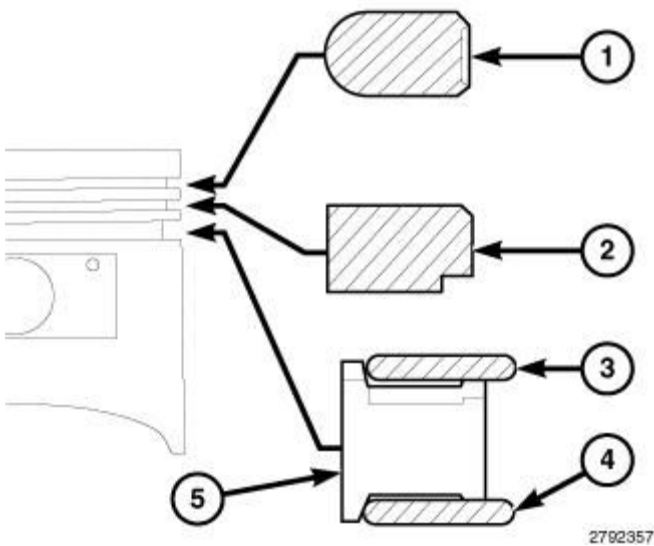


Fig. 375: Piston Ring Removal/Installation Sequence
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical piston shown in illustration.

1. If required, fit new rings to the piston. Refer to **RING(S), PISTON, STANDARD PROCEDURE**.

CAUTION: To avoid damage to the piston rings, they must be installed in the following order:

- Oil ring expander (5)
- Oil ring lower side rail (4)
- Oil ring upper side rail (3)
- No. 2 (intermediate) piston ring (2)
- No. 1 (upper) piston ring (1)

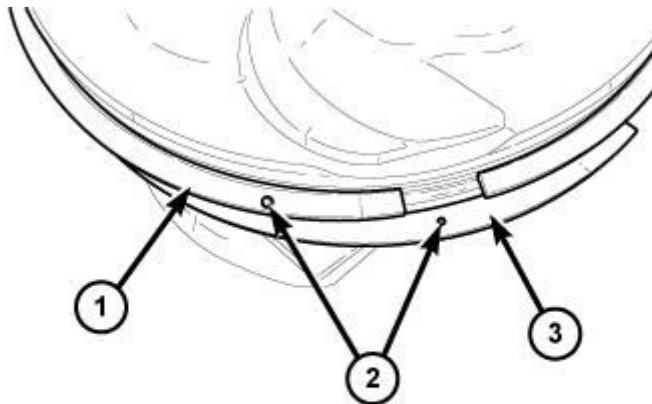


Fig. 376: Removing/Installing Piston Ring Side Rail

Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical piston shown in illustration. Do not use a piston ring expander to install the oil ring side rails.

2. Install the oil ring expander (1).
3. Install the oil ring lower side rail by placing one end between the piston ring groove and the oil ring expander. Hold this end firmly and press down the portion to be installed until the side rail is in position.
4. Install the oil ring upper side rail in the same manner as the lower side rail.



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Fig. 377: Dot Marks On Piston Rings

Courtesy of CHRYSLER GROUP, LLC

NOTE: The No. 1 (upper) piston ring (1) and No. 2 (intermediate) piston ring (3) have a different cross section. Install the rings with manufacturers I.D. mark (dot) (2) facing up, towards the top of the piston.

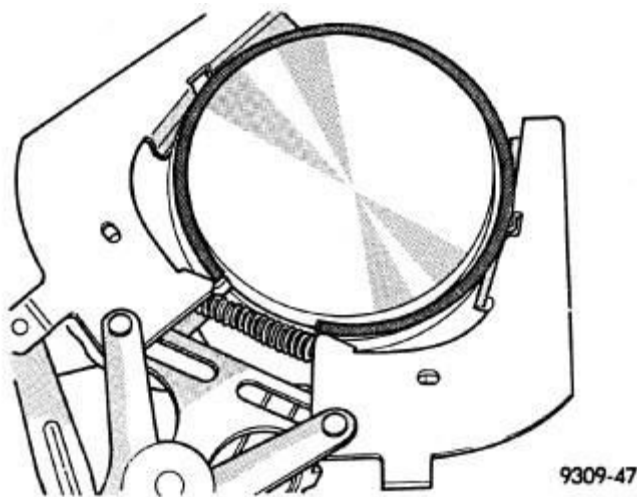


Fig. 378: Removing/Installing Upper & Intermediate Rings
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical piston shown in illustration.

5. Install the No. 2 (intermediate) piston ring using a ring expander tool.
6. Install the No. 1 (upper) piston ring using a ring expander tool.
7. Rotate the rings around the piston, the rings must rotate in the grooves with out binding.

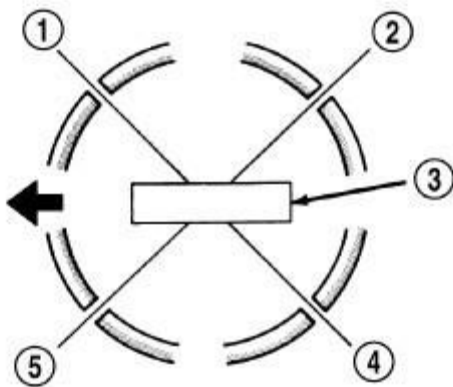


Fig. 379: Piston Ring End Gap Position
 Courtesy of CHRYSLER GROUP, LLC

8. Position the piston ring end gaps as follows:
 - Oil ring expander gap (5)
 - Oil ring lower side rail end gap (4)
 - Oil ring upper side rail end gap (1)
 - No. 2 (intermediate) ring end gap (5)

- No. 1 (upper) ring end gap (2)
9. Install the piston and connecting rod(s). Refer to **ROD, PISTON AND CONNECTING, INSTALLATION**.

ROD, PISTON AND CONNECTING**DESCRIPTION****DESCRIPTION**

0911009495

Fig. 380: Piston & Connecting Rod
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not use a metal stamp to mark connecting rods as damage may result, instead use ink or a scratch awl.

The pistons are a lightweight design with ultra low tension piston rings for improved fuel economy. The pistons are made of a high strength aluminum alloy and the piston skirt has a Moly® coating. The top piston ring land has an anodized coating for improved wear. The piston is connected to the rod using a full floating pin with two locking clips. The connecting rod is forged steel with a bolted cracked cap design. The connecting rod bolts are not reusable. Pistons are available in two different diameters with grade markings for each bore indicated on the side of the cylinder block. The upper compression ring is a 1.2 mm steel ring with a spray coating. The intermediate compression ring is 1.2 mm micro Napier design. Both compression rings have a dot or a mark on the piston ring. The marked side of the ring must face the top of the piston. The 2 mm three piece oil control ring is very thin. These are chrome plated rings and have a stainless steel expander.



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Fig. 381: Piston Components

Courtesy of CHRYSLER GROUP, LLC

- 1 - Head
- 2 - Valve Relief
- 3 - Upper or Top Land
- 4 - Second Land
- 5 - Third Land
- 6 - Moly® Coating
- 7 - Wrist Pin
- 8 - Locking Ring
- 9 - Skirt
- 10 - Oil Ring
- 11 - Secondary Compression Ring
- 12 - Top Compressor Ring

STANDARD PROCEDURE

PISTON FITTING

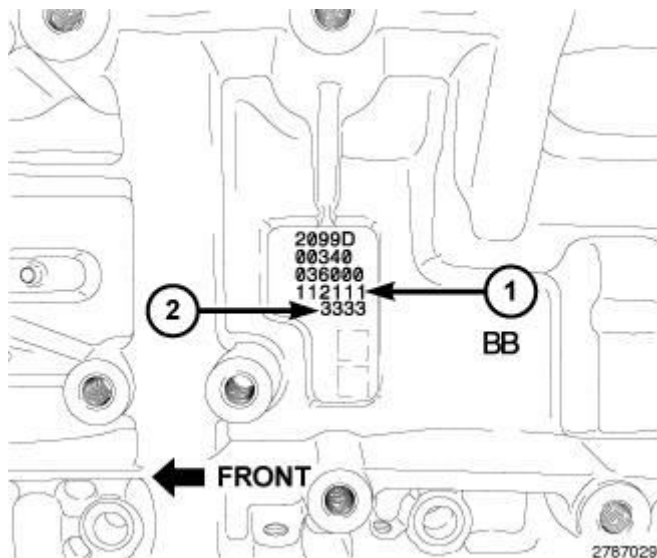


Fig. 382: Engine Block Main Bearing Journal Diameter Grade Markings
 Courtesy of CHRYSLER GROUP, LLC

The pistons are "select fit" to achieve proper oil clearance. Engine block cylinder bore diameter grade markings (1) are stamped into the left side of the engine block. These marks are read from left to right, corresponding with cylinder number 1, 2, 3, 4, 5, 6.

Engine block cylinder bore diameter grade markings correspond to specific cylinder bore diameters. The chart below identifies the two engine block grade markings and their associated cylinder bore diameters.

Engine Block Marking	Cylinder Bore Size mm (in.)
1	90.995 ± 0.005 mm (3.58248 ± 0.0002 in.)
2	91.005 ± 0.005 mm (3.58287 ± 0.0002 in.)

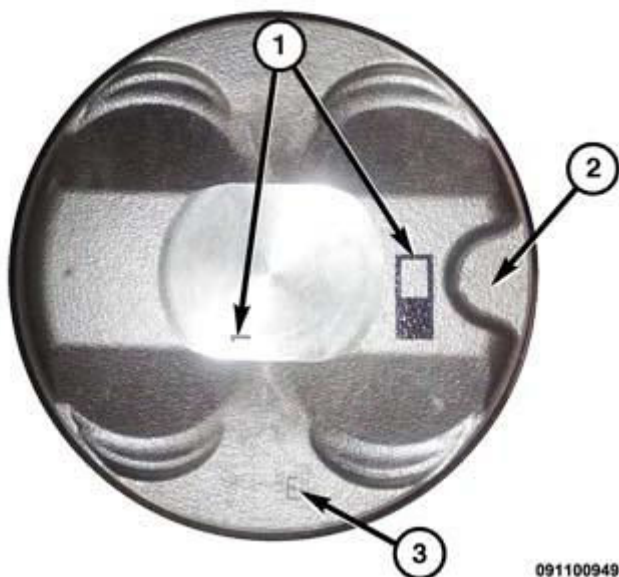


Fig. 383: Piston Markings

Courtesy of CHRYSLER GROUP, LLC

The piston is marked with the piston size (1) on the piston crown. The pistons are available in two different sizes in order to achieve the desired oil clearance. Select the piston size that corresponds to the engine block cylinder bore diameter grade markings for each cylinder.

The chart below identifies the two piston sizes.

Piston Marking	Size mm (in.)	
	Metal to Metal	Metal to Coating
1	90.995 ± 0.005 mm (3.7793 ± 0.0002 in.)	90.970 - 91.000 mm (3.7783 - 3.7795 in.)
2	90.965 ± 0.005 mm (3.7781 ± 0.0002 in.)	90.980 - 91.010 mm (3.7787 - 3.7835 in.)



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Fig. 384: Piston Components

Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical coated piston shown in illustration.

The coated pistons are serviced with the piston pin and connecting rod pre-assembled. The coating material (6) is applied to the piston after the final piston machining process. Piston installation into the cylinder bore requires slightly more pressure than that required for non-coated pistons. The bonded coating on the piston will give the appearance of a line-to-line fit with the cylinder bore.

CONNECTING ROD SIDE CLEARANCE

DIAL INDICATOR

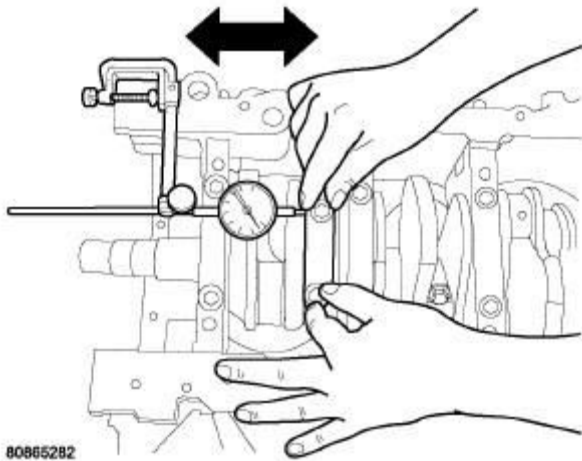


Fig. 385: Measuring Connecting Rod Side Clearance
 Courtesy of CHRYSLER GROUP, LLC

1. Mount Dial Indicator Set (special tool #C-3339A, Set, Dial Indicator) to a stationary point on the engine. Locate the probe perpendicular to and resting against the connecting rod cap being checked.
2. Move the connecting rod all the way to the rear of its travel.
3. Zero the dial indicator.
4. Move the connecting rod forward to the limit of travel and read the dial indicator. Compare the measured side clearance to the proper specification. Refer to **ENGINE SPECIFICATIONS**.
5. Repeat this procedure for each connecting rod. Rotate the crankshaft for connecting rod accessibility.

FEELER GAUGE

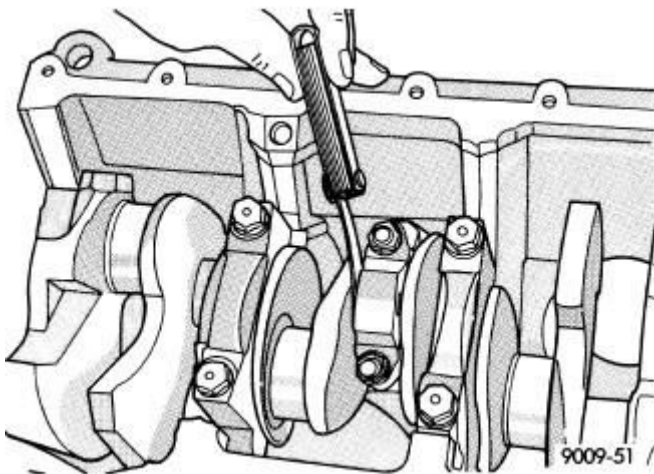


Fig. 386: Measuring Gap Between Connecting Rod & Crankshaft Journal Flange
 Courtesy of CHRYSLER GROUP, LLC

1. Slide a snug-fitting feeler gauge between the connecting rod and crankshaft journal flange. Compare the measured side clearance to the proper specification. Refer to **ENGINE SPECIFICATIONS**.
2. Repeat this procedure for each connecting rod. Rotate the crankshaft for connecting rod accessibility.

REMOVAL

REMOVAL

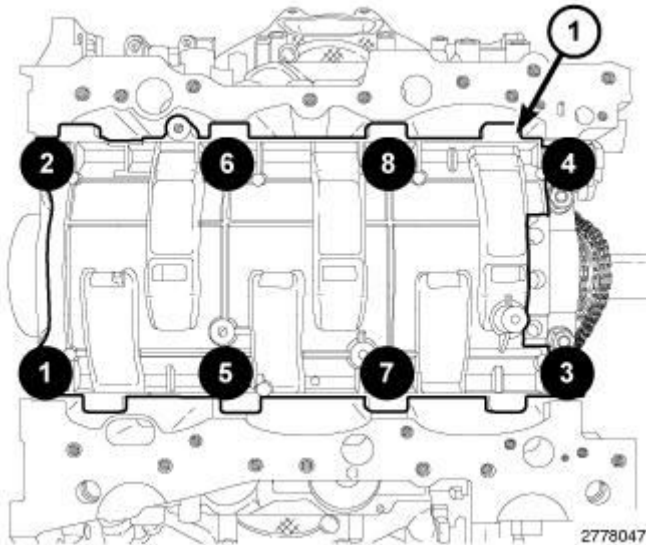
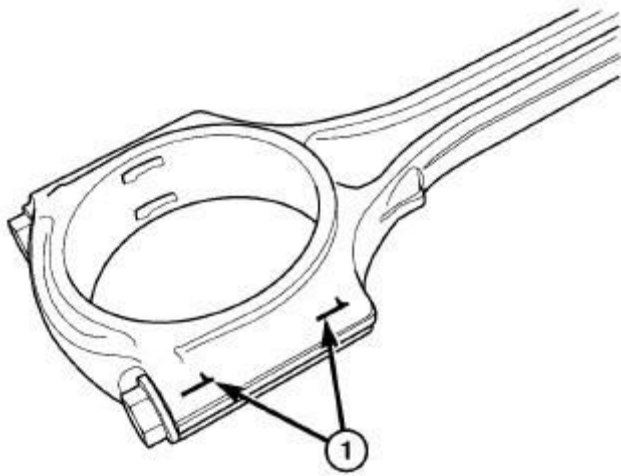


Fig. 387: Main Bearing Cap Bolts From Windage Tray Removal Sequence
 Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove the oil pans, engine timing cover and cylinder heads. Refer to **CYLINDER HEAD, REMOVAL**.
3. Remove the engine oil pump. Refer to **PUMP, ENGINE OIL, REMOVAL**.
4. Remove the eight main bearing cap bolts from the windage tray in the sequence shown in illustration and remove the windage tray (1).



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Fig. 388: Connecting Rod To Cylinder Identification

Courtesy of CHRYSLER GROUP, LLC

5. If necessary, remove the top ridge of the cylinder bores with a reliable ridge reamer before removing the pistons from the engine block. **Be sure to keep the tops of pistons covered during this operation.** Pistons and connecting rods must be removed from the top of the engine block. When removing piston and connecting rod assemblies from the engine, rotate the crankshaft clockwise so that each connecting rod is centered in the cylinder bore.

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods or caps, as damage to connecting rods could occur

NOTE: Connecting rods and bearing caps are not interchangeable and should be marked before removing to ensure correct reassembly.

6. Mark connecting rod and bearing cap positions (1) using a permanent ink marker or scribe tool.

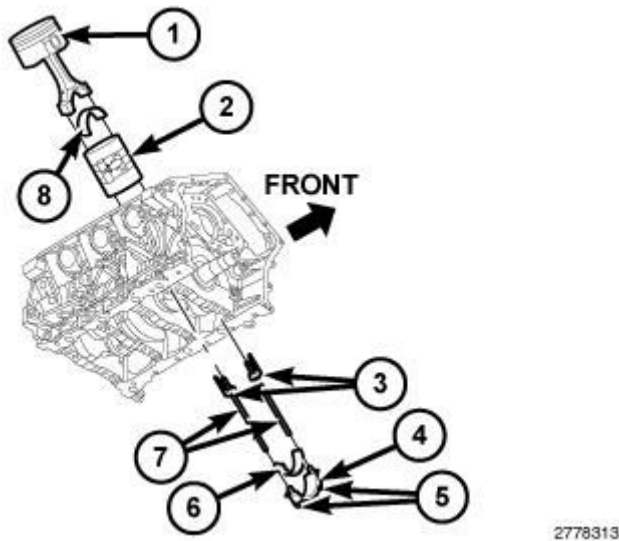


Fig. 389: Piston, Connecting Rod Cap, Bolts, Plastic Guide Plates & Guide Pins
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical V6 engine configuration shown in illustration.

CAUTION: Care must be taken not to damage the fractured rod and cap joint face surfaces, as engine damage may occur.

7. Remove the connecting rod cap bolts (5) and the connecting rod cap (4). Discard the cap bolts.

CAUTION: Care must be taken not to nick crankshaft journals, as engine damage may occur.

8. Remove the plastic guide plates (3) from the Guide Pins (special tool #8189, Guide Pins) (7) and install the Guide Pins to the connecting rod being removed.

CAUTION: Avoid contact with the piston oil cooler jet(s). Positioning of the oil cooler jet(s) is critical for proper engine operation.

9. Remove the piston and connecting rod (1) from cylinder bore.
10. Repeat the previous steps for each piston being removed.
11. Immediately after piston and connecting rod removal, reinstall the bearing cap (4) on the mating connecting rod to prevent damage to the fractured cap and rod surfaces.
12. If required, remove the piston rings. Refer to **RING(S), PISTON, REMOVAL**.
13. Repeat the previous steps for each piston being removed.

CLEANING

CLEANING

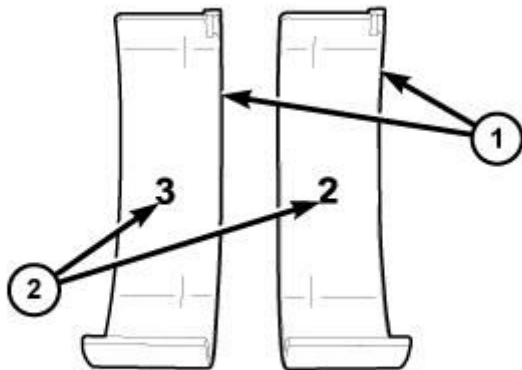
CAUTION: DO NOT use a wire wheel or other abrasive cleaning device to clean the pistons or connecting rods. The pistons have a Moly coating, this coating must not be damaged.

CAUTION: Do not remove the piston pin from the piston and connecting rod assembly.

1. Using a suitable cleaning solvent clean the pistons in warm water and towel dry.
2. Use a wood or plastic scraper to clean the ring land grooves.

INSPECTION

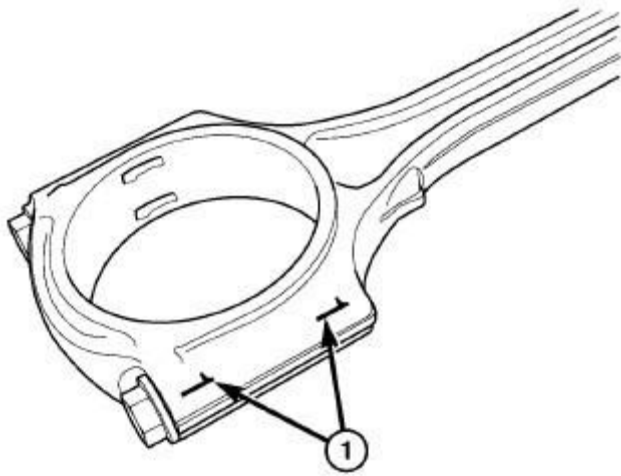
INSPECTION



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Fig. 390: Connecting Rod Bearing Shells & Bearing Size
Courtesy of CHRYSLER GROUP, LLC

1. Wipe the inserts (1) clean.
2. Inspect the inserts for abnormal wear patterns, scoring, grooving, fatigue, pitting and for metal or other foreign material imbedded in the lining.
3. Inspect the back of the inserts for fractures, scrapes, or irregular wear patterns.
4. Inspect the insert locking tabs for damage.
5. Replace any bearing that shows abnormal wear. Refer to **BEARING(S), CONNECTING ROD, STANDARD PROCEDURE**.



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Fig. 391: Connecting Rod To Cylinder Identification
Courtesy of CHRYSLER GROUP, LLC

6. Inspect the connecting rod bearing bores for signs of scoring, nicks and burrs.

NOTE: Misaligned or bent connecting rods can cause abnormal wear on pistons, piston rings, cylinder walls, connecting rod bearings and crankshaft connecting rod journals. If wear patterns or damage to any of these components indicate the probability of a misaligned connecting rod, inspect it for correct rod alignment.

7. Replace misaligned, bent or twisted connecting rods.

NOTE: Connecting rods are serviced with the piston pre-assembled. The pistons are "select fit" to achieve proper oil clearance. Refer to ROD, PISTON AND CONNECTING, STANDARD PROCEDURE .



0911009492

Fig. 392: Piston Components

Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical coated piston shown in illustration.

8. Inspect the piston for scoring or scraping marks in the piston skirts. Check the ring lands for cracks and/or deterioration.
9. Check the piston for taper and out of round shape.

NOTE: The coating material (6) is applied to the piston after the final piston machining process. Measuring the outside diameter of a coated piston will not provide accurate results. Therefore measuring the inside diameter of the cylinder bore with a dial Bore Gauge is **MANDATORY** . Refer to **ENGINE BLOCK, INSPECTION** .

10. Compare the measured cylinder bore diameter to the engine block cylinder bore grade marking chart. Select the piston size that corresponds to the engine block markings for each cylinder to provide the proper oil clearance. Refer to **ROD, PISTON AND CONNECTING, STANDARD PROCEDURE** .

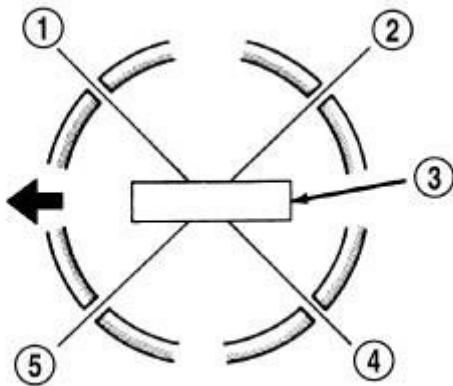
NOTE: Piston installation into the cylinder bore requires slightly more pressure than that required for non-coated pistons. The bonded coating on the piston will give the appearance of a line-to-line fit with the cylinder bore.

NOTE: The coated pistons will be serviced with the piston pin and connecting rod pre-assembled.

INSTALLATION

INSTALLATION

1. If required, select and fit new piston and connecting rod assemblies to the engine block. Refer to **ROD, PISTON AND CONNECTING, STANDARD PROCEDURE** .
2. If required, select and fit new bearings to the connecting rod. Refer to **BEARING(S), CONNECTING ROD, STANDARD PROCEDURE** .
3. If required, hone the cylinder bores. Refer to **ENGINE BLOCK, STANDARD PROCEDURE** .
4. If removed, install the piston rings. Refer to **RING(S), PISTON, INSTALLATION**.



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Fig. 393: Piston Ring End Gap Position
Courtesy of CHRYSLER GROUP, LLC

5. Position the piston ring end gaps as follows:
 - Oil ring expander gap (5)
 - Oil ring lower side rail end gap (4)
 - Oil ring upper side rail end gap (1)
 - No. 2 (intermediate) ring end gap (5)
 - No. 1 (upper) ring end gap (2)

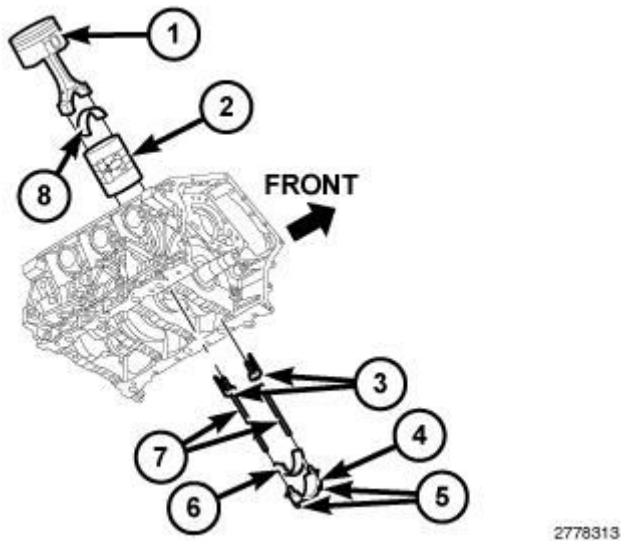


Fig. 394: Piston, Connecting Rod Cap, Bolts, Plastic Guide Plates & Guide Pins
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical V6 engine configuration shown in illustration.

NOTE: Ensure the position of the ring end gaps does not change when installing the ring compressor.

6. Lubricate the piston rings with clean engine oil. Position Piston Compressor (special tool #C-385, Compressor, Piston) (2) over the piston and rings. Tighten the compressor (2).

NOTE: Install the rod bearings in pairs. Do not mix sizes or use a new bearing half with an old bearing half.

7. Install the bearing shell (8) on the connecting rod with the tang inserted into the machined groove in the rod. Lubricate the bearing surface with clean engine oil.
8. Remove the plastic guide plates (3) from the Guide Pins (special tool #8189, Guide Pins) (7) and install the Guide Pins to the connecting rod being installed.

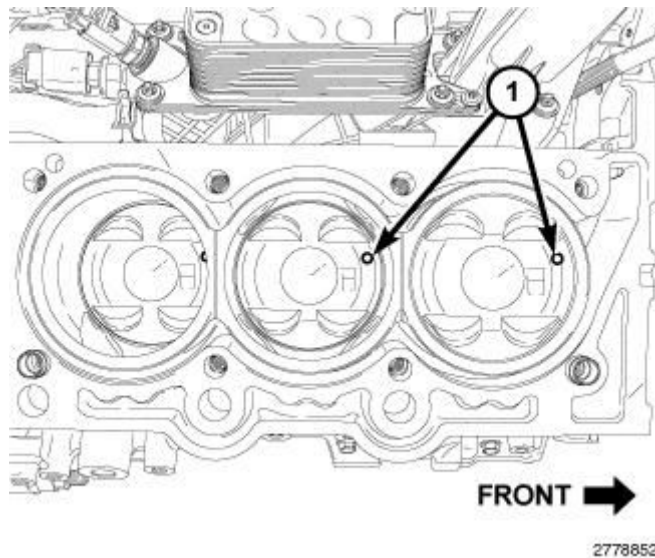


Fig. 395: Piston Installation Position
Courtesy of CHRYSLER GROUP, LLC

NOTE: Right cylinder bank shown in illustration, left cylinder bank similar.

9. The pistons crowns are stamped with a mark (1) indicating installation position. This mark must be positioned toward the front of engine on both cylinder banks.
10. Wipe the cylinder bore clean and lubricate with clean engine oil.
11. Rotate the crankshaft until the connecting rod journal is on the center of cylinder bore.

CAUTION: Avoid contact with the piston oil cooler jet(s). Positioning of the oil cooler jet(s) is critical for proper engine operation.

12. Insert the piston and connecting rod into the cylinder bore and carefully position the guide pins over the crankshaft journal.
13. Tap the piston down in the cylinder bore using a hammer handle while guiding the connecting rod into position over the rod journal.

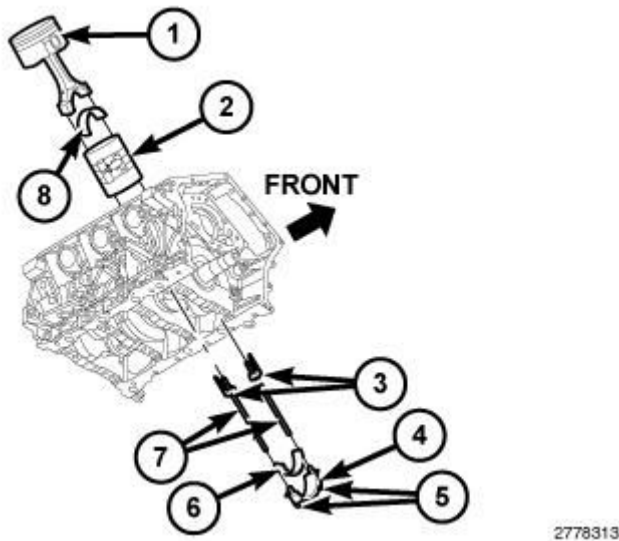


Fig. 396: Piston, Connecting Rod Cap, Bolts, Plastic Guide Plates & Guide Pins
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical V6 engine configuration shown in illustration.

CAUTION: The connecting rod bolts must not be reused. Always replace the connecting rod bolts whenever they are loosened or removed.

14. Install the bearing shell (6) on the connecting rod cap (4) with the tang inserted into the machined groove in the cap. Lubricate the bearing surface with clean engine oil.

NOTE: Do not lubricate the threads of the connecting rod cap bolts (5).

15. Install the connecting rod cap and bearing with the tang on the same side as the rod. Tighten the **NEW** connecting rod cap bolts (5) to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
16. If required, check the connecting rod side clearance. Refer to **ROD, PISTON AND CONNECTING, STANDARD PROCEDURE**.
17. Repeat the previous steps for each piston being installed.

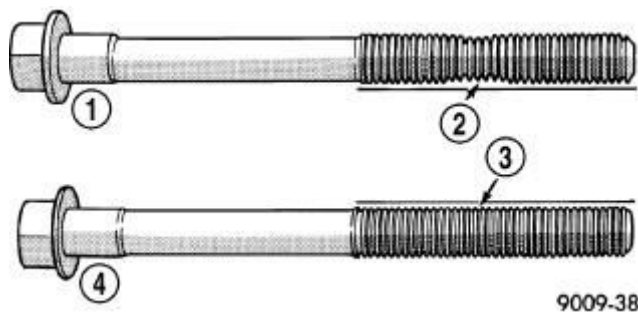


Fig. 397: Checking Cylinder Head Bolts For Stretching (Necking)

Courtesy of CHRYSLER GROUP, LLC

CAUTION: The main bearing cap bolts are tightened using a torque plus angle procedure. The bolts must be examined **BEFORE** reuse. If the threads are necked down the bolts must be replaced.

18. Check the main bearing cap bolts for necking by holding a scale or straight edge against the threads. If all the threads do not contact the scale (2) the bolt must be replaced.

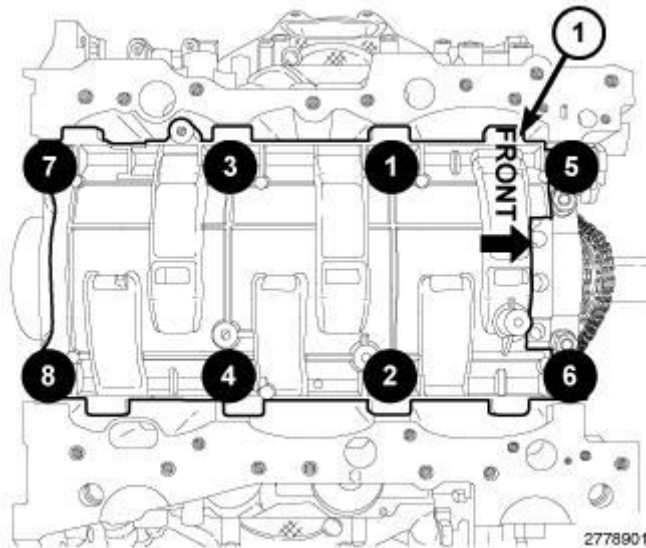


Fig. 398: Windage Tray With Main Bearing Cap Bolts Installation Sequence
Courtesy of CHRYSLER GROUP, LLC

19. Install the windage tray with eight main bearing cap bolts. Tighten the bolts in the sequence shown in illustration to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
20. Install the engine oil pump and oil pump pick-up. Refer to **PUMP, ENGINE OIL, INSTALLATION**.
21. Install the cylinder heads, engine timing cover and oil pans. Refer to **CYLINDER HEAD, INSTALLATION**.
22. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL, STANDARD PROCEDURE** .
23. Connect the negative battery cable and tighten the nut to the proper specification. Refer to **SPECIFICATIONS** .
24. Fill the cooling system. Refer to **STANDARD PROCEDURE** .
25. Operate the engine until it reaches normal operating temperature. Check cooling system for correct fluid level. Refer to **STANDARD PROCEDURE** .

SEAL, CRANKSHAFT OIL, FRONT

REMOVAL

REMOVAL

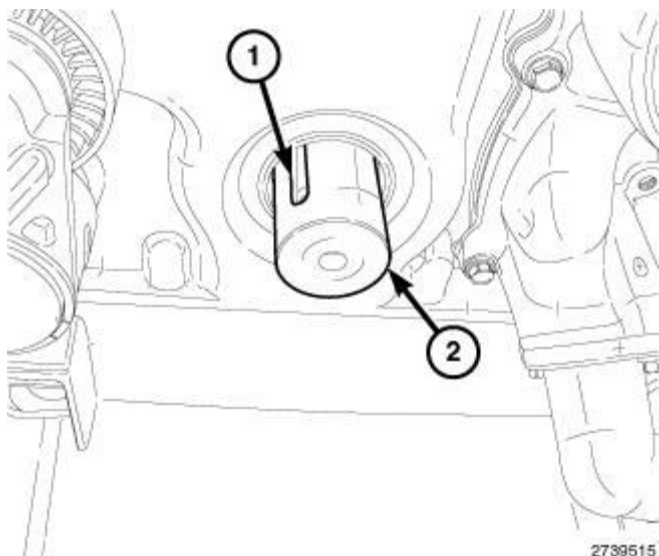


Fig. 399: Sleeve & Flywheel Key
 Courtesy of CHRYSLER GROUP, LLC

1. Remove the serpentine belt. Refer to **BELT, SERPENTINE, REMOVAL** .
2. Remove the crankshaft vibration damper. Refer to **DAMPER, VIBRATION, REMOVAL**.
3. Install the sleeve (2) from Seal Remover (special tool #8511, Remover, Seal) around the flywheel key (1) and onto the nose of the crankshaft.

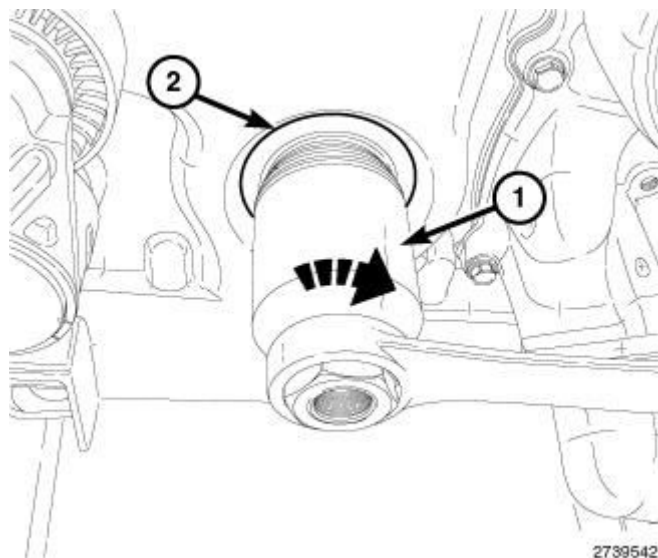


Fig. 400: Seal Remover & Front Crankshaft Oil Seal
 Courtesy of CHRYSLER GROUP, LLC

4. Thread the Seal Remover (special tool #8511, Remover, Seal) (1) into the front crankshaft oil seal (2).

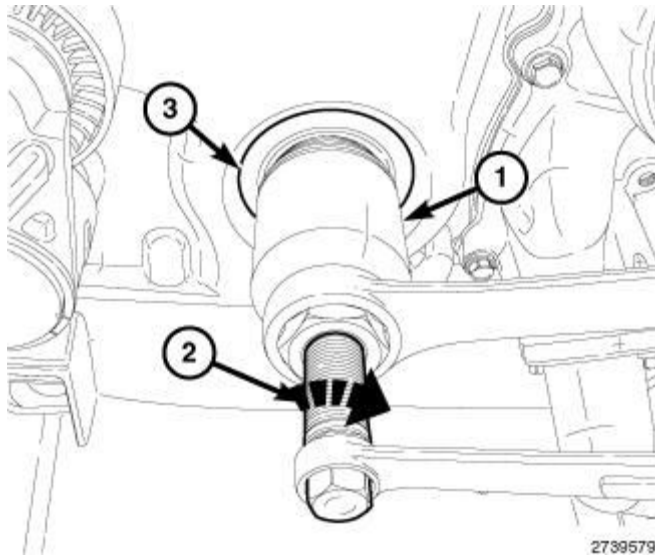


Fig. 401: Extractor Screw, Seal Remover & Front Crankshaft Oil Seal
Courtesy of CHRYSLER GROUP, LLC

5. Install the extractor screw (2) into the Seal Remover (special tool #8511, Remover, Seal) (1). Hold the seal remover stationary and tighten the extractor screw against the sleeve until the front crankshaft oil seal (3) is removed from the engine timing cover.

INSTALLATION

INSTALLATION

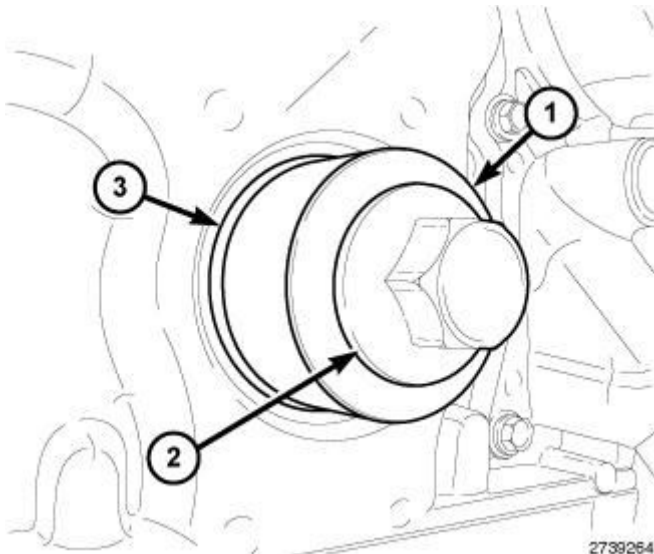


Fig. 402: Front Crankshaft Seal Installer & Oil Seal
Courtesy of CHRYSLER GROUP, LLC

1. Position the front crankshaft oil seal (3) to engine timing cover.
2. Align the Front Crankshaft Seal Installer (special tool #10199, Installer, Crankshaft Front Oil Seal) (1) to

the flywheel key on the crankshaft and against the front crankshaft oil seal (3).

CAUTION: Only tighten the crankshaft vibration damper bolt until the oil seal is seated in the cover. Overtightening of the bolt can crack the front timing cover.

3. Install and tighten the crankshaft vibration damper bolt (2) until the crankshaft oil seal is seated in the engine timing cover.
4. Install the crankshaft vibration damper. Refer to **DAMPER, VIBRATION, INSTALLATION**.
5. Install the serpentine belt. Refer to **BELT, SERPENTINE, INSTALLATION**.

SEAL, CRANKSHAFT OIL, REAR

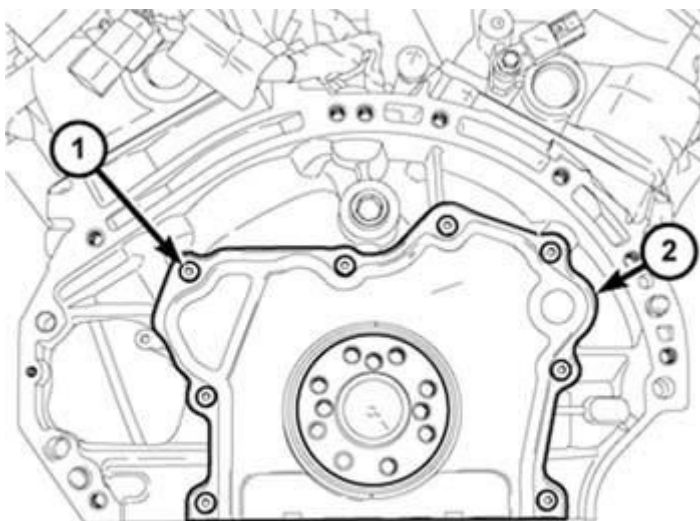
REMOVAL

REMOVAL

1. Remove the oil pan. Refer to **PAN, OIL, REMOVAL**.

CAUTION: Do not attempt to support the weight of the engine on the windage tray. The windage tray is a thin cast aluminum construction and can be easily damaged.

2. Support the rear of the engine with a screw-jack when removing the transmission. Position the support on the engine oil pan flange and not the windage tray.
3. Remove the transmission. Refer to **REMOVAL**.
4. Remove the flexplate. Refer to **FLEXPLATE, REMOVAL**.



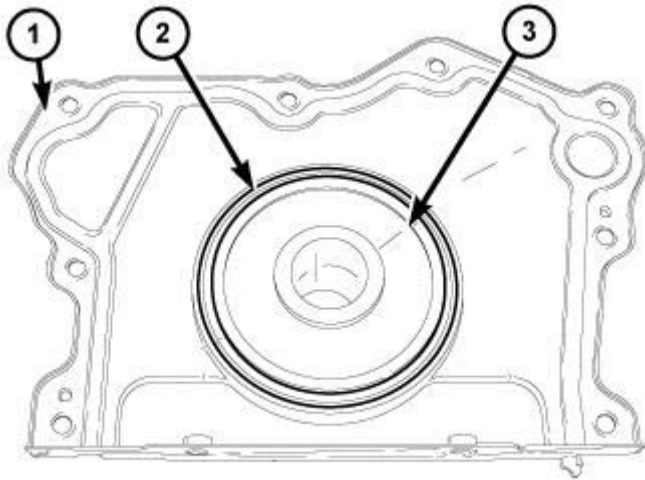
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Fig. 403: Seal Retainer & Attaching Screws

Courtesy of CHRYSLER GROUP, LLC

NOTE: The rear crankshaft oil seal is incorporated into the seal retainer (2) and can not be removed from the retainer. The rear crankshaft oil seal and seal retainer (2) are serviced as an assembly.

5. Remove the eight seal retainer attaching screws (1).
6. Remove and discard the seal retainer (2).

INSTALLATION**INSTALLATION**

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Fig. 404: Rear Crankshaft Oil Seal, Retainer & Seal Protector

Courtesy of CHRYSLER GROUP, LLC

CAUTION: The rear crankshaft oil seal (2) and retainer (1) are an assembly. To avoid damage to the seal lip, DO NOT remove the seal protector (3) from the rear crankshaft oil seal before installation onto the engine.

CAUTION: Whenever the crankshaft is replaced, the rear crankshaft oil seal must also be replaced. Failure to do so may result in engine fluid leakage.

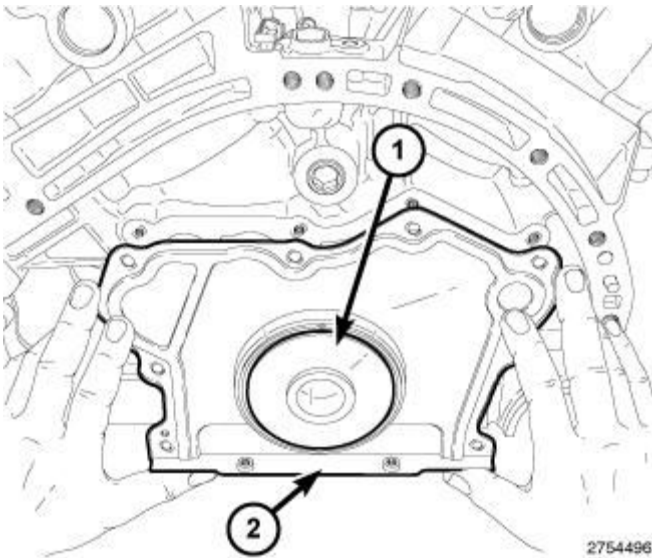


Fig. 405: Oil Seal Retainer Assembly & Seal Protector
 Courtesy of CHRYSLER GROUP, LLC

1. Inspect the crankshaft to make sure there are no nicks or burrs on the seal surface.
2. Clean the engine block sealing surfaces thoroughly.

NOTE: It is not necessary to lubricate the seal or the crankshaft when installing the seal retainer. Residual oil following installation can be mistaken for seal leakage.

3. Carefully position the oil seal retainer assembly (2), and seal protector (1) on the crankshaft and push firmly into place on the engine block (during this step, the seal protector will be pushed from the rear oil seal assembly as a result of installing the rear oil seal).

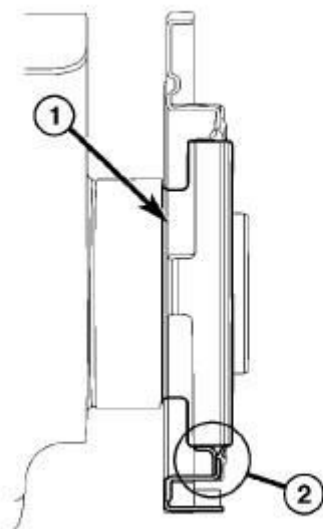
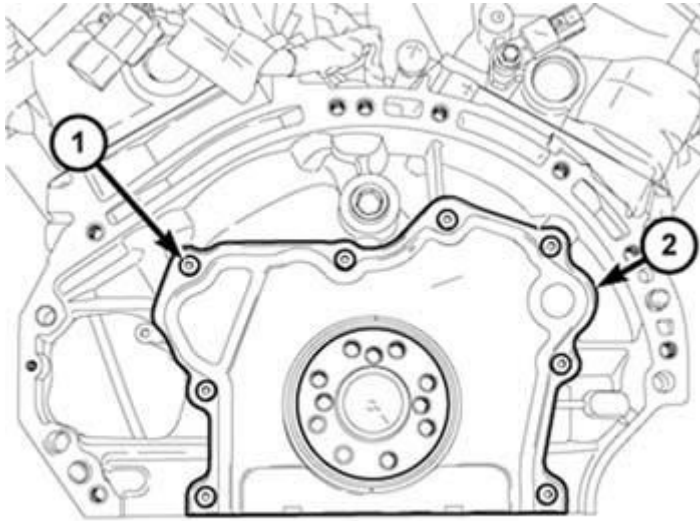


Fig. 406: Rear Seal Installed

Courtesy of CHRYSLER GROUP, LLC

4. Verify that the seal lip (2) on the retainer is uniformly curled inward toward the engine on the crankshaft (1).



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Fig. 407: Seal Retainer & Attaching Screws

Courtesy of CHRYSLER GROUP, LLC

NOTE: Make sure that the seal retainer flange is flush with the engine block oil pan sealing surface.

5. Install the eight seal retainer bolts (1) and tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
6. Install the flexplate. Refer to **FLEXPLATE, INSTALLATION**.
7. Install the transmission. Refer to **INSTALLATION** .
8. Install the oil pan. Refer to **PAN, OIL, INSTALLATION**.
9. Fill the engine crankcase with the proper oil to the correct level. Refer to **OIL, STANDARD PROCEDURE** .

ENGINE MOUNTING

INSULATOR, ENGINE MOUNT, LEFT

REMOVAL

REMOVAL



Fig. 408: Battery & Cables

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the battery's negative (3) and positive (1) cables.
2. Remove the battery (2).
3. Raise the vehicle.

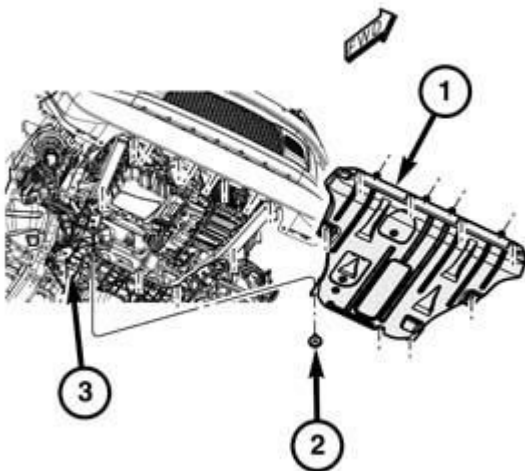
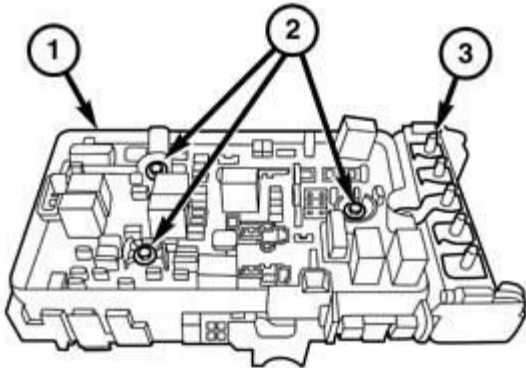


Fig. 409: Removing/Installing Belly Pans

Courtesy of CHRYSLER GROUP, LLC

4. Remove the belly pan.
5. Lower the vehicle.



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Fig. 410: Identifying Power Distribution Center, Power Feed Connections & Bolts
Courtesy of CHRYSLER GROUP, LLC

6. Remove the PDC (1) assembly. Refer to **CENTER, POWER DISTRIBUTION (PDC), REMOVAL**.
7. Carefully position a floor jack under transmission to support the transmission.

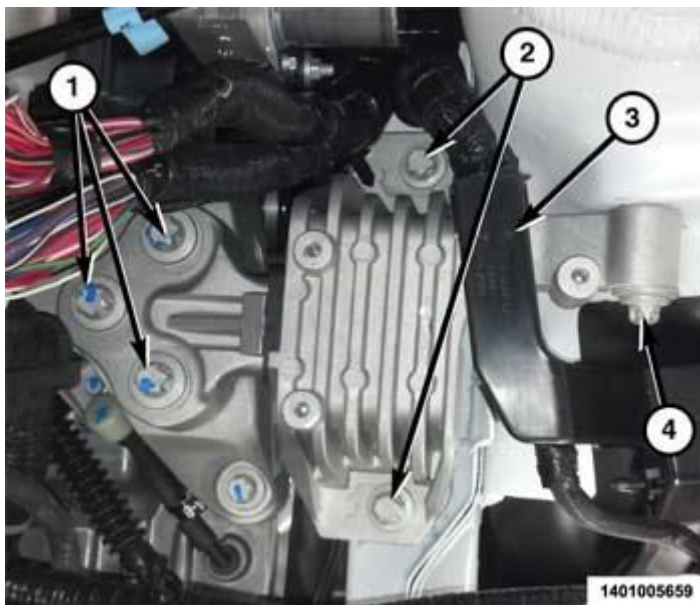


Fig. 411: Left Engine Mount-To-Transmission Mount Bracket Bolts
Courtesy of CHRYSLER GROUP, LLC

8. Using care, remove the wiring harness loom (3) from the mount.
9. Remove the transmission mount to frame bolts (2).
10. Loosen the mount to strut tower bolt (4).
11. Remove the bolts (1) at the transmission mount isolator to bracket.

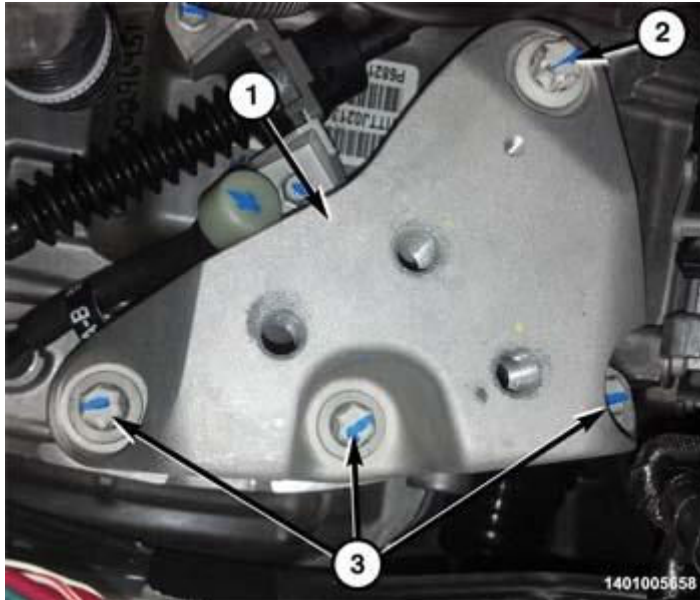


Fig. 412: Left Side Upper Transmission Mount Bracket
Courtesy of CHRYSLER GROUP, LLC

12. If required, remove the left side upper transmission mount bracket (1).

INSTALLATION

INSTALLATION

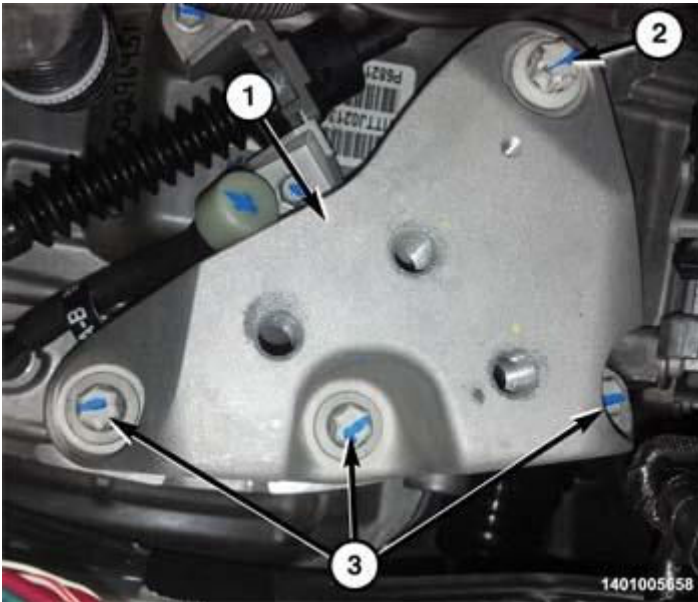


Fig. 413: Left Side Upper Transmission Mount Bracket
Courtesy of CHRYSLER GROUP, LLC

1. If removed, install the left side upper transmission mount bracket (1). Tighten bolts (2, 3) to 105 N.m (77 ft. lbs.).

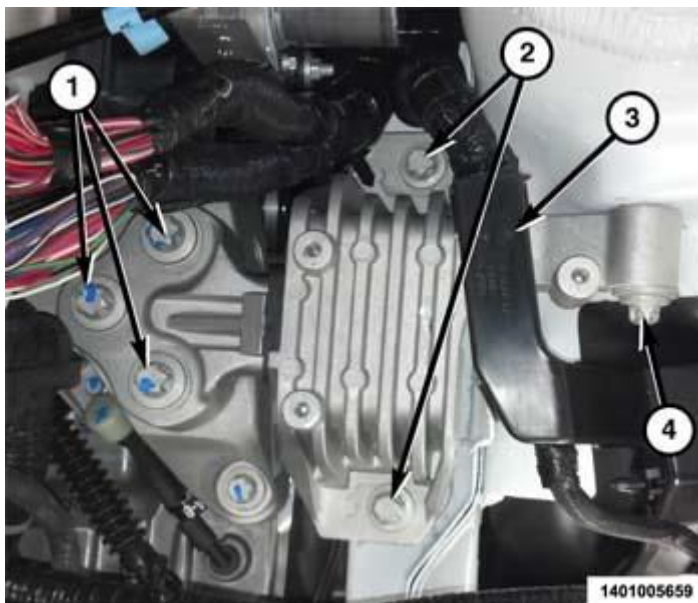
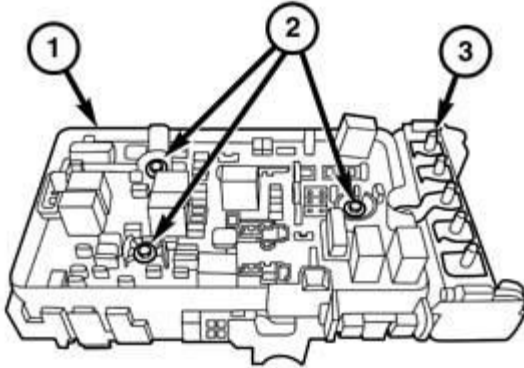


Fig. 414: Left Engine Mount-To-Transmission Mount Bracket Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Position the left transmission mount onto the vehicle.
3. Hand start all the bolts.
4. Tighten the mount to frame rail bolts (2) to 105 N.m (77 ft. lbs.).

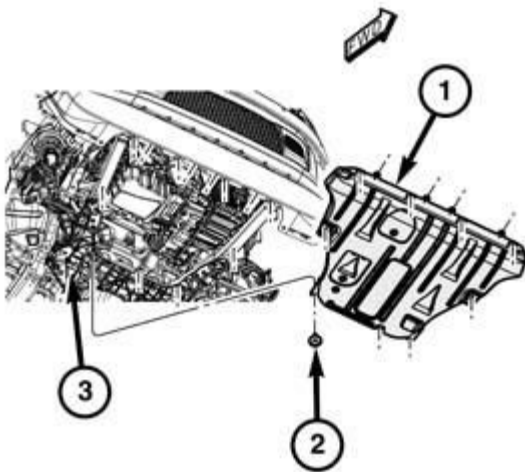
5. Tighten the mount to shock tower bolt (4) to 64 N.m (47 ft. lbs.).
6. Tighten the mount to transmission mount bracket bolts (1) to 157 N.m (116 ft. lbs.).



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Fig. 415: Identifying Power Distribution Center, Power Feed Connections & Bolts
Courtesy of CHRYSLER GROUP, LLC

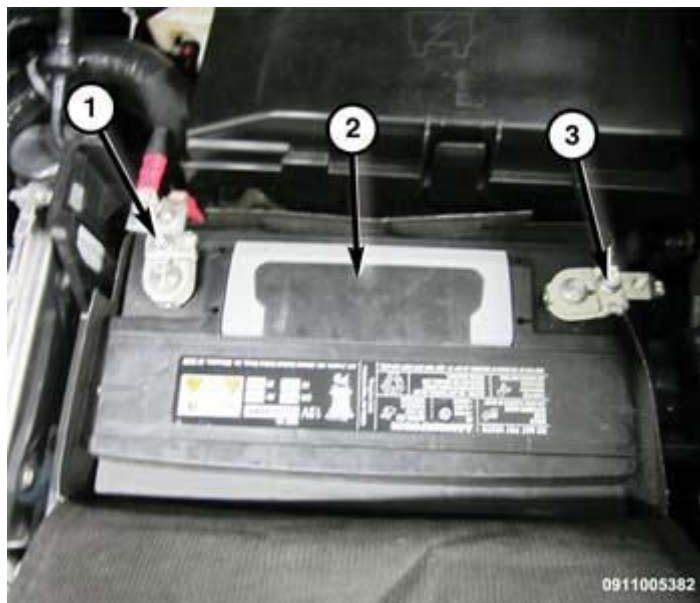
7. Install the PDC (1). Refer to **CENTER, POWER DISTRIBUTION (PDC), INSTALLATION**.
8. Remove the floor jack.
9. Raise the vehicle.



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Fig. 416: Removing/Installing Belly Pans
Courtesy of CHRYSLER GROUP, LLC

10. Install the belly pan (1).
11. Lower the vehicle.



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Fig. 417: Battery & Cables
Courtesy of CHRYSLER GROUP, LLC

12. Install the battery (2).

13. Connect the positive (1) and negative (3) battery cables and tighten nut to 9 N.m (80 in. lbs.).

INSULATOR, ENGINE MOUNT, RIGHT

REMOVAL

REMOVAL

1. Remove the air filter body. Refer to **BODY, AIR CLEANER, INSTALLATION**.

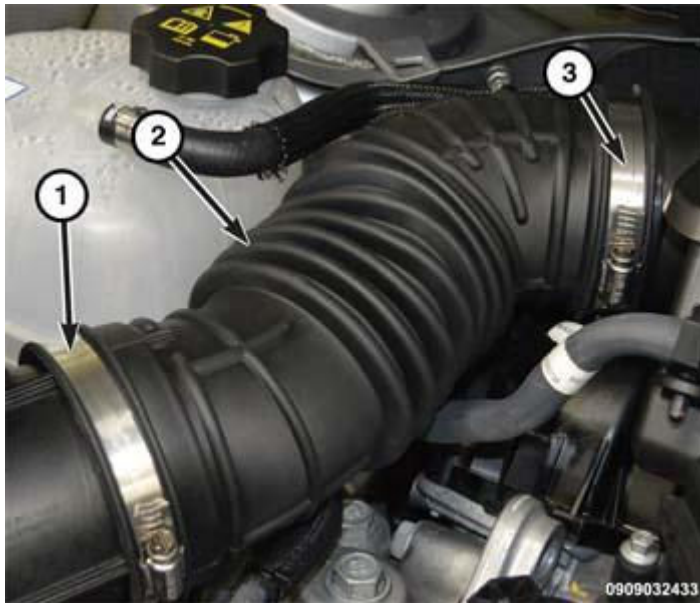


Fig. 418: Clean Air Hose & Clamps
Courtesy of CHRYSLER GROUP, LLC

2. Remove the coolant return line retainer from the clean air hose.
3. Remove the clean air hose (2) from the resonator.
4. Remove the overflow bottle from the mount and position aside.
5. Raise the vehicle.
6. Remove the belly pan. Refer to **BELLY PAN, REMOVAL**.
7. Lower the vehicle.
8. Carefully position a floor jack under the engine for support.

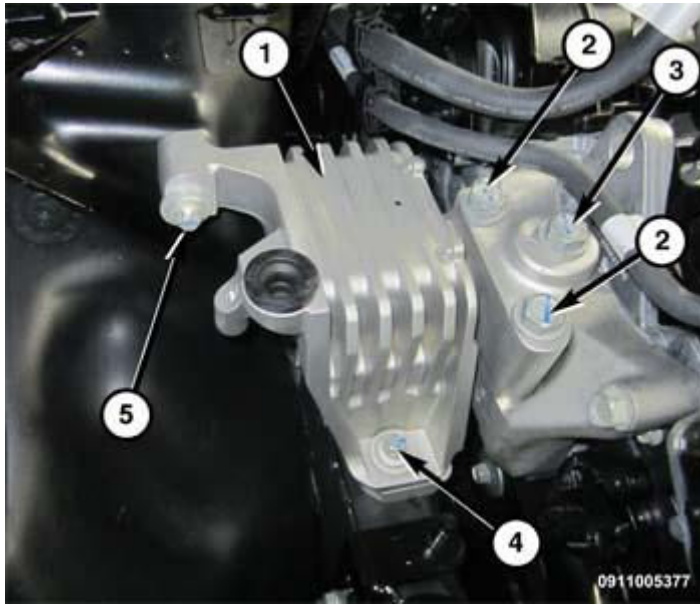


Fig. 419: Removing/Installing Right Engine Mount Assembly
Courtesy of CHRYSLER GROUP, LLC

9. Remove the engine mount (1) to frame bolts (4).
10. Loosen the engine mount to strut tower bolt (5).
11. Remove the center engine mount to engine bracket bolt (3).
12. Remove the outer engine mount to engine bracket bolts (2).

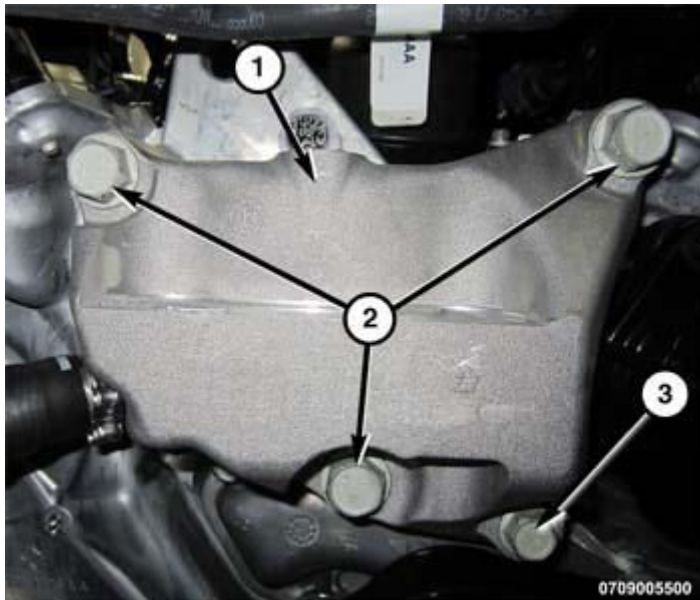


Fig. 420: Engine Mount Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

13. If required, remove the engine mount bracket (1) to timing cover bolts (2).

INSTALLATION

INSTALLATION

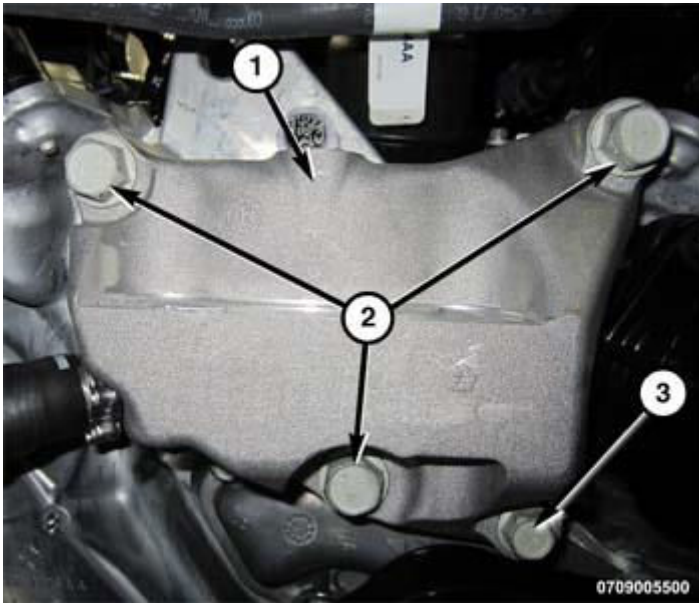


Fig. 421: Engine Mount Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. If removed, install the right engine mount bracket (1) and tighten the bolts (2, 3) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .

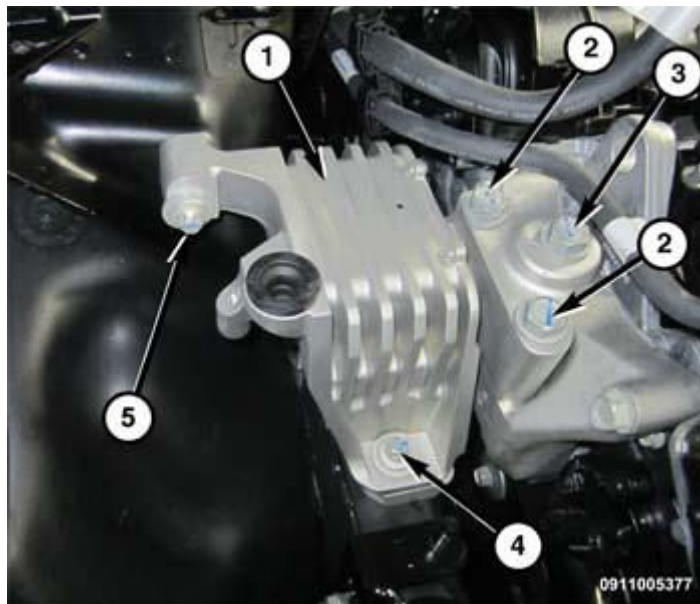


Fig. 422: Removing/Installing Right Engine Mount Assembly
Courtesy of CHRYSLER GROUP, LLC

2. Position the right engine mount isolator (1):
 - Align the engine so that the engine mount bracket is flush against the engine mount.
 - Hand tighten the center engine mount to engine bracket bolt (3).
 - Hand tighten the outer engine mount to engine bracket bolts (2).
 - Hand start the engine mount to strut tower (5).
 - Tighten the engine mount to frame rail bolts (4) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
 - Tighten the mount to strut tower bolt to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
 - Tighten mount to mount bracket bolts (2, 3) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
3. Remove the floor jack.
4. Raise the vehicle.
5. Install the belly pan. Refer to **BELLY PAN, INSTALLATION** .
6. Lower the vehicle.

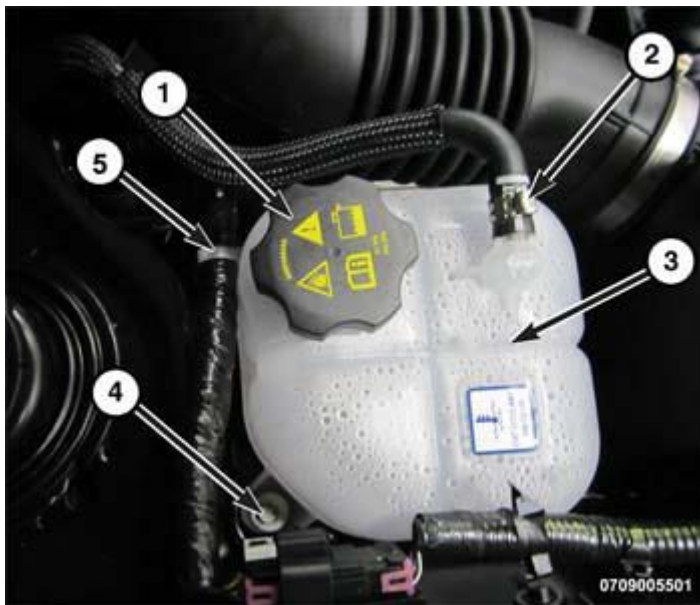


Fig. 423: Coolant Bottle & Components
 Courtesy of CHRYSLER GROUP, LLC

7. Install the overflow bottle (3). Tighten the bolts (4) to the proper specification. Refer to **SPECIFICATIONS** .

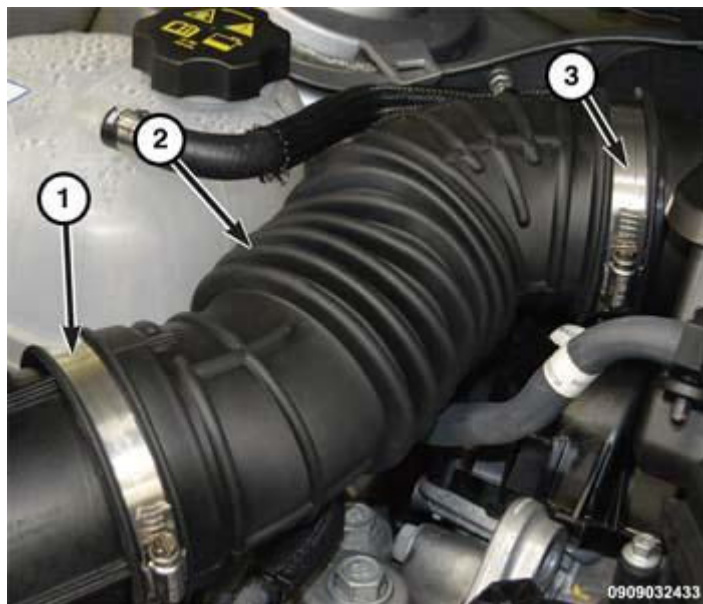


Fig. 424: Clean Air Hose & Clamps
Courtesy of CHRYSLER GROUP, LLC

8. Install the clean air hose (2) to the air resonator. Hand tighten the clamp (3).
9. Install the coolant return line retainer to the clean air hose.
10. Install the air filter body. Refer to **BODY, AIR CLEANER, REMOVAL**.

INSULATOR, ENGINE MOUNT, REAR

REMOVAL

REMOVAL

1. Raise the vehicle.
2. Remove the belly pan. Refer to **BELLY PAN, REMOVAL**.

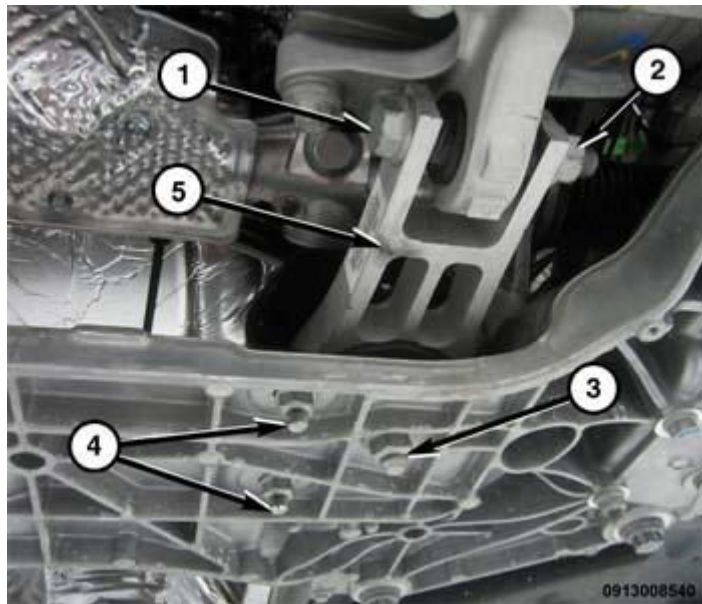


Fig. 425: Removing/Installing Rear Engine Mount Insulator
Courtesy of CHRYSLER GROUP, LLC

3. Remove the front transmission strut to pivot through bolt (1).
4. Remove the transmission strut to crossmember through bolt.

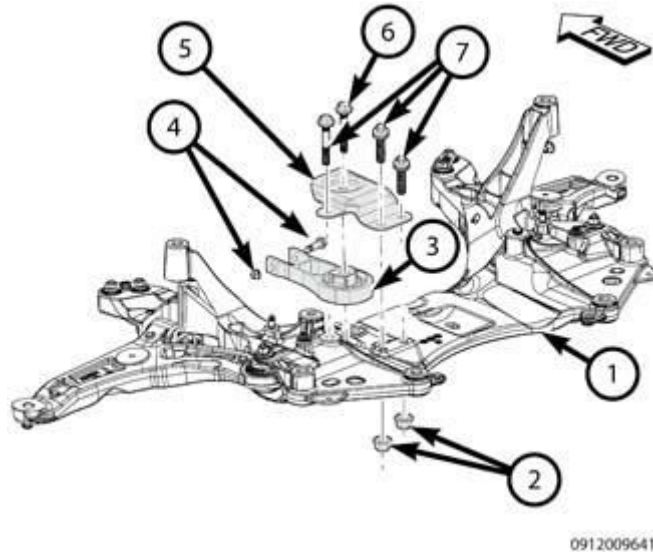


Fig. 426: Removing/Installing Rear Engine Mount Insulator
Courtesy of CHRYSLER GROUP, LLC

5. Loosen the strut cover bracket nuts (2).
6. Rotate the engine forward and remove the strut (3).
7. If required, remove the transmission pivot mount bracket from the transmission.

INSTALLATION

INSTALLATION

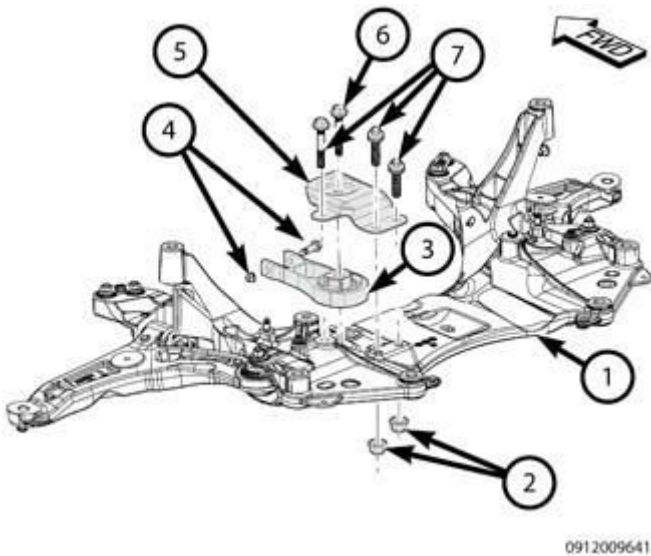


Fig. 427: Removing/Installing Rear Engine Mount Insulator
Courtesy of CHRYSLER GROUP, LLC

1. If removed, install the transmission pivot bracket to the transmission. Tighten the bolts to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
2. Rotated the engine to allow the lower engine strut mount (3) to be installed.

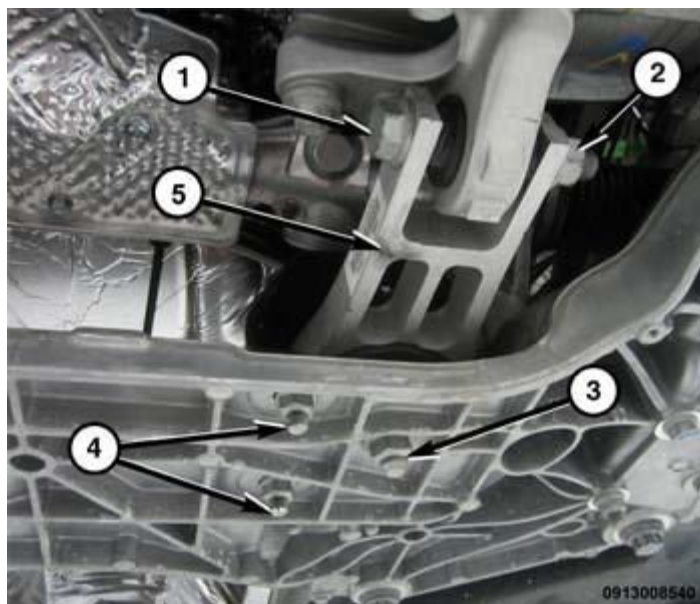


Fig. 428: Removing/Installing Rear Engine Mount Insulator
Courtesy of CHRYSLER GROUP, LLC

3. Position the rear strut mount to the crossmember.
4. Install the torque strut (5) to pivot bracket through bolt (1). Tighten the nut (2) to the proper specification.

Refer to **TORQUE SPECIFICATIONS** .

5. Install the rear torque strut to cradle through bolt. Tighten the nut (3) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .

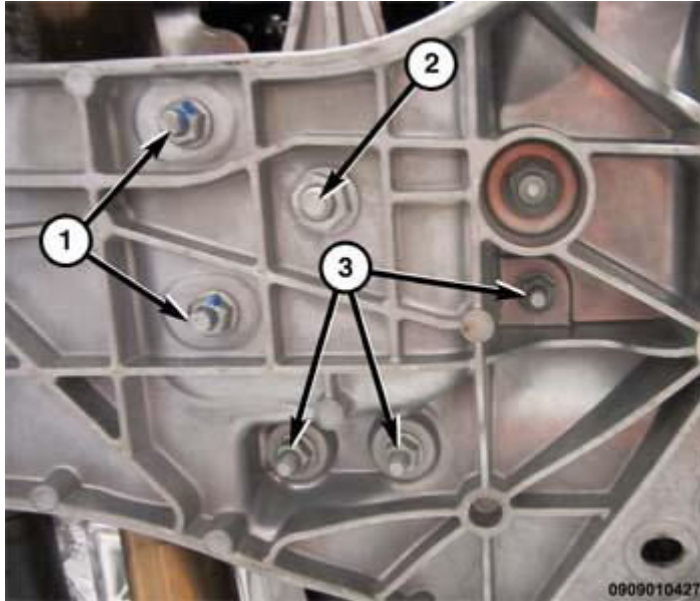


Fig. 429: Rear Mount Bracket Nuts
Courtesy of CHRYSLER GROUP, LLC

6. Tighten the strut cover bracket nuts (1, 3) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
7. Install the belly pan. Refer to **BELLY PAN, INSTALLATION** .
8. Lower the vehicle.

LUBRICATION

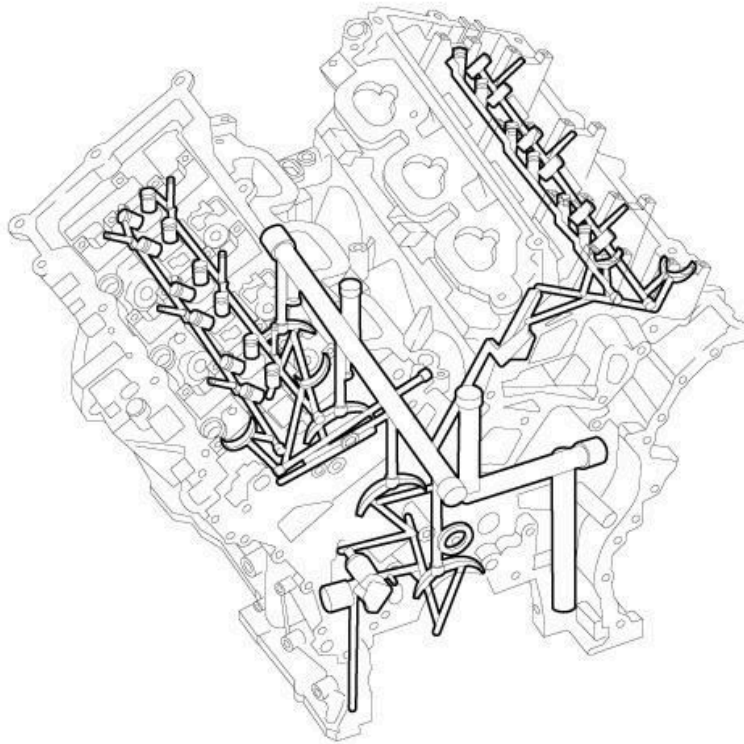
DESCRIPTION

DESCRIPTION

The lubrication system is a full flow filtration, pressure feed type lubrication system. The oil pump is mounted to the bottom of the cylinder block and chain driven by the crankshaft sprocket. The oil pump pick-up tube is attached to the oil pump and supported at the windage tray. There are three oil gallery plugs installed in the engine block. A system oil pressure sensor allows oil pressure to be monitored with a diagnostic scan tool. The oil pressure and oil temperature sensors are located on the oil filter housing assembly which is mounted to the top of the engine block between the cylinder heads. The oil cooler is mounted to the oil filter housing. There is a pressure relief valve in the oil pump that is only activated on a cold start or for emergency relief since the oil pump output is self-regulating. There are three piston oil cooler jets mounted to the engine block. Each jet cools two pistons.

OPERATION

OPERATION



2825793

Fig. 430: Engine Lubrication Flow
 Courtesy of CHRYSLER GROUP, LLC

The oil from the oil pan is pumped by a vane type oil pump mounted to the bottom of the cylinder block that is chain driven by the crankshaft sprocket. The oil from the pump travels to the oil filter element and then to the oil cooler assembly. After the oil has been filtered and cooled, the oil enters the main oil gallery. The pressurized oil travels through the main gallery to the four main journals to lubricate the crankshaft main bearings. The pressurized oil travels through the crankshaft main journals to cross-drilling supplying oil to the connecting rod journals. From the number one main bearing gallery, oil travels to the right secondary chain tensioner and to the primary chain idler shaft. The main oil gallery also supplies oil to three sets of piston oil cooling jets. From the cylinder block, the oil flows through the galleys into the left and right cylinder heads. Left cylinder head oil is supplied to the left secondary timing chain tensioner, camshaft journals and hydraulic lash adjusters. Right cylinder head oil is supplied to the right camshaft journals and hydraulic lash adjusters. The camshaft valve lobes and rocker arms are lubricated through a small hole in the rocker arm; oil flows through the lash adjuster then through the rocker arm and onto the camshaft lobe. Oil also flows through each of the four forward camshaft bearings into the camshafts and phasers.

ENGINE LUBRICATION FLOW CHART

FROM	TO
Oil Pickup Tube	Oil Pump
Oil Pump	Oil Filter
Oil Filter	Oil Cooler
Oil Cooler	Block Main Oil Gallery

2014 Jeep Cherokee Trailhawk

2014 ENGINE 3.2L - Service Information - Cherokee

Block Main Oil Gallery	1. Crankshaft Main Journals 2. Left Cylinder Head 3. Right Cylinder Head 4. Piston Cooling Jets
Crankshaft Number One Main Journal	1. Primary Chain Idler Shaft 2. Right Secondary Chain Tensioner 3. Oil Pump Feedback
Crankshaft Main Journals	Crankshaft Rod Journals
Left Cylinder Head	1. Left Secondary Chain Tensioner 2. Hydraulic Lash Adjusters 3. Camshaft Journals 4. Phaser Oil Control Valves
Right Cylinder Head	1. Hydraulic Lash Adjusters 2. Camshaft Journals 3. Phaser Oil Control Valves
Hydraulic Lash Adjusters	1. Rocker Arms 2. Cam Lobes

DIAGNOSIS AND TESTING**ENGINE OIL LEAK**

Begin with a thorough visual inspection of the engine, particularly at the area of the suspected leak. If an oil leak source is not readily identifiable, the following steps should be followed:

1. Do not clean or de-grease the engine at this time because some solvents may cause rubber to swell, temporarily stopping the leak.
2. Add an oil soluble dye (use as recommended by manufacturer). Start the engine and let idle for approximately 15 minutes. Check the oil dipstick to make sure the dye is thoroughly mixed as indicated with a bright yellow color under a black light.
3. Using a black light, inspect the entire engine for fluorescent dye, particularly at the suspected area of the oil leak. If the oil leak is found and identified, repair in accordance to the Service Information.
4. If dye is not observed, drive the vehicle at various speeds for approximately 24 km (15 miles), and repeat the inspection.

If the oil leak source is not positively identified at this time, proceed with the **AIR LEAK DETECTION TEST METHOD**.

AIR LEAK DETECTION TEST METHOD

1. Disconnect the make-up air hose from the cylinder head cover. Cap or plug the make-up air hose nipple.
2. Remove the PCV hose from the PCV valve. Cap or plug the PCV valve nipple.
3. Attach an air hose with a pressure gauge and regulator to the dipstick tube.

CAUTION: Do not subject the engine assembly to more than 20.6 kPa (3 PSI) of test pressure.

4. Gradually increase air pressure from 1 psi to 2.5 psi maximum while applying soapy water at the suspected leak source. Adjust the regulator to a suitable test pressure within this range that provides the best bubble generation which will pinpoint the leak source. If the oil leak is detected and identified, repair in accordance with the Service Information.
5. If the leakage occurs at the rear oil seal area, follow the procedures for rear seal area leaks. Refer to **LUBRICATION, DIAGNOSIS AND TESTING** .
6. If no leaks are detected, turn off the air supply and remove the air hose and all plugs and caps. Install the PCV valve and make-up air hoses.
7. Clean the oil off of the suspect oil leak area using a suitable solvent. Drive the vehicle at various speeds approximately 24 km (15 miles). Inspect the engine for signs of an oil leak by using a black light.

CHECKING ENGINE OIL PRESSURE

1. Disconnect and isolate the negative battery cable.
2. Remove the oil pressure sensor from the oil filter housing. Refer to **SENSOR, OIL PRESSURE, REMOVAL**.

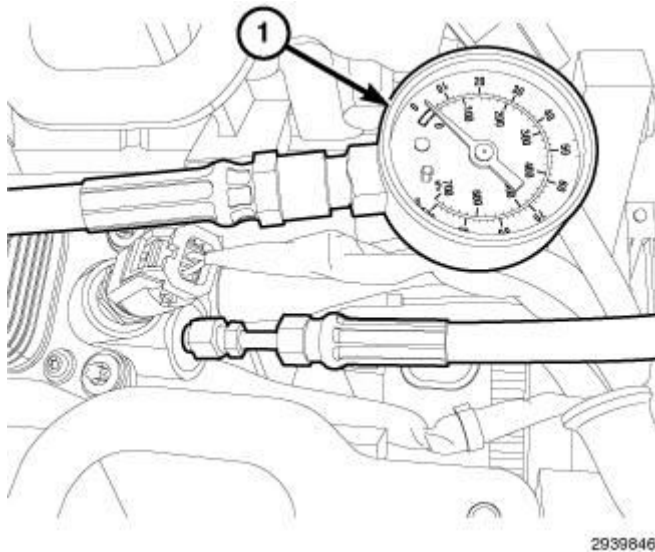


Fig. 431: Pressure Gauge Installed To Oil Pressure Port
Courtesy of CHRYSLER GROUP, LLC

3. Install Pressure Gauge (special tool #C-3292A, Gauge, Pressure) (1) to the oil pressure port. Tighten to 20 N.m (177 in. lbs.).
4. Install the intake manifold. Refer to **MANIFOLD, INTAKE, INSTALLATION**.
5. Connect the negative battery cable. Tighten the nut to the proper specification. Refer to **SPECIFICATIONS** .
6. Start and idle the engine. If oil pressure is 0 at idle, shut off the engine and consult the Engine Lubrication

and Diagnostic Table. Refer to **ENGINE, DIAGNOSIS AND TESTING**.

7. Run the engine until it reaches normal operating temperature.
8. Verify that the engine has acceptable oil pressure. Refer to **ENGINE SPECIFICATIONS**.

DIAGNOSIS AND TESTING - REAR SEAL AREA LEAKS

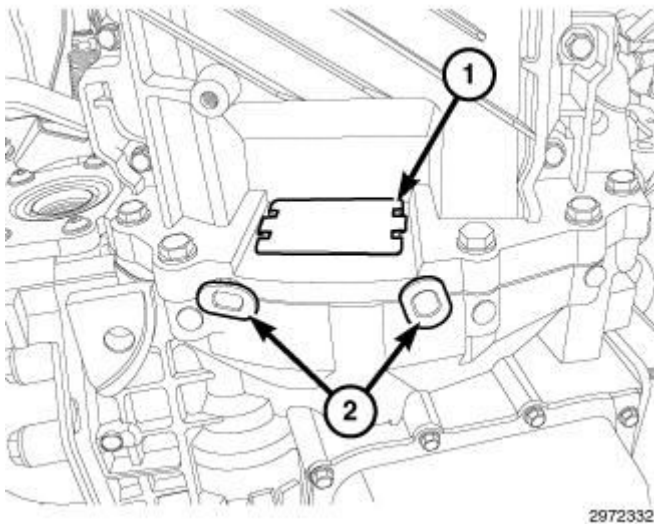


Fig. 432: Torque Converter Housing Dust Cover & Rubber Plugs
Courtesy of CHRYSLER GROUP, LLC

Since it is sometimes difficult to determine the source of an oil leak in the rear seal area of the engine, a more involved inspection is necessary. The following steps should be followed to help pinpoint the source of the leak.

If the leakage occurs at the crankshaft rear oil seal area:

1. Disconnect and isolate the negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
3. Remove the torque converter dust shield (1).
4. Remove two rubber plugs (2) covering the rear oil seal retainer flange bolts.
5. Inspect the flexplate and rear of the block for evidence of oil. Use a black light to check for the oil leak:
 - a. Circular spray pattern generally indicates seal leakage or crankshaft damage.
 - b. Where leakage tends to run straight down, possible causes are a porous block, rear oil seal retainer, oil galley pipe plug and rear seal retainer to oil pan mating surfaces.
6. If no leaks are detected, use the Air Leak Detection Method as outlined in Engine Oil Leak. Refer to **LUBRICATION, DIAGNOSIS AND TESTING**.

CAUTION: Do not subject the engine assembly to more than 20.6 kPa (3 PSI) of test pressure.

7. If the leak is not detected, very slowly turn the crankshaft and watch for leakage. If a leak is detected between the crankshaft and seal while slowly turning the crankshaft, it is possible the crankshaft seal surface is damaged. The seal area on the crankshaft could have minor nicks or scratches that can be polished out with emery cloth.

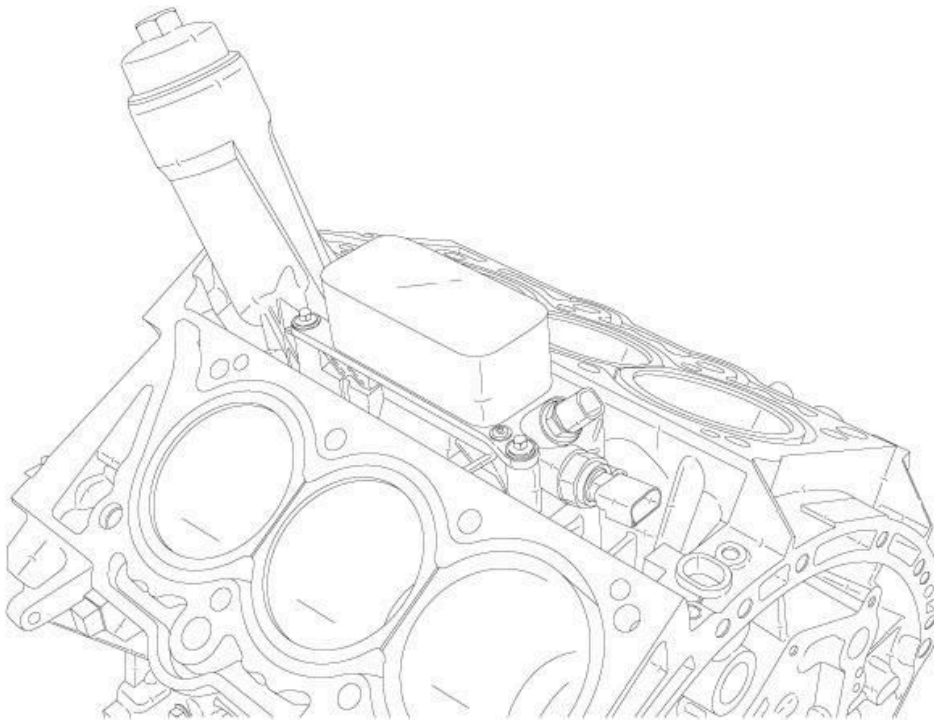
CAUTION: Use extreme caution when crankshaft polishing is necessary to remove minor nicks or scratches. The crankshaft seal flange is specially machined to complement the function of the rear oil seal.

8. For bubbles that remain steady with shaft rotation, no further inspection can be done until disassembled. Refer to **SEAL, CRANKSHAFT OIL, REAR, REMOVAL**.

COOLER, OIL

DESCRIPTION

DESCRIPTION

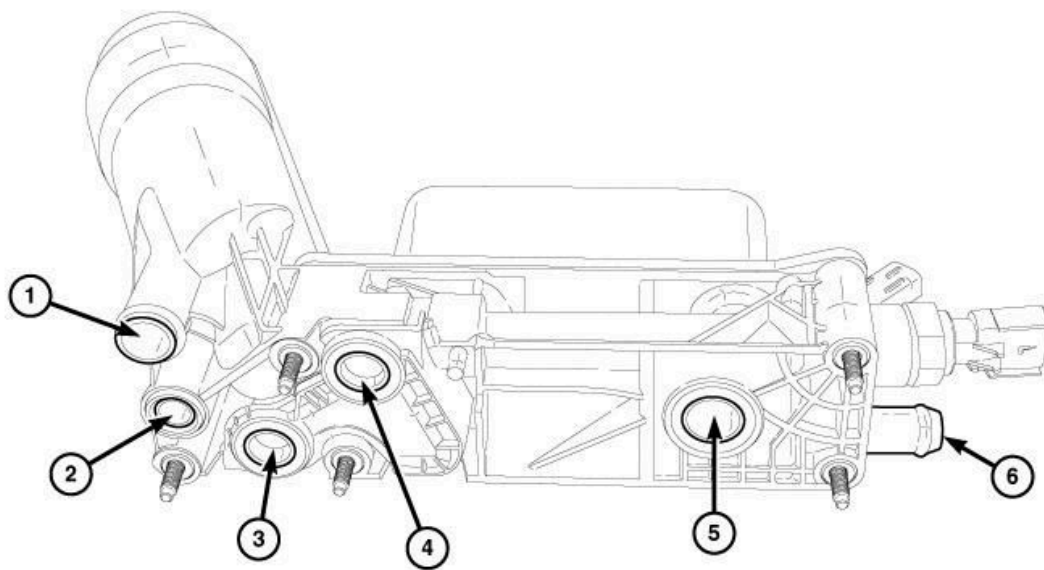


2826514

Fig. 433: Oil Filter Housing
Courtesy of CHRYSLER GROUP, LLC

The oil cooler is attached to the top of the oil filter housing which is located in the V of the cylinder block. The oil cooler is a plate style coolant-to-oil heat exchanger.

OPERATION

OPERATION

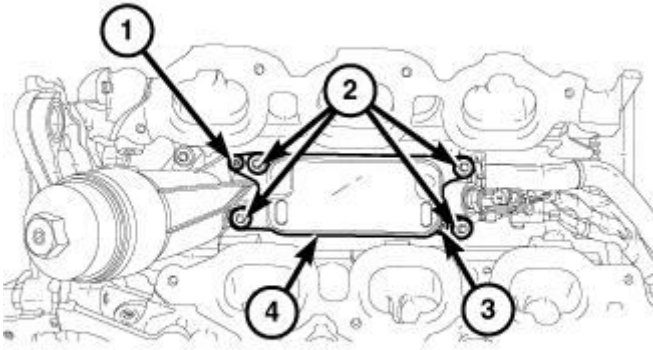
2826564

Fig. 434: Oil Flow & Coolant Flow Locations
Courtesy of CHRYSLER GROUP, LLC

Oil flows from the engine oil pump to the oil filter housing inlet (1) and to the oil filter element located within the oil filter housing. After the oil is filtered it travels internally through the engine oil cooler and then to the main oil gallery (5).

Coolant flows from the right cylinder block water jacket (3) and from the left cylinder block water jacket (4) into the housing. The coolant flows through the oil cooler and exits the housing from the rear hose nipple (6) where it is returned to the water pump. A coolant by-pass in the housing is designed to direct excessive coolant flow around the oil cooler for continuous circulation.

REMOVAL**REMOVAL**



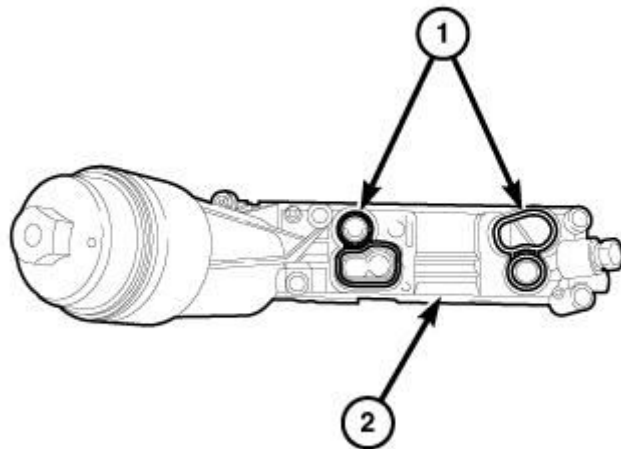
2707169

Fig. 435: Oil Cooler & Fasteners

Courtesy of CHRYSLER GROUP, LLC

NOTE: The oil cooler can not be cleaned out. In the event that the engine requires rebuilding or replacement, replace the oil cooler.

1. Perform the fuel pressure release procedure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE**.
2. Disconnect and isolate the negative battery cable.
3. Drain the cooling system. Refer to **STANDARD PROCEDURE**.
4. Remove the air cleaner housing assembly, upper and lower intake manifolds. Refer to **MANIFOLD, INTAKE, REMOVAL**.
5. Remove four bolts (2) and two screws (1) and (3).
6. Remove the oil cooler (4).



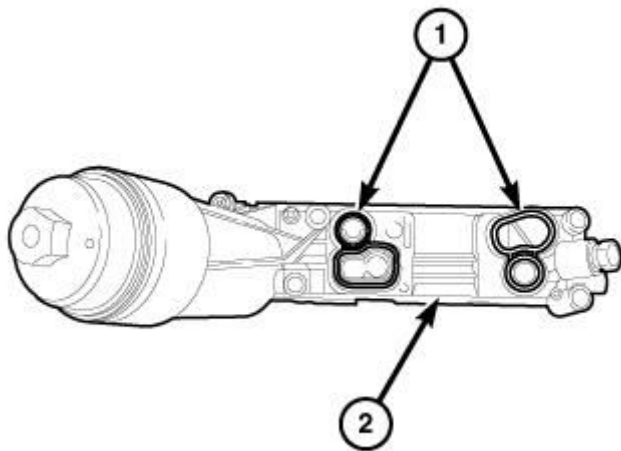
2710718

Fig. 436: Oil Cooler Seals & Oil Filter Housing
Courtesy of CHRYSLER GROUP, LLC

7. Remove and discard the oil cooler seals (1).

INSTALLATION

INSTALLATION



2710718

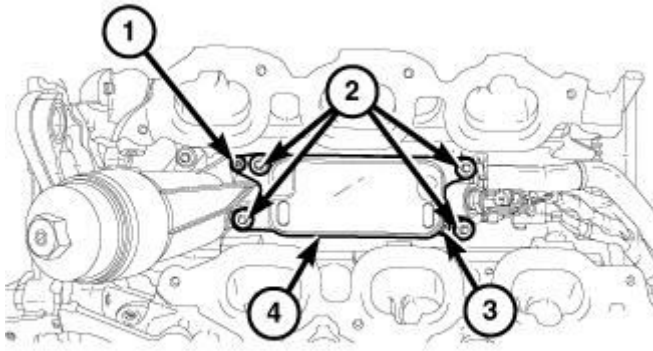
Fig. 437: Oil Cooler Seals & Oil Filter Housing
Courtesy of CHRYSLER GROUP, LLC

NOTE: Always use new dry seals (1) when installing the oil cooler. Do not lubricate the seals.

1. Clean and prepare the sealing surfaces of the oil cooler and the oil filter housing. Refer to **ENGINE**,

STANDARD PROCEDURE .

2. Install the new oil cooler seals (1) onto the oil filter housing (2).



2707169

Fig. 438: Oil Cooler & Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Position the oil cooler (4) on the oil filter housing.
4. Install two screws (1) and (3). Tighten the screws to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
5. Install four bolts (2) and tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
6. Install the upper and lower intake manifolds and air cleaner housing assembly. Refer to **MANIFOLD, INTAKE, INSTALLATION**.
7. Fill the engine crankcase with the proper oil to the correct level. Refer to **OIL, STANDARD PROCEDURE** .
8. Connect the negative battery cable and tighten nut to the proper specification. Refer to **SPECIFICATIONS** .
9. Fill the cooling system. Refer to **STANDARD PROCEDURE** .
10. Operate the engine until it reaches normal operating temperature. Check cooling system for correct fluid level. Refer to **STANDARD PROCEDURE** .

FILTER, ENGINE OIL**REMOVAL****REMOVAL**

All engines are equipped with a high quality full-flow, disposable type oil filter. Chrysler Corporation recommends a Mopar® or equivalent oil filter be used.

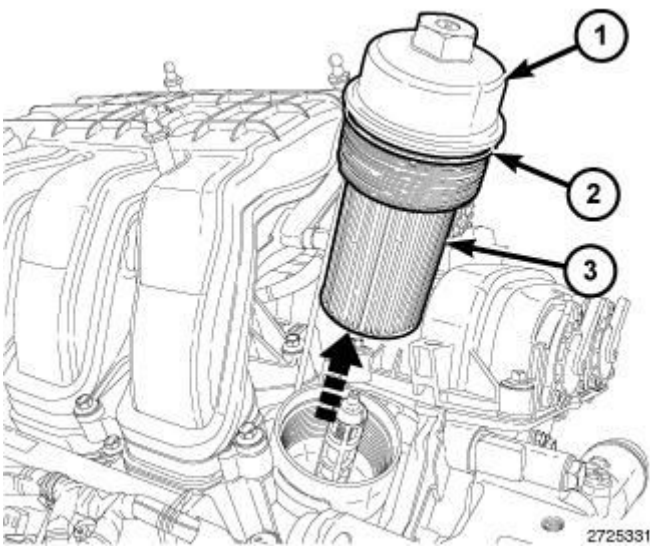


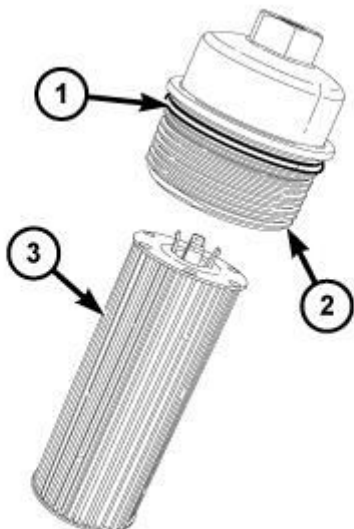
Fig. 439: Oil Filter Cap, O-Ring Seal & Oil Filter
Courtesy of CHRYSLER GROUP, LLC

CAUTION: When performing an engine oil change, the oil filter cap must be removed. Removing the oil filter cap releases oil held within the oil filter cavity and allows it to drain into the sump. Failure to remove the cap prior to reinstallation of the drain plug will not allow complete draining of the used engine oil.

1. Place an oil absorbent cloth around the oil filter housing at the base of the oil filter cap.

NOTE: The oil filter is attached to the oil filter cap.

2. Rotate the oil filter cap (1) counterclockwise and remove.



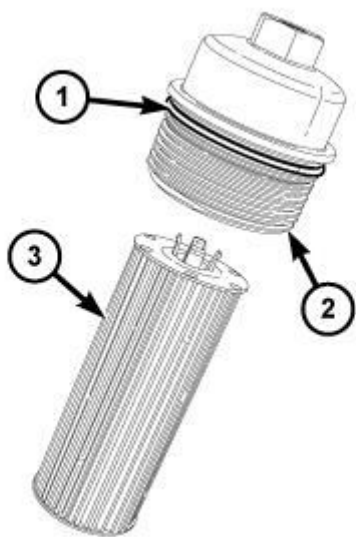
2725399

Fig. 440: O-Ring Seal, Oil Filter Cap & Oil Filter
Courtesy of CHRYSLER GROUP, LLC

3. Remove the oil filter (3) from the oil filter cap (2).
4. Remove and discard the O-ring seal (1).

INSTALLATION

INSTALLATION



2725399

Fig. 441: O-Ring Seal, Oil Filter Cap & Oil Filter
Courtesy of CHRYSLER GROUP, LLC

NOTE: It is not necessary to pre-oil the oil filter or fill the oil filter housing.

1. Lightly lubricate the new O-ring seal (1) with clean engine oil.
2. Install the O-ring seal (1) on the filter cap (2).
3. Install the new oil filter (3) into the oil filter cap (2).

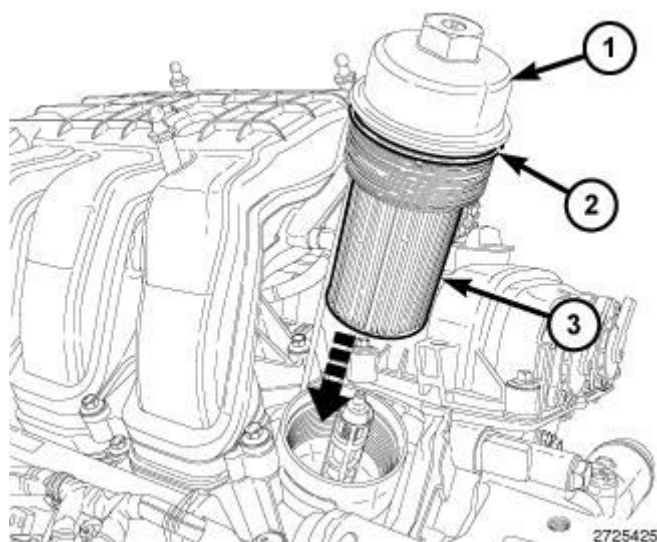


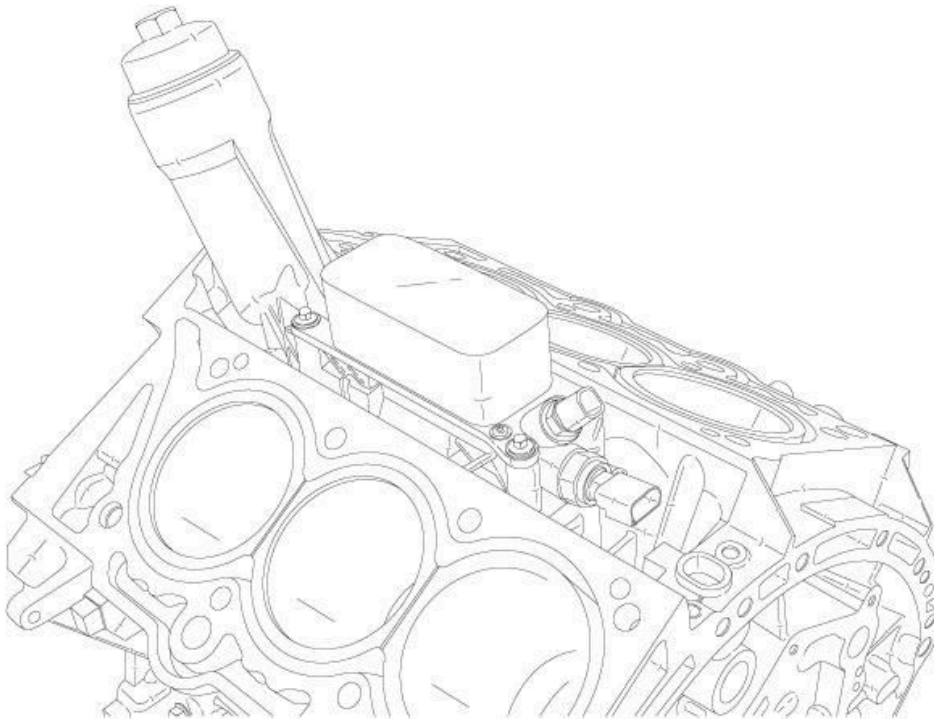
Fig. 442: Oil Filter Cap, O-Ring Seal & Oil Filter
Courtesy of CHRYSLER GROUP, LLC

4. Thread the oil filter cap (1) into the oil filter housing and tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
5. Add oil, verify crankcase oil level and start engine. Inspect for oil leaks. Refer to **OIL, STANDARD PROCEDURE** .

HOUSING, OIL FILTER

DESCRIPTION

DESCRIPTION

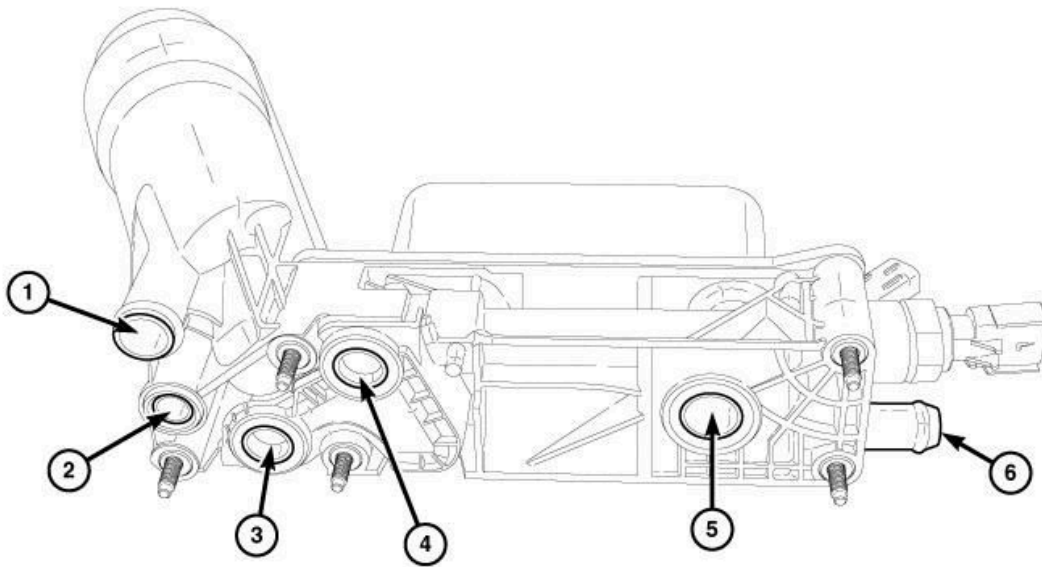


2826514

Fig. 443: Oil Filter Housing**Courtesy of CHRYSLER GROUP, LLC**

The oil filter housing is located in the V of the cylinder block. The oil filter element is located within the housing and the engine oil cooler is attached to the top of the housing. Both the oil pressure and oil temperature sensors are located at the rear of the housing.

OPERATION**OPERATION**



2826564

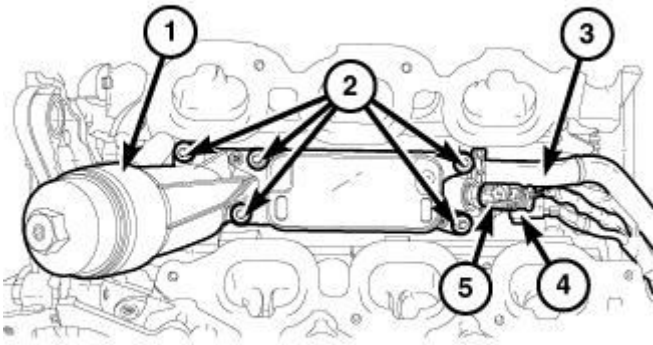
Fig. 444: Oil Flow & Coolant Flow Locations
Courtesy of CHRYSLER GROUP, LLC

Oil flows from the engine oil pump to the oil filter housing inlet (1) and to the oil filter element located within the oil filter housing. After the oil is filtered and then cooled it travels to the main oil gallery (5). An oil filter by-pass is built into the housing and is not serviceable. Removing the oil filter cap from the housing allows oil to drain from the oil filter cavity into to the crankcase (2).

Coolant flows from the right cylinder block water jacket (3) and from the left cylinder block water jacket (4) into the housing. The coolant flows through the oil cooler and exits the housing from the rear hose nipple (6) where it is returned to the water pump. A coolant by-pass in the housing is designed to direct excessive coolant flow around the oil cooler for continuous circulation.

REMOVAL

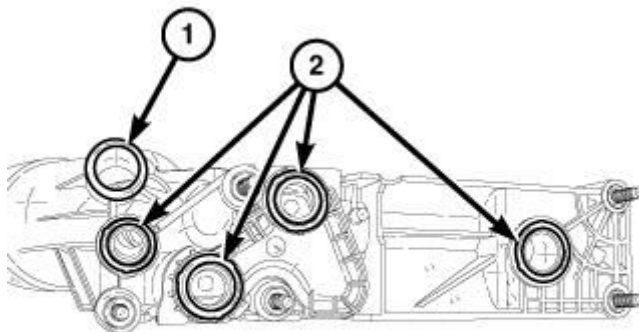
REMOVAL



2707704

Fig. 445: Oil Temperature Sensor Electrical Connector, Oil Pressure Sensor Electrical Connector, Oil Filter Housing, Heater Hose & Bolts
 Courtesy of CHRYSLER GROUP, LLC

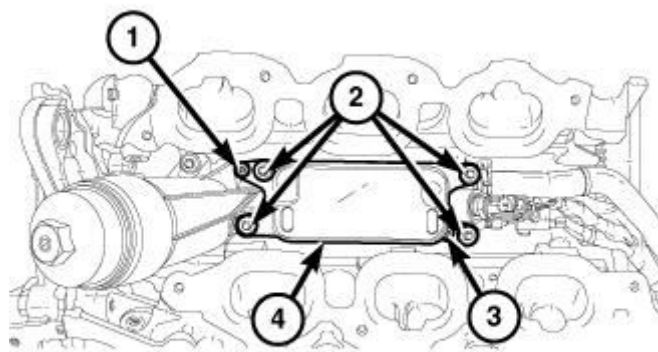
1. Perform the fuel system pressure release procedure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE** .
2. Disconnect and isolate the negative battery cable.
3. Drain the cooling system. Refer to **STANDARD PROCEDURE** .
4. Remove the lower intake manifold. Refer to **MANIFOLD, INTAKE, REMOVAL**.
5. Disconnect the oil temperature sensor electrical connector (5).
6. Disconnect the oil pressure sensor electrical connector (4).
7. Remove five bolts (2) and remove the oil filter housing (1).
8. Lift the oil filter housing and remove the heater hose (3).



2707844

Fig. 446: Oil Filter Housing Seals & O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

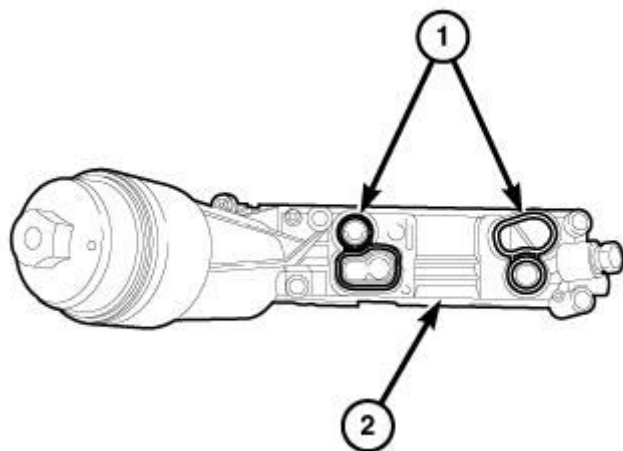
9. Remove and discard the oil filter housing seals (2). The O-ring seal (1) can be reused.



2707169

Fig. 447: Oil Cooler & Fasteners
Courtesy of CHRYSLER GROUP, LLC

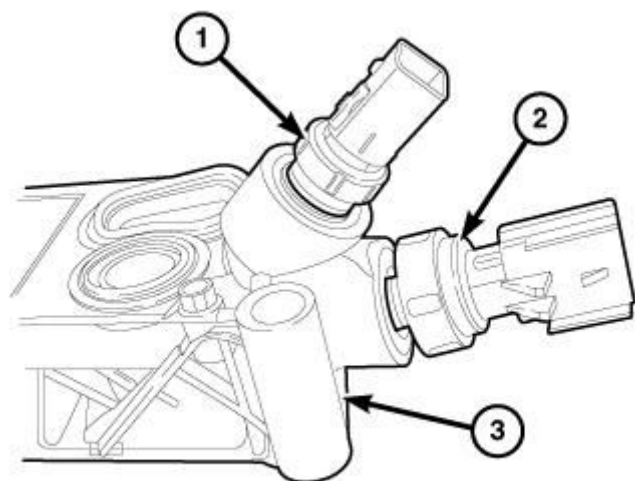
10. If required, remove the two screws (1, 3) and remove the oil cooler (4) from the oil filter housing.



2710718

Fig. 448: Oil Cooler Seals & Oil Filter Housing
Courtesy of CHRYSLER GROUP, LLC

11. Remove and discard the oil cooler seals (1).



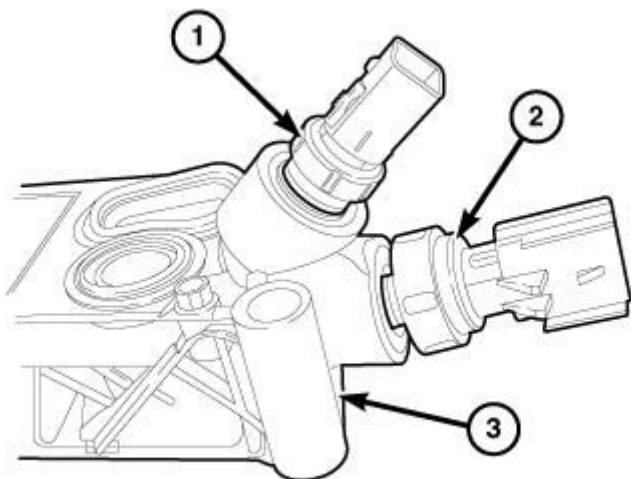
2710795

Fig. 449: Oil Temperature Sensor, Oil Pressure Sensor & Oil Filter Housing
 Courtesy of CHRYSLER GROUP, LLC

12. If required, remove the oil temperature sensor (1) from the oil filter housing (3).
13. If required, remove the oil pressure sensor (2) from the oil filter housing (3).

INSTALLATION

INSTALLATION

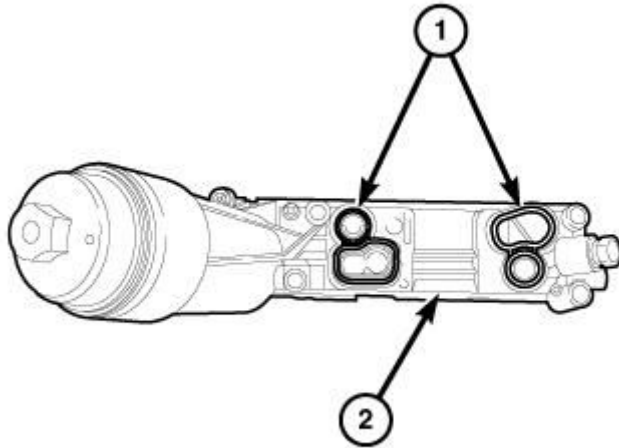


2710795

Fig. 450: Oil Temperature Sensor, Oil Pressure Sensor & Oil Filter Housing
 Courtesy of CHRYSLER GROUP, LLC

1. If removed, install the oil pressure sensor (2) and tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS**.

2. If removed, install the oil temperature sensor (1) and tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .

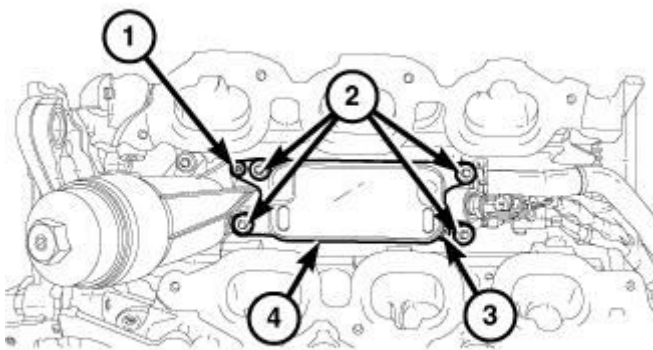


2710718

Fig. 451: Oil Cooler Seals & Oil Filter Housing
Courtesy of CHRYSLER GROUP, LLC

NOTE: Always use new dry seals (1) when installing the oil cooler. Do not lubricate the seals.

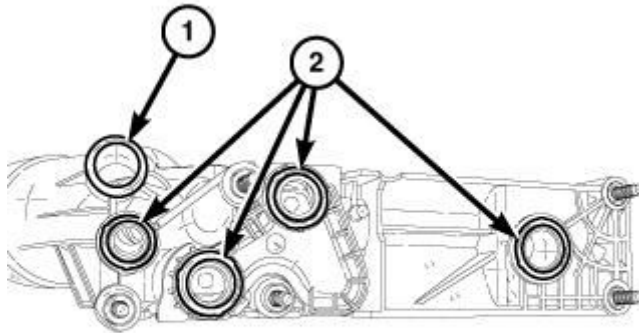
3. If removed, install the new oil cooler seals (1) onto the oil filter housing (2).



2707169

Fig. 452: Oil Cooler & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. If removed, position the oil cooler (4) on the oil filter housing.

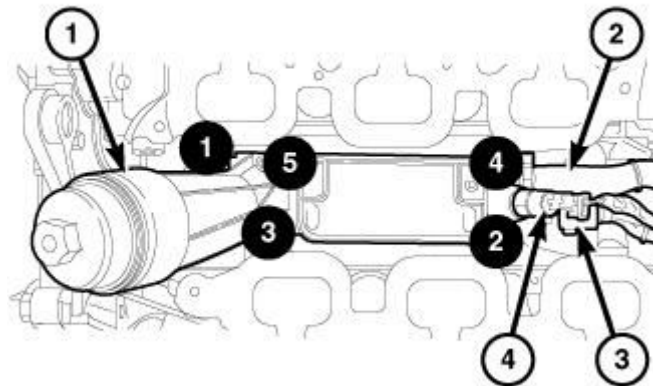


2707844

Fig. 453: Oil Filter Housing Seals & O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

NOTE: Always use new dry seals (2) when installing the oil filter housing. Lubricate the O-ring seal with clean engine oil prior to installation.

5. Install new oil filter housing seals (2) onto the oil filter housing.



2710852

Fig. 454: Heater Hose, Electrical Connectors, Oil Filter Housing & Bolt Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

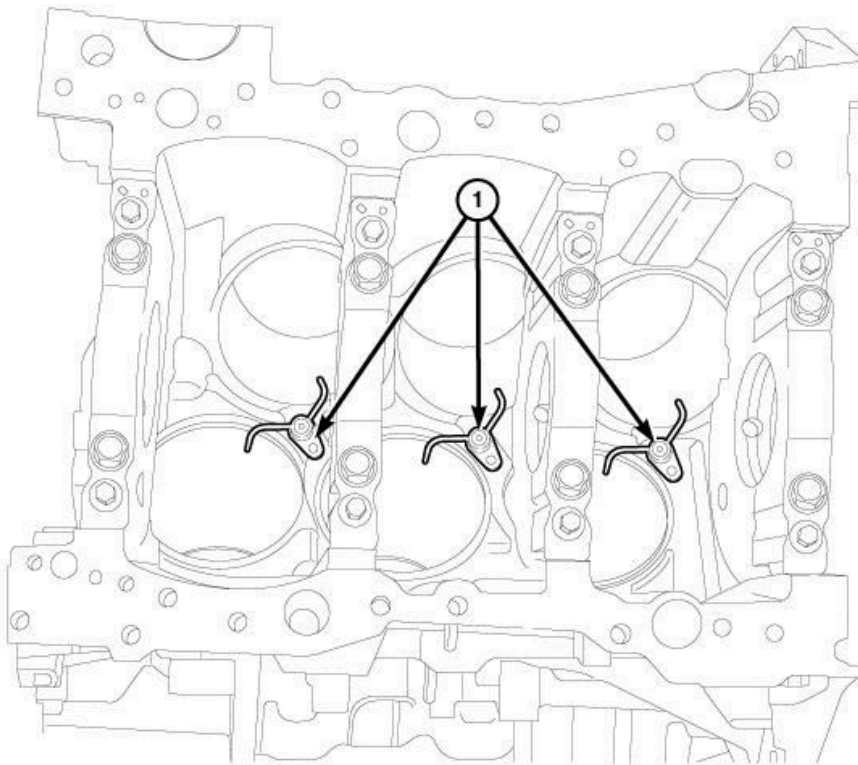
6. Install the heater hose (2) to the oil filter housing (1).
7. Position the oil filter housing (1) on the engine block.
8. Install five bolts and tighten in the sequence shown in illustration to the proper specification. Refer to **TORQUE SPECIFICATIONS**.

9. Connect the oil pressure sensor electrical connector (3).
10. Connect the oil temperature sensor electrical connector (4).
11. Install the lower intake manifold. Refer to **MANIFOLD, INTAKE, INSTALLATION**.
12. If required, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL, STANDARD PROCEDURE**.
13. Connect the negative battery cable and tighten the nut to the proper specification. Refer to **SPECIFICATIONS**.
14. Fill the cooling system. Refer to **STANDARD PROCEDURE**.
15. Operate the engine until it reaches normal operating temperature. Check cooling system for correct fluid level. Refer to **STANDARD PROCEDURE**.

JET, PISTON OIL COOLER

DESCRIPTION

DESCRIPTION



2867027

Fig. 455: Engine Blocked-Mounted Oil Jets
Courtesy of CHRYSLER GROUP, LLC

The Piston Oil Cooler Jet (1) is used to aid in the cooling of the pistons and the cylinder walls. There are three Piston Oil Cooler Jets used. Each jet is supplied oil by the main oil gallery. The oil is sprayed upwards onto the bottom of the pistons and sides of the cylinder walls. A Piston Oil Cooler Jet is mounted to the engine block under each pair of opposing cylinders.

Each jet has a check valve that closes below 241 kPa (35 psi) to maintain ample oil pressure at idle. All three oil jets are identical and seal to the engine block using an O-ring and fastener.

REMOVAL

REMOVAL

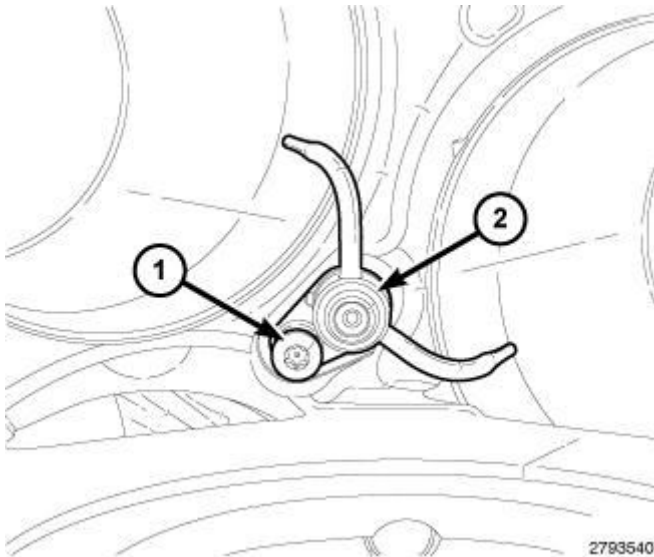


Fig. 456: Piston Oil Cooler Jet & Bolt
Courtesy of CHRYSLER GROUP, LLC

NOTE: Piston oil cooler jet for cylinders one/two shown in illustration. Piston oil cooler jets for cylinders three/four and five/six are similar.

1. Remove the crankshaft. Refer to **CRANKSHAFT, REMOVAL**.
2. Remove the bolt (1) and the piston oil cooler jet(s) (2) from the engine block.

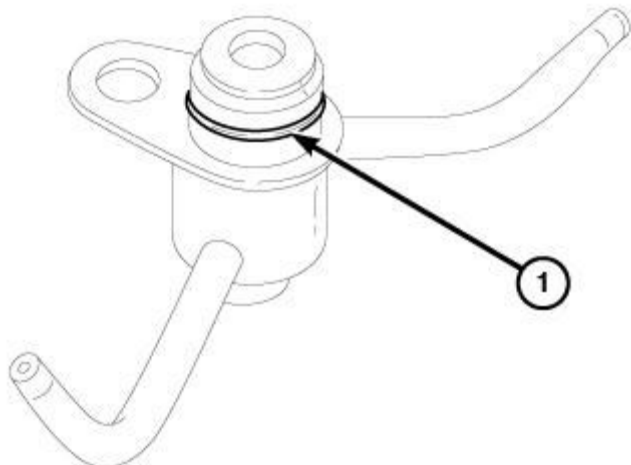


Fig. 457: Piston Oil Cooler Jet O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

3. Remove and discard the O-ring seal (1) from the piston oil cooler jet(s).

INSTALLATION

INSTALLATION

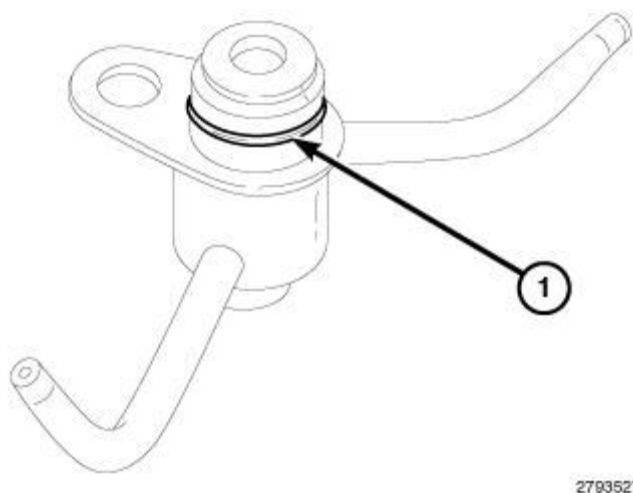


Fig. 458: Piston Oil Cooler Jet O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

1. Lubricate a new O-ring seal (1) with engine oil and install on the piston oil cooler jet(s).

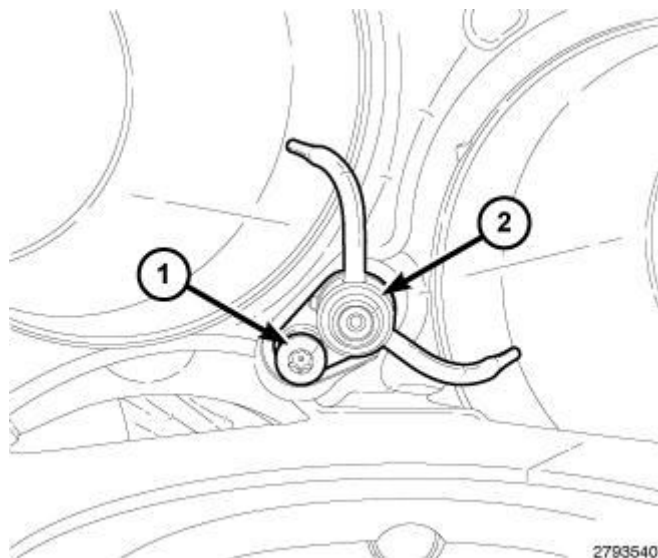


Fig. 459: Piston Oil Cooler Jet & Bolt
Courtesy of CHRYSLER GROUP, LLC

NOTE: **Piston oil cooler jet for cylinders one/two shown in illustration. Piston oil cooler jets for cylinders three/four and five/six are similar.**

2. Install the piston oil cooler jet(s) (2) into the engine block and tighten the retaining bolt (1) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
3. Install the crankshaft. Refer to **CRANKSHAFT, INSTALLATION**.
4. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL, STANDARD PROCEDURE** .
5. Fill the cooling system. Refer to **STANDARD PROCEDURE** .
6. Connect the negative battery cable and tighten the nut to the proper specification. Refer to **SPECIFICATIONS** .
7. Run the engine until it reaches normal operating temperature. Check cooling system for correct fluid level. Refer to **STANDARD PROCEDURE** .

OIL

STANDARD PROCEDURE

STANDARD PROCEDURE - ENGINE OIL AND FILTER CHANGE

ENGINE OIL SERVICE

WARNING: New or used engine oil can be irritating to the skin. Avoid prolonged or repeated skin contact with engine oil. Contaminants in used engine oil, caused by internal combustion, can be hazardous to your health. Thoroughly wash exposed skin with soap and water. Do not wash skin with gasoline, diesel fuel, thinner, or solvents, health problems can result. Do not pollute, dispose of used engine oil properly. Contact your dealer or government agency for location of collection center in your area.

Change the engine oil and filter at mileage and time intervals described in the Maintenance Schedule. Refer to **MAINTENANCE SCHEDULES, DESCRIPTION** .

1. Run the engine until achieving normal operating temperature.
2. Position the vehicle on a level surface and turn the engine off.
3. Remove the engine cover.

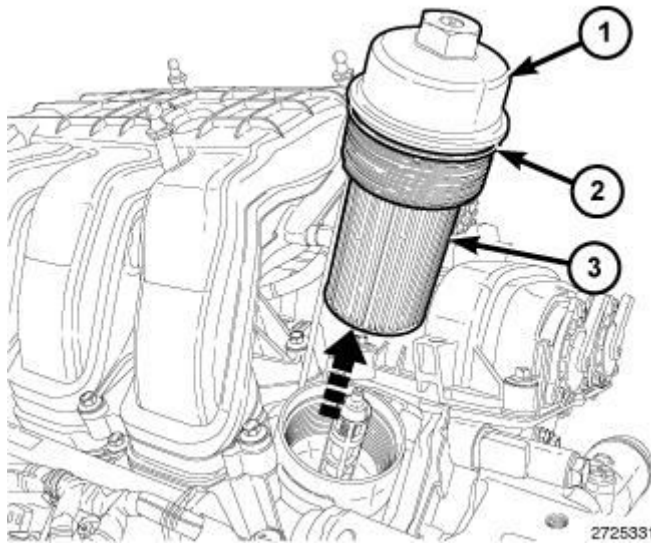


Fig. 460: Oil Filter Cap, O-Ring Seal & Oil Filter
Courtesy of CHRYSLER GROUP, LLC

CAUTION: When performing an engine oil change, the oil filter cap must be removed. Removing the oil filter cap releases oil held within the oil filter cavity and allows it to drain into the sump. Failure to remove the cap prior to reinstallation of the drain plug will not allow complete draining of the used engine oil.

4. Place an oil absorbent cloth around the oil filter housing at the base of the oil filter cap.

NOTE: The oil filter is attached to the oil filter cap.

5. Rotate the oil filter cap (1) counterclockwise and remove.
6. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.



Fig. 461: Crankcase Drain Plug
Courtesy of CHRYSLER GROUP, LLC

7. Place a suitable drain pan under the crankcase drain plug (1).
8. Remove the drain plug (1) from oil pan and allow the oil to drain into the drain pan. Inspect the drain plug threads for stretching or other damage. Replace the drain plug and gasket if damaged.
9. Install the drain plug (1) in the oil pan and tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
10. Lower the vehicle.

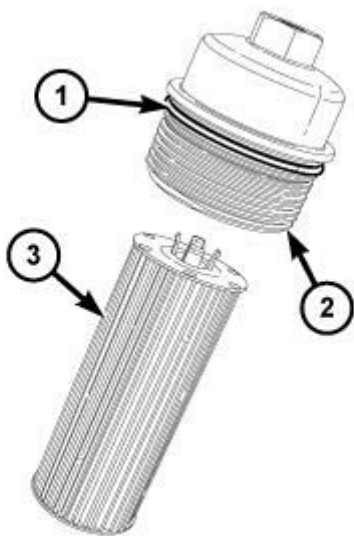


Fig. 462: O-Ring Seal, Oil Filter Cap & Oil Filter
Courtesy of CHRYSLER GROUP, LLC

11. Remove the oil filter (3) from the oil filter cap (2).

12. Remove and discard the O-ring seal (1).

NOTE: It is not necessary to pre-oil the oil filter or fill the oil filter housing.

13. Lightly lubricate the new O-ring seal (1) with clean engine oil.
14. Install the O-ring seal (1) on the filter cap (2).
15. Install the new oil filter (3) into the oil filter cap (2).

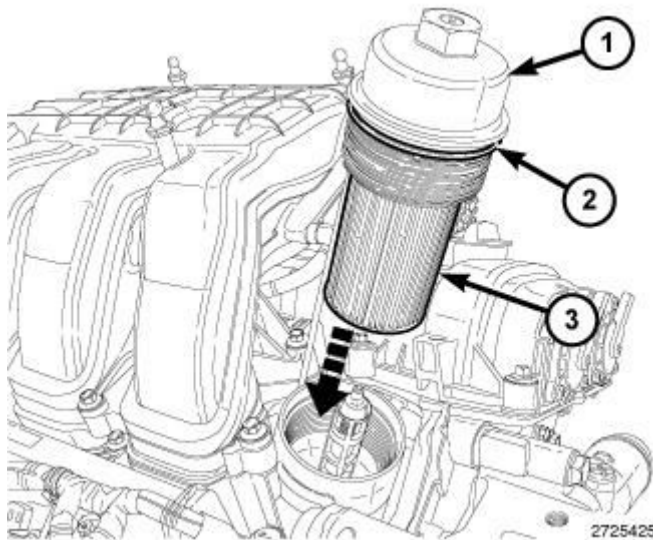


Fig. 463: Oil Filter Cap, O-Ring Seal & Oil Filter
Courtesy of CHRYSLER GROUP, LLC

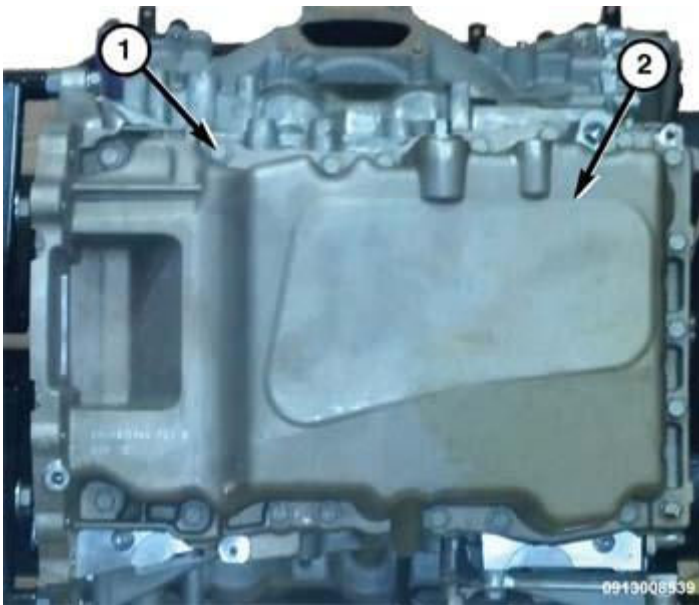
16. Thread the oil filter cap (1) into the oil filter housing and tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
17. Remove the oil fill cap. Fill the crankcase with the specified type and amount of engine oil. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** .
18. Install the oil fill cap.
19. Start the engine and inspect for leaks.
20. Stop the engine and check the oil level.
21. Install the engine cover.

OIL FILTER SPECIFICATION

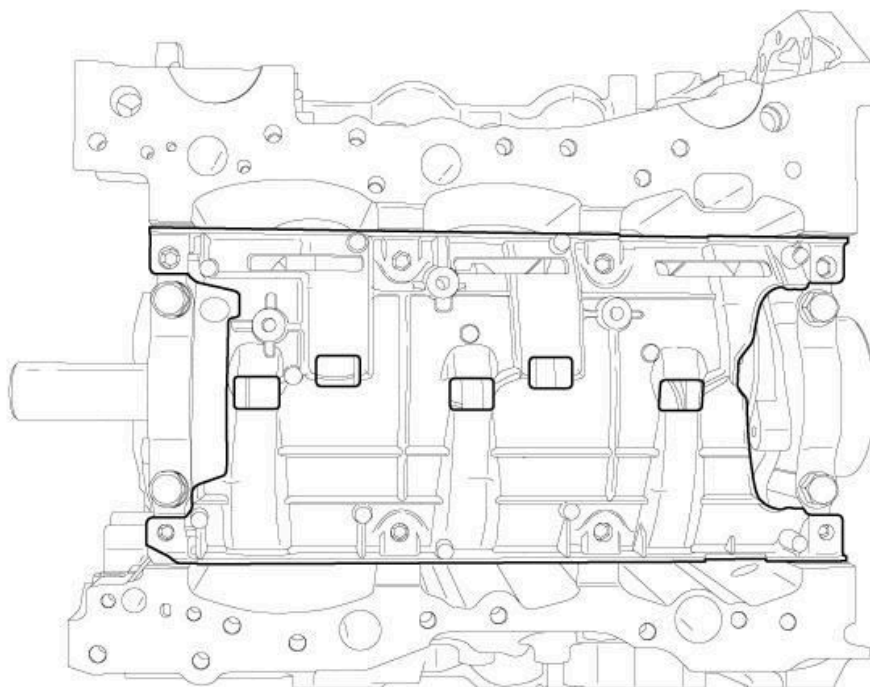
All engines are equipped with a high quality full-flow, disposable type oil filter. When replacing oil filter, use a Mopar® filter or equivalent.

USED ENGINE OIL DISPOSAL

Care should be exercised when disposing of used engine oil after it has been drained from a vehicle engine. Refer to WARNING under **ENGINE OIL SERVICE**.

PAN, OIL**DESCRIPTION****DESCRIPTION****ONE PIECE****Fig. 464: One-Piece Oil Pan****Courtesy of CHRYSLER GROUP, LLC**

The oil pan (2) is cast aluminum and also serves as the lower end structural support. The oil pan is sealed using Mopar® Threebond Engine RTV Sealant.

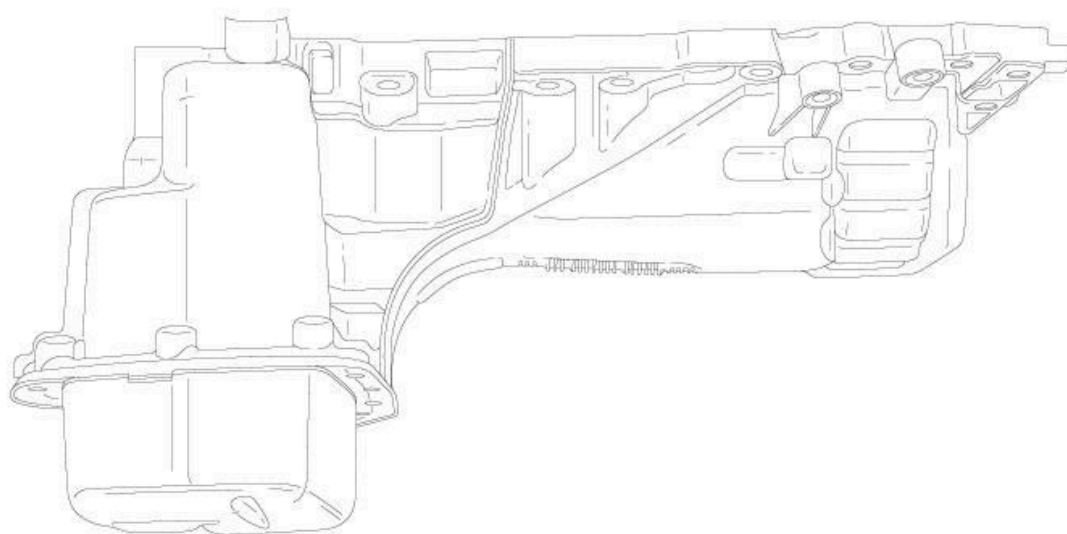


2830423

Fig. 465: Windage Tray**Courtesy of CHRYSLER GROUP, LLC**

The high pressure die cast aluminum windage tray is mounted to the main bearing caps and is designed to keep oil off of the connecting rods as the crankshaft rotates. When the oil is kept off the connecting rods, the engine rotates easier and oil foaming decreases. Like the oil pan, the windage tray is designed to stiffen the lower end of the engine. The tray is directional and the main bearing cap bolts hold it in place.

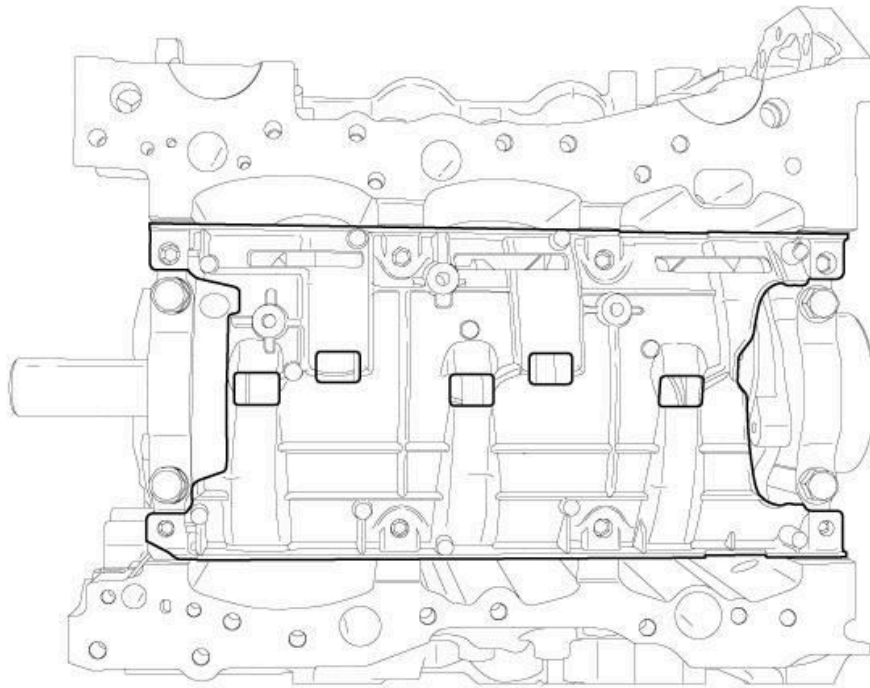
TWO PIECE



2830282

Fig. 466: Upper & Lower Oil Pan**Courtesy of CHRYSLER GROUP, LLC**

There is an upper and lower oil pan. The upper oil pan is cast aluminum and also serves as the lower end structural support. The lower pan is a stamped steel design. Both upper and lower oil pans are sealed using Mopar® Threebond Engine RTV Sealant. The lower oil pan must be removed in order to access all of the upper oil pan attaching bolts.



2830423

Fig. 467: Windage Tray**Courtesy of CHRYSLER GROUP, LLC**

The high pressure die cast aluminum windage tray is mounted to the main bearing caps and is designed to keep oil off of the connecting rods as the crankshaft rotates. When the oil is kept off the connecting rods, the engine rotates easier and oil foaming decreases. Like the oil pan, the windage tray is designed to stiffen the lower end of the engine. The tray is directional and the main bearing cap bolts hold it in place.

REMOVAL**ONE PIECE**

1. Disconnect and isolate the negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Remove the belly pan.
4. Drain the engine oil. Refer to **OIL, STANDARD PROCEDURE** .
5. Remove the crossunder pipe. Refer to **PIPE, EXHAUST CROSSUNDER, REMOVAL** .

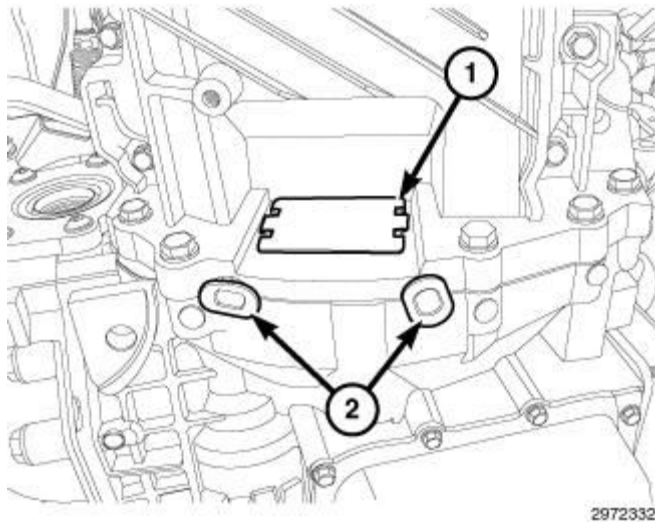


Fig. 468: Torque Converter Housing Dust Cover & Rubber Plugs
 Courtesy of CHRYSLER GROUP, LLC

6. Remove the oil pan to transmission bolts.
7. Remove the torque converter bolt access cover (1).
8. Remove two rubber plugs (2) covering the rear oil seal retainer flange bolts.

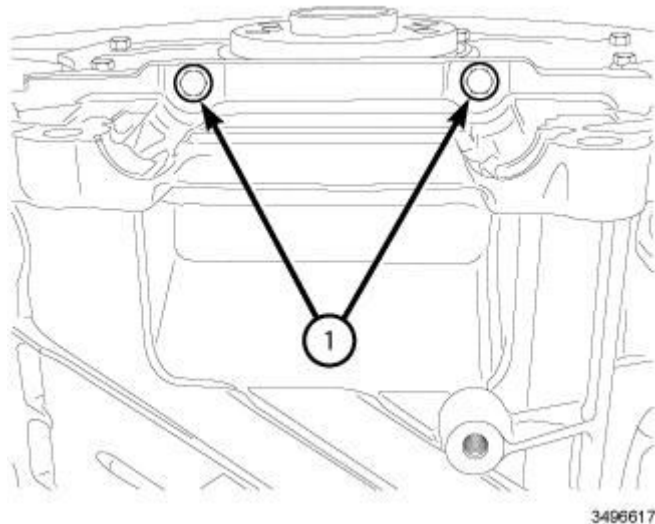


Fig. 469: Rear Oil Seal Retainer Flange Bolts
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Shown in illustration with transmission removed for clarity.

CAUTION: There are two hidden M6 bolts that must be removed from the rear of the upper oil pan flange. If these bolts are not removed, the rear oil seal retainer flange will be severely damaged.

9. Remove the bolts (1) from the rear oil seal retainer flange.

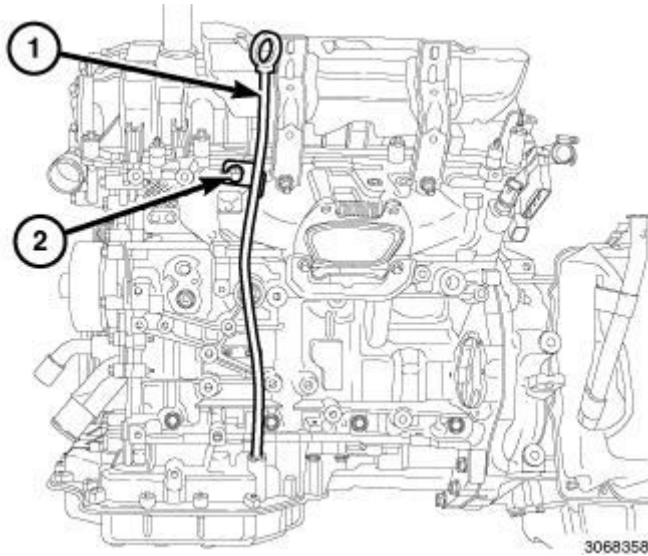


Fig. 470: Oil Level Indicator Tube & Bolt
Courtesy of CHRYSLER GROUP, LLC

10. Remove the nut (2) that secures the oil indicator tube (1) to the cylinder head.

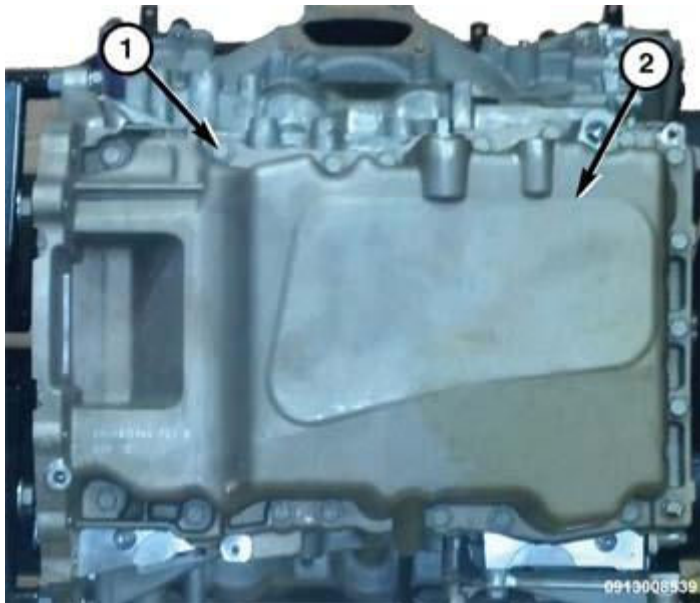


Fig. 471: One-Piece Oil Pan
Courtesy of CHRYSLER GROUP, LLC

11. Remove the oil pan mounting bolts (1).
12. Using the pry points, carefully remove the upper oil pan.
13. Remove all residual sealant (1) from the upper and lower oil pans, timing chain cover, rear seal retainer and engine block mating surfaces. Refer to **PAN, OIL, CLEANING**.

TWO PIECE

LOWER

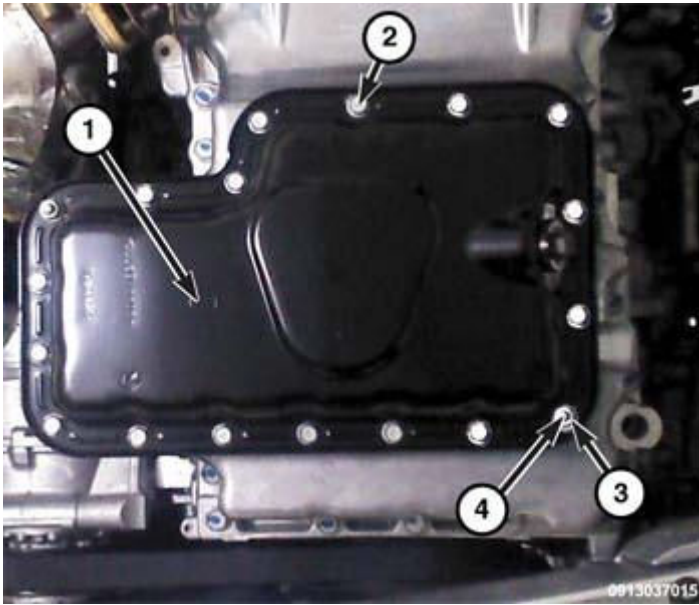


Fig. 472: Lower Oil Pan & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Drain the engine oil. Refer to **OIL, STANDARD PROCEDURE** .
3. Remove the front skid plate. Refer to **PLATE, SKID, FRONT, REMOVAL** .

NOTE: **The lower oil pan must be removed to access all of the upper oil pan retaining bolts.**

4. Remove sixteen bolts (2), two nuts (3) and two studs (4) from the flange of the lower oil pan (1).

CAUTION: Do not pry on the lower oil pan flange. There are no designated pry points for lower oil pan removal. Prying on only one or a few locations could bend the flange and damage the pan.

5. Using care, apply a side force to the lower oil pan in order to shear the sealant bond and remove the pan.
6. Remove all residual sealant from the upper and lower oil pans. Refer to **PAN, OIL, CLEANING**.

UPPER

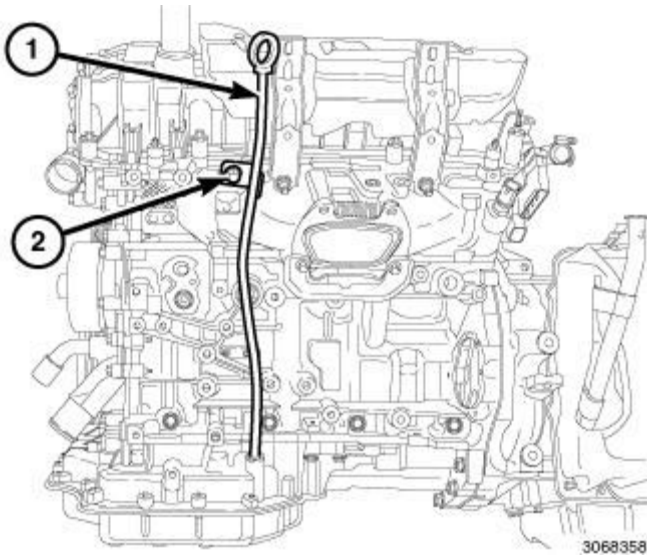


Fig. 473: Oil Level Indicator Tube & Bolt
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. **Loosen** the bolt (2) that secures the oil level indicator tube (1) to the cylinder head.
3. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
4. Remove the front and middle skid plates. Refer to **PLATE, SKID, FRONT, REMOVAL** .
5. Drain the engine oil. Refer to **OIL, STANDARD PROCEDURE** .

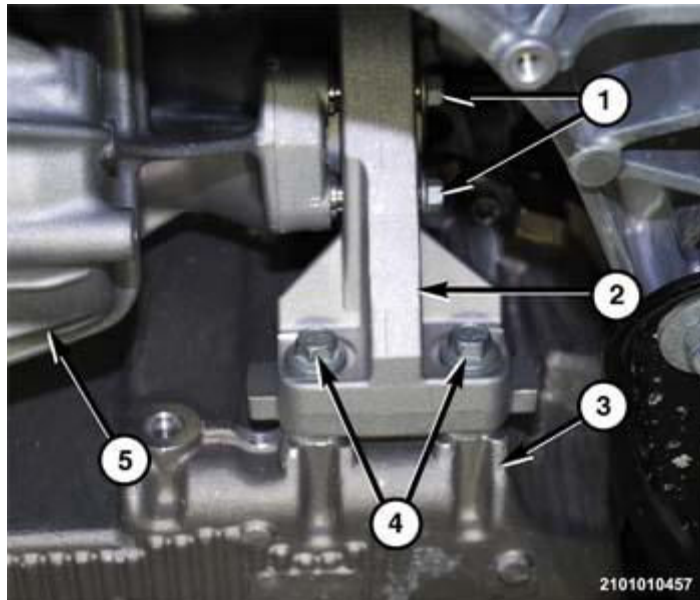


Fig. 474: PTU Support Bracket & Bolts At Block & Oil Pan
Courtesy of CHRYSLER GROUP, LLC

6. Remove the bolts (4) that secure the Power Transfer Unit (PTU) support bracket (2) to the engine block

and oil pan (3).

7. Remove the bolts (1) that secure the support bracket to the PTU.
8. Remove the PTU support bracket from the vehicle.
9. Remove the crossunder pipe. Refer to **PIPE, EXHAUST CROSSUNDER, REMOVAL**.

NOTE: The lower oil pan must be removed to access all of the upper oil pan retaining bolts.

10. Remove the lower oil pan. Refer to **PAN, OIL, REMOVAL**.

CAUTION: There are two hidden M6 bolts that must be removed from the rear of the upper oil pan flange. If these bolts are not removed, the rear oil seal retainer flange will be severely damaged.

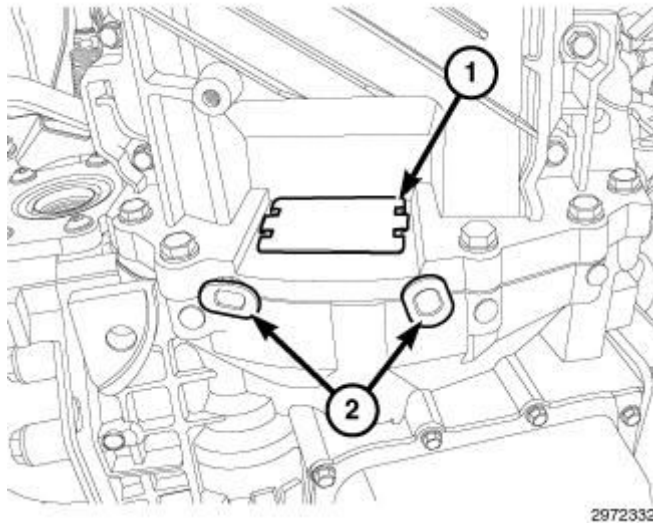


Fig. 475: Torque Converter Housing Dust Cover & Rubber Plugs
Courtesy of CHRYSLER GROUP, LLC

11. Remove the torque converter bolt access cover (1).
12. Remove two rubber plugs (2) covering the rear oil seal retainer flange bolts.

NOTE: Shown in illustration with transmission removed for clarity.

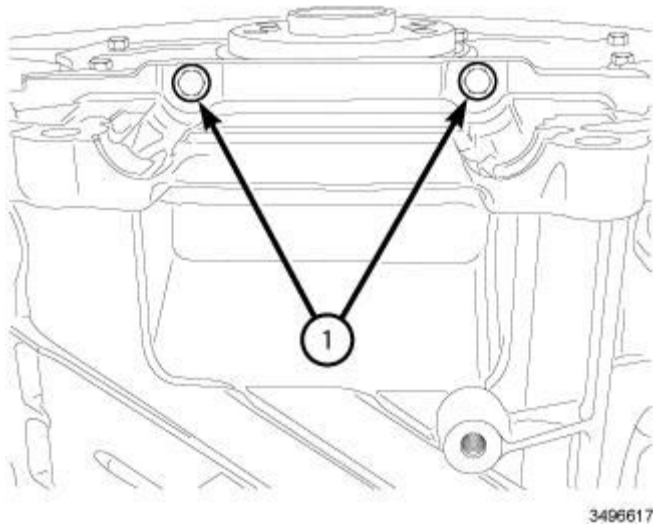


Fig. 476: Rear Oil Seal Retainer Flange Bolts
Courtesy of CHRYSLER GROUP, LLC

13. Remove the two bolts (1) from the rear oil seal retainer flange.

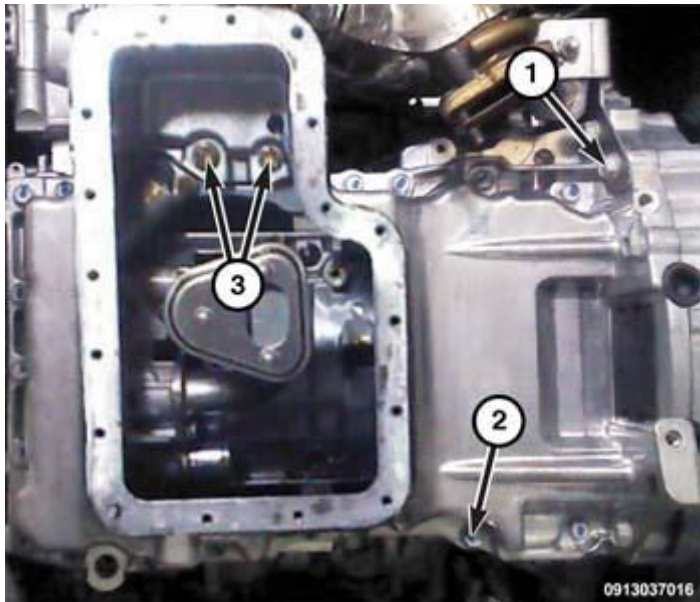


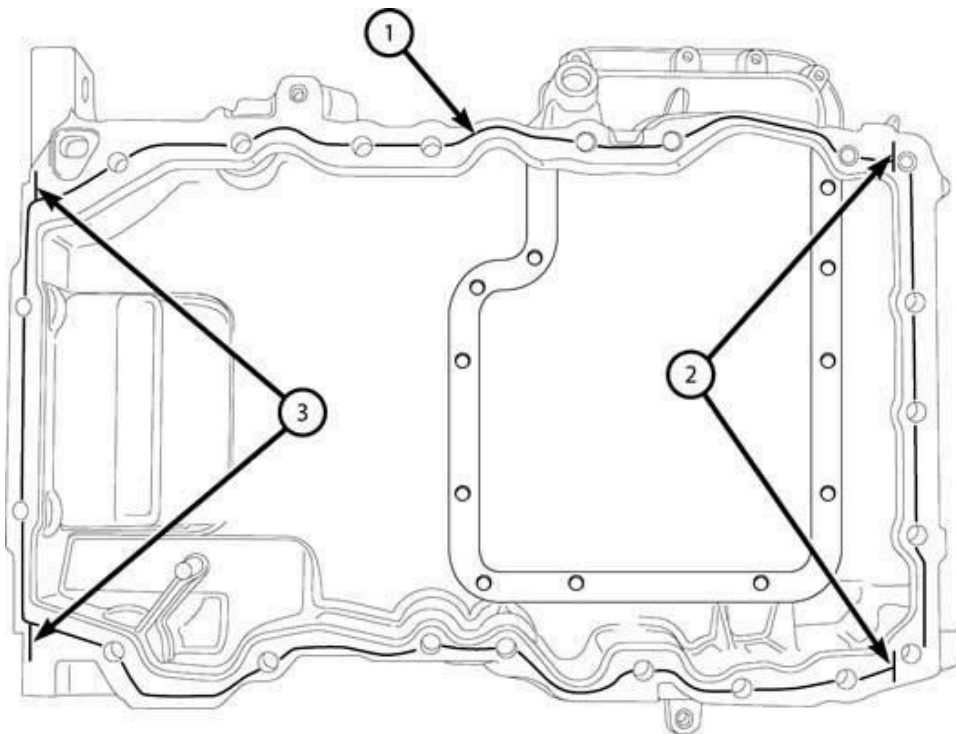
Fig. 477: Removing/Installing Upper Oil Pan
Courtesy of CHRYSLER GROUP, LLC

14. Remove the five oil pan to transmission bolts (1).
15. Remove the bolts (2, 3) that secure the oil pan to the engine block.
16. Using the pry points, carefully remove the upper oil pan.
17. Remove all residual sealant (1) from the upper and lower oil pans, timing chain cover, rear seal retainer and engine block mating surfaces. Refer to **PAN, OIL, CLEANING**.

CLEANING

CLEANING

CAUTION: Clean the upper and lower oil pans, timing chain cover, rear seal retainer and engine block mating surfaces thoroughly with isopropyl alcohol in preparation for sealant application. All surfaces that seal with RTV must be oil and contamination free to ensure proper adhesion of the RTV to the mating surface to prevent leaks.



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Fig. 478: RTV Sealant

Courtesy of CHRYSLER GROUP, LLC

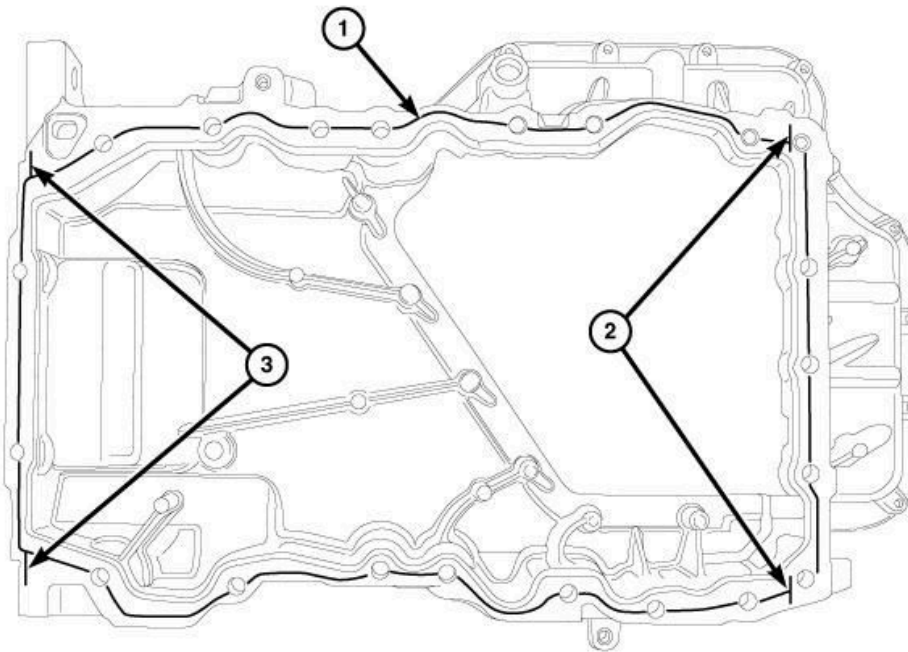
1. Clean the oil pan in solvent and wipe dry with a clean cloth.

CAUTION: Do not use oil based liquids, wire brushes, abrasive wheels or metal scrapers to clean the engine gasket surfaces. Use only isopropyl (rubbing) alcohol, along with plastic or wooden scrapers. Improper gasket surface preparation may result in engine fluid leakage.

2. Remove all residual sealant (1) from the oil pan. Refer to ENGINE, STANDARD PROCEDURE .

INSTALLATION

INSTALLATION



3078081

Fig. 479: Locating Sealant On Upper Oil Pan
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Engine assembly requires the use of a unique sealant that is compatible with engine oil. Using a sealant other than Mopar® Threebond Engine RTV Sealant may result in engine fluid leakage.

CAUTION: Clean the upper and lower oil pans, timing chain cover, rear seal retainer and engine block mating surfaces thoroughly with isopropyl alcohol in preparation for sealant application. All surfaces that seal with RTV must be oil and contamination free to ensure proper adhesion of the RTV to the mating surface to prevent leaks.

CAUTION: Following the application of Mopar® Threebond Engine RTV Sealant to the gasket surfaces, the components must be assembled within 20 minutes and the attaching fasteners must be tightened to specification within 45 minutes. Prolonged exposure to the air prior to assembly may result in engine fluid leakage.

1. Apply a 2 to 3 mm wide bead of Mopar® Threebond Engine RTV Sealant to the upper oil pan as shown in illustration in the following locations:
 - Oil pan to engine block flange (1)

- Two timing cover to engine block T-joints (2)
- Two rear seal retainer to engine block T-joints (3)

CAUTION: Make sure that the rear face of the oil pan is flush to the transmission bell housing before tightening any of the oil pan mounting bolts. A gap between the oil pan and the transmission could crack the oil pan or transmission casting.

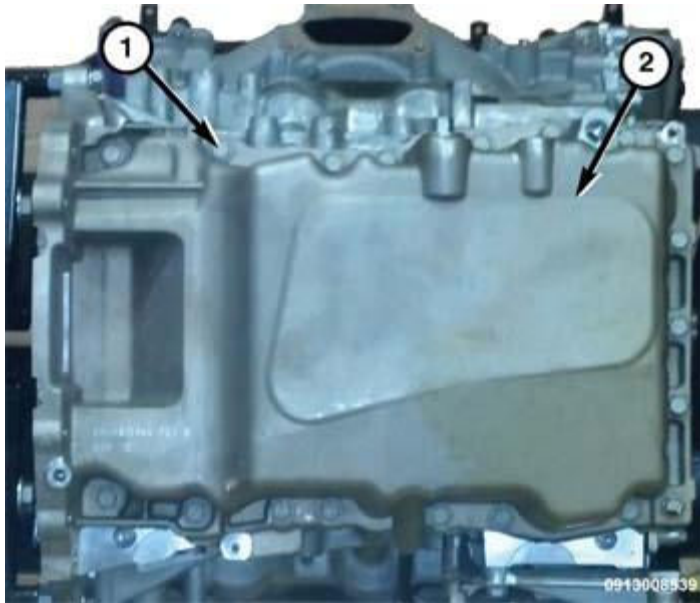


Fig. 480: One-Piece Oil Pan

Courtesy of CHRYSLER GROUP, LLC

2. Install the oil pan (2) to the engine block and flush to the transmission bell housing. Secure the oil pan to the engine block with the oil pan mounting bolts (1) finger tight.
3. Install the five oil pan to transmission bolts and tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
4. Tighten the oil pan mounting bolts to the proper specification. Refer to **TORQUE SPECIFICATIONS** .

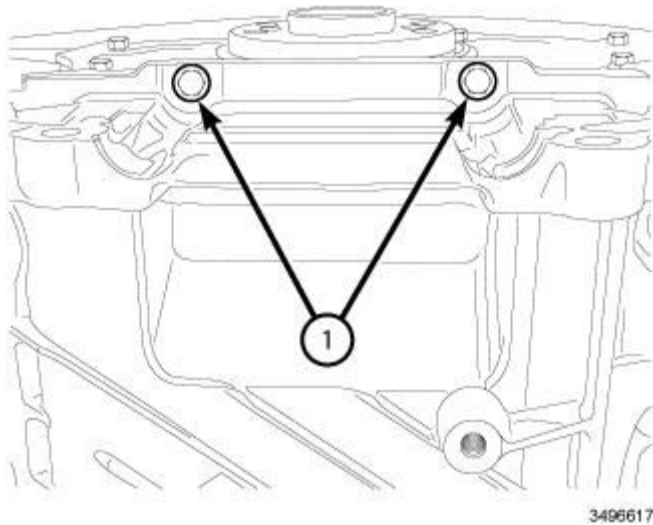


Fig. 481: Rear Oil Seal Retainer Flange Bolts
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Shown in illustration with transmission removed for clarity.

5. Install the two bolts (1) to the rear oil seal retainer flange and tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .

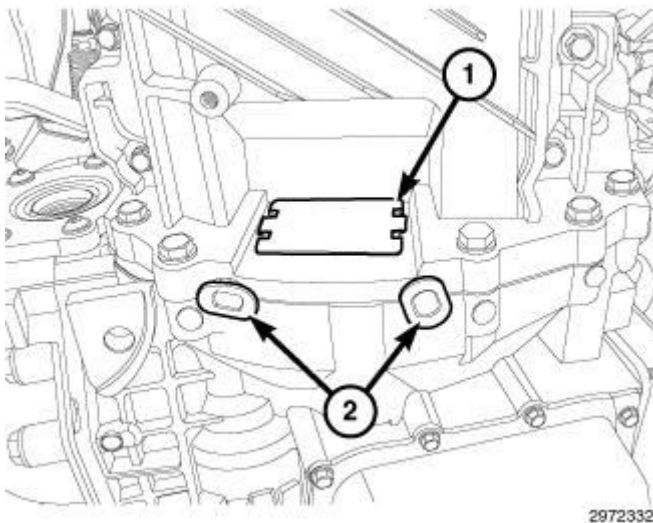


Fig. 482: Torque Converter Housing Dust Cover & Rubber Plugs
 Courtesy of CHRYSLER GROUP, LLC

6. Install the torque converter bolt access cover (1).
7. Install the two rubber plugs (2) covering the rear oil seal retainer flange bolts.
8. Install the crossunder pipe. Refer to **PIPE, EXHAUST CROSSUNDER, INSTALLATION** .
9. Install the belly pan.

10. Lower the vehicle.

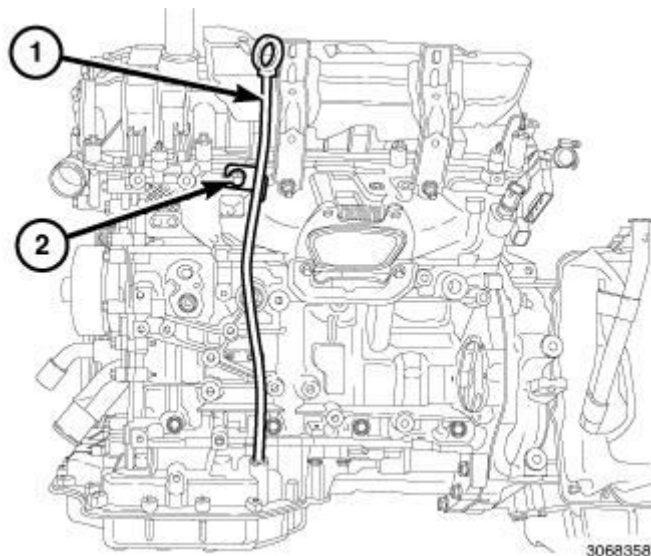


Fig. 483: Oil Level Indicator Tube & Bolt
Courtesy of CHRYSLER GROUP, LLC

11. Install the oil level indicator tube (1) into the oil pan.
12. Tighten the nut (2) to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
13. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL, STANDARD PROCEDURE**.
14. Connect the negative battery cable and tighten nut to the proper specification. Refer to **SPECIFICATIONS**.
15. Run the engine until it reaches normal operating temperature.

TWO PIECE

LOWER

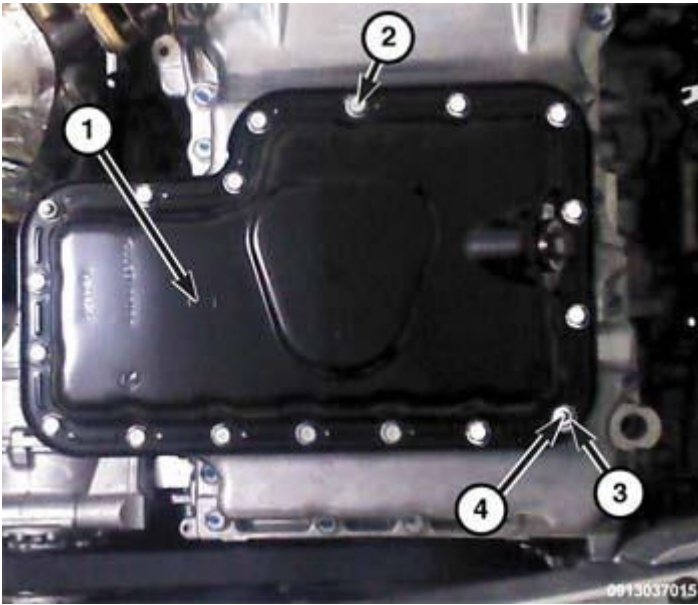


Fig. 484: Lower Oil Pan & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Clean the upper and lower oil pan mating surfaces with isopropyl alcohol in preparation for sealant application.

CAUTION: Engine assembly requires the use of a unique sealant that is compatible with engine oil. Using a sealant other than Mopar® Threebond Engine RTV Sealant may result in engine fluid leakage.

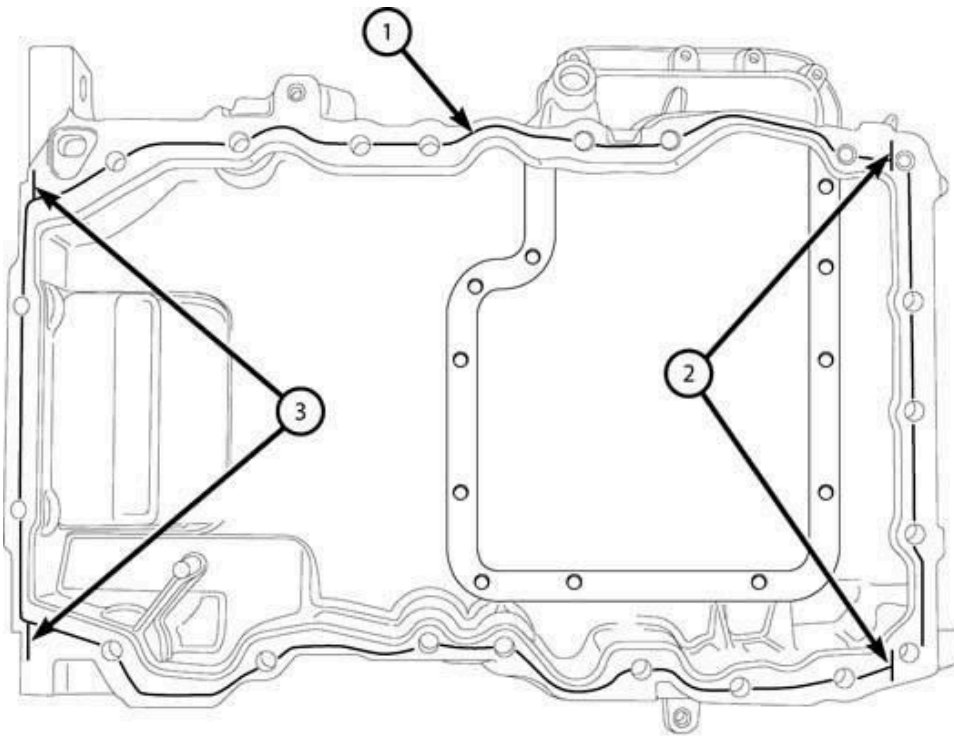
CAUTION: Following the application of Mopar® Threebond Engine RTV Sealant to the gasket surfaces, the components must be assembled within 20 minutes and the attaching fasteners must be tightened to specification within 45 minutes. Prolonged exposure to the air prior to assembly may result in engine fluid leakage.

2. Apply a 2 to 3 mm wide bead of Mopar® Threebond Engine RTV Sealant to the lower oil pan.
3. Install the two studs (4) into the upper oil pan flange.
4. Install the lower oil pan to the upper oil pan with sixteen bolts (2) and two nuts (3). Tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .

CAUTION: Following assembly, the Mopar® Threebond Engine RTV Sealant must be allowed to dry for 45 minutes prior to adding oil and engine operation. Premature exposure to oil prior to drying may result in engine fluid leakage.

5. Install the front skid plate. Refer to **PLATE, SKID, FRONT, INSTALLATION** .
6. Lower the vehicle.

7. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL, STANDARD PROCEDURE**.
8. Run the engine until it reaches normal operating temperature.
9. Check the oil pan for leaks.

UPPER

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Fig. 485: RTV Sealant

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Engine assembly requires the use of a unique sealant that is compatible with engine oil. Using a sealant other than Mopar® Threebond Engine RTV Sealant may result in engine fluid leakage.

CAUTION: Clean the upper and lower oil pans, timing chain cover, rear seal retainer and engine block mating surfaces thoroughly with isopropyl alcohol in preparation for sealant application. All surfaces that seal with RTV must be oil and contamination free to ensure proper adhesion of the RTV to the mating surface to prevent leaks.

CAUTION: Following the application of Mopar® Threebond Engine RTV Sealant to the gasket surfaces, the components must be assembled within 20 minutes and the attaching fasteners must be tightened to specification within 45

minutes. Prolonged exposure to the air prior to assembly may result in engine fluid leakage.

1. Apply a 2 to 3 mm wide bead of Mopar® Threebond Engine RTV Sealant to the upper oil pan as shown in illustration in the following locations:
 - Oil pan to engine block flange (1)
 - Two timing cover to engine block T-joints (2)
 - Two rear seal retainer to engine block T-joints (3)

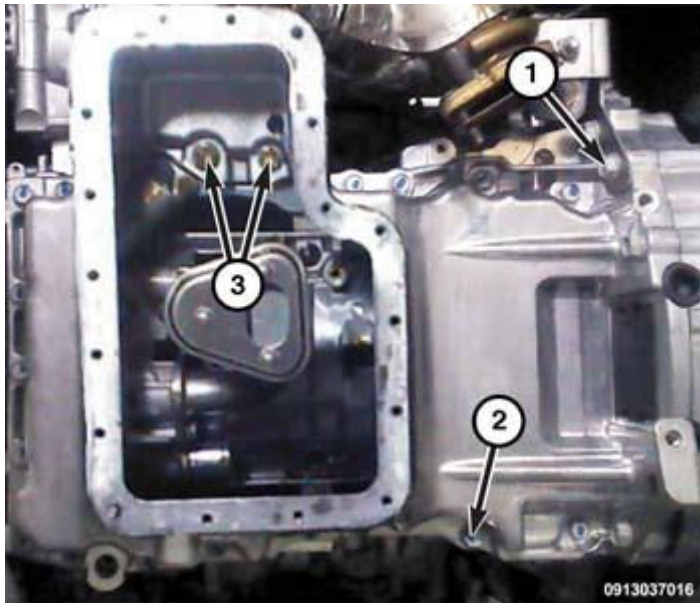


Fig. 486: Removing/Installing Upper Oil Pan

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Make sure that the rear face of the oil pan is flush to the transmission bell housing before tightening any of the oil pan mounting bolts. A gap between the oil pan and the transmission could crack the oil pan or transmission casting.

2. Guide the oil indicator tube into the oil pan while positioning the oil pan to the engine and the transmission bell housing.
3. Secure the oil pan to the engine block with nineteen oil pan mounting bolts (2, 3) finger tight.
4. Install the five oil pan to transmission bolts (1) and tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
5. Tighten the nineteen previously installed oil pan mounting bolts (2, 3) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .

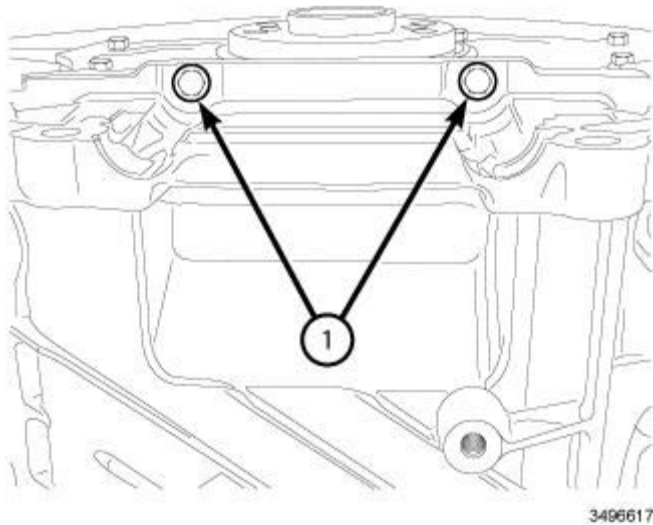


Fig. 487: Rear Oil Seal Retainer Flange Bolts
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Shown in illustration with transmission removed for clarity.

6. Install the two bolts (1) to the rear oil seal retainer flange and tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS**.

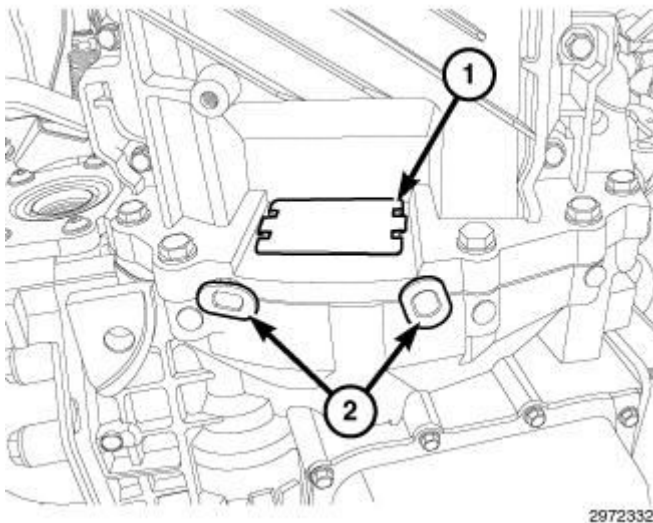


Fig. 488: Torque Converter Housing Dust Cover & Rubber Plugs
 Courtesy of CHRYSLER GROUP, LLC

7. Install the torque converter bolt access cover (1).
8. Install the two rubber plugs (2) covering the rear oil seal retainer flange bolts.
9. Install the lower oil pan. Refer to **PAN, OIL, INSTALLATION**.

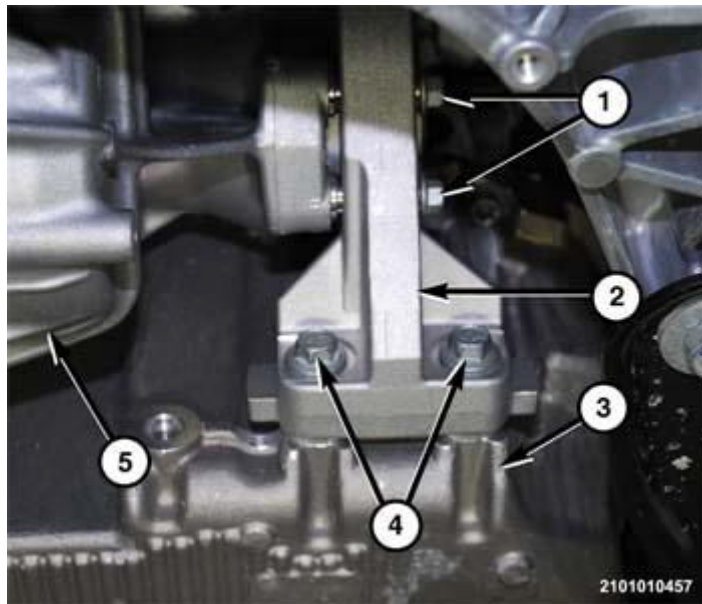


Fig. 489: PTU Support Bracket & Bolts At Block & Oil Pan
Courtesy of CHRYSLER GROUP, LLC

10. Position the Power Transfer Unit (PTU) support bracket (2) to the engine block and oil pan (3). Hand start the bolts (4).
11. Tighten the PTU support bracket to the PTU assembly bolts (1) to the proper specification. Refer to **SPECIFICATIONS** .
12. Tighten the PTU support bracket to the engine block and oil pan to the proper specification. Refer to **SPECIFICATIONS** .
13. Install the crossunder pipe (2). Refer to **PIPE, EXHAUST CROSSUNDER, INSTALLATION** .
14. Install the front skid plate. Refer to **PLATE, SKID, FRONT, INSTALLATION** .
15. Lower the vehicle.

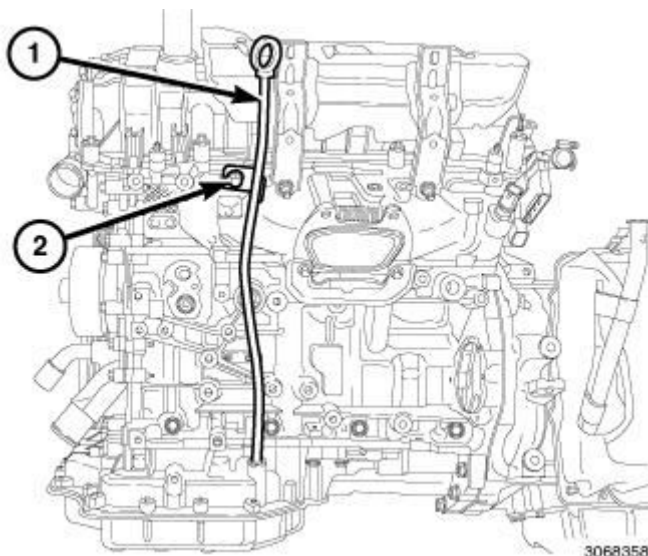


Fig. 490: Oil Level Indicator Tube & Bolt
Courtesy of CHRYSLER GROUP, LLC

16. Tighten the oil level indicator bolt (2) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
17. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL, STANDARD PROCEDURE** .
18. Connect the negative battery cable and tighten nut to the proper specification. Refer to **SPECIFICATIONS** .
19. Run the engine until it reaches normal operating temperature.
20. Check the oil pan for leaks.

PICK-UP, OIL PUMP

REMOVAL

REMOVAL

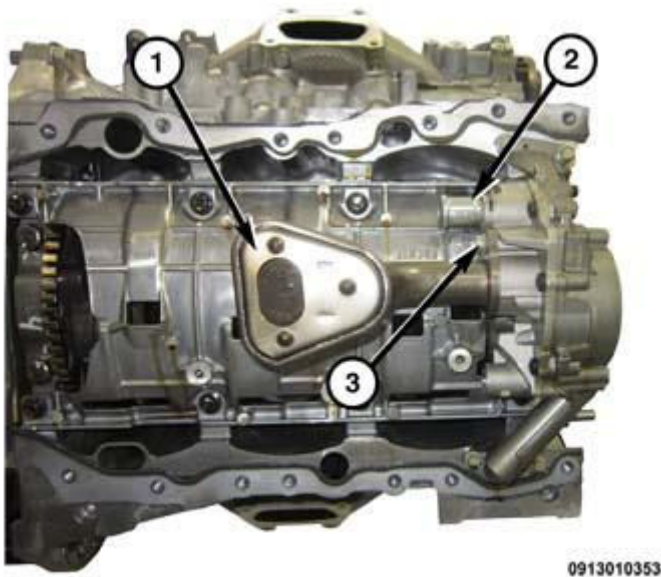
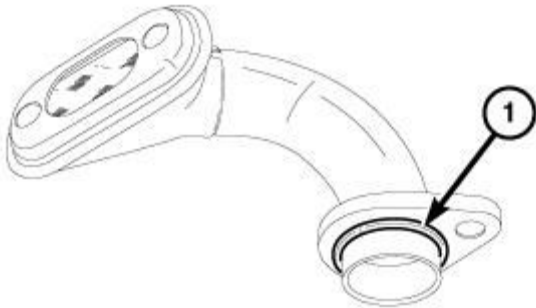


Fig. 491: Oil Pick-Up Tube & Bolt
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove the oil pan. Refer to **PAN, OIL, REMOVAL**.
3. Remove the bolt (3) and the oil pick-up tube (1) from the oil pump.



3078199

Fig. 492: Oil Pick-Up Tube O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

4. Remove and discard the O-ring seal (1) from the oil pick-up tube.

INSTALLATION

INSTALLATION



3078199

Fig. 493: Oil Pick-Up Tube O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

1. Lightly lubricate the new O-ring seal (1) with engine oil and install on the oil pick-up tube.

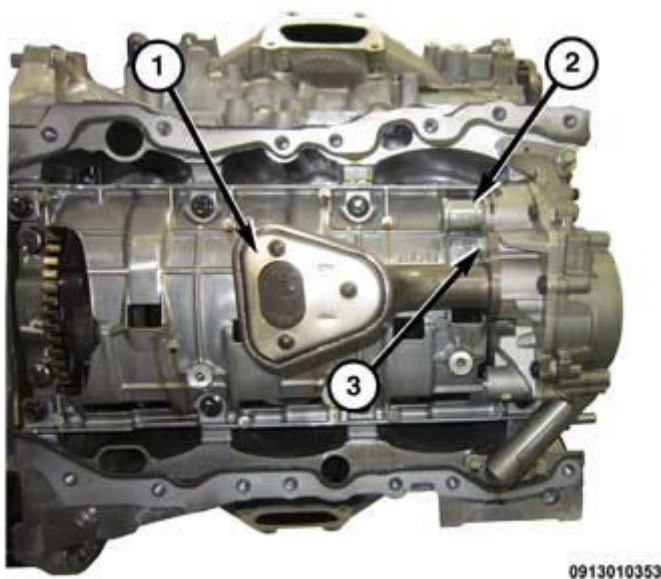


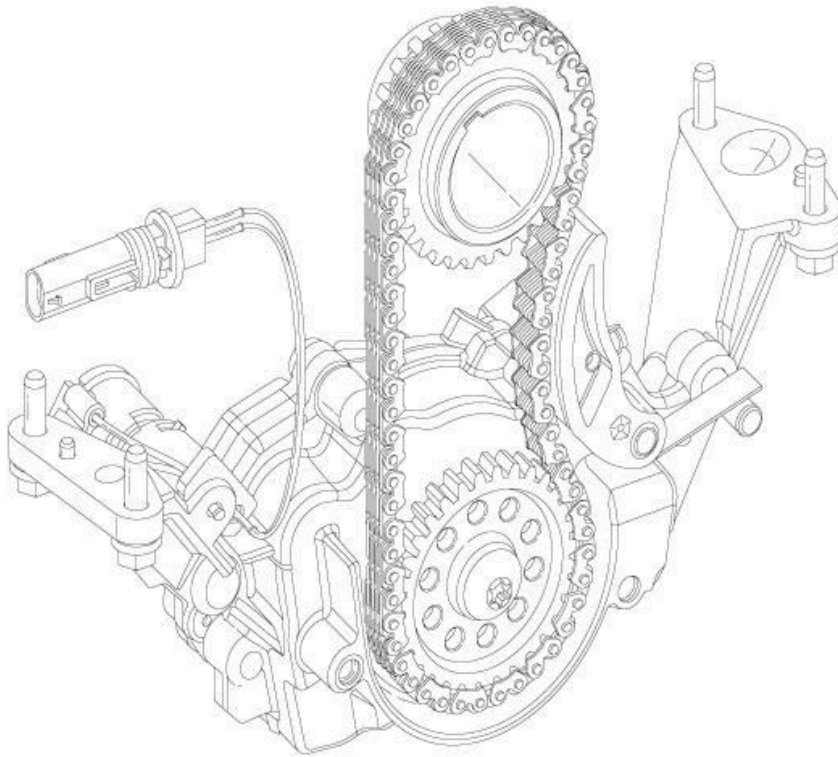
Fig. 494: Oil Pick-Up Tube & Bolt
Courtesy of CHRYSLER GROUP, LLC

2. Install the oil pick-up tube (1). Tighten the bolt (3) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
3. Install the oil pan. Refer to **PAN, OIL, INSTALLATION**.
4. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL, STANDARD PROCEDURE** .
5. Connect the negative battery cable and tighten nut to. Refer to **SPECIFICATIONS** .
6. Run the engine until it reaches normal operating temperature.

PUMP, ENGINE OIL

DESCRIPTION

DESCRIPTION



2831052

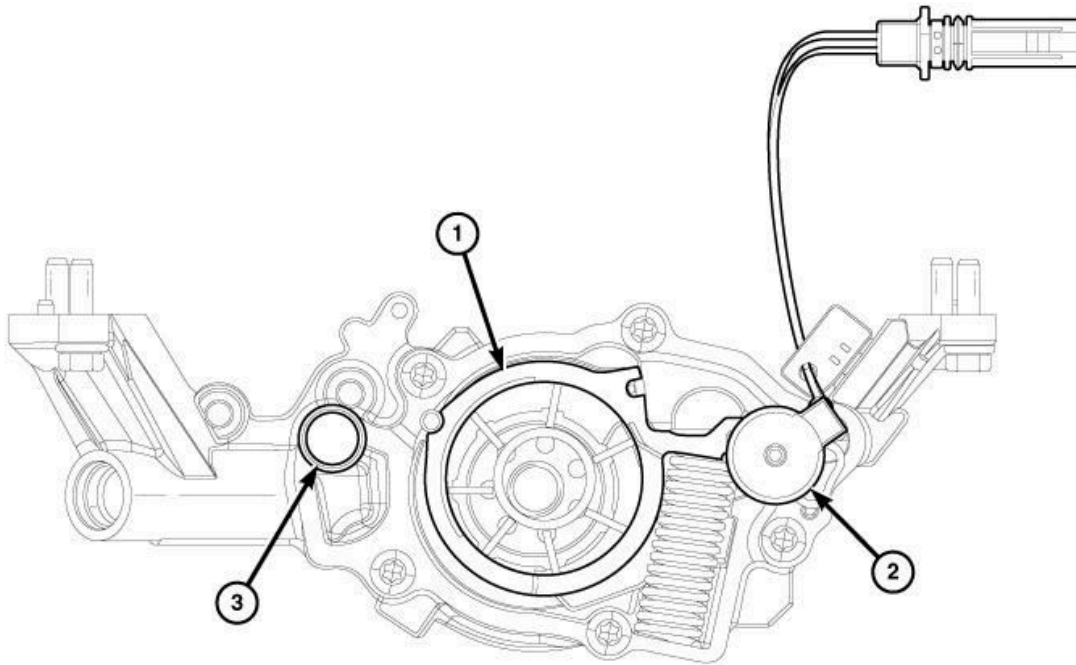
Fig. 495: Oil Pump Chain**Courtesy of CHRYSLER GROUP, LLC**

The vane type engine oil pump is mounted to the underside of the cylinder block and is driven by the oil pump chain off the crankshaft at a 1:1 drive ratio. This pump location improves efficiency compared to an on-crankshaft location. The pump is driven with a silent chain which is tensioned using a spring loaded tensioner. The pump is not timed to the engine.

An internal mechanical ball and spring type relief valve prevents excess pressure in the engine by dumping oil into the sump and provides emergency protection at conditions such as a cold start with high engine speed.

The pump has a moving slide mechanism for variable displacement capability and an on-off solenoid for two-stage pressure regulation. The pump and the solenoid are not to be disassembled. Both are non-serviceable components and are to be replaced as a complete assembly.

OPERATION**OPERATION**

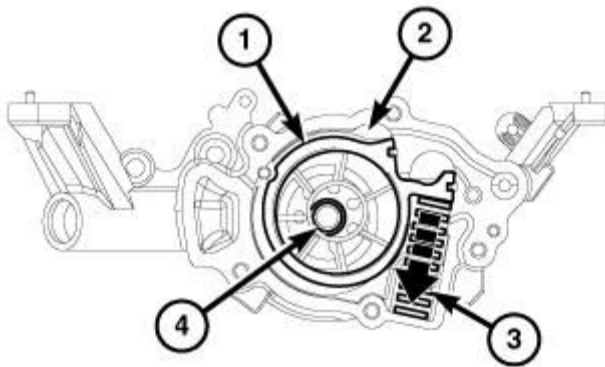


2632737

Fig. 496: Moving Element, On/Off Solenoid & Relief Valve
Courtesy of CHRYSLER GROUP, LLC

The engine oil pump features seven vanes and a moving element (1) that continuously adjusts to maintain a regulated oil pressure supply by varying the displacement of the pump. The pump has two regulated pressure stages of operation controlled by an on/off solenoid (2). Low pressure mode regulation (solenoid on) is approximately 200 kPa (29 psi) and high pressure mode regulation (solenoid off) is approximately 450 kPa (65 psi). The Powertrain Control Module (PCM) switches the pump between stages based on engine operating conditions, oil and coolant temperatures, speed and load. Under most typical conditions, the pump will run in low mode from idle up to around 3000 rpm, and switch from low to high mode between 3000 and 4000 rpm.

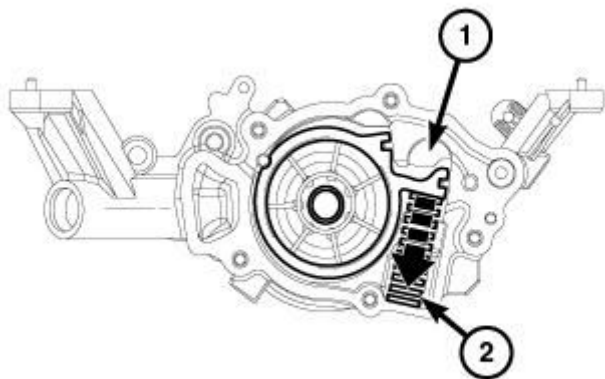
The maximum oil pressure in the engine is limited to 1000 kPa (145 psi) by the relief valve (3). Pressure in the main oil gallery of the engine can be monitored with diagnostic equipment through the oil pressure sensor mounted on the rear of the oil filter module. The minimum pressure for the engine is 41 kPa (6 psi) at any operating condition. Anything under this pressure could result in damage to critical moving parts.



2832771

Fig. 497: Moving Element, Main Gallery Oil Pressure, Spring Pressure & Pump Driveshaft
 Courtesy of CHRYSLER GROUP, LLC

In high pressure mode regulation (solenoid off) main gallery oil pressure (2) is applied to the moving element (1). The main gallery oil pressure works against spring pressure (3) to move the element to a more concentric location about the pump driveshaft (4) thus reducing displacement and pump output.



2832798

Fig. 498: Chamber & Spring
 Courtesy of CHRYSLER GROUP, LLC

In low pressure mode regulation (solenoid on) the energized solenoid opens an additional chamber (1) to main gallery oil pressure increasing the force on the spring (2) to further reduce displacement and output pressure.

REMOVAL

REMOVAL

1. Disconnect and isolate the negative battery cable.
2. Remove the oil pan. Refer to **PAN, OIL, REMOVAL**.
3. Remove the oil pump pick-up. Refer to **PICK-UP, OIL PUMP, REMOVAL**.

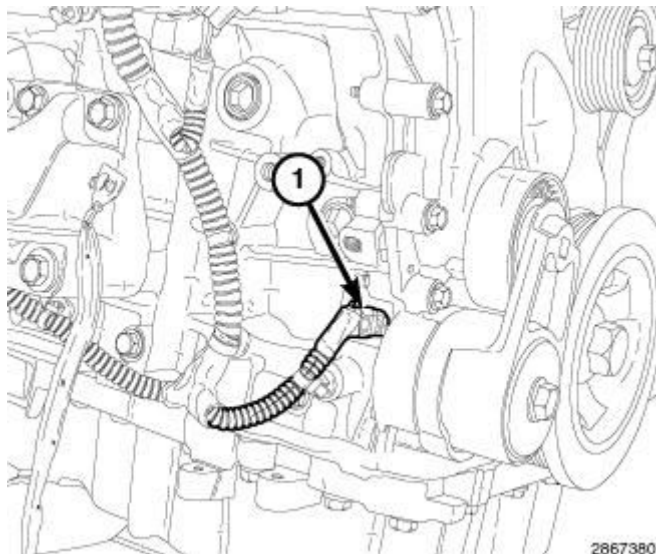


Fig. 499: Oil Pump Solenoid Electrical Connector
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the engine wire harness from the oil pump solenoid electrical connector (1).

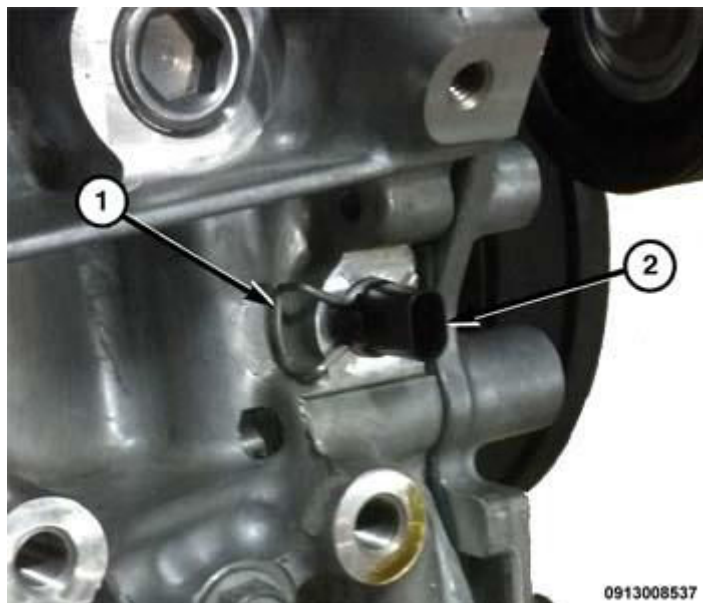


Fig. 500: Oil Pump Solenoid Electrical Connector & Locking Clip
Courtesy of CHRYSLER GROUP, LLC

5. Remove the locking clip (1) from the oil pump solenoid electrical connector (2).

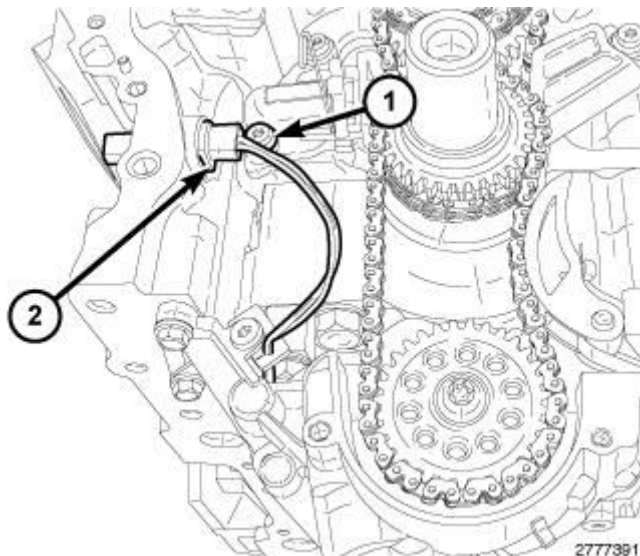


Fig. 501: Oil Pump Solenoid Electrical Connector & Primary Chain Tensioner Mounting Bolt
Courtesy of CHRYSLER GROUP, LLC

6. Push the oil pump solenoid electrical connector into the engine block, rotate the connector slightly CW, push it past the primary chain tensioner mounting bolt (1) and into the engine.

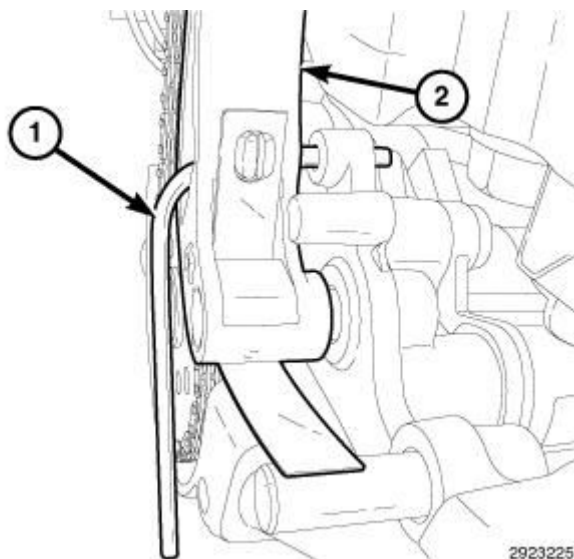


Fig. 502: Oil Pump Chain Tensioner & Retaining Pin
Courtesy of CHRYSLER GROUP, LLC

7. Push back the oil pump chain tensioner (2) and insert a suitable retaining pin (1) such as a 3 mm Allen wrench.

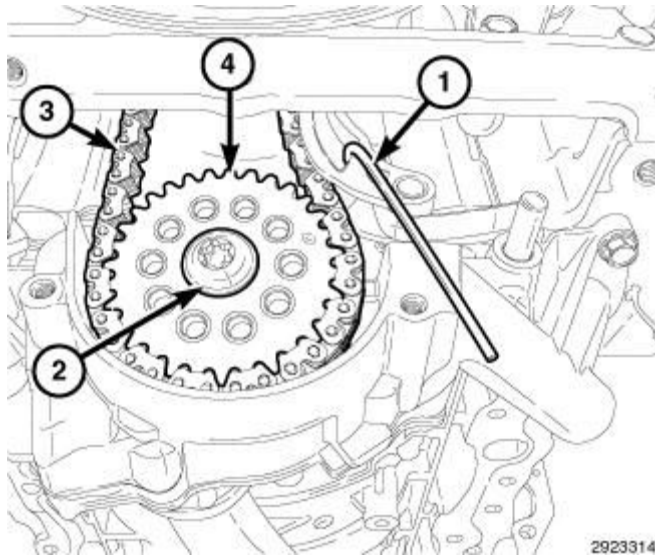


Fig. 503: Retaining Pin, Retaining Bolt, Oil Pump Chain & Sprocket
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Always reinstall timing chains so that they maintain the same direction of rotation. Inverting a previously run chain on a previously run sprocket will result in excessive wear to both the chain and sprocket.

8. Mark the direction of rotation on the oil pump chain (3) and sprocket (4) using a paint pen or equivalent to aid in reassembly.

NOTE: There are no timing marks on the oil pump gear or chain. Timing of the oil pump is not required.

9. Remove the oil pump sprocket T45 retaining bolt (2) and remove the oil pump sprocket (4).

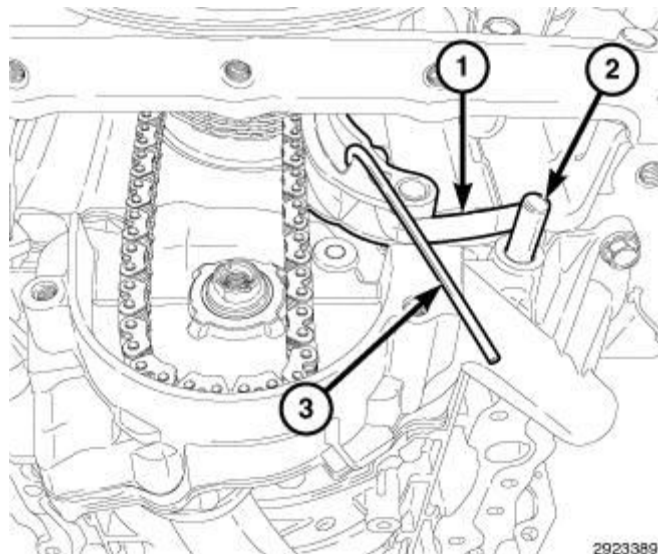


Fig. 504: Retaining Pin, Oil Pump Chain Tensioner Spring & Dowel Pin
Courtesy of CHRYSLER GROUP, LLC

10. Remove the retaining pin (3) and disengage the oil pump chain tensioner spring (1) from the dowel pin (2).
11. Remove the oil pump chain tensioner from the oil pump.

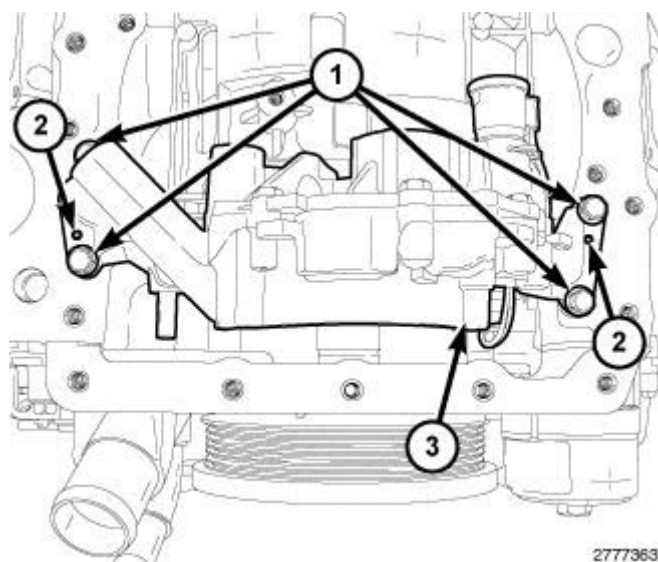
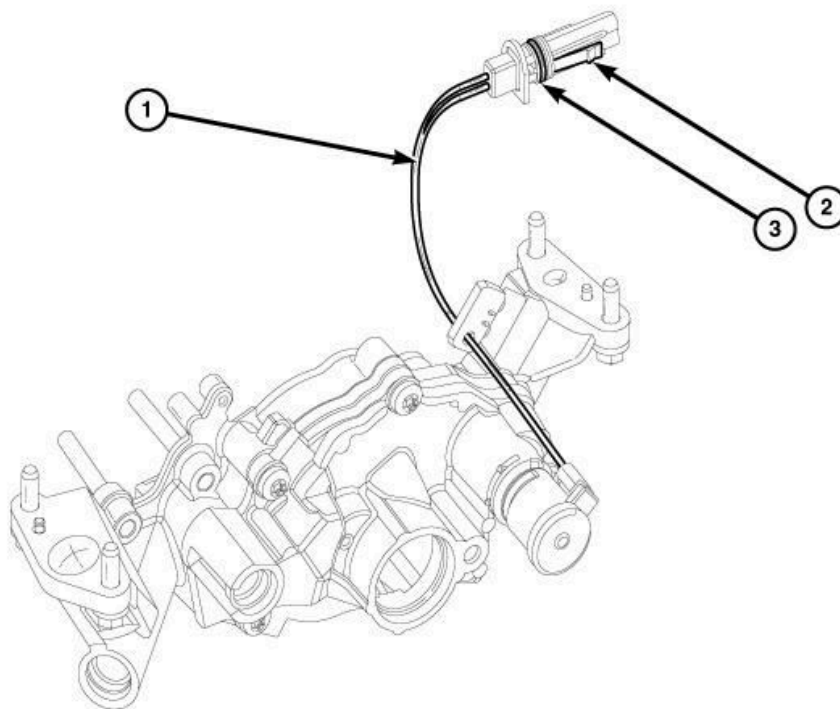


Fig. 505: Oil Pump, Locator Pins & Bolts
Courtesy of CHRYSLER GROUP, LLC

12. Remove the four oil pump bolts (1) and remove the oil pump (3).

INSPECTION

INSPECTION



2833271

Fig. 506: Solenoid Wires, Connector Retention Lock Tab & O-Ring Seal
 Courtesy of CHRYSLER GROUP, LLC

NOTE: The Oil pump is released as an assembly. The assembly includes both the pump and the solenoid. There are no serviceable sub-assembly components. In the event the oil pump or solenoid are not functioning or out of specification they must be replaced as an assembly.

1. Inspect the solenoid wires (1) for cuts or chaffing.
2. Inspect the condition of the connector O-ring seal (3).

INSTALLATION

INSTALLATION

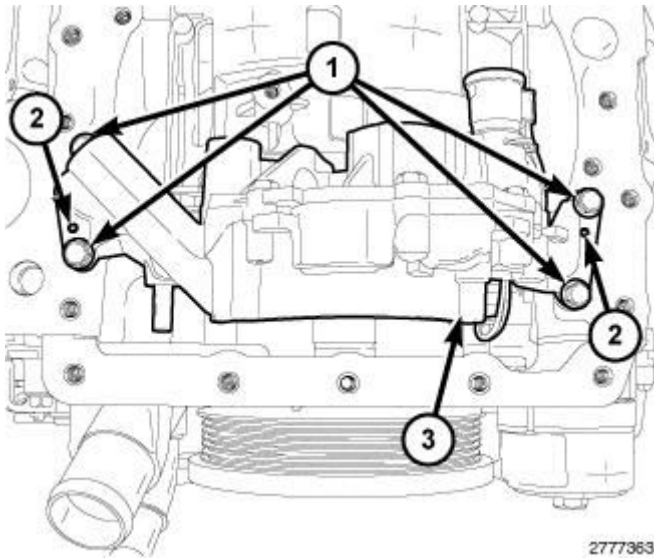


Fig. 507: Oil Pump, Locator Pins & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Align the locator pins (2) to the engine block and install the oil pump (3) with four bolts (1). Tighten the bolts to the proper specification. Refer to **TORQUE SPECIFICATIONS**.

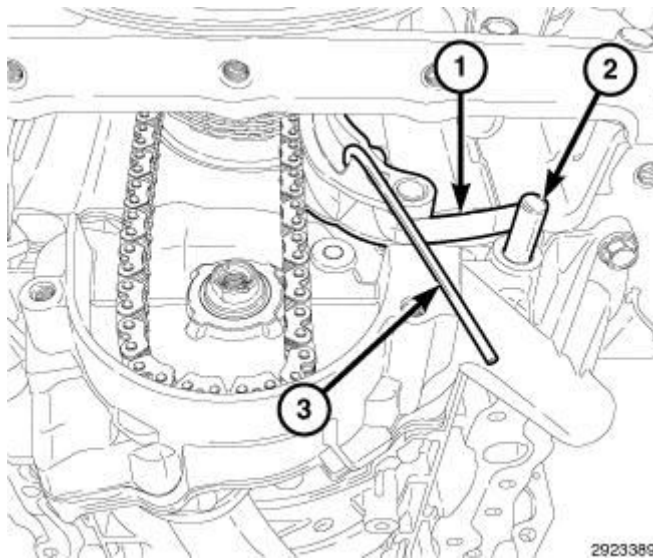


Fig. 508: Retaining Pin, Oil Pump Chain Tensioner Spring & Dowel Pin
Courtesy of CHRYSLER GROUP, LLC

2. Install the oil pump chain tensioner on the oil pump.
3. Position the oil pump chain tensioner spring (1) above the dowel pin (2).
4. Push back the oil pump chain tensioner and insert a suitable retaining pin (3) such as a 3 mm Allen wrench.

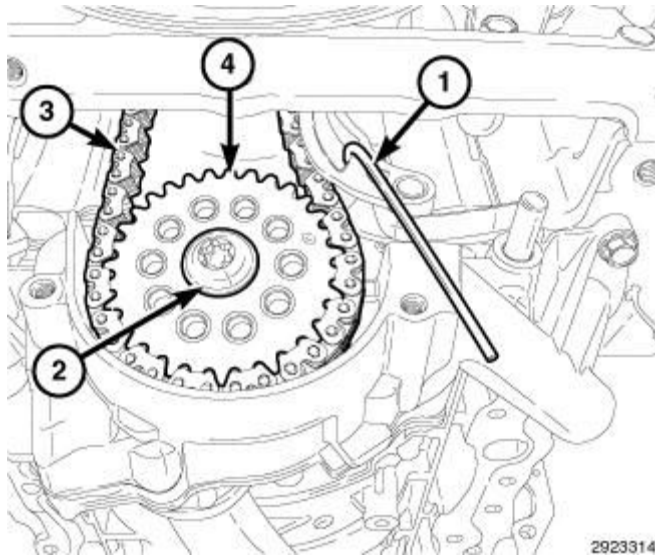


Fig. 509: Retaining Pin, Retaining Bolt, Oil Pump Chain & Sprocket
Courtesy of CHRYSLER GROUP, LLC

NOTE: There are no timing marks on the oil pump gear or chain. Timing of the oil pump is not required.

CAUTION: Always reinstall timing chains so that they maintain the same direction of rotation. Inverting a previously run chain on a previously run sprocket will result in excessive wear to both the chain and sprocket.

5. Place the oil pump sprocket (4) into the oil pump chain (3). Align the oil pump sprocket with the oil pump shaft and install the sprocket. Install the T45 retaining bolt (2) and tighten to 25 N.m (18 ft. lbs.).
6. Remove the retaining pin (1). Verify that the oil pump chain is centered on the tensioner and crankshaft sprocket.
7. Rotate the crankshaft CW one complete revolution to verify proper oil pump chain installation.

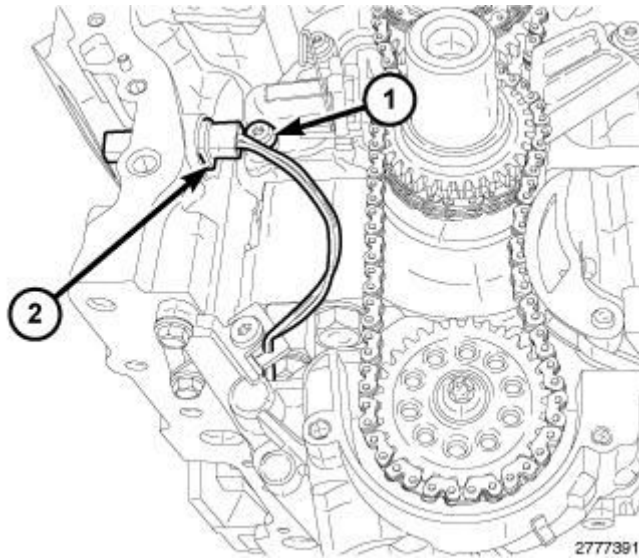


Fig. 510: Oil Pump Solenoid Electrical Connector & Primary Chain Tensioner Mounting Bolt
Courtesy of CHRYSLER GROUP, LLC

NOTE: Graphic shows the engine timing cover removed for clarity.

8. Position the oil pump solenoid electrical connector (2) into the engine block. Rotate the connector so that it can be pushed past the primary chain tensioner mounting bolt (1). Then rotate the connector slightly CCW and push it into the engine block until it locks in place.

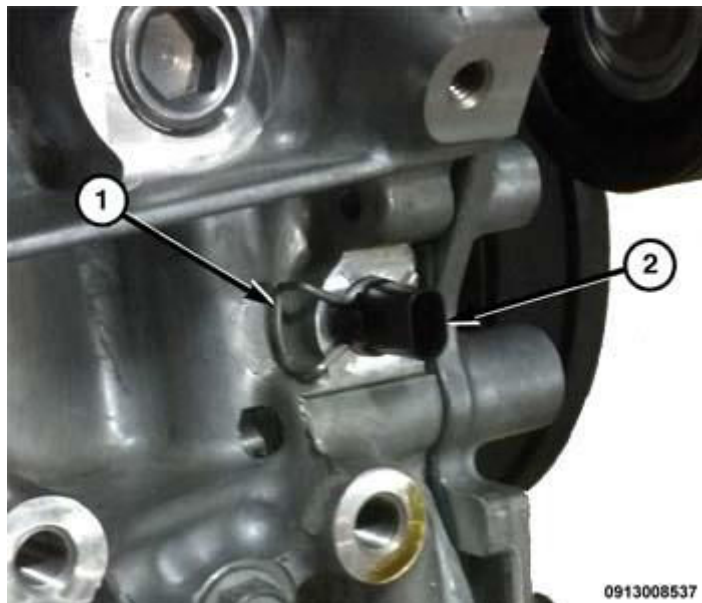


Fig. 511: Oil Pump Solenoid Electrical Connector & Locking Clip
Courtesy of CHRYSLER GROUP, LLC

9. Verify that the oil pump solenoid electrical connector lock clip (1) is engaged to the electrical connector (2).

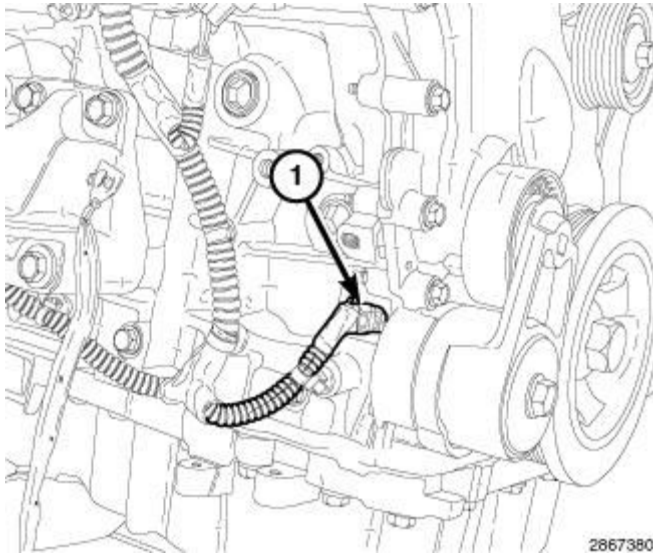


Fig. 512: Oil Pump Solenoid Electrical Connector
Courtesy of CHRYSLER GROUP, LLC

10. Connect the engine wire harness to the oil pump solenoid electrical connector (1).
11. Install the oil pump pick-up. Refer to **PICK-UP, OIL PUMP, INSTALLATION**.
12. Install the oil pan. Refer to **PAN, OIL, INSTALLATION**.
13. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL, STANDARD PROCEDURE**.
14. Connect the negative battery cable and tighten nut to the proper specification. Refer to **SPECIFICATIONS**.

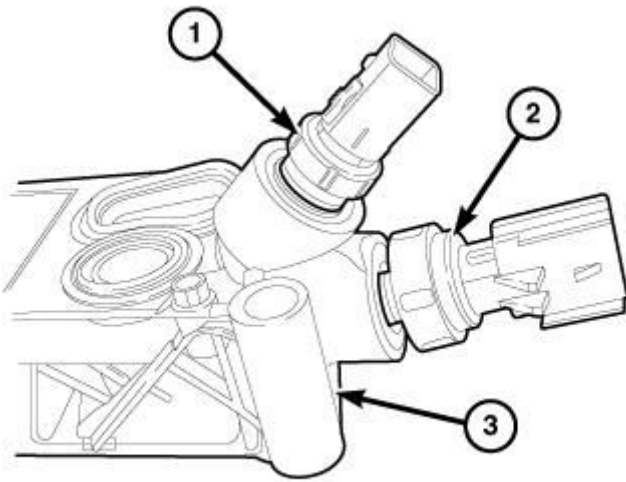
CAUTION: A MIL or low oil pressure indicator that remains illuminated for more than 2 seconds may indicate low or no engine oil pressure. Stop the engine and investigate the cause of the indication.

15. Start and run the engine until it reaches normal operating temperature.

SENSOR, OIL PRESSURE

DESCRIPTION

DESCRIPTION



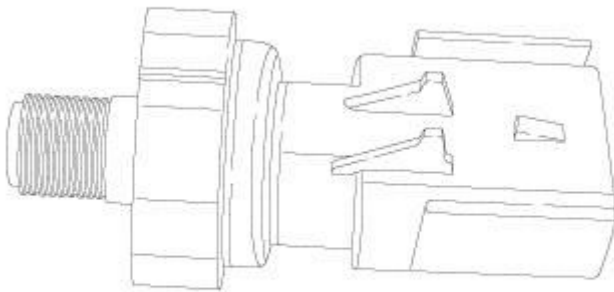
2710795

Fig. 513: Oil Temperature Sensor, Oil Pressure Sensor & Oil Filter Housing
 Courtesy of CHRYSLER GROUP, LLC

The oil pressure sensor (2) is located on the oil filter housing (3). The oil pressure sensor is a three wire sensor with a tapered threaded sensor port. The sensor port is mounted to the oil filter housing through an access hole. A thread lock patch seals the oil pressure sensor to the oil filter housing.

OPERATION

OPERATION



2867304

Fig. 514: Oil Pressure Sensor
 Courtesy of CHRYSLER GROUP, LLC

The oil pressure sensor is a silicon based sensing unit that measures the pressure of the engine oil. The Powertrain Control Module (PCM) supplies a 5 volt reference and a ground to the sensor. The input to the PCM

occurs on the signal return circuit. The oil pressure sensor is a linear sensor; as pressure changes, voltage changes proportionately and returns a voltage signal to the PCM that reflects oil pressure. The zero pressure reading is 0.5 volt and full scale is 4.5 volt.

REMOVAL

REMOVAL

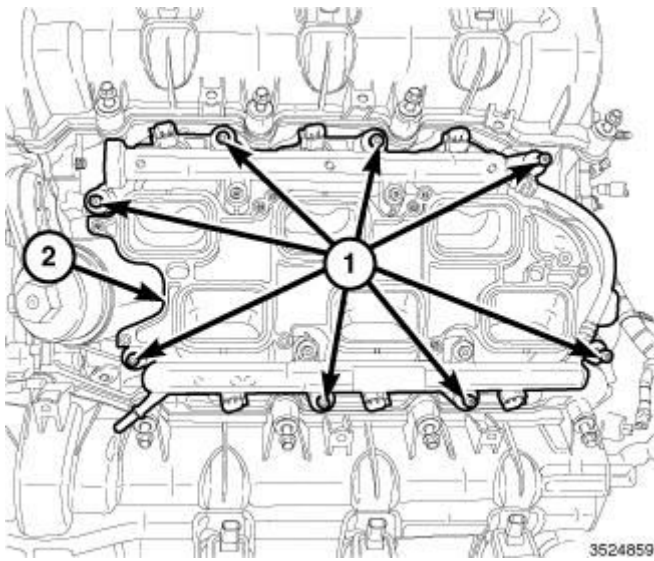


Fig. 515: Lower Intake Manifold & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Release fuel system pressure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE** .
2. Disconnect and isolate the negative battery cable.
3. Remove the air inlet hose, upper intake manifold and lower intake manifold with the fuel injectors and fuel rail (2). Refer to **MANIFOLD, INTAKE, REMOVAL**.

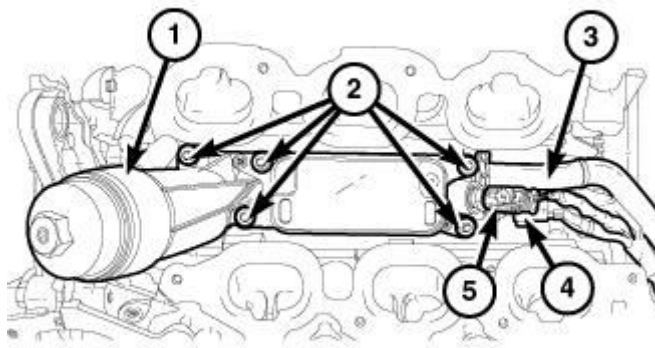
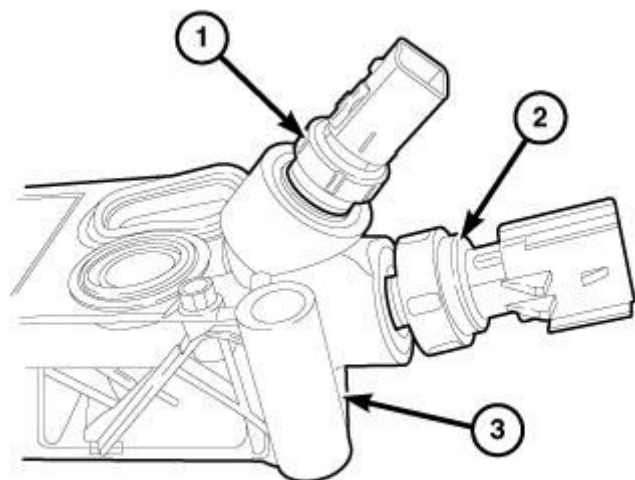


Fig. 516: Oil Temperature Sensor Electrical Connector, Oil Pressure Sensor Electrical Connector, Oil Filter Housing, Heater Hose & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the oil pressure sensor electrical connector (4).



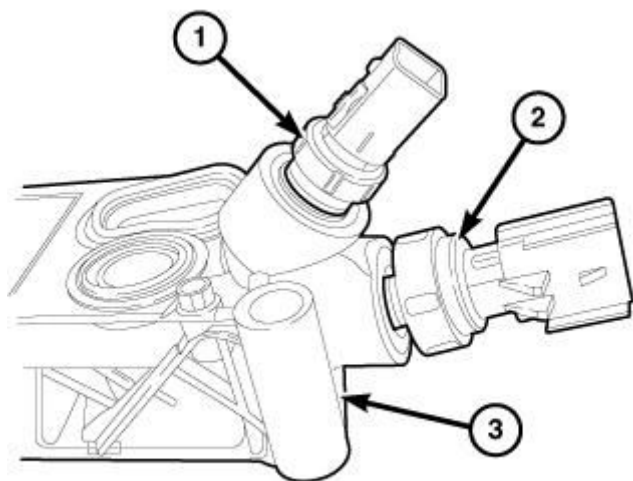
2710795

Fig. 517: Oil Temperature Sensor, Oil Pressure Sensor & Oil Filter Housing
Courtesy of CHRYSLER GROUP, LLC

5. Remove the oil pressure sensor (2) from the oil filter housing (3).

INSTALLATION

INSTALLATION

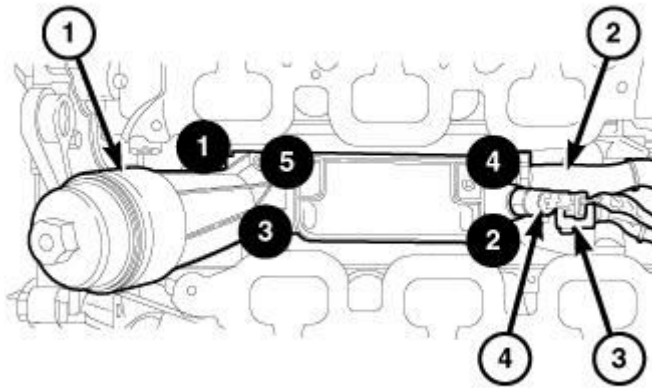


2710795

Fig. 518: Oil Temperature Sensor, Oil Pressure Sensor & Oil Filter Housing

Courtesy of CHRYSLER GROUP, LLC

1. Install the oil pressure sensor (2) and tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .



2710852

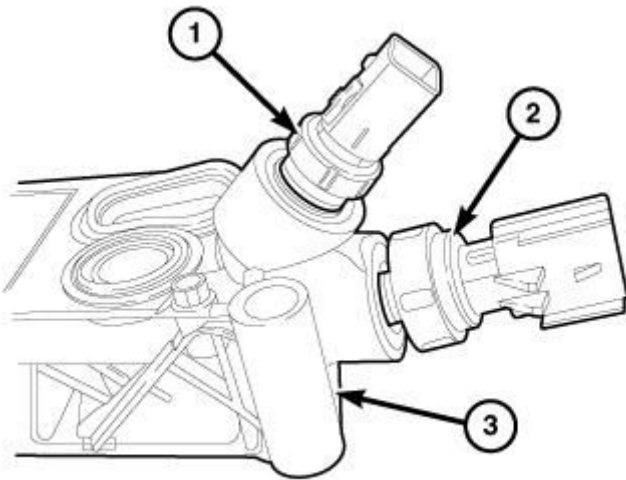
Fig. 519: Heater Hose, Electrical Connectors, Oil Filter Housing & Bolt Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

2. Connect the oil pressure sensor electrical connector (3).
3. Install the upper and lower intake manifolds and air cleaner housing assembly. Refer to **MANIFOLD, INTAKE, INSTALLATION**.
4. Connect the negative battery cable and tighten the nut to the proper specification. Refer to **SPECIFICATIONS** .

SENSOR, OIL TEMPERATURE

DESCRIPTION

DESCRIPTION



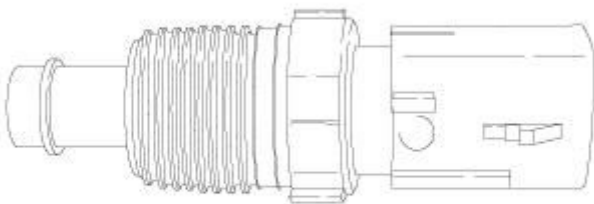
2710795

Fig. 520: Oil Temperature Sensor, Oil Pressure Sensor & Oil Filter Housing
 Courtesy of CHRYSLER GROUP, LLC

The oil temperature sensor (1) is located on the oil filter housing (3). The oil temperature sensor is a two wire sensor with a tapered threaded sensor probe. The sensor probe is mounted to the oil filter housing through an access hole. A thread lock patch seals the oil temperature sensor to the oil filter housing.

OPERATION

OPERATION



2867292

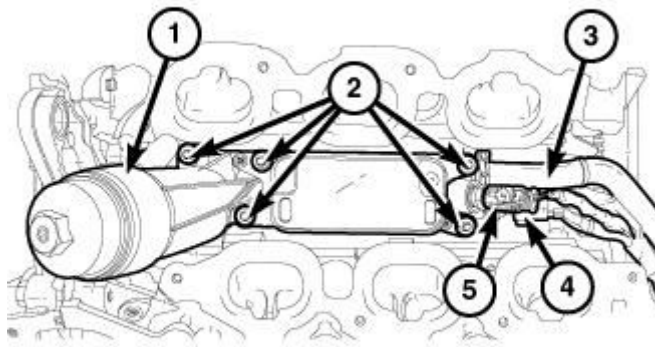
Fig. 521: Oil Temperature Sensor
 Courtesy of CHRYSLER GROUP, LLC

The oil temperature sensor is a variable resistor that measures the temperature of the engine oil. The Powertrain Control Module (PCM) supplies a 5 volt reference and a ground to the sensors low reference signal circuit.

When the oil temperature is low, the sensor resistance is high. When the oil temperature is high, the sensor resistance is low.

REMOVAL**REMOVAL**

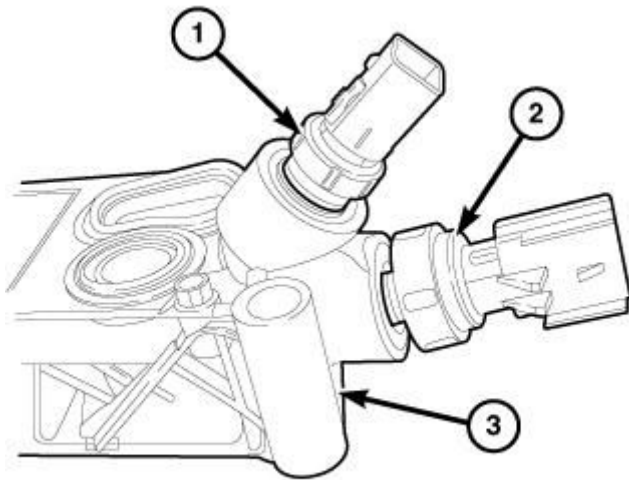
1. Release fuel system pressure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE** .
2. Disconnect and isolate the negative battery cable.
3. Remove the upper intake manifold and lower intake manifold. Refer to **MANIFOLD, INTAKE, REMOVAL**.



2707704

Fig. 522: Oil Temperature Sensor Electrical Connector, Oil Pressure Sensor Electrical Connector, Oil Filter Housing, Heater Hose & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the oil temperature sensor electrical connector (5).



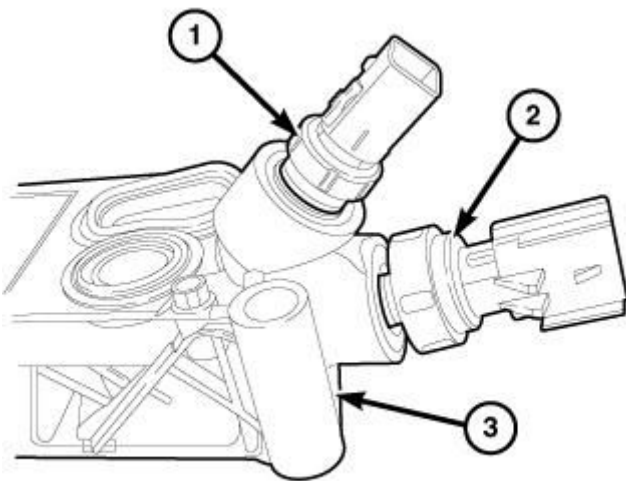
2710795

Fig. 523: Oil Temperature Sensor, Oil Pressure Sensor & Oil Filter Housing
Courtesy of CHRYSLER GROUP, LLC

5. Remove the oil temperature sensor (1) from the oil filter housing (3).

INSTALLATION

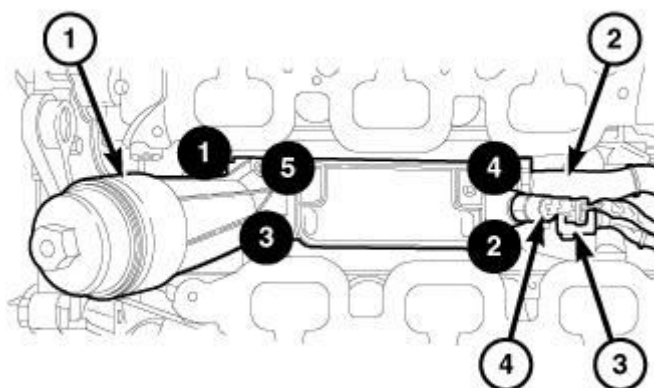
INSTALLATION



2710795

Fig. 524: Oil Temperature Sensor, Oil Pressure Sensor & Oil Filter Housing
Courtesy of CHRYSLER GROUP, LLC

Install the oil temperature sensor (1) and tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .



2710852

Fig. 525: Heater Hose, Electrical Connectors, Oil Filter Housing & Bolt Tightening Sequence
 Courtesy of CHRYSLER GROUP, LLC

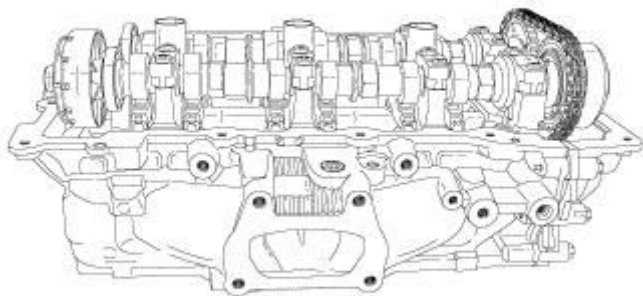
1. Connect the oil temperature sensor electrical connector (4).
2. Install the upper and lower intake manifolds. Refer to **MANIFOLD, INTAKE, INSTALLATION**.
3. Connect the negative battery cable and tighten nut to the proper specification. Refer to **SPECIFICATIONS** .

MANIFOLDS

MANIFOLD, EXHAUST

DESCRIPTION

DESCRIPTION



2793404

Fig. 526: Aluminum Cylinder Head
Courtesy of CHRYSLER GROUP, LLC

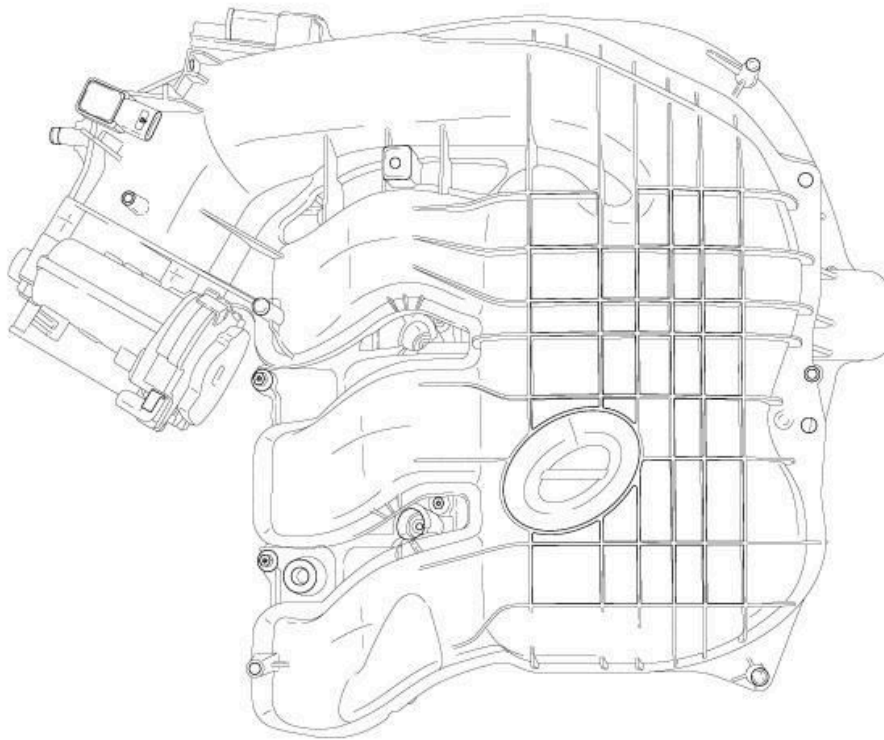
The aluminum cylinder heads are a unique design with left and right castings. The exhaust manifolds are integrated into the cylinder heads. If any damaged is found to the exhaust manifold portion, the cylinder head must be removed for repair or replacement. Refer to **CYLINDER HEAD, REMOVAL**.

MANIFOLD, INTAKE

DESCRIPTION

DESCRIPTION

UPPER INTAKE MANIFOLD



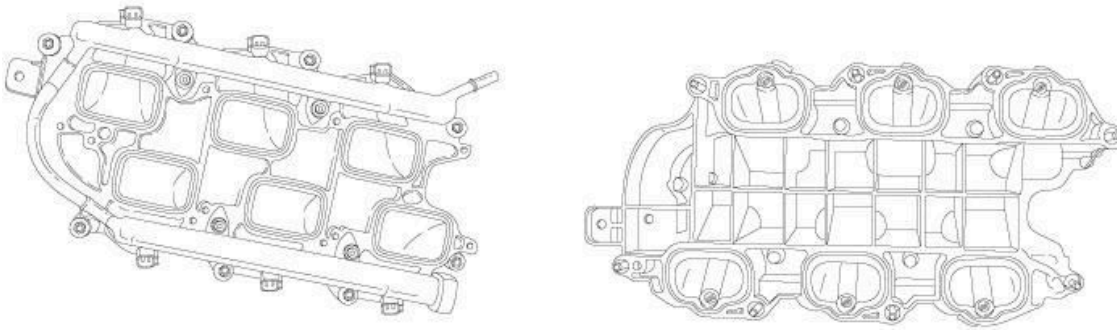
2809323

Fig. 527: Upper Intake Manifold Design
Courtesy of CHRYSLER GROUP, LLC

The upper intake manifold is an injection molded nylon composite design. The upper intake manifold is sealed to the lower intake manifold using six individual press-in-place port silicone gaskets. Replace the gaskets whenever the upper intake manifold is removed from the engine. There is a silencer pad positioned between the upper and lower intake manifolds for improved noise, vibration and harshness (NVH). The left cylinder head cover has two alignment posts to aid proper installation of the silencer pad. The seven upper intake manifold fasteners thread directly into the composite lower intake manifold and are a self-taping design. If the upper intake manifold is damaged or cracked, it must be replaced.

The Electronic Throttle Control (ETC) and Manifold Air Pressure (MAP) sensor are attached directly to the upper intake manifold. The upper intake manifold also provides vacuum ports for brake booster, positive crankcase ventilation (PCV) and emissions control.

LOWER INTAKE MANIFOLD



3510001

Fig. 528: Lower Intake Manifold Design
Courtesy of CHRYSLER GROUP, LLC

The lower intake manifold is an injection molded nylon composite design. The lower intake manifold is sealed to the cylinder heads using six individual press-in-place port silicone gaskets. Replace the gaskets whenever the lower intake manifold is removed from the engine. The seven upper intake manifold fasteners thread directly into the composite lower intake manifold and are a self-taping design.

The fuel injection fuel rail is also a composite design. The four fuel rail fasteners thread directly into the composite lower intake manifold and are a self-taping design. The lower intake manifold can be serviced without removing the fuel injector rail. The fuel rail and fuel injectors must be installed into the lower intake manifold as an assembly. Do not attempt to install the fuel rail when the injectors are in the manifold. Always install new O-rings on the fuel injectors.

If the lower intake manifold is damaged or cracked, it must be replaced.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - INTAKE MANIFOLD LEAKS

An intake manifold air leak is characterized by lower than normal manifold vacuum. Also, one or more cylinders may not be functioning.

WARNING: Use extreme caution when the engine is operating. Do not stand in a direct line with the fan. Do not put your hands near the pulleys, belts or

the fan. Do not wear loose clothing.

1. Start the engine.
2. Spray a small stream of water (spray bottle) at the suspected leak area.
3. If engine RPM'S change, the area of the suspected leak has been found.
4. Repair as required.

REMOVAL

UPPER INTAKE MANIFOLD

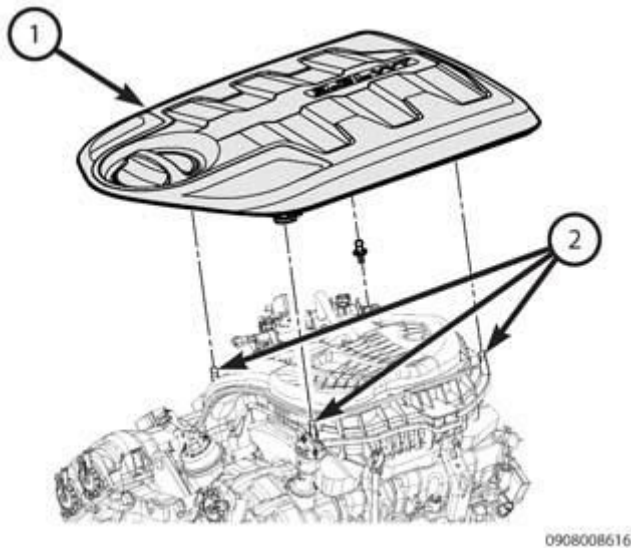


Fig. 529: Engine Cover & Ball Studs
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove the engine cover (1).
3. Remove the intake resonator. Refer to **RESONATOR, AIR CLEANER, REMOVAL**.

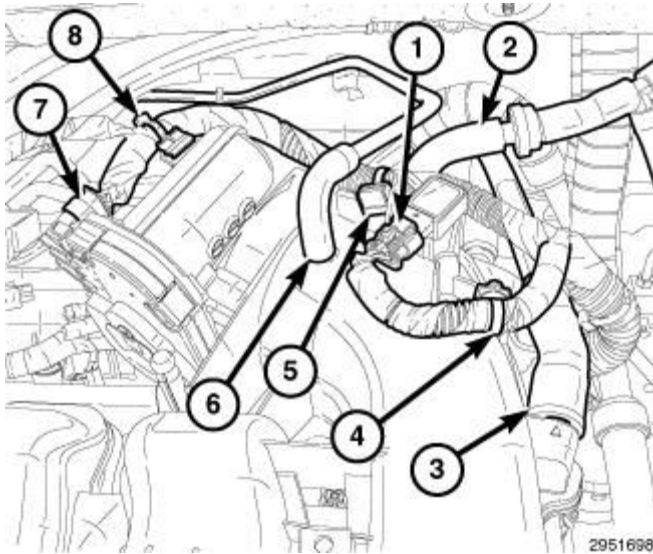


Fig. 530: MAP Sensor, ETC, PCV Hose, Brake Booster Vacuum Hose, EVAP Vapor Purge Line, Clip & Wire Harness Retainer

Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the electrical connectors from the Manifold Absolute Pressure (MAP) sensor (1) and the Electronic Throttle Control (ETC) (7).
5. Disengage the ETC harness from the clip (8) on the throttle body. Disengage the wire harness retainers (4 and 5) from the upper intake manifold near the MAP sensor and reposition the wire harness.
6. Disconnect the following hoses from the upper intake manifold:
 - Positive Crankcase Ventilation (PCV) (3)
 - vapor purge (6)
 - brake booster (2)

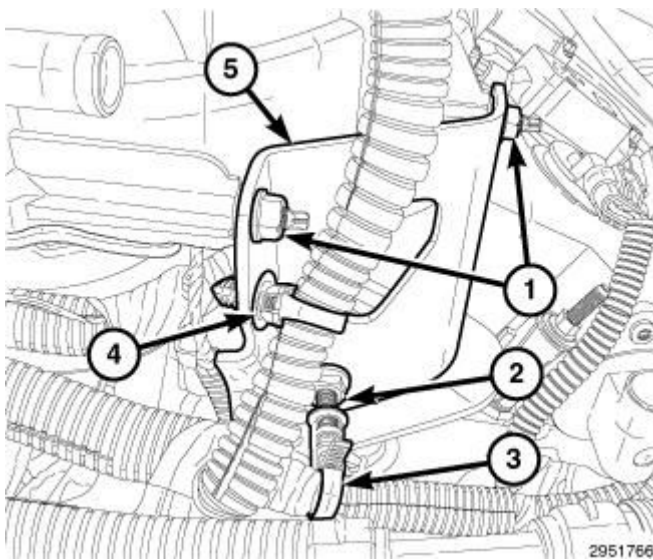


Fig. 531: Upper Intake Manifold Support Bracket, Stud & Fasteners

Courtesy of CHRYSLER GROUP, LLC

7. Disengage the wire harness retainer (4) from the upper intake manifold support bracket (5).
8. Disengage the wire harness retainer (3) from the stud-bolt (2).
9. Remove the upper nuts (1).
10. Remove the lower stud. (2).
11. Remove the bracket from the manifold.

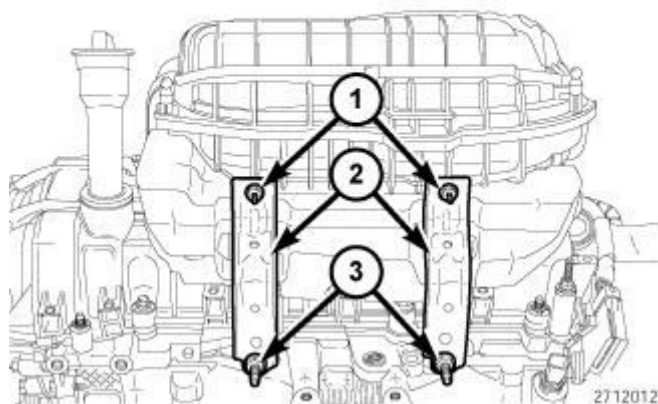


Fig. 532: Nuts, Stud Retainers & Upper Intake Manifold Support Brackets
Courtesy of CHRYSLER GROUP, LLC

12. Remove two upper nuts (1).

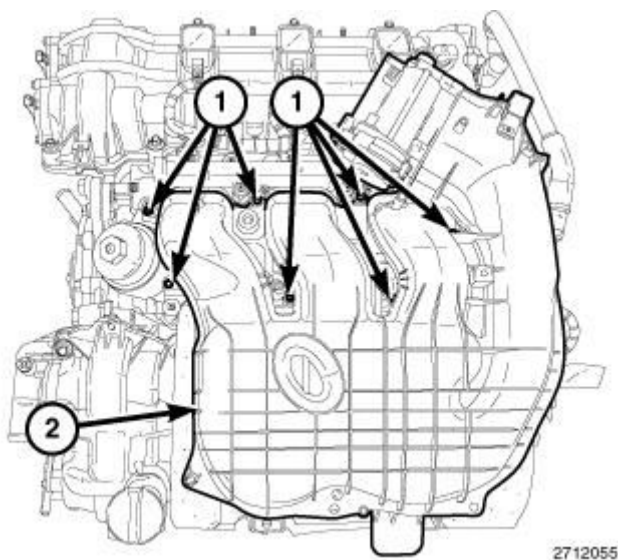


Fig. 533: Upper Intake Manifold & Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: The upper intake manifold attaching bolts are captured in the upper intake manifold. Once loosened, the bolts will have to be lifted out of the lower intake manifold and held while removing the upper intake manifold.

NOTE: Exercise care not to loosen the two fuel rail attachment bolts that are in close proximity of the upper intake manifold attaching bolts.

13. Remove seven manifold attaching bolts (1) and remove the upper intake manifold (2).

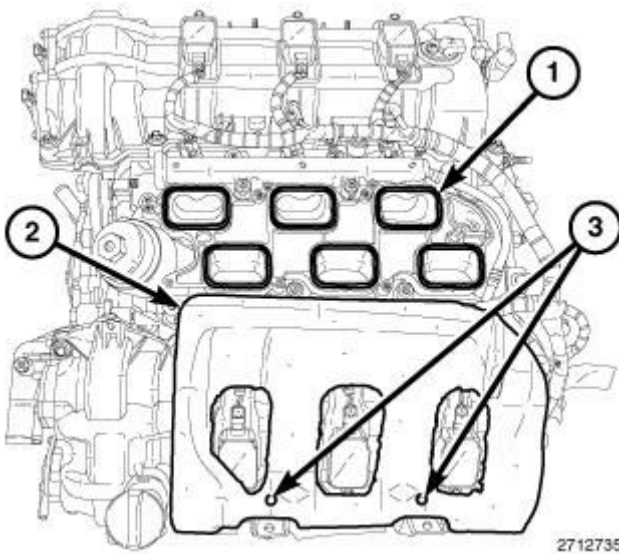


Fig. 534: Intake Ports, Insulator & Alignment Posts
Courtesy of CHRYSLER GROUP, LLC

14. Remove and discard the six upper to lower intake manifold seals (1).
15. Cover the open intake ports to prevent debris from entering the engine.
16. If required, remove the insulator (2) from the LH cylinder head cover.

LOWER INTAKE MANIFOLD

1. Release the fuel system pressure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE** .
2. Disconnect and isolate the negative battery cable.
3. Remove the resonator and upper intake manifold. Refer to **MANIFOLD, INTAKE, REMOVAL**.

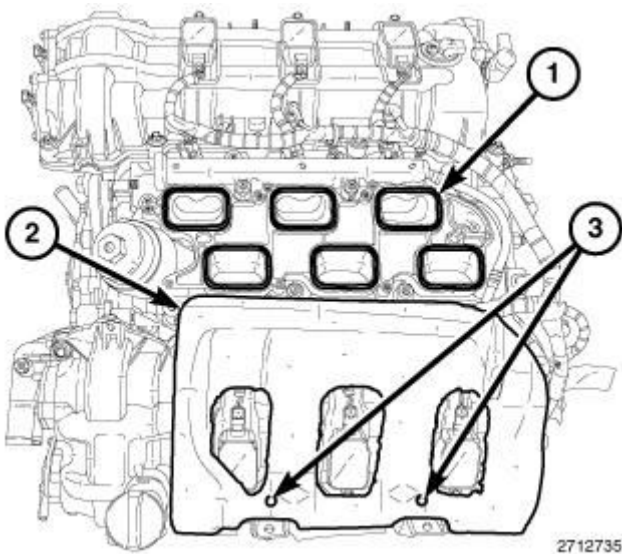


Fig. 535: Intake Ports, Insulator & Alignment Posts
 Courtesy of CHRYSLER GROUP, LLC

4. Remove the insulator (2) from the LH cylinder head cover.

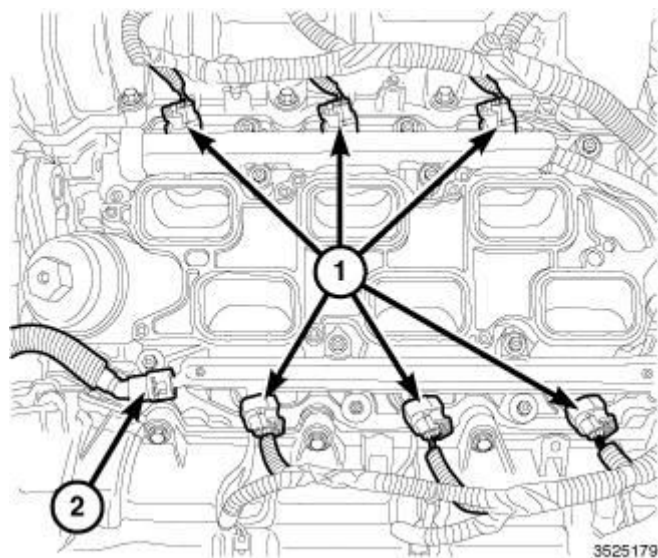


Fig. 536: Fuel Supply Line And Connectors
 Courtesy of CHRYSLER GROUP, LLC

5. Disconnect the fuel supply hose (2) from the fuel rail inlet. Refer to **FITTING, QUICK CONNECT**.
6. Disconnect the fuel injector electrical connectors (1).

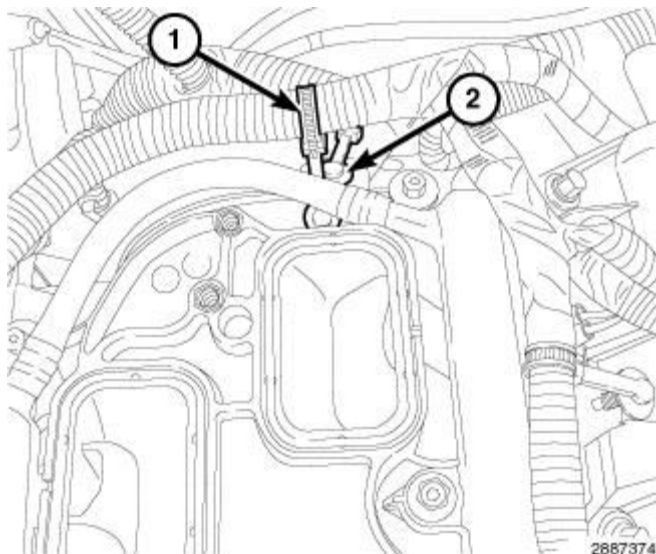


Fig. 537: Injection/Ignition Harness Retainer & Main Wire Harness Retainer
 Courtesy of CHRYSLER GROUP, LLC

7. Disengage the injection/ignition harness retainer (1) from the rear of the lower intake manifold.
8. Disengage the main wire harness retainer (2) from the rear of the lower intake manifold.

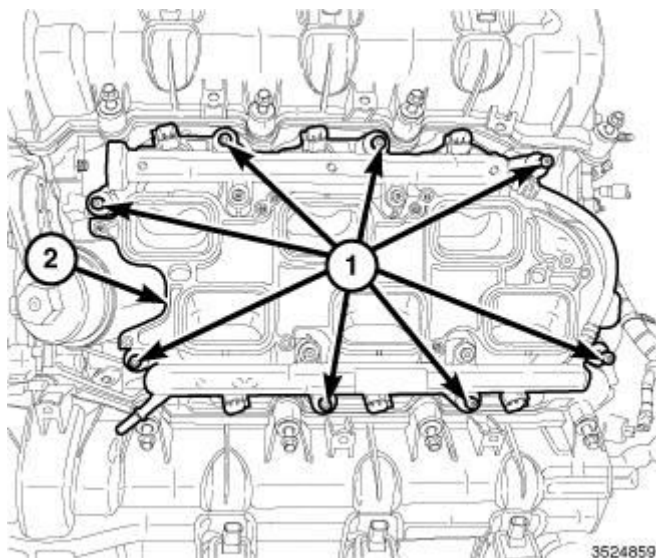
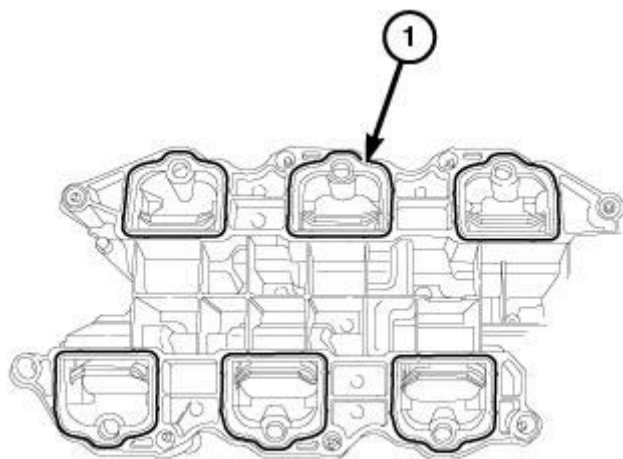


Fig. 538: Lower Intake Manifold & Bolts
 Courtesy of CHRYSLER GROUP, LLC

9. Remove the eight lower intake manifold attaching bolts (1).
10. Remove the lower intake manifold (2) with the fuel injectors and fuel rail.



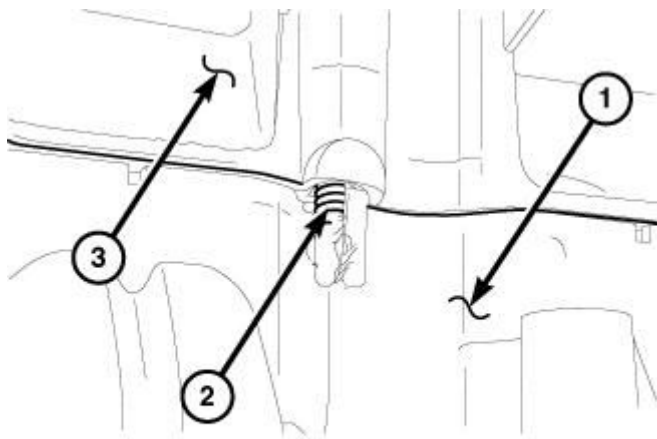
2757244

Fig. 539: Lower Intake Manifold To Cylinder Head Seals
Courtesy of CHRYSLER GROUP, LLC

11. Remove and discard the six lower intake manifold to cylinder head seals (1).
12. If required, remove the fuel rail and fuel injectors from the lower intake manifold. Refer to **RAIL, FUEL, REMOVAL**.

INSPECTION

INSPECTION



2869717

Fig. 540: Non-Repairable Damage To Lower Intake Manifold Due To Cross Threading Of An Upper Intake Manifold Attaching Bolt
Courtesy of CHRYSLER GROUP, LLC

NOTE: When the upper intake manifold (3) and lower intake manifold (1) are not aligned properly, cross threading of the upper intake manifold attaching bolts can occur. The graphic shows non-repairable damage to the lower intake manifold (1) due to cross threading of an upper intake manifold attaching bolt (2).

Check both the upper and lower intake manifolds for:

- Damage and cracks
- Gasket surface damage or warping

Check the lower intake manifold for:

- Damaged fuel injector ports

If either the upper or lower manifold exhibits any damaged or warped conditions, replace the manifold.

INSTALLATION

UPPER INTAKE MANIFOLD

NOTE: Prior to installing the upper intake manifold, verify that the four fuel rail bolts were not loosened. Refer to RAIL, FUEL, INSTALLATION .

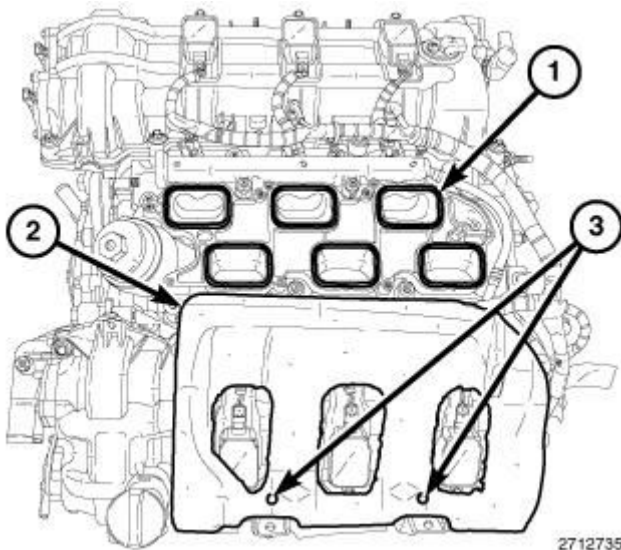


Fig. 541: Intake Ports, Insulator & Alignment Posts
Courtesy of CHRYSLER GROUP, LLC

1. Clean and inspect the sealing surfaces. Install new upper to lower intake manifold seals (1).

NOTE: Make sure the fuel injectors and wiring harnesses are in the correct position so that they don't interfere with the upper intake manifold

installation.

2. If removed, install the insulator (2) to the two alignment posts (3) on top of the LH cylinder head cover.

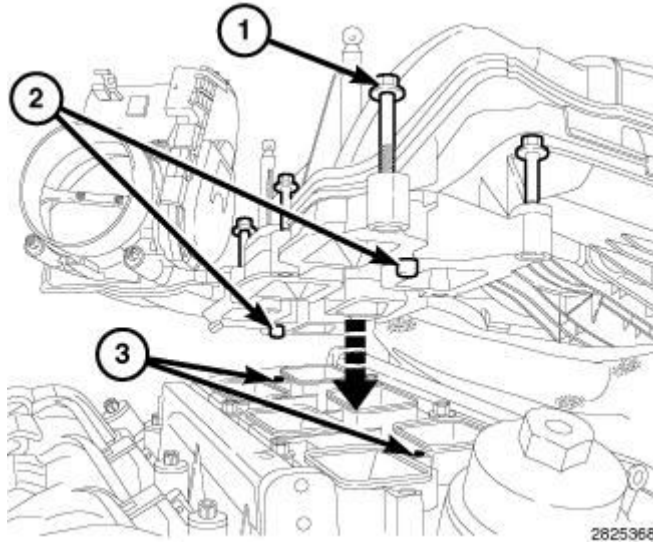


Fig. 542: Upper Intake Attaching Bolts, Locating Posts & Holes
 Courtesy of CHRYSLER GROUP, LLC

3. Lift and hold the seven upper intake attaching bolts (1) clear of the mating surface. Back the bolts out slightly or if required, use an elastic band to hold the bolts clear of the mating surface.
4. Position the upper intake manifold (1) onto the lower intake manifold so that the two locating posts (2) on the upper intake manifold align with corresponding holes (3) in the lower intake manifold.

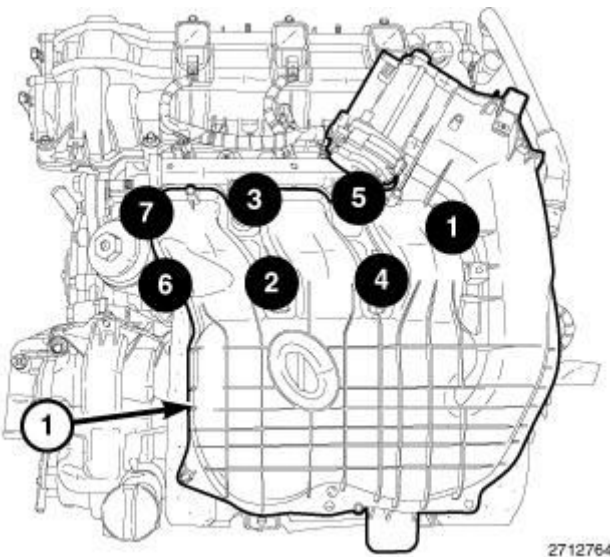


Fig. 543: Upper Intake Manifold Bolt Tightening Sequence
 Courtesy of CHRYSLER GROUP, LLC

5. Install the upper intake manifold attaching bolts. Tighten the bolts in the sequence shown in illustration to the proper specification. Refer to **TORQUE SPECIFICATIONS**.

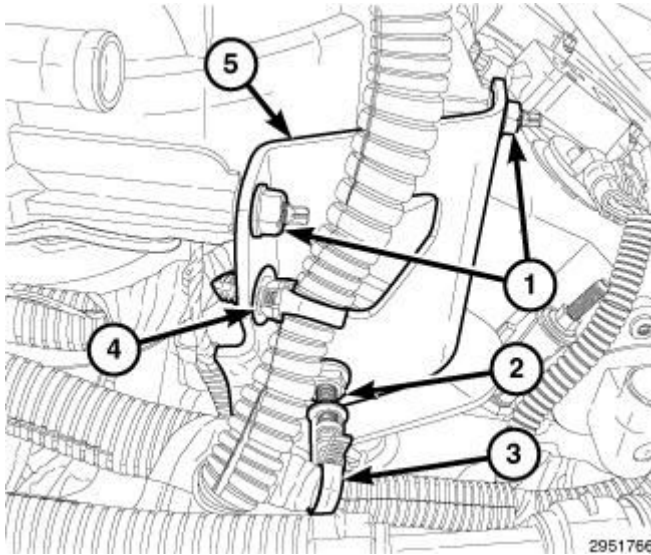


Fig. 544: Upper Intake Manifold Support Bracket, Stud & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

6. Position the support bracket (5) to the intake manifold studs.
7. Install the two nuts (1) to the upper intake manifold support bracket. Tighten the nuts (1) to the proper specification and tighten the studbolt (2) to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
8. Install the wire harness retainer (3) to the studbolt (2).
9. Install the wire harness retainer (4) to the upper intake manifold support bracket (5).

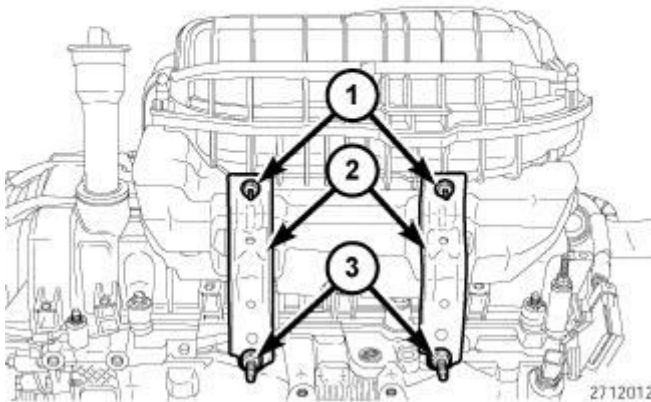


Fig. 545: Nuts, Stud Retainers & Upper Intake Manifold Support Brackets
 Courtesy of CHRYSLER GROUP, LLC

10. Install the two upper intake manifold support brackets nuts (1). Tighten the nuts to the proper specification. Refer to **TORQUE SPECIFICATIONS**.

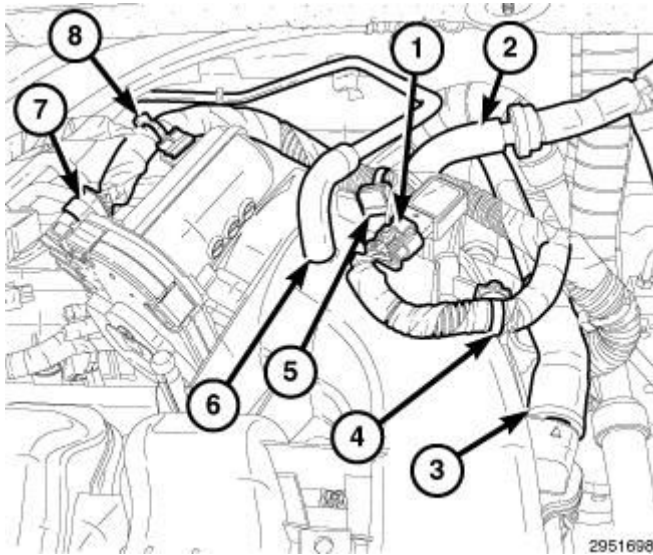


Fig. 546: MAP Sensor, ETC, PCV Hose, Brake Booster Vacuum Hose, EVAP Vapor Purge Line, Clip & Wire Harness Retainer
 Courtesy of CHRYSLER GROUP, LLC

11. Connect the following hoses to the upper intake manifold:
 - Positive Crankcase Ventilation (PCV) (3)
 - vapor purge (6)
 - brake booster (2)
12. Connect the electrical connectors to the Manifold Absolute Pressure (MAP) sensor (1) and the Electronic Throttle Control (ETC) (7).
13. Secure the ETC harness to the clip (7) on the throttle body and engage the wire harness retainers (4 and 5) to the upper intake manifold near the MAP sensor.
14. Install the intake resonator. Refer to **RESONATOR, AIR CLEANER, INSTALLATION**.

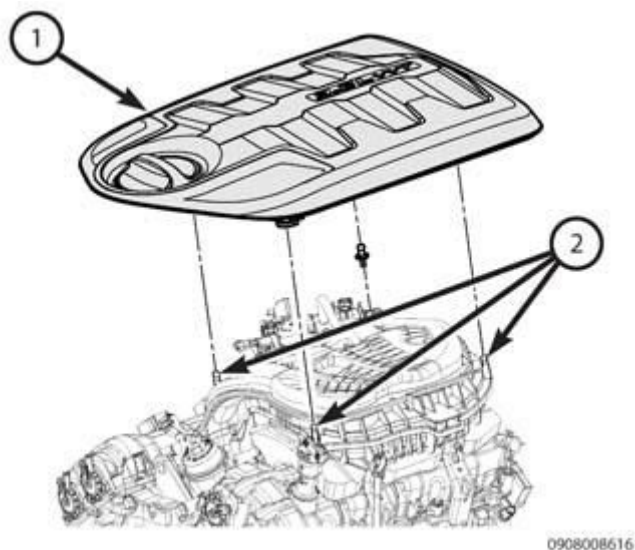


Fig. 547: Engine Cover & Ball Studs
Courtesy of CHRYSLER GROUP, LLC

15. Connect the negative battery cable and tighten nut to. Refer to **SPECIFICATIONS** .
16. Install the engine cover (1).

LOWER INTAKE MANIFOLD

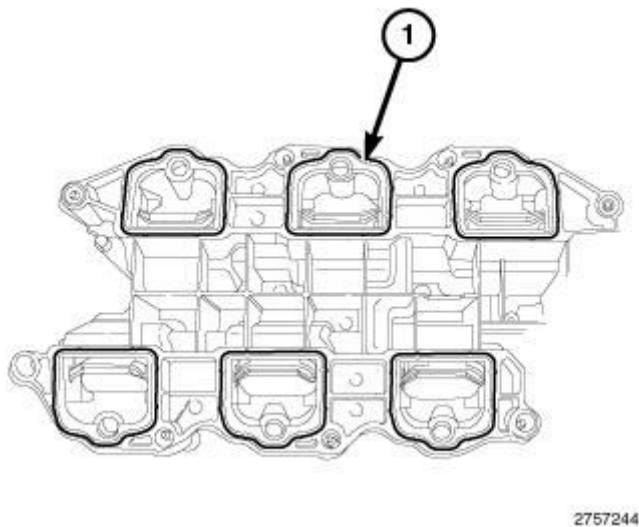


Fig. 548: Lower Intake Manifold To Cylinder Head Seals
Courtesy of CHRYSLER GROUP, LLC

1. Clean and inspect the sealing surfaces. Install new lower intake manifold to cylinder head seals (1).
2. If removed, install the fuel injectors and the fuel rail to the lower intake manifold. Refer to **RAIL, FUEL, INSTALLATION** .

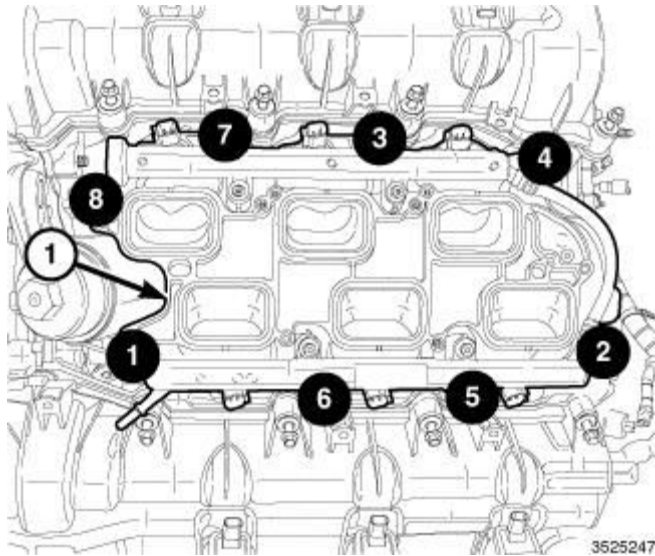


Fig. 549: Lower Intake Manifold Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

3. Position the lower intake manifold (1) on the cylinder head surfaces.
4. Tighten the bolts to the proper specification in the sequence shown in illustration. Refer to **TORQUE SPECIFICATIONS**.

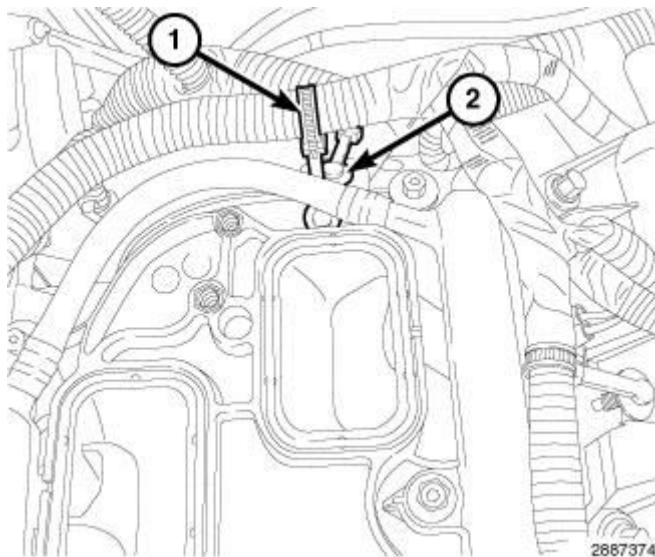


Fig. 550: Injection/Ignition Harness Retainer & Main Wire Harness Retainer
Courtesy of CHRYSLER GROUP, LLC

5. Engage the main wire harness retainer (2) to the rear of the lower intake manifold.
6. Engage the injection/ignition harness retainer (1) to the rear of the lower intake manifold.

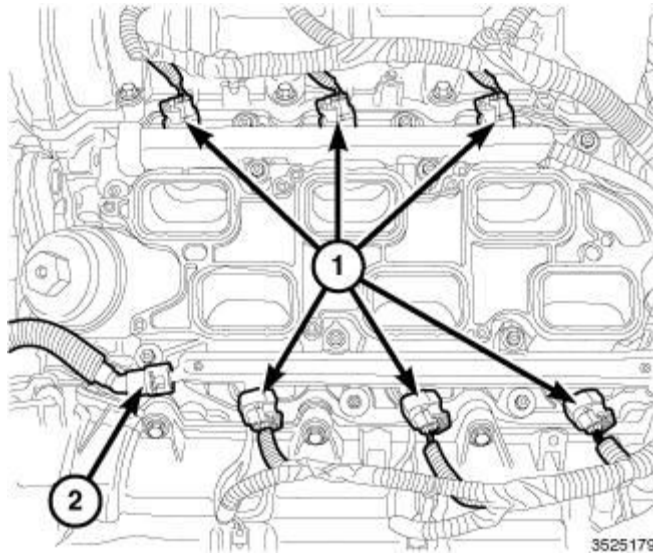


Fig. 551: Fuel Supply Line And Connectors

Courtesy of CHRYSLER GROUP, LLC

7. Connect the fuel injector harness connectors (1).
8. Connect the fuel supply hose (2) to the fuel rail. Refer to **FITTING, QUICK CONNECT** .

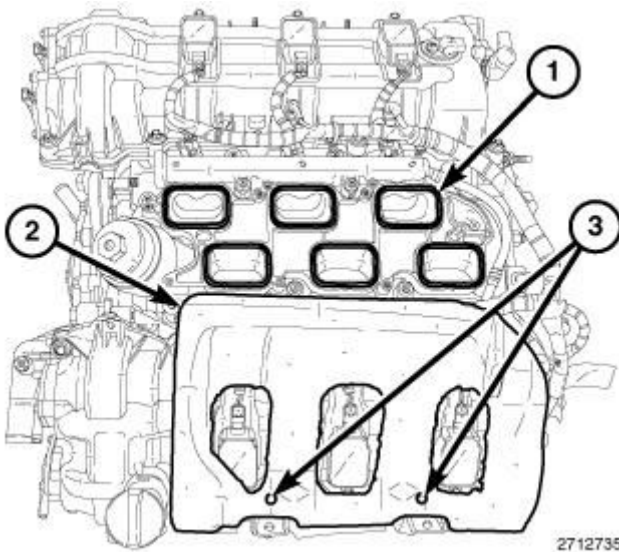


Fig. 552: Intake Ports, Insulator & Alignment Posts

Courtesy of CHRYSLER GROUP, LLC

9. Install the insulator (2) to the two alignment posts (3) on top of the LH cylinder head cover.
10. Install the upper intake manifold, support brackets and resonator. Refer to **MANIFOLD, INTAKE, INSTALLATION**.
11. Connect the negative battery cable and tighten the nut to the proper specification. Refer to **SPECIFICATIONS** .
12. Start the engine and check for leaks.

VALVE TIMING

DESCRIPTION

DESCRIPTION

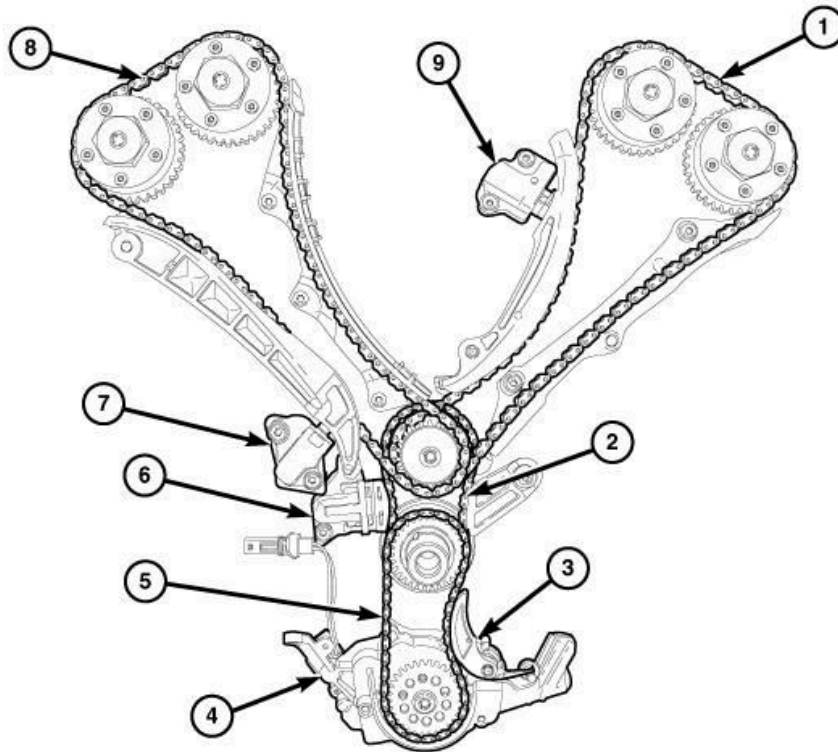


Fig. 553: Valve Timing System Components
Courtesy of CHRYSLER GROUP, LLC

The timing drive uses four silent chains. The silent chain link design improves sprocket engagement and reduces noise, vibration and harshness (NVH). One chain (5) drives the oil pump (4) and three chains drive the camshafts in a two stage design. The left secondary camshaft chain (1) uses an oil pressure controlled chain tensioner (9) with a ratcheting device. The right secondary camshaft chain (8) uses an oil pressure controlled tensioner (7) without a ratchet. The primary chain (2) also uses an oil pressure controlled tensioner (6) without a ratchet. A spring loaded tensioner (3) takes up the slack in the oil pump chain (5). The chain guides and tensioner arms are made of glass filled nylon with nylon wear faces.

OPERATION

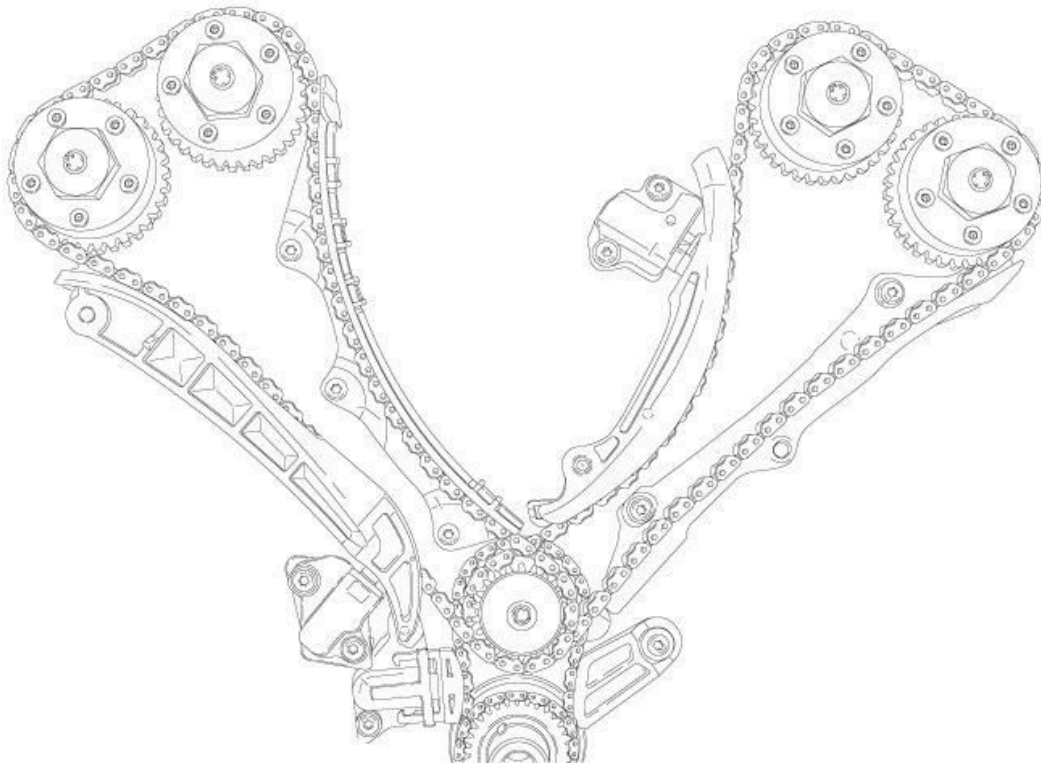
OPERATION



2873481

Fig. 554: Primary Chain, Idler Sprocket & Crankshaft Sprocket
Courtesy of CHRYSLER GROUP, LLC

The primary timing chain is a silent type. The primary chain drives the 28 tooth idler sprocket directly from a 21 tooth crankshaft sprocket. This results in a 75% speed reduction to the idler sprocket. The idler sprocket assembly connects the primary chain drive and the secondary chain drive. The idler sprocket assembly consists of two integral 22 tooth sprockets a 28 tooth sprocket. The idler sprocket assembly spins on a stationary idler shaft. The idler shaft is a light press-fit into the cylinder block. A large washer on the idler shaft bolt and the rear flange of the idler shaft are used to control sprocket thrust movement. Pressurized oil is routed through the center of the idler shaft to provide lubrication for the bushings used in the idler sprocket assembly. Primary chain motion is controlled by a hydraulic oil damped tensioner and a fixed guide. The tensioner and the guide both use nylon plastic wear faces for low friction and long wear. The primary chain receives oil splash lubrication.



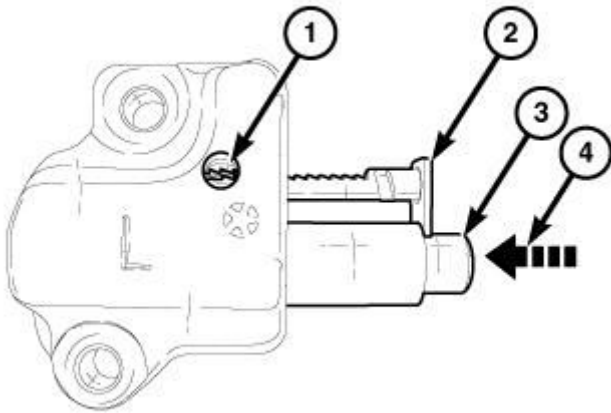
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Fig. 555: Secondary Drive Chains**Courtesy of CHRYSLER GROUP, LLC**

There are two identical secondary drive chains, both are silent type, one to drive the camshafts in each double overhead cam (DOHC) cylinder head. The secondary chains drive the 33 tooth camshaft sprockets directly from the 22 tooth idler sprockets. This speed reduction combined with the crankshaft to idler sprocket speed reduction produces the required 2:1 camshaft drive ratio. A fixed chain guide and a hydraulic oil damped tensioner are used to maintain tension in each secondary chain system. The left hydraulic secondary chain tensioner is fed from the main oil gallery through the cylinder head. The right hydraulic secondary chain tensioner is fed from the number one main bearing journal. Each tensioner incorporates a controlled leak path through a device known as a vent disc located in the nose of the piston to manage chain loads. Only the left tensioner has a mechanical ratchet system that limits chain slack if the tensioner piston bleeds down after engine shut down. The tensioner arms and guides also utilize nylon wear faces for low friction and long wear. The two secondary timing chains are lubricated by holes in the oil controlled tensioners that spray oil through an opening in the tensioner arms. The holes are protected from clogging by a fine mesh screen which is located on the back of the hydraulic tensioners.

STANDARD PROCEDURE

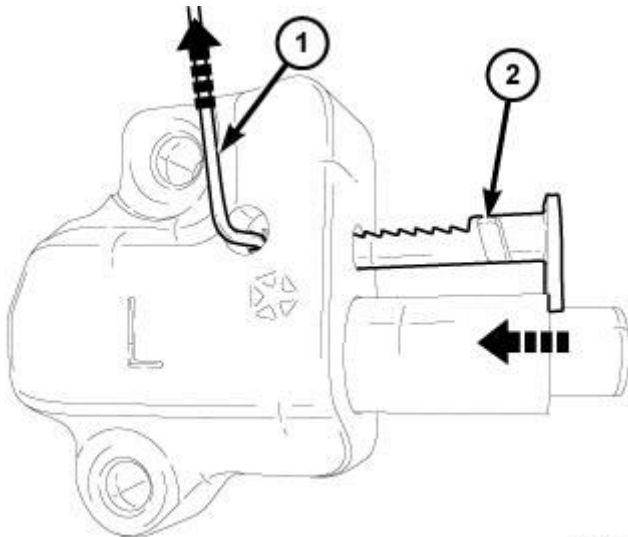
RESETTING LEFT CAM CHAIN TENSIONER



2661778

Fig. 556: Left Side Cam Chain Tensioner Ratchet Components
 Courtesy of CHRYSLER GROUP, LLC

The left side can chain tensioner used on the 3.6L engine is equipped with a ratchet. The ratchet consists of a rack (2) and a pawl (1). In use, the rack (2) extends with the piston (3) from the tensioner body. The pawl (1) will not allow the rack (2) to retract back into the tensioner body. In order to reset the tensioner, the pawl (1) must be disengaged from the rack (2) so that the piston (3) and rack (2) can be pushed back (4) into the tensioner body.



2661831

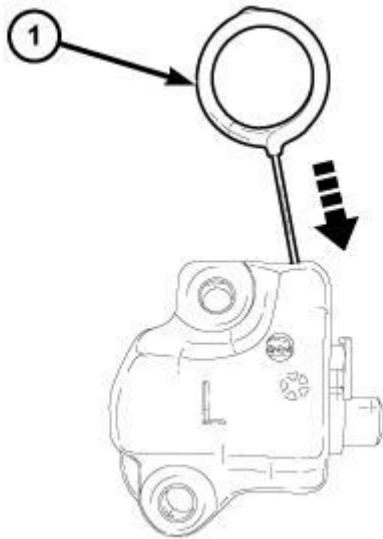
Fig. 557: Locating Slot In Rack & Allen Wrench
 Courtesy of CHRYSLER GROUP, LLC

WITH ENGINE TIMING COVER REMOVED

NOTE: The slot (2) in the rack provides an anchor point for a pin that holds the rack in

the retracted position.

1. Using a suitable tool, such as an allen wrench (1), lift the pawl off of the rack.
2. While holding the pawl off of the rack, push the rack and the piston into the tensioner body.

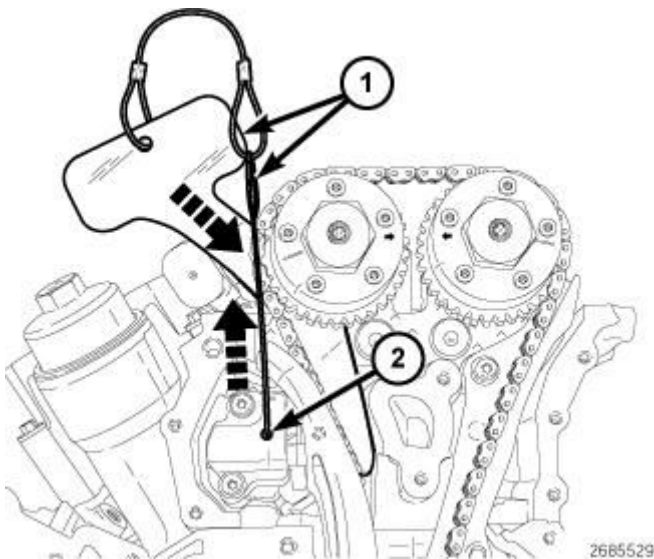


2681934

Fig. 558: Inserting Tensioner Pin To Hold Rack & Piston In Retracted Position

Courtesy of CHRYSLER GROUP, LLC

3. When the slot is aligned with the hole in the tensioner body, insert Tensioner Pin (special tool #8514, Pins, Tensioner) (1) to hold the rack and piston in the retracted position.



2685529

Fig. 559: Pin, Rack & Timing Chain Holder

Courtesy of CHRYSLER GROUP, LLC

WITH ENGINE TIMING COVER INSTALLED

NOTE: Graphic shows timing cover removed for clarity.

1. Using (special tool #10200-3, Pin) (2), lift the pawl off of the rack (3).

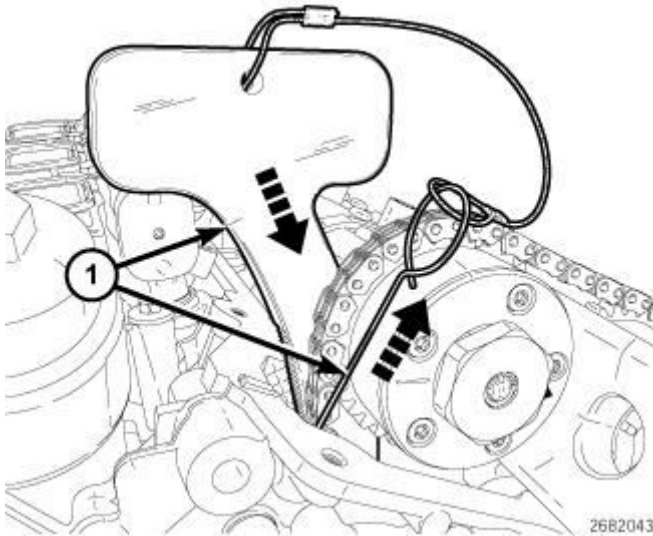


Fig. 560: Positioning Timing Chain Holder To Force Rack & Piston Back Into Tensioner Body
Courtesy of CHRYSLER GROUP, LLC

2. While holding the pawl off of the rack, push (special tool #10200-1, Holder, Timing Chain, Left Side) (1) into place between the cylinder head and the cam chain guide to force the rack and piston back into the tensioner body. The holder must remain in place during service to keep the rack and piston in the retracted position.

MEASURING TIMING CHAIN WEAR

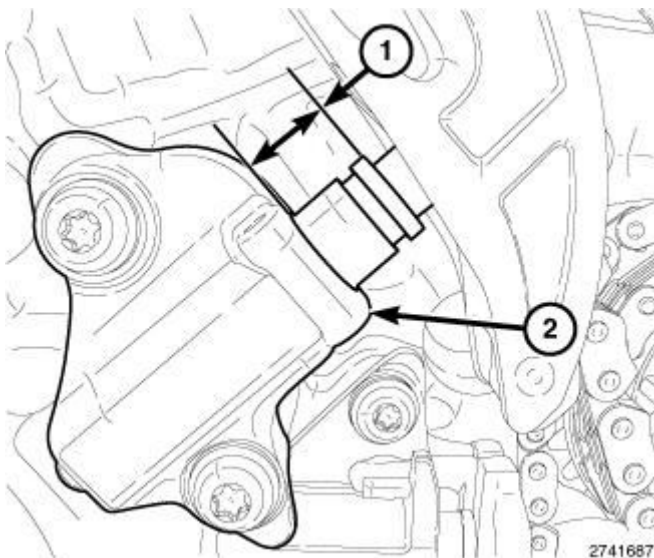


Fig. 561: Piston Extension & RH Cam Chain Tensioner
Courtesy of CHRYSLER GROUP, LLC

1. Remove the engine timing chain cover. Refer to **COVER(S), ENGINE TIMING, REMOVAL**.
2. To determine if the timing chains are worn, rotate the crankshaft clockwise until maximum tensioner piston extension (1) is obtained on the RH cam chain tensioner (2). Measure the distance between the secondary timing chain tensioner housing and the step ledge on the tensioner piston (1). Piston extension (1) must be less than 16 mm (0.630 in.).
3. Piston extension greater than 16 mm (0.630 in.) indicates that all timing chains are worn and require replacement. Refer to **CHAIN AND SPROCKETS, TIMING, REMOVAL**.

ENGINE TIMING VERIFICATION

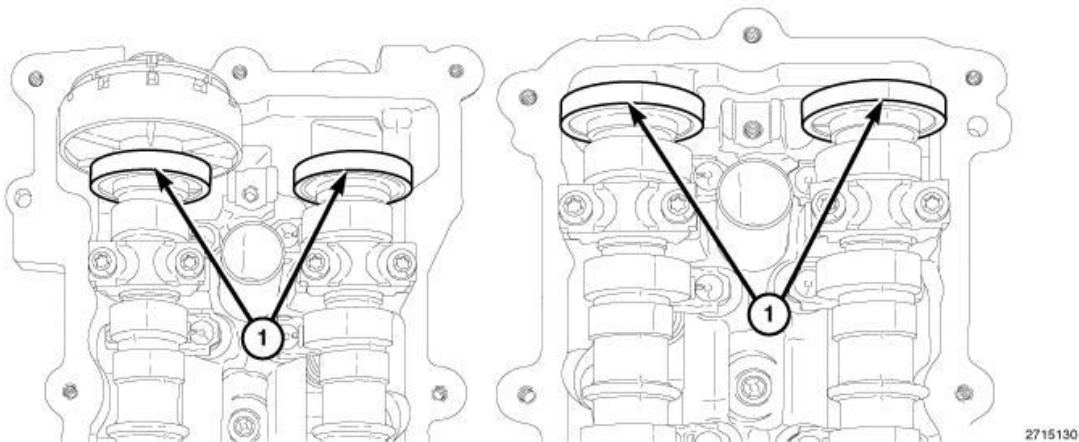
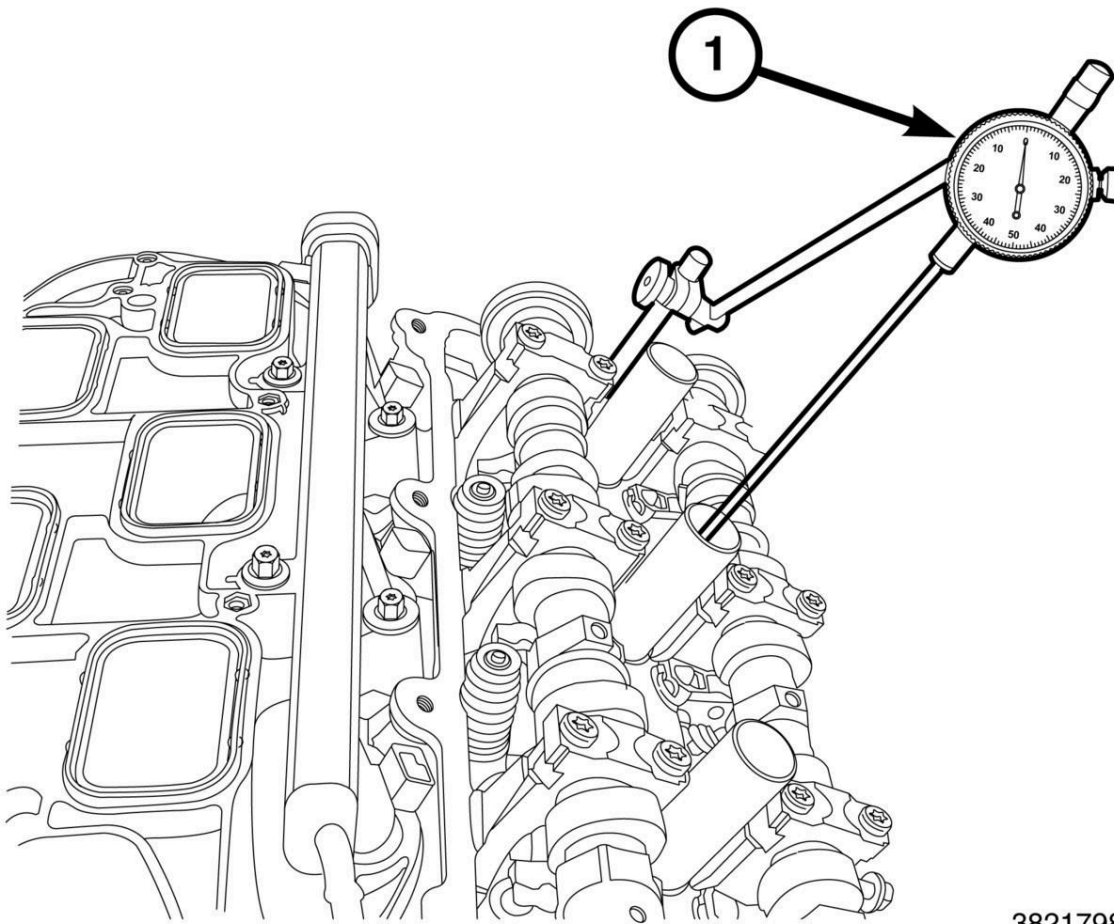


Fig. 562: Magnetic Timing Wheels
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.



3821798

Fig. 563: Positioning Dial Indicator & Setting #4 Cylinder At Top-Dead-Center Compression Stroke
Courtesy of CHRYSLER GROUP, LLC

Correct timing is critical for the NON free-wheeling designed, 3.6L engine. Engine timing can be verified by using the following procedures:

1. Remove the upper intake manifold and both cylinder head covers. Refer to **COVER(S), CYLINDER HEAD, REMOVAL**.
2. Remove the spark plugs. Refer to **SPARK PLUG, REMOVAL**.

CAUTION: When aligning timing marks, always rotate engine by turning the crankshaft. Failure to do so will result in valve and/or piston damage.

3. Mount Dial Indicator Set (special tool #C-3339A, Set, Dial Indicator) (1) to a stationary point on the engine, such as the left camshaft position (CMP) sensor mount. Position the indicator probe into the number four cylinder, rotate the crankshaft clockwise (as viewed from the front) to place the number four cylinder piston at top-dead-center on the compression stroke and set the indicator dial to **ZERO**.

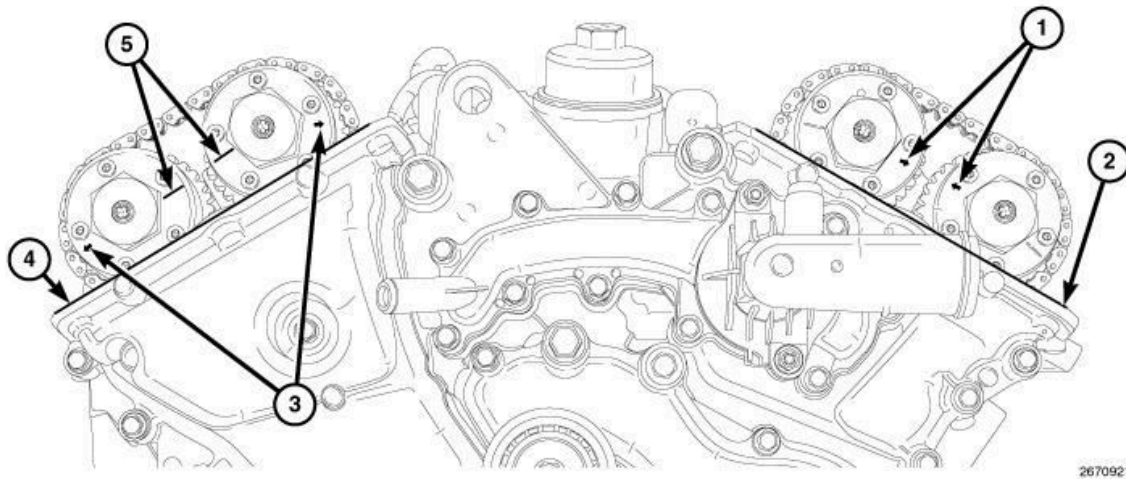


Fig. 564: Arrows, Scribe Lines & Cam Phasers
 Courtesy of CHRYSLER GROUP, LLC

4. While maintaining this alignment, verify that the **ARROWS** (1) on the left side cam phasers point toward each other and are parallel to the cylinder head cover mounting surface (2) and that the right side cam phaser **ARROWS** (3) point away from each other and the **SCRIBE LINES** (5) are parallel to the cylinder head cover mounting surface (4).

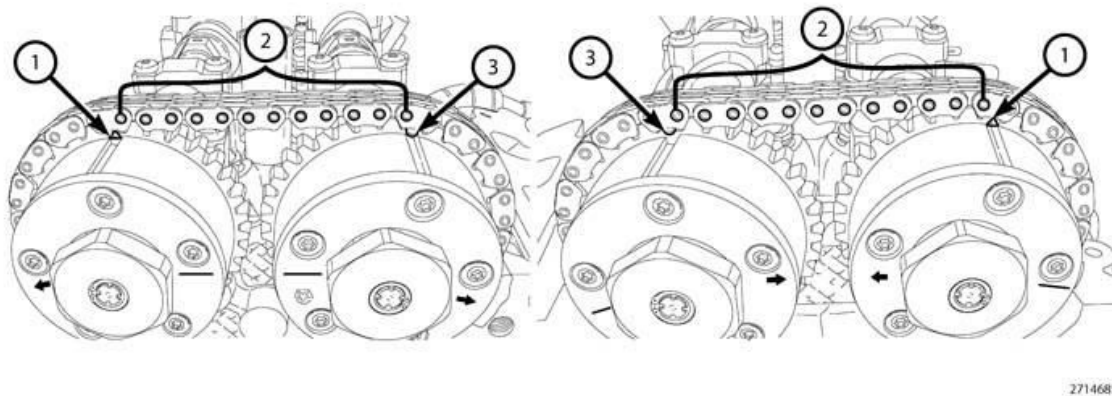


Fig. 565: Chain Pins, Exhaust Cam Phaser Triangle Marking & Circle Marking
 Courtesy of CHRYSLER GROUP, LLC

NOTE: The phaser markings (1 and 3) could align with either an external or internal chain link. Either alignment is acceptable as long as there are twelve chain pins between the markings.

5. There should be twelve chain pins (2) **BETWEEN** the exhaust cam phaser triangle marking (1) and the intake cam phaser circle marking (3) as viewed from either the front or rear of the cam phasers.
6. If the engine timing is not correct, proceed to Timing Chain and Sprockets for service procedures. Refer to **CHAIN AND SPROCKETS, TIMING, REMOVAL**.

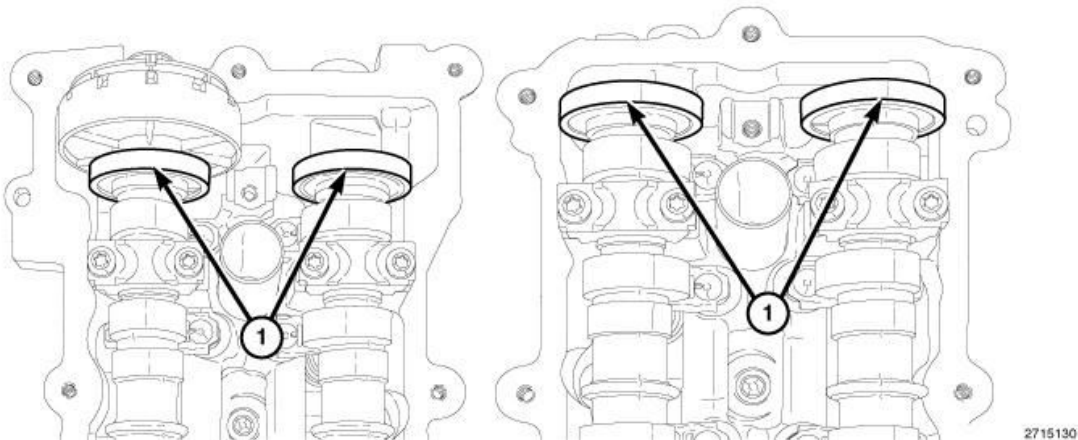
CHAIN AND SPROCKETS, TIMING**REMOVAL****REMOVAL**

Fig. 566: Magnetic Timing Wheels
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.

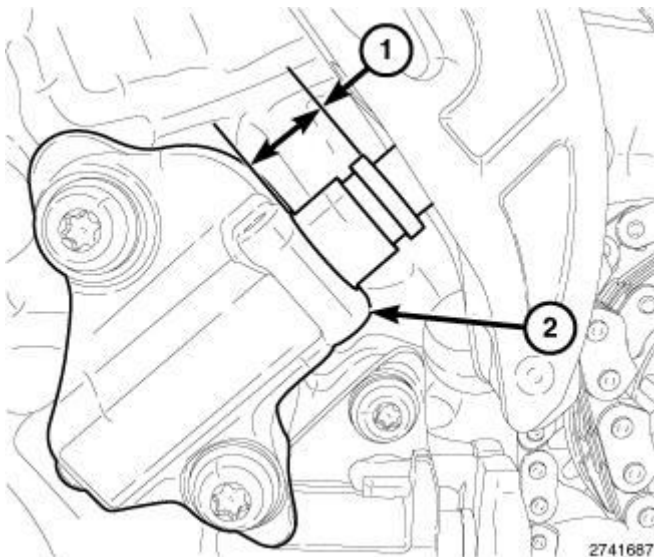


Fig. 567: Piston Extension & RH Cam Chain Tensioner
Courtesy of CHRYSLER GROUP, LLC

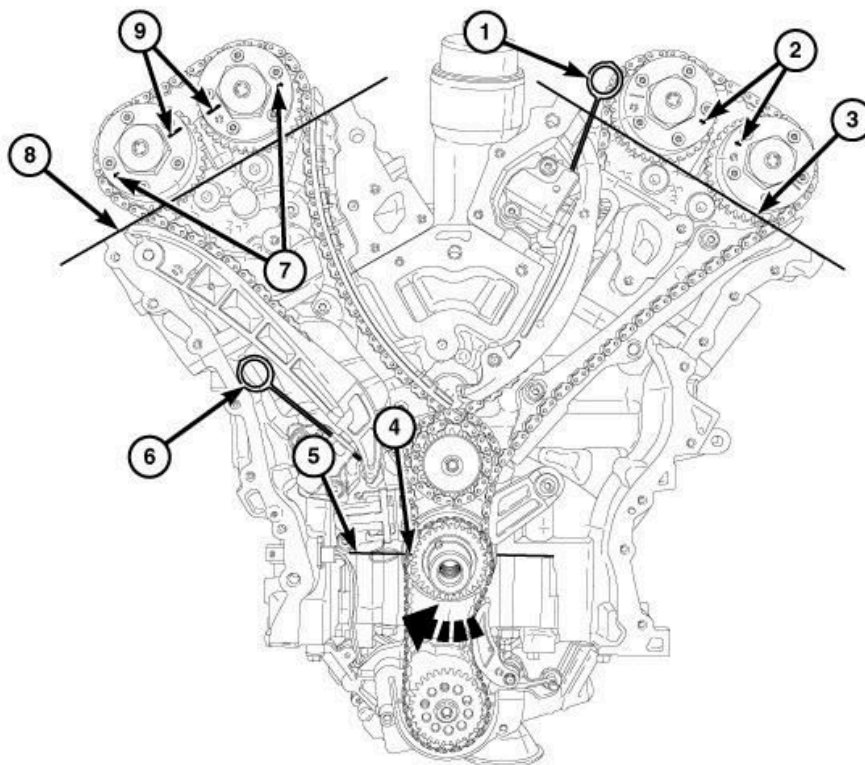
CAUTION: When the timing chains are removed and the cylinder heads are still

installed, DO NOT rotate the camshafts or crankshaft without first locating the proper crankshaft position. Failure to do so will result in valve and/or piston damage.

NOTE: The Variable Valve Timing (VVT) assemblies (Phasers) and Oil Control Valves (OCVs) can be serviced without removing the engine timing cover. Refer to ASSEMBLY, VARIABLE VALVE TIMING, PHASER/OIL CONTROL VALVE, REMOVAL.

1. Disconnect and isolate the negative battery cable.
2. Remove the air cleaner housing assembly and upper intake manifold. Refer to MANIFOLD, INTAKE, REMOVAL.
3. Remove both cylinder head covers. Refer to COVER(S), CYLINDER HEAD, REMOVAL.
4. Remove the spark plugs. Refer to SPARK PLUG, REMOVAL.
5. Raise and support the vehicle. Refer to HOISTING, STANDARD PROCEDURE.
6. Drain the cooling system. Refer to STANDARD PROCEDURE.
7. Remove the oil pan, accessory drive belts, crankshaft vibration damper and engine timing cover. Refer to COVER(S), ENGINE TIMING, REMOVAL.

NOTE: Take this opportunity to measure timing chain wear. Refer to VALVE TIMING - STANDARD PROCEDURE.



2661245

Fig. 568: Rotating Crankshaft Clockwise To Position No. 1 Piston At TDC On Exhaust Stroke

Courtesy of CHRYSLER GROUP, LLC

CAUTION: When aligning timing marks, always rotate engine by turning the crankshaft. Failure to do so will result in valve and/or piston damage.

8. Rotate the crankshaft clockwise (as viewed from the front) to place the number one cylinder piston at top-dead-center on the exhaust stroke by aligning the dimple (4) on the crankshaft with the block/bearing cap junction (5).
9. While maintaining this alignment, verify that the **ARROWS** (2) on the left side cam phasers point toward each other and are parallel to the cylinder head cover mounting surface (3) and that the right side cam phaser **ARROWS** (7) point away from each other and the **SCRIBE LINES** (9) are parallel to the cylinder head cover mounting surface (8).

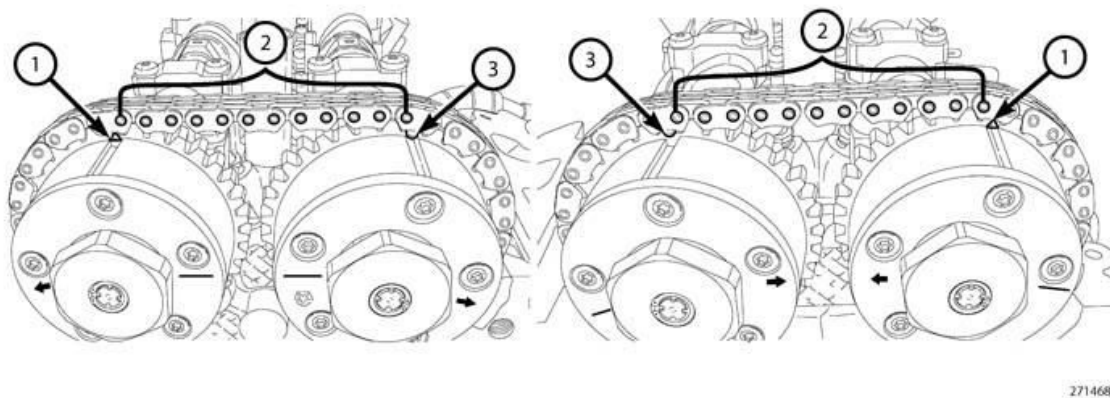


Fig. 569: Chain Pins, Exhaust Cam Phaser Triangle Marking & Circle Marking
Courtesy of CHRYSLER GROUP, LLC

NOTE: The phaser markings (1 and 3) could align with either an external or internal chain link. Either alignment is acceptable as long as there are twelve chain pins between the markings.

10. There should be twelve chain pins (2) **BETWEEN** the exhaust cam phaser triangle marking (1) and the intake cam phaser circle marking (3) as viewed from either the front or rear of the cam phasers.

CAUTION: Always reinstall timing chains so that they maintain the same direction of rotation. Inverting a previously run chain on a previously run sprocket will result in excessive wear to both the chain and sprocket.

11. Mark the direction of rotation on the following timing chains using a paint pen or equivalent to aid in reassembly:
 - Left side cam chain
 - Right side cam chain

- Oil pump chain
- Primary chain

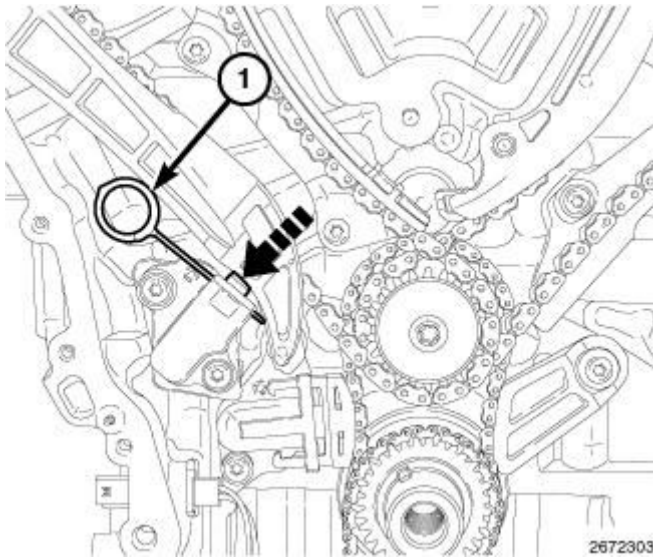


Fig. 570: Resetting Right Cam Chain Tensioner
Courtesy of CHRYSLER GROUP, LLC

- Reset the right side cam chain tensioner by pushing back the tensioner piston and installing Tensioner Pin (special tool #8514, Pins, Tensioner) (1).

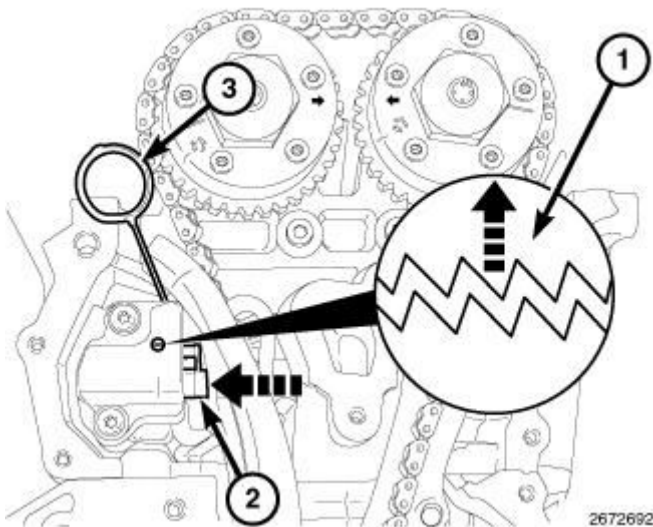
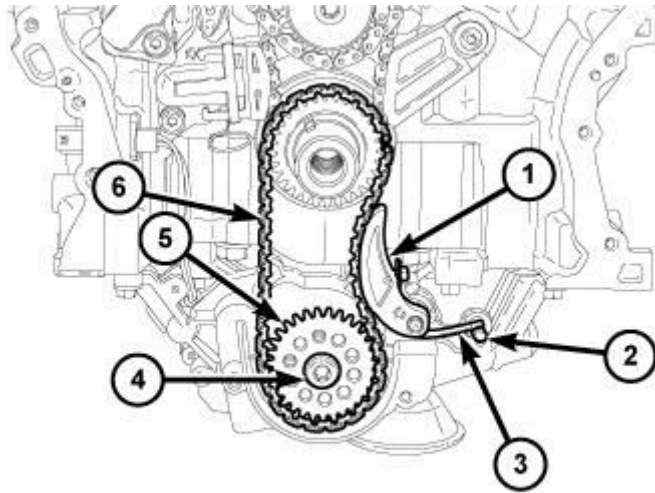


Fig. 571: Resetting Left Cam Chain Tensioner
Courtesy of CHRYSLER GROUP, LLC

- Reset the left side cam chain tensioner by lifting the pawl (1), pushing back the piston (2) and installing Tensioner Pin (special tool #8514, Pins, Tensioner) (3). Refer to **VALVE TIMING - STANDARD PROCEDURE**.

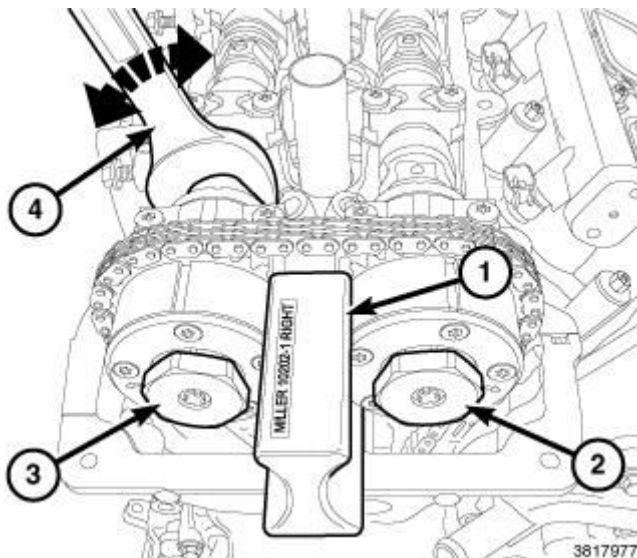


2662471

Fig. 572: Oil Pump Chain Tensioner, Spring, Retaining Bolt, Dowel Pin, Oil Pump Sprocket & Oil Pump Chain

Courtesy of CHRYSLER GROUP, LLC

14. Disengage the oil pump chain tensioner spring (3) from the dowel pin (2) and remove the oil pump chain tensioner (1).
15. Remove the oil pump sprocket T45 retaining bolt (4) and remove the oil pump sprocket (5) and oil pump chain (6).



3817977

Fig. 573: Camshaft Phaser Lock, Oil Control Valves & Wrench

Courtesy of CHRYSLER GROUP, LLC

NOTE: It may be necessary to rock the camshaft slightly (a few degrees) with a wrench (4) when installing the camshaft phaser lock.

16. Install the (special tool #10202-1, Lock, Camshaft/Phaser, Right Side) (1) with the tool number facing up.
17. Loosen, but do not remove, the exhaust oil control valve (3) and the intake oil control valve (2).
18. Remove the (special tool #10202-1, Lock, Camshaft/Phaser, Right Side) (1).
19. Remove the oil control valve (2) from the right side intake cam phaser.
20. Pull the right side intake cam phaser off of the camshaft and remove the right side cam chain.
21. If required, remove the oil control valve (3) and pull the right side exhaust cam phaser off of the camshaft.

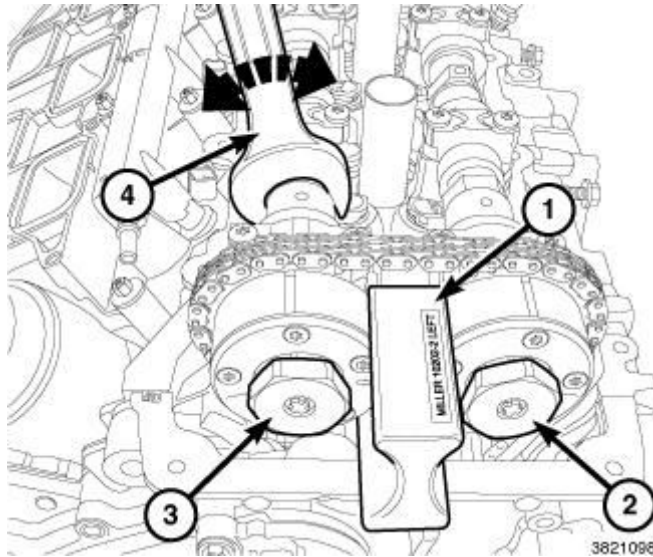


Fig. 574: Camshaft Phaser Lock, Oil Control Valves & Wrench
 Courtesy of CHRYSLER GROUP, LLC

NOTE: It may be necessary to rock the camshaft slightly (a few degrees) with a wrench (4) when installing the camshaft phaser lock.

22. Install the (special tool #10202-2, Lock, Camshaft/Phaser, Left Side) (1) with the tool number facing up.
23. Loosen, but do not remove, the exhaust oil control valve (2) and the intake oil control valve (3).
24. Remove the (special tool #10202-2, Lock, Camshaft/Phaser, Left Side) (1).
25. Remove the oil control valve (2) from the left side exhaust cam phaser.
26. Pull the left side exhaust cam phaser off of the camshaft and remove the left side cam chain.
27. If required, remove the oil control valve (3) and pull the left side intake cam phaser off of the camshaft.

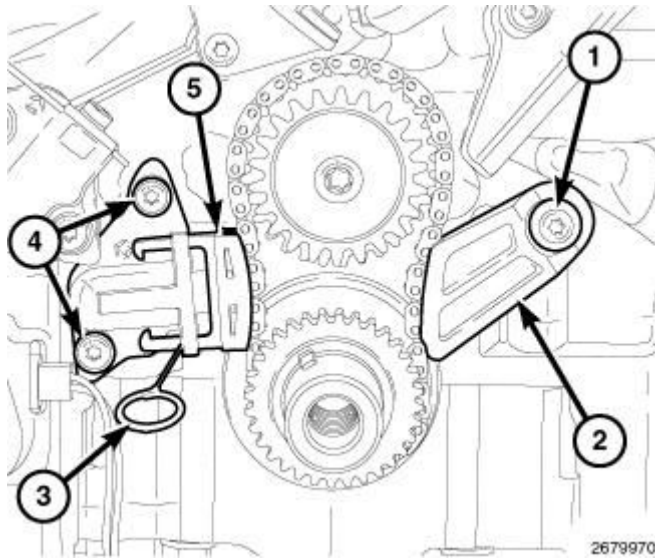


Fig. 575: Primary Chain Tensioner, Tensioner Pin, Primary Chain Guide & Bolts
 Courtesy of CHRYSLER GROUP, LLC

28. Reset the primary chain tensioner (5) by pushing back the tensioner piston and installing Tensioner Pin (special tool #8514, Pins, Tensioner) (3). Remove two T30 bolts (4) and remove the primary chain tensioner.
29. Remove the T30 bolt (1) and the primary chain guide (2).

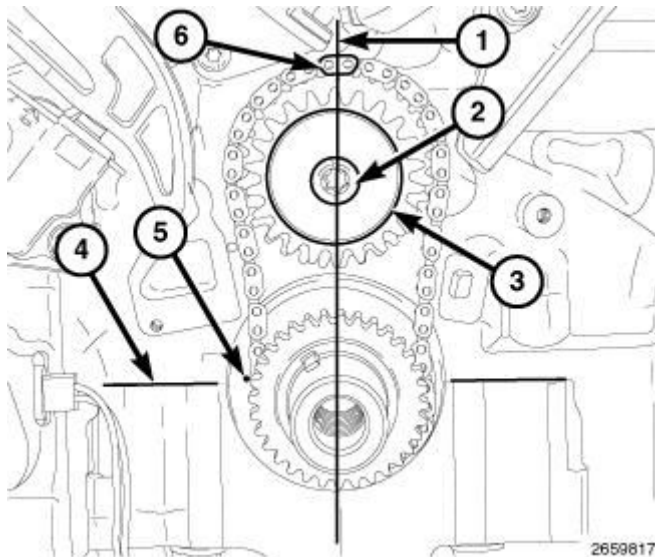
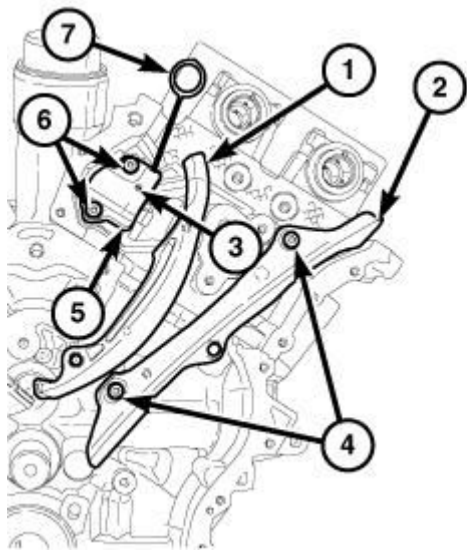


Fig. 576: Timing Chain Plated Link At 12 O'Clock, Washer, Retaining Bolt, Block/Bearing Cap Junction & Dimple
 Courtesy of CHRYSLER GROUP, LLC

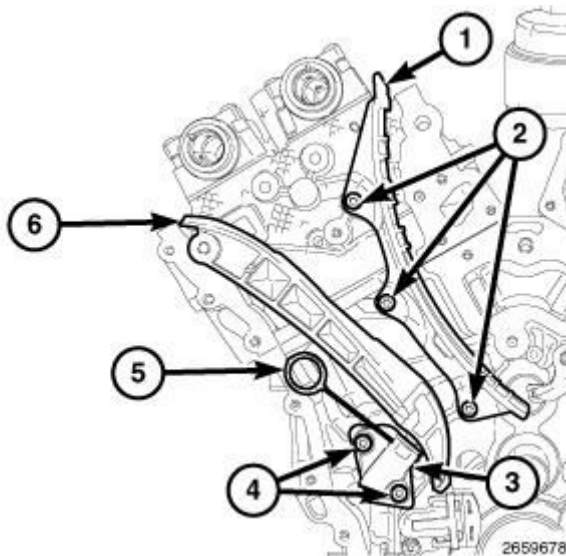
30. Remove the idler sprocket T45 retaining bolt (2) and washer (3).
31. Remove the primary chain, idler sprocket and crankshaft sprocket as an assembly.



2659731

Fig. 577: Left Cam Chain Tensioner, Arm, Guide & Bolts
 Courtesy of CHRYSLER GROUP, LLC

32. If required, remove two T30 bolts (6) and the left side cam chain tensioner (5).
33. If required, remove two T30 bolts (4) and the left side cam chain guide (2) and tensioner arm (1).



2659678

Fig. 578: Right Cam Chain Tensioner, Arm, Guide & Bolts
 Courtesy of CHRYSLER GROUP, LLC

34. If required, remove two T30 bolts (4) and the right side cam chain tensioner (3).
35. If required, remove three T30 bolts (2) and the right side cam chain guide (1) and tensioner arm (6).
36. Inspect all sprockets and chain guides. Replace if damaged.

INSPECTION

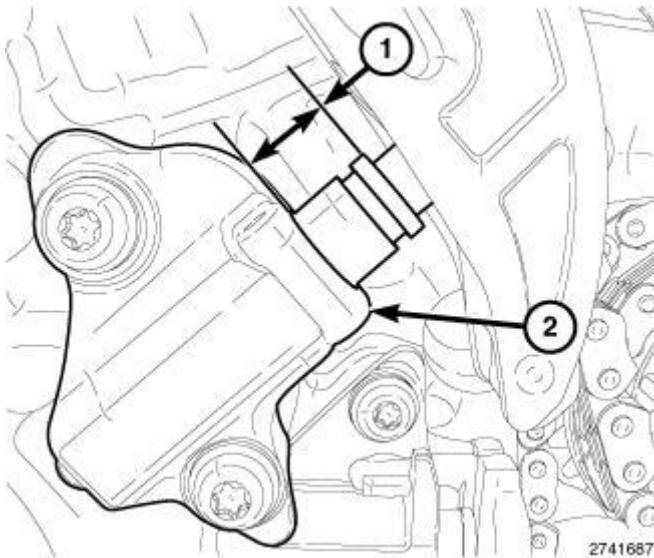
INSPECTION

Fig. 579: Piston Extension & RH Cam Chain Tensioner
Courtesy of CHRYSLER GROUP, LLC

Prior to disassembly of the timing chains and sprockets, measure the timing chain wear (1). Refer to **VALVE TIMING - STANDARD PROCEDURE** .

Inspect the following valve timing components:

- Sprockets for excessive tooth wear. Some tooth markings are normal and not a cause for sprocket replacement.
- Idler sprocket assembly bushing and shaft for excessive wear.
- Chain guides and tensioner arms. Replace these parts if grooving in plastic face is more than 1 mm (0.039 in.) deep.
- Secondary chain tensioner piston and ratcheting device. Inspect for evidence of heavy contact between tensioner piston and tensioner arm. If this condition exist the tensioner arm and chain should be replaced.
- Primary chain tensioner plastic faces. Replace as required.

INSTALLATION**INSTALLATION**

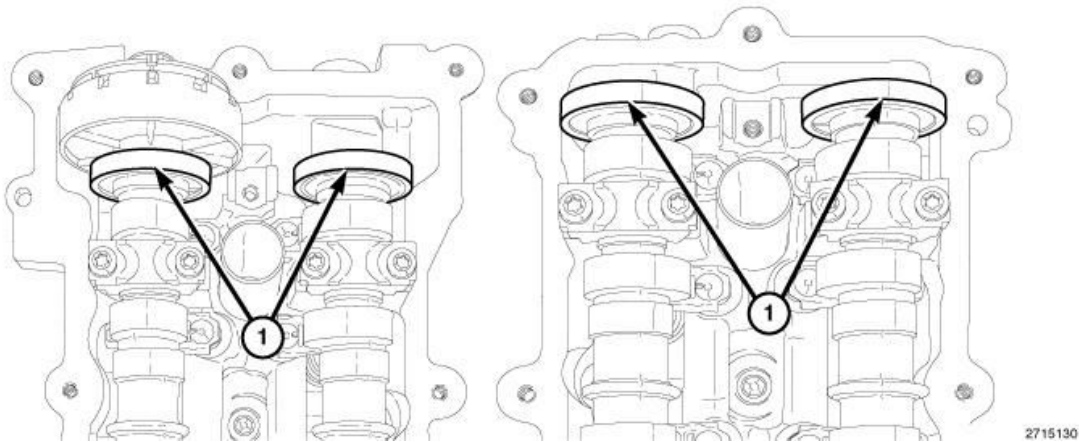


Fig. 580: Magnetic Timing Wheels
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.

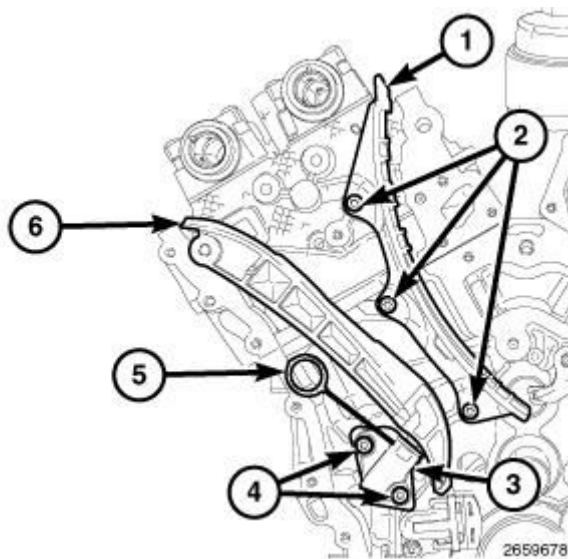
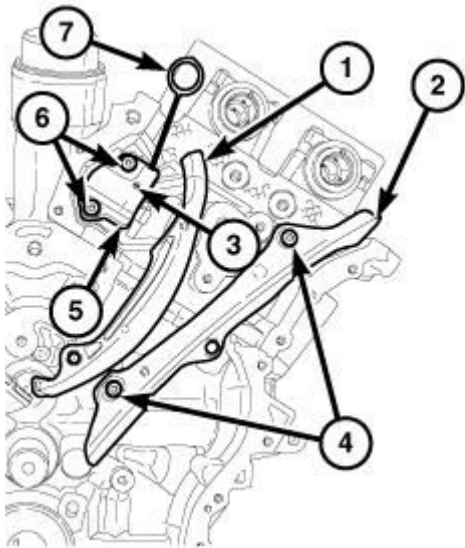


Fig. 581: Right Cam Chain Tensioner, Arm, Guide & Bolts
Courtesy of CHRYSLER GROUP, LLC

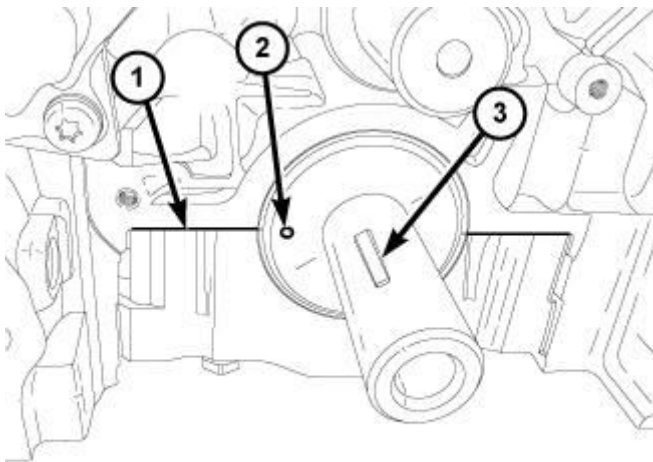
1. Inspect all sprockets and chain guides. Replace if damaged.
2. If removed, install the right side cam chain guide (1) and tensioner arm (6). Tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
3. If removed, install the right side cam chain tensioner (3) to the engine block with two bolts (4). Tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
4. Reset the right side cam chain tensioner (3) by pushing back the tensioner piston and installing Tensioner Pin (special tool #8514, Pins, Tensioner) (5).



2659731

Fig. 582: Left Cam Chain Tensioner, Arm, Guide & Bolts
Courtesy of CHRYSLER GROUP, LLC

5. If removed, install the left side cam chain guide (2) and tensioner arm (1). Tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
6. If removed, install the left side cam chain tensioner (5) to the cylinder head with two bolts (6). Tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
7. Reset the left side cam chain tensioner (5) by lifting the pawl (3), pushing back the piston and installing Tensioner Pin (special tool #8514, Pins, Tensioner) (7). Refer to **VALVE TIMING - STANDARD PROCEDURE** .



2605347

Fig. 583: Crankshaft Key, Dimple & Block/Bearing Cap Junction
Courtesy of CHRYSLER GROUP, LLC

8. Verify that the key (3) is installed in the crankshaft.

CAUTION: Do not rotate the crankshaft more than a few degrees independently of the camshafts. Piston to valve contact could occur resulting in possible valve damage. If the crankshaft needs to be rotated more than a few degrees, first remove the camshafts.

- 9.
10. Verify that the number one cylinder piston is positioned at top-dead-center by aligning the dimple (2) on the crankshaft with the block/bearing cap junction (1).

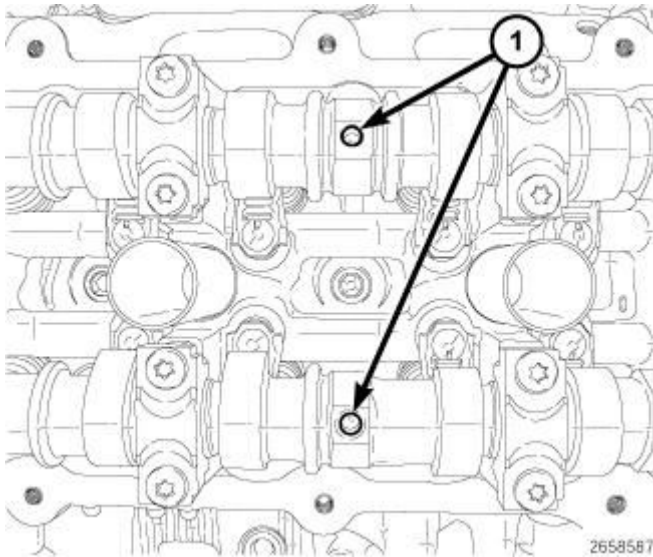
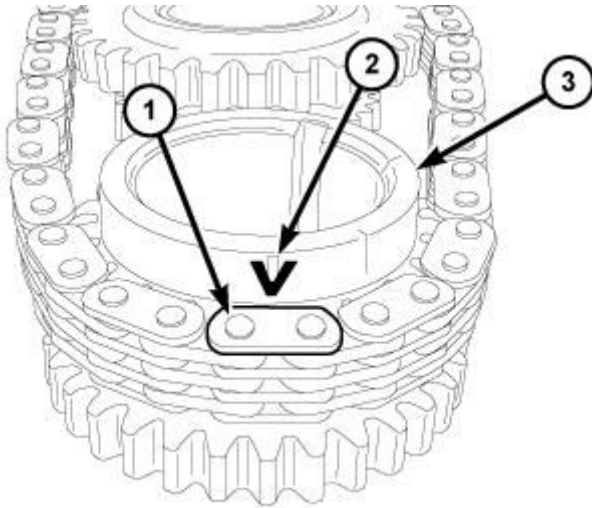


Fig. 584: Positioning Camshaft Alignment Holes Vertically
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not rotate the camshafts more than a few degrees independently of the crankshaft. Valve to piston contact could occur resulting in possible valve damage. If the camshafts need to be rotated more than a few degrees, first move the pistons away from the cylinder heads by rotating the crankshaft counterclockwise to a position 30° before-top-dead-center. Once the camshafts are returned to their top-dead-center position, rotate the crankshaft clockwise to return the crankshaft to top-dead-center.

- 11.
12. Verify that the camshafts are set at top-dead-center by positioning the alignment holes (1) vertically.



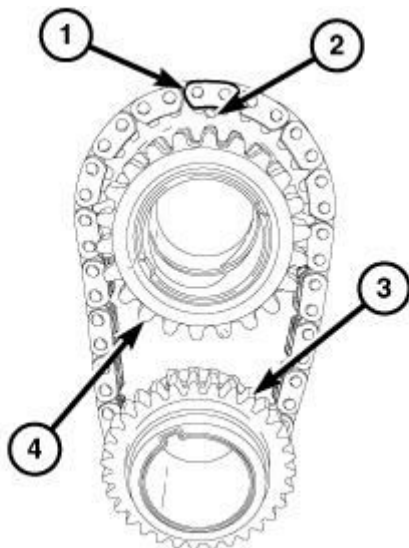
2588864

Fig. 585: Aligning Arrow With Plated Link On Primary Chain

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Always reinstall timing chains so that they maintain the same direction of rotation. Inverting a previously run chain on a previously run sprocket will result in excessive wear to both the chain and sprocket.

13. Place the primary chain onto the crankshaft sprocket (3) so that the arrow (2) is aligned with the plated link (1) on the timing chain.



2589142

Fig. 586: Placing Idler Sprocket Into Timing Chain So That Dimple Is Aligned With Plated Link On Timing Chain

Courtesy of CHRYSLER GROUP, LLC

14. While maintaining this alignment, invert the crankshaft sprocket and timing chain and place the idler sprocket (4) into the timing chain so that the dimple (2) is aligned with the plated link (1) on the timing chain.

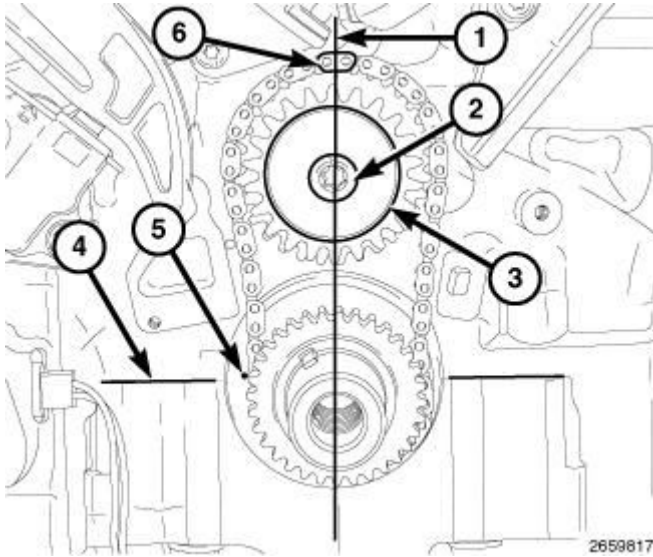


Fig. 587: Timing Chain Plated Link At 12 O'Clock, Washer, Retaining Bolt, Block/Bearing Cap Junction & Dimple

Courtesy of CHRYSLER GROUP, LLC

15. While maintaining this alignment, lubricate the idler sprocket bushing with clean engine oil and install the sprockets and timing chain on the engine. To verify that the timing is still correct, the timing chain plated link (6) should be located at 12:00 (1) when the dimple (5) on the crankshaft is aligned with the block/bearing cap junction (4).
16. Install the idler sprocket retaining bolt (2) and washer (3). Tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS**.

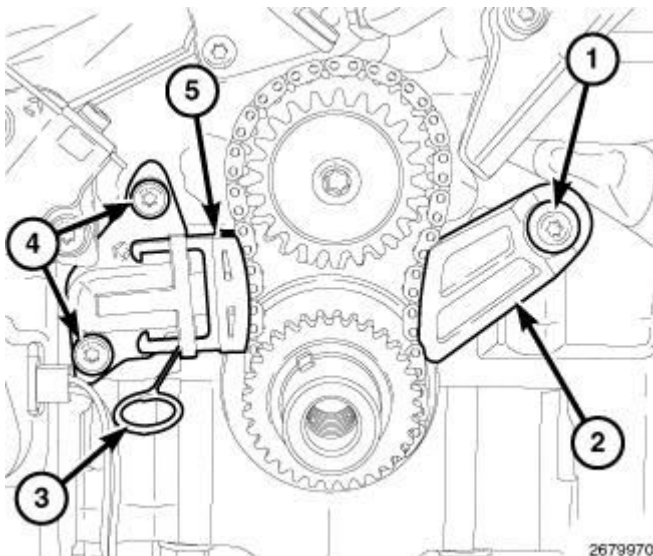


Fig. 588: Primary Chain Tensioner, Tensioner Pin, Primary Chain Guide & Bolts
Courtesy of CHRYSLER GROUP, LLC

17. Install the primary chain guide (2). Tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
18. Reset the primary chain tensioner (5) by pushing back the tensioner piston and installing Tensioner Pin (special tool #8514, Pins, Tensioner) (3).
19. Install the primary chain tensioner (5) to the engine block with two bolts (4). Tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS**.

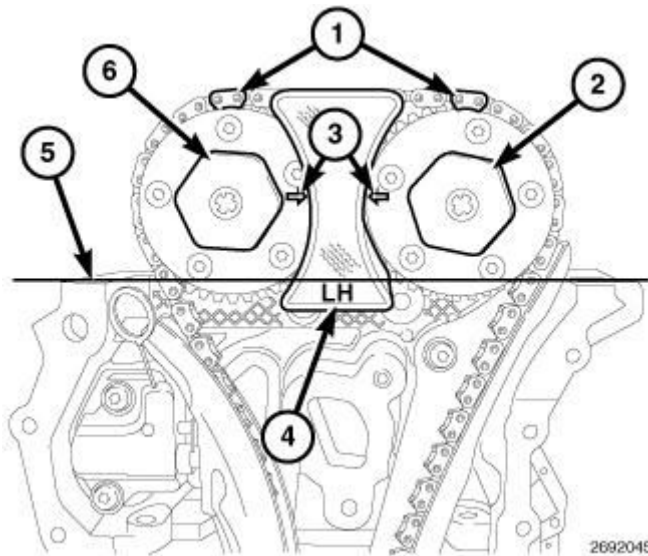


Fig. 589: Phaser Timing Marks, Oil Control Valves & LH Camshaft Phaser Lock
Courtesy of CHRYSLER GROUP, LLC

20. Press the left side intake cam phaser onto the intake camshaft. Install and hand tighten the oil control valve (6).

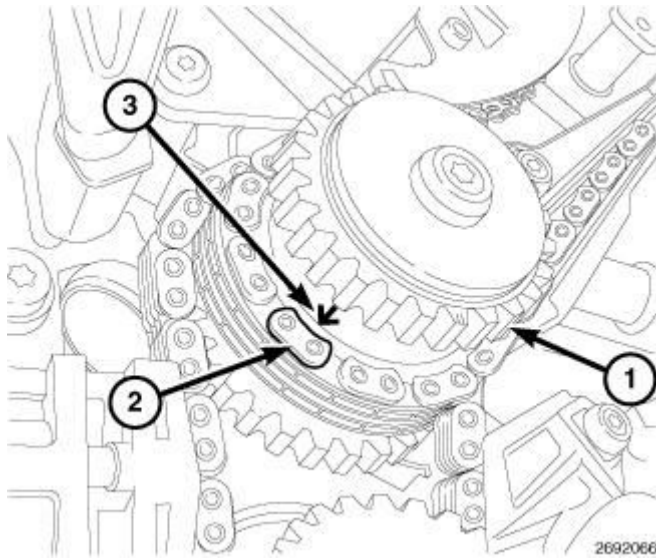


Fig. 590: Idler Sprocket, Plated Link & Arrow
Courtesy of CHRYSLER GROUP, LLC

NOTE: The left side and right side cam chains are identical.

CAUTION: Always reinstall timing chains so that they maintain the same direction of rotation. Inverting a previously run chain on a previously run sprocket will result in excessive wear to both the chain and sprocket.

21. Drape the left side cam chain over the left side intake cam phaser and onto the idler sprocket (1) so that the arrow (3) is aligned with the plated link (2) on the cam chain.

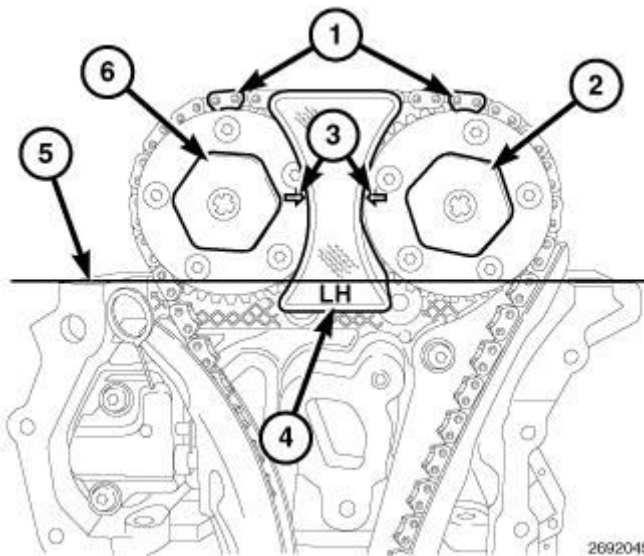


Fig. 591: Phaser Timing Marks, Oil Control Valves & LH Camshaft Phaser Lock
Courtesy of CHRYSLER GROUP, LLC

22. While maintaining this alignment, route the cam chain around the exhaust and intake cam phasers so that the plated links are aligned with the phaser timing marks (1). Position the left side cam phasers so that the arrows (3) point toward each other and are parallel to the cylinder head cover mounting surface (5). Press the exhaust cam phaser onto the exhaust cam, install and hand tighten the oil control valve (2).

NOTE: Minor rotation of a camshaft (a few degrees) may be required to install the camshaft phaser or phaser lock.

23. Install the (special tool #10202-2, Lock, Camshaft/Phaser, Left Side) (4) with the tool number facing up.
24. Tighten the oil control valves (2) and (6). Tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
25. Remove the Camshaft Phaser Lock (4).

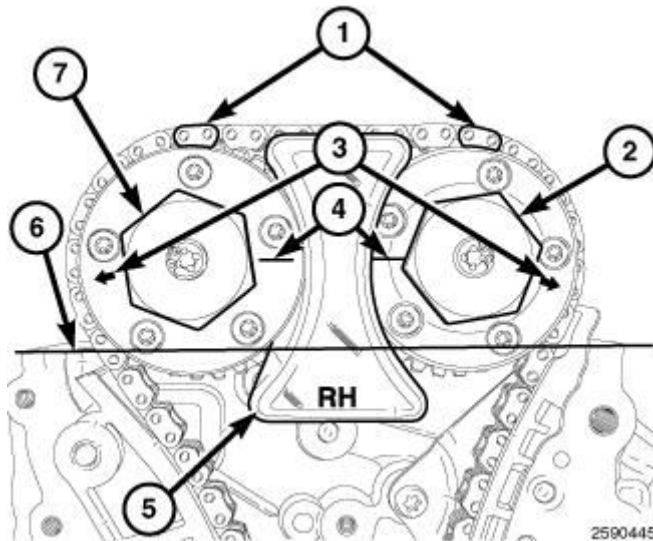


Fig. 592: Phaser Timing Marks, Oil Control Valves & RH Camshaft Phaser Lock
Courtesy of CHRYSLER GROUP, LLC

26. Press the right side exhaust cam phaser onto the exhaust camshaft. Install and hand tighten the oil control valve (7).

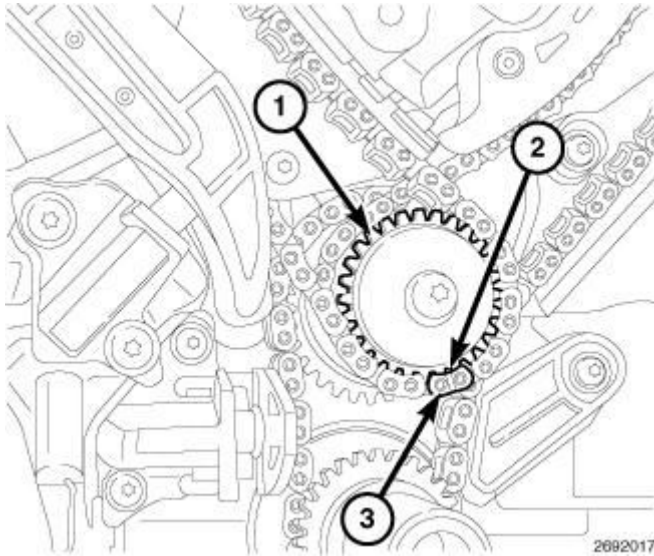


Fig. 593: Idler Sprocket, Dimple & Plated Link
 Courtesy of CHRYSLER GROUP, LLC

CAUTION: Always reinstall timing chains so that they maintain the same direction of rotation. Inverting a previously run chain on a previously run sprocket will result in excessive wear to both the chain and sprocket.

27. Drape the right side cam chain over the right side exhaust cam phaser and onto the idler sprocket (1) so that the dimple (2) is aligned with the plated link (3) on the cam chain.

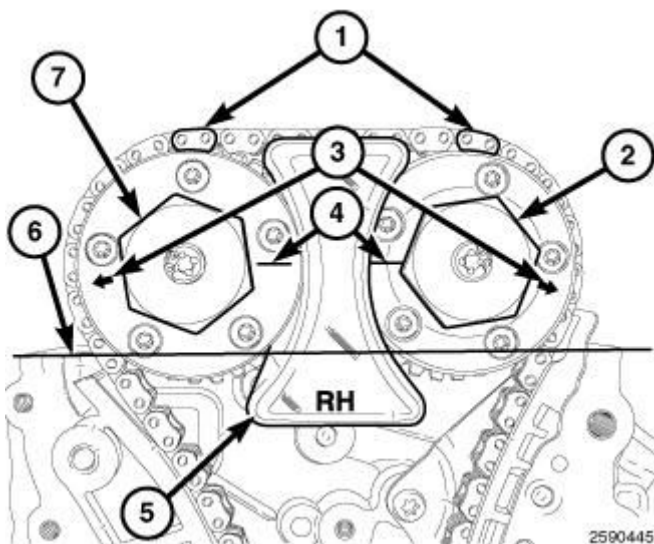


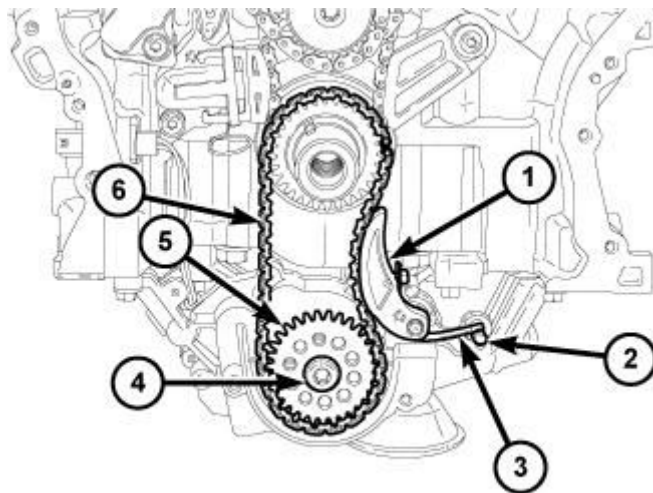
Fig. 594: Phaser Timing Marks, Oil Control Valves & RH Camshaft Phaser Lock
 Courtesy of CHRYSLER GROUP, LLC

28. While maintaining this alignment, route the cam chain around the exhaust and intake cam phasers so that

the plated links are aligned with the phaser timing marks (1). Position the right side cam phasers so that the arrows (3) point away from each other and the scribe lines (4) are parallel to the cylinder head cover mounting surface (6). Press the intake cam phaser onto the intake cam, install and hand tighten the oil control valve (2).

NOTE: Minor rotation of a camshaft (a few degrees) may be required to install the camshaft phaser or phaser lock.

29. Install the (special tool #10202-1, Lock, Camshaft/Phaser, Right Side) (5) with the tool number facing up.
30. Tighten the oil control valves (2) and (7). Tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
31. Remove the Camshaft Phaser Lock (5).



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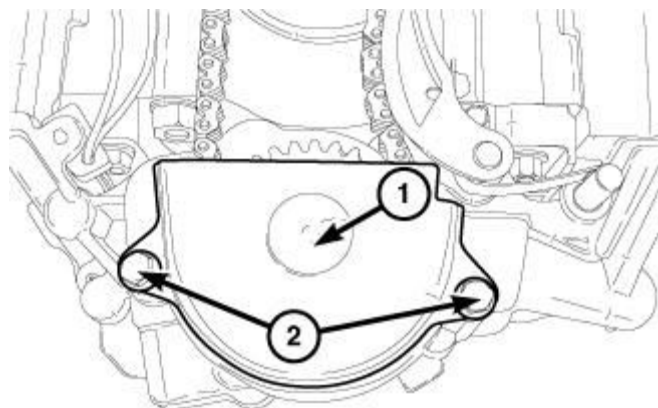
Fig. 595: Oil Pump Chain Tensioner, Spring, Retaining Bolt, Dowel Pin, Oil Pump Sprocket & Oil Pump Chain

Courtesy of CHRYSLER GROUP, LLC

NOTE: There are no timing marks on the oil pump gear or chain.

CAUTION: Always reinstall timing chains so that they maintain the same direction of rotation. Inverting a previously run chain on a previously run sprocket will result in excessive wear to both the chain and sprocket.

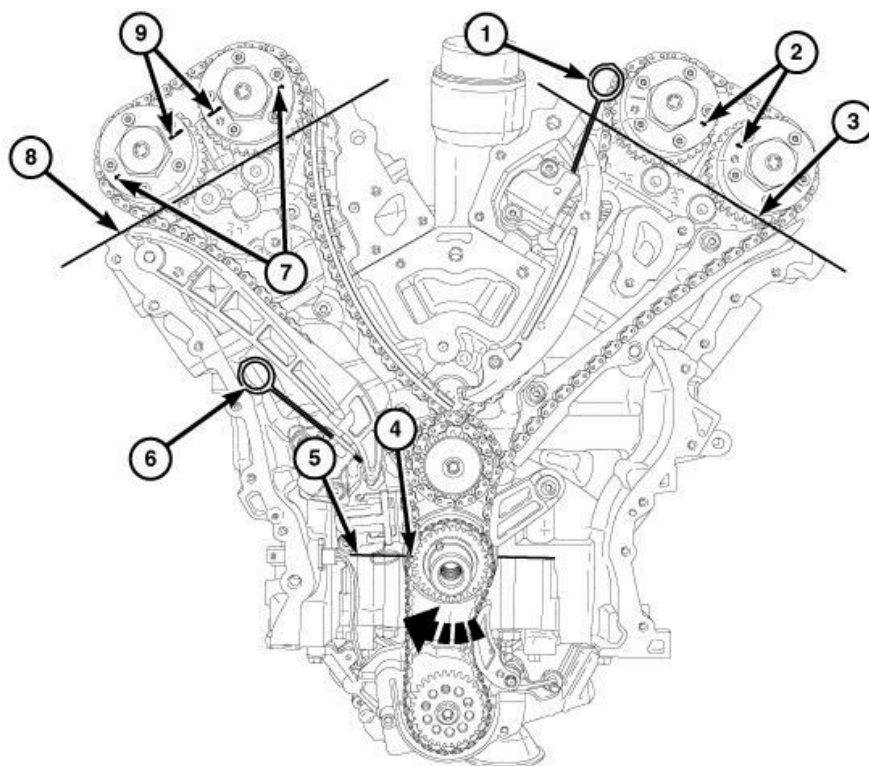
32. Place the oil pump sprocket (5) into the oil pump chain (6). Place the oil pump chain onto the crankshaft sprocket while aligning the oil pump sprocket with the oil pump shaft. Install the oil pump sprocket T45 retaining bolt (4). Tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
33. Install the oil pump chain tensioner (1). Insure that the spring (3) is positioned above the dowel pin (2).



3090017

Fig. 596: Timing Gear Splash Shield & Bolts
Courtesy of CHRYSLER GROUP, LLC

34. Install the timing gear splash shield (1). Tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .



2661245

Fig. 597: Rotating Crankshaft Clockwise To Position No. 1 Piston At TDC On Exhaust Stroke
Courtesy of CHRYSLER GROUP, LLC

35. Remove the Tensioner Pins (special tool #8514, Pins, Tensioner) (1) and (6) from the right side and left

side cam chain tensioners.

36. Rotate the crankshaft clockwise (as viewed from the front) two complete revolutions stopping when the dimple (4) on the crankshaft is aligned with the block/bearing cap junction (5).
37. While maintaining this alignment, verify that the **ARROWS** (2) on the left side cam phasers point toward each other and are parallel to the cylinder head cover mounting surface (3) and that the right side cam phaser **ARROWS** (7) point away from each other and the **SCRIBE LINES** (9) are parallel to the cylinder head cover mounting surface (8).

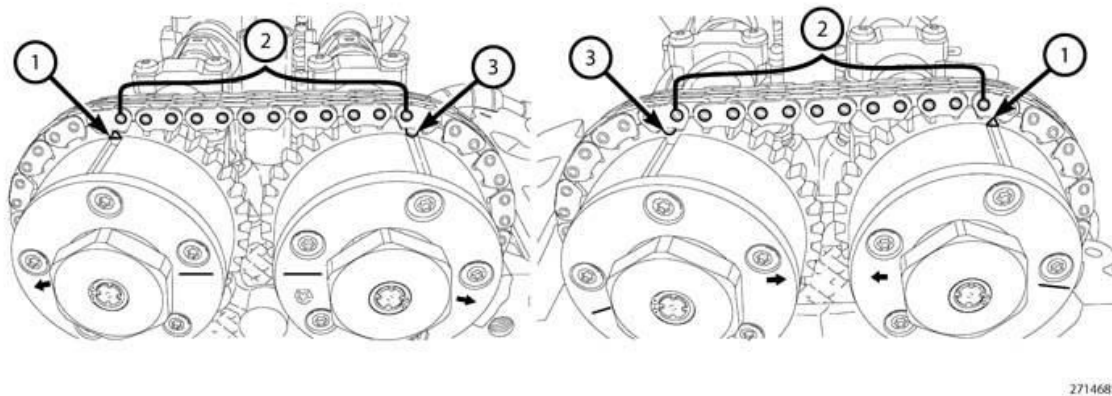


Fig. 598: Chain Pins, Exhaust Cam Phaser Triangle Marking & Circle Marking
Courtesy of CHRYSLER GROUP, LLC

38. There should be 12 chain pins (2) **BETWEEN** the exhaust cam phaser triangle marking (1) and the intake cam phaser circle marking (3) as viewed from either the front or rear of the cam phasers.
39. If the engine timing is not correct, repeat this procedure.
40. Install the engine timing cover, crankshaft vibration damper, accessory drive belts and oil pan. Refer to **COVER(S), ENGINE TIMING, INSTALLATION**.
41. Install the spark plugs. Refer to **SPARK PLUG, INSTALLATION**.
42. Install the cylinder head covers. Refer to **COVER(S), CYLINDER HEAD, INSTALLATION**.
43. Install the upper intake manifold and air cleaner housing assembly. Refer to **MANIFOLD, INTAKE, INSTALLATION**.
44. Fill the engine crankcase with the proper oil to the correct level. Refer to **OIL, STANDARD PROCEDURE**.
45. Connect the negative battery cable. Tighten to the proper specification. Refer to **SPECIFICATIONS**.
46. Fill the cooling system. Refer to **STANDARD PROCEDURE**.
47. Operate the engine until it reaches normal operating temperature. Check cooling system for correct fluid level. Refer to **STANDARD PROCEDURE**.

NOTE: The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components.

COVER(S), ENGINE TIMING

REMOVAL

REMOVAL

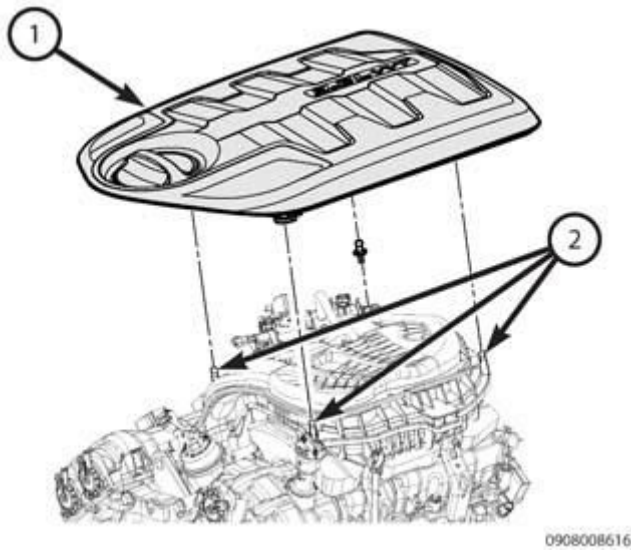


Fig. 599: Engine Cover & Ball Studs
 Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Remove the engine cover (1).
3. Drain the cooling system. Refer to **STANDARD PROCEDURE** .
4. Drain the engine oil.

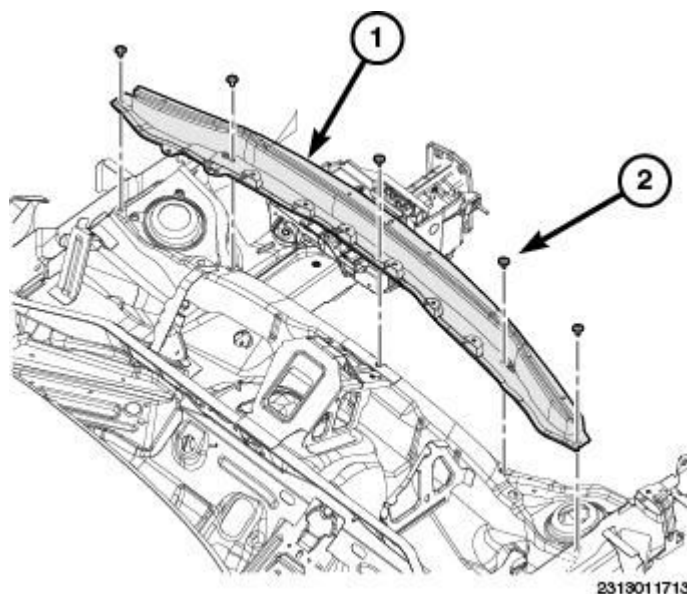
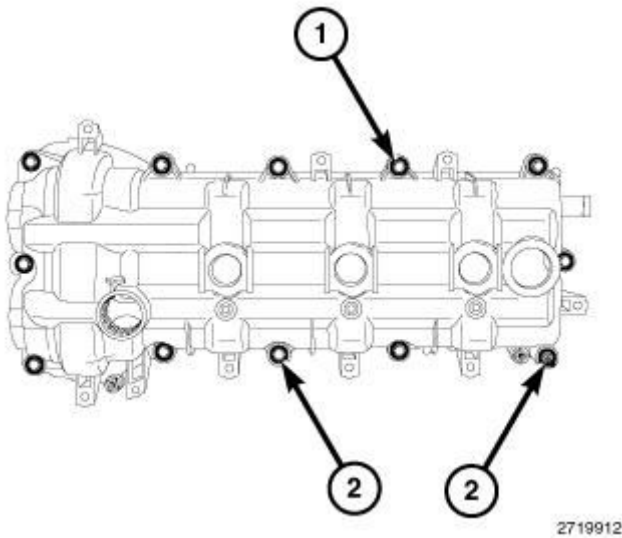


Fig. 600: Removing/Installing Cowl Panel

Courtesy of CHRYSLER GROUP, LLC

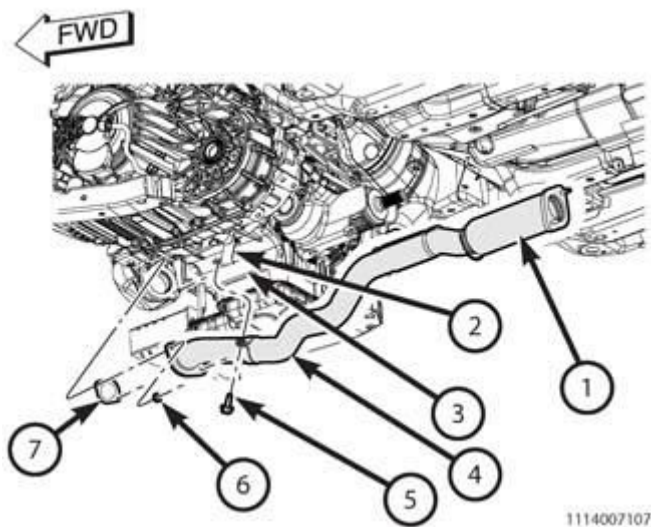
5. Remove the cowl panel (1). Refer to COVER, COWL PANEL, REMOVAL.

NOTE: Remove the oil pan while the vehicle is in the air during the valve cover removal procedure.

**Fig. 601: Cylinder Head Cover Mounting Bolts & Studbolts**

Courtesy of CHRYSLER GROUP, LLC

6. Remove the valve covers. Refer to COVER(S), CYLINDER HEAD, REMOVAL.

**Fig. 602: Removing/Installing Cross Under Pipe**

Courtesy of CHRYSLER GROUP, LLC

7. Remove the cross under pipe.

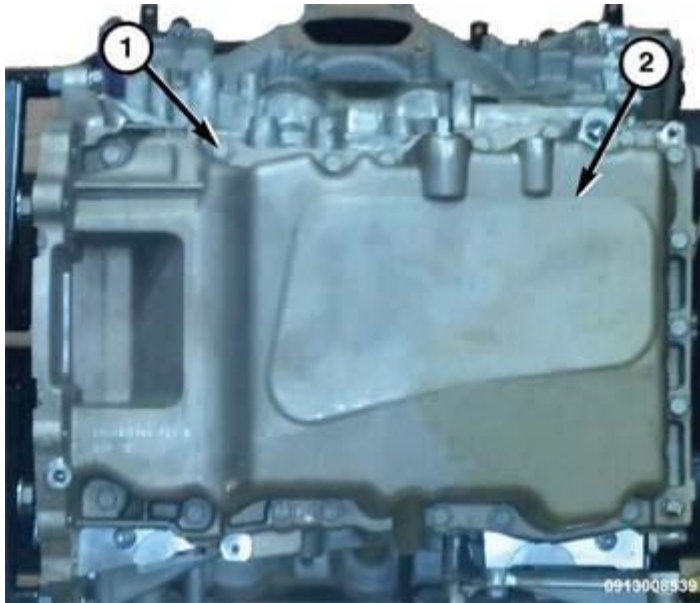


Fig. 603: One-Piece Oil Pan
Courtesy of CHRYSLER GROUP, LLC

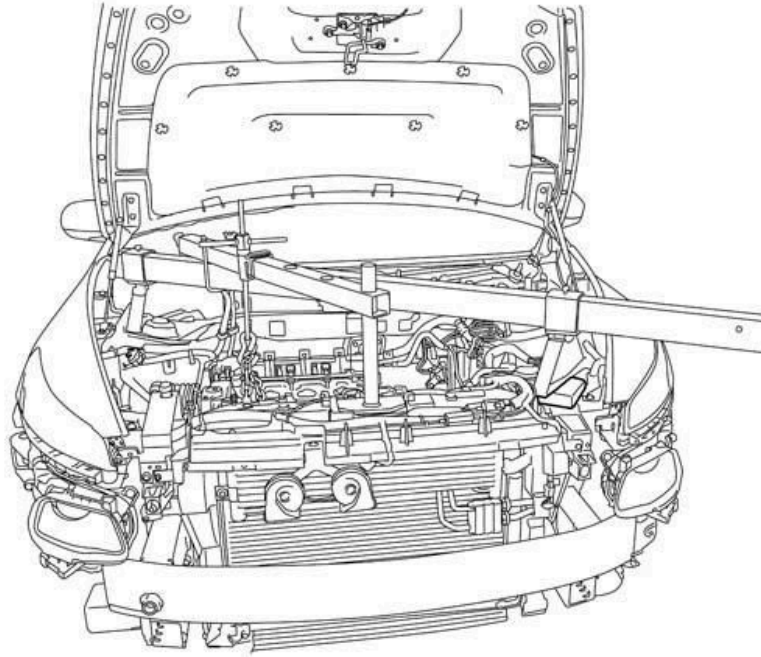
8. Remove the oil pan (2).
9. Lower the vehicle.



Fig. 604: Removing/Installing Thermostat Housing
Courtesy of CHRYSLER GROUP, LLC

10. Remove the heater core supply hose (1) from the coolant outlet housing (2).

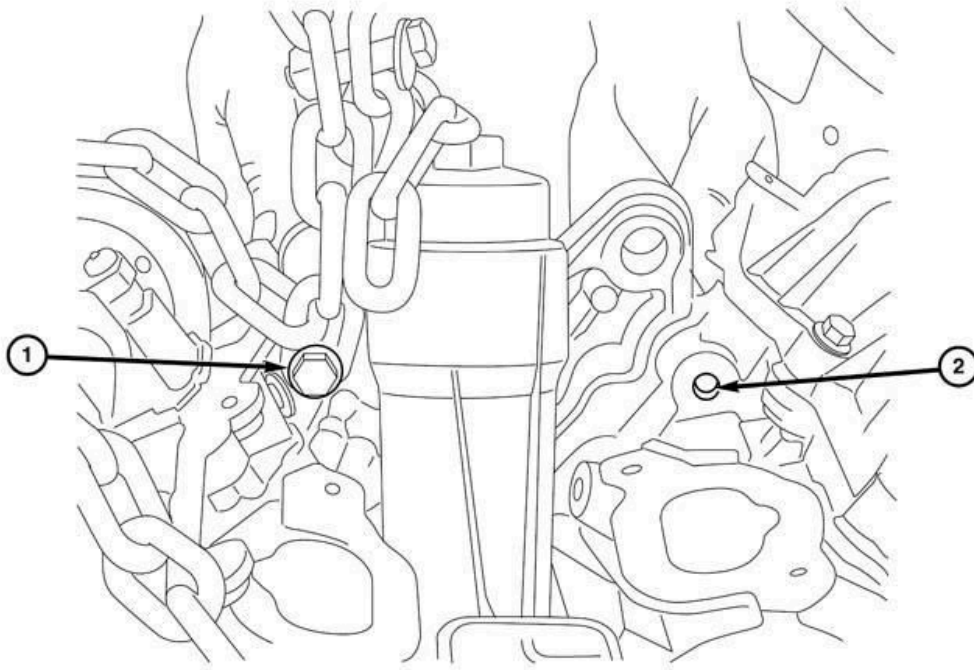
11. Remove the upper radiator hose (2) with the cooling pipe (3) and thermostat housing (1).
12. Remove the left side hood stabilizer support brace.



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Fig. 605: Driveline Support Fixture
Courtesy of CHRYSLER GROUP, LLC

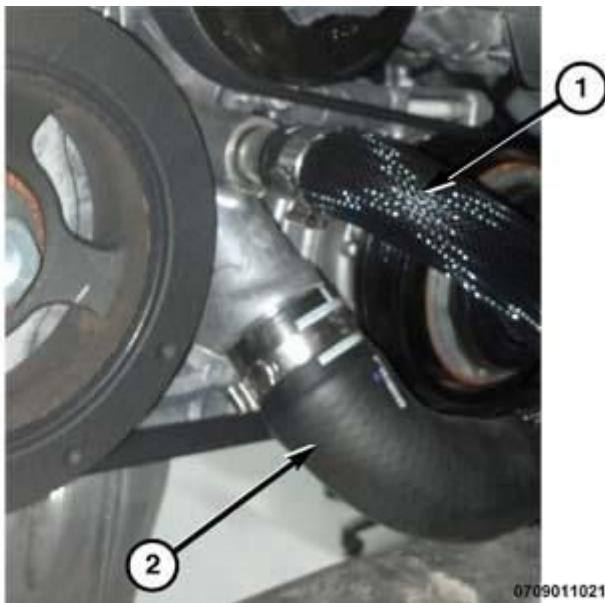
13. Support the engine assembly using the (special tool #8534B, Fixture, Driveline Support).



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Fig. 606: Supporting Engine At Cylinder Head
Courtesy of CHRYSLER GROUP, LLC

14. Support the engine at the cylinder head.
15. Partially raise the vehicle.

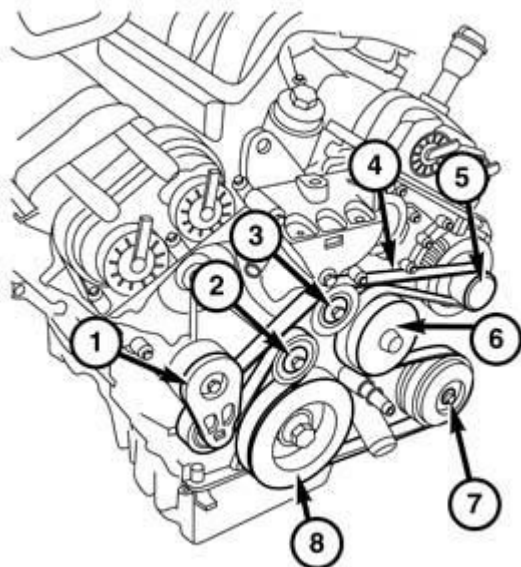


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Fig. 607: Installing Lower Radiator Hose & Heater Core Return Hose
Courtesy of CHRYSLER GROUP, LLC

16. Remove the heater core return hose (1) from the water pump housing.

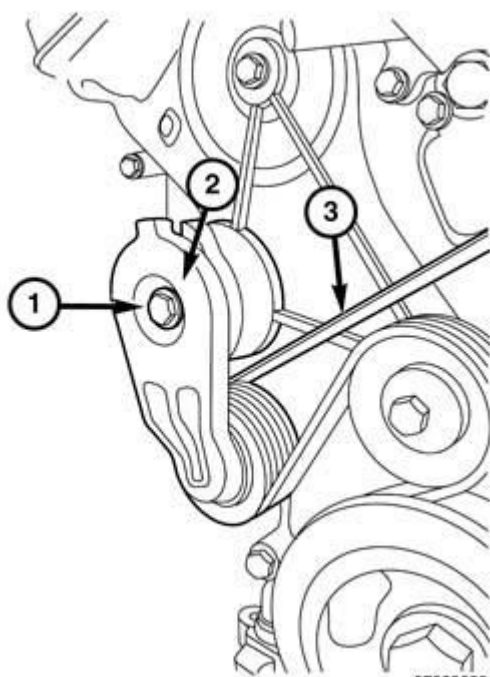
17. Remove the lower radiator hose (2) from the water pump housing.



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Fig. 608: Removing/Installing Accessory Drive Belt
Courtesy of CHRYSLER GROUP, LLC

18. Remove the accessory drive belt (4). Refer to **BELT, SERPENTINE, REMOVAL** .



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Fig. 609: Installing Accessory Drive Belt Tensioner
Courtesy of CHRYSLER GROUP, LLC

19. Remove the accessory drive belt tensioner (2).

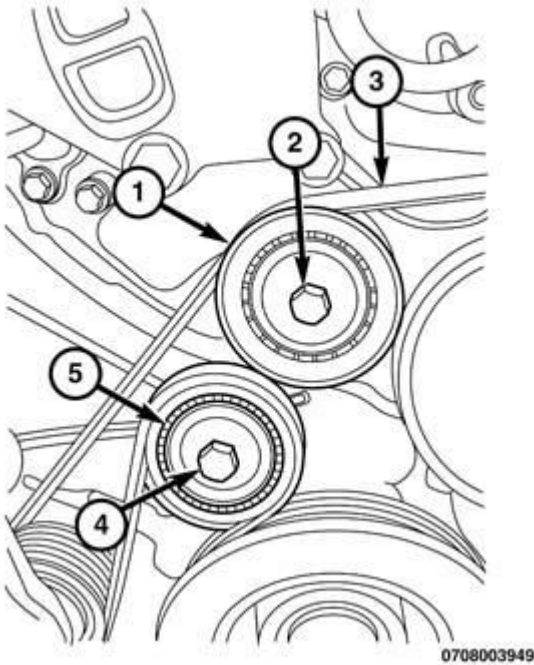


Fig. 610: Removing/Installing Accessory Idler Pulley
Courtesy of CHRYSLER GROUP, LLC

20. Remove the accessory idler pulleys (1, 5).

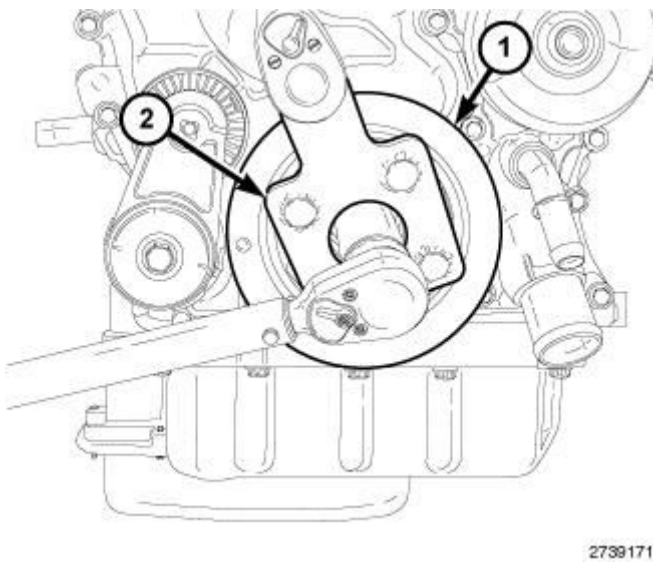


Fig. 611: Crankshaft Vibration Damper & Vibration Damper Holder
Courtesy of CHRYSLER GROUP, LLC

21. Remove the crankshaft vibration damper (1). Refer to **DAMPER, VIBRATION, REMOVAL**.



Fig. 612: Removing/Installing Water Pump
Courtesy of CHRYSLER GROUP, LLC

22. Remove the water pump M6 bolts (2, 3).
23. Remove the water pump M8 bolt (4).
24. Remove the water pump from the vehicle.



Fig. 613: Engine Timing Cover(s) Bolts Removing/Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

25. Remove the timing cover M8 bolts (2).
26. Remove the timing cover M6 bolts (3).

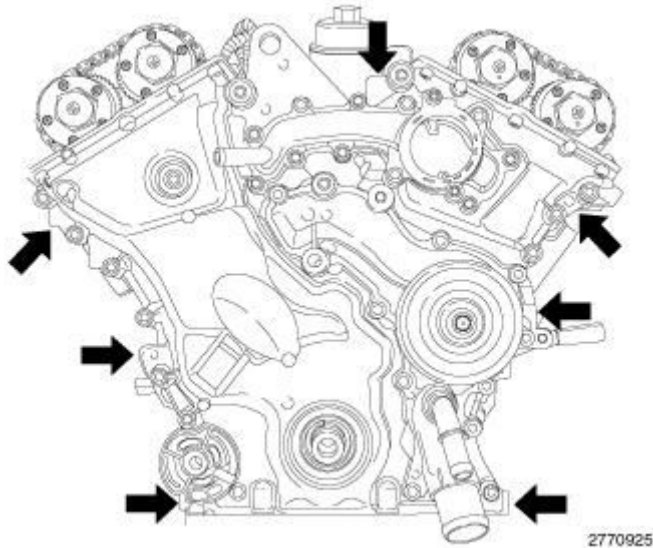


Fig. 614: Timing Cover Removal Pry Points
Courtesy of CHRYSLER GROUP, LLC

27. Using the seven indicated pry points, carefully remove the timing cover.

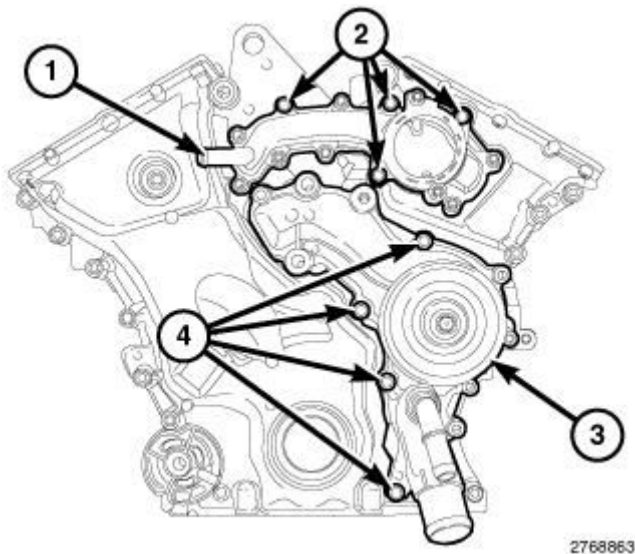
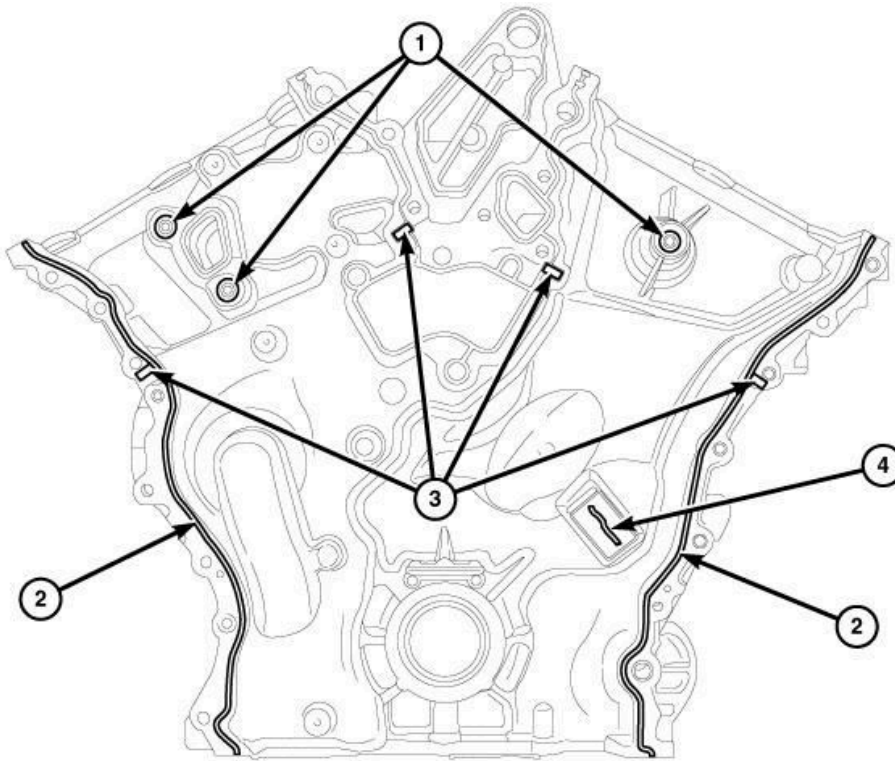


Fig. 615: Coolant Outlet Housing, Water Pump & Bolts
Courtesy of CHRYSLER GROUP, LLC

28. If required, remove the remaining four M6 bolts (2) and the coolant outlet housing (1) from the engine timing cover.

CAUTION: Do not use oil based liquids, wire brushes, abrasive wheels or metal

scrapers to clean the engine gasket surfaces. Use only isopropyl (rubbing) alcohol, along with plastic or wooden scrapers. Improper gasket surface preparation may result in engine fluid leakage.



2769376

Fig. 616: Sealant At Cylinder Head Bosses, Right & Left Flanges, Cylinder Head-To-Engine Block T-Joints & Cover To Right Cam Chain Tensioner Gap
Courtesy of CHRYSLER GROUP, LLC

29. Remove all residual sealant from the timing chain cover, cylinder head and engine block mating surfaces. Refer to **ENGINE, STANDARD PROCEDURE** .

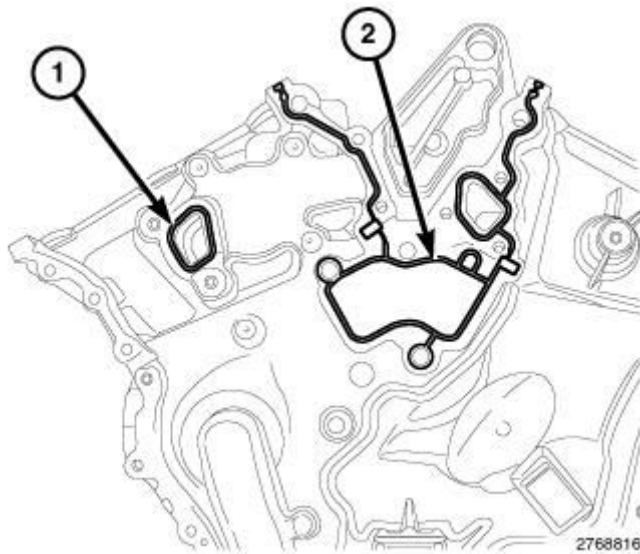


Fig. 617: Coolant Outlet Housing Gasket & Water Pump Gasket
Courtesy of CHRYSLER GROUP, LLC

30. Remove and discard the coolant outlet housing gasket (1) and the water pump gasket (2).

INSTALLATION

INSTALLATION

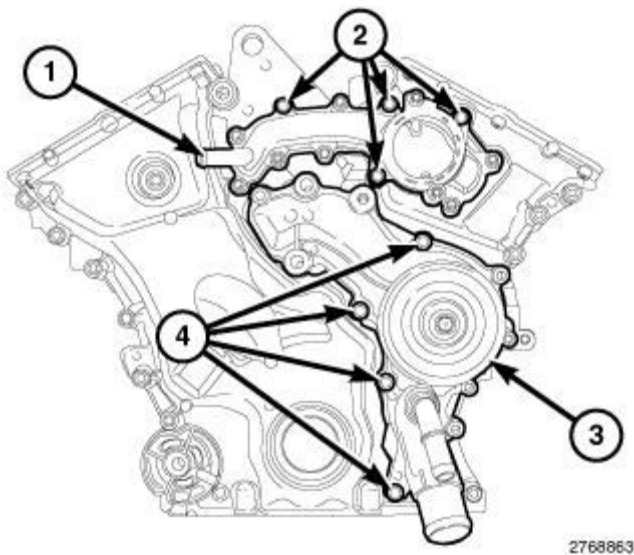


Fig. 618: Coolant Outlet Housing, Water Pump & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. If removed, install the coolant outlet housing (1) to the timing cover with a new gasket using only the four bolts (2) shown in illustration tightened to 12 N.m (106 in. lbs.).
2. If removed, install the water pump (3) to the timing cover using only the four bolts (4) shown in illustration tightened to 12 N.m (106 in. lbs.). Refer to **PUMP, WATER, INSTALLATION** .

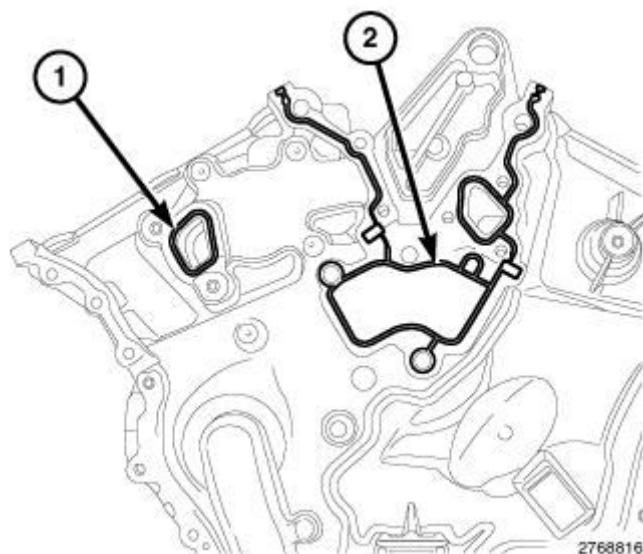


Fig. 619: Coolant Outlet Housing Gasket & Water Pump Gasket
 Courtesy of CHRYSLER GROUP, LLC

3. Install the coolant outlet housing gasket (1) and the water pump gasket (2).

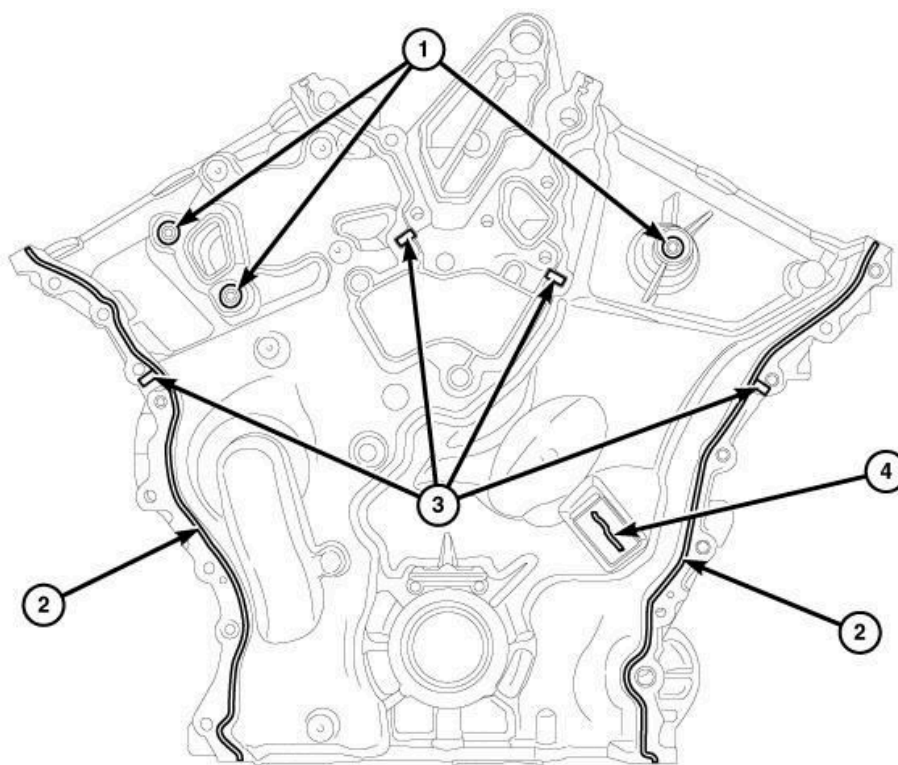


Fig. 620: Sealant At Cylinder Head Bosses, Right & Left Flanges, Cylinder Head-To-Engine Block T-Joints & Cover To Right Cam Chain Tensioner Gap
 Courtesy of CHRYSLER GROUP, LLC

4. Clean the engine timing cover, cylinder head and block mating surfaces with isopropyl alcohol in

preparation for sealant application.

CAUTION: Engine assembly requires the use of a unique sealant that is compatible with engine oil. Using a sealant other than Mopar® Threebond Engine RTV Sealant may result in engine fluid leakage.

CAUTION: Following the application of Mopar® Threebond Engine RTV Sealant to the gasket surfaces, the components must be assembled within 20 minutes and the attaching fasteners must be tightened to specification within 45 minutes. Prolonged exposure to the air prior to assembly may result in engine fluid leakage.

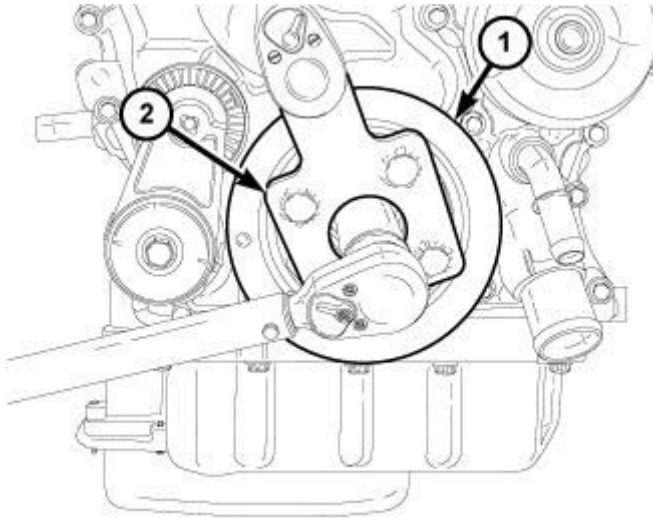
5. Apply a 2 to 3 mm wide bead of Mopar® Threebond Engine RTV Sealant to the front cover as shown in illustration in the following locations:
- Three cylinder head bosses (1)
 - Right and left flanges (2)
 - Four cylinder head to engine block T-joints (3)
 - Cover to right cam chain tensioner gap (4)



Fig. 621: Engine Timing Cover(s) Bolts Removing/Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

6. Align the locator pins on the engine block to the engine timing cover and install the cover.
7. Install the M6 bolts (3). Tighten to 12 N.m (106 in. lbs.).
8. Install the water pump. Tighten the M6 bolts (3) to 12 N.m (106 in. lbs.) and the M8 bolt (2) to 25 N.m (18 ft. lbs.).
9. Install the M8 bolts (2). Tighten to 25 N.m (18 ft. lbs.).

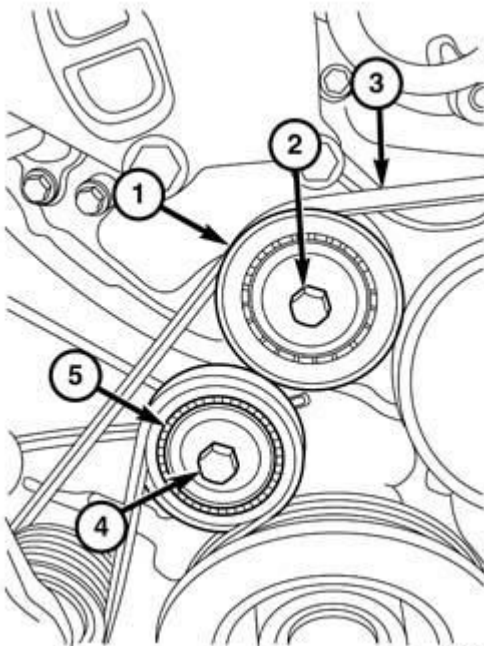
10. Partially raise the vehicle.



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Fig. 622: Crankshaft Vibration Damper & Vibration Damper Holder
 Courtesy of CHRYSLER GROUP, LLC

11. Install the crankshaft vibration damper (6). Refer to **DAMPER, VIBRATION, INSTALLATION**.



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Fig. 623: Removing/Installing Accessory Idler Pulley
 Courtesy of CHRYSLER GROUP, LLC

12. Install the accessory idler pulley (1, 5). Refer to **PULLEY, IDLER, INSTALLATION**.

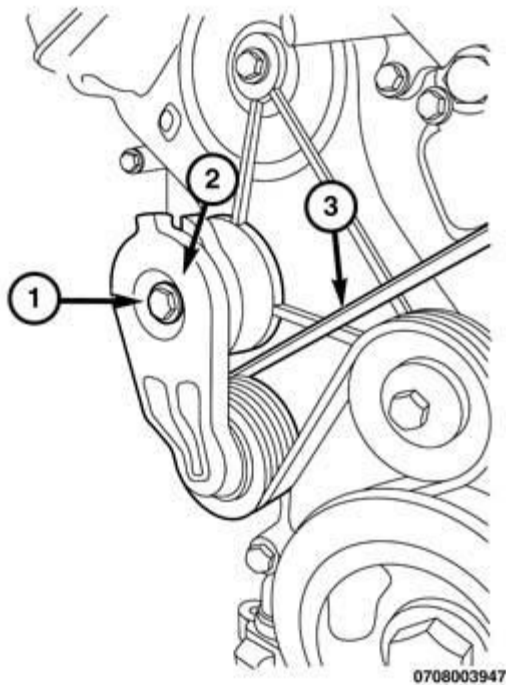


Fig. 624: Installing Accessory Drive Belt Tensioner
Courtesy of CHRYSLER GROUP, LLC

13. Install accessory drive belt tensioner (8). Refer to **TENSIONER, BELT, INSTALLATION** .

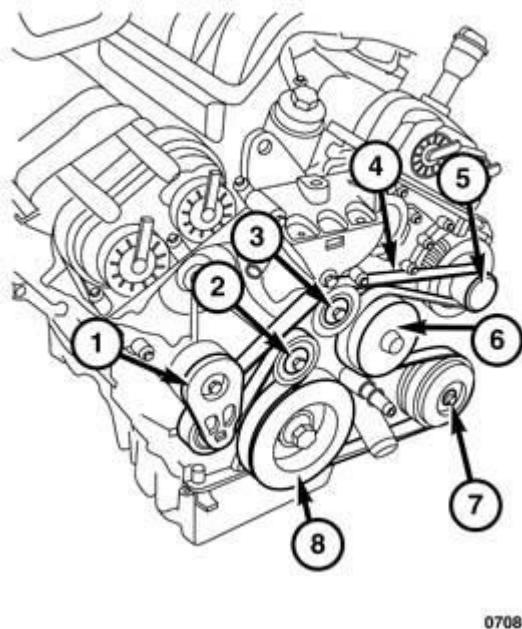


Fig. 625: Removing/Installing Accessory Drive Belt
Courtesy of CHRYSLER GROUP, LLC

14. Install the accessory drive belt (7). Refer to **BELT, SERPENTINE, REMOVAL**.

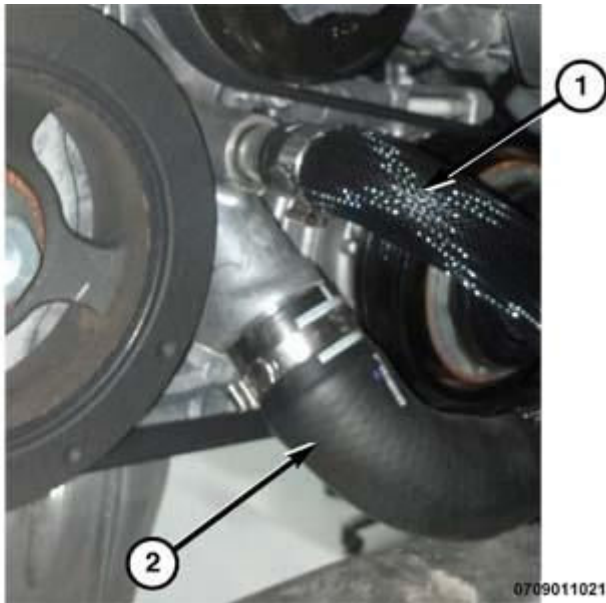


Fig. 626: Installing Lower Radiator Hose & Heater Core Return Hose
Courtesy of CHRYSLER GROUP, LLC

15. Install the lower radiator hose (2) to the water pump housing.
16. Install the heater core return hose (1) to the water pump housing.
17. Raise the vehicle.

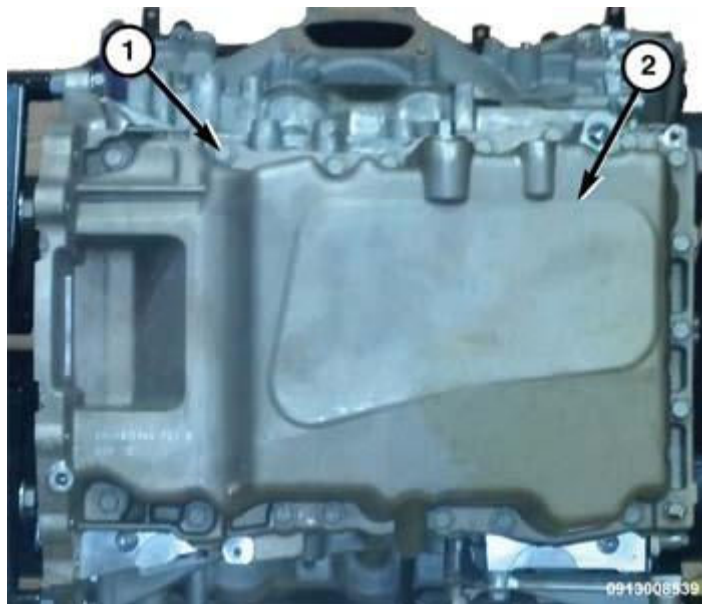


Fig. 627: One-Piece Oil Pan
Courtesy of CHRYSLER GROUP, LLC

18. Install the oil pan (1). Refer to **PAN, OIL, INSTALLATION**.

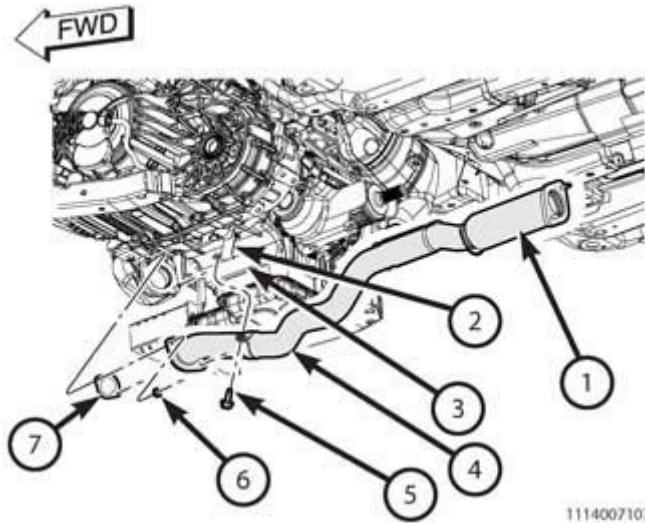


Fig. 628: Removing/Installing Cross Under Pipe
Courtesy of CHRYSLER GROUP, LLC

19. Install the cross under pipe (4). Refer to **PIPE, EXHAUST CROSSUNDER, INSTALLATION**.

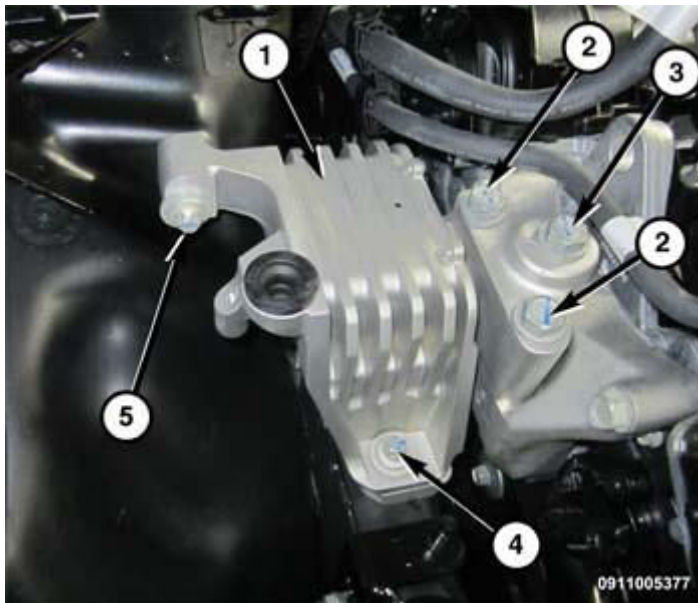


Fig. 629: Removing/Installing Right Engine Mount Assembly
Courtesy of CHRYSLER GROUP, LLC

20. Install the right engine mount assembly (1). Refer to **INSULATOR, ENGINE MOUNT, RIGHT, INSTALLATION**.

NOTE: Left cylinder head cover shown in illustration, right cylinder head cover

similar.

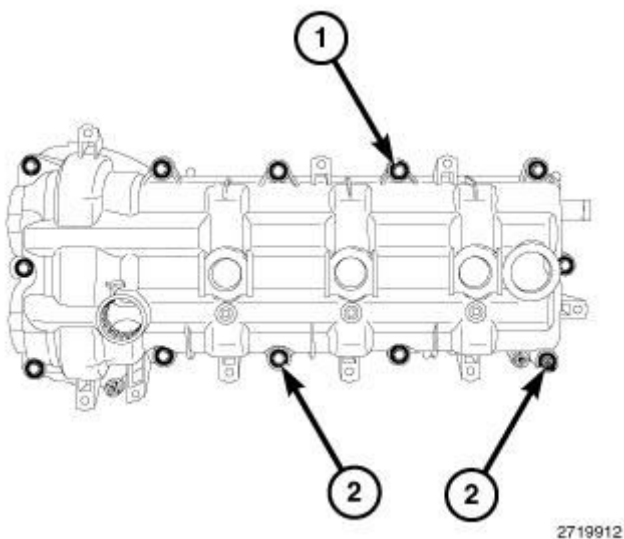


Fig. 630: Cylinder Head Cover Mounting Bolts & Studbolts
Courtesy of CHRYSLER GROUP, LLC

21. Install the right and left cylinder head covers and upper intake manifold. Refer to **COVER(S), CYLINDER HEAD, INSTALLATION**.

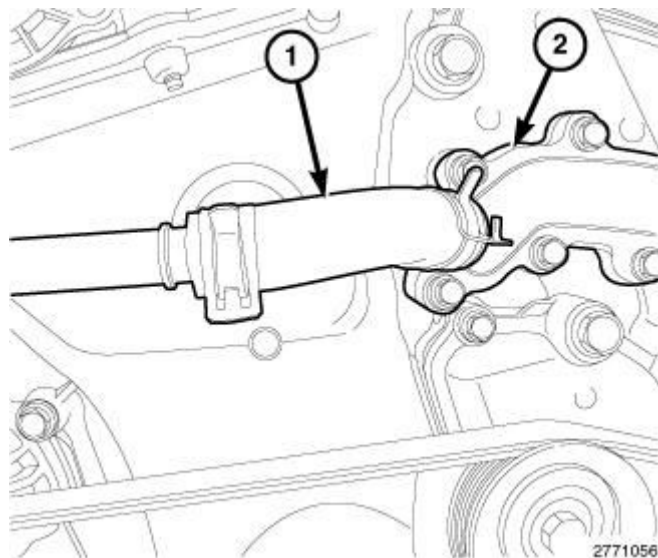


Fig. 631: Heater Core Supply Hose & Coolant Outlet Housing
Courtesy of CHRYSLER GROUP, LLC

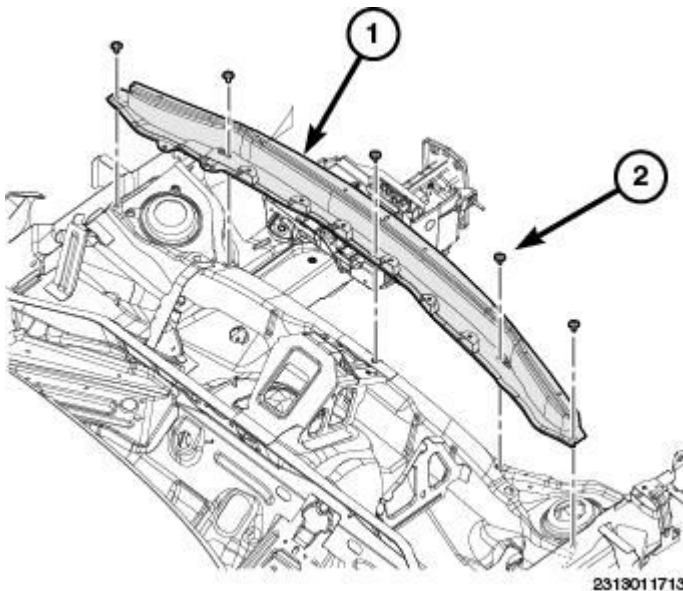
22. Install the heater core supply hose (1) to the coolant outlet housing (2).



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Fig. 632: Removing/Installing Thermostat Housing
Courtesy of CHRYSLER GROUP, LLC

23. Install the thermostat housing (1) and upper radiator hose (2). Refer to **THERMOSTAT, REMOVAL** .
24. Fill the cooling system. Refer to **STANDARD PROCEDURE** .



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Fig. 633: Removing/Installing Cowl Panel
Courtesy of CHRYSLER GROUP, LLC

25. If removed, install the cowl panel. Refer to **COVER, COWL PANEL, INSTALLATION** .
26. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL, STANDARD PROCEDURE** .
27. Connect the negative battery cable and tighten nut to 5 N.m (45 in. lbs.).

2014 Jeep Cherokee Trailhawk

2014 ENGINE 3.2L - Service Information - Cherokee

28. Run the engine until it reaches normal operating temperature. Check cooling system for correct fluid level. Refer to **STANDARD PROCEDURE** .

2014 ENGINE

Cooling System - Cherokee

DESCRIPTION

DESCRIPTION

The cooling system regulates engine operating temperature. It allows the engine to reach normal operating temperature as quickly as possible, maintains normal operating temperature and prevents overheating.

The cooling system also provides a means of heating the passenger compartment. The cooling system is pressurized and uses a centrifugal water pump to circulate coolant throughout the system. A separate and remotely mounted, coolant bottle is used.

COOLING SYSTEM COMPONENTS

The cooling system consists of:

- Electric cooling fan
- Radiator
- A coolant recovery system
- Thermostat
- Water pump
- Transmission oil cooler (ATX only)
- Radiator pressure cap
- Coolant
- Water pump
- Hoses and hose clamps
- A core support mounted coolant crossover tube (2.0L/2.4L only)
- Thermostat housing assembly
- After-run pump and hoses assembly (1.4L Turbocharged only)



Fig. 1: New Style Hose Clamps
Courtesy of CHRYSLER GROUP, LLC

A new style hose clamps called the CLIC E® and the CLIC R® are used to ensure a more even distribution of the clamping force.

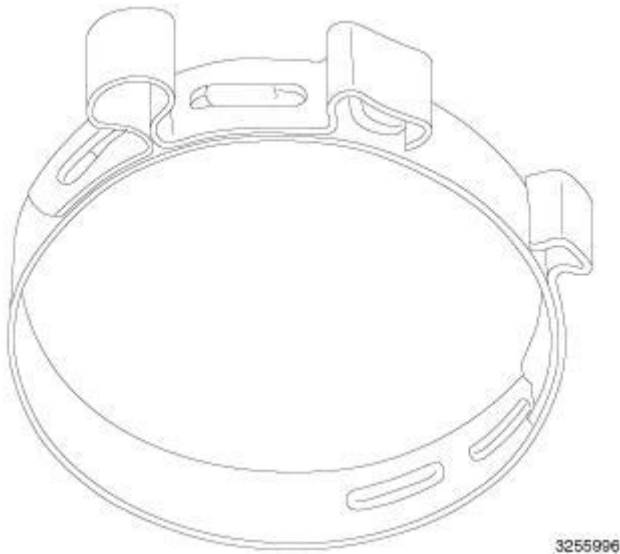


Fig. 2: CLIC E® Clamp
Courtesy of CHRYSLER GROUP, LLC

CLIC E®

- Used for most applications that have a large variation of expansion and contraction. Equipped with a spring. The clamp is able to adjust while ensuring proper tension. If the clamp is removed for repairs. It can be reused.

NOTE: **Always use Special tool 10288 Pliers when removing and installing the hose**

clamps to avoid damaging the clamp. The Click E type clamp can be reused if the clamp is in serviceable condition.



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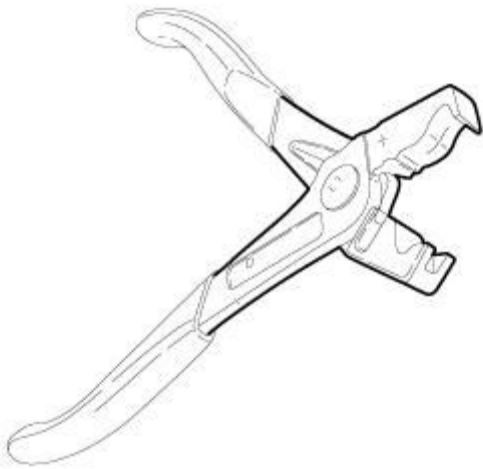
Fig. 3: CLIC R® Clamp

Courtesy of CHRYSLER GROUP, LLC

CLIC R®

- Used for most applications that require a capacity reserve designed to compensate for the tolerance ranges of the hoses and spigots to be tightened. If the clamp needs to be removed for repairs. The clamp must be replaced to ensure proper fitting to that component.

NOTE: If the hose or the fitting is not replaced, the same Click R type clamp can be reused given it is installed in the same orientation and same location on the hose. If the fitting or the hose is replaced, the Click R type clamp **MUST** be replaced.



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Fig. 4: CLIC® Style Pliers**Courtesy of CHRYSLER GROUP, LLC**

It is highly recommended that the use of a CLIC style pliers (Miller tool # (special tool #10288, Pliers, Hose Clamp)) be used for proper installation and removal of the CLIC® clamps. The use of specific tools for the clamp, will allow it to be reused.

The use of non CLIC® style pliers (screwdrivers, vice grips, channel locks, etc.) may damage the clamp and the clamp must be replaced.

OPERATION

OPERATION

The cooling system regulates engine operating temperature. It allows the engine to reach normal operating temperature as quickly as possible. It also maintains normal operating temperature and prevents overheating.

The cooling system also provides a source of hot coolant for heating the passenger compartment and cooling the automatic transmission fluid (if equipped). The cooling system is pressurized and uses a centrifugal water pump to circulate coolant throughout the system.

- When engine is cold the thermostat is closed. The cooling system has no flow through the radiator. The coolant flows through the engine, water pump, and heater.
- When engine is warm the thermostat is full open. On the gas engine coolant flows through the engine, radiator, heater, and water pump.

An optional factory installed maximum duty cooling package is available on most models. This package will provide additional cooling capacity for vehicles used under extreme conditions such as trailer towing in high ambient temperatures.

CLIC® HOSE CLAMP PLIERS - USAGE

When CLIC© style clamps are used. It requires that miller tool (special tool #10288, Pliers, Hose Clamp) for proper installation and removal.

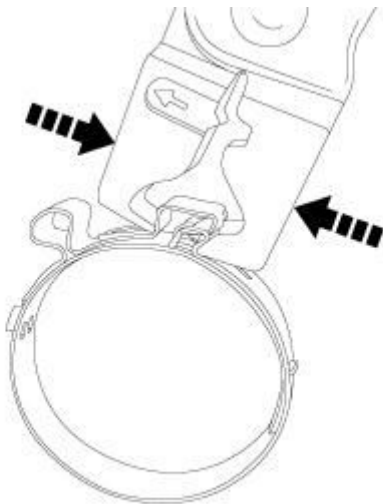


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Fig. 5: Flat Blade Of The Pliers

Courtesy of CHRYSLER GROUP, LLC

Installation of the hose clamp requires the flat blade of the pliers to rest against the latch lock side of the clamp. The notched end of the pliers will position to the protruded guide on the latch side. Squeeze the pliers until a **CLICK** sound is heard.



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Fig. 6: Notched End Of The Pliers

Courtesy of CHRYSLER GROUP, LLC

Removal of the hose clamp requires the notched end of the pliers to rest against the latch side of the clamp. Squeezing the pliers will cause the hook of the latch lock to ride up the beveled edging of the notched side, releasing itself from the lock.

DIAGNOSIS AND TESTING

AERATION

If coolant level drops below a certain point, aeration will occur drawing air into the water pump resulting in the following:

- High reading shown on the temperature gauge.
- Loss of coolant flow through the heater core.
- Corrosion in the cooling system.
- Transmission oil will become hotter (automatic transmission equipped vehicles).
- Water pump seal may run dry, increasing the risk of premature seal failure.
- Combustion gas leaks into the coolant can also cause the above problems.

DEAERATION

As air is removed from the cooling system, it gathers in the coolant recovery container. This pressure is released into the atmosphere through the pressure valve located in the radiator pressure cap when pressure reaches 96 - 124 kPa (14 - 18 psi). This air is replaced with coolant from the coolant recovery container.

NOTE: Deaeration does not occur at engine idle, higher engine speeds are required. Normal driving will deaerate cooling system.

To effectively deaerate the system, multiple thermal cycles of the system may be required.

PRELIMINARY CHECKS

ENGINE COOLING SYSTEM OVERHEATING

Establish what driving conditions caused the complaint. Abnormal loads on the cooling system such as the following may be the cause:

- Prolonged idle
- Very high ambient temperature
- Slow traffic
- Traffic jams
- High speed or steep grades
- Debris on front of the grill or the cooling module that is restricting airflow

Driving techniques that avoid overheating are:

- Idle with A/C off when temperature gauge is at end of normal range.
- Increasing engine speed up to 2000 RPM with transmission in park or neutral for more airflow is

2014 Jeep Cherokee Trailhawk

2014 ENGINE Cooling System - Cherokee

recommended.

RECENT SERVICE OR ACCIDENT REPAIR:

Determine if any recent service has been performed on vehicle that may affect the cooling system. This may be:

- Engine adjustments (incorrect timing)
- Slipping engine accessory drive belt(s)
- Brakes (possibly dragging)
- Changed parts. Incorrect water pump or pump rotating in wrong direction due to belt not correctly routed
- Reconditioned radiator or cooling system refilling (possibly under filled or air trapped in system).
- Service to electrically controlled viscous fan clutch

NOTE: If investigation reveals none of the previous items as a cause for an engine overheating complaint, refer to the **COOLING SYSTEM**. Refer to **DIAGNOSIS AND TESTING**.

COOLING SYSTEM

CONDITION	POSSIBLE CAUSE	CORRECTION
TEMPERATURE GAUGE READS LOW	1. Diagnostic Trouble Code (DTC) has been set indicating a stuck open engine thermostat.	1. Replace thermostat, if necessary. If a (DTC) has not been set, the problem may be with the temperature gauge.
	2. Engine Coolant Temperature Sensor.	2. Check connector at Engine Coolant Temperature Sensor. Repair as necessary.
	3. Inoperative temperature gauge.	3. Check gauge operation. Refer to <u>OPERATION</u> .
	4. Coolant level low during cold ambient temperature, accompanied by poor heater performance.	4. Check coolant level in the coolant recovery/reserve container and the radiator. Inspect the system for leaks. Repair as necessary. Refer to WARNINGS under <u>COOLANT</u> before removing pressure cap.
TEMPERATURE GAUGE READS HIGH OR ENGINE COOLANT WARNING LAMP ILLUMINATES. COOLANT MAY OR MAY NOT BE LOST FROM SYSTEM.	1. Trailer being towed, a steep hill being climbed, vehicle being operated in slow moving traffic, or engine idling during high ambient (outside) temperatures with air conditioning on. High altitudes could also cause these conditions.	1. This may be a temporary condition and repair is not necessary. Turn off the air conditioning and drive the vehicle without any of the previous conditions. Observe the temperature gauge. The gauge should return to the normal range.

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2014 ENGINE Cooling System - Cherokee

	If the gauge does not return to the normal range, determine the cause of the overheating and repair.
2. Inoperative temperature gauge.	2. Check gauge operation. Refer to OPERATION .
3. Is temperature warning lamp (if equipped) illuminating unnecessarily?	3. Check warning lamp operation. Refer to INDICATORS, INSTRUMENT CLUSTER, OPERATION .
4. Coolant low in recovery/reserve bottle and radiator?	4. Check for coolant leaks and repair as necessary.
5. Pressure cap not installed tightly. If cap is loose, boiling point of coolant will be lowered. Also refer to the following step 6.	5. Tighten cap.
6. Poor seals at pressure cap.	6. (a) Check condition of cap and cap seals. Refer to CAP, RADIATOR, DIAGNOSIS AND TESTING . Replace cap if necessary.
	(b) Check condition of filler neck. If neck is warped or damaged, replace neck.
7. Coolant level low in radiator, but not in coolant recovery/reserve bottle. This indicates the radiator is not drawing coolant from the coolant recovery/reserve bottle as the engine cools. As the engine cools, a vacuum is formed inside the cooling system. If the pressure cap seals are defective, or the cooling system has a leak, a vacuum cannot be formed.	7. (a) Check condition of pressure cap and cap seals. Replace cap if necessary.
	(b) Check condition of filler neck. Replace if damaged.
	(c) Check condition of hose from filler neck to coolant container. It should be tight at both ends without any kinks or tears. Replace hose as necessary.
	(d) Check coolant recovery/reserve bottle and hose for blockage. Repair as necessary.
8. Freeze point of coolant not correct. Mixture ratio may be too rich.	8. Check coolant concentration. Refer to COOLANT, DIAGNOSIS AND TESTING . Adjust glycol-to-water ratio as required.
9. Coolant not flowing through	9. Check for coolant flow at filler

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2014 ENGINE Cooling System - Cherokee

	system.	neck with some coolant removed, engine warm, and thermostat open. Coolant should be observed flowing through filler neck. If flow is not observed, determine reason for lack of flow and repair as necessary.
	10. Radiator air seals missing or improperly installed.	10. Inspect air seals. Correct as necessary.
	11. Radiator or A/C condenser fins are dirty or clogged.	11. Clean obstruction from fins.
	12. Radiator core is plugged or corroded.	12. Replace or clean radiator.
	13. Fuel or ignition system problems.	13. Refer to the appropriate ELECTRICAL DIAGNOSTICS article .
	14. Dragging Brakes.	14. Inspect brake system and repair as necessary. Refer to <u>BRAKES - DIAGNOSIS AND TESTING</u> .
	15. Bug screen or other aftermarket accessory is being used causing reduced air flow.	15. Remove bug screen or accessory.
	16. Thermostat partially or completely closed.	16. Check thermostat operation and replace as necessary. Refer to <u>THERMOSTAT, REMOVAL.</u>
	17. Cooling fan not operating properly.	17. Check electric fan operation and repair as necessary.
	18. Cylinder head gasket leaking.	18. Check cylinder head gasket for leaks. Refer to <u>DIAGNOSIS AND TESTING.</u>
	19. Heater core leaking.	19. Check heater core for leaks.
TEMPERATURE GAUGE READING IS INCONSISTENT (FLUCTUATES, CYCLES OR IS ERRATIC)	1. The gauge may cycle up and down. This is due to the cycling of the electric radiator fan.	1. A normal condition. No correction is necessary. If gauge cycling is the hot zone, check electric fan operation and repair as necessary.
	2. During cold weather operation with the heater blower in the high position, the gauge reading may drop slightly.	2. A normal condition. No correction is necessary.
	3. Temperature gauge or Engine Coolant Temperature Sensor is defective or shorted.	3. Check gauge operation. Refer to <u>OPERATION</u> .
	4. Gauge reading rises when	4. A normal condition. No

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	vehicle is brought to a stop after heavy use (engine still running).	correction is necessary. The gauge should return to normal range after vehicle is driven.
	5. Gauge reading high after restarting a warmed-up (hot) engine.	5. A normal condition. No correction is necessary. The gauge should return to normal range after a few minutes of engine operation.
	6. Coolant level low in radiator (air will build up in the cooling system causing the thermostat to open late).	6. Check and correct coolant leaks.
	7. Cylinder head gasket leaking allowing exhaust gas to enter cooling system. This will cause thermostat to open late.	7. (a) Check for cylinder head gasket leaks using Tool C-3685- A Block Leak Tester or the equivalent. Repair as necessary. (b) Check for coolant in the engine oil. Inspect for white steam emitting from exhaust system. Repair as necessary.
	8. Water pump impeller loose on shaft.	8. Check water pump and replace as necessary.
	9. Air leak on the suction side of water pump allows air to build up in cooling system. This will cause the thermostat to open late.	9. Locate leak and repair as necessary.
PRESSURE CAP IS BLOWING OFF STEAM AND/OR COOLANT FLOWING INTO RECOVERY BOTTLE. TEMPERATURE GAUGE READING MAY BE ABOVE NORMAL, BUT NOT HIGH. COOLANT LEVEL MAY BE HIGH IN RECOVERY BOTTLE.	1. Pressure relief valve in pressure cap is defective.	1. Check condition of pressure cap and seals. Refer to <u>CAP, RADIATOR, DIAGNOSIS AND TESTING</u> . Replace as necessary.
COOLANT LOSS TO THE GROUND WITHOUT PRESSURE CAP BLOWOFF. GAUGE IS READING HIGH OR HOT.	1. Coolant leaks in radiator, cooling system hoses, water pump or engine.	1. Pressure test cooling system and repair as necessary.
DETONATION OR PRE-IGNITION (NOT CAUSED BY IGNITION SYSTEM). GAUGE MAY OR MAY NOT BE READING HIGH.	1. Engine overheating.	1. Check reason for overheating and repair as necessary.
	2. Freeze point of coolant not correct.	2. Check the freeze point of the coolant. Refer to <u>COOLANT</u> ,

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		DIAGNOSIS AND TESTING. Adjust glycol-to-water ratio as required.
HOSE OR HOSES COLLAPSE WHEN ENGINE IS COOLING	1. Vacuum created in cooling system on engine cool-down is not being relieved through coolant recovery/reserve system.	1. (a) Pressure cap relief valve stuck. Refer to CAP, RADIATOR, DIAGNOSIS AND TESTING. Replace as necessary.
		(b) Hose between coolant recovery/reserve bottle and outlet connector is kinked. Repair as necessary.
		(c) Vent at coolant recovery/reserve bottle is plugged. Clean vent and repair as necessary.
		(d) Recovery/reserve bottle is internally blocked or plugged. Check for blockage and repair as necessary.
RADIATOR FAN OPERATES ALL THE TIME	1. Malfunctioning electrical component or circuit.	1. Refer to appropriate ELECTRICAL DIAGNOSTICS article . Repair as necessary.
	2. Check for low coolant level.	2. Repair as necessary.
RADIATOR FAN WILL NOT OPERATE, GAUGE READING HIGH OR HOT	1. Fan motor defective.	1. Refer to appropriate ELECTRICAL DIAGNOSTICS article for operation of the scan tool. Repair as necessary.
	2. Fan relay, powertrain control module (PCM) or engine coolant temperature sensor defective.	2. Refer to appropriate ELECTRICAL DIAGNOSTICS article for operation of the scan tool. Repair as necessary.
	3. Blown fuse in power distribution center (PDC).	3. Determine cause for blown fuse and repair as necessary.
NOISY FAN	1. Fan blade loose.	1. Replace radiator fan assembly.
	2. Fan blade striking a surrounding object.	2. Locate point of fan blade contact and repair as necessary.
	3. Air obstructions at radiator or A/C condenser.	3. Remove obstructions and/or clean debris from radiator and/or A/C condenser.
	4. Electric fan motor defective.	4. Replace radiator fan assembly.
INADEQUATE AIR CONDITIONER PERFORMANCE (COOLING SYSTEM SUSPECTED)	1. Electric radiator fan not operating when A/C is on.	1. Refer to appropriate ELECTRICAL DIAGNOSTICS article for operation of the scan tool. Repair as necessary.

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	2. Radiator and/or air conditioning condenser is restricted, obstructed or dirty.	2. Remove restriction and/or clean as necessary.
	3. Radiator air seals missing or improperly installed.	3. Inspect air seals. Repair as necessary.
	4. Engine is overheating (heat may be transferred from radiator to A/C condenser). High underhood temperature due to engine overheating may also transfer heat to A/C components.	4. Correct overheating condition. Refer to this Service Information.
INADEQUATE HEATER PERFORMANCE	1. Has a diagnostic trouble code (DTC) been set?	1. Refer to appropriate ELECTRICAL DIAGNOSTICS article Procedures.
	2. Coolant level low.	2. Check cooling system for leaks. Repair as necessary.
	3. Obstructions in heater hose fittings at engine.	3. Remove heater hoses at both ends and check for obstructions. Repair as necessary.
	4. Heater hose kinked.	4. Locate kinked area and repair as necessary.
	5. Water pump is not pumping coolant through the heater core. When the engine is fully warmed up, both heater hoses should be hot to the touch.	5. Check accessory drive belt operation. Repair as necessary.
HEAT ODOR	1. Various heat shields are used at certain components. One or more of these shields may be missing.	1. Locate missing shields and replace or repair as necessary.
	2. Is temperature gauge reading above the normal range?	2. Check gauge operation. Refer to OPERATION .
	3. Is cooling fan operating correctly?	3. Repair as necessary.
	4. Has undercoating been applied to any unnecessary component.	4. Clean undercoating as necessary.
	5. Engine may be running rich causing the catalytic converter to overheat.	5. Refer to appropriate ELECTRICAL DIAGNOSTICS article for operation of the scan tool. Repair as necessary.
POOR DRIVEABILITY (THERMOSTAT POSSIBLY STUCK OPEN). GAUGE MAY BE READING LOW	1. Has a diagnostic trouble code (DTC) been set?	1. Refer to appropriate ELECTRICAL DIAGNOSTICS article for checking a DTC related to the thermostat.

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STEAM IS COMING FROM FRONT OF VEHICLE NEAR GRILLE AREA WHEN WEATHER IS WET, ENGINE IS WARMED UP, RUNNING, AND VEHICLE IS STATIONARY. TEMPERATURE GAUGE IS IN NORMAL RANGE.	1. During wet weather, moisture (snow, ice or rain condensation) on the radiator will evaporate when the thermostat opens. This opening allows heated water into the radiator. When the moisture contacts the hot radiator, steam may be emitted. This usually occurs in cold weather with no fan or airflow to blow it away.	1. Occasional steam emitting from this area is normal. No repair is necessary.
COOLANT COLOR	1. Coolant color is not necessarily an indication of adequate corrosion or temperature protection. Do not rely on coolant color for determining condition of coolant.	1. Check the freeze point of the coolant. Refer to COOLANT, DIAGNOSIS AND TESTING . Adjust the glycol-to-water ratio as required.
COOLANT LEVEL CHANGES IN COOLANT RECOVERY/RESERVE BOTTLE	1. Level changes are to be expected as coolant volume fluctuates with engine temperature. If the level in the bottle was between the FULL HOT and ADD marks at normal engine operating temperature, the level should return to within that range after operation at elevated temperatures.	1. A normal condition. No repair is necessary.

LEAK TESTING

ULTRAVIOLET LIGHT METHOD

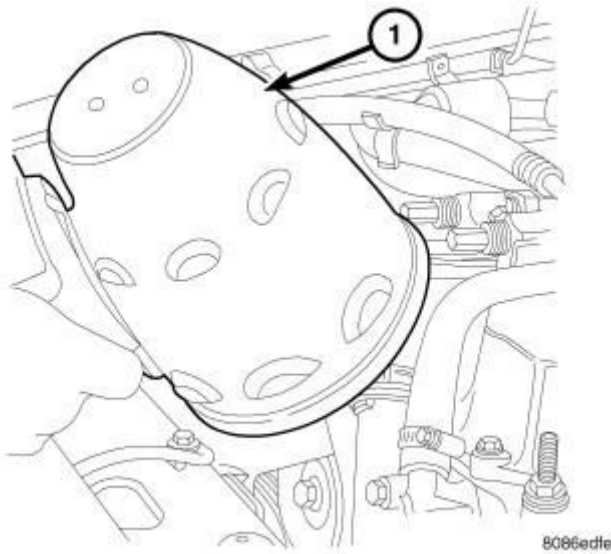


Fig. 7: Leak Detection Using Black Light-Typical
Courtesy of CHRYSLER GROUP, LLC

1 - TYPICAL BLACK LIGHT TOOL

A leak detection additive is available through the parts department that can be added to cooling system. The additive is highly visible under ultraviolet light (black light) (1). Pour one ounce of additive into cooling system. Place heater control unit in HEAT position. Start and operate the engine until the radiator upper hose is warm to the touch. Aim the commercially available black light tool at the components to be checked. If leaks are present, the black light will cause the additive to glow a bright green color.

The black light can be used in conjunction with a pressure tester to determine if any external leaks exist.

PRESSURE TESTER METHOD

The engine should be at normal operating temperature. Recheck the system cold if the cause of coolant loss is not located during the warm engine examination.

WARNING: Hot, pressurized coolant can cause injury by scalding.

Carefully remove the radiator pressure cap from the filler neck and check the coolant level. Push down on the cap to disengage it from the stop tabs. Wipe the inside of the filler neck and examine the lower inside sealing seat for nicks, cracks, paint, dirt and solder residue. Inspect the radiator-to- reserve/overflow tank hose for internal obstructions. Insert a wire through the hose to be sure it is not obstructed.

Inspect the cams on the outside of the filler neck. If the cams are damaged, seating of the pressure cap valve and tester seal will be affected.

Attach pressure tester ((special tool #7700, Tester, Cooling System) or an equivalent) to radiator filler neck.

Operate the tester pump to apply 103.4 kPa (15 psi) pressure to the system. If the hoses enlarge excessively or bulges while testing, replace as necessary. Observe the gauge pointer and determine the condition of the cooling system according to following criteria:

Holds Steady: If the pointer remains steady for two minutes, serious coolant leaks are not present in system. However, there could be an internal leak that does not appear with normal system test pressure. If it is certain that coolant is being lost and leaks cannot be detected, inspect for interior leakage or perform Internal Leakage Test. Refer to **INTERNAL LEAKAGE INSPECTION**.

Drops Slowly: Indicates a small leak or seepage is occurring. Examine all of the connections for seepage or slight leakage with a flashlight. Inspect the radiator, hoses, gasket edges and heater. Seal the small leak holes with a Sealer Lubricant (or equivalent). Repair the leak holes and inspect the system again with pressure applied.

Drops Quickly: Indicates that serious leakage is occurring. Examine the system for external leakage. Block side panels are embossed to highlight core plugs. Remove embossed noise panels to inspect and or repair core plugs. If leaks are not visible, inspect for internal leakage.

INTERNAL LEAKAGE INSPECTION

Remove the engine oil pan drain plug and drain a small amount of engine oil. If coolant is present in the pan, it will drain first because it is heavier than oil. An alternative method is to operate engine for a short period to churn the oil. After this is done, remove the engine dipstick and inspect for water globules. Also inspect the transmission dipstick for water globules and transmission fluid cooler for leakage.

WARNING: With radiator pressure tester tool installed on radiator, do not allow pressure to exceed 145 kPa (21 psi). Pressure will build up quickly if a combustion leak is present. To release pressure, rock tester from side to side. When removing tester, do not turn tester more than 1/2 turn if system is under pressure.

Operate the engine without the pressure cap on the radiator until the thermostat opens. Attach a Pressure Tester to the filler neck. If pressure builds up quickly it indicates a combustion leak exists. This is usually the result of a cylinder head gasket leak or crack in engine. Repair as necessary.

If there is not an immediate pressure increase, pump the Pressure Tester. Do this until indicated pressure is within system range of 110 kPa (16 psi). Fluctuation of the gauge pointer indicates compression or combustion leakage into cooling system.

Because the vehicle is equipped with a catalytic converter, **do not** short out cylinders to isolate compression leak.

If the needle on dial of the pressure tester does not fluctuate, race engine a few times to check for an abnormal amount of coolant or steam. This would be emitting from exhaust pipe. Coolant or steam from exhaust pipe may indicate a faulty cylinder head gasket, cracked engine cylinder block or cylinder head.

COMBUSTION LEAKAGE TEST - WITHOUT PRESSURE TESTER

DO NOT WASTE reusable coolant. If the solution is clean, drain the coolant into a clean container for reuse.

WARNING: Do not remove cylinder block drain plugs or loosen radiator draincock with system hot and under pressure. Serious burns from coolant can occur.

Drain sufficient coolant to allow thermostat removal. Refer to THERMOSTAT, REMOVAL. Remove accessory drive belt. Refer to BELT, SERPENTINE, REMOVAL.

Add coolant to radiator to bring level to within 6.3 mm (1/4 in) of the top of the thermostat housing.

CAUTION: Avoid overheating. Do not operate engine for an excessive period of time. Open draincock immediately after test to eliminate boil over.

Start engine and accelerate rapidly three times, to approximately 3000 RPM while observing coolant. If internal engine combustion gases are leaking into cooling system, bubbles will appear in coolant. If bubbles do not appear, internal combustion gas leakage is not present.

STANDARD PROCEDURE

DRAINING

When servicing the cooling system, it is essential that coolant does not drip onto the accessory drive belts and/or pulleys. Shield the belts with shop towels before working on the cooling system. If coolant contacts the belts or pulleys, flush both with clean water.

WARNING: Make sure engine cooling system is cool before servicing. Do not remove any clamps or hoses, pressure cap, or open the radiator draincock. When the system is hot and under pressure serious burns from coolant can occur.

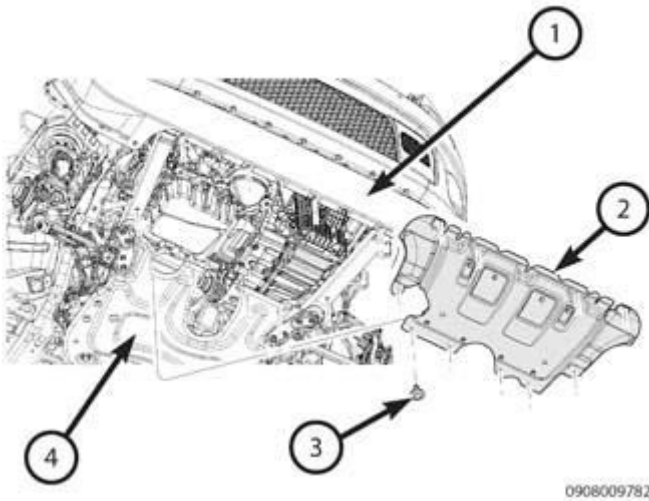


Fig. 8: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove fasteners (3) and the belly pan (2).
3. Position a drain pan under draincock location.
4. Open radiator draincock located at the lower left side of radiator. Turn draincock counterclockwise until it stops and allow to drain.
5. Remove coolant pressure cap.

REVERSE FLUSHING

CAUTION: The cooling system normally operates at 97-124 kPa (14-18 psi) pressure. Exceeding this pressure may damage the radiator or hoses.

Reverse flushing of the cooling system is the forcing of water through the cooling system. This is done using air pressure in the opposite direction of normal coolant flow. It is usually only necessary with very dirty systems with evidence of partial plugging.

CHEMICAL CLEANING

If visual inspection indicates the formation of sludge or scaly deposits, use a radiator cleaner (Mopar® Radiator Klean or equivalent) before flushing. This will soften scale and other deposits and aid the flushing operation.

CAUTION: Be sure instructions on the container are followed.

REVERSE FLUSHING RADIATOR

Disconnect the radiator hoses from the radiator fittings. Attach a section of radiator hose to the radiator bottom outlet fitting and insert the flushing gun. Connect a water supply hose and air supply hose to the flushing gun.

CAUTION: The cooling system normally operates at 97-124 kPa (14-18 psi) pressure. Exceeding this pressure may damage the radiator or hoses.

Allow the radiator to fill with water. When radiator is filled, apply air in short blasts allowing radiator to refill between blasts. Continue this reverse flushing until clean water flows out through rear of radiator cooling tube passages. For more information, refer to operating instructions supplied with flushing equipment. Have radiator cleaned more extensively by a radiator repair shop.

REVERSE FLUSHING ENGINE

Drain the cooling system. Refer to **STANDARD PROCEDURE**. Remove the thermostat housing and thermostat. Install the thermostat housing. Disconnect the radiator upper hose from the radiator and attach the flushing gun to the hose. Disconnect the radiator lower hose from the water pump. Attach a lead away hose to the water pump inlet fitting.

CAUTION: Be sure that the heater control valve is closed (heat off). This is done to prevent coolant flow with scale and other deposits from entering the heater core.

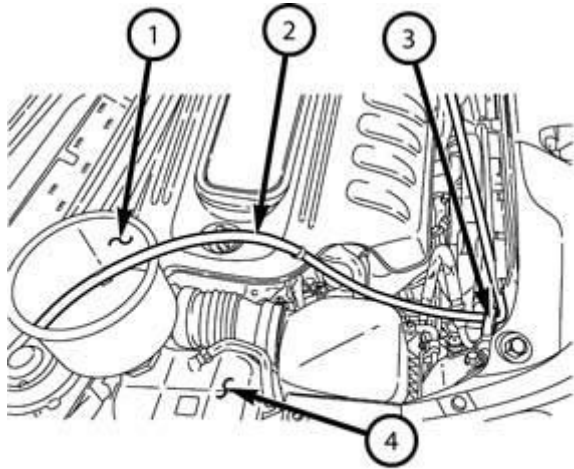
Connect the water supply hose and air supply hose to the flushing gun. Allow the engine to fill with water. When the engine is filled, apply air in short blasts, allowing the system to fill between air blasts. Continue until clean water flows through the lead away hose. For more information, refer to operating instructions supplied with flushing equipment.

Remove the lead away hose, flushing gun, water supply hose and air supply hose. Remove the thermostat housing. Refer to **THERMOSTAT, REMOVAL**. Install the thermostat and housing with a replacement gasket. Refer to **THERMOSTAT, INSTALLATION**. Connect the radiator hoses. Refill the cooling system with the correct antifreeze/water mixture. Refer to **STANDARD PROCEDURE**.

STANDARD PROCEDURE

COOLANT FILL - 2.4L

1. If using the universal fill funnel, special tool (special tool #8195A, Funnel) select the appropriate fitting extension, locking ring and attach to the fill neck of the cooling system.
2. Make sure the adapter seal fits firmly against the inside of the fill neck base to ensure a good seal. After the extension and locking ring are installed, make sure the extension can not be moved. This will confirm a good seal.



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Fig. 9: Fill Funnel, Vent Outlet & Hose
Courtesy of CHRYSLER GROUP, LLC

3. Select a length of clear hose that is long enough to reach from the radiator fill vent outlet to the coolant bottle.
4. Attach the hose (2) to the radiator fill vent outlet (3) and place the other end in the fill funnel (1).

NOTE: **The hose attachment will aid in air removal.**

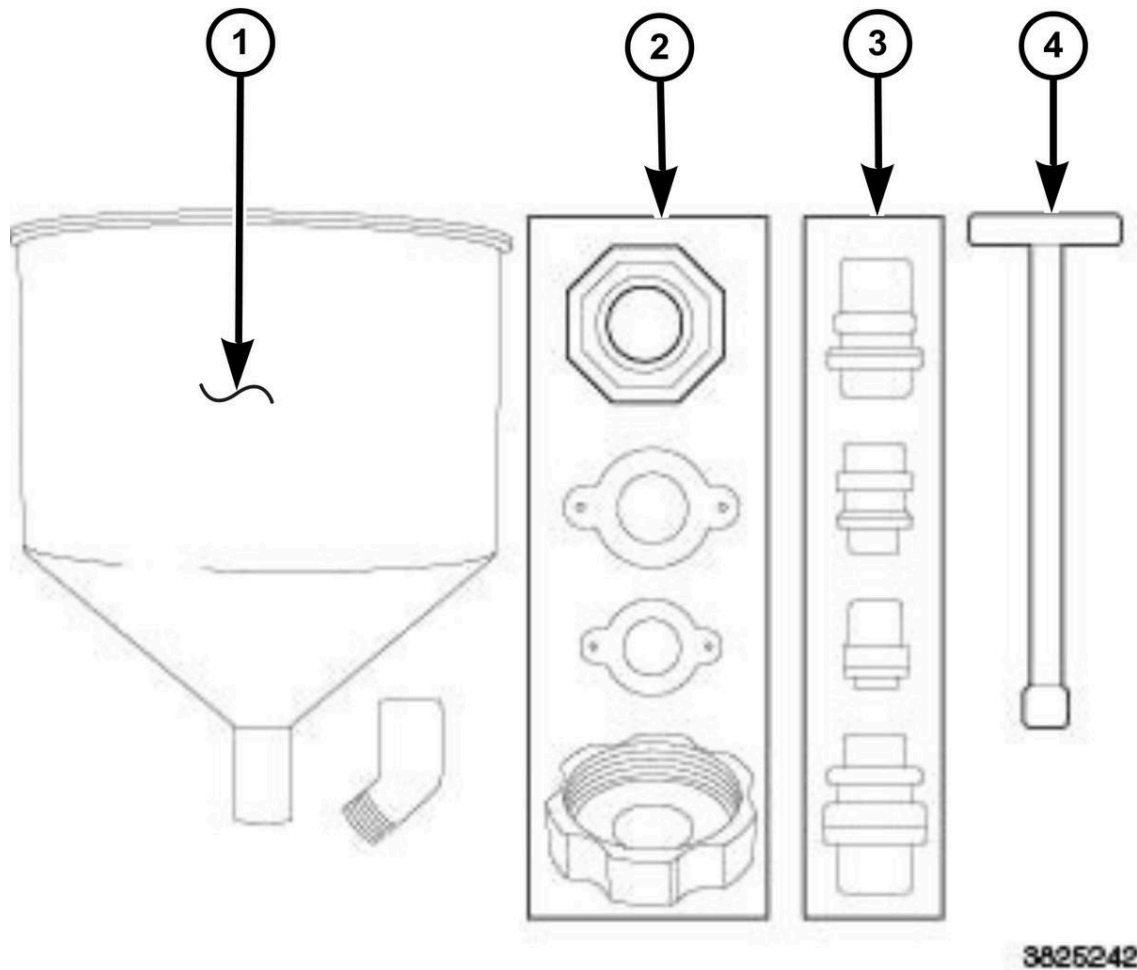
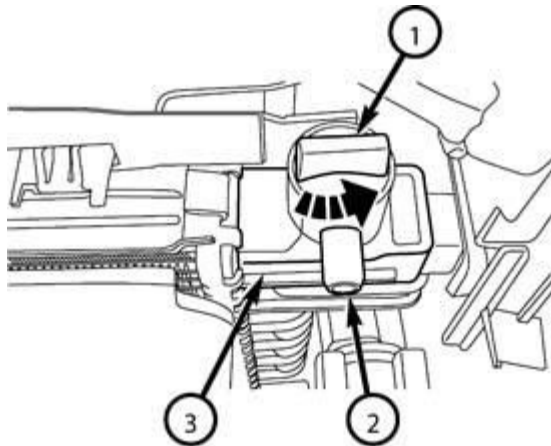


Fig. 10: Locating Funnel, Locking Ring, Fitting Extension & Stopper
Courtesy of CHRYSLER GROUP, LLC

5. Disconnect the coolant bottle return hose at the bottle end of the hose. Cap the coolant bottle nipple.
6. Attach the funnel (1) to the extension (3) and fill with coolant.



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Fig. 11: Rotating Radiator Valve Counterclockwise
Courtesy of CHRYSLER GROUP, LLC

7. Rotate the radiator vent valve handle (1) counterclockwise approximately 180°.

NOTE: The valve will need to be opened enough to allow air and coolant to escape into the attached hose.

DO NOT

remove the valve (1) from the radiator (3).

8. Add coolant to the funnel.

NOTE: Make sure a sign of coolant is present in the clear hose. It may be necessary to add more coolant to the funnel to accomplish this.

NOTE: The higher the fluid level, the better the bleed results.

Continue to add coolant until it is free of bubbles and settles at a level.

NOTE: Make sure the funnel does not become empty during the fill and bleed procedure.

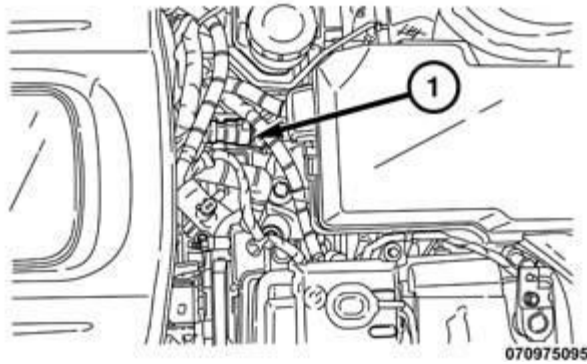


Fig. 12: Heater Core Return Hose Quick Connect
Courtesy of CHRYSLER GROUP, LLC

9. Release the heater core return hose quick connect (1) by squeezing the two release tabs. Wait until a stream of coolant is present.

NOTE: Venting air from the heater core return hose will help the water pump to prime.

10. Attach the quick connect.

Make sure the fitting is completely seated.

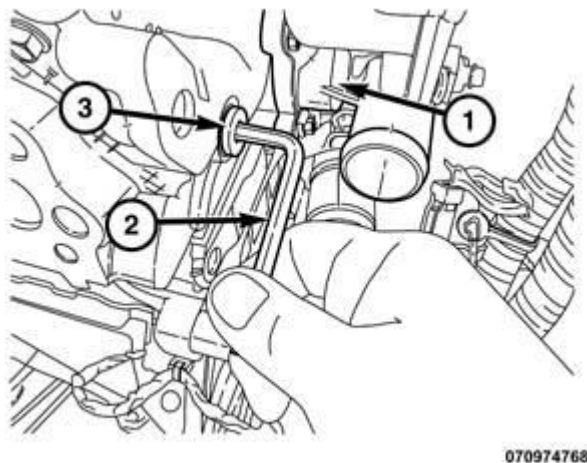


Fig. 13: Thermostat Housing, Drain Plug & Hex Wrench
Courtesy of CHRYSLER GROUP, LLC

11. Locate the cylinder head drain plug (3). It is located on the rear face of the head just forward of the thermostat housing (1).
12. Using a 6 mm hex wrench (2), loosen the drain plug 5 full turns.
13. Once fluid starts to seep from the area between the plug and the cylinder head, observe for fluid that is free of air bubbles. Once the fluid is clear of air, tighten the plug.

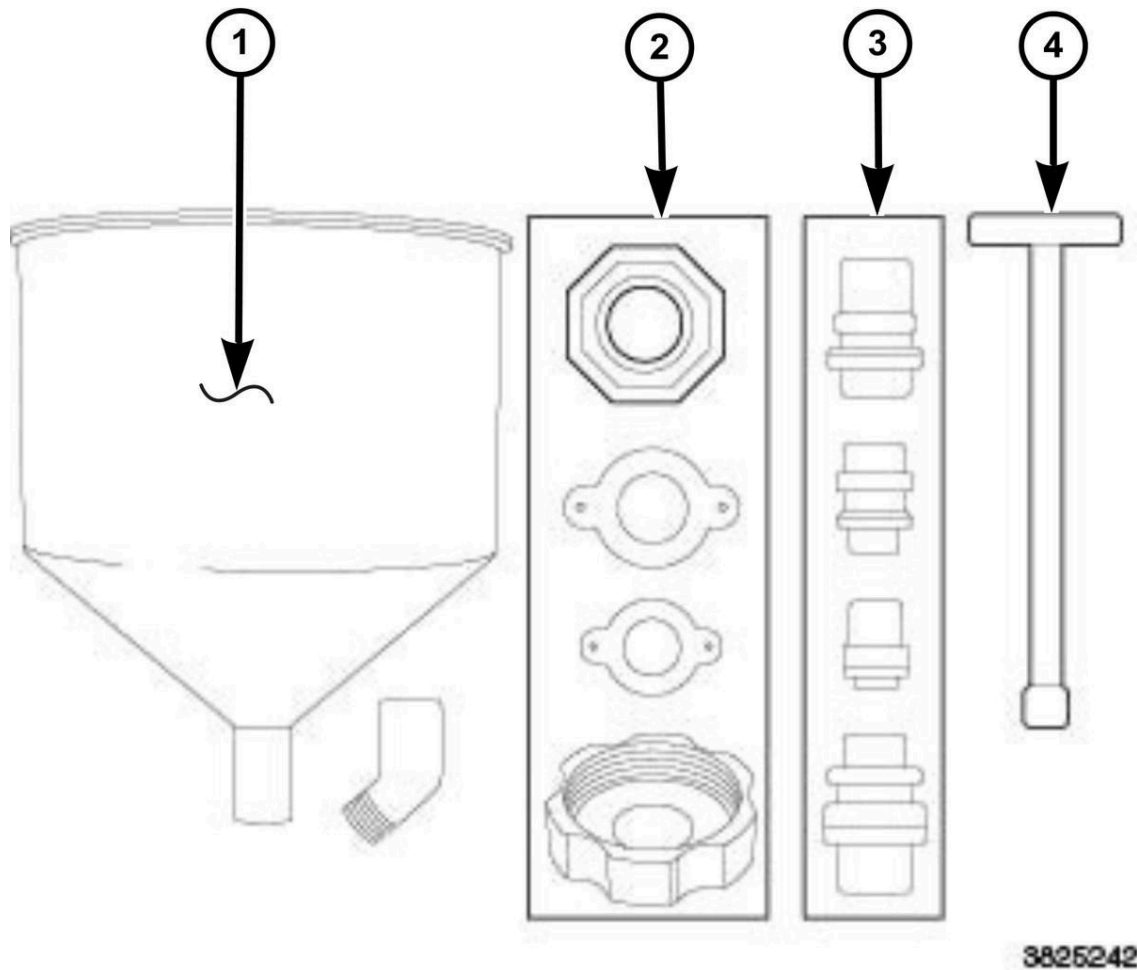
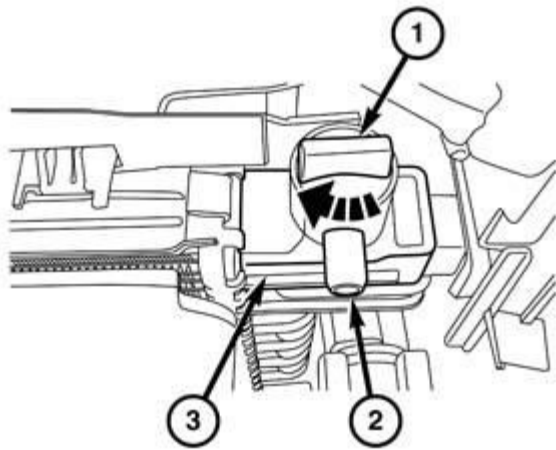


Fig. 14: Locating Funnel, Locking Ring, Fitting Extension & Stopper
 Courtesy of CHRYSLER GROUP, LLC

14. Install the stopper (4) into the funnel base. The stopper will prevent the fluid that is left in the funnel from spilling out when separated from the extension.



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Fig. 15: Rotating Radiator Valve Clockwise
Courtesy of CHRYSLER GROUP, LLC

15. Rotate the radiator valve (1) clockwise to the closed position.
16. Fill coolant recovery container to the FULL mark.
17. Remove the funnel, extension and locking ring.
18. Remove the cap from the coolant bottle nipple.
19. Attach the coolant bottle return hose to the bottle with a

NEW

CLIC E® clamp.

20. Top off the coolant bottle to the FULL line and install the cap.
21. Start the engine and accelerate from idle to 3000 RPM while an assistant observes the coolant bottle return hose inlet at the top of the bottle.

CAUTION: If there is no flow present at the coolant bottle return hose inlet, you must repeat the procedure beginning at step 1 or engine damage may occur.

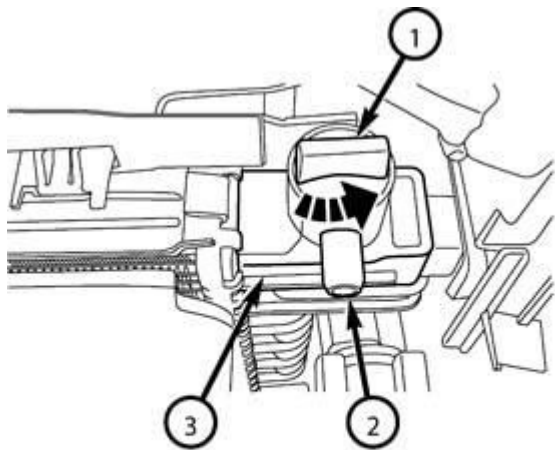
While the engine RPM's are up, the fluid will push through the hose and into the bottle. Once the fluid is free of air pockets/bubbles and the hose becomes warm, allow the engine to return to idle.

22. Run the engine until the thermostat opens, upper radiator hose will be warm to the touch.

23. Pinch off the upper radiator hose for a minimum of 30 seconds and as long as 1 minute while running the engine at 3000 RPM.

NOTE: Forcing coolant through the oil cooler will purge air trapped in the oil cooler lines.

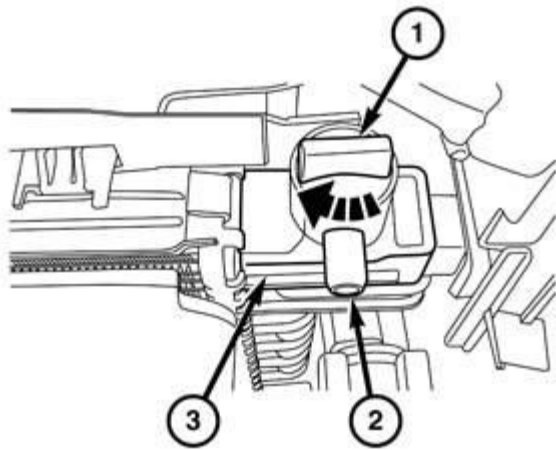
24. Allow the engine to return to idle. Shut the engine off. Allow the cooling system to settle and cool down.
25. Remove the coolant bottle cap.



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Fig. 16: Rotating Radiator Valve Counterclockwise
Courtesy of CHRYSLER GROUP, LLC

26. Open the radiator vent valve (1) until a solid flow of coolant is preset in the hose.



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Fig. 17: Rotating Radiator Valve Clockwise
Courtesy of CHRYSLER GROUP, LLC

27. Once coolant is evident in the hose, close the valve (1).
28. Remove the clear hose from the fitting.
29. Fill the coolant bottle to the FULL line. Install the cap.
30. Check for leaks.

COOLANT AIR EVACUATION

CAUTION: Failure to purge air from the cooling system can result in an overheating condition and severe engine damage.

NOTE: The preferred way to remove air from the cooling system is to use Chrysler PSE (Pentastar Service Equipment) (special tool #399-550000, Tool, UView Airlift™ Cooling System Refill) If this tool is not available, Special tool 8195A MUST BE USED and the procedure addressing the proper use of that tool is described below.

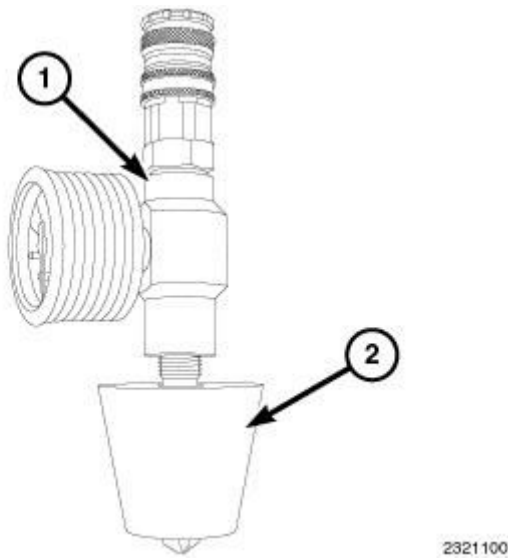


Fig. 18: Pressurized Air Operated Vacuum Generator
Courtesy of CHRYSLER GROUP, LLC

Evacuating or purging air from the cooling system involves the use of a pressurized air operated vacuum generator. The vacuum created allows for a quick and complete coolant refilling while removing any airlocks present in the system components.

NOTE: To avoid damage to the cooling system, ensure that no component would be susceptible to damage when a vacuum is drawn on the system.

WARNING: ANTIFREEZE IS AN ETHYLENE GLYCOL BASE COOLANT AND IS HARMFUL IF SWALLOWED OR INHALED. IF SWALLOWED, DRINK TWO GLASSES OF WATER AND INDUCE VOMITING. IF INHALED, MOVE TO FRESH AIR AREA. SEEK MEDICAL ATTENTION IMMEDIATELY. DO NOT STORE IN OPEN OR UNMARKED CONTAINERS. WASH SKIN AND CLOTHING THOROUGHLY AFTER COMING IN CONTACT WITH ETHYLENE GLYCOL. KEEP OUT OF REACH OF CHILDREN. DISPOSE OF GLYCOL BASED COOLANT PROPERLY. CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA. DO NOT OPEN A COOLING SYSTEM WHEN THE ENGINE IS AT OPERATING TEMPERATURE OR HOT UNDER PRESSURE; PERSONAL INJURY CAN RESULT. AVOID RADIATOR COOLING FAN WHEN ENGINE COMPARTMENT RELATED SERVICE IS PERFORMED; PERSONAL INJURY CAN RESULT.

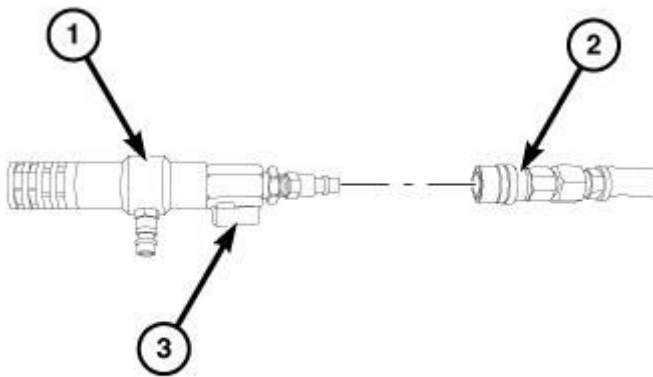
WARNING: WEAR APPROPRIATE EYE AND HAND PROTECTION WHEN PERFORMING THIS PROCEDURE.

NOTE: The service area where this procedure is performed should have a minimum shop air requirement of 80 PSI (5.5 bar) and should be equipped with an air

dryer system.

NOTE: For best results, the radiator should be empty.

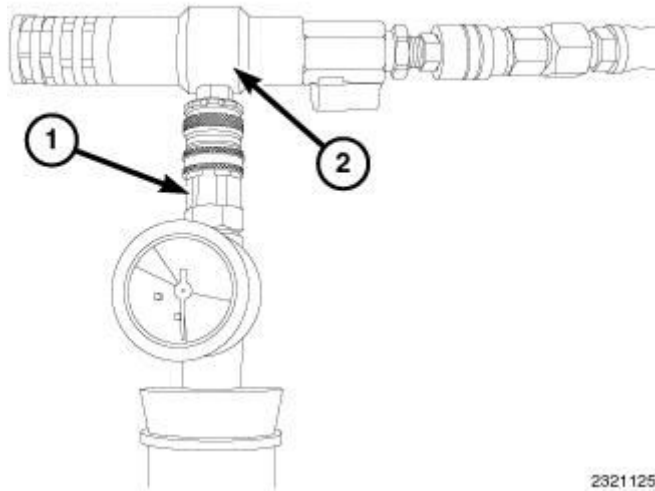
1. Refer to the Chrysler PSE (Pentastar Service Equipment) (special tool #399-550000, Tool, UView Airlift™ Cooling System Refill) or equivalent tool's operating manual for specific assembly steps.
2. Choose an appropriate adapter cone that will fit the reservoir tank neck.
3. Attach the adapter cone (2) to the vacuum gauge (1).



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Fig. 19: Vacuum Generator/Venturi Ball Valve
Courtesy of CHRYSLER GROUP, LLC

4. Make sure the vacuum generator/venturi ball valve (3) is closed and attach an airline hose (2) (minimum shop air requirement of 80 psi/5.5 bar) to the vacuum generator/venturi (1).
5. Position the adaptor cone/vacuum gauge assembly into the reservoir tank neck. Ensure that the adapter cone is sealed properly.



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Fig. 20: Vacuum Generator/Venturi
Courtesy of CHRYSLER GROUP, LLC

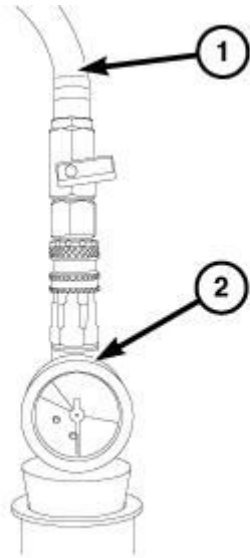
6. Connect the vacuum generator/venturi (2) to the positioned adaptor cone/vacuum gauge assembly (1).
7. Open the vacuum generator/venturi ball valve.

NOTE: Do not bump or move the assembly as it may result in loss of vacuum. Some radiator overflow hoses may need to be clamped off to obtain vacuum.

8. Let the system run until the vacuum gauge shows a good vacuum through the cooling system. Refer to the tool's operating manual for appropriate pressure readings.

NOTE: If a strong vacuum is being created in the system, it is normal to see the radiator hoses collapse.

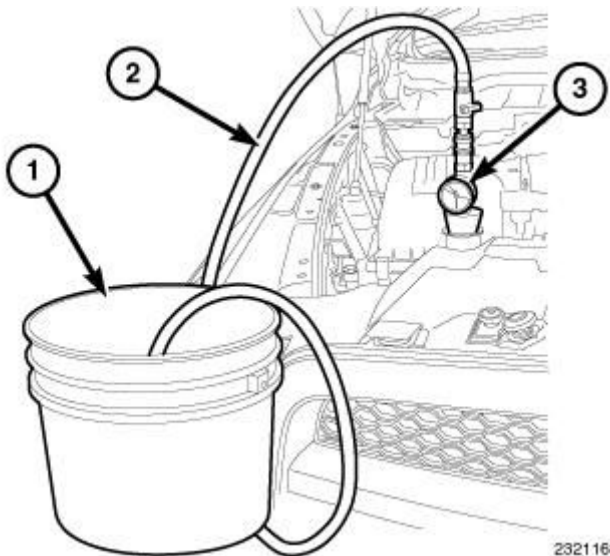
9. Close the vacuum generator/venturi ball valve.



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Fig. 21: Vacuum Generator/Venturi And Air Line
Courtesy of CHRYSLER GROUP, LLC

10. Disconnect the vacuum generator/venturi (1) and airline from the adaptor cone/vacuum gauge assembly (2).
11. Wait approximately 20 seconds, if the pressure readings do not move, the system has no leaks. If the pressure readings move, a leak could be present in the system and the cooling system should be checked for leaks and the procedure should be repeated.



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Fig. 22: Suction Hose Ball Valve
Courtesy of CHRYSLER GROUP, LLC

View typical

12. Place the tool's suction hose (2) into the coolant's container.

NOTE: Ensure there is a sufficient amount of coolant, mixed to the required strength/protection level available for use. For best results and to assist the refilling procedure, place the coolant container at the same height as the radiator filler neck. Always draw more coolant than required. If the coolant level is too low, it will pull air into the cooling system which could result in airlocks in the system.

13. Pre-fill the tool suction hose (2) with coolant.
14. Connect the tool's suction hose (2) to the adaptor cone/vacuum gauge assembly (3).

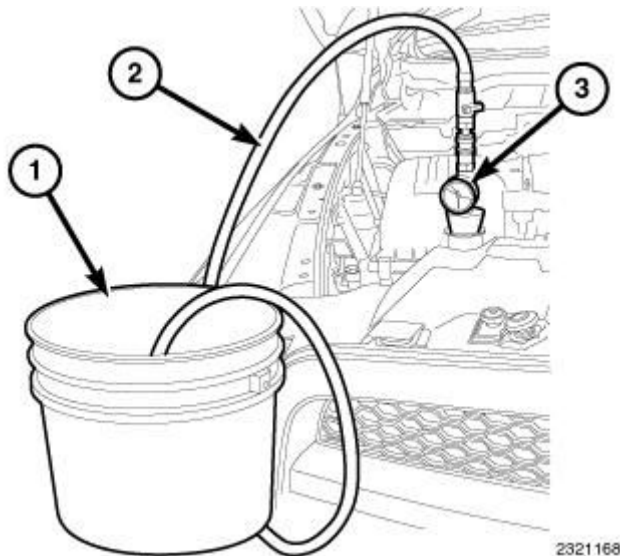


Fig. 23: Suction Hose Ball Valve
Courtesy of CHRYSLER GROUP, LLC

NOTE: View typical

15. Open the suction hose's ball valve to begin refilling the cooling system.
16. When the vacuum gauge reads zero and the proper level is reached in the coolant bottle, the system is filled.
17. Close the suction hose's ball valve and remove the suction hose from the adaptor cone/vacuum gauge assembly.
18. Remove the adaptor cone/vacuum gauge assembly from the coolant bottle neck.
19. Install the coolant bottle cap.
20. With heater control unit in the HEAT position, start the engine.
21. Run the engine at 3,000 RPM to help purge the air back to the bottle.
22. Look for flow at the coolant bottle return hose inlet.

CAUTION: If there is no flow present at the coolant bottle return hose inlet, you must repeat the procedure beginning at step 1 or engine damage

may occur.

23. After engine has reached normal operating temperature, shut engine off and allow it to cool. Use the radiator vent valve to purge any remaining air from the radiator.
24. Add coolant to the coolant bottle as necessary. **Only add coolant to the container when the engine is cold. Coolant level in a warm engine will be higher due to thermal expansion.** Add necessary coolant to raise container level to the FULL mark after each cool down period.
25. Once the appropriate coolant level is achieved, install the cap.

STANDARD PROCEDURE - COOLANT AIR EVACUATION

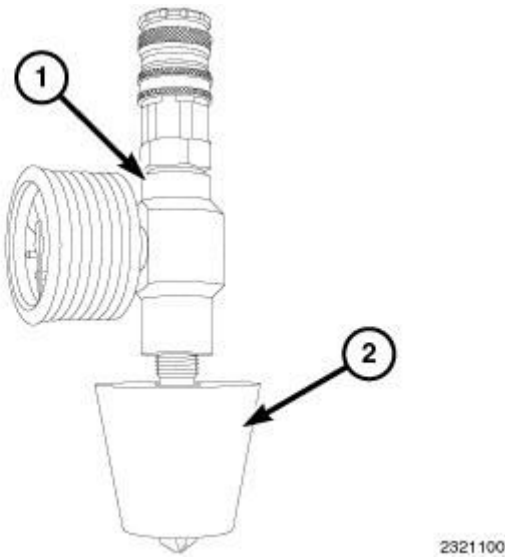


Fig. 24: Pressurized Air Operated Vacuum Generator
Courtesy of CHRYSLER GROUP, LLC

Evacuating or purging air from the cooling system involves the use of a pressurized air operated vacuum generator. The vacuum created allows for a quick and complete coolant refilling while removing any airlocks present in the system components.

NOTE: To avoid damage to the cooling system, ensure that no component would be susceptible to damage when a vacuum is drawn on the system.

WARNING: ANTIFREEZE IS AN ETHYLENE GLYCOL BASE COOLANT AND IS HARMFUL IF SWALLOWED OR INHALED. IF SWALLOWED, DRINK TWO GLASSES OF WATER AND INDUCE VOMITING. IF INHALED, MOVE TO FRESH AIR AREA. SEEK MEDICAL ATTENTION IMMEDIATELY. DO NOT STORE IN OPEN OR UNMARKED CONTAINERS. WASH SKIN AND CLOTHING THOROUGHLY AFTER COMING IN CONTACT WITH ETHYLENE GLYCOL. KEEP OUT OF REACH OF CHILDREN. DISPOSE OF GLYCOL BASED COOLANT PROPERLY. CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN

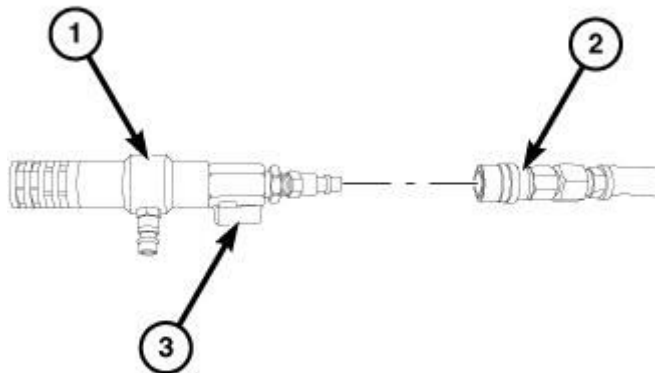
YOUR AREA. DO NOT OPEN A COOLING SYSTEM WHEN THE ENGINE IS AT OPERATING TEMPERATURE OR HOT UNDER PRESSURE; PERSONAL INJURY CAN RESULT. AVOID RADIATOR COOLING FAN WHEN ENGINE COMPARTMENT RELATED SERVICE IS PERFORMED; PERSONAL INJURY CAN RESULT.

WARNING: WEAR APPROPRIATE EYE AND HAND PROTECTION WHEN PERFORMING THIS PROCEDURE.

NOTE: The service area where this procedure is performed should have a minimum shop air requirement of 80 PSI (5.5 bar) and should be equipped with an air dryer system.

NOTE: For best results, the radiator should be empty. The vehicle's heater control should be set to the heat position (ignition may need to be turned to the on position but do not start the motor).

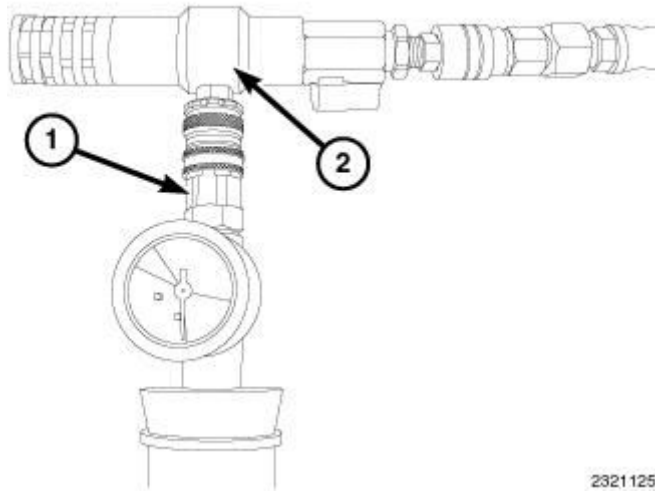
1. Refer to the Chrysler Pentastar Service Equipment (Chrysler PSE) Coolant Refiller #85-15-0650 or equivalent tool's operating manual for specific assembly steps.
2. Choose an appropriate adapter cone that will fit the vehicle's radiator filler neck or reservoir tank.
3. Attach the adapter cone (2) to the vacuum gauge (1).



2321148

Fig. 25: Vacuum Generator/Venturi Ball Valve
Courtesy of CHRYSLER GROUP, LLC

4. Make sure the vacuum generator/venturi ball valve (3) is closed and attach an airline hose (2) (minimum shop air requirement of 80 psi/5.5 bar) to the vacuum generator/venturi (1).
5. Position the adaptor cone/vacuum gauge assembly into the radiator filler neck or reservoir tank. Ensure that the adaptor cone is sealed properly.



2321125

Fig. 26: Vacuum Generator/Venturi
Courtesy of CHRYSLER GROUP, LLC

6. Connect the vacuum generator/venturi (2) to the positioned adaptor cone/vacuum gauge assembly (1).
7. Open the vacuum generator/venturi ball valve.

NOTE: Do not bump or move the assembly as it may result in loss of vacuum. Some radiator overflow hoses may need to be clamped off to obtain vacuum.

8. Let the system run until the vacuum gauge shows a good vacuum through the cooling system. Refer to the tool's operating manual for appropriate pressure readings.

NOTE: If a strong vacuum is being created in the system, it is normal to see the radiator hoses to collapse.

9. Close the vacuum generator/venturi ball valve.

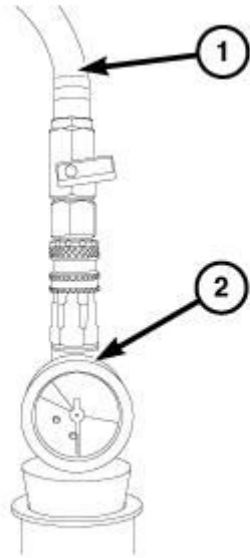


Fig. 27: Vacuum Generator/Venturi And Air Line
Courtesy of CHRYSLER GROUP, LLC

10. Disconnect the vacuum generator/venturi and airline from the adaptor cone/vacuum gauge assembly.
11. Wait approximately 20 seconds, if the pressure readings do not move, the system has no leaks. If the pressure readings move, a leak could be present in the system and the cooling system should be checked for leaks and the procedure should be repeated.
12. Place the tool's suction hose into the coolant's container.

NOTE: **Ensure there is a sufficient amount of coolant, mixed to the required strength/protection level available for use. For best results and to assist the refilling procedure, place the coolant container at the same height as the radiator filler neck. Always draw more coolant than required. If the coolant level is too low, it will pull air into the cooling system which could result in airlocks in the system.**

13. Connect the tool's suction hose (1) to the adaptor cone/vacuum gauge assembly (2).

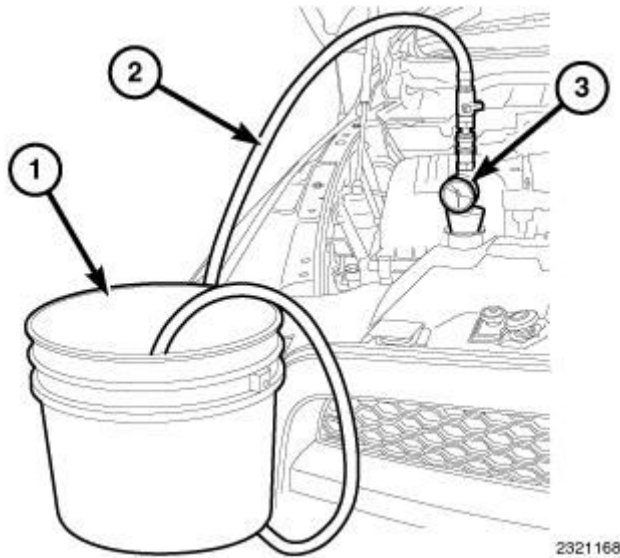


Fig. 28: Suction Hose Ball Valve
Courtesy of CHRYSLER GROUP, LLC

NOTE: View typical

14. Open the suction hose's ball valve to begin refilling the cooling system.
15. When the vacuum gauge reads zero, the system is filled.

NOTE: On some remote pressurized tanks, it is recommended to stop filling when the proper level is reached.

16. Close the suction hose's ball valve and remove the suction hose from the adaptor cone/vacuum gauge assembly.
17. Remove the adaptor cone/vacuum gauge assembly from the radiator filler neck or reservoir tank.
18. With heater control unit in the HEAT position, operate engine with container cap in place.
19. After engine has reached normal operating temperature, shut engine off and allow it to cool. When engine is cooling down, coolant will be drawn into the radiator from the pressure container.
20. Add coolant to the recovery bottle/container as necessary. **Only add coolant to the container when the engine is cold. Coolant level in a warm engine will be higher due to thermal expansion.** Add necessary coolant to raise container level to the COLD MINIMUM mark after each cool down period.
21. Once the appropriate coolant level is achieved, attach the radiator cap or reservoir tank cap.

ADDING ADDITIONAL COOLANT

WARNING: ANTIFREEZE IS AN ETHYLENE GLYCOL BASE COOLANT AND IS HARMFUL IF SWALLOWED OR INHALED. IF SWALLOWED, DRINK TWO GLASSES OF WATER AND INDUCE VOMITING. IF INHALED, MOVE TO FRESH AIR AREA. SEEK MEDICAL ATTENTION IMMEDIATELY. DO NOT STORE IN OPEN OR UNMARKED CONTAINERS. WASH SKIN AND

2014 Jeep Cherokee Trailhawk

2014 ENGINE Cooling System - Cherokee

CLOTHING THOROUGHLY AFTER COMING IN CONTACT WITH ETHYLENE GLYCOL. KEEP OUT OF REACH OF CHILDREN. DISPOSE OF GLYCOL BASED COOLANT PROPERLY. CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA. DO NOT OPEN A COOLING SYSTEM WHEN THE ENGINE IS AT OPERATING TEMPERATURE OR HOT UNDER PRESSURE; PERSONAL INJURY CAN RESULT. AVOID RADIATOR COOLING FAN WHEN ENGINE COMPARTMENT RELATED SERVICE IS PERFORMED; PERSONAL INJURY CAN RESULT.

2.4L - Coolant will normally be in the pressure chamber side of the coolant bottle. If additional coolant is to be added, use the indicators on the bottle as a guide. If the bottle was empty, perform the Deaeration procedure to properly remove any trapped air in the cooling system. Refer to **STANDARD PROCEDURE**.

3.6L - When additional coolant is needed, it should be added to the Pressurized Coolant Bottle. With the engine cold, add enough coolant to set the level between the add and full indicators on the bottle.

For the proper type of coolant. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, DESCRIPTION**.

SPECIFICATIONS

GAS FILL VOLUMES

DESCRIPTION	SPECIFICATION	
	US	METRIC
2.4L	7.2 Quarts	6.8 Liters
3.2L	10 Quarts	9.5 Liters
Use only MOPAR® OAT coolant.		

DIESEL FILL VOLUMES

SPECIFICATION		
DESCRIPTION	Metric	US
2.0L Diesel*	7.3L	7.7 qts
* 2.0 Diesel Engine uses Parafull coolant		

TORQUE SPECIFICATIONS - GAS

2.4L

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Accessory Drive Belt Tensioner Bolt	26	19	-
Block Heater	2	-	21
Condenser to Radiator	8	-	70

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Coolant Reservoir	8	-	70
Coolant Return Tube to Water/Coolant Pump Inlet Pipe	45	33	-
Coolant Return Tube to Oil Filter Housing	40	30	-
Coolant Supply Tube to Oil Filter Housing	9	-	80
Coolant Supply Tube to Thermostat Housing	9	-	80
Engine Coolant Temperature (ECT) Sensor	20	15	-
Fan Shroud to Radiator Mounting	8	-	70
Radiator Lower Isolator Bracket to Crossmember	8	-	70
Thermostat Housing	10	-	89
Water/Coolant Pump Bolts and Nut	10	-	89
Water/Coolant Pump Inlet Tube	9	-	80
Water/Coolant Pump Inlet Pipe Support Bracket Bolt	10	-	89

3.2L

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Accessory Drive Belt Tensioner Bolt	50	37	-
Block Heater	12	-	106
Condenser to Radiator	8	-	70
Coolant Reservoir	10	-	89
Coolant Return Tube to Oil Filter Housing	40	30	-
Coolant Supply Tube to Oil Filter Housing	9	-	80
Cross Over to Front Cover	12	-	106
Engine Coolant Temperature (ECT) Sensor	30	22	-
Idler Pulley Bolt	27	20	-
Radiator Lower Isolator Bracket to Crossmember	8	-	70
Thermostat Housing	12	-	106
Water/Coolant Pump Bolts			
M6	12	-	106
M8	23	17	-

TORQUE SPECIFICATIONS - DIESEL

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
A/C Condenser to Radiator	5	-	44
Accessory Drive Belt Tensioner Bolt	28	21	-
Charge Air Cooler (CAC) Nut	9	-	80
Cooling Fan Bolts	6	-	53

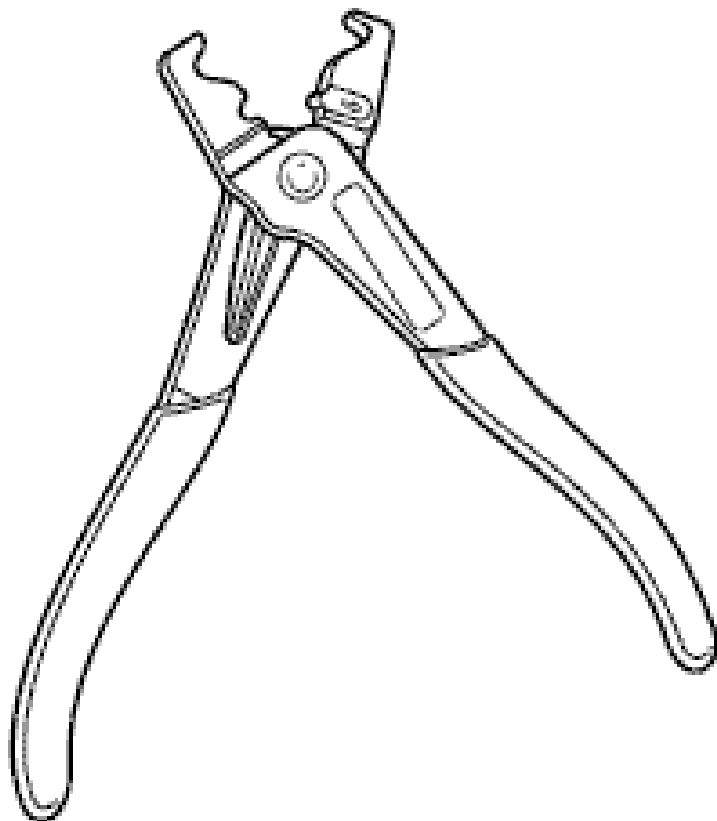
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EGR Cooler Manifold Bolts	3	-	27
EGR Tube Bolts	3	-	27
Engine Cooling Temperature (ECT) Sensor	11	-	97
Idler Pulley Bolt	50	37	-
Pressurized Coolant Bottle Bolt	8	-	71
Pressurized Coolant Bottle Nut	8	-	71
Radiator Isolator Bolts	8	-	71
Thermostat Housing Bolts	9	-	80
Water Pump Bolts	28	21	-

SPECIAL TOOLS

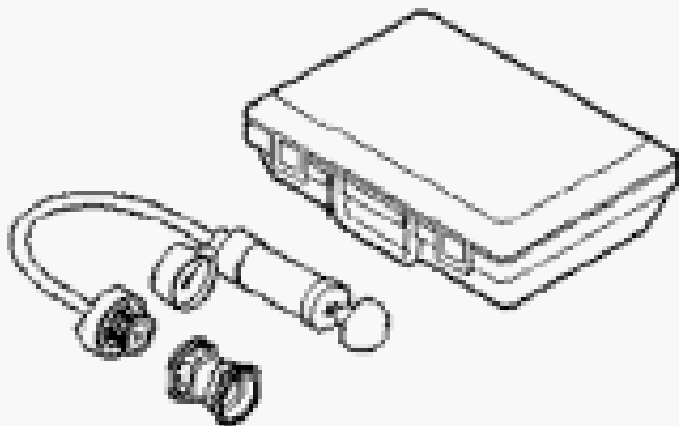
SPECIAL TOOLS



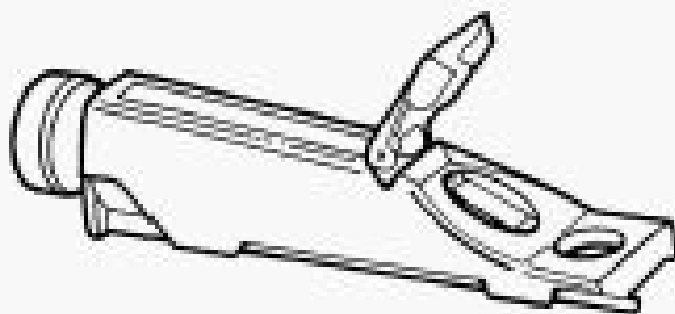
10288 - Pliers, Hose Clamp

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7700 - Tester, Cooling System
(Originally Shipped In Kit Number(s)
7700-A.)



8286 - Refractometer

ACCESSORY DRIVE

BELT, SERPENTINE

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - SERPENTINE BELT

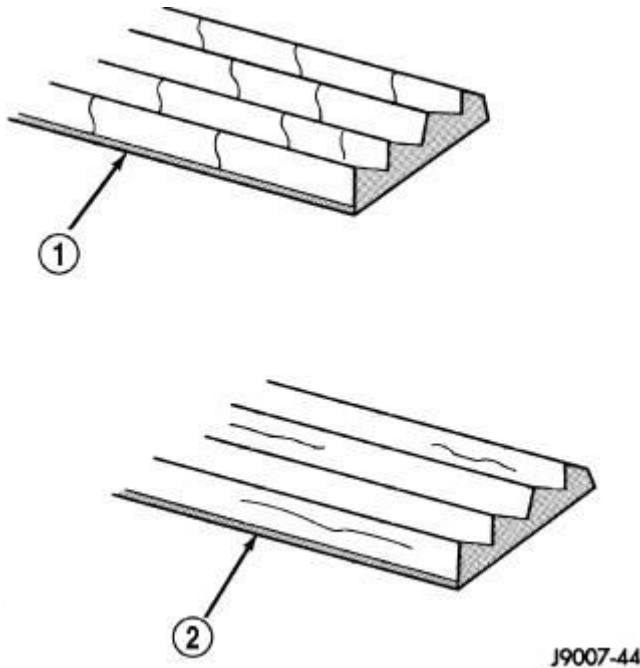


Fig. 29: Serpentine Accessory Drive Belt Wear Patterns
 Courtesy of CHRYSLER GROUP, LLC

- 1 - NORMAL CRACKS, BELT OK
 2 - ABNORMAL CRACKS, REPLACE BELT

When diagnosing serpentine drive belts, small cracks (1) that run across ribbed surface of belt from rib to rib, are considered normal. These are not a reason to replace belt. However, cracks running along a rib (not across) are **not** normal. Any belt with cracks running along a rib must be replaced. Also replace belt if it has excessive wear, frayed cords or severe glazing.

SERPENTINE DRIVE BELT DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSES	CORRECTION
BELT SEPARATION (ONE OR MORE RIBS HAS SEPARATED FROM BELT BODY)	1. Foreign objects imbedded in pulley grooves.	1. Remove foreign objects from pulley grooves. Replace belt. Correct the root cause of the foreign objects in the belt/pulley system.
	2. Fluids contacting the belt.	2. Identify the source of the fluid and correct as necessary.
RIB OR BELT WEAR	1. Pulley(s) misaligned.	1. Align pulley(s).
	2. Fluid contamination.	2. Clean pulley(s). Replace belt if necessary.
	3. Rusted pulley(s).	3. Clean rust from pulley(s).
	4. Sharp or jagged pulley groove tips.	4. Replace pulley.
	5. Rubber deteriorated.	5. Replace belt.

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LONGITUDINAL BELT CRACKING (CRACKS BETWEEN TWO RIBS)	1. Belt has clashed with the pulley grooves.	1. Replace belt. Align pulley(s), components as necessary.
	2. Pulley groove tip has worn away rubber to tensile member.	2. Replace belt.
BELT SLIPS	1. Belt slipping because of insufficient tension.	1. Replace automatic belt tensioner.
	2. Belt routed incorrectly.	2. Verify belt routing.
	3. Incorrect belt.	3. Replace belt.
	4. Belt or pulley subjected to substance (belt dressing, oil ethylene glycol) that has reduced friction.	4. Replace belt and clean pulleys.
	5. Driven component bearing failure.	5. Replace faulty component bearing.
	6. Belt glazed and hardened from heat and excessive slippage.	6. Replace belt.
"GROOVE JUMPING" (BELT DOES NOT MAINTAIN CORRECT POSITION ON PULLEY)	1. Belt tension either too high or too low.	1. Replace automatic belt tensioner.
	2. Belt routed incorrectly.	2. Verify belt routing.
	3. Incorrect belt.	3. Replace belt.
	4. Pulley(s) not within design tolerance.	4. Replace pulley(s).
	5. Foreign object(s) in grooves.	5. Remove foreign objects from grooves.
	6. Pulley misalignment.	6. Inspect pulleys and accessories. Inspect the mounting components. Apply chalk to the edges of the belt and rotate the engine 2-3 revolutions to transfer the chalk to the misaligned pulley. Adjust or replace as necessary.
	7. Belt cord line is broken.	7. Replace belt.
BELT BROKEN (NOTE: IDENTIFY AND CORRECT PROBLEM BEFORE NEW BELT IS INSTALLED)	1. Excessive tension.	1. Replace belt and automatic belt tensioner.
	2. Incorrect belt.	2. Replace belt.
	3. Tensile member damaged during belt installation.	3. Replace belt.
	4. Severe misalignment.	4. Check and replace.
	5. Bracket, pulley, or bearing failure.	5. Replace defective component and belt.
	6. Component failure/locked up pulley.	6. Inspect for smooth rotation of all component pulleys. Repair failed component.
NOISE (OBJECTIONABLE)	1. Belt slippage.	1. Replace belt or automatic belt

SQUEAL, SQUEAK, OR RUMBLE IS HEARD OR FELT WHILE DRIVE BELT IS IN OPERATION)

	tensioner.
2. Bearing noise.	2. Locate and repair.
3. Belt misalignment.	3. Replace belt.
4. Belt-to-pulley mismatch.	4. Install correct belt.

REMOVAL

2.0L DIESEL

1. Disconnect the negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
3. Remove the right side front wheel.

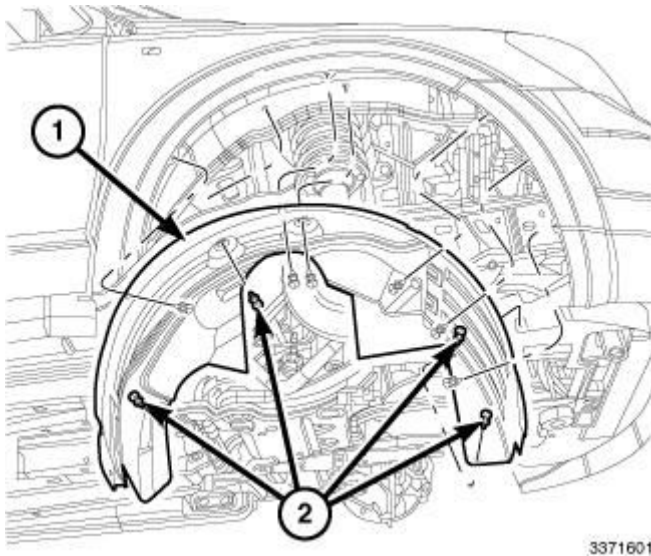


Fig. 30: Inner Fender Splash Shield
Courtesy of CHRYSLER GROUP, LLC

4. Remove fasteners and the inner fender splash shield (1).

CAUTION: Do not allow the tensioner to snap back to the unloaded position. Damage to the tensioner may occur.

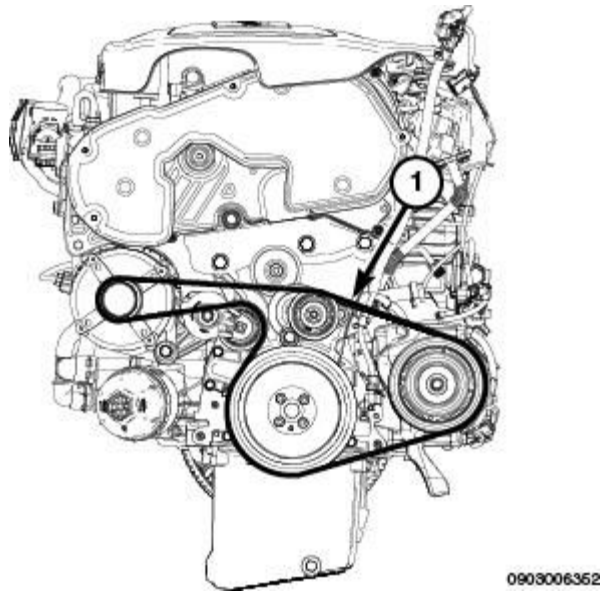


Fig. 31: Accessory Drive Belt Routing
Courtesy of CHRYSLER GROUP, LLC

5. Using a wrench, rotate the belt tensioner until the locking pin can be installed.
6. Remove the accessory drive belt (1).

2.4L

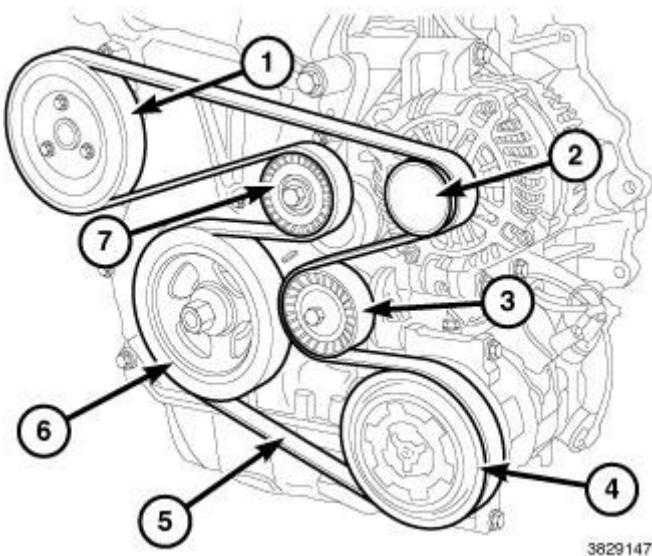


Fig. 32: Accessory Drive Belt Routing
Courtesy of CHRYSLER GROUP, LLC

1. Remove the engine cover.
2. Remove the air cleaner body

Refer to **BODY, AIR CLEANER, REMOVAL** .

3. Release the tensioner (7) by rotating the center bolt counterclockwise.
4. Remove the serpentine belt (5).
5. Slowly release the tensioner to the fully extended position.

3.2L

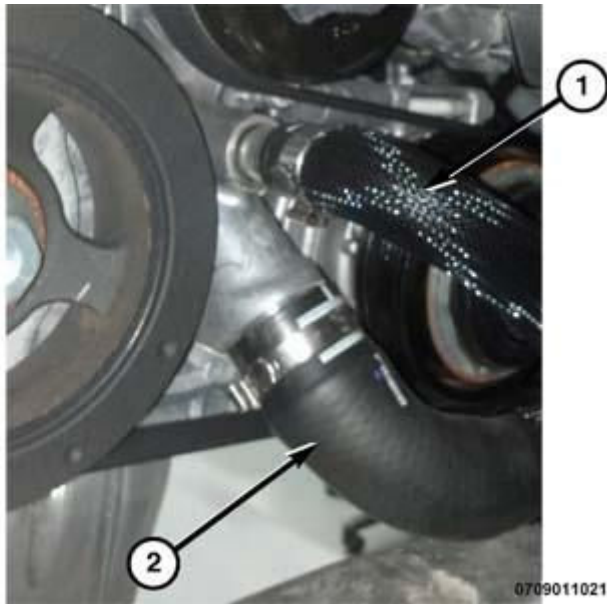
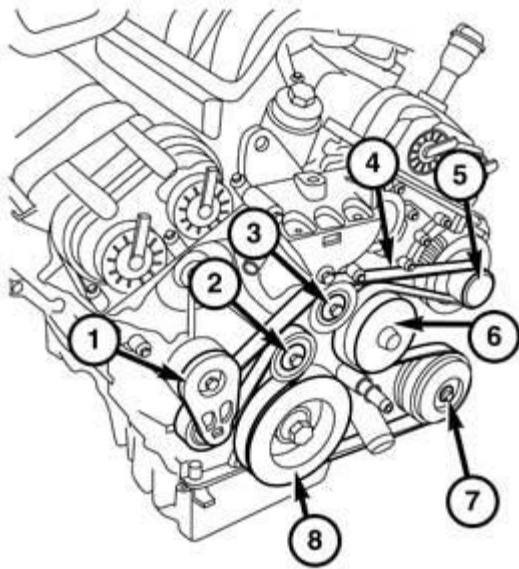


Fig. 33: Installing Lower Radiator Hose & Heater Core Return Hose
Courtesy of CHRYSLER GROUP, LLC

1. Hoist the vehicle.
2. Remove the wheel well splash shield.
3. Drain the cooling system.
4. Remove the heater hose (1) at the water pump.
5. Remove the lower radiator hose (2) at the water pump.



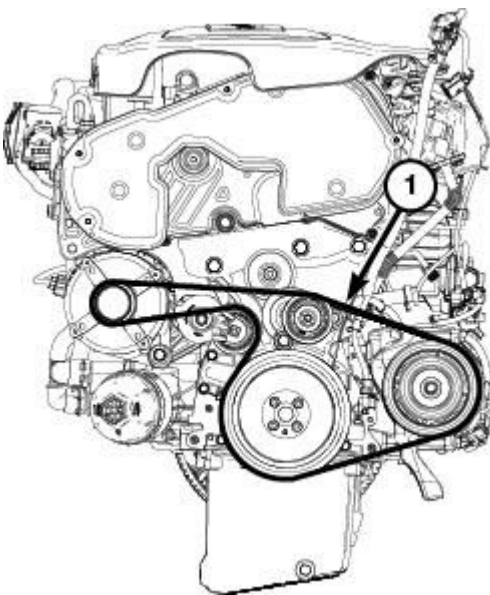
0708003948

Fig. 34: Installing Accessory Drive Belt
Courtesy of CHRYSLER GROUP, LLC

6. Release the serpentine belt tensioner (1) by rotating the pulley counterclockwise.
7. Remove the accessory drive belt (4).

INSTALLATION

2.0L DIESEL



0903006352

Fig. 35: Accessory Drive Belt Routing

Courtesy of CHRYSLER GROUP, LLC

NOTE: When installing accessory drive belt, be sure belt is routed around all accessories correctly.

1. Install belt over all pulleys.

CAUTION: Do not let the tensioner arm snap back to the freearm position, severe damage may occur to the tensioner.

2. Using a wrench, rotate the cam tensioner (5) until the locking pin can be removed from the tensioner (8).
3. Check the belt for proper alignment.

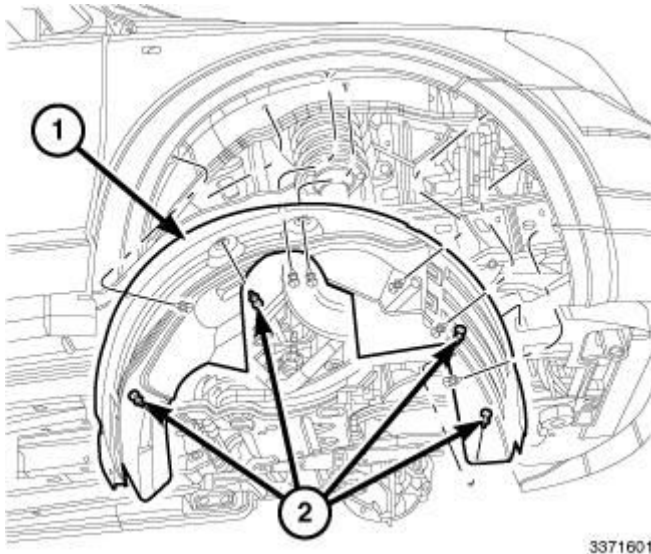


Fig. 36: Inner Fender Splash Shield
Courtesy of CHRYSLER GROUP, LLC

4. Install the lower belt splash shield (2).
5. Install the right side front wheel.
6. Lower the vehicle.
7. Connect the negative battery cable.

2.4L

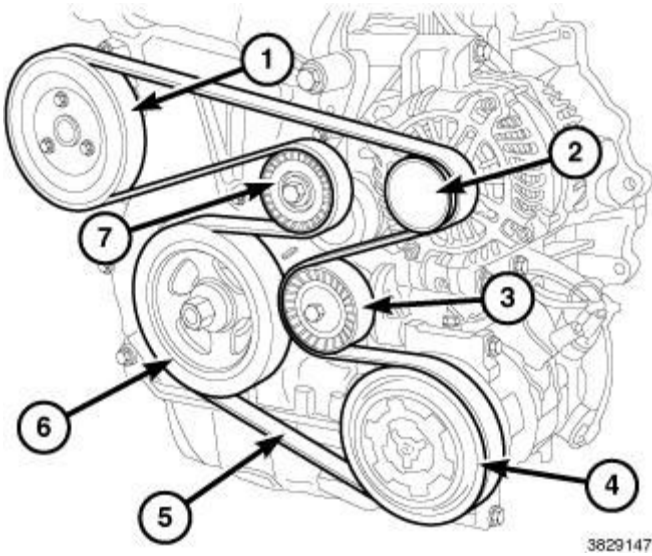
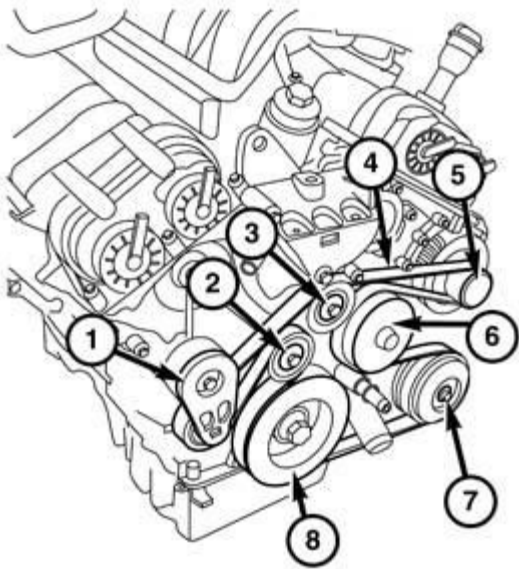


Fig. 37: Accessory Drive Belt Routing
Courtesy of CHRYSLER GROUP, LLC

1. Install the serpentine drive belt (5) by positioning the belt over all of the pulleys with the exception of the tensioner pulley.
2. Rotate the tensioner center bolt counterclockwise to allow the belt to be installed onto the tensioner pulley.
3. Slowly release the tensioner and allow it to adjust in a clockwise manner.
4. Visually inspect the belt to pulley alignment.
5. Start the engine and allow to run at idle momentarily. Shut the engine off and reinspect the belt alignment.
6. Install the air cleaner body Refer to **BODY, AIR CLEANER, INSTALLATION** .
7. Install the engine cover.

3.2L



0708003948

Fig. 38: Installing Accessory Drive Belt
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not let the tensioner arm snap back to the freearm position, severe damage may occur to the tensioner.

1. Position the serpentine belt (4) around the pulleys.
2. Rotate the tensioner (1) counterclockwise
3. Position the belt around the tensioner pulley.
4. Verify the belt is properly positioned around all of the pulleys.

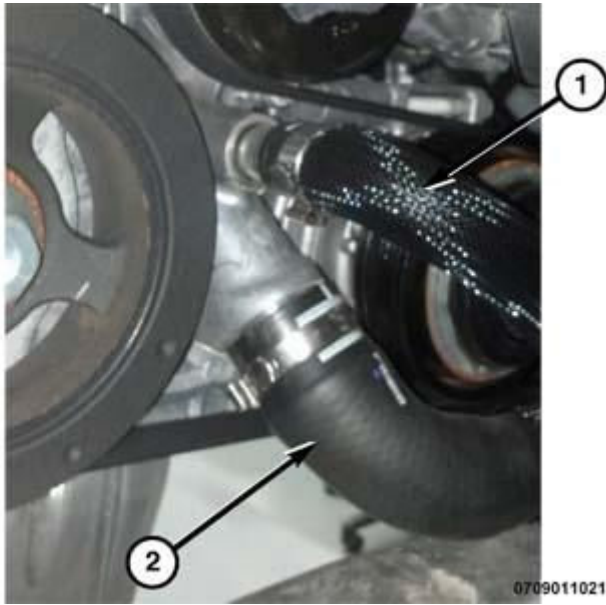


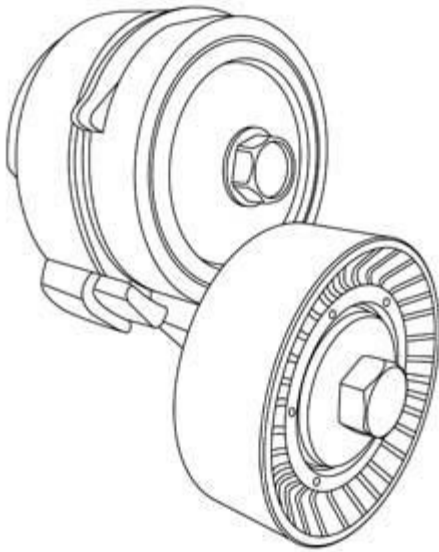
Fig. 39: Installing Lower Radiator Hose & Heater Core Return Hose
Courtesy of CHRYSLER GROUP, LLC

5. Install the lower radiator hose (2).
6. Install the heater hose (1) to the water pump
7. Install the wheel well splash shield.
8. Lower the vehicle.
9. Fill the cooling system. Refer to STANDARD PROCEDURE.

TENSIONER, BELT

DESCRIPTION

DESCRIPTION



070870807

Fig. 40: Belt Tensioner**Courtesy of CHRYSLER GROUP, LLC**

Correct drive belt tension is required to ensure optimum performance of the belt driven engine accessories. If specified tension is not maintained, belt slippage may cause; engine overheating, loss of air conditioning performance, reduced generator output rate, and greatly reduced belt life.

It is not necessary to adjust belt tension. The tensioner maintains correct accessory drive belt tension at all times.

OPERATION**OPERATION**

WARNING: The automatic belt tensioner assembly is spring loaded. Do not attempt to disassemble the tensioner assembly.

The automatic belt tensioner maintains correct belt tension using a coiled spring within the tensioner housing. The spring applies pressure to the tensioner arm pressing the arm into the belt, keeping the belt tight. The belt tensioner will maintain positive pressure on the back side of the belt at all times including engine load and engine speed changes. It is normal to observe torsional variances while the engine is running.

REMOVAL**2.0L DIESEL**

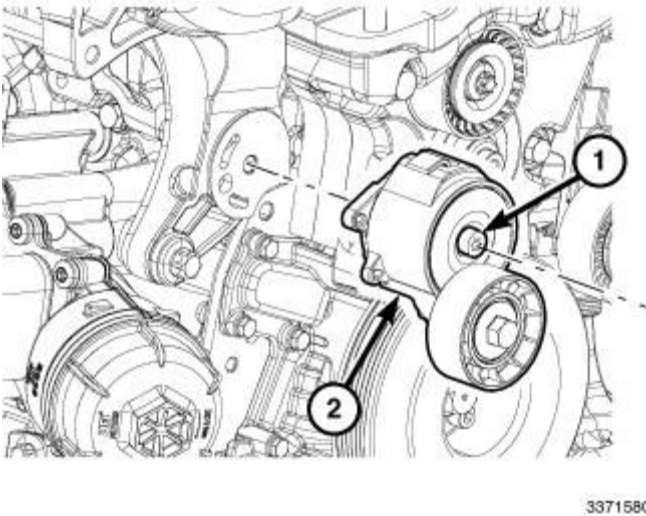


Fig. 41: Tensioner Mounting Bolt
Courtesy of CHRYSLER GROUP, LLC

1. Remove the accessory drive belt. Refer to **BELT, SERPENTINE, REMOVAL**.
2. Remove bolt (1) and the belt tensioner (2).

2.4L

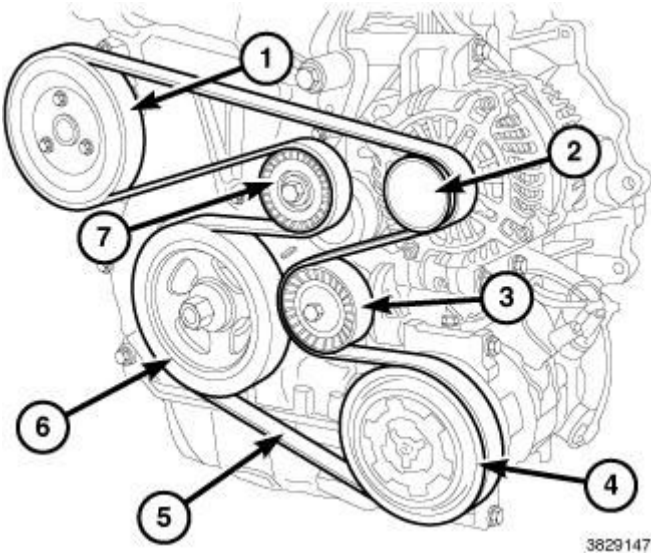


Fig. 42: Accessory Drive Belt Routing
Courtesy of CHRYSLER GROUP, LLC

1. Remove the engine cover.
2. Remove the air cleaner body

Refer to **BODY, AIR CLEANER, REMOVAL** .

3. Release the tensioner (7) by rotating the center bolt counterclockwise.
4. Remove the serpentine belt (5).
5. Slowly release the tensioner to the fully extended position.

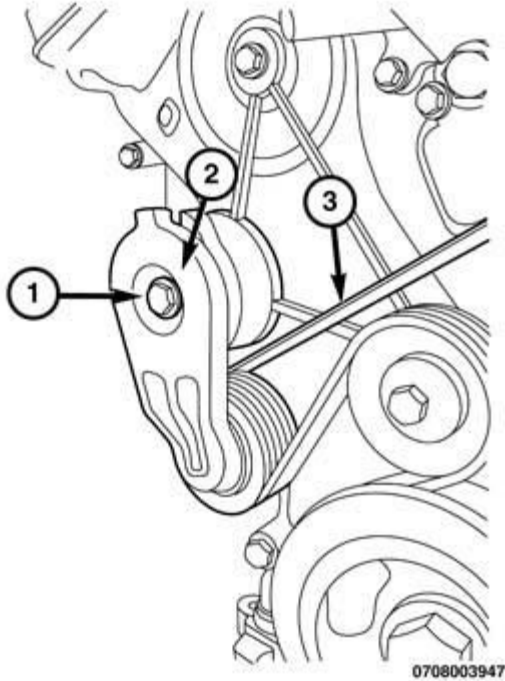
3.2L

Fig. 43: Installing Accessory Drive Belt Tensioner
Courtesy of CHRYSLER GROUP, LLC

NOTE: The belt and tensioner can be removed from the bottom of the vehicle.

1. Raise the vehicle.
2. Remove the right front wheel well inner splash shield.
3. Rotate the belt tensioner (2) counterclockwise.

CAUTION: Do not let the tensioner arm snap back to the freearm position, severe damage may occur to the tensioner.

4. Remove the serpentine belt (3).
5. Remove the tensioner mounting bolt (1).
6. Remove the tensioner from the vehicle.

INSTALLATION**2.0L DIESEL**

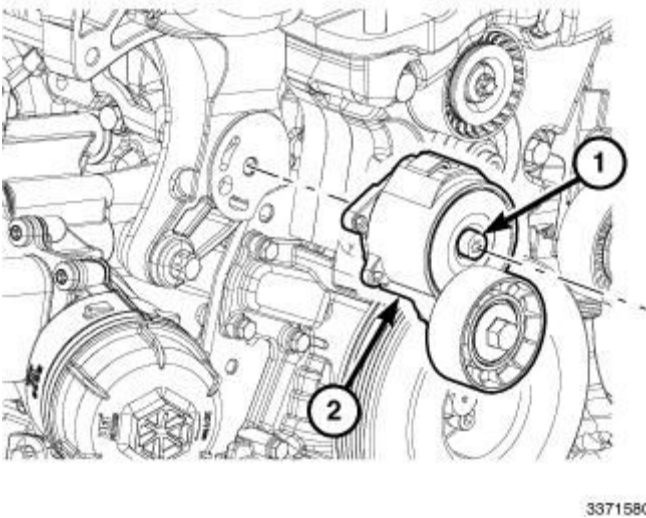


Fig. 44: Tensioner Mounting Bolt
Courtesy of CHRYSLER GROUP, LLC

1. Install the belt tensioner (2). Tighten bolt (1) to 50 N.m (37 ft. lbs.).
2. Install the accessory drive belt. Refer to **BELT, SERPENTINE, INSTALLATION**.

2.4L

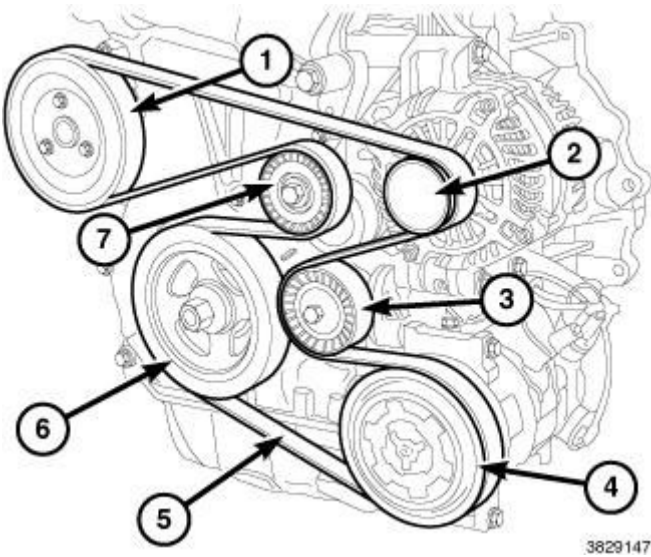


Fig. 45: Accessory Drive Belt Routing
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not let the tensioner arm snap back to the freearm position, severe damage may occur to the tensioner.

1. Position the tensioner into place through the wheel well opening.

2. Loosely install the lower bolt.
3. Lower the vehicle.
4. Install the upper bolt. Tighten the upper and lower bolts to 28 N.m (21 ft. lbs)
5. Install the accessory drive belt. Refer to **BELT, SERPENTINE, INSTALLATION**.
6. Install the inner wheel splash shield.
7. Install the right front wheel.
8. Connect the negative battery.
9. Install the engine cover.

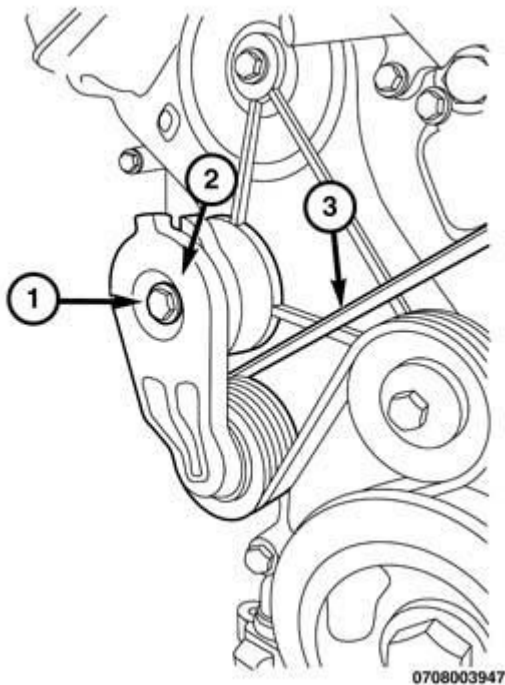
3.2L

Fig. 46: Installing Accessory Drive Belt Tensioner
Courtesy of CHRYSLER GROUP, LLC

1. Position the tensioner (2) into position.
2. Align the belt tensioner tabs to the holes on the accessory bracket.
3. Install the mounting bolt (1). Tighten bolt (1) to 50 N.m (37 ft. lbs.).
4. Rotate the tensioner pulley bolt (2) counterclockwise and install the accessory drive belt (3).

PULLEY, IDLER**REMOVAL****2.0L DIESEL**

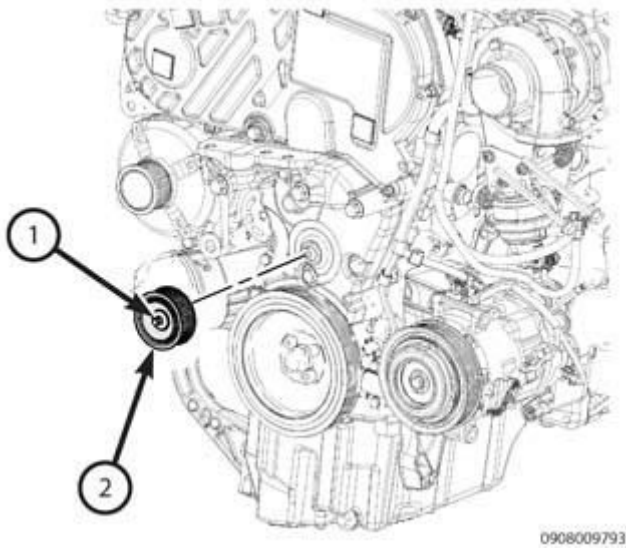


Fig. 47: Idler Pulley - 2.0L Diesel
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the accessory drive belt. Refer to **BELT, SERPENTINE, REMOVAL**.
3. From under the vehicle, remove bolt (1) and the idler pulley (2).

2.4L

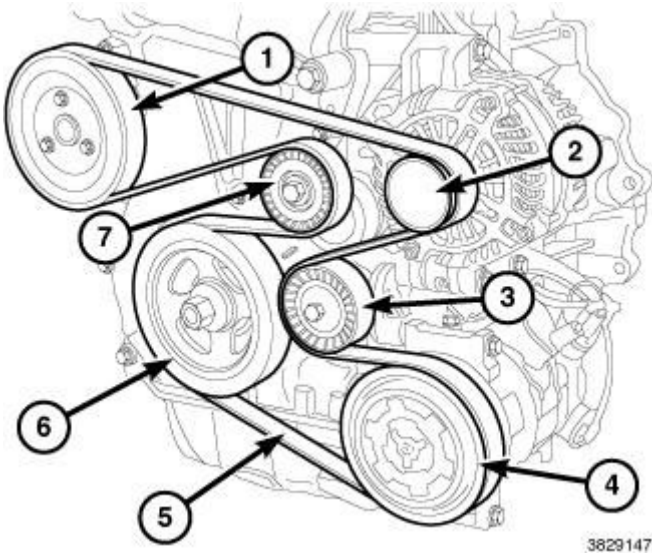


Fig. 48: Accessory Drive Belt Routing
Courtesy of CHRYSLER GROUP, LLC

1. Remove the serpentine belt (5).
2. Remove the idler pulley (3) center bolt.
3. Remove the idler pulley.

3.2L

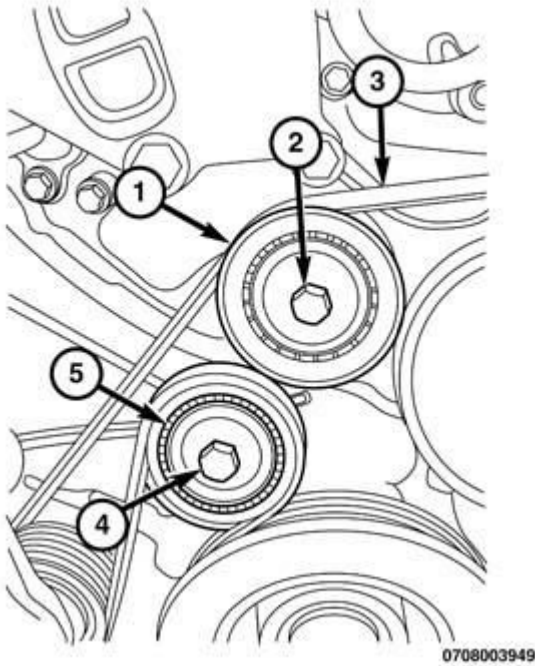


Fig. 49: Installing Accessory Idler Pulley
Courtesy of CHRYSLER GROUP, LLC

1. Remove the accessory drive belt (5). Refer to **BELT, SERPENTINE, REMOVAL**.
2. If Required, remove the upper idler pulley (1) center bolt (2).
3. If Required, remove the lower idler pulley (5) center bolt (4).
4. Remove the pulley from the cover.

INSTALLATION

2.0L DIESEL

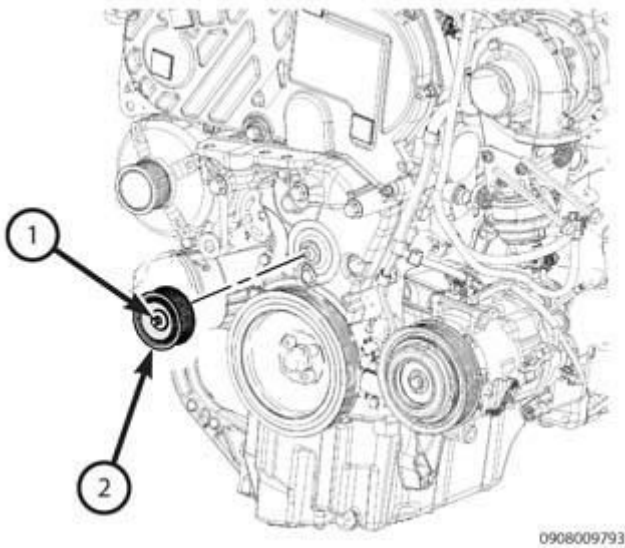


Fig. 50: Idler Pulley - 2.0L Diesel
Courtesy of CHRYSLER GROUP, LLC

1. Install the idler pulley (2) from under the vehicle. Tighten bolt (1) to 28 N.m (21 ft. lbs.).
2. Install the accessory drive belt. Refer to **BELT, SERPENTINE, REMOVAL**.
3. Connect the negative battery cable.

2.4L

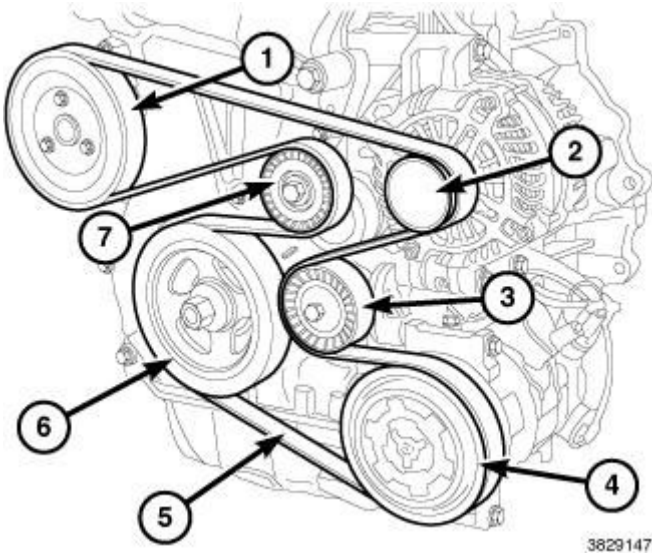


Fig. 51: Accessory Drive Belt Routing
Courtesy of CHRYSLER GROUP, LLC

1. Position the idler pulley (3) into position.
2. Install the center bolt. Tighten the bolt to 28 N.m (21 ft. lbs).
3. Install the accessory drive belt (5). Refer to **BELT, SERPENTINE, INSTALLATION**.

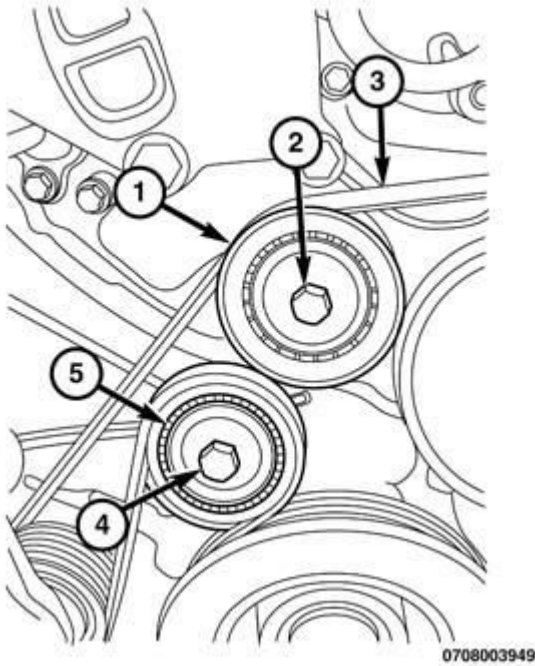
3.2L

Fig. 52: Installing Accessory Idler Pulley
Courtesy of CHRYSLER GROUP, LLC

1. If removed, position the lower idler pulley (5) into position.
2. If removed, position the upper idler pulley (2) into position.
3. Install the center bolt. Tighten the bolt to 27 N.m (20 ft. lbs.).
4. Install the accessory drive belt (3). Refer to **BELT, SERPENTINE, INSTALLATION**.

ENGINE**BOTTLE, PRESSURIZED COOLANT****REMOVAL****DIESEL**

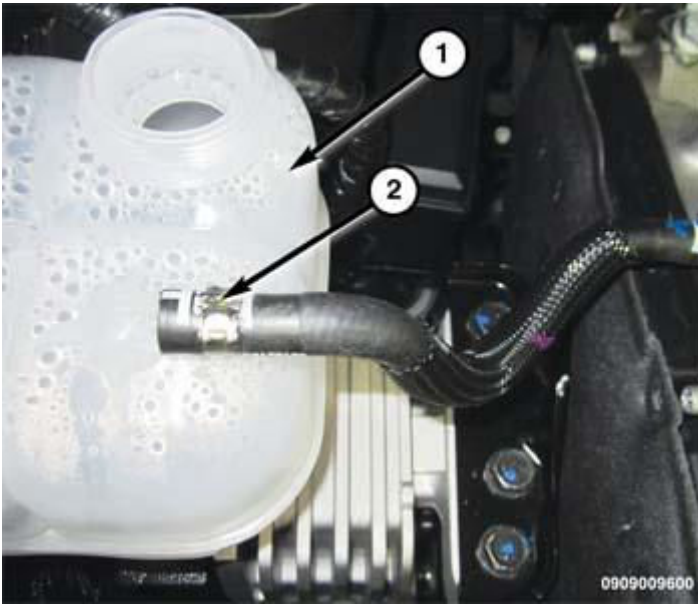


Fig. 53: Coolant Bottle & Hose
Courtesy of CHRYSLER GROUP, LLC

WARNING: Do not remove cylinder block drain plugs, pressure caps, or loosen radiator draincock with system hot and under pressure. Serious burns from coolant can occur.

1. Disconnect the negative battery cable.
2. Drain the coolant level below the pressurized coolant bottle. Refer to **STANDARD PROCEDURE**.
3. Remove the coolant hose (2) from top of coolant bottle (1).

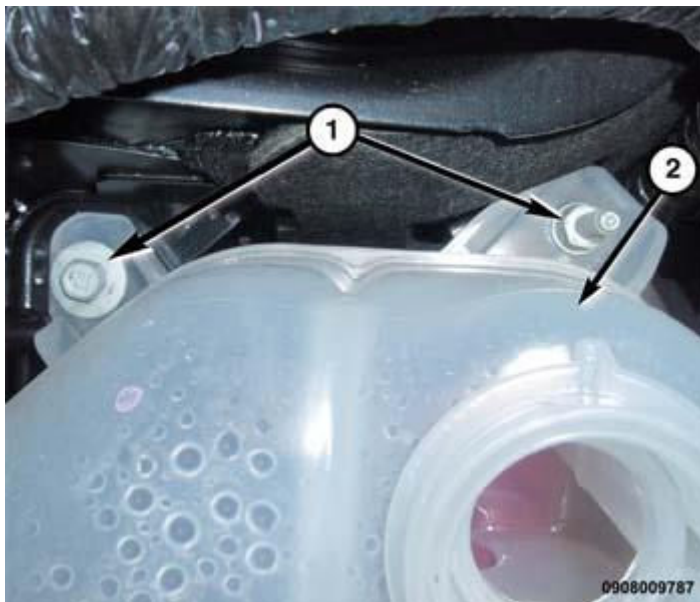


Fig. 54: Coolant Bottle & Fasteners

Courtesy of CHRYSLER GROUP, LLC

4. Remove the bolt and nut (1) securing the coolant bottle (2).

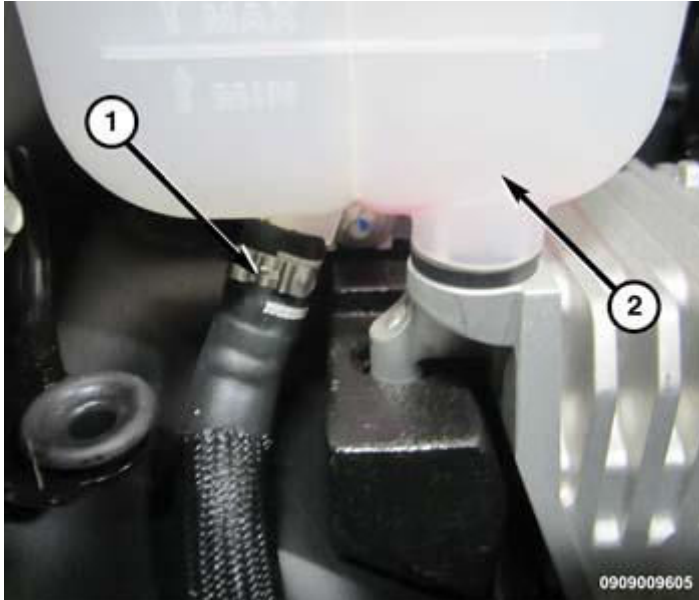


Fig. 55: Coolant Bottle & Lower Hose
Courtesy of CHRYSLER GROUP, LLC

5. Remove lower coolant hose (1) and the pressurized coolant bottle (2) from vehicle.

GAS

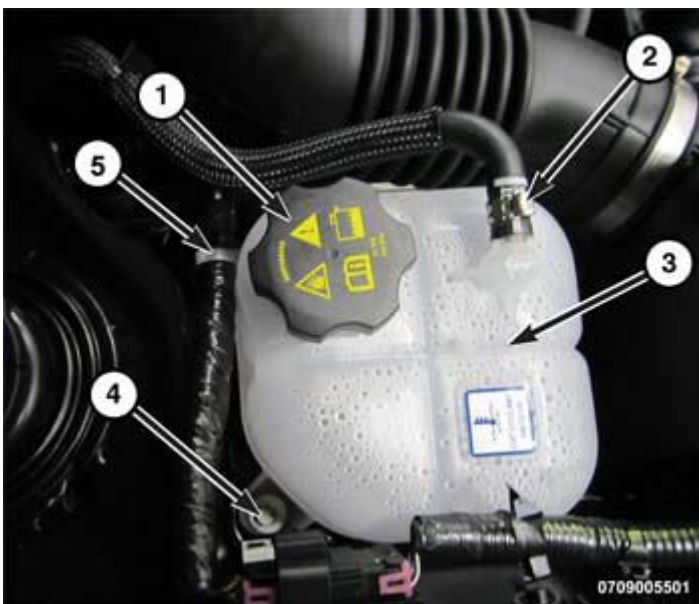


Fig. 56: Coolant Bottle & Components
Courtesy of CHRYSLER GROUP, LLC

WARNING: Do not remove cylinder block drain plugs, pressure caps, or loosen radiator draincock with system hot and under pressure. Serious burns from coolant can occur.

1. Disconnect the negative battery cable.
2. Drain the coolant level below the coolant recovery bottle. Refer to **STANDARD PROCEDURE**.
3. Remove the air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL** for 2.4L or **BODY, AIR CLEANER, REMOVAL** for 3.2L.
4. Remove the return hose (2).
5. Remove the bolt (4).
6. Remove the body harness retainer (5) from the stud bolt.
7. Remove the stud bolt.
8. Remove the lower heater supply hose.
9. Remove the coolant recovery bottle from the strut tower.

INSTALLATION

DIESEL

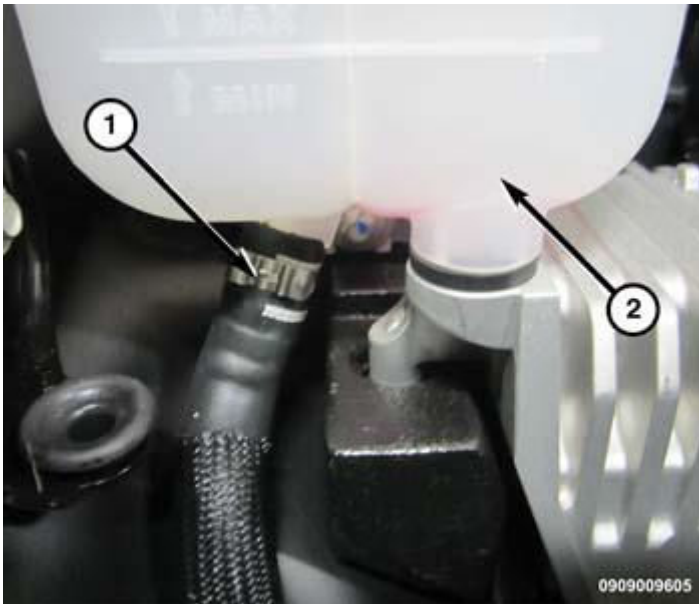


Fig. 57: Coolant Bottle & Lower Hose
Courtesy of CHRYSLER GROUP, LLC

1. Install the lower coolant hose (1) to pressurized coolant bottle (2).

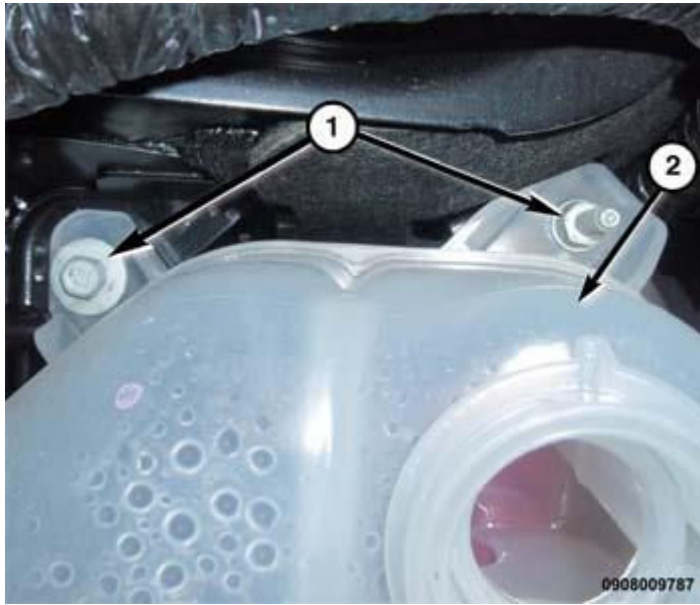


Fig. 58: Coolant Bottle & Fasteners
Courtesy of CHRYSLER GROUP, LLC

2. Install the pressurized coolant bottle (2).
 - Tighten bolt (1) to 8 N.m (70 in. lbs.).
 - Tighten nut to 8 N.m (70 in. lbs.).

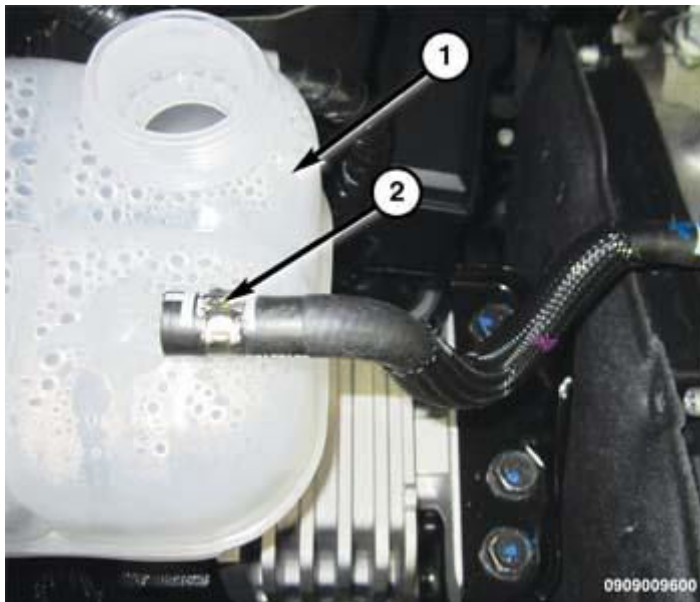


Fig. 59: Coolant Bottle & Hose
Courtesy of CHRYSLER GROUP, LLC

3. Install the coolant return hose (2) to top of pressurized coolant bottle (1).
4. Fill the cooling system. Refer to **STANDARD PROCEDURE**.

5. Connect the negative battery cable.

GAS

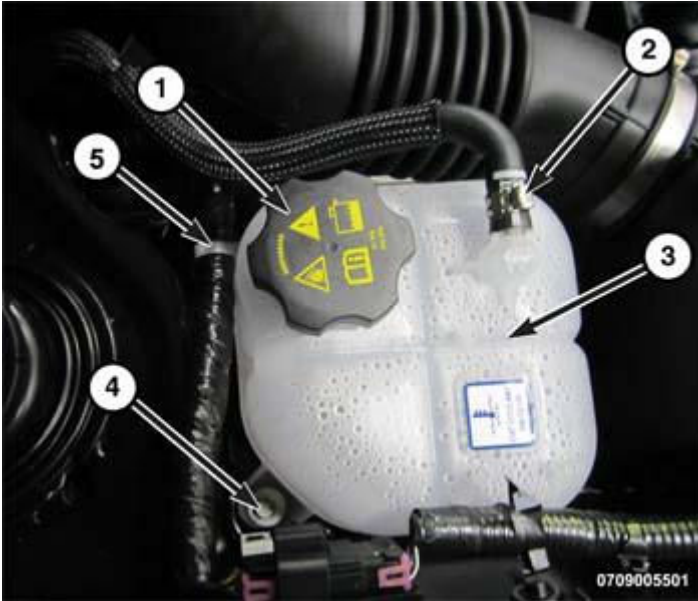


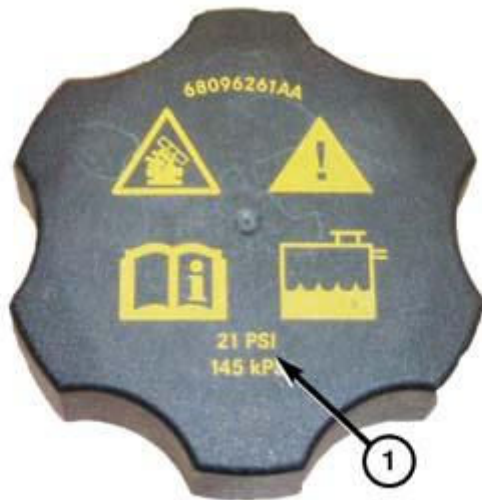
Fig. 60: Coolant Bottle & Components
Courtesy of CHRYSLER GROUP, LLC

1. Install the lower heater supply hose. Tighten the clamp.
2. Position the coolant bottle onto the rubber mount located on the right upper engine mount.
3. Install the bolt (4) and stud bolt. Tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS - GAS**.
4. Install the body harness retainer (5) onto the stud bolt.
5. Install the return hose (2). Tighten the clamp.
6. Fill the cooling system. Refer to **STANDARD PROCEDURE**.

CAP, RADIATOR

DESCRIPTION

DESCRIPTION



0911004876

Fig. 61: Radiator Cap**Courtesy of CHRYSLER GROUP, LLC**

All cooling systems are equipped with a pressure cap. For 2013 diesel engines, the pressure cap is located on top of the pressurized coolant bottle. The cap releases pressure at some point within a range of 145 kPa (21 psi). The pressure relief point (in pounds) is engraved on top of the cap.

The cooling system will operate at pressures slightly above atmospheric pressure. This results in a higher coolant boiling point allowing increased radiator cooling capacity. The cap contains a spring-loaded pressure relief valve. This valve opens when system pressure reaches the release range of 145 kPa (21 psi).

Two O-ring gasket seals the pressurized coolant bottle. This is done to maintain vacuum during coolant cool-down and to prevent leakage when system is under pressure.

DIAGNOSIS AND TESTING

RADIATOR CAP

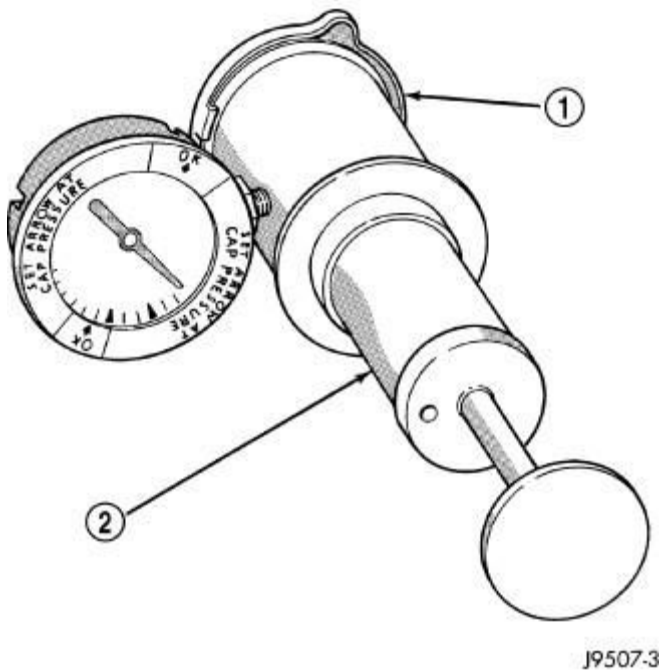


Fig. 62: Pressure Testing Radiator Pressure Cap-Typical
Courtesy of CHRYSLER GROUP, LLC

1 - PRESSURE CAP

2 - TYPICAL COOLING SYSTEM PRESSURE TESTER

Remove the cap from the radiator. Be sure that the sealing surfaces are clean. Moisten the rubber gasket with water and install the cap on the pressure tester (special tool #7700, Tester, Cooling System) or an equivalent.

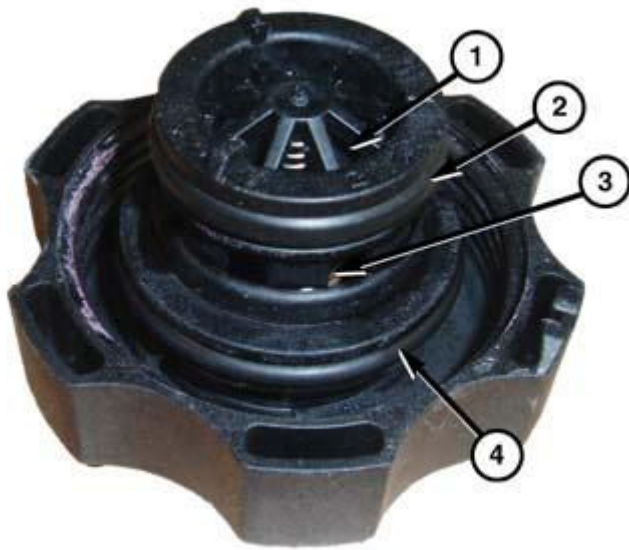
Using the cooling system tester, bring the pressure up to the pressure prescribed on cap. If the pressure cap fails to hold pressure, replace the cap. Refer to the following **CAUTION**.

The pressure cap may test properly while positioned on tool (special tool #7700, Tester, Cooling System) (or equivalent). It may not hold pressure or vacuum when installed on the radiator. If so, inspect the radiator filler neck and radiator cap's top gasket for damage. Also inspect for dirt or distortion that may prevent the cap from sealing properly.

CAUTION: Radiator pressure testing tools are very sensitive to small air leaks which will not cause cooling system problems. A pressure cap that does not have a history of coolant loss should not be replaced just because it leaks slowly when tested with this tool. Add water to tool. Turn tool upside down and recheck pressure cap to confirm that cap needs replacement.

INSPECTION

INSPECTION



0911004877

Fig. 63: Radiator Cap Components

Courtesy of CHRYSLER GROUP, LLC

- | |
|---|
| 1 - VENT VALVE
2 - LOWER O-RING SEAL
3 - MAIN SPRING
4 - UPPER O-RING SEAL |
|---|

The vent valve at bottom of cap should closed. A slight downward pull on the vent valve should open it. If the rubber gasket has swollen and prevents vent valve from opening, replace cap.

Hold cap at eye level, upside down. If any light can be seen between vent valve and rubber gasket, replace cap. A replacement cap must be the type designed for a coolant reserve/overflow system with a completely sealed diaphragm spring and a rubber gasket. This gasket is used to seal to radiator filler neck top surface.

COOLANT

DESCRIPTION

DESCRIPTION

CAUTION: Mopar® Antifreeze/Coolant, is a Lifetime of Engine Formula. IT MAY NOT BE MIXED WITH ANY OTHER TYPES OF ANTIFREEZE. Mixing of coolants other than specified (non-OAT or other OAT), may result in engine damage that may not be covered under the new vehicle warranty, and decreased corrosion protection.

To find the coolant needed. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** .

WARNING: ANTIFREEZE IS AN ETHYLENE-GLYCOL BASE COOLANT AND IS HARMFUL IF SWALLOWED OR INHALED. IF SWALLOWED, DRINK TWO GLASSES OF WATER AND INDUCE VOMITING. IF INHALED, MOVE TO FRESH AIR AREA. SEEK MEDICAL ATTENTION IMMEDIATELY. DO NOT STORE IN OPEN OR UNMARKED CONTAINERS. WASH SKIN AND CLOTHING THOROUGHLY AFTER COMING IN CONTACT WITH ETHYLENE-GLYCOL. KEEP OUT OF REACH OF CHILDREN. DISPOSE OF GLYCOL BASE COOLANT PROPERLY, CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA. DO NOT OPEN A COOLING SYSTEM WHEN THE ENGINE IS AT OPERATING TEMPERATURE OR HOT UNDER PRESSURE, PERSONAL INJURY CAN RESULT. AVOID RADIATOR COOLING FAN WHEN ENGINE COMPARTMENT RELATED SERVICE IS PERFORMED, PERSONAL INJURY CAN RESULT.

CAUTION: Mixing of engine coolant (antifreeze) other than specified Organic Additive Technology (OAT) engine coolant (antifreeze), may result in engine damage and may decrease corrosion protection. Organic Additive Technology (OAT) engine coolant is different and should not be mixed with Hybrid Organic Additive Technology (HOAT) engine coolant (antifreeze). If a non-OAT engine coolant (antifreeze) is introduced into the cooling system in an emergency, it should be replaced with the specified engine coolant (antifreeze) as soon as possible.

The cooling system is designed around the coolant. The coolant must accept heat from engine metal, in the cylinder head area near the exhaust valves and engine block. Then coolant carries the heat to the radiator where the tube/fin radiator can transfer the heat to the air.

The use of aluminum cylinder blocks, cylinder heads, and water pumps requires special corrosion protection. Mopar® Antifreeze/Coolant, or the equivalent ethylene-glycol base coolant with organic corrosion inhibitors (called OAT, for Organic Additive Technology) is recommended. This coolant offers the best engine cooling without corrosion when mixed with 50% ethylene-glycol and 50% distilled water to obtain a freeze point of -37°C (-35°F). If it loses color or becomes contaminated, drain, flush, and replace with fresh properly mixed coolant solution.

COOLANT PERFORMANCE

CAUTION: Mixing of engine coolant (antifreeze) other than specified Organic Additive Technology (OAT) engine coolant (antifreeze), may result in engine damage and may decrease corrosion protection. Organic Additive Technology (OAT) engine coolant is different and should not be mixed with Hybrid Organic Additive Technology (HOAT) engine coolant (antifreeze). If a non-OAT engine coolant (antifreeze) is introduced into the cooling system in an emergency, it should be replaced with the specified engine coolant (antifreeze) as soon as possible.

CAUTION: Richer antifreeze mixtures cannot be measured with normal field equipment and can cause problems associated with 100 percent ethylene-glycol.

The required ethylene-glycol (antifreeze) and water mixture depends upon climate and vehicle operating conditions. The coolant performance of various mixtures follows:

Pure Water- Water can absorb more heat than a mixture of water and ethylene-glycol, but this is not suitable for use in a cooling system. Water also freezes at a higher temperature, boils at a lower temperature and allows corrosion.

100 percent Ethylene-Glycol - The corrosion inhibiting additives in ethylene-glycol need the presence of water to dissolve. Without water, additives form deposits in system. These act as insulation causing temperature to rise to as high as 149°C (300°F). This temperature is hot enough to melt plastic and soften solder. The increased temperature can result in engine detonation. In addition, 100 percent ethylene-glycol freezes at -22°C (-8°F).

50/50 Ethylene-Glycol and Water - Is the recommended mixture, it provides protection against freezing to -37°C (-34°F). The antifreeze concentration **must always** be a minimum of 44 percent, year-round in all climates. If percentage is lower, engine parts may be eroded by cavitation. Maximum protection against freezing is provided with a 68 percent antifreeze concentration, which prevents freezing down to -67.7°C (-90°F). A higher percentage will freeze at a warmer temperature. Also, a higher percentage of antifreeze can cause the engine to overheat because specific heat of antifreeze is lower than that of water.

OAT coolant is a **Life of the Engine** coolant. Maintenance of the cooling system is not required unless a repair has been made with loss of coolant or the coolant has been contaminated.

COOLANT SELECTION AND ADDITIVES

The use of aluminum cylinder blocks, cylinder heads and water pumps requires special corrosion protection. Only Mopar® Antifreeze/Coolant (glycol base coolant with corrosion inhibitors called OAT, for Organic Additive Technology) is recommended. This coolant offers the best engine cooling without corrosion when mixed with 50% distilled water to obtain to obtain a freeze point of -37°C (-35°F). If it loses color or becomes contaminated, drain, flush, and replace with fresh properly mixed coolant solution.

CAUTION: Do not use coolant additives that are claimed to improve engine cooling.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - COOLANT CONCENTRATION TESTING

Check coolant concentration when any additional coolant is added to the system, or after a coolant drain, flush and refill. Use of a hydrometer or Refractometer Tool (special tool #8286, Refractometer), refractometer can be used to test coolant concentration.

A hydrometer tests the amount of glycol in a mixture by measuring the specific gravity of the mixture. The

higher the concentration of ethylene glycol, the larger the number of balls that will float, and the higher the freeze protection (up to a maximum of 60% by volume glycol).

A Refractometer Tool (special tool #8286, Refractometer) tests the amount of glycol in a coolant mixture by measuring the amount a beam of light bends as it passes through the fluid.

Some coolant manufacturers use other types of glycols into their coolant formulations. Propylene glycol is the most common new coolant. However, propylene glycol based coolants do not provide the same freezing protection and corrosion protection and are not recommended.

CAUTION: Do not mix types of coolant - corrosion protection will be severely reduced.

FAN, COOLING

REMOVAL

DIESEL

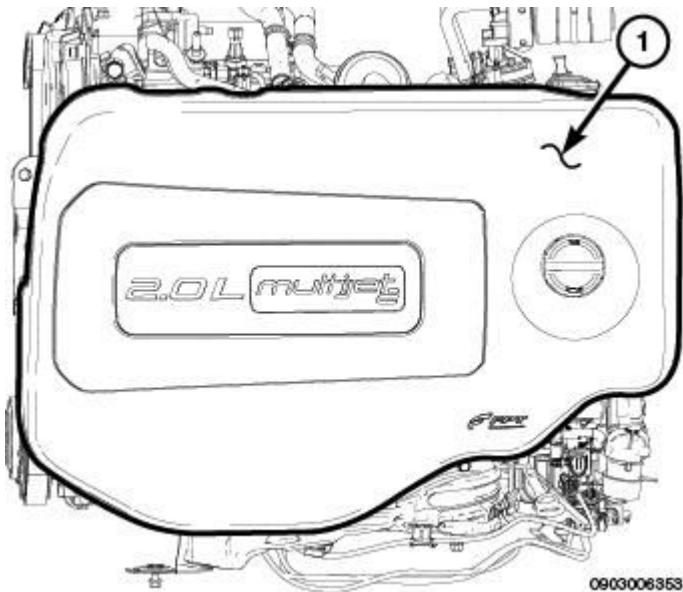


Fig. 64: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

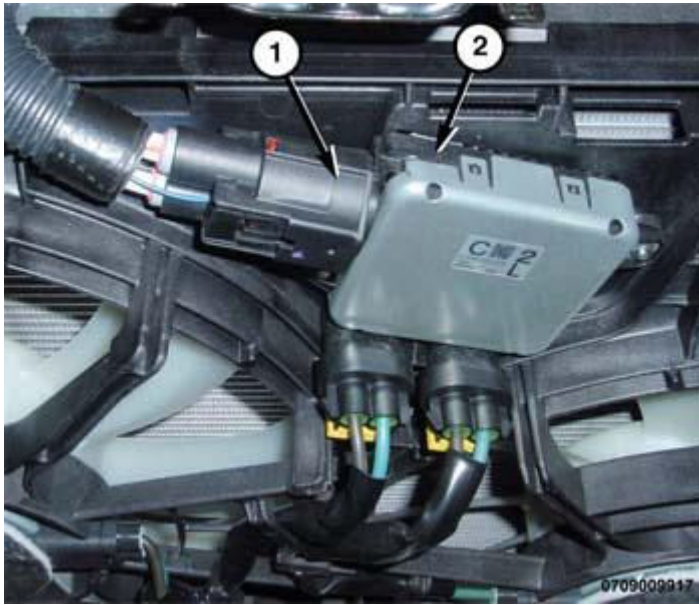


Fig. 65: Cooling Fan Module & Harness Connector
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the cooling fan module harness connector (1).

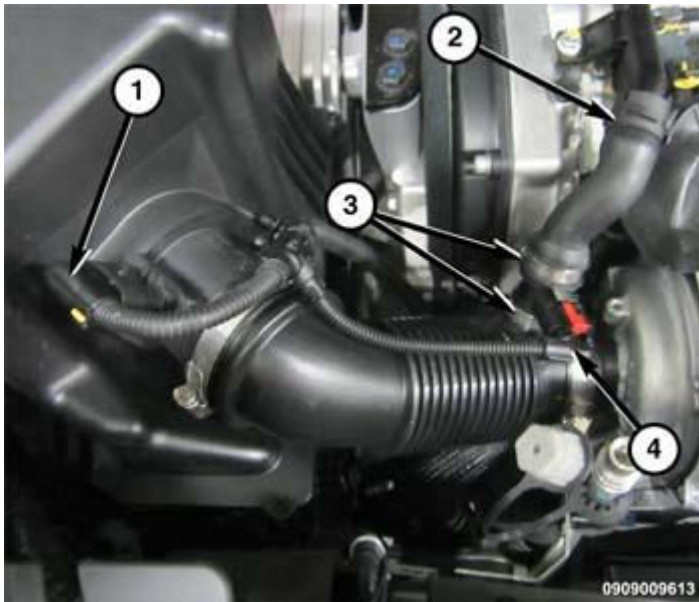


Fig. 66: MAF Sensor Harness Connector
Courtesy of CHRYSLER GROUP, LLC

4. Remove the breather hose (2) from breather tube.
5. Disconnect the Closed Crankcase Ventilation (CCV) heater wire harness connector (4).

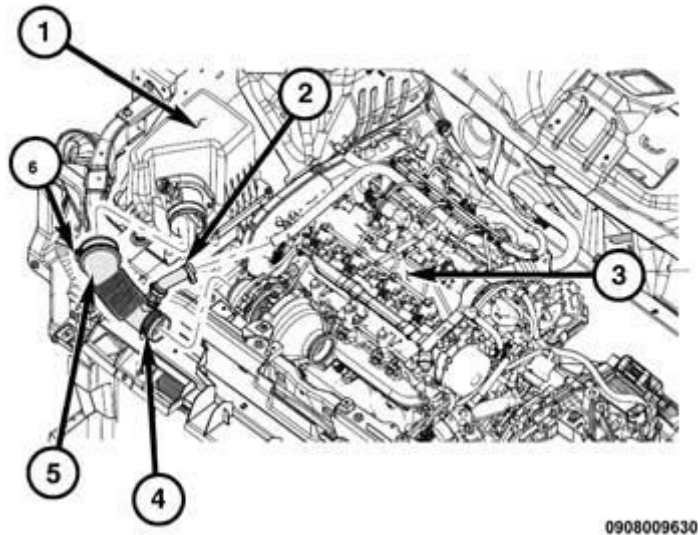


Fig. 67: Turbocharger Inlet Hose & Clamp
Courtesy of CHRYSLER GROUP, LLC

6. Loosen clamps (4, 6) and remove the turbocharger inlet tube (5).
7. Remove the bolts that secure the cooling fan assembly to the radiator.
8. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.

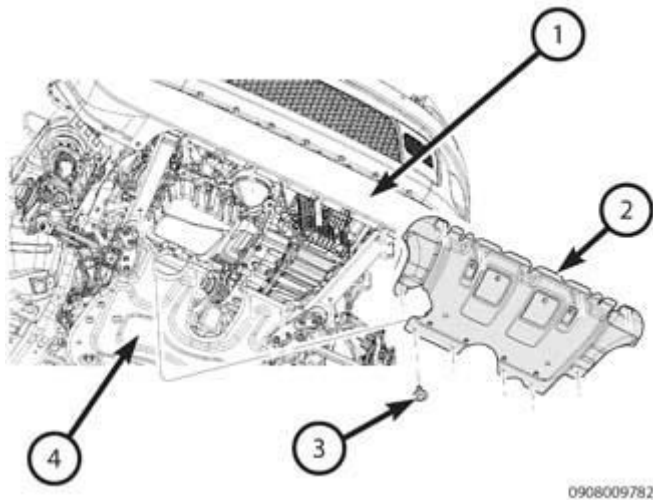


Fig. 68: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

9. Remove bolts (3) and the belly pan (2).

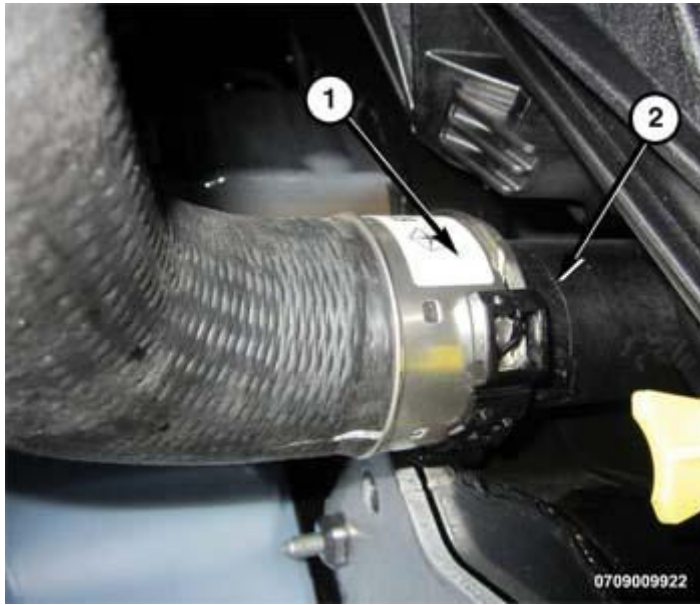


Fig. 69: Left Charge Air Cooler (CAC) & Hose
Courtesy of CHRYSLER GROUP, LLC

10. Disconnect the left Charge Air Cooler (CAC) hose (1) from cooler (2).

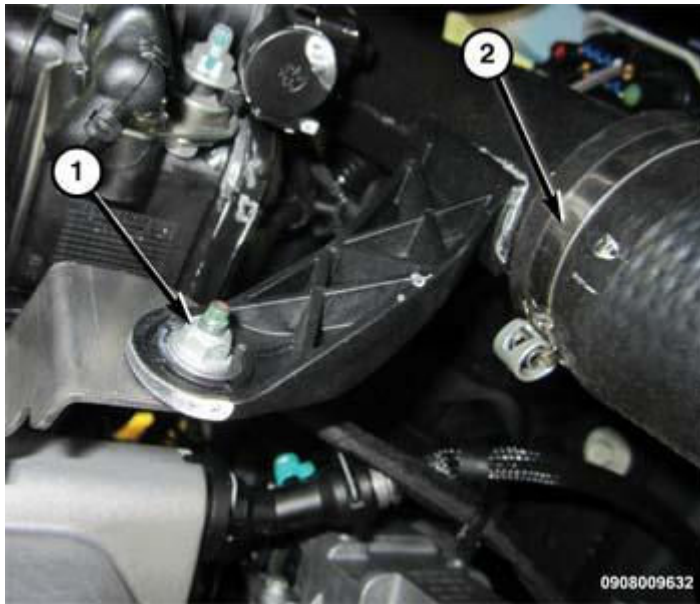


Fig. 70: CAC Tube-To-Engine Nut
Courtesy of CHRYSLER GROUP, LLC

11. Remove nut (1) securing CAC tube (2) to engine.
12. Lower the vehicle.

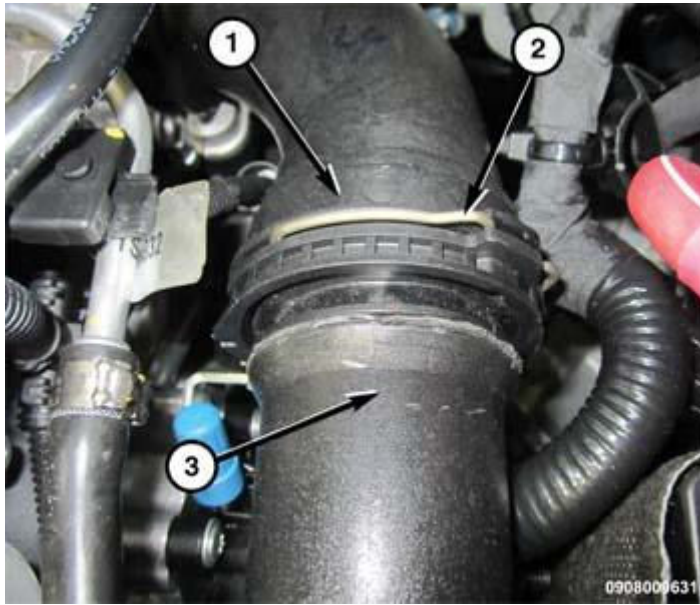


Fig. 71: EGR Air Flow Control Valve Inlet Tube, CAC Tube Wire Retainer & CAC Hose
Courtesy of CHRYSLER GROUP, LLC

13. Unlock CAC tube wire retainer (2).
14. Separate the CAC hose (3) at from EGR air flow control valve inlet tube (1).
15. Raise the vehicle.
16. Using care, lift the fan slightly upward.

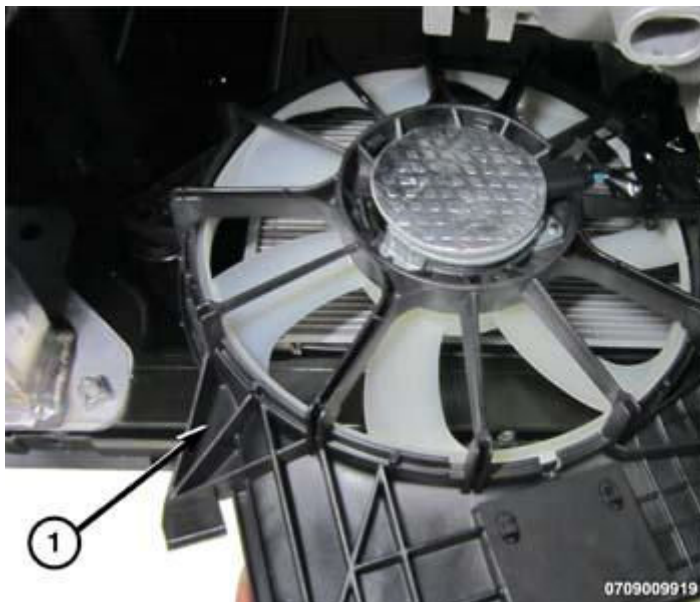


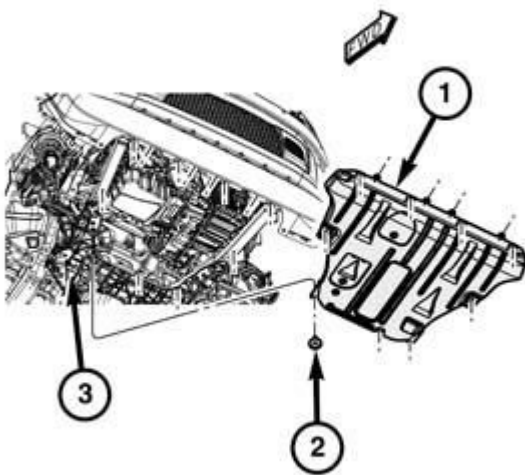
Fig. 72: Cooling Fan Assembly
Courtesy of CHRYSLER GROUP, LLC

17. Tilt the cooling fan down to allow for the upper mounting tab to clear the upper radiator hose.

18. Remove the fan assembly from the vehicle.

GAS

1. Disconnect the negative battery cable.
2. Remove the engine cover.
3. Raise the vehicle.



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Fig. 73: Removing/Installing Belly Pans
Courtesy of CHRYSLER GROUP, LLC

4. Remove the lower belly pan (1).
5. Partially drain the cooling system.

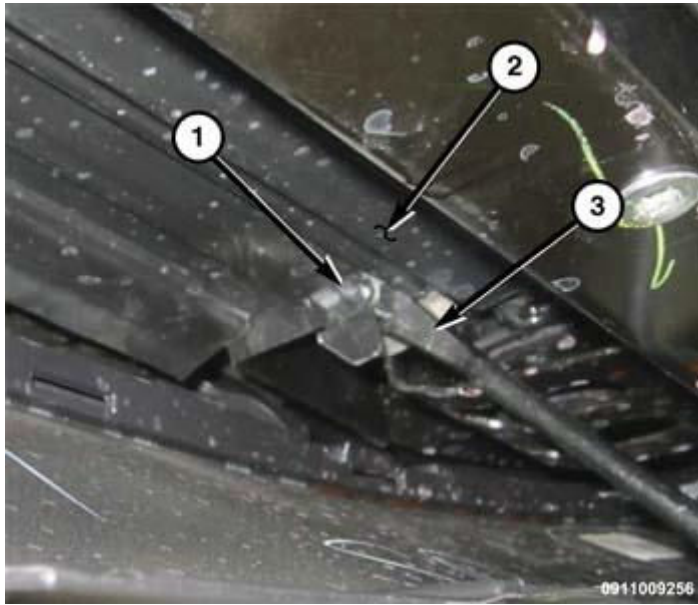


Fig. 74: Push Pins, Side Close Out Deflector & Lower Deflector
Courtesy of CHRYSLER GROUP, LLC

6. Remove the push pins (1) that secure the side close out deflector from the lower deflector (2).
7. Lower the vehicle.

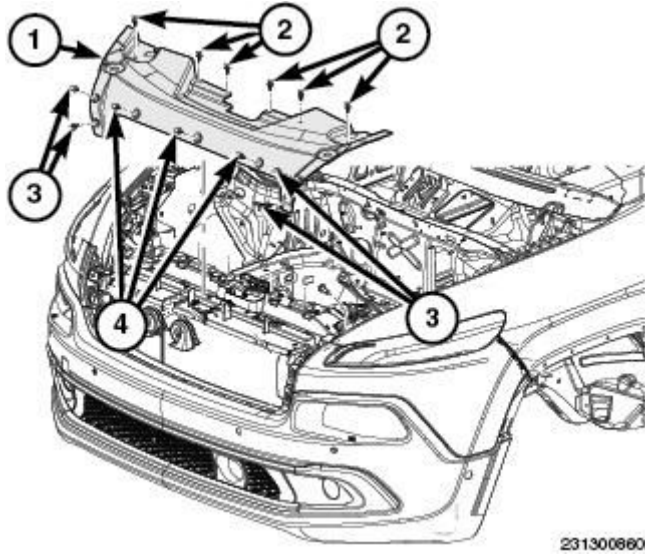


Fig. 75: Upper Close Out Panel Cover Components
Courtesy of CHRYSLER GROUP, LLC

8. Remove the upper close out panel cover (1).

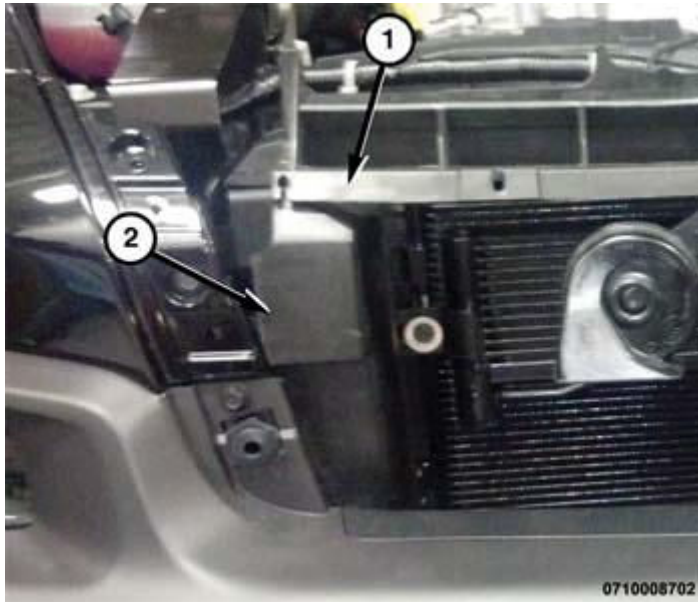


Fig. 76: Side Air Deflectors & Upper Radiator Closeout Panel
Courtesy of CHRYSLER GROUP, LLC

9. Separate the side air deflectors from the upper radiator closeout panel.

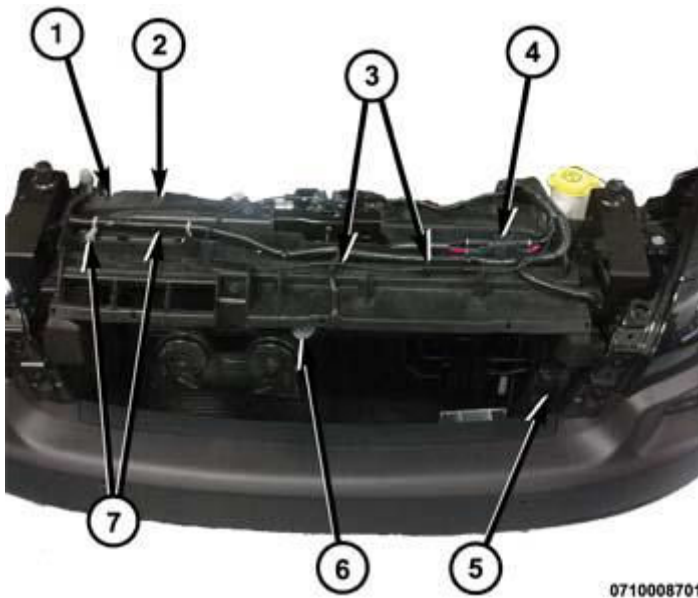


Fig. 77: Removing/Installing Upper Air Deflector
Courtesy of CHRYSLER GROUP, LLC

10. Disconnect the cooling fan module harness connector (4).
11. Disconnect the ambient air temperature sensor (5).
12. Disconnect the horn electrical connectors (6).
13. Remove the hood release cable (3) from the air deflector.

14. Remove the wiring harness (7) from the air deflector.
15. Remove the upper air deflector (1).

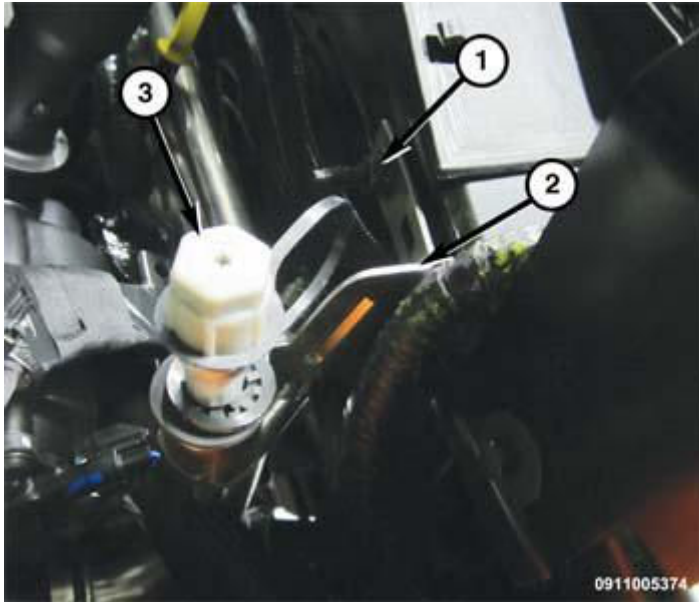


Fig. 78: Removing/Installing A/C Fill Port Support Bracket
Courtesy of CHRYSLER GROUP, LLC

16. Remove the A/C fill port support bracket (2) and position aside.



Fig. 79: Removing/Installing Transmission Cooler Line Support Bracket Bolt
Courtesy of CHRYSLER GROUP, LLC

17. Separate the transmission cooler line support brace bolt (1).

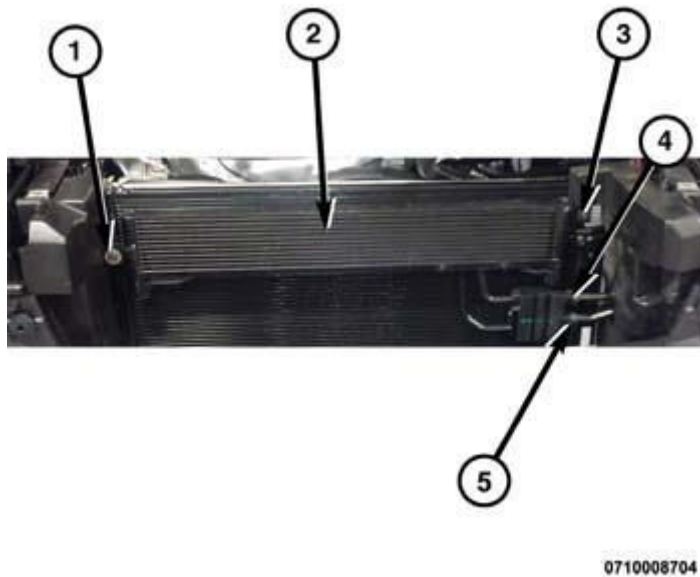


Fig. 80: Transmission Oil Cooler
Courtesy of CHRYSLER GROUP, LLC

18. Separate the transmission cooler (2) from the condenser and position aside.



Fig. 81: Removing/Installing Upper Radiator Mounts
Courtesy of CHRYSLER GROUP, LLC

19. Separate the upper radiator hose from the radiator.
20. Remove the upper radiator mounts (1).

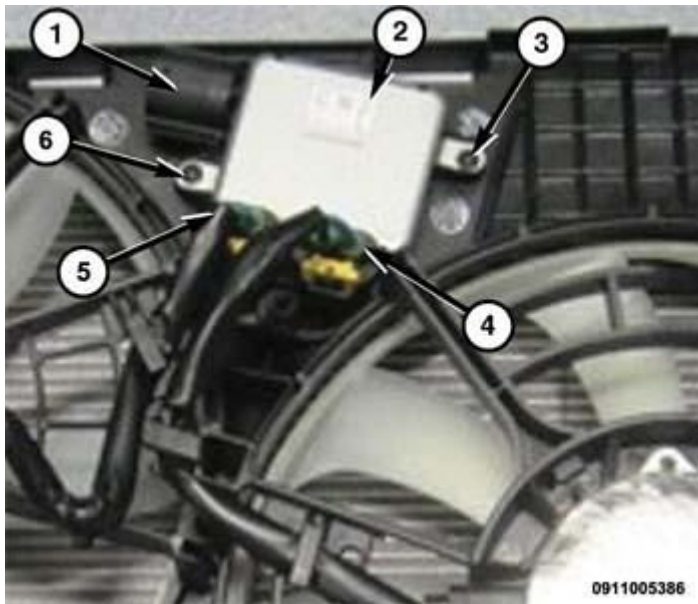


Fig. 82: Removing/Installing Fan Assembly
Courtesy of CHRYSLER GROUP, LLC

21. Remove the cooling fan module wiring harness from the module (2).
22. Remove the bolts (1) that secure the cooling fan assembly to the radiator.
23. Using care, lift the fan slightly upward.
24. Tilt the cooling fan down to allow for the upper mounting tab to clear the upper radiator hose.
25. Remove the fan assembly from the vehicle.

INSTALLATION

DIESEL

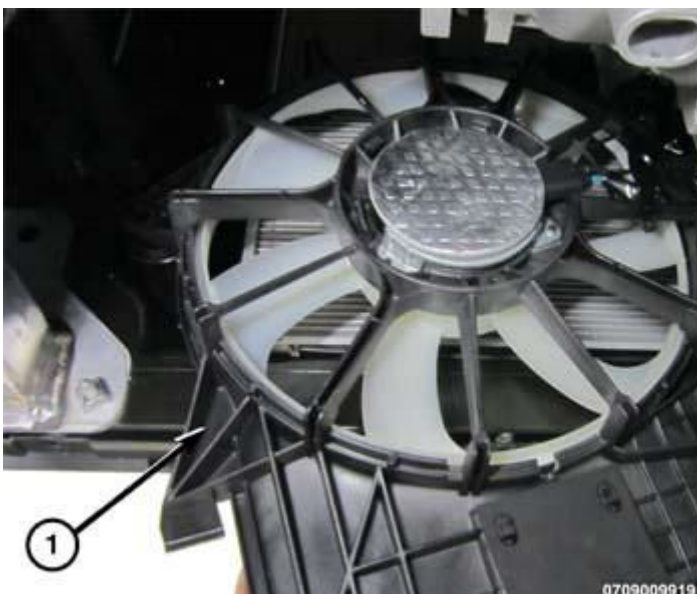


Fig. 83: Cooling Fan Assembly

Courtesy of CHRYSLER GROUP, LLC

1. Guide the cooling fan into position onto the radiator while clearing the upper radiator hose.
2. Once into position, insert the lower tabs into the retainers.
3. Install the bolts (1). Tighten to 8 N.m (71 in. lbs.).
4. Lower the vehicle.

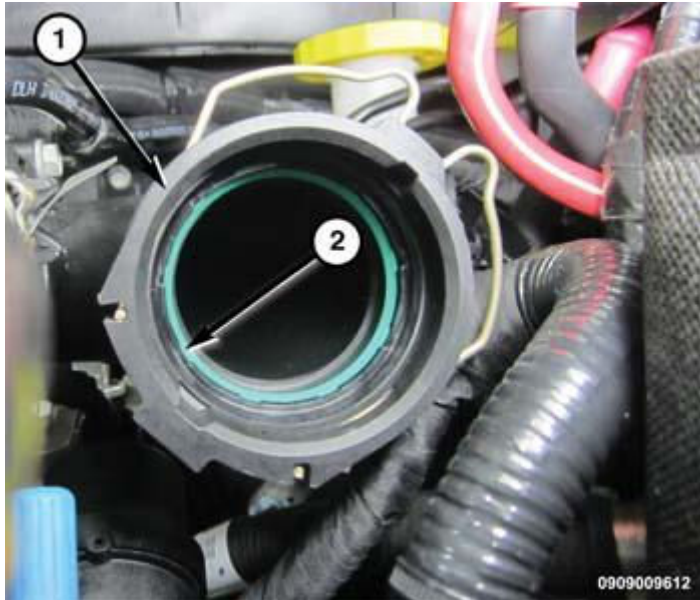


Fig. 84: O-Ring & EGR Air Flow Control Valve Inlet Tube

Courtesy of CHRYSLER GROUP, LLC

5. Install a new O-ring seal (2) onto the EGR air flow control valve inlet tube (1).

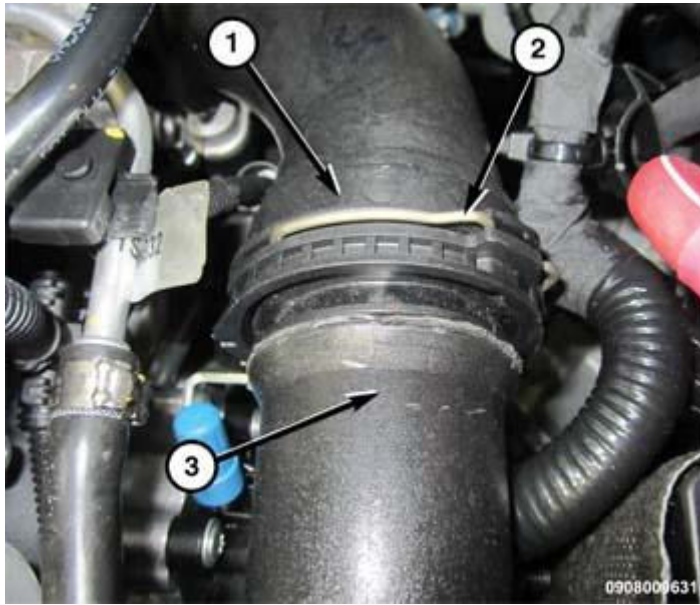


Fig. 85: EGR Air Flow Control Valve Inlet Tube, CAC Tube Wire Retainer & CAC Hose
Courtesy of CHRYSLER GROUP, LLC

6. Connect the Charge Air Cooler (CAC) hose (3) to the EGR air flow control valve inlet tube (1).
7. Lock CAC tube wire retainer (2).

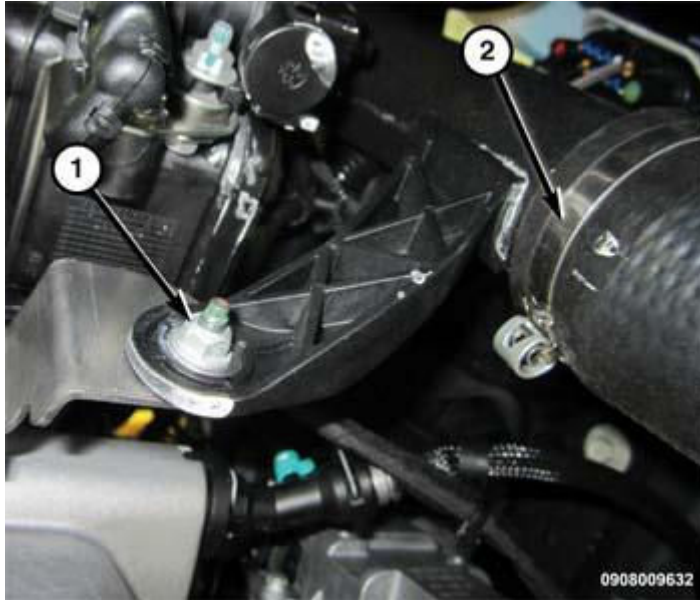


Fig. 86: CAC Tube-To-Engine Nut
Courtesy of CHRYSLER GROUP, LLC

8. Raise the vehicle.
9. Install the nut (1) securing CAC tube (2) to engine and tighten to 9 N.m (80 in. lbs.).

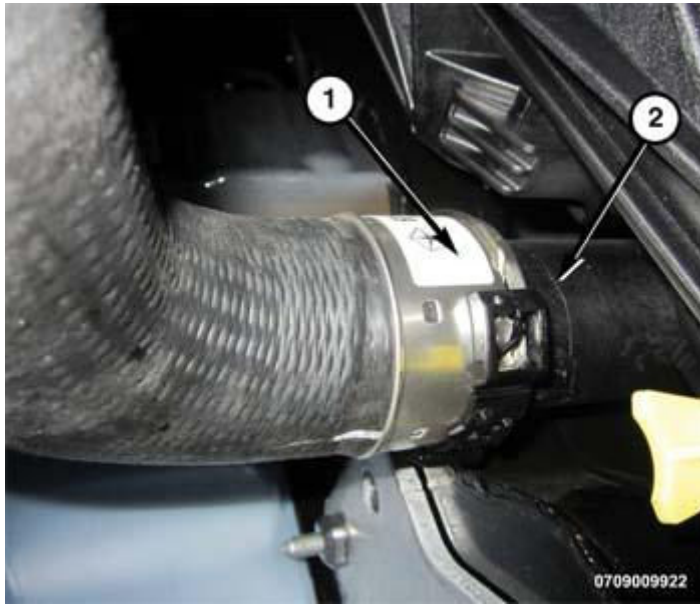


Fig. 87: Left Charge Air Cooler (CAC) & Hose
Courtesy of CHRYSLER GROUP, LLC

10. Connect the left CAC hose (1) to cooler (2).

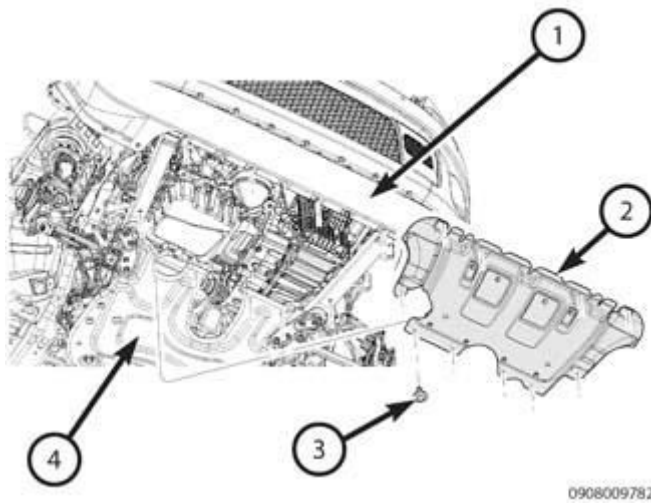


Fig. 88: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

11. Install the belly pan (2) and securely tighten bolts (2).
12. Lower the vehicle.

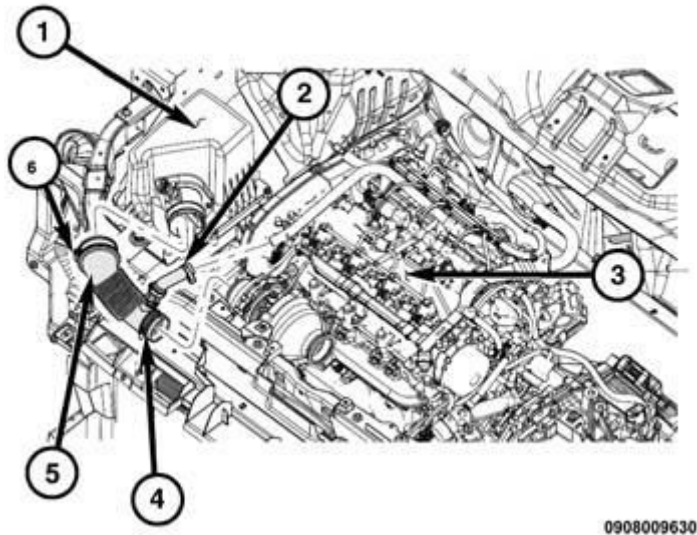


Fig. 89: Turbocharger Inlet Hose & Clamp
Courtesy of CHRYSLER GROUP, LLC

13. Install the turbocharger inlet tube (5) and securely tighten clamps (4, 6).

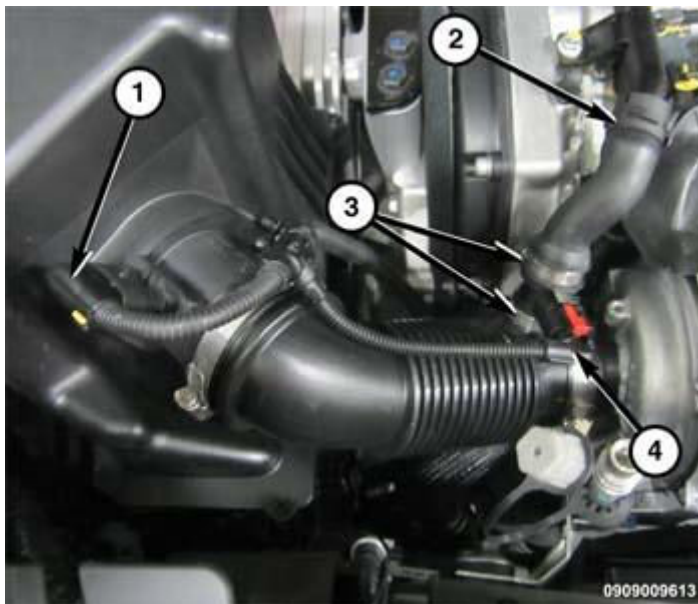


Fig. 90: MAF Sensor Harness Connector
Courtesy of CHRYSLER GROUP, LLC

14. Connect the Closed Crankcase Ventilation (CCV) heater wire harness connector (4).
15. Install the breather hose (2) onto breather tube.

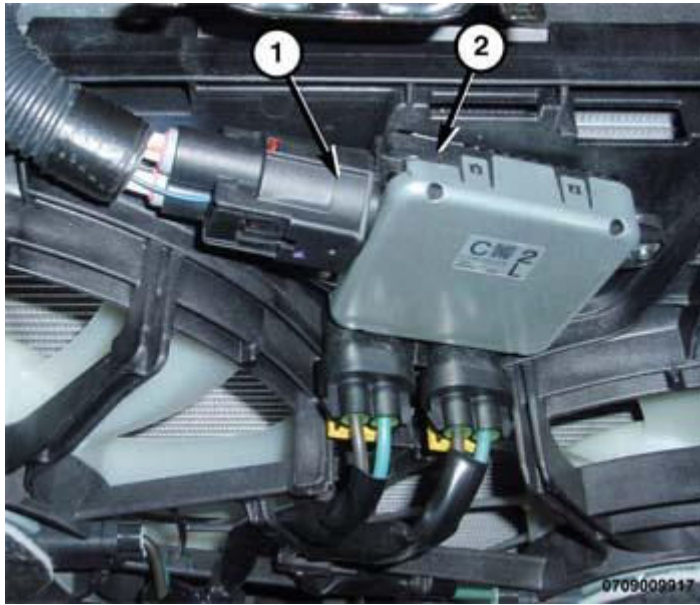


Fig. 91: Cooling Fan Module & Harness Connector
Courtesy of CHRYSLER GROUP, LLC

16. Connect the cooling fan wiring harness connector (1).

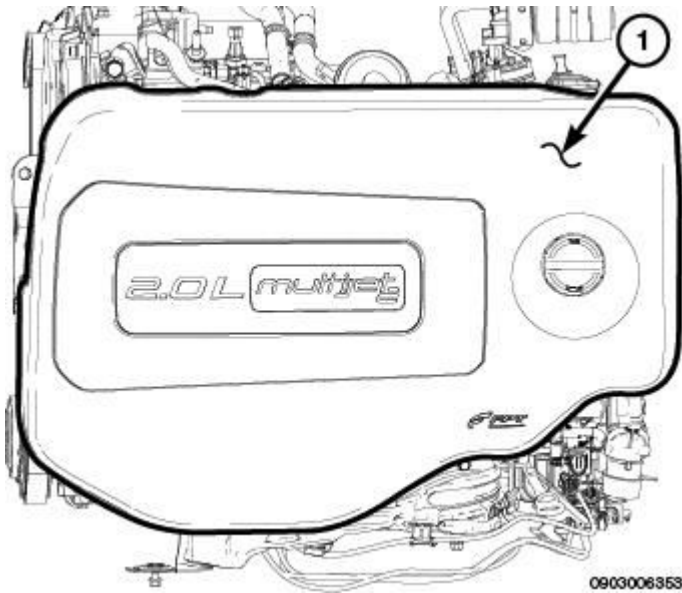
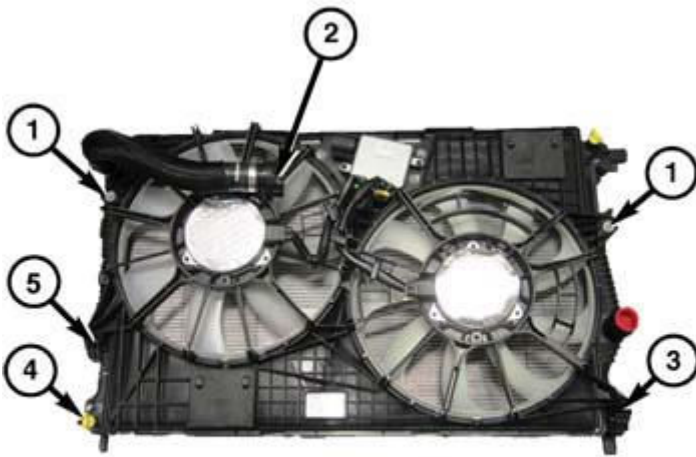


Fig. 92: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

17. Install the engine cover (1).
18. Connect the negative battery cable.

GAS



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Fig. 93: Fan Assembly & Components

Courtesy of CHRYSLER GROUP, LLC

1. Guide the cooling fan into position onto the radiator while clearing the upper radiator hose.
2. Once into position, insert the lower tabs into the retainers (3, 5).
3. Install the bolts (1). Tighten to 9 N.m (80 in. lbs.).



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Fig. 94: Removing/Installing Upper Radiator Mounts

Courtesy of CHRYSLER GROUP, LLC

4. Install the upper radiator mounts (1). Tighten mounting bolts (2) to 9 N.m (80 in. lbs.).

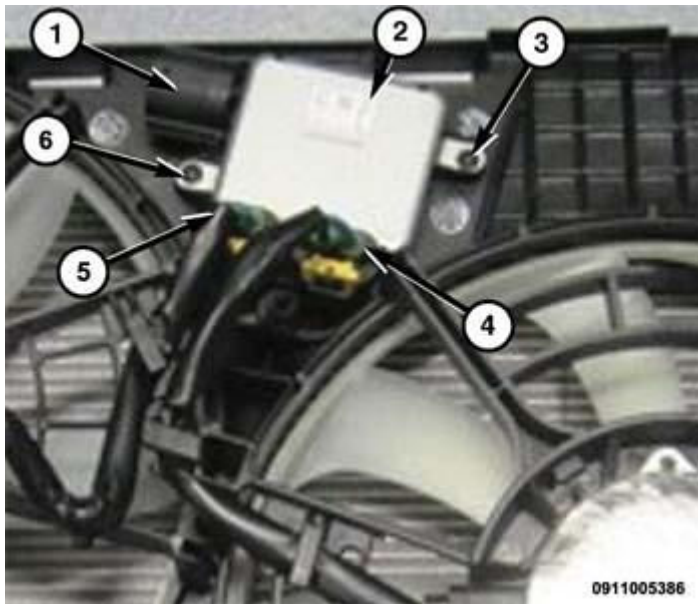


Fig. 95: Removing/Installing Fan Assembly
Courtesy of CHRYSLER GROUP, LLC

5. Install the wire harness connector to the cooling fan module (2).
6. Install the upper cooling fan module wiring harness (2).

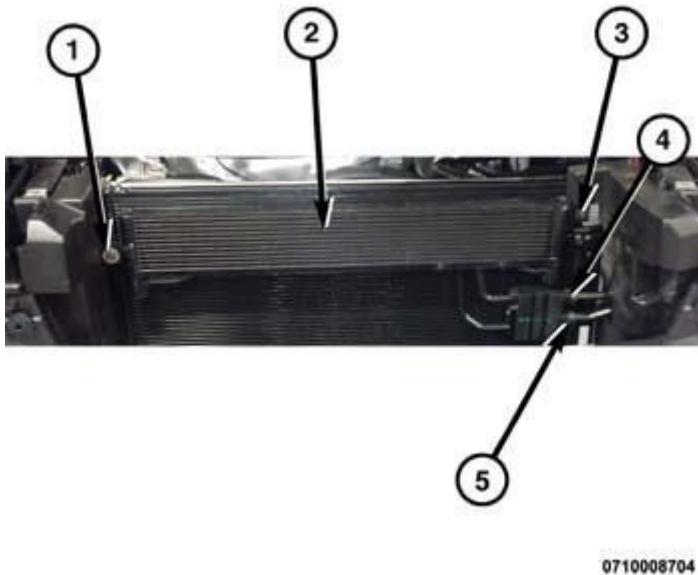


Fig. 96: Transmission Oil Cooler
Courtesy of CHRYSLER GROUP, LLC

7. Install the transmission oil cooler. Tighten mounting bolts (2) to 8 N.m (70 in. lbs.).

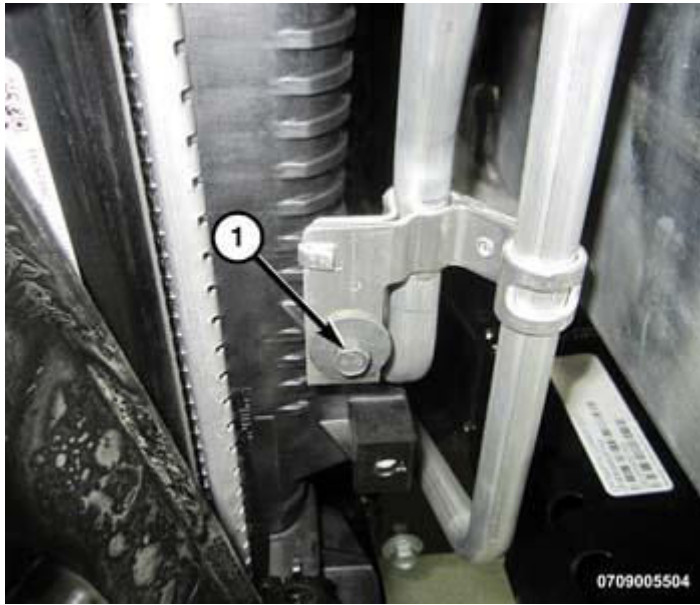


Fig. 97: Removing/Installing Transmission Cooler Line Support Bracket Bolt
Courtesy of CHRYSLER GROUP, LLC

8. Install the transmission cooler lines support brace bolt (1). Tighten to 8 N.m (70 in. lbs.).

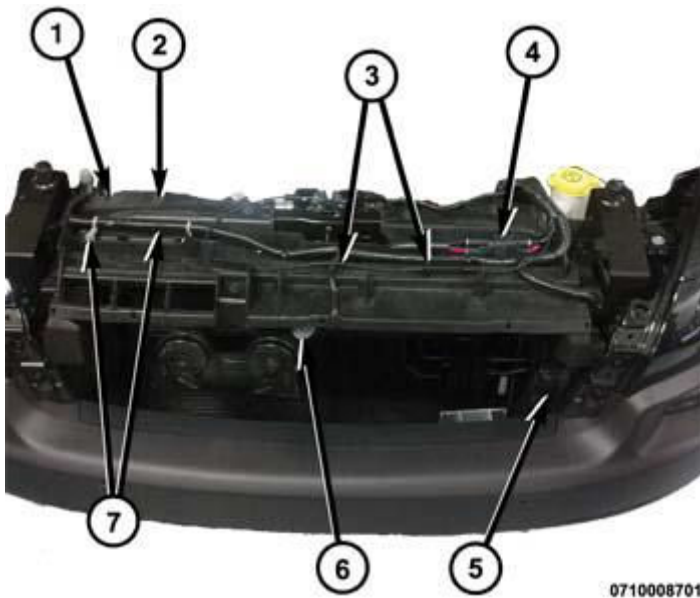


Fig. 98: Removing/Installing Upper Air Deflector
Courtesy of CHRYSLER GROUP, LLC

9. Install the upper air deflector (1).
10. Install the hood release cable (3).
11. Install the wiring harness (7).
12. Connect the ambient air temperature sensor (5).

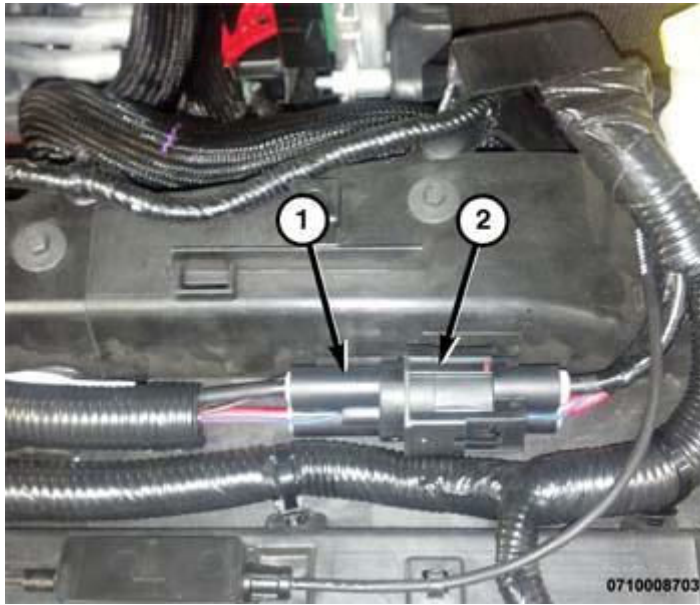


Fig. 99: Cooling Fan Wiring Harness
Courtesy of CHRYSLER GROUP, LLC

13. Connect the cooling fan wiring harness (1).
14. Install the engine cover and air intake assembly. Refer to **RESONATOR, AIR CLEANER, INSTALLATION** for 2.4L or **RESONATOR, AIR CLEANER, INSTALLATION** for 3.2L.

COOLER, EGR

REMOVAL

COOLER

The exhaust gas recirculation (EGR) cooler is not available separately and is serviced as part of the EGR manifold assembly, for removal. Refer to **COOLER, EGR, REMOVAL**.

EGR COOLER MANIFOLD

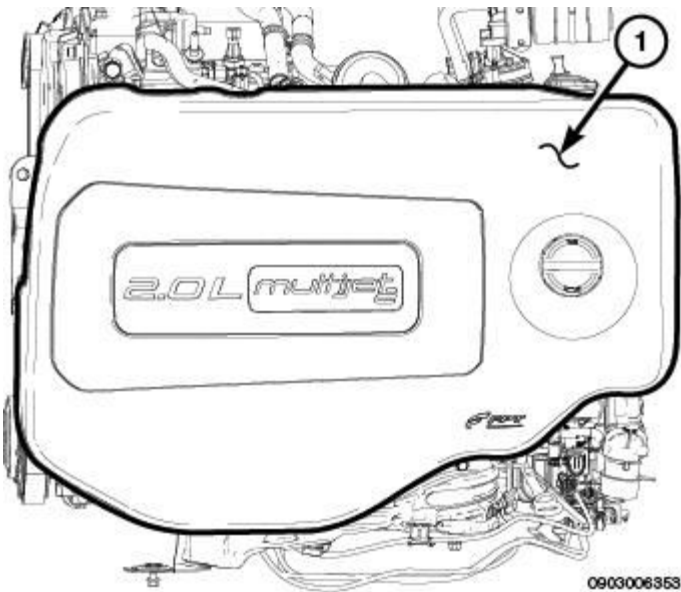


Fig. 100: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).
3. Drain the engine cooling system. Refer to **STANDARD PROCEDURE**.
4. Remove the engine air cleaner housing and inlet tube. Refer to **BODY, AIR CLEANER, REMOVAL** for 2.0L Diesel, **BODY, AIR CLEANER, REMOVAL** for 2.4L or **BODY, AIR CLEANER, REMOVAL** for 3.2L.
5. Remove the charge air cooler outlet tube from the Exhaust Gas Recirculation (EGR) flow control valve and position it out of the way. Refer to **COOLER AND HOSES, CHARGE AIR, REMOVAL**.

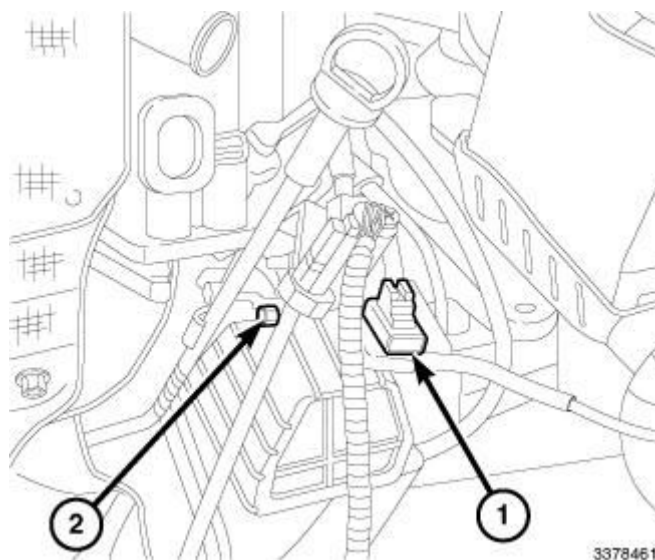


Fig. 101: Engine Oil Dipstick Tube Bolt & Wire Harness Connector

Courtesy of CHRYSLER GROUP, LLC

6. Remove the engine oil dipstick tube bolt (2) and carefully position the tube out of the way.
7. Disconnect the wire harness connector (1) from the EGR vacuum solenoid.

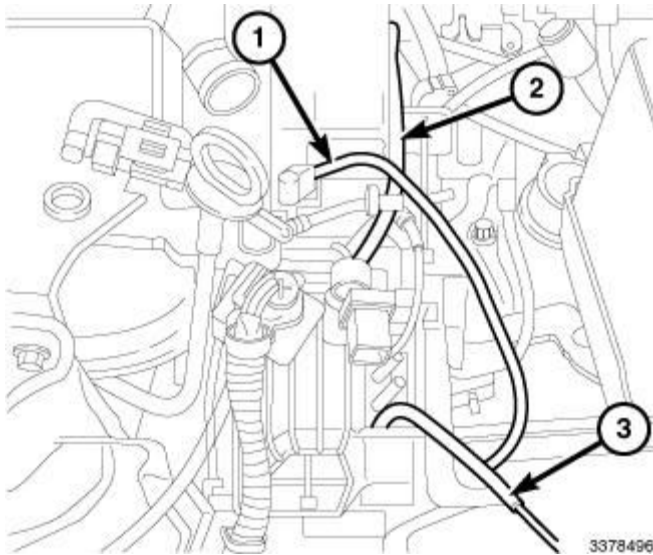


Fig. 102: Vacuum Supply Hose, Vacuum Hose & Vacuum Hose
Courtesy of CHRYSLER GROUP, LLC

8. Disconnect the radiator hose from the thermostat housing outlet and position the hose out of the way.
9. Disconnect the vacuum supply hose (1) for the vacuum reservoir.
10. If required, disconnect the vacuum hose (2) for the EGR valve solenoid.
11. Disconnect the vacuum hose (3) for the EGR vacuum valve solenoid.

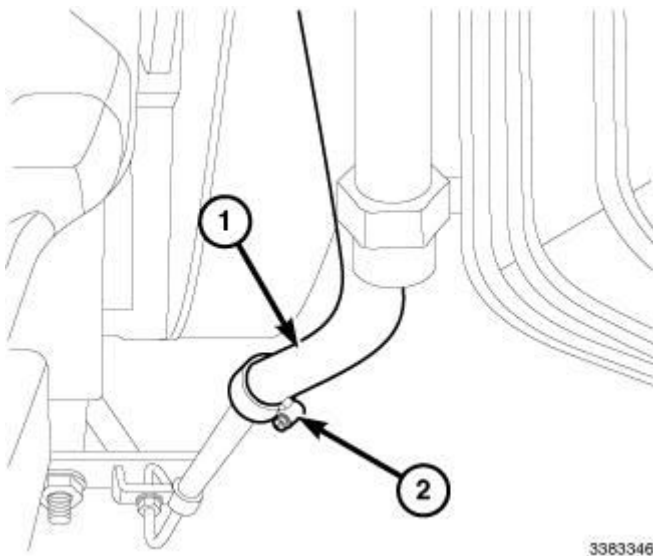


Fig. 103: Clamp & Particulate Filter Intermediate Pressure Hose
Courtesy of CHRYSLER GROUP, LLC

12. Loosen the clamp (1) and disconnect the particulate filter intermediate pressure hose (2).

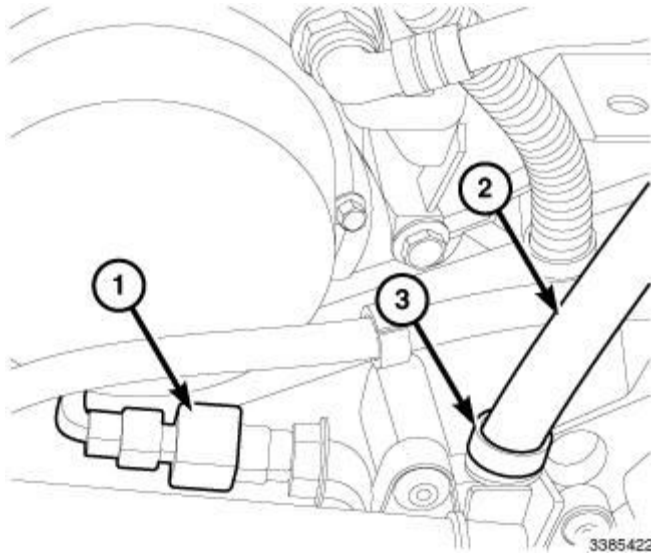


Fig. 104: Wiring Harness Connector, Clamp & Degassing Hose
Courtesy of CHRYSLER GROUP, LLC

13. Disconnect the wiring harness connector (1) from the engine coolant temperature sensor.
14. Loosen the clamp (1) and disconnect the degassing hose (2) from the thermostat housing.

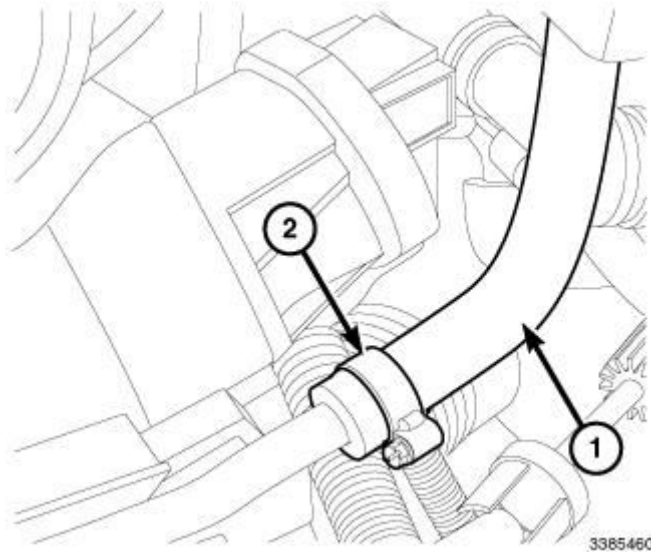


Fig. 105: Clamp & Heater Hose
Courtesy of CHRYSLER GROUP, LLC

15. Loosen the clamp (2) and disconnect the heater hose (1) from the heater tube.
16. Remove the EGR tube. Refer to **TUBE, EXHAUST GAS RECIRCULATION (EGR), REMOVAL** .

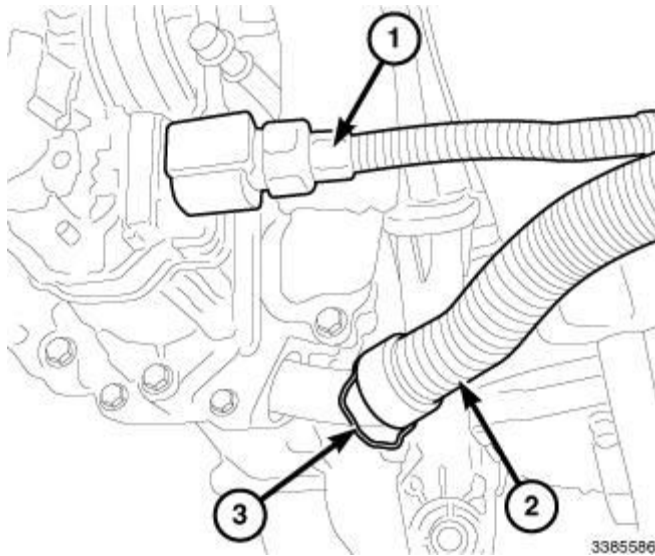


Fig. 106: Wiring Harness Connector
Courtesy of CHRYSLER GROUP, LLC

17. Disconnect the wiring harness connector (1) from the EGR valve.
18. Disengage the retaining clip (3) and disconnect the coolant hose (2) to the engine oil cooler.

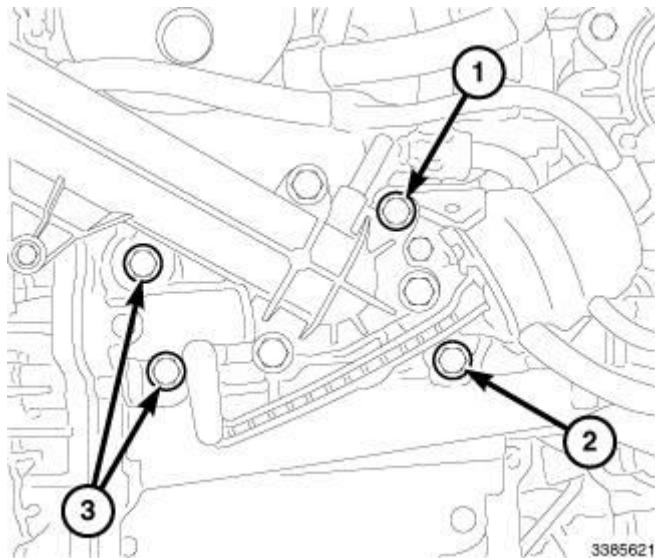


Fig. 107: Four Bolts
Courtesy of CHRYSLER GROUP, LLC

19. Remove the four bolts (1, 2 and 3) that secure the EGR cooler manifold to the engine.
20. Remove the EGR cooler manifold and gasket from the engine and place the manifold on a workbench.
21. If required, remove the EGR valve from the EGR cooler manifold. Refer to **VALVE, EXHAUST GAS RECIRCULATION (EGR), REMOVAL**.
22. If required, remove the EGR vacuum solenoid from the EGR cooler manifold. Refer to **SOLENOID, EXHAUST GAS RECIRCULATION (EGR), 2.0L DIESEL, REMOVAL**.

23. If required, remove the thermostat housing from the EGR cooler manifold. Refer to **THERMOSTAT, REMOVAL**.
24. If required, remove the engine coolant temperature sensor from the EGR cooler manifold. Refer to **SENSOR, COOLANT TEMPERATURE, REMOVAL**.

INSTALLATION

COOLER

The exhaust gas recirculation (EGR) cooler is not available separately and is serviced as part of the EGR manifold assembly, for installation. Refer to **COOLER, EGR, INSTALLATION**.

EGR COOLER MANIFOLD

1. Clean all gasket mating surfaces.
2. If removed, install the engine coolant temperature sensor onto the EGR cooler manifold. Refer to **SENSOR, COOLANT TEMPERATURE, INSTALLATION**.
3. If removed, install the thermostat housing onto the EGR cooler manifold. Refer to **THERMOSTAT, INSTALLATION**.
4. If removed, install the EGR vacuum solenoid onto the EGR cooler manifold. Refer to **SOLENOID, EXHAUST GAS RECIRCULATION (EGR), 2.0L DIESEL, REMOVAL**.
5. If removed, install the Exhaust Gas Recirculation (EGR) valve onto the EGR cooler manifold. Refer to **VALVE, EXHAUST GAS RECIRCULATION (EGR), REMOVAL**.

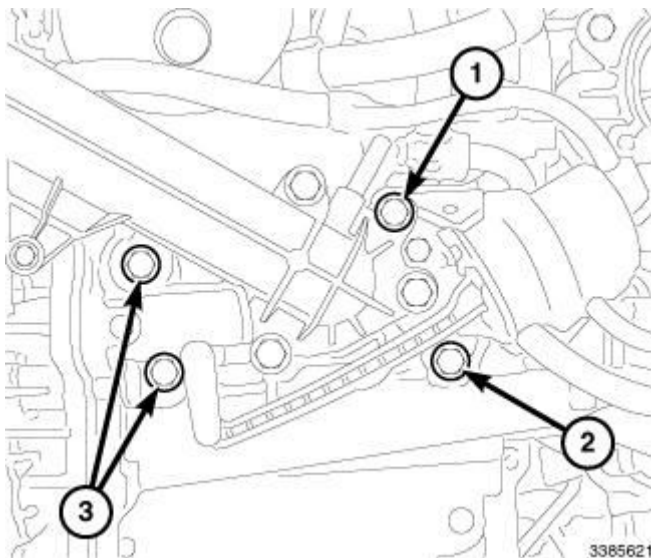


Fig. 108: Four Bolts

Courtesy of CHRYSLER GROUP, LLC

6. Position the EGR cooler manifold and a new gasket to the engine.
7. Install the four bolts (1, 2 and 3) that secure the EGR cooler manifold to the engine. Tighten the bolts to 3 N.m (27 in. lbs.).

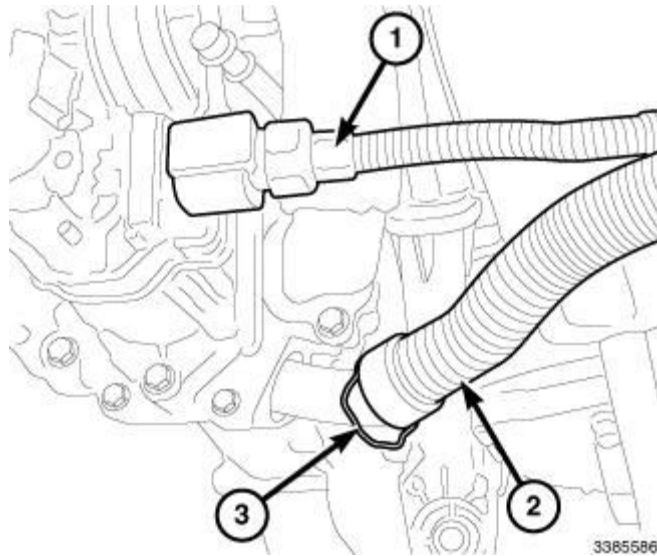


Fig. 109: Wiring Harness Connector
Courtesy of CHRYSLER GROUP, LLC

8. Connect the wiring harness connector (1) to the EGR valve.
9. Connect the oil cooler coolant hose (2) and engage the retaining clip (3). Make sure the retaining clip and hose connector are fully engaged.
10. Using a new gasket, install the EGR tube. Refer to **TUBE, EXHAUST GAS RECIRCULATION (EGR), INSTALLATION**.

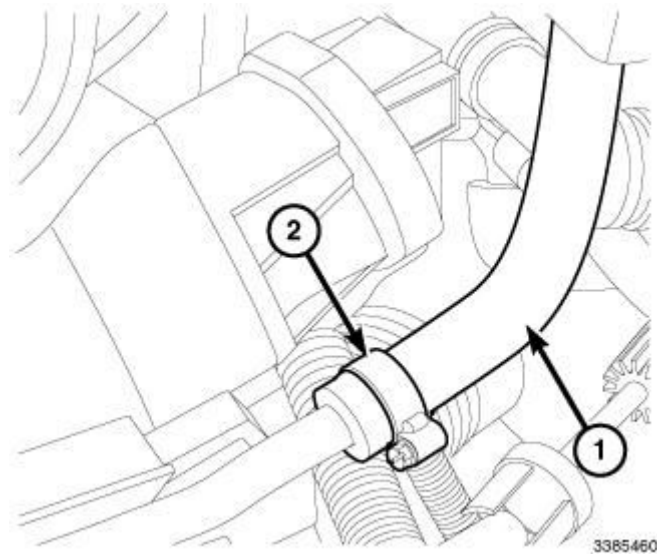


Fig. 110: Clamp & Heater Hose
Courtesy of CHRYSLER GROUP, LLC

11. Connect the heater hose (1) to the heater tube and tighten the hose clamp (2) securely.

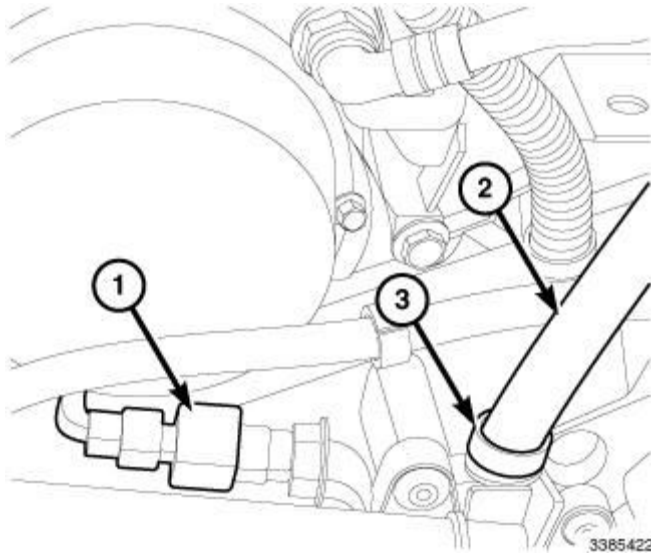


Fig. 111: Wiring Harness Connector, Clamp & Degassing Hose
Courtesy of CHRYSLER GROUP, LLC

12. Connect the wiring harness connector (1) to the engine coolant temperature sensor.
13. Connect the degassing hose (2) to the heater tube and tighten the hose clamp (3) securely.

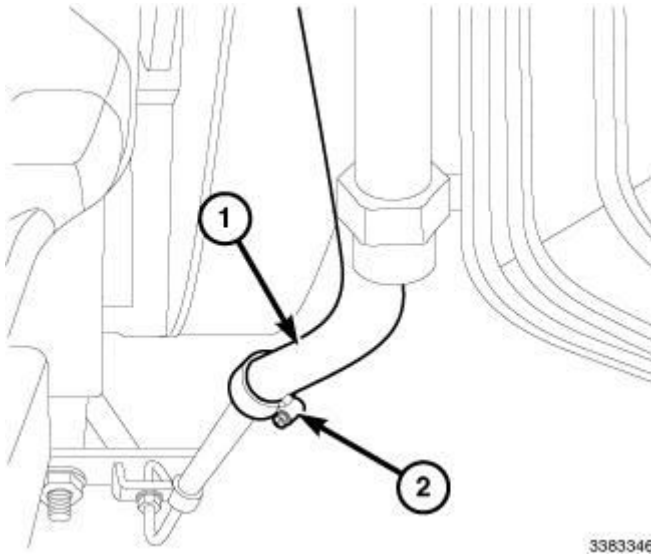


Fig. 112: Clamp & Particulate Filter Intermediate Pressure Hose
Courtesy of CHRYSLER GROUP, LLC

14. Connect the particulate filter intermediate pressure hose (1) and tighten the hose clamp (2) securely.

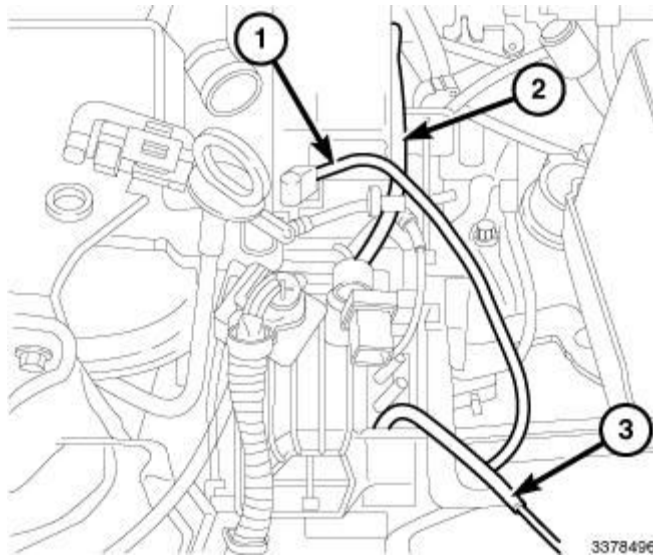


Fig. 113: Vacuum Supply Hose, Vacuum Hose & Vacuum Hose
Courtesy of CHRYSLER GROUP, LLC

15. Connect the vacuum hose (3) for the EGR vacuum valve solenoid.
16. If required, connect the vacuum hose (2) for the EGR vacuum solenoid.
17. Connect the vacuum supply hose (1) for the vacuum reservoir.
18. Connect the radiator hose to the thermostat housing outlet.

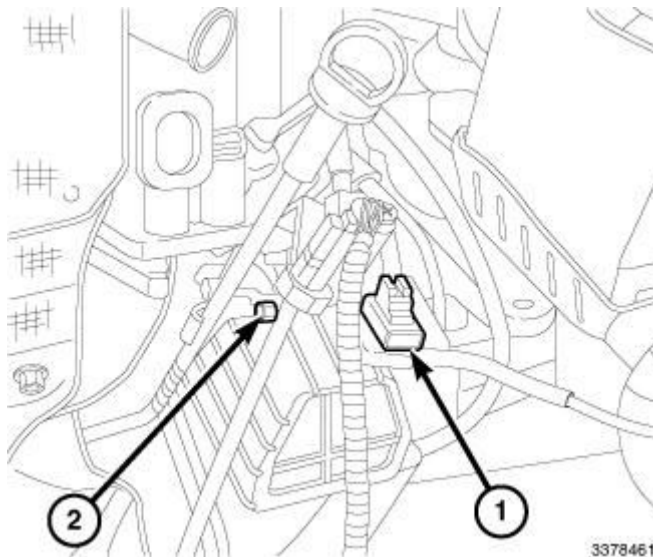


Fig. 114: Engine Oil Dipstick Tube Bolt & Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

19. Connect the wire harness connector (1) to the EGR vacuum solenoid.
20. Reposition the engine oil dipstick tube and install the retaining bolt (2). Tighten the bolt to 2 N.m (18 in. lbs.).
21. Install the charge air cooler outlet tube to the EGR flow control valve. Refer to **COOLER AND HOSES**.

CHARGE AIR, INSTALLATION

22. Install the engine air cleaner housing and inlet tube. Refer to **BODY, AIR CLEANER, INSTALLATION** for 2.0L Diesel, **BODY, AIR CLEANER, INSTALLATION** for 2.4L or **BODY, AIR CLEANER, INSTALLATION** for 3.2L.
23. Fill the cooling system. Refer to **STANDARD PROCEDURE**.

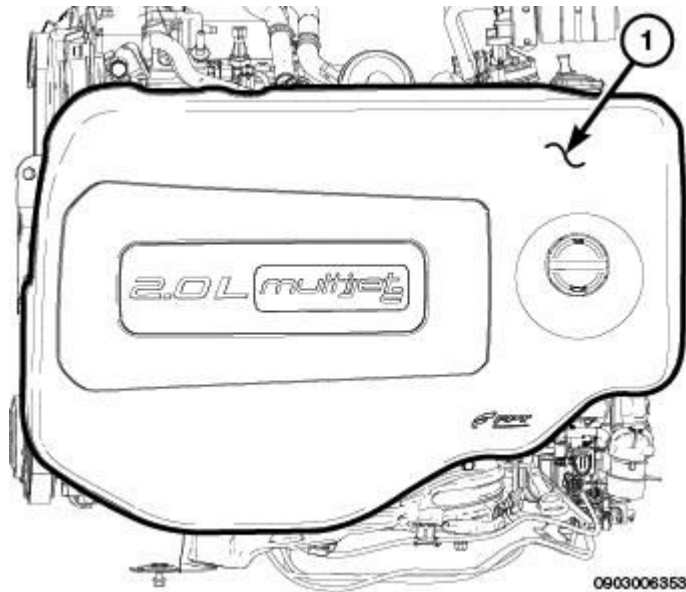


Fig. 115: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

24. Install the engine cover (1).
25. Connect the negative battery cable.

HEATER, ENGINE BLOCK

DESCRIPTION

DESCRIPTION

The engine block heater is available as an optional accessory on all models. The heater is operated by ordinary house current (110 Volt A.C.) through a power cord located behind the radiator grille. This provides easier engine starting and faster warm-up when vehicle is operated in areas having extremely low temperatures. The heater is mounted in a hole in the engine block.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - ENGINE BLOCK HEATER

If the unit does not operate, possible causes can be either the power cord or the heater element. Test the power cord for continuity with a 110-volt voltmeter or 110-volt test light. Test heater element continuity with an ohmmeter or a 12-volt test light.

CAUTION: To prevent damage, the power cord must be secured in it's retainer clips and away from any components that may cause abrasion or damage, such as linkages, exhaust components, etc.

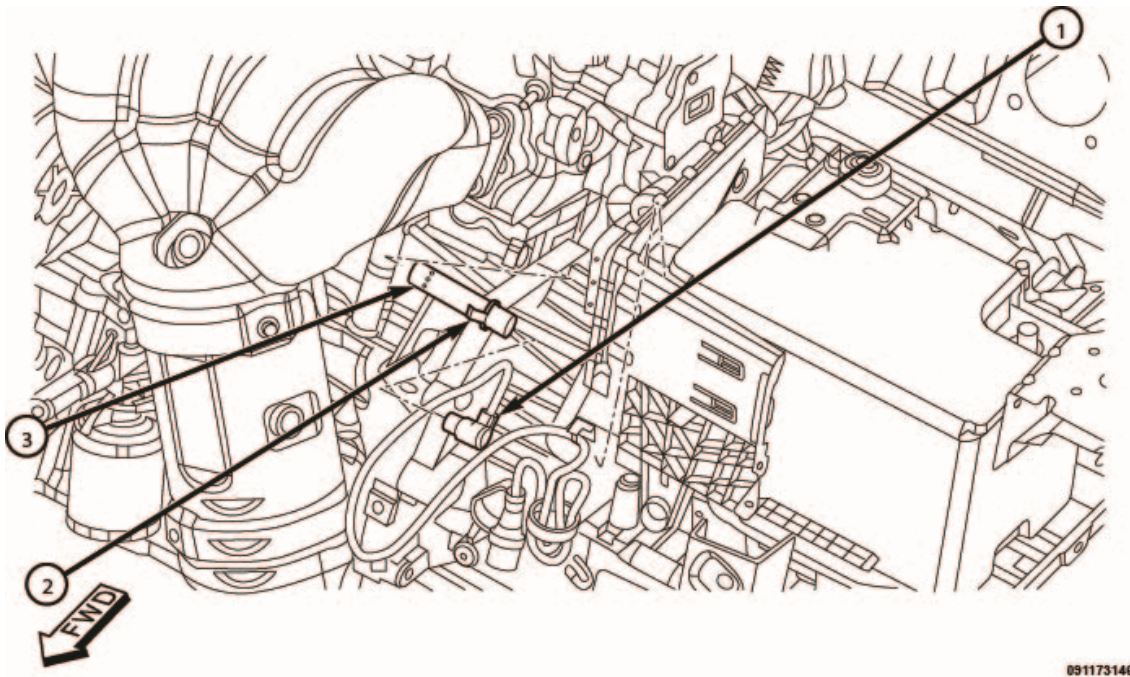
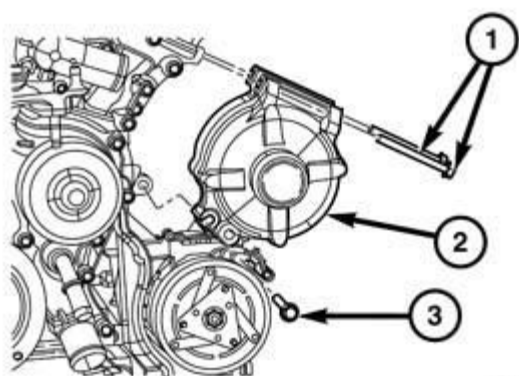
REMOVAL**2.4L**

Fig. 116: Removing/Installing Engine Block Heater
Courtesy of CHRYSLER GROUP, LLC

1. Remove the engine cover.
2. Unplug the power cord from block heater (1).
3. Pull the tab (2) away from the cylinder block.
4. Slide the block heater (3) to the right and out of the bore.
5. Remove the heater from the vehicle.

3.2L

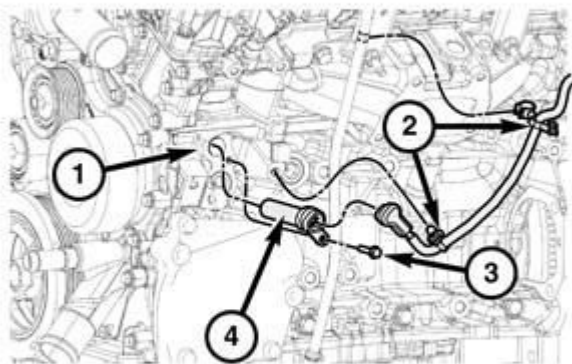


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Fig. 117: Removing/Installing Generator
Courtesy of CHRYSLER GROUP, LLC

1. Remove the generator

Refer to **GENERATOR, REMOVAL** .



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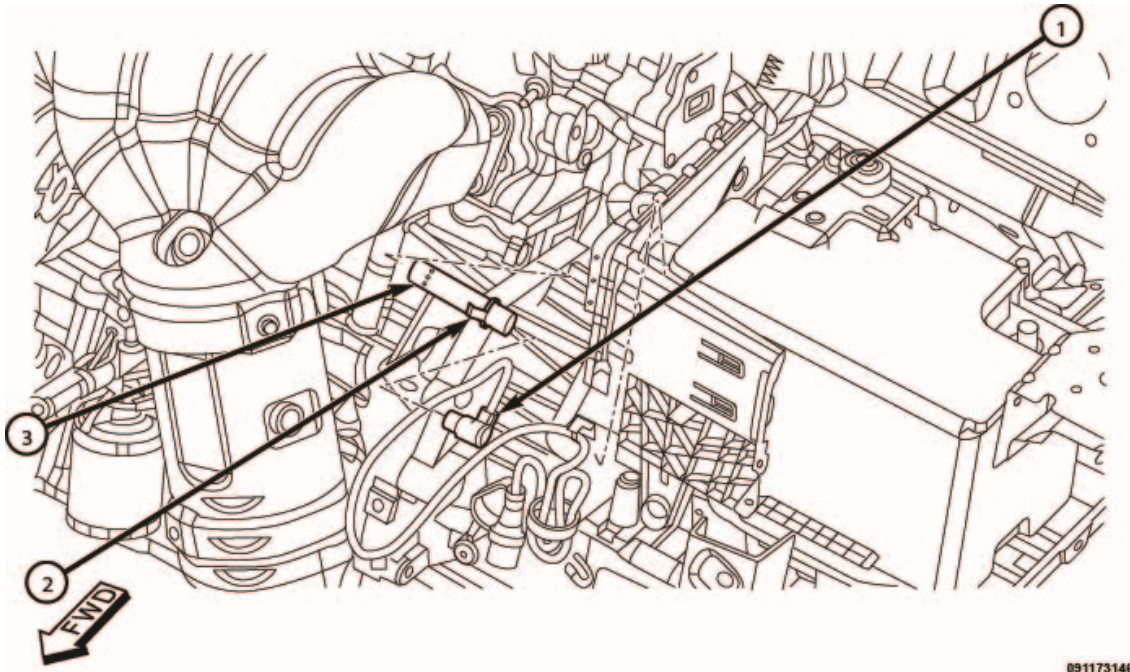
Fig. 118: Removing/Installing Engine Block Heater

Courtesy of CHRYSLER GROUP, LLC

2. Disconnect the power cord plug (2) from block heater (4).
3. Loosen the bolt (3) from the heater.

INSTALLATION

2.4L

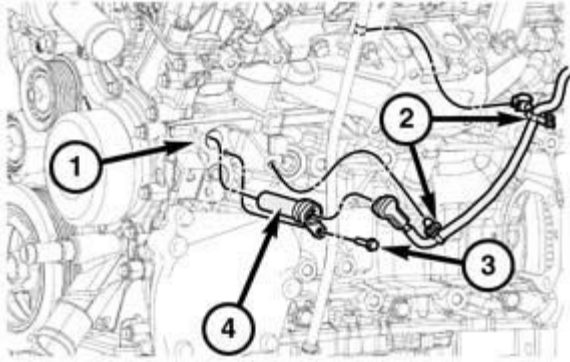


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Fig. 119: Removing/Installing Engine Block Heater
Courtesy of CHRYSLER GROUP, LLC

1. Insert the block heater (3) into the block bore.
2. Push the heater to the left until the tab (2) catches onto the block.
3. Plug the block heater cord (1) into the heater.
4. Install the engine cover.

3.2L



0909005830

Fig. 120: Removing/Installing Engine Block Heater
Courtesy of CHRYSLER GROUP, LLC

1. Clean block core hole (1) and heater seat.
2. Insert heater block (4) assembly.
3. With block heater seated, tighten bolt (3) to 12 N.m (106 in. lbs.) to assure a positive seal.
4. Install power cord plug to block heater (2).

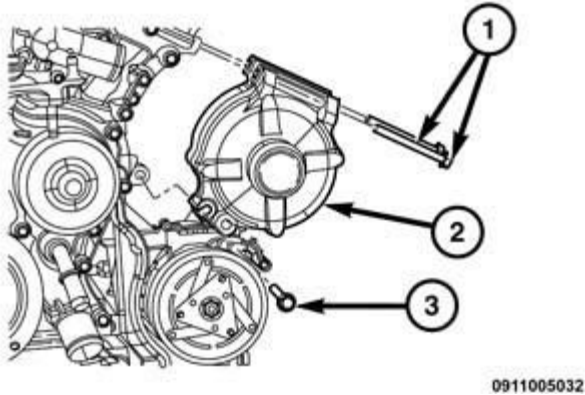


Fig. 121: Removing/Installing Generator
Courtesy of CHRYSLER GROUP, LLC

5. Install the generator (2). Refer to **GENERATOR, INSTALLATION** .

PUMP, WATER

REMOVAL

2.0L DIESEL

1. Disconnect and isolate the negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .

NOTE: **Drain the fluid in a clean container, free of debris. Save the fluid for re-use.**

3. Drain the cooling system. Refer to **STANDARD PROCEDURE**.
4. Remove the timing belt. Refer to **BELT, TIMING, REMOVAL** .

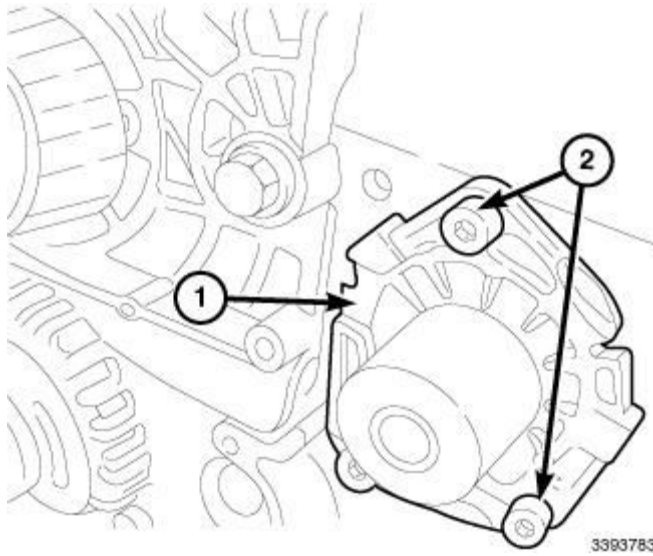


Fig. 122: Water Pump Mounting Bolts & Water Pump
Courtesy of CHRYSLER GROUP, LLC

5. Remove the water pump mounting bolts (2).
6. Separate the water pump (1) and the gasket from the cylinder head.

2.4L

1. Raise and support the vehicle.

Refer to **HOISTING, STANDARD PROCEDURE** .

2. Remove the right front tire.
3. Remove the belly pan
4. Remove the front closeout panel.
5. Drain the coolant.

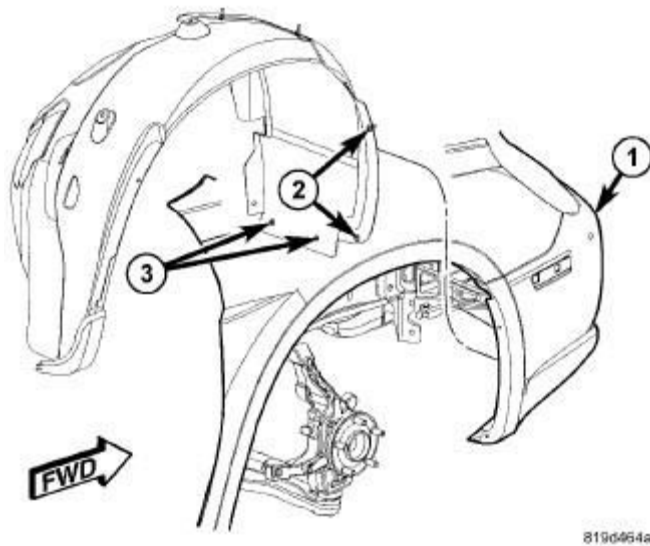


Fig. 123: Removing/Installing Front Splash Shields
Courtesy of CHRYSLER GROUP, LLC

6. Remove the 3 fender screws and the 3 push pins from the forward portion of the right front wheel liner. This will allow the liner to be positioned rearward to gain access to the accessory drive components.
7. Remove the serpentine belt.

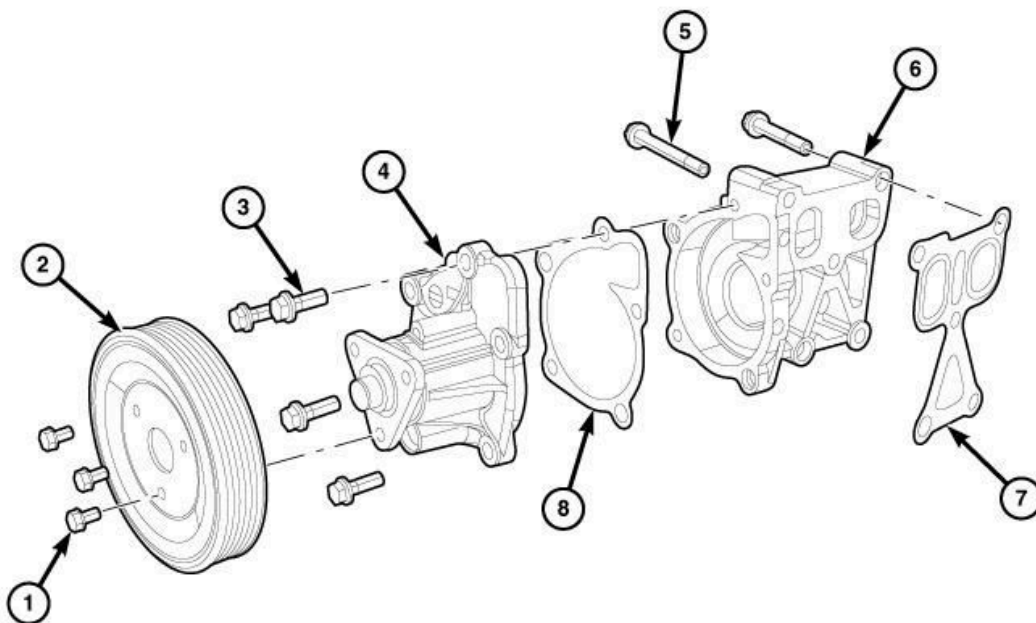


Fig. 124: Water Pump Pulley, Adapter And Gasket

Courtesy of CHRYSLER GROUP, LLC

8. Remove the 3 water pump pulley bolts (1).
9. Remove the water pump pulley (2).
10. Remove the water pump bolts (3).
11. Remove the water pump (4) and the water pump gasket (8).
12. Inspect the water pump housing (6) for impeller contact.
13. Clean the mating surface.
14. Remove the water pump.

3.2L

The water pump on 3.2L engines is bolted directly to the engine timing chain case cover.

1. Disconnect and isolate the battery negative cable.

WARNING: Constant tension hose clamps are used on most cooling system hoses. When removing or installing, use only tools designed for servicing this type of clamp. Always wear safety glasses when servicing constant tension clamps.

CAUTION: A number or letter is stamped into the tongue of constant tension clamps. If replacement is necessary, use only an original equipment clamp with matching number or letter.

2. Support the engine with an engine support fixture.
3. Remove the air cleaner body (1). Refer to **BODY, AIR CLEANER, REMOVAL** .
4. Remove the clean air hose from the intake resonator.
5. Remove the overflow bottle. Refer to **BOTTLE, PRESSURIZED COOLANT, REMOVAL**.

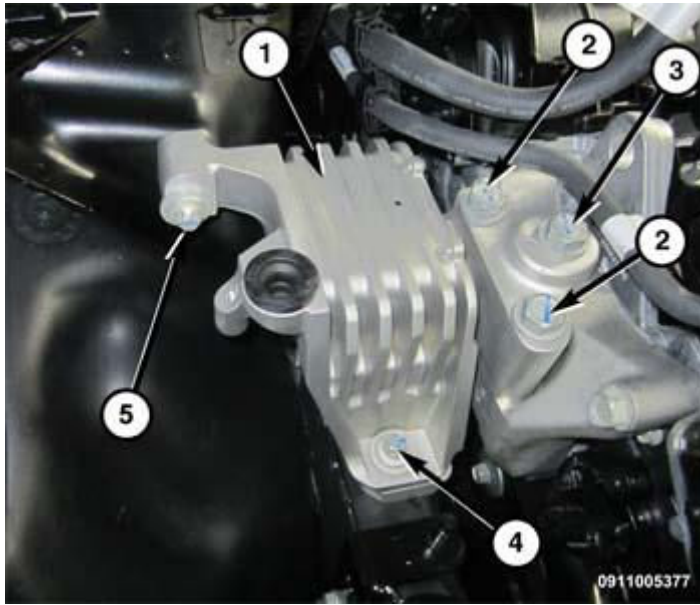


Fig. 125: Removing/Installing Right Engine Mount Assembly
Courtesy of CHRYSLER GROUP, LLC

6. Remove the right side engine mount assembly (1).

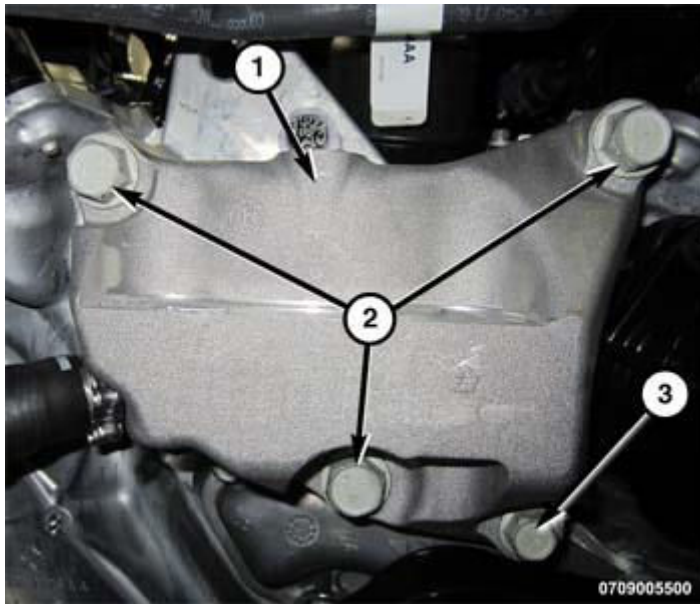


Fig. 126: Engine Mount Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

7. Using care, raise the engine to gain access to the right side engine mount bracket (1).
8. Remove the bolts (2, 3) that secure the bracket to the timing cover and cylinder head.
9. Raise the vehicle.
10. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .

11. Drain coolant into clean container for reuse. Refer to **STANDARD PROCEDURE**.
12. Remove the inner wheel housing splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL**.

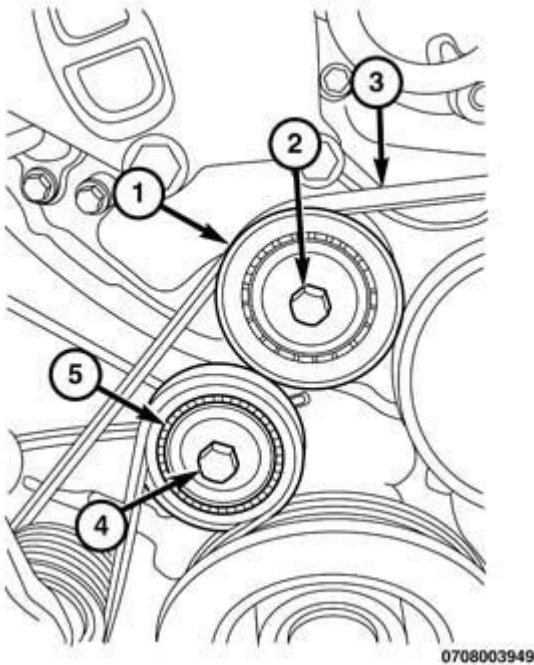


Fig. 127: Installing Accessory Idler Pulley
Courtesy of CHRYSLER GROUP, LLC

13. Remove the accessory drive belt (3). Refer to **BELT, SERPENTINE, REMOVAL**.
14. Remove the upper accessory drive belt idler pulley (1).

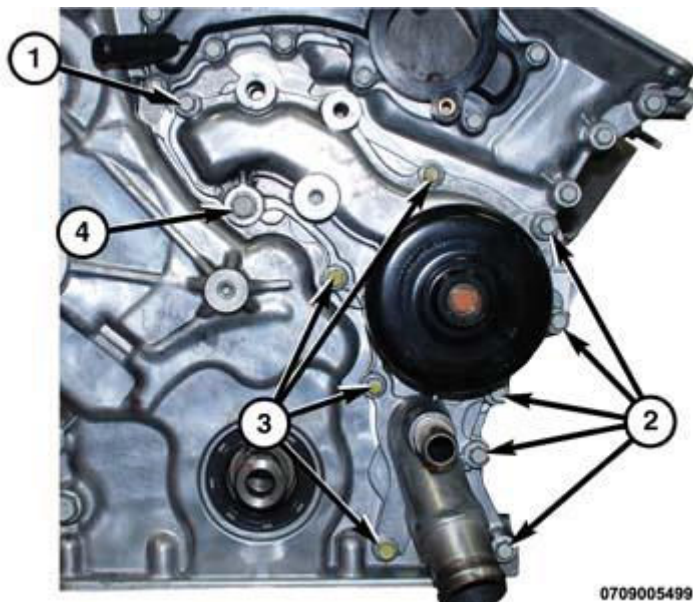


Fig. 128: Removing/Installing Water Pump
Courtesy of CHRYSLER GROUP, LLC

15. Remove the lower heater hose and the lower radiator hose from the water pump and position aside.

CAUTION: Do not pry on the water pump at the timing chain case/cover. The machined surfaces may be damaged resulting in leaks.

16. Remove the remaining water pump mounting bolts (1, 2, 4). Take notice to the four water pump bolts (3) that mount directly to the timing chain cover.
17. Remove the water pump and discard the seal.

INSTALLATION

2.0L DIESEL

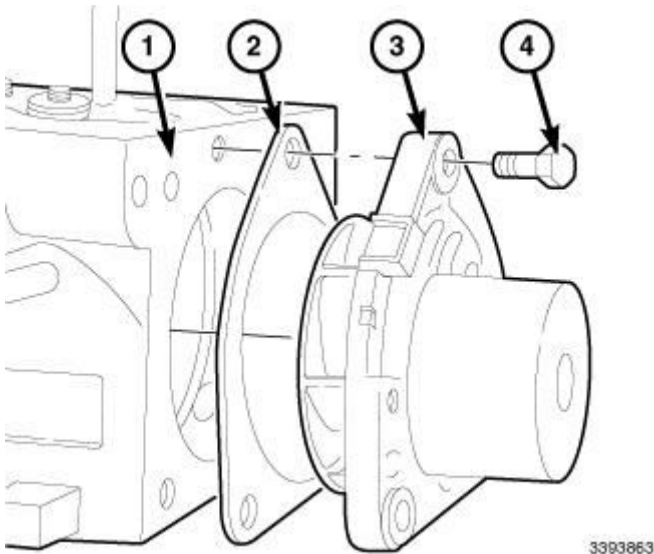
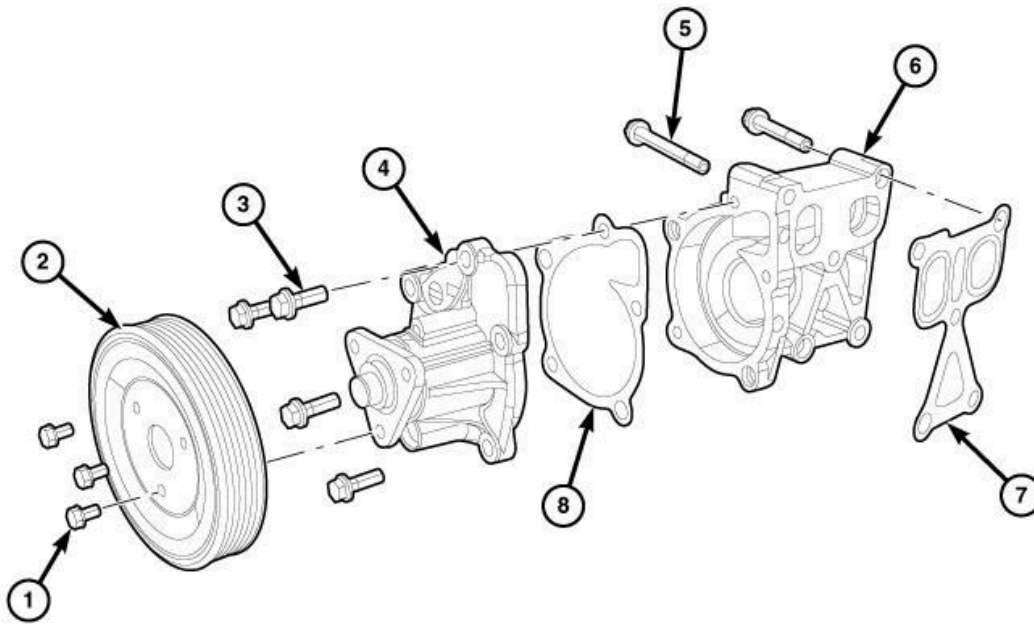


Fig. 129: Water Pump, New Gasket & Cylinder Head
Courtesy of CHRYSLER GROUP, LLC

1. Position the water pump (3) with a new gasket (2) onto the cylinder head (1). Tighten the bolts (4) to 28 N.m (21 ft. lbs.).
2. Install the timing belt. Refer to **BELT, TIMING, INSTALLATION**.
3. Evacuate air and refill cooling system. Refer to **STANDARD PROCEDURE**.
4. Connect the negative battery cable.
5. Check cooling system for leaks. Refer to **DIAGNOSIS AND TESTING**.

2.4L



2109355

Fig. 130: Water Pump Pulley, Adapter And Gasket
 Courtesy of CHRYSLER GROUP, LLC

1. Position the water pump (4) into position with a new gasket (8).
2. Install the water pump bolts (3). Tighten the bolts to 24 N.m (18 ft. lbs.)
3. Install the water pump pulley (2).
4. Install the pulley bolts (1). Tighten the bolts to 9 N.m (80 in lbs.).
5. Install the serpentine belt. Refer to **BELT, SERPENTINE, INSTALLATION**.
6. Install the belly pan and closeout panel

Refer to **BELLY PAN, INSTALLATION** .

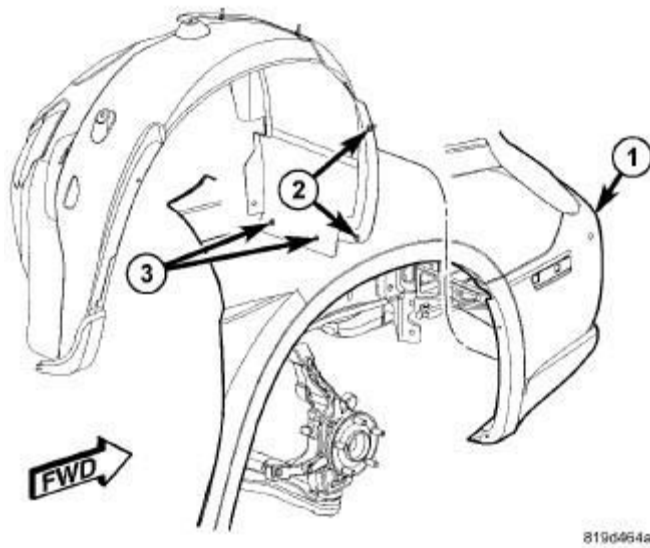


Fig. 131: Removing/Installing Front Splash Shields
Courtesy of CHRYSLER GROUP, LLC

7. Install the 3 fender screws and the 3 push pins in the right front wheel liner.
8. Install the tire/wheel assembly.

3.2L

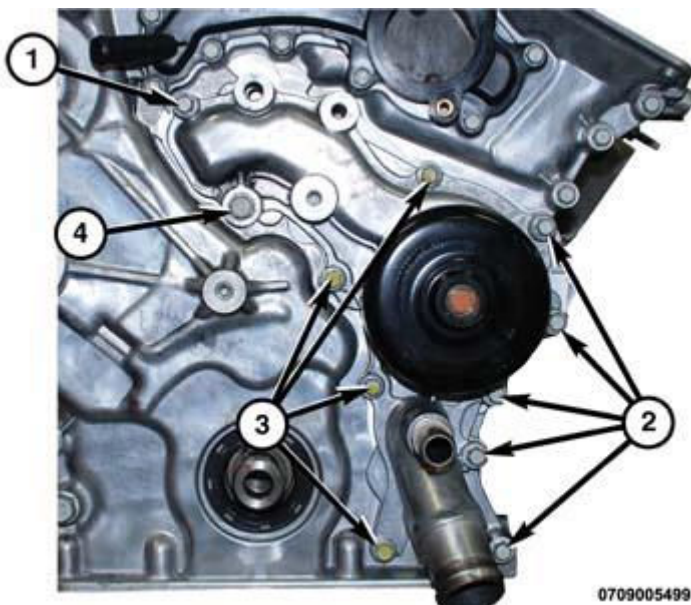


Fig. 132: Removing/Installing Water Pump
Courtesy of CHRYSLER GROUP, LLC

The water pump on 3.2L engines is bolted directly to the engine timing chain case cover.

1. Clean mating surfaces.
2. Using a new seal, position water pump and install mounting bolts (1, 2). Note the shorter bolts (3) bolt directly to the timing cover. Tighten the M6 water pump mounting bolts to the proper specification. Refer to **TORQUE SPECIFICATIONS - GAS**. Tighten the M8 water pump mounting bolt (4) to the proper specification. Refer to **TORQUE SPECIFICATIONS - GAS**.
3. Spin water pump to be sure that pump impeller does not rub against timing chain case/cover (1).
4. Install the lower radiator hose and the bypass hose.

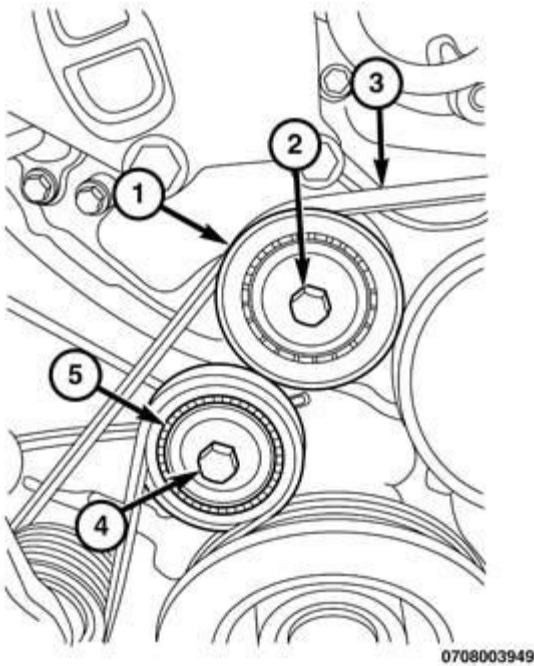


Fig. 133: Installing Accessory Idler Pulley
Courtesy of CHRYSLER GROUP, LLC

5. Install the idler pulley (1). Tighten the mounting bolt (2) to the proper specification. Refer to **TORQUE SPECIFICATIONS - GAS**.

CAUTION: When installing the serpentine accessory drive belt, belt must be routed correctly. If not, engine may overheat due to water pump rotating in wrong direction.

6. Install accessory drive belt (3).
7. Install the inner wheel housing splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION**.
8. Install the belly pan. Refer to **BELLY PAN, INSTALLATION**.
9. Lower vehicle.

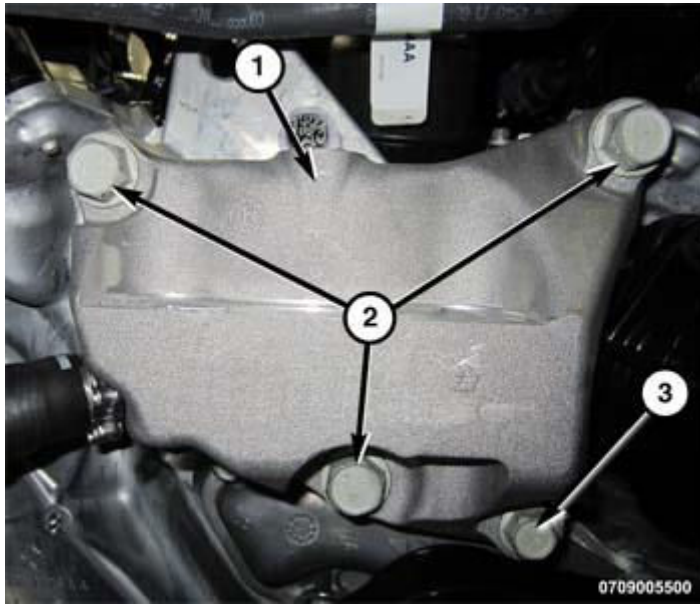


Fig. 134: Engine Mount Bracket & Bolts
Courtesy of CHRYSLER GROUP, LLC

10. slightly raise the engine to install the engine mount bracket (1). Tighten the M8 mounting bolt (3) to the proper specification. Refer to **TORQUE SPECIFICATIONS - GAS** . Tighten the M12 mounting bolts (2) to the proper specification. Refer to **TORQUE SPECIFICATIONS - GAS** .

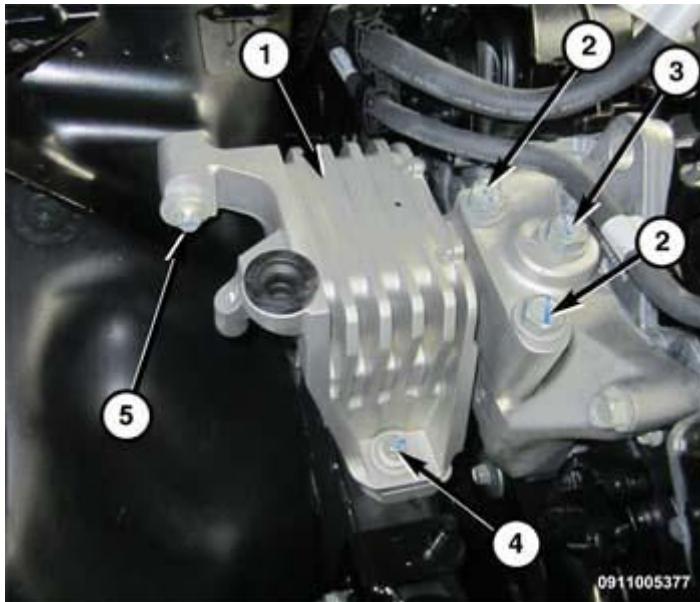


Fig. 135: Removing/Installing Right Engine Mount Assembly
Courtesy of CHRYSLER GROUP, LLC

11. Install the right engine mount isolator (1) and tighten bolts:
 - Align the engine so that the engine is flush against the engine mount.
 - Hand tighten the center engine to engine bracket bolt (3).

- Hand tighten the outer engine to engine bracket bolts (2).
 - Hand start the engine mount to strut tower (5).
 - Tighten mount to frame rail bolts (4) to 65 N.m (48 ft. lbs.).
 - Tighten the mount to strut tower bolt to 65 N.m (48 ft. lbs.).
 - Tighten mount to mount bracket bolts (2, 3) to 72 N.m (53 ft. lbs.).
12. Install the overflow bottle. Refer to **BOTTLE, PRESSURIZED COOLANT, INSTALLATION**.
 13. Install the air cleaner body. Refer to **BODY, AIR CLEANER, INSTALLATION**.
 14. Evacuate air and refill cooling system. Refer to **STANDARD PROCEDURE**.
 15. Remove the engine support fixture.
 16. Connect negative battery cable. Tighten the nut to the proper specification. Refer to **SPECIFICATIONS**.
 17. Check the cooling system for leaks. Refer to **DIAGNOSIS AND TESTING**.

RADIATOR, ENGINE COOLING

REMOVAL

2.0L DIESEL

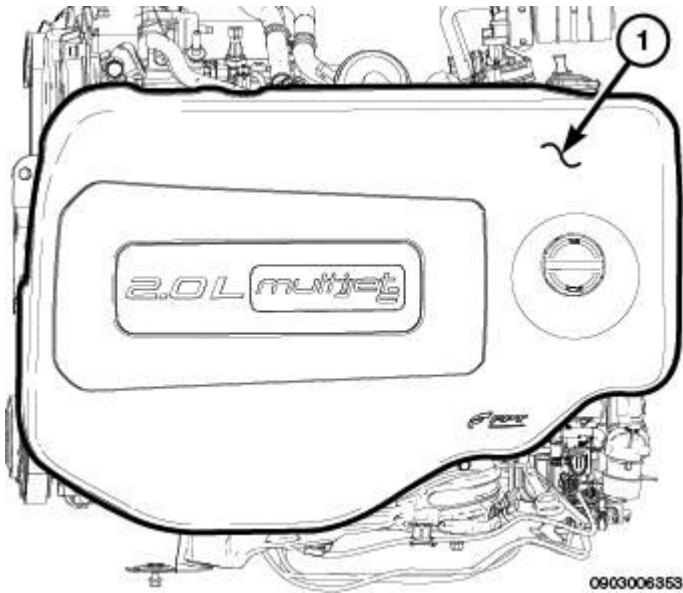


Fig. 136: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the battery negative cable.
2. Remove the engine cover (1).
3. Remove the battery tray. Refer to **TRAY, BATTERY, REMOVAL**.

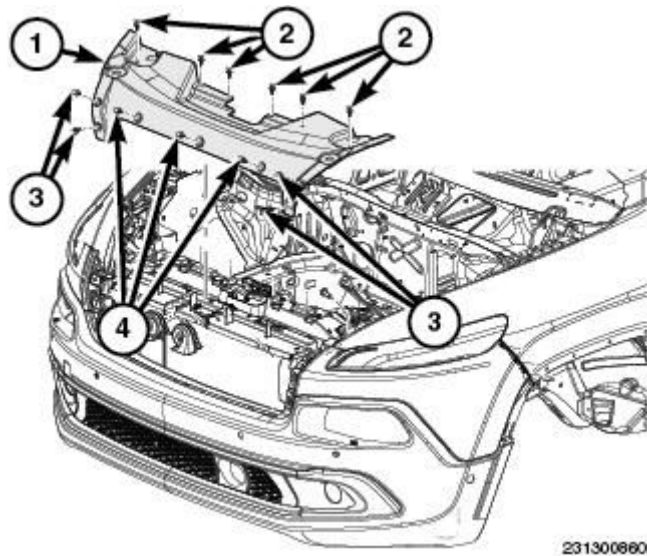


Fig. 137: Upper Close Out Panel Cover Components
Courtesy of CHRYSLER GROUP, LLC

4. Remove fasteners (2, 3, 4) and the upper close out panel cover (1).
5. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
6. Remove the front fascia. Refer to **FASCIA, FRONT, REMOVAL** .
7. Drain the cooling system. Refer to **STANDARD PROCEDURE**.
8. Remove the A/C condenser. Refer to **CONDENSER, A/C, REMOVAL** .
9. Remove the Charge Air Cooler (CAC). Refer to **COOLER AND HOSES, CHARGE AIR, REMOVAL** .

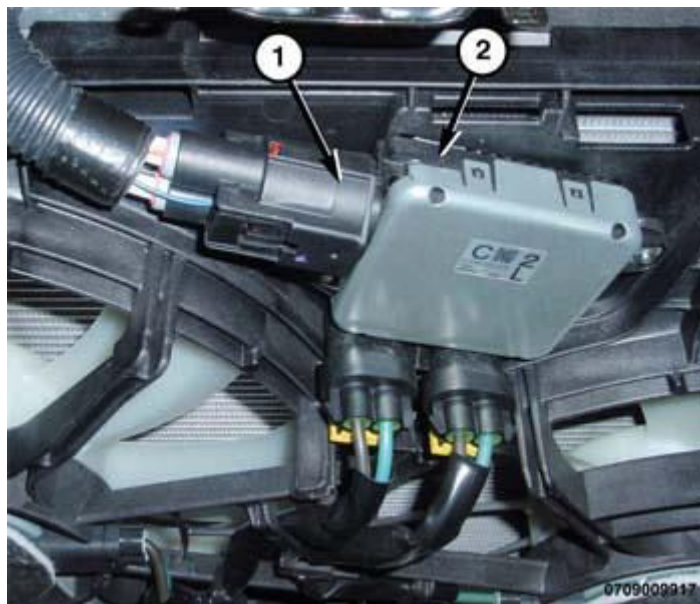


Fig. 138: Cooling Fan Module & Harness Connector
Courtesy of CHRYSLER GROUP, LLC

10. Disconnect the cooling fan module (2) wire harness connector (1).
11. Disconnect the horn wire harness connector.
12. Remove the hood release cable from the air deflector.



Fig. 139: Ambient Air Temperature Sensor & Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

13. Disconnect the ambient air temperature sensor wire harness connector (2).
14. Remove the left side radiator air deflector.
15. Remove the right side radiator air deflector.
16. Remove the washer reservoir. Refer to **RESERVOIR, WINDSHIELD WASHER, REMOVAL** .

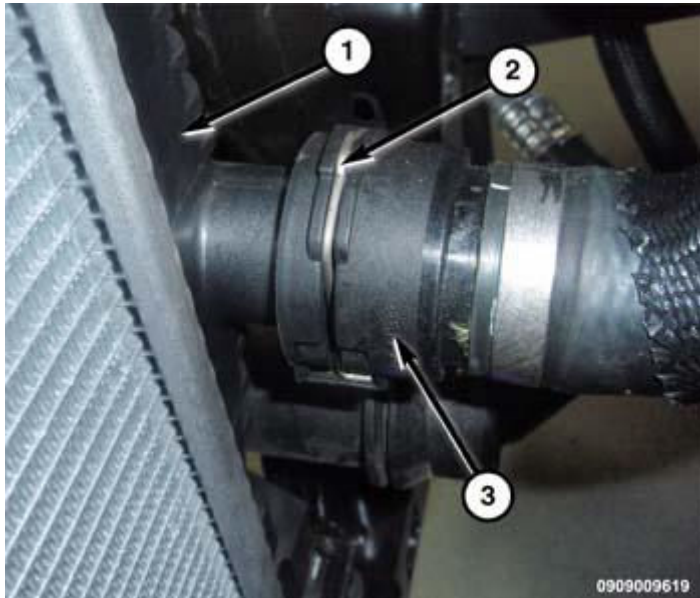


Fig. 140: Removing/Installing Lower Radiator Hose
Courtesy of CHRYSLER GROUP, LLC

17. release clip (2) and remove the lower radiator hose (3).

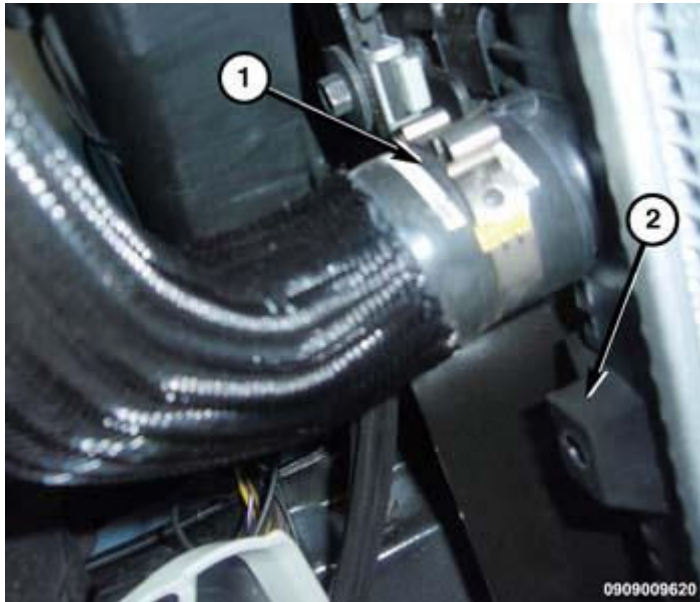


Fig. 141: Removing/Installing Upper Radiator Hose
Courtesy of CHRYSLER GROUP, LLC

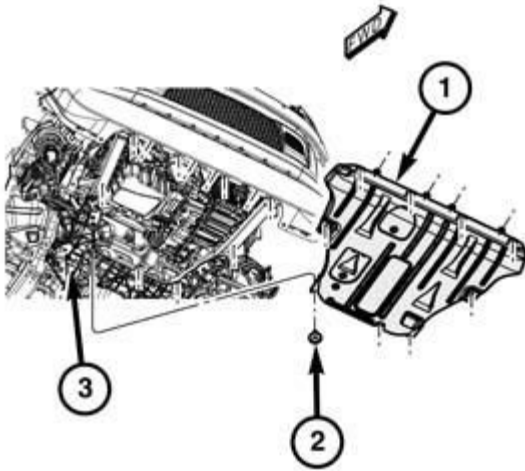
18. Remove the upper radiator hose (1).
19. Remove pushpin retainers securing wire harness and position aside wire harness.
20. Remove the isolators screws from the upper core support from the left and right mounting locators.

NOTE: The radiator and cooling fan should be removed from the top by slightly rotating the components down on the right while tilting the component rearward. The left end of the component should lead out of the vehicle.

21. Remove the radiator from the vehicle.
22. Remove bolts the cooling fan assembly from radiator.

2.4L

1. Disconnect the battery negative cable.
2. Remove the engine cover.
3. Raise the vehicle.



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Fig. 142: Removing/Installing Belly Pans
Courtesy of CHRYSLER GROUP, LLC

4. Remove the lower belly pan.
5. Drain the cooling system. Refer to **STANDARD PROCEDURE**.

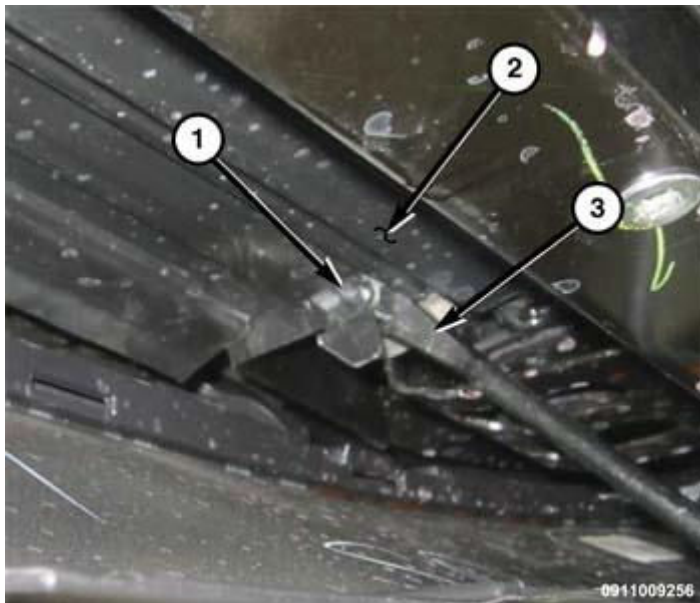


Fig. 143: Push Pins, Side Close Out Deflector & Lower Deflector
Courtesy of CHRYSLER GROUP, LLC

6. Separate the lower air deflector (2).

7. Separate the lower radiator hose at the radiator.

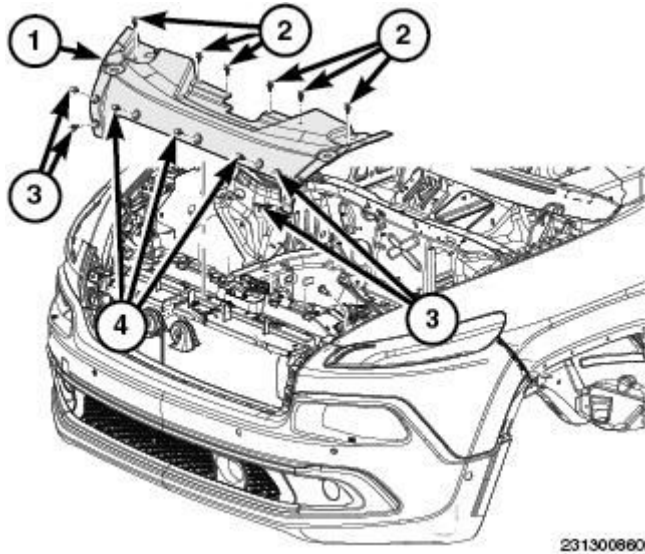


Fig. 144: Upper Close Out Panel Cover Components
Courtesy of CHRYSLER GROUP, LLC

8. Remove the upper close out panel cover (1).

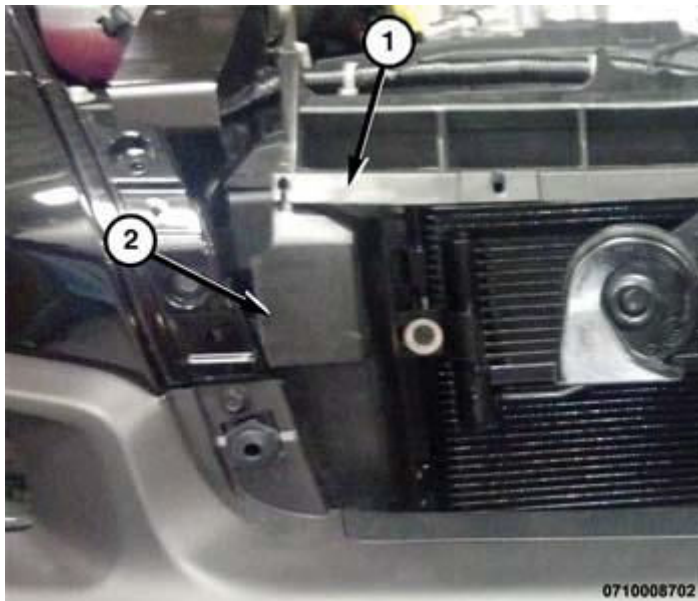


Fig. 145: Side Air Deflectors & Upper Radiator Closeout Panel
Courtesy of CHRYSLER GROUP, LLC

9. Separate the side air deflectors from the upper radiator closeout panel.

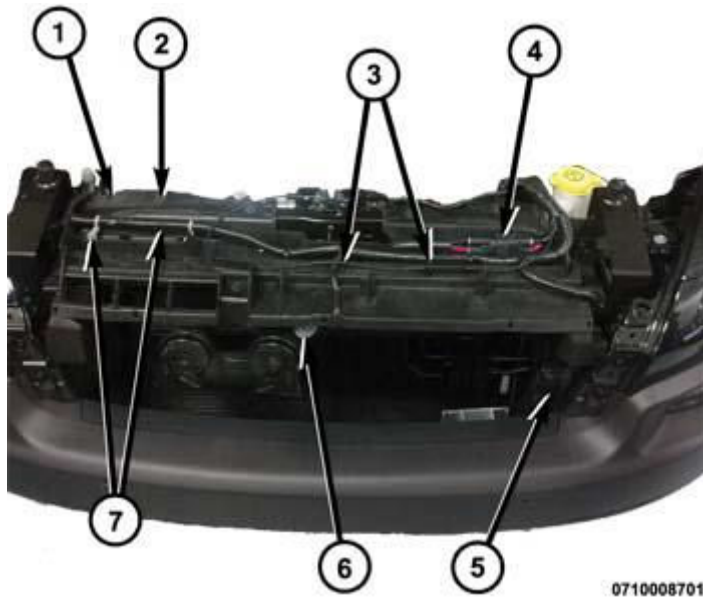


Fig. 146: Removing/Installing Upper Air Deflector
Courtesy of CHRYSLER GROUP, LLC

10. Disconnect the cooling fan module harness connector (4).
11. Disconnect the ambient air temperature sensor (5).
12. Disconnect the horn electrical connectors (6).
13. Remove the hood release cable (3) from the air deflector.
14. Remove the wiring harness (7) from the air deflector.
15. Remove the upper air deflector (1).

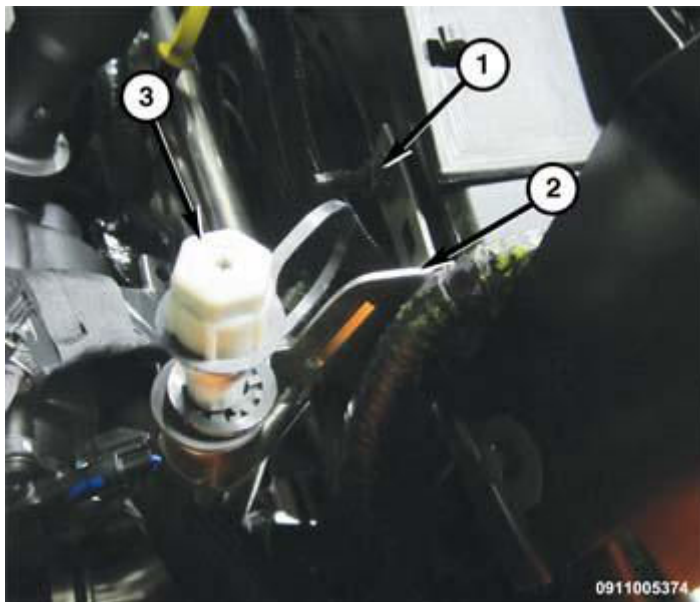


Fig. 147: Removing/Installing A/C Fill Port Support Bracket
Courtesy of CHRYSLER GROUP, LLC

16. Remove the A/C fill port support bracket (2) and position aside.

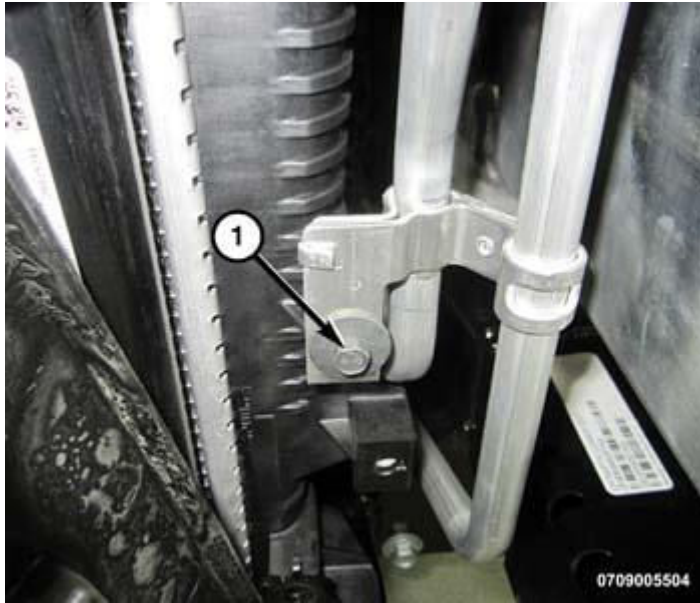


Fig. 148: Removing/Installing Transmission Cooler Line Support Bracket Bolt
Courtesy of CHRYSLER GROUP, LLC

17. Separate the transmission cooler line support brace bolt (1).

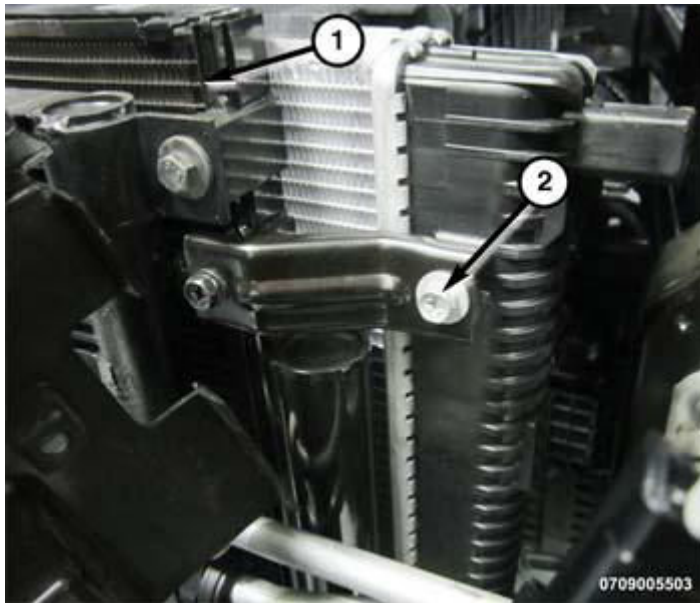


Fig. 149: Radiator & Bolt
Courtesy of CHRYSLER GROUP, LLC

18. Separate the condenser from the radiator (1).

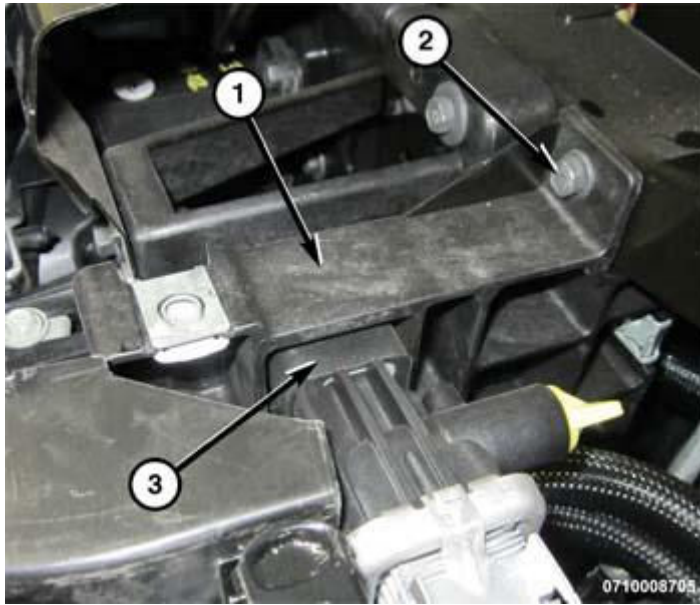
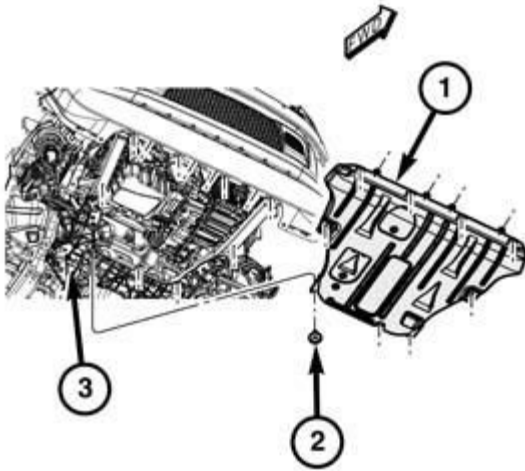


Fig. 150: Removing/Installing Upper Radiator Mounts
Courtesy of CHRYSLER GROUP, LLC

19. Separate the upper radiator hose from the upper cross over pipe.
20. Remove the upper radiator mounts (1).
21. Disconnect the electrical connector at the cooling fan module.
22. Remove the radiator from the vehicle.
23. Remove the radiator fan assembly.

3.2L

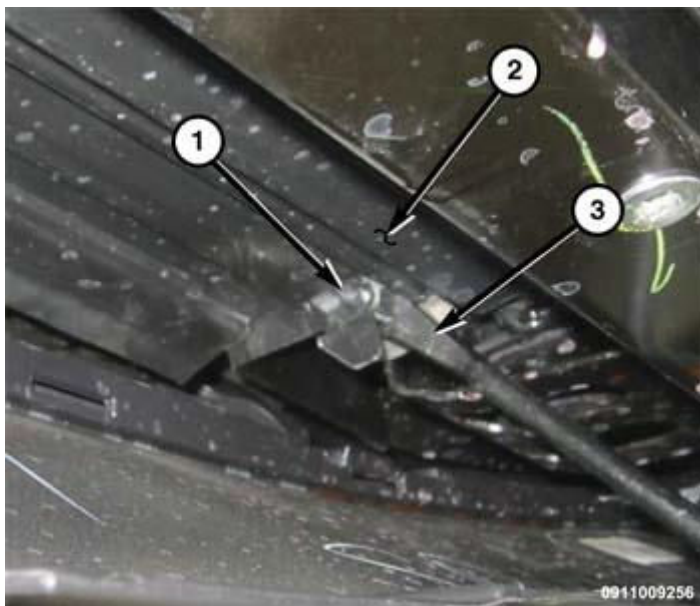
1. Disconnect the battery negative cable.
2. Remove the engine cover.
3. Raise the vehicle.



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Fig. 151: Removing/Installing Belly Pans
Courtesy of CHRYSLER GROUP, LLC

4. Remove the lower belly pan.
5. Separate the lower radiator hose at the radiator.
6. Drain the cooling system. Refer to **STANDARD PROCEDURE**.



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Fig. 152: Push Pins, Side Close Out Deflector & Lower Deflector
Courtesy of CHRYSLER GROUP, LLC

7. Separate the lower air deflector.
8. Remove the engine cover.

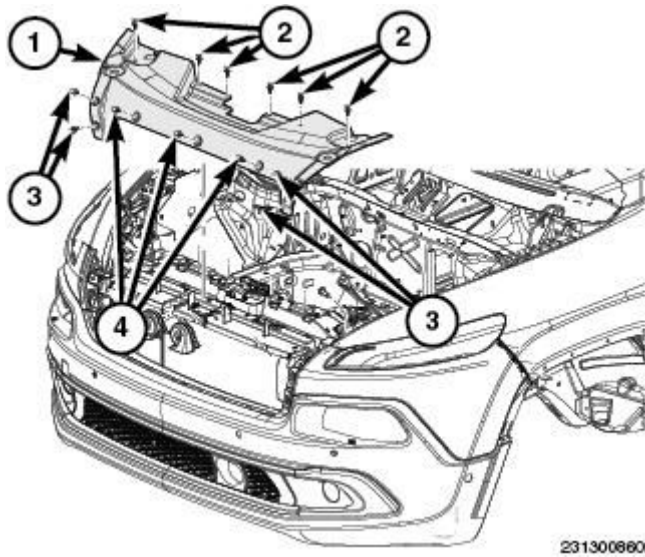


Fig. 153: Upper Close Out Panel Cover Components
Courtesy of CHRYSLER GROUP, LLC

9. Remove the upper close out panel cover (1).

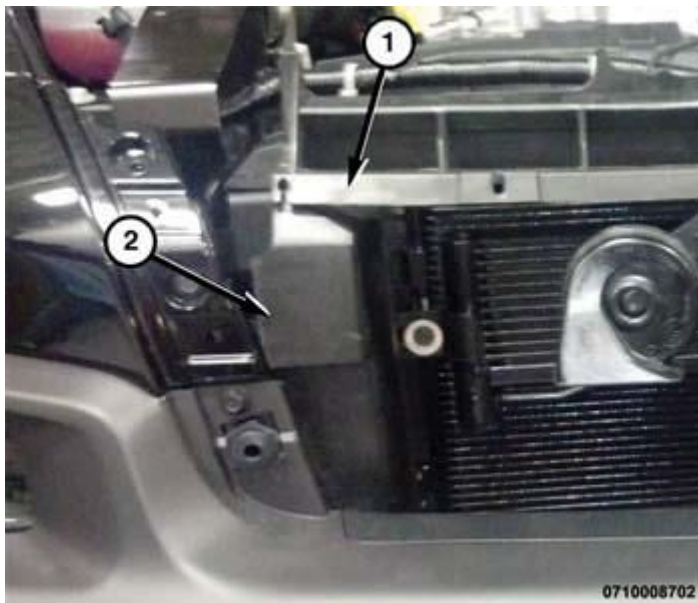


Fig. 154: Side Air Deflectors & Upper Radiator Closeout Panel
Courtesy of CHRYSLER GROUP, LLC

10. Separate the side air deflectors from the upper radiator closeout panel.

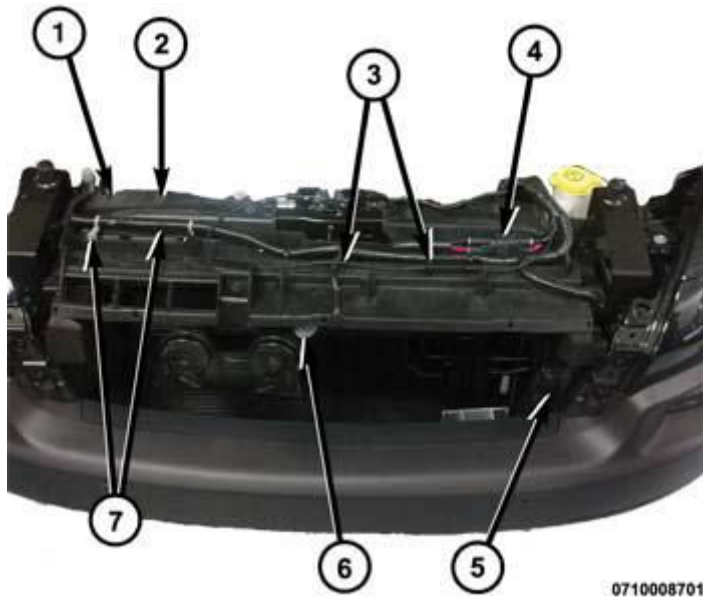


Fig. 155: Removing/Installing Upper Air Deflector
Courtesy of CHRYSLER GROUP, LLC

11. Disconnect the cooling fan module harness connector (4).
12. Disconnect the ambient air temperature sensor (5).
13. Disconnect the horn electrical connectors (6).
14. Remove the hood release cable (3) from the air deflector.
15. Remove the wiring harness (7) from the air deflector.
16. Remove the upper air deflector (1).

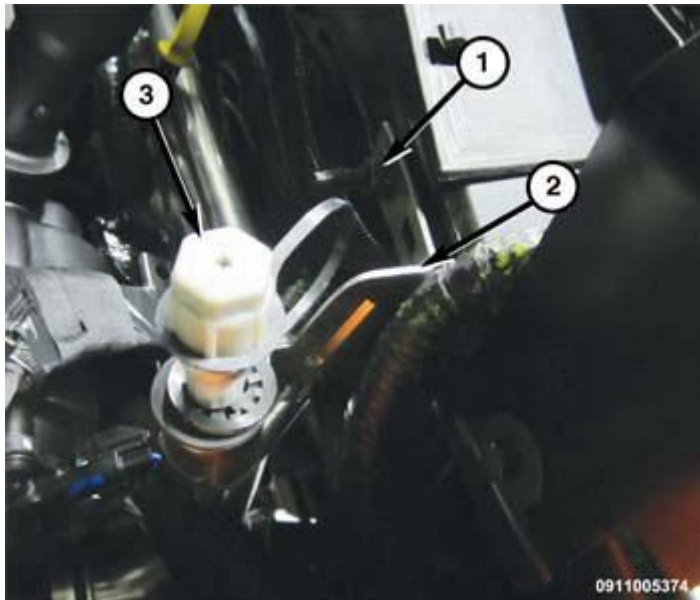


Fig. 156: Removing/Installing A/C Fill Port Support Bracket
Courtesy of CHRYSLER GROUP, LLC

17. Remove the A/C fill port support bracket (2) and position aside.

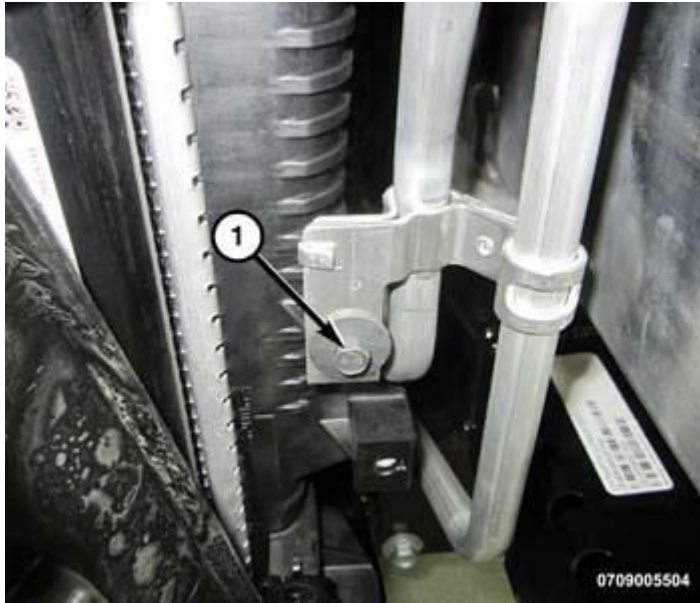


Fig. 157: Removing/Installing Transmission Cooler Line Support Bracket Bolt
Courtesy of CHRYSLER GROUP, LLC

18. Separate the transmission cooler line support brace bolt (1).

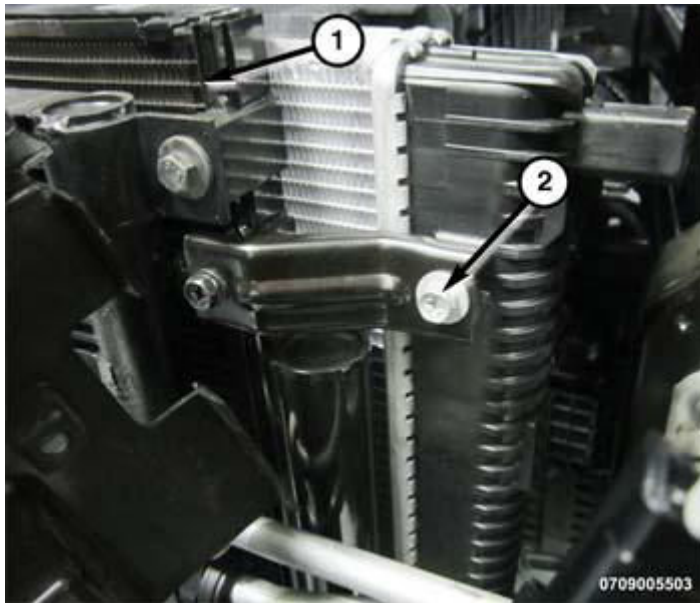


Fig. 158: Radiator & Bolt
Courtesy of CHRYSLER GROUP, LLC

19. Separate the condenser from the radiator (1).

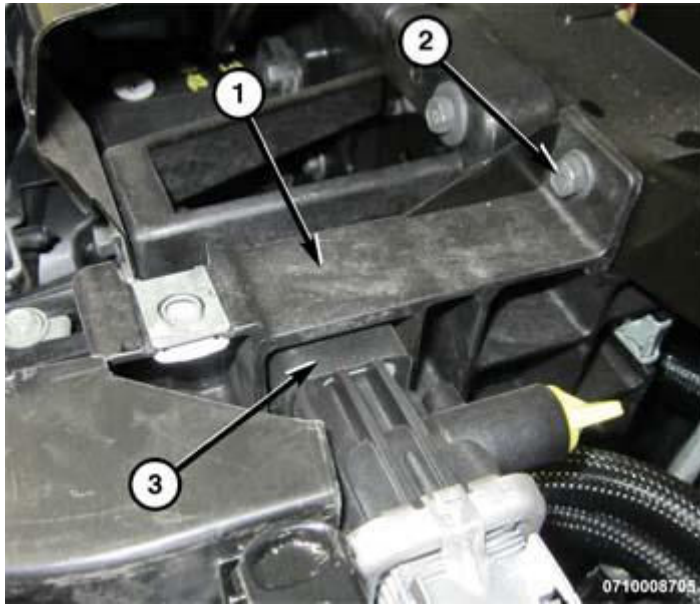


Fig. 159: Removing/Installing Upper Radiator Mounts
Courtesy of CHRYSLER GROUP, LLC

20. Separate the upper radiator hose from the upper cross over pipe.
21. Remove the upper radiator mounts (1).

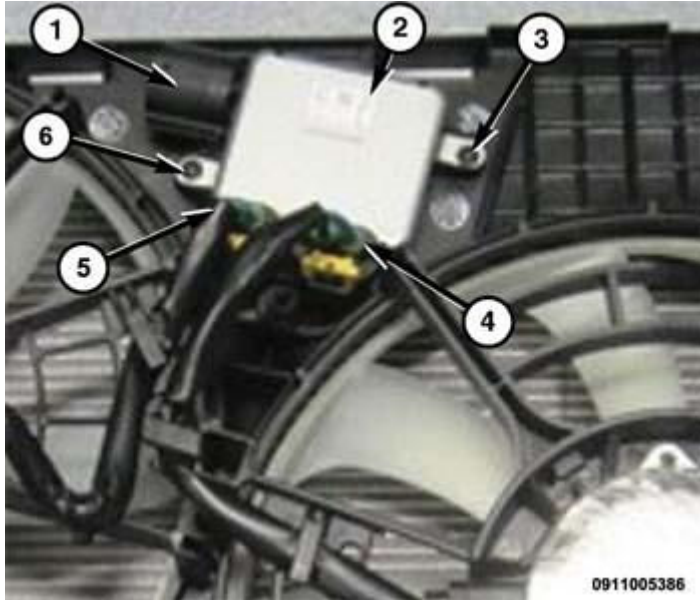
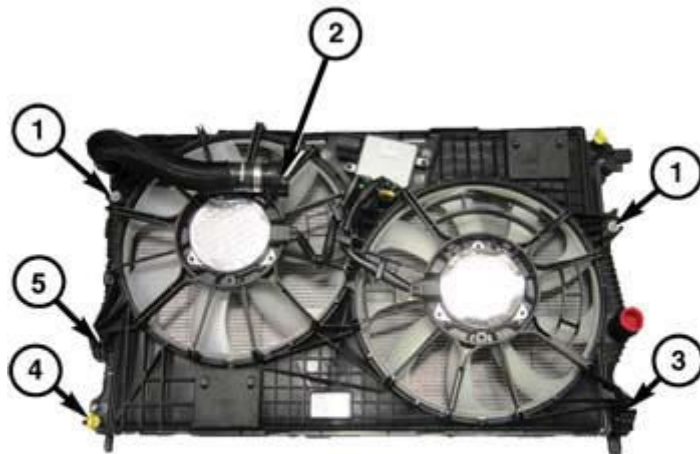


Fig. 160: Removing/Installing Fan Assembly
Courtesy of CHRYSLER GROUP, LLC

22. Disconnect the electrical connector (1) at the cooling fan module (2).
23. Remove the radiator from the vehicle.



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Fig. 161: Fan Assembly & Components
Courtesy of CHRYSLER GROUP, LLC

24. Remove the upper radiator hose (2).
25. Remove the radiator fan assembly.

INSTALLATION

2.0L DIESEL

NOTE: Care must be taken not to damage the radiator cooling fins and tubes during installation.

1. Install the cooling fan onto radiator. Tighten fasteners to 6 N.m (55 in. lbs.).
2. Install the radiator fan/shroud assembly.
3. Install the left and right mounting isolators. Tighten bolts to 8 N.m (71 in. lbs.).
4. Position the wire harness and install the pushpin retainers to secure wire harness.
5. Install the two remaining lower radiator fan shroud fasteners to radiator. Tighten fasteners to 6 N.m (53 in. lbs.).

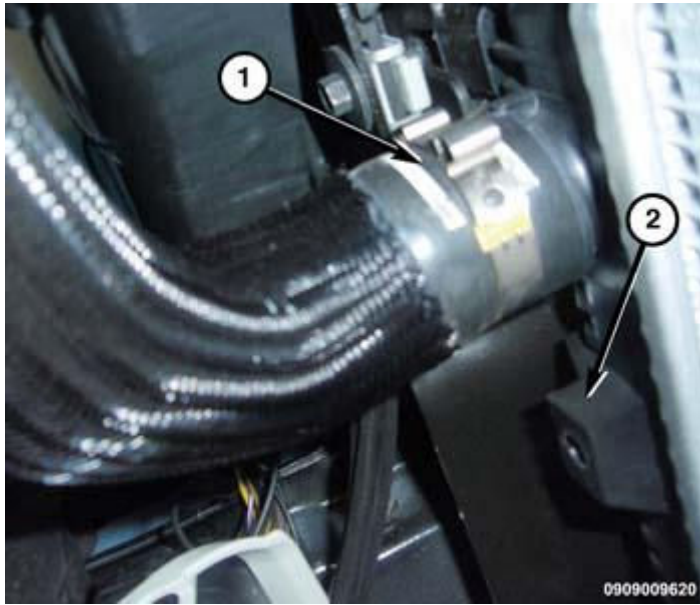


Fig. 162: Removing/Installing Upper Radiator Hose
Courtesy of CHRYSLER GROUP, LLC

6. Lower the vehicle.
7. Connect the upper radiator hose (1).

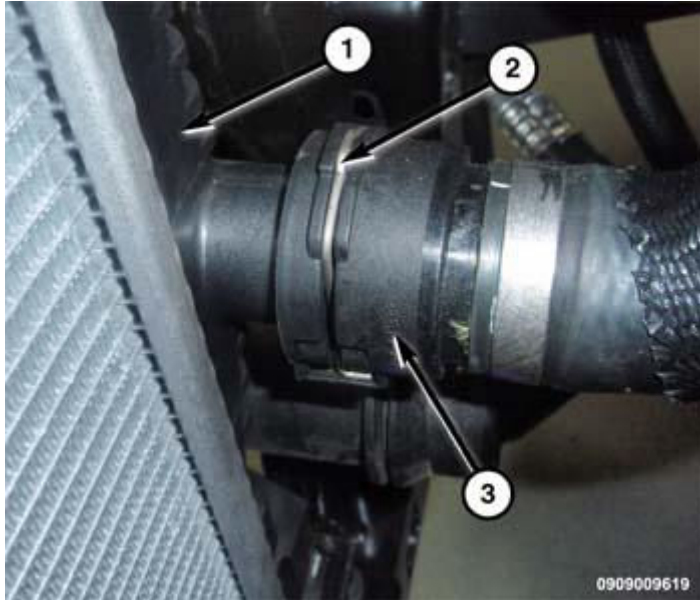


Fig. 163: Removing/Installing Lower Radiator Hose
Courtesy of CHRYSLER GROUP, LLC

8. Connect the lower radiator hose (3) and lock clip (2).

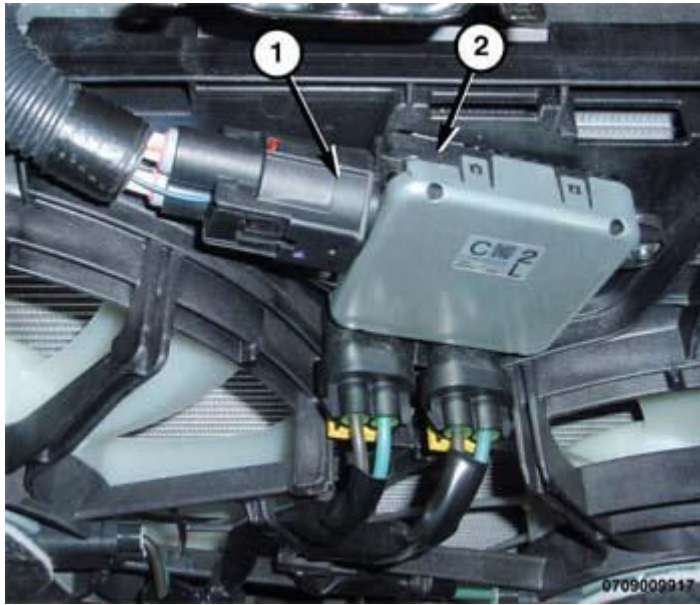


Fig. 164: Cooling Fan Module & Harness Connector
Courtesy of CHRYSLER GROUP, LLC

9. Install the washer reservoir. Refer to **RESERVOIR, WINDSHIELD WASHER, INSTALLATION**.
10. Install the right side radiator air deflector.
11. Install the left side radiator air deflector.



Fig. 165: Ambient Air Temperature Sensor & Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

12. Connect the ambient air temperature sensor wire harness connector (2).
13. Install the hood release cable from the air deflector.

14. Connect the horn wire harness connector.
15. Connect the cooling fan module wire harness connector (1).
16. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
17. Install the A/C condenser. Refer to **CONDENSER, A/C, INSTALLATION** .
18. Install the Charge Air Cooler (CAC). Refer to **COOLER AND HOSES, CHARGE AIR, INSTALLATION** .
19. Install the front fascia. Refer to **FASCIA, FRONT, INSTALLATION** .
20. Lower the vehicle.

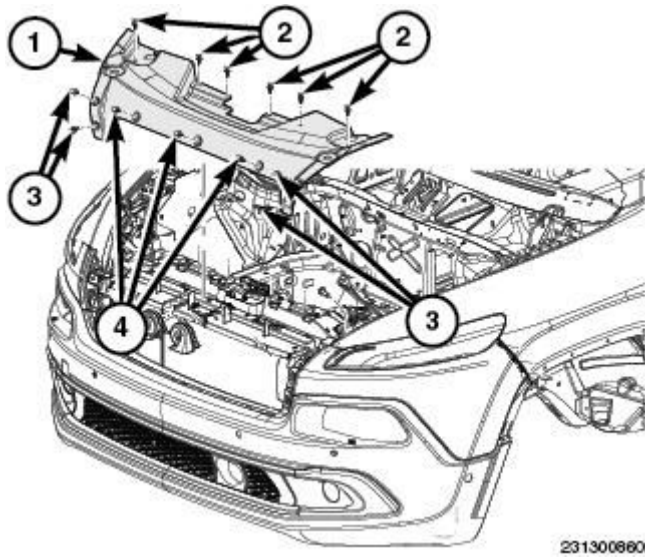


Fig. 166: Upper Close Out Panel Cover Components
Courtesy of CHRYSLER GROUP, LLC

21. Install the upper close out panel cover (1) and fasteners (2, 3, 4).

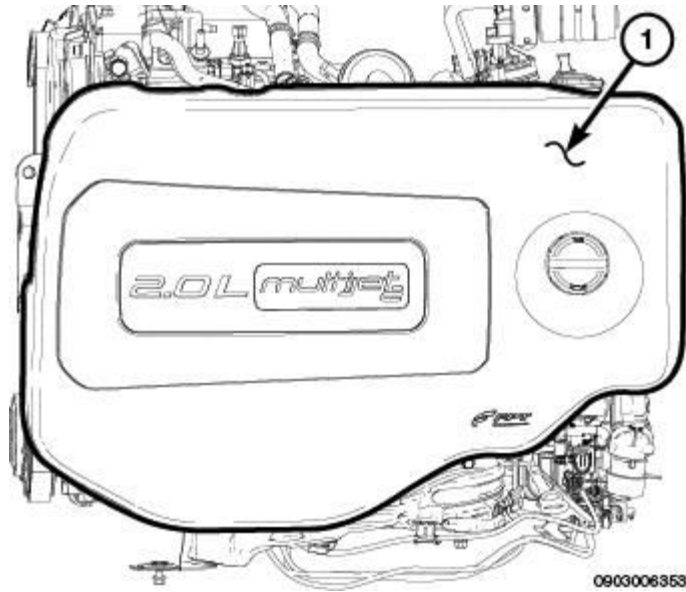


Fig. 167: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

22. Fill the cooling system with appropriate coolant. Refer to **STANDARD PROCEDURE**.
23. Install the battery tray. Refer to **TRAY, BATTERY, INSTALLATION**.
24. Install the engine cover (1).
25. Connect the negative battery cable.
26. Operate the engine until it reaches normal operating temperature. Check the cooling system for correct fluid level.

2.4L

1. Install the cooling fan onto the radiator. Tighten to bolts 8 N.m (70 in. lbs.)
- .
2. Install the upper radiator hose.

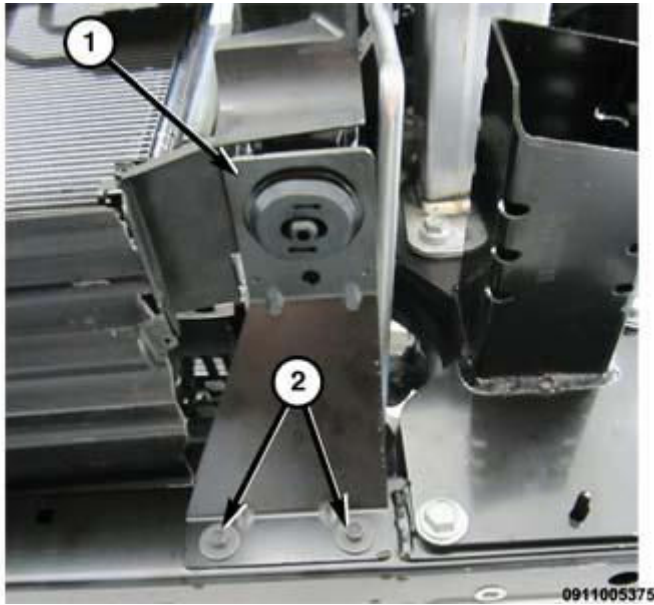


Fig. 168: Lower Mounting Isolator & Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Position the radiator into the lower mounting (1) isolators on the radiator lower support.

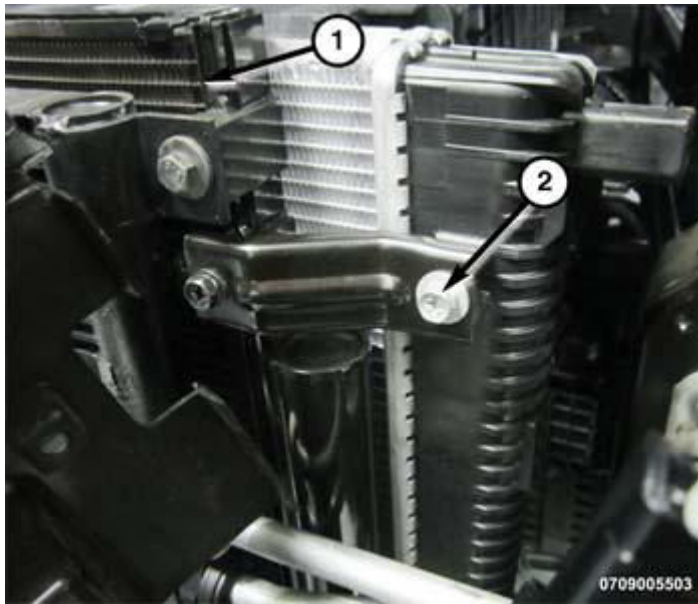


Fig. 169: Radiator & Bolt
Courtesy of CHRYSLER GROUP, LLC

4. Install the condenser to the radiator (1). Tighten the bolts (2) to 8 N.m (70 in. lbs.).

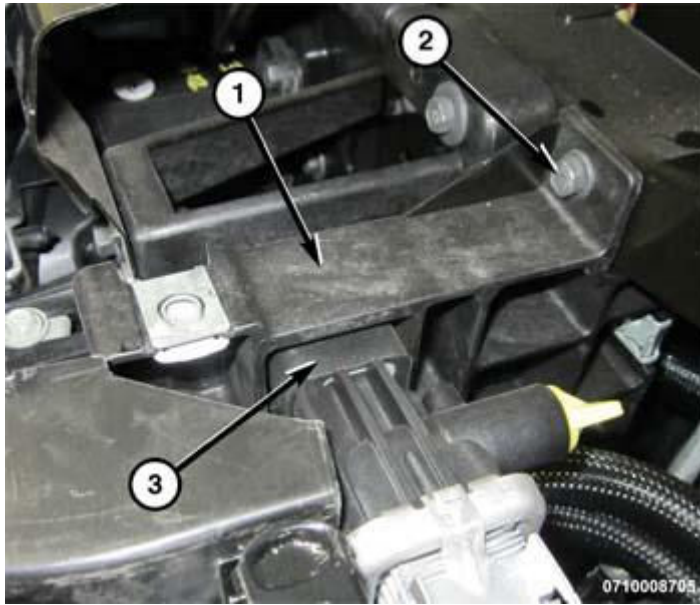


Fig. 170: Removing/Installing Upper Radiator Mounts
Courtesy of CHRYSLER GROUP, LLC

5. Install the upper radiator mounts (1). Tighten bolts to 11 N.m (97 in. lbs.).
6. Fill and bleed the cooling system. Refer to **STANDARD PROCEDURE**.
7. Connect the battery negative cable.

3.2L

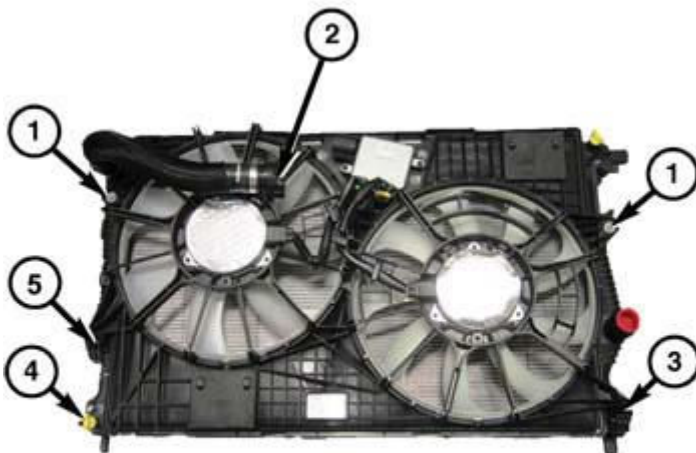


Fig. 171: Fan Assembly & Components
Courtesy of CHRYSLER GROUP, LLC

1. Install the cooling fan onto the radiator. Tighten to bolts (1) 9 N.m (80 in. lbs.).

2. Install the upper radiator hose (2).

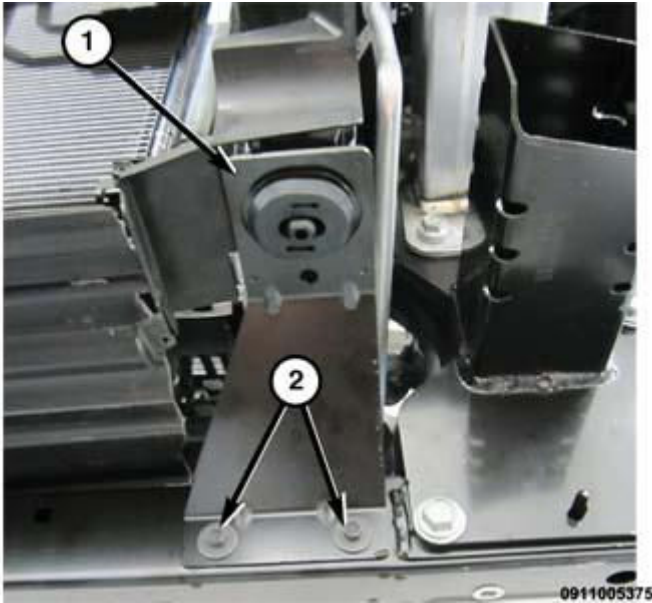


Fig. 172: Lower Mounting Isolator & Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Position the radiator into the lower mounting (1) isolators on the radiator lower support.

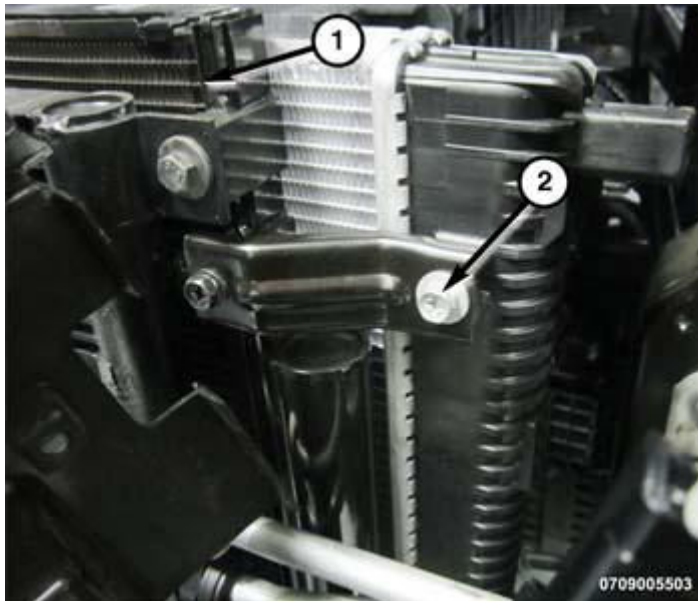


Fig. 173: Radiator & Bolt
Courtesy of CHRYSLER GROUP, LLC

4. Install the condenser to the radiator (1). Tighten the bolts (2) to 8 N.m (70 in. lbs.).

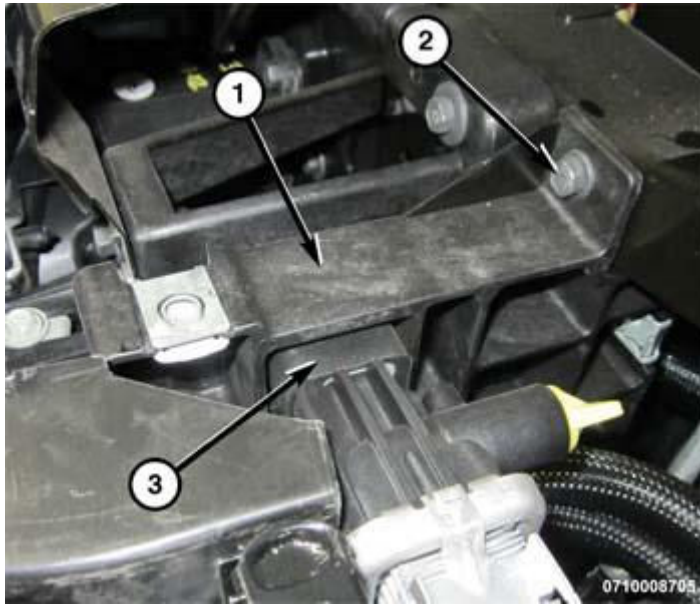


Fig. 174: Removing/Installing Upper Radiator Mounts
Courtesy of CHRYSLER GROUP, LLC

5. Install the upper radiator mounts (1). Tighten bolts to 9 N.m (80 in. lbs.).
6. Install the upper radiator hose
7. Connect the battery negative cable.

SENSOR, COOLANT TEMPERATURE

REMOVAL

2.0L DIESEL

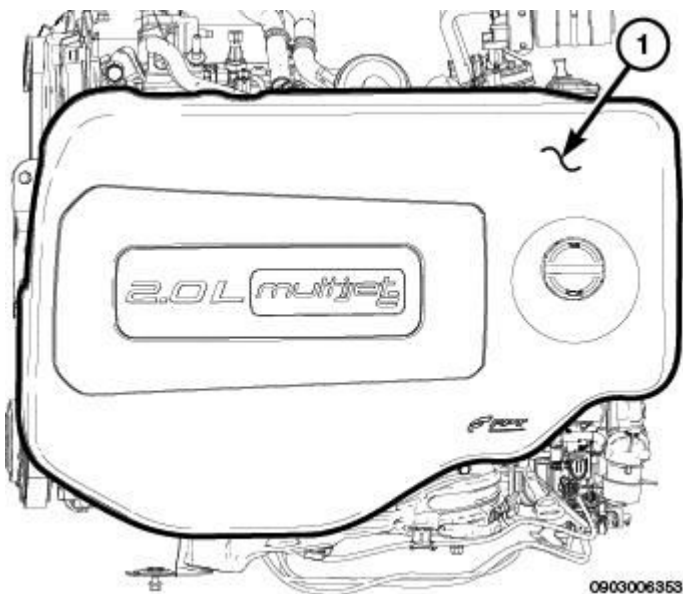


Fig. 175: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

The Engine Coolant Temperature (ECT) sensor on the 2.0L engine is installed at the front of the cylinder head below the vacuum pump located on the EGR coolant control valve housing.

WARNING: Hot, pressurized coolant can cause injury by scalding. Cooling system must be partially drained before removing the coolant temperature sensor.

NOTE: Do not waste reusable coolant. If solution is clean, drain coolant into a clean container for reuse.

1. Disconnect and isolate the negative battery cable.
2. Remove the engine cover (1).
3. Partially drain the cooling system. Refer to **STANDARD PROCEDURE**.

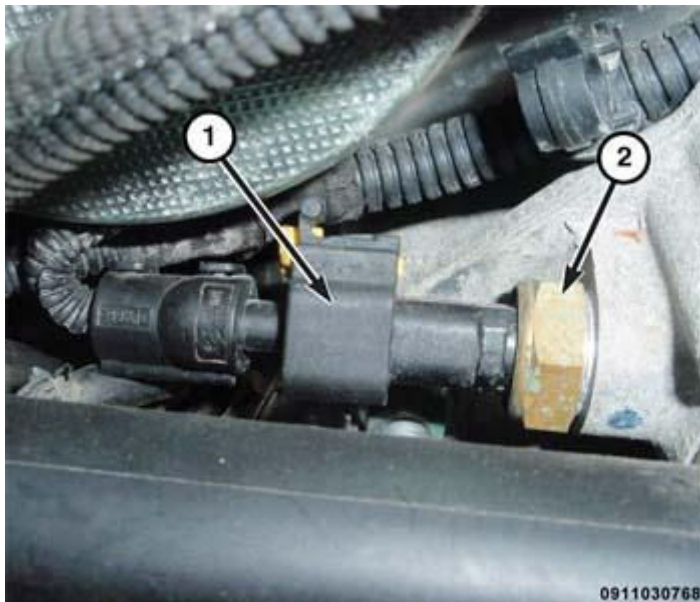


Fig. 176: Cooling Temperature Sensor & Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the Engine Cooling Temperature (ECT) sensor wire harness connector (1).
5. Remove the ECT sensor (2) from the EGR coolant control valve housing.

2.4L

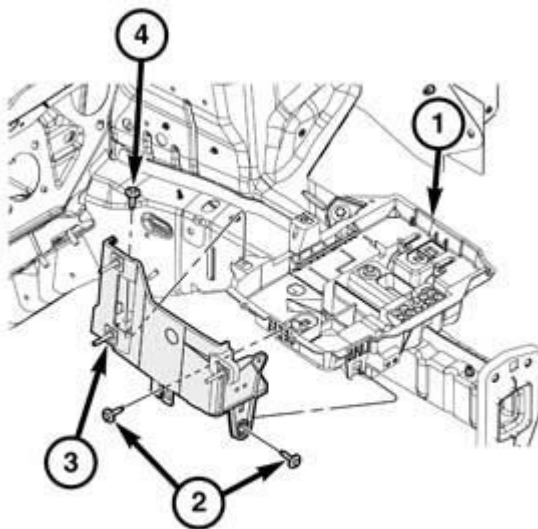
CAUTION: Do not loosen radiator draincock with system hot and pressurized. Serious burns from coolant can occur.

1. Remove the engine cover.
2. Disconnect and isolate the battery negative cable.
3. Raise and support the vehicle.
4. Remove the belly pan.
5. Drain the cooling system.
6. Lower vehicle.
7. Remove the battery

Refer to **BATTERY, REMOVAL** .

8. Remove the PCM

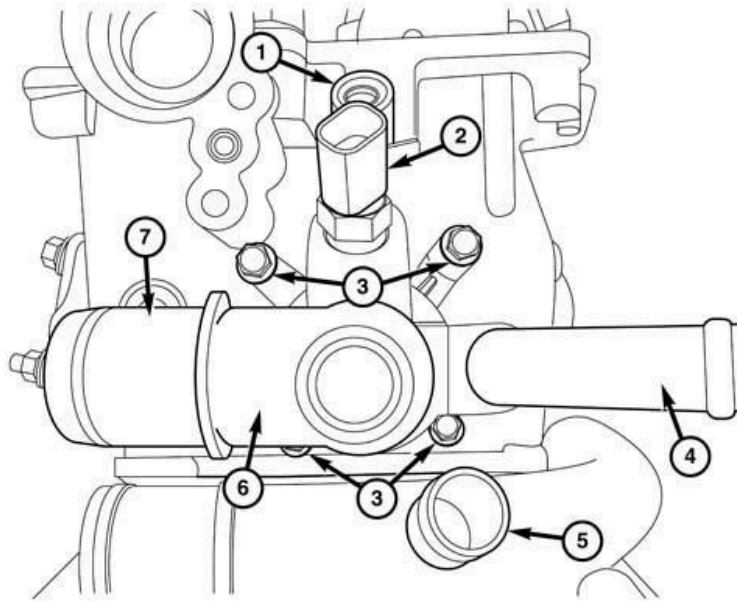
Refer to **MODULE, POWERTRAIN CONTROL, REMOVAL** .



0909005842

Fig. 177: Battery Tray, PCM Mount & Bolts
Courtesy of CHRYSLER GROUP, LLC

9. Remove the PCM mount bolts (2 & 4).
10. Remove the PCM mount (3) from the battery tray (1).

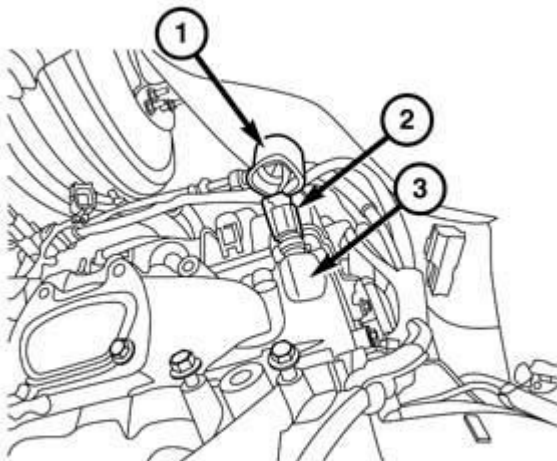


091072940

Fig. 178: Thermostat Housing, Hose Outlets/Inlets & Coolant Temperature Sensor
Courtesy of CHRYSLER GROUP, LLC

11. Disconnect the engine coolant temperature sensor harness connector.
12. Remove the engine coolant temperature sensor (2).

3.2L



090873114

Fig. 179: Identifying Engine Coolant Temperature Sensor
Courtesy of CHRYSLER GROUP, LLC

The Engine Coolant Temperature (ECT) sensor on the 3.2L engine is installed into a water jacket at rear of the cylinder head on the left side of the engine.

WARNING: Hot, pressurized coolant can cause injury by scalding. Cooling system must be partially drained before removing the coolant temperature sensor.

NOTE: Do not waste reusable coolant. If solution is clean, drain coolant into a clean container for reuse.

1. Partially raise the vehicle.
2. Partially drain the cooling system. Refer to **STANDARD PROCEDURE**.
3. Lower the vehicle.
4. Slide the heat shield (1) away from the temperature sensor (2).
5. Disconnect the electrical connector from the temperature sensor.
6. Remove the sensor from the cylinder head (3).

INSTALLATION

2.0L DIESEL

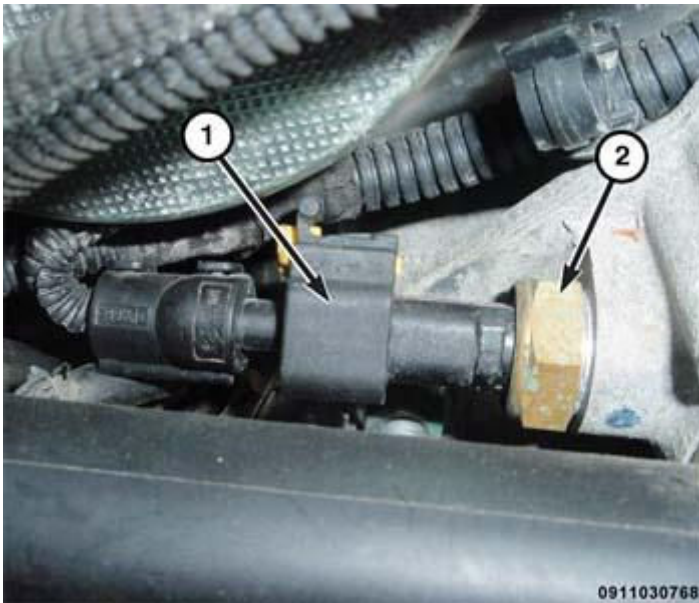


Fig. 180: Cooling Temperature Sensor & Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

1. Apply MOPAR® thread sealant with PFTE part number 04318034 to sensor threads.
2. Install the Engine Cooling Temperature (ECT) sensor (2) to cylinder head. Tighten sensor to 11 N.m (97 in. lbs.).
3. Connect the ECT sensor wire harness connector (1).

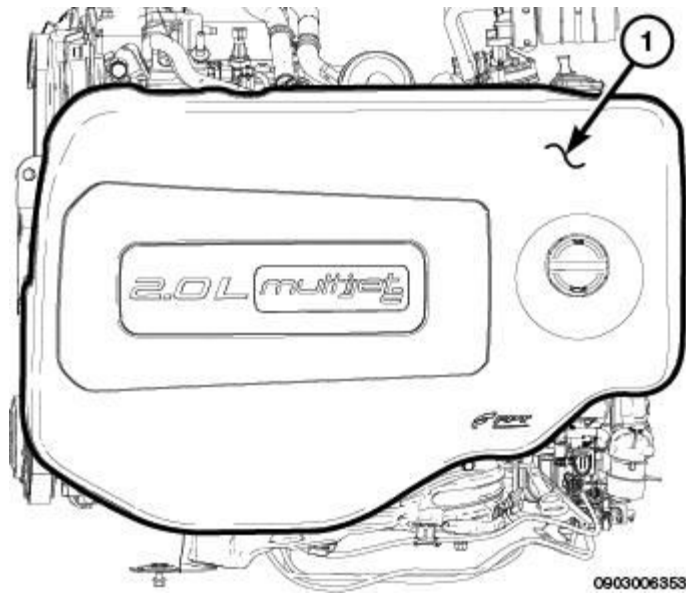


Fig. 181: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

4. Install the engine cover.
5. Replace any lost engine coolant. Refer to **STANDARD PROCEDURE**.
6. Connect the negative battery cable.

2.4L

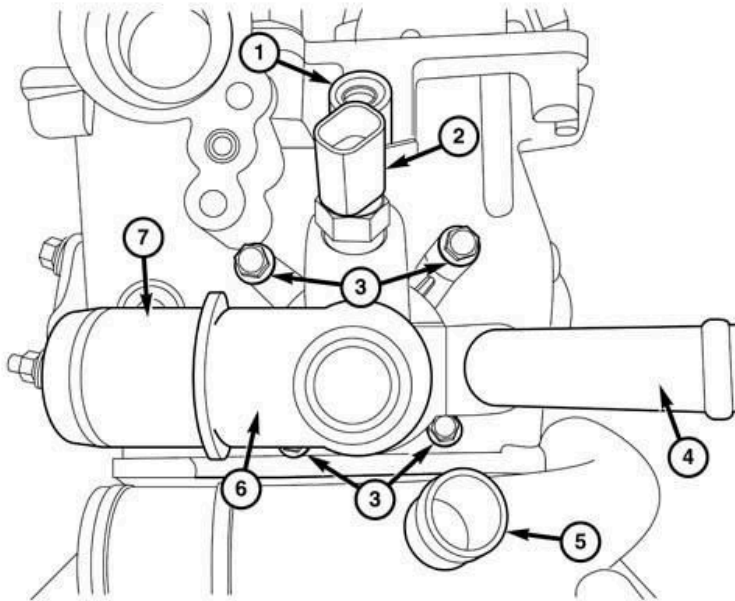


Fig. 182: Thermostat Housing, Hose Outlets/Inlets & Coolant Temperature Sensor
Courtesy of CHRYSLER GROUP, LLC

1. Install the engine coolant temperature sensor (2).
2. Connect the connector.

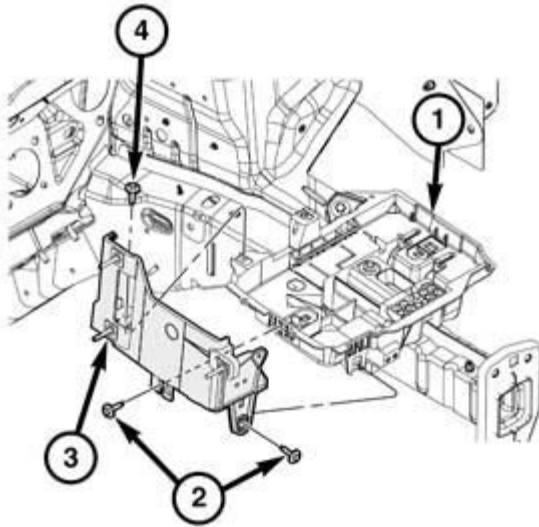


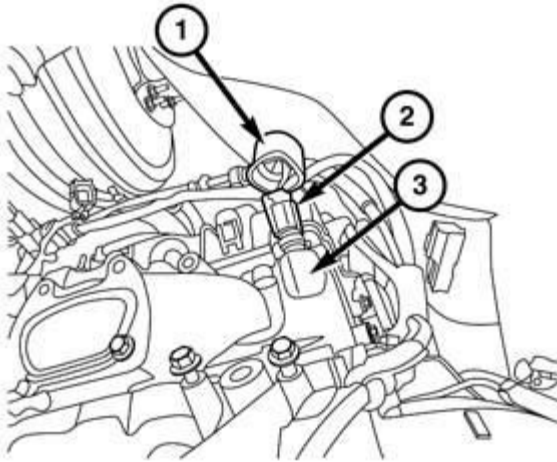
Fig. 183: Battery Tray, PCM Mount & Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Install the PCM mount (3) to the battery tray (1).
4. Install the PCM mount bolts (2 & 4).
5. Install the PCM

Refer to **MODULE, POWERTRAIN CONTROL, INSTALLATION** .

6. Install the battery. Tighten the clamp nut to 5 N.m (44 in. lbs.).
7. Fill the cooling system. Refer to **STANDARD PROCEDURE**.
8. Install the engine cover.

3.2L



090873114

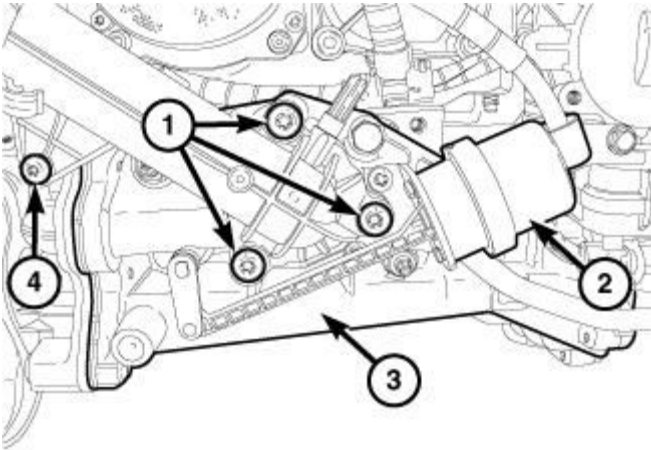
Fig. 184: Identifying Engine Coolant Temperature Sensor
Courtesy of CHRYSLER GROUP, LLC

1. Apply MOPAR® thread sealant with PFTE to sensor threads.
2. Install sensor (2) to cylinder head (3).
3. Tighten sensor to 30 N.m (22 ft. lbs.).
4. Connect electrical connector to temperature sensor.
5. Replace any lost engine coolant. Refer to **STANDARD PROCEDURE**.

THERMOSTAT

DESCRIPTION

2.0L DIESEL



3387839

Fig. 185: Thermostat Housing Mounting Bolts & Lower Thermostat Support Brace Bolt
Courtesy of CHRYSLER GROUP, LLC

The thermostat for the 2.0L diesel engines is located on the left side of the engine by the EGR cooler manifold. The thermostat housing is equipped with an air bleed vent.

OPERATION

OPERATION

The engine cooling thermostat is a wax pellet driven, reverse poppet choke type. The thermostat is designed to provide the fastest warm up possible operating temperature of 88°C (190°F). The thermostat also will automatically reach wide open so it will not restrict flow to the radiator as temperature of the coolant rises in hot weather. Above this temperature the coolant temperature is controlled by the radiator, fan, and ambient temperature, not the thermostat.

REMOVAL

2.0L DIESEL

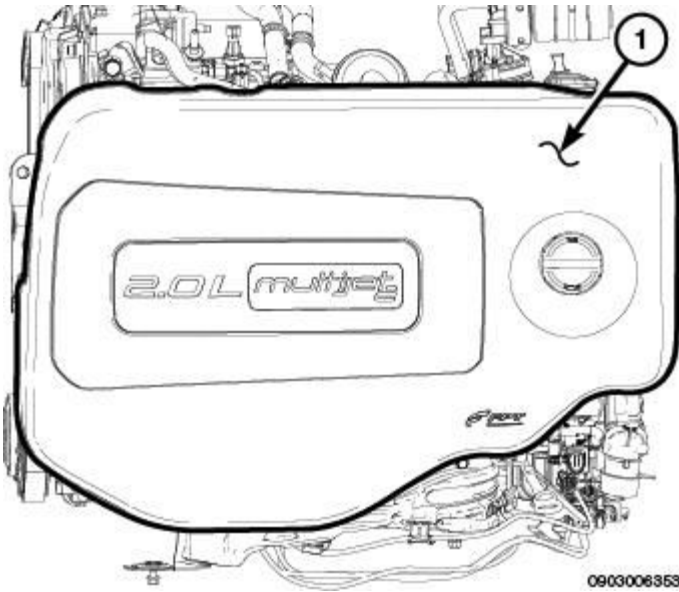


Fig. 186: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).
3. Drain the cooling system. Refer to **STANDARD PROCEDURE**.

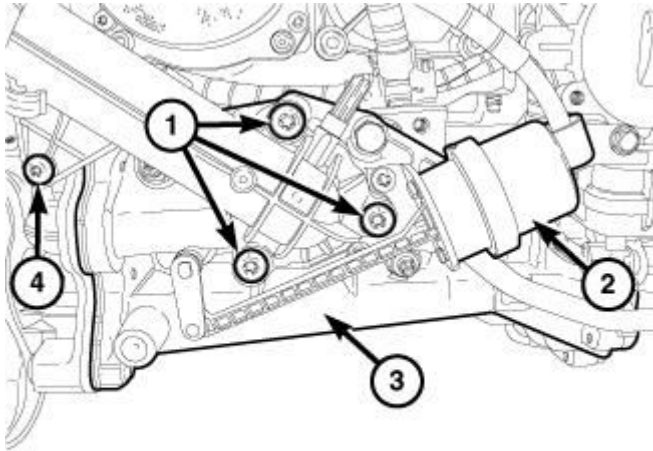


Fig. 187: Thermostat Housing & Hoses

Courtesy of CHRYSLER GROUP, LLC

4. Remove the coolant hose (2) from the thermostat housing.
5. Remove the upper radiator hose (1) from the thermostat housing.

6. Remove the left charge Air Cooler (CAC) hose. Refer to **COOLER AND HOSES, CHARGE AIR, REMOVAL**.



3387839

Fig. 188: Thermostat Housing Mounting Bolts & Lower Thermostat Support Brace Bolt
Courtesy of CHRYSLER GROUP, LLC

7. Remove bolts (1) and the thermostat housing.

2.4L

CAUTION: Do not loosen radiator draincock with system hot and pressurized. Serious burns from coolant can occur.

CAUTION: The Thermostat and housing is serviced as an assembly. Do not remove the thermostat from the housing, damage to the thermostat may occur.

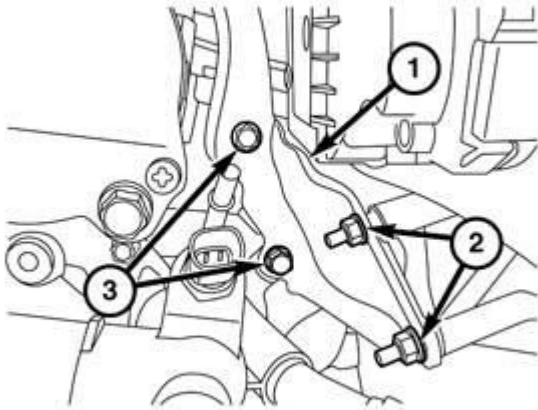
1. Remove the engine cover.
2. Disconnect and isolate the battery negative cable.
3. Raise and support the vehicle.
4. Remove the belly pan.
5. Drain the cooling system.
6. Lower vehicle.
7. Remove the battery.
8. Remove the battery tray assembly

Refer to **TRAY, BATTERY, REMOVAL**.

9. Remove the brake vacuum pump

Refer to **PUMP, VACUUM, REMOVAL** .

10. Remove the three bolts that attach the PDC to the body.
11. Position the PDC to the side to allow for thermostat housing removal.

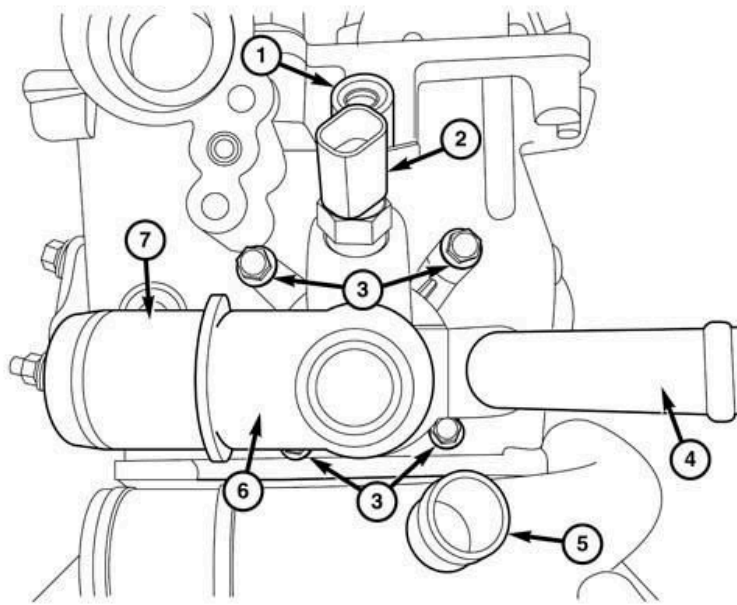


091468958

Fig. 189: Intake Manifold Upper Support Bracket, Bolts & Nuts
Courtesy of CHRYSLER GROUP, LLC

12. Remove the intake manifold upper support bracket (1) bolts (3).
13. Loosen but do not remove the bracket nuts (2).

NOTE: **The bracket can not be removed at this time, loosening the nuts allow the necessary movement for the thermostat housing to be removed.**



091072940

Fig. 190: Thermostat Housing, Hose Outlets/Inlets & Coolant Temperature Sensor
Courtesy of CHRYSLER GROUP, LLC

14. Remove the coolant recovery bottle return hose (1).
15. Disconnect the engine coolant temperature sensor harness connector (2).
16. Disconnect the forward most shift cable from the transmission lever.
17. Remove the heater core supply hose (4). (special tool #10288, Pliers, Hose Clamp)
18. Using Special Tool 10288, release the clamps at the heater core return (5) and thermostat outlet (7).
19. Remove the heater core return hose (5).
20. Remove the thermostat outlet hose (7).
21. Remove the thermostat housing bolts (3).
22. Remove the thermostat housing (6) from the engine.

3.2L

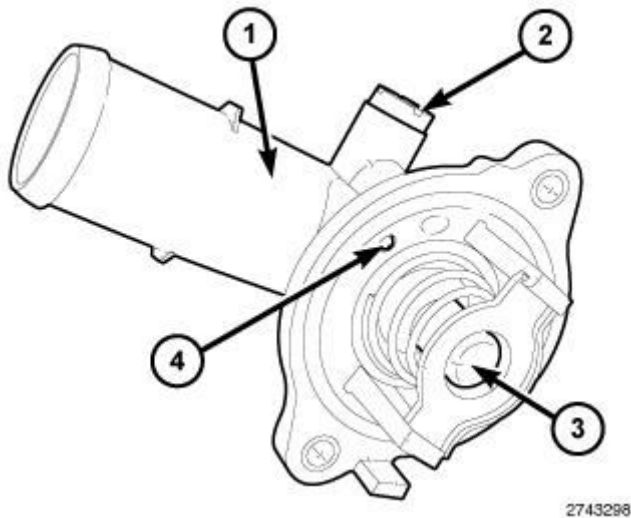


Fig. 191: Thermostat Housing & Thermostat
Courtesy of CHRYSLER GROUP, LLC

WARNING: Do not loosen radiator draincock with system hot and pressurized. Serious burns from coolant can occur.

CAUTION: The Thermostat and housing is serviced as an assembly. Do not remove the thermostat from the housing, damage to the thermostat may occur.

Do not waste reusable coolant. If solution is clean, drain coolant into a clean container for reuse.

If thermostat is being replaced, be sure that replacement is specified thermostat for vehicle model and engine type.

1. Disconnect negative battery cable at battery.
2. Remove the air intake assembly. Refer to **BODY, AIR CLEANER, REMOVAL** .
3. Drain cooling system. Refer to **STANDARD PROCEDURE**.

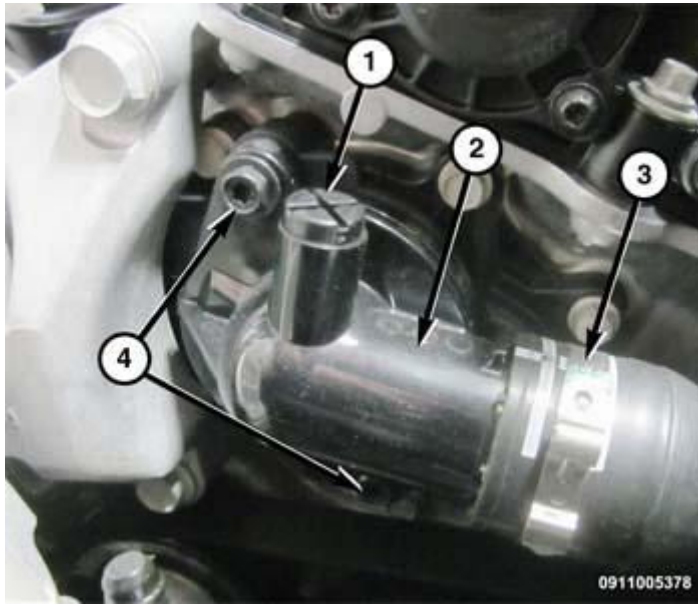


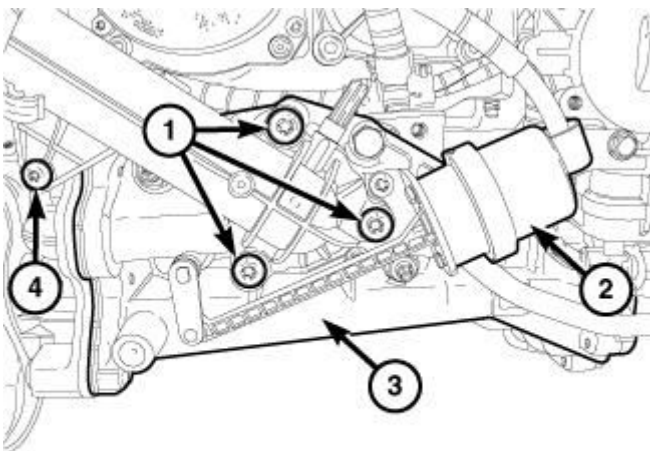
Fig. 192: Removing/Installing Thermostat
Courtesy of CHRYSLER GROUP, LLC

4. Remove upper radiator hose (3) at thermostat housing (2).
5. Remove thermostat housing mounting bolts (4).

INSTALLATION

2.0L DIESEL

NOTE: Use coolant on the seals of the thermostat housing so the seals won't become damaged and to help aid in installation.



3387839

Fig. 193: Thermostat Housing Mounting Bolts & Lower Thermostat Support Brace Bolt

Courtesy of CHRYSLER GROUP, LLC

1. Install the thermostat onto the EGR coolant flow control valve (3).
2. Install the thermostat housing mounting bolts (1). Tighten the bolts to 9 N.m (80 in. lbs.).
3. Install the lower thermostat support brace bolt (5). Tighten the bolts to 9 N.m (80 in. lbs.).
4. Install the left charge Air Cooler (CAC) hose. Refer to **COOLER AND HOSES, CHARGE AIR, INSTALLATION** .



Fig. 194: Thermostat Housing & Hoses
Courtesy of CHRYSLER GROUP, LLC

5. Install the upper radiator hose (1) onto the thermostat housing.
6. Install the coolant hose (2) onto the thermostat housing.
7. Fill the cooling system. Refer to **STANDARD PROCEDURE**.

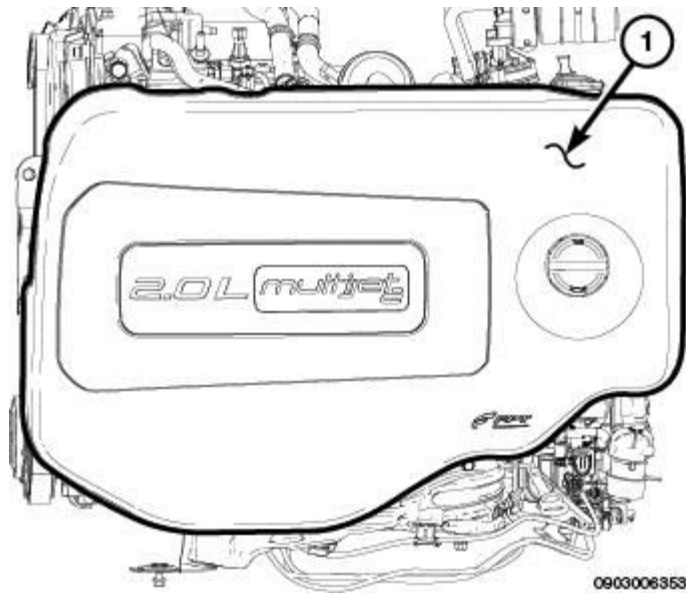


Fig. 195: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

8. Install the engine cover (1).
9. Connect the negative battery cable.
10. Run engine to operating temperature, check for leaks and proper operation.

2.4L

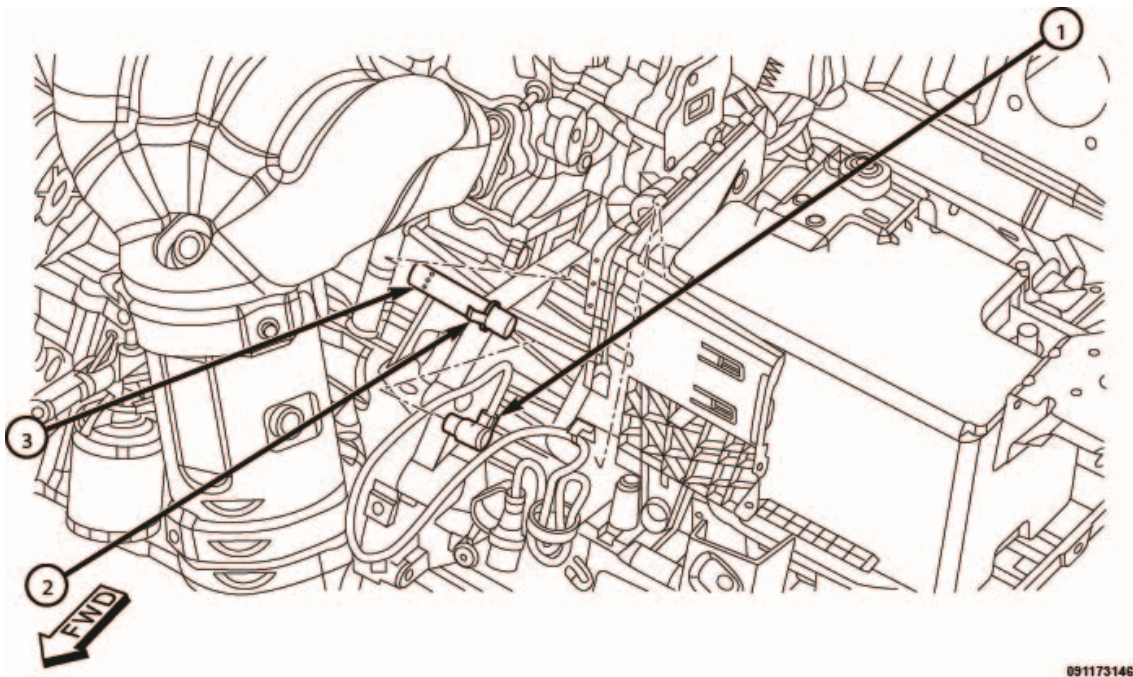


Fig. 196: Removing/Installing Engine Block Heater
Courtesy of CHRYSLER GROUP, LLC

1. Insert the block heater (3) into the block bore.
2. Push the heater to the left until the tab (2) catches onto the block.
3. Plug the block heater cord (1) into the heater.
4. Install the engine cover.

3.2L

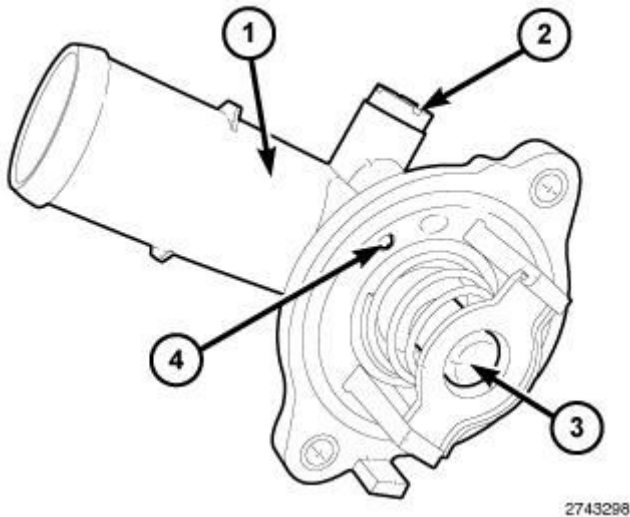


Fig. 197: Thermostat Housing & Thermostat
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The Thermostat and housing is serviced as an assembly. Do not remove the thermostat from the housing, damage to the thermostat may occur.

1. Clean mating areas of timing chain cover and thermostat housing (1).
2. Install a new gasket on to the thermostat housing.

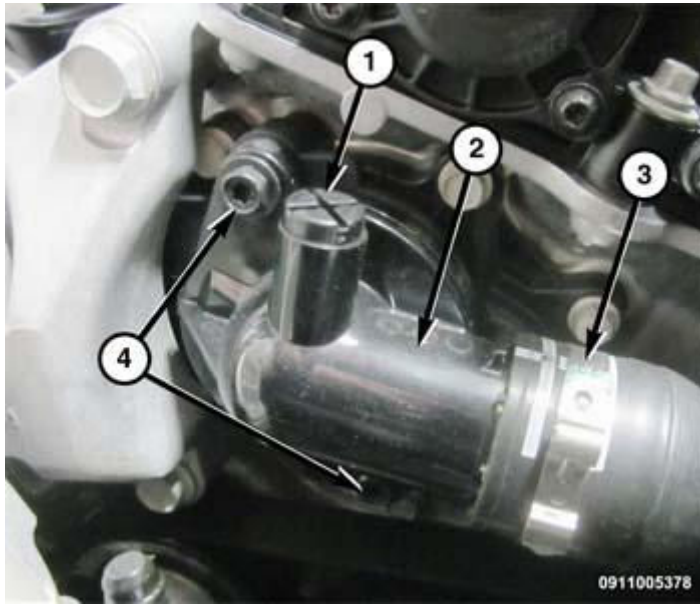


Fig. 198: Removing/Installing Thermostat
Courtesy of CHRYSLER GROUP, LLC

3. Position thermostat housing (1) on the water crossover.
4. Install two thermostat housing bolts (4). Tighten bolts to 12 N.m (106 in. lbs.).
5. Install upper radiator hose on thermostat housing (3).
6. Fill cooling system. Refer to **STANDARD PROCEDURE**.
7. Install the air intake system. Refer to **BODY, AIR CLEANER, INSTALLATION**.
8. Connect negative battery cable to battery.
9. Start and warm the engine. Check for leaks.

TRANSMISSION

COOLER, TRANSMISSION OIL

DESCRIPTION

DESCRIPTION

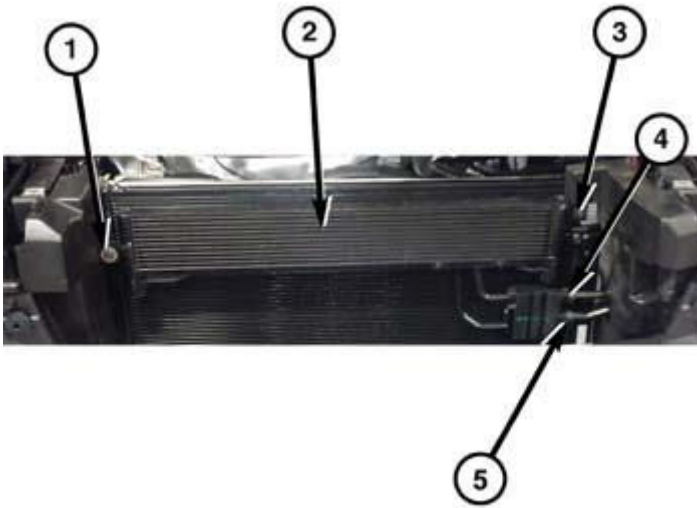
The automatic transmission cooler is located in the front of the condenser and behind the front fascia. The transmission cooler is a heat exchanger that allows heat in the transmission fluid to be transferred to the air passing over the cooler fins.

The Transmission oil cooler assembly is equipped with quick connect fitting for the transmission oil cooler lines.

OPERATION

OPERATION

Transmission oil is routed through the cooler where heat is removed from the transmission oil before returning to the transmission.

REMOVAL**REMOVAL**

0710008704

Fig. 199: Transmission Oil Cooler

Courtesy of CHRYSLER GROUP, LLC

1. Remove the cooler line bracket bolts (1, 3).
2. Release the lines from the cooler at the cooler quick connects (4, 5).

INSTALLATION**INSTALLATION**

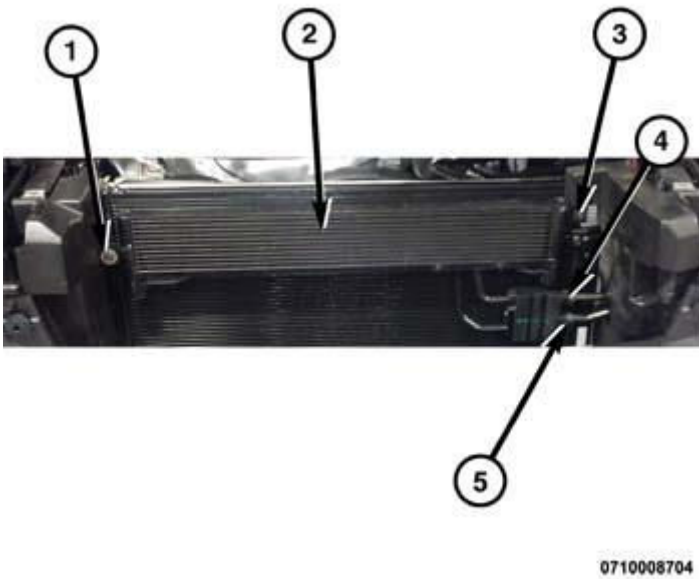


Fig. 200: Transmission Oil Cooler

Courtesy of CHRYSLER GROUP, LLC

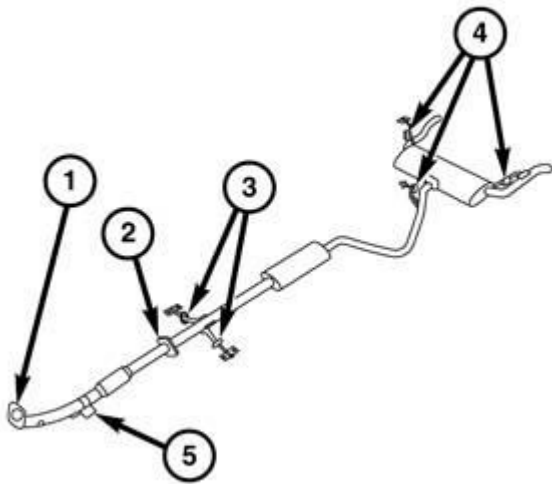
1. Position the transmission oil cooler (2) to the condenser.
2. Tighten the bolts (1, 3) to 9 N.m (80 in. lbs.).
3. Install the transmission cooler (4, 5) lines to the transmission cooler.
4. Check transmission fluid level, add as necessary.

2014 ENGINE

Exhaust System - Cherokee

DESCRIPTION

DIESEL

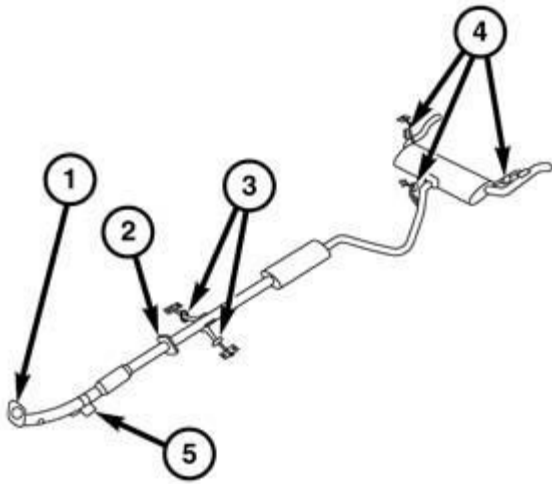


070969662

Fig. 1: Exhaust System Components
Courtesy of CHRYSLER GROUP, LLC

The exhaust system on the 2.0L diesel engine models consists of a Turbocharger, Diesel Particulate Filter (DPF), front exhaust pipe, resonator, muffler assembly, band clamp, and support isolators. The upstream oxygen sensor is located in the Diesel Particulate Filter (DPF).

DESCRIPTION



070969662

Fig. 2: Exhaust System Components

Courtesy of CHRYSLER GROUP, LLC

The exhaust system on the 2.4L exhaust engine models consists of a front mounted catalytic converter, resonator/pipe assembly, muffler/pipe assembly with two outlets, band clamps, and support isolators. The upstream oxygen sensor is located in the exhaust manifold. The downstream oxygen sensor is located in the catalytic converter.

The exhaust system on the 3.2L exhaust engine models consists of a front and rear mounted catalytic converter, cross under pipe, Y-pipe, resonator/pipe assembly, muffler/pipe assembly with a dual outlet, band clamps, and support isolators. The upstream oxygen sensor is located in the exhaust manifold. The downstream oxygen sensor is located in the catalytic converter.

Resonators, mufflers, and exhaust pipes are tuned to each powertrain combination.

DIAGNOSIS AND TESTING

EXCESSIVE EXHAUST SYSTEM NOISE

CONDITION	POSSIBLE CAUSES	CORRECTION
EXCESSIVE EXHAUST NOISE (UNDER HOOD)	1. Exhaust manifold cracked or broken.	1. Replace manifold.
	2. Manifold to cylinder head leak.	2. Tighten manifold and/or replace gasket.
	3. EGR Valve to manifold gasket leakage.	3. Tighten fasteners or replace gasket.

2014 Jeep Cherokee Trailhawk

2014 ENGINE Exhaust System - Cherokee

	4. EGR Valve to EGR tube gasket leakage.	4. Tighten fasteners or replace gasket.
	5. EGR tube to manifold tube leakage.	5. Tighten tube nut.
	6. Exhaust flex-joint to manifold leak.	6. Tighten joint fasteners and/or replace gasket.
	7. Exhaust flex-joint.	7. Replace catalytic converter assembly.
	8. Pipe and shell noise from front exhaust pipe.	8. Characteristic of single wall pipe.
EXCESSIVE EXHAUST NOISE	1. Leak at exhaust pipe joints.	1. Tighten clamps at leaking joints.
	2. Burned or rusted out muffler assembly or exhaust pipe.	2. Replace muffler resonator tailpipe assembly or exhaust pipe with catalytic converter assembly.
	3. Burned or rusted out resonator.	3. Replace muffler resonator tailpipe assembly.
	4. Restriction in exhaust system.	4. Perform Exhaust System RESTRICTION CHECK . Replace component as necessary.
	5. Converter material in muffler.	5. Replace muffler and converter assemblies. Check fuel injection and ignition systems for proper operation.

RESTRICTION CHECK

Exhaust system restriction can be checked by measuring back pressure using the scan tool and PEP module pressure tester.

WARNING: The normal operating temperature of the exhaust system is very high. Therefore, never work around or attempt to service any part of the exhaust system until it is cooled. Special care should be taken when working near the catalytic converter. The temperature of the converter rises to a high level after a short period of engine operation time.

1. Disconnect and remove the upstream (before catalytic converter) oxygen sensor. Refer to **SENSOR, OXYGEN, REMOVAL** for Gas or **SENSOR, OXYGEN, REMOVAL** for Diesel.
2. Install the Exhaust Back Pressure Fitting Adaptor (special tool #CH8519, Hose, Exhaust Back Pressure).
3. Connect the Low Pressure Sensor (15 psi) CH7063 to the back pressure fitting.
4. Following the PEP module instruction manual, connect all required cables to the scan tool and PEP module. Select the available menu options on the scan display screen for using the digital pressure gauge function.
5. Apply the park brake and start the engine.
6. With transmission in Park or Neutral, raise engine speed to 2000 RPM. Monitor the pressure readings on

the scan. Back pressure should not exceed specified limit. Refer to specification in table below.

NOTE: For applications with dual catalytic converters, repeat test on opposite converter using the previous steps.

7. If pressure exceeds maximum limits, inspect exhaust system for restricted component. For further catalytic converter inspection procedures. Refer to **CONVERTER, CATALYTIC, INSPECTION**. Replace component(s) as necessary.

EXHAUST BACK PRESSURE LIMITS

Exhaust Back Pressure Limit (Max)	
Vehicle in Park/Neutral (no load) @2000 RPM	3.45 kPa (0.5 psi)

LEAK TESTING



A multimedia supplement to the instructions contained in this article is available.

To view the multimedia example of the condition described go to;
<http://www.youtube.com/user/Mitchell1Tips>
 then type "A00641402.vid1" into the "Search Channel" box.

WARNING: The normal operating temperature of the exhaust system is very high. Therefore, never work around or attempt to service any part of the exhaust system until it is cooled. Special care should be taken when working near the catalytic converter. The temperature of the converter rises to a high level after a short period of engine operation time.

1. Raise and support vehicle.

CAUTION: The air pressure must not exceed 4 psi, otherwise engine damage can occur.

2. Connect Tool (special tool #8404-ECT, Exhaust Cone, Truck), Exhaust Cone to an adjustable air pressure regulator.
3. Attach shop air to the air pressure regulator.
4. Adjust the air pressure regulator to 4 psi
5. Insert Tool (special tool #8404-ECT, Exhaust Cone, Truck), Exhaust Cone into the vehicle tail pipe.
6. If the vehicle is equipped with dual exhaust, use Tool (special tool #8404-ECT, Exhaust Cone, Truck), Exhaust Cone with equipped attached plug. Plug one side of the dual exhaust pipe. Pressurize the other as described.
7. Apply a mixture of liquid dish soap and water to the following areas:
 - All welded joints from 6 inches rearward of the downstream O2 sensor forward
 - O2 sensor seal points

2014 Jeep Cherokee Trailhawk

2014 ENGINE Exhaust System - Cherokee

- O2 sensor boss welds
 - Flange/joint connection(s)
 - Exhaust manifold to cylinder head connection(s)
 - EGR solenoid gasket base and tube seal points (if equipped)
8. Watch for the liquid/soapy water to bubble.
 9. Use the following definitions to help determine if system or component repair/replacement is necessary:
 - **Type 1 Leak** is defined as a leak where very small foam like bubbles 1mm (.039 in.) or less appear. Any Type 1 or greater leaks found in welded joints, O2 sensor seal points or O2 sensor boss welds must be repaired or the component must be replaced.
 - **Type 2 Leak** is defined as a leak where larger bubbles 8mm (.315 in.) or greater appear. Any Type 2 or greater leaks found in flange or joint connections, exhaust manifold to cylinder head connections, or EGR gasket and tube seal points must be repaired or the components must be replaced.

Leak Location	Repair required if results at 4 psi reveal bubble size:
Welded joints	Type 1 - 1 mm (0.039 in.) or greater
O2 Sensor seal points	Type 1 - 1 mm (0.039 in.) or greater
O2 Sensor boss welds	Type 1 - 1 mm (0.039 in.) or greater
Flange/joint connections	Type 2 - 8 mm (0.315 in.) or greater
Exhaust Manifold to cylinder head connections	Type 2 - 8 mm (0.315 in.) or greater
EGR gasket and tube seal points	Type 2 - 8 mm (0.315 in.) or greater

If a leak is found that matches the above definition, repair or replace the component as necessary.

Once the repair is complete, repeat the procedure to verify that all leaks have been repaired.

ADJUSTMENTS

ADJUSTMENTS

A misaligned exhaust system is usually indicated by a vibration, rattling noise, or binding of exhaust system components. These noises are sometimes hard to distinguish from other chassis noises. Inspect exhaust system for broken or loose clamps, heat shields, isolators, and brackets. Replace or tighten as necessary. It is important that exhaust system clearances and alignment be maintained.

Perform the following procedures to align the exhaust system:

1. Loosen clamps and support brackets.
2. Align the exhaust system starting at the front, working rearward.
3. Tighten all clamps and brackets once alignment and clearances are achieved.

SPECIFICATIONS

2014 Jeep Cherokee Trailhawk

2014 ENGINE Exhaust System - Cherokee

SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Band Clamp Screw	19	14	168
Nuts-Exhaust Flange	19	14	168

TORQUE - DIESEL

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Body Heat Shield Fasteners	5	-	44
Diesel Particulate Filter to Turbocharger Band Clamp Nut	25	18	221
Diesel Particulate Filter bracket to Engine Block Bolts	20	-	177
Diesel Particulate Filter Heat Shield			
Bolt	12	-	106
Nut	8	-	71
Exhaust Temperature Sensor	45	33	-
Crossunder Pipe to Diesel Particulate Filter Flange Nuts	26	19	-
Isolator Mount Bolt	22	16	-
Muffler Clamp Nut	55	41	-
Resonator Clamp Nut	55	41	-
Turbocharger Heat Shield			
Bolt	8	-	71
Nut	8	-	71

REMOVAL

REMOVAL

NOTE: Some service procedures require the removal of the entire exhaust system in order to gain better access to certain components for removal and installation. The following procedure explains how to remove the exhaust system from the crossunder pipe. Refer to specific procedures if replacing individual exhaust components.

WARNING: The normal operating temperature of the exhaust system is very high. Therefore, never work around or attempt to service any part of the exhaust system until it is cooled. Special care should be taken when working near the catalytic converter. The temperature of the converter rises to a high level after a short period of engine operation time.

1. Raise and support the vehicle.
2. Apply penetrating oil to the fasteners that connect the exhaust system to the exhaust crossunder pipe

clamp.

3. Remove fasteners that attach exhaust system to exhaust crossunder pipe clamp.

CAUTION: Do not use any tools to remove the rubber isolators - remove by hand only. Soapy water may be used to assist removal/installation of isolators. DO NOT use a petroleum-based lubricant on the isolators, as damage to the rubber material can occur.

4. Remove all of the support isolators that support the exhaust system to the vehicle.
5. Remove the exhaust system from vehicle.

NOTE: When replacement is required on any component of the exhaust system, it is most important that original equipment parts (or their equivalent) be used for the following reasons:

- To insure proper alignment and size with other parts in the system.
- Provide acceptable exhaust noise levels.
- Does not change exhaust system back pressure that could affect emissions and performance.

INSPECTION

INSPECTION

Inspect the exhaust pipes, catalytic converters, muffler, and resonators for cracked joints, broken welds and corrosion damage that would result in a leaking exhaust system. Inspect the clamps, support brackets, and insulators for cracks and corrosion damage.

INSTALLATION

INSTALLATION

NOTE: When replacement is required on any component of the exhaust system, it is most important that original equipment parts (or their equivalent) be used for the following reasons:

- To insure proper alignment and size with other parts in the system.
- Provide acceptable exhaust noise levels.
- Does not change exhaust system back pressure that could affect emissions and performance.

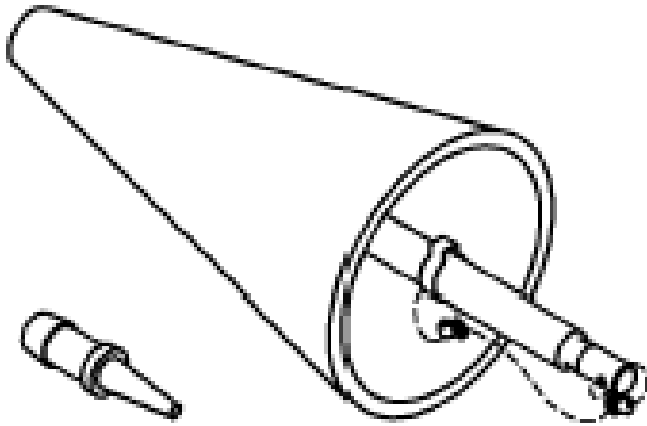
NOTE: Always work from the front to rear of the exhaust system when aligning and tightening exhaust system components.

1. Loosely install the fasteners that attach the exhaust system to the exhaust crossunder pipe.

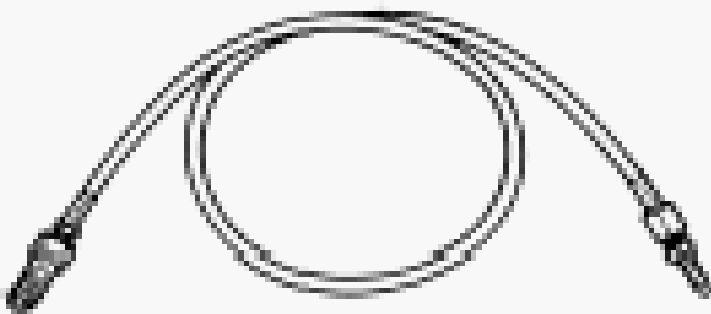
2. Install the support isolators to exhaust system supports.
3. Align the exhaust system to maintain position and proper clearance with underbody parts.
4. Make sure that all of the support isolators have equal load on them.
5. Tighten the fasteners that attach exhaust system to exhaust crossunder pipe to the proper. Refer to **SPECIFICATIONS**.
6. Lower the vehicle.
7. Start the engine and inspect for exhaust leaks. Repair exhaust leaks as necessary.
8. Check the exhaust system for contact with the body panels. Make the necessary adjustments, if needed.

SPECIAL TOOLS

SPECIAL TOOLS



8404-ECT - Exhaust Cone, Truck
(Originally Shipped In Kit Number(s)
8404-ECT.)



CH8519 - Hose, Exhaust Back Pressure

CONVERTER, CATALYTIC

DESCRIPTION**DESCRIPTION****TURBO**

The catalytic converter is mounted between the turbocharger and the front exhaust pipe. The upstream O2 sensor boss is welded onto the inlet pipe.

The converter is mated to the turbocharger by way of a band clamp. The outlet pipe of the converter is secured by a two piece bracket and is attached to the front exhaust pipe by way of a flange. Both ends require gaskets.

NON TURBO

The gas engine exhaust system components consist of a maniverter, intermediate pipe, mufflers, and support isolators.

The catalytic converter is part of the exhaust manifold, called a maniverter. For removal of the maniverter, Refer to **MANIFOLD, EXHAUST, REMOVAL** for 2.0L Diesel of **MANIFOLD, EXHAUST, REMOVAL** for 2.4L.

REMOVAL**REMOVAL****FRONT CATALYTIC CONVERTER**

1. Disconnect and isolate the negative battery.
2. Remove the lower engine belly pan. Refer to **BELLY PAN, REMOVAL** .

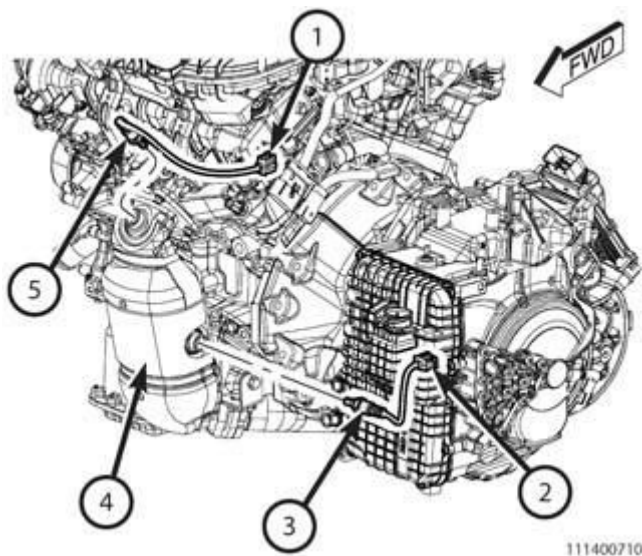


Fig. 3: Oxygen Sensors, Harness Connectors & Catalytic Converter

Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the upstream (1) and down stream oxygen sensor harness connectors (2).

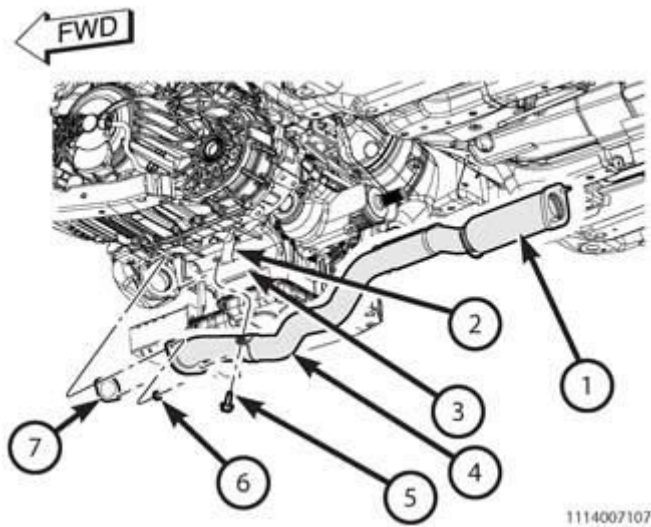


Fig. 4: Removing/Installing Cross Under Pipe
Courtesy of CHRYSLER GROUP, LLC

4. Separate the cross under pipe (4) from the front catalytic converter.

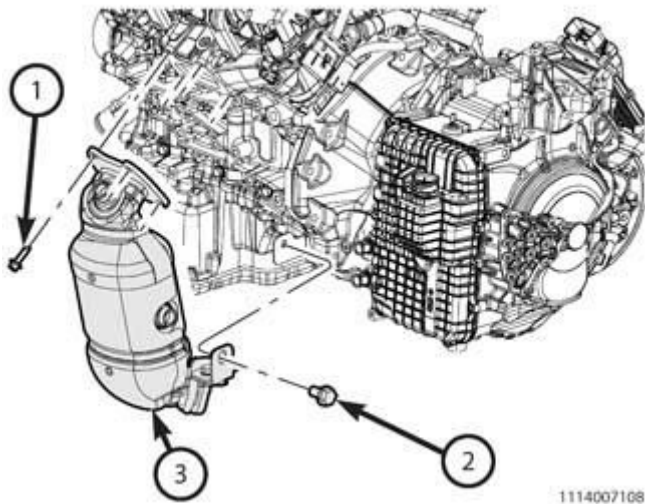


Fig. 5: Removing/Installing Front Catalytic Converter
Courtesy of CHRYSLER GROUP, LLC

5. Remove the converter to support bracket bolt (2).
6. Remove the catalytic converter to cylinder head flange upper bolts (1).
7. Remove the catalytic converter (3) by lifting and sliding the flange up and away from the cylinder head.

8. If required, remove the oxygen sensors.

REAR CATALYTIC CONVERTER

1. Disconnect and isolate the negative battery cable.
2. Remove the air intake resonator (1). Refer to **RESONATOR, AIR CLEANER, REMOVAL** .

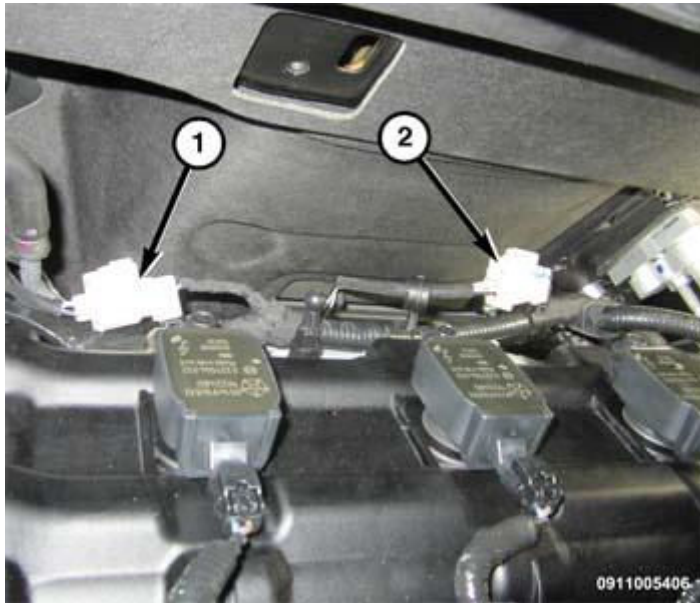


Fig. 6: Oxygen Sensor Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the upstream (1) and the downstream (2) oxygen sensor harness connectors.

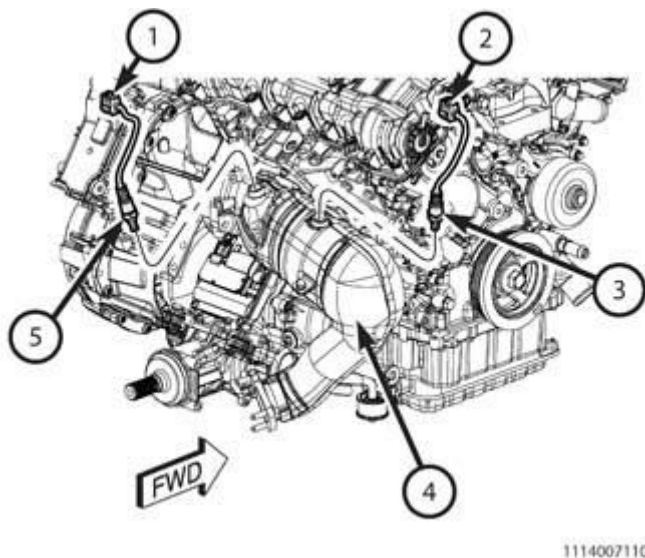


Fig. 7: Removing/Installing Oxygen Sensors
Courtesy of CHRYSLER GROUP, LLC

4. Remove the upstream (5) and downstream (3) oxygen sensors.

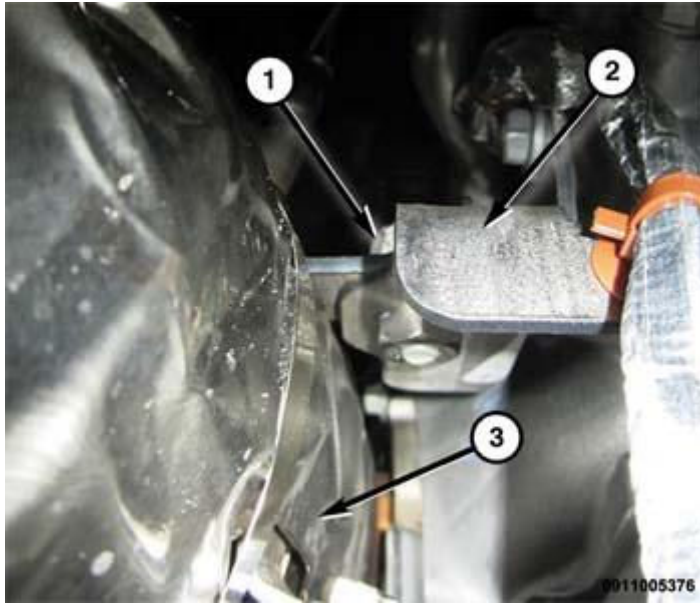


Fig. 8: Removing/Installing Upper Support Bracket Bolt
Courtesy of CHRYSLER GROUP, LLC

5. Remove the upper support bracket bolt (1).
6. If equipped with **FWD** , remove the right side intermediate shaft. Refer to **REMOVAL** .
7. Remove the lower engine belly pan Refer to **BELLY PAN, INSTALLATION** .

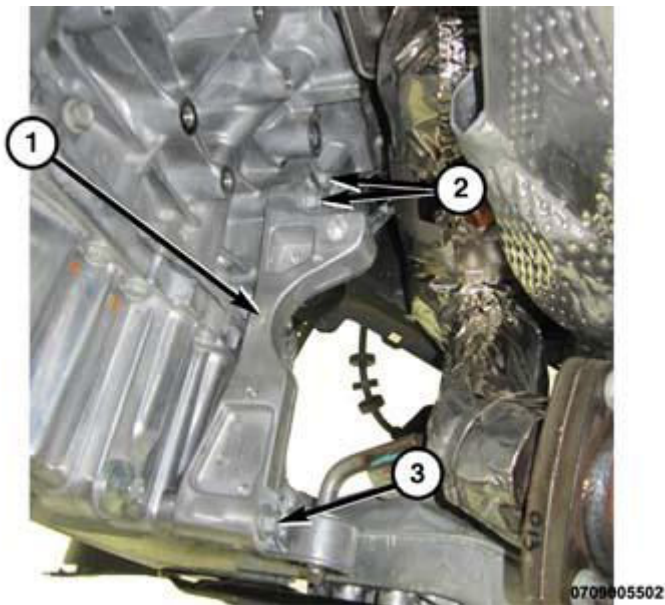


Fig. 9: Removing/Installing Lower Intermediate Shaft Support Bracket

Courtesy of CHRYSLER GROUP, LLC

8. Remove the lower intermediate shaft support bracket (1).
9. Remove the Y-pipe (Refer to **PIPE, EXHAUST**).
10. If quipped with **AWD** , remove the Power Transfer Unit (PTU) assembly. Refer to **REMOVAL** .

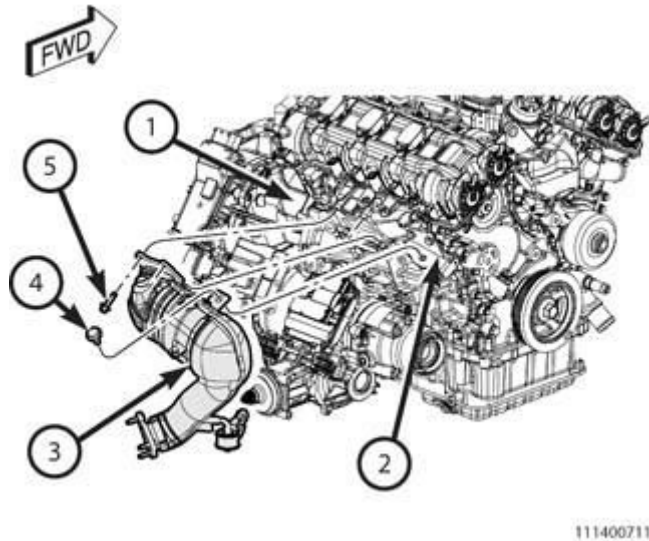


Fig. 10: Removing/Installing Catalytic Converter
Courtesy of CHRYSLER GROUP, LLC

11. Remove the catalytic converter to cylinder head upper flange bolts (5).
12. Remove the catalytic converter by lifting and sliding the flange up and away from the cylinder head.

INSPECTION

INSPECTION

WARNING: The normal operating temperature of the exhaust system is very high. Therefore, never attempt to service any part of the exhaust system until it is cooled. Special care should be taken when working near the catalytic converter. The temperature of the converter rises to a high level after a short period of engine operation time.

Check catalytic converter for a flow restriction. Exhaust System Restriction Check for procedure. Refer to **DIAGNOSIS AND TESTING**.

Visually inspect the catalytic converter element by using a borescope or equivalent. Remove oxygen sensor(s) and insert borescope. If borescope is not available, remove converter and inspect element using a flashlight. Inspect element for cracked or melted substrate.

NOTE: Before replacing a catalytic converter, determine the root cause of failure. Most

catalytic converter failures are caused by air, fuel or ignition problems. (Refer to Appropriate Diagnostic Information for test procedures.)

INSTALLATION

INSTALLATION

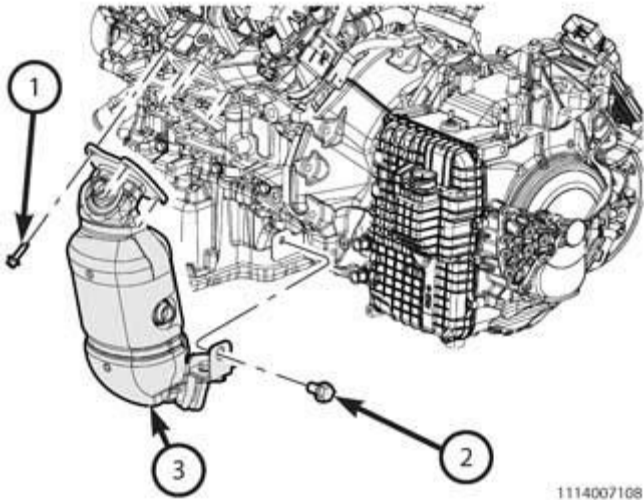


Fig. 11: Removing/Installing Front Catalytic Converter
Courtesy of CHRYSLER GROUP, LLC

FRONT CATALYTIC CONVERTER

1. If new gaskets need replacing, position new gasket onto the manifold flange. loosely install the lower bolt.
2. Position the catalytic converter (3) against the manifold.
3. Install the upper flange bolts. Tighten all the bolts (1) to 23 N.m (17 ft. lbs.).

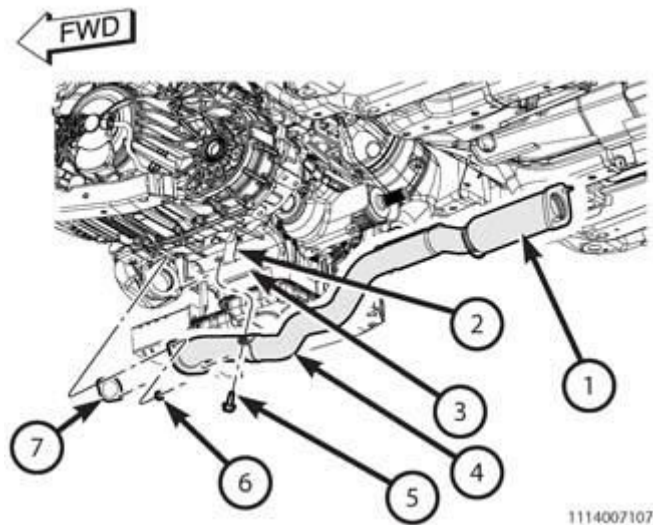


Fig. 12: Removing/Installing Cross Under Pipe
Courtesy of CHRYSLER GROUP, LLC

4. Position the cross under pipe (1) to the catalytic converter. Tighten the nuts (1) to 26 N.m (19 ft. lbs.).
5. Install the support bolt (5). Tighten to 23 N.m (17 ft. lbs.).

NOTE: Using care, do not to twist or kink the oxygen sensor wires.

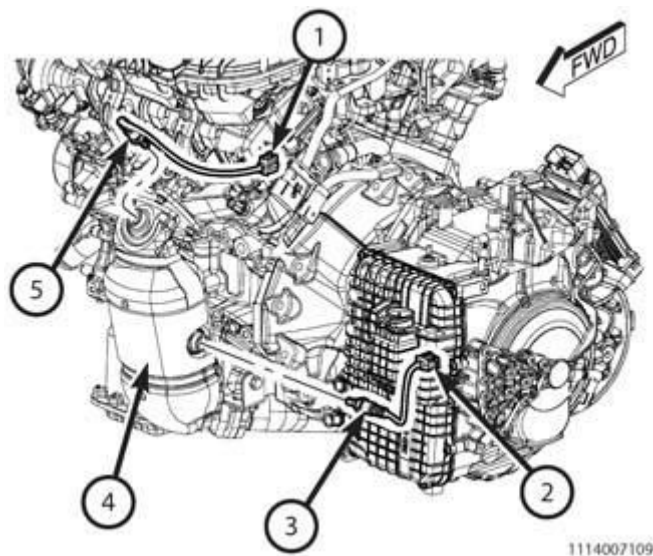
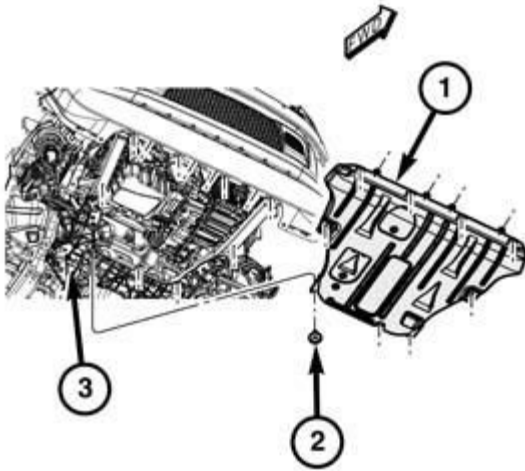


Fig. 13: Oxygen Sensors, Harness Connectors & Catalytic Converter
Courtesy of CHRYSLER GROUP, LLC

6. Reconnect the electrical connectors (1, 2).
7. If removed, install the oxygen sensors (3, 5). Tighten the sensors to 50 N.m (37 ft. lbs.).

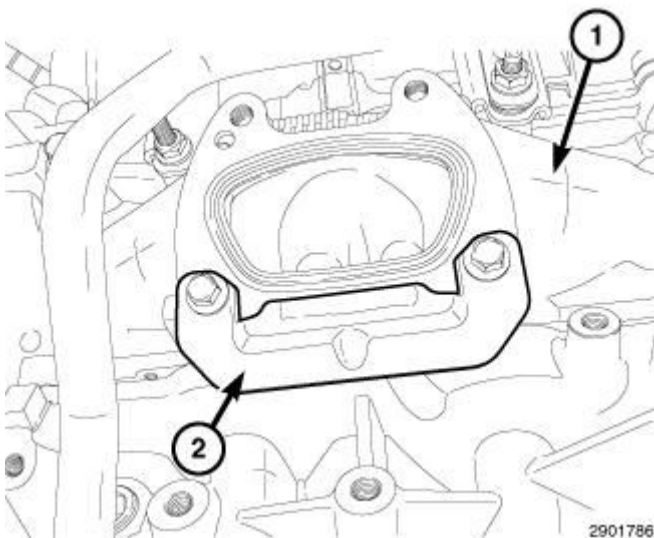


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Fig. 14: Removing/Installing Belly Pans
Courtesy of CHRYSLER GROUP, LLC

8. Install the belly pans (1).
9. Lower the vehicle.
10. Start the engine and inspect for exhaust leaks. Repair exhaust leaks as necessary.
11. Check the exhaust system for contact with the body panels. Make the necessary adjustments, if needed.

REAR CATALYTIC CONVERTER



2901786

Fig. 15: Retainer Plate & Exhaust Manifold Flange

Courtesy of CHRYSLER GROUP, LLC

1. Position the catalytic converter (3) against the exhaust manifold. Position the converter flange (2) to the retainer.

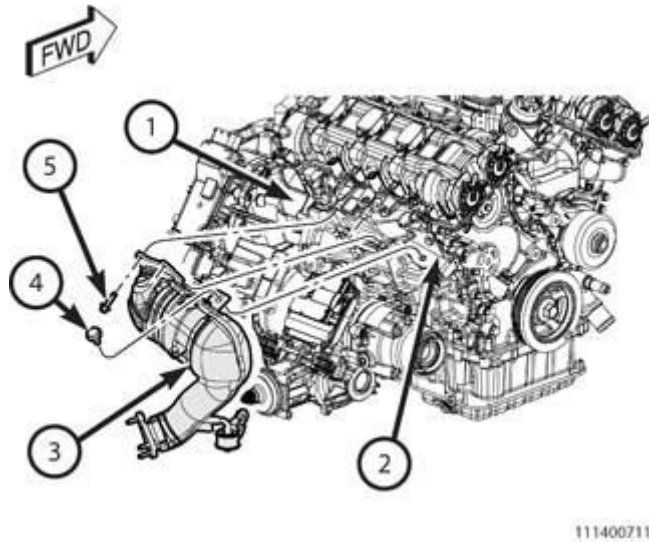


Fig. 16: Removing/Installing Catalytic Converter
Courtesy of CHRYSLER GROUP, LLC

2. Install the upper flange bolts (5). Tighten upper bolts to 23 N.m (17 ft. lbs.).

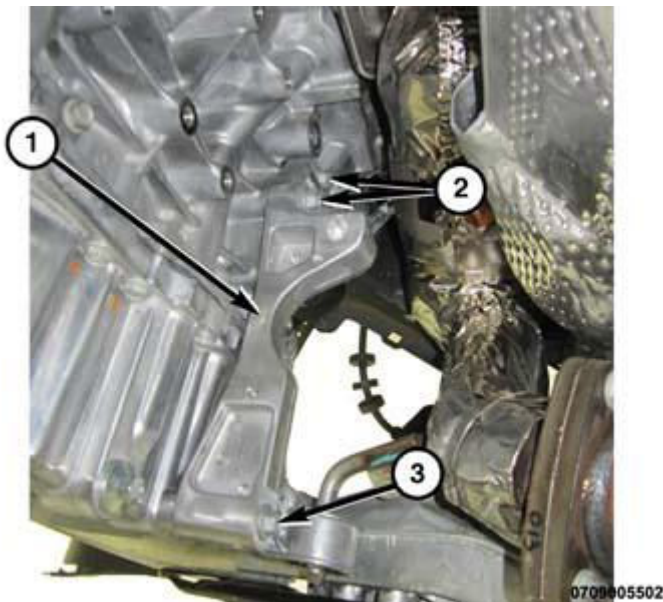


Fig. 17: Removing/Installing Lower Intermediate Shaft Support Bracket
Courtesy of CHRYSLER GROUP, LLC

3. If equipped with 2WD , install the intermediate shaft support bracket. Tighten upper bolts to 23 N.m (17

ft. lbs.).

4. If equipped with **4WD** , install the PTU. Refer to **INSTALLATION** .

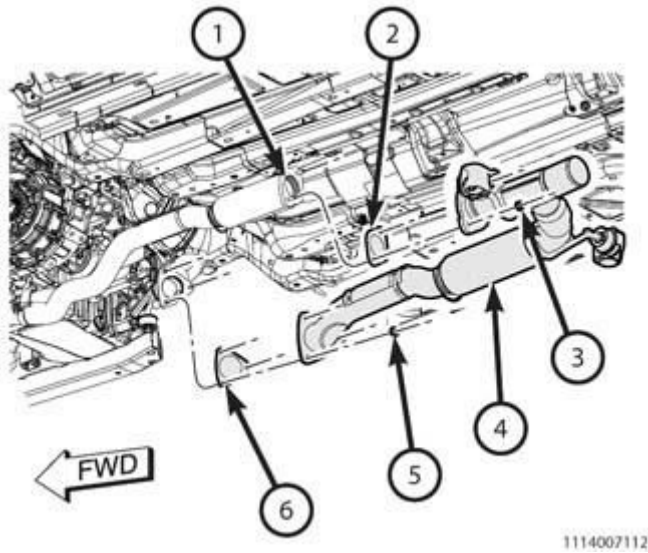


Fig. 18: Y-Pipe

Courtesy of CHRYSLER GROUP, LLC

5. Position the Y-pipe (4) to the rear catalytic converter. Tighten upper bolts to 26 N.m (19 ft. lbs.).

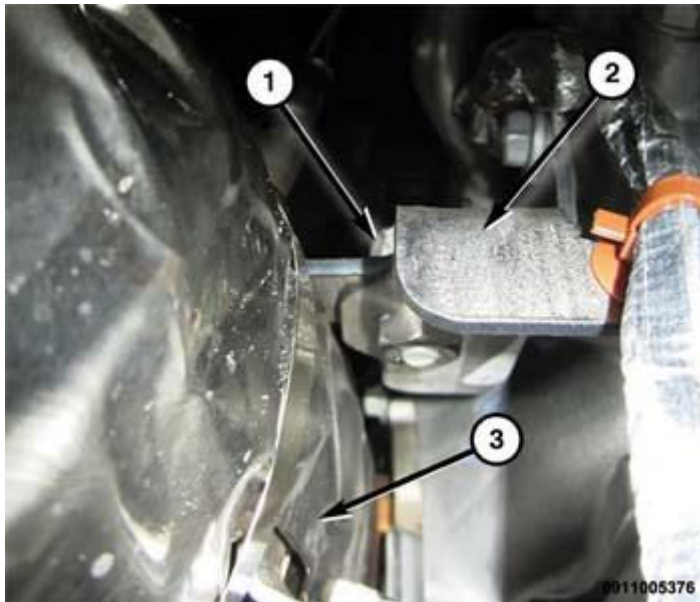
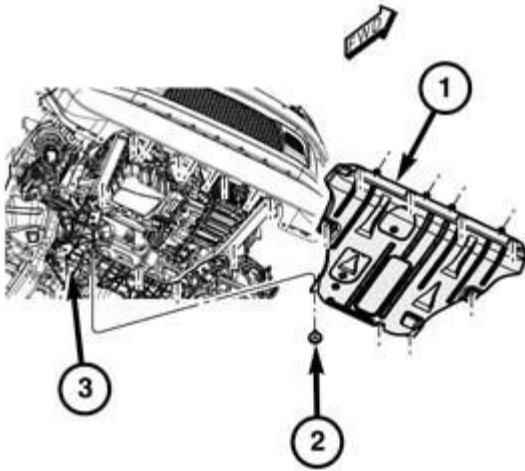


Fig. 19: Removing/Installing Upper Support Bracket Bolt

Courtesy of CHRYSLER GROUP, LLC

6. Loosely install the upper support bracket bolt (1). Tighten upper bolt to 23 N.m (17 ft. lbs.).

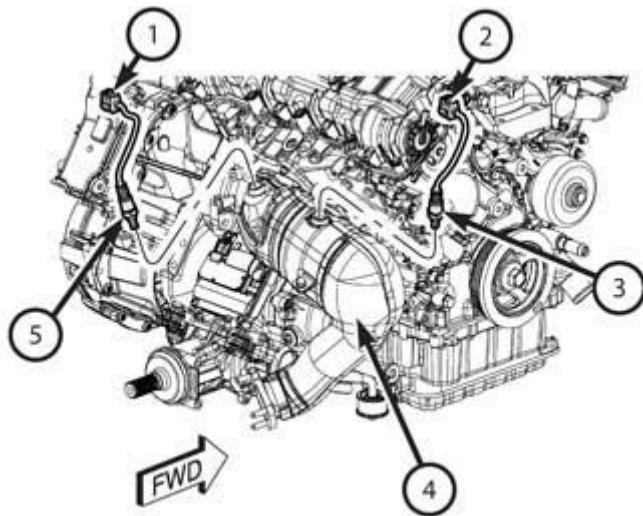


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Fig. 20: Removing/Installing Belly Pans
Courtesy of CHRYSLER GROUP, LLC

7. Install the belly pan (1).
8. Lower the vehicle.

NOTE: Be careful not to twist or kink the oxygen sensor wires.



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Fig. 21: Removing/Installing Oxygen Sensors
Courtesy of CHRYSLER GROUP, LLC

9. If removed, install the O2 sensors (3, 5). Tighten the O2 sensors to 50 N.m (37 ft. lbs.).

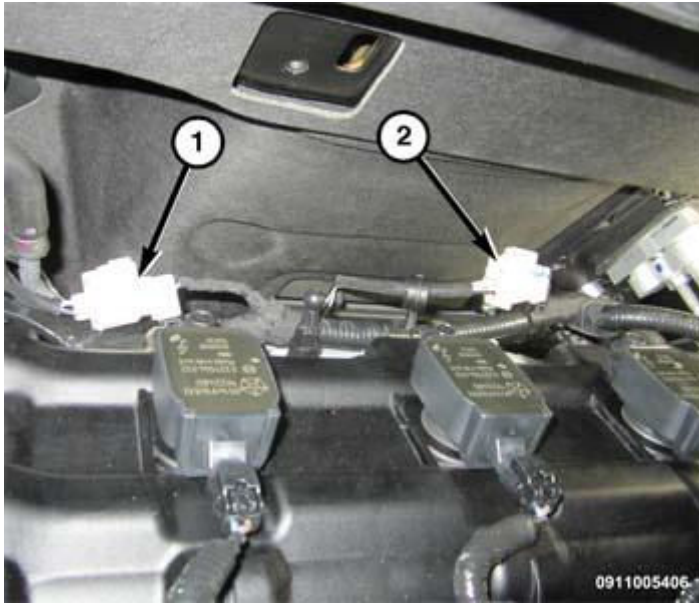


Fig. 22: Oxygen Sensor Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

10. Connect the O2 sensors electrical connectors.

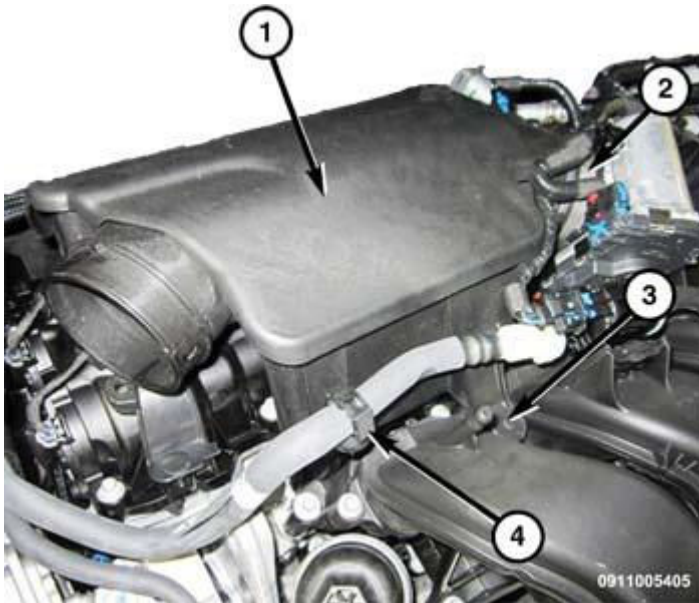


Fig. 23: Intake Resonator
Courtesy of CHRYSLER GROUP, LLC

11. Install the air intake resonator (1).
12. Connect the battery negative cable.

13. Start the engine and inspect for exhaust leaks. Repair exhaust leaks as necessary.
14. Check the exhaust system for contact with the body panels. Make the necessary adjustments, if needed.

MUFFLER, EXHAUST

REMOVAL

2.0L DIESEL

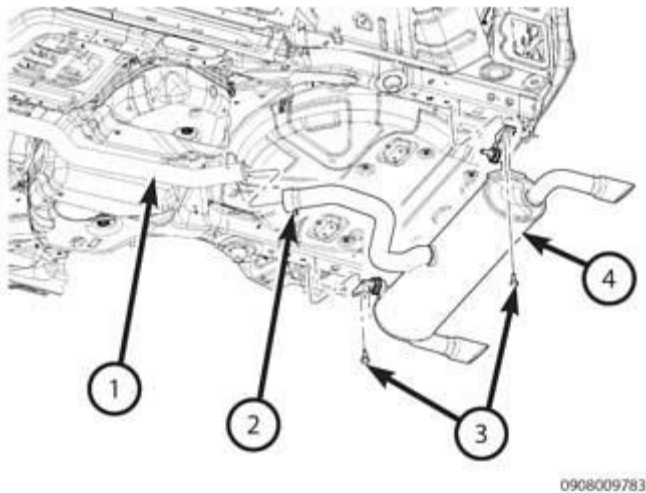


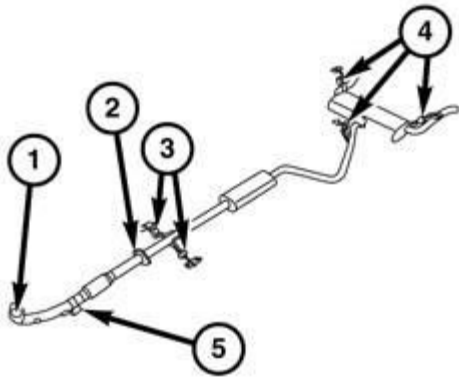
Fig. 24: Exhaust System - 2.0L Diesel
Courtesy of CHRYSLER GROUP, LLC

WARNING: The normal operating temperature of the exhaust system is very high. Therefore, never attempt to service any part of the exhaust system until it is cooled. Special care should be taken when working near the catalytic converter. The temperature of the converter rises to a high level after a short period of engine operation time.

NOTE: When replacement is required on any component of the exhaust system, it is most important that original equipment parts (or their equivalent) be used.

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Loosen the clamp at the muffler (2).
3. With the help of an assistant, remove the support bolts (3) from muffler supports.
4. Remove the muffler (4).

2.0L/2.4L



111068956

Fig. 25: Exhaust System Flanges, Isolators & Clamps
Courtesy of CHRYSLER GROUP, LLC

WARNING: The normal operating temperature of the exhaust system is very high. Therefore, never attempt to service any part of the exhaust system until it is cooled. Special care should be taken when working near the catalytic converter. The temperature of the converter rises to a high level after a short period of engine operation time.

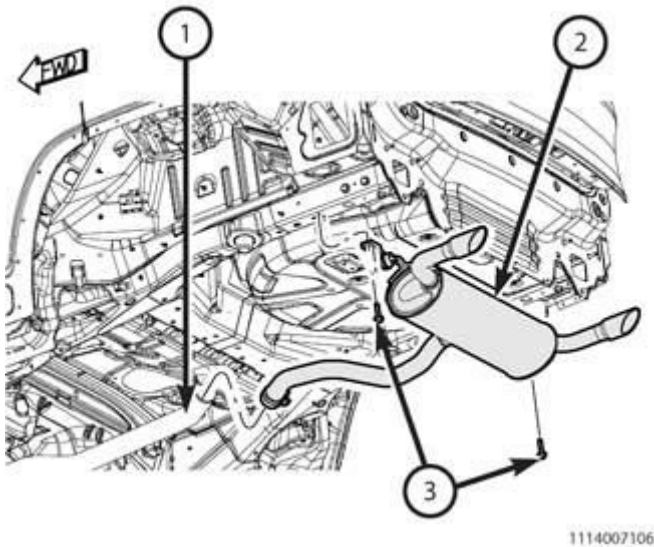
NOTE: When replacement is required on any component of the exhaust system, it is most important that original equipment parts (or their equivalent) be used.

1. Raise and support the vehicle.
2. Remove the nuts (2) holding front to rear exhaust pipes together.

CAUTION: Do not use any tools to remove the rubber isolators-remove by hand only. Soapy water or silicone based lubricant spray may be used to assist removal/installation of isolators. DO NOT use a petroleum based lubricant on the isolators, as damage to the rubber material can occur.

3. With the help of an assistant remove front (3) and rear (4) support isolators from muffler supports.
4. Remove the one muffler/resonator assembly.
5. Remove and discard the exhaust flange gasket.

3.2L

**Fig. 26: Exhaust System - 3.2L**

Courtesy of CHRYSLER GROUP, LLC

WARNING: The normal operating temperature of the exhaust system is very high. Therefore, never attempt to service any part of the exhaust system until it is cooled. Special care should be taken when working near the catalytic converter. The temperature of the converter rises to a high level after a short period of engine operation time.

NOTE: When replacement is required on any component of the exhaust system, it is most important that original equipment parts (or their equivalent) be used.

1. Raise and support the vehicle.
2. Loosen the holding clamp at the resonator exhaust pipe (1).

CAUTION: Do not use any tools to remove the rubber isolators-remove by hand only. Soapy water or silicone based lubricant spray may be used to assist removal/installation of isolators. DO NOT use a petroleum based lubricant on the isolators, as damage to the rubber material can occur.

3. With the help of an assistant. Remove the support bolts (3) from muffler supports.
4. Remove the muffler (2).

INSTALLATION**2.0L DIESEL**

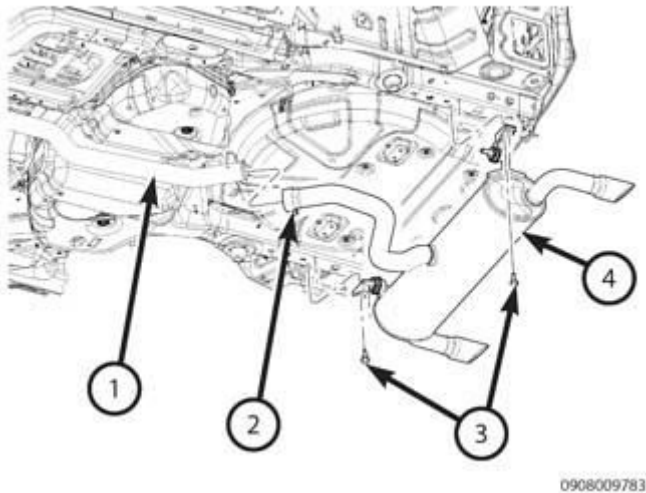


Fig. 27: Exhaust System - 2.0L Diesel
Courtesy of CHRYSLER GROUP, LLC

NOTE: Always work from the front to rear of exhaust system when aligning and tightening exhaust system components.

1. Position muffler (4) onto the resonator pipe (1).
2. Install the support isolator bolts (3). Tighten bolts to 22 N.m (16 ft. lbs.).
3. Align muffler and resonator assembly to maintain position and proper clearance with underbody parts. All support isolators should have equal load on them.
4. Tighten the clamp nut (2) to 52 N.m (38 ft. lbs.).
5. Lower the vehicle.
6. Start the engine and inspect for exhaust leaks. Repair exhaust leaks as necessary.
7. Check the exhaust system for contact with the body panels. Make the necessary adjustments, if needed.

2.4L

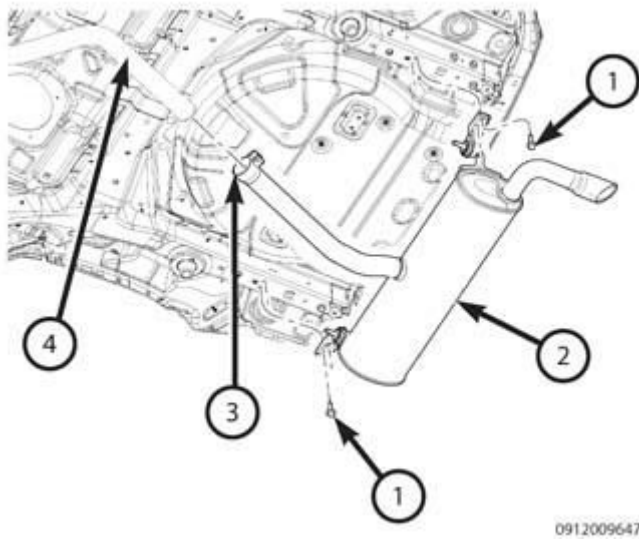


Fig. 28: Exhaust System - 2.4L
Courtesy of CHRYSLER GROUP, LLC

WARNING: The normal operating temperature of the exhaust system is very high. Therefore, never attempt to service any part of the exhaust system until it is cooled. Special care should be taken when working near the catalytic converter. The temperature of the converter rises to a high level after a short period of engine operation time.

1. Support the resonator pipe (4) with a stand.
2. Position the muffler pipe (3) onto the resonator pipe (4).
3. Install the muffler isolator bolts (1).
4. Remove the stand.
5. Align muffler and resonator assembly to maintain position and proper clearance with underbody parts. All support isolators should have equal load on them.
6. Tighten the isolator bolts to 19 N.m (168 in. lbs.).
7. Tighten the clamp (3) to 55 N.m (41 ft. lbs.).
8. Start the engine and inspect for exhaust leaks. Repair exhaust leaks as necessary.
9. Check the exhaust system for contact with the body panels. Make the necessary adjustments, if needed.

3.2L

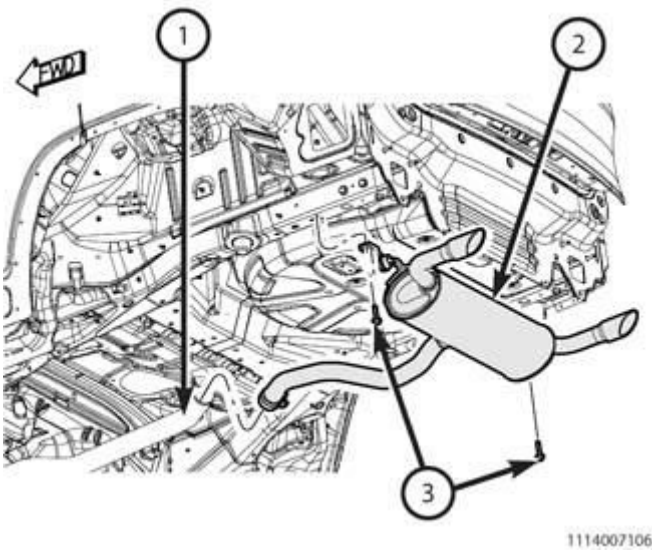


Fig. 29: Exhaust System - 3.2L
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Always work from the front to rear of exhaust system when aligning and tightening exhaust system components.

1. Position muffler pipe to the resonator pipe (1).
2. Install the support isolator bolts (3).
3. Align muffler and resonator assembly to maintain position and proper clearance with underbody parts. All support isolators should have equal load on them.
4. Tighten the front to rear pipe clamp. Tighten the nut to 19 N.m (168 in. lbs.).
5. Lower vehicle.
6. Start the engine and inspect for exhaust leaks. Repair exhaust leaks as necessary.
7. Check the exhaust system for contact with the body panels. Make the necessary adjustments, if needed.

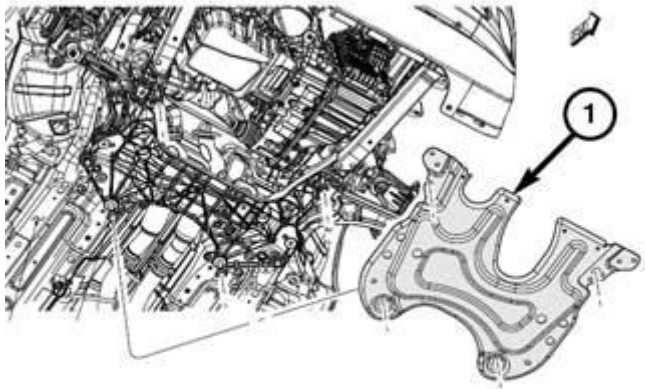
PIPE, EXHAUST CROSSUNDER

REMOVAL

2.0L DIESEL

WARNING: The normal operating temperature of the exhaust system is very high. Therefore, never attempt to service any part of the exhaust system until it is cooled. Special care should be taken when working near the catalytic converter. The temperature of the converter rises to a high level after a short period of engine operation time.

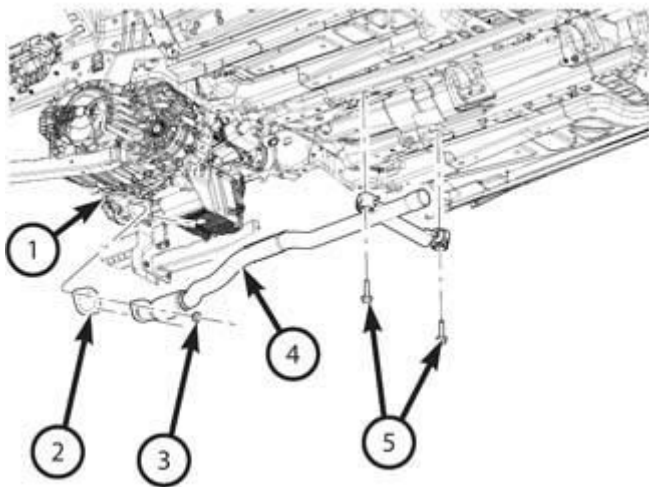
1. Raise the vehicle.
2. Remove the belly pan. Refer to **BELLY PAN, REMOVAL**.



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Fig. 30: Middle Belly Pan
Courtesy of CHRYSLER GROUP, LLC

3. Remove fasteners and the middle belly pan (1).



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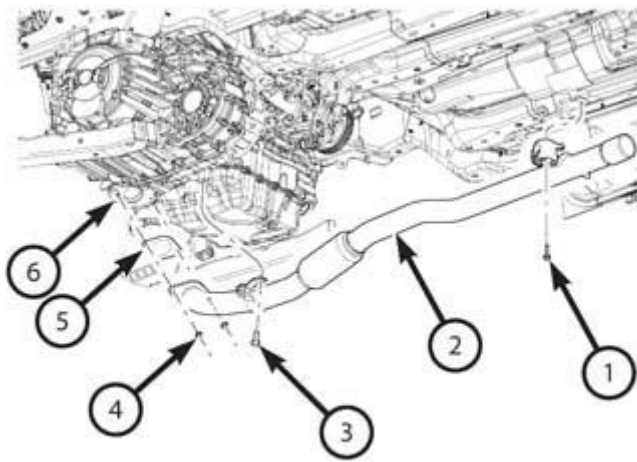
Fig. 31: Removing/Installing Resonator - 2.0L Diesel
Courtesy of CHRYSLER GROUP, LLC

4. Remove the exhaust resonator. Refer to **RESONATOR, EXHAUST, REMOVAL**.
5. Remove the cross under pipe isolator bolts (5).
6. Remove flange nuts (3) the cross under pipe (4) from the vehicle.

2.4L

WARNING: The normal operating temperature of the exhaust system is very high. Therefore, never attempt to service any part of the exhaust system until it is cooled. Special care should be taken when working near the catalytic converter. The temperature of the converter rises to a high level after a short period of engine operation time.

1. Raise and support the vehicle.
2. Remove the front and rear skid plates if equipped.
3. Remove the belly pan if equipped.



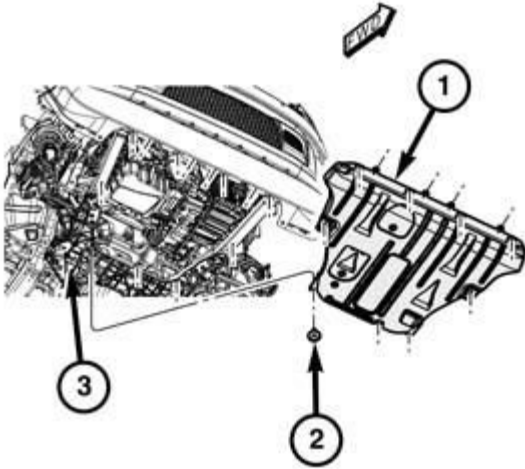
0912009642

Fig. 32: Removing/Installing Resonator - 2.4L

Courtesy of CHRYSLER GROUP, LLC

4. Remove the exhaust resonator. Refer to **RESONATOR, EXHAUST, REMOVAL**.
5. Remove the cross under pipe isolator bolts (1).
6. Remove flange nuts (4) and flange gasket (5). Discard the gasket.
7. Remove the pipe support bolt (3).
8. Remove the cross under pipe (2) from the vehicle.

3.2L



0909005829

Fig. 33: Removing/Installing Belly Pans
Courtesy of CHRYSLER GROUP, LLC

WARNING: The normal operating temperature of the exhaust system is very high. Therefore, never attempt to service any part of the exhaust system until it is cooled. Special care should be taken when working near the catalytic converter. The temperature of the converter rises to a high level after a short period of engine operation time.

1. Raise the vehicle.
2. Remove the belly pan (1).

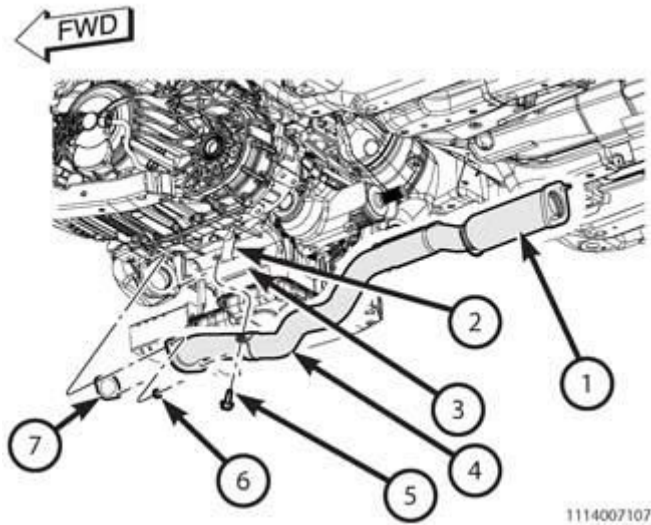


Fig. 34: Removing/Installing Cross Under Pipe
Courtesy of CHRYSLER GROUP, LLC

3. Remove the cross under pipe (1) rear flange nuts.
4. Remove the cross under center support bolt (5).
5. Remove the front cross under pipe flange nuts (6).
6. Remove the cross under pipe from the vehicle.

INSTALLATION

2.0L DIESEL

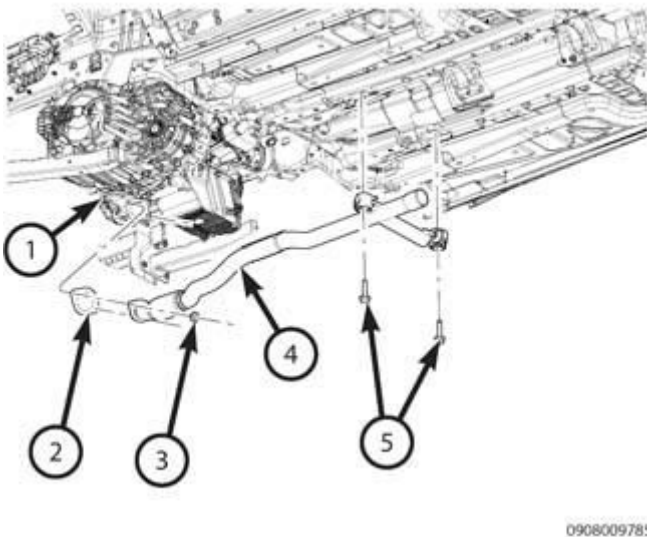
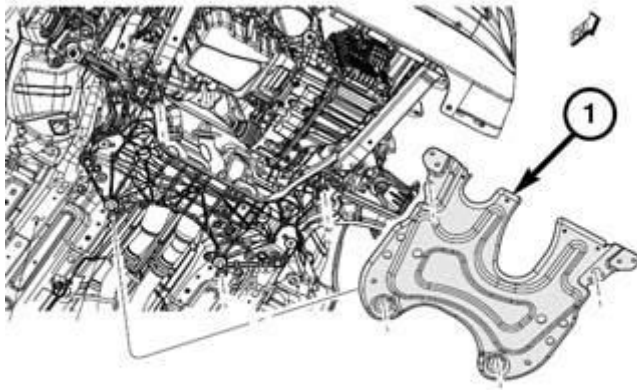


Fig. 35: Removing/Installing Resonator - 2.0L Diesel
Courtesy of CHRYSLER GROUP, LLC

1. Using a new gasket (2) install cross under pipe (4) to the Diesel Particulate Filter (DPF) and tighten nuts (3) finger tight.
2. Install the cross under pipe isolator bolts (5). Tighten bolts (5) to 22 N.m (16 ft. lbs.).
3. Tighten the cross under pipe to DPF flange nuts (3) to 26 N.m (19 ft. lbs.).
4. Install the exhaust resonator. Refer to **RESONATOR, EXHAUST, INSTALLATION**.
5. Check the exhaust system for contact with the body panels. Make the necessary adjustments, if needed.

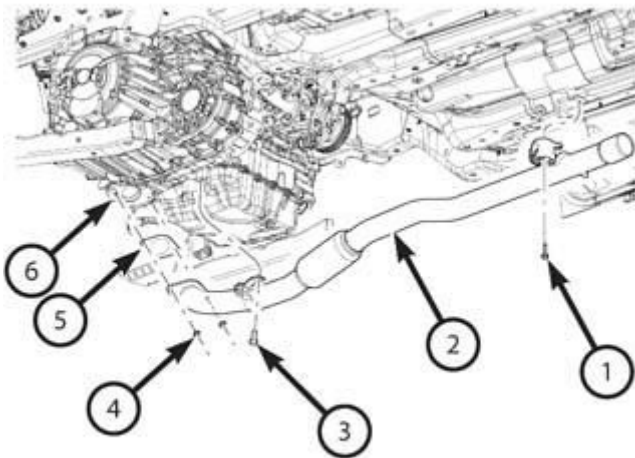


0908009626

Fig. 36: Middle Belly Pan
Courtesy of CHRYSLER GROUP, LLC

6. Install the middle belly pan (1) and securely tighten fasteners.
7. Install the belly pan. Refer to **BELLY PAN, INSTALLATION** .
8. Lower the vehicle.
9. Start the engine and inspect for exhaust leaks. Repair exhaust leaks as necessary.

2.4L



0912009642

Fig. 37: Removing/Installing Resonator - 2.4L

Courtesy of CHRYSLER GROUP, LLC

1. Position a new flange gasket (5) into place.
2. Install the cross under pipe (2) to the catalytic converter outlet flange (6). Install the flange nuts (4) to hold the pipe in position.
3. Install the cross under pipe isolator bolts (1). Tighten bolts (5) to 22 N.m (16 ft. lbs.).
4. Install the exhaust pipe to oil pan support brace bolt (3).
5. Tighten bolt to 25 N.m (18 ft. lbs.).
6. Tighten the cross under pipe flange nuts (4) to 26 N.m (19 ft. lbs.).
7. Install the exhaust resonator. Refer to **RESONATOR, EXHAUST, INSTALLATION**.
8. Check for proper pipe to shield/component clearance.
9. Check for exhaust leaks. Repair exhaust leaks as necessary.

3.2L

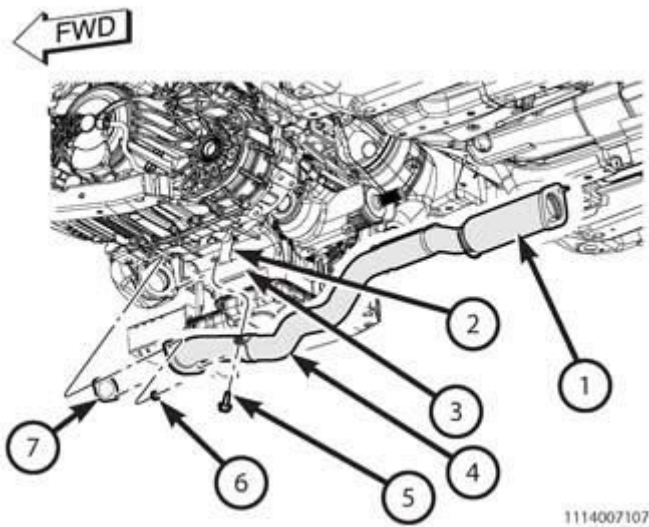


Fig. 38: Removing/Installing Cross Under Pipe
Courtesy of CHRYSLER GROUP, LLC

1. Loosely install cross under pipe (4) to the front catalytic converter.
2. Connect the resonator pipe to cross under pipe (1). Tighten nuts (3) to 26 N.m (19 ft. lbs.).
3. Install the center support bolt (5). Tighten bolt to 25 N.m (18 ft. lbs.).
4. Tighten the 2 nuts (6) for cross under pipe to catalytic converter flange to 26 N.m (19 ft. lbs.).
5. Lower vehicle.
6. Start the engine and inspect for exhaust leaks. Repair exhaust leaks as necessary.
7. Check the exhaust system for contact with the body panels. Make the necessary adjustments, if needed.

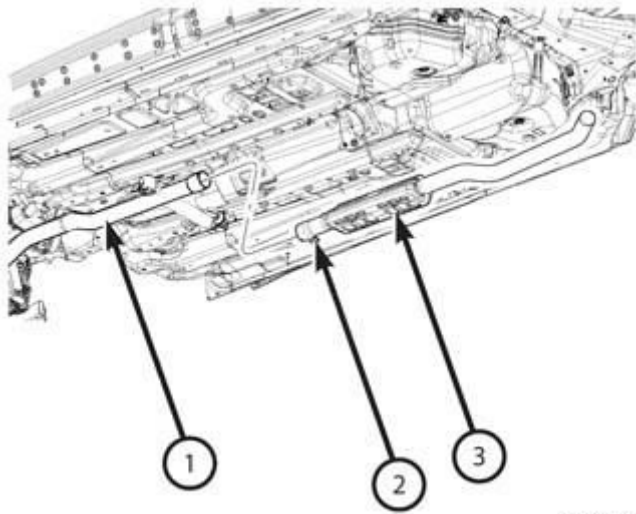
RESONATOR, EXHAUST

REMOVAL

2.0L DIESEL

WARNING: The normal operating temperature of the exhaust system is very high. Therefore, never attempt to service any part of the exhaust system until it is cooled. Special care should be taken when working near the catalytic converter. The temperature of the converter rises to a high level after a short period of engine operation time.

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove the muffler (4). Refer to **MUFFLER, EXHAUST, REMOVAL**.

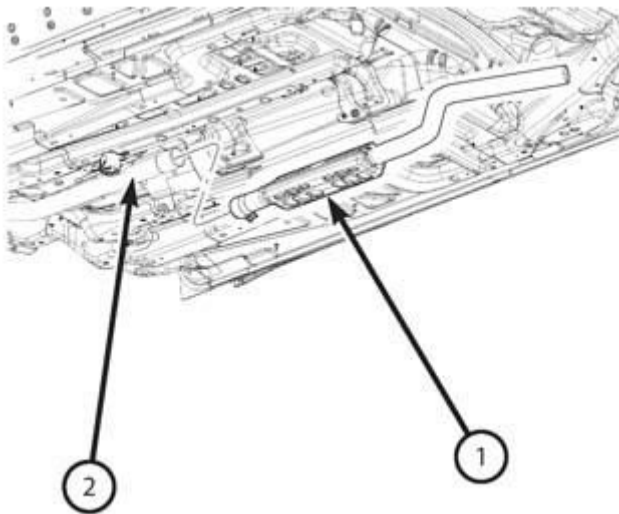


0908009784

Fig. 39: Removing/Installing Resonator - 2.0L Diesel
Courtesy of CHRYSLER GROUP, LLC

3. Loosen clamp (2) and remove resonator (3) from vehicle.

2.4L



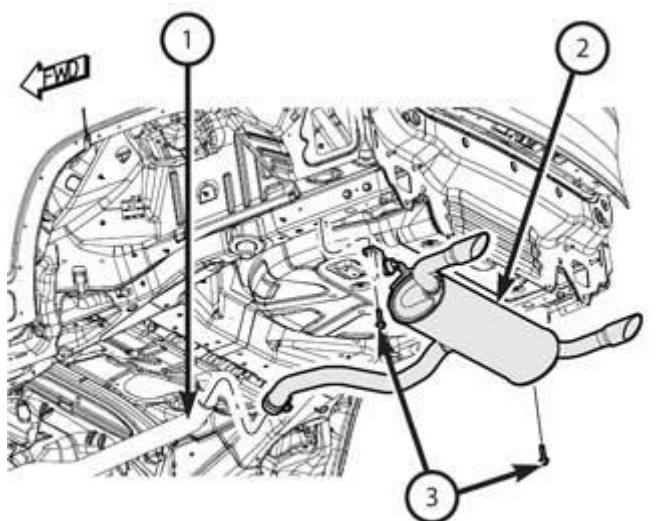
0912009646

Fig. 40: Removing/Installing Resonator - 2.4L
Courtesy of CHRYSLER GROUP, LLC

1. Loosen the muffler clamp.
2. Loosen the resonator clamp.
3. Using a twisting motion, walk the resonator (1) off of the front exhaust pipe (2).
4. Walk the pipe out of the muffler inlet.

3.2L

WARNING: The normal operating temperature of the exhaust system is very high. Therefore, never attempt to service any part of the exhaust system until it is cooled. Special care should be taken when working near the catalytic converter. The temperature of the converter rises to a high level after a short period of engine operation time.

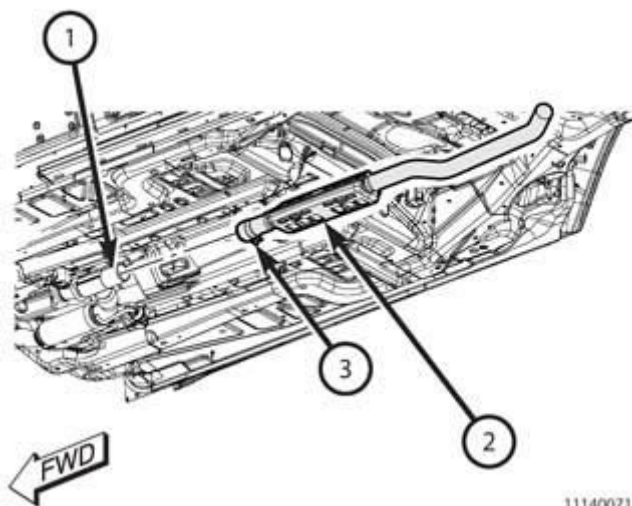


1114007106

Fig. 41: Exhaust System - 3.2L

Courtesy of CHRYSLER GROUP, LLC

1. Raise the vehicle.
2. Separate the muffler (2) pipe from the resonator pipe (1).



1114007113

Fig. 42: Resonator & Y-Pipe

Courtesy of CHRYSLER GROUP, LLC

3. Separate resonator (2) from the Y-pipe (1).
4. Remove resonator from vehicle.

INSTALLATION

2.0L DIESEL

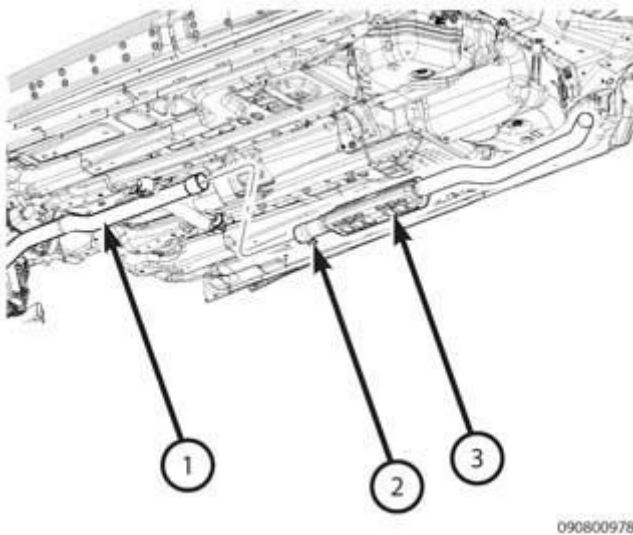
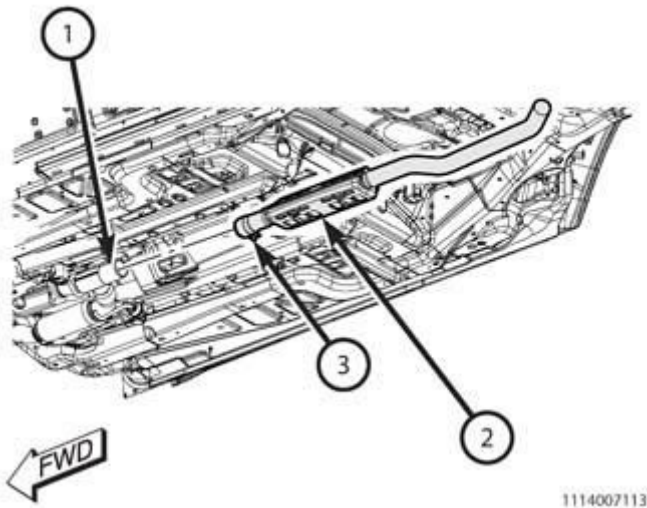


Fig. 43: Removing/Installing Resonator - 2.0L Diesel

Courtesy of CHRYSLER GROUP, LLC

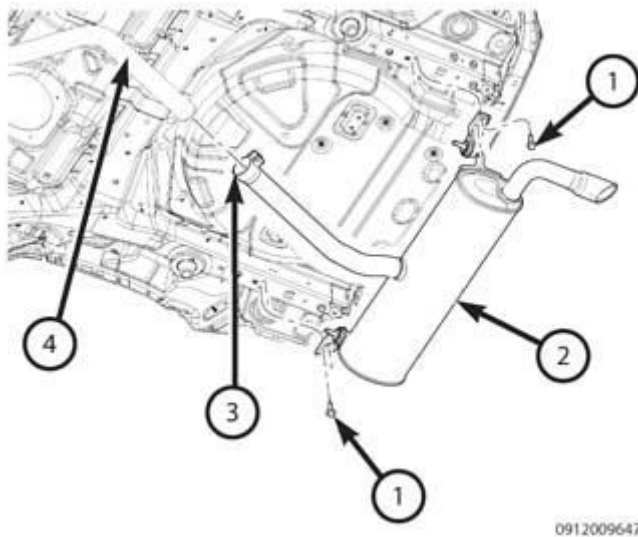
1. Install the resonator (3) onto the crossunder pipe (1). Tighten the clamp (2) to 52 N.m (38 ft. lbs.).
2. Install the muffler. Refer to **MUFFLER, EXHAUST, INSTALLATION**.
3. Lower the vehicle.
4. Start the engine and inspect for exhaust leaks. Repair exhaust leaks as necessary.
5. Check the exhaust system for contact with the body panels. Make the necessary adjustments, if needed.

2.4L

**Fig. 44: Resonator & Y-Pipe**

Courtesy of CHRYSLER GROUP, LLC

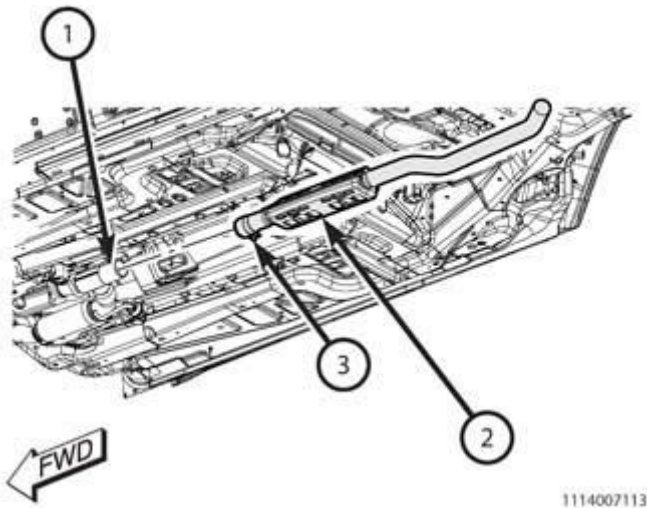
1. Install the resonator (2) onto the front exhaust pipe outlet (1). Tighten the clamp (3) to 55 N.m (41 ft. lbs.).

**Fig. 45: Exhaust System - 2.4L**

Courtesy of CHRYSLER GROUP, LLC

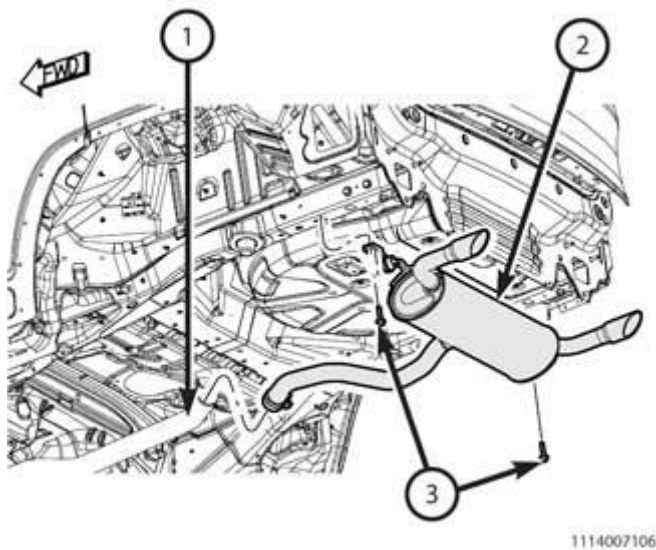
2. Insert the resonator pipe (4) into the muffler (2). Tighten the clamp (3) to 55 N.m (41 ft. lbs.).
3. Start the engine and inspect for exhaust leaks.
4. Check for proper clearance between the exhaust and the surrounding components.

INSTALLATION

**Fig. 46: Resonator & Y-Pipe**

Courtesy of CHRYSLER GROUP, LLC

1. Install the resonator (2) into the Y-pipe (1). Tighten the clamp (3) to 55 N.m (41 ft. lbs.).

**Fig. 47: Exhaust System - 3.2L**

Courtesy of CHRYSLER GROUP, LLC

2. Install the resonator pipe (1) into the muffler (2) pipe. Tighten the clamp (3) to 55 N.m (41 ft. lbs.).
3. Lower the vehicle.
4. Start the engine and inspect for exhaust leaks. Repair exhaust leaks as necessary.
5. Check the exhaust system for contact with the body panels. Make the necessary adjustments, if needed.

SHIELD, HEAT

DESCRIPTION

DESCRIPTION

The exhaust system heat shields are attached to the under body of the vehicle.

OPERATION

OPERATION

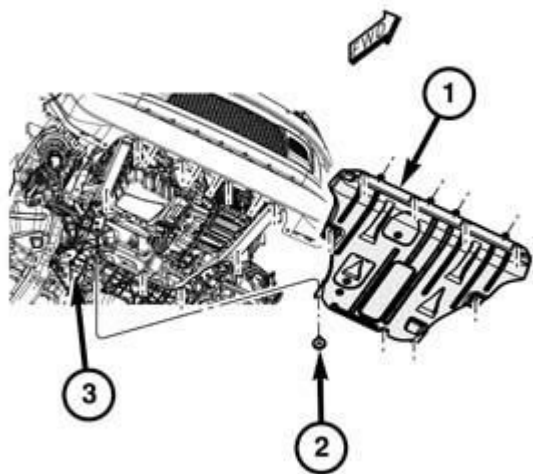
Heat shields are needed to protect both the vehicle and the environment from the high temperatures developed near the catalytic converter.

Avoid application of rust prevention compounds or undercoating materials to exhaust system floor pan heat shields on vehicles so equipped. Light over spray near the edges is permitted. Application of coating will greatly reduce the efficiency of the heat shields resulting in excessive floor pan temperatures and objectionable fumes.

PIPE, EXHAUST

REMOVAL

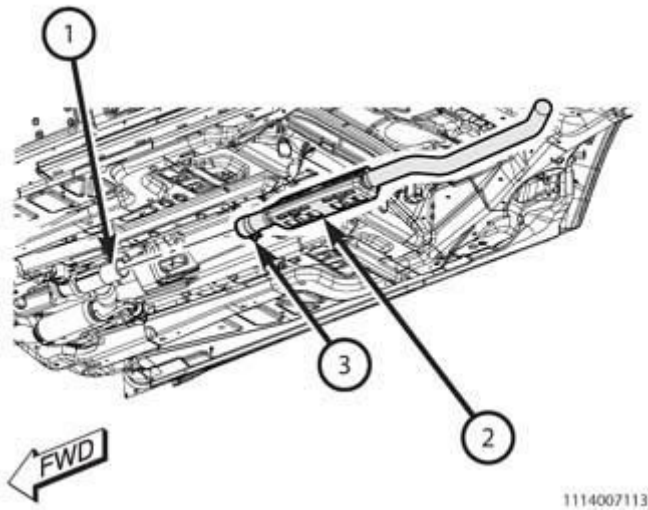
3.2L



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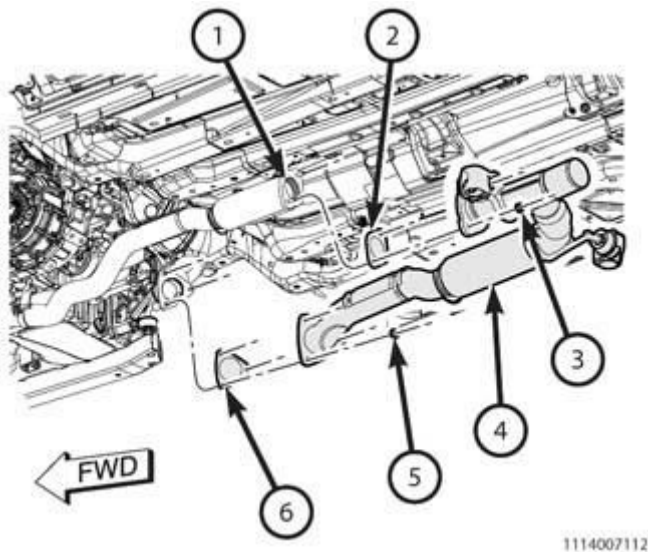
Fig. 48: Removing/Installing Belly Pans
Courtesy of CHRYSLER GROUP, LLC

1. Raise vehicle.
2. Remove the belly pan (1).

**Fig. 49: Resonator & Y-Pipe**

Courtesy of CHRYSLER GROUP, LLC

3. Using a jack or suitable stand. Position the stand under the resonator piping to help support and aid in removal from the cross under pipe.
4. Separate the resonator (2) from the Y-pipe (1).

**Fig. 50: Y-Pipe**

Courtesy of CHRYSLER GROUP, LLC

5. Remove the Y-pipe (4) support isolator bolts.
6. Separate the cross under pipe (1) from the Y-pipe.

7. Separate the rear catalytic converter from the Y-pipe.

INSTALLATION

3.2L

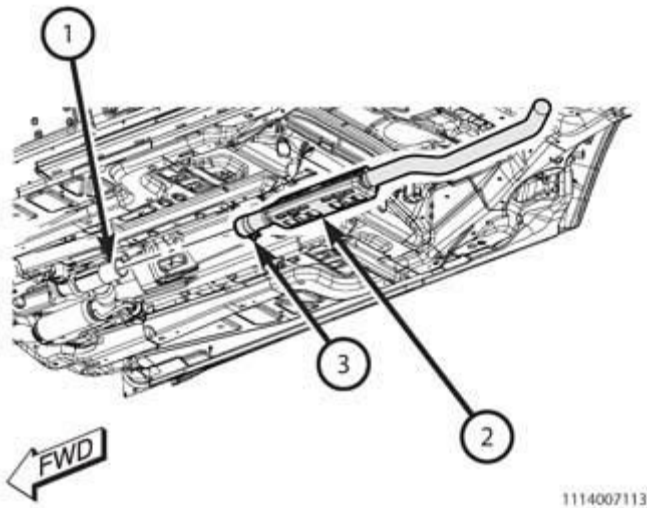


Fig. 51: Resonator & Y-Pipe
Courtesy of CHRYSLER GROUP, LLC

1. Install the Y-pipe (1) to the resonator (2). Tighten the clamp (3) to 55 N.m (40 ft. lbs.).

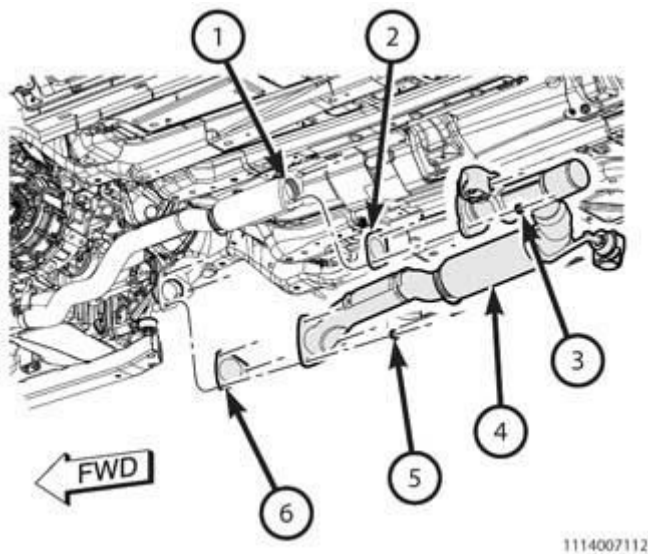
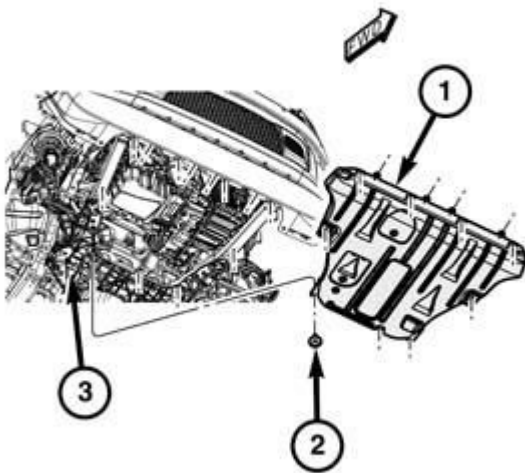


Fig. 52: Y-Pipe
Courtesy of CHRYSLER GROUP, LLC

2. Install the Y-pipe (4) isolator bolts.

3. If required, install new gaskets (2, 6).
4. Align the Y-pipe to the cross under pipe flange (1) and the rear catalytic converter flange. Tighten the nuts (3, 5) to 26 N.m (19 ft. lbs.).



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Fig. 53: Removing/Installing Belly Pans
Courtesy of CHRYSLER GROUP, LLC

5. Install the belly pan (1).
6. Lower vehicle.
7. Check for clearance of the exhaust to body.

FILTER, DIESEL PARTICULATE

DESCRIPTION

DESCRIPTION

A diesel particulate filter (DPF) is installed for exhaust gas after-treatment. The DPF filters, stores and burns particulate matter (soot) that is generated during the combustion process. The soot is oxidized to carbon dioxide CO₂ at exhaust temperatures over 600° C (1, 112° F).

OPERATION

OPERATION

The oxidation catalysts raise the exhaust gas temperatures to regenerate the DPF, which is passive regeneration.

If the passive regeneration cannot keep up with the build up of soot in the DPF, the Powertrain Control Module (PCM) will actively regenerate the DPF to burn off the soot. Residue remains inside the DPF in the form of non burnable ash. Ash comes from the oils and other materials that are trapped in the oils and are present in the soot. Ash is not eliminated by the regeneration cycle. Excessive ash accumulation requires the replacement of the DPF. The DPF uses a silicon carbide wall-flow monolith with a platinum coating to trap particulates. The monolith contains a large number of square parallel channels, which run in the axial direction and are separated by thin porous walls. The channels are alternatively open at one end, but plugged at the other. The exhaust gases flow through the walls and escape through the pores in the wall material. Particulates, however, are too large to escape and are trapped in the monolith walls. The PCM starts the regeneration of the DPF if the soot load exceeds a performance map value. The PCM determines the load condition of the DPF based upon the exhaust gas pressure upstream and downstream of the DPF. A pressure differential sensor provides the pressure input to the PCM. During the regeneration process, the PCM raises the temperature in the DPF to burn off the soot accumulated. Under normal operation, the engine does not produce enough heat to oxidize the soot inside the DPF. This process requires temperatures above 550 °C (1, 022 °F). After regeneration, the PCM reads the actual pressure difference at the DPF and compares it with a reference value. From this comparison, the PCM determines the ash quantity inside the DPF.

REMOVAL

REMOVAL

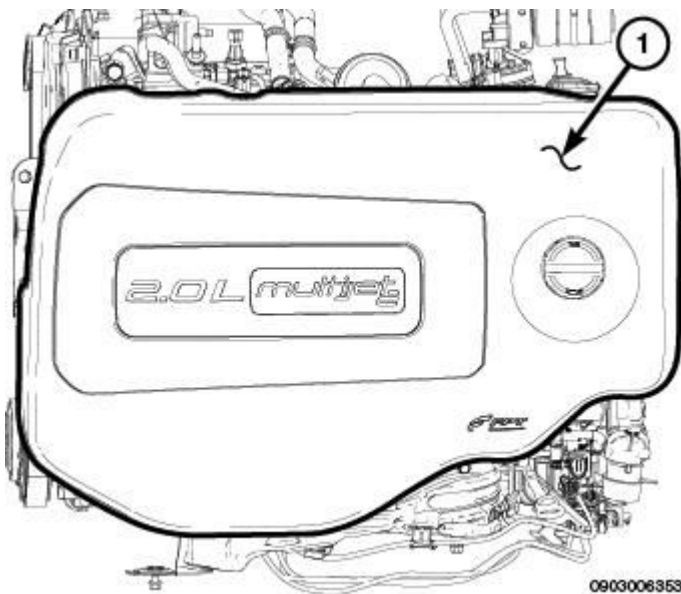


Fig. 54: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

WARNING: The normal operating temperature of the exhaust system is very high. Therefore, never work around or attempt to service any part of the exhaust system until it is cooled. Special care should be taken when working near the catalytic converter. The temperature of the converter rises to a high level after a short period of engine operating time.

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

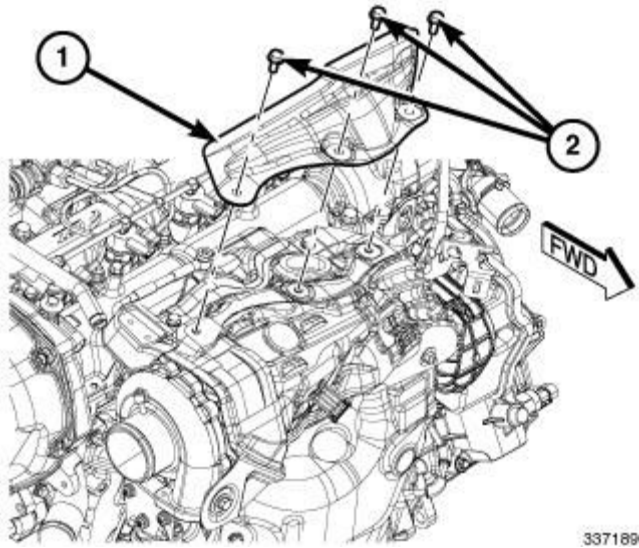


Fig. 55: Upper Turbocharger Heat Shield & Mid Upper Turbocharger Heat Shield
Courtesy of CHRYSLER GROUP, LLC

3. Remove the upper turbocharger heat shield (1).

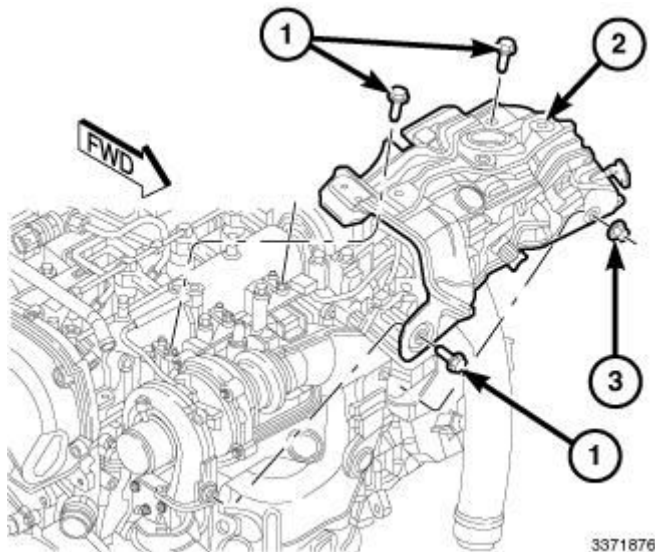
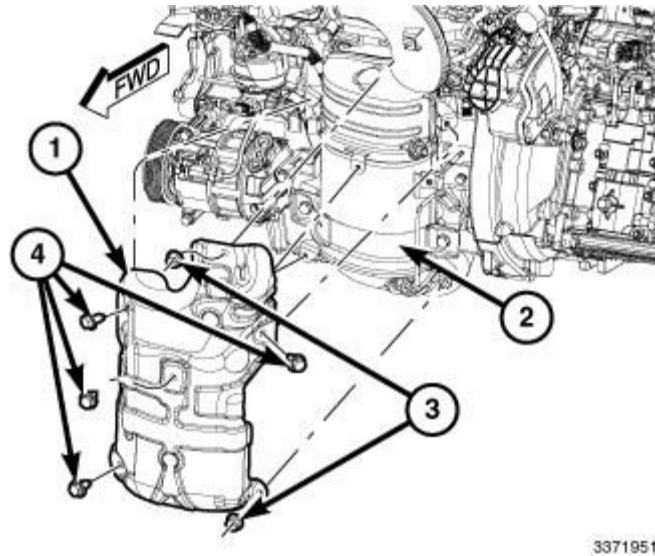


Fig. 56: Turbocharger Heat Shield & Fasteners
Courtesy of CHRYSLER GROUP, LLC

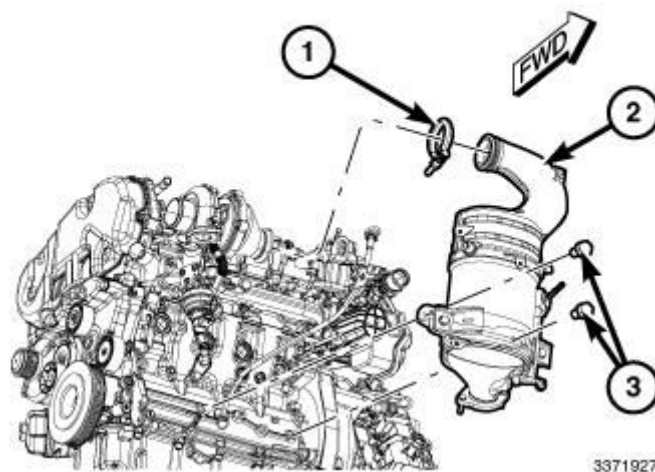
4. Disconnect the upstream O2 sensor wire harness connector.
5. Remove the mid upper turbocharger heat shield (2).



3371951

Fig. 57: DPF, Heatshield & Bolts
Courtesy of CHRYSLER GROUP, LLC

6. Remove the pressure differential tubing from the DPF (2) and position aside.
7. Disconnect the temperature and downstream O2 sensor wire harness connectors.
8. Remove the DPF heat shield (1).
9. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
10. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .
11. Remove the crossunder pipe. Refer to **PIPE, EXHAUST CROSSUNDER, REMOVAL**.
12. Lower the vehicle.



3371927

Fig. 58: Clamp, Turbocharger & Two Attaching Bolts
Courtesy of CHRYSLER GROUP, LLC

13. Loosen the band clamp (1) from the DPF pipe to turbocharger (2).
14. Remove the two attaching bolts (3) and remove DPF.

INSTALLATION

INSTALLATION

NOTE: When replacement is required on any component of the exhaust system, original equipment parts (or equivalent) must be used.

CAUTION: Band clamps should never be tightened such that the two sides of the clamps are bottomed out against the center hourglass shaped center block. Once this occurs, the clamp band has been stretched and has lost its clamping force and must be replaced.

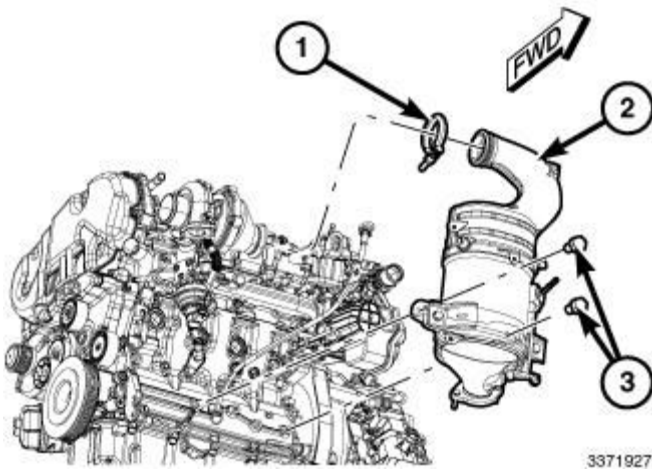


Fig. 59: Clamp, Turbocharger & Two Attaching Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Position the DPF (2) onto the engine block.
 - Tighten the band clamp (1) to 25 N.m (18 ft. lbs.).
 - Tighten the DPF bolts (3) to 20 N.m (177 in. lbs.).

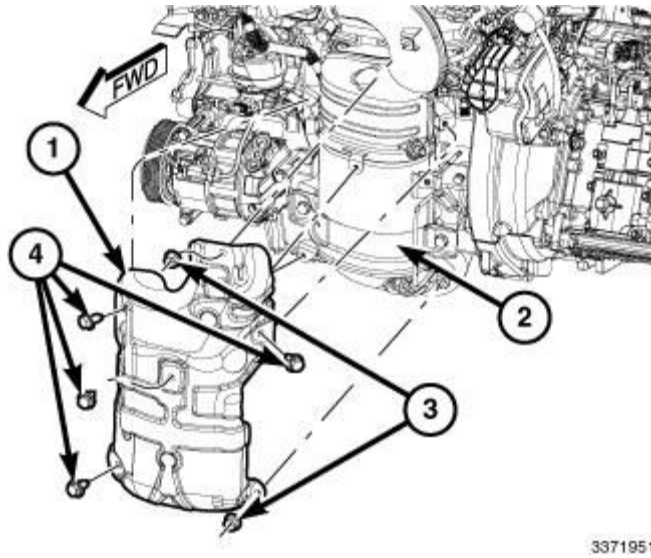


Fig. 60: DPF, Heatshield & Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Install the DPF heat shield (1):
 - Tighten the bolts (4) to 12 N.m (106 in. lbs.).
 - Tighten the nuts to (3) 8 N.m (71 in. lbs.).
3. Install the differential pressure tubing into DPF.
4. Connect the temperature sensor and the downstream O2 sensor wire harness connectors.

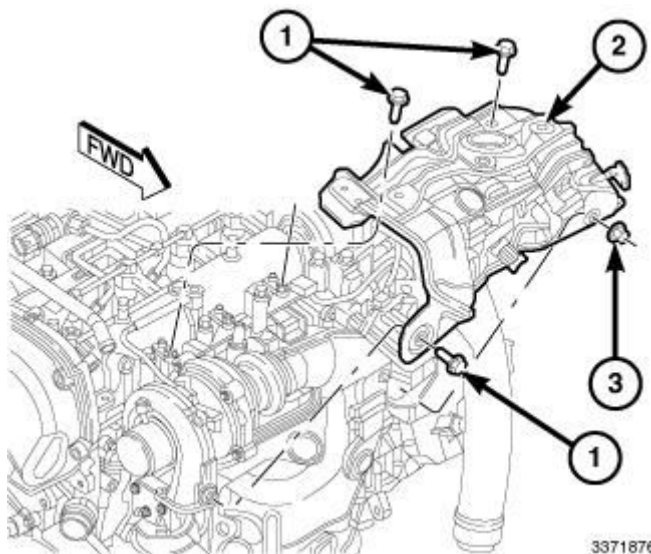


Fig. 61: Turbocharger Heat Shield & Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. Install the mid upper turbocharger heat shield:
 - Tighten the bolts (3) to 8 N.m (71 in. lbs.).

- Tighten the nut to 8 N.m (71 in. lbs.).
6. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
 7. Install the cross under pipe. Refer to **PIPE, EXHAUST CROSSUNDER, INSTALLATION**.
 8. Install the belly pan Refer to **BELLY PAN, INSTALLATION** .
 9. Lower the vehicle.
 10. Start the vehicle and check for leaks. Repair as necessary.

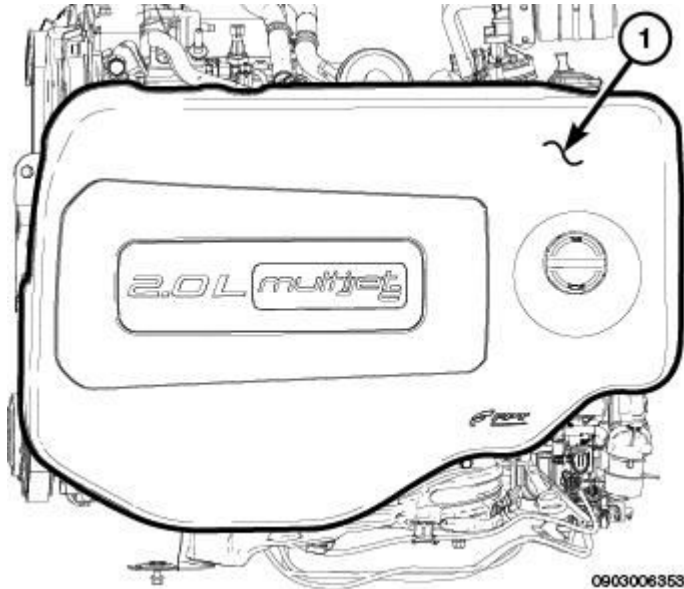


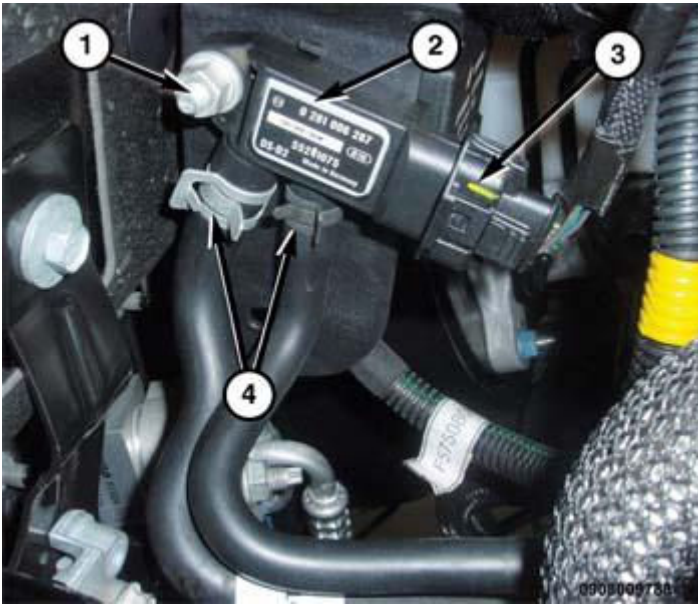
Fig. 62: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

11. Install the engine cover (1).

SENSOR, DIFFERENTIAL PRESSURE

DESCRIPTION

DESCRIPTION

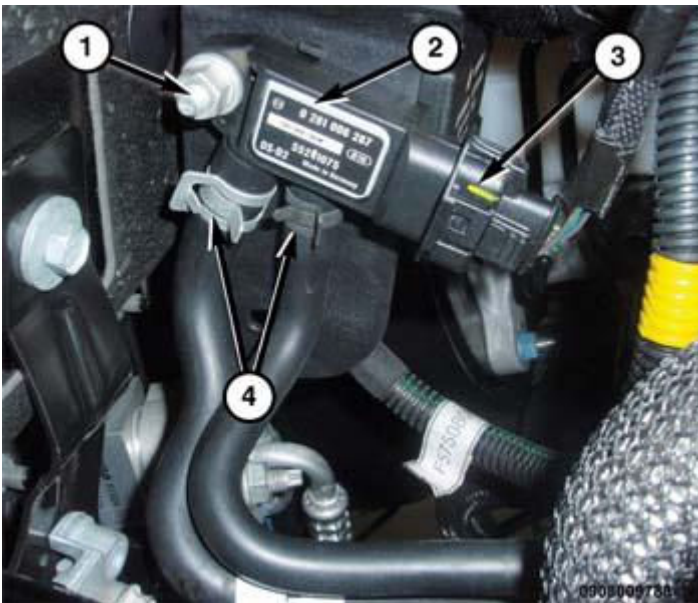
**Fig. 63: Differential Pressure Sensor**

Courtesy of CHRYSLER GROUP, LLC

The Differential Pressure Sensor (2) is located near the Powertrain Control Module (PCM). Two pressure tubes (4) measure pressure before and after the Diesel Particulate Filter (DPF)/Diesel Oxidation Catalyst (DOC). The sensor is critical for fail-safe of regeneration strategy, because it interprets high pressure drops as possible high soot loads.

REMOVAL

REMOVAL

**Fig. 64: Differential Pressure Sensor**

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Disconnect the differential pressure sensor wire harness connector (3).
3. Disconnect the differential pressure sensor vacuum hoses (4).
4. Remove nut (1) and differential pressure sensor (2).

INSTALLATION

INSTALLATION

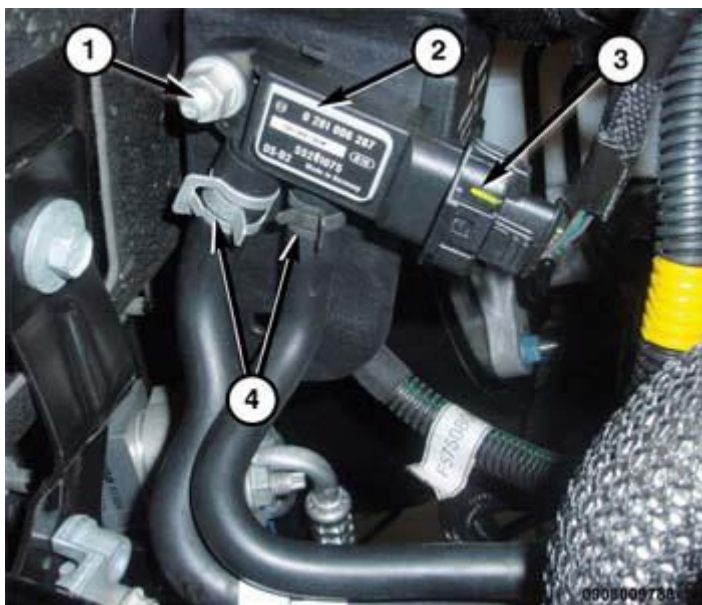


Fig. 65: Differential Pressure Sensor

Courtesy of CHRYSLER GROUP, LLC

1. Install the differential pressure sensor (2) and securely tighten nut (1).
2. Connect the differential pressure sensor vacuum hoses (4).
3. Connect the differential pressure sensor wire harness connector (3).
4. Connect the negative battery cable.

SENSOR, EXHAUST TEMPERATURE

REMOVAL

EXHAUST TEMPERATURE SENSOR 1/1

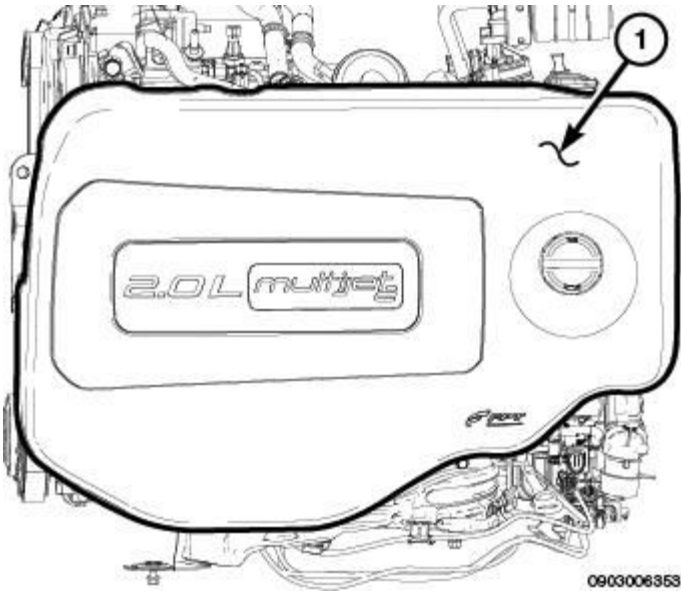


Fig. 66: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

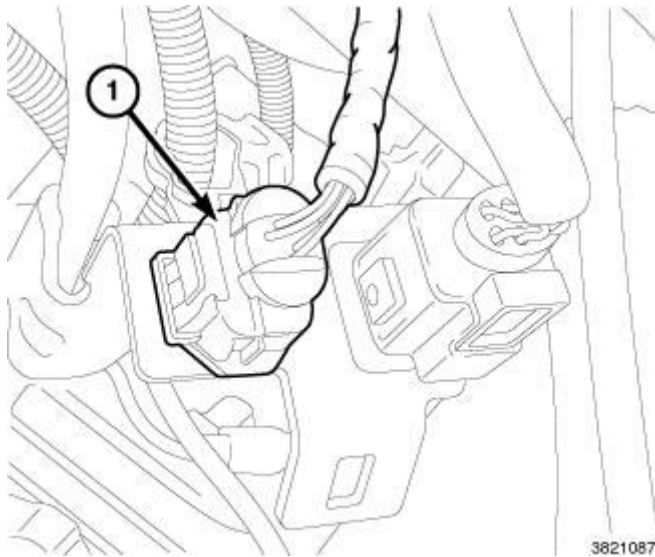


Fig. 67: Upstream Exhaust Temperature Sensor Connector

Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the upstream exhaust temperature sensor 1/1 wire harness connector (1).

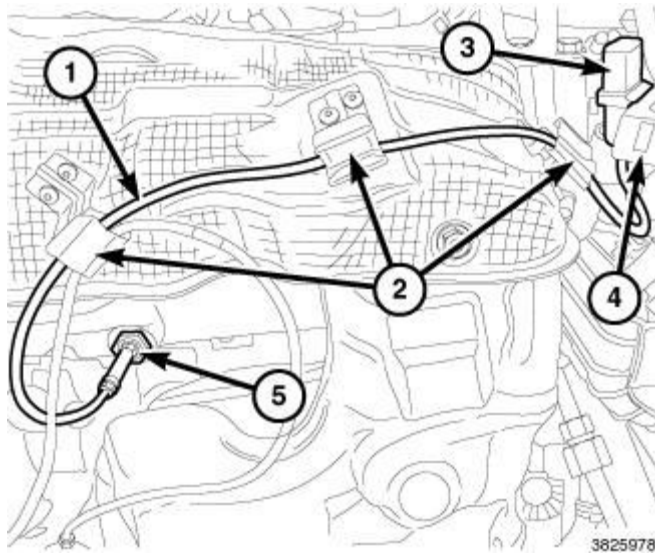


Fig. 68: Upstream Exhaust Temperature Sensor, Wire, Bracket & Connector
Courtesy of CHRYSLER GROUP, LLC

NOTE: The heat shield is removed for clarity.

4. Detach the upstream exhaust temperature sensor 1/1 wire (1) from heat shield (2).
5. Detach the upstream exhaust temperature sensor 1/1 wire harness connector (3) from bracket (4).
6. Remove the upstream exhaust temperature sensor 1/1 (5).

EXHAUST TEMPERATURE SENSOR 1/2

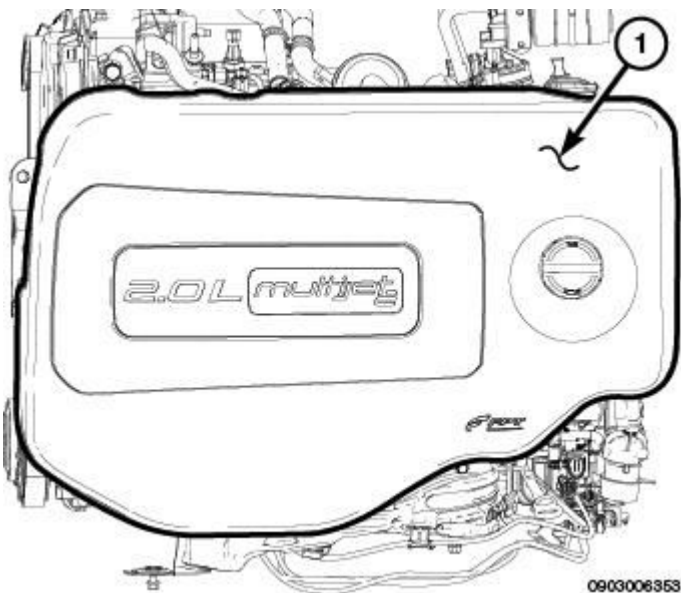


Fig. 69: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

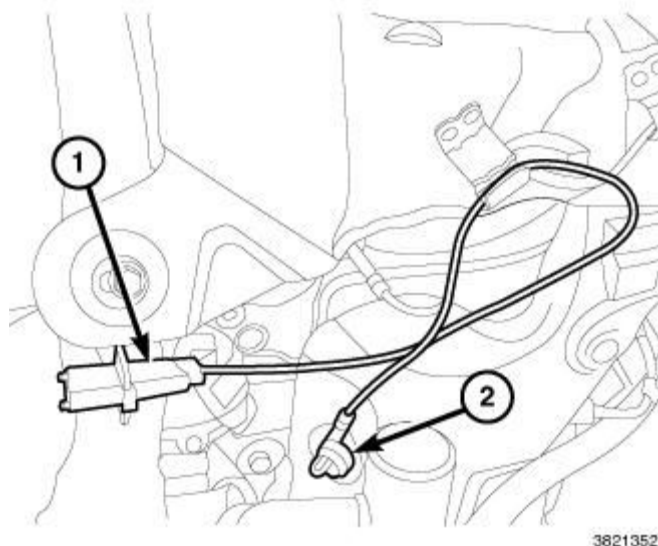


Fig. 70: Downstream Exhaust Temperature Sensor & Connector
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the downstream exhaust temperature sensor wire harness connector.
4. Detach the downstream exhaust temperature sensor wire harness connector (1) from bracket.
5. Remove the downstream exhaust temperature sensor (2).

INSTALLATION

EXHAUST TEMPERATURE SENSOR 1/1

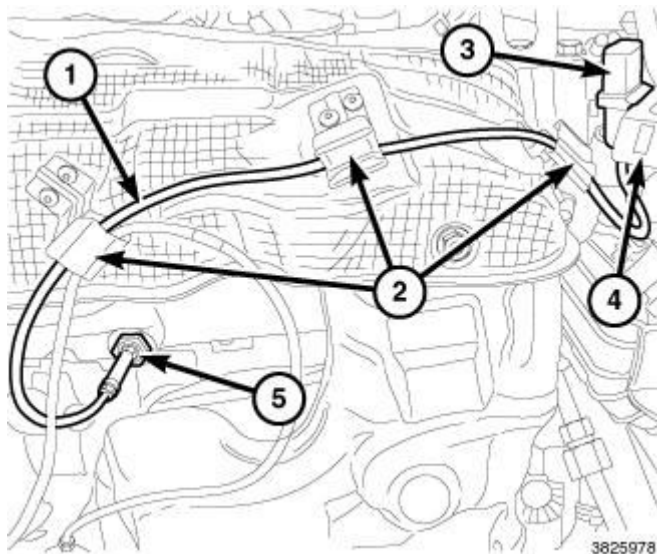


Fig. 71: Upstream Exhaust Temperature Sensor, Wire, Bracket & Connector

Courtesy of CHRYSLER GROUP, LLC

1. Install the upstream exhaust temperature sensor 1/1 (5) and tighten to 45 N.m (33 ft. lbs.).
2. Attach the upstream exhaust temperature sensor 1/1 wire harness connector (3) to bracket (4).
3. Attach the upstream exhaust temperature sensor 1/1 wire (1) to heat shield (2).

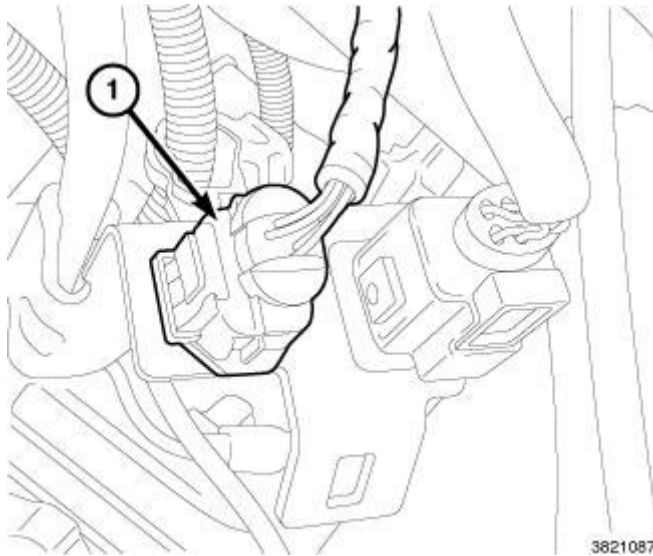


Fig. 72: Upstream Exhaust Temperature Sensor Connector
Courtesy of CHRYSLER GROUP, LLC

4. Connect the upstream temperature sensor wire harness connector (1).

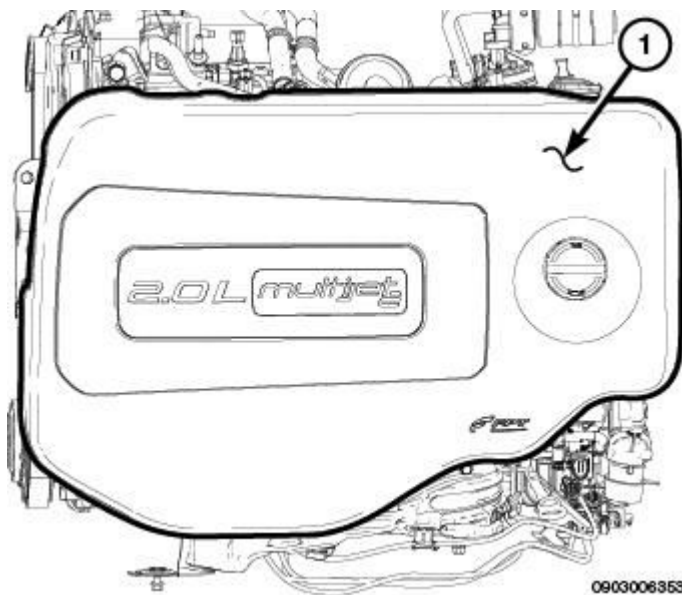


Fig. 73: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

5. Install the engine cover (1).
6. Connect the negative battery cable.

EXHAUST TEMPERATURE SENSOR 1/2

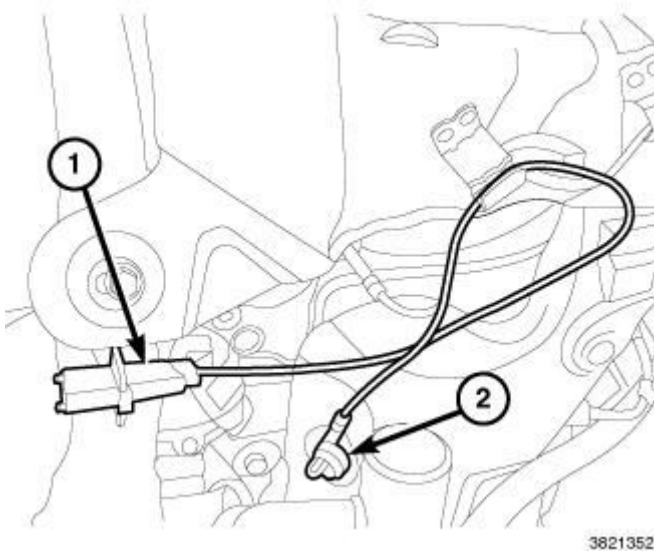


Fig. 74: Downstream Exhaust Temperature Sensor & Connector
Courtesy of CHRYSLER GROUP, LLC

1. Install the downstream exhaust temperature sensor 1/2 (2) and tighten to 45 N.m (33 ft. lbs.).
2. Attach the downstream exhaust temperature sensor 1/2 wire harness connector (1) to bracket.
3. Connect the downstream exhaust temperature sensor 1/2 wire harness connector.

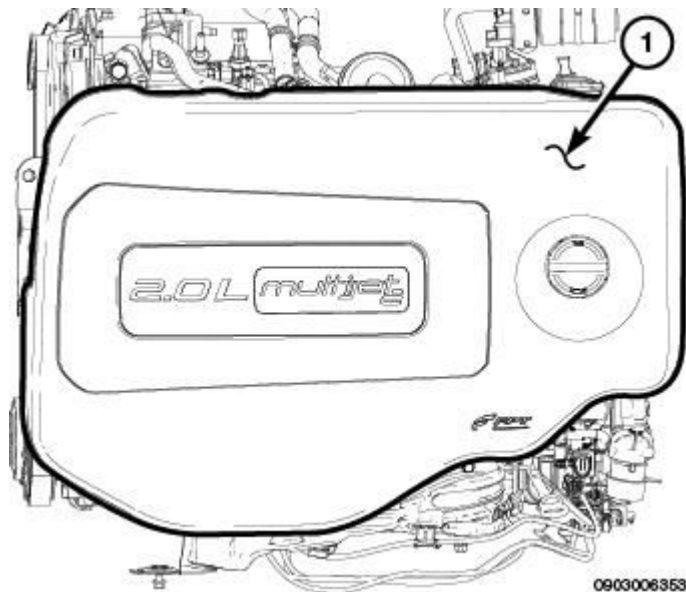


Fig. 75: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

2014 Jeep Cherokee Trailhawk
2014 ENGINE Exhaust System - Cherokee

4. Install the engine cover (1).
5. Connect the negative battery cable.

2014 ENGINE

Fuel System - Cherokee

FUEL DELIVERY, GAS

STANDARD PROCEDURE

FUEL SYSTEM PRESSURE RELEASE PROCEDURE

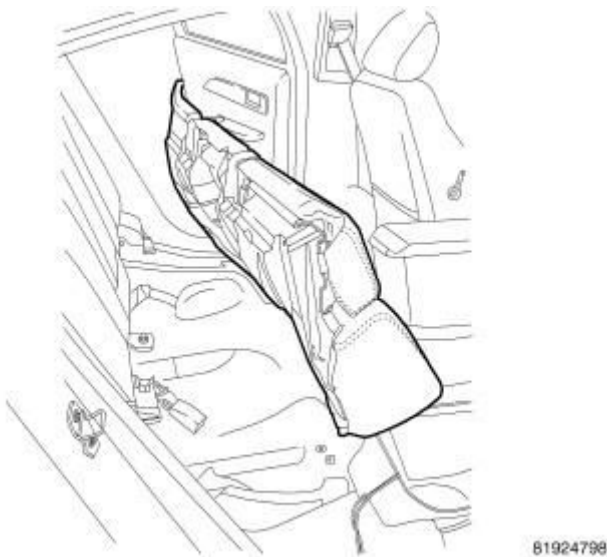


Fig. 1: Removing/Installing Rear Seat
Courtesy of CHRYSLER GROUP, LLC

WARNING: The fuel system is under constant pressure even with engine off. Until the fuel pressure has been properly relieved from the system, do not attempt to open the fuel system. Do not smoke or use open flames/sparks when servicing the fuel system. Wear protective clothing and eye protection. Make sure the area in which the vehicle is being serviced is in a well ventilated area.

A separate fuel pump relay is no longer used. A circuit within the Body Control Module (BCM) is used to control the electric fuel pump located within the fuel pump module.

1. Remove fuel fill cap.
2. Remove lower rear seat cushion.

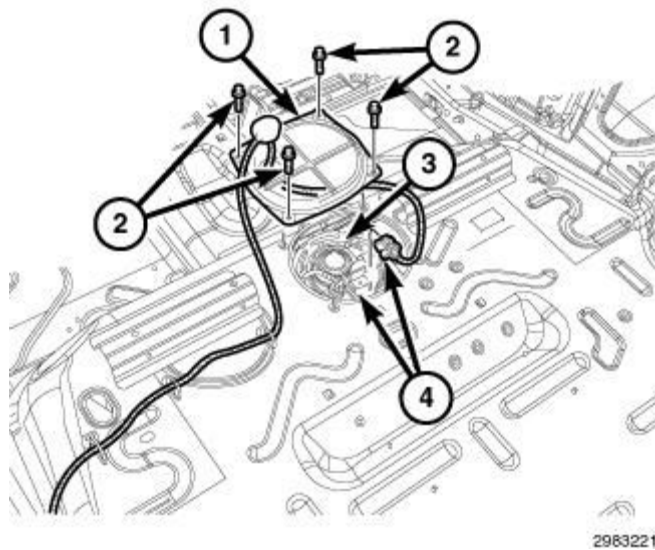


Fig. 2: Access Cover, Connector & Screws
Courtesy of CHRYSLER GROUP, LLC

3. Remove the fuel pump module cover (1).

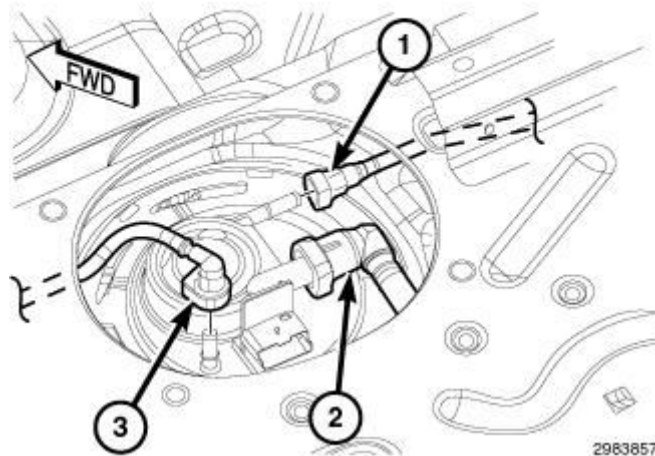


Fig. 3: Fuel Supply, Return & Vapor Lines
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect electrical connector from fuel pump module.
5. Start and run engine until it stalls.
6. Attempt to restarting engine a few times until the engine will no longer start.
7. Turn ignition key to OFF position.
8. Disconnect negative battery cable.
9. Place a shop towel below and disconnect the fuel line quick-connect fittings at the fuel pump module. Refer to **STANDARD PROCEDURE - QUICK-CONNECT FITTINGS**.

NOTE: After servicing the fuel system, one or more Diagnostic Trouble Codes (DTC's) may have been stored in Powertrain Control Module (PCM) memory due to disconnecting fuel pump module circuit. A diagnostic scan tool must be used to erase a DTC.

DRAINING FUEL TANK

1. Release fuel system pressure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE** .
2. Remove the fuel pump module. Refer to **MODULE, FUEL PUMP, REMOVAL** .
3. Drain fuel from fuel tank with approved siphoning equipment, store fuel in approved fuel storage container.

SPECIFICATIONS

FUEL SYSTEM PRESSURE

DESCRIPTION	METRIC	STANDARD
Fuel Pressure	400 kPa $\pm$ 34 kPa	58 psi $\pm$ 5 psi

TORQUE SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Fuel Fill Tube Clamp	3	-	27
Fuel Rail to Intake Manifold	7	-	62
Fuel Tank Strap Bolts	48	35	-
Filler Tube Mounting Nut	12	-	106

DIAGNOSIS AND TESTING

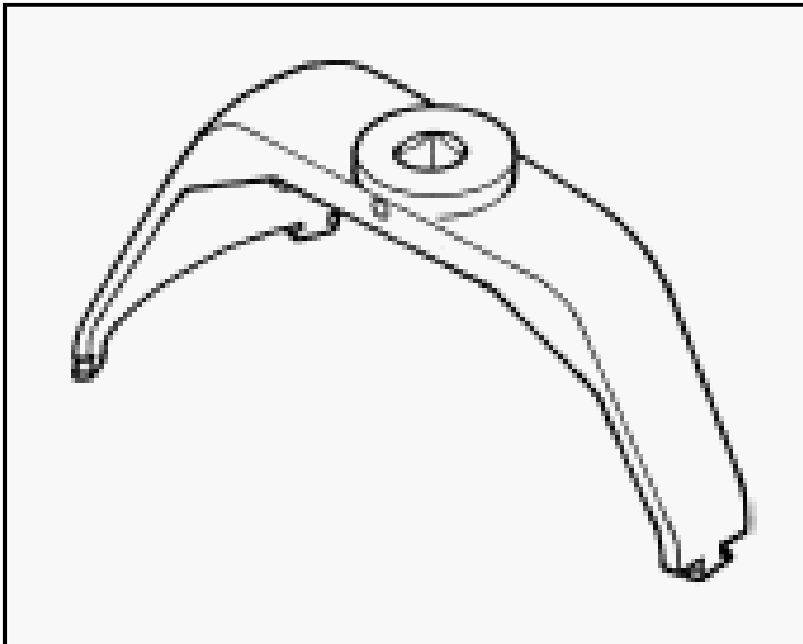
DIAGNOSIS AND TESTING - HARD TO FILL WITH FUEL

1. Disconnect the vapor recirculation tube at the fuel tank.
2. Attempt to refill fuel tank.
3. Does tank refill properly?
 - a. Yes >> Proceed to next step.
 - b. No > Proceed to step 8.
4. Reconnect the vapor recirculation tube at the fuel tank.
5. Disconnect the other end of the vapor recirculation tube at the fuel filler tube.
6. Attempt to refill fuel tank.
7. Does tank refill properly?
 - a. Yes >> Replace fuel filler tube.
 - b. No > Replace the vapor recirculation tube.

8. Disconnect the control valve to EVAP canister tube at the fuel tank.
9. Reconnect the vapor recirculation tube at the fuel tank.
10. Does tank refill properly?
 - a. Yes >> Replace fuel tank.
 - b. No > Proceed to step 11.
11. Reconnect the control valve to EVAP canister tube at the fuel tank.
12. Disconnect the control valve to EVAP canister tube at the EVAP canister.
13. Attempt to refill fuel tank.
14. Does tank refill properly?
 - a. Yes >> Blockage is in the EVAP Canister, or ESIM, or Clean air hose (ESIM vent hose), or filter. Diagnose appropriately.
 - b. No > Replace the control valve to EVAP canister tube.

SPECIAL TOOLS

SPECIAL TOOLS



9340 - SAE Fuel Pump Lock Ring
Wrench
(Originally Shipped In Kit Number(s)
9327, 9327CC, 9397, 9575.)

FILTER, FUEL

DESCRIPTION

DESCRIPTION

The fuel filter is combined within the fuel pump module assembly. It is not serviceable separately.

FITTING, QUICK CONNECT

STANDARD PROCEDURE

STANDARD PROCEDURE - QUICK-CONNECT FITTINGS

Different types of quick-connect fittings are used to attach the various fuel system components, lines and tubes. Some quick-connect fittings require the use of a special tool for disconnection and removal.

NOTE: Care must be used when separating fittings. Over-flexing may cause the tube to become deformed or damaged.

These are the quick-connect fittings:

- Redundant Latch Single Button Type Fitting
- Single Button Type Fitting
- Pinch Type Fitting
- Single Tab Type Fitting
- Two Tab Type Fitting
- Plastic Retainer Ring Type Fitting
- Latch Clip Type 1 Fitting
- Latch Clip Type 2 Fitting
- Wing Type Fitting

DISCONNECTING

WARNING: On vehicles equipped with gasoline engines, the fuel system is under a constant pressure (even with engine off). Before servicing any fuel system hose, fitting or line, fuel system pressure must be released.

CAUTION: Before separating a Quick-Connect fitting, pay attention to what type of fitting is being used. This will prevent unnecessary fitting or fitting latch breakage.

CAUTION: The interior components (O-rings, clips) of quick-connect fittings are not serviced separately, but new plastic spacers and latches are available for some types. If service parts are not available, do not attempt to repair the damaged fitting or fuel line (tube). If repair is necessary, replace the complete fuel line (tube) assembly.

REDUNDANT LATCH SINGLE BUTTON TYPE FITTING:

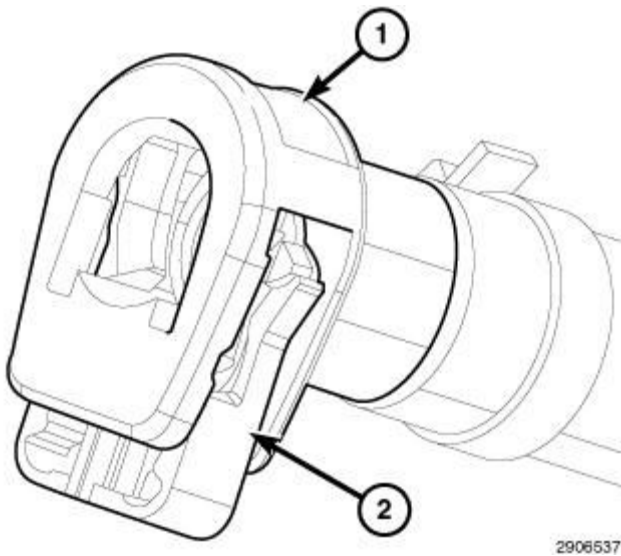


Fig. 4: Redundant Latch & Push Button
Courtesy of CHRYSLER GROUP, LLC

This type of quick-connect fitting is equipped with a redundant latch (2) and a single push button (1) that releases two internal latches located in the quick-connect fitting. Special tools are not required for removal.

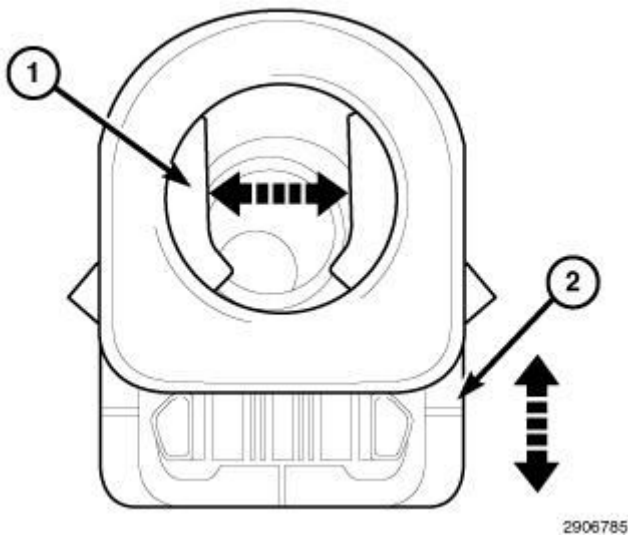
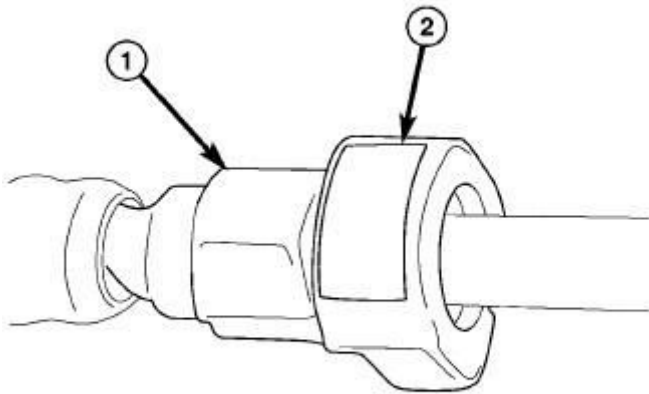


Fig. 5: Redundant Latch & Internal Latches
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not pry or pull up on the push button as damage to the latches of the quick-connect fitting will occur.

1. Pull the redundant latch (2) out away from the quick-connect fitting.
2. Press on the push button with your thumb, release the internal latches (1) and remove the quick-connect fitting from the fuel system component.

SINGLE BUTTON TYPE FITTING:

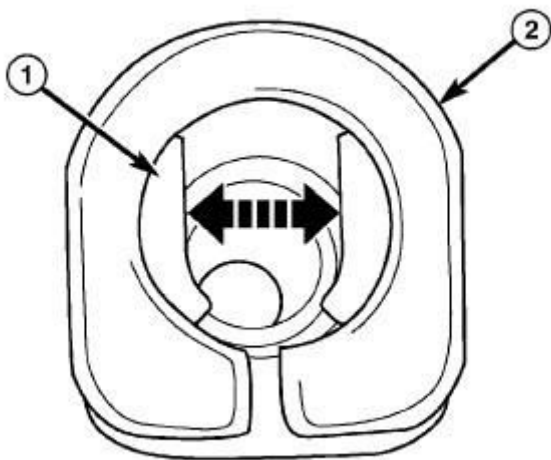
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Fig. 6: Single Button Fitting

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not pry or pull up on the push button as damage to the latches of the quick-connect fitting will occur.

This type of quick-connect fitting is equipped with a single push button (2) that releases two internal latches located in the quick-connect fitting. Special tools are not required for removal.

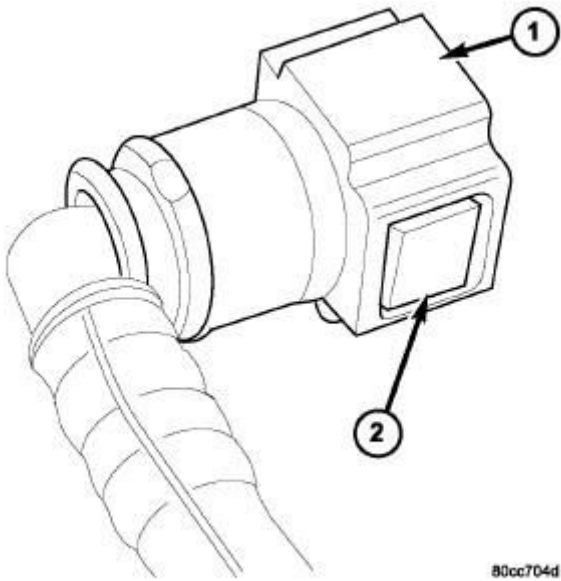


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Fig. 7: Quick-Connect Fitting Latches

Courtesy of CHRYSLER GROUP, LLC

1. Press on the push button with your thumb, release the internal latches (1).
2. Remove the quick-connect fitting from the fuel system component.

2 BUTTON TYPE FITTING**Fig. 8: 2-Button Type Fitting**

Courtesy of CHRYSLER GROUP, LLC

This type of quick-connect fitting (1) is equipped with two push buttons (2) that releases two internal latches located in the quick-connect fitting. Special tools are not required for removal.

1. Press on both push buttons with your thumb, release the internal latches.
2. While holding the two push buttons simultaneously, remove the quick-connect fitting from the fuel system component.

PINCH TYPE FITTING

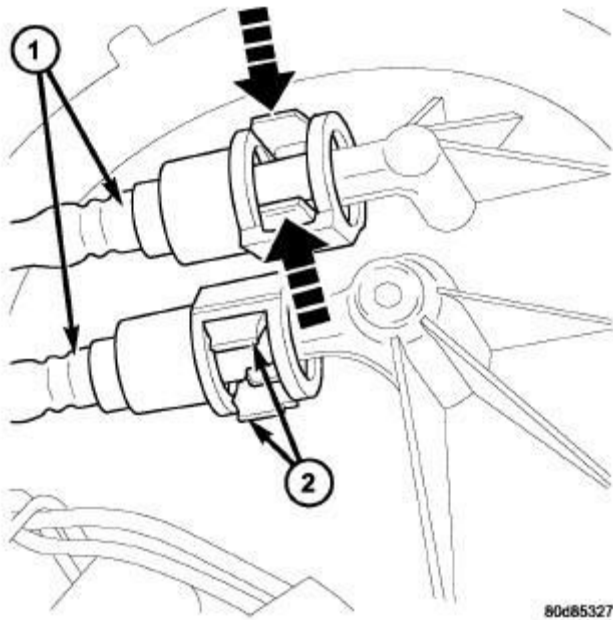


Fig. 9: Pinch Type Quick-Connect Fitting
Courtesy of CHRYSLER GROUP, LLC

This type of quick-connect fitting (1) is equipped with two finger tabs (2). Special tools are not required for removal.

1. Pinch both tabs (2) together and release the quick-connect fitting.
2. Remove the quick-connect fitting from the fuel system component.

SINGLE TAB TYPE FITTING

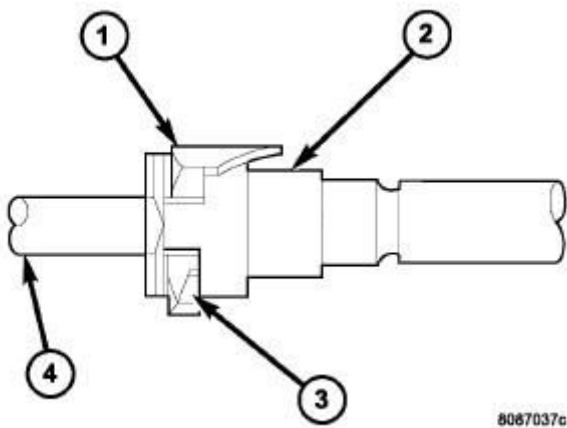


Fig. 10: Single-Tab Type Fitting
Courtesy of CHRYSLER GROUP, LLC

This type of quick-connect fitting (3) is equipped with a single pull tab (1). The tab is removable. After tab is removed the quick-connect fitting can be separated from the fuel system component. Special tools are not required for removal.

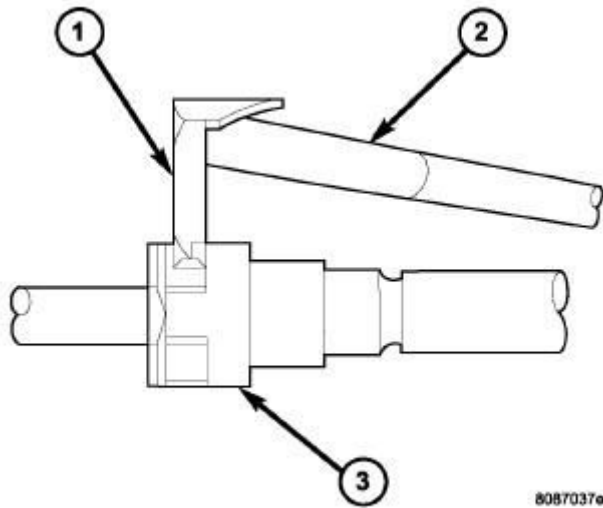


Fig. 11: Disconnecting Single-Tab Type Fitting
Courtesy of CHRYSLER GROUP, LLC

1. Press release tab on side of fitting to release pull tab (1). **If release tab is not pressed prior to releasing pull tab, pull tab will be damaged.**
2. While pressing the release tab on the side of the quick-connect fitting use a screwdriver (2) to pry up the pull tab.
3. Raise the pull tab until it separates from the quick-connect fitting.
4. Remove the quick-connect fitting from the fuel system component.

TWO TAB TYPE FITTING

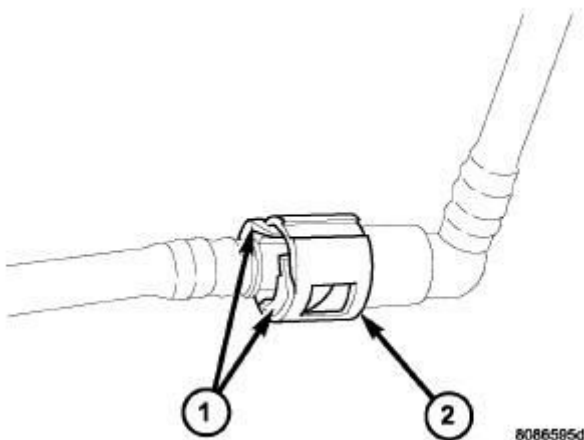


Fig. 12: Typical Two-Tab Type Quick-Connect Fitting
 Courtesy of CHRYSLER GROUP, LLC

This type of quick-connect fitting (2) is equipped with tabs located on both sides of the fitting (1). These tabs are integral to the fuel system component. The plastic tabs will remain on the component being serviced after the quick-connect fitting is removed. The O-ring and spacer will remain in the quick-connect fitting. Special tools are not required for removal.

1. Squeeze the plastic tabs (1) against the sides of component being serviced with your fingers.
2. Remove the quick-connect fitting from the fuel system component.

PLASTIC RETAINER RING TYPE FITTING

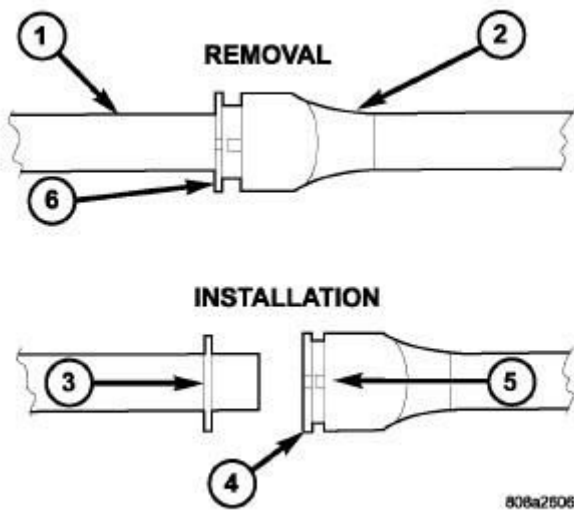


Fig. 13: Plastic Retainer Ring Type Fitting
 Courtesy of CHRYSLER GROUP, LLC

This type of fitting can be identified by the use of a round plastic retainer ring (4) usually black in color. Special tools are not required for removal.

NOTE: The round plastic retainer ring must be pressed squarely into the quick-connect fitting body. If this retainer is cocked during removal it will be difficult to disconnect the quick-connect fitting. Use an open-end wrench on the shoulder of the plastic retainer ring to aid in disconnection.

1. Firmly push the quick-connect fitting (5) towards the component being serviced while firmly pushing the round plastic retainer ring into the quick-connect fitting (6). With the round plastic ring depressed, remove the quick-connect fitting from the fuel system component.
2. After removal the plastic retainer ring will remain with the quick-connect fitting.

LATCH CLIP TYPE 1 FITTING

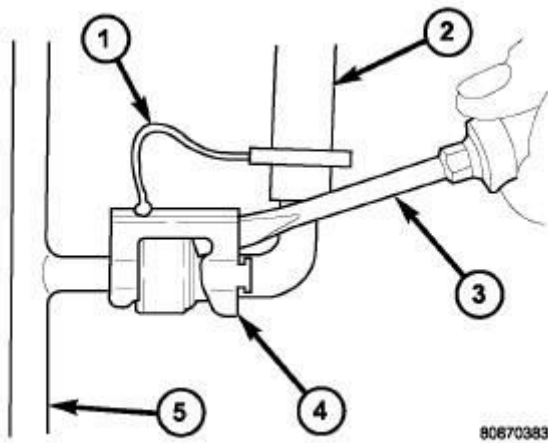


Fig. 14: Latch Clip Type 1
Courtesy of CHRYSLER GROUP, LLC

Depending on vehicle model and engine, 2 different types of safety latch clips are used. One is tethered (1) to fuel line and the other is not. A special tool will be necessary to disconnect the fuel line after latch clip is removed. The latch clip may be used on certain fuel line and fuel rail connections or to join fuel lines together.

1. Pry up on the latch clip (4) with a screwdriver (3).
2. Slide the latch clip away from the quick-connect fitting while lifting the screwdriver and position aside.

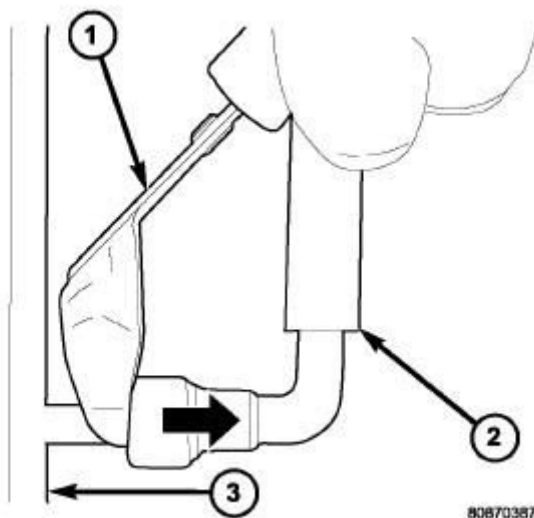


Fig. 15: Fuel Line Disconnection Using Special Tool
Courtesy of CHRYSLER GROUP, LLC

3. Insert the commercially available fuel line removal tool (1) into the quick-connect fitting and release the

internal latches.

NOTE: After removal the internal latches will remain in the quick-connect fitting.

4. With the commercially available fuel line removal tool (1) still inserted, remove the quick-connect fitting from the fuel system component.

LATCH CLIP TYPE 2 FITTING

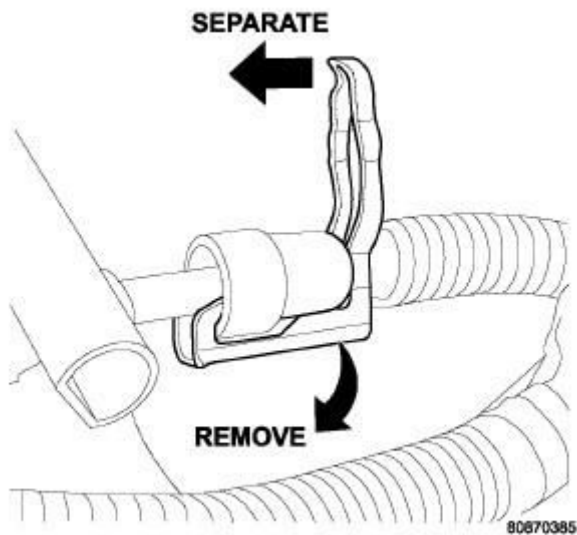


Fig. 16: Latch Clip Type 2

Courtesy of CHRYSLER GROUP, LLC

Depending on vehicle model and engine, 2 different types of safety latch clips are used. One is tethered to the fuel line and the other is not. A special tool will be necessary to disconnect the fuel line after the latch clip is removed. The latch clip may be used on certain fuel line and fuel rail connections or to join fuel lines together.

1. Unlatch the small arms on the end of clip, swing away and separate from the fuel system component.
2. Slide the latch clip away from the quick-connect fitting while lifting with a screwdriver and position aside.

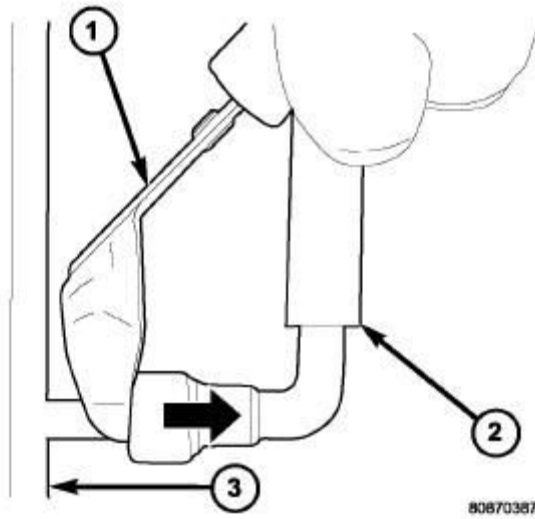


Fig. 17: Fuel Line Disconnection Using Special Tool
 Courtesy of CHRYSLER GROUP, LLC

3. Insert the commercially available fuel line removal tool (1) into the quick-connect fitting and release the internal latches.

NOTE: After removal the internal latches will remain in the quick-connect fitting.

4. With the commercially available fuel line removal tool (1) inserted, remove the quick-connect fitting from the fuel system component.

WING TYPE FITTING

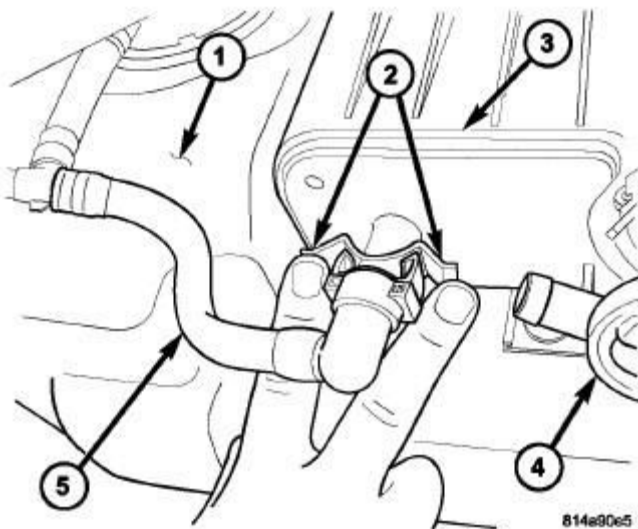


Fig. 18: EVAP Canister Vapor Hose

Courtesy of CHRYSLER GROUP, LLC

The wing type fitting is used on fuel system and emission components. The wing type fitting is most commonly used on the EVAP canister (3). Special tools are not required for removal.

1. Using two fingers, press both wings (2) and release the locking tabs.

NOTE: After removal the locking tabs will remain with the quick-connect fitting.

2. While holding the wings, remove the quick-connect fitting from the fuel system component.

CONNECTING

1. Inspect the quick-connect fitting body and fuel system components for damage. Replace as necessary.
2. Prior to connecting any quick-connect fitting to components, check condition of fitting and components. Clean parts with a lint-free cloth. Lubricate with clean engine oil.
3. Insert the quick-connect fitting onto the fuel tube or fuel system component until the built-in stop on the fuel tube or component rests against the back of fitting.
4. Continue pushing until a click is felt.
5. If Equipped:
 - **Redundant Latch Single Button Type Fitting:** Push redundant latch until it locks into position in the quick-connect fitting.
 - **Single Tab Type Fitting:** Push new tab down until it locks into position in the quick-connect fitting.
 - **Latch Clip Type Fitting:** Install latch clip (snaps into position). **If latch clip will not snap into position, this indicates the quick-connect fitting is not properly installed onto fuel system component, recheck the connection.**
6. Verify a locked condition by firmly pulling on the quick-connect fitting connection of the fuel system component.

REGULATOR, FUEL PRESSURE**DESCRIPTION****DESCRIPTION**

The fuel pressure regulator is located within the fuel pump module. It is serviced by replacing the fuel pump module assembly.

MODULE, FUEL PUMP**DESCRIPTION****DESCRIPTION**

The fuel pump module is mounted on the top of the fuel tank and contains the following components:

- Mounting flange
- Electric fuel pump
- Fuel pump reservoir
- Inlet strainer
- Fuel pressure regulator
- Fuel level sending unit
- Fuel filter

The fuel level sending unit is the only serviceable component of the primary fuel pump module. If the electric fuel pump, fuel pressure regulator or fuel filter requires service, the fuel pump module must be replaced as an assembly.

OPERATION

OPERATION

An electric fuel pump is located within the fuel pump module. The electric fuel pump is a positive displacement, immersible pump with a permanent magnet electric motor capable of creating 860 kPa (125 psi) of operating pressure. The fuel pressure regulator limits fuel pressure to 400 kPa (58 psi).

The fuel gauge is controlled by the instrument cluster circuit board based upon cluster programming and a hard wired input received by the cluster from the fuel level sending unit on the module in the fuel tank.

The instrument cluster continually monitors the fuel tank sending unit to determine the level of fuel in the fuel tank. This information is available to other vehicle control modules via the Controller Area Network (CAN) data bus. Fuel gauge diagnosis is conducted as part of the instrument cluster circuitry. Refer to **DIAGNOSIS AND TESTING** .

REMOVAL

REMOVAL

NOTE: Fuel pump for the saddle style fuel tank shown in illustration. Single style similar.

WARNING: Risk of injury to eyes and skin from contact with fuel. Wear protective clothing and eye protection. Risk of poisoning from inhaling and swallowing fuel. Pour fuel only into appropriately marked and approved containers. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: The fuel system is under constant high pressure even with engine OFF. Until the fuel pressure has been properly released from the system, do

not attempt to open the fuel system. Do not smoke or use open flames/sparks when servicing the fuel system. Make sure the area in which the vehicle is being serviced is in a well ventilated area. Failure to comply may result in serious or fatal injury.

1. Perform the fuel system pressure release procedure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE** .

NOTE: The fuel pump module has to be properly located in the fuel tank for the fuel level gauge to work properly.

2. Disconnect and isolate the negative battery cable.
3. Remove the right side rear seat for the single fuel pump module. For the saddle style fuel tank. Remove the rear seat assembly. Refer to **SEAT, REAR, REMOVAL** .

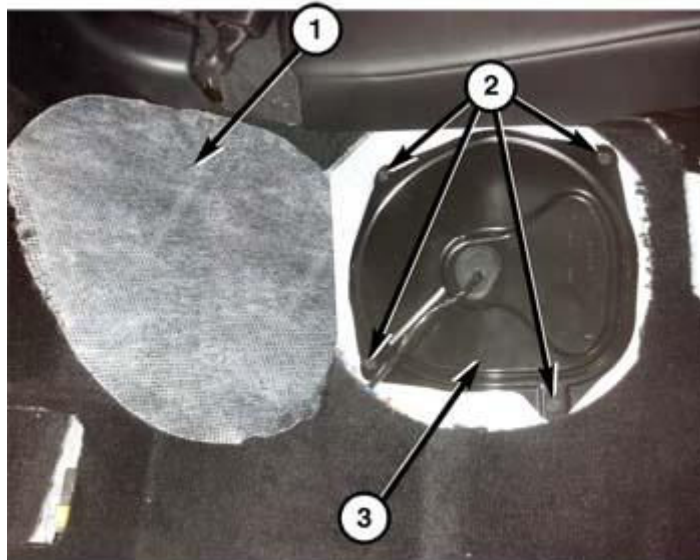
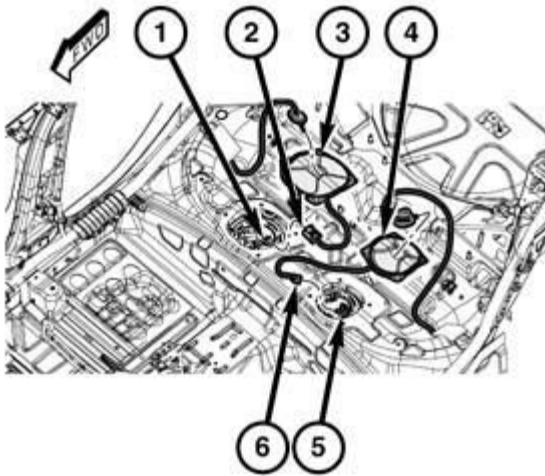


Fig. 19: Carpeting, Screws & Fuel Module Cover
Courtesy of CHRYSLER GROUP, LLC

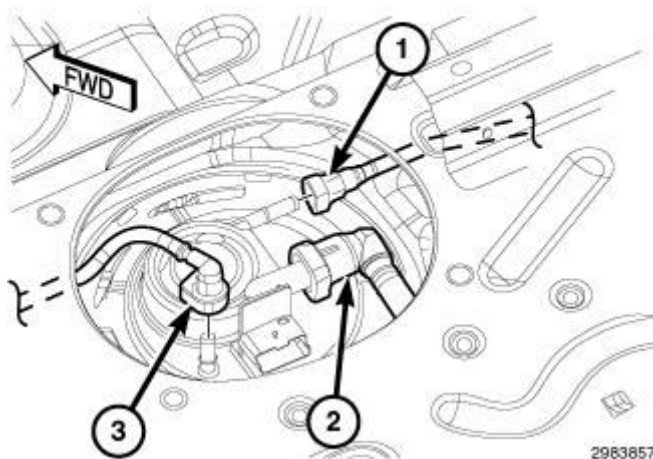
4. Cut along the perforated lines in the carpeting and position aside (1).
5. Remove the screws (2) that secure the fuel module cover (3) to the floor.



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Fig. 20: Fuel Module Access Covers & Wire Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

6. Lift up on the fuel pump module access cover (3, 4) and disconnect the wire harness connectors (2, 6).
7. Use a marker and place a mark across the position of the fuel pump module lock-ring, fuel pump module and the fuel tank prior to removal.



2963857

Fig. 21: Fuel Supply, Return & Vapor Lines
Courtesy of CHRYSLER GROUP, LLC

8. Disconnect the fuel tank vapor line (1, 3) from fuel pump module.

9. Disconnect the fuel lines (2) from the fuel pump module.

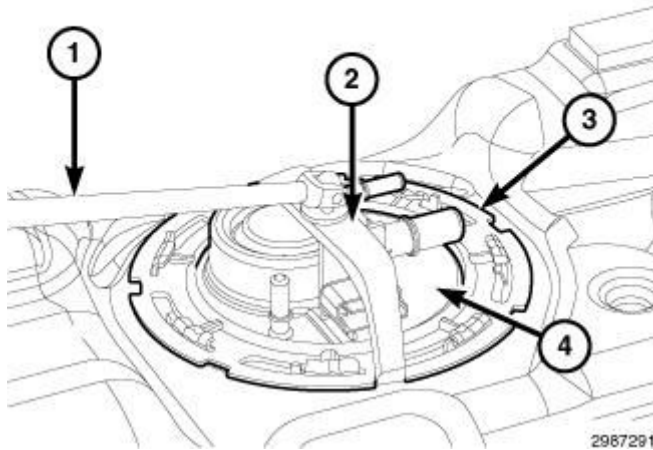


Fig. 22: Fuel Pump Module, Locking Ring & Lock Ring Wrench
Courtesy of CHRYSLER GROUP, LLC

NOTE: Prior to removing the fuel pump module, use compressed air to remove any accumulated dirt and debris from around fuel tank opening.

10. Position the lock-ring remover/installer (2) (special tool #9340, SAE Fuel Pump Lock Ring Wrench) or into the notches on the outside edge of the lock-ring (3).
11. Install a 1/2 inch drive breaker bar into the lock-ring remover/installer.
12. Rotate the breaker bar (1) counterclockwise and remove the lock-ring (3).

WARNING: The fuel pump module reservoir does not empty out when the tank is drained. The fuel in the reservoir will spill out when the module is removed.

NOTE: Do not spill fuel into the interior of the vehicle.

13. Lift up and removed the fuel pump module out of the fuel tank using caution not spill fuel inside the vehicle or bend the float arm.
14. Tip the fuel pump module on its side and drain all fuel from the reservoir.

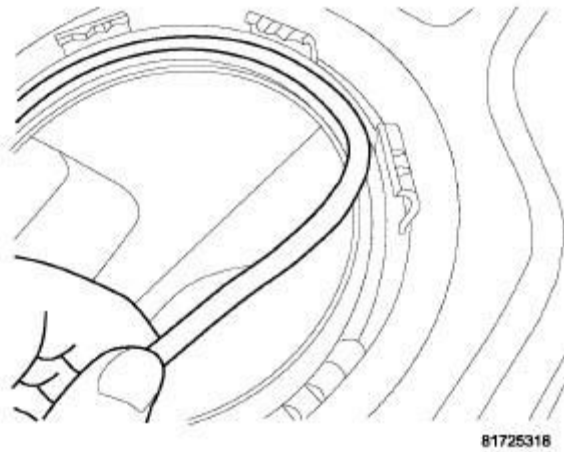


Fig. 23: Fuel Pump Module Seal
Courtesy of CHRYSLER GROUP, LLC

15. Remove and discard the rubber O-ring seal.

INSTALLATION

INSTALLATION

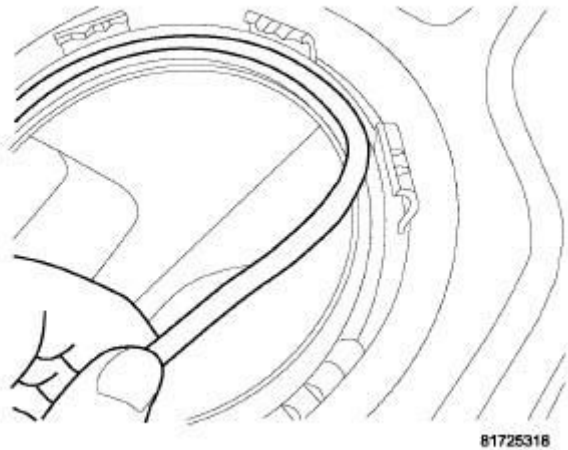


Fig. 24: Fuel Pump Module Seal
Courtesy of CHRYSLER GROUP, LLC

WARNING: Risk of injury to eyes and skin from contact with fuel. Wear protective

clothing and eye protection. Risk of poisoning from inhaling and swallowing fuel. Pour fuel only into appropriately marked and approved containers. Failure to follow these instructions may result in possible serious or fatal injury.

CAUTION: Whenever the fuel pump module is serviced, the rubber O-ring seal must be replaced.

1. Clean the rubber O-ring seal area of the fuel tank and install a new rubber O-ring seal.
2. Lower the fuel pump module into the fuel tank using caution not to bend the float arm.

NOTE: The fuel pump module must be properly located in the fuel tank for the fuel level gauge to work properly.

3. Align the rubber O-ring seal and rotate the fuel pump module to the orientation marks noted during removal. This step must be performed for the fuel level gauge to work properly.

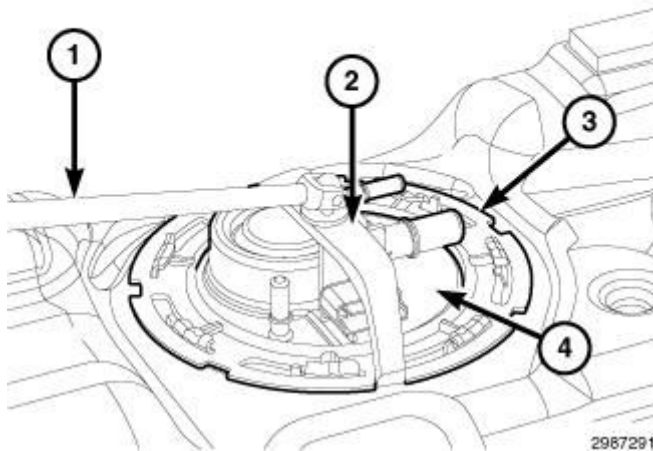


Fig. 25: Fuel Pump Module, Locking Ring & Lock Ring Wrench
Courtesy of CHRYSLER GROUP, LLC

4. Position the lock-ring (3) over top of the fuel pump module (4).
5. Position the lock-ring remover/installer (2) (special tool #9340, SAE Fuel Pump Lock Ring Wrench) into the notches on the outside edge of the lock-ring (3).
6. Install a 1/2 inch drive breaker bar (1) into the lock-ring remover/installer (2) (special tool #9340, SAE Fuel Pump Lock Ring Wrench).
7. Rotate the breaker bar (1) clockwise until all seven notches of the lock-ring (3) have engaged.

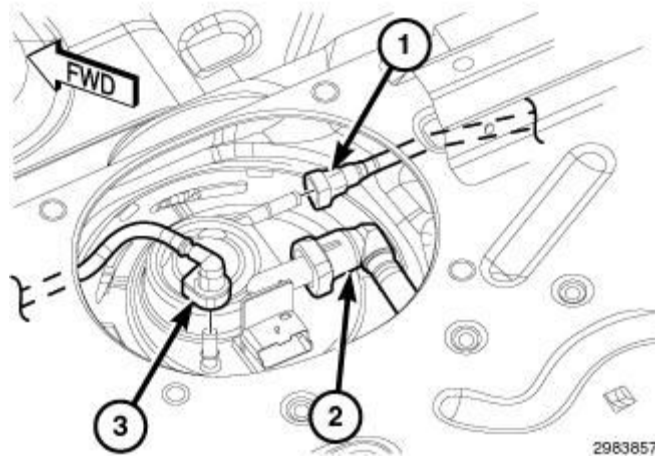


Fig. 26: Fuel Supply, Return & Vapor Lines
Courtesy of CHRYSLER GROUP, LLC

8. Connect the fuel lines (1, 2) to the fuel pump module.
9. Connect the fuel tank vapor line (3) to the fuel pump module.

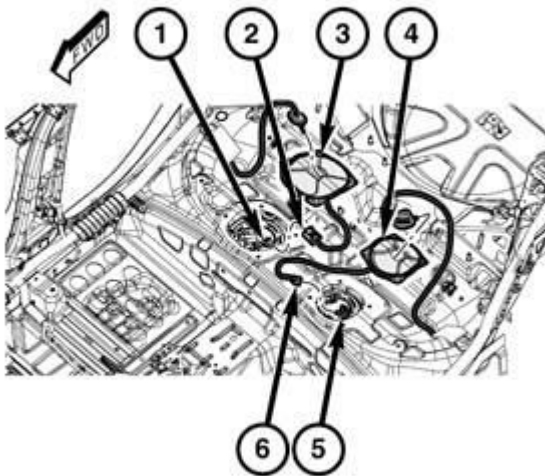


Fig. 27: Fuel Module Access Covers & Wire Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

10. Connect the fuel pump module wire harness connector (2, 6). Install the access cover (3, 4) and securely tighten the screws.

11. Install the rear seat. Refer to **SEAT, REAR, INSTALLATION** .
12. Connect the negative battery cable.
13. Use the Scan Tool to pressurize the system and check for leaks.

RAIL, FUEL

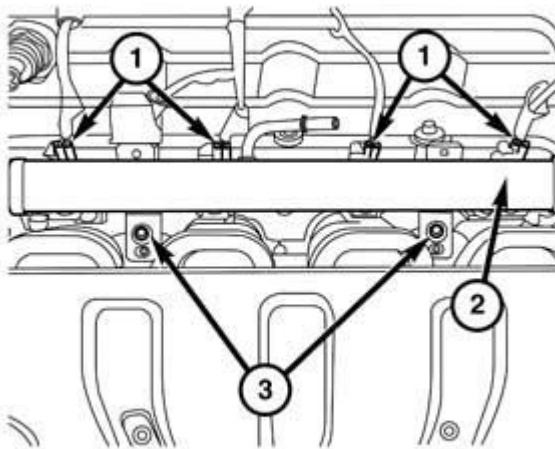
REMOVAL

2.4L

WARNING: Risk of injury to eyes and skin from contact with fuel. Wear protective clothing and eye protection. Risk of poisoning from inhaling and swallowing fuel. Pour fuel only into appropriately marked and approved containers. Failure to follow these instructions may result in possible serious or fatal injury.

NOTE: Wrap shop towels around hose to catch any gasoline spillage.

1. Release the fuel system pressure.
2. Disconnect and isolate the negative battery cable.
3. Remove the air cleaner resonator. Refer to **RESONATOR, AIR CLEANER, REMOVAL** .
4. Remove the purge control valve (Refer to **VALVE, PURGE CONTROL** /Removal).
5. Disconnect the fuel line from the fuel rail. Refer to **STANDARD PROCEDURE - QUICK-CONNECT FITTINGS** .



140169663

Fig. 28: Fuel Rail, Connectors & Bolts
Courtesy of CHRYSLER GROUP, LLC

6. Unlock and disconnect the fuel injectors wire harness connectors (1)
7. Remove bolts (3) and the fuel rail (2).

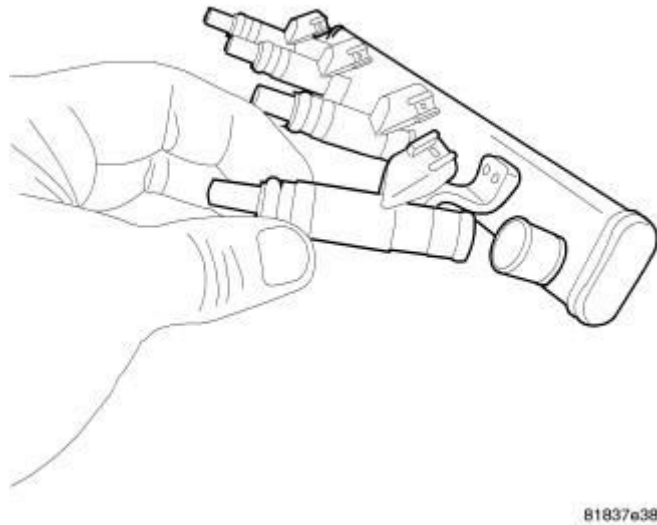


Fig. 29: Fuel Injector & Rail
Courtesy of CHRYSLER GROUP, LLC

8. If necessary, remove fuel injectors from the fuel rail.

3.2L

CAUTION: When removing the fuel supply line from the fuel inlet tube at the fuel rail, care must be taken that the fuel inlet tube is not being over-flexed. Damage to the fuel rail inlet tube may occur.

WARNING: The fuel system is under constant pressure even with engine off. Before servicing the fuel rail, fuel system pressure must be released.

1. Release fuel system pressure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE** .
2. Disconnect and isolate the negative battery cable.
3. Remove the upper intake manifold. Refer to **MANIFOLD, INTAKE, REMOVAL** .

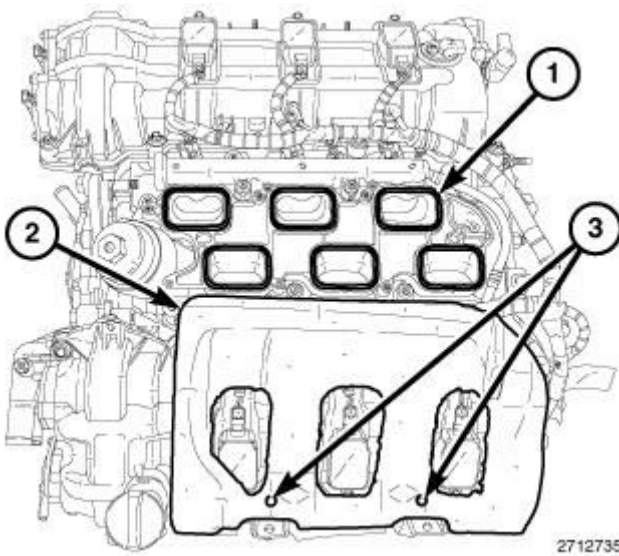


Fig. 30: Intake Ports, Insulator & Alignment Posts
Courtesy of CHRYSLER GROUP, LLC

4. Remove the insulator (2) from the LH cylinder head cover.

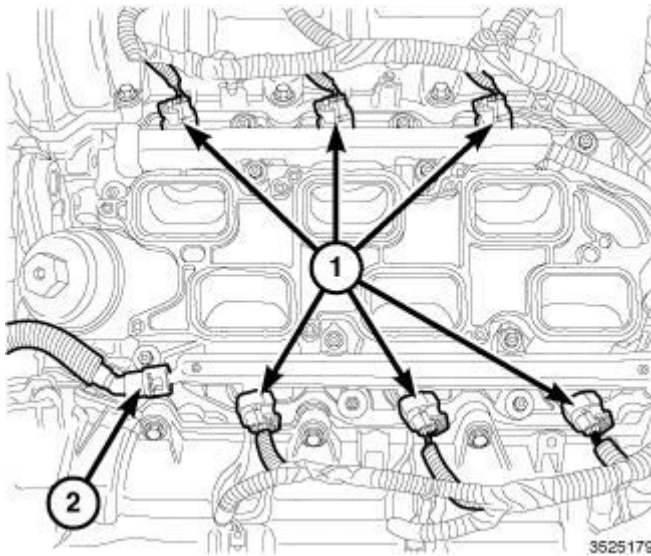
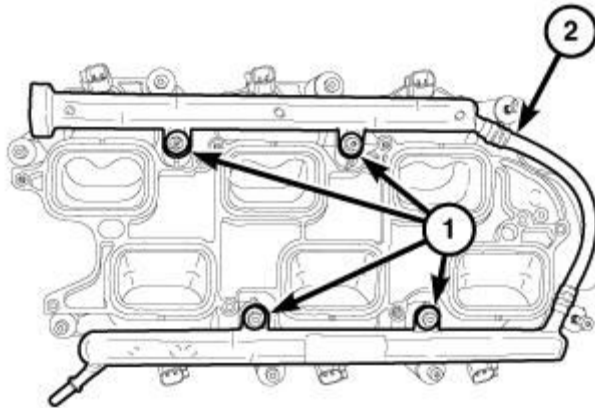


Fig. 31: Fuel Supply Line And Connectors
Courtesy of CHRYSLER GROUP, LLC

5. Disconnect the fuel injector electrical connectors (1).
6. Disconnect the fuel supply hose (2) from the fuel rail. Refer to **STANDARD PROCEDURE - QUICK-CONNECT FITTINGS** .



3524834

Fig. 32: Bolts & Fuel Rail

Courtesy of CHRYSLER GROUP, LLC

CAUTION: The left and right fuel rails are replaced as an assembly. Do not attempt to separate the rail halves at the connector tube. Due to the design of this tube, it does not use any clamps. Never attempt to install a clamping device of any kind on the tube. When removing the fuel rail assembly for any reason, be careful not to bend or kink the tube.

7. Remove the four bolts (1) from the fuel rail (2).

CAUTION: When removing the fuel rail from the lower intake manifold, one or more fuel injectors may remain in the intake manifold resulting in residual fuel spilling onto the engine from the fuel rail.

8. Lift the fuel rail and the fuel injectors from the lower intake manifold.

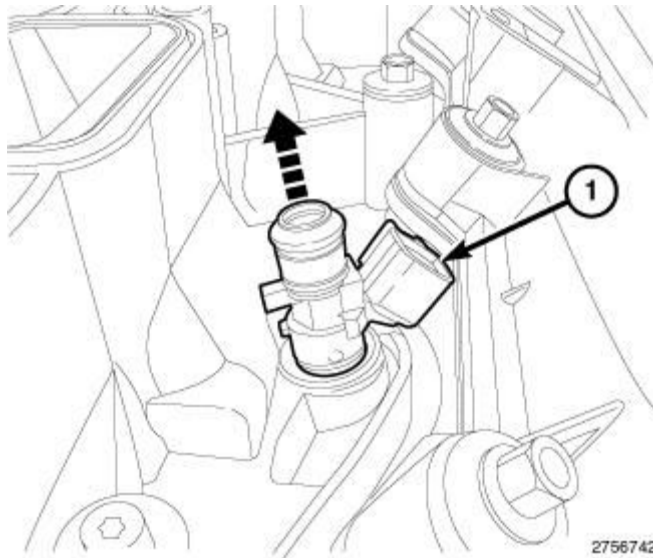


Fig. 33: Removing Fuel Injector From Intake Manifold
Courtesy of CHRYSLER GROUP, LLC

9. Remove any remaining fuel injectors (1) from the lower intake manifold.

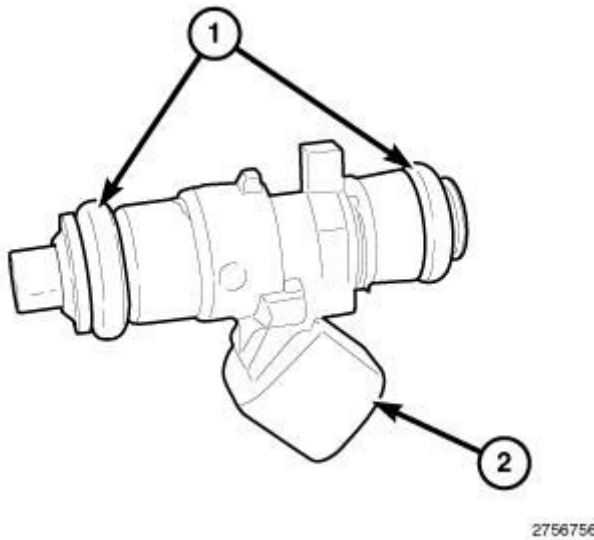


Fig. 34: O-Ring Seals
Courtesy of CHRYSLER GROUP, LLC

10. If required, remove the fuel injectors from the fuel rail. Refer to **INJECTOR(S), FUEL, REMOVAL**.
11. Remove and discard all fuel injector O-ring seals (1).

INSTALLATION

2.4L

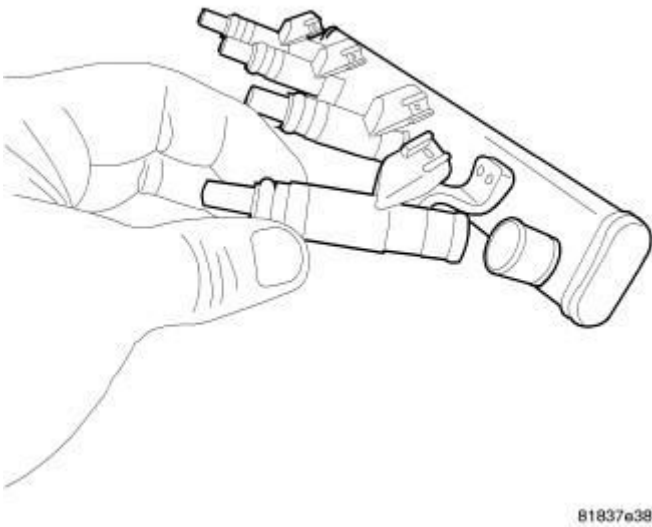


Fig. 35: Fuel Injector & Rail
Courtesy of CHRYSLER GROUP, LLC

1. Apply a light coating of clean engine oil to the O-ring on the nozzle end of each injector.
2. If necessary, install the fuel injectors into the fuel rail.

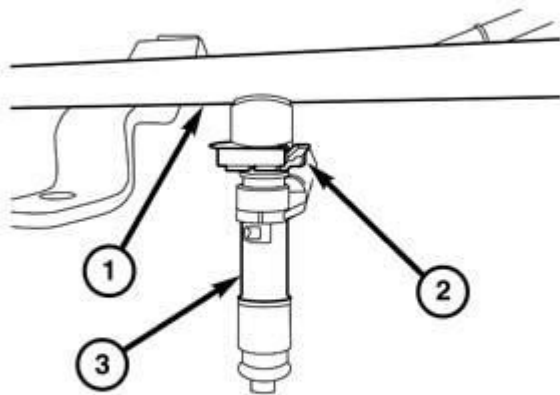
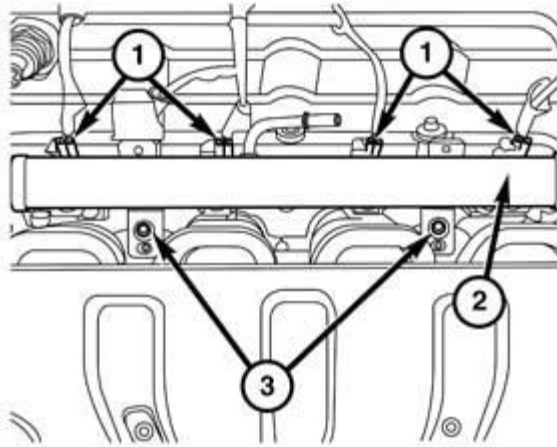


Fig. 36: Fuel Rail, Injector & Retaining Clip
Courtesy of CHRYSLER GROUP, LLC

3. If necessary, install the fuel injectors retaining clip (2) and check to ensure injector is properly captured.



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Fig. 37: Fuel Rail, Connectors & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Install the fuel rail (2). Tighten bolts (3) to 7 N.m (62 in. lbs.).
5. Connect and lock the wire harness connectors (1).
6. Connect the fuel line to fuel rail.
7. Install the purge control valve (Refer to VALVE, PURGE CONTROL /Installation).
8. Install the air cleaner resonator. Refer to RESONATOR, AIR CLEANER, INSTALLATION .
9. Connect the battery negative cable.
10. Use the Scan Tool Fuel System Test to pressurize the fuel system. Check for leaks.

3.2L

CAUTION: When removing the fuel supply line from the fuel inlet tube at the fuel rail, care must be taken that the fuel inlet tube is not being over-flexed. Damage to the fuel rail inlet tube may occur.

WARNING: The fuel system is under constant pressure even with engine off. Before servicing the fuel rail, fuel system pressure must be released.

1. Release fuel system pressure. Refer to FUEL SYSTEM PRESSURE RELEASE PROCEDURE .
2. Disconnect and isolate the negative battery cable.
3. Remove the upper intake manifold. Refer to MANIFOLD, INTAKE, REMOVAL .

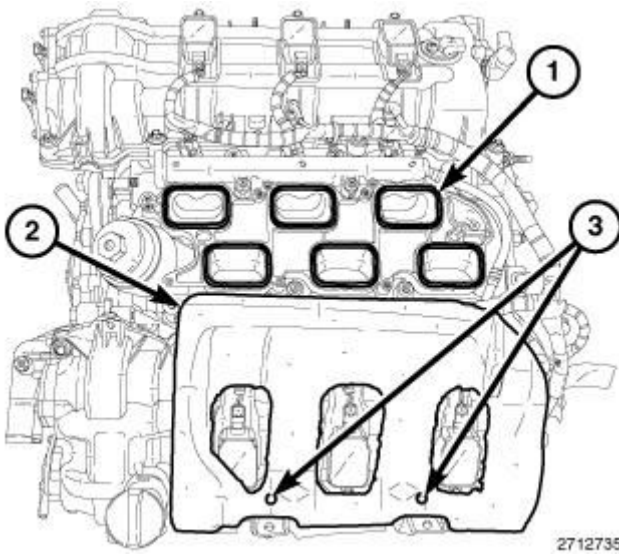


Fig. 38: Intake Ports, Insulator & Alignment Posts
Courtesy of CHRYSLER GROUP, LLC

4. Remove the insulator (2) from the LH cylinder head cover.

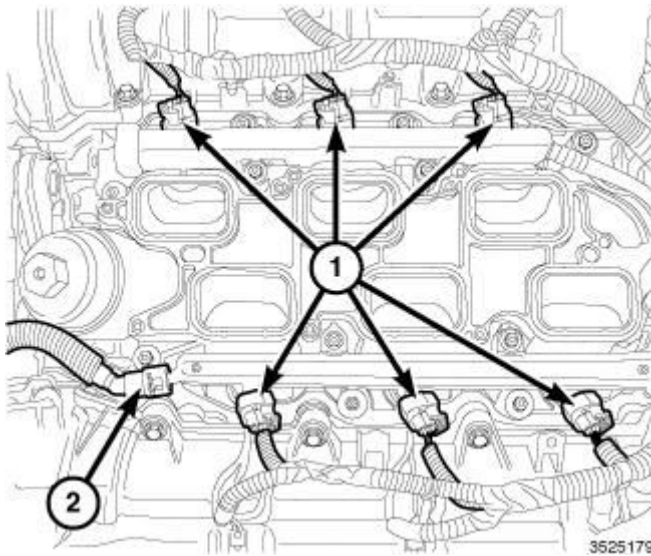
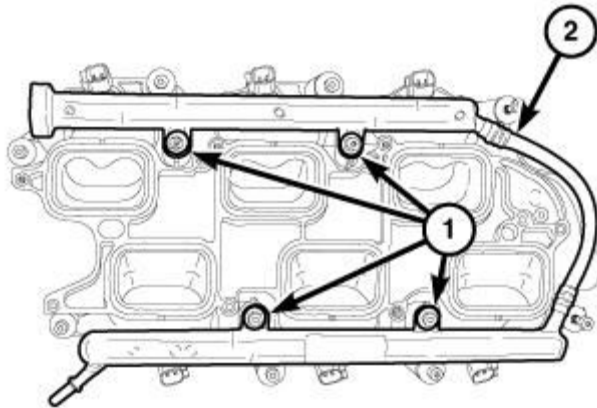


Fig. 39: Fuel Supply Line And Connectors
Courtesy of CHRYSLER GROUP, LLC

5. Disconnect the fuel injector electrical connectors (1).
6. Disconnect the fuel supply hose (2) from the fuel rail. Refer to **STANDARD PROCEDURE - QUICK-CONNECT FITTINGS** .



3524834

Fig. 40: Bolts & Fuel Rail

Courtesy of CHRYSLER GROUP, LLC

CAUTION: The left and right fuel rails are replaced as an assembly. Do not attempt to separate the rail halves at the connector tube. Due to the design of this tube, it does not use any clamps. Never attempt to install a clamping device of any kind on the tube. When removing the fuel rail assembly for any reason, be careful not to bend or kink the tube.

7. Remove the four bolts (1) from the fuel rail (2).

CAUTION: When removing the fuel rail from the lower intake manifold, one or more fuel injectors may remain in the intake manifold resulting in residual fuel spilling onto the engine from the fuel rail.

8. Lift the fuel rail and the fuel injectors from the lower intake manifold.

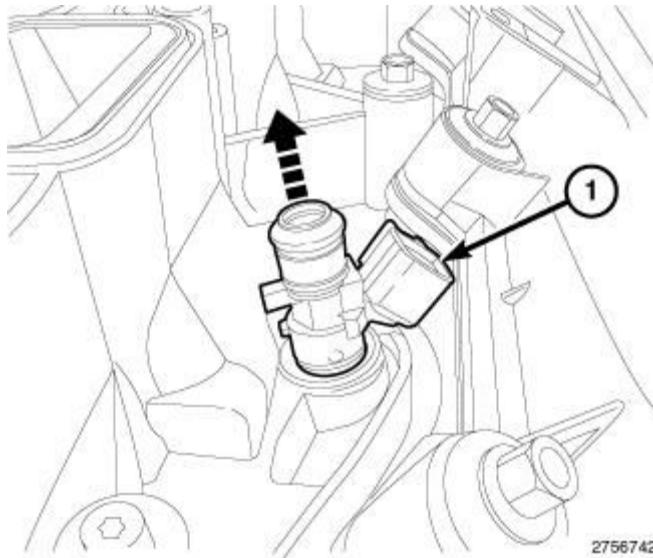


Fig. 41: Removing Fuel Injector From Intake Manifold
Courtesy of CHRYSLER GROUP, LLC

9. Remove any remaining fuel injectors (1) from the lower intake manifold.

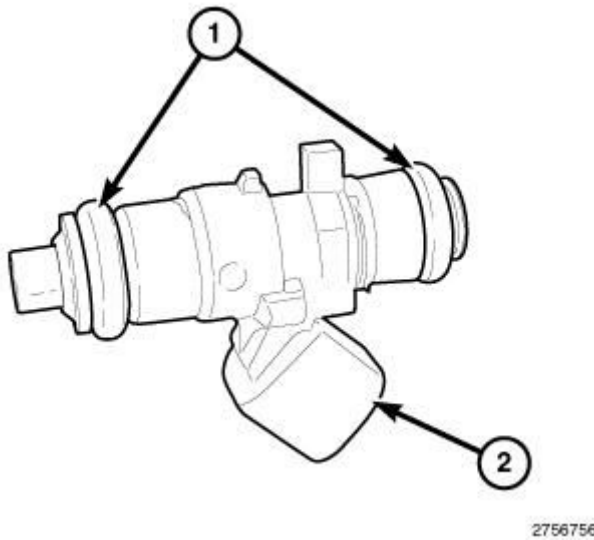


Fig. 42: O-Ring Seals
Courtesy of CHRYSLER GROUP, LLC

10. If required, remove the fuel injectors from the fuel rail. Refer to **INJECTOR(S), FUEL, REMOVAL**.
11. Remove and discard all fuel injector O-ring seals (1).

SENDING UNIT AND SENSOR, FUEL LEVEL

DESCRIPTION

DESCRIPTION

The fuel gauge sending unit (fuel level sensor) is attached to the fuel pump module. The sending unit consists of a float, an arm, and a variable resistor.

The sending unit/fuel level sensor is not serviceable. If the fuel level sensor sending unit has failed, the fuel pump module will need to be replaced. Refer to **MODULE, FUEL PUMP, REMOVAL**.

TANK, FUEL

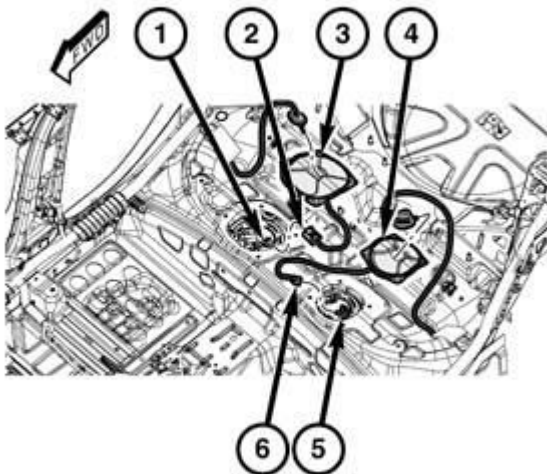
REMOVAL

REMOVAL

NOTE: Saddle style fuel tank shown in illustration. Standard fuel tank.

WARNING: The fuel system is under constant pressure even with engine off. Until the fuel pressure has been properly relieved from the system, do not attempt to open the fuel system. Do not smoke or use open flames/sparks when servicing the fuel system. Wear protective clothing and eye protection. Make sure the area in which the vehicle is being serviced is in a well ventilated area.

1. Perform the draining fuel tank procedure. Refer to **DRAINING FUEL TANK**.
2. Disconnect and isolate the negative battery cable.
3. Remove the rear seat. Refer to **SEAT, REAR, REMOVAL**.



0909005834

Fig. 43: Fuel Module Access Covers & Wire Harness Connectors

Courtesy of CHRYSLER GROUP, LLC

4. Remove screws and lift up on the fuel pump module access cover (3, 4) and disconnect the wire harness connector (2, 6).

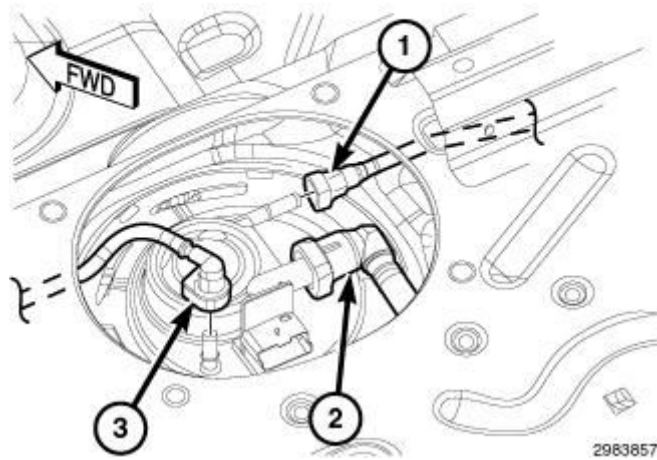


Fig. 44: Fuel Supply, Return & Vapor Lines

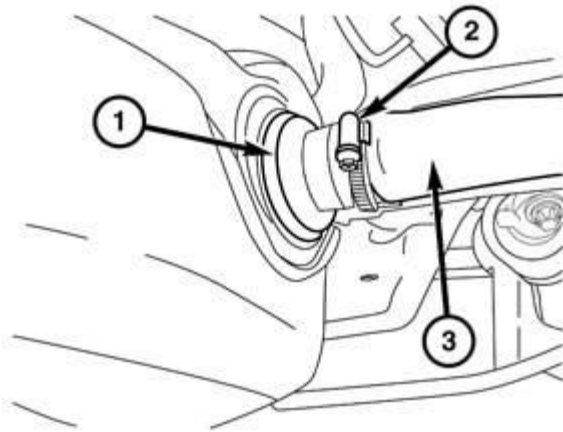
Courtesy of CHRYSLER GROUP, LLC

WARNING: Risk of injury to eyes and skin from contact with fuel. Wear protective clothing and eye protection. Risk of poisoning from inhaling and swallowing fuel. Pour fuel only into appropriately marked and approved containers. Failure to follow these instructions may result in possible serious or fatal injury.

5. Disconnect the fuel tank vapor line (1, 3) from fuel pump module. Refer to **STANDARD PROCEDURE - QUICK-CONNECT FITTINGS** .
6. Disconnect the supply line quick connect fitting (2) from fuel pump module. Refer to **STANDARD PROCEDURE - QUICK-CONNECT FITTINGS** .
7. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
8. Remove the exhaust system. Refer to **REMOVAL** .
9. **AWD ONLY:**

Remove the rear propeller shaft assembly

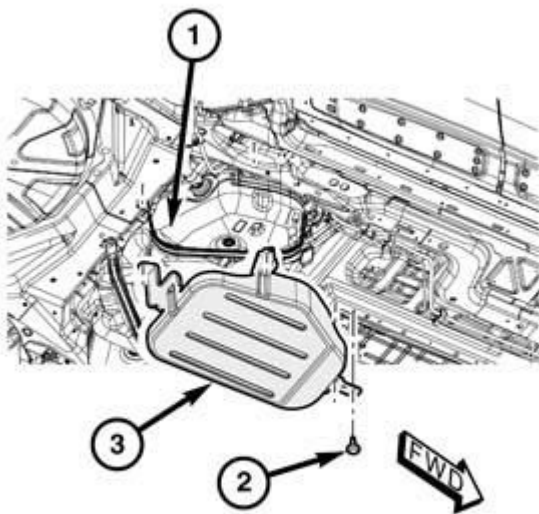
Refer to **REMOVAL** .



140169664

Fig. 45: Fuel Tank, Filler Tube & Hose Clamp
Courtesy of CHRYSLER GROUP, LLC

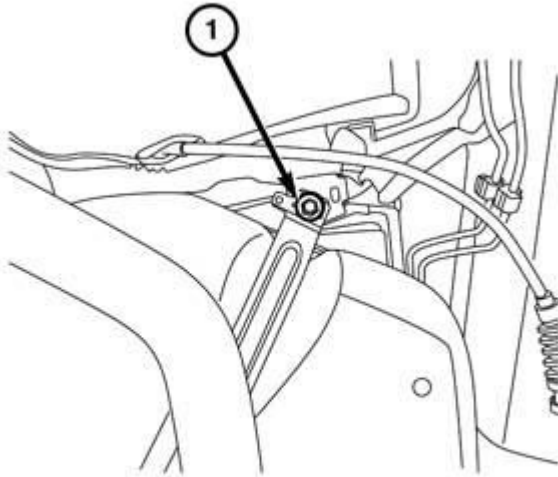
10. Loosen the hose clamp (2) and remove the fuel filler tube (3) from the fuel tank (1).



0909005839

Fig. 46: Skid Plate
Courtesy of CHRYSLER GROUP, LLC

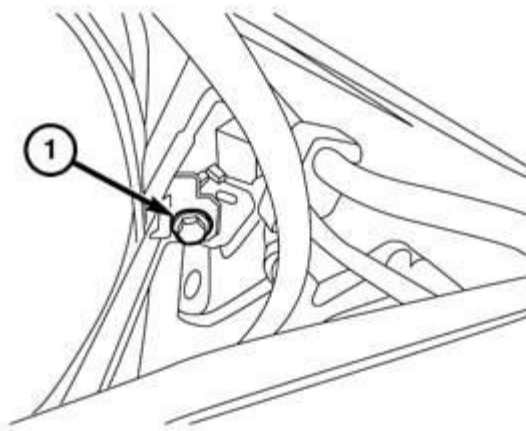
11. If equipped, remove the skid plates (3).



140170151

Fig. 47: Left Fuel Tank Strap Bolt
Courtesy of CHRYSLER GROUP, LLC

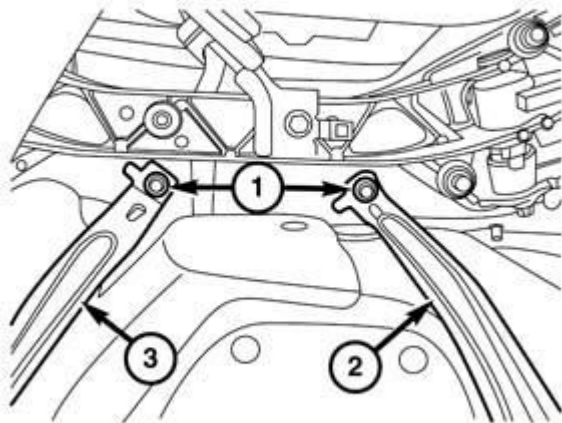
12. Use a transmission jack to support fuel tank.
13. Remove the left fuel tank strap bolt (1).



140170153

Fig. 48: Right Fuel Tank Strap Bolt
Courtesy of CHRYSLER GROUP, LLC

14. Remove the right fuel tank strap bolt (1).



140170152

Fig. 49: Fuel Tank Straps & Bolts
Courtesy of CHRYSLER GROUP, LLC

15. Remove bolts (1) and the left fuel tank strap (3).
16. Remove bolts (1) and the right fuel tank strap (2).
17. Lower fuel tank from vehicle.
18. If fuel tank is to be replaced, remove heat shield from fuel tank.

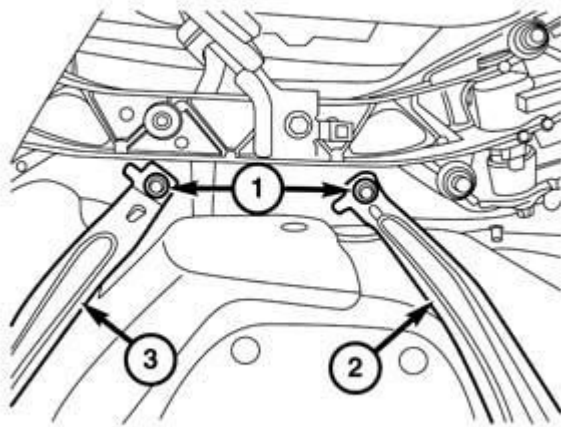
INSTALLATION

INSTALLATION

1. If fuel tank was replaced, install heat shield to the fuel tank.

WARNING: Support the fuel tank with a transmission jack or equivalent. Use straps to secure the fuel tank to the jack. Failure to properly support and secure the fuel tank during removal may cause fuel to spill or the fuel tank to fall from the jack.

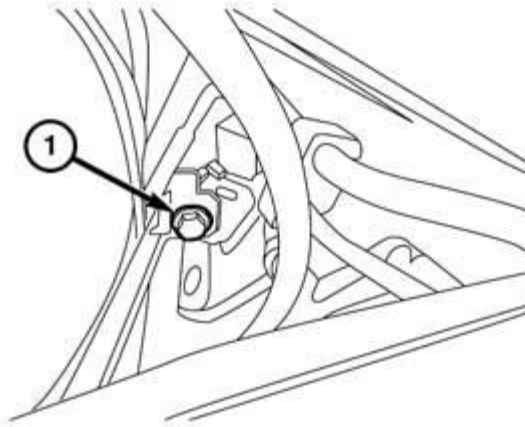
2. Position fuel tank onto a transmission jack or equivalent and raise the fuel tank into vehicle position.



140170152

Fig. 50: Fuel Tank Straps & Bolts
Courtesy of CHRYSLER GROUP, LLC

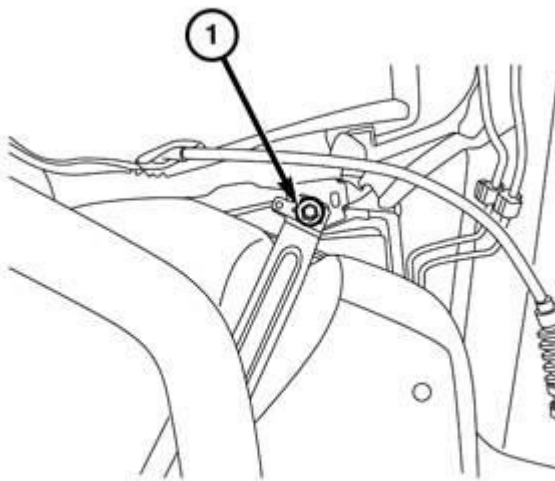
3. Install the right fuel tank strap (2). Tighten the rear bolt (1) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
4. Install the left fuel tank strap (3). Tighten the rear bolt (1) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .



140170153

Fig. 51: Right Fuel Tank Strap Bolt
Courtesy of CHRYSLER GROUP, LLC

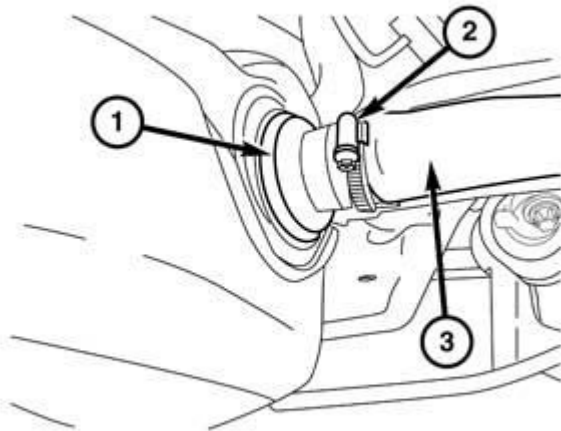
5. Install the right front fuel tank strap bolt (1) and tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .



140170151

Fig. 52: Left Fuel Tank Strap Bolt
Courtesy of CHRYSLER GROUP, LLC

6. Install the left front fuel tank strap bolt (1) and tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
7. Remove the transmission jack.
8. Install the fuel line shield. Tighten nuts to the proper specification. Refer to **TORQUE SPECIFICATIONS** .



140169664

Fig. 53: Fuel Tank, Filler Tube & Hose Clamp
Courtesy of CHRYSLER GROUP, LLC

9. Install fuel filler tube (3) to the fuel tank (1). Hand tighten the clamp (2).
10. Install the exhaust system. Refer to **INSTALLATION** .
11. Lower the vehicle.

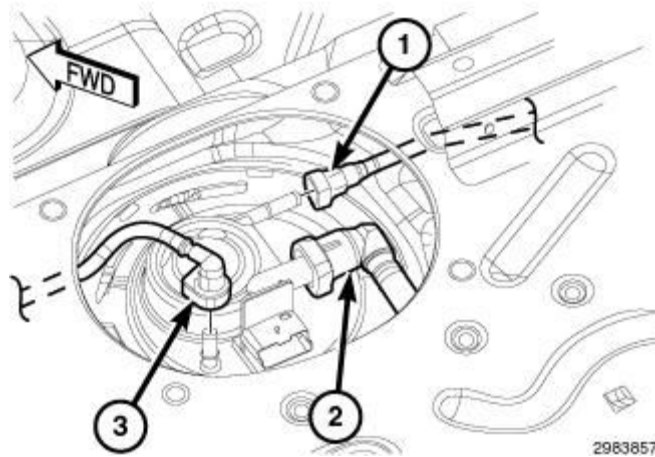


Fig. 54: Fuel Supply, Return & Vapor Lines
 Courtesy of CHRYSLER GROUP, LLC

12. Connect the fuel supply line (2) to the fuel pump module.
13. Connect the fuel tank vapor line (1, 3) to the fuel pump module.
14. Connect fuel pump/module electrical connector (2).

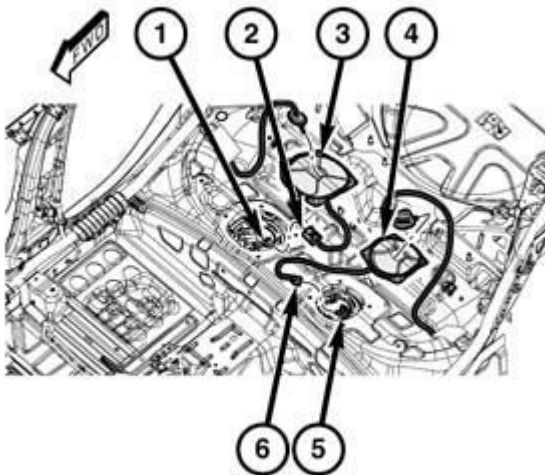


Fig. 55: Fuel Module Access Covers & Wire Harness Connectors
 Courtesy of CHRYSLER GROUP, LLC

15. Connect the fuel pump module wire harness connector (2, 6). Install the access cover (3, 4) and hand

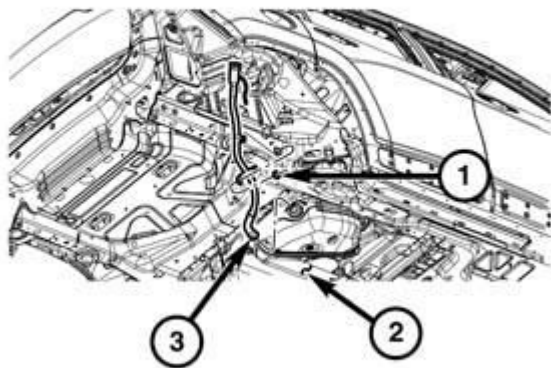
tighten the bolts.

16. Install the rear seat assembly. Refer to **SEAT, REAR, INSTALLATION** .
17. Fill fuel tank and install fuel filler cap.
18. Connect the negative battery cable.
19. Use the scan tool to pressurize the fuel system. Check for leaks.

TUBE, FUEL TANK FILLER

REMOVAL

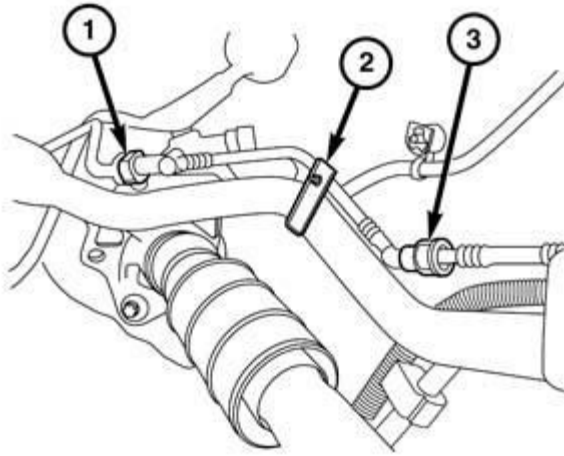
REMOVAL



0909005846

Fig. 56: Isolating Negative Battery Cable
Courtesy of CHRYSLER GROUP, LLC

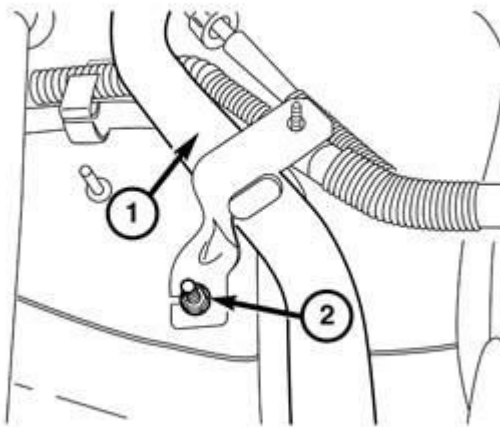
1. Disconnect and isolate negative battery cable.
2. Remove fuel cap.
3. Remove the right rear wheel and tire assembly. Refer to **REMOVAL** .
4. Remove the inner splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL** .



140169666

Fig. 57: Fuel Tube Vent Line & Retainer
Courtesy of CHRYSLER GROUP, LLC

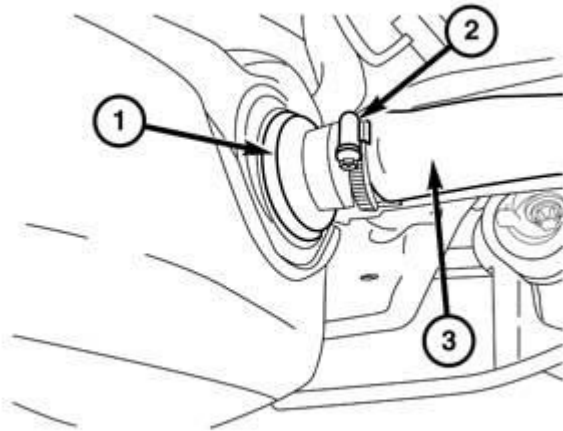
5. Disconnect the fuel tube vent line (1) quick connect fitting and detach from retainer (2). Refer to **STANDARD PROCEDURE - QUICK-CONNECT FITTINGS** .



140169665

Fig. 58: Filler Tube Mounting Bracket Nut
Courtesy of CHRYSLER GROUP, LLC

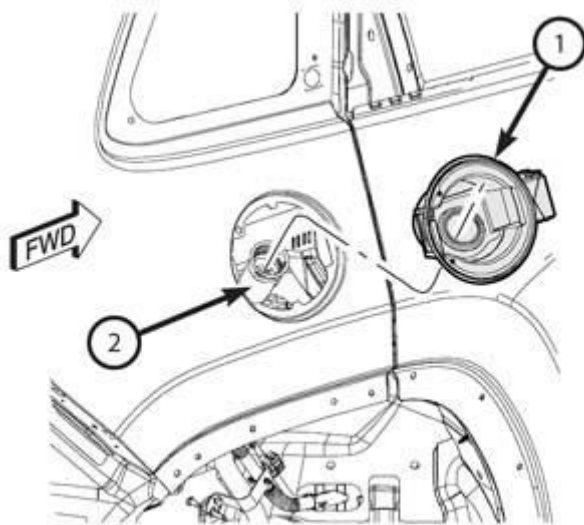
Remove filler tube mounting bracket nut (2).



140169664

Fig. 59: Fuel Tank, Filler Tube & Hose Clamp
Courtesy of CHRYSLER GROUP, LLC

6. Loosen the hose clamp (3) and remove the fuel filler tube (4) from the fuel tank.



1401008783

Fig. 60: Fuel Door Housing Assembly & Fuel Filler Tube
Courtesy of CHRYSLER GROUP, LLC

7. Remove fuel filler tube (2) from the fuel door housing assembly (1).

INSTALLATION

INSTALLATION

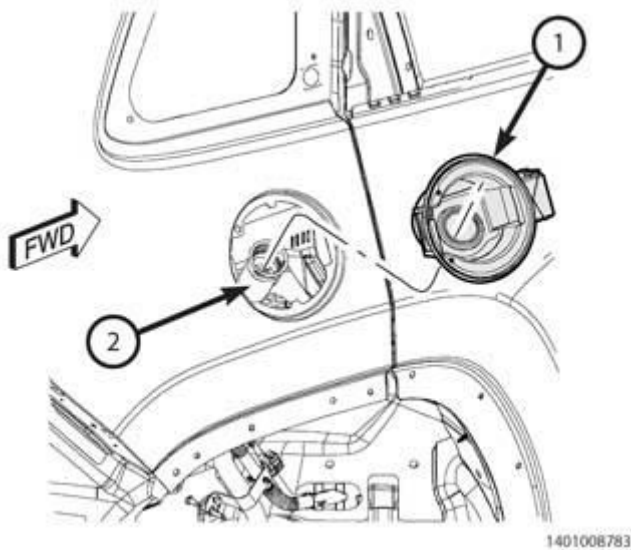


Fig. 61: Fuel Door Housing Assembly & Fuel Filler Tube
Courtesy of CHRYSLER GROUP, LLC

1. Install fuel filler tube (2) to the fuel door housing assembly (1).

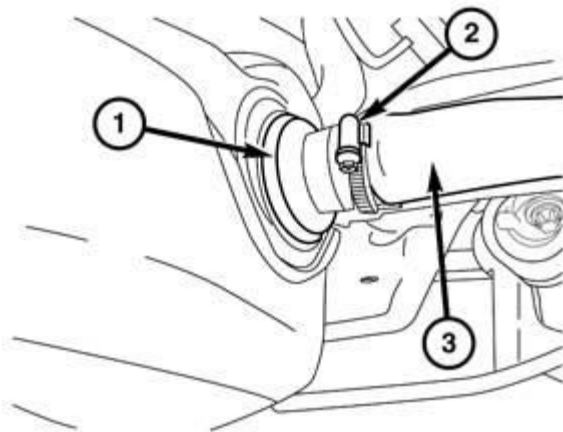


Fig. 62: Fuel Tank, Filler Tube & Hose Clamp
Courtesy of CHRYSLER GROUP, LLC

2. Install fuel filler tube (4) to the fuel tank. Tighten the hose clamp (3) to the proper (Torque Specifications).

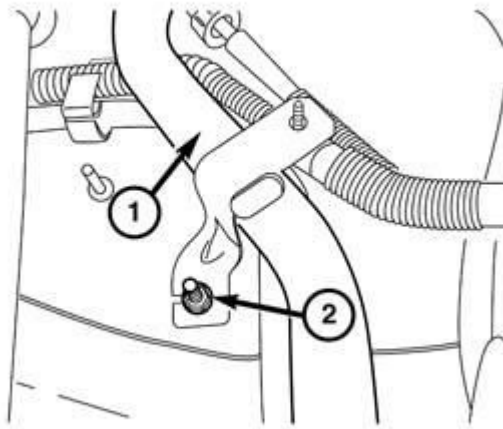
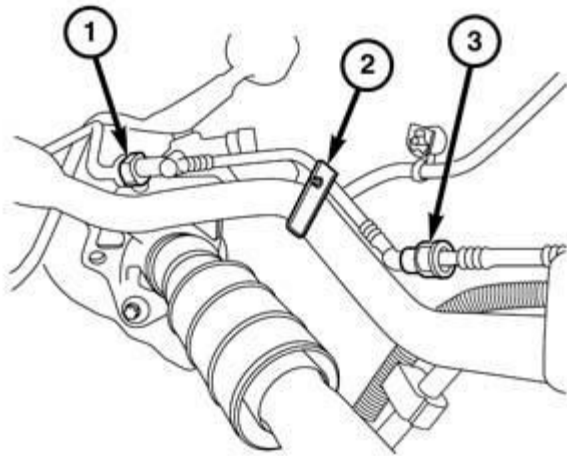


Fig. 63: Filler Tube Mounting Bracket Nut
Courtesy of CHRYSLER GROUP, LLC

3. Install filler tube mounting bracket nut (2). Tighten to the proper (Torque Specifications).



140169666

Fig. 64: Fuel Tube Vent Line & Retainer
Courtesy of CHRYSLER GROUP, LLC

4. Attach line to retainer (2) and connect the fuel tube vent line (1) quick connect fitting.
5. Install the inner splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION** .
6. Install the right rear wheel and tire assembly. Refer to **INSTALLATION** .
7. Install fuel cap.
8. Connect negative battery cable, tighten nut to the proper specification. Refer to **SPECIFICATIONS** .

FUEL INJECTION, GAS

OPERATION

FUEL ECONOMY AND MAINTENANCE

A vehicle that is not properly tuned and maintained cannot be expected to perform at its maximum efficiency and can have an adverse effect on fuel economy. The following recommendations will ensure that the vehicle is performing at its maximum efficiency:

- **Use the recommended motor oil grade.** Using the manufacturer's recommended grade of Mopar® motor oil can improve fuel mileage by 1-2%. Mopar® motor oil labeled "Energy Conserving" contains friction-reducing additives.
- **Check and replace air filters.** Replacing a clogged air filter with a new Mopar® air filter can improve fuel mileage by as much as 10%.

2014 Jeep Cherokee Trailhawk

2014 ENGINE Fuel System - Cherokee

- **Keep the engine tuned.** Repairing a vehicle that is noticeably out of tune can improve fuel mileage by an average of 4%. Maintaining a vehicle and repairing problems, such as a faulty oxygen sensor, can improve mileage by as much as 40%.
- **Keep tires properly inflated.** Underinflated tires can lower fuel mileage by 0.4% for every 1 psi drop in pressure of all four tires.

SPECIFICATIONS

TORQUE SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Accelerator Pedal	6	-	53
Crankshaft Position Sensor Bolt	9	-	80
Oxygen Sensors	45	33	-
Throttle Body Bolts	8	-	71
Throttle Body Nut	8	-	-
Throttle Body Bracket Bolt	25	18	-

INJECTOR(S), FUEL

REMOVAL

3.2L

WARNING: The fuel system is under constant pressure even with engine off. Before servicing the fuel rail, fuel system pressure must be released.

1. Perform the fuel pressure release procedure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE** .

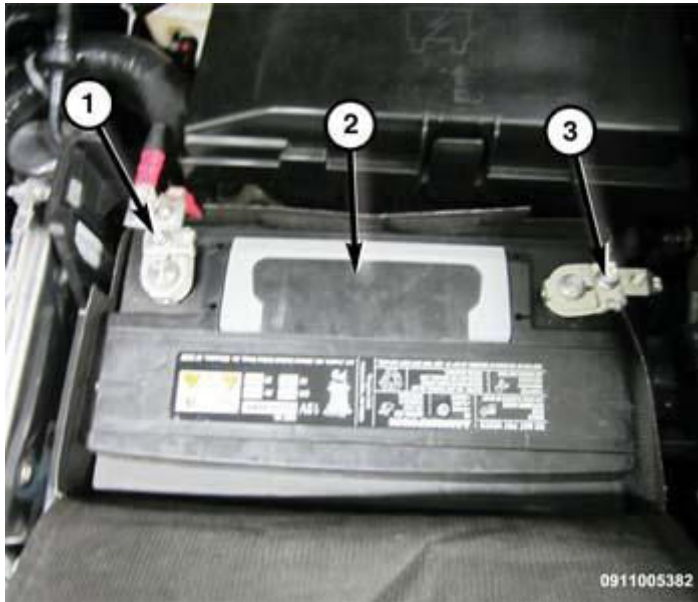


Fig. 65: Battery & Cables

Courtesy of CHRYSLER GROUP, LLC

2. Disconnect and isolate the negative battery cable (3).

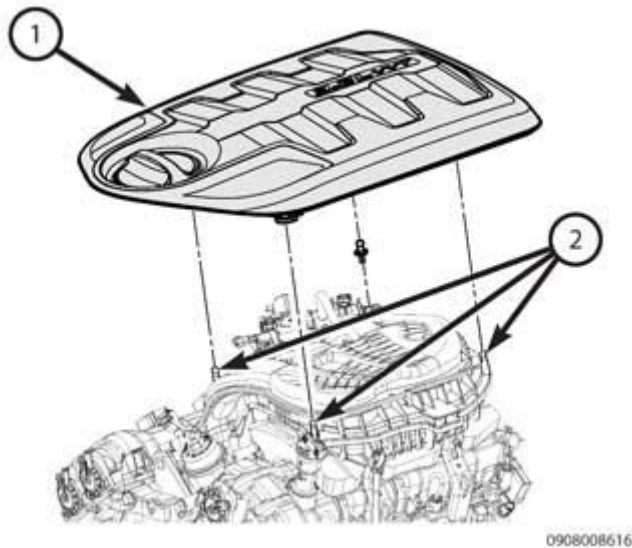
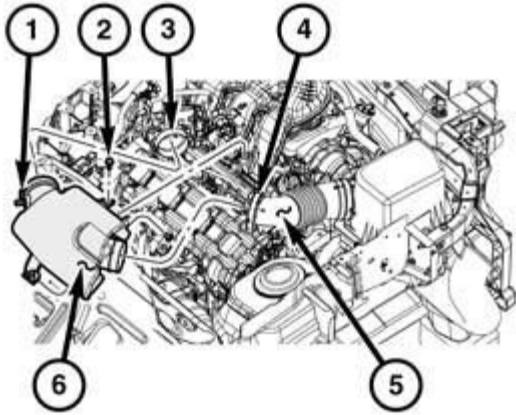


Fig. 66: Engine Cover & Ball Studs

Courtesy of CHRYSLER GROUP, LLC

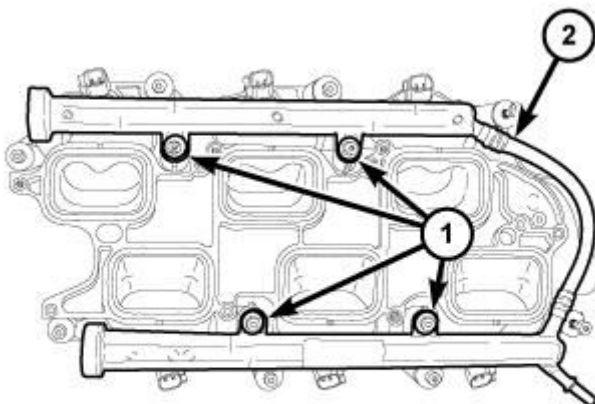
3. Lift the engine cover retaining grommets off the ball studs and remove the engine cover (1).



0909005845

Fig. 67: IAT Sensor Connector, Throttle Body & Air Inlet Hose Housing
 Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the electrical connector (1) from the Inlet Air Temperature (IAT) sensor.
5. Loosen the clamp at the throttle body (3)
6. Loosen the clamp at the air cleaner housing.
7. Lift the air inlet hose assembly retaining grommet off the ball stud.
8. Remove the air inlet hose assembly (5).

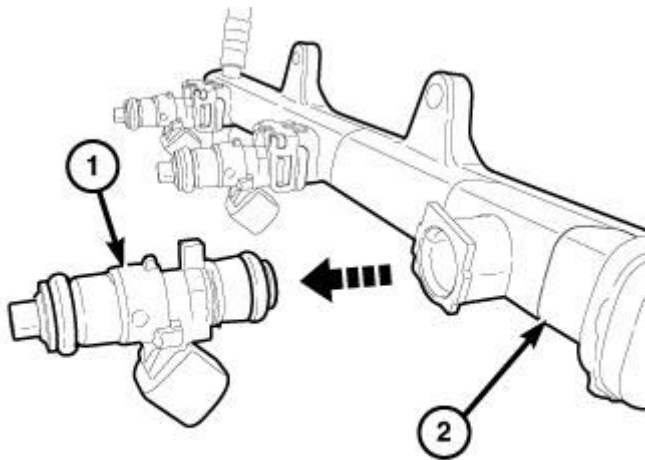


2714021

Fig. 68: Fuel Rail & Retaining Bolts
 Courtesy of CHRYSLER GROUP, LLC

CAUTION: When removing the fuel rail from the lower intake manifold, one or more fuel injectors may remain in the intake manifold resulting in residual fuel spilling onto the engine from the fuel rail.

9. Remove the upper intake manifold.
10. Remove the fuel rail (2). Refer to **RAIL, FUEL, REMOVAL**.

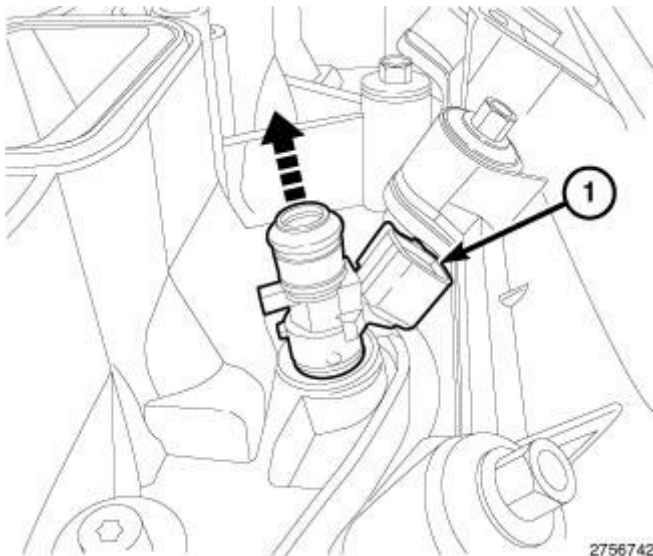


2744672

Fig. 69: Removing Fuel Injector From Fuel Rail
Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 2 fuel injector removal shown in illustration, all other fuel injectors similar.

11. Remove the fuel injectors (1) from the fuel rail (2).



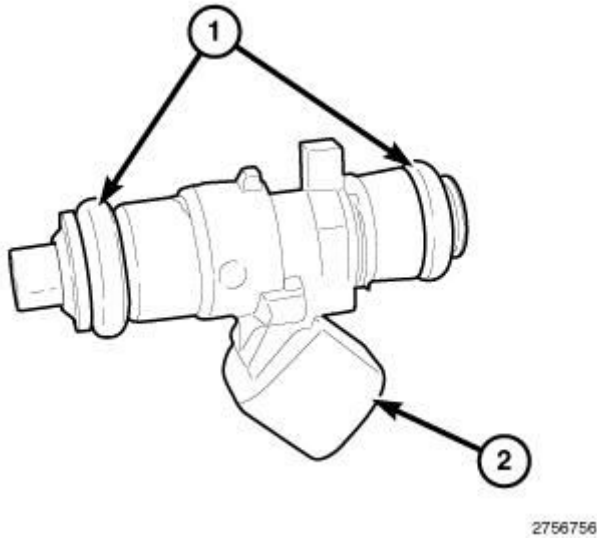
2756742

Fig. 70: Removing Fuel Injector From Intake Manifold

Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 2 fuel injector removal shown in illustration, all other fuel injectors similar.

12. Remove the fuel injectors (1) from the lower intake manifold.

**Fig. 71: O-Ring Seals**

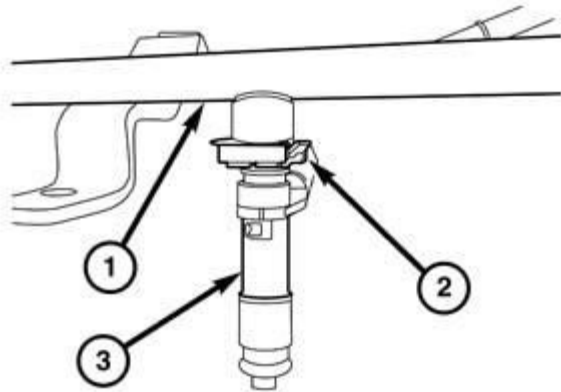
Courtesy of CHRYSLER GROUP, LLC

13. Remove and discard all fuel injector O-ring seals (1).

2.4L

WARNING: Risk of injury to eyes and skin from contact with fuel. Wear protective clothing and eye protection. Risk of poisoning from inhaling and swallowing fuel. Pour fuel only into appropriately marked and approved containers. Failure to follow these instructions may result in possible serious or fatal injury.

1. Release the fuel pressure, refer to the **FUEL SYSTEM PRESSURE RELEASE PROCEDURE**.
2. Disconnect the battery negative cable.
3. Remove the fuel rail. Refer to **RAIL, FUEL, REMOVAL**.



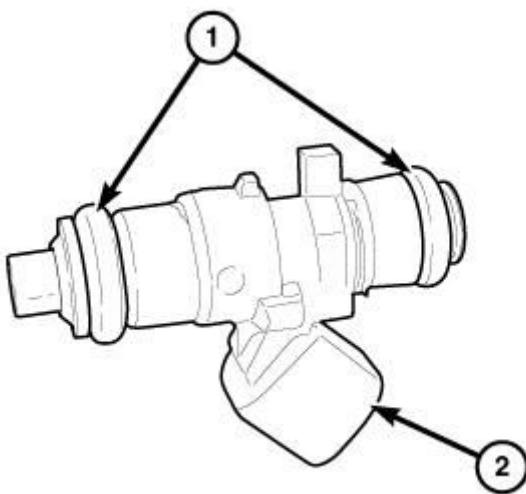
140269674

Fig. 72: Fuel Rail, Injector & Retaining Clip
Courtesy of CHRYSLER GROUP, LLC

4. Remove the fuel injector (3) retaining clip (2).
5. Remove the fuel injector (3) from fuel rail (1).

INSTALLATION

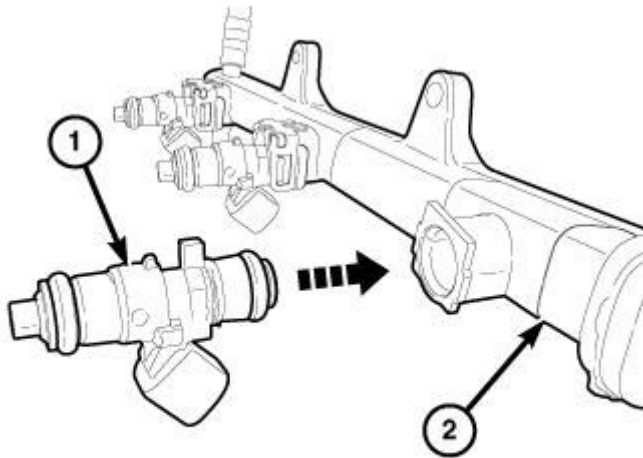
3.2L



2756756

Fig. 73: O-Ring Seals
Courtesy of CHRYSLER GROUP, LLC

1. Lightly lubricate the new O-ring seals (1) with clean engine oil and position the seals onto the fuel injector (2).

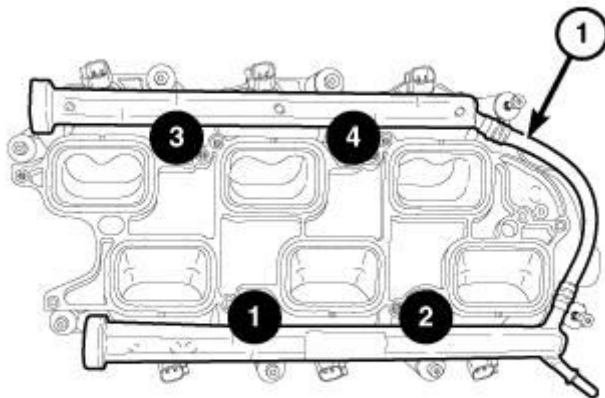


2756853

Fig. 74: O-Ring Seals & Fuel Injector
Courtesy of CHRYSLER GROUP, LLC

NOTE: Number 2 fuel injector installation shown in illustration, all other fuel injectors similar.

2. Install the fuel injectors (1) into the fuel rail (2).

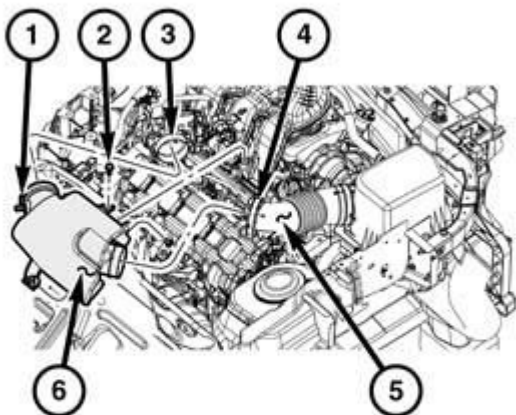


2756534

Fig. 75: Fuel Rail Bolt Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

3. Install the fuel rail. Refer to **RAIL, FUEL, INSTALLATION** .

4. Install the upper intake manifold.



0909005845

Fig. 76: IAT Sensor Connector, Throttle Body & Air Inlet Hose Housing
Courtesy of CHRYSLER GROUP, LLC

5. Position the air inlet assembly (5) onto the air cleaner housing.
6. Secure the air inlet resonator (6) retaining grommet onto the ball stud.
7. Install the air intake resonator support bolt (2). Tighten the bolt to 8 N.m (71 in. lbs.).
8. Tighten the clamp at the air cleaner housing to 5 N.m (44 in. lbs.).
9. Tighten the clamp at the throttle body (3) to 5 N.m (44 in. lbs.).
10. Connect the Inlet Air Temperature (IAT) sensor electrical connector (1).

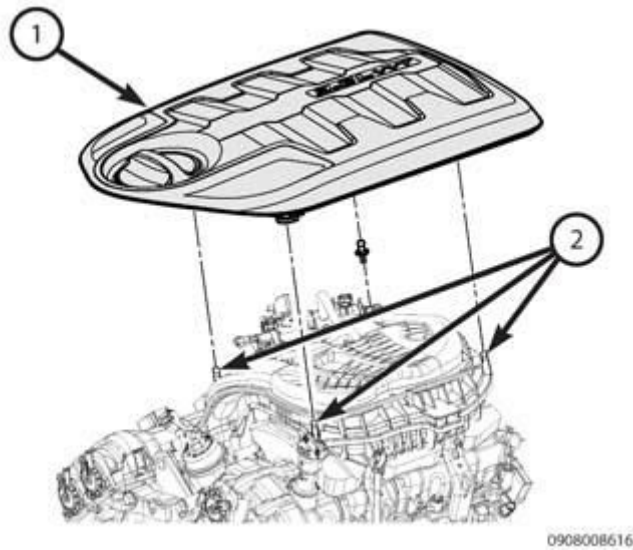


Fig. 77: Engine Cover & Ball Studs
Courtesy of CHRYSLER GROUP, LLC

11. Install the engine cover (1).

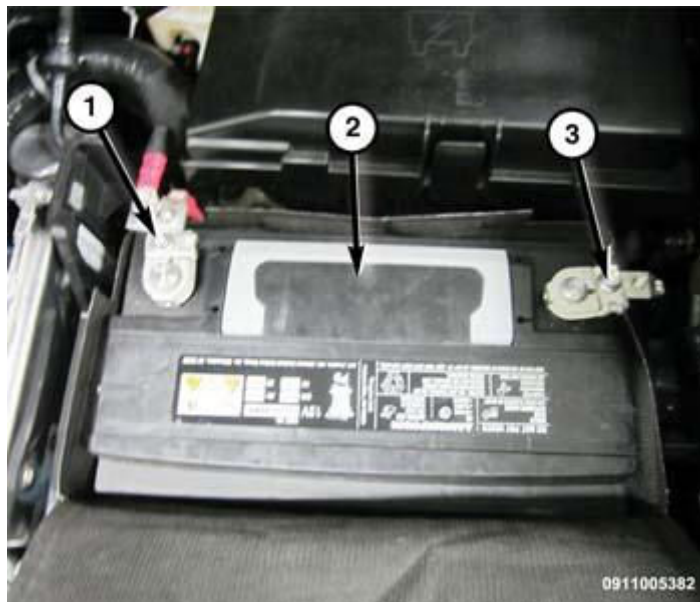
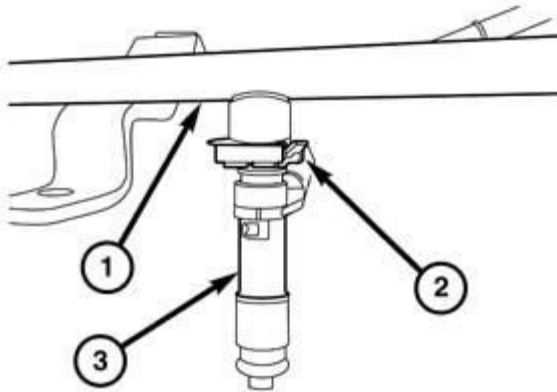


Fig. 78: Battery & Cables
Courtesy of CHRYSLER GROUP, LLC

12. Connect the negative battery cable (3) and tighten nut to 5 N.m (45 in. lbs.).
13. Start the engine and check for leaks.

2.0L



140269674

Fig. 79: Fuel Rail, Injector & Retaining Clip
Courtesy of CHRYSLER GROUP, LLC

1. Apply a light coating of clean engine oil to the upper O-ring.
2. Install the fuel injector (3) into fuel rail (1).
3. Install the fuel injector retaining clip (2).
4. Install the fuel rail. Refer to **RAIL, FUEL, INSTALLATION** .
5. Connect the negative battery cable.
6. Use the scan tool to pressurize the fuel system. Check for leaks.

PEDAL, ACCELERATOR

REMOVAL

REMOVAL

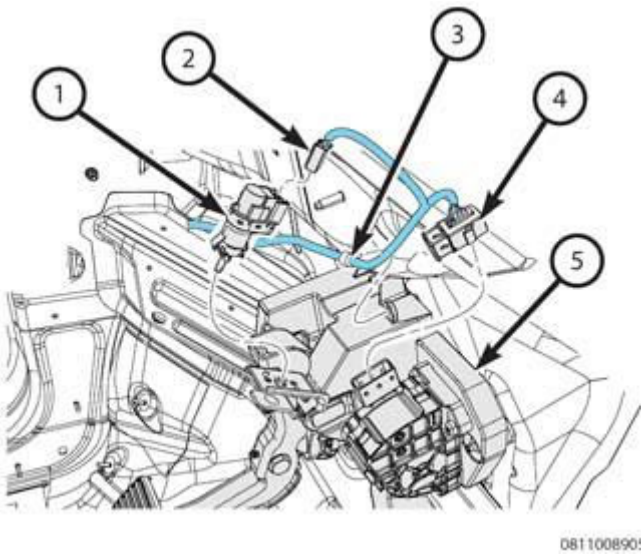


Fig. 80: Wiring Loom & Connectors
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Separate the wiring harness loom (3) from the accelerator housing (5).
3. Disconnect the accelerator pedal connector (4).

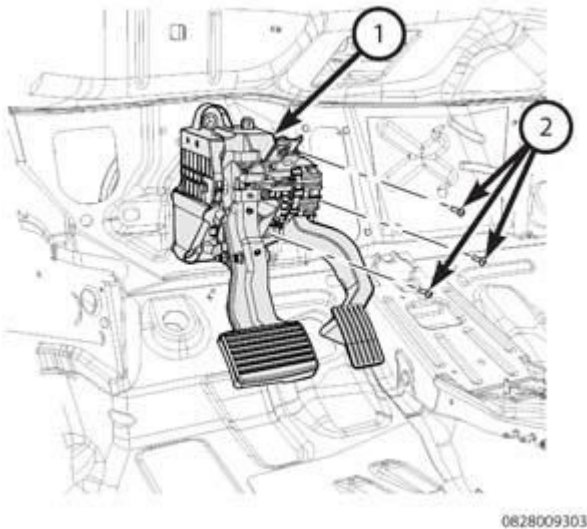


Fig. 81: Accelerator Pedal & Brake Pedal Assembly
Courtesy of CHRYSLER GROUP, LLC

4. Remove the screws (2) that secure the accelerator pedal to the brake pedal assembly.

INSTALLATION

INSTALLATION

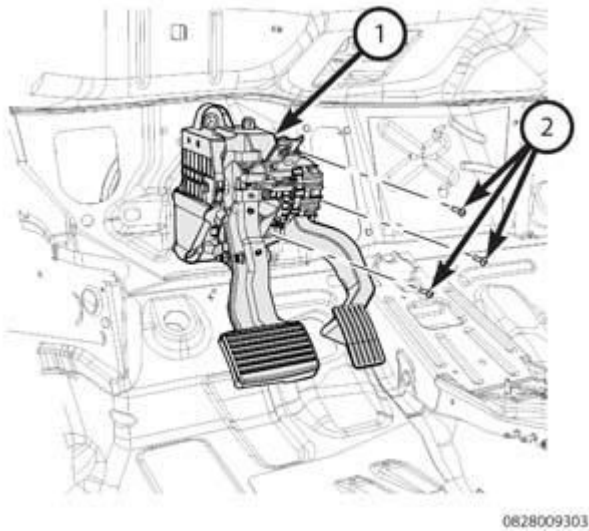


Fig. 82: Accelerator Pedal & Brake Pedal Assembly
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The accelerator pedal and mounting nuts need to be torque in a mandatory torque sequence or damage could result to the pedal assembly.

1. Install the accelerator pedal (2). Tighten the screws to the proper specification. Refer to **TORQUE SPECIFICATIONS** .

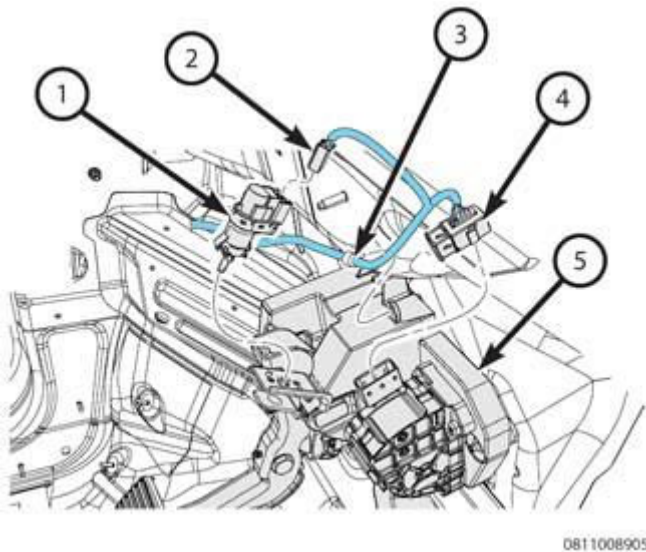


Fig. 83: Wiring Loom & Connectors
Courtesy of CHRYSLER GROUP, LLC

2. Connect the accelerator pedal (5) wire harness connector (4).
3. Connect negative battery cable, tighten the nut to the proper specification. Refer to **SPECIFICATIONS** .

4. Use a scan tool and perform the APPS RELEARN function.

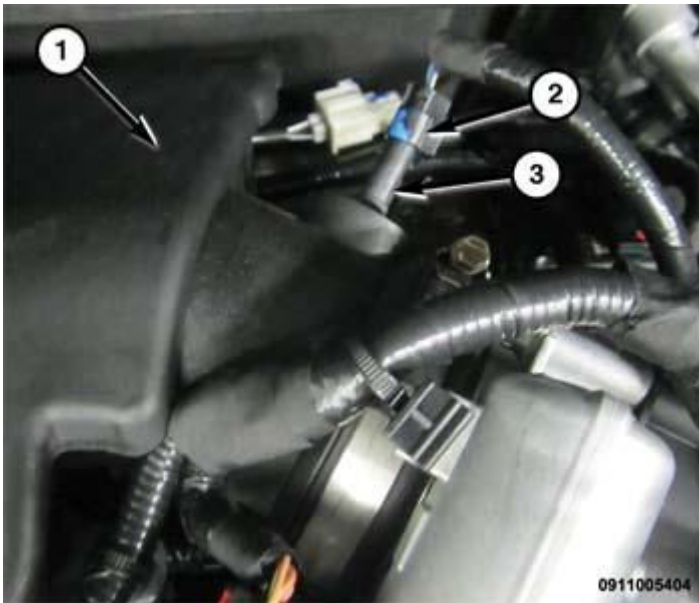
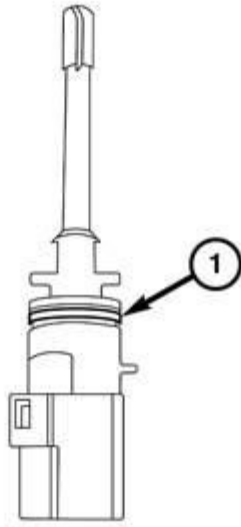
SENSOR, AIR TEMPERATURE, INLET**REMOVAL****REMOVAL**

Fig. 84: Air Cleaner Resonator & IAT Sensor
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the air cleaner resonator (1). Refer to **RESONATOR, AIR CLEANER, REMOVAL** for 2.4L or **RESONATOR, AIR CLEANER, REMOVAL** for 3.2L.
3. Rotate the Inlet Air Temperature (IAT) sensor (3) 1/4 turn counter clockwise and remove sensor.

INSTALLATION**INSTALLATION**



140269672

Fig. 85: IAT Sensor O-Ring Seal

Courtesy of CHRYSLER GROUP, LLC

1. If necessary, inspect and replace the O-ring seal (1).



Fig. 86: Air Cleaner Resonator & IAT Sensor

Courtesy of CHRYSLER GROUP, LLC

2. Install the Inlet Air Temperature (IAT) sensor (3) and rotate 1/4 turn to lock in place.
3. Install the air cleaner resonator (1). Refer to **RESONATOR, AIR CLEANER, INSTALLATION** for

2.4L or **RESONATOR, AIR CLEANER, INSTALLATION** for 3.2L.

4. Connect the negative battery cable.

SENSOR, CRANKSHAFT POSITION

DESCRIPTION

DESCRIPTION

The Crankshaft Position (CKP) sensor is located on the front engine block, left side. It is positioned and bolted into a machined hole.

OPERATION

OPERATION

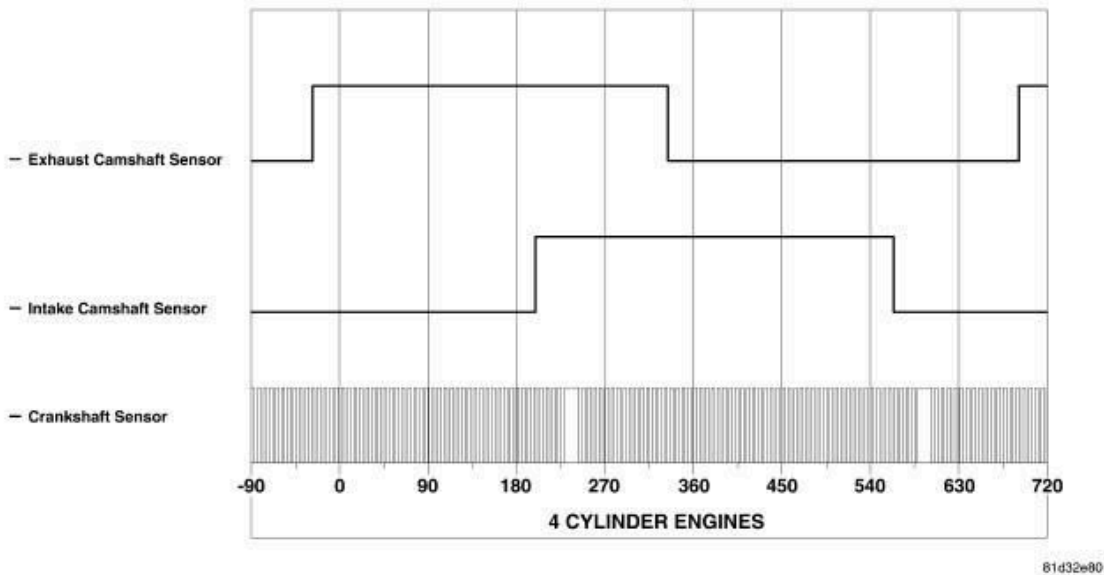


Fig. 87: 4 Cylinder Cam & Crank Signals

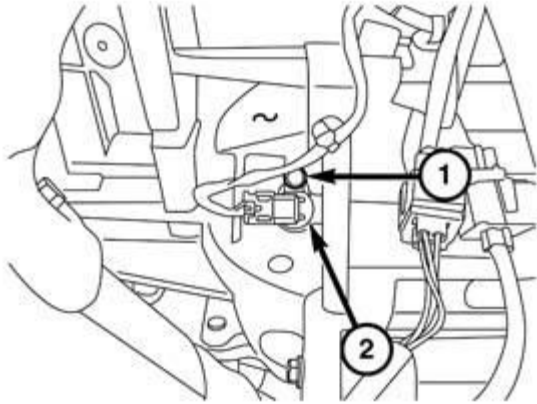
Courtesy of CHRYSLER GROUP, LLC

NOTE: The graphic represents the relationship between camshaft and crankshaft sensors edges with camshafts in "lock pin" position (cam shafts are not "phasing"). This is normally seen during idle.

Depiction of good camshaft and crankshaft square wave signals for 4 cylinder engines.

REMOVAL

REMOVAL



140268955

Fig. 88: Crankshaft Position Sensor & Bolt
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Disconnect the Crankshaft Position (CKP) sensor wire harness connector.
3. Remove bolt (1) and the CKP sensor (2).

3.2L

The crankshaft position (CKP) sensor is mounted into the right rear side of the cylinder block.

1. Disconnect and isolate the negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. If equipped with AWD, remove the PTU (1). Refer to **REMOVAL** .

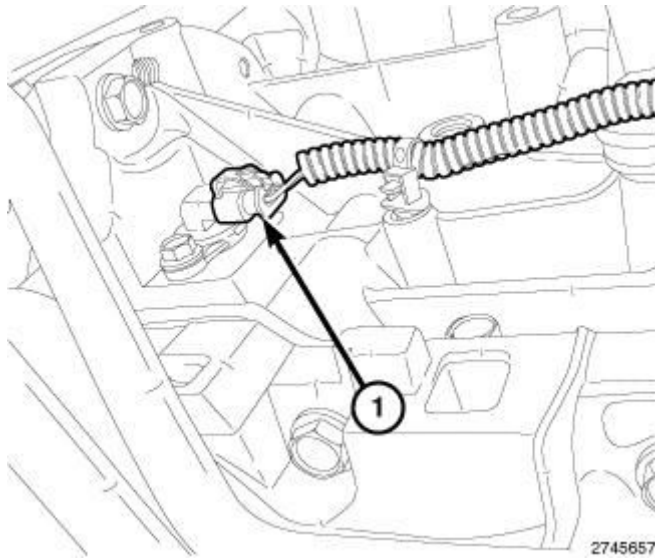


Fig. 89: Crankshaft Position Sensor Electrical Connector
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the electrical connector (1) from the crankshaft position (CKP) sensor.

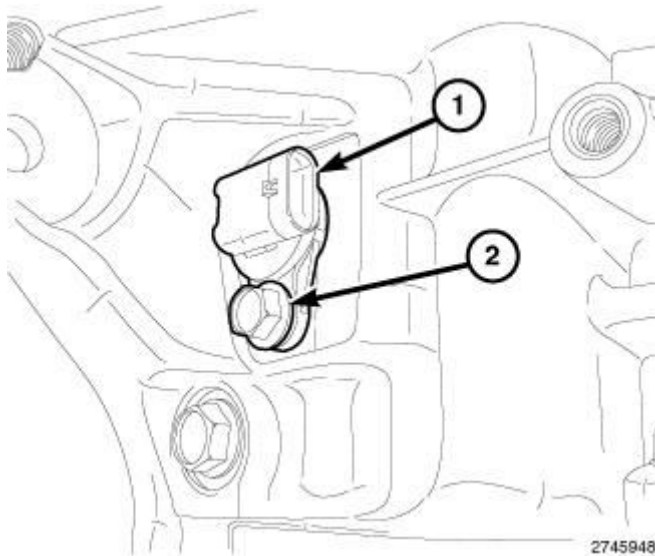
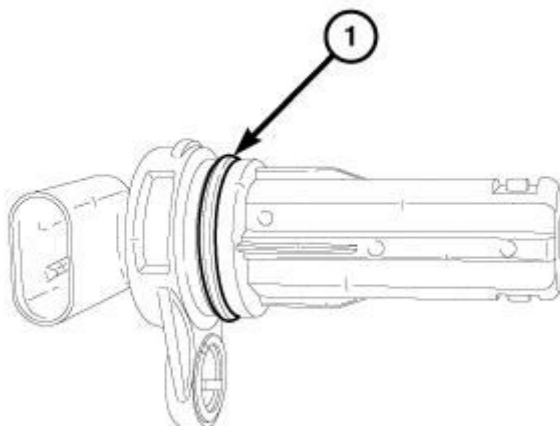


Fig. 90: Sensor Mounting Bolt & Sensor
Courtesy of CHRYSLER GROUP, LLC

5. Remove the sensor mounting bolt (2).
6. Carefully twist the sensor (1) from the cylinder block.



2745956

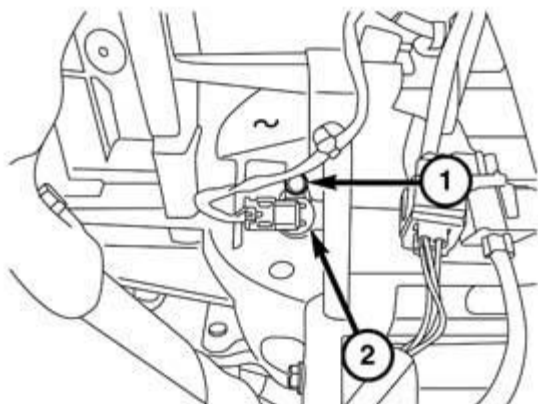
Fig. 91: O-Ring

Courtesy of CHRYSLER GROUP, LLC

7. The CKP sensor O-ring (1) can be reused if not damaged.

INSTALLATION

INSTALLATION



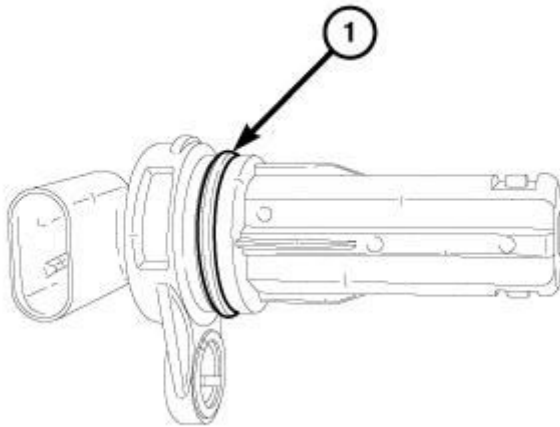
140268955

Fig. 92: Crankshaft Position Sensor & Bolt

Courtesy of CHRYSLER GROUP, LLC

1. Insert the Crankshaft Position (CKP) sensor (2). Tighten the bolt (1) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .
2. Connect the CKP sensor wire harness connector.
3. Connect the battery negative cable.

3.2L

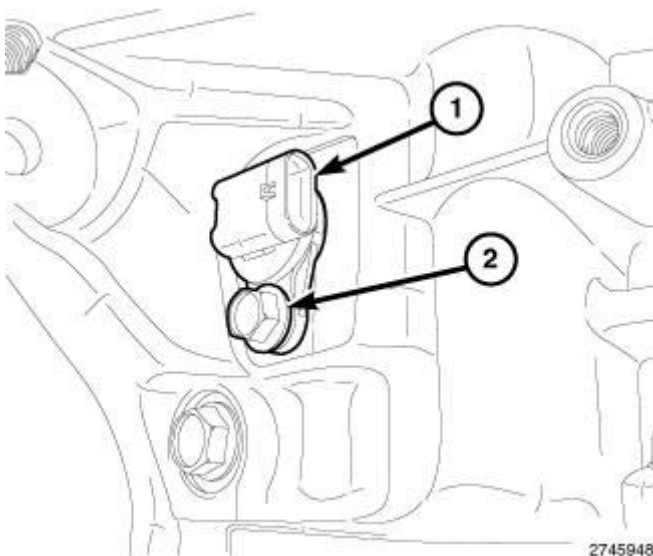


2745956

Fig. 93: O-Ring

Courtesy of CHRYSLER GROUP, LLC

1. The crankshaft position (CKP) sensor O-ring (1) can be reused if not damaged.
2. Apply a small amount of engine oil to the sensor O-ring (1).



2745948

Fig. 94: Sensor Mounting Bolt & Sensor
Courtesy of CHRYSLER GROUP, LLC

3. Clean out the CKP sensor mounting bolt hole in the engine block.
4. Install the sensor (1) into the engine block with a slight rocking and twisting action.

CAUTION: Before tightening the CKP sensor mounting bolt, be sure the sensor is completely flush to the cylinder block. If the CKP sensor is not flush, damage to the sensor mounting tang may result.

5. Install the mounting bolt (2) and tighten to 12 N.m (106 in. lbs.).

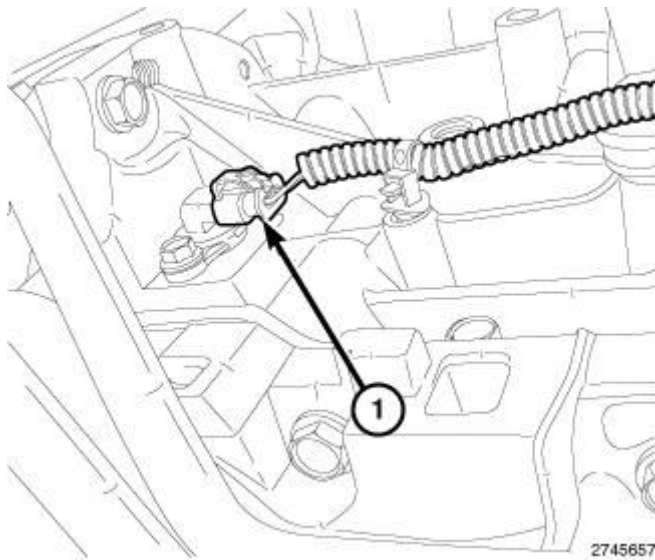


Fig. 95: Crankshaft Position Sensor Electrical Connector
Courtesy of CHRYSLER GROUP, LLC

6. Connect the electrical connector (1) to the sensor.
7. If equipped with AWD, install the PTU (1). Refer to **INSTALLATION**.
8. Lower the vehicle.
9. Connect the negative battery cable and tighten nut to 5 N.m (45 in. lbs.).

NOTE: The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components.

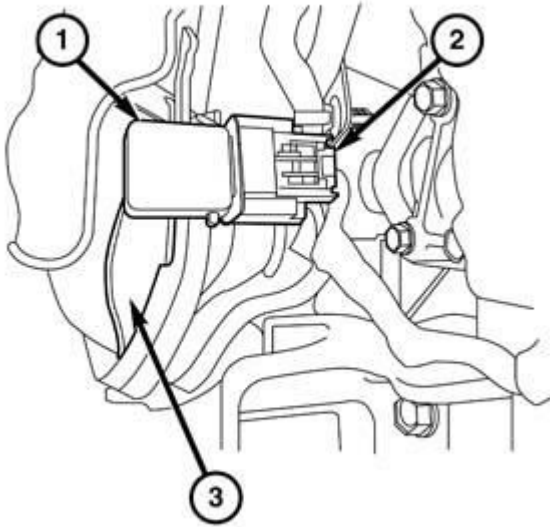
SENSOR, MANIFOLD AIR PRESSURE (MAP)

REMOVAL

2.4L

1. Disconnect the negative battery cable.

2. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .

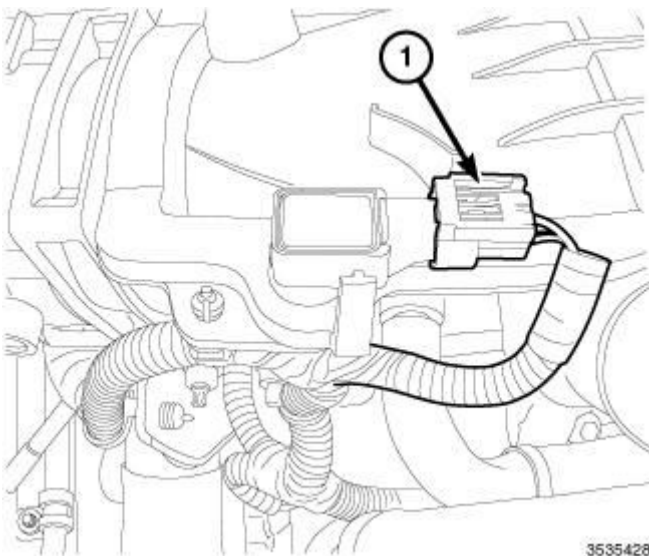


140269673

Fig. 96: MAP Sensor & Connector
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the Manifold Absolute Pressure (MAP) sensor wire harness connector (2).
4. Rotate the MAP sensor 90° counter clockwise and remove sensor (1).

3.2L



3535428

Fig. 97: MAP Sensor Electrical Connector

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Unlock and disconnect the electrical connector (1) from the MAP sensor.

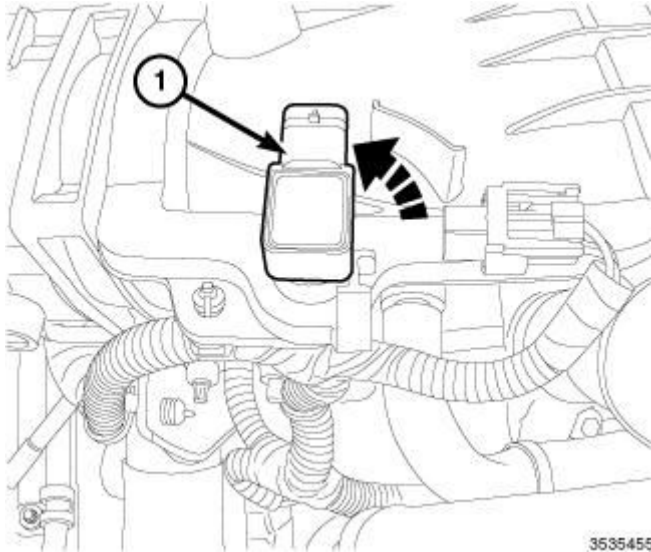


Fig. 98: Rotating MAP Sensor 1/4 Turn Counterclockwise
Courtesy of CHRYSLER GROUP, LLC

3. Rotate the MAP sensor 1/4 turn counterclockwise and pull the sensor straight up and out of the upper intake manifold.

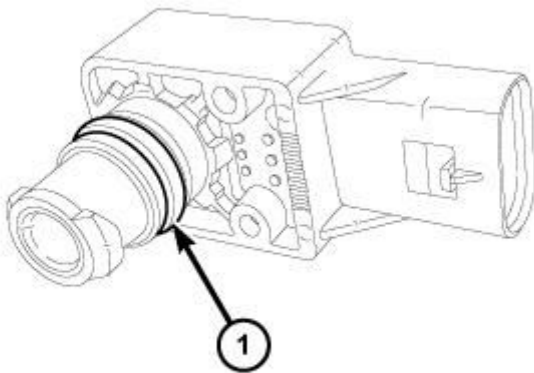
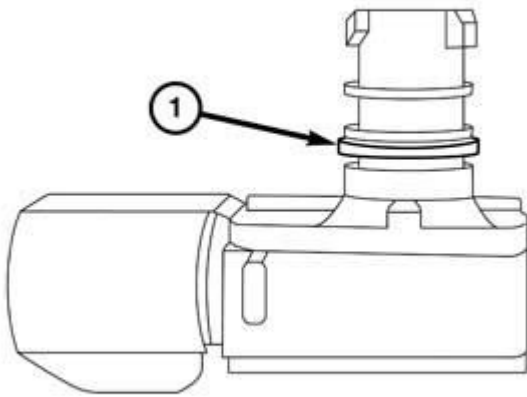


Fig. 99: O-Ring
Courtesy of CHRYSLER GROUP, LLC

4. The MAP sensor O-ring (1) can be reused if not damaged.

INSTALLATION

2.4L

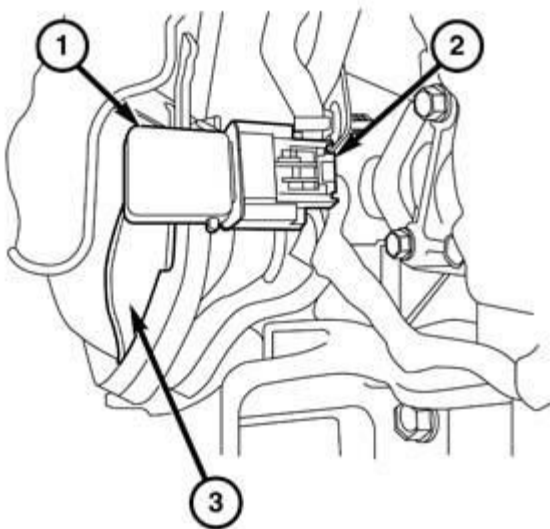


140269670

Fig. 100: MAP Sensor O-Ring Seal

Courtesy of CHRYSLER GROUP, LLC

1. Inspect and replace the O-ring seal (1) as necessary.

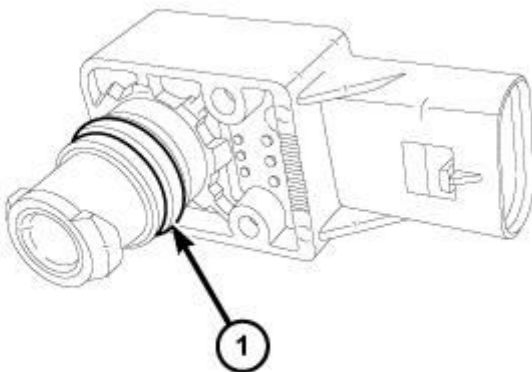


140269673

Fig. 101: MAP Sensor & Connector
Courtesy of CHRYSLER GROUP, LLC

2. Install Manifold Absolute Pressure (MAP) sensor (1) and rotate 90° clockwise to lock in place.
3. Connect the MAP sensor wire harness connector (2).
4. Install the belly pan. Refer to **BELLY PAN, INSTALLATION** .
5. Connect the negative battery cable.

3.2L



2748738

Fig. 102: O-Ring

Courtesy of CHRYSLER GROUP, LLC

1. The manifold air pressure (MAP) sensor O-ring (1) can be reused if not damaged.
2. Apply a small amount of engine oil to the sensor O-ring (1).

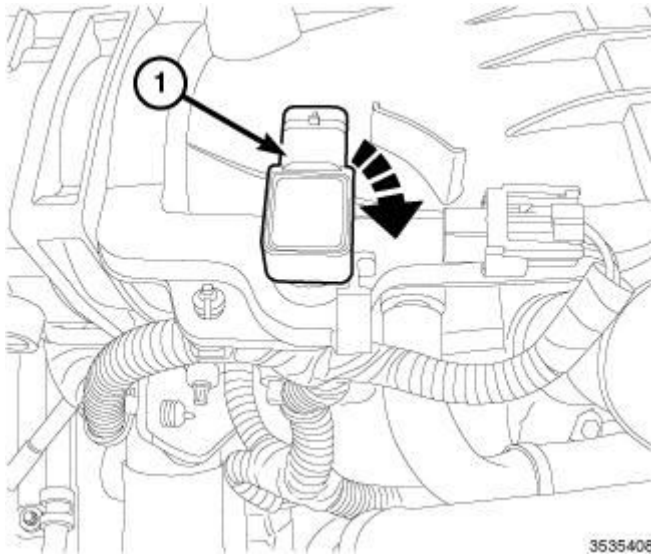


Fig. 103: Rotating MAP Sensor Rotate 1/4 Turn Clockwise
Courtesy of CHRYSLER GROUP, LLC

3. Install the MAP sensor (1) into the upper intake manifold and rotate 1/4 turn clockwise.

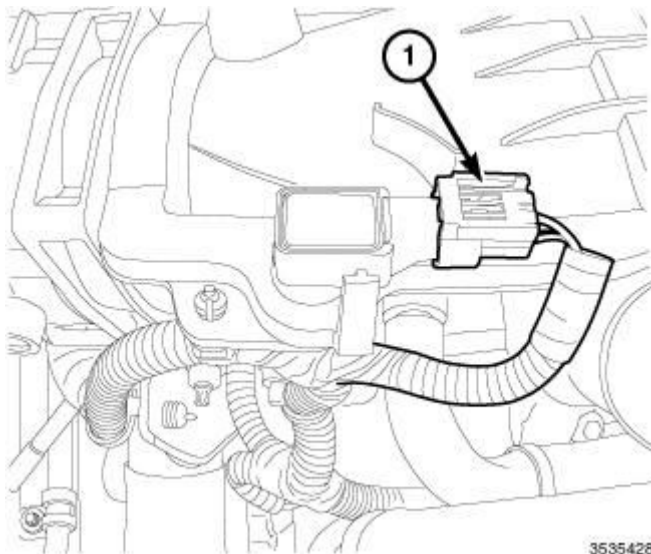


Fig. 104: MAP Sensor Electrical Connector
Courtesy of CHRYSLER GROUP, LLC

4. Connect and lock the electrical connector (1) to the sensor.
5. Connect the negative battery cable and tighten nut to 5 N.m (45 in. lbs.).

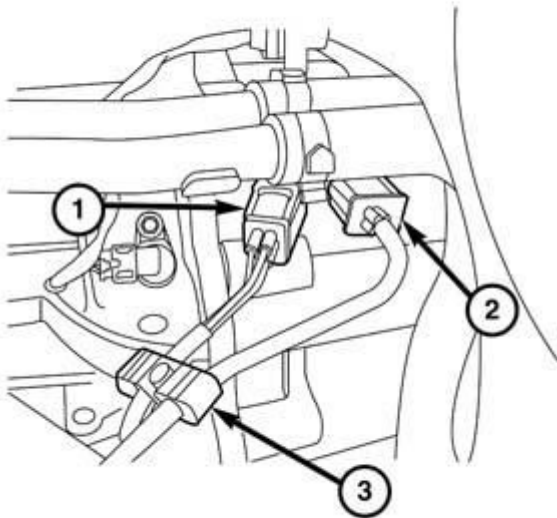
SENSOR, OXYGEN**REMOVAL**

2.4L/3.2L

UPSTREAM OXYGEN SENSOR (1/1)

WARNING: The exhaust manifold, exhaust pipes and catalytic converter(s) become very hot during engine operation. Allow engine to cool before removing oxygen sensor. Failure to allow engine to cool before removal may result in personal injury caused by burns.

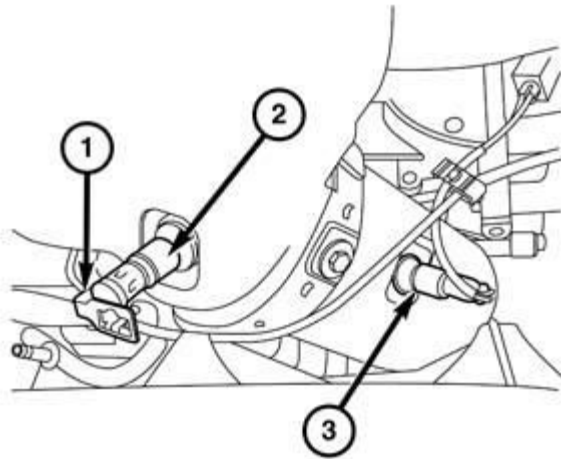
CAUTION: When disconnecting sensor electrical connector, do not pull directly on wires going into oxygen sensor (O2S). Damage to the oxygen sensor may occur.



140269669

Fig. 105: Harness Connectors & Retainer
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Disconnect O2S wire harness from retainer (3).
3. Disconnect O2S sensor wire harness connector (2).



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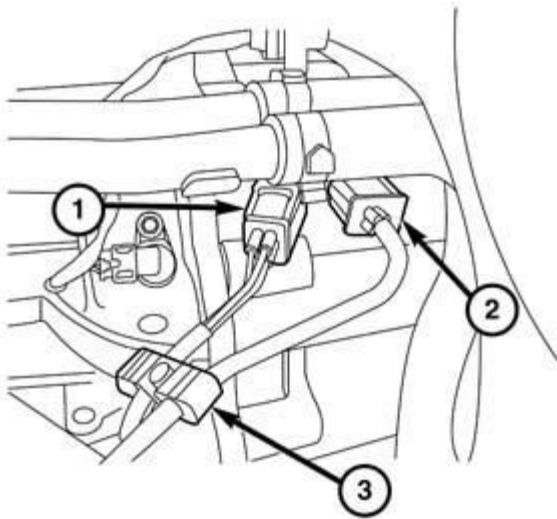
Fig. 106: O2 Sensors & Wire Harness Protector
Courtesy of CHRYSLER GROUP, LLC

4. Remove the wire harness protector (1).
5. Remove the O2S (2) sensor.

DOWNSTREAM OXYGEN SENSOR (1/2)

WARNING: The exhaust manifold, exhaust pipes and catalytic converter(s) become very hot during engine operation. Allow engine to cool before removing oxygen sensor. Failure to allow engine to cool before removal may result in personal injury caused by burns.

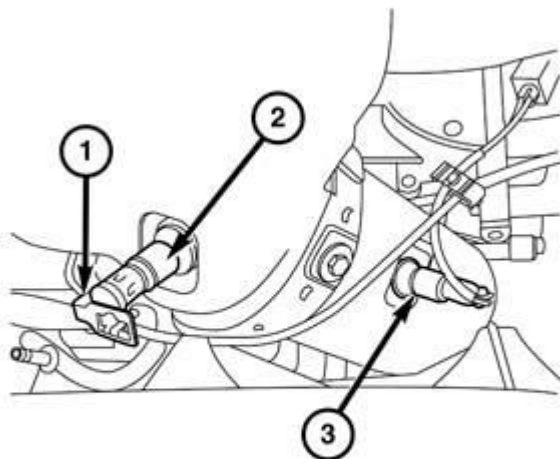
CAUTION: When disconnecting sensor electrical connector, do not pull directly on wires going into oxygen sensor (O2S). Damage to the oxygen sensor may occur.



140269669

Fig. 107: Harness Connectors & Retainer
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Disconnect O2S wire harness from retainer (3).
3. Disconnect O2S sensor wire harness connector (1).



140269668

Fig. 108: O2 Sensors & Wire Harness Protector
Courtesy of CHRYSLER GROUP, LLC

4. Remove the O2S (3) sensor.

FRONT

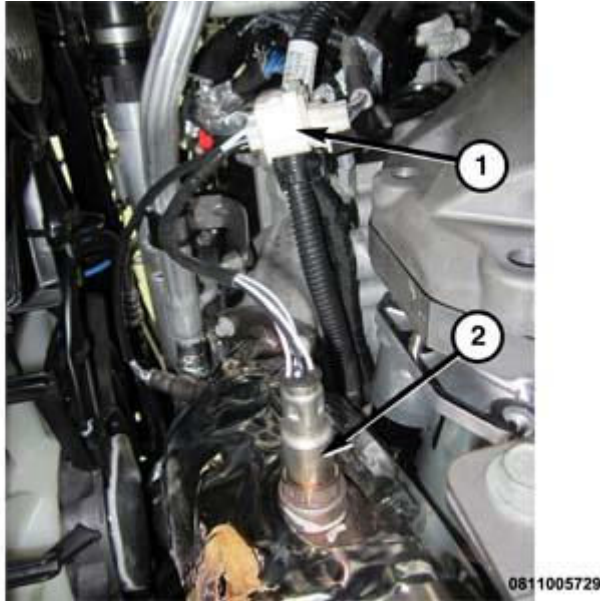


Fig. 109: Up Stream Oxygen Sensor & Electrical Connectors
Courtesy of CHRYSLER GROUP, LLC

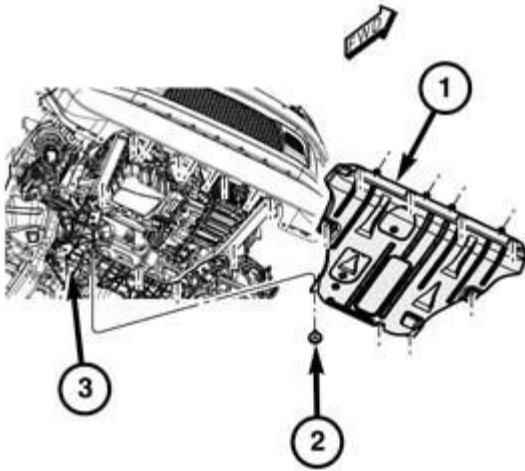
The engine is equipped with four heated oxygen sensors:

WARNING: The exhaust pipes and catalytic converter become very hot during engine operation. Allow the engine to cool before removing the oxygen sensor.

1. Disconnect and isolate the negative battery cable.

CAUTION: When disconnecting the oxygen sensor electrical connector, do not pull directly on the wire going into the sensor. The sensor wiring can be damaged resulting in sensor failure.

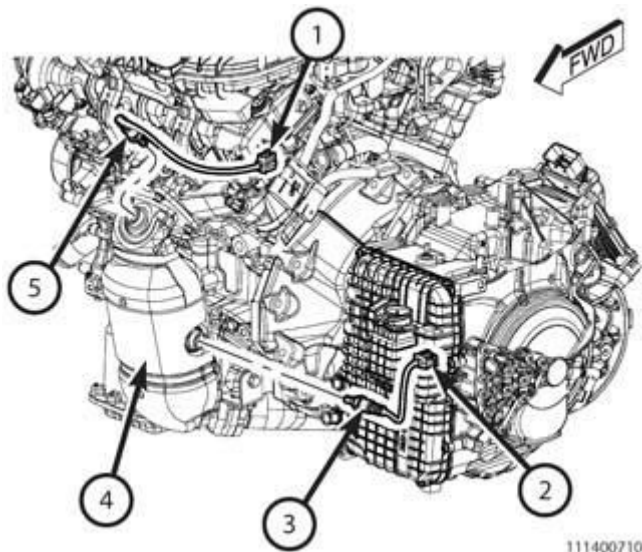
2. Disconnect the heated oxygen sensor electrical connectors (1).
3. Remove the up stream oxygen sensor (2).
4. Raise the vehicle.



0909005829

Fig. 110: Removing/Installing Belly Pans
Courtesy of CHRYSLER GROUP, LLC

5. Remove the belly pan (1).



1114007109

Fig. 111: Oxygen Sensors, Harness Connectors & Catalytic Converter
Courtesy of CHRYSLER GROUP, LLC

6. Disconnect the heated oxygen sensor electrical connector (3).
7. Remove the down stream O2 sensor (3).
8. Clean the exhaust pipe threads using an appropriate tap.

REAR

The engine is equipped with four heated oxygen sensors:

WARNING: The exhaust pipes and catalytic converter become very hot during engine operation. Allow the engine to cool before removing the oxygen sensor.

1. Disconnect and isolate the negative battery cable.

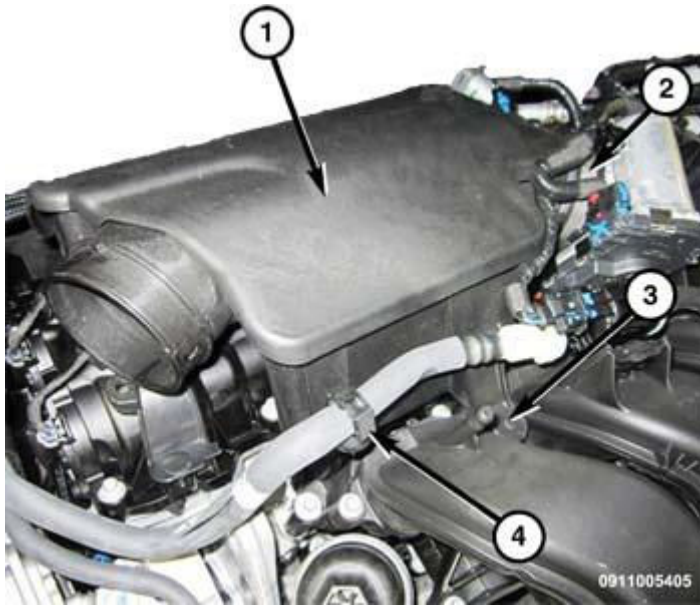


Fig. 112: Intake Resonator

Courtesy of CHRYSLER GROUP, LLC

2. Remove the resonator (1)

Refer to **RESONATOR, AIR CLEANER, REMOVAL** for 2.4L or **RESONATOR, AIR CLEANER, REMOVAL** for 3.2L.

CAUTION: When disconnecting the oxygen sensor electrical connector, do not pull directly on the wire going into the sensor. The sensor wiring can be damaged resulting in sensor failure.

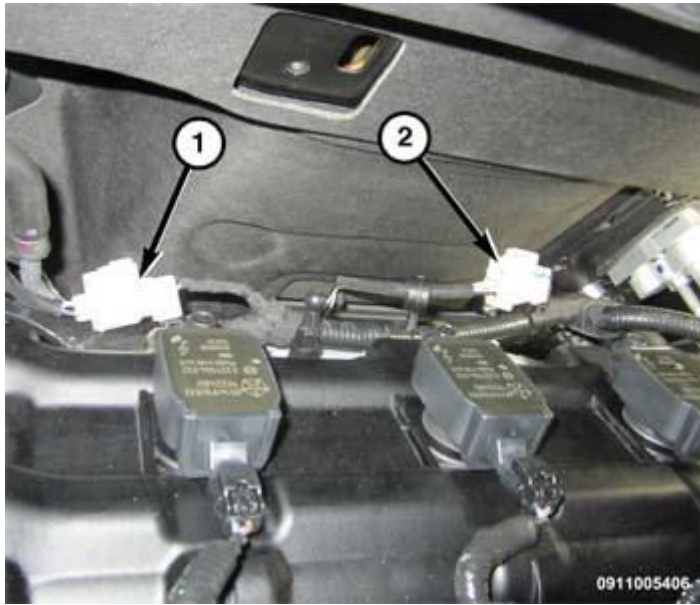


Fig. 113: Oxygen Sensor Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the heated oxygen sensor electrical connectors (1, 2).

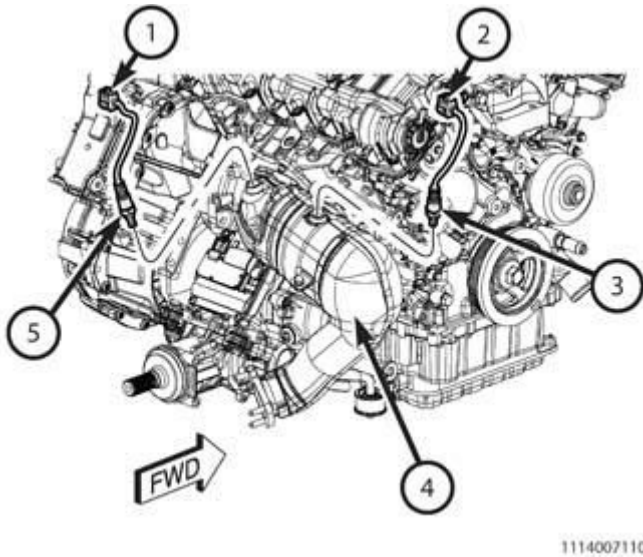


Fig. 114: Removing/Installing Oxygen Sensors
Courtesy of CHRYSLER GROUP, LLC

4. Remove the oxygen sensors (3, 5).
5. Clean the exhaust pipe threads using an appropriate tap.

INSTALLATION

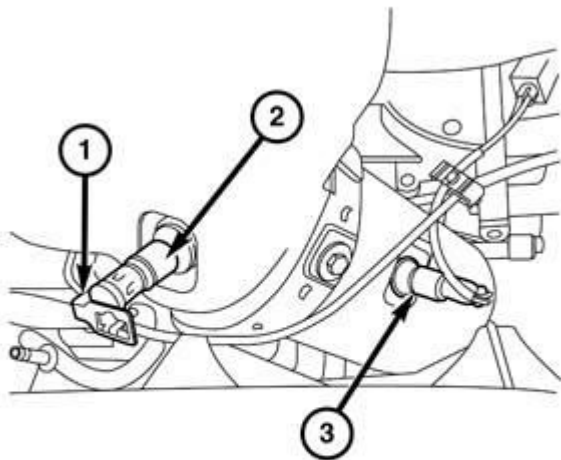
2.4L/3.2L

UPSTREAM OXYGEN SENSOR (1/1)

WARNING: The exhaust manifold, exhaust pipes and catalytic converter(s) become very hot during engine operation. Allow engine to cool before removing oxygen sensor. Failure to allow engine to cool before removal may result in personal injury caused by burns.

CAUTION: When Equipped: The oxygen sensor (O2S) pigtail harness must be clipped and/or bolted back to their original positions on engine or body to prevent mechanical damage to wiring.

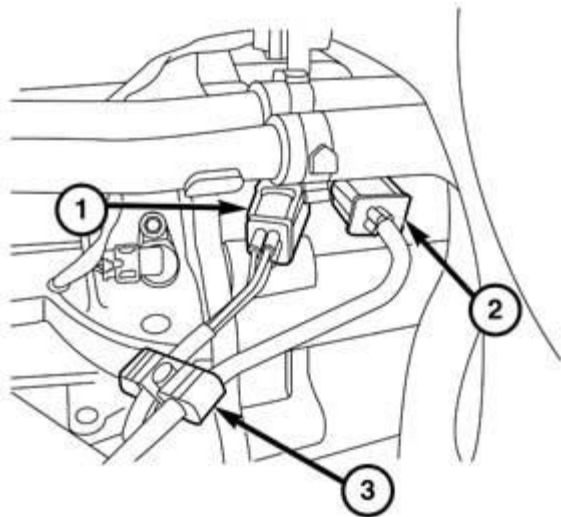
Threads of new oxygen sensors are factory coated with anti-seize compound to aid in removal. **DO NOT** add any additional anti-seize compound to threads of a new O2S.



140269668

Fig. 115: O2 Sensors & Wire Harness Protector
Courtesy of CHRYSLER GROUP, LLC

1. Install the O2S (2) sensor. Tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS**.
2. Install the wire harness protector (1).



140269669

Fig. 116: Harness Connectors & Retainer
Courtesy of CHRYSLER GROUP, LLC

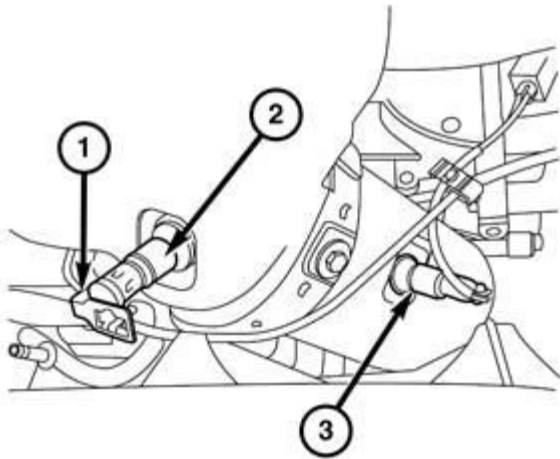
3. Connect O2S sensor wire harness connector (2).
4. Connect O2S sensor wire harness to retainer (3).
5. Connect the negative battery cable.

DOWNSTREAM OXYGEN SENSOR (1/2)

WARNING: The exhaust manifold, exhaust pipes and catalytic converter(s) become very hot during engine operation. Allow engine to cool before removing oxygen sensor. Failure to allow engine to cool before removal may result in personal injury caused by burns.

CAUTION: When Equipped: The oxygen sensor (O2S) pigtail harness must be clipped and/or bolted back to their original positions on engine or body to prevent mechanical damage to wiring.

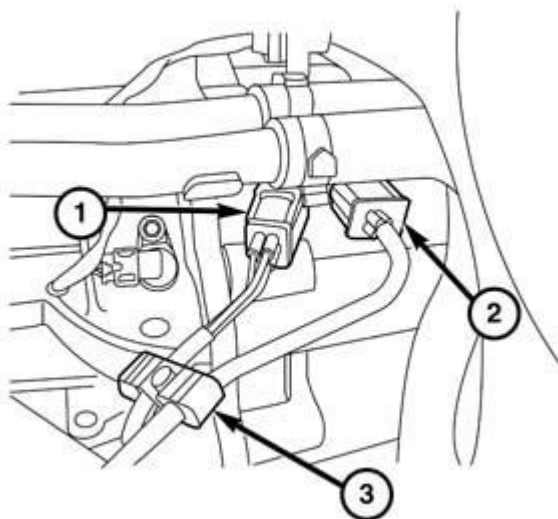
Threads of new oxygen sensors are factory coated with anti-seize compound to aid in removal. **DO NOT** add any additional anti-seize compound to threads of a new O2S.



140269668

Fig. 117: O2 Sensors & Wire Harness Protector
Courtesy of CHRYSLER GROUP, LLC

1. Install the O2S (3) sensor. Tighten to the proper specification. Refer to **TORQUE SPECIFICATIONS** .



140269669

Fig. 118: Harness Connectors & Retainer
Courtesy of CHRYSLER GROUP, LLC

2. Connect O2S sensor wire harness connector (1).
3. Connect O2S sensor wire harness to retainer (3).
4. Connect the negative battery cable.

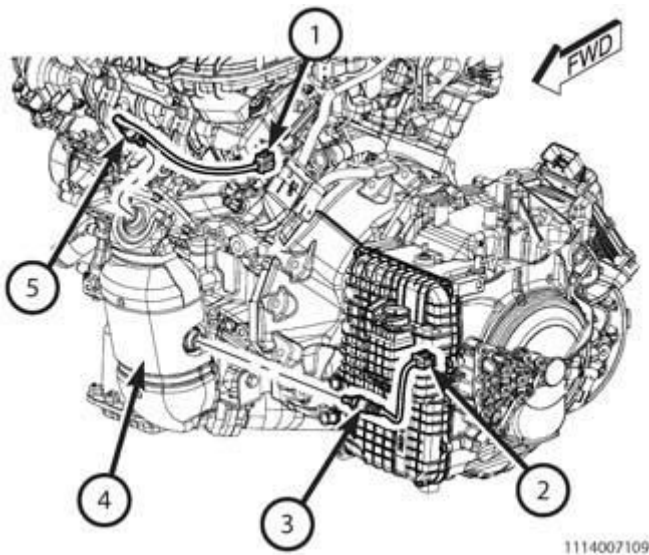
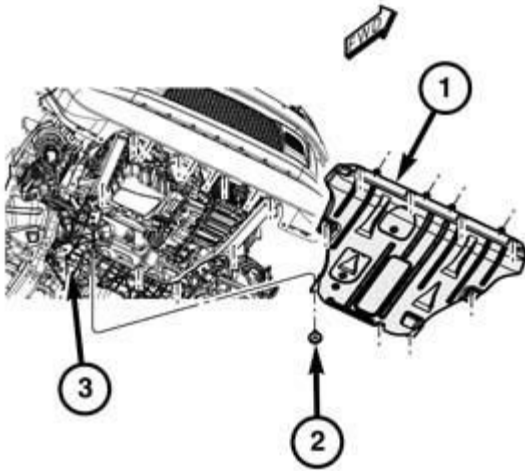
REAR

Fig. 119: Oxygen Sensors, Harness Connectors & Catalytic Converter
Courtesy of CHRYSLER GROUP, LLC

1. If reinstalling the original oxygen sensor, coat the sensor threads with an anti-seize compound such as Loctite 771- 64 or equivalent. New sensors have compound on the threads and do not require an additional coating. **Do Not add any additional anti-seize compound to the threads of a new oxygen sensor.**

CAUTION: Never apply any type of grease to the oxygen sensor electrical connector, or attempt any repair of the sensor wiring harness.

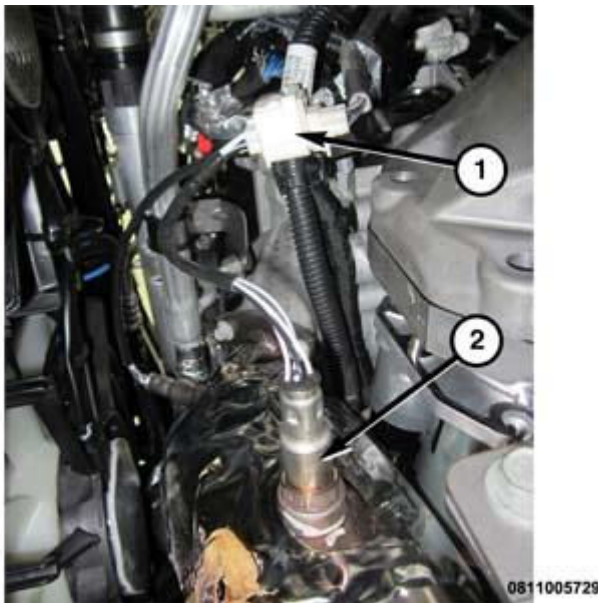
2. Install the oxygen sensor (3). Tighten to 43 N.m (32 ft. lbs.).
3. Connect the electrical connector (2).



0909005829

Fig. 120: Removing/Installing Belly Pans
Courtesy of CHRYSLER GROUP, LLC

4. Install the belly pan.
5. Lower the vehicle.

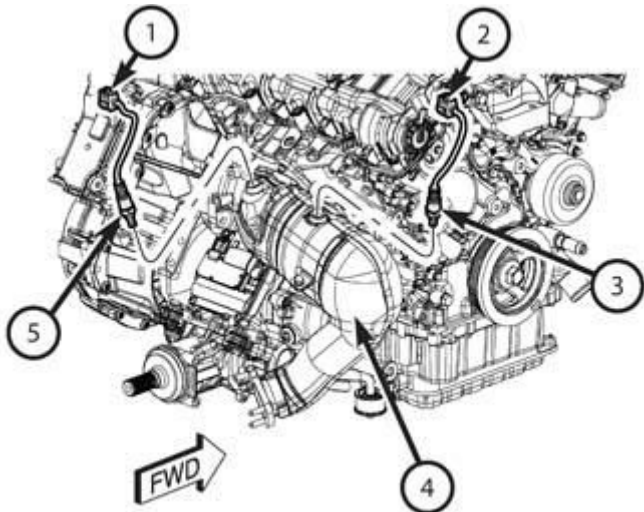


0811005729

Fig. 121: Up Stream Oxygen Sensor & Electrical Connectors
Courtesy of CHRYSLER GROUP, LLC

6. Install the upper O2 sensor (2). Tighten to 43 N.m (32 ft. lbs.).

7. Connect the electrical connector (1).
8. Connect the negative battery cable and tighten nut to 5 N.m (45 in. lbs.).

REAR

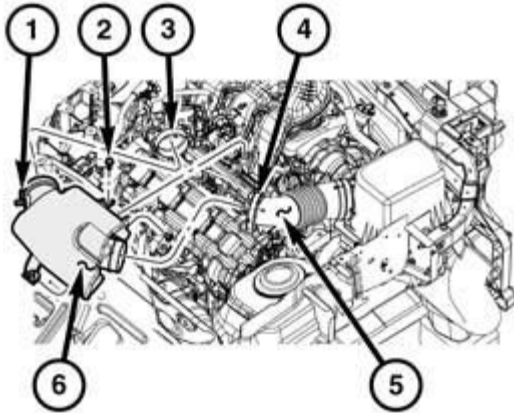
1114007110

Fig. 122: Removing/Installing Oxygen Sensors
Courtesy of CHRYSLER GROUP, LLC

1. If reinstalling the original oxygen sensor, coat the sensor threads with an anti-seize compound such as Loctite 771- 64 or equivalent. New sensors have compound on the threads and do not require an additional coating. **Do Not add any additional anti-seize compound to the threads of a new oxygen sensor.**
2. Install the oxygen sensor and tighten to:
 - Rear upstream oxygen sensor (3), 43 N.m (32 ft. lbs.).
 - Rear downstream oxygen sensor (2), 45 N.m (33 ft. lbs.).

CAUTION: Never apply any type of grease to the oxygen sensor electrical connector, or attempt any repair of the sensor wiring harness.

3. Connect the heated oxygen sensor electrical connector (1, 2).



0909005845

Fig. 123: IAT Sensor Connector, Throttle Body & Air Inlet Hose Housing
Courtesy of CHRYSLER GROUP, LLC

4. Install the air intake resonator (6). Refer to **RESONATOR, AIR CLEANER, INSTALLATION** for 2.4L or **RESONATOR, AIR CLEANER, INSTALLATION** for 3.2L.
5. Connect the negative battery cable and tighten nut to 5 N.m (45 in. lbs.).

THROTTLE BODY

REMOVAL

3.2L



Fig. 124: Battery & Cables

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable (3).

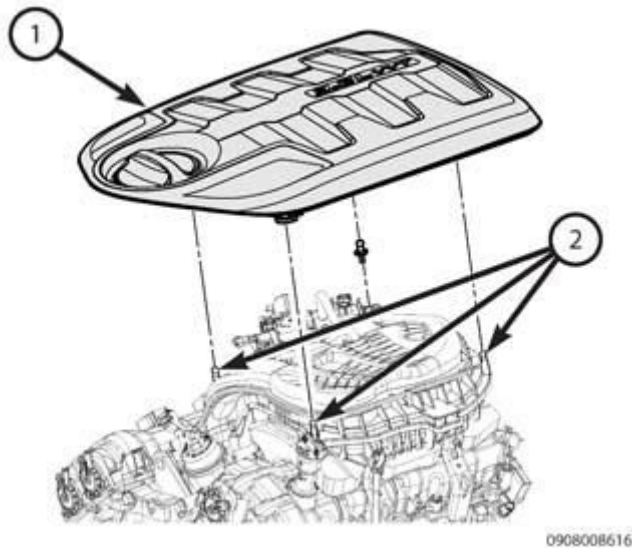
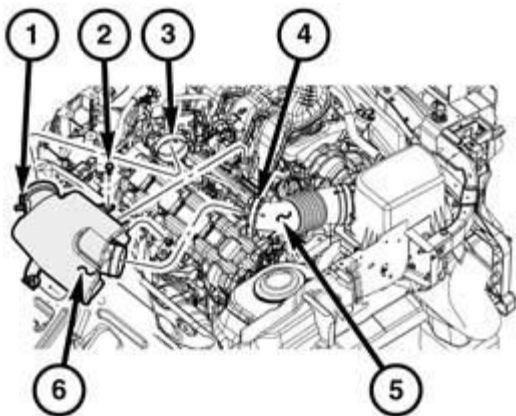


Fig. 125: Engine Cover & Ball Studs

Courtesy of CHRYSLER GROUP, LLC

2. Lift the engine cover retaining grommets off the ball studs and remove the engine cover (1).



0909005845

Fig. 126: IAT Sensor Connector, Throttle Body & Air Inlet Hose Housing
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the electrical connector (1) from the Inlet Air Temperature (IAT) sensor.
4. Loosen the clamp at the throttle body (3).
5. Loosen the clamp at the air cleaner housing.
6. Lift the air inlet resonator assembly (6) off the ball stud.

CAUTION: Never have the ignition key in the ON position when checking the throttle body shaft for a binding condition. This may set DTC's.

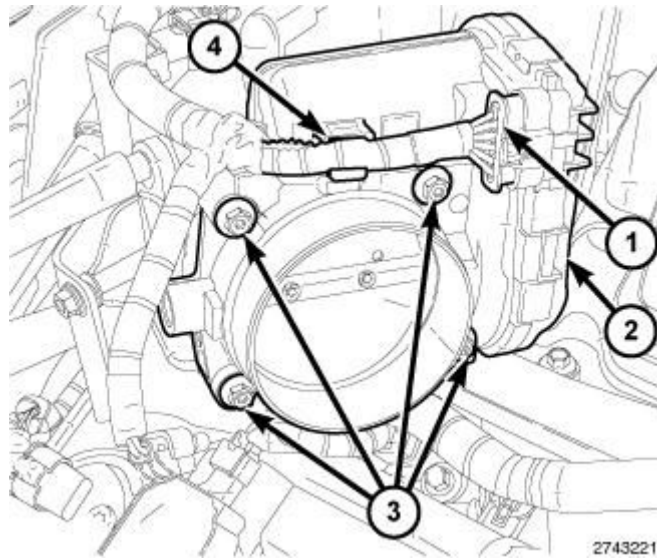


Fig. 127: Electrical Connector, Electronic Throttle Control (ETC), Clip & Mounting Bolts
 Courtesy of CHRYSLER GROUP, LLC

7. Disconnect the electrical connector (1) from the Electronic Throttle Control (ETC) (2) and unfasten the ETC harness from the clip (4) on the throttle body.
8. Remove four throttle body mounting bolts (3).
9. Remove the throttle body from the upper intake manifold.
10. Check the condition of the throttle body-to-intake manifold seal. The seal can be reused if not damaged.

2.4L

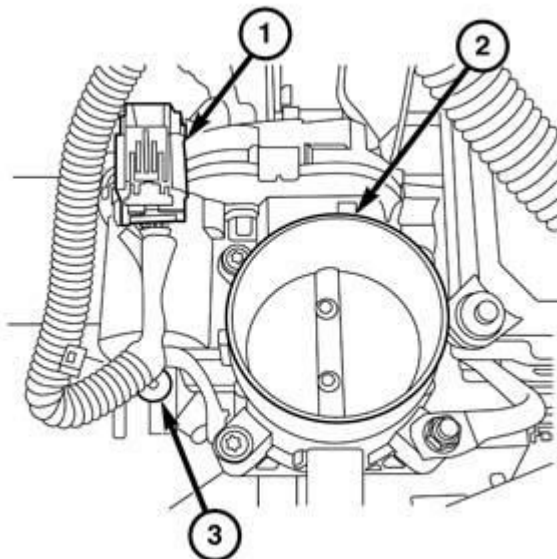


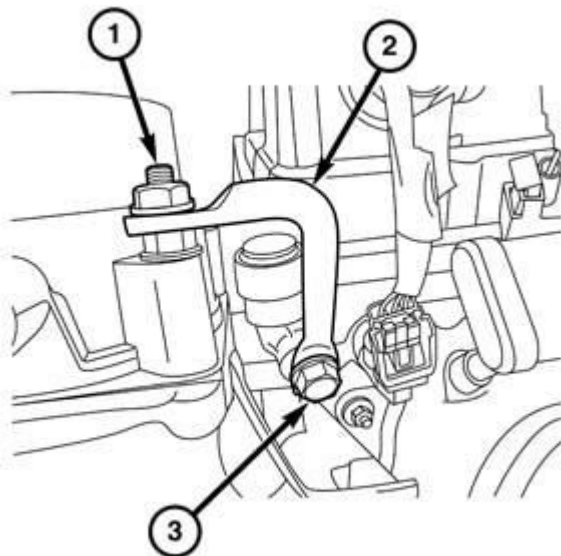
Fig. 128: Throttle Body, Retainer & Connector

Courtesy of CHRYSLER GROUP, LLC

WARNING: DO NOT place fingers in or around the throttle body plate. If the throttle body is energized, the throttle plate could move causing personal injury. Always disconnect the negative battery cable prior to servicing the throttle body.

CAUTION: DO NOT move the throttle plate while power is connected to the throttle body. This may cause fault codes to set.

1. Disconnect and isolate negative battery cable.
2. Remove the air cleaner resonator assembly. Refer to **RESONATOR, AIR CLEANER, REMOVAL**.
3. Disconnect throttle body wire harness connector (1) and detach wire harness retainer (3) from throttle body (2).

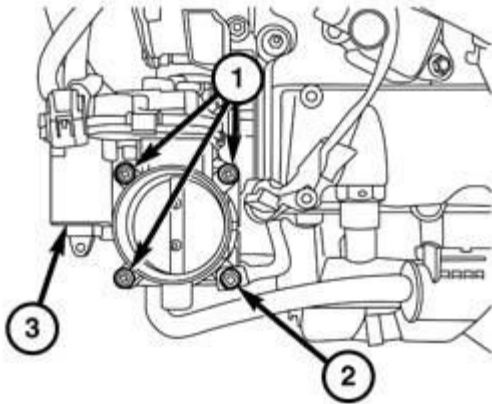


081569489

Fig. 129: Throttle Body Support Bracket, Nut & Bolt

Courtesy of CHRYSLER GROUP, LLC

4. Remove nut (1), bolt (3) and the throttle body support bracket (2).



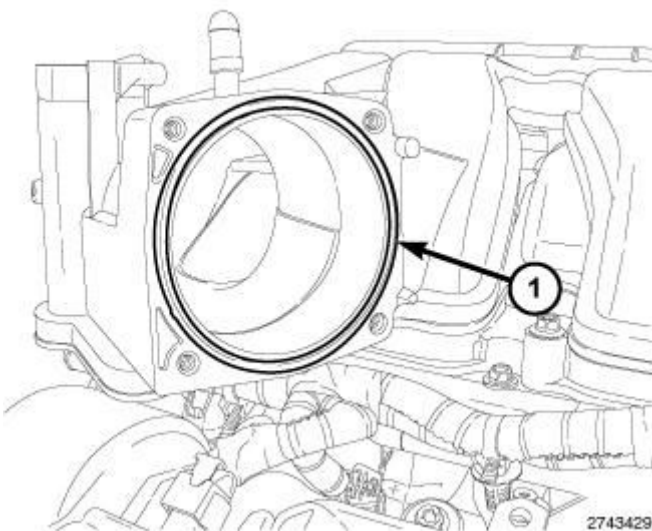
091468957

Fig. 130: Throttle Body, Gasket & Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Remove four bolts (1, 2) and throttle body (3) from the intake manifold.
6. Inspect intake manifold to throttle body gasket (2) for damage, remove if necessary.

INSTALLATION

3.2L



2743429

Fig. 131: Throttle Body-To-Intake Manifold Seal
Courtesy of CHRYSLER GROUP, LLC

1. Check the condition of the throttle body-to-intake manifold seal (1). The seal can be reused if not damaged.
2. Clean the mating surfaces of the throttle body and intake manifold.

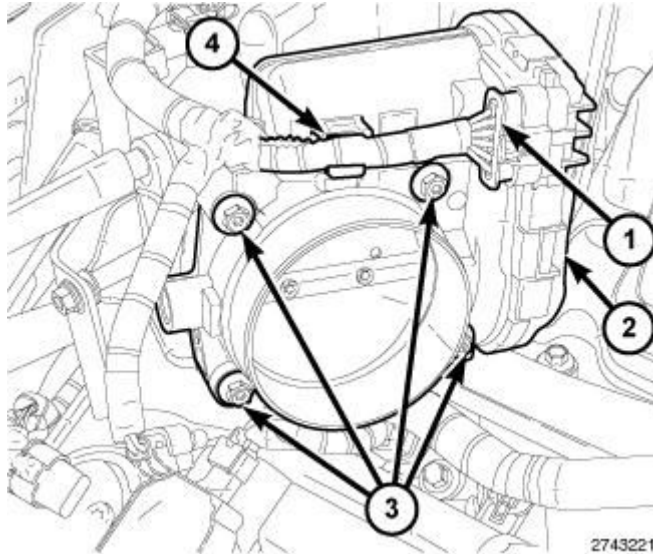
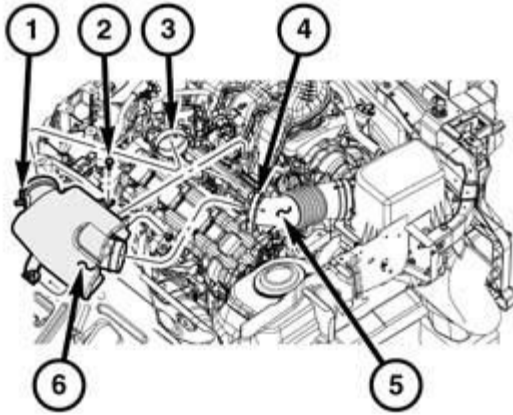


Fig. 132: Electrical Connector, Electronic Throttle Control (ETC), Clip & Mounting Bolts
 Courtesy of CHRYSLER GROUP, LLC

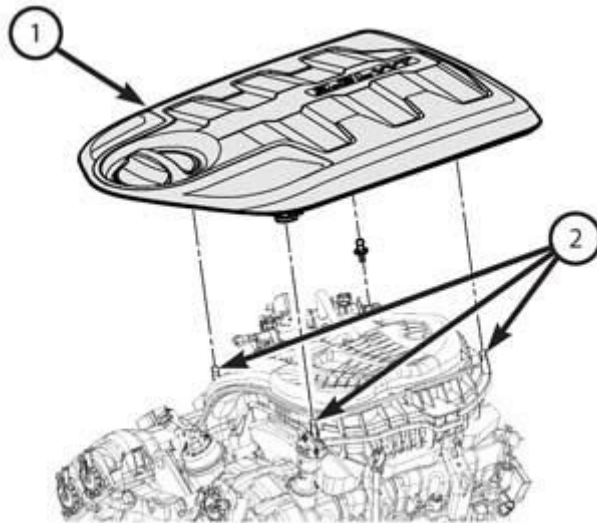
3. Position the throttle body (2) to the intake manifold.
4. Install the throttle body mounting bolts (3) and tighten in a crisscross pattern sequence to the proper specification. Refer to **RESONATOR, AIR CLEANER, REMOVAL** .
5. Connect the electrical connector (1) to the Electronic Throttle Control (ETC) (2) and secure the ETC harness to the clip (4) on the throttle body.



0909005845

Fig. 133: IAT Sensor Connector, Throttle Body & Air Inlet Hose Housing
Courtesy of CHRYSLER GROUP, LLC

6. Position the air inlet hose (5) onto the resonator housing (6). Hand tighten the clamp (4).
7. Secure the air inlet hose assembly retaining grommet onto the ball stud.
8. Hand tighten the clamp (3) at the throttle body.
9. Connect the Inlet Air Temperature (IAT) sensor electrical connector (1).



0908008616

Fig. 134: Engine Cover & Ball Studs
Courtesy of CHRYSLER GROUP, LLC

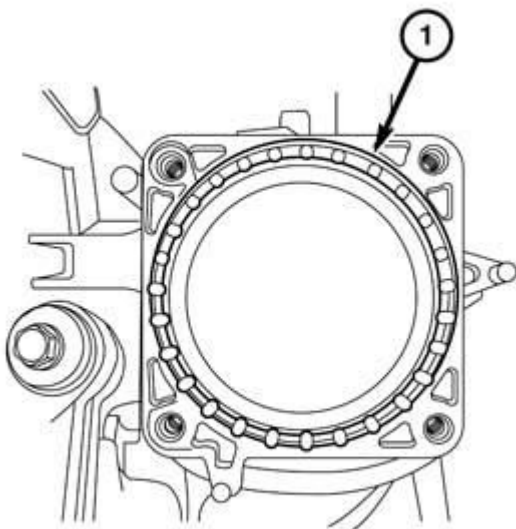
10. Position the engine cover (1) and secure the retaining grommets onto the ball studs.



Fig. 135: Battery & Cables
Courtesy of CHRYSLER GROUP, LLC

11. Connect the negative battery cable (3). Tighten the nut to the proper specification. Refer to **SPECIFICATIONS** .

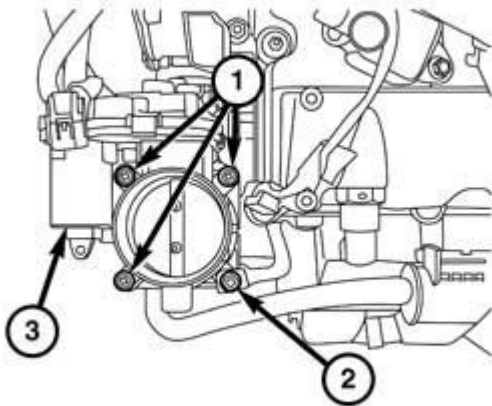
2.4L



140269667

Fig. 136: New Throttle-To-Intake Manifold Gasket
Courtesy of CHRYSLER GROUP, LLC

1. If necessary, Install a new throttle-to-intake manifold gasket (1).



091468957

Fig. 137: Throttle Body, Gasket & Bolts
Courtesy of CHRYSLER GROUP, LLC

CAUTION: DO NOT OVER TORQUE. Over tightening can cause damage to the throttle body, gaskets, bolts and/or the intake manifold.

2. Install throttle body (3). Tighten four bolts (1, 2) finger tighten.

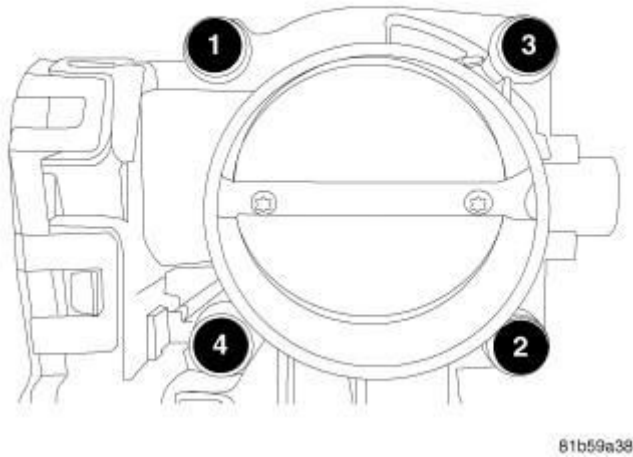


Fig. 138: Throttle Body Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The throttle body must be torqued in a mandatory torque sequence.
Tighten in a criss - cross pattern to specification.

3. Tighten the bolts in criss cross pattern to 8 N.m (71 in. lbs.).

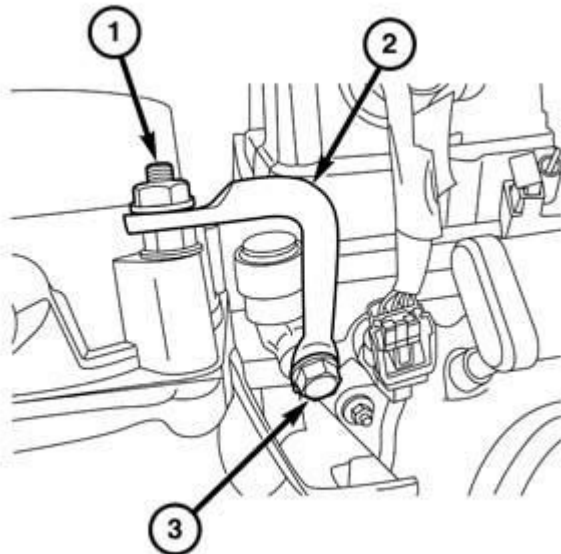
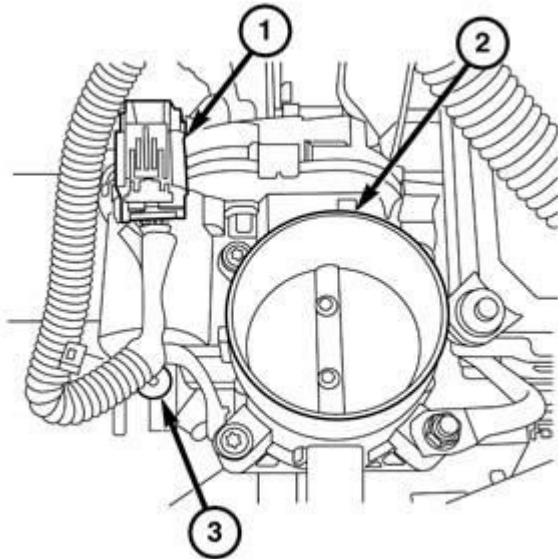


Fig. 139: Throttle Body Support Bracket, Nut & Bolt
Courtesy of CHRYSLER GROUP, LLC

4. Install throttle body support bracket (2), bolt (3) and nut (1). Tighten fasteners to:
 - Tighten the bracket nut (1) to 8 N.m (71 in. lbs.).
 - Tighten the bracket bolt (3) to 25 N.m (18 ft. lbs.).



140270054

Fig. 140: Throttle Body, Retainer & Connector
Courtesy of CHRYSLER GROUP, LLC

5. Install wire harness retainer (3) to throttle body (2) and connect the throttle body wire harness connector (1).
6. Install the air cleaner resonator assembly. Refer to **RESONATOR, AIR CLEANER, INSTALLATION**.
7. Connect the negative battery cable. Tighten nut to 5 N.m (44 in. lbs.).
8. Use a scan tool and clear all fault codes then perform the ETC RELEARN function.

FUEL DELIVERY, DIESEL

WARNING

WARNING

WARNING: Under no circumstances should gasoline be mixed with diesel fuel (not even during winter). The high pressure pump is lubricated by diesel fuel. Immediate fuel system damage may occur causing replacement and flushing of the complete diesel fuel system. High pressure pump seizure will cause metal particles to spread through out the fuel circuit. All CDI

fuel system components connected to the fuel circuit will have to be exchanged and the lines flushed.

HIGH FUEL SYSTEM PRESSURE

WARNING: High pressure fuel lines deliver fuel under extreme pressure from the injection pump to the injectors. This may be as high as 1600 bar (23, 206 psi). Use extreme caution when inspecting for high pressure fuel leaks. Fuel under this amount of pressure can penetrate skin causing personal injury or death. Inspect high pressure fuel leaks with a sheet of cardboard. Wear safety goggles and adequate protective clothing when servicing fuel system.

HIGH PRESSURE FUEL PUMP DELIVERY

RPM	PRESSURE
400	550 BAR (7977 PSI)
500	650 BAR (9427 PSI)
800	885 BAR (12836 PSI)
1000	1038 BAR (15055 PSI)
1173	1134 BAR (16447 PSI)
1340	1231 BAR (17854 PSI)
1750	1514 BAR (21959 PSI)
1860	1600 BAR (23206 PSI)
3200	1600 BAR (23206 PSI)
3700	770 BAR (11168 PSI)
4000	400 BAR (5802 PSI)
4200	400 BAR (5802 PSI)
4400	100 BAR (1450 PSI)

DIAGNOSIS AND TESTING

FUEL DELIVERY SYSTEM

WARNING: High-pressure fuel lines deliver fuel under extreme pressure from the injection pump to the injectors. This may be as high as 1600 bar (23, 206 psi). Use extreme caution when inspecting for high-pressure fuel leaks. Fuel under this amount of pressure can penetrate skin causing serious or fatal injury. Inspect high-pressure fuel leaks with a sheet of cardboard. Wear safety goggles and adequate protective clothing when servicing fuel system.

CONDITION	POSSIBLE CAUSES	CORRECTION
	1. Contaminated Fuel	1. Drain, Flush and Refill Fuel

2014 Jeep Cherokee Trailhawk

2014 ENGINE Fuel System - Cherokee

		System
No Start/Hard Start/Start and Stall	2. Low Fuel Pressure Supply to Fuel Filter	2. Perform the Low Pressure Fuel Pump Test to check the fuel pump pressure of the in-tank electric fuel pump. Refer to <u>FUEL DELIVERY - STANDARD PROCEDURE</u> .
	3. High Pressure Fuel Injection Pump	3. Perform the Fuel Injection Pump Pressure Test / Replace necessary fuel line(s)
	4. Restricted Fuel Filter	4. Replace Fuel Filter
	5. Fuel Heater Inoperative	5. Test Fuel Heater and circuitry
	6. Restricted or Leaking Fuel Lines	6. Inspect / Replace necessary fuel line(s)
	7. Stored Diagnostic Trouble Codes	7. Refer to the <u>2.0L DIESEL - DIAGNOSTIC CODE INDEX</u>
Stalls Under Aggressive Maneuvers/Loss Of Fuel Pressure	1. Restricted or Damaged Fuel Pump Lower Filter	1. Test Fuel Pump Pressure
	2. Contaminated Fuel	2. Drain, Flush and Refill Fuel System
	3. Damaged Fuel Tank	3. Replace Fuel Tank
	4. Restricted Fuel Filter	4. Replace Fuel Filter
Cannot Refill Fuel Tank/Excessive Pressure in Fuel Tank When Cap Is Removed	1. Sticking or Damaged Fuel Tank Fill/Vent Valve	1. Replace Fuel Tank
	2. Restricted or Damaged Fuel Tank Fill/Vent Valve Filter or Hose	2. Replace Fuel Tank Vent Filter

AIR IN FUEL SYSTEM

Air will enter the fuel system whenever fuel supply lines, separator filters, injection pump, high-pressure lines or injectors are removed or disconnected. Air trapped in the fuel system can result in hard starting, a rough running engine, engine misfire, low power, excessive smoke and fuel knock.

Inspect the fuel system from the fuel tank to the injectors for loose connections. Refer to **FUEL DELIVERY, DIESEL, WARNING**. Leaking fuel is an indicator of loose connections or defective seals. Air can also enter the fuel system between the fuel tank and the fuel pump. Inspect the fuel tank module and fuel lines for damage that might allow air into the system.

With the scan tool connected to the vehicle, select Engine and the select Sensor Display. Page down to view Fuel Pressure Set Point and Actual Fuel Pressure. Start the engine and observe the Fuel Pressure Set Point and the Actual Fuel Pressure. If the Actual Fuel Pressure Oscillates above and below the Fuel Pressure Set Point in a regular cycle, inspect the fuel system for air intrusion.

If the Actual Fuel Pressure gradually drops below the Fuel Pressure Set Point then spikes well above the Fuel Pressure Set Point, replace the fuel pressure control valve and recheck.

HIGH PRESSURE FUEL LINES

WARNING: High-pressure fuel lines deliver fuel under extreme pressure from the injection pump to the injectors. This may be as high as 1600 bar (23, 206 psi). Use extreme caution when inspecting for high-pressure fuel leaks. Fuel under this amount of pressure can penetrate skin causing personal injury or death. Inspect for high-pressure fuel leaks with a sheet of cardboard placed in the suspected area while the engine is not running. Start the vehicle and allow the engine to run for a short period. Turn the engine off and inspect the piece of cardboard. Wear safety goggles and adequate protective clothing when servicing fuel system.

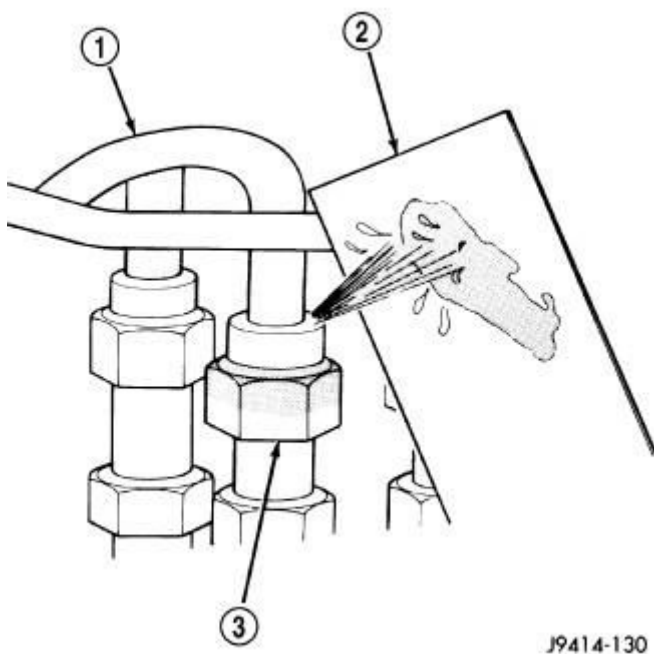


Fig. 141: Checking For Fuel Leaks
Courtesy of CHRYSLER GROUP, LLC

- | |
|--|
| 1 - HIGH-PRESSURE LINE
2 - CARDBOARD
3 - FITTING |
|--|

High-pressure fuel line (1) leaks can cause starting problems and poor engine performance.

- Turn the engine off.
- Place a piece of cardboard (2) in the suspected area.
- Start the engine and allow to run for a short period.
- Turn the engine off.
- Inspect the cardboard.

If a high-pressure line connection is leaking, counterhold and tighten the connection to specification then perform this procedure again. Replace any damaged, restricted or leaking high-pressure fuel lines with the correct replacement line.

CAUTION: The high-pressure fuel lines cannot contact each other or other components. Do not attempt to weld high-pressure fuel lines or to repair lines that are damaged. Only use the recommended lines when replacement of high-pressure fuel line is necessary.

STANDARD PROCEDURE

CLEANING FUEL SYSTEM COMPONENTS

CAUTION: Cleanliness cannot be overemphasized when handling or replacing diesel fuel system components. This especially includes the fuel injectors, high-pressure fuel lines, fuel rail, and fuel injection pump. Very tight tolerances are used with these parts. Dirt contamination could cause rapid part wear and possible plugging of fuel injector nozzle tip holes. This in turn could lead to possible engine misfire. Always wash/clean any fuel system component thoroughly before disassembly and then air dry. **DO NOT** wire brush injector nozzles when cleaning. Cap or cover any open part after disassembly. Before assembly, examine each part for dirt, grease or other contaminants and clean if necessary. When installing new parts, lubricate them with clean engine oil or clean diesel fuel only.

DRAINING FUEL TANK

CONVENTIONAL PROCEDURE

WARNING: The fuel system is under constant high pressure even with engine off. Until the fuel pressure has been properly released from the system, do not attempt to open the fuel system. Do not smoke or use open flames/sparks when servicing the fuel system. Wear protective clothing and eye protection. Make sure the area in which the vehicle is being serviced is in a well ventilated area and free of flames/sparks. Failure to comply may result in serious or fatal injury.

WARNING: No sparks, open flames or smoking. Risk of poisoning from inhaling and swallowing fuel. Pour fuel only into appropriately marked OSHA approved containers. Wear protective clothing. Risk of injury to eyes and skin from contact with fuel.

Due to a one-way check valve installed into the fuel fill fitting at the tank, the tank cannot be drained at the fuel fill cap.

1. Disconnect the fuel supply line at the quick-connect fitting (2) at the fuel rail. Refer to **FITTING**,

QUICK CONNECT .

2. Install the appropriate Fuel Line Adapters / Fitting from the (special tool #8978A, Decay Tool, Fuel). Route the opposite end of this hose to an diesel fuel draining station.

NOTE: **Activation of the fuel pump module may time out and need to be restarted several times to completely drain the fuel tank.**

3. Using a diagnostic scan tool, activate the fuel pump module until the fuel tank has been evacuated.

ALTERNATIVE PROCEDURE

NOTE: **If the electric fuel pump is not operating, the fuel tank must be removed and drained through the fuel pump module opening of the fuel tank.**

1. Disconnect the negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Remove the fuel tank. Refer to **TANK, FUEL, REMOVAL**.

CAUTION: Do not allow the float arm of the fuel pump module to come in contact with any part of the fuel tank during removal or installation, damage to the float arm and fuel level sending card may result.

4. Remove the fuel pump module. Refer to **MODULE, FUEL PUMP, REMOVAL**.
5. Position a hose into the fuel pump module opening of the fuel tank.
6. Attach the opposite end of this hose to approved diesel fuel caddy.
7. Using the diesel caddy, evacuate the fuel tank.

DIESEL FUEL SYSTEM CONTAMINATION

NOTE: **Fuel system damage that was caused by incorrect or contaminated fuel that was introduced into the fuel system by the customer is not covered under warranty.**

IF THE ENGINE WAS NOT STARTED AFTER INCORRECT OR CONTAMINATED FUEL WAS USED DURING REFUELING

If the fuel system has been contaminated (with gasoline, water, etc.) AND the engine WAS NOT STARTED, the following procedure must be followed:

1. Drain the fuel from the fuel tank. Refer to **FUEL DELIVERY - STANDARD PROCEDURE** . Use an appropriate fuel container. Dispose of the contaminated fuel using the proper procedures.

CAUTION: Dispose of petroleum based products in a manner consistent with all applicable Local, State, Federal, and Provincial regulations.

2. Remove the fuel tank. Refer to **TANK, FUEL, REMOVAL**.
3. Ensure the swirl pot indentation below the in the fuel tank electric fuel pump inlet is completely drained of any contaminated fuel.
4. Completely drain the low pressure fuel lines, and install a new fuel filter.
5. Install the fuel tank, and fill with clean diesel fuel.
6. Road test the vehicle to verify normal operation.

IF THE ENGINE WAS STARTED AFTER INCORRECT OR CONTAMINATED FUEL WAS USED DURING REFUELING

If the fuel system has been contaminated (with gasoline, water, etc.) AND the engine WAS STARTED, the following procedure must be followed:

1. Remove all fuel from the fuel tank. Refer to **FUEL DELIVERY - STANDARD PROCEDURE** . Use an appropriate fuel container. Dispose of the contaminated fuel using the proper procedures.

CAUTION: Dispose of petroleum based products in a manner consistent with all applicable Local, State, Federal, and Provincial regulations.

2. Remove the fuel tank. Refer to **TANK, FUEL, REMOVAL**.
3. Ensure the swirl pot indentation below the in the fuel tank electric fuel pump inlet is completely drained of any contaminated fuel.
4. Completely drain the low pressure fuel lines, and install a new fuel filter.
5. Install the fuel tank, and fill with clean diesel fuel.
6. Lift up on locking retaining tab to unlock the lock the fuel injector return line from injector
7. Disconnect the low pressure fuel injector return line T-Fitting from fuel injector.
8. Connect a clean hose to the T-Fitting orifice, and place the other end in a suitable clean container.
9. Turn the ignition ON, and collect the fuel escaping from the T-Fitting orifice in a clean container. Check the fuel sample for metal chips, dirt, or other foreign matter.
10. If any dirt or metal chips are present in the fuel sample, completely clean the high pressure side of the fuel injection system, then install new the fuel injectors, and the high pressure fuel pump.
11. If there are no metal chips or dirt present in the fuel sample, the fuel system is OK. Reconnect the T-Fitting orifice, and road test the vehicle to verify normal operation.

SPECIFICATIONS

TORQUE SPECIFICATIONS - FUEL DELIVERY

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Fuel Filter/Water Separator Bracket Bolt	25	18	-
Fuel Filter Cover	20	-	177
Fuel Heater/Temperature Sensor	10	-	89

2014 Jeep Cherokee Trailhawk**2014 ENGINE Fuel System - Cherokee**

Fuel Injection Pump Nuts	25	18	-
Fuel Injection Pump Sprocket Nut	50	37	-
Fuel Pressure Sensor	72	53	-
Fuel Rail-to-Cylinder Head Bolt	25	18	-
Fuel Tank Bolts	22	16	-
Fuel Tube to Fuel Rail Union Nut	20	-	177
Fuel Tube to Fuel Injection Pump Union Nut	24	18	-

SPECIFICATIONS**RADIAL JET PUMP**

DESCRIPTION	SPECIFICATION
TYPE	RADIAL JET WITH RADIAL PUMPING ELEMENTS
NUMBER OF PUMPING ELEMENTS	3
TOTAL CAPACITY	0.697 CUBIC CENTIMETERS (0.0425 CUBIC INCHES) PER REVOLUTION
VOLUMETRIC OUTPUT	LESS THAN 80 PERCENT AT 1600 BAR (23, 206 PSI) AT 2000 PUMP RPM WITH DIESEL FUEL AT 40°C (104°F)
MAXIMUM OPERATING PRESSURE	1600 BAR (23, 206 PSI)
POWER USE	1.6 KILOWATT (2.145 HORSEPOWER) AT 1600 BAR (23, 206 PSI), 3450 ENGINE RPM
FUEL SUPPLY (INPUT)	DIESEL FUEL AT A PRESSURE OF 3.5 BAR (50.76 PSI) WITH A MINIMUM FLOW RATE OF 160 LITERS (42.27 GALLONS) PER HOUR
LUBRICANT	DIESEL FUEL
COOLANT	DIESEL FUEL

HIGH PRESSURE FUEL PUMP DELIVERY

RPM	PRESSURE
400	550 BAR (7977 PSI)
500	650 BAR (9427 PSI)
800	885 BAR (12836 PSI)
1000	1038 BAR (15055 PSI)
1173	1134 BAR (16447 PSI)
1340	1231 BAR (17854 PSI)
1750	1514 BAR (21959 PSI)
1860	1600 BAR (23206 PSI)
3200	1600 BAR (23206 PSI)
3700	770 BAR (11168 PSI)

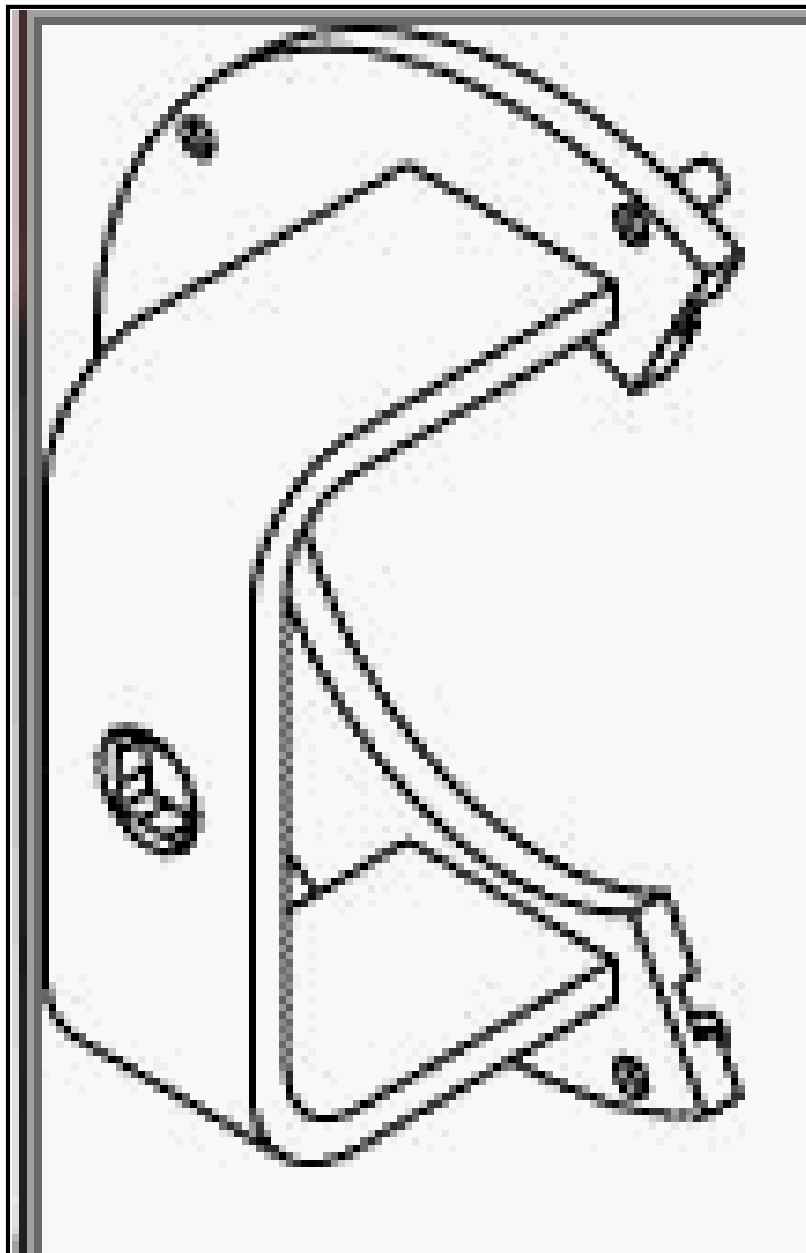
2014 Jeep Cherokee Trailhawk

2014 ENGINE Fuel System - Cherokee

4000	400 BAR (5802 PSI)
4200	400 BAR (5802 PSI)
4400	100 BAR (1450 PSI)

SPECIAL TOOLS

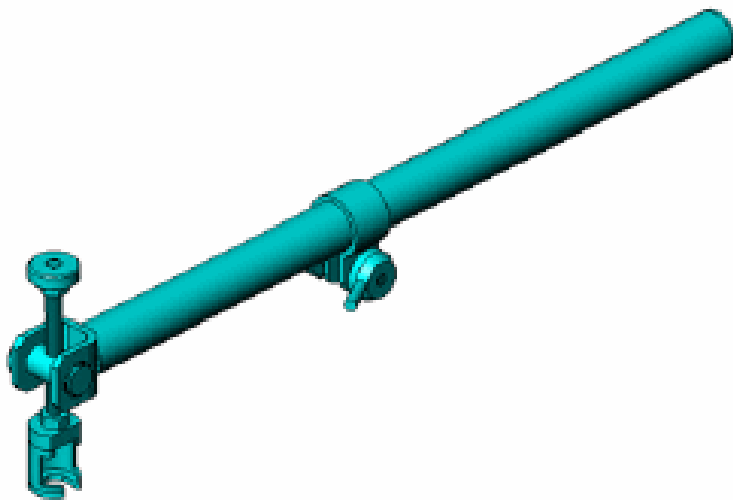
SPECIAL TOOLS



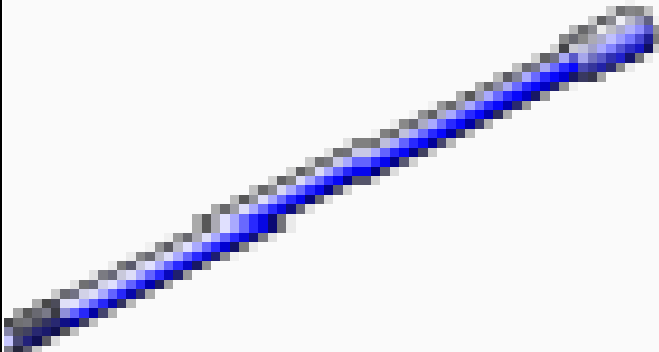
10189 - Wrench, DEF Module Lock Ring
(Originally Shipped In Kit Number(s)
10189, 9896.)

2014 Jeep Cherokee Trailhawk

2014 ENGINE Fuel System - Cherokee



20114 - Tool, High Pressure Fuel Pump
Pulley Removal

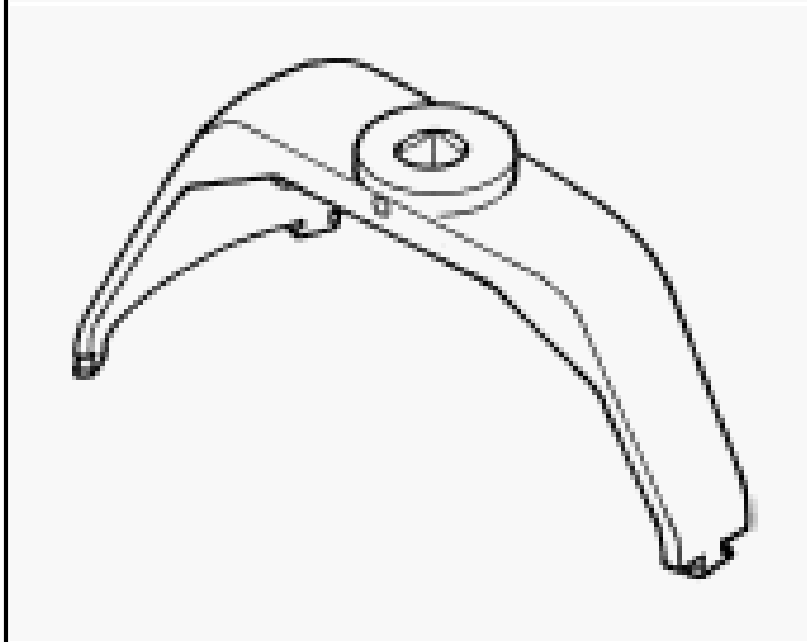
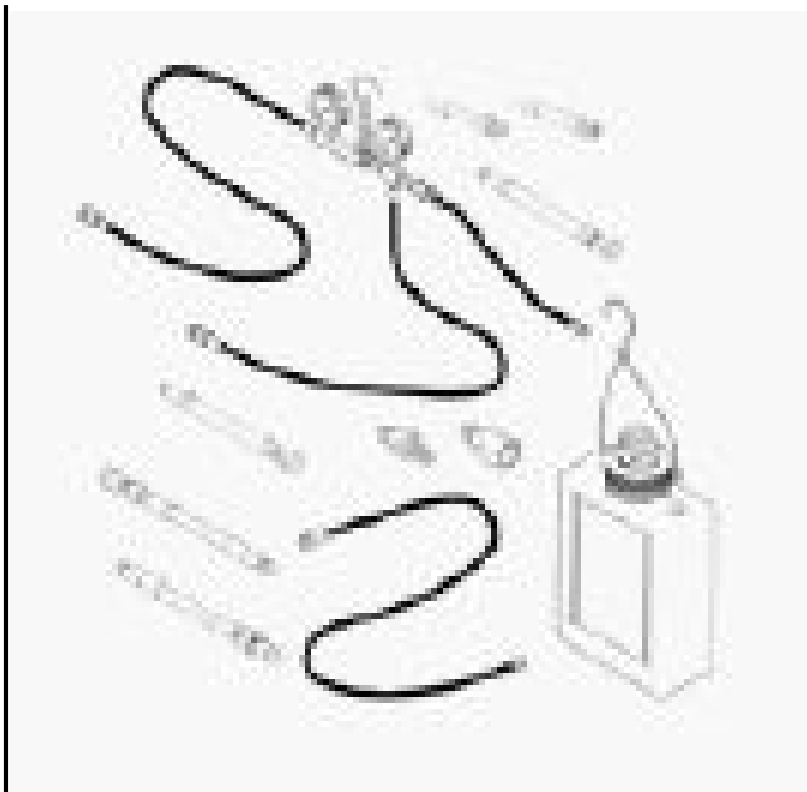


20150 - Remover/Installer, High Pressure
Fuel Pump

8978A - Decay Tool, Fuel

2014 Jeep Cherokee Trailhawk

2014 ENGINE Fuel System - Cherokee



9340 - SAE Fuel Pump Lock Ring
Wrench
(Originally Shipped In Kit Number(s)
9327, 9327CC, 9397, 9575.)

FITTING, QUICK CONNECT

DESCRIPTION

DESCRIPTION

Different types of quick-connect fittings are used to attach the various fuel system components, lines and tubes. Some are equipped with safety latch clips. Some may require the use of a special tool for disconnection and removal.

These are the different type quick-connect fittings:

- Redundant Latch Single Button Type Fitting
- Single Button Type Fitting
- Pinch Type Fitting
- Single Tab Type Fitting
- Two Tab Type Fitting
- Plastic Retainer Ring Type Fitting
- Latch Clip Type 1 Fitting
- Latch Clip Type 2 Fitting
- Wing Type Fitting

STANDARD PROCEDURE

STANDARD PROCEDURE

DISCONNECTING

WARNING: On vehicles equipped with gasoline engines, the fuel system is under a constant pressure (even with engine off). Before servicing any fuel system hose, fitting or line, fuel system pressure must be released.

CAUTION: Before separating a Quick-Connect fitting, pay attention to what type of fitting is being used. This will prevent unnecessary fitting or fitting latch breakage.

CAUTION: The interior components (O-rings, clips) of quick-connect fittings are not serviced separately, but new plastic spacers and latches are available for some types. If service parts are not available, do not attempt to repair the damaged fitting or fuel line (tube). If repair is necessary, replace the complete fuel line (tube) assembly.

REDUNDANT LATCH SINGLE BUTTON TYPE FITTING:

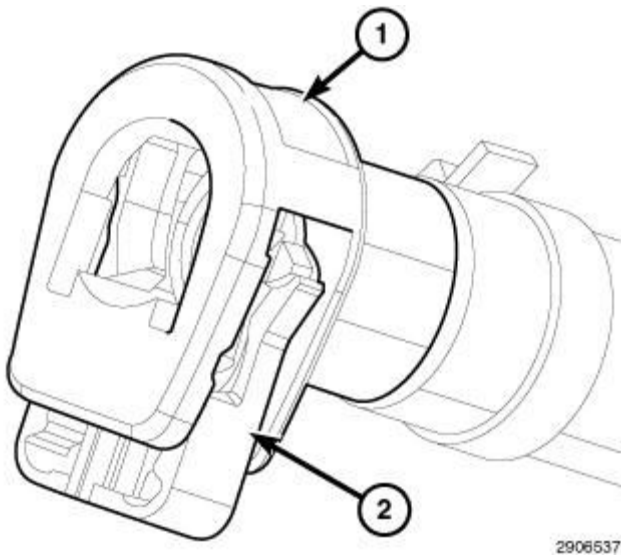


Fig. 142: Redundant Latch & Push Button
Courtesy of CHRYSLER GROUP, LLC

This type of quick-connect fitting is equipped with a redundant latch (2) and a single push button (1) that releases two internal latches located in the quick-connect fitting. Special tools are not required for removal.

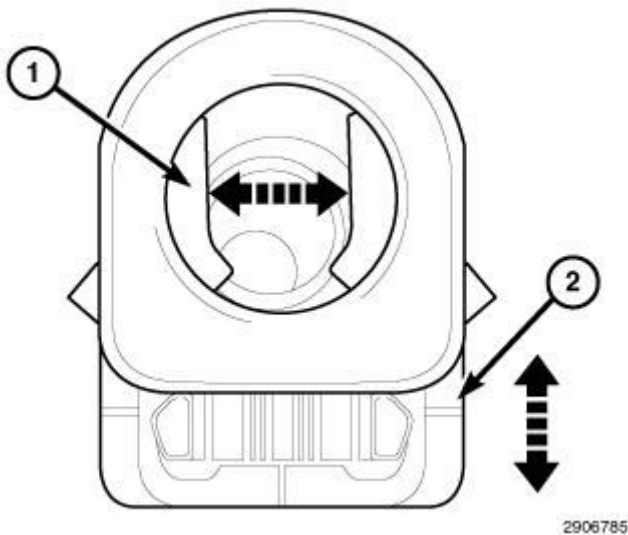
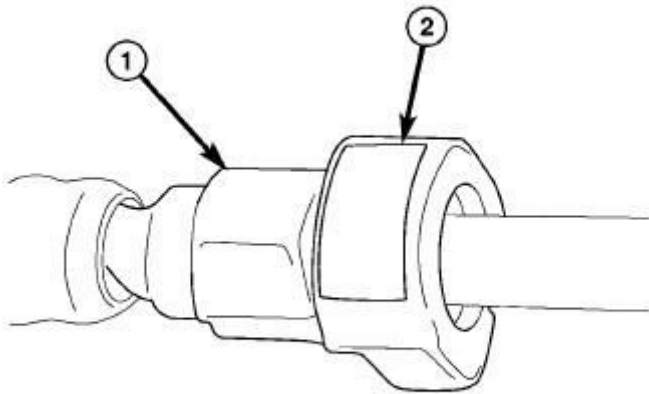


Fig. 143: Redundant Latch & Internal Latches
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not pry or pull up on the push button as damage to the latches of the quick-connect fitting will occur.

1. Pull the redundant latch (2) out away from the quick-connect fitting.
2. Press on the push button with your thumb, release the internal latches (1) and remove the quick-connect fitting from the fuel system component.

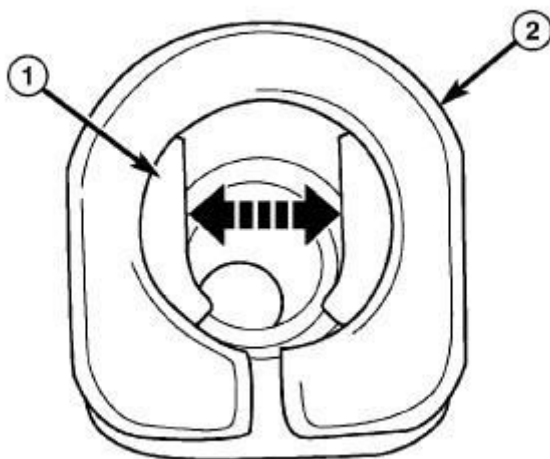
SINGLE BUTTON TYPE FITTING

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Fig. 144: Single Button Quick-Connect Fitting
Courtesy of CHRYSLER GROUP, LLC

1 - QUICK-CONNECT FITTING
2 - SINGLE PUSH-BUTTON

1. This type of fitting is equipped with a single push-button (2) located on the quick-connect fitting.



8120c655

Fig. 145: Fitting Latches
Courtesy of CHRYSLER GROUP, LLC

1 - LATCHES

2 - QUICK-CONNECT FITTING

2. The push-button is attached to two internal latches (1). To disconnect, press on push-button with your thumb and unlatch fitting from fuel line. Tools are not required for disconnection. **DO NOT ATTEMPT TO PRY OR PULL UP ON PUSH BUTTON. LATCHES WILL BE BROKEN.**

TWO BUTTON TYPE FITTING

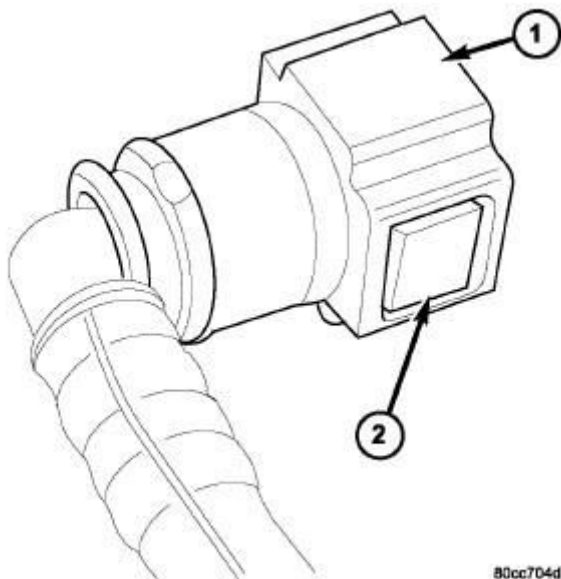


Fig. 146: 2-Button Type Fitting

Courtesy of CHRYSLER GROUP, LLC

1 - QUICK-CONNECT FITTING

2 - PUSH-BUTTONS (2)

1. This type of fitting (1) is equipped with a push-button located on each side of quick-connect fitting (2). Press on both buttons simultaneously for removal. Tools are not required for disconnection.
2. Press on both push buttons with your thumb, release the internal latches.
3. While holding the two push buttons simultaneously, remove the quick-connect fitting from the fuel system component.

PINCH TYPE FITTING

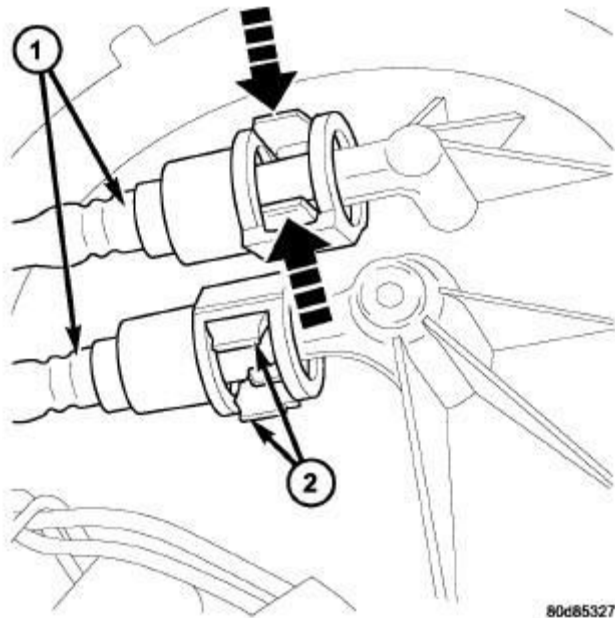


Fig. 147: Pinch Type Quick-Connect Fitting
Courtesy of CHRYSLER GROUP, LLC

- | |
|----------------------------|
| 1 - QUICK-CONNECT FITTINGS |
| 2 - PINCH TABS |

1. This fitting (1) is equipped with two finger tabs (2). Pinch both tabs together while removing fitting. Tools are not required for disconnection.

SINGLE TAB TYPE FITTING

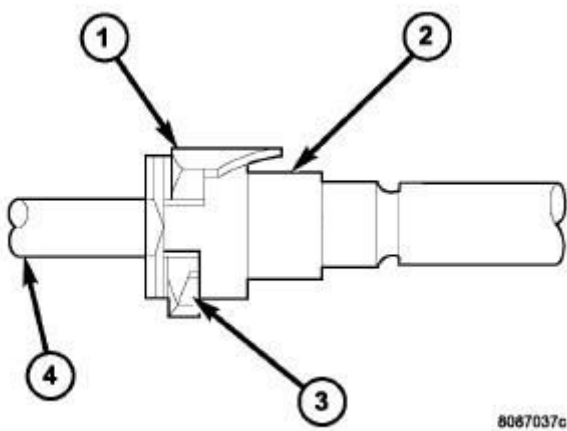


Fig. 148: Single-Tab Type Fitting
Courtesy of CHRYSLER GROUP, LLC

- 1 - PULL TAB
- 2 - QUICK-CONNECT FITTING
- 3 - PRESS HERE TO REMOVE PULL TAB
- 4 - INSERTED TUBE END

1. This type of fitting (2) is equipped with a single pull tab (1). The tab is removable. After tab is removed, quick-connect fitting can be separated from fuel system component. Tools are not required for disconnection.

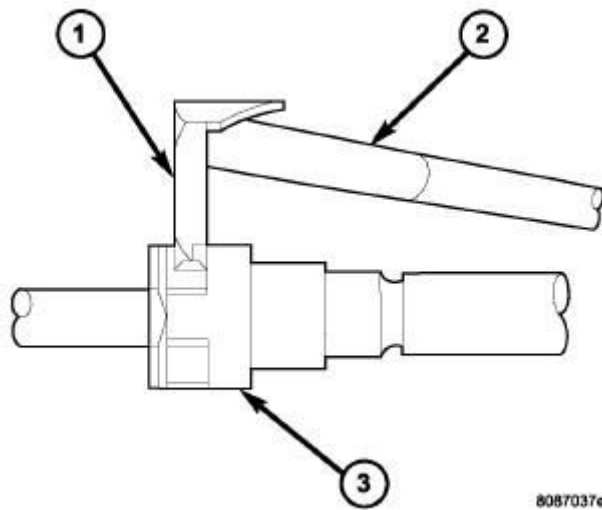


Fig. 149: Disconnecting Single-Tab Type Fitting
Courtesy of CHRYSLER GROUP, LLC

- 1 - PULL TAB
- 2 - SCREWDRIVER
- 3 - QUICK-CONNECT FITTING

2. Press release tab on side of fitting to release pull tab (1). **If release tab is not pressed prior to releasing pull tab, pull tab will be damaged.**
3. While pressing release tab on side of fitting, use screwdriver (2) to pry up pull tab.
4. Raise pull tab until it separates from quick-connect fitting.

TWO TAB TYPE FITTING

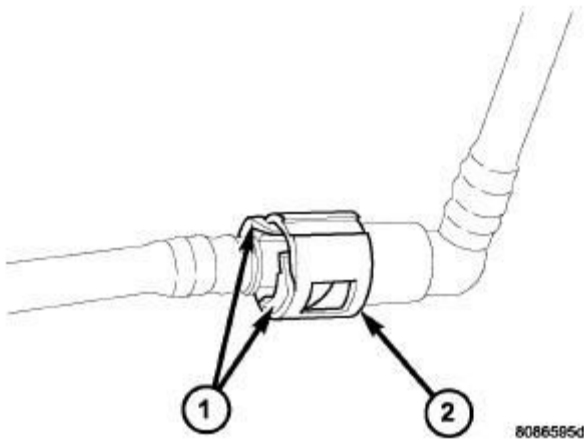


Fig. 150: Two-Tab Type Fitting

Courtesy of CHRYSLER GROUP, LLC

1 - TAB(S)

2 - QUICK-CONNECT FITTING

1. This type of fitting (2) is equipped with tabs located on both sides of fitting (1). The tabs are supplied for disconnecting quick-connect fitting from component being serviced.
 - a. To disconnect quick-connect fitting, squeeze plastic retainer tabs (1) against sides of quick-connect fitting with your fingers. Tool use is not required for removal and may damage plastic retainer.
 - b. Pull fitting from fuel system component being serviced.
 - c. The plastic retainer will remain on component being serviced after fitting is disconnected. The O-rings and spacer will remain in quick-connect fitting connector body.

PLASTIC RETAINER RING TYPE FITTING

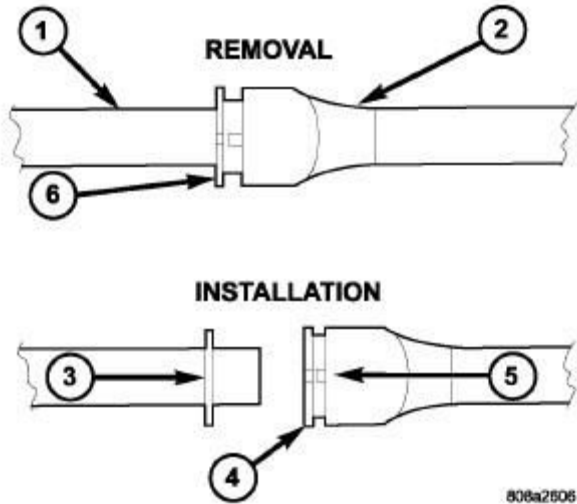
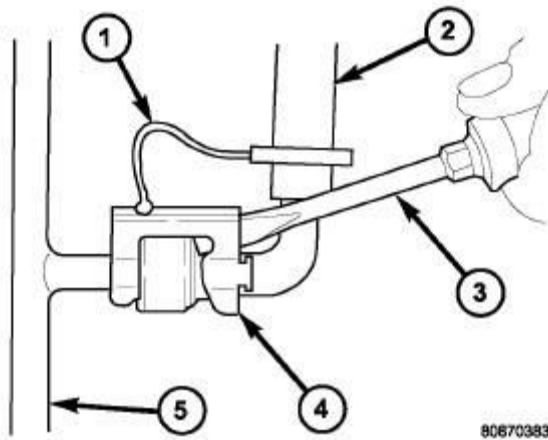


Fig. 151: Plastic Retainer Ring Type Fitting
 Courtesy of CHRYSLER GROUP, LLC

- 1 - FUEL TUBE
- 2 - QUICK CONNECT FITTING
- 3 - PUSH
- 4 - PLASTIC RETAINER
- 5 - PUSH
- 6 - PUSH
- 7 - PUSH
- 8 - PUSH

1. This type of fitting can be identified by the use of a full-round plastic retainer ring (4) usually black in color.
 - a. To release fuel system component from quick-connect fitting, firmly push fitting towards component being serviced while firmly pushing plastic retainer ring into fitting (6). With plastic ring depressed, pull fitting from component. **The plastic retainer ring must be pressed squarely into fitting body. If this retainer is cocked during removal, it may be difficult to disconnect fitting. Use an open-end wrench on shoulder of plastic retainer ring to aid in disconnection.**
 - b. After disconnection, plastic retainer ring will remain with quick-connect fitting connector body.
 - c. Inspect fitting connector body, plastic retainer ring and fuel system component for damage. Replace as necessary.

LATCH CLIPS - TYPE 1

**Fig. 152: Latch Clip-Type 1**

Courtesy of CHRYSLER GROUP, LLC

- | |
|------------------|
| 1 - TETHER STRAP |
| 2 - FUEL LINE |
| 3 - SCREWDRIVER |
| 4 - LATCH CLIP |
| 5 - FUEL RAIL |

1. Depending on vehicle model and engine, three different types of safety latch clips are used. Types 1 and 3 (4) are tethered to fuel line and type 2 is not. A special tool will be necessary to disconnect fuel line after latch clip is removed. The latch clip may be used on certain fuel line/fuel rail connection, or to join fuel lines together.
2. Pry up on latch clip with a screwdriver (3).
3. Slide latch clip toward fuel rail while lifting with screwdriver.

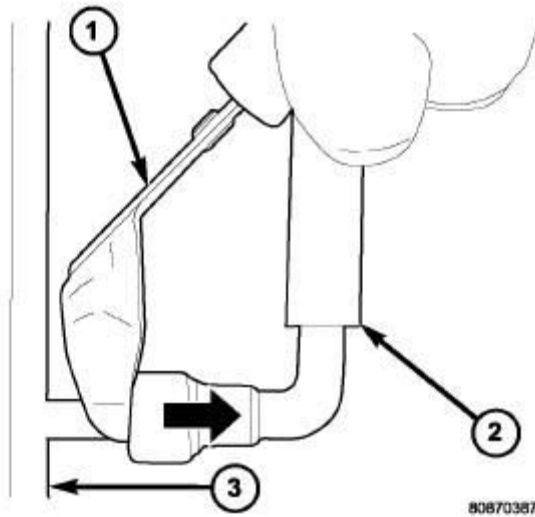


Fig. 153: Fuel Line Disconnection Using Special Tool
 Courtesy of CHRYSLER GROUP, LLC

- | |
|--|
| 1 - SPECIAL FUEL LINE TOOL
2 - FUEL LINE
3 - FUEL RAIL |
|--|

- Insert the appropriate fuel line removal tool (1) into the quick-connect fitting and release the internal latches.

NOTE: After disconnection, locking fingers will remain within quick-connect fitting at end of fuel line.

- With the special tool still inserted, remove quick-connect fitting from fuel system component being serviced.

LATCH CLIPS - TYPE 2

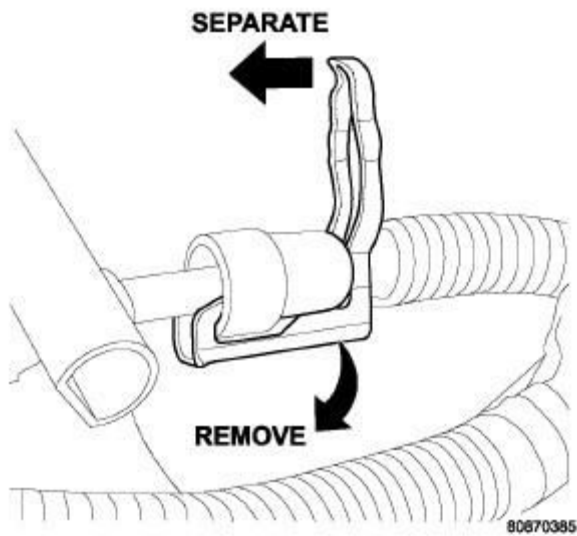


Fig. 154: Latch Clip - Type 2

Courtesy of CHRYSLER GROUP, LLC

1 - LATCH CLIP

1. Depending on vehicle model and engine, 2 different types of safety latch clips are used. Type 1 is tethered to fuel line and type 2 is not. A special tool will be necessary to disconnect fuel line after latch clip is removed. The latch clip may be used on certain fuel line/fuel rail connection, or to join fuel lines together.
2. Type 2: Separate and unlatch 2 small arms (1) on end of clip and swing away from fuel line.
3. Slide latch clip toward fuel rail while lifting with screwdriver.

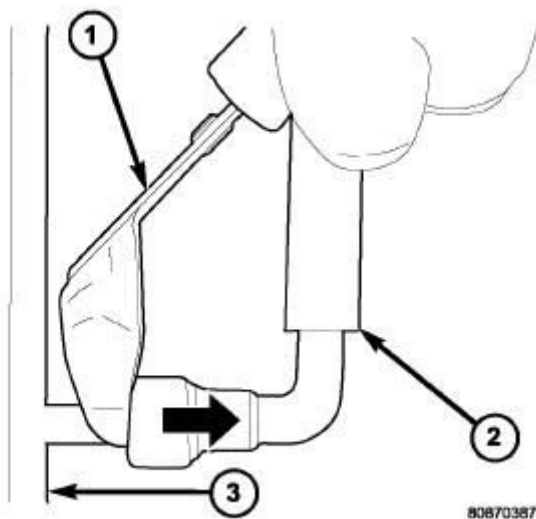


Fig. 155: Fuel Line Disconnection Using Special Tool

Courtesy of CHRYSLER GROUP, LLC

- 1 - SPECIAL FUEL LINE TOOL
- 2 - FUEL LINE
- 3 - FUEL RAIL

4. Insert the appropriate fuel line removal tool (1) into the quick-connect fitting and release the internal latches.

NOTE: After disconnection, locking fingers will remain within quick-connect fitting at end of fuel line.

5. With the special tool still inserted, remove quick-connect fitting from fuel system component being serviced.

LATCH CLIPS - TYPE 3

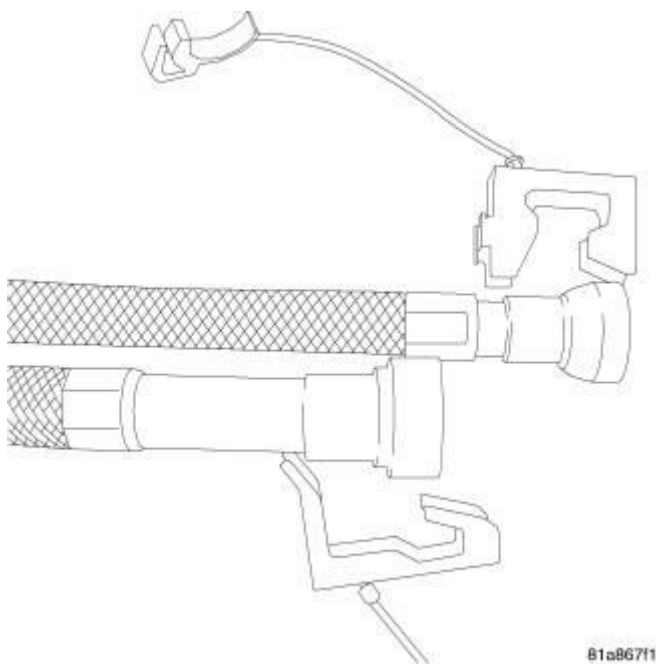


Fig. 156: Latch Clips - Type 3
Courtesy of CHRYSLER GROUP, LLC

1. A special tool is not necessary to disconnect fuel line after latch clip is removed. The latch clip is used to join fuel lines together.
2. Type 3: Separate and unlatch 2 small arms on the end of clip and swing away from the fuel line.

CONNECTING

1. Inspect quick-connect fitting body and fuel system component for damage. Replace as necessary.

2. Prior to connecting quick-connect fitting to component being serviced, check condition of fitting and component. Clean parts with a lint-free cloth. Lubricate with clean engine oil.
3. Insert quick-connect fitting into fuel tube or fuel system component until built-on stop on fuel tube or component rests against back of fitting.
4. Continue pushing until a click is felt.
5. Redundant Latch Single Button Type Fitting: Push redundant latch until it locks into position in the quick-connect fitting.
6. Single-tab type fitting: Push new tab down until it locks into place in quick-connect fitting.
7. Latch Clip Equipped: Install latch clip (snaps into position). **If latch clip will not fit, this indicates fuel line is not properly installed to fuel rail (or other fuel line). Recheck fuel line connection.**
8. Verify a locked condition by firmly pulling on the quick-connect fitting connection of the fuel system component.

HEATER, FUEL

DESCRIPTION

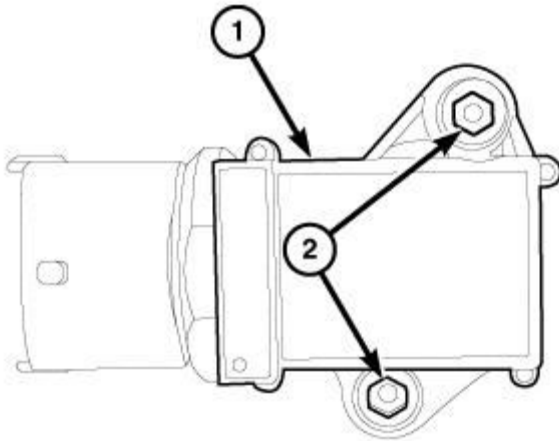
DESCRIPTION

The Fuel Heater is located in the fuel filter/water separator housing assembly and is located on the left-rear side of the engine compartment. The fuel heater is not a serviceable component. If diagnosis has lead you to replace the fuel heater then the whole fuel filter/water separator housing must be replaced.

REMOVAL

REMOVAL

1. Disconnect the negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Disconnect the fuel heater/temperature sensor wire harness connector.



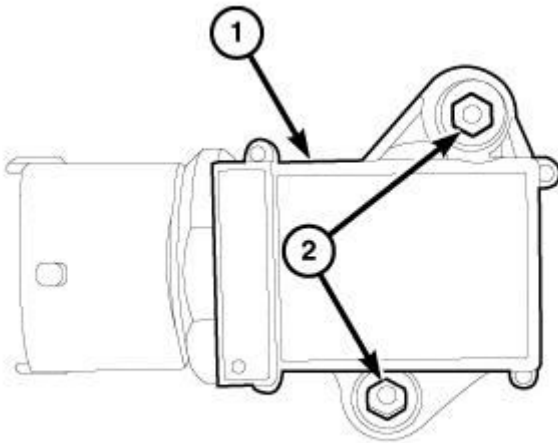
3550984

Fig. 157: Bolts & Fuel Heater/Temperature Sensor
Courtesy of CHRYSLER GROUP, LLC

4. Remove bolts (2), and the fuel heater/temperature sensor (1).
5. Remove and discard O-ring seal.

INSTALLATION

INSTALLATION



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Fig. 158: Bolts & Fuel Heater/Temperature Sensor
Courtesy of CHRYSLER GROUP, LLC

1. Clean the O-ring surface sealing area.

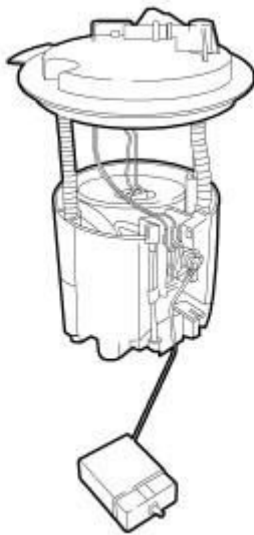
NOTE: Lubricate the O-ring seal with clean diesel fluid.

2. Using a new O-ring seal, install the fuel heater/temperature sensor (1). Tighten bolts (2) to 10 N.m (89 in. lbs.).
3. Connect the fuel heater/temperature sensor wire harness connector.
4. Lower the vehicle.
5. Connect the negative battery cable.

MODULE, FUEL PUMP

DESCRIPTION

DESCRIPTION



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Fig. 159: Fuel Pump Module

Courtesy of CHRYSLER GROUP, LLC

The diesel fuel pump module contains a submersible permanent magnet electric fuel pump, fuel pump reservoir, fuel level sending unit, fuel pressure regulator and a fuel filter. The entire module except for the mounting flange is concealed within the fuel tank. The module is connected to the vehicle electrical system through a dedicated take out and connector of the underbody wire harness.

The fuel level sending unit is available for separate service replacement. Refer to **SENDING UNIT AND SENSOR, FUEL LEVEL, REMOVAL**. The remainder of the module is serviced only as a complete unit.

OPERATION

OPERATION

When the Powertrain Control Module (PCM) senses the ignition status is ON or START it provides an output to energize the Auto Shut Down (ASD) relay and the fuel pump relay in the underhood Power Distribution

Center (PDC). The PCM will also ground the fuel pump relay driver at this time, closing the fuel pump relay contacts, completing the fuel pump circuit to chassis ground. If the PCM senses the ignition in the ON position, without a engine crank signal for more than about 30 seconds, it will open the fuel pump driver circuit, shutting down the fuel pump.

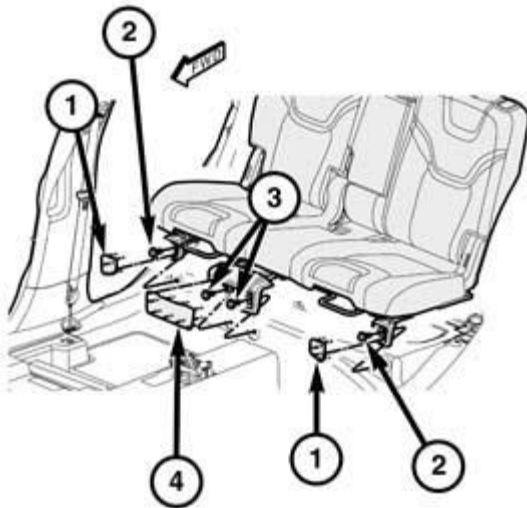
The diesel fuel pump module draws fuel through a internal filter and pushes it through the motor to an outlet pipe. The fuel pump module contains two check valves. One valve relieves internal fuel pump pressure and regulates maximum pump output. The second valve, located within the pump outlet, maintains residual pressure during engine OFF conditions. The pressure regulated fuel pump will maintain constant fuel pressure to the fuel injection pump. The fuel pump pressure regulator contains a calibrated spring which forces a diaphragm against the fuel filter return port. When pressure exceeds the calibrated value, the diaphragm retracts, allowing excess fuel pressure in the fuel pump module to purge back into the fuel tank.

REMOVAL

REMOVAL

Vehicles equipped with a saddle style fuel tank system require two fuel pump modules due to the saddle-like design of the fuel tank, which is necessary to provide clearance for the rear axle drive shaft. The main fuel pump module is located in the left half of the fuel tank and the auxiliary fuel pump module is located in the right half.

REMOVAL



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Fig. 160: Removing/Installing Rear Seat
Courtesy of CHRYSLER GROUP, LLC

WARNING: Risk of injury to eyes and skin from contact with fuel. Wear protective clothing and eye protection. Risk of poisoning from inhaling and swallowing fuel. Pour fuel only into appropriately marked and approved containers. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: The fuel system is under constant high pressure even with engine OFF. Until the fuel pressure has been properly released from the system, do not attempt to open the fuel system. Do not smoke or use open flames/sparks when servicing the fuel system. Make sure the area in which the vehicle is being serviced is in a well ventilated area. Failure to comply may result in serious or fatal injury.

1. Perform the fuel system pressure release procedure. Refer to **FUEL DELIVERY - STANDARD PROCEDURE** .

NOTE: The fuel pump module has to be properly located in the fuel tank for the fuel level gauge to work properly.

2. Disconnect and isolate the negative battery cable.
3. Remove the rear seat assembly. Refer to **SEAT, REAR, REMOVAL** .

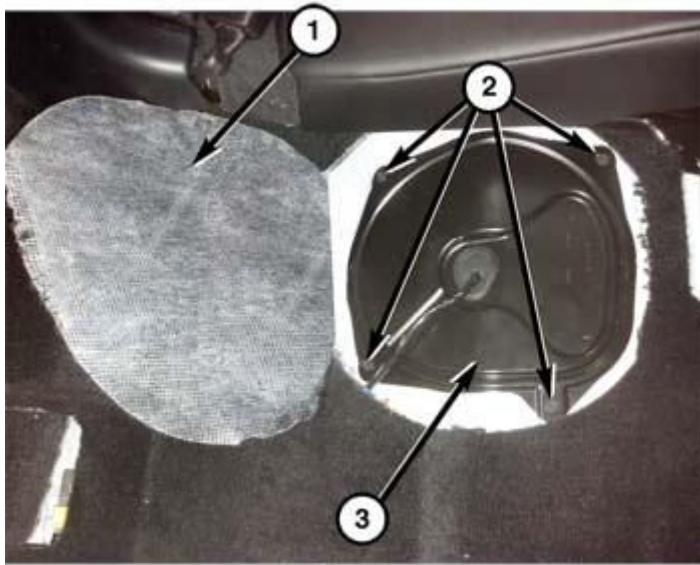
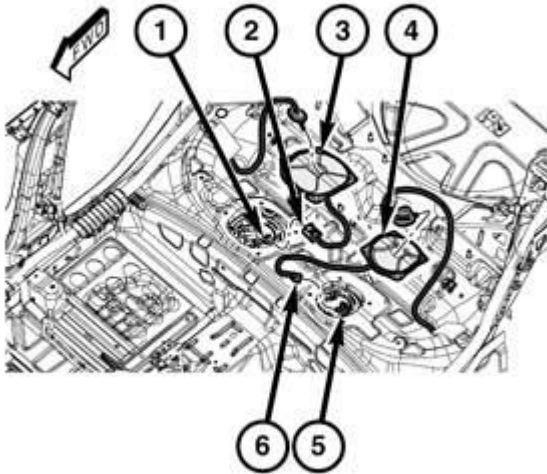


Fig. 161: Carpeting, Screws & Fuel Module Cover
Courtesy of CHRYSLER GROUP, LLC

NOTE: Right side shown in illustration, left side similar.

4. Cut along the perforated lines in the carpeting and position aside (1).

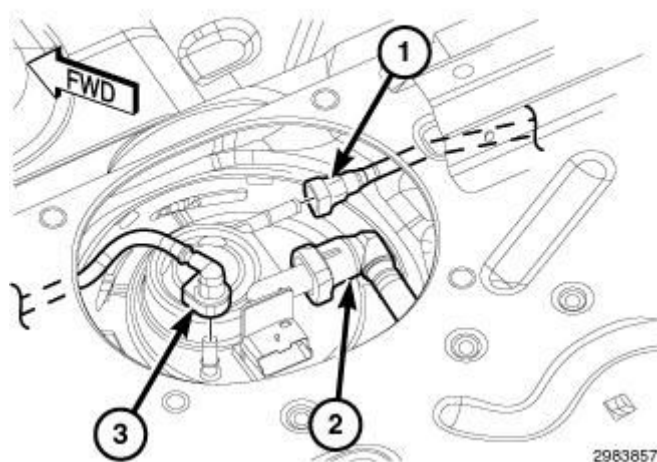
5. Remove the screws (2) that secure the fuel module cover (3) to the floor.



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Fig. 162: Fuel Module Access Covers & Wire Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

6. Lift up on the fuel pump module access cover (3, 4) and disconnect the wire harness connectors (2, 6).
7. Use a marker and place a mark across the position of the fuel pump module lock-ring, fuel pump module and the fuel tank prior to removal.



2963857

Fig. 163: Fuel Supply, Return & Vapor Lines
Courtesy of CHRYSLER GROUP, LLC

8. Disconnect the fuel tank vapor line (1, 3) from fuel pump module.
9. Disconnect the fuel lines (2) from the fuel pump module.

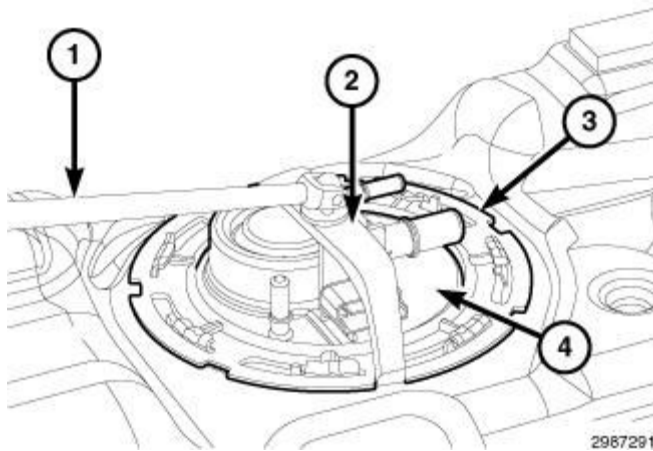


Fig. 164: Fuel Pump Module, Locking Ring & Lock Ring Wrench
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Prior to removing the fuel pump module, use compressed air to remove any accumulated dirt and debris from around fuel tank opening.

10. Position the lock-ring remover/installer (2) (special tool #9340, SAE Fuel Pump Lock Ring Wrench) or into the notches on the outside edge of the lock-ring (3).
11. Install a 1/2 inch drive breaker bar into the lock-ring remover/installer (special tool #9340, SAE Fuel Pump Lock Ring Wrench).
12. Rotate the breaker bar (1) counterclockwise and remove the lock-ring (3).

WARNING: The fuel pump module reservoir does not empty out when the tank is drained. The fuel in the reservoir will spill out when the module is removed.

NOTE: Do not spill fuel into the interior of the vehicle.

13. Lift up and removed the fuel pump module out of the fuel tank using caution not spill fuel inside the vehicle or bend the float arm.
14. Tip the fuel pump module on its side and drain all fuel from the reservoir.

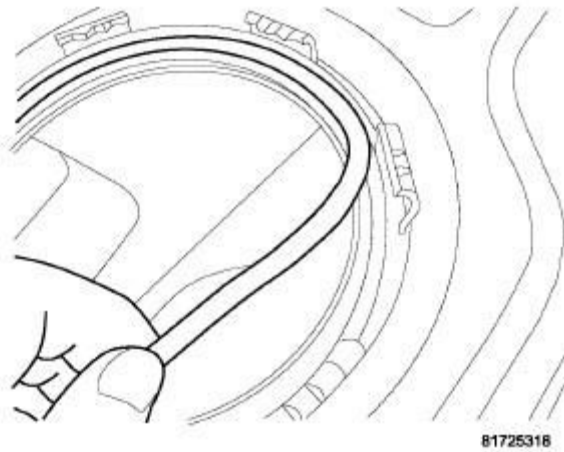


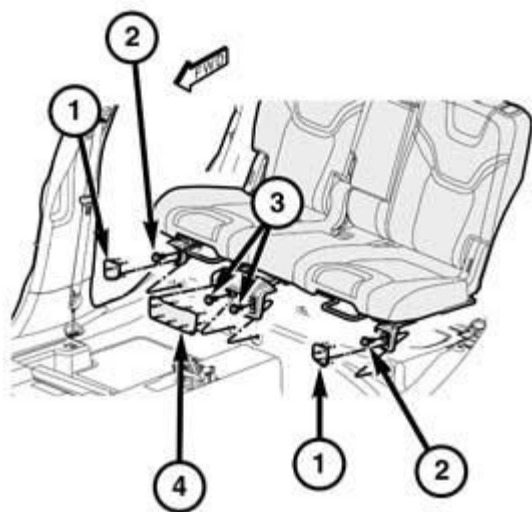
Fig. 165: Fuel Pump Module Seal
Courtesy of CHRYSLER GROUP, LLC

15. Remove and discard the rubber O-ring seal.

AUXILIARY

WARNING: Risk of injury to eyes and skin from contact with fuel. Wear protective clothing and eye protection. Risk of poisoning from inhaling and swallowing fuel. Pour fuel only into appropriately marked and approved containers. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: The fuel system is under constant high pressure even with engine OFF. Until the fuel pressure has been properly released from the system, do not attempt to open the fuel system. Do not smoke or use open flames/sparks when servicing the fuel system. Make sure the area in which the vehicle is being serviced is in a well ventilated area. Failure to comply may result in serious or fatal injury.



0909005843

Fig. 166: Removing/Installing Rear Seat
Courtesy of CHRYSLER GROUP, LLC

1. Perform the fuel system pressure release procedure. Refer to **FUEL DELIVERY - STANDARD PROCEDURE** .

NOTE: Prior to removing the fuel pump module, use compressed air to remove any accumulated dirt and debris from around fuel tank opening.

NOTE: The fuel pump module has to be properly located in the fuel tank for the fuel level gauge to work properly.

2. Disconnect and isolate the negative battery cable.
3. Remove the rear seat assembly. Refer to **SEAT, REAR, REMOVAL** .

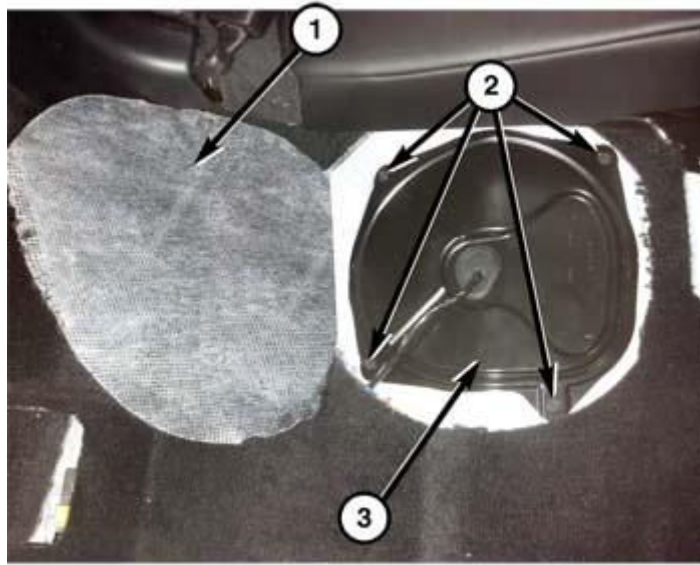
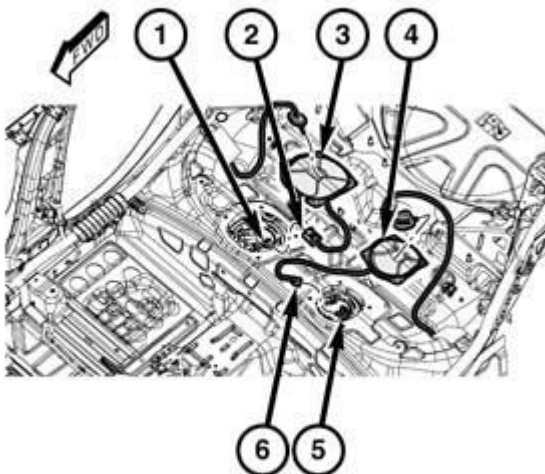


Fig. 167: Carpeting, Screws & Fuel Module Cover
Courtesy of CHRYSLER GROUP, LLC

NOTE: Right side shown in illustration, left side similar.

4. Cut along the perforated lines in the carpeting and position aside (1).
5. Remove the screws (2) that secure the fuel module cover (3) to the floor.



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Fig. 168: Fuel Module Access Covers & Wire Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

6. Lift up on the fuel pump module access cover (3, 4) and disconnect the wire harness connectors (2, 6).
7. Carefully note or mark the fuel pump module flange and the edge of the opening in the fuel tank to indicate proper module orientation.

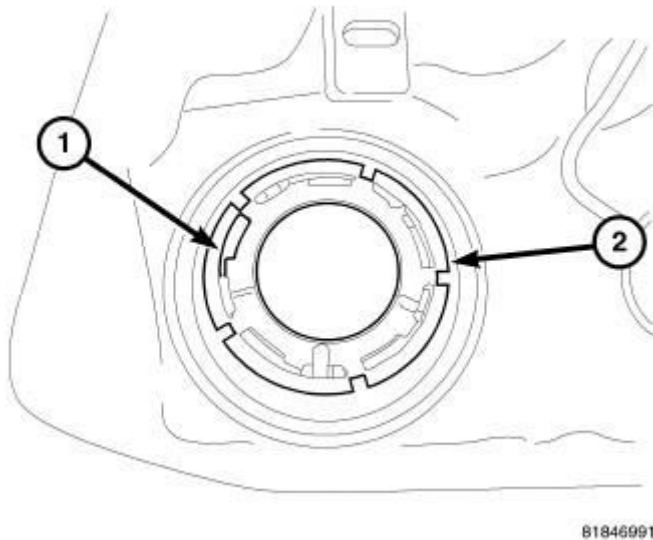


Fig. 169: Small Module Lock Ring
Courtesy of CHRYSLER GROUP, LLC

8. Position the (special tool #10521, Wrench, Fuel Pump Lock Ring) into the notches on the outside edge of the lock ring (1).
9. Install a 1/2 inch drive breaker bar into the (special tool #10521, Wrench, Fuel Pump Lock Ring).
10. Rotate the breaker bar counterclockwise and remove the lock ring.



Fig. 170: Auxiliary Fuel Pump Module Internal Fuel Line
Courtesy of CHRYSLER GROUP, LLC

11. Lift the auxiliary fuel pump module out of the fuel tank far enough to access the internal auxiliary pump fuel line.
12. Disconnect the internal fuel line from the auxiliary fuel pump module.
13. Remove the auxiliary fuel pump module from the fuel tank using caution not to bend the float arm.

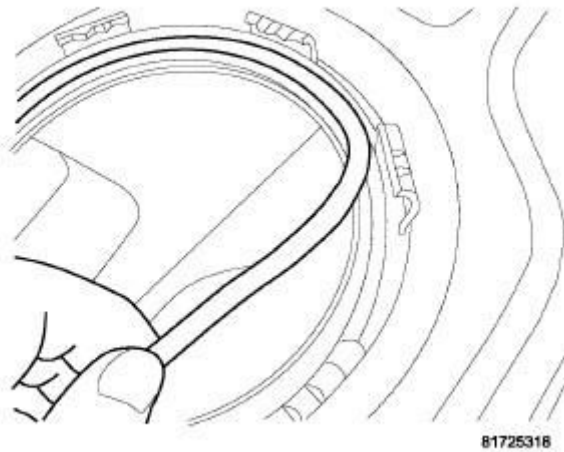


Fig. 171: Fuel Pump Module Seal
Courtesy of CHRYSLER GROUP, LLC

14. Remove and discard the rubber O-ring seal.

INSTALLATION

INSTALLATION

Vehicles equipped with saddle style fuel tank system require two fuel pump modules due to the saddle-like design of the fuel tank, which is necessary to provide clearance for the rear axle drive shaft. The main fuel pump module is located in the left half of the fuel tank and the auxiliary fuel pump module is located in the right half.

INSTALLATION

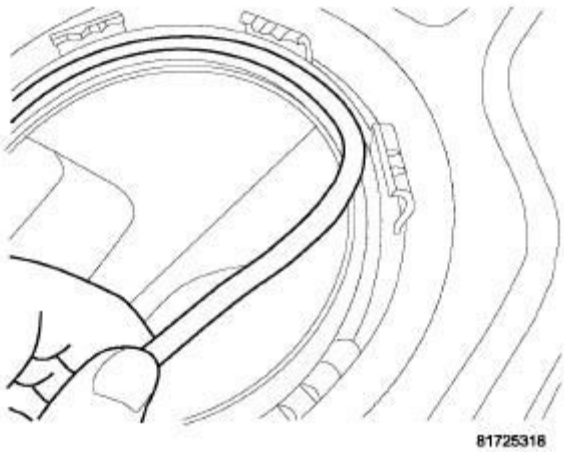


Fig. 172: Fuel Pump Module Seal

Courtesy of CHRYSLER GROUP, LLC

WARNING: Risk of injury to eyes and skin from contact with fuel. Wear protective clothing and eye protection. Risk of poisoning from inhaling and swallowing fuel. Pour fuel only into appropriately marked and approved containers. Failure to follow these instructions may result in possible serious or fatal injury.

CAUTION: Whenever the fuel pump module is serviced, the rubber O-ring seal must be replaced.

1. Clean the rubber O-ring seal area of the fuel tank and install a new rubber O-ring seal.
2. Lower the fuel pump module into the fuel tank using caution not to bend the float arm.

NOTE: The fuel pump module must be properly located in the fuel tank for the fuel level gauge to work properly.

3. Align the rubber O-ring seal and rotate the fuel pump module to the orientation marks noted during removal. This step must be performed for the fuel level gauge to work properly.

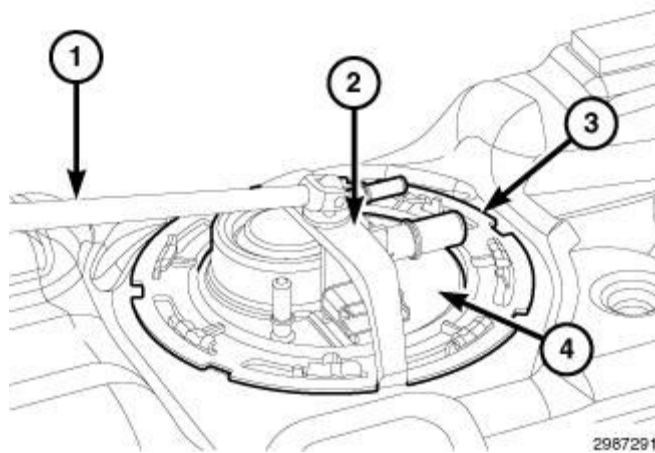


Fig. 173: Fuel Pump Module, Locking Ring & Lock Ring Wrench
 Courtesy of CHRYSLER GROUP, LLC

4. Position the lock-ring (3) over top of the fuel pump module (4).
5. Position the lock-ring remover/installer (2) (special tool #9340, SAE Fuel Pump Lock Ring Wrench) into the notches on the outside edge of the lock-ring (3).
6. Install a 1/2 inch drive breaker bar (1) into the lock-ring remover/installer (2) (special tool #9340, SAE Fuel Pump Lock Ring Wrench).
7. Rotate the breaker bar (1) clockwise until all seven notches of the lock-ring (3) have engaged.

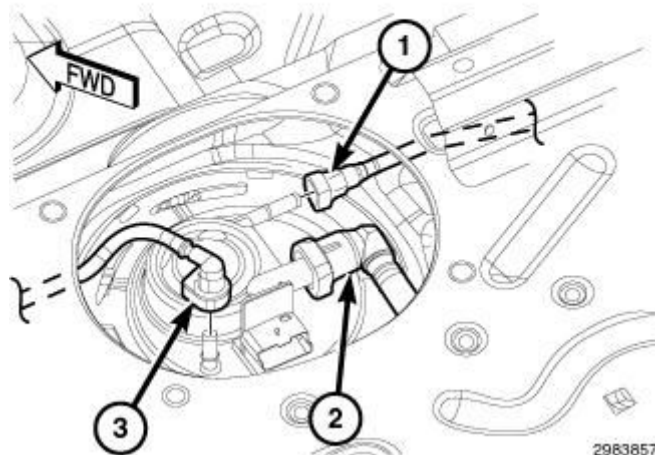
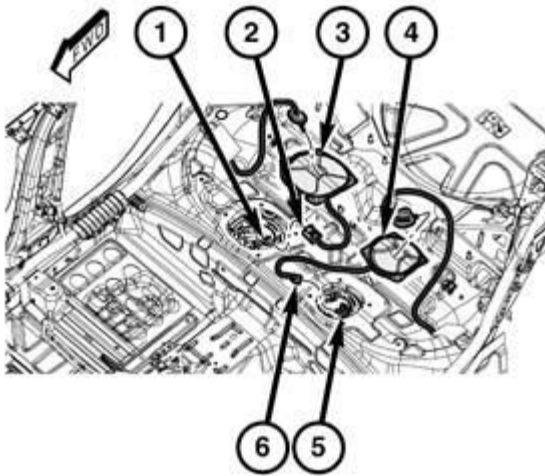


Fig. 174: Fuel Supply, Return & Vapor Lines
 Courtesy of CHRYSLER GROUP, LLC

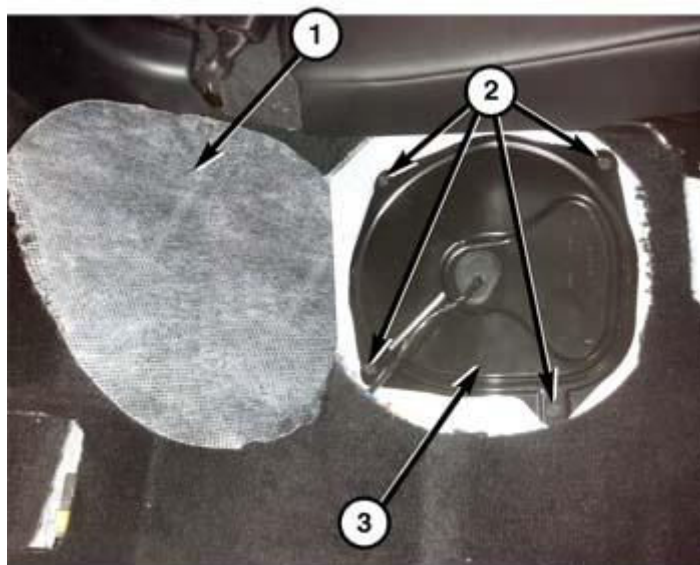
8. Connect the fuel lines (1, 2) to the fuel pump module.
9. Connect the fuel tank vapor line (3) to the fuel pump module.



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Fig. 175: Fuel Module Access Covers & Wire Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

10. Connect the fuel pump module wire harness connector (2, 6).

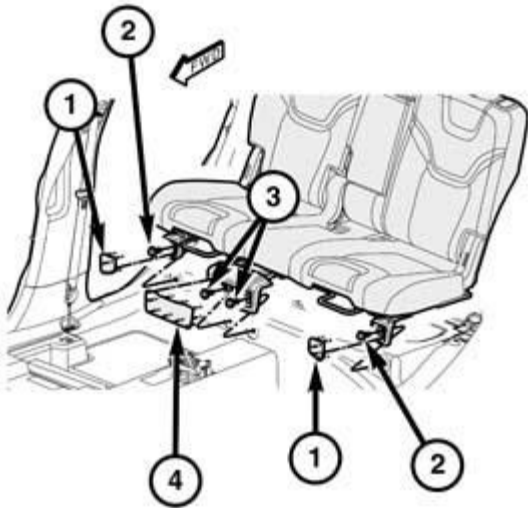


1401005661

Fig. 176: Carpeting, Screws & Fuel Module Cover
Courtesy of CHRYSLER GROUP, LLC

NOTE: Right side shown in illustration, left side similar.

11. Install the access cover (3) and securely tighten the screws (2).
12. Position back the carpet access cover (1).



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Fig. 177: Removing/Installing Rear Seat
Courtesy of CHRYSLER GROUP, LLC

13. Install the rear seat. Refer to SEAT, REAR, INSTALLATION.
14. Connect the negative battery cable.
15. Use the Scan Tool to pressurize the system and check for leaks.

AUXILIARY

WARNING: Risk of injury to eyes and skin from contact with fuel. Wear protective clothing and eye protection. Risk of poisoning from inhaling and swallowing fuel. Pour fuel only into appropriately marked and approved containers. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: The fuel system is under constant high pressure even with engine OFF. Until the fuel pressure has been properly released from the system, do not attempt to open the fuel system. Do not smoke or use open flames/sparks when servicing the fuel system. Make sure the area in which the vehicle is being serviced is in a well ventilated area. Failure to comply may result in serious or fatal injury.

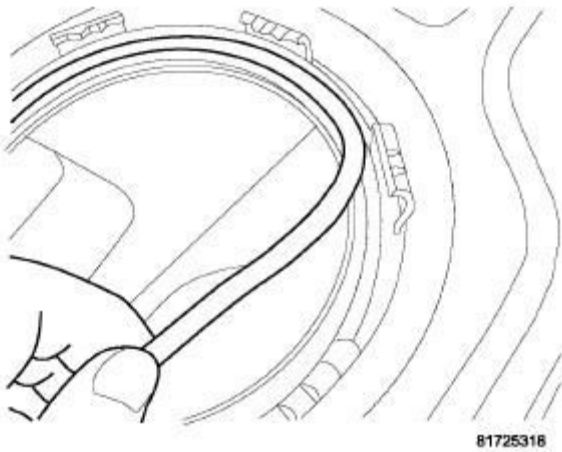


Fig. 178: Fuel Pump Module Seal

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Whenever the fuel pump module is serviced, the rubber O-ring seal must be replaced.

1. Clean the rubber O-ring seal area of the fuel tank module opening and install a new rubber O-ring seal.



Fig. 179: Auxiliary Fuel Pump Module Internal Fuel Line

Courtesy of CHRYSLER GROUP, LLC

2. Reconnect the internal fuel line to the auxiliary fuel pump module.
3. Lower the auxiliary fuel pump module into the fuel tank using caution not to bend the float arm.

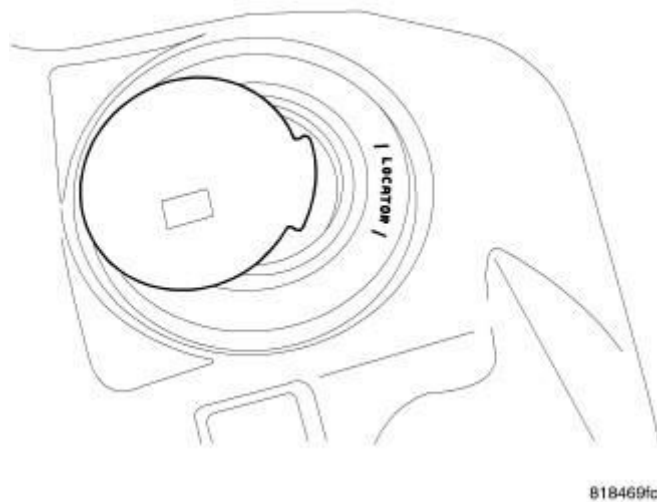


Fig. 180: Auxiliary Fuel Pump Module Tab
Courtesy of CHRYSLER GROUP, LLC

NOTE: The fuel pump module must be properly located in the fuel tank for the fuel level gauge to work properly.

4. Align the rubber O-ring seal and rotate the auxiliary fuel pump module to the orientation noted or marked during removal. This step must be performed for the fuel level gauge to work properly.

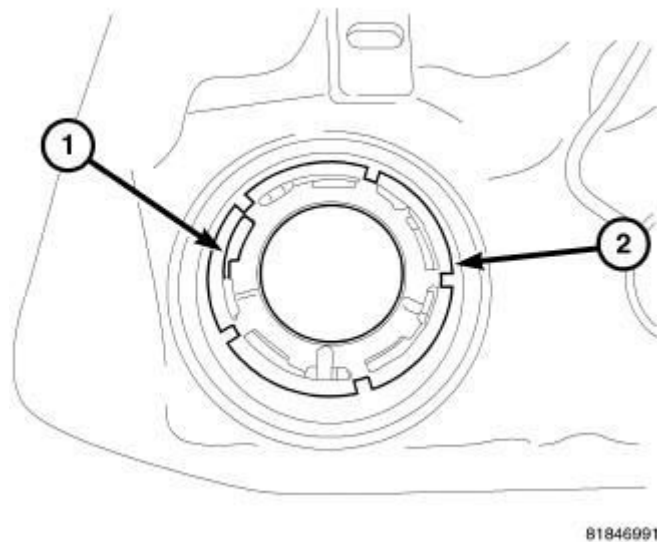
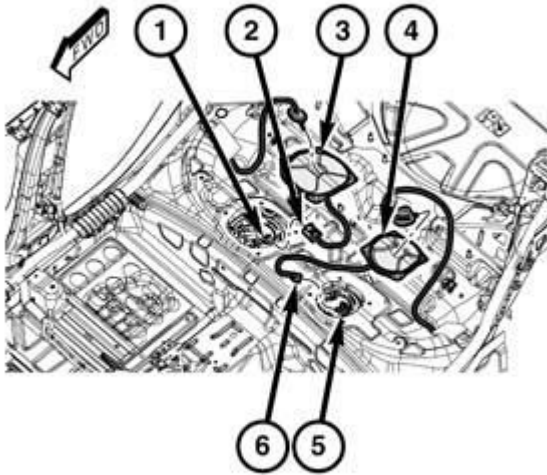


Fig. 181: Small Module Lock Ring
Courtesy of CHRYSLER GROUP, LLC

5. Position the lock ring (1) over the top of the fuel pump module flange.
6. Position the (special tool #10521, Wrench, Fuel Pump Lock Ring) into the notches on the outside edge of the lock ring.

7. Install a 1/2 inch drive breaker bar into the (special tool #10521, Wrench, Fuel Pump Lock Ring).
8. Rotate the breaker bar clockwise until all seven notches of the lock ring have engaged.

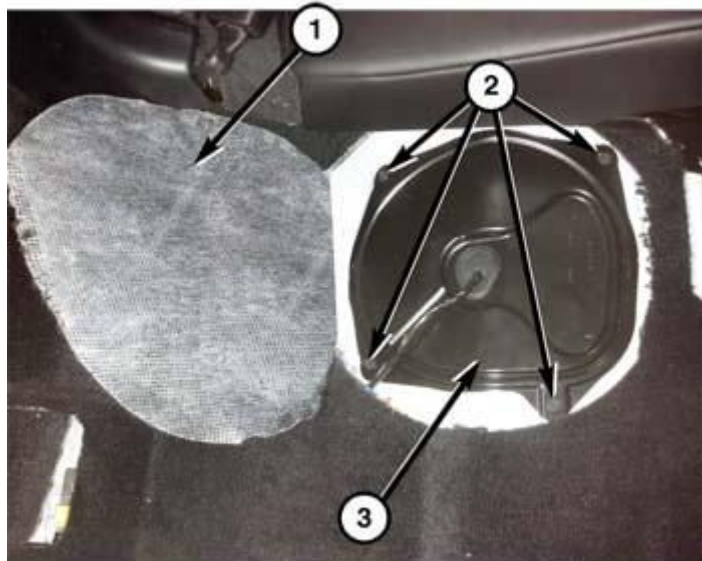
Remove the screws (2) that secure the fuel module cover (3) to the floor.



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Fig. 182: Fuel Module Access Covers & Wire Harness Connectors
 Courtesy of CHRYSLER GROUP, LLC

9. Connect the fuel pump module wire harness connector (2, 6).



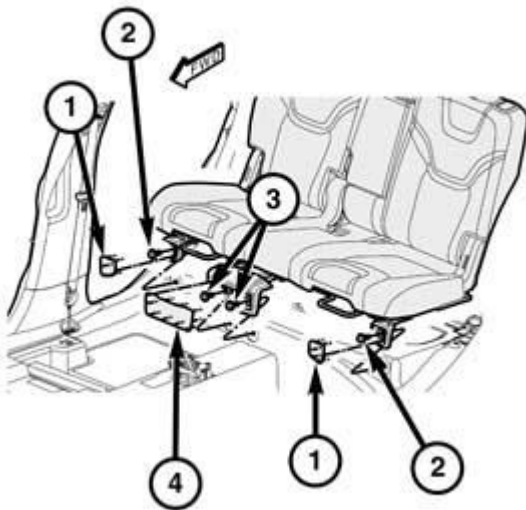
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Fig. 183: Carpeting, Screws & Fuel Module Cover

Courtesy of CHRYSLER GROUP, LLC

NOTE: Right side shown in illustration, left side similar.

10. Install the access cover (3) and securely tighten the screws (2).
11. Position back the carpet access cover (1).



0909005843

Fig. 184: Removing/Installing Rear Seat

Courtesy of CHRYSLER GROUP, LLC

12. Install the rear seat. Refer to **SEAT, REAR, INSTALLATION** .
13. Connect the negative battery cable.
14. Use the Scan Tool to pressurize the system and check for leaks.

PUMP, FUEL INJECTION, HIGH PRESSURE**DESCRIPTION****DESCRIPTION**

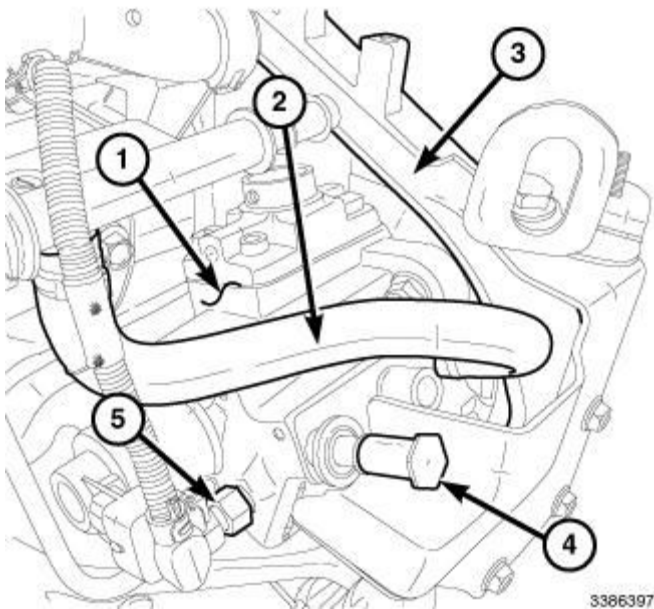


Fig. 185: Fuel Injection Pressure Pump
Courtesy of CHRYSLER GROUP, LLC

The fuel injection pressure pump (1) is secured to a special cast support (3) that is attached to the front of the cylinder head and hangs out over the intake side of the engine. The support also serves as part of the timing belt cover. A molded rubber fuel return hose (2) is connected to a port near the front of the pump, while the fuel supply is secured to a port (4) near the back of the pump using a quick-connect fitting. The high pressure port (5) and the fuel pressure regulator are located on the rear of the pump.

The pressure pump shaft is equipped with a toothed drive sprocket that is driven and timed along with the camshafts by the timing belt on the crankshaft. The timing belt includes yellow reference marks for correct timing of the pressure pump and the camshafts to crankshaft rotation. The pump for this common rail injection system is known as a radial jet pump because pressure is achieved using three pistons arranged at equal 120 degree intervals in a radial orientation around the pump shaft rotation axis.

Most components of the fuel injection pressure pump are not serviceable. If any part of the pump is damaged or ineffective, the entire pump unit must be replaced. The pump support and the pump drive sprocket are available for separate service replacement.

OPERATION

OPERATION

The timed fuel injection pressure pump is driven by the crankshaft through a toothed belt and sprocket arrangement. The pump must be supplied fuel through the low pressure circuit with a minimum pressure of 3.5 bar and a minimum flow rate of 160 liters per hour to ensure correct operation. This supply is achieved by means of the low pressure electric fuel pump integral to the fuel pump module submersed within the fuel tank.

The three pump pistons are operated by the rotation of a triangular-shaped cam integrated with the pump input

shaft. This cam causes the movement of the three pistons in succession, through the movement of a mechanical interface (tappet) between the cam and the base of the piston. The contact between the cam and each individual tappet is maintained by means of a spring.

Each pumping unit is equipped with a plate type intake valve and a ball type supply valve. All three delivery valves of the pumping elements are united inside the pump and deliver the pressurized fuel to the common rail (manifold) through a single high pressure tube. A feature of this pump is that it is lubricated and cooled at the same time by the diesel fuel circulating inside it, via special ports.

The fuel quantity solenoid on the pump adjusts the supply pressure at the pump intake as needed to compress only the amount of diesel fuel needed to reach the pressure targeted by the Powertrain Control Module (PCM).

The pump is driven by the engine at a rotation speed equal to $\frac{2}{3}$ (4v) and $\frac{25}{43}$ (2v) of that of the actual engine, by means of a toothed belt transmission. The timing and injection duration are, in this injection system, tasks of the electronic control system; this pump only carries out the task of permanently maintaining the fuel contained in the manifold at the requested pressure level.

REMOVAL

REMOVAL

WARNING: Observe the following precautions when working on fuel systems: No sparks, open flames or smoking. Avoid inhaling and swallowing fuel. Avoid eye and skin contact with fuel. Pour fuels only into suitable and appropriately marked containers. Wear protective clothing. Failure to observe these precautions may result in fire, explosion, property damage, and serious or fatal injury.

WARNING: High pressure fuel lines deliver fuel under extreme pressure from the injection pump to the injectors. This may be as high as 1600 bar (23, 206 psi). Use extreme caution when inspecting for high pressure fuel leaks. Fuel under this amount of pressure can penetrate skin causing personal injury or death. Inspect high pressure fuel leaks with a sheet of cardboard. Wear safety goggles and adequate protective clothing when servicing fuel system.

CAUTION: Cranking the engine for an extended time without a fuel supply may damage the fuel injection pressure pump.

NOTE: The fuel injection pressure pump must not be disassembled or opened. The only serviceable components are the sprocket and the support.

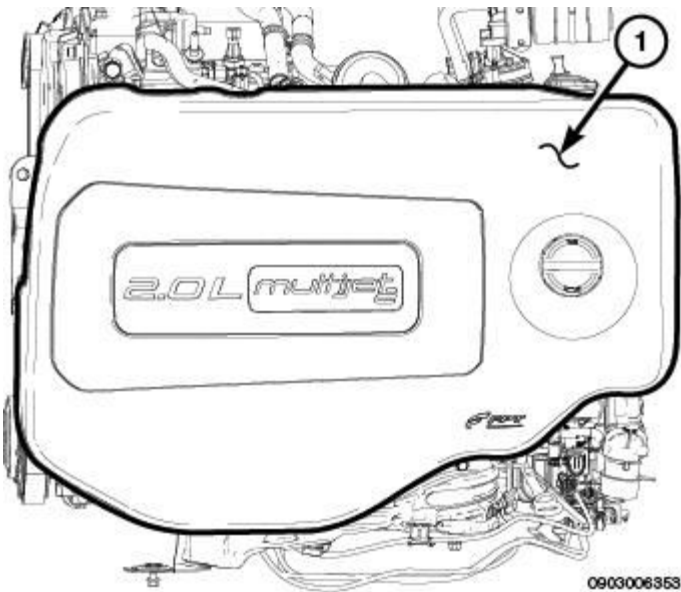
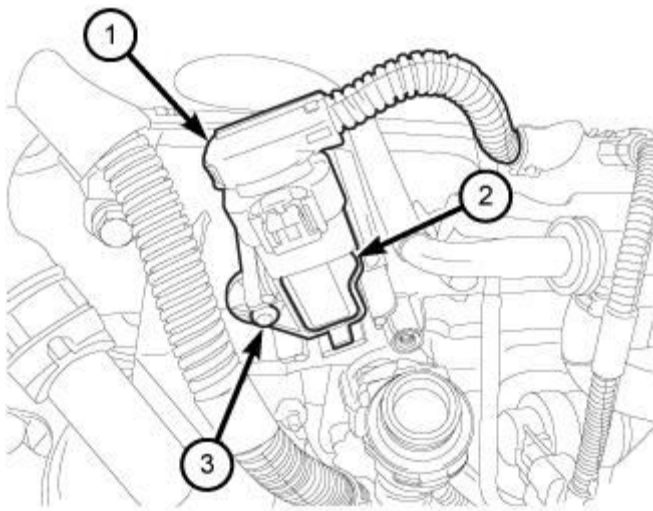


Fig. 186: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).
3. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
4. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .
5. Remove the right front wheel and tire.
6. Remove the right front wheelhouse splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL** .
7. Drain cooling system. Refer to **STANDARD PROCEDURE** .
8. Lower the vehicle.



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Fig. 187: Fuel Quantity Solenoid Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

9. Disconnect the boost pressure wire harness connector (1).

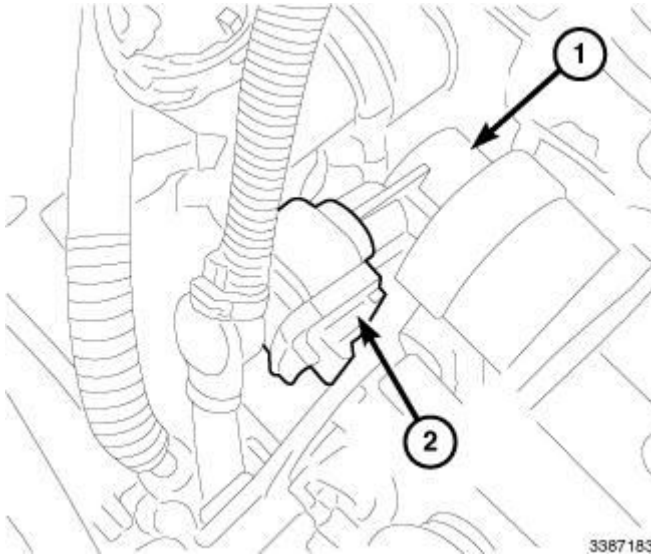


Fig. 188: Fuel Quantity Solenoid Connector
Courtesy of CHRYSLER GROUP, LLC

10. Disconnect the fuel quantity solenoid wire harness connector (2).
11. Detach the wire harness retainer at upper timing cover and position aside the engine wire harness.
12. Remove the upper timing cover. Refer to **COVER(S), ENGINE TIMING, REMOVAL** .

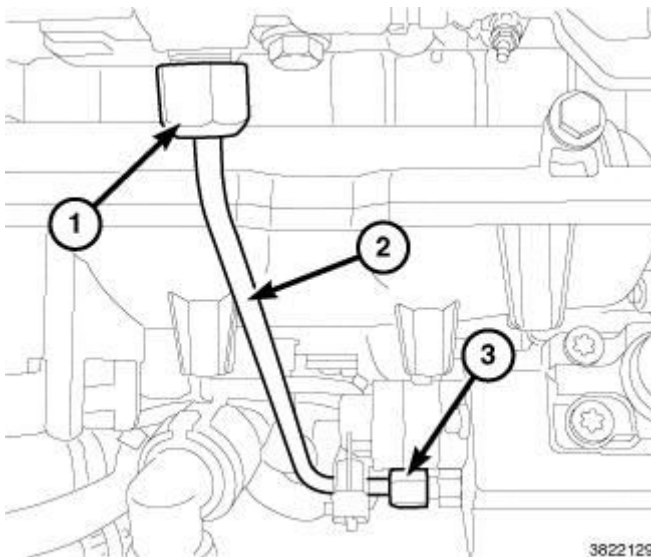


Fig. 189: Fuel Tube, Fuel Injection Pump & Fuel Rail
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not crimp or bend fuel lines. Capture all fluids that flow out of connections.

NOTE: Fuel return manifold removed for clarity.

13. Remove the fuel tube (2) between the fuel injection pump (3) and the fuel rail (1).

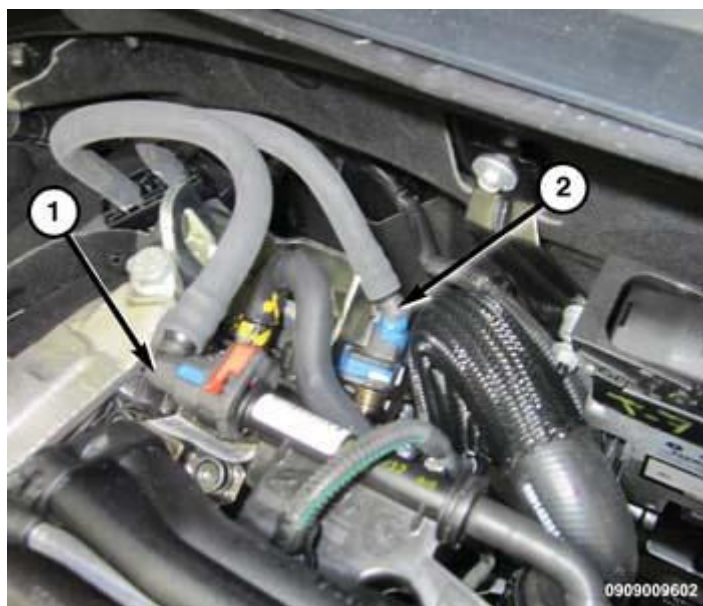


Fig. 190: Fuel Supply & Return Line Quick-Connect Fittings
Courtesy of CHRYSLER GROUP, LLC

14. Disconnect the fuel supply (2) line and return line (1) quick-connect fittings at fuel injection pump. Refer to **FITTING, QUICK CONNECT**.

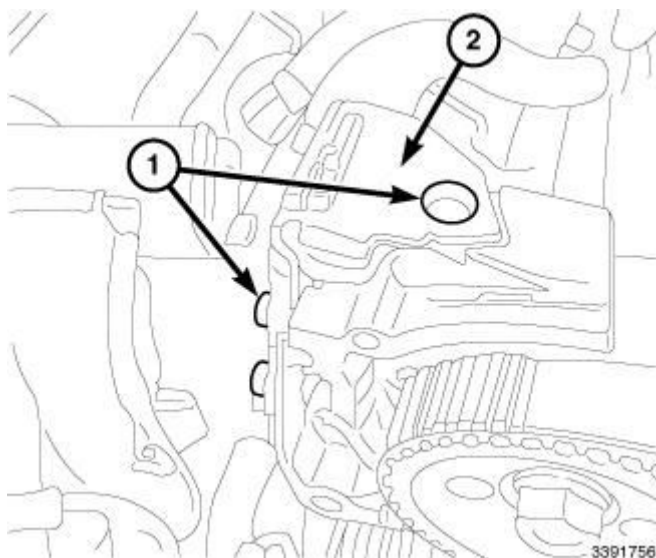


Fig. 191: Fuel Injection Pump Guard

Courtesy of CHRYSLER GROUP, LLC

15. Detach the fuel supply line from the retainer clip.
16. Remove bolts (1) and the fuel injection pump guard (2).

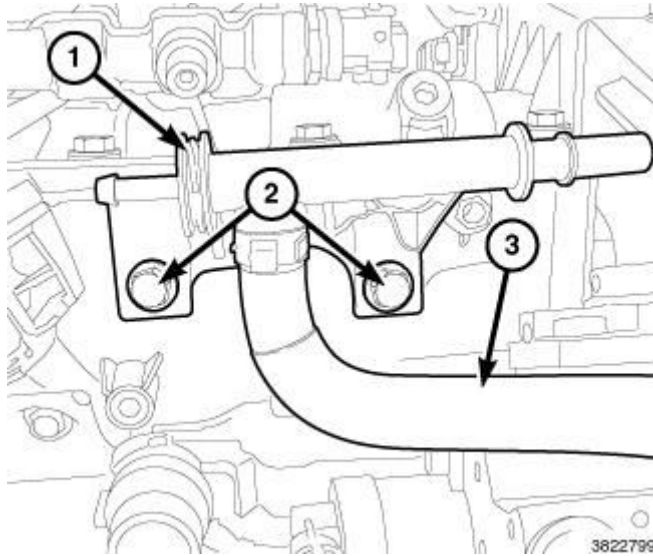


Fig. 192: Fuel Return Manifold

Courtesy of CHRYSLER GROUP, LLC

17. Disconnect the fuel injector return line at the fuel return manifold (1).
18. Loosen the clamp and disconnect the fuel return hose (3) from the fuel injection pump.
19. Remove bolts (2) and position aside the fuel return manifold (1).

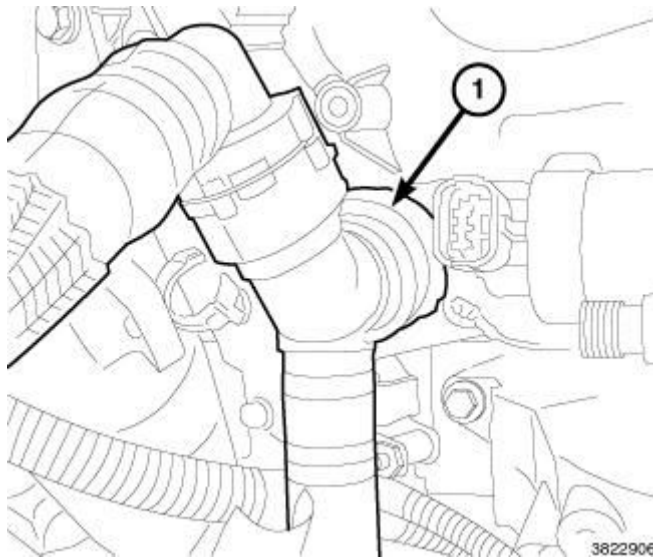


Fig. 193: Coolant Manifold

Courtesy of CHRYSLER GROUP, LLC

20. Remove the coolant manifold (1) at intake manifold.

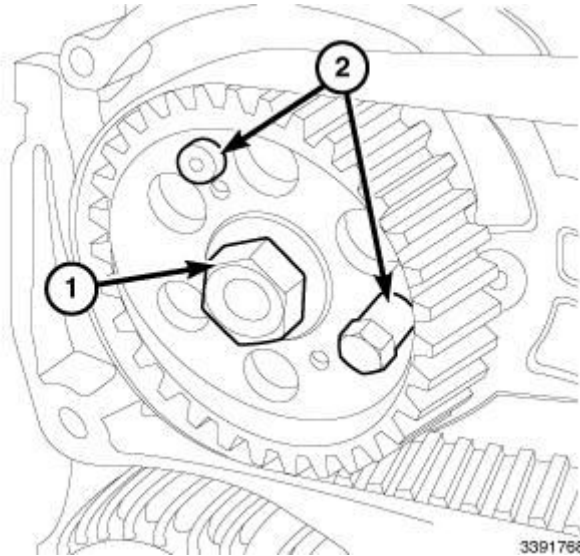


Fig. 194: Special Tool On Fuel Injection Pump Sprocket & Nut
 Courtesy of CHRYSLER GROUP, LLC

21. Rotate the crankshaft far enough to align the threaded holes in the pressure pump sprocket with the corresponding holes in the pressure pump support.
22. Install and tighten the (special tool #20150, Remover/Installer, High Pressure Fuel Pump) (2) to secure the fuel injection pump sprocket.
23. Remove the nut (1) securing the sprocket to the fuel injection pump shaft.

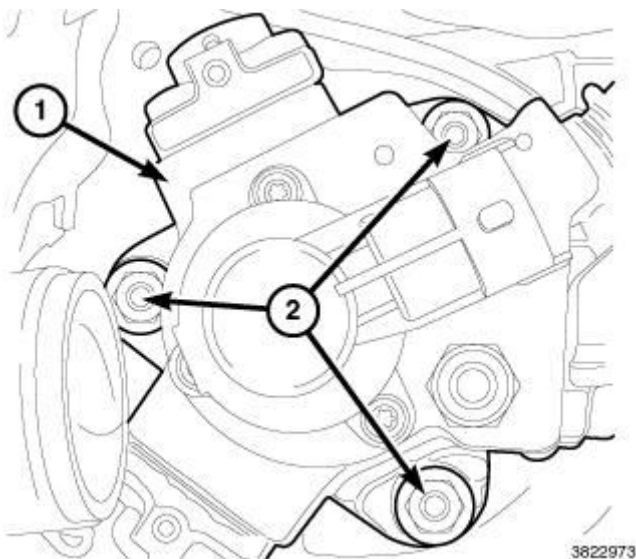


Fig. 195: Fuel Injection Pump & Nuts
 Courtesy of CHRYSLER GROUP, LLC

24. Remove the three nuts (1) securing the fuel injection pump (2).

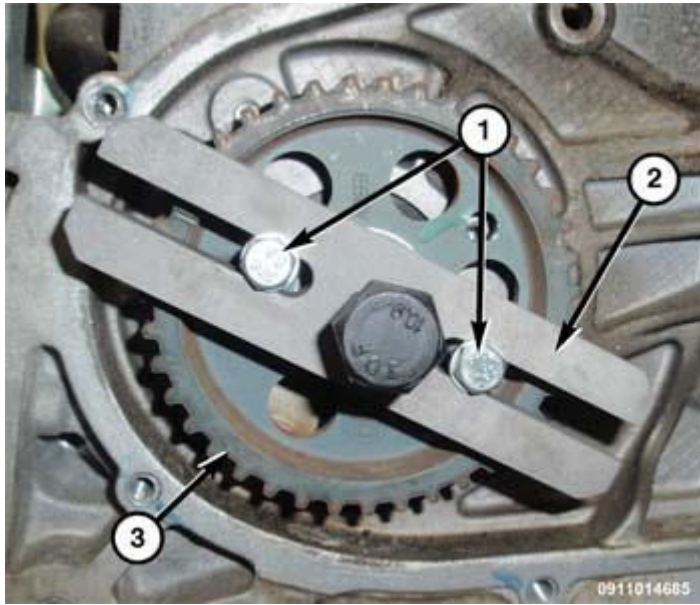


Fig. 196: Special Tool, Bolts & Fuel Injection Pump Sprocket
Courtesy of CHRYSLER GROUP, LLC

25. Install the (special tool #10499, Remover, Pulley) (2) and the (special tool #20150, Remover/Installer, High Pressure Fuel Pump) bolts (1) onto fuel injection pump sprocket (3).
26. Using the extractor, separate the fuel injection pump from sprocket (2) and remove the fuel injection pump.
27. Remove the (special tool #20150, Remover/Installer, High Pressure Fuel Pump) bolts (3) and the Remover, Pump Pulley 10499 (1) from the fuel injection sprocket (2).

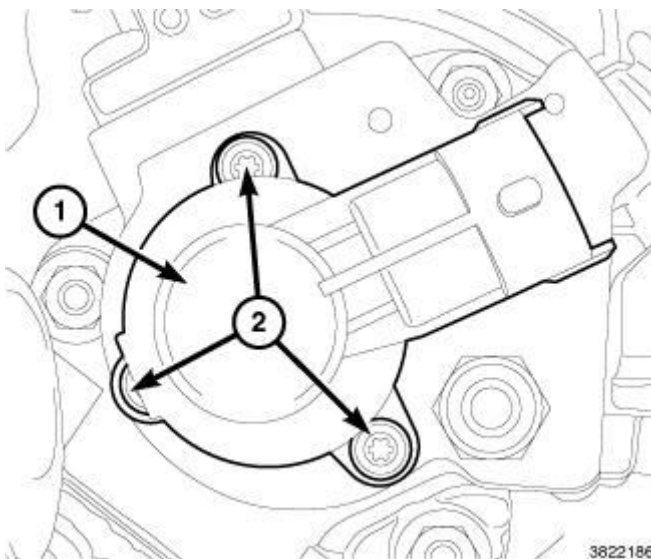


Fig. 197: Fuel Quantity Solenoid
Courtesy of CHRYSLER GROUP, LLC

28. If necessary, remove fasteners (2) and the fuel quantity solenoid (1).

INSTALLATION

INSTALLATION

WARNING: Observe the following precautions when working on fuel systems: No sparks, open flames or smoking. Avoid inhaling and swallowing fuel. Avoid eye and skin contact with fuel. Pour fuels only into suitable and appropriately marked containers. Wear protective clothing. Failure to observe these precautions may result in fire, explosion, property damage, and serious or fatal injury.

WARNING: High pressure fuel lines deliver fuel under extreme pressure from the injection pump to the injectors. This maybe as high as 1600 bar (23, 206 psi). Use extreme caution when inspecting for high pressure fuel leaks. Fuel under this amount of pressure can penetrate skin causing personal injury or death. Inspect high pressure fuel leaks with a sheet of cardboard. Wear safety goggles and adequate protective clothing when servicing fuel system.

CAUTION: Cranking the engine for an extended time without a fuel supply may damage the fuel injection pressure pump.

NOTE: The fuel injection pressure pump must not be disassembled or opened. The only serviceable components are the sprocket and the fuel quantity solenoid.

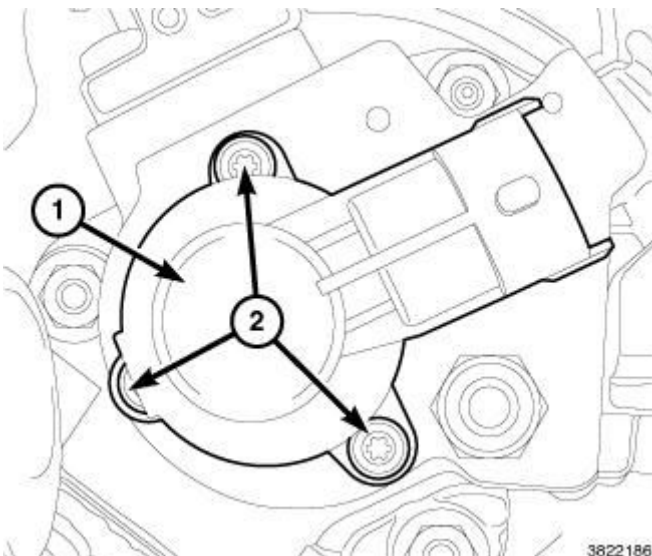


Fig. 198: Fuel Quantity Solenoid
Courtesy of CHRYSLER GROUP, LLC

1. If removed, clean sealing surfaces and Install new O-ring seals onto the fuel quantity solenoid (1).
2. If removed, install the fuel quantity solenoid (1) and securely tighten fasteners (2).

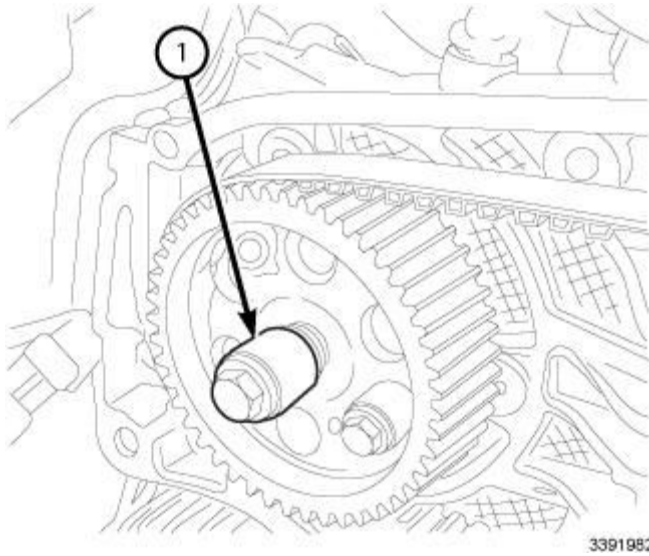


Fig. 199: Pump Rotation Special Tool On Pump Shaft
Courtesy of CHRYSLER GROUP, LLC

3. Position the fuel injection pump to the back of the support with the pump shaft inserted through the drive sprocket and the pump housing engaged over the mounting studs on the support.
4. Install the (Pump Rotation) (special tool #20150, Remover/Installer, High Pressure Fuel Pump) Tool (1) onto the threaded end of the pump shaft enough to align the pin in the pump shaft with the keyway in the hub of the drive sprocket and tighten finger tight.

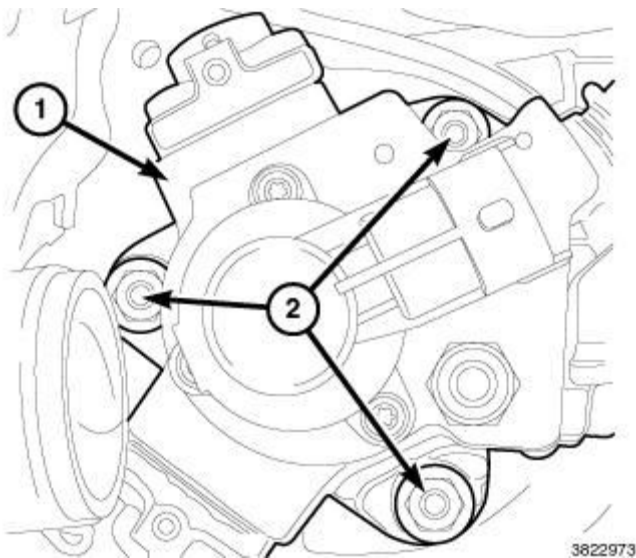


Fig. 200: Fuel Injection Pump & Nuts
Courtesy of CHRYSLER GROUP, LLC

5. Install the three nuts (1) securing the fuel injection pump (2) and tighten to 25 N.m (18 ft. lbs.).

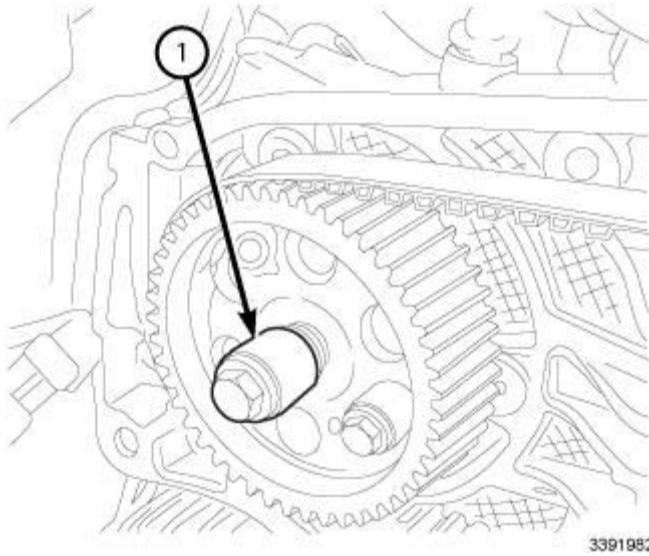


Fig. 201: Pump Rotation Special Tool On Pump Shaft
Courtesy of CHRYSLER GROUP, LLC

6. Remove the (Pump Rotation) (special tool #20150, Remover/Installer, High Pressure Fuel Pump) Tool (1) from the threaded end of the pump shaft.

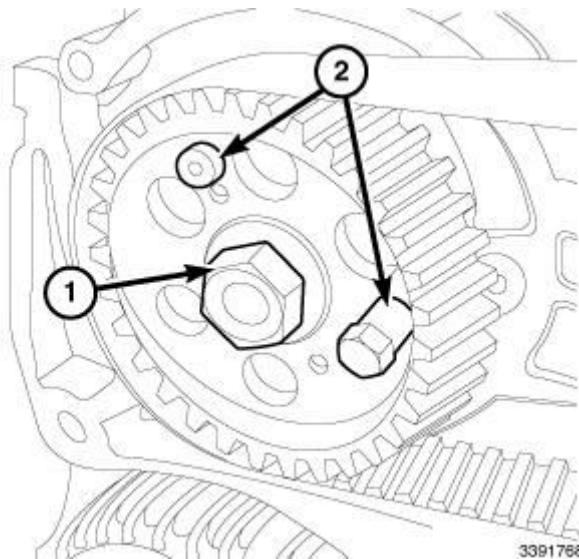


Fig. 202: Special Tool On Fuel Injection Pump Sprocket & Nut
Courtesy of CHRYSLER GROUP, LLC

7. Install the nut (1) securing the sprocket to the fuel injection pump and tighten to 50 N.m (37 ft. lbs.).
8. Remove the (special tool #20150, Remover/Installer, High Pressure Fuel Pump) (2).

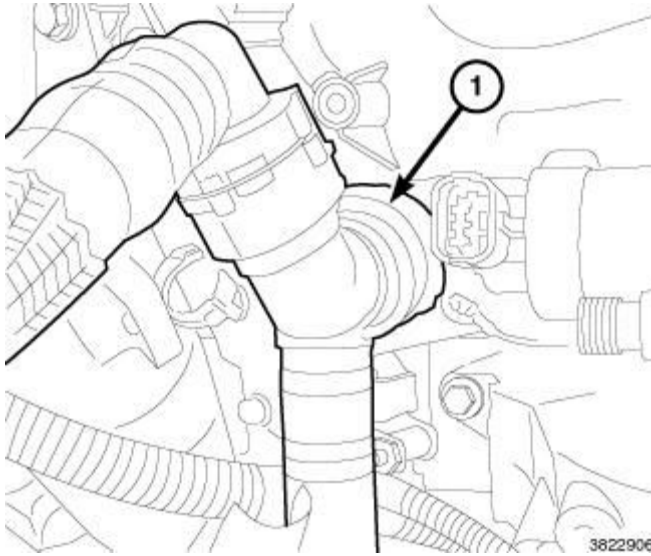


Fig. 203: Coolant Manifold
Courtesy of CHRYSLER GROUP, LLC

9. Install the coolant manifold (1) at intake manifold.

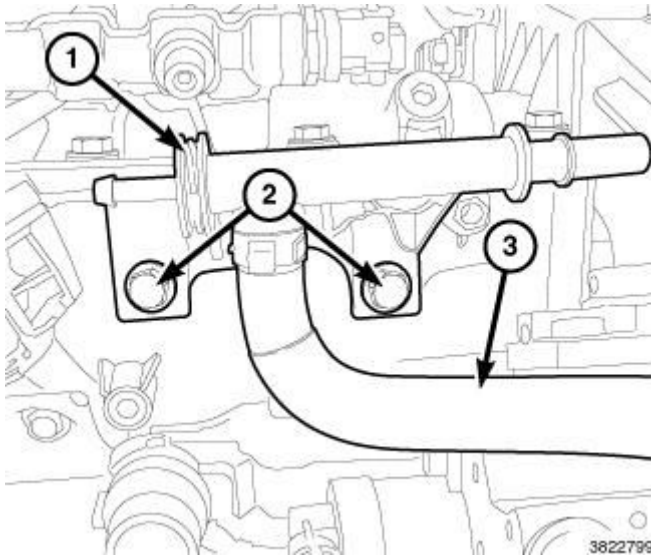


Fig. 204: Fuel Return Manifold
Courtesy of CHRYSLER GROUP, LLC

10. Install the fuel return manifold (1) and securely tighten bolts (2).
11. Connect the fuel return hose (3) to the fuel injection pump and tighten clamp.
12. Connect the fuel injector return line to the fuel return manifold (1).

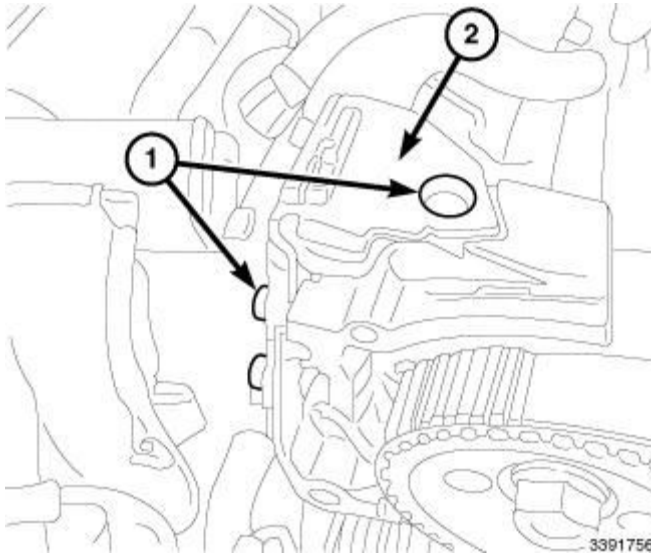


Fig. 205: Fuel Injection Pump Guard
Courtesy of CHRYSLER GROUP, LLC

13. Install the fuel injection pump guard (2) and securely tighten bolts (1).
14. Attach the fuel supply line to the retainer clip.

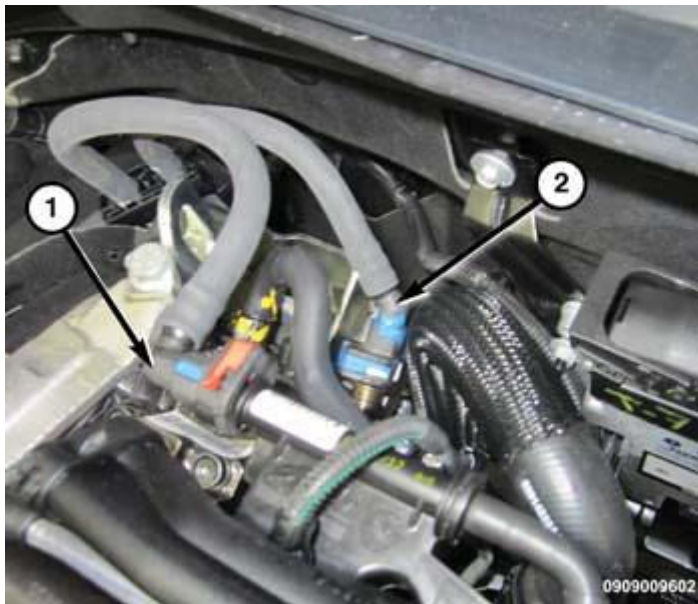


Fig. 206: Fuel Supply & Return Line Quick-Connect Fittings
Courtesy of CHRYSLER GROUP, LLC

15. Connect the fuel supply line (2) and fuel return line (1) quick-connect fitting.

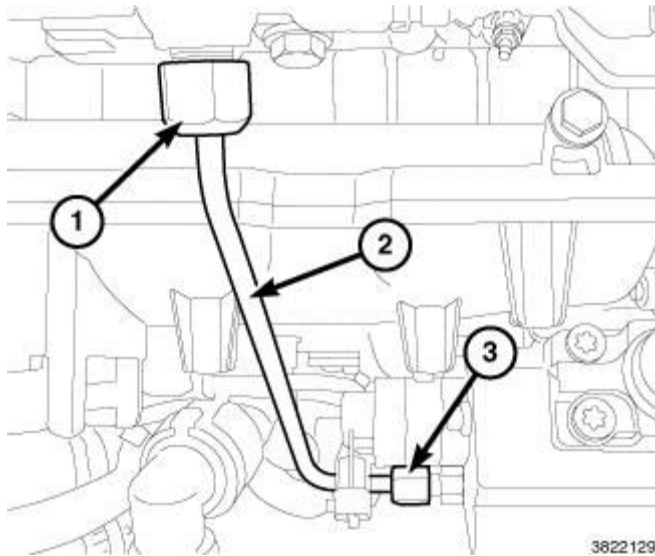


Fig. 207: Fuel Tube, Fuel Injection Pump & Fuel Rail
 Courtesy of CHRYSLER GROUP, LLC

NOTE: High pressure fuel tubes from the fuel injection pressure pump to the fuel rail or from the fuel rail to the fuel injector must be replaced with new units if removed.

16. Install new fuel tube (2) between the fuel injection pump (3) and the fuel rail (1). Tighten the union nuts to:
 - Step 1 Tighten the union nut (1) at fuel rail to 20 N.m (177 in. lbs.).
 - Step 2 Using a wrench to counter hold fitting, tighten union nut (3) at the fuel injection pump to 24 N.m (18 ft. lbs.).
17. Install the upper timing cover. Refer to **COVER(S), ENGINE TIMING, INSTALLATION** .
18. Position the engine wire harness and attach the wire harness retainer to the upper timing cover.

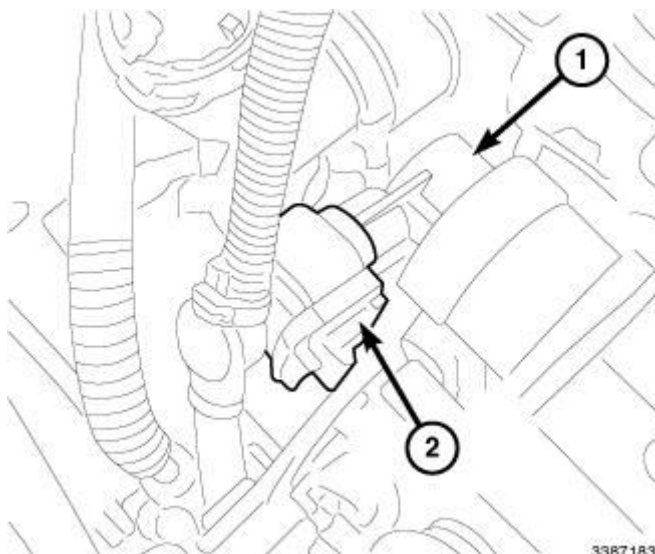
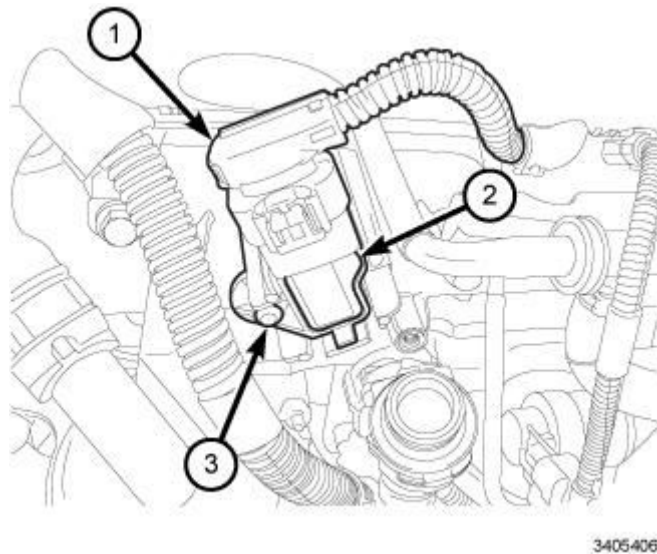


Fig. 208: Fuel Quantity Solenoid Connector

Courtesy of CHRYSLER GROUP, LLC

19. Connect the fuel quantity solenoid wire harness connector (2).

**Fig. 209: Fuel Quantity Solenoid Wire Harness Connector**

Courtesy of CHRYSLER GROUP, LLC

20. Connect the boost pressure wire harness connector.
21. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
22. Install the right front wheelhouse splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION** .
23. Install the right front wheel and tire.
24. Install the belly pan. Refer to **BELLY PAN, INSTALLATION** .
25. Lower the vehicle.

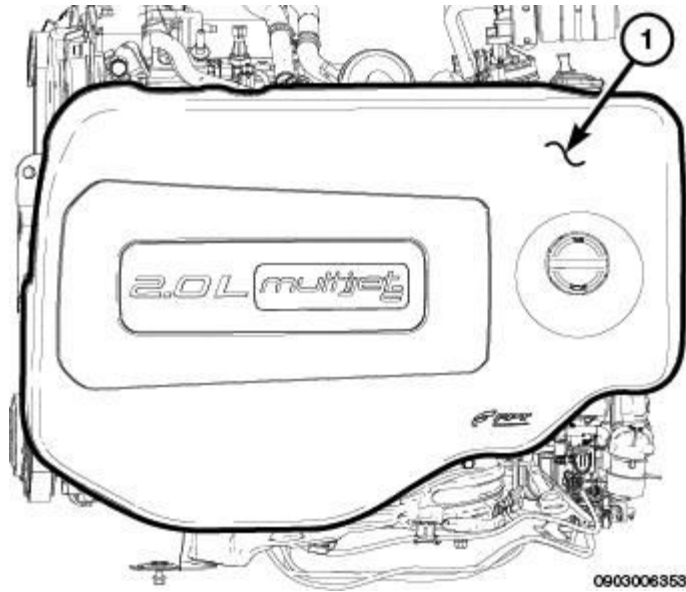


Fig. 210: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

26. Fill the cooling system. Refer to **STANDARD PROCEDURE** .
27. Connect the negative battery cable.
28. Start the engine and inspect the fuel connections for leaks.
29. Install the engine cover (1).

RAIL, FUEL

DESCRIPTION

DESCRIPTION

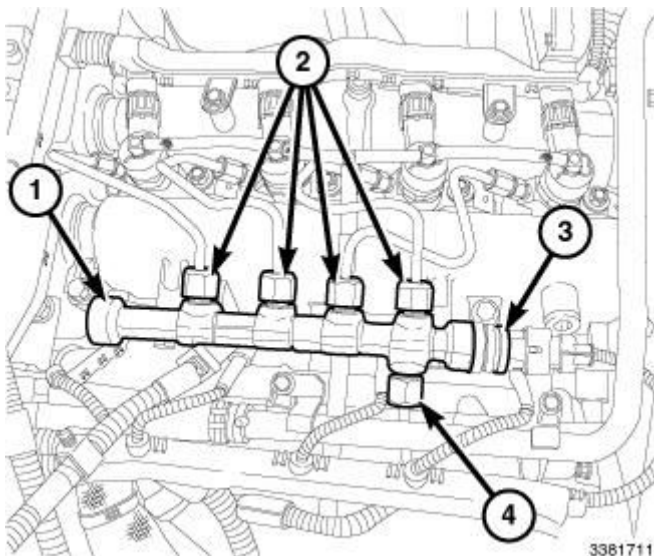


Fig. 211: Fuel Rail**Courtesy of CHRYSLER GROUP, LLC**

A common fuel rail (1) (also known as a manifold) is secured by two screws to the camshaft housing on the intake side of the cylinder head. The fuel rail is a metal casting with six machined ports. A supply port connects the fuel rail to the high pressure fuel circuit through a single tube and fitting (4) from the outlet side of the fuel injection pump. An outlet port connects to each of the fuel injectors through a high pressure fuel tube and fitting (2). The fuel rail also has a threaded port on one end into which the fuel pressure sensor (3) is installed. The fuel rail cannot be adjusted or repaired. If damaged or ineffective, it must be replaced.

OPERATION**OPERATION**

The stored volume of high pressure fuel inside the fuel rail helps to stabilize and equalize pressure fluctuations which result because of pulsations in the supply from the injector pump as well as due to the brief and repetitive extractions of fuel injector firing. The rail primarily influences the atomization of fuel at the injector nozzle, and the accuracy of the injected fuel quantity during injection.

REMOVAL**REMOVAL**

WARNING: Observe the following precautions when working on fuel systems: No sparks, open flames or smoking. Avoid inhaling and swallowing fuel. Avoid eye and skin contact with fuel. Pour fuels only into suitable and appropriately marked containers. Wear protective clothing. Failure to observe these precautions may result in fire, explosion, property damage, and serious or fatal injury.

WARNING: High pressure fuel lines deliver diesel fuel under extreme pressure from the injection pump to the fuel rail and from the fuel rail to the fuel injectors. This pressure may be as high as 1600 bar (23, 206 psi). Use extreme caution when inspecting for high pressure fuel leaks. Fuel under this amount of pressure can penetrate skin causing personal injury or death. Inspect for high pressure fuel leaks with a sheet of cardboard. Wear safety goggles and adequate protective clothing when servicing the high pressure circuits of the fuel system.

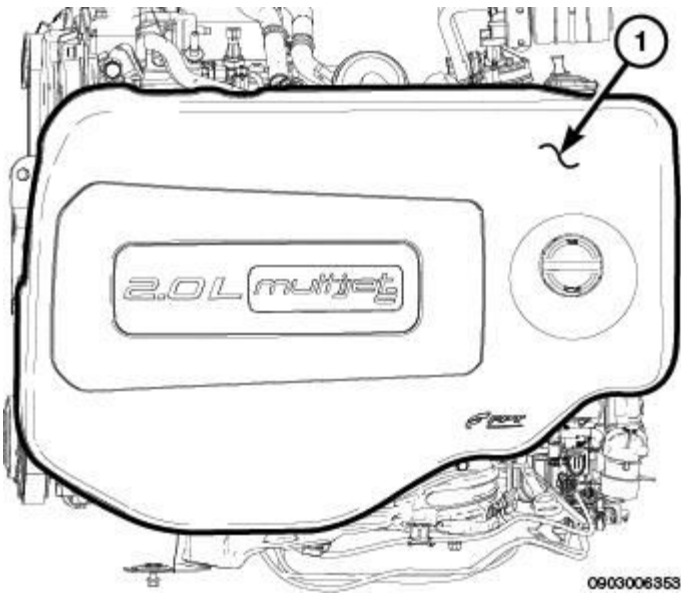


Fig. 212: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

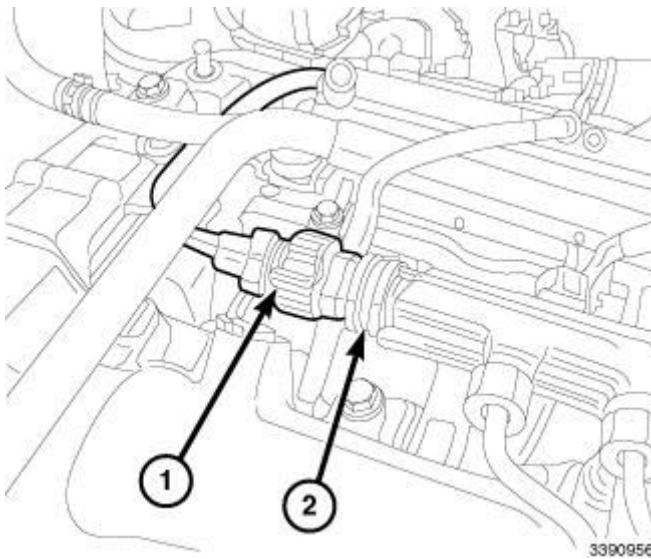


Fig. 213: Fuel Pressure Sensor Wire Harness Connector

Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the fuel pressure sensor wire harness connector (1).

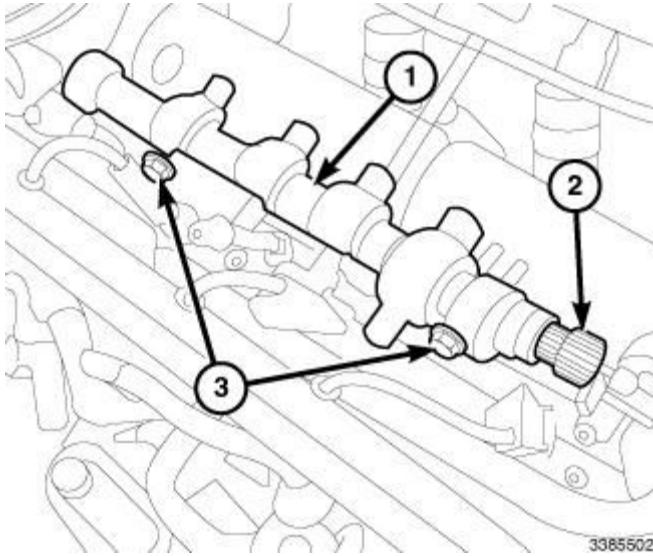


Fig. 214: Fuel Rail & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Remove the high pressure fuel tubes. Refer to **TUBE(S), FUEL, HIGH PRESSURE, REMOVAL**.
5. Remove bolts (3) and the fuel rail (1).

INSTALLATION

INSTALLATION

WARNING: Observe the following precautions when working on fuel systems: No sparks, open flames or smoking. Avoid inhaling and swallowing fuel. Avoid eye and skin contact with fuel. Pour fuels only into suitable and appropriately marked containers. Wear protective clothing. Failure to observe these precautions may result in fire, explosion, property damage, and serious or fatal injury.

WARNING: High pressure fuel lines deliver diesel fuel under extreme pressure from the injection pump to the fuel rail and from the fuel rail to the fuel injectors. This pressure may be as high as 1600 bar (23, 206 psi). Use extreme caution when inspecting for high pressure fuel leaks. Fuel under this amount of pressure can penetrate skin causing personal injury or death. Inspect for high pressure fuel leaks with a sheet of cardboard. Wear safety goggles and adequate protective clothing when servicing the high pressure circuits of the fuel system.

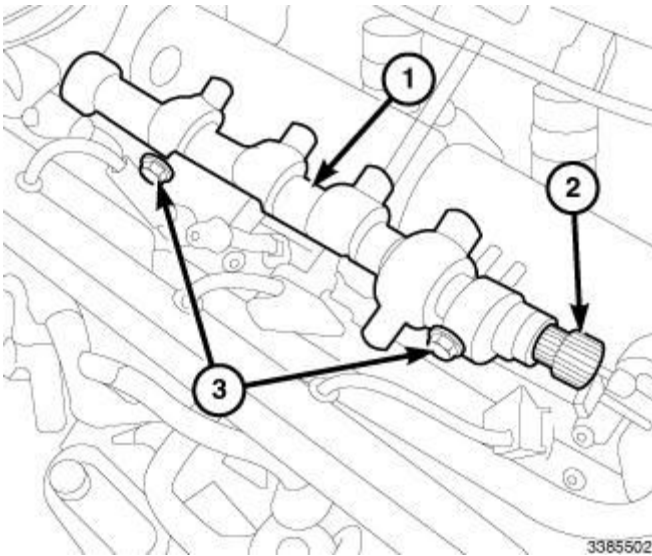


Fig. 215: Fuel Rail & Fasteners

Courtesy of CHRYSLER GROUP, LLC

1. If a new fuel rail is being installed, transfer the fuel pressure sensor from the old fuel rail. Refer to **SENSOR, FUEL PRESSURE, INSTALLATION**.
2. Install the fuel rail (1). Tighten bolts (3) to 25 N.m (18 ft. lbs.).
3. Install new high pressure fuel tubes. Refer to **TUBE(S), FUEL, HIGH PRESSURE, INSTALLATION**.

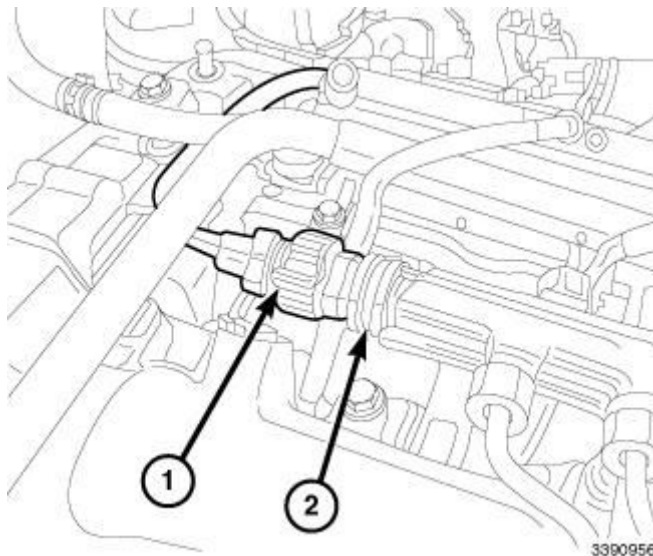


Fig. 216: Fuel Pressure Sensor Wire Harness Connector

Courtesy of CHRYSLER GROUP, LLC

4. Connect the fuel pressure sensor wire harness connector (1).

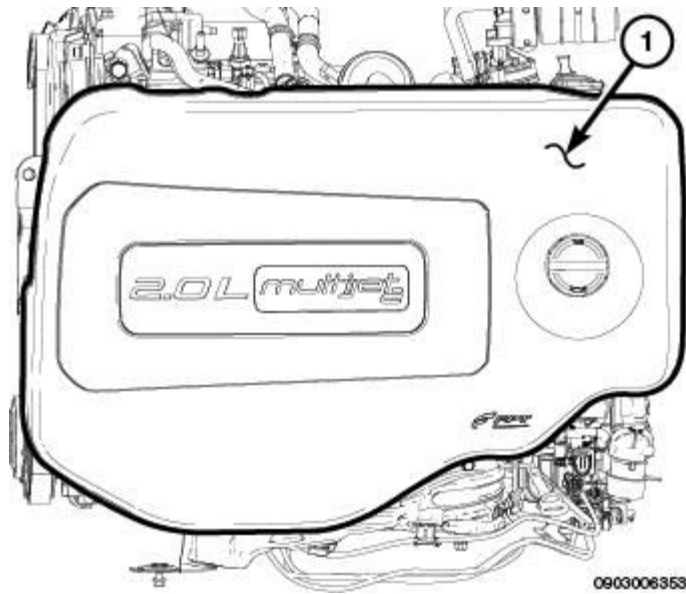


Fig. 217: Engine Cover
 Courtesy of CHRYSLER GROUP, LLC

5. Connect the negative battery cable.
6. Start the engine and inspect all of the fuel rail connections for leaks.
7. Install the engine cover (1).

SENDING UNIT AND SENSOR, FUEL LEVEL

DESCRIPTION

DESCRIPTION

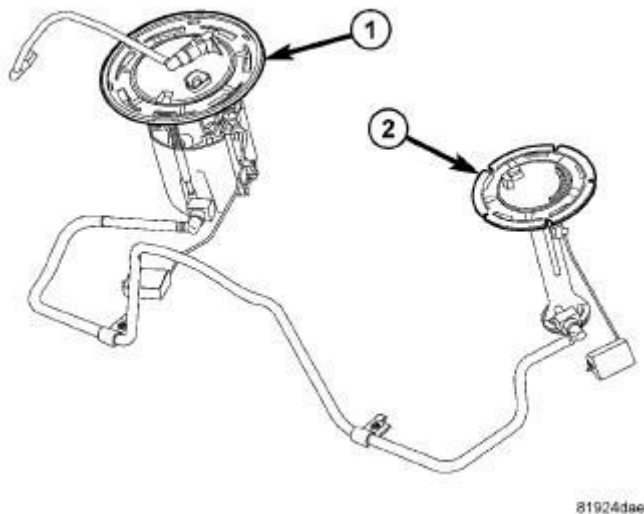


Fig. 218: Main Fuel Pump Module & Auxiliary Fuel Pump Module
Courtesy of CHRYSLER GROUP, LLC

Diesel vehicles are equipped with a saddle fuel tank configurations which have a main (1) and auxiliary (2) fuel level sending units.

The main fuel level sending unit located on the main fuel pump reservoir (1) and is serviceable.

The auxiliary fuel level sending unit (2) is integrated with the auxiliary fuel pump module. The auxiliary fuel pump module and the fuel level sending unit is serviced as an assembly.

OPERATION

OPERATION

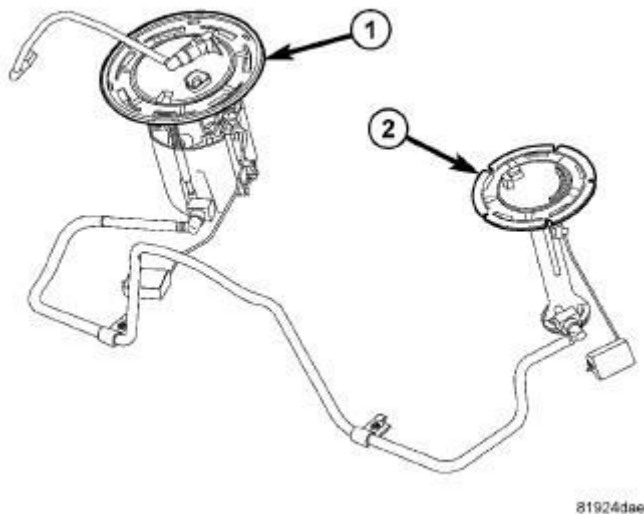


Fig. 219: Main Fuel Pump Module & Auxiliary Fuel Pump Module
Courtesy of CHRYSLER GROUP, LLC

Operation of the main fuel pump module along with the addition of a auxiliary fuel pump module with a auxiliary fuel level sending unit and draws fuel from the base of the auxiliary fuel pump module (2) through an internal tube.

The auxiliary fuel pump module flow rate is greater than the vehicle fuel consumption rate so that the auxiliary side of the tank is emptied before fuel is depleted from the primary side.

REMOVAL

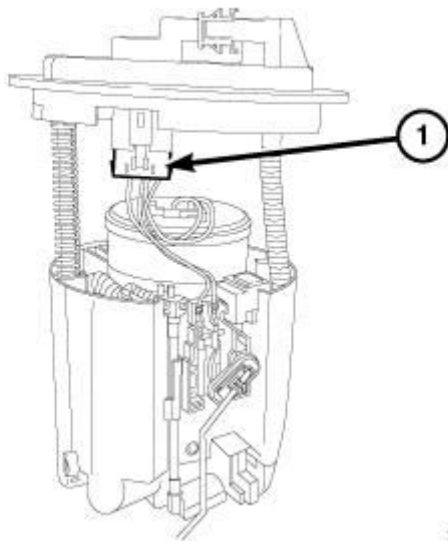
REMOVAL

WARNING: Risk of injury to eyes and skin from contact with fuel. Wear protective

clothing and eye protection. Risk of poisoning from inhaling and swallowing fuel. Pour fuel only into appropriately marked and approved containers. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: The fuel system is under constant high pressure even with engine OFF. Until the fuel pressure has been properly released from the system, do not attempt to open the fuel system. Do not smoke or use open flames/sparks when servicing the fuel system. Make sure the area in which the vehicle is being serviced is in a well ventilated area. Failure to comply may result in serious or fatal injury.

1. Remove the fuel pump module from the fuel tank. Refer to **MODULE, FUEL PUMP, REMOVAL**.



2660162

Fig. 220: Fuel Level Sending Unit Electrical Connector
Courtesy of CHRYSLER GROUP, LLC

2. Disconnect the fuel level sending unit and sensor pigtail wire connector (1) from the connector receptacle integral to the underside of the fuel pump module mounting flange.

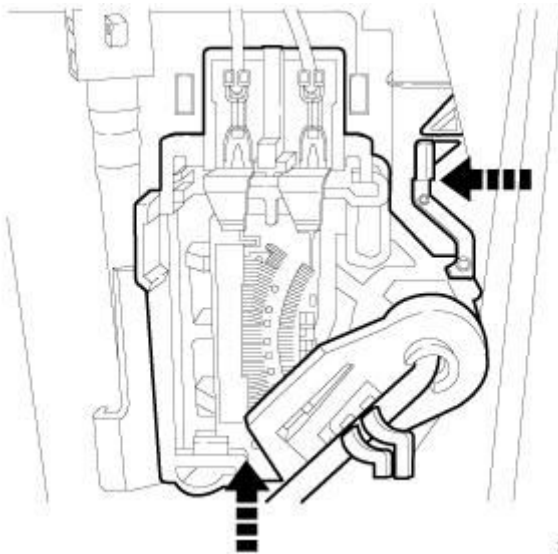


Fig. 221: Pressing Fuel Level Sending Unit Snap Tab To Left
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not touch the terminals or the resistor card.

CAUTION: Do not pull the fuel level sending unit by the wires or the float arm.

3. Using your finger, press the fuel level sending unit snap tab to the left while gently pushing up on the bottom of the sending unit and sensor.
4. Remove the sending unit and sensor from the fuel pump module reservoir.

INSTALLATION

INSTALLATION

WARNING: Risk of injury to eyes and skin from contact with fuel. Wear protective clothing and eye protection. Risk of poisoning from inhaling and swallowing fuel. Pour fuel only into appropriately marked and approved containers. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: The fuel system is under constant high pressure even with engine OFF. Until the fuel pressure has been properly released from the system, do not attempt to open the fuel system. Do not smoke or use open flames/sparks when servicing the fuel system. Make sure the area in which the vehicle is being serviced is in a well ventilated area. Failure to comply may result in serious or fatal injury.

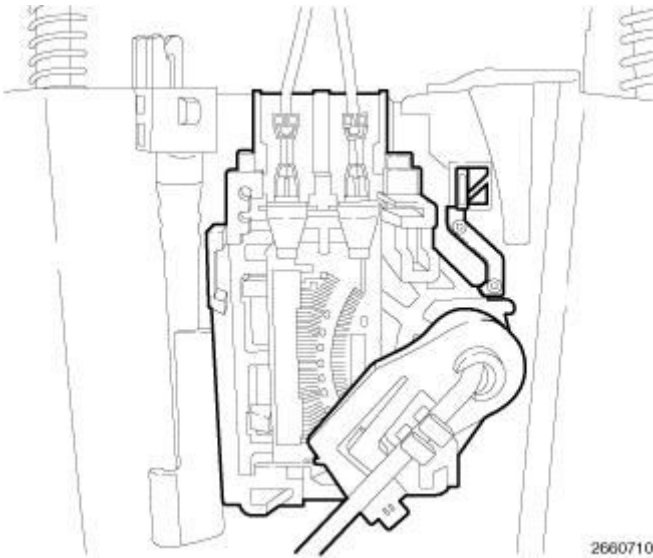


Fig. 222: Resistor Card
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not touch the terminals or the resistor card.

CAUTION: Do not handle the new fuel level sending unit by the float arm.

1. Position the new fuel level sending unit and sensor to the mount integral to the fuel pump module reservoir.

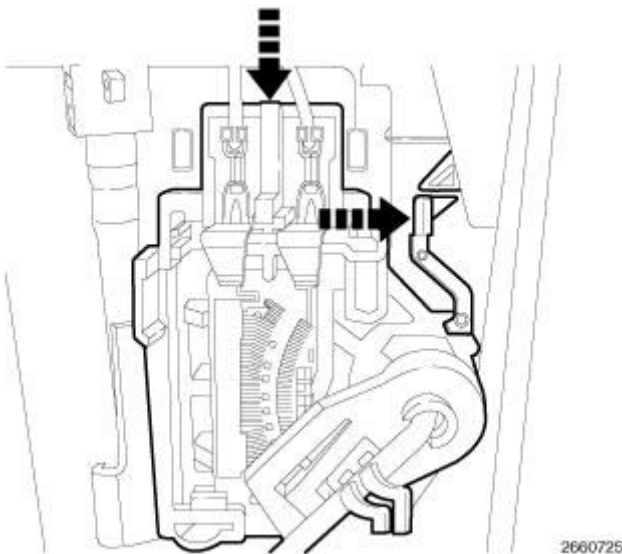


Fig. 223: Pushing Fuel Level Sending Unit Down Until Snap Tab Engages
Courtesy of CHRYSLER GROUP, LLC

2. Gently push the sending unit down until the latch tab engages.

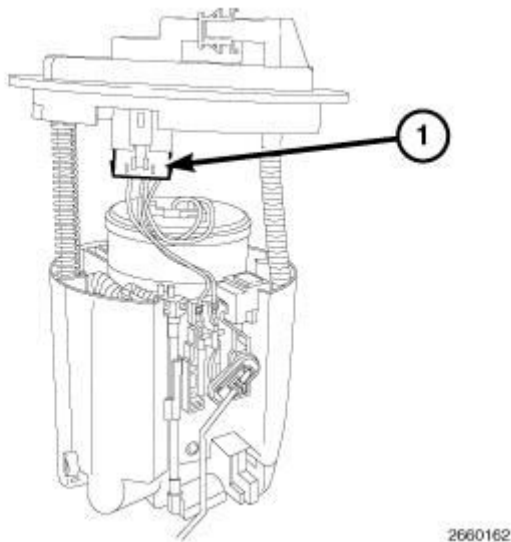


Fig. 224: Fuel Level Sending Unit Electrical Connector
Courtesy of CHRYSLER GROUP, LLC

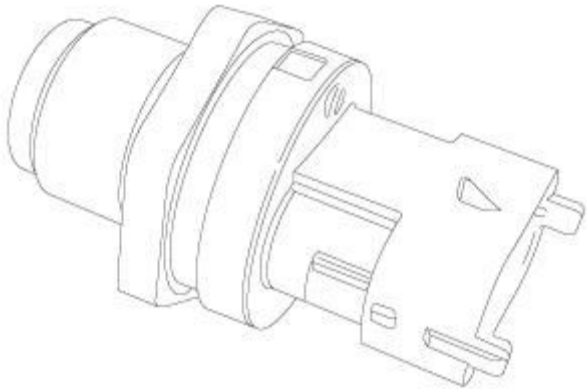
CAUTION: Ensure the fuel level sending unit wires are routed so they do not get pinched between the coils of the spring when the module is completely compressed.

3. Reconnect the sending unit pigtail wire connector (1) to the connector receptacle integral to the underside of the fuel pump module mounting flange.
4. Reinstall the fuel pump module into the fuel tank. Refer to **MODULE, FUEL PUMP, INSTALLATION**.

SENSOR, FUEL PRESSURE

DESCRIPTION

DESCRIPTION



3390906

Fig. 225: Fuel Pressure Sensor
Courtesy of CHRYSLER GROUP, LLC

The fuel pressure sensor is fitted at the end of the common rail and its function is to provide the injection control unit with a feedback signal to enable it to modulate injection pressure and regulate fuel injection duration.

The fuel pressure sensor cannot be adjusted or repaired. If damaged or ineffective, the sensor must be replaced.

OPERATION

OPERATION

The fuel pressure sensor receives voltage and ground from the Powertrain Control Module (PCM), then provides a return input to the PCM through a separate signal circuit. This input along with internal programming and numerous inputs from other sensors allows the PCM to modulate fuel injection pressure and regulate fuel injector pulse duration as appropriate.

The fuel pressure sensor control and signal circuits are continuously monitored by the PCM. If the PCM detects a problem in any monitored circuit, it will store a Diagnostic Trouble Code (DTC) in its memory circuits. Such a DTC can be retrieved from the PCM through the Controller Area Network (CAN) data bus using a diagnostic scan tool connected to the Data Link Connector (DLC).

The fuel pressure sensor and the hard wired circuits between the sensor and the PCM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the fuel pressure sensor or the electronic controls or communication between other modules and devices that provide some features of the fuel injection system. The most reliable, efficient, and accurate means to diagnose the fuel pressure sensor or the electronic controls and communication related to fuel injection system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

REMOVAL

WARNING: Observe the following precautions when working on fuel systems: No sparks, open flames or smoking. Avoid inhaling and swallowing fuel. Avoid eye and skin contact with fuel. Pour fuels only into suitable and appropriately marked containers. Wear protective clothing. Failure to observe these precautions may result in fire, explosion, property damage, and serious or fatal injury.

WARNING: High pressure fuel lines deliver diesel fuel under extreme pressure from the injection pump to the fuel rail and from the fuel rail to the fuel injectors. This pressure may be as high as 1600 bar (23, 206 psi). Use extreme caution when inspecting for high pressure fuel leaks. Fuel under this amount of pressure can penetrate skin causing personal injury or death. Inspect for high pressure fuel leaks with a sheet of cardboard. Wear safety goggles and adequate protective clothing when servicing the high pressure circuits of the fuel system.

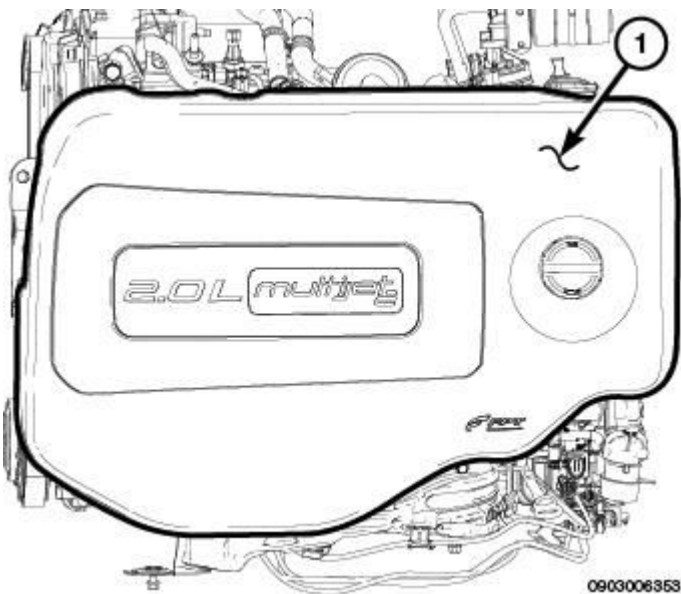


Fig. 226: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

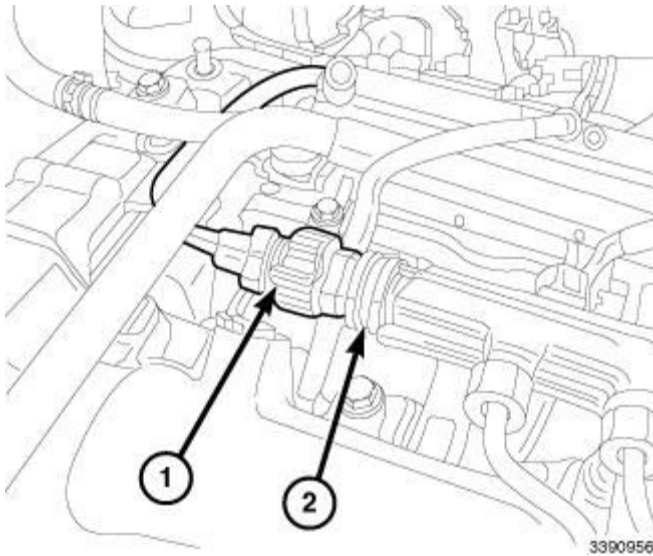


Fig. 227: Fuel Pressure Sensor Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the fuel pressure wire harness connector (1).
4. Unscrew the fuel pressure sensor (2) from fuel rail.

INSTALLATION

INSTALLATION

WARNING: Observe the following precautions when working on fuel systems: No sparks, open flames or smoking. Avoid inhaling and swallowing fuel. Avoid eye and skin contact with fuel. Pour fuels only into suitable and appropriately marked containers. Wear protective clothing. Failure to observe these precautions may result in fire, explosion, property damage, and serious or fatal injury.

WARNING: High pressure fuel lines deliver diesel fuel under extreme pressure from the injection pump to the fuel rail and from the fuel rail to the fuel injectors. This pressure may be as high as 1600 bar (23, 206 psi). Use extreme caution when inspecting for high pressure fuel leaks. Fuel under this amount of pressure can penetrate skin causing personal injury or death. Inspect for high pressure fuel leaks with a sheet of cardboard. Wear safety goggles and adequate protective clothing when servicing the high pressure circuits of the fuel system.

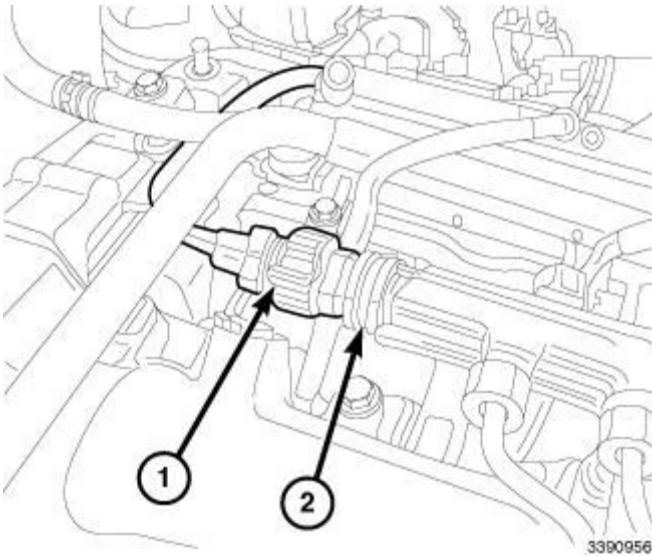


Fig. 228: Fuel Pressure Sensor Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

1. Install the fuel pressure sensor (2) into the fuel rail. Tighten the sensor to 70 N.m (52 ft. lbs.).
2. Connect the fuel pressure wire harness connector (1).

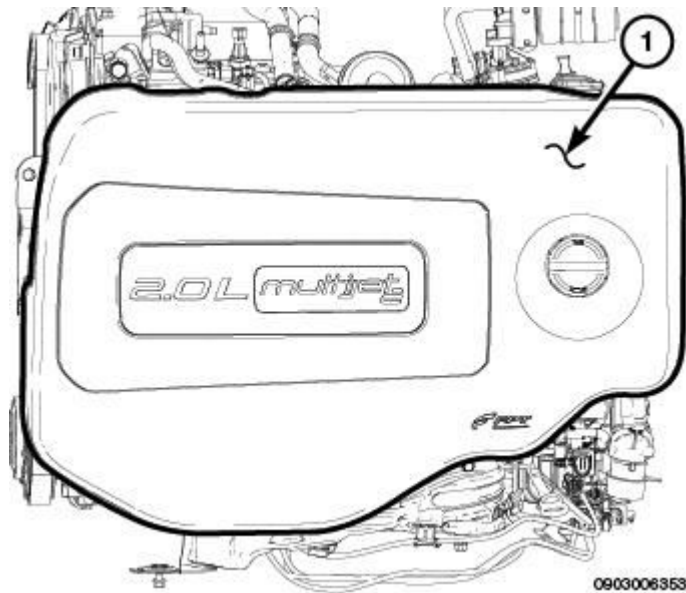


Fig. 229: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

3. Connect the negative battery cable.
4. Start the engine and allow it to warm. Turn the engine OFF and inspect the fuel pressure sensor to fuel rail connection for leaks.
5. Install the engine cover (1).

SENSOR, FUEL TEMPERATURE

DESCRIPTION

DESCRIPTION

The Fuel Temperature Sensor is located in the fuel filter/water separator housing assembly and is located on the left-rear side of the engine compartment. The fuel temperature sensor is not a serviceable component. If diagnosis has lead you to replace the fuel temperature sensor then the whole fuel filter/water separator housing must be replaced.

REMOVAL

REMOVAL

1. The fuel temperature sensor is a combination fuel heater/temperature sensor which is a serviceable component. Refer to **HEATER, FUEL, REMOVAL**.

INSTALLATION

INSTALLATION

1. The fuel temperature sensor is a combination fuel heater/temperature sensor which is a serviceable component. Refer to **SEPARATOR AND FILTER, FUEL AND WATER, INSTALLATION**.

SENSOR, WATER IN FUEL

DESCRIPTION

DESCRIPTION

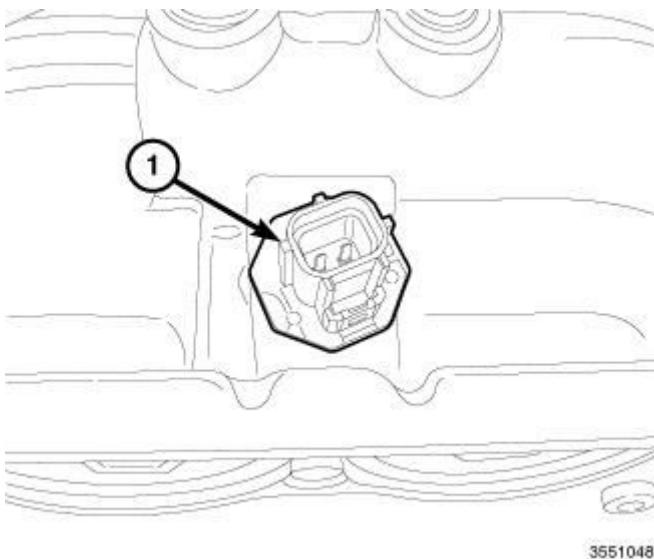


Fig. 230: Fuel (WIF) Sensor

Courtesy of CHRYSLER GROUP, LLC

The Water In Fuel (WIF) sensor (1) is located in the fuel filter housing. The WIF sensor (1) detects the presence of water in the fuel. If water is present in the fuel, a signal is sent to the Powertrain Control Module (PCM) and the PCM signals the instrument cluster, over the CAN bus, to illuminate the water in fuel warning.

OPERATION**OPERATION**

The non-dielectric properties of the water allow the sensors probes to close the electronic circuit when water is present in the system. When diesel fuel is present in the system, its dielectric (does not conduct electricity well) properties do not allow any electrical contact between the probes. A 12V power signal is always present in order to illuminate the indicator on the instrument cluster.

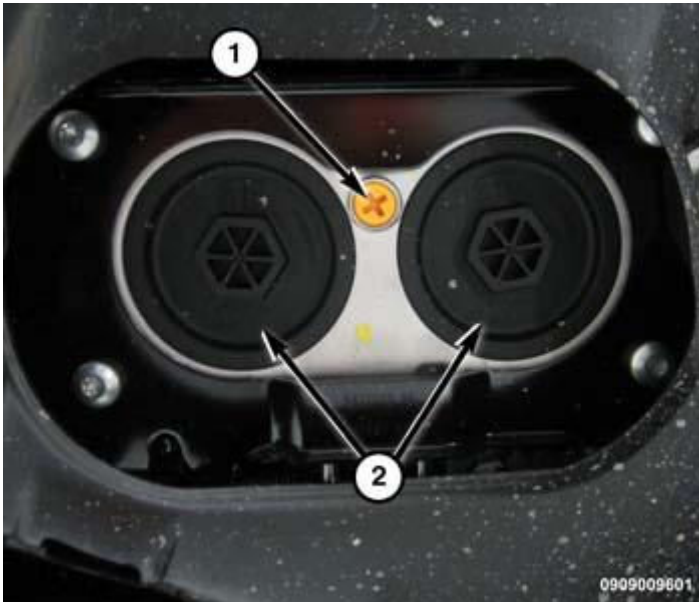
REMOVAL**REMOVAL**

Fig. 231: Drain Plugs

Courtesy of CHRYSLER GROUP, LLC

NOTE: Remove any dirt and debris around the fuel filter assembly using a suitable solvent or compressed air. Area around the fuel filter assembly must be clean and dry.

1. Disconnect the negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Loosen drain plug (1) and drain fuel filter/water separator into a suitable container.

4. Securely tighten drain plug (2).

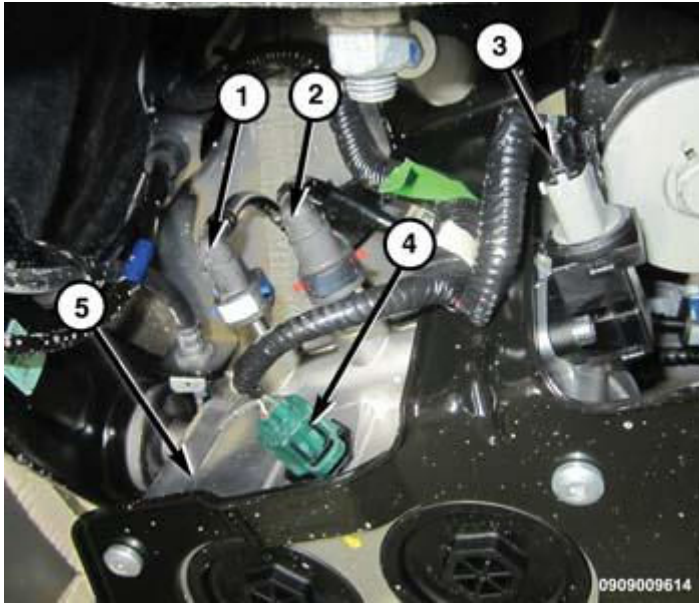


Fig. 232: WIF Sensor Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

5. Disconnect the Water In Fuel (WIF) sensor wire harness connector (4).

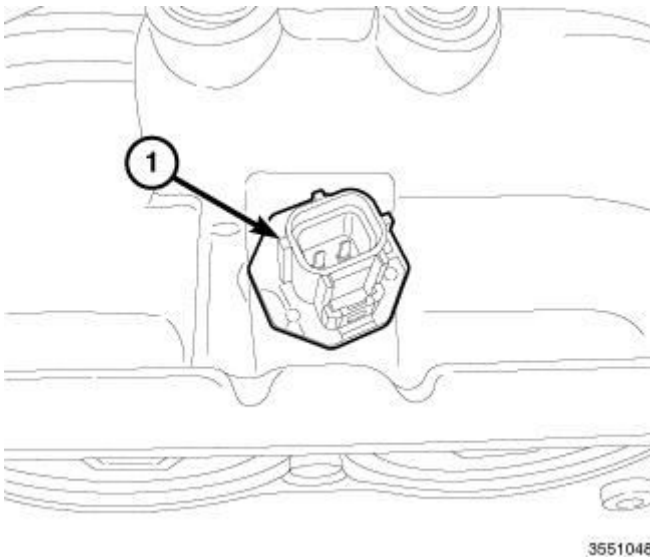


Fig. 233: Fuel (WIF) Sensor
Courtesy of CHRYSLER GROUP, LLC

6. Remove the water in fuel sensor (1).
7. Remove and discard O-ring seal.

INSTALLATION

INSTALLATION

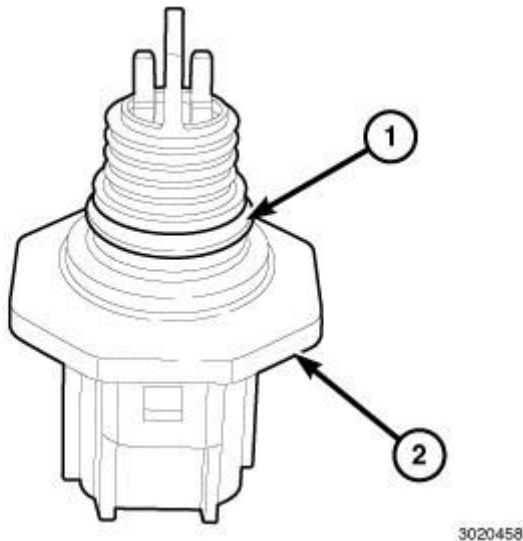


Fig. 234: O-Ring Seal & Water In Fuel Sensor
Courtesy of CHRYSLER GROUP, LLC

1. Clean the O-ring sealing area of housing.

NOTE: Lubricate the O-ring seal with clean diesel fluid.

2. Install a new O-ring seal (1) onto Water in Fuel (WIF) sensor (2).

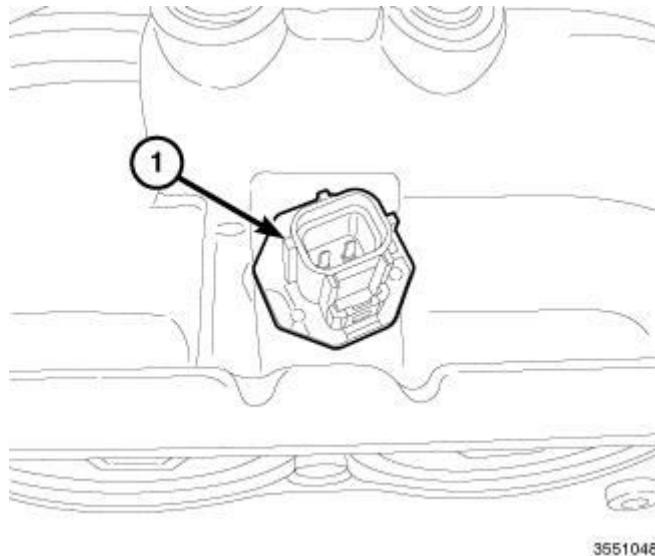


Fig. 235: Fuel (WIF) Sensor
Courtesy of CHRYSLER GROUP, LLC

3. Install the WIF sensor (1) and securely tighten sensor.

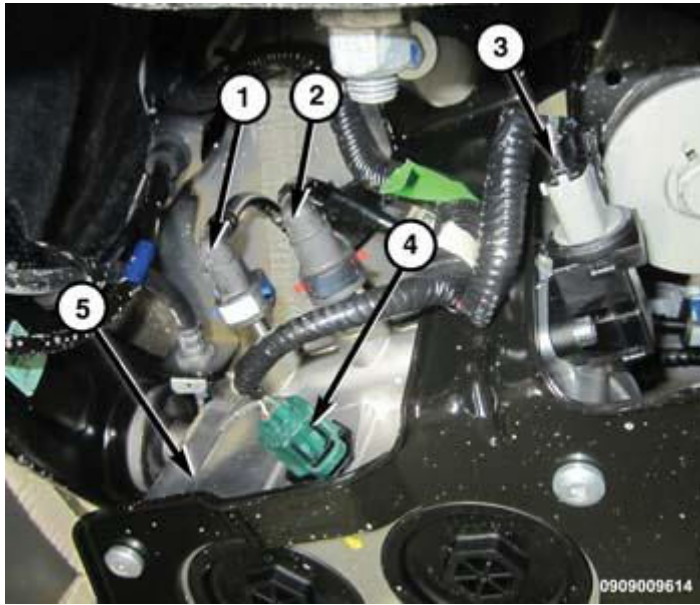


Fig. 236: WIF Sensor Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

4. Connect the Water In Fuel (WIF) sensor wire harness connector (4).
5. Lower the vehicle.
6. Connect the negative battery cable.

SEPARATOR AND FILTER, FUEL AND WATER

DESCRIPTION

DESCRIPTION

The fuel filter/water separator housing is located on the left side of the vehicle in front of the fuel tank. The filter has the task of cleaning the fuel before it is fed to the high-pressure system and ultimately to the injector nozzles.

1. The fuel filter/water separator housing incorporates the following components:
 - Two 5 micron fuel filter element.
 - Water separator
 - Drain plug
 - Water In Fuel sensor (WIF)
 - Fuel heater/temperature sensor

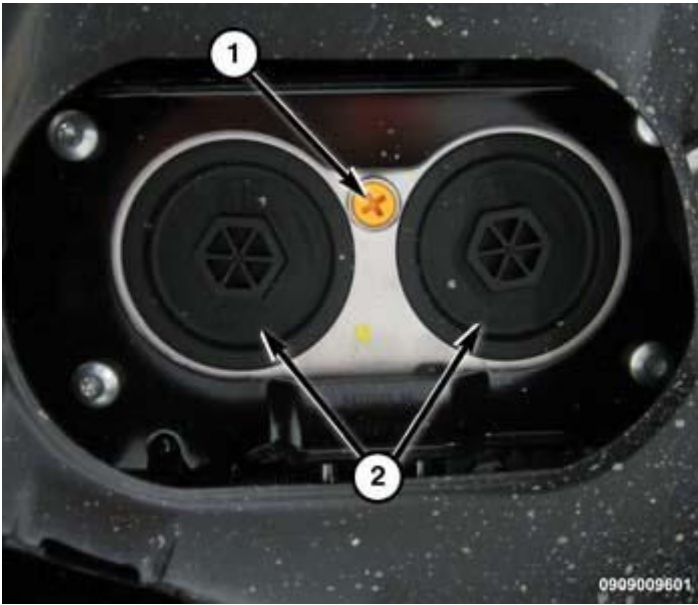


Fig. 237: Drain Plugs

Courtesy of CHRYSLER GROUP, LLC

Fuel filtering is critical in common-rail systems. Small amounts of impurities may damage the precision mechanical components over time. Water entering the injection system can also lead to damage. Servicing the fuel filters (2) is done from the bottom of the fuel filter/water separator housing.

A water reservoir is located at the bottom of the filter to collect any water contained in the fuel. A drain plug (1) is located on the bottom of the filter housing. The filter housing should be drained if a Water-in-Fuel message is displayed in the instrument cluster. Water is drained by removing the drain plug.

OPERATION

OPERATION

The fuel filter/water separator protects the fuel injection pump by removing contamination from the fuel being supplied to the pump.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - FUEL FILTER

This diagnostic will test for a restricted fuel filter.

1. CHECK THE LOW SIDE FUEL SYSTEM PRESSURE

1. Turn the ignition off.

WARNING: No sparks, open flames or smoking. Risk of poisoning from inhaling and swallowing fuel. Risk of injury to eyes and skin from contact with fuel. Pour fuels only into suitable and

appropriately marked containers. Wear protective clothing.

2. Disconnect the quick connect fitting between the Fuel Filter outlet and the High Pressure Fuel Pump and connect a fuel pressure gauge in-line.
3. Crank the engine or start the engine and observe the reading on the fuel pressure gauge.

Does the fuel pressure read between 4.0 bar (58 psi) and 5.5 (79.7 psi)?

No, pressure reading is below specification:

- Go To 2

2. CHECK THE FUEL SUPPLY PRESSURE AT FUEL FILTER INLET

1. Turn the ignition off.
2. Remove the fuel pressure gauge from between the Fuel Filter outlet and the High Pressure Fuel Pump. Reconnect the fuel line.
3. Disconnect the fuel supply line quick connect at the Fuel Filter inlet.
4. Connect the fuel pressure gauge in-line between the fuel supply line and the Fuel Filter inlet fitting.
5. Crank the engine or start the engine and observe the reading on the fuel pressure gauge.

Does the fuel pressure read 4.0 bar (58 psi) or above?

Yes

- Replace the Fuel Filter in accordance with the service information.
- Perform the PCM VERIFICATION TEST - 2.0L DIESEL. Refer to **PCM VERIFICATION TEST - 2.0L DIESEL** .

No

- Perform the CHECKING THE FUEL DELIVERY SYSTEM test procedure. Refer to **DIAGNOSIS AND TESTING** .

REMOVAL

REMOVAL

WARNING: No sparks, open flames or smoking. Risk of poisoning from inhaling and swallowing fuel. Risk of injury to eyes and skin from contact with fuel. Pour fuels only into suitable and appropriately marked containers. Wear protective clothing.

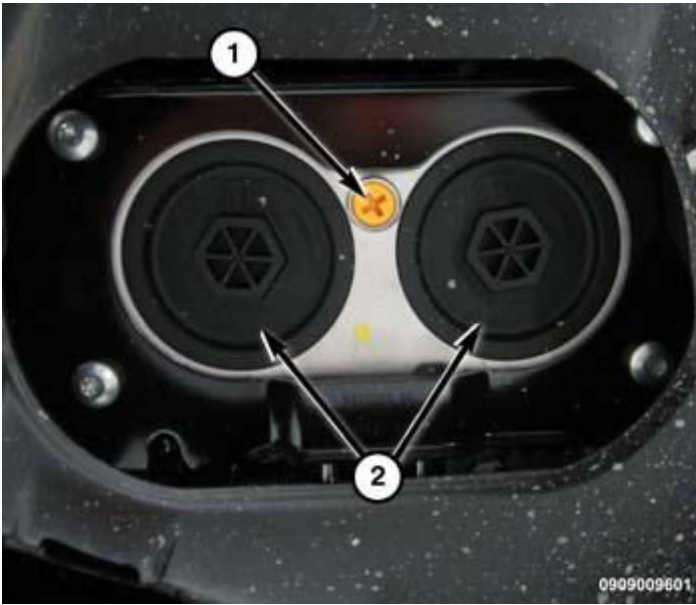


Fig. 238: Drain Plugs

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
3. Loosen drain plug (1) and drain fuel filter/water separator into a suitable container.
4. Securely tighten drain plug (1).

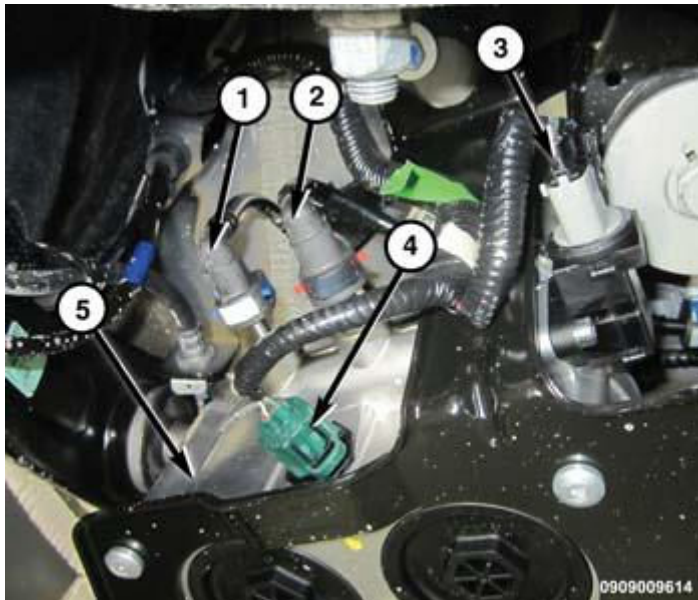
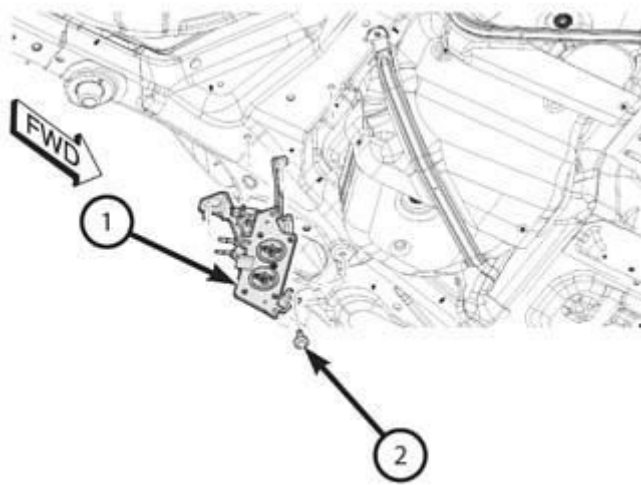


Fig. 239: WIF Sensor Wire Harness Connector

Courtesy of CHRYSLER GROUP, LLC

5. Disconnect the fuel filter/water separator outlet fuel line (1). Refer to **FITTING, QUICK CONNECT**.

6. Disconnect the fuel filter/water separator inlet fuel line (2). Refer to **FITTING, QUICK CONNECT** .
7. Disconnect the Water In Fuel (WIF) sensor harness connector (4).
8. Disconnect the combination fuel heater/temperature sensor wire harness connector (3).



0709009921

Fig. 240: WIF Sensor Assembly & Bolt
Courtesy of CHRYSLER GROUP, LLC

9. Remove bolts (2) and the fuel filter/water separator assembly (1).

INSTALLATION

INSTALLATION

WARNING: No sparks, open flames or smoking. Risk of poisoning from inhaling and swallowing fuel. Risk of injury to eyes and skin from contact with fuel. Pour fuels only into suitable and appropriately marked containers. Wear protective clothing.

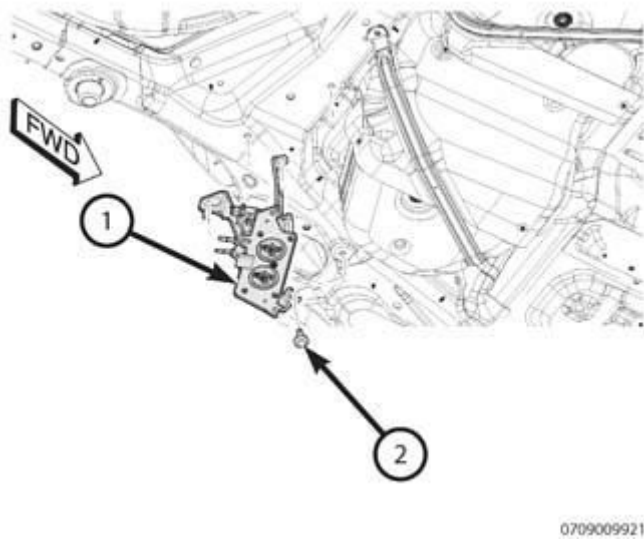


Fig. 241: WIF Sensor Assembly & Bolt
Courtesy of CHRYSLER GROUP, LLC

1. Install the fuel filter/water separator assembly (1). Tighten bolts (2) to 55 N.m (41 ft. lbs.).

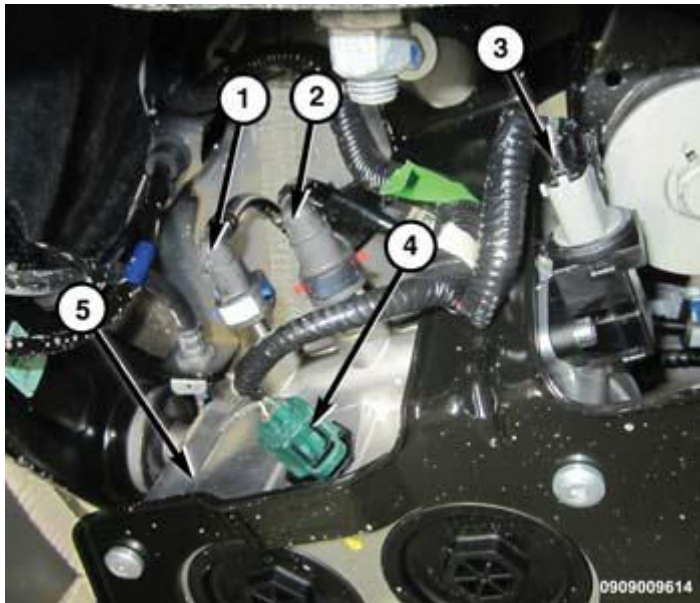


Fig. 242: WIF Sensor Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

2. Connect the combination fuel heater/temperature sensor wire harness connector (3).
3. Connect the Water In Fuel (WIF) sensor wire harness connector (4).
4. Connect the fuel filter/water separator inlet fuel line (2).
5. Connect the fuel filter/water separator outlet fuel line (1).

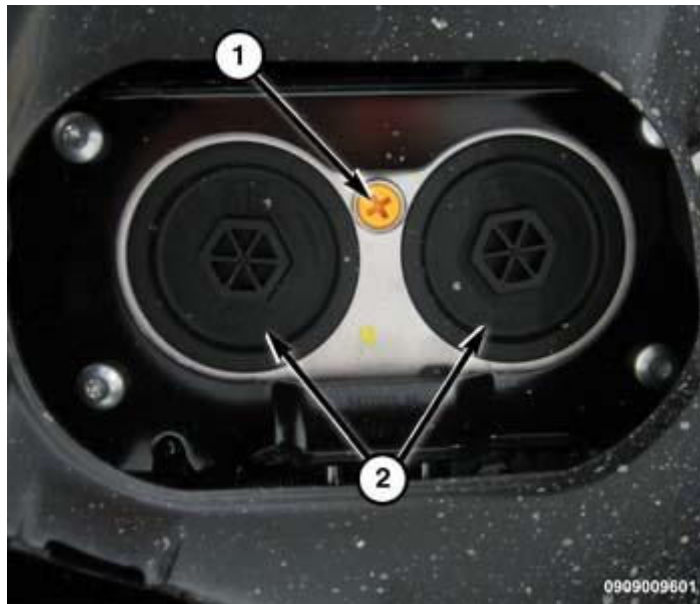


Fig. 243: Drain Plugs

Courtesy of CHRYSLER GROUP, LLC

6. Make sure fuel filter drain port (2) is closed.
7. Lower the vehicle.
8. Connect the negative battery cable.
9. Start the engine and inspect for leaks.

SOLENOID, FUEL QUANTITY

DESCRIPTION

DESCRIPTION

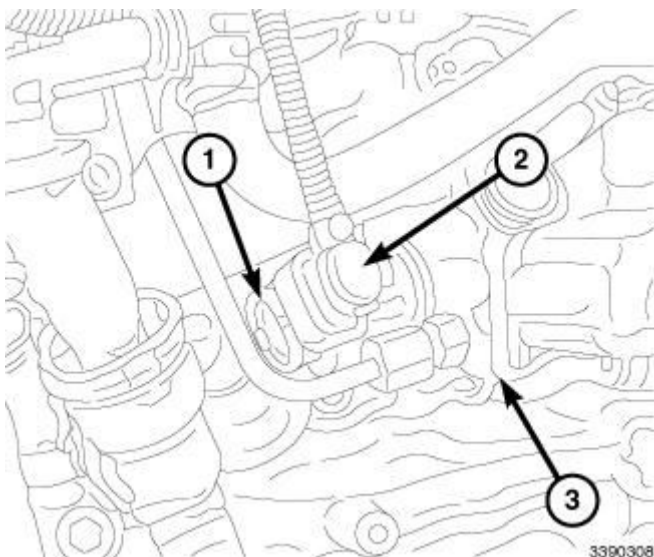


Fig. 244: Fuel Quantity Solenoid, Connector & High Pressure Fuel Injection Pump
Courtesy of CHRYSLER GROUP, LLC

The Fuel Quantity Solenoid (FQS) (1) is mounted to the back of the High Pressure Fuel Injection Pump (HPFIP) (3). The FQS controls the quantity of fuel entering the HPFIP internal pumping chambers.

OPERATION

OPERATION

The Fuel Quantity Solenoid (FQS) controls the quantity of fuel entering the High Pressure Fuel Injection Pump (HPFIP) internal pumping chambers. The PCM determines the fuel pressure needs of the fuel injection system based upon internal programming and numerous sensor inputs. The PCM then controls the FQS as needed to maintain the appropriate injection system operating pressure by directing fuel pressurized by the pump into either the high pressure fuel circuit or the fuel return circuit.

The FQS and control circuits are continuously monitored by the PCM. If the PCM detects a problem in any monitored circuit, it will store a Diagnostic Trouble Code (DTC) in its memory circuits. Such a DTC can be retrieved from the PCM through the Controller Area Network (CAN) data bus using a diagnostic scan tool connected to the Data Link Connector (DLC).

The FQS and the hard wired circuits between the solenoid and the PCM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the fuel quantity solenoid or the electronic controls or communication between other modules and devices that provide some features of the fuel injection system. The most reliable, efficient, and accurate means to diagnose the fuel quantity solenoid or the electronic controls and communication related to fuel injection system operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

REMOVAL

WARNING: No sparks, open flames or smoking. Risk of poisoning from inhaling and swallowing fuel. Risk of injury to eyes and skin from contact with fuel. Pour fuels only into suitable and appropriately marked containers. Wear protective clothing.

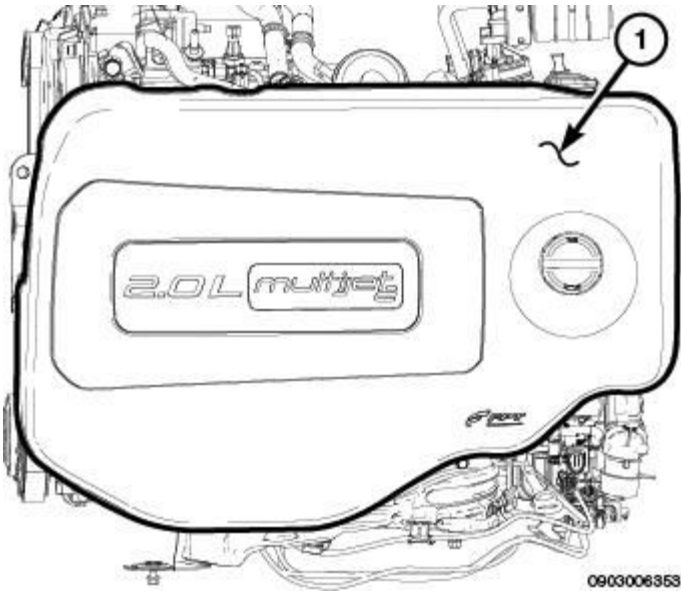


Fig. 245: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

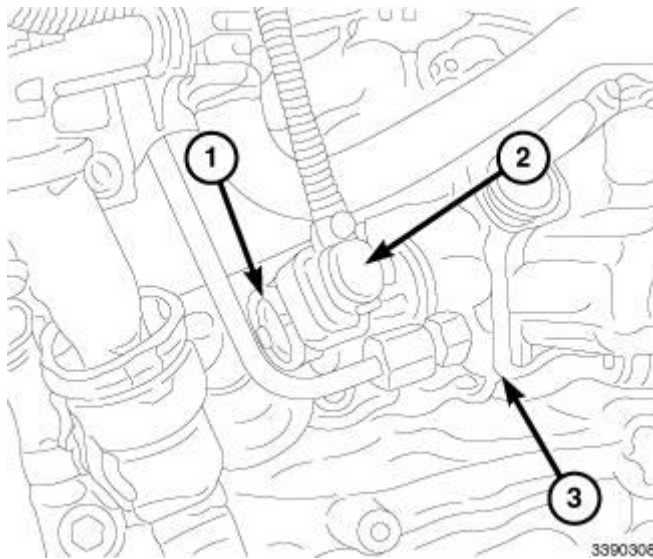


Fig. 246: Fuel Quantity Solenoid, Connector & High Pressure Fuel Injection Pump

Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the fuel quantity solenoid wire harness connector (2).

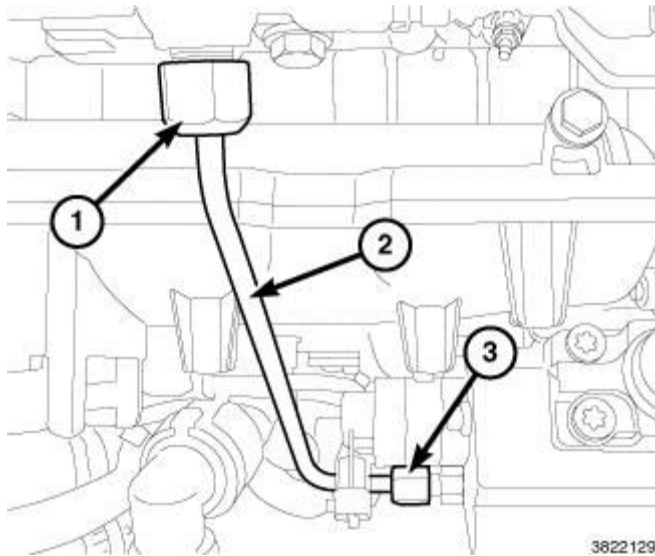


Fig. 247: Fuel Tube, Fuel Injection Pump & Fuel Rail
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Counter hold union connections with a wrench and **DO NOT EXCEED** the recommended tightening torque in order to avoid also loosening the threaded connection between the union and the fuel injection pump.

4. Unscrew union nuts (1) at the fuel rail.
5. Using a wrench to counter hold fitting, unscrew the union nut (3) from the fuel injection pump outlet port and discard the fuel tube (2).

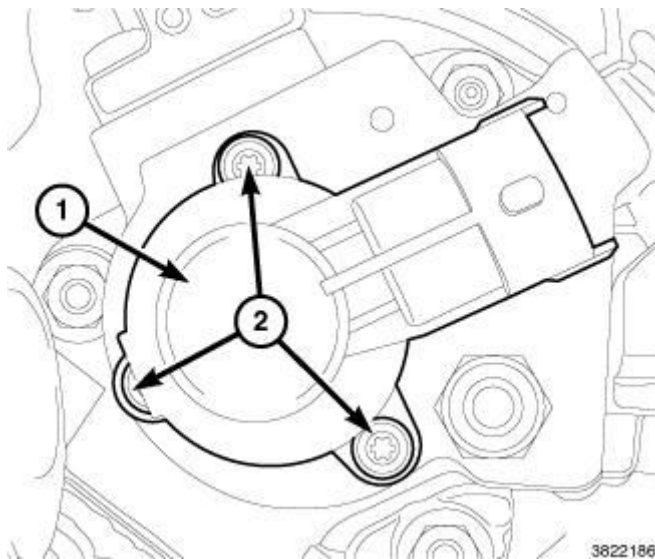


Fig. 248: Fuel Quantity Solenoid
Courtesy of CHRYSLER GROUP, LLC

6. Remove fasteners (2) and the fuel quantity solenoid (1).

INSTALLATION

INSTALLATION

WARNING: No sparks, open flames or smoking. Risk of poisoning from inhaling and swallowing fuel. Risk of injury to eyes and skin from contact with fuel. Pour fuels only into suitable and appropriately marked containers. Wear protective clothing.

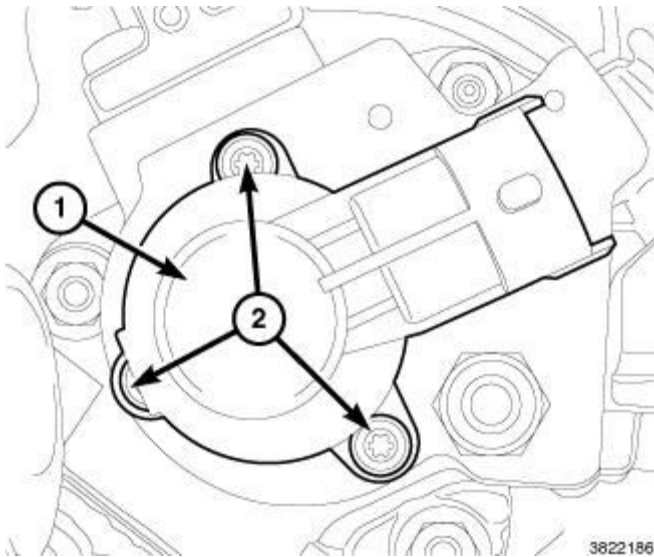


Fig. 249: Fuel Quantity Solenoid
Courtesy of CHRYSLER GROUP, LLC

1. Clean sealing surfaces.
2. Install new O-ring seals onto the fuel quantity solenoid (1).
3. Install the fuel quantity solenoid (1) and securely tighten fasteners (2).

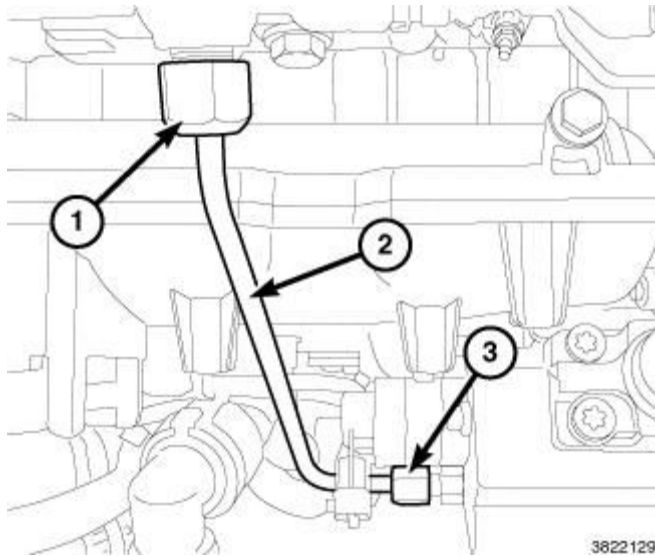


Fig. 250: Fuel Tube, Fuel Injection Pump & Fuel Rail
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Counter hold union connections with a wrench and **DO NOT EXCEED** the recommended tightening torque in order to avoid also loosening the threaded connection between the union and the fuel injection pump.

CAUTION: **DO NOT** crimp or bend the high pressure fuel tubes.

NOTE: High pressure fuel tubes from the fuel injection pressure pump to the fuel rail or from the fuel rail to the fuel injector must be replaced with new units if removed.

4. Install new fuel tube (2) between the fuel injection pump (3) and the fuel rail (1). Tighten the union nuts to:
 - Step 1 Tighten the union nut (1) at fuel rail to 20 N.m (177 in. lbs.).
 - Step 2 Using a wrench to counter hold fitting, tighten union nut (3) at the fuel injection pump to 24 N.m (18 ft. lbs.).

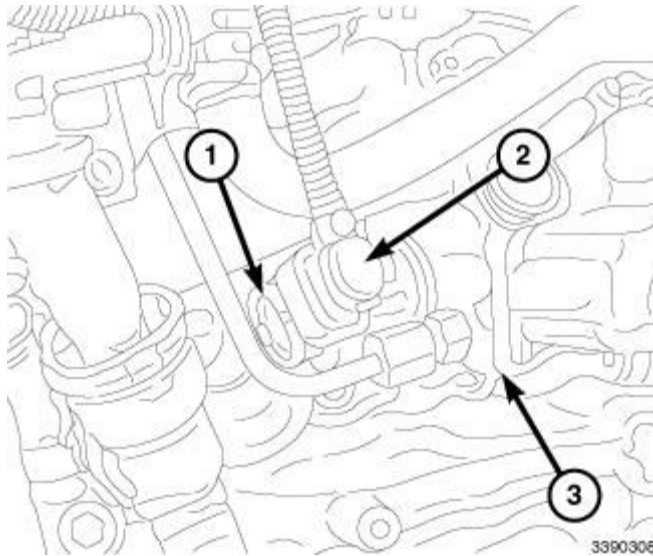


Fig. 251: Fuel Quantity Solenoid, Connector & High Pressure Fuel Injection Pump
Courtesy of CHRYSLER GROUP, LLC

5. Connect the fuel quantity solenoid wiring harness connector (2).

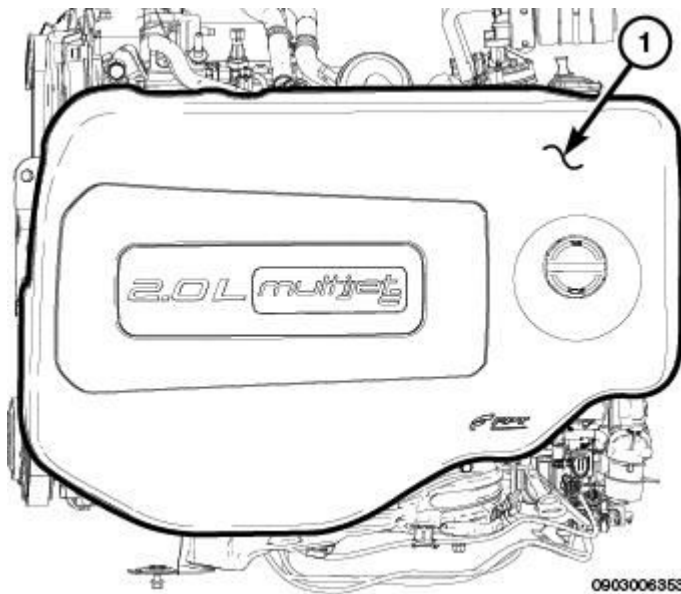


Fig. 252: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

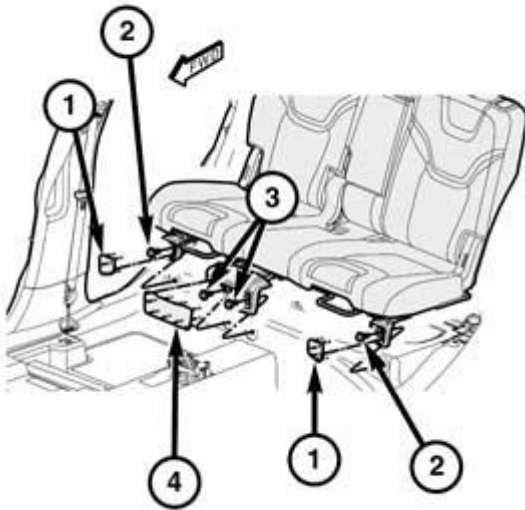
6. Connect the negative battery cable.
7. Start the engine and inspect for leaks.
8. Install the engine cover (1).

TANK, FUEL

REMOVAL

REMOVAL

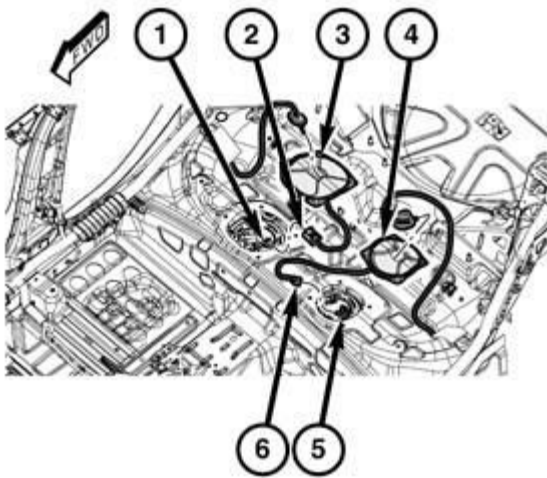
WARNING: The fuel system is under constant pressure even with engine OFF. Until the fuel pressure has been properly relieved from the system, do not attempt to open the fuel system.



0909005843

Fig. 253: Removing/Installing Rear Seat
Courtesy of CHRYSLER GROUP, LLC

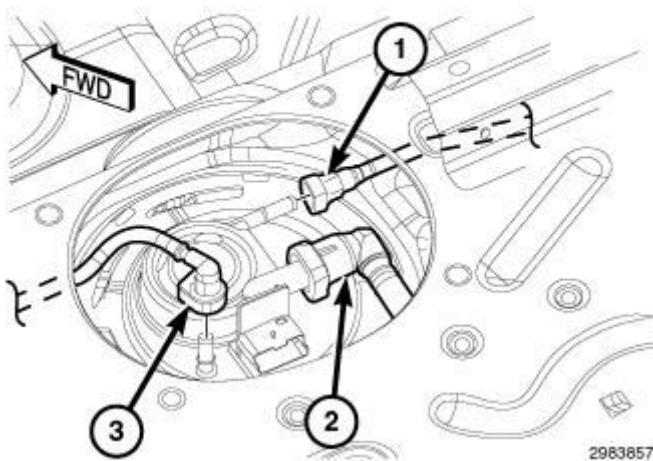
1. Drain the fuel from the fuel tank. Refer to **FUEL DELIVERY - STANDARD PROCEDURE** .
2. Disconnect and isolate the battery negative cable.
3. Remove the rear seat. Refer to **SEAT, REAR, REMOVAL** .



0909005834

Fig. 254: Fuel Module Access Covers & Wire Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

4. Remove the carpet piece covering the access covers for fuel pumps.
5. Remove screws and lift up on the fuel pump module access cover (3, 4) and disconnect the wire harness connector (2, 6).



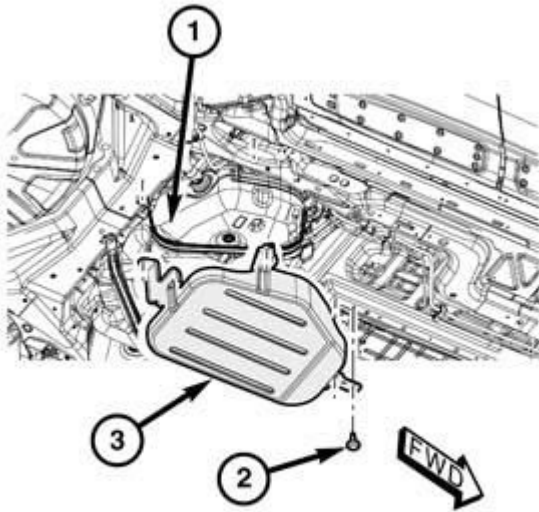
2963857

Fig. 255: Fuel Supply, Return & Vapor Lines
Courtesy of CHRYSLER GROUP, LLC

6. Disconnect vapor line (1, 3) and the fuel line (2) quick connect fittings. Refer to **FITTING, QUICK**

CONNECT .

7. Remove the exhaust pipes from the vehicle. Refer to **PIPE, EXHAUST, REMOVAL** .
8. If equipped with All-Wheel Drive (AWD), remove the rear propeller shaft.



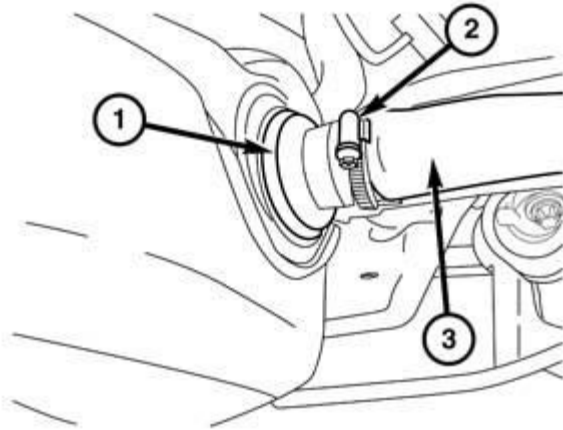
0909005839

Fig. 256: Skid Plate

Courtesy of CHRYSLER GROUP, LLC

NOTE: Right side shown in illustration in illustration, left side similar.

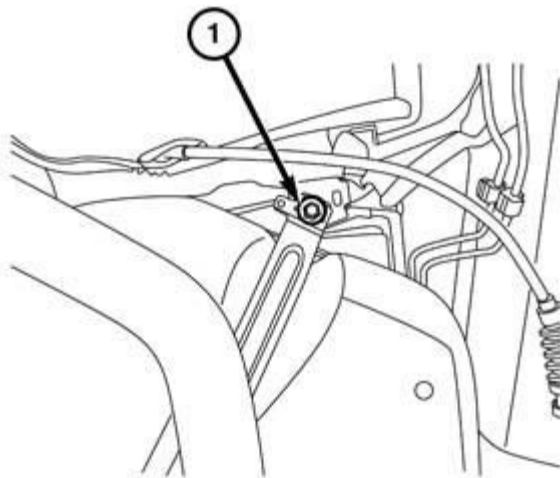
9. If equipped AWD, remove bolts (2) and the right and left fuel tank shields (3).
10. Remove the right and left underbody shield.



140169664

Fig. 257: Fuel Tank, Filler Tube & Hose Clamp
Courtesy of CHRYSLER GROUP, LLC

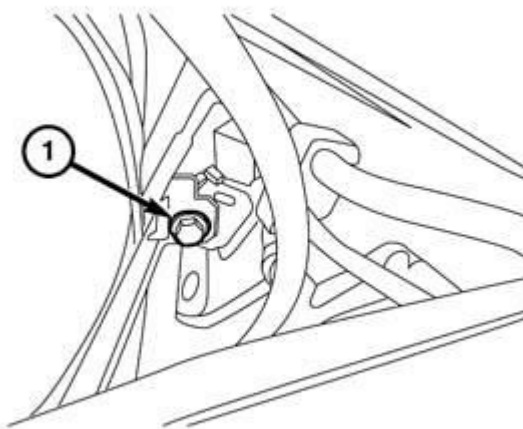
11. Loosen clamp (3) and disconnect the fuel filler tube (3) from fuel tank (1).
12. Disconnect the fuel filler tube vent line (2) and the fuel tank recirculation line (3) quick connect fittings. Refer to **FITTING, QUICK CONNECT** .
13. Use a transmission jack to support the fuel tank (1).



140170151

Fig. 258: Left Fuel Tank Strap Bolt
Courtesy of CHRYSLER GROUP, LLC

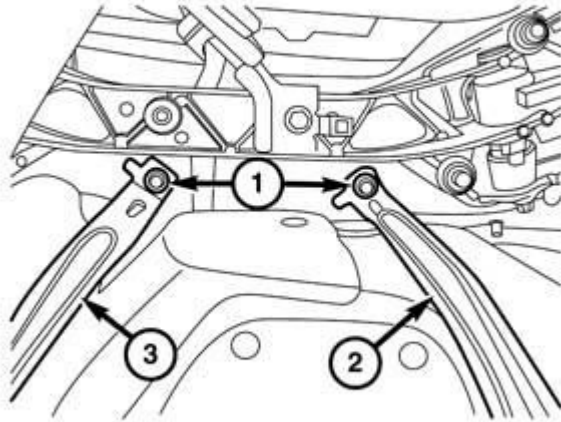
14. Remove the left fuel tank strap bolt (1).



140170153

Fig. 259: Right Fuel Tank Strap Bolt
Courtesy of CHRYSLER GROUP, LLC

15. Remove the right fuel tank strap bolt (1).



140170152

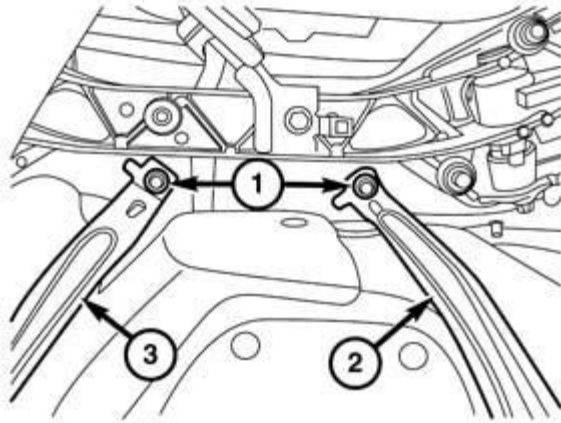
Fig. 260: Fuel Tank Straps & Bolts
Courtesy of CHRYSLER GROUP, LLC

16. Remove bolt (1) and the left fuel tank strap (3).
17. Remove bolt (1) and the right fuel tank strap (2).
18. Lower the fuel tank far enough to access and disconnect the underbody wire harness connector from the fuel pump module.
19. Continue lowering the fuel tank for removal.
20. If the fuel tank is being replaced, remove the main and auxiliary fuel pump modules from the fuel tank for transfer to the new tank. Refer to **MODULE, FUEL PUMP, REMOVAL**.
21. If fuel tank is being replaced, remove the shield (1) from the fuel tank (2) for transfer to the new tank.

INSTALLATION

INSTALLATION

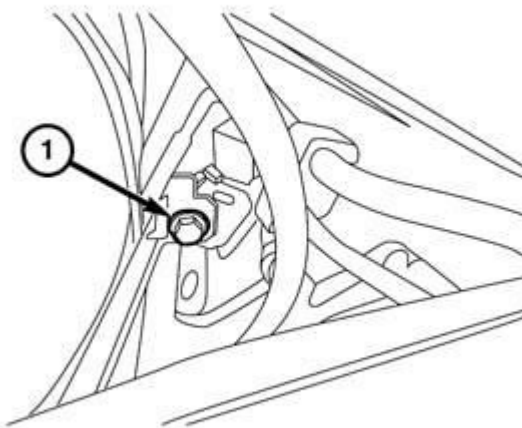
1. If a new fuel tank is being installed, transfer the shield (1) to the fuel tank (2) from the removed tank.
2. If a new fuel tank is being installed, install the fuel pump module (Front-Wheel Drive/FWD) or the main and auxiliary fuel pump modules (All-Wheel Drive/AWD) into the new fuel tank from the removed tank. Refer to **MODULE, FUEL PUMP, INSTALLATION**.
3. Position the fuel tank onto a transmission jack.
4. Raise the fuel tank close enough to the vehicle underbody to connect the fuel pump module harness connector.



140170152

Fig. 261: Fuel Tank Straps & Bolts
Courtesy of CHRYSLER GROUP, LLC

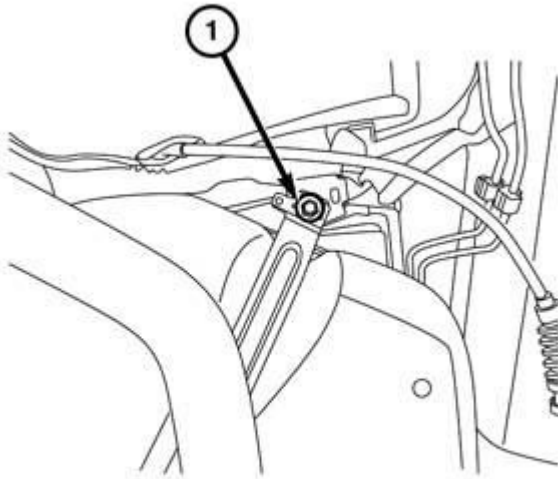
5. Complete raising the fuel tank (1) into position against the vehicle underbody.
6. Install the right fuel tank strap (3). Tighten rear bolt (1) to 22 N.m (16 ft. lbs.).
7. Install the left fuel tank strap (2). Tighten rear bolt (1) to 22 N.m (16 ft. lbs.).



140170153

Fig. 262: Right Fuel Tank Strap Bolt
Courtesy of CHRYSLER GROUP, LLC

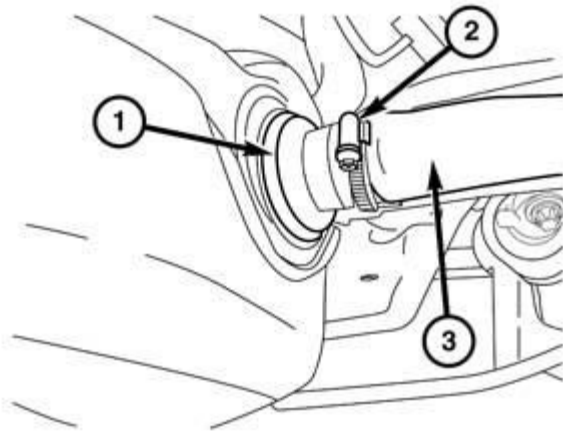
8. Install the right fuel tank strap bolt (1) and tighten to 22 N.m (16 ft. lbs.).



140170151

Fig. 263: Left Fuel Tank Strap Bolt
Courtesy of CHRYSLER GROUP, LLC

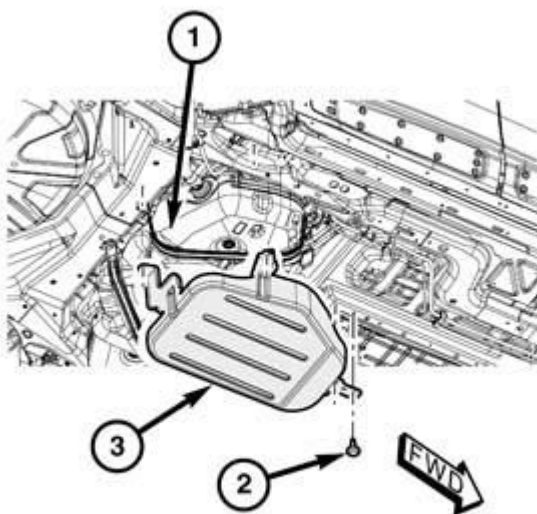
9. Install the left fuel tank strap bolt (1) and tighten to 22 N.m (16 ft. lbs.).
10. Remove the transmission jack.



140169664

Fig. 264: Fuel Tank, Filler Tube & Hose Clamp
 Courtesy of CHRYSLER GROUP, LLC

11. Connect the fuel filler tube vent line and the fuel tank recirculation line quick connect fittings.
12. Connect the fuel filler tube (3) to the fuel tank (1). Tighten clamp to 3 N.m (27 in. lbs.).
13. Install the left and right underbody shield.



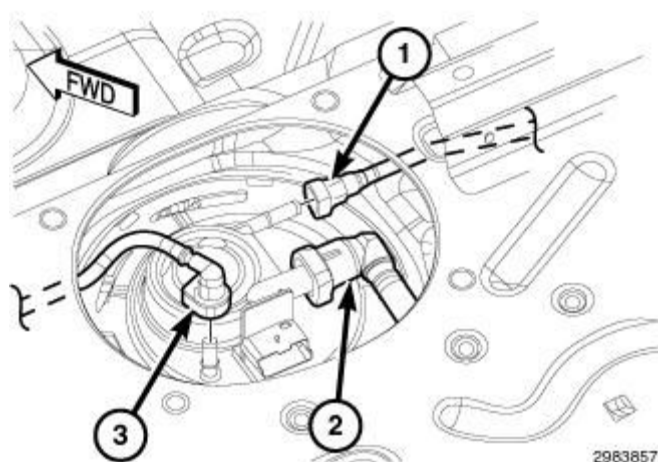
0909005839

Fig. 265: Skid Plate

Courtesy of CHRYSLER GROUP, LLC

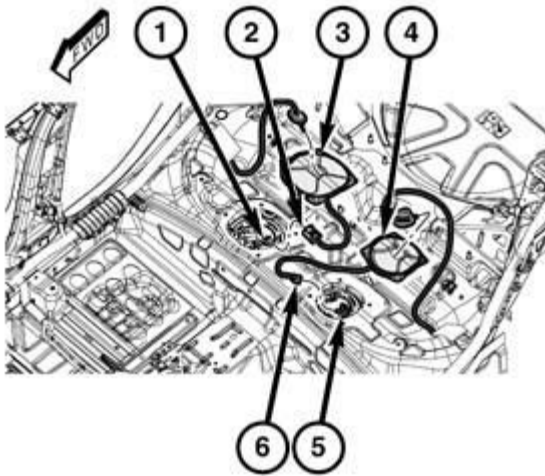
NOTE: Right side shown in illustration, left side similar.

14. If equipped, Install the right and left fuel tank shields (3). Tighten bolts (2) to 55 N.m 41 ft. lbs.).
15. If equipped with All-Wheel Drive (AWD), reinstall the rear propeller shaft.
16. Install the exhaust pipes to the vehicle. Refer to **PIPE, EXHAUST, INSTALLATION** .

**Fig. 266: Fuel Supply, Return & Vapor Lines**

Courtesy of CHRYSLER GROUP, LLC

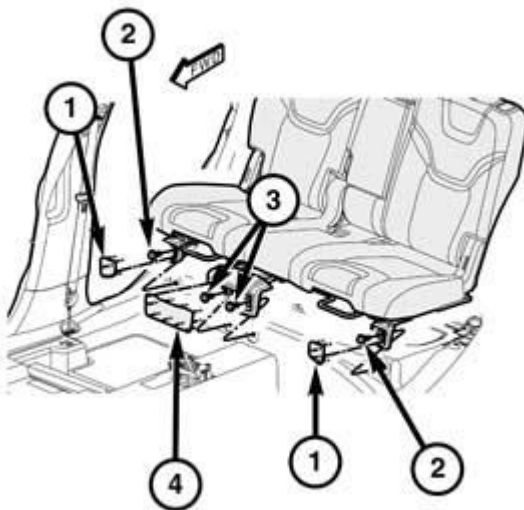
17. Connect the fuel line (2) and vapor line (1, 2) quick connect fittings.



0909005834

Fig. 267: Fuel Module Access Covers & Wire Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

18. Connect the fuel pump module wire harness connector (2, 6). Install the access cover (3, 4) and securely tighten the screws.
19. Install the carpet piece covering the access covers for fuel pumps.



0909005843

Fig. 268: Removing/Installing Rear Seat
Courtesy of CHRYSLER GROUP, LLC

20. Install the rear seat. Refer to SEAT, REAR, INSTALLATION .
21. Fill the fuel tank.
22. Connect the battery negative cable.
23. Use a diagnostic scan tool to pressurize the fuel system.
24. Check the fuel system carefully for leaks.

TUBE(S), FUEL, HIGH PRESSURE

REMOVAL

REMOVAL

WARNING: Observe the following precautions when working on fuel systems: No sparks, open flames or smoking. Avoid inhaling and swallowing fuel. Avoid eye and skin contact with fuel. Pour fuels only into suitable and appropriately marked containers. Wear protective clothing. Failure to observe these precautions may result in fire, explosion, property damage, and serious or fatal injury.

WARNING: High pressure fuel lines deliver diesel fuel under extreme pressure from the injection pump to the fuel rail and from the fuel rail to the fuel injectors. This pressure may be as high as 1600 bar (23, 206 psi). Use extreme caution when inspecting for high pressure fuel leaks. Fuel under this amount of pressure can penetrate skin causing personal injury or death. Inspect for high pressure fuel leaks with a sheet of cardboard. Wear safety goggles and adequate protective clothing when servicing the high pressure circuits of the fuel system.

NOTE: High pressure fuel tubes from the fuel injection pressure pump to the fuel rail or from the fuel rail to the fuel injector must be replaced with new units if removed.

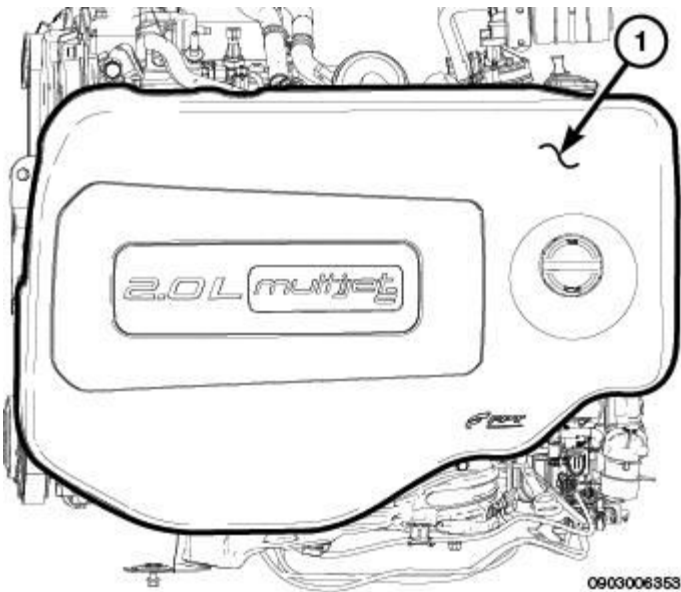


Fig. 269: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

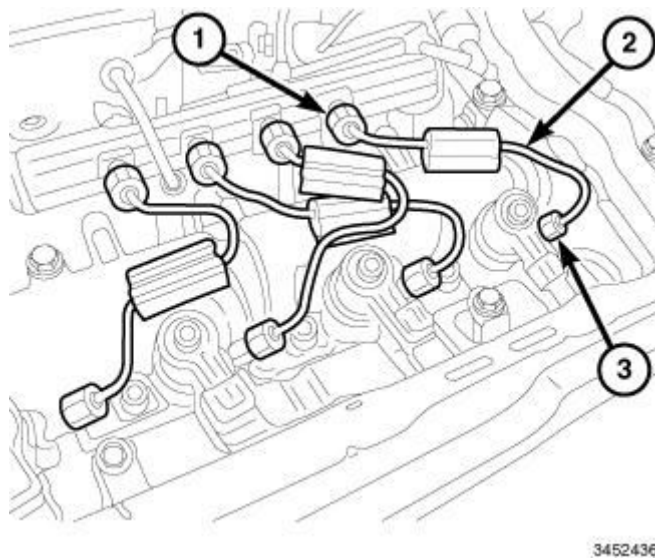


Fig. 270: High Pressure Fuel Tubes

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Counter hold union connections with a wrench at the fuel injectors. **DO NOT EXCEED** the recommended tightening torque in order to avoid also loosening the threaded connection between the union and the fuel injector.

CAUTION: DO NOT crimp or bend the high pressure fuel tubes.

NOTE: After removing high pressure fuel tubes from the fuel system, be certain to seal the connections to maintain and ensure system cleanliness.

3. Unscrew union nuts (1 and 3) and the discard high pressure fuel tubes (2).

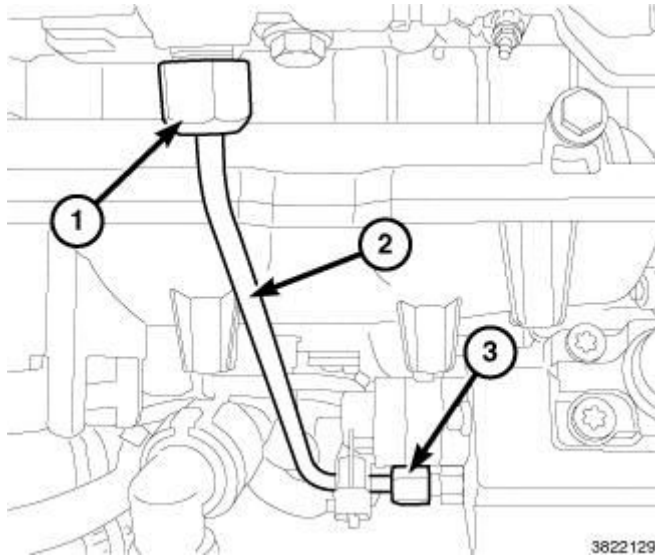


Fig. 271: Fuel Tube, Fuel Injection Pump & Fuel Rail
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Counter hold union connections with a wrench and **DO NOT EXCEED** the recommended tightening torque in order to avoid also loosening the threaded connection between the union and the fuel injection pump.

4. Unscrew union nuts (1) at the fuel rail.
5. Using a wrench to counter hold fitting, unscrew the union nut (3) from the fuel injection pump outlet port and discard the fuel tube (2).

INSTALLATION

INSTALLATION

WARNING: Observe the following precautions when working on fuel systems: No sparks, open flames or smoking. Avoid inhaling and swallowing fuel. Avoid eye and skin contact with fuel. Pour fuels only into suitable and appropriately marked containers. Wear protective clothing. Failure to observe these precautions may result in fire, explosion, property damage, and serious or fatal injury.

WARNING: High pressure fuel lines deliver diesel fuel under extreme pressure from the injection pump to the fuel rail and from the fuel rail to the fuel injectors. This pressure may be as high as 1600 bar (23, 200 psi). Use extreme caution when inspecting for high pressure fuel leaks. Fuel under this amount of pressure can penetrate skin causing personal injury or death. Inspect for high pressure fuel leaks with a sheet of cardboard. Wear safety goggles and adequate protective clothing when servicing the high pressure circuits of the fuel system.

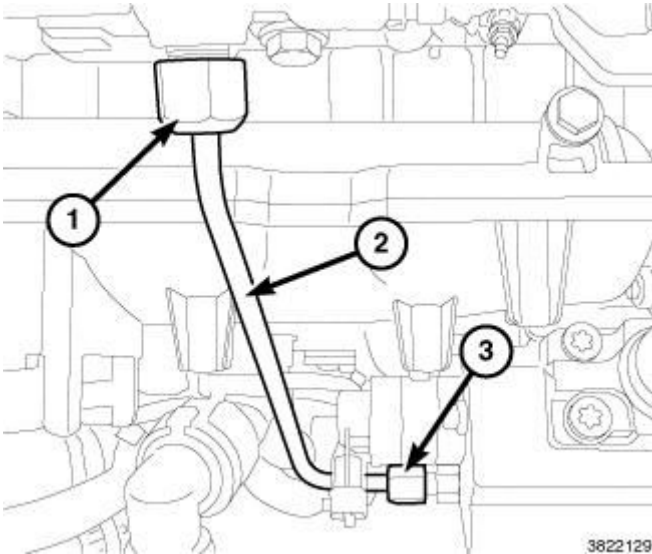


Fig. 272: Fuel Tube, Fuel Injection Pump & Fuel Rail
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Counter hold union connections with a wrench and **DO NOT EXCEED** the recommended tightening torque in order to avoid also loosening the threaded connection between the union and the fuel injection pump.

CAUTION: **DO NOT** crimp or bend the high pressure fuel tubes.

NOTE: High pressure fuel tubes from the fuel injection pressure pump to the fuel rail or from the fuel rail to the fuel injector must be replaced with new units if removed.

1. Loosen the fuel rail mounting screws to ease the positioning of the new high pressure fuel tube.
2. Position the new fuel tube between the fuel injection pressure pump and the fuel rail. Tighten the union nuts to:
 - Step 1 Tighten the union nut (1) at fuel rail to 20 N.m (177 in. lbs.).
 - Step 2 Using a wrench to counter hold fitting, tighten union nut (3) at the high pressure pump to 24 N.m (18 ft. lbs.).

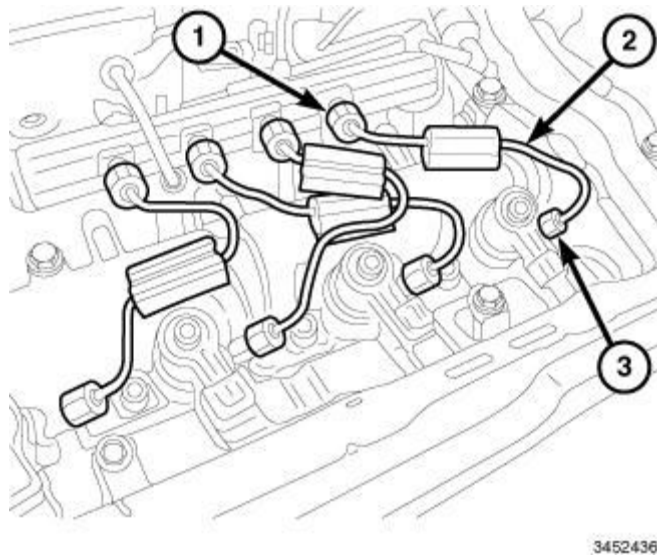


Fig. 273: High Pressure Fuel Tubes
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Counter hold union connections with a wrench at the fuel injectors. **DO NOT EXCEED** the recommended tightening torque in order to avoid also loosening the threaded connection between the union and the fuel injector.

3. Position the new fuel tubes (2) between the fuel injectors and the fuel rail. Tighten the union nuts to:
 - Step 1 Tighten the union nut at fuel rail (1) to 20 N.m (177 in. lbs.).
 - Step 2 Tighten the union nut at fuel injector (3) to 24 N.m (18 ft. lbs.).
4. Tighten the fuel rail mounting screws to 25 N.m (18 ft. lbs.).

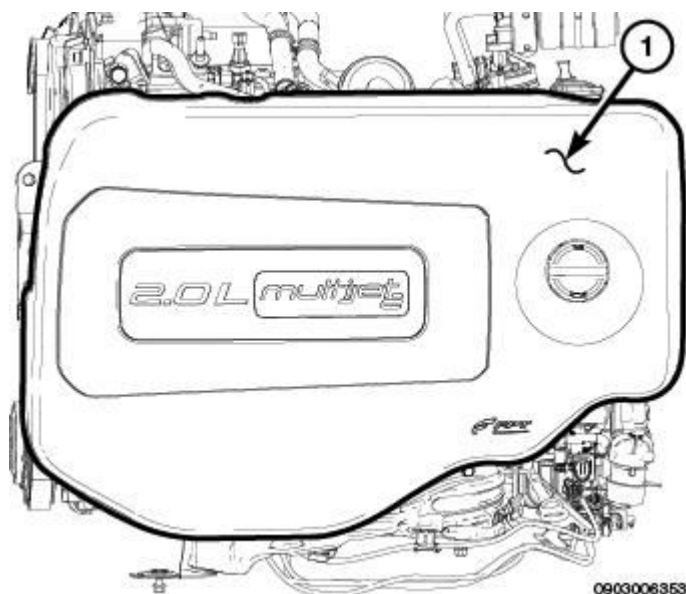


Fig. 274: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

5. Connect the negative battery cable.
6. Start the engine and inspect all of the high pressure fuel tube connections for leaks.
7. Install the engine cover (1).

TUBE, FUEL TANK FILLER

REMOVAL

REMOVAL

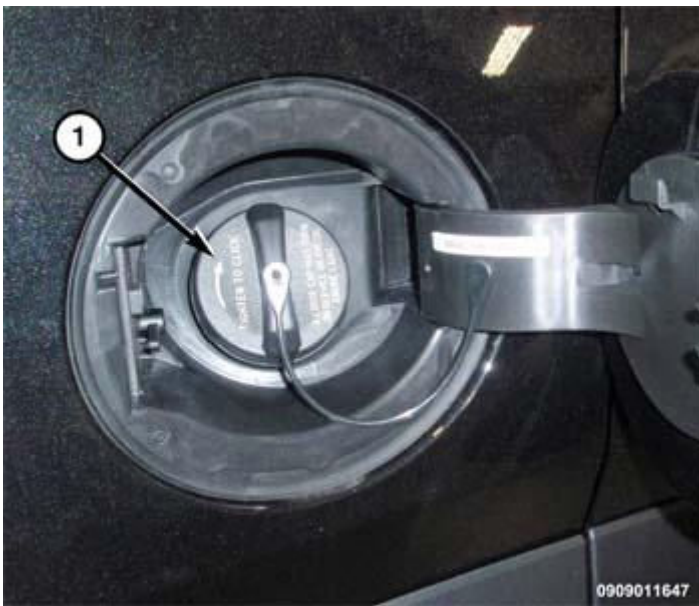
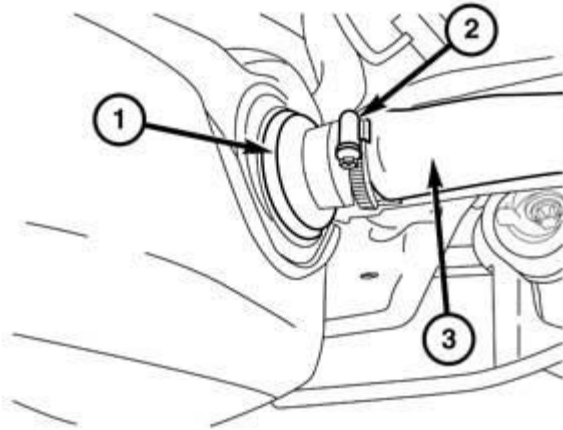


Fig. 275: Fuel Cap

Courtesy of CHRYSLER GROUP, LLC

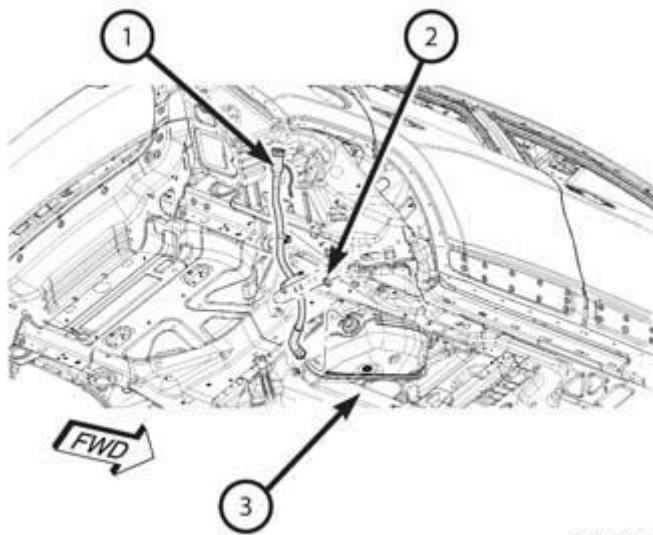
1. Disconnect and isolate the negative battery cable.
2. Remove the fuel cap (1).



140169664

Fig. 276: Fuel Tank, Filler Tube & Hose Clamp
 Courtesy of CHRYSLER GROUP, LLC

3. Remove the right rear wheelhouse splash shield. Refer to **SHIELD, SPLASH, REAR WHEELHOUSE, REMOVAL** .
4. Loosen the hose clamp (2) and remove the fuel filler tube (3) from the fuel tank (1).



0709009920

Fig. 277: Fuel Door Housing Assembly & Mounting Bracket Nut
 Courtesy of CHRYSLER GROUP, LLC

5. Remove filler tube mounting bracket nut (2).

6. Remove the fuel filler tube from fuel door housing assembly (1).

INSTALLATION

INSTALLATION

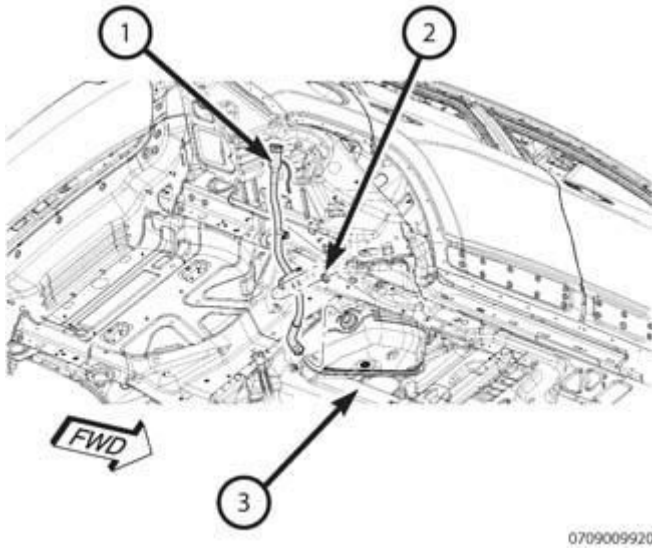


Fig. 278: Fuel Door Housing Assembly & Mounting Bracket Nut
 Courtesy of CHRYSLER GROUP, LLC

1. Install fuel filler tube (1) to the fuel door housing assembly.
2. Install filler tube mounting bracket nut (2). Tighten bolt to 8 N.m (71 in. lbs.).

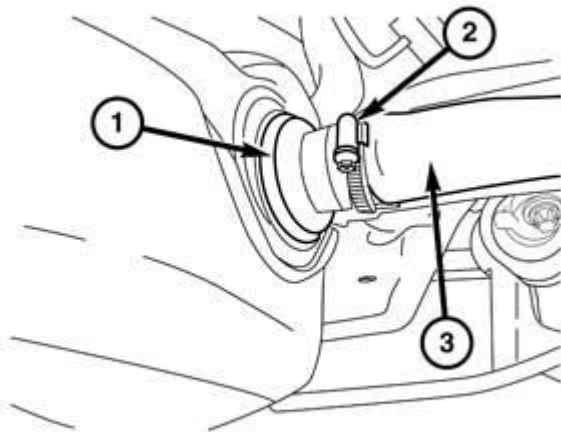


Fig. 279: Fuel Tank, Filler Tube & Hose Clamp
Courtesy of CHRYSLER GROUP, LLC

3. Install fuel filler tube (1) to the fuel tank (3). Tighten hose clamp (4) to 3 N.m (27 in. lbs.).
4. Install the right rear wheelhouse splash shield. Refer to **SHIELD, SPLASH, REAR WHEELHOUSE, INSTALLATION**.

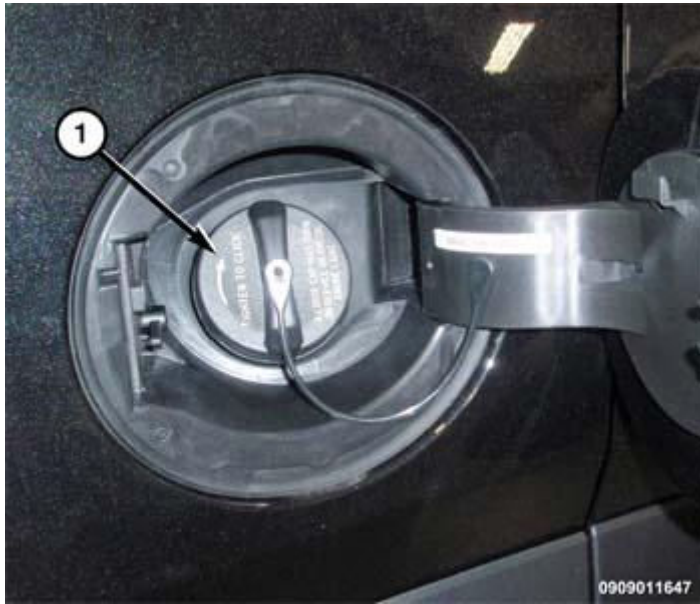


Fig. 280: Fuel Cap
Courtesy of CHRYSLER GROUP, LLC

5. Install the fuel cap (1).
6. Connect the negative battery cable.

FUEL INJECTION, DIESEL

OPERATION

OPERATION

A vehicle that is not properly tuned and maintained cannot be expected to perform at its maximum efficiency and can have an adverse effect on fuel economy. The following recommendations will ensure that the vehicle is performing at its maximum efficiency:

- **Use the recommended motor oil grade.** Using the manufacturer's recommended grade of Mopar® motor oil can improve fuel mileage by 1-2%. Mopar® motor oil labeled "Energy Conserving" contains friction-reducing additives.
- **Check and replace air filters.** Replacing a clogged air filter with a new Mopar® air filter can improve fuel mileage by as much as 10%.
- **Keep the engine tuned.** Repairing a vehicle that is noticeably out of tune can improve fuel mileage by an

2014 Jeep Cherokee Trailhawk

2014 ENGINE Fuel System - Cherokee

average of 4%. Maintaining a vehicle and repairing problems, such as a faulty oxygen sensor, can improve mileage by as much as 40%.

- **Keep tires properly inflated.** Under inflated tires can lower fuel mileage by 0.4% for every 1 psi drop in pressure of all four tires.

SPECIFICATIONS

TORQUE - FUEL INJECTION

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Accelerator Pedal Position Sensor Nuts	18	-	159
Crankshaft Position Sensor Bolt	9	-	80
Fuel Injector Tensioning Claw Nut	28	21	-
High Pressure Fuel Tube at Fuel Injector Union Nut	24	18	-
High Pressure Tube at Fuel Rail Union Nut	20	-	177
Oxygen Sensor	45	33	-

SPECIAL TOOLS

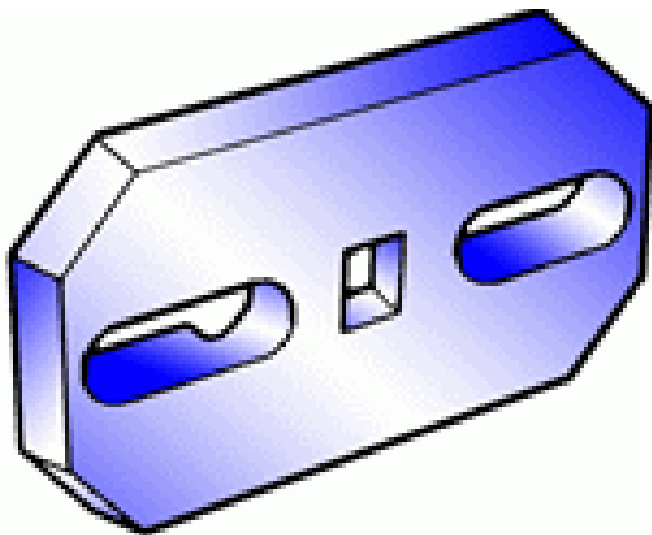
SPECIAL TOOLS



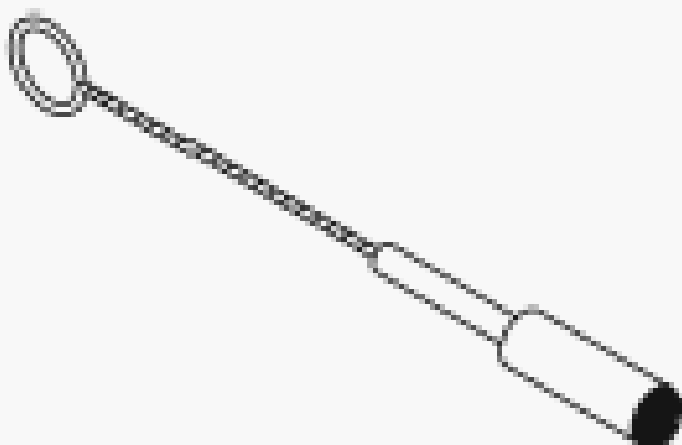
20125 - Tool, Flywheel Injector Removal

2014 Jeep Cherokee Trailhawk

2014 ENGINE Fuel System - Cherokee



20134 - Tool, Fuel Injector Remover

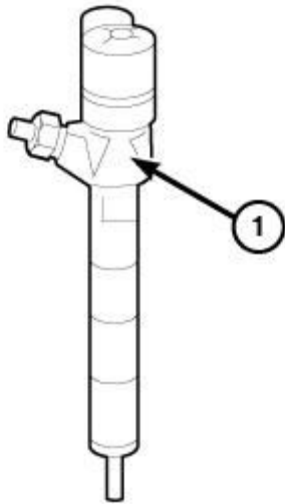


9717 - Brush, Injector Bore
(Originally Shipped In Kit Number(s)
9910.)

INJECTOR(S), FUEL

DESCRIPTION

DESCRIPTION



3458585

Fig. 281: Fuel Injectors**Courtesy of CHRYSLER GROUP, LLC**

There are four individual fuel injectors (1) for all four cylinders. These fuel injectors (1) are used to deliver atomized fuel into the combustion chamber. They also pressurize the fuel and meter the fuel.

OPERATION**OPERATION**

The Common Rail system makes it possible to carry out a pre-injection (pilot injection) before T.D.C. This has the advantage of reducing the pressure shift in the combustion chamber, thus reducing the combustion noise typical of direct injection engines. The control unit controls the quantity of fuel injected, regulating the line pressure and injection times.

The control unit processes the following information in order to control the quantity of fuel to inject:

- Engine RPM;
- Coolant Temperature;
- Turbocharging Pressure;
- Air Temperature;
- Aspirated Air Quantity;
- Battery Voltage;
- Diesel Pressure;
- Accelerator Pedal Position.

STANDARD PROCEDURE**STANDARD PROCEDURE - CLEANING FUEL INJECTORS**

NOTE: Before cleaning the injector recesses, seal the injector holes in the injector recesses with the appropriate pin to prevent debris from falling into the recesses and entering the motor.

1. Seal the injector holes inside the cylinder head recesses.



Fig. 282: Special Tool #9717 Injector Bore Brush
Courtesy of CHRYSLER GROUP, LLC

2. Clean the bottom of the cylinder recess with the Injector Bore Brush (special tool #9717, Brush, Injector Bore).
3. Blow out the recess and clean again with a non-woven cloth and cover over.
4. Perform these steps for each injector recess.

NOTE: DO NOT clean the tip of the injector with a wire brush. Use a non - woven cloth.

5. Clean injector body with a wire brush.
6. Clean injector tips with a non-woven cloth.

NOTE: Do Not apply antiseize lubricant to the injector nozzle area.

7. Grease injector body with anti seize lubricant.

NOTE: Always replace the seals that seal off the injectors at the cylinder head to the combustion chamber and replace the retaining screws.

REMOVAL

REMOVAL

CAUTION: PAY CLOSE ATTENTION TO THE FOLLOWING POINTS WHEN REMOVING FUEL INJECTORS:

- Injectors **MUST** be removed only using the special tools provided for this purpose.
- Injectors **MUST NOT** be disassembled.

- Before cleaning injector recesses, seal all injector holes in the injector recesses with a pin.
- Clean all injector recesses in the cylinder head with a non-woven cloth and then a cylinder brush.
- Carefully clean sealing surfaces of injector recesses with the round brush. **DO NOT** use a power brush.

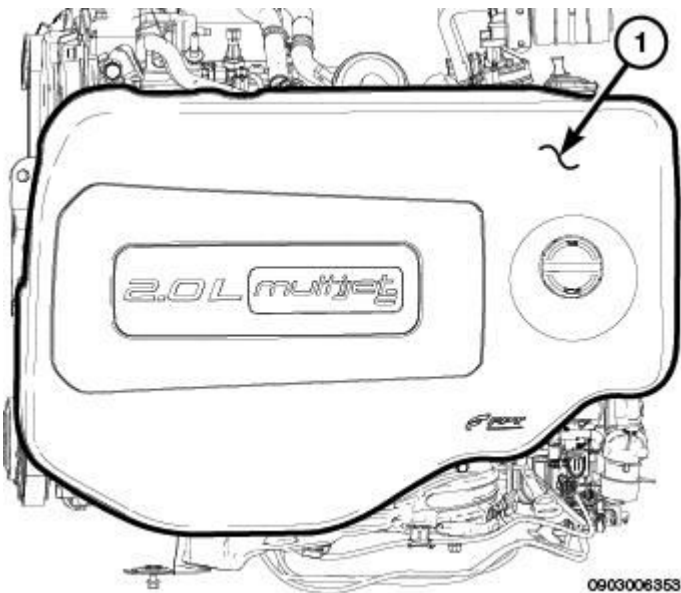


Fig. 283: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

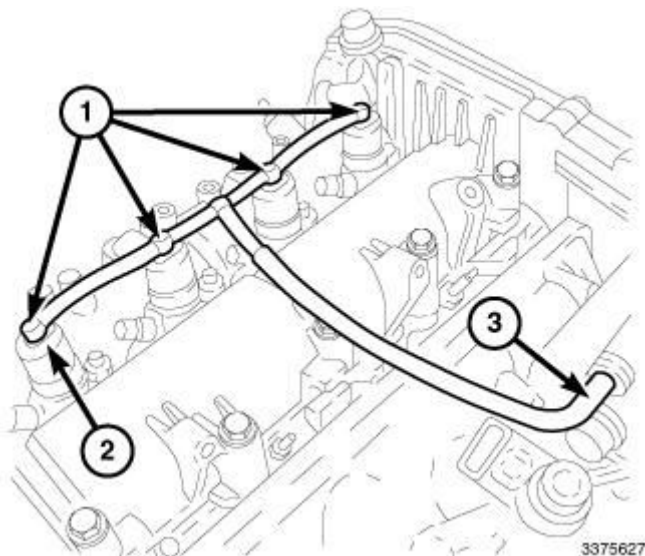


Fig. 284: Fuel Return Lines & Injectors
Courtesy of CHRYSLER GROUP, LLC

3. Remove the retaining clips and the fuel return lines (1) from the fuel injectors (2) and position aside.

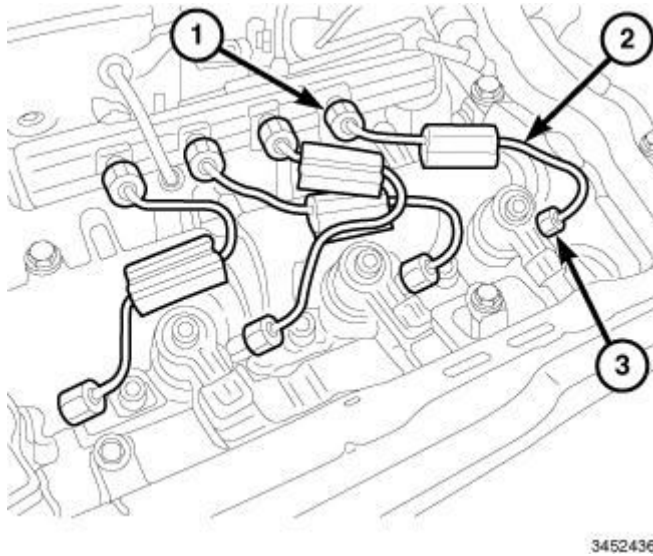


Fig. 285: High Pressure Fuel Tubes
Courtesy of CHRYSLER GROUP, LLC

NOTE: The fuel rail to fuel injector fuel tubes must be replaced if remove.

4. Unscrew union nuts (1 and 3) and the discard high pressure fuel tubes (2).

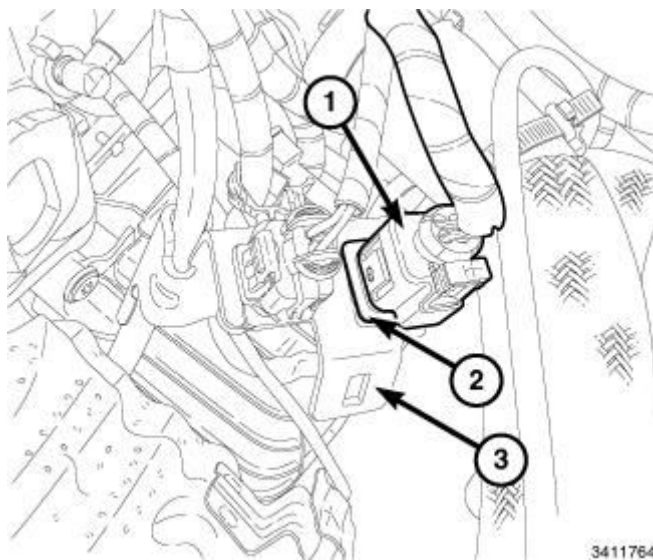


Fig. 286: Oxygen Sensor Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

5. Disconnect the oxygen sensor wire harness connector (1) and detach the harness connector (2) from bracket (3).

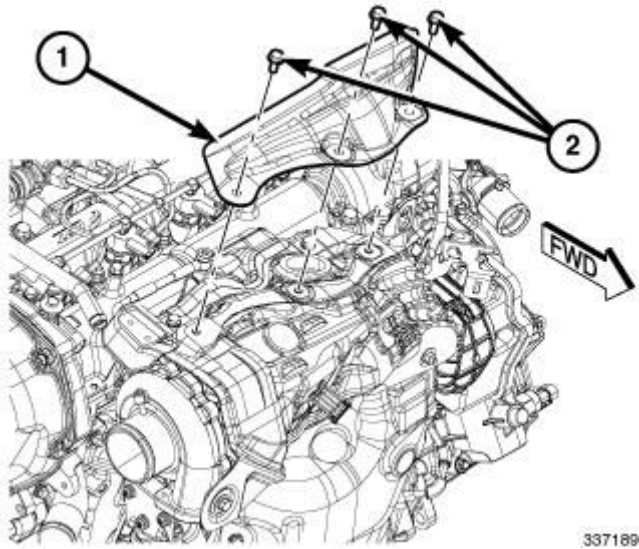


Fig. 287: Upper Turbocharger Heat Shield & Mid Upper Turbocharger Heat Shield
Courtesy of CHRYSLER GROUP, LLC

6. Remove bolts (2) and the upper turbocharger heat shield (1).

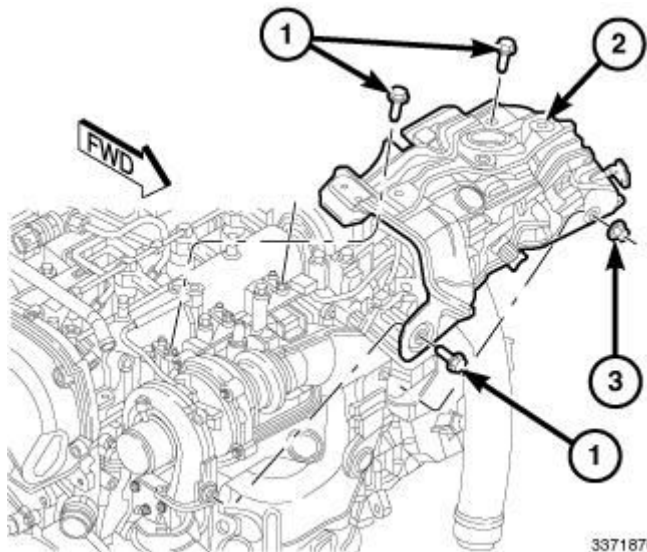


Fig. 288: Turbocharger Heat Shield & Fasteners
Courtesy of CHRYSLER GROUP, LLC

7. Detach the exhaust manifold exhaust temperature sensor wire harness from the lower turbocharger heat shield.
8. Remove bolts (1), nut (3), and the lower turbocharger heat shield (2).

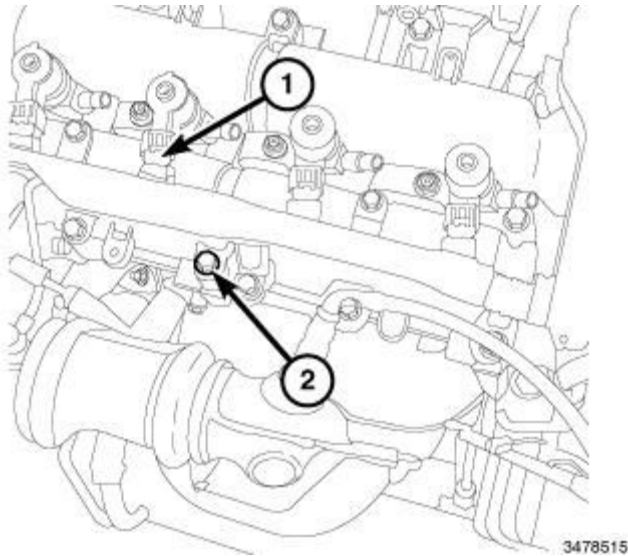


Fig. 289: Fuel Injector Wire Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

9. Disconnect the Camshaft Position Sensor (CMP) wire harness connector.
10. Remove the seven bolts (2) securing the engine wire harness.
11. Disconnect the fuel injectors wire harness connectors (1) and position harness aside.

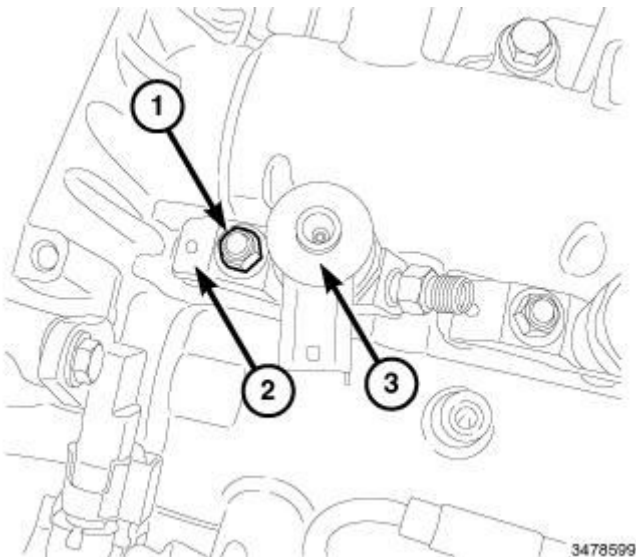


Fig. 290: Fuel Injector & Retaining Clamp
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Prior to removing the fuel injectors, use compressed air to remove any accumulated dirt and debris. If dirt and debris enter the engine, internal engine damage may result.

12. Using compressed air, remove any accumulated dirt and debris from around the fuel injectors.

NOTE: Record the location of each fuel injector removed so it can be installed in its original location.

13. Remove nut (1) the fuel injector retaining clamp (2) and remove the fuel injector (3).

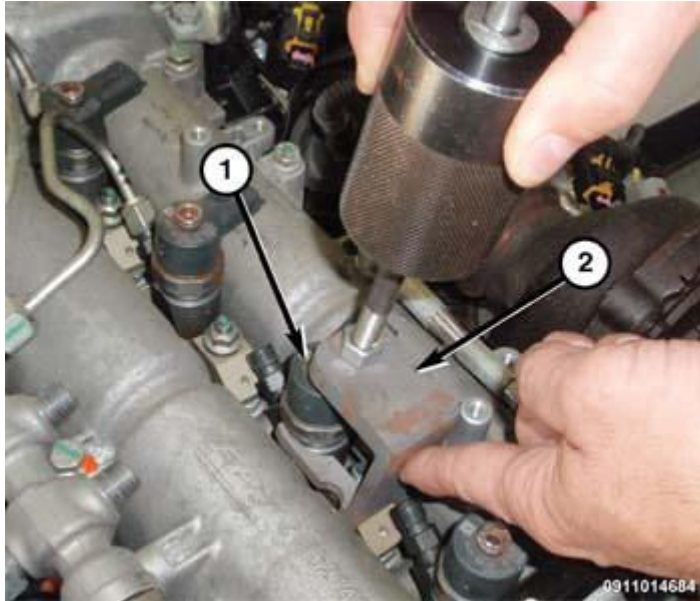


Fig. 291: Removing Fuel Injector
Courtesy of CHRYSLER GROUP, LLC

14. If the fuel injector can't be removed by hand then use the (special tool #10495, Remover, Fuel Injector) (2) with slide hammer C-3752 and install it on the fuel injector (1) and remove the fuel injector.

INSTALLATION

INSTALLATION

CAUTION: Pay close attention to the following points when installing fuel injectors.

- Blow out injector recesses, clean again with a non-woven cloth and then cover over. Fiber residues from woven cloths ARE NOT permissible.
- Carefully carry out a visual inspection of the sealing surfaces of the injector recesses.
- The length of the round brush can be adjusted and should be approximately 3 mm for cleaning the seal seat. Optimal cleaning is achieved only if a brush with a flat surface is used. If necessary the surface of the brush can be ground flat on a grinding stone.
- ALWAYS replace the seals which seal off the injectors at the cylinder head to the combustion chamber. It is important that no grease gets onto the seal. Any impurities on the seal, on the sealing surfaces at

the injector and cylinder head as a result of combustion residue or similar are absolutely not permissible.

- The nuts attaching the injectors must always be replaced.
- The tip of the injector nozzle **MUST NOT** be cleaned with a wire brush. Use a non-woven cloth.
- Clean entire injector with a non-woven cloth.
- Fiber residues from a woven cloths are not permissible.

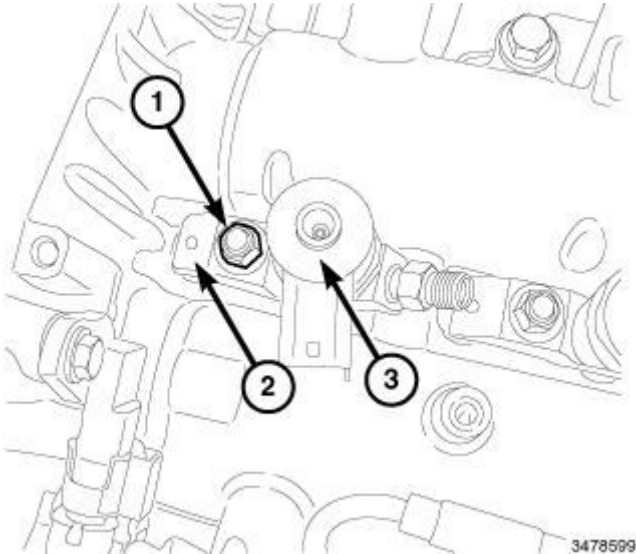


Fig. 292: Fuel Injector & Retaining Clamp
Courtesy of CHRYSLER GROUP, LLC

NOTE: If a new fuel injector is being installed, there is a nine digit alphanumeric code on the injector that needs to be entered into the PCM using the scan tool.

1. Clean injectors and recesses. Refer to **INJECTOR(S), FUEL, STANDARD PROCEDURE**.
2. Coat injector body with clean diesel fuel and install new sealing washers.
3. Install the fuel injector (3) and retaining claw (2) to its original location as noted during the removal process and apply downward pressure to seat it. Install nut (1) and tighten to 28 N.m (21 ft. lbs.).

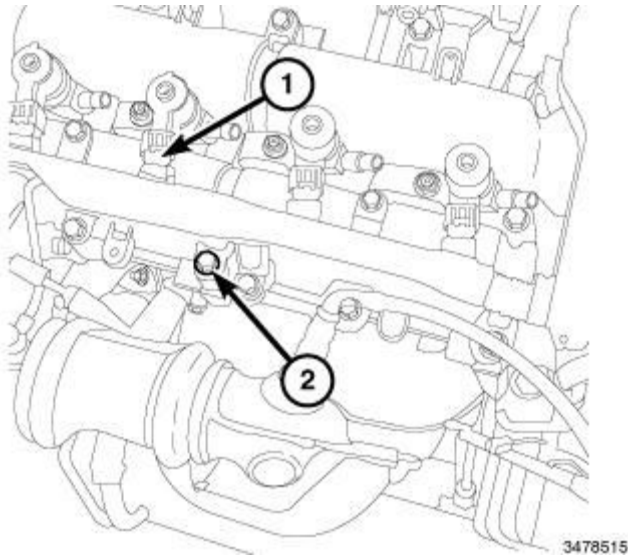


Fig. 293: Fuel Injector Wire Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

4. Connect the Camshaft Position Sensor (CMP) wire harness connector.
5. Position the engine wire harness and connect all four fuel injector wire harness connectors (1).
6. Install and securely tighten the seven bolts (2) securing the engine wire harness.

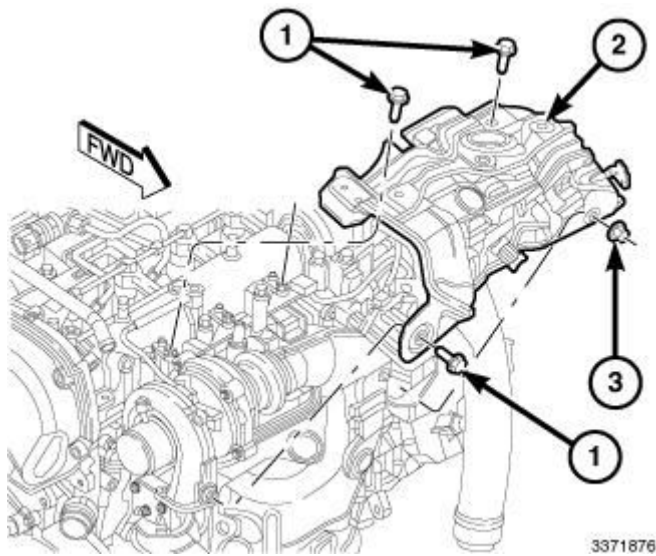


Fig. 294: Turbocharger Heat Shield & Fasteners
Courtesy of CHRYSLER GROUP, LLC

7. Install the lower turbocharger heat shield (2).
 - Tighten bolts (1) to 12 N.m (106 in. lbs.).
 - Tighten nut (3) to 8 N.m (71 in. lbs.).
8. Attach the exhaust manifold exhaust temperature sensor wire harness to the lower turbocharger heat shield.

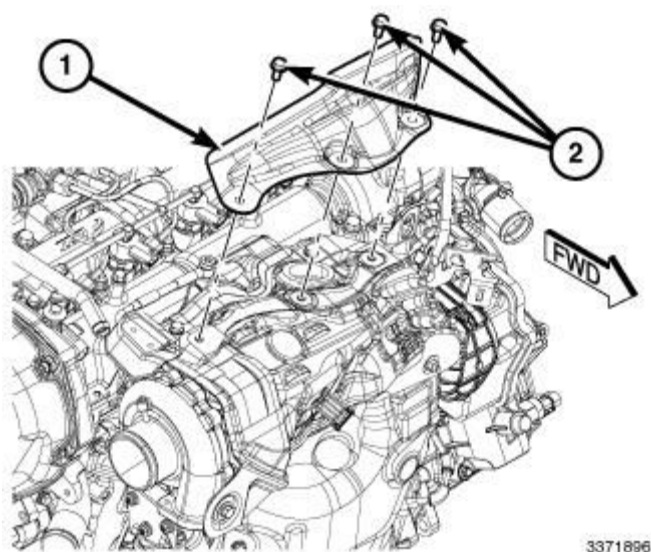


Fig. 295: Upper Turbocharger Heat Shield & Mid Upper Turbocharger Heat Shield
Courtesy of CHRYSLER GROUP, LLC

9. Install the upper turbocharger heat shield (2). Tighten the bolts (1) to 12 N.m (106 in. lbs.).

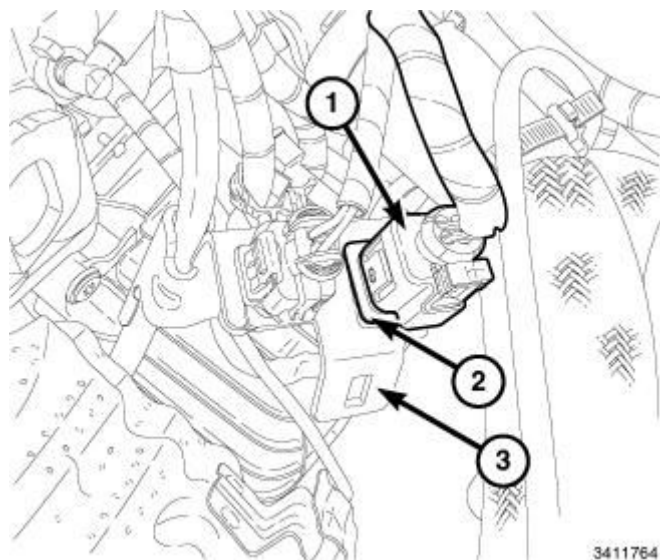


Fig. 296: Oxygen Sensor Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

10. Attach the oxygen sensor wire harness connector (2) to the bracket (3) and connect the oxygen sensor wire harness connector (1).

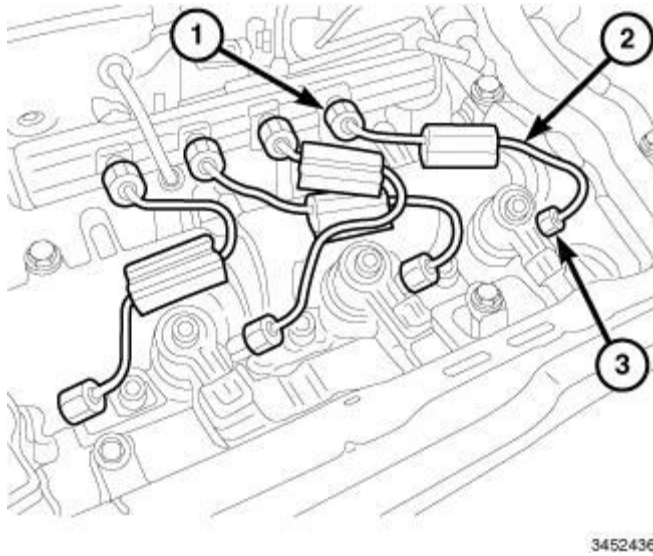


Fig. 297: High Pressure Fuel Tubes
Courtesy of CHRYSLER GROUP, LLC

11. Install new fuel tubes (2). Refer to **TUBE(S), FUEL, HIGH PRESSURE, INSTALLATION.**

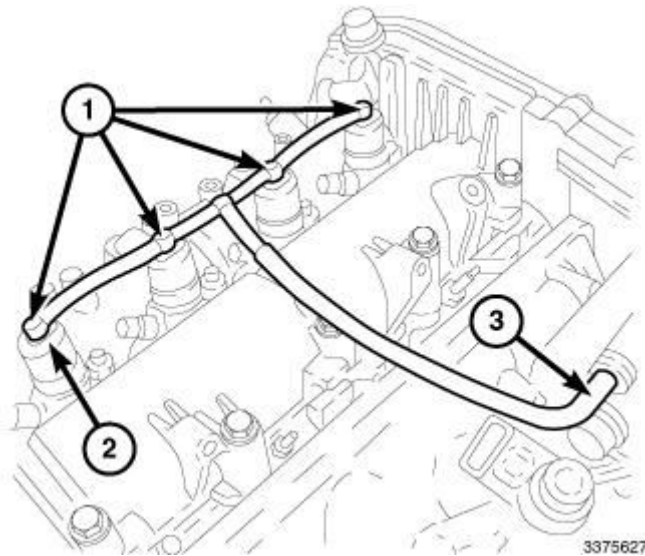


Fig. 298: Fuel Return Lines & Injectors
Courtesy of CHRYSLER GROUP, LLC

12. Install the fuel return lines (1) to the fuel injectors (2) and install the retaining clips.

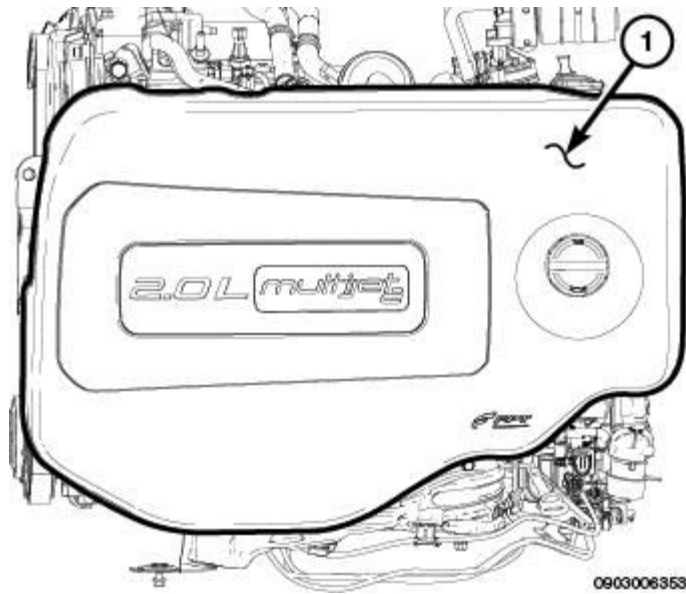


Fig. 299: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

13. Connect the negative battery cable.
14. Using a diagnostic scan tool, entered the fuel injector nine digit alphanumeric code into the PCM.
15. Start the engine and check for leaks.
16. Install the engine cover (1).

SENSOR, ACCELERATOR PEDAL POSITION

DESCRIPTION

DESCRIPTION

The Accelerator Pedal Position Sensor (APPS) is a variable resistor that provides the Powertrain Control Module (PCM) with an input signal (voltage). The signal represents throttle blade position. As the position of the accelerator pedal changes, the resistance of the APPS changes.

REMOVAL

REMOVAL

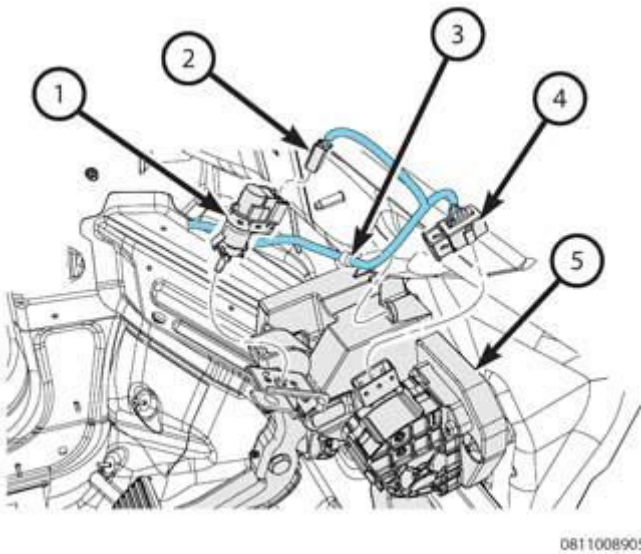


Fig. 300: Wiring Loom & Connectors
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate negative battery cable at battery.
2. Separate the wiring harness loom (3) from the accelerator housing (5).
3. Disconnect the accelerator pedal wire harness connector (4).
4. Disconnect the brake switch wire connector (2).

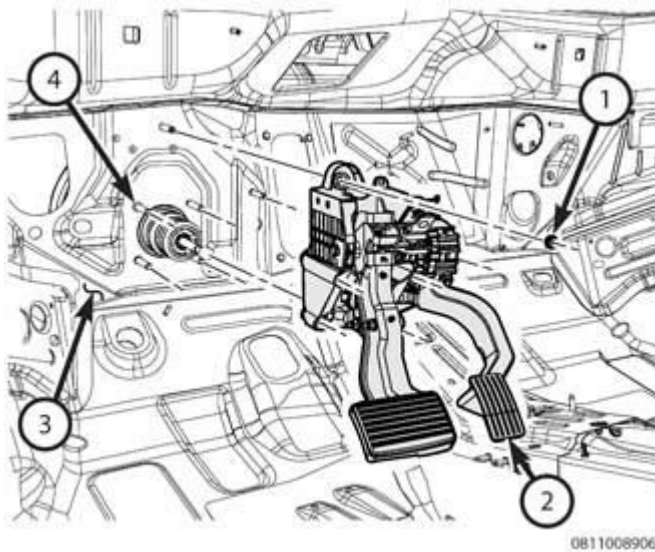


Fig. 301: Accelerator/Brake Pedal Assembly & Nuts
Courtesy of CHRYSLER GROUP, LLC

5. Remove mounting nuts (1) and the accelerator/brake pedal assembly (2).

INSTALLATION

INSTALLATION

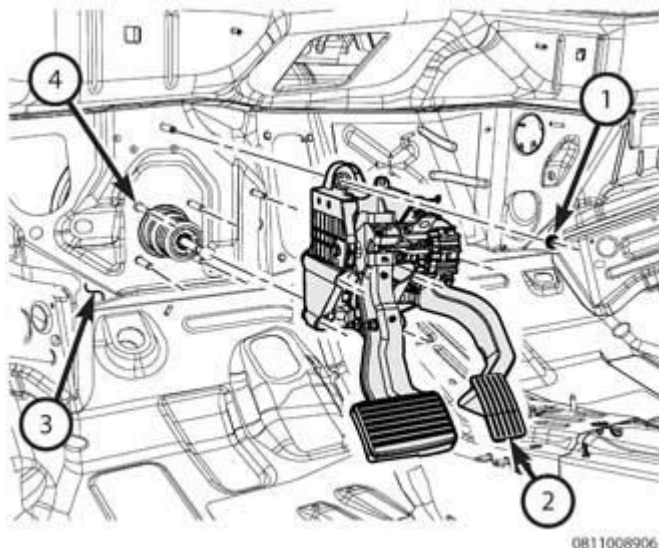


Fig. 302: Accelerator/Brake Pedal Assembly & Nuts
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The accelerator pedal and mounting nuts need to be torque in a mandatory torque sequence or damage could result to the pedal assembly.

1. Install the accelerator/brake pedal (2). Tighten nuts (1) to 18 N.m (159 in. lbs.).

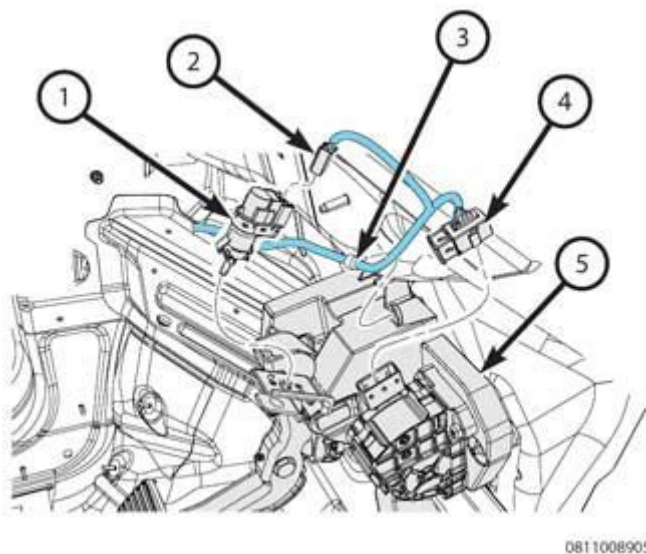


Fig. 303: Wiring Loom & Connectors
Courtesy of CHRYSLER GROUP, LLC

2. Connect the brake switch wire harness connector (2).

3. Connect the accelerator pedal wire harness connector (4).
4. Attach the wiring harness loom (3) from the accelerator housing (5).
5. Connect negative battery cable, tighten nut to 5 N.m (45 in. lbs.).
6. Use a scan tool and perform the APPS RELEARN function.

SENSOR, AIR TEMPERATURE, INTAKE

DESCRIPTION

DESCRIPTION

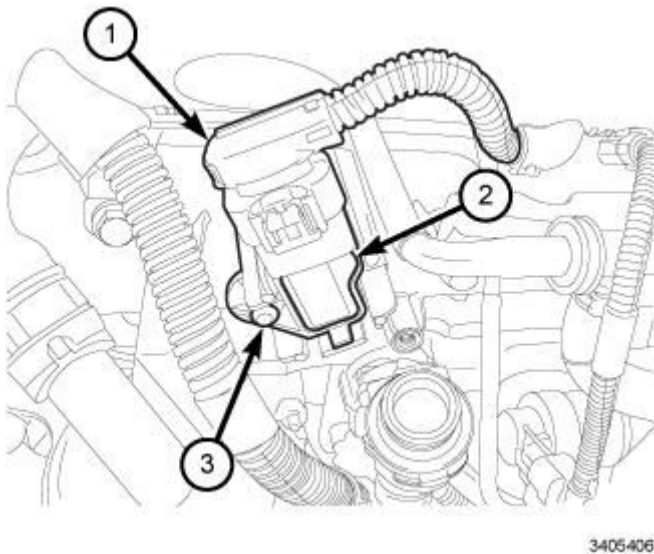


Fig. 304: Fuel Quantity Solenoid Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

The intake air temperature (IAT) sensor is integrated with the boost pressure sensor, which is located in the back side of the intake manifold. The IAT is used to monitor the intake air temperature. Refer to **SENSOR, BOOST PRESSURE, REMOVAL** and **SENSOR, BOOST PRESSURE, INSTALLATION** for removal and installation procedures.

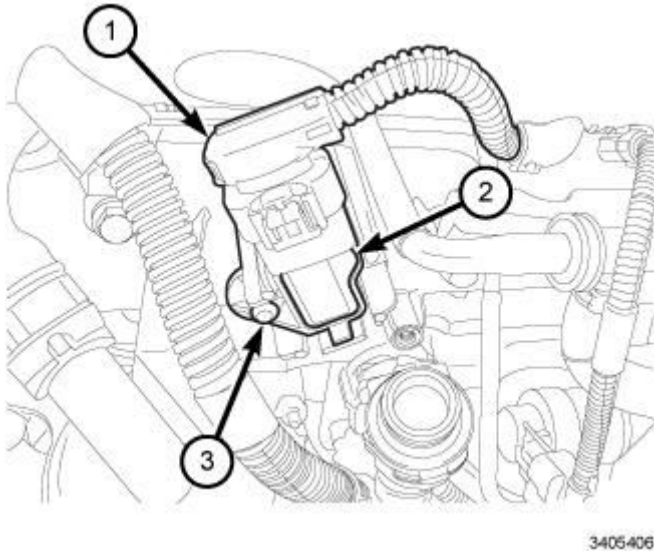
OPERATION

OPERATION

The intake air temperature sensor is a negative temperature coefficient (NTC) thermistor (resistance varies with temperature). This means at cold air temperature its resistance is high, so the voltage signal will be high. As intake air temperature increases, sensor resistance decreases and the signal voltage will be low. This allows the sensor to provide an analog voltage signal (0.2-4.8 volts) to the Powertrain Control Module (PCM).

SENSOR, BOOST PRESSURE

DESCRIPTION

DESCRIPTION

3405406

Fig. 305: Fuel Quantity Solenoid Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

The boost pressure sensor (2) is integrated with the intake air temperature sensor, and mounted in the intake manifold. The sensor allows the PCM to monitor air pressure within the intake manifold.

OPERATION**OPERATION**

When the intake manifold pressure is low (high vacuum) sensor voltage output is 0.25-1.8 volts at the Powertrain Control Module (PCM). When the intake manifold pressure is high due to turbo boost, sensor voltage output is 2.0-4.7 volts. The sensor receives a 5-volt reference from the PCM. Sensor ground is also provided by the PCM. The PCM uses boost pressure combined with intake air temperature to determine the volume of air entering the engine. regulate the pressure of the variable geometry turbine in order to ensure optimum engine performance in all operating conditions. The boost pressure sensor is regulate the pressure of the variable geometry turbine in order to ensure optimum engine performance in all operating conditions and to regulate fuel injection duration.

DIAGNOSIS AND TESTING**DIAGNOSIS AND TESTING - BOOST PRESSURE SENSOR**

If the boost pressure sensor fails, the PCM records a DTC into memory and continues to operate the engine in one of the three limp-in modes. When the PCM is operating in this mode, a loss of power will be present, as if the turbocharger was not operating. The best method for diagnosing faults with the boost pressure sensor is with a scan tool. Refer to the appropriate Diesel ELECTRICAL DIAGNOSTICS information for more information.

Refer to On-Board Diagnostics in Emissions Control System for a list of Diagnostic Trouble Codes (DTCs) for certain fuel system components. Refer to **2.0L DIESEL - DIAGNOSTIC CODE INDEX** .

REMOVAL

REMOVAL

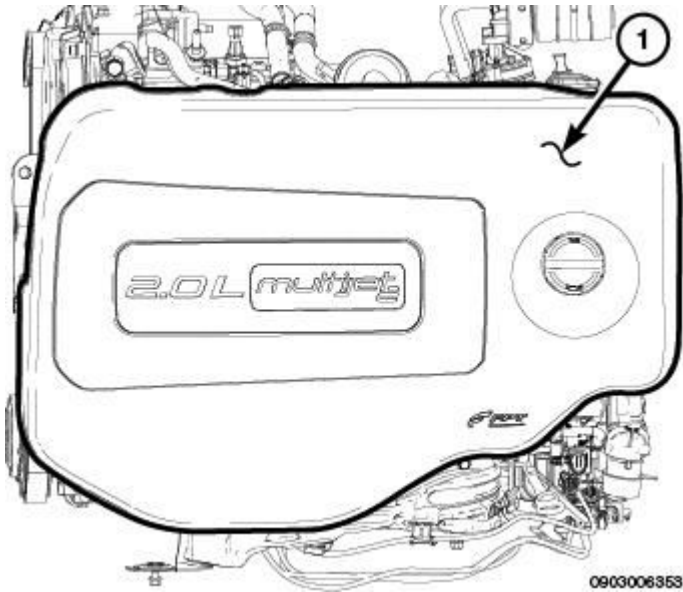


Fig. 306: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

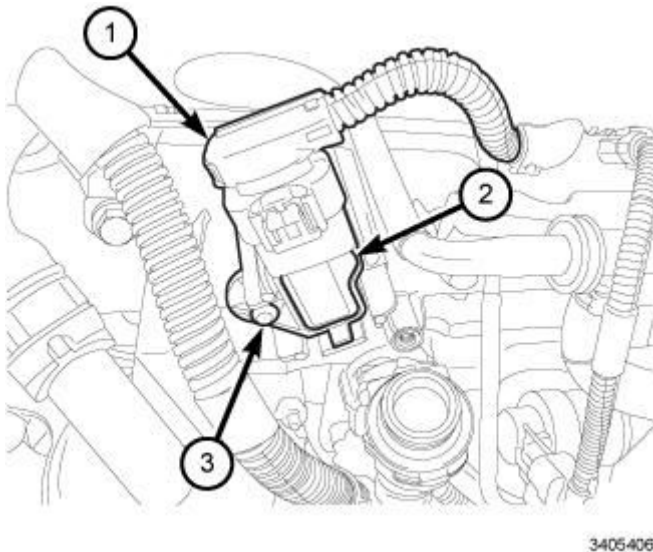


Fig. 307: Fuel Quantity Solenoid Wire Harness Connector

Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the boost pressure sensor (2) wire harness connector (1).
4. Remove bolt (3) and the boost pressure sensor (2) from the intake manifold.

INSTALLATION

INSTALLATION

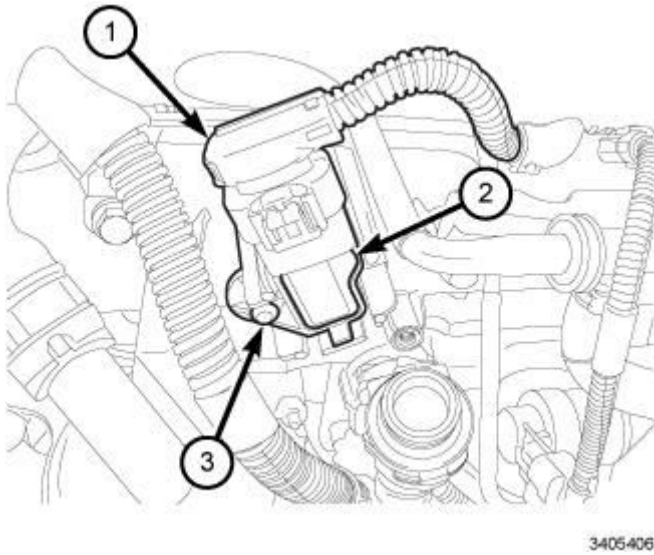


Fig. 308: Fuel Quantity Solenoid Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

1. Install the boost pressure sensor (2) securely tighten bolt (3).
2. Connect the boost pressure sensor (2) wire harness connector (1).

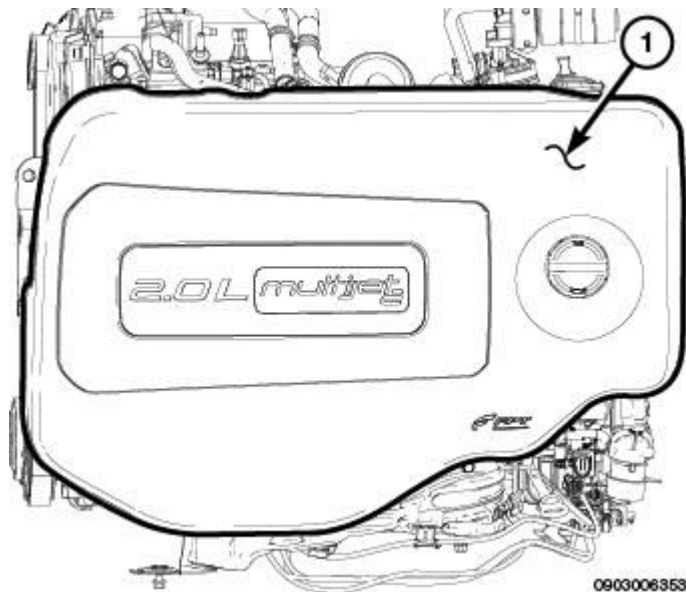


Fig. 309: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

3. Install the engine cover (1).
4. Connect the negative battery cable.

SENSOR, CRANKSHAFT POSITION

DESCRIPTION

DESCRIPTION

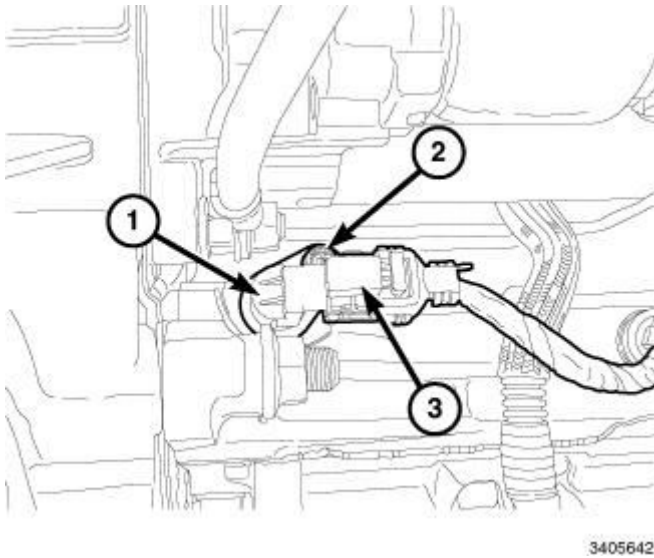


Fig. 310: Crankshaft Position Sensor, Connector & Bolt
Courtesy of CHRYSLER GROUP, LLC

The Crankshaft Position Sensor (CKP) (1) is located near the rear main oil seal assembly. This sensor is used to generate a signal that corresponds to engine RPM. The Powertrain Control Module (PCM) also uses the CKP to detect when the engine is at TDC. The CKP is located on the backside of the engine near the starter.

OPERATION

OPERATION

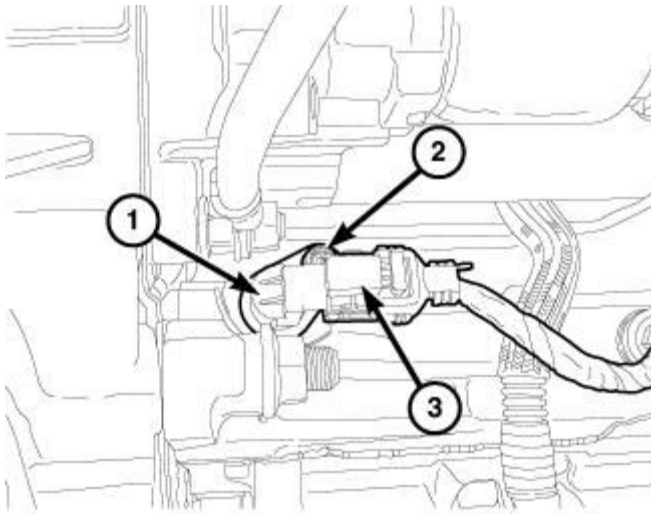
The crankshaft position and engine speed are sensed with a contactless hall effect signal generated by the crankshaft position sensor. The distance between the crankshaft position sensor and the tone wheel inside the rear main seal assembly is fixed by the installation position.

When the crankshaft rotates, a pulse width modulated (ON/OFF) voltage signal is generated in the crankshaft position sensor by the tone wheel inside the rear main seal assembly.

REMOVAL

REMOVAL

1. Disconnect the negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .



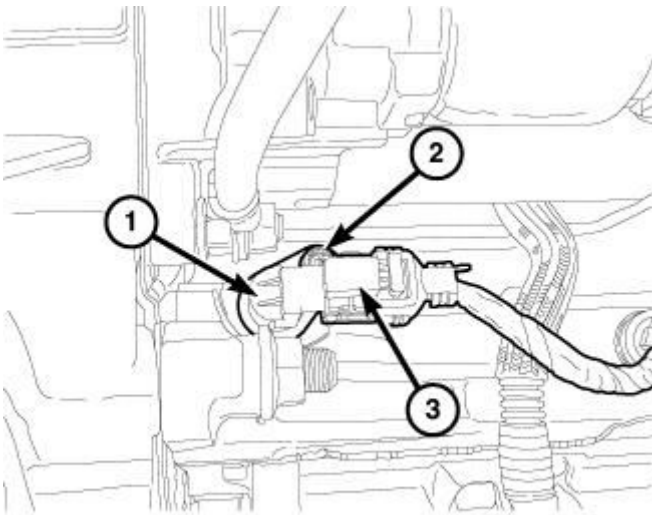
3405642

Fig. 311: Crankshaft Position Sensor, Connector & Bolt
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the Crankshaft Position Sensor (CKP) wire harness connector (3).
5. Remove bolt (2) the CKP sensor (1).

INSTALLATION

INSTALLATION



3405642

Fig. 312: Crankshaft Position Sensor, Connector & Bolt
Courtesy of CHRYSLER GROUP, LLC

1. Install the Crankshaft Position Sensor (CKP) (1). Tighten bolt (2) 9 N.m (80 in. lbs.).
2. Connect the CKP wire harness connector (3).

3. Install the belly pan. Refer to **BELLY PAN, INSTALLATION** .
4. Lower the vehicle.
5. Connect the negative battery cable.

SENSOR, MASS AIRFLOW (MAF)

DESCRIPTION

DESCRIPTION

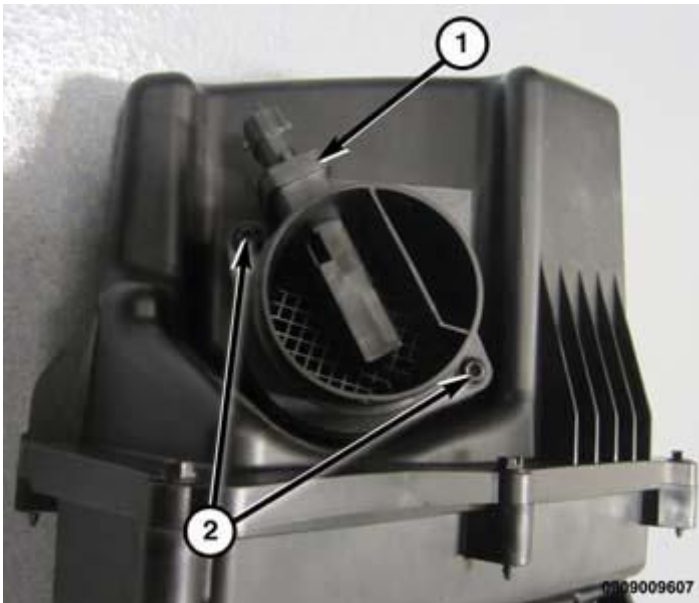


Fig. 313: MAF Sensor & Fasteners
Courtesy of CHRYSLER GROUP, LLC

The miromechanical Mass Air Flow (MAF) sensor (2) is a hot film thermal flowmeter with an integrated temperature sensor which detects the intake air temperature. The sensor is designed for recording load on combustion engines with diesel fuel injection and has a cylinder size in accordance with the required air flow rate. The MAF Sensor is mounted inline in the air intake between the air filter and the Charge Air Cooler (CAC).

OPERATION

OPERATION

The Mass Air Flow (MAF) sensor sensing element consists of two temperature sensors symmetrical to a heating area sitting on a thin membrane. Up and down stream sensors see the same temperature when there is no air flowing through the sensor. With incoming flow, the upstream heating area is cooled down due to heat transfer, while the downstream area retains its temperature because the air has been heated up after it flows through the heating area. The characteristic of temperature change in relation to airflow at the upstream area is utilized to determine the mass airflow passing through the sensor. This signal voltage variation is used by the Powertrain Control Module (PCM) along with internal calibrations to coordinate the total mass air flow.

To reduce contamination during sensing, a partial air flow is directed at an angle with respect to the main flow in the measuring channel for the fact that moisture and other particles tend not to react in the same manner that air does after they hit the channel wall. The Diesel Power Relay supplies battery power the to MAF sensor, ground is provided by the PCM. The MAF sensor signal is provided by the PCM.

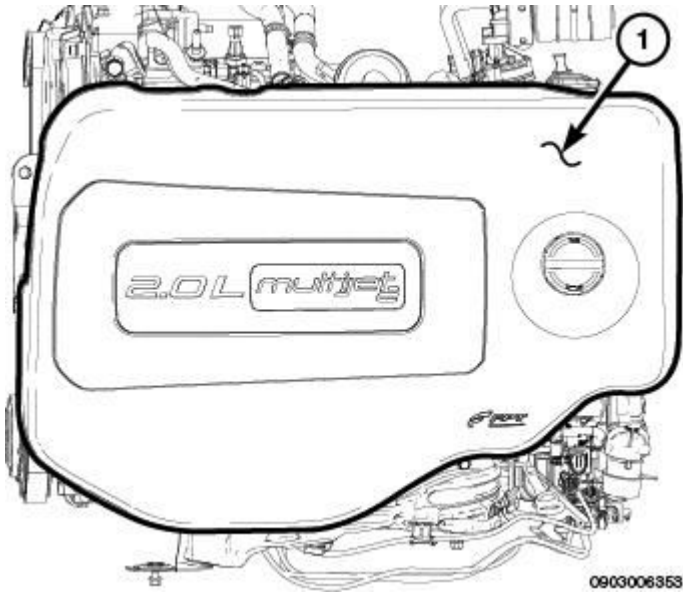
REMOVAL**REMOVAL**

Fig. 314: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

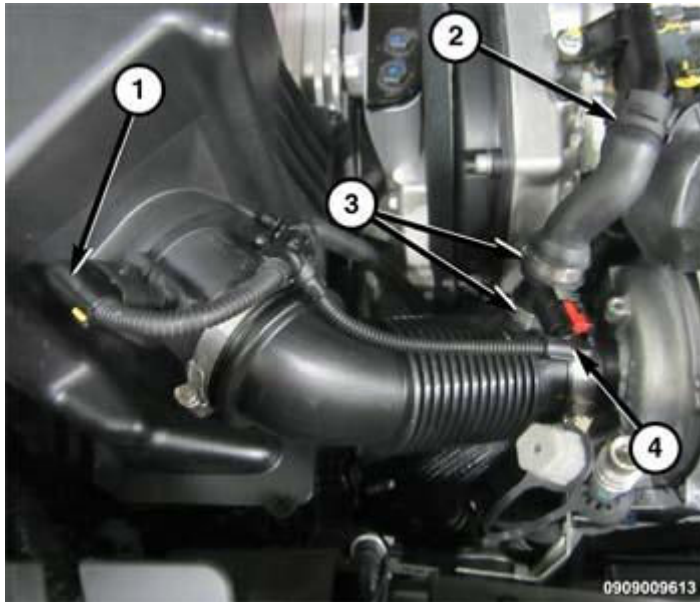


Fig. 315: MAF Sensor Harness Connector
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect Mass Air Flow (MAF) sensor wire harness connector (1).

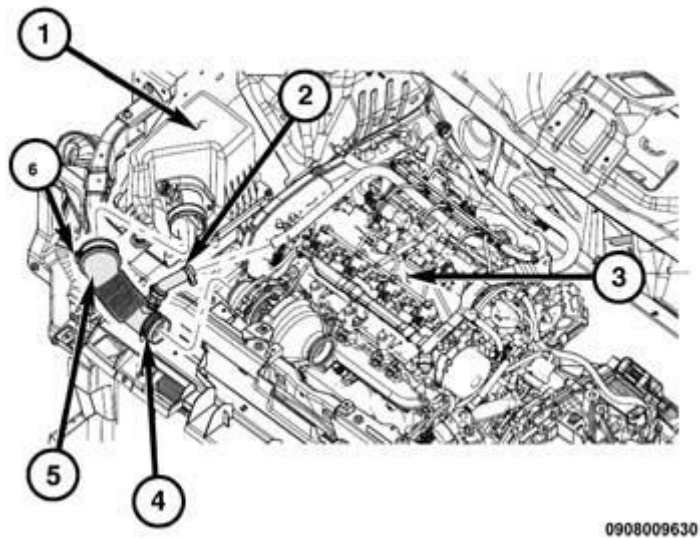


Fig. 316: Turbocharger Inlet Hose & Clamp
Courtesy of CHRYSLER GROUP, LLC

4. Loosen clamps (4, 6) and disconnect the turbocharger air inlet tube (5).

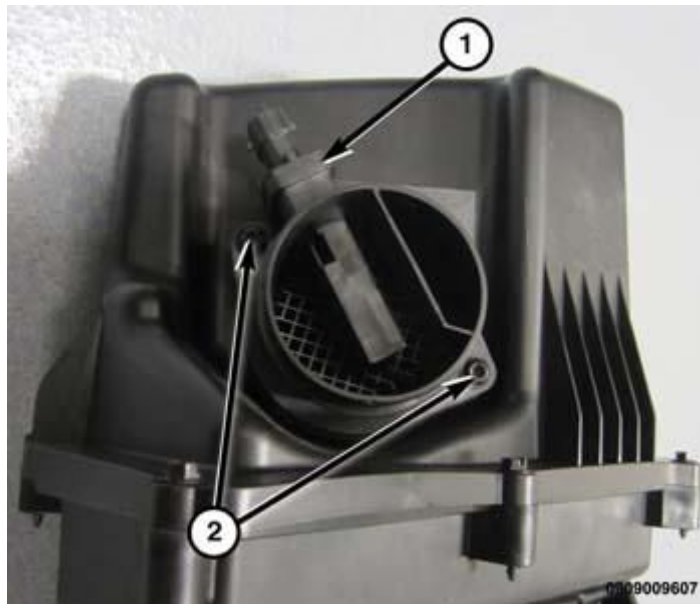


Fig. 317: MAF Sensor & Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. Remove screws (2) and the MAF sensor (1) from air cleaner body.

INSTALLATION

INSTALLATION

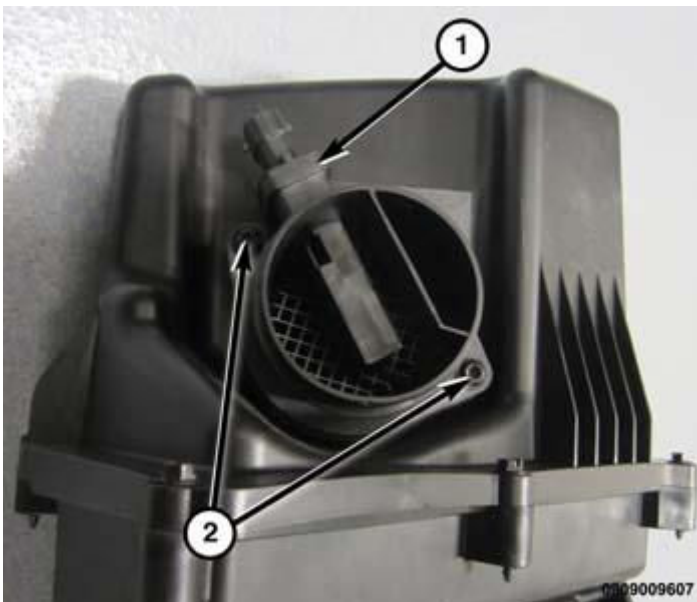


Fig. 318: MAF Sensor & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Install the Mass Air Flow (MAF) sensor (1) into air cleaner body and securely tighten screws (2).

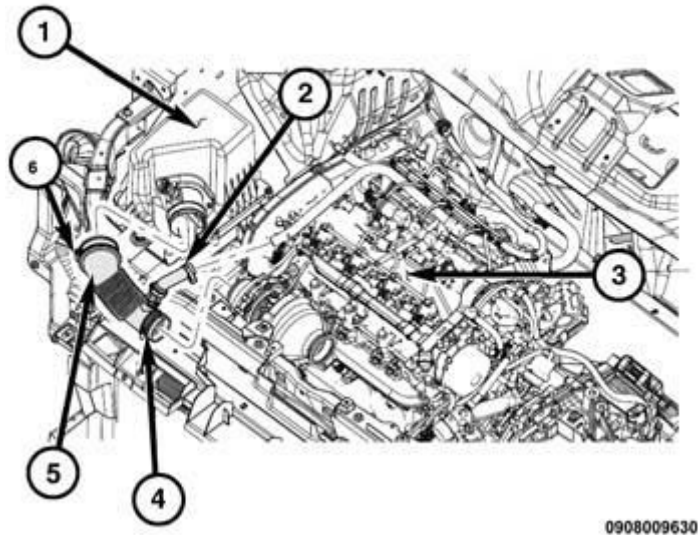


Fig. 319: Turbocharger Inlet Hose & Clamp
Courtesy of CHRYSLER GROUP, LLC

2. Connect the turbocharger air inlet tube (5) and securely tighten clamp (4, 6).

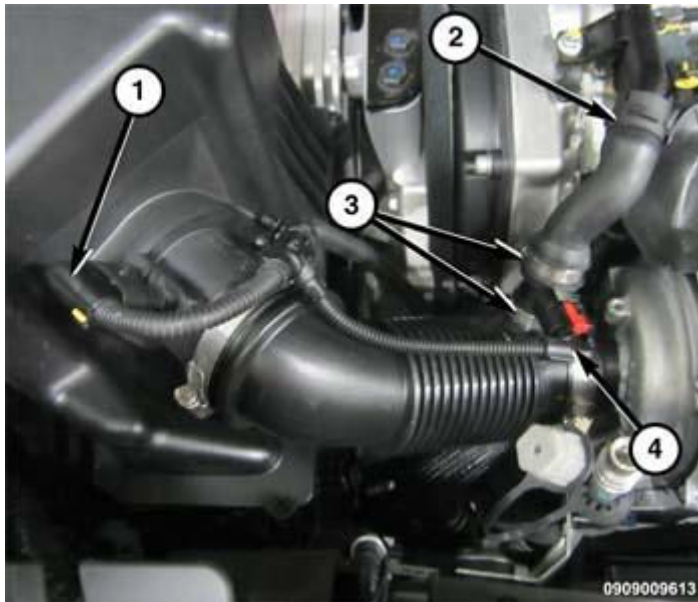


Fig. 320: MAF Sensor Harness Connector
Courtesy of CHRYSLER GROUP, LLC

3. Connect MAF sensor wire harness connector (1).

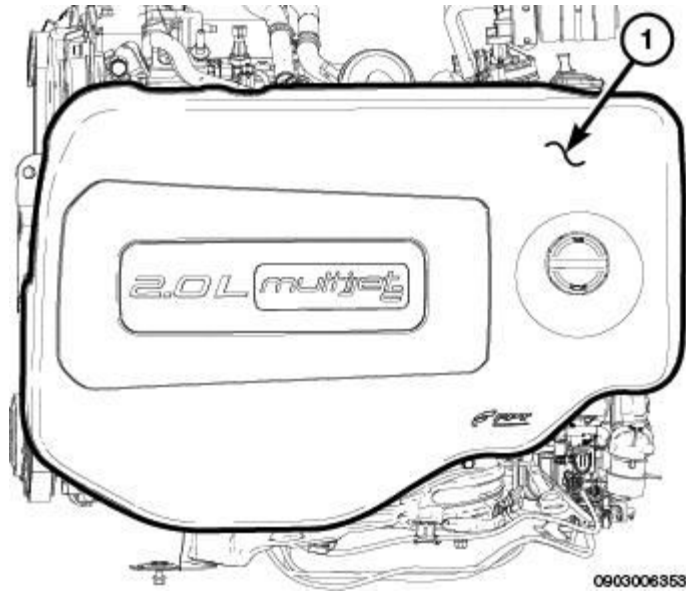


Fig. 321: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

4. Install the engine cover (1).
5. Connect the negative battery cable.

SENSOR, OXYGEN

DESCRIPTION

DESCRIPTION

This sensor is used to measure the oxygen content and the Lambda value (ratio between quantity of intake air and theoretical quantity of air required for complete combustion of fuel injected) in automotive engine exhaust gases. When the mass of oxygen present coincides with the amount required to burn all the fuel, the mixture is known as stoichiometric and the ratio is 14.6. In this case the Lambda is at the unit value. The Lambda can be expressed as the ratio between the quantity of intake air and the quantity of air required for the combustion of the fuel injected. The Lambda sensor is located in the front of the engine in the diesel particulate filter.

REMOVAL

REMOVAL

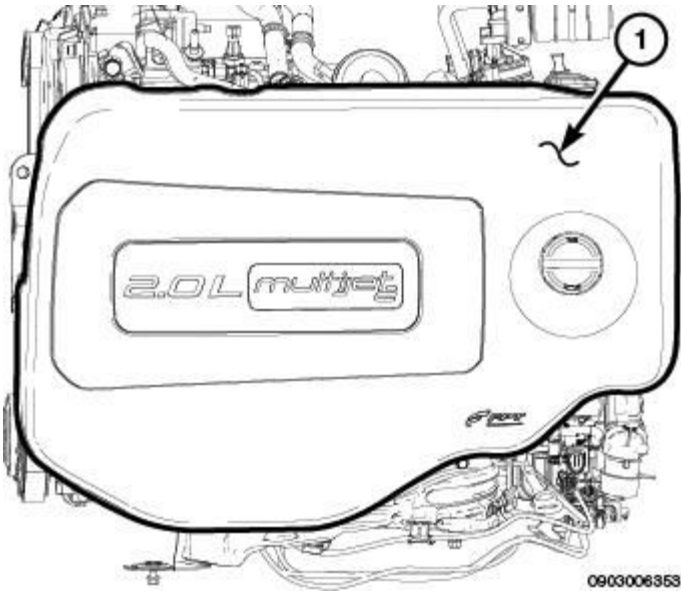


Fig. 322: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

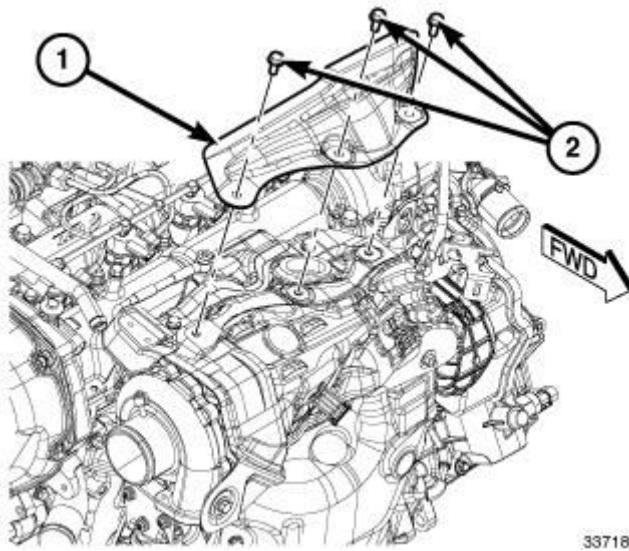


Fig. 323: Upper Turbocharger Heat Shield & Mid Upper Turbocharger Heat Shield

Courtesy of CHRYSLER GROUP, LLC

3. Remove bolts (2) and the upper turbocharger heat shield (1).

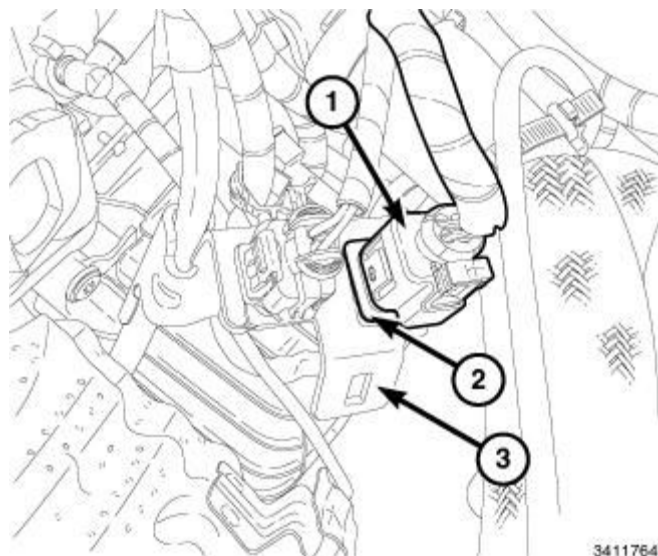


Fig. 324: Oxygen Sensor Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the oxygen sensor wire harness connector (1) and remove the wire harness connector pick-tail (2) from support bracket (3).

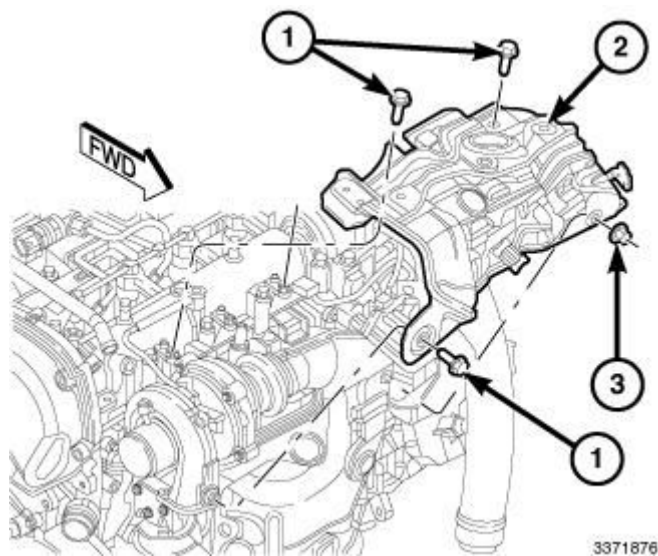
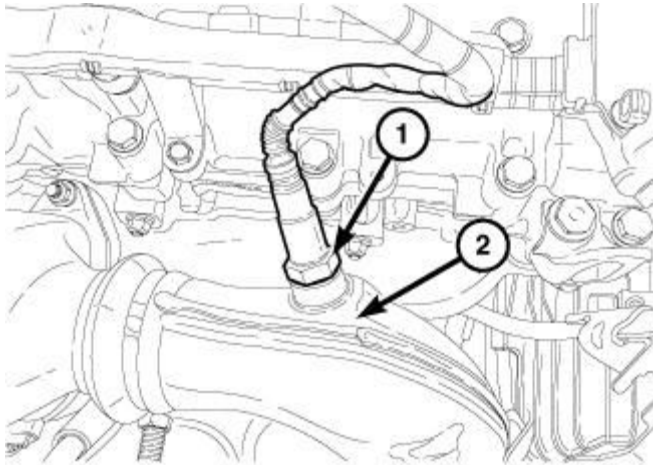


Fig. 325: Turbocharger Heat Shield & Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. Remove the exhaust temperature sensor wire from lower heat shield (1).
6. Remove the three bolts (1), one nut (4) and the mid upper turbocharger heat shield (1).



3412119

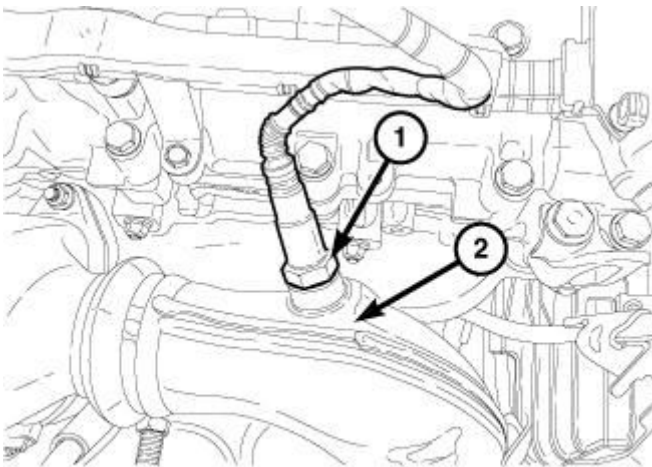
Fig. 326: Oxygen Sensor

Courtesy of CHRYSLER GROUP, LLC

7. Remove the oxygen sensor (1).

INSTALLATION

INSTALLATION



3412119

Fig. 327: Oxygen Sensor

Courtesy of CHRYSLER GROUP, LLC

1. Install the oxygen sensor (1). Tighten to 45 N.m (33 ft. lbs.).

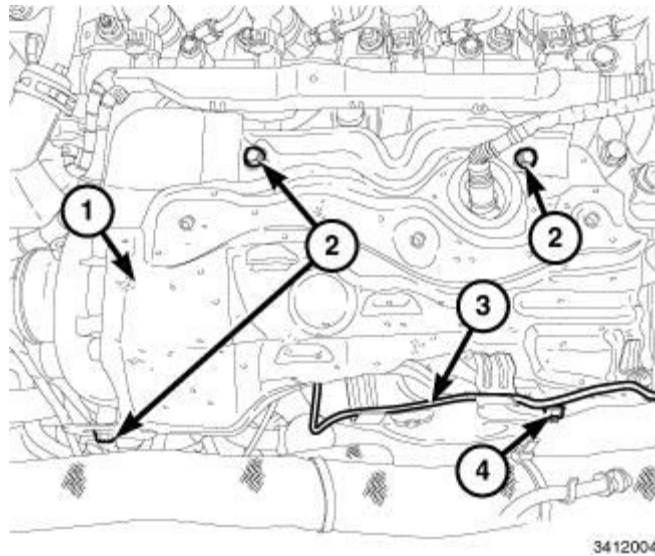


Fig. 328: Mid Upper Turbocharger Heat Shield
Courtesy of CHRYSLER GROUP, LLC

2. Install the mid upper turbocharger heat shield (1):
 - Tighten the bolts (2) to 12 N.m (106 in. lbs.).
 - Tighten the nut (4) to 8 N.m (71 in. lbs.).
3. Install the exhaust temperature sensor wire (3) to the lower heat shield (1).

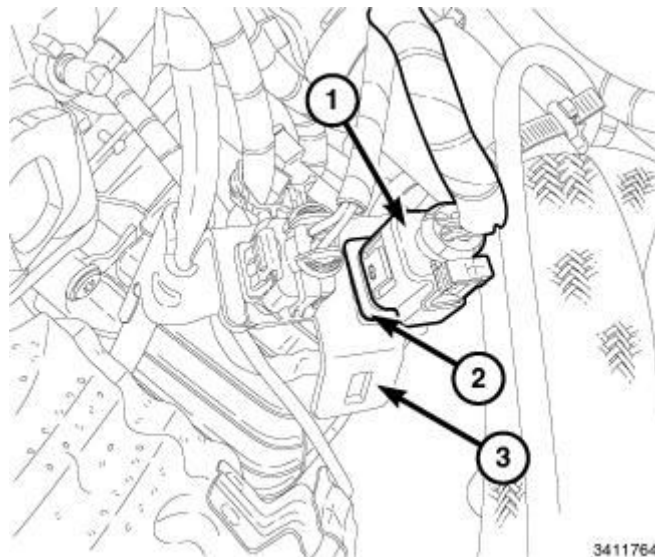
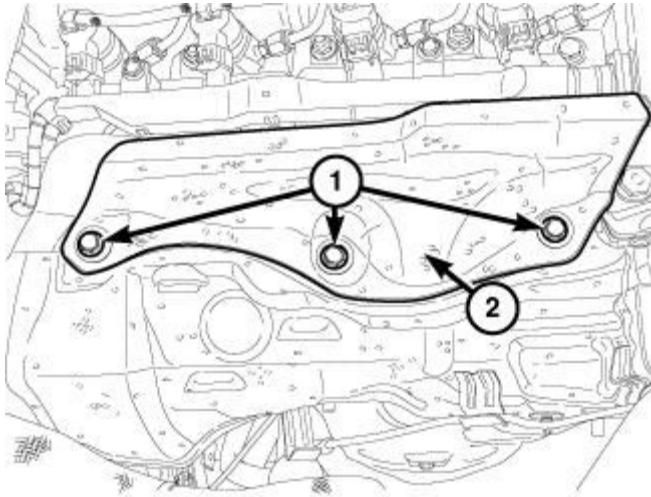


Fig. 329: Oxygen Sensor Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

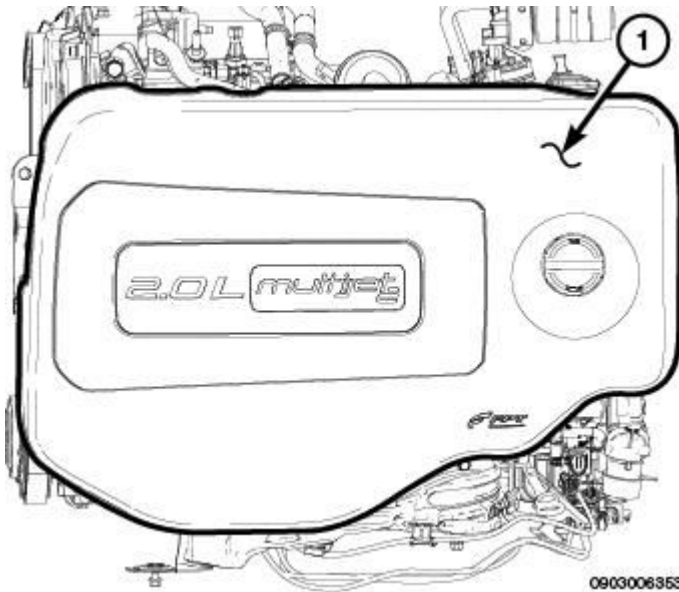
4. Install the oxygen sensor wire harness connector pick-tail (2) to support bracket (3) and connect the oxygen sensor wire harness connector (1).



3411756

Fig. 330: Upper Turbocharger Heat Shield
Courtesy of CHRYSLER GROUP, LLC

5. Install the upper turbocharger heat shield (2). Tighten the bolts (1) to 12 N.m (106 in. lbs.).



0903006353

Fig. 331: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

6. Install the engine cover (1).
7. Connect the negative battery cable.

2014 ENGINE**Ignition System - Service Information - Cherokee****DESCRIPTION****DESCRIPTION**

NOTE: All engines use a fixed ignition timing system. Basic ignition timing is not adjustable. All spark advance is determined by the Powertrain Control Module (PCM).

The ignition system used on these engines is referred to as coil on plug. The system's four main components are the coils, crankshaft position sensor, spark plugs, and camshaft position sensors. The coil on plug ignition system utilizes an ignition coil for every cylinder. The ignition coils are mounted directly over the each spark plug.

OPERATION**OPERATION**

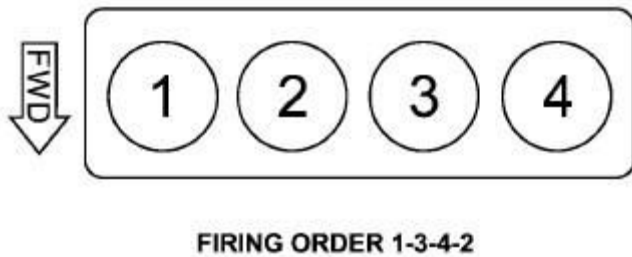
The crankshaft position sensor and camshaft position sensor are hall effect devices. The camshaft position sensor and crankshaft position sensor generate square wave pulses that are inputs to the PCM. The PCM determines engine position from these sensors. The PCM calculates injector sequence and ignition timing from crankshaft AND camshaft position.

SPECIFICATIONS**SPARK PLUG**

Engine	Spark Plug	Electrode Gap
2.4L	REC10WMPB4	1.2mm (0.047 in.)
3.2L	RER8ZWYCB4	1.1mm (0.043 in.)

FIRING ORDER

2.4L



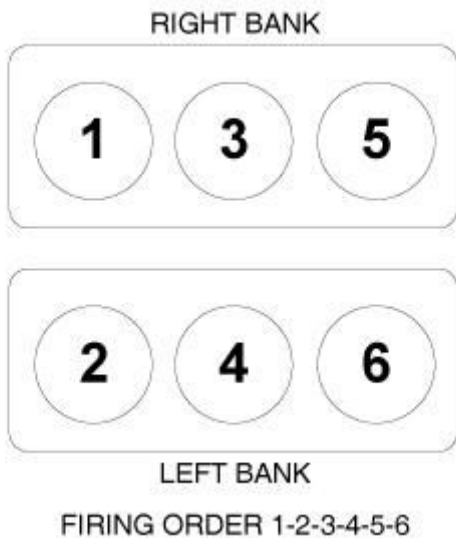
B1d1aa54

Fig. 1: Transverse 4 Cyl. Firing Order
 Courtesy of CHRYSLER GROUP, LLC

The firing order is 1-3-4-2.

3.2L V6

Firing Order: 1-2-3-4-5-6



2807009

Fig. 2: Firing Order: 1 - 2 - 3 - 4 - 5 - 6
 Courtesy of CHRYSLER GROUP, LLC

IGNITION RESISTANCE

IGNITION COIL RESISTANCE

2014 Jeep Cherokee Trailhawk

2014 ENGINE Ignition System - Service Information - Cherokee

Engine	Primary Resistance at 21°C-27°C (70°F-80°F)	Secondary Resistance at 21°C-27°C (70°F-80°F)
2.4L	0.468 to 0.572 Ohms	5.287 to 7.153 K Ohms
3.2L	0.6 - 0.9 Ohms	6, 000 - 9, 000 Ohms

TORQUE SPECIFICATION

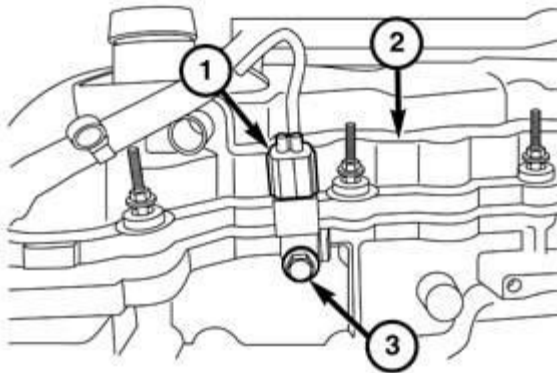
DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Camshaft Position Sensor Bolt	9	-	80
Ignition Coil Mounting Bolts	8	-	71
Spark Plugs	27	20	-
Knock Sensor	20	15	-
Ignition Coil Capacitor Bolt	10	-	89
Transmission mounting bolt	61	45	-

* Do not apply any sealant, thread-locker or adhesive to bolts. Poor sensor performance may result.

CAPACITOR, IGNITION

REMOVAL

2.4L



081569690

Fig. 3: Connector, Ignition Capacitor & Mounting Bolt
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate negative battery cable.
2. Remove electrical connector (1).
3. Remove mounting bolt (3) and ignition capacitor (1) from the front of the cylinder head.

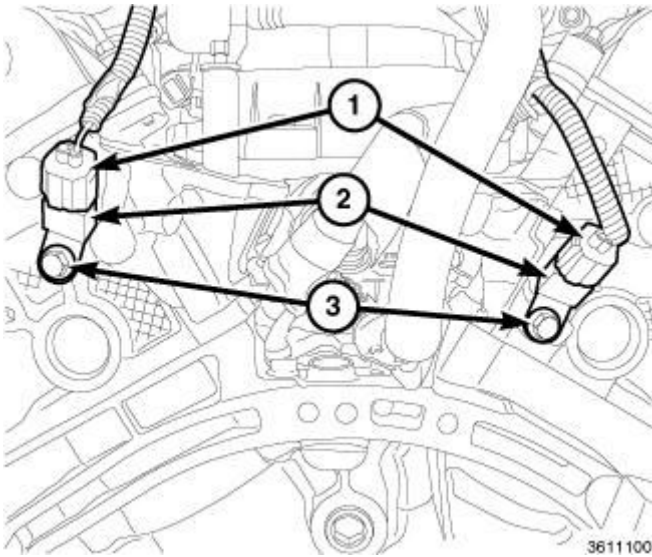
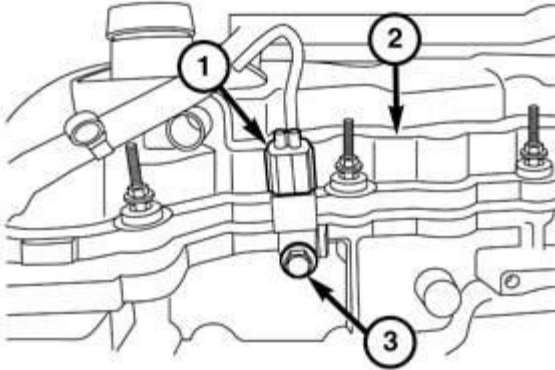
3.2L

Fig. 4: Electrical Connector, Mounting Bolt & Ignition Capacitor
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Separate the engine harness connector retainers from the intake manifold and Position the main engine wiring harness aside.
3. Remove the electrical connector (1).
4. Remove the mounting bolt (3) and the ignition capacitor (2).

INSTALLATION**2.4L**



081569690

Fig. 5: Connector, Ignition Capacitor & Mounting Bolt
Courtesy of CHRYSLER GROUP, LLC

1. Install ignition capacitor to the front of the cylinder head (2) and bolt (3), tighten bolt to the proper specification. Refer to **SPECIFICATIONS**.
2. Connect electrical connector (1).
3. Connect the negative battery cable, tighten the nut to the proper specification. Refer to **SPECIFICATIONS**.

3.2L

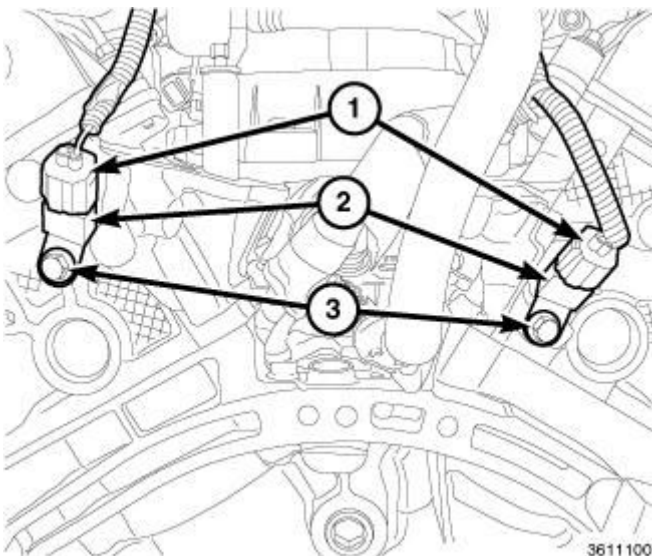


Fig. 6: Electrical Connector, Mounting Bolt & Ignition Capacitor
Courtesy of CHRYSLER GROUP, LLC

1. Position capacitor (2) to the rear of the cylinder head.
2. Tighten nut (3) to 7 N.m (60 in. lbs.).
3. Connect electrical connector (1) to coil capacitor.
4. Install the main engine harness retainers onto the intake manifold.
5. Connect the battery negative cable.

COIL, IGNITION

REMOVAL

2.4L

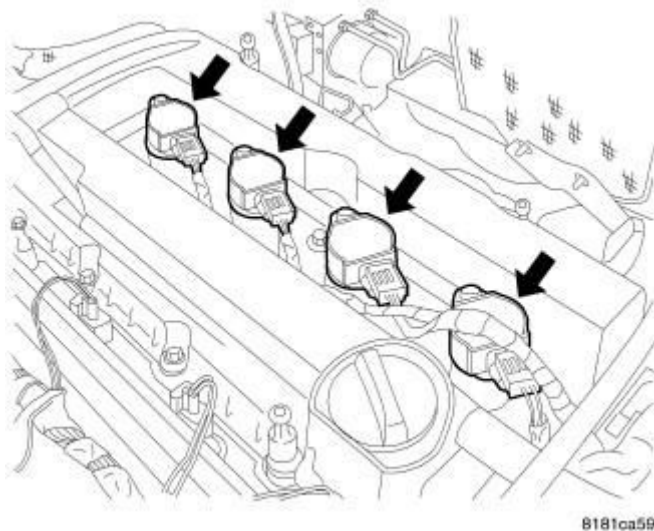


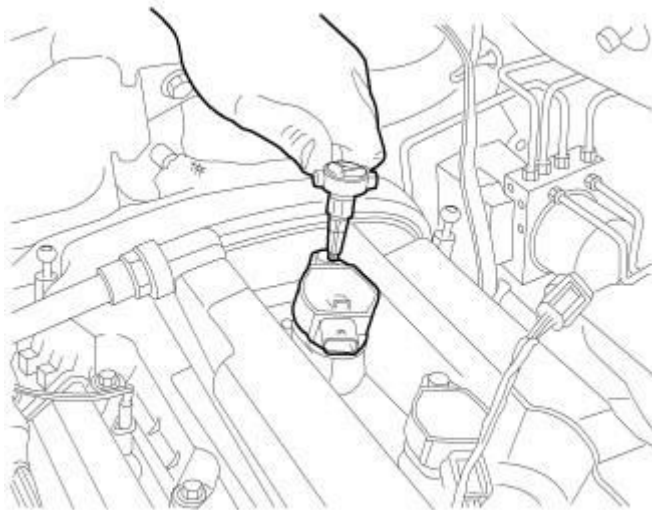
Fig. 7: Ignition Coils
Courtesy of CHRYSLER GROUP, LLC

NOTE: View typical

NOTE: Prior to removing coil, spray compressed air around coil top to make sure no dirt drops into the spark plug tube.

The electronic ignition coil attaches directly to the valve cover.

1. Remove the negative battery cable.
2. Disconnect electrical connector from ignition coil.

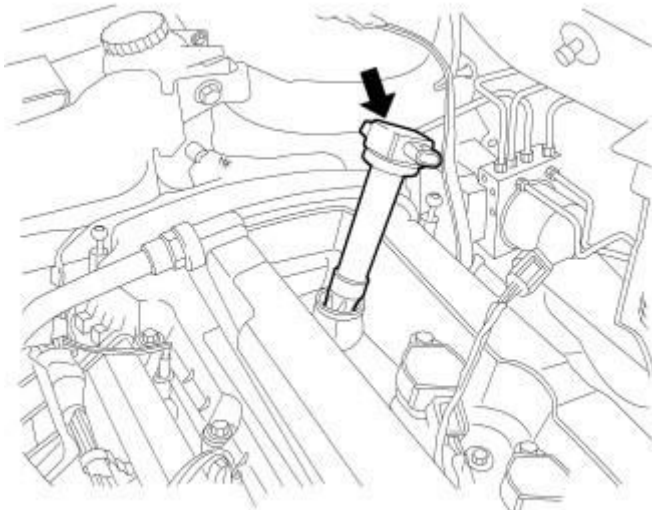


8181d713

Fig. 8: Ignition Coil Bolt

Courtesy of CHRYSLER GROUP, LLC

3. Remove ignition coil mounting bolts.



8181ca6a

Fig. 9: Removing/Installing Ignition Coil

Courtesy of CHRYSLER GROUP, LLC

4. Remove ignition coil.

3.2L

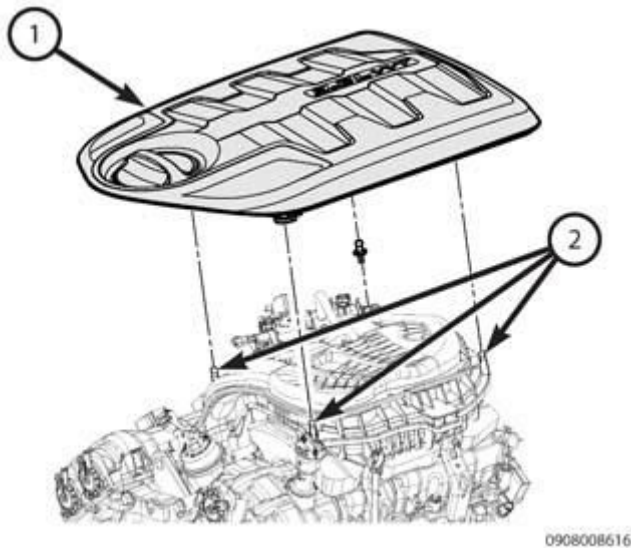


Fig. 10: Engine Cover & Ball Studs
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Lift the engine cover from the retaining grommets off of the ball studs (2) and remove the engine cover (1).
3. If removing the ignition coils from cylinders 1, 3 or 5 on the right side of the engine. Remove the air intake resonator. Refer to **RESONATOR, AIR CLEANER, REMOVAL**.
4. If removing the ignition coils from cylinders 2, 4 or 6 on the left side of the engine. Remove the upper intake manifold and insulator. Refer to **MANIFOLD, INTAKE, REMOVAL**.

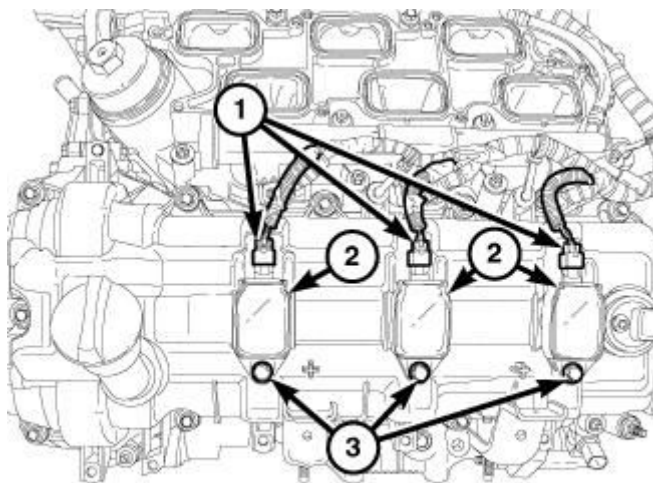


Fig. 11: Electrical Connector, Ignition Coils & Ignition Coil Retaining Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: The left side ignition coils are shown in illustration, the right side ignition

coils are similar.

5. Disconnect the harness connector (1) from the ignition coil (2).
6. Remove the ignition coil retaining bolt (3).
7. Pull the ignition coil (2) from cylinder head cover opening with a slight twisting action.

INSTALLATION

2.4L

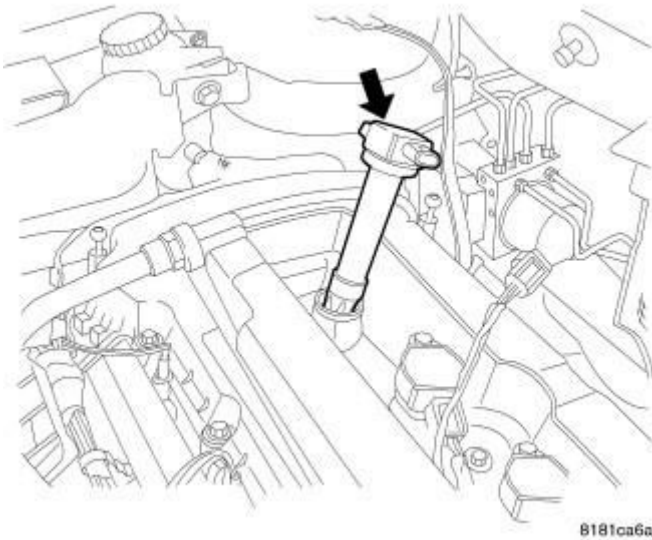


Fig. 12: Removing/Installing Ignition Coil
Courtesy of CHRYSLER GROUP, LLC

NOTE: **View typical**

1. Install ignition coil.

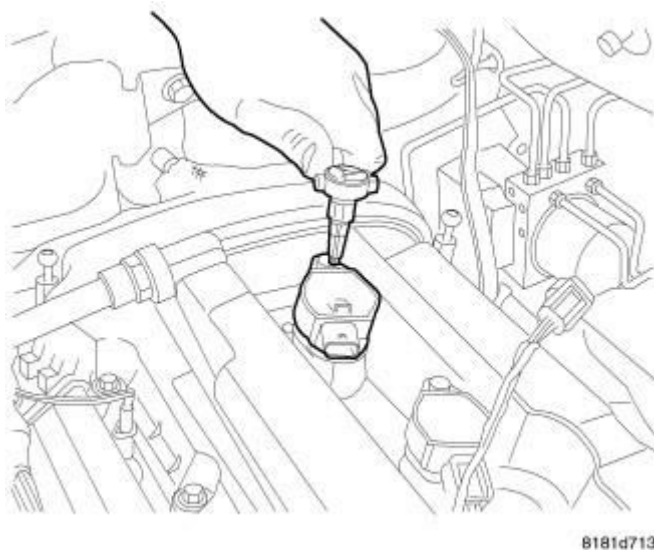


Fig. 13: Ignition Coil Bolt
Courtesy of CHRYSLER GROUP, LLC

2. Tighten bolt to 9 N.m (79.5 in. lbs.).
3. Connect electrical connectors and lock.
4. Install the negative battery cable.

3.2L

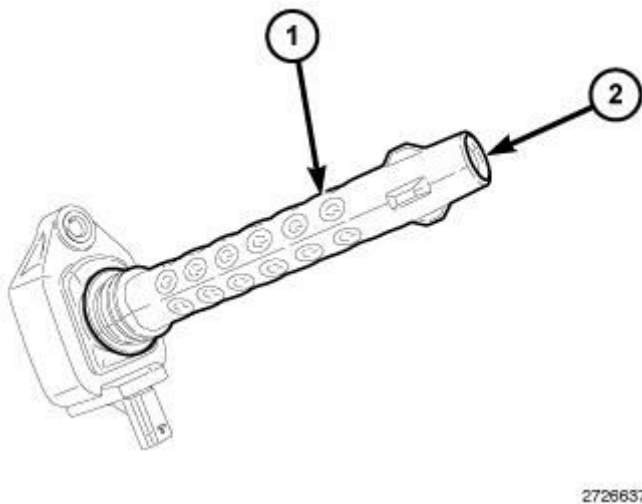


Fig. 14: Ignition Coil Rubber Boot & Opening Of The Boot
Courtesy of CHRYSLER GROUP, LLC

1. Using compressed air, blow out any dirt or contaminants from around the top of spark plug.
2. Check the condition of the ignition coil rubber boot (1). Inspect the opening of the boot (2) for any debris, tears or rips. Carefully remove any debris with a lint free cloth.

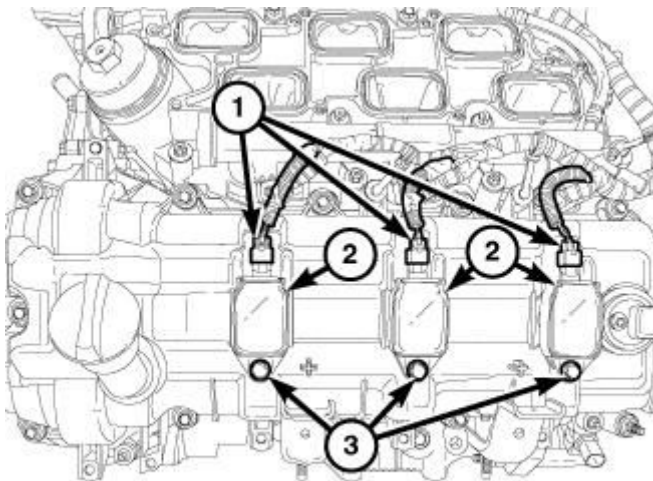


3404740

Fig. 15: Fluostar 2LF Lubricant
 Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not apply a silicone based grease such as Mopar® Dielectric Grease to the ignition coil rubber boot. The silicone based grease will absorb into the boot causing it to stick and tear.

3. Place a small, 360° bead of **Uniflor 8172** lubricant (1) along the inside opening of the coil boot approximately 1 to 2 mm from the chamfer edge but not on the chamfered surface.



2728572

Fig. 16: Electrical Connector, Ignition Coils & Ignition Coil Retaining Bolts
 Courtesy of CHRYSLER GROUP, LLC

NOTE: The LH ignition coils are shown in illustration, the RH ignition coils are similar.

4. Position the ignition coil (2) into the cylinder head cover opening. Using a twisting action, push the ignition coil onto the spark plug.
5. Install the ignition coil mounting bolt (3) and tighten to the proper specification. Refer to **SPECIFICATIONS**.
6. Connect the harness connector (1) to the ignition coil (2).
7. If removed, install the insulator and upper intake manifold. Refer to **MANIFOLD, INTAKE, INSTALLATION**.

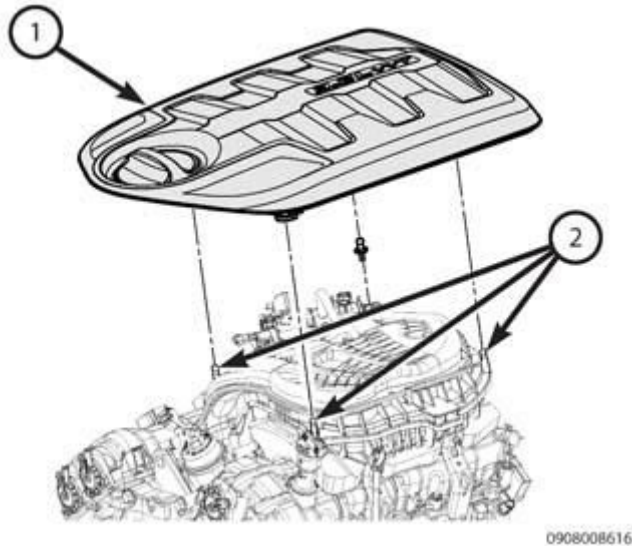


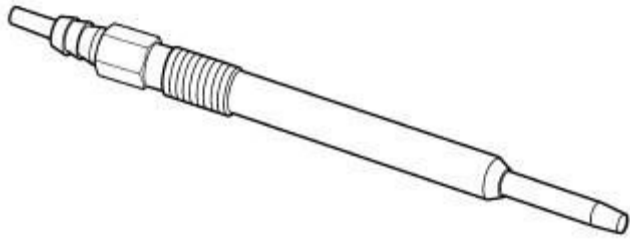
Fig. 17: Engine Cover & Ball Studs
Courtesy of CHRYSLER GROUP, LLC

8. Install the engine cover.
9. Connect the negative battery cable and tighten nut to the proper specification. Refer to **SPECIFICATIONS**.

PLUG, GLOW

DESCRIPTION

DESCRIPTION



80c46a18

Fig. 18: Glow Plug**Courtesy of CHRYSLER GROUP, LLC**

Glow plugs are used to help start a cold or cool engine. The glow plugs will heat up and glow to heat the combustion chamber of each cylinder. An individual glow plug is used for each cylinder. Each glow plug is threaded into the cylinder head below the cylinder head cover.

OPERATION**OPERATION**

The glow plugs are used to preheat the combustion chambers in order to achieve the ignition temperature required for the fuel-air mixture.

The heating element is integrated in the glow rod. It consists of a heating winding and a control winding connected in series.

The glow plug system is a quick start type. This allows for immediate start in practically all weather conditions without long periods of pre-glowing; this works in conjunction with the injectors.

REMOVAL**REMOVAL**

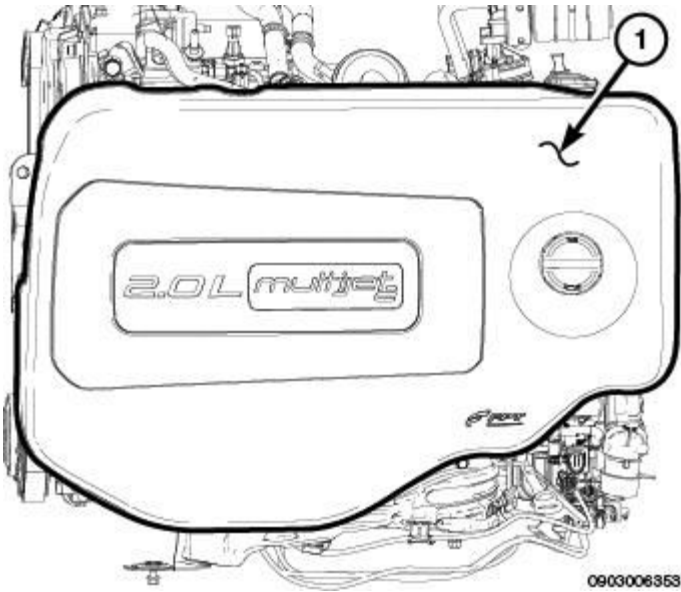


Fig. 19: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

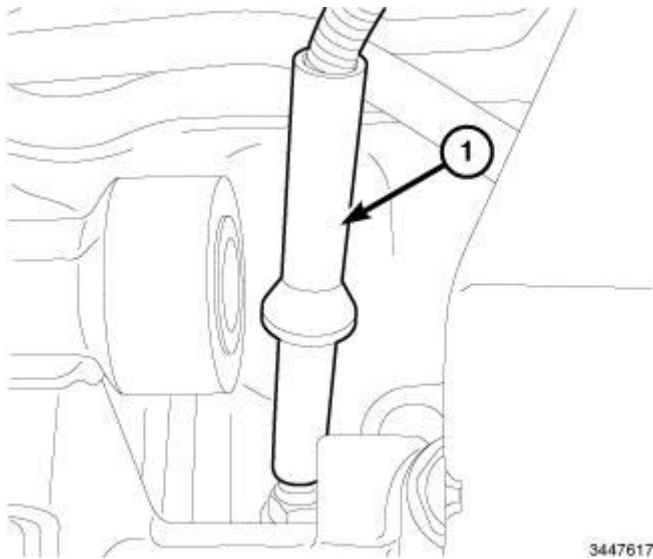


Fig. 20: Glow Plug Harness Connector

Courtesy of CHRYSLER GROUP, LLC

3. Clean glow plug bay area.
4. Disconnect glow plug harness connector (1).

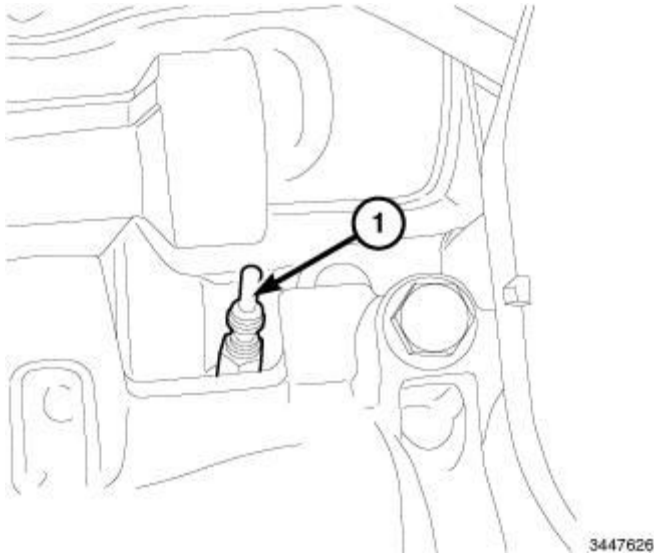


Fig. 21: Glow Plug
Courtesy of CHRYSLER GROUP, LLC

5. Remove glow plug (1) from cylinder head.

INSTALLATION

INSTALLATION

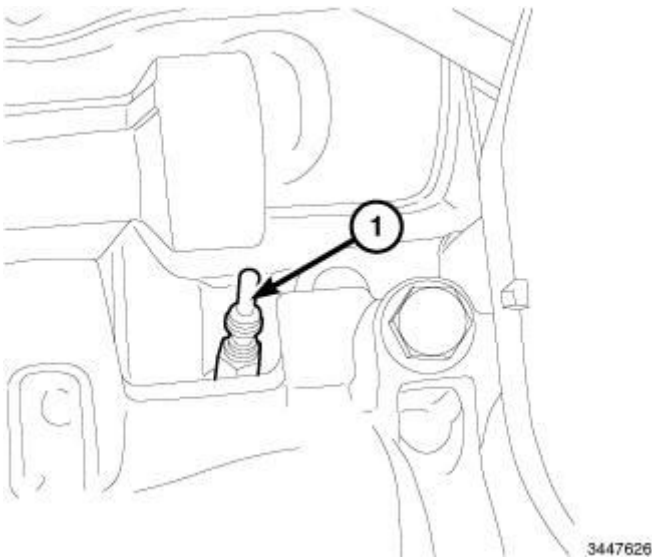


Fig. 22: Glow Plug
Courtesy of CHRYSLER GROUP, LLC

1. Install glow plugs (1). Tighten glow plugs to 11 N.m (97 in. lbs.).

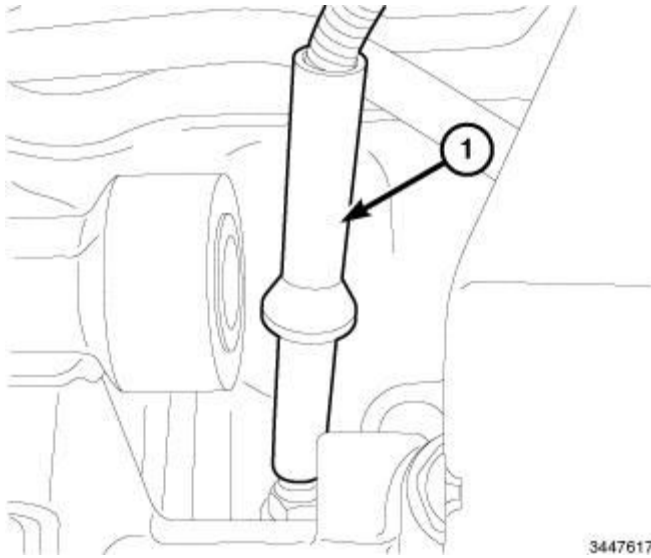


Fig. 23: Glow Plug Harness Connector
Courtesy of CHRYSLER GROUP, LLC

2. Connect glow plug harness connector (1).

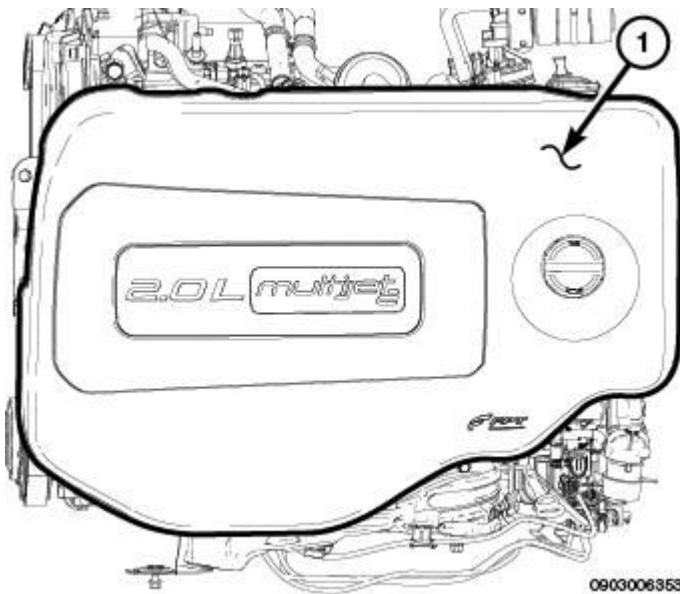


Fig. 24: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

3. Install engine cover (1).
4. Connect the negative battery cable.

RELAY, AUTO SHUT DOWN

DESCRIPTION

DESCRIPTION

The 5-pin, 12-volt, Automatic Shutdown (ASD) relay is located in the Power Distribution Center (PDC). Always refer to the label on the power distribution center cover for relay location.

OPERATION**OPERATION**

The ground circuit for the coil within the Automatic Shutdown (ASD) relay is controlled by the Powertrain Control Module (PCM). The PCM operates the ASD relay by switching its ground circuit on and off.

The ASD relay powers a number of critical circuits through the Power Distribution Center (PDC). These circuits include:

- Four ASD feed circuits to the PCM
- Fuel Injectors
- Ignition Coils
- Upstream O2 Sensor Heater
- Downstream O2 Sensor Heater
- EVAP Purge (Control) Solenoid

One of the ASD feed circuits is used as an ASD sense so that the PCM can determine if the ASD circuit is powered or not.

REMOVAL**REMOVAL**

The Automatic Shutdown (ASD) relay is located in the engine compartment within the Power Distribution Center (PDC). Always refer to the label on the power distribution center cover for relay location.

1. Remove the power distribution center cover.
2. Remove the relay from the power distribution center.
3. Check the condition of the relay terminals and power distribution center connector terminals for damage or corrosion. Repair if necessary before installing the relay.
4. Check for pin height (pin height should be the same for all terminals within the power distribution center connector). Repair if necessary before installing the relay.

INSTALLATION**INSTALLATION**

The Automatic Shutdown (ASD) relay is located in the engine compartment within the Power Distribution Center (PDC). Always refer to the label on the power distribution center cover for relay location.

1. Install the relay to the power distribution center.
2. Install the cover to the power distribution center.

SENSOR, CAMSHAFT POSITION, 2.0L DIESEL

DESCRIPTION

2.0L-DIESEL

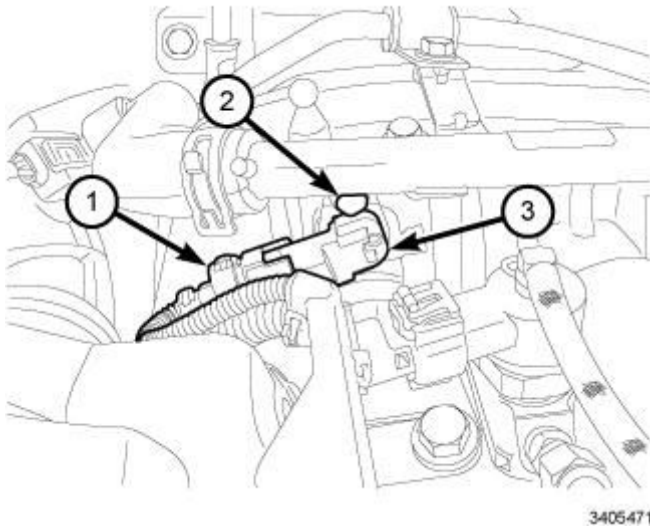


Fig. 25: Camshaft Position Sensor, Connector & Bolt
Courtesy of CHRYSLER GROUP, LLC

The camshaft position sensor (3) is mounted to the cylinder head cover. The hall effect sensor generates a signal that corresponds to the camshaft position of rotation. The Powertrain Control Module (PCM) uses the camshaft position sensor signal to detect the TDC position of cylinder 1. The PCM controls Injection timing and the duration of time each injector delivers fuel during an injection cycle based on the camshaft signal and the crankshaft signals.

OPERATION

2.0L-DIESEL

The signal circuit of the camshaft sensor has a voltage of approximately 5V. If the segment machined into the exhaust camshaft sprocket is positioned opposite the camshaft sensor, the camshaft signal is approximately 0V. This 0V to 5V signal is used by the Powertrain Control Module (PCM) for detecting ignition TDC of cylinder 1 as the engine rotates. If no signal is supplied by the camshaft position sensor, the vehicle will not start.

REMOVAL

DIESEL

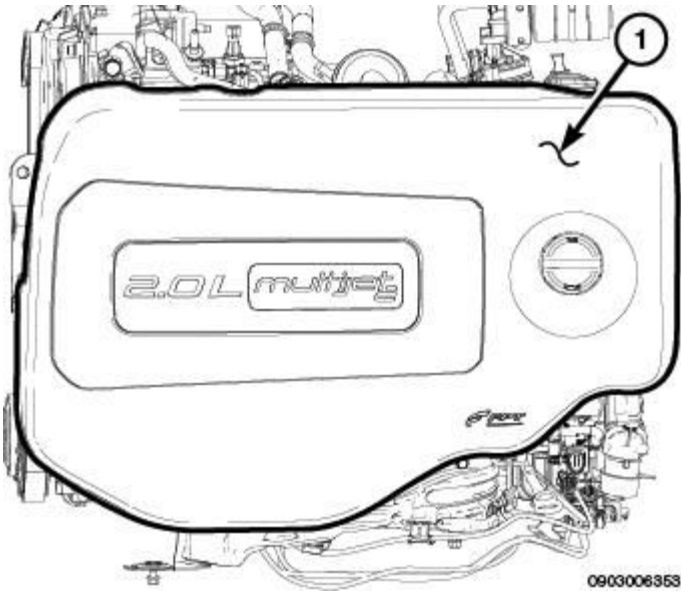


Fig. 26: Engine Cover

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the negative battery cable.
2. Remove the engine cover (1).

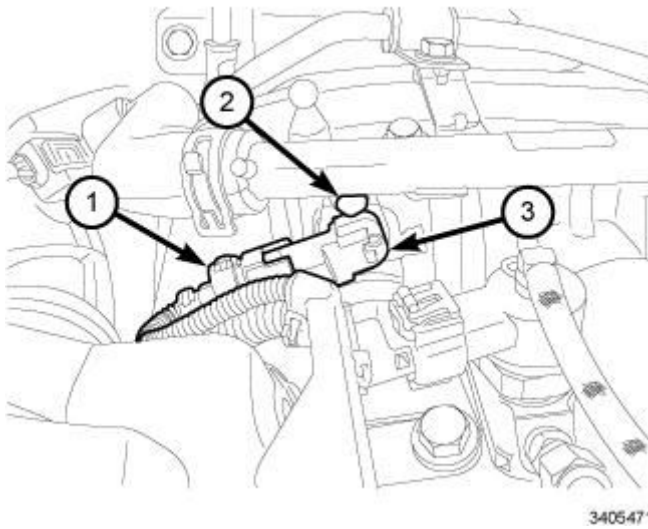


Fig. 27: Camshaft Position Sensor, Connector & Bolt

Courtesy of CHRYSLER GROUP, LLC

3. Disconnect Camshaft Position Sensor (CMP) wire harness connector (1).
4. Remove bolt (2) and the CMP sensor (3).

INSTALLATION

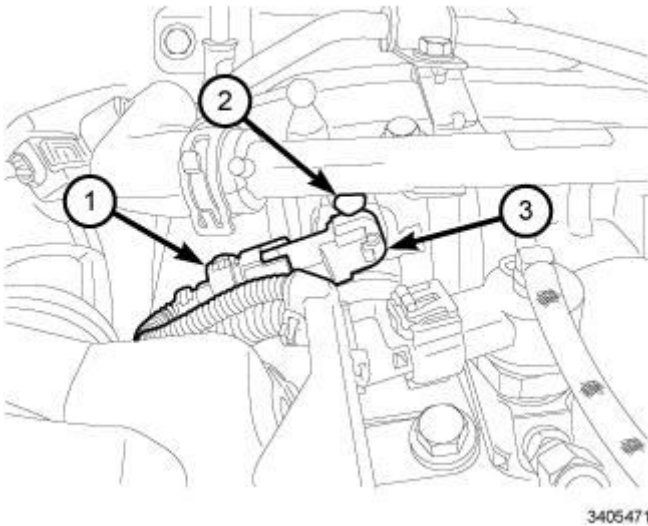
DIESEL

Fig. 28: Camshaft Position Sensor, Connector & Bolt
Courtesy of CHRYSLER GROUP, LLC

1. Install the Camshaft Position Sensor (CMP) (3). Tighten bolt (2) to 9 N.m (80 in. lbs.).
2. Connect the CMP wire harness connector (1).

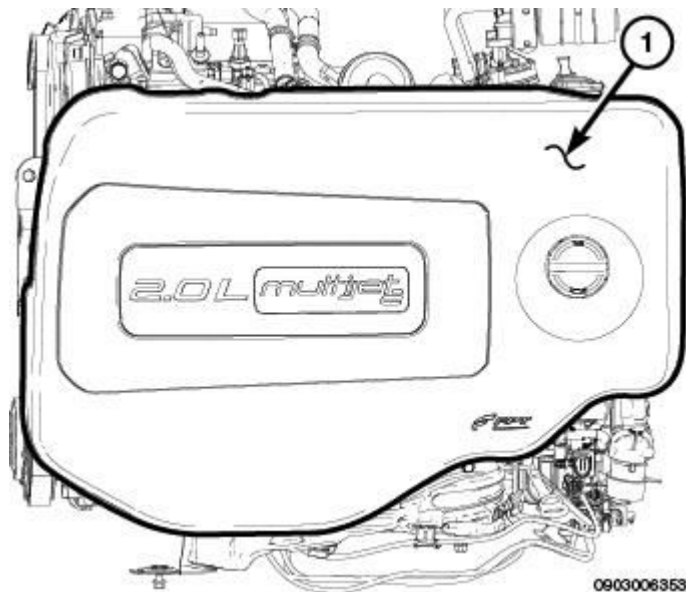


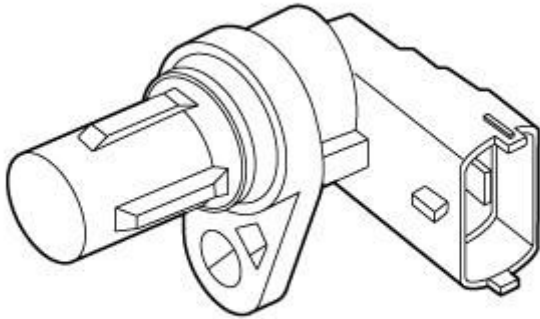
Fig. 29: Engine Cover
Courtesy of CHRYSLER GROUP, LLC

3. Install the engine cover (1).
4. Connect the negative battery cable.

SENSOR, CAMSHAFT POSITION

DESCRIPTION

DESCRIPTION



3119404

Fig. 30: Camshaft Position (CMP) Sensor
Courtesy of CHRYSLER GROUP, LLC

The Camshaft Position (CMP) sensor is a Hall effect type sensor and is used by the Powertrain Control Module (PCM) in conjunction with the Crankshaft Position (CKP) sensor and TDC signal to recognize the position of the cylinders and determine the injection and ignition point. The CMP sensor is located on the camshaft bearing housing and faces the camshaft.

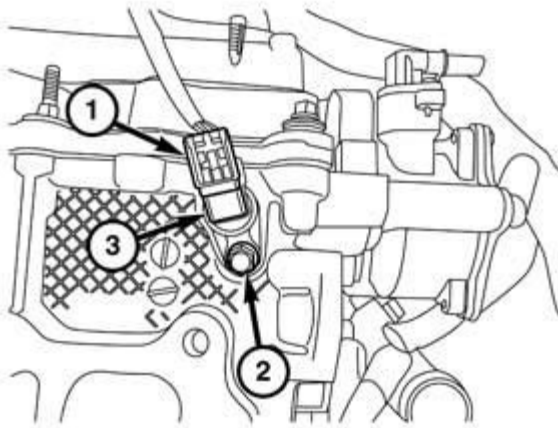
OPERATION

OPERATION

A current-carrying semiconductor layer immersed in a normal magnetic field (force lines at right angles to current direction) generates a potential difference known as a Hall voltage at its terminals. If current intensity remains constant, the generated voltage depends on magnetic field intensity alone. Periodic changes in magnetic field intensity are sufficient to generate a modulated electrical signal with frequency proportional to the speed of magnetic field change. The distance between the sensor and the surface of the timing wheel on the cam axis is altered to produce this change.

REMOVAL

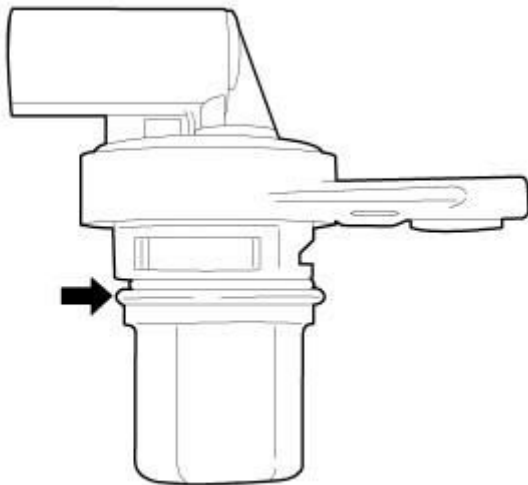
2.4L



081569481

Fig. 31: Connector, Mounting Bolt & Camshaft Position Sensor
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect negative battery cable.
2. Disconnect electrical connector at sensor (1).
3. Remove mounting bolt (2).



8181dc89

Fig. 32: Cam Sensor
Courtesy of CHRYSLER GROUP, LLC

4. Remove the exhaust cam sensor (3).

3.2L

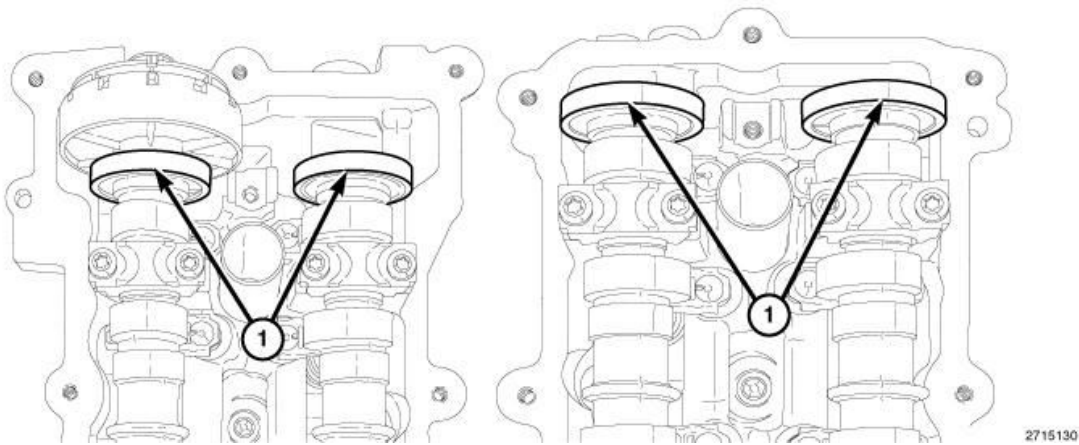


Fig. 33: Magnetic Timing Wheels
Courtesy of CHRYSLER GROUP, LLC

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.

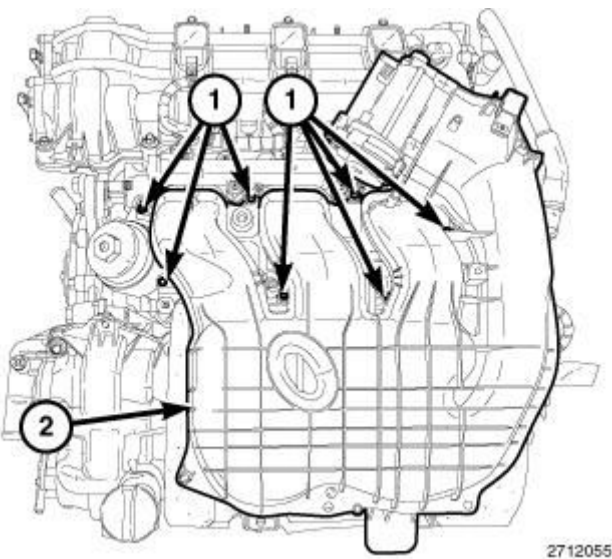


Fig. 34: Upper Intake Manifold & Bolts
Courtesy of CHRYSLER GROUP, LLC

The Camshaft Position (CMP) sensors are located at the rear of the cylinder head covers and are bolted to the cylinder head.

1. Disconnect and isolate the negative battery cable.
2. Remove the air cleaner resonator.

3. If removing the LH CMP sensor, first remove the upper intake manifold (2). Refer to **MANIFOLD, INTAKE, REMOVAL**.

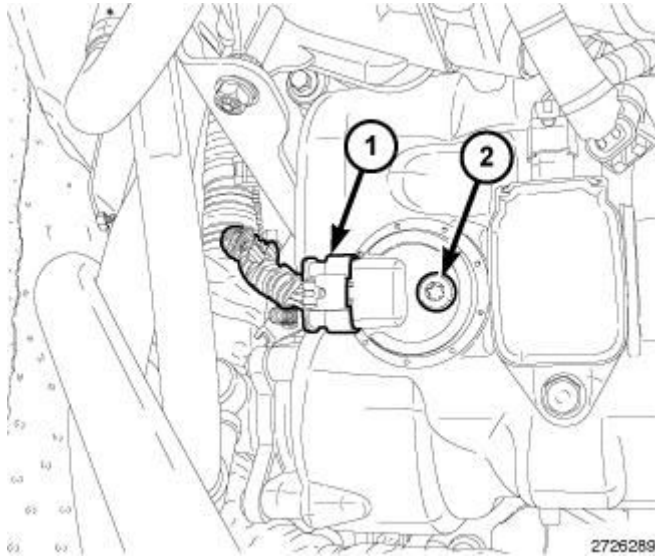


Fig. 35: CMP Sensor & Bolt

Courtesy of CHRYSLER GROUP, LLC

NOTE: The RH CMP sensor is shown in illustration, the LH CMP sensor is similar. If removing both RH and LH CMP sensors, mark the sensors so they can be installed in their original locations.

4. Disconnect the electrical connector (1) from the CMP sensor.
5. Loosen the sensor mounting bolt (2).

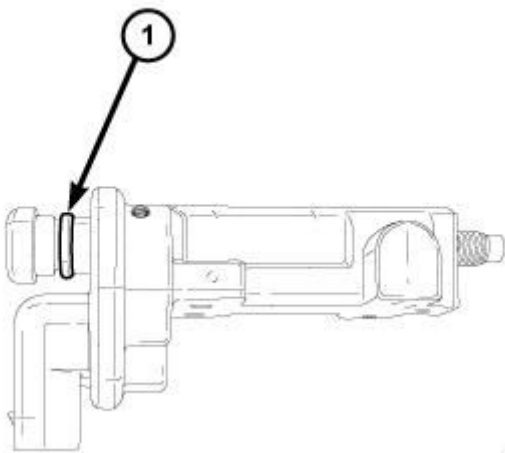


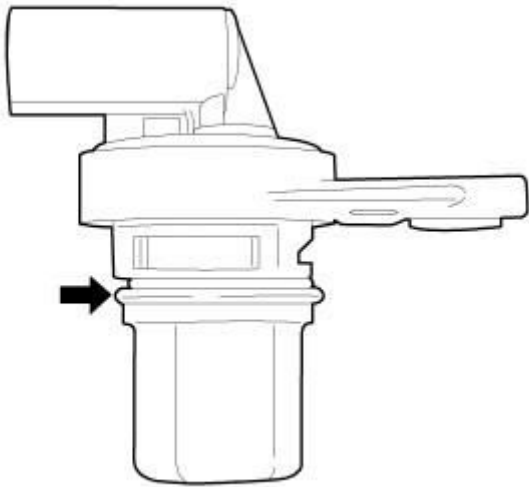
Fig. 36: O-Ring Seal

Courtesy of CHRYSLER GROUP, LLC

6. Pull the sensor and mounting bolt from the cylinder head cover.
7. The O-ring seal (1) can be reused if not damaged.

INSTALLATION

2.4L



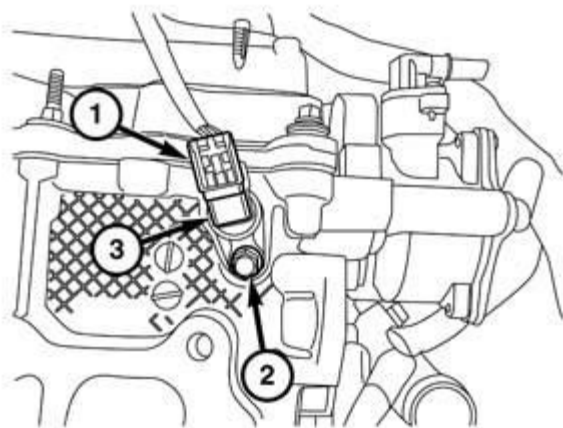
8181dc89

Fig. 37: Cam Sensor

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Install camshaft position (CMP) sensor utilizing twisting motion. Make sure CMP sensor is fully seated. Do not drive CMP sensor into the bore with mounting screw. This may cause CMP sensor to be incorrectly seated causing a faulty signal or no signal at all.

1. Lubricate sensor O-ring.
2. Install the exhaust cam sensor (3) and mounting bolt (2) and tighten to the proper specification. Refer to **SPECIFICATIONS**.



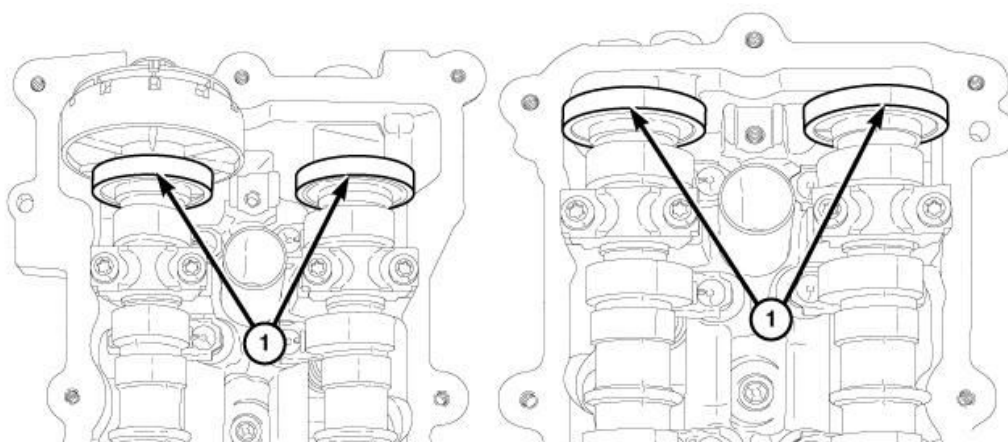
081569481

Fig. 38: Connector, Mounting Bolt & Camshaft Position Sensor
 Courtesy of CHRYSLER GROUP, LLC

3. Connect electrical connector (1) to the camshaft position sensor.
4. Connect negative battery cable. Tighten the nut to the proper specification. Refer to **SPECIFICATIONS** .

3.2L

CAUTION: The magnetic timing wheels (1) must not come in contact with magnets (pickup tools, trays, etc.) or any other strong magnetic field. This will destroy the timing wheels ability to correctly relay camshaft position to the camshaft position sensor.



2715130

Fig. 39: Magnetic Timing Wheels

Courtesy of CHRYSLER GROUP, LLC

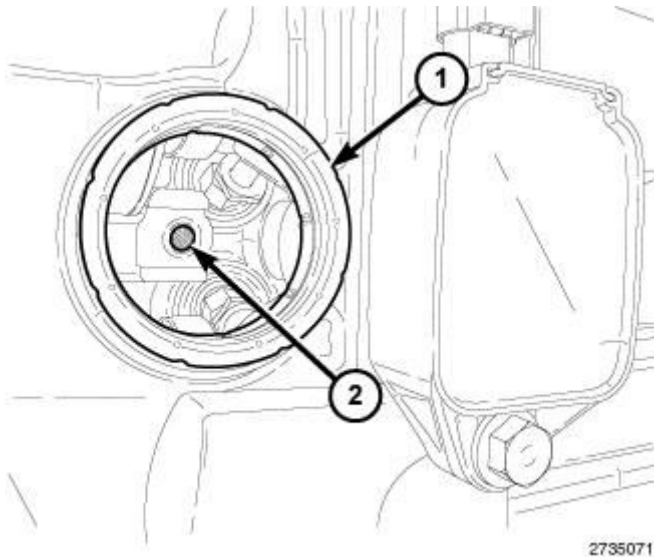


Fig. 40: CMP Sensor Seal & Mounting Bolt Hole

Courtesy of CHRYSLER GROUP, LLC

1. Clean out the camshaft position (CMP) sensor mounting bolt hole (2) in cylinder head.
2. The CMP sensor seal (1) can be reused if not damaged.

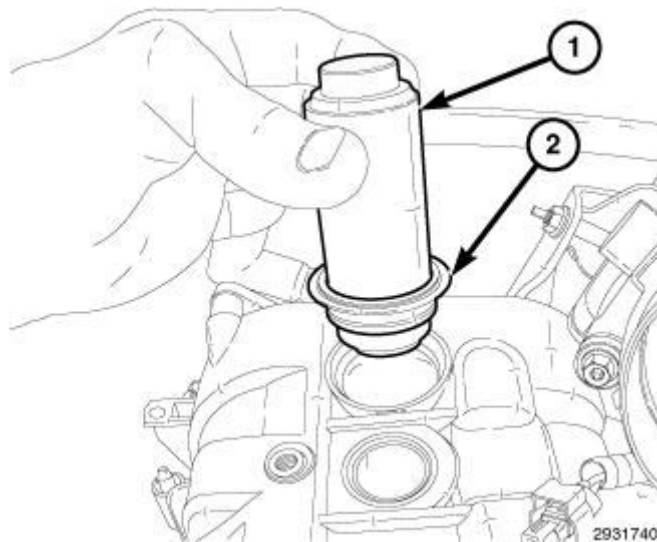


Fig. 41: Installing CMP Sensor Seal

Courtesy of CHRYSLER GROUP, LLC

3. If required, install a new CMP sensor seal (2) in the cylinder head cover:
 - Lubricate the CMP sensor seal inner and outer diameters with clean engine oil.
 - Place the CMP sensor seal (2) on the Cam Sensor/Spark Plug Tube Seal Installer (special tool

#10256, Installer, Cam Installer, Cam Sensor/Spark Plug Tube Seal) (1).

- Push the seal into the cylinder head cover until the base of the seal is seated.
- Remove the tool.

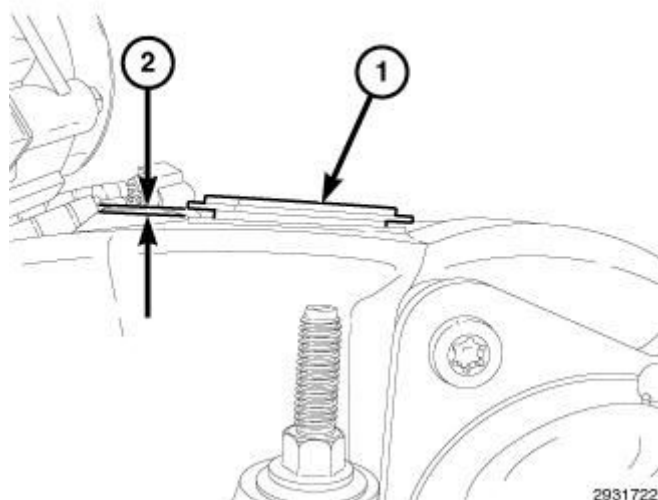


Fig. 42: Gap & CMP Sensor Seal
Courtesy of CHRYSLER GROUP, LLC

NOTE: A properly installed CMP sensor seal (1) will have a 1.5 - 2.0 mm (0.06 - 0.08 in.) gap (2) between the cylinder head cover and the seal upper flange.

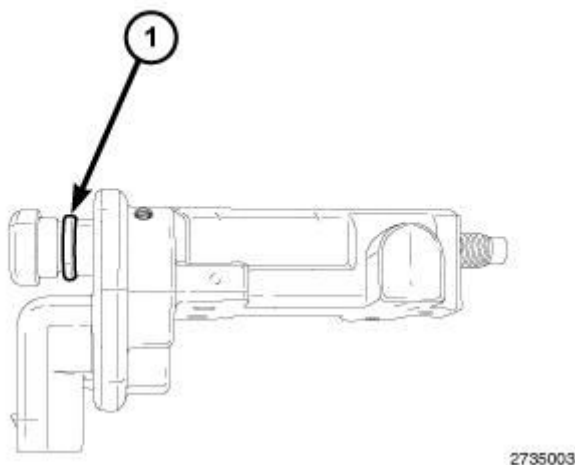


Fig. 43: O-Ring Seal
Courtesy of CHRYSLER GROUP, LLC

4. The sensor mounting bolt O-ring (1) can be reused if not damaged.

5. Apply a small amount of engine oil to the sensor mounting bolt O-ring (1).

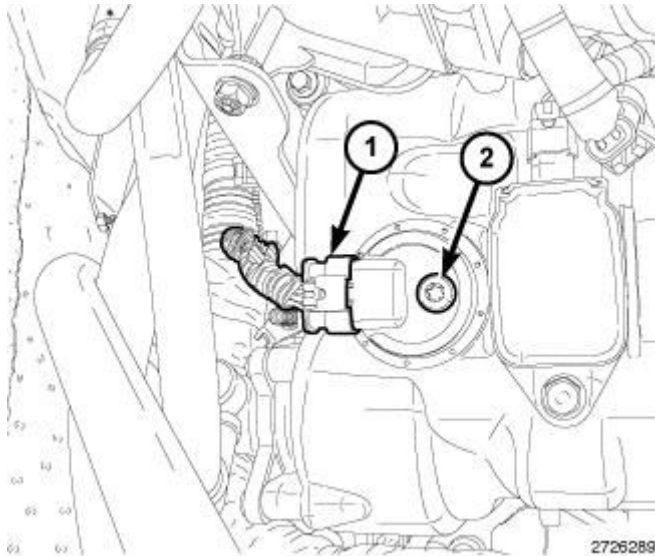


Fig. 44: CMP Sensor & Bolt
 Courtesy of CHRYSLER GROUP, LLC

NOTE: The right CMP sensor is shown in illustration, the left CMP sensor is similar. If both right and left CMP sensors were removed, install them into their original locations.

6. Install the CMP sensor to the cylinder head. Tighten the mounting bolt (2) to 9 N.m (80 in. lbs.).
7. Connect the electrical connector (1) to the sensor.

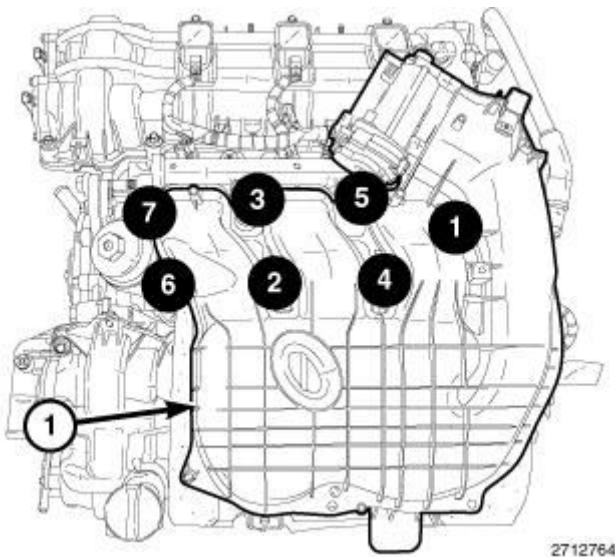


Fig. 45: Upper Intake Manifold Bolt Tightening Sequence
 Courtesy of CHRYSLER GROUP, LLC

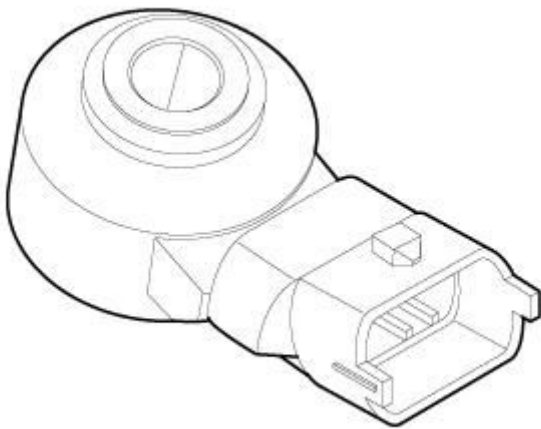
8. If required, install the upper intake manifold (1) and air inlet hose. Refer to **MANIFOLD, INTAKE, INSTALLATION**.
9. Connect the negative battery cable and tighten nut to 5 N.m (45 in. lbs.).

NOTE: The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components.

SENSOR, KNOCK

DESCRIPTION

DESCRIPTION



3119433

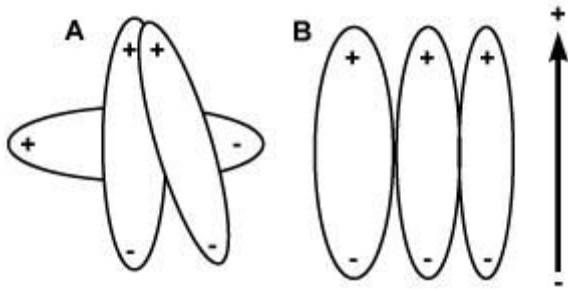
Fig. 46: Knock Sensor

Courtesy of CHRYSLER GROUP, LLC

The knock sensor is the piezoelectric type and is fitted on the crankcase to detect the intensity of the vibrations caused by detonation in the combustion chambers. The phenomenon produces a mechanical repercussion on a piezoelectric crystal that sends a signal to the powertrain control module (PCM) and, on the basis of this signal, the PCM reduces the ignition advance until the phenomenon disappears. Later on, the advance is gradually restored to the basic value.

OPERATION

OPERATION



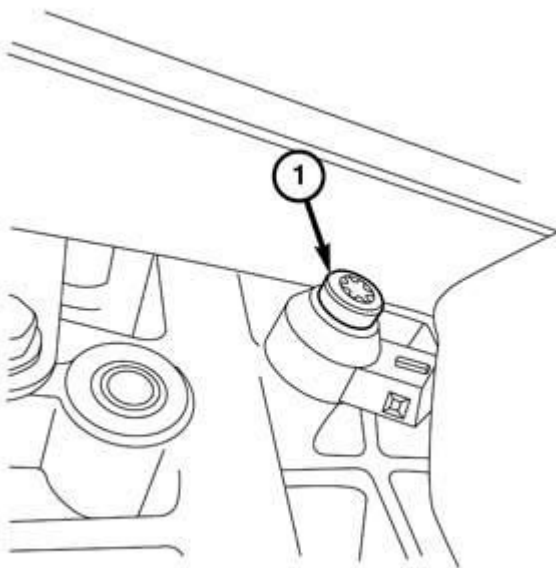
3119462

Fig. 47: Electrical Polarization Operation
Courtesy of CHRYSLER GROUP, LLC

The molecules of a quartz crystal are affected by electrical polarization. In rest conditions (A) the molecules are not arranged in a particular way. When the crystal is subjected to pressure or to an impact (B), the higher the pressure, the more marked their arrangement. This arrangement produces a voltage at the ends of the crystal.

REMOVAL

2.4L



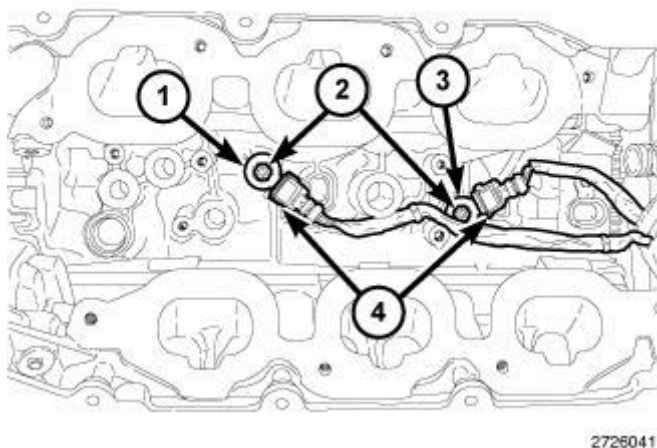
081569693

Fig. 48: Knock Sensor Mounting Bolt

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Remove the Intake manifold. Refer to **MANIFOLD, INTAKE, REMOVAL** .
4. Remove the knock sensor electrical connector.
5. Remove the mounting bolt (1) and knock sensor.

3.2L

**Fig. 49: Knock Sensor 1 & Knock Sensor 2**

Courtesy of CHRYSLER GROUP, LLC

NOTE: The forward sensor (1) is known to the powertrain control module (PCM) as knock sensor 1. The rear sensor (3) is known to the PCM as knock sensor 2.

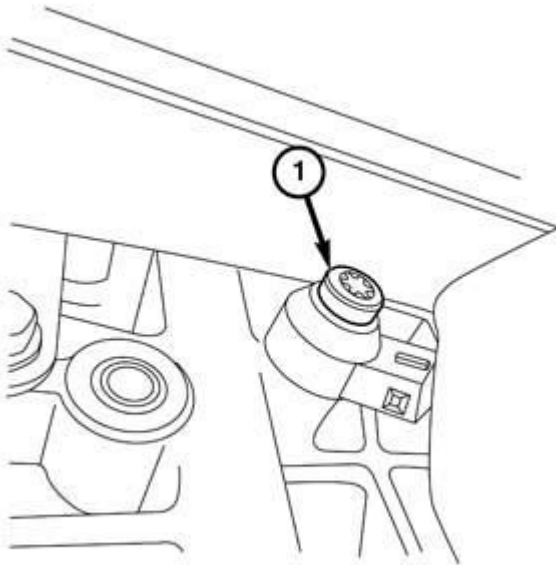
1. Perform the fuel pressure release procedure. Refer to **FUEL SYSTEM PRESSURE RELEASE PROCEDURE** .
2. Disconnect and isolate the negative battery cable.
3. Drain the cooling system. Refer to **STANDARD PROCEDURE** .
4. Remove the air cleaner housing assembly, upper and lower intake manifolds and the oil filter housing. Refer to **HOUSING, OIL FILTER, REMOVAL** .
5. Remove the electrical connector (4).

NOTE: There may be a foam strip on the bolt threads. This foam is used only to retain the bolts to the sensors for plant assembly. It is not used as a sealant. Do not apply any adhesive, sealant or thread locking compound to these bolts.

6. Remove the mounting bolt (2) and knock sensor 1 (1) or knock sensor 2 (3).

INSTALLATION

2.4L



081569693

Fig. 50: Knock Sensor Mounting Bolt
Courtesy of CHRYSLER GROUP, LLC

1. Thoroughly clean the knock sensor mounting hole.

CAUTION: Over or under tightening the knock sensor mounting bolt will affect knock sensor performance, possibly causing improper spark control. Always use the specified torque when installing the knock sensor. Do not apply any adhesive, sealant or thread locking compound to the bolt.

2. Install the knock sensor with mounting bolt (1). Tighten the mounting bolt to the proper specification. Refer to **SPECIFICATIONS**.
3. Connect the electrical connector.
4. Install the Intake manifold. Refer to **MANIFOLD, INTAKE, INSTALLATION**.
5. Lower the vehicle.
6. Connect the negative battery cable and tighten nut to the proper specification. Refer to **SPECIFICATIONS**.

3.2L

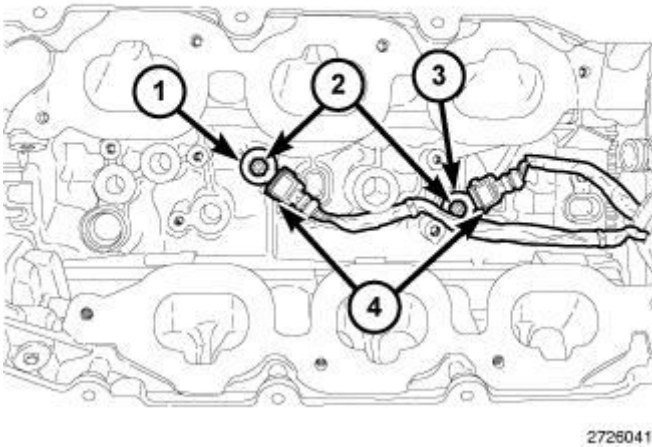


Fig. 51: Knock Sensor 1 & Knock Sensor 2
Courtesy of CHRYSLER GROUP, LLC

NOTE: The forward sensor (1) is known to the powertrain control module (PCM) as knock sensor 1. The rear sensor (3) is known to the PCM as knock sensor 2.

1. Thoroughly clean the knock sensor mounting holes.

NOTE: Over or under tightening the sensor mounting bolts will affect knock sensor performance, possibly causing improper spark control. Always use the specified torque when installing the knock sensors. The torque specification for the knock sensor bolt is less than the typical 8 mm bolt.

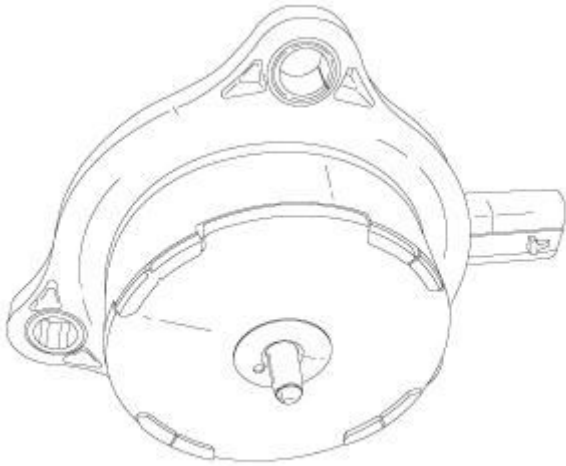
NOTE: There may be a foam strip on the bolt threads. This foam is used only to retain the bolts to the sensors for plant assembly. It is not used as a sealant. Do not apply any adhesive, sealant or thread locking compound to these bolts.

2. Install knock sensor 1 (1) or knock sensor 2 (3) with mounting bolt (2). Tighten the mounting bolt to 20 N.m (15 ft. lbs.).
3. Connect the electrical connector (4).
4. Install the oil filter housing, upper and lower intake manifolds and air cleaner housing assembly. Refer to **HOUSING, OIL FILTER, INSTALLATION**.
5. If removed, install the oil filter and fill the engine crankcase with the proper oil to the correct level. Refer to **OIL - STANDARD PROCEDURE**.
6. Connect the negative battery cable and tighten nut to 5 N.m (45 in. lbs.).
7. Fill the cooling system. Refer to **STANDARD PROCEDURE**.
8. Operate the engine until it reaches normal operating temperature. Check cooling system for correct fluid level. Refer to **STANDARD PROCEDURE**.

SOLENOID, VARIABLE VALVE TIMING

DESCRIPTION

DESCRIPTION



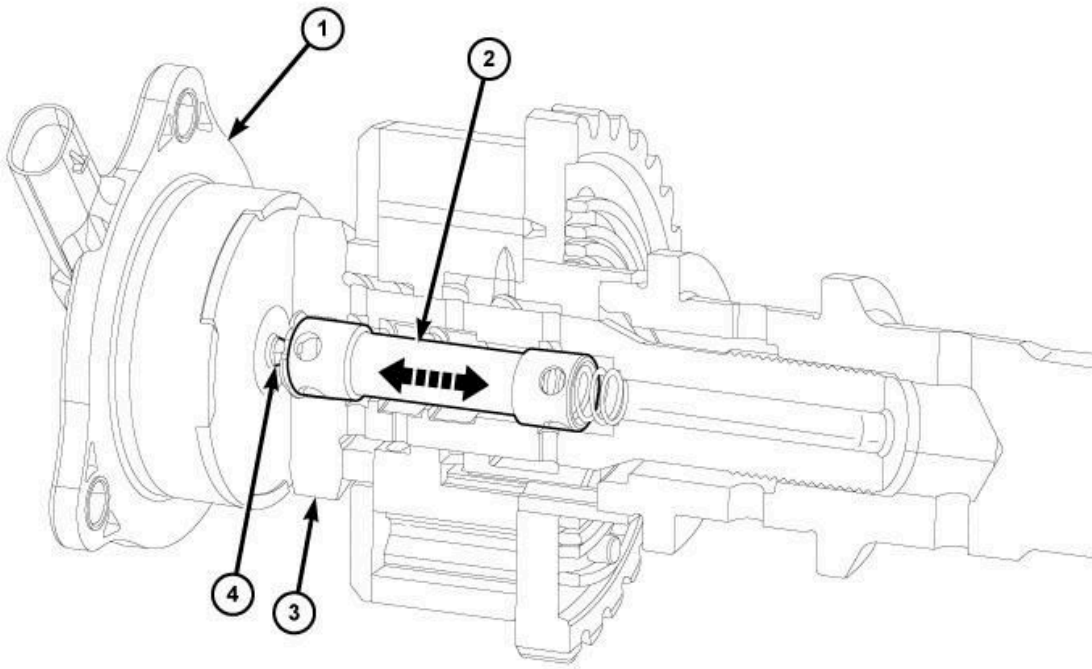
2809261

Fig. 52: Variable Valve Timing Solenoid
Courtesy of CHRYSLER GROUP, LLC

The 3.6L engine is equipped with Variable Valve Timing (VVT). This system adjusts the timing of all four camshafts independently using solenoids and oil control valves to direct oil pressure into the camshaft phaser assemblies. The camshaft phaser assembly advances and/or retards camshaft timing to improve engine performance, mid-range torque, idle quality, fuel economy, and reduce emissions. The four VVT solenoids are located on the front of the cylinder head covers. The pintle should move freely within the solenoid body. Do not attempt to disassemble the solenoids, they are not serviceable. The solenoids are identical but should be installed in the same location as removed.

OPERATION

OPERATION



2811799

Fig. 53: Oil Control Valve (OCV), VVT Solenoid, Solenoid Pintle & Internal Spool Valve
Courtesy of CHRYSLER GROUP, LLC

Camshaft phaser position is adjusted using regulated oil pressure through an Oil Control Valve (OCV) (3). To begin Phaser movement, the Powertrain Control Module (PCM) applies a pulse-width modulated voltage signal to the VVT solenoid (1) to extend or retract the solenoid pintle (4). The pintle pushes against an internal spool valve (2) within the OCV moving the valve forwards and backwards to direct oil flow. The position of the spool inside the OCV determines which ports and chambers inside the phaser are being fed, either to advance the timing of the phaser sprocket relative to the camshaft, retard it, or hold a desired position. Refer to **ASSEMBLY, VARIABLE VALVE TIMING, PHASER/OIL CONTROL VALVE, OPERATION** .

The Camshaft Position (CMP) sensor monitors the position of the camshaft with respect to the crankshaft and provides feedback to the PCM.

The debris crush mode will only occur with the key on and the engine off (KOEO). If the ignition is cycled to the start position without a momentary pause (immediate crank), the debris crush mode will not occur. In this instance the procedure will be performed at the next key off cycle.

REMOVAL

LEFT

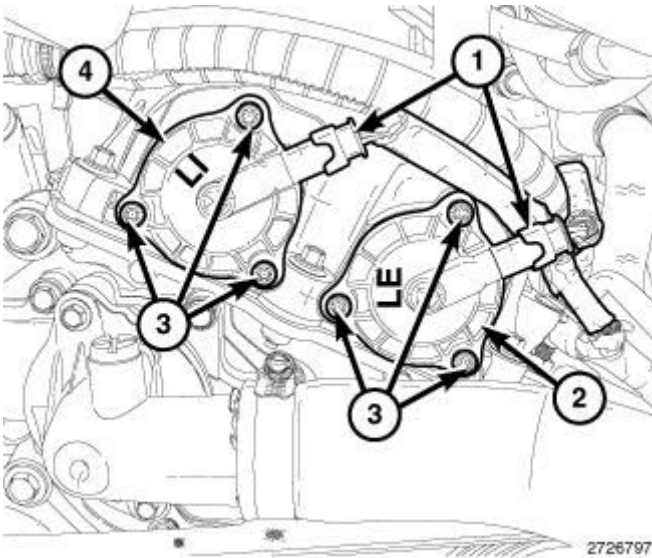


Fig. 54: Variable Valve Timing Solenoids, Connectors & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.

NOTE: Mark the variable valve timing solenoid connectors (1) with a paint pen or equivalent so that they may be reinstalled in their original locations.

2. Mark the intake variable valve timing solenoid (4) and the exhaust variable valve timing solenoid (2) with a paint pen or equivalent so that they may be reinstalled in their original locations.
3. Disconnect the electrical connector (1) from the variable valve timing solenoid.
4. Remove the variable valve timing solenoid mounting bolts (3).

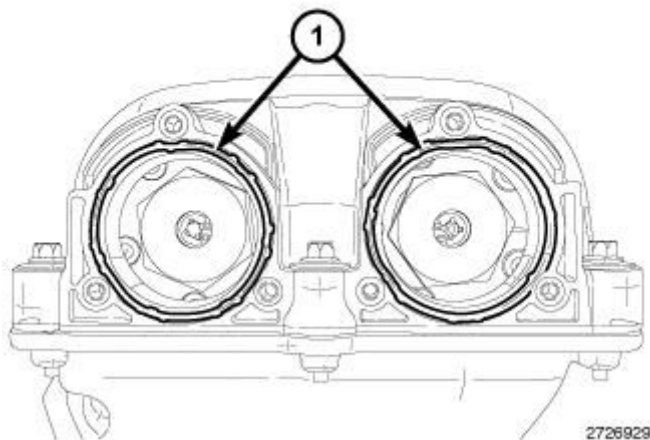
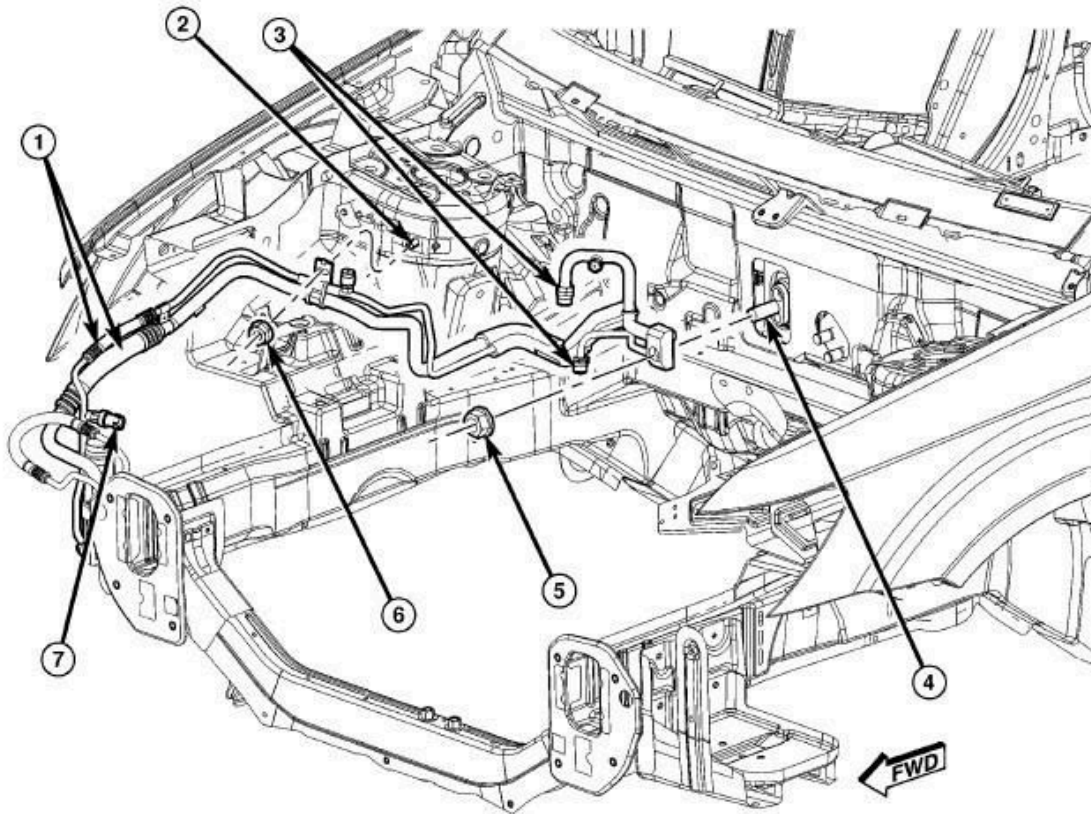


Fig. 55: VVT Seal
Courtesy of CHRYSLER GROUP, LLC

5. Pull the variable valve timing solenoid from the cylinder head cover.
6. The seal (1) can be reused if not damaged.

RIGHT



81w0047a

Fig. 56: Liquid And Suction Line Assembly
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Recover the refrigerant from the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.
3. Remove the resonator. Refer to **RESONATOR, AIR CLEANER, REMOVAL** for 2.4L or **RESONATOR, AIR CLEANER, REMOVAL** for 3.2L.
4. Remove the upper A/C liquid and suction line assembly (1). Refer to **LINE, A/C SUCTION, REMOVAL**.

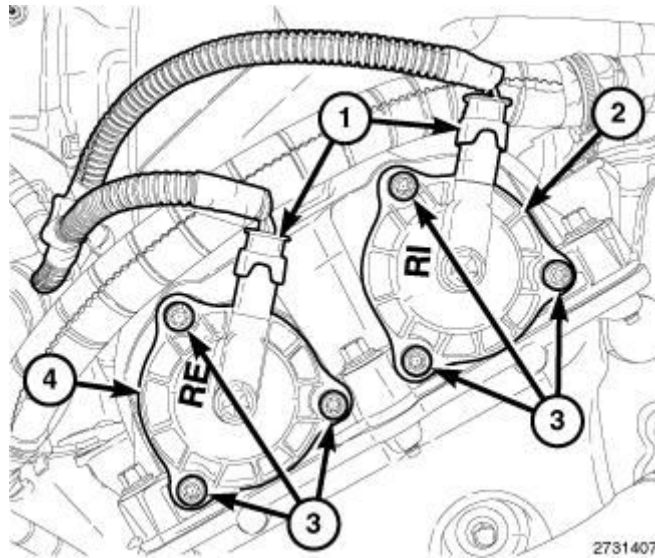


Fig. 57: Variable Valve Timing Solenoids, Connectors & Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: Mark the variable valve timing solenoid connectors (1) with a paint pen or equivalent so that they may be reinstalled in their original locations.

5. Mark the intake variable valve timing solenoid (2) and the exhaust variable valve timing solenoid (4) with a paint pen or equivalent so that they may be reinstalled in their original locations.
6. Disconnect the electrical connector (1) from the variable valve timing solenoid.
7. Remove the variable valve timing solenoid mounting bolts (3).

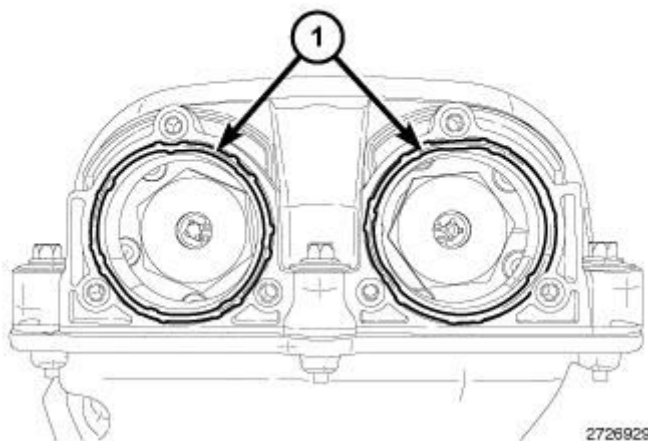


Fig. 58: VVT Seal
Courtesy of CHRYSLER GROUP, LLC

8. Pull the variable valve timing solenoid from the cylinder head cover.

9. The seal (1) can be reused if not damaged.

INSTALLATION

LEFT

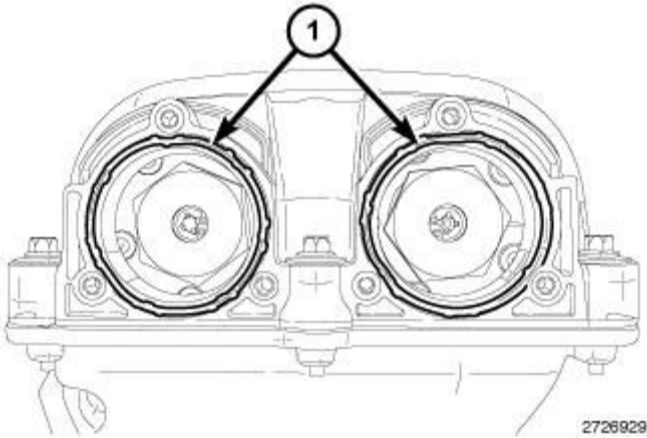


Fig. 59: VVT Seal

Courtesy of CHRYSLER GROUP, LLC

1. Install the variable valve timing solenoid seals (1). The seals can be reused if not damaged.

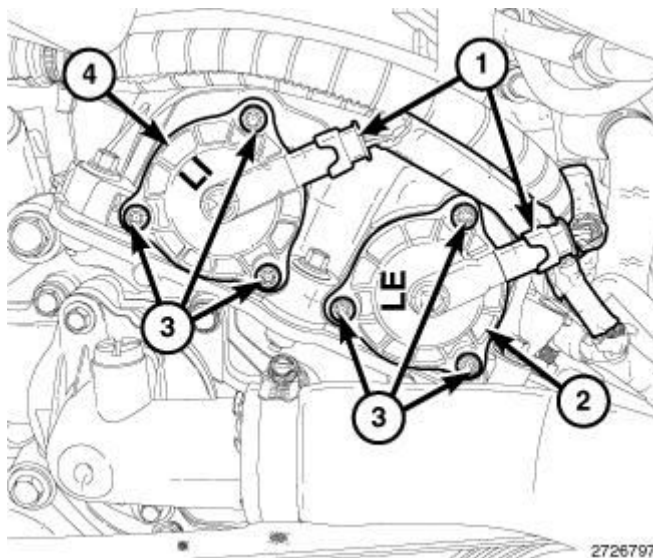


Fig. 60: Variable Valve Timing Solenoids, Connectors & Bolts

Courtesy of CHRYSLER GROUP, LLC

2. Refer to the markings made at disassembly and install the intake variable valve timing solenoid (4) and

the exhaust variable valve timing solenoid (2) in their original locations.

3. Install the variable valve timing solenoid mounting bolts (3) and hand tighten.
4. Connect the electrical connector (1) to the variable valve timing solenoid.
5. Connect the negative battery cable and tighten the nut to the proper specification. Refer to **SPECIFICATIONS** .

NOTE: **The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components.**

RIGHT

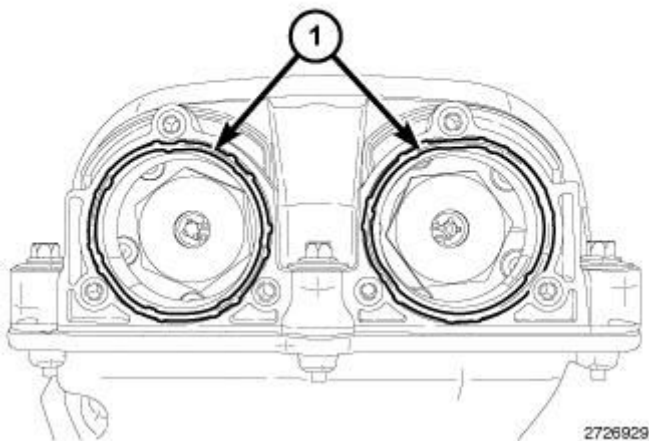


Fig. 61: VVT Seal

Courtesy of CHRYSLER GROUP, LLC

1. Install the variable valve timing solenoid seals (1). The seals can be reused if not damaged.

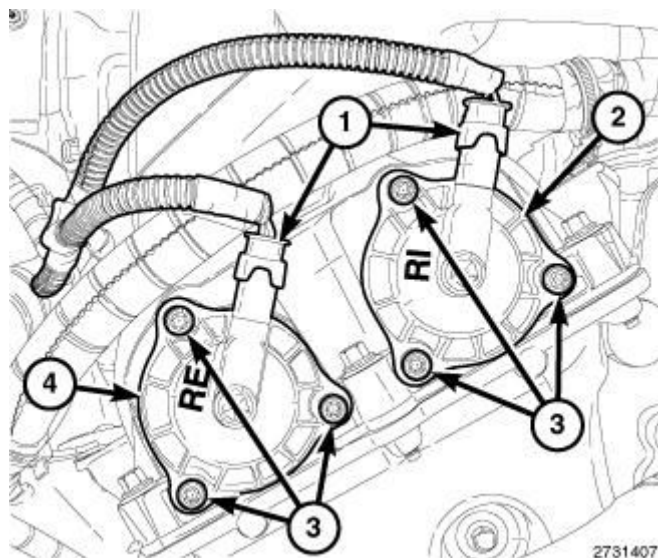
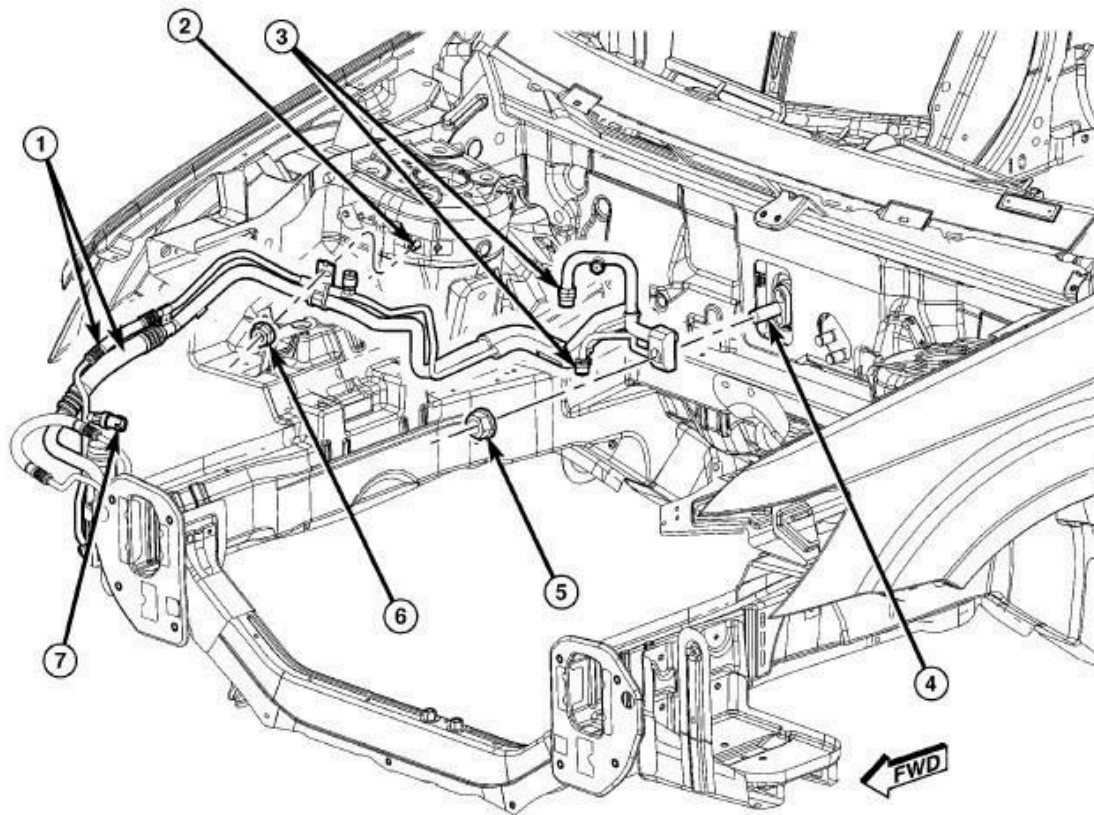


Fig. 62: Variable Valve Timing Solenoids, Connectors & Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Refer to the markings made at disassembly and install the intake variable valve timing solenoid (2) and the exhaust variable valve timing solenoid (4) in their original locations.
3. Install the variable valve timing solenoid mounting bolts (3) and hand tighten.
4. Connect the electrical connector (1) to the variable valve timing solenoid.



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Fig. 63: Liquid And Suction Line Assembly
Courtesy of CHRYSLER GROUP, LLC

5. Install the upper A/C liquid and suction line assembly (1). Refer to **LINE, A/C SUCTION, INSTALLATION**.
6. Install the resonator. Refer to **RESONATOR, AIR CLEANER, INSTALLATION** for 2.4L or **RESONATOR, AIR CLEANER, INSTALLATION** for 3.2L.
7. Connect the negative battery cable and tighten nut to the proper specification. Refer to **SPECIFICATIONS**.

NOTE: The Cam/Crank Variation Relearn procedure must be performed using the scan tool anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components.

SPARK PLUG

REMOVAL

2.4L

CAUTION: Handle the spark plugs with care. Do not drop or force the spark plugs into the wells, damage to the electrodes and/or porcelain body may occur. Always start each spark plug by hand in order to avoid cross-threading the spark plug in the cylinder head.

Always tighten spark plugs to the specified torque. Too much or not enough torque will cause damage to the cylinder head and/or spark plug and may lead to poor engine performance.

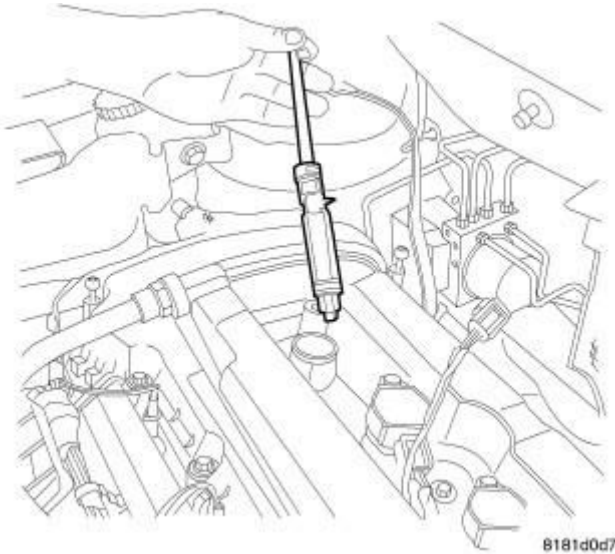


Fig. 64: Spark Plug Removed

Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical

1. Install each spark plug to the cylinder head. Tighten spark plugs to 27 N.m (20 ft. lbs.).

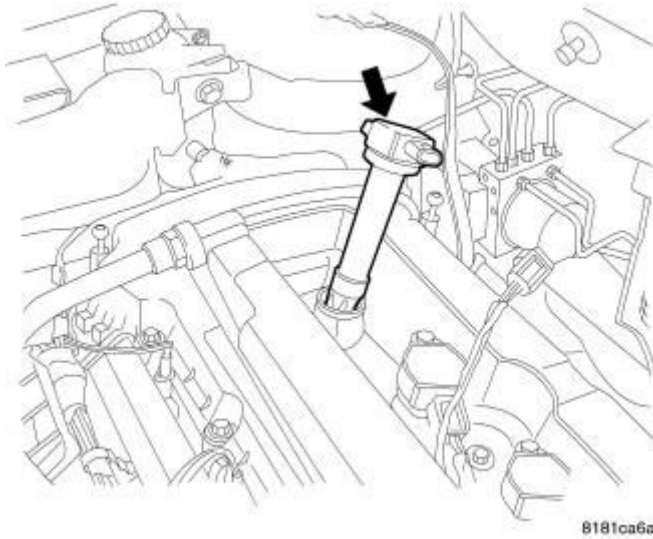


Fig. 65: Removing/Installing Ignition Coil
Courtesy of CHRYSLER GROUP, LLC

2. Install ignition coil onto spark plug.

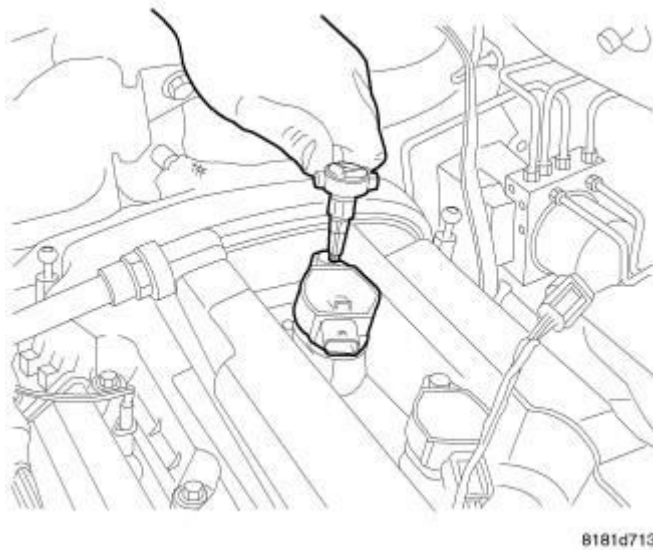
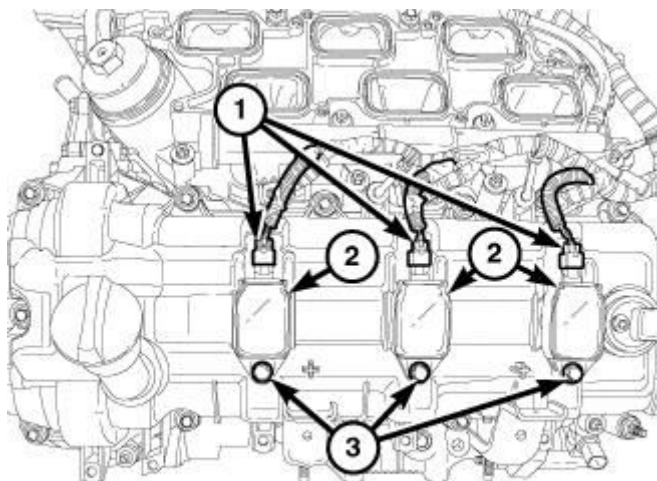


Fig. 66: Ignition Coil Bolt
Courtesy of CHRYSLER GROUP, LLC

3. Install ignition coil mounting bolt. Tighten to 9 N.m (79.5 in. lbs.).
4. Connect ignition coil electrical connectors.
5. Connect the negative battery cable.

3.2L



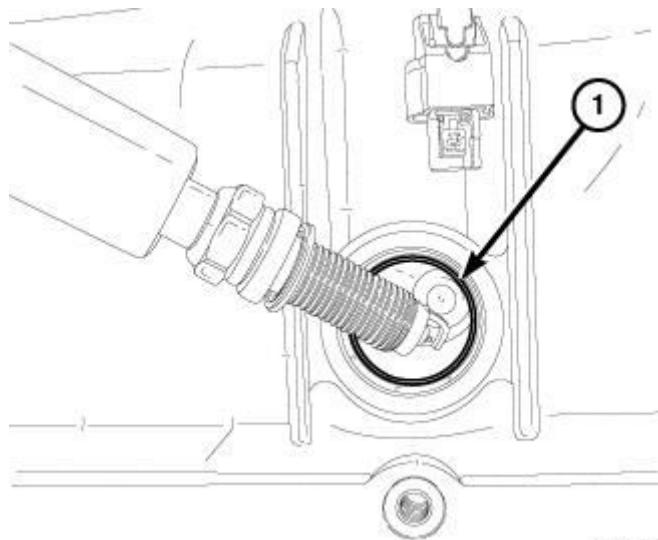
2726572

Fig. 67: Electrical Connector, Ignition Coils & Ignition Coil Retaining Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: The left side ignition coils are shown in illustration, the right side ignition coils are similar.

1. Remove the ignition coil (2). Refer to COIL, IGNITION, REMOVAL.

CAUTION: The spark plug tubes (1) are a thin wall design. Avoid damaging the spark plug tubes. Damage to the spark plug tube can result in oil leaks.



2733374

Fig. 68: Spark Plug Tubes
Courtesy of CHRYSLER GROUP, LLC

2. Prior to removing the spark plug, spray compressed air into the cylinder head opening. This will help prevent foreign material from entering combustion chamber.
3. Remove the spark plug from the cylinder head using a quality thin wall socket with a rubber or foam insert.
4. Inspect the spark plug condition.

INSTALLATION

2.4L

CAUTION: Handle the spark plugs with care. Do not drop or force the spark plugs into the wells, damage to the electrodes and/or porcelain body may occur. Always start each spark plug by hand in order to avoid cross-threading the spark plug in the cylinder head.

Always tighten spark plugs to the specified torque. Too much or not enough torque will cause damage to the cylinder head and/or spark plug and may lead to poor engine performance.

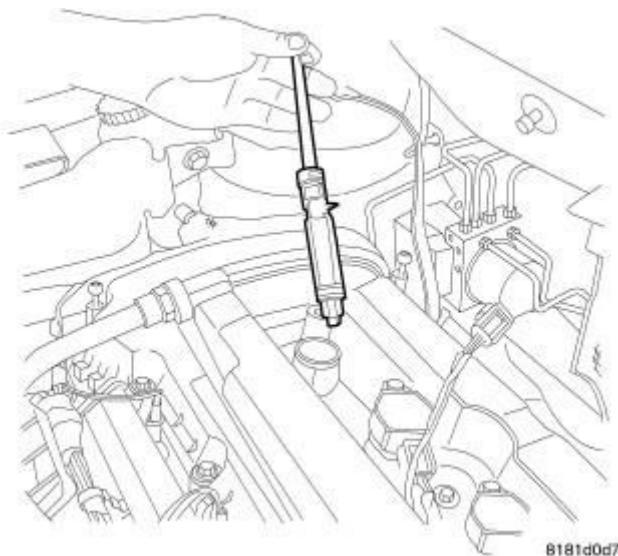


Fig. 69: Spark Plug Removed

Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical

1. Install each spark plug to the cylinder head. Tighten spark plugs to 27 N.m (20 ft. lbs.).

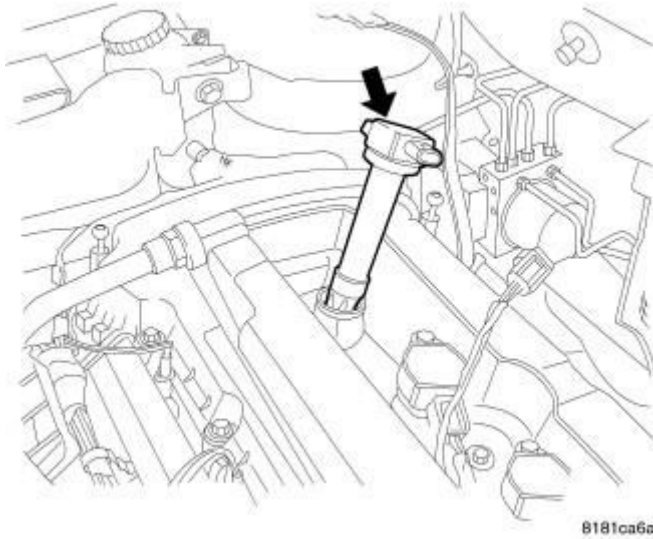


Fig. 70: Removing/Installing Ignition Coil
Courtesy of CHRYSLER GROUP, LLC

2. Install ignition coil onto spark plug.

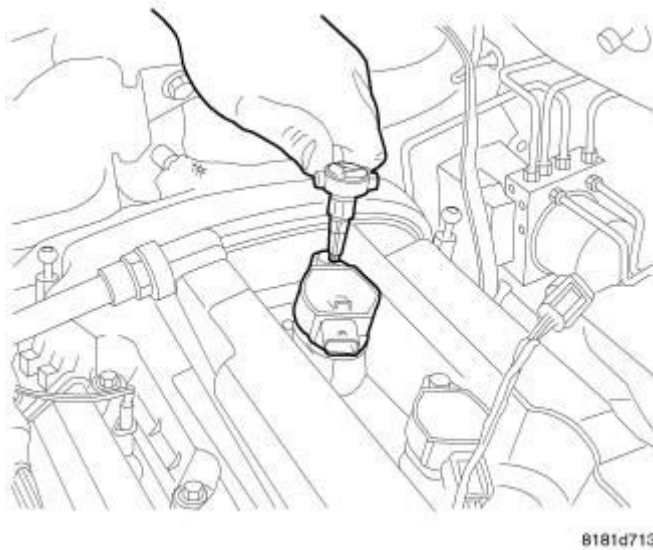


Fig. 71: Ignition Coil Bolt
Courtesy of CHRYSLER GROUP, LLC

3. Install ignition coil mounting bolt. Tighten to 9 N.m (79.5 in. lbs.).
4. Connect ignition coil electrical connectors.
5. Connect the negative battery cable.

3.2L

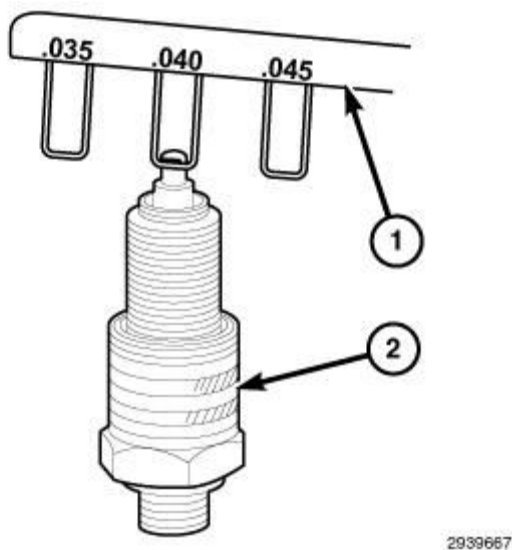


Fig. 72: Gap Gauging Tool
Courtesy of CHRYSLER GROUP, LLC

1. Check and adjust the spark plug gap with a gap gauging tool (1). Refer to **SPECIFICATIONS**.

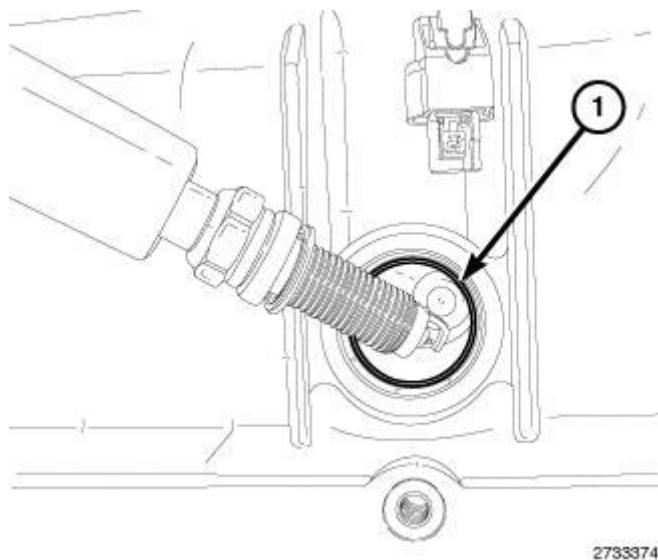


Fig. 73: Spark Plug Tubes
Courtesy of CHRYSLER GROUP, LLC

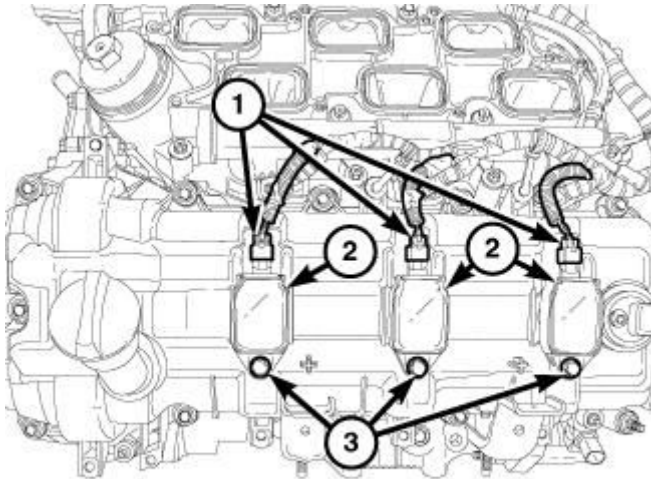
CAUTION: Special care should be taken when installing spark plugs into the cylinder head spark plug wells. Be sure the plugs do not drop into the plug wells as electrodes can be damaged.

CAUTION: The spark plug tubes (1) are a thin wall design. Avoid damaging the spark plug tubes. Damage to the spark plug tube can result in oil leaks.

2. Start the spark plug into the cylinder head by hand to avoid cross threading.

CAUTION: Spark plug torque is critical and must not exceed the specified value. Overtightening stretches the spark plug shell reducing its heat transfer capability resulting in possible catastrophic engine failure.

3. Tighten the spark plugs to 17.5 N.m (13 ft. lbs.).



2726572

Fig. 74: Electrical Connector, Ignition Coils & Ignition Coil Retaining Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: The left side ignition coils are shown in illustration, the right side ignition coils are similar.

4. Install the ignition coil (2). Refer to COIL, IGNITION, INSTALLATION.

SWITCH, IGNITION

DESCRIPTION

DESCRIPTION

The ignition switch is located on the steering column. It is used as the main on/off switching device for most electrical components. The mechanical key cylinder is used to engage/disengage the electrical ignition switch.

OPERATION

OPERATION

Vehicles equipped with an automatic transmission and a steering column mounted shifter: an interlock device is

located within the shift cable. This interlock device is used to lock the transmission shifter in the PARK position when the key cylinder is in any position and the brake pedal is not depressed.

REMOVAL

REMOVAL

1. Disconnect the and isolate the negative battery cable.
2. Remove the dash end cap. Refer to **CAP, INSTRUMENT PANEL END, REMOVAL** .
3. Remove the steering column opening cover.
4. Remove the HVAC control head. Refer to **CONTROL, A/C AND HEATER, REMOVAL** .
5. Remove the instrument cluster bezel. Refer to **BEZEL, INSTRUMENT CLUSTER, REMOVAL** .
6. Disconnect the wire harness connector from the Ignition Node Module.

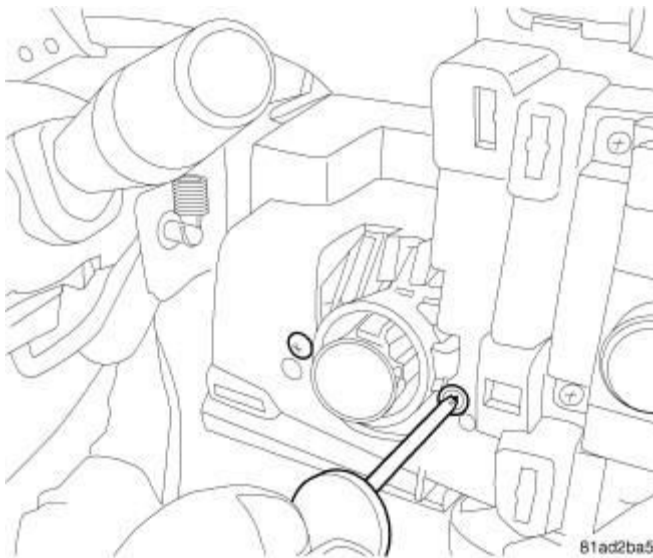


Fig. 75: Removing/Installing Switch Mounting Screws
Courtesy of CHRYSLER GROUP, LLC

7. Remove 4 screws from the I/P holding the Ignition Node Module in place.
8. Remove the Ignition Node Module from the backside of the I/P.

INSTALLATION

INSTALLATION

1. Install the Ignition Node Module into the Instrument Panel from the backside.
2. Pull the Ignition Node Module into place.

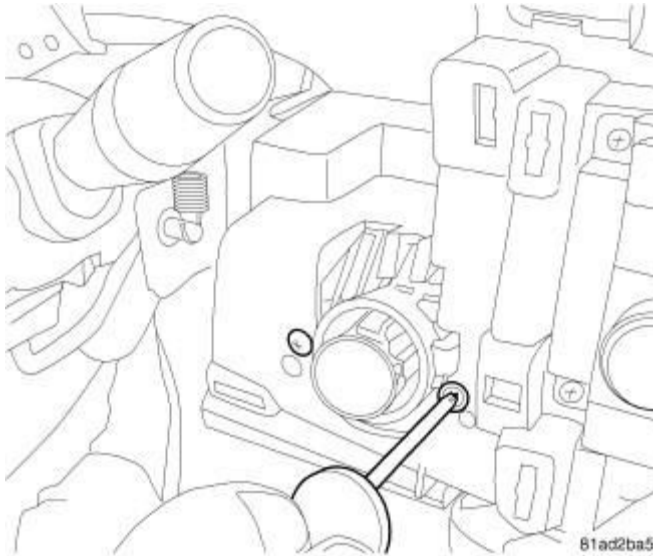


Fig. 76: Removing/Installing Switch Mounting Screws
Courtesy of CHRYSLER GROUP, LLC

3. Install 4 screws through the instrument Panel into the Ignition Node Module and tighten.
4. Connect Electrical harness connector into Ignition Node Module.
5. Install the Instrument Panel bezel and connect wire harness connectors. Refer to **BEZEL, INSTRUMENT CLUSTER, INSTALLATION** .
6. Install the HVAC control head and connect wire harness connectors. Refer to **CONTROL, A/C AND HEATER, INSTALLATION** .
7. Install the steering column opening cover and connect the wire harness connectors.
8. Install dash end cap. Refer to **CAP, INSTRUMENT PANEL END, INSTALLATION** .
9. Connect negative battery cable.
10. If Ignition Node Module is being replaced, program the module. Refer to **STANDARD PROCEDURE** . **This procedure will require you to log into DealerCONNECT and enter a PIN when requested. The PIN is temporary and will be active for 12 hours. After 12 hours, a new PIN will need to be obtained from DealerCONNECT.**

When the operator presses the Start/Stop Button on a KIN or cycles the FOB/K in a IGNM type ignition, the FOB/K is validated wirelessly by the RF Hub (Radio Frequency Hub Module). If the FOB/K is recognized as belonging to the vehicle and is inside the vehicle, the system allows the ignition state of the vehicle to be changed by the operator between the LOCK, ACCESSORY, RUN, and START ignition states.

LED Operation

The LEDs in the IGNM and Start/Stop Button provide visual indication of the ignition system and button use to aid the driver. The Logic for LED control is implemented in the IGNM and RF HUB. The IGNM and Start/Stop Button contain four LEDs:

- OFF Indication
- ACC Indication (Accessory)
- ON Indication (On or Run)
- Ignition Switch Indicator (button backlight)

The LEDs indicate the vehicle ignition position and are driven by the CAN bus signals related to the ignition position. The Center LED (Ignition Switch Indicator) will blink if there is a related concern.

The RF HUB will log a DTC indicating an incorrect Ignition status value is present; in this state the ignition status is unknown. This will continue until the correct signal is received by the RF Hub.

EVIC Operation

The Keyless Go feature requires the vehicle to be equipped with an EVIC display for prompts and status information. The display messages are:

- Service Keyless System
- FOB Not Detected
- FOB Left Vehicle
- Not in Park
- Push Brake Pedal and Push Button to Start
- Push Clutch Pedal and Push Button to Start
- Vehicle not in Park Warning

BCM/RF Hub Module Interaction

There are a few things that must take place before the starter relay can apply voltage to the starter. Below are some key points to check when diagnosing a no crank condition.

The BCM requires two signals from the RF HUB to verify the ignition is in the run or start position. The voltage on the F20 circuit is one of these signals. It can be monitored in both the RF HUB and BCM data display screens as the Ignition Run/Start under the "Sensor" value. The run or start position voltage on this circuit should be at or close to battery voltage.

Simultaneously the RF HUB busses the Ignition Run/Start status to the BCM. The BCM monitors the bussed input information as the secondary verification on the Ignition Run/Start status. The bussed messages can be monitored with the scan tool in both the RF HUB and BCM data display screens.

The F20 circuit voltage and the bussed ignition run/start status message received by the BCM must agree to enable starting. Once the vehicle is started, the loss of only one ignition signal will not cause the vehicle to cycle off as long as the other feed still indicates a "run status".

The RF HUB also requires an input from the Gated park switch (hardwired) and the OK to start CAN Bus message from the TCM (Crank Enable).

Diagnostic Aids

NOTE: **The No Crank Diagnostic serves as an aid in diagnosing the concern and is intended to be used as a general guide, since each no crank condition can be unique.**

The No Crank Diagnostic Test assumes all of the following to be true:

- The condition is currently present.
- The TCM, PCM, RF HUB, and BCM are at the latest calibration (part number) levels.
- There are no active DTCs.
- There are no applicable Recalls.
- There are no applicable TSBs.
- There are no PCM inhibits (i.e. RPM, Trans Range, Clutch).
- The FOBs complete function and operation is correct.
- All battery cables and connections are clean and tight.
- There are no open fuses.
- The battery is fully charged and can pass a load test from the GR8 tester.
- The engine rotates freely.
- Any aftermarket equipment/wiring that has been installed is operating correctly.

Starter Relay Operation

In a no crank condition the Starter Relay can be missing power at pin 85, feed at pin 30, controlled ground at pin 86 or output at pin 87. Further explanation of how a relay operates is listed below:

- Pin 85 receives power from the BCM once the parameters for the Ignition Switch position and status, and all inhibit monitors (i.e. clutch switch, RPM, etc.) are satisfied.
- Pin 30 is a constant B+ feed.
- Pin 86 is a controlled ground by a module (i.e. PCM or BCM). Once power is sent from the BCM to the pin 85 of the relay it passes through a coil and leaves the relay through pin 86 to the control module.
- Pin 87 is an output circuit to the Starter solenoid. Once the circuit on pin 86 is grounded by the control

module, the coil winding in the relay magnetically pulls the internal switch closed. When the internal switch is closed the power at pin 30 is sent to pin 87 of the relay.

DIAGNOSTIC TEST**1. STARTER RELAY CHECK**

1. When attempting to start the vehicle, listen and if needed feel for a click at the starter relay in the PDC.

NOTE: Some starter relays are internal to a module and may not be accessible, making it more difficult to hear, or feel the clicking response. It is possible for a poor ground or the Trans Range Sensor position to be lost causing the starter to click once.

Did you hear an audible click at the relay or starter?

Yes

- Go To 9

No

- Go To 2

2. STARTER RELAY INPUT CHECK

1. Use a 12 volt test light/DVOM to check for power at pin 85 of the starter relay.

Is there Power/12 volts at pin 85?

Yes

- Go To 8

No

- Go To 3

3. RF HUB OPERATION

1. Using the scan tool, confirm the ignition switch status changes in the RF HUB under the data display screen for the "Sensor" values.

Does the ignition switch status on the data screen match the physical position of the KIN/IGNM?

Yes

- Go To 5

No

- Go To 4

4. REMOTE START ANTENNA

NOTE: If the vehicle is not equipped with Remote Start, proceed to the next test step.

1. Cycle the ignition off.
2. Disconnect the Remote Start Antenna from the RF HUB.
3. Using one FOB/IK and sitting in the driver's seat, attempt to start the vehicle.

Did the vehicle start?

Yes

- Replace the Remote Start Antenna in accordance with the Service Information.
- Perform the BODY VERIFICATION TEST. Refer to **BODY VERIFICATION TEST** .

No

- Go To 5

5. BCM IGNITION STATUS

1. Using the scan tool, confirm the ignition switch status changes in the BCM under the data display screen for the "Bussed Input" and "Sensor" values.

NOTE: The change of status in the BCM for the "Sensor" value validates the voltage activity (with very low amperage) of the F20 circuit.

In the BCM, do both values for the ignition switch status match; and do they match those in the RF HUB?

Yes

- Go To 6

No

- If the status of the Ignition Switch position is not changing under the "Sensor" value, check the F20 circuit at the BCM for battery voltage with a DVOM (not a test light).
- If there is Battery voltage **at the BCM on the F20 circuit** verify all power, ground and bus circuits are ok for the BCM. If no problem found replace the BCM in accordance with Service Information. Refer to **MODULE, BODY CONTROL, REMOVAL** .
- If there is **NO** Battery voltage **at the BCM** on the F20 circuit, then check for voltage on the

F20 circuit at the RF HUB.

- If there is Battery voltage **coming out of the RF HUB on the F20 circuit** , check the F20 circuit between the RF HUB and BCM for a short, open condition or high resistance.
- If there is **NO** Battery voltage **coming out of the RF HUB on the F20 circuit** verify all power, ground & communication circuits, & connections to the RF HUB prior to replacing. Refer to **MODULE, RADIO FREQUENCY (RF HUB), REMOVAL** .
- In the data screen, if the status of the Ignition Switch was not changing under the "Bussed Input" value, further diagnosis is needed between the RF HUB, (bus circuits, connections) and the BCM.

6. PCM IGNITION, TRANS RANGE/CLUTCH SWITCH STATUS VERIFICATION

1. Using the scan tool confirm there are no inhibits that have been triggered in the PCM (i.e. Ignition Switch, Trans Range or Clutch Switch) and any switch inputs (filtered states) relating to the starting system function and operate correctly under the data display screen.

Does the PCM show any inhibits (**not DTCs**) for starting (**not remote starting**)?

Yes

- Correct the inhibit reason listed.
- If no problem can be found, then verify all power, ground and bus circuits to the PCM and replace the PCM in accordance with the Service Information. Refer to **MODULE, POWERTRAIN CONTROL, REMOVAL** .

No

- Go To 7

7. BCM TO STARTER RELAY POWER INPUT CHECK

1. At this time if all the correct inputs for the ignition switch status are correct in the RF HUB, BCM and PCM, verify both power feeds are present (pin 30 and 85) to the Starter Relay while in the crank position.

Are both power feeds present at the relay when the ignition is in the crank position?

Yes

- Go To 8

No

- If, there is no power to pin 30 or 85, no DTCs, TSBs, Recalls, or Inhibits replace the BCM in accordance with Service Information. Refer to **MODULE, BODY CONTROL, REMOVAL** .

8. STARTER RELAY CONTROL CIRCUIT CHECK

1. Using a test light/DVOM determine if the Starter Control circuit at pin 86 of the relay is missing

ground (at the relay if equipped with a removable relay or wiring to the internal relay) when the ignition is in the crank position.

Was the Starter Control circuit for pin 86 being grounded when the ignition was in the crank position?

Yes

- Go To 10

No

- Verify the Starter Relay Control circuit from pin 86, has no shorts, opens or high resistance on the wiring going from the Starter Relay in the BCM (or PDC) to the PCM.
- Verify the cables do not have excessive resistance by performing a voltage drop on the battery cables.

9. STARTER RELAY OUTPUT CIRCUIT CHECK

NOTE: **At this point in the test, when the key is in the crank position power has been verified at Pin 30 & 85, along with the control circuit being grounded for pin 86.**

1. Remove the Starter Relay Output circuit connector from the Starter solenoid.
2. Using a test light/DVOM and ignition in the crank position check for power at pin 87 (If equipped with a removable relay or wiring to the internal relay) of the relay and at the connection to the starter.

Was there power at pin 87 for the output circuit?

Yes

- Go To 10

No

- If power is missing to pin 30 of the starter relay the BCM is suspect. Verify all power, ground, communication circuits and connections to the BCM before replacing in accordance with service information.
- If power is missing at pin 87 of the starter relay and the relay is replaceable, change out the relay and recheck the concern. If a known good relay causes no change, check the Starter Output circuit from pin 87 of the relay to the starter for an open, short, excessive resistance, or poor connections to the solenoid or starter.
- Verify and Inspect the Starter to ensure it is free of corrosion, oil, and there is no damage, or binding conditions.
- Verify that all wiring, cables and connections are clean and tight.

10. STARTER RELAY OUTPUT CIRCUIT LOAD TEST

1. Load test the Starter Relay output circuit going from the BCM to the Starter.

Does the starter relay output circuit pass the load test?

Yes

- Verify that all connections are clean, tight and there is no damage to starter when fully inspected. If no problem found then replace the Starter in accordance with Service Information. Refer to **STARTER, REMOVAL** .

No

- Adjust the shift cable in accordance with the Service Information. Perform the POWERTRAIN VERIFICATION TEST. Refer to appropriate ELECTRICAL DIAGNOSTICS article.

REMOTE START INOPERATIVE (BCM - RF HUB EQUIPPED)

For a complete wiring diagram, refer to **SYSTEM WIRING DIAGRAMS** article .

THEORY OF OPERATION

The customer may notice that the signal range of the Remote Keyless Entry (RKE) system is reduced. This condition may be due to the RKE antenna where the RKE key fob may need to be closer than 3 meters (10 feet) before the functions available on the key fob will operate. The diagnostic test is provided as a diagnostic aid for the dealer technician.

It is necessary to confirm the correct sales code(s) are present in the Standard and Optional Equipment sections of DealerCONNECT to determine if a factory or a Mopar® Accessory Remote Start kit was installed. If the vehicle has a Mopar® Accessory Remote Start kit, verify that at least 20 minutes has elapsed since the sales codes were added to DealerCONNECT. Once it has been confirmed that the proper sales codes have been added and the allotted time has passed, verify the vehicle has been configured properly using the scan tool. Also, make sure that the system shows as enabled in the BCM and that the temporary remote start override is set to disabled.

For any further assistance on diagnosing the installed Mopar® Accessory kit contact the Mopar® Accessories group at 800-84-MOPAR (66787).

DIAGNOSTIC TEST**1. REMOTE START FUNCTION**

NOTE: In some cases the vehicle will start then stall, indicating a fuel level concern (less than a quarter of a tank). Before proceeding verify there is enough fuel in the tank for the vehicle to start and run.

1. Attempt to start the vehicle with the FOBIK.

Does the vehicle start when using the FOBIK?

Yes

- At this time the Remote Start is functioning properly.
- Using the scan tool, check for any related Starting, Communication, or Ignition related DTCs that may inhibit the Remote Starting feature. Check the BCM for any previous Remote Start Inhibits and mileage that were stored. Inhibits may be found under the system tests or miscellaneous functions tab.

No

- Go To 2

2. REMOTE START VISUAL CHECK

1. While pressing the remote start button on the FOBIK, observe the exterior lights and the horn operation.

Does the horn sound and the exterior parking lights flash?

Yes

- Go To 3

No

- Go To 4

3. CHECKING BCM INHIBITS

NOTE: Since the horn sounds and the parking lights flash, this verifies the BCM is receiving the CAN BUS message from the RF HUB. It also verifies the RF signal for Remote Start from the FOBIK to the RF HUB is operating correctly.

1. Using the scan tool, check the Remote Start inhibits of the BCM or any ACTIVE DTCs listed in all modules.

NOTE: Inhibits may be found under the system tests or miscellaneous functions tab. The fuel level may not be a listed inhibit.

Are there any Remote Start inhibits or any ACTIVE DTCs listed in the entire vehicle?

Yes

- For any inhibits for a complete list of Remote Start inhibits. Refer to **DIAGNOSIS AND TESTING**.
- For any ACTIVE DTCs, perform the appropriate diagnostic procedure in **DTC INDEX** article.

No

- Check for any related TSBs prior to replacing the BCM. If no related TSBs are found, then replace the BCM in accordance with the Service Information. Refer to **MODULE, BODY CONTROL, REMOVAL**.

4. RKE FUNCTION SHORT RANGE

1. While standing next to the Driver door and using the FOB/K, attempt to lock and unlock the doors.

Does the RKE function properly?

Yes

- Go To 5

No

- Go To 7

5. RKE FUNCTION MID RANGE

1. While standing 20 feet from the vehicle and using the FOB/K, attempt to lock and unlock the doors.

Does the RKE function properly at 20 feet?

Yes

- Go To 6

No

- Go To 7

6. RKE FUNCTION LONG RANGE

1. While standing 100 feet from the vehicle and using the FOB/K, attempt to lock and unlock the doors.

Does the RKE function properly at 100 feet?

Yes

- Go To 9

No

- Go To 7

7. FOBIK SIGNAL STRENGTH

1. Use the RF Tester 9001 to check the signal strength of the FOBIK.

Does the FOBIK pass?

Yes

- Go To 10

No

- Go To 8

8. CHECKING THE FOBIK

1. Replace the battery in the FOBIK with a known good battery and recheck the signal from the FOBIK with the RF Tester 9001.

Does the FOBIK pass?

Yes

- Go To 9

No

- Check for any related TSBs prior to replacing the FOBIK. If no related TSBs are found, then replace the FOBIK in accordance with the Service Information. Refer to **TRANSMITTER, INTEGRATED KEY FOB, STANDARD PROCEDURE** .

9. CHECKING FOR ACTIVE DTCs

NOTE: **The RKE portion of the FOBIK is operational, this verifies that the RF HUB is capable of receiving signals and communicating to operate the locks.**

1. Use the scan tool to check for ACTIVE DTCs.

Did the scan tool show any ACTIVE DTCs in the entire vehicle?

Yes

- Diagnose the DTCs in accordance with the Service Information before proceeding with the Remote Start Inoperative concern.

No

- Go To 10

10. CHECKING THE RF HUB

NOTE: Even though the RKE function of the system may work with no concern, the BCM is either not receiving a message or is receiving a corrupt message from the RF HUB for remote start operation.

1. While sitting in the driver seat and using the scan tool, monitor the RF HUB on the data display screen for changes when the Remote Start button of the FOBIK is pressed.

Did the status change when the Remote Start button of the FOBIK was pressed?

Yes

- Go To 11

No

- Go To 12

11. CHECKING BCM INHIBITS

NOTE: The parking lights flash and the horn are inoperative when using the FOBIK, this indicates a faulty BCM or "Inhibit" that may be preventing the start request from occurring.

1. Use the scan tool to check for any Remote Start inhibits listed in the BCM. This may be found under the system tests or miscellaneous functions tab.

Were there any Remote Start inhibits listed in the BCM?

Yes

- Perform the REMOTE START SYSTEM Diagnosing and Testing. Refer to **DIAGNOSIS AND TESTING** .

No

- If this has had a Mopar® Accessory kit installed verify the correct Sales Code for Remote Start has been added to Dealer Connect and a Restore Vehicle Configuration has been performed.
- Confirm the system is enabled; and the temporary Remote Start override is set to disabled in the BCM and contact the Mopar® Accessories group (800-84-Mopar) for further details before proceeding.
- If this has a factory installed Remote Start, check for any related TSBs prior to replacing the BCM. If no related TSBs are found, then replace the BCM in accordance with the Service

Information.

12. CHECKING THE REMOTE START ANTENNA

1. Cycle the ignition off
2. Disconnect the Remote Start antenna from the RF Hub.
3. Using one FOB/K and sitting in the driver's seat, attempt to start the vehicle.

Did the vehicle start?

Yes

- Replace the Remote Start Antenna in accordance with the Service Information.
- Perform the BODY VERIFICATION TEST. Refer to **BODY VERIFICATION TEST** .

No

- Verify all power, ground, communication circuits, & connections to the RF HUB prior to replacing. Refer to **MODULE, RADIO FREQUENCY (RF HUB), REMOVAL** .

2014 ENGINE**Starting - Service Information - Cherokee****DESCRIPTION****STANDARD STARTING SYSTEM**

The starting system consists of:

- Starter relay
- Starter motor (including an integral starter solenoid)

Other components to be considered as part of starting system are:

- Battery
- Battery cables
- Ignition switch and key lock cylinder
- Clutch pedal position switch (manual transmission)
- Park/neutral position switch (automatic transmission)
- Neutral Position Sensor (manual transmission with Stop/Start system integrated)
- Wire harnesses and connections.

The Battery, Starting, and Charging systems operate in conjunction with one another, and must be tested as a complete system. For correct operation of starting/charging systems, all components used in these 3 systems must perform within specifications. When attempting to diagnose any of these systems, it is important that you keep their interdependency in mind.

The diagnostic procedures used in this Service Information include the most basic conventional diagnostic methods, to the more sophisticated On-Board Diagnostics (OBD) built into the Powertrain Control Module (PCM). Use of an induction-type milliampere ammeter, volt/ohmmeter, battery charger, carbon pile rheostat (load tester), and 12-volt test lamp may be required.

OPERATION**STANDARD STARTING SYSTEM**

When you press the Keyless Go button (KIN Button), a request is sent to RFHM via the private LIN. Once the RFHM receives the request from the KIN it then looks for the valid key via the Passive Entry Module (PEM) antennas. If the RFHM detects a valid key and if the brake is engaged, then the RFHM sets the ignition position to START/CRANK. The BCM then turns the Ignition status to START/CRANK. Then the BCM sends command to turn the vehicle to the CRANK. For an IGNM (Ignition Node Module) vehicle, when the customer turns the key to Start position the RFHM sets the ignition to START/CRANK. The brake pedal status is not required to start the IGNM vehicle but can be started with brake pedal engaged. The BCM then turns the

Ignition status to START/CRANK. Then the BCM sends command to turn the vehicle to the CRANK. The functionality is the same except it is not wirelessly detected. If conditions are correct to start the ECM turn on the high side of the ECM starter relay and turns the Crank Hold Signal to True. If the BCM is still in crank and the Crank Hold is true then the BCM turns on the Low side of the BCM Starter relay and the engine will start cranking. Once the engine started the ECM deactivates the double start over ride. The BCM will then deactivate the starter either when the engine starts or the maximum time has been reach for the tip start (10 sec for Gas and 25 sec for diesel). The RFHM changes the ignition position to RUN if the start type is TIP start or the 5 second time expires or the engine controller indicates the vehicle is not in park or neutral The engine can be manually shut down by the driver with speeds over 5 MPH in any gear.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - STANDARD STARTING SYSTEM

NOTE: **Note: All voltage measurements are with respect to Ground unless otherwise specified. All relay coils checking (between 85 and 86) must be conducted with the respective relays removed.**

No start trouble shooting:

1. Check battery voltage.
2. Check Fuel followed by Fuel pump fuse F21.
3. Turn the ignition to start and complete the following procedures within 10 seconds (TIP start will disable after 10 seconds). Hook up the MM before turning the ignition to start.
4.
 1. Measure the voltage at pin 87 of the ECM relay.
 2. If not measured, remove the BCM and ECM relay. Connect test lamp between PIN 86 of BCM starter relay, PIN 85 of the ECM starter relay and start the car. Confirm the bulb lit up for 10 seconds. If the bulb is lit, the issue is either in starter motor, the starter solenoid, the wiring, loose connection or engine itself. If issue exists go to step 6.
 3. If the measured voltage equals Battery voltage then the Starting relays, BCM and ECM modules are working as designed, if there is no security key violation (The SKIM light will start flashing if there is security key mismatch and a DTC will be set by RFHM).
 4. Quick Check: Turn the radio on and turn the ignition to the start position, if the radio mutes and the car still doesn't start, then assume the issue is with the engine controller, or the engine itself.
5. If the above conditions are true, then issue is either in the starter motor, the starter solenoid, the wiring or can be a loose connection. Follow the procedure 6 to check the wiring from PIN 87 of the ECM relay and the starter solenoid. Go to step 6, If not go to step 11.
6. Connect a multi meter between the starter solenoid terminals and confirm the MM is measuring battery voltage.
7. If the voltage is equal to battery voltage, then the issue must either be in the solenoid, starter or the engine itself. If the issue cannot be identified go to step 8.
- 8.

1. Turn the ignition to OFF.
2. Check the voltage at terminal 30 of the RUN/START relay (T09). If not check for loose battery connection, wiring or the fuse feed to 30.
3. Turn the ignition to RUN and check the battery voltage at 87 of the T09 relay. If not measured go to step 9.
9. Check the BCM starter relay fuse feed and confirm it is intact.
10. Check BCM relay connections/feed.
11. Turn the ignition to start and complete the following procedures within 10 seconds (TIP start will disable after 10 seconds). Hook up the test lamp before turning the ignition to start.
12. Connect a 12V test lamp between 86 and 85 of the BCM start relay and confirm the blub lights up for 10 seconds. The MM may give a false reading because it is driven by a low side driver.
13. If the 12v test lamp does **not** stay lit for 10 seconds, turn the ignition to the start position and using a DVOM, measure between battery voltage (+) and PIN 86 (-) of the BCM relay. Should read equal to battery voltage.
14. Check ECM relay connections/feed.
15. Turn the ignition to start and complete the following procedures within 10 seconds (TIP start will disable after 10 seconds). Hook up the test lamp before turning the ignition to start.
16. Connect a 12V test lamp between 86 and 85 of the ECM start relay and confirm the blub lights up for 10 seconds.
17. If not start the car and measure them individually.
18. Measure the resistance between the ground and pin 85 of the ECM start relay.

Additional diagnostic checks

1. Check the Ignition sense start line from RFHM to BCM. The vehicle will not start if this line is not intact.
2. The RFHM must detect brake input (Normally Open) to start the KIN (Keyless Ignition Node) car in case of auto trans vehicle.
3. The RFHM must detect clutch input (Normally Open) to start the manual trans vehicle. Check also the clutch output from RFHM to ECM.
4. The RFHM must detect gated park switch to start the car.

CONTROL CIRCUIT TEST

The starter control circuit has:

- Starter motor with integral solenoid
- Starter relay
- Transmission range sensor, or Park/Neutral Position switch with automatic transmissions
- Ignition switch
- Battery
- All related wiring and connections

- Powertrain Control Module (PCM)

CAUTION: Before performing any starter tests, the ignition and fuel systems must be disabled.

- Disable ignition and fuel systems.

STARTER SOLENOID

WARNING: Check to ensure that the transmission is in the park position with the parking brake applied. This may result in personal injury or death.

1. Verify battery condition. Battery must be in good condition with a full charge before performing any starter tests. Refer to Battery Tests. Refer to **DIAGNOSIS AND TESTING - BATTERY SYSTEM**.
2. Perform Starter Solenoid test BEFORE performing the starter **RELAY TEST**.
3. Perform a visual inspection of the starter/starter solenoid for corrosion, loose connections or faulty wiring.
4. Locate and remove the starter relay.
5. Connect a remote starter switch or a jumper wire between the remote battery positive post and terminal 87 of the starter relay connector.
 - a. If engine cranks, starter/starter solenoid is good. Go to the Starter **RELAY TEST**.
 - b. If engine does not crank or solenoid chatters, check wiring and connectors from starter relay to starter solenoid and from the battery positive terminal to starter post for loose or corroded connections. Particularly at starter terminals.
 - c. Repeat test. If engine still fails to crank properly, trouble is within starter or starter mounted solenoid, and replace starter. Inspect the ring gear teeth.

STARTER RELAY

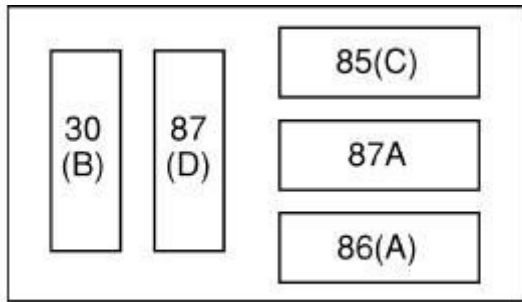
WARNING: Check to ensure that the transmission is in the park/neutral position with the parking brake applied. This may result in personal injury or death.

RELAY TEST

Remove the starter relay as described in this Service Information to perform the following tests:

1. A relay in the de-energized position should have continuity between terminals 87A and 30, and no continuity between terminals 87 and 30. If OK, go to 2. If not OK, replace the faulty relay.
2. Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 5 ohms. If OK, go to 3. If not OK, replace the faulty relay.
3. Connect a battery B+ lead to terminals 85 and a ground lead to terminal 86 to energize the relay. The relay should click. Also test for continuity between terminals 30 and 87, and no continuity between

terminals 87A and 30. If OK, refer to Relay Circuit Test procedure. If not OK, replace the faulty relay.



BQb1b41e

Fig. 1: Starter Relay Pinout

Courtesy of CHRYSLER GROUP, LLC

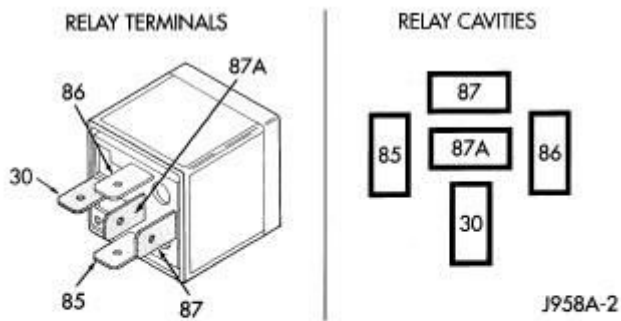


Fig. 2: Starter Relay Pinout

Courtesy of CHRYSLER GROUP, LLC

30
COMMON FEED
85
COIL GROUND
86
COIL BATTERY
87
NORMALLY OPEN
87A
NORMALLY CLOSED

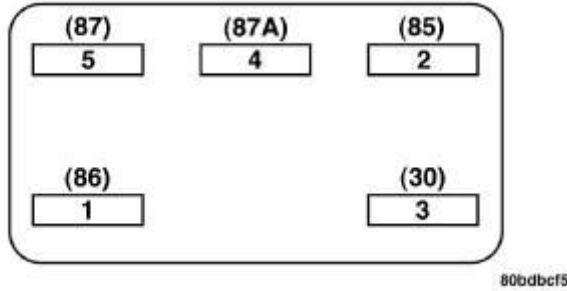


Fig. 3: Starter Relay Pinout

Courtesy of CHRYSLER GROUP, LLC

CAV	FUNCTION
30	B (+)
85	IGNITION SWITCH OUTPUT
86	PCM-CONTROLLED GROUND
87	STARTER RELAY OUTPUT
87A	NO CONNECT

RELAY CIRCUIT TEST

1. The relay common feed terminal cavity (30) is connected to battery voltage and should be hot at all times. If OK, go to 2. If not OK, repair the open circuit to the PDC fuse as required.
2. The relay normally closed terminal (87A) is connected to terminal 30 in the de-energized position, but is not used for this application. Go to 3.
3. The relay normally open terminal (87) is connected to the common feed terminal (30) in the energized position. This terminal supplies battery voltage to the starter solenoid field coils. There should be continuity between the cavity for relay terminal 87 and the starter solenoid terminal at all times. If OK, go to 4. If not OK, repair the open circuit to the starter solenoid as required.
4. The coil battery terminal (85) is connected to the electromagnet in the relay. It is energized when the ignition switch is held in the Start position and the clutch pedal is depressed (manual trans). Check for battery voltage at the cavity for relay terminal 86 with the ignition switch in the Start position and the clutch pedal is depressed (manual trans), and no voltage when the ignition switch is released to the On position. If OK, go to 5. If not OK, check for an open or short circuit to the ignition switch and repair, if required. If the circuit to the ignition switch is OK, see the **IGNITION SWITCH**.
5. The coil ground terminal (86) is connected to the electromagnet in the relay. It is grounded by the PCM if the conditions are right to start the car. For automatic transmission cars, the PCM must see Park Neutral switch low and near zero engine speed (RPM). For manual transmission cars, the PCM only needs to see near zero engine speed (RPM) and low clutch interlock input and see near zero engine speed (RPM). To diagnose the Park Neutral switch of the transmission range sensor refer to the **C635 MANUAL TRANSMISSION - SERVICE INFORMATION**. Check for continuity to ground while the ignition switch is in the start position and if equipped the clutch pedal depressed. If not OK and the vehicle has an automatic transmission verify Park Neutral switch operation. If that checks OK check for continuity between PCM and the terminal 86. Repair open circuit as required. Also check the clutch interlock switch

operation if equipped with a manual transmission. If OK, the PCM may be defective.

SAFETY SWITCHES

For diagnostics of the Transmission Range Sensor, refer to the appropriate Transmission article for more information.

If equipped with Clutch Interlock/Upstop Switch, refer to **DIAGNOSIS AND TESTING** in the Clutch System article.

IGNITION SWITCH

After testing starter solenoid and relay, test ignition switch and wiring. Refer to the **IGNITION SYSTEM - SERVICE INFORMATION** or **SYSTEM WIRING DIAGRAMS** article for more information. Check all wiring for opens or shorts, and all connectors for being loose or corroded.

BATTERY

For battery diagnosis and testing, refer to **DIAGNOSIS AND TESTING - BATTERY SYSTEM** for procedures.

ALL RELATED WIRING AND CONNECTORS

Refer to **SYSTEM WIRING DIAGRAMS** article for more information.

FEED CIRCUIT RESISTANCE TEST

Before proceeding with this operation, review Diagnostic Preparation and Starter Feed Circuit Tests. The following operation will require a voltmeter, accurate to 1/10 of a volt.

CAUTION: Ignition and Fuel systems must be disabled to prevent engine start while performing the following tests.

1. To disable the Ignition and Fuel systems, disconnect the Automatic Shutdown Relay (ASD).
2. Gain access to battery terminals.
3. With all wiring harnesses and components properly connected, perform the following:
 - a. Connect the negative lead of the voltmeter to the battery negative post, and positive lead to the battery negative cable clamp. Rotate and hold the ignition switch in the START position. Observe the voltmeter. If voltage is detected, correct poor contact between cable clamp and post.
 - b. Connect positive lead of the voltmeter to the battery positive post, and negative lead to the battery positive cable clamp. Rotate and hold the ignition switch key in the START position. Observe the voltmeter. If voltage is detected, correct poor contact between the cable clamp and post.
 - c. Connect negative lead of voltmeter to battery negative terminal, and positive lead to engine block near the battery cable attaching point. Rotate and hold the ignition switch in the START position. If voltage reads above 0.2 volt, correct poor contact at ground cable attaching point. If voltage reading

- is still above 0.2 volt after correcting poor contacts, replace ground cable.
- Connect positive voltmeter lead to the starter motor housing and the negative lead to the battery negative terminal. Hold the ignition switch key in the START position. If voltage reads above 0.2 volt, correct poor starter to engine ground.
 - Connect the positive voltmeter lead to the battery positive terminal, and negative lead to battery cable terminal on starter solenoid. Rotate and hold the ignition switch in the START position. If voltage reads above 0.2 volt, correct poor contact at battery cable to solenoid connection. If reading is still above 0.2 volt after correcting poor contacts, replace battery positive cable.
 - If resistance tests do not detect feed circuit failures, replace the starter motor.

STARTING SYSTEM TEST

For circuit descriptions and diagrams, refer to the **SYSTEM WIRING DIAGRAMS** article .

WARNING: On vehicles equipped with airbags, refer to the **RESTRAINTS - SERVICE INFORMATION** article before attempting steering wheel, steering column, or instrument panel component diagnosis or service. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury.

STARTING SYSTEM DIAGNOSIS

CONDITION	POSSIBLE CAUSE	CORRECTION
STARTER FAILS TO ENGAGE.	1. Battery discharged or faulty.	1. Refer to <u>DIAGNOSIS AND TESTING - BATTERY SYSTEM</u> for more information. Charge or replace battery, if required.
	2. Starting circuit wiring faulty.	2. Refer to <u>FEED CIRCUIT RESISTANCE TEST</u> .
	3. Starter relay faulty.	3. Refer to <u>RELAY TEST</u> . Replace relay, if necessary.
	4. Ignition switch faulty.	4. Refer to ignition switch test, in the <u>IGNITION SYSTEM - SERVICE INFORMATION</u> or <u>SYSTEM WIRING DIAGRAMS</u> article. Replace switch, if necessary.
	5. Park/neutral position switch (auto trans) faulty or mis-adjusted.	5. Refer to <u>948TE AUTOMATIC TRANSMISSION - SERVICE INFORMATION</u> for more information. Replace switch, if necessary.
	6. Clutch interlock switch (man trans) faulty.	6. Refer to <u>DIAGNOSIS AND TESTING - CLUTCH PEDAL POSITION SWITCH</u> . Replace switch, if necessary.
	7. Starter solenoid faulty.	7. Refer to <u>STARTER SOLENOID</u> . Replace starter assembly, if necessary.
	8. Starter assembly faulty.	8. If all other starting system components and circuits check ok, replace starter assembly.
	9. Faulty teeth on ring gear.	9. Rotate flywheel 360°, and inspect teeth and ring gear replaced if damaged.

2014 Jeep Cherokee Trailhawk

2014 ENGINE Starting - Service Information - Cherokee

	10. PCM double start override output failure.	10. Refer to CHECKING THE PCM POWER AND GROUND CIRCUITS . Check for continuity between PCM and terminal 85. Repair open circuit as required. If ok, PCM may be defective.
STARTER ENGAGES, FAILS TO TURN ENGINE.	1. Battery discharged or faulty.	1. Refer to the BATTERY SYSTEM - SERVICE INFORMATION for more information. Charge or replace battery as necessary.
	2. Starting circuit wiring faulty.	2. Refer to the FEED CIRCUIT RESISTANCE TEST . Repair as necessary.
	3. Starter assembly faulty.	3. If all other starting system components and circuits check ok, replace starter assembly.
	4. Engine seized.	4. Refer to the appropriate Engine Service Information article for diagnostic and service procedures.
	5. Loose connection at battery, PDC (Diesel Only), TIPM, starter, or engine ground.	5. Inspect for loose connections.
	6. Faulty teeth on ring gear.	6. Rotate flywheel 360°, and inspect teeth and ring gear replaced if damaged.
STARTER ENGAGES, SPINS OUT BEFORE ENGINE STARTS.	1. Broken teeth on starter ring gear.	1. Remove starter. Inspect ring gear and replace if necessary.
	2. Starter assembly faulty.	2. If all other starting system components and circuits check ok, replace starter assembly.
STARTER DOES NOT DISENGAGE.	1. Starter improperly installed.	1. Install starter. Tighten starter mounting hardware to correct torque specifications.
	2. Starter relay faulty.	2. Refer to RELAY TEST . Replace relay, if necessary.
	3. Ignition switch faulty.	3. Refer to IGNITION SYSTEM - SERVICE INFORMATION . Replace switch, if necessary.
	4. Starter assembly faulty.	4. If all other starting system components and circuits check ok, replace starter assembly.
	5. Faulty teeth on ring gear.	5. Rotate flywheel 360°, and inspect teeth and ring gear replaced if damaged.

INSPECTION

Before removing any unit from the starting system for repair or diagnosis, perform the following inspections:

- **Battery** - Visually inspect the battery for indications of physical damage and loose or corroded cable connections. Determine the state-of-charge and cranking capacity of the battery. Charge or replace the battery, if required. Refer to the **BATTERY SYSTEM - SERVICE INFORMATION** for more information.
- **Ignition Switch** - Visually inspect the ignition switch for indications of physical damage and loose or corroded wire harness connections.

2014 Jeep Cherokee Trailhawk

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- **Transmission Range Sensor or Park/Neutral Switch** - Visually inspect the transmission range sensor for indications of physical damage and loose or corroded wire harness connections.
- **Starter Relay** - Visually inspect the starter relay for indications of physical damage and loose or corroded wire harness connections.
- **Starter Motor** - Visually inspect the starter motor for indications of physical damage and loose or corroded wire harness connections.
- **Starter Solenoid** - Visually inspect the starter solenoid for indications of physical damage and loose or corroded wire harness connections.
- **Wiring** - Visually inspect the wire harness for damage. Repair or replace any faulty wiring, as required. Check for loose or corroded wire harness connections at main engine ground and remote jump post.

SPECIFICATIONS

TORQUE-DIESEL

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Battery Cable Nut	9	-	80
Starter B+ Nut	10	-	89
Starter Mounting Bolts	24	18	-

TORQUE

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Engine Anti-roll to Fore/Aft Crossmember Bolt	47	35	-
Engine Anti-roll Mount Bolts	50	37	-
Engine Anti-roll Mount Thru Bolt	47	35	-
Fore/Aft Crossmember front Bolts	55	40.5	-
Fore/Aft Crossmember Rear Bolts	50	37	-
Negative Battery Cable Nut	5	-	45
Remote Start Antenna Mounting Screws	2.5	-	22
Starter Mounting Bolts	54	40	-
Starter Solenoid Battery Nut	10	-	90
Torque Reaction Bracket Bolts	54	40	-

STARTER

REMOVAL

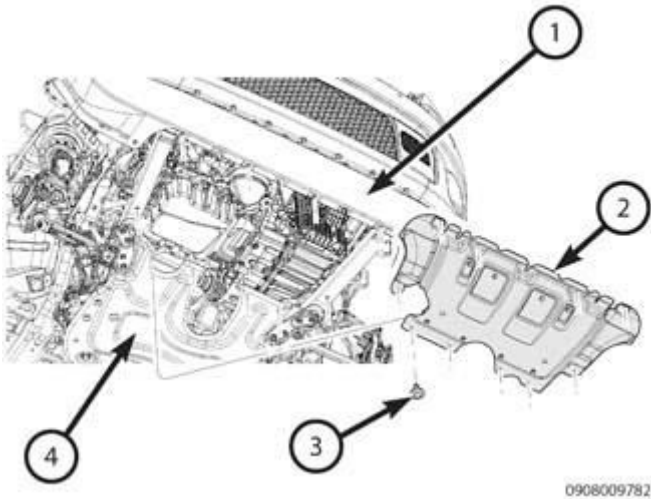
2.0L DIESEL

Fig. 4: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Raise and support the vehicle.
3. Remove bolts (3) and the belly pan (2).

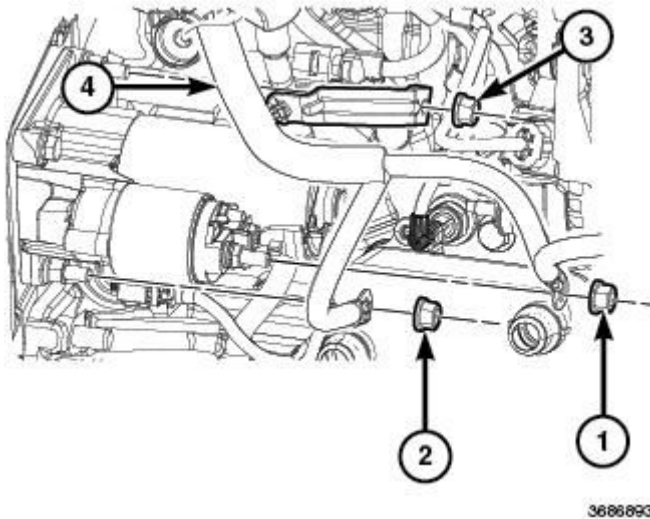
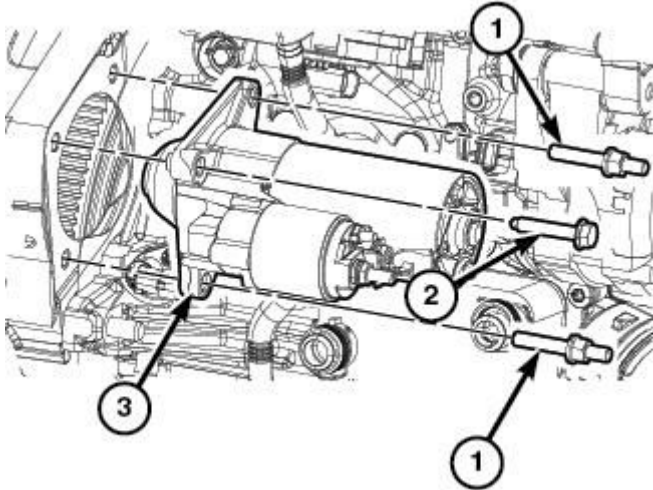


Fig. 5: B+ Cable Retainer
Courtesy of CHRYSLER GROUP, LLC

4. Remove the nut (1) from the B+ cable.
5. Disconnect the solenoid wire connector from the starter.
6. Remove the upper starter cable bracket mounting nut (3).

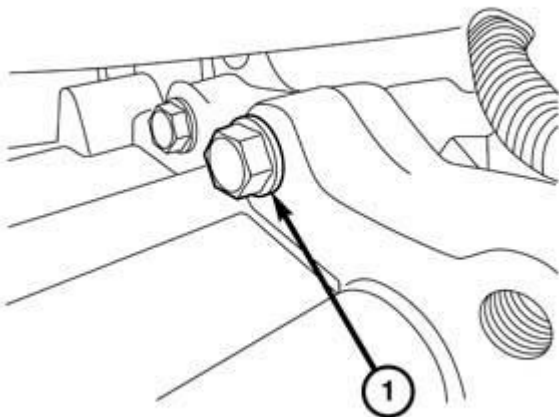
7. Remove nut (2) and the starter ground cable from stud.
8. Position the starter cable assembly aside (4).



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Fig. 6: Lower Starter Mounting Stud Bolt, Center Starter Mounting Bolt & Starter
Courtesy of CHRYSLER GROUP, LLC

9. Remove bolt (1, 2) and the starter motor (3)

2.4L

081569490

Fig. 7: Upper Starter Bolt

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the battery negative cable.
2. Loosen the upper starter bolt (1).

NOTE: The bolt will not be able to be removed due to lack of clearance.

3. Remove the intake manifold assembly Refer to MANIFOLD, INTAKE, REMOVAL .

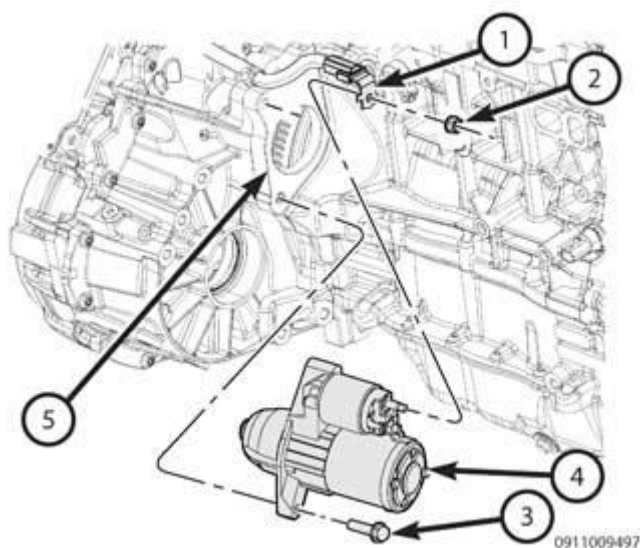


Fig. 8: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

4. Remove the 12 volt feed cable (1).
5. Disconnect the ignition feed connector.
6. Remove the lower starter bolt (3).
7. Remove the starter (4) from the block (5).

3.2L

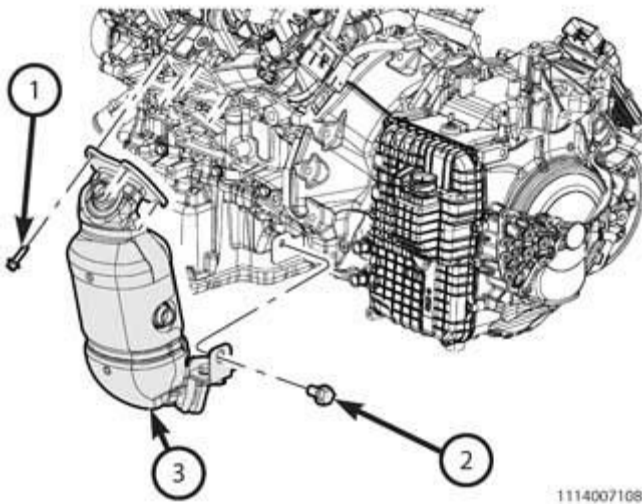


Fig. 9: Removing/Installing Catalytic Converter
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Raise and support the vehicle.
3. Remove the catalytic converter (3). Refer to **CONVERTER, CATALYTIC , REMOVAL** .

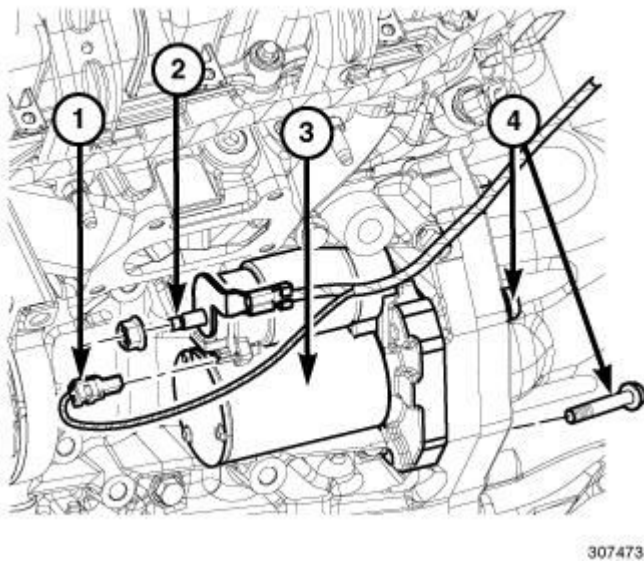


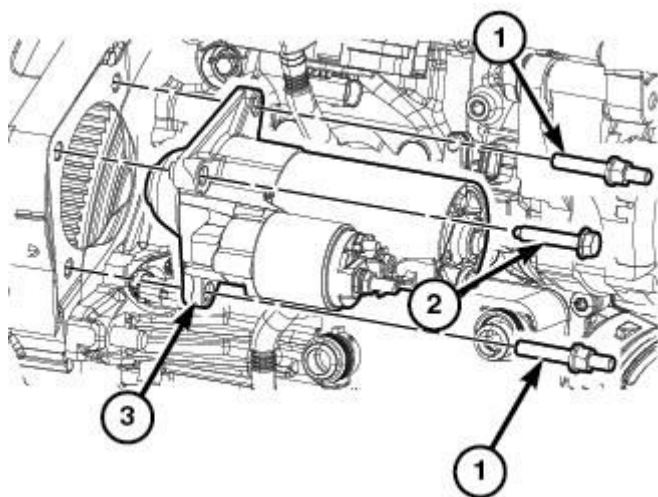
Fig. 10: Starter Solenoid Electrical Connector, Solenoid Stud, Starter Mounting Bolts & Starter Assembly
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the starter solenoid electrical connector (1) from the starter solenoid terminal.
5. Remove the battery cable nut and battery cable from the solenoid stud (2).

6. Remove the starter mounting bolts (4).
7. Remove the starter assembly (3) from the transmission.

INSTALLATION

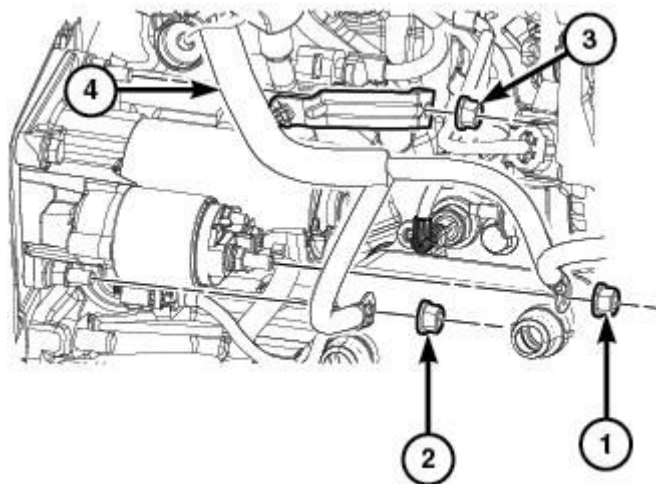
2.0L DIESEL



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Fig. 11: Lower Starter Mounting Stud Bolt, Center Starter Mounting Bolt & Starter
Courtesy of CHRYSLER GROUP, LLC

1. Install the starter (3). Tighten bolts (1, 2) to 24 N.m (18 ft. lbs.).



3686893

Fig. 12: B+ Cable Retainer
Courtesy of CHRYSLER GROUP, LLC

2. Install the B+ on the starter solenoid stud. Tighten Nut (1) to 10 N.m (89 in. lbs.).
3. Install the ground cable onto bottom stud. Tighten nut (2) to 10 N.m (89 in. lbs.).
4. Install the cable bracket on upper stud. Tighten nut (3) to 10 N.m (89 in. lbs.).
5. Connect the solenoid connector to the starter.

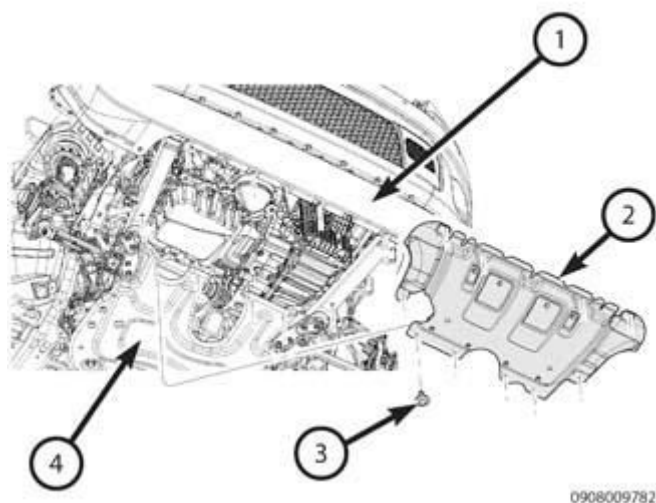


Fig. 13: Removing/Installing Starter
Courtesy of CHRYSLER GROUP, LLC

6. Install the belly pan (2) and securely tighten bolts (3).
7. Lower the vehicle.
8. Connect the negative battery cable.

2.4L

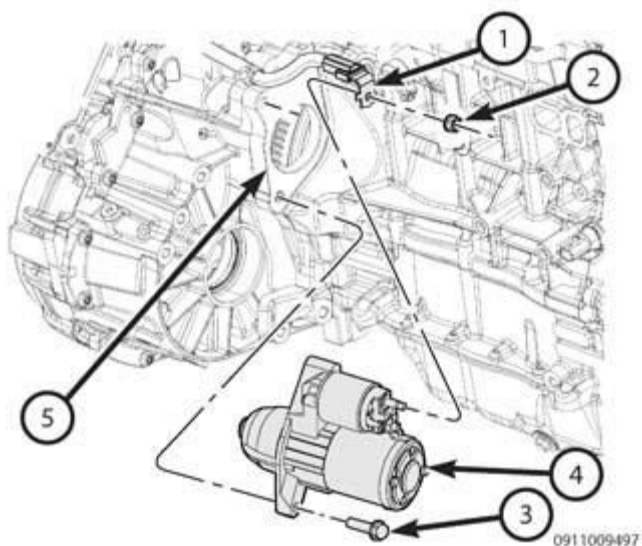
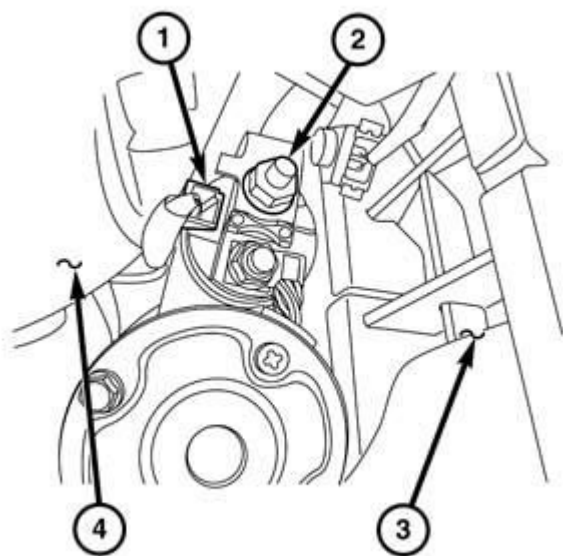


Fig. 14: Removing/Installing Starter

Courtesy of CHRYSLER GROUP, LLC

1. Install the starter into position.
2. Start the upper bolt by hand.
3. Start the lower bolt by hand.
4. Tighten the upper and lower bolts to 54 N.m (40 ft. lbs.).



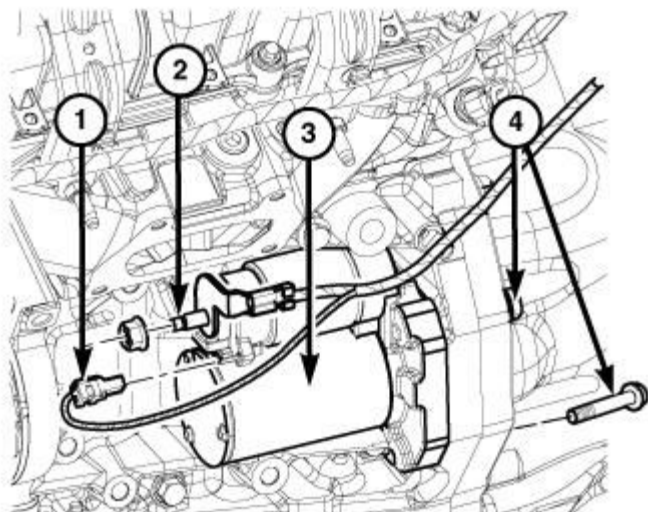
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Fig. 15: Electrical Connector, Battery Positive Cable Nut & Engine

Courtesy of CHRYSLER GROUP, LLC

5. Install the battery cable (2) onto the starter and install the nut. Torque the nut to 10 N.m (90 in. lbs.).
6. Reconnect the starter electrical connector (1).
7. Install the intake manifold assembly Refer to **MANIFOLD, INTAKE, INSTALLATION** .
8. Reconnect the negative battery cable.

3.2L

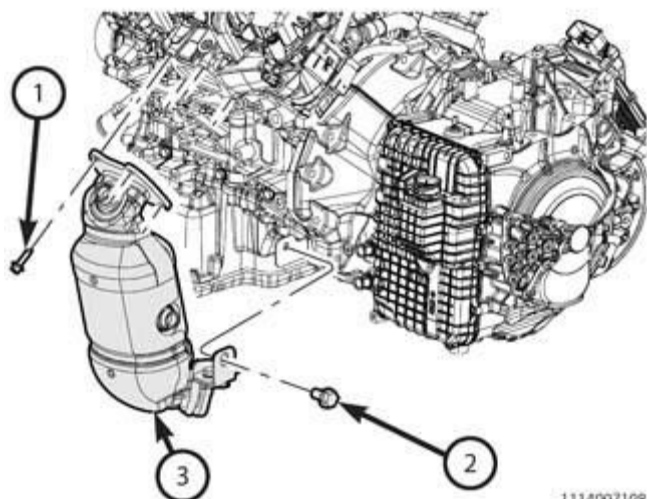


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Fig. 16: Starter Solenoid Electrical Connector, Solenoid Stud, Starter Mounting Bolts & Starter Assembly

Courtesy of CHRYSLER GROUP, LLC

1. Position the starter (3) inside the transmission.
2. Install the starter mounting bolts (4) and tighten to 55 N.m (41 ft. lbs.).
3. Connect the starter solenoid electrical connector (1) to starter solenoid terminal.
4. Install the battery cable and nut to the solenoid stud (2). Tighten the nut to 10 N.m (86 in. lbs.).



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Fig. 17: Removing/Installing Catalytic Converter

Courtesy of CHRYSLER GROUP, LLC

5. Install the catalytic converter (3). Refer to **CONVERTER, CATALYTIC , INSTALLATION** .

6. Lower the vehicle.
7. Connect the negative battery cable and tighten nut to 5 N.m (4.5 in. lbs.).

ANTENNA, REMOTE START

DESCRIPTION

DESCRIPTION

The Remote Start Antenna Module Assembly consists of an electrical connection to the Radio Frequency Hub (RF Hub), a short length of coaxial cable with a connection to the RF HUB, two mounting clips, and the control module/antenna. The antenna is located in the rear cargo area next to the RF HUB assembly concealed by the headliner. The antenna which is printed on a circuit board in an enclosed plastic housing that is fed regulated 5v DC (+/-5%) via the attached coaxial cable pigtail. The Remote Start Antenna captures radiated RF signals that are transmitted from the Key FOB transmitter throughout the intended broadcast bands. The RF signal captured is then amplified and sent to the desired receiver/tuner.

OPERATION

OPERATION

The Remote Start Antenna is used for receive the signal from the remote key. The antenna captures radiated RF signals that are transmitted from the Key FOB transmitter throughout the intended broadcast bands. The RF signal captured is then amplified and sent to the Remote Frequency Hub Module (RFHUB).

REMOVAL

REMOVAL

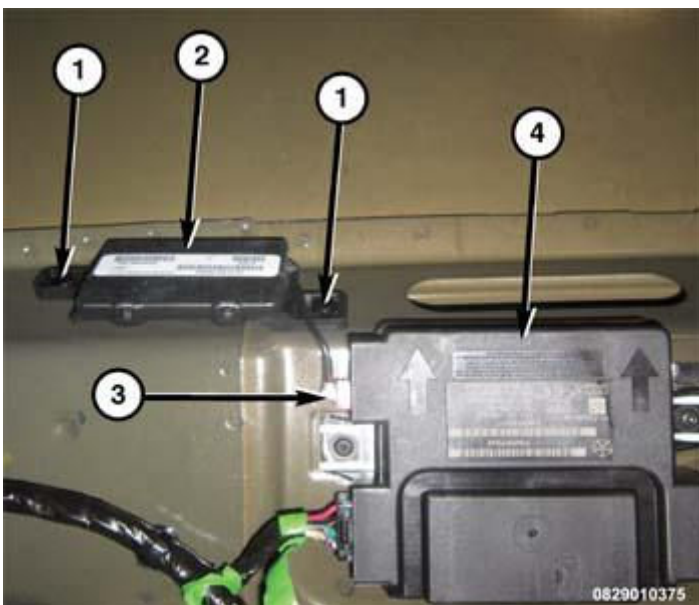
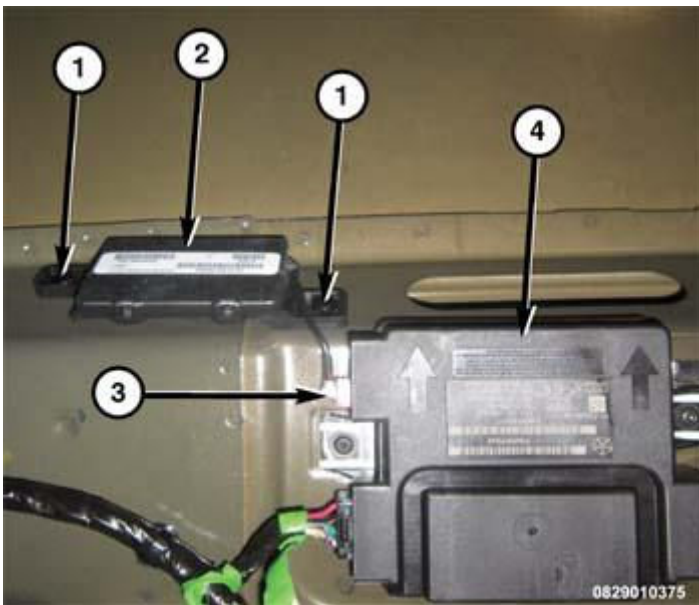


Fig. 18: Removing/Installing Remote Start Antenna

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Lower the rear of the headliner. Refer to **HEADLINER, REMOVAL** .
3. Disconnect the remote start antenna connector (3) from the Radio Frequency Hub (RF Hub) (4).
4. Remove the two fasteners (1) securing the remote start antenna (2) to the roof.

INSTALLATION**INSTALLATION****Fig. 19: Removing/Installing Remote Start Antenna**

Courtesy of CHRYSLER GROUP, LLC

1. Position the remote start antenna (2) to its mounting surface and secure the antenna using two fasteners (1).
2. Connect the remote start connector (3) to the RF Hub (4).
3. Install the headliner. Refer to **HEADLINER, INSTALLATION** .
4. Connect the negative battery cable.
5. Perform the BODY VERIFICATION TEST. Refer to **STANDARD PROCEDURE** .

NOTE: If this Electronic Control Unit (ECU) is being replaced with a new unit, a diagnostic scan tool **MUST** be used to align the PROXI configuration data into the new ECU. Follow the routine outlined in the diagnostic scan tool for PROXI Configuration Alignment under Body Control Module (BCM) Miscellaneous Functions menu.

SYSTEM, START STOP

DESCRIPTION

STOP START SYSTEM

The Stop-Start system automatically stops and starts the engine when certain conditions are met to improve fuel economy and lower CO2 emissions.

The primary input for manual transmission vehicles to an autostop is zero vehicle speed with the transmission in neutral and the clutch pedal released, while the primary input to autostarting is depression of the clutch pedal. The primary input for an automatic transmission vehicle to gain an autostop is zero vehicle speed with the brake pedal depressed, while the primary input to autostarting is release of the brake pedal. Many secondary inputs determine if it is acceptable to autostop and autostart. A number of devices on the vehicle are added or improved to support the Stop-Start function.

- **Voltage Stabilization Module (VSM)**

- This component is required to maintain system voltage during Start events. This also provides a buffer for the vehicles ECU's when battery power is being sent to the starter for cranking.

- **InRush Current Relay (ICR)** - This component works in conjunction with the VSM in order to prevent voltage dips.
- **High Durability Starter** - This is a modified starter used for the Stop Start system. Changes are hardened gears with lead in chamfer, a spring pinion (Diesel), reinforced castings, a higher power motor, long-life brushes, precision bearings and motor shaft.
- **Advanced Glass Mat (AGM) Battery with High Durability Battery Cables** - The AGM type battery and the high durability cables are capable of withstanding the increased cycling that a stop/start vehicle will experience.
- **Generator** - A 220a generator that is up-sized specifically for use with the stop/start system.
- **Intelligent Battery Sensor (IBS)** - The IBS is responsible for measuring the state-of-charge. It will also predict voltage and capacity (ah) for future crank events. The IBS is also responsible for measuring battery temperature and alternator voltage current.
- **Transmission Neutral Sensor (MTX Only)** - This is located on the transmission selector cable.
- **Powertrain Control Module (PCM)** - The PCM monitors conditions for STOP/START.

The Battery, Starting, and Charging systems operate in conjunction with one another, and must be tested as a complete system. For correct operation of starting/charging systems, all components used in these 3 systems must perform within specifications. When attempting to diagnose any of these systems, it is important that you keep their interdependency in mind.

The diagnostic procedures used in this Service Information include the most basic conventional diagnostic methods, to the more sophisticated On-Board Diagnostics (OBD) built into the Powertrain Control Module (PCM). Use of an induction-type milliamperage ammeter, volt/ohmmeter, battery charger, carbon pile rheostat (load tester), and 12-volt test lamp may be required.

Certain starting system components are monitored by the PCM and may produce a Diagnostic Trouble Code (DTC).

OPERATION

OPERATION

Primary Autostop Enablers - Brake pedal depressed (automatic transmission). Shifter/transmission in neutral and clutch pedal released (manual transmissions).

Secondary Autostop Enablers - Vehicle speed, coolant temperature, hood closed, doors closed, driver's seat belt latched, interior climate and settings, battery state and energy demand, steering wheel angle, steering wheel torque, ambient temperature, time and speed since last autostop, transfer case position, and ESC status, No stop-start related faults present.

Autostop Events

- Autostop state broadcast on CAN Buss
- Cluster telltale illuminates.
- EVIC displays message indicating autostop.
- Engine shutdown begins.

As the engine slows it passes through three phases:

- Fuel and spark restart permissible.
- Restart prohibited.
- Restart permitted, based on start system employed.

Autostart requests are evaluated throughout the autostop event.

When in autostop:

- Instrument cluster stop/start telltale remains illuminated.
- EVIC displays the autostop state message.
- Body controller starter relay is energized providing the engine controller with direct starter control.

Vehicle Function:

- Consumer electronics continue to function in a normal manner.
- HVAC fan speed and other setting adjusted to maximize cabin comfort and autostop duration (based on climate control settings and conditions).
- Electric Power Steering (EPS) maintained during autostop, possibly with reduced maximum assist.

System Requested Autostarts:

- Battery State
- Brake Vacuum
- Climate control stress
- Vehicle speed
- Steering wheel angle or torque
- Transmission selector position.

Stop-Start Disable (while autostopped)

- Vehicle systems monitored that may disable stop-start (requiring a key restart if in autostop) include: hood opened, occupant sensing indicating driver not present, unsafe gear shift position for autostart and critical system faults.

Autostart Decision:

- All autostart enablers present
- Brake pedal released or shifter place in reverse (automatic transmissions)
- Clutch pedal depressed past the up-stop position (manual transmission)
- Throttle pedal depressed

Autostart Events:

- Autostart state broadcasted on the CAN Bus
- instrument cluster stop/start telltale illumination cancelled
- EVIC display changed to previous EVIC message (outside temp and compass, etc.)
- VSMs are placed in voltage conditioning mode
- Hill Assist requested
- Starter relay commanded to initiate cranking
- Engine achieves idle speed

Launch Events:

- Automatic transmission clutches engaged
- Hill assist released
- Climate control returned to pre-autostop conditions
- Stop-Start Ready state broadcast on the CAN Bus
- Embedded EVIC stop-start message indicating "Stop/Start Ready"

Planned Autostart (Engine On) Enable Conditions:

1. Valid target gear and brake switch pressure condition
2. Completed initial engine key start

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- | |
|--|
| 3. Occupant sensing allow engine start condition met |
| 4. OBD allow engine start condition met |
| 5. Vehicle hood not Ajar |

Potential Autostop (Engine Off) Enable Conditions:

- | |
|--|
| 1. Tow Haul mode not active |
| 2. Steering wheel angle within defined range |
| 3. Steering wheel angle gradient within defined range |
| 4. Steering column torque within defined range |
| 5. Battery health state of function greater than threshold |

Planned Autostop (Engine Off) Enable Conditions:

- | |
|--|
| 1. Valid target gear and brake switch pressure state combination |
| 2. Threshold vehicle speed exceeded or timed-out since last shift out of reverse |
| 3. Transmission ready |
| 4. 4WD Low mode not active |
| 5. Starter cool down condition met after reaching max allowable consecutive restarts |
| 6. Ambient temperature within defined range |
| 7. Engine coolant temperature within defined range |
| 8. Catalyst temperature within defined range |
| 9. Battery temperature within defined range |
| 10. Barometric pressure greater than threshold |
| 11. Brake booster delta pressure less than threshold |
| 12. Fuel level greater than threshold |
| 13. Vehicle hood not Ajar |
| 14. No throttle request |
| 15. No engine stop inhibit request by HVAC |
| 16. Battery state of charge greater than threshold |
| 17. Battery voltage state of function greater than threshold |
| 18. Engine speed less than threshold |
| 19. Vehicle speed less than threshold |
| 20. Threshold vehicle speed exceeded since last engine start |
| 21. Occupant sensing allow engine stop condition met |
| 22. OBD allow engine stop condition met |
| 23. Engine runtime greater than threshold |
| 24. Stop-Start "Off" switch not activated |
| 25. Flex fuel learn mode not active |
| 26. ABS brake event not present |

EVIC Pop Up Messages Displayed on the EVIC

- EVIC message states Stop/Start Autostop Active

- No Chime
- Normal Use
- Pop-up maintained for 5 seconds
- Displays with green hard telltale

Stop/Start To Restart Press

- Single Chime
- Driver put gear shift in gear without using Clutch; customer needs to return to Neutral or fully depress clutch pedal
- Pop up maintained for 5 seconds

Stop/Start Restart Required Fault Detected

- Single Chime
- MIL or ESS system fault preventing safe state confirmation during autostop.

EVIC Pop Up Messages Displayed within EVIC "Ring" menu**Stop/Start Ready**

- Stop-Start conditions met to enable engine stop.

Stop/Start Off

- Stop-Start turned off by the customer at the switch

Stop/Start Not Ready

- Stop-Start conditions are not met to enable engine stop (ex: HVAC settings, engine temperature, etc.)

Stop/Start Not Ready Steering Wheel Turned

- Stop-Start condition not met with steering wheel turned past calibratable angle

DIAGNOSIS AND TESTING**STOP START SYSTEM DIAGNOSIS**

For diagnostics of the starting system, refer to **DIAGNOSIS AND TESTING**.

For diagnostics of the Stop Start system, the scan tool can be used to review the inhibitor menu to help root cause a potential Stop Start concern.

Possible Reasons The Engine Does Not AUTO STOP

Prior to engine shut down, the system will check many safety and comfort conditions to see if they are fulfilled. In following situations the engine will not stop:

- Driver's seat belt is not buckled
- Outside temperature is less than 1°F (-17°C) or greater than 104°F (40°C)
- Actual cabin temperature is significantly different than temperature set on Auto HVAC
- HVAC is set to full defrost mode
- Engine has not reached normal operating temperature
- Battery discharged
- When driving in REVERSE
- Hood is open
- Vehicle is in 4LO transfer case mode

It may be possible for the vehicle to be driven several times without the STOP/START system going into a STOP/START READY state under more extreme conditions of the items listed above.

For a more technical and detailed explanation of AutoStop, review the following inhibitors.

When it comes to Stop Start, we allow AutoStop event if:

- Accelerator pedal is in the rest position.
- HVAC Control allows an auto stop event. The AC load can not be in a high demand mode of operation
- Battery state (charge 65%, function 8 volts, health 40 ampere hour) is within an acceptable range.
- Current master cylinder brake pressure exceeds the required HSA brake pressure and is sufficient to hold the vehicle on a grade.
- Electronic Stability Control (ECS) is not requesting control.
- Fuel level is greater than the minimum fuel level threshold.
- Both hood switches indicate the hood is closed.
- Predefined OBD faults are not present.
- Vehicle occupants are not attempting a vehicle exit maneuver.
- Absolute Barometric Pressure is within range. Barometric pressure is greater then a minimum of 605 kPa.
- Brake Booster is sufficient to maintain master cylinder pressure with current applied pedal force.
Minimum 205 kPa
- Starter motor engagement has not exceeded prescribed frequency use.
- Vehicle speed is 0
- Steering angle has not exceeded the prescribed range.
- Steering torque is less than the prescribed value.
- Ambient Air Temperature is within the prescribed range (-10F - 110F).

- Catalyst temperature is within the prescribed range (150F - 950F)
- Coolant temperature is within the prescribed range.
- Engine oil temperature is within the prescribed range (40C - 110C).
- Anti-lock brake system is not active.
- Transfer case is not in 4WDLO
- Vehicle is not in tow haul mode.
- Vehicle is in valid target gear and brake switch combination.
- Threshold vehicle speed exceeded or timeout since last shift out of reverse.
- Transmission ready.
- Battery temperature is within the prescribed range (-256F - 256F).
- Engine speed is below a set threshold of 1000 RPM.
- Engine runtime is greater then threshold of 3 seconds.
- Start Stop disable switch is not active.
- Flex fuel learn mode is not active.
- Vehicle is not on a grade.
- Threshold vehicle speed exceeded since last engine start is 8 mph.

Conditions that will cause the engine to start automatically while in STOP/START AUTO STOP ACTIVE mode:

- Actual cabin temperature is significantly different than temperature set in Auto HVAC.
- HVAC is set to full defrost mode.
- STOP/START AUTO STOP TIME ACTIVE exceeds 5 minutes.
- Battery Voltage drops too low.
- Low brake vacuum e.g. after several brake pedal applications.
- Vehicle is moving faster then 3 mph (5 km/h)
- STOP/START OFF switch is pressed.
- 4WD is put into 4LO mode.

We allow Stop Start AutoStarts to occur when any of the conditions are made active:

- Accelerator pedal is in the "rest" position.
- HVAC Control is allows an Auto Stop event.
- Battery State (charge, function, health) is within acceptable range.
- Current master cylinder brake pressure exceeds the required HSA brake pressure and is sufficient to hold the vehicle on a grade.
- Electronic Stability Control system is not requesting control.
- Fuel Level is greater than the minimum fuel level threshold.
- Both hood switches indicate hood is closed.

- Predefined OBD faults are not present.
- Vehicle occupants are not attempting a vehicle exit maneuver.
- Absolute Barometric Pressure is within range.
- Brake Booster Pressure is sufficient to maintain master cylinder pressure with current applied pedal force.
- Starter motor engagement has not exceeded prescribed frequency of use.
- Vehicle speed is 0.
- Steering Angle has not exceeded the prescribed range.
- Steering Torque is less than the prescribed value.
- Ambient Air Temperature is within the prescribed range.
- Catalyst Temperature is within the prescribed range.
- Coolant Temperature is within the prescribed range.
- Engine Oil Temperature is within the prescribed range.
- Anti-Lock Brake System is not active.
- Transfer Case Mode is not in 4WDLO.
- Vehicle is not in TOW-HAUL mode.
- Vehicle is in valid target gear and brake switch state combination
- Threshold vehicle speed exceeded or timeout since last shift out of reverse
- Transmission ready
- Battery temperature is within the prescribed range
- Engine speed is below a set threshold
- Threshold vehicle speed exceeded since last engine start
- Engine runtime greater than threshold
- Stop-Start disable switch is not Active
- Flex fuel learn mode not active
- Vehicle is not on a grade.

We allow Stop Start AutoStarts to occur when any of the conditions are made active:

- Accelerator pedal is not in the "rest" position.
- HVAC Control is active.
- Battery State (charge, function, health) is out of range.
- Current master cylinder brake pressure does not have enough HSA brake pressure.
- Electronic Stability Control system is requesting control.
- Fuel Level is lower than the minimum fuel level threshold.
- One or both hood switches indicate hood is open.
- Predefined OBD faults are present.
- Absolute Barometric Pressure is out of range.
- Brake Booster Pressure is insufficient to maintain master cylinder pressure with current applied pedal

force.

- Starter motor engagement has exceeded prescribed frequency of use.
- Vehicle speed is above 0.
- Steering Angle has exceeded the prescribed range.
- Steering Torque is more than the prescribed value.
- Ambient Air Temperature is outside the prescribed range.
- Catalyst Temperature is outside the prescribed range.
- Coolant Temperature is outside the prescribed range.
- Engine Oil Temperature is outside the prescribed range.
- Anti-Lock Brake System is active.
- Transfer Case Mode is in 4WDLO.
- Vehicle is in TOW-HAUL mode.
- Transmission not ready
- Battery temperature is out of the prescribed range
- Stop-Start disable switch is Active
- Flex fuel learn mode is active

The above conditions can restart the vehicle as long as:

1. Completed initial engine key start.
2. Occupant sensing allow engine start condition met.
3. OBD allow engine start condition met.
4. Vehicle hood closed.

System Malfunction:

If there is a malfunction in the STOP/START system, the system will not shut down the engine. A SERVICE STOP/START SYSTEM message will appear in the EVIC.

SENSOR, NEUTRAL POSITION

DESCRIPTION

DESCRIPTION



Fig. 20: Neutral Position Sensor
Courtesy of CHRYSLER GROUP, LLC

The Neutral Position Sensor (NPS) (1) is a component of the automatic stop/start feature on KL platform vehicles with manual transmissions. It is located on the transmission shift cable and it is only serviced by replacing the shift cable assembly.

OPERATION

OPERATION

The purpose of the Neutral Position Sensor (NPS) is to provide an output from the sensor to a controller concerning gear range position. On vehicles equipped with a manual transmission, the shift cable position is interpreted by the controller from the NPS to determine if the transmission is in neutral or in some gear range, for the purpose of determining when the stop/start system can safely restart the vehicle without the clutch pedal being depressed. The switch outputs a PWM signal whose percentage of duty cycle corresponds to the ranged denoted in Neutral, in a gear range, or as a fault value. The NPS is attached to shift cable such that it is nominally outputting 50% duty cycle at or when the vehicle is shifted to Neutral. Higher or lower duty cycle outputs are denoted as the magnet on the shift cable moves with respect to the NPS when the vehicle is shifted to gear range positions.

The NPS receives an Input of 5 volts excitation, has a common ground and outputs Pulse-width modulated signal to the controller.

Outputs reading less than 5% or more than 95% of duty cycle will trigger diagnostic trouble codes. Outputs reading between 5-25% or 75-95% represent in-gear positions and outputs readings between 25-75% represent Neutral position. Check that the sensor is attached properly to shift cable (inside the center console, at the shifter) and that wiring lead is attached to wiring harness coming up from rearward in vehicle from shifter. Check that the shift cable is properly attached to shifter and transmission ends to levers and load reaction points. With a jumper, voltages from the sensor input and output can be read with a voltmeter and compared with

The In-rush Current Reduction (ICR) Relay Module is intended to reduce the in-rush current drawn by the starter motor during the initial stage of the crank sequence, thus maintaining an adequate voltage level and allowing critical electrical/electronic systems to function without interruption, or reset. At the same time, the relay will allow sufficient current and voltage to reach the starter motor, to allow cranking the engine at an adequate speed, so that the engine can generate the air-fuel mixture necessary for self-sustained operation, even under adverse conditions.

This component is mounted to a bracket that mounts to the top of the starter assembly. The relay is serviceable and is shipped along with a bracket that secures the ICR.

OPERATION

OPERATION

In-Rush Current Reduction Relay.

Within the ICR relay, prior to the starter motor solenoid's contact closure, the shorting bar opens contacts, thus routing the starter motor current through a resistor bar (10 mOhm for V6 Pentastar). The increase in series resistance reduces/eliminates the initial current spike (or, inrush current) and reduces the consequent voltage drop. After a set time (185 msec), the power to the ICR relay is cut, the shorting bar closes the contacts, removing the resistor bar from the circuit and restoring full power to the starter motor. At this point, there is a rebound of the current surge and subsequent drop in voltage; however, neither is as intense as they would be would be without initial jump in resistance.

2014 GENERAL INFORMATION

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WARNING

GENERAL WARNINGS

WARNINGS provide information to prevent personal injury and vehicle damage. Below is a list of general warnings that should be followed any time a vehicle is being serviced.

WARNING: Always wear safety glasses for eye protection.

WARNING: Use safety stands anytime a procedure requires being under a vehicle.

WARNING: Be sure that the ignition switch is always in the off position, unless the procedure requires it to be on.

WARNING: Set the parking brake when working on any vehicle. An automatic transmission should be in park. A manual transmission should be in neutral.

WARNING: Operate the engine only in a well-ventilated area.

WARNING: Keep away from moving parts when the engine is running, especially the fan and belts.

WARNING: To prevent serious burns, avoid contact with hot parts such as the radiator, exhaust manifold(s), tail pipe, catalytic converter and muffler.

WARNING: Do not allow flame or sparks near the battery. Gases are always present in and around the battery.

WARNING: Always remove rings, watches, loose hanging jewelry and avoid loose clothing.

DESCRIPTION

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2014 GENERAL INFORMATION Circuit Testing Procedures - Non-DTC-Based Diagnostics - Cherokee

CIRCUIT FUNCTIONS

All circuits in the wiring diagrams use an alpha/numeric code to identify the wire and its function. To identify which circuit code applies to a system, refer to the Circuit Identification Code Chart.

NOTE: This chart shows the main circuits only and does not show the secondary codes that may apply to some models.

CIRCUIT IDENTIFICATION CODE CHART

CIRCUIT CODE	FUNCTION
A	BATTERY FEED
B	BRAKE CONTROLS
C	CLIMATE CONTROLS
D	DIAGNOSTIC CIRCUITS
E	DIMMING ILLUMINATION CIRCUITS
F	FUSED CIRCUITS
G	MONITORING CIRCUITS (GAUGES)
H	MULTIPLE
I	NOT USED
J	OPEN
K	POWERTRAIN CONTROL MODULE
L	EXTERIOR LIGHTING
M	INTERIOR LIGHTING
N	MULTIPLE
O	NOT USED
P	POWER OPTION (BATTERY FEED)
Q	POWER OPTIONS (IGNITION FEED)
R	PASSIVE RESTRAINT
S	SUSPENSION/STEERING
T	TRANSMISSION/TRANSAXLE/ TRANSFER CASE
U	OPEN
V	SPEED CONTROL, WIPER/WASHER
W	WIPERS
X	AUDIO SYSTEMS
Y	TEMPORARY
Z	GROUND

CIRCUIT INFORMATION

Each wire shown in the wiring diagrams contains a code which identifies the main circuit, a specific portion of the main circuit, gauge of wire, and color.

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2014 GENERAL INFORMATION Circuit Testing Procedures - Non-DTC-Based Diagnostics - Cherokee

As an example, circuit **A 2 18 LB/YL** is decoded in the following manner:

Circuit Type:	A (Battery Feed Circuit)
Circuit Level:	2 (Level Two)
Wire Size:	18 (Eighteen Gauge Wire)
Wire Color:	LB/YL (Light Blue with Yellow Tracer)

WIRE COLOR CODE CHART

COLOR CODE	COLOR
BL	BLUE
BK	BLACK
BR	BROWN
DB	DARK BLUE
DG	DARK GREEN
GY	GRAY
LB	LIGHT BLUE
LG	LIGHT GREEN
OR	ORANGE
PK	PINK
RD	RED
TN	TAN
VT	VIOLET
WT	WHITE
YL	YELLOW
*	WITH TRACER

DIAGNOSIS AND TESTING

WIRING HARNESS TESTING

TROUBLESHOOTING TOOLS

When diagnosing a problem in an electrical circuit there are several common tools necessary. These tools are listed and explained below:

Voltmeter

The voltmeter is used to measure the electrical pressure or the voltage difference between two points. A voltmeter reads available voltages such as battery voltage, generator output voltage, and voltage drop across a component or conductor. A high voltage drop may indicate a high resistance in the circuit. The voltmeter can be used to locate an open circuit and circuits with an unintentional ground. Observing polarity, always connect a voltmeter in parallel to the existing circuit. If the leads are reversed on a digital multimeter, a minus sign

appears in the display.

CAUTION: Most of the electrical components used in today's vehicles are Solid State. When checking voltages in these circuits, use a meter with a 10 - megohm or greater impedance rating.

Ohmmeter

The ohmmeter is used to measure the resistance of a component or the resistance between two points in a circuit in ohms, and to check a portion of the circuit for continuity. Some meters have a built-in tone to indicate that the circuit has continuity. No resistance indicates a short circuit or unintentional ground whereas resistance that is higher than specification indicates a high resistance in the circuit such as a loose, dirty or corroded connection, or a defective component. An "OL" reading means that the circuit or component had infinite resistance; an open circuit or defective component is indicated. Ohmmeters have an internal battery and must never be connected to a power circuit. Connecting an ohmmeter to a powered circuit causes the meter fuse to blow and can damage its dry cell battery. Ohmmeters can be connected into a circuit without regard to polarity, unless the circuit contains a diode. When using an ohmmeter, the component or portion of the circuit must be isolated from other components or branches to avoid false readings.

CAUTION: Most of the electrical components used in today's vehicles are Solid State. When checking resistance in these circuits use a meter with a 10 - megohm or greater impedance rating. In addition, make sure the power is disconnected from the circuit. Circuits that are powered up by the vehicle's electrical system can cause damage to the equipment and provide false readings.

Ammeter

Amperage or current is the measure of the rate of electron "flow" in a circuit. It is measured in the unit of the Ampere, simply called an Amp (A). In order to measure current in a circuit, the circuit must be broken or opened, and an ammeter must be inserted in series (in-line) with the circuit so that all the current that flows through the circuit will have to go through the meter. When measuring current in this manner, it requires the meter be made part of the circuit, this type of measurement is more difficult than measuring either voltage or resistance.

When an ammeter is placed in series with a circuit, it ideally drops no voltage as current goes through it. In other words, it acts very much like a piece of wire, with very little resistance from one test probe to the other. Consequently, an ammeter will act as a short circuit if placed in parallel (across the terminals of) a substantial source of voltage. If this is done, a surge in current will result, potentially damaging the meter. Ammeters are generally protected from excessive current by means of a small fuse located inside the meter housing. If the ammeter is accidentally connected across a substantial voltage source, the resultant surge in current will "blow" the fuse and render the meter incapable of measuring current until the fuse is replaced.

Consult the owner's manual of the particular model of meter you own for details on measuring current.

CAUTION: Do not crank the engine or turn on any accessories that may draw more

than 10 Amps. You may open the protective fuse in the multimeter.

12-Volt Test Light

The 12-Volt test light when properly used, is one of the best and quickest pieces of test equipment available for troubleshooting 12-volt power systems. It's especially good for times when there are only two voltages, battery voltage and no voltage. For example, if you're checking to see if you have 12-volts on the Battery(+), the test light will immediately tell you if voltage is present or not.

With any test equipment, you should confirm that it's in good working order before you begin testing. For a test light, you have to have a voltage source. Connect the test light's ground clip to a good ground and touch it to a point where you believe that there is 12-volt supply. If the light doesn't light up, check the light by connecting it directly across the battery. Initially, make sure that you have the ground clip on the negative battery terminal. If you touch the probe to the positive terminal, the test light should light up. If it doesn't and the battery is not completely dead, the test light isn't working properly. The test light must be in proper working order before any circuit testing can occur.

Jumper Wire

The sole purpose of the jumper wire is to complete a circuit. It is nothing more than a suitable length of insulated wire with terminals or connectors on each end. Jumper wires may be bought or made with various sizes of wire and styles of terminals including alligator clips, spade lugs and pin plugs, and should include a fuse device of some type for circuit and component protection. A jumper wire is used to verify a faulty conductor by substituting a known good one. It is jumped across a suspicious conductor in the circuit. If the circuit works with the jumper, but not without, there is an open somewhere in the area being jumped. A jumper wire is **ONLY** used to bypass a faulty conductor (including switches and connectors). **NEVER** bypass a load device with a jumper wire. The circuit needs the resistance from the load device and shorting across it causes high current flow, which could damage other components.

WARNING: Never use a jumper wire across a load, such as a motor, connected between a battery feed and ground.

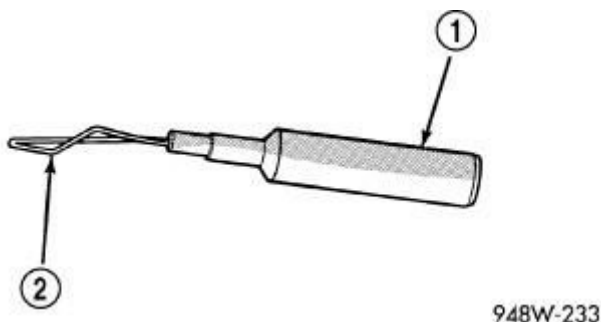


Fig. 1: Probing Tool

Courtesy of CHRYSLER GROUP, LLC

1 - SPECIAL TOOL 6801

2 - PROBING END

Probing Tools

These tools are used for probing terminals in connectors. Select the proper size tool from Special Tool Package (special tool #6807, Terminal Tools), and insert the probing end (2) into the terminal being tested. Use the other end of the tool (1) to insert the meter probe.

INTERMITTENT AND POOR CONNECTIONS

Most intermittent electrical problems are caused by faulty electrical connections or wiring. It is also possible for a sticking component or relay to cause a problem.

Before condemning a component or wiring assembly, check the following items:

- Connectors are fully seated
- Spread terminals, or terminal push out
- Terminals in the wiring assembly are fully seated into the connector/component and locked into position
- Dirt or corrosion on the terminals. Any amount of corrosion or dirt could cause an intermittent problem
- Damaged connector/component casing exposing the item to dirt or moisture
- Wire insulation that has rubbed through causing a short to ground
- Some or all of the wiring strands broken inside of the insulation
- Wiring broken inside of the insulation

TROUBLESHOOTING WIRING PROBLEMS

When troubleshooting wiring problems there are six steps which can aid in the procedure. The steps are listed and explained below. Always check for non-factory items added to the vehicle before doing any diagnosis. If the vehicle is equipped with these items, disconnect them to verify these add-on items are not the cause of the problem.

Perform the following Six Step Diagnosis Process:

1. Verify the problem.
2. Verify any related symptoms. Do this by performing operational checks on components that are in the same circuit. Refer to **SYSTEM WIRING DIAGRAMS** .
3. Analyze the symptoms. Use the wiring diagrams to determine what the circuit is doing, where the problem most likely is occurring and where the diagnosis will continue.
4. Isolate the problem area.
5. Repair the problem area.

6. Verify the proper operation. For this step, check for proper operation of all items on the repaired circuit. Refer to **SYSTEM WIRING DIAGRAMS**.

NOTE: The Six Step Diagnosis Process used by Chrysler is a time proven process. The basic concepts of this process have been used by others for problem solving for many years. The successful application of this process requires a solid understanding of the conditions that affect each step, and when its time to advance to the next step. These conditions based on experience formulate what is known as "Best Practices".

STANDARD PROCEDURE

CHECK A 12-VOLT FUSED BATTERY B(+) CIRCUIT FOR VOLTAGE

THEORY OF OPERATION

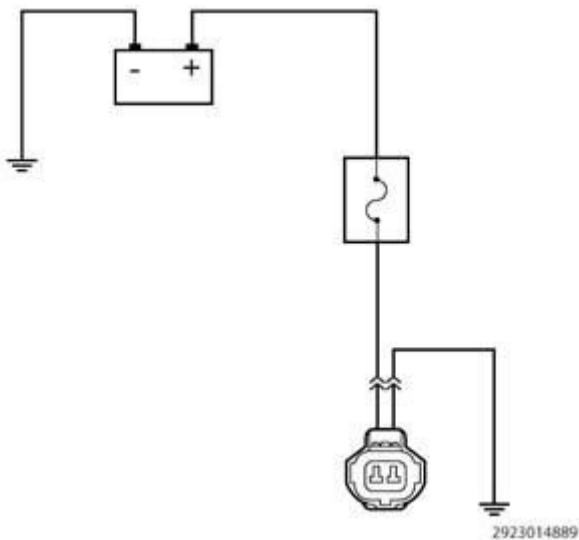


Fig. 2: Checking 12-Volt Fused Battery B(+) Circuit For Voltage
Courtesy of CHRYSLER GROUP, LLC

The purpose of the following procedure(s) is to demonstrate how to check the voltage of a 12-volt fused battery B(+) circuit with a test light or voltmeter.

NOTE: The circuit shown is an example, and is intended for demonstrational purpose only.

The following are circuit tests covered in this procedure:

- Testing 12-Volt Fused Battery B(+) Circuit Voltage With A Test Light
- Testing 12-Volt Fused Battery B(+) Circuit Voltage With A Voltmeter

NOTE: Perform the following test using a known good test light or functioning multimeter.

Below is a list of possible causes that could be related to a No Voltage condition.

Possible Causes
OPEN CIRCUIT (CHAFED, PIERCED, PINCHED OR BROKEN WIRES)
OPEN FUSE
OPEN IN-LINE CONNECTOR (BENT, PUSHED OUT OR CORRODED TERMINALS)

DIAGNOSTIC TEST

1. TESTING 12-VOLT FUSED BATTERY B(+) CIRCUIT VOLTAGE WITH A TEST LIGHT

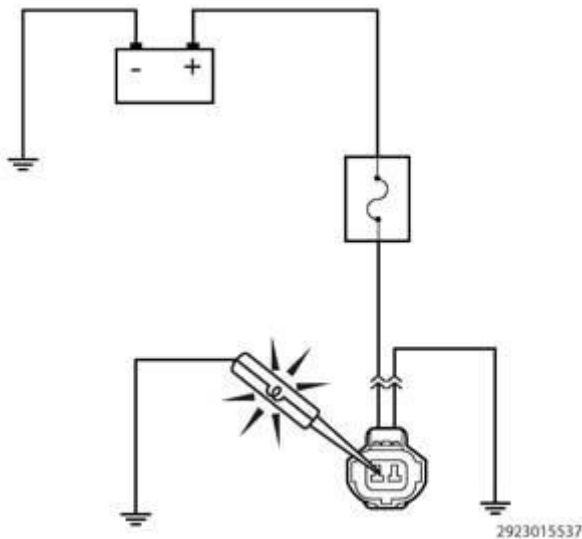


Fig. 3: Checking 12-Volt Fused Battery B(+) Circuit Voltage With A Test Light
Courtesy of CHRYSLER GROUP, LLC

NOTE: Before testing any circuits, first verify the 12-volt test light is operating properly. Connect the 12-volt test light to battery ground or to any other known good ground. Touch the lead of the test light to Battery(+). If the test light is operational, it should illuminate brightly.

1. Turn the ignition off.
2. Disconnect the wire harness connector from the component that is being tested.

NOTE: Check connectors - Clean/repair as necessary.

3. At this time, leave all in-line connectors connected.
4. Connect the 12-volt test light to a known good ground.

5. Use the test light lead to carefully probe the Battery or Ignition voltage circuit in the harness connector.
6. First check with the ignition off, next check with the ignition on, and lastly check while cranking the engine.

Does the test light illuminate brightly?

Yes

- The circuit is not open at this time or the condition that originally caused the open may not be present at this time. Continue to monitor the test light and wiggle the wire harness and connectors to check for an intermittent open or excessive resistance condition.
- Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the open could occur intermittently.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals. Verify that there is good pin to terminal contact in the related wire harness connectors.
- Perform any Technical Service Bulletins (TSBs) that may apply.

No

- Repair the open in the circuit. Use the wiring diagram as a guide to trace the circuit and look for any in-line connectors where the open could occur.
- One method to help isolate the open is to disconnect any in-line connectors and measure the resistance from one side of the in-line connector to the matching component harness connector. If the open goes away, the open is on the other side of the in-line connector.
- If this is a fused circuit, make sure to inspect the fuse. If the fuse is open, check the circuit for a short to ground before installing a new fuse. The circuit may have a short to ground causing the fuse to open. This short to ground could be in the wire harness or in one of the components the circuit is supplying voltage to.

2. TESTING 12-VOLT FUSED BATTERY B(+) CIRCUIT VOLTAGE WITH A VOLTMETER

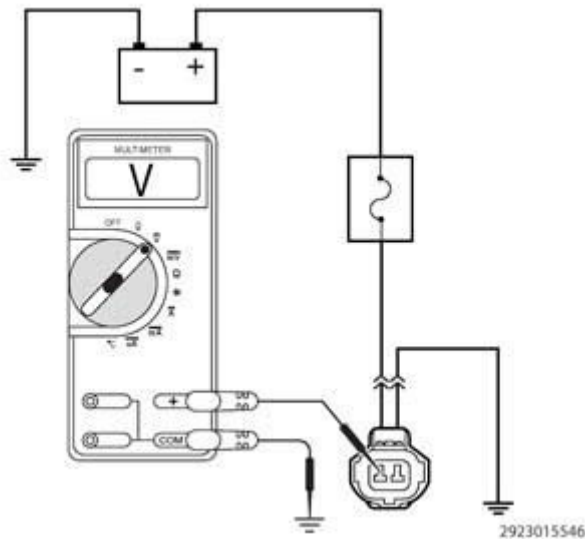


Fig. 4: Checking Testing 12-Volt Fused Battery B(+) Circuit Voltage With A Voltmeter
 Courtesy of CHRYSLER GROUP, LLC

NOTE: The connector displayed in the graphics are only an example.

1. Turn the ignition off.
2. Disconnect the wire harness connector from the component that is being tested.

NOTE: Check connectors - Clean/repair as necessary.

3. At this time leave all in-line connectors connected.
4. Use a multimeter set to measure DC voltage.
5. Connect the ground lead of the meter to a known good ground.
6. Use the positive lead of the multimeter and probe the circuit that is being checked for voltage.
7. Ignition on, engine not running.

Is the voltage within specifications for this circuit?

Yes

- The circuit is functioning properly or the condition that originally caused the open or short may not be present at this time. Continue to measure the voltage and wiggle the wire harness and connectors while checking for an intermittent open or short.
- Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the short could occur intermittently.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals. Verify that there is good pin to terminal contact in the related wire harness connectors.

- Perform any Technical Service Bulletins (TSBs) that may apply.

No

- Repair the open or short to ground in the circuit. Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the short could occur.
- One method to help isolate the open or short is to disconnect any in-line connectors that the circuit being checked runs through and check for the voltage again. If the voltage is present, the open or short is on the other side of the in-line connector.

CHECK A 12-VOLT SWITCHED BATTERY B(+) CIRCUIT FOR VOLTAGE

THEORY OF OPERATION

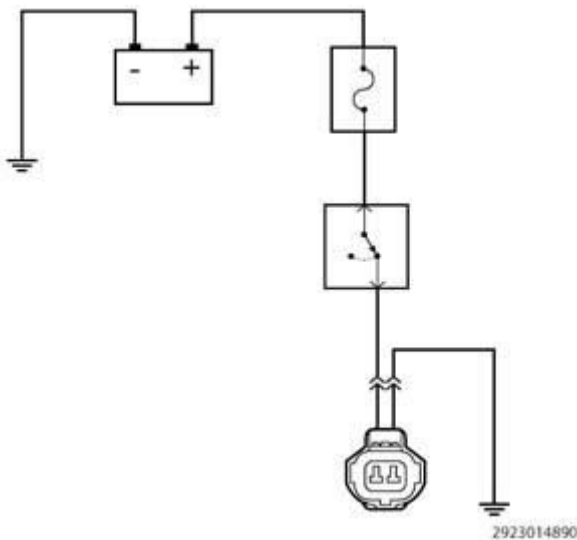


Fig. 5: Checking 12-Volt Switched Battery B(+) Circuit For Voltage
Courtesy of CHRYSLER GROUP, LLC

The purpose of the following procedure is to demonstrate how to check the voltage of a 12-Volt switched battery B(+) circuit with a test light or voltmeter.

NOTE: **The circuit shown is an example, and is intended for demonstrational purpose only.**

The following are circuit tests covered in this procedure:

- Testing 12-Volt Switched Battery B(+) Circuit Voltage With A Test Light
- Testing 12-Volt Switched Battery B(+) Circuit Voltage With A Voltmeter

NOTE: **Perform the following test using a known good test light or functioning multimeter.**

Below is a list of possible causes that could be related to a No Voltage condition.

Possible Causes
OPEN CIRCUIT (CHAFED, PIERCED, PINCHED OR BROKEN WIRES)
OPEN FUSE
OPEN IN-LINE CONNECTOR (BENT, PUSHED OUT OR CORRODED TERMINALS)

DIAGNOSTIC TEST

1. TESTING 12-VOLT SWITCHED BATTERY B(+) CIRCUIT VOLTAGE WITH A TEST LIGHT

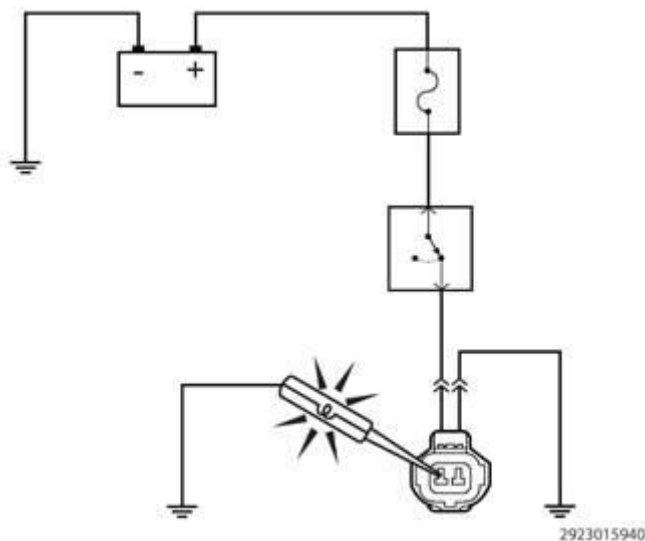


Fig. 6: Testing 12-Volt Switched Battery B(+) Circuit Voltage With A Test Light
Courtesy of CHRYSLER GROUP, LLC

NOTE: Before testing any circuits, first verify the 12-volt test light is operating properly. Connect the 12-volt test light to battery ground or to any other known good ground. Touch the lead of the test light to Battery(+). If the test light is operational, it should illuminate brightly.

1. Turn the ignition off.
2. Disconnect the wire harness connector from the component that is being tested.

NOTE: Check connectors - Clean/repair as necessary.

3. At this time, leave all in-line connectors connected.
4. Connect the 12-volt test light to a known good ground.
5. Use the test light lead to carefully probe the Battery or Ignition voltage circuit in the harness connector.
6. First check with the ignition off, next check with the ignition on, and lastly check while cranking

the engine.

Does the test light illuminate brightly?

Yes

- The circuit is not open at this time or the condition that originally caused the open may not be present at this time. Continue to monitor the test light and wiggle the wire harness and connectors to check for an intermittent open or excessive resistance condition.
- Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the open could occur intermittently.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals. Verify that there is good pin to terminal contact in the related wire harness connectors.
- Perform any Technical Service Bulletins (TSBs) that may apply.

No

- Repair the open in the circuit. Use the wiring diagram as a guide to trace the circuit and look for any in-line connectors where the open could occur.
- One method to help isolate the open is to disconnect any in-line connectors and measure the resistance from one side of the in-line connector to the matching component harness connector. If the open goes away, the open is on the other side of the in-line connector.
- If this is a fused circuit, make sure to inspect the fuse. If the fuse is open, check the circuit for a short to ground before installing a new fuse. The circuit may have a short to ground causing the fuse to open. This short to ground could be in the wire harness or in one of the components the circuit is supplying voltage to.

2. TESTING 12-VOLT SWITCHED BATTERY B(+) CIRCUIT VOLTAGE WITH A VOLTMETER

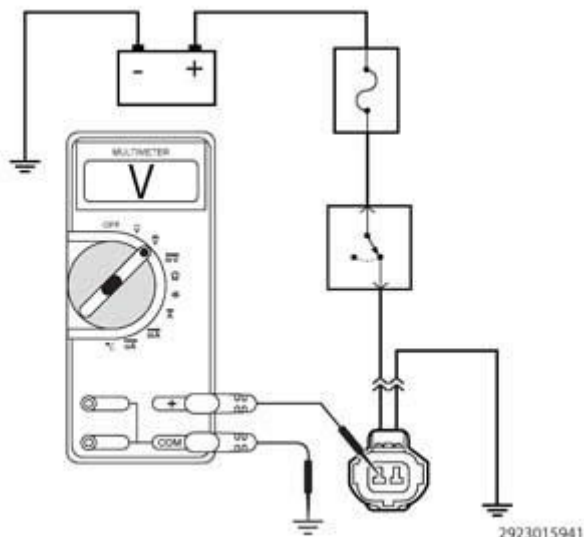


Fig. 7: Testing 12-Volt Switched Battery B(+) Circuit Voltage With A Voltmeter
Courtesy of CHRYSLER GROUP, LLC

NOTE: The connector displayed in the graphics are only an example.

1. Turn the ignition off.
2. Disconnect the wire harness connector from the component that is being tested.

NOTE: Check connectors - Clean/repair as necessary.

3. At this time leave all in-line connectors connected.
4. Use a multimeter set to measure DC voltage.
5. Connect the ground lead of the meter to a known good ground.
6. Use the positive lead of the multimeter and probe the circuit that is being checked for voltage.
7. Ignition on, engine not running.

Is the voltage within specifications for this circuit?

Yes

- The circuit is functioning properly or the condition that originally caused the open or short may not be present at this time. Continue to measure the voltage and wiggle the wire harness and connectors while checking for an intermittent open or short.
- Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the short could occur intermittently.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals. Verify that there is good pin to terminal contact in the related wire harness connectors.
- Perform any Technical Service Bulletins (TSBs) that may apply.

No

- Repair the open or short to ground in the circuit. Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the short could occur.
- One method to help isolate the open or short is to disconnect any in-line connectors that the circuit being checked runs through and check for the voltage again. If the voltage is present, the open or short is on the other side of the in-line connector.

CHECK A 5-VOLT SUPPLY CIRCUIT FOR VOLTAGE

THEORY OF OPERATION

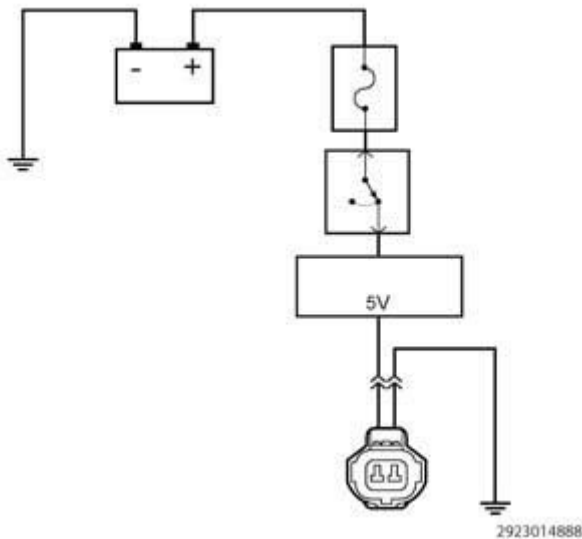


Fig. 8: Checking 5-Volt Supply Circuit For Voltage
Courtesy of CHRYSLER GROUP, LLC

The purpose of the following procedure is to demonstrate how to check the voltage of a 5-Volt supply circuit with a voltmeter.

NOTE: The circuit shown is an example, and is intended for demonstrational purpose only.

The following are circuit tests covered in this procedure:

- Testing A 5-Volt Supply Circuit For Voltage
- Testing A 5-Volt Supply Circuit And Sensor Ground Circuit

NOTE: Perform the following test using a known good multimeter.

Below is a list of possible causes that could be related to a No Voltage condition.

Possible Causes
OPEN CIRCUIT (CHAFED, PIERCED, PINCHED OR BROKEN WIRES)
OPEN IN-LINE CONNECTOR (BENT, PUSHED OUT OR CORRODED TERMINALS)
ELECTRONIC CONTROL MODULE (5-VOLT SUPPLY OUTPUT)

DIAGNOSTIC TEST

1. TESTING A 5-VOLT SUPPLY CIRCUIT FOR VOLTAGE

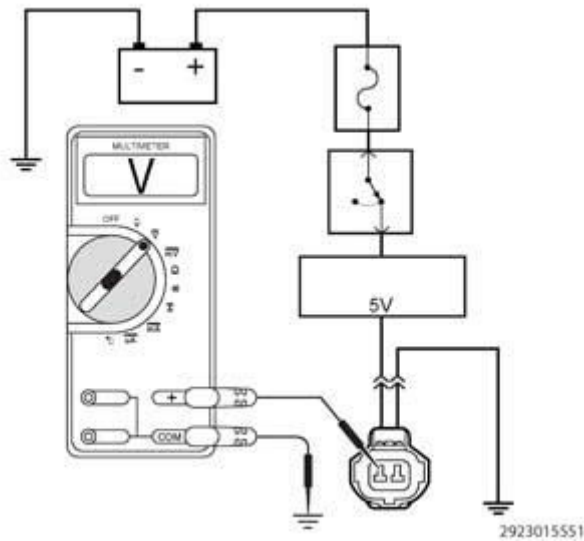


Fig. 9: Checking 5-Volt Supply Circuit For Voltage
Courtesy of CHRYSLER GROUP, LLC

1. Turn the ignition off.
2. Disconnect the sensor harness connector.

NOTE: Check connectors - Clean/repair as necessary.

3. Turn the ignition on.
4. Set the multimeter to measure DC voltage.
5. Connect the negative lead of the multimeter to a known good ground.
6. With the positive lead of the multimeter, carefully probe the 5-volt supply circuit.

Is the voltage between 4.7 and 5.2 volts?

Yes

- Go To 2

No

- Check the 5-volt supply circuit for an open or short to ground. For further assistance, perform the appropriate Sensor Reference Voltage DTC diagnostic procedure.

2. TESTING A 5-VOLT SUPPLY CIRCUIT AND SENSOR GROUND CIRCUIT

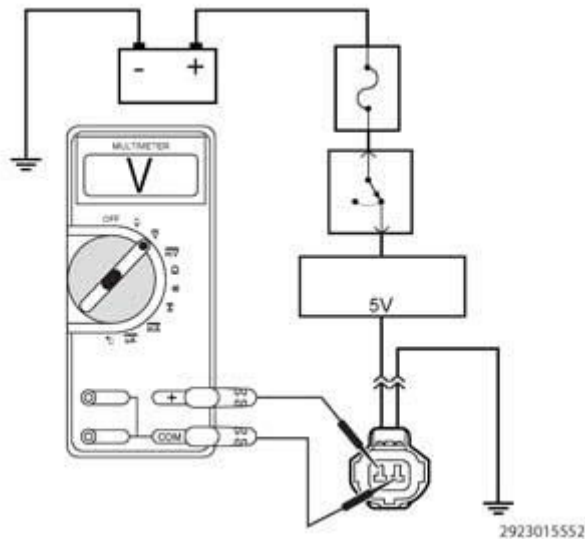


Fig. 10: Checking 5-Volt Supply Circuit And Sensor Ground Circuit
Courtesy of CHRYSLER GROUP, LLC

1. With the multimeter set to measure DC voltage.
2. Move the negative lead of the multimeter to carefully probe the sensor ground or sensor return circuit in the harness connector.
3. With the positive lead of the multimeter, carefully probe the 5-volt supply circuit.

Is the voltage between 4.7 and 5.2 volts?

Yes

- At this time the 5-volt supply and sensor ground circuit are working properly. Continue to measure the voltage between the wires, wiggle the wire harness and connectors while checking for an intermittent condition.
- Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the open could occur intermittently.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals. Verify that there is good pin to terminal contact in the related wire harness connectors.
- Perform any Technical Service Bulletins (TSBs) that may apply.

No

- Repair the open or excessive resistance in the Sensor Ground (Sensor Return) circuit.

CHECK A CIRCUIT FOR A SHORT TO GROUND

THEORY OF OPERATION

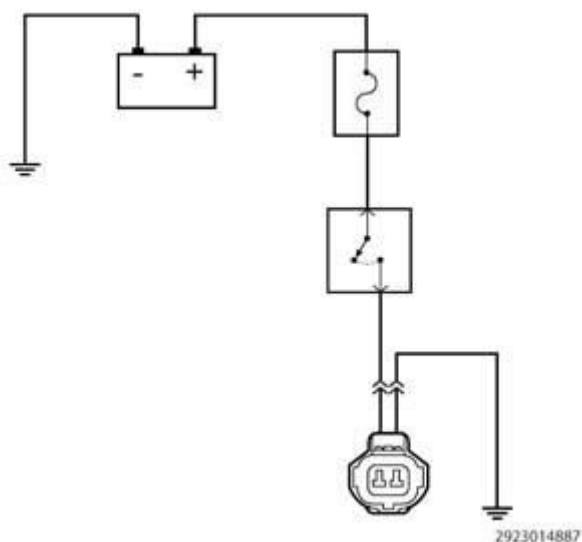


Fig. 11: Checking Circuit For A Short To Ground
Courtesy of CHRYSLER GROUP, LLC

The purpose of the following procedure is to demonstrate how to check a circuit for a Short to Ground.

NOTE: The circuit shown is an example, and is intended for demonstrational purpose only.

The following are circuit tests covered in this procedure:

- Testing For A Short To Ground Using An Ohmmeter

NOTE: Perform the following test using a known good multimeter.

Below is a list of possible causes that could be related to a Short to Ground condition.

Possible Causes
SHORTED CIRCUIT (CHAFED, PIERCED OR PINCHED WIRES)
SHORTED IN-LINE CONNECTOR (BENT, PUSHED OUT OR CORRODED TERMINALS)

DIAGNOSTIC TEST

TESTING FOR A SHORT TO GROUND USING AN OHMMETER

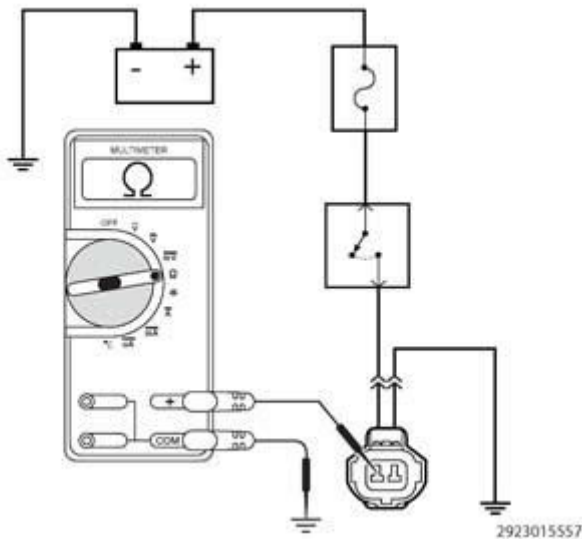


Fig. 12: Checking For A Short To Ground Using An Ohmmeter
Courtesy of CHRYSLER GROUP, LLC

NOTE: Before measuring the resistance of any circuit, first measure the resistance between the two leads of the multimeter. Take this value and subtract it from the value recorded when measuring the resistance of the circuit being checked (The meter leads can add 0.5 ohm or more of total resistance).

1. Turn the ignition off.
2. Disconnect the wire harness connectors from the module and component for the suspected circuit being shorted to ground.

NOTE: Check connectors - Clean/repair as necessary.

3. With the component wire harness connectors disconnected, use a meter set to measure Ohms (Ω), and measure the resistance between the circuit and a known good ground.
4. Use the negative lead of the meter and touch a known good ground.
5. Use the positive lead of the meter and carefully probe the circuit suspected of having the short.

Is the resistance to ground below 10k ohms ?

Yes

- Repair the short to ground. Use the wiring diagram as a guide to follow the path of the circuit.
- One method to help isolate the short is to disconnect any in-line connectors that the circuit being tested runs through and measure for the short again. If the short goes away, the short is on the other side of the in-line connector.

No

- The circuit is not shorted to ground or the condition that originally caused the short may not be present at this time. Continue to measure the resistance, wiggle the wire harness and connectors while checking for an intermittent short.
- Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the short could occur intermittently.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals. Verify that there is good pin to terminal contact in the related wire harness connectors.
- Perform any Technical Service Bulletins (TSBs) that may apply.

CHECK A CIRCUIT FOR A SHORT TO VOLTAGE

THEORY OF OPERATION

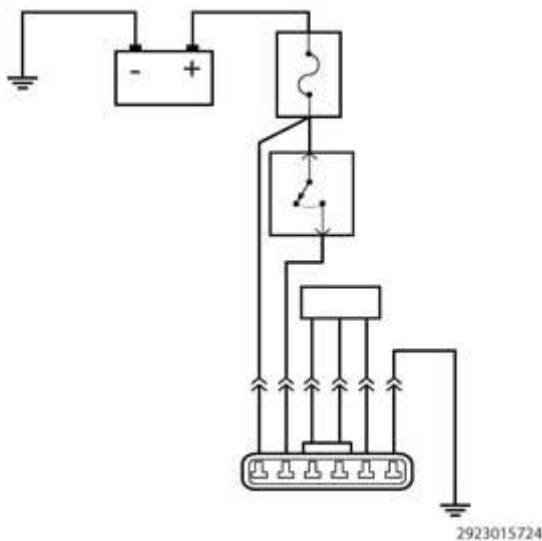


Fig. 13: Battery Circuit Diagram
Courtesy of CHRYSLER GROUP, LLC

The purpose of the following procedure is to demonstrate different methods of checking for a short to voltage in a circuit. When diagnosing a DTC it might be necessary to verify that proper voltage is on a circuit or that a circuit is not shorted high.

NOTE: The circuit shown is an example, and is intended for demonstrational purpose only.

The following are circuit tests covered in this procedure:

- Testing For A Short To Battery Voltage Using A Voltmeter
- Testing For A Short To Switched Battery Voltage Using A Voltmeter
- Testing For A Short To Battery Voltage Using A 12-Volt Test Light

- Testing For A Short To Switched Battery Voltage Using A 12-Volt Test Light

NOTE: Perform the following test using a known good test light or functioning multimeter.

Below is a list of possible causes that could be related to a Short To Voltage condition.

Possible Causes
SHORTED CIRCUIT (CHAFED, PIERCED OR PINCHED WIRES)
SHORTED IN-LINE CONNECTOR (BENT, PUSHED OUT OR CORRODED TERMINALS)

DIAGNOSTIC TEST

1. TESTING FOR A SHORT TO BATTERY VOLTAGE USING A TEST LIGHT

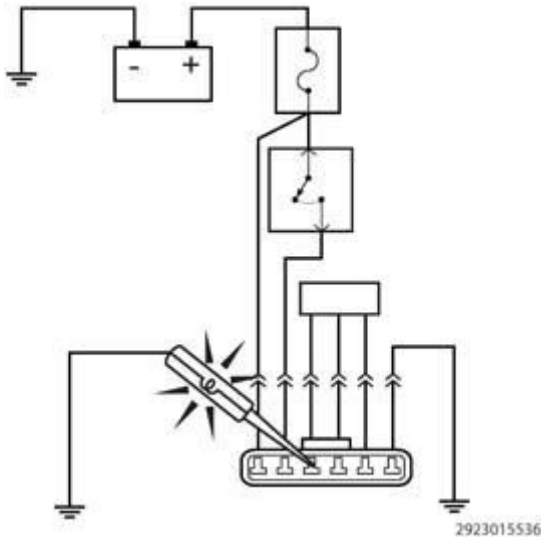


Fig. 14: Checking For A Short To Battery Voltage Using A Test Light
Courtesy of CHRYSLER GROUP, LLC

NOTE: Before testing any circuits, first verify the 12-volt test light is operating properly. Connect the 12-volt test light to battery ground or to any other known good ground. Touch the lead of the test light to Battery(+). If the test light is operational, it should illuminate brightly.

1. Turn the ignition off.
2. Disconnect the wire harness connectors of all components that contain the circuits that are suspected of having the short.

NOTE: Check connectors - Clean/repair as necessary.

3. At this time leave all in-line connectors connected.
4. Connect the 12-volt test light to a known good ground.
5. Use the lead of the test light and carefully probe the circuit suspected of having the short.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts or fan. Do not wear loose clothing. Failure to follow these instructions may result in possible serious or fatal injury.

6. First, check with the ignition off, next with the ignition on, and lastly while cranking the engine.

Does the test light illuminate brightly?

Yes

- Repair the short to voltage. Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the short could occur.
- One method to help isolate the short is to disconnect any in-line connectors that the circuit being checked runs through and check for the short again. If the short goes away, the short is on the other side of the in-line connector.

No

- The circuit is not shorted to voltage or the condition that originally caused the short may not be present at this time. Continue to measure the resistance and wiggle the wire harness to check for an intermittent short.

NOTE: By disconnecting the wire harness connectors you may have eliminated the source of the voltage causing the short. Use the wiring diagram as a guide, check to see if there are any battery circuits in the same wire harness as the circuit you are testing. It is necessary to check for a short to those circuits using an ohmmeter. Refer to **STANDARD PROCEDURE** and perform the **Check for a Short Between Multiple Circuits diagnostic procedure**.

- Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the short could occur intermittently.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals. Verify that there is good pin to terminal contact in the related component and wire harness connectors.
- Perform any Technical Service Bulletins (TSBs) that may apply.

2. TESTING FOR A SHORT TO SWITCHED IGNITION VOLTAGE USING A TEST LIGHT

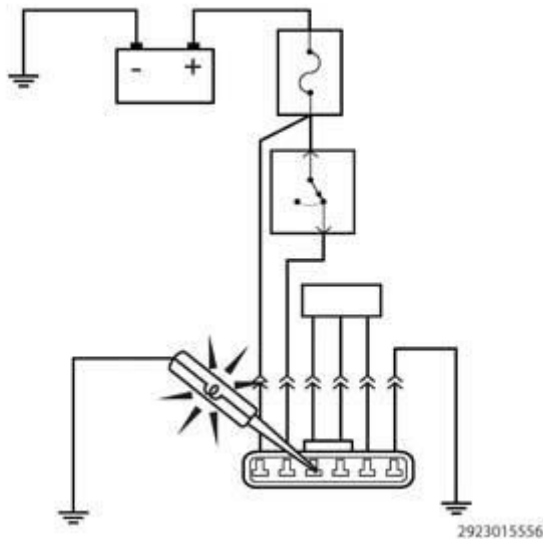


Fig. 15: Checking For A Short To Switched Ignition Voltage Using A Test Light
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Before testing any circuits, first verify the 12-volt test light is operating properly. Connect the 12-volt test light to battery ground or to any other known good ground. Touch the lead of the test light to Battery(+). If the test light is operational, it should illuminate brightly.

1. Turn the ignition off.
2. Disconnect the wire harness connectors of all components that contain the circuits that are suspected of having the short.

NOTE: Check connectors - Clean/repair as necessary.

3. At this time leave all in-line connectors connected.
4. Connect the 12-volt test light to a known good ground.
5. Use the lead of the test light and carefully probe the circuit suspected of having the short.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts or fan. Do not wear loose clothing. Failure to follow these instructions may result in possible serious or fatal injury.

6. First, check with the ignition off, next with the ignition on, and lastly while cranking the engine.

Does the test light illuminate brightly?

Yes

- Repair the short to voltage. Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the short could occur.
- One method to help isolate the short is to disconnect any in-line connectors that the circuit being checked runs through and check for the short again. If the short goes away, the short is on the other side of the in-line connector.

No

- The circuit is not shorted to voltage or the condition that originally caused the short may not be present at this time. Continue to measure the resistance and wiggle the wire harness to check for an intermittent short.

NOTE: By disconnecting the wire harness connectors you may have eliminated the source of the voltage causing the short. Use the wiring diagram as a guide, check to see if there are any battery circuits in the same wire harness as the circuit you are testing. It is necessary to check for a short to those circuits using an ohmmeter. Refer to **STANDARD PROCEDURE** and perform the **Check for a Short Between Multiple Circuits** diagnostic procedure.

- Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the short could occur intermittently.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals. Verify that there is good pin to terminal contact in the related component and wire harness connectors.
- Perform any Technical Service Bulletins (TSBs) that may apply.

3. TESTING FOR A SHORT TO BATTERY VOLTAGE USING A VOLTMETER

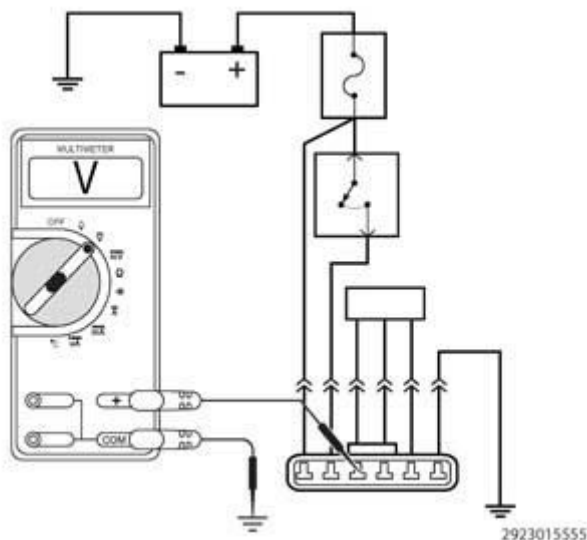


Fig. 16: Checking For A Short To Battery Voltage Using A Voltmeter
Courtesy of CHRYSLER GROUP, LLC

1. Turn the ignition off.
2. Disconnect the wire harness connectors of the components that contain the circuit that is suspected as having a short.

NOTE: Check connectors - Clean/repair as necessary.

3. At this time leave all in-line connectors connected.
4. With all the component wire harness connectors disconnected, use a multimeter set to measure DC voltage.
5. Connect the ground lead of the meter to a known good ground.
6. Use the positive lead of the multimeter and probe the circuit that is being checked for a short.

Is there any voltage present?

Yes

- Repair the short to battery voltage. Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the short could occur.
- One method to help isolate the short is to disconnect any in-line connectors that the circuit being checked runs through and measure for the short again. If the short goes away, the short is on the other side of the in-line connector.

No

- The circuit is not shorted to voltage or the condition that originally caused the short may not be present at this time. Continue to measure the voltage and wiggle the wire harness to check for an intermittent short.

NOTE: By disconnecting the wire harness connectors you may have eliminated the source of the voltage causing the short. Use the wiring diagram as a guide, check to see if there are any battery circuits in the same wire harness as the circuit you are testing. It is necessary to check for a short to those circuits using an ohmmeter. Refer to **STANDARD PROCEDURE** and perform the **Check for a Short Between Multiple Circuits** diagnostic procedure.

- Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the short could occur intermittently.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals. Verify that there is good pin to

terminal contact in the related wire harness connectors.

- Perform any Technical Service Bulletins (TSBs) that may apply.

4. TESTING FOR A SHORT TO SWITCHED IGNITION VOLTAGE USING A VOLTMETER

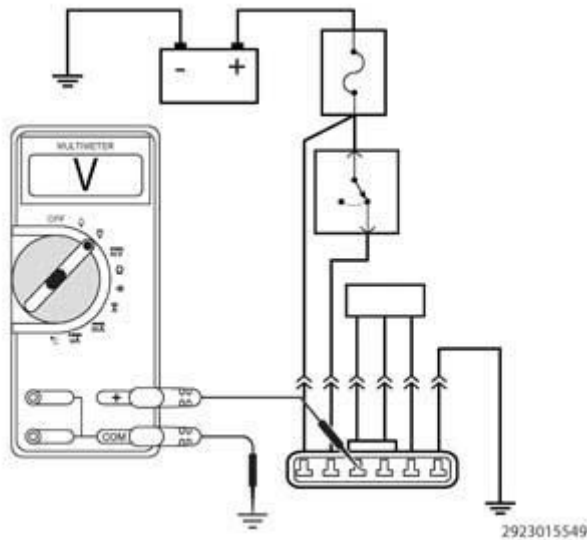


Fig. 17: Checking For A Short To Switched Ignition Voltage Using A Voltmeter
Courtesy of CHRYSLER GROUP, LLC

1. Turn the ignition off.
2. Disconnect the wire harness connectors of all components that contain the circuits that are suspected as being shorted.

NOTE: Check connectors - Clean/repair as necessary.

3. At this time leave all in-line connectors connected.
4. With all the component wire harness connectors disconnected, use a multimeter set to measure DC voltage.
5. Connect the ground lead of the meter to a known good ground.
6. Use the positive lead of the multimeter and probe the circuit suspected of having the short.
7. Ignition on, engine not running.

Is any voltage present?

Yes

- Repair the short to ignition voltage. Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the short could occur.
- One method to help isolate the short is to disconnect any in-line connectors that the circuit being checked runs through and check for the short again. If the short goes away, the short is on the other side of the in-line connector.

No

- The circuit is not shorted to voltage or the condition that originally caused the short may not be present at this time. Continue to measure the voltage and wiggle the wire harness to check for an intermittent short.

NOTE: By disconnecting the wire harness connectors you may have eliminated the source of the voltage causing the short. Use the wiring diagram as a guide, check to see if there are any battery circuits in the same wire harness as the circuit you are testing. It is necessary to check for a short to those circuits using an ohmmeter. Refer to **STANDARD PROCEDURE** and perform the **Check for a Short Between Multiple Circuits** diagnostic procedure.

- Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the short could occur intermittently.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals. Verify that there is good pin to terminal contact in the related wire harness connectors.
- Perform any Technical Service Bulletins (TSBs) that may apply.

CHECK FOR AN OPEN GROUND CIRCUIT

THEORY OF OPERATION

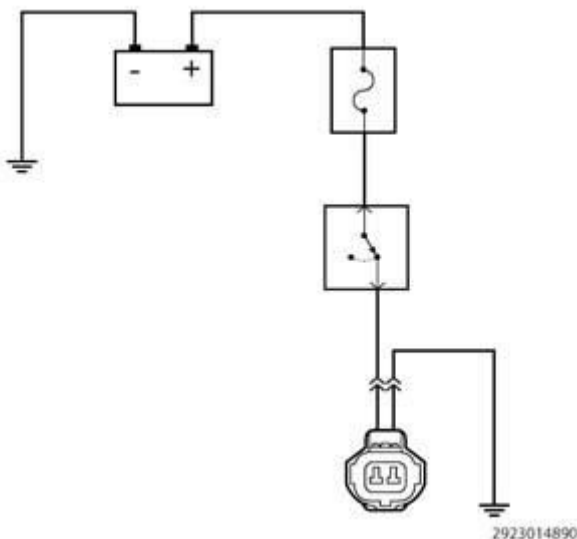


Fig. 18: Checking 12-Volt Switched Battery B(+) Circuit For Voltage
Courtesy of CHRYSLER GROUP, LLC

The purpose of the following procedure is to demonstrate how to check the operation of a generic ground circuit

with a test light.

NOTE: The circuit shown is an example, and is intended for demonstrational purpose only.

The following are circuit tests covered in this procedure:

- Testing Ground Circuit With Test Light

NOTE: Perform the following test using a known good test light.

Possible Causes
OPEN GROUND CIRCUIT (CHAFED, PIERCED, PINCHED OR BROKEN WIRE)
OPEN IN-LINE CONNECTOR (BENT, PUSHED OUT OR CORRODED TERMINALS)

DIAGNOSTIC TEST

TESTING GROUND CIRCUIT WITH TEST LIGHT

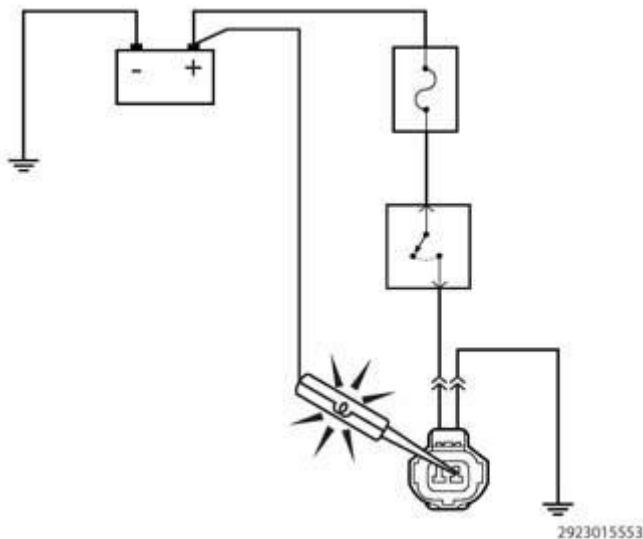


Fig. 19: Checking Ground Circuit With Test Light
Courtesy of CHRYSLER GROUP, LLC

NOTE: Before testing any circuits, first verify the 12-volt test light is operating properly. Connect the 12-volt test light to battery ground or to any other known good ground. Touch the lead of the test light to Battery(+). If the test light is operational, it should illuminate brightly.

1. Turn the ignition off.
2. Disconnect the wire harness connectors of the components that contain the ground circuit suspected of

containing excessive resistance.

NOTE: Check connectors - Clean/repair as necessary.

3. At this time leave all in-line connectors connected.
4. With all the component wire harness connectors disconnected, connect the 12-volt test light to Battery(+).
5. Use the test light lead to lightly probe the ground circuit in the harness connector.

Does the test light illuminate brightly?

Yes

- The suspected ground circuit is not open or the condition that originally caused the open or excessive resistance is not present at this time. Another way to check for an open would be to use an ohmmeter and measure the resistance of the ground circuit. While continuing to measure the resistance of the circuit, wiggle the wire harness and connectors to check for an intermittent open or poor connection.
- Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the open could occur intermittently.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals. Verify that there is good pin to terminal contact in the related wire harness connectors.
- Perform any Technical Service Bulletins (TSBs) that may apply.

No

- Repair the open in the ground circuit. Use the wiring diagram as a guide to trace the circuit and look for any in-line connectors where the open could occur.
- One method to help isolate the open is to disconnect any in-line connectors and measure the resistance from one side of the in-line connector to the matching component harness connector. If the open goes away, the open is on the other side of the in-line connector.

CHECK FOR A SHORT BETWEEN MULTIPLE CIRCUITS

THEORY OF OPERATION

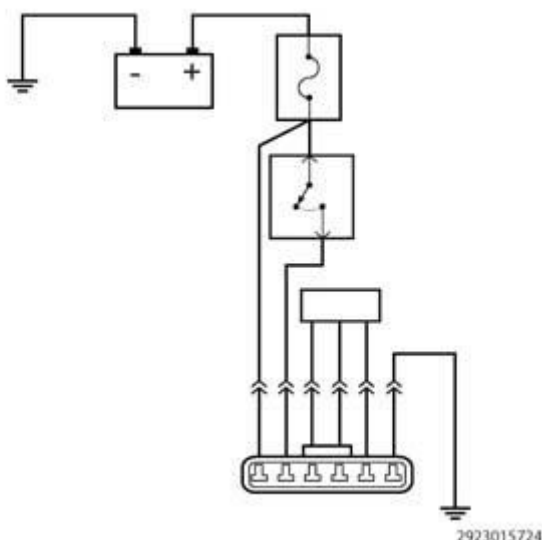


Fig. 20: Battery Circuit Diagram
Courtesy of CHRYSLER GROUP, LLC

The purpose of the following procedure is to demonstrate how to check for a short circuit between multiple circuits.

NOTE: The circuit shown is an example, and is intended for demonstrational purpose only.

The following are circuit tests covered in this procedure:

- Testing For A Short Between Multiple Circuits

NOTE: Perform the following test using a known good multimeter.

Below is a list of possible causes that could be related to a Multiple Short condition.

Possible Causes
SHORTED CIRCUIT (CHAFED, PIERCED OR PINCHED WIRES)
SHORTED IN-LINE CONNECTOR (BENT, PUSHED OUT OR CORRODED TERMINALS)

DIAGNOSTIC TEST

TESTING FOR A SHORT BETWEEN MULTIPLE CIRCUITS

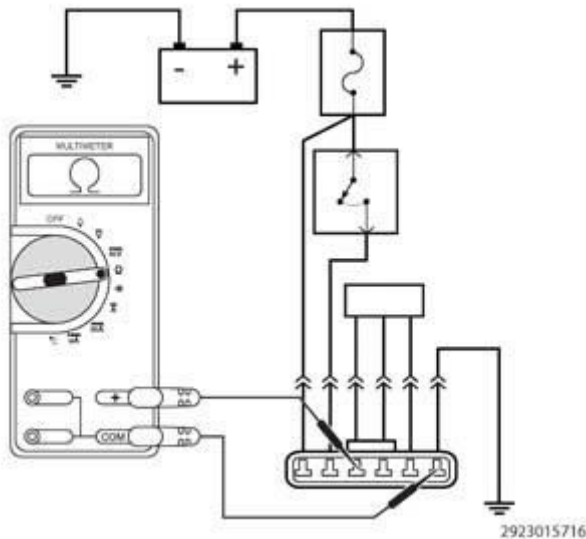


Fig. 21: Checking For A Short Between Multiple Circuits
Courtesy of CHRYSLER GROUP, LLC

NOTE: Before measuring the resistance of any circuit, first measure the resistance between the two leads of the multimeter. Take this value and subtract it from the value recorded when measuring the resistance of the circuit being checked (The meter leads can add 0.5 ohm or more of total resistance).

1. Turn the ignition off.
2. Disconnect the wire harness connectors of the components that contain the circuits that are suspected of being shorted together.

NOTE: Check connectors - Clean/repair as necessary.

3. At this time leave all in-line connectors connected.
4. With all the component wire harness connectors disconnected, use a multimeter set to Ohms (Ω), and measure the resistance between the applicable circuits in one of the harness connectors.
5. Use one lead of the multimeter and carefully probe the circuit suspected of being shorted.
6. Use the other lead of the meter and one at a time, carefully probe the other circuits in the harness connector.

Is the resistance below 10k ohms when probing any two circuits?

Yes

- Repair the short between the circuits. Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the short could occur.
- One method to help isolate the short is to disconnect any in-line connectors that the circuit being tested runs through and measure for the short again. If the short goes away, the short is on the other

side of the in-line connector.

No

- The circuit is not shorted or the condition that originally caused the short may not be present at this time. Continue to measure the resistance and wiggle the wire harness and connectors while checking for an intermittent short.

NOTE: By disconnecting the wire harness connectors you may have eliminated the source that was causing the short.

- Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the short could occur intermittently.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals. Verify that there is good pin to terminal contact in the related wire harness connectors.
- Perform any Technical Service Bulletins (TSBs) that may apply.

CHECK THE RESISTANCE OF A CIRCUIT USING AN OHMMETER

THEORY OF OPERATION

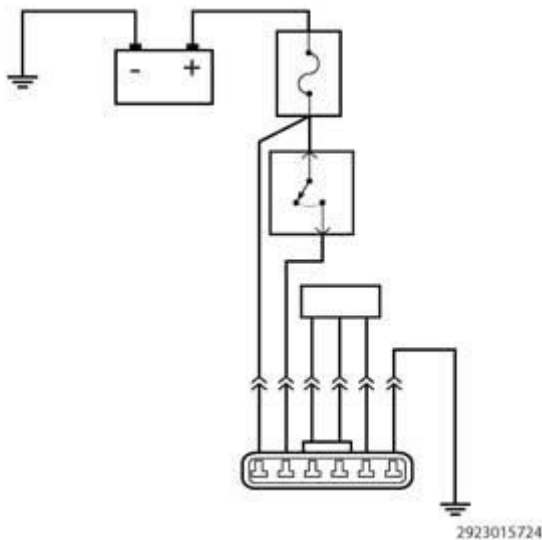


Fig. 22: Battery Circuit Diagram
Courtesy of CHRYSLER GROUP, LLC

The purpose of the following procedure is to demonstrate how to check the resistance of a circuit with an ohmmeter.

NOTE: The circuit shown is an example, and is intended for demonstrational purpose only.

The following are circuit tests covered in this procedure:

- Testing For An Open Circuit Using An Ohmmeter

NOTE: Perform the following test using a known good multimeter.

Below is a list of possible causes that could be related to an Open Circuit condition.

Possible Causes
OPEN CIRCUIT (CHAFED, PIERCED, PINCHED OR BROKEN WIRES)
OPEN IN-LINE CONNECTOR (BENT, PUSHED OUT OR CORRODED TERMINALS)

DIAGNOSTIC TEST

TESTING FOR AN OPEN CIRCUIT USING AN OHMMETER

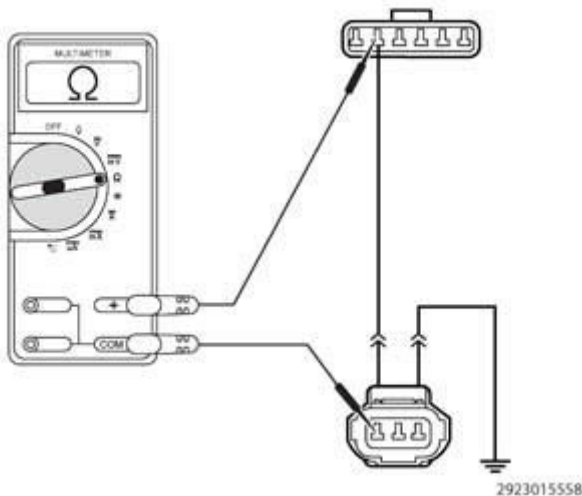


Fig. 23: Checking For An Open Circuit Using An Ohmmeter
Courtesy of CHRYSLER GROUP, LLC

NOTE: Before measuring the resistance of any circuit, first measure the resistance between the two leads of the multimeter. Take this value and subtract it from the value recorded when measuring the resistance of the circuit being checked (The meter leads can add 0.5 ohm or more of total resistance).

1. Turn the ignition off.
2. Disconnect the wire harness connectors of the components that contain the circuit suspected of being open.

NOTE: Check connectors - Clean/repair as necessary.

3. At this time leave all in-line connectors connected.
4. With the component wire harness connectors disconnected, use a multimeter set to Ohms (Ω), and measure the resistance of the circuit.
5. Use one lead of the meter and probe the circuit in one harness connector.
6. Use the other lead of the meter and probe the same circuit in the other harness connector.

Is the resistance in the circuit below 10k ohms?

Yes

- The circuit does not contain any excessive resistance or the condition that originally caused the excessive resistance may not be present at this time. Continue to measure the resistance of the circuit, wiggle the wire harness and connectors to check for an intermittent open or poor connection.
- Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the open could occur intermittently.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals. Verify that there is good pin to terminal contact in the related wire harness connectors.
- Perform any Technical Service Bulletins (TSBs) that may apply.

No

- Repair the excessive resistance in the circuit between the two wire harness connectors. Using the wiring diagram as a guide, trace the circuit and check for any in-line connectors where the open or excessive resistance could occur.
- One method to help isolate the open is to disconnect any in-line connectors and measure the resistance from one side of the in-line connector to the matching component harness connector. If the open or excessive resistance is not present, the open or excessive resistance is on the other side of the in-line connector.

CHECK FOR EXCESSIVE CURRENT DRAW

THEORY OF OPERATION

What is current draw?

Current draw, or parasitic draw is an electrical load that draws current from the battery when the ignition is turned off. Some are considered normal, some above normal. Normal draw comes from various electronic devices connected to battery positive at all times. Many vehicle modules draw a few mA (milliamps) as a means to "Keep Alive Memory". Whether it's the clock in the radio or the last known position of the memory mirrors, these tiny amounts of current typically will only add up to 20 or 30 mA. The vehicle can sit parked for days, even a few weeks without any problems of excessive battery drain that might prevent starting. As long as the vehicle is driven periodically in order for the alternator to recharge the battery there is no problem. A problem may occur, in situations such as new vehicles in dealer stock or long term airport parking situations.

Below are some examples of modules and components that require keep alive memory:

- Powertrain Control Module (PCM)
- Body Control Module (BCM)
- Memory Seat Module (MSM)
- Radio

What is excessive current draw?

Excessive current draw can be determined by an ammeter reading in excess of 50 mA. The typical "normal" current draw will not exceed 20 or 30 mA.

How to locate the problem?

Locating the problem involves a process of elimination. If the problem is not obvious, like the trunk light staying on, you will have to start troubleshooting:

- Start by removing one fuse at a time until you see the reading on the meter drop off (be careful to reinstall the fuses in their proper location).
- Once you've determined the high-draw circuit, there still may be a half-dozen loads, each individually drawing current from the battery.
- To zero in on that circuit or circuits, use the schematic diagram and disconnect each device on the circuit one-at-a-time and check the meter.
- When the milliamp reading drops off significantly, you've found the problem.

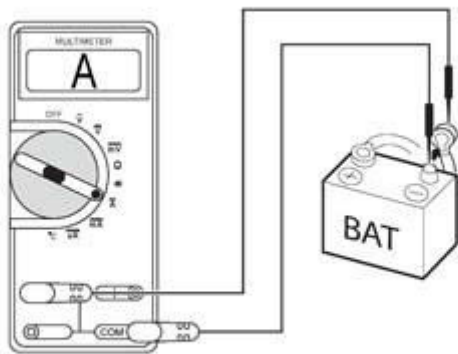
Perform the following test to determine where the cause of the draw is located.

Possible Causes
INSTALLED AFTERMARKET ACCESSORIES (AUDIO SYSTEMS, VEHICLE ALARMS, ETC.)
COURTESY LIGHTS REMAINING ON (INTERIOR, TRUNK, HOOD, ETC.)
BATTERY CHARGERS PLUGGED INTO THE CIGARETTE LIGHTER/POWER OUTLETS

DIAGNOSTIC TEST

TESTING FOR PARASITIC DRAW

NOTE: For a more accurate current draw reading, wait 20 minutes to make sure all modules have powered down before continuing. Some modules may stay powered up longer than others.



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Fig. 24: Checking For Parasitic Draw Using Multimeter
Courtesy of CHRYSLER GROUP, LLC

Turn the ignition off.

1. Disconnect the Negative battery cable (ground).
2. Using a multimeter, set the multimeter leads up to properly measure Amperage.
3. Connect the ground lead that is plugged into the COM port of the multimeter to the Negative battery post/terminal.
4. Connect the other lead of the multimeter that is plugged into the Amp port of the multimeter to the Negative battery cable.

CAUTION: Do not crank the engine or turn on any accessories that may draw more than 10 Amps. You may open the protective fuse in the multimeter.

5. While monitoring the amperage reading on the multimeter, begin to remove fuses (one at a time) from each fuse location on the vehicle and see if the amperage drops.

NOTE:

- Only remove one fuse at a time until the cause of the voltage draw is determined.
- Many vehicles have multiple fuse locations on the vehicle.

6. If the amperage does not drop, install the fuse you just removed and remove the next fuse.

Does the amperage drop to between 0.02 to 0.04 of an Amp when removing any fuses?

Yes

- Use the wiring diagram as a guide to help indicate what components or modules are powered by the fuse.
- At this point you can install the fuse and begin disconnecting the components powered by the fuse.
 - When the amperage drops after disconnecting a component this will indicate which component is at fault.
 - It is important to know how long some modules are designed to remain awake.
 - You don't want to replace a component that is operating normally.
 - The condition that originally caused the draw may not be present at this time.

No

- The condition that originally caused the draw may not be present at this time.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded ground terminals.
- Perform any Technical Service Bulletins (TSBs) that may apply.

CIRCUIT LOAD TESTING PROCEDURE**THEORY OF OPERATION**

A circuit load test can be performed to test the ability of a circuit to carry the current required to operate a connected device. A circuit load test should be performed after a circuit has passed a resistance test using a DVOM and the circuit is still suspected of a failure.

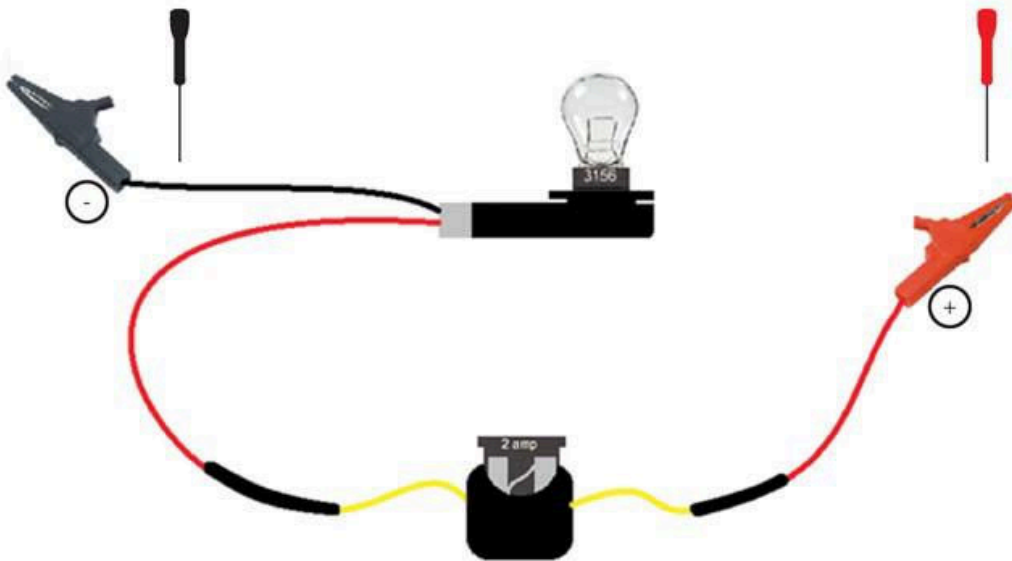
- A single copper wire strand will carry enough current to light a test light bulb, while showing very low resistance using a DVOM.
- Some test lights are insufficient for load testing because of the very low resistance bulb being used.
- The Load Test tool listed below will require higher current flow to power the bulb; and this will test the ability of the circuit to carry a load.
- This test will indicate if the circuit being tested can carry the current required to operate a connected device.

WARNING: To avoid possible serious or fatal injury, **DO NOT** load test any air bag/restraint system components or circuits using the procedures listed here. Refer to **RESTRAINTS - SERVICE INFORMATION** for proper air bag/restraint system testing procedures.

CAUTION: Do not load test any circuits with components still connected to the circuit.

NOTE: Depending upon the location of the circuit in question, this test may require jumper wires.

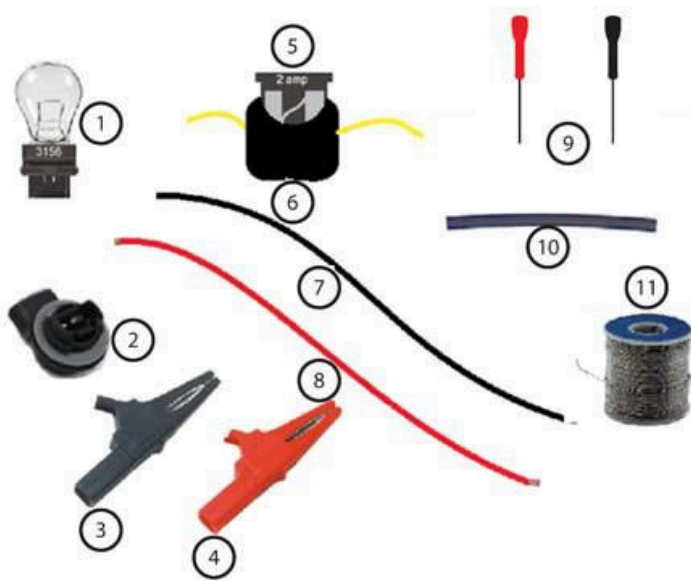
NOTE: Use the wiring diagrams as a guide to trace the circuits and look for any in-line connectors where the circuit failure could occur intermittently. Look for any chafed, pierced, pinched, or partially broken wires. Look for broken, bent, pushed out or corroded terminals - clean/repair as necessary. Verify that there is good pin to terminal contact in the related wire harness connectors.



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Fig. 25: Load Test Tool
Courtesy of CHRYSLER GROUP, LLC

Here is an example of a simple tool you can build to test a circuit's ability to carry a load.



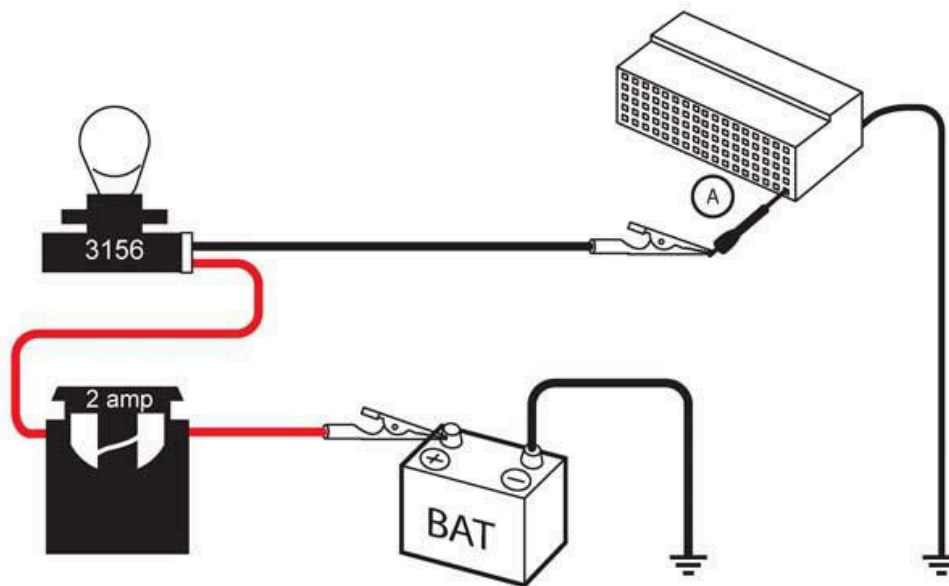
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Fig. 26: Load Test Tool Components

Courtesy of CHRYSLER GROUP, LLC

The following is a list of components required to build a load test tool:

1. 3156 Bulb
2. 3156 Bulb socket
3. Negative alligator clip with covers
4. Positive alligator clip with covers
5. 2 Amp mini fuse
6. Mini fuse holder
7. 2' to 4' of Black 16ga wire
8. 2' to 4' of Red 16ga wire
9. Approved back probe tool
10. Shrink tubing
11. Solder

LOAD TESTING A GROUND CIRCUIT**DIAGNOSTIC LOAD TEST (GROUND CIRCUIT)**

2923007883

Fig. 27: Performing Diagnostic Load Test (Ground Circuit)
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the connector from the device(s) to gain access and isolate the terminal for the circuit being tested.
2. Connect the positive lead of the load test tool to the positive side of the battery.
3. Using an approved connector back probe tool, connect the negative lead of the load test tool to the circuit

being tested at point (A).

CAUTION: Use only approved connector back probe tools when back probing a connector so as not to cause damage to the terminals or insulation of the connector. Damage to the terminals can cause poor terminal contact or retention. Damage to the insulation can introduce corrosion due to water infiltration.

Does the bulb light bright, when compared to a direct battery connection?

Yes

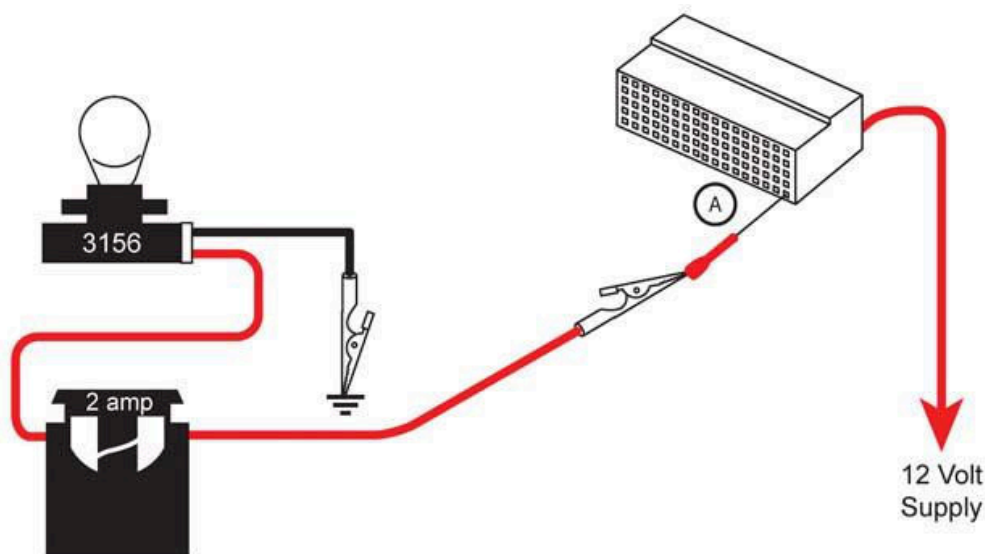
- The circuit being tested can carry a load, check other circuits, connectors and terminals for concerns.

No

- Repair the circuit, connector or terminal that has an open or excessive resistance.
- Perform any related Recalls or Technical Service Bulletins (TSBs) that may apply.

LOAD TESTING A BATTERY OR IGNITION FEED CIRCUIT

DIAGNOSTIC LOAD TEST (BATTERY/IGNITION FEED CIRCUIT)



2923007884

Fig. 28: Performing Diagnostic Load Test (Battery/Ignition Feed Circuit)
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the connector from the device(s) to gain access and isolate the terminal for the circuit being tested.

2. Using an approved connector back probe tool, connect the positive lead of the load test tool to the circuit being tested at point (A).
3. Connect the negative lead of the load test tool to the negative side of the battery or ground.

CAUTION: Use only approved connector back probe tools when back probing a connector so as not to cause damage to the terminals or insulation of the connector. Damage to the terminals can cause poor terminal contact or retention. Damage to the insulation can introduce corrosion due to water infiltration.

Does the bulb light bright, when compared to a direct battery connection?

Yes

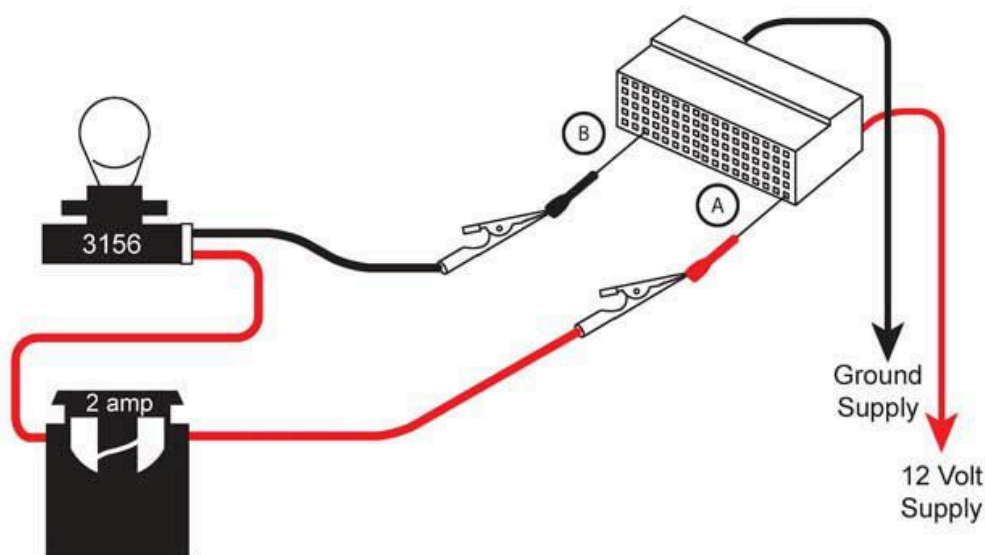
- The circuit being tested can carry a load, check other circuits, connectors and terminals for concerns.

No

- Repair the circuit, connector or terminal that has an open or excessive resistance.
- Perform any related Recalls or Technical Service Bulletins (TSBs) that may apply.

LOAD TESTING A BATTERY OR IGNITION FEED CIRCUIT AND GROUND CIRCUIT

DIAGNOSTIC LOAD TEST (BATTERY FEED & GROUND CIRCUIT)



2923007884

Fig. 29: Performing Diagnostic Load Test (Battery Feed & Ground Circuit)
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect the connector from the device(s) to gain access and isolate the terminal for the circuit being tested.
2. Using an approved connector back probe tool, connect the positive lead of the load test tool to the circuit being tested at point (A).
3. Using an approved connector back probe tool, connect the negative lead of the load test tool to the circuit being tested at point (B).

CAUTION: Use only approved connector back probe tools when back probing a connector so as not to cause damage to the terminals or insulation of the connector. Damage to the terminals can cause poor terminal contact or retention. Damage to the insulation can introduce corrosion due to water infiltration.

Does the bulb light bright, when compared to a direct battery connection?

Yes

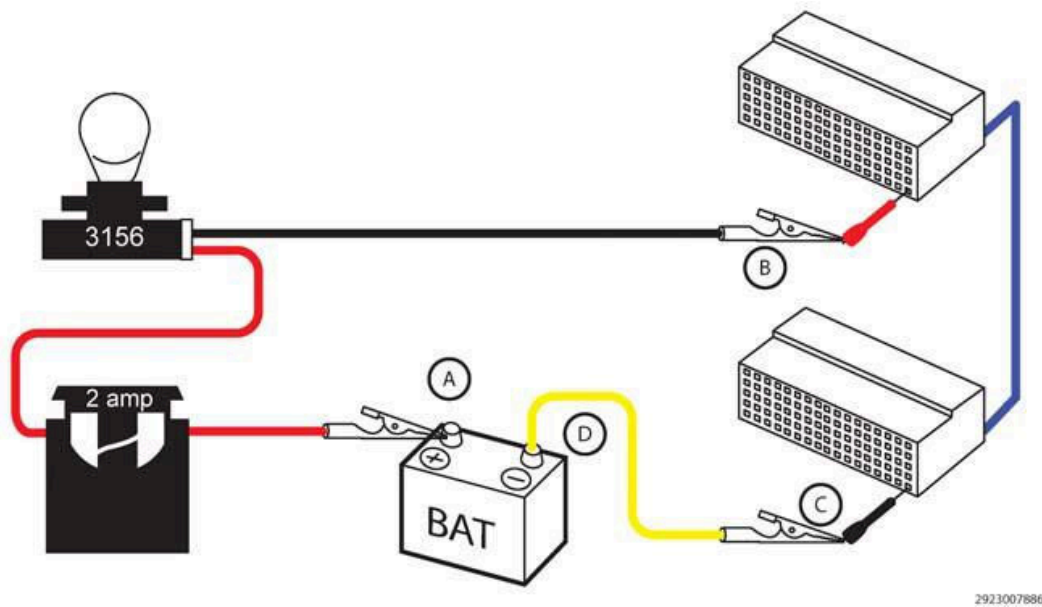
- The circuit being tested can carry a load, check other circuits, connectors and terminals for concerns.

No

- Test the circuits individually to determine which circuit is the cause of the test failure.
- Repair the circuit, connector or terminal that has an open or excessive resistance.
- Perform any related Recalls or Technical Service Bulletins (TSBs) that may apply.

LOAD TESTING A CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

DIAGNOSTIC LOAD TEST (OPEN/HIGH RESISTANCE CIRCUIT)



2923007886

Fig. 30: Performing Diagnostic Load Test (Open/High Resistance Circuit)

Courtesy of CHRYSLER GROUP, LLC

1. Disconnect all components from the circuit being tested.
2. Connect the positive lead of the load test tool to the positive side of the battery (A).
3. Using an approved connector back probe tool, connect the negative lead of the load test tool to the circuit being tested at point (B).
4. Using an approved connector back probe tool, connect a jumper wire to the circuit being tested at point (C).
5. Then connect the other end of the jumper wire to the negative side of the battery or ground (D).

CAUTION: Use only approved connector back probe tools when back probing a connector so as not to cause damage to the terminals or insulation of the connector. Damage to the terminals can cause poor terminal contact or retention. Damage to the insulation can introduce corrosion due to water infiltration.

Does the bulb light bright, when compared to a direct battery connection?

Yes

- The circuit being tested can carry a load, check other circuits, connectors and terminals for concerns.

No

- Repair the circuit, connector or terminal that has an open or excessive resistance.
- Perform any related Recalls or Technical Service Bulletins (TSBs) that may apply.

VOLTAGE DROP TEST PROCEDURE

THEORY OF OPERATION

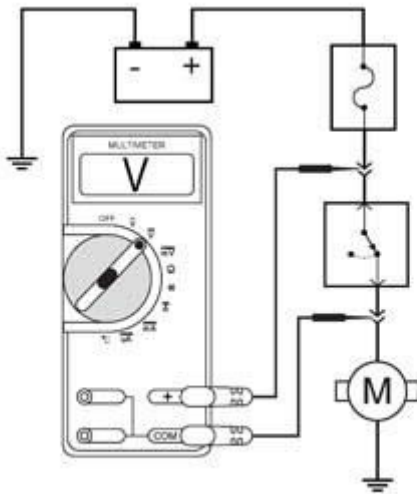
Voltage drop is the reduction in voltage in an electrical circuit between the voltage source and load components. The wires and connectors of a circuit should contain almost no resistance and **all** the voltage should be consumed through the load. The "load" is the component using the power, such as a light, starter, or blower motor. If a circuit has excessive resistance, it prevents the wire from carrying sufficient current under high load conditions. A voltage drop test is an effective way to locate excessive resistance in connections and circuits.

To perform a voltage drop test, a Digital Volt Ohm Meter (DVOM) is used to measure the voltage drop across a live circuit or connection while it is under the load. If the circuit or connection being tested has excessive resistance, the DVOM will measure the voltage that the resistance is using. **Little or no voltage drop should be read, ideally less than 0.2 of a volt**, anything greater indicates excessive resistance and the circuit or connection should be inspected for cleaning or repair.

Possible Causes
EXCESSIVE CIRCUIT RESISTANCE (CHAFED, PIERCED OR CORRODED WIRES)
HIGH RESISTANCE WITH IN-LINE CONNECTOR (BENT, PUSHED OUT OR CORRODED TERMINALS)

DIAGNOSTIC TEST

TESTING FOR VOLTAGE DROP



2923015567

Fig. 31: Testing for Voltage Drop
Courtesy of CHRYSLER GROUP, LLC

1. Turn the ignition off.
2. Use the wiring diagram as a guide, trace the circuit being tested and locate the components related to the circuit.

3. Set the multimeter to measure DC voltage.
4. Carefully back probe the two component harness connectors of the circuit being tested.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts or fan. Do not wear loose clothing. Failure to follow these instructions may result in possible serious or fatal injury.

NOTE: If you are testing the starting circuit, disable the engine so the engine does not start.

5. Crank the engine for five seconds if you are testing the starting circuit and monitor the multimeter voltage reading.
6. For circuits that don't require the engine running, turn the ignition on.
7. For circuits that require the engine running, start the engine.

NOTE: If the circuit you are checking needs to be operating, such as the Blower Motor or a Lamp, do so now.

8. Monitor the voltage reading.
9. The voltmeter will show the difference in voltage between the two points.

Is the voltage less than 0.2 of a Volt?

Yes

- At this time the circuit is functioning properly. Continue to measure the voltage between the components and wiggle the wire harness and connectors while checking for an intermittent condition.
- Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors where the excessive resistance could occur intermittently.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Look for broken, bent, pushed out or corroded terminals. Verify that there is good pin to terminal contact in the related wire harness connectors.
- Perform any Technical Service Bulletins (TSBs) that may apply.

No

- Repair the excessive resistance in the circuit.
- Use the wiring diagram as a guide to trace the circuit and look for any in-line connectors where the excessive resistance may occur.
- Look for any chafed, pierced, pinched, or partially broken wires.

- Look for broken, bent, pushed out or corroded terminals. Verify that there is good pin to terminal contact in the related wire harness connectors.
- Perform any Technical Service Bulletins (TSBs) that may apply.

ELECTROSTATIC DISCHARGE (ESD) SENSITIVE DEVICES



80ce3d47

Fig. 32: Electrostatic Discharge Symbol
Courtesy of CHRYSLER GROUP, LLC

All ESD sensitive components are solid state and a symbol is used to indicate this. When handling any component with this symbol, comply with the following procedures to reduce the possibility of electrostatic charge build up on the body and inadvertent discharge into the component. If it is not known whether the component is ESD sensitive, assume that it is.

Perform the following procedure when handling ESD sensitive components:

1. Always touch a known good ground before handling the component. This should be repeated while handling the component and more frequently after sliding across a seat, sitting down from a standing position, or walking a distance.
2. Avoid touching electrical terminals of the component, unless instructed to do so by a written procedure.
3. When using a voltmeter, be sure to connect the ground lead first.
4. Do not remove the component from its protective packing until it is time to install the component.
5. Before removing the component from its package, ground the package to a known good ground on the vehicle.

WIRE SPLICING



A multimedia supplement to the instructions contained in this article is available.

To view the multimedia example of the condition described go to;
<http://www.youtube.com/user/Mitchell1Tips>
then type "A00641526.vid1" into the "Search Channel" box.

CAUTION: If additional wire is needed when making a splice repair to any wire, it is important that the same or next larger size wire gauge be used. Refer to **SYSTEM WIRING DIAGRAMS** for the original wire gauge size.

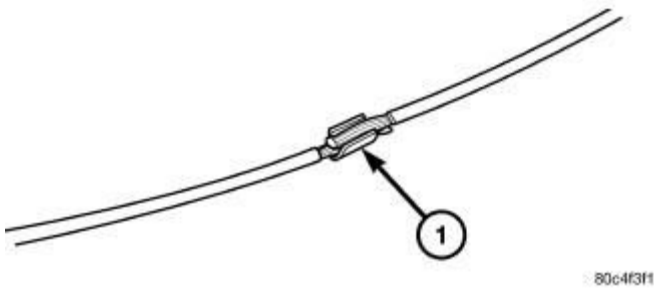


Fig. 33: Splice Band

Courtesy of CHRYSLER GROUP, LLC

1. Remove 13 millimeters (0.50 inch) of insulation from each wire that needs to be spliced.
2. Place a piece of adhesive sealant-lined heat shrink tubing (Part Number 04778570 or equivalent) over the wire on one side of the splice. Be certain the length of tubing will be sufficient to cover and seal the entire repair area.
3. Place the strands of the wires being spliced so that they are overlapping each other within the splice band (1).

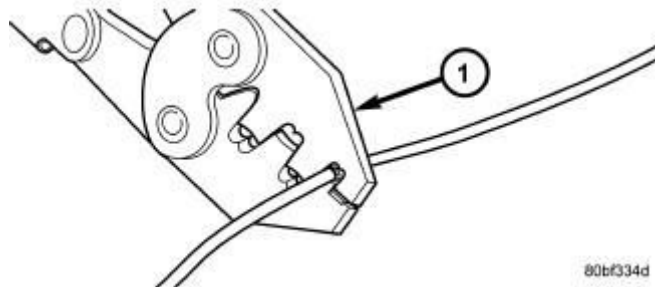


Fig. 34: Crimping Tool

Courtesy of CHRYSLER GROUP, LLC

4. Using a crimping tool (1) (MOPAR Part Number 05019912AA, Miller Special Tool Number (special tool #10042, Crimper, Wire/Terminal) or equivalent) crimp the splice band and wires together securely.

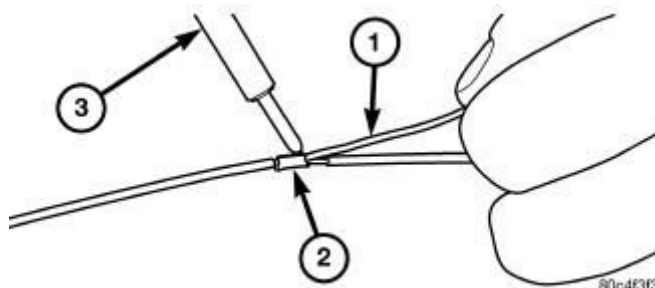


Fig. 35: Solder Splice

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Never use acid core solder for electrical wiring repairs.

5. Using Rosin Core type solder (1) only and a suitable soldering iron (3), solder the wire and splice band connection (2) together.

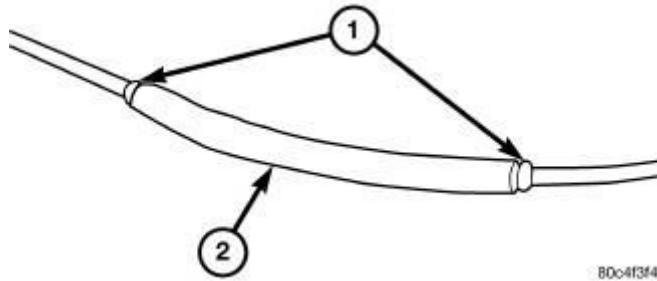


Fig. 36: Heat Shrink Tube
Courtesy of CHRYSLER GROUP, LLC

6. Center the heat shrink tubing (2) over the splice joint repair and heat using a suitable heat gun. Heat the joint until the tubing is tightly sealed and sealant (1) begins to ooze out of both ends of the tubing.

REMOVAL

CONNECTOR TERMINAL REMOVAL

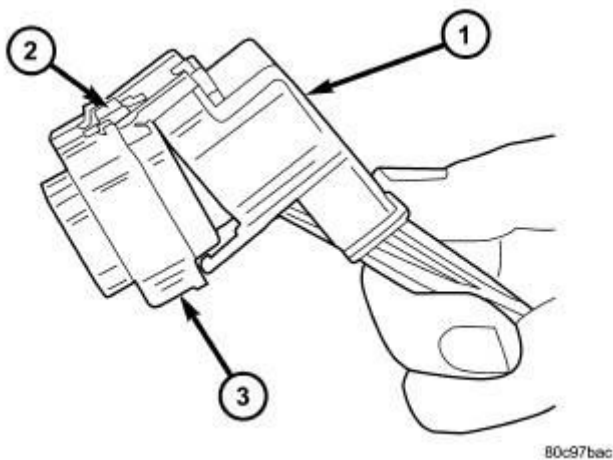
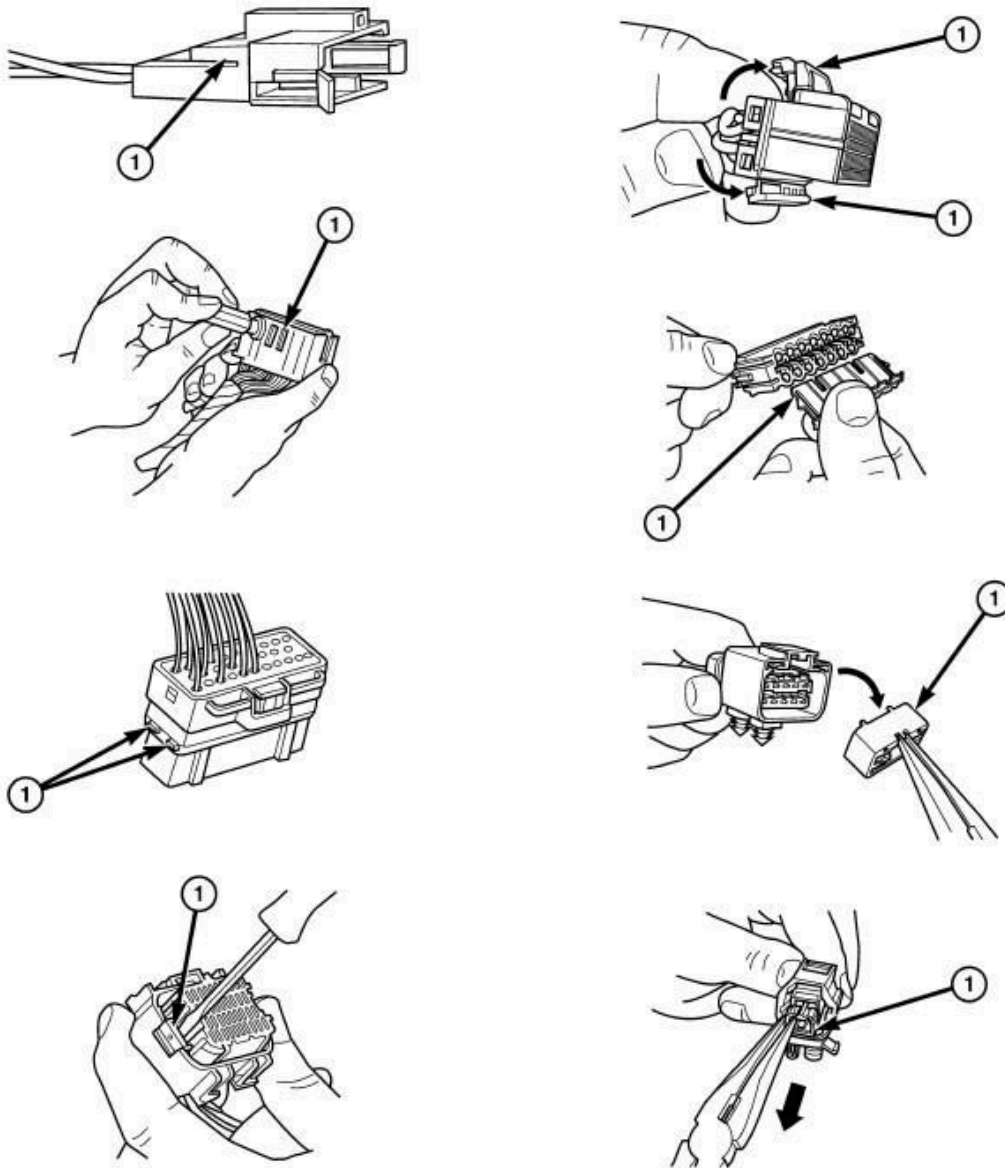


Fig. 37: Removal Of Dress Cover
Courtesy of CHRYSLER GROUP, LLC

- | |
|---|
| <p>1 - DRESS COVER
2 - CONNECTOR LOCK
3 - CONNECTOR</p> |
|---|

1. Disconnect battery.

2. Release Connector Lock (2).
3. Disconnect the connector (3) being repaired from its mating half/component.
4. Remove the dress cover (if applicable) (1).



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Fig. 38: Connector Secondary Terminal Lock
Courtesy of CHRYSLER GROUP, LLC

1 - Secondary Terminal Lock

5. Release the Secondary Terminal Lock, if required (1).

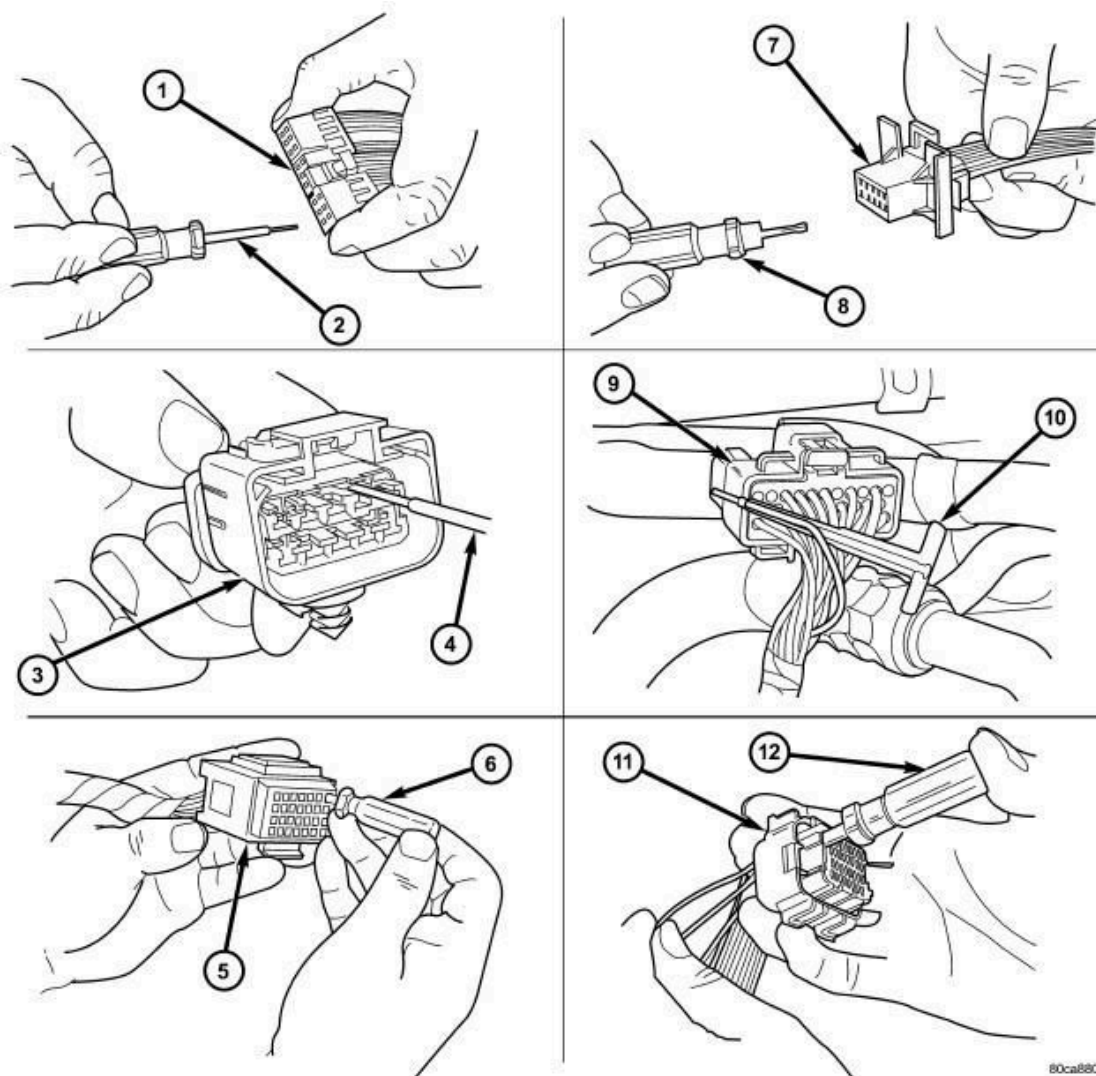


Fig. 39: Terminal Removal
Courtesy of CHRYSLER GROUP, LLC

- 1 - TYPICAL CONNECTOR
- 2 - PICK FROM TERMINAL REMOVER KIT 10300
- 3 - APEX CONNECTOR
- 4 - PICK FROM TERMINAL REMOVER KIT 10300
- 5 - AUGAT CONNECTOR
- 6 - ELECTRICAL TERMINAL REMOVAL TOOL
- 7 - MOLEX CONNECTOR
- 8 - PICK FROM TERMINAL REMOVER KIT 10300
- 9 - THOMAS AND BETTS CONNECTOR
- 10 - TERMINAL REMOVER
- 11 - CONNECTOR
- 12 - ELECTRICAL TERMINAL REMOVER

6. Position the connector locking finger away from the terminal using the proper special tool. Pull on the wire to remove the terminal from the connector.

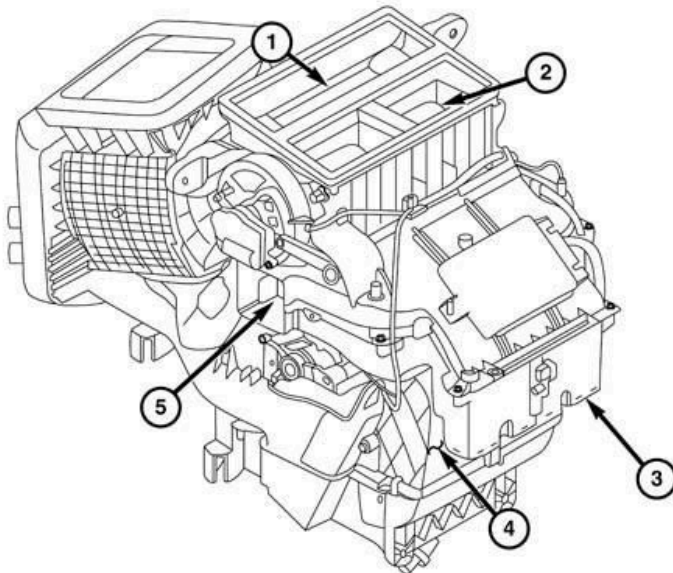
INSTALLATION

CONNECTOR TERMINAL INSTALLATION

1. Select a wire from the terminal repair kit that best matches the color and gauge of the wire being repaired.
2. Cut the repair wire to the proper length and remove one-half (1/2) inch of insulation.
3. Splice the repair wire to the wire harness (see Wire Splicing procedure). Refer to **STANDARD PROCEDURE**.
4. Insert the repaired wire into the connector.
5. Install the connector locking wedge, if required, and reconnect the connector to its mating half/component.
6. Re-tape the wire harness starting at 1-1/2 inches behind the connector and 2 inches past the repair.
7. Connect battery and test all affected systems.

2014 HVAC**Heating & Air Conditioning - Service Information - Cherokee****DESCRIPTION****DESCRIPTION**

The HVAC housing is mounted longitudinally in the vehicle, which means it doesn't follow the line of the bulkhead, but protrudes into the passenger compartment. The assembly is available in a single or dual zone configuration, and has a cabin compartment filter on all applications. See the Controls information for more information.



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Fig. 1: HVAC Housing Assembly
Courtesy of CHRYSLER GROUP, LLC

All vehicles use an HVAC housing (4) that combines heating, ventilating and A/C capabilities into a single housing. Based upon the mode selected, conditioned air can exit the HVAC housing through one, or a combination of, the panel (2), defrost (1) and floor (5 and 3) outlets. Once the conditioned air exits the HVAC housing, it is further directed through molded plastic ducts to the air outlets within the vehicle interior. See the Distribution information for more information.

The A/C system uses a variable displacement compressor, and an A/C expansion valve to meter the flow of refrigerant to the A/C evaporator. See the Plumbing information for more information.

To maintain the performance level of the HVAC system, the engine cooling system must be properly maintained. The use of a bug screen is not recommended. Any obstructions in front of the radiator or A/C condenser will reduce the performance of the A/C and engine cooling systems. The engine cooling system includes the radiator, thermostat, radiator hoses and the engine coolant pump. See **ENGINE COOLING**

SYSTEM for more information.

OPERATION

OPERATION

NOTE: Typical blend-air type HVAC system shown in illustration.

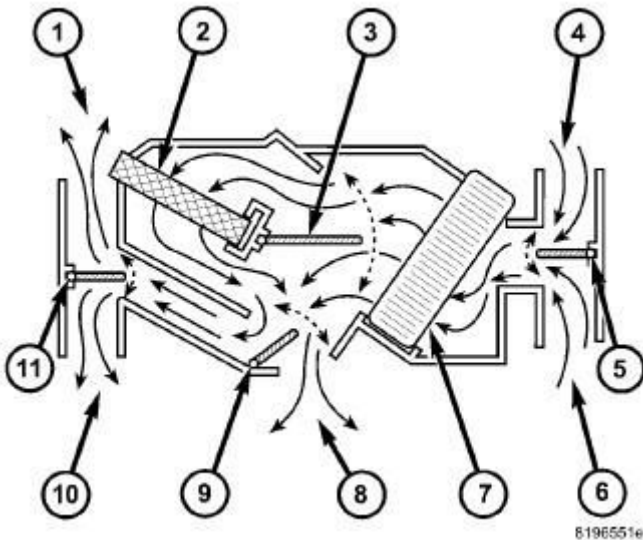


Fig. 2: Blend Air System Schematic
Courtesy of CHRYSLER GROUP, LLC

The heating and A/C systems used in this vehicle are a single zone, blend-air type system. In this blend-air heating and A/C system, two blend-air doors (3) control the amount of conditioned air that is allowed to flow through, or around the heater core (2).

The system pulls outside (ambient) air through the fresh air intake (4) located at the cowl panel at the right side base of the windshield and into the air inlet housing, inside the passenger compartment. From there, the ambient air passes through the A/C evaporator (7) and is then directed either through or around the heater core. This is done by adjusting the position of the blend-air doors with the temperature control located on the A/C heater control in the instrument panel. Air flow is then directed out the floor outlets (8), instrument panel outlets (10) or the defroster outlets (1) in various combinations by adjusting the position of the mode-air doors (9 and 11) using the mode control located on the A/C heater control. The Automatic Temperature Control (ATC) system uses electric actuators to operate the blend and mode air doors. The Manual Temperature Control (MTC) system uses cables to operate the blend and mode air doors.

The velocity of the air flow out of the outlets can be adjusted with the blower speed control located on the A/C heater control.

The fresh air intake can be shut off by the Recirculation control, located on the A/C heater control. This will

operate the electrically actuated recirculation-air door (5), which closes off the fresh air intake. With the fresh air intake closed, the conditioned air within the vehicle is pulled back into the HVAC housing through the recirculation air intake (6), located within the passenger compartment.

NOTE: It is important to keep the fresh air intake opening clear of debris. Leaf particles and other debris that is small enough to pass through the cowl opening screen can accumulate within the HVAC housing. The closed, warm, damp and dark environment created within the housing is ideal for the growth of certain molds, mildews and other fungi. Any accumulation of decaying plant matter that enters the housing with the fresh ambient air provides an additional food source for the fungal spores. If the air intake opening is not kept clear of debris, objectionable odors created by growing fungi and decaying plant matter, as well as excess debris, can be discharged into the passenger compartment during heater and A/C operation.

The A/C compressor can be engaged by pressing A/C (snowflake) button on the A/C heater control. When equipped, the A/C compressor will automatically engage when the mode control is set in any Mix to Defrost position. This will remove heat and humidity from the air before it is directed through or around the heater core.

DIAGNOSIS AND TESTING

A/C PERFORMANCE

The A/C system is designed to provide the passenger compartment with low temperature and low humidity air. The A/C evaporator, located in the HVAC housing is cooled to temperatures near the freezing point. As warm damp air passes over the fins of the A/C evaporator, the air transfers its heat to the refrigerant in the evaporator coils and the moisture in the air condenses on the evaporator fins. During periods of high heat and humidity, an A/C system will be more effective in the Recirculation mode (max-A/C). With the system in the Recirculation mode, only air from the passenger compartment passes through the A/C evaporator. As the passenger compartment air dehumidifies, the A/C system performance levels rise.

Humidity has an important bearing on the temperature of the air delivered to the interior of the vehicle. It is important to understand the effect that humidity has on the performance of the A/C system. When humidity is high, the A/C evaporator has to perform a double duty. It must lower the air temperature, and it must lower the temperature of the moisture in the air that condenses on the evaporator fins. Condensing the moisture in the air transfers heat energy into the evaporator fins and coils. This reduces the amount of heat the A/C evaporator can absorb from the air. High humidity greatly reduces the ability of the A/C evaporator to lower the temperature of the air.

However, evaporator capacity used to reduce the amount of moisture in the air is not wasted. Wringing some of the moisture out of the air entering the vehicle adds to the comfort of the passengers. Although, an owner may expect too much from their A/C system on humid days. A performance test is the best way to determine whether the system is performing up to design standards. This test also provides valuable clues as to the possible cause of trouble with the A/C system.

A/C PERFORMANCE TEST

WARNING: Review the warnings and cautions for this system before performing the procedure. Failure to follow these instructions may result in serious injury or death.

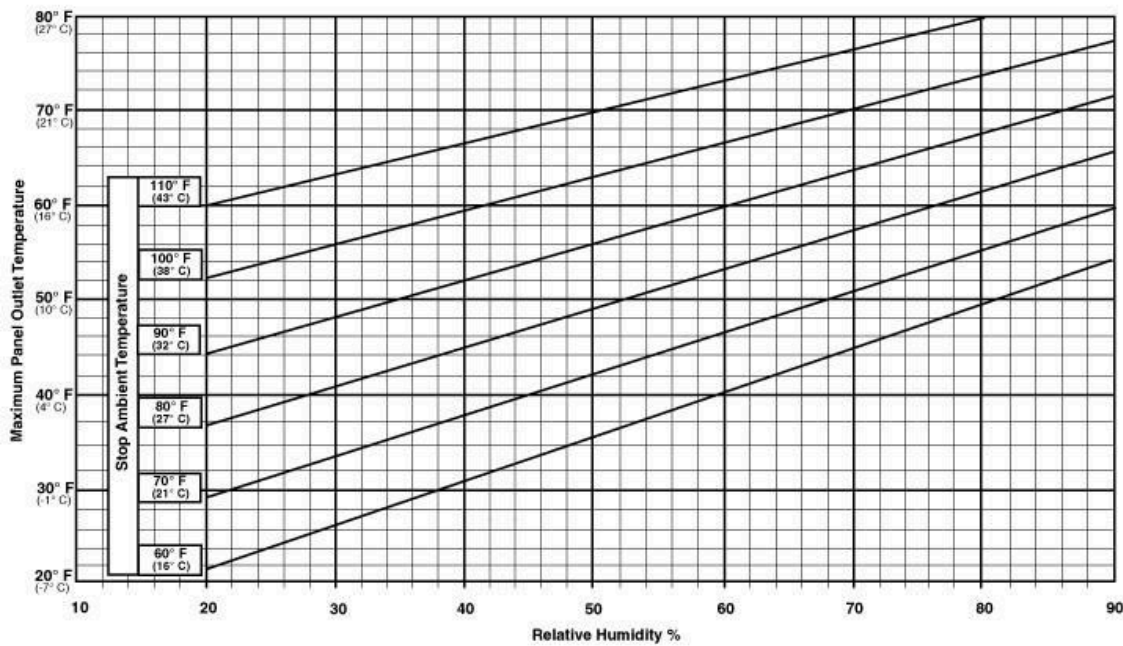
1. Make sure the following conditions are met in the area where this test is to be performed:
 - Maximum ambient temperature: 43.3°C (110°F)
 - Minimum ambient temperature: 15.5°C (60°F)
 - Maximum relative humidity: 90%
 - Minimum relative humidity: 20%
2. Using a scan tool, check for Diagnostic Trouble Codes (DTCs) related to the Controller Area Network (CAN) data bus, HVAC module, Body Control Module (BCM) and Powertrain Control Module (PCM). If no DTCs are found, go to Step 3. If any DTCs are found, repair as required, then proceed to **Step 3**.
3. Operate the heating and A/C system under the following conditions.
 - Engine at normal operating temperature
 - Engine at normal idle speed
 - No sun-load in the cabin of the vehicle
 - Vehicle doors and windows closed
 - Transmission in Park or Neutral with the park brake On.
 - A/C heater controls set to Recirculation mode, full cool, panel mode, high blower and with A/C compressor engaged. If the A/C compressor does not engage, see the **A/C SYSTEM DIAGNOSIS**.
 - All panel outlet vanes open and positioned straight rearward

NOTE: If the following step is not performed, the results of this test will not be accurate.

4. Using a scan tool, operate the engine cooling fans at high speed from the PCM View>Actuators.
5. Insert a thermometer in the driver side center panel air outlet and operate the A/C system until the thermometer temperature stabilizes or a minimum of five minutes.

NOTE: This procedure requires you to know what the temperature and relative humidity is in your location at the time of the test.

6. With the A/C clutch engaged, compare the observed panel outlet air temperature along with the ambient temperature of the work area and the relative humidity to the Maximum Panel Outlet Temperature chart.
7. If the air outlet temperature fails to meet the specifications shown in the Maximum Panel Outlet Temperature chart (see **Fig. 3**), refer to the A/C System Diagnosis table below.



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Fig. 3: Maximum Panel Outlet Temperature
Courtesy of CHRYSLER GROUP, LLC

A/C SYSTEM DIAGNOSIS

Condition	Possible Causes	Correction
Rapid A/C clutch cycling (ten or more cycles per minute).	1. Low refrigerant system charge.	1. See Refrigerant System Leaks. Refer to PLUMBING, DIAGNOSIS AND TESTING . Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required.
Equal pressures, but the A/C clutch does not engage.	1. No refrigerant in the refrigerant system.	1. See Refrigerant System Leaks. Refer to PLUMBING, DIAGNOSIS AND TESTING . Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required.
	2. Open fuse.	2. See appropriate Wiring Information. Check the fuses in the Power Distribution Center (PDC). Repair the shorted circuit or component and replace the fuse(s), if required.
	3. Inoperative A/C clutch.	3. See COMPRESSOR, A/C . Test the A/C clutch and coil and replace, if required.
	4. Improperly installed or inoperative evaporator	4. See SENSOR, EVAPORATOR TEMPERATURE . Test the sensor and

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	temperature sensor.	replace, if required.
	5. Inoperative A/C pressure transducer.	5. See <u>TRANSDUCER, A/C PRESSURE</u> . Test the sensor and replace, if required.
	6. Inoperative control module, CAN bus or wiring.	6. See the appropriate Electrical Diagnostic Procedures for testing of the modules and CAN bus, and see Wiring Information for compressor control circuit repair, if required.
Normal pressures, but A/C Performance Test air temperatures at center panel outlet are too high.	1. Excessive refrigerant oil in system.	1. See <u>OIL, REFRIGERANT, STANDARD PROCEDURE</u> . Recover the refrigerant from the refrigerant system and inspect the refrigerant oil content. Restore the refrigerant oil to the proper level, if required.
	2. Blend door actuator(s) improperly installed or inoperative.	2. See <u>ACTUATOR, BLEND DOOR</u> . Inspect the actuator(s) for proper operation and replace, if required.
	3. Blend-air door(s) inoperative or sealing improperly.	3. See <u>HOUSING, HVAC</u> . Inspect the blend-air door(s) for proper operation and sealing. Repair if required.
The low side pressure is normal or slightly low, and the high side pressure is too low.	1. Low refrigerant system charge.	1. See Refrigerant System Leaks. Refer to <u>PLUMBING, DIAGNOSIS AND TESTING</u> . Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required.
	2. Refrigerant flow through the A/C evaporator is restricted.	2. See <u>EVAPORATOR, A/C</u> . Replace the restricted A/C evaporator, if required.
	3. Inoperative A/C compressor.	3. See <u>COMPRESSOR, A/C</u> . Replace the A/C compressor, if required.
The low side pressure is normal or slightly high, and the high side pressure is too high.	1. A/C condenser air flow restricted.	1. See <u>CONDENSER, A/C</u> . Check the A/C condenser for damaged fins, foreign objects obstructing air flow through the condenser fins, and missing or improperly installed air seals. Clean, repair, or replace components as required.
	2. Refrigerant flow through the A/C receiver/drier is restricted.	2. See <u>DRIER, A/C RECEIVER</u> . Replace the restricted A/C receiver/drier, if required.
	3. Inoperative radiator cooling fan.	3. See <u>ENGINE COOLING SYSTEM</u> . Test the radiator cooling fan and replace, if required.
	4. Refrigerant system overcharged.	4. See <u>R-134A REFRIGERANT SYSTEM CHARGE</u> . Recover the refrigerant from the refrigerant system. Charge the refrigerant system to the proper level, if required.

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	5. Air in the refrigerant system.	5. See Refrigerant System Leaks. Refer to <u>PLUMBING, DIAGNOSIS AND TESTING</u> . Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required.
	6. Engine overheating.	6. See <u>ENGINE COOLING SYSTEM</u> . Test the engine cooling system and repair, if required.
The low side pressure is too high, and the high side pressure is too low.	1. Accessory drive belt slipping.	1. See <u>ENGINE COOLING SYSTEM</u> . Inspect the accessory drive belt condition and tension. Repair as required.
	2. Inoperative A/C expansion valve.	2. See <u>VALVE, A/C EXPANSION</u> . Replace the valve, if required.
	3. Inoperative A/C compressor.	3. See <u>COMPRESSOR, A/C</u> . Replace the A/C compressor, if required.
The low side pressure is too low, and the high side pressure is too high.	1. Restricted refrigerant flow through the refrigerant lines.	1. See Liquid Line, Suction Line and Discharge Line. Refer to appropriate procedure in <u>STANDARD PROCEDURE</u> . Inspect the refrigerant lines for kinks, tight bends or improper routing. Correct the routing or replace the refrigerant line, if required.
	2. Restricted refrigerant flow through the A/C expansion valve.	2. See <u>VALVE, A/C EXPANSION</u> . Replace the valve, if required.
	3. Restricted refrigerant flow through the A/C condenser.	3. See <u>CONDENSER, A/C</u> . Replace the restricted A/C condenser, if required.

HEATER PERFORMANCE

Before performing the following tests, refer to **ENGINE COOLING SYSTEM** for the procedures to check the engine coolant level and flow, engine coolant reserve/recovery system operation, accessory drive belt condition and tension, radiator air flow and the fan drive operation.

WARNING: Do not remove radiator cap when engine is hot. Failure to follow this instruction may result in serious injury.

If vehicle has been run recently, wait 15 minutes before removing the radiator cap. Place a rag over the cap and turn it to the first safety stop. Allow pressure to escape through the overflow tube. When the system pressure stabilizes, remove the cap completely.

MAXIMUM HEATER OUTPUT

Engine coolant is delivered to and from the heater core through two heater hoses. With the engine idling at normal operating temperature, set the temperature control to the full hot position, the mode control to the floor

position, and the blower motor control to the highest speed position. Using a test thermometer, check the temperature of the air being discharged at the front floor outlets. Compare the test thermometer reading to the Heater Temperature Reference chart.

HEATER TEMPERATURE REFERENCE

Ambient Temperature		Minimum Floor Outlet Temperature	
Celsius	Fahrenheit	Celsius	Fahrenheit
16°	60°	54°	130°
21°	70°	56°	132°
26°	80°	57°	134°
32°	90°	58°	136°

If the heater outlet air temperature is below the minimum specification, refer to Group 7 - Cooling. Both of the heater hoses should be hot to the touch. The coolant return heater hose should be slightly cooler than the coolant supply heater hose. If the return hose is much cooler than the supply hose, locate and repair the engine coolant flow obstruction in the cooling system. Refer to Group 7 - Cooling for more information.

OBSTRUCTED COOLANT FLOW

Possible locations or causes of obstructed coolant flow are as follows:

- Low coolant level
- Inoperative water pump
- Inoperative thermostat
- Pinched or kinked heater hoses
- Improper heater hose routing
- Plugged heater hoses or supply and return ports at the cooling system connections
- Plugged heater core

If proper coolant flow through the cooling system is verified, and heater outlet air temperature is low, a mechanical problem may exist.

MECHANICAL PROBLEMS

Possible causes of insufficient heat due to mechanical problems are as follows:

- Restricted cabin air filter
- Obstructed cowl air intake
- Obstructed heater system outlets
- Inoperative engine thermostat
- Inoperative blower motor system
- Inoperative A/C-heater control
- Inoperative blend door actuator

- Inoperative, obstructed or improperly installed blend-air door

TEMPERATURE CONTROL

If the heater outlet air temperature cannot be adjusted with the temperature control on the A/C-heater control, the following could require service:

- Inoperative A/C-heater control
- Inoperative blend door actuator
- Inoperative, obstructed or improperly installed blend-air door
- Improper engine coolant temperature

STANDARD PROCEDURE

STANDARD PROCEDURE - A/C EVAPORATOR CLEANING

Some vehicle operators may experience a musty odor from the A/C system, primarily at start up in hot and humid climates. This odor may be the result of microbial growth on the cooling coil. During normal A/C system operation, condensation forms in and around the A/C cooling coil. When airborne pollutants mix with this condensation, bacteria and fungi growth begins and odor may result.

If the vehicle operator experiences a musty odor when operating the A/C system, perform the following procedure.

WARNING: Always use eye protection, rubber gloves and protective clothing when performing the following procedure. Avoid continuous breathing of vapors from evaporator coil cleaning and sealing fluids. Avoid contact with skin and eyes. Failure to follow these instruction may result in possible serious or fatal injury.

1. On models equipped with a cabin air filter, remove the filter and inspect for dirt and debris. Refer to **FILTER, CABIN AIR, REMOVAL**. Discard the used cabin filter if required.
2. Remove the cowl panel cover. Refer to **COVER, COWL PANEL** for more information.
3. Clean any dirt and debris that may be present at the HVAC fresh air inlet screen and at the top of the cowl panel.
4. Install the cowl panel cover.
5. Raise and support the vehicle.
6. Inspect the evaporator drain hose or tube (depending on application) for foreign material that may be blocking the drain and repair as necessary.
7. Once drain operation has been verified;
 - when equipped with a rubber drain hose, temporarily pinch the drain hose closed using an appropriate pair of heater hose pliers.
 - when equipped with a solid plastic drain tube, obtain an appropriate size rubber or plastic cap or

plug and temporarily cap or plug the drain tube.

8. Lower the vehicle.
9. Place a protective cover over the front passenger side floor and seat area.
10. Remove the blower motor. Refer to **MOTOR, BLOWER, REMOVAL**.
11. Remove the blower motor power module. Refer to **MODULE, POWER, BLOWER MOTOR, REMOVAL**.
12. Clean any dirt and debris that may be present inside the HVAC blower motor housing and all readily accessible areas inside the HVAC housing. If necessary, use a vacuum with a small flexible hose, and take caution not to damage the evaporator core fins.
13. Using PSE Flex Spray Delivery Tool 534-62637 or equivalent, completely coat the entire surface of A/C evaporator with three bottles of Mopar® Cooling Coil Cleaner through the blower motor and power module or resistor openings. Be sure to use all of the coil cleaner in each container.
14. Allow the vehicle to sit for 30 minutes.
15. Raise and support the vehicle.

WARNING: Excess cooling coil cleaner will drain from the evaporator housing when the clamp, cap or plug is removed from the evaporator drain hose or tube. Always use eye protection, rubber gloves and protective clothing. Avoid continuous breathing of vapors from evaporator coil cleaning fluid. Avoid contact with skin and eyes. Failure to follow these instructions may result in possible serious or fatal injury.

16. Remove the previously installed clamp, cap or plug from the evaporator drain hose or tube and allow excess coil cleaner to drain from the HVAC housing.
17. Lower the vehicle.
18. Refill the three empty coil cleaner bottles with clean tap water.
19. Using PSE Flex Spray Delivery Tool 534-62637 or equivalent, completely rinse the entire surface of A/C evaporator with the three bottles of clean tap water through the blower motor and power module or resistor openings. Be sure to use all of the water in each container.
20. Install the blower motor. Refer to **MOTOR, BLOWER, INSTALLATION**.
21. Install the blower motor power module. Refer to **MODULE, POWER, BLOWER MOTOR, INSTALLATION**.
22. Disconnect the wire harness connector from the A/C compressor to disable compressor operation. Refer to **COMPRESSOR, A/C, REMOVAL**.
23. Start the engine
24. Adjust all the windows so they are open approximately 8 mm (0.5 in.).
25. Set the A/C-heater controls to the following:
 - air distribution to Panel and Recirculation mode
 - temperature to full heat
26. Allow the vehicle to run for 20 minutes.

27. Turn the engine off.
28. Raise and support the vehicle.
29. Inspect the evaporator drain hose or tube (depending on application) for foreign material that may have blocked the drain during evaporator coil cleaning and repair as necessary.
30. Once drain operation has been verified;
 - when equipped with a rubber drain hose, temporarily pinch the drain hose closed using an appropriate pair of heater hose pliers.
 - when equipped with a solid plastic drain tube, obtain an appropriate size rubber or plastic cap or plug and temporarily cap or plug the drain tube.
31. Lower the vehicle.
32. Remove the blower motor. Refer to **MOTOR, BLOWER, REMOVAL**.
33. Remove the blower motor power module. Refer to **MODULE, POWER, BLOWER MOTOR, REMOVAL**.
34. Using PSE Flex Spray Delivery Tool 534-62637 or equivalent, completely coat the entire surface of A/C evaporator with one bottle of Mopar® Cooling Coil Coating through the blower motor and power module or resistor openings. Be sure to use all of the coil coating in the container.

NOTE: Be sure to thoroughly clean out the spray delivery tool with warm water once coil coating is complete to prevent damage to the tool.

35. Refill the empty bottles with clean warm tap water and completely rinse out the PSE Flex Spray Delivery Tool 534-62637, or equivalent.
36. Allow the vehicle to sit for 30 minutes.
37. Install the blower motor. Refer to **MOTOR, BLOWER, INSTALLATION**.
38. Install the blower motor power module. Refer to **MODULE, POWER, BLOWER MOTOR, INSTALLATION**.
39. Raise and support the vehicle.

WARNING: Excess cooling coil coating will drain from the evaporator housing when the clamp, cap or plug is removed from the evaporator drain hose or tube. Always use eye protection, rubber gloves and protective clothing. Avoid continuous breathing of vapors from evaporator coil sealing fluid. Avoid contact with skin and eyes. Failure to follow these instruction may result in possible serious or fatal injury.

40. Remove the previously installed clamp, cap or plug from the evaporator drain hose or tube and allow excess coil coating to drain from the HVAC housing.
41. Lower the vehicle.
42. Start the engine
43. Adjust all the windows so they are open approximately 8 mm (0.5 in.).
44. Set the A/C-heater controls to the following:

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- air distribution to Panel and Recirculation mode
 - temperature to full heat
45. Allow the vehicle to run for 20 minutes.
 46. Turn vehicle off.
 47. Remove protective cover from front passenger side floor and seat area.
 48. On models equipped with a cabin air filter, install the filter. Refer to **FILTER, CABIN AIR, INSTALLATION**.
 49. Connect the wire harness connector to the A/C compressor. Refer to **COMPRESSOR, A/C, INSTALLATION**.
 50. Verify proper A/C-heater system operation.

SPECIFICATIONS

A/C SYSTEM SPECIFICATIONS

A/C SYSTEM SPECIFICATIONS

Item	Description	Notes
A/C Clutch Air Gap	0.35 - 0.60 mm (0.014 - 0.024 in.)	
A/C Clutch Coil Draw	3.2 - 3.3 amps	@ 12V $\pm$ 0.5V @ 21° C (70° F)
A/C Clutch Coil Resistance	3.6 $\pm$ 0.2 ohms	When measured across coil lead connector
Freeze-up Control	Evaporator Temperature Sensor	HVAC housing mounted
High psi Control	A/C pressure transducer	A/C discharge line mounted
R-1234YF Refrigerant Charge Capacity	2.0L/2.4L/3.2L engines - 510g (1.125lb)	Use only ND-12 PAG oil
R-134A Refrigerant Charge Capacity	2.0L/2.4L/3.2L engines - 539g (1.19lb)	See A/C Underhood Specification Label located in the engine compartment

NOTE: Always use the type of PAG oil listed for the model being serviced. See A/C Underhood Specification Label located in the engine compartment. Do not mix different types of PAG oils.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Description	N.m	Ft. Lbs.	In. Lbs.
A/C Compressor to Engine	28	21	-
A/C Expansion Valve to Evaporator Bolts	11	-	97
Air Distribution Housing Halves Screws	2.2	-	20

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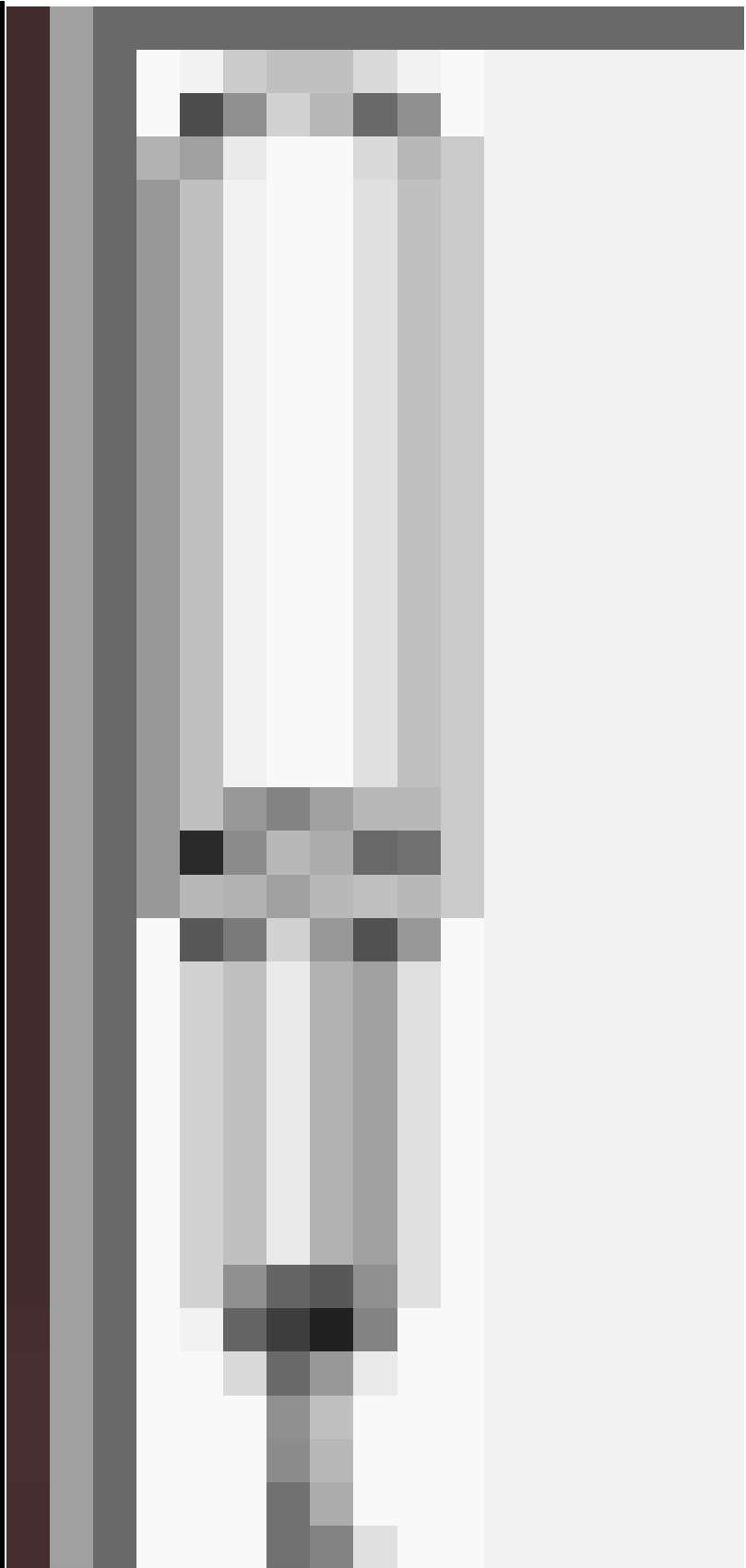
Air Distribution Housing to HVAC Housing Screws	2.2	-	20
Air Inlet Housing to HVAC Housing Screws	2.2	-	20
A/C Pressure Transducer	5.1	-	45
Blower Motor Screws	2.2	-	20
Compressor Shaft Bolt	19	-	168
Heater Core Bracket Screw	2.2	-	20
HVAC Housing Halves Screws	2.2	-	20
HVAC Housing to Instrument Panel Bolts	4	-	40
HVAC Housing to Instrument Panel Nuts	4	-	40
In Car Temperature Sensor	1	-	9
Refrigerant Lines to A/C Compressor Nut	20	15	-
Refrigerant Lines to A/C Condenser Nut	25	18	-
Refrigerant Lines to A/C Expansion Valve Nut	20	15	-
Refrigerant Line to Refrigerant Line Nut	20	15	-

SPECIAL TOOLS**SPECIAL TOOLS**

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2014 Jeep Cherokee Trailhawk

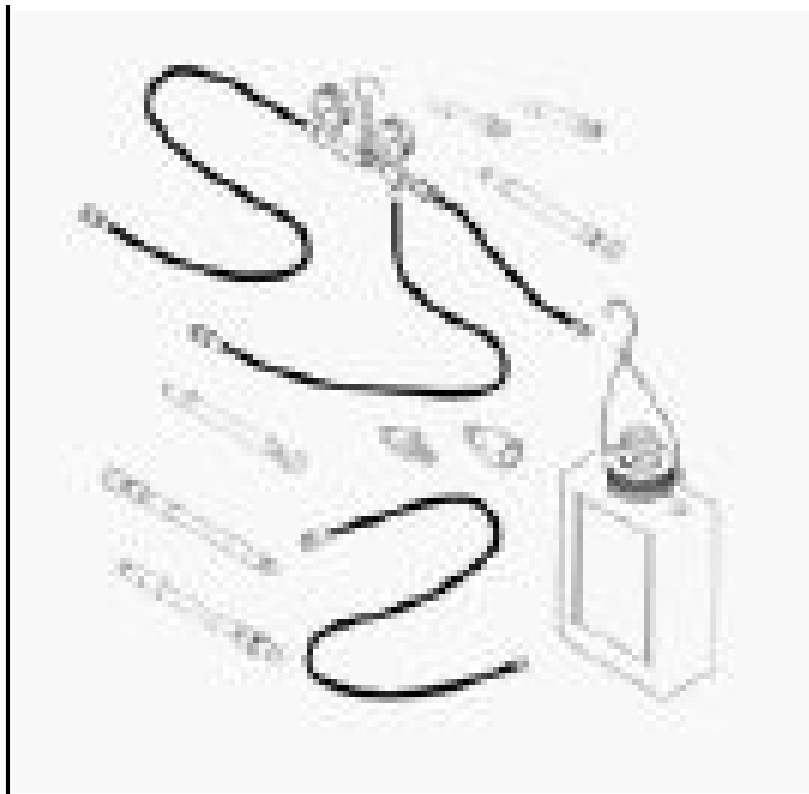
2014 HVAC Heating & Air Conditioning - Service Information - Cherokee



6801 - Terminal Probe
(Originally Shipped In Kit Number(s)
10190.)

2014 Jeep Cherokee Trailhawk

2014 HVAC Heating & Air Conditioning - Service Information - Cherokee



C-4755 - Trim Stick
(Originally Shipped In Kit Number(s)
9299, 9299CC, 9299CC, 9300A-CAN.)

CONTROLS

ACTUATOR, BLEND DOOR

DESCRIPTION

DESCRIPTION

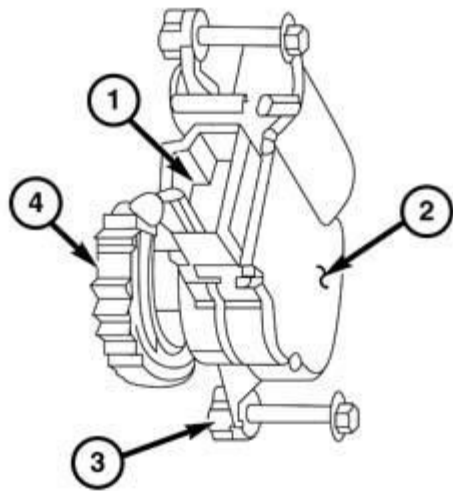


Fig. 4: Connector, Blend Door Actuator, Mounting Tabs & Gears
Courtesy of CHRYSLER GROUP, LLC

The blend door actuator (2) used in the Automatic Temperature Control (ATC) heating and A/C system, is a reversible, 12 volt Direct Current (DC) servo motor, that is mechanically connected to the two blend-air doors. There is a blend door actuator located on both sides of the HVAC housing.

The blend door actuator is contained within a black molded plastic housing with an integral wire connector receptacle (1). An output shaft with gears (4) connect it to the blend door linkage and integral mounting tabs (3) allow the actuator to be secured to the HVAC housing. The blend door actuator requires mechanical indexing to the blend door linkage and is electronically calibrated by the A/C heater control.

The A/C heater control must be recalibrated each time an actuator motor is replaced. Refer to **STANDARD PROCEDURE** .

OPERATION

OPERATION

The blend door actuator used in the Automatic Temperature Control (ATC) heating and A/C system is connected to the A/C heater control by a dedicated five-wire lead and connector of the HVAC wire harness. The blend door actuator can move the blend-air doors in two directions. When the A/C heater control pulls the voltage on one side of the motor connection high and the other connection low, the blend door actuator will move in one direction. When the A/C heater control reverses the polarity of the voltage to the motor, the blend door actuator moves in the opposite direction. Once the A/C heater control makes the voltage to both connections high or both connections low, the blend door actuator stops and will not move.

The blend door actuator contains a potentiometer which the ATC A/C heater control uses to monitor the _____

relative position of the blend-air doors. The A/C heater control learns the blend-air door stop positions during the calibration procedure and will store a diagnostic trouble code (DTC) for any problems it detects in the blend door actuator circuits. Refer to **DIAGNOSIS AND TESTING** .

The blend door actuator cannot be adjusted or repaired and must be replaced if inoperative or damaged.

REMOVAL

REMOVAL

WARNING: Disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions may result in accidental airbag deployment and possible serious or fatal injury.

NOTE: The Dual Zone heating and A/C system has two blend door actuators, one for the driver side and one for the passenger side.

LEFT SIDE

1. Disconnect and isolate the negative battery cable.
2. Remove the left side instrument panel silencer. Refer to **PANEL, SILENCER, LOWER, REMOVAL** .
3. Remove the left side center console closeout. Refer to **CONSOLE, FLOOR, REMOVAL** .

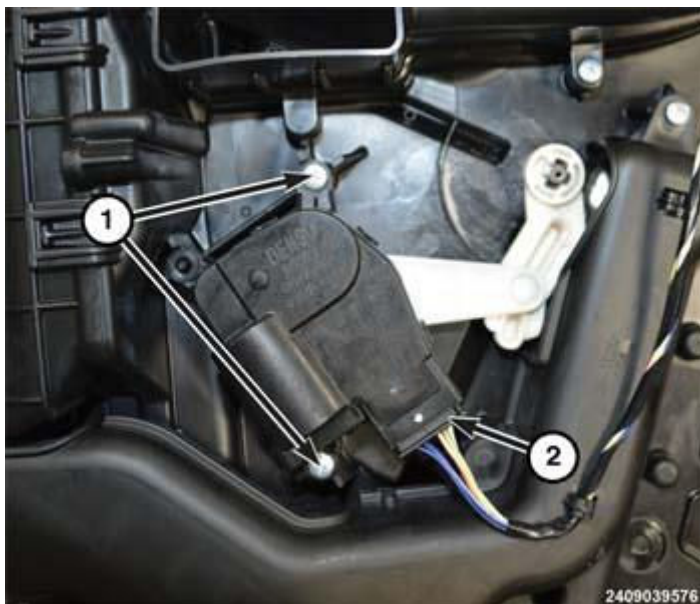


Fig. 5: Blend Door Actuator - Left Side
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the electrical connector (2) from the blend door actuator.
5. Remove the two screws (1) that secure the blend door actuator to the left side of the HVAC housing.
6. Remove the blend door actuator from the HVAC housing.

RIGHT SIDE

1. Disconnect and isolate the negative battery cable.
2. Remove the right side instrument panel silencer. Refer to **PANEL, SILENCER, LOWER, REMOVAL** .
3. Remove the right side center console closeout. Refer to **CONSOLE, FLOOR, REMOVAL** .

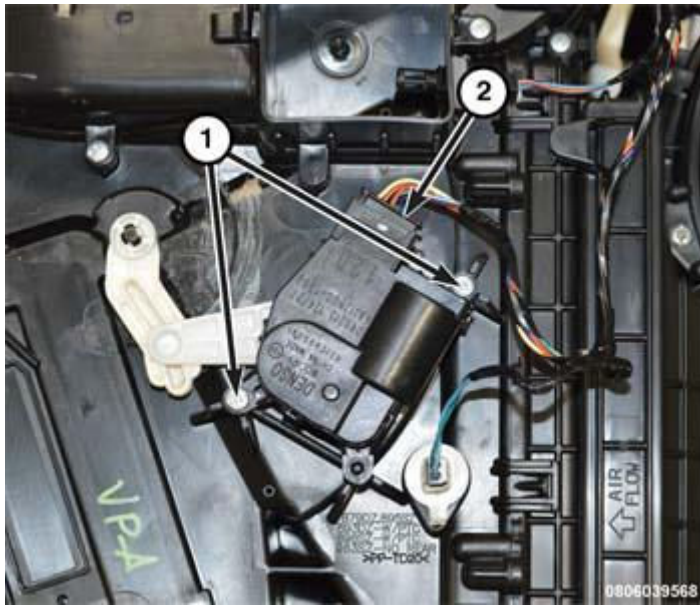


Fig. 6: Blend Door Actuator - Right Side
Courtesy of CHRYSLER GROUP, LLC

4. Remove the two screws (1) that secure the blend door actuator to the right side of the HVAC housing.
5. Disconnect the HVAC wire harness connector (2) from the blend door actuator.
6. Remove the blend door actuator from the HVAC housing.

INSTALLATION**INSTALLATION**

NOTE: The Dual Zone heating and A/C system has two blend door actuators, one for the driver side and one for the passenger side.

LEFT SIDE

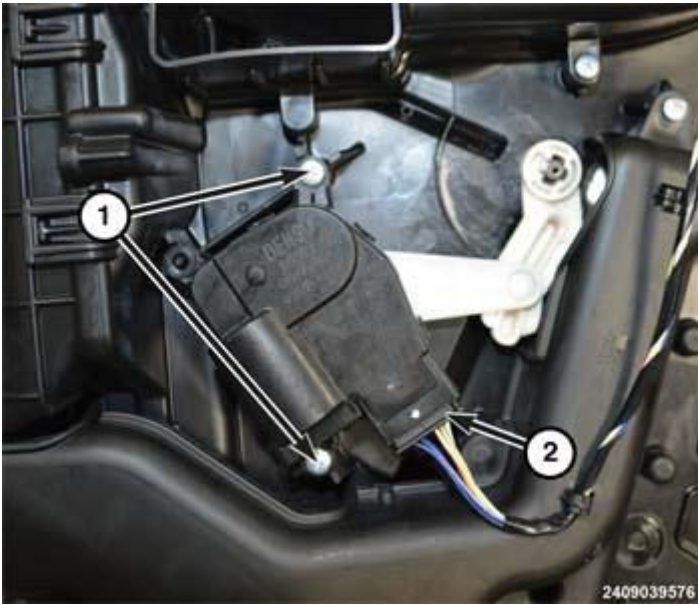


Fig. 7: Blend Door Actuator - Left Side
Courtesy of CHRYSLER GROUP, LLC

1. Install the blend door actuator onto the left side of the HVAC housing. If necessary, rotate the actuator slightly to align the teeth on the actuator output shaft with those on the blend door cam.
2. Install the two screws (1) that secure the blend door actuator to the HVAC housing and tighten to the proper. Refer to **SPECIFICATIONS**.
3. Connect the HVAC wire harness connector (2) to the blend door actuator.
4. Install the left side center console closeout. Refer to **CONSOLE, FLOOR, INSTALLATION** .
5. Install the left side instrument panel silencer. Refer to **PANEL, SILENCER, LOWER, INSTALLATION** .
6. Connect the negative battery cable.
7. Initiate the Actuator Calibration function using a scan tool. Refer to **STANDARD PROCEDURE** .

RIGHT SIDE

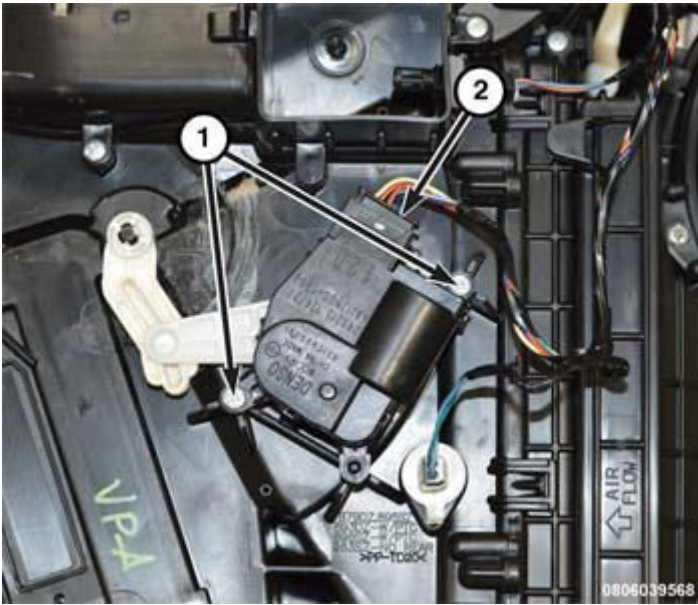


Fig. 8: Blend Door Actuator - Right Side
 Courtesy of CHRYSLER GROUP, LLC

1. Install the blend door actuator onto the right side of the HVAC housing. If necessary, rotate the actuator slightly to align the teeth on the actuator output shaft with those on the blend door cam.

Install the two screws (1) that secure the blend door actuator to the HVAC housing and tighten to the proper. Refer to **SPECIFICATIONS**.

2. Connect the HVAC wire harness connector (2) to the blend door actuator.
3. Install the center console closeout. Refer to **CONSOLE, FLOOR, INSTALLATION** .
4. Install the right side instrument panel silencer. Refer to **PANEL, SILENCER, LOWER, INSTALLATION** .
5. Connect the negative battery cable.
6. Initiate the Actuator Calibration function using a scan tool. Refer to **STANDARD PROCEDURE** .

ACTUATOR, MODE DOOR

DESCRIPTION

DESCRIPTION

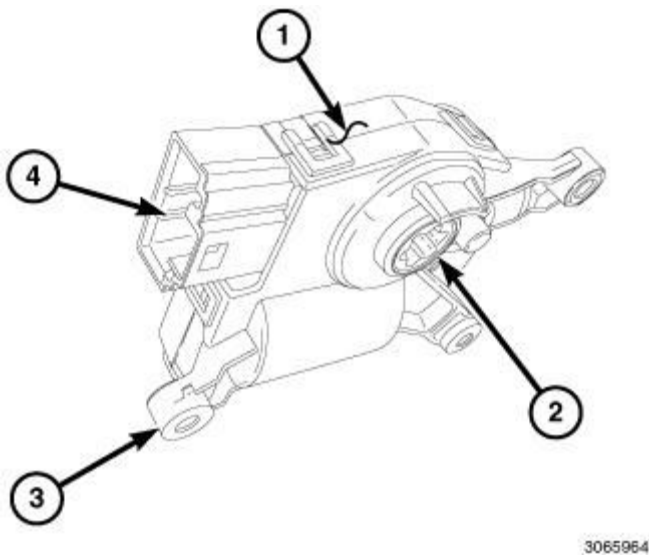


Fig. 9: Actuator Components

Courtesy of CHRYSLER GROUP, LLC

The mode door actuator (1) used in the Automatic Temperature Control (ATC) heating and A/C system, is a reversible, 12 volt Direct Current (DC) servo motor, that is mechanically connected to the three mode-air doors. The mode door actuator is located on the upper left side of the HVAC housing.

The mode door actuator is contained within a black molded plastic housing with an integral wire connector receptacle (3). An output shaft (2) with splines connect it to the mode door linkage and integral mounting tabs (3) allow the actuator to be secured to the HVAC housing. The mode door actuator requires mechanical indexing to the mode door linkage and is electronically calibrated by the HVAC module.

The HVAC module must be calibrated each time an actuator motor is replaced. Refer to **STANDARD PROCEDURE** .

The mode door actuator is interchangeable with the actuator for the blend-air doors.

OPERATION

OPERATION

The mode door actuator used in the Automatic Temperature Control (ATC) heating and A/C system is connected to the A/C heater control by a dedicated five-wire lead and connector of the HVAC wire harness. The mode door actuator can move the mode-air doors in two directions. When the A/C heater control pulls the voltage on one side of the motor connection high and the other connection low, the mode door actuator will move in one direction. When the A/C heater control reverses the polarity of the voltage to the motor, the mode door actuator moves in the opposite direction. Once the A/C heater control makes the voltage to both connections high or both connections low, the mode door actuator stops and will not move.

The mode door actuator contains a potentiometer, which the ATC A/C heater control uses to monitor the relative position of the mode-air doors. The A/C heater control learns the mode-air door stop positions during the calibration procedure and will store a diagnostic trouble code (DTC) for any problems it detects in the mode

door actuator circuits. Refer to **DIAGNOSIS AND TESTING** .

The mode door actuator cannot be adjusted or repaired and must be replaced if inoperative or damaged.

REMOVAL

REMOVAL

WARNING: Disable the airbag system before attempting any steering wheel, steering column or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

NOTE: Illustration shown with instrument panel cut away for clarity.

1. Disconnect and isolate the negative battery cable.
2. Remove the power inverter module. Refer to **MODULE, POWER INVERTER, REMOVAL** .

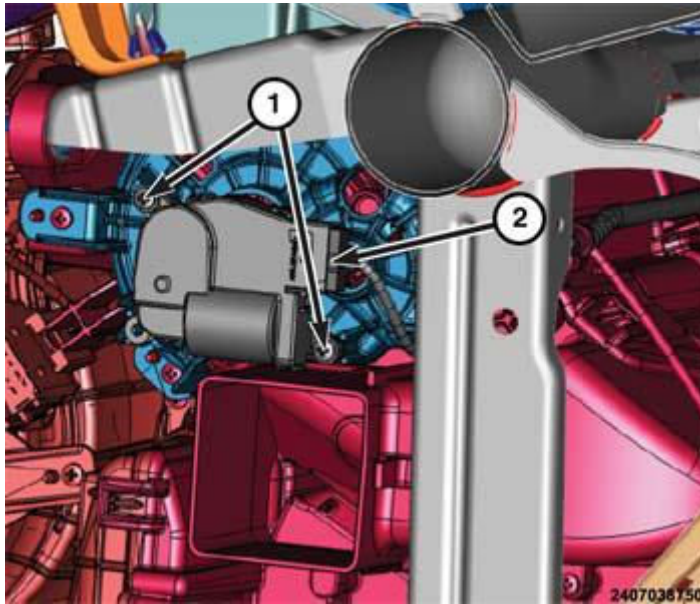


Fig. 10: View Of Mode Door Actuator At Air Distribution Housing
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the wire harness connector (2) from the mode door actuator.
4. Remove the two screws (1) that secure the mode door actuator to the air distribution housing.
5. Remove the mode door actuator from the air distribution housing.

INSTALLATION

INSTALLATION

NOTE: Illustrations shown with instrument panel removed for clarity.

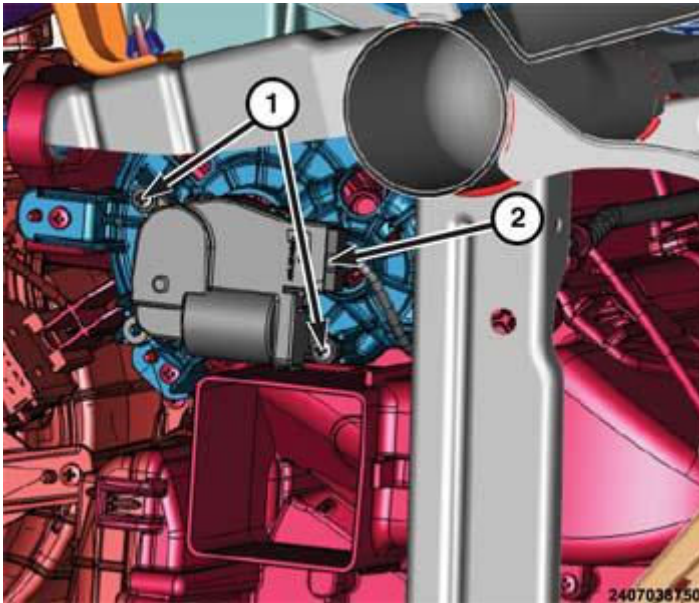


Fig. 11: View Of Mode Door Actuator At Air Distribution Housing

Courtesy of CHRYSLER GROUP, LLC

1. Position the mode door actuator to the left side of the air distribution housing.
2. Install the two screws (1) that secure the mode door actuator to the air distribution housing. Tighten the screws to 0.8 N.m (7 in. lbs.).
3. Connect the wire harness connector (2) to the mode door actuator.
4. Install the power inverter module. Refer to **MODULE, POWER INVERTER, INSTALLATION** .
5. Connect the negative battery cable.
6. Initiate the Actuator Calibration function using a scan tool. Refer to **STANDARD PROCEDURE** .

ACTUATOR, RECIRCULATION DOOR**DESCRIPTION****DESCRIPTION**

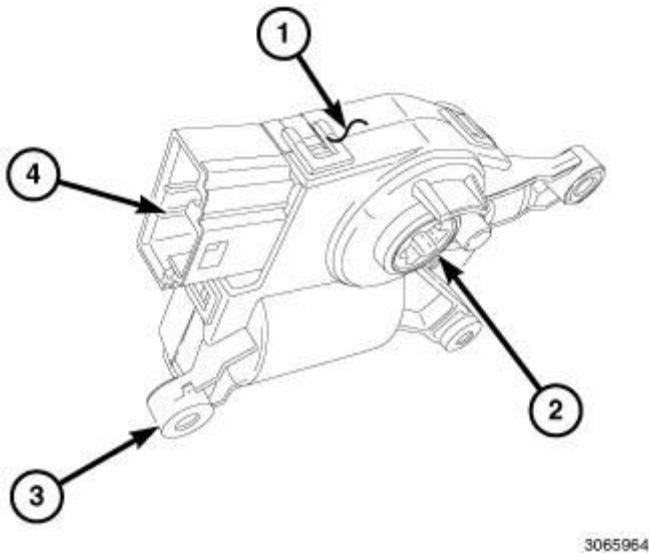


Fig. 12: Actuator Components
Courtesy of CHRYSLER GROUP, LLC

The recirculation door actuator (1) is a reversible 12 volt Direct Current (DC) servo motor. The recirculation door actuator is located on the bottom of the HVAC air inlet housing, behind the instrument panel.

The recirculation door actuator is contained within a black molded plastic housing with an integral wire connector receptacle (4). Three mounting tabs (3) allow the actuator to be secured to the housing and output shaft (2) connects it to the recirculation air door.

The recirculation door actuator requires mechanical indexing to the recirculation air door.

OPERATION

OPERATION

The recirculation door actuator is connected to the A/C heater control or module (depending on heating and A/C system application) by a dedicated two-wire lead and connector of the HVAC wire harness. The recirculation door actuator can move the recirculation air door in two directions. When the A/C heater control or module pulls the voltage on one side of the motor connection high and the other connection low, the recirculation air door will move in one direction. When the A/C heater control or module reverses the voltage, the recirculation air door will move in the other direction. When the recirculation air door reaches its travel limit, the A/C heater control or module turns the voltage off.

The recirculation door actuator is diagnosed using a scan tool. Refer to **DIAGNOSIS AND TESTING** .

The recirculation door actuator cannot be adjusted or repaired and must be replaced if inoperative or damaged.

REMOVAL

REMOVAL

WARNING: Disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

1. Disconnect and isolate the negative battery cable.
2. Remove the steering column. Refer to COLUMN, REMOVAL .
3. Remove the pedal assembly. Refer to PEDAL(S), BRAKE AND/OR ACCELERATOR, REMOVAL .

NOTE: Illustration shown with instrument panel removed for clarity

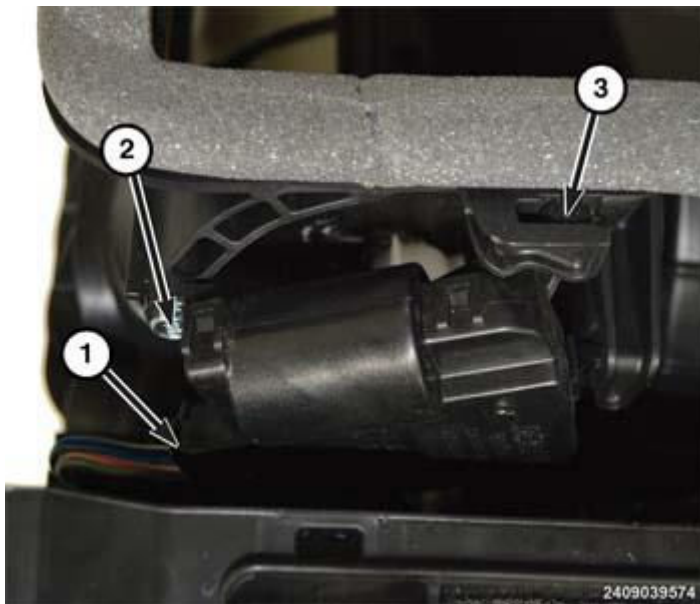


Fig. 13: View Of Recirculation Door Actuator At Air Inlet Housing
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the HVAC wiring harness connector and position to the side to gain additional clearance.
5. Disconnect the wire harness connector (1) from the recirculation door actuator.
6. Remove the screw (2) that secures the recirculation door actuator to the air inlet housing.
7. Rotate the recirculation door actuator to disengage it from the retaining clip (3) on the air inlet housing.
8. Separate the recirculation door actuator from the linkage.

INSTALLATION

INSTALLATION

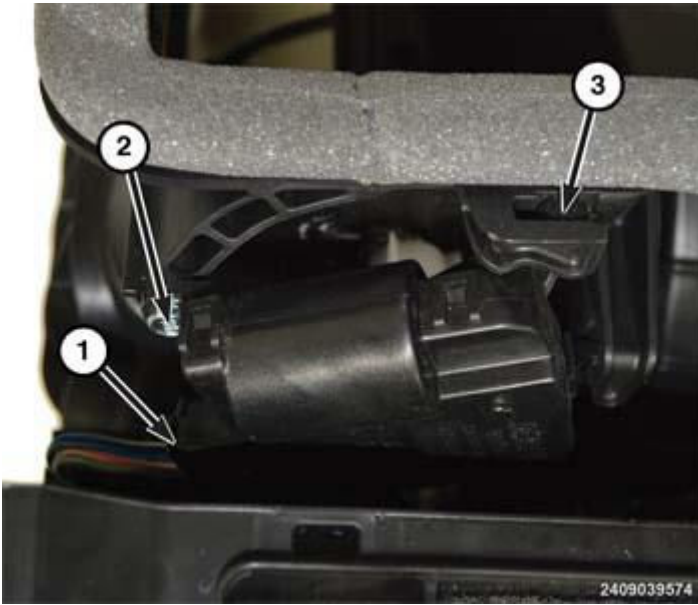


Fig. 14: View Of Recirculation Door Actuator At Air Inlet Housing
Courtesy of CHRYSLER GROUP, LLC

1. Position the recirculation door actuator to the air inlet housing and align the actuator output shaft with the splines of the recirculation door linkage.
2. Rotate the recirculation door actuator to engage the retaining clip (3) on the air inlet housing.
3. Install the recirculation door actuator retaining screw (2) and tighten to the proper. Refer to **SPECIFICATIONS**.
4. Connect the wire harness connector to the recirculation door actuator (1).
5. Connect the HVAC wiring harness connector.
6. Install the pedal assembly. Refer to **PEDAL(S), BRAKE AND/OR ACCELERATOR, INSTALLATION** .
7. Install the steering column. Refer to **COLUMN, INSTALLATION** .
8. Connect the negative battery cable.
9. Initiate the Actuator Calibration function using a scan tool. Refer to **STANDARD PROCEDURE** .

CONTROL, A/C AND HEATER

DESCRIPTION

AUTOMATIC TEMPERATURE CONTROL (ATC)

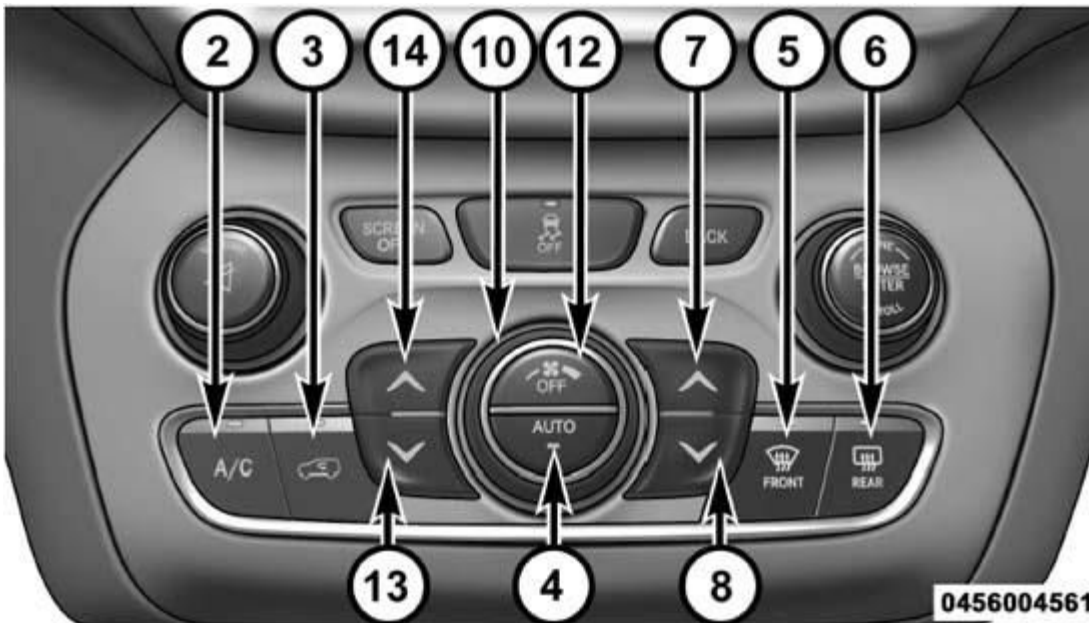


Fig. 15: Automatic Temperature Control (ATC) Panel
Courtesy of CHRYSLER GROUP, LLC

The Automatic Temperature Control (ATC) heating and A/C system maintains the interior comfort level desired by the vehicle operator. This is accomplished by use of air duct temperature sensors, located in the HVAC housing, that measure the temperature of the conditioned air leaving the HVAC housing and an in-car temperature sensor, that measures the temperature of the conditioned air within the vehicle. Based on the sensors inputs, the ATC system automatically adjusts the air temperature, airflow volume, airflow distribution and amount of inside air recirculation to maintain occupant comfort, even under changing outside weather conditions. All controls are identified by International Standards Organization (ISO) graphic symbols.

The ATC heating and A/C system uses electrically operated controls. These controls provide the vehicle operator with a number of setting options to help control the climate and comfort within the vehicle and offers several manual override features such as fan speed and airflow distribution. When the outside air contains smoke, odors, high humidity, or if rapid cooling is desired, the interior conditioned air can be recirculated within the vehicle.

Prior to replacing the A/C heater control, check for any Diagnostic Trouble Codes (DTCs) related to the heating and A/C system, and run the Actuator Calibration function using a scan tool to verify that the concern is not an air door calibration issue. Refer to **STANDARD PROCEDURE** .

The A/C heater control cannot be adjusted or repaired and must be replaced if inoperative or damaged.

MANUAL TEMPERATURE CONTROL (MTC)

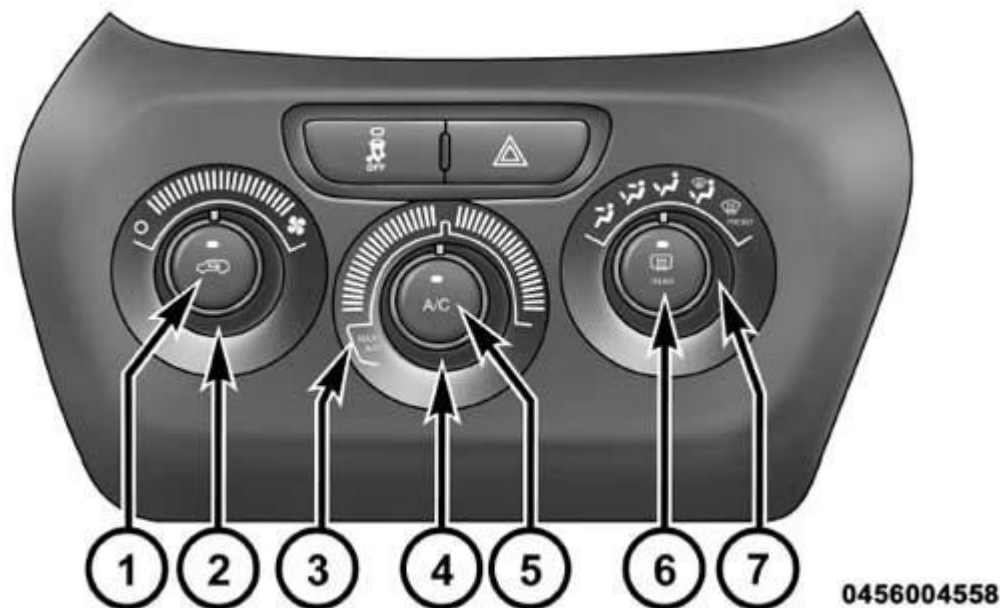


Fig. 16: Manual Temperature Control (MTC) Panel
Courtesy of CHRYSLER GROUP, LLC

The A/C heater control for the Manual Temperature Control (MTC) heating and A/C system allows one temperature setting for the entire vehicle. The MTC heating and A/C system uses electronically operated controls to provide the vehicle operator with a number of setting options to help control the climate and comfort within the vehicle. All controls are identified by International Standards Organization (ISO) graphic symbols.

The MTC A/C heater control is located in center of the instrument panel.

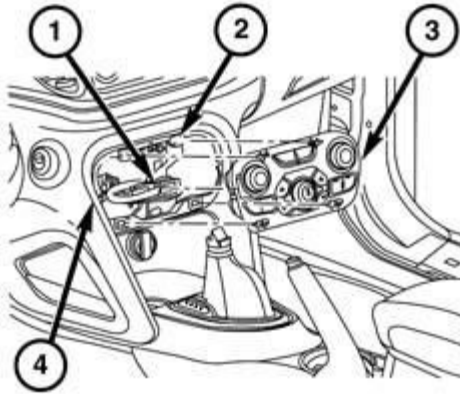
The A/C heater control cannot be adjusted or repaired and must be replaced if inoperative or damaged.

REMOVAL

REMOVAL

WARNING: Disable the airbag system before attempting any steering wheel, steering column or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

1. Disconnect and isolate the negative battery cable.



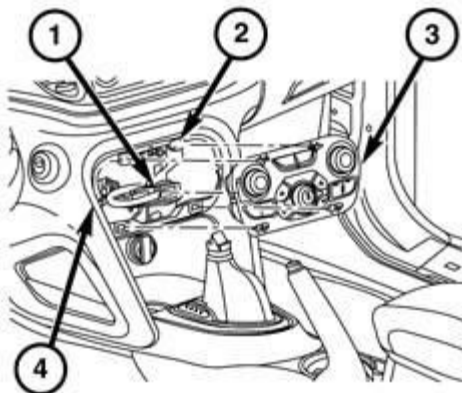
240769579

Fig. 17: Connector, Retaining Tabs, A/C Heater Control & Instrument Panel
Courtesy of CHRYSLER GROUP, LLC

2. Using Trim Stick (special tool #C-4755, Trim Stick) or equivalent, disengage the retaining tabs (2) that secure the A/C heater control (3) and remove the A/C heater control from the instrument panel (4).
3. Disconnect the HVAC wire harness connector (2) from the A/C heater control and remove the control.

INSTALLATION

INSTALLATION



240769579

Fig. 18: Connector, Retaining Tabs, A/C Heater Control & Instrument Panel
Courtesy of CHRYSLER GROUP, LLC

1. Position the A/C heater control (3) to the instrument panel (4) and connect the HVAC wire harness connector (1).
2. Position the A/C heater control to the instrument panel and engage the retaining tabs (2). Make sure the retaining tabs are fully engaged into the instrument panel.
3. Reconnect the negative battery cable.
4. Initiate the Actuator Calibration function using a scan tool. Refer to **STANDARD PROCEDURE** .

MODULE, POWER, BLOWER MOTOR

DESCRIPTION

DESCRIPTION

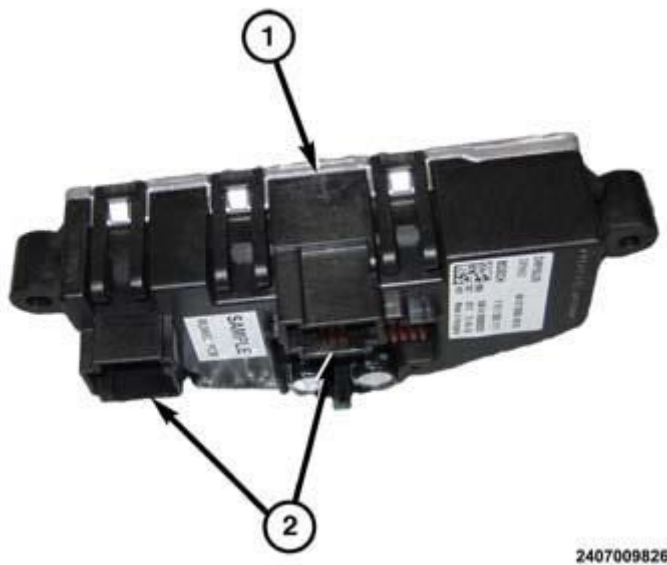


Fig. 19: Blower Motor Power Module
Courtesy of CHRYSLER GROUP, LLC

The blower motor power module consists of a molded plastic housing with integral wire connector receptacles (2) and mounting provisions. Concealed behind the housing is the power module electronic circuitry and a finned aluminum heat sink (1). The blower motor power module is located on the passenger side of the HVAC housing and is serviceable without removal of the HVAC housing.

OPERATION

OPERATION

A blower motor power module is used on the Automatic Temperature Control (ATC) system, and allows the microprocessor-based A/C heater control to calculate and provide infinitely variable blower motor speeds based upon either manual blower switch input or the ATC programming.

The ATC blower motor control system uses a Pulse Width Modulated (PWM) circuit strategy. PWM voltage is applied to a comparator circuit which compares the PWM signal voltage to the blower motor feedback voltage. The resulting output drives the power module circuitry, which provides a linear output voltage to change or maintain the desired blower speed.

The blower motor power module is diagnosed using a scan tool. Refer to **DIAGNOSIS AND TESTING** .

The blower motor power module cannot be adjusted or repaired must be replaced if inoperative or damaged.

REMOVAL

REMOVAL

WARNING: Disable the airbag system before attempting any steering wheel, steering

column or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable. Wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: The blower motor power module may get very hot during normal operation. If the blower motor was turned on prior to servicing the power module, wait at least five minutes to allow the module heat sink to cool before performing diagnosis or service. Failure to take this precaution may result in possible serious injury.

1. Disconnect and isolate the negative battery cable.
2. Remove the passenger side silencer panel. Refer to **PANEL, SILENCER, LOWER, REMOVAL** .
3. Remove the passenger side console closeout.



Fig. 20: Blower Motor Power Module And Blower Motor Wiring Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the wire harness connectors (1) from the blower motor power module and blower motor.

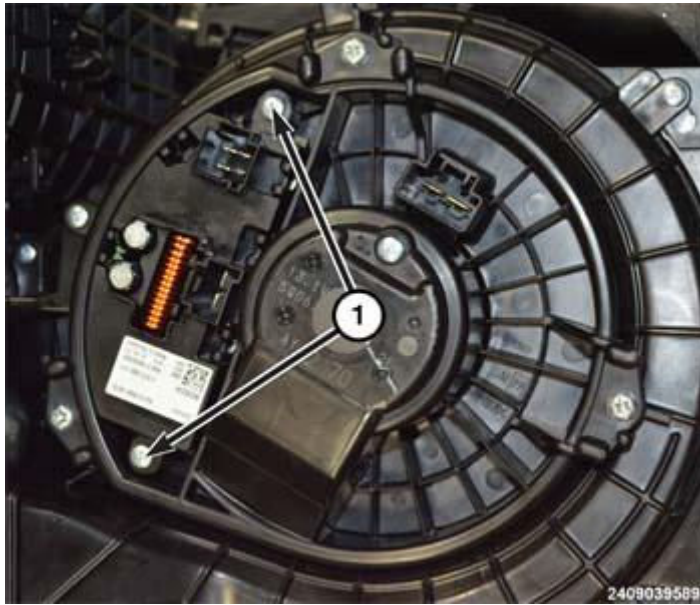


Fig. 21: Blower Motor Power Module & Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. Remove the screws (1) that secures the blower motor power module to the blower motor and remove the power module.

INSTALLATION

INSTALLATION

1. Install the blower motor power module to the blower motor and install the retaining screws. Tighten the screw to 0.8 N.m (7 in. lbs.).
2. Connect the wire harness connectors to the blower motor power module.
3. Install the passenger side console closeout cover.
4. Install the passenger side silencer panel. Refer to **PANEL, SILENCER, LOWER, INSTALLATION**.
5. Connect the negative battery cable.

SENSOR, AMBIENT TEMPERATURE

DESCRIPTION

DESCRIPTION

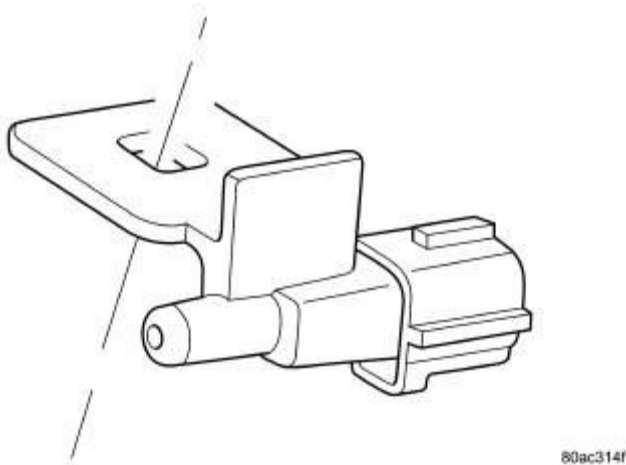


Fig. 22: Identifying Ambient Air Temperature Sensor
Courtesy of CHRYSLER GROUP, LLC

The ambient air temperature sensor is a variable resistor that monitors the air temperature outside of the vehicle. The Automatic Temperature Control (ATC) heating and A/C system uses the ambient air temperature sensor data to help maintain optimum passenger compartment temperature levels. The ambient air temperature sensor is mounted behind the grille on the left side.

OPERATION

OPERATION

The ambient air temperature sensor is a variable resistor that operates on a 5 volt Direct Current (DC) reference signal sent by the Body Control Module (BCM). The ambient air temperature sensor is connected to the BCM through a two-wire lead and connector of the vehicle wire harness. The ambient air temperature sensor changes its internal resistance in response to changes in the outside air temperature, which either increases or decreases the reference signal voltage read by the BCM. The BCM converts and broadcasts the sensor data over the Controller Area Network (CAN) data bus, where it is read by the Automatic Temperature Control (ATC) A/C heater module and other vehicle control modules.

The ambient air temperature sensor is diagnosed using a scan tool. Refer to **DIAGNOSIS AND TESTING** .

The ambient air temperature sensor cannot be adjusted or repaired and must be replaced if inoperative or damaged.

REMOVAL

REMOVAL

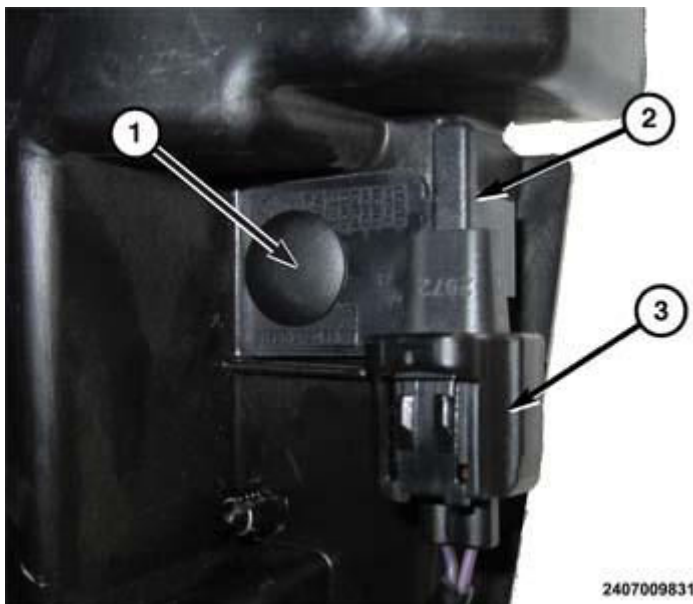


Fig. 23: Ambient Temperature Sensor, Connector & Push Pin
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Disconnect the wire harness connector (3) from the ambient air temperature sensor (2).
3. Remove the push pin (1) that secures the ambient air temperature sensor and remove the sensor.

INSTALLATION

INSTALLATION

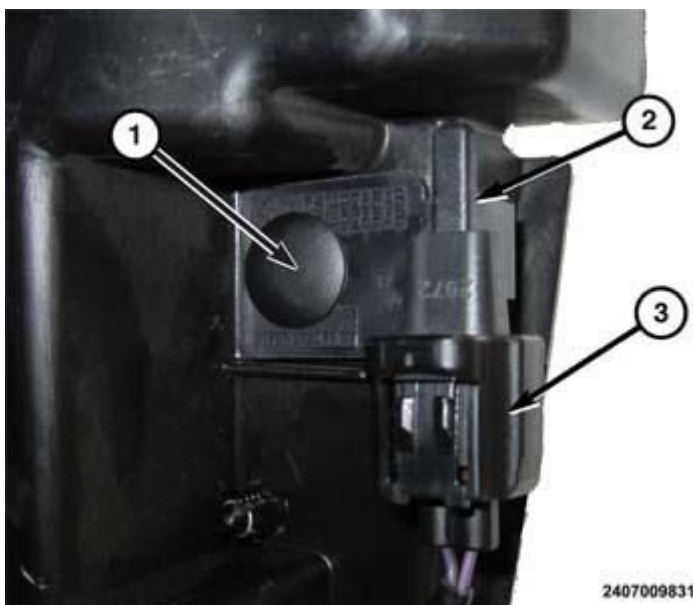


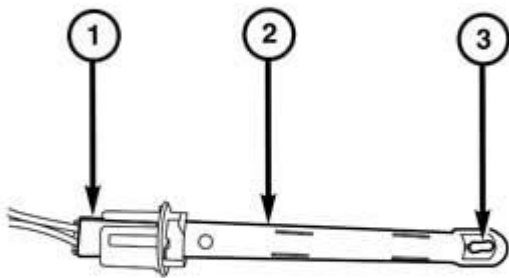
Fig. 24: Ambient Temperature Sensor, Connector & Push Pin
Courtesy of CHRYSLER GROUP, LLC

1. Install the push pin (1) that secures the ambient air temperature sensor to the vehicle.
2. Connect the wire harness connector (3) to the ambient air temperature sensor (2).
3. Connect the negative battery cable.

SENSOR, EVAPORATOR TEMPERATURE

DESCRIPTION

DESCRIPTION



240969967

Fig. 25: Connector, Bracket & Electrical Thermistor
Courtesy of CHRYSLER GROUP, LLC

The evaporator temperature sensor measures the temperature of the conditioned air downstream of the A/C evaporator. The evaporator temperature sensor is an electrical thermistor (3) mounted on a molded plastic bracket (2) that is inserted into the A/C evaporator, near its coldest point. The evaporator temperature sensor is connected to the vehicle electrical system by use of a two wire lead and connector (1).

OPERATION

OPERATION

The evaporator temperature sensor monitors the surface temperature of A/C evaporator and supplies an input signal to the A/C heater module. The A/C heater module uses the evaporator temperature sensor input signal to optimize A/C system performance and to protect the A/C system from evaporator freezing. The evaporator temperature sensor will change its internal resistance in response to the temperatures it monitors and is connected to the A/C heater module through a sensor ground circuit and a 5 volt Direct Current (DC) reference

signal circuit. As the temperature of the A/C evaporator decreases, the internal resistance of the evaporator temperature sensor decreases.

The A/C heater module uses the monitored voltage reading as an indication of evaporator temperature. The A/C heater module is programmed to respond to this input by requesting the Powertrain Control Module (PCM) to cycle the A/C clutch as necessary to optimize A/C system performance and to protect the A/C system from evaporator freezing.

When equipped with Automatic Temperature Control (ATC), the evaporator temperature sensor is diagnosed using a scan tool. Refer to the **DIAGNOSTIC CODE INDEX** .

When equipped with Manual Temperature Control System (MTC), the evaporator temperature sensor is diagnosed using a scan tool. Refer to appropriate DIAGNOSIS AND TESTING.

The evaporator temperature sensor cannot be adjusted or repaired and must be replaced if inoperative or damaged.

REMOVAL

REMOVAL

WARNING: Disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible serious or fatal injury.

1. Disconnect and isolate the negative battery cable.
2. Remove the right side silencer panel. Refer to **PANEL, SILENCER, LOWER, REMOVAL** .
3. Remove the right side console closeout cover.



Fig. 26: Evaporator Temperature Sensor Location
Courtesy of CHRYSLER GROUP, LLC

4. Rotate the evaporator temperature sensor (1) forty five degrees to disengage from the HVAC housing.

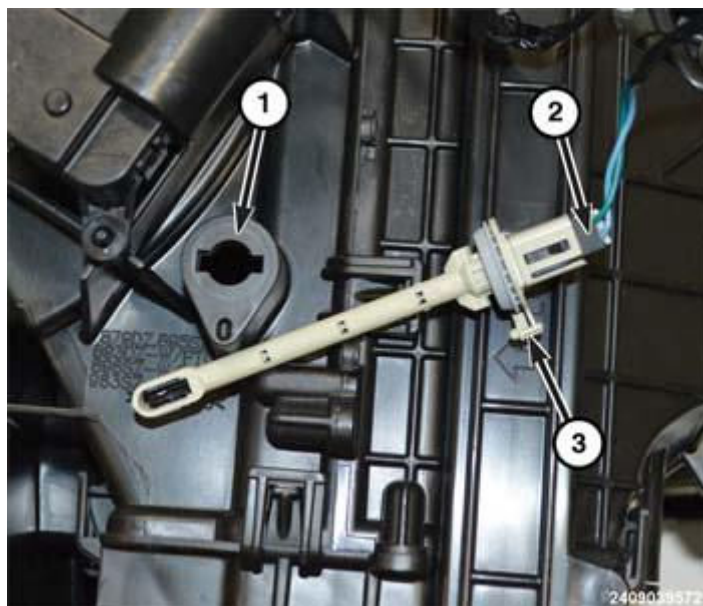


Fig. 27: View Of Evaporator Temperature Sensor
Courtesy of CHRYSLER GROUP, LLC

5. Remove the evaporator temperature sensor (3) from the HVAC housing (1).
6. Disconnect the wire harness connector (2) from the evaporator temperature sensor.

INSTALLATION

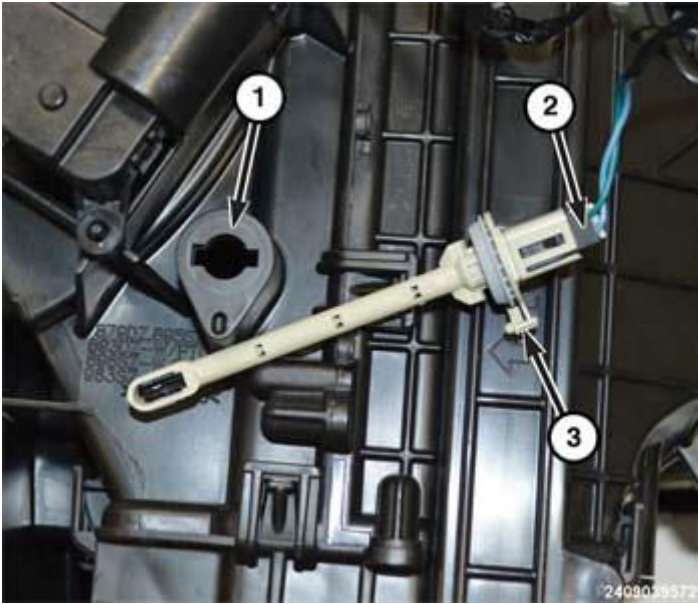
INSTALLATION

Fig. 28: View Of Evaporator Temperature Sensor
Courtesy of CHRYSLER GROUP, LLC

1. Connect the wire harness connector (2) to the evaporator temperature sensor (3).
2. Position the evaporator temperature sensor into the HVAC housing (1).



Fig. 29: Evaporator Temperature Sensor Location
Courtesy of CHRYSLER GROUP, LLC

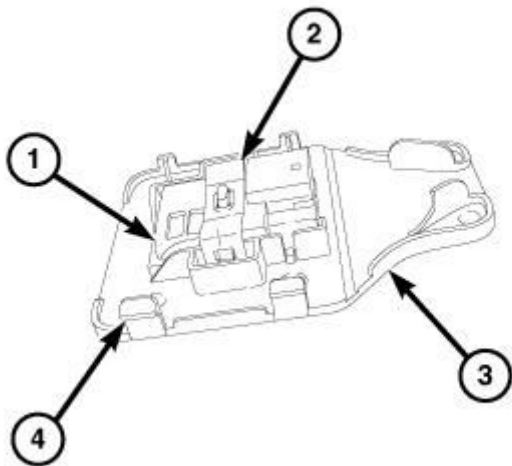
3. Rotate the evaporator temperature sensor forty five degrees to engage the locking tab (1) to the HVAC housing.

4. Position the right side console closeout cover, and engage the retaining tabs.
5. Install the right side silencer panel. Refer to **PANEL, SILENCER, LOWER, INSTALLATION** .
6. Connect the negative battery cable.

SENSOR, HUMIDITY

DESCRIPTION

DESCRIPTION



3180623

Fig. 30: Humidity Sensor, Bracket, Retaining Clip & Plastic Tabs
 Courtesy of CHRYSLER GROUP, LLC

A humidity sensor (1) is used on Automatic Temperature Control (ATC) models to detect humidity levels inside the vehicle to optimize the dehumidifying effect of the A/C system. The humidity sensor is attached to a plastic bracket (3) by a metal retaining clip (2). The sensor bracket is attached to the inside of the windshield by an adhesive. A cover is attached to the sensor bracket by four plastic tabs (4). The humidity sensor is connected to the Body Control Module (BCM) by a dedicated three wire lead and connector that protrudes out from under the front of the headliner.

CAUTION: Use care when servicing the humidity sensor. The humidity sensor bracket cannot be serviced separately from the windshield. If the sensor bracket becomes damaged, the windshield will need to be replaced.

The humidity sensor can be serviced without the use of any special tools.

OPERATION

OPERATION

The humidity sensor detects humidity, dew point and windshield glass temperature, and sends this information

to the Body Control Module (BCM) over a Local Interconnect Network (LIN) data bus connection. The BCM then broadcasts the message over the Controller Area Network (CAN) data bus to the A/C heater module. The A/C heater module automatically adjusts A/C clutch operation, amount of recirculated air, blower motor speeds and outlet modes to prevent fogging on the inside of the windshield glass. If the humidity sensor message is not received by the A/C heater module, a Diagnostic Trouble Code (DTC) will set. The information the A/C heater module receives from the humidity sensor can be viewed using a scan tool.

The humidity sensor is diagnosed using a scan tool. Refer to **DIAGNOSIS AND TESTING**.

The humidity sensor cannot be adjusted or repaired and must be replaced if inoperative or damaged.

REMOVAL

REMOVAL

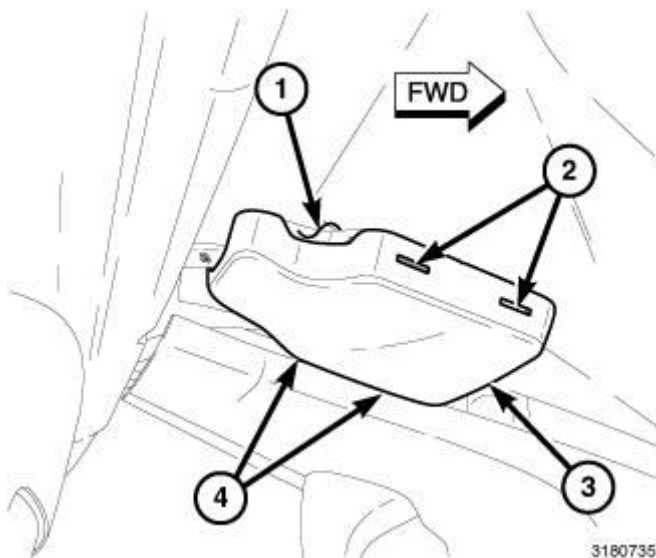


Fig. 31: Humidity Sensor Cover, Sensor Bracket & Retaining Tabs
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable

CAUTION: Use care when removing the humidity sensor cover. The humidity sensor bracket cannot be serviced separately from the windshield. If the sensor bracket becomes damaged, the windshield will need to be replaced.

2. Carefully disengage the four retaining tabs (2 and 4) that secure the cover (3) to the humidity sensor bracket (1) by pressing in on the right side of the cover, while rocking the left side of the cover off the bracket.

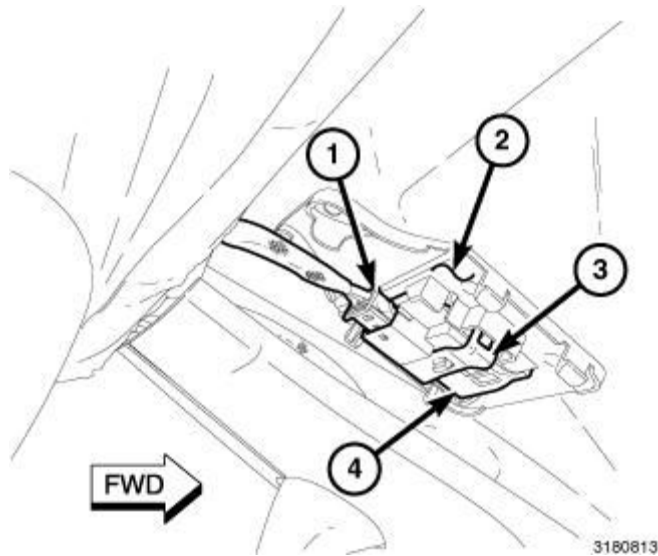


Fig. 32: Wire Harness Connector, Humidity Sensor, Bracket & Clip
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Use care when removing the humidity sensor. The humidity sensor bracket cannot be serviced separately from the windshield. If the sensor bracket becomes damaged, the windshield will need to be replaced.

3. Using a small screwdriver or similar tool, carefully disengage the metal retaining clip (3) from the sensor bracket (2) and remove the humidity sensor (4) and the clip as an assembly.
4. Disconnect the wire harness connector (1) from the humidity sensor.
5. If the humidity sensor bracket is damaged and cannot be reused, replace the windshield. Refer to **WINDSHIELD, REMOVAL** .

INSTALLATION

INSTALLATION

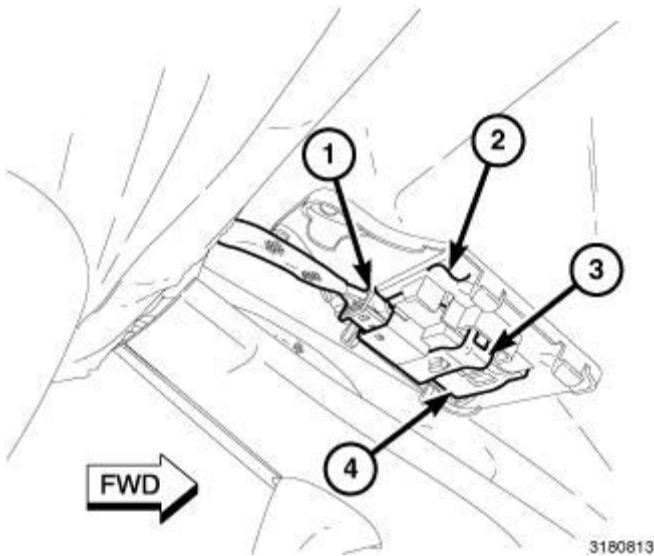


Fig. 33: Wire Harness Connector, Humidity Sensor, Bracket & Clip
 Courtesy of CHRYSLER GROUP, LLC

1. If the humidity sensor bracket (1) is damaged and cannot be reused, install a new windshield. Refer to **WINDSHIELD, INSTALLATION**.
2. Connect the wire harness connector (1) to the humidity sensor (4).

CAUTION: Use care when installing the humidity sensor. The humidity sensor bracket cannot be serviced separately from the windshield. If the sensor bracket becomes damaged, the windshield will need to be replaced.

3. Position the humidity sensor to the sensor bracket (2) and engage the metal retaining clip (3) to the bracket. Make sure both sides of the retaining clip are fully engaged to the bracket.

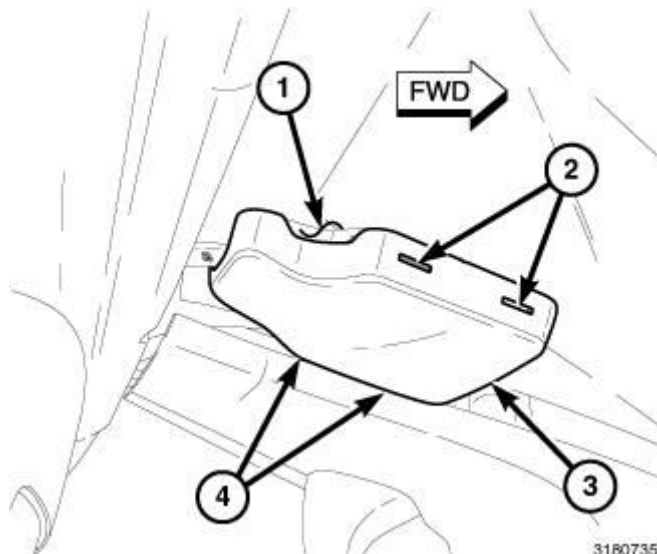


Fig. 34: Humidity Sensor Cover, Sensor Bracket & Retaining Tabs
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Use care when install the humidity sensor cover. The humidity sensor bracket cannot be serviced separately from the windshield. If the sensor bracket becomes damaged, the windshield will need to be replaced.

4. Carefully install the humidity sensor cover (3) onto the sensor bracket (1). Make sure the four retaining tabs (2 and 4) are fully engaged to the bracket
5. Reconnect the negative battery cable.

SENSOR, SUN

DESCRIPTION

DESCRIPTION

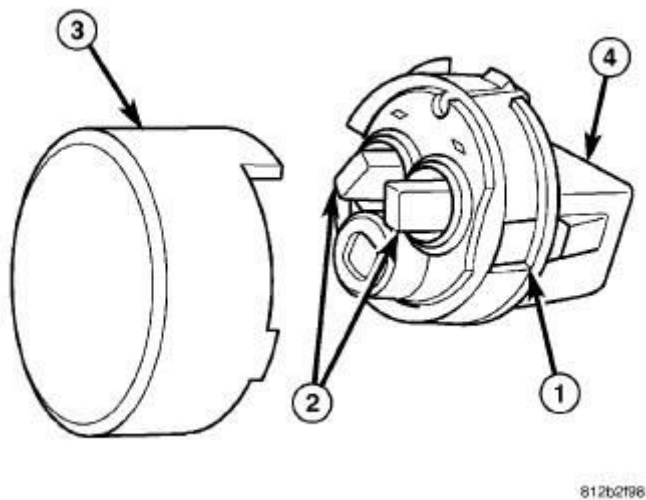


Fig. 35: Sun Sensor
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical sun sensor assembly shown in illustration.

The Automatic Temperature Control (ATC) heating and A/C system uses a sun sensor assembly (1) to measure sun light intensity. The sun sensor assembly incorporates three sun sensors (2) within a molded plastic case with a clear lens (3), that protrudes through the center of the defroster grille. The wire harness receptacle (4) connects the sun sensors to the vehicle electrical system through a wire lead and connector of the instrument panel wire harness.

OPERATION**OPERATION**

The Automatic Temperature Control (ATC) Dual Zone heating and A/C system uses two sun sensors to balance the system in response to side-to-side variations of sun light intensity. Passengers in sun and shadow require different functional settings because they experience very different temperatures. The sun sensor assembly provides data to the A/C heater module to help determine proper mode and blend-air door positions and blower motor speeds. The sun sensors are not thermistor type sensors, but rather photo diodes. For this reason the sun sensors responds to sun light intensity rather than temperature. The sun sensor assembly is also used to sense day and night conditions for automatic headlight control, if equipped.

The sun sensor is diagnosed using a scan tool. Refer to **DIAGNOSIS AND TESTING** .

The sun sensor assembly cannot be adjusted or repaired and must be replaced if inoperative or damaged.

DIAGNOSIS AND TESTING**DIAGNOSIS AND TESTING - SUN SENSOR**

WARNING: Disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable. Wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in possible serious or fatal injury.

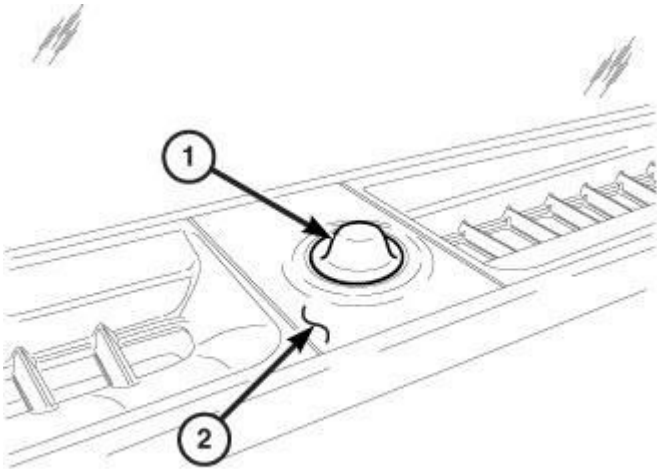
The sun sensor assembly is located so that the sun rays will hit the sensors in the same way that it will hit the driver and the passenger. It is important that the area in front of the sun sensor assembly be unobstructed. If the vehicle exhibits a lack of passenger comfort in sunny weather such as in the early afternoon, check for the following:

- Any items laying on top of the instrument panel are not covering the sun sensor.
- Any stickers on the windshield are not directly in front of the sun sensor.
- Confirm that the windshield wipers are properly adjusted.
- Confirm that the sun sensor is properly installed. Refer to **SENSOR, SUN, INSTALLATION**.
- Confirm that the defroster grille is properly installed. Refer to **GRILLE, DEFROSTER, INSTALLATION** .

The A/C heater module continually monitors the sun sensor circuits and will store Diagnostic Trouble Codes (DTCs) for any problem it detects. The sun sensor can be tested in the vehicle with a scan tool. Refer to **DIAGNOSIS AND TESTING** .

REMOVAL**REMOVAL**

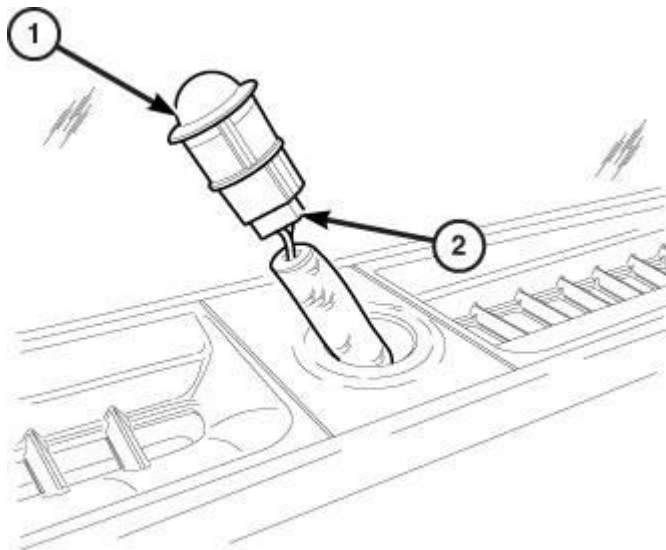
WARNING: Disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable. Wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in possible serious or fatal injury.



2859764

Fig. 36: Sun Sensor & Defroster Grille
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative battery cable.
2. Using Trim Stick (special tool #C-4755, Trim Stick) or equivalent, remove the sun sensor (1) from the defroster grille (2).



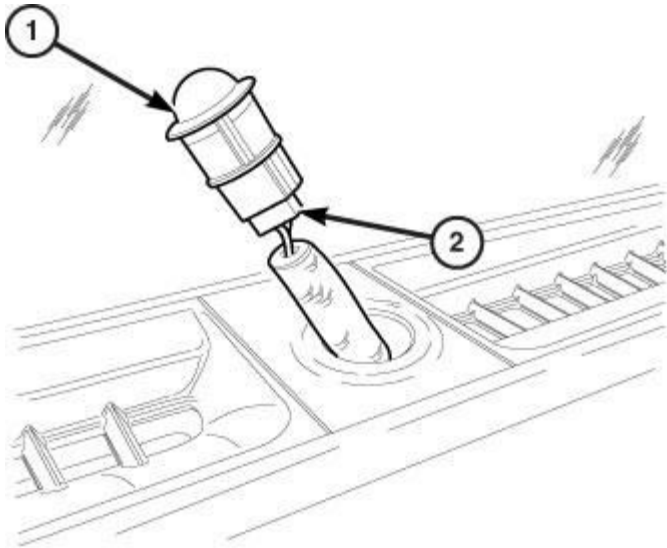
2859808

Fig. 37: Sun Sensor & Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the wire harness connector (2) from the sun sensor (1) and remove the sensor.

INSTALLATION

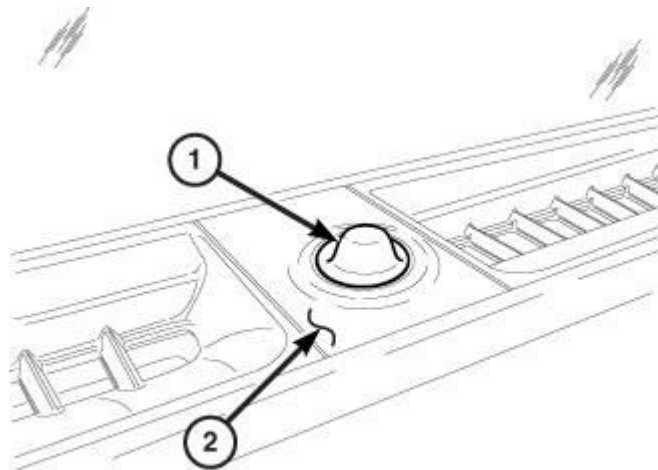
INSTALLATION



2859808

Fig. 38: Sun Sensor & Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

1. Position the sun sensor (1) to the top of the instrument panel and connect the wire harness connector (2) to the sensor.



2859754

Fig. 39: Sun Sensor & Defroster Grille
Courtesy of CHRYSLER GROUP, LLC

2. Align the tab on the sun sensor (1) with the slot in the opening in the defroster grille (2) and install the sensor onto the grille. Make sure that the sensor is fully engaged to the defroster grille.
3. Reconnect the negative battery cable.

SENSOR, TEMPERATURE, AIR OUTLET

DESCRIPTION

DESCRIPTION

Four air outlet temperature sensors are used in the Automatic Temperature Control (ATC) heating and A/C system to measure the temperature of the conditioned air leaving the HVAC housing. Each air outlet temperature sensor is an electrical thermistor located within a molded plastic case.

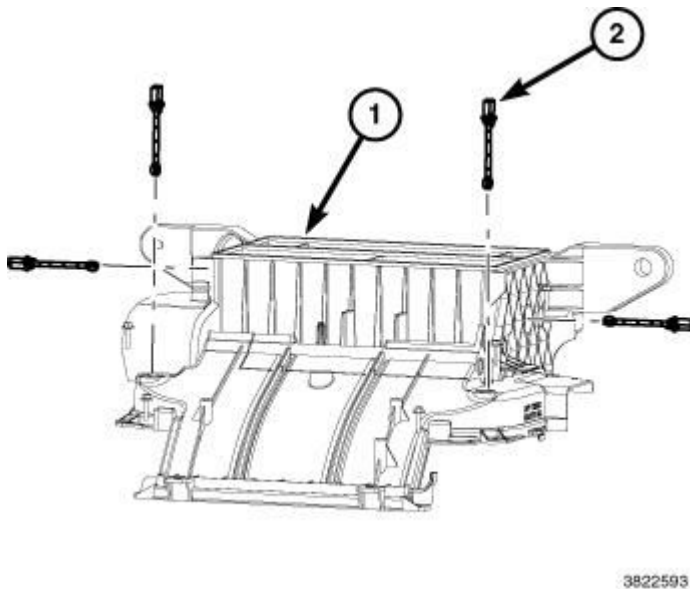


Fig. 40: Mode Case & Air Outlet Temperature Sensor
Courtesy of CHRYSLER GROUP, LLC

Each air outlet temperature sensor (2) is inserted into the mode case (1) near the top of the HVAC housing.

Each air outlet temperature sensor is connected to the vehicle electrical system through a separate wire lead and connector of the HVAC wire harness. The external location of the air outlet temperature sensors allow them to be removed or installed without removing the HVAC housing from the vehicle.

OPERATION

OPERATION

The air duct temperature sensors monitor the temperature of the conditioned air leaving the HVAC housing and

supplies an input signal to the A/C heater control, when equipped with the Automatic Temperature Control (ATC) heating and A/C system. The air duct temperature sensors change their internal resistance in response to the temperatures they monitor. The air duct temperature sensors are connected to the ATC A/C heater control through a sensor ground circuit and a 5 volt Direct Current (DC) reference signal circuit. As the temperature of the conditioned air leaving the HVAC housing decreases, the internal resistance of the temperature sensor increases. As the temperature of the conditioned air leaving the HVAC housing increases, the internal resistance of the temperature sensor decreases.

The ATC A/C heater control uses the monitored voltage readings as an indication of air outlet temperature. The A/C heater control is programmed to respond to this and other inputs by adjusting the blend and the mode air door positions, and by cycling the A/C clutch on and off as necessary in order to automatically adjust the heating and A/C system to the operator temperature preference setting.

The air duct temperature sensors are diagnosed using a scan tool. Refer to **DIAGNOSIS AND TESTING** .

The air duct temperature sensors cannot be adjusted or repaired and must be replaced if inoperative or damaged.

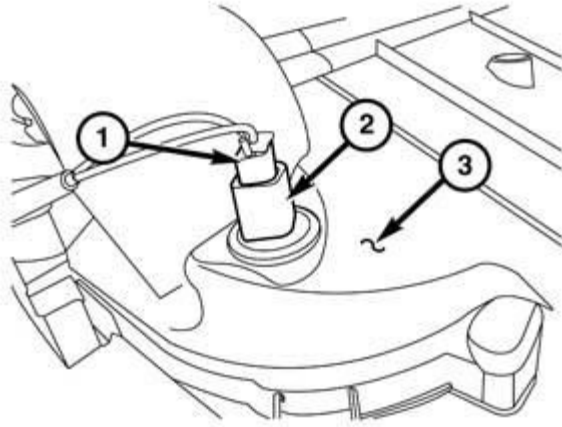
REMOVAL

REMOVAL

WARNING: Disable the airbag system before attempting any steering wheel, steering column or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

NOTE: The Automatic Temperature Control (ATC) heating and A/C system uses four air outlet temperature sensors, that are mounted on both sides and on top of the air distribution housing. Two are for the instrument panel outlets and the other two for the floor outlets.

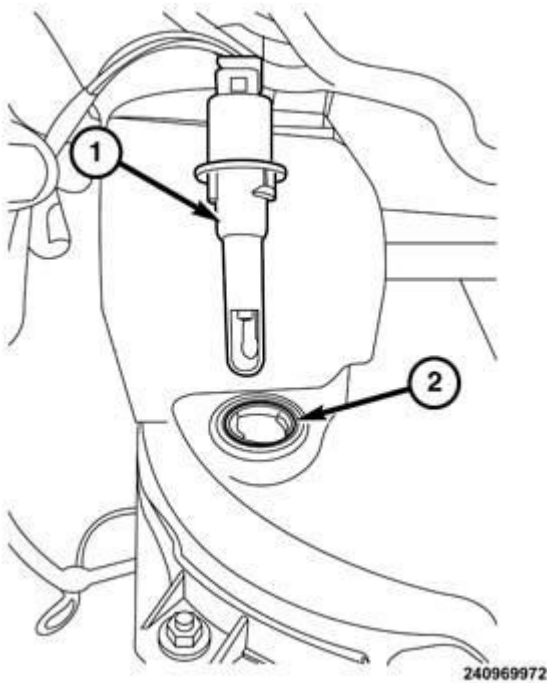
1. Disconnect and isolate the negative battery cable.
2. Remove the radio. Refer to **RADIO, REMOVAL** .



240969973

Fig. 41: Connector, Air Outlet Temperature Sensor & HVAC Housing
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the HVAC wire harness (1) from the air outlet temperature sensor (2).



240969972

Fig. 42: Air Outlet Temperature Sensor & HVAC Housing
Courtesy of CHRYSLER GROUP, LLC

4. Rotate the air outlet temperature sensor (1) counterclockwise and remove from the HVAC housing (2).

INSTALLATION**INSTALLATION**

NOTE: The Automatic Temperature Control (ATC) heating and A/C system uses four air outlet temperature sensors, that are mounted on both sides and on top of the air distribution housing. Two are for the instrument panel outlets and the other two are for the floor outlets.

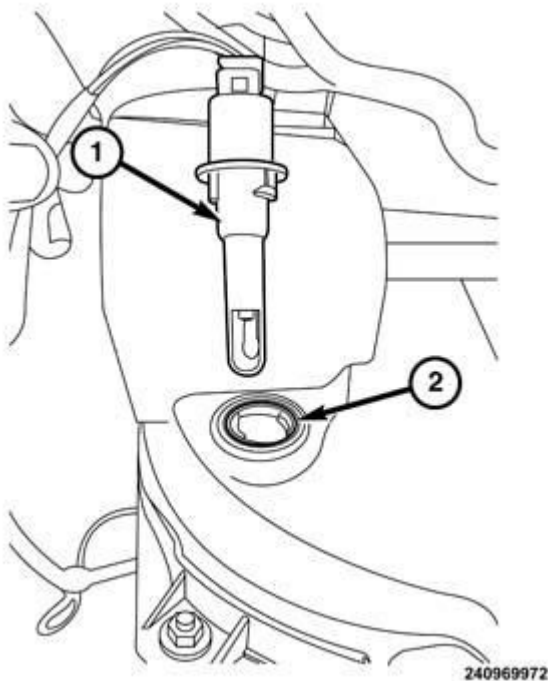
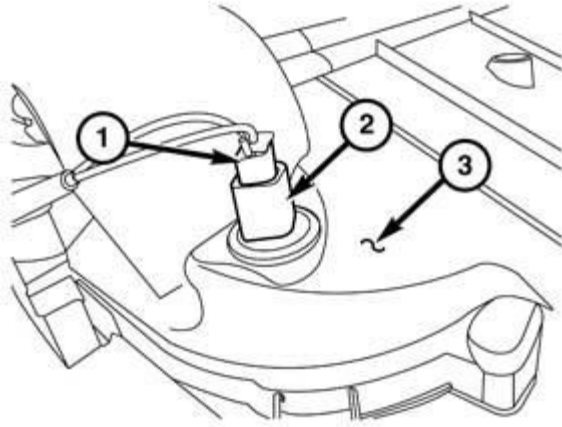


Fig. 43: Air Outlet Temperature Sensor & HVAC Housing
Courtesy of CHRYSLER GROUP, LLC

1. Install the air duct temperature sensor (1) into the air distribution housing (2). Turn the air duct temperature sensor clockwise to engage the sensor into the air distribution housing.



240969973

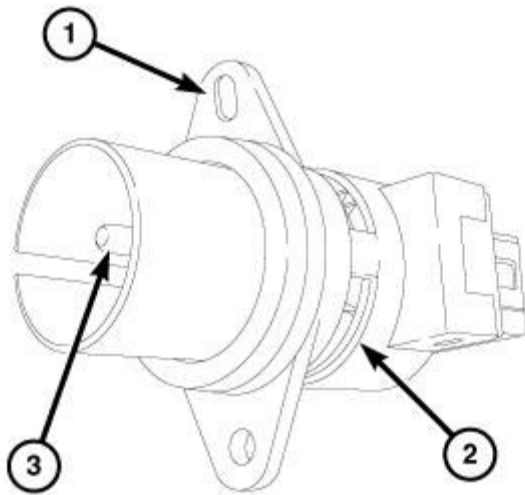
Fig. 44: Connector, Air Outlet Temperature Sensor & HVAC Housing
Courtesy of CHRYSLER GROUP, LLC

2. Connect the HVAC wire harness (1) to the air duct temperature sensor (2).
3. Install the radio. Refer to **RADIO, INSTALLATION** .
4. Connect the negative battery cable.

SENSOR, TEMPERATURE, IN-CAR

DESCRIPTION

DESCRIPTION



2877494

Fig. 45: In-Car Temperature Sensor, Aspirator Motor & Thermistor
Courtesy of CHRYSLER GROUP, LLC

The in-car temperature sensor (1) is used in the Automatic Temperature Control (ATC) heating and A/C system only. The in-car temperature sensor consists of an aspirator motor (2) and a temperature thermistor (3). The in-car temperature sensor sends a resistance signal to the ATC A/C heater module and is attached to the instrument panel, below the steering column.

OPERATION

OPERATION

Air is drawn from the passenger compartment by the aspirator motor and flows over the temperature thermistor. The thermistor changes resistance with air temperature. The Automatic Temperature Control (ATC) A/C-heater control receives the resistance signal over hard-wired circuits and calculates the temperature of the air in the passenger compartment. The ATC system then automatically makes adjustments to maintain the optimum passenger compartment comfort.

The in-car temperature sensor cannot be adjusted or repaired and must be replaced if inoperative or damaged.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - IN-CAR TEMPERATURE SENSOR

NOTE: For complete circuit diagrams, see Wiring Information. Wiring Information includes wiring diagrams, connector pin-out and location views, details of wire harness routing and retention, splice and ground locations and proper wire and connector repair procedures.

Using a scan tool, check for Diagnostic Trouble Codes (DTCs) related to the in-car temperature sensor and the A/C-heater control. If any DTCs are found, repair as necessary. Refer to **DIAGNOSIS AND TESTING** . If no DTCs are found, perform the two following tests. Replace the in-car temperature sensor if the sensor fails either

test.

ASPIRATOR MOTOR TEST

The in-car temperature sensor uses an aspirator motor to draw air from the passenger compartment and flow the air over the temperature thermistor. Test the motor as follows.

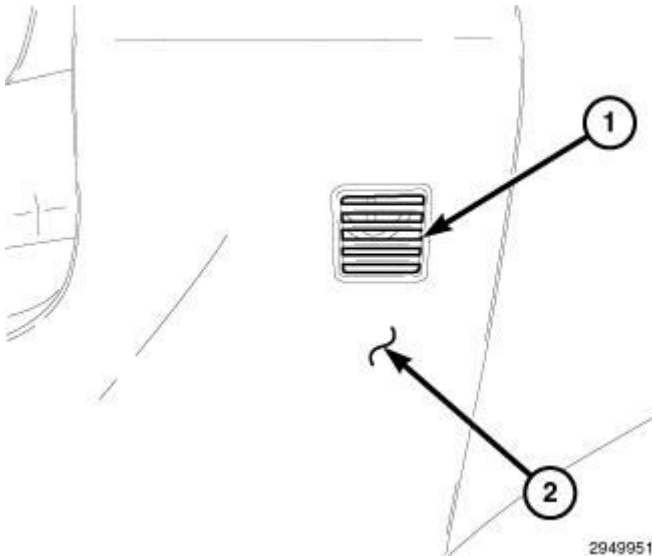


Fig. 46: Opening Grille & Opening Cover
Courtesy of CHRYSLER GROUP, LLC

1. Place the ignition in the Run position.
2. Place a small piece of newspaper in front of the aspirator motor opening grille (1), located on the steering column opening cover (2). If the paper sticks to the grille, the aspirator motor is operating properly. The piece of paper should be only large enough to cover the opening.
3. If the paper does not stick to the grille, check the in-car temperature sensor electrical connections and wiring. If connections and wiring are OK, replace the in-car temperature sensor.

TEMPERATURE THERMISTOR TEST

The in-car temperature sensor uses a temperature thermistor to provide resistance values that correlate with temperature change. Test the thermistor as follows.

1. Remove the in-car temperature sensor and place it on a workbench. Refer to **SENSOR, TEMPERATURE, IN-CAR, REMOVAL**.
2. Note the current ambient air temperature of the work area.
3. Use an ohm meter and check the resistance between pins 1 and 2 of the in-car temperature sensor. Compare the temperature of the work area to the found resistance value. The resistance should be within specifications as listed in the **Resistance and Temperature** chart below. If not OK, replace the in-car temperature sensor.

RESISTANCE AND TEMPERATURE

2014 Jeep Cherokee Trailhawk

2014 HVAC Heating & Air Conditioning - Service Information - Cherokee

Air Temperature Range	Low Resistance Range (kohm)	High Resistance Range (kohm)
-21° to -15°C (-5° to 5°F)	292 ± 1.0	223 ± 0.9
-14° to -9°C (6° to 15°F)	198 ± 0.9	161 ± 0.8
-8° to -4°C (16° to 25°F)	144 ± 0.8	123 ± 0.8
-3° to 1°C (26° to 35°F)	111 ± 0.7	95 ± 0.7
2 to 7°C (36° to 45°F)	86 ± 0.7	70 ± 0.6
8 to 12°C (46° to 55°F)	64 ± 0.6	55 ± 0.5
13° to 18°C (56° to 65°F)	51 ± 0.5	42 ± 0.4
19° to 23°C (66° to 75°F)	39 ± 0.4	33 ± 0.3
24° to 29°C (76° to 85°F)	31 ± 0.3	26 ± 0.3
30° to 35°C (86° to 95°F)	24 ± 0.3	20 ± 0.3
36° to 40°C (96° to 105°F)	18 ± 0.3	16 ± 0.3
41° to 46°C (106° to 115°F)	15 ± 0.3	13 ± 0.3

REMOVAL**REMOVAL**

WARNING: Disable the airbag system before attempting any steering wheel, steering column or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

NOTE: Take the proper precautions to protect the face of the steering column opening cover from cosmetic damage while performing this procedure.

1. Disconnect and isolate the negative battery cable.
2. Remove the steering column opening cover. Refer to **COVER, STEERING COLUMN OPENING, REMOVAL**.

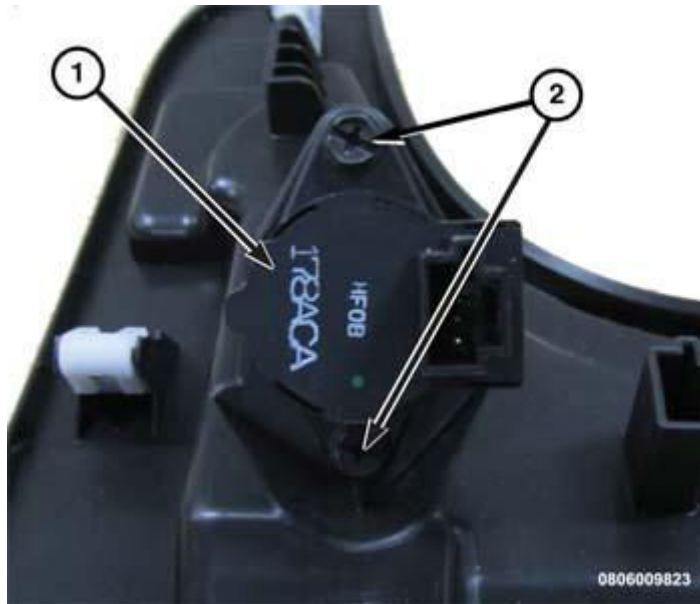


Fig. 47: In-Car Temperature Sensor & Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Remove the two screws (2) that secure the in-car temperature sensor (1) to the steering column opening cover and remove the sensor.

INSTALLATION

INSTALLATION

NOTE: Take the proper precautions to protect the face of the steering column opening cover from cosmetic damage while performing this procedure.

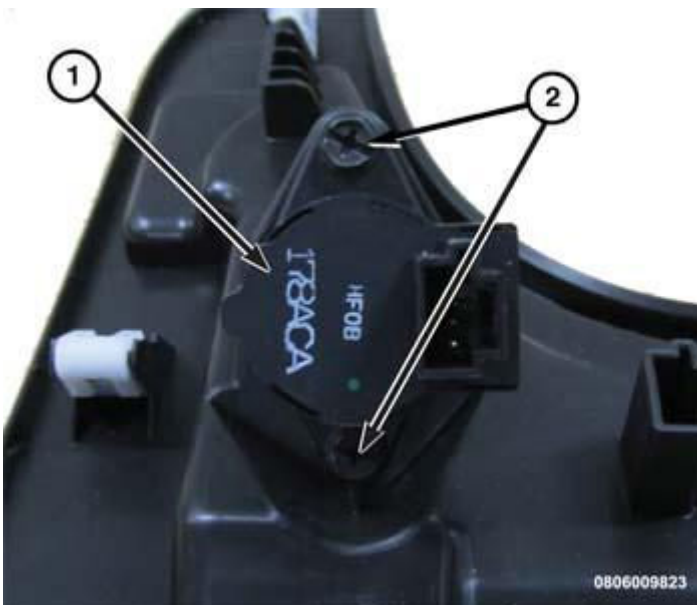


Fig. 48: In-Car Temperature Sensor & Fasteners

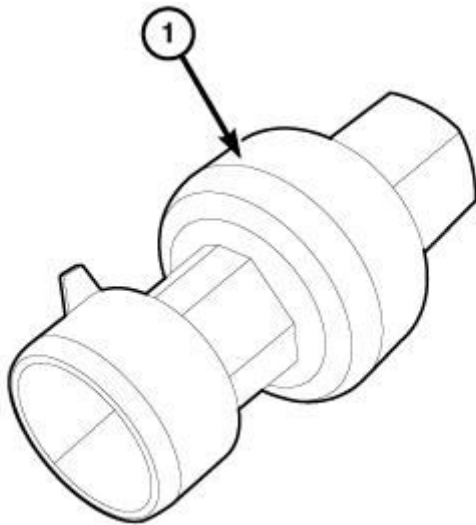
Courtesy of CHRYSLER GROUP, LLC

1. Position the in-car temperature sensor (1) onto the steering column opening cover.
2. Install the two screws (2) that secure the in-car temperature sensor to the steering column opening cover. Tighten the screws securely.
3. Install the steering column opening cover. Refer to **COVER, STEERING COLUMN OPENING, INSTALLATION**.
4. Connect the negative battery cable.

TRANSDUCER, A/C PRESSURE

DESCRIPTION

DESCRIPTION



2998424

Fig. 49: A/C Pressure Transducer

Courtesy of CHRYSLER GROUP, LLC

The A/C pressure transducer (1) is a switch that is installed on a fitting located on the A/C liquid line. The A/C liquid line fitting has an external O-ring seal and uses a Schrader-type valve that allows the A/C pressure transducer to be removed without recovering the refrigerant system. The A/C pressure transducer is connected to the vehicle electrical system by a molded plastic connector with three terminals.

OPERATION

OPERATION

The internal resistance in the A/C pressure transducer changes in response to the pressures in the high side of the A/C refrigerant system. The Powertrain Control Module (PCM) provides a five volt reference signal and a sensor ground to the A/C pressure transducer, and uses the output voltage of the transducer to determine

refrigerant high-side pressure. The PCM is programmed to respond to this and other sensor inputs by controlling the operation of the A/C clutch and the radiator cooling fan to help optimize A/C system performance and to protect refrigerant system components from damage.

The A/C pressure transducer is diagnosed using a scan tool. Refer to the **DTC INDEX** article .

The A/C pressure transducer cannot be adjusted or repaired and must be replaced if inoperative or damaged.

REMOVAL

REMOVAL

NOTE: It is not necessary to discharge the refrigerant system to replace the A/C pressure transducer.

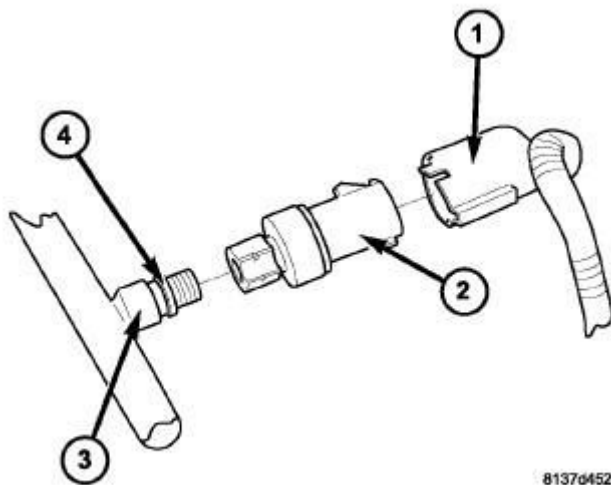


Fig. 50: Removing/Installing A/C Pressure Transducer
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical A/C pressure transducer shown in illustration.

1. Disconnect and isolate the negative battery cable.
2. Disconnect the wire harness connector (1) from the A/C pressure transducer (2) on the A/C discharge line (3).
3. Remove the A/C pressure transducer from the A/C discharge line and remove and discard the O-ring seal (4).

INSTALLATION

INSTALLATION

NOTE: Use only the specified O-ring as it is made of special material for R-134a. Use only refrigerant oil of the type required for the A/C compressor.

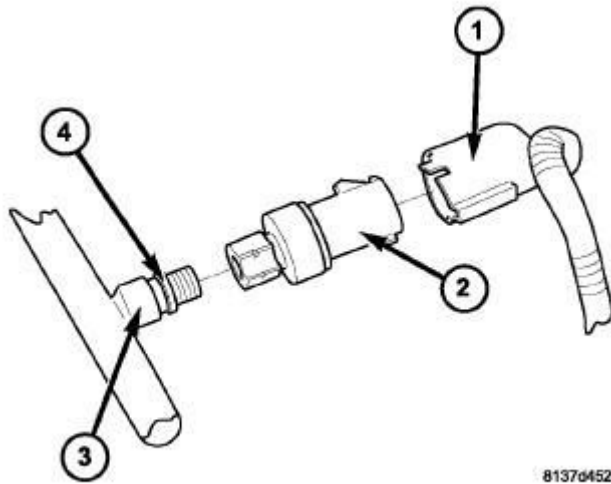


Fig. 51: Removing/Installing A/C Pressure Transducer
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical A/C pressure transducer shown in illustration.

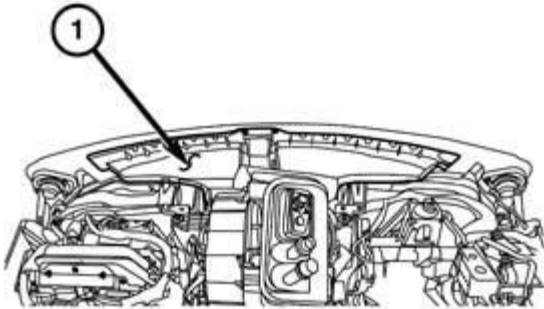
1. Lubricate a new rubber O-ring seal (4) with clean refrigerant oil and install it onto the A/C discharge line (3).
2. Install the A/C pressure transducer (2) onto the A/C discharge line. Tighten the A/C pressure transducer securely.
3. Connect the wire harness connector (1) to the A/C pressure transducer.
4. Reconnect the negative battery cable.

DISTRIBUTION

DUCT, DEFROSTER

DESCRIPTION

DESCRIPTION



240769580

Fig. 52: Defroster Duct**Courtesy of CHRYSLER GROUP, LLC**

The defroster outlets receive airflow from the HVAC housing through a molded plastic defroster duct (1) that is attached to the underside of the instrument panel cover.

The defroster duct is integral to the instrument panel cover and is not serviced separately.

DUCT, FLOOR DISTRIBUTION

REMOVAL

REMOVAL

WARNING: Disable the airbag system before attempting any steering wheel, steering column or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable. Wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in possible serious or fatal injury.

NOTE: Driver side shown in illustration, passenger side typical.

1. Remove the front and rear floor carpet. Refer to **CARPET, FLOOR, REMOVAL** .

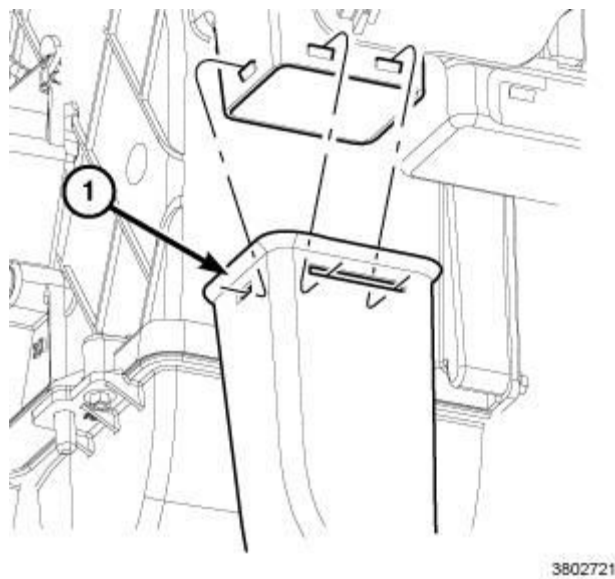


Fig. 53: Floor Duct Retaining Tabs
Courtesy of CHRYSLER GROUP, LLC

2. Using a small Flathead screwdriver or equivalent, disengage the retaining tabs securing the floor duct (1) at the HVAC housing.

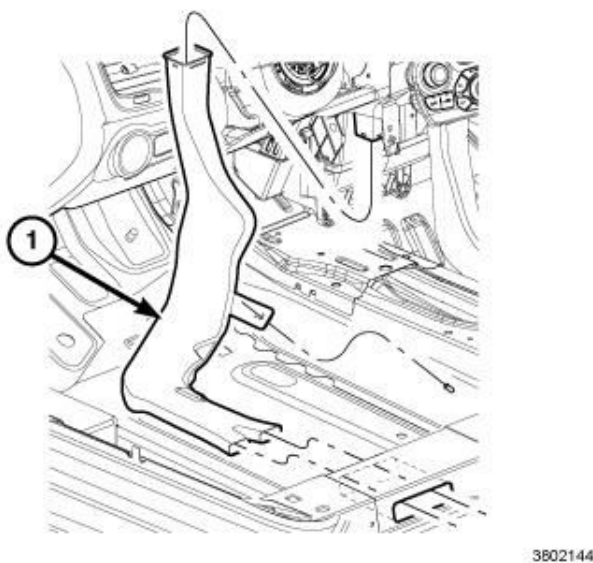


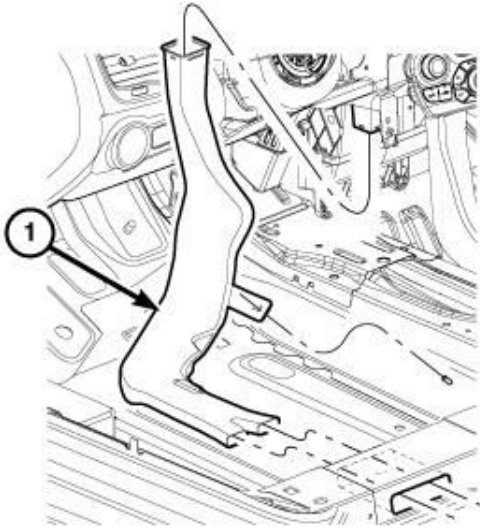
Fig. 54: Floor Duct
Courtesy of CHRYSLER GROUP, LLC

3. Detach/remove the floor duct retainer from the stud in the floorpan.
4. Remove the floor duct (1).

INSTALLATION

INSTALLATION

NOTE: Driver side shown in illustration, passenger side typical.

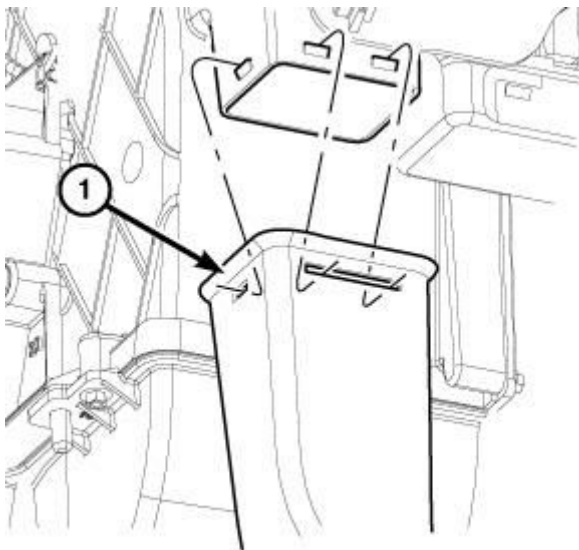


3802144

Fig. 55: Floor Duct

Courtesy of CHRYSLER GROUP, LLC

1. Position the floor duct (1) into the vehicle.
2. Attach/install the floor duct retainer to the stud in the floorpan.



3802721

Fig. 56: Floor Duct Retaining Tabs

Courtesy of CHRYSLER GROUP, LLC

3. Push the duct up to engage the retaining tabs securing the floor duct (1) at the HVAC housing.
4. Install the front and rear floor carpet. Refer to **CARPET, FLOOR, INSTALLATION** .

OUTLET, AIR

REMOVAL

FRONT OUTER AIR OUTLETS

WARNING: Disable the airbag system before attempting any steering wheel, steering column or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable and wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

1. Remove the Instrument Panel End Cap. Refer to **CAP, INSTRUMENT PANEL END, REMOVAL** .
2. Remove the lower trim panel in order to access the retaining screw.
3. Using trim stick or equivalent, carefully disengage the retaining tabs that secure the air outlet to the instrument panel.
4. After the retaining tabs have been disengaged, gently pull the top of the air outlet first and remove the air outlet from the instrument panel.

FRONT CENTER AIR OUTLETS

WARNING: Disable the airbag system before attempting any steering wheel, steering column or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable and wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

NOTE: Take the proper precautions to protect the front face of the center bezel from cosmetic damage during this procedure.

1. Disconnect and isolate the negative battery cable.
2. Remove the center bezel (1) from the instrument panel and place it on a workbench. Refer to **INSTRUMENT PANEL** for information.



Fig. 57: Center Bezel & Front Center Air Outlets
Courtesy of CHRYSLER GROUP, LLC

3. Using Trim Stick (special tool #C-4755, Trim Stick) or equivalent, carefully disengage the plastic retaining clips (1) that secure each air outlet to the center bezel.

INSTALLATION

FRONT OUTER AIR OUTLETS

1. Position the air outlet to the opening in the instrument panel and align the outlet to the instrument panel duct.
2. Engage the retaining tabs that secure each air outlet to the instrument panel. Make sure the retaining tabs are fully engaged.
3. Install the retaining screw.
4. Install the lower trim panel.
5. Install the Instrument Panel End Cap. Refer to **CAP, INSTRUMENT PANEL END, INSTALLATION**.

FRONT CENTER AIR OUTLETS

NOTE: Take the proper precautions to protect the front face of the center bezel from cosmetic damage during this procedure.



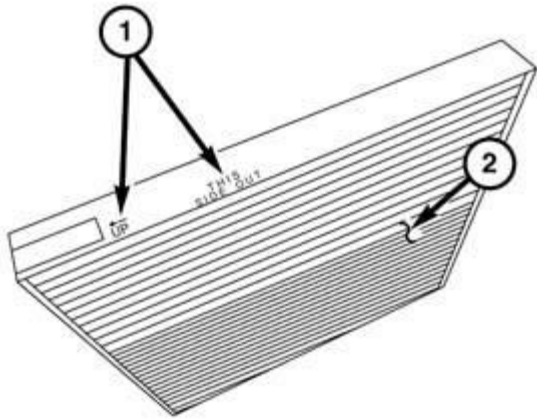
Fig. 58: Center Bezel & Front Center Air Outlets
Courtesy of CHRYSLER GROUP, LLC

1. Position the center air outlet(s) to the back of the instrument panel center bezel and engage the outlet to the center bezel.
2. Carefully engage the plastic retaining clips (1) that secure each air outlet to the center bezel. Make sure the retaining clips are fully engaged.
3. Install the instrument panel center bezel. Refer to **INSTRUMENT PANEL** for information.
4. Connect the negative battery cable.

FILTER, CABIN AIR

DESCRIPTION

DESCRIPTION



240968706

Fig. 59: Label & Cabin Air Filter
Courtesy of CHRYSLER GROUP, LLC

All models are equipped with a cabin air filter (2) that helps purify the outside air entering the HVAC housing. The filter is mounted in the passenger compartment, on the right side of the HVAC housing.

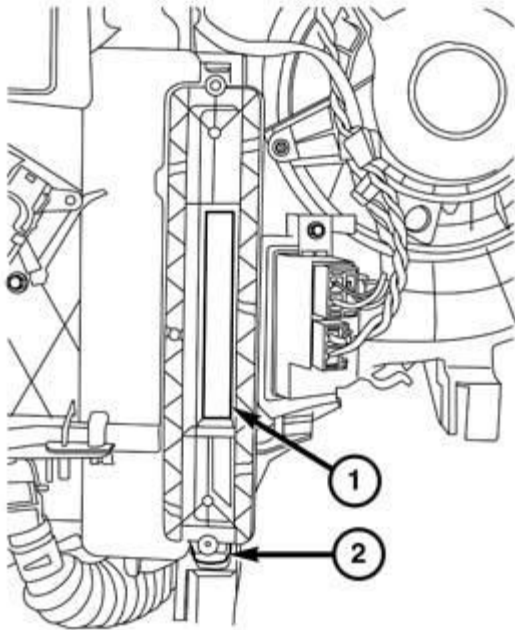
The filter should be replaced at least once a year or every 24, 000 km (15, 000 miles) and checked if heating or A/C system performance seems lower than expected. The cabin air filter is labeled (1) to indicate the proper installation position.

REMOVAL

REMOVAL

WARNING: Disable the airbag system before attempting any steering wheel, steering column or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

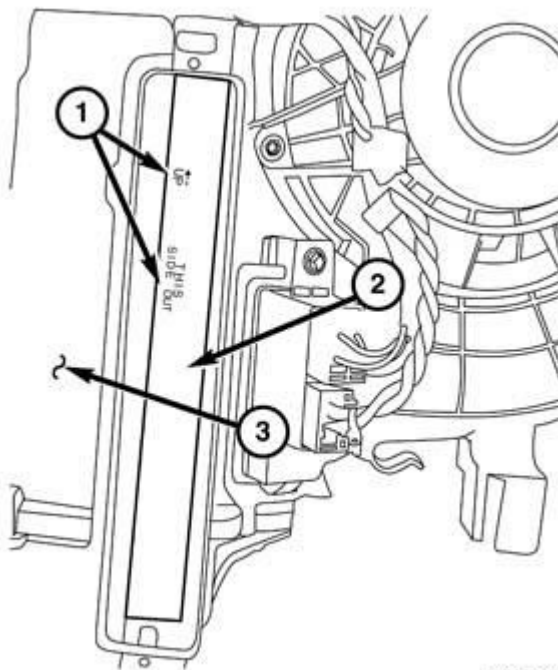
1. Disconnect and isolate the negative battery cable.
2. Remove the passenger side silencer panel. Refer to **PANEL, SILENCER, LOWER, REMOVAL**.
3. Remove the passenger side console closeout.



240968704

Fig. 60: Filter Cover & Retaining Tab
Courtesy of CHRYSLER GROUP, LLC

4. Disengage the retaining tab (2) and remove the filter cover (1).



240968705

Fig. 61: Air Filter Position Indicators, Cabin Air Filter & HVAC Housing
Courtesy of CHRYSLER GROUP, LLC

5. Remove the cabin air filter (2) from the right side of the HVAC housing (3) by pulling the filter element straight out of the housing. Take note of the air filter position indicators (1).

INSTALLATION

INSTALLATION

NOTE: The cabin air filter is labeled with an arrow to indicate proper filter position. Make sure to properly install the cabin air filter. Failure to properly install the filter will result in the need to replace the filter sooner than required by design.

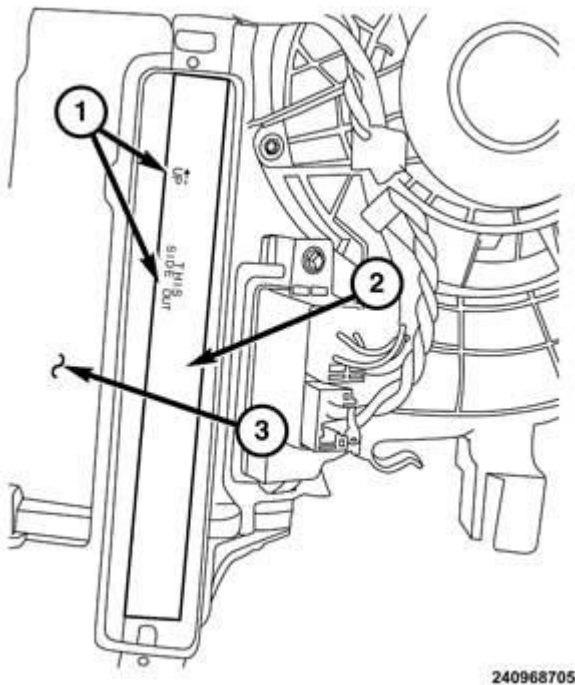
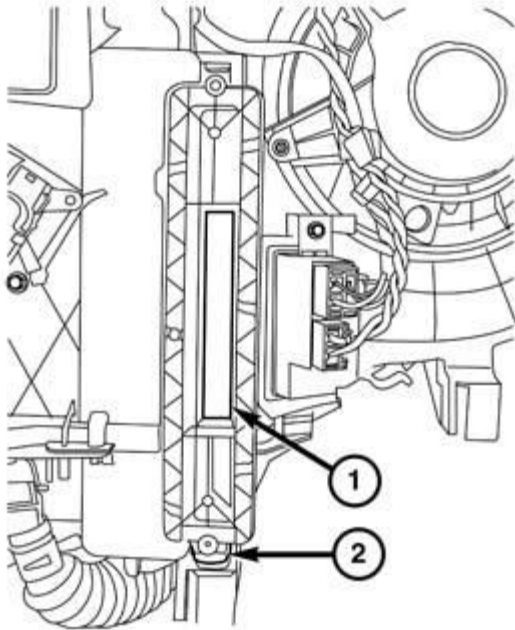


Fig. 62: Air Filter Position Indicators, Cabin Air Filter & HVAC Housing
 Courtesy of CHRYSLER GROUP, LLC

1. Install the cabin air filter (2) into the right side of the HVAC housing (3). Make note of the air filter position indicators (1).



240968704

Fig. 63: Filter Cover & Retaining Tab
 Courtesy of CHRYSLER GROUP, LLC

2. Install the cabin air filter cover (1) onto the right side of the HVAC housing.
3. Engage the retaining tab (2) into the HVAC housing.
4. Install the passenger side console closeout.
5. Install the passenger side silencer panel. Refer to **PANEL, SILENCER, LOWER, INSTALLATION** .
6. Connect the negative battery cable.

HOUSING, HVAC

REMOVAL

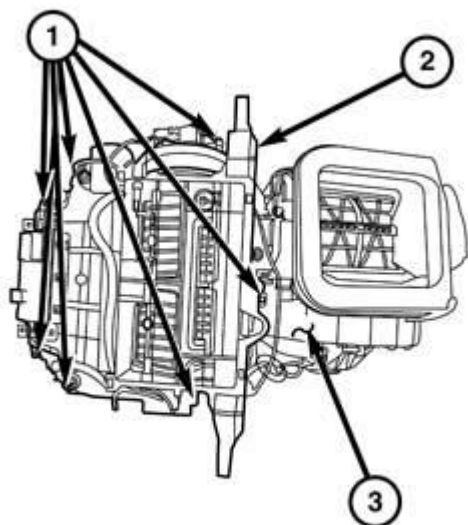
HOUSING-AIR DISTRIBUTION

WARNING: Disable the airbag system before attempting any steering wheel, steering column or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

WARNING: Review the warnings and cautions for this system before performing the procedure. Failure to follow these instructions may result in serious injury or death.

NOTE: The air distribution housing must be removed from the HVAC housing and disassembled for service of the blend-air and mode-air doors.

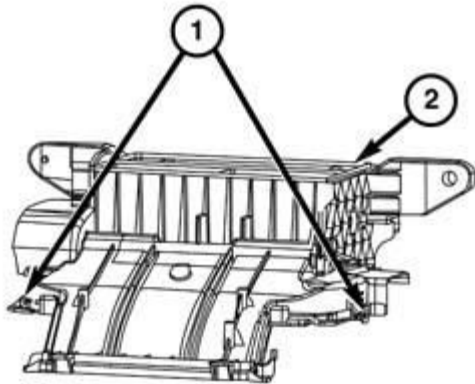
1. Remove the HVAC housing assembly and place it on a workbench. Refer to **HOUSING, HVAC, REMOVAL**.



240769577

Fig. 64: Screws, Air Distribution Housing & HVAC Housing
Courtesy of CHRYSLER GROUP, LLC

2. Remove the seven screws (1) that secure the air distribution housing to the top of the HVAC housing (3).
3. Disconnect wiring harness connectors.



240769578

Fig. 65: Retaining Clips & Air Distribution Housing
Courtesy of CHRYSLER GROUP, LLC

4. Release the two retaining clips (1) that secure the bottom of air distribution housing (2) to the HVAC housing.
5. Remove the air distribution housing from the top of the HVAC housing.
6. If required, disassemble the air distribution housing. Refer to **HOUSING, HVAC, DISASSEMBLY**.

HOUSING-AIR INLET

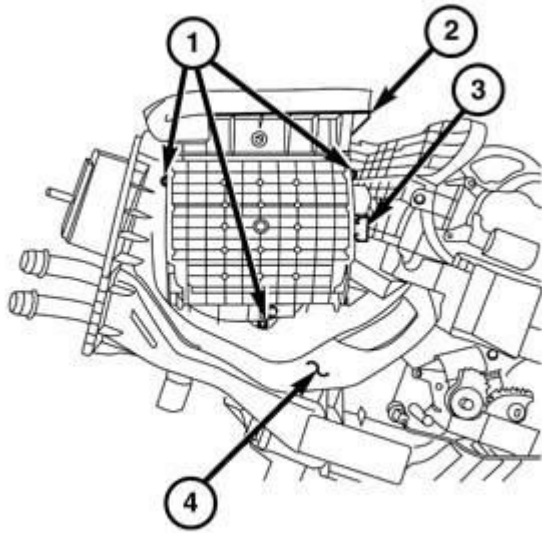
WARNING: Review the warnings and cautions for this system before performing the procedure. Failure to follow these instructions may result in serious injury or death.

WARNING: Disable the airbag system before attempting any steering wheel, steering column or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

NOTE: The air inlet housing must be removed from HVAC housing and disassembled for service of the recirculation-air door.

1. Remove the HVAC housing assembly and place it on a workbench. Refer to **HOUSING, HVAC,**

REMOVAL.



240969651

Fig. 66: Screws, Inlet Housing, Recirculation Door Actuator & HVAC Housing
 Courtesy of CHRYSLER GROUP, LLC

2. Disconnect the wire harness connector from the recirculation door actuator (3).
3. Remove the three screws (1) that secure the air inlet housing (2) to HVAC housing (4).
4. Remove the inlet housing from the HVAC housing.
5. If required, disassemble the air inlet housing. Refer to **HOUSING, HVAC, DISASSEMBLY**.

HOUSING-HVAC

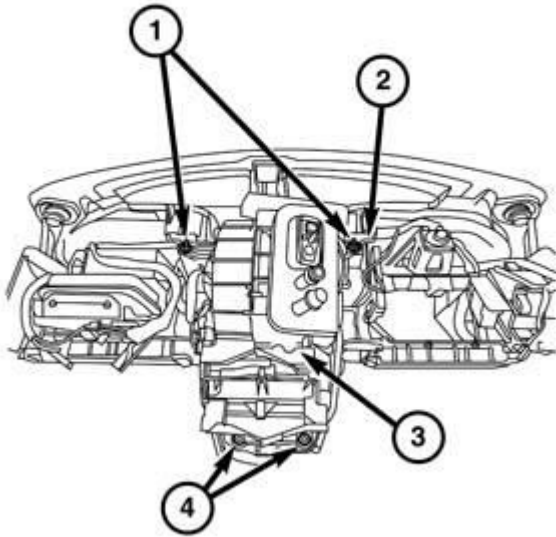
WARNING: Disable the airbag system before attempting any steering wheel, steering column or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable. Wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: Review the warnings and cautions for this system before performing the procedure. Failure to follow these instructions may result in serious injury or death.

NOTE: The HVAC housing and instrument panel must be removed from the vehicle as an assembly.

NOTE: The HVAC housing must be removed from the instrument panel and disassembled for service of the A/C evaporator, air intake housing, and the heater core.

1. Remove the instrument panel and place it on a workbench. Refer to **PANEL, INSTRUMENT, REMOVAL**.



240970356

Fig. 67: Nuts, Bolts, Instrument Panel Support & HVAC Housing Assembly
Courtesy of CHRYSLER GROUP, LLC

2. Disconnect the instrument panel wire harness connectors from the HVAC wiring harness.
3. Remove the 2 nuts (1) and the 2 bolts (4) that secure the HVAC housing assembly (3) to the center of the instrument panel support (2) and remove the housing from the support.

SCREEN-AIR INLET

NOTE: LHD model shown in illustration. RHD model similar.

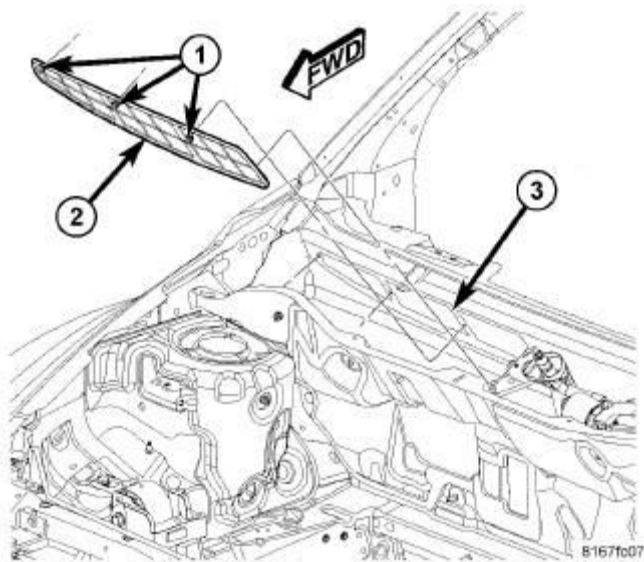


Fig. 68: View Of HVAC Housing Air Inlet Screen
 Courtesy of CHRYSLER GROUP, LLC

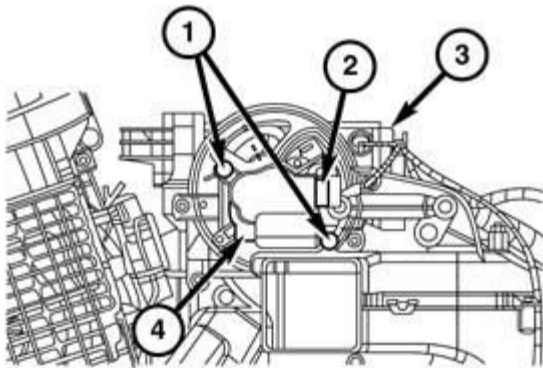
1. Remove the cowl grille screen. Refer to **COVER, COWL PANEL, REMOVAL** .
2. Disengage the three push-in retainers (1) that secure the HVAC housing air inlet screen (2) to the cowl panel (3) and remove the screen.

DISASSEMBLY

HOUSING-AIR DISTRIBUTION

1. Remove the air distribution housing assembly and place it on a workbench. Refer to **HOUSING, HVAC, REMOVAL**.

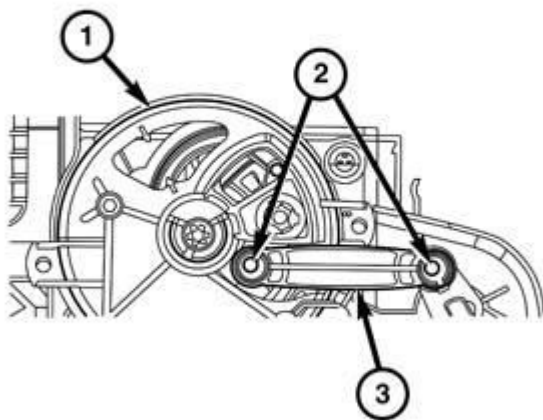
Remove the air temperature sensors. Refer to **SENSOR, TEMPERATURE, AIR OUTLET, REMOVAL**.



240969744

Fig. 69: Screws, Connector, Air Distribution Housing & Mode Door Actuator
Courtesy of CHRYSLER GROUP, LLC

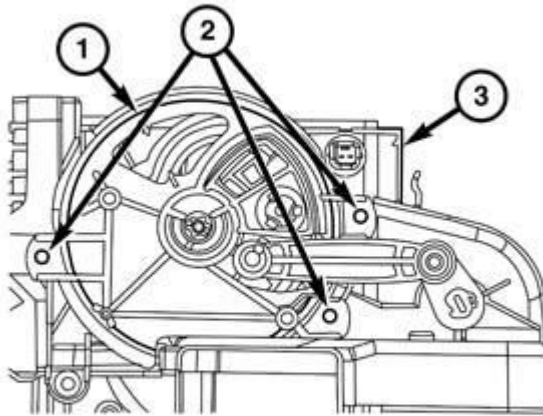
2. Disconnect the wiring harness connector (2) from the mode door actuator.
3. Remove the two retaining screws (1).
4. Remove the mode door actuator (4) from the air distribution housing (3).



240969745

Fig. 70: Cam, Lever & Heater Link
Courtesy of CHRYSLER GROUP, LLC

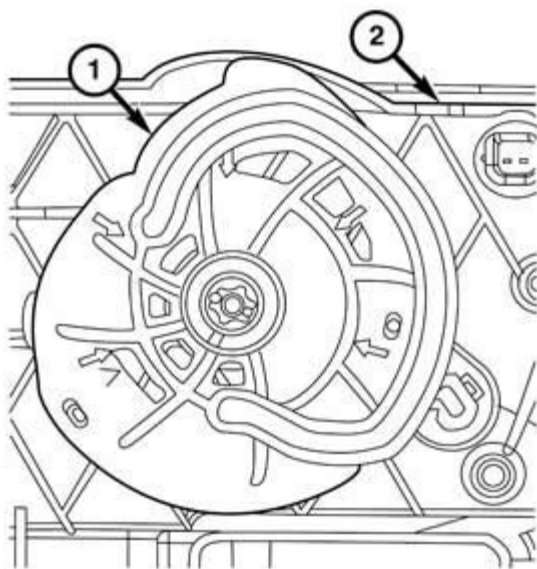
5. Disconnect heater link (3) from the cam (1) and lever (2).



240969746

Fig. 71: Mounting Bracket, Screws & Air Distribution Housing
Courtesy of CHRYSLER GROUP, LLC

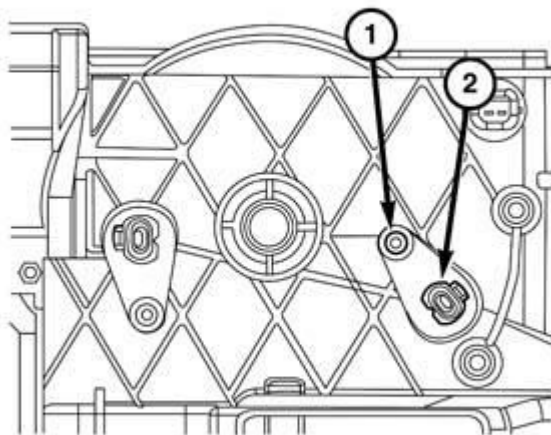
6. Remove the three screws (2) from the mounting bracket (1).
7. Remove the mounting bracket from the air distribution housing (3).



240969747

Fig. 72: Mode Cam & Air Distribution Housing
Courtesy of CHRYSLER GROUP, LLC

8. Remove mode cam (1) from the air distribution housing (3).



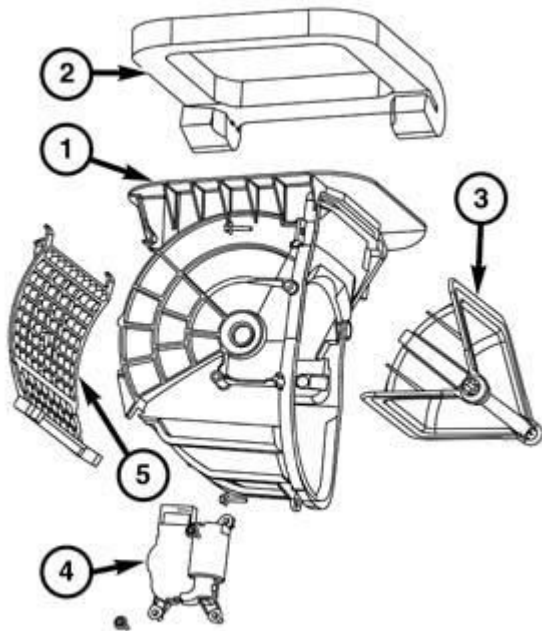
240969748

Fig. 73: Levers & Retaining Tabs
Courtesy of CHRYSLER GROUP, LLC

- Disengage the plastic retaining tabs (2) and remove the levers (1) from the air distribution housing.

HOUSING-AIR INLET

- Remove the air inlet housing from the HVAC housing. Refer to **HOUSING, HVAC, REMOVAL**.



240969652

Fig. 74: Air Inlet Housing, Foam Seal, Recirculation Air Door, Recirculation Door Actuator & Air Inlet Screen

Courtesy of CHRYSLER GROUP, LLC

- Remove the screw that secures the recirculation door actuator (4) to the air inlet housing (1) and remove the actuator.
- Remove air inlet screen (5) from air inlet housing.
- The recirculation air door (3) is serviced as an assembly with the air inlet housing.

NOTE: If the foam seal (2) on the air inlet housing is deformed or damaged, the seal must be replaced.

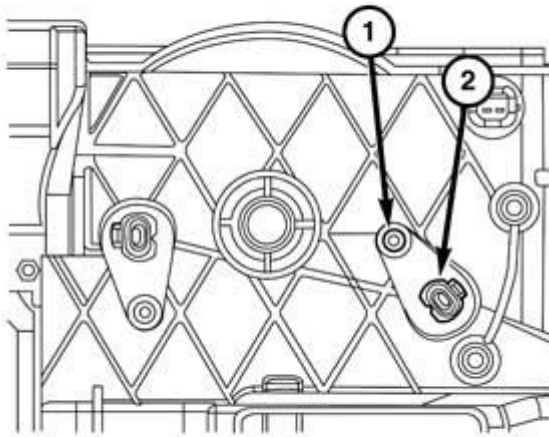
HOUSING-HVAC

NOTE: The HVAC housing must be removed from the vehicle and disassembled for service of the A/C evaporator and heater core.

- Remove the HVAC housing assembly and place it on a workbench. Refer to **HOUSING, HVAC, REMOVAL**.
- Remove the blower motor power module. Refer to **MODULE, POWER, BLOWER MOTOR,**

REMOVAL.

3. Remove the evaporator temperature sensor. Refer to **SENSOR, EVAPORATOR TEMPERATURE, REMOVAL.**
4. Remove the HVAC wiring harness (1).
5. Remove the A/C evaporator. Refer to **EVAPORATOR, A/C, REMOVAL.**

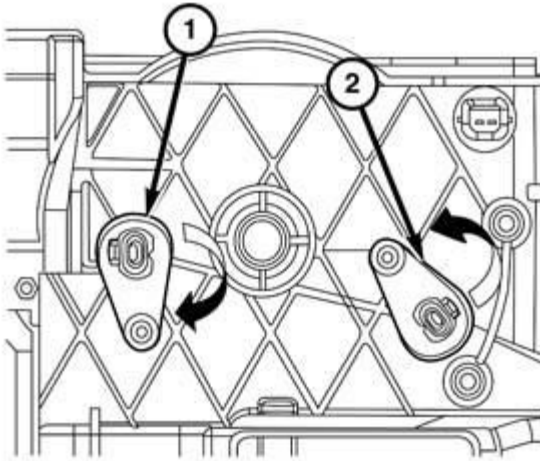
ASSEMBLY**HOUSING-AIR DISTRIBUTION**

240969748

Fig. 75: Levers & Retaining Tabs

Courtesy of CHRYSLER GROUP, LLC

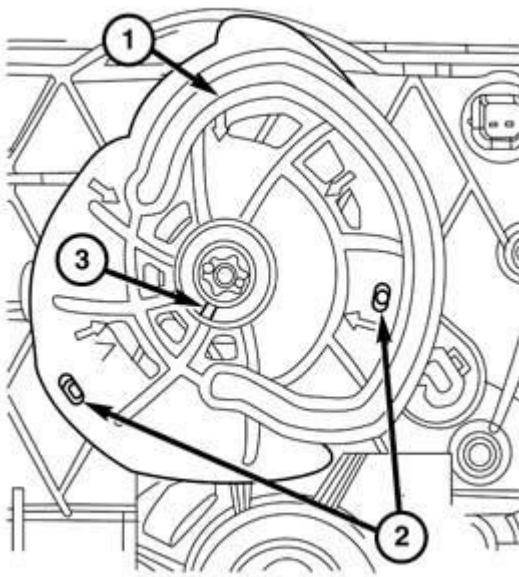
1. Install the two mode door levers (1) onto the air distribution housing. Make sure the lever retaining tabs (2) are fully engaged.



240969749

Fig. 76: Left & Right Mode Door Levers
Courtesy of CHRYSLER GROUP, LLC

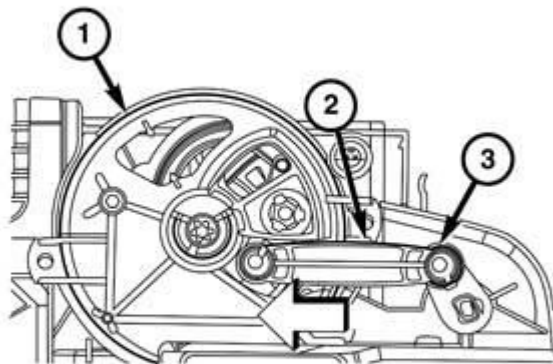
2. Align the two mode door levers, the left lever (1) must be fully rotated clockwise and the right lever (2) must be fully rotated counterclockwise, gravity will allow them to stay in this position.



240969750

Fig. 77: Cam Lobe, Windows & Rib On Shaft
Courtesy of CHRYSLER GROUP, LLC

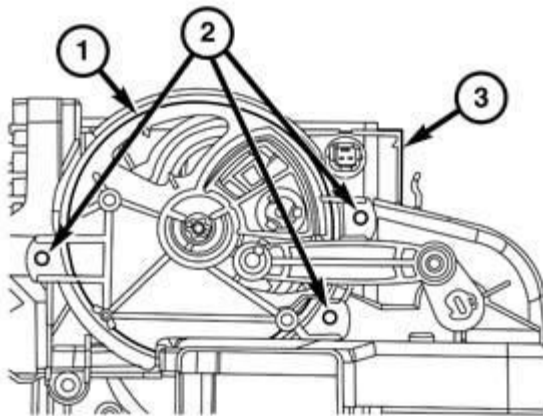
3. With the levers in position, the cam should be oriented with the lobe up (1), rib on shaft pointing to seven O'clock (3), then pressed into place. There are windows (2) in the cam to help see the pins on the levers.



240969751

Fig. 78: Cam & Heater Link**Courtesy of CHRYSLER GROUP, LLC**

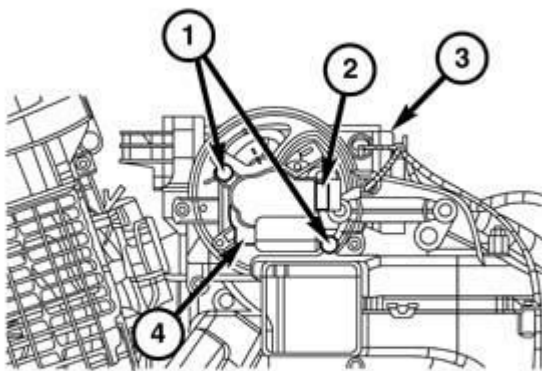
4. To place the bracket on the top of the cam (1), push heater link (2) all the way to the left, move the lever counter clockwise and assembly to the heater link (3), press bracket onto cam.



240969746

Fig. 79: Mounting Bracket, Screws & Air Distribution Housing
Courtesy of CHRYSLER GROUP, LLC

5. Install the three screws (2) that secure the mounting bracket (1) to the air distribution housing (3). Tighten the screws to 2 N.m (17 in. lbs.).

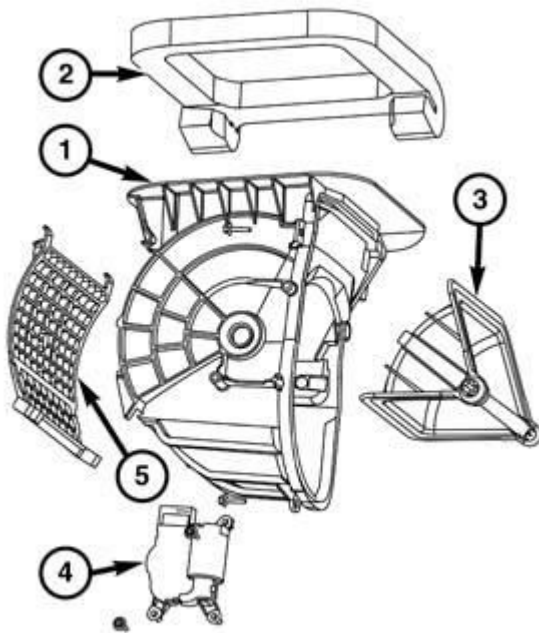


240969744

Fig. 80: Screws, Connector, Air Distribution Housing & Mode Door Actuator
Courtesy of CHRYSLER GROUP, LLC

6. Position the blend door actuator (4) onto the air distribution housing (3).
7. Install the two screws (1) securing the mode door actuator. Tighten the screws to 2 N.m (17 in. lbs.).
8. Connect the wiring harness connector (3) to the blend door actuator.
9. Install the air temperature sensors. Refer to **SENSOR, TEMPERATURE, AIR OUTLET, INSTALLATION**.
10. Install the air distribution housing onto the HVAC housing (1). Refer to **HOUSING, HVAC, INSTALLATION**.
11. Install the HVAC housing assembly. Refer to **HOUSING, HVAC, INSTALLATION**.

HOUSING-AIR INLET



240969652

Fig. 81: Air Inlet Housing, Foam Seal, Recirculation Air Door, Recirculation Door Actuator & Air Inlet Screen

Courtesy of CHRYSLER GROUP, LLC

1. Install the recirculation door actuator (4) onto the air inlet housing. If necessary, rotate the actuator slightly to align the splines of the actuator output shaft with those on the recirculation door pivot shaft adapter.
2. Install the retaining screw securing the recirculation door actuator to the housing. Tighten the screw to 2 N.m (17 in. lbs.).
3. Install the air inlet screen (5) onto the air inlet housing.
4. Install the air inlet housing onto the HVAC housing. Refer to **HOUSING, HVAC, INSTALLATION**.

NOTE: If the foam seal (2) on the air inlet housing is deformed or damaged, the seal must be replaced.

HOUSING-HVAC

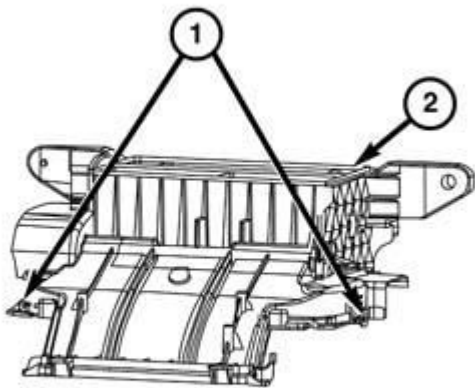
CAUTION: Be certain to adjust the refrigerant oil level when servicing the A/C refrigerant system. Failure to properly adjust the refrigerant oil level will prevent the A/C system from operating as designed and can cause serious A/C compressor damage.

NOTE: When replacing multiple A/C system components, see the Refrigerant Oil Capacities chart to determine how much oil should be added to the refrigerant system. Refer to OIL, REFRIGERANT, STANDARD PROCEDURE.

1. Install the A/C evaporator. Refer to EVAPORATOR, A/C, INSTALLATION.
2. Install the HVAC wiring harness. Make sure the harness is routed through all wiring retainers.
3. Install the evaporator temperature sensor. Refer to SENSOR, EVAPORATOR TEMPERATURE, INSTALLATION.
4. Install the blower motor power module. Refer to MODULE, POWER, BLOWER MOTOR, INSTALLATION.
5. Install the HVAC housing assembly. Refer to HOUSING, HVAC, INSTALLATION.

INSTALLATION

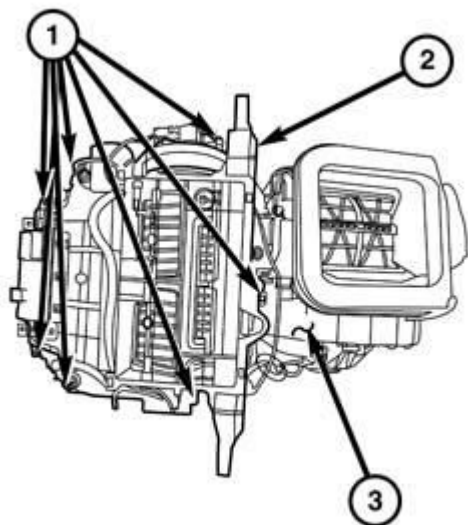
HOUSING-AIR DISTRIBUTION



240769578

Fig. 82: Retaining Clips & Air Distribution Housing
Courtesy of CHRYSLER GROUP, LLC

1. Position the air distribution housing (2) onto the top of the top of HVAC housing.
2. Fasten the retaining clips (1) that secure the bottom of the air distribution housing to the HVAC housing.
3. Fasten the wiring harness connectors.

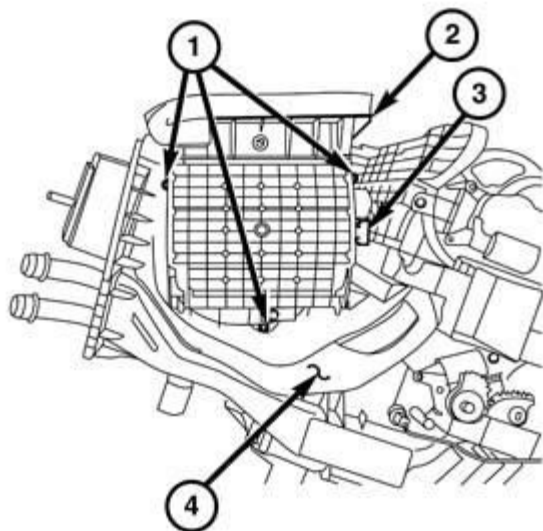


240769577

Fig. 83: Screws, Air Distribution Housing & HVAC Housing
Courtesy of CHRYSLER GROUP, LLC

4. Install the seven screws (1) that secure the air distribution housing (2) to the HVAC housing (3). Tighten the screws to 1.2 N.m (10 in. lbs.).
5. Install the HVAC housing assembly. Refer to **HOUSING, HVAC, INSTALLATION**.

HOUSING-AIR INLET

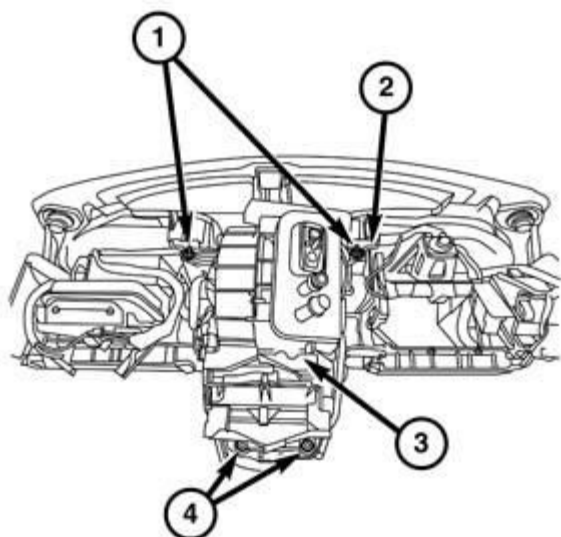


240969651

Fig. 84: Screws, Inlet Housing, Recirculation Door Actuator & HVAC Housing
Courtesy of CHRYSLER GROUP, LLC

1. Position the air inlet housing (1) to the left side of the HVAC housing (4).
2. Install the 3 screws (1) that secure the air inlet housing to the HVAC housing. Tighten the screws to 2.2 N.m (20 in. lbs.).
3. Connect the wire harness connector to the recirculation door actuator (3).
4. Install the HVAC housing assembly. Refer to **HOUSING, HVAC, INSTALLATION**.

HOUSING-HVAC



240970356

Fig. 85: Nuts, Bolts, Instrument Panel Support & HVAC Housing Assembly
Courtesy of CHRYSLER GROUP, LLC

1. Position the HVAC housing assembly (3) into the instrument panel support (1).
2. Install the 2 nuts (1) and the 2 bolts (4) that secure the HVAC housing assembly to the center of instrument panel support. Tighten to 4 N.m (35 in. lbs.).
3. Connect the instrument panel wire harness connectors to the HVAC wiring harness.

NOTE: **If the foam seal on the top of the HVAC housing is deformed or damaged, the seal must be replaced.**

4. Install the instrument panel. Refer to **PANEL, INSTRUMENT, INSTALLATION** .

SCREEN-AIR INLET

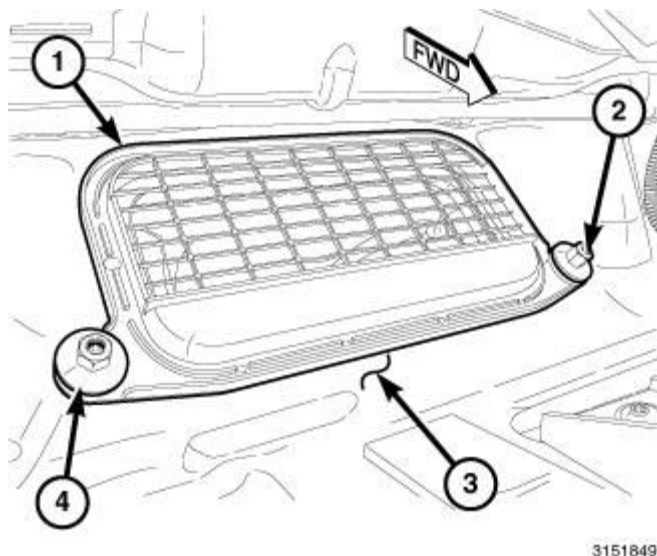


Fig. 86: Air Inlet Screen & Plastic Nuts
 Courtesy of CHRYSLER GROUP, LLC

1. Position the air inlet screen (1) to the cowl panel (3).
2. Install the two plastic nuts (2 and 4) that secure the air inlet screen to the cowl panel. Tighten the nuts securely.
3. Install the cowl panel cover. Refer to **COVER, COWL PANEL, INSTALLATION** .

MOTOR, BLOWER

DESCRIPTION

DESCRIPTION

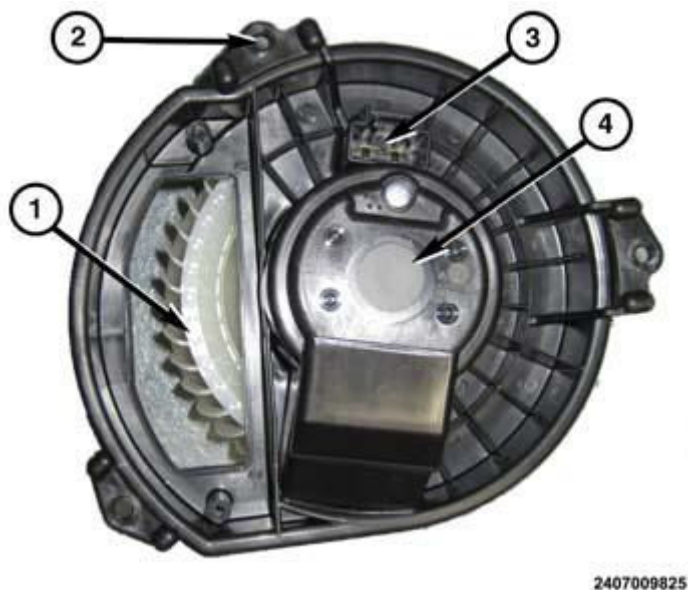


Fig. 87: Blower Motor**Courtesy of CHRYSLER GROUP, LLC**

The blower motor (4) is used to control the velocity of air moving through the HVAC housing by spinning the blower wheel (1) within the HVAC air inlet housing at the selected speed.

The blower motor is a 12-volt, direct current (DC) motor mounted within a plastic housing with an integral wire harness connector (3) and three mounting tabs (2). The squirrel cage-type blower wheel is secured to the blower motor shaft and is positioned within the air inlet housing on the passenger side of the HVAC housing.

OPERATION**OPERATION**

The blower motor controls the velocity of air moving through the HVAC housing by spinning the blower wheel within the HVAC air inlet housing at the selected speed.

Both the Manual Temperature Control (MTC) heating-A/C system and the Automatic Temperature Control (ATC) heating-A/C system have an electronic blower motor power module to control blower motor speed. The power module uses a Pulse Width Modulated (PWM) input from the A/C-heater control and a feedback signal from the blower motor to regulate the blower motor ground path. On both systems, the blower motor receives battery current through the Power Distribution Center (PDC) whenever the ignition switch is in the Run position, and the blower motor control is in any position except Off.

The blower motor control system is diagnosed using a scan tool. Refer to **STANDARD PROCEDURE** .

The blower motor and blower motor wheel are factory balanced as an assembly and cannot be adjusted or repaired and must be replaced if inoperative or damaged.

DIAGNOSIS AND TESTING**DIAGNOSIS AND TESTING - BLOWER MOTOR**

WARNING: Disable the airbag system before attempting any steering wheel, steering column or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable and wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

To determine if an open condition exists within the blower motor circuit wiring, it is necessary to disconnect the negative battery cable and check for continuity within the blower motor circuits using an ohmmeter. See Wiring Information for circuit descriptions and diagrams.

REMOVAL

REMOVAL

1. Disconnect and isolate the negative battery cable.
2. Remove the passenger side silencer panel. Refer to **PANEL, SILENCER, LOWER, REMOVAL**.
3. Remove the passenger side center console close out.
4. Remove the blower motor power module

Refer to **MODULE, POWER, BLOWER MOTOR, REMOVAL**.

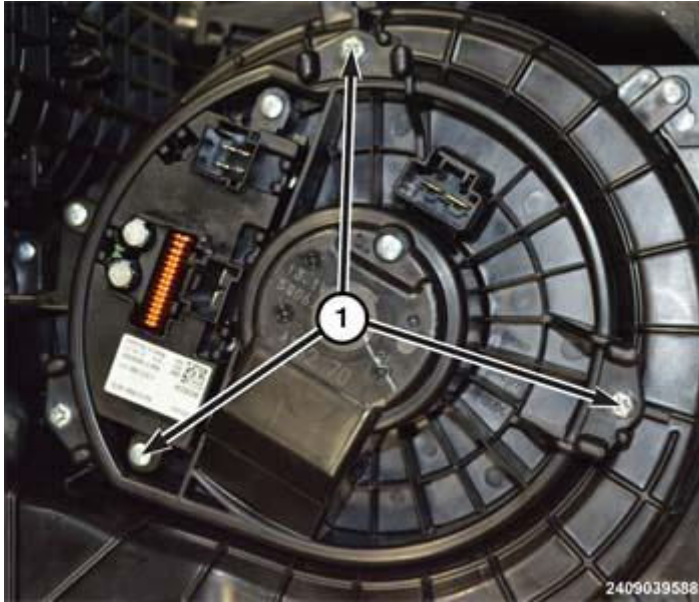


Fig. 88: Blower Motor To HVAC Housing & Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. Remove the three screws (1) that secure the blower motor.
6. Remove the blower motor from the passenger side of the HVAC housing.

INSTALLATION**INSTALLATION**

1. Position the blower motor into the passenger side of the HVAC housing.
2. Install the three screws that secure the blower motor. Tighten the screws to 1.2 N.m (10 in. lbs.).
3. Connect the wire harness connector.
4. Install the blower motor power module

Refer to **MODULE, POWER, BLOWER MOTOR, INSTALLATION**.

5. Install the center console close out.
6. Install the passenger side silencer panel. Refer to **PANEL, SILENCER, LOWER, INSTALLATION**.

7. Connect the negative battery cable.

PLUMBING

WARNING

WARNING

WARNING: The A/C system contains refrigerant under high pressure. Repairs should only be performed by qualified service personnel. Serious or fatal injury may result from improper service procedures.

WARNING: Avoid breathing the refrigerant and refrigerant oil vapor or mist. Exposure may irritate the eyes, nose, and/or throat. Wear eye protection when servicing the A/C refrigerant system. Serious eye injury can result from direct contact with the refrigerant. If eye contact occurs, seek medical attention immediately.

WARNING: Do not expose the refrigerant to open flame. Poisonous gas is created when refrigerant is burned. An electronic leak detector is recommended. Serious or fatal injury may result from improper service procedures.

WARNING: If accidental A/C system discharge occurs, ventilate the work area before resuming service. Large amounts of refrigerant released in a closed work area will displace the oxygen and cause suffocation and serious or fatal injury.

WARNING: The engine cooling system is designed to develop internal pressures up to 145 kPa (21 psi). Do not remove or loosen the coolant pressure cap, cylinder block drain plugs, radiator drain, radiator hoses, heater hoses, or hose clamps while the engine cooling system is hot and under pressure. Allow the vehicle to cool for a minimum of 15 minutes before opening the cooling system for service. Failure to observe this warning can result in serious burns from the heated engine coolant.

CAUTION

CAUTION

CAUTION: The use of A/C system sealers may result in damage to A/C refrigerant recovery/evacuation/recharging equipment and/or A/C system. Many federal, state/provincial and local regulations prohibit the recharge of A/C systems with known leaks. Chrysler LLC recommends the detection of A/C system leaks through the use of approved leak detectors and fluorescent

leak detection dyes. Vehicles found with A/C system sealers should be treated as contaminated and replacement of the entire A/C refrigerant system is recommended. A/C systems found to be contaminated with A/C system sealers, A/C stop-leak products or seal conditioners voids the warranty for the A/C system.

CAUTION: Recover the refrigerant before opening any fitting or connection. Open the fittings with caution, even after the system has been discharged. Never open or loosen a connection before recovering the refrigerant.

CAUTION: If equipped, do not remove the secondary retention clip from any spring-lock coupler connection while the refrigerant system is under pressure. Recover the refrigerant before removing the secondary retention clip. Open the fittings with caution, even after the system has been discharged. Never open or loosen a connection before recovering the refrigerant.

CAUTION: The internal parts of the A/C system will remain stable as long as moisture-free refrigerant and refrigerant oil is used. Abnormal amounts of dirt, moisture or air can upset the chemical stability. This may cause operational troubles or even serious damage if present in more than very small quantities. Before disconnecting a component, clean the outside of the fittings thoroughly to prevent contamination from entering the refrigerant system. Keep service tools and the work area clean. Do not open the refrigerant system or uncap a replacement component until you are ready to service the system. Immediately after disconnecting a component from the refrigerant system, seal the open fittings with a cap or plug. This will prevent contamination from entering the A/C system.

CAUTION: Refrigerant oil will absorb moisture from the atmosphere if left uncapped. Do not open a container of refrigerant oil until you are ready to use it. Replace the cap on the oil container immediately after using. Store refrigerant oil only in a clean, airtight, and moisture-free container.

CAUTION: Do not overcharge the refrigerant system. Overcharging will cause excessive compressor head pressure and can cause compressor noise and A/C system failure.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - REFRIGERANT SYSTEM LEAKS

WARNING: Review the safety precautions and warnings in this information before performing this procedure. Failure to follow these instructions may result in serious injury or death.

WARNING: Do not expose the refrigerant to open flame. Poisonous gas is created when refrigerant is burned. An electronic leak detector is recommended. Serious or fatal injury may result from improper service procedures.

WARNING: Use extreme care when working around a running engine. Keep hands and fingers clear of the radiator fan, accessory drive belt and all other moving components. Keep away when wearing loose clothing, jewelry or long hair that is not properly secured. Underhood components may become hot to the touch. Be careful not to come into contact with hot engine, A/C and engine cooling system components. Failure to follow these instructions may result in serious or fatal injury.

NOTE: Always conduct the A/C Performance Test as outlined in this group prior to searching for an A/C refrigerant leak. Refer to DIAGNOSIS AND TESTING.

NOTE: The A/C system in this vehicle comes equipped from the factory with fluorescent refrigerant leak detection dye installed in the refrigerant system.

When searching for a refrigerant leak in the A/C system, use an Ultra Violet (UV) light and an electronic leak detector that is designed for refrigerant used on this vehicle. It is important to use only high-quality refrigerant leak detection equipment to properly locate refrigerant system leaks, such as the equipment listed in the team PSE Service Equipment Catalog. When the use of additional leak detection dye is required, use only Chrysler LLC approved refrigerant leak detection dye, available through Mopar®.

LEAK TEST

1. Begin searching for refrigerant leaks using a high quality UV light to detect the fluorescent refrigerant leak detection dye.
 - Inspect all connections, plumbing fittings, brazed joints, hoses, hose crimps, service ports, compressor housing, pressure relief valve and A/C condenser for dye
 - Inspect the evaporator drain tube and condensate for presence of dye, which indicates a leak from the A/C evaporator
 - If equipped with rear A/C, inspect the underbody refrigerant lines, fittings, rear evaporator drain tube and condensate for presence of dye, which indicates a leak from the rear evaporator
 - If no leaks are found using a UV light, proceed to **step #2** .
2. If a leak is not found with the leak detection dye, operate the heating and A/C system with the engine at idle under the following conditions for at least 15 minutes, then proceed to **step #3** .
 - Doors or windows open
 - Transmission in Park or Neutral with the parking brake set (depending on transmission application)
 - A/C and heater controls set to outside air, full cool, panel mode, high blower and A/C compressor engaged (If the A/C compressor does not engage, go to **LOW OR EMPTY REFRIGERANT SYSTEM**).
 - If equipped with rear A/C, set rear controls to full cool and high blower

3. Shut the vehicle off and wait at least 5 minutes.
4. Insert the leak detector into the evaporator drain tube and the instrument panel air outlets, to check for evaporator leaks. Check the evaporator tubes at the A/C expansion valve, for leaks not visible behind the expansion valve. Check around the front of the A/C compressor, for compressor shaft seal leaks. Check between the A/C condenser and radiator for condenser leaks not previously visible.
5. If equipped with rear A/C, insert the leak detector into the rear evaporator drain tube and rear air outlets. Check the underbody A/C lines and fittings, evaporator tubes and rear A/C expansion valve.

LOW OR EMPTY REFRIGERANT SYSTEM

NOTE: **This procedure should only be done after an A/C Performance Test has been conducted and a refrigerant system leak has NOT been found using the factory installed leak detection dye.**

Do the following if the A/C compressor will not engage and a refrigerant leak in the A/C system is suspected but cannot be found using the factory installed leak detection dye.

1. Recover, evacuate and recharge the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.
2. Operate the heating and A/C system with the engine at idle under the following conditions for at least 15 minutes.
 - Doors or windows open
 - Transmission in Park or Neutral with the parking brake set (depending on transmission application)
 - A/C and heater controls set to outside air, full cool, panel mode, high blower and A/C compressor engaged
 - If equipped with rear A/C, set rear controls to full cool and high blower
3. Shut the vehicle off and return to. Refer to **LEAK TEST**.

STANDARD PROCEDURE**R-134A REFRIGERANT SYSTEM RECOVERY**

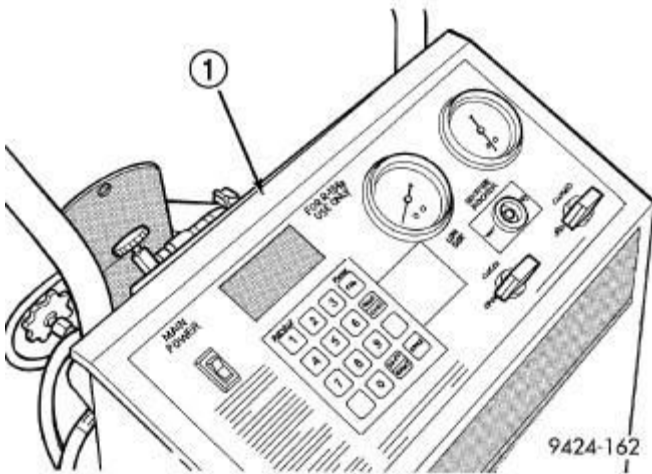


Fig. 89: Identifying R-134a Refrigerant Recovery/Recycling/Charging Station
Courtesy of CHRYSLER GROUP, LLC

The R-134a refrigerant must be recovered from the A/C system prior to performing any repairs that require disconnection of an A/C refrigerant line.

When recovering the A/C refrigerant system, use an R-134a refrigerant recovery/recycling/charging station (1) that meets SAE standard J2788. Per SAE standard J2788, refrigerant recovery stations must recover 95% of the refrigerant system within 30 minutes at 21.1° C (70° F) and be able to measure the amount of refrigerant removed from the system to an accuracy of 28 grams (1 oz.). See the operating instructions supplied by the equipment manufacturer for proper care and use of this equipment.

NOTE: A/C system should be tested prior to refrigerant recovery if the use of A/C system sealants are suspected. These sealants have the potential to clog refrigerant recovery equipment and cause vehicle A/C component damage. Various tool manufacturers make tool kits that detect A/C system sealants. See the operating instructions supplied by the equipment manufacturer for proper care and use of this equipment.

If sealants are detected in an A/C system, the system should be treated as contaminated and replacement of the entire A/C refrigerant system is recommended. A/C systems found to be contaminated with A/C system sealers, A/C stop-leak products or seal conditioners void the warranty for the A/C system.

RECOVERY PROCEDURE

WARNING: Review the safety precautions and warnings in this information before performing this procedure. Failure to follow these instructions may result in serious injury or death.

CAUTION: Various aftermarket manufacturers produce A/C system sealants that are designed to stop A/C refrigerant system leaks. The use of A/C system sealants may result in damage to A/C refrigerant

recovery/evacuation/recharging equipment and/or the vehicle A/C system and are not recommended for use by Chrysler LLC.

CAUTION: A small amount of refrigerant oil is removed from the A/C system each time the refrigerant system is recovered and evacuated. Before charging the A/C system, you **MUST** replenish any oil lost during the recovery process. See the equipment manufacturer instructions for more information.

1. If use of aftermarket A/C system sealant is suspected, the A/C system should be tested for sealant prior to refrigerant system recovery. See the operating instructions supplied by the equipment manufacturer for proper use and care of this equipment.
2. Connect an R-134a refrigerant recovery/recycling/charging station that meets SAE standard J2788 to the refrigerant system.
3. Recover the A/C refrigerant system following the operating instructions supplied by the recovery/recycling/charging station manufacturer.
4. Disconnect the refrigerant recovery/recycling/charging station from the refrigerant system service ports.
5. Reinstall the caps onto the refrigerant system service ports.

R-1234YF REFRIGERANT SYSTEM RECOVERY

WARNING: Review the safety precautions and warnings in this information before performing this procedure. Failure to follow these instructions may result in serious injury or death.

CAUTION: Various aftermarket manufacturers produce A/C system sealants that are designed to stop A/C refrigerant system leaks. The use of A/C system sealants may result in damage to A/C refrigerant recovery/evacuation/recharging equipment and/or the vehicle A/C system and are not recommended for use by Chrysler LLC.



Fig. 90: R-1234YF Refrigerant Recovery/Recycling/Charging Station
Courtesy of CHRYSLER GROUP, LLC

When servicing the A/C system, an R-1234YF refrigerant recovery/recycling/charging station that meets SAE standard must be used. Per SAE standard, refrigerant recovery stations must recover 95% of the refrigerant system within 30 minutes at 21.1° C (70° F) and be able to measure the amount of refrigerant removed from the system to an accuracy of 28 grams (1 oz.). See the operating instructions supplied by the equipment manufacturer for proper care and use of this equipment.

NOTE: **A/C system should be tested prior to refrigerant recovery if the use of A/C system sealants are suspected. These sealants have the potential to clog refrigerant recovery equipment and cause vehicle A/C component damage. Various tool manufacturers make tool kits that detect A/C system sealants. See the operating instructions supplied by the equipment manufacturer for proper care and use of this equipment.**

If sealants are detected in an A/C system, the system should be treated as contaminated and replacement of the entire A/C refrigerant system is recommended. A/C systems found to be contaminated with A/C system sealers, A/C stop-leak products or seal conditioners void the warranty for the A/C system.

RECOVERY PROCEDURE

WARNING: Review the safety precautions and warnings in this information before performing this procedure. Failure to follow these instructions may result in serious injury or death.

CAUTION: Various aftermarket manufacturers produce A/C system sealants that are designed to stop A/C refrigerant system leaks. The use of A/C system sealants may result in damage to A/C refrigerant

recovery/evacuation/recharging equipment and/or the vehicle A/C system and are not recommended for use by Chrysler LLC.

CAUTION: A small amount of refrigerant oil is removed from the A/C system each time the refrigerant system is recovered and evacuated. Before charging the A/C system, you **MUST** replenish any oil lost during the recovery process. See the equipment manufacturer instructions for more information.

1. If use of aftermarket A/C system sealant is suspected, the A/C system should be tested for sealant prior to refrigerant system recovery. See the operating instructions supplied by the equipment manufacturer for proper use and care of this equipment.
2. Connect an R-1234YF refrigerant recovery/recycling/charging station that meets SAE standard to the refrigerant system.
3. Recover the A/C refrigerant system following the operating instructions supplied by the recovery/recycling/charging station manufacturer.
4. Disconnect the refrigerant recovery/recycling/charging station from the refrigerant system service ports.
5. Reinstall the caps onto the refrigerant system service ports.

R-134A REFRIGERANT SYSTEM EVACUATE

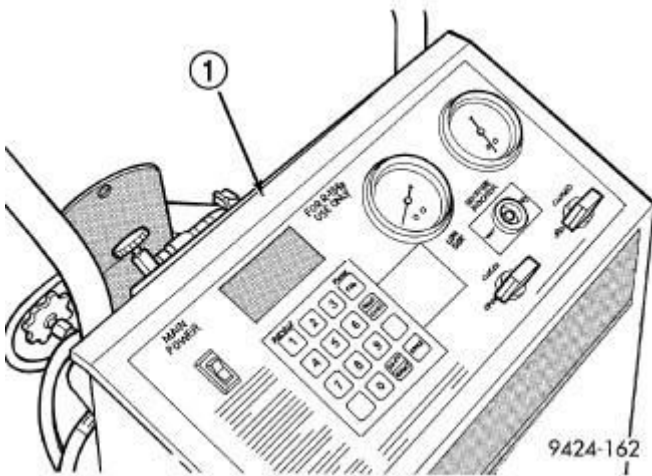


Fig. 91: Identifying R-134a Refrigerant Recovery/Recycling/Charging Station
Courtesy of CHRYSLER GROUP, LLC

If the A/C refrigerant system has been open to the atmosphere, it must be evacuated before the A/C system can be recharged with R-134a refrigerant.

NOTE: Special effort must be used to prevent moisture from entering the A/C system oil. Moisture in the oil is very difficult to remove and will cause a reliability problem with the A/C compressor.

Moisture and air in the A/C refrigerant system will raise the compressor head pressure above acceptable operating levels. This will reduce the performance of the A/C system and damage the A/C compressor. Moisture will boil at near room temperature when exposed to vacuum. Always use an R-134a refrigerant recovery/recycling/charging station with a vacuum pump (1) that meets SAE standard J2788, or an R-134a compatible manifold gauge set and a stand-alone vacuum pump.

If an A/C compressor is left open to the atmosphere for an extended period of time, it is recommended that the refrigerant oil in the compressor be drained and replaced with new refrigerant oil to reduce the possibility of contaminating the refrigerant system. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE**.

R-134A EVACUATION PROCEDURE

WARNING: Review the safety precautions and warnings in this information before performing this procedure. Failure to follow these instructions may result in serious injury or death.

CAUTION: A small amount of refrigerant oil is removed from the A/C system each time the refrigerant system is recovered and evacuated. Before charging the A/C system, you **MUST** replenish any oil lost during the recovery process. See the equipment manufacturer instructions for more information.

1. Recover the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.

NOTE: When connecting service equipment couplers to refrigerant line service ports, verify that the valve of each coupler is fully closed prior to connecting. This will reduce the amount of effort required to make the connections.

2. Connect an R-134a refrigerant recovery/recycling/charging station with a vacuum pump that meets SAE standard J2788 to the refrigerant system, or an R-134a compatible manifold gauge set and a stand-alone vacuum pump (depending on available equipment).
3. Open the refrigerant recovery/recycling/charging station or manifold gauge set valves and start the vacuum pump. The vacuum pump should run a minimum of 45 minutes prior to recharge to eliminate all moisture in system. When the low-side gauge reads to the lowest degree of vacuum possible (approximately -88 kPa (-26 in. Hg) or greater) for 30 minutes, close all valves and turn off vacuum pump. If the refrigerant system fails to reach specified vacuum, the refrigerant system likely has a leak that must be corrected. If the refrigerant system maintains specified vacuum for at least 30 minutes, start the vacuum pump, open the valves and allow the refrigerant system to evacuate an additional 10 minutes.
4. Close the refrigerant recovery/recycling/charging station or manifold gauge set valves. Turn off and disconnect the vacuum pump.
5. Disconnect the refrigerant recovery/recycling/charging station or manifold gauge set from the refrigerant system service ports.
6. Install the caps onto the refrigerant system service ports.

R-1234YF REFRIGERANT SYSTEM EVACUATE

Fig. 92: R-1234YF Refrigerant Recovery/Recycling/Charging Station
Courtesy of CHRYSLER GROUP, LLC

If the A/C refrigerant system has been open to the atmosphere, it must be evacuated before the A/C system can be recharged with R-1234YF refrigerant.

NOTE: **Special effort must be used to prevent moisture from entering the A/C system oil. Moisture in the oil is very difficult to remove and will cause a reliability problem with the A/C compressor.**

Moisture and air in the A/C refrigerant system will raise the compressor head pressure above acceptable operating levels. This will reduce the performance of the A/C system and damage the A/C compressor. Moisture will boil at near room temperature when exposed to vacuum. Always use an R-1234YF refrigerant recovery/recycling/charging station with a vacuum pump that meets SAE standard, or an R-1234YF compatible manifold gauge set and a stand-alone vacuum pump.

If an A/C compressor is left open to the atmosphere for an extended period of time, it is recommended that the refrigerant oil in the compressor be drained and replaced with new refrigerant oil to reduce the possibility of contaminating the refrigerant system. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE**.

EVACUATION PROCEDURE

WARNING: Review the safety precautions and warnings in this information before performing this procedure. Failure to follow these instructions may result in serious injury or death.

CAUTION: A small amount of refrigerant oil is removed from the A/C system each

time the refrigerant system is recovered and evacuated. Before charging the A/C system, you MUST replenish any oil lost during the recovery process. See the equipment manufacturer instructions for more information.

1. Recover the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.

NOTE: When connecting service equipment couplers to refrigerant line service ports, verify that the valve of each coupler is fully closed prior to connecting. This will reduce the amount of effort required to make the connections.

2. Connect an R-1234YF refrigerant recovery/recycling/charging station with a vacuum pump that meets SAE standard to the refrigerant system, or an R-1234YF compatible manifold gauge set and a stand-alone vacuum pump (depending on available equipment).
3. Open the refrigerant recovery/recycling/charging station or manifold gauge set valves and start the vacuum pump. The vacuum pump should run a minimum of 45 minutes prior to recharge to eliminate all moisture in system. When the low-side gauge reads to the lowest degree of vacuum possible (approximately -88 kPa (-26 in. Hg) or greater) for 30 minutes, close all valves and turn off vacuum pump. If the refrigerant system fails to reach specified vacuum, the refrigerant system likely has a leak that must be corrected. If the refrigerant system maintains specified vacuum for at least 30 minutes, start the vacuum pump, open the valves and allow the refrigerant system to evacuate an additional 10 minutes.
4. Close the refrigerant recovery/recycling/charging station or manifold gauge set valves. Turn off and disconnect the vacuum pump.
5. Disconnect the refrigerant recovery/recycling/charging station or manifold gauge set from the refrigerant system service ports.
6. Install the caps onto the refrigerant system service ports.

R-134A REFRIGERANT SYSTEM CHARGE

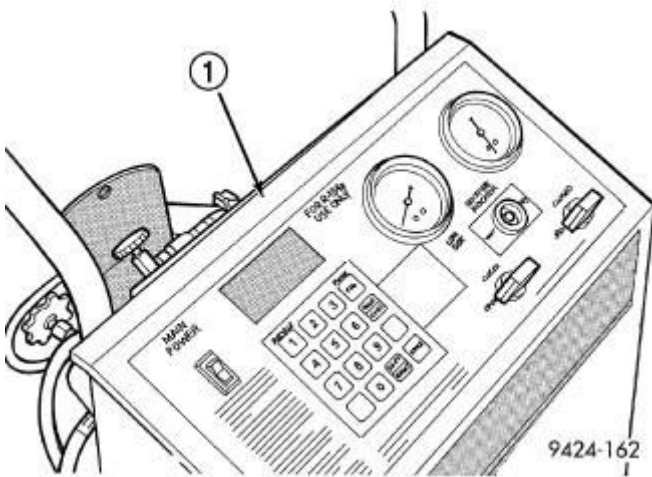


Fig. 93: Identifying R-134a Refrigerant Recovery/Recycling/Charging Station

Courtesy of CHRYSLER GROUP, LLC

After all A/C refrigerant system repairs have been completed and the refrigerant system has been evacuated, the A/C system can be recharged with R-134a refrigerant.

When charging the A/C system, use an R-134a refrigerant recovery/recycling/charging station (1) that meets SAE standard J2788. Per SAE standard J2788, refrigerant recovery stations must charge the system to an accuracy of 14 grams (0.5 oz.). See the operating instructions supplied by the equipment manufacturer for proper care and use of this equipment.

R-134A CHARGING PROCEDURE

WARNING: Review the safety precautions and warnings in this information before performing this procedure. Failure to follow these instructions may result in serious injury or death.

CAUTION: A small amount of refrigerant oil is removed from the A/C system each time the refrigerant system is recovered and evacuated. Before charging the A/C system, you **MUST** replenish any oil lost during the recovery process. See the equipment manufacturer instructions for more information.

1. Recover and evacuate the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.
2. Connect an R-134a refrigerant recovery/recycling/charging station that meets SAE standard J2788 to the refrigerant system.
3. When required, adjust the refrigerant oil level. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE**.

NOTE: A/C system refrigerant capacity can be found on the HVAC Specification Label, located in the engine compartment.

4. Measure the proper amount of refrigerant and heat it to 52° C (125° F) with the charging station. Refer to **REFRIGERANT, SPECIFICATIONS**. See the operating instructions supplied by the equipment manufacturer for proper use of this equipment.
5. Open both the low and high side valves, then open the charge valve to allow the heated refrigerant to flow into the refrigerant system.
6. When the transfer of refrigerant has stopped, close the valves.

WARNING: Take care not to open the high side (high pressure) valve while performing Step 7. Failure to follow these instructions may result in possible serious or fatal injury.

7. Perform the following if all of the refrigerant charge did not transfer from the dispensing device.
 - Open all of the windows in the vehicle.

- Set the heating and A/C system so that the A/C compressor is operating and the blower motor is operating at its lowest speed setting.
 - Run the engine at a steady high idle (about 1400 RPM).
 - If the A/C compressor does not operate, test the compressor control circuits and repair as required.
 - Open the low side valve and the charge valve to allow the remaining refrigerant to flow into the refrigerant system.
 - When the transfer of refrigerant has stopped, close the valves.
8. Disconnect the refrigerant recovery/recycling/charging station from the refrigerant system service ports.
 9. Reinstall the caps onto the refrigerant system service ports.

R-1234YF REFRIGERANT SYSTEM CHARGE

WARNING: Review the warnings and cautions for this system before performing the procedure. Failure to follow these instructions may result in serious injury or death.

NOTE: The Underhood HVAC Specification Label contains the refrigerant fill specification of the vehicle being serviced.



Fig. 94: R-1234YF Refrigerant Recovery/Recycling/Charging Station
Courtesy of CHRYSLER GROUP, LLC

After all refrigerant system leaks have been repaired and the refrigerant system has been evacuated, a refrigerant charge can be injected into the system. Refer to **PLUMBING, STANDARD PROCEDURE**.

When charging the A/C system, use an R-1234YF refrigerant recovery/recycling/charging station that meets SAE standard. Per SAE standard, refrigerant recovery stations must charge the system to an accuracy of 14 grams (0.5 oz.). See the operating instructions supplied by the equipment manufacturer for proper care and use.

of this equipment.

CHARGING PROCEDURE

WARNING: Review the safety precautions and warnings in this information before performing this procedure. Failure to follow these instructions may result in serious injury or death.

CAUTION: A small amount of refrigerant oil is removed from the A/C system each time the refrigerant system is recovered and evacuated. Before charging the A/C system, you **MUST** replenish any oil lost during the recovery process. See the equipment manufacturer instructions for more information.

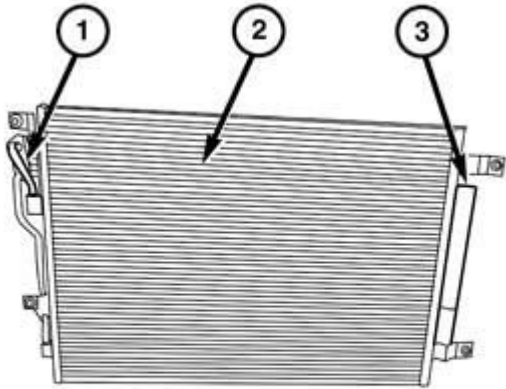
1. Recover and evacuate the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.
2. Connect an R-1234YF refrigerant recovery/recycling/charging station that meets SAE standard to the refrigerant system.
3. When required, adjust the refrigerant oil level. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE**.

NOTE: A/C system refrigerant capacity can be found on the HVAC Specification Label, located in the engine compartment.

4. Open both the low and high side valves, then open the charge valve to allow the refrigerant to flow into the refrigerant system.
5. When the transfer of refrigerant has stopped, close the valves.

WARNING: Take care not to open the high side (high pressure) valve while performing Step 7. Failure to follow these instructions may result in possible serious or fatal injury.

6. Perform the following if all of the refrigerant charge did not transfer from the dispensing device.
 - Open all of the windows in the vehicle.
 - Set the heating and A/C system so that the A/C compressor is operating and the blower motor is operating at its lowest speed setting.
 - Run the engine at a steady high idle (about 1400 RPM).
 - If the A/C compressor does not operate, test the compressor control circuits and repair as required.
 - Open the low side valve and the charge valve to allow the remaining refrigerant to flow into the refrigerant system.
 - When the transfer of refrigerant has stopped, close the valves.
7. Disconnect the refrigerant recovery/recycling/charging station from the refrigerant system service ports.
8. Install the caps onto the refrigerant system service ports.

DRIER, A/C RECEIVER**DESCRIPTION****DESCRIPTION**

240970354

Fig. 95: A/C Condenser & A/C Receiver/Drier
Courtesy of CHRYSLER GROUP, LLC

The A/C receiver/drier (3) is mounted to the left side of the A/C condenser (2) and is on the high-side of the A/C system. The A/C receiver/drier helps remove moisture from the refrigerant, filters the refrigerant, stores any unnecessary refrigerant and retains any refrigerant vapor that may leave the A/C condenser, until it becomes a liquid.

The A/C receiver/drier is integral to the A/C condenser and must be replaced with the condenser as an assembly.

OPERATION**OPERATION**

The A/C receiver/drier performs a filtering action to prevent foreign material that may be in the refrigerant from contaminating the A/C expansion valve and the A/C compressor. Refrigerant enters the A/C receiver/drier as a high-pressure, low temperature liquid. Desiccant inside the A/C receiver/drier absorbs any moisture which may have entered and become trapped within the refrigerant system. In addition, during periods of high demand operation of the A/C system, the A/C receiver/drier acts as a reservoir to store surplus refrigerant.

The A/C receiver/drier is integral to the A/C condenser and has no serviceable parts.

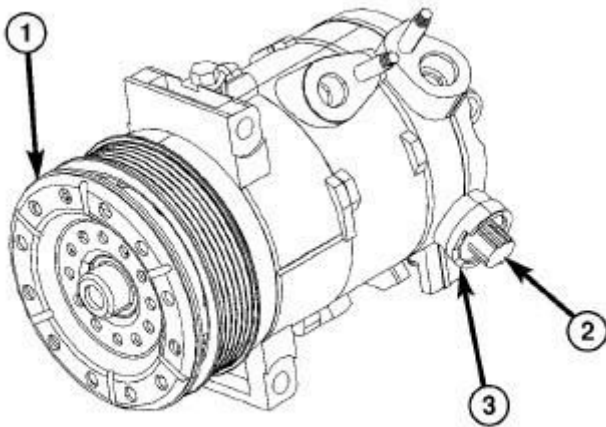
CAUTION: The A/C condenser and receiver/drier must be replaced as an assembly if an internal failure of the A/C compressor has occurred. Failure to replace the A/C condenser and receiver/drier can cause serious damage to the replacement A/C compressor.

The A/C receiver/drier cannot be repaired and the A/C condenser and receiver/drier must be replaced as an assembly, if the receiver/drier is leaking or damaged, or if an internal failure of the A/C compressor has occurred.

COMPRESSOR, A/C

DESCRIPTION

VARIABLE DISPLACEMENT A/C COMPRESSOR



81df706a

Fig. 96: A/C Compressor, Control Valve & High Pressure Relief Valve
Courtesy of CHRYSLER GROUP, LLC

This A/C compressor has a total displacement of 170 cubic centimeters (10.37 cubic inches) and a control valve (2) and a high pressure relief valve (3) located on the back cover. The A/C compressor is secured to the engine with three bolts.

A label identifying the type of refrigerant and oil is located on the A/C compressor.

OPERATION

A/C CLUTCH

The A/C compressor clutch components provide the means to engage and disengage the A/C compressor from the engine accessory drive belt. When the electromagnetic A/C clutch coil is energized, it magnetically draws

the clutch plate into contact with the clutch pulley and drives the compressor shaft. When the coil is not energized, the pulley freewheels on the clutch hub bearing, which is part of the pulley assembly.

A/C compressor clutch engagement is controlled by the Powertrain Control Module (PCM). Refer to the **DTC INDEX** article .

VARIABLE DISPLACEMENT A/C COMPRESSOR

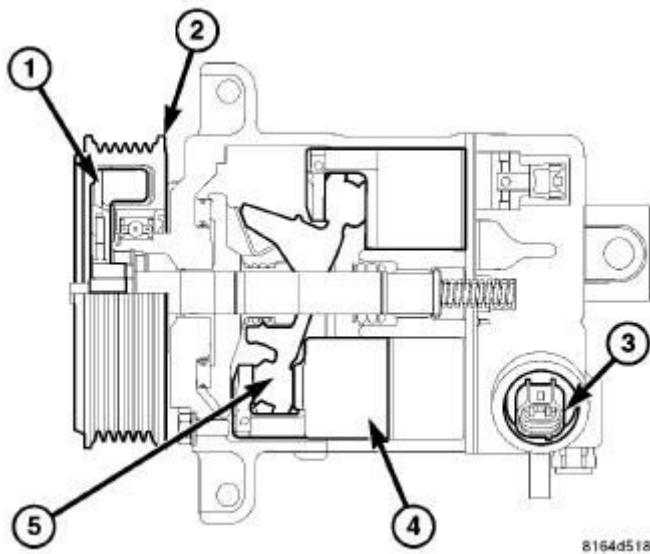


Fig. 97: Cutaway View Of Variable Displacement A/C Compressor (Typical)
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical variable displacement A/C compressor shown in illustration.

The Denso 7SBH17C A/C compressor is a Variable Displacement Compressor (VDC) which is driven by the engine through a LE40 Clutch (1) and pulley (2). This compressor uses an integral control solenoid (3) to reduce or increase the stroke of the pistons (4) within the compressor by automatically adjusting the angle of the swashplate (5).

The A/C compressor draws in low-pressure refrigerant vapor from the A/C evaporator through its suction port. It then compresses the refrigerant into a high-pressure, high-temperature refrigerant vapor, which is then pumped to the A/C condenser through the compressor discharge port. The A/C compressor is lubricated by refrigerant oil that is circulated throughout the refrigerant system with the refrigerant. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE**.

The A/C compressor is controlled by the HVAC module. The HVAC module calculates compressor displacement required by A/C system load and demand by monitoring vehicle speed, A/C high side pressure, engine speed, evaporator temperature, accelerator pedal position, ambient temperature and A/C-heater request signals. The HVAC module then sends a Pulse Width Modulated (PWM) signal to the A/C compressor control solenoid to increase or decrease refrigerant flow. The amount of refrigerant allowed to pass through the compressor determines the head pressure which controls the angle of the swashplate, which in turn, determines

the amount of compressor displacement. When there is no demand for A/C, the swashplate is adjusted to nearly a zero degree angle, which removes compressor torque drag from the engine.

This A/C compressor will reduce the displacement of the compressor based on ambient air temperature. For example; as the outside temperature falls from 27° C (80° F) to 19° C (66° F), the amount of refrigerant flow required through the A/C orifice tube to keep the A/C evaporator cool becomes less, and the swashplate is adjusted to a lower angle, which reduces compressor displacement. However, due to the lower outside air temperature, panel air outlet temperature will not noticeably change.

The A/C compressor control system is diagnosed using a scan tool. Refer to **DIAGNOSIS AND TESTING**.

CAUTION: Do NOT run the engine with a vacuum pump in operation or with a vacuum present within the A/C system when equipped with a variable displacement A/C compressor. Failure to follow this caution will result in serious A/C compressor damage.

CAUTION: Be certain to adjust the refrigerant system oil level when replacing an A/C compressor. Failure to properly adjust the refrigerant oil level can prevent the A/C system from operating as designed and can cause serious A/C compressor damage.

DIAGNOSIS AND TESTING

A/C CLUTCH COIL

The A/C clutch coil electrical circuit is controlled by the Powertrain Control Module (PCM), through the Power Distribution Center (PDC). See Wiring Information for complete HVAC wiring diagrams. Begin testing of a suspected A/C clutch coil problem by performing the preliminary checks.

PRELIMINARY CHECKS

1. Using a scan tool, check for any Diagnostic Trouble Codes (DTCs). If no DTCs are found, go to Step 2. If any DTCs are found, repair as required.
2. If the A/C clutch still will not engage, verify the refrigerant charge level by conducting the A/C Performance test. Refer to **DIAGNOSIS AND TESTING**. If the refrigerant charge level is OK, go to **COIL RESISTANCE TEST** and **COIL CURRENT DRAW TEST**. If the refrigerant charge level is not OK, adjust the refrigerant charge as required.

COIL RESISTANCE TEST

1. Disconnect and isolate the negative battery cable.
2. Disconnect the wire harness connector from the A/C clutch coil connector.
3. Use an ohm meter and Back Probe Tool (special tool #6801, Terminal Probe) and measure the resistance of the A/C clutch coil at the coil connector terminals.
4. See A/C Clutch Coil Specifications table for acceptable A/C clutch coil resistance. Specifications apply for a work area temperature of 21° C (70° F).

- a. If the A/C clutch coil reading is below specifications, the coil is shorted and must be replaced.
- b. If the A/C clutch coil reading is above specifications, the coil is open and must be replaced.

COIL CURRENT DRAW TEST

1. Verify the battery state of charge. Refer to **BATTERY, DIAGNOSIS AND TESTING**.
2. Connect an ammeter (0 to 10 ampere scale selected) in series with the A/C clutch coil feed terminal using Back Probe Tool (special tool #6801, Terminal Probe). Connect a voltmeter (0 to 20 volt scale selected) to measure voltage across the battery and the A/C clutch coil.
3. With the A/C heater control in the A/C mode and the blower motor at low speed, start the engine and allow it to run at a normal idle speed.
4. The A/C clutch should engage immediately and the clutch coil supply voltage should be within two volts of the battery voltage. If the clutch coil supply voltage is OK, go to 5. If the coil supply voltage is not within two volts of battery voltage, test the clutch coil feed circuit for excessive voltage drop and repair as necessary.
5. See **A/C CLUTCH COIL SPECIFICATIONS** for acceptable A/C clutch coil current draw. Specifications apply for a work area temperature of 21° C (70° F). If voltage is more than 12.5 volts, add electrical loads by turning on electrical accessories until voltage reads below 12.5 volts.
 - a. If the A/C clutch coil current reading is zero, the coil is open and must be replaced.
 - b. If the A/C clutch coil current reading is above specifications, the coil is shorted and must be replaced.

PRELIMINARY-CHECKS**A/C CLUTCH COIL SPECIFICATIONS**

Coil Resistance	Coil Current Draw
4.0 ± 0.2 ohms	2.0 amps Max @ 12V ± 0.5V @ 21° C (70° F)

A/C SYSTEM NOISE

CAUTION: The A/C condenser and receiver/drier must be replaced as an assembly if an internal failure of the A/C compressor has occurred. Failure to replace the A/C condenser and receiver/drier can cause serious damage to the replacement A/C compressor.

When investigating an A/C system related noise, you must first know the conditions under which the noise occurs. These conditions include: weather, vehicle speed, transmission in gear or neutral, engine speed, engine temperature, and any other special conditions. Noises that develop during A/C operation can often be misleading. For example: What sounds like a failed front engine bearing or connecting rod, may be caused by loose bolts, nuts, mounting brackets or a loose compressor clutch assembly.

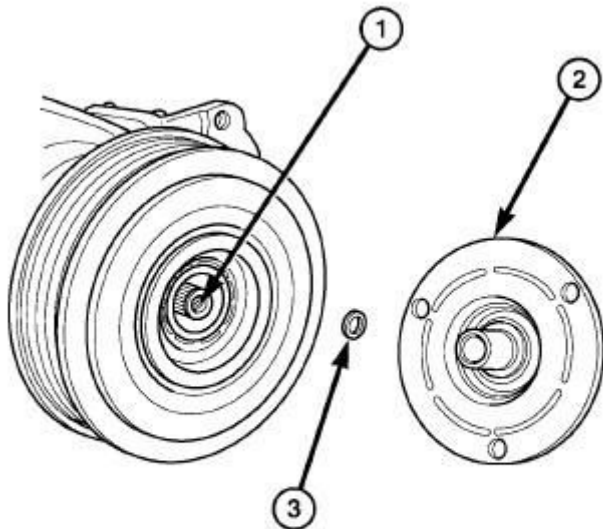
Drive belts are speed sensitive. At different engine speeds and depending upon drive belt tension, drive belts can develop noises that are mistaken for an A/C compressor noise. Improper drive belt tension can cause a misleading noise when the compressor clutch is engaged, which may not occur when the compressor clutch is disengaged. Check the accessory drive belt condition and tension as described in Cooling before beginning this

procedure.

1. Select a quiet area for testing. Duplicate the complaint conditions as much as possible. Turn the A/C compressor On and Off several times to clearly identify the compressor noise.
2. Loosen all of the compressor mounting hardware and retighten. Check the A/C clutch. Be certain that the clutch coil, clutch plate and pulley are mounted securely to the A/C compressor, and that the clutch plate and pulley are properly aligned and have the correct air gap.
3. To duplicate high-ambient temperature conditions (high head pressure), restrict the air flow through the A/C condenser. Install a manifold gauge set or a scan tool to be certain that the high side pressure does not exceed 3.53 Mpa (512 psi).
4. Check the refrigerant system plumbing for incorrect routing, rubbing or interference, which can cause unusual noises. Also check the refrigerant lines and hoses for kinks or sharp bends that will restrict refrigerant flow, which can cause noises.
5. Listen to the A/C compressor while the clutch is engaged and disengaged. Probe the A/C compressor with an engine stethoscope or a long screwdriver with the handle held to your ear to better localize the source of the noise. If the noise is from the A/C compressor, conduct the A/C Performance test and verify refrigerant charge level. Refer to **DIAGNOSIS AND TESTING**.
6. If the A/C clutch and refrigerant charge level is OK, but the noise persists, replace the A/C compressor. Refer to **COMPRESSOR, A/C, REMOVAL**.

STANDARD PROCEDURE

STANDARD PROCEDURE - A/C CLUTCH INSPECTION



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Fig. 98: Identifying Compressor Shaft, Clutch Plate & Shim
 Courtesy of CHRYSLER GROUP, LLC

Examine the friction surfaces of the pulley and clutch plate (2) for wear. The pulley and clutch plate should be replaced if excessive wear or scoring is found.

If the friction surfaces are oily, inspect the shaft and nose area of the A/C compressor (1) for refrigerant oil. If refrigerant oil is found, the compressor shaft seal is leaking and the A/C compressor must be replaced.

Check the pulley bearing for roughness or excessive leakage of grease. Replace the pulley and bearing assembly, if required.

REMOVAL

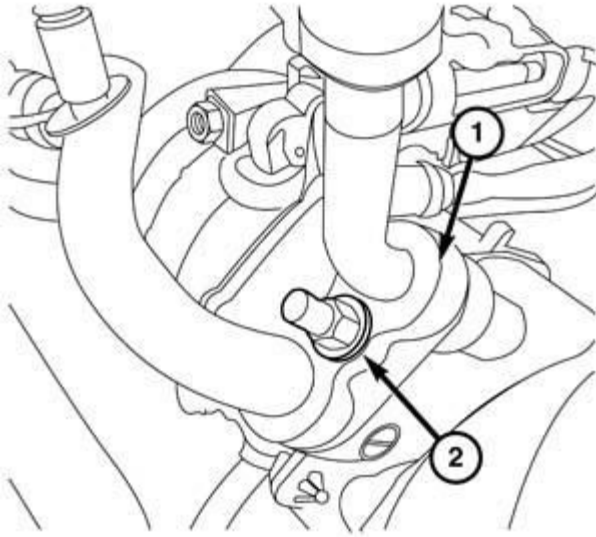
2.0L, 2.4L ENGINE

WARNING: Review the warnings and cautions for this system before performing the procedure. Failure to follow these instructions may result in serious injury or death.

CAUTION: The A/C condenser and receiver/drier must be replaced as an assembly if an internal failure of the A/C compressor has occurred. Failure to replace the A/C condenser and receiver/drier can cause serious damage to the replacement A/C compressor.

NOTE: The A/C compressor may be removed and repositioned without disconnecting the refrigerant lines or discharging the refrigerant system. Discharging is not necessary if servicing the A/C clutch, clutch coil or engine.

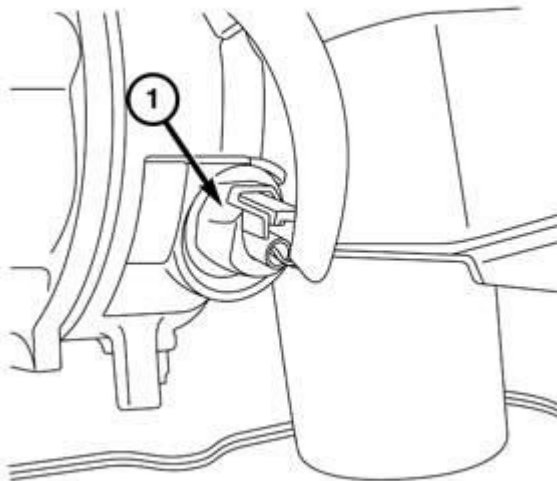
1. Disconnect and isolate the negative battery cable.
2. Recover the refrigerant from the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.
3. Remove the accessory drive belt. Refer to **BELT, SERPENTINE, REMOVAL**.



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Fig. 99: A/C Discharge Line/Suction Line Manifold & Nut
Courtesy of CHRYSLER GROUP, LLC

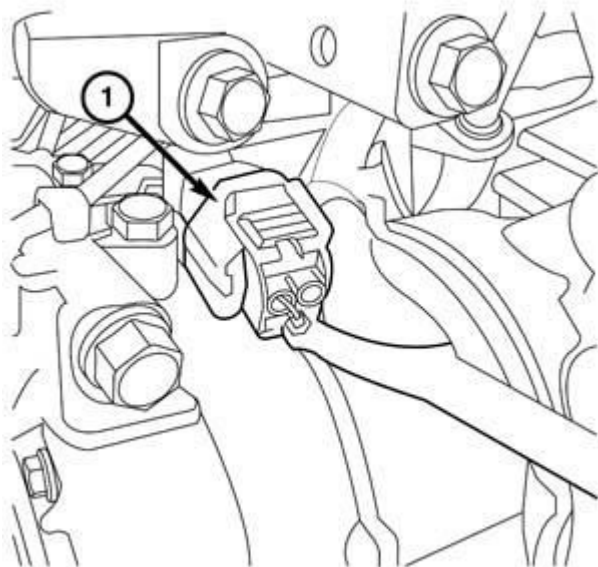
4. Remove nut (2) and the A/C discharge line/suction line manifold (1) from the A/C compressor.
5. Remove and discard the O-ring seals.
6. Install tape or plugs into the opened refrigerant line fittings and the compressor ports.



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Fig. 100: A/C Compressor High Pressure Switch Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

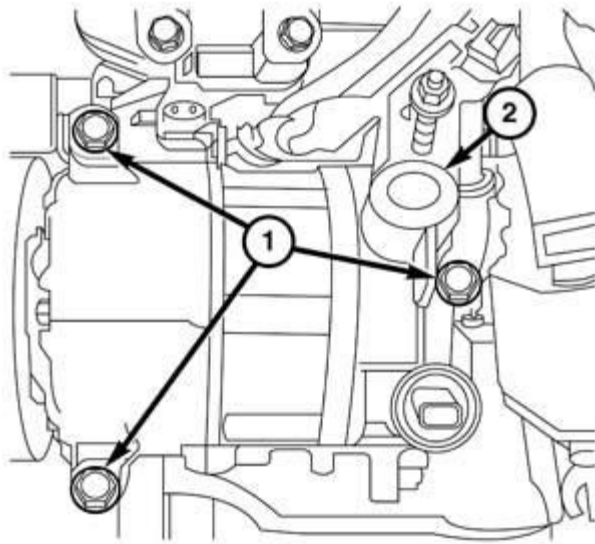
7. Disconnect the A/C compressor high pressure switch wire harness connector (1).



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Fig. 101: A/C Compressor Clutch Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

8. Disconnect the A/C compressor clutch wire harness connector (1) and detach the wire harness from the A/C compressor.



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Fig. 102: Bolts & A/C Compressor
Courtesy of CHRYSLER GROUP, LLC

9. Remove the bolts (1) and the A/C compressor (2).

3.2L ENGINE

WARNING: Review the warnings and cautions for this system before performing the procedure. Failure to follow these instructions may result in serious injury or death.

NOTE: The A/C condenser must be replaced if an internal failure of the A/C compressor has occurred. Refer to CONDENSER, A/C, REMOVAL.

NOTE: The A/C compressor may be removed and repositioned without disconnecting the refrigerant lines or discharging the refrigerant system. Discharging is not necessary if servicing the A/C clutch, clutch coil or engine.

1. Recover the refrigerant from the refrigerant system. Refer to PLUMBING, STANDARD PROCEDURE.
2. Disconnect and isolate the negative battery cable.
3. Remove the accessory drive belt. Refer to BELT, SERPENTINE, REMOVAL.

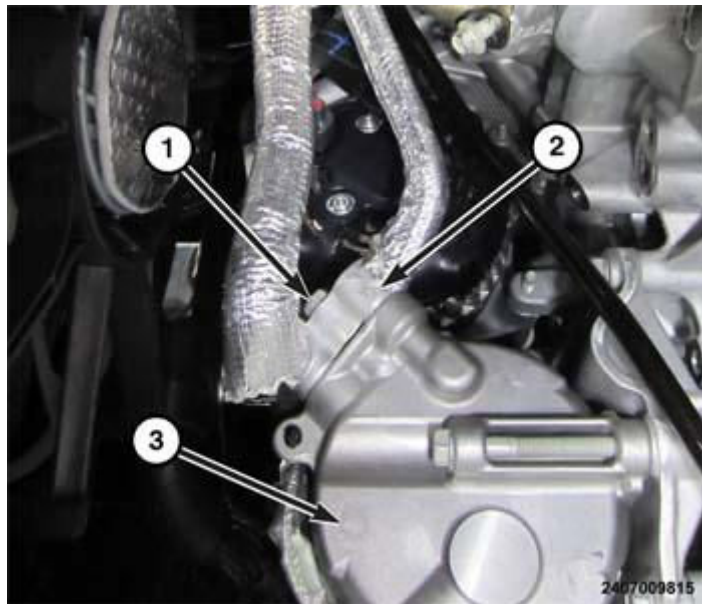


Fig. 103: A/C Compressor, IHX Manifold Line & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Remove the bolt (1) that secures the A/C suction line and A/C discharge lines (2) to the A/C compressor (3).
5. Disconnect the refrigerant lines from the A/C compressor and remove and discard the seals.
6. Install plugs in, or tape over all of the opened refrigerant line fittings and the compressor ports.

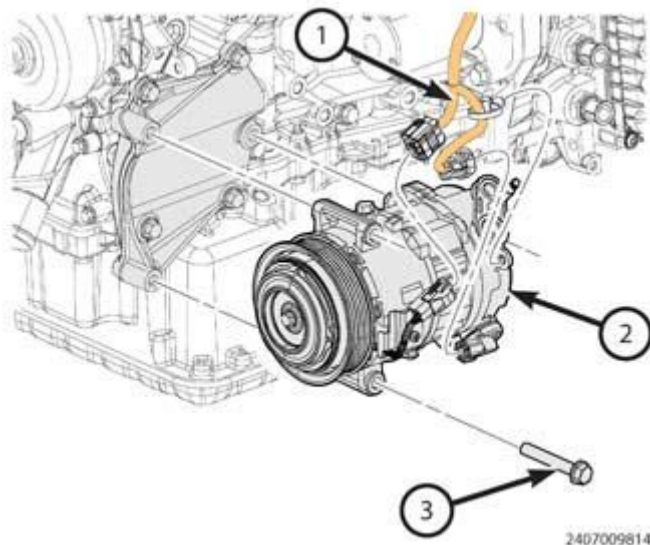


Fig. 104: Removing/Installing A/C compressor
Courtesy of CHRYSLER GROUP, LLC

7. Disconnect the engine wire harness (1) from the A/C compressor (2).
8. Support the A/C compressor and remove the three bolts (3).

9. Remove the A/C compressor from the engine compartment.

A/C CLUTCH

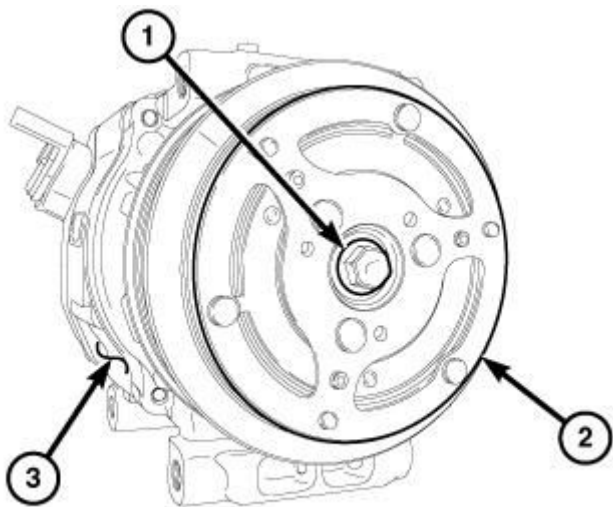


Fig. 105: Compressor Shaft Bolt, Clutch Plate & A/C Compressor
 Courtesy of CHRYSLER GROUP, LLC

1. Remove the A/C compressor (3) and place it on a workbench. Refer to **COMPRESSOR, A/C, REMOVAL**.
2. Remove the compressor shaft bolt (1). A band-type oil filter wrench or a strap wrench may be used to hold the clutch plate (2) from rotating during bolt removal.

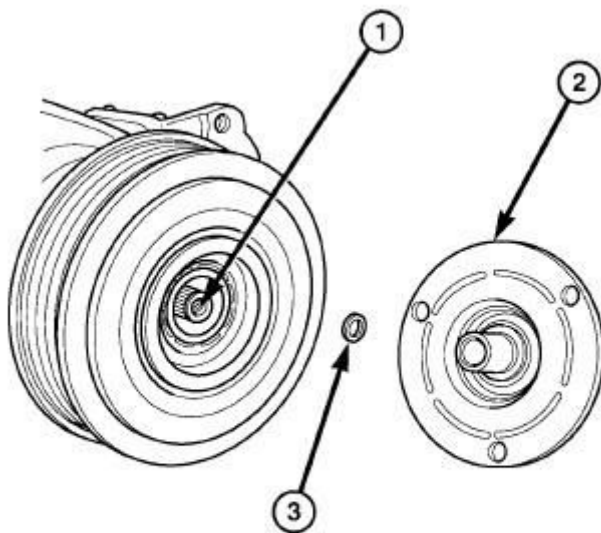


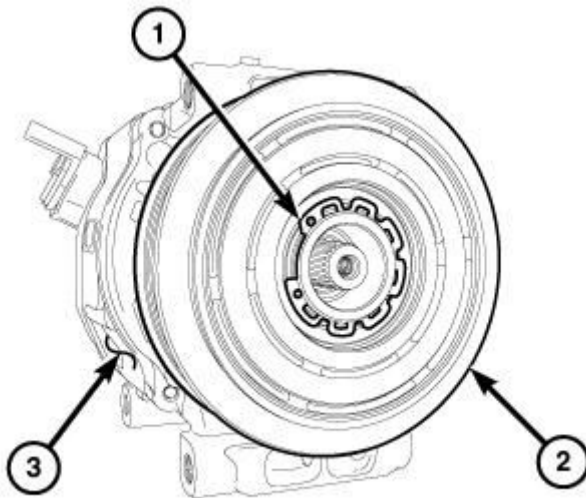
Fig. 106: Identifying Compressor Shaft, Clutch Plate & Shim

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not pry between the clutch plate and the pulley and bearing assembly to remove the clutch plate from the compressor shaft as this may damage the clutch plate.

NOTE: Use care not to misplace any clutch shim(s) during removal of the clutch plate, as they may be reused during the clutch plate installation process.

3. Tap the clutch plate (2) lightly with a plastic mallet to release it from the splines on the compressor shaft (1) and remove the clutch plate and shim(s) (3).



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Fig. 107: Compressor Pulley Snap Ring, Pulley And Bearing Assembly & A/C Compressor

Courtesy of CHRYSLER GROUP, LLC

4. Using snap ring pliers, remove the snap ring (1) that secures the pulley and bearing assembly (2) to the A/C compressor (3) and remove the pulley and bearing assembly.

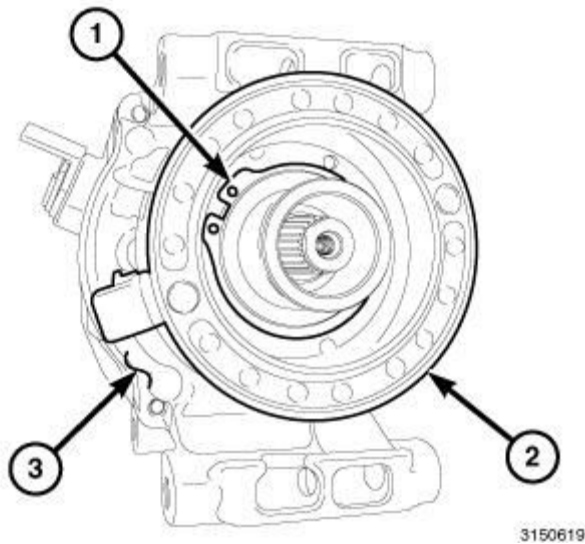


Fig. 108: Compressor Clutch Coil Snap Ring, A/C Clutch Coil & A/C Compressor
Courtesy of CHRYSLER GROUP, LLC

5. Using snap ring pliers, remove the snap ring (1) that secures the A/C clutch coil (2) to the A/C compressor (3) and remove the coil.

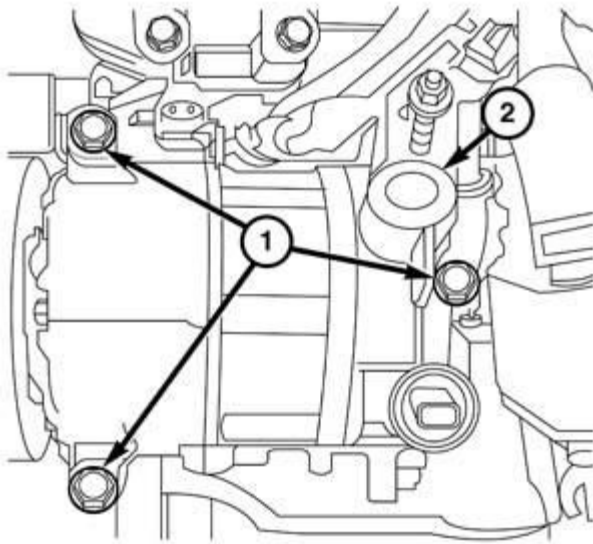
INSTALLATION

2.0L, 2.4L ENGINE

CAUTION: If the A/C compressor is being replaced, be certain to adjust the refrigerant system oil level. Failure to properly adjust the refrigerant oil level will prevent the A/C system from operating as designed and can cause serious A/C compressor damage.

CAUTION: The A/C condenser and receiver/drier must be replaced as an assembly if an internal failure of the A/C compressor has occurred. Failure to replace the A/C condenser and receiver/drier can cause serious damage to the replacement A/C compressor.

CAUTION: The A/C condenser and receiver/drier must be replaced as an assembly if an internal failure of the A/C compressor has occurred. Failure to replace the A/C condenser and receiver/drier can cause serious damage to the replacement A/C compressor.



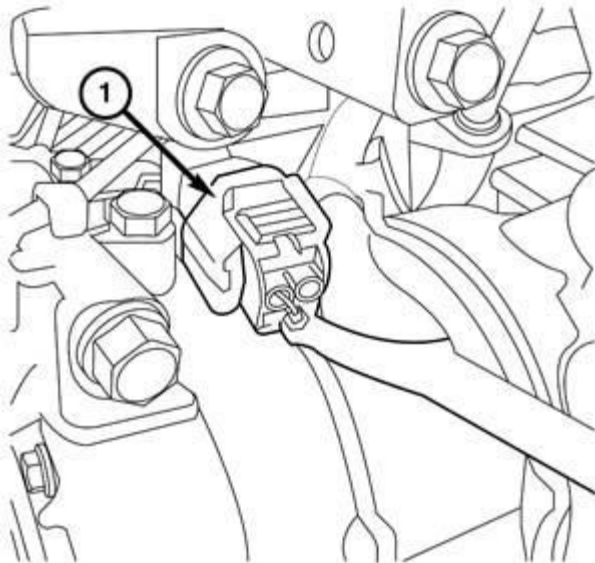
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Fig. 109: Bolts & A/C Compressor
 Courtesy of CHRYSLER GROUP, LLC

NOTE: When replacing multiple A/C system components, see the Refrigerant Oil Capacities chart to determine how much oil should be removed from the new A/C compressor. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE**.

NOTE: Replacement of the refrigerant line O-ring seals is required anytime a refrigerant line is disconnected from the A/C compressor. Failure to replace the rubber O-ring seals may result in a refrigerant system leak.

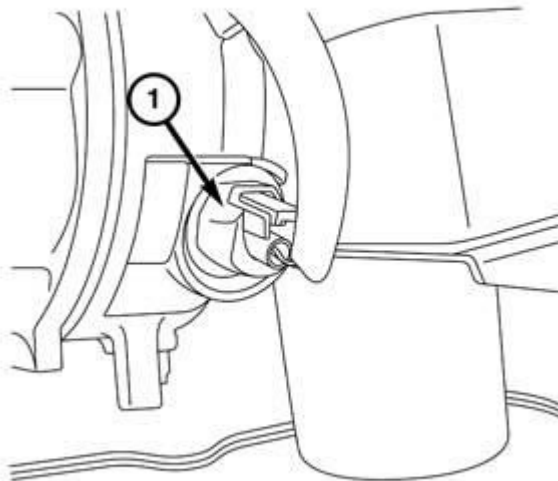
1. If the A/C compressor (1) is being replaced, the refrigerant oil in the old compressor must be first drained and measured. Then the oil in the new A/C compressor must be drained. Finally, the new compressor must be refilled with the same amount of new refrigerant oil that was drained out of the old compressor. When replacing multiple A/C system components, see the Refrigerant Oil Capacities chart to determine how much oil should be added to the refrigerant system. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE**. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
2. Install the A/C compressor (2) and tighten the bolts (1) to the proper. Refer to **SPECIFICATIONS**.



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Fig. 110: A/C Compressor Clutch Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

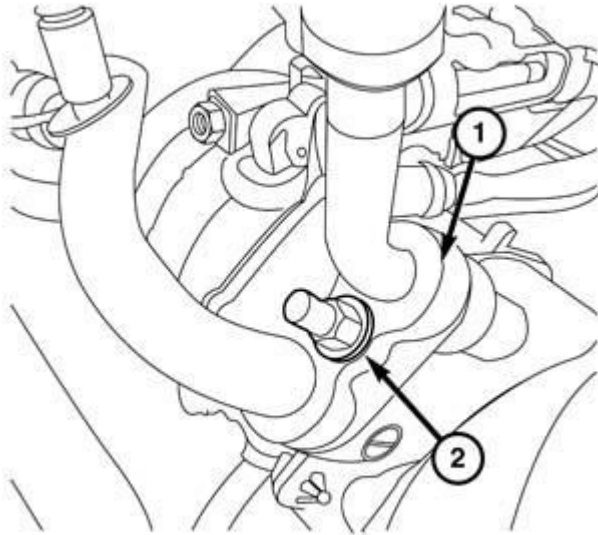
3. Attach the A/C wire harness to the compressor and connect the A/C compressor clutch wire harness connector (1).



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Fig. 111: A/C Compressor High Pressure Switch Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

4. Connect the A/C compressor high pressure switch wire harness connector (1).



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Fig. 112: A/C Discharge Line/Suction Line Manifold & Nut
Courtesy of CHRYSLER GROUP, LLC

5. Remove the tape or plugs from the opened refrigerant line fittings and the compressor ports.
6. Lubricate new O-ring seals with clean refrigerant oil and install them onto the refrigerant line fittings. Use only the specified O-ring seals as they are made of a special material for the system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
7. Install the A/C discharge line/suction line manifold (1) to the A/C compressor (3) and tighten the nut (1) to the proper. Refer to **SPECIFICATIONS**.
8. Install the accessory drive belt. Refer to **BELT, SERPENTINE, INSTALLATION** .
9. Evacuate and charge the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.
10. Install the air cleaner resonator. Refer to **RESONATOR, AIR CLEANER, INSTALLATION** **RESONATOR, AIR CLEANER, INSTALLATION** .
11. Install the air cleaner body. Refer to **BODY, AIR CLEANER, INSTALLATION** **BODY, AIR CLEANER, INSTALLATION** **BODY, AIR CLEANER, INSTALLATION** .
12. Connect the negative battery cable.

3.2L ENGINE

CAUTION: If the A/C compressor is being replaced, be certain to adjust the refrigerant system oil level. Failure to properly adjust the refrigerant oil level will prevent the A/C system from operating as designed and can cause serious A/C compressor damage.

NOTE: The A/C condenser must be replaced if an internal failure of the A/C compressor has occurred. Refer to CONDENSER, A/C, REMOVAL.

NOTE: When replacing multiple A/C system components, see the Refrigerant Oil Capacities chart to determine how much oil should be removed from the new A/C compressor. Refer to OIL, REFRIGERANT, STANDARD PROCEDURE.

NOTE: Replacement of the refrigerant line O-ring seals and gaskets is required anytime a refrigerant line is disconnected. Failure to replace the rubber O-ring seals and metal gaskets may result in a refrigerant system leak.

1. If the A/C compressor (2) is being replaced, the refrigerant oil in the old compressor must be first drained and measured. Then the oil in the new A/C compressor must be drained. Finally, the new compressor must be refilled with the same amount of new refrigerant oil that was drained out of the old compressor. When replacing multiple A/C system components, see the Refrigerant Oil Capacities chart to determine how much oil should be added to the refrigerant system. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE**. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.

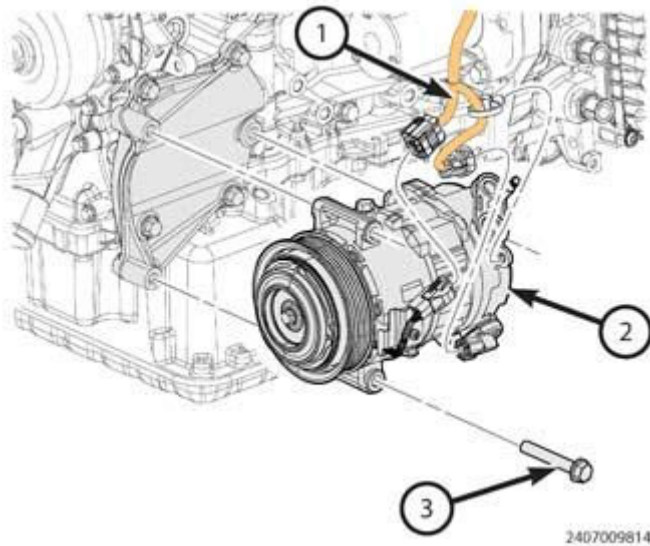


Fig. 113: Removing/Installing A/C compressor
 Courtesy of CHRYSLER GROUP, LLC

2. Position the A/C compressor (2) to the engine and loosely install the three bolts (3) that secure the A/C compressor to the engine.
3. Tighten the A/C compressor retaining bolts to the proper. Refer to SPECIFICATIONS.
4. Connect the engine wire harness (1) to the A/C compressor.

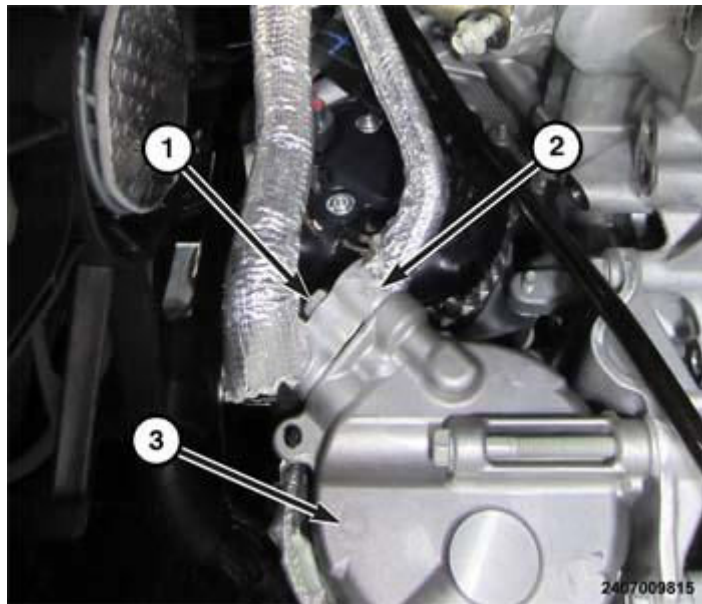


Fig. 114: A/C Compressor, IHX Manifold Line & Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. Remove the tape or plugs from the opened refrigerant line fittings and the A/C compressor ports.
6. Lubricate new seals with clean refrigerant oil and install them onto the refrigerant line fittings. Use only the specified seals as they are made of a special material for the system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
7. Install the A/C suction line and the A/C discharge line (2) onto the A/C compressor (3).
8. Install the bolt (1) that secures the refrigerant lines to the A/C compressor and tighten the bolt to the proper. Refer to **SPECIFICATIONS**.
9. Install the accessory drive belt. Refer to **BELT, SERPENTINE, INSTALLATION**.

NOTE: The A/C condenser must be replaced if an internal failure of the A/C compressor has occurred. Refer to **CONDENSER, A/C, REMOVAL**.

10. Connect the negative battery cable.
11. Evacuate and charge the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.

A/C CLUTCH

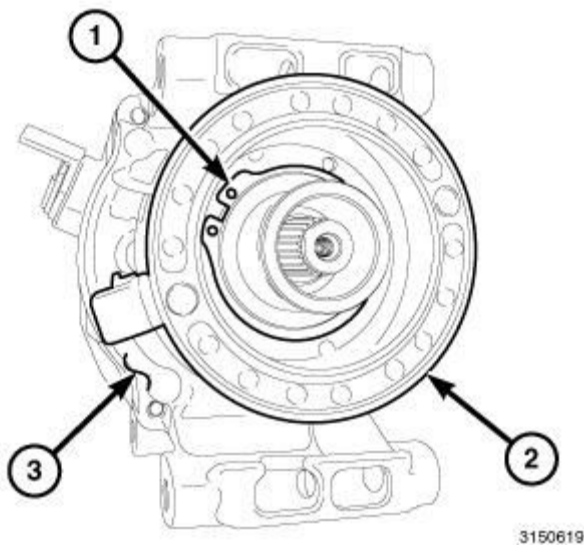


Fig. 115: Compressor Clutch Coil Snap Ring, A/C Clutch Coil & A/C Compressor
 Courtesy of CHRYSLER GROUP, LLC

1. Align the dowel pin on the back of the A/C clutch coil (2) with the hole in the front of the A/C compressor (3) and install the coil onto the compressor.

CAUTION: The snap ring must be fully and properly seated in the groove or it may vibrate out, resulting in a clutch failure and severe damage to the A/C compressor.

2. Using snap ring pliers, install the snap ring (1) that secures the A/C clutch coil (2) to the A/C compressor (3). Be certain that the snap ring is fully and properly seated in the groove.

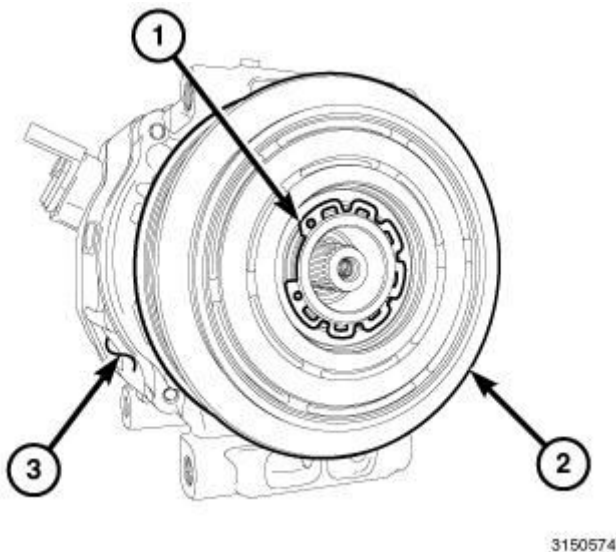
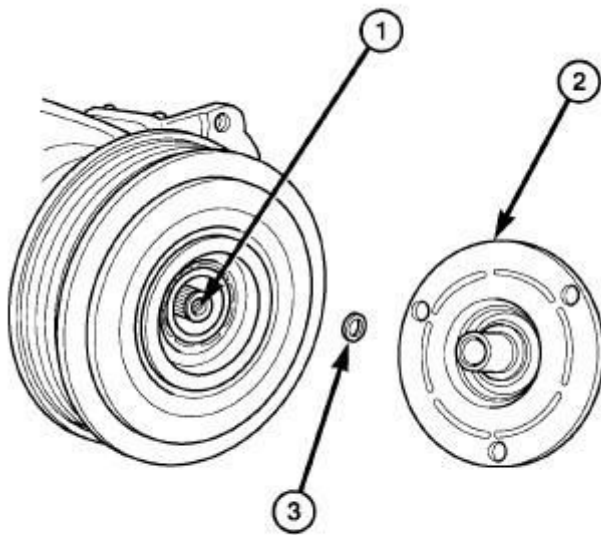


Fig. 116: Compressor Pulley Snap Ring, Pulley And Bearing Assembly & A/C Compressor
 Courtesy of CHRYSLER GROUP, LLC

CAUTION: When installing the pulley and bearing assembly, **DO NOT** mar the friction surfaces of the pulley or premature failure of the A/C clutch may result.

3. Install the pulley and bearing assembly (2) onto the A/C compressor (3). If necessary, gently tap the pulley onto the compressor using a block of wood placed on the pulley friction surface.
4. Using snap ring pliers, install the snap ring (1) that secures the pulley and bearing assembly to the A/C compressor. Be certain that the snap ring is fully and properly seated in the groove.



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Fig. 117: Identifying Compressor Shaft, Clutch Plate & Shim
Courtesy of CHRYSLER GROUP, LLC

5. If the original clutch plate (2) and pulley and bearing assembly are to be reused, reinstall the original shim (s) (3) onto the compressor shaft (1). If a new clutch plate and pulley and bearing assembly are being used, install a trial stack of shims 2.54 mm (0.010 in.) thick onto the compressor shaft.

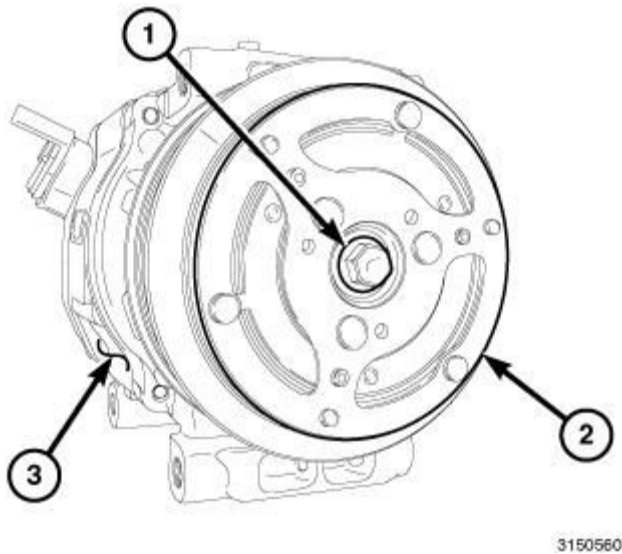


Fig. 118: Compressor Shaft Bolt, Clutch Plate & A/C Compressor
 Courtesy of CHRYSLER GROUP, LLC

6. Install the clutch plate (2) onto the A/C compressor (3).
7. Install the compressor shaft bolt (1) and tighten to the proper. Refer to **SPECIFICATIONS**.

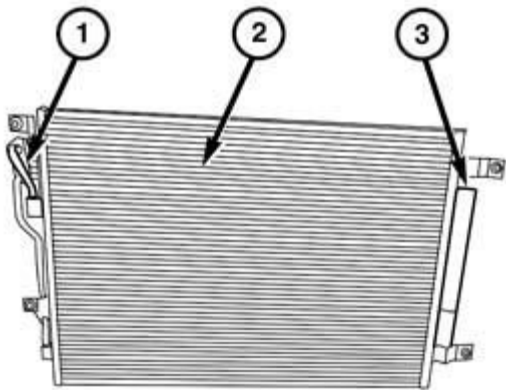
NOTE: The shims may compress after tightening the shaft bolt. Check the air gap in four or more places to verify the air gap is correct. Spin the pulley before performing a final check of the air gap.

8. With the clutch plate assembled tight against the shim(s), measure the air gap between the clutch plate and the pulley and bearing assembly. If the air gap is not within, add or subtract shims as needed until the correct air gap is obtained. Refer to **SPECIFICATIONS**.
9. Install the A/C compressor. Refer to **COMPRESSOR, A/C, INSTALLATION**.

CONDENSER, A/C

DESCRIPTION

DESCRIPTION



240970354

Fig. 119: A/C Condenser & A/C Receiver/Drier
Courtesy of CHRYSLER GROUP, LLC

The A/C condenser is located in the front of the engine compartment behind the front fascia. The A/C condenser is a heat exchanger that allows the high-pressure refrigerant gas being discharged by the A/C compressor to give up its heat to the air passing over the condenser fins (2), which causes the refrigerant to cool and change to a liquid state.

The A/C condenser is equipped with tapping blocks for the A/C refrigerant lines (1). The A/C condenser has an integral A/C receiver/drier (3).

OPERATION

OPERATION

When air passes through the fins of the A/C condenser, the high-pressure refrigerant gas within the A/C condenser gives up its heat. The refrigerant then condenses as it leaves the A/C condenser and becomes a high-pressure liquid. The volume of air flowing over the condenser fins is critical to the proper cooling performance of the A/C system. Therefore, it is important that there are no objects placed in front of the radiator grille openings at the front of the vehicle or foreign material on the condenser fins that might obstruct proper air flow. Also, any factory-installed air seals or shrouds must be properly reinstalled following radiator or A/C condenser service.

NOTE: Replacement of the refrigerant line O-ring seals and gaskets is required anytime a refrigerant line is disconnected. Failure to replace the rubber O-ring seals and metal gaskets could result in a refrigerant system leak.

The A/C condenser has no serviceable parts except for the O-ring seals and gaskets. The O-ring seals used on the connections are made from a special type of rubber not affected by R-1234YF refrigerant. The O-ring seals and gaskets must be replaced whenever a refrigerant line is disconnected from the A/C condenser.

The A/C condenser cannot be repaired and must be replaced if leaking or damaged.

REMOVAL

REMOVAL

WARNING: Review the warnings and cautions for this system before performing the procedure. Failure to follow these instructions may result in serious injury or death.

CAUTION: Before removing the A/C condenser, note the location of each of the radiator/condenser air seals. These air seals are used to direct air through the A/C condenser and radiator. The air seals must be reinstalled in their proper locations in order for the A/C and engine cooling systems to perform as designed.

1. Recover the refrigerant from the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.
2. Disconnect and isolate the negative battery cable.
3. Partially remove the radiator. Refer to **RADIATOR, ENGINE COOLING, REMOVAL**.

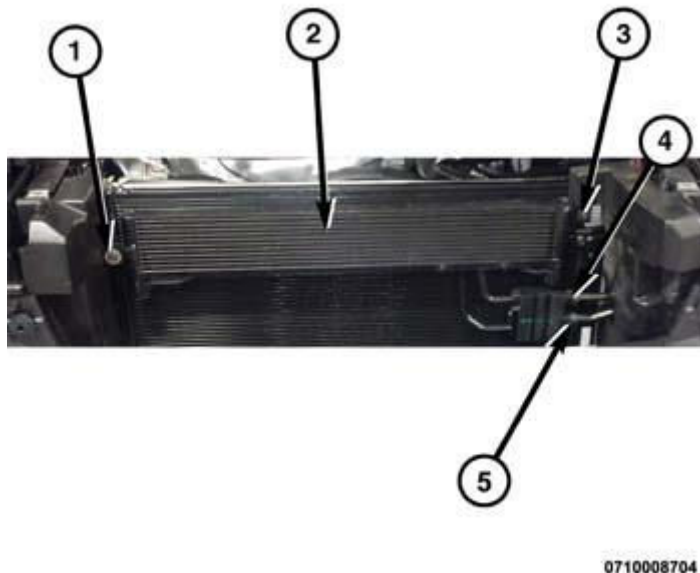


Fig. 120: Transmission Oil Cooler
Courtesy of CHRYSLER GROUP, LLC

4. Unbolt the transmission oil cooler (2) if equipped and move to the side. Refer to **COOLER,**

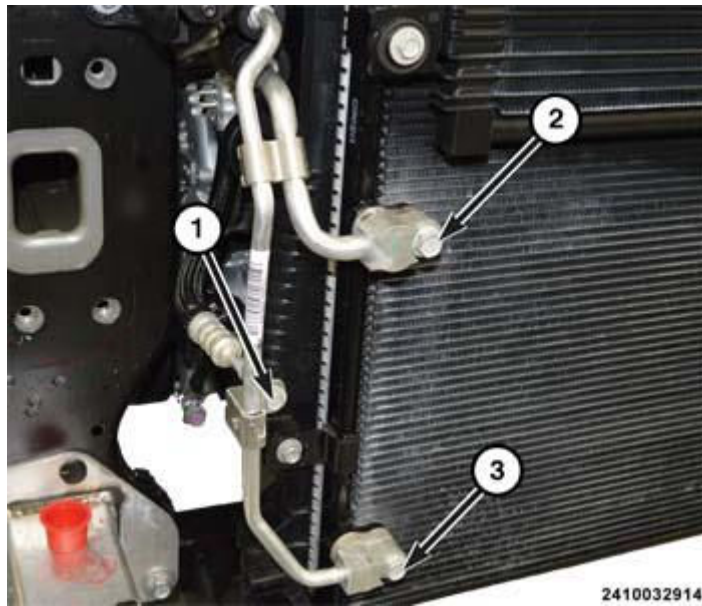
TRANSMISSION OIL, REMOVAL .

Fig. 121: A/C Condenser, Liquid Line, Discharge Line & Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. Disconnect the liquid line (3) and the discharge line (2) from the condenser.
6. Remove and discard the O-ring seals and gasket and install plugs in, or tape over the opened refrigerant line fittings and ports.
7. Remove the condenser from the vehicle.

INSTALLATION**INSTALLATION**

CAUTION: Be certain to adjust the refrigerant oil level when servicing the A/C refrigerant system. Failure to properly adjust the refrigerant oil level will prevent the A/C system from operating as designed and can cause serious A/C compressor damage.

NOTE: When replacing multiple A/C system components, see the Refrigerant Oil Capacities chart to determine how much oil should be added to the refrigerant system. Refer to OIL, REFRIGERANT, STANDARD PROCEDURE.

NOTE: If only the A/C condenser is being replaced, add 20 milliliters (0.7 fluid ounce) of refrigerant oil to the refrigerant system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.

NOTE: Replacement of the refrigerant line O-ring seals and gaskets is required anytime

a refrigerant line is disconnected. Failure to replace the rubber O-ring seals and metal gaskets could result in a refrigerant system leak.

1. Position the condenser in the vehicle.
2. Install the radiator. Refer to **RADIATOR, ENGINE COOLING, INSTALLATION** .

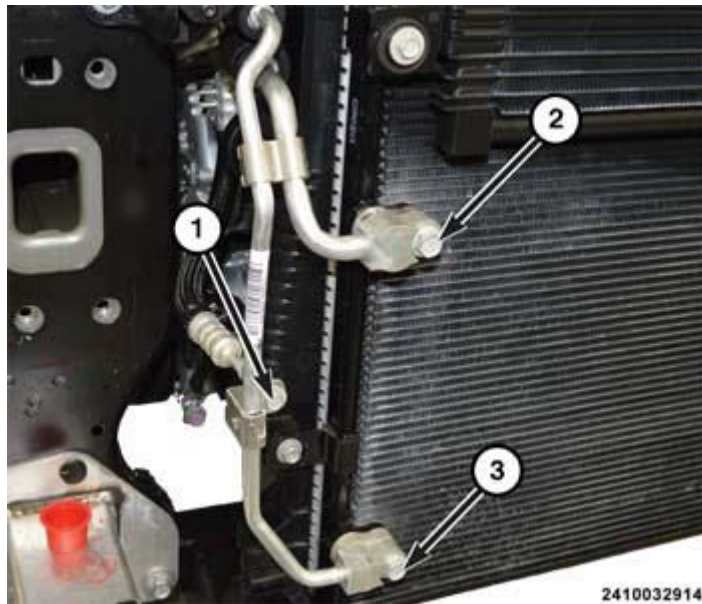
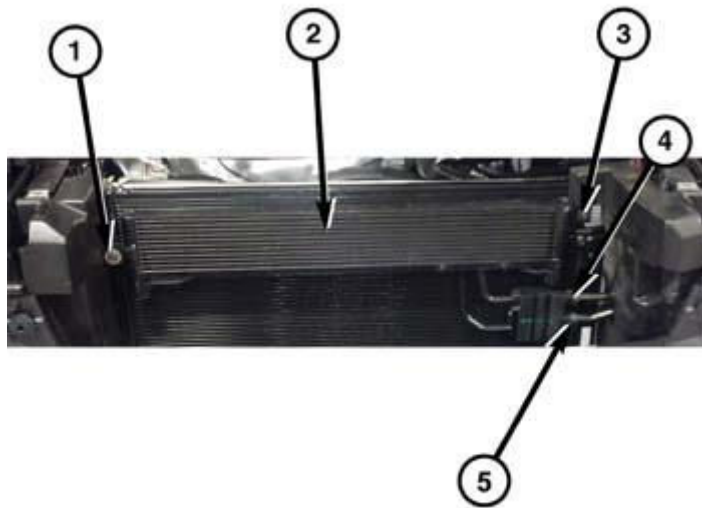


Fig. 122: A/C Condenser, Liquid Line, Discharge Line & Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Remove the tape or plugs from the opened refrigerant line fittings and ports.
4. Connect the liquid line (3) and discharge line (2) to the condenser and tighten the bolts to the proper. Refer to **SPECIFICATIONS**.



0710008704

Fig. 123: Transmission Oil Cooler
Courtesy of CHRYSLER GROUP, LLC

5. Install the transmission oil cooler (2) if equipped. Refer to **COOLER, TRANSMISSION OIL, INSTALLATION**.
6. Connect the negative battery cable.
7. Evacuate the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.
8. If the condenser is being replaced, add 20 milliliters (0.7 fluid ounce) of refrigerant oil to the refrigerant system. When replacing multiple components, see the Refrigerant Oil Capacities chart to determine how much oil should be added to the refrigerant system. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE**.
9. Charge the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.

CORE, HEATER

DESCRIPTION

DESCRIPTION

**Fig. 124: Heater Core**

Courtesy of CHRYSLER GROUP, LLC

The heater core is mounted in the HVAC housing, which is located behind the instrument panel. The heater core is a heat exchanger made of rows of aluminum tubes and fins (1). The heater core is positioned within the HVAC housing so that only the selected amount of air entering the housing passes through the heater core, before being distributed through the heating and A/C system ducts and outlets. One end of the heater core is fitted with a tank that includes the fittings for the heater core tubes (2).

The HVAC housing must be removed from the vehicle for service of the heater core.

OPERATION

OPERATION

Engine coolant is circulated through the heater hoses to the heater core at all times. As the coolant flows through the heater core, heat is removed from the engine and is transferred to the heater core tubes and fins. Air directed through the heater core picks up the heat from the heater core fins. The blend-air door allows control of the heater output air temperature by regulating the amount of air flowing through the heater core. The blower motor speed controls the volume of air flowing through the HVAC housing.

The heater core cannot be repaired and it must be replaced if inoperative, leaking or damaged.

REMOVAL

REMOVAL

NOTE: The HVAC housing assembly must be removed from vehicle for service of the heater core.

1. Remove the HVAC housing assembly and place it on a workbench. Refer to **HOUSING, HVAC, REMOVAL**.



Fig. 125: Removing/Installing Heater Core Tubing Cover
Courtesy of CHRYSLER GROUP, LLC

2. Remove the wire harness from the retaining clips (2) on the heater core cover.
3. Remove the retaining screws (1) from the heater core tubing cover and remove the heater core tubing cover from the left side of HVAC housing.

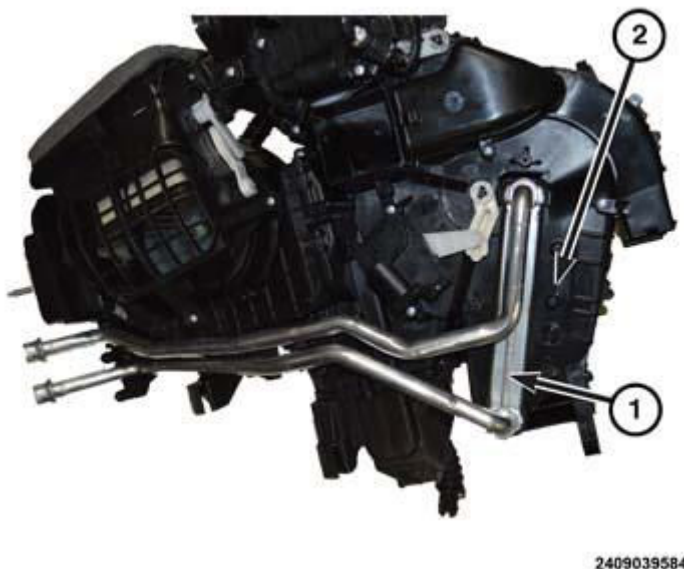


Fig. 126: Removing/Installing Heater Core
Courtesy of CHRYSLER GROUP, LLC

4. Remove heater core (1) from the left side of HVAC housing (2).

INSTALLATION**INSTALLATION**

2409039584

Fig. 127: Removing/Installing Heater Core
Courtesy of CHRYSLER GROUP, LLC

1. Install heater core (1) into the left side of the HVAC housing (2).



2409039578

Fig. 128: Removing/Installing Heater Core Tubing Cover
Courtesy of CHRYSLER GROUP, LLC

2. Position the heater core tubing cover onto the left side of the HVAC housing and tighten the screws (1) to the proper. Refer to **SPECIFICATIONS**.
3. Fasten the wire harness into the retaining clips (2) on the tubing cover.
4. Install the HVAC housing assembly. Refer to **HOUSING, HVAC, INSTALLATION**.

CORE, SERVICE PORT VALVE

DESCRIPTION

DESCRIPTION

Refrigerant system service ports are used to recover, recycle, evacuate, charge and test the A/C refrigerant system. Unique sizes are used on the two service ports depending on the type of refrigerant system used to ensure the system is not accidentally contaminated with the wrong refrigerant or by service equipment used for another refrigerant.

- On the 2.0L and 2.4L engine, the high side service port is located on the A/C suction/distribution line in front of the engine by the A/C compressor.
- On the 2.0L and 2.4L engine, the low side service port is located on the Internal Heat Exchanger (IHx).
- On the 3.2L engine, the high side service port is located on the A/C suction line.
- On the 3.2L engine, the low side service port is located on the IHx.

Both the high side and low side A/C service port valve cores are serviceable.

NOTE: **The protective cap aids in service port sealing and helps protect the refrigerant system from contamination. Remember to always reinstall the protective cap onto the service port when refrigerant system service is complete.**

Each of the service ports has a threaded plastic protective cap installed over it from the factory. The service port caps are serviceable items.

REMOVAL

REMOVAL

WARNING: Review the warnings and cautions for this system before performing the procedure. Failure to follow these instructions may result in serious injury or death.

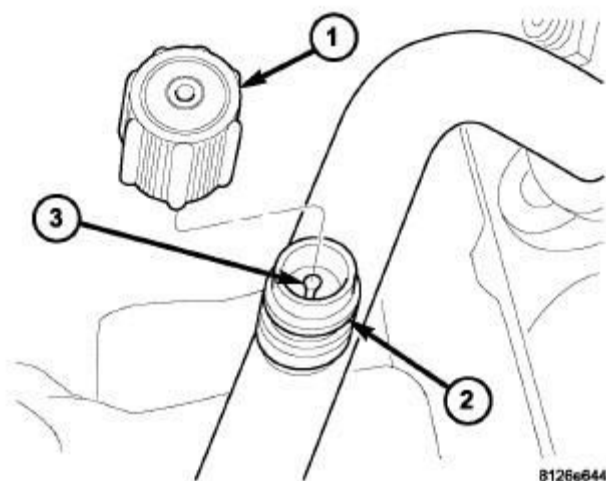


Fig. 129: Identifying A/C Service Port Components
Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical A/C service port shown in illustration.

1. Remove the protective cap (1) from the service port (2).
2. Recover the refrigerant from the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.
3. Using a Schrader-type valve core tool, remove the valve core (3) from the service port.
4. Install a plug in, or tape over the opened service port(s).

INSTALLATION

INSTALLATION

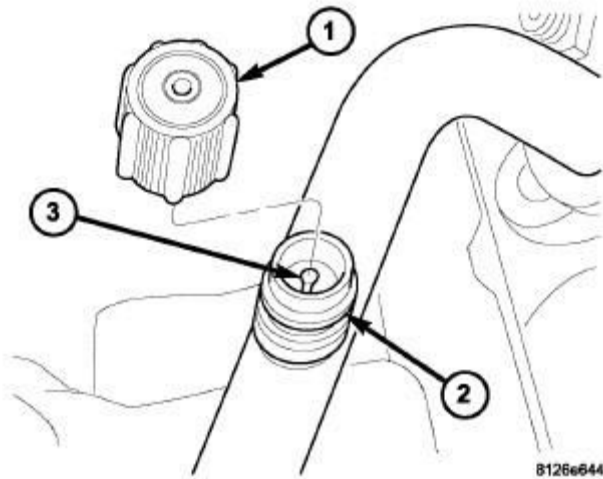


Fig. 130: Identifying A/C Service Port Components
 Courtesy of CHRYSLER GROUP, LLC

NOTE: Typical A/C service port shown in illustration.

1. Lubricate the valve core (3) with clean refrigerant oil prior to installation. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
2. Remove the tape or plug from the service port (2).

CAUTION: A valve core that is not fully seated in the A/C service port can result in damage to the valve during refrigerant system evacuation and charge. Such damage may result in a loss of system refrigerant while uncoupling the charge adapters.

3. Using a Schrader-type valve core tool, install and tighten the valve core into the service port(s).

CAUTION: Do NOT run the engine with a vacuum pump in operation or with a vacuum present within the A/C system. Failure to follow this caution will result in serious A/C compressor damage.

4. Evacuate the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.
5. Charge the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.

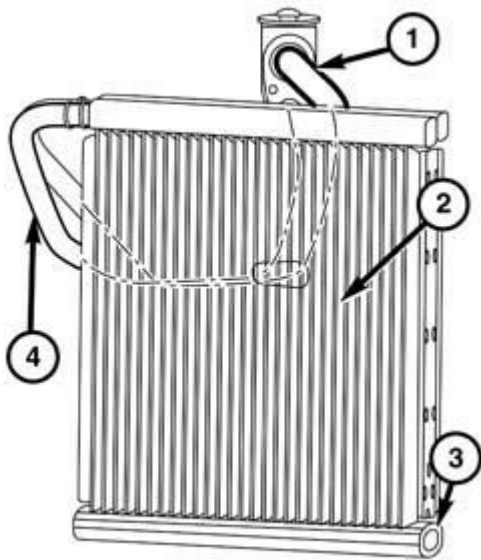
NOTE: The protective cap helps aid in service port sealing and helps protect the refrigerant system from contamination. Remember to always reinstall the protective cap onto the service port when refrigerant system service is complete.

6. Install the protective cap (1) onto the service port.

EVAPORATOR, A/C

DESCRIPTION

DESCRIPTION



240969970

Fig. 131: Tapping Block, Evaporator Fins, A/C Evaporator & A/C Evaporator Tubes
Courtesy of CHRYSLER GROUP, LLC

The A/C evaporator (3) for the heating-A/C system is mounted in the HVAC housing, which is located behind the instrument panel. The A/C evaporator and its insulator are positioned within the HVAC housing so that all air entering the housing must pass over the evaporator fins (2) before it is distributed through the heating-A/C system ducts and outlets.

A tapping block (1) and O-ring seals are used to connect and seal the A/C evaporator tubes (4) to the underhood refrigerant lines.

The A/C evaporator can only be serviced by removing and disassembling the HVAC housing assembly.

OPERATION

OPERATION

Refrigerant enters the A/C evaporator from the A/C expansion valve as a low-temperature, low-pressure mixture of liquid and gas. As air flows over the fins of the A/C evaporator, the humidity in the air condenses on

the fins, and the heat from the air is absorbed by the refrigerant. Heat absorption causes the refrigerant to boil and vaporize. The refrigerant becomes a low-pressure gas when it leaves the A/C evaporator.

NOTE: Replacement of the refrigerant line O-ring seals and gaskets is required anytime a refrigerant line is disconnected. Failure to replace the rubber O-ring seals and metal gaskets could result in a refrigerant system leak.

The A/C evaporator has no serviceable parts except for the O-ring seals. The O-ring seals used on the connections are made from a special type of rubber not affected by R-1234YF refrigerant.

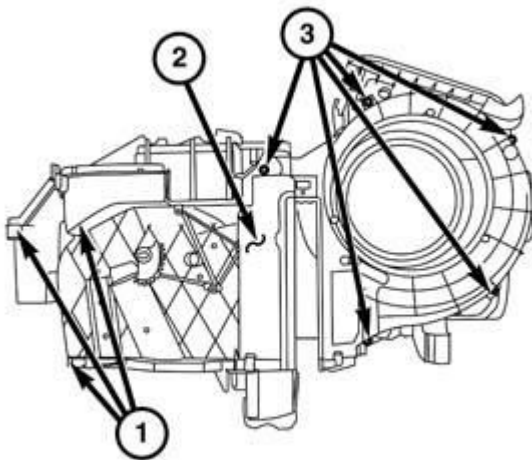
The A/C evaporator cannot be repaired and must be replaced if leaking or damaged.

REMOVAL

REMOVAL

NOTE: The HVAC housing assembly must be removed from vehicle and disassembled for service of the A/C evaporator.

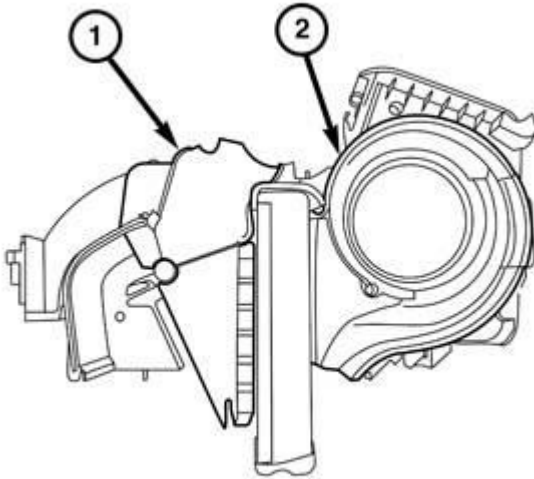
1. Remove the HVAC housing and place it on a workbench. Refer to HOUSING, HVAC, REMOVAL.
2. Remove the air inlet housing. Refer to HOUSING, HVAC, REMOVAL.
3. Remove the heater core. Refer to CORE, HEATER, REMOVAL.
4. Remove the blower motor. Refer to MOTOR, BLOWER, REMOVAL.
5. Remove the air distribution housing. Refer to HOUSING, HVAC, REMOVAL.
6. Remove the HVAC wiring harness.



240969658

Fig. 132: HVAC Housing & Fasteners
Courtesy of CHRYSLER GROUP, LLC

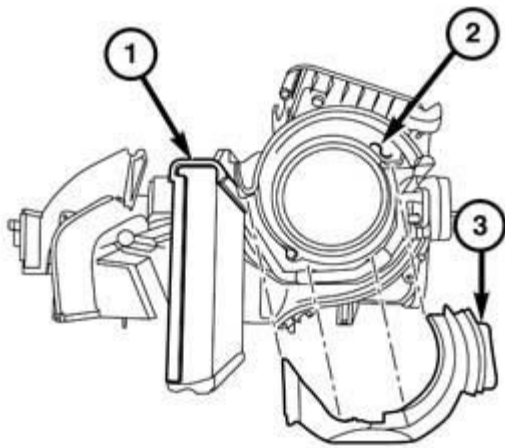
7. Remove the eight screws (1 and 3) that secure the left side of the HVAC housing to the right side of the HVAC housing (2) and remove the right side of the housing.



240969657

Fig. 133: HVAC Housing & Case Separator
Courtesy of CHRYSLER GROUP, LLC

8. Remove the case separator (1) from the HVAC housing (2).



240969653

Fig. 134: A/C Evaporator, HVAC Housing & Tubing Cover
Courtesy of CHRYSLER GROUP, LLC

9. Remove the tubing cover (3) from the A/C evaporator tubing.
10. Carefully lift the A/C evaporator (1) out of the left side of the HVAC housing (2).

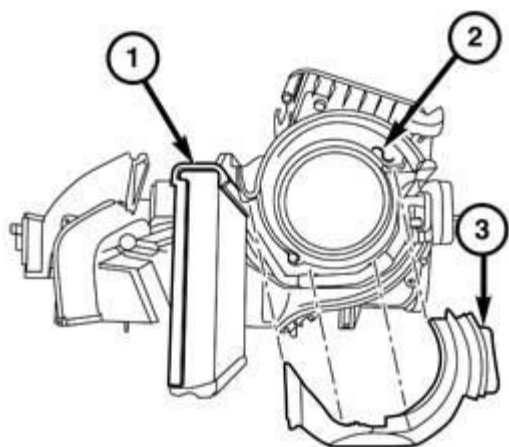
INSTALLATION

INSTALLATION

CAUTION: Be certain to adjust the refrigerant oil level when servicing the A/C refrigerant system. Failure to properly adjust the refrigerant oil level will prevent the A/C system from operating as designed and can cause serious A/C compressor damage.

NOTE: When replacing multiple A/C system components, see the Refrigerant Oil Capacities chart to determine how much oil should be added to the refrigerant system. Refer to OIL, REFRIGERANT, STANDARD PROCEDURE.

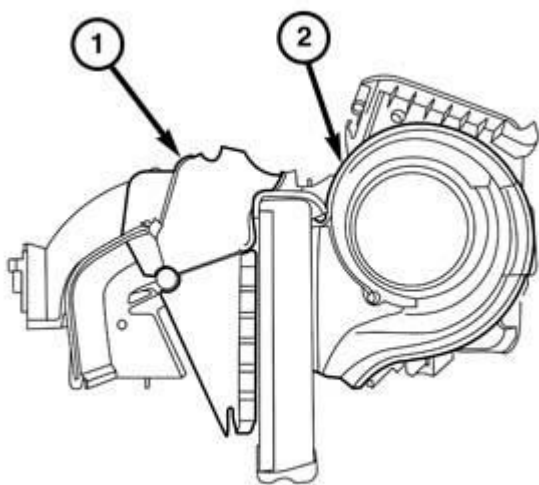
NOTE: Replacement of the refrigerant line O-ring seals and gaskets is required anytime a refrigerant line is disconnected. Failure to replace the rubber O-ring seals and metal gaskets could result in a refrigerant system leak.



240969653

Fig. 135: A/C Evaporator, HVAC Housing & Tubing Cover
Courtesy of CHRYSLER GROUP, LLC

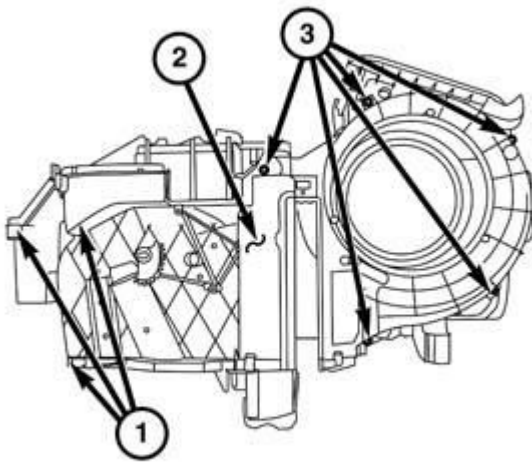
1. Install the A/C evaporator (1) into the left side of the HVAC housing (2). Make sure that the evaporator drain within the HVAC housing is clean and unrestricted and that the insulator around the A/C evaporator is properly installed.
2. Install the cover (3) onto the A/C evaporator tubing.



240969657

Fig. 136: HVAC Housing & Case Separator
Courtesy of CHRYSLER GROUP, LLC

3. Install the case separator (1) into the HVAC housing (2).



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Fig. 137: HVAC Housing & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Position the right side of the HVAC housing (2) onto the left side of the HVAC housing and install the eight screws (1 and 3) that secure the left and the right side of the HVAC housing together. Tighten the screws to 2.2 N.m (20 in lbs.).
5. Install the HVAC wiring harness. Make sure the harness is routed through all wiring retainers.
6. Install the air distribution housing. Refer to **HOUSING, HVAC, INSTALLATION**.
7. Install the blower motor. Refer to **MOTOR, BLOWER, INSTALLATION**.
8. Install the heater core. Refer to **CORE, HEATER, INSTALLATION**.
9. Install the cabin air filter. Refer to **FILTER, CABIN AIR, INSTALLATION**.
10. Install the air inlet housing. Refer to **HOUSING, HVAC, INSTALLATION**.
11. Install the HVAC housing. Refer to **HOUSING, HVAC, INSTALLATION**.
12. If the A/C evaporator is being replaced, add 20 milliliters (0.7 fluid ounce) of refrigerant oil to the refrigerant system. When replacing multiple A/C system components, see the Refrigerant Oil Capacities chart to determine how much oil should be added to the refrigerant system. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE**. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.

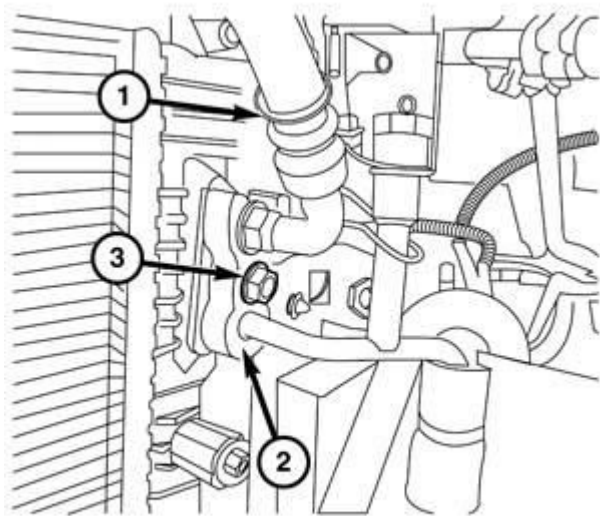
LINE, A/C DISCHARGE

REMOVAL**2.0L, 2.4L ENGINE**

WARNING: Review the safety precautions and warnings in this information before performing this procedure. Failure to follow these instructions may result in serious injury or death.

NOTE: The lower portion of the A/C suction line is only serviced as an assembly with the A/C discharge line.

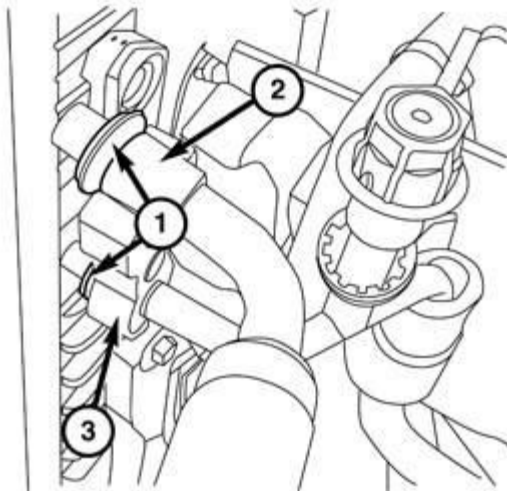
1. Disconnect and isolate the negative battery cable.
2. Remove the air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL** **BODY, AIR CLEANER, REMOVAL** **BODY, AIR CLEANER, REMOVAL** .
3. Remove the air cleaner resonator. Refer to **RESONATOR, AIR CLEANER, REMOVAL** **RESONATOR, AIR CLEANER, REMOVAL** .
4. Recover the refrigerant from the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE** .



250769716

Fig. 138: A/C Suction/Liquid Line Manifold & Nut
Courtesy of CHRYSLER GROUP, LLC

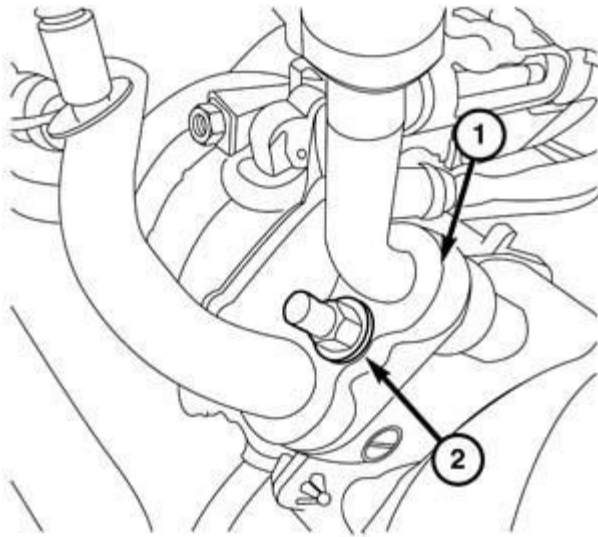
5. Remove nut (3) and the A/C suction/liquid line manifold (2) from the A/C condenser.



250769722

Fig. 139: Seal, Discharge Line & Manifold
 Courtesy of CHRYSLER GROUP, LLC

6. Detach the suction line (2) from manifold (3). Remove and discard the seals (1).
7. Install plugs in, or tape over the opened refrigerant line fittings and the condenser and suction line ports.
8. Remove the splash shield from the right side frame rail. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL** **SHIELD, SPLASH, REAR WHEELHOUSE, REMOVAL** .
9. Remove nut (3) and disconnect the lower suction line (4). Remove and discard the seal (1).
10. Install plugs in, or tape over the opened refrigerant line fittings and the condenser and suction line ports.



250769715

Fig. 140: A/C Discharge Line/Suction Line Manifold & Nut
 Courtesy of CHRYSLER GROUP, LLC

11. Remove the nut (2) and the A/C suction and discharge line (2) from the A/C compressor. Discard the O-ring seal and gasket.
12. Install plugs in, or tape over the opened discharge line fitting and the compressor port.

3.2L ENGINE

WARNING: Review the safety precautions and warnings in this information before performing this procedure. Failure to follow these instructions may result in serious injury or death.

1. Disconnect and isolate the negative battery cable.
2. Remove the air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL BODY, AIR CLEANER, REMOVAL BODY, AIR CLEANER, REMOVAL**.
3. Recover the refrigerant from the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.

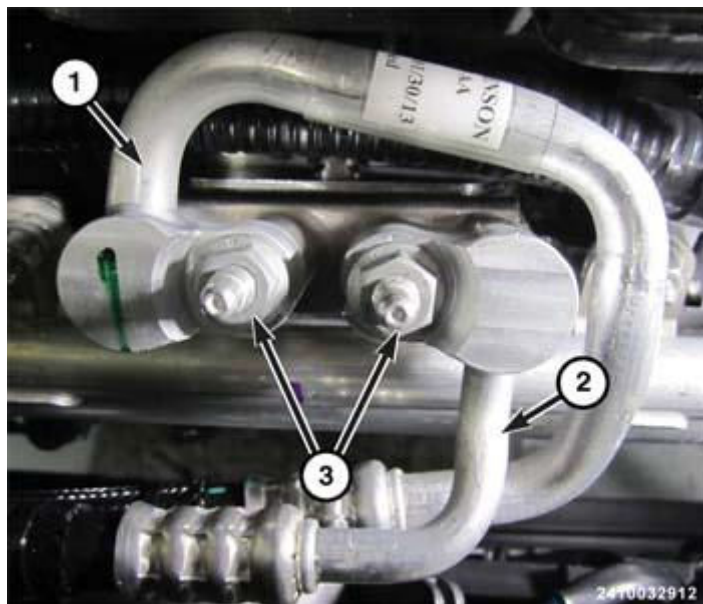


Fig. 141: View Of Discharge Line, Liquid Line & Fasteners
Courtesy of CHRYSLER GROUP, LLC

4. Remove nuts (3) and separate the A/C discharge (1) and liquid line (2) manifolds from the Internal Heat Exchanger (IHX).
5. Remove and discard the seals.
6. Install plugs in, or tape over the opened refrigerant line fittings.
7. Remove the engine belly pan.
8. Remove the upper radiator close out panel.
9. Remove the right side radiator air deflector.

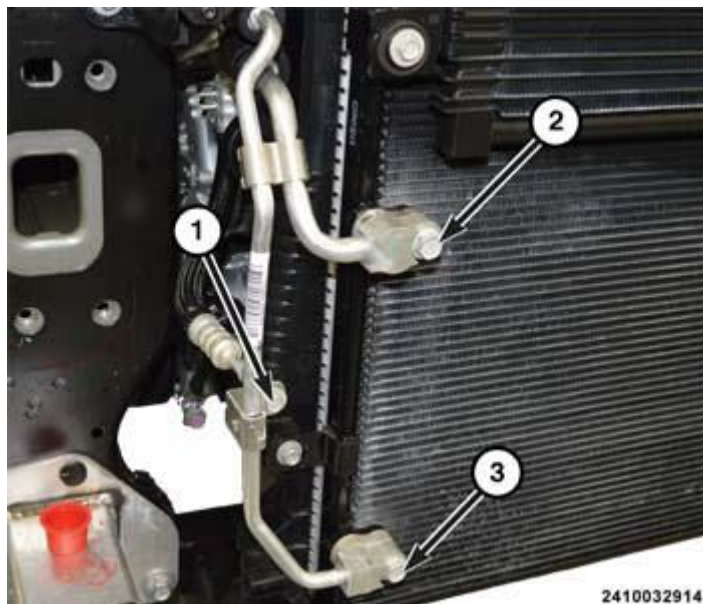


Fig. 142: A/C Condenser, Liquid Line, Discharge Line & Fasteners

Courtesy of CHRYSLER GROUP, LLC

10. Remove the line bracket bolt (1) from the radiator.
11. Remove the bolt (3) and disconnect the liquid line.
12. Remove the bolt (2) and disconnect the discharge line.
13. Remove and discard the seals.
14. Install plugs in, or tape over the opened refrigerant line fittings and ports.

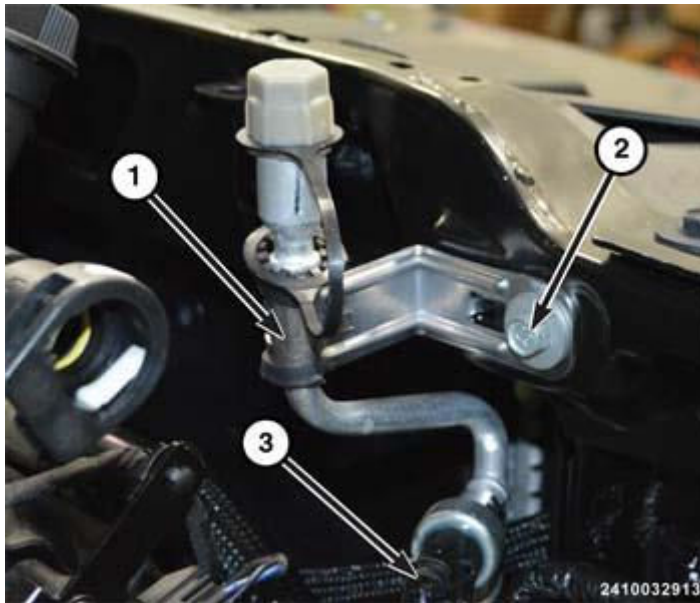


Fig. 143: A/C Service Port & Bracket
Courtesy of CHRYSLER GROUP, LLC

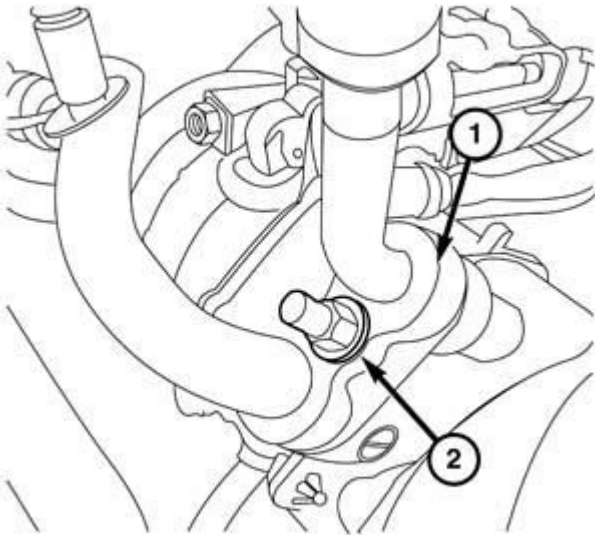
15. Remove the bolt (2) that secures the service port (1).
16. Disconnect the electrical connector (3) from the pressure switch.
17. Remove the discharge/liquid line assembly from the engine compartment.

INSTALLATION**2.0L, 2.4L ENGINE**

CAUTION: Be certain to adjust the refrigerant oil level when servicing the A/C refrigerant system. Failure to properly adjust the refrigerant oil level will prevent the A/C system from operating as designed and can cause serious A/C compressor damage.

NOTE: When replacing multiple A/C system components, refer to the Refrigerant Oil Capacities chart to determine how much oil should be added to the refrigerant system. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE.**

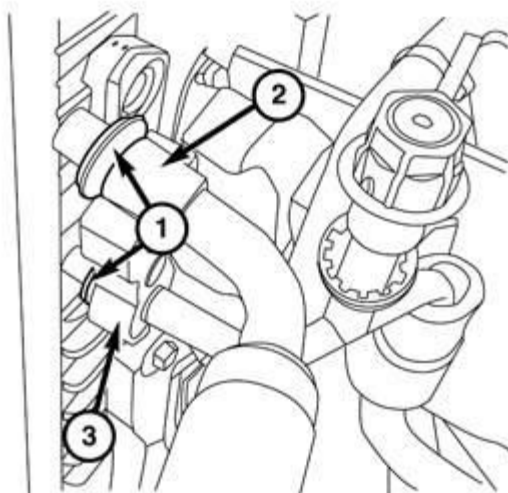
NOTE: Replacement of the refrigerant line O-ring seals and gaskets is required anytime a refrigerant line is opened. Failure to replace the rubber O-ring seals and metal gaskets could result in a refrigerant system leak.



250769715

Fig. 144: A/C Discharge Line/Suction Line Manifold & Nut
Courtesy of CHRYSLER GROUP, LLC

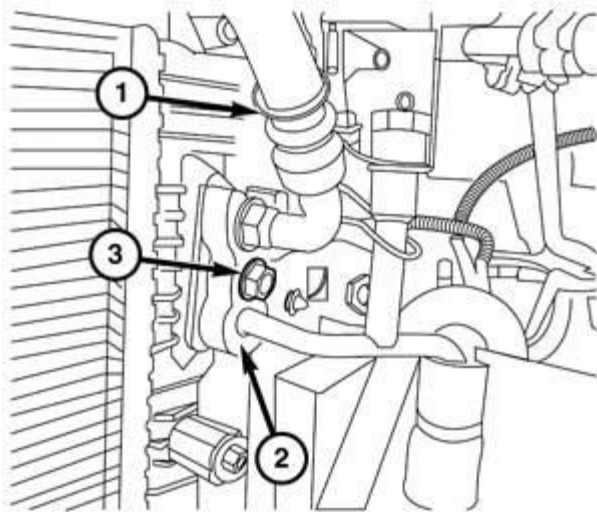
1. Remove the tape or plugs from the line fittings and the compressor ports.
2. Lubricate a new rubber seal with clean refrigerant oil and install it and a new seal onto the discharge line fitting. Use only the specified seals as it is made of a special material for the system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
3. Install the A/C suction and discharge line (1) to the A/C compressor and tighten the nut (2) to the proper. Refer to **SPECIFICATIONS**.
4. Remove the tape or plugs from the refrigerant line fittings.
5. Lubricate a new rubber seal with clean refrigerant oil and install it and a new seal onto the suction line fitting. Use only the specified seals as it is made of a special material for the system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
6. Connect the lower suction line and tighten the nut to the proper. Refer to **SPECIFICATIONS**.
7. Install the splash shield onto the right side frame rail. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION SHIELD, SPLASH, REAR WHEELHOUSE, INSTALLATION** .



250769722

Fig. 145: Seal, Discharge Line & Manifold
Courtesy of CHRYSLER GROUP, LLC

8. Remove the tape or plugs from the refrigerant line fittings and the condenser ports.
9. Lubricate a new seal (1) with clean refrigerant oil and install it and a new seals onto the discharge line fitting. Use only the specified seals as it is made of a special material for the system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
10. Attach the discharge line (2) to the liquid line manifold (3).



250769716

Fig. 146: A/C Suction/Liquid Line Manifold & Nut
Courtesy of CHRYSLER GROUP, LLC

11. Install the A/C discharge/liquid line manifold (2) to the A/C condenser and tighten the nut (3) to the proper. Refer to SPECIFICATIONS.
12. Connect the negative battery cable.

CAUTION: Do NOT run the engine with a vacuum pump in operation or with a vacuum present within the A/C system. Failure to follow this caution will result in serious A/C compressor damage.

13. Evacuate the refrigerant system. Refer to PLUMBING, STANDARD PROCEDURE.
14. Adjust the refrigerant oil level. Refer to OIL, REFRIGERANT, STANDARD PROCEDURE.
15. Charge the refrigerant system. Refer to PLUMBING, STANDARD PROCEDURE.

3.2L ENGINE

CAUTION: Be certain to adjust the refrigerant oil level when servicing the A/C refrigerant system. Failure to properly adjust the refrigerant oil level will prevent the A/C system from operating as designed and can cause serious A/C compressor damage.

NOTE: When replacing multiple A/C system components, refer to the Refrigerant Oil Capacities chart to determine how much oil should be added to the refrigerant system. Refer to OIL, REFRIGERANT, STANDARD PROCEDURE.

NOTE: Replacement of the refrigerant line O-ring seals and gaskets is required anytime a refrigerant line is opened. Failure to replace the rubber O-ring seals and metal gaskets could result in a refrigerant system leak.

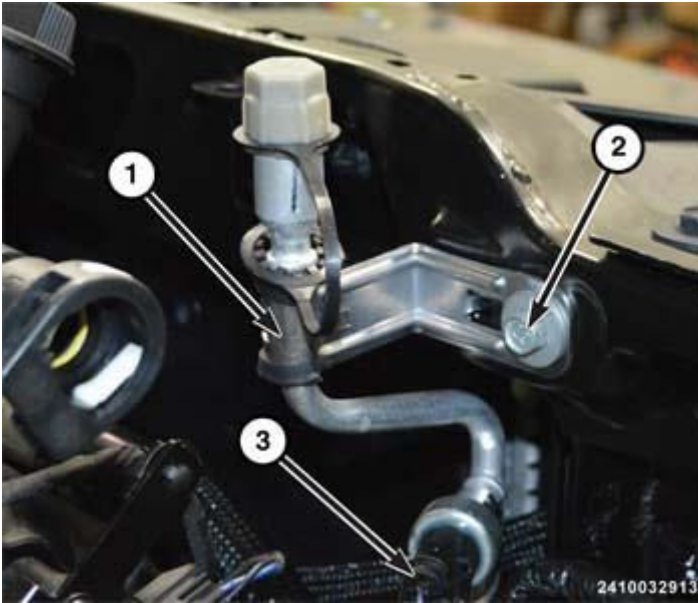


Fig. 147: A/C Service Port & Bracket
Courtesy of CHRYSLER GROUP, LLC

1. Position the discharge/liquid line assembly into the engine compartment.
2. Install the bolt (2) securing the service port (1) and tighten to the proper. Refer to **SPECIFICATIONS**.
3. Connect the electrical connector (3) to the pressure switch.

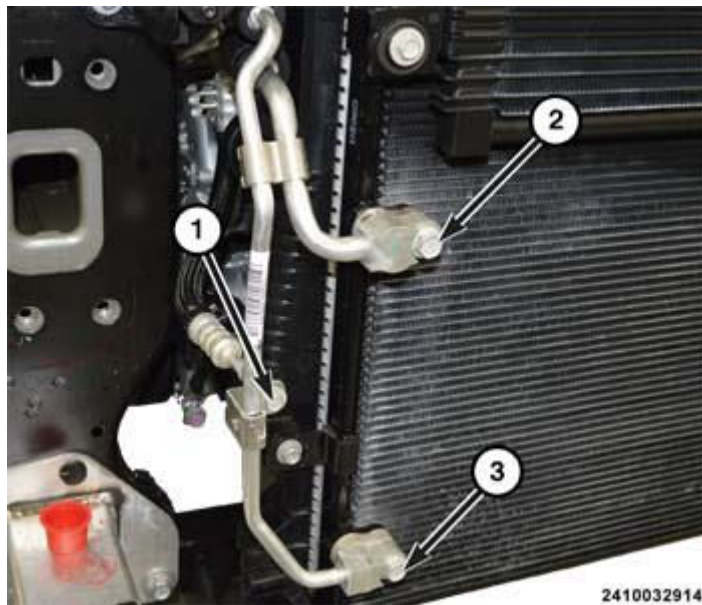


Fig. 148: A/C Condenser, Liquid Line, Discharge Line & Fasteners

Courtesy of CHRYSLER GROUP, LLC

4. Remove the tape or plugs from the line fittings and ports.
5. Lubricate a new rubber seal with clean refrigerant oil and install. Use only the specified seals as it is made of a special material for the system. Use only refrigerant oil of the type recommended for the vehicle.
6. Install the bolt (2) securing the discharge line to the A/C condenser and tighten the bolt to the proper. Refer to **SPECIFICATIONS**.
7. Install the bolt (3) securing the liquid line to the A/C condenser and tighten the bolt to the proper. Refer to **SPECIFICATIONS**.
8. Install the line bracket bolt (1) and tighten the bolt to the proper. Refer to **SPECIFICATIONS**.
9. Install the right side radiator air deflector.
10. Install the upper radiator close out panel.
11. Install the engine belly pan.

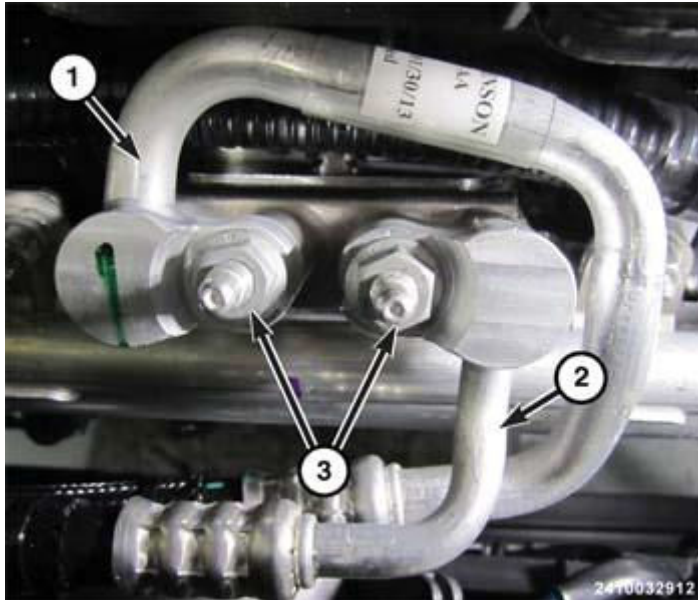


Fig. 149: View Of Discharge Line, Liquid Line & Fasteners
Courtesy of CHRYSLER GROUP, LLC

12. Attach the discharge line (1) and liquid line (2) to the Internal Heat Exchanger (IHX) and tighten nuts (3) to the proper. Refer to **SPECIFICATIONS**.
13. Connect the negative battery cable.

CAUTION: Do NOT run the engine with a vacuum pump in operation or with a vacuum present within the A/C system. Failure to follow this caution will result in serious A/C compressor damage.

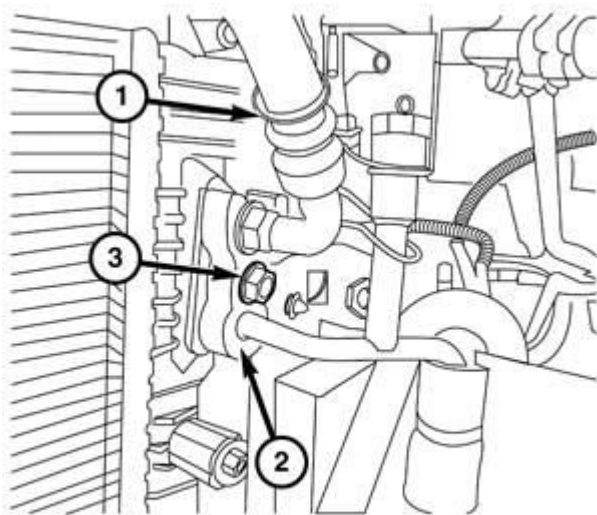
14. Evacuate the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.
15. Adjust the refrigerant oil level. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE**.

16. Charge the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.

LINE, A/C LIQUID**REMOVAL****2.0L, 2.4L ENGINE**

WARNING: Review the safety precautions and warnings in this information before performing this procedure. Failure to follow these instructions may result in serious injury or death.

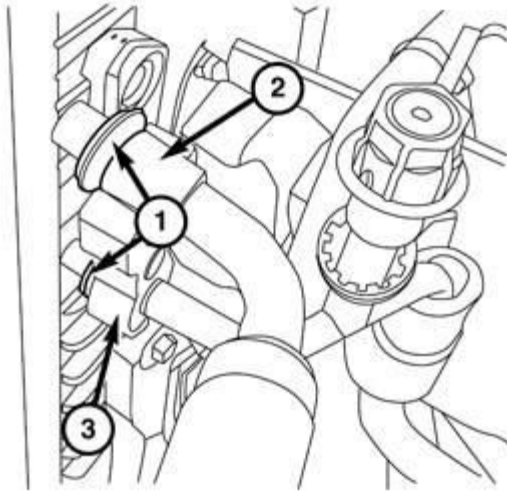
1. Disconnect and isolate the negative battery cable.
2. Remove the air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL BODY, AIR CLEANER, REMOVAL BODY, AIR CLEANER, REMOVAL** .
3. Remove the air cleaner resonator. Refer to **RESONATOR, AIR CLEANER, REMOVAL RESONATOR, AIR CLEANER, REMOVAL** .
4. Recover the refrigerant from the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.



250769716

Fig. 150: A/C Suction/Liquid Line Manifold & Nut
Courtesy of CHRYSLER GROUP, LLC

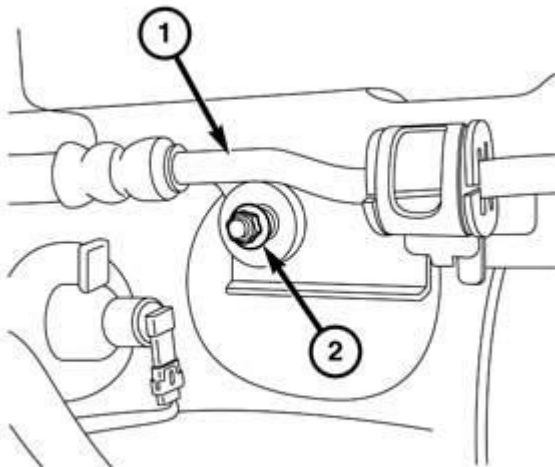
5. Remove nut (3) and the A/C discharge/liquid line manifold (2) from the A/C condenser.



250769722

Fig. 151: Seal, Discharge Line & Manifold
Courtesy of CHRYSLER GROUP, LLC

6. Detach the suction line (2) from manifold (3). Remove and discard the O-ring seal and gasket (1).
7. Install plugs in, or tape over the opened refrigerant line fittings and the condenser and suction line ports.

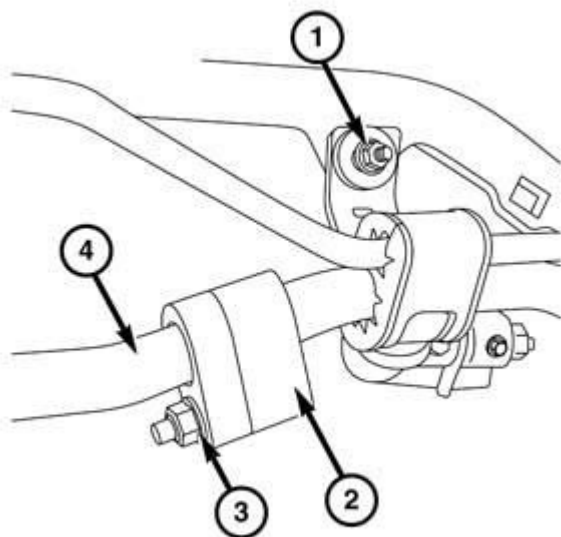


241070006

Fig. 152: Nut & Liquid Line

Courtesy of CHRYSLER GROUP, LLC

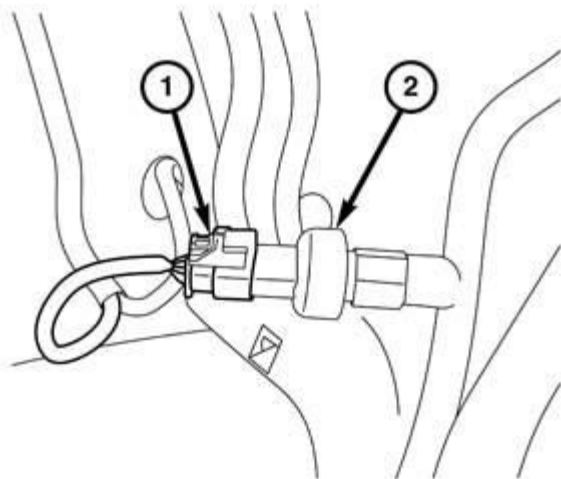
8. Remove nut (2) securing the front liquid line (1) and bracket to frame rail.



241070009

Fig. 153: Nut, Upper & Lower Suction Lines
Courtesy of CHRYSLER GROUP, LLC

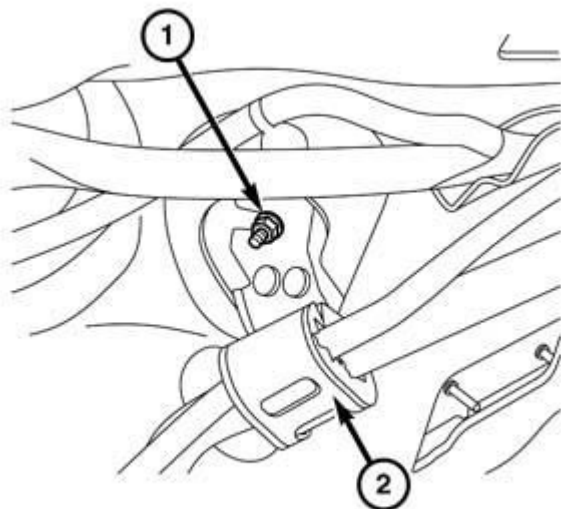
9. Remove nut (3) and disconnect the lower suction line (4) from upper suction line (2).
10. Install plugs in, or tape over the opened refrigerant line fittings.
11. Remove nut (1) securing the liquid and upper suction line bracket.



241070010

Fig. 154: Pressure Transducer & Connector
Courtesy of CHRYSLER GROUP, LLC

12. Disconnect the pressure transducer wire harness connector (1).
13. If necessary, remove the pressure transducer (2).

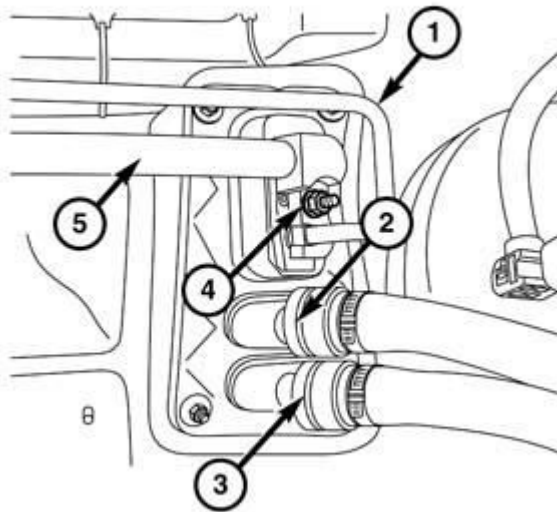


241070012

Fig. 155: Nut, Liquid & Suction Line Bracket

Courtesy of CHRYSLER GROUP, LLC

14. Remove nut (1) securing the liquid and suction line bracket (2).



241070008

Fig. 156: Refrigerant Lines, Heater Core Hoses & Fastener
Courtesy of CHRYSLER GROUP, LLC

15. Remove nut (4) and detach the A/C liquid (1) and suction line manifold (5) from the A/C evaporator. Remove and discard the seals.
16. Remove the A/C liquid (1) and suction line (5) assembly from the engine compartment.
17. Install plugs in, or tape over the opened refrigerant line fittings and the evaporator ports.

3.2L ENGINE

WARNING: Review the safety precautions and warnings in this information before performing this procedure. Failure to follow these instructions may result in serious injury or death.

1. Disconnect and isolate the negative battery cable.
2. Remove the engine cover.
3. Recover the refrigerant from the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.

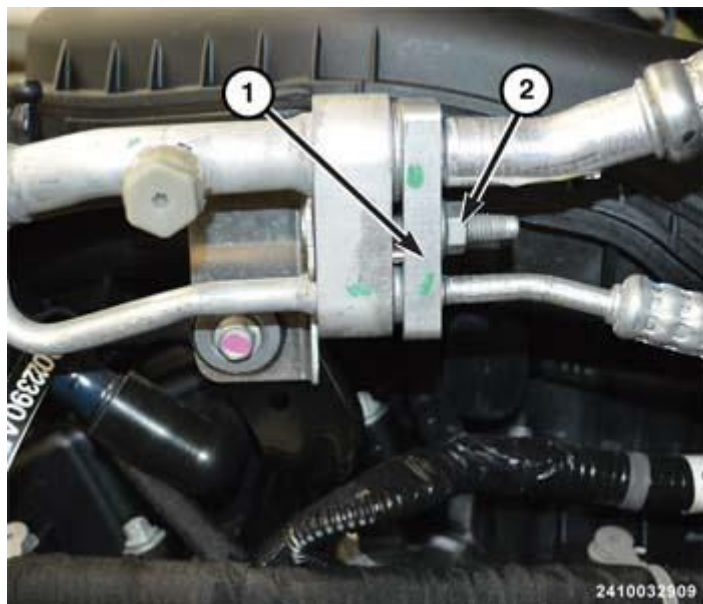


Fig. 157: Suction/Liquid Line Manifold & Internal Heat Exchanger (IHX)
Courtesy of CHRYSLER GROUP, LLC

4. Remove the nut (2) and separate the suction/liquid line manifold (1) from the Internal Heat Exchanger (IHX).
5. Remove and discard the seals.
6. Install plugs in, or tape over the opened refrigerant line fittings.

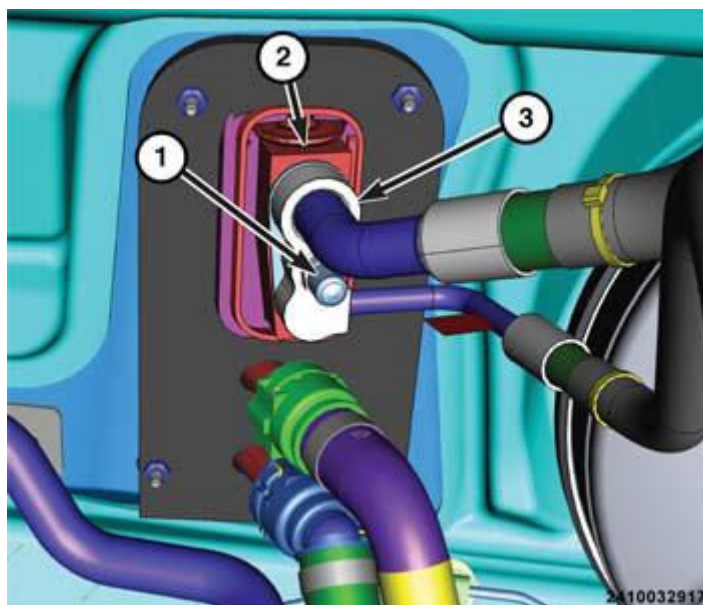


Fig. 158: Suction/Liquid Line Manifold & Expansion Valve
Courtesy of CHRYSLER GROUP, LLC

7. Remove the nut (1) and separate the suction/liquid line manifold (3) from the expansion valve (2).

8. Remove and discard the seals.
9. Install plugs in, or tape over the opened refrigerant line fittings.
10. Remove the suction/liquid line assembly from the engine compartment.

INSTALLATION

2.0L, 2.4L ENGINE

CAUTION: Be certain to adjust the refrigerant oil level when servicing the A/C refrigerant system. Failure to properly adjust the refrigerant oil level will prevent the A/C system from operating as designed and can cause serious A/C compressor damage.

CAUTION: The A/C liquid line must be replaced if an internal failure of the A/C compressor has occurred. Failure to replace the A/C liquid line can prevent the A/C system from operating as designed and can cause serious A/C compressor damage.

NOTE: When replacing multiple A/C system components, refer to the Refrigerant Oil Capacities chart to determine how much oil should be added to the refrigerant system. Refer to OIL, REFRIGERANT, STANDARD PROCEDURE.

NOTE: Replacement of the refrigerant line O-ring seals and gaskets is required anytime a refrigerant line is opened. Failure to replace the rubber O-ring seals and metal gaskets could result in a refrigerant system leak.

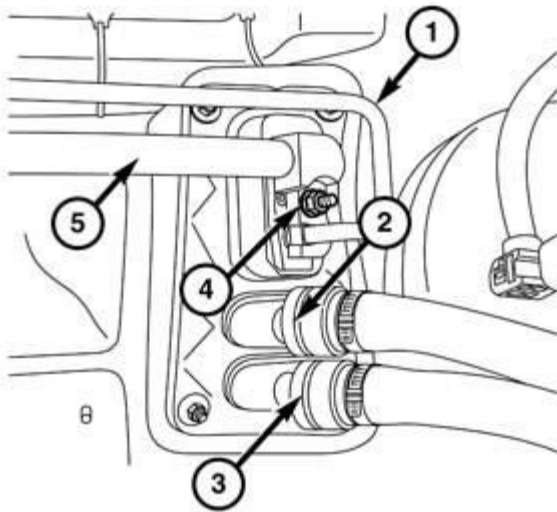
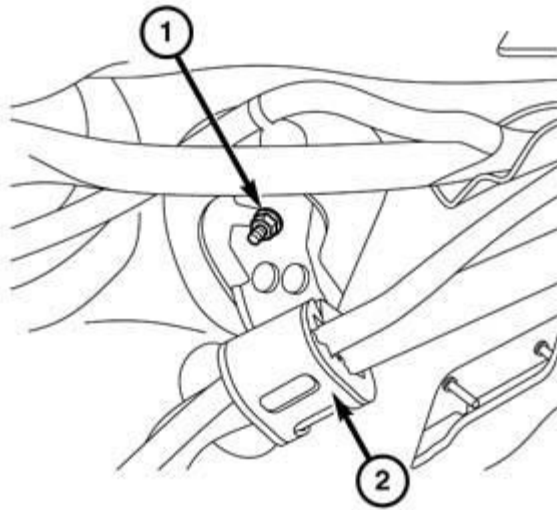


Fig. 159: Refrigerant Lines, Heater Core Hoses & Fastener
Courtesy of CHRYSLER GROUP, LLC

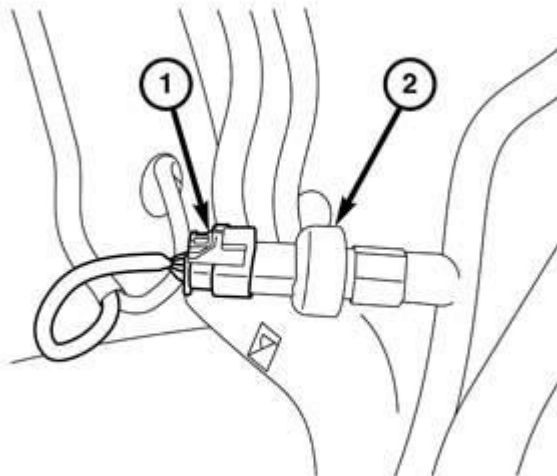
1. Remove the tape or plugs from the refrigerant line fittings and the evaporator ports.
2. Lubricate the new seals with clean refrigerant oil and install the seals onto the liquid (1) and suction line (5) fittings. Use only the specified seals as they are made of special materials compatible to the system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
3. Position the A/C liquid (1) and suction line (5) assembly into the engine compartment.
4. Attach the A/C liquid and suction line assembly to the A/C evaporator (6) and tighten the nut (4) to the proper. Refer to **SPECIFICATIONS**.



241070012

Fig. 160: Nut, Liquid & Suction Line Bracket
Courtesy of CHRYSLER GROUP, LLC

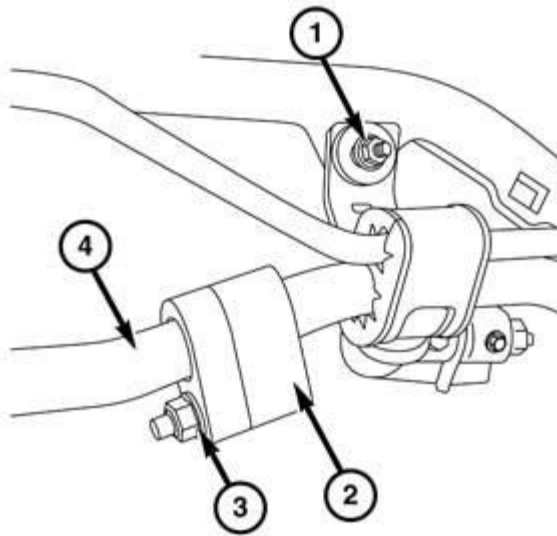
5. Install the nut securing the liquid and suction line bracket (2) and tighten nut to the proper. Refer to **SPECIFICATIONS**.



241070010

Fig. 161: Pressure Transducer & Connector
Courtesy of CHRYSLER GROUP, LLC

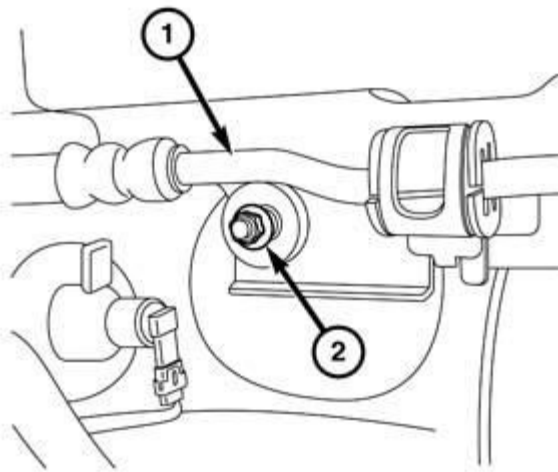
6. If removed, inspect the O-ring seal and install the pressure transducer and securely tighten.
7. Connect the pressure transducer wire harness connector.



241070009

Fig. 162: Nut, Upper & Lower Suction Lines
Courtesy of CHRYSLER GROUP, LLC

8. Remove the tape or plugs from the refrigerant line fittings and the evaporator ports.
9. Lubricate the new seals with clean refrigerant oil and install the seals onto the suction line fitting. Use only the specified seals as they are made of special materials compatible to the R-134a system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
10. Install the liquid and suction line bracket and tighten the nut (1) to the proper. Refer to **SPECIFICATIONS**.
11. Connect the lower suction line (4) to the upper suction line (2) assembly and install nut (3) and tighten the nut to the proper. Refer to **SPECIFICATIONS**.

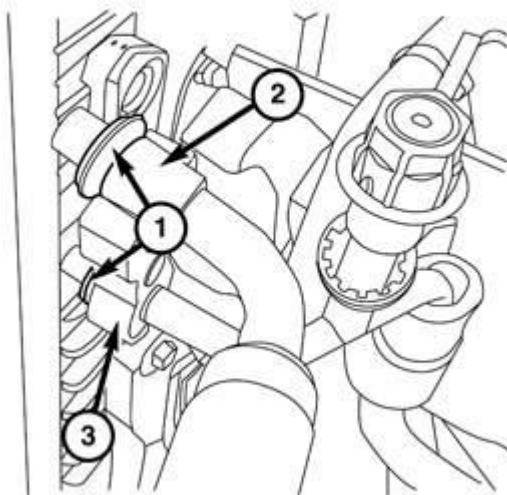


241070006

Fig. 163: Nut & Liquid Line

Courtesy of CHRYSLER GROUP, LLC

12. Install the front liquid line (1) support bracket and tighten the nut to the proper. Refer to **SPECIFICATIONS**.

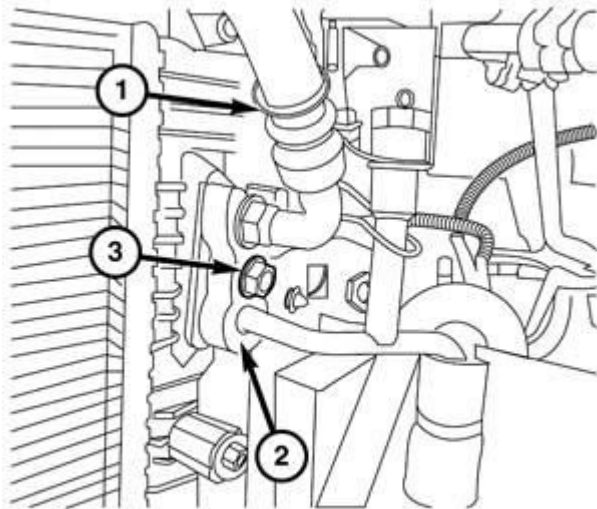


250769722

Fig. 164: Seal, Discharge Line & Manifold

Courtesy of CHRYSLER GROUP, LLC

13. Remove the tape or plugs from the suction and liquid line fitting and the condenser port.
14. Lubricate the new seals (1) with clean refrigerant oil and install it onto the suction and liquid line fitting. Use only the specified O-ring as it is made of a special material for the system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
15. Attach the suction line (2) to the liquid manifold (3).



250769716

Fig. 165: A/C Suction/Liquid Line Manifold & Nut
Courtesy of CHRYSLER GROUP, LLC

16. Install the A/C suction (1) and liquid line manifold (2) to the A/C condenser and tighten the nut to the proper. Refer to **SPECIFICATIONS**.
17. Connect the negative battery cable.

CAUTION: Do NOT run the engine with a vacuum pump in operation or with a vacuum present within the A/C system. Failure to follow this caution will result in serious A/C compressor damage.

18. Evacuate the refrigerant system Refer to **PLUMBING, STANDARD PROCEDURE**.
19. Adjust the refrigerant oil level. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE**.
20. Charge the A/C system. Refer to **PLUMBING, STANDARD PROCEDURE**.
21. Install the air cleaner resonator. Refer to **RESONATOR, AIR CLEANER, INSTALLATION** .
22. Install the air cleaner body. Refer to **BODY, AIR CLEANER, INSTALLATION** and **BODY, AIR CLEANER, INSTALLATION** .

3.2L ENGINE

CAUTION: Be certain to adjust the refrigerant oil level when servicing the A/C refrigerant system. Failure to properly adjust the refrigerant oil level will prevent the A/C system from operating as designed and can cause serious A/C compressor damage.

CAUTION: The A/C liquid line must be replaced if an internal failure of the A/C compressor has occurred. Failure to replace the A/C liquid line can prevent the A/C system from operating as designed and can cause serious A/C compressor damage.

NOTE: When replacing multiple A/C system components, refer to the Refrigerant Oil Capacities chart to determine how much oil should be added to the refrigerant system. Refer to OIL, REFRIGERANT, STANDARD PROCEDURE.

NOTE: Replacement of the refrigerant line O-ring seals and gaskets is required anytime a refrigerant line is opened. Failure to replace the rubber O-ring seals and metal gaskets could result in a refrigerant system leak.

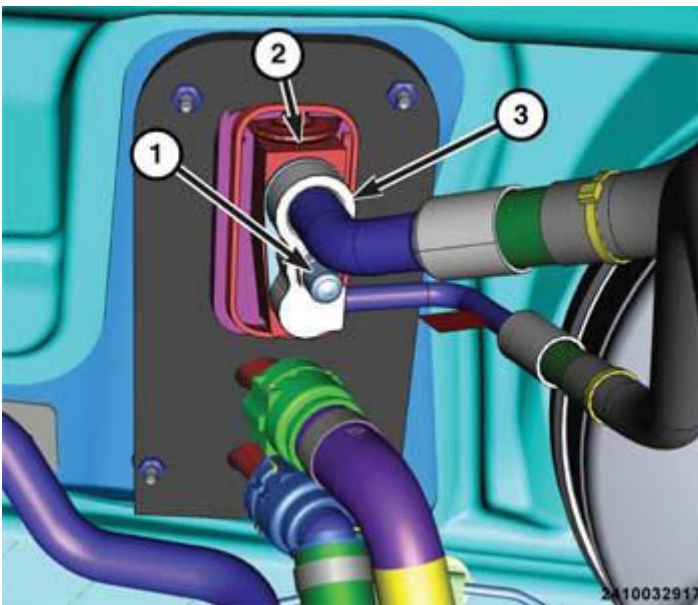


Fig. 166: Suction/Liquid Line Manifold & Expansion Valve
Courtesy of CHRYSLER GROUP, LLC

1. Remove the tape or plugs from the refrigerant line fittings and the expansion valve ports.
2. Lubricate the new seals with clean refrigerant oil and install the seals onto the liquid and suction line fittings. Use only the specified seals as they are made of special materials compatible to the system. Use only refrigerant oil of the type recommended for the vehicle.
3. Position the suction/liquid line assembly into the engine compartment.
4. Attach the suction/liquid line manifold (3) to the expansion valve (2) and tighten the nut (1) to the proper. Refer to SPECIFICATIONS.

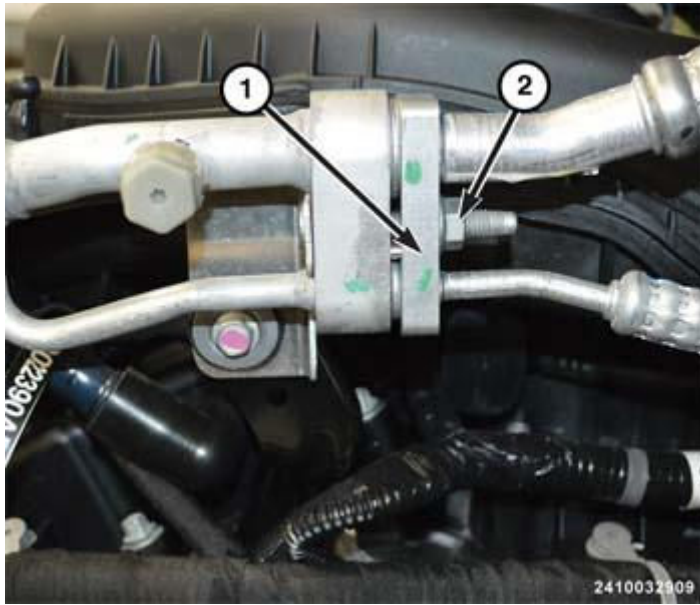


Fig. 167: Suction/Liquid Line Manifold & Internal Heat Exchanger (IHX)
 Courtesy of CHRYSLER GROUP, LLC

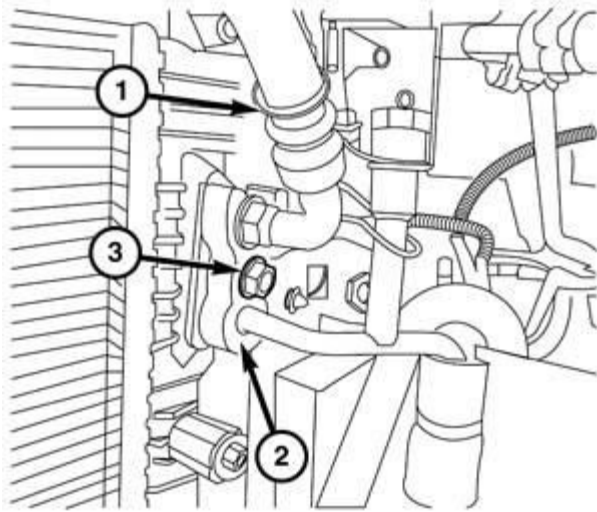
5. Remove the tape or plugs from the refrigerant line fittings.
6. Lubricate the new seals with clean refrigerant oil and install the seals onto the suction/liquid line fitting.
7. Connect the suction/liquid line manifold (1) to the Internal Heat Exchanger (IHX) and tighten the nut (2) to the proper. Refer to **SPECIFICATIONS**.
8. Connect the negative battery cable.
9. Evacuate the refrigerant system Refer to **PLUMBING, STANDARD PROCEDURE**.
10. Adjust the refrigerant oil level. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE**.
11. Charge the A/C system. Refer to **PLUMBING, STANDARD PROCEDURE**.
12. Install the engine cover.

LINE, A/C SUCTION

REMOVAL

2.0L, 2.4L ENGINE

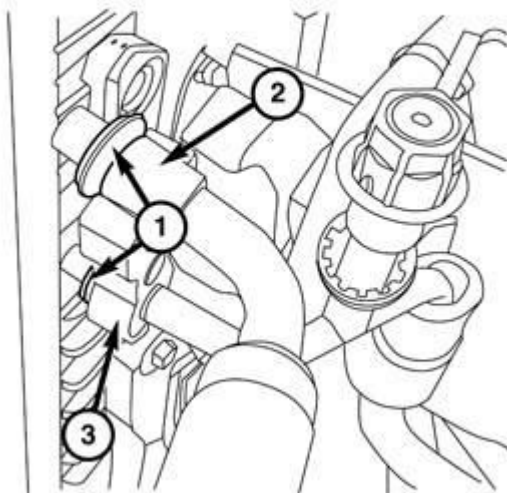
1. Disconnect and isolate the negative battery cable.
2. Remove the air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL BODY, AIR CLEANER, REMOVAL BODY, AIR CLEANER, REMOVAL** .
3. Remove the air cleaner resonator. Refer to **RESONATOR, AIR CLEANER, REMOVAL RESONATOR, AIR CLEANER, REMOVAL** .
4. Recover the refrigerant from the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.



250769716

Fig. 168: A/C Suction/Liquid Line Manifold & Nut
Courtesy of CHRYSLER GROUP, LLC

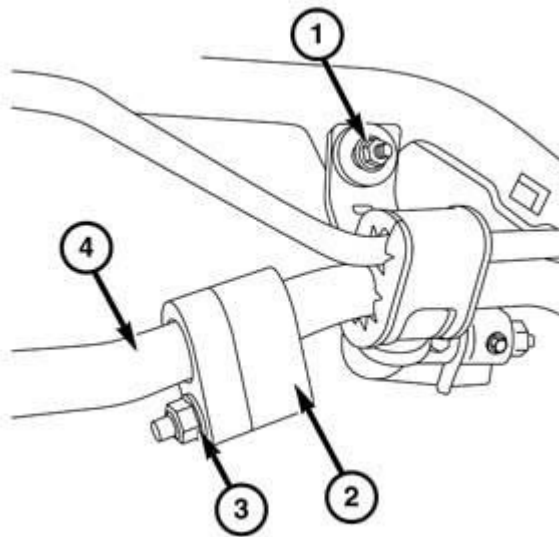
5. Remove nut (3) and the A/C discharge/liquid line manifold (2) from the A/C condenser.



250769722

Fig. 169: Seal, Discharge Line & Manifold
Courtesy of CHRYSLER GROUP, LLC

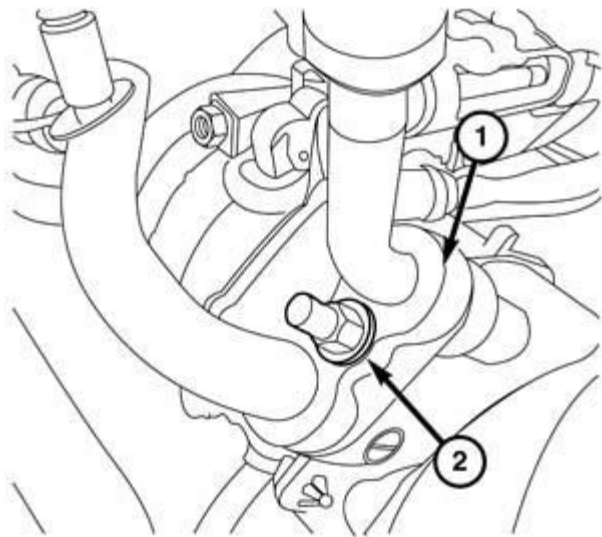
6. Detach the suction line (2) from liquid line manifold (3). Remove and discard the O-ring seal and gasket (1).
7. Install plugs in, or tape over the opened refrigerant line fittings and the condenser and suction line ports.



241070009

Fig. 170: Nut, Upper & Lower Suction Lines
Courtesy of CHRYSLER GROUP, LLC

8. Remove the nut (2) that secures the lower A/C suction (4) line (3) to the upper A/C suction line (2).
9. Disconnect the lower A/C suction line from the A/C upper A/C suction line. Remove and discard the seal.
10. Install plugs in, or tape over the opened suction line fitting.



250769715

Fig. 171: A/C Discharge Line/Suction Line Manifold & Nut
Courtesy of CHRYSLER GROUP, LLC

11. Remove nut (2) and the lower A/C suction/discharge manifold (1) from the A/C compressor and discard the seals.
12. Install plugs in, or tape over the opened suction line fitting and the compressor port.

3.2L ENGINE

1. Remove the engine cover.
2. Recover the refrigerant from the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.
3. Remove the powertrain control module. Refer to **MODULE, POWERTRAIN CONTROL, REMOVAL**.



- Fig. 173: View Of Discharge Line, Liquid Line & Fasteners**
Courtesy of CHRYSLER GROUP, LLC

- 171

9. Remove and discard the O-ring seal and gasket.
10. Install plugs in, or tape over the opened refrigerant line fittings and ports.

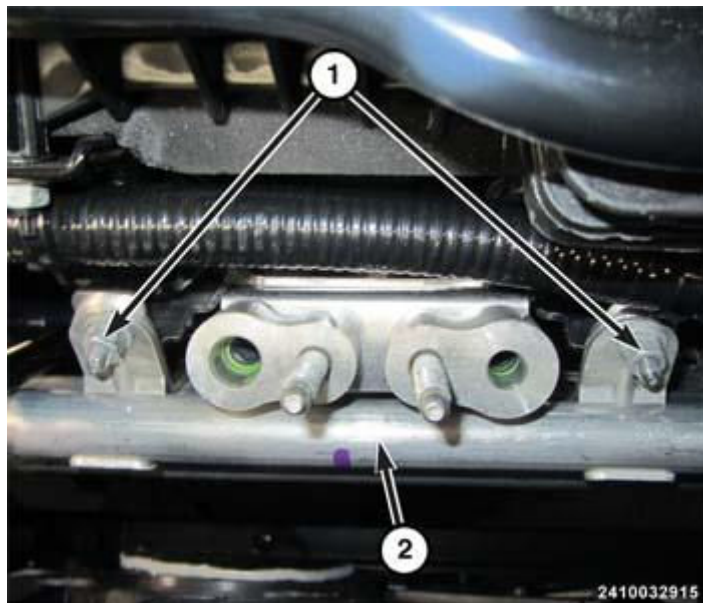


Fig. 174: Coolant Tube & Fasteners
Courtesy of CHRYSLER GROUP, LLC

11. Remove the nuts (1) securing the coolant tube (2) and reposition the tube to gain clearance.

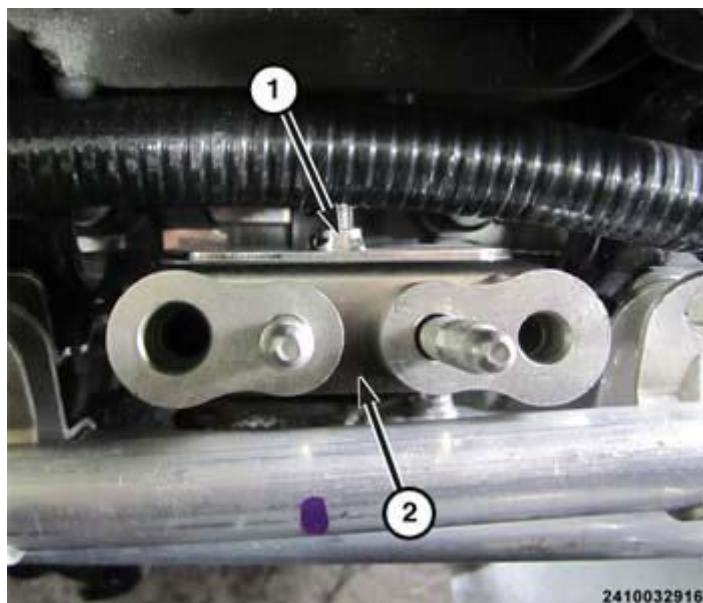


Fig. 175: View Of IHX Line Bracket
Courtesy of CHRYSLER GROUP, LLC

12. Remove bolt (1) securing the IHX manifold (2) to the bracket.

13. Remove the Catalytic Converter. Refer to **CONVERTER, CATALYTIC [EHB], REMOVAL** .

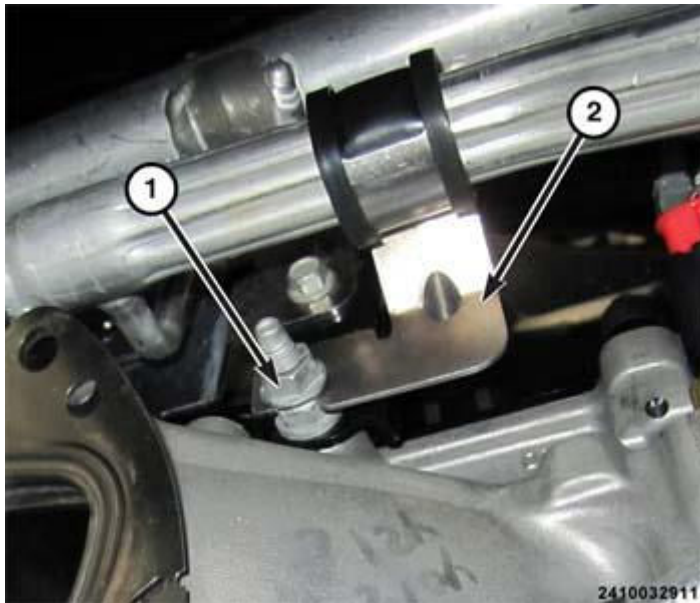


Fig. 176: IHX Line Bracket & Fasteners
Courtesy of CHRYSLER GROUP, LLC

14. Remove the nut (1) securing the IHX bracket (2).

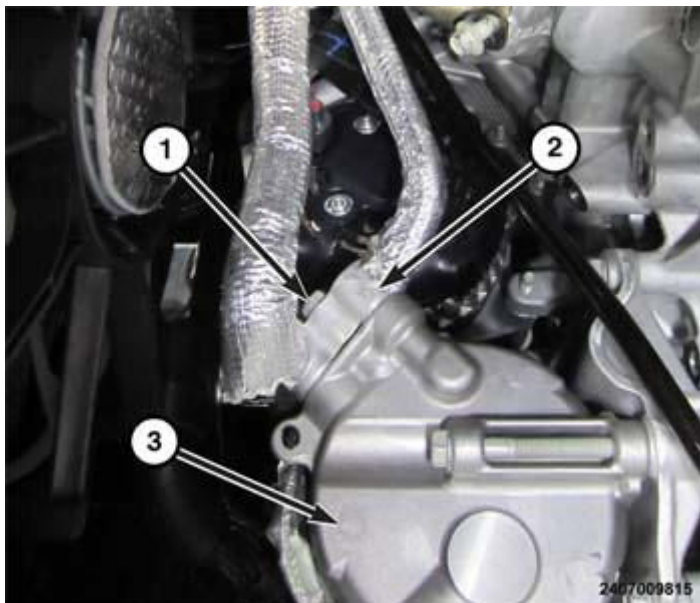
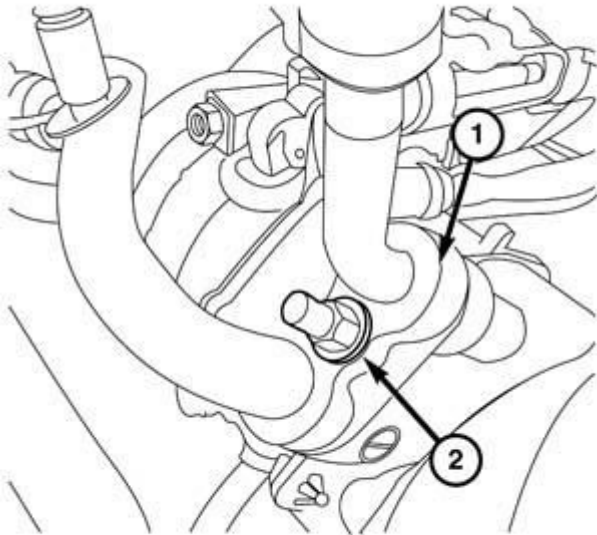


Fig. 177: A/C Compressor, IHX Manifold Line & Fasteners
Courtesy of CHRYSLER GROUP, LLC

15. Remove the fastener (1) securing the IHX manifold (2) to the A/C compressor (3) and detach the manifold from the compressor.
16. Remove and discard the seals and install plugs in or tape over the opened line fittings and ports.

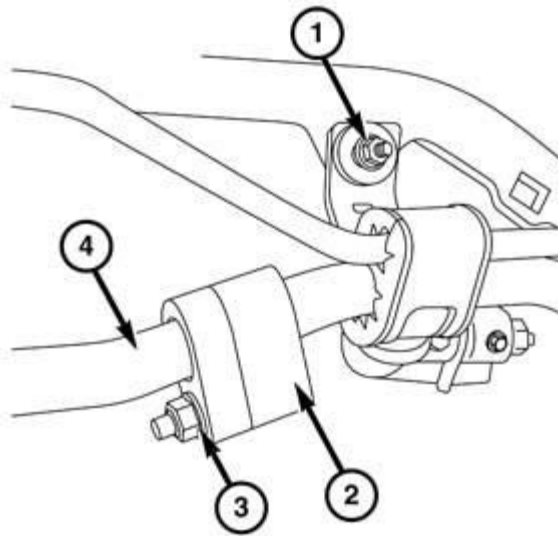
17. Remove the IHX from the engine compartment.

INSTALLATION**2.0L, 2.4L ENGINE**

250769715

Fig. 178: A/C Discharge Line/Suction Line Manifold & Nut
Courtesy of CHRYSLER GROUP, LLC

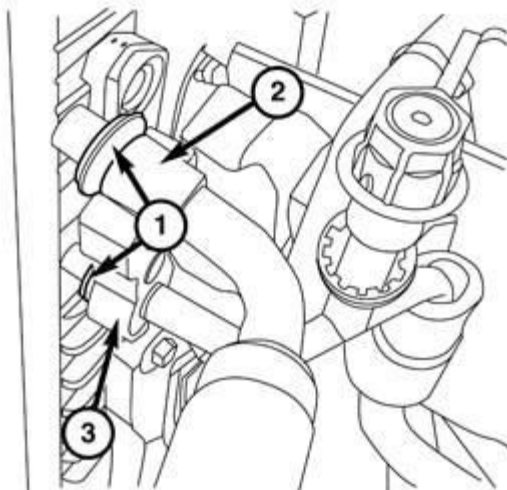
1. Remove the tape or plugs from the suction line fitting and the compressor port.
2. Lubricate a new seal with clean refrigerant oil and install it and new seals onto the suction/discharge manifold. Use only the specified seals as it is made of a special material for the system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
3. Install the lower A/C suction/discharge manifold (1) to the A/C compressor and tighten the nut to the proper. Refer to **SPECIFICATIONS**.



241070009

Fig. 179: Nut, Upper & Lower Suction Lines
Courtesy of CHRYSLER GROUP, LLC

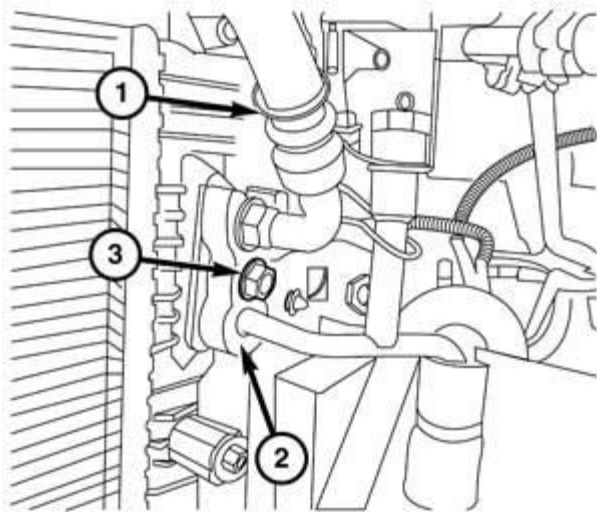
4. Remove the tape or plugs from the upper suction line fitting.
5. Lubricate a new seal with clean refrigerant oil and install it and new seal onto the suction line fitting. Use only the specified seal as it is made of a special material for the system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
6. Install the lower A/C lower suction line (4) to the upper A/C suction line (2) and tighten the nut (3) to the proper. Refer to **SPECIFICATIONS**.



250769722

Fig. 180: Seal, Discharge Line & Manifold
Courtesy of CHRYSLER GROUP, LLC

7. Remove the tape or plugs from the upper suction line fitting.
8. Lubricate a new seal with clean refrigerant oil and install it and new seal onto the suction line fitting. Use only the specified seal as it is made of a special material for the system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
9. Attach the suction line (2) to the liquid line manifold (3).



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Fig. 181: A/C Suction/Liquid Line Manifold & Nut
Courtesy of CHRYSLER GROUP, LLC

10. Install the A/C discharge/liquid line manifold (2) from the A/C condenser and tighten the nut (3) to the proper. Refer to **SPECIFICATIONS**.
11. Connect the negative battery cable.

CAUTION: Do NOT run the engine with a vacuum pump in operation or with a vacuum present within the A/C system. Failure to follow this caution will result in serious A/C compressor damage.

12. Evacuate the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.
13. Adjust the refrigerant oil level. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE**.
14. Charge the A/C system. Refer to **PLUMBING, STANDARD PROCEDURE**.

3.2L ENGINE

1. Remove the tape or plugs from the Internal Heat Exchanger line fittings and ports.
2. Lubricate a new seal with clean refrigerant oil and install it and new seals onto the suction/discharge manifold. Use only the specified seals as it is made of a special material for the system. Use only refrigerant oil of the type recommended for the vehicle.

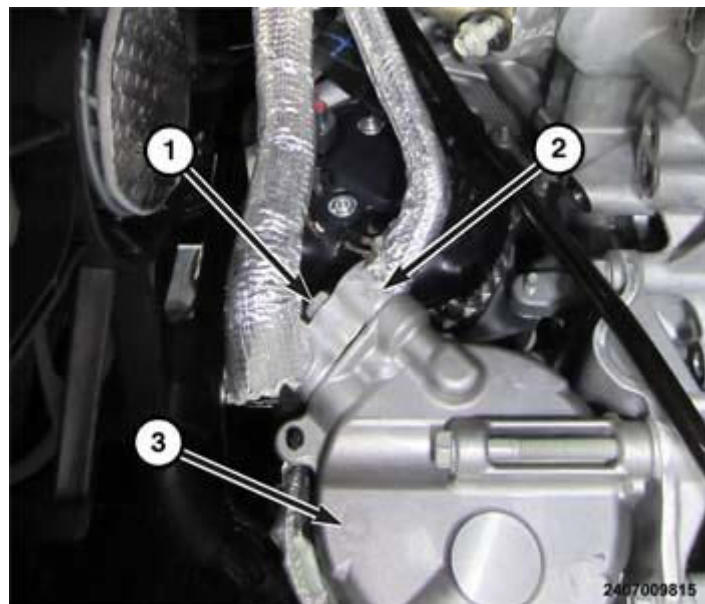


Fig. 182: A/C Compressor, IHX Manifold Line & Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Position the IHX in the engine compartment.
4. Install the IHX manifold (1) to the A/C compressor (3) and tighten the fastener (1) to the proper. Refer to **SPECIFICATIONS**.

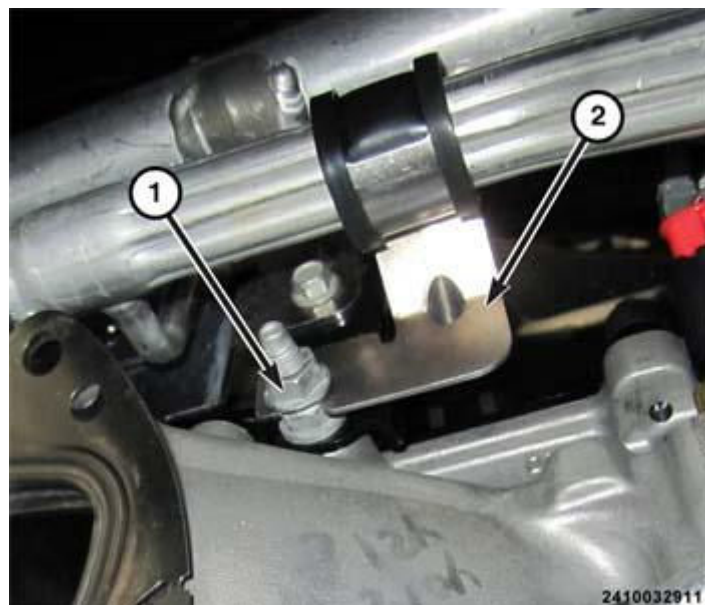


Fig. 183: IHX Line Bracket & Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. Position the IHX bracket (2) on the mounting stud and securely tighten the nut (1).
6. Install the catalytic converter. Refer to **CONVERTER, CATALYTIC [EHB], INSTALLATION**.



Fig. 184: View Of IHX Line Bracket
Courtesy of CHRYSLER GROUP, LLC

7. Install the bolt (1) securing the IHX manifold (2) to the bracket.

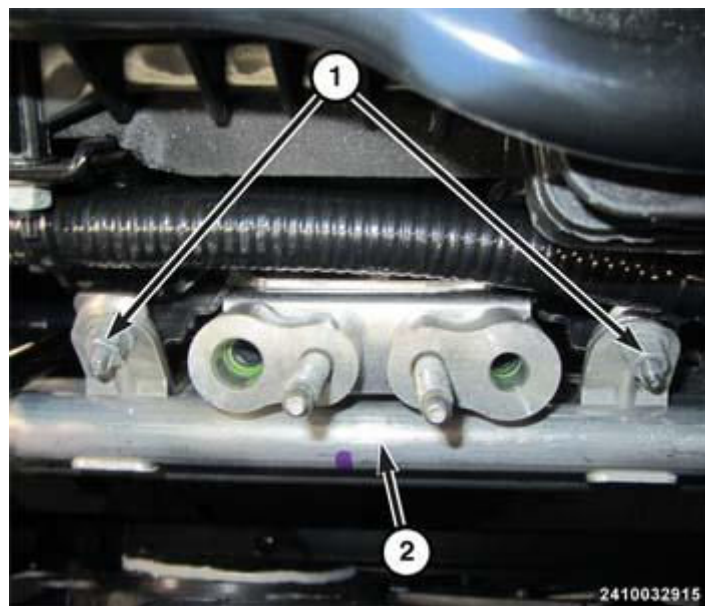


Fig. 185: Coolant Tube & Fasteners
Courtesy of CHRYSLER GROUP, LLC

8. Position the coolant tube (2) on the mounting studs and securely tighten the nuts (1).

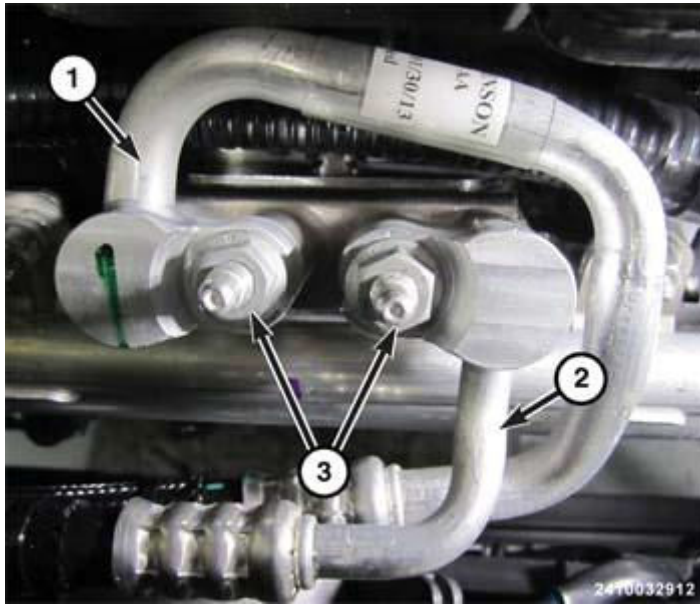


Fig. 186: View Of Discharge Line, Liquid Line & Fasteners
Courtesy of CHRYSLER GROUP, LLC

9. Remove the tape or plugs from the line fittings and ports.
10. Lubricate a new seal with clean refrigerant oil and install it and new seal onto the suction line fitting. Use only the specified seal as it is made of a special material for the system. Use only refrigerant oil of the type recommended for the vehicle.
11. Install the discharge line (1) and liquid line (2) to the IHX and tighten the nuts (3) to the proper. Refer to **SPECIFICATIONS**.

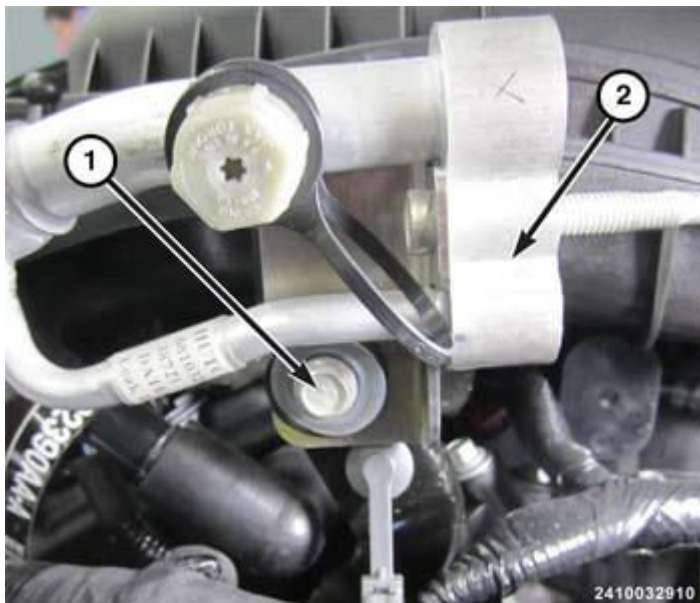


Fig. 187: View Of IHX Manifold Bracket At Engine
Courtesy of CHRYSLER GROUP, LLC

12. Remove the tape or plugs from the upper suction line fitting.
13. Lubricate a new seal with clean refrigerant oil and install it and new seal onto the suction line fitting. Use only the specified seal as it is made of a special material for the system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
14. Install the bolt (1) securing the IHX manifold (2) bracket to the engine and securely tighten.
15. Attach the suction/discharge line to the IHX manifold (2) and tighten the nut to the proper. Refer to **SPECIFICATIONS**.
16. Install the powertrain control module. Refer to **MODULE, POWERTRAIN CONTROL, INSTALLATION**.
17. Evacuate the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.
18. Adjust the refrigerant oil level. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE**.
19. Charge the A/C system. Refer to **PLUMBING, STANDARD PROCEDURE**.
20. Install the engine cover.

OIL, REFRIGERANT

STANDARD PROCEDURE

STANDARD PROCEDURE - REFRIGERANT OIL LEVEL

When an A/C system is assembled at the factory, all components except the A/C compressor are refrigerant oil free. After the refrigerant system has been charged and operated, the refrigerant oil in the A/C compressor is dispersed throughout the refrigerant system. The A/C receiver/drier, A/C evaporator, A/C condenser and the A/C compressor will each retain a significant amount of the needed refrigerant oil.

It is important to have the correct amount of refrigerant oil in the A/C system. This ensures proper lubrication of the A/C compressor. Too little oil will result in damage to the A/C compressor, while too much oil will reduce the cooling capacity of the A/C system and consequently result in higher discharge air temperatures.

CAUTION: Be certain to adjust the refrigerant system oil level when replacing an A/C compressor. Drain the refrigerant oil from the A/C compressor using the procedures described below. Failure to properly drain the refrigerant oil from the A/C compressor can prevent the A/C system from operating as designed and cause serious compressor damage.

NOTE: Most reclaim/recycling equipment will measure the amount of refrigerant oil being removed during the recovery process. This amount of refrigerant oil should always be added back into the refrigerant system. Refer to the reclaim/recycling equipment manufacturers instructions.

It will not be necessary to check the oil level within the A/C refrigerant system or to add oil, unless there has been an oil loss. A refrigerant oil loss may occur due to component replacement or a rupture or leak from a refrigerant line, connector fitting, component or component seal. If a leak does occurs, add 30 milliliters (1 fluid ounce) of the recommended refrigerant oil to the refrigerant system after the repair has been made. Refrigerant

oil loss will be evident at the leak point by the presence of a wet, shiny surface around the leak.

Refrigerant oil must be added when an A/C accumulator, A/C evaporator or A/C condenser is replaced. See Refrigerant Oil Capacities charts below.

The refrigerant oil level in a new A/C compressor must first be adjusted prior to compressor installation. See COMPRESSOR OIL DRAIN PROCEDURES.

REFRIGERANT OIL CAPACITIES

Component	ml.	oz.
A/C Receiver/Dryer	30	1.0
A/C Condenser	30	1.0
A/C Evaporator	45	1.5
A/C Compressor - Denso 7SBH17C	130	4.6
	(See COMPRESSOR OIL DRAIN PROCEDURE -VARIABLE DISPLACEMENT)	

COMPRESSOR OIL DRAIN PROCEDURE

CAUTION: Be certain to adjust the refrigerant system oil level when replacing an A/C compressor. Failure to properly drain and measure the refrigerant oil from the A/C compressor can prevent the A/C system from operating as designed and cause serious compressor damage.

The A/C compressor is filled with refrigerant oil from the factory. Use the following procedure to drain and measure refrigerant oil from the A/C compressor.

1. Drain all of the refrigerant oil from the old A/C compressor into a clean measured container.
2. Drain all of the refrigerant oil from the new A/C compressor into a clean measured container.
3. Refill the new A/C compressor with the same amount of refrigerant oil that was drained out of the old compressor. Use only clean refrigerant oil of the type specified for the A/C compressor in the vehicle.
4. Install the new A/C compressor onto the engine. Refer to **COMPRESSOR, A/C, INSTALLATION**.

REFRIGERANT

SPECIFICATIONS

SPECIFICATIONS

REFRIGERANT CHARGE CAPACITY

Application	Capacity
R-1234yf	1.125 lbs. (510g)
R-134a	1.19 lbs (539g)

VALVE, A/C EXPANSION

DESCRIPTION

DESCRIPTION

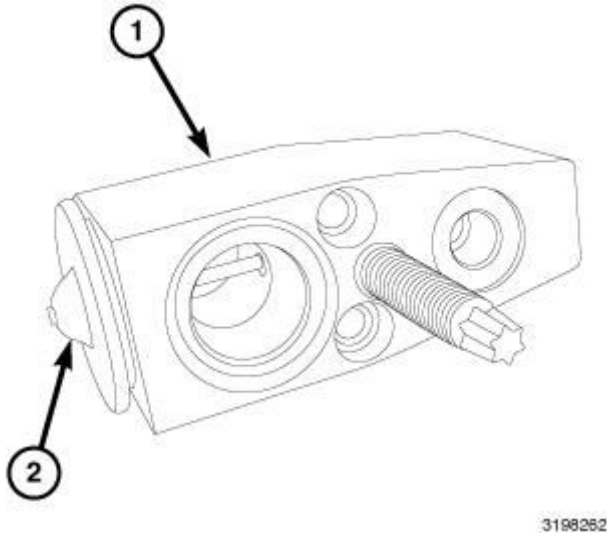


Fig. 188: H-Valve Type Body & Thermal Sensor
Courtesy of CHRYSLER GROUP, LLC

The A/C expansion valve controls the amount of refrigerant entering the A/C evaporator. The A/C expansion valve is of a thermostatic expansion valve (TXV) design and consists of an aluminum H-valve type body (1), with an integral thermal sensor (2). The A/C expansion valve is located at the dash panel between the A/C refrigerant lines and the A/C evaporator.

OPERATION

OPERATION

The A/C expansion valve controls the high-pressure, low temperature liquid refrigerant and converts it into a low-pressure, low-temperature mixture of liquid and gas, before it enters the A/C evaporator. A mechanical sensor in the A/C expansion valve monitors the temperature and pressure of the refrigerant leaving the A/C evaporator through the A/C suction line, and adjusts the orifice size at the liquid line port to let the proper amount of refrigerant into the evaporator to meet the vehicle A/C cooling requirements. Controlling the refrigerant flow through the A/C evaporator ensures that none of the refrigerant leaving the A/C evaporator is still in a liquid state, which could damage the A/C compressor.

NOTE: Replacement of the refrigerant line O-ring seals is required anytime a refrigerant line or A/C expansion valve is disconnected. Failure to replace the rubber O-ring seals may result in a refrigerant system leak.

The A/C expansion valve is factory calibrated and cannot be adjusted or repaired and must be replaced if inoperative or damaged.

DIAGNOSIS AND TESTING**DIAGNOSIS AND TESTING - A/C EXPANSION VALVE**

WARNING: Review the warnings and cautions for this system before performing the procedure. Failure to follow these instructions may result in serious injury or death.

NOTE: The A/C expansion valve should only be tested after performing the A/C performance test. Refer to **DIAGNOSIS AND TESTING**.

NOTE: Liquid CO² is required to test the A/C expansion valve. This material is available from most welding supply facilities. Liquid CO² is also available from companies which service and sell fire extinguishers.

When testing the A/C expansion valve, the work area and the vehicle temperature must be 21° to 27° C (70° to 85° F). To test the expansion valve:

1. Connect a charging station or manifold gauge set to the refrigerant system service ports.
2. Close all doors, windows and vents to the passenger compartment.
3. Set the A/C heater controls so that the A/C compressor is operating, the temperature control is in the highest temperature position, the mode air door is directing air output to the floor and the blower motor operating is operating at the highest speed.
4. Start the engine and allow it to idle. After the engine has reached normal operating temperature, allow the passenger compartment to heat up. This will create the need for maximum refrigerant flow into the A/C evaporator.
5. If the refrigerant charge is sufficient, the discharge (high pressure) gauge should read 827 kPa to 1655 kPa (120 psi to 240 psi). The suction (low pressure) gauge should read 207 kPa to 345 kPa (30 psi to 50 psi). If OK, go to 6. If not OK, replace the inoperative A/C expansion valve.

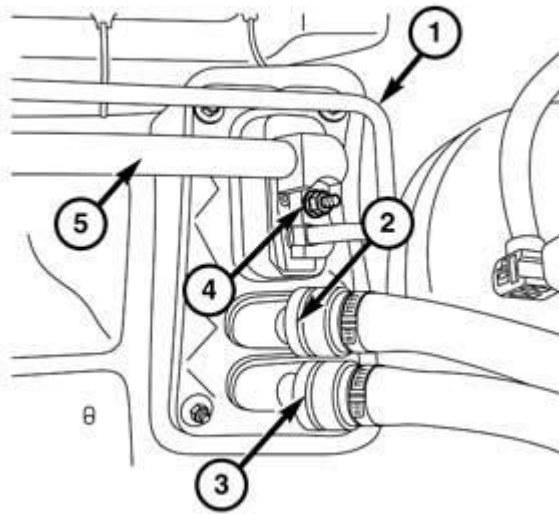
WARNING: Protect the skin and eyes from exposure to liquid CO² or personal injury can result.

6. If the suction (low pressure) gauge reads within the specified range, freeze the A/C expansion valve for 30 seconds using liquid CO² or another suitable super-cold material. **Do not spray refrigerant on the A/C expansion valve for this test.** The suction (low pressure) gauge reading should drop by 69 kPa (10 psi). If OK, go to 7. If not OK, replace the inoperative A/C expansion valve.
7. Allow the expansion valve control head to thaw. The suction (low pressure) gauge reading should stabilize at 207 kPa to 345 kPa (30 psi to 50 psi). If not OK, replace the inoperative A/C expansion valve.

REMOVAL**REMOVAL**

WARNING: Review the warnings and cautions for this system before performing the procedure. Failure to follow these instructions may result in serious injury or death.

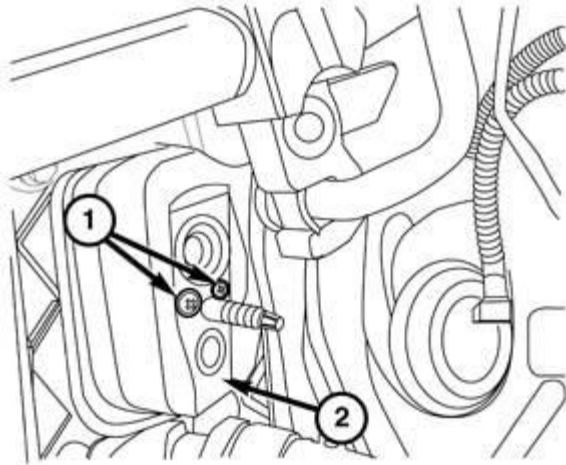
1. Disconnect and isolate the negative battery cable.
2. Remove the air cleaner resonator. Refer to **RESONATOR, AIR CLEANER, REMOVAL**.
3. Recover the refrigerant from the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.



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Fig. 189: Refrigerant Lines, Heater Core Hoses & Fastener
Courtesy of CHRYSLER GROUP, LLC

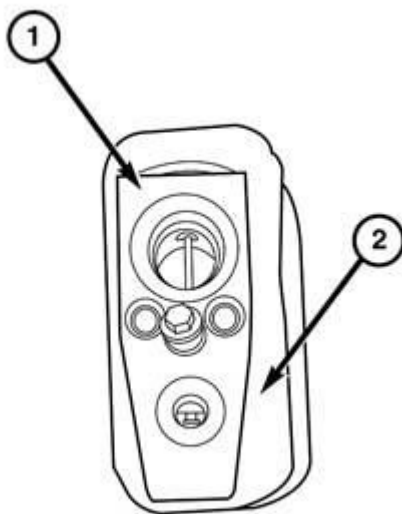
4. Remove the nut (4) and the A/C liquid line (1) and A/C suction line (5) manifold from the A/C expansion valve.
5. Remove and discard the seals.



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Fig. 190: Bolts & A/C Expansion Valve
Courtesy of CHRYSLER GROUP, LLC

6. Remove the two bolts (1) and the A/C expansion valve (2) from the evaporator.
7. Remove and discard the O-ring seals.
8. Install plugs in, or tape over, the opened refrigerant line fittings and evaporator ports.



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Fig. 191: Expansion Valve & Insulating Foam
Courtesy of CHRYSLER GROUP, LLC

9. If necessary, remove the insulating foam (2) from the expansion valve (1).

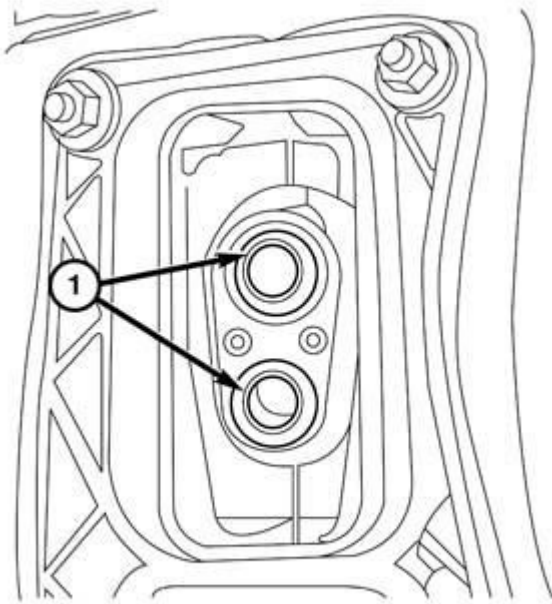
INSTALLATION

INSTALLATION

CAUTION: Be certain to adjust the refrigerant oil level when servicing the A/C refrigerant system. Failure to properly adjust the refrigerant oil level will prevent the A/C system from operating as designed and can cause serious A/C compressor damage.

NOTE: When replacing multiple A/C system components, see the Refrigerant Oil Capacities chart to determine how much oil should be added to the refrigerant system. Refer to OIL, REFRIGERANT, STANDARD PROCEDURE.

NOTE: Replacement of the O-ring seals is required anytime a refrigerant line or A/C expansion valve is disconnected. Failure to replace the O-ring seals may result in a refrigerant system leak.

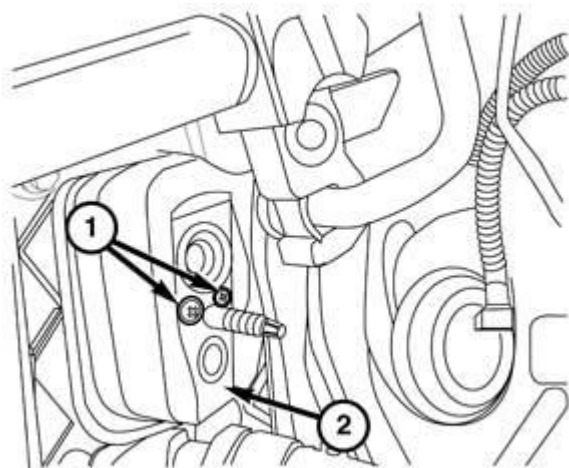


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Fig. 192: O-Ring Seals
Courtesy of CHRYSLER GROUP, LLC

1. Remove the tape or plugs from all the opened refrigerant line fittings and evaporator ports.

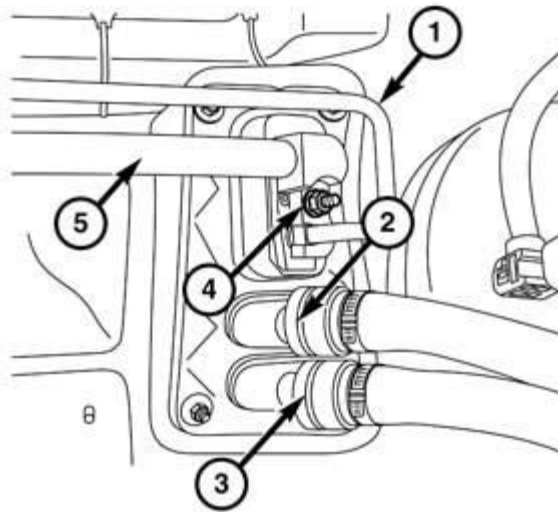
2. Lubricate new O-ring seals (1) with clean refrigerant oil and install them onto the evaporator tube fittings. Use only the specified O-ring seals as they are made of a special material for the system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.



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Fig. 193: Bolts & A/C Expansion Valve
Courtesy of CHRYSLER GROUP, LLC

3. Install the A/C expansion valve (2) onto the evaporator and tighten the bolts to the proper. Refer to **SPECIFICATIONS**.



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Fig. 194: Refrigerant Lines, Heater Core Hoses & Fastener
Courtesy of CHRYSLER GROUP, LLC

4. Lubricate new O-ring seals with clean refrigerant oil and install them onto the refrigerant line fittings. Use only the specified seals as they are made of a special material for the system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
5. Install the A/C liquid line (1) and the A/C suction line manifold (5) to the A/C expansion and tighten the nut to the proper. Refer to **SPECIFICATIONS**.
6. Evacuate the refrigerant system. Refer to **PLUMBING, STANDARD PROCEDURE**.
7. Adjust the refrigerant oil level. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE**.
8. Charge the refrigerant system. Refer to **OIL, REFRIGERANT, STANDARD PROCEDURE**.
9. Install the air cleaner resonator. Refer to **RESONATOR, AIR CLEANER, INSTALLATION** or **RESONATOR, AIR CLEANER, INSTALLATION**.
10. Connect the negative battery cable.

TUBE, CONDENSATION DRAIN

REMOVAL

REMOVAL

WARNING: Disable the airbag system before attempting any steering wheel, steering column or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag

system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

1. Disconnect and isolate the negative battery cable.
2. Remove the right side center console closeout from the center console.

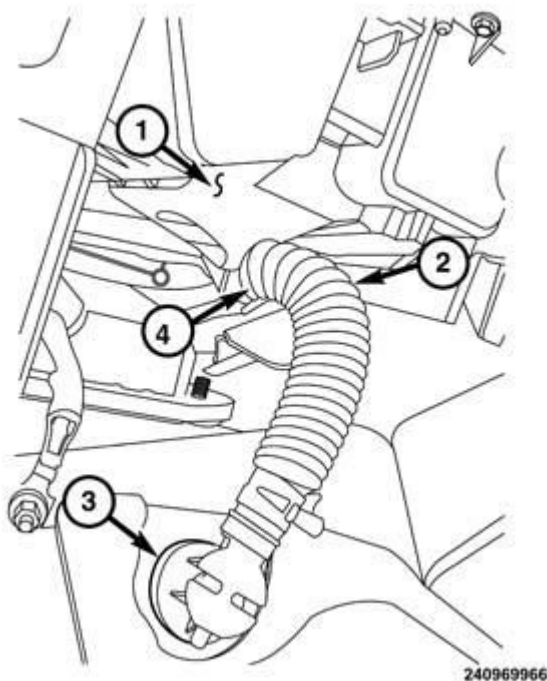


Fig. 195: HVAC Housing, Condensation Drain Tube, Floor Panel & Clamp
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect clamp (4) and remove the condensation drain tube (2) from the HVAC housing (1).
4. Remove the condensation drain tube from the floor panel (3).

INSTALLATION

INSTALLATION

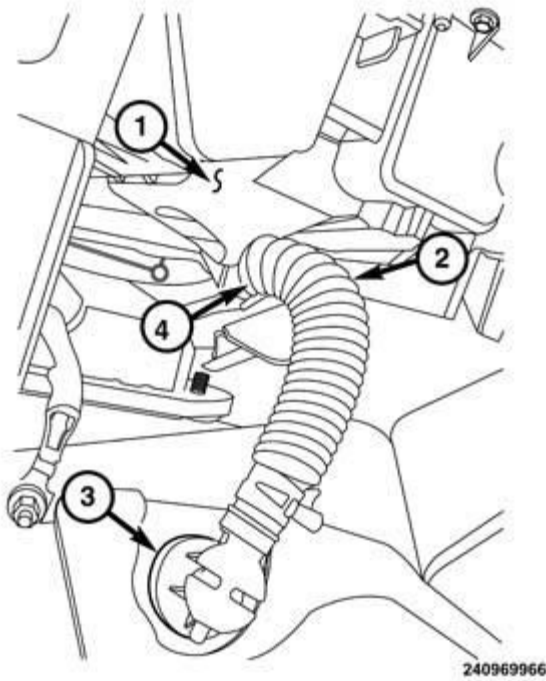


Fig. 196: HVAC Housing, Condensation Drain Tube, Floor Panel & Clamp
Courtesy of CHRYSLER GROUP, LLC

1. Install the condensation drain tube (2) into the floor panel (3).
2. Connect the condensation drain tube with clamp (4) to the HVAC housing (1).
3. Install the passenger side center console closeout.
4. Connect the negative battery cable.

2014 MANUAL TRANSMISSION**C635 - Service Information - Cherokee****DIAGNOSIS AND TESTING****COMMON PROBLEM CAUSES**

NEUTRAL GEAR RATTLE: Neutral gear rattle is not an indication of an internal transaxle fault. Neutral gear rattle is caused by the clutch disc springs loading and unloading under the weight of the geartrain in the transaxle. Usually, after releasing the clutch with the engine at idle, the geartrain will rotate quietly. When the engine operating system makes an idle alteration the transaxle geartrain will bounce causing the clutch springs to compress. Afterward, the spring release flinging the geartrain faster than the engine idle. When the engine idle catches up with the geartrain and the spring compress and the process repeats over and over causing the geartrain to rattle. Neutral gear rattle is most audible in enclosed areas, such as a garage or between other parked vehicles.

PRE-DIAGNOSTIC INSPECTION:

- Verify that the transaxle fluid level is at the proper cold fill level.
- Inspect the exterior of the transaxle for evidence of fluid leaks.
- Inspect the exterior of the transaxle for mechanical issues, such as improper shift cable routing or loose mounting bolts.

NOTE: If a fluid with anti-friction additive is used in a C-365 transaxle the synchronizers will fail, requiring synchronizer replacement.

SYMPTOM	POSSIBLE CAUSE	REPAIR
Neutral gear rattle.	Weak clutch disc springs.	No trans repair required. If rattle is excessive when vehicle is in an open area replace the clutch disc.
Tip in tip out clunk. No gear whine.	1. Excessively strong clutch disc springs. 2. Loose front hub nuts	1. If the condition is excessive replace the clutch disc. 2. Replace hub nut and tighten to proper torque specification. Refer to FRONT, SPECIFICATIONS.
Bearing whine.	1. Low fluid level. 2. Improper fluid.	1. Repair cause of fluid loss and fill transaxle to cold fill level. 2. If doubt exists, replace the transaxle fluid. Refer to CAPACITIES AND

2014 Jeep Cherokee Trailhawk

2014 MANUAL TRANSMISSION C635 - Service Information - Cherokee

	3. Bearings in transaxle assembled to tight.	<u>RECOMMENDED FLUIDS, DESCRIPTION</u> . 3. Verify the turning torque of transaxle bearings with NEW bearings installed.
Growl in neutral.	1. Low fluid level. 2. Improper fluid. 3. Bearings in transaxle assembled to loose.	1. Repair cause of fluid loss and fill transaxle to cold fill level. 2. If doubt exists, replace the transaxle fluid. Refer to <u>CAPACITIES AND RECOMMENDED FLUIDS, DESCRIPTION</u> . 3. Verify the turning torque of transaxle bearings with NEW bearings installed.
Gear noise when driving in any gear range	1. Low fluid level. 2. Improper fluid. 3. Bearings in transaxle assembled to loose.	1. Repair cause of fluid loss and fill transaxle to cold fill level. 2. If doubt exists, replace the transaxle fluid. Refer to <u>CAPACITIES AND RECOMMENDED FLUIDS, DESCRIPTION</u> . 3. Verify the turning torque of transaxle bearings with NEW bearings installed.
Gear clash going into 1st or reverse from neutral with clutch depressed for 3+ seconds.	1. Improper fluid or additives in fluid. 2. Faulty synchronizers.	1. If doubt exists, replace the transaxle fluid. Refer to <u>CAPACITIES AND RECOMMENDED FLUIDS, DESCRIPTION</u> . 2. Disassemble transaxle to inspect. Replace synchronizers.
Fluid expelled from vent.	Transaxle is overfilled.	Adjust transaxle cold fill level.

HARD SHIFTING

Hard shifting may be caused by:

- Misadjusted crossover cable.
- If hard shifting is accompanied by gear clash, synchronizer drum, clutch stop rings or gear teeth may be worn or damaged.
- Mis-assembled synchronizer components also cause shifting problems.
- Incorrectly installed synchronizer sleeves, struts, or springs can cause shift problems.
- Worn, damaged, mis-assembled or leaking hydraulic clutch release system/components can also cause difficult shifting or gear clash.

NOISY OPERATION

Transaxle noise is most often a result of :

- Worn or damaged internal components.
- Chipped, broken gear or synchronizer teeth, and brinnelled, spalled bearings.
- Insufficient lubricant.
- Aftermarket additives can damage synchronizers.

SLIPS OUT OF GEAR

Transaxle disengagement may be caused by:

- Mis-aligned or damaged shift components.
- Worn teeth on the drive gears or synchronizer components.
- Incorrectly assembled geartrain.

LOW LUBRICANT LEVEL

Insufficient transaxle lubricant is usually the result of:

- Fluid leaks.
- Inaccurate fluid level check or refill method.
- Porosity in the transaxle castings.

NOTE: **For leaks that are difficult to pinpoint, tracer dye can be added to the lubricant to aid in detecting the origin of the leak. Tracer dye becomes luminous under black light.**

CLUTCH PROBLEMS

NEUTRAL GEAR RATTLE: Neutral gear rattle is not an indication of an internal transaxle fault. Neutral gear rattle is caused by the clutch disc springs loading and unloading under the weight of the geartrain in the transaxle. Usually, after releasing the clutch with the engine at idle, the geartrain will rotate quietly. When the engine operating system makes an idle alteration the transaxle geartrain will bounce causing the clutch springs to compress. Afterward, the spring release flinging the geartrain faster than the engine idle. When the engine

idle catches up with the geartrain and the spring compress and the process repeats over and over causing the geartrain to rattle. Neutral gear rattle is most audible in enclosed areas, such as a garage or between other parked vehicles.

SYMPTOM	POSSIBLE CAUSE	REPAIR
Gear clash shifting to reverse or neutral after clutch is depressed 3+ seconds.	Clutch disc hub spline seized to the transaxle input shaft.	Replace clutch disc and clean corrosion from input shaft.

ADJUSTMENTS

BEARING PRELOAD ADJUSTMENT

It is not necessary to reestablish preload shim thickness when new bearings are installed. It is only necessary to establish preload shim thickness when a transaxle housing component, gear shaft, or differential is replaced. This procedure is used to measure zero end play of the gear shafts and differential in the C635 (Manual or DDCT) Transaxle and establish the proper thickness of the select shims placed behind the bearing races in the transaxle housing to apply specific bearing preload to prevent bearing failure and gear rattle.

Transaxle Preparation

1. Clean the transaxle with suitable solvent.
2. Install new bearings on the gear shafts and the differential.

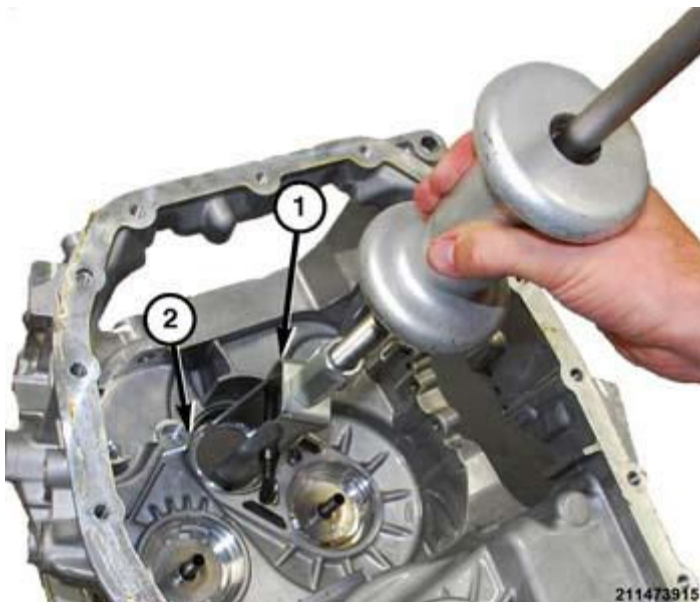


Fig. 1: Removing Preload Bearing Races
Courtesy of CHRYSLER GROUP, LLC

3. Remove the bearing races (2) from the transaxle housing using tools 9664 Remover (1) (special tool #9664, Remover, Bearing Cup) and C-637 Slide Hammer (special tool #C-637, Slide Hammer,

Universal).

4. Remove the factory installed select shims from the transaxle housing. Mark the shims to identify the bore that they were removed from.
5. From the circumference of the original bearing races, grind 0.18 mm (0.007 in) material from the races to allow them to slip-fit into the transaxle housing.

NOTE: To ensure a flat uniform surface on the outside diameter (OD) of the bearing races, chuck them on a suitable (brake) lathe and remove material from the OD with a suitable die grinder.

6. Insert the, reduced OD, differential bearing race into the transaxle housing.

NOTE: No select shim is required to measure the differential zero end play.

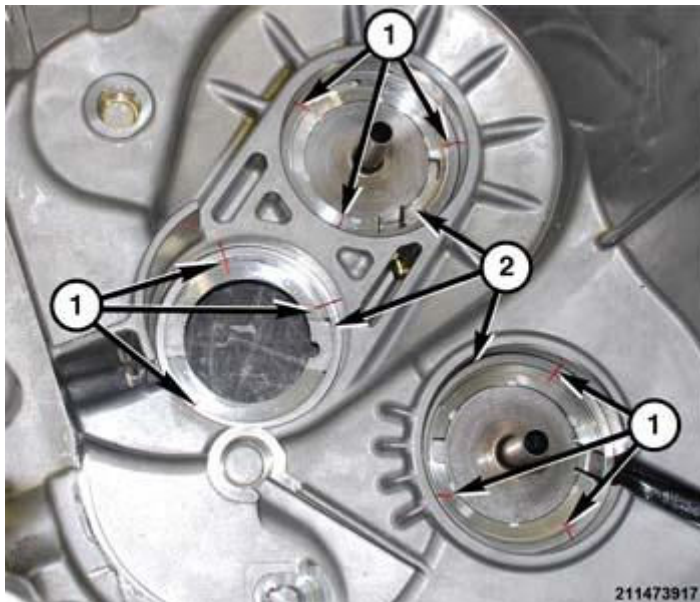


Fig. 2: Starter Shims & Plastigauge®
Courtesy of CHRYSLER GROUP, LLC

7. Insert an 0.80 mm (0.031 in), or suitable thickness, starter shims (2) in each gear shaft bearing race bore in the transaxle housing. This will create measurable gear shaft end play after the transaxle cases are assembled.

NOTE: If the original shims are greater than 1.32 mm (0.052 in) thick, use a 1 mm starter shim.

8. Use RED Plastigauge®, cut in 6 mm (1/4 in.) lengths (1), placed 120 degrees apart around the side surface of the select shims.

NOTE: If the gear shaft end play is less than the RED Plastigauge® can accurately

measure, use GREEN Plastigauge®.

9. Install the reduced diameter bearing races in the bores in the transaxle to capture the Plastigauge®.

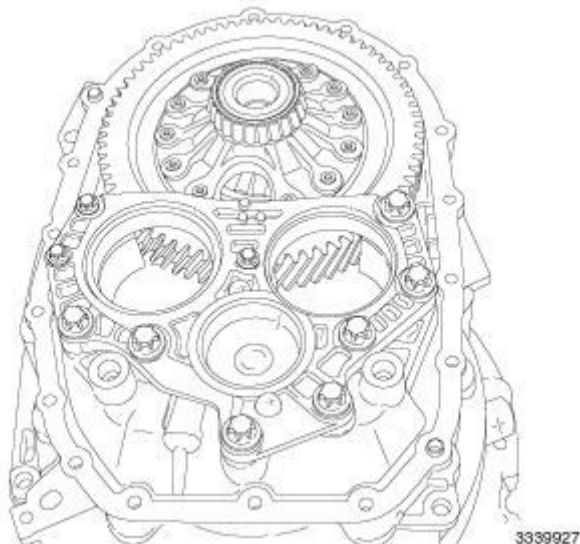


Fig. 3: Differential Assembly In Bellhousing
Courtesy of CHRYSLER GROUP, LLC

10. Install the differential assembly in the bellhousing half of the transaxle housing.
11. Place the bearing race plate in position on the bellhousing half of the transaxle housing.
12. Install the bolts to hold the bearing race plate to the bellhousing. Tighten the bolts to torque specification.

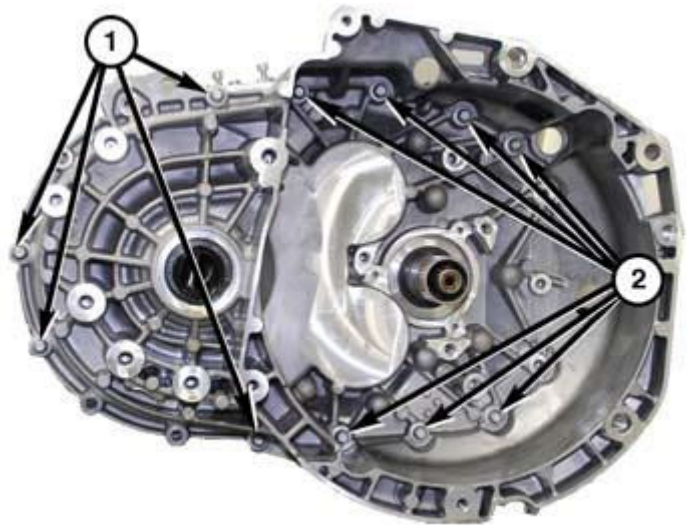


Fig. 4: Three Gear Shafts In Bellhousing
Courtesy of CHRYSLER GROUP, LLC

13. Install the three gear shafts in the bellhousing half of the transaxle housing.

14. Install the transaxle housing onto the bellhousing.

NOTE: If the reduced diameter bearing races slip out of the bearing bores, Door Ease® wax can be applied to the circumference of the race to adhere it to the bore.



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Fig. 5: Transaxle Housing To Bellhousing Bolts
Courtesy of CHRYSLER GROUP, LLC

15. Install four bolts (1) to hold the transaxle housing to the bellhousing around the differential side of the transaxle. Tighten the bolts to 50% of the torque specification.
16. Turn the transaxle on its side to gain access to the inside of the bellhousing.
17. Install seven bolts (2), four above and three below the gear shafts, to hold the transaxle case halves together, Tighten the bolts to 50% of the torque specification.
18. Turn transaxle, bellhousing downward, on the work surface.

Measuring Differential End Play

1. Install (special tool #C-4995A, Tool, Differential Bearing Torque) (1) into the differential side gear (2).

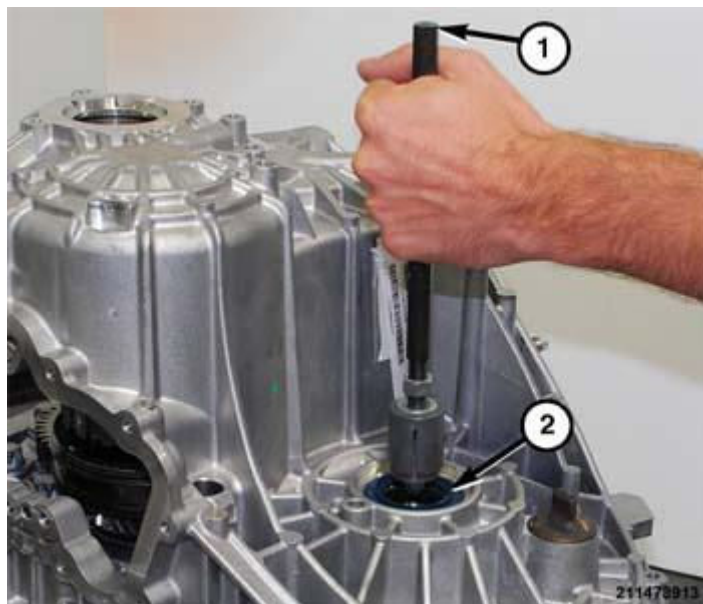


Fig. 6: Installing Special Tool To Differential Side Gear
Courtesy of CHRYSLER GROUP, LLC

2. Clamp a typical vise grip pliers (4) on tool C-4995A (2).
3. Attach dial indicator C-3339A (1) (special tool #C-3339A, Set, Dial Indicator) to transaxle housing with the plunger placed on the end of tool C-4995A (2).

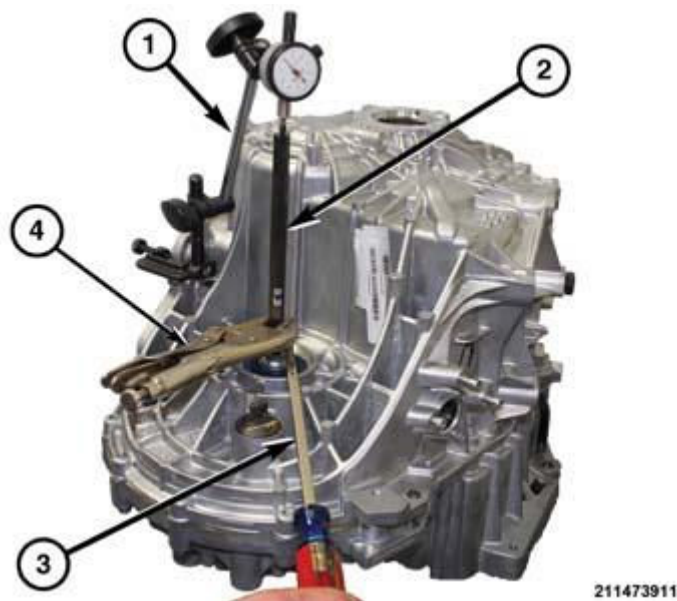


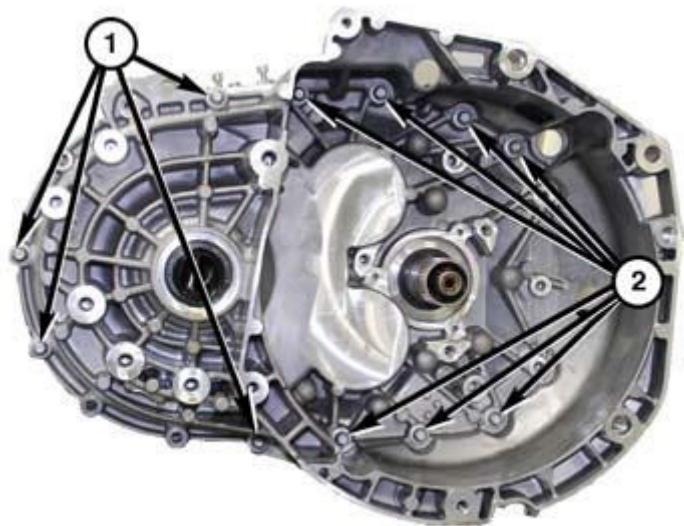
Fig. 7: Measuring Differential End Play
Courtesy of CHRYSLER GROUP, LLC

4. Zero the indicator dial (1).
5. Use a large screw driver (3) to pry upward on tool C-4995A (2) to take up the bearing free play.

6. While holding tool C-4995A (2) upward read the dial indicator (1).
7. Add 0.15 mm (0.006 in.) to the dial indicator reading.
8. The sum is the proper thickness of the differential preload shim.

Measuring Gear Shaft End Play

1. Turn the transaxle on its side to gain access to the inside of the bellhousing.



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Fig. 8: Transaxle Housing To Bellhousing Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Remove the bolts (2) holding the bellhousing to the transaxle housing.
3. Turn transaxle, bellhousing downward, on the work surface.
4. Remove the remaining bolts (1) holding the bellhousing to the transaxle housing.
5. Place the transaxle housing on the work surface inside up.

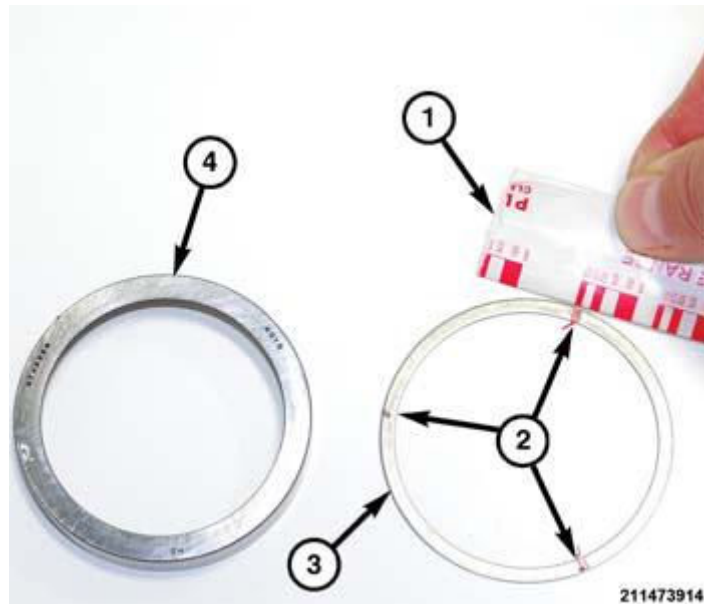


Fig. 9: Bearing Race, Shim & Plastigauge®
Courtesy of CHRYSLER GROUP, LLC

6. Using a hook tool, remove the reduced size bearing races (4). Be careful not to damage the Plastigauge® (2).
7. Compare the thickness of the Plastigauge® (2) to the RANGE template on the Plastigauge® packaging (1).
8. Add the Plastigauge® RANGE thickness, plus 0.15 mm (0.006 in.) to the thickness of the starter shim used to create gear shaft end play.
9. The sum is the proper thickness to preload for each of the gear shaft bearings.
10. Install the closest thickness shims from the list provided by Mopar® Parts.

NOTE: If the measured thickness falls between the shim thicknesses provided by Mopar® Parts, install the shim that is slightly thicker.

After proper bearing preload is established, finish assembling the transaxle.

SPECIFICATIONS

SPECIFICATIONS

TORQUE SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Bolts, Slave Cylinder-to-Bell Housing	10	-	88
Bolt, Differential Ring Gear-to-Carrier	83	61	-
Bolt, Transmission Case-to-Bell			

2014 Jeep Cherokee Trailhawk

2014 MANUAL TRANSMISSION C635 - Service Information - Cherokee

Housing	32	24	-
Plug, Transaxle Drain/Fill	25	18	-
Switch, Backup Lamp	38	28	-
Bolts, Flywheel-to-Crankshaft	160	118	-
Bolts, Clutch cover-to-Flywheel	25	18	-
Bolt, Transaxle-to-engine Lower	40	30	-
Bolts, Transaxle-to-engine Upper	50	37	-
Bolts, Rear Transmission Mount Bracket-Lower	20	15	-
Bolts, Rear Transmission Mount Bracket-Through	110	81	-
Bolts, Lower Mount Bracket-to-Transmission	105	77	-
Bolt, Pivot Bracket-to-Transmission	147	108	-
Bolt, Input Shaft Rear Bearing Retention	56	41	-
Bolt, Gear Shaft Rear Bearing Retention	110	81	-
Bolts, Small Race Plate	25	18	-
Bolts, Large Race Plate-First Pass	20	15	-
Bolts, Large Race Plate-Second Pass	80	59	-
Nut, Transaxle to Engine Stud	60	44	-
Bolt, Reverse Idler Gear	10		89
Bolts, Shift Lever Assembly-to-Case	20	15	-
Bolts, Shift Cable Bracket-to-case	20	15	-
Bolts, Shift Cable Bracket-to-case	20	15	-
Nuts, Shifter Assembly Mounting	7	-	61
Switch, Backup Lamp	38	28	-

REMOVAL

REMOVAL

1. Position the vehicle on a suitable hoist with the transmission in neutral. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Release the hood latch and open the hood.

3. Support the hood on the provided prop-rod.
4. Remove the engine cover.
5. Remove the upper radiator closeout panel.
6. Disengage the clips holding the wire harness to the battery tray.
7. Remove the battery and battery tray. Refer to **TRAY, BATTERY, REMOVAL** .
8. Remove the pinch bolt holding the steering column to the steering gear.
9. Raise the vehicle to gain access to the front wheels.
10. Remove the front wheels. Refer to **REMOVAL** .
11. Raise the vehicle to gain access to the belly pan.
12. Remove the belly pan. Refer to **BELLY PAN, REMOVAL** .
13. Release the clamp from the charge air outlet hose on the left side of the radiator support panel.
14. Remove the bolt holding the charge air hose to the side of the transmission.
15. Remove the left front fender splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL** .
16. Remove the right front fender splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, REMOVAL** .
17. Disconnect wire harness connector at the left side of the front fascia.
18. Release the retainer holding the wire harness to the front fascia.
19. Lower the vehicle to mid level.
20. Remove the front fascia. Refer to **FASCIA, FRONT, REMOVAL** .
21. Disconnect the charge air tube from the throttle body adapter.
22. Separate the charge air tube from the vehicle.
23. Raise the vehicle to gain access to the halfshafts.
24. Using a suitable punch tool, pry out the lock staking on the front hub nuts.
25. Install the front wheel bolts in the front brake rotor hub.
26. While holding a pry bar across the wheel bolts to prevent the wheel hub from rotating, remove the front wheel hub nuts.
27. Remove the front halfshafts. Refer to **REMOVAL** .
28. If equipped, remove the rear propeller shaft.
29. Remove the exhaust crossunder pipe.
30. Place a suitable drain pan under the transmission.
31. Remove the drain plug to allow the fluid to drain into the drain pan.
32. If equipped, remove the power transfer unit (PTU).
33. Lower vehicle to gain access to the shift cables.

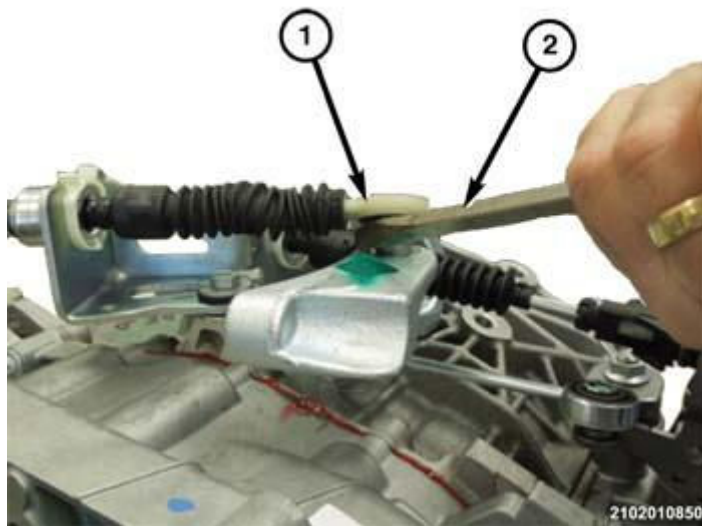


Fig. 10: Prying Shift Cable End From Lever Ball Stud On Transmission
Courtesy of CHRYSLER GROUP, LLC

34. Using a suitable prying tool, pry the shift cable end from the lever ball stud on the transmission.

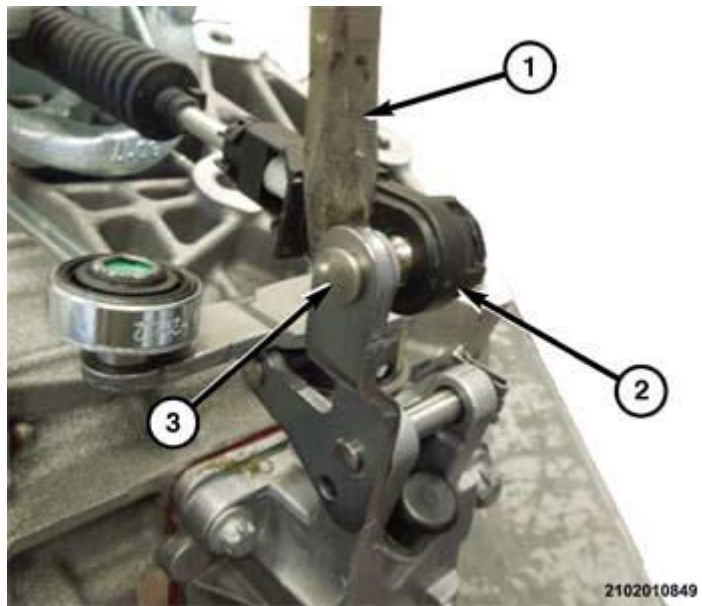


Fig. 11: Prying Select Cable End From Select Lever Ball Stud On Transmission
Courtesy of CHRYSLER GROUP, LLC

35. Using a suitable prying tool, pry the select cable end from the select lever ball stud on the transmission.
36. Release the clips holding the shift cables housing ends to the bracket on the transmission.
37. Remove the exhaust heat shield from the exhaust manifold.
38. Disconnect the wire connector from the exhaust temperature sensor.

39. Disconnect the wire connector from the oxygen sensor.
40. Remove the oxygen sensor. Refer to **SENSOR, OXYGEN, REMOVAL**.
41. Remove the exhaust clamp holding the turbo charger to the catalytic converter.



Fig. 12: Wire Harness Retainers
Courtesy of CHRYSLER GROUP, LLC

42. Disengage the wire harness retainers (1) along the top of the bellhousing.
43. Position the wire harness out of the way.

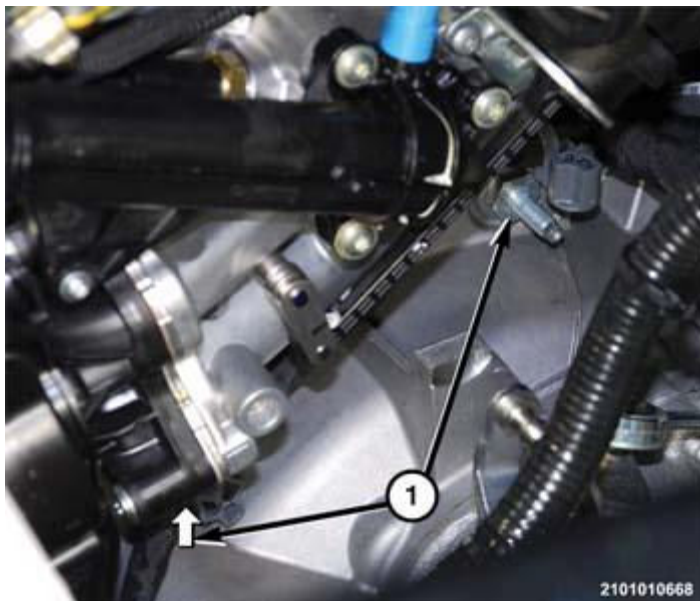


Fig. 13: Locating Bolts Holding Upper Bellhousing To Engine Block
Courtesy of CHRYSLER GROUP, LLC

44. Remove the bolts (1) holding the upper bellhousing to the engine block.
45. Position a floor jack under the transmission and lift the transmission enough to take tension off the upper transmission mount.

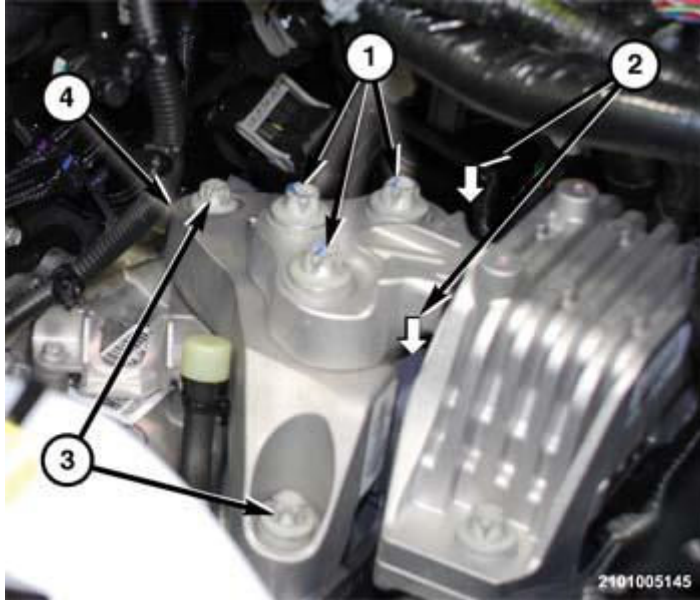


Fig. 14: Locating Bolts Holding Upper Mount To Adapter Spacer & Adapter Spacer To Transmission

Courtesy of CHRYSLER GROUP, LLC

46. Remove the bolts (1) holding the upper transmission mount to the transmission mount adapter spacer (4).
47. Remove the bolts (3), (2= hidden) holding the transmission mount adapter spacer (4) to the transmission.

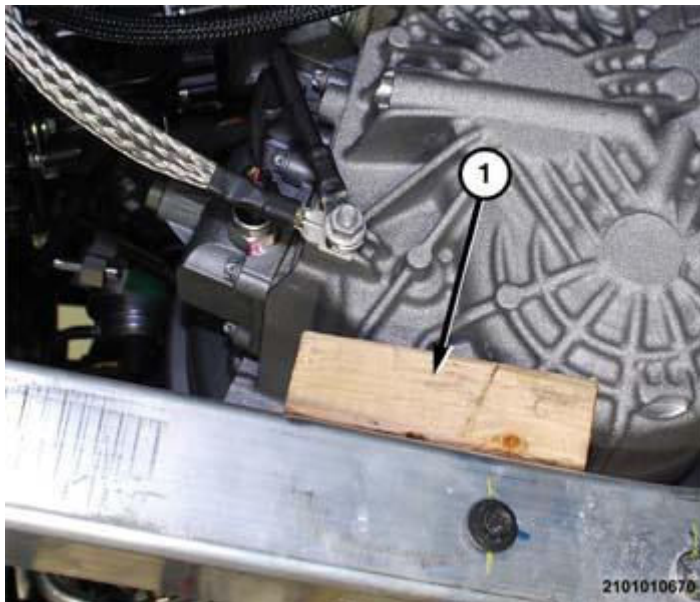


Fig. 15: Installing Block Of Wood Between Transmission & Left Load Beam

Courtesy of CHRYSLER GROUP, LLC

48. While holding a wood block (1) between the transmission and the left load beam, lower the transmission.
49. Remove the floor jack from under the vehicle.
50. Remove transmission mount spacer from the vehicle.
51. Raise the vehicle to gain access to the front suspension cradle.

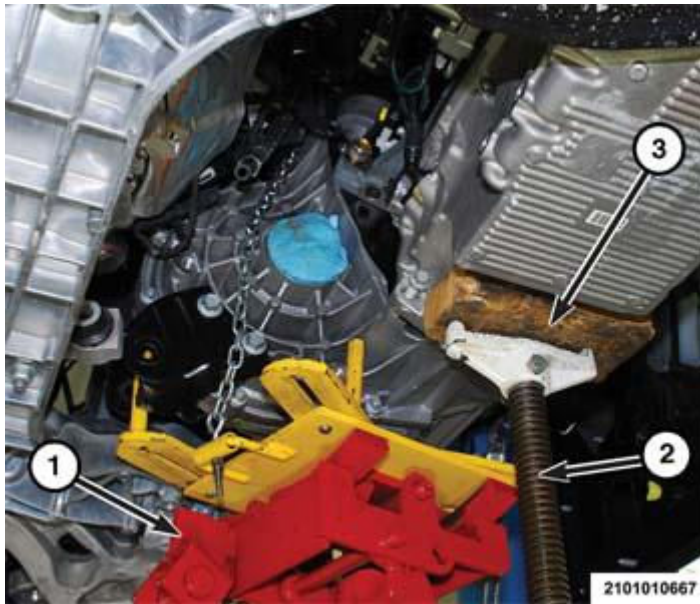


Fig. 16: Positioning Transmission Jack, High Stand & Wood Block
Courtesy of CHRYSLER GROUP, LLC

52. Position a suitable transmission jack (1) under the transmission in a stable fashion and secure the transmission to the transmission jack cradle with a safety chain or strap.
53. Position a high stand (2) under the engine oil pan, use a wood block (3) to protect the oil pan.

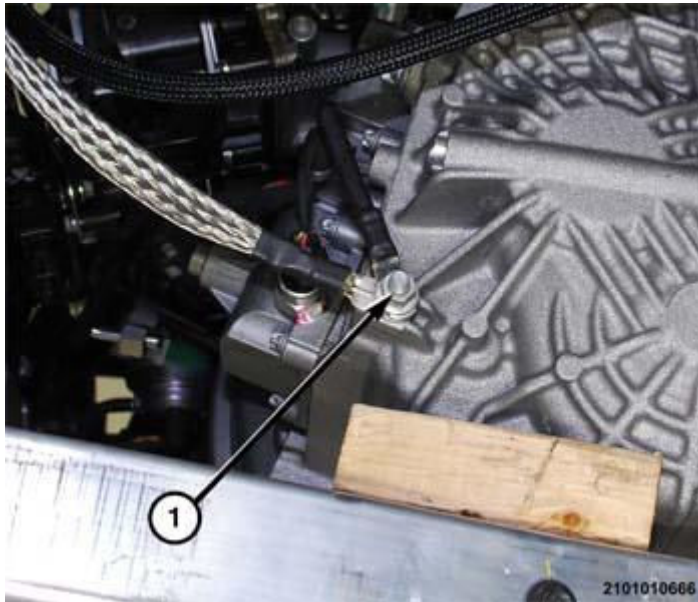


Fig. 17: Locating Nut Holding Ground Cable To Transmission
Courtesy of CHRYSLER GROUP, LLC

54. Remove the nut (1) holding the ground cable to the transmission from above the left load beam.
55. Separate the ground cable from the transmission.

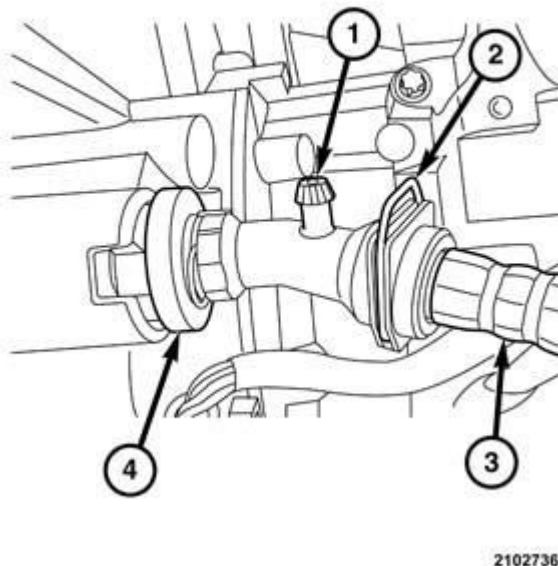


Fig. 18: Clutch Slave Cylinder Union & Nipple
Courtesy of CHRYSLER GROUP, LLC

56. Disengage the clutch hydraulic coupling (4) from the slave cylinder on the transmission.

57. Using a suitable cap-plug, seal the end of the hydraulic line to avoid losing hydraulic fluid.
58. Remove the catalytic converter from the engine. Refer to **CONVERTER, CATALYTIC, REMOVAL** .
59. Remove the starter motor. Refer to **STARTER, REMOVAL** .
60. Remove the front suspension cradle and load beams.

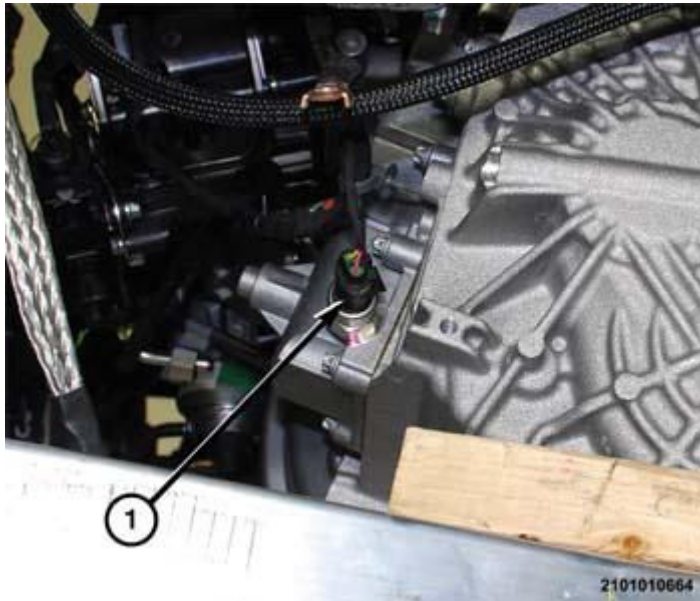


Fig. 19: Backup Lamp Switch Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

61. Disconnect the wire harness connector (1) from the backup lamp switch.

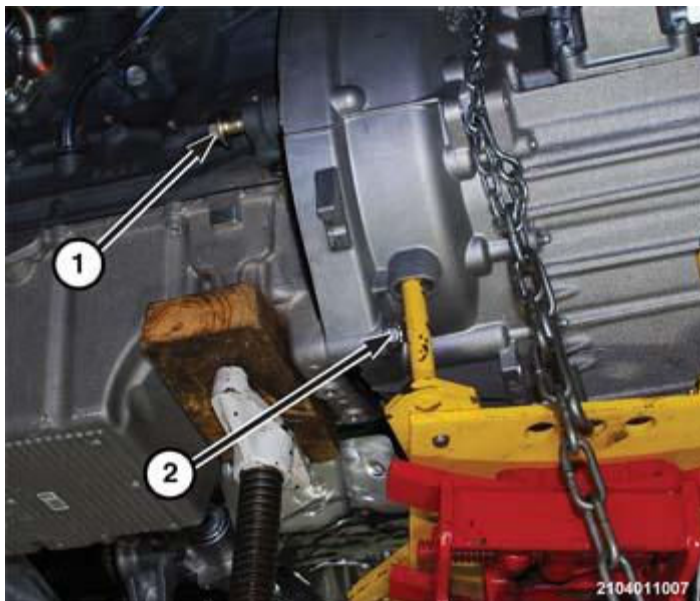


Fig. 20: Locating Bolts Holding Engine To Bellhousing & Bellhousing To Oil Pan
Courtesy of CHRYSLER GROUP, LLC

62. On the backside of the engine, remove the bolt (1) holding engine to the bellhousing and the bolt (2) holding the bellhousing to the oil pan.



Fig. 21: Locating Bolts Holding Engine Block To Transmission Bellhousing & Bellhousing To Oil Pan

Courtesy of CHRYSLER GROUP, LLC

63. On the front of the engine, remove the bolts (1) holding the engine block to the transmission bellhousing and the bellhousing to the oil pan.

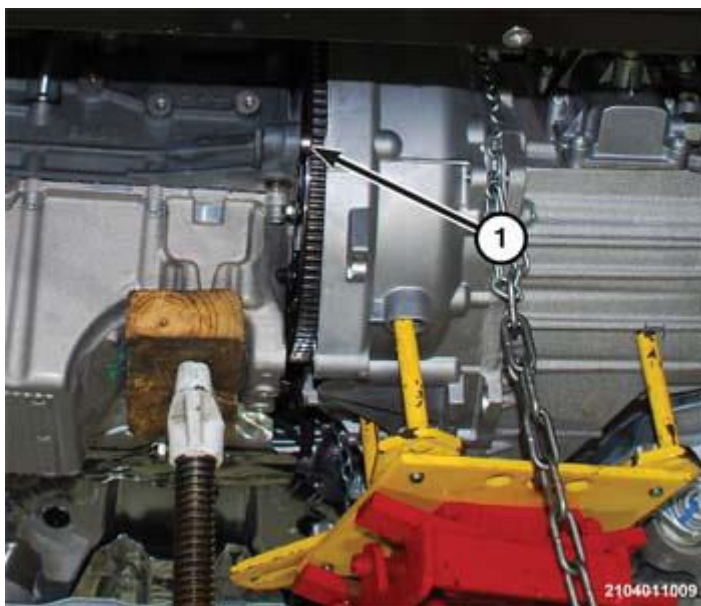


Fig. 22: Removing/Installing Transmission

Courtesy of CHRYSLER GROUP, LLC

64. Using a suitable pry bar, separate the transmission from the engine far enough for the clutch to clear the bellhousing (1).
65. Lower the transmission while avoiding obstacles and separate the transmission from the vehicle.

DISASSEMBLY

DISASSEMBLY

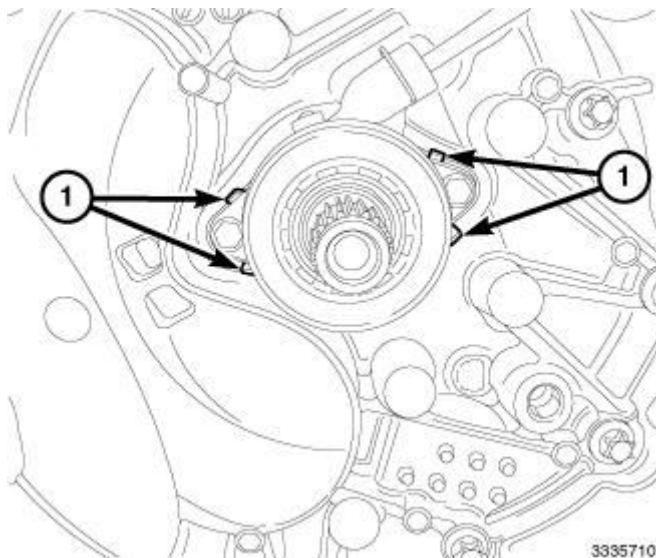


Fig. 23: Concentric Slave Cylinder Retention Tabs
Courtesy of CHRYSLER GROUP, LLC

1. Release the retention tabs from the Concentric Slave Cylinder (CSC) (1).

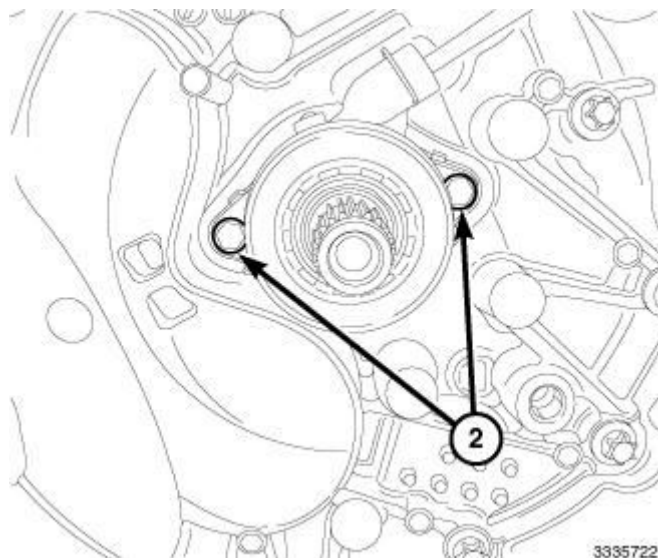


Fig. 24: CSC Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Remove the CSC bolts (2).

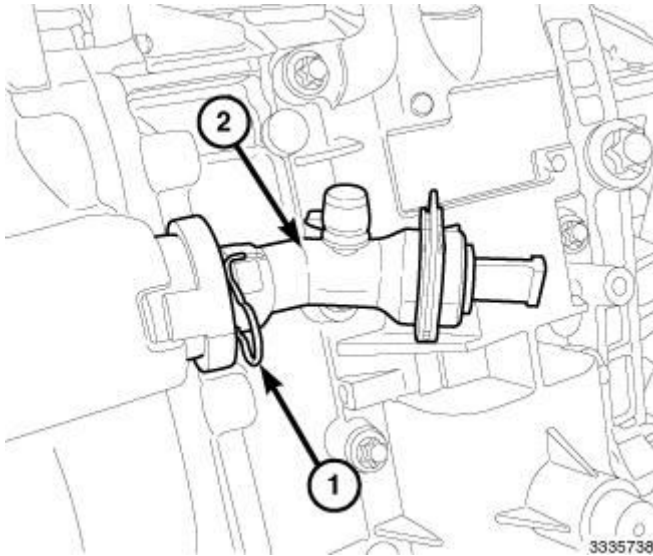


Fig. 25: Retention Clip & Connection
Courtesy of CHRYSLER GROUP, LLC

3. Disconnect the hydraulic connection at the case. Release the retention clip (1) then separate the connection (2).

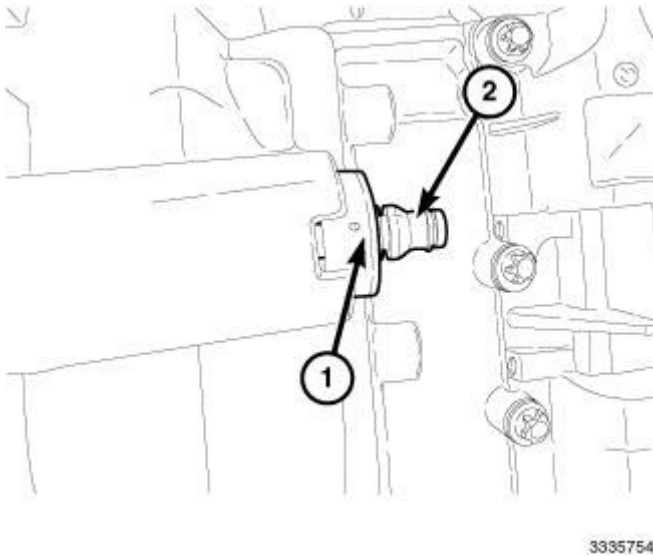
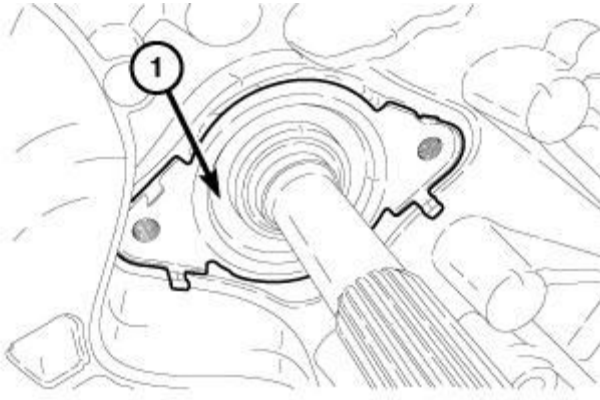


Fig. 26: Hydraulic Fitting & Plastic Retainer
Courtesy of CHRYSLER GROUP, LLC

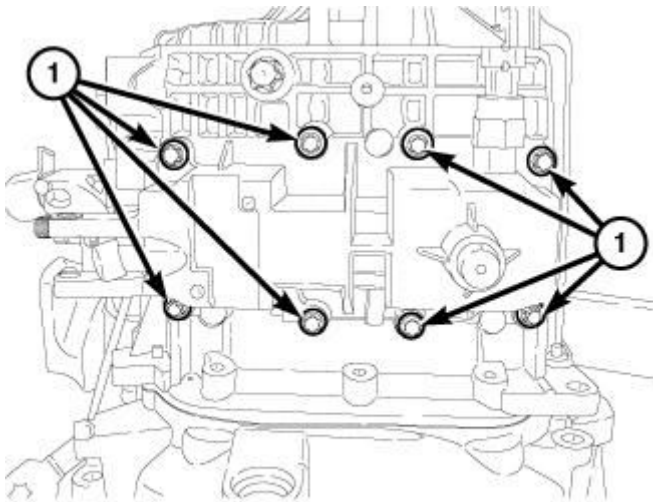
4. Disconnect the hydraulic fitting (2) from the plastic retainer (1).
5. Remove the CSC.



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Fig. 27: Mainshaft Oil Seal Plate
Courtesy of CHRYSLER GROUP, LLC

6. Remove the mainshaft oil seal plate (1).



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Fig. 28: Gear Selector Assembly Bolts
Courtesy of CHRYSLER GROUP, LLC

7. Remove the gear selector assembly bolts (1).
8. Use a plastic hammer or the equivalent to loosen the assembly and remove from the case.

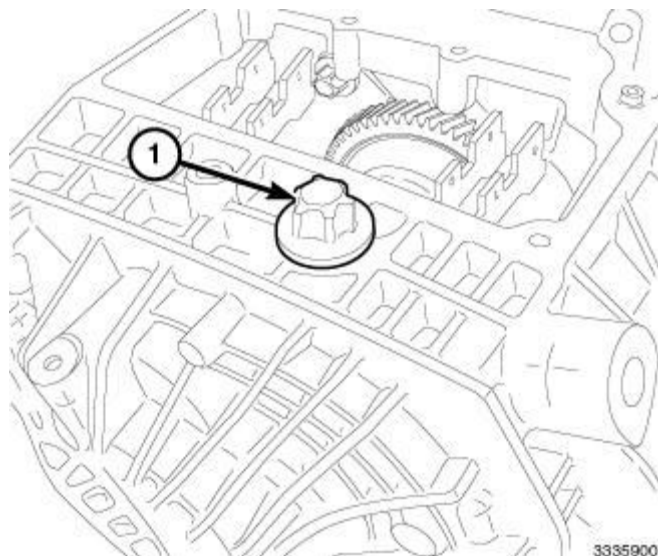


Fig. 29: Reverse Idler Gear Assembly Retaining Bolt
 Courtesy of CHRYSLER GROUP, LLC

9. Remove the reverse idler gear assembly retaining bolt.
10. Remove the axle seals. Refer to **SEAL, AXLE DRIVE SHAFT, REMOVAL**.

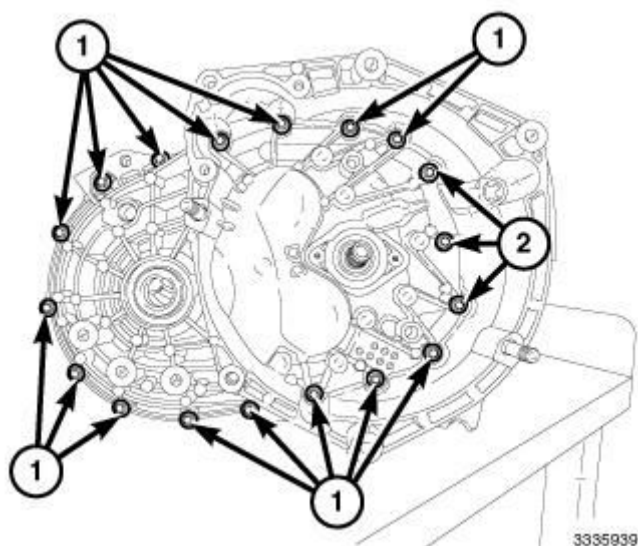


Fig. 30: Long Case Bolts & Short Case Bolts
 Courtesy of CHRYSLER GROUP, LLC

11. Remove the long case bolts (1) and the short case bolts (2).

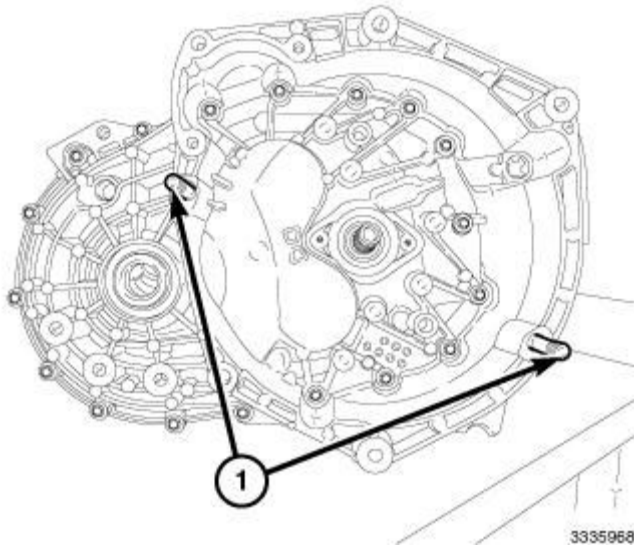


Fig. 31: Studs

Courtesy of CHRYSLER GROUP, LLC

12. Remove the studs (1).

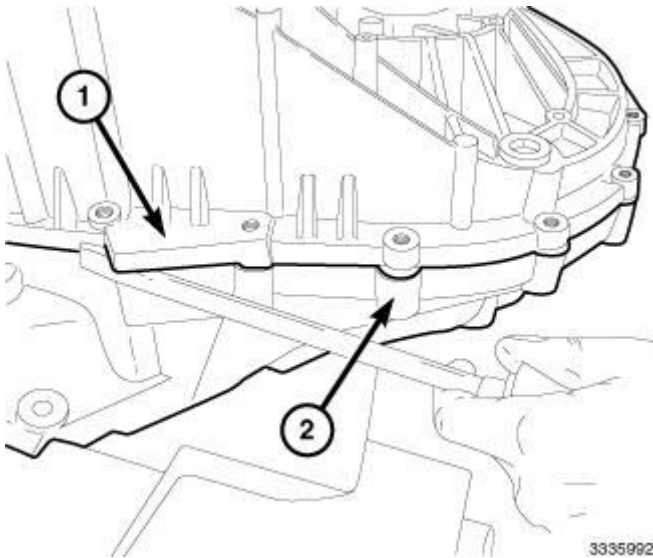


Fig. 32: Gear Side Half & Bell Housing Side Half

Courtesy of CHRYSLER GROUP, LLC

13. Separate the case halves by carefully prying on the gear side half (1) and the bell housing side half (2).

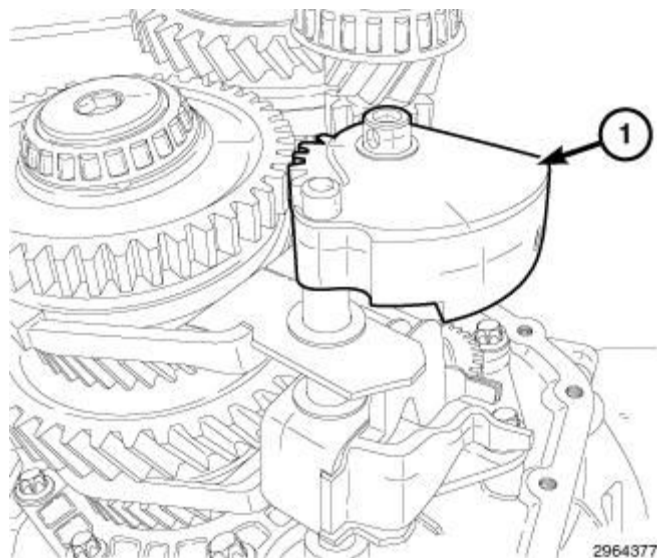


Fig. 33: Reverse Idler Gear Assembly
Courtesy of CHRYSLER GROUP, LLC

14. Remove the reverse idler gear assembly (1).
15. Using a hydraulic press, remove the pin from the reverse gear mounting bracket.
16. Separate the reverse idler gear and the needle bearing.

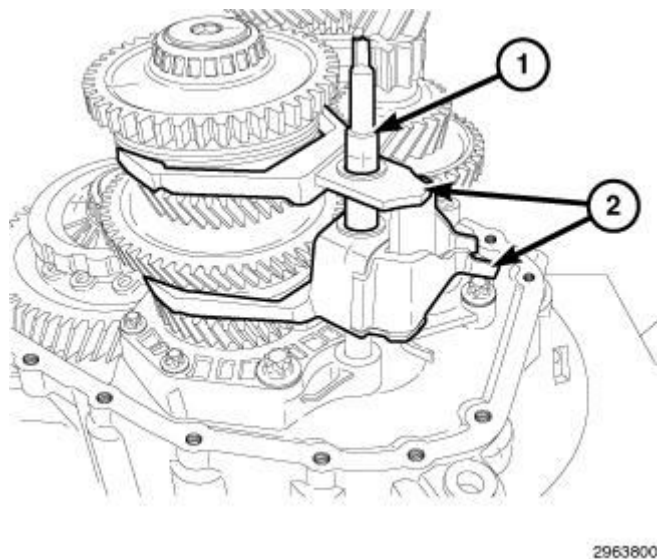
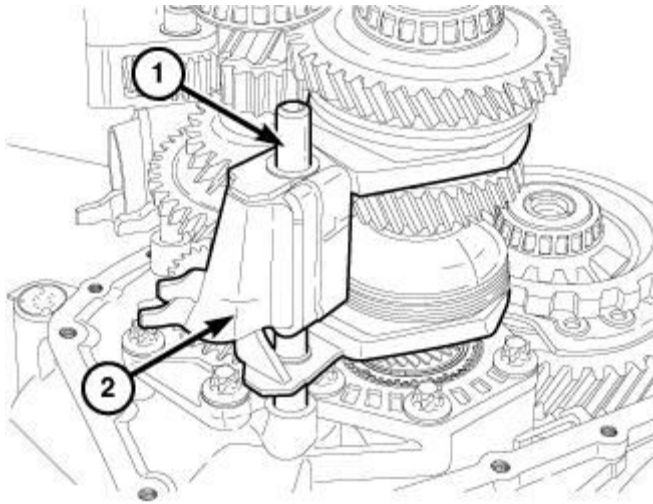


Fig. 34: Shifter Fork Pivot Pin
Courtesy of CHRYSLER GROUP, LLC

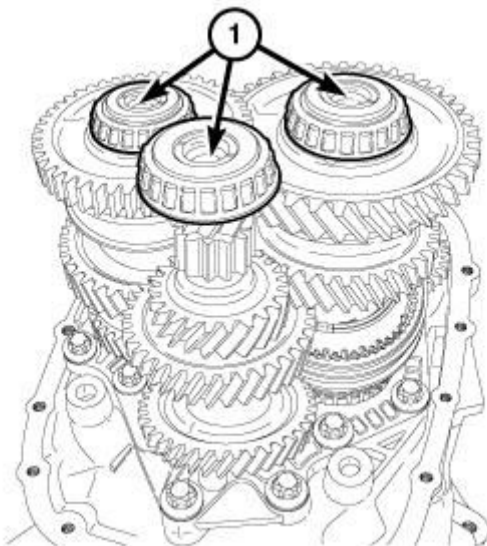
17. Remove the shifter fork pivot pin (1).
18. Remove the 3-4-reverse gear shifter fork assembly (2).



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Fig. 35: Shifter Fork Pivot Pin & 1-2-5-6 Gear Shifter Fork Assembly
Courtesy of CHRYSLER GROUP, LLC

19. Remove the shifter fork pivot pin (1).
20. Remove the 1-2-5-6 gear shifter fork assembly (2).



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Fig. 36: Output And Main Shafts
Courtesy of CHRYSLER GROUP, LLC

21. Remove the output and main shafts (1) as a group.

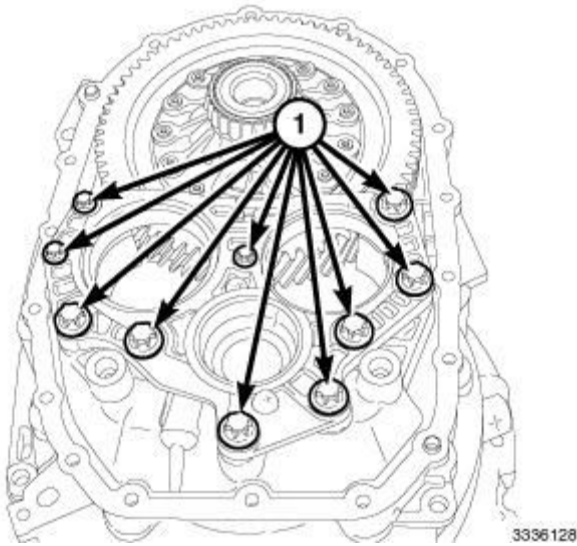


Fig. 37: Bearing Race Plate Bolts
Courtesy of CHRYSLER GROUP, LLC

22. Remove the bearing race plate bolts.

NOTE: Use a screw drive or equivalent as an aid in releasing the plate from the locating bushings.

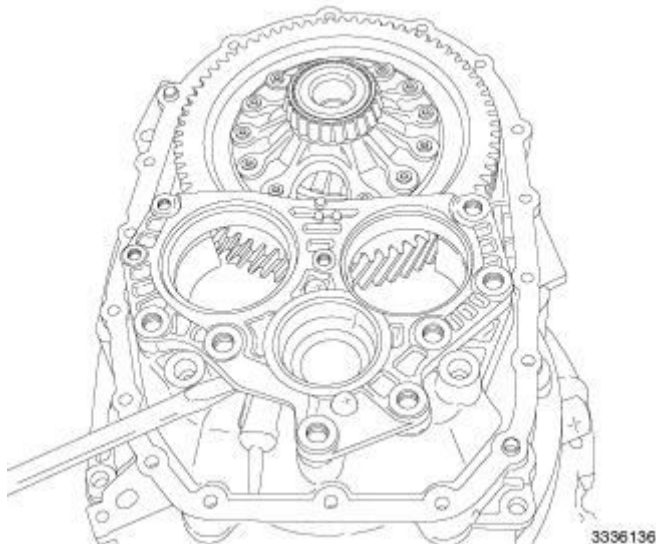


Fig. 38: Bearing Race Plate
Courtesy of CHRYSLER GROUP, LLC

23. Remove the bearing race plate.

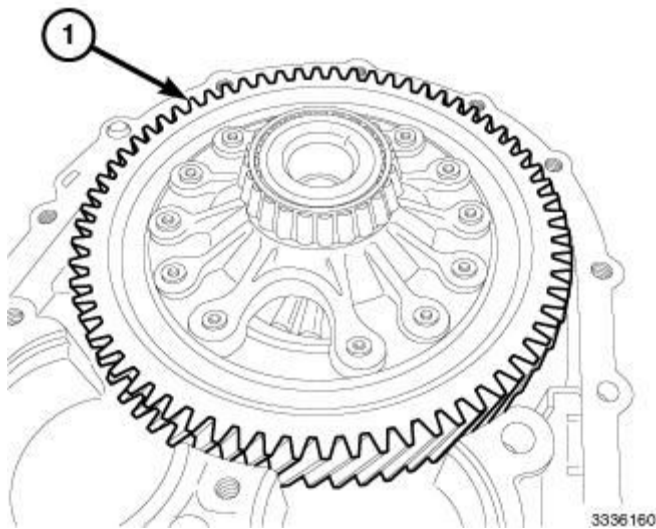


Fig. 39: Differential Assembly
Courtesy of CHRYSLER GROUP, LLC

24. Remove the differential assembly (1).
25. Remove the axle seals Refer to **SEAL, AXLE DRIVE SHAFT, REMOVAL**.

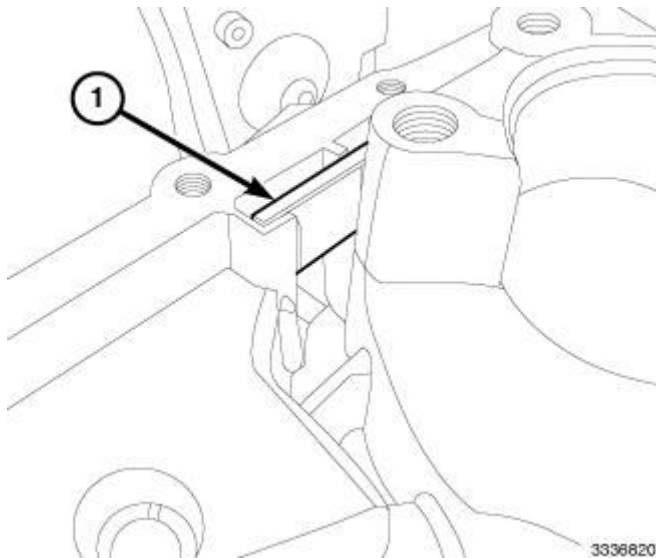


Fig. 40: Magnet
Courtesy of CHRYSLER GROUP, LLC

26. Remove the magnet.

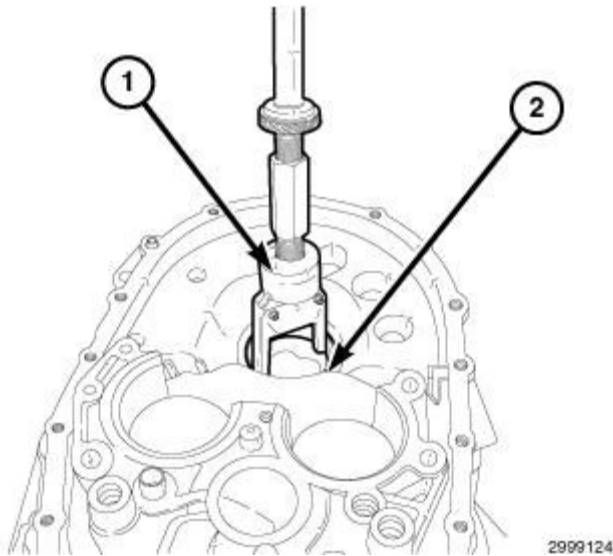


Fig. 41: Removing Bell Housing Side Differential Bearing Race
Courtesy of CHRYSLER GROUP, LLC

27. Remove the bell housing side differential bearing race using (special tool #C-637, Slide Hammer, Universal) and (special tool #9664, Remover, Bearing Cup).

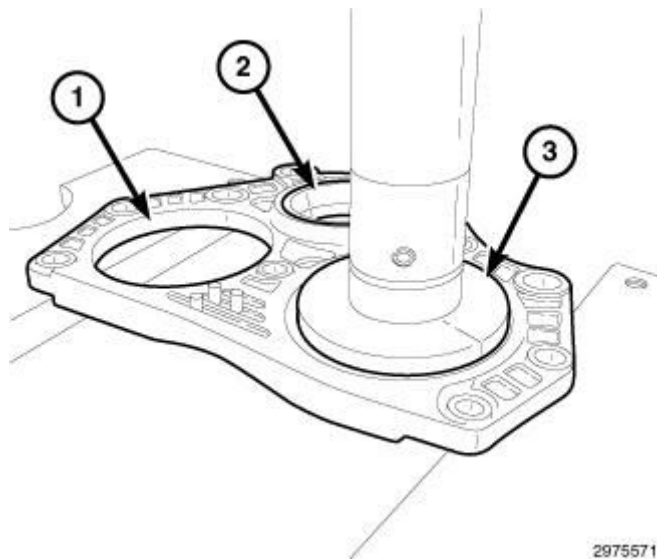


Fig. 42: Input Shaft Bearing Cup
Courtesy of CHRYSLER GROUP, LLC

28. Remove shaft bearing cup (2) using a press and (special tool #10302, Installer, Bearing Cup).
29. Remove the input shaft bearing cup (2) using (special tool #C-637, Slide Hammer, Universal) (special tool #9664, Remover, Bearing Cup).
30. Remove the output shaft bearing cup from the race mounting plate using a press and tools (special tool #D-111, Installer, Bearing Cup) (3), 10302.

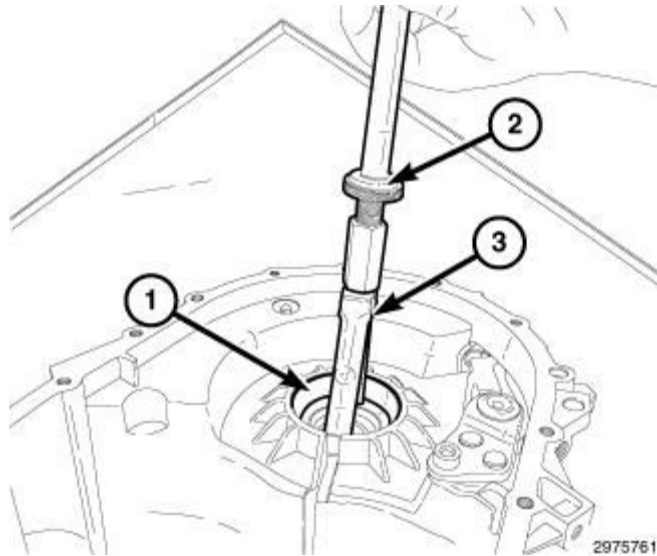


Fig. 43: Removing Differential Bearing Race Cups & Shims

Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not discard the shim as it will be utilized as the starting point for the bearing preload adjustment process.

31. Remove the case side differential bearing race cups and shims (1) using (special tool #C-637, Slide Hammer, Universal) (special tool #9664, Remover, Bearing Cup) (3).

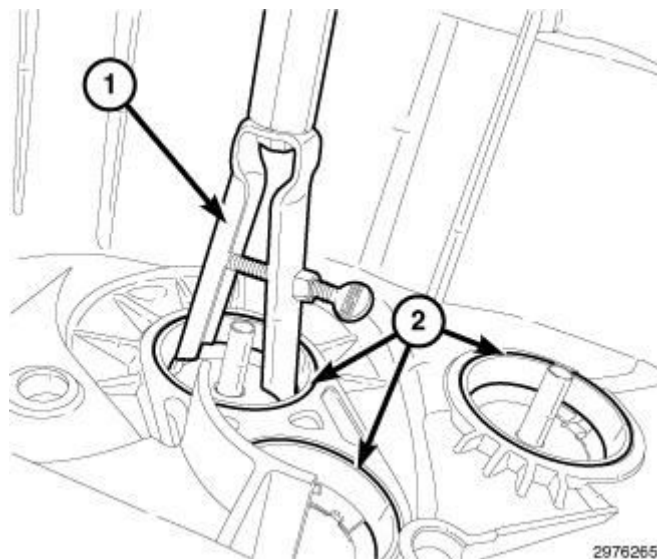


Fig. 44: Removing Case Side Gear Shaft Bearing Race Cups & Shims

Courtesy of CHRYSLER GROUP, LLC

NOTE: Document the location of each shim as they will be utilized as the starting point for the bearing preload adjustment process.

32. Remove the case side gear shaft bearing race cups and shims (2) using a Slide Hammer (special tool #C-637, Slide Hammer, Universal) (special tool #9664, Remover, Bearing Cup) (1).

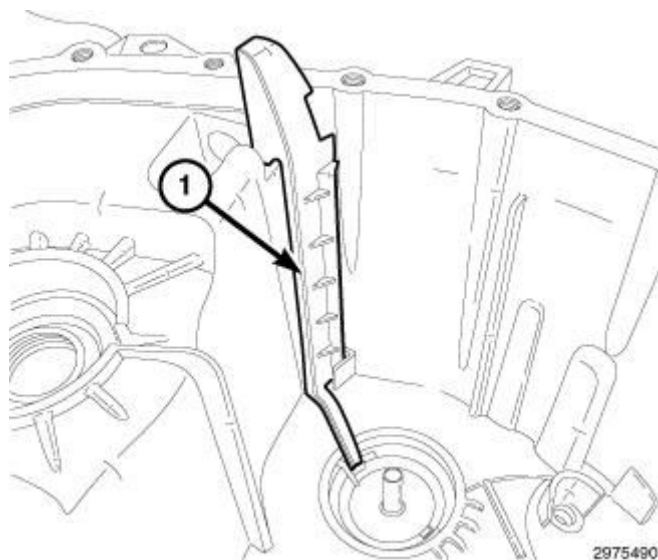


Fig. 45: Lubricating Duct
Courtesy of CHRYSLER GROUP, LLC

33. Remove the lubricating duct by pulling upward.

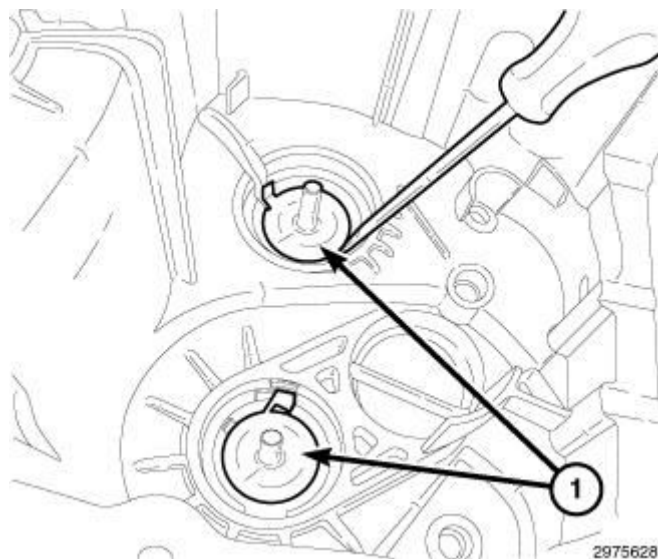


Fig. 46: Shaft Oil Ducts
Courtesy of CHRYSLER GROUP, LLC

NOTE: The oil ducts are staked to the case and may require some grinding before removal.

34. Remove the shaft oil ducts (1) from the case using a screwdriver or the equivalent.

CLEANING

CLEANING

Clean the gears, bearings, shafts, synchronizers, thrust washers, oil feeder, shift mechanism, gear case, and bellhousing. Do not use solvent to clean sealed bearings. Dry all parts except the bearings with compressed air. Allow the bearings to either air dry or wipe them dry with clean shop towels.

ASSEMBLY

ASSEMBLY

NOTE: It is not necessary to reestablish preload shim thickness when new bearings are installed. It is only necessary to establish preload shim thickness when a transaxle housing component, gear shaft, or differential is replaced. Refer to **ADJUSTMENTS**.

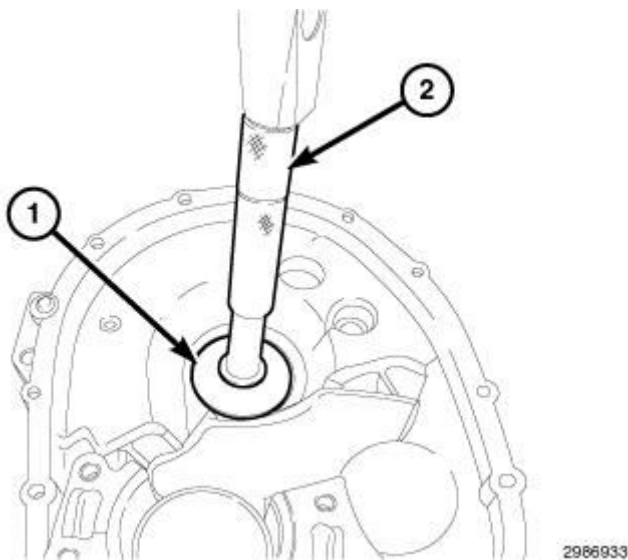


Fig. 47: Right And Left Side Differential Bearing Races And Universal Driver Handle
Courtesy of CHRYSLER GROUP, LLC

1. Install the right and left side differential bearing races using (special tool #8866, Installer, Bearing Cup) and (special tool #C-4171, Driver Handle, Universal).



Fig. 48: Special Tool #8866

Courtesy of CHRYSLER GROUP, LLC

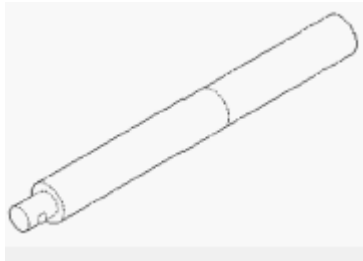


Fig. 49: Special Tool #C-4171

Courtesy of CHRYSLER GROUP, LLC

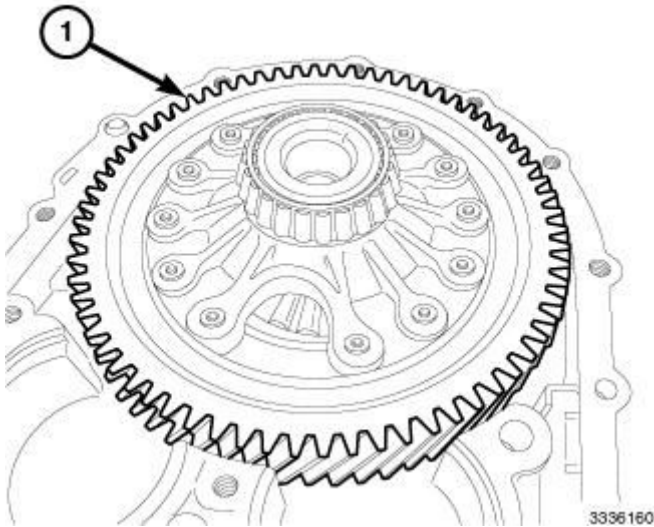


Fig. 50: Differential Assembly

Courtesy of CHRYSLER GROUP, LLC

2. Install the differential.

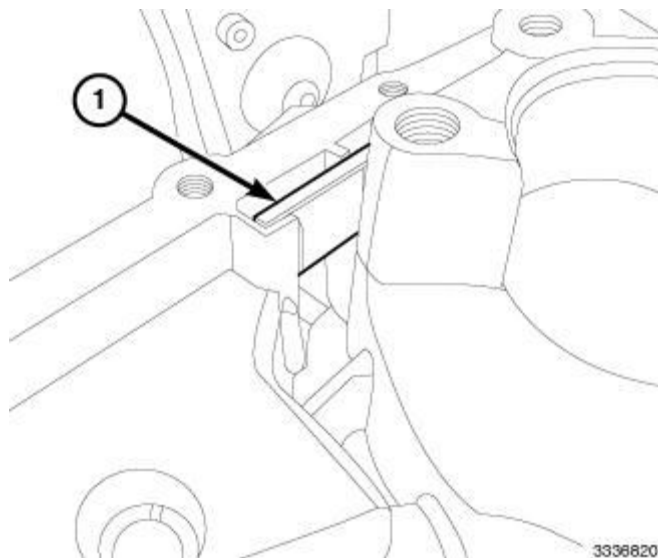


Fig. 51: Magnet
Courtesy of CHRYSLER GROUP, LLC

3. Install the magnet.

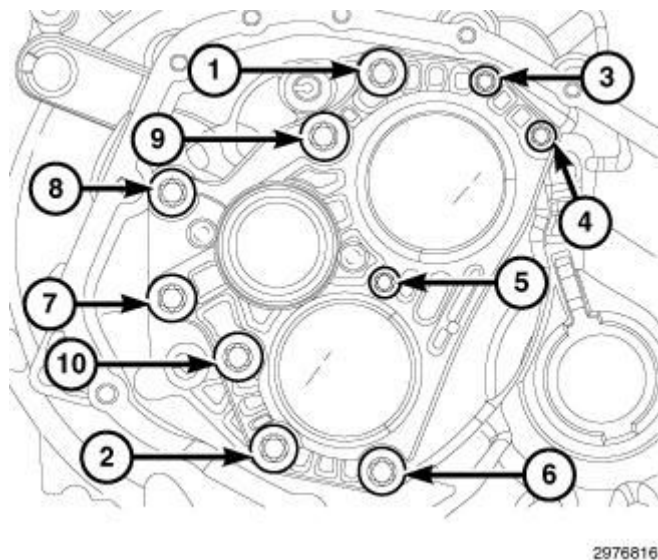


Fig. 52: Bearing Race Plate Tightening Sequence
Courtesy of CHRYSLER GROUP, LLC

4. Install the bearing race plate and tighten the bolts in four steps using the sequence shown in illustration:
 - Step 1 - Tighten bolts 9-10-6-8-1 to 20 N.m (15 ft. lbs.) in order.
 - Step 2 - Tighten bolts 3-5-4 to 25 N.m (18 ft. lbs.) in order.
 - Step 3 - Tighten bolts 2-7 to 80 N.m (59 ft. lbs.) in order.
 - Step 4 - Tighten bolts 9-10-6-8-1 to 80 N.m (59 ft. lbs.) in order.

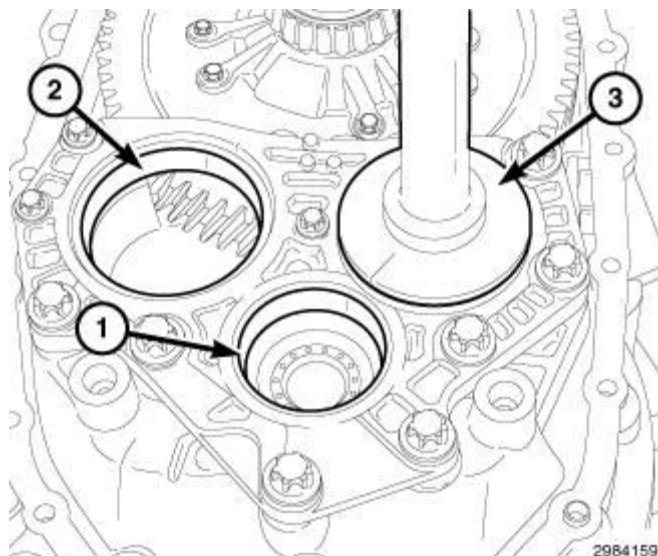


Fig. 53: Bearing Cup

Courtesy of CHRYSLER GROUP, LLC

NOTE: The following tools are to be used in conjunction with (special tool #C-4171, Driver Handle, Universal).

5. Install the new bearing races to the race plate using the following tools:
- For the shaft bearing race use (special tool #10302, Installer, Bearing Cup) (2).
 - For the shaft bearing race use (special tool #D-111, Installer, Bearing Cup) (3).
 - For the main shaft bearing race use (special tool #C-4198, Installer, Axle Bearing) (1).

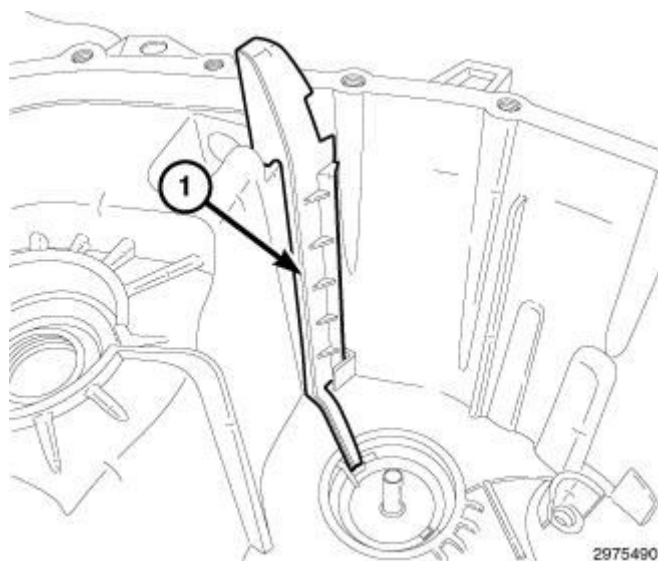


Fig. 54: Lubricating Duct

Courtesy of CHRYSLER GROUP, LLC

6. Install the lubricating duct (1).

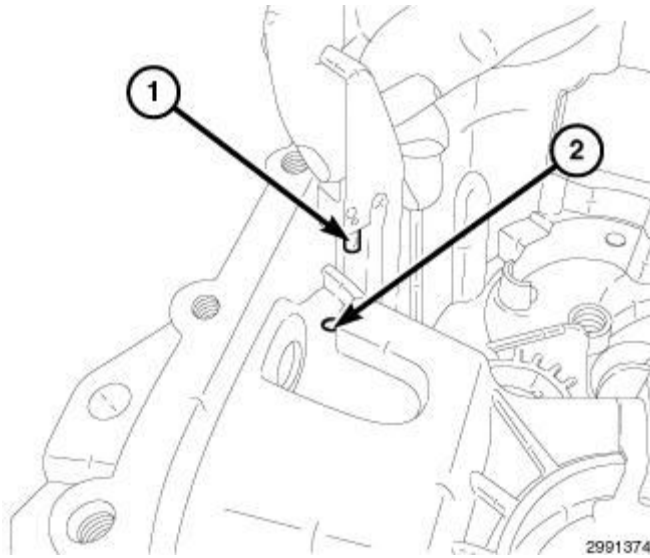


Fig. 55: Oil Duct Locating Pin & Locating Hole
Courtesy of CHRYSLER GROUP, LLC

7. Ensure that the oil duct locating pin (1) is in the locating hole (2).

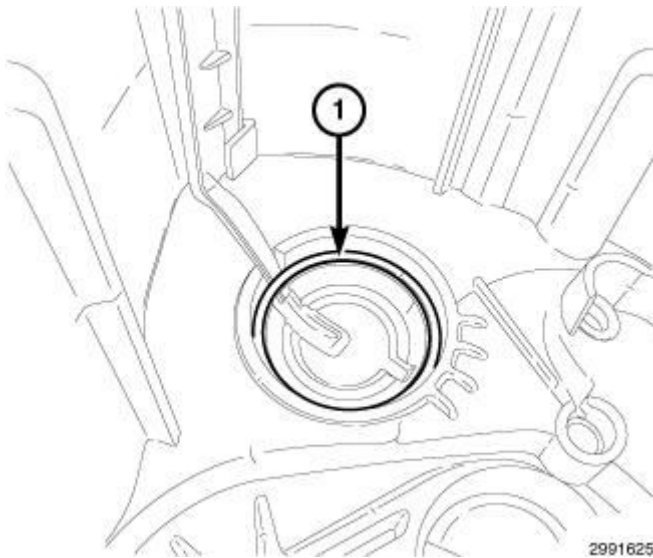


Fig. 56: Correct Shim
Courtesy of CHRYSLER GROUP, LLC

8. Install the correct shim (1) to the case.

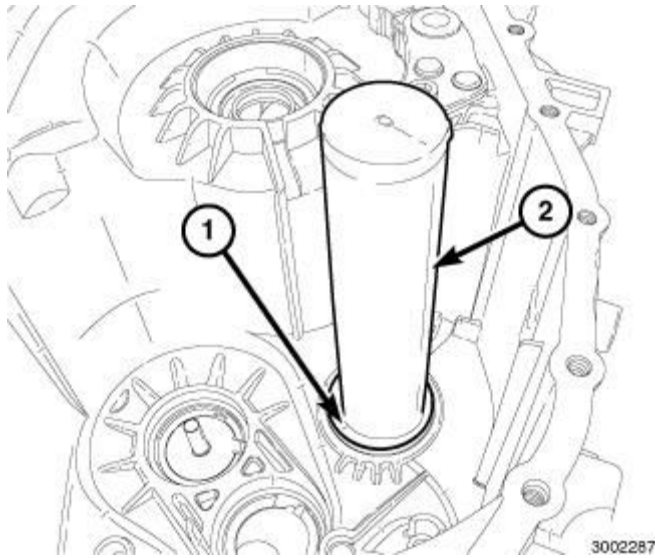


Fig. 57: Output Shaft The Bearing Races To The Case Using Bearing Cup Installer
Courtesy of CHRYSLER GROUP, LLC

9. Install output shaft the bearing races to the case using (special tool #L-4520, Installer, Seal/Cup) and (special tool #6446, Installer, Bearing).

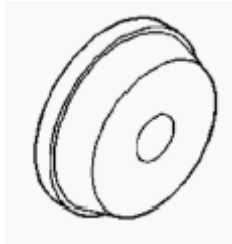


Fig. 58: Special Tool #L-4520
Courtesy of CHRYSLER GROUP, LLC

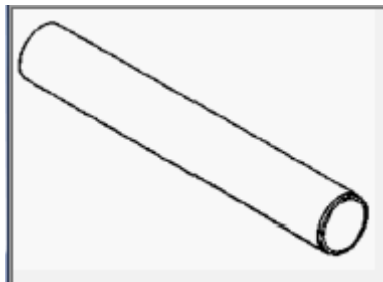


Fig. 59: Special Tool #6446
Courtesy of CHRYSLER GROUP, LLC

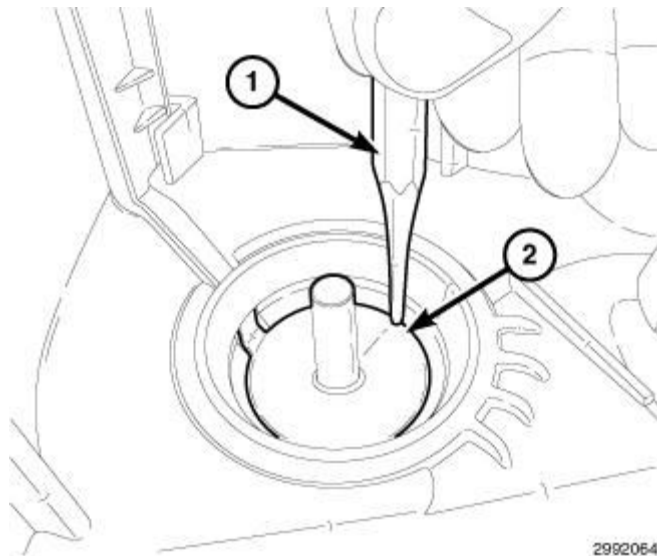


Fig. 60: Re-Staking Ducts To Case
Courtesy of CHRYSLER GROUP, LLC

10. Install the gear shaft oil ducts. Using an appropriate drift (1) re-stake the ducts (2) to the case.
11. Install the input shaft bearing race using (special tool #C-4171, Driver Handle, Universal) and (special tool #10305, Installer, Differential Bearing Cup).
12. Install the gear side differential bearing race using (special tool #C-4171, Driver Handle, Universal) and (special tool #8866, Installer, Bearing Cup).

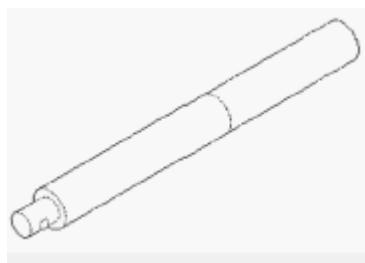


Fig. 61: Special Tool #C-4171
Courtesy of CHRYSLER GROUP, LLC



Fig. 62: Special Tool #8866
Courtesy of CHRYSLER GROUP, LLC

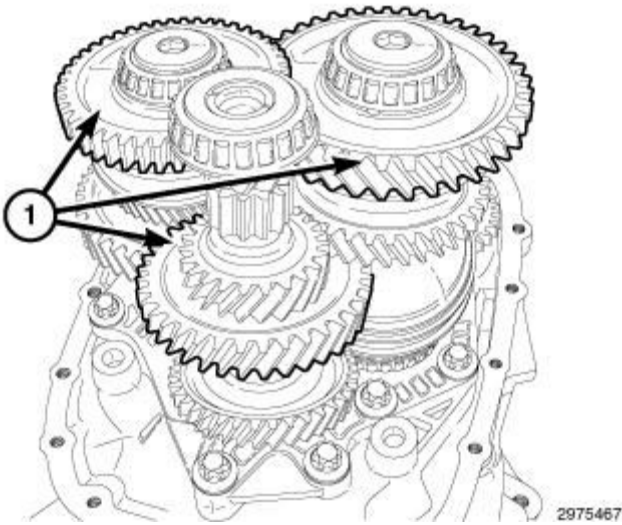


Fig. 63: Output And Main Shafts
Courtesy of CHRYSLER GROUP, LLC

13. Install the output and main shafts (1) as a group.

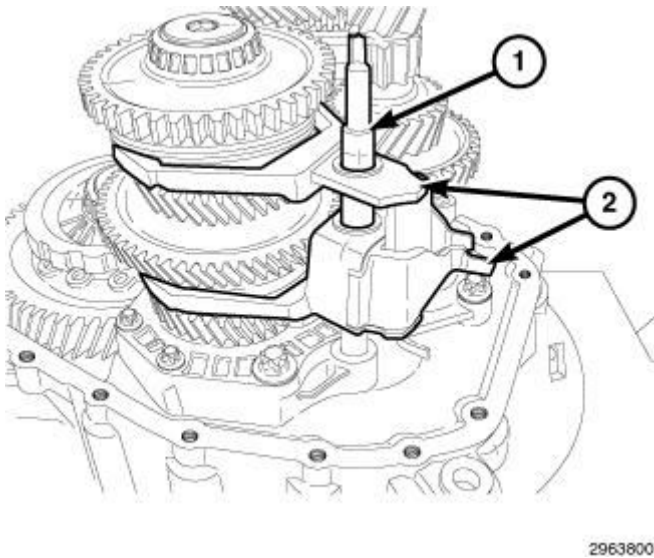
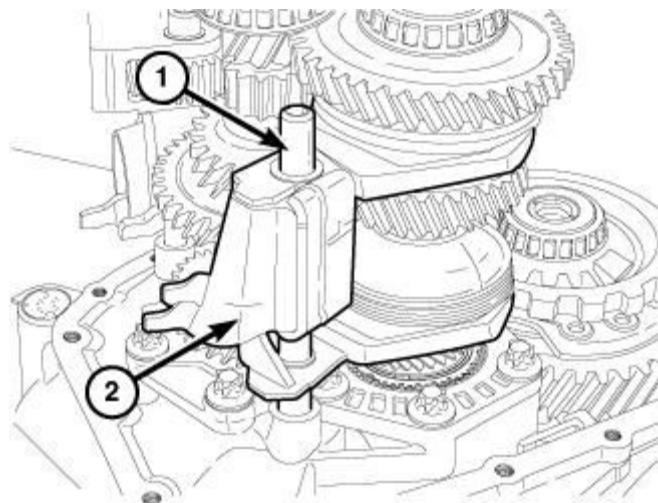


Fig. 64: Shifter Fork Pivot Pin
Courtesy of CHRYSLER GROUP, LLC

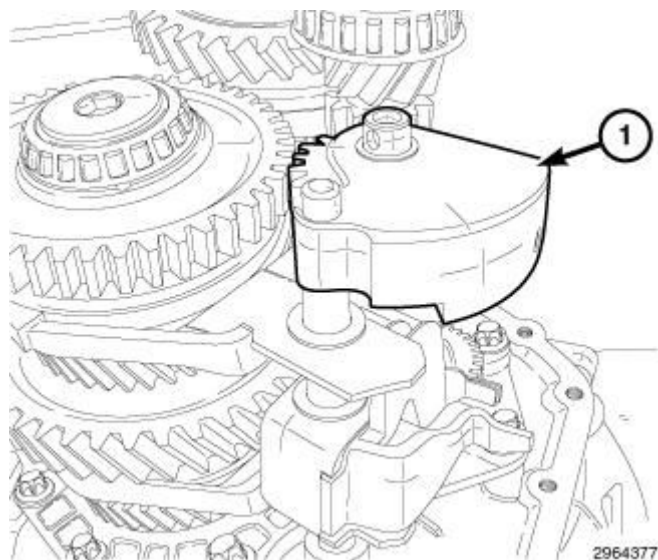
14. Install the 3-4-R gear shifter fork assembly.



2963780

Fig. 65: Shifter Fork Pivot Pin & 1-2-5-6 Gear Shifter Fork Assembly
Courtesy of CHRYSLER GROUP, LLC

15. Install the 1-2-5-6 gear shifter fork assembly.



2964377

Fig. 66: Reverse Idler Gear Assembly
Courtesy of CHRYSLER GROUP, LLC

16. Install the reverse idler gear and the needle bearing.
17. Using a hydraulic press, install the pin to the reverse gear mounting bracket.
18. Install the reverse idler gear assembly (1).

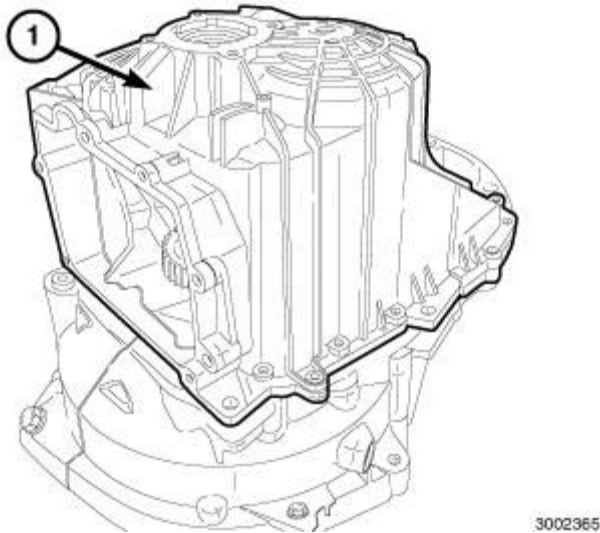


Fig. 67: Gear Side Case Half
Courtesy of CHRYSLER GROUP, LLC

NOTE: The case halves must be assembled within 15 minutes after the application of the anaerobic sealant. Do not allow transmission oil or any other lubricants to come in contact with the sealant for at least one hour after the case halves have been assembled.

19. Apply a uniform bead of LOCTITE®509™ Sealer or equivalent to the sealing surface of the case.
20. Install the gear side case half (1) to the bellhousing case half (2).

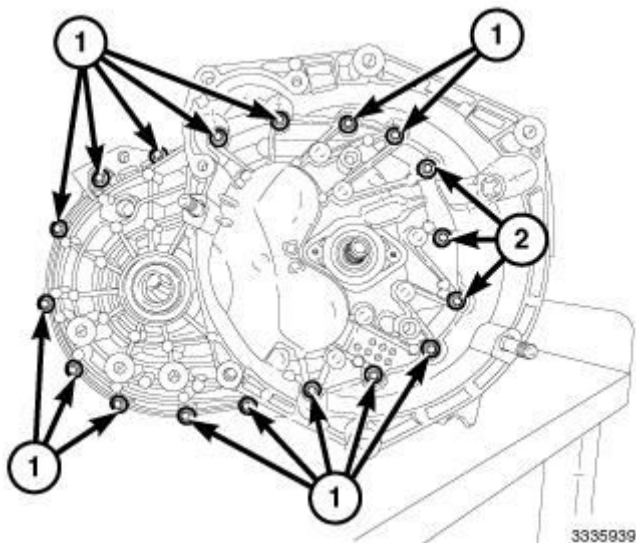


Fig. 68: Long Case Bolts & Short Case Bolts
Courtesy of CHRYSLER GROUP, LLC

21. Install the long case bolts (1) and the short case bolts (2) and tighten to 25 N.m (18 ft. lbs.) using a cross

sequence.

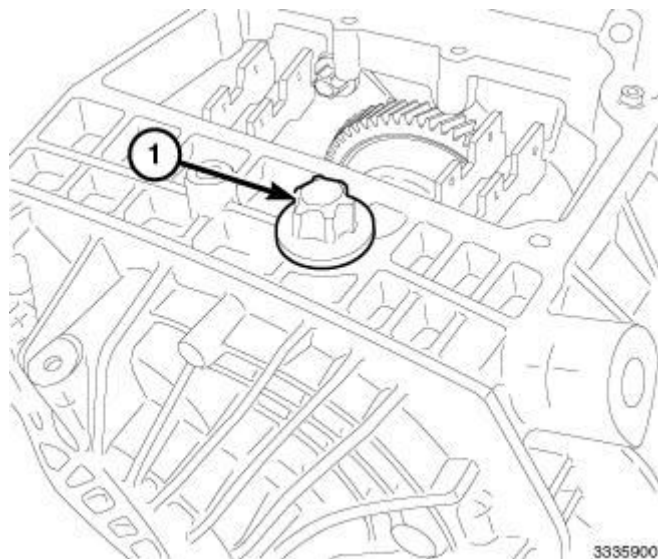


Fig. 69: Reverse Idler Gear Assembly Retaining Bolt
Courtesy of CHRYSLER GROUP, LLC

22. Patch and install the reverse gear idler retaining bolt using the following process. Tighten to 10 N.m (89 in. lbs.).
 - Remove the remaining traces of the original locking patch with a wire brush or the equivalent.
 - Clean the threads with denatured alcohol and allow to dry.
 - Apply the locking patch using Mopar thread locker.

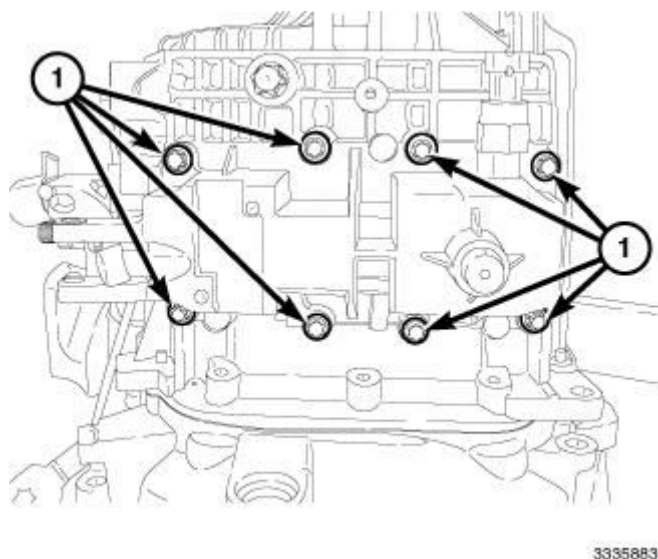
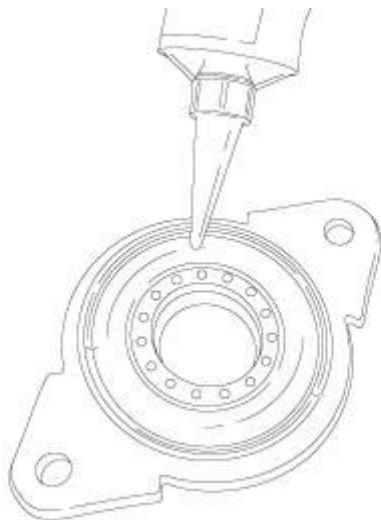


Fig. 70: Gear Selector Assembly Bolts
Courtesy of CHRYSLER GROUP, LLC

23. Apply a uniform bead of LOCTITE®509™ Sealer or equivalent to the sealing surface of the case.

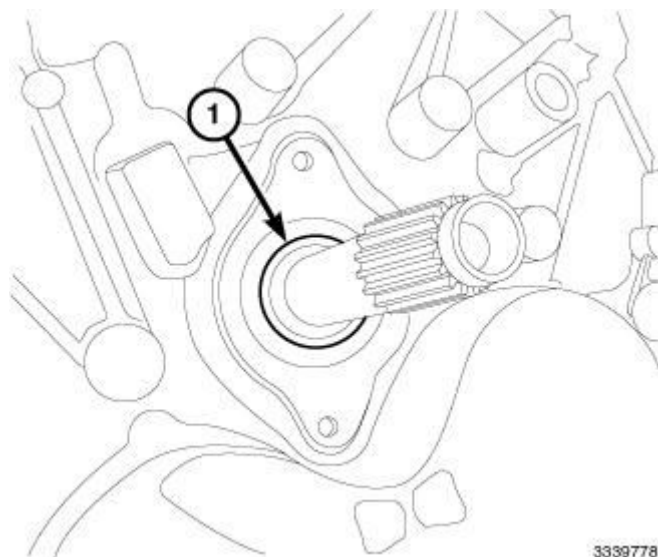
24. Install the gear selector assembly, tighten the bolts to 20 N.m (15 ft. lbs.).



3339240

Fig. 71: Uniform Bead Of Mopar® RTV Sealer
Courtesy of CHRYSLER GROUP, LLC

25. Apply a uniform bead of Mopar® Threebond RTV Sealer or equivalent to the sealing surface of the **new** input shaft sealing ring.



3339778

Fig. 72: Sealing Ring To The Transmission
Courtesy of CHRYSLER GROUP, LLC

26. Install the sealing ring to the transmission.

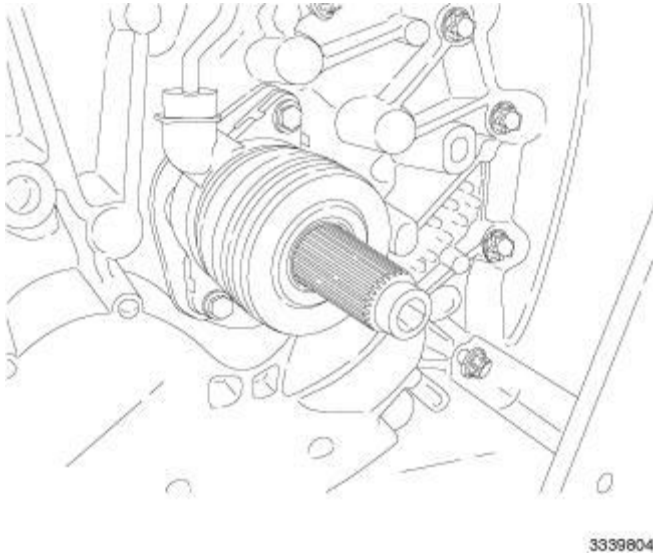


Fig. 73: Concentric Slave Cylinder (CSC) and Bolts
Courtesy of CHRYSLER GROUP, LLC

27. Install the Concentric Slave Cylinder (CSC) and bolt to the transmission. Tighten the bolts to 10 N.m (89 in. lbs.) and engage the retention tabs.

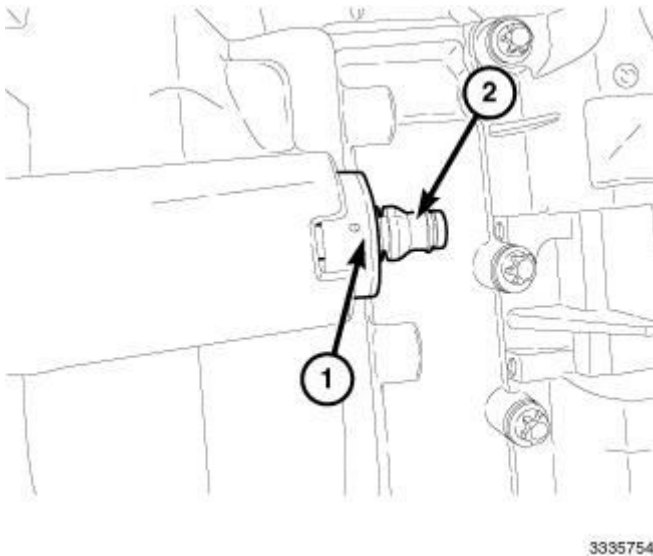


Fig. 74: Hydraulic Fitting & Plastic Retainer
Courtesy of CHRYSLER GROUP, LLC

28. Connect the hydraulic fitting (2) to the plastic retainer (1).

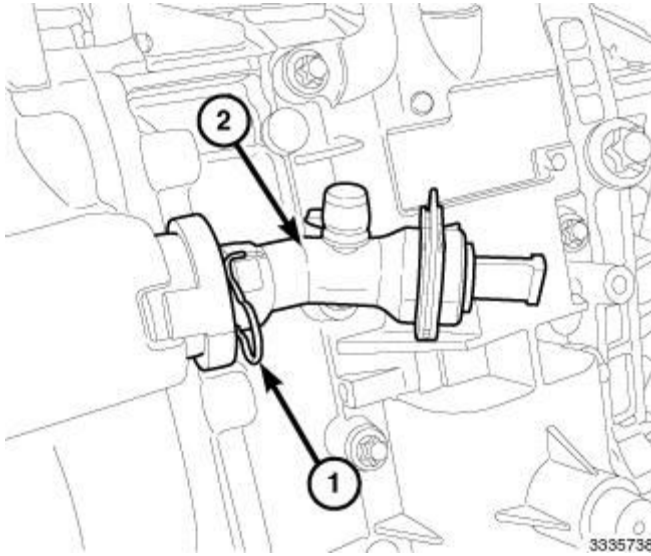


Fig. 75: Retention Clip & Connection
Courtesy of CHRYSLER GROUP, LLC

29. Connect the hydraulic connection at the case.
30. Install the axle seals.

Refer to SEAL, AXLE DRIVE SHAFT, INSTALLATION.

INSTALLATION

INSTALLATION

1. Raise the transmission while avoiding obstacles and until the transmission is in line with the engine.

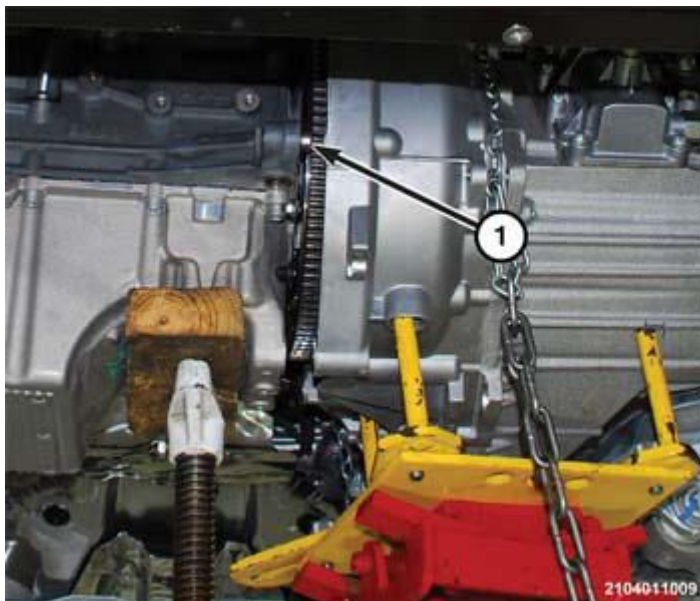


Fig. 76: Removing/Installing Transmission
Courtesy of CHRYSLER GROUP, LLC

2. Push the transmission toward the engine far enough for the input shaft to engage the clutch.

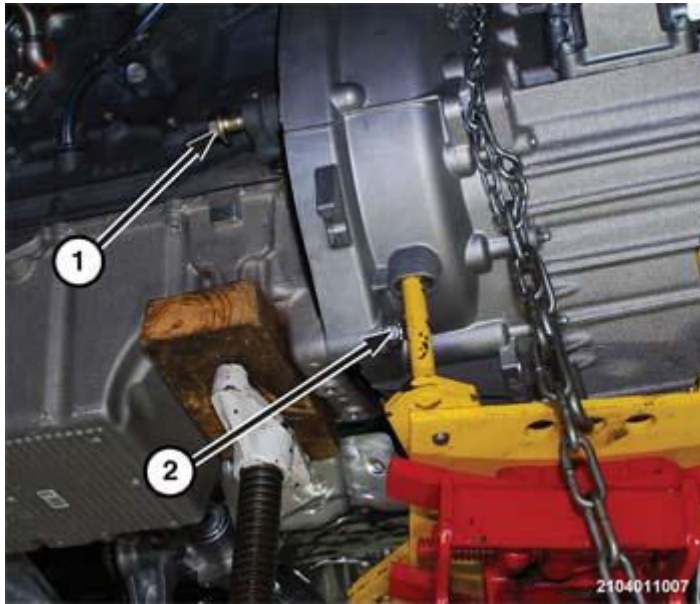


Fig. 77: Locating Bolts Holding Engine To Bellhousing & Bellhousing To Oil Pan
Courtesy of CHRYSLER GROUP, LLC

3. On the backside of the engine, Install the bolt (1) to hold engine to the bellhousing and the bolt (2) to hold the bellhousing to the oil pan. Refer to **SPECIFICATIONS**.



Fig. 78: Locating Bolts Holding Engine Block To Transmission Bellhousing & Bellhousing To Oil Pan

Courtesy of CHRYSLER GROUP, LLC

4. On the front of the engine, remove the bolts (1) to hold the engine block to the transmission bellhousing and the bellhousing to the oil pan. Refer to **SPECIFICATIONS**.

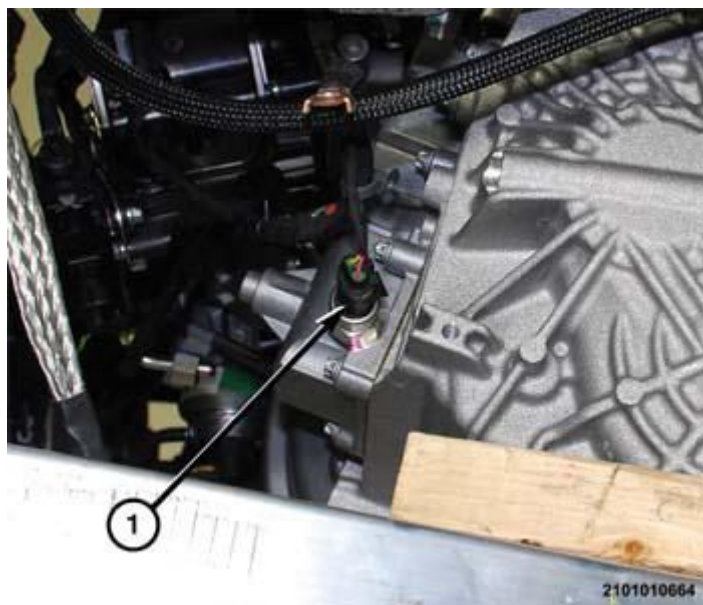
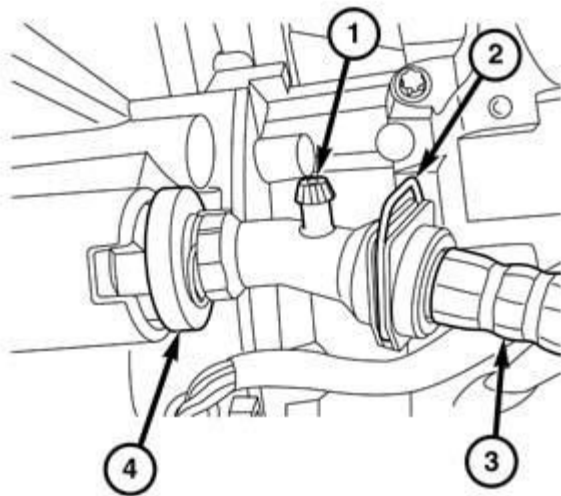


Fig. 79: Backup Lamp Switch Wire Harness Connector
Courtesy of CHRYSLER GROUP, LLC

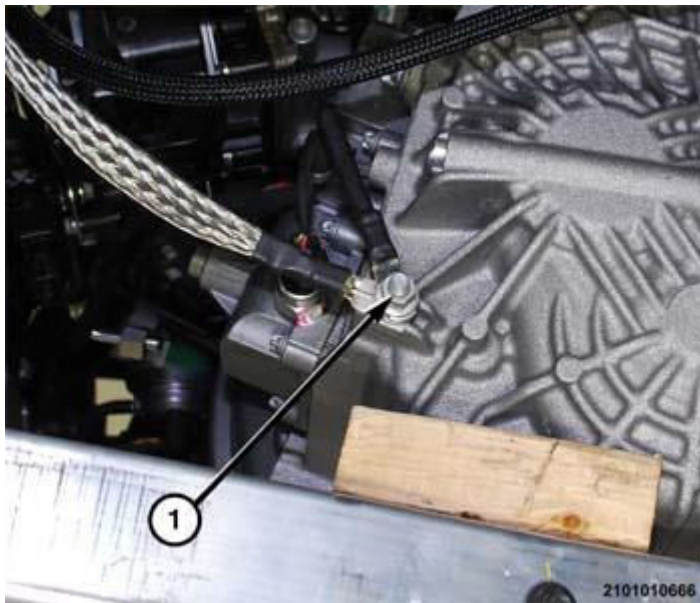
5. Connect the wire harness connector (1) to the backup lamp switch.
6. Install the front suspension cradle and load beams.
7. Install the starter motor. Refer to **STARTER, INSTALLATION**.
8. Install the catalytic converter on the engine. Refer to **PIPE, EXHAUST CROSSUNDER, INSTALLATION**.



210273640

Fig. 80: Clutch Slave Cylinder Union & Nipple
Courtesy of CHRYSLER GROUP, LLC

9. If Used, remove the cap-plug sealing the end of the hydraulic line used to avoid losing hydraulic fluid.
10. Engage the clutch hydraulic coupling (4) onto the slave cylinder on the transmission.



2101010606

Fig. 81: Locating Nut Holding Ground Cable To Transmission
Courtesy of CHRYSLER GROUP, LLC

11. Place the ground cable in position on the transmission.

12. Install the nut (1) to hold the ground cable to the transmission. Refer to **SPECIFICATIONS**.

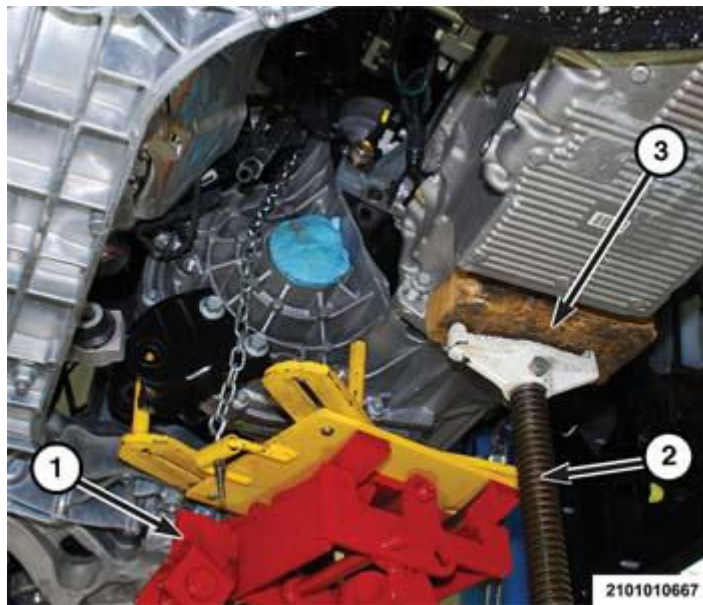


Fig. 82: Positioning Transmission Jack, High Stand & Wood Block
Courtesy of CHRYSLER GROUP, LLC

13. Remove the high stand (2) from under the engine oil pan.
14. Remove the safety chain or strap and lower transmission jack (1) from under the transmission.
15. Lower the vehicle.

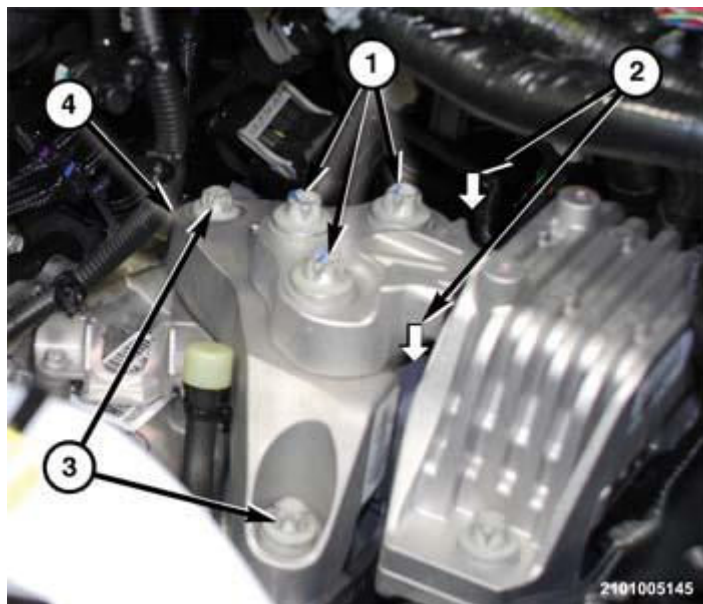


Fig. 83: Locating Bolts Holding Upper Mount To Adapter Spacer & Adapter Spacer To Transmission
Courtesy of CHRYSLER GROUP, LLC

16. Place transmission mount spacer in position on the transmission.
17. Install the bolts (3),(2= hidden) to hold the transmission mount adapter spacer (4) to the transmission. Refer to **SPECIFICATIONS**.
18. Position a floor jack under the transmission and lift the transmission enough to start the bolts in the upper transmission mount.
19. Install the bolts (1) to hold the upper transmission mount to the transmission mount adapter spacer (4). Refer to **SPECIFICATIONS**.

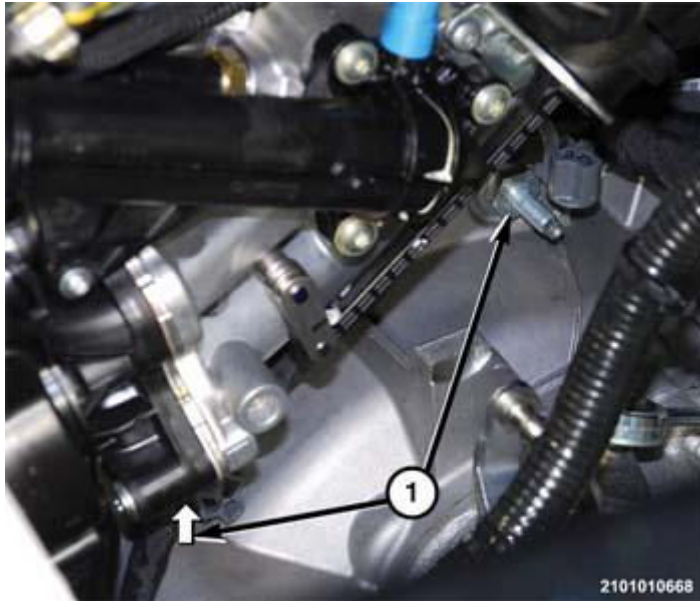


Fig. 84: Locating Bolts Holding Upper Bellhousing To Engine Block
Courtesy of CHRYSLER GROUP, LLC

20. Install the bolts (1) to hold the upper bellhousing to the engine block. Refer to **SPECIFICATIONS**.

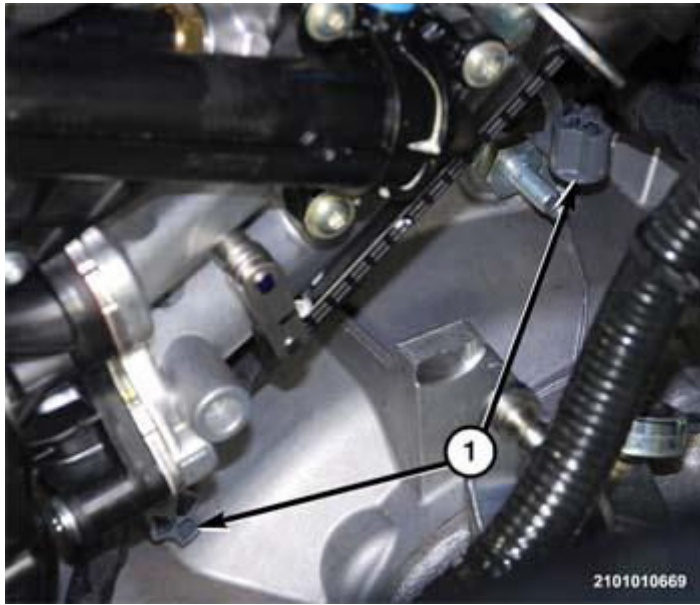


Fig. 85: Wire Harness Retainers
 Courtesy of CHRYSLER GROUP, LLC

21. Route the wire harness in proper position.
22. Engage the wire harness retainers (1) onto the top of the bellhousing bolts.
23. Install the exhaust clamp to hold the turbo charger to the catalytic converter.
24. Install the oxygen sensor. Refer to **SENSOR, OXYGEN, INSTALLATION** .
25. Connect the wire connector onto the oxygen sensor.
26. Connect the wire connector onto the exhaust temperature sensor.
27. Install the exhaust heat shield in position on the exhaust manifold.
28. Engage the clips to hold the shift cables housing ends to the bracket on the transmission.
29. Snap the select cable end in position on the lever ball stud on the transmission.
30. Snap the shift cable end in position on the lever ball stud on the transmission.
31. Raise the vehicle to gain access to the power transfer unit (PTU).
32. If equipped, Install the PTU.
33. Remove the fill plug and fill the transmission with the proper quantity and type fluid. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** .
34. Install the fill plug.
35. Install the exhaust crossunder pipe. Refer to **PIPE, EXHAUST CROSSUNDER, INSTALLATION** .
36. If equipped, Install the rear propeller shaft. Refer to **INSTALLATION** .
37. Install the front halfshafts.
38. Install the front wheel bolts in the front brake rotor hub.
39. While holding a pry bar across the wheel bolts to prevent the wheel hub in position on rotating, Install the NEW front wheel hub nuts. Refer to **SPECIFICATIONS** .
40. Using tool (special tool #10287-1, Tool, Staking), stake the front hub nuts to lock them on the halfshaft

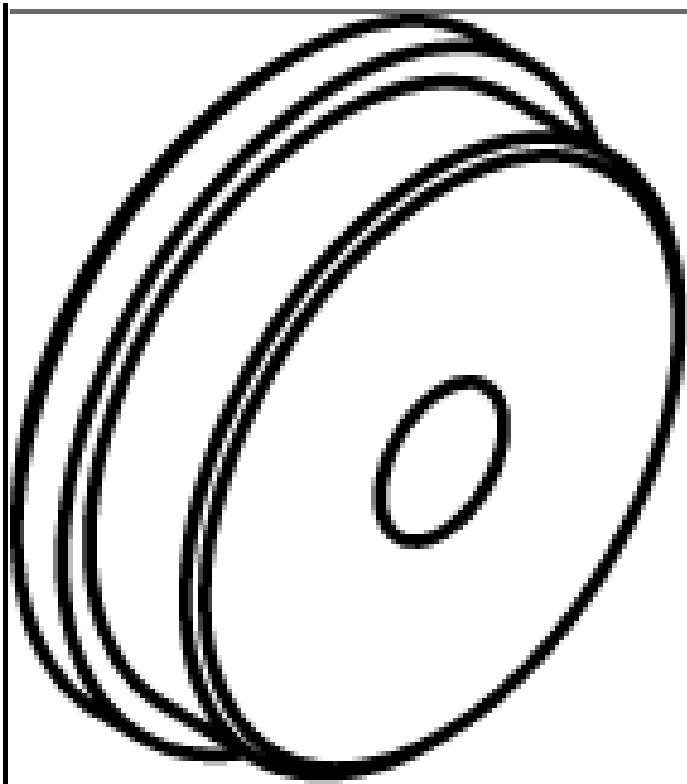
stub shaft.

41. Lower the vehicle to gain access engine compartment.
42. Place the charge air tube in position on the vehicle.
43. Connect the charge air tube to the throttle body adapter.
44. Install the front fascia. Refer to **FASCIA, FRONT, INSTALLATION** .
45. Engage the retainer to hold the wire harness to the front fascia.
46. Connect wire harness connector at the left side of the front fascia.
47. Install the right front fender splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION** .
48. Install the left front fender splash shield. Refer to **SHIELD, SPLASH, FRONT WHEELHOUSE, INSTALLATION** .
49. Install the bolt to hold the charge air hose to the side of the transmission.
50. Engage the clamp on the charge air outlet hose on the left side of the radiator support panel.
51. Install the belly pan. Refer to **BELLY PAN, INSTALLATION** .
52. Lower the vehicle to mid level.
53. Install the front wheels. Refer to **INSTALLATION** .
54. Lower the vehicle to gain access to the engine compartment.
55. Install the pinch bolt to hold the steering column to the steering gear.
56. Install the battery and battery tray. Refer to **INSTALLATION** .
57. Engage the clips to hold the wire harness to the battery tray.
58. Install the upper radiator closeout panel.
59. Install the engine cover.
60. Close and latch the hood.
61. Road test the vehicle to verify the repair.

SPECIAL TOOLS

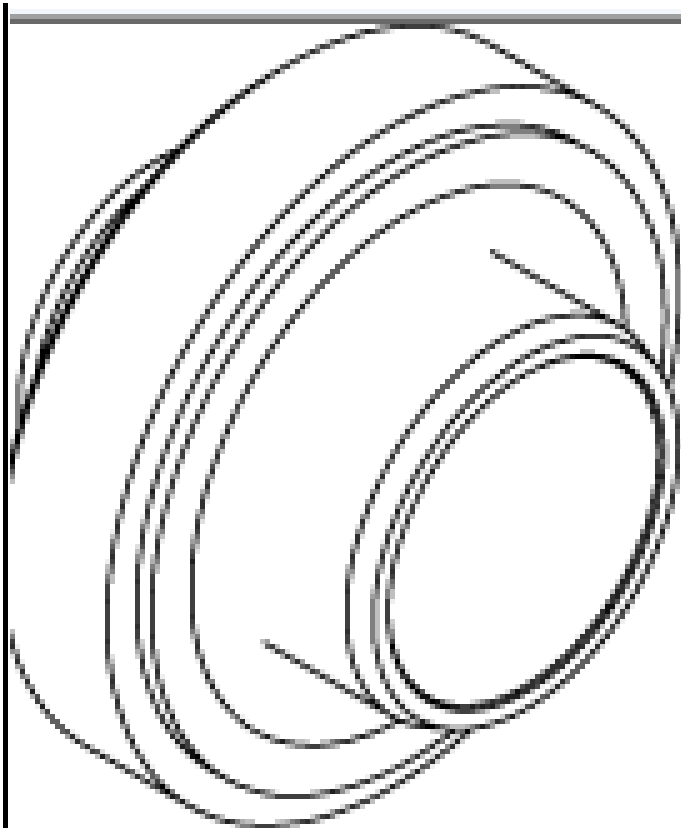
SPECIAL TOOLS

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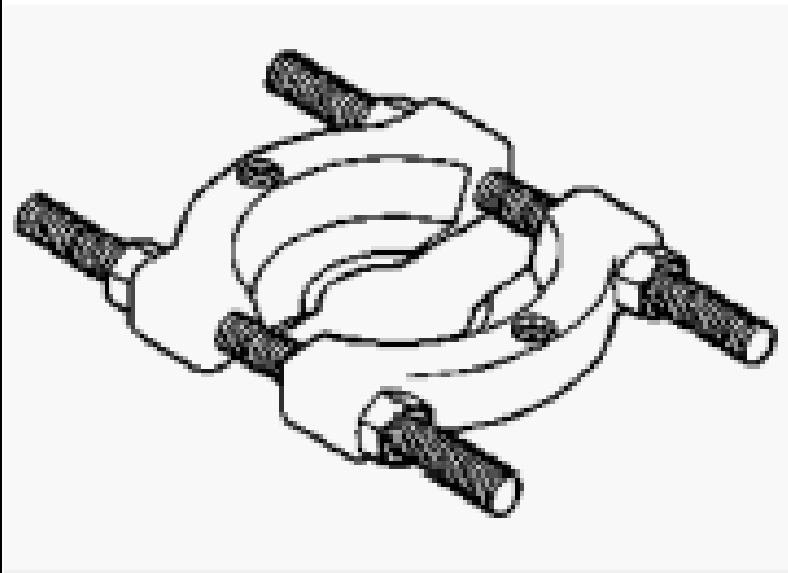
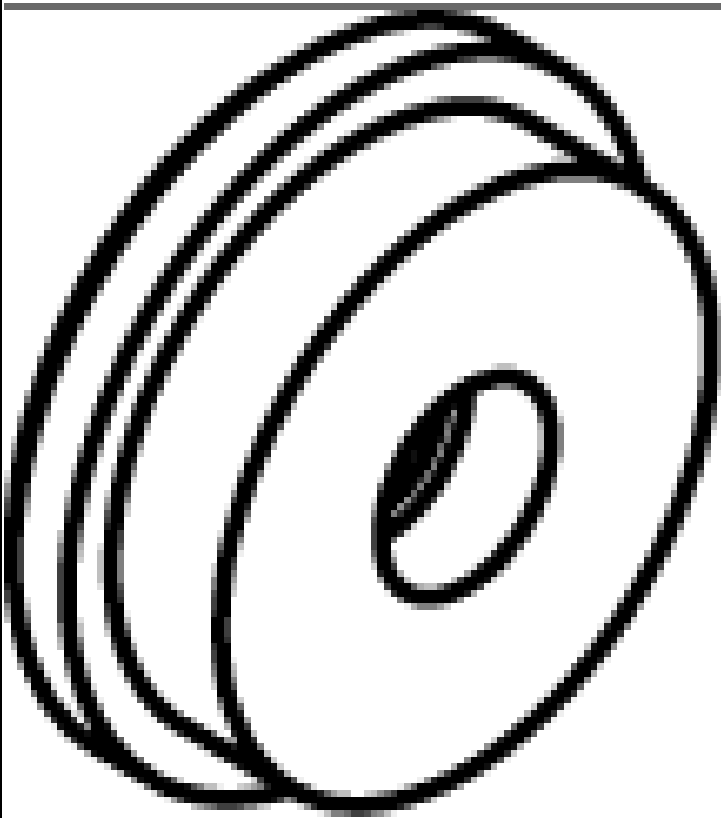


10302 - Installer, Bearing Cup

10303 - Installer, Differential Oil Seal



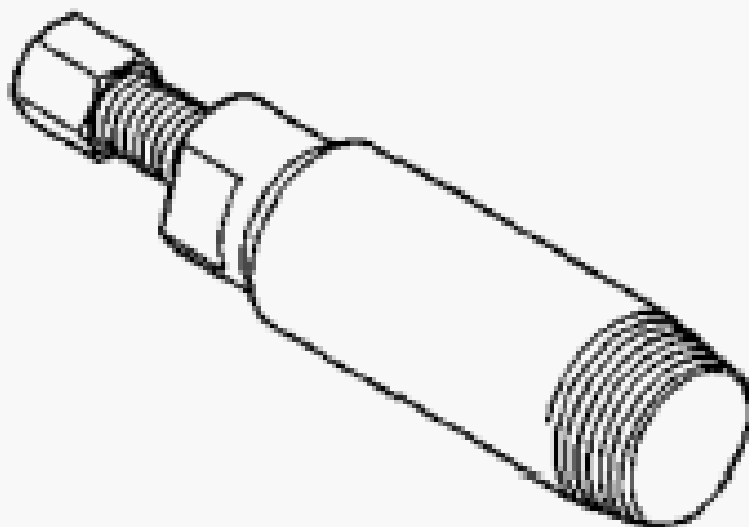
10305 - Installer, Differential Bearing Cup



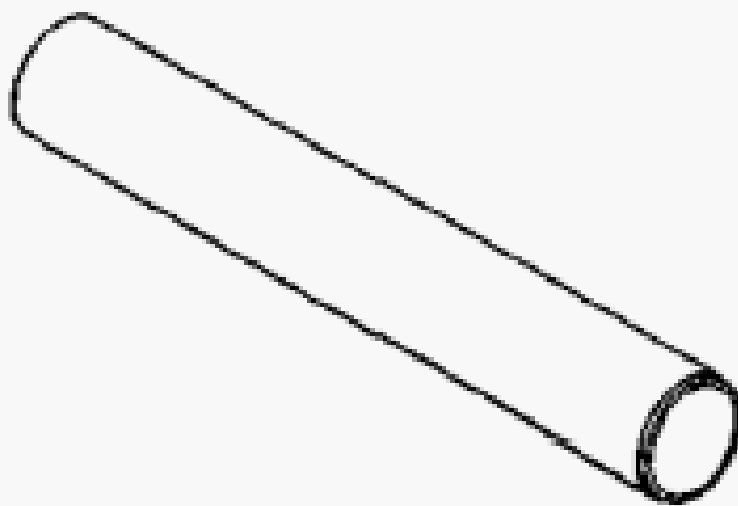
1130 - Splitter, Bearing/Gear
(Originally Shipped In Kit Number(s)
6745, 6947, 6949, 9202, 9202A-CAN,
9202CC, 9299.)

2014 Jeep Cherokee Trailhawk

2014 MANUAL TRANSMISSION C635 - Service Information - Cherokee

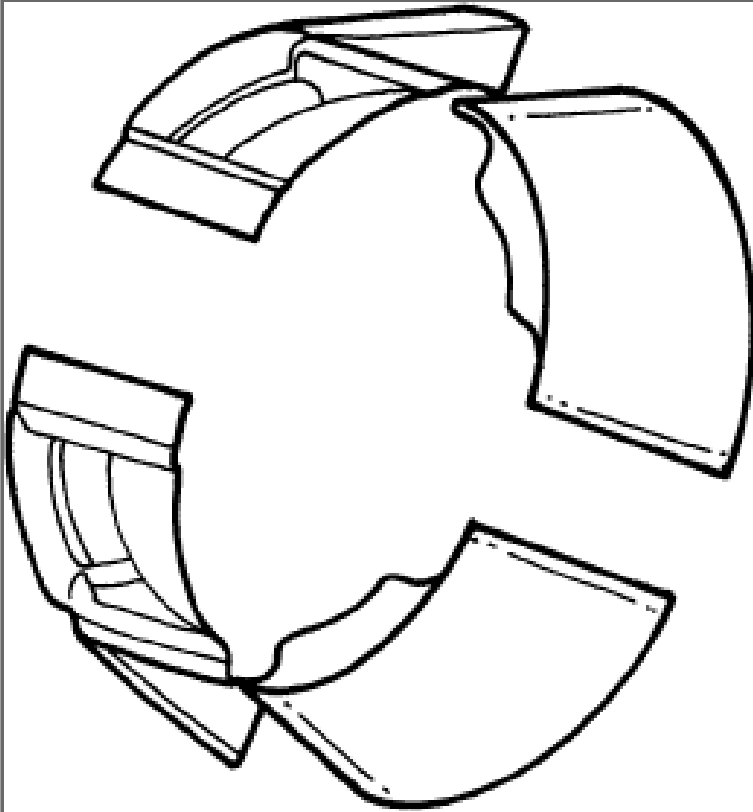
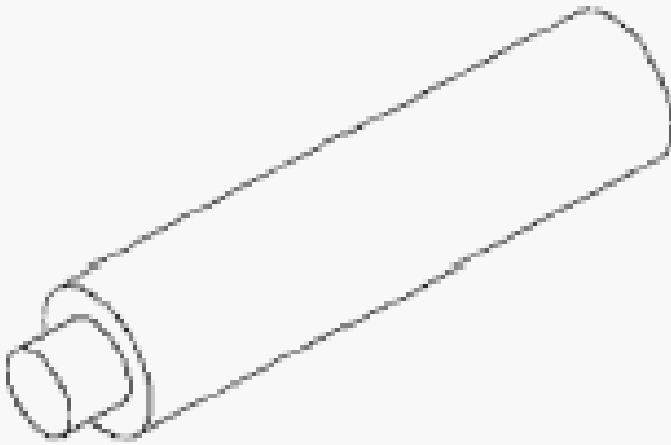


6341A - Remover, Seal
(Originally Shipped In Kit Number(s)
6671.)

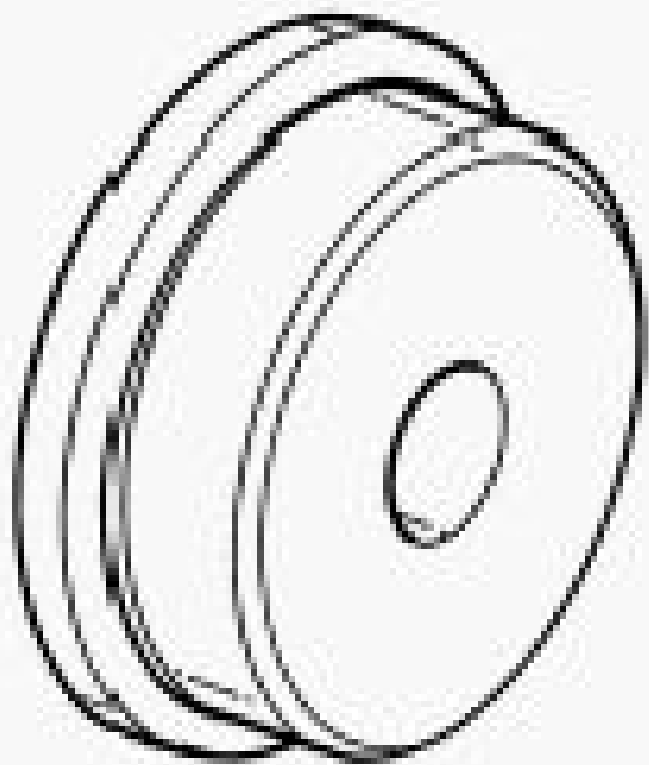


6446 - Installer, Bearing
(Originally Shipped In Kit Number(s)
6440.)

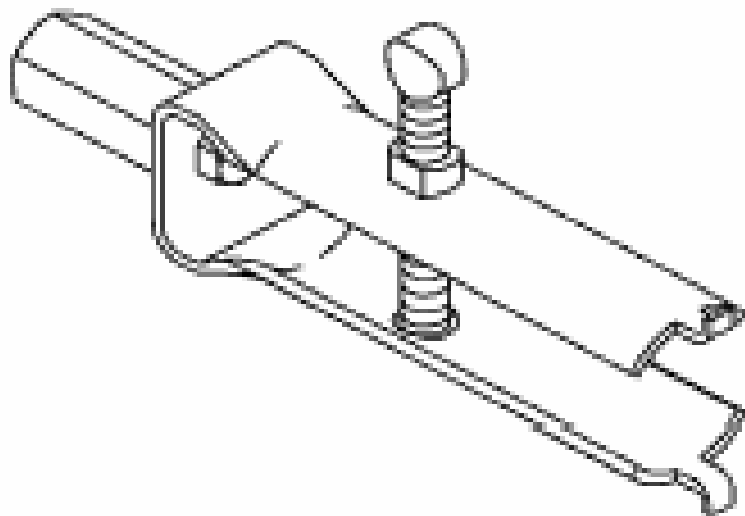
8254 - Installer, Grommet
(Originally Shipped In Kit Number(s)
8283, 8283CC, 8527, 8527CC, 8575,
8575CC, 9975.)



8353 - Blocks, Adapter
(Originally Shipped In Kit Number(s)
8283CC, 8527CC.)



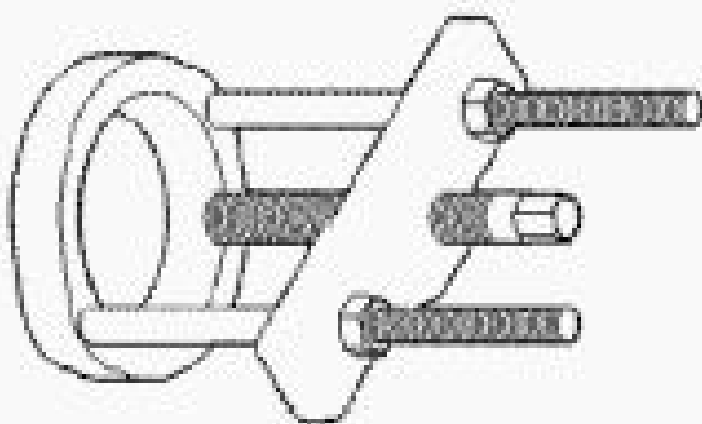
8866 - Installer, Bearing Cup
(Originally Shipped In Kit Number(s)
8998, 8998CC.)



9664 - Remover, Bearing Cup
(Originally Shipped In Kit Number(s)
9675, 9685, 9695.)



9676 - Adapter Plug
(Originally Shipped In Kit Number(s)
9675, 9685, 9695.)

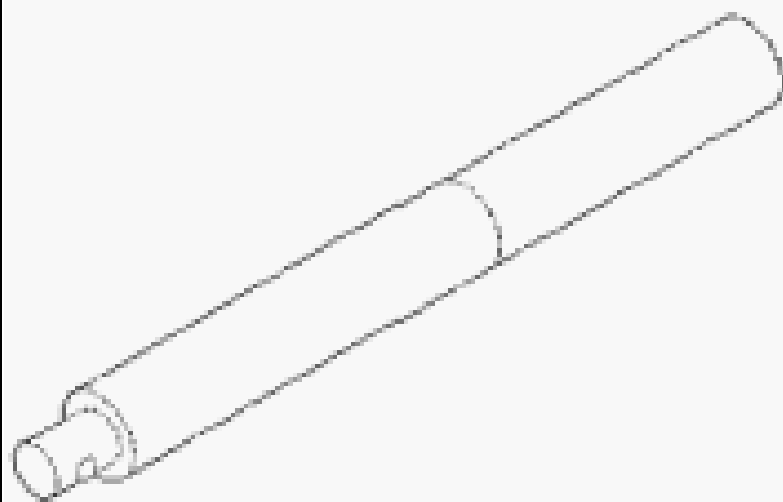
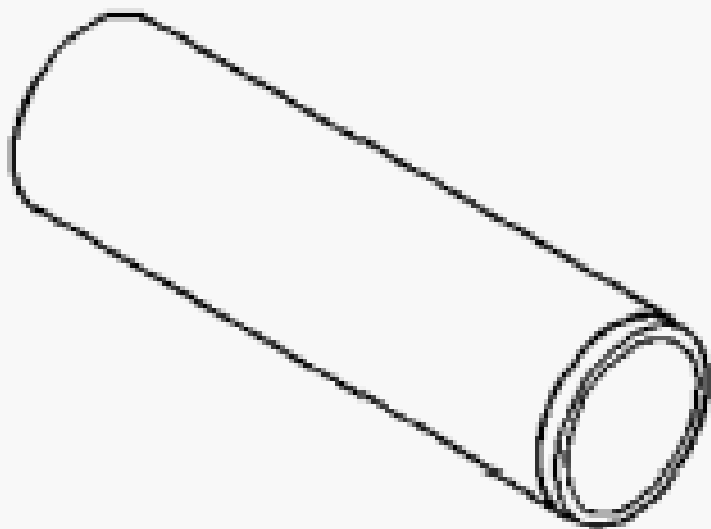


C-293-PA - Puller, Press
(Originally Shipped In Kit Number(s)
8418, 8837, C-293-M.)

C-3095-A - Installer, Bearing

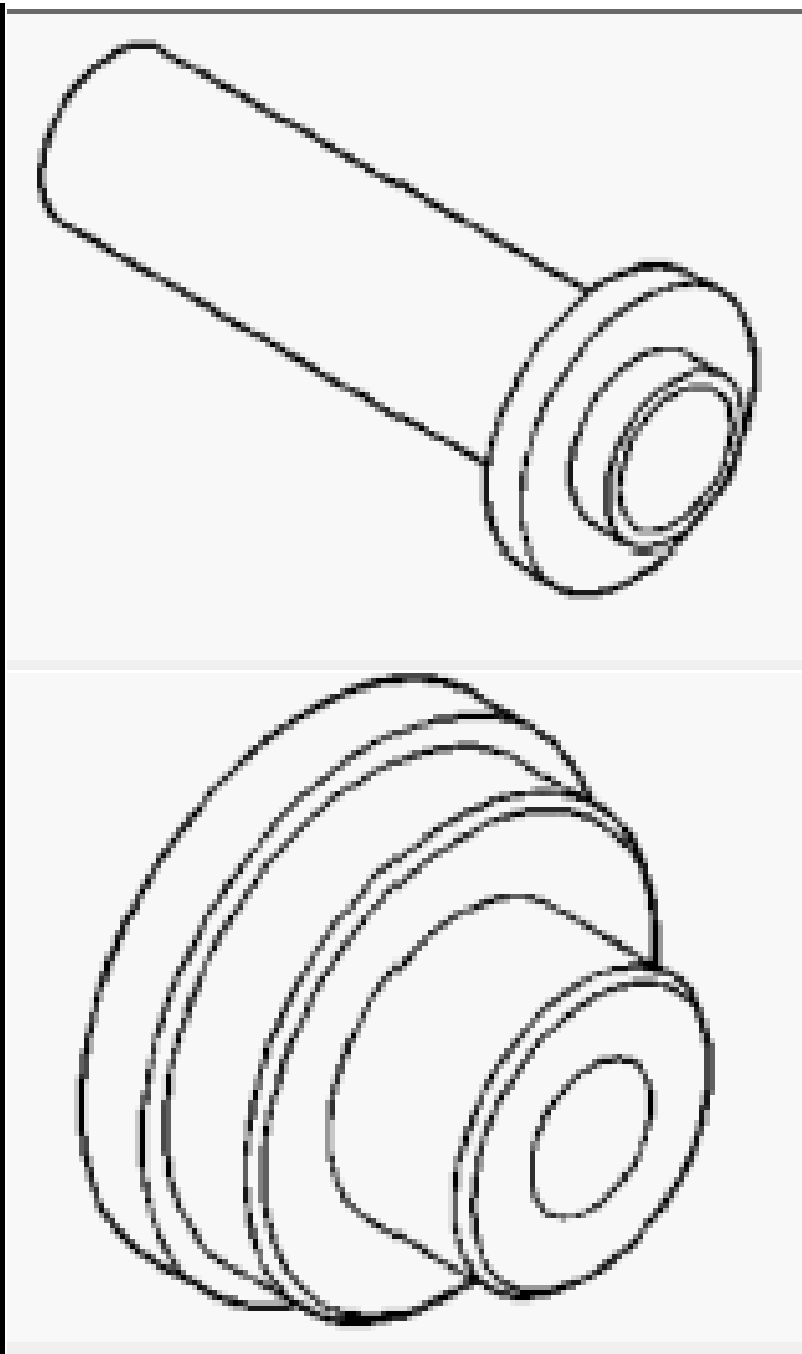
2014 Jeep Cherokee Trailhawk

2014 MANUAL TRANSMISSION C635 - Service Information - Cherokee



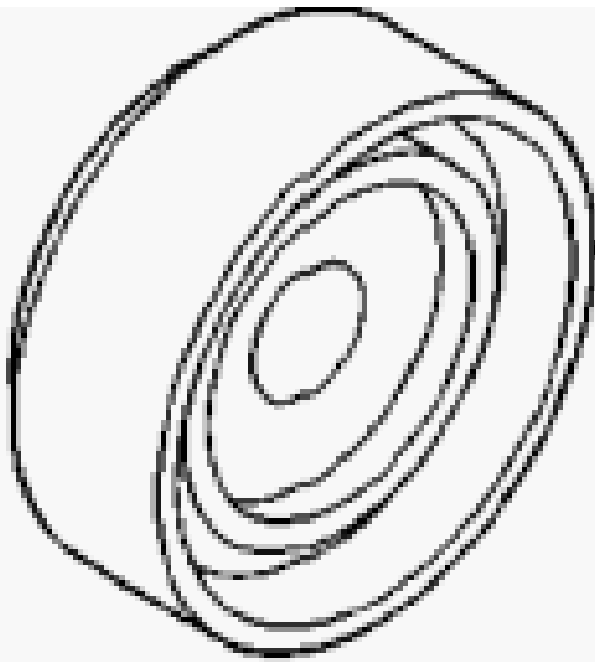
C-4171 - Driver Handle, Universal
(Originally Shipped In Kit Number(s)
9202, 9202A-CAN, 9202CC, 9299,
9299CC, 9299CC, 9300A-CAN.)

C-4193A - Installer, Seal
(Originally Shipped In Kit Number(s)
6671.)

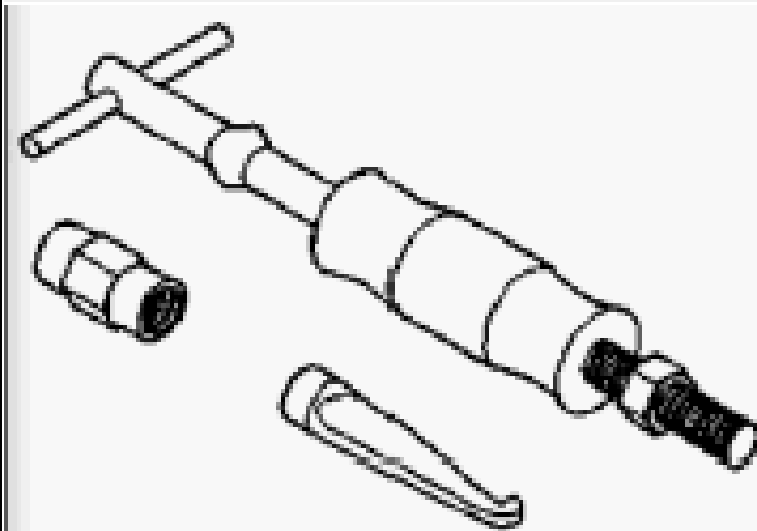


C-4198 - Installer, Axle Bearing
(Originally Shipped In Kit Number(s)
8207.)

C-4340 - Installer, Bearing



(Originally Shipped In Kit Number(s)
8418, 8659.)



C-637 - Slide Hammer, Universal
(Originally Shipped In Kit Number(s)
9202.)

D-111 - Installer, Bearing Cup

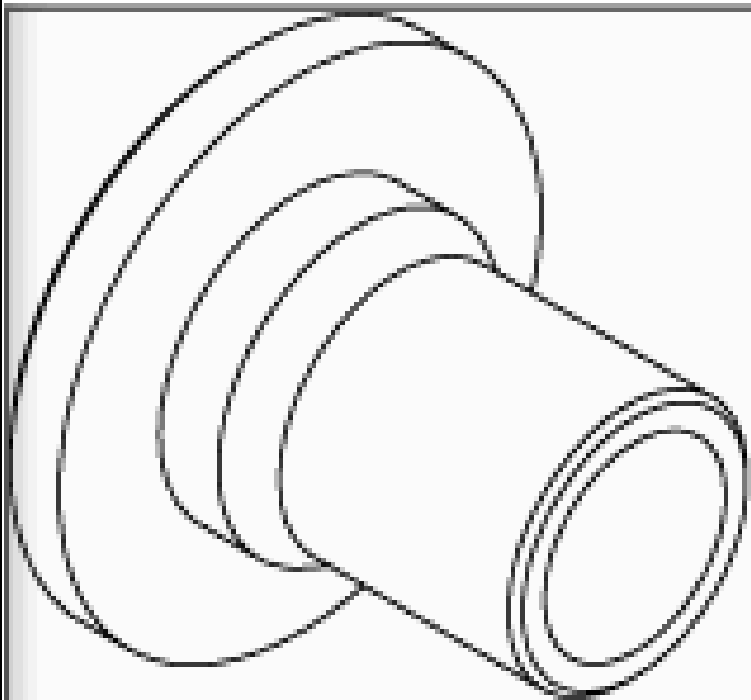
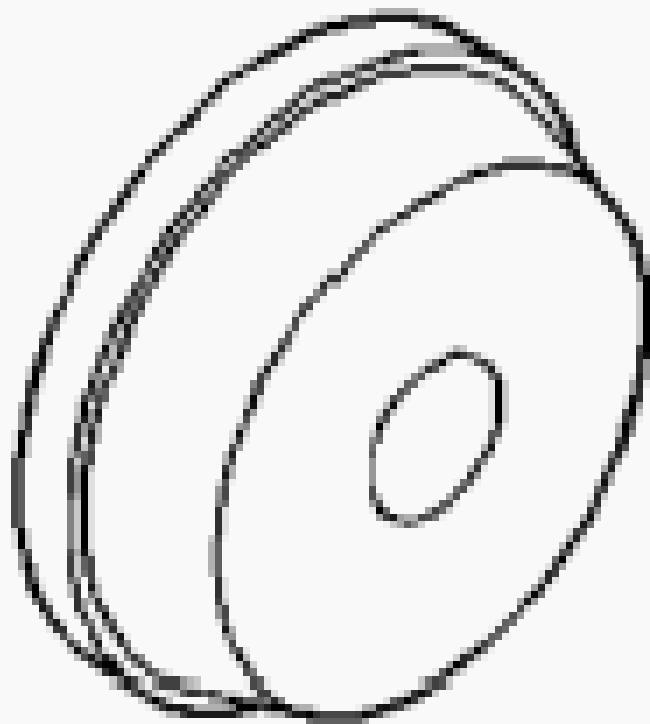
2014 Jeep Cherokee Trailhawk

2014 MANUAL TRANSMISSION C635 - Service Information - Cherokee

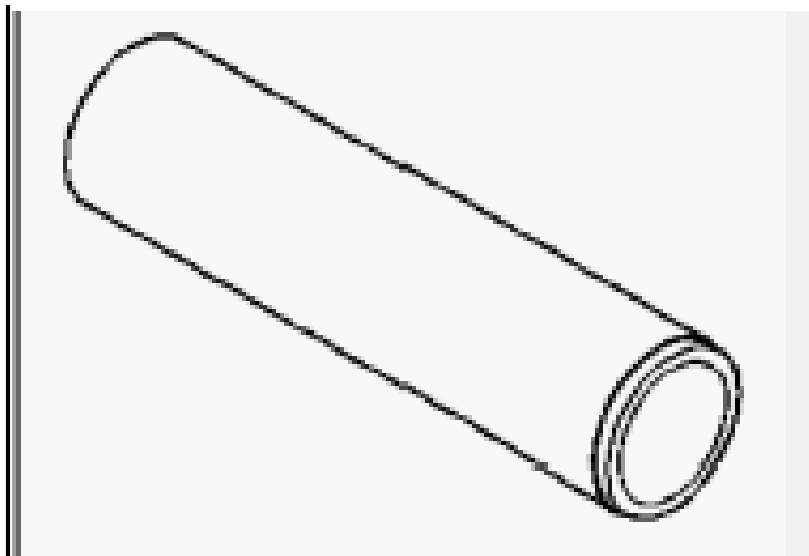


(Originally Shipped In Kit Number(s)
9925, 9926.)

L-4520 - Installer, Seal/Cup
(Originally Shipped In Kit Number(s)
6822.)



MD998200 - Installer, Seal



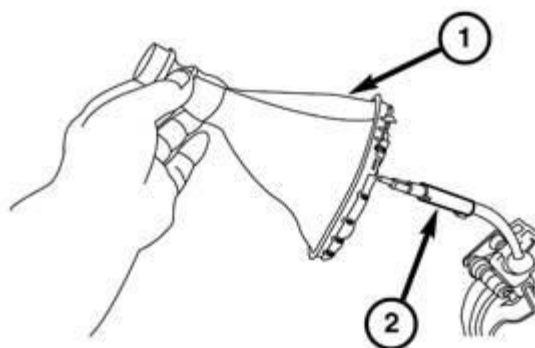
W-262 - Installer, Bearing
(Originally Shipped In Kit Number(s)
8418.)

BOOT, GEARSHIFT

REMOVAL

REMOVAL

1. Remove the gear shift knob.
2. Disengage arrowhead fasteners holding lower shifter boot escutcheon to the floor console.
3. Pull boot upward to gain access to the reverse lockout cable.
4. Pull the reverse lock out cable housing upward and sideways to disengage the cable from the shifter base.
5. Disengage the cable end from the lockout lever.



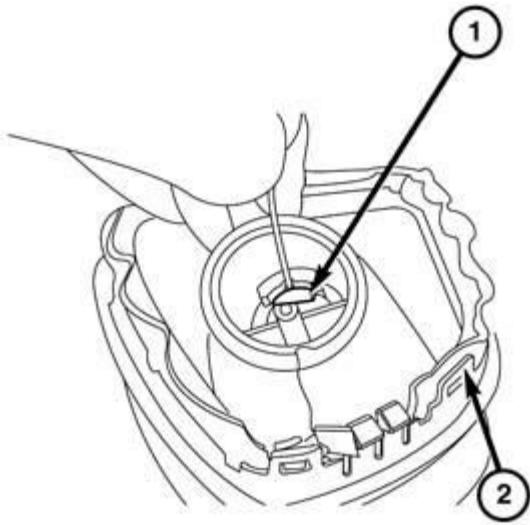
061069626

Fig. 86: Gear Shift Boot
Courtesy of CHRYSLER GROUP, LLC

6. Separate the shifter boot from the vehicle.

INSTALLATION

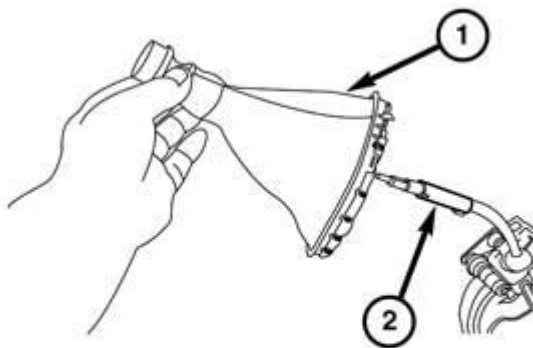
INSTALLATION



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Fig. 87: Shift Boot & Reverse Lockout Cable End
Courtesy of CHRYSLER GROUP, LLC

1. Engage reverse lockout cable end (1) into the slot in the pass through opening under the shift boot (2).



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Fig. 88: Gear Shift Boot
Courtesy of CHRYSLER GROUP, LLC

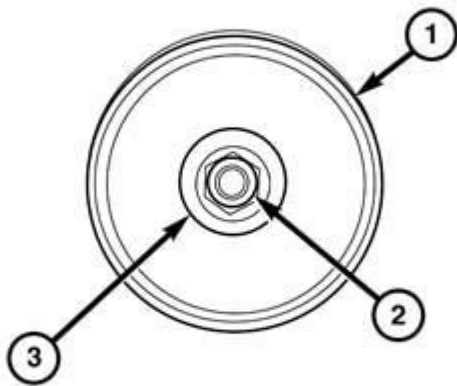
2. Place the shifter boot in position over the shift lever.
3. While holding the reverse lockout cable end in place, align the flat guide in the pass through opening in the boot with the flat on the gear shift lever.
4. Push the boot downward until it seats on the gear shift lever.
5. Engage the lower lockout cable end into the lock lever on the shifter base.
6. Pull upward on the lockout cable housing while guiding the lockout cable core into the slot on the shifter base.
7. Insert the lockout cable housing into the retaining hole in the shifter base.
8. Engage arrowhead fasteners to hold lower shifter boot escutcheon to the floor console.
9. Install the gear shift knob.

KNOB, GEARSHIFT

REMOVAL

REMOVAL

NOTE: The upper hemisphere of the gearshift knob is fastened to the lower hemisphere with polyurethane adhesive. The upper hemisphere must be destroyed to remove it.



061069622

Fig. 89: Gear Shift Knob & Internal Nut
Courtesy of CHRYSLER GROUP, LLC

1. To remove the gearshift knob:

- Using a 15 mm (5/8 in.) hole saw or drill bit, drill a hole (3) in the crown of the upper hemisphere of the gear shift knob (1) to gain access to an internal nut (2).
- **Alternate method:**

Using Channel-lock™ pliers, fracture the upper hemisphere and separate it from the gear shift knob lower hemisphere.

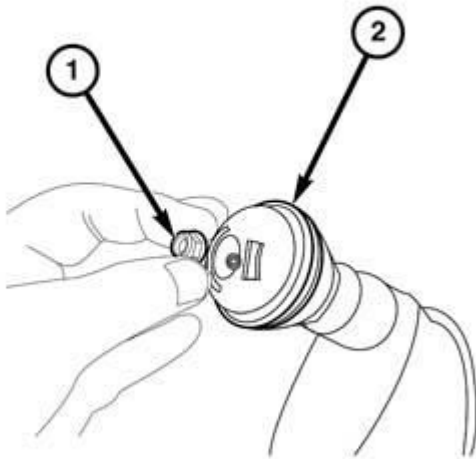
2. Using a suitable vacuum cleaner or regulated 3.4 kPa (50 psi) shop air, clean the access hole of debris.
3. Remove nut (2) holding the gear shift knob to the gear shift lever.
4. Separate the gear shift knob from the gear shift lever.

INSTALLATION

INSTALLATION

NOTE: The service replacement package should contain a small tube of adhesive.

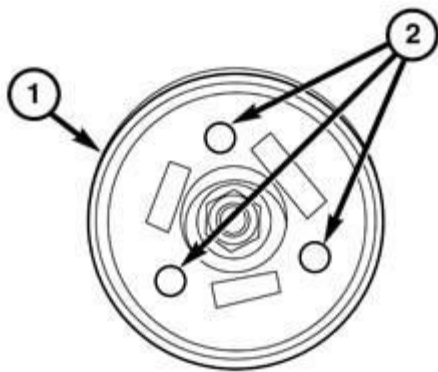
1. Align the flat guide surface inside the center pass through hole in the lower hemisphere with the flat on the gearshift lever and push down until the gearshift knob seats.



061069621

Fig. 90: Gear Shift Knob & Nut
Courtesy of CHRYSLER GROUP, LLC

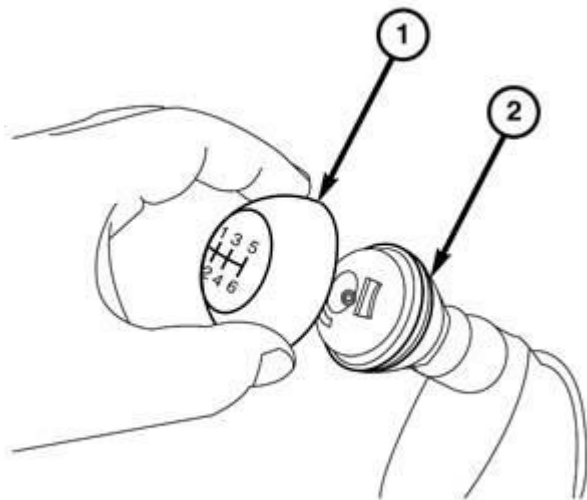
2. Install the nut (1) to hold the gearshift knob (2) to the gearshift lever.



061069624

Fig. 91: Gear Shift Knob & Adhesive Locations
Courtesy of CHRYSLER GROUP, LLC

3. Apply 6 mm (1/4 in.) dabs of adhesive in three locations (2) next to the elongated slots on the lower gear shift knob (1).



061069625

Fig. 92: Upper & Lower Hemisphere
Courtesy of CHRYSLER GROUP, LLC

4. Align the longest lock-tab on the upper hemisphere (1) to the longest slot on the lower hemisphere (2).
5. Push the upper hemisphere (1) downward until it locks in place.

CABLE, GEARSHIFT CONTROL

ADJUSTMENTS

ADJUSTMENT/SELECT CABLE

NOTE: The select cable adjustment device is located at the transaxle end of the select cable.

1. Release the hood latch and open the hood.
2. Support the hood on the provided prop-rod.
3. Remove the engine cover.
4. Remove the upper radiator closeout panel.
5. Disengage the clips holding the wire harness to the battery tray.
6. Remove the battery and battery tray. Refer to **TRAY, BATTERY, REMOVAL**.

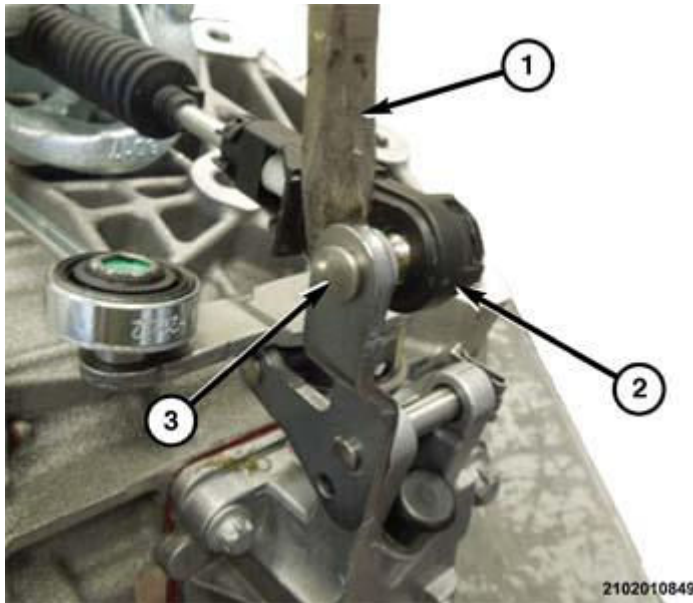
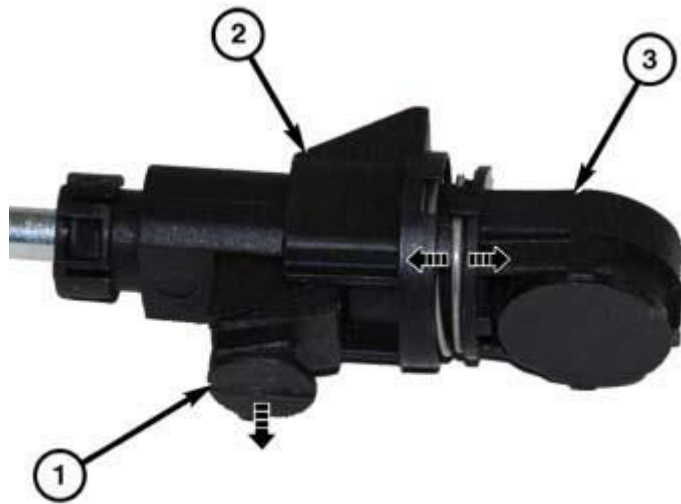


Fig. 93: Prying Select Cable End From Select Lever Ball Stud On Transmission
Courtesy of CHRYSLER GROUP, LLC

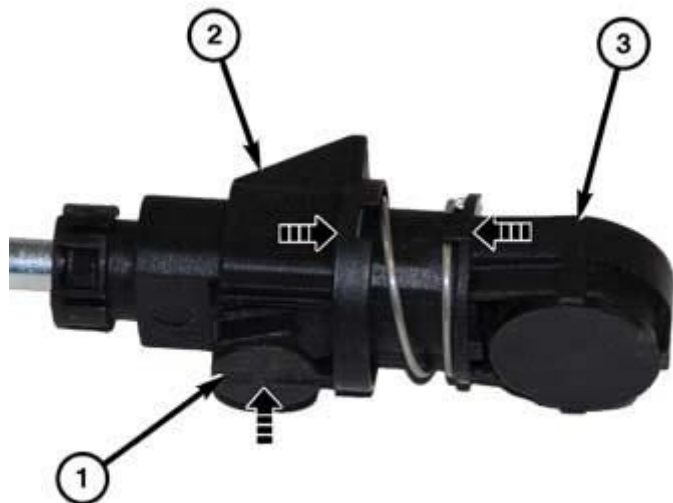
7. Using a suitable prying tool, pry the select cable end from the select lever ball stud on the transaxle.
8. Manually hold the select lever into neutral/reverse position.
9. Using a suitable elastic strap, Push the shift handle to the right and fix the shift handle in the reverse/neutral location.



2102011231

Fig. 94: Disengaging Adjuster Slide Lock Button To Allow Select Cable End To Telescope
Courtesy of CHRYSLER GROUP, LLC

10. Disengage the adjuster slide (2) lock button (1) to allow the select cable end (3) to telescope.
11. Connect the select cable end on the select lever ball stud.



2102011232

Fig. 95: Engaging Adjuster Slide Lock Button To Set Select Cable End Length
Courtesy of CHRYSLER GROUP, LLC

12. Engage the adjuster slide (2) lock button (1) to set the select cable length.
13. Verify that the shifter operates properly.
14. Install the battery tray and battery.

15. Connect the wire harness retainers to the battery tray.
16. Install the upper radiator closeout panel.
17. Install the engine cover.
18. Close the hood.
19. Road test the vehicle to verify the repair.

REMOVAL

REMOVAL

NOTE: The transaxle shift cables are serviced as a set. The cable ends are too large to be drawn through the holes in the rubber floor plug.

1. Position the vehicle on a suitable hoist with the transaxle in neutral.
2. Remove the center console assembly. Refer to **CONSOLE, FLOOR, REMOVAL**.

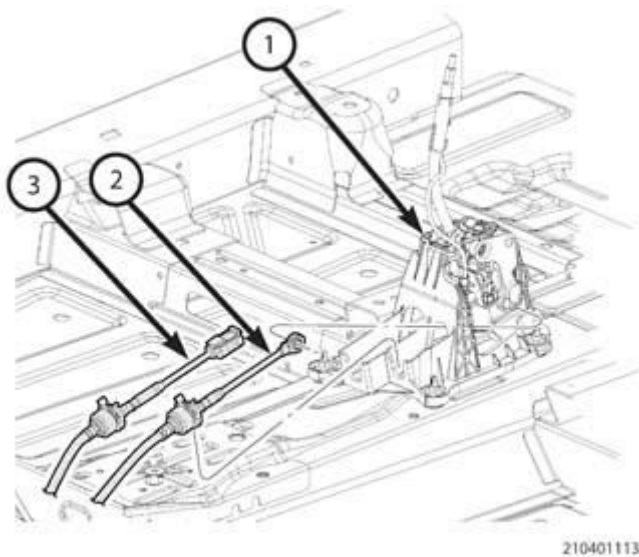


Fig. 96: Disengaging/Engaging Retainers Holding Cable Housings To Shifter Base
 Courtesy of CHRYSLER GROUP, LLC

3. Disengage retainers holding cable housings to shifter base.
4. Pull the cable housing from the shifter base.

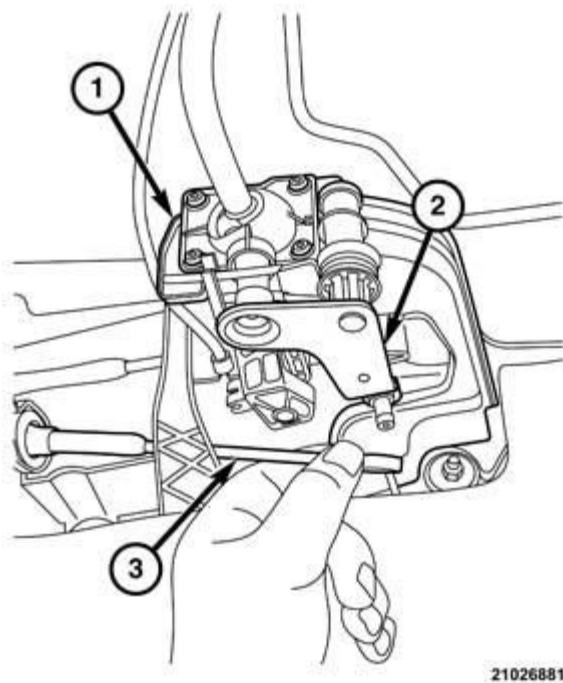


Fig. 97: Neutral Gate Cable End & Shifter Pin
Courtesy of CHRYSLER GROUP, LLC

5. Pry select cable (3) end to the left toward the driver's seat to disengage the cable end from the select lever (2) pin.

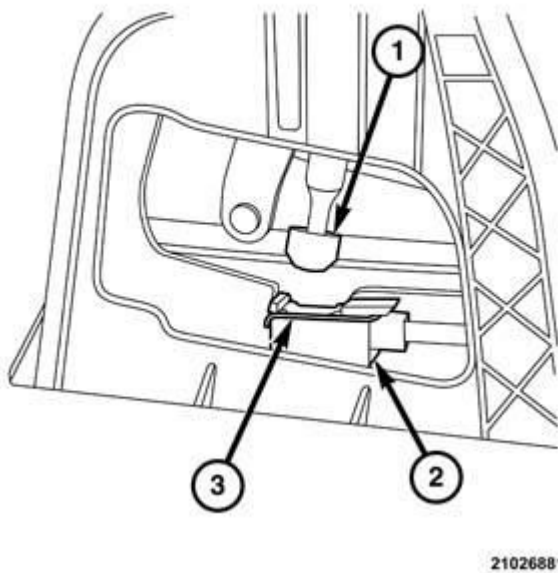


Fig. 98: Fulcrum Ball, Cable End & Spring-Clip
Courtesy of CHRYSLER GROUP, LLC

6. Release spring-clip (3) holding cable end (2) to fulcrum ball (1) under the shifter handle and push the cable end upward to engage it.
7. Release the lock on the neutral sensor wire connector.
8. Separate the wire harness connector from the neutral sensor.
9. Unhook the wire harness retainer and position the harness out of the way.
10. Remove the nuts holding the shifter to the floor.
11. Separate the shifter from the vehicle.
12. Open the hood and support it on the prop-rod.
13. Remove the engine cover/air cleaner assembly to gain access to the top of the transaxle. Refer to **BODY, AIR CLEANER, REMOVAL**.

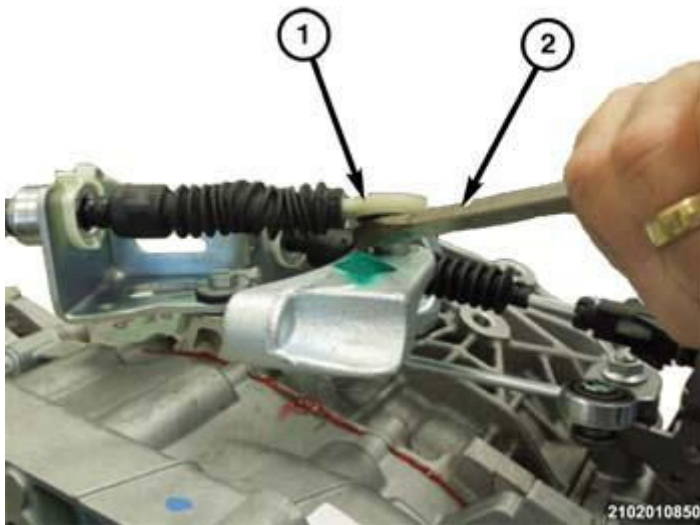


Fig. 99: Prying Shift Cable End From Lever Ball Stud On Transmission
Courtesy of CHRYSLER GROUP, LLC

14. Disengage retainer holding the shift cable to the transaxle bracket and lift the shift cable housing from the bracket.
15. Using a suitable pry bar (2), pry shift cable upward (1) to disengage it from the counterweighted gearshift lever ball stud.

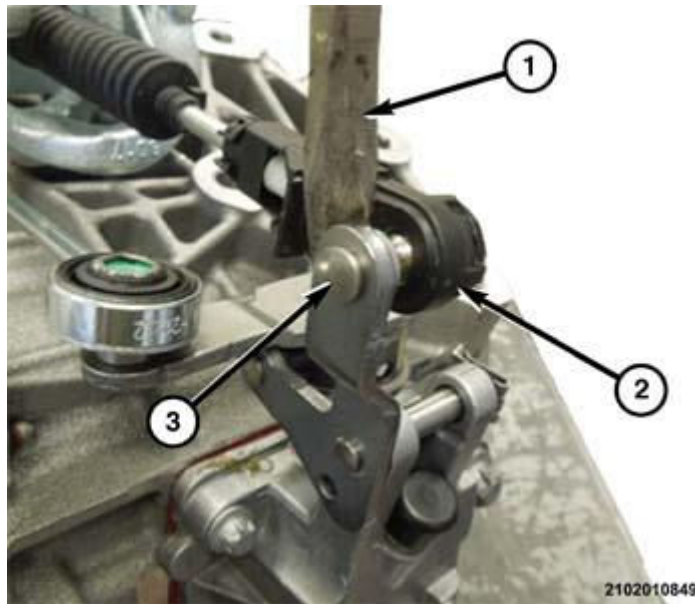


Fig. 100: Prying Select Cable End From Select Lever Ball Stud On Transmission
Courtesy of CHRYSLER GROUP, LLC

16. Disengage retainer holding the select cable to the transaxle bracket and lift the cable housing from the bracket.
17. Using a suitable pry bar (1), pry select cable (2) end to the left (driver side) to disengage the select cable end from the select lever ball stud.
18. Remove the locking retainers from the shift cable housing ends to avoid breaking them during removal.
19. Raise the vehicle to gain access to the underside of the vehicle.

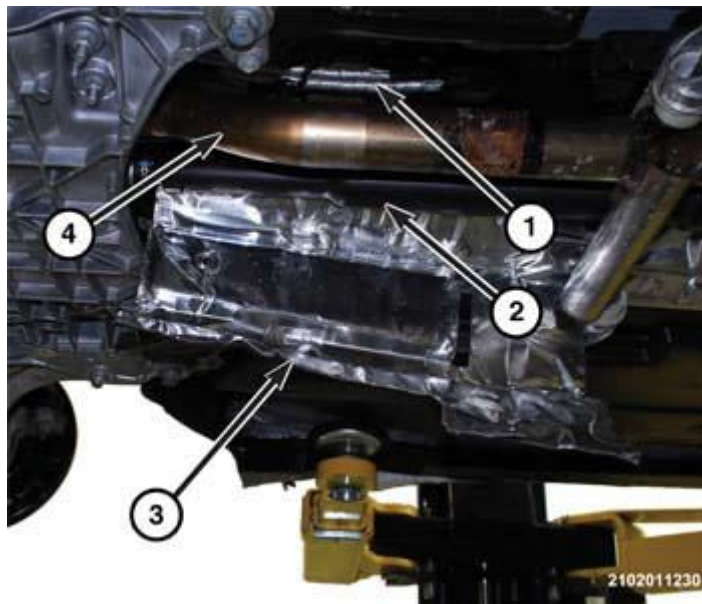


Fig. 101: Exhaust Heat Shield, Exhaust Pipe & Rear Drive Shaft
Courtesy of CHRYSLER GROUP, LLC

20. Remove the bolts holding the exhaust heat shield (3) to the floor above the exhaust pipe (4) and if equipped, the rear drive shaft (2).
21. Roll the heat shield (3) to the right (passenger side) of the vehicle and separate the heat shield (3) from the vehicle.

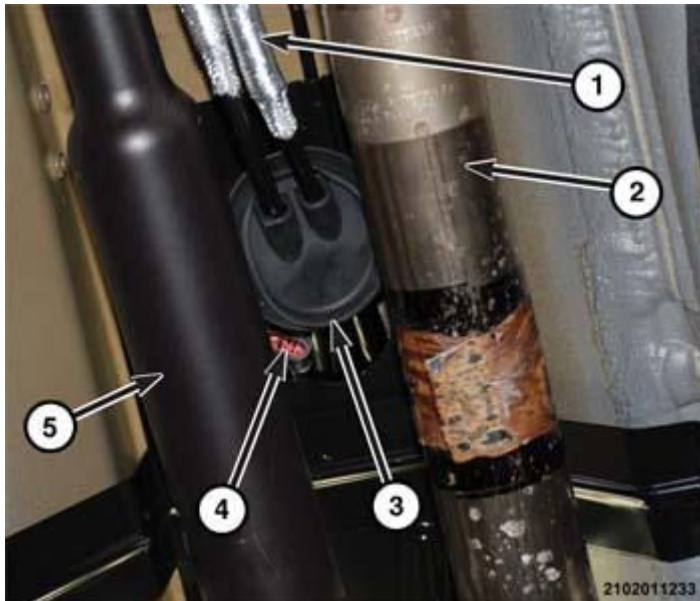


Fig. 102: Shift Cables, Rubber Floor Plug & Floor Opening
Courtesy of CHRYSLER GROUP, LLC

22. Using a suitable prying tool, pry the rubber floor plug (3) downward, taking care not to tear the plug.
23. Pull the shift cables (1) through the opening in the floor (4) and under the floor pan.

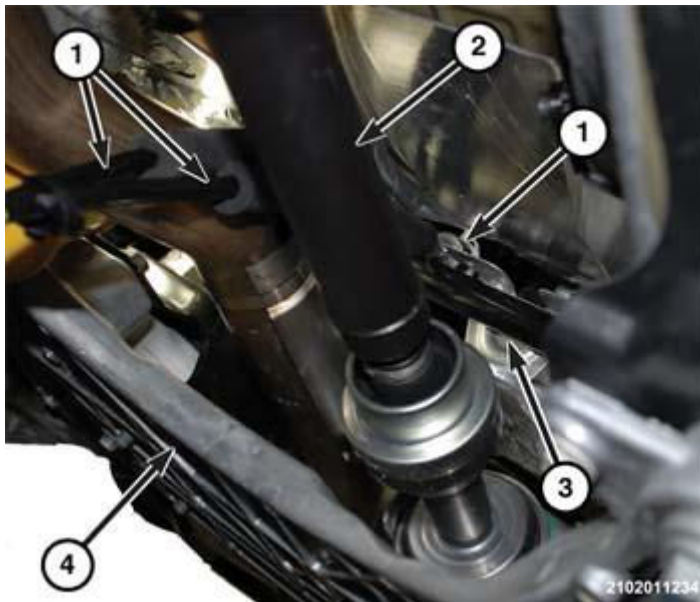


Fig. 103: Shift Cables, Rear Propeller Shaft & Front Stabilizer Bar

Courtesy of CHRYSLER GROUP, LLC

24. If equipped, guide the shift cables (1) over the top of the rear propeller shaft (2) to the left side of the vehicle.
25. Guide the cables (1) rearward until the upper cable ends (1) are visible above the front stabilizer bar (3).
26. One at a time, pull the cable ends (1) through the gap above the stabilizer bar (3).
27. Separate the cables from the vehicle.

INSTALLATION**INSTALLATION**

NOTE: The transaxle shift cables are serviced as a set. The cable ends are too large to be drawn through the holes in the rubber floor plug.

1. Position the vehicle on a suitable hoist with the transaxle in neutral.
2. Raise the vehicle to gain access to the underside of the vehicle.

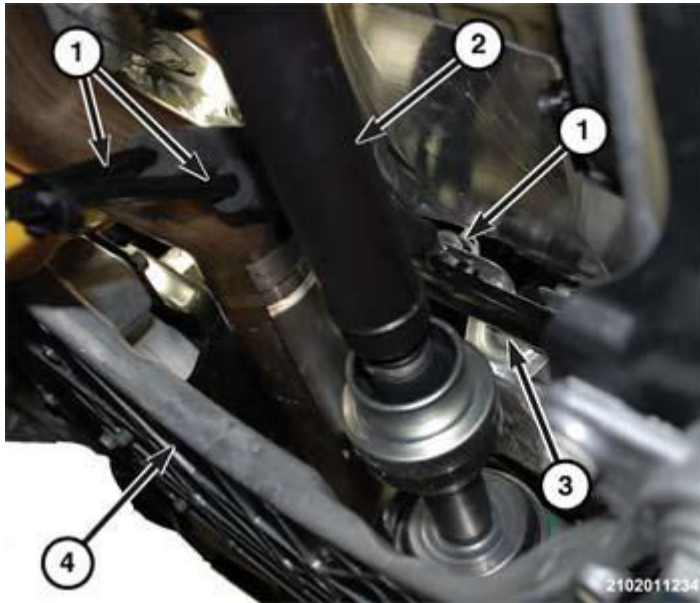


Fig. 104: Shift Cables, Rear Propeller Shaft & Front Stabilizer Bar
Courtesy of CHRYSLER GROUP, LLC

3. Place the cables in position on the vehicle.
4. One at a time, push the cable ends (1) through the gap above the stabilizer bar (3).
5. Guide the cables (1) forward until the upper cable ends (1) are in line with the retaining bracket on top of the transaxle.
6. If equipped, guide the shift cables (1) over the top of the rear propeller shaft (2) and in line with the opening in the floor.

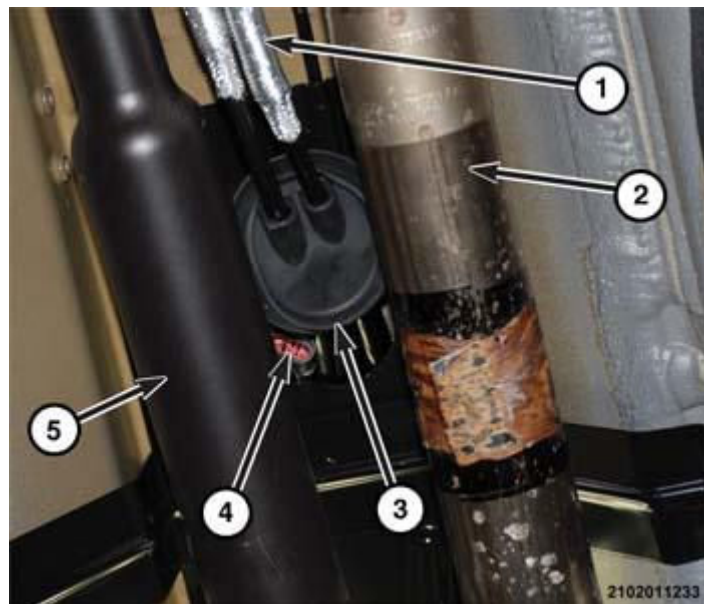


Fig. 105: Shift Cables, Rubber Floor Plug & Floor Opening
Courtesy of CHRYSLER GROUP, LLC

7. Push the shift cables (1) through the opening in the floor.
8. Insert the rubber floor plug (3) upward until it seats properly.

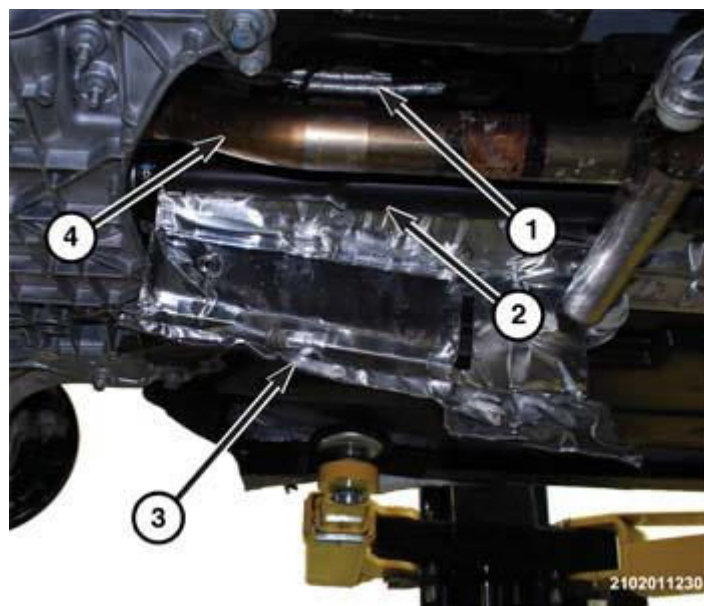


Fig. 106: Exhaust Heat Shield, Exhaust Pipe & Rear Drive Shaft
Courtesy of CHRYSLER GROUP, LLC

9. Roll the heat shield (3) to the left in proper position on the vehicle.
10. Install the bolts to hold the exhaust heat shield (3) to the floor above the exhaust pipe (4) and if equipped, the rear propeller shaft (2).

11. Lower the vehicle to gain access to the top side of the vehicle.
12. Install the locking rings onto the shift cable housing ends.

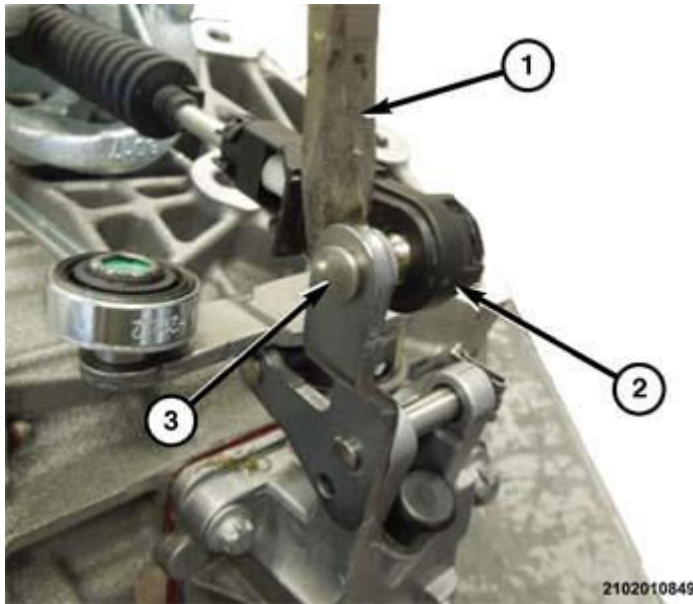


Fig. 107: Prying Select Cable End From Select Lever Ball Stud On Transmission
Courtesy of CHRYSLER GROUP, LLC

13. Place the select cable end on the select lever ball stud and snap the select cable (2) end onto the ball stud.
14. Place the cable housing in position on the bracket and engage the retainer to hold the select cable to the transaxle bracket.

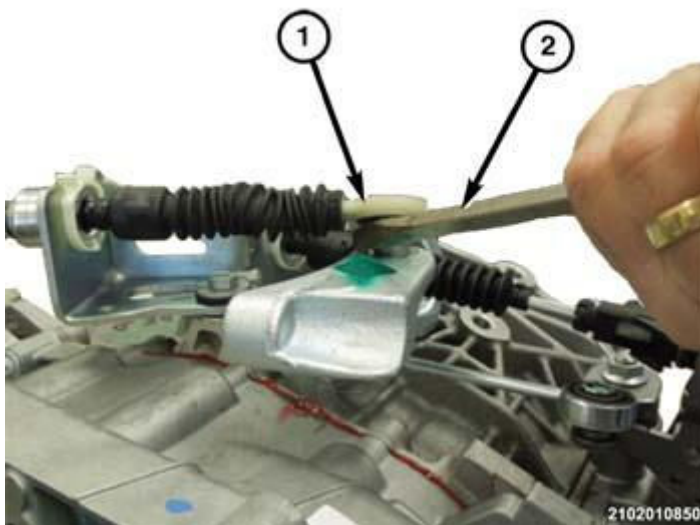
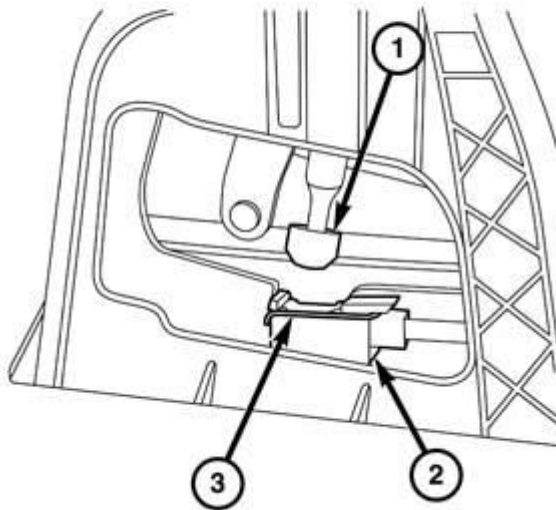


Fig. 108: Prying Shift Cable End From Lever Ball Stud On Transmission
Courtesy of CHRYSLER GROUP, LLC

15. Place the shift cable end on the shift lever ball stud and snap the shift cable (2) end onto the ball stud.
16. Place the cable housing in position on the bracket and engage the retainer to hold the select cable to the transaxle bracket.
17. Install the engine cover/air cleaner assembly. Refer to **BODY, AIR CLEANER, INSTALLATION** .
18. Place the shifter in position in the vehicle.
19. Install the nuts to hold the shifter to the floor.
20. Place the harness in proper position and hook the wire harness retainer to the shift mechanism.
21. Engage the wire harness connector into the neutral sensor lead connector.
22. Engage the lock on the neutral sensor wire connector.



210268818

Fig. 109: Fulcrum Ball, Cable End & Spring-Clip
Courtesy of CHRYSLER GROUP, LLC

23. Engage spring-clip (3) to hold cable end (2) to fulcrum ball (1) under the shifter handle and push the cable end upward to disengage it.

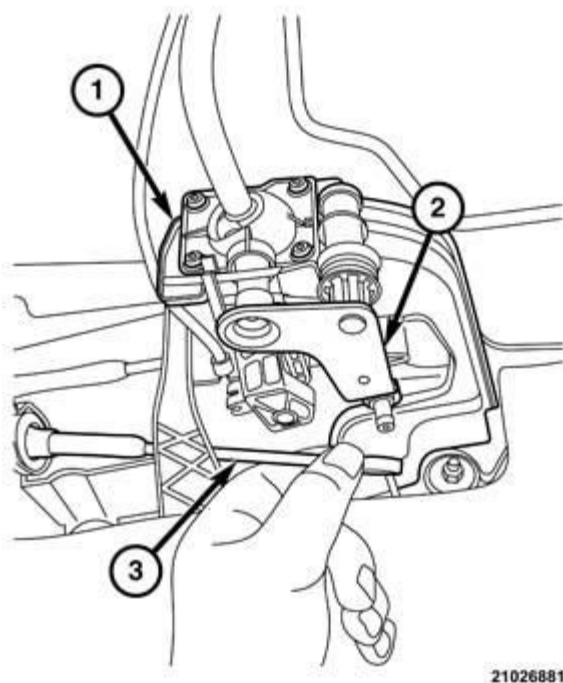


Fig. 110: Neutral Gate Cable End & Shifter Pin
 Courtesy of CHRYSLER GROUP, LLC

24. Engage the cable (3) end onto the select lever (2) pin.

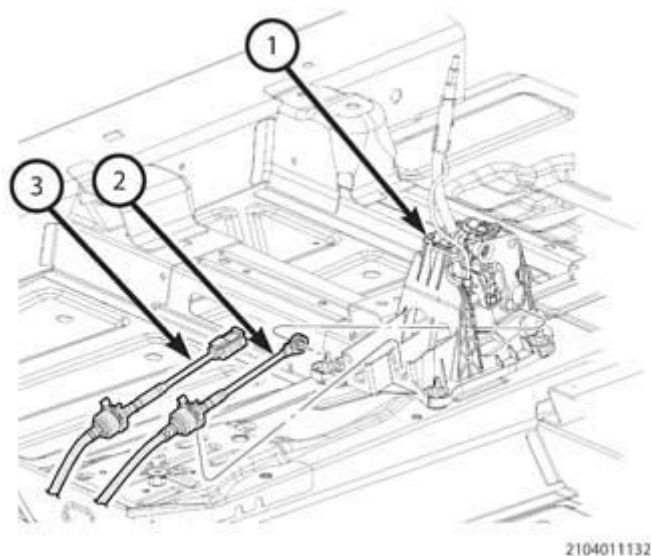


Fig. 111: Disengaging/Engaging Retainers Holding Cable Housings To Shifter Base
 Courtesy of CHRYSLER GROUP, LLC

25. Engage retainers to hold the cable housings to shifter base (1).
26. If necessary, adjust the shift select cable.
27. Install the center console assembly.

28. Close the hood.
29. Road test the vehicle to verify the repair.

DIFFERENTIAL, TRANSAXLE

DISASSEMBLY

DISASSEMBLY

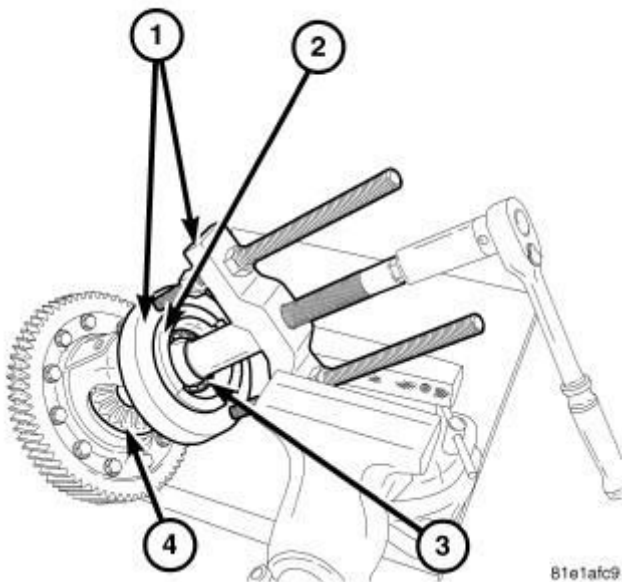


Fig. 112: Remove Pinion Side Bearing
Courtesy of CHRYSLER GROUP, LLC

NOTE: This procedure will require the removal of the bearing cage and rollers. New bearings must be used upon reassembly.

1. Using (special tool #C-293-PA, Puller, Press) (1), (special tool #8353, Blocks, Adapter) (2), and (special tool #9676, Adapter Plug) (3) remove the pinion side differential bearing.

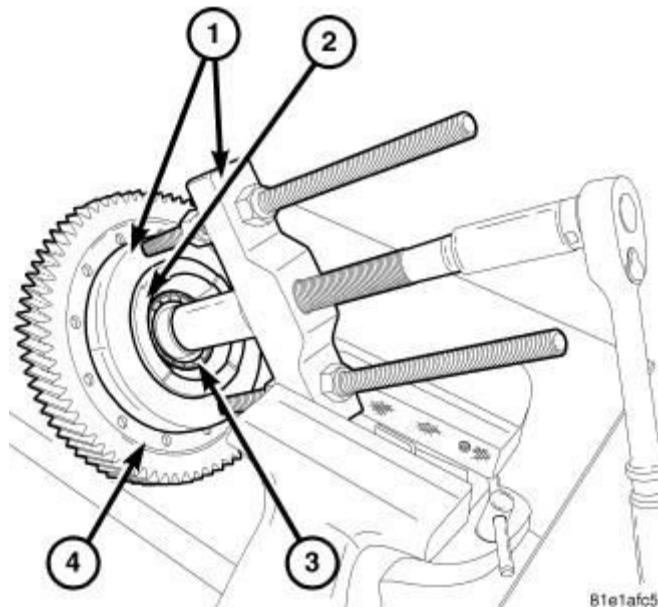
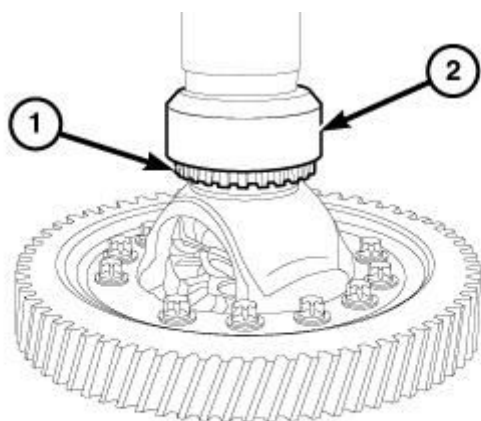


Fig. 113: Remove Ring Gear Side Bearing
 Courtesy of CHRYSLER GROUP, LLC

2. Using (special tool #C-293-PA, Puller, Press) (1), (special tool #8353, Blocks, Adapter) (2), and (special tool #9676, Adapter Plug), remove the ring gear side differential bearing.
3. Remove the ring gear bolts.
4. Remove the ring gear.

ASSEMBLY

ASSEMBLY



3807416

Fig. 114: Differential Bearing & Special Tool

Courtesy of CHRYSLER GROUP, LLC

1. Position the ring gear.
2. Install **new** ring gear bolts (1) and tighten to 83 N.m (61 ft. lbs.).
3. Install a **new** ring gear side differential bearing (1) using a suitable press and (special tool #C-4340, Installer, Bearing) (2).
4. Install a **new** Pinion gear side differential bearing using a suitable press and (special tool #C-4340, Installer, Bearing) (2).

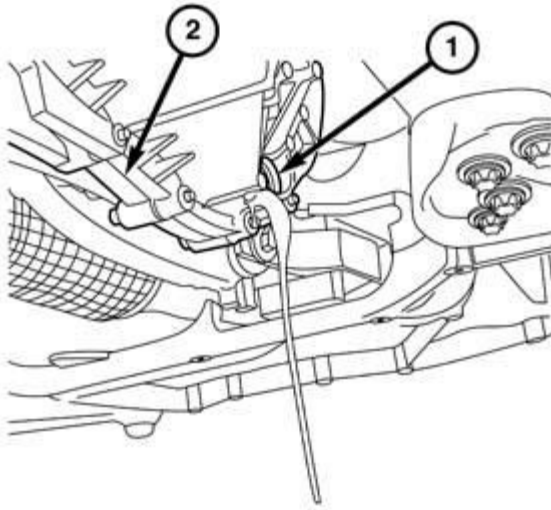
FLUID**STANDARD PROCEDURE****FLUID DRAIN AND FILL**

NOTE: It is acceptable to top-off fluid level in the case of fluid loss due to service of halfshaft, seal, etc.

- Add fluid until it reaches the rolled lower edge of the sloped ramp 40 mm (1.5 in) inside the threshold of the fill hole next to the differential ring gear carrier. This surface is approximately 8 mm (0.3 in) below the bottom of the fill hole.
- The minimum acceptable fluid level is 23 mm (0.9 in) below the bottom of the fill hole.

To fabricate a fluid level dipstick, cut a 15 mm (0.6 in) wide strip, length wise, from a common business card. At 30 mm (1.2 in) from one end, fold the strip to 90°. The short end of the strip is the dipstick and the long end is the handle. Insert the paper dipstick into the fill hole and press the handle end against the flattened threshold so the dipstick end turns downward into the sump near the differential carrier. Remove the paper dipstick and immediately measure the distance from the fold crease in the paper to the top of the fluid line. As time passes the paper will absorb the fluid and the witness mark the fluid left in the paper will become invalid. The distance from the fold to the fluid mark is the fluid level.

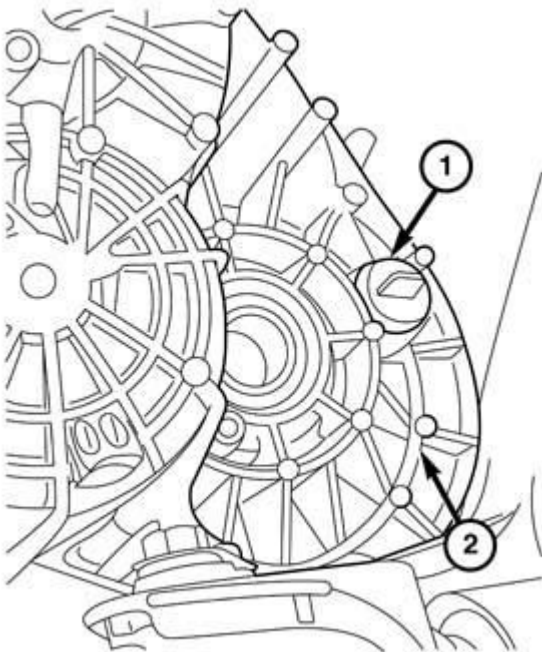
1. Raise vehicle on a suitable jack or hoist.
2. Remove the belly pan.
3. Place a suitable drain pan under transaxle.



210268675

Fig. 115: Transaxle & Drain Plug Hole
Courtesy of CHRYSLER GROUP, LLC

4. Remove transaxle drain plug to allow the fluid to flow (1) into the drain pan until transaxle (2) is empty.
5. Install the drain plug and tighten to 25 N.m (18 lbs. ft.).



210268674

Fig. 116: Transaxle & Fill Plug

Courtesy of CHRYSLER GROUP, LLC

6. Using regulated 344 kPa (50 psi) compressed shop air or stiff bristle brush, clean the area around the fill plug to avoid contaminating the transaxle during the filling operation.
7. Remove the rubber fill plug (1) from the transaxle (2), located rearward and above the left halfshaft.
8. Fill the **COLD** transaxle with 1.7 l (1.8 qt.) of the proper fluid type. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS**.
9. Install the fill plug.
10. Install the belly pan.

FLUID LEVEL INSPECTION

NOTE: The threshold of the fill hole opening extends 40 mm (1.5 in) into the transaxle before turning downward into the sump near the differential ring gear carrier.

NOTE: It is acceptable to top-off fluid level in the case of fluid loss due to service of halfshaft, seal, etc.

- Add fluid until it reaches the rolled lower edge of the sloped ramp 40 mm (1.5 in) inside the threshold of the fill hole next to the differential ring gear carrier. This surface is approximately 8 mm (0.3 in) below the bottom of the fill hole.
- The minimum acceptable fluid level is 23 mm (0.9 in) below the bottom of the fill hole.

To fabricate a fluid level dipstick, cut a 15 mm (0.6 in) wide strip, length wise, from a common business card. At 30 mm (1.2 in) from one end, fold the strip to 90°. The short end of the strip is the dipstick and the long end is the handle. Insert the paper dipstick into the fill hole and press the handle end against the flattened threshold so the dipstick end turns downward into the sump near the differential carrier. Remove the paper dipstick and immediately measure the distance from the fold crease in the paper to the top of the fluid line. As time passes the paper will absorb the fluid and the witness mark the fluid left in the paper will become invalid. The distance from the fold to the fluid mark is the fluid level.

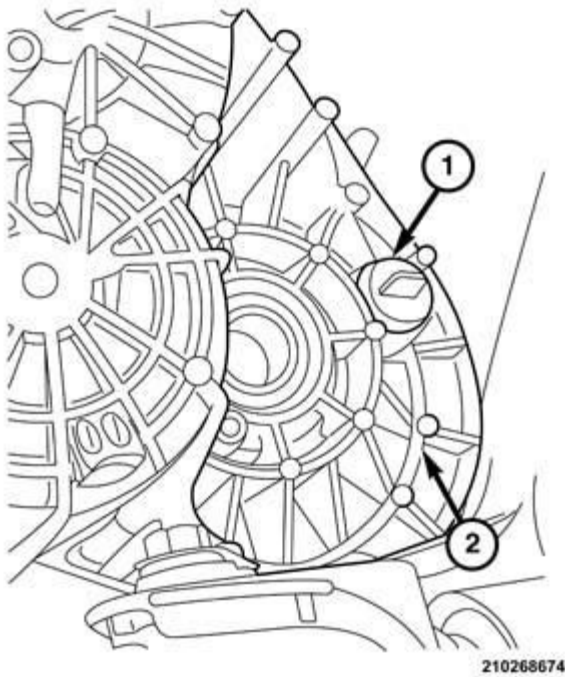


Fig. 117: Transaxle & Fill Plug

Courtesy of CHRYSLER GROUP, LLC

1. Hoist the vehicle on a suitable hoist so the vehicle stays in a level position.
2. Remove belly pan.
3. Using regulated 344 kPa (50 psi) compressed shop air or stiff bristle brush, clean the area around the fill plug to avoid contaminating the transaxle during the filling operation.
4. Remove the rubber fill plug (1) from the transaxle (2), located rearward and above the left halfshaft.
5. Fill the **COLD** transaxle to:
 - Add fluid until it reaches the rolled lower edge of the sloped ramp 40 mm (1.5 in) inside the threshold of the fill hole next to the differential ring gear carrier. This surface is approximately 8 mm (0.3 in) below the bottom of the fill hole. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS** .
6. Install the fill plug.
7. Install the belly pan.

INPUT SHAFT, TRANSMISSION

DISASSEMBLY

DISASSEMBLY

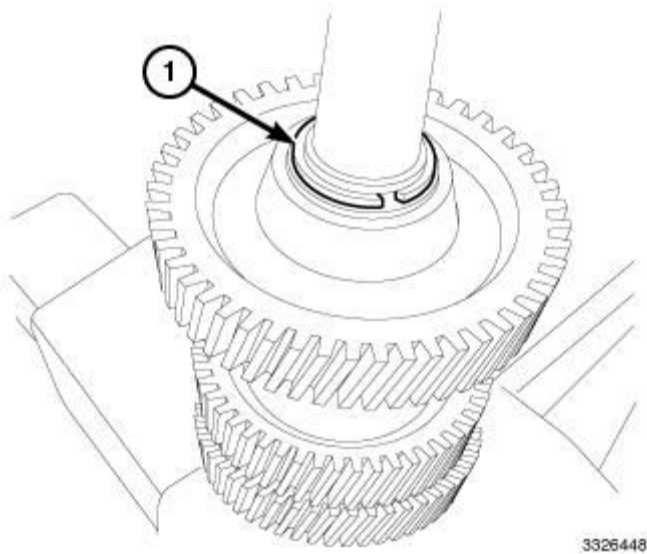


Fig. 118: Snap Ring

Courtesy of CHRYSLER GROUP, LLC

1. Remove the **right hand** thread rear bearing retention bolt and discard.
2. Remove the snap ring (1) from the input shaft.

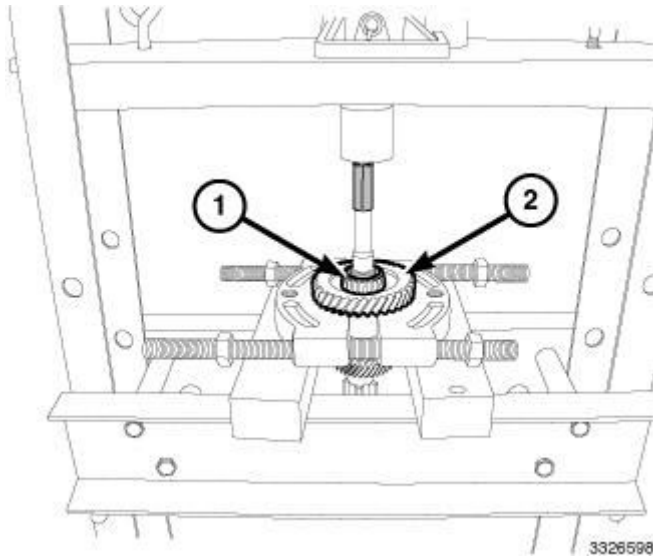


Fig. 119: Removing Front Bearing & Forth-Sixth Gear

Courtesy of CHRYSLER GROUP, LLC

3. Remove the front bearing (1) and the forth-sixth gear (2) using a press and (special tool #1130, Splitter, Bearing/Gear).

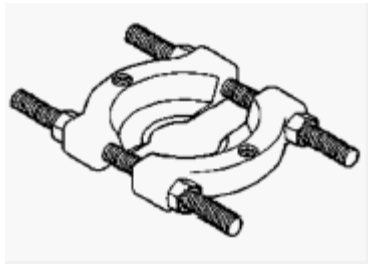


Fig. 120: Splitter, Bearing/Gear
Courtesy of CHRYSLER GROUP, LLC

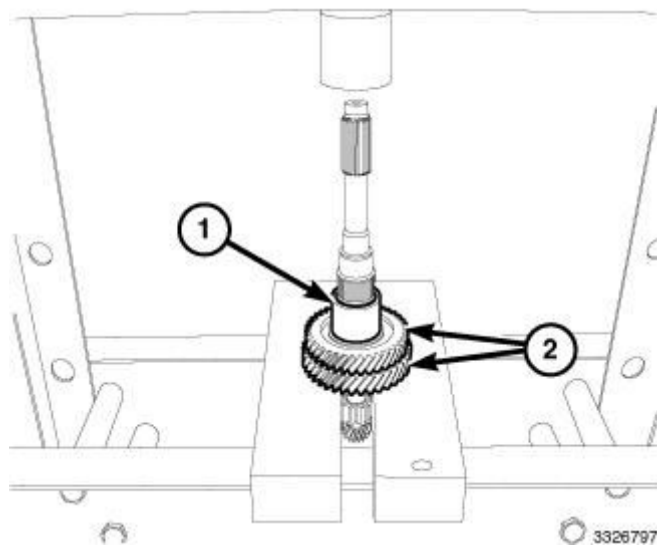


Fig. 121: Sleeve & Third-Fifth Gears
Courtesy of CHRYSLER GROUP, LLC

4. Remove the sleeve (1) and the third-fifth gears (2) using a press and plates.

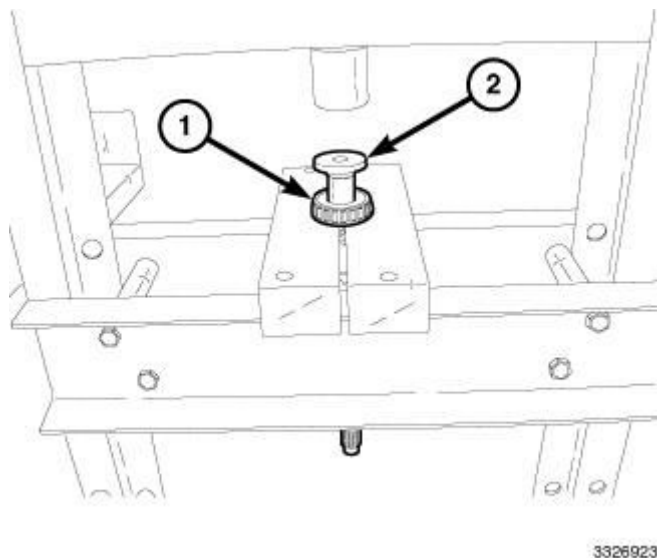


Fig. 122: Removing Rear Bearing
Courtesy of CHRYSLER GROUP, LLC

5. Remove the rear bearing (1) using (special tool #MD998200, Installer, Seal) and plates.

ASSEMBLY

ASSEMBLY

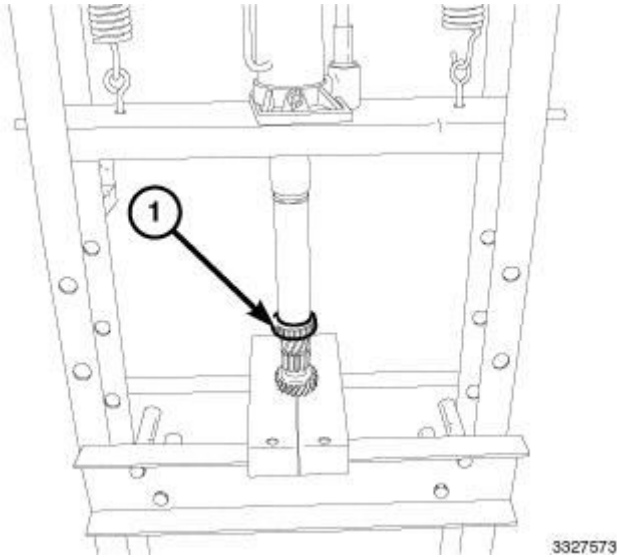


Fig. 123: Rear Bearing
Courtesy of CHRYSLER GROUP, LLC

1. Install the rear bearing (1) using (special tool #W-262, Installer, Bearing).

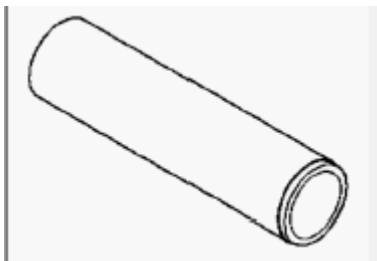


Fig. 124: Special Tool #W-262
Courtesy of CHRYSLER GROUP, LLC

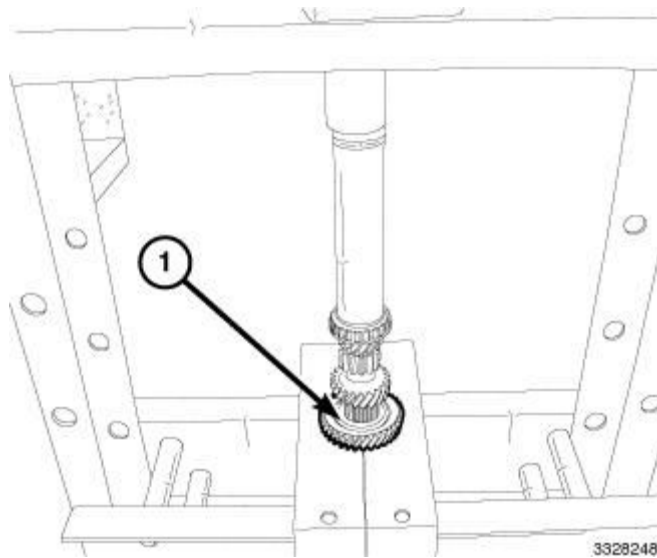


Fig. 125: Installing Fifth Gear
Courtesy of CHRYSLER GROUP, LLC

2. Install the fifth gear (1) using (special tool #W-262, Installer, Bearing).

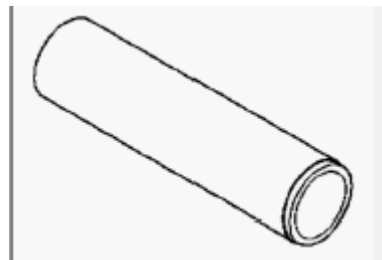


Fig. 126: Special Tool #W-262
Courtesy of CHRYSLER GROUP, LLC

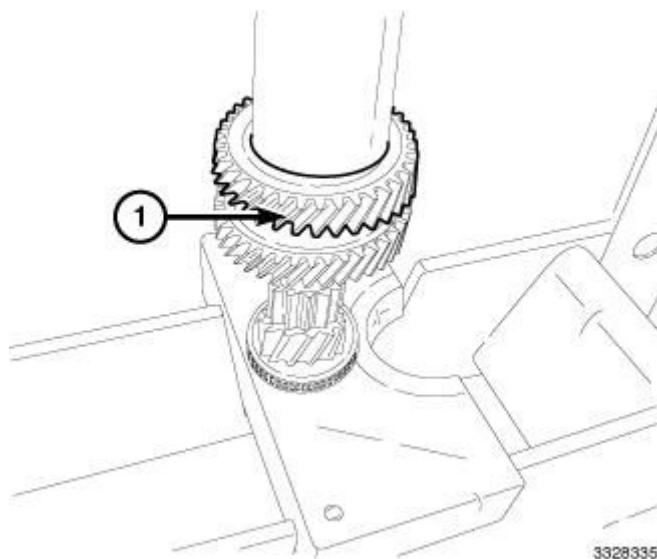


Fig. 127: Third Gear

Courtesy of CHRYSLER GROUP, LLC

3. Install the third gear (1) using (special tool #W-262, Installer, Bearing).

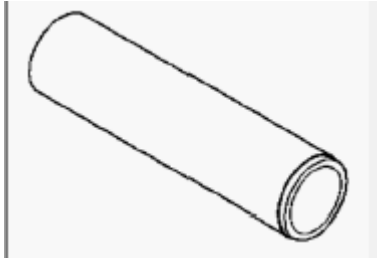


Fig. 128: Special Tool #W-262

Courtesy of CHRYSLER GROUP, LLC

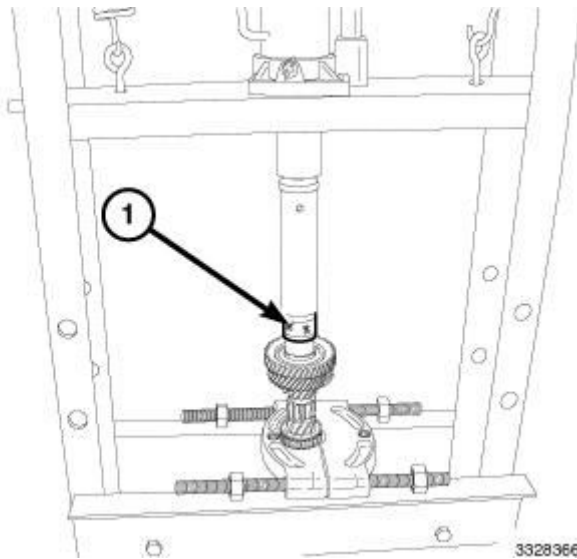


Fig. 129: Installing Collar

Courtesy of CHRYSLER GROUP, LLC

4. Install the collar (1) using (special tool #W-262, Installer, Bearing).

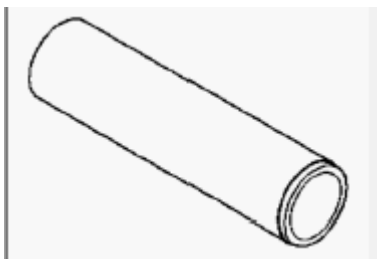


Fig. 130: Special Tool #W-262

Courtesy of CHRYSLER GROUP, LLC

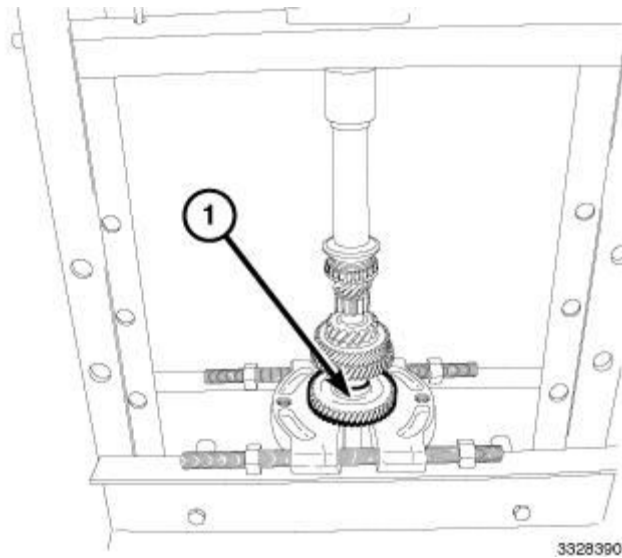


Fig. 131: Installing Forth-Sixth Gear
Courtesy of CHRYSLER GROUP, LLC

5. Install the forth-sixth gear (1) using (special tool #C-4193A, Installer, Seal).

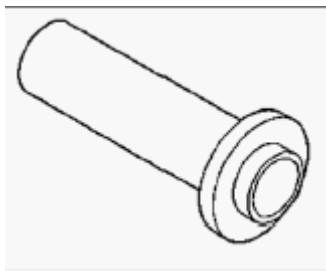


Fig. 132: Special Tool #C-4193A
Courtesy of CHRYSLER GROUP, LLC

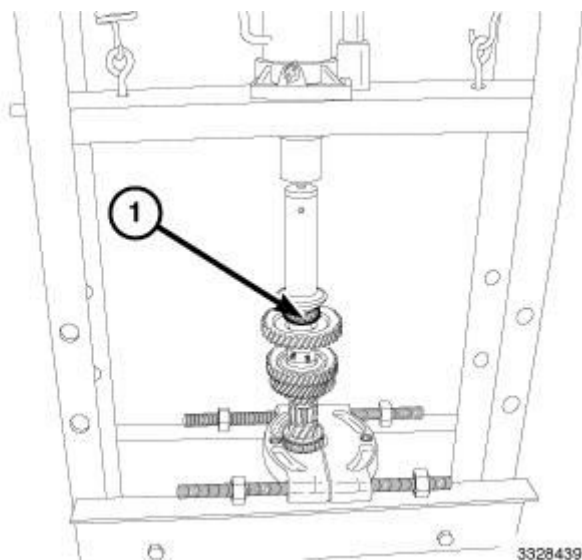


Fig. 133: Installing Front Bearing
Courtesy of CHRYSLER GROUP, LLC

6. Install the front bearing (1) using Seal Installer (special tool #C-4193A, Installer, Seal).

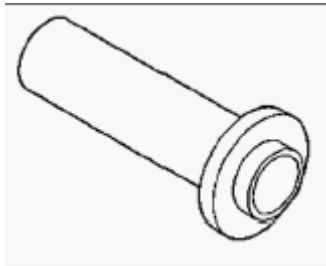


Fig. 134: Special Tool #C-4193A
Courtesy of CHRYSLER GROUP, LLC

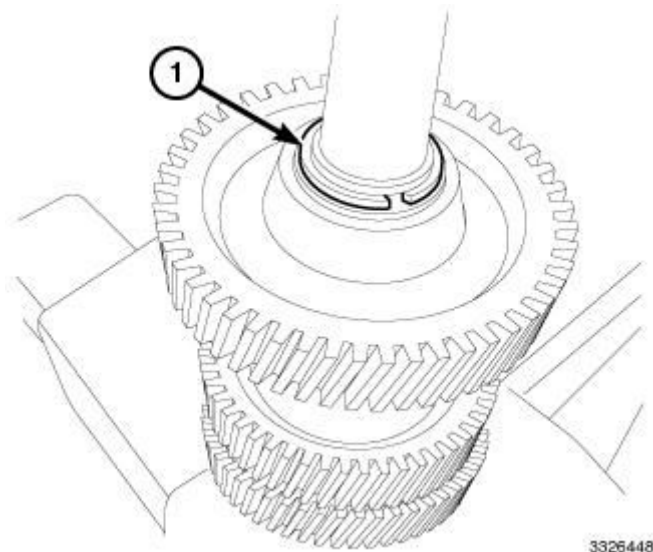


Fig. 135: Snap Ring
Courtesy of CHRYSLER GROUP, LLC

7. Install the snap ring (1).
8. Install a **new** rear bearing retention bolt, tighten to 56 N.m (41 ft. lbs.).

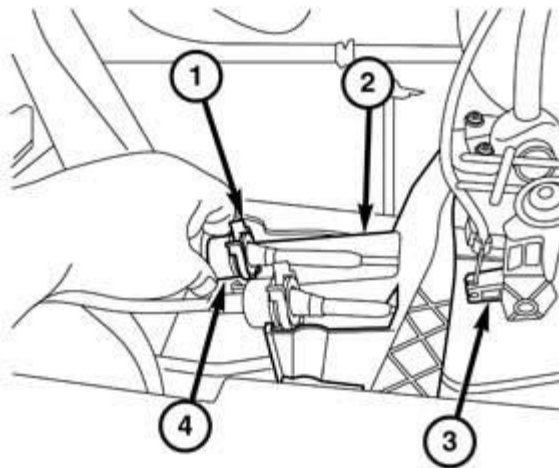
MECHANISM, GEARSHIFT

REMOVAL

REMOVAL

1. Remove the center console assembly.

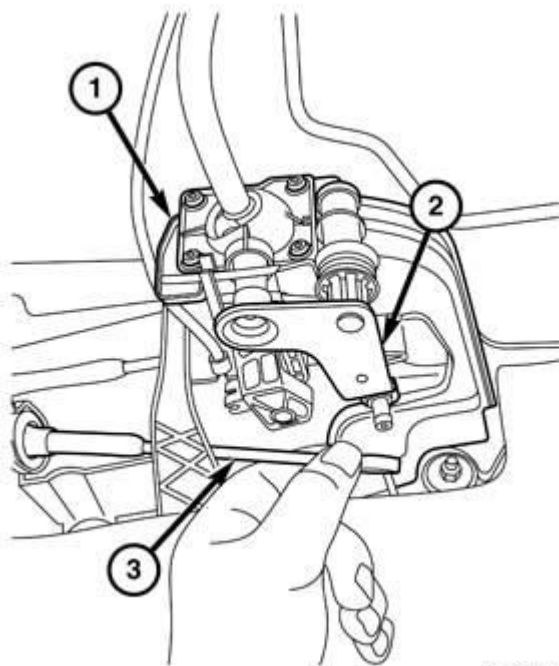
Refer to **CONSOLE, FLOOR, REMOVAL** .



210268815

Fig. 136: Shifter Bracket, Cable Housing & Retainers
Courtesy of CHRYSLER GROUP, LLC

2. Disengage retainers (1) holding cable housings (4) to shifter base (2).
3. Pull the cable housing (4) from the shifter base (2).

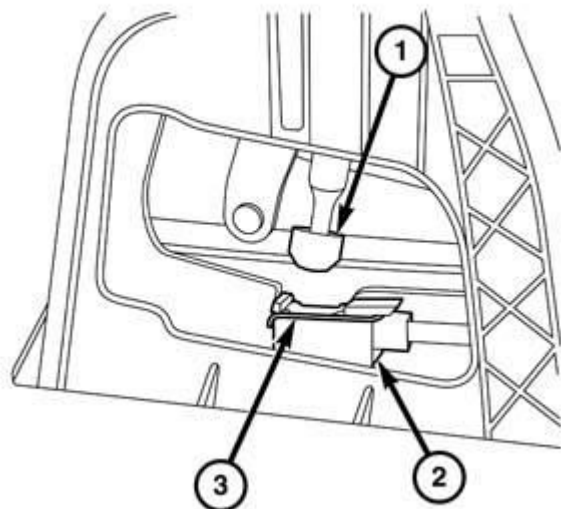


210268816

Fig. 137: Neutral Gate Cable End & Shifter Pin

Courtesy of CHRYSLER GROUP, LLC

4. Pry select cable end (3) to the left toward drive seat to disengage the cable end (3) from the select lever pin (2).



210268818

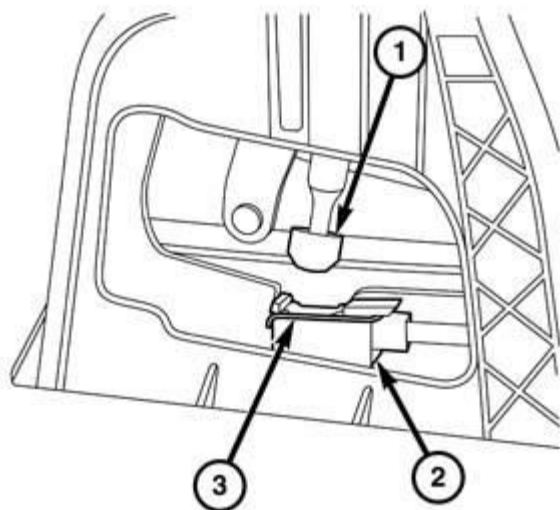
Fig. 138: Fulcrum Ball, Cable End & Spring-Clip
Courtesy of CHRYSLER GROUP, LLC

5. Release spring-clip (3) holding the cable end (2) to fulcrum ball (1) under the shifter handle and push the cable end downward to disengage it.
6. Remove nuts holding the shifter to the floor.
7. Separate the shifter from the vehicle.

INSTALLATION

INSTALLATION

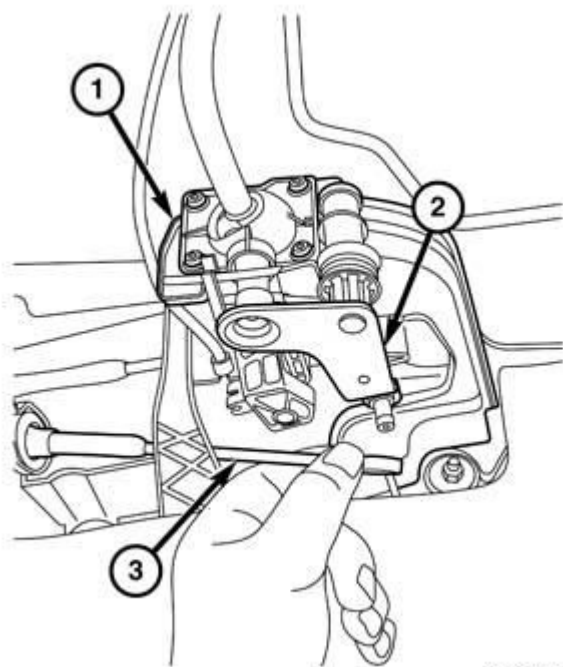
1. Place the shifter in position on the floor pan.



210268818

Fig. 139: Fulcrum Ball, Cable End & Spring-Clip
Courtesy of CHRYSLER GROUP, LLC

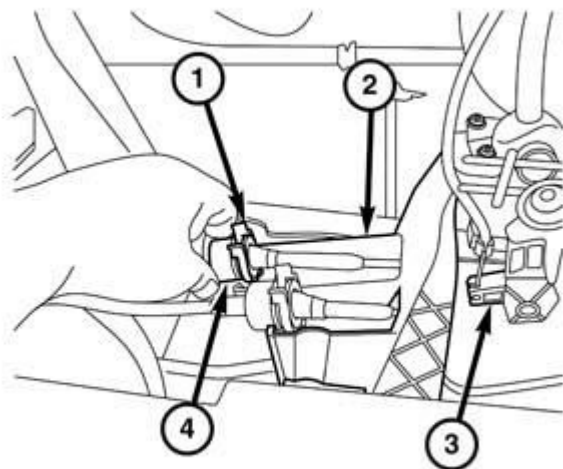
2. Align cable end (2) to fulcrum ball (1) under the shifter handle and push the cable end (2) upward to engage it.



210268816

Fig. 140: Neutral Gate Cable End & Shifter Pin
Courtesy of CHRYSLER GROUP, LLC

3. Align select cable end (3) to the engage select lever pin (2).



210268815

Fig. 141: Shifter Bracket, Cable Housing & Retainers
Courtesy of CHRYSLER GROUP, LLC

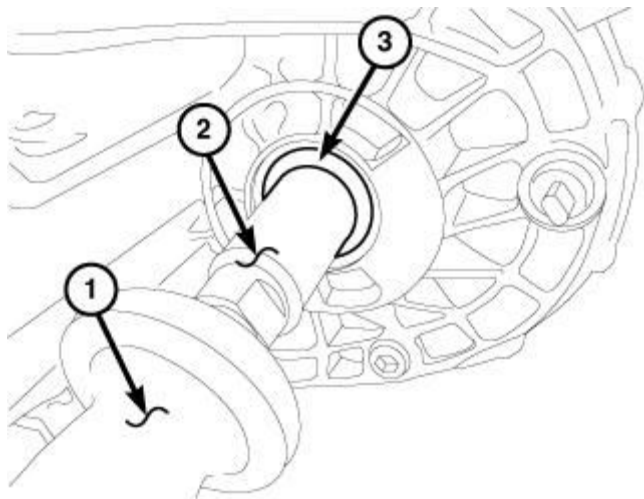
4. Insert the cable housing (4) into the shifter base (2) and push downward until the retainers (1) lock in position.
5. Install nuts to hold the shifter to the floor and tighten to 9 N.m (80 in lb.).
6. Install the center console assembly.

Refer to **CONSOLE, FLOOR, REMOVAL** .

SEAL, AXLE DRIVE SHAFT

REMOVAL

REMOVAL



3375805

Fig. 142: Removing Axle Seal

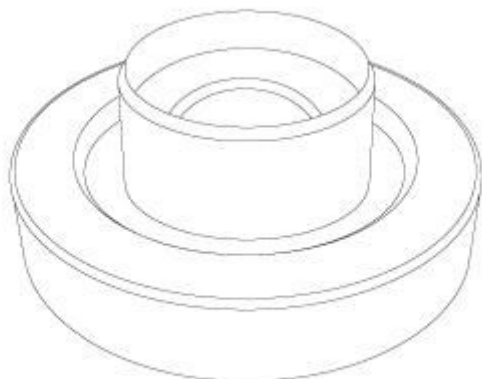
Courtesy of CHRYSLER GROUP, LLC

NOTE: Left side is shown in illustration, right side is similar.

1. Remove the halfshaft. Refer to **REMOVAL**.
2. **For the left side**, remove the axle seal (3) using (special tool #6341A, Remover, Seal) (2) and (special tool #C-637, Slide Hammer, Universal)
3. **For the right side**, remove the axle seal (3) using (special tool #9664, Remover, Bearing Cup) (2) and (special tool #C-637, Slide Hammer, Universal)

INSTALLATION

INSTALLATION



3375829

Fig. 143: Installer 10303

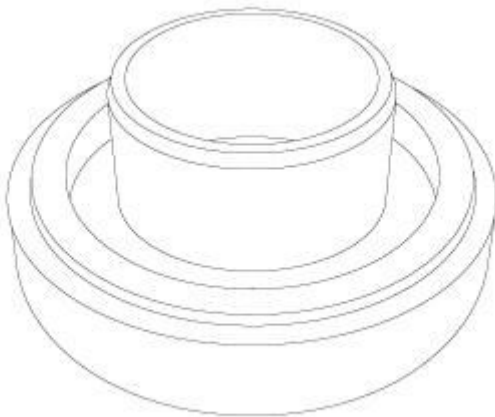
Courtesy of CHRYSLER GROUP, LLC

1. Using the **flat** side of (special tool #10303, Installer, Differential Oil Seal) to install the right side differential seal.



Fig. 144: Special Tool #10303

Courtesy of CHRYSLER GROUP, LLC



3375850

Fig. 145: Seal Installer 10303

Courtesy of CHRYSLER GROUP, LLC

2. Using the **raised** side of (special tool #10303, Installer, Differential Oil Seal) to install the left side differential seal.



Fig. 146: Special Tool #10303

Courtesy of CHRYSLER GROUP, LLC

NOTE: Left side is shown in illustration, right side is similar.

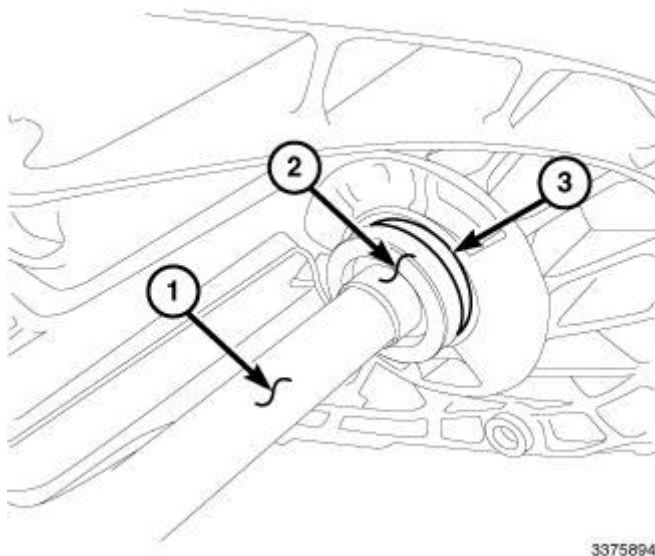


Fig. 147: Seal Installer And Handle

Courtesy of CHRYSLER GROUP, LLC

3. Using (special tool #10303, Installer, Differential Oil Seal) (2) and (special tool #C-4171, Driver Handle, Universal) (1) install the differential seal (3) to the bearing cover side of the differential housing.
4. Install the half shaft.

Refer to **INSTALLATION** .

SHAFT, OUTPUT, 1ST, 2ND, 5TH AND 6TH

DISASSEMBLY

DISASSEMBLY

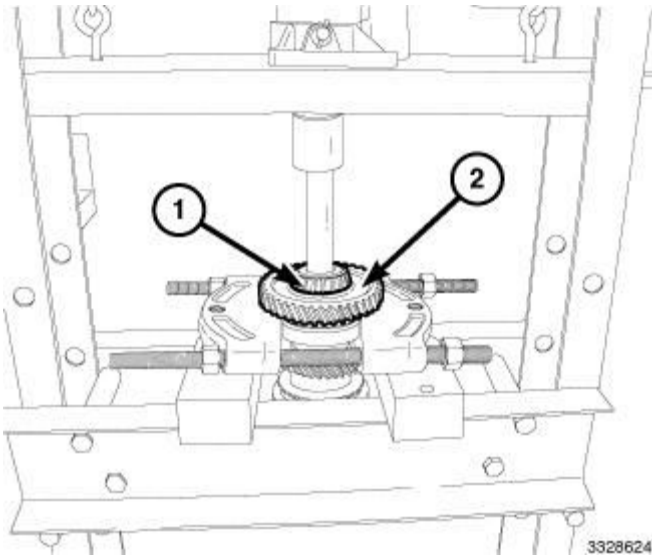


Fig. 148: Removing Rear Bearing & First Speed Gear
Courtesy of CHRYSLER GROUP, LLC

1. Remove the **left hand** thread rear bearing retention bolt and discard.
2. Remove the rear bearing (1) and the first speed gear (2) using (special tool #8254, Installer, Grommet) and (special tool #1130, Splitter, Bearing/Gear).

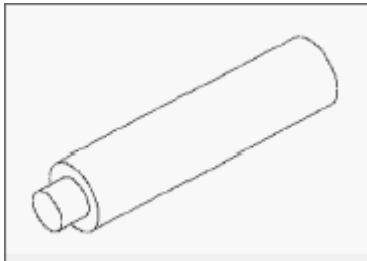


Fig. 149: Special Tool #8254
Courtesy of CHRYSLER GROUP, LLC

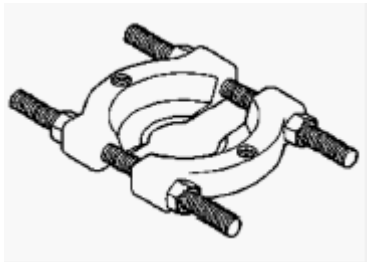
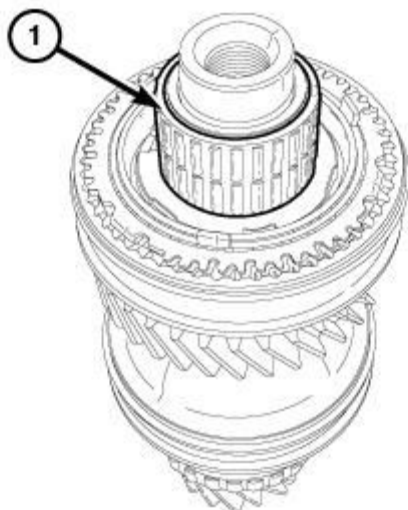


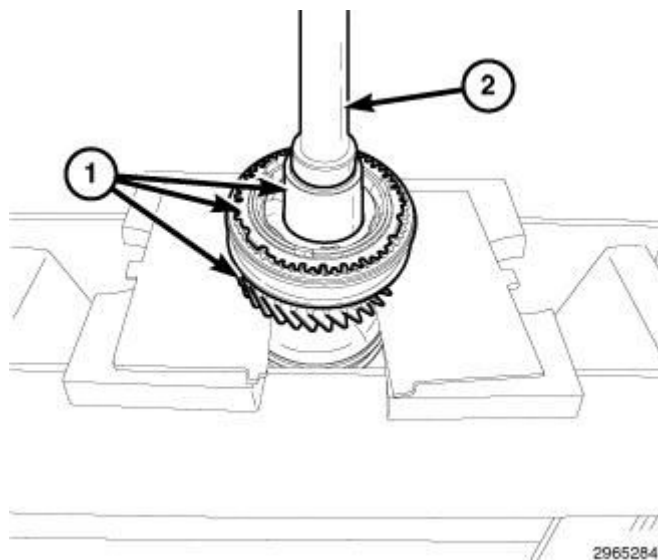
Fig. 150: Splitter, Bearing/Gear
Courtesy of CHRYSLER GROUP, LLC



2970656

Fig. 151: Needle Bearing
Courtesy of CHRYSLER GROUP, LLC

3. Remove the needle bearing (1).



2965284

Fig. 152: Removing Third Gear, Synchronizer & Retainer
Courtesy of CHRYSLER GROUP, LLC

4. Remove the collar (1), the synchronizer (2) and the 2nd speed gear (3).
5. Remove the third gear, third gear synchronizer and retainer (1) from the shaft using (special tool #8254, Installer, Grommet) and (special tool #1130, Splitter, Bearing/Gear).

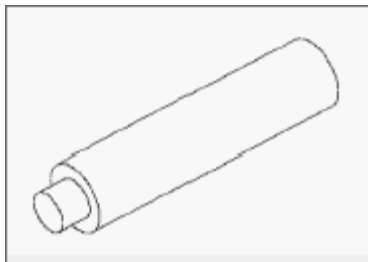


Fig. 153: Special Tool #8254

Courtesy of CHRYSLER GROUP, LLC

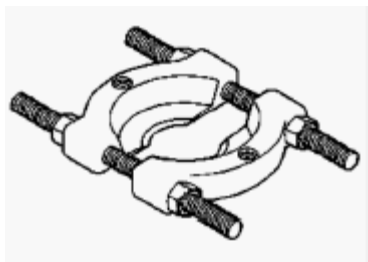
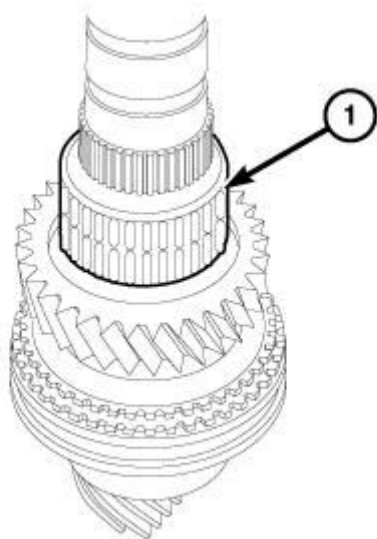


Fig. 154: Splitter, Bearing/Gear

Courtesy of CHRYSLER GROUP, LLC



3328670

Fig. 155: Needle Bearing

Courtesy of CHRYSLER GROUP, LLC

6. Remove the needle bearing (1).

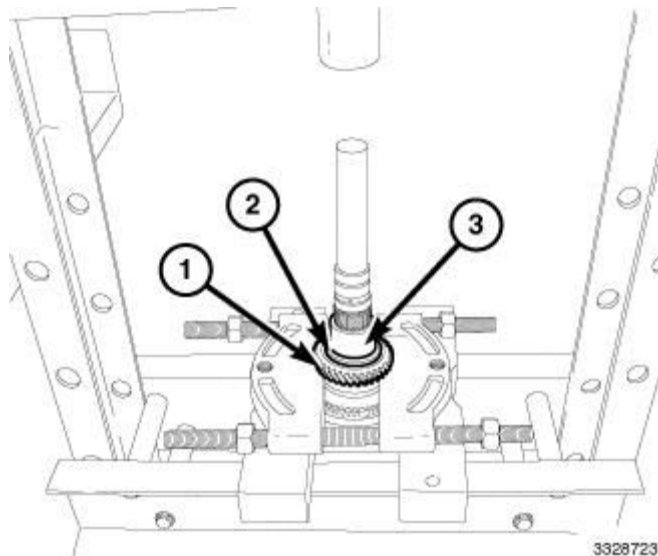


Fig. 156: Removing Collar, Spacer Ring & 5th Speed Gear
Courtesy of CHRYSLER GROUP, LLC

7. Remove the collar (3), the spacer ring (2) and the 5th speed gear (1) using (special tool #8254, Installer, Grommet) and (special tool #1130, Splitter, Bearing/Gear).

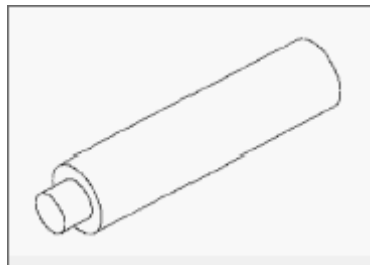


Fig. 157: Special Tool #8254
Courtesy of CHRYSLER GROUP, LLC

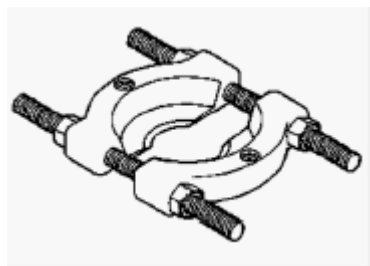
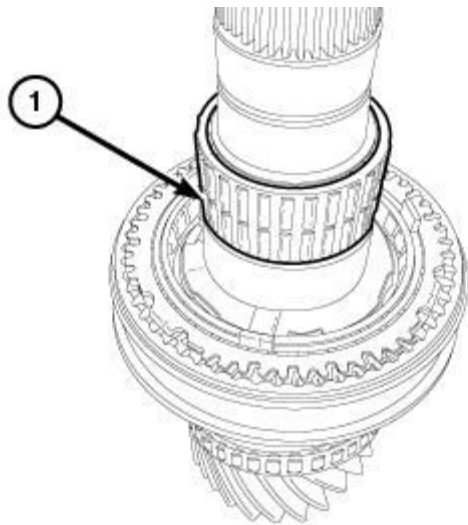


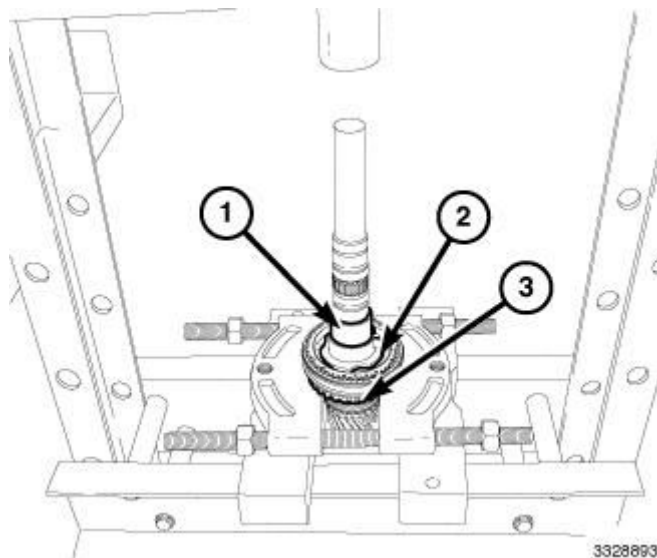
Fig. 158: Splitter, Bearing/Gear
Courtesy of CHRYSLER GROUP, LLC



3328761

Fig. 159: Needle Bearing
Courtesy of CHRYSLER GROUP, LLC

8. Remove the needle bearing.



3328893

Fig. 160: Removing Collar, Synchronizer & 6th Speed Gear
Courtesy of CHRYSLER GROUP, LLC

9. Remove the collar (1), the synchronizer (2) and the 6th speed gear (3) using (special tool #8254, Installer, Grommet) and (special tool #1130, Splitter, Bearing/Gear).

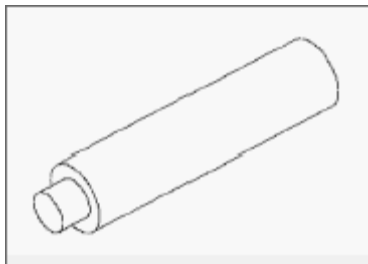


Fig. 161: Special Tool #8254

Courtesy of CHRYSLER GROUP, LLC

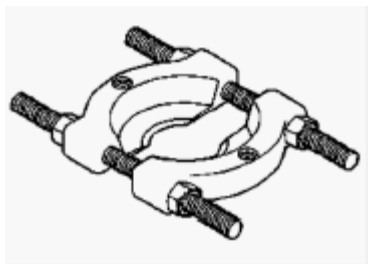
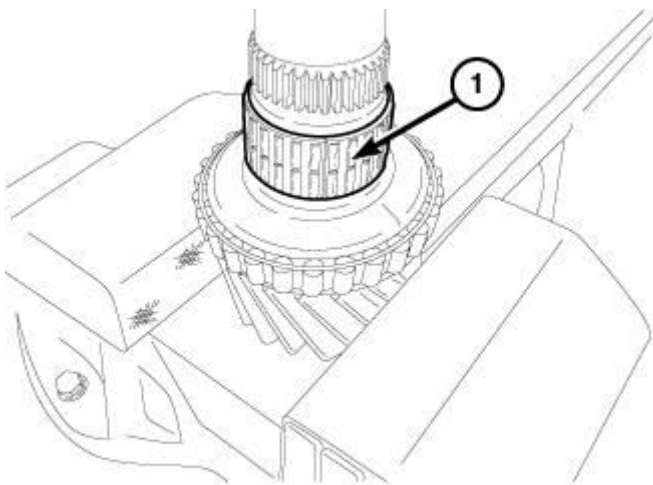


Fig. 162: Splitter, Bearing/Gear

Courtesy of CHRYSLER GROUP, LLC



3328933

Fig. 163: Needle Bearing

Courtesy of CHRYSLER GROUP, LLC

10. Remove the needle bearing (1).

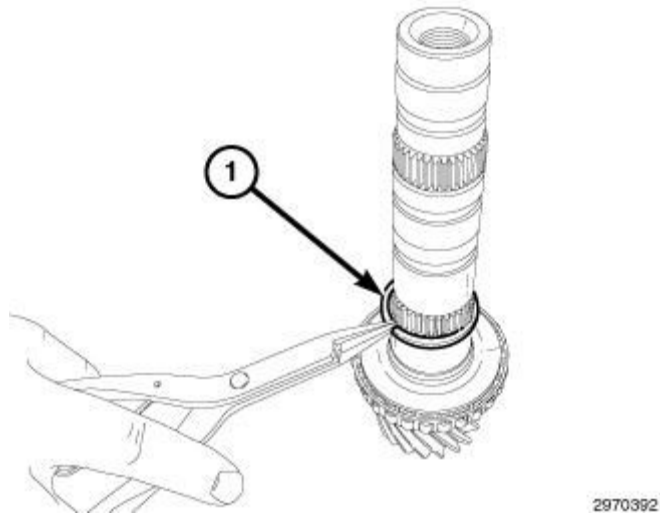


Fig. 164: Front Bearing Snap Ring
Courtesy of CHRYSLER GROUP, LLC

11. Remove the front bearing snap ring (2).

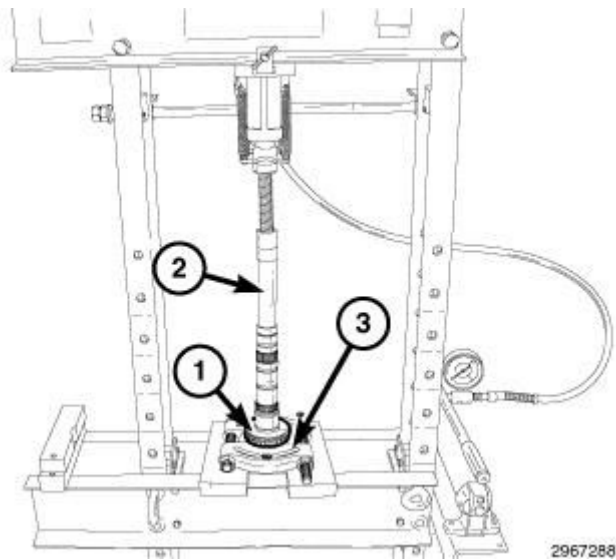


Fig. 165: Removing Front Bearing
Courtesy of CHRYSLER GROUP, LLC

12. Remove the front bearing (1) using (special tool #8254, Installer, Grommet) and (special tool #1130, Splitter, Bearing/Gear) (3).

ASSEMBLY

ASSEMBLY

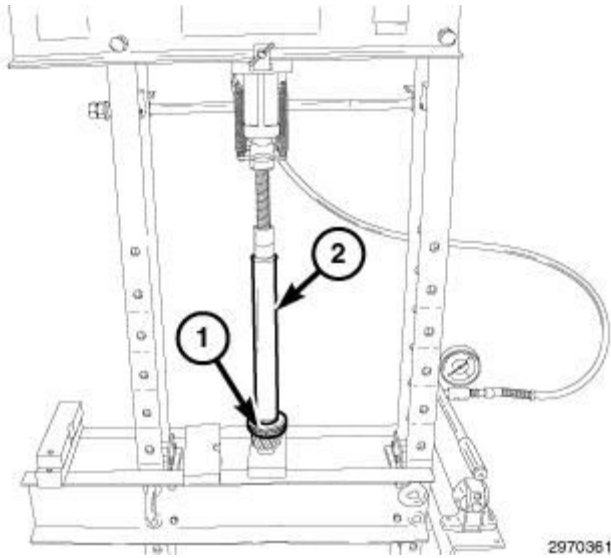


Fig. 166: Installing Front Bearing

Courtesy of CHRYSLER GROUP, LLC

1. Install the bearing (1) using (special tool #C-3095-A, Installer, Bearing) (2).

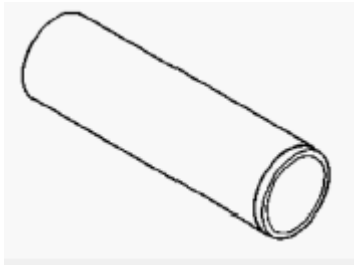


Fig. 167: Special Tool #C-3095-A

Courtesy of CHRYSLER GROUP, LLC

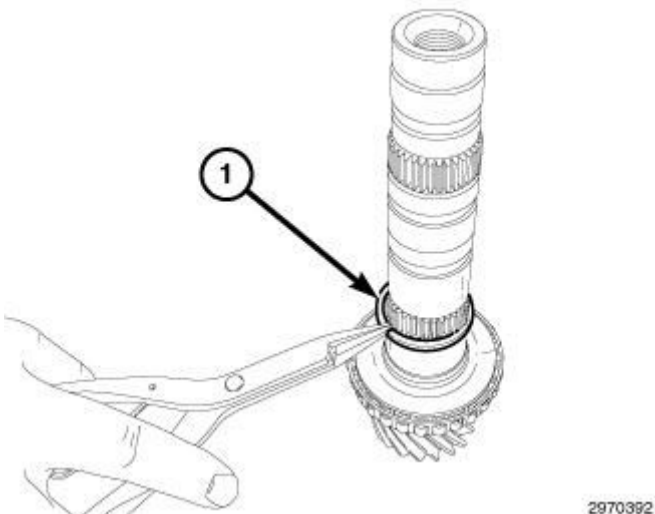
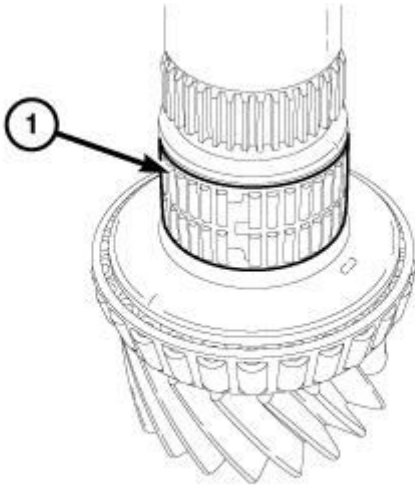


Fig. 168: Front Bearing Snap Ring
Courtesy of CHRYSLER GROUP, LLC

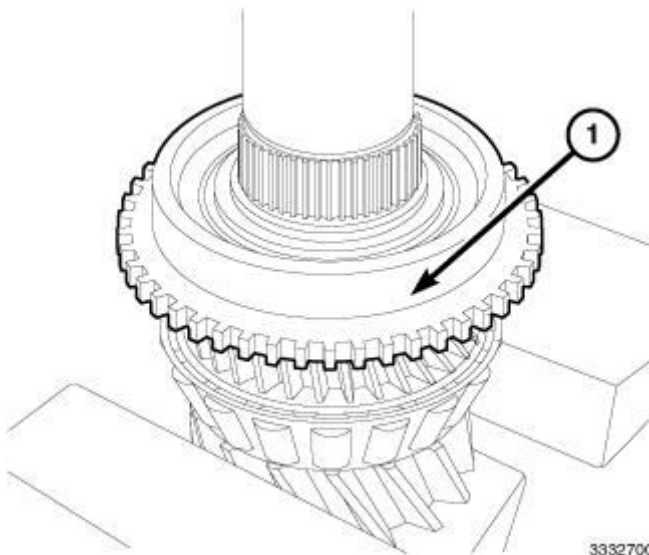
2. Install snap ring to the shaft (1).



2970435

Fig. 169: Needle Bearing
Courtesy of CHRYSLER GROUP, LLC

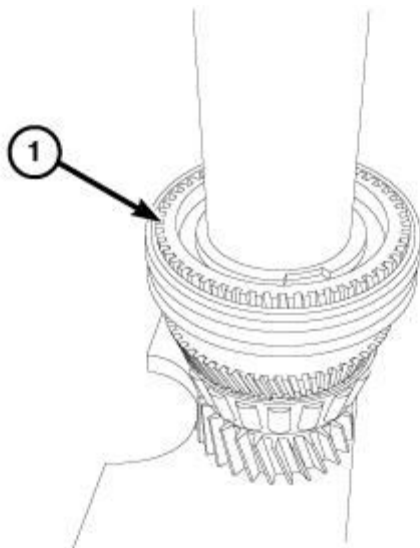
3. Install the needle bearing (1).



3332700

Fig. 170: Sixth Speed Gear
Courtesy of CHRYSLER GROUP, LLC

4. Install the sixth speed gear (1).



3332780

Fig. 171: Sixth Speed Synchronizer
Courtesy of CHRYSLER GROUP, LLC

5. Install the sixth speed synchronizer using (special tool #C-3095-A, Installer, Bearing).

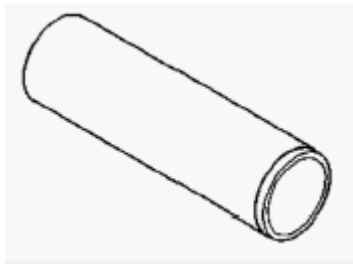
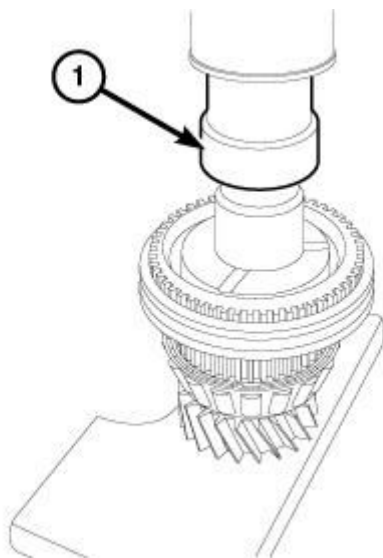


Fig. 172: Special Tool #C-3095-A
Courtesy of CHRYSLER GROUP, LLC



3332803

Fig. 173: Installing Fifth/Sixth Gear Spacer
Courtesy of CHRYSLER GROUP, LLC

6. Install the fifth/sixth gear spacer using (special tool #W-262, Installer, Bearing).

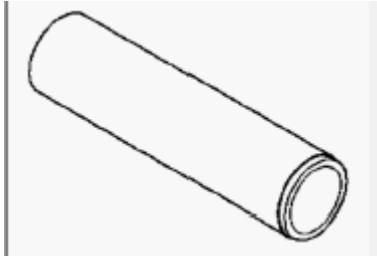
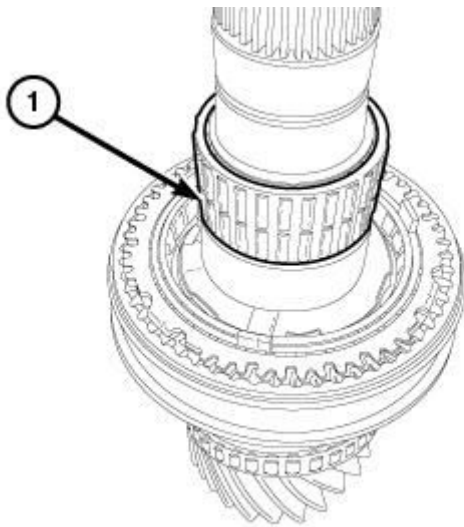


Fig. 174: Special Tool #W-262
Courtesy of CHRYSLER GROUP, LLC



3328761

Fig. 175: Needle Bearing
Courtesy of CHRYSLER GROUP, LLC

7. Install the needle bearing (1).

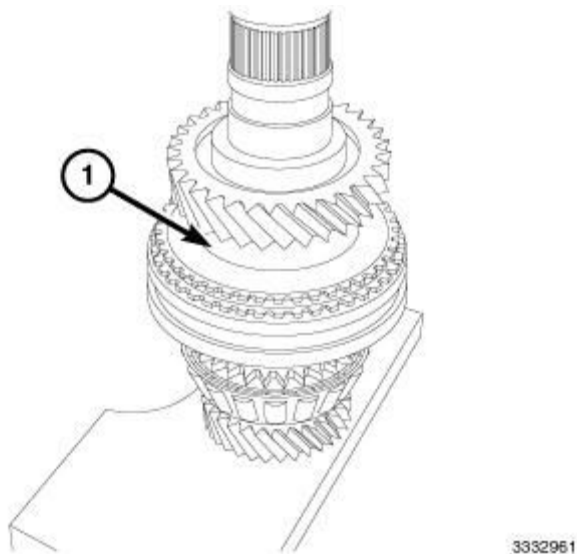


Fig. 176: Installing Fifth Speed Gear
Courtesy of CHRYSLER GROUP, LLC

8. Install the fifth speed gear (1).

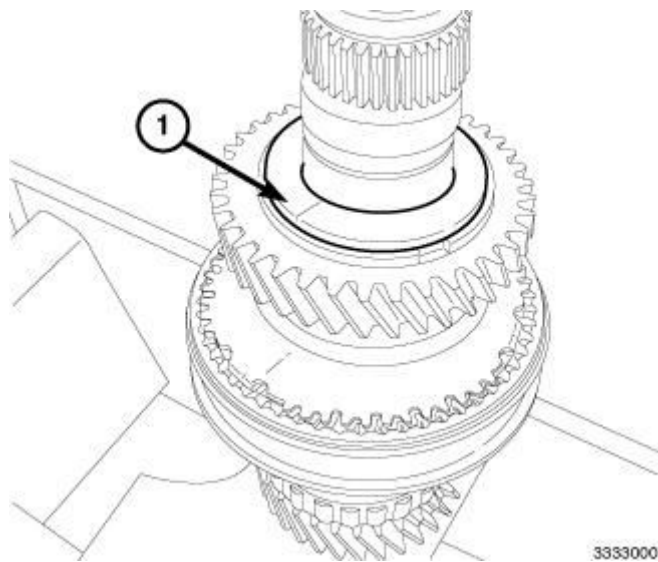


Fig. 177: Shim
Courtesy of CHRYSLER GROUP, LLC

9. Install the shim (1).

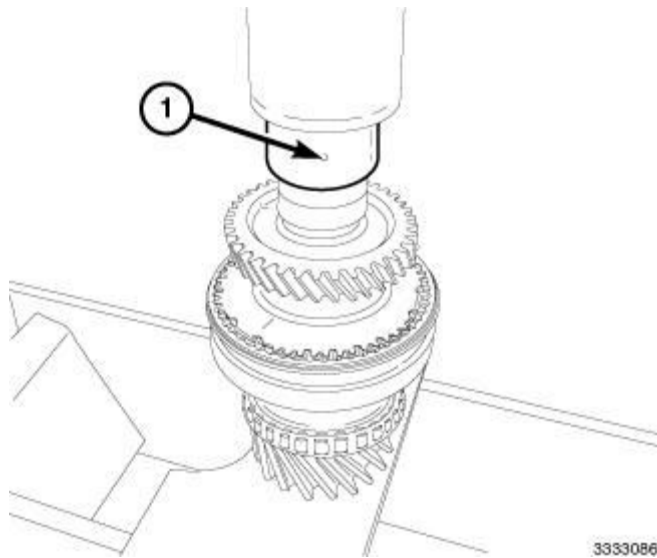


Fig. 178: Installing Collar/Spacer
Courtesy of CHRYSLER GROUP, LLC

10. Install the collar/spacer (1) using (special tool #W-262, Installer, Bearing).

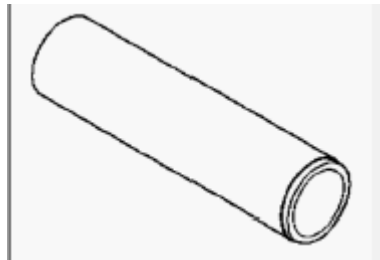


Fig. 179: Special Tool #W-262
Courtesy of CHRYSLER GROUP, LLC

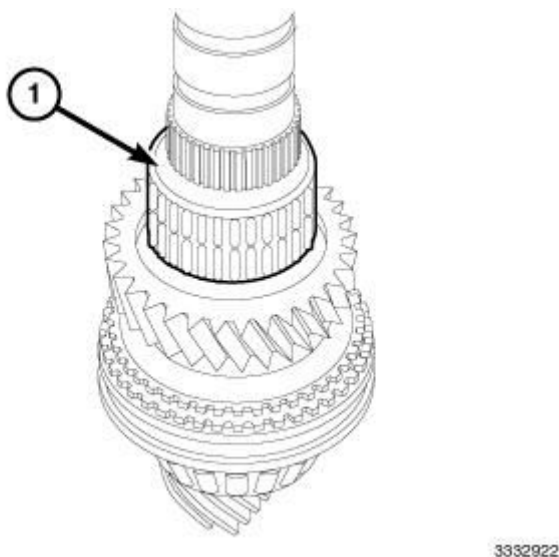
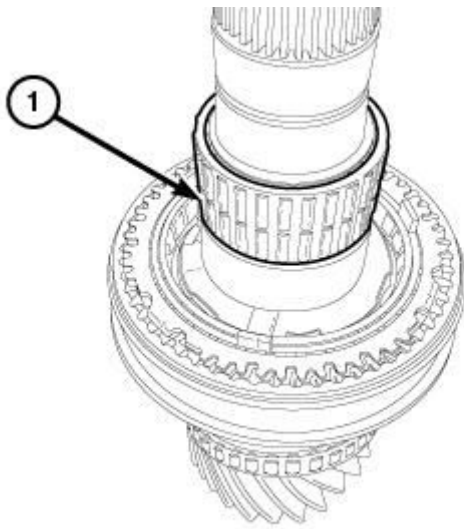


Fig. 180: Gear

Courtesy of CHRYSLER GROUP, LLC

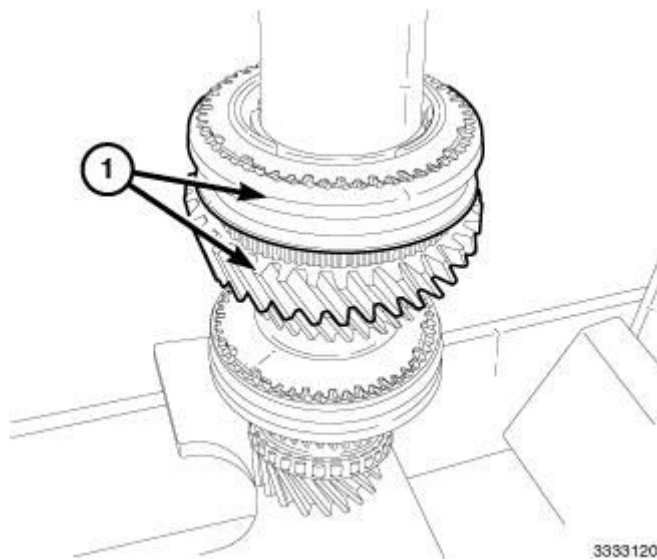


3328761

Fig. 181: Needle Bearing

Courtesy of CHRYSLER GROUP, LLC

11. Install the needle bearing (1).



3333120

Fig. 182: Second Speed Gear

Courtesy of CHRYSLER GROUP, LLC

12. Install the synchronizer complete with second speed gear (1) using (special tool #W-262, Installer, Bearing).

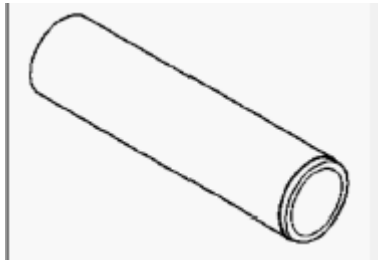


Fig. 183: Special Tool #W-262
Courtesy of CHRYSLER GROUP, LLC

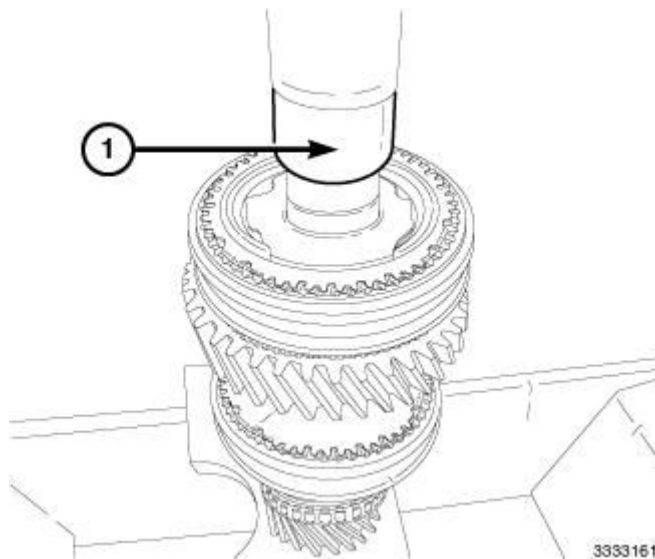


Fig. 184: Installing Collar/Spacer
Courtesy of CHRYSLER GROUP, LLC

13. Install the collar/spacer (1) using (special tool #W-262, Installer, Bearing).

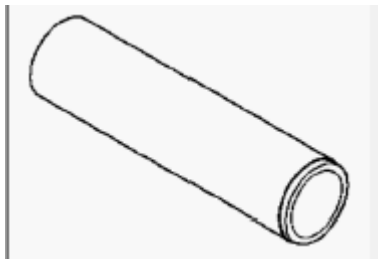


Fig. 185: Special Tool #W-262
Courtesy of CHRYSLER GROUP, LLC

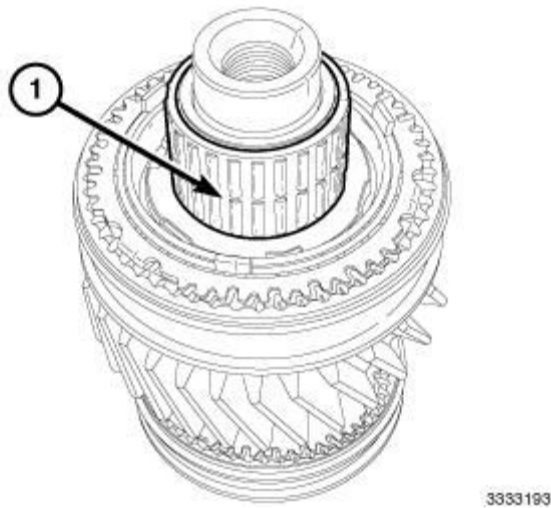


Fig. 186: Needle Bearing
Courtesy of CHRYSLER GROUP, LLC

14. Install the needle bearing (1).

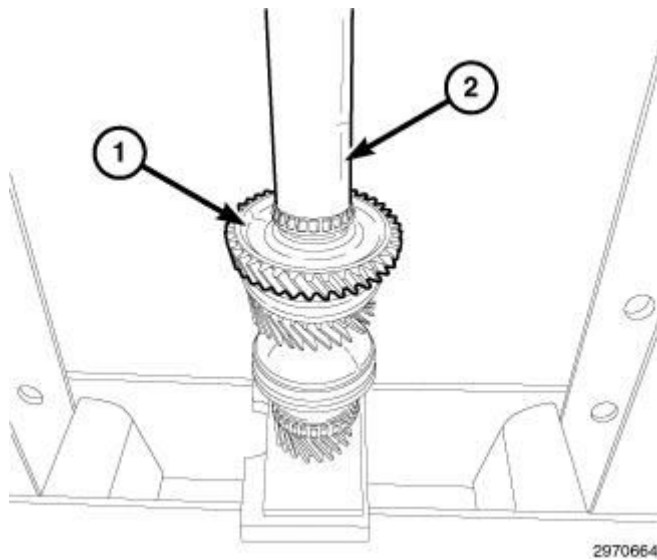


Fig. 187: Installing First Gear & Bearing
Courtesy of CHRYSLER GROUP, LLC

15. Install first gear and the bearing (1) using (special tool #W-262, Installer, Bearing) (2).
16. Install a **new** rear bearing retention bolt, tighten to 110 N.m (81 ft. lbs.).

SHAFT, OUTPUT REVERSE, 3RD AND 4TH

DISASSEMBLY

DISASSEMBLY

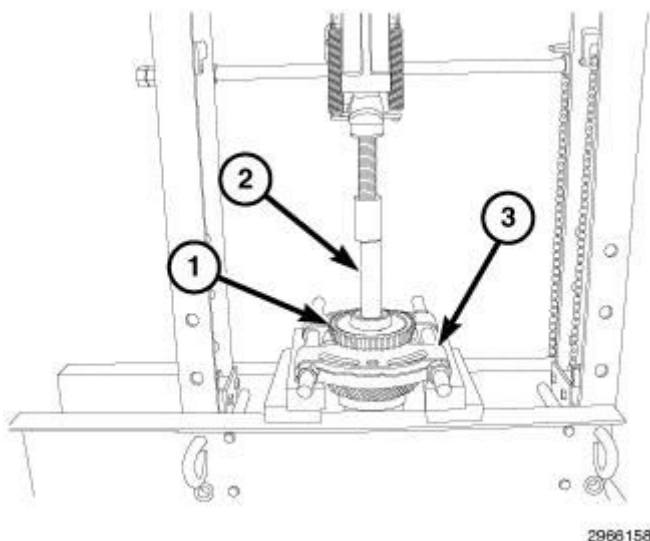


Fig. 188: Removing Rear Bearing & Reverse Gear
Courtesy of CHRYSLER GROUP, LLC

1. Remove the **left hand** thread rear bearing retention bolt and discard.
2. Remove the rear bearing and reverse gear (1) from the shaft using (special tool #8254, Installer, Grommet) (2) and (special tool #1130, Splitter, Bearing/Gear) (3).

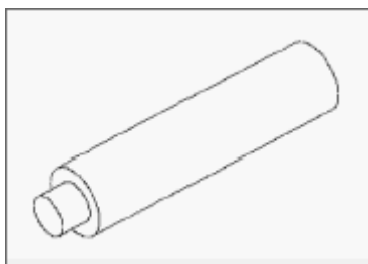


Fig. 189: Special Tool #8254
Courtesy of CHRYSLER GROUP, LLC

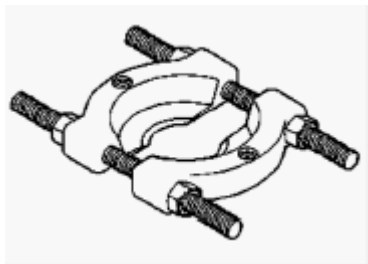


Fig. 190: Splitter, Bearing/Gear
Courtesy of CHRYSLER GROUP, LLC

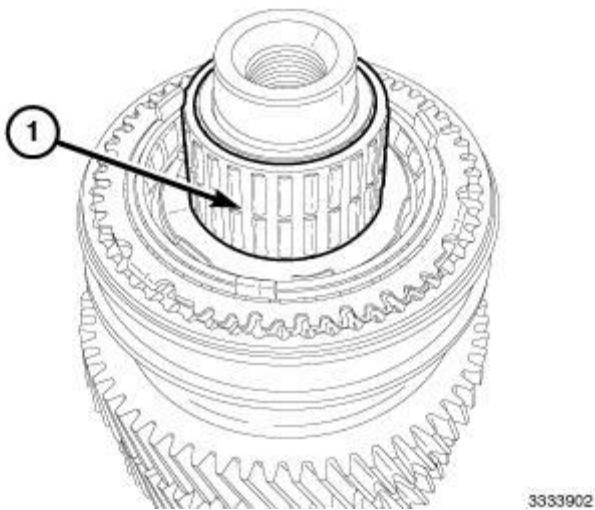


Fig. 191: Needle Bearing
Courtesy of CHRYSLER GROUP, LLC

3. Remove the needle bearing (1).

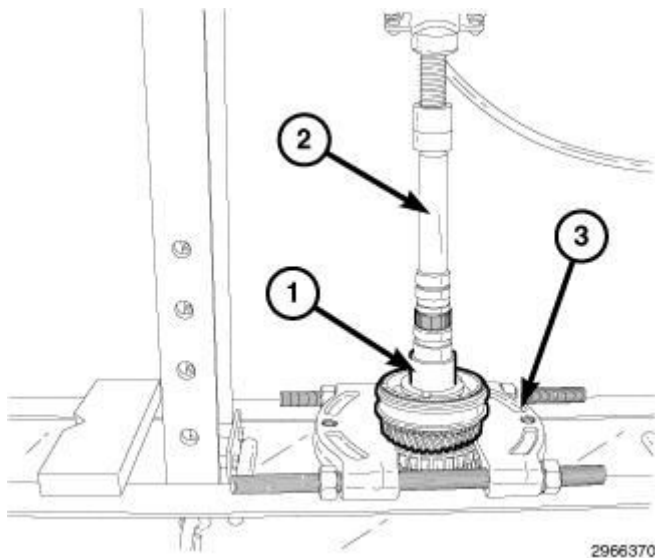


Fig. 192: Spacer, Grommet Installer And Bearing Splitter
Courtesy of CHRYSLER GROUP, LLC

4. Remove the spacer (1) and synchronizer hub using (special tool #8254, Installer, Grommet) and (special tool #1130, Splitter, Bearing/Gear) (3).
5. Remove the spacer, shim and third speed gear using a Grommet Installer.

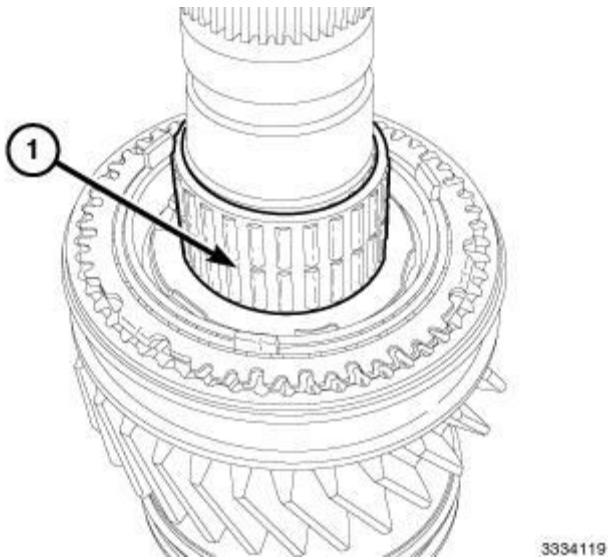


Fig. 193: Needle Bearing
Courtesy of CHRYSLER GROUP, LLC

6. Remove the needle bearing (1).

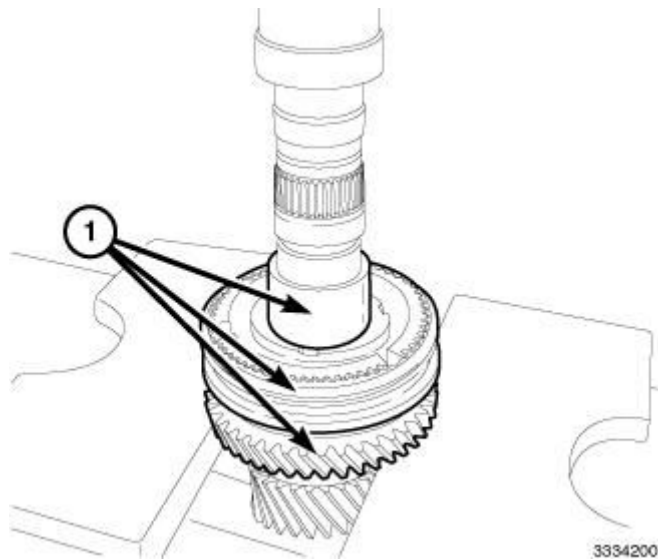


Fig. 194: Spacer, Synchronizer & Fourth Speed Gear
Courtesy of CHRYSLER GROUP, LLC

7. Remove the spacer (1), the synchronizer (2) and the fourth speed gear (3) using (special tool #8254, Installer, Grommet) and (special tool #1130, Splitter, Bearing/Gear)

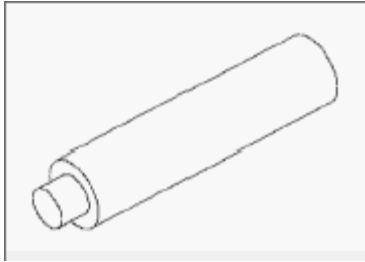


Fig. 195: Special Tool #8254

Courtesy of CHRYSLER GROUP, LLC

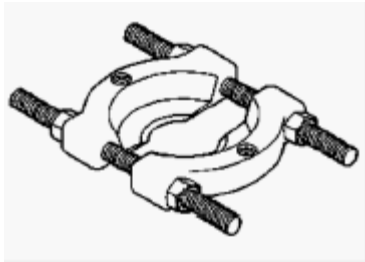


Fig. 196: Splitter, Bearing/Gear

Courtesy of CHRYSLER GROUP, LLC

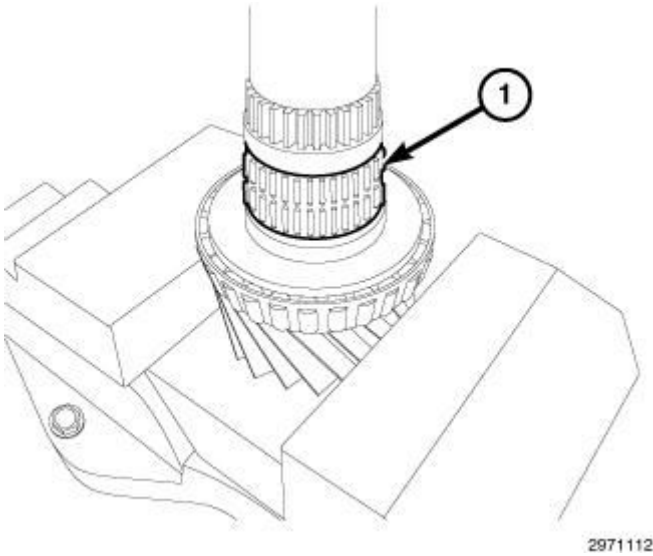


Fig. 197: Second/Forth Gear Needle Bearing

Courtesy of CHRYSLER GROUP, LLC

8. Remove the needle bearing (1).

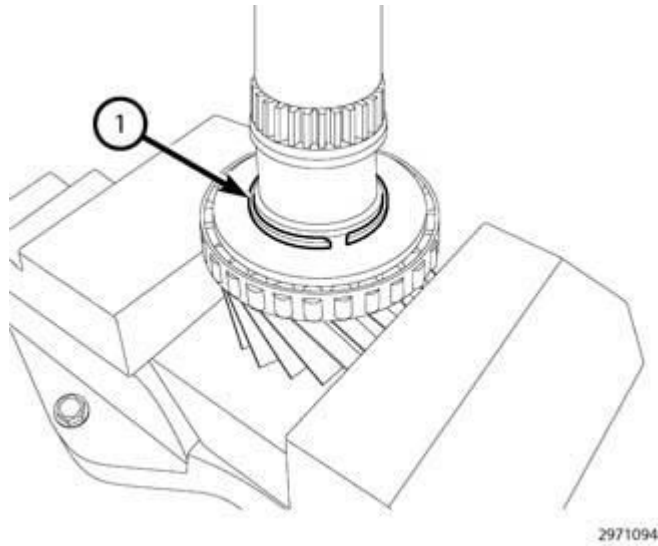


Fig. 198: Front Bearing Snap Ring
Courtesy of CHRYSLER GROUP, LLC

9. Remove the front bearing snap ring (1).

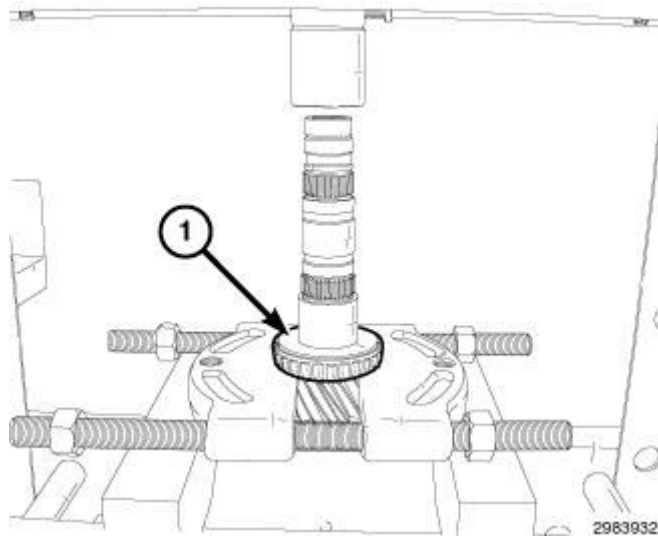
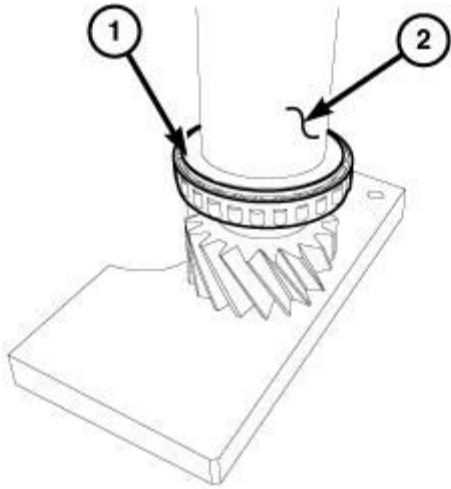


Fig. 199: Removing Front Bearing
Courtesy of CHRYSLER GROUP, LLC

10. Remove the front bearing (1) using (special tool #1130, Splitter, Bearing/Gear).

ASSEMBLY

ASSEMBLY

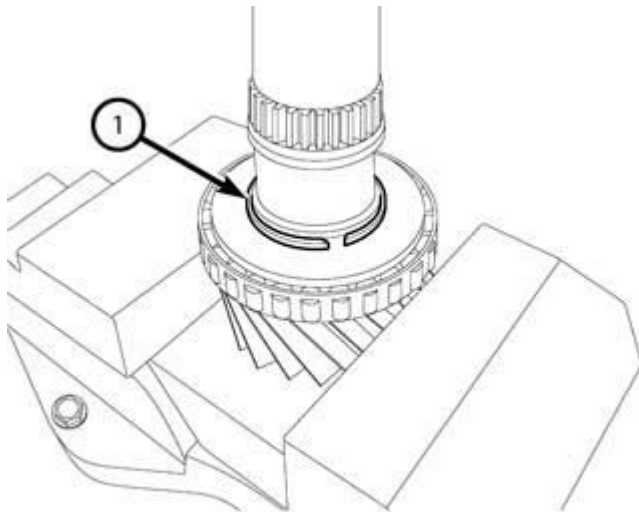


2971077

Fig. 200: Installing Front Bearing

Courtesy of CHRYSLER GROUP, LLC

1. Install the bearing (1) using (special tool #C-3095-A, Installer, Bearing) (2).



2971094

Fig. 201: Front Bearing Snap Ring

Courtesy of CHRYSLER GROUP, LLC

2. Install the bearing snap ring.

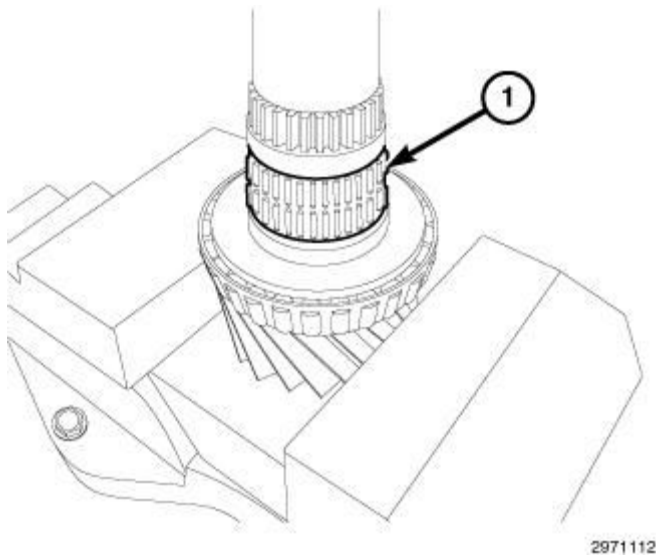


Fig. 202: Second/Forth Gear Needle Bearing
Courtesy of CHRYSLER GROUP, LLC

3. Install the needle bearing.

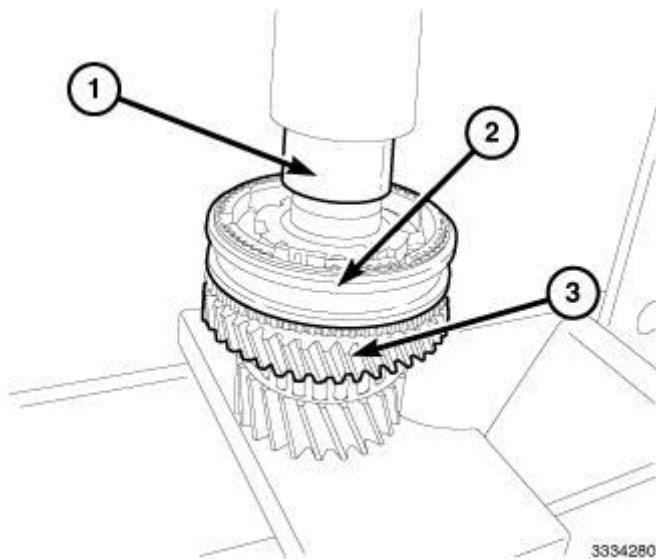


Fig. 203: Installing Fourth Speed Gear, Synchronizer & Spacer
Courtesy of CHRYSLER GROUP, LLC

4. Install the fourth speed gear (3), the synchronizer (2) and the spacer (1) using (special tool #W-262, Installer, Bearing).

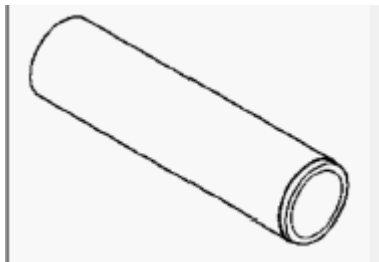


Fig. 204: Special Tool #W-262
Courtesy of CHRYSLER GROUP, LLC

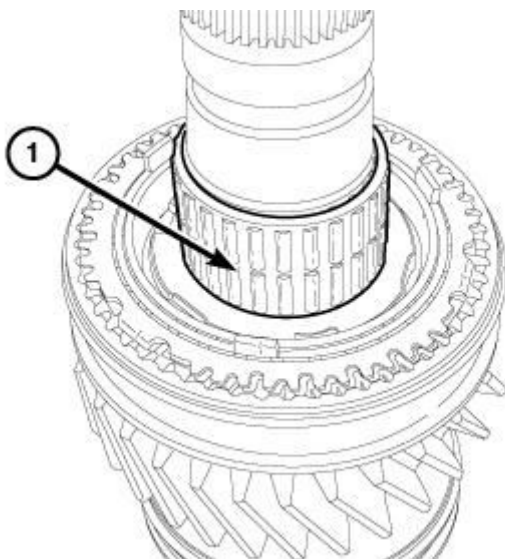


Fig. 205: Needle Bearing
Courtesy of CHRYSLER GROUP, LLC

5. Install the needle bearing.

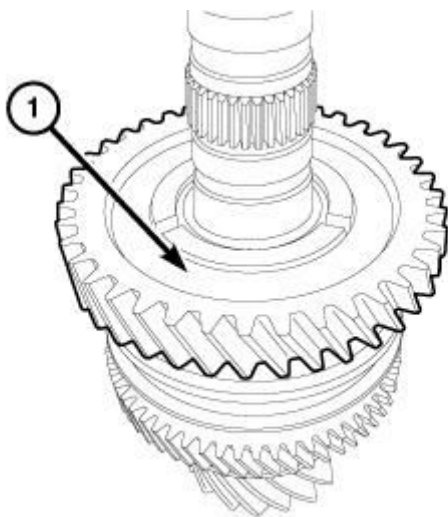
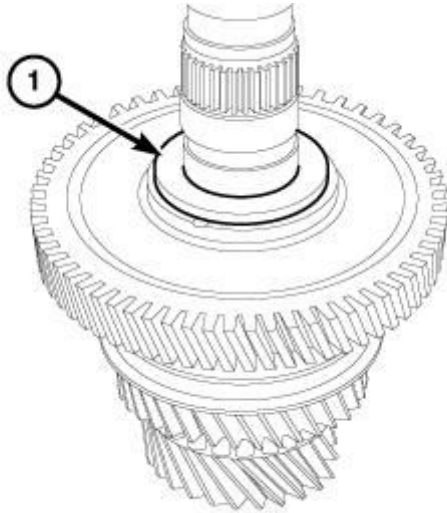


Fig. 206: Third Speed Gear

Courtesy of CHRYSLER GROUP, LLC

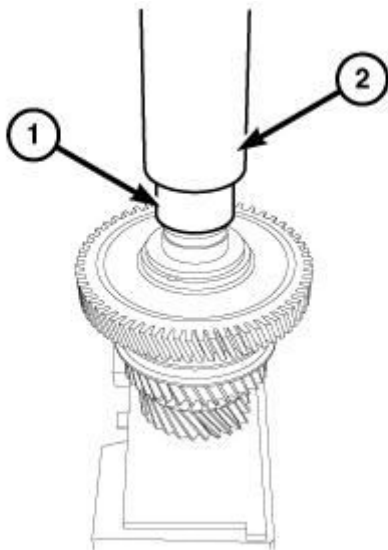
6. Install the third speed gear.



2971232

Fig. 207: Third Speed Gear Shim
Courtesy of CHRYSLER GROUP, LLC

7. Install the third speed gear shim.



2971243

Fig. 208: Installing Fifth Gear Bushing
Courtesy of CHRYSLER GROUP, LLC

8. Install the collar to the shaft (1) using (special tool #W-262, Installer, Bearing).

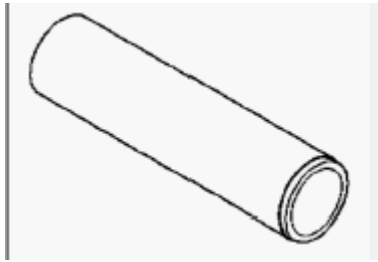


Fig. 209: Special Tool #W-262
Courtesy of CHRYSLER GROUP, LLC

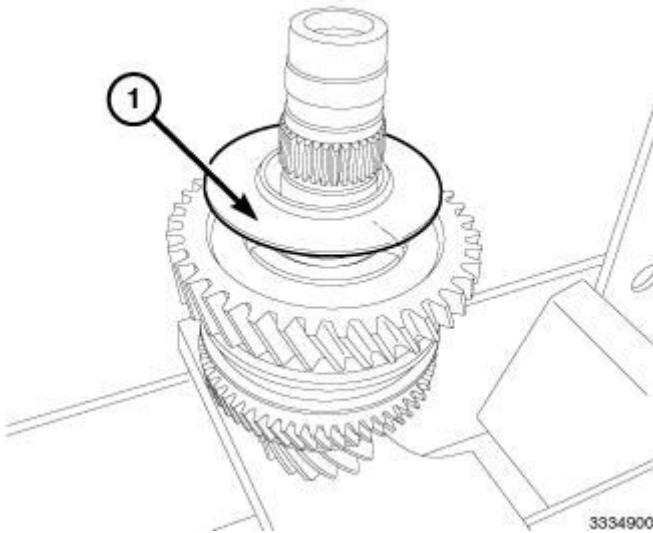


Fig. 210: Synchronizer Mounting Bushing
Courtesy of CHRYSLER GROUP, LLC

9. Install the synchronizer mounting bushing.

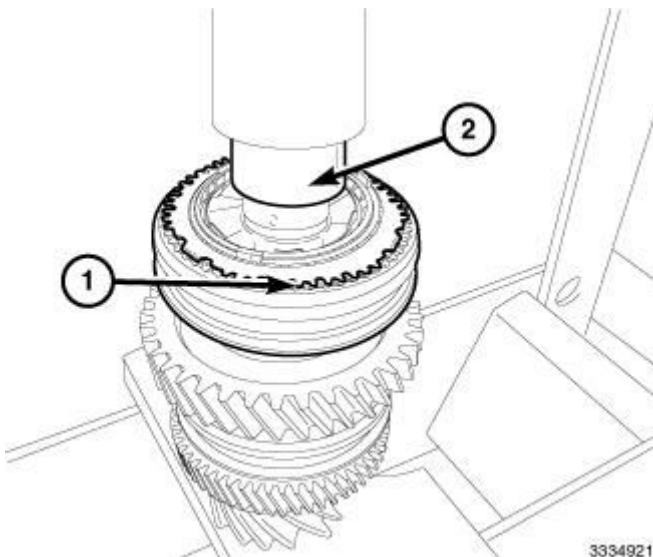


Fig. 211: Synchronizer & Spacer

Courtesy of CHRYSLER GROUP, LLC

10. Install the synchronizer (1) and the spacer (2) using (special tool #W-262, Installer, Bearing).

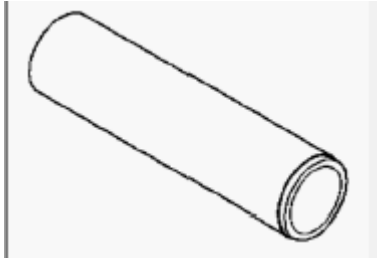
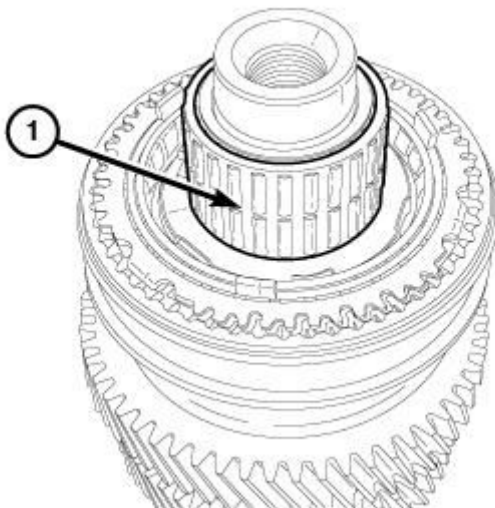


Fig. 212: Special Tool #W-262

Courtesy of CHRYSLER GROUP, LLC



3333902

Fig. 213: Needle Bearing

Courtesy of CHRYSLER GROUP, LLC

11. Install the needle bearing.

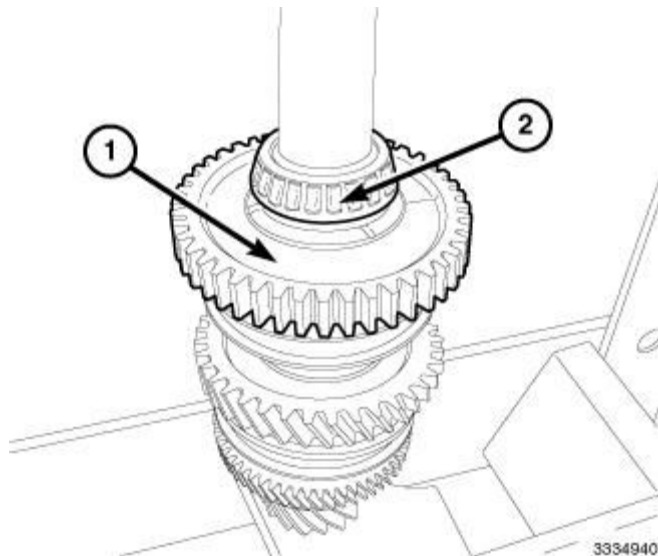


Fig. 214: Reverse Gear & Rear Bearing
Courtesy of CHRYSLER GROUP, LLC

12. Install the reverse gear (1) and the rear bearing (2) using (special tool #W-262, Installer, Bearing).
13. Install a **new** rear bearing retention bolt, tighten to 110 N.m (81 ft. lbs.).

SWITCH, BACKUP LAMP

REMOVAL

REMOVAL

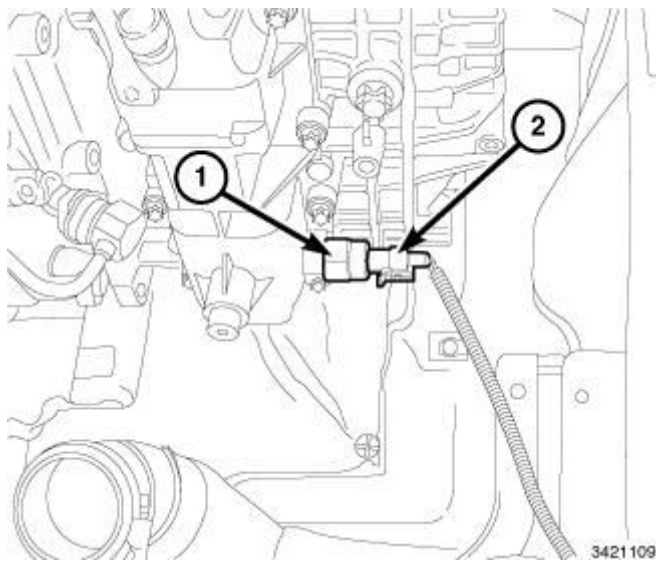


Fig. 215: Backup Lamp Switch Connector & Backup Lamp Switch
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect battery negative cable.
2. Remove the air cleaner body. Refer to **BODY, AIR CLEANER, REMOVAL** .
3. Disconnect backup lamp switch connector (2).
4. Remove backup lamp switch (1).

INSTALLATION

INSTALLATION

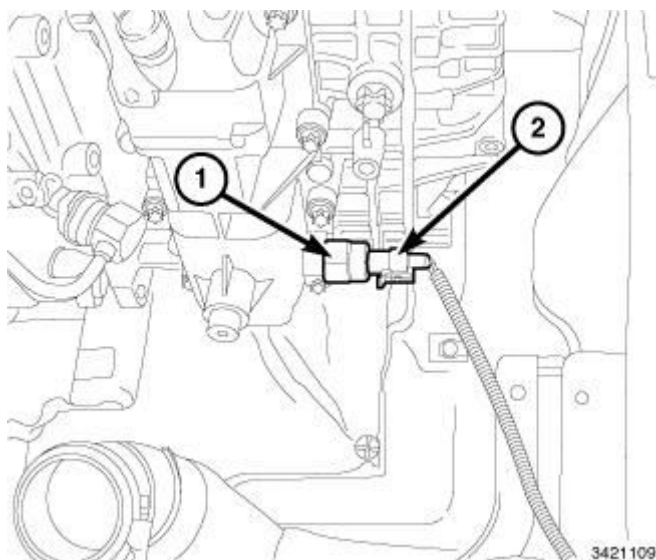


Fig. 216: Backup Lamp Switch Connector & Backup Lamp Switch
Courtesy of CHRYSLER GROUP, LLC

1. Install the backup lamp switch (1) and tighten to 38 N.m (28 lbs. ft.).
2. Connect backup lamp switch connector (2).
3. Install the air cleaner body. Refer to **BODY, AIR CLEANER, INSTALLATION**
4. Connect battery negative cable.

2014 RESTRAINTS

Service Information - Cherokee

WARNING

WARNING

WARNING: To avoid serious or fatal injury on vehicles equipped with the Supplemental Restraint System (SRS), never attempt to repair the electrically conductive circuits or wiring components related to the SRS for which there is no MOPAR wiring repair kit. It is important to use **ONLY** the recommended splicing kit and procedure. For applicable and available MOPAR wiring repair kits, please visit the MOPAR® Connector Web Site at the following address on the internet: (<http://dto.vftis.com/mopar/disclaimer.asp>). Inappropriate repairs can compromise the conductivity and current carrying capacity of those critical electrical circuits, which may cause SRS components not to deploy when required, or to deploy when not required. Only minor cuts or abrasions of wire and terminal insulation where the conductive material has not been damaged, or connector insulators where the integrity of the latching and locking mechanisms have not been compromised may be repaired using appropriate methods.

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to

disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid potential physical injury or damage to sensitive electronic circuits and systems, always disconnect and isolate the battery negative (ground) cable and the positive cable, then ground the positive cable to discharge the Occupant Restraint Controller (ORC) capacitor before performing any welding operations on the vehicle. Failure to take the proper precautions could result in accidental airbag deployment, possible damage to the Supplemental Restraint System (SRS) circuits and components, and possible damage to other electronic circuits and components. Whenever a welding process is being performed within 12 inches (30 centimeters) of an electronic module or wiring harness, then that module or harness should be relocated out of the way, or disconnected. Always protect against component or vehicle damage from weld spatter by using weld blankets and screens.

WARNING: To avoid serious or fatal injury, do not attempt to dismantle an airbag unit or tamper with its inflator. Do not puncture, incinerate or bring into contact with electricity. Do not store at temperatures exceeding 93°C (200°F). An airbag inflator unit may contain sodium azide and potassium nitrate. These materials are poisonous and extremely flammable. Contact with acid, water, or heavy metals may produce harmful and irritating gases (sodium hydroxide is formed in the presence of moisture) or combustible compounds. An airbag inflator unit may also contain a gas canister pressurized to over 17.24 kPa (2500 psi). Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: To avoid serious or fatal injury when handling a seat belt tensioner retractor or buckle, proper care should be exercised to keep fingers out from under the retractor or buckle cover and away from the seat belt webbing or cable where it exits from the retractor or buckle cover.

WARNING: To avoid serious or fatal injury, replace all Supplemental Restraint System (SRS) components only with parts specified in the Chrysler Mopar® Parts Catalog. Substitute parts may appear interchangeable, but internal differences may result in inferior occupant protection.

WARNING: To avoid serious or fatal injury, the fasteners, screws, and bolts originally used for the Supplemental Restraint System (SRS) components must never be replaced with any substitutes. These fasteners have special coatings and are specifically designed for the SRS. Anytime a new fastener is needed, replace it with the correct fasteners provided in the service package or specified in the Chrysler Mopar® Parts Catalog.

WARNING: To avoid serious or fatal injury when a steering column has an airbag unit attached, never place the column on the floor or any other surface with the steering wheel or airbag unit face down. Failure to follow these instructions may result in possible serious or fatal injury.

DESCRIPTION

SUPPLEMENTAL RESTRAINT SYSTEM

A Supplemental Restraint System (SRS) is standard factory-installed safety equipment on this vehicle. Available supplemental occupant restraints for this vehicle include both active and passive types. Active restraints are those which require the vehicle occupants to take some action to employ, such as fastening and adjusting a seat belt; while passive restraints require no action by the vehicle occupants to be employed. Additional details of each of these subsystems of the SRS can be found elsewhere within this service information.

ACTIVE RESTRAINTS

The active restraints for this vehicle include:

- **Child Restraint Anchors** - All vehicles are equipped with three, fixed-position child seat upper tether anchors for the rear seating. Two anchors are integral to the back of the left (60 percent) rear seat back panel, and one is integral to the right (40 percent) rear seat back panel. Two lower anchors are also provided for each outboard rear seating position. The lower anchors are integral to each rear seat stanchion assembly on the rear floor panel and are accessed from the front of the rear seat where the seat back meets the seat cushion.
- **Front Seat Belts** - Both front seating positions are equipped with three-point seat belt systems employing a lower B-pillar mounted inertia latch-type emergency locking retractor, a height-adjustable upper B-pillar mounted turning loop, a fixed lower seat belt anchor buckle secured to an anchor latch plate on the inner sill near the base of the B-pillar and a traveling end-release seat belt buckle secured to a bracket near the back of the upper inboard seat track. The driver and passenger side front seat belt buckles include an integral seat belt switch that detects whether the front seat belts have been fastened.
- **Rear Seat Belts** - All three rear seating positions are equipped with three-point seat belt systems. The outboard rear seating position belts employ a C-pillar mounted inertia latch-type emergency locking retractors, fixed position upper C-pillar mounted turning loops and fixed lower seat belt anchors secured to the lower C-pillars. The rear center seating position has an inertia latch-type emergency locking retractor that is secured within the left (60 percent) rear seat back. The rear center seating position belt lower anchor is secured to the traveling left rear seat cushion frame along with the left outboard and center end-release seat belt buckles. The right outboard seating position also has a end-release seat belt buckle secured to the traveling right rear seat cushion frame. In vehicles manufactured for certain export markets, each rear seat belt buckle includes an integral seat belt switch that detects whether the rear seat belts have been fastened.

PASSIVE RESTRAINTS



8098029e

Fig. 1: SRS Logo

Courtesy of CHRYSLER GROUP, LLC

The passive restraints available for this vehicle include the following:

- **Active Head Restraints** - Inertia activated Active Head Restraints (AHR) are standard equipment for both front seating positions in this vehicle.
- **Dual Front Airbags** - A multistage Driver AirBag (DAB) and front Passenger AirBag (PAB) are used in this vehicle. This airbag system consists of passive, inflatable, Supplemental Restraint System (SRS) components and vehicles with this equipment can be readily identified by the **SRS - AIRBAG** logo molded into the DAB trim cover in the center of the steering wheel and also into the PAB area on the top of the instrument panel above the glove box. Vehicles with the airbag system can also be identified by the airbag indicator, which will illuminate in the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) from four to six seconds as a bulb test each time the status of the ignition switch transitions to On. Pyrotechnic-type driver and passenger front seat belt retractors and anchor buckle tensioners also work in conjunction with the dual front and side curtain airbags.
- **Knee Airbags** - The front airbag system also includes driver and passenger front Knee AirBags (KAB) (also known as Inflatable Knee Blockers/IKB) that are located just below the lower instrument panel reinforcements. These airbags are also passive, inflatable, SRS components and vehicles with this equipment can be readily identified by the **SRS - AIRBAG** logo molded into the instrument panel trim just above each airbag location.
- **Front Seat Airbags** - Front seat integrated Seat AirBags (SAB) (also known as pelvic and thoracic airbags) are standard equipment in these vehicles. This airbag system consists of passive, inflatable SRS components and vehicles with this equipment can be readily identified by a sewn tag with the **SRS - AIRBAG** logo located on the outboard side of the front seat back trim cover.
- **Rear Seat Airbags** - Rear seat integrated Seat AirBags (SAB) (also known as pelvic and thoracic airbags) are optional equipment in these vehicles. This airbag system consists of passive, inflatable SRS components and vehicles with this equipment can be readily identified by a sewn tag with the **SRS - AIRBAG** logo located on the outboard sides of the rear seat cushion trim cover.
- **Side Curtain Airbags** - Side curtain airbags (also known as Side AirBag Inflatable Curtains/SABIC) are standard equipment in this vehicle. This airbag system consists of passive, inflatable SRS components and vehicles with this equipment can be readily identified by a molded identification **SRS - AIRBAG**

logo located near the top of each B-pillar trim panel.

The SRS includes the following major components, which are described in further detail elsewhere in this service information:

- **Active Head Restraints** - One Active Head Restraint (AHR) is located atop each front seat back unit.
- **Airbag Indicator** - The airbag indicator is integral to the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC), which is located on the instrument panel in front of the driver.
- **Clockspring** - The clockspring is located near the top of the steering column, directly beneath the steering wheel.
- **Driver Airbag** - The Driver AirBag (DAB) is located in the center of the steering wheel, beneath the DAB trim cover.
- **Front Impact Sensor** - Two front impact sensors are used on vehicles equipped with dual front airbags, one left side and one right side. One sensor is located on the back side of the Front End Module (FEM) carrier, just outboard of each side of the cooling module.
- **Knee Airbags** - This vehicle is equipped with Knee AirBags (KAB) (also known as Inflatable Knee Blockers/IKB). The KAB are mounted below the lower instrument panel reinforcements on each side of the vehicle.
- **Occupant Classification System** - Vehicles manufactured for domestic markets have a Occupant Classification System (OCS). The OCS includes a Seat Weight Sensor (SWS) bladder, a pressure hose and an Occupant Classification Module (OCM) integral to the calibrated passenger front seat cushion.
- **Occupant Detection Sensor** - Vehicles manufactured for export markets have a Occupant Detection Sensor (ODS) located on the top of the seat cushion foam of the passenger side front seat.
- **Occupant Restraint Controller** - The Occupant Restraint Controller (ORC) is located on the floor panel transmission tunnel, between the dash panel and the instrument panel center stack support.
- **Passenger Airbag** - The Passenger AirBag (PAB) is located in the instrument panel, beneath the instrument panel cover and above the glove box on the passenger side of the vehicle.
- **Front Seat Airbag** - A front Seat AirBag (SAB) (also known as pelvic and thoracic airbag) is secured to each outboard front seat back frame, where it is concealed beneath the seat back trim cover and foam.
- **Rear Seat Airbag** - The optional rear Seat AirBags (SAB) (also known as pelvic and thoracic airbags) are secured to each outboard end of the rear seat cushion pan, where they are concealed beneath the seat cushion trim cover and foam.
- **Seat Belt Tensioner** - A seat belt tensioner is integral to both front seat belt retractors and both front seat belt anchor buckle units. The seat belt retractor tensioner units are secured to each lower inner B-pillar and are concealed behind the lower B-pillar trim. The seat belt anchor buckle tensioner units are located on the inner sill near the base of the B-pillar and are concealed behind the inner sill trim.
- **Seat Track Position Sensor** - There are two Seat Track Position Sensors (STPS). One sensor is located on the inboard side of one of the seat adjuster tracks on both the driver and the passenger front seats.
- **Side Curtain Airbag** - A standard equipment side curtain airbag (also known as a Side AirBag Inflatable Curtain/SABIC) is secured to each inside roof side rail above the headliner, and extends from the A-pillar to just beyond the C-pillar.
- **Side Impact Sensor** - Six side impact sensors are used on vehicles equipped with side curtain airbags, three on each side of the vehicle. One acceleration-type sensor is located behind the B-pillar trim near the

base of each B-pillar, and one acceleration-type sensor is located behind the quarter panel trim near the base of each C-pillar. One pressure-type sensor is located on each front door hardware carrier panel, concealed behind each front door inside trim panel.

The ORC, the IPC and the OCM each contain a microcontroller and programming that allow them to communicate with each other using the Controller Area Network (CAN) data bus. This method of communication is used by the ORC for control of the airbag indicator in the IPC. Refer to **COMMUNICATION, DESCRIPTION**.

Hard wired circuitry connects the SRS components to each other through the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system, and to the SRS components through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin out and location views for the various wire harness connectors, splices and grounds.

OPERATION

SUPPLEMENTAL RESTRAINT SYSTEM

The Supplemental Restraint System (SRS) is comprised of two primary subsystems: Active Restraints and Passive Restraints. Additional operational details on each of these subsystems of the SRS can be found elsewhere within this service information.

ACTIVE RESTRAINTS

The primary passenger restraints in this or any other vehicle are the standard equipment factory-installed seat belts and child restraint anchors. Seat belts and child restraint anchors are referred to as an active restraint because the vehicle occupants are required to physically fasten and properly adjust these restraints in order to benefit from them.

PASSIVE RESTRAINTS

The passive restraints are referred to as Supplemental Restraint System (SRS) components because they were designed and are intended to enhance the protection for the occupants of the vehicle **only** when used in conjunction with the seat belts. They are referred to as passive restraints because the vehicle occupants are not required to do anything to make them operate; however, the vehicle occupants must be wearing their seat belts in order to obtain the maximum safety benefit from the factory-installed SRS components. In addition, each front seat occupant must have their Active Head Restraint (AHR) unit properly adjusted in order to obtain its maximum safety benefit.

The SRS electrical circuits are continuously monitored and controlled by a microcontroller and software contained within the Occupant Restraint Controller (ORC). An airbag indicator in the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) illuminates from four to six seconds as a bulb test each time the status of the ignition switch transitions to On or Start. Following the bulb test, the airbag indicator is turned

On or Off by the ORC to indicate the status of the SRS. If the airbag indicator comes On at any time other than during the bulb test, it indicates that there is a problem in the SRS electrical circuits. Such a problem may cause airbags not to deploy when required, or to deploy when not required.

Deployment of the SRS components depends upon the angle and severity of an impact. Deployment is not based upon vehicle speed; rather, deployment is based upon the rate of deceleration as measured by the forces of gravity (also known as G forces) upon the acceleration-type impact sensors, or by a pressure wave within a door as measured by the pressure-type impact sensor. When an impact is severe enough, the microcontroller within the ORC signals the inflator of the appropriate airbag units to deploy their airbag cushions. The Occupant Classification System (OCS) monitors the passenger side front seat to determine whether or not the passenger side front seat is occupied and, if the seat is occupied, classifies the size of the occupant. The Occupant Classification Module (OCM) then provides an additional logic input that is used by the ORC to determine the appropriate force with which the Passenger AirBag (PAB) and seat belt tensioner should be deployed.

The front seat belt retractor tensioners, front seat belt anchor buckle tensioners, the front seat belt adaptive load limiters and the Knee AirBags (KAB) (also known as the Inflatable Knee Blockers/IKB) are provided with a deployment signal by the ORC in conjunction with the front airbags. The side curtain airbags (also known as the Side AirBag Inflatable Curtains/SABIC) and the Seat AirBags (SAB) (also known as pelvic and thoracic airbags) are provided with a deployment signal individually by the ORC based upon a side impact sensor input for the same side of the vehicle. The ORC also contains a rollover sensor. Should the vehicle roll over and not cause any impact sensor to signal the need for a deployment, the rollover sensor in the ORC will deploy the SABIC units, the SAB units and under certain conditions, will also actuate the front seat belt retractor and anchor buckle tensioners.

During a frontal vehicle impact, the KAB units work in concert with properly fastened and adjusted seat belts to restrain both the driver and the front seat passenger in the proper position for an airbag deployment. The KAB units also absorb and distribute the crash energy from the driver and the front seat passenger to the structure of the instrument panel. The seat belt tensioners remove the slack from the front seat belts to provide further assurance that the driver and front seat passenger are properly positioned and restrained for a front airbag deployment. The adaptive load limiters for the front seat belts allow the ORC to control the belt pressure applied to the chests of the front seat occupants based upon the impact sensor inputs.

Typically, the vehicle occupants recall more about the events preceding and following a collision than they do of an airbag deployment itself. This is because the airbag deployment and deflation occur very rapidly. In a typical 48 kilometer-per-hour (30 mile-per-hour) barrier impact, from the moment of impact until the airbags are fully inflated takes about 40 milliseconds. Within one to two seconds from the moment of impact, the airbags are almost entirely deflated. The times cited for these events are approximations, which apply only to a barrier impact at the given speed. Actual times will vary somewhat, depending upon the vehicle speed, impact angle, severity of the impact and the type of collision.

When the ORC monitors a problem in any of the SRS circuits or components, including the seat belt tensioners and adaptive load limiter units, it stores a fault code or Diagnostic Trouble Code (DTC) in its memory circuit and sends an electronic message to the IC to turn On the airbag indicator. The hard wired circuits between components related to the SRS may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and

location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the SRS or the electronic controls and communication between other modules and devices that provide features of the SRS. The most reliable, efficient and accurate means to diagnose the SRS or the electronic controls and communication related to SRS operation, as well as the retrieval or erasure of a DTC requires the use of a diagnostic scan tool and may also require the use of the SRS Load Tool special tool along with the appropriate Load Tool Jumpers and Adapters. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - SUPPLEMENTAL RESTRAINT SYSTEM

The hard wired circuits between modules and components related to the Supplemental Restraint System (SRS) may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the SRS or the electronic controls and communication between other modules and devices that provide features of the SRS. The most reliable, efficient and accurate means to diagnose the SRS or the electronic controls and communication related to SRS operation, as well as the retrieval or erasure of a DTC requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

In addition to a diagnostic scan tool that contains the latest version of the proper diagnostic software, certain diagnostic procedures for the SRS may require the use of the SRS Load Tool special tool along with the appropriate Load Tool Jumpers and Adapters. Refer to the appropriate diagnostic information.

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

STANDARD PROCEDURE

HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS

At no time should any source of electricity be permitted near the inflator on the back of a non-deployed airbag or seat belt tensioner. When carrying a non-deployed airbag, the trim cover or airbag cushion side of the unit should be pointed away from the body to minimize injury in the event of an accidental deployment. If the airbag

unit is placed on a bench or any other surface, the trim cover or airbag cushion side of the unit should be face up to minimize movement in the event of an accidental deployment.

When handling a non-deployed seat belt tensioner, take proper care to keep fingers out from under the retractor or buckle cover and away from the seat belt webbing or cable where it exits from the retractor or buckle cover. In addition, the Supplemental Restraint System (SRS) should be disarmed whenever any steering wheel, steering column, seat belt tensioner, airbag, impact sensor or instrument panel components require diagnosis or service. Failure to observe this warning could result in accidental airbag deployment and possible personal injury.

All damaged, ineffective or non-deployed airbags and seat belt tensioners which are replaced on vehicles are to be handled and disposed of properly. If an airbag or seat belt tensioner unit is ineffective or damaged and non-deployed, refer to the Hazardous Substance Control System for information regarding the potentially hazardous properties of the subject component and the proper safe handling procedures. Then dispose of all non-deployed and deployed airbags and seat belt tensioners in a manner consistent with state, provincial, local and federal regulations.

SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT

Any vehicle which is to be returned to use following a Supplemental Restraint System (SRS) component deployment must have the deployed restraints replaced. In addition, the following guidelines **MUST** be observed.

- **Following ANY major vehicle impact damage in the vicinity of an impact sensor or the ORC** - It is critical that the mounting surfaces and mounting brackets for the Occupant Restraint Controller (ORC), front impact sensors and side impact sensors located within the proximity of the impact damage be closely inspected and restored to their original conditions. Because the ORC and each impact sensor are used by the SRS to monitor or confirm the direction and severity of a vehicle impact, improper orientation or insecure fastening of these components may cause airbags not to deploy when required, or to deploy when not required.
- **If an active head restraint is deployed** - An inertia-based Active Head Restraint (AHR) unit that is undamaged following a deployment may be reset. These units are designed with the intention of reuse.
- **If the driver airbag is deployed** - If the Driver AirBag (DAB) has been deployed, the clockspring and the steering column must also be replaced.
- **If the knee airbags are deployed** - If the Knee AirBags (KAB) (also known as Inflatable Knee Blockers/IKB) have been deployed, the instrument panel steering column opening cover (left side) and the glove box (right side) must also be replaced.
- **If the passenger airbag is deployed** - If the Passenger AirBag (PAB) has been deployed, the instrument panel upper trim cover must also be replaced.
- **If a front seat airbag is deployed** - If a front Seat AirBag (SAB) (also known as a pelvic and thoracic airbag) has been deployed, the front seat back frame, the front seat back foam and the front seat back trim cover on the same side of the vehicle as the deployed airbag must also be replaced.
- **If a rear seat airbag is deployed** - If a rear Seat AirBag (SAB) (also known as a pelvic and thoracic airbag) has been deployed, the rear seat cushion foam and the rear seat cushion trim cover must also be replaced.

- **If a seat belt tensioner is deployed** - The seat belt retractor and anchor buckle tensioners as well as the adaptive load limiters are deployed in conjunction with the front airbags, but can also be deployed with front Seat AirBag (SAB) (also known as a pelvic and thoracic airbag) or side curtain airbags (also known as Side AirBag Inflatable Curtains/SABIC). The seat belt tensioners must be replaced if either front airbag has been deployed, and must be inspected if either front SAB or SABIC has been deployed.
- **If a side curtain airbag is deployed** - If a side curtain airbag (also known as a Side AirBag Inflatable Curtain/SABIC) has been deployed, the headliner as well as the deploy brackets on the upper B-pillars and the upper C and D-pillars and the trim on the upper A, B, C and D-pillars on the same side of the vehicle as the deployed airbag must also be replaced. On vehicles with an optional sunroof, the sunroof drain tubes and hoses must be closely inspected following a SABIC deployment.

The components identified with the deployed SRS components in the preceding list are not intended for reuse and will be damaged or weakened as a result of an airbag deployment, which may or may not be obvious during a visual inspection. All other vehicle components should be closely inspected following any SRS component deployment, but are to be replaced only as required by the extent of the visible damage incurred.

SQUIB CIRCUIT DAMAGE

In addition to the preceding guidelines, be aware that the heat created by the initiator during an airbag or tensioner deployment will cause collateral damage to the connected wiring (squib circuits) and connector insulators. There are two methods by which an airbag or seat belt tensioner may be connected to the vehicle electrical system. The first method involves a short pigtail harness and connector insulator that are integral to the airbag or tensioner unit and are replaced as a unit with the service replacement airbag or seat belt tensioner. This connection method typically requires no additional wiring repair following a deployment.

However, the second connection method involves a wire harness takeout and connector insulator that are connected directly to the airbag or tensioner initiator or squib. These direct-connect type take outs and connector insulators **MUST** be repaired following an airbag or seat belt tensioner deployment using the approved Supplemental Restraint System Wiring Repairs procedure.

AIRBAG SQUIB STATUS

Multistage airbags with multiple initiators (squibs) must be checked to determine that all squibs were used during the deployment event. The Driver AirBag (DAB) and Passenger AirBag (PAB) in this vehicle are deployed by electrical signals generated by the Occupant Restraint Controller (ORC) through the driver or passenger squib 1 and squib 2 circuits to the two initiators in the airbag inflators. Typically, both initiators are used and all potentially hazardous chemicals are burned during an airbag deployment event. However, it is possible for only one initiator to be used; therefore, it is always necessary to confirm that both initiators have been used in order to avoid the improper handling or disposal of potentially live pyrotechnic or hazardous materials. The following procedure should be performed using a diagnostic scan tool to verify the status of both airbag squibs before either deployed airbag is removed from the vehicle for disposal.

CAUTION: Deployed front airbags having two initiators (squibs) in the airbag inflator may or may not have live pyrotechnic material within the inflator. Do not dispose of these airbags unless you are certain of complete deployment. Refer to the Hazardous Substance Control System for information

regarding the potentially hazardous properties of the subject component and the proper safe handling procedures. Then dispose of all non-deployed and deployed airbags and seat belt tensioners in a manner consistent with state, provincial, local and federal regulations.

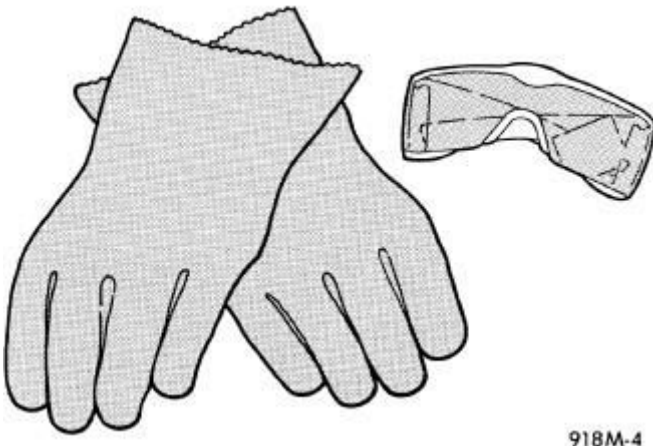
1. Be certain that the diagnostic scan tool contains the latest version of the proper diagnostic software. Connect the scan tool to the 16-way Data Link Connector (DLC). The DLC is located on the driver side lower edge of the instrument panel, outboard of the steering column.
2. Transition the ignition switch to the On status.
3. Using the scan tool, read and record the active (current) Diagnostic Trouble Code (DTC) data.

Using the active DTC information, refer to the **AIRBAG SQUIB STATUS** table to determine the status of both DAB squibs and both PAB squibs.

AIRBAG SQUIB STATUS		
IF THE ACTIVE DTC IS:	CONDITIONS	SQUIB STATUS
Driver or Passenger Squib 1 open	AND the stored DTC minutes for both Driver or Passenger squibs are within 15 minutes of each other	Both Squib 1 and 2 were used.
Driver or Passenger Squib 2 open		
Driver or Passenger Squib 1 open	AND the stored DTC minutes for Driver or Passenger Squib 2 open is GREATER than the stored DTC minutes for Driver or Passenger Squib 1 by 15 minutes or more	Squib 1 was used; Squib 2 is live.
Driver or Passenger Squib 2 open		
Driver or Passenger Squib 1 open	AND the stored DTC minutes for Driver or Passenger Squib 1 open is GREATER than the stored DTC minutes for Driver or Passenger Squib 2 by 15 minutes or more	Squib 1 is live; Squib 2 was used.
Driver or Passenger Squib 2 open		
Driver or Passenger Squib 1 open	AND Driver or Passenger Squib 2 open is NOT an active code	Squib 1 was used; Squib 2 is live.
Driver or Passenger Squib 2 open	AND Driver or Passenger Squib 1 open is NOT an active code	Squib 1 is live; Squib 2 was used.

NOTE: If none of the Driver or Passenger Squib 1 or 2 open are active codes, the status of the airbag squibs is unknown. In this case the airbag should be handled and disposed of as if the squibs were both live.

CLEANUP PROCEDURE

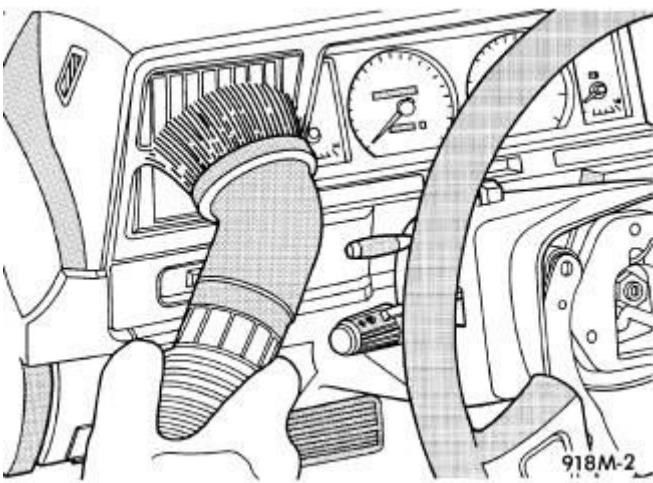


918M-4

Fig. 2: Clean Up Safety Equipment
Courtesy of CHRYSLER GROUP, LLC

Following a Supplemental Restraint System (SRS) component deployment, the vehicle interior will contain a powdery residue. This residue consists primarily of harmless particulate by-products of the small pyrotechnic charge that initiates the propellant used to deploy a SRS component. However, this residue may also contain traces of sodium hydroxide powder, a chemical by-product of the propellant material that is used to generate the inert gas that inflates the airbag. Since sodium hydroxide powder can irritate the skin, eyes, nose, or throat, be certain to wear safety glasses, rubber gloves, and a long-sleeved shirt during cleanup.

WARNING: To avoid serious or fatal injury, if you experience skin irritation during cleanup, run cool water over the affected area. Also, if you experience irritation of the nose or throat, exit the vehicle for fresh air until the irritation ceases. If irritation continues, see a physician.



918M-2

Fig. 3: Vacuuming Residual Powder
Courtesy of CHRYSLER GROUP, LLC

1. Begin the cleanup by using a vacuum cleaner to remove any residual powder from the vehicle interior.

Clean from outside the vehicle and work your way inside, so that you avoid kneeling or sitting on a non-cleaned area.

2. Be certain to vacuum the heater and air conditioning outlets as well. Run the heater and air conditioner blower on the lowest speed setting and vacuum any powder expelled from the outlets.

CAUTION: Deployed front airbags having two initiators (squibs) in the airbag inflator may or may not have live pyrotechnic material within the inflator. Do not dispose of these airbags unless you are certain of complete deployment. Refer to the AIRBAG SQUIB STATUS heading within this information. All damaged, ineffective, or non-deployed Supplemental Restraint System (SRS) components which are replaced on vehicles are to be handled and disposed of properly. If an airbag or seat belt tensioner unit is ineffective or damaged and non-deployed, refer to the Hazardous Substance Control System for information regarding the potentially hazardous properties of the subject component and the proper safe handling procedures. Then dispose of all non-deployed and deployed airbags and seat belt tensioners in a manner consistent with state, provincial, local and federal regulations.

3. Next, remove the deployed SRS components from the vehicle. Refer to the appropriate service removal procedures.
4. You may need to vacuum the interior of the vehicle a second time to recover all of the powder.

SUPPLEMENTAL RESTRAINT STORAGE

Airbags and seat belt tensioners must be stored in their original, special container until they are used for service. Also, they must be stored in a clean, dry environment away from sources of extreme heat, sparks and high electrical energy. Always place or store any airbag on a surface with its trim cover or airbag cushion side facing up, to minimize movement in case of an accidental deployment.

SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

NOTE: The following procedure should be performed using a diagnostic scan tool to verify proper Supplemental Restraint System (SRS) operation following the

service or replacement of any SRS component. Refer to the appropriate diagnostic procedures.

1. During the following test, the negative cable of the battery remains disconnected and isolated, as it was during the Supplemental Restraint System (SRS) component removal and installation procedures.
2. Be certain that the diagnostic scan tool contains the latest version of the proper diagnostic software. Connect the scan tool to the 16-way Data Link Connector (DLC). The DLC is located on the driver side lower edge of the instrument panel, near the steering column opening cover and outboard of the steering column.
3. Transition the status of the ignition switch (also known as the Wireless Ignition Node/WIN, Keyless Ignition Node/KIN or IGnition Node Module/IGNM) to On and exit the vehicle with the scan tool.
4. Check to be certain that nobody is in the vehicle, then reconnect the negative cable to the battery.
5. Using the scan tool, read and record the active (current) Diagnostic Trouble Code (DTC) data.
6. Next, use the scan tool to read and record any stored (historical) DTC data.
7. If any DTC is found in Step 5 or Step 6, refer to the appropriate diagnostic information.
8. Use the scan tool to erase the stored DTC data. If any problems remain, the stored DTC data will not erase. Refer to the appropriate diagnostic information to diagnose any stored DTC that will not erase. If the stored DTC information is successfully erased, go to Step 9.
9. Transition the status of the ignition switch to Off for about 15 seconds, and then back to On. Observe the airbag indicator in the instrument cluster. It should light from four to six seconds, and then go out. This indicates that the SRS is functioning normally and that the repairs are complete. If the airbag indicator fails to light, or lights and stays On, there is still an active SRS fault or malfunction. Refer to the appropriate diagnostic information to diagnose the problem.

SUPPLEMENTAL RESTRAINT SYSTEM WIRING REPAIRS

It is important when repairing any Supplemental Restraint System (SRS) electrical circuits to use the recommended splicing kit and procedure. For applicable and available MOPAR wiring repair kits, please visit the MOPAR Connector Web Site at the following address on the internet:
(<http://dto.vftis.com/mopar/disclaimer.asp>).

This recommended procedure involves crimping the wires together with a splice band, soldering the crimped connection and, finally, sealing and protecting the repair. The crimp and solder ensure a strong mechanical bond that will always pass a pull test while also maintaining the conductivity and current carrying capacity of the circuit. The adhesive sealant and heat shrink tubing ensures the splice repair will perform as well or better than the original wire and be safe from potential corrosion or short circuits.

There is no limit to the number of splice repairs that can be made in one harness using this procedure. However, as has been past practice, multiple adjacent splices should be offset from each other. This wiring splice repair procedure is approved for harness side repairs only. Repairs and splices to pigtail wires on SRS components such as airbag units, seat belt tensioner units or clocksprings are not approved or recommended.

REPAIR PROCEDURE

CAUTION: If additional wire is needed when making a splice repair to any wire, it is important that the same or next larger size wire gauge be used. Refer to the appropriate wiring diagram for the original wire gauge size.

1. Remove 13 millimeters (0.50 inch) of insulation from each wire that needs to be spliced.

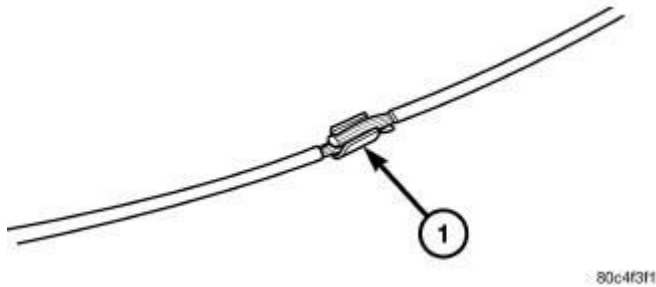


Fig. 4: Splice Band

Courtesy of CHRYSLER GROUP, LLC

2. Place a piece of adhesive sealant-lined heat shrink tubing (Part Number 04778570 or equivalent) over the wire on one side of the splice. Be certain the length of tubing will be sufficient to cover and seal the entire repair area.
3. Place the strands of the wires being spliced so that they are overlapping each other within the splice band (1).

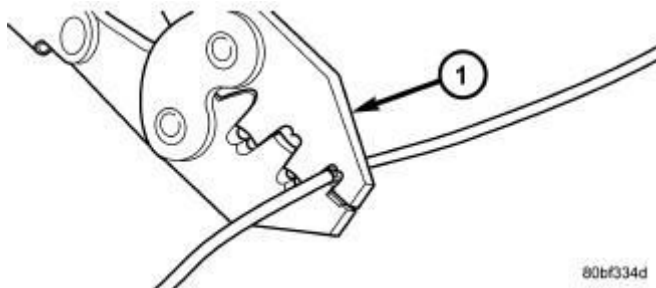


Fig. 5: Crimping Tool

Courtesy of CHRYSLER GROUP, LLC

4. Using a crimping tool (1) (MOPAR Part Number 05019912AA, Miller Special Tool Number (special tool #10042, Crimper, Wire/Terminal) or equivalent) crimp the splice band and wires together securely.

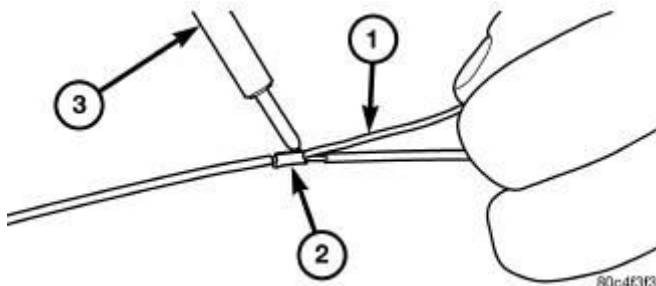
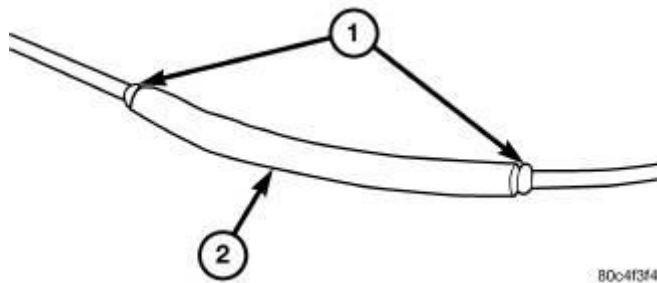


Fig. 6: Solder Splice

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Never use acid core solder for electrical wiring repairs.

5. Using rosin core type solder (1) only and a suitable soldering iron (3), solder the wire and splice band connection (2) together.

**Fig. 7: Heat Shrink Tube**

Courtesy of CHRYSLER GROUP, LLC

6. Center the heat shrink tubing (2) over the splice joint repair and heat using a suitable heat gun. Heat the joint until the tubing is tightly sealed and sealant (1) begins to ooze out of both ends of the tubing.

SPECIFICATIONS

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

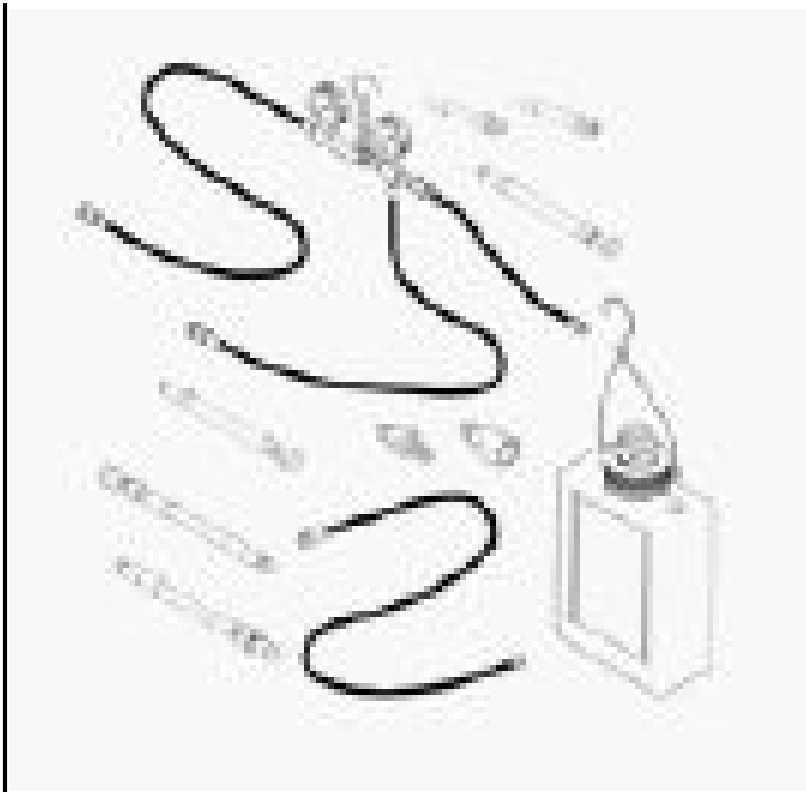
TORQUE SPECIFICATIONS			
DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Seat Belt Turning Loop Height Adjuster Screws	45	33	-
Seat Belt Turning Loop To Height Adjuster Nuts	45	33	-
Inflatable Knee Blocker To Instrument Panel Nuts	9	-	80
Passenger Airbag To Instrument Panel Structural Support Screws	9	-	80
Front Seat Airbag To Seat Back Frame Nuts	10	-	88
Rear Seat Airbag To Rear Seat Cushion Frame Nuts	7	-	62
Rear Seat Airbag Initiator Cover Screw	3	-	27
Rear Seat Airbag Tether Anchor Clip			

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Screw	5	-	44
Side Curtain Airbag To Inner Roof Rail Screws	7	-	62
Side Curtain Airbag Front Tether Clip Screw	7	-	62
Side Curtain Airbag Rear Tether Clip Screw	7	-	62
Front Seat Belt Anchor Tensioner To Inner Sill Screws	45	33	-
Front Seat Belt Buckle Lower Anchor To Seat Screws	45	33	-
Rear Seat Belt Buckle Lower Anchor To Floor Panel Nuts	40	30	-
Occupant Restraint Controller To Floor Panel Nuts	8	-	71
Front Seat Belt Retractor To Inner B-Pillar Screws	58	43	-
Front Seat Belt Turning Loop To Height Adjuster Nut	45	33	-
Rear Seat Belt Retractor To Shelf Panel Nut	45	33	-
Rear Seat Belt Lower Anchor To Floor Panel Nut	45	33	-
Front Impact Sensor To Front End Module Screws	11	-	97
Side Impact Sensor To Inner B-Pillar Nuts	11	-	97
Side Impact Sensor To Inner C-Pillar Nuts	11	-	97
Side Impact Sensor To Front Door Hardware Module Carrier Screws	2.4	-	21

SPECIAL TOOLS**SPECIAL TOOLS**

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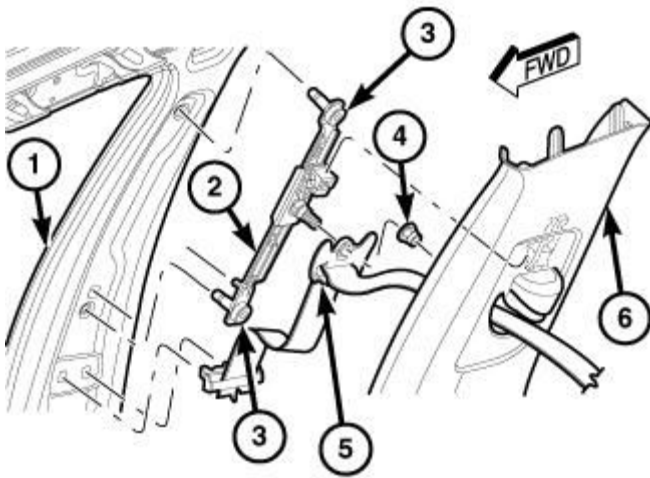
10042 - Crimper, Wire/Terminal
(Originally Shipped In Kit Number(s)
10042.)

ADJUSTER, SEAT BELT TURNING LOOP

REMOVAL

REMOVAL

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog.



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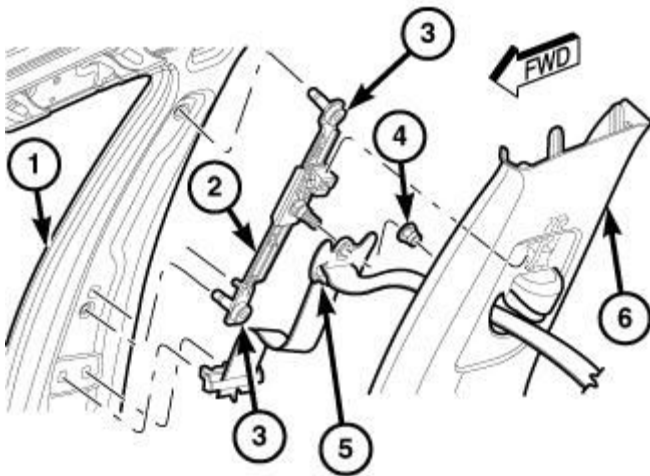
Fig. 8: B-Pillar, Height Adjuster, Screws, Nut, Seat Belt Turning Loop & Upper Trim
Courtesy of CHRYSLER GROUP, LLC

1. Remove the upper trim (6) from the inside of the B-pillar (1). Refer to **PANEL, B-PILLAR TRIM, REMOVAL**.
2. Remove the nut (4) that secures the seat belt turning loop (5) to the stud on the height adjuster (2).
3. Remove the seat belt turning loop from the height adjuster.
4. Remove the two screws (3) that secure the height adjuster to the upper inner B-pillar.
5. Remove the seat belt turning loop adjuster from the B-pillar.

INSTALLATION

INSTALLATION

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog.



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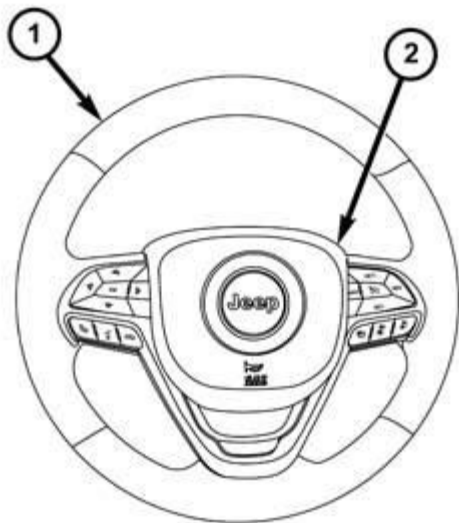
Fig. 9: B-Pillar, Height Adjuster, Screws, Nut, Seat Belt Turning Loop & Upper Trim
 Courtesy of CHRYSLER GROUP, LLC

1. Position the seat belt turning loop height adjuster (2) to the inside of the upper inner B-pillar (1).
2. Install and tighten the two screws (3) that secure the adjuster to the B-pillar. Tighten the screws to 45 N.m (33 ft. lbs.).
3. Position the seat belt turning loop (5) onto the stud of the height adjuster on the B-pillar. Be certain that the seat belt webbing between the retractor and the turning loop is not twisted.
4. Install and tighten the nut (4) that secures the turning loop to the height adjuster. Tighten the nut to 45 N.m (33 ft. lbs.).
5. Reinstall the upper trim (6) onto the inside of the B-pillar. Refer to **PANEL, B-PILLAR TRIM, INSTALLATION**.

AIR BAG, DRIVER

DESCRIPTION

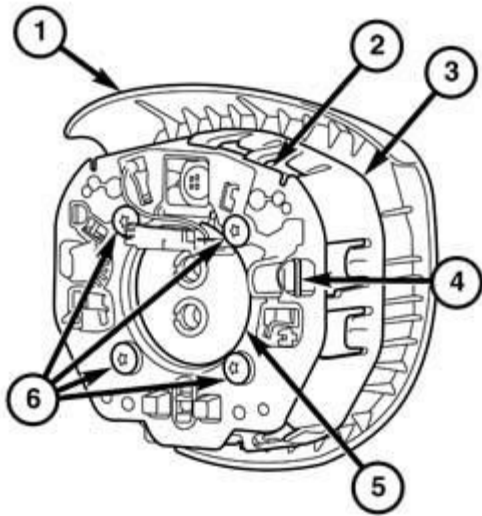
DESCRIPTION



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Fig. 10: Steering Wheel & Driver AirBag (DAB)
Courtesy of CHRYSLER GROUP, LLC

The injection molded, thermoplastic Driver AirBag (DAB) protective trim cover (2) is the most visible part of the DAB. The DAB is located in the center of the steering wheel (1), where it is secured by a spring wire retainer integral to the fixing plate to two hooks of the steering wheel armature within the hub cavity of the steering wheel. An injection molded, bright emblem with the Chrysler logo is applied to the center of the trim cover.



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Fig. 11: Driver AirBag (DAB) Components
Courtesy of CHRYSLER GROUP, LLC

Concealed beneath the DAB trim cover (1) are the folded airbag cushion, the airbag housing (3), the airbag inflator (5) and the retainers that secure the inflator to the housing. The airbag cushion, housing and inflator are secured within an integral receptacle molded into the back of the trim cover. The vertical walls of this receptacle have numerous integral window features that are engaged by numerous hook features around the perimeter of the DAB housing. Once the trim cover is fully seated onto the housing, it can only be removed by cutting it off. The DAB housing also has four well nuts, to which four screws (6) are fastened to secure the spring wire retainer (4) and the floating horn switch/mounting plate unit (2) to the back of the housing.

The DAB used in this vehicle is a multistage-type that complies with revised federal airbag standards to deploy with less force than those used in some prior vehicles. A radial deploying fabric airbag cushion with internal tethers is used. The airbag inflator is a dual-initiator, non-azide, pyrotechnic-type unit and is secured to the airbag housing.

Keyed and color-coded connector receptacles on the two inflator initiators and a third, non-azide, pyrotechnic-type Micro Gas Generator (MGG) inflator for the DAB active vent are integral to the airbag housing. The three keyed and color-coded connector receptacles are connected to the vehicle electrical system through three jacketed, two-wire pigtail harnesses from the clockspring.

The DAB cannot be repaired, and must be replaced if deployed, ineffective or in any way damaged. The DAB trim cover and the floating horn switch are serviced only as a unit with the DAB.

OPERATION

OPERATION

The multistage Driver AirBag (DAB) and the active vent (domestic market vehicles only) are deployed by electrical signals generated by the Occupant Restraint Controller (ORC) through the DAB squib 1, 2 and 3 circuits to the two initiators in the airbag inflator and the active vent inflator. By using two initiators and an active vent, the airbag can be deployed at multiple levels of force. The force level is managed by the ORC to suit the monitored impact conditions by providing one of several delay intervals between the electrical signals provided to the two initiators and the active vent. The longer the delay between the initiator signals and the later the active vent is released, the less forcefully the DAB will deploy.

When the ORC sends the proper electrical signals to each inflator initiator, the electrical energy generates enough heat to initiate a small pyrotechnic charge which ignites chemical pellets within the inflator. Once ignited, these chemical pellets burn rapidly and produce a large quantity of inert gas. The inflator is sealed to the back of the DAB housing and a diffuser in the inflator directs all of the inert gas into the airbag cushion, causing the cushion to inflate. As the cushion inflates, the DAB trim cover will split at predetermined breakout lines, then fold back out of the way. Following a deployment, the airbag cushion quickly deflates by venting the inert gas towards the instrument panel through discrete vents within the fabric used to construct the back (steering wheel side) panel of the airbag cushion.

The active vent is like a small airbag cushion within the airbag cushion except the active vent cushion slows the deflation of the primary cushion by partially blocking the vents in the primary cushion. The ORC monitors a seat track position sensor on the driver front seat. The ORC signals the active vent Micro Gas Generator (MGG) to deploy in a manner that provides the optimal airbag deployment force to reduce the possibility of an airbag-induced injury.

Some of the chemicals used to create the inert gas may be considered hazardous while in their solid state before they are burned, but they are securely sealed within the airbag inflator. Typically, both initiators are used and all potentially hazardous chemicals are burned during an airbag deployment event. However, it is possible for only one initiator to be used during a deployment due to a Supplemental Restraint System (SRS) fault; therefore, it is necessary to always confirm that both initiators have been used in order to avoid the improper disposal of potentially live pyrotechnic or hazardous materials. Refer to **STANDARD PROCEDURE**.

The inert gas that is produced when the chemicals are burned during a deployment is harmless. However, a small amount of residue from the burned chemicals may cause some temporary discomfort if it contacts the skin, eyes or breathing passages. If skin or eye irritation is noted, rinse the affected area with plenty of cool, clean water. If breathing passages are irritated, move to another area where there is plenty of clean, fresh air to breath. If the irritation is not alleviated by these actions, contact a physician.

The ORC monitors the condition of the DAB through circuit resistance, and will illuminate the airbag indicator in the instrument cluster and store a Diagnostic Trouble Code (DTC) for any fault that is detected. Proper diagnosis of the DAB inflator and squib circuits requires the use of a diagnostic scan tool and may also require the use of the SRS Load Tool special tool along with the appropriate Load Tool Jumpers and Adapters. Refer to the appropriate diagnostic information.

REMOVAL

REMOVAL

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable

the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury when removing a deployed airbag, rubber gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the airbag cushion and other interior surfaces. In large doses, these deposits may cause irritation to the skin and eyes.

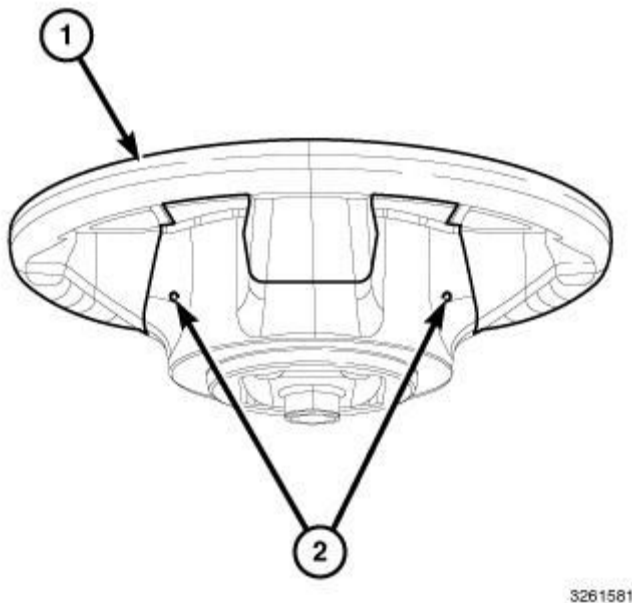


Fig. 12: Access Holes & Steering Wheel
Courtesy of CHRYSLER GROUP, LLC

NOTE: The following procedure is for replacement of an ineffective or damaged Driver AirBag (DAB). If the airbag is ineffective or damaged, but not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to **HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS**. If the DAB has been deployed, review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the airbag from the vehicle. Refer to **SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT**.

1. Disconnect and isolate the negative cable from the battery. Wait two minutes for the system capacitor to discharge before further service.

2. Locate the access holes (2) in the lower surface of the steering wheel (1) hub rear trim cover near each of the two horizontal spokes.

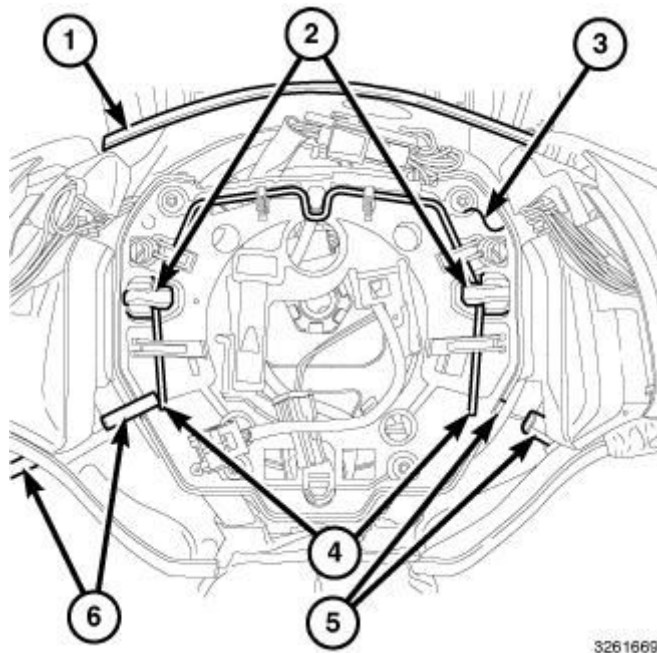


Fig. 13: Driver AirBag (DAB) Mounting/Horn Switch Plate, Retainer Spring, Hooks & Steering Wheel Hub Cavity

Courtesy of CHRYSLER GROUP, LLC

NOTE: The graphic for this procedure shows the Driver AirBag (DAB) mounting/horn switch plate (3) and the retainer spring (4) engaged under the hooks (2) of the armature within the steering wheel hub cavity (1) without the DAB trim cover, cushion, housing and inflator present. This was done to provide graphical clarity of the components involved in DAB retention. The DAB trim cover, cushion, housing and inflator can only be removed as a unit with the mounting/horn switch plate and retainer spring as outlined in the following procedure.

3. Insert an appropriately sized pin punch or Allen wrench through one of the steering wheel access holes. A guide and notch (5) integral to each side of the steering wheel hub rear trim cover (1) and the mounting/horn switch plate (3) will assist in directing the tool to the ends of the retainer spring (4).

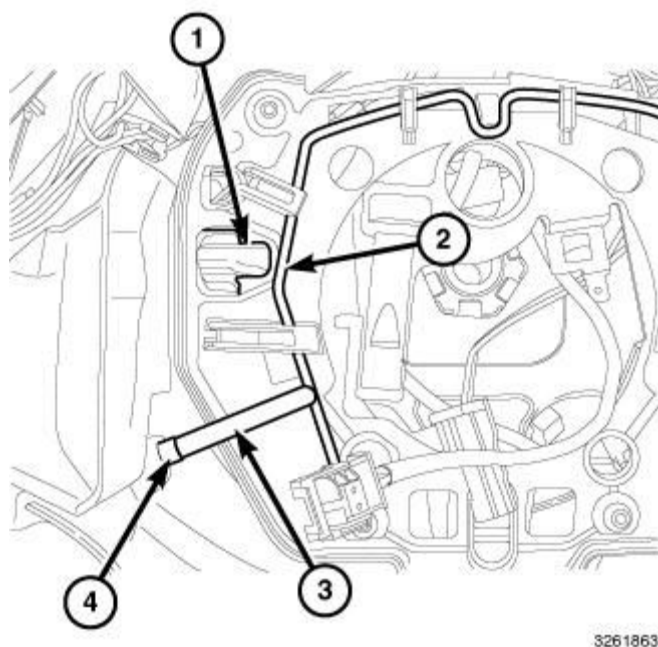


Fig. 14: Special Tool, Groove, Retainer Spring & Hook
Courtesy of CHRYSLER GROUP, LLC

4. When the tool (3) makes contact with the retainer spring (2), push inward (toward the steering column) on the tool far enough to disengage the retainer spring from under the hook (1) of the steering wheel armature.

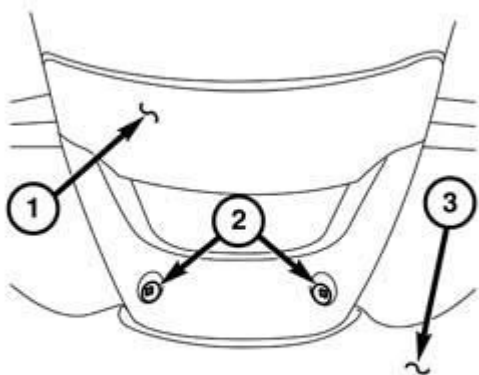
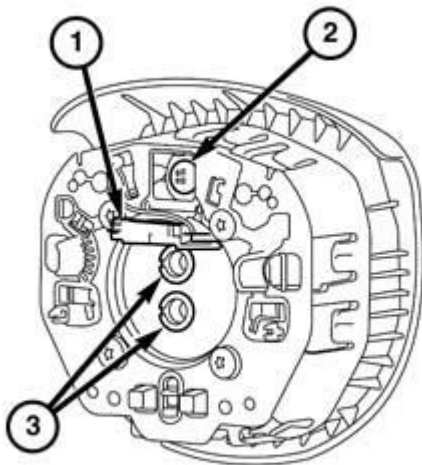


Fig. 15: Lower Rear Spoke Cover, Screws & Steering Wheel
Courtesy of CHRYSLER GROUP, LLC

NOTE: It is not necessary, but may prove helpful to remove the two screws (2) that secure the lower rear spoke cover (1) to the back of the steering wheel (3) and remove the cover. It will then be possible to observe the Allen wrench or pin punch contacting and releasing the retainer spring.

5. Pull the released side of the DAB away from the steering wheel far enough to insert a trim stick or another long and thin obstacle between the released side of the DAB trim cover and the steering wheel hub cavity. This will help to prevent the released end of the retainer spring from becoming accidentally engaged again, while the opposite end of the retainer spring is being released.
6. Repeat Steps 3 and 4 for the opposite end of the retainer spring.



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Fig. 16: View Of DAB Wiring Connections
Courtesy of CHRYSLER GROUP, LLC

7. Pull the DAB away from the steering wheel far enough to access the clockspring pigtail wire connections to the horn switch (1), the active vent (2 - domestic market vehicles only) and the DAB inflator initiators (3).
8. Disconnect the clockspring pigtail wire connector from the floating horn switch plate connector on the back of the switch plate.
9. On domestic market vehicles only, the clockspring DAB pigtail wire connector insulator is secured by an integral Connector Position Assurance (CPA) lock to the active vent connector receptacle, which is located on the back of the DAB housing. Pull the lock straight back from the connector insulator, then pull the insulator straight out from the connector receptacle to disengage and disconnect it.

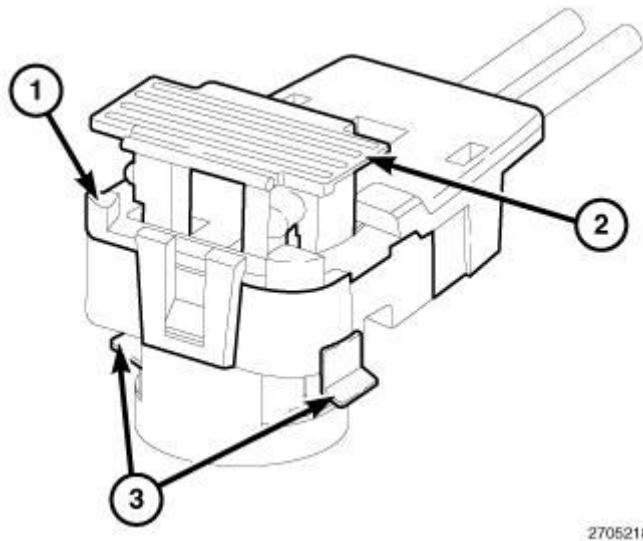


Fig. 17: Clockspring DAB Pigtail Wire Connector Insulators, Latches & Connector Position Assurance (CPA) Lock

Courtesy of CHRYSLER GROUP, LLC

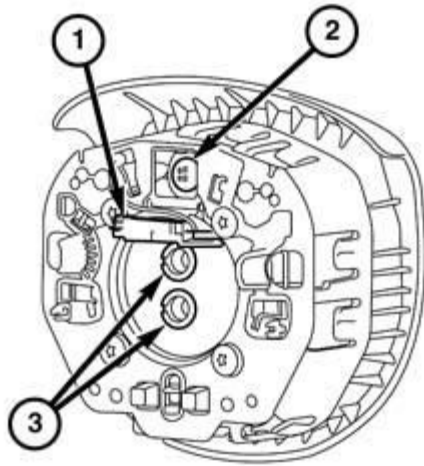
10. The clockspring DAB pigtail wire connector insulators (1) are secured by integral latches (3) and a CPA lock (2) to the airbag inflator connector receptacles, which are located on the back of the floating horn switch plate and the DAB housing. Pull the lock straight out from the connector insulator, then pull the insulators straight out from the connector receptacles to disengage and disconnect them.
11. Remove the DAB and floating horn switch plate from the steering wheel as a unit.
12. If the DAB has been deployed, the clockspring and the steering column must also be replaced. Refer to **CLOCKSPRING, REMOVAL**. Refer to **COLUMN, REMOVAL**.

INSTALLATION

INSTALLATION

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury, use extreme care to prevent any foreign material from entering the Driver AirBag (DAB), or becoming entrapped between the DAB cushion and the DAB trim cover. Failure to observe this warning could result in occupant injuries upon airbag deployment.



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Fig. 18: View Of DAB Wiring Connections
Courtesy of CHRYSLER GROUP, LLC

NOTE: The following procedure is for replacement of an ineffective or damaged Driver AirBag (DAB). If the airbag is ineffective or damaged, but not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to **HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS**. If the DAB has been deployed, review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the airbag from the vehicle. Refer to **SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT**.

1. Position the Driver AirBag (DAB) and floating horn switch unit close enough to the steering wheel to access the clockspring pigtail wire connections to the horn switch (1), the active vent (2 - domestic market vehicles only) and the DAB inflator initiators (3).
2. Reconnect the clockspring pigtail wire connectors to the airbag inflator initiator connector receptacles by pressing straight in on the connector insulator. Be certain to engage each keyed and color-coded connector to the matching connector receptacle. Be certain that each connector is fully engaged in its receptacle, then push the Connector Position Assurance (CPA) lock straight into the connector to lock it into place.
3. For domestic market vehicles only, reconnect the clockspring pigtail wire connector to the DAB active vent connector receptacle on the back of the mounting and horn switch plate. Be certain that the connector is fully engaged in its receptacle, then slide the CPA lock straight into the connector to lock it into place.
4. Reconnect the clockspring wire harness connector to the floating horn switch connector on the back of the mounting/horn switch plate.

5. Carefully position the DAB and floating horn switch unit into the steering wheel hub cavity while tugging lightly upward on the clockspring pigtail wires for the airbag and tucking the wires into the upper hub cavity of the steering wheel. Be certain that none of the steering wheel wiring is pinched between the airbag housing or the horn switch and the steering wheel armature.
6. Using both hands, push firmly and evenly on both sides of the DAB trim cover until both ends of the spring retainer have snapped into place under the hooks within the hub cavity of the steering wheel.
7. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST**.

AIR BAG, KNEE BLOCKER

DESCRIPTION

DESCRIPTION

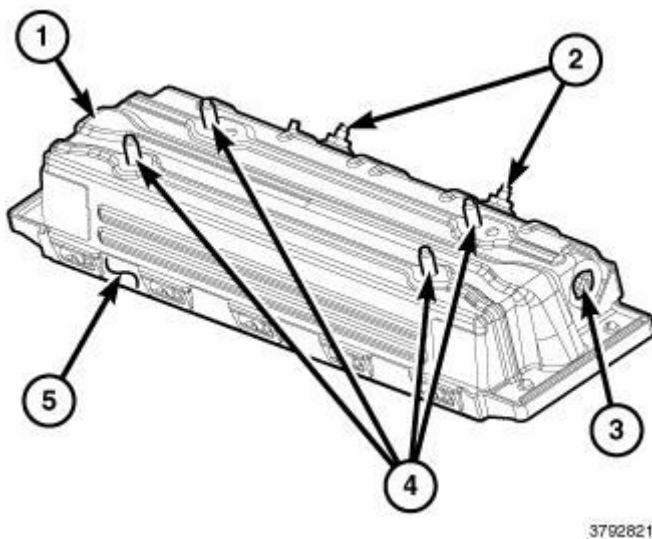


Fig. 19: Airbag Housing, Studs, Inflator Initiator & Protective Cover
Courtesy of CHRYSLER GROUP, LLC

Knee AirBags (KAB) (also known as Inflatable Knee Blockers/IKB) are used on both the driver and passenger sides of this vehicle when it is manufactured for domestic markets. Vehicles manufactured for export markets have only a driver side KAB. These airbags are passive, inflatable Supplemental Restraint System (SRS) components. Vehicles with this equipment may be readily identified by the **SRS - AIRBAG** logo located on the instrument panel steering column opening cover for the driver side and on the glove box door for the passenger side. The KAB units are concealed below the lower edge of the instrument panel, just beneath the steering column opening cover on the driver side or just beneath the glove box door on the passenger side.

The stamped metal airbag housing (1) is secured by four studs (4) with nuts to the stamped metal lower instrument panel reinforcement of the instrument panel support structure. A molded plastic protective cover (5) is secured over the folded airbag cushion by several hook formations stamped into the airbag housing that are engaged through window openings in tabs integral to the outer perimeter of the cover.

The airbag housing contains the airbag inflator and a heat shield. The airbag inflator is a single-initiator, non-azide hybrid-type unit that is secured to the housing by two studs (2) with nuts and sealed within the airbag housing. The airbags are connected to the vehicle electrical system through dedicated take outs and connector insulators of the instrument panel wire harness that connect directly to the inflator initiator (3) of each airbag.

The driver and passenger side KAB units are not interchangeable. The inflator initiators are on the opposite, inboard ends of the module housing and the mounting stud locations are offset to prevent each airbag unit from being installed in the improper location.

The KAB units cannot be repaired, and must be replaced if deployed, ineffective or in any way damaged. If the KAB units are deployed, the steering column opening cover and the glove box must also be replaced.

OPERATION

OPERATION

The Knee AirBags (KAB) (also known as Inflatable Knee Blockers/IKB) are deployed by electrical signals generated by the Occupant Restraint Controller (ORC) to which it is connected through a driver or passenger KAB line 1 (or squib) circuit to the initiator in the airbag inflator. The hybrid-type inflator assembly for each airbag contains a small canister of highly compressed inert gas. When the ORC sends the proper electrical signal to the airbag inflator, the electrical energy creates enough heat to ignite chemical pellets within the inflator.

Once ignited, these chemical pellets burn rapidly and produce the pressure necessary to rupture a containment disk in the inert gas canister. The inflator is sealed to the airbag cushion and a diffuser in the inflator directs all of the inert gas into the airbag cushion, causing the cushion to inflate. As the cushion inflates, the KAB protective cover will split at predetermined tear seam lines concealed on the underside of the cover, then fold open and out of the way.

The cushion protects the lower extremities of the vehicle driver or front seat passenger and helps to keep the seat occupant properly positioned for the Driver AirBag (DAB) or Passenger AirBag (PAB) deployment during a frontal impact collision. Following an airbag deployment, the KAB cushion quickly deflates by venting the inert gas through the loose weave of the fabric used to construct the instrument panel side of the airbag cushion, and the deflated cushion hangs down loosely from the lower instrument panel.

The ORC monitors the condition of the KAB through circuit resistance, and will illuminate the airbag indicator in the instrument cluster and store a Diagnostic Trouble Code (DTC) for any fault that is detected. Proper diagnosis of the KAB initiators and squib circuits requires the use of a diagnostic scan tool and may also require the use of the SRS Load Tool special tool along with the appropriate Load Tool Jumpers and Adapters. Refer to the appropriate diagnostic information.

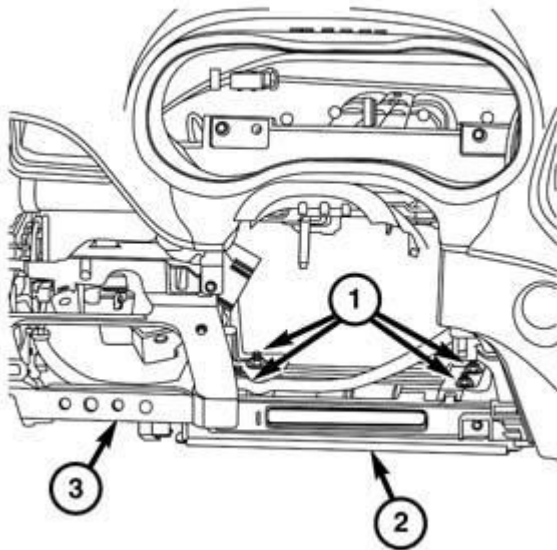
REMOVAL

DRIVER

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering

wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury when removing a deployed airbag, rubber gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the airbag cushion and other interior surfaces. In large doses, these deposits may cause irritation to the skin and eyes.



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Fig. 20: View Of Knee AirBag (KAB) Fasteners LH Side
Courtesy of CHRYSLER GROUP, LLC

NOTE: The following procedure is for replacement of an ineffective or damaged Knee AirBag (KAB) (also known as the Inflatable Knee Blocker/IKB). If the airbag is ineffective or damaged, but not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS. If the KAB has been deployed, review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the airbag from the vehicle. Refer to SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT.

1. Disconnect and isolate the negative cable from the battery. Wait two minutes for the system capacitor to

discharge before further service.

2. Remove the steering column opening cover from the instrument panel. Refer to **COVER, STEERING COLUMN OPENING, REMOVAL**.
3. Remove the four nuts (1) that secure the Knee AirBag (KAB) (2) to the lower reinforcement (3) of the instrument panel structural support.
4. Rotate the outboard end of the KAB downward so that the KAB is vertical and the instrument panel wire harness connection to the KAB faces upward.

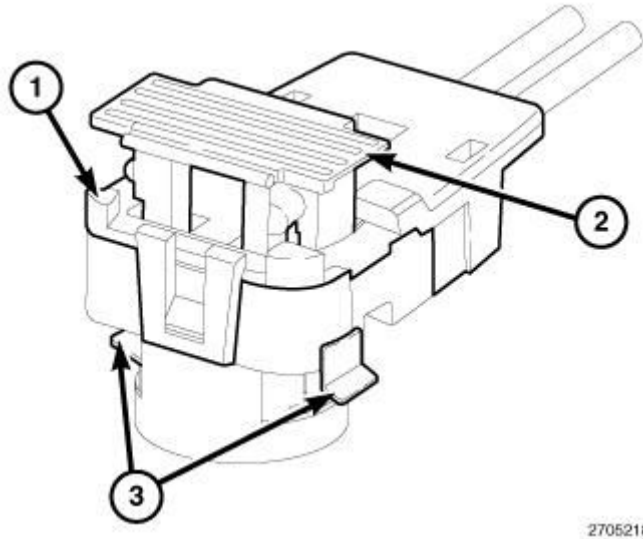


Fig. 21: Clockspring DAB Pigtail Wire Connector Insulators, Latches & Connector Position Assurance (CPA) Lock

Courtesy of CHRYSLER GROUP, LLC

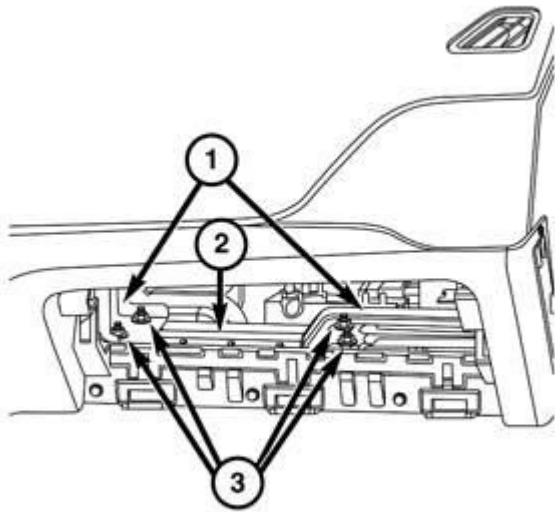
5. The KAB connector insulator (1) is secured by integral latches (3) and a Connector Position Assurance (CPA) lock (2) to the airbag inflator connector receptacle. Pull the lock straight out from the connector insulator, then pull the insulator straight out from the connector receptacle to disengage and disconnect it.
6. Remove the KAB from the vehicle.

PASSENGER

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury when removing a deployed airbag, rubber

gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the airbag cushion and other interior surfaces. In large doses, these deposits may cause irritation to the skin and eyes.



1011006177

Fig. 22: Knee AirBag (KAB) Fasteners RH Side
Courtesy of CHRYSLER GROUP, LLC

NOTE: The following procedure is for replacement of an ineffective or damaged Knee AirBag (KAB) (also known as the Inflatable Knee Blocker/IKB). If the airbag is ineffective or damaged, but not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS. If the KAB has been deployed, review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the airbag from the vehicle. Refer to SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT.

1. Disconnect and isolate the negative cable from the battery. Wait two minutes for the system capacitor to discharge before further service.
2. Remove the glove box from the instrument panel. Refer to GLOVE BOX, INSTRUMENT PANEL, REMOVAL.
3. Remove the four nuts (3) that secure the Knee AirBag (KAB) (2) to the lower reinforcement (1) of the instrument panel structural support.
4. Rotate the outboard end of the KAB unit downward so that the KAB is vertical and the instrument panel wire harness connection to the KAB faces upward.

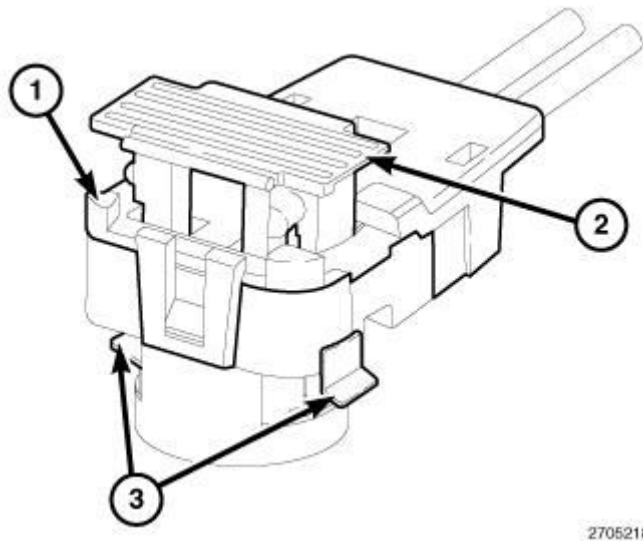


Fig. 23: Clockspring DAB Pigtail Wire Connector Insulators, Latches & Connector Position Assurance (CPA) Lock

Courtesy of CHRYSLER GROUP, LLC

5. The KAB connector insulator (1) is secured by integral latches (3) and a Connector Position Assurance (CPA) lock (2) to the airbag inflator connector receptacle. Pull the lock straight out from the connector insulator, then pull the insulator straight out from the connector receptacle to disengage and disconnect it.
6. Remove the KAB from the vehicle.

INSTALLATION

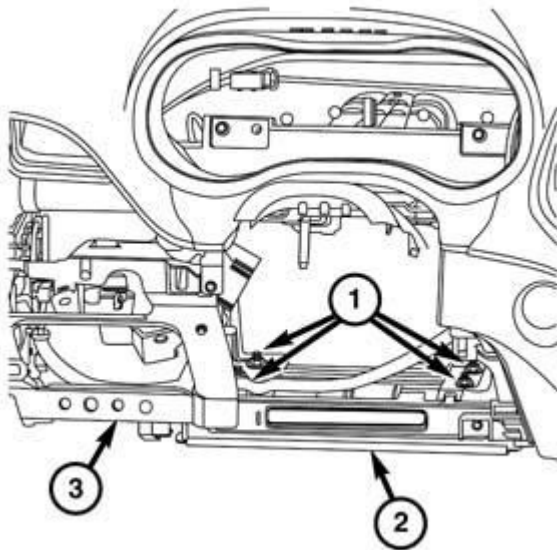
DRIVER

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury when removing a deployed airbag, rubber gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the airbag unit and other interior surfaces. In large doses, these deposits may cause irritation to the skin and eyes.

WARNING: To avoid serious or fatal injury, use extreme care to prevent any foreign material from entering the Inflatable Knee Blocker (IKB) airbag, or

becoming entrapped between the IKB airbag cushion and the IKB cover. Failure to observe this warning could result in occupant injuries upon airbag deployment.



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Fig. 24: View Of Knee AirBag (KAB) Fasteners LH Side
Courtesy of CHRYSLER GROUP, LLC

NOTE: The following procedure is for replacement of an ineffective or damaged Knee AirBag (KAB) (also known as the Inflatable Knee Blocker/IKB). If the airbag is ineffective or damaged, but not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS. If the KAB has been deployed, review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the airbag from the vehicle. Refer to SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT.

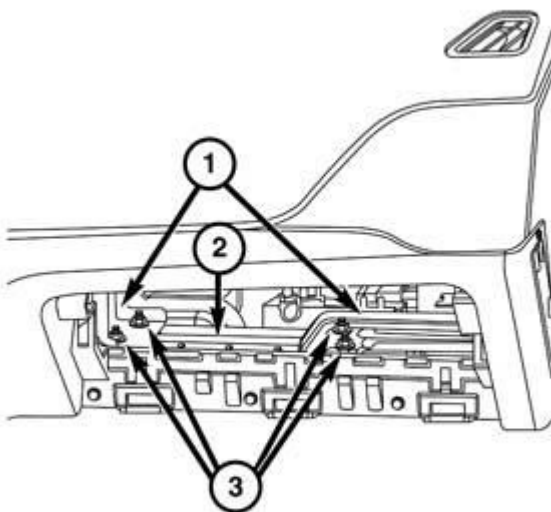
1. Position the Knee AirBag (KAB) (2) unit below the steering column opening of the instrument panel in a vertical orientation with the KAB inflator initiator connector receptacle facing upward.
2. Reconnect the connector insulator of the instrument panel wire harness take out for the KAB to the inflator initiator connector receptacle by pressing straight in on the connector. Be certain that the connector is fully engaged in its receptacle, then push the Connector Position Assurance (CPA) lock straight into the connector to lock it into place.
3. Carefully position the KAB unit to the lower reinforcement (3) of the instrument panel structural support. **Be certain the instrument panel wire harness take out for the KAB is routed behind the KAB and is not pinched between the KAB housing and the lower reinforcement of the instrument panel structural support.**

4. Install and tighten the four nuts (1) that secure the mounting studs of the KAB unit to the lower reinforcement of the instrument panel structural support. Tighten the nuts to 9 N.m (80 in. lbs.).
5. Reinstall the steering column opening cover onto the instrument panel. Refer to **COVER, STEERING COLUMN OPENING, INSTALLATION**.
6. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST**.

PASSENGER

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury, use extreme care to prevent any foreign material from entering the Inflatable Knee Blocker (IKB) airbag, or becoming entrapped between the IKB airbag cushion and the IKB cover. Failure to observe this warning could result in occupant injuries upon airbag deployment.



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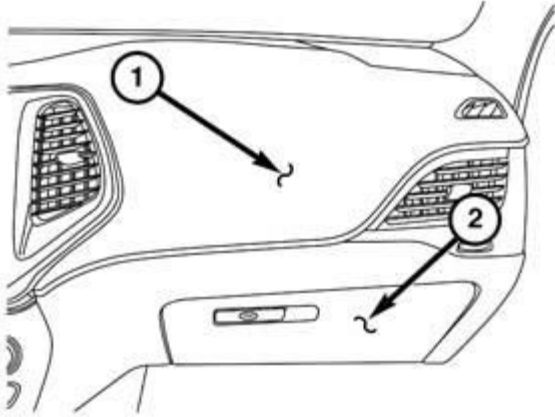
Fig. 25: Knee AirBag (KAB) Fasteners RH Side
Courtesy of CHRYSLER GROUP, LLC

- NOTE:** The following procedure is for replacement of an ineffective or damaged Knee AirBag (KAB) (also known as the Inflatable Knee Blocker/IKB). If the airbag is ineffective or damaged, but not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to **HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS**. If the KAB has been deployed, review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the airbag from the vehicle. Refer to **SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT**.
1. Position the Knee AirBag (KAB) (2) unit below the glove box opening of the instrument panel in a vertical orientation with the KAB inflator initiator connector receptacle facing upward.
 2. Reconnect the connector insulator of the instrument panel wire harness take out for the KAB to the inflator initiator connector receptacle by pressing straight in on the connector. Be certain that the connector is fully engaged in its receptacle, then push the Connector Position Assurance (CPA) lock straight into the connector to lock it into place.
 3. Carefully position the KAB unit to the lower reinforcement (1) of the instrument panel structural support. **Be certain the instrument panel wire harness take out for the KAB is routed behind the KAB and is not pinched between the KAB housing and the lower reinforcement of the instrument panel structural support.**
 4. Install and tighten the four nuts (3) that secure the mounting studs of the KAB unit to the lower reinforcement of the instrument panel structural support. Tighten the nuts to 9 N.m (80 in. lbs.).
 5. Reinstall the glove box into the instrument panel. Refer to **GLOVE BOX, INSTRUMENT PANEL, INSTALLATION**.
 6. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST**.

AIR BAG, PASSENGER

DESCRIPTION

DESCRIPTION

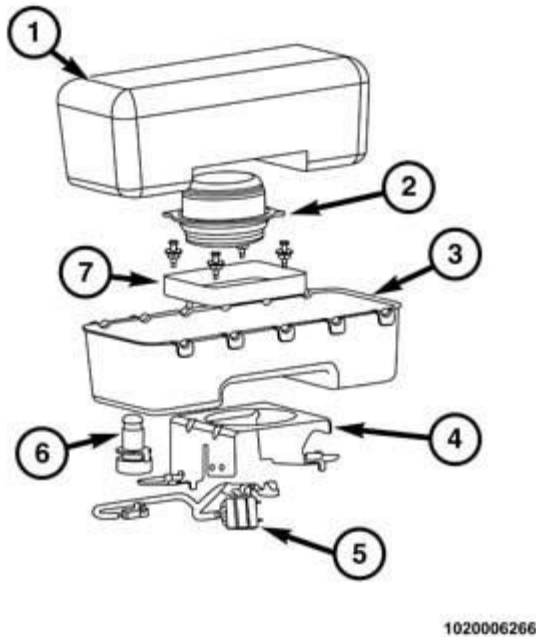


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Fig. 26: Air Bag, Passenger (PAB)**Courtesy of CHRYSLER GROUP, LLC**

The horizontal surface of the instrument panel top pad (1) above the glove box (2) is the most visible part of the Passenger Airbag (PAB). The PAB door is integral to the top of the instrument panel top pad forward of and above the glove box on the instrument panel in front of the front seat passenger seating position.

Located below the PAB door area of the instrument panel top pad, the molded thermoplastic PAB retainer or chute is secured to the underside of the top pad. The retainer defines the PAB door breakout area of the top pad and serves as the receptacle for the PAB cushion and housing. Numerous small window openings on the forward and rearward flanges of the receptacle receive mating hook formations stamped into the airbag housing, which locate and secure the housing to the top pad.

**Fig. 27: PAB Unit Components**

Courtesy of CHRYSLER GROUP, LLC

The PAB unit is also secured by a mounting bracket (4) and two screws to the instrument panel structural support. The PAB unit used in this vehicle is a multistage type that complies with revised federal airbag standards to deploy with less force than those used in some prior vehicles. The PAB unit consists of a stamped metal housing (3), the airbag cushion (1), a Micro Gas Generator (MGG) for the active vent (6) (domestic market vehicles only) and the two-stage airbag inflator (2). The PAB inflator, the mounting bracket and the airbag cushion are secured to the housing by four studs and four nuts. The airbag housing contains the folded airbag cushion and the cushion retainer (7). An approximately 66 centimeter (26 inch) wide by 76 centimeter (30 inch) high rectangular fabric cushion is used.

The PAB inflator is a non-azide, pyrotechnic-type unit that is secured to and sealed within the airbag housing. Three dedicated take outs and yellow connectors of the PAB wire harness (5) with keyed, color-coded insulators connect the two inflator initiators and the active vent MGG to a yellow, 6 way connector secured to the mounting bracket. A dedicated take out and connector of the instrument panel wire harness connects the PAB to the vehicle electrical system.

The PAB cannot be repaired, and must be replaced if deployed, ineffective or in any way damaged. The PAB door and chute or retainer are serviced only as a unit with the instrument panel top pad. If the PAB is deployed, the top pad must also be replaced.

OPERATION

OPERATION

The multistage Passenger AirBag (PAB) is deployed by electrical signals generated by the Occupant Restraint

Controller (ORC) through PAB squib 1 and squib 2 circuits to the two initiators in the airbag inflator, and by a PAB squib 3 circuit to the initiator of the Micro Gas Generator (MGG) for the active vent (domestic market vehicles only). By using two initiators and an active vent, the PAB can be deployed at multiple levels of force. The force level is managed by the ORC to suit the monitored impact conditions by providing one of multiple delay intervals between the electrical signals provided to the two initiators and the tether release. The longer the delay between the initiator signals and the sooner the active vent is opened, the less forcefully the PAB will deploy.

When the ORC sends the proper electrical signals to each initiator, the electrical energy generates enough heat to initiate a small pyrotechnic charge which, in turn ignites chemical pellets within the inflator. Once ignited, these chemical pellets burn rapidly and produce a large quantity of inert gas. The inflator is sealed to the airbag cushion and a diffuser in the inflator directs all of the inert gas into the airbag cushion, causing the cushion to inflate. As the cushion inflates, the PAB door will split at predetermined tear seam lines concealed on the inside surface of the door, then the door will pivot up over the top of the instrument panel and out of the way. Following an airbag deployment, the airbag cushion quickly deflates by venting the inert gas through a discrete vent in each fabric side panel of the airbag cushion.

The MGG inflates a small cushion within the primary cushion to control the active vent. The ORC monitors a seat track position sensor on the passenger front seat. If the seat is in the full forward position when an airbag deployment occurs, the ORC keeps the active vent open. With the active vent open the airbag deployment is less forceful, which reduces the possibility of an airbag-induced injury when the passenger is seated close to the deploying airbag. If the passenger front seat is not in the full forward position, the active vent is closed during airbag deployment.

Typically, all initiators are used during a PAB deployment event. However, it is possible for only one initiator to be used during a deployment due to an airbag system fault; therefore, it is necessary to always confirm that all initiators have been used in order to avoid the improper disposal of potentially live pyrotechnic materials. Refer to **STANDARD PROCEDURE**.

The ORC monitors the condition of the PAB through circuit resistance, and will illuminate the airbag indicator in the instrument cluster and store a Diagnostic Trouble Code (DTC) for any fault that is detected. Proper diagnosis of the PAB inflator, the active vent MGG and the squib circuits requires the use of a diagnostic scan tool and may also require the use of the SRS Load Tool special tool along with the appropriate Load Tool Jumpers and Adapters. Refer to the appropriate diagnostic information.

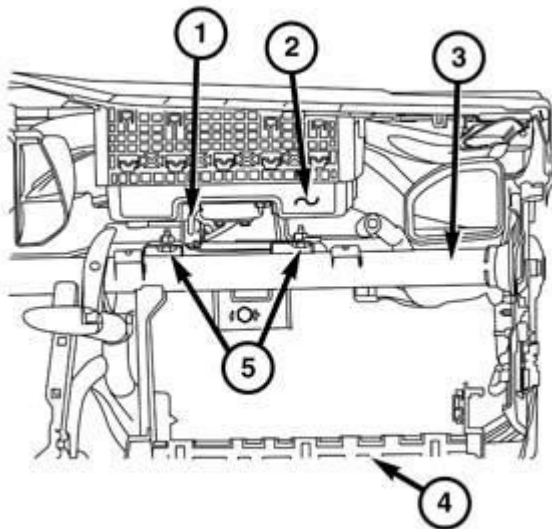
REMOVAL

REMOVAL

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in

accidental airbag deployment.

WARNING: To avoid serious or fatal injury when removing a deployed airbag, rubber gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the airbag unit and other interior surfaces. In large doses, these deposits may cause irritation to the skin and eyes.



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Fig. 28: Removing/Installing Passenger AirBag (PAB)

Courtesy of CHRYSLER GROUP, LLC

NOTE: The following procedure is for replacement of an ineffective or damaged Passenger AirBag (PAB). If the airbag is ineffective or damaged, but not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS. If the PAB has been deployed, review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the airbag from the vehicle. Refer to SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT.

1. Disconnect and isolate the negative cable from the battery. Wait two minutes for the system capacitor to discharge before further service.
2. Remove the glove box from the instrument panel. Refer to GLOVE BOX, INSTRUMENT PANEL, REMOVAL.
3. Reach through and above the glove box opening (4) of the instrument panel to access and remove the two screws (5) that secure the Passenger AirBag (PAB) (2) lower mounting bracket to the instrument panel structural support (3).

4. Still reaching through the glove box opening, disconnect the instrument panel wire harness connector from the PAB pigtail wire harness connector (1).

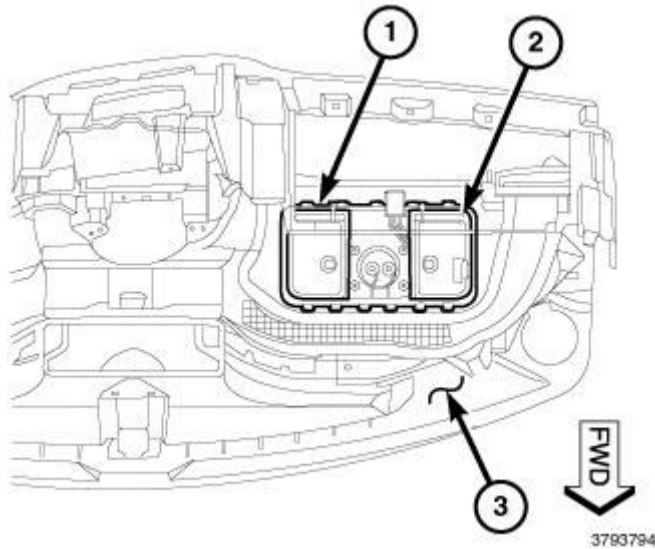


Fig. 29: Chute, Housing & Top Pad
Courtesy of CHRYSLER GROUP, LLC

5. Remove the top pad (3) and PAB from the instrument panel as a unit. Refer to **PAD, INSTRUMENT PANEL, REMOVAL**.
6. Place the top pad on a suitable work surface with the top facing down. If the top pad will be reused, be certain to take the proper precautions to prevent the top pad from receiving cosmetic damage during the following procedures.
7. Disengage each of the hooks on one side of the PAB housing (2) from the windows in the forward or rearward vertical walls of the PAB retainer or chute (1) on the underside of the top pad. To disengage the hooks, use hand pressure to pull the adjacent edge of the PAB housing firmly and evenly upward out of the retainer receptacle, while at the same time pulling the upper edge of the receptacle wall outward far enough to disengage the hooks.
8. With all of the hooks on one side of the PAB housing disengaged from the retainer, rotate that side of the housing upward far enough to disengage the hooks on the opposite side of the housing from the retainer.
9. With all of the hooks disengaged, lift the PAB housing, inflator, and cushion as a unit from the receptacle of the PAB retainer or chute on the underside of the instrument panel top pad.

INSTALLATION

INSTALLATION

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground)

cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury when removing a deployed airbag, rubber gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the airbag unit and other interior surfaces. In large doses, these deposits may cause irritation to the skin and eyes.

WARNING: To avoid serious or fatal injury, use extreme care to prevent any foreign material from entering the passenger airbag, or becoming entrapped between the passenger airbag cushion and the instrument panel top pad. Failure to observe this warning could result in occupant injuries upon airbag deployment.

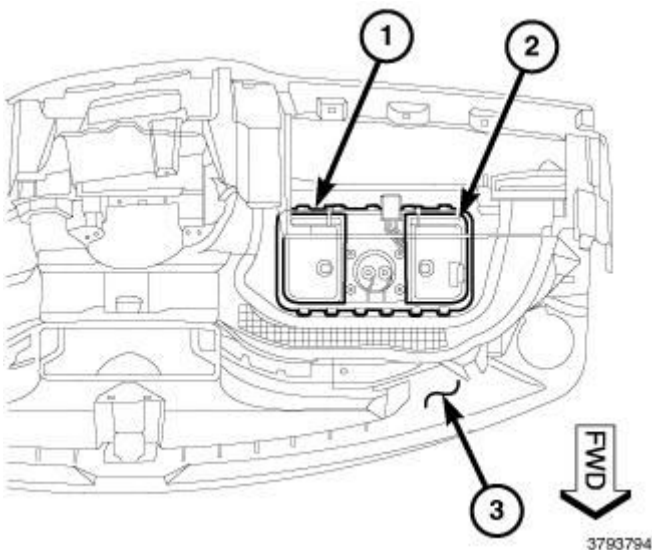


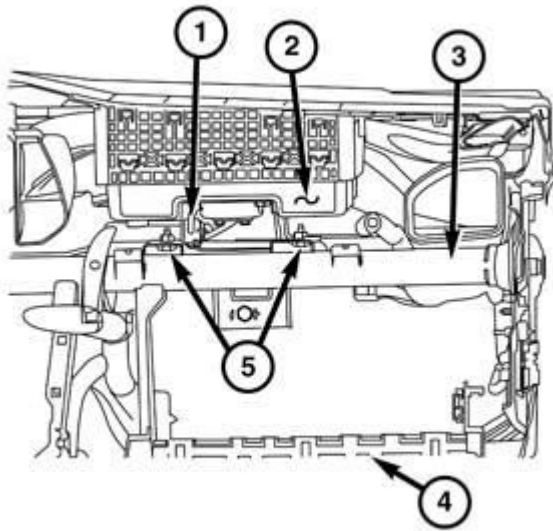
Fig. 30: Chute, Housing & Top Pad
Courtesy of CHRYSLER GROUP, LLC

NOTE: The following procedure is for replacement of an ineffective or damaged Passenger AirBag (PAB). If the airbag is ineffective or damaged, but not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS. If the PAB has been deployed, review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the airbag from the vehicle. Refer to SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT.

1. Place the instrument panel top pad (3) on a suitable work surface with the Passenger AirBag (PAB) retainer or chute (1) receptacle facing up. Be certain to take the proper precautions to prevent the top pad

from receiving cosmetic damage during the following procedures.

2. Carefully position the PAB housing (2) to the PAB retainer or chute receptacle. The side of the PAB housing with 5 hooks faces rearward in the vehicle.
3. Engage all of the hooks on one side of the PAB housing through the windows on the same side of the PAB retainer or chute, then rotate the opposite side of the PAB housing downward into the receptacle.
4. Inspect around the perimeter of the PAB making certain each of the hooks on the PAB housing is fully engaged through the windows in the forward and rearward vertical walls of the PAB retainer or chute receptacle.
5. Reinstall the top pad onto the instrument panel. Refer to **PAD, INSTRUMENT PANEL, INSTALLATION**.



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Fig. 31: Removing/Installing Passenger AirBag (PAB)

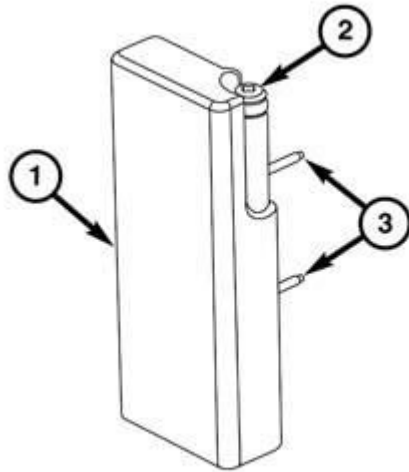
Courtesy of CHRYSLER GROUP, LLC

6. Reach through and above the glove box opening (4) of the instrument panel to reconnect the instrument panel wire harness connector to the PAB pigtail wire harness connector (1). Be certain that the connector is fully engaged and locked.
7. Still reaching through the glove box opening, install and tighten the two screws (5) that secure the PAB (2) lower mounting bracket to the instrument panel structural support (3). Tighten the screws to 9 N.m (80 in. lbs.).
8. Reinstall the glove box into the instrument panel. Refer to **GLOVE BOX, INSTRUMENT PANEL, INSTALLATION**.
9. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST**.

AIR BAG, SEAT

DESCRIPTION

FRONT



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Fig. 32: Front Seat Airbags (SAB)

Courtesy of CHRYSLER GROUP, LLC

The front Seat AirBags (SAB) (1) (also known as pelvic and thoracic airbags) are completely concealed beneath the seat back trim cover on the outboard sides of both front seat backs. Vehicles with this equipment can be readily identified by a sewn tag with the **SRS - AIRBAG** logo located on the outboard side of the front seat back trim cover. The folded SAB cushion is contained within a fabric wrap secured to the two airbag mounting studs. The airbag cushion is constructed of a coated nylon fabric. The airbags are inserted into a sewn pouch called an intensifier on the inside of the trim cover. The pouch is made of the same material as the airbag cushion.

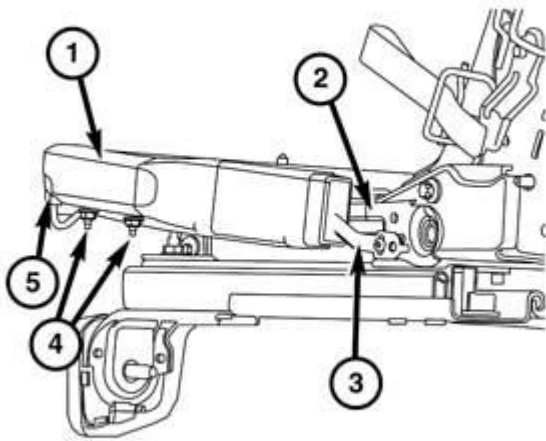
The fabric wrap of the SAB also contains the airbag inflator and a heat shield. Two studs (3) are installed on the inflator within the fabric wrap and extend through the rearward side of the unit. The airbag is then secured to the seat back frame by nuts on those two studs. The SAB inflator is a single-initiator, pyrotechnic-type Micro Gas Generator (MGG) unit (2) that is secured to and sealed within the SAB. The SAB is connected to the vehicle electrical system through a dedicated jumper wire harness with a connector insulator that connects directly to the MGG initiator. The connector insulator is uniquely keyed and color-coded to ensure that it can only be connected to the initiator.

There are unique versions of the SAB for the various seat options available, and they are not interchangeable. Besides unique part numbers, the SAB for the standard seat is taller and narrower, while the SAB for the fold

flat (also known as the storage seat) is shorter and wider.

The front SAB cannot be repaired, and must be replaced if deployed, ineffective or in any way damaged. If the front SAB is deployed, the seat back frame, the seat back foam cushion, the seat back trim cover and the SAB jumper wire harness must also be replaced.

REAR



1011006270

Fig. 33: Rear Seat Airbags (SAB)
Courtesy of CHRYSLER GROUP, LLC

The available rear Seat AirBags (SAB) (also known as pelvic and thoracic airbags) are completely concealed within the lower outboard ends of the rear seat cushion beneath the rear seat cushion trim cover and sandwiched between the outboard seat cushion frame (2) and the outboard seat cushion trim. Vehicles with this equipment can be readily identified by a sewn tag with the **SRS - AIRBAG** logo located on the outboard side of the rear seat cushion trim cover. The rear SAB cushion is constructed of a coated nylon fabric. The folded SAB cushion is contained within and protected by a soft fabric wrap (1) made of the same material as the airbag cushion. The airbags are inserted into a sewn pouch called an intensifier on the inside of the trim cover. The pouch is also made of the same material as the airbag cushion.

The open end of the SAB cushion is clamped over the outlet tube integral to the SAB inflator. Two studs (4) on the inflator are secured by nuts to a stamped metal bracket on the outboard side of the seat cushion frame, while a tether strap (3) on the loose end of the SAB cushion is secured by a screw to the rear corner of the seat cushion frame. The SAB inflator is a single-initiator, pyrotechnic-type unit. The SAB is connected to the vehicle electrical system through a dedicated take out and connector insulator of a rear seat cushion wire harness that connects directly to the inflator initiator (5). The connector insulators are uniquely keyed and color-coded to ensure they can only be connected to the initiator.

The rear SAB cannot be repaired, and must be replaced if deployed, ineffective or in any way damaged. If a rear SAB is deployed, the rear seat cushion foam, the seat cushion trim cover and the rear seat cushion wire harness must also be replaced.

OPERATION

FRONT

Each front Seat AirBag (SAB) (also known as a pelvic and thoracic airbag) is deployed individually by an electrical signal generated by the Occupant Restraint Controller (ORC) to which it is connected through left or right front SAB line 1 and line 2 (or squib) circuits. When the ORC sends the proper electrical signal to the pyrotechnic-type Micro Gas Generator (MGG) inflator, the electrical energy generates enough heat to initiate a small pyrotechnic charge which ignites chemical pellets within the inflator.

Once ignited, these chemical pellets burn rapidly and produce a large quantity of inert gas. The inflator is sealed to the SAB cushion and a diffuser in the inflator directs all of the inert gas into the folded SAB cushion, causing the cushion to inflate. As the cushion inflates it will split the fabric wrap, the pouch (intensifier) integral to the seat back trim cover and the outboard side of the seat back trim cover. The cushion then expands into the area between the outboard side of the front seat and the front door to form a cushion to protect the front seat occupant during a side impact collision or a vehicle rollover incident.

Following the SAB deployment, the cushion slowly deflates by venting the inert gas through the loose weave of the cushion fabric, and through a vent in the cushion. After venting is achieved, the deflated cushion hangs down loosely from the outboard side of the front seat back.

The ORC monitors the condition of the front SAB through circuit resistance, and will illuminate the airbag indicator in the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) and store a Diagnostic Trouble Code (DTC) for any fault that is detected. Proper diagnosis of the front MGG SAB inflator and squib circuits requires the use of a diagnostic scan tool and may also require the use of the SRS Load Tool special tool along with the appropriate Load Tool Jumpers and Adapters. Refer to the appropriate diagnostic information.

REAR

Each rear Seat AirBag (SAB) (also known as a pelvic and thoracic airbag) is deployed individually by an electrical signal generated by the Occupant Restraint Controller (ORC) to which it is connected through left or right rear SAB line 1 and line 2 (or squib) circuits. Each SAB has a pyrotechnic-type Micro Gas Generator (MGG) inflator assembly.

When the ORC sends the proper electrical signal to the SAB inflator initiator, the electrical energy creates enough heat to initiate a small pyrotechnic charge which, in turn ignites chemical pellets within the inflator. Once ignited, these chemical pellets burn rapidly and produce a large quantity of inert gas.

The inflator is sealed to the airbag cushion and a diffuser in the inflator directs all of the inert gas into the airbag cushion, causing the cushion to inflate. As the cushion inflates it will split the fabric wrap, the pouch (intensifier) integral to the seat cushion trim cover and the outboard side of the seat cushion trim cover, then expand into the area between the outboard side of the rear seat and the rear door to form a cushion to protect the rear seat occupant during a side impact collision or a vehicle rollover incident.

Following the rear SAB deployment, the cushion slowly deflates by venting the inert gas through the loose weave of the cushion fabric and through a vent in the cushion. After venting is achieved, the deflated cushion hangs down loosely from the outboard side of the rear seat cushion.

The ORC monitors the condition of the rear SAB through circuit resistance, and will illuminate the airbag indicator in the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) and store a Diagnostic Trouble Code (DTC) for any fault that is detected. Proper diagnosis of the rear SAB inflator and squib circuits requires the use of a diagnostic scan tool and may also require the use of the SRS Load Tool special tool along with the appropriate Load Tool Jumpers and Adapters. Refer to the appropriate diagnostic information.

REMOVAL

FRONT

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury when removing a deployed airbag, rubber gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the airbag unit and other interior surfaces. In large doses, these deposits may cause irritation to the skin and eyes.

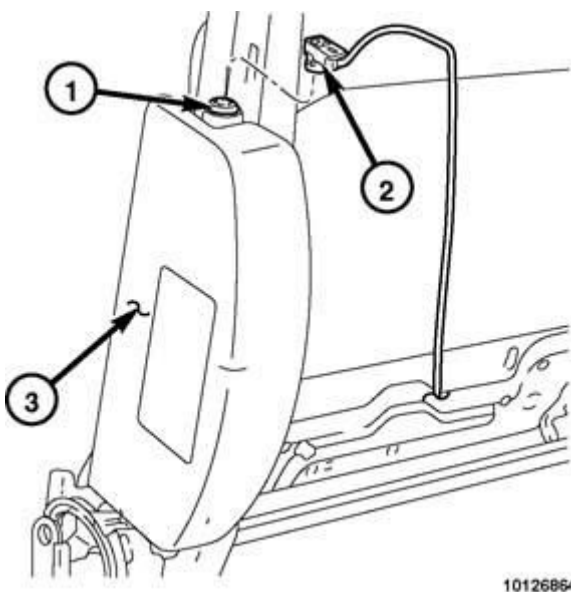


Fig. 34: Inflator Connector Receptacle, Jumper Wire Harness & Seat Airbag

Courtesy of CHRYSLER GROUP, LLC

NOTE: The following procedure is for replacement of an ineffective or damaged Seat AirBag (SAB). If the airbag is ineffective or damaged, but not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS. If the SAB has been deployed, review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the airbag from the vehicle. Refer to SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT.

1. Position the front seat to its most forward position for easiest access to the front seat mounting hardware.
2. Disconnect and isolate the negative cable from the battery. Wait two minutes for the system capacitor to discharge before further service.
3. Remove the front seat from the vehicle. Refer to SEAT, REMOVAL.

CAUTION: During removal of the seat back trim cover, be certain not to tear or damage the integral nylon pouch that contains the seat airbag. If the nylon pouch or the trim cover are torn or damaged, the entire front seat back trim cover must be replaced with a new unit.

4. Remove the trim from the front and back of the front seat back frame, but do not remove from the outboard side of the seat back until after the Seat AirBag (SAB) (3) has been detached from the seat. Refer to COVER, SEAT BACK, REMOVAL.

CAUTION: Do not pull on the seat airbag jumper wire harness (4) take out or pry on the connector insulator to disengage the connector from the seat airbag (1) inflator connector receptacle. Improper removal of this take out and its connector insulator can result in damage to the airbag circuits or the connector insulator.

5. Disconnect the seat wire harness connector (2) from the top of the SAB inflator (1). Pull the lock straight out from the connector insulator, then pull the insulator straight out from the connector receptacle to disengage and disconnect it.

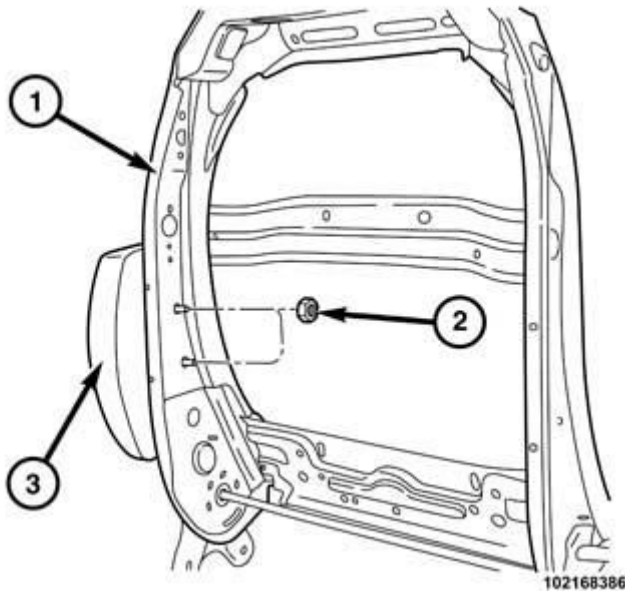


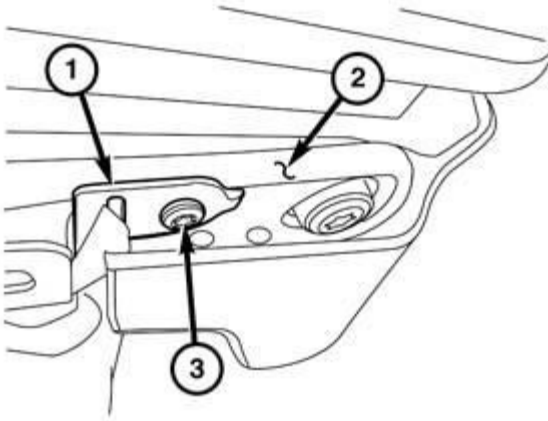
Fig. 35: Seat Back Frame, Nuts & Seat Airbag
Courtesy of CHRYSLER GROUP, LLC

6. Remove the two nuts (2) from the inside of the seat back frame (1) that secure the SAB (3) to the outside of the seat back frame.
7. Disengage the SAB mounting studs from the outboard side of the seat back frame, then remove the trim cover and the SAB from the seat back frame as a unit.
8. Carefully disengage the two SAB mounting studs from the nylon pouch (intensifier) and slide the SAB out of the pouch. Be careful not to tear or damage the pouch or the trim cover.

REAR

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury when removing a deployed airbag, rubber gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the airbag unit and other interior surfaces. In large doses, these deposits may cause irritation to the skin and eyes.

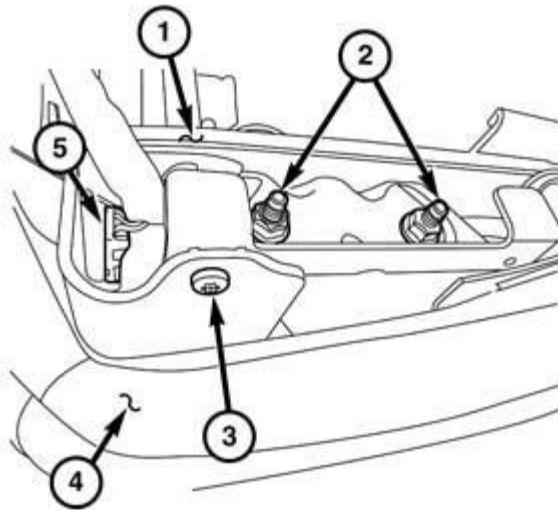


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Fig. 36: Rear Seat Airbag (SAB) & Tether Anchor Clip
Courtesy of CHRYSLER GROUP, LLC

NOTE: The following procedure is for replacement of an ineffective or damaged Seat AirBag (SAB). If the airbag is ineffective or damaged, but not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to **HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS**. If the SAB has been deployed, review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the airbag from the vehicle. Refer to **SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT**.

1. Disconnect and isolate the negative cable from the battery. Wait two minutes for the system capacitor to discharge before further service.
2. Remove the rear seat cushion from the vehicle. (Refer to **SEATS, REAR**).
3. Disengage the outboard end of the trim cover from the rear seat cushion.
4. Remove the screw (3) that secures the rear Seat AirBag (SAB) tether anchor clip (1) to the outboard rear corner of the seat cushion frame (2).



1021006271

Fig. 37: Removing/Installing Seat AirBag (SAB)
Courtesy of CHRYSLER GROUP, LLC

5. Remove the screw (3) that secures the plastic SAB initiator cover to the bracket on the outboard front corner of the seat cushion frame (1).
6. Move the plastic SAB initiator cover far enough to access and disconnect the seat wire harness connector (5) from the rear SAB inflator initiator. Pull the Connector Position Assurance (CPA) lock straight out from the connector insulator, then pull the insulator straight out from the connector receptacle to disengage and disconnect it.
7. Remove the two nuts that secure the studs (2) of the SAB inflator to the bracket near the outboard front corner of the seat cushion frame.
8. Carefully disengage the SAB from the nylon pouch (intensifier) and slide the SAB out of the pouch. Be careful not to tear or damage the pouch or the trim cover.
9. Remove the SAB from the seat cushion frame.

INSTALLATION

FRONT

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to

disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

CAUTION: The seat airbag (1) must be installed into the nylon mesh pouch integral to the front seat back trim cover before the airbag or the trim cover are installed on the front seat back frame (2). Failure to do so will adversely affect the function of the seat airbag system.

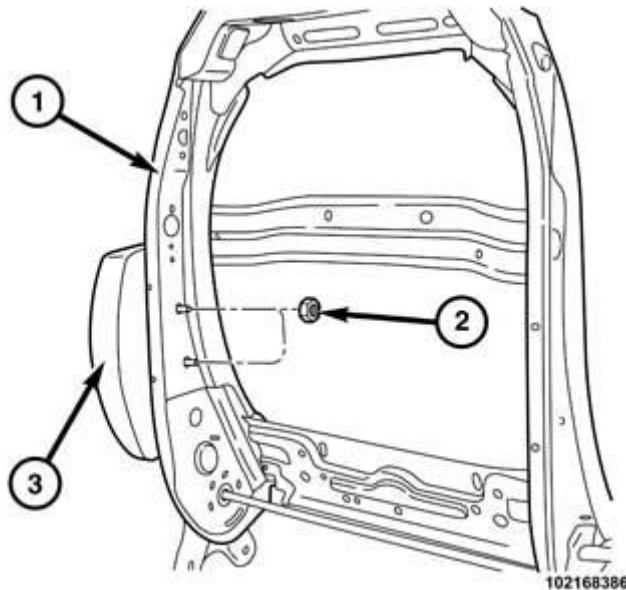


Fig. 38: Seat Back Frame, Nuts & Seat Airbag
Courtesy of CHRYSLER GROUP, LLC

NOTE: The following procedure is for replacement of an ineffective or damaged Seat AirBag (SAB). If the airbag is ineffective or damaged, but not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS. If the SAB has been deployed, review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the airbag from the vehicle. Refer to SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT.

1. Carefully slide the Seat AirBag (SAB) (3) into the nylon pouch (intensifier) integral to the outboard side of the front seat back trim cover and engage the two SAB mounting studs through the holes provided in the pouch. Be careful not to tear or damage the pouch or the trim cover.
2. Position the SAB and trim cover as a unit to the outboard side of the seat back frame (1) and insert the studs through the mounting holes in the seat back frame.
3. Install and tighten the two nuts (2) that secure the SAB to the inside of the seat back frame. Tighten the nuts to 10 N.m (88 in. lbs.).

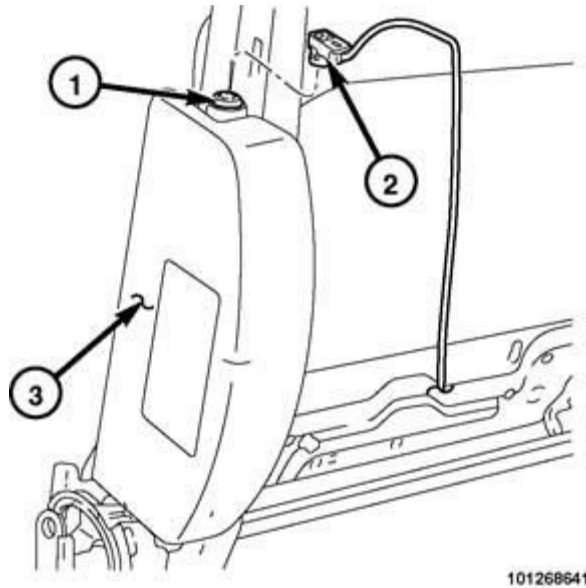


Fig. 39: Inflator Connector Receptacle, Jumper Wire Harness & Seat Airbag
Courtesy of CHRYSLER GROUP, LLC

4. Reconnect the seat wire harness connector (2) to the top of the SAB (3) inflator (1). You can be certain that the connector is fully engaged in its receptacle by listening carefully for a distinct, audible click as the connector snaps into place.
5. Push the Connector Position Assurance (CPA) lock firmly into the SAB connector insulator until it is flush with the upper surface of the insulator.

CAUTION: Be certain that all of the trim is properly reinstalled on the front seat back frame. Failure to do so will adversely affect the function of the seat airbag system.

6. Reinstall the trim onto the front and back of the front seat back frame. Refer to **COVER, SEAT BACK, INSTALLATION**.
7. Reinstall the front seat into the vehicle. Refer to **SEAT, INSTALLATION**.
8. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST**.

REAR

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to

disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

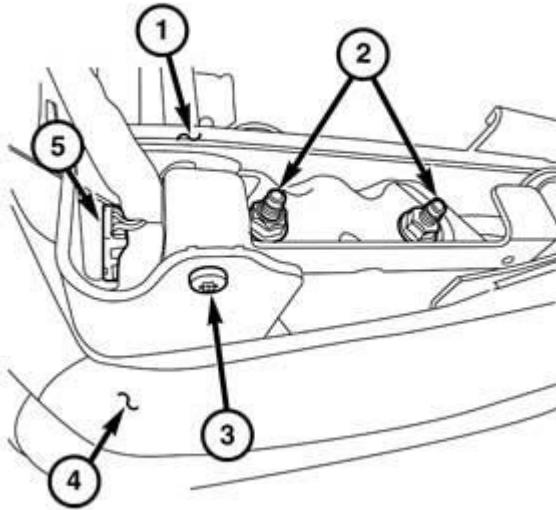


Fig. 40: Removing/Installing Seat AirBag (SAB)
Courtesy of CHRYSLER GROUP, LLC

NOTE: The following procedure is for replacement of an ineffective or damaged Seat AirBag (SAB). If the airbag is ineffective or damaged, but not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS. If the SAB has been deployed, review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the airbag from the vehicle. Refer to SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT.

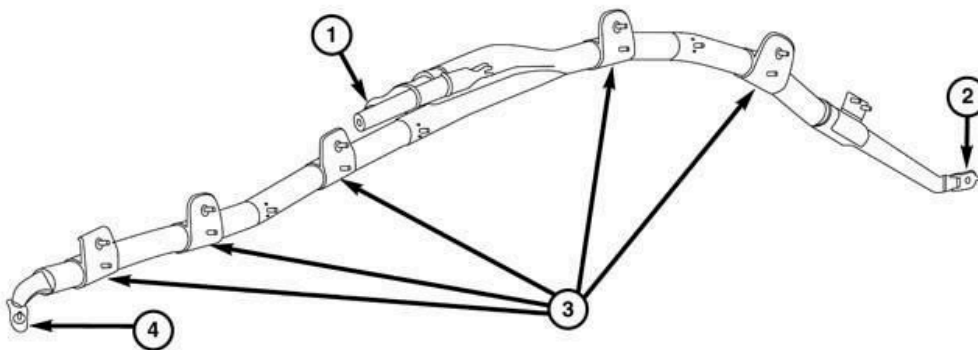
1. Carefully slide the Seat AirBag (SAB) (3) into the nylon pouch (intensifier) integral to the outboard side of the rear seat cushion trim cover. Use care not to tear or damage the pouch or the trim cover.
2. Position the rear Seat AirBag (SAB) onto the bracket near the outboard front corner of the seat cushion frame (1).
3. Install and tighten the two nuts that secure the studs (2) of the SAB inflator to the bracket on the outboard front corner of the seat cushion frame. Tighten the nuts to 7 N.m (62 in. lbs.).
4. Reconnect the seat wire harness connector (5) to the SAB inflator. You can be certain that the connector is fully engaged in its receptacle by listening carefully for a distinct, audible click as the connector snaps into place.
5. Push the Connector Position Assurance (CPA) lock firmly into the SAB connector insulator until it is flush with the upper surface of the insulator.

6. Position the plastic SAB initiator cover to the bracket on the outboard front corner of the seat cushion frame.
7. Install and tighten the screw that secures the plastic SAB initiator cover to the bracket on the outboard front corner of the seat cushion frame. Tighten the screw to 3 N.m (27 in. lbs.).
8. Reinstall the outboard end of the trim cover (4) onto the rear seat cushion frame.
9. Position rear SAB tether anchor clip (1) to the outboard rear corner of the seat cushion frame (2).
10. Install and tighten the screw (3) that secures the rear SAB tether anchor clip to the seat cushion frame. Tighten the screw to 5 N.m (44 in. lbs.).
11. Reinstall the rear seat cushion into the vehicle. (Refer to **SEATS, REAR**).
12. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST**.

AIR BAG, SIDE CURTAIN

DESCRIPTION

DESCRIPTION



1011006175

Fig. 41: Side Curtain Airbag
Courtesy of CHRYSLER GROUP, LLC

Side curtain airbags (also known as Side AirBag Inflatable Curtains/SABIC) are standard factory-installed equipment for this vehicle. These airbags are passive, inflatable, Supplemental Restraint System (SRS) components. The side curtain airbag system is designed to reduce injuries to the vehicle occupants in the event of a side impact collision or a vehicle rollover incident. Each side curtain airbag cushion provides full coverage of the side glass on the same side of the vehicle as the monitored impact.

Each vehicle is equipped with two individually controlled side curtain airbag units. These side curtain airbag units are concealed and mounted above the headliner where they are each secured to one of the roof side rails. Each folded airbag cushion is contained within a fabric wrap and suspended from plastic clamp hangers (3) that are spaced along the inner roof rail from the A-pillar at the front of the vehicle to near the D-pillar at the rear of the vehicle. A tether (2) extends down the A-pillar from the front of the side curtain airbag cushion, while a second tether (4) is secured above the D-pillar at the rear. A stamped retainer at the end of each tether is secured to a slot in the sheet metal. A nut secures the front tether retainer to a weld stud on the A-pillar, while a screw secures the rear tether to the inner roof rail.

The hybrid-type inflator (1) for each side curtain airbag is secured to the roof rail above the B-pillar and is connected to the airbag cushion by a long tubular manifold. The inflator bracket has an integral hook formation on one end. The inflator is initially hung from the roof rail by the hook formation, then plastic push-in fasteners secure the clamp hangers and the body of the airbag cushion to the roof rail and to stamped metal deploy brackets at the top of the B-pillar and above the C and D-pillars. Finally, the entire assembly is secured with screws to the inner roof rail.

The airbag inflator is connected to the vehicle electrical system through a dedicated take out and connector of the body wire harness near the top of the B-pillar. The body wire harness connects the side curtain airbag unit to the Occupant Restraint Controller (ORC).

The side curtain airbag units cannot be adjusted or repaired and must be replaced if deployed, ineffective or in any way damaged. Once a side curtain airbag has been deployed, the complete side curtain airbag unit, the deploy brackets, the headliner, the A-pillar trim as well as all other visibly damaged components must be replaced.

OPERATION

OPERATION

Each side curtain airbag (also known as Side AirBag Inflatable Curtain/SABIC) is deployed individually by an electrical signal generated by the Occupant Restraint Controller (ORC) to which it is connected through the left or right SABIC line 1 and line 2 (or squib) circuits. The hybrid-type inflator assembly for each airbag contains a small canister of highly compressed inert gas. When the ORC sends the proper electrical signal to the airbag inflator, the electrical energy creates enough heat to ignite chemical pellets within the inflator.

Once ignited, these chemicals burn rapidly and produce the pressure necessary to rupture a containment disk in the inert gas canister. The inflator and inert gas canister are sealed and connected to a tubular manifold so that all of the released gas is directed into the folded airbag cushion, causing the cushion to inflate. As the cushion inflates it will drop down from the roof rail between the edge of the headliner and the side glass/body pillars to form a curtain-like cushion to protect the vehicle occupants during a side impact collision or a vehicle rollover incident. The cushion features large chambers that inflate adjacent to the head of each front and rear seat occupant.

The front and rear tethers keep the side curtain airbag cushion taut to the side of the vehicle. In addition, the deploy brackets at the top of each B-pillar and above the C and D-pillars guide the cushion past the upper B, C and D-pillar trim into the proper deployment position. Following the deployment, the cushion slowly deflates by venting the inert gas through the loose weave of the cushion fabric and the deflated cushion hangs down

loosely from the roof rail.

The ORC monitors the condition of the side curtain airbags through circuit resistance, will illuminate the airbag indicator in the instrument cluster and will store a Diagnostic Trouble Code (DTC) for any fault that is detected. Proper diagnosis of the side curtain airbag inflator and squib circuits requires the use of a diagnostic scan tool and may also require the use of the SRS Load Tool special tool along with the appropriate Load Tool Jumpers and Adapters. Refer to the appropriate diagnostic information.

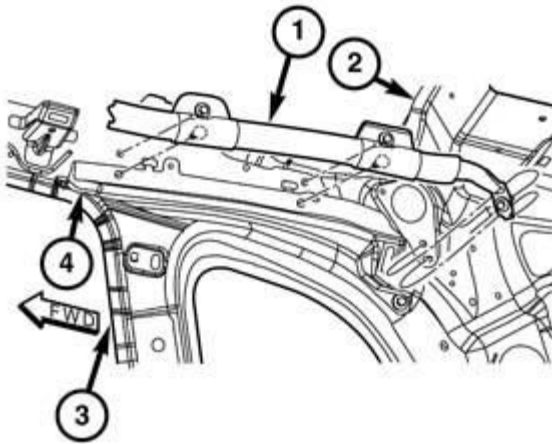
REMOVAL

AIRBAG

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury when removing a deployed airbag, rubber gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the airbag unit and other interior surfaces. In large doses, these deposits may cause irritation to the skin and eyes.

WARNING: To avoid serious or fatal injury, use extreme care to prevent any foreign material from entering the side curtain airbag, or becoming entrapped between the side curtain airbag cushion and the headliner. Failure to observe this warning could result in occupant injuries upon airbag deployment.



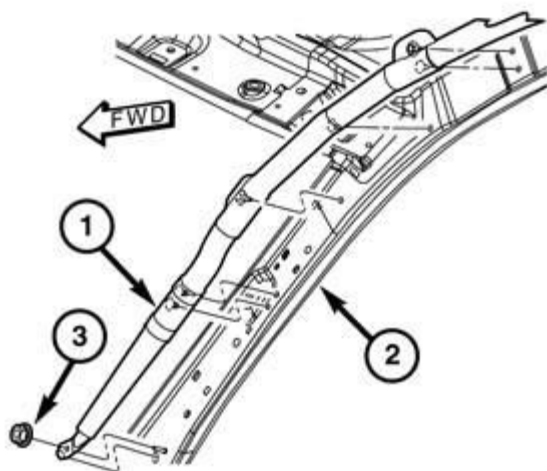
1009005966

Fig. 42: Removing/Installing C&D-Pillar Side AirBag Curtain
Courtesy of CHRYSLER GROUP, LLC

NOTE: The following procedure is for replacement of an ineffective or damaged side curtain airbag (also known as Side AirBag Inflatable Curtain/SABIC). If the airbag is ineffective or damaged, but not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS. If the side curtain airbag has been deployed, review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the airbag from the vehicle. Refer to SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT.

1. Disconnect and isolate the negative cable from the battery. Wait two minutes for the system capacitor to discharge before further service.
2. Remove the headliner from the vehicle. Refer to HEADLINER, REMOVAL.
3. Remove the screw that secures the Side AirBag Inflatable Curtain (SABIC) (1) rear tether to the inner roof rail (2).
4. Remove the two screws that secure the SABIC mounting tabs to the inner roof rail above the C (3) and D-pillars.
5. Disengage the plastic push-in retainers that secure the SABIC to the C and D-pillar deploy bracket (4) above the C and D-pillars.

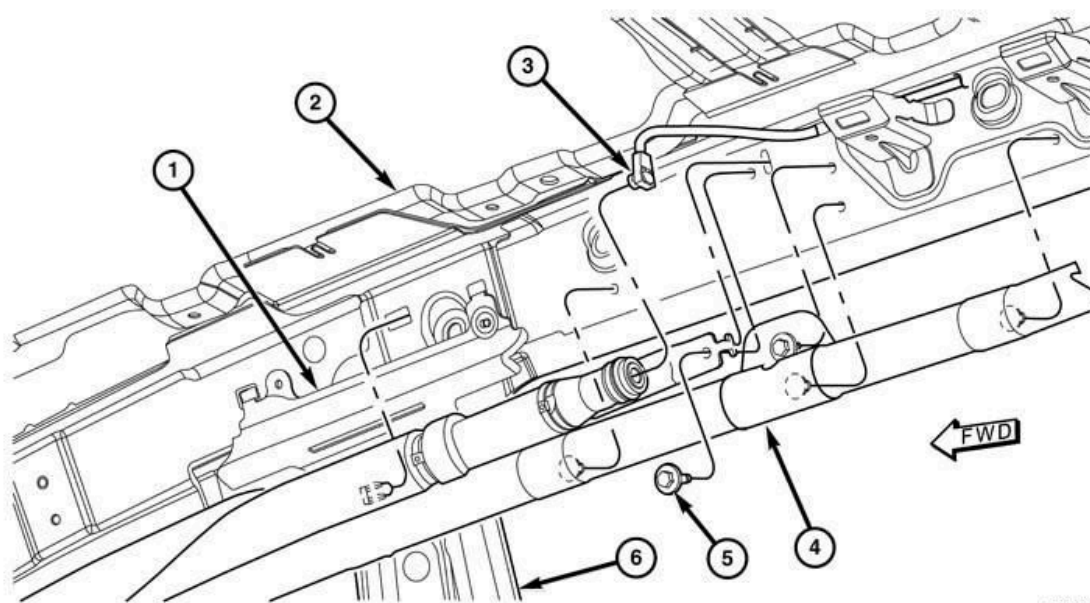
NOTE: If the SABIC has been deployed, the C and D-pillar deploy bracket must also be replaced.



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Fig. 43: Removing/Installing A-Pillar Side AirBag Curtain
Courtesy of CHRYSLER GROUP, LLC

6. Remove the nut (3) that secures the SABIC (1) front tether to the inner A-pillar (2) near the belt line.
7. Remove the two screws that secure the SABIC mounting tabs to the inner A-pillar and the inner roof rail above the A-pillar.
8. Disengage the plastic push-in retainers that secure the SABIC to the inner A-pillar and the inner roof rail above the A-pillar.



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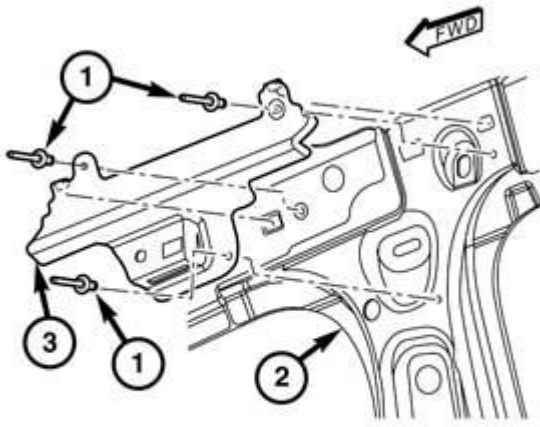
Fig. 44: Removing/Installing B-Pillar Side AirBag Curtain
Courtesy of CHRYSLER GROUP, LLC

9. Disconnect the body wire harness connector (3) from the connector receptacle at the rear of the SABIC inflator located on the inner roof rail (2) above the B-pillar (6). The SABIC connector insulator is secured by integral latches and a Connector Position Assurance (CPA) lock to the airbag inflator connector receptacle. Pull the lock straight out from the connector insulator, then pull the insulator straight out from the connector receptacle to disengage and disconnect it.
10. Remove the two screws (5) that secure the SABIC mounting tab to the inner roof rail above the rear door opening and the inflator bracket above the B-pillar.

NOTE: If the SABIC has been deployed, the B-pillar deploy bracket (1) must also be replaced.

11. Disengage the plastic push-in retainers that secure the SABIC to the inner roof rail.
12. Disengage the metal hooks that secure the inflator mounting bracket from the slots in the inner roof rail.
13. Remove the SABIC and inflator from the vehicle as a unit.

B-PILLAR



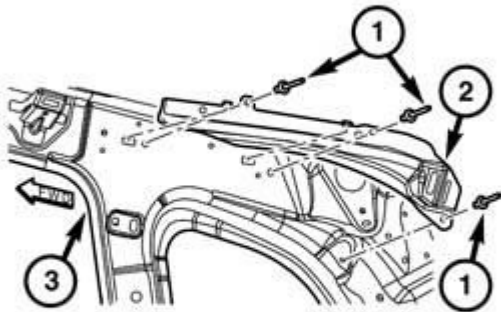
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Fig. 45: Removing/Installing B-Pillar Side Curtain Airbag
Courtesy of CHRYSLER GROUP, LLC

1. Remove the side curtain airbag (also known as Side AirBag Inflatable Curtain/SABIC) from the vehicle. Refer to **AIR BAG, SIDE CURTAIN, REMOVAL**.
2. Remove the three blind rivets (1) that secure the deploy bracket (3) near the top of the B-pillar (2).

3. Slide the bracket upward far enough to disengage the tabs at the top of the bracket from the locator holes in the inner B-pillar and roof rail.
4. Remove the deploy bracket from the vehicle and discard.

C AND D-PILLAR



1009005963

Fig. 46: Removing/Installing C&D-Pillar Side Curtain Airbag
Courtesy of CHRYSLER GROUP, LLC

1. Remove the side curtain airbag (also known as Side AirBag Inflatable Curtain/SABIC) from the vehicle. Refer to **AIR BAG, SIDE CURTAIN, REMOVAL**.
2. Remove the three blind rivets (1) that secure the deploy bracket (2) near the tops of the C-pillar (3) and D-pillar.
3. Disengage the tabs at the top of the bracket from the locator holes in the upper inner C-pillar.
4. Remove the deploy bracket from the vehicle and discard.

INSTALLATION

AIRBAG

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before

performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury when removing a deployed airbag, rubber gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the airbag unit and other interior surfaces. In large doses, these deposits may cause irritation to the skin and eyes.

WARNING: To avoid serious or fatal injury, use extreme care to prevent any foreign material from entering the side curtain airbag, or becoming entrapped between the side curtain airbag cushion and the headliner. Failure to observe this warning could result in occupant injuries upon airbag deployment.

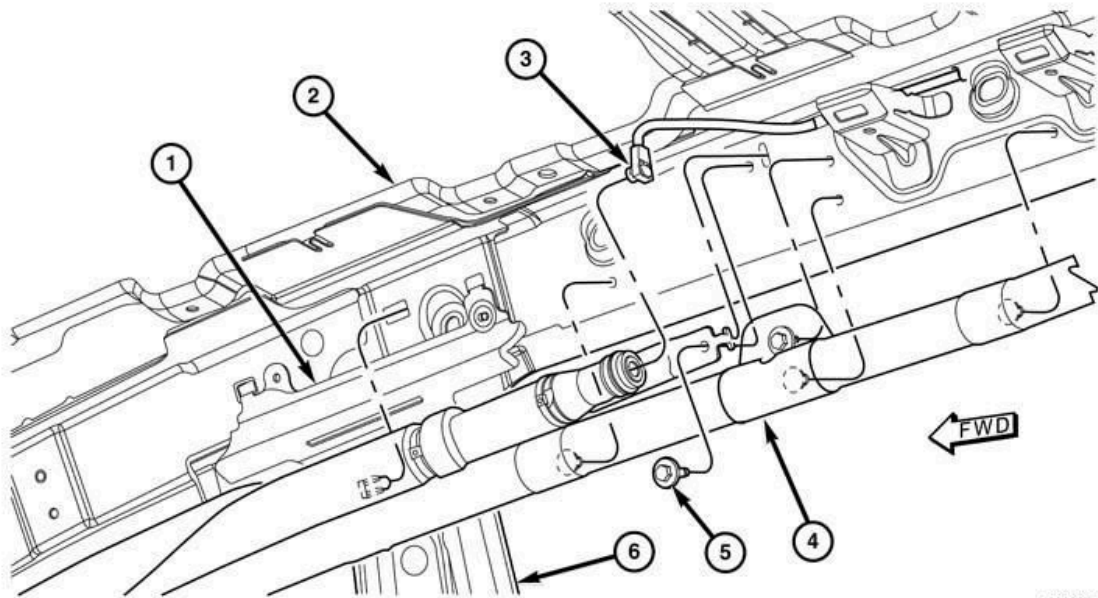
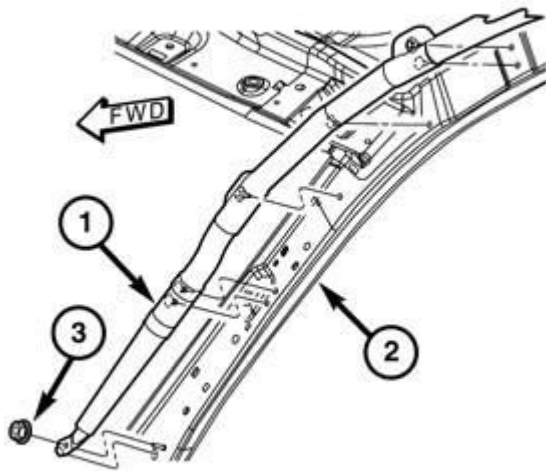


Fig. 47: Removing/Installing B-Pillar Side AirBag Curtain
Courtesy of CHRYSLER GROUP, LLC

NOTE: The following procedure is for replacement of an ineffective or damaged side curtain airbag (also known as Side AirBag Inflatable Curtain/SABIC). If the airbag is ineffective or damaged, but not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS. If the side curtain airbag has been deployed, review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the airbag from the vehicle. Refer to SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT.

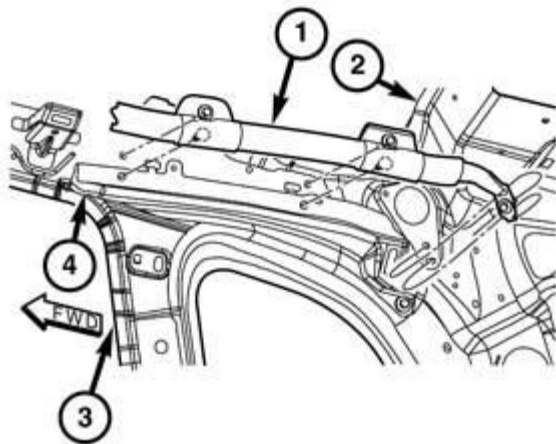
1. Position the Side AirBag Inflatable Curtain (SABIC) and inflator (4) into the vehicle as a unit.
2. Position the inflator mounting bracket to the inner roof rail above the deploy bracket (1) on the B-pillar (6) and engage the metal hooks on the inflator bracket into the slots in the inner roof rail (2).
3. Engage the plastic push-in retainers that temporarily secure the SABIC to the inner roof rail.
4. Install and tighten the two screws (5) that secure the inflator bracket above the B-pillar and the mounting tab to the inner roof rail above the rear door opening. Tighten the screw to 7 N.m (62 in. lbs.).
5. Reconnect the connector insulator (3) of the body wire harness take out for the SABIC to the inflator initiator connector receptacle at the rear of the inflator by pressing straight in on the connector. Be certain that the connector is fully engaged in its receptacle, then push the Connector Position Assurance (CPA) lock straight into the connector to lock it into place.



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Fig. 48: Removing/Installing A-Pillar Side AirBag Curtain
Courtesy of CHRYSLER GROUP, LLC

6. Engage the plastic push-in retainers that secure the SABIC (1) to the inner roof rail above the A-pillar and to the inner A-pillar (2).
7. Install and tighten the two screws (2) that secure SABIC mounting tabs to the inner roof rail above the A-pillar and to the inner A-pillar. Tighten the screws to 7 N.m (62 in. lbs.).
8. Install and tighten the nut (3) that secures the front tether to the inner A-pillar near the belt line. Tighten the nut to 7 N.m (62 in. lbs.).

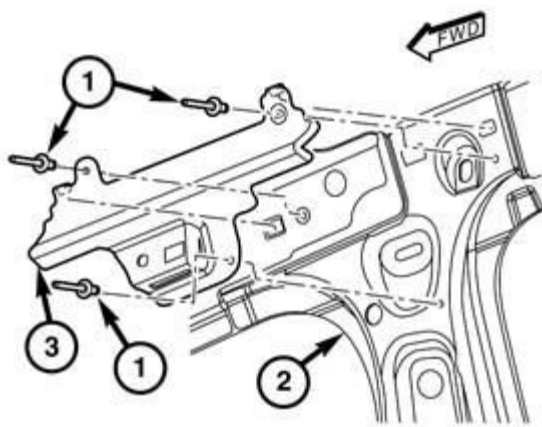


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Fig. 49: Removing/Installing C&D-Pillar Side AirBag Curtain
Courtesy of CHRYSLER GROUP, LLC

9. Engage the plastic push-in retainers that secure the SABIC (1) to the C and D-pillar deploy bracket (4) above the C (3) and D-pillars.
10. Install and tighten the two screws that secure the SABIC mounting tabs to the inner roof rail (2). Tighten the screws to 7 N.m (62 in. lbs.).
11. Install and tighten the screw that secures the SABIC rear tether to the inner roof rail. Tighten the screw to 7 N.m (62 in. lbs.).
12. Reinstall the headliner into the vehicle. Refer to **HEADLINER, INSTALLATION**.
13. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST**.

B-PILLAR

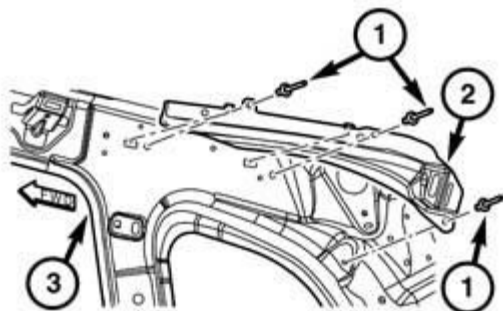


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Fig. 50: Removing/Installing B-Pillar Side Curtain Airbag
Courtesy of CHRYSLER GROUP, LLC

1. Position the deploy bracket (3) near the top of the inner B-pillar (2).
2. Engage the tabs at the top of the bracket into the locator holes in the inner B-pillar.
3. Install three new blind rivets (1) to secure the bracket to the B-pillar.
4. Reinstall the side curtain airbag (also known as Side AirBag Inflatable Curtain/SABIC) into the vehicle.
Refer to **AIR BAG, SIDE CURTAIN, INSTALLATION**.

C AND D-PILLAR



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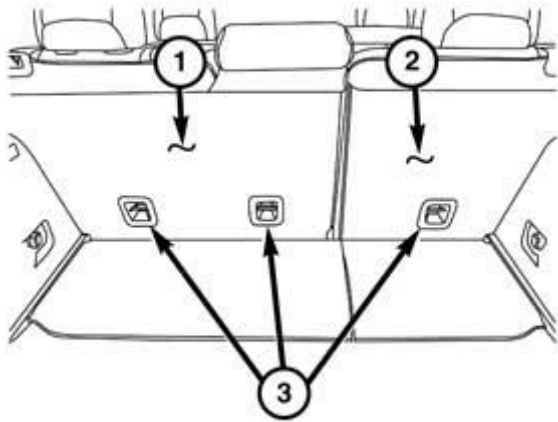
Fig. 51: Removing/Installing C&D-Pillar Side Curtain Airbag
Courtesy of CHRYSLER GROUP, LLC

1. Position the deploy bracket (2) near the tops of the inner C-pillar (3) and D-pillar.
2. Engage the tabs at the top of the bracket into the locator holes in the upper inner C-pillar.
3. Install three new blind rivets (1) to secure the bracket near the tops of the C-pillar and D-pillar.
4. Reinstall the side curtain airbag (also known as Side AirBag Inflatable Curtain/SABIC) into the vehicle.
Refer to **AIR BAG, SIDE CURTAIN, INSTALLATION**.

ANCHOR, CHILD SEAT

DESCRIPTION

DESCRIPTION



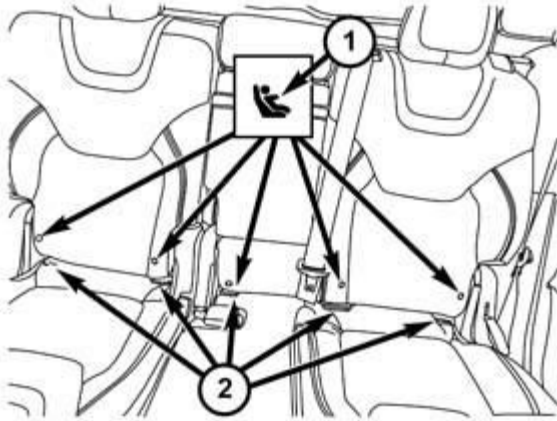
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Fig. 52: Child Seat Anchor/Tether
Courtesy of CHRYSLER GROUP, LLC

This vehicle is equipped with a Lower Anchors and Tether for Children (LATCH) child restraint anchorage system for domestic markets. The LATCH system provides for the installation of suitable child restraints in certain seating positions without using the standard equipment seat belt provided for that seating position. The rear seats in these vehicles are equipped with a fixed-position child restraint upper tether anchor for both the center and the two outboard seating positions, and child restraint lower anchors (also known as ISOFIX anchors) for child restraints in either the two outboard seating positions or for the right outboard and the center positions only. There should never be three child restraints installed in the rear seat at the same time. Vehicles manufactured for export markets are not equipped with the upper tether anchors, but do have the ISOFIX lower anchors.

The three upper tether anchors (3) are integral to the rear seat back panels. One anchor is integral to the back of the right rear panel (2), and two are integral to the left rear panel (1). These anchors are each constructed from short lengths of heavy-gauge steel wire that is securely welded to the seat back frames. A molded plastic trim bezel and cup provides a neat appearance to each of the anchor openings in the seat back panels.

These child restraint upper tether anchors cannot be adjusted or repaired and, if ineffective or damaged, they must be replaced as a unit with their respective rear seat back panels. The trim bezels are available for separate service replacement.



100905961

Fig. 53: ISOFIX Lower Anchors

Courtesy of CHRYSLER GROUP, LLC

The ISOFIX lower anchors are integral to the left or right rear seat stanchion assembly located beneath the rear edge of the rear seat cushion. These anchors are each constructed from a heavy-gauge steel wire loop that is securely welded to the rear seat stanchion frame. The rear seat ISOFIX lower anchors are each accessed from the front of their respective seat, at each side where the seat back meets the seat cushion. Round marker buttons with a molded child seat icon help identify the ISOFIX anchor locations as they may be otherwise difficult to see with the seat back in the upright position.

The child restraint ISOFIX lower tether anchors cannot be adjusted or repaired and, if ineffective or damaged, they must be replaced as a unit with the rear seat stanchion assembly.

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog.

OPERATION

OPERATION

All vehicles manufactured for sale in the United States and Canada are required to be equipped with a Lower Anchors and Tether for CHildren, or LATCH child restraint anchorage system. The second row seats in this vehicle have two pairs of anchor provisions for installing a LATCH-compatible child seat. A single seat may be mounted in the center seating position, one in each outboard seating position or one in the center and another in the right outboard position. There should never be three seats installed at the same time, or a seat in the center position in combination with a seat in the left outboard position.

With LATCH, child seats are secured by direct attachment to the vehicle seat structure, rather than by the seat belts. With LATCH-compatible child seats, lower (also known as ISOFIX) anchors attach to the seat structure through heavy-gauge wire loops located at the intersection between the seat cushion and the seat back surfaces.

Three upper tether anchors are integral to the second row seat back frames to secure the top tether strap of child seats equipped with this feature. These upper tether anchors work with both LATCH-compatible and other child seats equipped with a top tether strap. Vehicles manufactured for export markets are equipped with only the ISOFIX lower anchors, and have no upper tether anchor provisions.

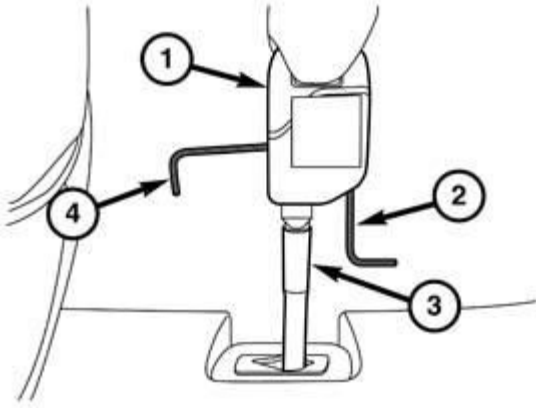
The owner's information packet in the vehicle glove box contains details and suggestions on the proper use of all of the factory-installed child restraint anchors.

BUCKLE, SEAT BELT

STANDARD PROCEDURE

STANDARD PROCEDURE - SEAT BELT ANCHOR RELEASE

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog.



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Fig. 54: Lower Anchor Buckle, Allen Key Wrench & Lower Anchor Latch Plate
Courtesy of CHRYSLER GROUP, LLC

Use two Allen key wrenches and the following steps in sequence to disconnect the front seat belt lower anchor latch plate (3) from the lower anchor buckle (1).

1. Insert an Allen key wrench (2) of the appropriate size into the outer hole at the bottom of the anchor buckle housing far enough to compress and hold compressed the internal lock feature of the buckle.
2. While pushing the anchor buckle lightly downward to relieve the tension of the buckle latch mechanism on the latch plate, insert a second Allen key wrench (4) of the appropriate size into the hole in the side of the buckle housing far enough to compress the internal latch plate release feature of the buckle.
3. Pull the seat belt anchor latch plate out of the anchor buckle.
4. Remove both Allen key wrenches from the holes in the anchor buckle housing.

REMOVAL

FRONT ANCHOR TENSIONER

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in

accidental airbag deployment.

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog.

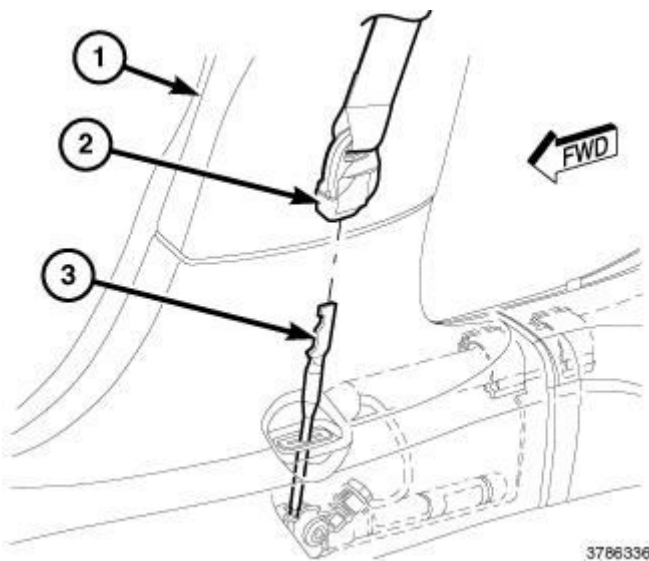


Fig. 55: B-Pillar, Front Seat Belt Anchor Tensioner Buckle & Front Seat Belt Anchor Latch Plate
Courtesy of CHRYSLER GROUP, LLC

NOTE: The following procedure is for replacement of an ineffective or damaged seat belt anchor tensioner unit. If the front seat belt anchor tensioner is ineffective or damaged, but is not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to **HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS**. If the seat belt anchor tensioner has been deployed, review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the unit from the vehicle. Refer to **SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT**.

1. Position the front seat for easiest access to the front seat belt anchor tensioner buckle (2).
2. Disconnect and isolate the negative cable from the battery. Wait two minutes for the system capacitor to

discharge before further service.

3. Release the front seat belt anchor latch plate (3) from the anchor buckle. Refer to **BUCKLE, SEAT BELT, STANDARD PROCEDURE**.

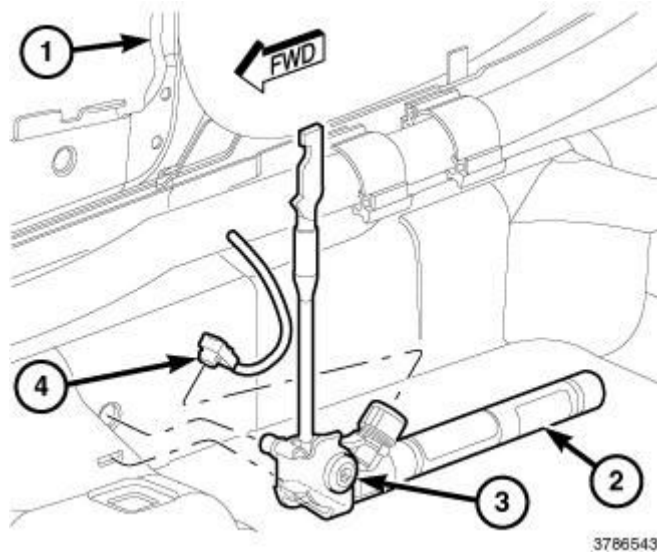


Fig. 56: Lower B-Pillar, Front Seat Belt Anchor Tensioner Unit, Screw & Harness Connector
Courtesy of CHRYSLER GROUP, LLC

4. Remove the trim from the lower B-pillar (1) and from over the front seat belt anchor tensioner unit (2) on the inner sill at the base of the B-pillar. Refer to **PANEL, B-PILLAR TRIM, REMOVAL**.
5. Disconnect the body wire harness connector (4) from the anchor tensioner initiator.
6. Remove the screw (3) that secures the anchor tensioner unit to the inner sill.
7. Remove the anchor tensioner unit from the vehicle.

FRONT SEAT

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog.

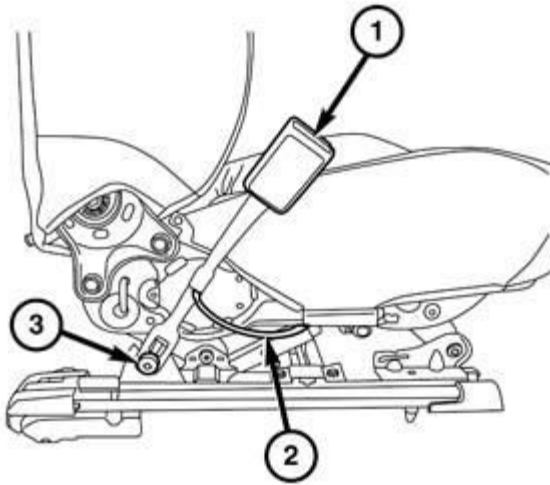


Fig. 57: Front Seat Belt Buckle, Seat Belt Buckle Switch Pigtail Wire Connector & Screw
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery.
2. Remove the front seat from the vehicle. Refer to **SEAT, REMOVAL**.
3. Remove the screw (3) that secures the front seat belt buckle (1) lower anchor to the bracket near the back of the upper inboard seat track.
4. Reach under the seat cushion to access and disconnect the seat wire harness connector from the seat belt buckle switch pigtail wire (2) connector.
5. Remove the seat belt buckle from the front seat.

REAR CENTER

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog. Failure to follow these instructions may result in possible serious or fatal

injury.

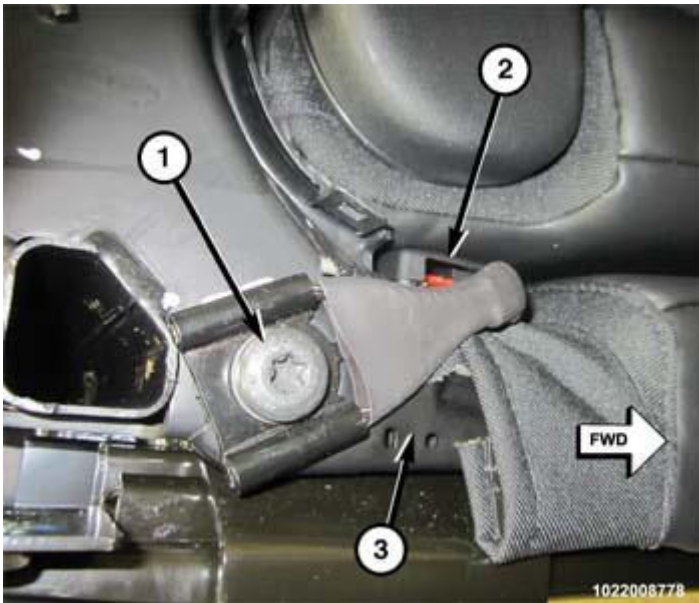


Fig. 58: Center Seat Belt Buckle And Anchor
Courtesy of CHRYSLER GROUP, LLC

1. Adjust the right (40 percent) rear seat to the full forward position, and the left (60 percent) rear seat to the full rearward position.
2. Working from behind the rear seats, unsnap and remove the trim cover from the inboard hinge bracket of the left (60 percent) rear seat.
3. Still working from behind the rear seats, remove the screw (1) that secures the lower anchor for the rear center seat belt buckle (2) to the inboard side of the left (60 percent) rear seat cushion frame (3).
4. Remove the center seat belt buckle and anchor from the left (60 percent) rear seat.

REAR LEFT

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog. Failure to follow these instructions may result in possible serious or fatal injury.

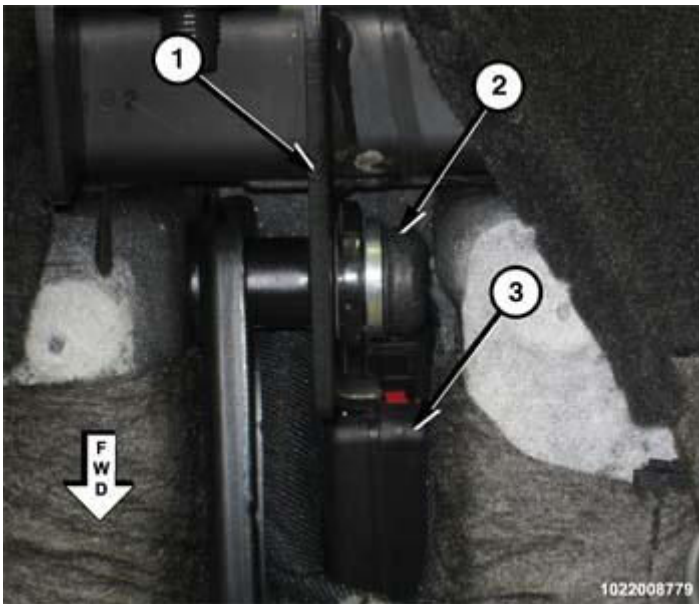
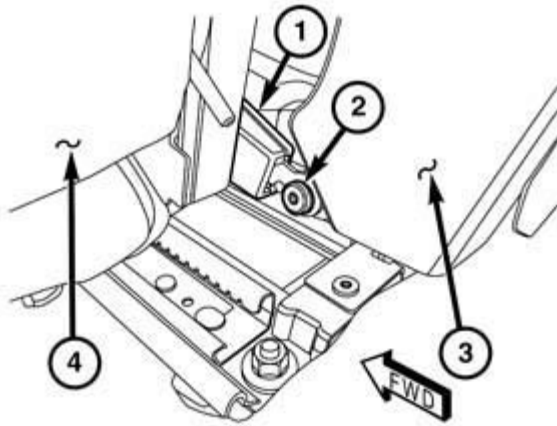


Fig. 59: Rear Left Seat Belt Buckle And Anchor Plate (60 Percent)
Courtesy of CHRYSLER GROUP, LLC

1. Remove the left (60 percent) rear seat from the vehicle. Refer to **SEAT, REAR, REMOVAL**.
2. Working beneath the rear of the left (60 percent) rear seat cushion, remove the screw (2) that secures the anchor plate of the rear left seat belt buckle (3) to the rear seat cushion frame (1).
3. Remove the rear left seat belt buckle and anchor plate from the left (60 percent) rear seat cushion as a unit.

REAR RIGHT

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog. Failure to follow these instructions may result in possible serious or fatal injury.



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Fig. 60: Right Rear Seat Belt Buckle Anchor
Courtesy of CHRYSLER GROUP, LLC

1. Adjust the left (60 percent) rear seat (4) to the full forward position, and the right (40 percent) rear seat (3) to the full rearward position.
2. Working from behind the rear seats, remove the screw (2) that secures the lower anchor for the right rear seat belt buckle (1) to the bracket at the back of the right rear seat upper inner adjuster track.
3. Remove the right rear seat belt buckle from between the rear seat cushions as a unit.

INSTALLATION

FRONT ANCHOR TENSIONER

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper

installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog.

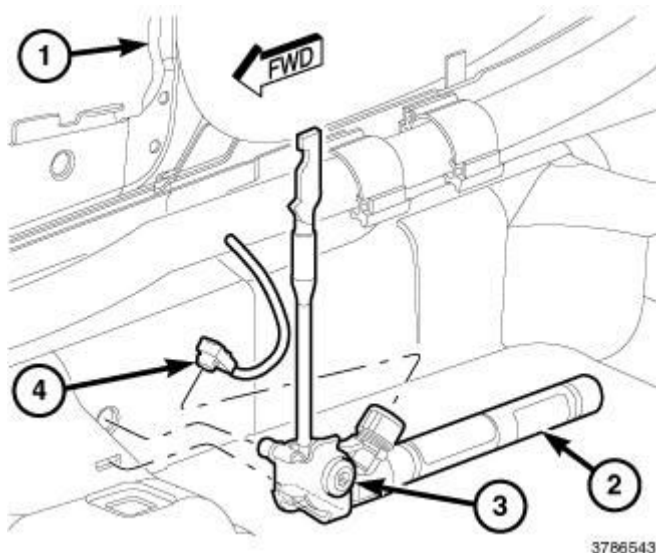


Fig. 61: Lower B-Pillar, Front Seat Belt Anchor Tensioner Unit, Screw & Harness Connector
Courtesy of CHRYSLER GROUP, LLC

NOTE: The following procedure is for replacement of an ineffective or damaged seat belt anchor buckle tensioner unit. The front seat belt anchor buckle is secured to a seat belt anchor buckle tensioner. If the front seat belt anchor buckle tensioner is ineffective or damaged, but the tensioner is not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS. If the seat belt anchor buckle tensioner has been deployed, review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the unit from the vehicle. Refer to SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT.

1. Position the front seat belt anchor buckle tensioner unit (2) into the vehicle.
2. Install and tighten the screw (3) that secures the anchor tensioner unit to the inner sill. Tighten the screw to 45 N.m (33 ft. lbs.).
3. Reconnect the body wire harness connector (4) to the anchor tensioner initiator.
4. Reinstall the lower B-pillar trim panel over the front seat belt anchor tensioner unit on the inner sill at the base of the B-pillar. Refer to PANEL, B-PILLAR TRIM, INSTALLATION.

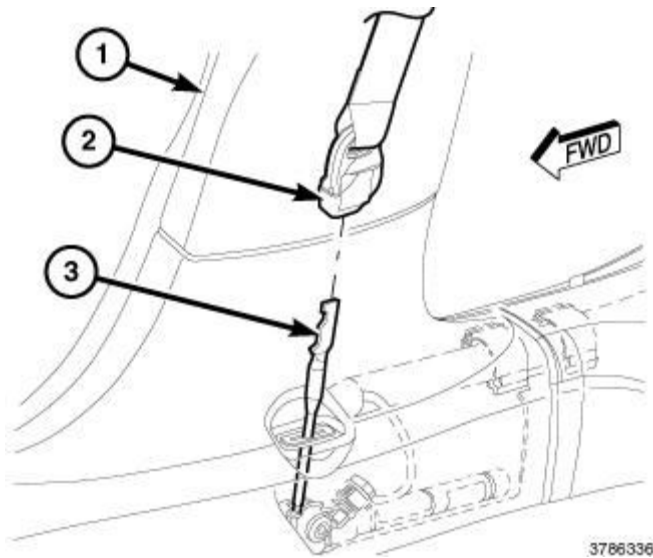


Fig. 62: B-Pillar, Front Seat Belt Anchor Tensioner Buckle & Front Seat Belt Anchor Latch Plate
Courtesy of CHRYSLER GROUP, LLC

5. Engage the front seat belt anchor latch plate (3) into the anchor buckle (2).
6. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST**.

FRONT SEAT

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog.

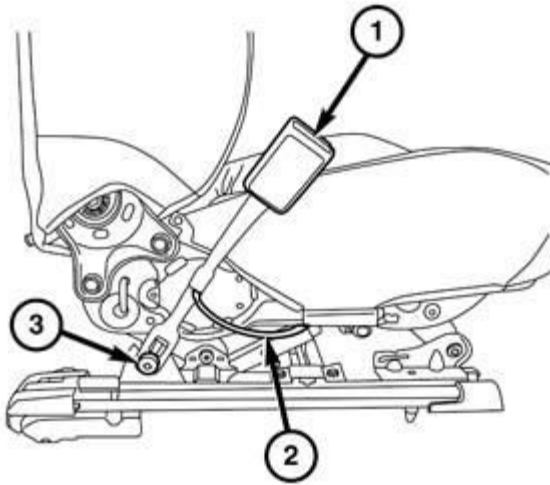


Fig. 63: Front Seat Belt Buckle, Seat Belt Buckle Switch Pigtail Wire Connector & Screw
Courtesy of CHRYSLER GROUP, LLC

1. Position the front seat belt buckle (1) lower anchor to the bracket near the back of the upper inboard seat track.
2. Reach under the seat cushion to access and reconnect the seat wire harness connector to the seat belt buckle switch pigtail wire (2) connector.
3. Install and tighten the screw (3) that secures the buckle lower anchor to the bracket. Tighten the screw to 45 N.m (33 ft. lbs.).
4. Reinstall the front seat into the vehicle. Refer to **SEAT, INSTALLATION**.
5. Reconnect the negative cable to the battery.

REAR CENTER

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog.

Failure to follow these instructions may result in possible serious or fatal injury.

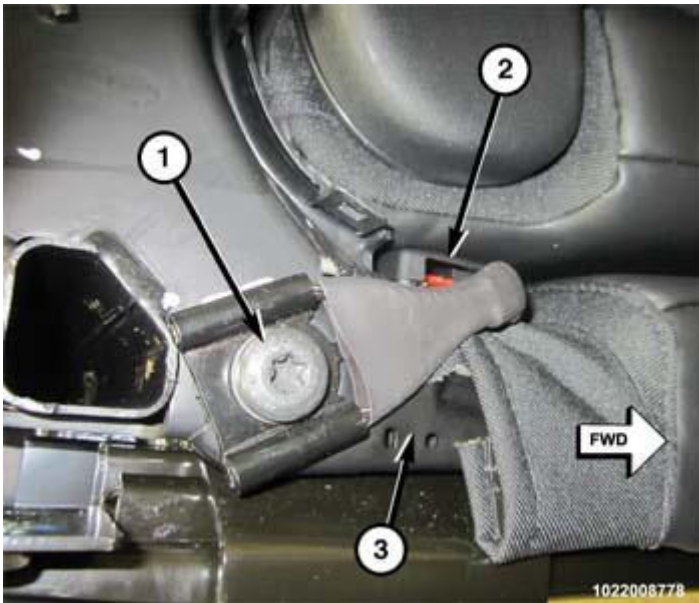


Fig. 64: Center Seat Belt Buckle And Anchor
Courtesy of CHRYSLER GROUP, LLC

1. Position the rear center seat belt buckle (2) and anchor plate to the left (60 percent) rear seat.
2. Working from behind the rear seats, install and tighten the screw (1) that secures the lower anchor for the rear center seat belt buckle to the inboard side of the left (60 percent) rear seat cushion frame (3). Tighten the screw to 55 N.m (41 ft. lbs.).
3. Still working from behind the rear seats, reinstall the trim cover onto the inboard hinge bracket of the left (60 percent) rear seat.
4. Adjust the left (60 percent) rear seat and right (40 percent) rear seat to their original positions.

REAR LEFT

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog. Failure to follow these instructions may result in possible serious or fatal

injury.

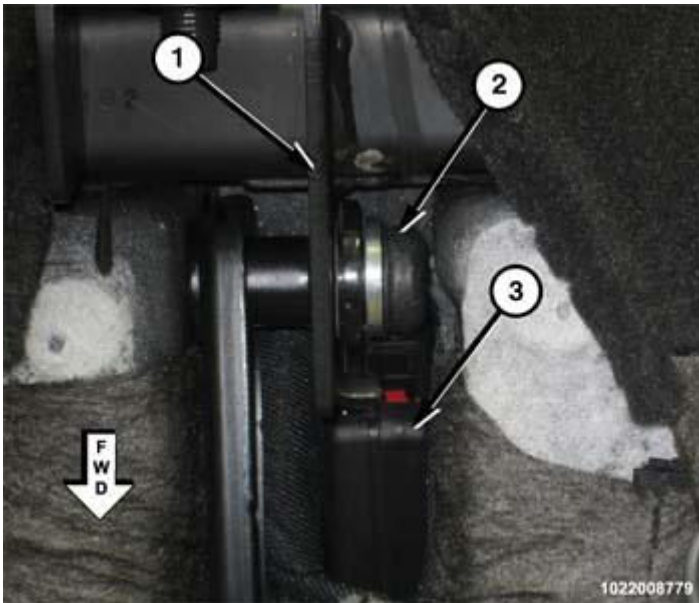
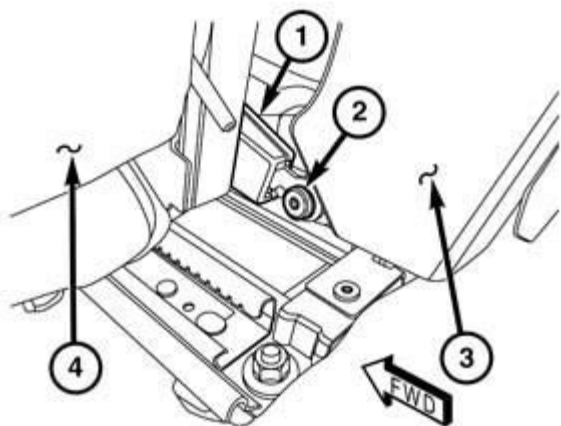


Fig. 65: Rear Left Seat Belt Buckle And Anchor Plate
Courtesy of CHRYSLER GROUP, LLC

1. Working beneath the rear of the left (60 percent) rear seat cushion, position the rear left seat belt buckle (3) to the rear seat cushion frame (1).
2. Install and tighten the screw (2) that secures the anchor plate of the rear left seat belt buckle to the rear seat cushion frame. Tighten the screw to 55 N.m (41 ft. lbs.).
3. Reinstall the left (60 percent) rear seat into the vehicle. Refer to **SEAT, REAR, INSTALLATION** .

REAR RIGHT

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog. Failure to follow these instructions may result in possible serious or fatal injury.



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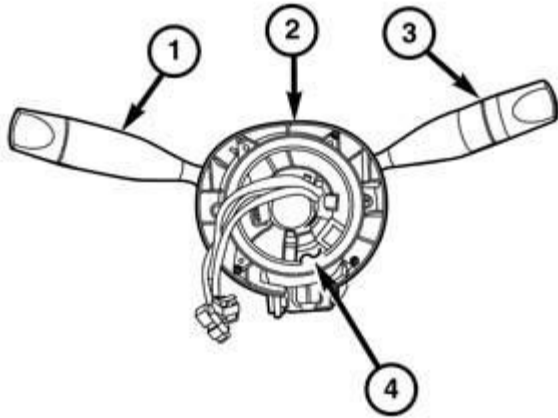
Fig. 66: Right Rear Seat Belt Buckle Anchor
Courtesy of CHRYSLER GROUP, LLC

1. Working from behind the rear seats, position the rear right seat belt buckle (1) between the rear seat cushions as a unit.
2. Position the lower anchor of the seat belt buckle to the bracket at the back of the right rear seat upper inner adjuster track.
3. Install and tighten the screw (2) that secures the buckle anchor to the bracket at the back of the right rear seat upper inner adjuster track. Tighten the screw to 55 N.m (41 ft. lbs.).
4. Adjust the left (60 percent) rear seat (4) and right (40 percent) rear seat (3) to their original positions.

CLOCKSPRING

DESCRIPTION

DESCRIPTION



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Fig. 67: Steering Column Control Module (SCCM) & Clockspring
Courtesy of CHRYSLER GROUP, LLC

The clockspring (4) for this vehicle is secured to the Steering Column Control Module (SCCM) mounting housing (2) near the top of the steering column below the steering wheel. The clockspring is contained within a flat, molded plastic case that includes four integral mounting tabs that secure the unit with screws to mounts integral to the outer circumference of the SCCM mounting housing. The clockspring also includes an integral turn signal cancel cam that is serviced as a unit with the clockspring. The SCCM mounting housing also supports the left (1) and right (3) multifunction switches and the Steering Control Module (SCM), which is internal to the mounting housing. The multifunction switches and the SCM are serviced only as a unit with the SCCM mounting housing, while the clockspring can be separated from and is serviced separately from the SCCM mounting housing.

Within the plastic clockspring case is a spool-like molded clear plastic rotor with an exposed hub. The upper surface of the rotor hub has a large center hole, three short pigtail wires with connectors and a connector receptacle that face toward the steering wheel. The inner surface of the clockspring rotor hub has keyway features that are engaged by lug features on the outer circumference of the steering wheel hub. These interlocking features allow the steering wheel to drive the clockspring and also unlock the clockspring rotor when the steering wheel has been properly installed.

Wound around the rotor spool within the case are long ribbon-like tapes that consist of several thin copper wire leads sandwiched between two thin plastic membranes. The outer end of the tapes terminate at the terminal pins that are housed within a connector receptacle integral to the SCCM mounting housing and face the instrument panel, while the inner ends of the tapes terminate at the pigtail wires and connector receptacle on the hub of the clockspring rotor that face the steering wheel. The outer surface of the rotor spool hub within the clockspring case also has the integral lobes of the turn signal cancel cam.

The clockspring also has an interconnect with terminal pins that engage a mating interconnect receptacle integral to the SCCM mounting housing. This interconnect features several circuits which pass through the clockspring to connect the SCM to the vehicle electrical system.

The clear plastic clockspring rotor has an outer band that has a translucent or frosted appearance except for a small, clear inspection window area. The clockspring tape has several black squares that are only visible through the clear inspection window when the clockspring is properly centered. If these squares are not visible through the inspection window, clockspring centering has been compromised and the entire clockspring must be replaced with a new unit.

The service replacement clockspring is shipped with the clockspring pre-centered and with a yellow molded plastic locking tab installed. The locking tab secures the centered clockspring rotor to the clockspring case during shipment and handling, but must be removed after the clockspring is installed on the steering column and before the steering wheel can be installed. The clockspring cannot be repaired. If the clockspring is ineffective, damaged, if clockspring centering is compromised or if the Driver AirBag (DAB) has been deployed the entire clockspring unit must be replaced. Refer to **CLOCKSPRING, STANDARD PROCEDURE**.

OPERATION

OPERATION

The clockspring is a mechanical electrical circuit component that is used to provide continuous electrical continuity between the fixed instrument panel wire harness and certain electrical components mounted on or in the rotating steering wheel. On this vehicle the rotating electrical components include the Driver AirBag (DAB), the horn switch and, if the vehicle is so equipped, the odometer switch pod or the Electronic Vehicle Information Center (EVIC) switch pod, the Local Interface Network (LIN) module, the speed control switch pod and the remote radio switches. The clockspring is positioned and secured near the top of the steering column. The fixed connector receptacle on the back of the fixed Steering Column Control Module (SCCM) mounting housing connects the clockspring to the vehicle electrical system through a take out with connector from the instrument panel wire harness.

The turn signal cancel cam is integral to the rim of the clockspring rotor hub within the SCCM mounting housing so it also moves with the rotation of the steering wheel. Three short, sleeved pigtail wires on the upper surface of the clockspring rotor connect the clockspring to the DAB, while a steering wheel wire harness connected to the connector receptacle on the upper surface of the clockspring rotor completes circuits to the horn switch and, if the vehicle is so equipped, the odometer switch pod or the EVIC switch pod, the LIN module, the speed control switch pod and the remote radio switches.

Like the clockspring in a timepiece, the clockspring tape has travel limits and can be damaged by being wound too tightly during full stop-to-stop steering wheel rotation. To prevent this from occurring, the clockspring is centered when it is installed on the steering column. Centering the clockspring indexes the clockspring tape to the movable steering components so that the tape can operate within its designed travel limits.

However, if the steering shaft is disconnected from the steering gear the clockspring rotor spool can change position relative to other movable steering components. Clockspring centering must be confirmed by viewing the inspection window on the clockspring rotor. If the black squares of the clockspring tape are not visible in

the inspection window, clockspring centering has been compromised and the entire clockspring must be replaced with a new unit.

Service replacement clocksprings are shipped pre-centered and with a yellow plastic locking tab installed. This locking tab should not be removed until the clockspring has been properly installed on the steering column. If the locking tab is removed before the clockspring is installed on a steering column, clockspring centering must be confirmed by viewing the inspection window on the clockspring rotor. If the black squares of the clockspring tape are not visible in the inspection window, the clockspring must be replaced with a new unit.

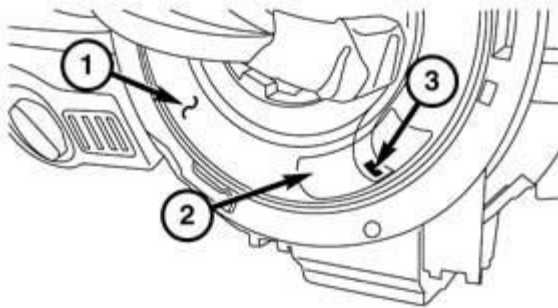
The hard wired clockspring circuits may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the electronic controls and communication between stationary electronic modules and devices in the vehicle and the rotating electronic modules and devices on or in the steering wheel. The most reliable, efficient and accurate means to diagnose the electronic controls and communication related to clockspring operation requires the use of a diagnostic scan tool and may also require the use of the SRS Load Tool special tool along with the appropriate Load Tool Jumpers and Adapters. Refer to the appropriate diagnostic information.

STANDARD PROCEDURE

STANDARD PROCEDURE - CLOCKSPRING CENTERING

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

CAUTION: Always turn the steering wheel until the front wheels are in the straight-ahead position. Then, prior to disconnecting the steering column from the steering gear, lock the steering wheel to the steering column. If clockspring centering has been compromised for ANY reason, the entire Steering Column Control Module (SCCM) and clockspring unit **MUST** be replaced with a new unit.



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Fig. 68: Clockspring Rotor, Inspection Window & Black Squares
Courtesy of CHRYSLER GROUP, LLC

Like the clockspring in a timepiece, the clockspring tape has travel limits and can be damaged by being wound too tightly during full stop-to-stop steering wheel rotation. To prevent this from occurring, the clockspring is centered when it is installed on the steering column. Centering the clockspring indexes the clockspring tape to the movable steering components so that the tape can operate within its designed travel limits. However, if the steering shaft is disconnected from the steering gear, the clockspring rotor spool can change position relative to the fixed steering components.

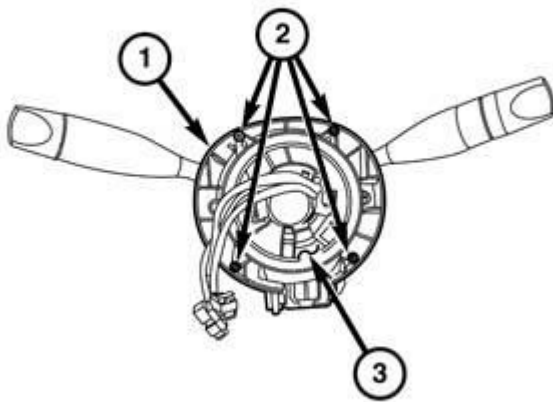
Clockspring centering must always be confirmed by viewing the inspection window (2) on the clockspring rotor (1). If the black squares (3) on the clockspring tape are not visible through the inspection window, clockspring centering has been compromised and the clockspring must be replaced with a new unit. Refer to **CLOCKSPRING, REMOVAL**.

The service replacement clockspring is shipped pre-centered and with a yellow plastic locking tab installed. This locking tab should not be removed until the clockspring has been properly installed on the steering column. If the locking tab is removed before the clockspring is installed on a steering column, clockspring centering must be confirmed by viewing the black squares on the clockspring tape through the inspection window on the clockspring rotor. If the black squares of the clockspring tape are not visible through the inspection window, clockspring centering has been compromised and the clockspring must be replaced with a new unit. Refer to **CLOCKSPRING, INSTALLATION**.

REMOVAL

REMOVAL

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.



1012006658

Fig. 69: Clockspring & Fasteners

Courtesy of CHRYSLER GROUP, LLC

NOTE: Before starting this procedure, be certain to turn the steering wheel until the front wheels are in the straight-ahead position and be certain that the entire steering system is locked or inhibited from rotation.

1. Place the front wheels in the straight ahead position.
2. Disconnect and isolate the negative cable from the battery.
3. Remove the Driver AirBag (DAB) from the steering wheel. Refer to **AIR BAG, DRIVER, REMOVAL**.
4. Disconnect the steering wheel wire harness connector from the upper clockspring connector receptacle.
5. Remove the steering wheel from the upper steering column shaft. Refer to **WHEEL, STEERING, REMOVAL**.
6. If the removed clockspring is to be reused, be certain that the clockspring rotor is secured to the clockspring case to maintain clockspring centering until the steering wheel is reinstalled on the steering

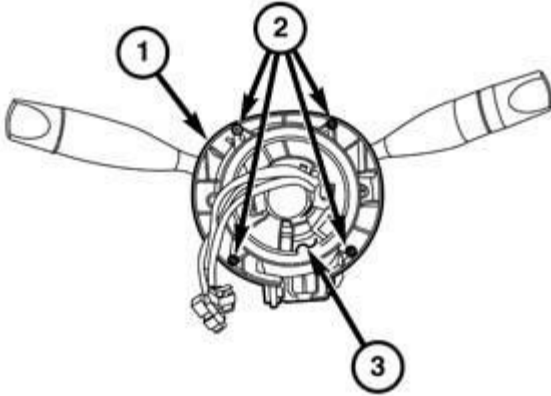
column. If clockspring centering is not maintained, the clockspring must be replaced with a new unit. Refer to **CLOCKSPRING, STANDARD PROCEDURE**.

7. Move the steering column to the fully lowered position and leave the tilt release lever in the released (down) position.
8. Remove the upper and lower shrouds from the steering column. Refer to **SHROUD, STEERING COLUMN, LOWER, REMOVAL** and **SHROUD, STEERING COLUMN, UPPER, REMOVAL** .
9. Disconnect the instrument panel wire harness connectors from the back of the Steering Column Control Module (SCCM) mounting housing (1).
10. Remove the four screws (2) that secure the clockspring to the outer circumference of the SCCM mounting housing.
11. Carefully pull the clockspring (3) away from the SCCM mounting housing far enough to disengage the interconnect terminal pins of the clockspring from the interconnect receptacle of the SCCM mounting housing.
12. Remove the clockspring from the steering column.

INSTALLATION

INSTALLATION

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.



1012006658

Fig. 70: Clockspring & Fasteners

Courtesy of CHRYSLER GROUP, LLC

NOTE: Before starting this procedure, be certain to turn the steering wheel until the front wheels are in the straight-ahead position and be certain that the entire steering system is locked or inhibited from rotation.

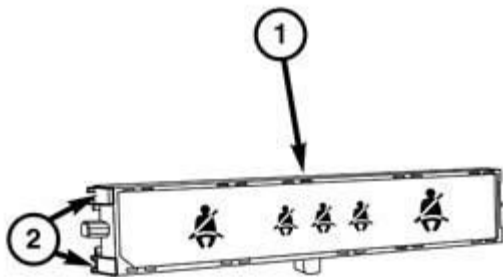
1. Carefully slide the clockspring (3) down over the steering column upper shaft far enough to align and engage the interconnect terminal pins of the clockspring with the interconnect receptacle of the Steering Column Control Module (SCCM) mounting housing (1).
2. Install and tighten the four screws (2) that secure the mounting tabs of the clockspring to the outer circumference of the SCCM mounting housing. Tighten the screws securely.
3. Reconnect the instrument panel wire harness connectors to the back of the SCCM mounting housing.
4. Reinstall the upper and lower shrouds onto the steering column. Refer to **SHROUD, STEERING COLUMN, LOWER, INSTALLATION** and **SHROUD, STEERING COLUMN, UPPER, INSTALLATION**.
5. Move the steering column back to the fully raised position and move the tilt release lever back to the locked (up) position.
6. If a new clockspring is being installed, remove (break off) the yellow locking tab that secures the clockspring rotor to the clockspring case.
7. Reinstall the steering wheel onto the upper steering column shaft. Be certain to align and insert the rotational lugs on the steering wheel hub into the slots in the hub of the clockspring. Also, the steering wheel fastener **MUST** be tightened to the proper torque specification to ensure proper clockspring operation. Refer to **WHEEL, STEERING, INSTALLATION**.
8. Reconnect the steering wheel wire harness connector to the upper clockspring connector receptacle.

9. Reinstall the Driver AirBag (DAB) onto the steering wheel. Refer to **AIR BAG, DRIVER, REMOVAL**.
10. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST**.

INDICATOR, SEAT BELT REMINDER (SBR)

DESCRIPTION

DESCRIPTION



1022007446

Fig. 71: Seat Belt Reminder (SBR) Indicator
Courtesy of CHRYSLER GROUP, LLC

Vehicles manufactured for certain export markets are equipped with the Seat Belt Reminder (SBR) indicator (1), which is located within the overhead console. The SBR indicator consists of Light Emitting Diode (LED) units, a Local Interface Network (LIN) data bus communication microchip, an opaque overlay and a translucent outer lens.

The molded plastic indicator housing is secured to the inner surface of the overhead console housing by two spring clips (2) on each end of the housing. An integral connector receptacle on the back of the housing connects the SBR to the vehicle electrical system through a dedicated take out and connector of the overhead console wire harness.

The opaque overlay of the SBR includes five stencil-like cutouts of the International Control and Display Symbol icon for **Seat Belt** within the SBR indicator. Three of the icons in the center of the display are smaller and represent the three rear seating positions, while the two larger icons border the smaller ones and represent

the two front seating positions. An LED unit behind each icon causes that icon to appear in green or red through the translucent lens when it is illuminated from behind by the LED.

Some settings for the SBR feature may be programmable using a diagnostic scan tool and the appropriate commands through the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) Electronic Control Unit (ECU). The SBR indicator cannot be adjusted or repaired and, if ineffective or damaged the SBR indicator unit must be replaced.

OPERATION

OPERATION

The Seat Belt Reminder (SBR) indicator gives an indication to the vehicle operator and occupants of the status of the seat belt for each seating position of the vehicle. When a seat belt is buckled, the icon for that seating position is illuminated in green and when a seat belt is unbuckled, the icon for that seating position is illuminated in red. In the case of the larger icons representing the front seating positions, the indicator is illuminated in red only if the seat is occupied (the driver seat is assumed to be occupied while the status of the ignition is On) and the seat belt is unbuckled, while the smaller icons representing the rear seating positions are illuminated in red with the seat belt unbuckled regardless of whether that seating position is occupied.

The Occupant Restraint Controller (ORC) monitors the status of each of the seat belt switches and the Occupant Detection Sensor (ODS) for the passenger side front seat. The ORC then sends the appropriate seat belt switch status messages over the Controller Area Network (CAN) data bus to the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC). The IC uses internal hardware and programming to interpret the messages from the ORC and manage both the audible and visual features of the seat belt reminder function. The IC controls audible outputs related to the seat belt reminder through an on board transducer soldered onto its Printed Circuit Board (PCB). The IC is also a Local Interface Network (LIN) master node and uses a number of electronic command messages to control the visual output of the SBR indicator, which is a LIN slave node.

Besides the seat belt switch messages from the ORC, the IC also monitors vehicle speed and the Reverse (R) gear status in order to implement the various visual and audible outputs it controls. Besides the solid red or green indications, the SBR red indication may be flashed on and off, as dictated by the LIN bus message from the IC. All seat belt reminder audible and visual indications have several pre-programmed counters that will cause the indications to change or cease upon expiration of certain timed intervals or due to a change of an input status. Some of the feature programming is mandated by state, provincial, local and federal regulations.

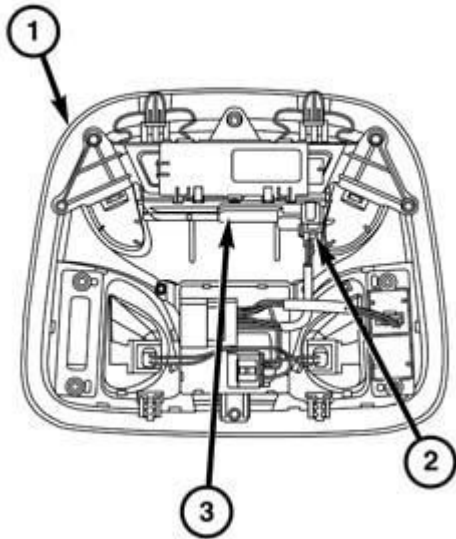
The SBR indicator is completely controlled by the IC. The indicator receives a battery current input on a fused ignition (run) circuit and is connected to a path to ground at all times. Therefore, the SBR indicator will always be Off when the status of the ignition switch (also known as the Keyless Ignition Node/KIN or IGnition Node Module/IGNM) is anything except On.

The IC and the ORC will store Diagnostic Trouble Codes (DTC) for any malfunctions they detect. The hard wired circuits between the SBR indicator and the IC may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the SBR indicator or the electronic controls and communication between other modules and devices that provide some features of the SBR. The most reliable, efficient and accurate means to diagnose the SBR indicator or the electronic controls and communication related to SBR indicator

operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

REMOVAL



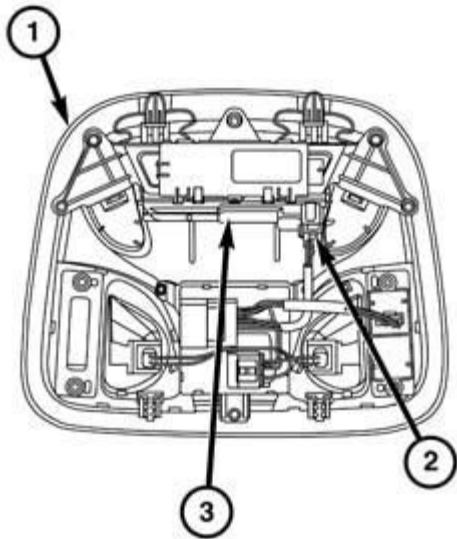
1022007447

Fig. 72: Overhead Console & Seat Belt Reminder (SBR) Indicator Location
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery.
2. Remove the overhead console (1) from the headliner. Refer to **CONSOLE, OVERHEAD, FRONT, REMOVAL**.
3. If the vehicle is so equipped, remove the Ultrasonic and Antitilt Module (UAM) (also known as the Ultrasonic Alarm Module/UAM or the Intrusion Transceiver Module/ITM) from the overhead console. Refer to **MODULE, ULTRASONIC AND ANTI-TILT, REMOVAL**.
4. Disconnect the overhead console wire harness connector (2) from the Seat Belt Reminder (SBR) indicator (3) connector receptacle.
5. Using a trim stick or another suitable wide flat-bladed tool, carefully and evenly pry each outboard end of the SBR away from the overhead console housing until all four spring clips are free.
6. Remove the SBR indicator from the overhead console.

INSTALLATION

INSTALLATION



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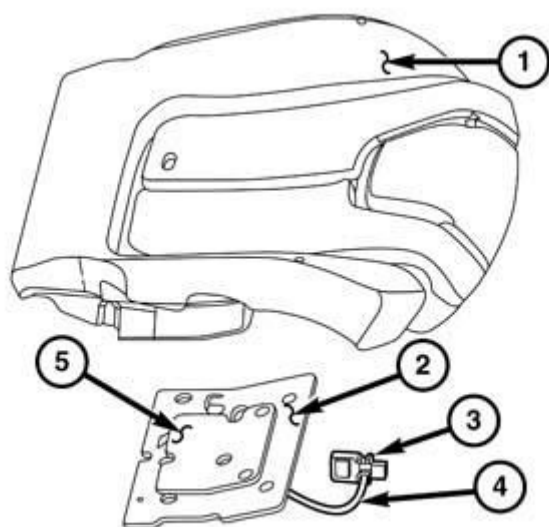
Fig. 73: Overhead Console & Seat Belt Reminder (SBR) Indicator Location
 Courtesy of CHRYSLER GROUP, LLC

1. Position the Seat Belt Reminder (SBR) indicator (3) to the overhead console (1) housing.
2. Align the SBR indicator to the opening in the overhead console housing.
3. Press the outboard ends of the SBR indicator firmly and evenly into the overhead console housing until the four spring clips are fully seated.
4. Reconnect the overhead console wire harness connector (2) to the SBR indicator connector receptacle.
5. If the vehicle is so equipped, reinstall the Ultrasonic and Antitilt Module (UAM) (also known as the Ultrasonic Alarm Module/UAM or the Intrusion Transceiver Module/ITM) onto the overhead console. Refer to **MODULE, ULTRASONIC AND ANTI-TILT, INSTALLATION**.
6. Reinstall the overhead console onto the headliner. Refer to **CONSOLE, OVERHEAD, FRONT, INSTALLATION**.
7. Reconnect the negative cable to the battery.

MODULE, OCCUPANT CLASSIFICATION

DESCRIPTION

DESCRIPTION



100868364

Fig. 74: Seat Cushion Foam, Insulator Pad, Occupant Classification Module, Pressure Hose & Bladder
 Courtesy of CHRYSLER GROUP, LLC

In vehicles manufactured for domestic markets, the passenger side front seat incorporates the Occupant Classification System (OCS). The OCS consists of a single factory-calibrated unit, which includes the following components:

- **Electronic Pressure Sensor** - The electronic pressure sensor is integral and internal to the Occupant Classification Module (OCM). Only the hose nipple for the pressure hose is visible on the outside of the OCM housing. The remainder of the sensor and the sensor circuitry are concealed and protected within the molded black plastic OCM housing.
- **Occupant Classification Module** - The Occupant Classification Module (OCM) (3) is located beneath the front of the passenger front seat cushion. Concealed within a hollow in the center of the molded black plastic OCM housing is the electronic circuitry of the module. The module housing is sealed to enclose and protect the internal electronic circuitry. A connector receptacle integral to the front of the OCM housing contains terminal pins that connect the sensor to the vehicle electrical system through a dedicated take out and connector of the passenger front seat wire harness. A hose nipple formation is integral to the OCM housing.

A slot integral to the top of the OCM housing snaps over a blade on a stamped metal bracket riveted to the inboard upper seat track on models with the base seat. On models with the optional storage seat, the OCM housing snaps over a blade on a molded plastic stanchion integral to the forward inboard underside of the seat cushion pan.

- **Pressure Hose** - Beneath the seat cushion a length of clear poly hose serves as the OCS pressure hose (4). The hose is securely clamped at one end to a hose nipple fitting that extends downward from the Seat Weight Sensor (SWS) (also known as the seat weight bladder), and at the opposite end to the hose nipple formation of the electronic pressure sensor integral to the outside of the OCM housing. The pressure sensor circuitry is internal and integral to the OCM. The pressure hose is filled with the same silicone fluid that fills the SWS.

- **Seat Cushion Foam** - The passenger front seat cushion foam (1) is an integral part of the factory-calibrated OCS. There are two unique foam configurations: one for the standard passenger front seat and another for the optional storage front seat. The storage front seat includes a small storage bin which is accessed by lifting the center insert of the seat cushion.
- **Seat Weight Sensor** - The Seat Weight Sensor (SWS) (also known as the seat weight bladder) is sandwiched between the seat cushion springs and the seat cushion foam. A heavy jute-like insulator pad (2) is installed between the lower surface of the bladder (5) and the seat cushion pan and springs. The bladder and pad are secured near the forward end to the seat cushion pan by two plastic push-in fasteners. There are two unique bladder configurations: one for the standard passenger front seat and another for the optional storage front seat. The storage front seat includes a small storage bin which is accessed by lifting the center insert of the seat cushion.

The bladder consists of two sheets of an elastomeric material and a molded plastic hose nipple fitting. The two sheets of elastomeric material are sealed together around their perimeter and joined at numerous specific intervals within their field. The hose nipple fitting is sealed to a small round hole in the lower surface of the bladder and is pointed downward where it passes through a clearance hole in the insulator pad and extends to just below the seat cushion springs. The bladder is filled with a silicone fluid to become a pliable, quilted, resistive mat and is connected to a pressure hose that connects it to the electronic pressure sensor within the OCM unit.

All of the components that make up the OCS are a factory-calibrated and assembled unit. The OCS components cannot be adjusted or repaired and, if damaged or ineffective, they must be replaced as a calibrated unit. Any time the OCS is removed or replaced for any reason, the new OCS data must be configured within the Occupant Restraint Controller (ORC) using a diagnostic scan tool. Refer to the appropriate diagnostic information.

OPERATION

OPERATION

In vehicles manufactured for domestic markets, the Occupant Classification System (OCS) provides electronic message inputs to other electronic modules in the vehicle indicating whether the passenger front seat is occupied and the relative size classification of the seat occupant. The microcontroller within the Occupant Classification Module (OCM) contains the OCS logic and communication circuitry. The OCM uses On-Board Diagnostics (OBD) and can communicate with other electronic modules in the vehicle as well as with a diagnostic scan tool using the Controller Area Network (CAN) data bus. This method of communication is also used for OCS diagnosis and testing through the 16-way data link connector located on the driver side lower edge of the instrument panel.

The Seat Weight Sensor (SWS) (also known as the seat weight bladder) and the electronic pressure sensor integral and internal to the OCM allow the OCS logic circuits to sense the relative weight of a load applied to the passenger front seat cushion. When a load is applied to the seat cushion, silicone fluid within the bladder becomes pressurized. These changes in bladder fluid pressure are measured by the electronic pressure sensor circuitry through the OCS pressure hose. As the pressure within the bladder changes, the electronic pressure sensor input to the OCM microcontroller also changes. This electronic pressure sensor input allows the OCM to monitor the passenger front seat cushion by providing a weight-sensing reference to the relative load on the seat cushion.

Pre-programmed decision algorithms and OCS calibration allow the OCM microcontroller to determine the appropriate occupant classification based upon the seat cushion load as signaled by the pressure sensor. The OCM then sends the proper electronic **occupant classification status** messages over the CAN data bus to the Occupant Restraint Controller (ORC) and the ORC controls the deployment circuits for the passenger front supplemental restraints accordingly.

The OCM continuously monitors all of the OCS electrical circuits and components to determine the system readiness. If the OCM detects a monitored system fault, it sets an active and stored Diagnostic Trouble Code (DTC) and sends the appropriate electronic messages to the Occupant Restraint Controller (ORC) over the CAN data bus. Then the ORC sets a DTC and sends electronic messages to the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) to control airbag indicator operation.

The OCM receives battery current on a fused ignition output (run-start) circuit through a fuse in the Power Distribution Center (PDC). The OCM circuitry has a path to ground at all times through a ground circuit and take out of the instrument panel wire harness, which it shares with the ORC. This take out is secured to the body sheet metal. These connections allow the OCM to be operational whenever the ignition switch status is ON or START.

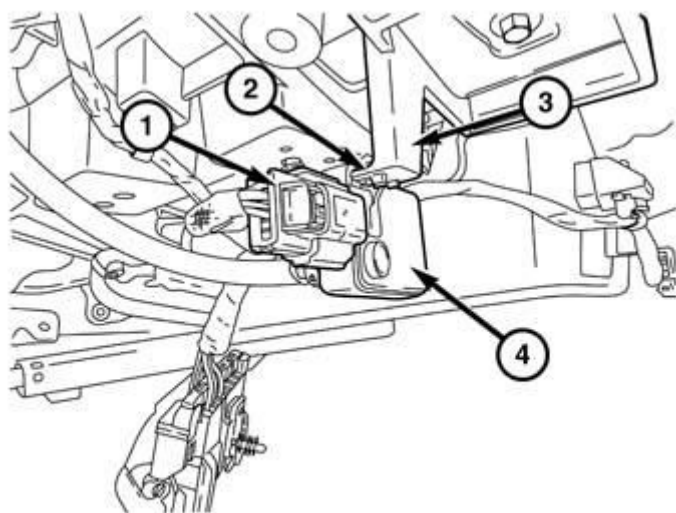
The Body Control Module (BCM) stores and compares vehicle configuration data with the OCM as well as with other Electronic Control Units (ECU) in the vehicle. This process is referred to as PRogramming Of Configuration of Systems Integrated (PROCSI) (also known as PROXI). If a configuration mismatch is detected, the BCM sets a DTC. A configuration mismatch DTC will require the performance of a Restore BCM PROXI Configuration routine, or a PROXI Configuration Alignment routine using a diagnostic scan tool.

The hard wired inputs and outputs for the OCM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the OCM or the electronic controls and communication between other modules and devices that provide some features of the OCS. The most reliable, efficient and accurate means to diagnose the OCM or the electronic controls and communication related to OCS operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

REMOVAL

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.



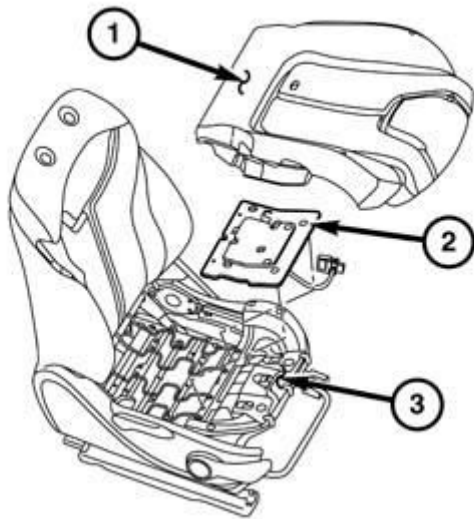
100868365

Fig. 75: Harness Connector, Blade, Stanchion & Occupant Classification Module
Courtesy of CHRYSLER GROUP, LLC

NOTE: The Occupant Classification System (OCS) is used only in the passenger side front seat of vehicles manufactured for domestic markets. Vehicles manufactured for export markets use the Occupant Detection Sensor (ODS) instead of the OCS on the passenger side front seat.

NOTE: All of the components of the Occupant Classification System (OCS) including the Occupant Classification Module (OCM), the Seat Weight Sensor (SWS) (also known as the seat weight bladder), the jute-like SWS pad, the passenger seat cushion foam, the electronic pressure sensor and the OCS pressure hose are serviced only as a factory-calibrated and assembled unit. Any time any one of these components requires replacement for any reason, the entire calibrated OCS must be replaced and re-zeroed in the Occupant Restraint Controller (ORC) using a diagnostic scan tool. Refer to the appropriate diagnostic information.

1. Disconnect and isolate the negative cable from the battery. Wait two minutes for the system capacitor to discharge before further service.
2. Remove the passenger front seat from the vehicle. Refer to **SEAT, REMOVAL** .
3. Disconnect the seat wire harness connector (1) from the Occupant Classification Module (OCM) (4) beneath the inboard front corner of the seat cushion pan.
4. Using a small flat-bladed screwdriver or a small pick tool, carefully pry the latch tab integral to the OCM mount to release it from the blade (2) of the mounting bracket (base seat) or stanchion (3) (storage seat) beneath the inboard front corner of the seat cushion.
5. Remove the trim cover from the passenger front seat cushion. Refer to **COVER, SEAT CUSHION, REMOVAL** .



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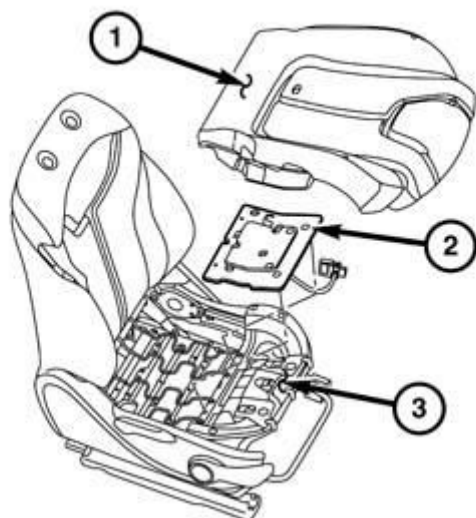
Fig. 76: Seat Cushion Foam, Seat Weight Sensor Pad & Seat Frame
Courtesy of CHRYSLER GROUP, LLC

6. Remove the foam (1) from the seat cushion.
7. Remove the two push-in plastic fasteners that secure the Seat Weight Sensor (SWS) (also known as the seat weight bladder) and the jute-like SWS pad (2) to the seat cushion pan (3).
8. Remove the SWS, the pad, the pressure hose and the OCM with integral electronic pressure sensor from above the front seat cushion as a unit.
9. If any of the OCS components requires replacement, discard the entire OCS unit. **Replace it with the entire contents of the factory-calibrated service replacement package, which includes an OCM with integral and internal electronic pressure sensor, a pressure hose, the SWS, the jute-like SWS pad and the seat cushion foam.**

INSTALLATION

INSTALLATION

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.



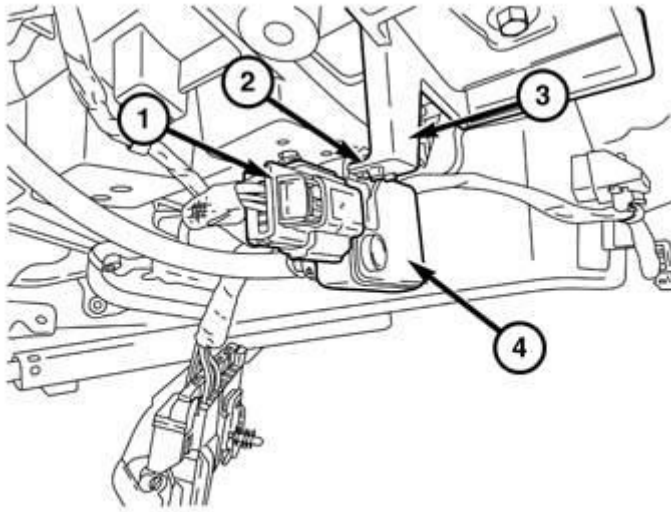
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Fig. 77: Seat Cushion Foam, Seat Weight Sensor Pad & Seat Frame
Courtesy of CHRYSLER GROUP, LLC

NOTE: The Occupant Classification System (OCS) is used only in the passenger side front seat of vehicles manufactured for domestic markets. Vehicles manufactured for export markets use the Occupant Detection Sensor (ODS) instead of the OCS on the passenger side front seat.

NOTE: All of the components of the Occupant Classification System (OCS) including the Occupant Classification Module (OCM), the Seat Weight Sensor (SWS) (also known as the seat weight bladder), the jute-like SWS pad, the passenger seat cushion foam, the electronic pressure sensor and the OCS pressure hose are serviced only as a factory-calibrated and assembled unit. Any time any one of these components requires replacement for any reason, discard all of the removed OCS components including the OCM with integral and internal electronic pressure sensor, the pressure hose, the SWS, the jute-like SWS pad and the seat cushion foam and replace them with the entire contents of the factory-calibrated OCS service replacement package.

1. Position the Seat Weight Sensor (SWS) (also known as the seat weight bladder), the jute-like SWS pad (2), the Occupant Classification System (OCS) pressure hose and the Occupant Classification Module (OCM) with integral electronic pressure sensor to the top of the front seat cushion as a unit. Lift the back of the SWS and pad far enough to access and insert the OCM and pressure hose between the seat cushion springs to the underside of the seat cushion. Be certain the pressure hose is not pinched or kinked.
2. Install the two push-in plastic fasteners that secure the SWS and jute-like pad to the seat cushion pan (3).
3. Position the foam (1) onto the seat cushion.
4. Reinstall the trim cover onto the passenger front seat cushion. Refer to **COVER, SEAT CUSHION, INSTALLATION**.



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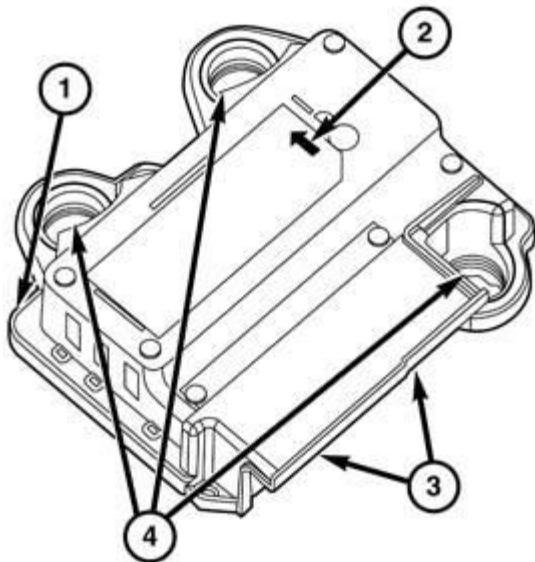
Fig. 78: Harness Connector, Blade, Stanchion & Occupant Classification Module
Courtesy of CHRYSLER GROUP, LLC

5. From the underside of the seat cushion, snap the OCM (4) onto the blade (2) of the mounting bracket (base seat) or stanchion (3) (storage seat) beneath the inboard front corner of the seat cushion. Route the pressure hose away from sharp or moving objects and be certain the hose is not kinked.
6. Reconnect the seat wire harness connector (1) to the OCM beneath the inboard front corner of the seat cushion.
7. Reinstall the passenger front seat into the vehicle. Refer to **SEAT, INSTALLATION**.
8. If this Electronic Control Unit (ECU) is being replaced with a new unit, a diagnostic scan tool **MUST** be used to align the PROXI configuration data into the new ECU. Follow the routine outlined in the diagnostic scan tool for PROXI Configuration Alignment under Body Control Module (BCM) Miscellaneous Functions menu.
9. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST**.
10. Following successful completion of the SRS Verification Test procedure, perform the OCM System Verification Test procedure found in the diagnostic scan tool under Miscellaneous Functions. Refer to the appropriate diagnostic procedures.

MODULE, OCCUPANT RESTRAINT CONTROLLER

DESCRIPTION

DESCRIPTION



100868611

Fig. 79: Occupant Restraint Controller, Printed Arrow, Connector Receptacles & Mounting Flanges
Courtesy of CHRYSLER GROUP, LLC

The Occupant Restraint Controller (ORC) (1) is secured by three nuts to three studs on the top of the floor panel transmission tunnel near the dash panel and beneath the instrument panel forward of the center stack in the passenger compartment of the vehicle. Concealed within a hollow in the center of the molded black plastic ORC housing is the electronic circuitry of the ORC which includes a microcontroller, an electronic impact sensor, an electronic safing sensor, a rollover sensor, a integral Electronic Stability Control (ESC) dynamics sensor (also known as the yaw sensor or sensor cluster) and an energy storage capacitor. A stamped metal cover plate is secured to the bottom of the ORC housing to enclose and protect the internal electronic circuitry and components.

An arrow (2) printed on the label on the top of the ORC housing provides a visual verification of the proper orientation of the unit, and should always be pointed toward the front of the vehicle. The ORC housing has integral mounting flanges (4) on the right and left front and the right rear corners. Two molded plastic electrical connector receptacles (3) exit the rearward facing side of the ORC housing. These receptacles connect the ORC to the vehicle electrical system through two dedicated take outs and connectors, one from the instrument panel wire harness and the second from the body wire harness.

The impact sensor and safing sensor internal to the ORC are calibrated for the specific vehicle, and are only serviced as a unit with the ORC. In addition, there are unique versions of the ORC for vehicles with or without certain optional Supplemental Restraint System (SRS) components. The ORC cannot be repaired or adjusted and, if damaged or ineffective, it must be replaced.

OPERATION

OPERATION

The microcontroller within the Occupant Restraint Controller (ORC) contains the Supplemental Restraint System (SRS) logic circuits and controls all of the SRS components. The ORC uses On-Board Diagnostics (OBD) and can communicate with other electronic modules in the vehicle as well as with the diagnostic scan tool using the Controller Area Network (CAN) data bus. This method of communication is used for control of the airbag and seat belt indicators in the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) and for SRS diagnosis and testing through the 16-way data link connector located on the driver side lower edge of the instrument panel.

The ORC microcontroller continuously monitors all of the SRS electrical circuits to determine the system readiness. If the ORC detects a monitored system fault, it sets an active and stored Diagnostic Trouble Code (DTC) and sends electronic messages to the IC over the CAN data bus to turn On the airbag indicator. An active fault only remains for the duration of the fault, or in some cases for the duration of the current ignition cycle, while a stored fault causes a DTC to be stored in memory by the ORC. In the case of some faults which have not recurred for a number of ignition cycles, the ORC will automatically erase the stored DTC. For other internal faults, the stored DTC is latched forever.

The ORC receives battery current through two circuits; a fused ignition output (run) circuit through a fuse in the Power Distribution Center (PDC) and a fused ignition output (run-start) circuit through a second fuse in the PDC. The ORC receives ground through a ground circuit and take out of the instrument panel wire harness that is secured by a ground screw to the body sheet metal. These connections allow the ORC to be operational whenever the status of the ignition switch (also known as the Keyless Ignition Node/KIN or the IGnition Node Module/IGNM) is Start or On.

The ORC also contains an energy-storage capacitor. When the ignition switch status is Start or On, this capacitor is continually being charged with enough electrical energy to deploy the SRS components for up to one second following a battery disconnect or failure. The purpose of the capacitor is to provide backup SRS protection in case there is a loss of battery current supply to the ORC during an impact event.

Various sensors within the ORC are continuously monitored by the ORC logic. These internal sensors, along with several external impact sensor inputs allow the ORC to determine both the severity of an impact and to verify the necessity for deployment of any SRS components. Two remote front impact sensors are located on the back of the right and left sides of the Front End Module (FEM) carrier inboard of the headlamps near the front of the vehicle. The electronic impact sensors are accelerometers that sense the rate of vehicle deceleration, which provides verification of the direction and severity of an impact.

The ORC also monitors inputs from an internal rollover sensor, the seat track position sensors, the front seat belt switches, the rear seat belt switches (export markets only) and six additional remote side impact sensors located on the left and right front door hardware module carriers, on the right and left lower B-pillars and on the right and left lower C-pillars to control deployment of the side curtain airbag units, the front seat airbags (also known as pelvic and thoracic airbags) and, if equipped, the rear seat airbags. The ORC also uses electronic message inputs from the Occupant Classification Module (OCM) beneath the passenger front seat cushion pan and will send electronic messages to the IC to illuminate the seat belt indicator when appropriate.

The impact sensors within the ORC are electronic accelerometer sensors that provide an additional logic input to the ORC microcontroller. These sensors are used to verify the need for a SRS component deployment by detecting impact energy of a lesser magnitude than that of the primary electronic impact sensors, and must exceed a safing threshold in order for the SRS components to deploy. A separate impact sensor within the ORC

provides confirmation to the ORC microcontroller of side impact forces. The ORC uses this input to verify the need for side curtain airbags or seat airbag deployment. This separate sensor is a bi-directional unit that detects impact forces from either side of the vehicle.

In most domestic markets this vehicle is also equipped with the Occupant Classification System (OCS). The ORC communicates with the Occupant Classification Module (OCM) over the CAN data bus. The ORC uses inputs from the OCM as an additional logic input for determining the appropriate level of airbag deployment force required for the front passenger seating position. The OCM notifies the ORC when it has detected a monitored system fault and stored a DTC in its memory for any ineffective OCS component or circuit, then the ORC sets a DTC and will send electronic messages to the IC to illuminate the airbag indicator as appropriate.

Pre-programmed decision algorithms in the ORC microcontroller determine when the deceleration rate as signaled by the impact sensors indicate an impact that is severe enough to require SRS protection. Based upon the severity of the monitored impact as well as the seat track position sensor and the passenger front seat OCS inputs, the ORC logic determines the level of front airbag deployment force required for each front seating position. When the programmed conditions are met, the ORC sends the proper electrical signals to deploy the dual multistage front airbags at the programmed force levels, the knee airbags, the front seat belt tensioners, either side curtain airbag and either right or left, front and rear seat airbag units.

The ORC also contains a integral Electronic Stability Control (ESC) dynamics sensor (also known as the yaw sensor or the sensor cluster). The ORC microcontroller energizes the ESC dynamics sensor, then relays the sensor outputs to the Antilock Brake Module (ABM) over the CAN data bus. Refer to **MODULE, ANTI-LOCK BRAKE SYSTEM, OPERATION** .

The Body Control Module (BCM) stores and compares vehicle configuration data with the ORC as well as with other Electronic Control Units (ECU) in the vehicle. This process is referred to as PRogramming Of Configuration of Systems Integrated (PROCSI) (also known as PROXI). If a configuration mismatch is detected, the BCM sets a DTC. A configuration mismatch DTC will require the performance of a Restore BCM PROXI Configuration routine, or a PROXI Configuration Alignment routine using a diagnostic scan tool.

The hard wired inputs and outputs for the ORC may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the ORC or the electronic controls and communication between other modules and devices that provide some features of the SRS. The most reliable, efficient and accurate means to diagnose the ORC or the electronic controls and communication related to SRS operation requires the use of a diagnostic scan tool and may also require the use of the SRS Load Tool special tool along with the appropriate Load Tool Jumpers and Adapters. Refer to the appropriate diagnostic information.

REMOVAL

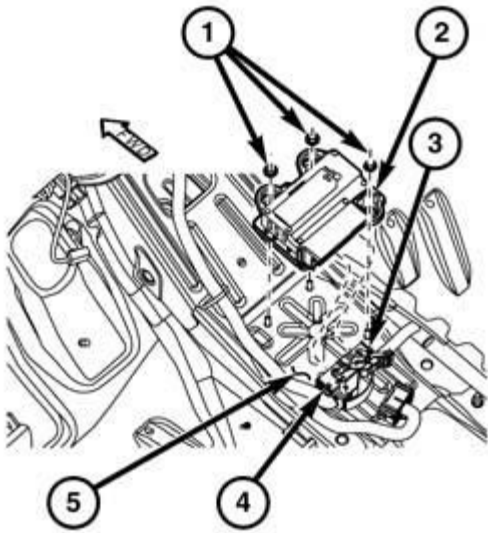
REMOVAL

WARNING: To avoid serious or fatal injury on vehicles equipped with side curtain airbags, disable the Supplemental Restraint System (SRS) before attempting any Occupant Restraint Controller (ORC) diagnosis or service. The ORC may contain a rollover sensor, which enables the system to deploy the side SRS components in the event of a vehicle rollover event.

If an ORC containing a rollover sensor is accidentally rolled during service while still connected to battery power, the side SRS components will deploy. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury, never strike or drop the Occupant Restraint Controller (ORC), as it can damage the impact sensor or affect its calibration. The ORC contains the impact sensor, which enables the system to deploy the Supplemental Restraint System (SRS) components. If an ORC is accidentally dropped during service, the module must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper SRS component deployment.



100868612

Fig. 80: Nuts, Occupant Restraint Controller, Harness Connectors & Transmission Tunnel
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery. Wait two minutes for the system capacitor to discharge before further service.
2. Remove the front side panels from the center floor console on both the right and left sides of the floor panel transmission tunnel. Refer to **CONSOLE, FLOOR, REMOVAL**.
3. Working from the left side front floor panel, reach around the forward edge of the instrument panel center stack support on the floor panel transmission tunnel (5) to access, unlatch and disconnect the body wire harness connector (4) from the Occupant Restraint Controller (ORC) (2) connector receptacle located on the rearward facing side of the module. To disconnect the wire harness connector from the ORC, depress the release tab and lift the lever arm on the connector.
4. Still working from the left side front floor panel, remove the nut (1) that secures the left front mount of the ORC to the stud on the top of the floor panel transmission tunnel.
5. Working from the right side front floor panel, remove the bracket that secures the lower instrument panel center stack structural support to the floor panel transmission tunnel. Refer to **PANEL, INSTRUMENT, REMOVAL**.
6. Still working from the right side front floor panel, reach around the forward edge of the instrument panel center stack support to access, unlatch and disconnect the instrument panel wire harness connector (3) from the ORC connector receptacle located on the rearward facing side of the module. To disconnect the wire harness connector from the ORC, depress the release tab and lift the lever arm on the connector.
7. Still on the right side, remove the two nuts (1) that secure the right front and rear mounts of the ORC to the studs on the top of the floor panel transmission tunnel.
8. Remove the ORC from the vehicle.

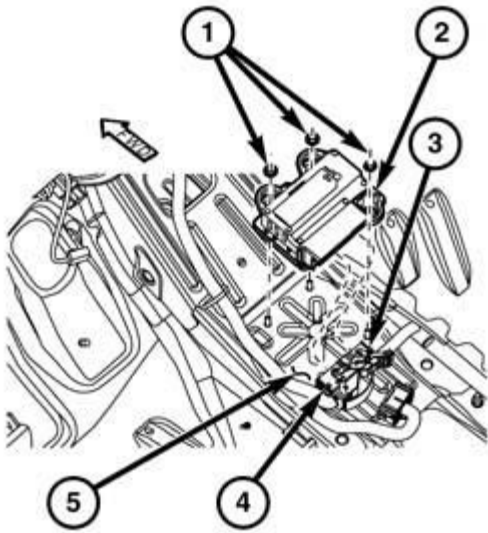
INSTALLATION

INSTALLATION

WARNING: To avoid serious or fatal injury on vehicles equipped with side curtain airbags, disable the Supplemental Restraint System (SRS) before attempting any Occupant Restraint Controller (ORC) diagnosis or service. The ORC may contain a rollover sensor, which enables the system to deploy the side SRS components in the event of a vehicle rollover event. If an ORC containing a rollover sensor is accidentally rolled during service while still connected to battery power, the side SRS components will deploy. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury, never strike or drop the Occupant Restraint Controller (ORC), as it can damage the impact sensor or affect its calibration. The ORC contains the impact sensor, which enables the system to deploy the Supplemental Restraint System (SRS) components. If an ORC is accidentally dropped during service, the module must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper SRS component deployment.



100868612

Fig. 81: Nuts, Occupant Restraint Controller, Harness Connectors & Transmission Tunnel
 Courtesy of CHRYSLER GROUP, LLC

1. Working from the right side front floor panel, carefully position the Occupant Restraint Controller (ORC) (2) onto the front of the floor panel transmission tunnel (5), aligning the mounts of the ORC to the studs on the floor panel. When the ORC is correctly positioned, the bottom of the housing will fit flush with the floor and the orientation arrow on the label on top of the housing will be pointed forward in the vehicle.
2. Still working from the right side front floor panel, reach around the forward edge of the instrument panel center stack support on the floor panel transmission tunnel to install and tighten the two nuts (1) that secure the ORC to the studs on the floor panel transmission tunnel. Tighten the nuts to 8 N.m (71 in. lbs.).
3. Still on the right side, reconnect and latch the instrument panel wire harness connector (3) to the ORC connector receptacle located on the rearward facing side of the module. Be certain that the latch on the connector is fully engaged.
4. Still on the right side, reinstall the bracket that secures the lower instrument panel center stack structural support to the floor panel transmission tunnel. Refer to **PANEL, INSTRUMENT, INSTALLATION**.
5. Working from the left side front floor panel, reach around the forward edge of the instrument panel center stack support on the floor panel transmission tunnel to install and tighten the nut (1) that secures the ORC to the stud on the floor panel transmission tunnel. Tighten the nut to 8 N.m (71 in. lbs.).
6. Still working from the left side front floor panel, reconnect and latch the body wire harness connector (4) to the ORC connector receptacle located on the rearward facing side of the module. Be certain that the latch on the connector is fully engaged.
7. Reinstall the front side panels onto the center floor console on both the right and left sides of the floor panel transmission tunnel. Refer to **CONSOLE, FLOOR, INSTALLATION**.
8. If this Electronic Control Unit (ECU) is being replaced with a new unit, a diagnostic scan tool **MUST** be used to align the PROXI configuration data into the new ECU. Follow the routine outlined in the diagnostic scan tool for PROXI Configuration Alignment under Body Control Module (BCM)

Miscellaneous Functions menu.

9. If this Electronic Control Unit (ECU) is being replaced with a new unit, the Initialize ORC Miscellaneous Function must be run using a diagnostic scan tool. Refer to **STANDARD PROCEDURE**.
10. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST**.

RESTRAINT, ACTIVE HEAD

DESCRIPTION

DESCRIPTION

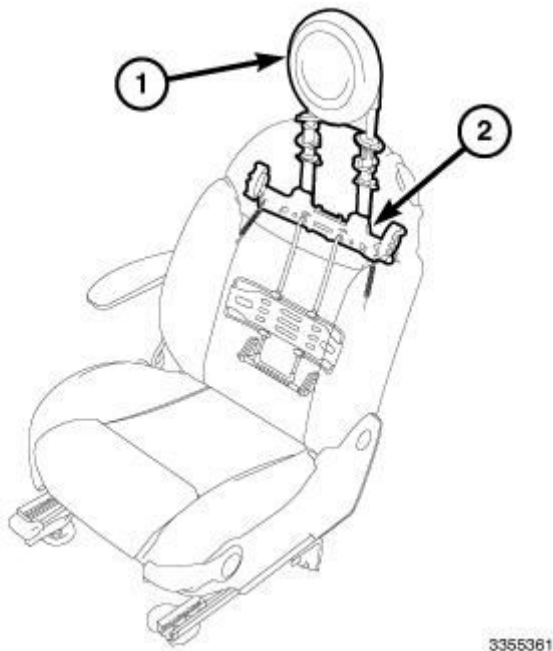


Fig. 82: Active Head Restraint (AHR) Units & Mechanical Components
Courtesy of CHRYSLER GROUP, LLC

Active Head Restraint (AHR) units (1) are standard equipment for both front seating positions in this vehicle. One inertia-activated AHR unit is located atop each front seat back. Outwardly, an inertia-activated AHR appears the same as a non-active head restraint. The mechanical components (2) that articulate the inertia-activated AHR headrest pad are all concealed within the front seat back frame assembly.

At the top of the seat back frame are two stamped steel headrest guide tubes. The guide tubes are each inserted through a molded plastic fulcrum bushing installed in the upper seat back frame member and are permanently fixed to a movable stamped steel armature bracket located just below the upper frame member near the top of the seat back. The armature bracket is secured to a stamped steel pivot link at each side that pivots on a screw threaded into a mounting bracket welded to each side member of the seat back frame.

The pivot links are each have a spring attached to a lever opposite the armature bracket attachment that is

anchored to the seat back frame side member below, which provides the spring-loaded return action of the inertia mechanism. The upper end of the static lumbar assembly is secured at each side to the base of the armature bracket. Each side of the lower end of the lumbar assembly is engaged in a ramp bracket riveted to the lower seat back frame member.

The inertia-activated AHR linkage cannot be repaired. If damaged or ineffective, it must be replaced as a unit with a new seat back frame assembly.

OPERATION

OPERATION

The inertia-activated Active Head Restraint (AHR) units are deployed automatically by the mechanism contained within each front seat back assembly. During a rear impact, inertia drives the seat occupant rearward into the seat back, loading the seat lumbar assembly. The ramp brackets at the base of the lumbar assembly translate this rearward travel into a vertical motion. The vertical motion of the lumbar assembly is then transmitted to the armature bracket.

Through the rotation of the pivot links at each side of the armature bracket, the vertical motion of the lumbar assembly is converted to a slightly forward and upward arc of the armature bracket, headrest guide tubes and headrest that is designed to reduce the space between the back of the head of the seat occupant and the head restraint pad. Closing this space catches the head of the seat occupant during a low speed rear impact collision event and is important in reducing or eliminating potentially debilitating cervical (also known as whiplash) injuries.

Unless damaged following the rear impact, the inertia-activated AHR can be reset by simply pushing the front seat headrests rearward to their normal positions.

STANDARD PROCEDURE

STANDARD PROCEDURE - ACTIVE HEAD RESTRAINT RESET

If the Active Head Restraint (AHR) units have been deployed, both the driver and passenger side units must be reset. You can recognize that an AHR has been deployed by the forward position of the head restraint cushion. If deployed, the AHR units can be manually reset by pressing the head restraint rearward.

RETRACTOR, SEAT BELT

DESCRIPTION

DESCRIPTION

The seat belt retractors used in all seating positions include an inertia-type, Emergency Locking Retractor (ELR) mechanism as standard equipment. However, the ELR for all seating positions except the driver side front are mechanically switchable from an ELR to an Automatic Locking Retractor (ALR). Both front seat belt retractors also include a seat belt tensioner feature and an adaptive load limiting feature. Refer to

TENSIONER, SEAT BELT, DESCRIPTION.

The ELR mechanism, the ALR mechanism, the tensioner mechanism and the adaptive load limiting feature are all integral to the seat belt and retractor unit and are concealed beneath molded plastic covers located on the sides of the retractor spool. These features cannot be adjusted or repaired and if ineffective, damaged or deployed, the entire seat belt and retractor unit must be replaced.

OPERATION

OPERATION

The standard inertia-type Emergency Locking Retractor (ELR) will allow the seat belt webbing to unwind from and wind onto the retractor spool freely unless and until a predetermined inertia load is sensed. The retractor has an internal inertia latch mechanism that will lock the retractor spool once the predetermined inertia load is sensed. Locking the retractor spool prevents the seat belt webbing from being extracted from the retractor and firmly restrains the occupant wearing the seat belt. The retractor spool is automatically unlatched once the loading of the retractor inertia mechanism and the seat belt are relieved.

The primary function of the switchable ELR to Automatic Locking Retractor (ALR) feature is to securely accommodate an infant or child booster seat in any seating position of the vehicle except the driver side front seat without the need for a self-cinching seat belt tip half latch plate unit or another supplemental device that would be required to prevent the seat belt webbing from unwinding freely from the retractor spool of an inertia-type ELR in situations where the minimum inertia locking threshold has not been achieved.

The locked mode of the ALR is engaged and the retractor is switched from operating as a standard inertia-type ELR by first buckling the combination lap and shoulder belt buckle. Then all of the shoulder belt webbing is pulled out from the retractor. Once all of the belt webbing is extracted from the retractor spool, the retractor will automatically become engaged in the pre-locked ALR mode and will make a light, audible clicking or ratchet-like sound as the shoulder belt is allowed to retract onto the spool to provide an audible confirmation that the ALR mode is engaged. Once the ALR mode is engaged, the retractor will remain locked and the belt will remain tight around whatever it is restraining.

The retractor is returned to standard ELR (inertia) mode by unbuckling the combination lap and shoulder belt buckle and allowing the belt webbing to be almost fully retracted back onto the retractor spool. The ELR mode is confirmed by the absence of the light, audible clicking or ratchet-like sound as the belt webbing retracts. This mode will allow the belt to unwind from and wind onto the retractor spool freely unless and until a predetermined inertia load threshold is sensed, or until the retractor is again switched to the ALR mode.

REMOVAL

FRONT

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to

disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog.

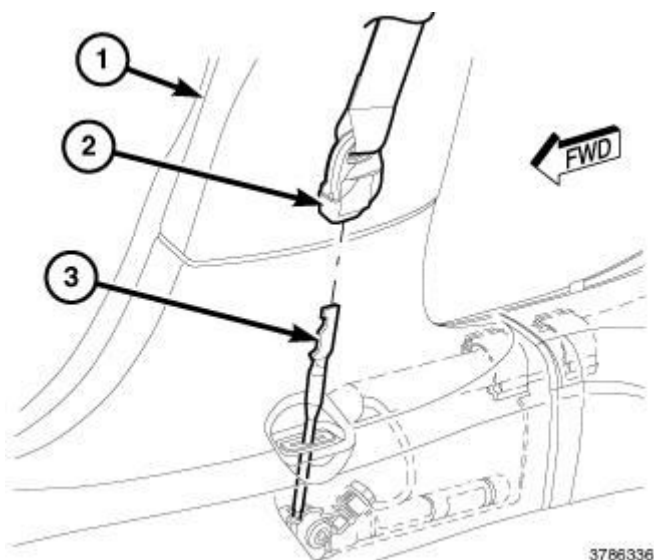
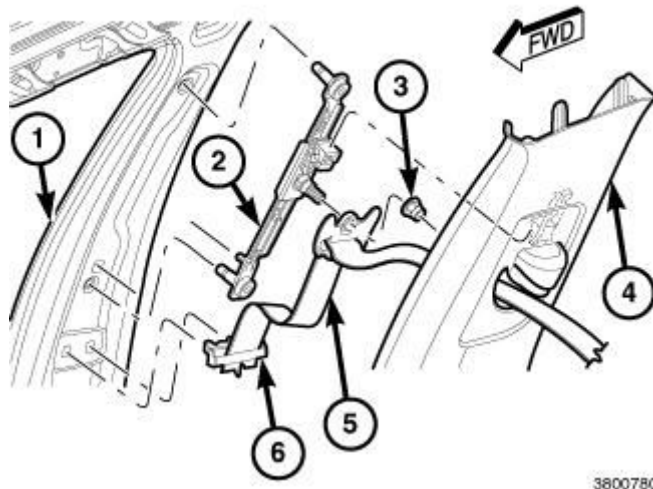


Fig. 83: B-Pillar, Front Seat Belt Anchor Tensioner Buckle & Front Seat Belt Anchor Latch Plate
Courtesy of CHRYSLER GROUP, LLC

NOTE: The following procedure is for replacement of an ineffective or damaged seat belt and retractor unit. The front retractor also includes a seat belt tensioner. If the front seat belt or retractor is ineffective or damaged, but the seat belt tensioner is not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS. If the seat belt tensioner has been deployed, review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the unit from the vehicle. Refer to SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT.

1. Position the front seat for easiest access to the front seat belt anchor buckle (2).

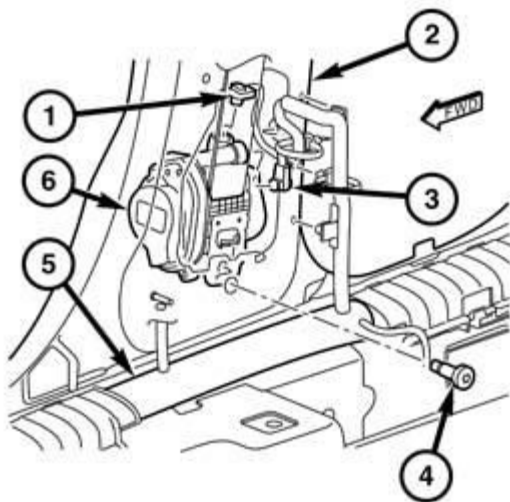
2. Disconnect and isolate the negative cable from the battery. Wait two minutes for the system capacitor to discharge before further service.
3. Release the front seat belt anchor latch plate (3) from the anchor buckle. Refer to **BUCKLE, SEAT BELT, STANDARD PROCEDURE**.



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Fig. 84: B-Pillar, Height Adjuster, Nut, Upper Trim, Seat Belt & Web Guide
 Courtesy of CHRYSLER GROUP, LLC

4. Remove the upper trim (4) from the inside of the B-pillar (1). Refer to **PANEL, B-PILLAR TRIM, REMOVAL**.
5. Remove the nut (3) that secures the seat belt (5) turning loop to the stud on the height adjuster (2).
6. Remove the seat belt turning loop from the height adjuster.
7. Unsnap the seat belt web guide (6) from the inside of the B-pillar.



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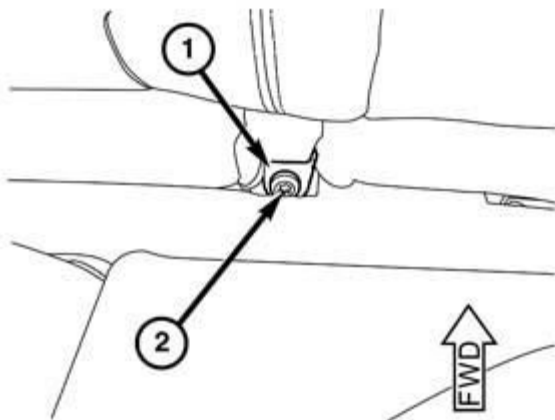
Fig. 85: Remove/Install B-Pillar Seat Belt Retractor
Courtesy of CHRYSLER GROUP, LLC

8. Remove the lower trim from the inside of the B-pillar (2) and from over the front seat belt retractor tensioner unit (6) near the base of the B-pillar. Refer to **PANEL, B-PILLAR TRIM, REMOVAL**.
9. Remove the screw (4) that secures the retractor lower bracket to the base of the inner B-pillar.
10. Pull the retractor out from the B-pillar far enough to access the yellow body wire harness (5) connectors on the retractor.
11. Disconnect the yellow body wire harness connector (3) from the retractor tensioner initiator. The connector insulator is secured by integral latches and a Connector Position Assurance (CPA) lock to the initiator connector receptacle. Pull the lock straight out from the connector insulator, then pull the insulator straight out from the connector receptacle to disengage and disconnect it.
12. Disconnect the yellow body wire harness connector (1) from the retractor adaptive tension limiter initiator. The connector insulator is secured by integral latches and a CPA lock to the initiator connector receptacle. Pull the lock straight out from the connector insulator, then pull the insulator straight out from the connector receptacle to disengage and disconnect it.
13. Remove the front seat belt and retractor from the vehicle as a unit.

REAR CENTER

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor.

Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog. Failure to follow these instructions may result in possible serious or fatal injury.



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Fig. 86: Seat Belt Lower Anchor Plate
Courtesy of CHRYSLER GROUP, LLC

NOTE: All seat belt retractors except the driver side front and the rear center include a switchable automatic locking mechanism. Refer to **RETRACTOR, SEAT BELT, DESCRIPTION**.

1. Remove the left (60 percent) rear seat from the vehicle as a unit and place it on a suitable work surface. Be certain to take the proper precautions to prevent the trim cover from receiving cosmetic damage during the following procedures. Refer to **SEAT, REAR, REMOVAL**.
2. Working from behind the seat, remove the screw (2) that secures the seat belt lower anchor plate (1) to the bracket on the back of the seat cushion frame.

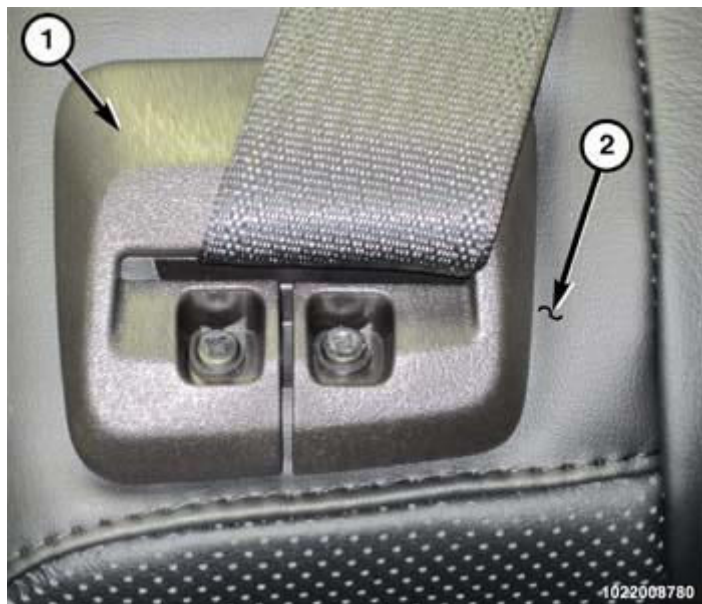


Fig. 87: Seat Belt Web Bezel & Fasteners
 Courtesy of CHRYSLER GROUP, LLC

3. Remove the two screws that secure the seat belt web bezel (1) to the top of the seat back and disengage the webbing through the slot in the bezel.
4. Remove the trim cover (2) and foam from the left (60 percent) seat back frame. Refer to **SEAT BACK, FRONT, DISASSEMBLY** .

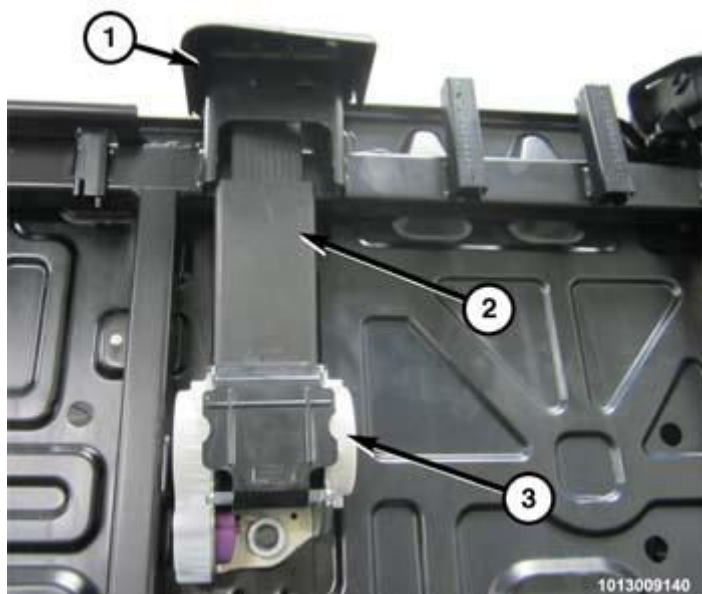


Fig. 88: Seat Back Frame & Seat Belt Web Guide
 Courtesy of CHRYSLER GROUP, LLC

5. Remove the two screws that secure the seat belt web guide (1) to the top of the seat back frame and disengage the webbing through the slot in the guide.

6. Disengage the push-in plastic fastener that secures the plastic scabbard (2) of the retractor (3) to the seat back frame.

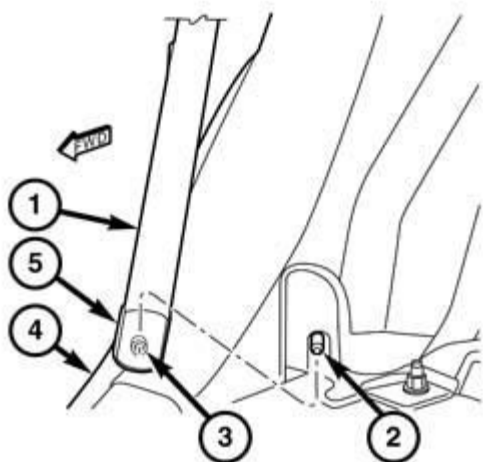


Fig. 89: Rear Center Seat Belt Retractor Fastener
Courtesy of CHRYSLER GROUP, LLC

7. Remove the screw (3) that secures the rear center seat belt retractor to the rear left (60 percent) seat back panel.
8. Disengage the T-tab (2) of the retractor bracket from the T-slot of the seat back panel.
9. Remove the rear center seat belt and retractor unit from the seat back panel.

REAR OUTBOARD

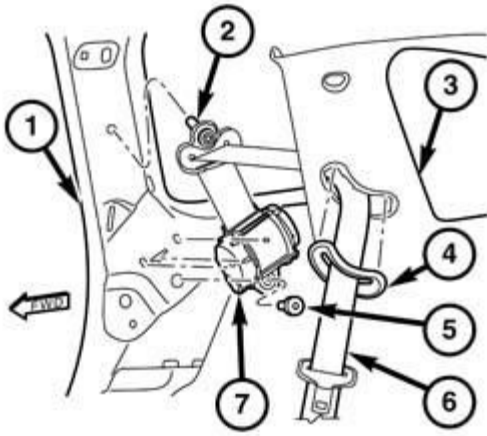
WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog. Failure to follow these instructions may result in possible serious or fatal injury.



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Fig. 90: C-Pillar Seat Belt Webbing Lower Anchor Attachment
Courtesy of CHRYSLER GROUP, LLC

1. Adjust the left or right rear seat to its most forward position for easiest access to the base of the C-pillar (4).
2. Disengage and slide the lower anchor cover (5) up the seat belt webbing (1) far enough to access the lower anchor attachment.
3. Unscrew the captive nut (3) on the lower anchor from the stud (2) at the base of the C-pillar.



1012006770

Fig. 91: Remove/Install Rear Outboard Seat Belt And Retractor
Courtesy of CHRYSLER GROUP, LLC

4. Disengage the upper quarter trim panel (3) from the upper C-pillar (1). Refer to **PANEL, QUARTER TRIM, REMOVAL**.
5. Unsnap the C-pillar belt opening bezel (4) from the upper quarter trim panel.
6. Feed the bezel, the belt webbing (6), the latch plate and the lower anchor through the upper quarter trim panel belt opening.
7. Remove the screw (2) that secures the seat belt turning loop to the inside of the upper C-pillar.
8. Remove the seat belt turning loop from the upper inner C-pillar.
9. Remove the screw (5) that secures the retractor (7) bracket to the inner C-pillar.
10. Lift the retractor upward far enough to disengage the retractor bracket tab from the keyed slot in the inner C-pillar.
11. Remove the rear outboard seat belt and retractor from the vehicle as a unit.

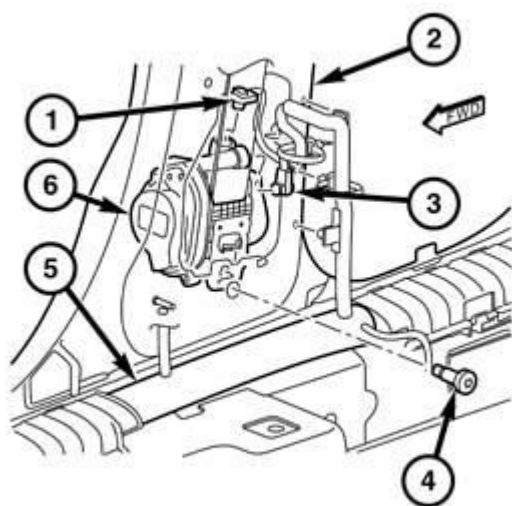
INSTALLATION

FRONT

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before

performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog.



1012006768

Fig. 92: Remove/Install B-Pillar Seat Belt Retractor

Courtesy of CHRYSLER GROUP, LLC

NOTE: The following procedure is for replacement of an ineffective or damaged seat belt and retractor unit. The front retractor also includes a seat belt tensioner. If the front seat belt or retractor is ineffective or damaged, but the seat belt tensioner is not deployed, review the recommended procedures for Handling Non-Deployed Supplemental Restraints. Refer to **HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS**. If the seat belt tensioner has been deployed,

review the recommended procedures for Service After A Supplemental Restraint Deployment before removing the unit from the vehicle. Refer to SERVICE AFTER A SUPPLEMENTAL RESTRAINT SYSTEM DEPLOYMENT.

1. Position the seat belt and retractor (5) into the vehicle as a unit.
2. Reconnect the yellow body wire harness connector (3) to the retractor seat belt tensioner initiator by pressing straight in on the connector. Be certain that the connector is fully engaged in its receptacle, then push the Connector Position Assurance (CPA) lock straight into the connector to lock it into place.
3. Reconnect the yellow body wire harness connector (2) to the retractor adaptive tension limiter initiator by pressing straight in on the connector. Be certain that the connector is fully engaged in its receptacle, then push the CPA lock straight into the connector to lock it into place.
4. Position the retractor lower bracket to the inner B-pillar (1).
5. Install and tighten the screw (4) that secures the retractor to the inner B-pillar. Tighten the screw to 58 N.m (43 ft. lbs.).
6. Reinstall the lower trim onto the inside of the B-pillar. Refer to **PANEL, B-PILLAR TRIM, INSTALLATION**.

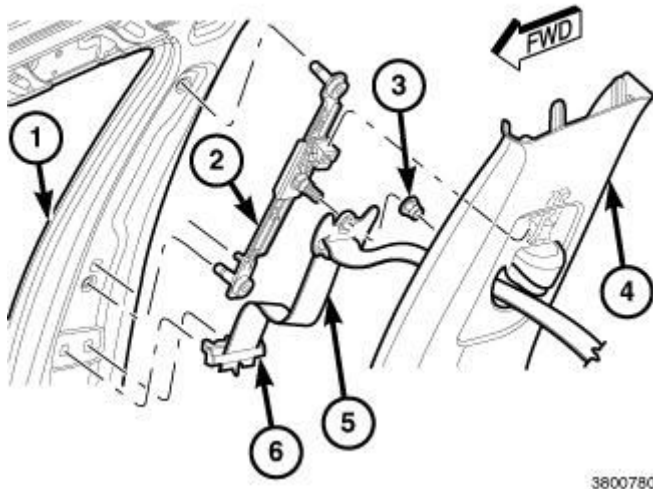


Fig. 93: B-Pillar, Height Adjuster, Nut, Upper Trim, Seat Belt & Web Guide
Courtesy of CHRYSLER GROUP, LLC

7. Snap the seat belt web guide (6) onto the inner B-pillar (1). Be certain that the seat belt webbing (5) between the retractor and the web guide is not twisted.
8. Position the seat belt turning loop onto the stud on the height adjuster (2). Be certain that the seat belt webbing between the web guide and the turning loop is not twisted.
9. Install and tighten the nut (3) that secures the turning loop to the bracket. Tighten the nut to 45 N.m (33 ft. lbs.).
10. Reinstall the upper trim onto the inside of the B-pillar. Refer to **PANEL, B-PILLAR TRIM, INSTALLATION**.

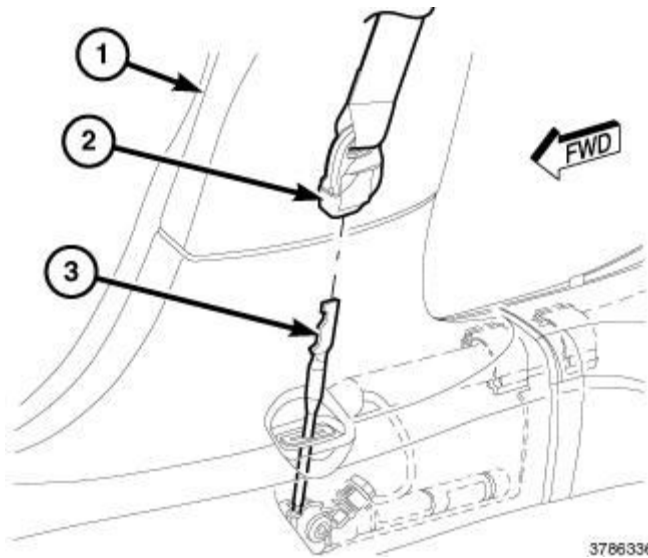


Fig. 94: B-Pillar, Front Seat Belt Anchor Tensioner Buckle & Front Seat Belt Anchor Latch Plate
Courtesy of CHRYSLER GROUP, LLC

11. Be certain the seat belt webbing between the turning loop and the lower anchor buckle (2) is not twisted.
12. Insert the lower anchor latch plate into the anchor buckle until it latches into position.
13. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST**.

REAR CENTER

WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog. Failure to follow these instructions may result in possible serious or fatal injury.

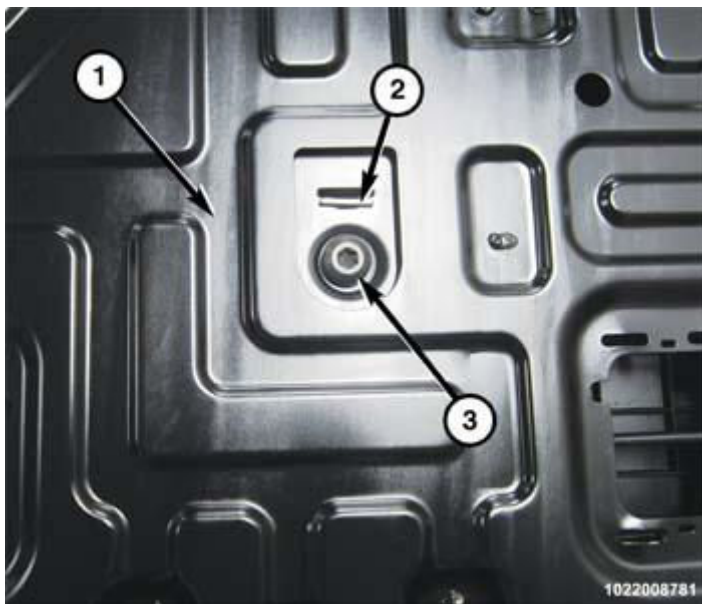


Fig. 95: Rear Center Seat Belt Retractor Fastener
Courtesy of CHRYSLER GROUP, LLC

NOTE: All seat belt retractors except the driver side front and the rear center include a switchable automatic locking mechanism. Refer to **RETRACTOR, SEAT BELT, DESCRIPTION**.

1. Position the rear center seat belt and retractor unit onto the left (60 percent) seat back panel (1). Be certain to engage the T-tab (2) on the retractor frame into the T-slot in the back panel.
2. Install and tighten the screw (3) that secures the retractor to the seat back panel. Tighten the screw to 55 N.m (41 ft. lbs.).

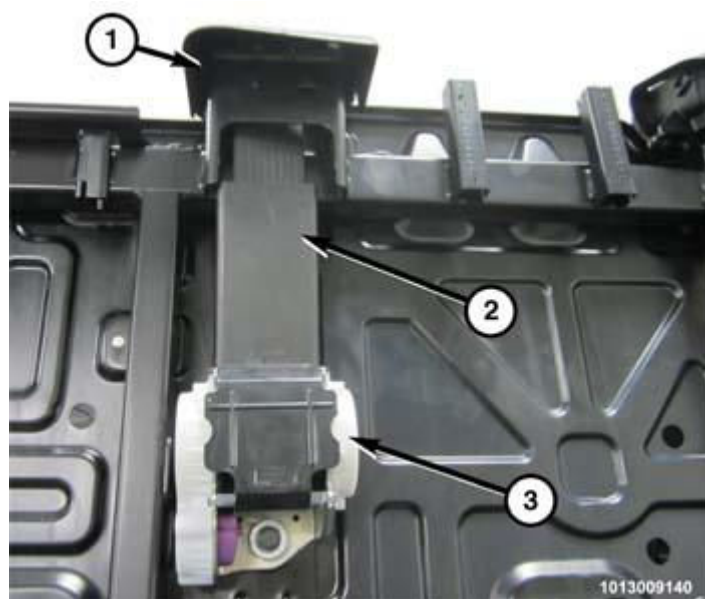


Fig. 96: Seat Back Frame & Seat Belt Web Guide

Courtesy of CHRYSLER GROUP, LLC

3. Engage the push-in plastic fastener that secures the plastic scabbard (2) of the retractor (3) to the seat back frame.
4. Engage the seat belt webbing through the slot in the seat belt web guide (1) and position the guide to the top of the seat back frame. Be certain the seat belt webbing between the retractor and the guide is not twisted.
5. Install and tighten the two screws that secure the seat belt web guide to the top of the seat back frame. Tighten the screws securely.

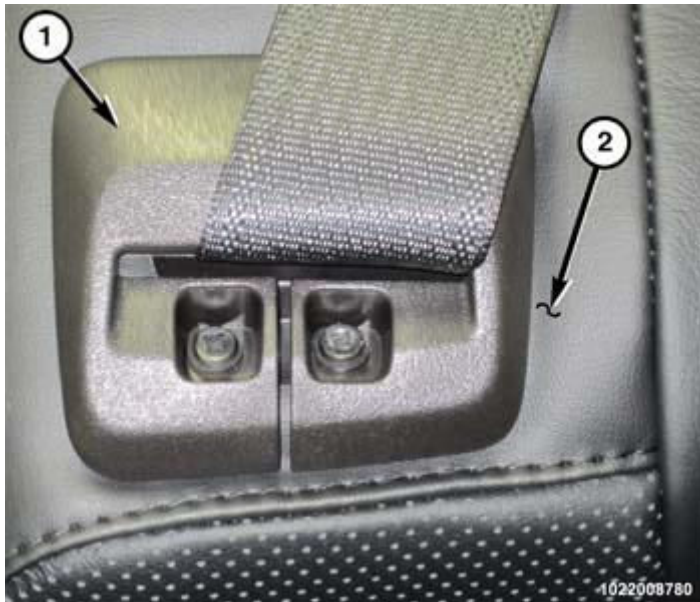
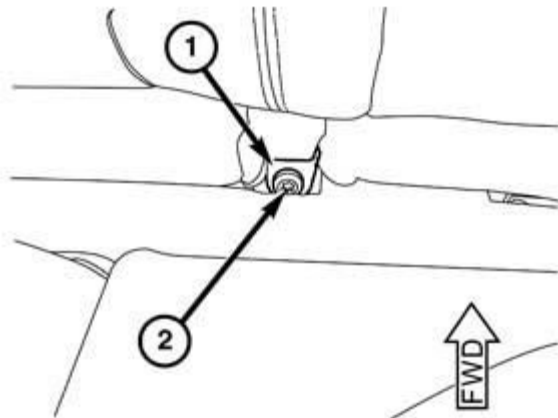


Fig. 97: Seat Belt Web Bezel & Fasteners
Courtesy of CHRYSLER GROUP, LLC

6. Reinstall the foam and the trim cover (2) onto the seat back frame. Refer to **SEAT BACK, FRONT, ASSEMBLY**.
7. Engage the seat belt webbing through the slot in the seat belt web bezel (1) and position the bezel to the top of the seat back.
8. Install and tighten the two screws that secure the seat belt web bezel to the top of the seat back frame. Tighten the screws securely.



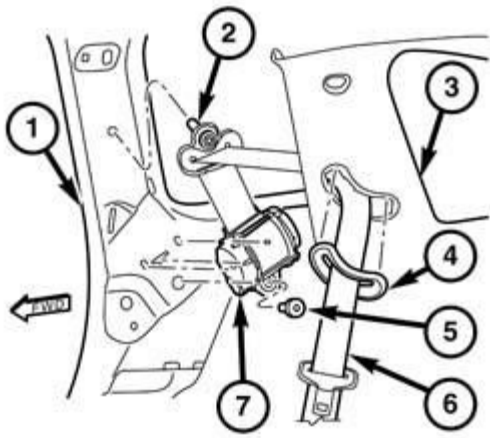
0809008698

Fig. 98: Seat Belt Lower Anchor Plate
Courtesy of CHRYSLER GROUP, LLC

9. Working from behind the rear seat, position the rear center seat belt lower anchor plate (1) to the bracket at the back of the seat cushion frame. Be certain the seat belt webbing between the bezel at the top of the seat back and the lower anchor plate is not twisted.
10. Install and tighten the screw (2) that secures the rear center seat belt lower anchor plate to the bracket at the back of the seat cushion frame. Tighten the screw to 55 N.m (41 ft. lbs.).
11. Reinstall the left (60 percent) rear seat into the vehicle. Refer to **SEAT, INSTALLATION SEAT, REAR, INSTALLATION**.

REAR OUTBOARD

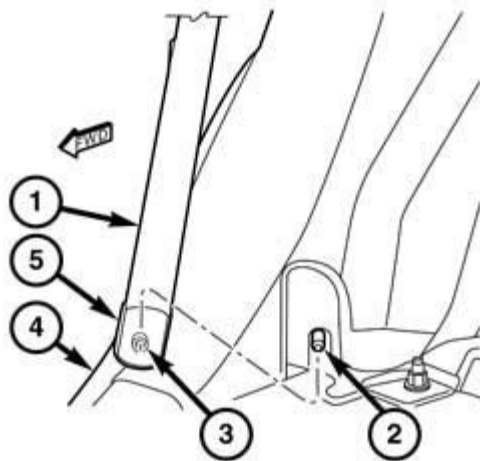
WARNING: To avoid serious or fatal injury during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or ineffective buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or ineffective seat belt and child restraint components with the correct, new and unused replacement parts listed in the Chrysler Mopar® Parts Catalog.



1012006770

Fig. 99: Remove/Install Rear Outboard Seat Belt And Retractor
Courtesy of CHRYSLER GROUP, LLC

1. Position the rear outboard seat belt and retractor unit (7) onto the inner C-pillar (1). Be certain to engage the retractor bracket tab into the keyed slot in the inner C-pillar.
2. Install and tighten the screw (5) that secures the retractor bracket to the inner C-pillar. Tighten the screw to 45 N.m (33 ft. lbs.).
3. Position the seat belt turning loop onto the upper inner C-pillar. Be certain the seat belt webbing (6) is not twisted between the retractor and the turning loop.
4. Install and tighten the screw (2) that secures the seat belt turning loop to the inside of the upper C-pillar. Tighten the screw to 45 N.m (33 ft. lbs.).
5. Feed the seat belt lower anchor, the latch plate, the seat belt opening bezel (4) and the belt webbing (6) through the upper quarter trim panel (3) belt opening. Be certain the seat belt webbing is not twisted between the turning loop and the upper quarter trim panel belt opening.
6. Snap the C-pillar belt opening bezel into the upper quarter trim panel.
7. Reinstall the upper quarter trim panel onto the upper C-pillar. Refer to **PANEL, QUARTER TRIM, INSTALLATION**.



1012006769

Fig. 100: C-Pillar Seat Belt Webbing Lower Anchor Attachment
Courtesy of CHRYSLER GROUP, LLC

8. Position the rear outboard seat belt lower anchor to the stud (2) at the base of the C-pillar (4). Be certain the seat belt webbing (1) is not twisted between the upper C-pillar belt opening bezel and the lower anchor.
9. Install and tighten the captive nut (3) that secures the rear outboard seat belt lower anchor to the stud at the base of the C-pillar. Tighten the nut to 45 N.m (33 ft. lbs.).
10. Slide the lower anchor cover (5) down the seat belt webbing and engage it over the lower anchor attachment.
11. Restore the left or right rear seat to its rearward position.

SENSOR, IMPACT

DESCRIPTION

IMPACT SENSORS

Remote or satellite impact sensors are mounted in various strategic locations of the vehicle. These sensors are mounted remotely from the impact sensor that is internal to the Occupant Restraint Controller (ORC). Sensors at the front of the vehicle provide an additional logic input for use by the Occupant Restraint Controller (ORC) to control the front airbags and the seat belt pretensioners. Sensors on each side of the vehicle provide an additional logic input for use by the ORC to control the side curtain airbags, seat airbags and the seat belt pretensioners. Two types of sensors are used in this vehicle. They are the acceleration-type and the pressure-type, which are described in further detail elsewhere within this service information.

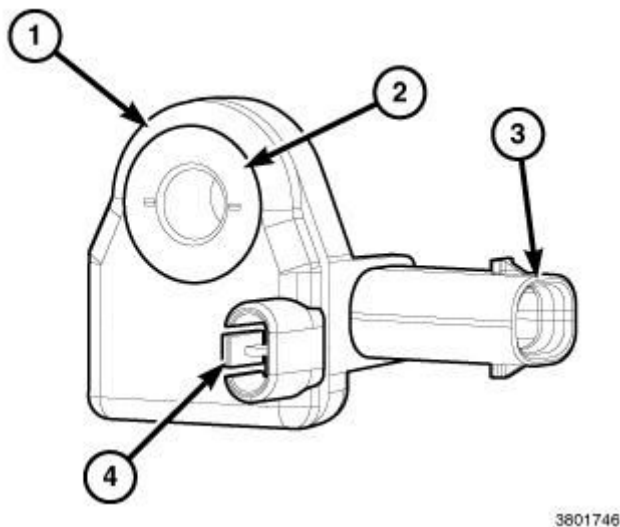
ACCELERATION TYPE

Fig. 101: Acceleration-Type Impact Sensor, Metal Sleeve, Connector Receptacle & Latch
Courtesy of CHRYSLER GROUP, LLC

Remote or satellite acceleration-type impact sensors (1) are mounted in various locations in the vehicle. These sensors are mounted remotely from the impact sensor that is internal to the Occupant Restraint Controller (ORC). Sensors at the front of the vehicle provide an additional logic input for use by the ORC to control the front airbags and the seat belt pretensioners. Sensors on each side of the vehicle provide an additional logic input for use by the ORC to control the side curtain airbags, the seat belt pretensioners and the seat (also known as pelvic and thorax) airbags.

Although the front and side acceleration-type impact sensors are similar in appearance and construction, they may not be interchangeable. The front impact sensors may monitor acceleration forces on a different axis than those monitored by the side impact sensors. Each sensor is secured to its mounting location by a single screw or by a nut and a weld stud. The front sensors are located on each vertical support member of the Front End Module (FEM) carrier between the cooling module and the front lamp unit. A side sensor is located on each inner B-pillar and each inner C-pillar and concealed behind the interior trim.

Each sensor housing has an integral connector receptacle (3), an integral locator pin with a latch feature (4) and an integral mounting hole with a metal sleeve (2) to provide crush protection. A cavity in the center of the molded plastic impact sensor housing contains the electronic circuitry of the sensor which includes an electronic communication chip and an electronic acceleration sensor. Potting material fills the housing, which is laser welded to seal and protect the internal electronic circuitry and components.

The front impact sensors are each connected to the vehicle electrical system through dedicated take outs and connectors of the Front End Module (FEM) wire harness, while the side impact sensors are connected through dedicated take outs and connectors of the body wire harness.

The acceleration-type impact sensors cannot be repaired or adjusted and, if damaged or ineffective, they must be replaced.

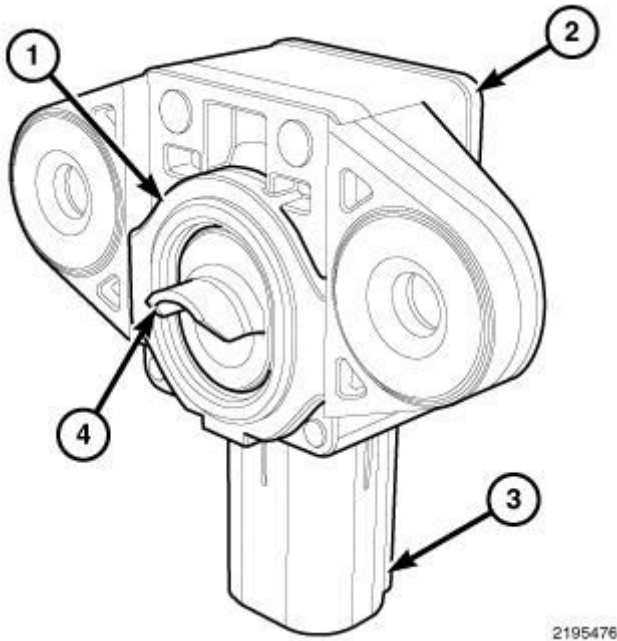
PRESSURE TYPE

Fig. 102: Pressure-Type Front Door Side Impact Sensors
Courtesy of CHRYSLER GROUP, LLC

Two pressure-type front door side impact sensors (2) are used on this vehicle, one each for the left and right sides of the vehicle. These sensors are mounted remotely from the impact sensor that is internal to the Occupant Restraint Controller (ORC). Each side sensor is secured with two screws and is sealed by a resilient gasket (1) to the front door hardware module carrier on the front door inner panel. The sensors are concealed behind the front door trim panel within the passenger compartment.

The right and left front door side impact sensors are identical in construction and calibration. The impact sensor housing has an integral connector receptacle (3), two integral mounting tabs, and an integral hood-like water shield (4). The water shield extends through a hole in the front door module carrier into the interior of the door cavity and protects the sensor orifice from contamination.

A cavity in the center of the molded plastic impact sensor housing contains the electronic circuitry of the sensor, which includes an electronic communication chip and the pressure sensor. The housing cavity is filled with a potting material to seal and protect the internal electronic circuitry and components. The pressure-type side impact sensors are each connected to the vehicle electrical system through a dedicated take out and connector of the front door wire harness.

The pressure-type side impact sensors cannot be repaired or adjusted and, if damaged or ineffective, they must be replaced.

OPERATION**IMPACT SENSORS**

Two types of impact sensors are used in this vehicle. They are the acceleration-type and the pressure-type. Additional operational details of each of these sensor types is described in further detail elsewhere within this service information.

ACCELERATION TYPE

The acceleration-type impact sensors are electronic accelerometers that sense the rate of vehicle deceleration, which provides verification of the direction and severity of an impact. Each sensor also contains an electronic communication chip that allows the unit to communicate the sensor status as well as sensor fault information to the microcontroller within the Occupant Restraint Controller (ORC).

The ORC microcontroller continuously monitors all of the Supplemental Restraint System (SRS) electrical circuits to determine the system readiness. If the ORC detects a monitored system fault, it sets a Diagnostic Trouble Code (DTC) and controls the airbag indicator operation accordingly. The impact sensors each receive battery current and ground through dedicated left and right sensor plus and minus circuits from the ORC. The impact sensors and the ORC communicate by modulating the voltage in the sensor plus circuit.

The hard wired circuits between the impact sensors and the ORC may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the impact sensors or the electronic controls and communication between other modules and devices that provide some features of the SRS. The most reliable, efficient and accurate means to diagnose the acceleration-type impact sensors or the electronic controls and communication related to impact sensor operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

PRESSURE TYPE

The pressure-type front door side impact sensors recognize a side impact in the front door area by monitoring changes in pressure within the front door cavity. A sudden pressure wave is created as the door collapses during an impact event. Each sensor also contains an electronic communication chip that allows the unit to communicate the sensor status as well as sensor fault information to the microcontroller within the Occupant Restraint Controller (ORC).

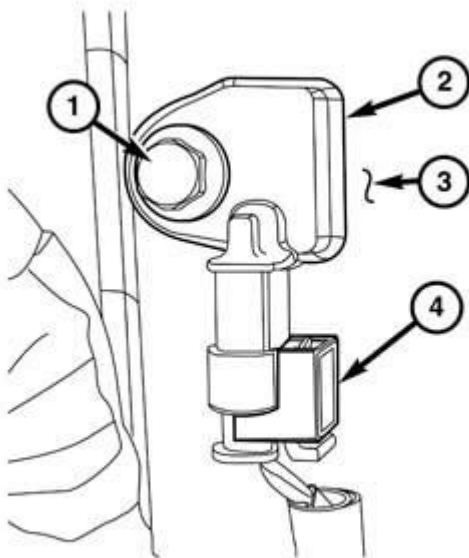
The ORC microcontroller continuously monitors all of the Supplemental Restraint System (SRS) electrical circuits to determine the system readiness. If the ORC detects a monitored system fault, it sets a Diagnostic Trouble Code (DTC) and controls the airbag indicator operation accordingly. The impact sensors each receive battery current and ground through dedicated left and right sensor plus and minus circuits from the ORC. The impact sensors and the ORC communicate by modulating the current in the sensor plus circuit.

The hard wired circuits between the pressure-type front door side impact sensors and the ORC may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the impact sensors or the electronic controls and communication between other modules and devices that provide features of the SRS. The most reliable, efficient and accurate means to diagnose the pressure-type impact sensors or the electronic controls and communication related to impact sensor operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL**FRONT**

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury, never strike or drop the front impact sensor, as it can damage the impact sensor or affect its calibration. The front impact sensor enables the system to deploy the front supplemental restraints. If an impact sensor is accidentally dropped during service, the sensor must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper front supplemental restraint deployment.



1014006016

Fig. 103: Front Impact Sensor
Courtesy of CHRYSLER GROUP, LLC

NOTE: The front and the side impact sensors are NOT interchangeable.

1. Disconnect and isolate the negative cable from the battery. Wait two minutes for the system capacitor to discharge before further service.
2. For the left impact sensor only, remove the battery tray from the left side of the engine compartment.

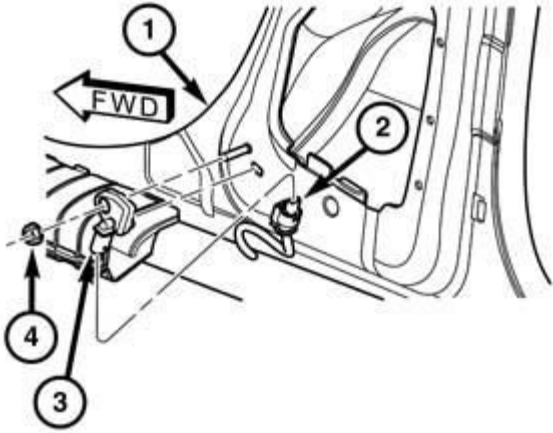
Refer to **TRAY, BATTERY, REMOVAL** .

3. For the right impact sensor only, remove the engine air cleaner housing from the right side of the engine compartment. Refer to **BODY, AIR CLEANER, REMOVAL** -2.0L, **BODY, AIR CLEANER, REMOVAL** -2.4L, or **BODY, AIR CLEANER, REMOVAL** -3.2L.
4. Locate the front impact sensor (2) located on the engine compartment side of the Front End Module (FEM) carrier (3), below the upper radiator cross member and just outboard of the cooling module.
5. Disconnect the FEM wire harness connector (4) from the right or left front impact sensor connector receptacle.
6. Remove the screw (1) that secures the sensor to the back of the FEM carrier.
7. Gently pry the sensor away from the FEM carrier far enough to disengage the latch feature of the locator pin on the back of the sensor from the locator hole in the FEM carrier.
8. Remove the right or left front impact sensor from the vehicle.

SIDE - B-PILLAR

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury, never strike or drop the side impact sensor, as it can damage the impact sensor or affect its calibration. The side impact sensor enables the system to deploy the side Supplemental Restraint System (SRS) components. If an impact sensor is accidentally dropped during service, the sensor must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper side SRS component deployment.



1014006354

Fig. 104: B-Pillar Side Impact Sensor
Courtesy of CHRYSLER GROUP, LLC

NOTE: The front and the side impact sensors are **NOT** interchangeable.

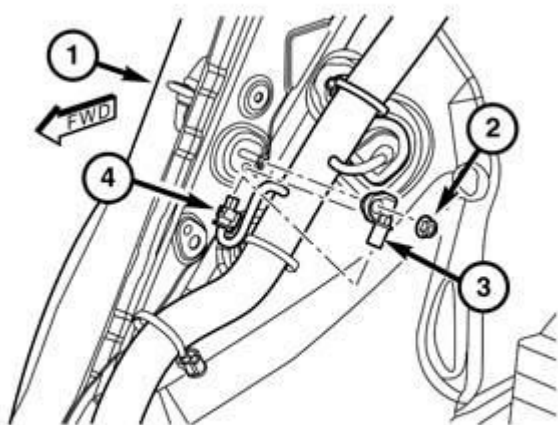
1. Adjust the driver or passenger side front seat to its most forward position for easiest access to the B-pillar trim.
2. Disconnect and isolate the negative cable from the battery. Wait two minutes for the system capacitor to discharge before further service.
3. Remove the trim from the inside of the B-pillar (1). Refer to **PANEL, B-PILLAR TRIM, REMOVAL**.
4. Disconnect the body wire harness connector (2) from the side impact sensor (3) connector receptacle.
5. Remove the nut (4) that secures the sensor to the weld stud on the lower B-pillar.
6. Gently pry the sensor away from the inner B-pillar far enough to disengage the latch feature of the locator pin from the locator hole.
7. Remove the sensor from the inner B-pillar.

SIDE - C-PILLAR

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to

disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury, never strike or drop the side impact sensor, as it can damage the impact sensor or affect its calibration. The side impact sensor enables the system to deploy the side Supplemental Restraint System (SRS) components. If an impact sensor is accidentally dropped during service, the sensor must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper side SRS component deployment.



1014006014

Fig. 105: C-Pillar Side Impact Sensor
Courtesy of CHRYSLER GROUP, LLC

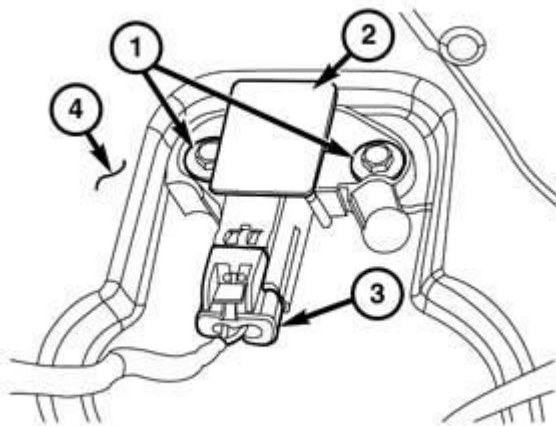
NOTE: The front and the side impact sensors are NOT interchangeable.

1. Disconnect and isolate the negative cable from the battery. Wait two minutes for the system capacitor to discharge before further service.
2. Remove the trim from the inside of the lower C-pillar (1). Refer to **PANEL, QUARTER TRIM, REMOVAL**.
3. Disconnect the body wire harness connector (4) from the side impact sensor (3) connector receptacle.
4. Remove the nut (2) that secures the sensor to the weld stud on the inner C-pillar.
5. Gently pry the sensor away from the inner C-pillar far enough to disengage the latch feature of the locator pin from the locator hole.
6. Remove the sensor from the inner C-pillar.

SIDE - FRONT DOOR

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury, never strike or drop the side impact sensor, as it can damage the impact sensor or affect its calibration. The side impact sensor enables the system to deploy the side Supplemental Restraint System (SRS) components. If an impact sensor is accidentally dropped during service, the sensor must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper side SRS component deployment.



1014006015

Fig. 106: Front Door Side Impact Sensor
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery. Wait two minutes for the system capacitor to discharge before further service.
2. Remove the trim panel from the inside of the right or left front door. Refer to **PANEL, DOOR TRIM**,

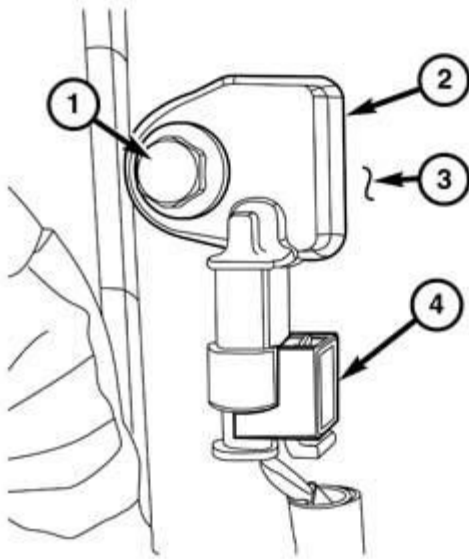
REMOVAL .

3. Disconnect the front door wire harness connector (3) from the side impact sensor (2) connector receptacle.
4. Remove the two screws (1) that secure the side impact sensor to the front door hardware module carrier panel (4).
5. Remove the side impact sensor from the vehicle.

INSTALLATION**FRONT**

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury, never strike or drop the front impact sensor, as it can damage the impact sensor or affect its calibration. The front impact sensor enables the system to deploy the front Supplemental Restraint System (SRS) components. If an impact sensor is accidentally dropped during service, the sensor must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper front SRS component deployment.



1014006016

Fig. 107: Front Impact Sensor

Courtesy of CHRYSLER GROUP, LLC

NOTE: The front and the side impact sensors are **NOT** interchangeable.

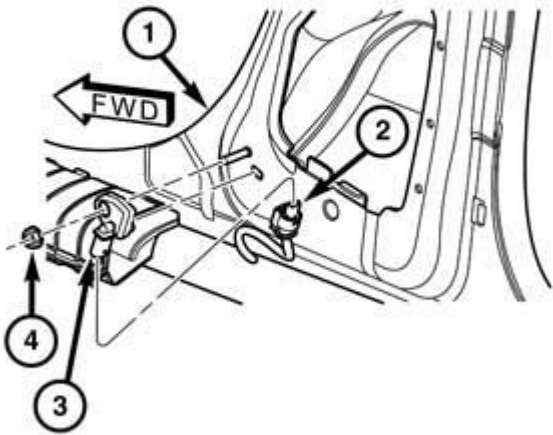
1. Position the right or left front impact sensor (2) to the back of the Front End Module (FEM) carrier (3) just outboard of the cooling module.
2. Be certain to engage the locating pin integral to the back of the sensor into the locating hole in the FEM carrier.
3. Install and tighten the screw (1) that secures the sensor to the back of the FEM carrier. Tighten the screw to 11 N.m (97 in. lbs.).
4. Reconnect the FEM wire harness connector (4) to the sensor connector receptacle.
5. For the left impact sensor only, reinstall the battery tray into the left side of the engine compartment. Refer to **TRAY, BATTERY, INSTALLATION**.
6. For the right impact sensor only, reinstall the engine air cleaner housing into the right side of the engine compartment. Refer to **BODY, AIR CLEANER, INSTALLATION** -2.0L, **BODY, AIR CLEANER, INSTALLATION** -2.4L, or **BODY, AIR CLEANER, INSTALLATION** -3.2L.
7. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST**.

SIDE - B-PILLAR

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering

wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury, never strike or drop the side impact sensor, as it can damage the impact sensor or affect its calibration. The side impact sensor enables the system to deploy the side Supplemental Restraint System (SRS) components. If an impact sensor is accidentally dropped during service, the sensor must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper side SRS component deployment.



1014006354

Fig. 108: B-Pillar Side Impact Sensor
Courtesy of CHRYSLER GROUP, LLC

NOTE: The front and the side impact sensors are NOT interchangeable.

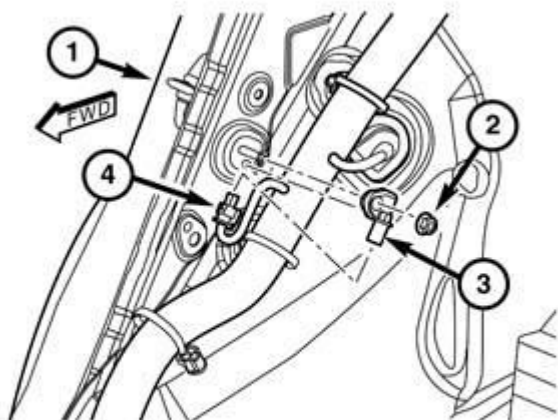
1. Position the side impact sensor (3) onto the weld stud on the inner B-pillar (1). Be certain that the locator pin on the sensor is fully engaged in the locator hole of the inner B-pillar.
2. Install and tighten the nut (4) that secures the sensor to the inner B-pillar. Tighten the nut to 11 N.m (97 in. lbs.).
3. Reconnect the body wire harness connector (2) to the sensor connector receptacle.

4. Reinstall the trim onto the inside of the B-pillar. Refer to **PANEL, B-PILLAR TRIM, INSTALLATION**.
5. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST**.

SIDE - C-PILLAR

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury, never strike or drop the side impact sensor, as it can damage the impact sensor or affect its calibration. The side impact sensor enables the system to deploy the side Supplemental Restraint System (SRS) components. If an impact sensor is accidentally dropped during service, the sensor must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper side SRS component deployment.



1014006014

Fig. 109: C-Pillar Side Impact Sensor

Courtesy of CHRYSLER GROUP, LLC

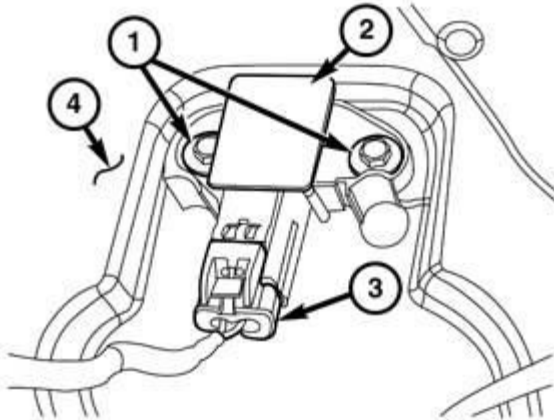
NOTE: The front and the side impact sensors are NOT interchangeable.

1. Position the side impact sensor (3) onto the weld stud on the inner C-pillar (1). Be certain that the locator pin on the sensor is fully engaged in the locator hole of the inner C-pillar.
2. Install and tighten the nut (2) that secures the sensor to the inner C-pillar. Tighten the nut to 11 N.m (97 in. lbs.).
3. Reconnect the body wire harness connector (4) to the sensor connector receptacle.
4. Reinstall the trim onto the inside of the C-pillar. Refer to **PANEL, QUARTER TRIM, INSTALLATION**.
5. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST**.

SIDE - FRONT DOOR

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

WARNING: To avoid serious or fatal injury, never strike or drop the side impact sensor, as it can damage the impact sensor or affect its calibration. The side impact sensor enables the system to deploy the side Supplemental Restraint System (SRS) components. If an impact sensor is accidentally dropped during service, the sensor must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper side SRS component deployment.



1014006015

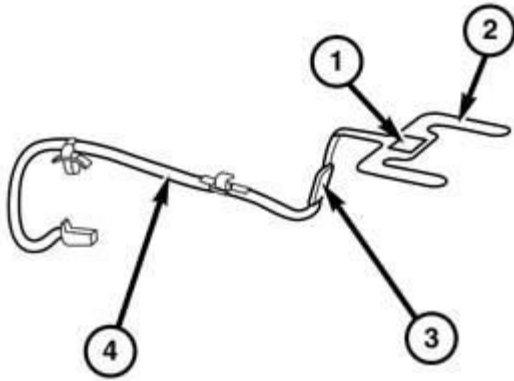
Fig. 110: Front Door Side Impact Sensor
Courtesy of CHRYSLER GROUP, LLC

- NOTE:** Be certain that the gasket between the pressure-type side impact sensor and the front door hardware module carrier panel is in good condition and positioned on the back of the sensor. There **MUST** be a good seal between the sensor and the hardware module carrier panel for the sensor to operate properly. If the gasket is in poor condition, replace the sensor.
1. Position the side impact sensor (2) to the right or left front door hardware module carrier panel (4). When the sensor is correctly positioned, the sensor connector receptacle will be pointed toward the bottom of the door.
 2. Install and tighten the two screws (1) that secure the side impact sensor to the door hardware module carrier panel. Tighten the screws to 2.4 N.m (21 in. lbs.).
 3. Reconnect the front door wire harness connector (3) to the sensor connector receptacle.
 4. Reinstall the trim panel onto the inside of the right or left front door. Refer to **PANEL, DOOR TRIM, INSTALLATION**.
 5. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST**.

SENSOR, OCCUPANT DETECTION

DESCRIPTION

DESCRIPTION



1014006355

Fig. 111: Occupant Detection Sensor (ODS)
Courtesy of CHRYSLER GROUP, LLC

Vehicles manufactured for export markets have an Occupant Detection Sensor (ODS) as standard equipment. The ODS is located directly below the passenger side front seat cushion trim cover. This sensor provides information to the Occupant Restraint Controller (ORC) used for control of the passenger belt alert feature.

The ODS consists of a flexible clear plastic sensor mat (2) containing several resistive membrane, force sensing resistor cells that is secured by an adhesive strip (1) to the top surface of the seat cushion foam. The adhesive patch on the ODS is a one time only material and cannot be reactivated or reused if removed.

A short, two-conductor pigtail wire and connector (4) connect the sensor to the vehicle electrical system through a dedicated take out and connector of the seat wire harness. A hot melt adhesive block (3) encapsulates and protects the connections between the electrical conductors in the tail of the sensor mat and the pigtail wires as well as a diagnostic resistor.

The ODS cannot be adjusted or repaired, and must be replaced if damaged or ineffective.

OPERATION

OPERATION

In vehicles manufactured for export markets, the Occupant Detection Sensor (ODS) acts as a simple switch to detect loads placed upon the passenger side front seat cushion. The sensor circuits are connected to and monitored by the Occupant Restraint Controller (ORC) whenever the status of the ignition switch (also known as the Keyless Ignition Node/KIN or the Ignition Node Module/IGNM) is On. The ORC uses an algorithm logic in monitoring the changing states of the sensor input to determine whether the seat cushion load is static or

dynamic.

The ORC microcontroller continuously monitors all of the Supplemental Restraint System (SRS) electrical circuits to determine the system status and readiness. If the ORC detects a monitored system fault, it sets a Diagnostic Trouble Code (DTC). However, because the ODS input is only used for control of the passenger belt alert feature, which has no effect on SRS component features or functions, the airbag indicator is **NOT** illuminated in response to a detected ODS circuit fault.

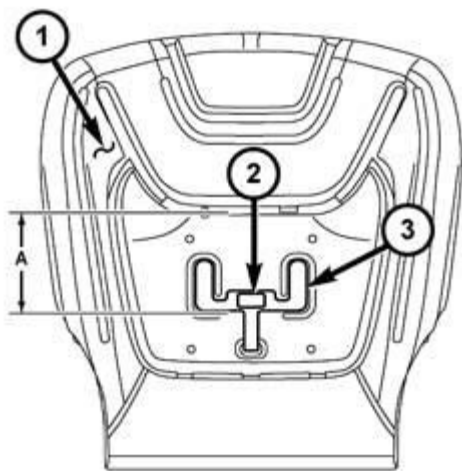
The ODS receives source current and a clean ground through dedicated sensor plus and minus circuits from the ORC. The ORC then sends the appropriate sensor status information over the Controller Area Network (CAN) data bus to the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC), which uses this information as an additional logic input used for control of the seat belt indicator and the passenger belt alert feature.

The hard wired circuits between the ODS and the ORC may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the ODS or the electronic controls and communication between other modules and devices that provide some features of the passenger belt alert feature. The most reliable, efficient and accurate means to diagnose the ODS or the electronic controls and communication related to the passenger belt alert feature operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

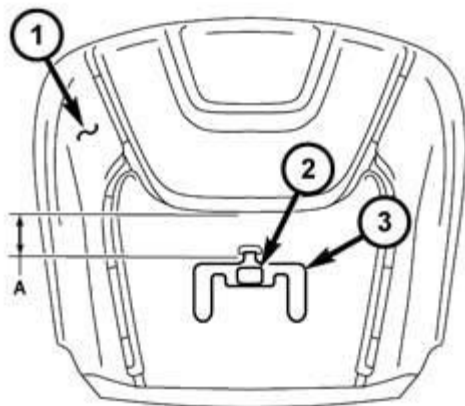
REMOVAL

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.



1017009895

Fig. 112: Base (Non-Storage) Seat
Courtesy of CHRYSLER GROUP, LLC



1017009896

Fig. 113: Storage Seat
Courtesy of CHRYSLER GROUP, LLC

NOTE: The Occupant Detection Sensor (ODS) is used only in the passenger side front

seat of vehicles manufactured for export markets. Vehicles manufactured for domestic markets use the Occupant Classification System (OCS) instead of the ODS on the passenger side front seat.

1. Position the passenger side front seat to its most forward position for easiest access to the front seat mounting hardware.
2. Disconnect and isolate the negative cable from the battery. Wait two minutes for the system capacitor to discharge before further service.
3. Remove the passenger side front seat from the vehicle. Refer to **SEAT, REMOVAL**.
4. Remove the trim from the front seat cushion foam (1) and frame. Refer to **COVER, SEAT CUSHION, REMOVAL**.
5. If equipped, remove the heater and/or ventilation elements from the seat cushion foam. Refer to **PAD, HEATER, REMOVAL**.
6. Reach under the seat cushion pan to access and disconnect the Occupant Detection Sensor (ODS) pigtail wire harness connector from the seat wire harness.
7. Carefully disengage the adhesive patch (2) of the ODS mat (3) from the top surface of the seat cushion foam.

NOTE: Care must be taken not to pull off any of the seat cushion foam along with the ODS mat. If part of the seat cushion foam is removed with the mat, the entire seat cushion foam should be replaced.

8. Extract the tail of the ODS and the sensor pigtail wire harness from the clearance hole in the seat cushion foam.

INSTALLATION

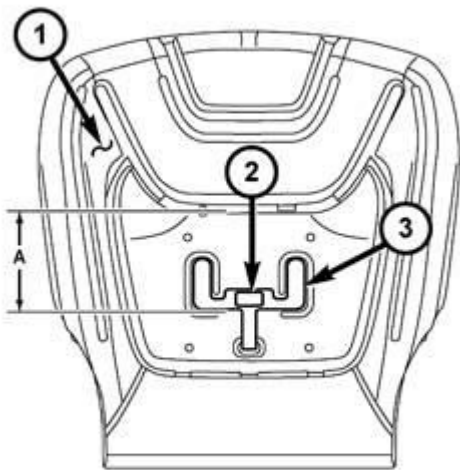
INSTALLATION

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

CAUTION: When handling a new Occupant Detection Sensor (ODS), it should never be bent, creased, torn, cut or abraded. The ODS should not be handled with or come into contact with hard or sharp-edged tools or objects. Do not allow the ODS to drop more than 2 meters (6.5 feet). Prior to installation, do not sit on, stand on or place boxes, tools or any other foreign object on the ODS. If the ODS adhesive patches become

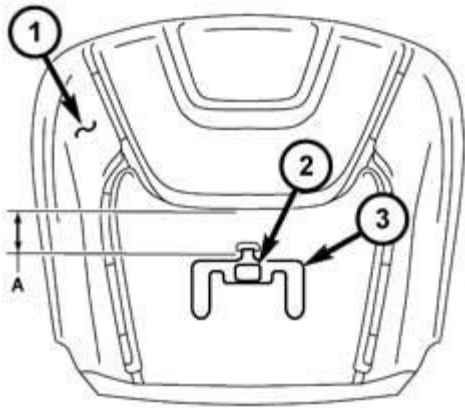
inadvertently adhered to any seat materials or foreign objects prior to proper positioning on the seat cushion, the ODS must be scrapped and replaced with a new unit. Do not modify the seat foam or trim materials of a seat that contains an ODS. Failure to observe these cautions may result in an inoperative ODS, or an ODS that provides inaccurate inputs to the Occupant Restraint Controller (ORC).

CAUTION: The adhesive used to secure the ODS to the seat is heat activated and requires that both the adhesive and the material it is applied to be ideally between 21° and 38° C (between 70° and 100° F). Application of the ODS to surfaces below 10° C (50° F) is not recommended as the adhesive becomes too firm to readily adhere. Do not touch or allow the adhesive patches to contact any foreign materials with the release paper removed. Do not attempt to add adhesive materials to the ODS.



1017009895

Fig. 114: Base (Non-Storage) Seat
Courtesy of CHRYSLER GROUP, LLC



1017009896

Fig. 115: Storage Seat

Courtesy of CHRYSLER GROUP, LLC

NOTE: The Occupant Detection Sensor (ODS) is used only in the passenger side front seat of vehicles manufactured for export markets. Vehicles manufactured for domestic markets use the Occupant Classification System (OCS) instead of the ODS on the passenger side front seat.

1. Carefully inspect the Occupant Detection Sensor (ODS) (3) to be certain that it is in good condition.
2. Insert the ODS pigtail wire harness and the tail of the ODS through the clearance hole near the back (with base, non-storage seat) or near the center (with storage seat) of the seat cushion foam.
3. Carefully position and center the ODS mat onto the seat cushion foam (1). On a base (non-storage) seat, the distance (A) from the rear edge of the trench in the foam to the rear edge of the sensor mat should be 145 millimeters (inches). On a storage seat, the distance (A) from the rear edge of the trench to the front edge of the sensor mat should be 70 millimeters (inches).
4. Remove the release paper from the adhesive patch of the ODS mat.

NOTE: The release paper should not be removed from the adhesive patch of a new ODS mat until just prior to application to the seat cushion foam.

5. Apply hand pressure (0.8 bar or 12 psi) over the adhesive patch of the ODS for at least four seconds to activate and adhere the adhesive to the seat cushion foam.
6. Reach under the seat cushion pan to access and reconnect the ODS pigtail wire connector to the seat wire harness.
7. If equipped, reinstall the heater and/or ventilation elements onto the seat cushion foam.

Refer to **PAD, HEATER, INSTALLATION** .

8. Reinstall the trim onto the front seat cushion foam and pan. Refer to **COVER, SEAT CUSHION, INSTALLATION** .
9. Reinstall the passenger side front seat into the vehicle. Refer to **SEAT, INSTALLATION** .
10. Reconnect the negative cable to the battery.

SENSOR, SEAT TRACK POSITION

DESCRIPTION

DESCRIPTION

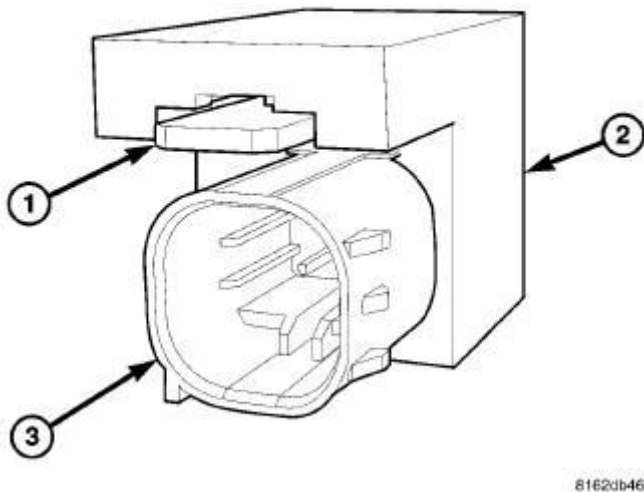


Fig. 116: Identifying Seat Track Position Sensor
Courtesy of CHRYSLER GROUP, LLC

The Seat Track Position Sensor (STPS) (2) is a Hall Effect-type sensor used on some vehicles. This sensor consists of a Hall Effect Integrated Circuit (IC) chip encased in potting material within a cavity of the molded plastic sensor housing.

The STPS housing has a mounting slot containing an integral latch feature (1) and slides and latches onto a stamped metal blade-type bracket located on the inboard side of the upper inboard seat adjuster track near the rear of both the passenger and driver front seats. A molded connector receptacle (3) integral to the STPS housing is connected to the vehicle electrical system through a connector and take out of the seat wire harness beneath the front seat cushion frame.

The STPS cannot be adjusted or repaired and, if ineffective or damaged, the entire STPS unit must be replaced.

OPERATION

OPERATION

The Seat Track Position Sensor (STPS) is designed to provide a seat position data input to the Occupant Restraint Controller (ORC) indicating whether the driver or passenger front seat is in a full forward or a not full forward position. The ORC uses this data as an additional logic input for use in determining the appropriate force to be used when deploying the multistage Driver AirBag (DAB) or Passenger AirBag (PAB).

The STPS receives a nominal five volt supply from the ORC. The STPS communicates the seat position by modulating the voltage returned to the ORC on a sensor data circuit. The ORC also monitors the condition of the STPS circuits and will store a Diagnostic Trouble Code (DTC) for any fault that is detected. The ORC sends messages over the CAN data bus to control the illumination of the airbag indicator in the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC).

The hard wired circuits between the STPS and the ORC may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the STPS or the electronic controls and communication between other modules and devices that provide features of the Supplemental Restraint System (SRS). The most reliable, efficient and accurate means to diagnose the STPS or the electronic controls and communication related to STPS operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

REMOVAL

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

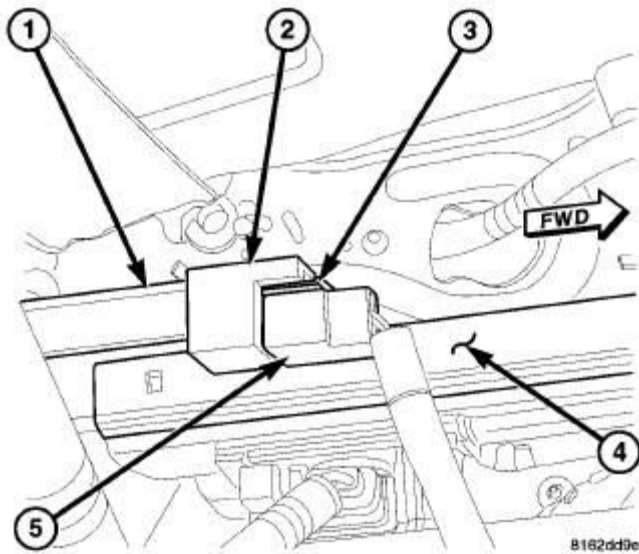


Fig. 117: Seat Track Position Sensor, Bracket, Upper Inboard Seat Track & Harness Connector
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery. Wait two minutes for the system capacitor to discharge before further service.
2. Reach under the rear edge of the front seat cushion to access the Seat Track Position Sensor (STPS) (2) on a bracket (1) located on the inboard side near the rear of one of the upper seat tracks (4).
3. Using a small screwdriver, hold the latch feature (3) depressed while sliding the connector end of the STPS off of the bracket.
4. Disconnect the seat wire harness connector (5) from the STPS connector receptacle.
5. Remove the STPS from under the front seat.

INSTALLATION

INSTALLATION

WARNING: To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbag, Occupant Classification System (OCS), seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to follow these instructions may result in accidental airbag deployment.

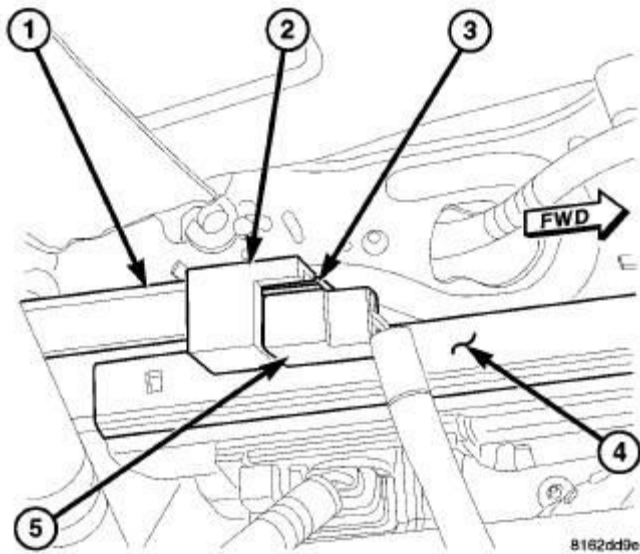


Fig. 118: Seat Track Position Sensor, Bracket, Upper Inboard Seat Track & Harness Connector
Courtesy of CHRYSLER GROUP, LLC

1. Reach under the rear edge of the front seat cushion to reconnect the seat wire harness connector (5) to the Seat Track Position Sensor (STPS) (2) connector receptacle. Be certain that the latch on the connector is fully engaged.
2. Align the open end of the STPS mounting slot to the blade of the STPS bracket (1) located on the inboard side near the rear of one of the upper seat tracks (4).
3. Push the STPS firmly onto the bracket until the latch feature (3) snaps into place with an audible click.
4. Do not reconnect the negative cable to the battery at this time. The Supplemental Restraint System (SRS) Verification Test procedure should be performed following service of any SRS component. Refer to **SUPPLEMENTAL RESTRAINT SYSTEM VERIFICATION TEST**.

SWITCH, SEAT BELT

DESCRIPTION

DESCRIPTION

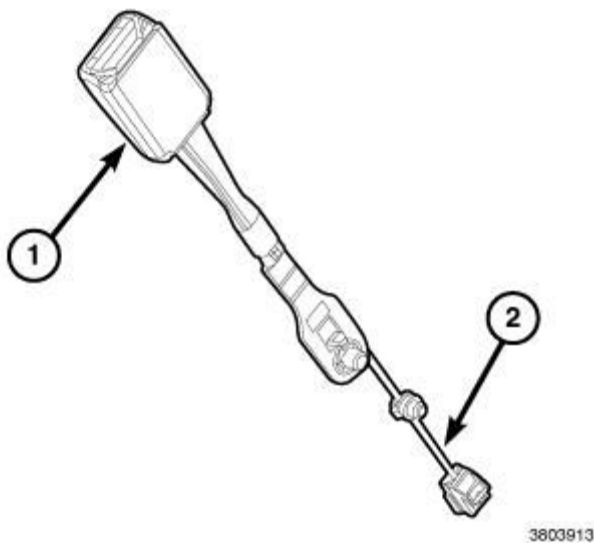


Fig. 119: Seat Belt Buckle, Pigtail Wire & Connector
Courtesy of CHRYSLER GROUP, LLC

Both the driver and passenger front seat belt switches for this vehicle are actually Hall Effect-type sensors. These sensors consist of a fixed-position, Hall Effect Integrated Circuit (IC) chip and a small permanent magnet that are integral to the front seat belt buckles (1). The front seat belt buckles are located on a molded plastic scabbard and secured by a screw to a bracket near the back of the upper, inboard seat adjuster track. The front seat belt switches are connected to the vehicle electrical system through a two-lead pigtail wire and connector (2) on the front seat belt buckle-half, which is connected to a wire harness connector and take out of the seat wire harness. A one kilohm diagnostic resistor is connected in parallel with the IC where the two pigtail wire leads connect to the IC pins.

Vehicles manufactured for certain export markets also have seat belt switches for each of the rear seating positions. The rear seat belt switches are small, normally open, single pole, single throw, mechanical leaf contact, momentary switches. These switches are integral to the buckle of each rear seat belt buckle-half. The rear seat belt switches are connected to the vehicle electrical system through a two-wire pigtail wire and connector on the seat belt buckle-half, which is connected to a wire harness connector and take out of the seat wire harness routed beneath the rear seat cushions in the passenger compartment.

The front and rear seat belt switches cannot be adjusted or repaired and, if ineffective or damaged, the entire front or rear seat belt buckle-half unit must be replaced.

OPERATION

OPERATION

The driver front seat belt switch is designed to control a hard wired sense input to the Occupant Restraint Controller (ORC), while the passenger front seat belt switch controls a similar input to the Occupant Classification Module (OCM). A spring-loaded slide with a small window-like opening is integral to each buckle latch mechanism. When a seat belt tip-half is inserted and latched into the seat belt buckle, the slide is pushed downward and the window of the slide exposes the Hall-effect Integrated Circuit (IC) chip within the buckle. The field of the permanent magnet induces a current within the chip. The chip provides this induced

current as an output to the ORC or the OCM. When the seat belt is unbuckled, the spring-loaded slide moves upward and shields the IC from the field of the permanent magnet, causing the output current from the seat belt switch to be reduced. The front seat belt switches receive a supply of current from the ORC or the OCM, and the ORC or OCM senses the status of the front seat belt switch through its connection to the seat wire harnesses.

In vehicles built for certain export markets equipped with rear seat belt switches, the seat belt switches are designed to control a path to ground for the seat belt switch sense inputs of the ORC. When the rear seat belt tip-half is inserted into the seat belt buckle, the switch closes the path to ground; and, when the rear seat belt tip-half is removed from the seat belt buckle, the switch opens the ground path. The switch is actuated by the latch mechanism within the seat belt buckle. The seat belt switch is connected in series between ground and the seat belt switch sense input of the ORC. The seat belt switch receives ground at all times through its pigtail wire connection to the seat wire harness from a take out of the body wire harness. An eyelet terminal connector on the body wire harness ground take out is secured to the body sheet metal.

The ORC or the OCM provides electronic **seat belt switch status** messages to the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) over the Controller Area Network (CAN) data bus. The IC uses these messages as an additional logic input for control of the seat belt indicator. In vehicles built for certain export markets equipped with rear seat belt switches, the IC reads the messages received from the ORC then controls the Seat Belt Reminder (SBR) indications in the overhead console using Local Interface Network (LIN) data bus communication. The ORC and OCM monitor the condition of the seat belt switch circuits and will store a Diagnostic Trouble Code (DTC) for any fault that is detected.

The hard wired circuits between the seat belt switches and the ORC or OCM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the switches or the electronic controls and communication between other modules and devices that provide some features of the seat belt reminder system. The most reliable, efficient and accurate means to diagnose the seat belt switches or the electronic controls and communication related to seat belt switch operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

TENSIONER, SEAT BELT

DESCRIPTION

SEAT BELT TENSIONERS

The seat belts for both front seats in this vehicle incorporate dual tensioners. One tensioner is integral to the seat belt retractor, and one tensioner is integral to the seat belt lower anchor. Each of these tensioner types is described in further detail elsewhere within this service information.

ANCHOR TENSIONER

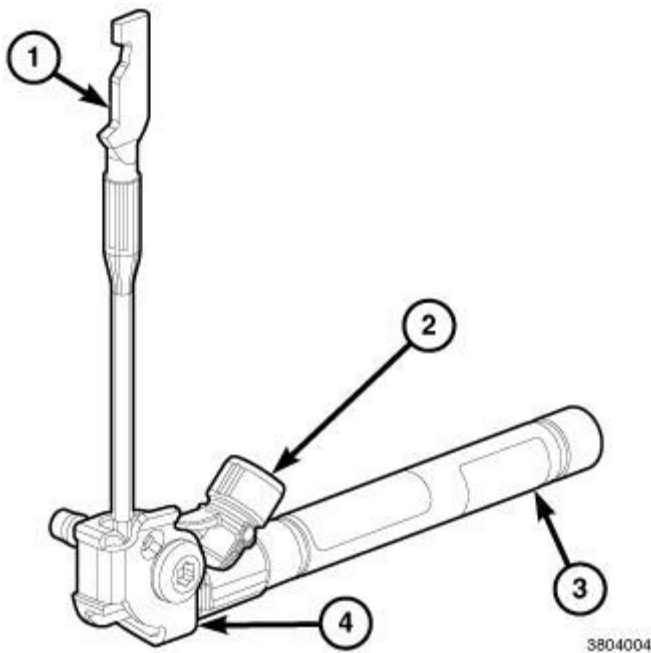


Fig. 120: Anchor Latch Plate, Gas Generator, Metal Cylinder Tube & Bracket
Courtesy of CHRYSLER GROUP, LLC

A seat belt anchor tensioner supplements the dual front airbag system for all versions of this vehicle. These tensioners are integral to the front seat belt anchor units, which are secured to the inside of the sill at the base of the B-pillar outboard of each front seat. The anchor tensioner consists of the anchor latch plate (1), a cable and piston, a cable guide and bracket (4), a metal cylinder tube (3) and a small pyrotechnically activated Micro Gas Generator (MGG) (2). The anchor tensioners are controlled by the Occupant Restraint Controller (ORC) and are connected to the vehicle electrical system through dedicated take outs of the body wire harness by keyed and latching yellow molded plastic connector insulators to ensure a secure connection.

A special procedure requiring two small Allen key wrenches is used to disconnect the seat belt anchor latch plate from the anchor buckle. Refer to **BUCKLE, SEAT BELT, STANDARD PROCEDURE**.

The anchor tensioners cannot be repaired and, if ineffective or damaged, the entire anchor tensioner unit must be replaced. If the front airbags have been deployed, the anchor tensioners have also been deployed. The anchor tensioners are not intended for reuse and must be replaced following any front airbag deployment. Refer to **BUCKLE, SEAT BELT, REMOVAL**.

RETRACTOR TENSIONER

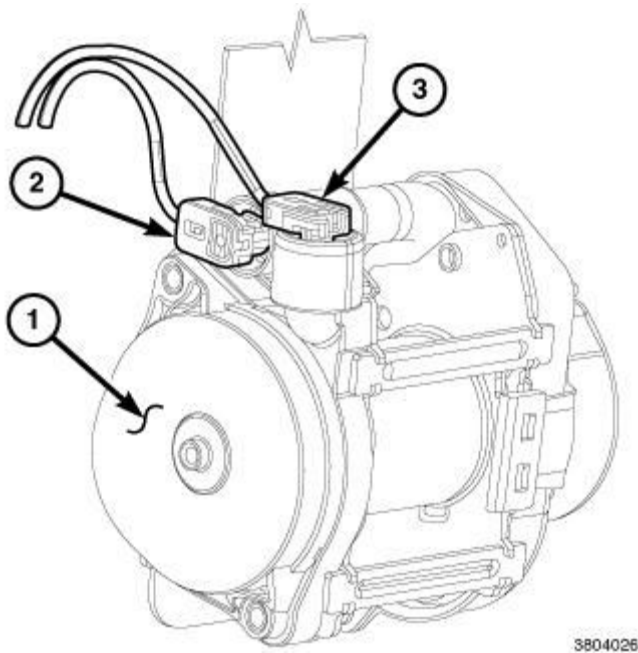


Fig. 121: Seat Belt Retractor Unit & Connector Insulator
Courtesy of CHRYSLER GROUP, LLC

Seat belt retractor tensioners supplement the dual front airbag system for all versions of this vehicle. These tensioners are integral to the front seat belt retractor units (1), which are secured near the base of the inner B-pillar on the right and left sides of the vehicle. The retractor is concealed beneath the molded plastic inner B-pillar trim. The retractor tensioners are controlled by the Occupant Restraint Controller (ORC). Each retractor tensioner has an initiator connected to the vehicle electrical system through a dedicated take out of the body wire harness by a keyed and latching yellow molded plastic connector insulator (2) to ensure a secure connection.

An adaptive load-limiting device is also integral to the front seat belt retractor to supplement the anchor and retractor tensioners. The adaptive load limiter is also controlled by the ORC. Each adaptive load limiter initiator is connected to the vehicle electrical system through a dedicated take out of the body wire harness by a keyed and latching yellow molded plastic connector insulator (3) to ensure a secure connection.

The retractor tensioners and adaptive load limiters cannot be repaired and, if ineffective or damaged, the entire front seat belt and retractor unit must be replaced. If the front airbags have been deployed, the retractor tensioners and adaptive load limiters have also been deployed. The retractor tensioners and adaptive load limiters are not intended for reuse and must be replaced following any front airbag deployment. A growling or grinding sound while attempting to operate the seat belt retractor is a sure indication that the retractor tensioner and adaptive load limiter have been deployed and require replacement. Refer to **RETRACTOR, SEAT BELT, REMOVAL**.

OPERATION

OPERATION

The seat belt tensioners and adaptive load limiter are deployed in conjunction with the dual front airbags by

signals generated by the Occupant Restraint Controller (ORC) through the individual driver or passenger retractor (or sill end), pretensioner (or anchor) or adaptive load limiter line 1 and line 2 (or squib) circuits. When the ORC sends the proper electrical signal to the tensioner and adaptive load limiter initiators, the electrical energy generates enough heat to initiate a small pyrotechnic Micro Gas Generator (MGG).

In sequence, the ORC activates the retractor tensioner, followed by the anchor tensioner. The adaptive load limiter on the retractor is activated only after both the retractor and anchor buckle tensioners. The retractor tensioner gas generator drives the seat belt retractor spool causing slack to be removed from the front seat belt. The anchor tensioner gas generator pulls the buckle downward, causing the slack to be removed from the front seat belt. The ORC uses the adaptive load limiter to adjust the belt resistance based upon impact data, to reduce the force of the tightened seat belt on the chest of the front seat occupant, reducing the potential for injuries.

Removing excess slack from the front seat belts not only keeps the occupants properly positioned for an airbag deployment following a frontal impact of the vehicle, but also helps to reduce injuries that the occupants of the front seats might experience in these situations as a result of harmful contact with the steering wheel, steering column, instrument panel or windshield.

The ORC monitors the condition of the seat belt tensioners and adaptive load limiter through circuit resistance, and will illuminate the airbag indicator in the Instrument Cluster (IC) (also known as the Instrument Panel Cluster/IPC) and store a Diagnostic Trouble Code (DTC) for any fault that is detected. Proper diagnosis of the seat belt tensioner and adaptive load limiter initiators and squib circuits requires the use of a diagnostic scan tool and may also require the use of the SRS Load Tool special tool along with the appropriate Load Tool Jumpers and Adapters. Refer to the appropriate diagnostic information.

2014 STEERING

Steering System - Cherokee

DESCRIPTION

DESCRIPTION

This vehicle comes with Electric Power Steering (EPS) as standard equipment and it is the only steering system available. The power steering system consists of these major components:

- Rack and Pinion Steering Gear with EPS assist
- Steering Column
- Inner and Outer Tie Rod Ends

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - STEERING DIAGNOSIS CHARTS

NOTE: There are two diagnosis charts following that cover PERFORMANCE ISSUES and NOISE, VIBRATION AND HARSHNESS (NVH) ISSUES.

NOTE: For any performance issues, check for DTCs related to the steering system. Verify the correct software and calibration files are loaded in the Electric Power Steering (EPS) system.

PERFORMANCE ISSUES

CONDITION	POSSIBLE CAUSES	EVALUATION/CORRECTION
STEERING WHEEL IS OFF CENTER	1. Front toe is out of adjustment.	1. Perform wheel alignment. Refer to <u>WHEEL ALIGNMENT, STANDARD PROCEDURE</u> .
VEHICLE PULLS LEFT OR RIGHT	1. The center position of the column does not match the center position of the vehicle alignment.	1. Perform wheel alignment. Refer to <u>WHEEL ALIGNMENT, STANDARD PROCEDURE</u> .
	2. Suspension components are bent and/or damaged.	2. Inspect suspension components for damage.
STEERING WHEEL OR COLUMN HAS FREE-PLAY/LASH/LOOSENESS	1. Loose coupling pinch bolt at gear input shaft.	1. Check pinch bolt torque. Replace pinch bolt with thread locker patch and tighten to specifications.

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2014 STEERING Steering System - Cherokee

(CLUNKING OR RATTLING)		
	2. Steering gear loose on cradle/crossmember.	2. Inspect gear mounting bolts. Replace if necessary and tighten to specifications.
	3. Excessive free-play or noise from steering column bearings.	3. Replace steering column. Refer to COLUMN, REMOVAL .
	4. Excessive intermediate (steering) shaft coupling U-joint free-play.	4. Rotate steering wheel back-and-forth while watching coupling. Observe for free-play. Replace the column as necessary. Refer to COLUMN, REMOVAL .
	5. Loose or worn inner tie rod or outer tie rod.	5. For evaluation and correction, refer to TIE ROD, STEERING, DIAGNOSIS AND TESTING .
	6. Lack of lubrication in lower ball joint or ball joint is damaged.	6. Lubricate ball joint if equipped with a zerk fitting and check for function. If not equipped with a zerk fitting, test and replace ball joint/lower control arm as necessary.
	7. Excessive lash inside steering gear.	7. Disconnect intermediate shaft and turn steering gear input shaft. Observe for any movement without a corresponding tire movement. Replace steering gear as necessary.
STEERING WHEEL HAS FORE AND AFT LOOSENESS	1. Steering wheel retaining bolt loose.	1. Check steering wheel retaining bolt torque and tighten to specifications as necessary.
	2. Loose steering column to instrument panel fasteners.	2. Check steering column to instrument panel fastener torque and tighten to specifications as necessary.
STEERING WHEEL, DASH OR VEHICLE VIBRATES DURING STEERING MANEUVERS (ESPECIALLY AT LOW SPEED OR STANDSTILL)	1. Tire(s) not properly inflated.	1. Check and inflate tires to the specified pressure.
	2. Excessive engine vibration.	2. Ensure that the engine is tuned properly.
	3. Loose tie rod end jam nut.	3. Check torque and tighten the inner to outer tie rod jam nut to specifications.
	4. Grounded, damaged or loose engine mount.	4. Visually inspect for damaged or misaligned mounts. Check fastener torque. Replace or realign as necessary.
	5. Loose or worn outer tie rod.	5. For evaluation and correction, refer to TIE ROD, STEERING, DIAGNOSIS AND TESTING .
	6. Steering gear noisy.	6. During a parking event at 0 mph, verify there is vibration only with steering. Steer in both directions

2014 Jeep Cherokee Trailhawk

2014 STEERING Steering System - Cherokee

	7. Steering gear has instability, shudder, etc.	and verify that the noise follows the steering input. Check TSBs for any known issues. Replace steering gear as necessary. 7. Perform EPS calibration procedures. If this does not fix the issue, replace the steering gear.
INCREASED STEERING EFFORT/STEERING WHEEL DOES NOT RETURN TO CENTER POSITION	1. Tire(s) not properly inflated. 2. Lack of lubrication in lower ball joint or ball joint is damaged.	1. Check and inflate tires to the specified pressure. 2. Lubricate ball joint if equipped with a zerk fitting and check for function. If not equipped with a zerk fitting, test and replace ball joint as necessary.
	3. Steering knuckle binding.	3. Disconnect the outer tie rod end from knuckle and then rotate knuckle. Refer to <u>TIE ROD, STEERING, REMOVAL</u> . If the knuckle does not rotate freely separate the strut from the knuckle to determine if the ball joint or strut mount bearing is the cause of the binding and replace components as necessary or refer to <u>STRUT, SUSPENSION, ASSEMBLY, REMOVAL</u> .
	4. EPS steering not functioning.	4. Perform EPS calibration procedures. If this does not fix the issue, replace the steering gear.
	5. Steering column internal issue.	Do not turn past two revolutions. Damage to the clockspring may occur. Always rotate steering column back to initial position. Steering column is equipped with an absolute position sensor that has a unique zero position. 5. Disconnect the intermediate shaft and rotate steering column. If condition is still present, replace steering column. Refer to <u>COLUMN, INSTALLATION</u> .
	6. Binding outer tie rod.	6. For evaluation and correction, refer to <u>TIE ROD, STEERING, DIAGNOSIS AND TESTING</u> .
	7. Improper front wheel alignment.	7. Check and adjust wheel alignment as necessary.
EXCESSIVE STEERING WHEEL KICKBACK FROM ROAD INPUTS	1. Steering gear loose on cradle/crossmember.	1. Inspect gear mounting bolts. Replace if necessary and tighten to specifications.
	2. Steering column, coupling or intermediate shaft worn or loose.	2. Rotate steering wheel back-and-forth while inspecting intermediate shaft going into steering gear. Look for excessive free-play. Retighten if loose bolt is found. Replace steering column if necessary. Refer to <u>COLUMN, REMOVAL</u> .

NOISE, VIBRATION AND HARSHNESS (NVH) ISSUES

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2014 Jeep Cherokee Trailhawk

2014 STEERING Steering System - Cherokee

CONDITION	POSSIBLE CAUSES	EVALUATION/CORRECTION
RATTLE OR EXCESSIVE CLUNK*	1. Steering gear loose on engine cradle/crossmember.	1. Check fastener torque and tighten to specifications. Replace as necessary. Check steering wheel center following repair.
	2. Loose strut assembly mounting fasteners at tower or knuckle.	2. Check fastener torque and tighten to specifications.
	3. Excessive play in inner or outer tie rod.	3. For evaluation and correction, refer to <u>TIE ROD, STEERING, DIAGNOSIS AND TESTING.</u>
	4. Engine cradle/crossmember mounting fasteners loose at frame or bushings worn.	4. Check fastener torque and tighten to specifications. Inspect bushings and repair as necessary.
	5. Wheel mounting (lug) bolts loose.	5. Inspect wheel mounting (Lug) bolts and repair as necessary. Tighten bolts to specifications.
	6. Stabilizer bar link joints worn (occurs with steering input only when moving, not stationary).	6. At park, jounce only one side of vehicle front to exercise stabilizer bar. Replace stabilizer bar link.
	7. Loose lower control arm mounting bolts at engine cradle, frame or crossmember (occurs with steering input only when moving, not stationary).	7. Check control arm mounting bolts and tighten to specified torque.
	8. Loose intermediate shaft or column.	8. Rotate intermediate (steering) shaft in relationship to gear, checking for free-play. Check column fasteners and tighten to specifications as necessary.
	9. Lower control arm pivot bushing worn (occurs with steering input only when moving, not stationary).	9. Inspect bushings for wear and replace lower control arm as necessary.
	10. Internal steering gear noise.	10. Drive vehicle on rough road listening for noises. Also, steer rapidly back and forth when stopped listening for noises. Replace steering gear as necessary.
	11. Loose inner or outer tie rod.	11. For evaluation and correction, refer to <u>TIE ROD, STEERING, DIAGNOSIS AND TESTING.</u>
	12. Damaged engine cradle/crossmember.	12. Inspect the cradle/crossmember for cracks or other damage. Replace as necessary.
POPPING NOISE	1. Loose steering gear mounting fasteners.	1. Check fasteners for proper torque and retighten as necessary.
	2. Loose outer tie rod mounting nut or jam nut.	2. Check fastener torque. Replace nuts as necessary and tighten to specifications.
	3. Loose intermediate (steering)	3. Make sure coupling is fully seated on gear

2014 Jeep Cherokee Trailhawk

2014 STEERING Steering System - Cherokee

	shaft coupling at gear input shaft.	input shaft. Retighten or re-seat as necessary.
	4. Worn tie rod (outer or inner).	4. For evaluation and correction, refer to <u>TIE ROD, STEERING, DIAGNOSIS AND TESTING</u> .
	5. Worn axle half-shaft.	5. For evaluation and correction, refer to <u>DIAGNOSIS AND TESTING</u> .
SQUEAKING OR RUBBING SOUND	1. Steering column shroud or shaft rubbing.	1. While turning the steering wheel, listen down column to locate. Check interference between moving components. Move or realign shrouds or shaft as necessary. Replace components if this does not correct problem.
	2. Clockspring inside steering column noisy.	2. Remove clockspring and reinstall steering wheel for testing. If noise is gone, replace clockspring.
	3. Boot/dash seal lubrication inadequate.	3. Remove boot seal and recheck for noise. Lubricate seal as necessary.
	4. Steering gear inner or outer tie rod noisy.	4. While a helper turns the steering wheel, use an electronic listening tool to determine if noise is coming from either outer tie rod. Replace outer tie rods as necessary. Refer to <u>DIAGNOSIS AND TESTING</u> .
	5. Steering gear internally noisy.	5. Remove dash seal boot, then exercise the steering wheel. If noise is still present at gear, replace steering gear.
SCRUBBING OR KNOCKING SOUND	1. Incorrect tire or wheel size.	1. Replace incorrect size tire or wheel with original equipment size.
	2. Worn motor or transmission mount.	2. Drive vehicle, moving accelerator pedal rapidly up and down attempting to locate noise. Try in both forward and reverse. Replace mounts as necessary.
	3. Tires contacting wheel well.	3. Make sure wheel house is properly positioned. If not, reposition as necessary. If steering wheel is properly centered, check steering gear travel left to right by rotating the steering wheel to each stop. Steering wheel should rotate the same amount in both directions from center. If not, replace steering gear.
	4. Interference between moving steering components and other components.	4. Check for bent or misaligned components. Correct or replace as necessary.

NOTE: * A light clunk may be felt or heard during steering wheel reversal while vehicle is stationary. This results from internal steering gear rack movement at the bushings and in no way affects the performance of the steering system. This

2014 Jeep Cherokee Trailhawk

2014 STEERING Steering System - Cherokee

movement may be felt in the steering components during steering wheel reversal.

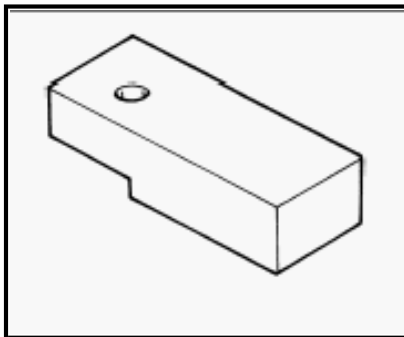
SPECIFICATIONS

SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Gear Mounting Bolts	115	85	-
Front Bumper Extension and Support Beams Mounting Bolts	45	33	-
Inner Tie Rod	110	81	-
Intermediate Shaft Coupling Bolt	30	22	-
Lower Ball Joint Pinch Bolt	25 Plus 180°	18 Plus 180°	-
Outer Tie Rod to Knuckle	30 Plus 90°	22 Plus 90°	-
Rear Engine Mount Bracket Mounting Bolts	60	44	-
Rear Engine Isolator Mounting Bolt	130	96	-
Stabilizer Link to Stabilizer Bar	55	41	-
Stabilizer Link to Strut	63	46	-
Steering Gear Heat Shield	7	-	62
Suspension Crossmember to Front Support Beams Bracket	95	70	-
Suspension Crossmember Mounting Bolts	189	139	-
Suspension Crossmember Mounting Bolts - Above Control Arms	120	86	-
Tie Rod Adjuster Jam Nut	70	52	-

SPECIAL TOOLS

SPECIAL TOOLS



C-3894-A - Puller, Tie Rod
(Originally Shipped In Kit Number(s) 9202, 9202A-CAN, 9202CC, 9299, 9299CC, 9299CC, 9300A-CAN.)

COLUMN

WARNING

WARNING

WARNING: Safety goggles should be worn at all times when working on steering columns.

WARNING: Before beginning any service procedure that involves removing the air bag: Remove and isolate the negative (-) battery cable (ground) from the vehicle battery. This is the only sure way to disable the air bag system. Failure to do this could result in accidental air bag deployment and possible personal injury.

WARNING: The air bag system is a sensitive, complex electro-mechanical unit. Before attempting to diagnose, remove or install the air bag system components you must first disconnect and isolate the battery negative (ground) cable. Failure to do so could result in accidental deployment of the air bag and possible personal injury. The fasteners, screws, and bolts, originally used for the air bag components, have special coatings and are specifically designed for the air bag system. They must never be replaced with any substitutes. Anytime a new fastener is needed, replace with the correct fasteners provided in the service package or fasteners listed in the parts books. Before servicing a steering column equipped with an air bag,

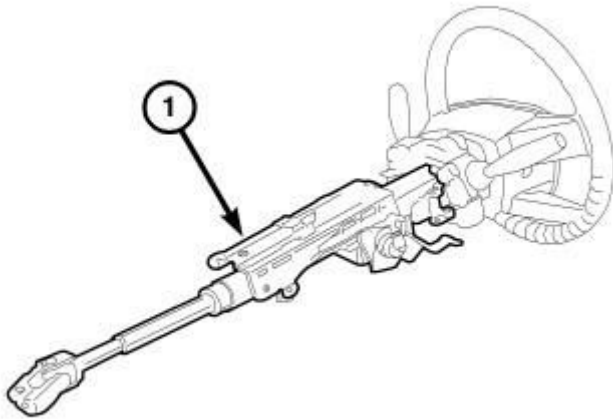
WARNING: When handling an undeployed air bag during servicing of the steering column, the following precautions should be observed:

- At no time should any source of electricity be permitted near the inflator on the back of the air bag.
- When carrying a live air bag, the trim cover should be pointed away from the body to minimize injury if the air bag should accidentally deploy.
- If the air bag is placed on a bench or other surface, the plastic cover should be face-up to minimize movement, in case of accidental deployment.

CAUTION: Disconnect negative (ground) cable from the battery before servicing any column component.

DESCRIPTION

DESCRIPTION



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Fig. 1: Identifying Steering Column
Courtesy of CHRYSLER GROUP, LLC

This vehicle is equipped with a tilt/telescoping type steering column (1). When the lever is in the released position, the column can be tilted or telescoped manually.

The steering column is designed to be serviced only as a complete assembly if an internal component is found to be defective. The shaft, bearings and intermediate shaft are all serviced with the column.

The major components on the steering column assembly are:

- Clockspring (Integral part of Steering Column Control Module (SCCM))
- Driver Airbag
- Multi-Function Switches
- Tilt Lever
- Shrouds
- Steering Wheel

These components can be serviced without removal of the steering column from the vehicle. Refer to the appropriate Service Information for servicing these components separately.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - STEERING COLUMN

NOTE: Refer to **DIAGNOSIS AND TESTING** .

If the vehicle is involved in a front end collision or the air bag has deployed or both, the steering column must be replaced.

SPECIFICATIONS

SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Intermediate Shaft Coupling Bolt	30	22	-
Steering Column Mounting Bolt	24	18	-
Steering Column Mounting Nuts	24	18	-
Steering Wheel Retaining Bolt	50	37	-

REMOVAL

REMOVAL

WARNING: When an undeployed airbag module is to be removed from the vehicle, first disconnect the battery ground cable and isolate it. Allow the system capacitor to discharge for a minimum of two minutes before starting any removal.

NOTE: Before proceeding, refer to COLUMN, WARNING.

1. Disconnect the negative cable from the battery and isolate the cable.
2. Position the column tilt at the full-downward position.



Fig. 2: Identifying Lower Shroud & Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. Remove upper and lower (2) shrouds from the steering column. Refer to SHROUD, STEERING

COLUMN, LOWER, REMOVAL and SHROUD, STEERING COLUMN, UPPER, REMOVAL.

4. Remove the steering column opening cover. Refer to **COVER, STEERING COLUMN OPENING, REMOVAL**.
5. Remove the screws to the steering column trim ring.
6. Remove knee blocker air bag, if equipped. Refer to **AIR BAG, KNEE BLOCKER, REMOVAL**.
7. Remove the driver air bag. Refer to **AIR BAG, DRIVER, REMOVAL**.
8. Disconnect the wiring harness connectors at the Steering Column Control Module (SCCM).
9. Disconnect all other wiring harness connectors at column components.

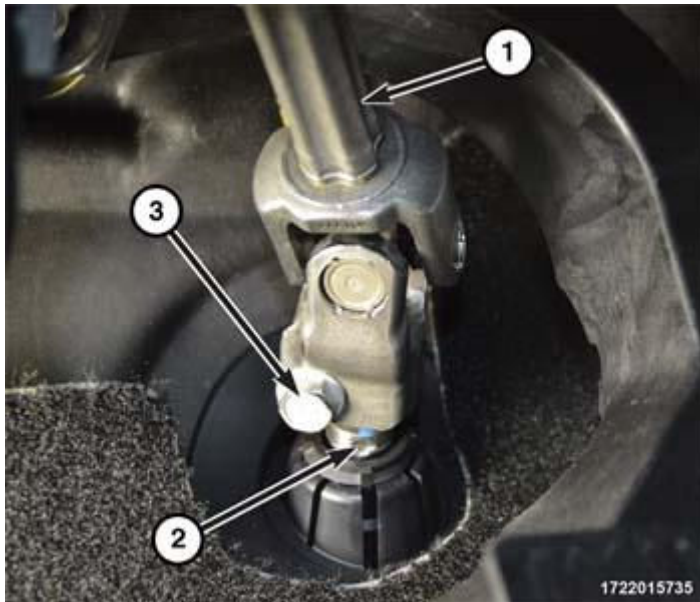
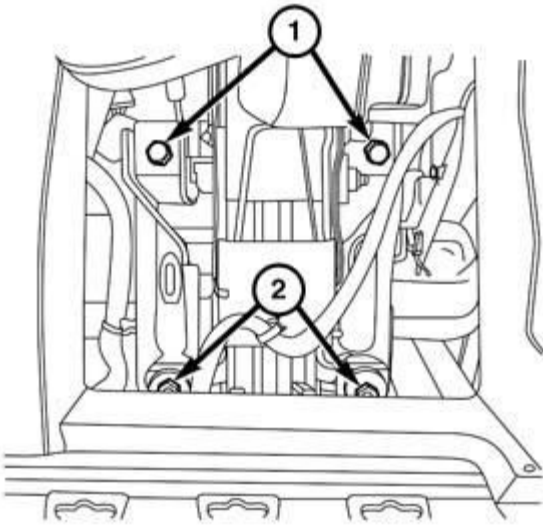


Fig. 3: Identifying Intermediate Shaft, Pinch Bolt And Steering Gear Pinion Shaft
Courtesy of CHRYSLER GROUP, LLC

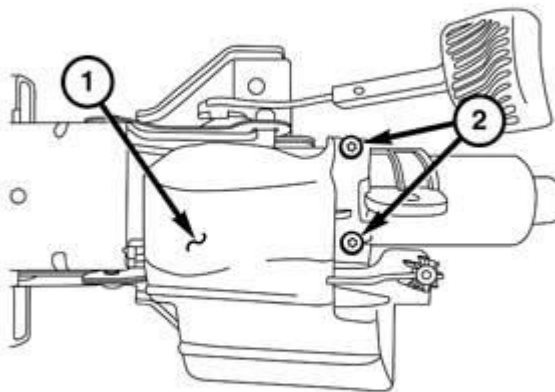
10. Remove intermediate shaft pinch bolt (3) and separate the intermediate shaft (1) at the base of the column from the steering gear pinion shaft (2). Discard the pinch bolt (3); it is not to be reused.



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Fig. 4: Steering Column Mounting Bolts & Nuts
Courtesy of CHRYSLER GROUP, LLC

11. Remove the two mounting bolts (1) and nuts (2) attaching the steering column to the instrument panel.
12. Remove the steering column from the vehicle.



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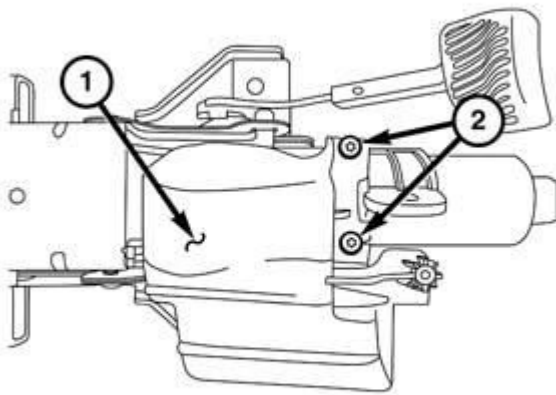
Fig. 5: Plastic Bracket & Screws

Courtesy of CHRYSLER GROUP, LLC

13. If replacing the column, remove the mounting screws (2) and transfer the plastic bracket (1) to the new column.

INSTALLATION

INSTALLATION

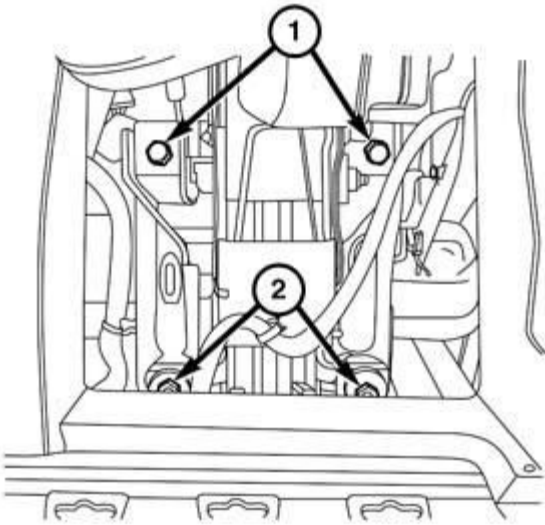


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Fig. 6: Plastic Bracket & Screws

Courtesy of CHRYSLER GROUP, LLC

1. If the column was replaced, position the plastic bracket (1) and install and securely tighten the screws (2).



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Fig. 7: Steering Column Mounting Bolts & Nuts
Courtesy of CHRYSLER GROUP, LLC

2. Install the steering column with the steering column trim ring, through the steering column opening.
3. Raise the column onto the mounting studs and install the two mounting nuts (2) on the studs and install the mounting bolts (1).

NOTE: **Verify that the tilt lever is in the unlocked position prior to tightening the steering column fasteners.**

4. Install two column mounting bolts (1). Tighten all 4 column fasteners to 24 N.m (18 ft. lbs.).

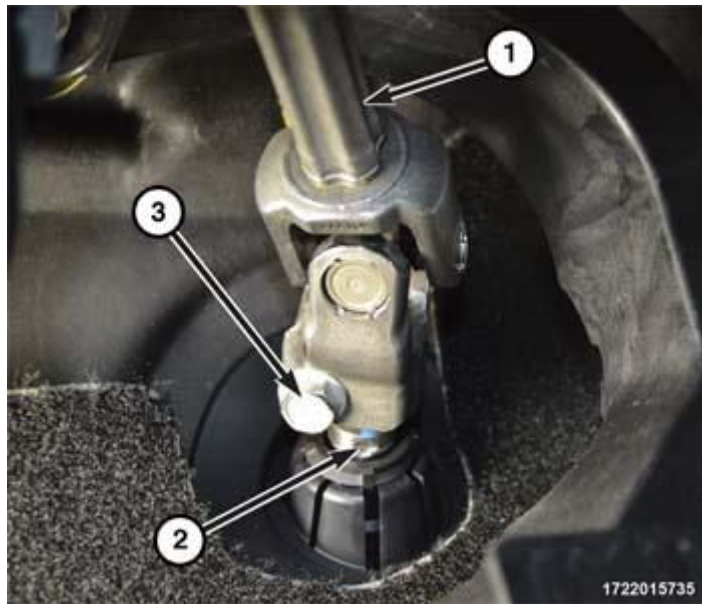


Fig. 8: Identifying Intermediate Shaft, Pinch Bolt And Steering Gear Pinion Shaft
Courtesy of CHRYSLER GROUP, LLC

NOTE: A new pinch bolt (3) must be installed every time the pinch bolt is removed.

5. Verify the front wheels of vehicle are in the STRAIGHT-AHEAD position.
6. Slide the intermediate shaft (1) onto the steering gear pinion shaft (2).
7. Install a **NEW** pinch bolt (3) and tighten the bolt to 30 N.m (22 ft. lbs.).
8. Confirm that:
 - a. The front wheels are in the STRAIGHT-AHEAD position.
 - b. The turn signal stalk is in the NEUTRAL position.
9. Connect wiring harness connectors at the Steering Column Control Module (SCCM).
10. Connect any other wiring harness connectors at the steering column components.
11. Install knee blocker air bag, if equipped. Refer to **AIR BAG, KNEE BLOCKER, INSTALLATION** .
12. Install the driver air bag. Refer to **AIR BAG, DRIVER, INSTALLATION** .
13. Install the screws to the steering column trim ring.
14. Install the steering column opening cover. Refer to **COVER, STEERING COLUMN OPENING, INSTALLATION** .



Fig. 9: Identifying Lower Shroud & Fasteners
Courtesy of CHRYSLER GROUP, LLC

15. Install the upper and lower (2) shrouds on the steering column. Refer to **SHROUD, STEERING COLUMN, LOWER, INSTALLATION** and **SHROUD, STEERING COLUMN, UPPER, INSTALLATION**.

WARNING: Do not connect the battery ground cable without following the proper procedure as indicated in the following step. Personal injury or death may result if the Airbag System Test is not performed first.

16. Reconnect the battery ground terminal following the air bag system test found in restraints. Refer to **DIAGNOSIS AND TESTING**.
17. Perform Vehicle Trim Procedure. Refer to **STANDARD PROCEDURE**.
18. Test the operation of all column mounted components.
19. Road test the vehicle to ensure proper operation of the steering system.

SHROUD, STEERING COLUMN, LOWER

REMOVAL

REMOVAL



Fig. 10: Identifying Lower Shroud & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Push the column tilt lever downward.
2. Remove the screws (3, 1) attaching the lower shroud (2) to the column.
3. Separate the lower shroud (2) from the upper shroud by pressing on the edges of the shrouds.
4. Remove the lower shroud from the column.

INSTALLATION

INSTALLATION



Fig. 11: Identifying Lower Shroud & Fasteners

Courtesy of CHRYSLER GROUP, LLC

1. Push the column tilt lever downward.
2. Install the lower shroud (2) into the upper shroud, snapping the shrouds together.
3. Install the screws (3, 1) attaching the lower shroud (2) to the column.

SHROUD, STEERING COLUMN, UPPER

REMOVAL

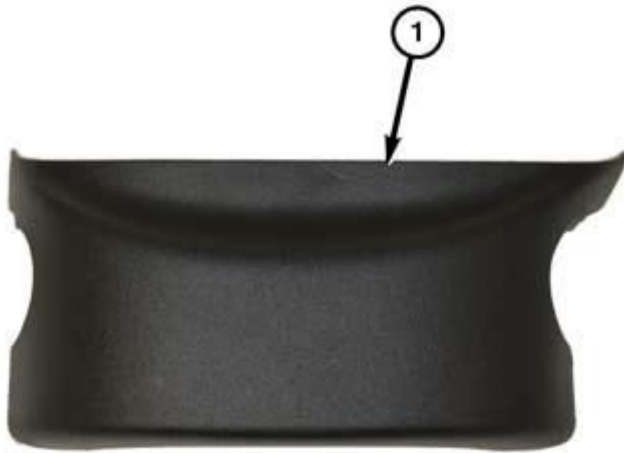
REMOVAL



Fig. 12: Identifying Lower Shroud & Fasteners

Courtesy of CHRYSLER GROUP, LLC

1. Push the column tilt lever downward.
2. Remove the screws (3, 1) attaching the lower shroud (2) to the column.
3. Separate the lower shroud (2) from the upper shroud by pressing on the edges of the shrouds.



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Fig. 13: Identifying Upper Shroud
Courtesy of CHRYSLER GROUP, LLC

4. Remove the upper shroud (1) from the lower shroud.

INSTALLATION

INSTALLATION



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Fig. 14: Identifying Upper Shroud, Positioning Keys & Fasteners
Courtesy of CHRYSLER GROUP, LLC

1. Install the upper shroud onto the column and position the keys (1) into the steering column trim ring.



Fig. 15: Identifying Lower Shroud & Fasteners
Courtesy of CHRYSLER GROUP, LLC

2. Push the column tilt lever downward.
3. Install the lower shroud (2) into the upper shroud, snapping the shrouds together.
4. Install the screws (3, 1) attaching the lower shroud (2) to the column.

WHEEL, STEERING

REMOVAL

REMOVAL

WARNING:

- Do not place a non-deployed airbag face down on a hard surface. The airbag will propel into the air if accidentally deployed. Failure to follow this instruction may result in possible serious or fatal injury.
- Disconnect and isolate the battery negative (ground) cable before beginning steering wheel removal or installation. This will disable the airbag system. Failure to follow this instruction may result in accidental airbag deployment and possible serious or fatal injury.
- Allow the airbag system capacitor to discharge for two minutes before removing the steering wheel or any airbag system component. Failure to follow this instruction may result in accidental airbag deployment and possible serious or fatal injury.

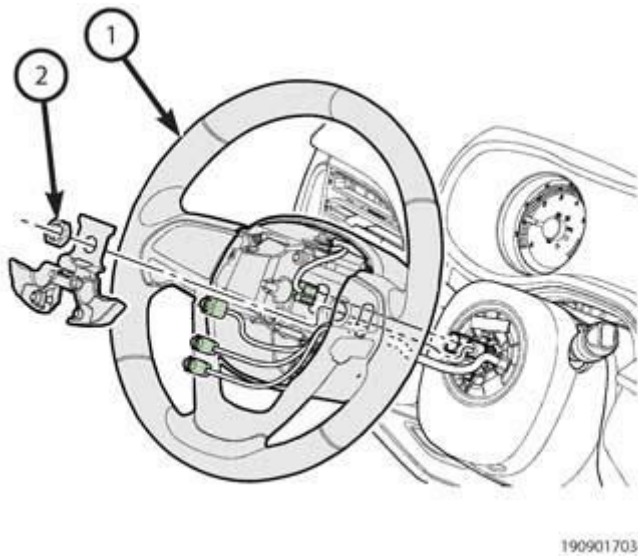


Fig. 16: Identifying Steering Wheel & Nut
Courtesy of CHRYSLER GROUP, LLC

1. Adjust the steering wheel so that the tires are in the STRAIGHT-AHEAD position.
2. Disconnect and isolate the negative battery cable.
3. Remove the driver airbag. Refer to **AIR BAG, DRIVER, REMOVAL** .
4. Disconnect the wiring connector at the clockspring.

CAUTION: Do not bump or hammer on the steering wheel or steering column shaft when removing the steering wheel.

CAUTION: Do not attempt to rotate the clockspring rotor once the steering wheel is removed. The clockspring must remain centered in its travel to avoid overextending the clockspring inner parts, causing the clockspring to become inoperative. If removed and handled properly using the correct procedures, it should remain in the "centered" position. If there is any question as to whether the clockspring is in the "centered" position of travel, perform the clockspring centering procedure before installing the steering wheel.

5. While holding the steering wheel (1) firmly in place, remove the nut (2) that secures the steering wheel to the steering column shaft.
6. While holding the steering wheel firmly in the STRAIGHT-AHEAD position, remove the steering wheel from the steering column shaft splines.

INSTALLATION

INSTALLATION

CAUTION: When installing the steering wheel, the clockspring must be centered in its travel to avoid overextending the clockspring inner parts, causing the clockspring to become inoperative. If removed and handled properly using the correct procedures, it should be in the "centered" position. If there is any question as to whether the clockspring is in the "centered" position of travel, perform the clockspring centering procedure before proceeding.

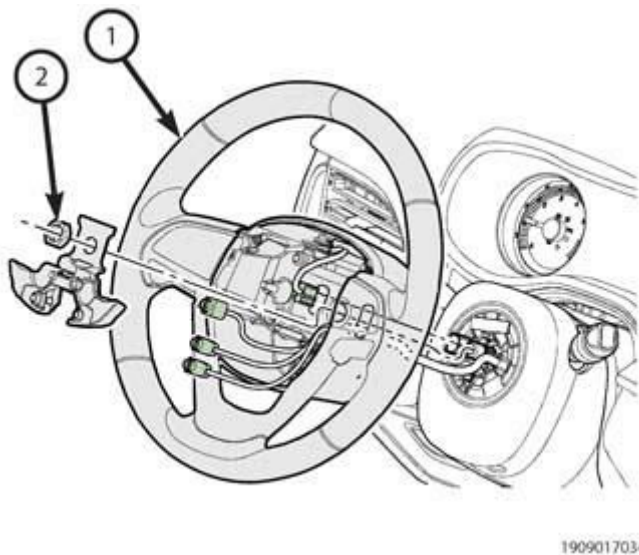


Fig. 17: Identifying Steering Wheel & Nut
Courtesy of CHRYSLER GROUP, LLC

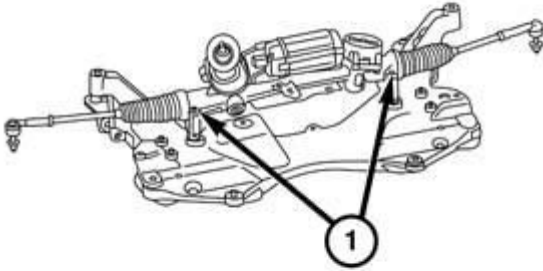
1. Confirm that:
 - a. The front wheels are in the STRAIGHT-AHEAD position.
 - b. The turn signal stalk is in the NEUTRAL position.
2. Install the steering wheel retaining nut (2). Tighten the steering wheel retaining nut to 50 N.m (37 ft. lbs.).
3. Connect the wiring connector at the clockspring.
4. Install the driver airbag. Refer to **AIR BAG, DRIVER, INSTALLATION** .

WARNING: Do not reconnect the battery without first performing the Airbag System Test procedure. Failure to perform the Airbag System Test may result in accidental airbag deployment and serious or fatal injury.

5. Reconnect the battery using the Airbag System Test procedure. Refer to **DIAGNOSIS AND TESTING** .
6. Verify vehicle and system operation.

GEAR

DESCRIPTION

DESCRIPTION

191069437

Fig. 18: Steering Gear

Courtesy of CHRYSLER GROUP, LLC

The steering gear is the rack-and-pinion type with Electric Power Assist (EPS). It is mounted on the front suspension crossmember, and the front crossmember must be removed from the vehicle to service the steering gear. The only serviceable parts of the steering gear are the inner tie rods, outer tie rods, and the inner tie rod bellows.

The EPS system is only serviced as an assembly, including the Steering Angle Sensor (SAS). If the SAS requires replacement, the entire steering gear must be replaced.

NOTE: If a **NEW** steering gear is installed, programming is required. Refer to **STANDARD PROCEDURE** .

OPERATION**OPERATION**

Turning of the steering wheel is converted into linear (side-to-side) travel through the meshing of the helical pinion teeth with the rack teeth within the steering gear. The lateral travel pushes and pulls the tie rods to change the direction of the vehicle's front wheels.

Power assist steering is provided by an electric motor and control unit connected to the steering gear. The Electric Power Steering (EPS) system provides variable assist for steering maneuvers based on several inputs:

- Steering wheel position and rate of movement from Steering Angle Sensor (SAS)
- Steering wheel torque from torque sensors in the EPS Gear
- Vehicle speed

No components of the EPS system can be serviced separately. If any component of the EPS requires service, the entire steering gear must be replaced. The only serviceable parts are inner and outer tie rods, and tie rod bellows.

The EPS system communicates over the CAN network, including broadcasting the Steering Angle Sensor (SAS) position.

Manual steering control of the vehicle can be maintained if power steering assist is lost. However, under this condition, steering effort is significantly increased.

REMOVAL

REMOVAL

NOTE: Before proceeding, refer to **FRONT, WARNING** .

NOTE: If equipped, removal of the power transfer unit may be necessary in order to remove the steering gear . Refer to **REMOVAL** .

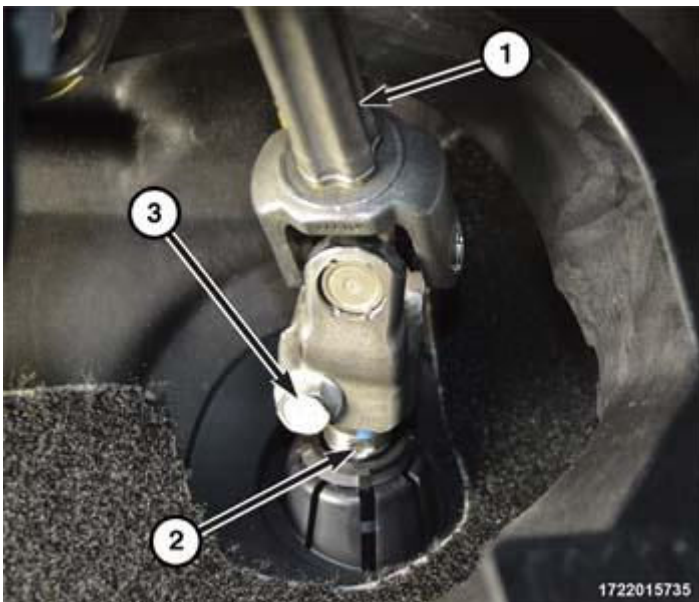
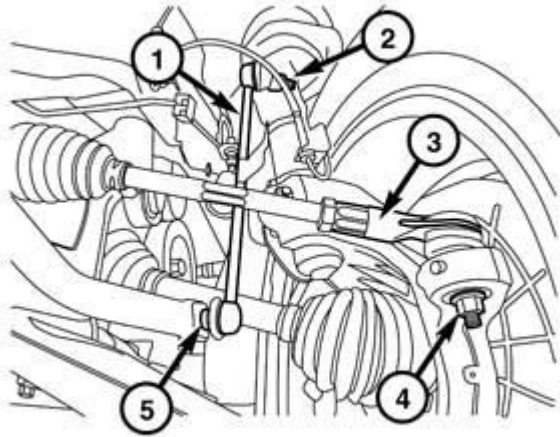


Fig. 19: Identifying Intermediate Shaft, Pinch Bolt And Steering Gear Pinion Shaft
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect battery negative cable.
2. Using a steering wheel holder, lock the steering wheel in place to keep it from rotating. This keeps the

clockspring in the proper orientation.

3. Remove pinch bolt (3) and separate intermediate shaft (1) from steering gear shaft (2).



1715005812

Fig. 20: Identifying Steering Link, Outer Tie Rod End & Nuts
Courtesy of CHRYSLER GROUP, LLC

4. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
5. Remove the wheel mounting bolts, then the tire and wheel assembly.
6. Remove the engine belly pan. Refer to **BELLY PAN, REMOVAL**.

NOTE: Repeat STEP 7 to STEP 14 on opposite side of vehicle.

7. While holding the stabilizer bar link stud stationary, remove the nut securing the link (1) to the stabilizer bar.

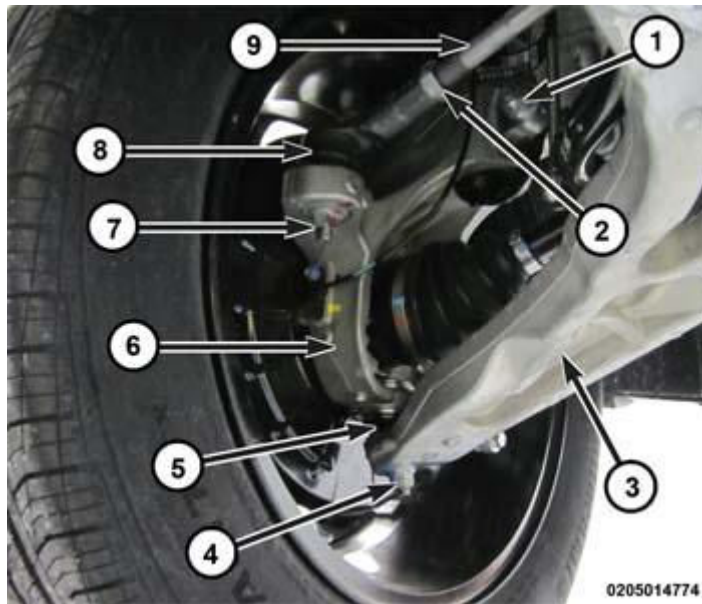


Fig. 21: Removing/Installing The Lower Ball Joint Nut To Control Arm
Courtesy of CHRYSLER GROUP, LLC

8. Remove the outer tie rod end (8) from the knuckle. Refer to **TIE ROD, STEERING, REMOVAL**.
9. Remove the ball joint to control arm retaining nut (4). **Discard the nut; it is not to be reused.**
10. Using (special tool #C-3894-A, Puller, Tie Rod) separate the ball joint stud from the control arm.

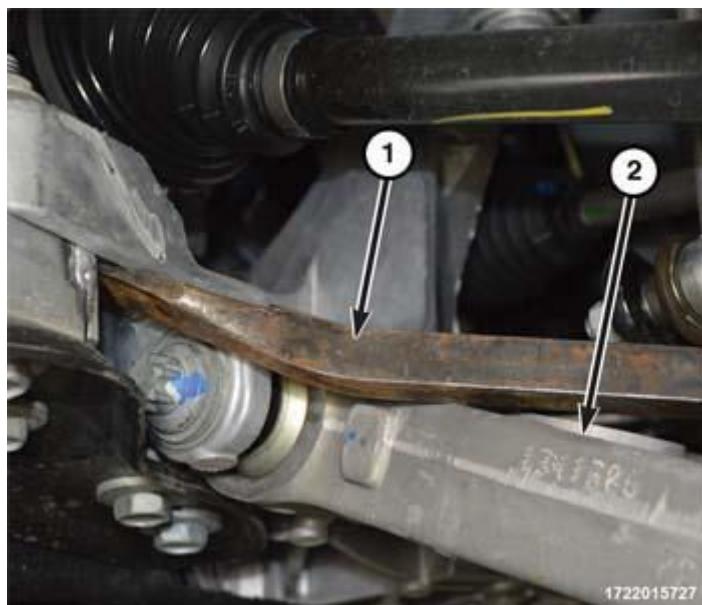
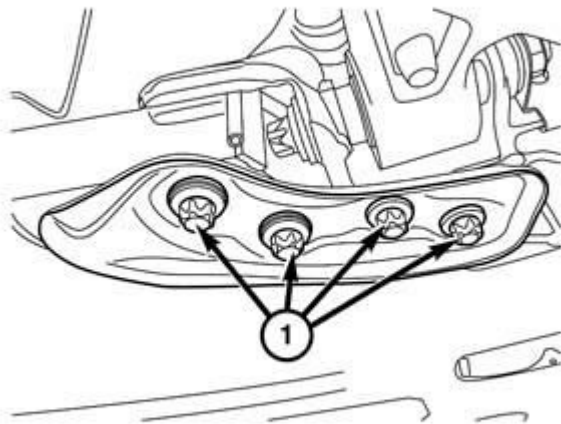


Fig. 22: Identifying Pry Bar & Control Arm
Courtesy of CHRYSLER GROUP, LLC

NOTE: Use care when separating the ball joint stud from the knuckle so the ball joint boot does not get cut

NOTE: After separating the control arm from the knuckle, do not let it swing rapidly back up, this can tear the ball joint dust boot.

11. Insert a pry bar (1) in the opening between the control arm front mounting bolt and the front fascia support beam.
12. Pry down on the control arm (2) until the ball joint stud is clear of the control arm, then push the knuckle assembly to the side when it is clear of the ball joint stud and slowly release the control arm.



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Fig. 23: Crossmember To Fascia Support Beams Bracket Retaining Bolts
Courtesy of CHRYSLER GROUP, LLC

13. Remove the four bracket retaining bolts (1) from the cross member to fascia support beams bracket, then remove the bracket.

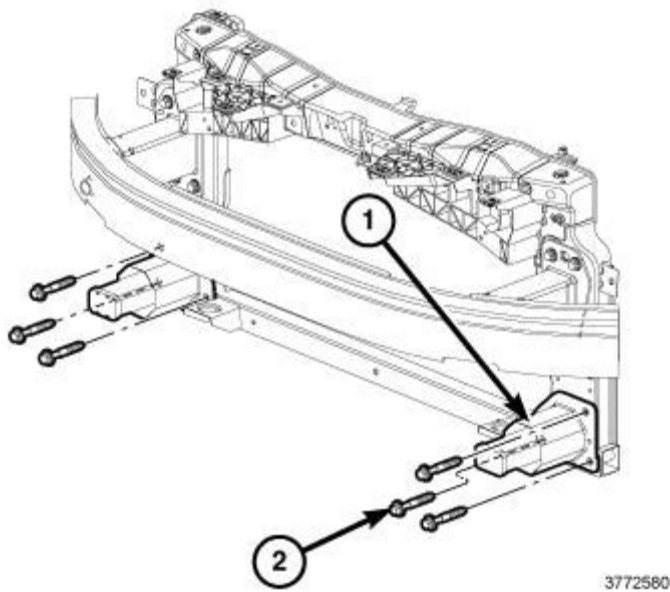


Fig. 24: Lower Bumper Reinforcements & Fasteners
Courtesy of CHRYSLER GROUP, LLC

14. Remove the fasteners (2) securing the lower bumper reinforcement (1) and front fascia support beams to the frame/front end module.

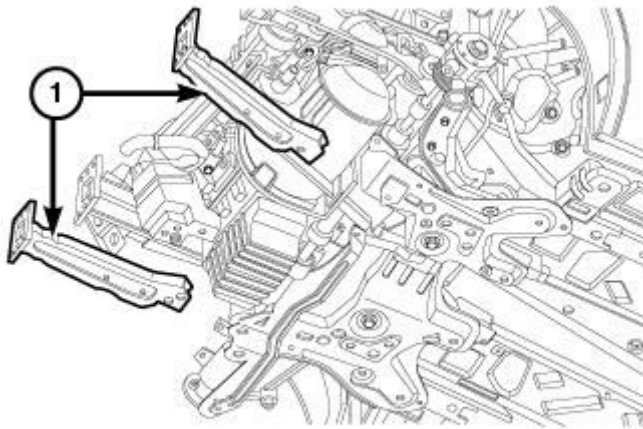
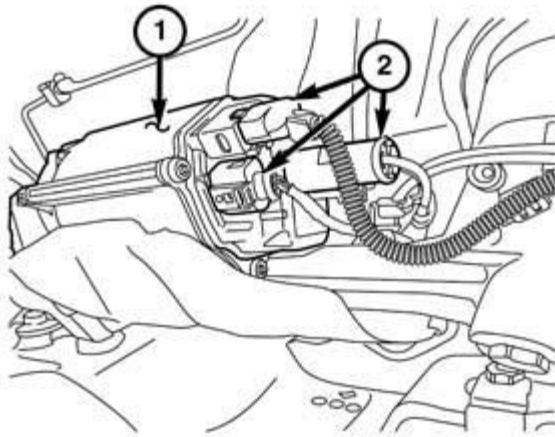


Fig. 25: Front Fascia Support Beams
Courtesy of CHRYSLER GROUP, LLC

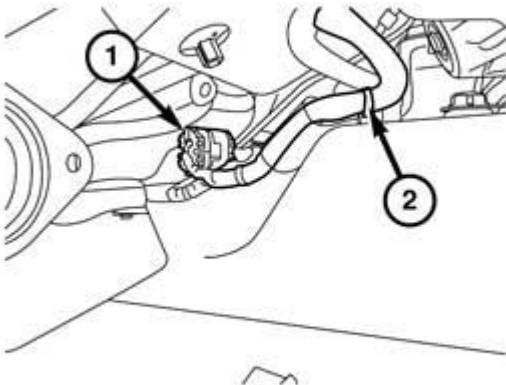
15. Remove the front fascia support beams.



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Fig. 26: Steering Gear Control Module & Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

16. Disconnect the downstream oxygen sensor harness connector.
17. Remove the exhaust extension pipe.
18. Disconnect the harness connectors (2) at the steering gear control module (1).



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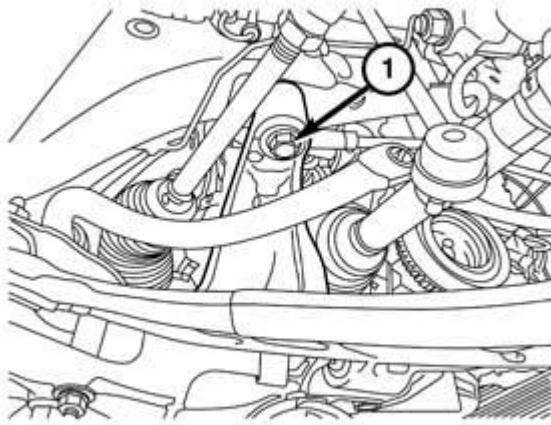
Fig. 27: Steering Gear Connector & Tie Strap

Courtesy of CHRYSLER GROUP, LLC

19. Disconnect the steering gear connector (1) from the body harness connector at the bottom of the dash panel.
20. Separate the steering gear harness from the crossmember by removing the tie strap (2) from the crossmember.
21. Remove the rear engine mount.

NOTE: Before lowering the front suspension crossmember, the location of the crossmember must be marked on the body of the vehicle. Do this so the crossmember can be relocated, upon reinstallation, against the body of vehicle in the same location as before removal. If the front suspension crossmember is not reinstalled in exactly the same location as before removal, the preset front wheel alignment settings (caster and camber) may be lost.

22. Mark the position of the cross member with a grease pencil or equivalent.

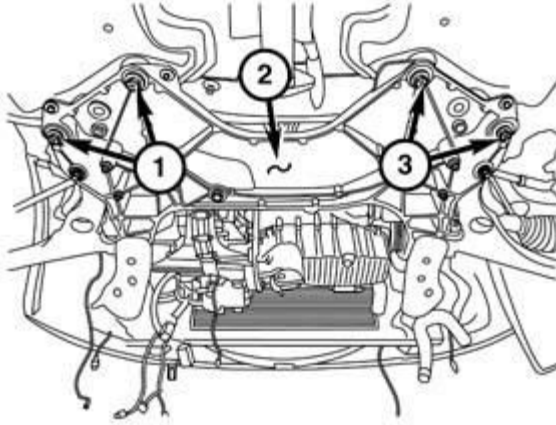


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Fig. 28: Upper Crossmember Mounting Bolt

Courtesy of CHRYSLER GROUP, LLC

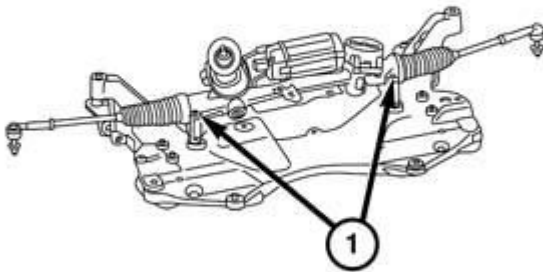
23. Support the crossmember with a transmission jack, or equivalent.
24. Remove the upper mounting bolt (1) from each side of the crossmember.



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Fig. 29: Crossmember Rear Mounting Bolts
Courtesy of CHRYSLER GROUP, LLC

25. Remove the four rear mounting bolts (1, 3) that secure the crossmember (2) to the vehicle
26. Slowly lower the crossmember with the jack and remove from the vehicle.



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Fig. 30: Steering Gear

Courtesy of CHRYSLER GROUP, LLC

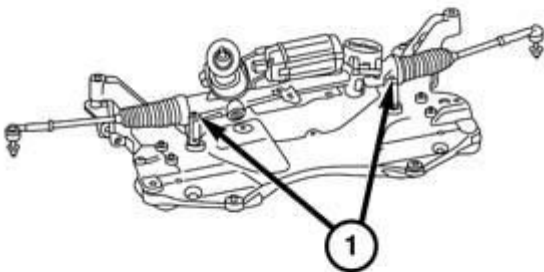
27. Remove the steering rack mounting fasteners (1) and remove the steering rack from the crossmember.

INSTALLATION

INSTALLATION

NOTE: Transfer the tie rod ends if they are being reused.

NOTE: If removed, install the power transfer unit Refer to INSTALLATION .

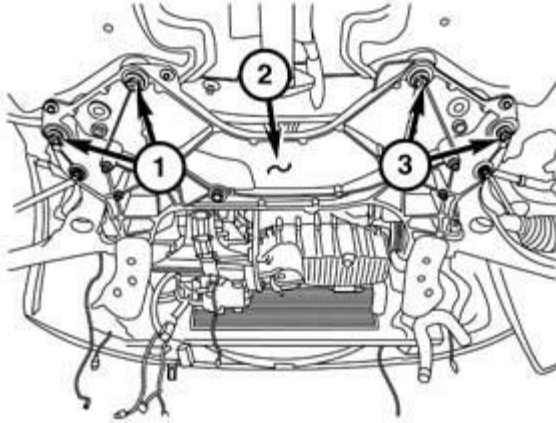


191069437

Fig. 31: Steering Gear

Courtesy of CHRYSLER GROUP, LLC

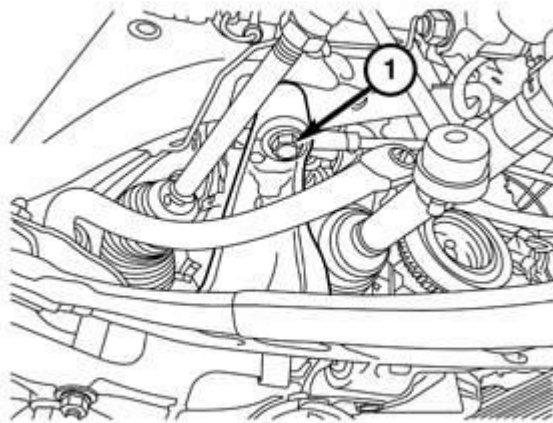
1. Install the steering gear to the crossmember.
2. Install the steering gear mounting bolts (1) and tighten to 115 N.m (85 ft. lbs.).



020568626

Fig. 32: Crossmember Rear Mounting Bolts
Courtesy of CHRYSLER GROUP, LLC

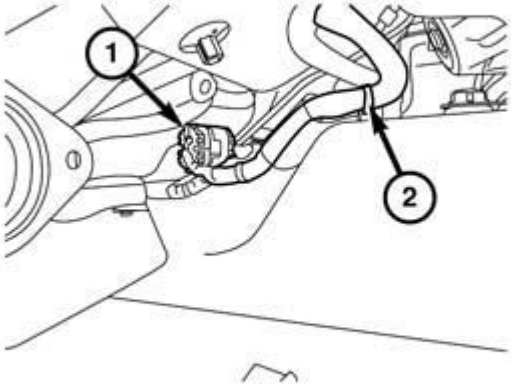
3. Slowly raise the crossmember (2) into mounted position using the transmission jack matching the crossmember to the marked locations on the body made during removal.
4. Install four mounting bolts (1, 3) and tighten to 126 N.m (93 ft. lbs.).



020568633

Fig. 33: Upper Crossmember Mounting Bolt
Courtesy of CHRYSLER GROUP, LLC

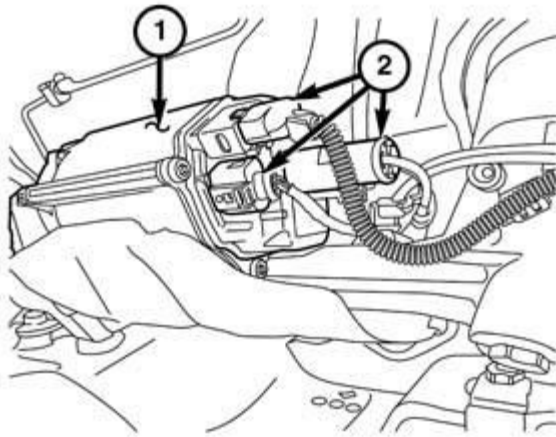
5. Install the upper mounting bolt (1) on each side of the crossmember and tighten to 120 N.m (86 ft. lbs.).



191069436

Fig. 34: Steering Gear Connector & Tie Strap
Courtesy of CHRYSLER GROUP, LLC

6. Connect the steering harness connector (1) to the body harness connector at the bottom of the dash panel.
7. Install the tie strap (2) to the crossmember.

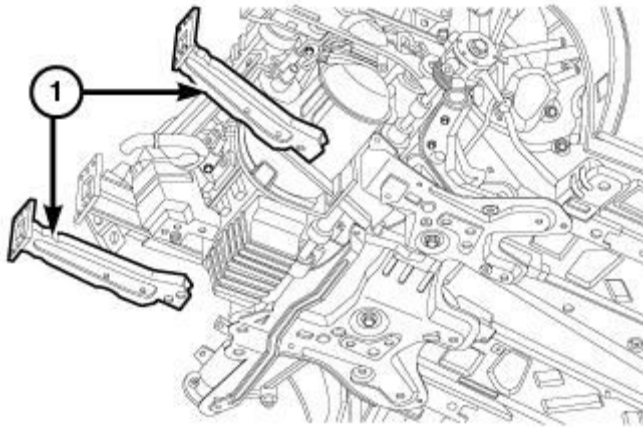


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Fig. 35: Steering Gear Control Module & Harness Connectors
Courtesy of CHRYSLER GROUP, LLC

8. Connect the harness connectors (2) at the steering gear module (1).
9. Install the rear engine mount. Refer to **INSULATOR, ENGINE MOUNT, RIGHT, INSTALLATION** for 2.0L Diesel, **INSULATOR, ENGINE MOUNT, LEFT, INSTALLATION** for 2.0L Diesel, **INSULATOR, ENGINE MOUNT, REAR, INSTALLATION** for 2.0L Diesel, **INSULATOR, ENGINE MOUNT, LEFT, INSTALLATION** for 2.4L, **INSULATOR, ENGINE MOUNT, REAR, INSTALLATION** for 2.4L, **INSULATOR, ENGINE MOUNT, RIGHT, INSTALLATION** for 2.4L, **INSULATOR, ENGINE MOUNT, LEFT, INSTALLATION** for 3.2L, **INSULATOR, ENGINE MOUNT, RIGHT, INSTALLATION** for 3.2L, **INSULATOR, ENGINE MOUNT, REAR, INSTALLATION** for 3.2L.
10. Install the exhaust extension pipe.
11. Connect the downstream oxygen sensor harness connector.

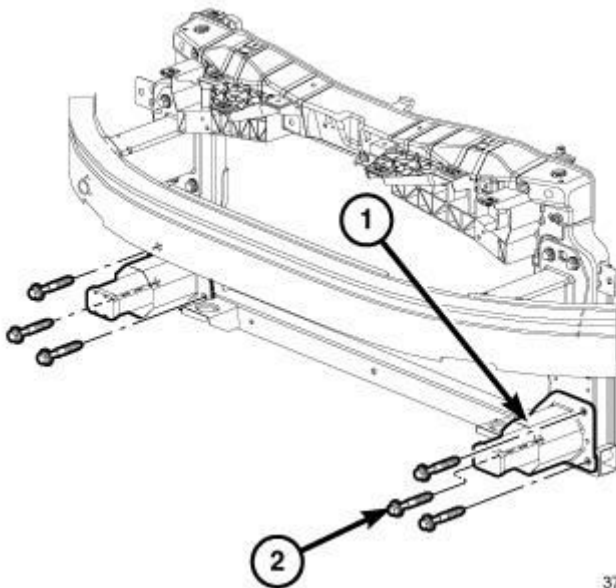
NOTE: Repeat STEP 12 through STEP 19 on each side of vehicle.



3140748

Fig. 36: Front Fascia Support Beams
Courtesy of CHRYSLER GROUP, LLC

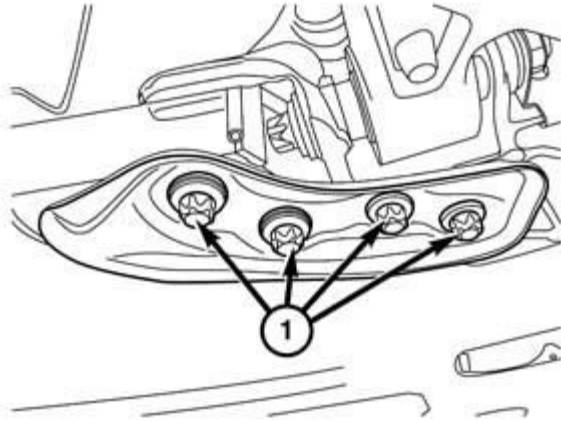
12. Install the front fascia beams (1).



3772580

Fig. 37: Lower Bumper Reinforcements & Fasteners
Courtesy of CHRYSLER GROUP, LLC

13. Install the fasteners (2) securing the lower bumper reinforcement (1) to the frame/front end module. Tighten the fasteners to 45 N.m (33 ft. lbs.).



020568625

Fig. 38: Crossmember To Fascia Support Beams Bracket Retaining Bolts
Courtesy of CHRYSLER GROUP, LLC

14. Install the crossmember to fascia support beam bracket and install the four retaining bolts (1) and tighten to 95 N.m (70 ft. lbs.).

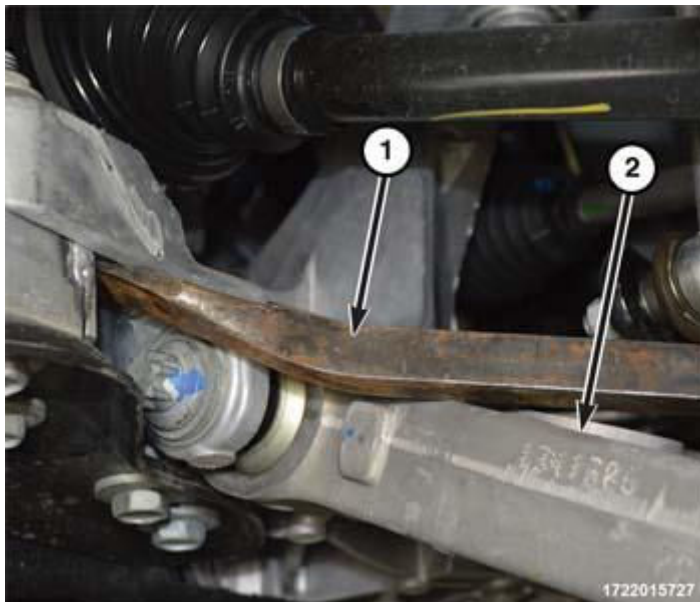


Fig. 39: Identifying Pry Bar & Control Arm
Courtesy of CHRYSLER GROUP, LLC

15. Insert a pry bar (1) in the opening between the control arm front mounting bolt and the front fascia

support beam.

16. Pry down on the control arm (2) until the ball joint stud is clear of the control arm, align the stud with hole in control arm then slowly release the control arm.

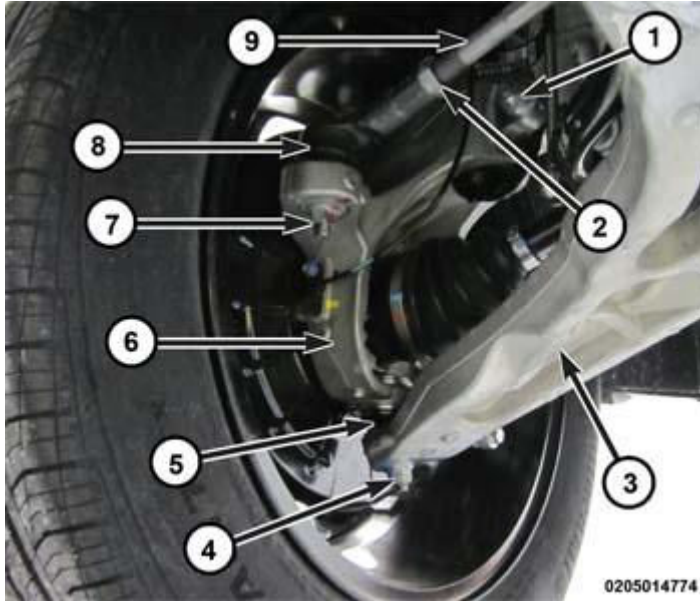
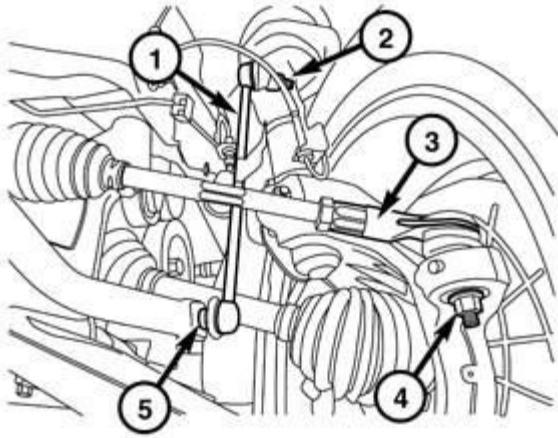


Fig. 40: Removing/Installing The Lower Ball Joint Nut To Control Arm
Courtesy of CHRYSLER GROUP, LLC

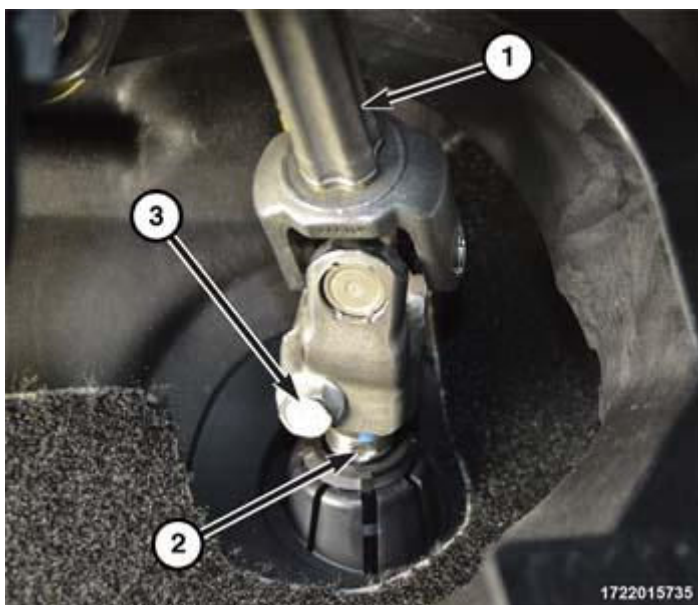
17. Install a **NEW** ball joint to control arm retaining nut (4) and tighten to 25 N.m plus 175° (18 ft. lbs. plus 175°).
18. Install the outer tie rod end (8) into the knuckle. Refer to **TIE ROD, STEERING, INSTALLATION**.



1715005812

Fig. 41: Identifying Steering Link, Outer Tie Rod End & Nuts
Courtesy of CHRYSLER GROUP, LLC

19. Install the stabilizer link stud into the stabilizer bar. Refer to **LINK, STABILIZER BAR, INSTALLATION** .
20. Install the engine belly pan. Refer to **BELLY PAN, INSTALLATION** .
21. Install the tire and wheel assembly. Refer to **INSTALLATION** .
22. Lower the vehicle.



1722015735

Fig. 42: Identifying Intermediate Shaft, Pinch Bolt And Steering Gear Pinion Shaft

Courtesy of CHRYSLER GROUP, LLC

NOTE: The intermediate shaft has a block teeth design and can only be installed in the correct direction. Do not force the shaft onto the pinion shaft.

23. Install the intermediate shaft (1) to the steering gear pinion shaft (2).
24. Install a **NEW** pinch bolt (3) and tighten to 30 N-m (22 ft. lbs.).
25. Remove the steering wheel holder.
26. Connect the battery negative cable.
27. If a **NEW** steering gear is installed, programming is required. Refer to **STANDARD PROCEDURE** .

TIE ROD, STEERING

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - TIE ROD

Tie rod free-play can be measured using the following hand methods:

OUTER TIE ROD

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove the front wheels. Refer to **REMOVAL** .
3. Install two standard wheel mounting nuts, flat side to rotor, diagonally opposite to each on the rotor.

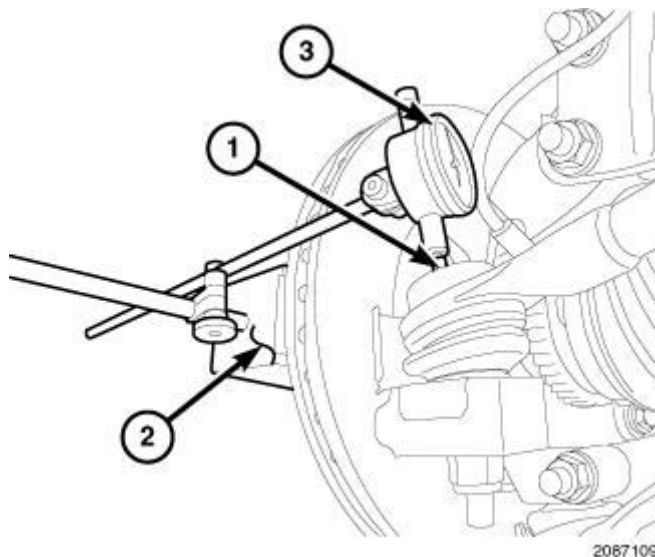
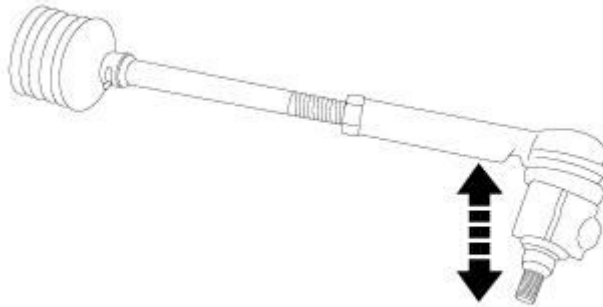


Fig. 43: Magnetic Dial Indicator (2)
Courtesy of CHRYSLER GROUP, LLC

4. Attach a magnetic dial indicator (2) to the inside or outside of the brake rotor, then align the dial indicator's contact pointer (1) with the direction of the stud axis and touch the outer tie rod.

5. Zero the dial indicator. (3)



2094103

Fig. 44: Checking Outer Tie Rod Free-Play
Courtesy of CHRYSLER GROUP, LLC

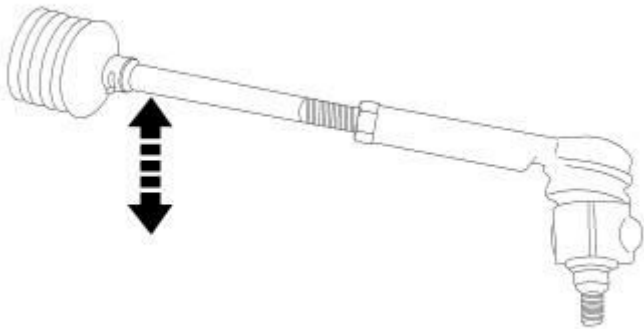
NOTE: When checking free-play, **DO NOT** rotate the tie rod. Just because a tie rod rotates easily does not mean that it is necessarily faulty. Using more than light hand pressure will result in a false reading.

6. Grasp the outer tie rod near the ball stud and attempt to move the tie rod straight up and down using light hand pressure. (Less than 10 lbs. of force.)
7. Measure and record any tie rod free-play movement.
8. Remove the magnetic dial indicator.
9. Remove the standard wheel mounting nuts from the two studs.

If the free-play in the tie rod exceeds 0.05 mm (.002 in.), replace the outer tie rod. Refer to **TIE ROD, STEERING, REMOVAL**. If the free-play is less than 0.05 mm (.002 in.) at the outer tie rod check the inner tie rod for free-play. Refer to the following procedure.

INNER TIE ROD

NOTE: Always check and repair (if necessary) outer tie rod free-play before checking inner tie rod free-play. False results can otherwise be obtained.



81896138

Fig. 45: Checking Inner Tie Rod Free-Play
Courtesy of CHRYSLER GROUP, LLC

1. Grasp the inner tie rod near the steering gear bellows and attempt to move the tie rod straight up and down. If any free-play is felt, replace the inner tie rod. Refer to **TIE ROD, STEERING, REMOVAL**.
2. If no free-play is felt, install the front wheels. Refer to **INSTALLATION**.
3. Remove support and lower the vehicle.

REMOVAL

OUTER TIE ROD END

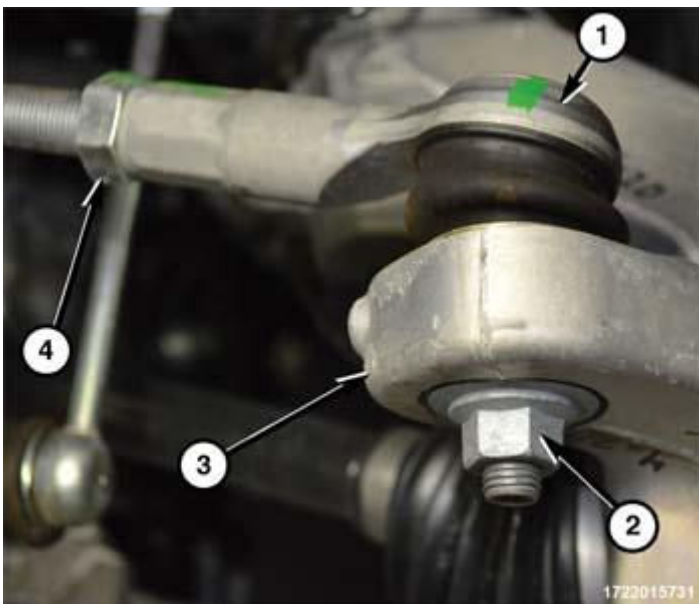


Fig. 46: Identifying Tie Rod End, Jam Nut, Knuckle & Nut
Courtesy of CHRYSLER GROUP, LLC

NOTE: When unscrewing the outer tie rod from inner, count the number of revolutions to take it off. This action will aid in installation, getting the toe close to where it needs to be when setting the wheel alignment.

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove the front wheel mounting bolts and remove the front wheel.
3. Loosen the jam nut (4) from the tie rod end (1).
4. Remove the retaining nut (2) from the outer tie rod end (1).

Discard the nut; it is not to be reused.

5. Separate the outer tie rod end (1) from the knuckle (3) using (special tool #C-3894-A, Puller, Tie Rod) and remove from the inner tie rod.

INNER TIE ROD

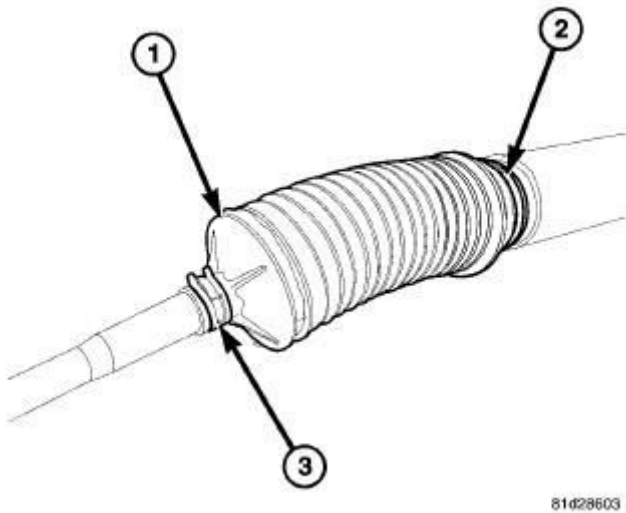


Fig. 47: Bellows Clamps

Courtesy of CHRYSLER GROUP, LLC

1. Remove the outer tie rod. Refer to **TIE ROD, STEERING, REMOVAL**.
2. Remove the tie rod jam nut from the inner tie rod.
3. Remove the clamp (2) securing the bellows (1) to the steering gear body.
4. Remove the clamp (3) from the small end of the bellows and remove the bellows (1) from the gear.

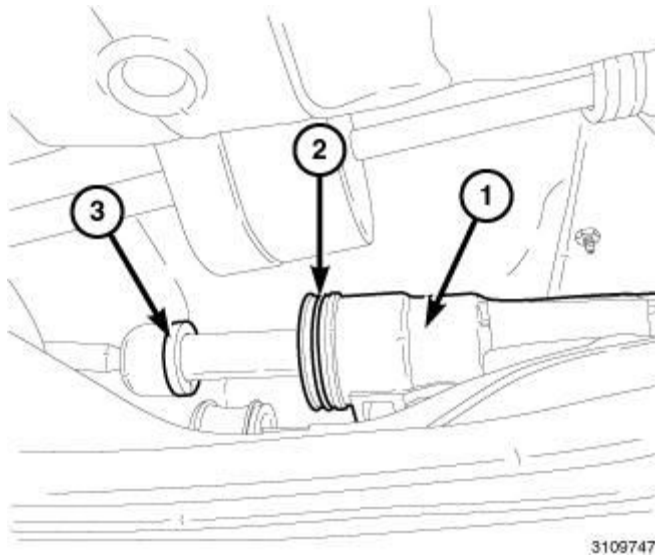


Fig. 48: Travel Restrictor, O Ring & Steering Gear
Courtesy of CHRYSLER GROUP, LLC

CAUTION: If the inner tie rod cannot be removed using the specified tools, do not use a hammer or heat to loosen. Damage to the steering gear will occur. Replace the entire steering gear.

5. Install an appropriate inner tie rod removal tool on the flats of the inner tie rod.
6. Unthread and remove the inner tie rod from the steering gear (1).
7. Inspect the inner portion of the gear for corrosion, contamination, and damage. If any is found, replace the steering gear.

INSTALLATION

OUTER TIE ROD END

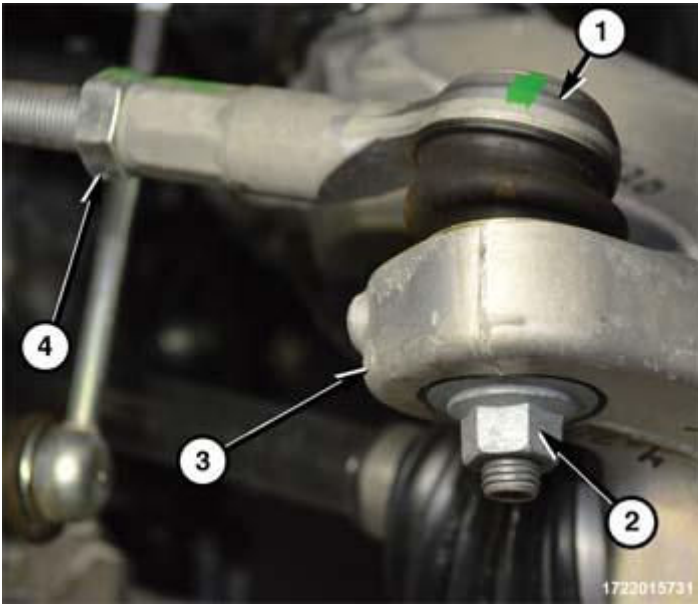


Fig. 49: Identifying Tie Rod End, Jam Nut, Knuckle & Nut
Courtesy of CHRYSLER GROUP, LLC

1. If it is not already installed, install the jam nut (4) on the inner tie rod threads.
2. Thread the outer tie rod (1) onto the inner tie rod approximately the same amount of revolutions as the original was installed.
3. Thread the jam nut (4) down the inner tie rod far enough to hold the outer tie rod. Do not tighten the jam nut at this time.
4. Install the outer tie rod end (1) stud into the hole in the knuckle arm (3). Start a **NEW** tie rod retaining nut (2) on the stud. While holding the tie rod end stud with a wrench, tighten the nut (2) to 30 N.m Plus 90° (22 ft. lbs. Plus 90°).
5. Install the tire and wheel assembly. Refer to **INSTALLATION** .
6. Adjust the front wheel toe setting. Refer to **WHEEL ALIGNMENT, STANDARD PROCEDURE** .
7. Tighten the tie rod jam nut (4) to 70 N.m (52 ft. lbs.) once wheel toe is set.
8. Lower the vehicle.

INNER TIE ROD

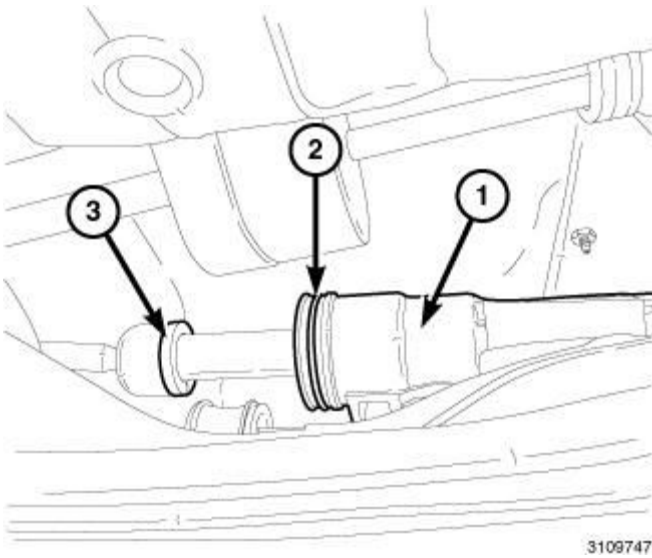


Fig. 50: Travel Restrictor, O Ring & Steering Gear
Courtesy of CHRYSLER GROUP, LLC

1. Apply Mopar® Lock AND Seal Adhesive or equivalent medium thread locker adhesive to the inboard end threads of the inner tie rod.
2. Install the inner tie rod onto the gear (1) using an appropriate inner tie rod installation tool on the flats. Tighten the inner tie rod to 110 N.m. (81 ft. lbs.).

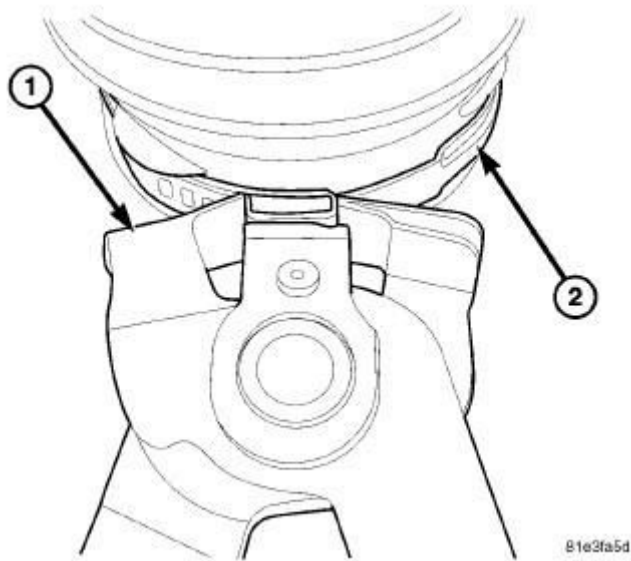


Fig. 51: Crimping Pliers On Bellows Clamp
Courtesy of CHRYSLER GROUP, LLC

3. Loosely place a NEW clamp over the large end of the NEW bellows.
4. Using crimping pliers (1), crimp the large clamp (2) securing the bellows to the gear body.

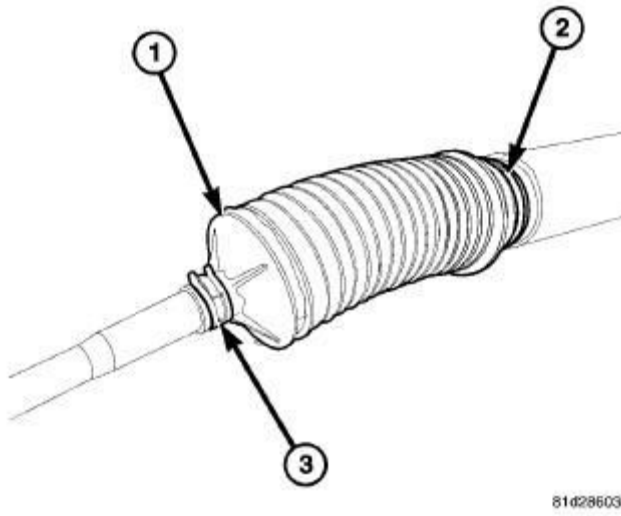


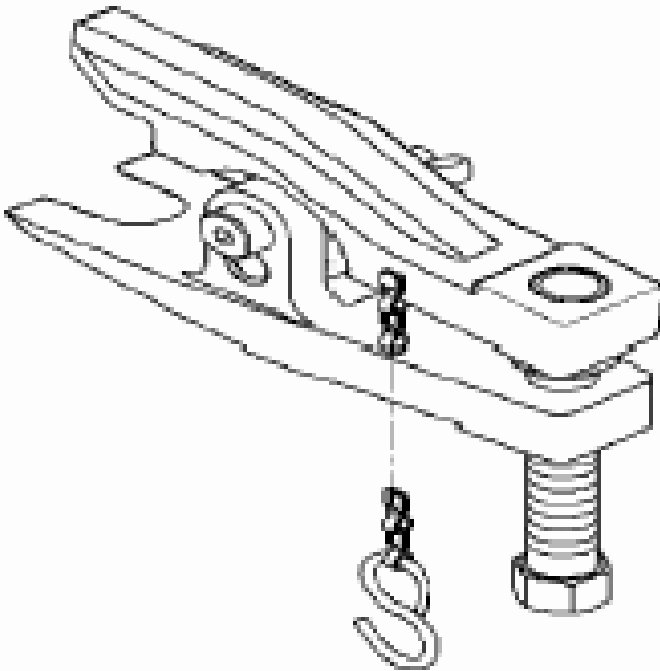
Fig. 52: Bellows Clamps

Courtesy of CHRYSLER GROUP, LLC

5. Install small end of bellows into groove and secure with clip (3).
6. Thread the tie rod jam nut onto the inner tie rod far enough to install the outer tie rod.
7. Install the outer tie rod. Refer to **TIE ROD, STEERING, INSTALLATION**.

2014 SUSPENSION**Front Suspension & Wheel Alignment - Cherokee****STANDARD PROCEDURE****STANDARD PROCEDURE - LUBRICATION**

There are no serviceable lubrication points on the front or rear suspension. The ball joints and tie rod ends are sealed for life and require no maintenance.

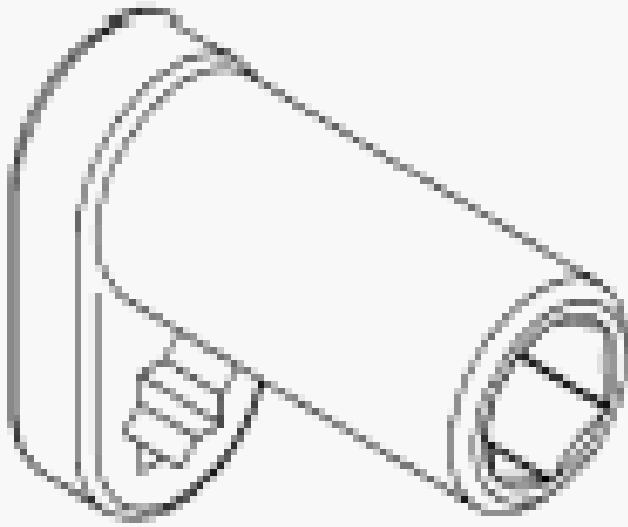
SPECIAL TOOLS**SPECIAL TOOLS**

9360 - Remover, Ball Joint
(Originally Shipped In Kit Number(s)
9329, 9515, 9516, 9516-CAN, 9517,
9517-CAN, 9518, 9519, 9540, 9541.)

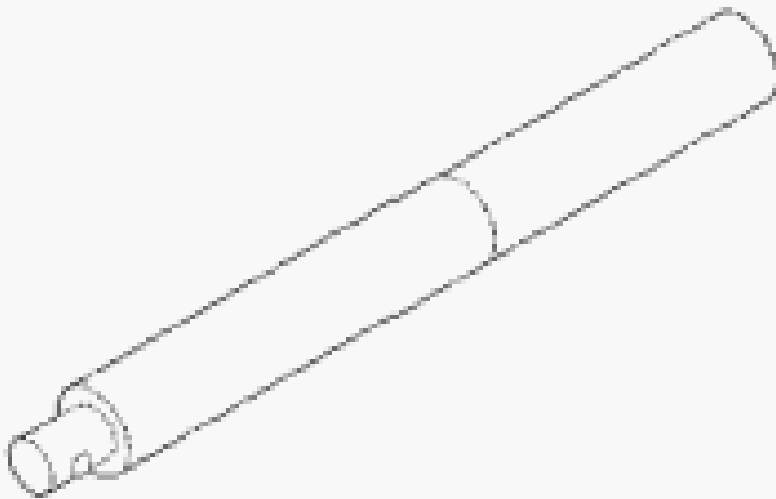
9362 - Wrench, Strut Nut
(Originally Shipped In Kit Number(s)
9329, 9515, 9516, 9516-CAN, 9517,

2014 Jeep Cherokee Trailhawk

2014 SUSPENSION Front Suspension & Wheel Alignment - Cherokee

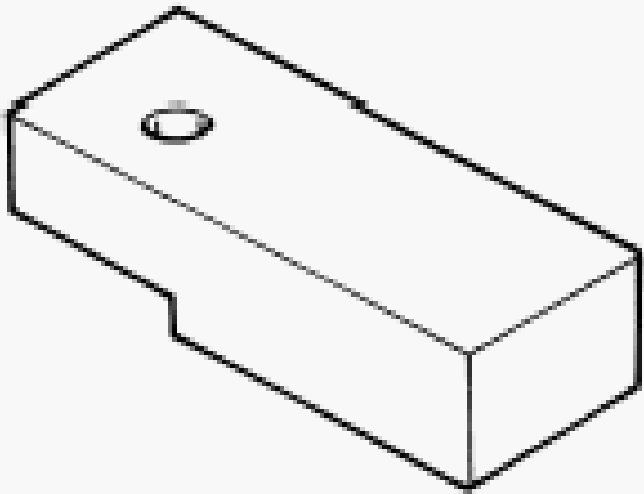


9517-CAN, 9518, 9519, 9540, 9541.)



C-3339A - Set, Dial Indicator
(Originally Shipped In Kit Number(s)
9202.)

C-3894-A - Puller, Tie Rod
(Originally Shipped In Kit Number(s)



9202, 9202A-CAN, 9202CC, 9299,
9299CC, 9299CC, 9300A-CAN.)

FRONT

WARNING

WARNING

WARNING: Chrysler does not manufacture any vehicles or replacement parts that contain asbestos. Aftermarket products may or may not contain asbestos. Refer to aftermarket product packaging for product information.

Whether the product contains asbestos or not, dust and dirt can accumulate on brake parts during normal use. Follow practices prescribed by appropriate regulations for the handling, processing and disposing of dust and debris.

WARNING: Do not remove the strut rod nut while strut assembly is installed in vehicle, or before the coil spring is compressed with a compression tool. The spring is held under high pressure.

CAUTION: At no time when servicing a vehicle can a sheet metal screw, bolt, or other metal fastener be installed in the shock tower to take the place of an original plastic clip. It may come into contact with the strut or coil spring.

CAUTION: Wheel bearing damage will result if after loosening the axle hub nut, the vehicle is rolled on the ground or the weight of the vehicle is allowed to be

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supported by the tires for any length of time.

SPECIFICATIONS**SPECIFICATIONS****SPECIFICATIONS**

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Brake Shield	8	-	71
Hub and Bearing to Knuckle Mounting Bolts	95	70	-
Hub Nut	200	148	-
Lower Ball Joint to Control Arm Nut	25 plus 175°	18 plus 175°	-
Lower Control Arm Front Horizontal Pivot Bolt	100 Plus 135°	74 Plus 135°	-
Lower Control Arm Rear Vertical Bolt	75 Plus 90°	55 Plus 90°	-
Stabilizer Bar to Cross-member Mounting Bolts	50	37	-
Stabilizer Bar Link to Stabilizer Bar	55	41	-
Stabilizer Bar Link to Strut	55	41	-
Strut-to-Knuckle Lower Retaining Bolt	110	81	-
Suspension Cross-member to Front Support Beams Bracket	95	70	-
Suspension Cross-member Mounting Bolts	126	93	-
Suspension Cross-member Mounting Bolts - Above Control Arms	120	89	-
Tie Rod Adjuster Jam Nut	80	59	-
Tie Rod End Knuckle Nut	30 Plus 90°	22 Plus 90°	-
Wheel Mounting (Lug) Bolts - Aluminum	130	96	-

ARM, LOWER CONTROL**DIAGNOSIS AND TESTING****DIAGNOSIS AND TESTING - LOWER CONTROL ARM**

Inspect the lower control arm for signs of damage from contact with the ground or road debris. If the lower control arm shows any sign of damage, look for distortion. Do not attempt to repair or straighten a broken or bent lower control arm. If damaged, the lower control arm is serviced only as a complete component.

Inspect both lower control arm isolator bushings for severe deterioration and replace the lower control arm as required.

REMOVAL**REMOVAL**

NOTE: Before proceeding, refer to **FRONT, WARNING**.

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove the wheel mounting bolts and the tire and wheel assembly.



Fig. 1: Identifying Lower Ball Joint Nut
Courtesy of CHRYSLER GROUP, LLC

3. Remove and discard the lower ball joint nut (1).
4. Using (special tool #C-3894-A, Puller, Tie Rod), separate the lower ball joint stud from the control arm.

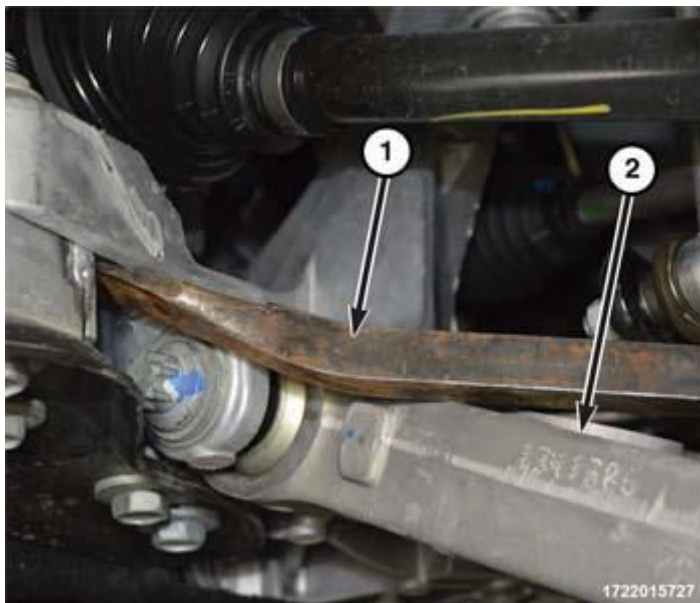


Fig. 2: Identifying Pry Bar & Control Arm

Courtesy of CHRYSLER GROUP, LLC

NOTE: Make sure the ball joint boot does not get cut when separating the ball joint stud from the control arm.

NOTE: After separating the control arm from the knuckle, do not let it swing rapidly back up. This can tear the ball joint dust boot.

5. Insert a pry bar (1) in the opening between the control arm front mounting bolt and the front fascia support beam.
6. Pry down on the control arm (2) until the ball joint stud is clear of the control arm, then push the knuckle assembly to the side when it is clear of the ball joint stud and slowly release the control arm.
7. Remove the Lower Load Beam. Refer to **REMOVAL** .

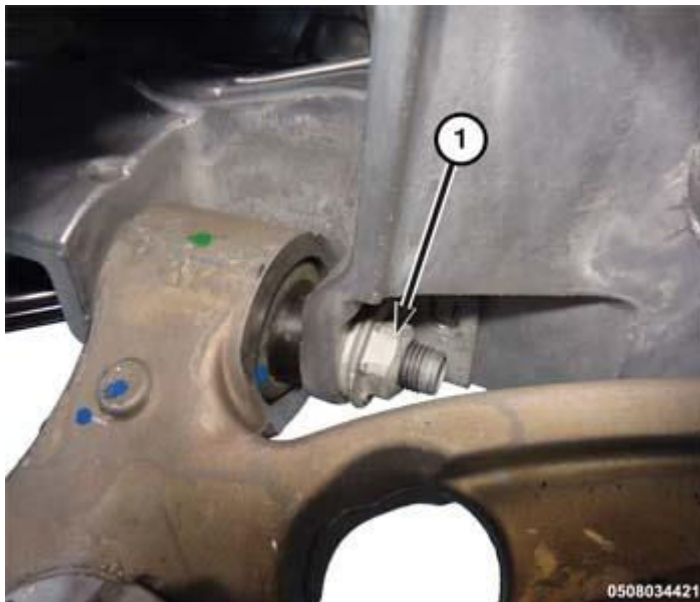


Fig. 3: Identifying Front Lower Control Arm Nut
Courtesy of CHRYSLER GROUP, LLC

8. Remove and discard the front lower control arm nut (1). Then remove the bolt attaching the lower control arm to the front suspension crossmember.



Fig. 4: Identifying Rear Lower Control Arm Nut
Courtesy of CHRYSLER GROUP, LLC

9. Remove and discard the rear lower control arm nut (1). Then remove the lower control arm bolt.
10. Remove the lower control arm from the crossmember.

INSTALLATION

INSTALLATION

1. Position the lower control arm in the front suspension crossmember.



Fig. 5: Identifying Rear Lower Control Arm Nut

Courtesy of CHRYSLER GROUP, LLC

2. Install a **NEW** rear lower control arm bolt and a **NEW** rear lower control arm nut (1). Do not tighten to specification at this time.

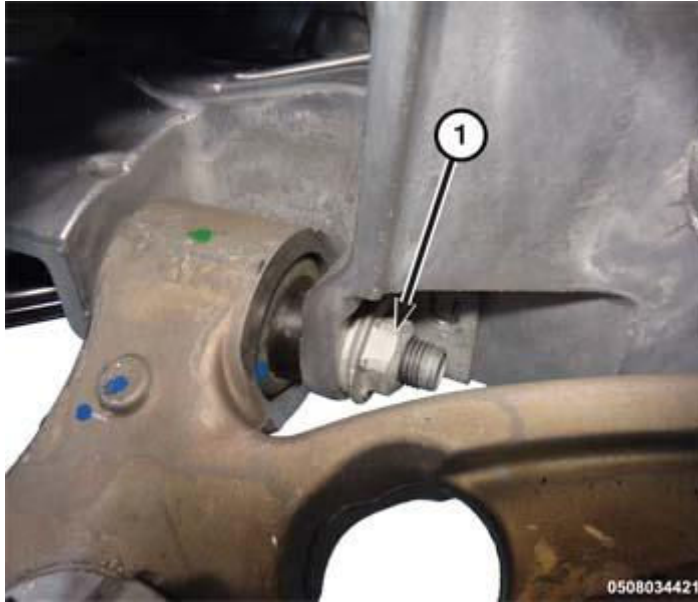


Fig. 6: Identifying Front Lower Control Arm Nut
Courtesy of CHRYSLER GROUP, LLC

3. Install a **NEW** front lower control arm bolt and a **NEW** front lower control arm nut (1). Do not tighten to specification at this time.

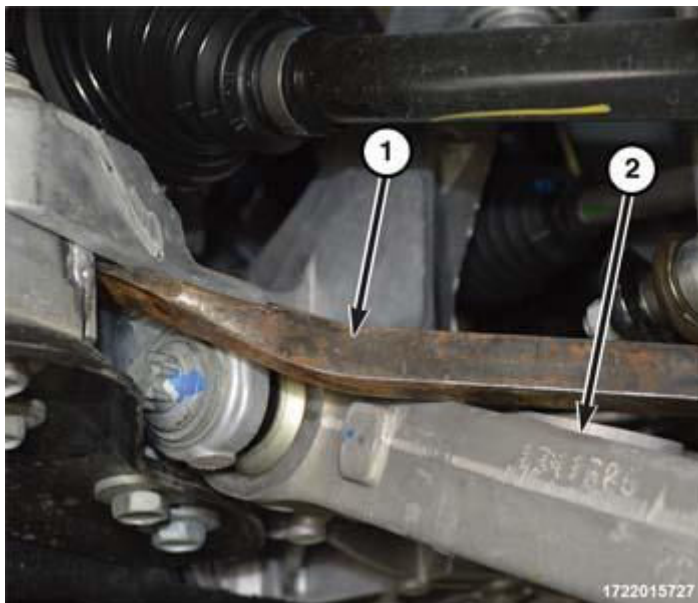
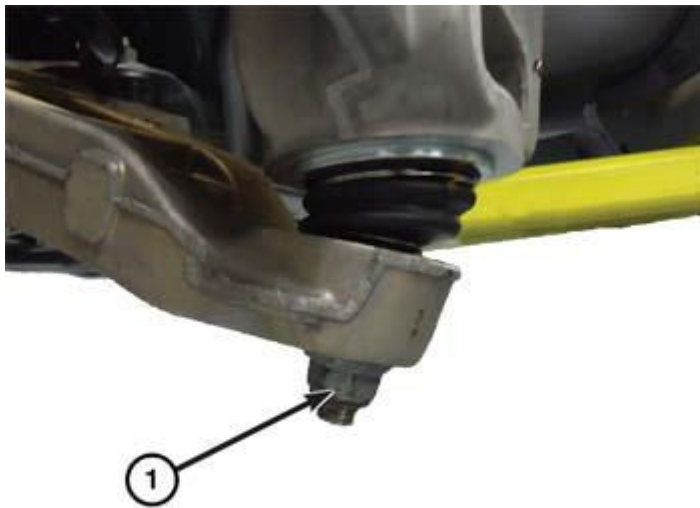


Fig. 7: Identifying Pry Bar & Control Arm
Courtesy of CHRYSLER GROUP, LLC

4. Insert a pry bar (1) in the opening between the control arm front mounting bolt and the front fascia support beam.
5. Pry down on the control arm (2) until the ball joint stud is clear of the control arm, align the stud with hole in control arm then slowly release the control arm.
6. Lower the vehicle and install a floor jack under the control arm. Raise the jack until the lower control arm is at ride height. Tighten the bolts:
 - Front lower control arm bolt: 100 N.m Plus 135° (74 ft. lbs. Plus 135°).
 - Rear lower control arm bolt: 75 N.m Plus 90° (55 ft. lbs Plus 90°).
7. Raise the vehicle back up to the original position.
8. Install the Lower Load Beam. Refer to **LOAD BEAM, LOWER, INSTALLATION** .



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Fig. 8: Identifying Lower Ball Joint Nut
Courtesy of CHRYSLER GROUP, LLC

9. Install a **NEW** ball joint nut (1) and tighten to 25 N.m plus 175° (18 ft. lbs. plus 175°).
10. Install the wheel and tire assembly. Refer to **INSTALLATION** .
11. Lower the vehicle.

BALL JOINT, SUSPENSION, LOWER

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - LOWER BALL JOINT

1. Raise the vehicle allowing the front suspension to hang.
2. Remove the tire and wheel assembly.
3. Using Dial Indicator (special tool #C-3339A, Set, Dial Indicator), or equivalent, attach the dial indicator

mount to the knuckle and align the dial indicator's plunger with the direction of the stud axis, touching the end of the ball joint stud in the lower control arm.

4. Push up on the lower control arm and zero the dial indicator.

NOTE: **Use care when applying load to the knuckle as to avoid damaging the ball joint seal boot.**

5. From the front of the vehicle, insert a pry bar between the knuckle and lower control arm, resting it on the lower control arm. Use lever principle to push the knuckle up from the lower control arm. Apply the load until the needle of the dial indicator no longer moves.
6. Record the ball joint movement. The end play is acceptable if no more than 1.0 mm (0.039 in.) of end play is achieved back-to-back.
7. Perform this procedure on each side of the vehicle as necessary.

HUB AND BEARING

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - HUB AND BEARING - NOISE

NOTE: **The wheel bearing is designed to last for the life of the vehicle and requires no type of periodic maintenance.**

Bearings will produce noise if worn or damaged. The noise will generally change when the bearings are loaded. A road test of the vehicle is normally required to determine if there is a bearing noise, or if it may be some other component, and to assist in finding the location. The following procedure, together with the **DIAGNOSTIC CHART**, should help determine the proper cause. Note that if a particular vehicle road test maneuver, steering to the right for instance, results in noise only part of the time, it is not likely a faulty bearing. Bearing noises are not typically intermittent.

NOTE: **Damaged bearing seals and the resulting excessive grease loss may also require bearing replacement. Moderate grease seepage from the bearing is considered normal and should not require replacement of the wheel bearing. Wheel bearings are designed to last the life of the vehicle and require no type of periodic maintenance. To diagnose the hub, measure hub runout. Refer to ROTOR, BRAKE, DIAGNOSIS AND TESTING.**

DIAGNOSTIC PROCEDURE:

1. Perform drive evaluation. Find a smooth level road surface void of traffic or obstructions. Turn off any accessories which may cause background noise. Evaluate for noise at 50 km/h (30 mph) and 100 km/h (60 mph) and with vehicle in neutral to eliminate potential drivetrain noises. With vehicle at a constant speed, steer back and forth to left and right (approximately 45 degree steering input each way). This will load and unload the bearings and may change the noise level. When bearing damage is slight, the noise is sometimes noticeable at lower speeds and at other times is more noticeable at higher speeds.

2. Drive evaluation results: Noise increase when turning right may indicate a problem with the left bearing. Noise increase when turning left may indicate a problem with the right bearing.
3. Put vehicle up on hoist. Grab the tire by pushing in on the top center and pulling out on the bottom center to check for excessive movement in the bearing.
4. Check for potential rubbing on rotating components, such as rotor splash shields, heat shields touching propshaft or halfshaft, wheel well liners contacting tire, wheel cover on wheel, etc. Any cyclic noise (once per wheel revolution for example) is not likely a wheel bearing fault.
5. Remove the wheel and tire assembly, disc brake caliper and brake rotor. Refer to **ROTOR, BRAKE, DIAGNOSIS AND TESTING**.
6. Rotate the wheel hub, checking for resistance or roughness.
7. Any roughness or resistance to rotation may indicate dirt intrusion or a failed hub bearing. If the bearing exhibits any of these conditions, the hub & bearing will require replacement. Do not attempt to disassemble the bearing for repair.
8. Rotate the wheel hub, utilize Chassis Ears (or equivalent) to check for noise.
9. If none of the above checks indicate a bearing failure, refer to the **DIAGNOSTIC CHART** for other possible causes.

DIAGNOSTIC CHART - HUB & BEARING

CONDITION	POSSIBLE CAUSES	POTENTIAL CORRECTIONS
FRONT END WHINE ON TURNS	1. Low Power Steering Fluid Level (if applicable) 2. Worn Tires and/or Incorrect Wheel Alignment 3. Defective Wheel Bearing 4. Wrong Power Steering Fluid (if applicable)	1. Fill power steering fluid reservoir to proper level, check for leaks (make sure all air is bled from system fluid) 2. Replace Tires, Check And Reset Wheel Alignment 3. Replace Wheel Bearing 4. Replace With Correct Power Steering Fluid
FRONT END GROWL OR GRINDING ON TURNS	1. Loose Wheel Lug Nuts 2. Engine Mount Grounding Against Frame Or Body Of Vehicle 3. Worn Tires and/or Incorrect Wheel Alignment 4. Defective Wheel Bearing 5. Worn or Broken C/V Joint 6. Engine Not Centered, Causing Axle Half Shaft to Bottom Out	1. Verify Wheel Lug Nut Torque 2. Check For Engine Mount Hitting Frame Rail And Reposition Engine As Required 3. Replace Tires, Check and Reset Wheel Alignment 4. Replace Wheel Bearing 5. Replace C/V Joint 6. Center the Engine

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POPPING/CLICKING/SNAPPING DURING ACCELERATION AFTER DRIVE-TO-REVERSE SHIFT, REVERSE-TO-DRIVE SHIFT OR WHILE TURNING	1. Insufficient Hub Nut Torque 2. Insufficient Grease on Mating Surface of Axle Half Shaft Outer C/V Joint to Wheel Hub/Bearing, or Worn/Damaged Gasket	1. Torque Hub Nut to Spec 2. Separate Half Shaft From Hub and Bearing and Wipe Mating Surfaces Clean. Apply Light Coating of Wheel Bearing Grease to C/V Joint Surface and Reassemble, or Replace Gasket. Torque Hub Nut to Spec
WHINE/HUM/ROAR WITH VEHICLE GOING STRAIGHT AT A CONSTANT SPEED	1. Worn Tires and/or Incorrect Wheel Alignment 2. Defective Wheel Bearing	1. Replace Tires and Reset Wheel Alignment 2. Replace Wheel Bearing
GROWL OR GRINDING WITH VEHICLE GOING STRAIGHT AT A CONSTANT SPEED	1. Engine Mount Grinding Against Frame or Body 2. Defective Wheel Bearing 3. Worn or Broken C/V Joint	1. Check and Reposition Engine as Required 2. Replace Wheel Bearing 3. Replace C/V Joint

REMOVAL

REMOVAL

NOTE: Before proceeding, review all Warnings and Cautions. Refer to **FRONT, WARNING.**

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove the wheel mounting bolts and the tire and wheel assembly.

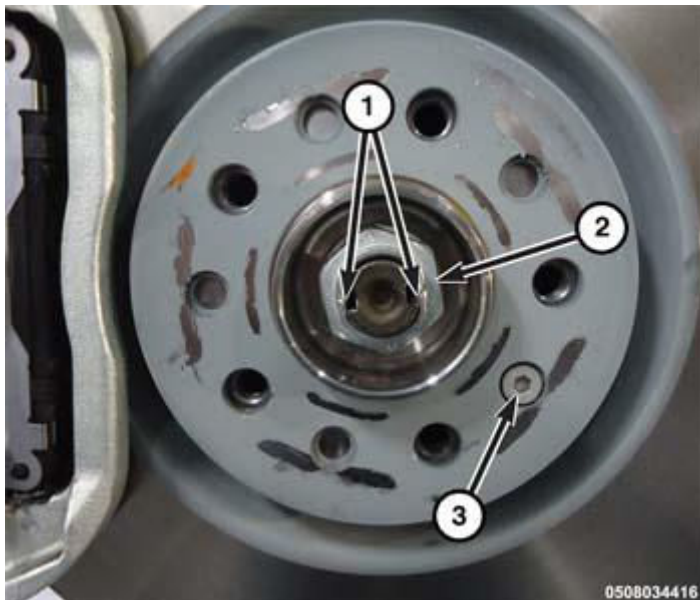


Fig. 9: Identifying Staked Areas, Hub Nut & Rotor Bolt
Courtesy of CHRYSLER GROUP, LLC

3. Using a suitable punch, lift the two staked areas (1) in the hub nut. Use care not to damage the half-shaft.
4. While a helper applies the brakes to keep the hub from rotating, remove the hub nut (2) and discard it. Remove the rotor bolt (3). **Do not reuse hub nut.**
5. Remove the front brake rotor. Refer to **ROTOR, BRAKE, REMOVAL** .
6. Remove the four hub and bearing bolts.

NOTE: **The bolts are one time use. Discard the bolts.**

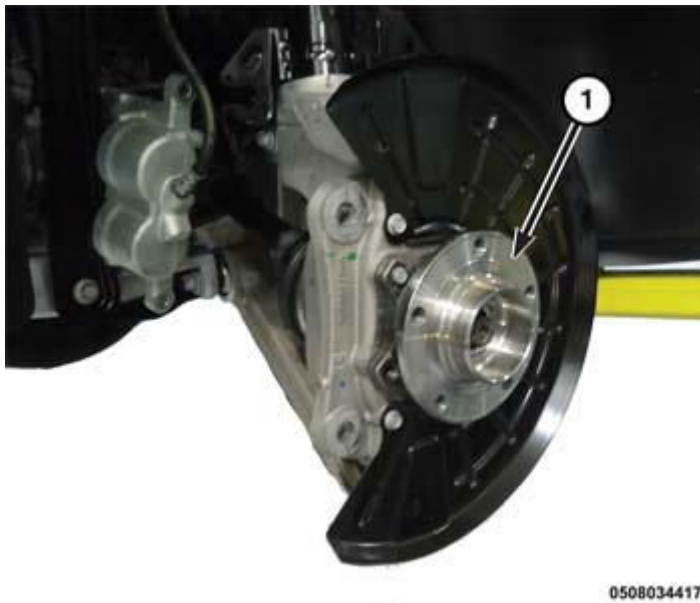


Fig. 10: Identifying Hub & Bearing
Courtesy of CHRYSLER GROUP, LLC

7. Slide the hub and bearing (1) off the half shaft and out of the knuckle.

INSTALLATION

INSTALLATION



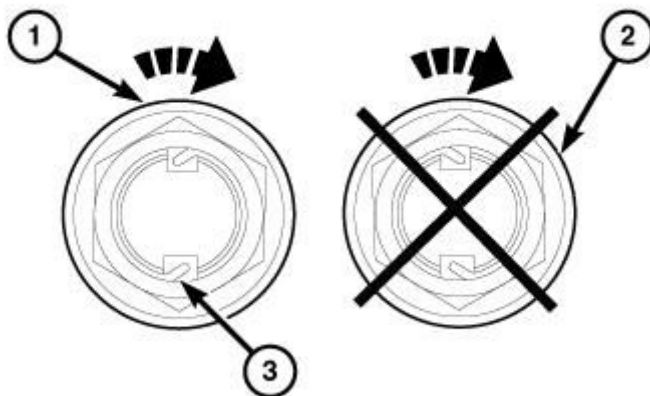
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Fig. 11: Identifying Hub & Bearing

Courtesy of CHRYSLER GROUP, LLC

1. Position the halfshaft into the hub and bearing. Install the hub and bearing (1) in to the knuckle.
2. Install four **NEW** hub and bearing bolts and tighten to. Refer to **FRONT, SPECIFICATIONS**.
3. Install the front brake rotor and caliper assembly. Refer to **ROTOR, BRAKE, INSTALLATION**.
4. Install a **NEW** hub nut and while a helper applies the brakes, tighten to specification. Refer to **SPECIFICATIONS**.

NOTE: Do not use air tools on staking tool while staking hub nut.



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Fig. 12: Correct Hub Nut Staking

Courtesy of CHRYSLER GROUP, LLC

Correct Hub Nut Staking

5. Using (special tool #10287, Tool, Front Hub Staking) align the leading cutting edge of tool with the top left side channel on axle. Tighten fastener on staking tool with hand tools until the threads bottom out completely.

NOTE: The hub nut must be staked (1) as shown in **Correct Hub Nut Staking**. Both edges must be split and bent into the shape shown (3). The staking must be in the opposite direction from the forward rotation of the wheel.

NOTE: Do not stake the hub nut as shown (2).

6. Install the wheel and tire assembly. Refer to **INSTALLATION**.

KNUCKLE, STEERING**DIAGNOSIS AND TESTING****DIAGNOSIS AND TESTING - KNUCKLE**

The front suspension knuckle is not a repairable component of the front suspension. It must be replaced if found to be damaged in any way. If it is determined that the knuckle is bent when servicing the vehicle, no attempt is to be made to straighten the knuckle.

REMOVAL**REMOVAL**

NOTE: Before proceeding, review all Warnings and Cautions. Refer to **FRONT, WARNING**.

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove the wheel mounting bolts and the tire and wheel assembly.

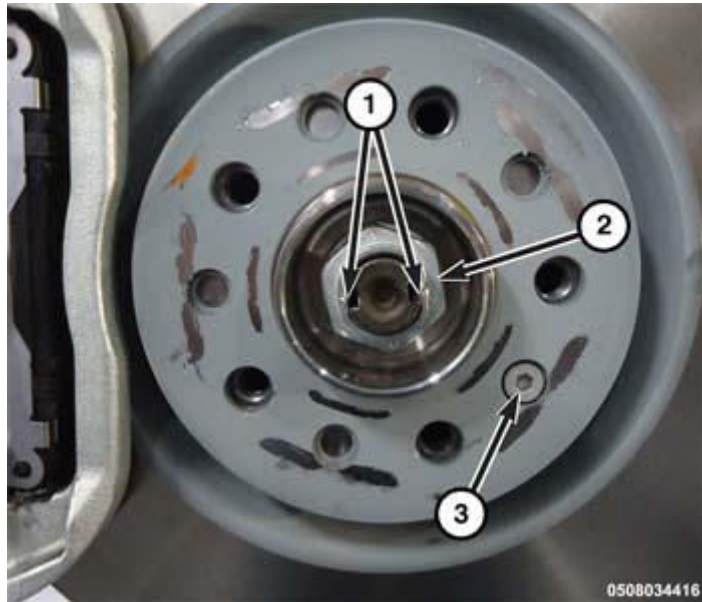


Fig. 13: Identifying Staked Areas, Hub Nut & Rotor Bolt
Courtesy of CHRYSLER GROUP, LLC

3. Using a suitable punch, lift the two staked areas (1) on the hub nut. Use care not to damage the half-shaft.
4. While a helper applies the brakes to keep the hub from rotating, remove the hub nut (2) and discard it. Remove the rotor bolt (3). **Do not reuse the hub nut.**
5. Remove the front brake rotor. Refer to **ROTOR, BRAKE, REMOVAL** .

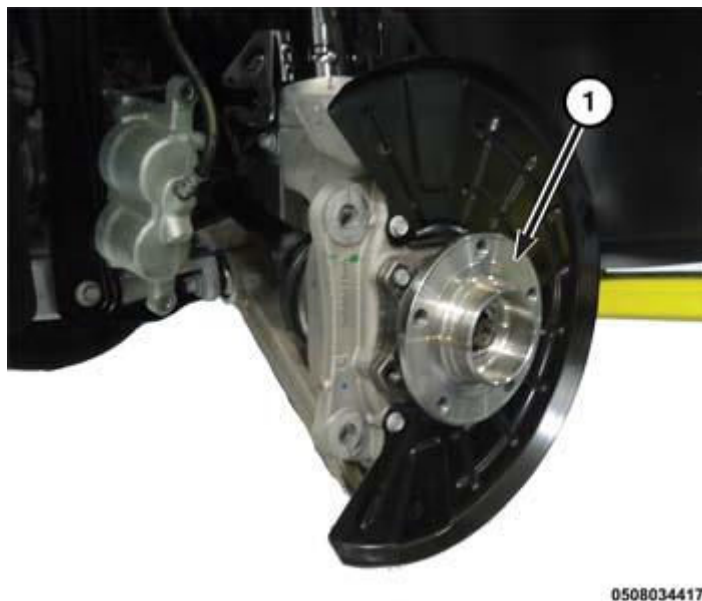


Fig. 14: Identifying Hub & Bearing
Courtesy of CHRYSLER GROUP, LLC

6. Remove the four hub and bearing to knuckle bolts and slide the hub and bearing (1) off the half shaft and out of the knuckle.

7. Remove the front brake rotor splash shield.

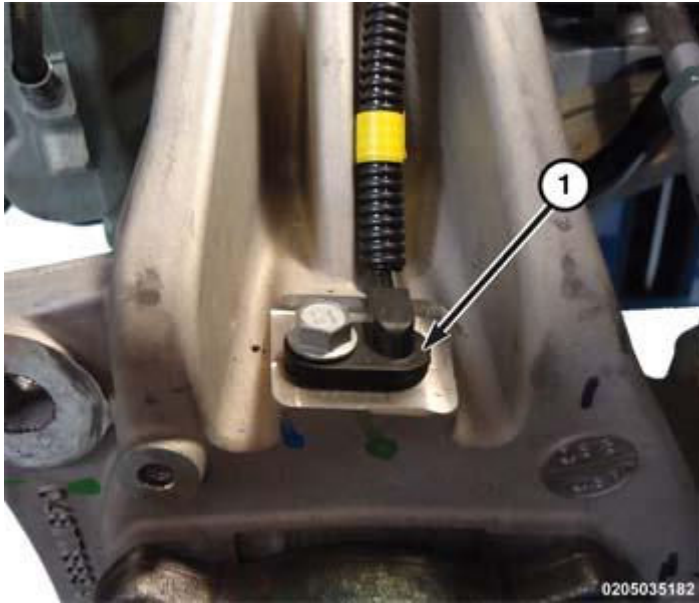


Fig. 15: Identifying Wheel Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

8. Remove the wheel speed sensor (1) and position it aside.

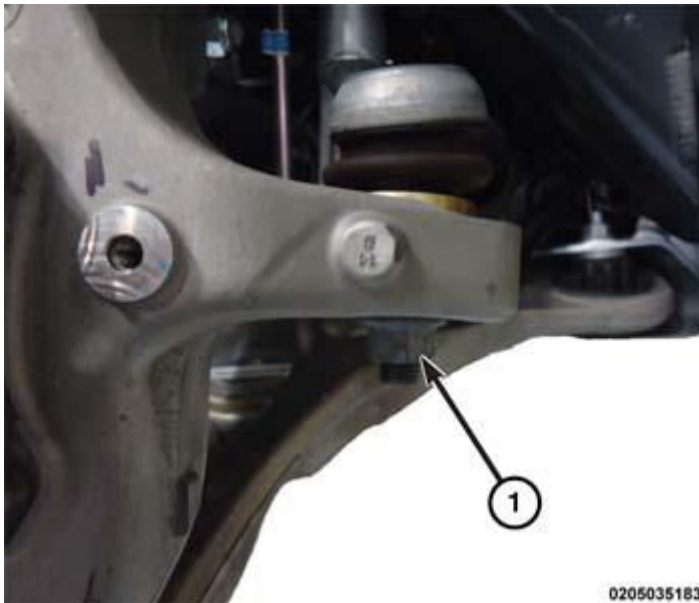


Fig. 16: Identifying Outer Tie Rod End
Courtesy of CHRYSLER GROUP, LLC

9. Remove the outer tie rod end (1) from the knuckle. Refer to **TIE ROD, STEERING, REMOVAL** .



Fig. 17: Identifying Lower Ball Joint Nut
Courtesy of CHRYSLER GROUP, LLC

10. Remove and discard the lower ball joint nut (1).
11. Using (special tool #C-3894-A, Puller, Tie Rod) separate the ball joint stud from the control arm.

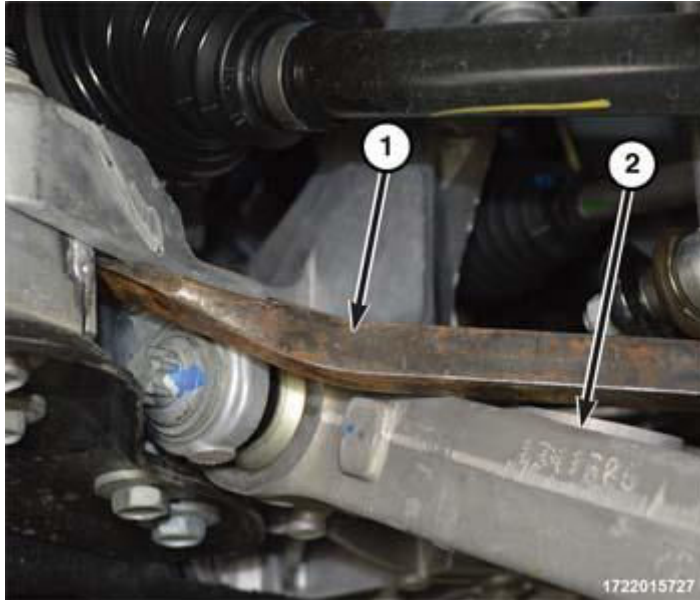


Fig. 18: Identifying Pry Bar & Control Arm
Courtesy of CHRYSLER GROUP, LLC

NOTE: Make sure the ball joint boot does not get cut when separating the control arm from the knuckle.

NOTE: After separating the control arm from the knuckle, do not let it swing rapidly back up. This can tear the ball joint dust boot.

12. Insert a pry bar (1) in the opening between the control arm front mounting bolt and the front fascia support beam.
13. Pry down on the control arm (2) until the ball joint stud is clear of the control arm. Position the knuckle assembly to the side until it is clear of the ball joint stud. Slowly release the control arm.

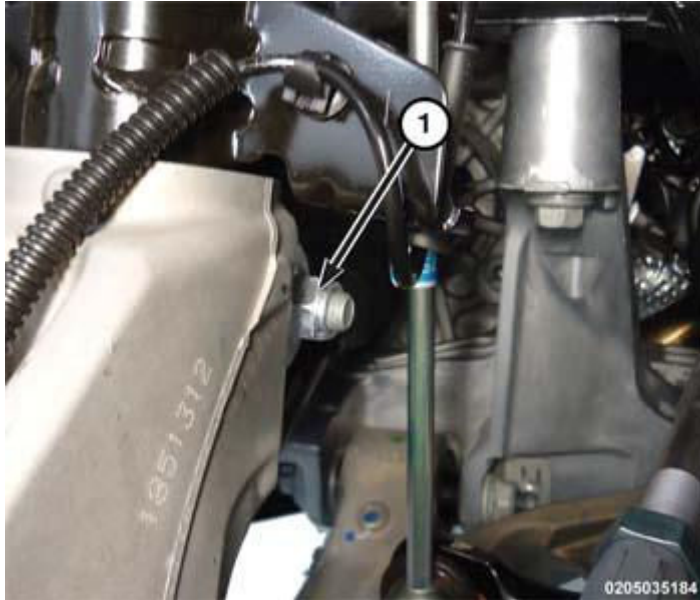


Fig. 19: Identifying Knuckle To Strut Pinch Bolt & Nut
Courtesy of CHRYSLER GROUP, LLC

14. Remove the knuckle to strut pinch bolt and nut (1).

Discard the nut and bolt.

NOTE: Do not allow the half shaft to hang by the inner C/V joint. Support the half shaft to keep the joint from separating.

15. Remove the knuckle.

INSTALLATION

INSTALLATION

1. Position the half shaft into the knuckle and slide the strut into the knuckle.

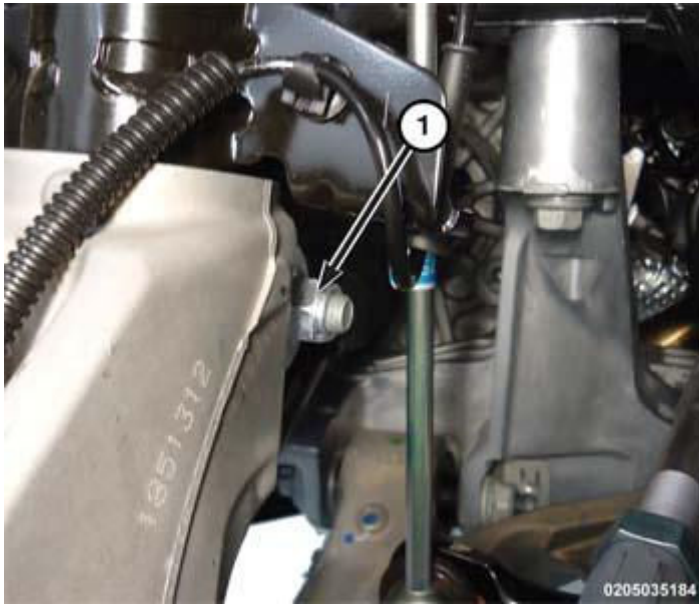


Fig. 20: Identifying Knuckle To Strut Pinch Bolt & Nut
Courtesy of CHRYSLER GROUP, LLC

2. Install a **NEW** strut pinch bolt and nut (1). Tighten the pinch bolt to specification.

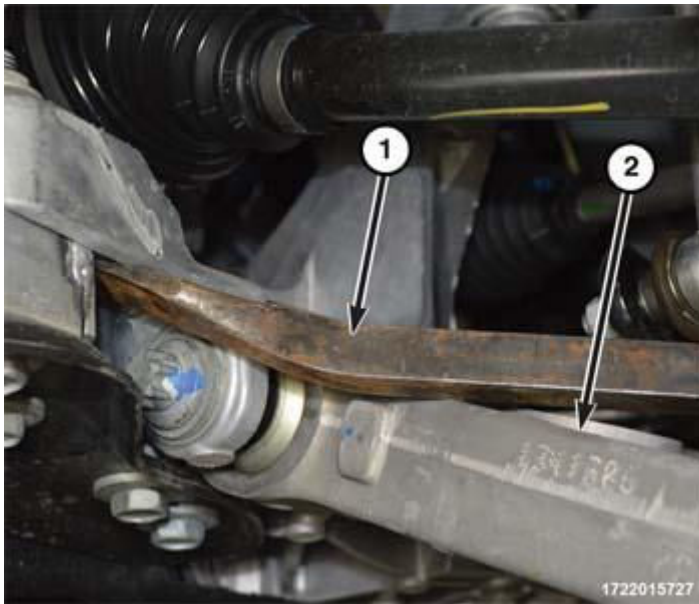


Fig. 21: Identifying Pry Bar & Control Arm
Courtesy of CHRYSLER GROUP, LLC

3. Insert a pry bar (1) in the opening between the control arm front mounting bolt and the front fascia support beam.
4. Pry down on the control arm (2) until the ball joint stud is clear of the control arm, align the stud with hole in control arm then slowly release the control arm.



Fig. 22: Identifying Lower Ball Joint Nut
Courtesy of CHRYSLER GROUP, LLC

5. Install a **NEW** lower ball joint nut (1). Tighten the lower ball joint nut to specification.

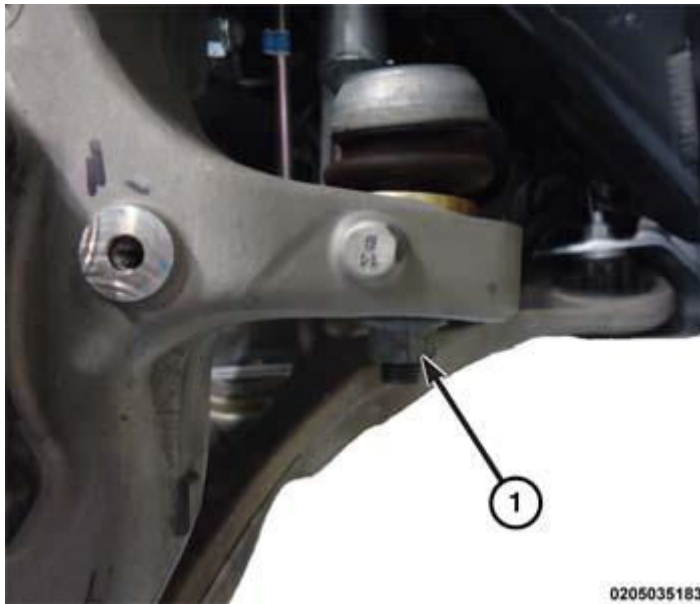


Fig. 23: Identifying Outer Tie Rod End
Courtesy of CHRYSLER GROUP, LLC

6. Install the outer tie rod to the knuckle. Refer to **TIE ROD, STEERING, INSTALLATION** .

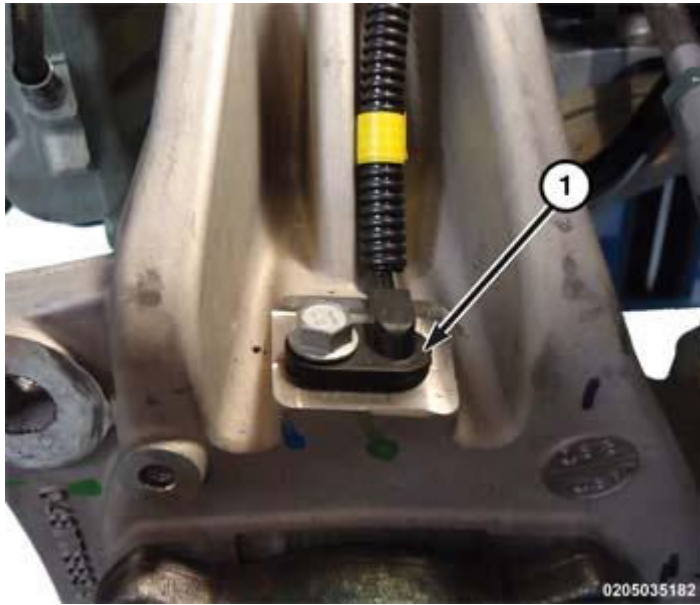


Fig. 24: Identifying Wheel Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

7. Install the wheel speed sensor. Tighten the wheel speed sensor bolt to specification.
8. Install the front brake rotor splash shield.

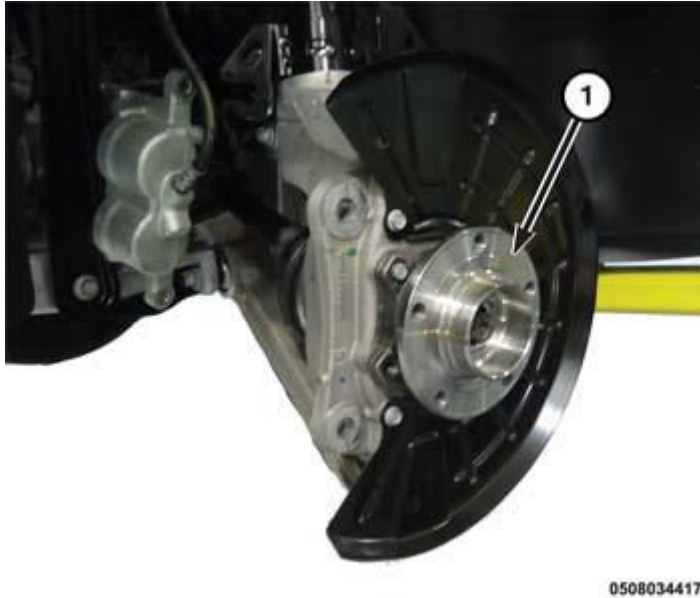


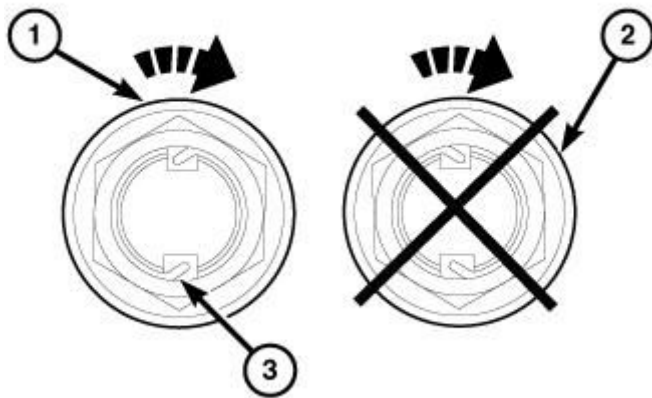
Fig. 25: Identifying Hub & Bearing
Courtesy of CHRYSLER GROUP, LLC

9. Position the half shaft into the hub and bearing. Install the hub and bearing (1) to the knuckle. Install four **new** hub an bearing bolts. Tighten the hub bolts to specification.
10. Install the front brake rotor and brake caliper. Refer to **CALIPER, DISC BRAKE, FRONT, INSTALLATION** and **ROTOR, BRAKE, INSTALLATION**.

NOTE: Always install a new hub nut. The original hub nut is one-time use only and must be discarded when removed.

- 11.
12. Install a **NEW** hub nut and while a helper applies the brakes, tighten the nut to 200 N.m (148 ft. lbs.)

NOTE: Do not use air tools on staking tool while staking hub nut.



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Fig. 26: Correct Hub Nut Staking
Courtesy of CHRYSLER GROUP, LLC

Correct Hub Nut Staking

13. Using (special tool #10287, Tool, Front Hub Staking) align the leading cutting edge of tool with the top left side channel on axle. Tighten fastener on staking tool with hand tools until the threads bottom out completely.

NOTE: The hub nut must be staked (1) as shown in Correct Hub Nut Staking. Both edges must be split and bent into the shape shown (3). The staking must be in the opposite direction from the forward rotation of the wheel.

NOTE: Do not stake the hub nut as shown (2).

14. Install the wheel and tire assembly. Refer to **INSTALLATION**.

LINK, STABILIZER BAR

REMOVAL

REMOVAL

NOTE: Before proceeding, refer to **FRONT, WARNING.**

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove the wheel mounting bolts and the tire and wheel assembly.

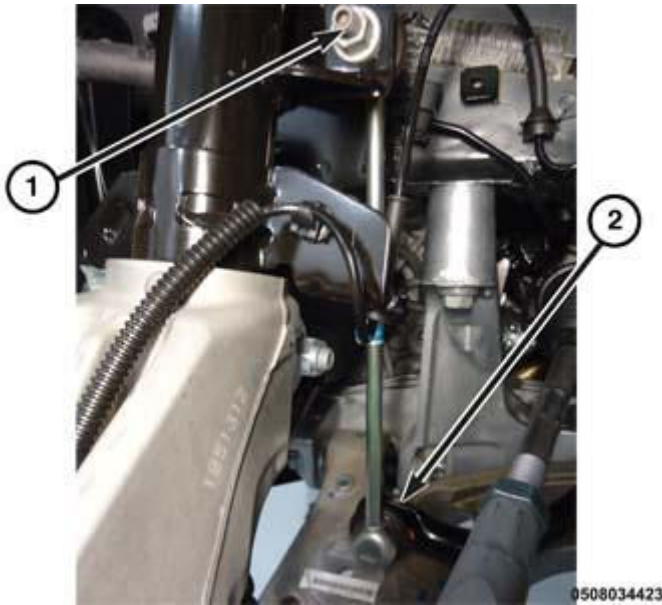


Fig. 27: Identifying Upper & Lower Nut
Courtesy of CHRYSLER GROUP, LLC

3. Hold the stabilizer bar link studs stationary and remove the upper nut (1) and the lower nut (2).
4. Remove the stabilizer bar link.

INSTALLATION**INSTALLATION**

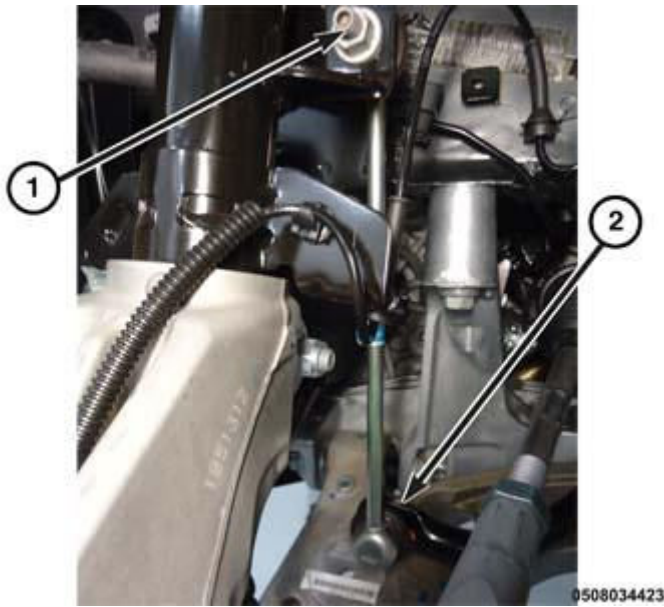


Fig. 28: Identifying Upper & Lower Nut
Courtesy of CHRYSLER GROUP, LLC

1. Position the stabilizer bar link to the strut and install the stabilizer bar link nut (1).
2. Position the stabilizer bar link to the stabilizer bar and install the stabilizer bar link nut (2).
3. Hold the stabilizer bar link studs stationary and tighten the Stabilizer Bar Link Nuts to Specification.
4. Install the tire and wheel assembly and the lug bolts. Refer to **INSTALLATION** .
5. Lower the vehicle.

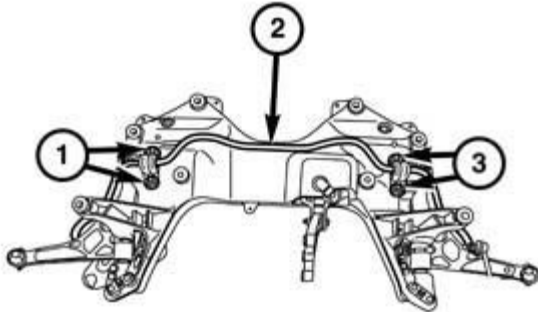
STABILIZER BAR, FRONT

REMOVAL

REMOVAL

NOTE: Before proceeding, refer to **FRONT, WARNING**.

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove the crossmember. Refer to **CROSSMEMBER, FRONT SUSPENSION, REMOVAL** .



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Fig. 29: Stabilizer Bar Retaining Bolts
Courtesy of CHRYSLER GROUP, LLC

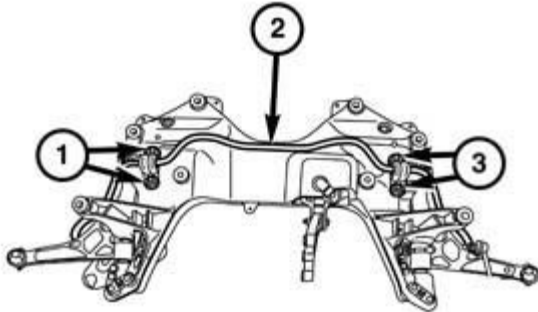
3. Remove the four stabilizer bolts (1, 3) and separate the stabilizer bar (2) from the crossmember.

INSTALLATION

INSTALLATION

NOTE: **Inspect the brackets, insulators and links for wear or damage. Install new components as necessary.**

1. Install the stabilizer bar (2) to the crossmember.



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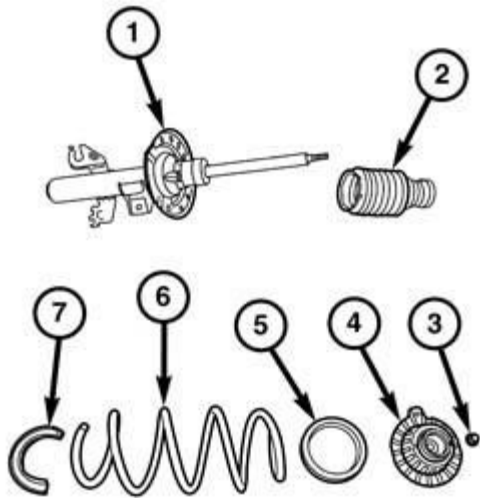
Fig. 30: Stabilizer Bar Retaining Bolts
Courtesy of CHRYSLER GROUP, LLC

2. Install the four stabilizer bar mounting bolts (1, 3). Tighten the to Stabilizer Bar Mounting Bolts to Specification.
3. Install the crossmember. Refer to **CROSSMEMBER, FRONT SUSPENSION, INSTALLATION** .

STRUT, SUSPENSION, ASSEMBLY

DESCRIPTION

DESCRIPTION



020468822

Fig. 31: Front Strut Components

Courtesy of CHRYSLER GROUP, LLC

A Macpherson type design strut assembly is used in place of the traditional front suspension upper control arm and upper ball joint. The bottom of the strut mounts directly to the steering knuckle using a "shark fin" and pinch bolt going through the knuckle. The top of the strut mounts directly to the strut tower of the vehicle using a retaining clip on the strut assembly upper mount.

The strut assembly includes the following components:

- Strut (damper) (1)
- Dust shield (2)
- Strut rod nut (3)
- Bearing and upper spring seat (4)
- Upper spring isolator (5)
- Coil spring (6)
- Lower spring isolator (7)

Each component is serviced by removing the strut assembly from the vehicle and disassembling it.

Coil springs are rated separately for each corner or side of the vehicle depending on optional equipment and type of vehicle service. If a coil spring requires replacement, be sure that it is replaced with a spring meeting the correct load rating for the vehicle and its specific options.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - STRUT ASSEMBLY

Inspect the strut assembly for the following conditions:

- Inspect for a damaged or broken coil spring.
- Inspect for a torn or damaged dust shield.
- Lift the dust shield and inspect the strut assembly for evidence of fluid running from the upper end of the strut fluid reservoir. (Actual leakage will be a stream of fluid running down the side and dripping off lower end of unit). A slight amount of seepage between the strut shaft and strut shaft seal is not unusual and does not affect performance of the strut assembly.
- Inspect the jounce bumper for signs of damage or deterioration.
- Inspect the clearance between the shock tower and the coil spring. Make sure no fasteners are protruding through the shock tower possibly contacting the coil spring and strut. Because of the minimum clearance in this area, installation of metal fasteners could damage the coil spring coating and lead to a corrosion failure of the spring.

REMOVAL**REMOVAL**

NOTE: Before proceeding, refer to **FRONT, WARNING.**

NOTE: Removal of the strut assembly is the same for both sides.

NOTE: If both strut assemblies are removed, label the strut assemblies right or left. Keep the other strut parts separated with right or left as well. Not all parts of the strut assembly are interchangeable side-to-side.

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove the wheel mounting bolts and the tire and wheel assembly.

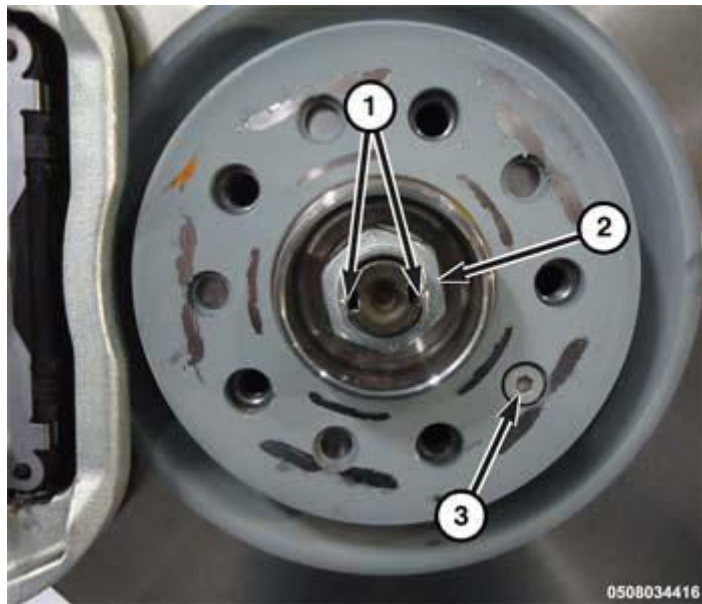


Fig. 32: Identifying Staked Areas, Hub Nut & Rotor Bolt
Courtesy of CHRYSLER GROUP, LLC

3. Using a suitable punch, lift the two staked areas (1) on the hub nut. Use care not to damage the halfshaft.
4. While a helper applies the brakes to keep the hub from rotating, remove the hub nut (2) and discard it. Remove the rotor bolt (3). **Do not reuse the hub nut.**
5. Remove the front brake rotor. Refer to **ROTOR, BRAKE, REMOVAL** .

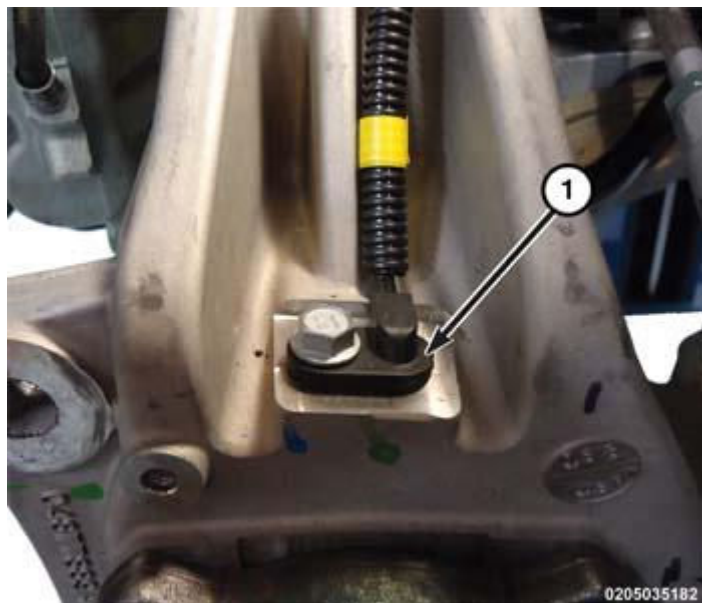


Fig. 33: Identifying Wheel Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

6. Remove the wheel speed sensor (1) and remove the wire harness from the strut. Position the wire harness aside.

7. Remove the stabilizer bar link. Refer to **LINK, STABILIZER BAR, REMOVAL**.

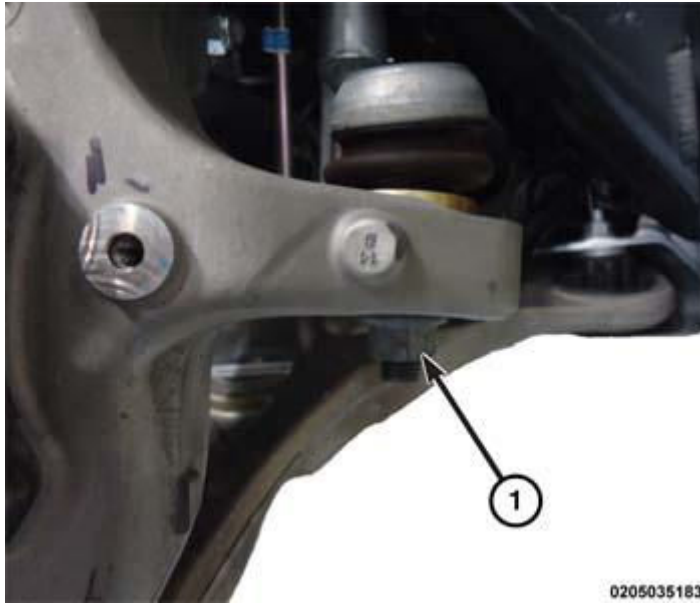


Fig. 34: Identifying Outer Tie Rod End
Courtesy of CHRYSLER GROUP, LLC

8. Remove the outer tie rod end from the knuckle (1). Refer to **TIE ROD, STEERING, REMOVAL**.



Fig. 35: Identifying Lower Ball Joint Nut
Courtesy of CHRYSLER GROUP, LLC

9. Remove and discard the lower ball joint nut (1).
10. Using (special tool #C-3894-A, Puller, Tie Rod) separate the ball joint stud from the control arm.

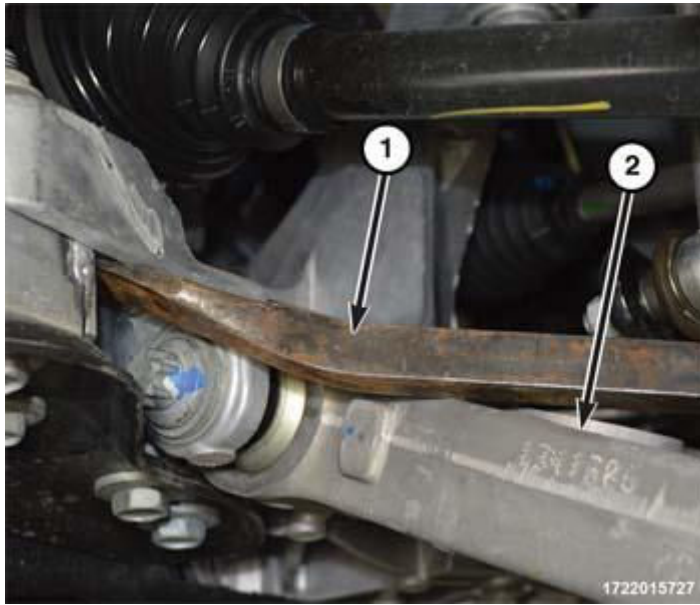


Fig. 36: Identifying Pry Bar & Control Arm
Courtesy of CHRYSLER GROUP, LLC

NOTE: Make sure the ball joint boot does not get cut when separating the control arm from the knuckle.

NOTE: After separating the control arm from the knuckle, do not let it swing rapidly back up. This can tear the ball joint dust boot.

11. Insert a pry bar (1) in the opening between the control arm front mounting bolt and the front fascia support beam.
12. Pry down on the control arm (2) until the ball joint stud is clear of the control arm, then push the knuckle assembly to the side when it is clear of the ball joint stud and slowly release the control arm.
13. Separate the axle from the knuckle and support the axle.

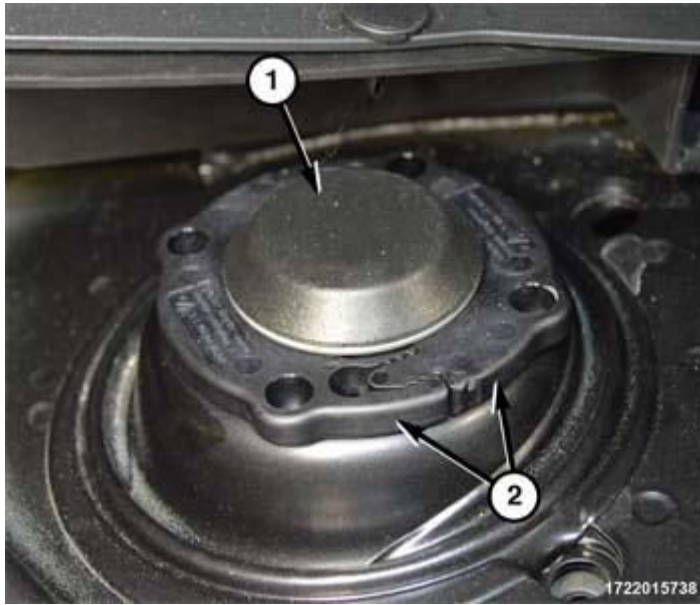


Fig. 37: Identifying Strut & Clips
Courtesy of CHRYSLER GROUP, LLC

14. Insert the ball joint back into the control arm to support the strut during upper strut clip removal.
15. Lower the hoist until a floor jack can be used to raise the strut (1) to relieve tension on the upper strut clip.
16. Using two screwdrivers, pry the two ends (2) of the strut clip in opposite directions to separate and break the clip. **Discard the clips after removal.**

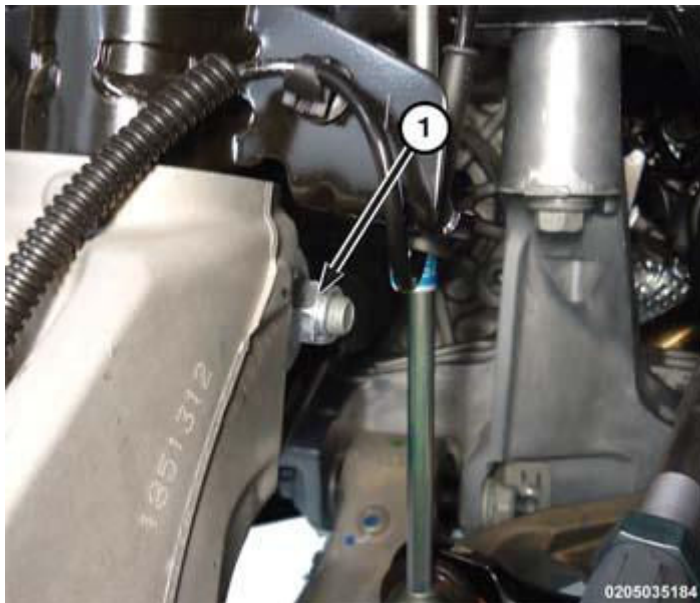


Fig. 38: Identifying Knuckle To Strut Pinch Bolt & Nut
Courtesy of CHRYSLER GROUP, LLC

17. Remove the knuckle to strut pinch bolt and nut (1). **Discard the nut and bolt.**

18. Remove the strut from the vehicle.
19. To disassemble the strut, refer to **STRUT, SUSPENSION, ASSEMBLY, DISASSEMBLY**.

DISASSEMBLY

DISASSEMBLY



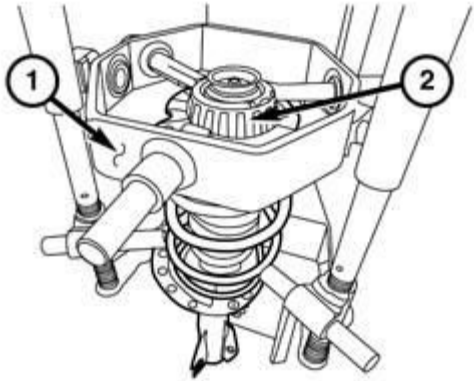
Fig. 39: Identifying Pliers On Chrome Machined Surface Of Shock/Strut Rod
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not use any type of pliers on the chrome machined surface of shock/strut rod to assist in the disassembly/assembly of shocks or struts. Use only tools designed to hold the shock/strut rod stationary when servicing shock or strut components.

NOTE: The strut assembly must be removed from the vehicle for it to be disassembled and assembled. Refer to **STRUT, SUSPENSION, ASSEMBLY, REMOVAL**.

For the disassembly and assembly of the strut assembly, use strut spring compressor, teamPSE tool 223-7400, or the equivalent, to compress the coil spring. Follow the manufacturer's instructions closely.

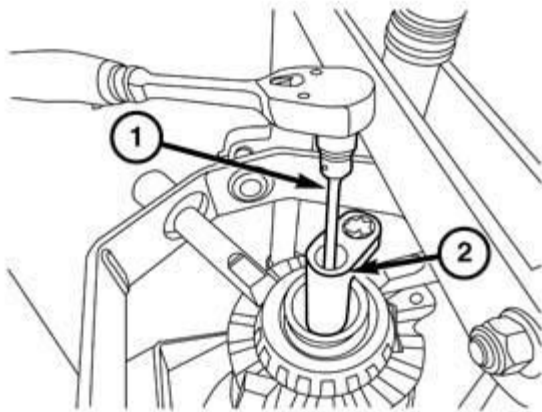
WARNING: Do not remove the strut rod nut before the coil spring is properly compressed. The coil spring is held under pressure. The coil spring must be compressed, removing spring tension from the upper mount and bearing, before the strut rod nut is removed.



050870143

Fig. 40: Spring Compressor & Strut Assembly
Courtesy of CHRYSLER GROUP, LLC

1. If both struts are being serviced at the same time, mark both the coil spring and strut assembly according to which side of the vehicle the strut is being removed from.
2. Position the strut assembly (2) in the strut coil spring compressor (1) following the manufacturer's instructions and set the lower and upper hooks of the compressor on the coil spring. Position the strut clevis bracket straight outward, away from the compressor.
3. Compress the coil spring until all coil spring tension is removed from the upper mount and bearing.



050870144

Fig. 41: Hex Head Wrench & Special Tool #9362
 Courtesy of CHRYSLER GROUP, LLC

CAUTION: Never use impact or high speed tools to remove the strut rod nut. Damage to the strut internal bearings can occur.

4. Once the spring is sufficiently compressed, install (special tool #9362, Wrench, Strut Nut) (2), on the strut rod nut. Next, install a hex head wrench (1) into the strut rod internal hex. While holding the strut rod from turning, remove the nut using the strut nut wrench.
5. Remove the clamp (if installed) from the bottom of the coil spring and remove the strut (damper) out through the bottom of the coil spring.
6. Remove the lower spring isolator from the strut seat.
7. Remove the dust shield.
8. Remove the upper strut mount from the top of the bearing and upper spring seat.
9. Remove the upper spring seat and isolator from the top of the coil spring.
10. Release the tension from the coil spring by backing off the compressor drive completely. Push back the compressor hooks and remove the coil spring.
11. Inspect the strut assembly components for the following and replace as necessary:
 - Inspect the strut (damper) for shaft binding over the full stroke of the shaft.
 - Inspect the jounce bumper for cracks and signs of deterioration.
 - Inspect the dust shield for cracks and tears.
 - Check the upper mount for cracks and distortion and its retaining studs for any sign of damage.
 - Check the bearing and upper spring seat for any binding.

- Inspect the upper and lower spring isolators for material deterioration and distortion.
- Inspect the coil spring for any sign of damage to the coating.

NOTE: For reassembly, refer to **STRUT, SUSPENSION, ASSEMBLY, ASSEMBLY.**

ASSEMBLY

ASSEMBLY

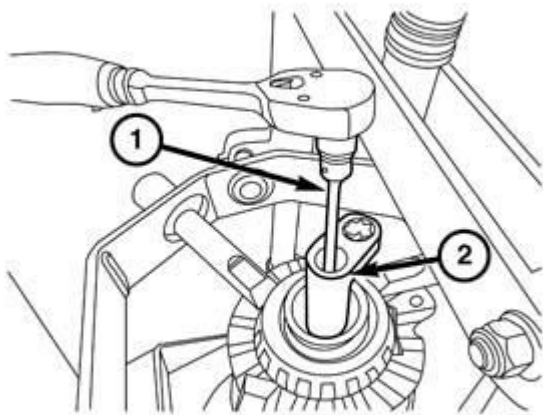


Fig. 42: Identifying Pliers On Chrome Machined Surface Of Shock/Strut Rod
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not use any type of pliers on the chrome machined surface of shock/strut rod to assist in the disassembly/assembly of shocks or struts. Use only tools designed to hold the shock/strut rod stationary when servicing shock or strut components.

1. Place the coil spring in the spring compressor following the manufacturer's instructions. Before compressing the spring, rotate the spring so the end of the bottom coil is at approximately the 9 o'clock position as viewed above (or to where the spring was when removed from the compressor). This action will allow the strut (damper) clevis bracket to be positioned outward, away from the compressor once installed.
2. Slowly compress the coil spring until enough room is available for strut assembly reassembly.
3. Install the bearing and upper spring seat, and isolator on top of the coil spring.
4. Install the upper mount on top of the bearing and upper spring seat.
5. Install the lower spring isolator on the spring seat on the strut (damper).
6. Slide the jounce bumper and dust shield onto the strut rod.

7. Install the strut up through the bottom of the coil spring and upper spring seat, mount, and bearing until the lower spring seat contacts the lower end of the coil spring. Rotate the strut as necessary until the end of the bottom coil comes in contact with the stop built into the lower spring isolator.
8. While holding the strut in position, install the (special tool #10140-2, Receiver) nut on the end of the strut rod.

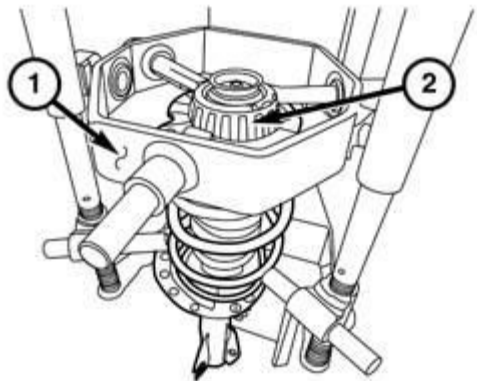


050870144

Fig. 43: Hex Head Wrench & Special Tool #9362
Courtesy of CHRYSLER GROUP, LLC

**CAUTION: Never use impact or high speed tools to remove the strut rod nut.
Damage to the strut internal bearings can occur.**

9. Install (special tool #9362, Wrench, Strut Nut) (2) on the strut rod nut. Next, install an hex head wrench (1) on the end of the strut rod. While holding the strut rod from turning, tighten the strut rod nut to 68 N.m (50 ft. lbs.) using a torque wrench on the end of Special Tool (special tool #9362, Wrench, Strut Nut).



050870143

Fig. 44: Spring Compressor & Strut Assembly
Courtesy of CHRYSLER GROUP, LLC

10. Slowly release the tension from the coil spring by backing off the compressor drive completely. As the tension is relieved, make sure the upper mount and bearing align properly. Verify the upper mount does not bind when rotated.
11. Remove the strut assembly (2) from the spring compressor (1).
12. Install the strut assembly on the vehicle. Refer to **STRUT, SUSPENSION, ASSEMBLY, INSTALLATION**.

INSTALLATION

INSTALLATION

NOTE: Installation of the strut assembly is the same for both sides.

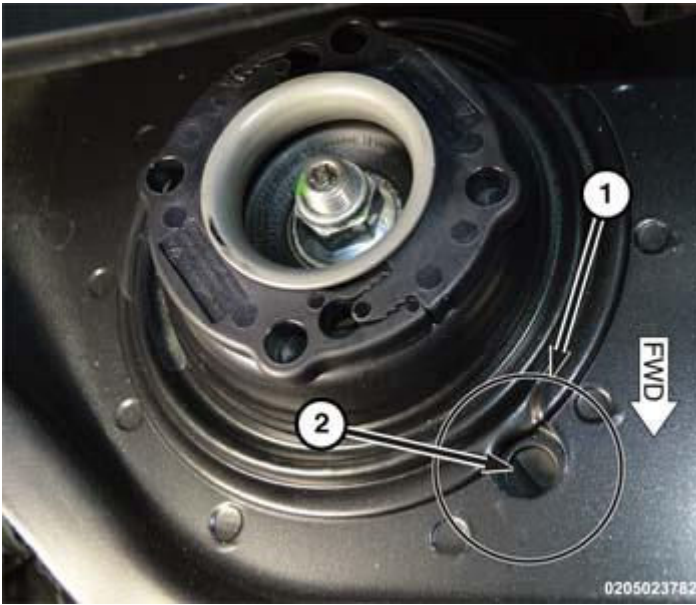


Fig. 45: Identifying Strut Mount Slot & Forward Hole
Courtesy of CHRYSLER GROUP, LLC

1. Install the strut into the vehicle. When installing the strut, align the slot in the strut mount (2) with the forward hole (1) in the body of the strut tower.

NOTE: The strut retaining clip must be fully closed and the serrations fully engaged after installation.



Fig. 46: Identifying Strut & Clips
Courtesy of CHRYSLER GROUP, LLC

2. Install the cover (1) and each half of the upper strut clip (2).

3. Press each side of the strut clip (2) toward each other to assemble the clip. Make sure that the clip is fully closed and the serrations fully engaged.
4. Install the strut into the top of the knuckle.

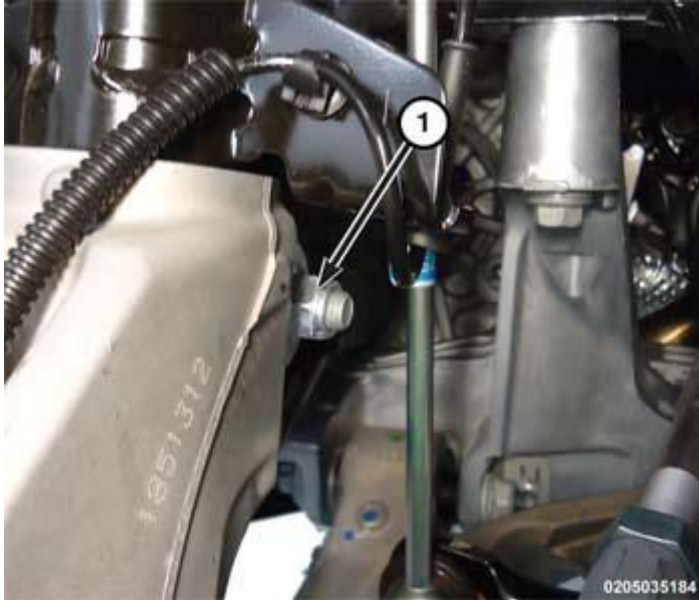


Fig. 47: Identifying Knuckle To Strut Pinch Bolt & Nut
Courtesy of CHRYSLER GROUP, LLC

5. Install the **NEW** knuckle to strut pinch bolt and nut (1). Tighten the Knuckle to Strut Nut to Specification.
6. Install the axle into the knuckle.

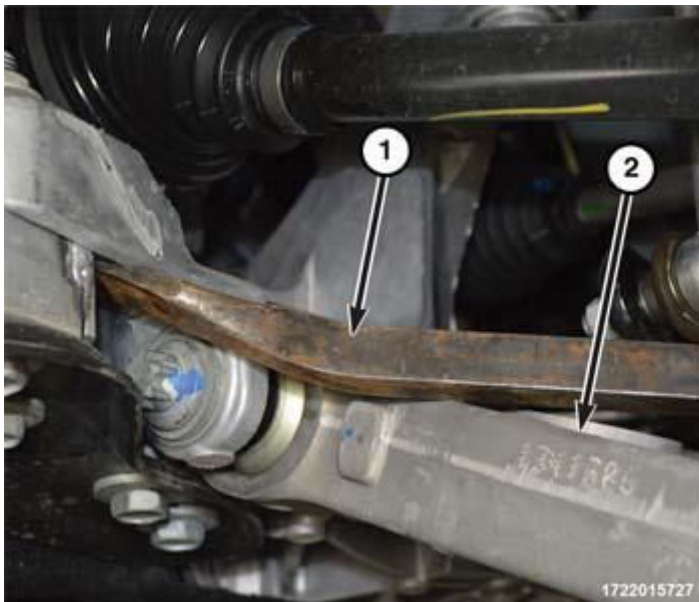
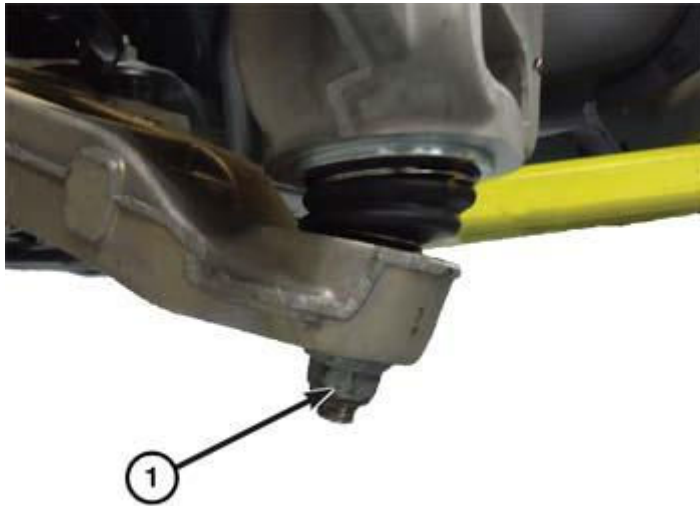


Fig. 48: Identifying Pry Bar & Control Arm

Courtesy of CHRYSLER GROUP, LLC

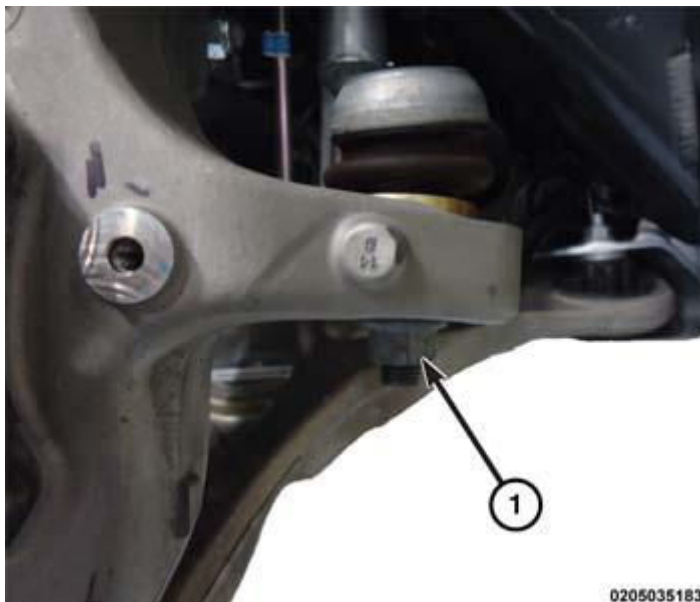
7. Insert a pry bar (1) in the opening between the control arm front mounting bolt and the front fascia support beam.
8. Pry down on the control arm (2) until the ball joint stud is clear of the control arm, align the stud with hole in control arm then slowly release the control arm.



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Fig. 49: Identifying Lower Ball Joint Nut
Courtesy of CHRYSLER GROUP, LLC

9. Install a **NEW** lower ball joint nut (1). Tighten the Lower Ball Joint Nut to Specification.



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Fig. 50: Identifying Outer Tie Rod End

Courtesy of CHRYSLER GROUP, LLC

10. Install the outer tie rod end into the knuckle (1). Tighten the Outer Tie Rod End Nut to Specification. Refer to **TIE ROD, STEERING, INSTALLATION** .
11. Install the stabilizer bar link. Refer to **LINK, STABILIZER BAR, INSTALLATION**.

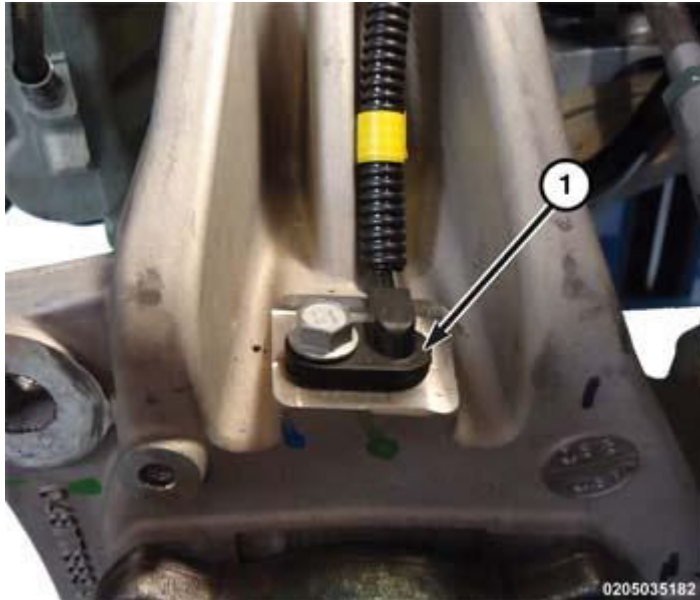
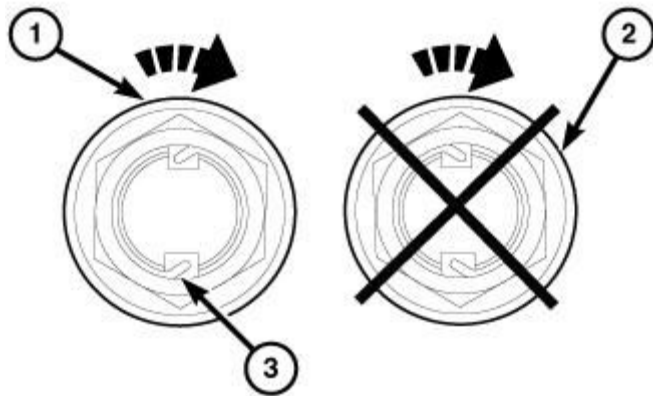


Fig. 51: Identifying Wheel Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

12. Install the wheel speed sensor (1) and connect the harness to the strut. Tighten the Wheel Speed Sensor Bolt to Specification.
13. Install the front brake rotor and caliper assembly. Refer to **ROTOR, BRAKE, INSTALLATION** .
14. Install the **NEW** hub nut and while a helper applies the brakes, tighten the Hub Nut to Specification.

NOTE: **Do not use air tools on staking tool while staking hub nut.**



3112889

Fig. 52: Correct Hub Nut Staking
Courtesy of CHRYSLER GROUP, LLC

Correct Hub Nut Staking

15. Using (special tool #10287, Tool, Front Hub Staking) align the leading cutting edge of tool with the top left side channel on the axle. Tighten fastener on staking tool with hand tools until the threads bottom out completely.

NOTE: The hub nut must be staked as shown (1) in Correct Hub Nut Staking. Both edges must be split and bent into the shape shown (3). The staking must be in the opposite direction from the forward rotation of the wheel.

NOTE: Do not stake the hub nut as shown in Correct Hub Nut Staking (2).

16. Install wheel and tire assembly. Refer to INSTALLATION.
17. Perform alignment procedure. Refer to WHEEL ALIGNMENT, STANDARD PROCEDURE.

WHEEL ALIGNMENT

STANDARD PROCEDURE

CURB HEIGHT MEASUREMENT

The wheel alignment is to be checked and all alignment adjustments made with the vehicle at its required curb height specification.

Vehicle height is to be checked with the vehicle on a flat, level surface, preferably a vehicle alignment rack. The tires are to be inflated to the recommended pressure. All tires are to be the same size as standard equipment.

Vehicle height is checked with the fuel tank full of fuel, and no passenger or luggage compartment load.

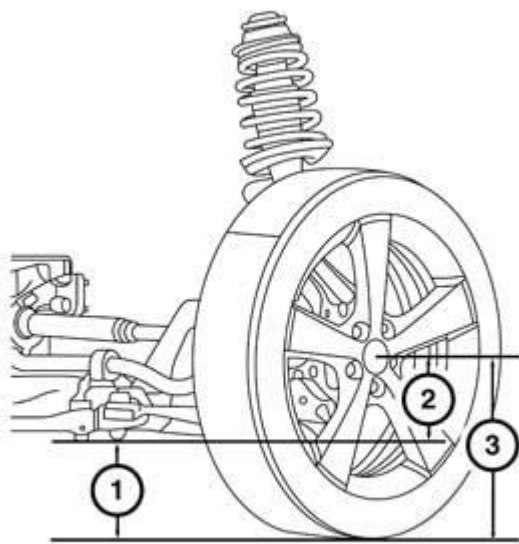
Vehicle height is not adjustable. If the measurement is not within specifications, inspect the vehicle for bent or weak suspension components. Compare the parts tag on the suspect coil spring(s) to the parts book and the vehicle sales code, checking for a match. Once removed from the vehicle, compare the coil spring height to a correct new or known good coil spring. The heights should vary if the suspect spring is weak.

NOTE: Do not apply the electric park brake (EPB) during ride height and alignment measurements.

NOTE: Prior to reading the curb height measurement, the front and rear of the vehicle must be jounced to settle the suspension. Induce jounce by pushing down on the center of the bumper (fascia), using care not to damage the vehicle, moving the vehicle up and down, gradually increasing the suspension travel with each stroke. Release the bumper at the bottom of each stroke, repeating this action several times. Perform this to both front and rear suspensions an equal amount of times.

Measure curb height as follows:

1. Jounce the vehicle. Refer to above note.



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Fig. 53: Identifying Distance Measurements
Courtesy of CHRYSLER GROUP, LLC

NOTE: On some vehicles it may be necessary to remove an engine belly pan in order to gain access to the cradle bolt.

2. FRONT - On each side of the vehicle, measure the distance (1) from the center of the front cradle bolt head to the floor or alignment rack/lift runway surface. It may be necessary to measure to the bottom of a straight edge placed from lift runway to runway to get an accurate measurement.
3. FRONT - Measure and record the distance (3) from the center of the spindle to the same surface or straight edge used to measure from the vertical pivot bolt.
4. Subtract the cradle bolt height (1) from the spindle height (3) to obtain the curb height value (2). Compare the curb height value (2) to specifications listed in the following CURB HEIGHT SPECIFICATIONS chart. **Maximum left-to-right differential is not to exceed 10 mm (0.39 in.).**

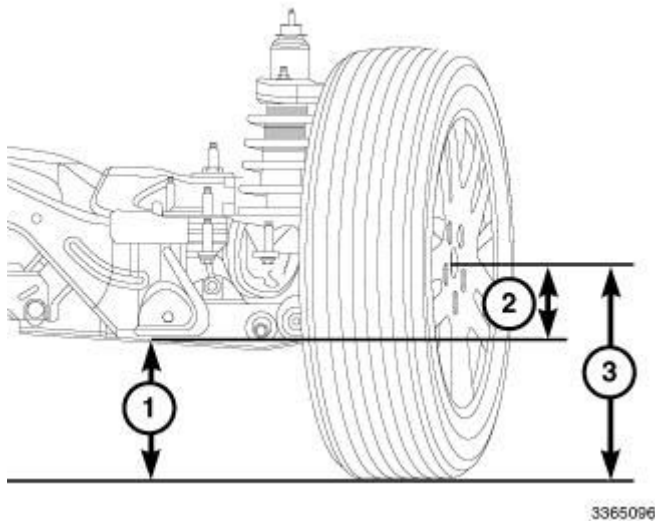


Fig. 54: Mounting Bolt Height, Spindle Height & Curb Height Value
 Courtesy of CHRYSLER GROUP, LLC

5. REAR - On each side of the vehicle, measure and record the distance (1) from the bottom of the cradle toe link mount to the floor or alignment rack/lift runway surface. It may be necessary to measure to the bottom of a straight edge placed from lift runway to runway, to get an accurate measurement.
6. REAR - On each side of the vehicle, measure and record the distance (3) from the center of the rear spindle to the same surface that was used to measure the cradle toe link mount.
7. REAR - Subtract the cradle toe link mount height (1) from the spindle height (3) to obtain the curb height value (2). Compare the curb height value (2) to specifications listed in the following CURB HEIGHT SPECIFICATIONS chart. **Maximum left-to-right differential is not to exceed 10 mm (0.39 in.).**
8. If curb height is found to be out of specification and there is no sign of excessive body damage, curb height can be changed by replacing the applicable spring with a spring offering a different check load. Refer to **STRUT, SUSPENSION, ASSEMBLY, REMOVAL**.

CURB HEIGHT SPECIFICATIONS

		FWD	AWD	Lifted
Center of Spindle to Front Cradle Attachment Bolt	Front	130 mm (5.12 in.)	117 mm (4.61)	88 mm (3.46 in.)

2014 Jeep Cherokee Trailhawk

2014 SUSPENSION Front Suspension & Wheel Alignment - Cherokee

Center of Spindle to Rear Cradle	Rear	106 mm (4.17 in.)	105 mm (4.13 in.)	92 mm (3.62 in.)
All curb height tolerances +/- 10 mm (0.39 in.) with full tank of fuel.				

WHEEL ALIGNMENT

PRE-WHEEL ALIGNMENT INSPECTION

Before any attempt is made to change or correct the wheel alignment, the following inspection and necessary corrections must be made to the vehicle to ensure proper alignment.

1. This vehicle is equipped with an Electronic Power Steering (EPS) system. Make sure there are no faults or problems with the EPS system before diagnosing an alignment issue.
2. Verify the fuel tank is full of fuel. If the fuel tank is not full, the reduction in weight will affect the curb height of the vehicle and the alignment specifications.
3. The passenger and luggage compartments of the vehicle should be free of any load that is not factory equipment.
4. Check the tires on the vehicle. The tires are to be inflated to the recommended air pressure. All tires must be the same size and in good condition with approximately the same tread wear.
5. Check the front tire and wheel assemblies for excessive radial runout.
6. Inspect all suspension component fasteners for looseness and proper torque.
7. Inspect the lower front ball joints and all steering linkage for looseness and any sign of wear or damage.
8. Inspect the rubber bushings on all the suspension components for signs of wear or deterioration. If any bushings show signs of wear or deterioration, they should be replaced prior to aligning the vehicle.
9. Check vehicle curb height to verify it is within specifications. Refer to **WHEEL ALIGNMENT, STANDARD PROCEDURE**.

WHEEL ALIGNMENT SETUP

1. Position the vehicle on an alignment rack.
2. Install all required alignment equipment on the vehicle, per the alignment equipment manufacturer's instructions. On this vehicle, a four-wheel alignment is recommended.

NOTE: Prior to reading the vehicle's alignment readouts, the front and rear of vehicle should be jounced. Induce jounce (rear first, then front) by grasping the center of the bumper and jouncing each end of vehicle an equal number of times. The bumper should always be released when vehicle is at the bottom of the jounce cycle.

3. Read the vehicle's current front and rear alignment settings. Compare the vehicle's current alignment settings to the vehicle specifications for camber, caster and toe-in. Refer to **WHEEL ALIGNMENT, SPECIFICATIONS**.

REAR CAMBER

CAUTION: Do not attempt to adjust the vehicle's wheel alignment by heating or bending any of the suspension components.

The rear toe link mounting location to the cradle is slotted with a cam bolt to adjust the camber.

FRONT CAMBER AND CASTER

Front camber and caster settings on this vehicle are determined at the time the vehicle is designed, by the location of the vehicle's suspension components. This is referred to as Net Build. The result is no required adjustment of camber and caster after the vehicle is built or when servicing the suspension components. Thus, when performing a wheel alignment, caster and camber are not normally considered adjustable angles but some adjustment can be made. Camber and caster should be checked to ensure they meet vehicle specifications. Refer to **WHEEL ALIGNMENT, SPECIFICATIONS**.

If individual front camber or caster is found not to meet alignment specifications, the only adjustment available is shifting the front crossmember.

CAUTION: Do not attempt to adjust the vehicle's wheel alignment by heating or bending any of the suspension components.

ADJUSTMENT BY SHIFTING CROSSMEMBER

CAUTION: Always use care when shifting crossmember to avoid damaging other components on the vehicle.

1. Loosen the bolts fastening the front crossmember to the frame just enough to allow movement of the crossmember. Refer to **CROSSMEMBER, FRONT SUSPENSION, REMOVAL**.

CAUTION: When shifting the front crossmember, keep in mind that the front and rear engine mounts are attached to the front crossmember and fore/aft crossmember and should be inspected following the crossmember shift to make sure they are properly aligned.

2. Shift front crossmember as necessary (See following charts) to bring camber or caster into specifications. When shifting crossmember, use care not to move other angles (camber or caster) that are within specifications, out of specifications.

FRONT CAMBER ADJUSTMENT BY SHIFTING CROSSMEMBER*	
Left Camber Below Specification	Move crossmember to the right
Left Camber Above Specification	Move crossmember to the left
Right Camber Below Specification	Move crossmember to the left
Right Camber Above Specification	Move crossmember to the right
Cross Camber Below Specification	Move crossmember to the right

2014 Jeep Cherokee Trailhawk

2014 SUSPENSION Front Suspension & Wheel Alignment - Cherokee

Cross Camber Above Specification

Move crossmember to the left

* For every move to adjust one side of the vehicle, a countermove on the opposite side will occur.

FRONT CASTER ADJUSTMENT BY SHIFTING CROSSMEMBER

Left Caster Below Specification	Move left side of crossmember forward
Left Caster Above Specification	Move left side of crossmember rearward
Right Caster Below Specification	Move right side of crossmember forward
Right Caster Above Specification	Move right side of crossmember rearward
Cross Caster Below Specification	Move left side of crossmember forward and right side rearward
Cross Caster Above Specification	Move left side of crossmember rearward and right side forward

3. Tighten all previously loosened fasteners (bolts) securing the crossmember to the vehicle to specifications. Refer to **CROSSMEMBER, FRONT SUSPENSION, INSTALLATION**.
4. Jounce the rear, then front of the vehicle an equal amount of times.
5. Measure camber and caster. If camber and caster are within specifications, proceed to TOE. If camber and/or caster cannot be brought into specifications, check for bent or damaged components.

TOE

NOTE: When setting toe, make sure to set rear toe to the preferred specifications before setting front toe to the preferred specifications

1. Center the steering wheel and lock it in place using a steering wheel clamp.

REAR TOE

NOTE: Perform the following at each rear wheel as necessary.

1. While holding the cam bolt head stationary, loosen the spring link mounting cam bolt nut.
2. Rotate the cam bolt head left or right until the rear wheel toe for that rear wheel is set to the preferred specification. Refer to **WHEEL ALIGNMENT, SPECIFICATIONS**.
3. While holding the cam bolt head stationary, tighten the spring link mounting cam bolt nut to specifications. Refer to **SPECIFICATIONS**.

FRONT TOE

NOTE: Perform the following at each front wheel as necessary.

CAUTION: Do not twist the inner tie rod-to-steering gear boot (bellows) while turning the inner tie rod during front toe adjustment. It may be necessary to remove the clamp where the boot meets the inner tie rod.

2014 Jeep Cherokee Trailhawk

2014 SUSPENSION Front Suspension & Wheel Alignment - Cherokee

1. Loosen the tie rod adjusting jam nut. Grasp the inner tie rod and rotate it one way or the other until the front wheel toe is set to the preferred specification. Refer to **WHEEL ALIGNMENT, SPECIFICATIONS**.
2. Tighten the tie rod adjusting jam nut to specifications. Refer to **FRONT, SPECIFICATIONS**.
3. Make sure the inner tie rod-to-steering gear boot is not twisted. If removed, reinstall the clamp where the boot meets the inner tie rod.
4. Remove the steering wheel clamp.
5. Remove the alignment equipment.
6. Perform the Clear Steering Pull Compensation Procedure. Refer to **STANDARD PROCEDURE**.
7. Road test the vehicle to verify the steering wheel is straight and the vehicle does not pull or wander.

SPECIFICATIONS

SPECIFICATIONS

NOTE: All specifications are given in degrees.

NOTE: All wheel alignments are to be set with the vehicle at curb height. Refer to **WHEEL ALIGNMENT, STANDARD PROCEDURE**.

FRONT WHEEL ALIGNMENT SPECIFICATIONS

Front Wheel Alignment Specifications					
	Total Toe**	Caster*	Cross Caster*	Camber*	Cross Camber*
FWD	0.10° +/- 0.15°	3.51° +/- 0.40°	0.00° +/- 0.50°	-0.55° +/- 0.40°	0.00° +/- 0.50°
AWD	0.10° +/- 0.15°	3.83° +/- 0.40°	0.00° +/- 0.50°	-0.55° +/- 0.40°	0.00° +/- 0.50°
LIFTED	0.10° +/- 0.15°	4.13° +/- 0.40°	0.00° +/- 0.50°	-0.45° +/- 0.40°	0.00° +/- 0.50°
Notes:					
* For reference only. These are nonadjustable angles.					
** TOTAL TOE is the sum of both the left and right wheel toe settings. TOTAL TOE should be equally split between each wheel on the same axle to ensure the steering wheel is centered after setting toe.					
Positive toe (+) is toe-in and negative toe (-) is Toe-out.					

REAR WHEEL ALIGNMENT SPECIFICATIONS

Rear Wheel Alignment Specifications					
	Toe	Total Toe**	Thrust Angle	Camber	Cross Camber
FWD	0.00° +/- 0.10°	0.00° +/- 0.15°	0.00° +/- 0.10°	-0.99° +/- 0.40°	0.00° +/- 0.40°
AWD	0.00° +/- 0.10°	0.00° +/- 0.15°	0.00° +/- 0.10°	-0.99° +/- 0.40°	0.00° +/- 0.40°
LIFTED	0.00° +/- 0.10°	0.00° +/- 0.15°	0.00° +/- 0.10°	-1.15° +/- 0.40°	0.00° +/- 0.40°
Notes:					

2014 Jeep Cherokee Trailhawk

2014 SUSPENSION Front Suspension & Wheel Alignment - Cherokee

* For reference only. These are nonadjustable angles.

** TOTAL TOE is the sum of both the left and right wheel toe settings. TOTAL TOE should be equally split between each wheel on the same axle to ensure the steering wheel is centered after setting toe.

Positive toe (+) is toe-in and negative toe (-) is Toe-out.

2014 SUSPENSION**Rear Suspension - Cherokee****WARNING****WARNING**

WARNING: Chrysler LLC does not manufacture any vehicles or replacement parts that contain asbestos. Aftermarket products may or may not contain asbestos. Refer to aftermarket product packaging for product information.

Whether the product contains asbestos or not, dust and dirt can accumulate on brake parts during normal use. Follow practices prescribed by appropriate regulations for the handling, processing and disposing of dust and debris.

CAUTION: Only frame contact or wheel lift hoisting equipment can be used on this vehicle. It cannot be hoisted using equipment designed to lift a vehicle by the rear axle. If this type of hoisting equipment is used, damage to rear suspension components will occur.

NOTE: If a rear suspension component becomes bent, damaged or fails, no attempt should be made to straighten or repair it. Always replace it with a new component.

SPECIFICATIONS**SPECIFICATIONS****SPECIFICATIONS**

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Brake Tube Bracket Mounting Screw	12	-	106
Crossmember to Body Mounting Bolt	130	96	-
Hub And Bearing Mounting Bolt	95	70	-
Hub Nut	200	148	-
Spring Link to Knuckle Mounting Bolt	80 Plus 90°	59 Plus 90°	-
Spring Link Mounting to Cradle Nut	150	113	-
Toe Link to Cradle Mounting Nut	180	133	-
Toe Link to Knuckle Mounting Bolt (Steel Link)	155	116	-
Camber Link to Cradle Mounting Nut	60 Plus 90°	44 Plus 90°	-
Camber Link to Knuckle Mounting Nut	60 Plus 90°	44 Plus 90°	-

2014 Jeep Cherokee Trailhawk

2014 SUSPENSION Rear Suspension - Cherokee

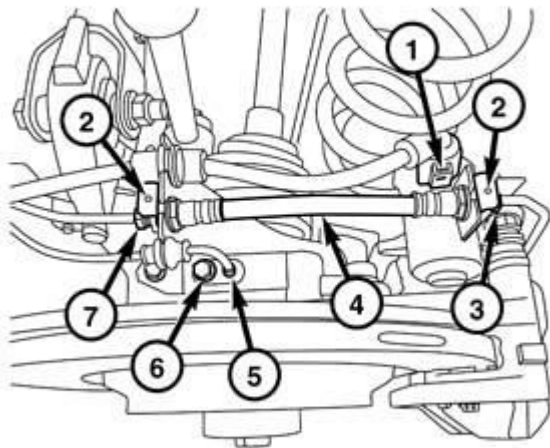
Shock to Knuckle Bolt (M14 bolt)	185	139	-
Shock Upper Mounting Nuts	49	37	-
Shock Rod Nut	30	22	-
Stabilizer Bar to Rear Crossmember Nut	60	44	-
Stabilizer Link Nut to Stabilizer Bar	55	41	-
Stabilizer Link Nut to Spring Link	55	41	-
Trailing Link to Body Mounting Bolts	105	79	-
Trailing Link to Knuckle Mounting Bolts	120	90	-
Wheel Mounting (Lug) Bolt - Aluminum Wheels	135	100	-

KNUCKLE, REAR

REMOVAL

REMOVAL

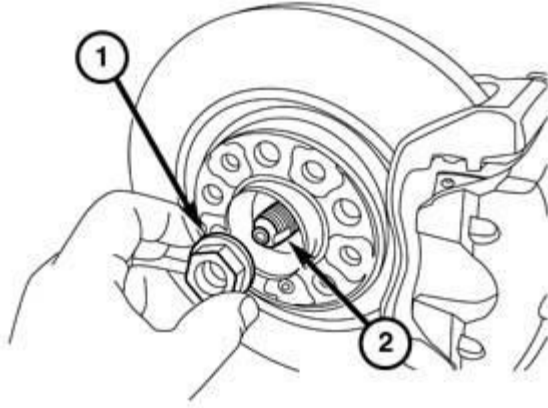
1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove the wheel mounting bolts, then the tire and wheel assembly.



1715005817

Fig. 1: Removing/Installing Rear Wheel Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

3. Remove wheel speed sensor retaining bolt (6) and wheel speed sensor (5) from knuckle.



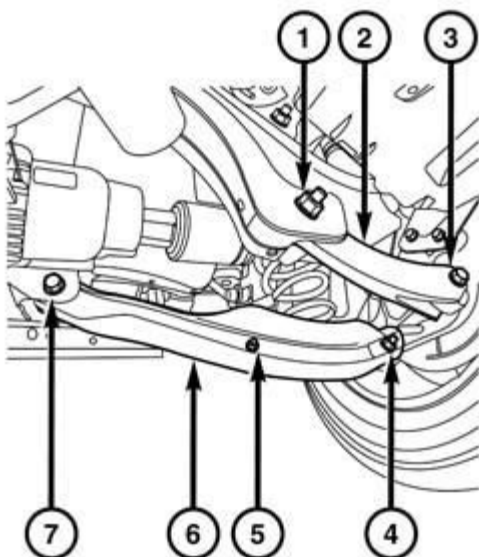
030369423

Fig. 2: Hub Nut & Halfshaft

Courtesy of CHRYSLER GROUP, LLC

4. If equipped with halfshaft, using a suitable punch, lift the two staked areas in the hub nut to avoid damaging the halfshaft.
5. While a helper applies the brakes to keep the hub from rotating, remove the hub nut (1) from the halfshaft (2) and discard it.

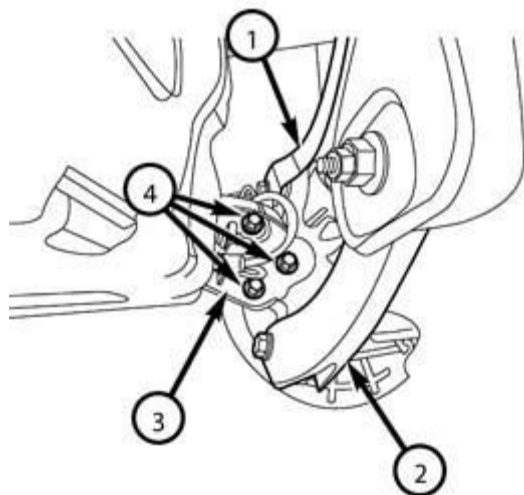
The used hub nut is not reusable.



1715005823

Fig. 3: Identifying Spring Link, Camber Link, Nuts & Bolts
 Courtesy of CHRYSLER GROUP, LLC

6. Remove the brake rotor. Refer to **ROTOR, BRAKE, REMOVAL** .
7. Support the outer end of the spring link (6).
8. Remove spring assembly. Refer to **SPRING(S), REMOVAL**.
9. Remove the camber link (2) from the knuckle. Refer to **LINK, CAMBER, REMOVAL**, **LINK, TOE, REMOVAL** and **LINK, SPRING, REMOVAL**.

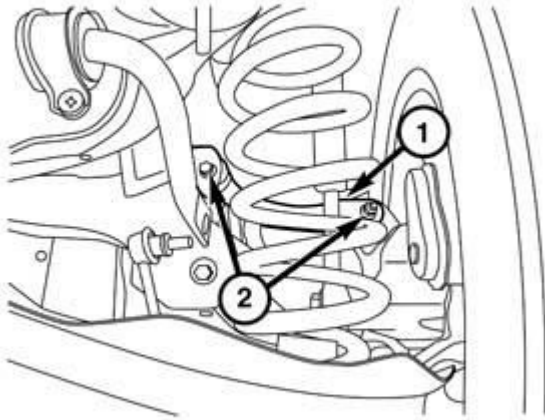


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Fig. 4: Identifying Toe Link, Trailing Link, Knuckle, Nuts & Bolts

Courtesy of CHRYSLER GROUP, LLC

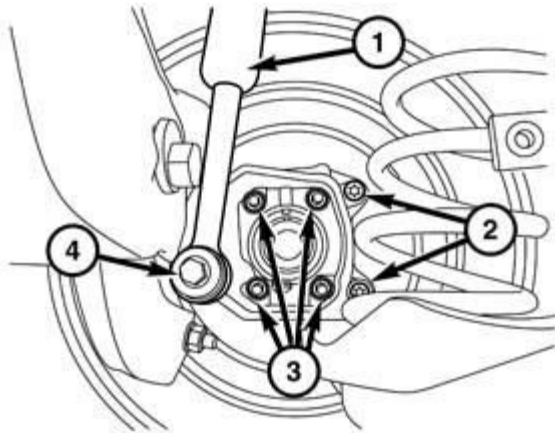
10. Remove the trailing link (3) from the knuckle. Refer to **LINK, TRAILING, REAR, REMOVAL**.



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Fig. 5: Identifying Toe Link, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

11. Remove the toe link (1) from the knuckle. Refer to **LINK, CAMBER, REMOVAL**, **LINK, TOE, REMOVAL** and **LINK, SPRING, REMOVAL**.



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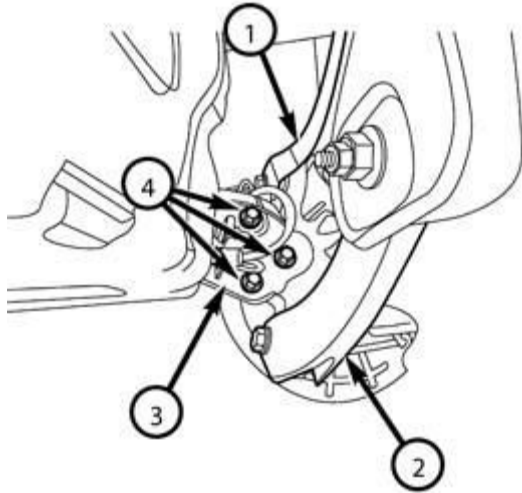
Fig. 6: Identifying Lower Shock, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

12. Disconnect the lower shock (1) from knuckle. Refer to **SHOCK ABSORBER, SUSPENSION, REMOVAL**.
13. Remove the rear knuckle from vehicle.
14. If necessary, remove the hub from the knuckle. Refer to **HUB AND BEARING, REMOVAL**.

INSTALLATION

INSTALLATION

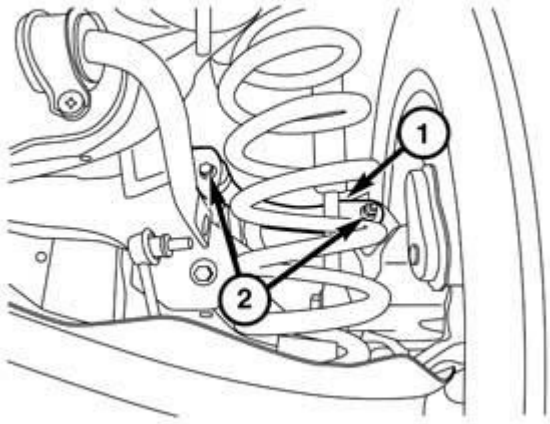
1. If necessary, install the hub/bearing in the knuckle. Refer to **HUB AND BEARING, INSTALLATION**.



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Fig. 7: Identifying Toe Link, Trailing Link, Knuckle, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

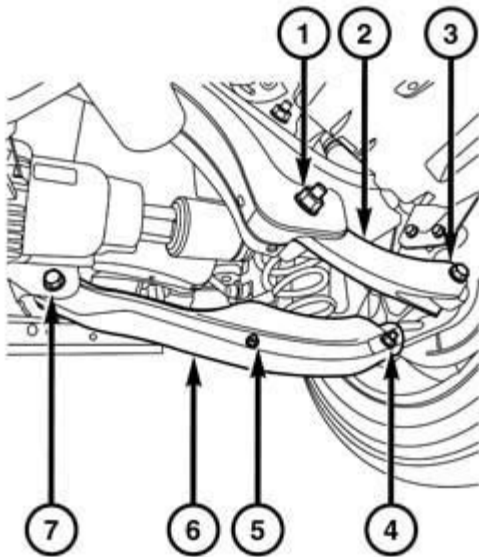
2. Position the knuckle to the trailing arm link (3) and install fasteners (4). Refer to **KNUCKLE, REAR, INSTALLATION**.



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Fig. 8: Identifying Toe Link, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Install the toe link (1) to the knuckle. Refer to **LINK, CAMBER, INSTALLATION**, **LINK, TOE, INSTALLATION** and **LINK, SPRING, INSTALLATION**.



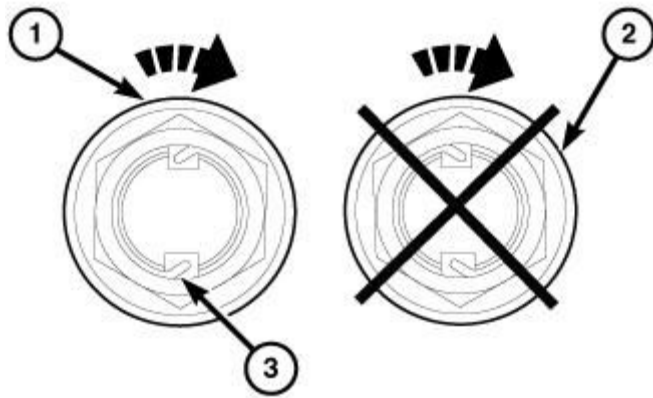
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Fig. 9: Identifying Spring Link, Camber Link, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

4. Install the camber link (2) to the knuckle. Refer to **LINK, CAMBER, INSTALLATION**, **LINK, TOE, INSTALLATION** and **LINK, SPRING, INSTALLATION**.
5. Install the spring. Refer to **SPRING(S), INSTALLATION**.
6. Remove the support from the spring link.
7. Install the brake rotor and brake caliper assembly. Refer to **ROTOR, BRAKE, INSTALLATION**.

NOTE: Always install a new hub nut. The original hub nut is one-time use only and must be discarded when removed.

8. If equipped with halfshaft, install a **NEW** hub nut and while a helper applies the brakes, tighten the nut to specifications. Refer to **SPECIFICATIONS**.



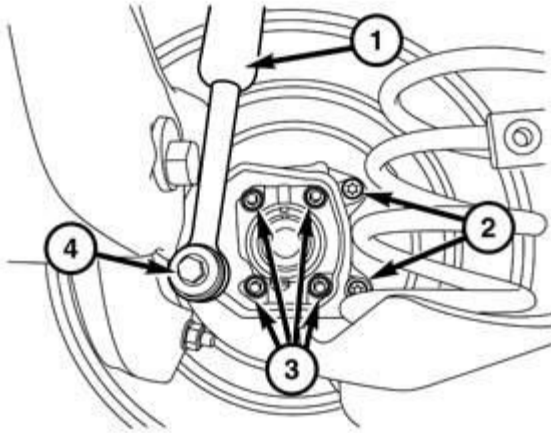
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Fig. 10: Correct Hub Nut Staking
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not use air tools on staking tool while staking hub nut.

9. Using (special tool #10287, Tool, Front Hub Staking) align the leading cutting edge of tool with the top left side channel on axle as shown (1). Tighten fastener on staking tool with hand tools until the threads bottom out completely.

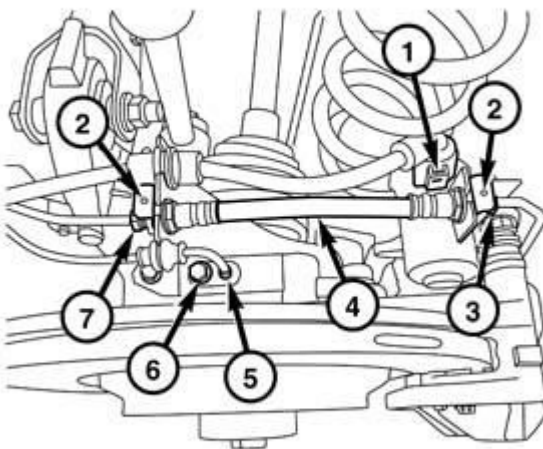
NOTE: The hub nut must be staked so that it looks similar to. Both edges must be split and bent into the shape shown (3). The staking must be in the opposite direction from the forward rotation of the wheel.



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Fig. 11: Identifying Lower Shock, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

10. Connect the lower shock (1) from knuckle. Refer to **SHOCK ABSORBER, SUSPENSION, INSTALLATION**.



1715005817

Fig. 12: Removing/Installing Rear Wheel Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

11. Install wheel speed sensor (5) into knuckle.
12. Install the retaining bolt (6) and tighten to specifications. Refer to **SPECIFICATIONS** .
13. Install the wheel and tire assembly. Refer to **INSTALLATION** .
14. Remove the supports and lower the vehicle.

HUB AND BEARING

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - HUB AND BEARING - NOISE

NOTE: **The wheel bearing is designed to last for the life of the vehicle and requires no type of periodic maintenance.**

Bearings will produce noise if worn or damaged. The noise will generally change when the bearings are loaded. A road test of the vehicle is normally required to determine if there is a bearing noise, or if it may be some other component, and to assist in finding the location. The following procedure, together with the **DIAGNOSTIC CHART** , should help determine the proper cause. Note that if a particular vehicle road test maneuver, steering to the right for instance, results in noise only part of the time, it is not likely a faulty bearing. Bearing noises are not typically intermittent.

NOTE: **Damaged bearing seals and the resulting excessive grease loss may also require bearing replacement. Moderate grease seepage from the bearing is considered normal and should not require replacement of the wheel bearing. Wheel bearings are designed to last the life of the vehicle and require no type of periodic maintenance. To diagnose the hub, measure hub runout. Refer to ROTOR, BRAKE, DIAGNOSIS AND TESTING .**

DIAGNOSTIC PROCEDURE:

1. Perform drive evaluation. Find a smooth level road surface void of traffic or obstructions. Turn off any accessories which may cause background noise. Evaluate for noise at 50 km/h (30 mph) and 100 km/h (60 mph) and with vehicle in neutral to eliminate potential drivetrain noises. With vehicle at a constant speed, steer back and forth to left and right (approximately 45 degree steering input each way). This will load and unload the bearings and may change the noise level. When bearing damage is slight, the noise is sometimes noticeable at lower speeds and at other times is more noticeable at higher speeds.
2. Drive evaluation results: Noise increase when turning right may indicate a problem with the left bearing. Noise increase when turning left may indicate a problem with the right bearing.
3. Put vehicle up on hoist. Grab the tire by pushing in on the top center and pulling out on the bottom center to check for excessive movement in the bearing.
4. Check for potential rubbing on rotating components, such as rotor splash shields, heat shields touching propshaft or halfshaft, wheel well liners contacting tire, wheel cover on wheel, etc. Any cyclic noise (once per wheel revolution for example) is not likely a wheel bearing fault.
5. Remove the wheel and tire assembly, disc brake caliper and brake rotor. Refer to **ROTOR, BRAKE,**

DIAGNOSIS AND TESTING .

6. Rotate the wheel hub, checking for resistance or roughness.
7. Any roughness or resistance to rotation may indicate dirt intrusion or a failed hub bearing. If the bearing exhibits any of these conditions, the hub & bearing will require replacement. Do not attempt to disassemble the bearing for repair.
8. Rotate the wheel hub, utilize Chassis Ears (or equivalent) to check for noise.
9. If none of the above checks indicate a bearing failure, refer to the **DIAGNOSTIC CHART** for other possible causes.

DIAGNOSTIC CHART - HUB & BEARING

CONDITION	POSSIBLE CAUSES	POTENTIAL CORRECTIONS
FRONT END WHINE ON TURNS	1. Low Power Steering Fluid Level (if applicable) 2. Worn Tires and/or Incorrect Wheel Alignment 3. Defective Wheel Bearing 4. Wrong Power Steering Fluid (if applicable)	1. Fill power steering fluid reservoir to proper level, check for leaks (make sure all air is bled from system fluid) 2. Replace Tires, Check And Reset Wheel Alignment 3. Replace Wheel Bearing 4. Replace With Correct Power Steering Fluid
FRONT END GROWL OR GRINDING ON TURNS	1. Loose Wheel Lug Nuts 2. Engine Mount Grounding Against Frame Or Body Of Vehicle 3. Worn Tires and/or Incorrect Wheel Alignment 4. Defective Wheel Bearing 5. Worn or Broken C/V Joint 6. Engine Not Centered, Causing Axle Half Shaft to Bottom Out	1. Verify Wheel Lug Nut Torque 2. Check For Engine Mount Hitting Frame Rail And Reposition Engine As Required 3. Replace Tires, Check and Reset Wheel Alignment 4. Replace Wheel Bearing 5. Replace C/V Joint 6. Center the Engine
POPPING/CLICKING/SNAPPING DURING ACCELERATION AFTER DRIVE-TO-REVERSE SHIFT, REVERSE-TO-DRIVE SHIFT OR WHILE TURNING	1. Insufficient Hub Nut Torque 2. Insufficient Grease on Mating Surface of Axle Half Shaft Outer C/V Joint to Wheel Hub/Bearing, or Worn/Damaged Gasket	1. Torque Hub Nut to Spec 2. Separate Half Shaft From Hub and Bearing and Wipe Mating Surfaces Clean. Apply Light Coating of Wheel Bearing Grease to C/V Joint Surface and Reassemble, or Replace Gasket. Torque Hub

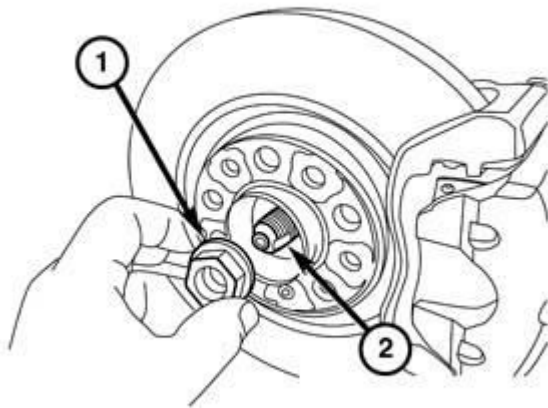
		Nut to Spec
WHINE/HUM/ROAR WITH VEHICLE GOING STRAIGHT AT A CONSTANT SPEED	1. Worn Tires and/or Incorrect Wheel Alignment 2. Defective Wheel Bearing	1. Replace Tires and Reset Wheel Alignment 2. Replace Wheel Bearing
GROWL OR GRINDING WITH VEHICLE GOING STRAIGHT AT A CONSTANT SPEED	1. Engine Mount Grinding Against Frame or Body 2. Defective Wheel Bearing 3. Worn or Broken C/V Joint	1. Check and Reposition Engine as Required 2. Replace Wheel Bearing 3. Replace C/V Joint

REMOVAL

REMOVAL

NOTE: Before proceeding, refer to **WARNING**.

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove the wheel mounting bolts, then the tire and wheel assembly.



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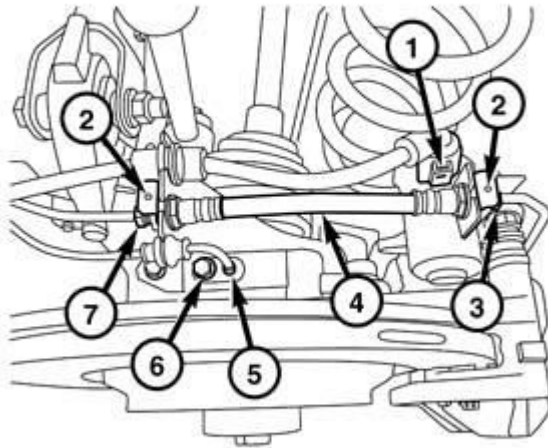
Fig. 13: Hub Nut & Halfshaft
Courtesy of CHRYSLER GROUP, LLC

3. Using a suitable punch, lift the two staked areas in the hub nut to avoid damaging the halfshaft (if equipped).
4. While a helper applies the brakes to keep the hub from rotating, remove the hub nut (1) from the halfshaft

(if equipped) (2) and discard it.

The used hub nut is not reusable.

5. Access and remove the rear brake rotor. Refer to **ROTOR, BRAKE, REMOVAL** .

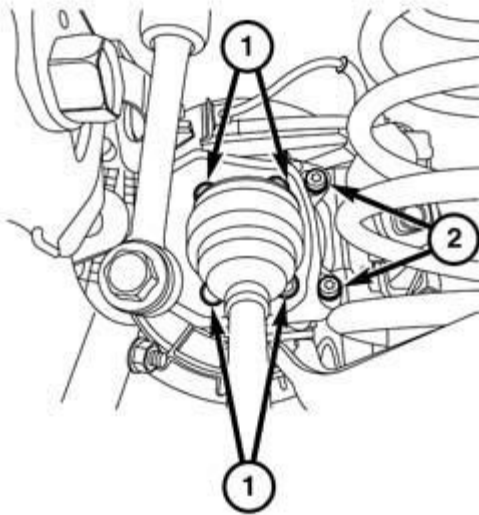


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Fig. 14: Removing/Installing Rear Wheel Speed Sensor

Courtesy of CHRYSLER GROUP, LLC

6. Remove the rear wheel speed sensor retaining bolt (6) and remove the sensor (5) from the knuckle.



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Fig. 15: Removing Caliper Bracket Mounting Bolts And Mounting Bracket
Courtesy of CHRYSLER GROUP, LLC

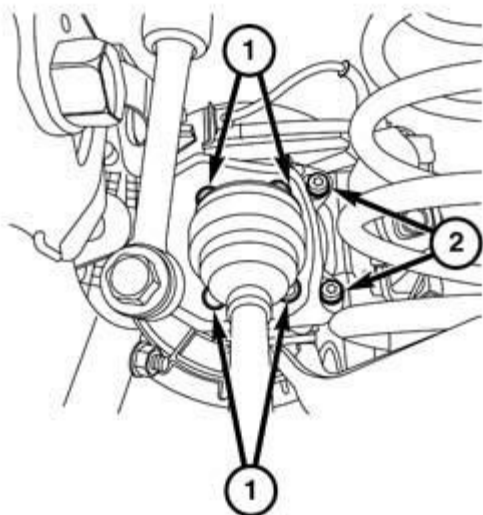
7. Remove the four bolts (1) fastening the hub and bearing to the knuckle.

NOTE: **The bolts are one time use and need to be discarded.**

8. Slide the hub and bearing off the halfshaft (if equipped) and out of the knuckle.

INSTALLATION

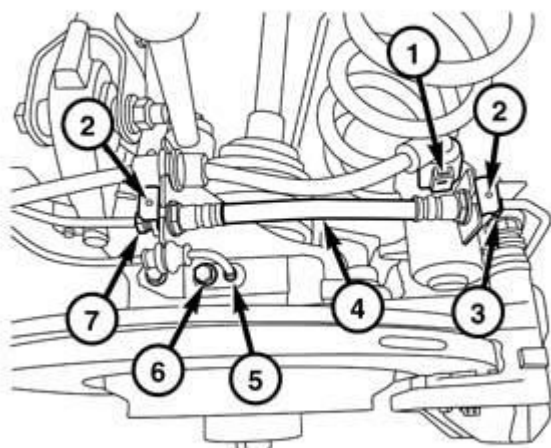
INSTALLATION



1715005821

Fig. 16: Removing Caliper Bracket Mounting Bolts And Mounting Bracket
Courtesy of CHRYSLER GROUP, LLC

1. Slide the hub and bearing onto the half shaft (if equipped) and install into the knuckle.
2. Install four **NEW** mounting bolts (1). Refer to **SPECIFICATIONS** and tighten to specifications.



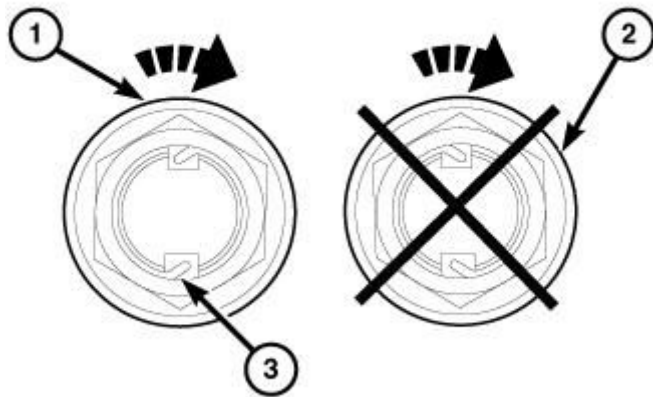
1715005817

Fig. 17: Removing/Installing Rear Wheel Speed Sensor
Courtesy of CHRYSLER GROUP, LLC

3. Install the rear wheel speed sensor (5) in the knuckle.
4. Install the retaining bolt (6) and tighten to specifications. Refer to **SPECIFICATIONS** .

NOTE: Always install a new hub nut. The original hub nut is one-time use only and must be discarded when removed.

5. Install the rear brake rotor. Refer to **ROTOR, BRAKE, INSTALLATION** .
6. Install a **NEW** hub nut and while a helper applies the brakes, tighten the nut to specifications. Refer to **SPECIFICATIONS**.



3112889

Fig. 18: Correct Hub Nut Staking
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not use air tools on staking tool while staking hub nut.

7. Using (special tool #10287, Tool, Front Hub Staking) align the leading cutting edge of tool with the top left side channel on axle as shown (1). Tighten fastener on staking tool with hand tools until the threads bottom out completely.

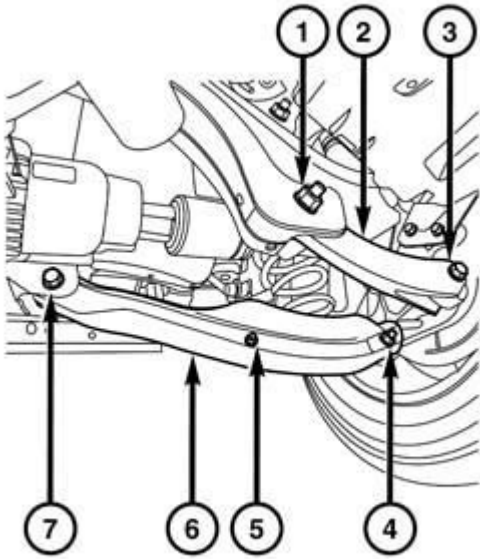
NOTE: The hub nut must be staked so that it looks similar to **Fig. 2**. Both edges must be split and bent into the shape shown (3). The staking must be in the opposite direction from the forward rotation of the wheel.

8. Install the wheel and tire assembly. Refer to **INSTALLATION** .
9. Lower the vehicle.
10. Pump the brake pedal several times to ensure the vehicle has a firm brake pedal before moving the vehicle.

LINK, STABILIZER BAR

REMOVAL

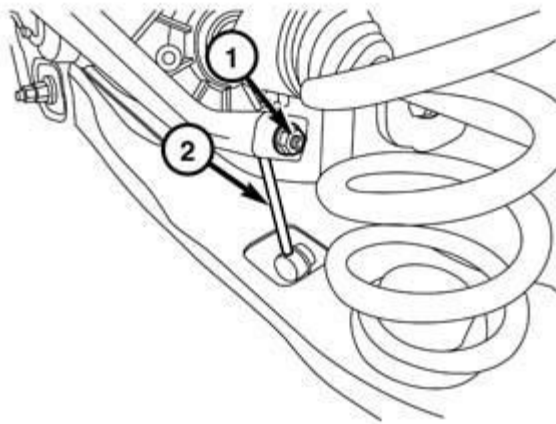
REMOVAL



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Fig. 19: Identifying Spring Link, Camber Link, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Hold the stabilizer bar link stud stationary and remove the lower nut (5) securing the link.



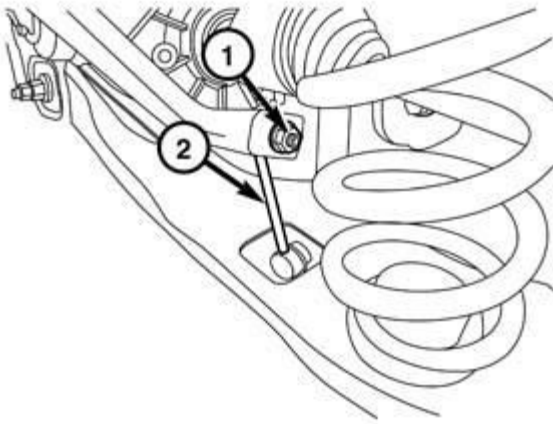
1715005806

Fig. 20: Identifying Stabilizer Bar Link & Upper Nut
Courtesy of CHRYSLER GROUP, LLC

3. Hold the stabilizer bar link stud stationary and remove the upper nut (1) securing the link (2).
4. Remove the stabilizer bar link (2).

INSTALLATION

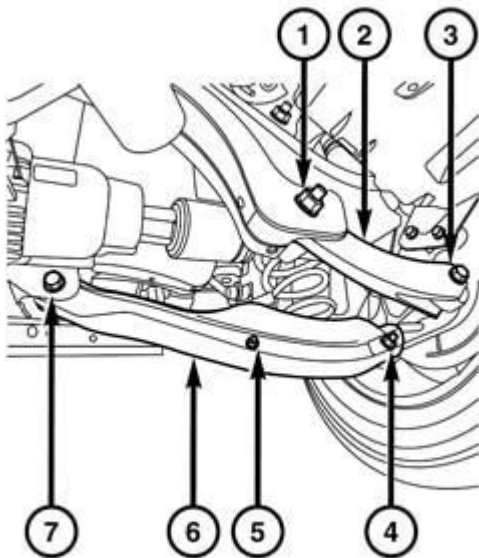
INSTALLATION



1715005806

Fig. 21: Identifying Stabilizer Bar Link & Upper Nut
 Courtesy of CHRYSLER GROUP, LLC

1. Install the stabilizer link (2) upper stud in the end of the stabilizer bar from the outboard side. Install the nut (1) on the upper stud and while holding the stabilizer link stud stationary, tighten the nut to specifications. Refer to **SPECIFICATIONS**.



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Fig. 22: Identifying Spring Link, Camber Link, Nuts & Bolts

Courtesy of CHRYSLER GROUP, LLC

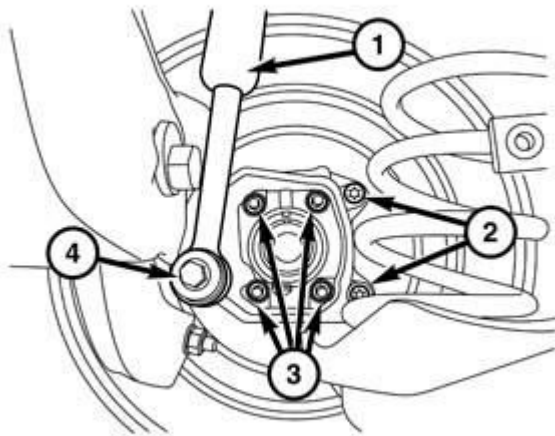
2. Attach the stabilizer bar link to the spring link (6). Install the nut (5) and while holding the stabilizer bar link lower stud stationary, tighten the nut (5) to specification. Refer to **SPECIFICATIONS**.
3. Lower the vehicle.

SHOCK ABSORBER, SUSPENSION

REMOVAL

REMOVAL

NOTE: Before proceeding, refer to **WARNING**.

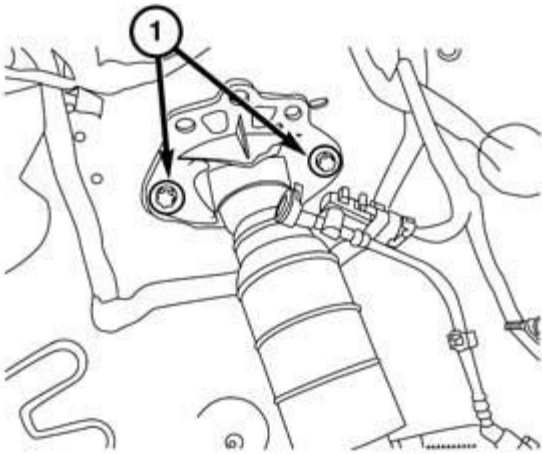


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Fig. 23: Identifying Lower Shock, Nuts & Bolts

Courtesy of CHRYSLER GROUP, LLC

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove the wheel mounting bolts, then the rear tire and wheel assembly.
3. Remove the wheel house splash shield. Refer to **SHIELD, SPLASH, REAR WHEELHOUSE, REMOVAL**.
4. Support the rear suspension with a jack stand or equivalent.
5. Remove the bolt (4) securing the lower end of the shock assembly (1) to the lower knuckle assembly.



171868833

Fig. 24: Upper Shock Mounting Bolts
Courtesy of CHRYSLER GROUP, LLC

6. Remove the upper shock mounting bolts (1) and remove the shock from the vehicle.

DISASSEMBLY

DISASSEMBLY



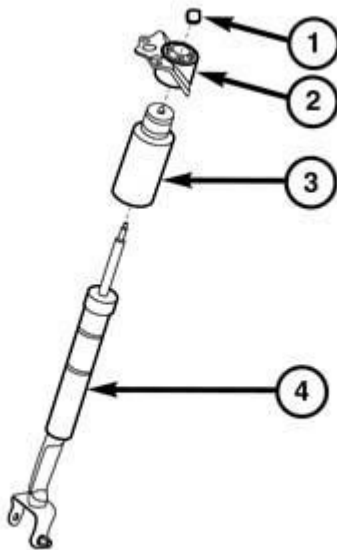
Fig. 25: Identifying Pliers On Chrome Machined Surface Of Shock/Strut Rod

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not use any type of pliers on the chrome machined surface of shock/strut rod to assist in the disassembly/assembly of shocks or struts. Use only tools designed to hold the shock/strut rod stationary when servicing shock or strut components.

NOTE: View is typical

NOTE: The shock assembly must be removed from the vehicle for it to be disassembled and assembled. Refer to **SHOCK ABSORBER, SUSPENSION, REMOVAL**.



171069591

Fig. 26: Retaining Nut, Upper Shock Mount, Dust Shield & Shock Body
Courtesy of CHRYSLER GROUP, LLC

1. Remove the retaining nut (1) using the appropriate shock absorber tool kit.
2. Remove the upper shock mount (2).
3. Remove the dust shield (3) from the shock body (4).
4. Perform the inspection procedure below:
 - Inspect the shock absorber (damper) (4) for shaft binding over the full stroke of the shaft.
 - Inspect the dust shield (3) for cracks and tears.
 - Check the upper mounting bracket (2) for cracks and distortion
5. For reassembly, refer to **SHOCK ABSORBER, SUSPENSION, ASSEMBLY**.

ASSEMBLY

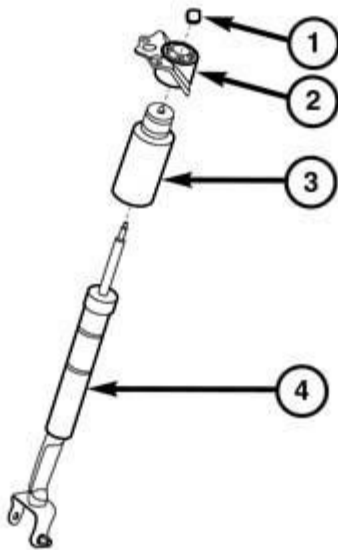
ASSEMBLY



Fig. 27: Identifying Pliers On Chrome Machined Surface Of Shock/Strut Rod
Courtesy of CHRYSLER GROUP, LLC

CAUTION: Do not use any type of pliers on the chrome machined surface of shock/strut rod to assist in the disassembly/assembly of shocks or struts. Use only tools designed to hold the shock/strut rod stationary when servicing shock or strut components.

NOTE: View is typical



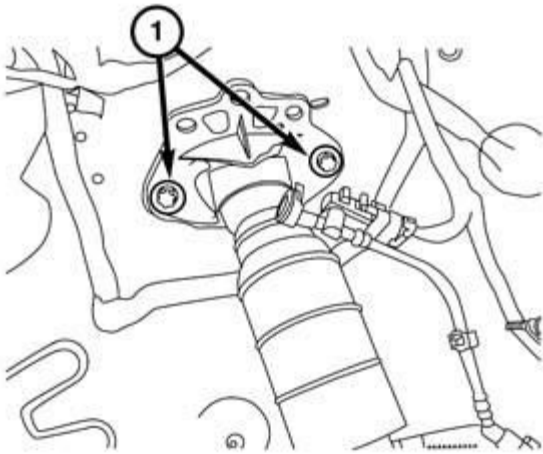
171069591

Fig. 28: Retaining Nut, Upper Shock Mount, Dust Shield & Shock Body
Courtesy of CHRYSLER GROUP, LLC

1. Place the dust shield (3) over the shock body (4).
2. Install the upper shock mount (2) and install the retaining nut (1). Using the appropriate shock absorber tool kit, tighten the nut to 30 N.m (22 ft. lbs.).
3. Install the shock in the vehicle. Refer to **SHOCK ABSORBER, SUSPENSION, INSTALLATION**.

INSTALLATION

INSTALLATION

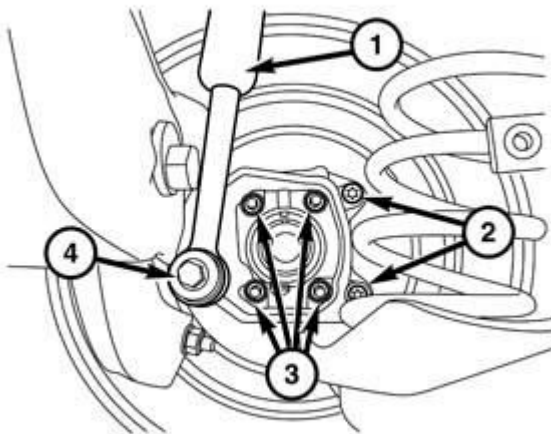


171868833

Fig. 29: Upper Shock Mounting Bolts

Courtesy of CHRYSLER GROUP, LLC

1. Use a jack stand or equivalent to raise the suspension into position.
2. Install the shock upper mount to the body and install the upper mounting bolts (1) and tighten to specifications. Refer to **SPECIFICATIONS**.



0508006463

Fig. 30: Identifying Lower Shock, Nuts & Bolts

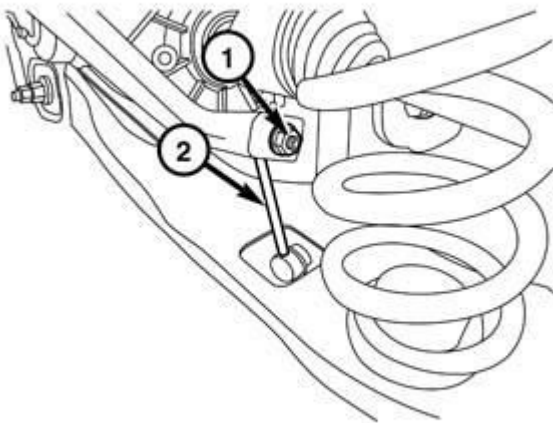
Courtesy of CHRYSLER GROUP, LLC

3. Position the lower end of the shock (1) to the knuckle assembly.
4. Install the lower retaining bolt (4) and tighten to specifications. Refer to **SPECIFICATIONS**.
5. Install the wheel house splash shield. Refer to **SHIELD, SPLASH, REAR WHEELHOUSE, INSTALLATION**.
6. Install the tire and wheel assembly. Refer to **INSTALLATION**.
7. Lower the vehicle.

SPRING(S)

REMOVAL

REMOVAL



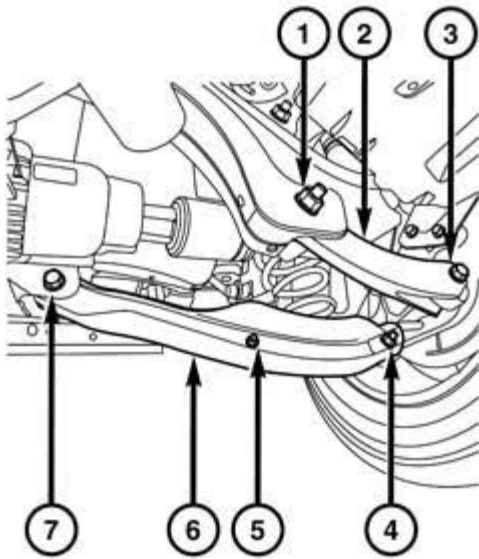
1715005806

Fig. 31: Identifying Stabilizer Bar Link & Upper Nut

Courtesy of CHRYSLER GROUP, LLC

NOTE: Before proceeding, refer to **WARNING**.

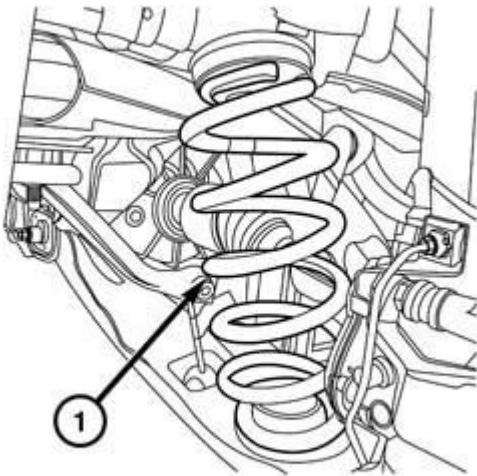
1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove the wheel mounting bolts, then the rear tire and wheel assembly.
3. Hold the upper stud stationary and remove the stabilizer link nut (1).
4. Separate the stabilizer link (2) from the stabilizer bar.



1715005823

Fig. 32: Identifying Spring Link, Camber Link, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Support the suspension with a jack stand or equivalent.
6. Remove the spring link bolt (4) and separate the spring link (6) from the knuckle.



1715005820

Fig. 33: Identifying Coil Spring

Courtesy of CHRYSLER GROUP, LLC

7. Slowly lower the jack stand and remove the coil spring (1).
8. If replacing the spring, remove the spring isolators from the top and bottom of the spring.

INSTALLATION

INSTALLATION

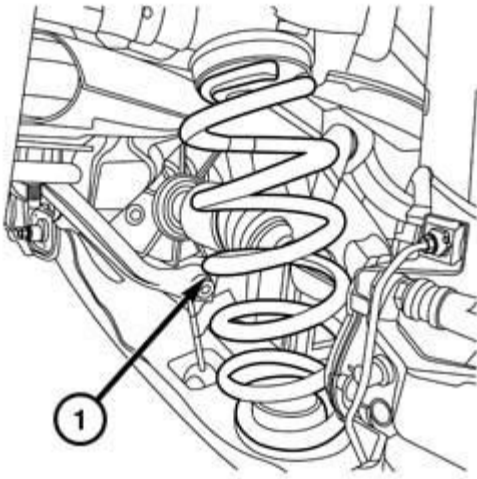


Fig. 34: Identifying Lower End Of Spring & Spring Isolator
Courtesy of CHRYSLER GROUP, LLC

NOTE: When installing the spring, the lower end of the spring (1) and the spring isolator orientation feature (2) must be aligned as shown. The lower end of the spring is always outboard.

NOTE: The label on the spring is always closest to the top isolator.

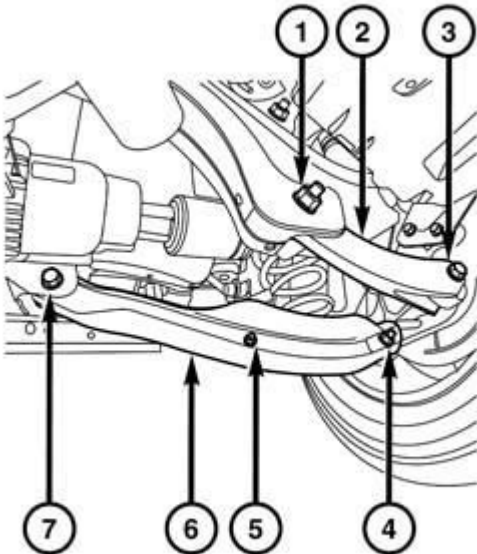
1. If spring isolators were removed or a new spring is being installed, place spring isolator on each end of spring.



1715005820

Fig. 35: Identifying Coil Spring
Courtesy of CHRYSLER GROUP, LLC

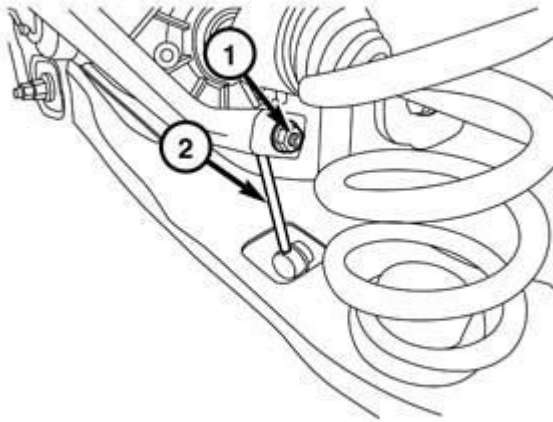
2. Place the coil spring (1) on top of the spring link perches.



1715005823

Fig. 36: Identifying Spring Link, Camber Link, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Use a jack stand or equivalent to raise the suspension into place.
4. Position the spring link (6) in the installed position and install the bolt (4). Do not tighten to specification at this time.



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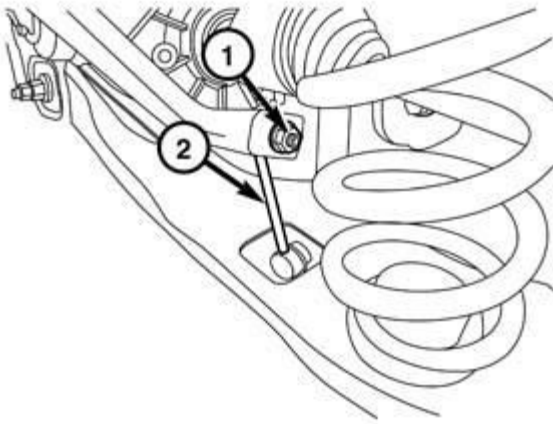
Fig. 37: Identifying Stabilizer Bar Link & Upper Nut
Courtesy of CHRYSLER GROUP, LLC

5. Install the stabilizer link (2) stud to the stabilizer bar and install the retaining nut (1).
6. While holding the stabilizer link stud stationary, tighten the nut to specifications. Refer to **SPECIFICATIONS**.
7. Install the tire and wheel assembly. Refer to **INSTALLATION**.
8. Lower the vehicle to normal ride height and tighten the spring link to the lower knuckle assembly bolt to specifications. Refer to **SPECIFICATIONS**.
9. Check for proper vehicle curb height. Refer to **WHEEL ALIGNMENT, STANDARD PROCEDURE**.

STABILIZER BAR, REAR SUSPENSION

REMOVAL

REMOVAL



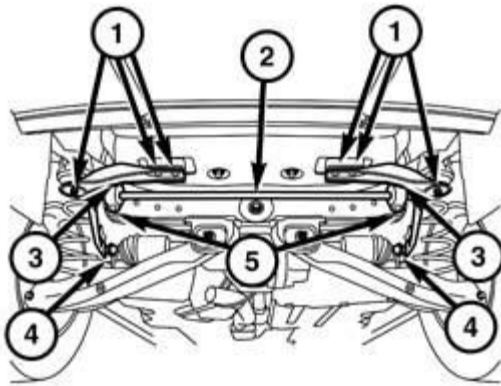
1715005806

Fig. 38: Identifying Stabilizer Bar Link & Upper Nut
Courtesy of CHRYSLER GROUP, LLC

NOTE: Before proceeding, refer to **WARNING**.

NOTE: The stabilizer cushions are not serviced separately. If they require replacement, the entire stabilizer bar must be replaced.

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. On each side of the vehicle, while holding the stabilizer bar link studs stationary, remove the nuts (1) securing the link (2) to the stabilizer bar.



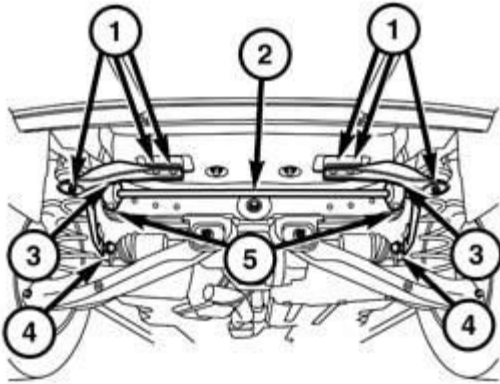
0508006461

Fig. 39: Identifying Stabilizer Bar, Crossmember, Brackets & Fasteners
Courtesy of CHRYSLER GROUP, LLC

3. On each side of the vehicle, remove the screws (1) securing the brackets (3) to the crossmember and remove brackets.
4. On each side of the vehicle, remove the upper and lower screws (5) securing the stabilizer bar (2) to the crossmember.
5. Remove the stabilizer bar (2) from the vehicle.

INSTALLATION

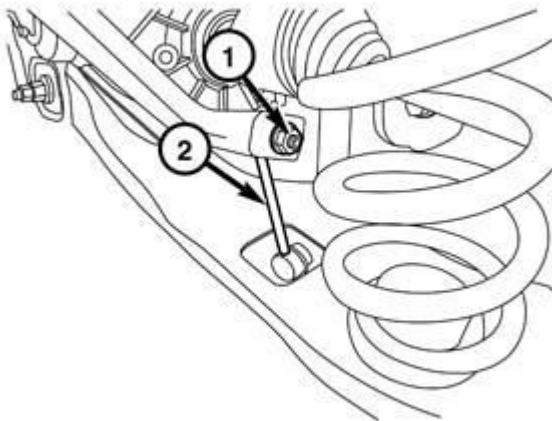
INSTALLATION



0508006461

Fig. 40: Identifying Stabilizer Bar, Crossmember, Brackets & Fasteners
Courtesy of CHRYSLER GROUP, LLC

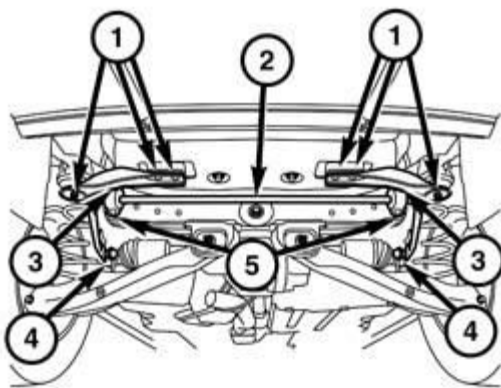
1. Position the stabilizer bar (2) on the rear crossmember.
2. Install the upper and lower retaining screws (5) in the mounting holes. Do not tighten the screws at this time.



1715005806

Fig. 41: Identifying Stabilizer Bar Link & Upper Nut
Courtesy of CHRYSLER GROUP, LLC

3. On each side of the vehicle, install the stabilizer link (2) studs, one in the in the end of the stabilizer bar and one in the lower mounting location. Install the nut (1) on each end and while holding the stabilizer link stud stationary, tighten each nut to specifications. Refer to **SPECIFICATIONS**.
4. On each side of the vehicle, tighten the stabilizer bar to crossmember retainer screws (1). Refer to **SPECIFICATIONS**.



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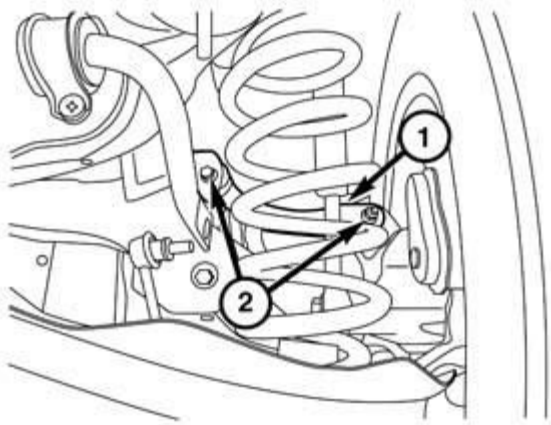
Fig. 42: Identifying Stabilizer Bar, Crossmember, Brackets & Fasteners
Courtesy of CHRYSLER GROUP, LLC

5. On each side of the vehicle, install the brackets (3) and the screws (1) securing the brackets to the crossmember.
6. Lower the vehicle.

LINK, CAMBER

DESCRIPTION

DESCRIPTION



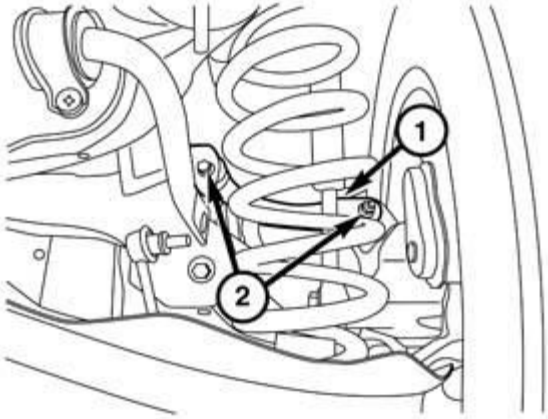
1710009334

Fig. 43: Identifying Toe Link, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

The camber link (1) is connected between the cradle and the front of the knuckle with a bonded bushing on each end. The bushings are serviced with a new link only. On the knuckle side of the link, the bushing is not between two parts of a bracket. Because of this the bolt (2) has a captive washer that will hold the bushing/link in place if the bonding were to separate from the link. Make sure that the proper bolts and nuts are used when servicing.

REMOVAL

REMOVAL



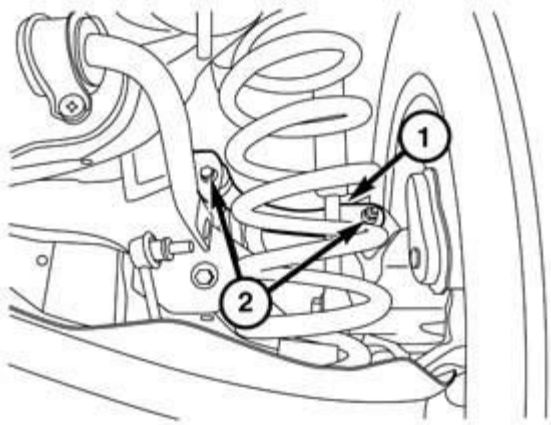
1710009334

Fig. 44: Identifying Toe Link, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove the camber link to cradle bolt/nut (2), the camber link to knuckle bolt/nut (2) and remove the camber link (1) from the vehicle.

INSTALLATION

INSTALLATION



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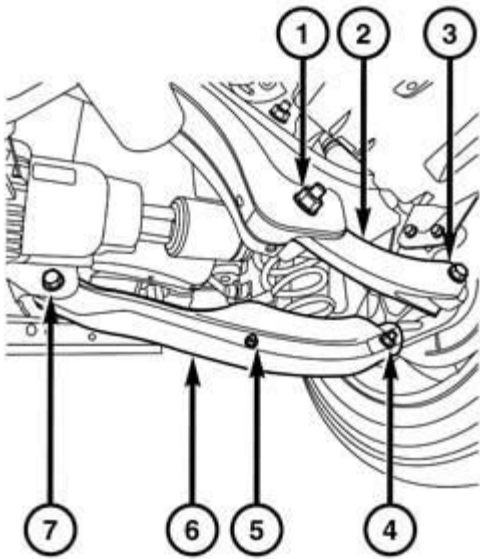
Fig. 45: Identifying Toe Link, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Position the camber link (1) and install the camber link to knuckle bolt/nut (2) and camber link to cradle cam bolt/nut (2). Do not tighten.
2. Using a suitable holding fixture, support the outboard end of the spring link and lift it to normal ride height.
3. Tighten the camber link to knuckle bolt/nut to specifications. Refer to **SPECIFICATIONS**.
4. Tighten the camber link to cradle bolt/nut to specifications. Refer to **SPECIFICATIONS**.
5. Remove the spring link holding fixture.
6. Lower the vehicle.

LINK, TOE

DESCRIPTION

DESCRIPTION



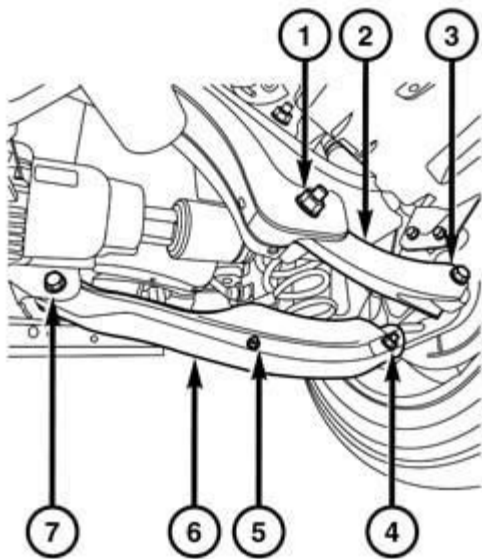
1715005823

Fig. 46: Identifying Spring Link, Camber Link, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

The toe link (2) is connected between the cradle and the middle of the knuckle with a bonded bushing on the cradle side end. The bushing is serviced with a new link only. On the cradle side of the link a cam bolt (1) is used for alignment purposes. On the knuckle side of the link, the bushing is on the knuckle and is between the two parts of the toe link. Make sure that the proper bolts and nuts are used when servicing.

REMOVAL

REMOVAL



1715005823

Fig. 47: Identifying Spring Link, Camber Link, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

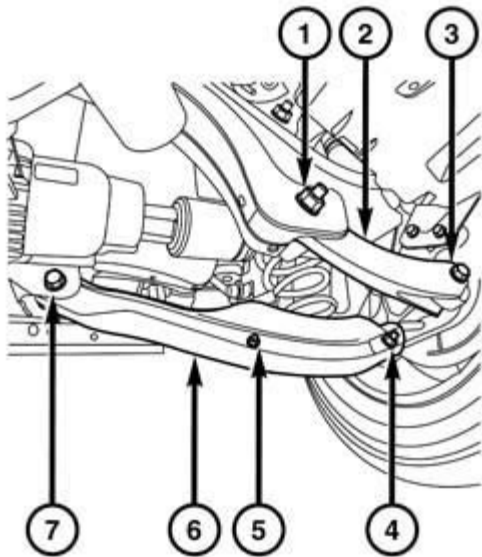
1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove the wheel.

NOTE: Mark the position of the cam nut/bolt on the cradle side for installation.

3. Remove and discard the toe link to cradle bolt/nut (1) and the toe link to knuckle bolt/nut (3) and remove the toe link (2) from the vehicle.

INSTALLATION

INSTALLATION



1715005823

Fig. 48: Identifying Spring Link, Camber Link, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

1. Position the toe link (2) and install a **New** link to knuckle bolt/nut (3). Do not tighten.

NOTE: Always use new fasteners

2. Install a **New** toe link to cradle cam bolt/nut (1). Do not tighten.
3. Using a suitable holding fixture, support the outboard end of the spring link and lift it to normal ride height.
4. Tighten the toe link to knuckle bolt/nut (3) to specifications. Refer to **SPECIFICATIONS**.

NOTE: Position the cam as close to removal marking as possible to aid in alignment.

5. Tighten the toe link to cradle cam bolt/nut (1) to specifications. Refer to **SPECIFICATIONS**.
6. Remove the spring link holding fixture.
7. Install the wheel. Refer to **INSTALLATION**.
8. Remove the supports and lower the vehicle.
9. Perform an alignment. Refer to **WHEEL ALIGNMENT, STANDARD PROCEDURE**.

LINK, SPRING

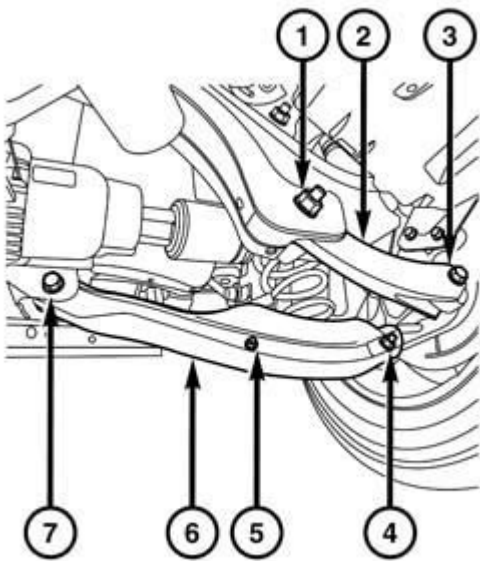
REMOVAL

REMOVAL



A multimedia supplement to the instructions contained in this article is available.

To view the multimedia example of the condition described go to;
<http://www.youtube.com/user/Mitchell1Tips>
then type "A00641397.vid1" into the "Search Channel" box.



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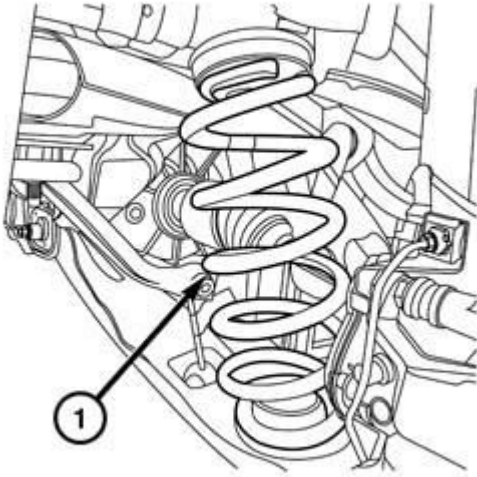
Fig. 49: Identifying Spring Link, Camber Link, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: On four wheel drive models, the spring link to cradle bolt (7) will contact the rear differential unit when attempting to remove it. To remove it, partially remove the bolt, cut it in half, then remove the remaining portion of the bolt. Install the new bolt and cam nut in the opposite direction from which it was removed.

1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove the wheel mounting bolts then the tire and wheel assembly.
3. Support the spring link with a jack stand or equivalent.
4. While holding the lower stud stationary, remove the lower stabilizer link nut (5) and separate the link from the spring link.

NOTE: Mark the location of the outer mounting bolt (4) with a grease pencil or equivalent to mark the position to help during installation and rear wheel alignment.

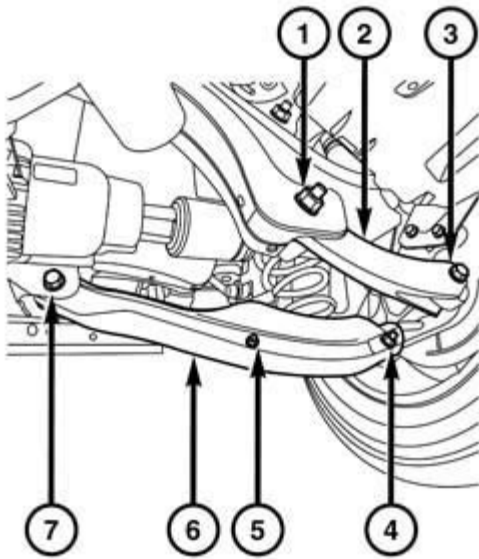
5. Remove and discard the bolt/nut (4) from the spring link (6).



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Fig. 50: Identifying Coil Spring
Courtesy of CHRYSLER GROUP, LLC

6. Slowly lower the jack stand or equivalent and remove the rear spring (1) from the vehicle while separating the spring link from the knuckle.



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Fig. 51: Identifying Spring Link, Camber Link, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: Mark the location of the inner mounting bolts (7) with a paint marker or equivalent. The marked location will be used during installation to make sure the rear alignment is not changed.

7. Remove and discard the spring link bolt/nut (7) from the spring link.

INSTALLATION

INSTALLATION



Fig. 52: Identifying Lower End Of Spring & Spring Isolator
Courtesy of CHRYSLER GROUP, LLC

NOTE: When installing the spring, the lower end of the spring (1) and the spring isolator orientation feature (2) must be aligned as shown. The lower end of the spring is always outboard.

NOTE: The label on the spring is always closest to the top isolator.

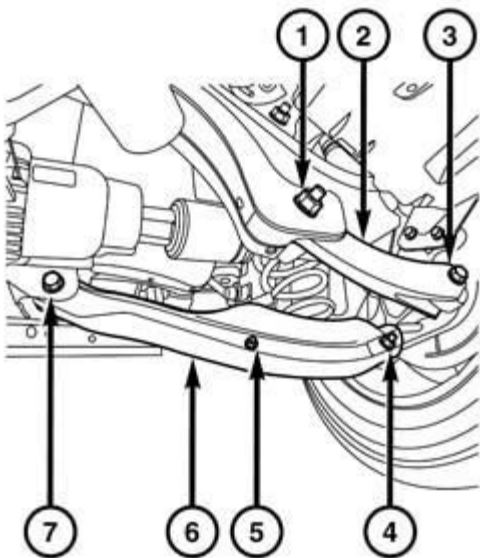


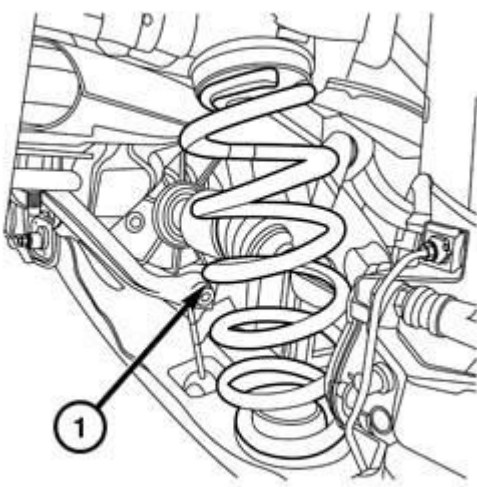
Fig. 53: Identifying Spring Link, Camber Link, Nuts & Bolts

Courtesy of CHRYSLER GROUP, LLC

1. Position the spring link (6) to the mount.

NOTE: On four wheel drive models, install the spring link to cradle bolt in the opposite direction from which it was removed.

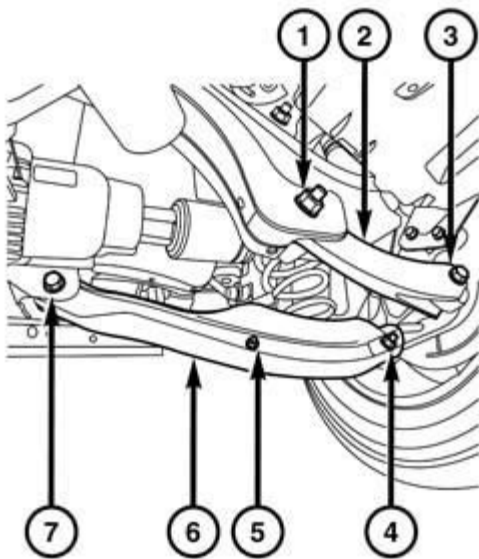
2. Install a **NEW** bolt/nut (7), but do not tighten to specification at this time. Support the spring link with a jack stand or equivalent.



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Fig. 54: Identifying Coil Spring
Courtesy of CHRYSLER GROUP, LLC

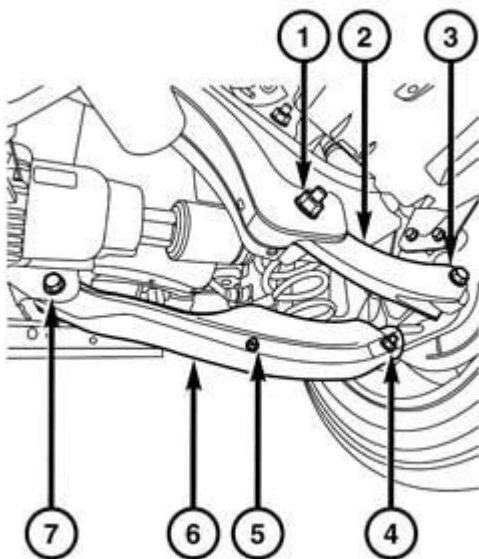
3. Install the rear spring (1) into the vehicle.



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Fig. 55: Identifying Spring Link, Camber Link, Nuts & Bolts
 Courtesy of CHRYSLER GROUP, LLC

4. While raising the jack stand or equivalent, attach the spring link (6) to the knuckle.
5. Install a **NEW** bolt/nut (4) but do not tighten to specification at this time.



1715005823

Fig. 56: Identifying Spring Link, Camber Link, Nuts & Bolts

Courtesy of CHRYSLER GROUP, LLC

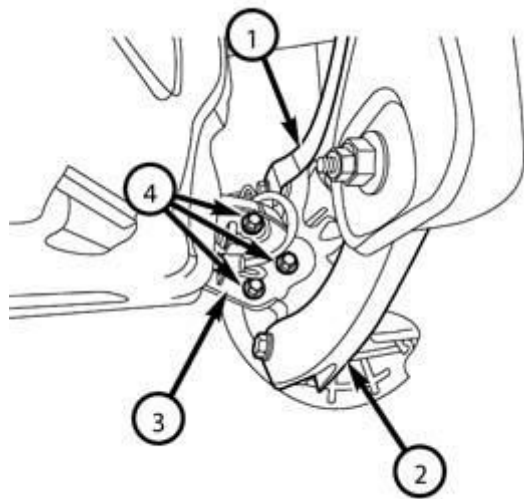
6. Install the stabilizer link to the spring link.
7. Hold the stabilizer stud stationary and tighten the retaining nut to specifications. Refer to **SPECIFICATIONS**.
8. Install the tire and wheel assembly. Refer to **INSTALLATION**.
9. Lower vehicle to normal ride height. Tighten the spring link to knuckle and the spring link to cradle fasteners to specifications. Refer to **SPECIFICATIONS**.
10. Perform wheel alignment as necessary. Refer to **WHEEL ALIGNMENT, STANDARD PROCEDURE**.

LINK, TRAILING, REAR

REMOVAL

REMOVAL

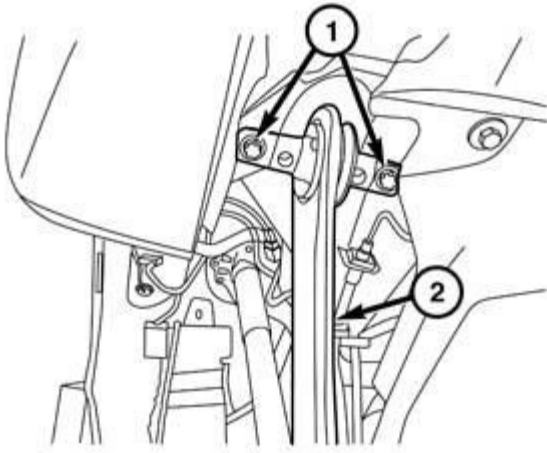
1. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove the wheel mounting bolts, then the tire and wheel assembly.



1710009331

Fig. 57: Identifying Toe Link, Trailing Link, Knuckle, Nuts & Bolts
Courtesy of CHRYSLER GROUP, LLC

3. Remove the routing clips attached to the trailing link (3).
4. Remove the three bolts (4) securing the knuckle to the trailing link (3).



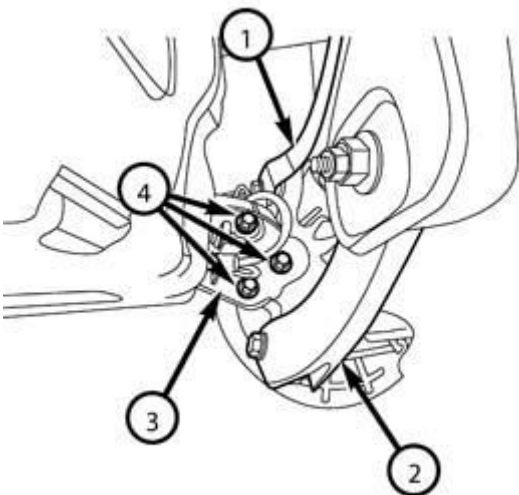
1710009335

Fig. 58: Identifying Trailing Link & Bolts
Courtesy of CHRYSLER GROUP, LLC

5. Remove the two bolts (1) fastening the leading end of the trailing link (2) to the body.
6. Remove the trailing link.

INSTALLATION

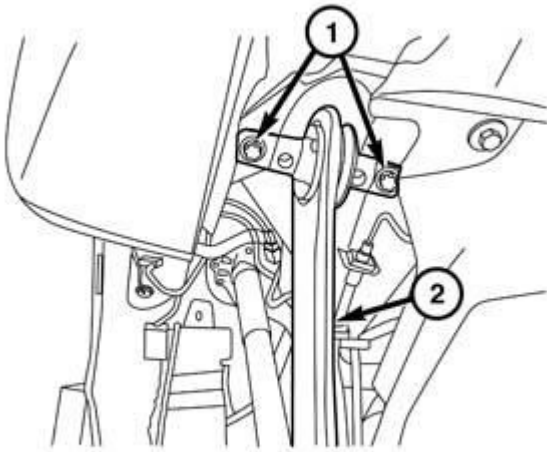
INSTALLATION



1710009331

Fig. 59: Identifying Toe Link, Trailing Link, Knuckle, Nuts & Bolts
 Courtesy of CHRYSLER GROUP, LLC

1. Position the trailing link (3) and install the three bolts (4) securing the trailing link to the knuckle. Tighten the mounting bolts to specifications. Refer to **SPECIFICATIONS**.



1710009335

Fig. 60: Identifying Trailing Link & Bolts
 Courtesy of CHRYSLER GROUP, LLC

2. Position the forward end of the trailing link (2) on the body and install the two mounting bolts (1). Do not tighten the bolts at this time.
3. Using a suitable holding fixture, support the outboard end of the spring link and lift it to normal ride height.
4. Tighten the two mounting bolts (1) fastening the leading end of the trailing link (2) to the body to specifications. Refer to **SPECIFICATIONS**.
5. Remove the lower control arm holding fixture.
6. Install the routing clips attached to the trailing link.
7. Install tire and wheel assembly. Refer to **INSTALLATION**.
8. Lower the vehicle.

2014 SUSPENSION**Tires & Wheels - Service Information - Cherokee****DIAGNOSIS AND TESTING****DIAGNOSIS AND TESTING - TIRE AND WHEEL VIBRATION**

Tire and wheel imbalance, runout and tire road force variation can cause vehicles to exhibit steering wheel vibration and/or seat vibration.

VISUAL INSPECTION

Visual inspection of the vehicle is recommended prior to road testing or performing any other procedure. Raise and support the vehicle. Refer to **HOISTING, STANDARD PROCEDURE** .

Inspect for the following:

- Verify correct (OEM) wheel and tire, as well as presence of wheel weights.
- Inspect tires and wheels for damage, mud packing and unusual wear; correct as necessary.
- Check and adjust tire air pressure to the pressure listed on the label attached to the driver's door opening.

ROAD TEST

NOTE: If a Noise & Vibration Analyzer is available, use it to diagnosis the issue during the road test.

NOTE: If the vehicle has been sitting for an extended period of time it is recommended to drive to warm the tires. This process could eliminate flat spots that can cause vibration.

Road test vehicle on a smooth road **at and near the designated speed** where legal speed limits allow. Lightly place hands on steering wheel at the 10:00 and 2:00 positions and observe for:

- Steering wheel oscillation: clockwise/counterclockwise
- Steering wheel high frequency movement: rapid vibration up and down
- Seat high frequency movement: rapid vibration up and down

To rule out vibrations due to brakes or powertrain:

- Lightly apply brakes at the designated speed; if vibration occurs or is enhanced, vibration is likely due to a brake concern.
- Shift transmission into neutral while vibration is occurring; if vibration is eliminated, vibration is likely due to a powertrain concern. Refer to **DIAGNOSIS AND TESTING** for additional information.

TIRE/WHEEL BALANCE AND ROAD FORCE VARIATION

NOTE: If wheel balance equipment is capable of testing tire road force variation and the tire/wheel assemblies are within specification, place the tires with the greater road force variation on the rear of the vehicle.

Balance the tire and wheel assemblies as necessary, and if wheel balance equipment is capable, also test for tire and wheel runout and road force variation following the wheel balancer manufacturer's instructions and using the information listed in Tire And Wheel Balance. Refer to **STANDARD PROCEDURE**. Repeat the road test above to verify the vibration is repaired.

STANDARD PROCEDURE

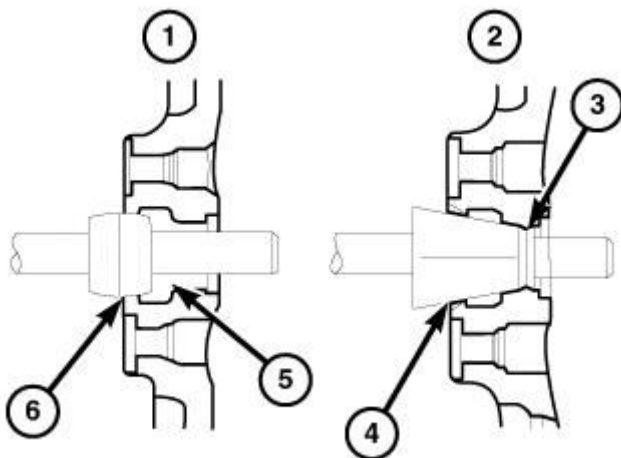
TIRE AND WHEEL BALANCE

NOTE: Always verify the wheel and tire balance before removing any wheel weights. If assembly is within specification and weights are not corroded or loose, do not remove weights. The process of removing and adding weight could damage wheel protective coating.

NOTE: Balance and road force variation equipment must be calibrated and maintained per equipment manufacturer's specifications.

NOTE: If a tire sealant & inflator kit was used to temporarily repair small punctures then the tire must be removed from wheel and all the sealant must be removed with a water damped cloth before repairing & balancing the assembly.

NOTE: Some wheels may not have an outer flange. Apply adhesive weights on midplane surface to balance.



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Fig. 1: Balancing Wheels Using Cone/Collet

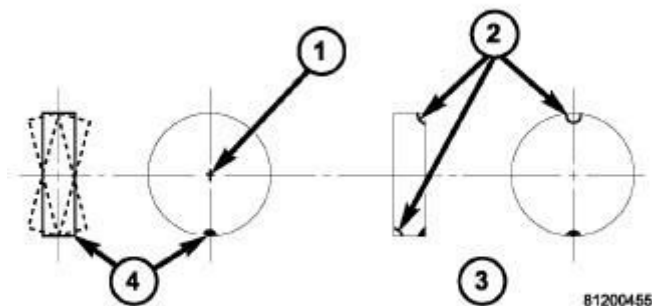
Courtesy of CHRYSLER GROUP, LLC

NOTE: Use of the proper collet will prevent potential damage to the Chrome Clad wheels.

NOTE: Balance equipment could read an incorrect balance result when measuring Chrome Clad wheels. This is caused by the equipments mounting cone/collet contacting the cladding or the cone/collet is not balanced. A dual-taper collet (1) type wheel centering tool is recommended as opposed to a high-taper cone (2) type wheel centering tool. Always use the manufacturer's recommended balance equipment.

- Dual-taper collet type (1)
- High-taper cone type (2)
- Possible obstruction (3)
- May not seat properly (4)
- No obstruction (5)
- Properly seated (6)

NOTE: If wheel balance equipment is capable of testing tire road force variation and the tire/wheel assemblies are within specification, place the tires with the greater road force variation on the rear of the vehicle.

**Fig. 2: Dynamic Balancing**

Courtesy of CHRYSLER GROUP, LLC

For dynamic balancing (**recommended**), the balance equipment is designed to indicate the location and amount of weight to be applied to both the inner and outer rim flanges (2).

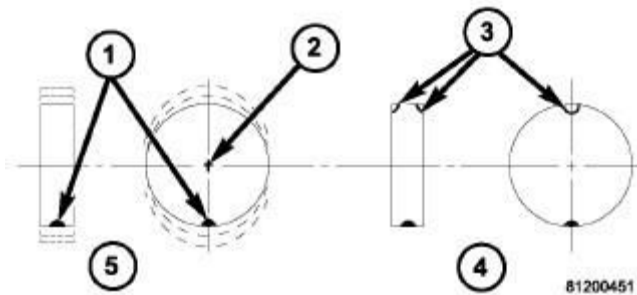


Fig. 3: Static Balancing

Courtesy of CHRYSLER GROUP, LLC

For static balancing (**not recommended**), find the location of the heavy spot causing the imbalance (1). Counter balance the wheel directly opposite the heavy spot. Determine weight required to counterbalance the area of imbalance. Place half of this weight on the **inner** rim flange and the other half on the **outer** rim flange (3) at the predetermined spots.

Aluminum wheels use a different type wheel weight than steel wheels. Be sure to use the correct wheel weight for the wheel type.

Always verify the balance. When using off-vehicle equipment, remount the tire and wheel assembly 180 degrees on the balancer spindle and recheck balance. Balance variation from one spot to the other should not be more than 0.125 (?) ounce. If variation is more than 0.125 ounce, balancing equipment could be malfunctioning, or the wrong collet/cone may have been used.

If difficult to balance, break down the tire and wheel assembly and check for loose debris inside the tire. Prior to disassembly, mark (index) the tire at the valve stem. Use this mark in order to remount the tire in its original orientation with respect to the wheel.

TIRE AND WHEEL ROTATION

NOTE: Refer to the Owner's Manual for rotation schedules.

NON-DIRECTIONAL TREAD PATTERN TIRES

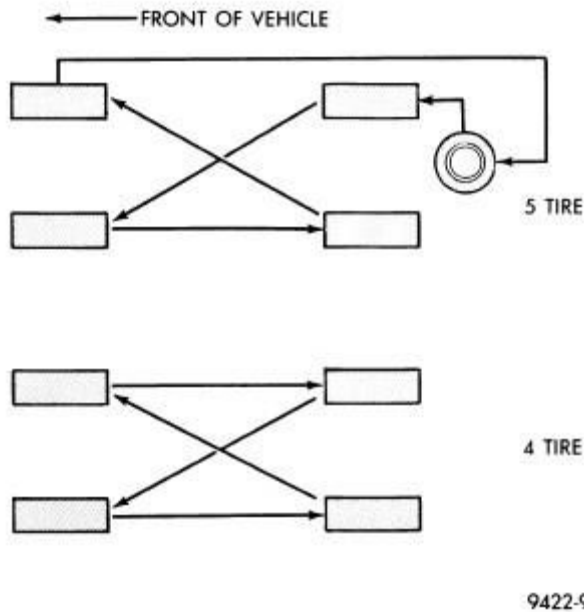


Fig. 4: Forward-Cross Tire Rotation Method

Courtesy of CHRYSLER GROUP, LLC

Tires on the front and rear operate at different loads and perform different steering, driving, and braking functions. For these reasons they wear at unequal rates and tend to develop irregular wear patterns. These effects can be reduced by rotating the tires at regular intervals. The benefits of tire rotation are:

- Increase tread life
- Maintain traction levels
- A smooth, quiet ride

The suggested method of tire rotation is shown in this graphic. Other rotation methods can be used, but they will not provide all the tire longevity benefits.

CAUTION: Only the four-tire rotation may be used on vehicles equipped with tire pressure monitoring (TPM) due to sensors being present in the four road wheels and not in the spare.

NOTE: Only the four-tire rotation method may be used if the vehicle is equipped with a compact or temporary spare tire.

DIRECTIONAL TREAD PATTERN TIRES

Some vehicles may be fitted with special high-performance tires having a directional tread pattern. These tires are designed to improve traction on wet pavement. To obtain the full benefits of this design, the tires must be installed so that they rotate in the correct direction. This is indicated by arrows on the tire sidewalls.

When being installed, extra care is needed to ensure that this direction of rotation is maintained.

REMOVAL

REMOVAL

1. Raise and support the vehicle so that tire and wheel assembly clears ground level. Refer to **HOISTING, STANDARD PROCEDURE** .
2. Remove the five wheel mounting (lug) bolts.
3. Remove the tire and wheel assembly from the hub.

INSTALLATION

INSTALLATION

WARNING: Installing wheels without good metal-to-metal contact with the mounting surface could cause loosening of the wheel mounting (lug) bolts. This could adversely affect the safety and handling of the vehicle.

1. Never use oil or grease on studs or wheel mounting (lug) bolts.

Clean the wheel mounting surfaces, removing any build-up of corrosion. It is important to have good metal-to-metal contact between the wheel and vehicle.

2. Install and lightly snug all five wheel mounting (lug) bolts. **Do not tighten at this time** .
3. Remove the support and lower the vehicle.
4. Progressively tighten all the wheel mounting (lug) bolts in a star pattern to the proper specification. Refer to **SPECIFICATIONS** .

TIRE PRESSURE MONITORING

DESCRIPTION

DESCRIPTION

The Tire Pressure Monitoring (TPM) system monitors air pressure in the four road tires (excludes spare). Pressure in the spare tire is monitored in case of a matching spare with sensor. Sensor transmissions occur if there is significant change in pressure. RFHM has to be awake when sensor transmits to monitor spare pressure.

The TPM system consists of tire pressure monitoring sensors attached to each road wheel through the valve stem mounting hole, an electronic display, and an indicator lamp. The system communicates through the RF Hub Module.

The receiver circuit for the TPM system is integrated into the RF Hub. The RF Hub decodes the RF signals transmitted by each of the vehicle's tire pressure sensors. The decoded information is used to determine if "warning" or "fault" conditions exist within the TPM system.

Upon detection of a warning or fault condition, the RF Hub will send a request to the module that controls the indicator lamp and the text display via the vehicle bus system to illuminate or flash the indicator lamp. Also, upon detection of a warning or fault condition, the electronic display will send a request to sound the "chime".

The RF Hub will store all warning and fault conditions, placard pressure values and low-pressure threshold values (lamp ON and OFF) in memory that can be accessed through diagnostic communication. If new sensors are introduced to the vehicle, the data stored for the sensor being replaced will be deleted.

The RF Hub will store all wheel sensor IDs and locations and faults in memory that can be accessed through diagnostic communication. All other data values transmitted from each active wheel sensor shall be stored in the RF Hub memory.

The RF Hub automatically learns and stores the sensor IDs while driving "within 20 minutes continuously above 20 mph (32 km/h)" after a sensor has been replaced. The learning sequence will initiate when the vehicle has been stopped for more than 20 minutes.

NOTE: **A new sensor ID can also be programmed directly into the RF Hub by using a RKE-TPM Analyzer in conjunction with a Scan Tool. Once the new sensor ID has been programmed, the RKE-TPM Analyzer can be used to update the TPMS by activating the sensor.**

OPERATION

OPERATION

TIRE PRESSURE MONITORING

The tire pressure monitoring system (TPMS) is designed to operate without loss of function for all OEM tire construction for this vehicle. Sensors, mounted to each road wheel as part of the valve stem, transmit an RF signal indicating their individual pressure to a receiver located in the Radio Frequency (RF) Hub. Refer to **SENSOR, TIRE PRESSURE MONITORING (TPM), OPERATION**.

If the TPM system detects that the tire pressure in any road tire is low, beyond the Low Pressure (lamp) ON threshold (see placard table below), the TPM system will continuously illuminate an indicator lamp. If a system fault is detected, the indicator lamp will flash on/off for 75 seconds, then remain on solid.

If the RF Hub detects a warning or fault condition at ignition key "on", the display module will request a chime once per ignition cycle for the first "warning" or "fault" condition detected. A "warning" or "fault" condition will remain enabled until the problem causing the condition is corrected and removed/reset.

The RF Hub shall continuously monitor for the receipt of tire pressure RF message transmissions from the wheel sensors during both the ignition key "on" and key "off" cycles. The wheel sensor ID's and the location of each sensor (e.g. Tire 1, Tire 2 etc.) are stored in the RF Hub non-volatile memory during the initial

2014 Jeep Cherokee Trailhawk

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Manufacturing Plant Process, or during a service procedure, as required.

The TPM System will continue to warn the driver of low tire pressure as long as the condition exists, and will not turn off the indicator lamp until the tire pressure is at or above the placard. The system will automatically update and the TPM indicator lamp will extinguish once the updated tire pressures have been received.

Tire pressure will vary with temperature by about 1 psi (6.9 kPa) for every 12°F (6.5°C). This means that when the outside temperature decreases, the tire pressure will decrease. Tire pressure should always be set based on cold inflation tire pressure (placard pressure). This is defined as the tire pressure after a vehicle has not been driven for more than 3 hours (and in outside ambient temperature). The tire pressure will also increase as the vehicle is driven; this is normal and there should be no adjustment for this increased pressure. For a system fault, the system will return to normal once the RF Hub receives a valid transmission from that sensor location.

TPM THRESHOLD PRESSURES

The recommended "Placard Pressure" for the tires installed on the vehicle, are stored in the RF Hub non-volatile memory during the initial Manufacturing Plant Process, or during a service procedure, as required. To determine the pressure thresholds for a vehicle, refer to the Tire Inflation Pressure (Placard) Label, and then apply the placard pressure to the following table.

For further information, refer to the Owners Manual or the Appropriate Diagnostic Information.

TPM THRESHOLD PRESSURES

Placard Pressure (Cold) (PSI)	Low Pressure ON Threshold (PSI)	
28	22	
29	23	
30	24	
31	25	
32	25	
33	26	
34	27	
35	28	
36	29	
37	29	
38	30	
39	31	
40	32	
41	33	
42	34	
43	35	
44	36	
45	36	
46	37	
47	38	

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48	38	
49	39	
50	40	
51	41	
55	44	
60	48	
65	52	
70	56	
75	60	
80	64	

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - TIRE PRESSURE MONITORING

When diagnosing a tire pressure issue, first check the Tire Pressure Monitoring (TPM) indicator lamp in the instrument cluster during ignition key ON. From the OFF position, turn the key to ON and check the TPM indicator lamp to observe one of the following:

- If after 10 seconds the indicator lamp is illuminating continuously (not flashing), proceed to **LOW PRESSURE**.
- If after 10 seconds the indicator lamp flashes on/off for 75 seconds, then remains on solid, there is a system fault detected. Proceed to **SYSTEM FAULT**.

LOW PRESSURE

NOTE: Tire pressure may increase from 2 to 6 psi (14 to 41 kPa) during normal driving conditions. Do NOT reduce this normal pressure build up.

NOTE: Tire pressure will vary with temperature by about 1 psi (6.9 kPa) for every 12°F (6.5°C). This means that when the outside temperature decreases, the tire pressure will also decrease. Tire pressure should always be set based on cold inflation tire pressure. For details, refer to **TIRES, STANDARD PROCEDURE**.

Check air pressure as necessary in all tires using a known accurate air gauge and adjust to the specification listed on the Tire Inflation Pressure Label (Placard) provided with the vehicle (usually applied to the driver side B-pillar). After adjusting air pressure in a tire on the vehicle, allow approximately two minutes for the message or indicator lamp to go out.

If air pressure in any tire is low, inspect **all** the tires for leaks. A water "dunk tank" or other water test may be used to check for a leak around the sensor as long as any water at the valve core is removed once the procedure is completed. The water can be easily expelled from the core area by pushing in on the core for several seconds, allowing escaping air to drive out any moisture. Reinflate the tire as necessary. Always make sure the original (special) valve stem cap is securely installed to keep moisture out of the sensor.

If the indicator lamp is still ON continuously, refer to the appropriate diagnostic information.

SYSTEM FAULT

If a system fault is detected, a chime will sound, and the TPM indicator lamp will flash for 75 seconds, then remain on solid. For vehicles with TPM Systems, a "SERVICE TIRE PRESSURE MONITORING SYSTEM" (Highline IPC) or "SERVICE TIRE PRESSURE SYSTEM" (Midline IPC) message will appear in the Electronic Vehicle Information Center (EVIC), followed by a graphic display. A system fault can occur by many scenarios, including the following:

- Signal interference due to electronic devices or driving next to facilities emitting the same Radio Frequencies as the TPM sensors.
- Installing some form of aftermarket window tinting that affects radio wave signals.
- Accumulation of snow or ice around the wheels or wheel housings.
- Using tire chains on the vehicle.
- Using wheels not equipped with TPM sensors.

Refer to the appropriate diagnostic information.

SENSOR, TIRE PRESSURE MONITORING (TPM)**CAUTION****CAUTION**

CAUTION: The Tire Pressure Monitoring (TPM) system has been optimized for the original equipment tires and wheels. TPM system pressures have been established for the tire size equipped on the vehicle. Undesirable system operation or sensor damage may result when using replacement equipment that is not of the same size, type, or style. Aftermarket wheels can cause sensor damage. Do not use aftermarket tire sealants or balance beads if your vehicle is equipped with TPM, as damage to the sensors may result.

CAUTION: Do not attempt to install a tire pressure sensor in an aftermarket wheel. Use tire pressure sensors in original style factory wheels only. If aftermarket wheels are installed, and therefore do not contain tire pressure sensors, the system will not function properly and the driver will be continuously notified of a system malfunction.

CAUTION: After inspecting or adjusting the tire pressure always reinstall the valve stem cap. This will prevent moisture and dirt from entering the valve stem, which could damage the Tire Pressure Sensor.

CAUTION: Tire pressure sensor valve stem caps and cores are specially designed for

the sensors. Due to risk of corrosion, do not use a standard valve stem cap or core in a tire pressure sensor in place of the original equipment style sensor cap and core.

CAUTION: Any time a sensor is to be installed in a wheel, it is necessary to install a new sensor-to-wheel seal, metal washer and valve stem nut, to ensure air tight sealing.

CAUTION: When installing the valve core, be sure to tighten the core to specifications. Overtightening by a little as three or four inch pounds can damage the sensor.

DESCRIPTION

DESCRIPTION

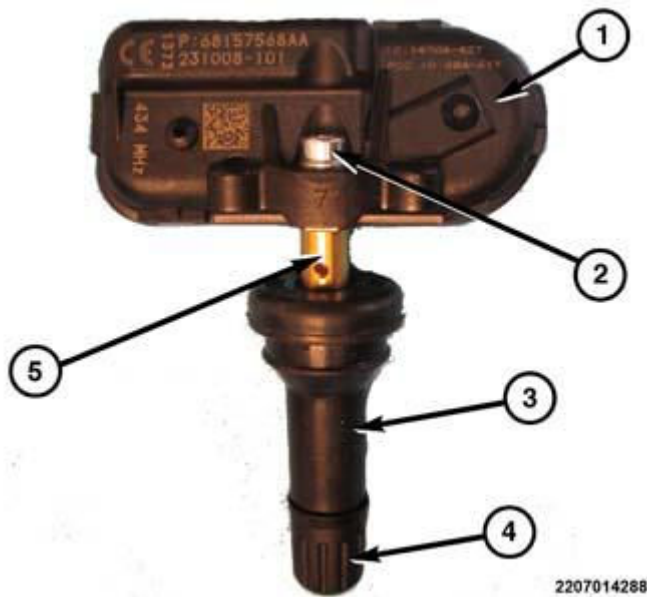


Fig. 5: Tire Pressure Sensor & Components
Courtesy of CHRYSLER GROUP, LLC

NOTE: Replace the valve stem assembly and tire pressure sensor mounting screw with each tire change.

One tire pressure sensor (1) is mounted to a valve stem (3) specifically designed for mounting the pressure sensor (1) in each wheel in place of the traditional tire valve stem. Each sensor has an internal battery that lasts up to 10 years. The battery is not serviceable. At the time of battery failure, the sensor (1) must be replaced. The TPM system operates on a 433 MHz radio frequency. The tire pressure sensor valve stem (3) looks similar to a standard valve stem with the tire mounted on the wheel.

NOTE: This vehicle uses the 433 MHz TPM sensor. Although 315 MHz and 433 MHz sensors are identical in size and shape, they are not interchangeable. Always make sure the correct sensor is being used. A RKE-TPM Analyzer can be used to determine the sensor's frequency without having to dismount the tire.

The TPM sensors are designed for original style factory wheels. It is not recommended to install a tire pressure sensor in an aftermarket wheel. (This could cause sealing and system performance issues.)

The serviceable components of the tire pressure sensor are:

- Tire pressure sensor (1), including all components below:
- Valve stem (3), including screw (2).
- Valve stem core (not shown).
- Valve stem cap (4)

The valve stem caps and cores used are specifically designed for the tire pressure monitoring sensors. Although similar to standard valve stem caps and cores, they are different. The valve stem cap has a special seal inside to keep moisture and corrosion out. The valve stem core has a special nickel coating to protect from corrosion.

OPERATION

OPERATION

CAUTION: The TPMS has been optimized for the original equipment tires and wheels. TPMS pressures have been established for the tire size equipped on your vehicle. Undesirable system operation or sensor damage may result when using replacement equipment that is not of the same size, type, and/or style. After-market wheels can cause sensor damage. Do not use aftermarket tire sealants or balance beads if your vehicle is equipped with a TPMS, as damage to the sensors may result.

CAUTION: After inspecting or adjusting the tire pressure always reinstall the valve stem cap. This will prevent moisture and dirt from entering the valve stem, which could damage the Tire Pressure Monitoring Sensor.

CAUTION: Tire pressure sensor valve stem caps and cores are specially designed for the sensors. Due to risk of corrosion, do not use a standard valve stem cap or core in a tire pressure sensor in place of the original equipment style sensor cap and core.

CAUTION: Any time a sensor is to be reinstalled in a wheel, a new valve stem assembly must be installed to ensure air tight sealing.

NOTE: TPM thresholds have been established for the original tire size equipped on the

vehicle. Use original size tires only to maintain system accuracy.

The battery operated tire pressure sensor is both a transmitter and a receiver. The TPM sensor can be forced to transmit if using a special tool such as a TPM-RKE Analyzer. The TPM-RKE Analyzer has the ability to change the sensor mode and to diagnose a faulty TPM sensor. Using a TPM-RKE Analyzer can take up to a minute to force a transmission from a sensor.

Each sensor's (transmitter) broadcast is uniquely coded so that the module can monitor the state of each of the sensors on the four rotating road wheels. The module can automatically learn and store the sensor's ID while driving "within 20 minutes continuously above 20 m.p.h. (32 Km/h)" after a sensor has been replaced. The vehicle must be stationary for more than 20 minutes in order to initiate the learning sequence.

The sensor IDs can also be programmed using the TPM-RKE Analyzer Tool. Scan each TPM sensor at each road wheel, and store each Sensor ID in the correct location. (LEFT FRONT, LEFT REAR, RIGHT FRONT, and RIGHT REAR) Connect the TPM-RKE Analyzer Tool to the Scan Tool. Then follow the programming steps outlined in the diagnostic Scan Tool for "Program Tire Pressure Sensor ID w/ TPM Tool".

REMOVAL**REMOVAL**

1. Raise and support vehicle. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Remove tire and wheel assembly.

CAUTION: The cap used on this valve stem contains an O-ring seal to prevent contamination and moisture from entering the valve stem. Do not substitute a regular valve stem cap in its place.

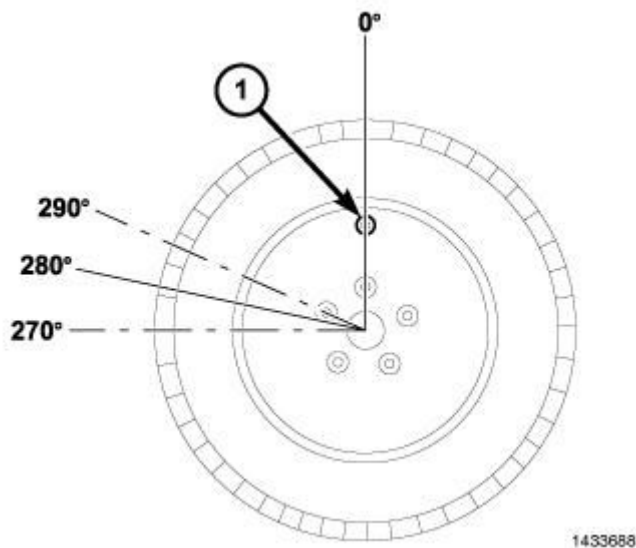


Fig. 6: Start Mount/Dismount Tool Within 10 Degrees Of Valve Stem
Courtesy of CHRYSLER GROUP, LLC

3. Dismount tire from wheel following tire changer manufacturers instructions while paying special attention to the following to avoid damaging the pressure sensor:
 - a. When breaking the tire bead loose from the wheel rim, avoid using the Bead Breaker in the area of the sensor (1). That includes both outer and inner beads of the tire.
 - b. When preparing to dismount the tire from the wheel, carefully insert the mounting/dismounting tool 280° from the valve stem $\pm 10^\circ$, then proceed to dismount the tire from the wheel. Use this process on both outer and inner tire beads.

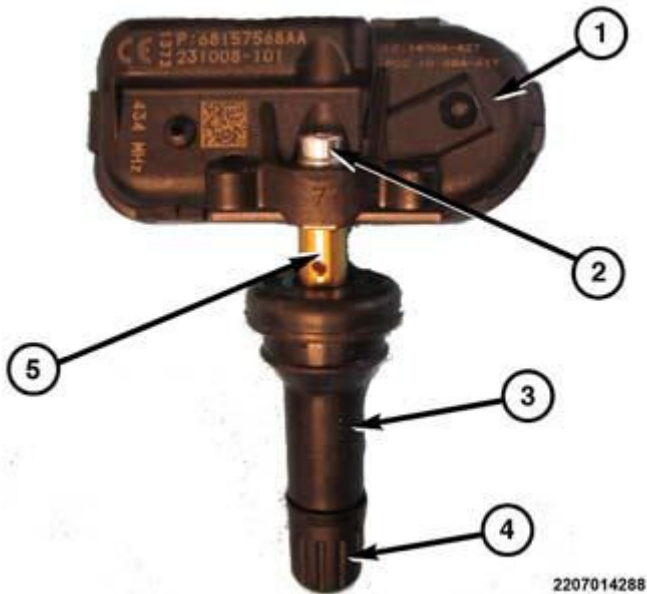


Fig. 7: Tire Pressure Sensor & Components
 Courtesy of CHRYSLER GROUP, LLC

4. Remove the sensor to valve stem retainer screw (2) and remove the sensor (1) from the valve stem (3).
5. Remove the valve stem (3) from the wheel.

INSTALLATION

INSTALLATION

NOTE: If replacing tire pressure sensor, a new valve stem will be pre-mounted to the sensor as an assembly. Verify that the sensor is positioned properly before seating the valve stem. If replacing a valve stem only (using the existing tire pressure sensor), the new valve stem will include a new tire pressure sensor mounting screw. Always use a new mounting screw when attaching a sensor to a valve stem.

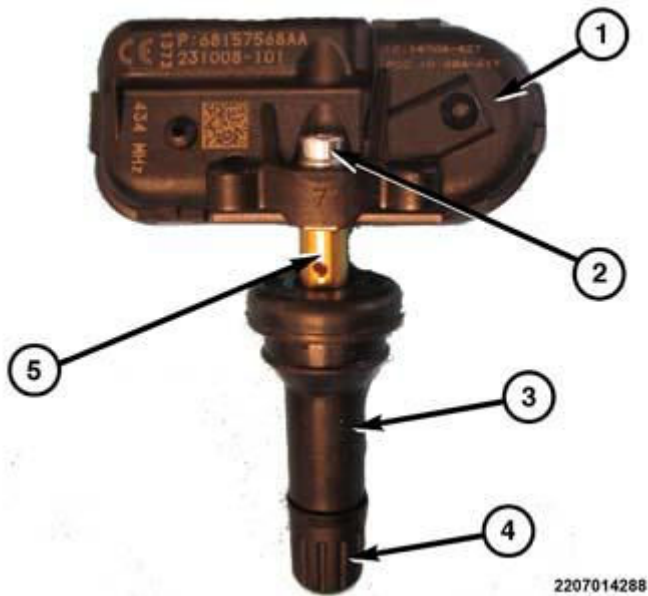


Fig. 8: Tire Pressure Sensor & Components
Courtesy of CHRYSLER GROUP, LLC

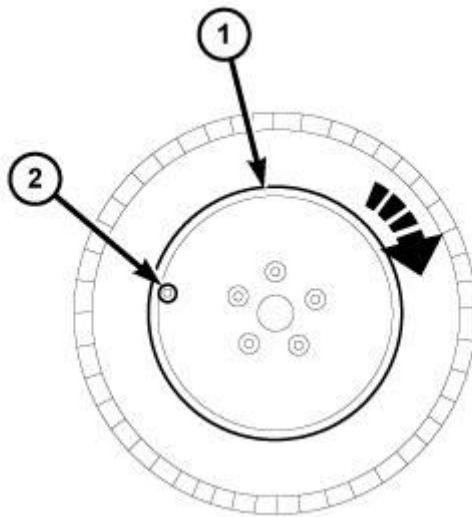
CAUTION: Any time a sensor is to be reinstalled in a wheel, a new valve stem assembly must be installed to ensure air tight sealing.

1. Wipe area clean around sensor/valve stem mounting hole in wheel. Make sure surface of wheel is not damaged.

NOTE: When installing a new valve stem, tire bead lubricant should be used for proper installation.

NOTE: If replacing tire pressure sensor, a new valve stem will be pre-mounted to the sensor as an assembly. Verify that the sensor is positioned properly before seating the valve stem.

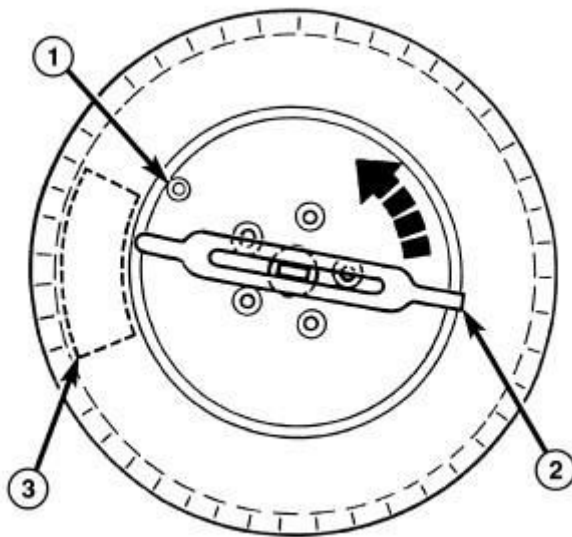
2. Insert valve stem (3) through wheel and pull through to seat with standard valve stem installation tool.
3. If replacing the valve stem (3) only (using the existing tire pressure sensor), verify that the flat sides of the brass extension on the bottom of the valve stem (5) are at a 90 degree angle with the wheel. Position the pressure sensor (1) over the brass extension (5), install the retainer screw (2) and tighten to 1.4 N.m (12 in. lbs.).
4. Mount tire on wheel following tire changer manufacturers instructions, paying special attention to the following to avoid damaging tire pressure sensor:



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Fig. 9: Mounting Tire Using Rotating Wheel Machine
Courtesy of CHRYSLER GROUP, LLC

- a. Rotating Wheel Tire Changers - Once the wheel is mounted to the changer, position the sensor valve stem (2) approximately 280° from the head of the changer (located at 1) in a clockwise direction before rotating the wheel (also in a clockwise direction) to mount the tire. Use this procedure on both the outer and inner tire beads.



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Fig. 10: Mounting Tire Using Rotating Tool Machine
Courtesy of CHRYSLER GROUP, LLC

- b. Rotating Tool Tire Changers - Position the wheel on the changer so that the sensor valve stem (1) is

located approximately 210° clockwise from the installation end of the mounting/dismounting tool (2) once the tool is mounted for tire installation. Make sure the sensor is clear of the lower bead breaker area (3) to avoid damaging the sensor when the breaker rises. Rotate the tool (2) in a counterclockwise direction to mount the tire. Use this procedure on both the outer and inner tire beads.

- c. Adjust air pressure to that listed on Tire Inflation Pressure Label (Placard) provided with vehicle (usually applied to driver's side B-pillar). Make sure **original style** valve stem cap is securely installed to keep moisture out of sensor.
- d. Install tire and wheel assembly on the vehicle.
- e. Remove the support and lower the vehicle.
- f. Perform one of the following to make the system learn the new sensor ID.
- g. Use the TPM-RKE Analyzer, 9936, with the Scan Tool to program the RF Hub module with the tire pressure sensor ID. This is part of the TPM Diagnostic Verification Test. Refer to **STANDARD PROCEDURE**.
- h. Once the vehicle has remained stationary for more than 20 minutes, drive vehicle for a minimum of 20 minutes while maintaining a continuous speed above 20 mph (32 km/h). During this time, the system will learn the new sensor ID. This is part of the TPM Diagnostic Verification Test. Refer to **STANDARD PROCEDURE**.

NOTE: If a sensor cannot be trained, refer to appropriate diagnostic information.

TIRES

DESCRIPTION

TIRE

Tires are designed and engineered for each specific vehicle. They provide the best overall performance for normal operation. The ride and handling characteristics match the vehicle's requirements. With proper care they will give excellent reliability, traction, skid resistance, and tread life.

Driving habits have more effect on tire life than any other factor. Careful drivers will obtain, in most cases, much greater mileage than severe use or careless drivers. A few of the driving habits which will shorten the life of any tire are:

- Rapid acceleration
- Severe application of brakes
- High-speed driving
- Taking turns at excessive speeds
- Striking curbs and other obstacles
- Operating vehicle with over or under inflated tire pressures

Radial ply tires are more prone to irregular tread wear. It is important to follow the tire rotation interval shown in **TIRE AND WHEEL ROTATION**. This will help to achieve a greater tread-life potential.

TIRE IDENTIFICATION

Tire type, size, load index and speed rating are encoded in the letters and numbers imprinted on the side wall of the tire. Refer to the Tire Identification chart to decipher the code. An All Season type tire will also have either M + S, M AND S or M - S (indicating mud and snow traction) imprinted on the side wall. An Extra or Light Load marking "XL" or "LL" may also be listed on the sidewall.

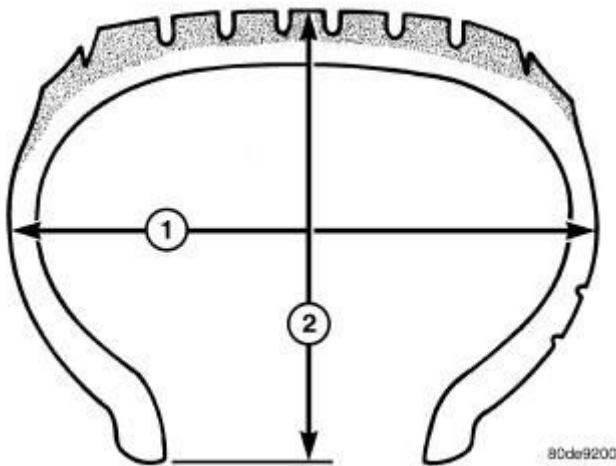


Fig. 11: Tire Aspect Ratio

Courtesy of CHRYSLER GROUP, LLC

For example purposes, tire size P225/60 R 16 97 T is used in the Tire Identification chart. P stands for Passenger tire. Sectional width (1) is 225mm. Sectional height (2) is 60 percent of sectional width. R represents Radial construction. 16 is the wheel diameter in inches. 97 T is the tire manufacturers load and speed ratings.

TIRE IDENTIFICATION

Reading Tire Codes		
P	TIRE TYPE (Not present on all tires)	P - Passenger
		T - Temporary
		C - Commercial
		LT - Light Truck
225	SECTIONAL WIDTH	SHOWN IN MILLIMETERS
60	ASPECT RATIO	SHOWN IN PERCENTAGE
R	CONSTRUCTION TYPE	R - RADIAL
		B - BIAS BELTED
		D - DIAGONAL (BIAS)
16	WHEEL DIAMETER	SHOWN IN INCHES
97	LOAD INDEX	*
T	SPEED RATING	*
* Consult the tire manufacturer regarding any questions on tire specifications or capabilities.		

TIRE CHAINS

Refer to the owners manual supplied with the vehicle to determine whether the use of tire chains is permitted on this vehicle.

REPLACEMENT TIRES

WARNING: Failure to equip the vehicle with tires having adequate speed capability can result in sudden tire failure.

WARNING: In order to maintain the speed capability of the vehicle, replacement tires must have speed ratings equal to or higher than those fitted to the vehicle as original equipment. If tires with lower speed ratings are fitted, the vehicle's handling may be affected and the speed capability of the vehicle may be lowered to the maximum speed capability of the replacement tires. To avoid an accident resulting in severe or fatal injury, consult the tire manufacturer in regards to maximum speed ratings.

It is recommended that tires equivalent to the original equipment tires be used when replacement is needed.

Failure to use equivalent replacement tires may adversely affect the safety and handling of the vehicle.

The original equipment tires provide a proper combination of many characteristics such as:

- Ride
- Noise
- Handling
- Durability
- Tread life
- Traction
- Rolling resistance
- Speed capability

The use of tires smaller than the minimum tire size approved for the vehicle can result in tire overloading and failure.

Use tires that have the approved load rating for the vehicle and never overload them. Failure to equip the vehicle with tires having adequate speed capability can result in sudden tire failure and loss of vehicle control.

The use of oversize tires may cause interference with vehicle components. Under extremes of suspension and steering travel, interference with vehicle components may cause tire damage.

SPARE TIRE

A compact (temporary) spare tire and wheel assembly is standard equipment on this vehicle.

Some vehicles are equipped with a Tire Inflator/Sealant tire repair kit as standard equipment in place of a spare tire. It is to be used to repair small punctures in the tire as necessary. For additional information, refer to the Owners Manual.

The compact spare tire is designed for emergency use only. The original tire should be repaired or replaced at the first opportunity, then reinstalled. Do not exceed speeds of 80 km/h (50 mph) when using the compact spare tire. Refer to the Owner's Manual for complete details.

DIAGNOSIS AND TESTING

TIRE NOISE

Unusual tire noise can be associated with tire and wheel vibration or irregular tire wear. For vibration issues, refer to **DIAGNOSIS AND TESTING**. For irregular tire wear issues, refer to **TIRES, DIAGNOSIS AND TESTING**.

TIRE WEAR PATTERNS

CONDITION	RAPID WEAR AT SHOULDERS	RAPID WEAR AT CENTER	CRACKED TREADS	WEAR ON ONE SIDE	FEATHERED EDGE	BALD SPOTS	SCALLOPED WEAR
EFFECT	1. 2.						
CAUSE	UNDER-INFLATION OR LACK OF ROTATION	OVER-INFLATION OR LACK OF ROTATION	UNDER-INFLATION OR EXCESSIVE SPEED*	EXCESSIVE CAMBER	INCORRECT TOE	UNBALANCED WHEEL OR TIRE DEFECT*	LACK OF ROTATION OF TIRES OR WORN OR OUT-OF-ALIGNMENT SUSPENSION.
CORRECTION	ADJUST PRESSURE TO SPECIFICATIONS WHEN TIRES ARE COOL ROTATE TIRES			ADJUST CAMBER TO SPECIFICATIONS	ADJUST TOE-IN TO SPECIFICATIONS	DYNAMIC OR STATIC BALANCE WHEELS	ROTATE TIRES AND INSPECT SUSPENSION SEE GROUP 2

* HAVE TIRE INSPECTED FOR FUTURE USE.

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Fig. 12: Identifying Tire Wear Patterns
Courtesy of CHRYSLER GROUP, LLC

Under inflation will cause wear on the shoulders of tire. Over inflation will cause wear at the center of tire.

Excessive camber causes the tire to run at an angle to the road. One side of tread is then worn more than the other.

Excessive toe-in or toe-out causes wear on the tread edges and a feathered effect across the tread.

TREAD WEAR INDICATORS

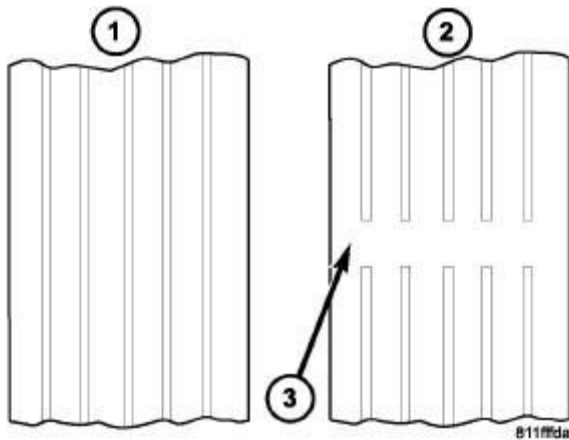


Fig. 13: Identifying Tread Wear Indicators
Courtesy of CHRYSLER GROUP, LLC

Tread wear indicators are molded into the bottom of the tread grooves. When tread depth is 1.6 mm (1/16 in.), the tread wear indicators will appear as a 13 mm (1/2 in.) band (3).

Tire replacement is necessary when indicators appear in two or more grooves or if localized balding occurs.

STANDARD PROCEDURE

TIRE INFLATION PRESSURES

The specified tire pressures have been chosen to provide safe operation, vehicle stability, and a smooth ride. The proper tire pressure specification can be found on the Tire And Loading Information Label provided with the vehicle (usually on the driver's door opening (B-pillar) or rear shutface of driver's door).

A quality air pressure gauge is recommended to check tire air pressure. Tire pressure should be checked cold once per month. Check tire pressure more frequently when the weather temperature varies widely. Tire pressure will decrease when the outdoor temperature drops. After checking the air pressure, replace valve cap finger tight.

Inflation pressures specified on the Tire Inflation Pressure Label are always the cold inflation pressure of the tire. Cold inflation pressure is obtained after the vehicle has not been operated for at least 3 hours, or the vehicle is driven less than one mile after being inoperative for 3 hours. Tire inflation pressures may increase from 2 to 6 pounds per square inch (psi) during operation. Do not reduce this normal pressure buildup.

Improper inflation can cause:

- Uneven wear patterns
- Reduced tread life
- Reduced fuel economy
- Unsatisfactory ride

- The vehicle to drift.

WARNING: Over or Under inflated tires can affect vehicle handling. The tire can fail suddenly, resulting in loss of vehicle control.

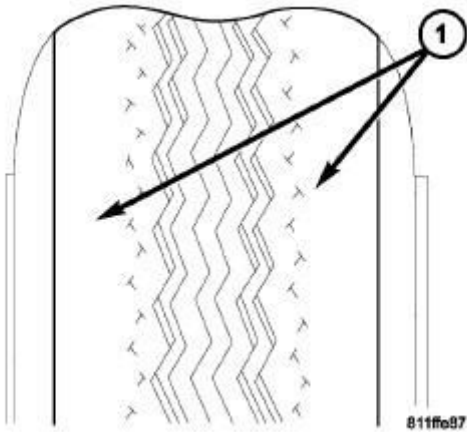


Fig. 14: Under Inflation

Courtesy of CHRYSLER GROUP, LLC

Under inflation causes rapid shoulder wear, tire flexing, and can result in tire failure (1).

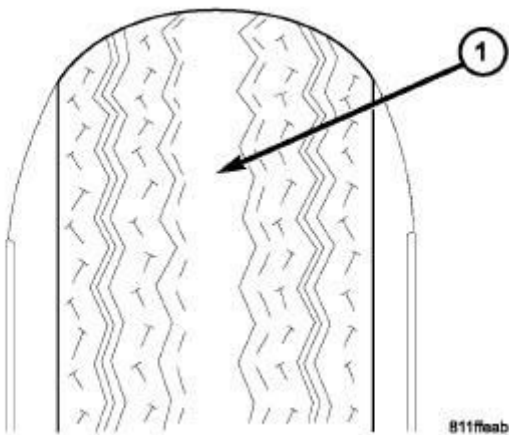


Fig. 15: Identifying Over Inflated Tire

Courtesy of CHRYSLER GROUP, LLC

Over inflation causes rapid center wear and loss of the tire's ability to cushion shocks (1).

TIRE PRESSURE FOR HIGH SPEED OPERATION

Refer to the vehicle's Owners Manual Package.

TIRE LEAK REPAIRING

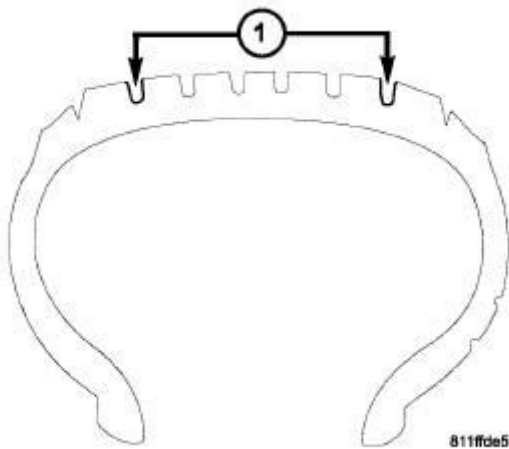


Fig. 16: Identifying Tire Repair Area
Courtesy of CHRYSLER GROUP, LLC

For proper repairing, a radial tire must be removed from the wheel. Repairs should only be made if the defect, or puncture, is in the tread area (1). The tire should be replaced if the puncture is located in the sidewall.

Deflate tire completely before attempting to dismount the tire from the wheel. **Use a lubricant such as a mild soap solution when dismounting or mounting tire.** Use tools free of burrs or sharp edges which could damage the tire or wheel rim.

Before mounting tire on wheel, make sure all rust is removed from the rim bead and repaint if necessary.

Install wheel on vehicle. Refer to **INSTALLATION**.

CLEANING

CLEANING

Before delivery of a vehicle, remove the protective coating on the tires with white sidewalls or raised white letters. To remove the protective coating, apply warm water and let it soak for a few minutes. Afterwards, scrub the coating away with a soft bristle brush. Steam cleaning may also be used to remove the coating.

CAUTION: DO NOT use gasoline, mineral oil, oil-based solvent or a wire brush for cleaning.

REMOVAL

REMOVAL

A multimedia supplement to the instructions contained in this article is
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available.

To view the multimedia example of the condition described go to;
<http://www.youtube.com/user/Mitchell1Tips>
 then type "A00641393.vid1" into the "Search Channel" box.



A multimedia supplement to the instructions contained in this article is available.

To view the multimedia example of the condition described go to;
<http://www.youtube.com/user/Mitchell1Tips>
 then type "A00641393.vid2" into the "Search Channel" box.

IF REMOVING THE TIRE FROM THE WHEEL, PERFORM THE PROCEDURE BELOW:

CAUTION: The cap used on this valve stem contains an O-ring seal to prevent contamination and moisture from entering the valve stem. Do not substitute a regular valve stem cap in its place.

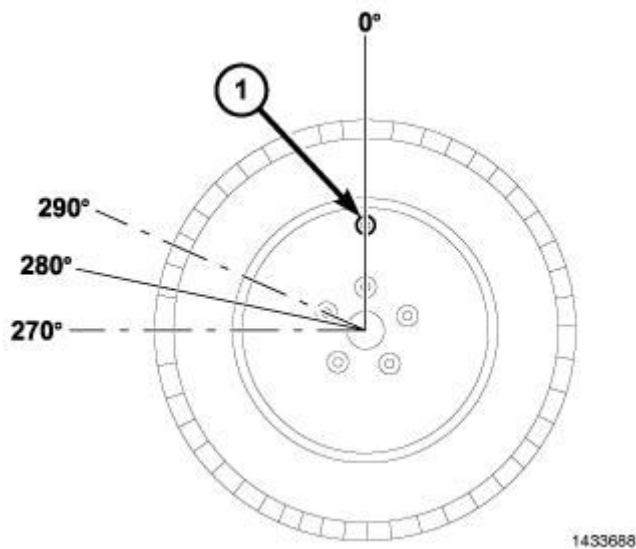


Fig. 17: Start Mount/Dismount Tool Within 10 Degrees Of Valve Stem
 Courtesy of CHRYSLER GROUP, LLC

- 1.
2. Dismount tire from wheel following tire changer manufacturers instructions while paying special attention to the following to avoid damaging the pressure sensor:
 - a. When breaking the tire bead loose from the wheel rim, avoid using the Bead Breaker in the area of the sensor (1). That includes both outer and inner beads of the tire.
 - b. When preparing to dismount the tire from the wheel, carefully insert the mounting/dismounting tool 280° from the valve stem $\pm 10^\circ$, then proceed to dismount the tire from the wheel. Use this process on both outer and inner tire beads.

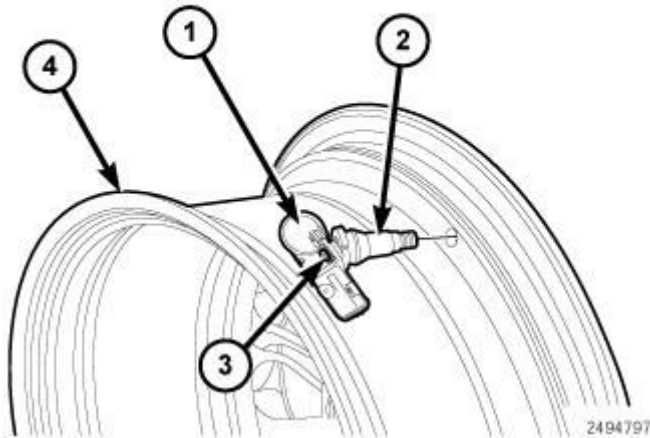


Fig. 18: Sensor Mounting To Wheel
Courtesy of CHRYSLER GROUP, LLC

3. Remove the sensor to valve stem retainer screw (3) and remove the sensor (1) from the valve stem (2).
4. Remove the valve stem (2) from the wheel (4).

INSTALLATION

INSTALLATION

NOTE: If replacing tire pressure sensor, a new valve stem will be pre-mounted to the sensor as an assembly. Verify that the sensor is positioned properly before seating the valve stem. If replacing a valve stem only (using the existing tire pressure sensor), the new valve stem will include a new tire pressure sensor mounting screw. Always use a new mounting screw when attaching a sensor to a valve stem.

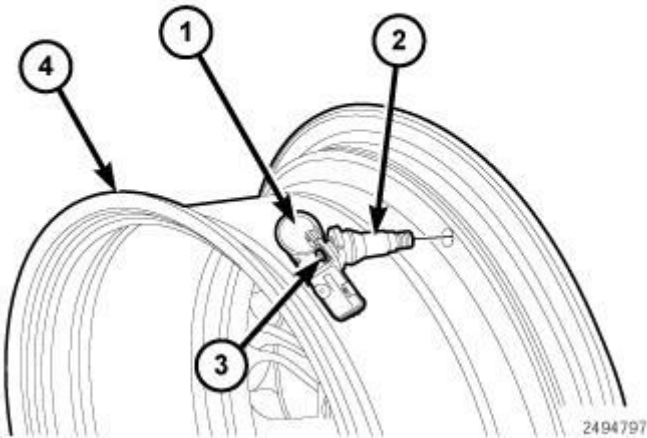


Fig. 19: Sensor Mounting To Wheel

Courtesy of CHRYSLER GROUP, LLC

CAUTION: Any time a sensor is to be reinstalled in a wheel, a new valve stem assembly must be installed to ensure air tight sealing.

IF THE TIRE WAS REMOVED FROM THE WHEEL, PERFORM THE PROCEDURE BELOW:

1. Wipe area clean around sensor/valve stem mounting hole in wheel (4). Make sure surface of wheel is not damaged.

NOTE: A new valve stem is pre-lubricated for proper installation with a standard tool.

NOTE: If replacing tire pressure sensor, a new valve stem will be pre-mounted to the sensor as an assembly. Verify that the sensor is positioned properly before seating the valve stem.

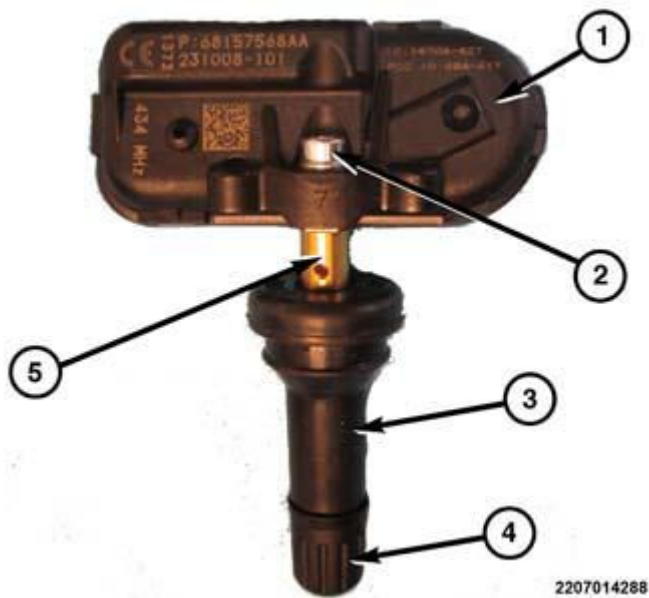


Fig. 20: Tire Pressure Sensor & Components
Courtesy of CHRYSLER GROUP, LLC

2. Insert valve stem (3) through wheel and pull through to seat with standard valve stem installation tool.
3. If replacing the valve stem (3) only (using the existing tire pressure sensor), verify that the flat sides of the brass extension on the bottom of the valve stem (3) are at a 90 degree angle with the wheel. Position the pressure sensor (1) over the brass extension (5), install the retainer screw (2) and tighten to 1.4 N.m (12 in. lbs.).
4. Mount tire on wheel following tire changer manufacturers instructions, paying special attention to the following to avoid damaging tire pressure sensor:

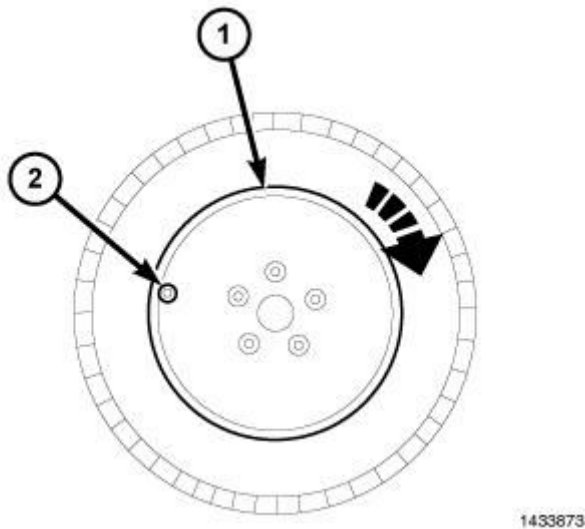
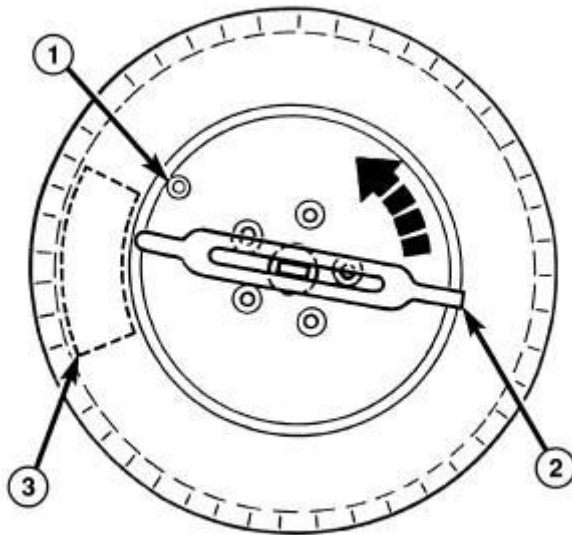


Fig. 21: Mounting Tire Using Rotating Wheel Machine
Courtesy of CHRYSLER GROUP, LLC

- a. Rotating Wheel Tire Changers - Once the wheel is mounted to the changer, position the sensor valve stem (2) approximately 280° from the head of the changer (located at 1) in a clockwise direction before rotating the wheel (also in a clockwise direction) to mount the tire. Use this procedure on both the outer and inner tire beads.



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Fig. 22: Mounting Tire Using Rotating Tool Machine
Courtesy of CHRYSLER GROUP, LLC

- b. Rotating Tool Tire Changers - Position the wheel on the changer so that the sensor valve stem (1) is located approximately 210° clockwise from the installation end of the mounting/dismounting tool (2) once the tool is mounted for tire installation. Make sure the sensor is clear of the lower bead breaker area (3) to avoid damaging the sensor when the breaker rises. Rotate the tool (2) in a counterclockwise direction to mount the tire. Use this procedure on both the outer and inner tire beads.
- c. Adjust air pressure to that listed on Tire Inflation Pressure Label (Placard) provided with vehicle (usually applied to driver's side B-pillar). Make sure **original style** valve stem cap is securely installed to keep moisture out of sensor.
- d. Install tire and wheel assembly on the vehicle.
- e. Remove the support and lower the vehicle.
- f. Perform one of the following to make the system learn the new sensor ID.
- g. Use the TPM-RKE Analyzer, 9936, with the Scan Tool to program the RF Hub module with the tire pressure sensor ID. This is part of the TPM Diagnostic Verification Test. Refer to **STANDARD PROCEDURE**.
- h. Once the vehicle has remained stationary for more than 20 minutes, drive vehicle for a minimum of 10 minutes while maintaining a continuous speed above 15 mph (24 km/h). During this time, the

system will learn the new sensor ID. This is part of the TPM Diagnostic Verification Test. Refer to **STANDARD PROCEDURE** .

NOTE: If a sensor cannot be trained, refer to appropriate diagnostic information.

WHEELS

DESCRIPTION

DESCRIPTION

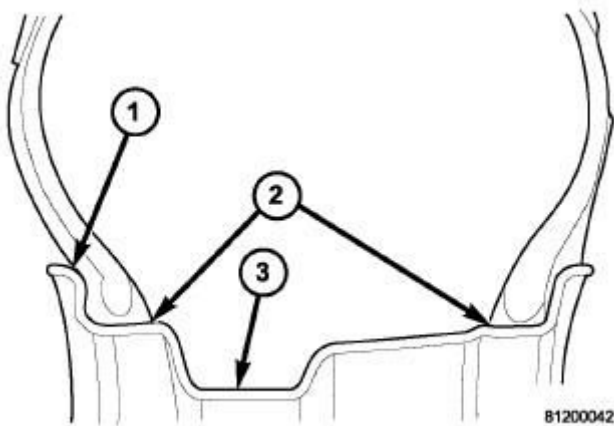


Fig. 23: Identifying Wheel/Rim Design
 Courtesy of CHRYSLER GROUP, LLC

All vehicles use either steel or cast aluminum drop center wheels. The original equipment wheels are designed for proper operation at all loads up to the specified maximum vehicle capacity.

Every wheel has raised sections between the rim flanges (1) and drop well (3) called safety humps (2). In case of air loss, these raised sections help hold the tire in position on the wheel until the vehicle can be brought to a safe stop. When being installed on the wheel, initial inflation of the tire forces the tire bead over these raised sections into place.

The wheel studs and nuts are designed for specific wheel applications and must be replaced with equivalent parts. Do not use replacement parts of lesser quality or of a substitute design. All aluminum and steel wheels have wheel stud nuts with an enlarged nose. This enlarged nose is necessary to ensure proper retention of the wheels.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - WHEEL INSPECTION

Inspect wheels for:

- Excessive runout
- Dents, cracks or irregular bends
- Damaged wheel stud (lug) holes
- Air Leaks

NOTE: **Do not attempt to repair a wheel by hammering, heating or welding.**

If a wheel is damaged, an original equipment replacement wheel should be used. When obtaining replacement wheels, they should be equivalent in load carrying capacity. The diameter, width, offset, pilot hole and bolt circle of the wheel should be the same as the original wheel.

WARNING: Failure to use equivalent replacement wheels may adversely affect the safety and handling of the vehicle.

WARNING: Replacement with used wheels is not recommended. The service history of the wheel may have included severe treatment or very high mileage. The rim could fail without warning.

WARNING: Chrysler LLC does not recommend that customers use "reconditioned" wheels (wheels that have been damaged and repaired) because they can result in a sudden catastrophic wheel failure which could cause loss of control and result in injury or death. For clarification:

- Cosmetic refinishing for the purpose of repairing a superficial flaw is an acceptable procedure providing it is limited to paint or clear coat only, the wheel is not modified in any way, and there is no exposure to paint curing heat over 200 degrees Fahrenheit (93 degrees Celsius).
- Damaged wheels are those which have been bent, broken, cracked or sustained some other physical damage which may have compromised the wheel structure.
- Repaired indicates that the wheel has been modified through bending, welding, heating, straightening, or material removal to rectify damage.
- Re-plating of chrome plated wheels is not an acceptable procedure nor is chrome plating of original equipment painted or polished wheels, as this may alter mechanical properties and affect fatigue life.

SPECIFICATIONS

SPECIFICATIONS

2014 Jeep Cherokee Trailhawk

2014 SUSPENSION Tires & Wheels - Service Information - Cherokee

TORQUE SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Valve Core	0.5	-	4
Wheel Mounting (Lug) Bolt	130	96	-

CLEANING

CLEANING

All wheels and wheel trim, especially aluminum and chrome plated, should be cleaned regularly using mild soap and water to maintain their luster and to prevent corrosion. Wash them with the same soap solution recommended for the body of the vehicle.

When cleaning extremely dirty wheels, care must be taken in the selection of tire and wheel cleaning chemicals and equipment to prevent damage to the wheels. Mopar® Wheel Treatment or Mopar® Chrome Cleaner is recommended. Any of the "DO NOT USE" items listed below can damage wheels and wheel trim.

DO NOT USE:

- Any abrasive cleaner
- Any abrasive cleaning pad (such as steel wool) or abrasive brush
- Any cleaner that contains an acid which can react with and discolor the chrome surface. **Many wheel cleaners contain acids that can harm the wheel surface.**
- Oven cleaner
- A car wash that uses carbide-tipped wheel cleaning brushes or acidic solutions.

USING MITCHELL1'S WIRING DIAGRAMS

For information on using these wiring diagrams, see [USING MITCHELL1'S SYSTEM WIRING DIAGRAMS](#) article.

AIR CONDITIONING

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 1: Automatic A/C Circuit (1 of 5)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

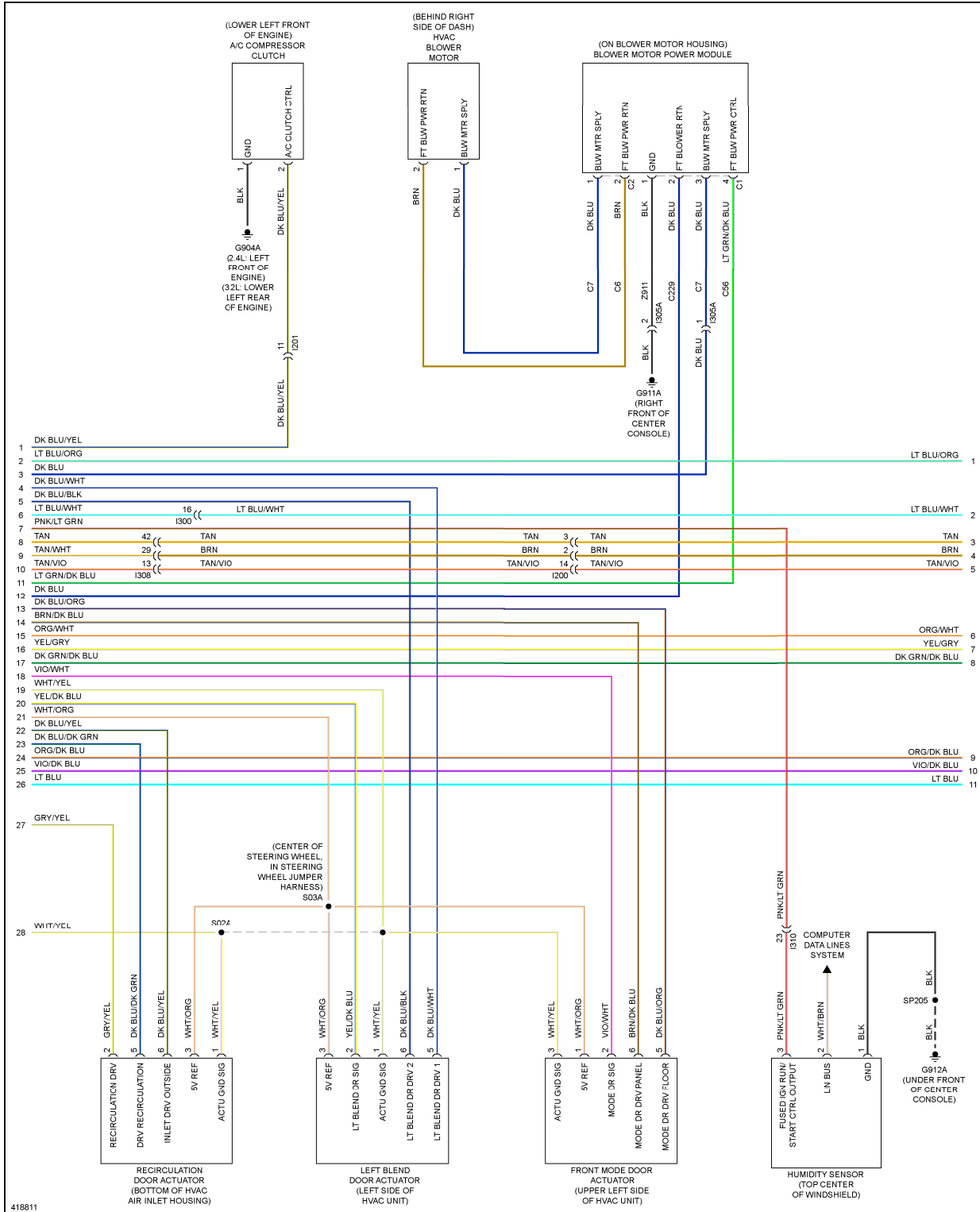


Fig. 2: Automatic A/C Circuit (2 of 5)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 3: Automatic A/C Circuit (3 of 5)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

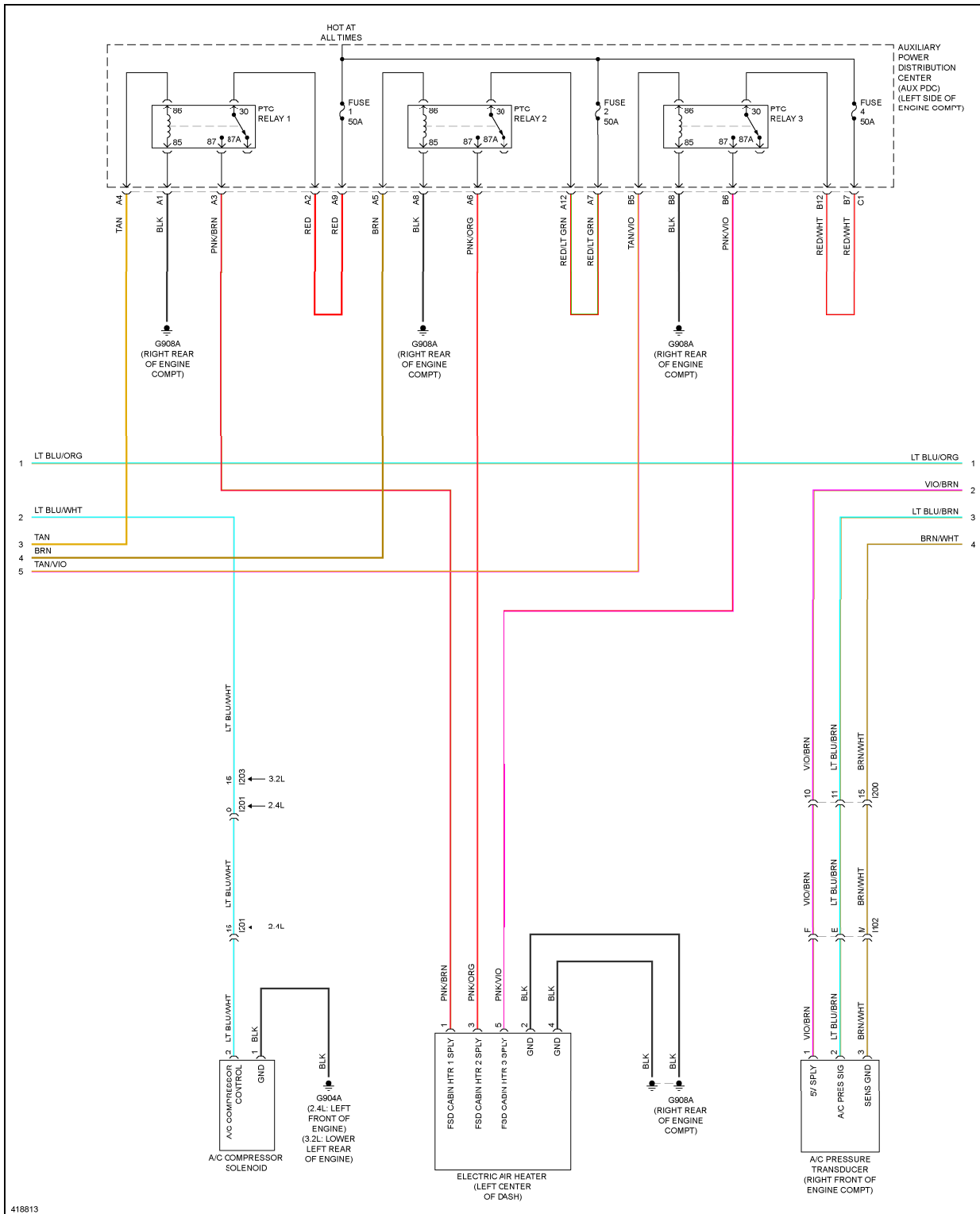


Fig. 4: Automatic A/C Circuit (4 of 5)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

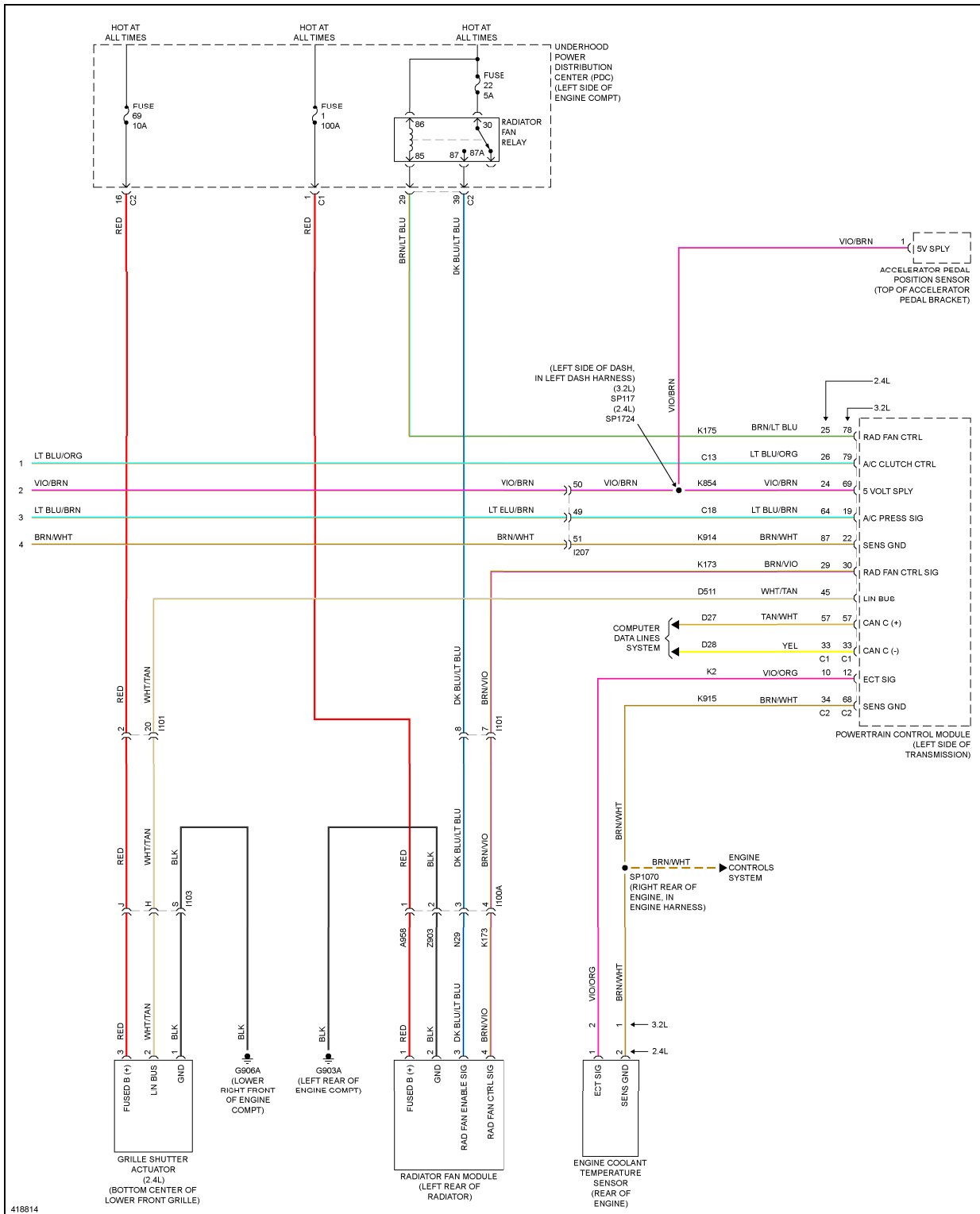


Fig. 5: Automatic A/C Circuit (5 of 5)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 6: Manual A/C Circuit (1 of 4)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 7: Manual A/C Circuit (2 of 4)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 8: Manual A/C Circuit (3 of 4)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 9: Manual A/C Circuit (4 of 4)

ANTI-LOCK BRAKES

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 10: Anti-lock Brakes Circuit

ANTI-THEFT

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

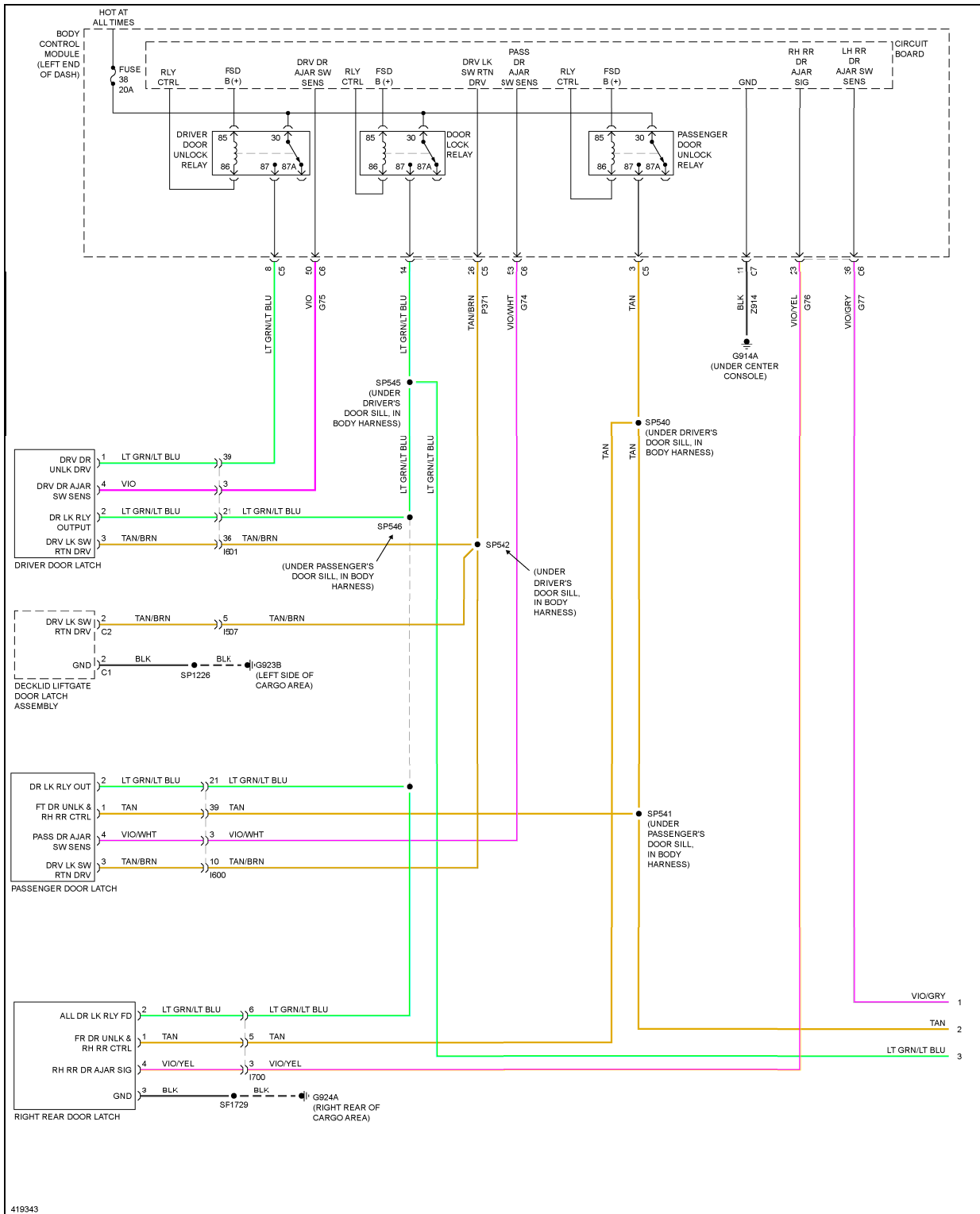


Fig. 11: Forced Entry Circuit (1 of 2)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 12: Forced Entry Circuit (2 of 2)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

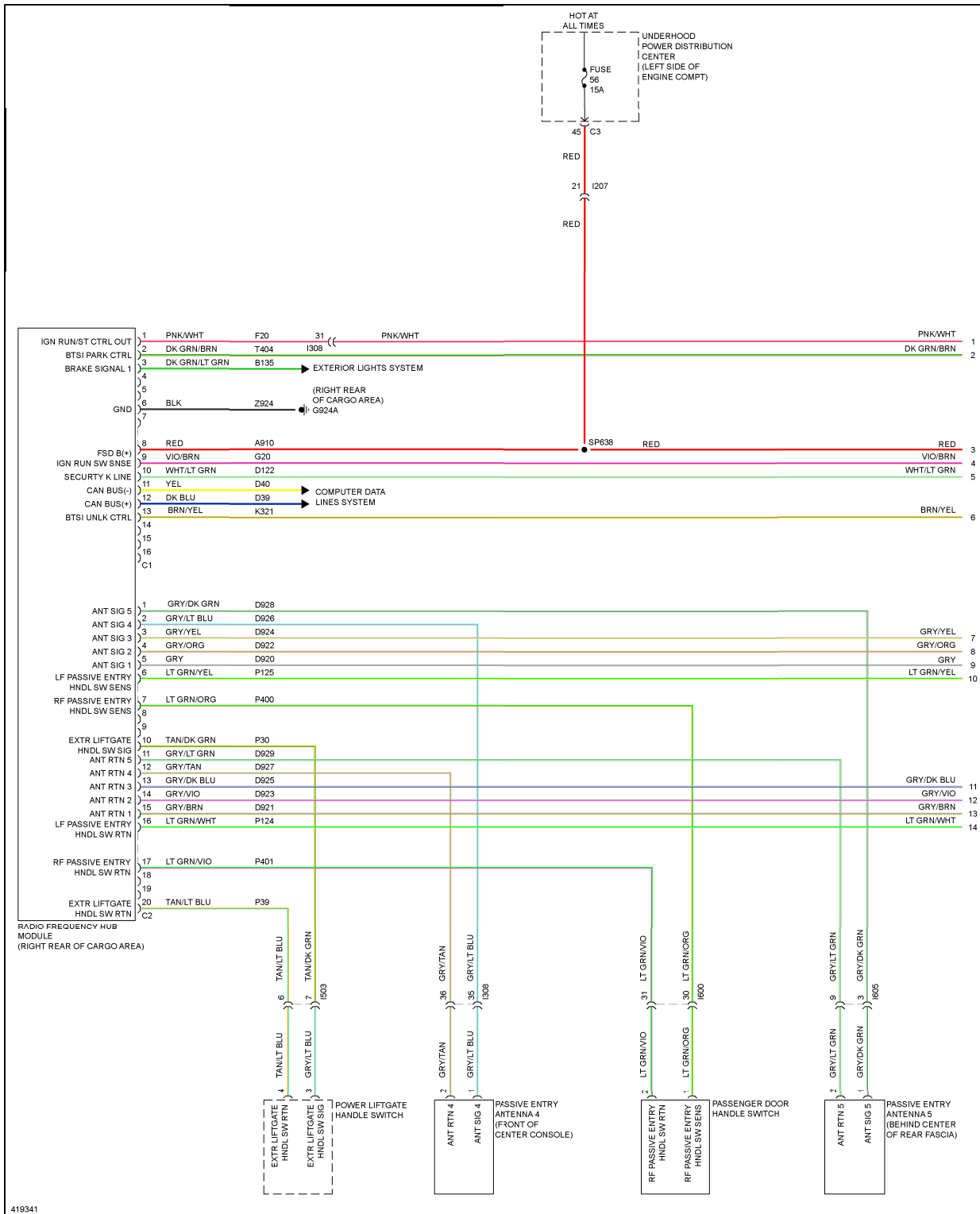


Fig. 13: Passive Entry Circuit (1 of 2)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

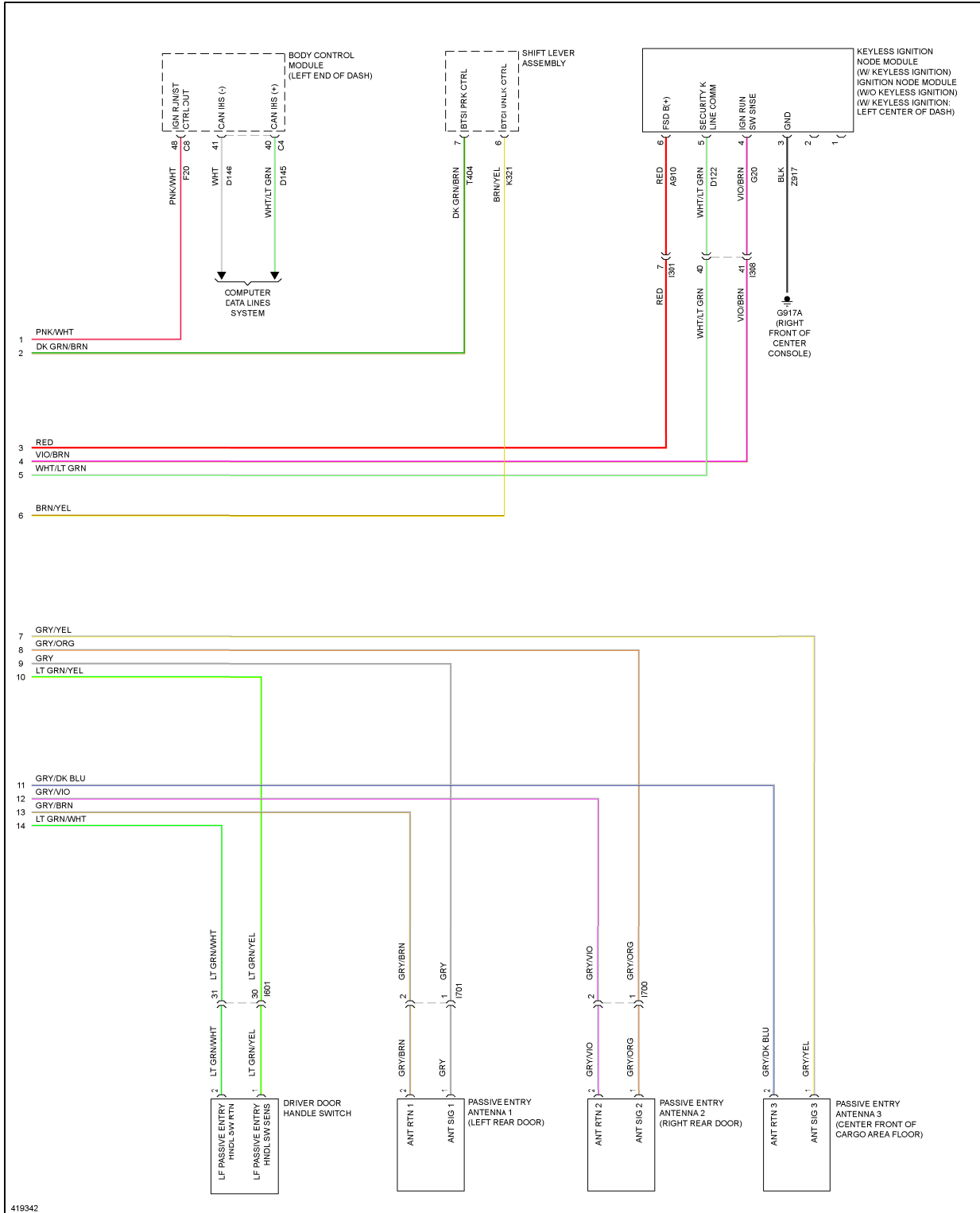


Fig. 14: Passive Entry Circuit (2 of 2)

BODY CONTROL MODULES

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

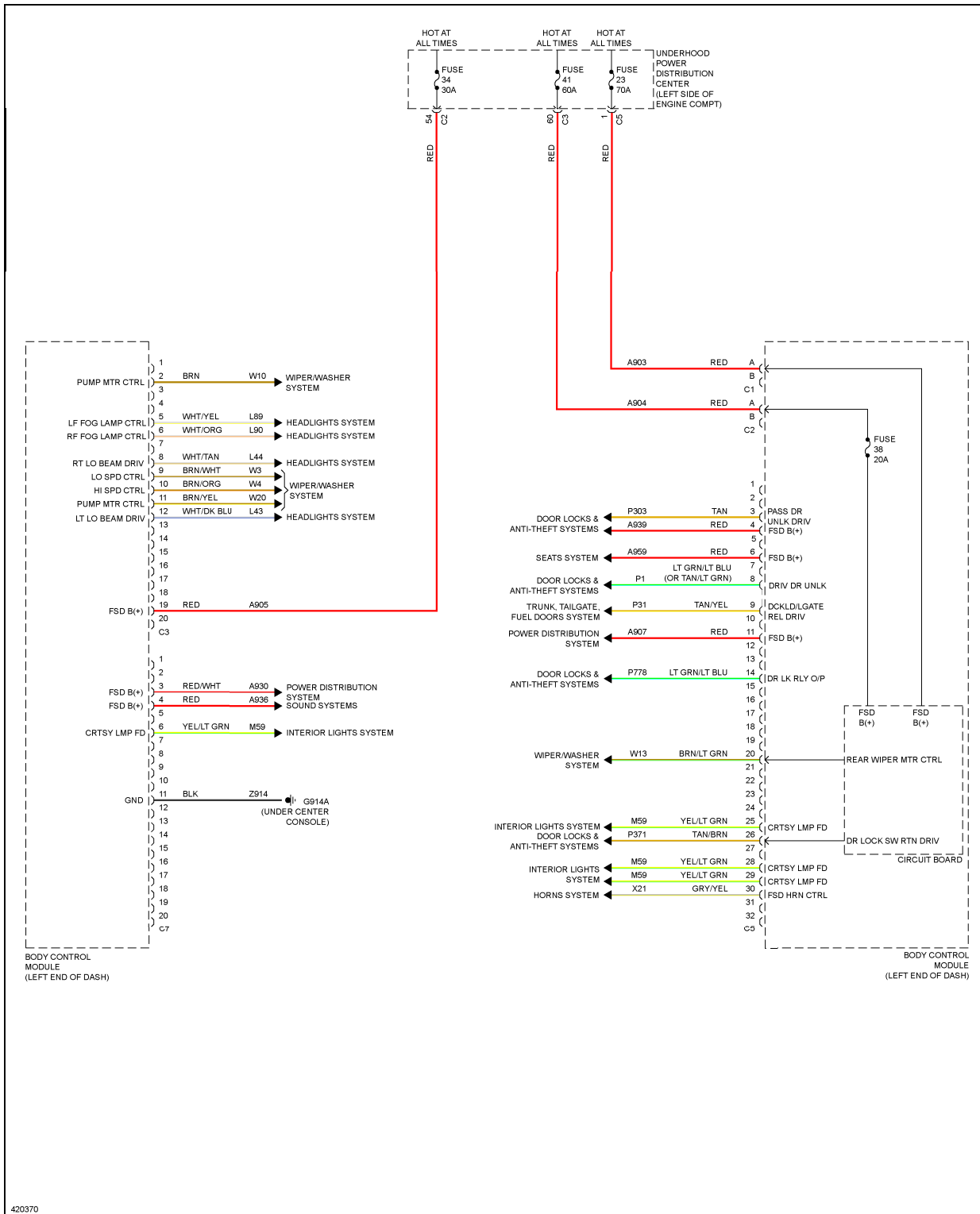


Fig. 15: Body Control Modules Circuit (1 of 3)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

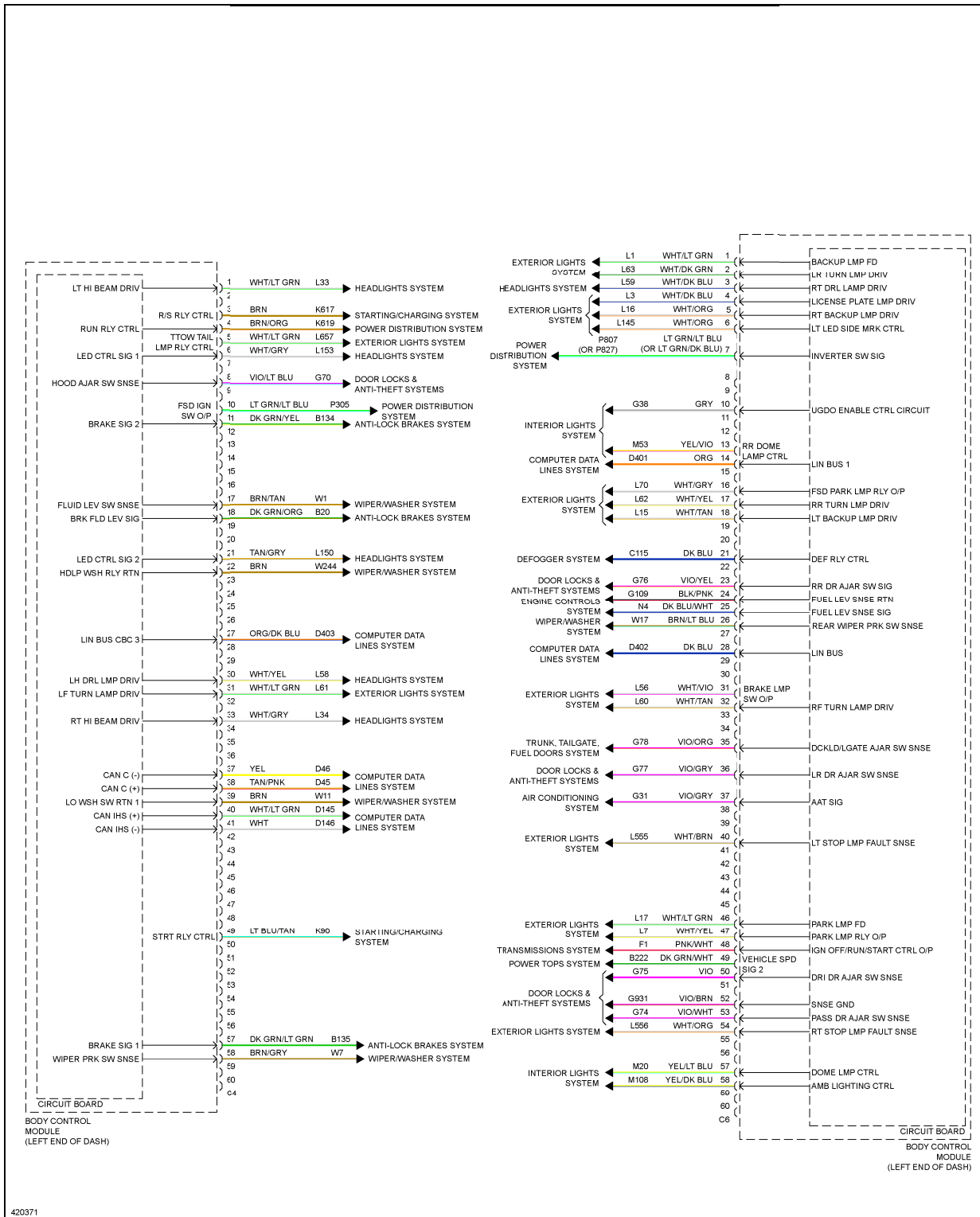


Fig. 16: Body Control Modules Circuit (2 of 3)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

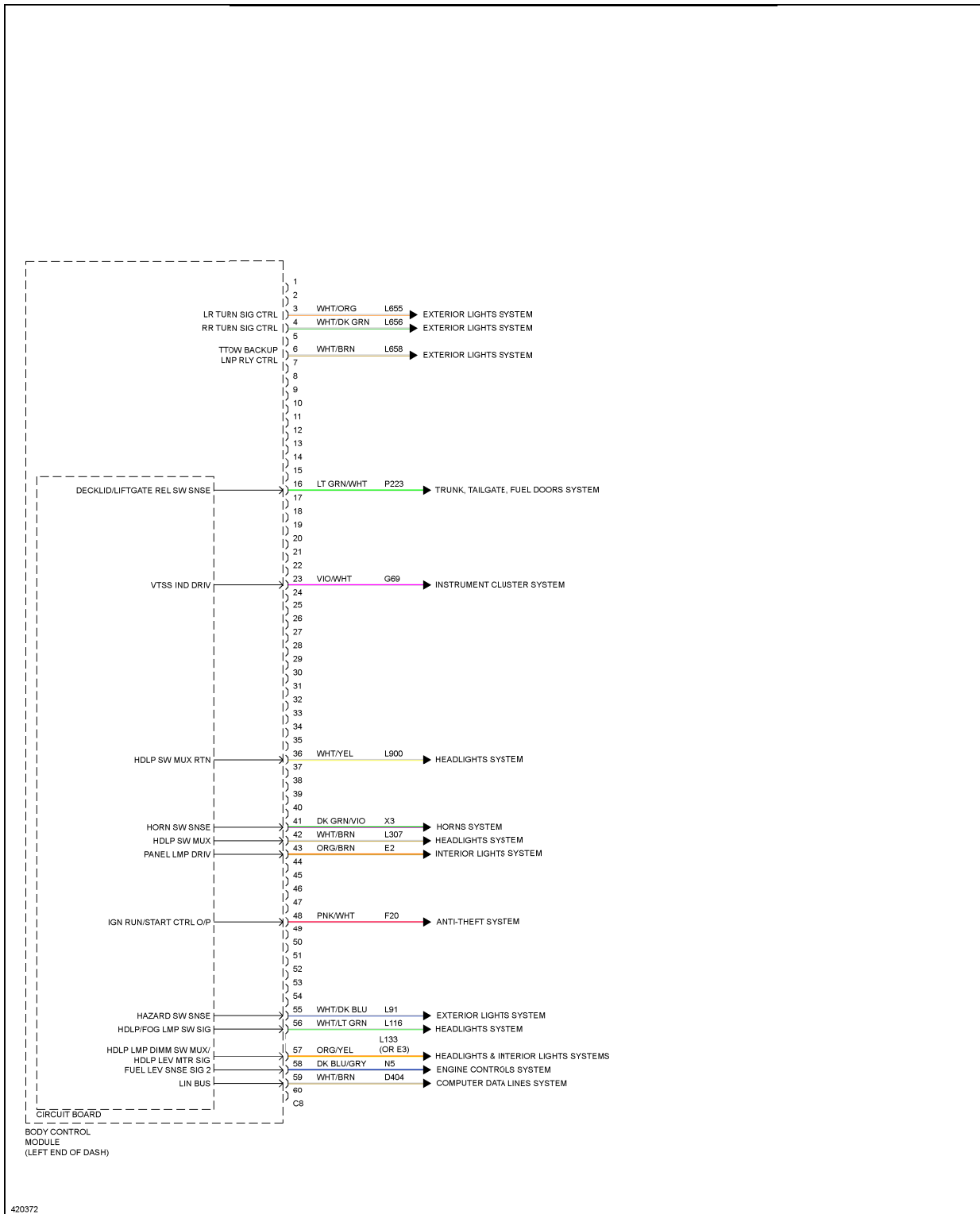
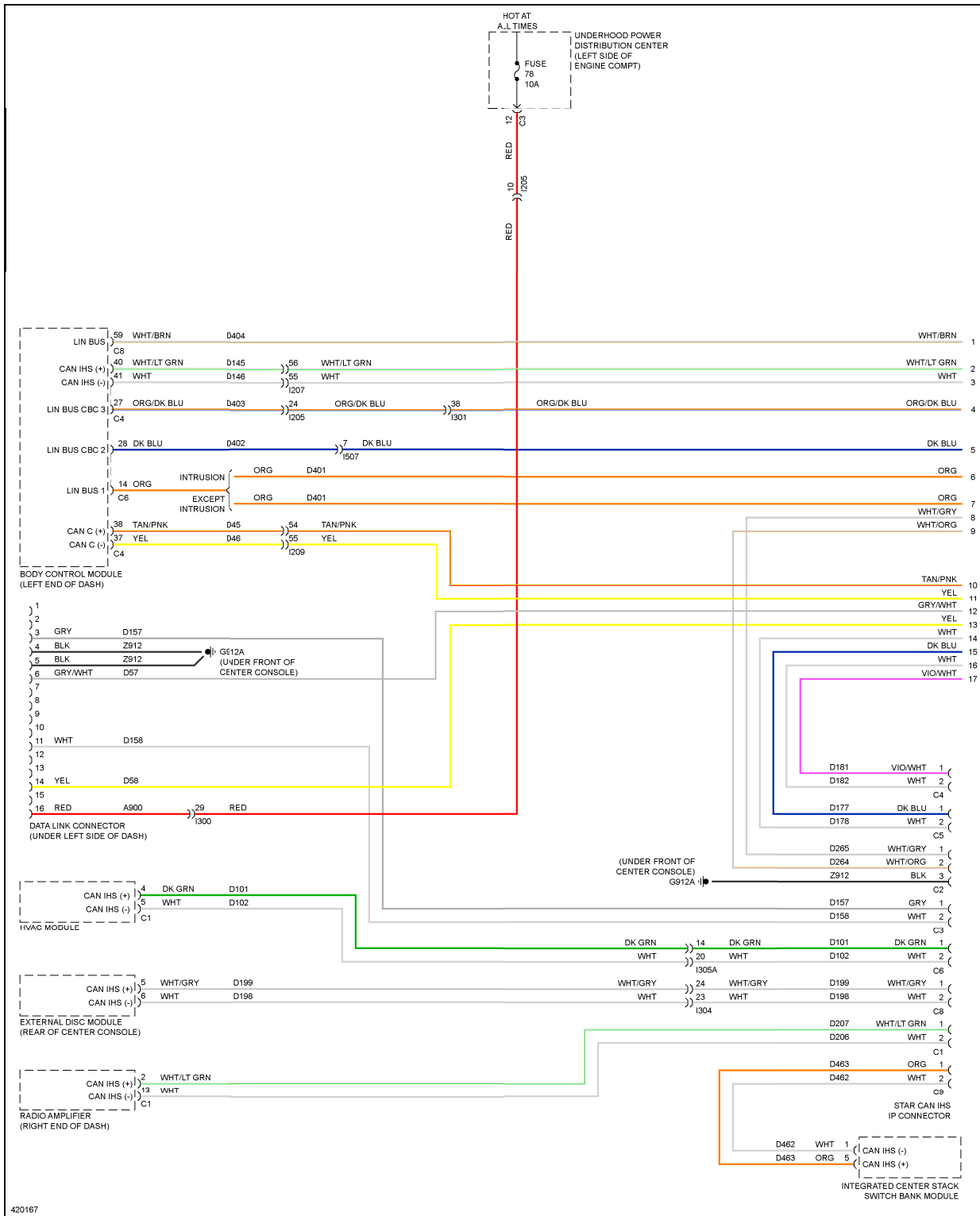


Fig. 17: Body Control Modules Circuit (3 of 3)

COMPUTER DATA LINES

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



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Fig. 18: Computer Data Lines Circuit (1 of 5)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

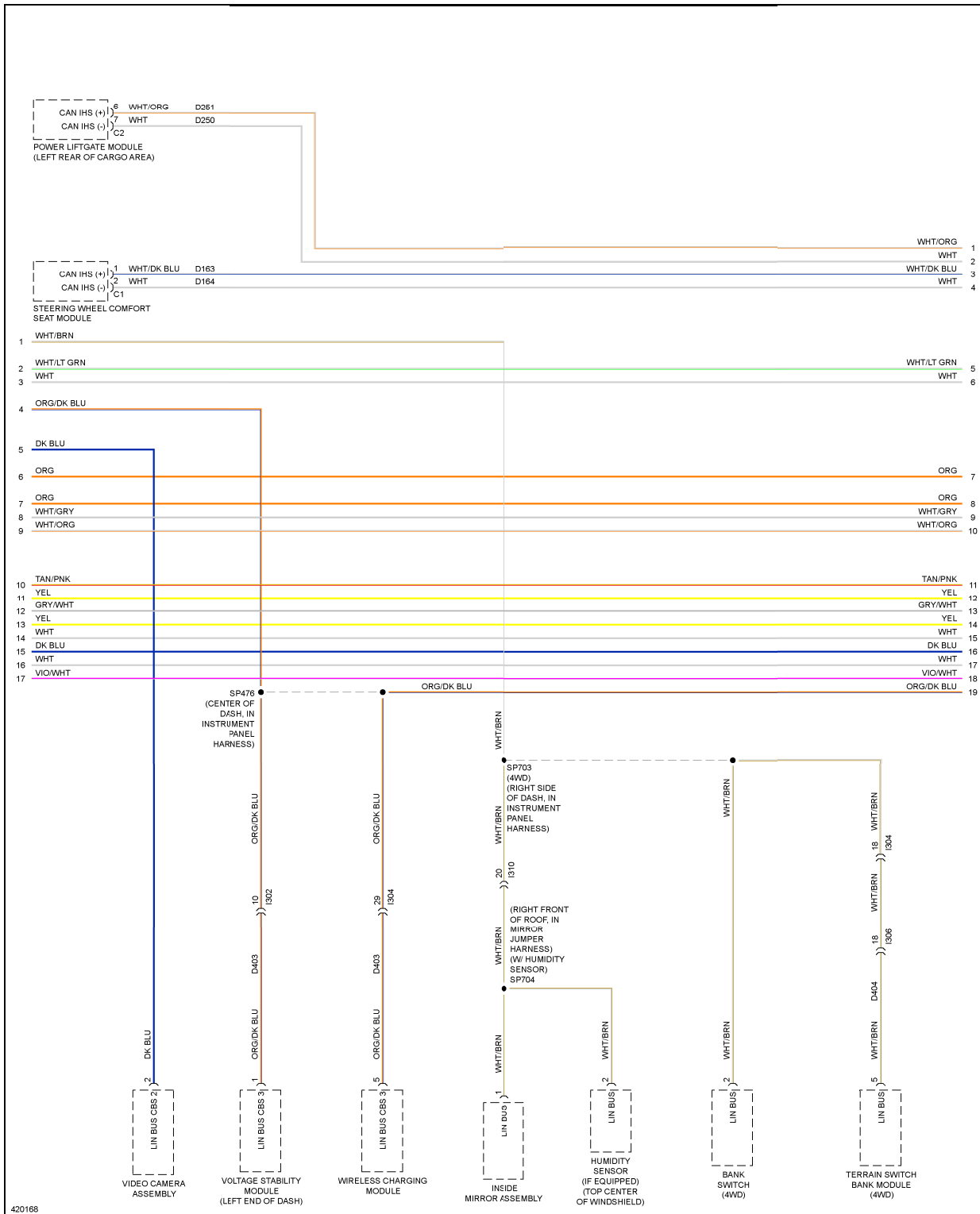


Fig. 19: Computer Data Lines Circuit (2 of 5)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 20: Computer Data Lines Circuit (3 of 5)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 21: Computer Data Lines Circuit (4 of 5)

Fig. 22: Computer Data Lines Circuit (5 of 5)

COOLING FAN

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

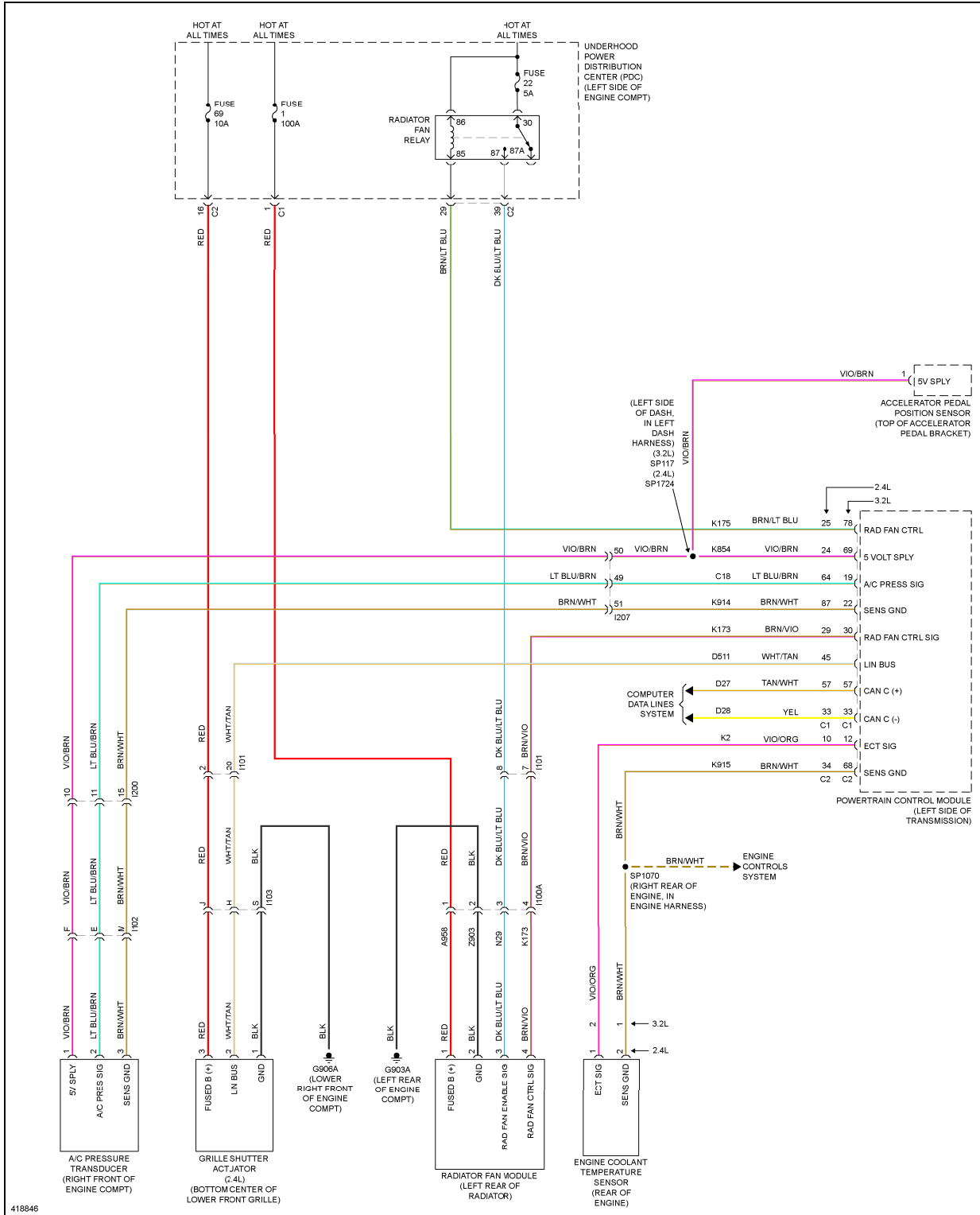


Fig. 23: Cooling Fan Circuit

CRUISE CONTROL

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

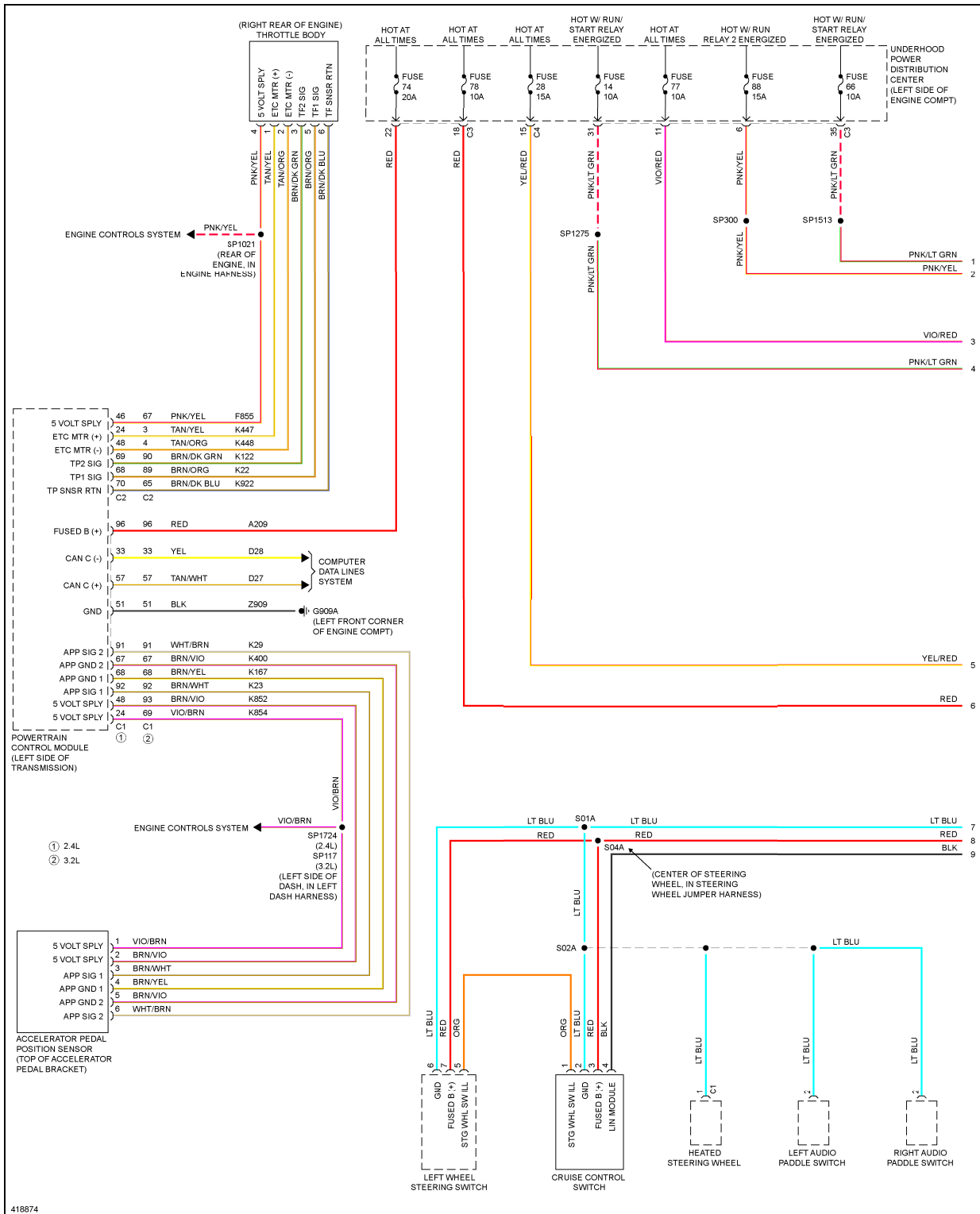


Fig. 24: Cruise Control Circuit (1 of 2)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

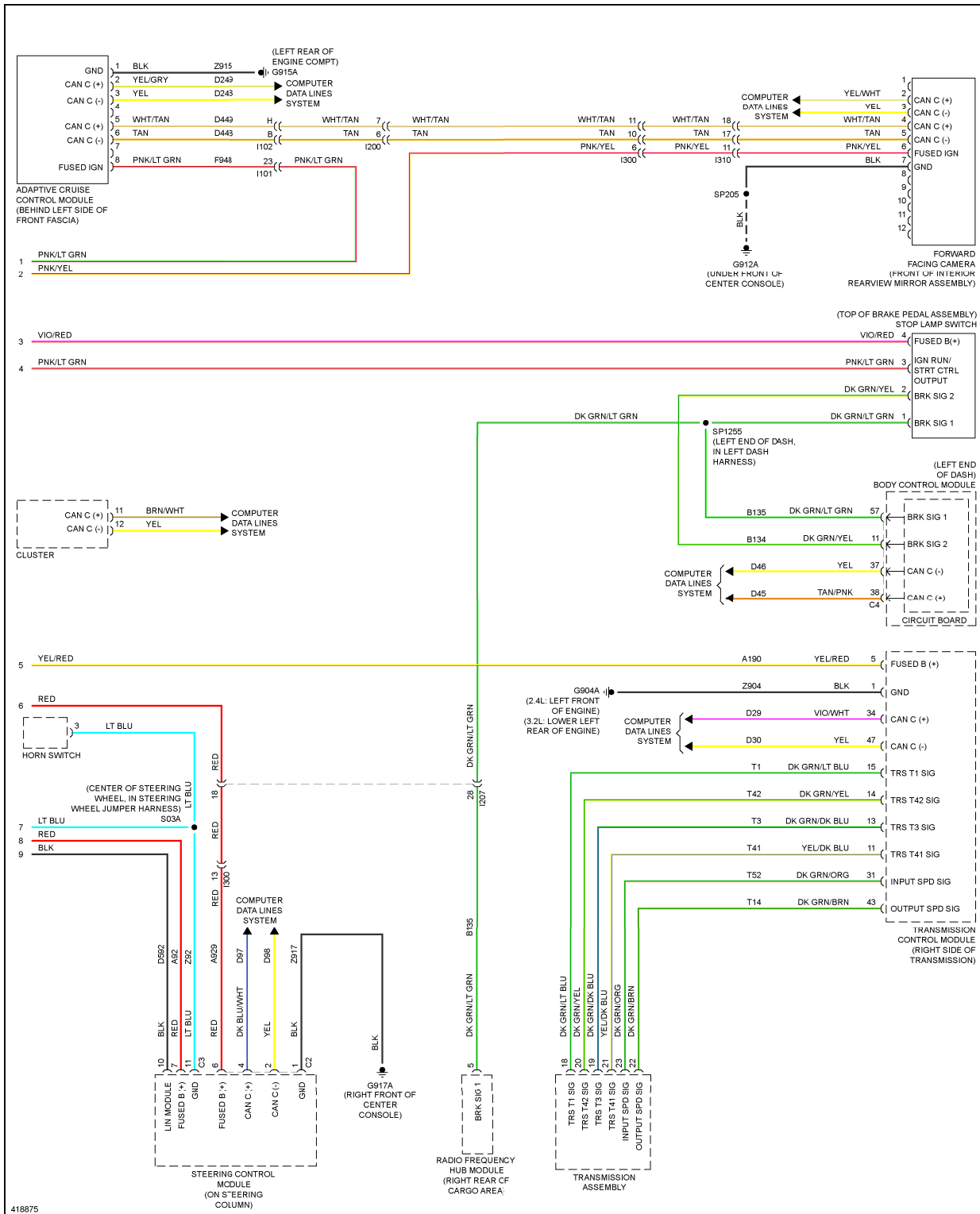


Fig. 25: Cruise Control Circuit (2 of 2)

DEFOGGERS

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

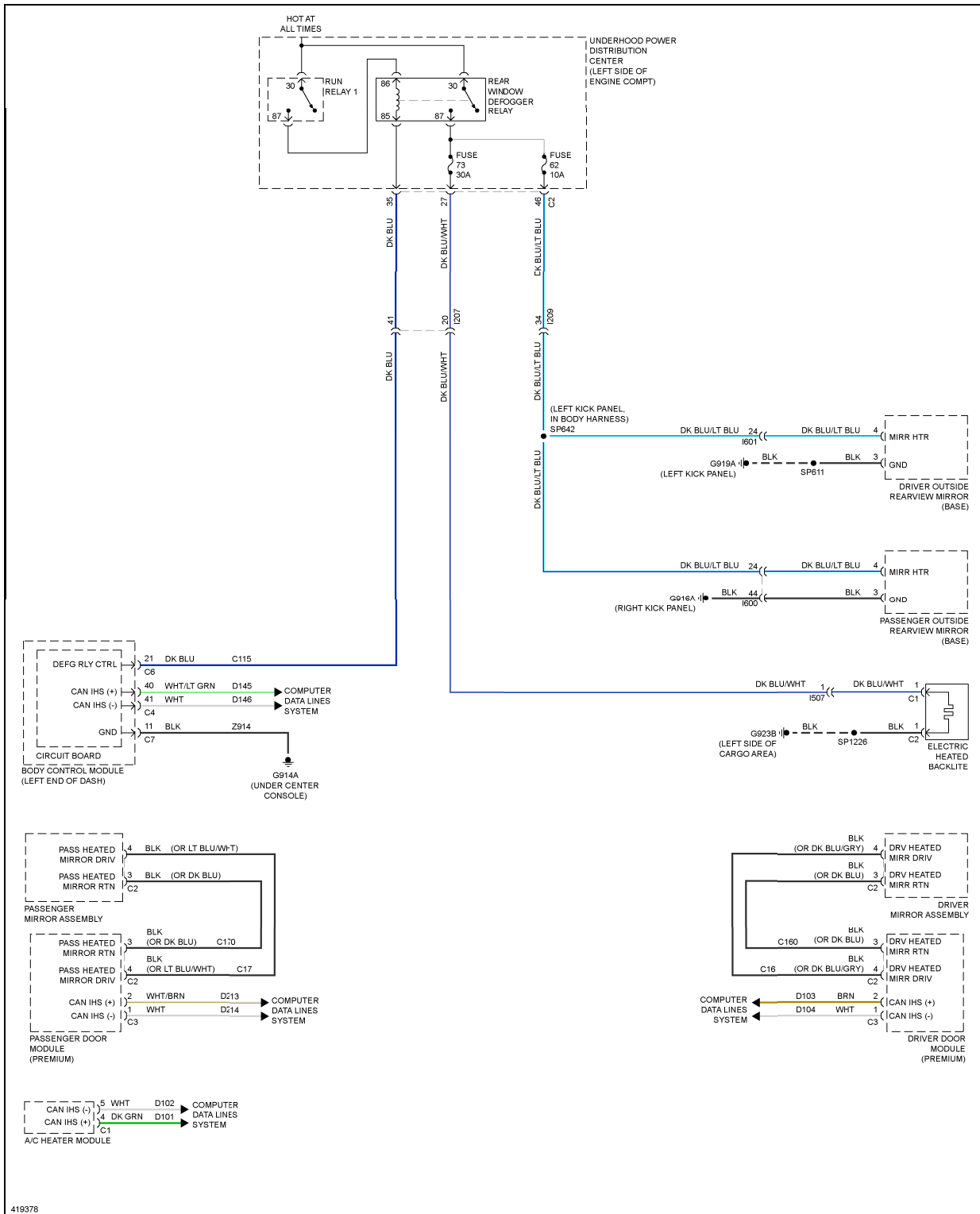


Fig. 26: Defoggers Circuit

ELECTRONIC POWER STEERING

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

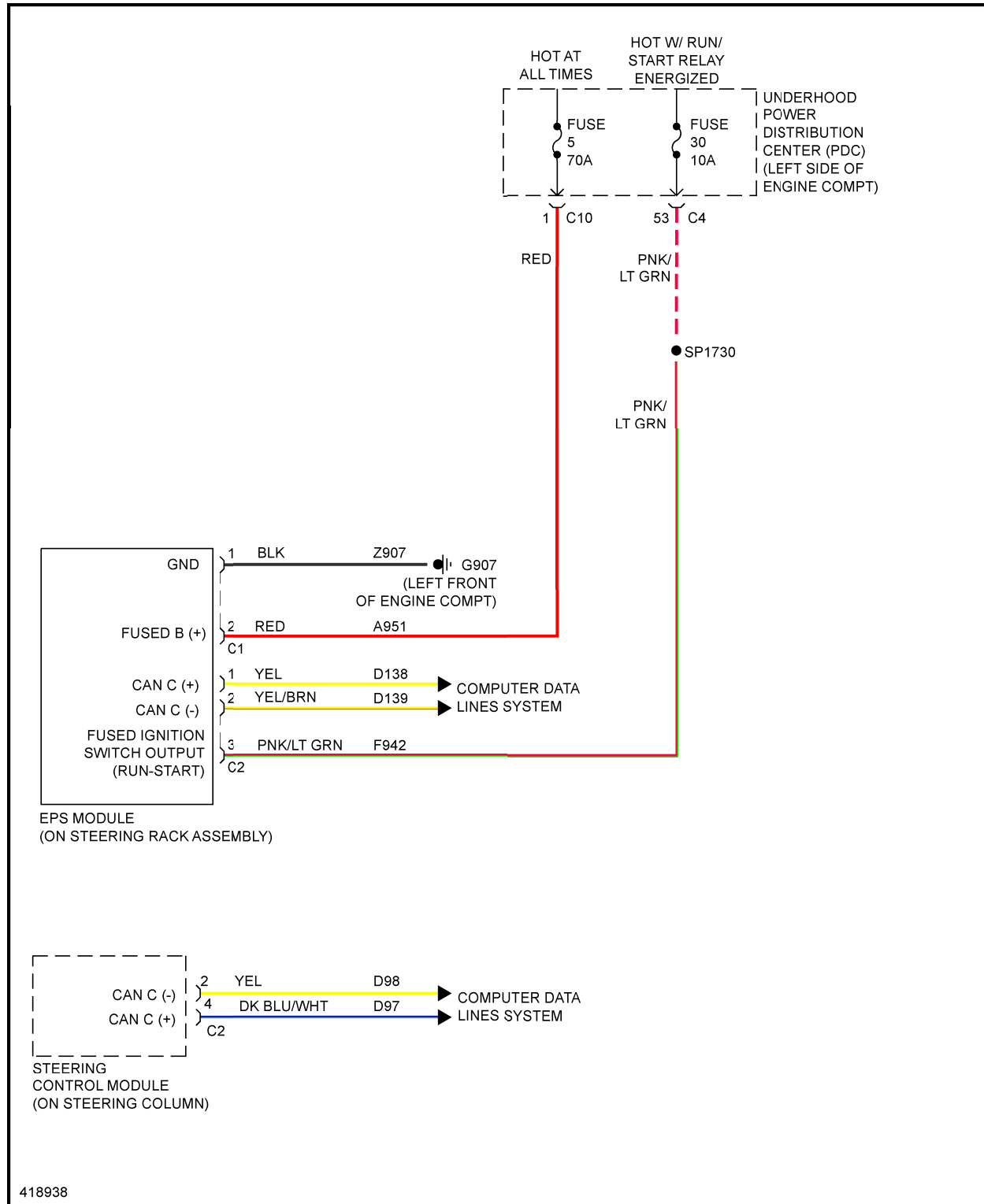


Fig. 27: Electronic Power Steering Circuit

ENGINE PERFORMANCE

2.4L

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

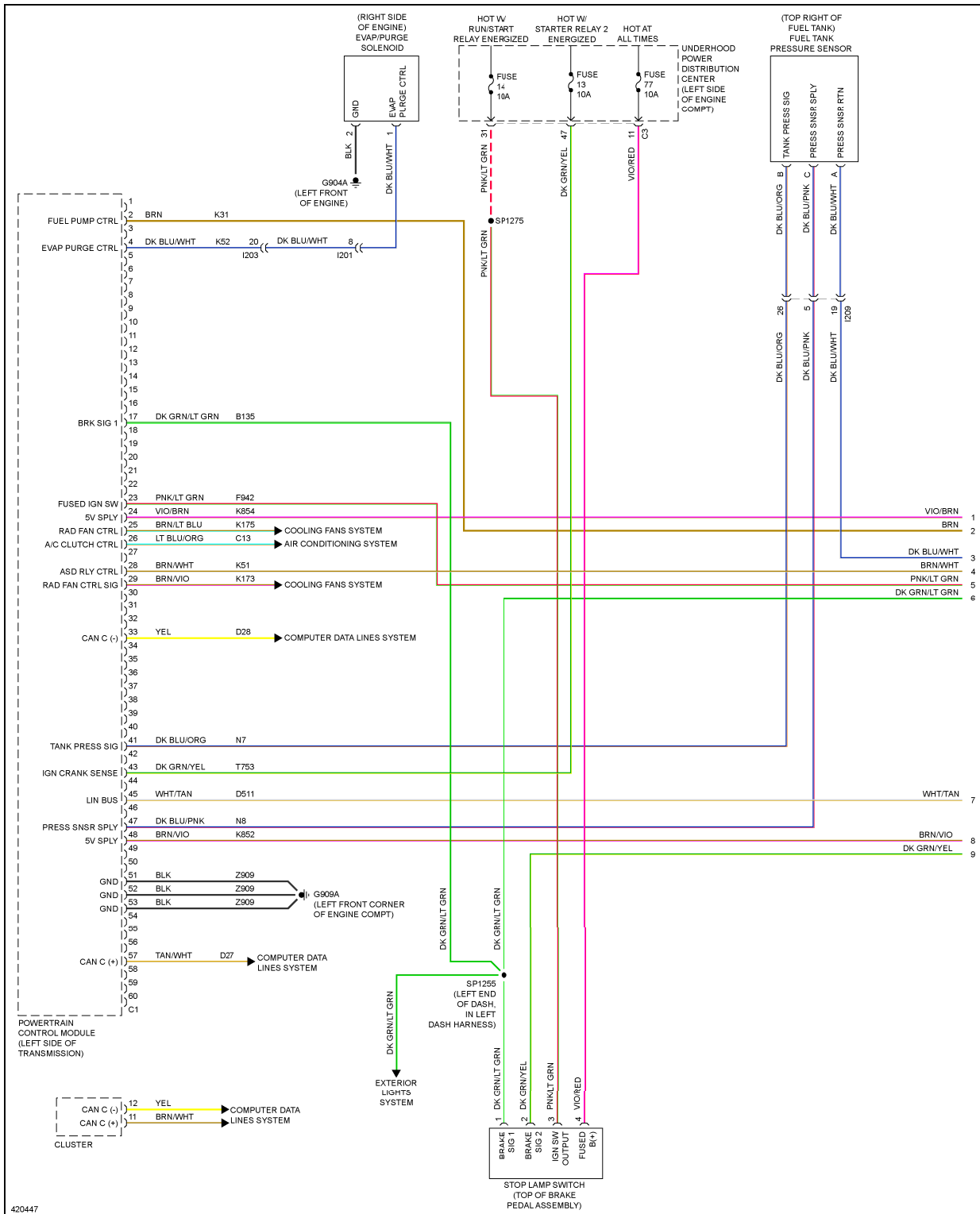


Fig. 28: 2.4L, Engine Performance Circuit (1 of 7)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 29: 2.4L, Engine Performance Circuit (2 of 7)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 30: 2.4L, Engine Performance Circuit (3 of 7)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

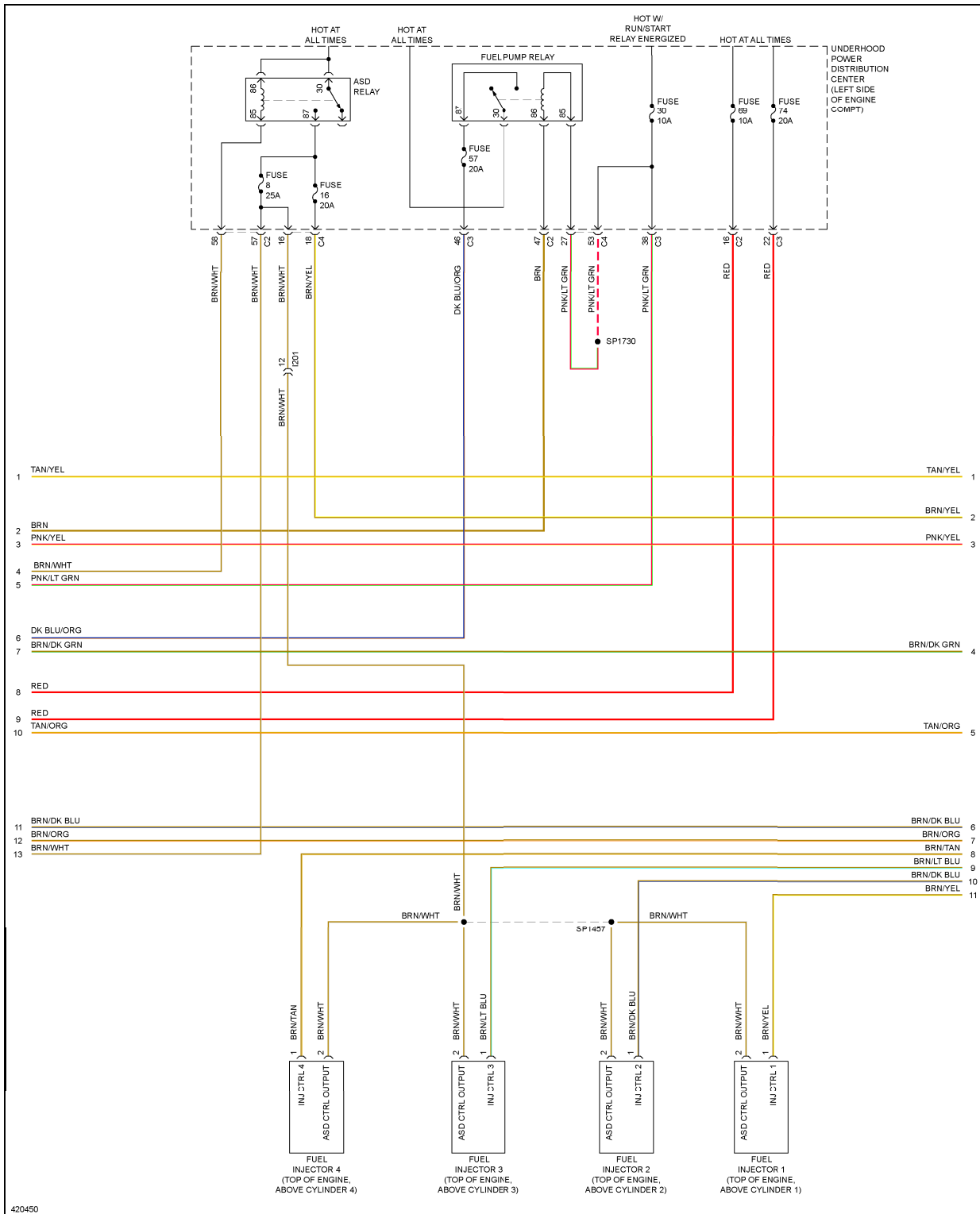


Fig. 31: 2.4L, Engine Performance Circuit (4 of 7)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

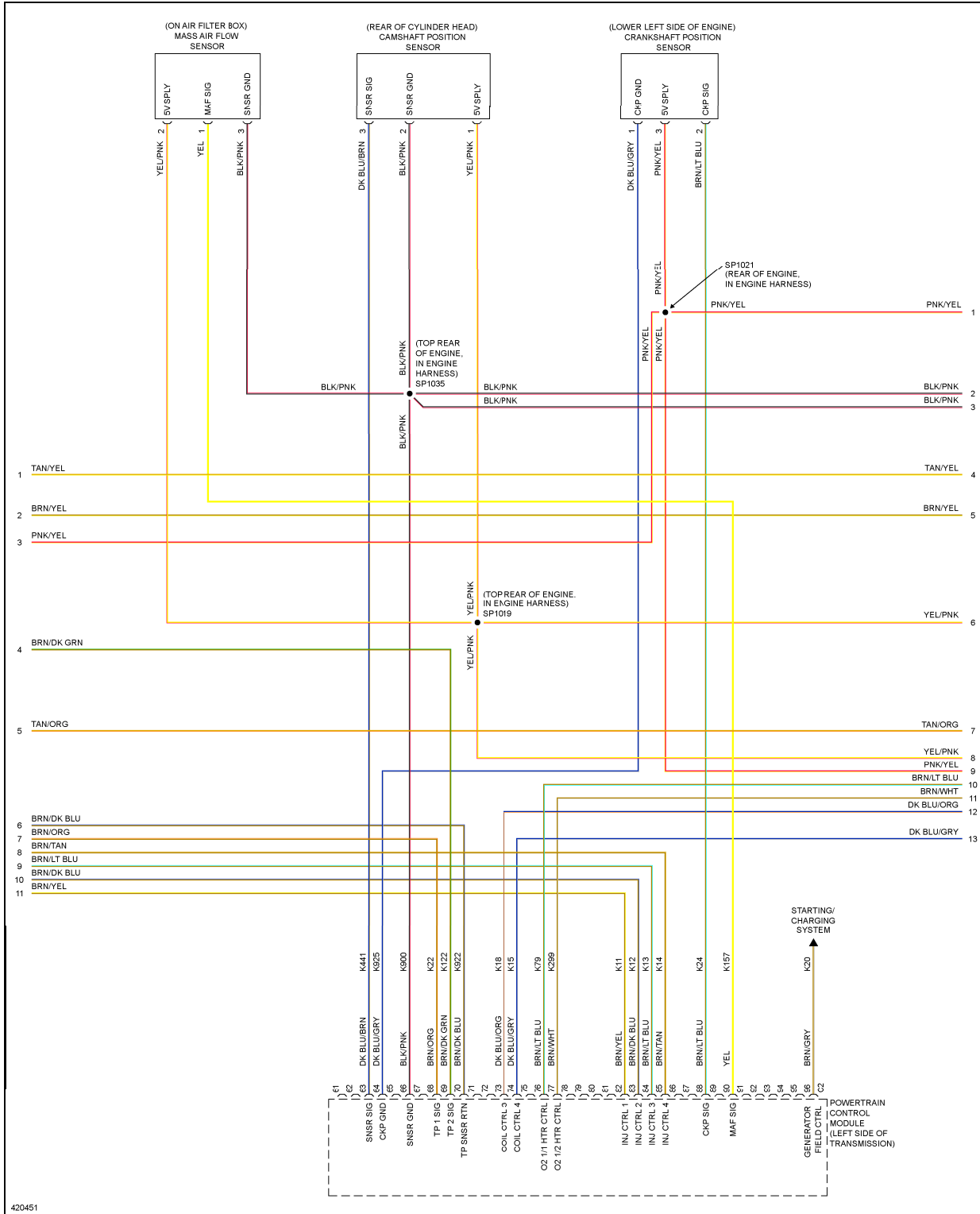


Fig. 32: 2.4L, Engine Performance Circuit (5 of 7)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

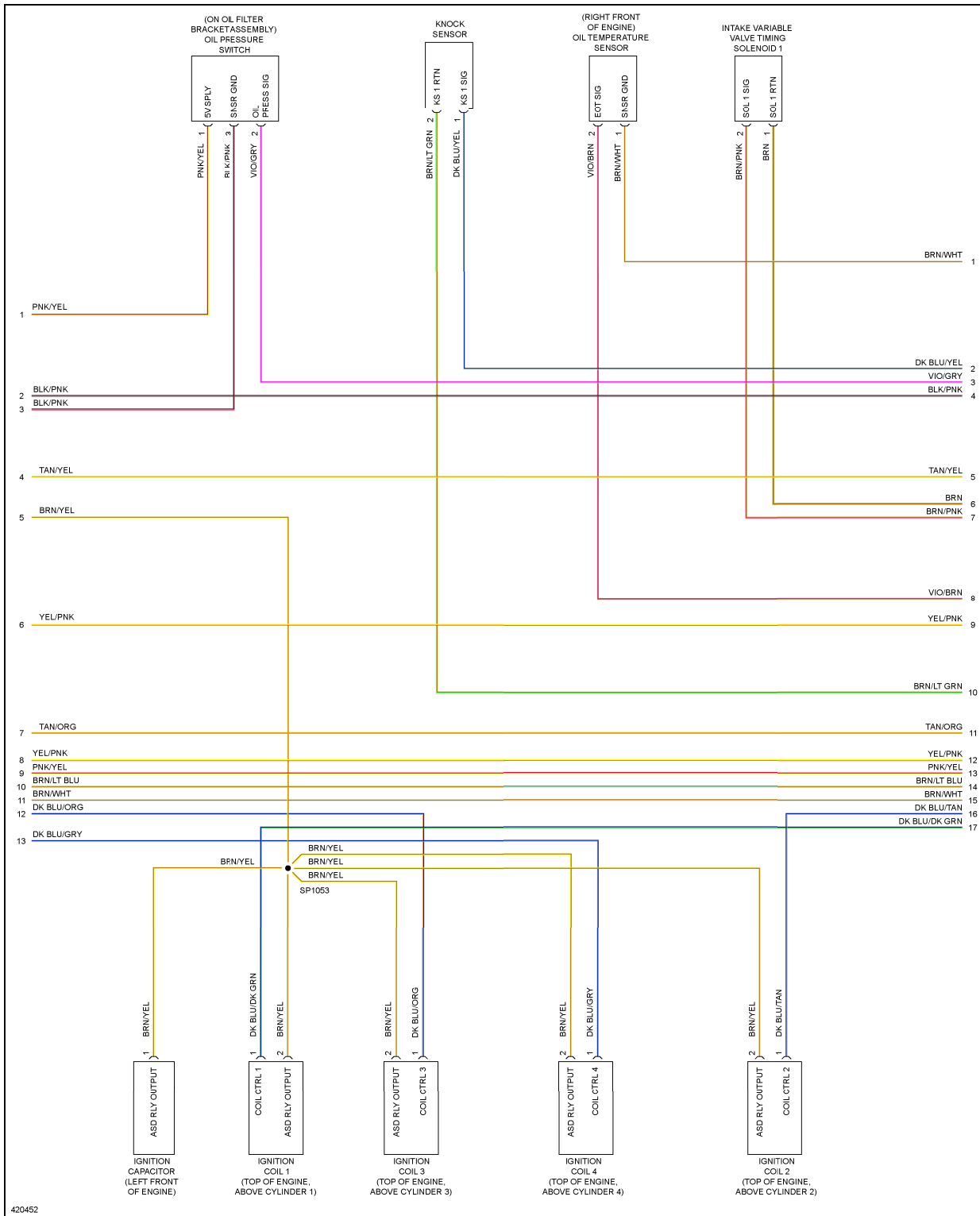
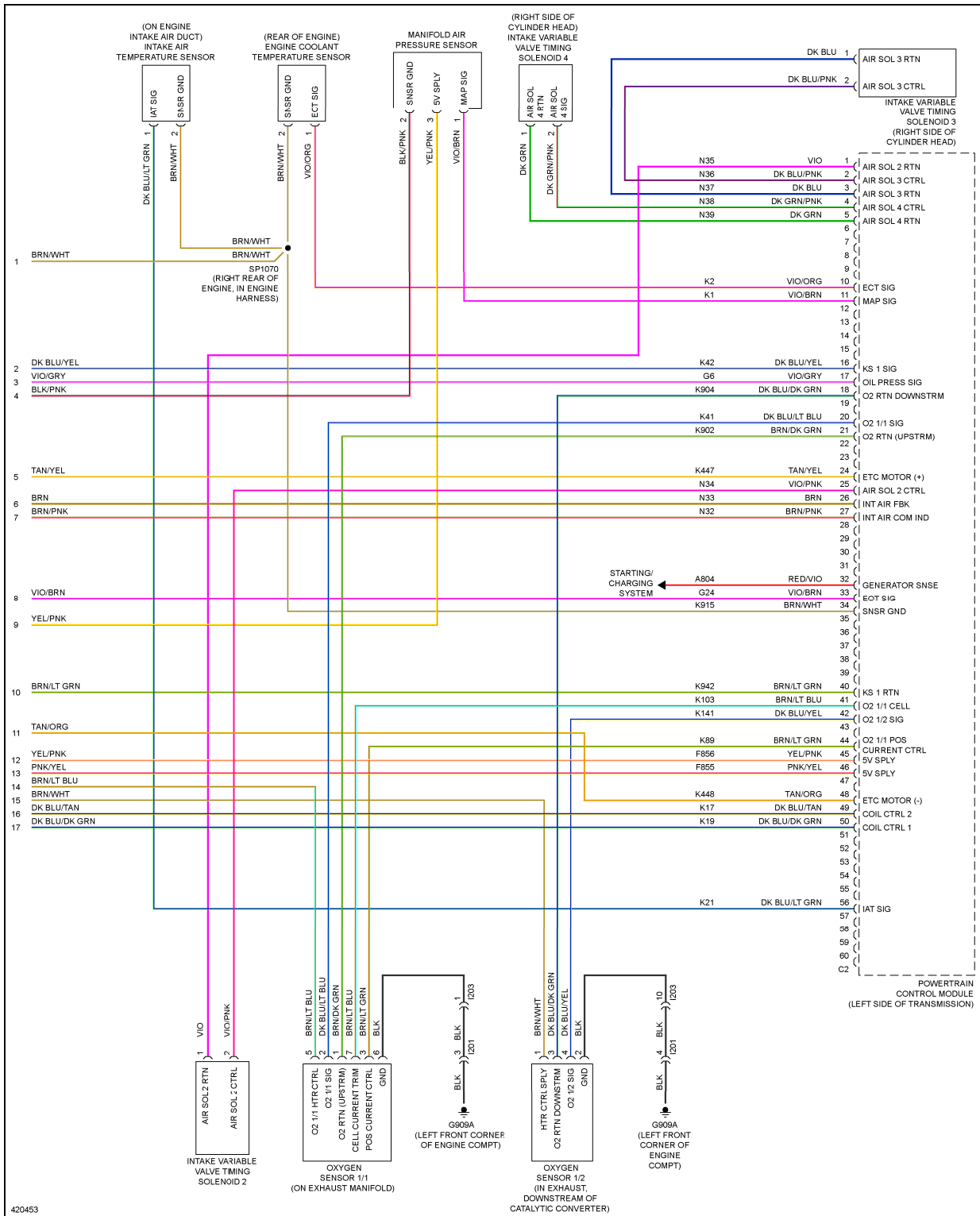


Fig. 33: 2.4L, Engine Performance Circuit (6 of 7)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



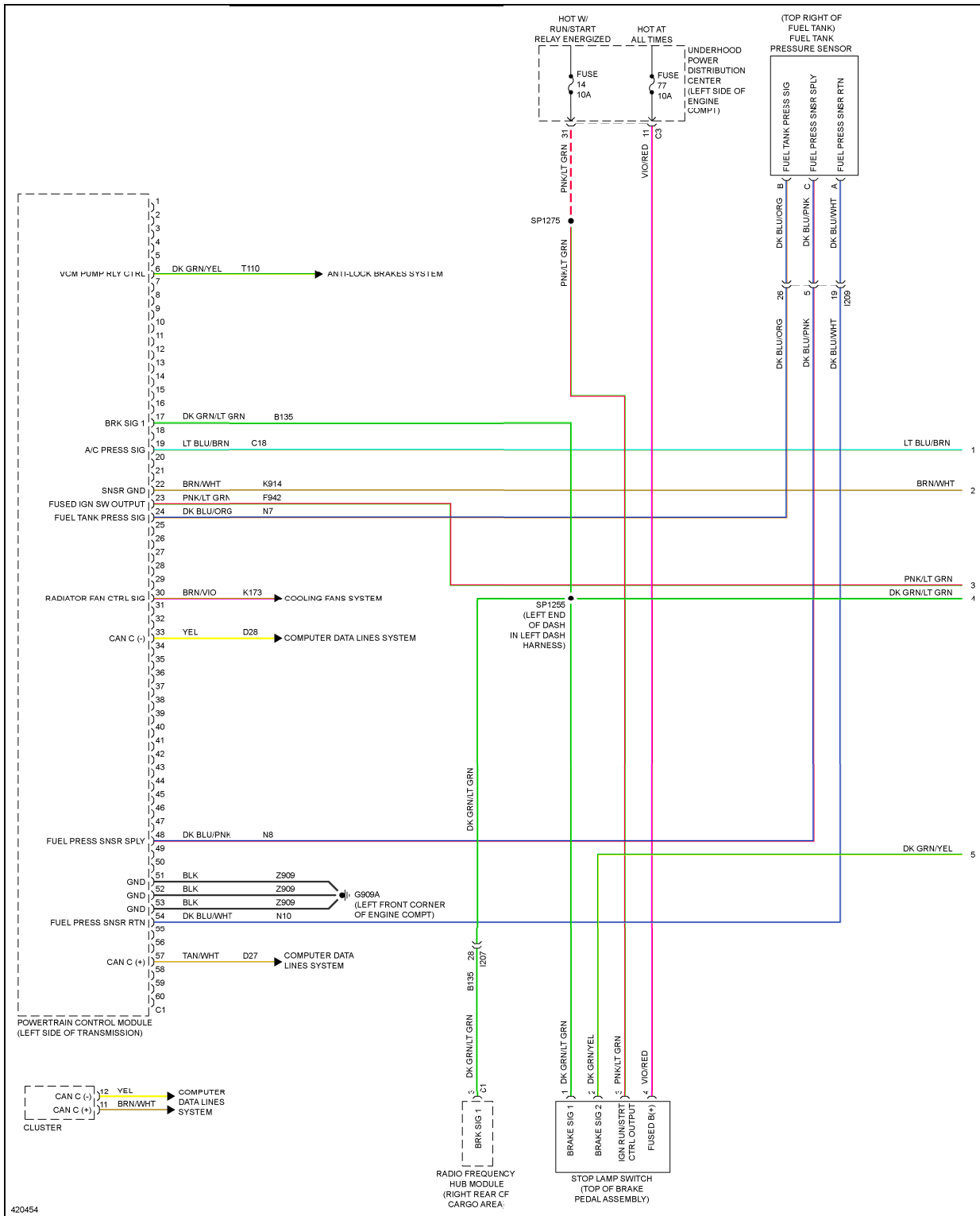
420453

Fig. 34: 2.4L, Engine Performance Circuit (7 of 7)

3.2L

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



420454

Fig. 35: 3.2L, Engine Performance Circuit (1 of 7)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

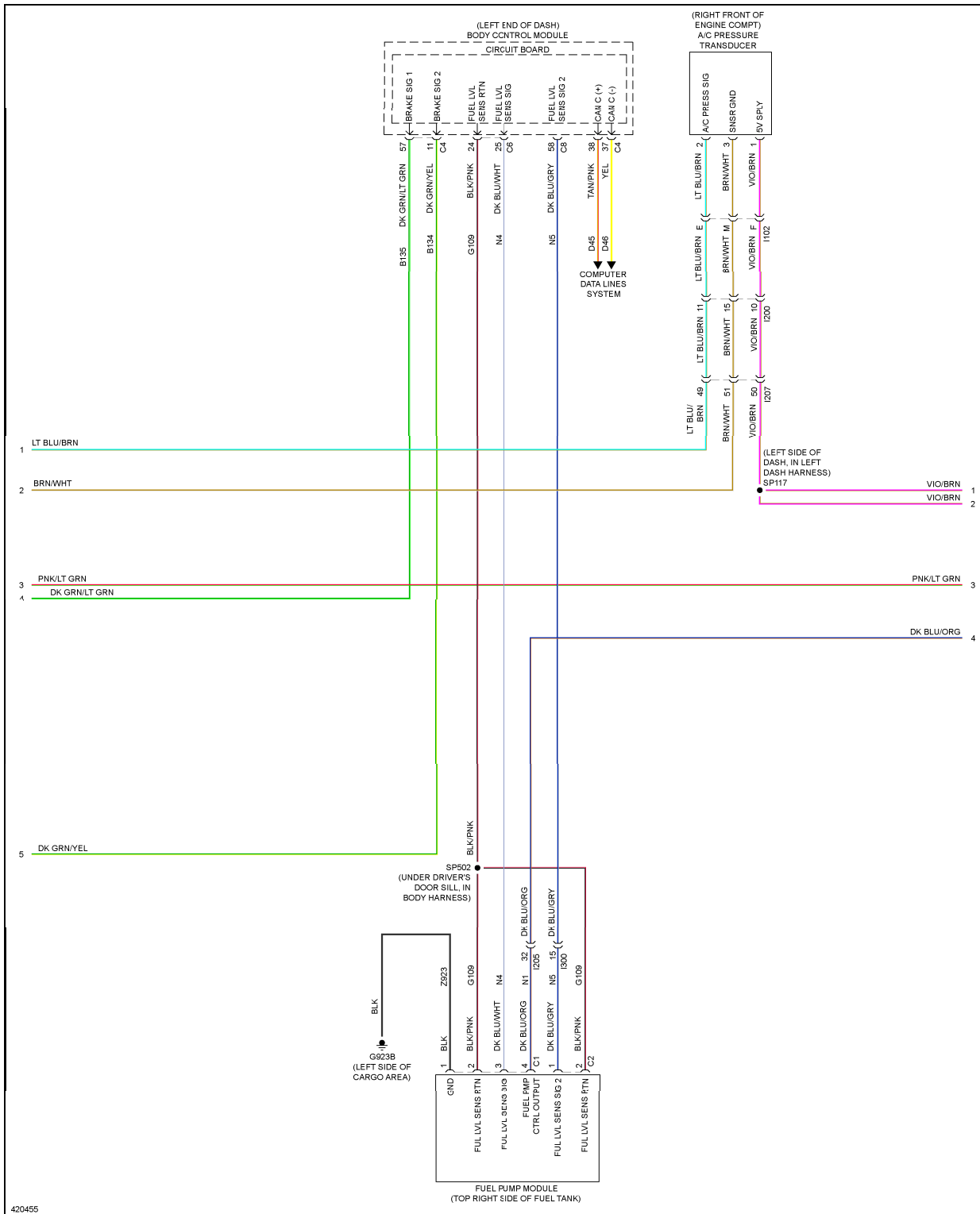


Fig. 36: 3.2L, Engine Performance Circuit (2 of 7)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

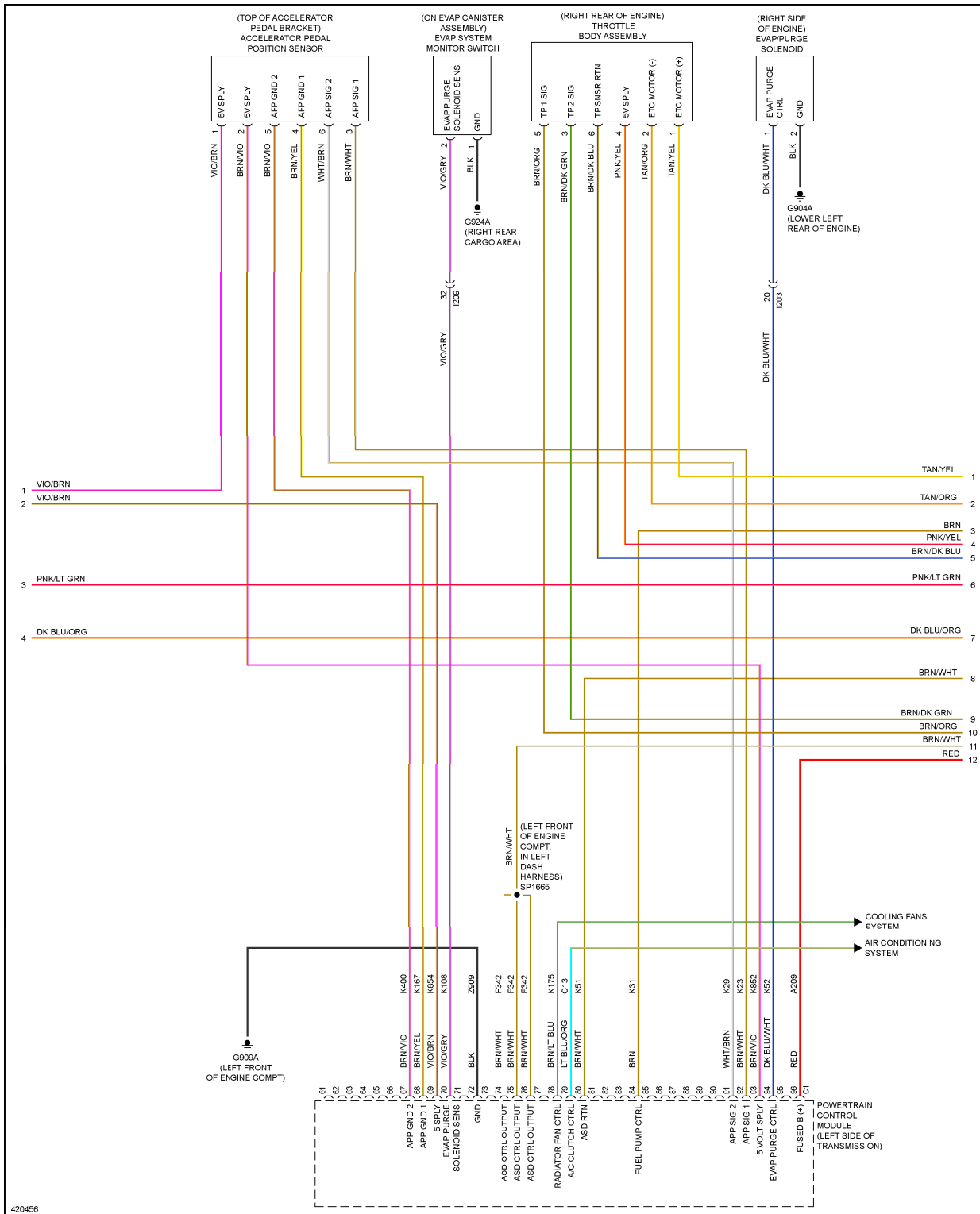


Fig. 37: 3.2L, Engine Performance Circuit (3 of 7)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

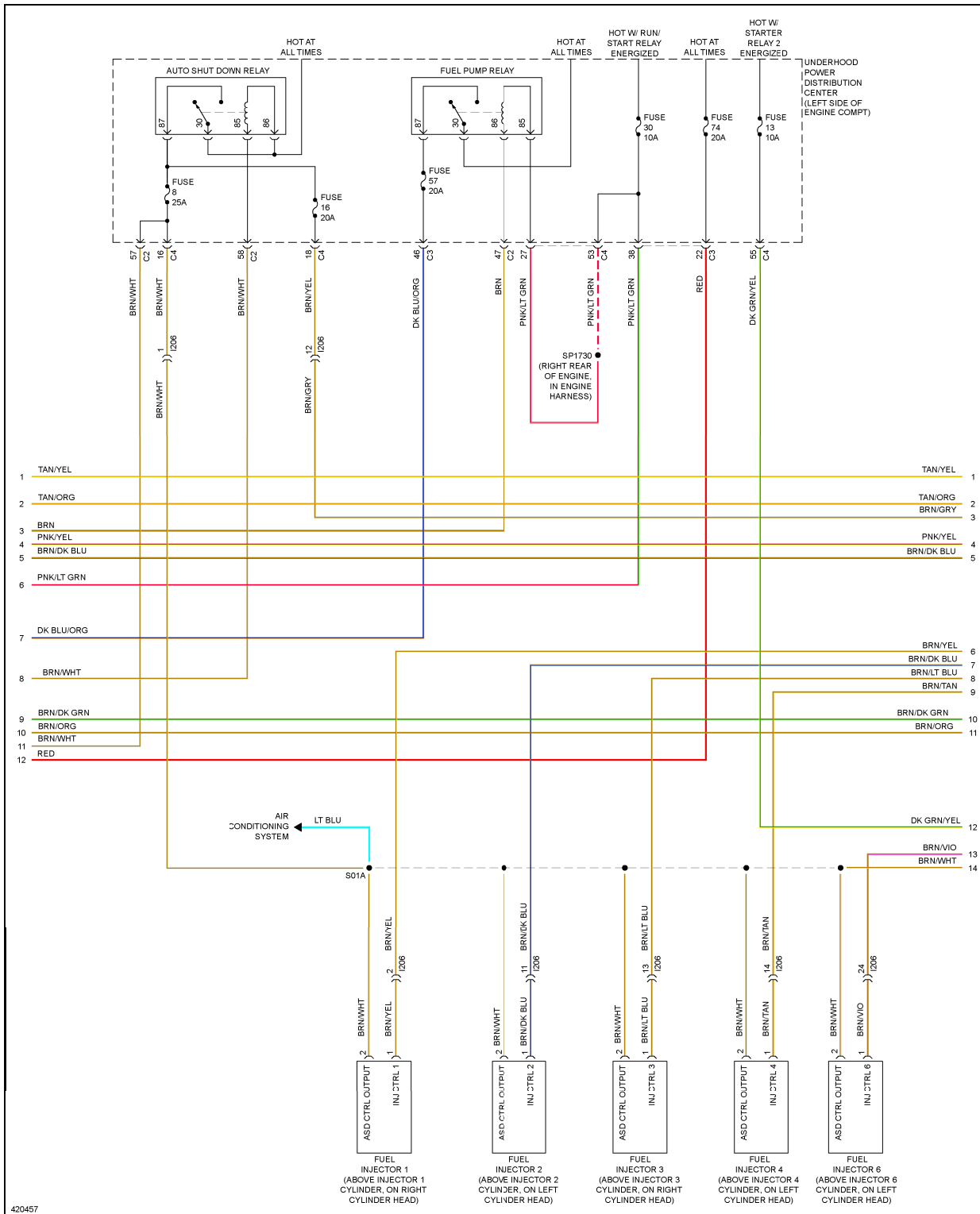


Fig. 38: 3.2L, Engine Performance Circuit (4 of 7)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 39: 3.2L, Engine Performance Circuit (5 of 7)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

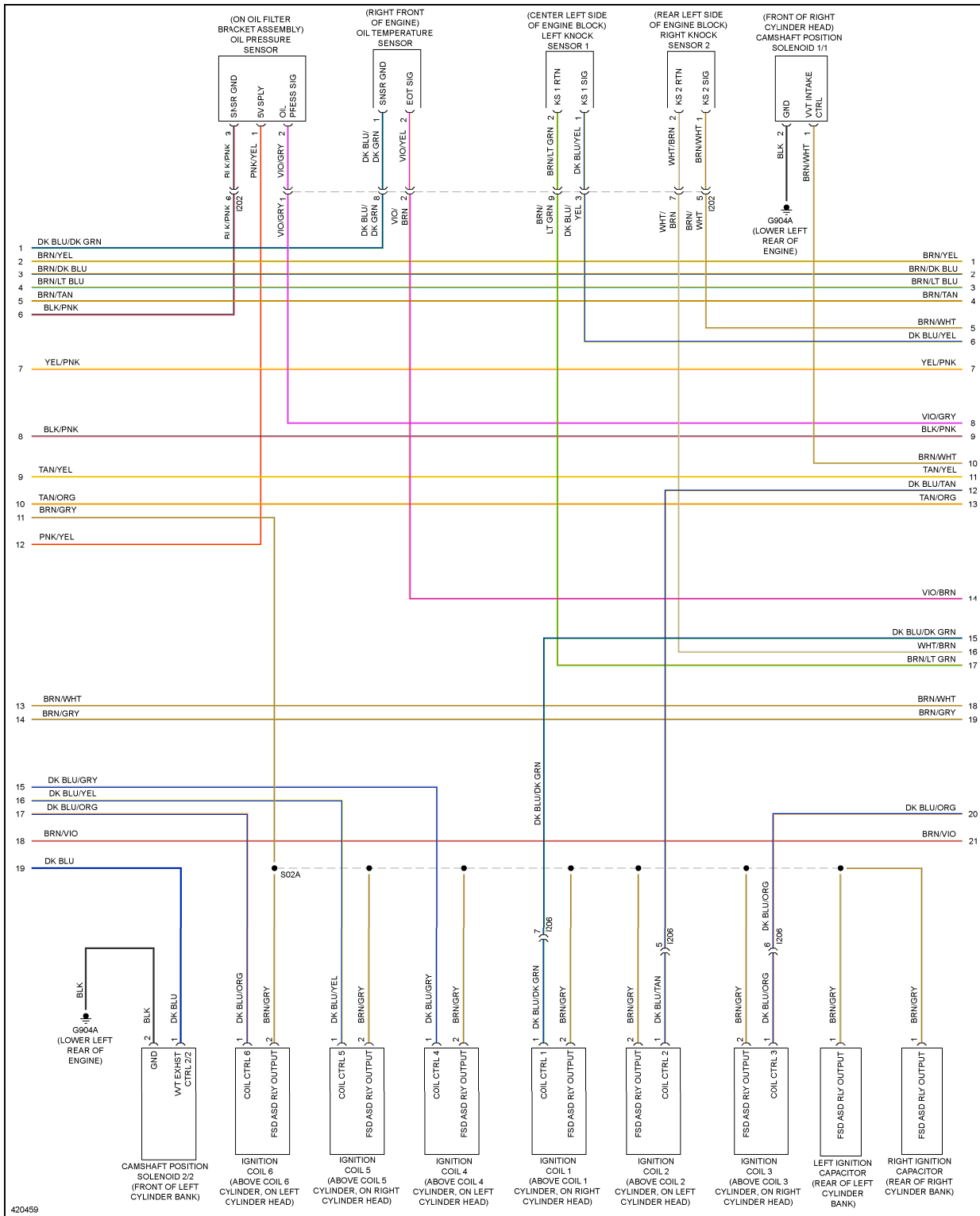


Fig. 40: 3.2L, Engine Performance Circuit (6 of 7)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

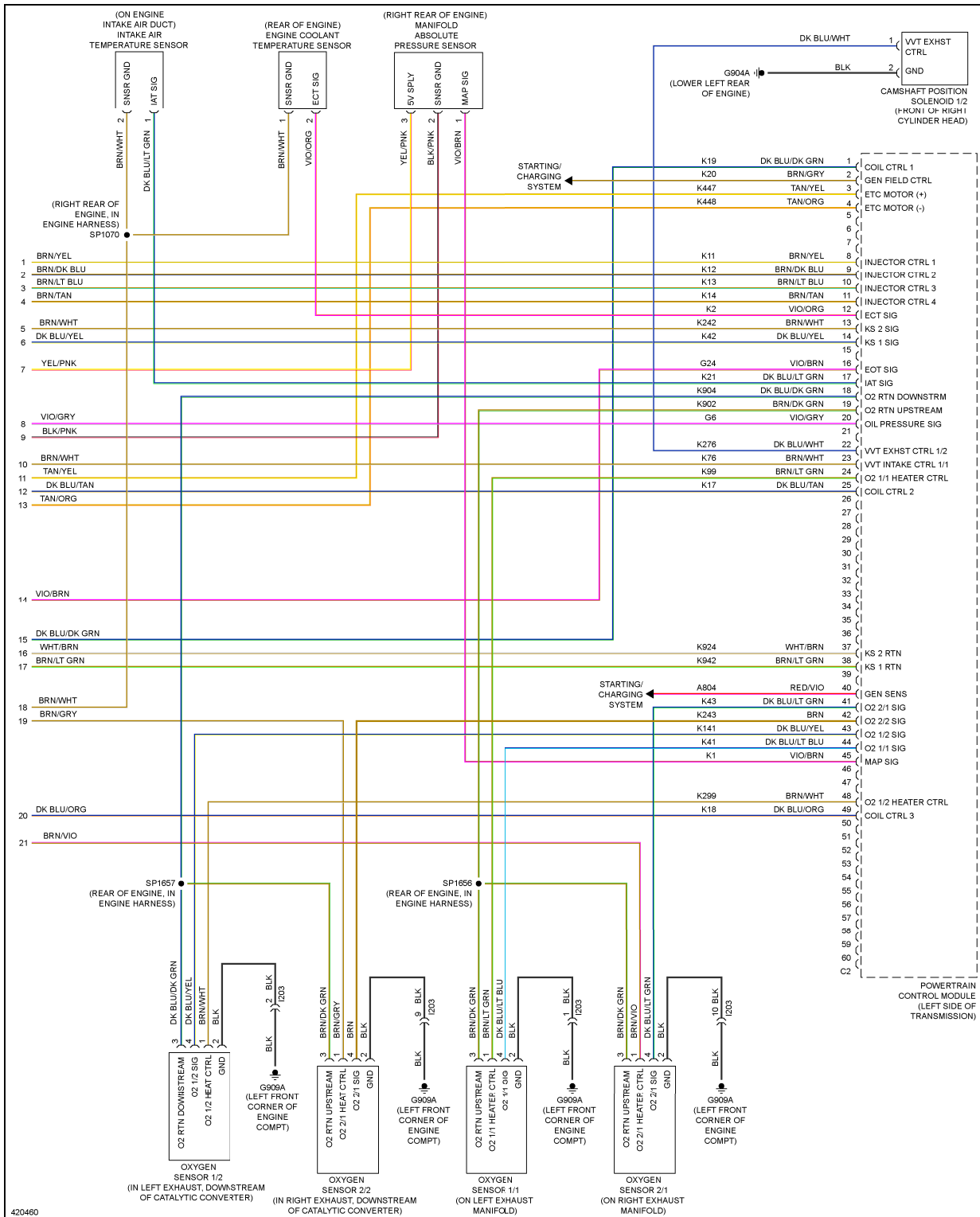


Fig. 41: 3.2L, Engine Performance Circuit (7 of 7)

EXTERIOR LIGHTS

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

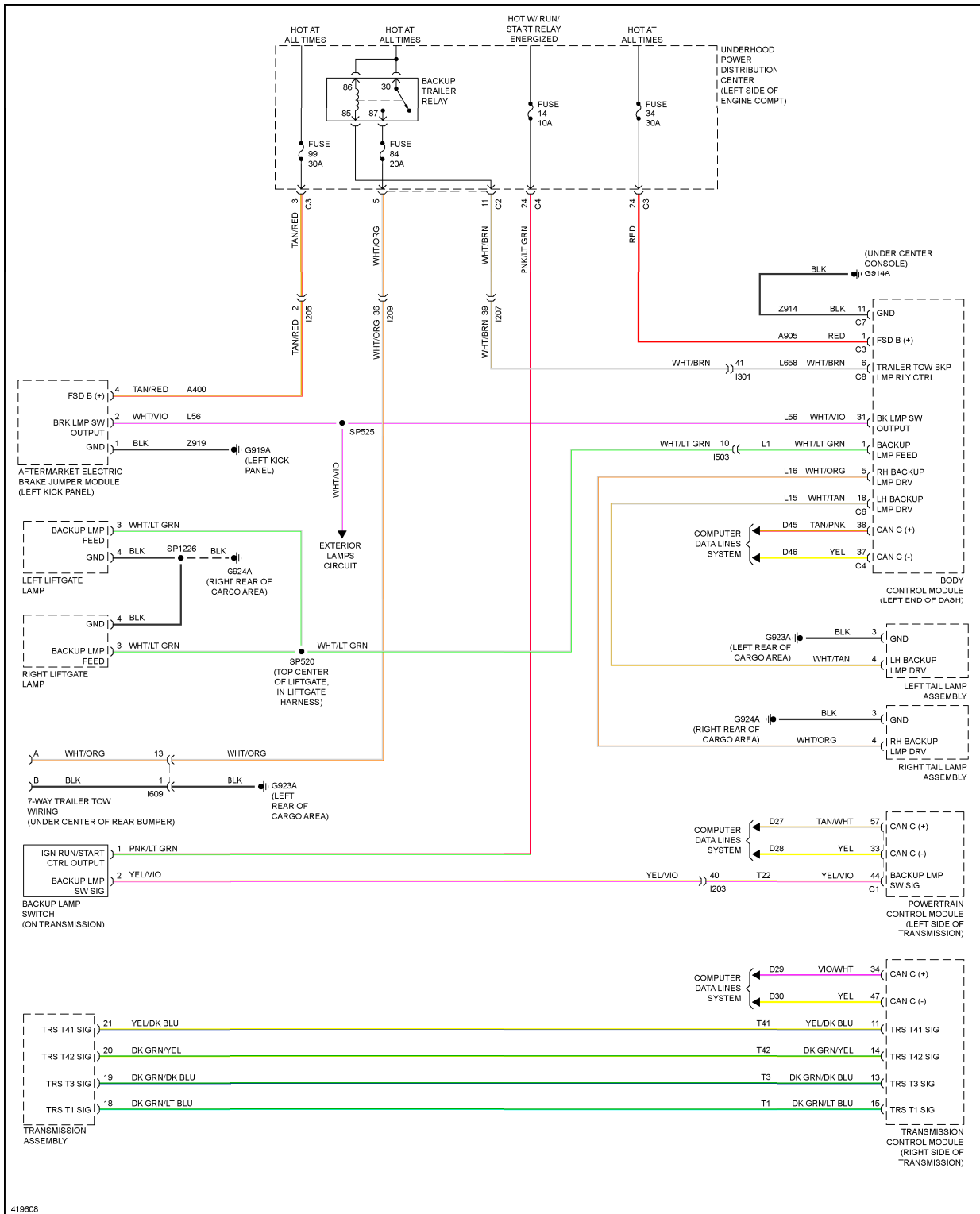


Fig. 42: Backup Lamps Circuit

Fig. 43: Exterior Lamps Circuit (1 of 2)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 44: Exterior Lamps Circuit (2 of 2)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

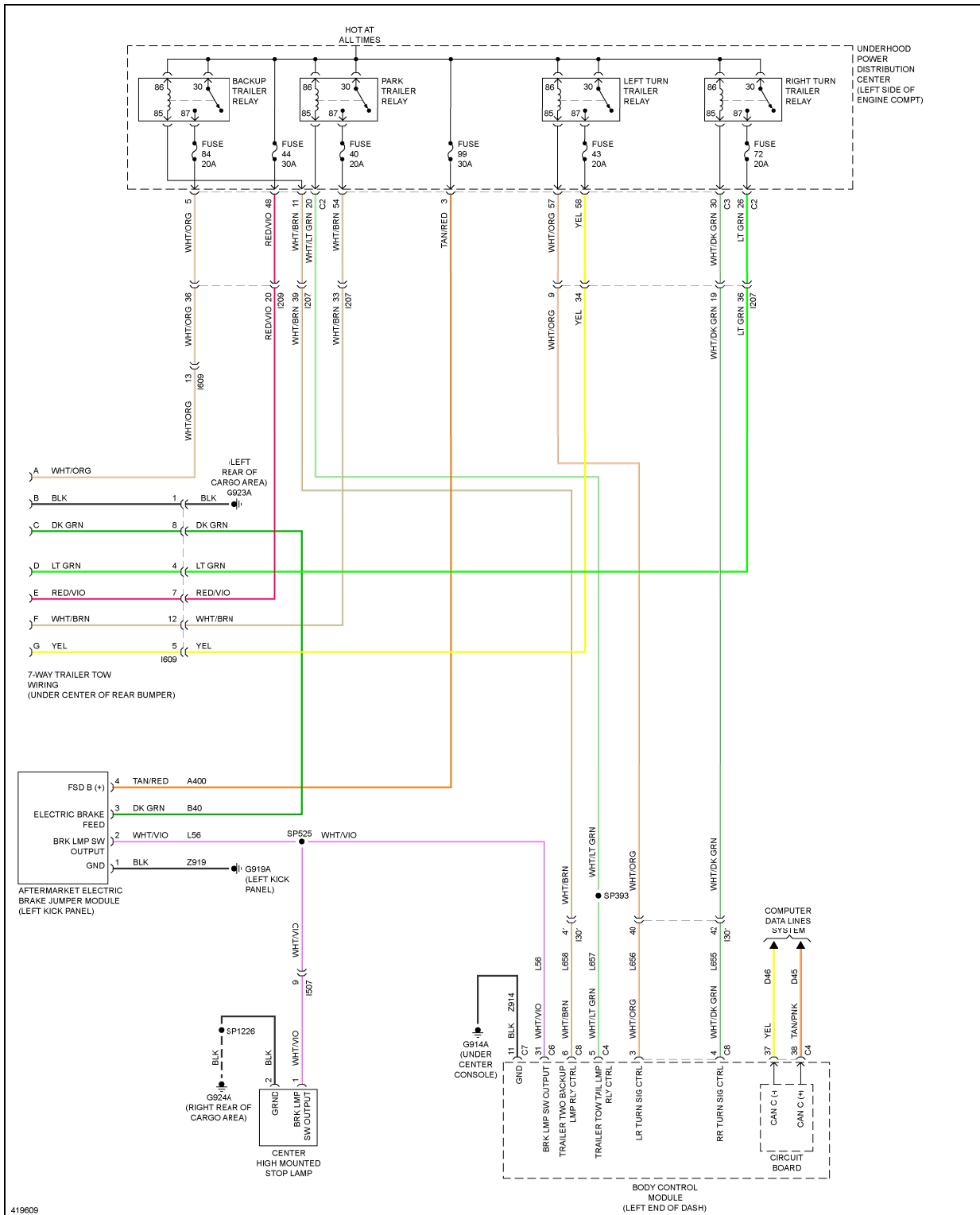


Fig. 45: Trailer Tow Circuit

GROUND DISTRIBUTION

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

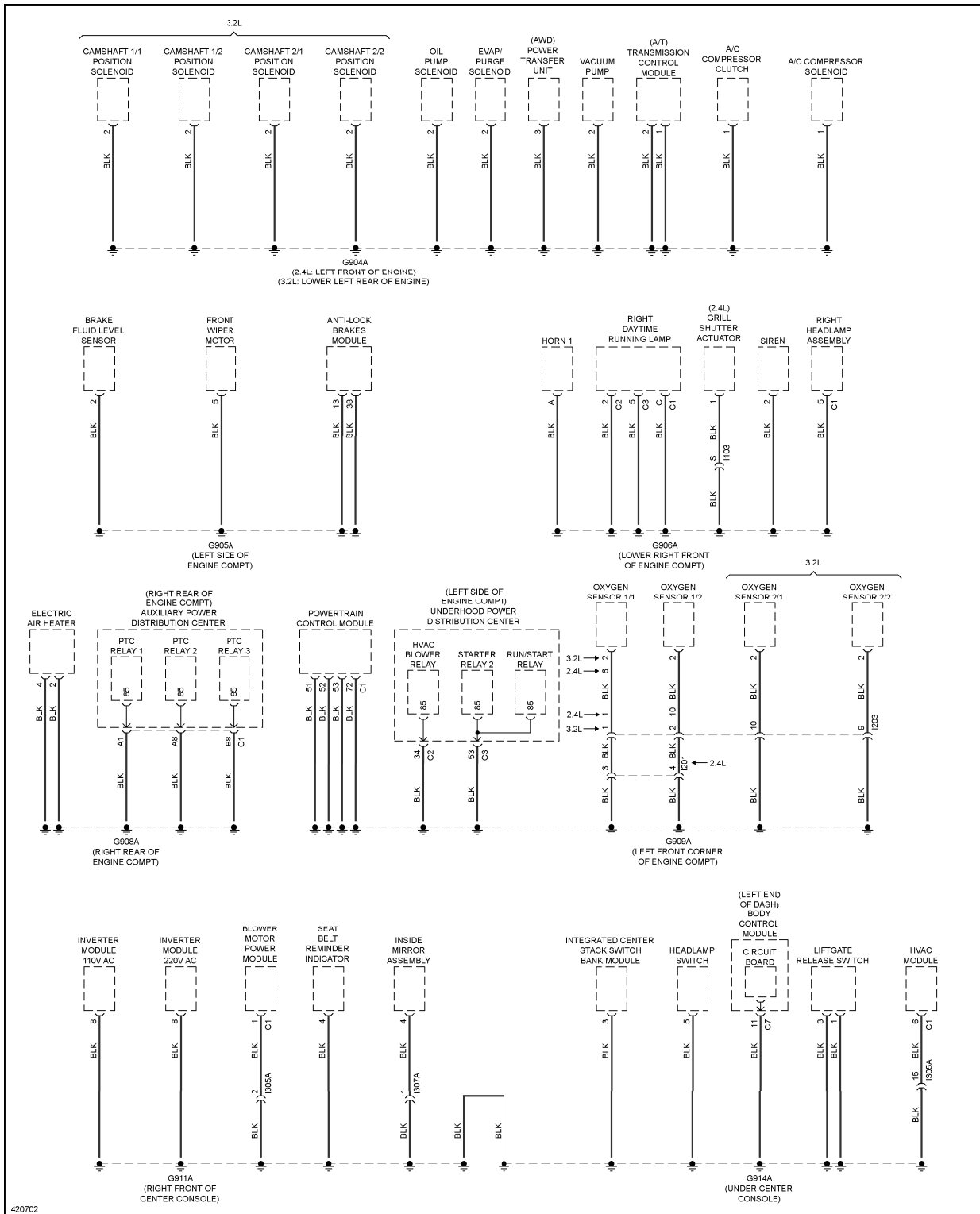


Fig. 46: Ground Distribution Circuit (1 of 4)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

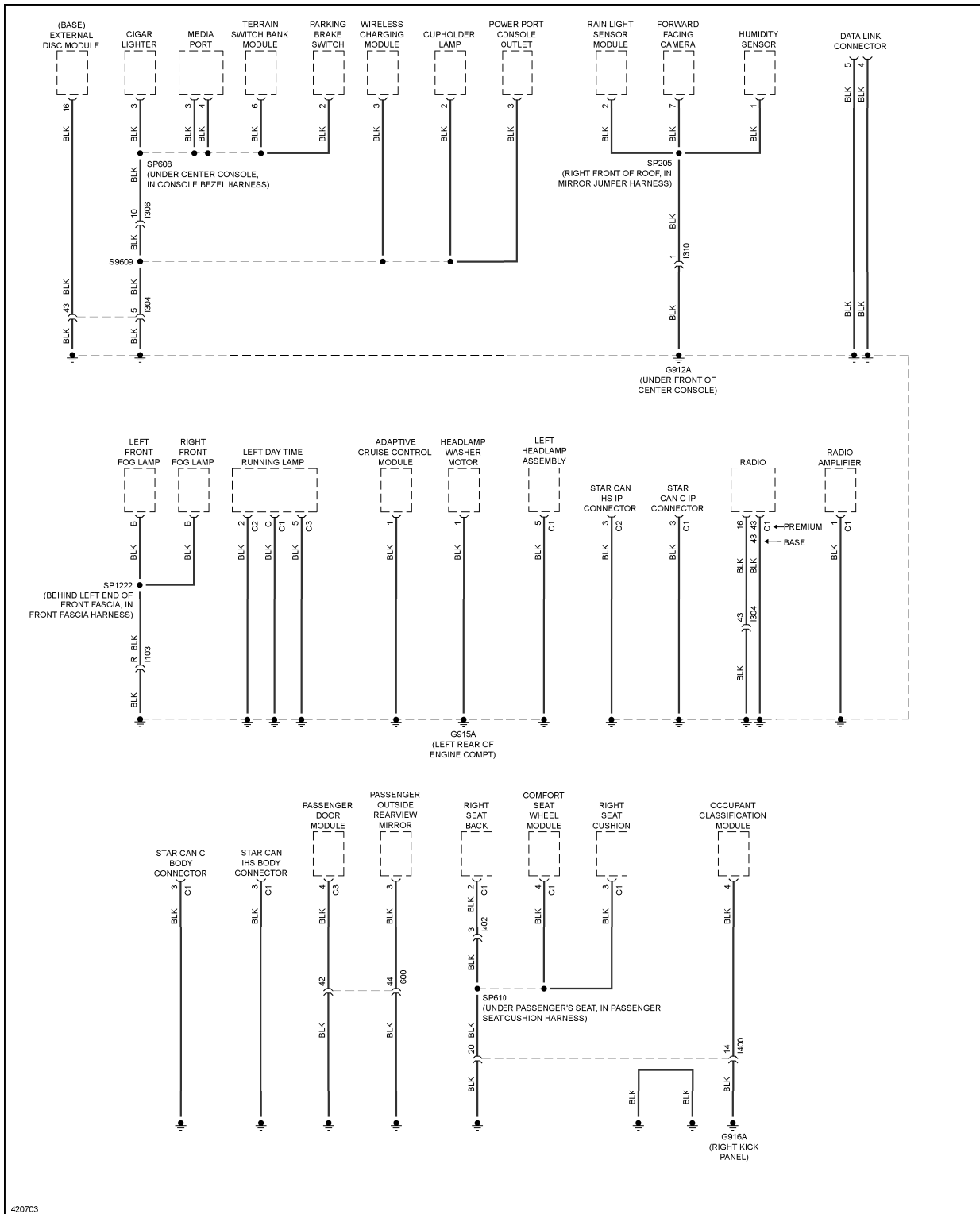
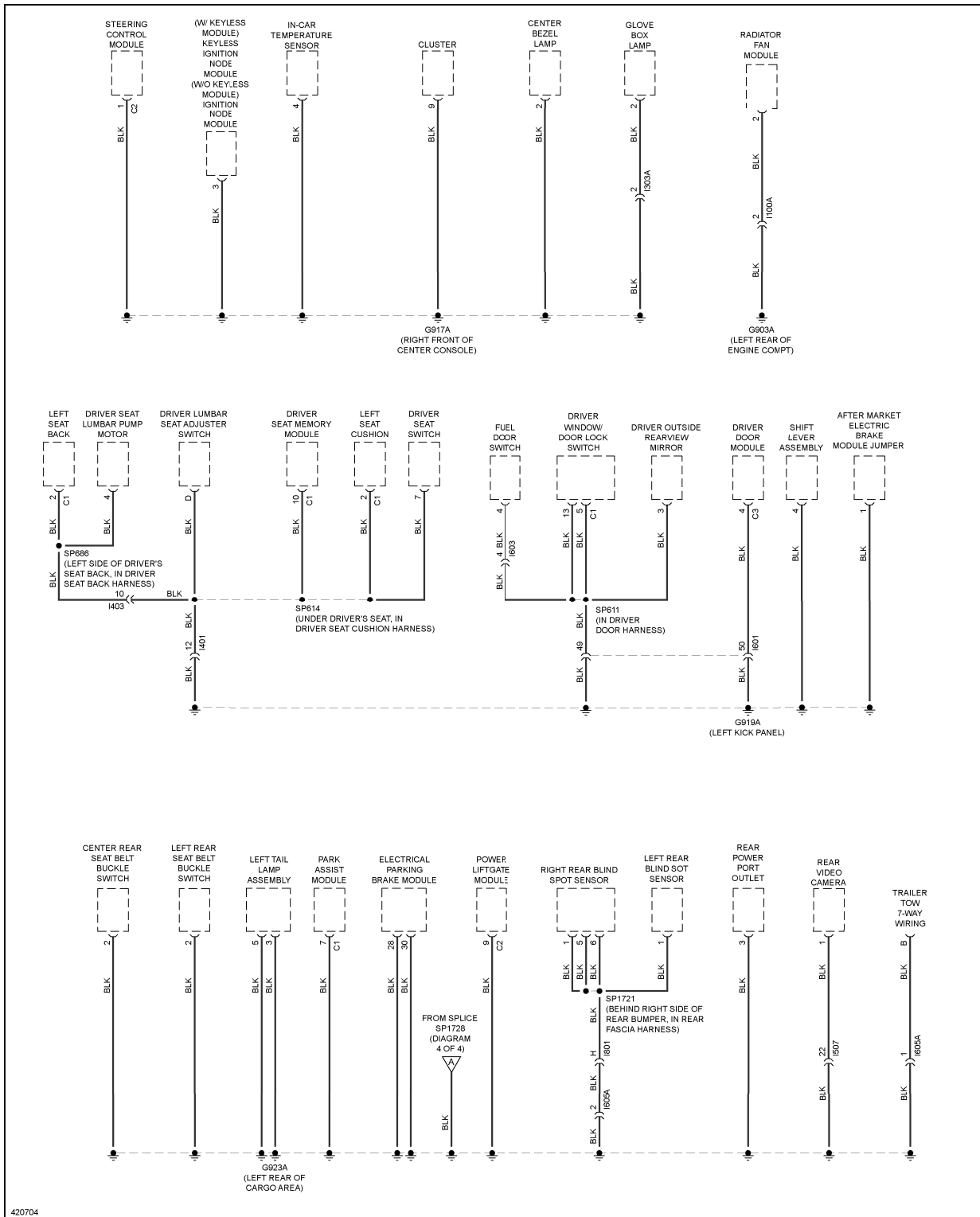


Fig. 47: Ground Distribution Circuit (2 of 4)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



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Fig. 48: Ground Distribution Circuit (3 of 4)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

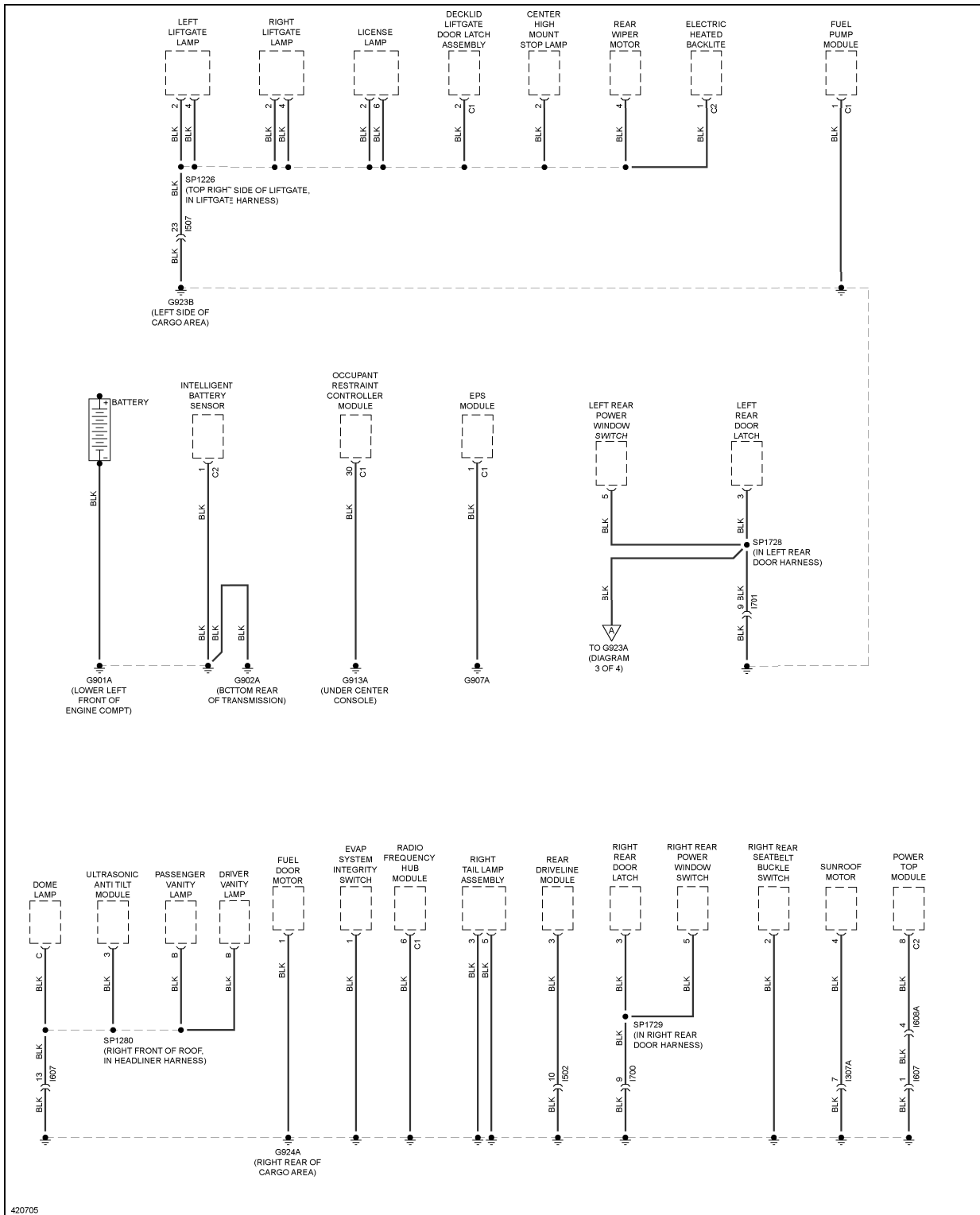


Fig. 49: Ground Distribution Circuit (4 of 4)

HEADLIGHTS

Fig. 50: Headlights Circuit (1 of 2)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

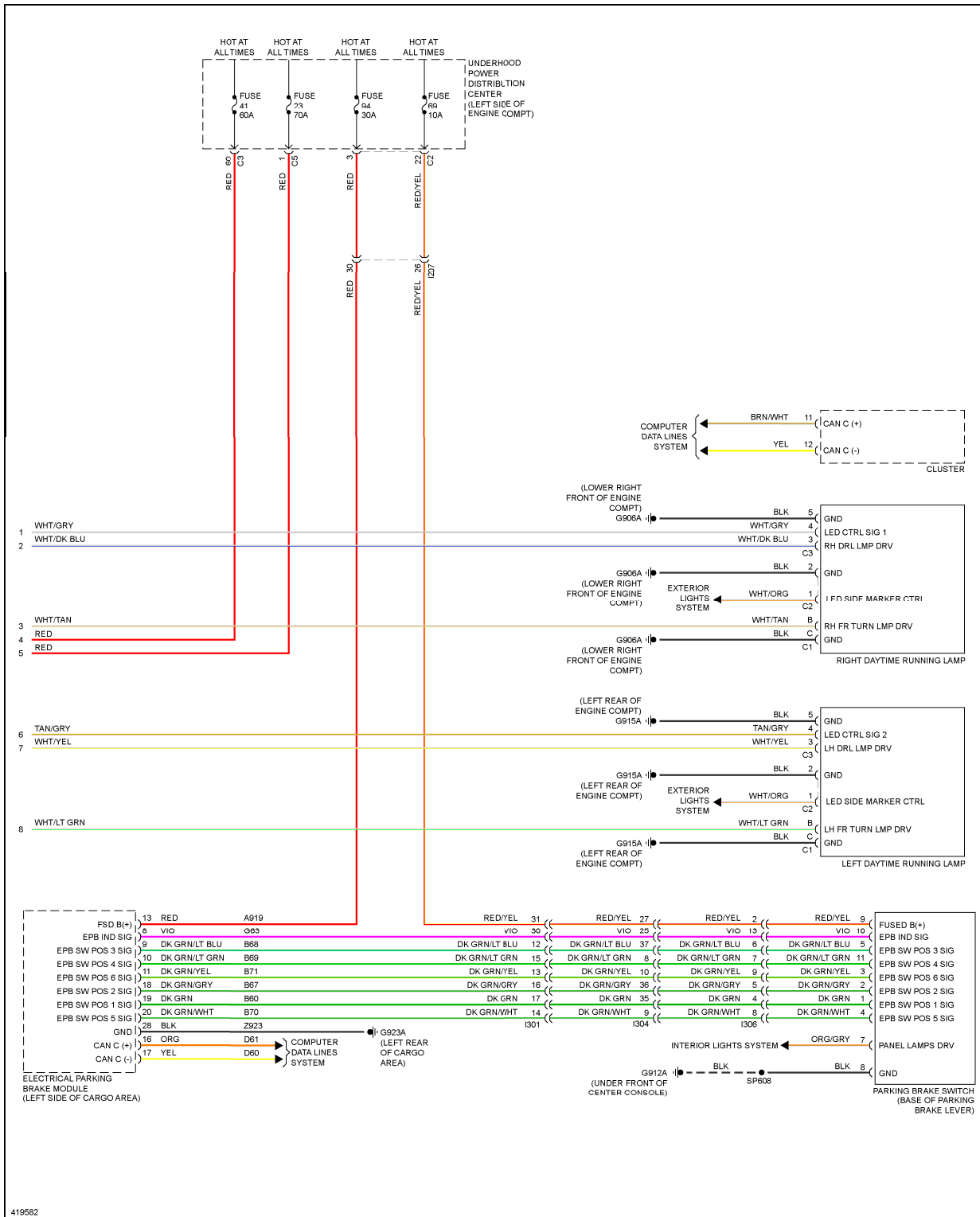


Fig. 51: Headlights Circuit (2 of 2)

HORN

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

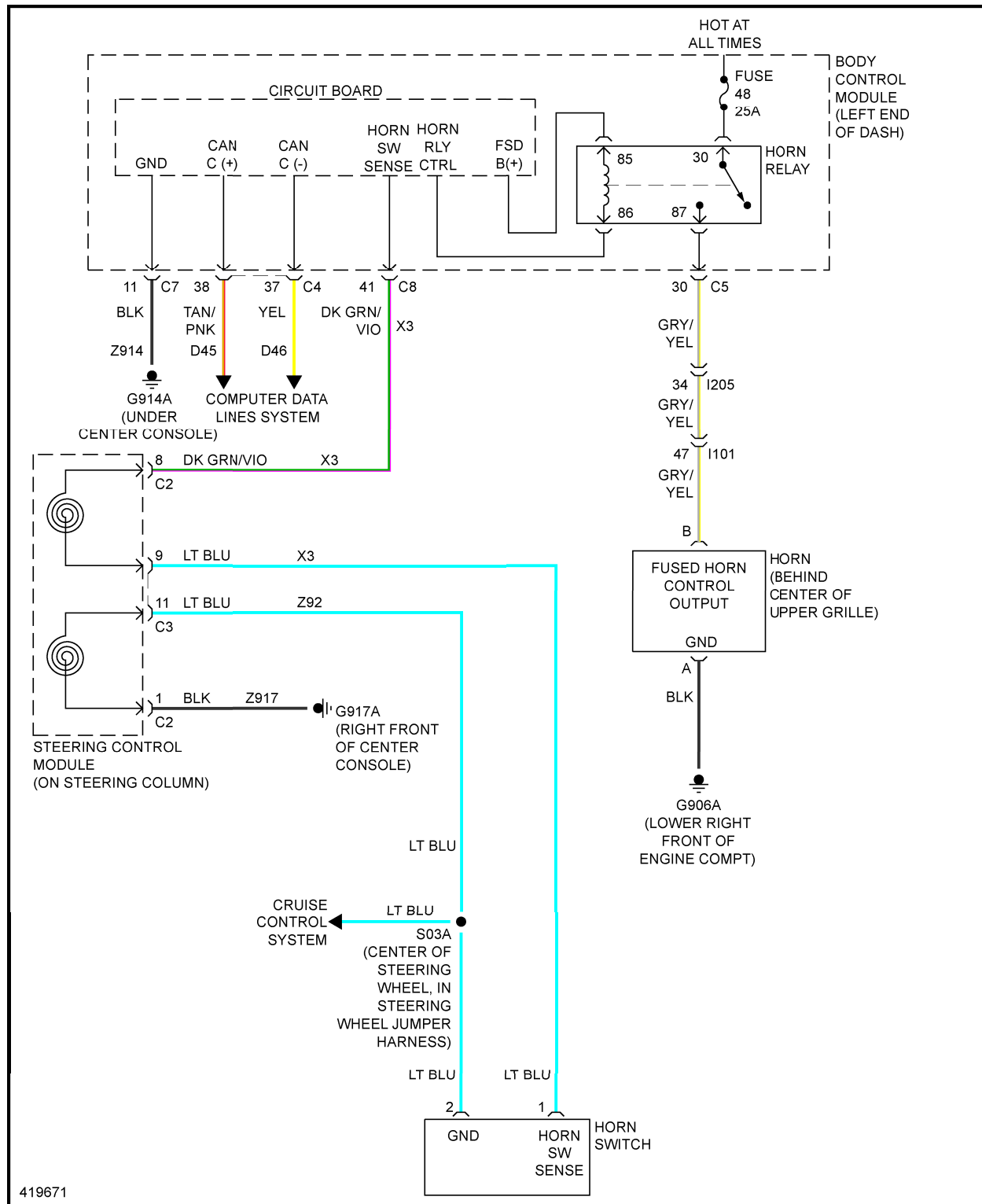


Fig. 52: Horn Circuit

INSTRUMENT CLUSTER

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

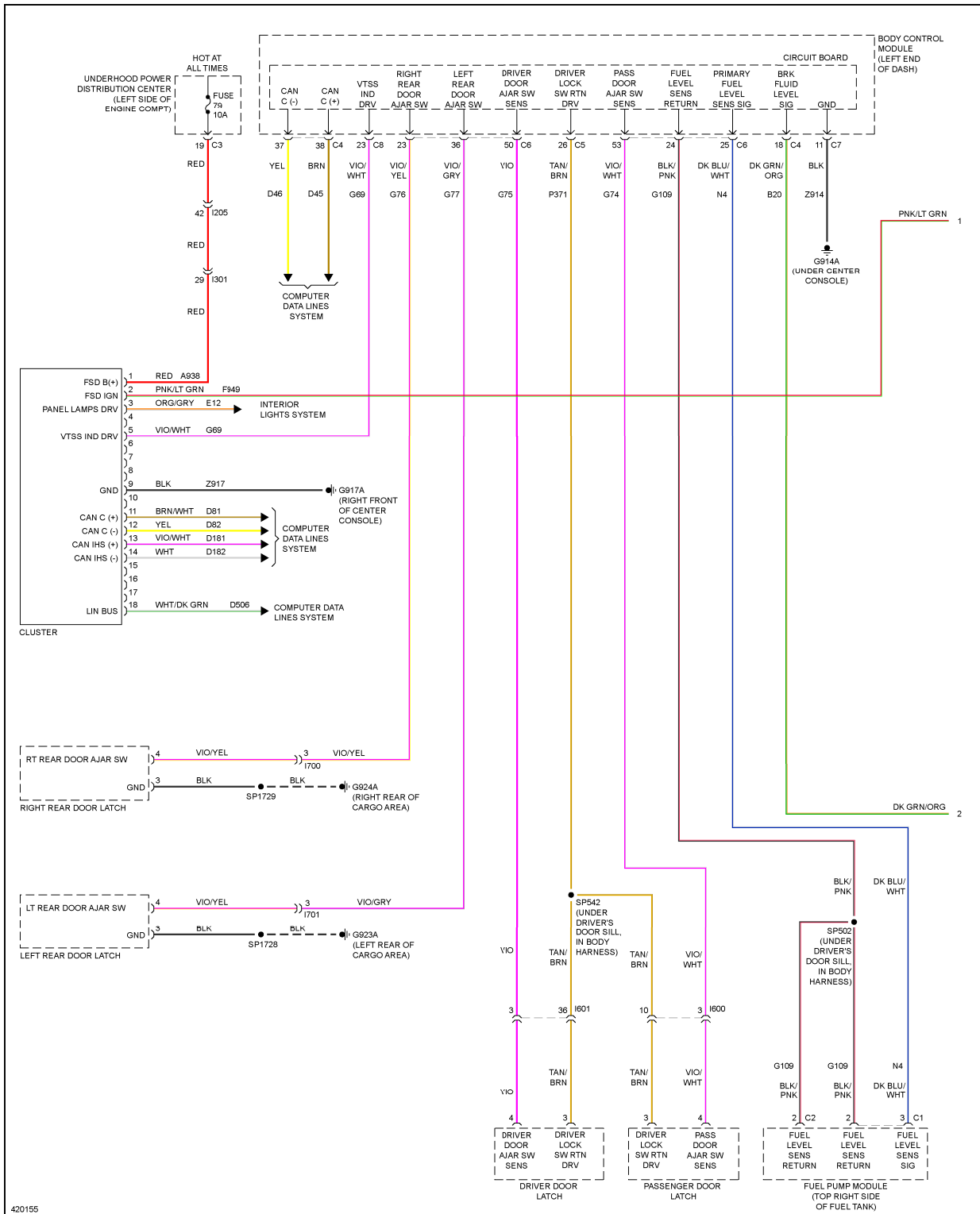


Fig. 53: Instrument Cluster Circuit (1 of 2)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 54: Instrument Cluster Circuit (2 of 2)

INTERIOR LIGHTS

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

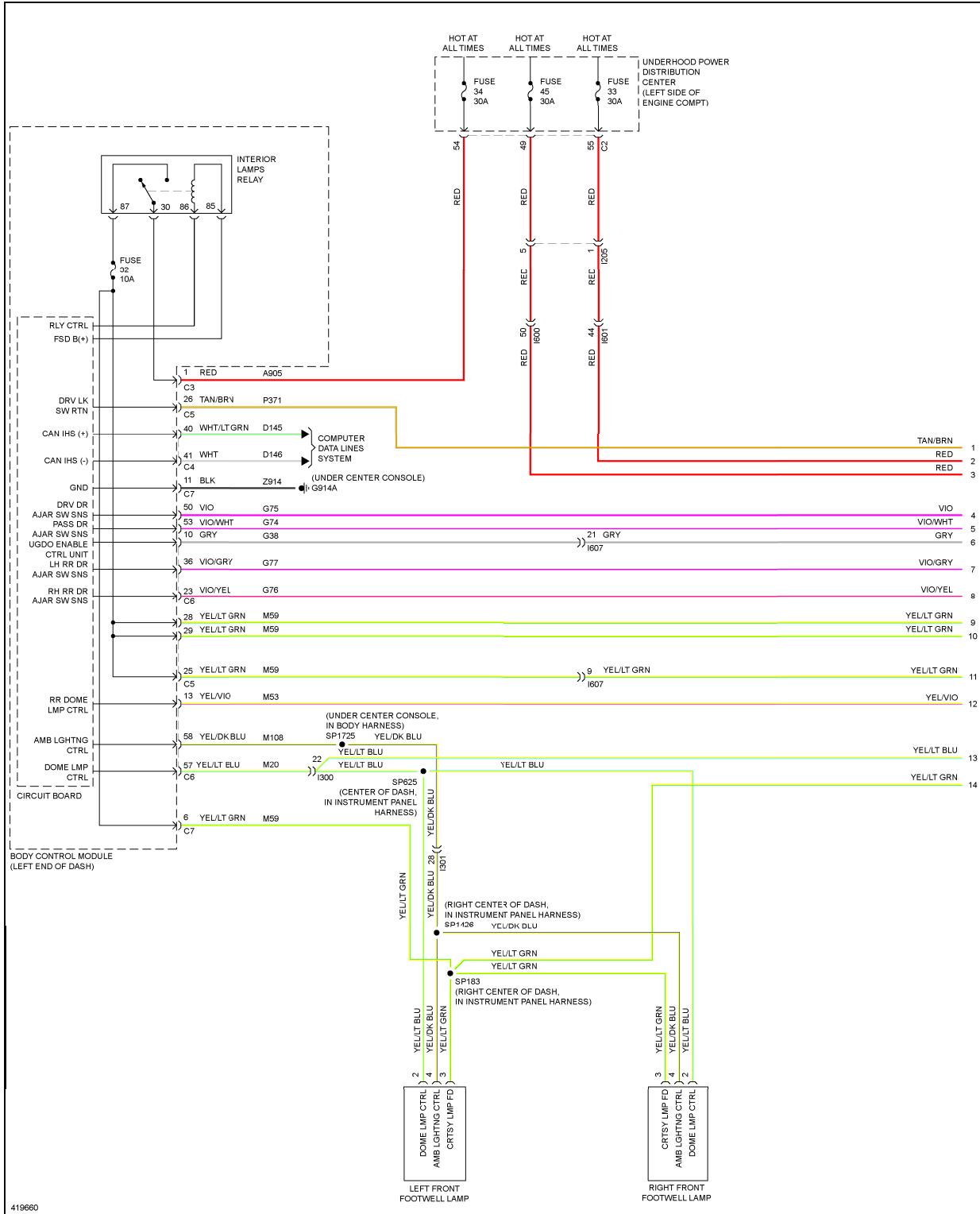


Fig. 55: Courtesy Lamps Circuit (1 of 3)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

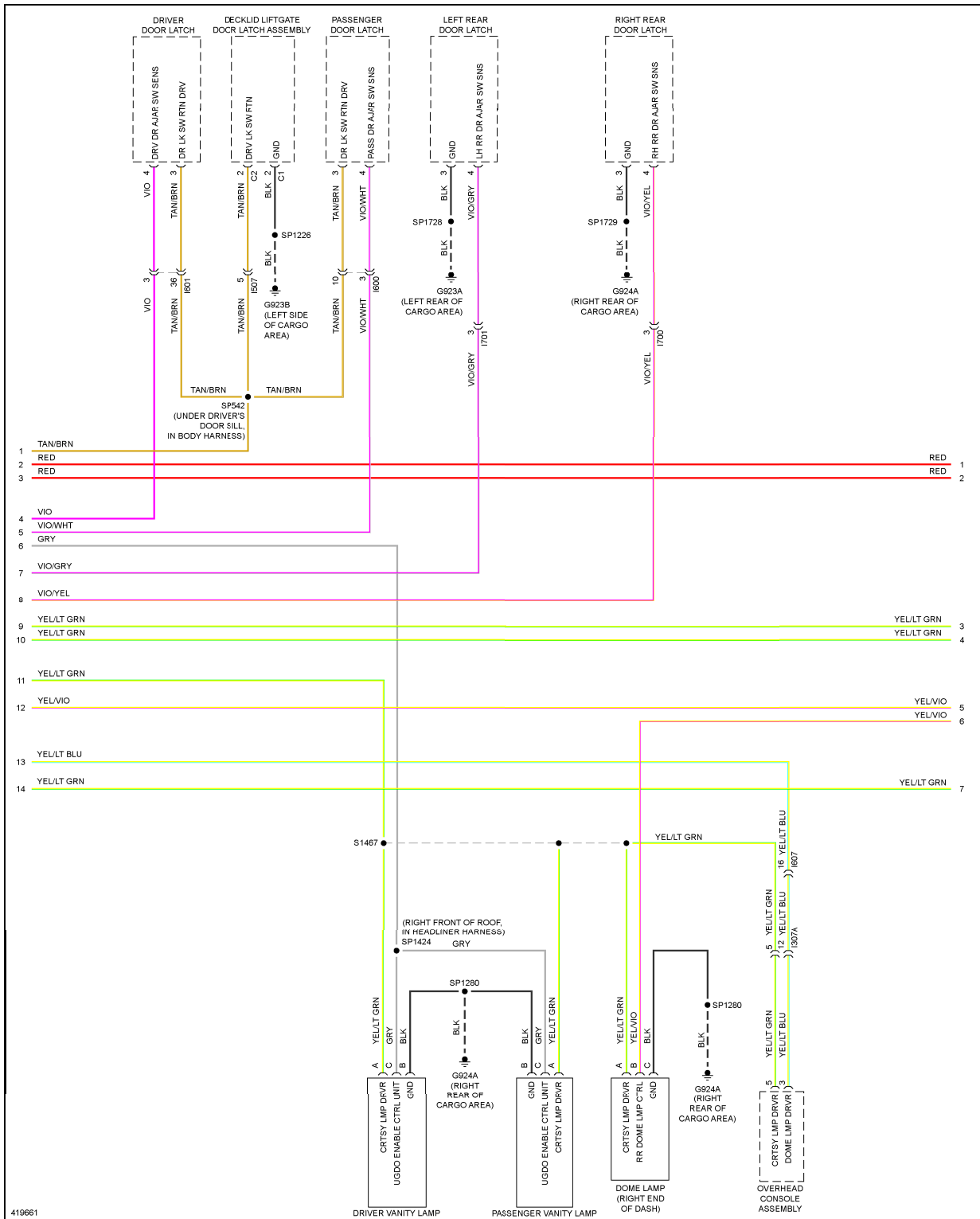


Fig. 56: Courtesy Lamps Circuit (2 of 3)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

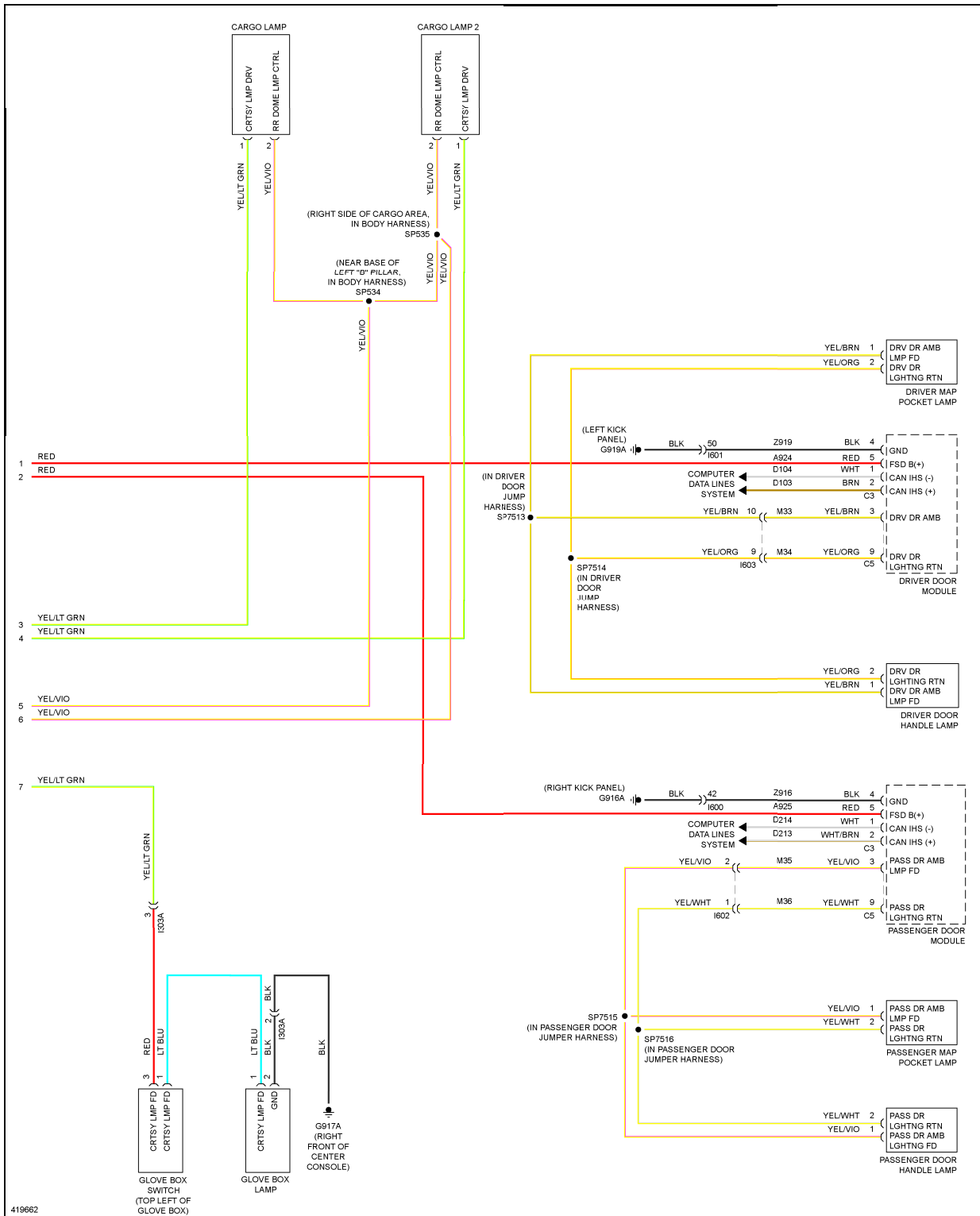


Fig. 57: Courtesy Lamps Circuit (3 of 3)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 58: Instrument Illumination Circuit

MEMORY SYSTEMS

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

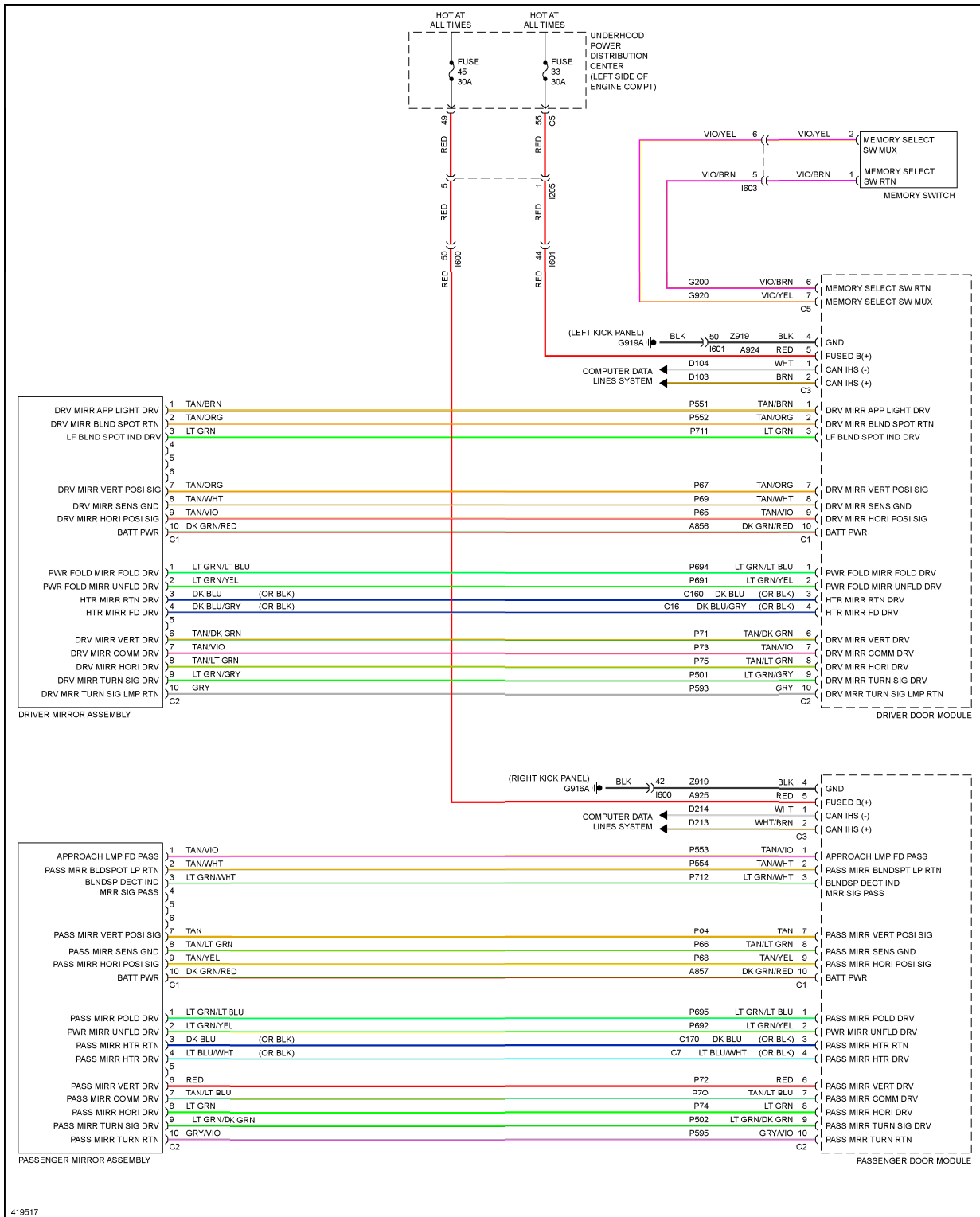


Fig. 59: Memory Mirrors Circuit

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 60: Memory Seat Circuit

NAVIGATION

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

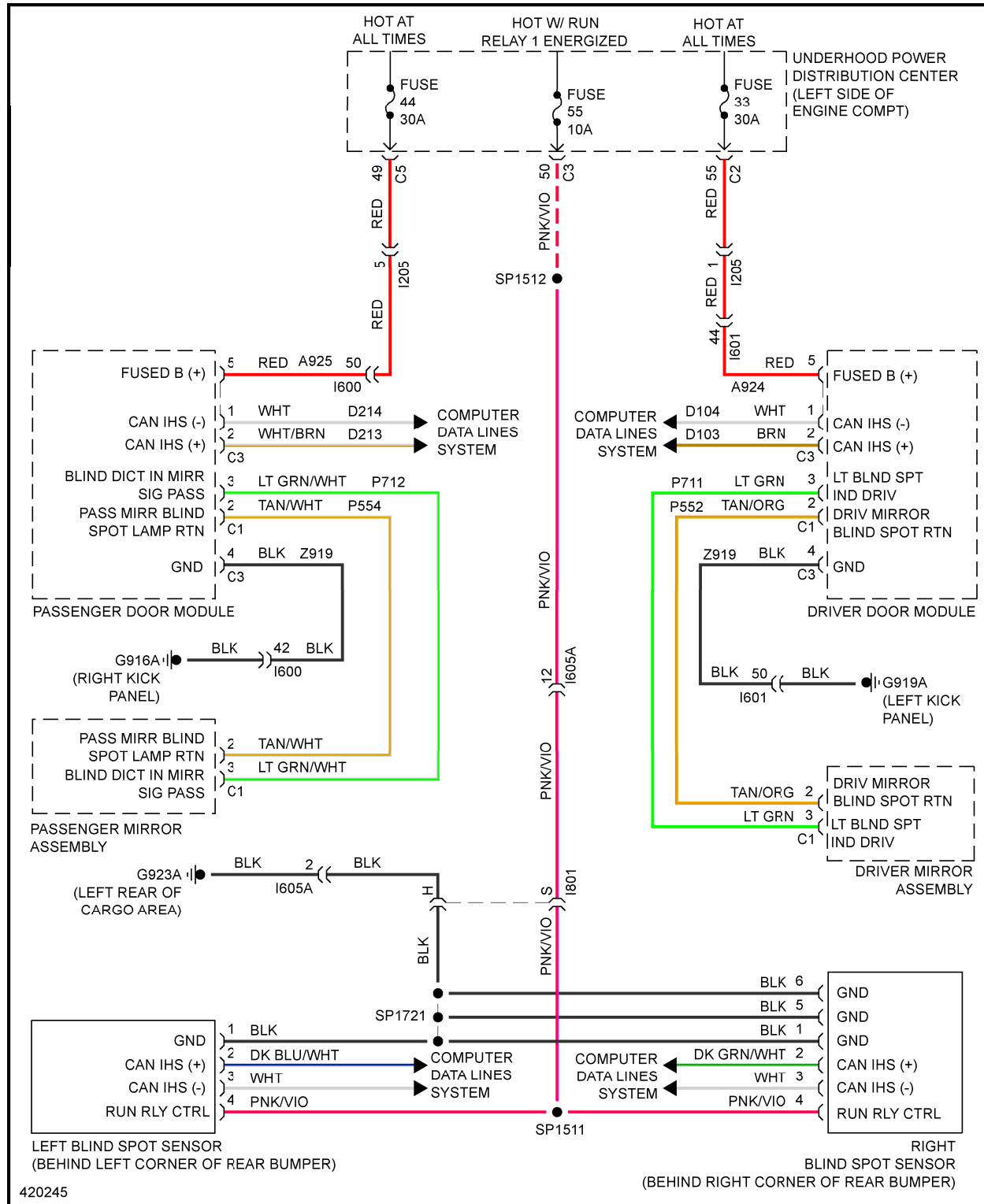


Fig. 61: Blind Spot Monitoring Circuit

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

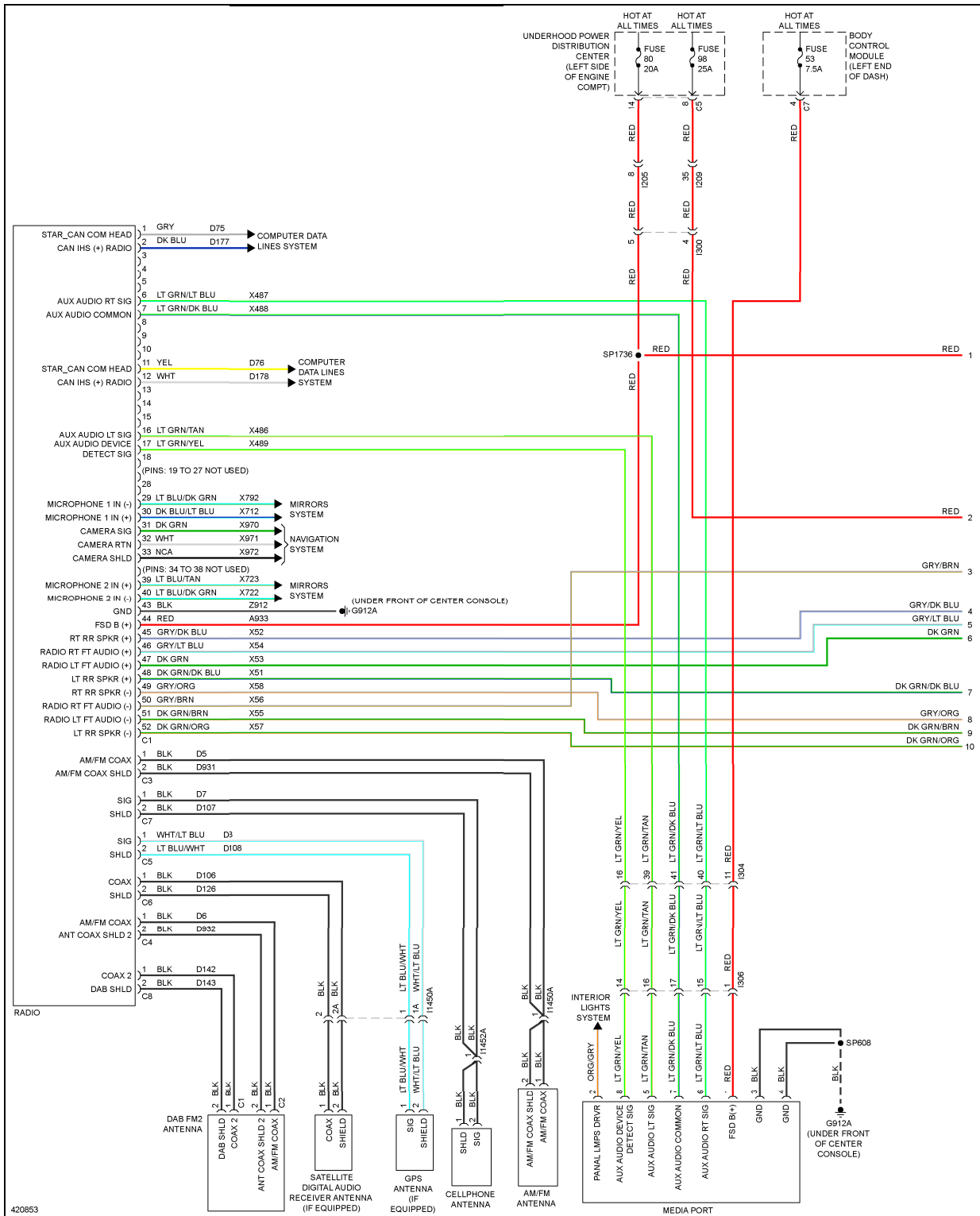


Fig. 62: Navigation Circuit, Premium (1 of 3)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 63: Navigation Circuit, Premium (2 of 3)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

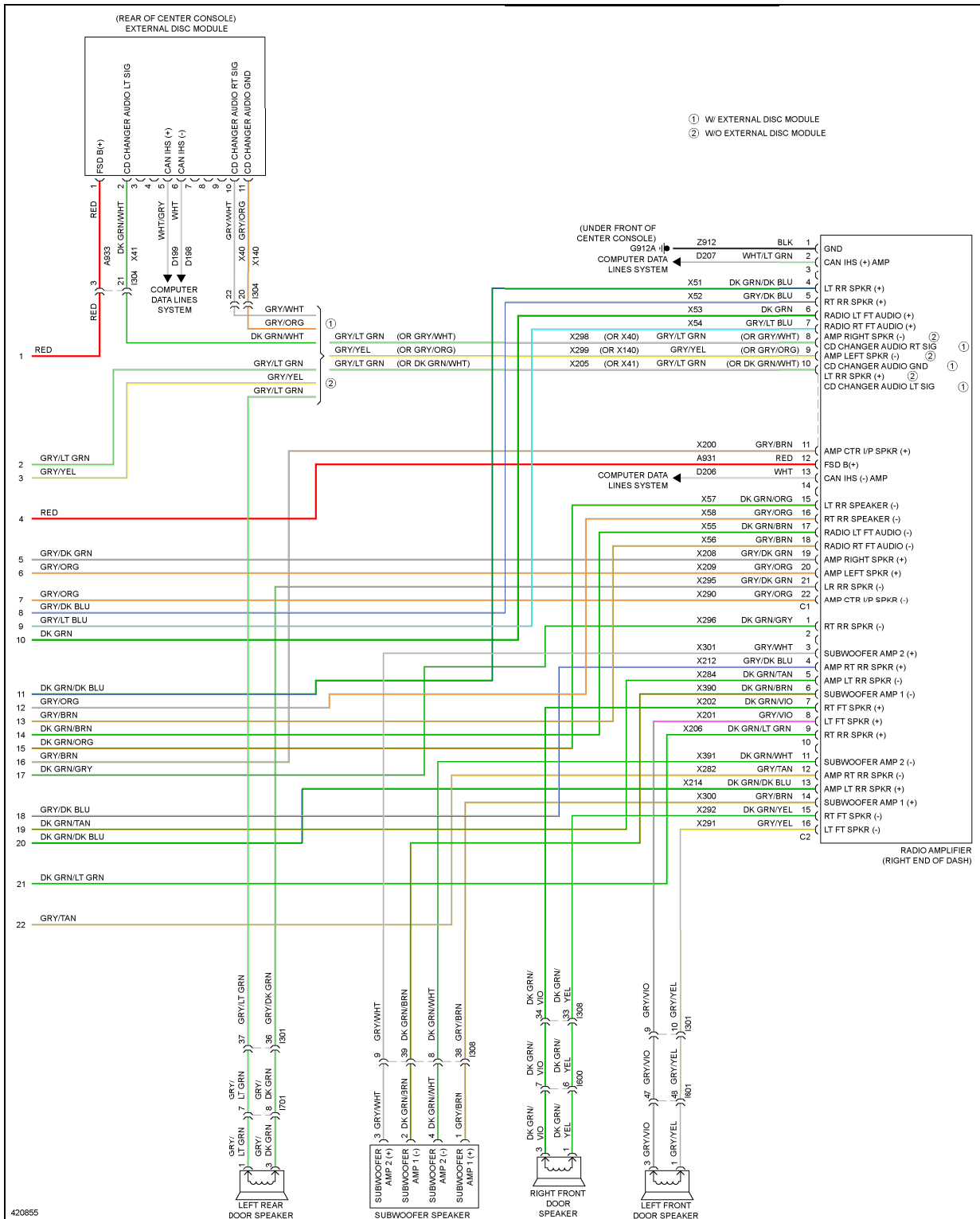


Fig. 64: Navigation Circuit, Premium (3 of 3)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

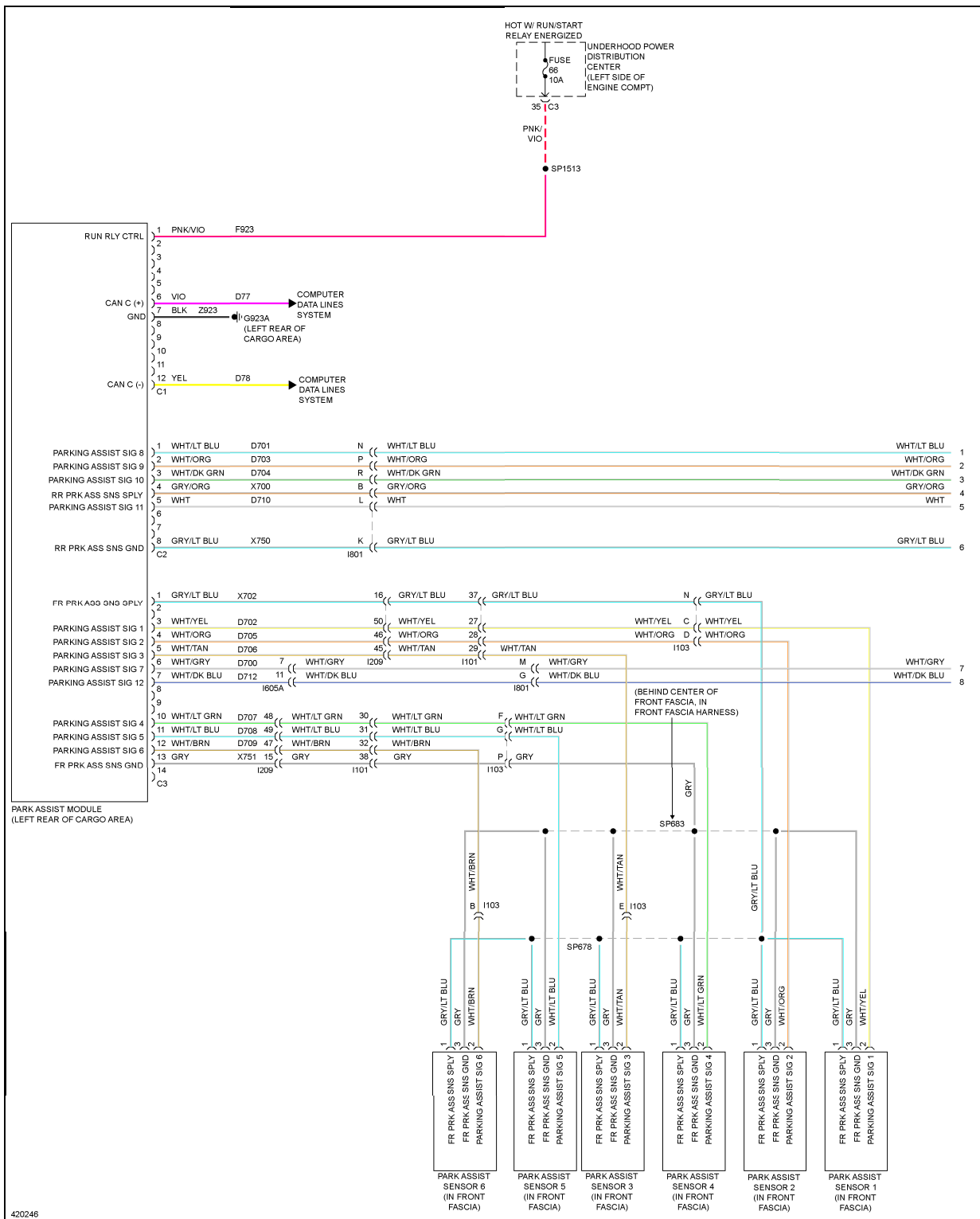


Fig. 65: Parking Assistant Circuit (1 of 2)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

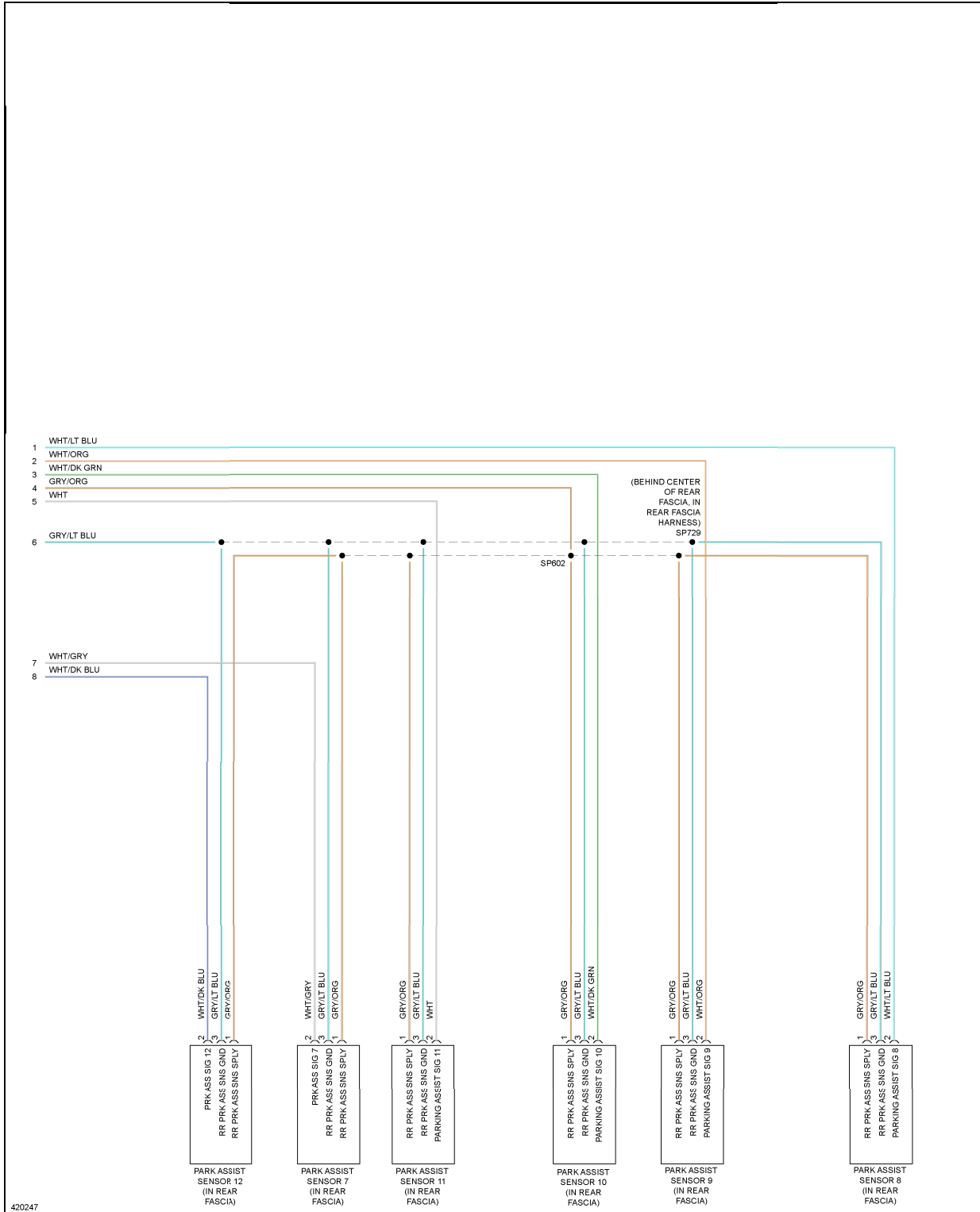


Fig. 66: Parking Assistant Circuit (2 of 2)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

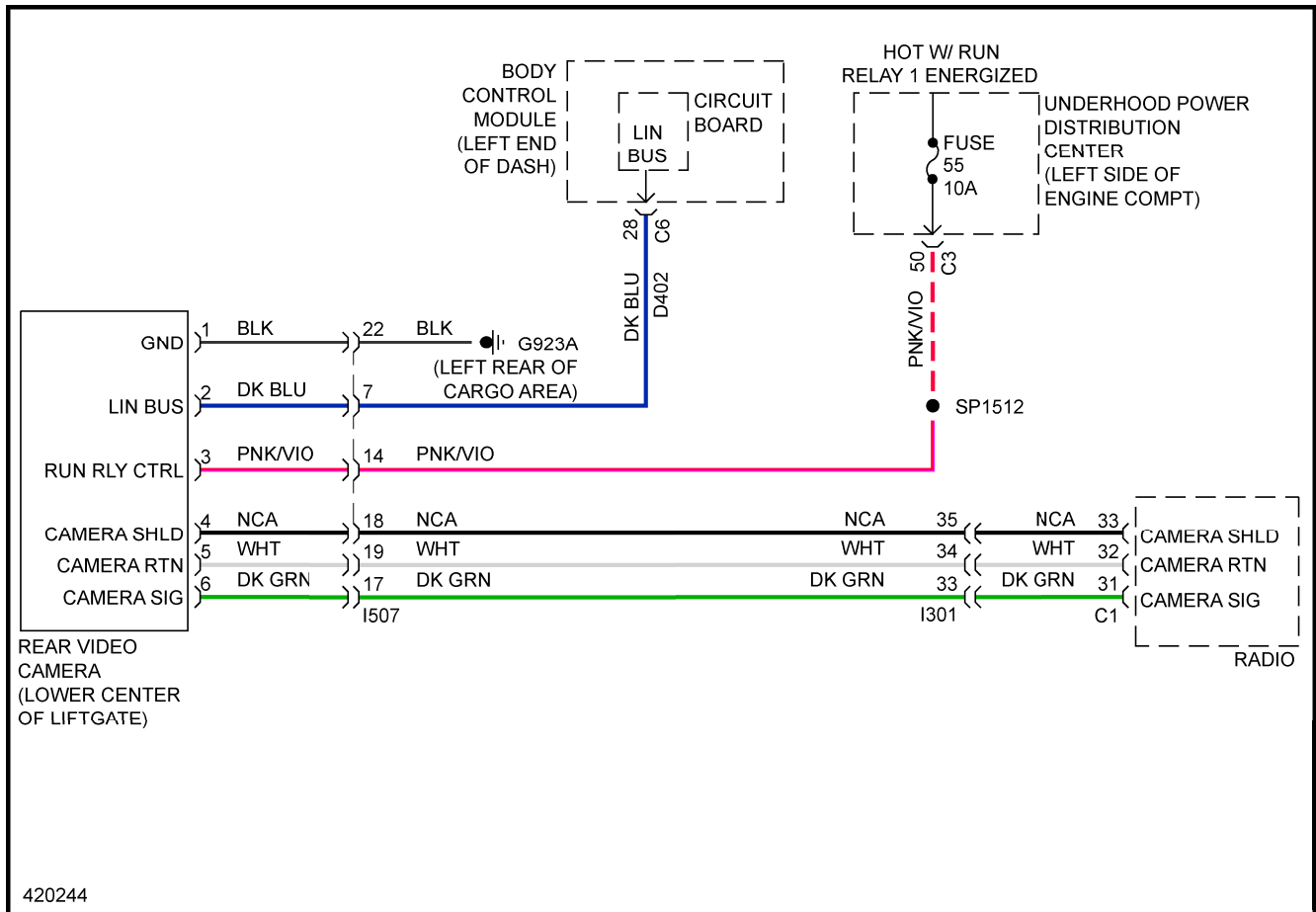


Fig. 67: Rear Camera Circuit

POWER DISTRIBUTION

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

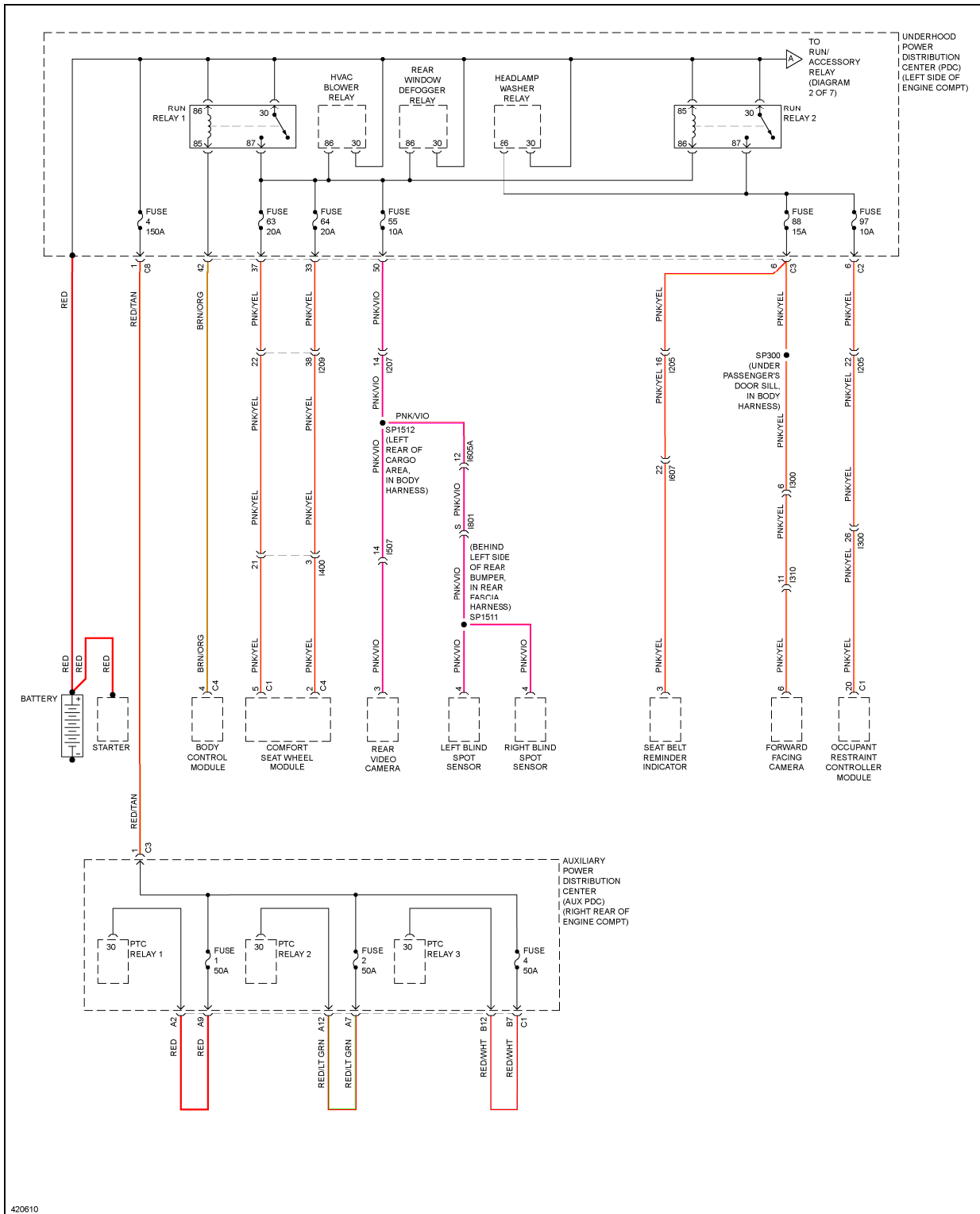


Fig. 68: Power Distribution Circuit (1 of 7)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 69: Power Distribution Circuit (2 of 7)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

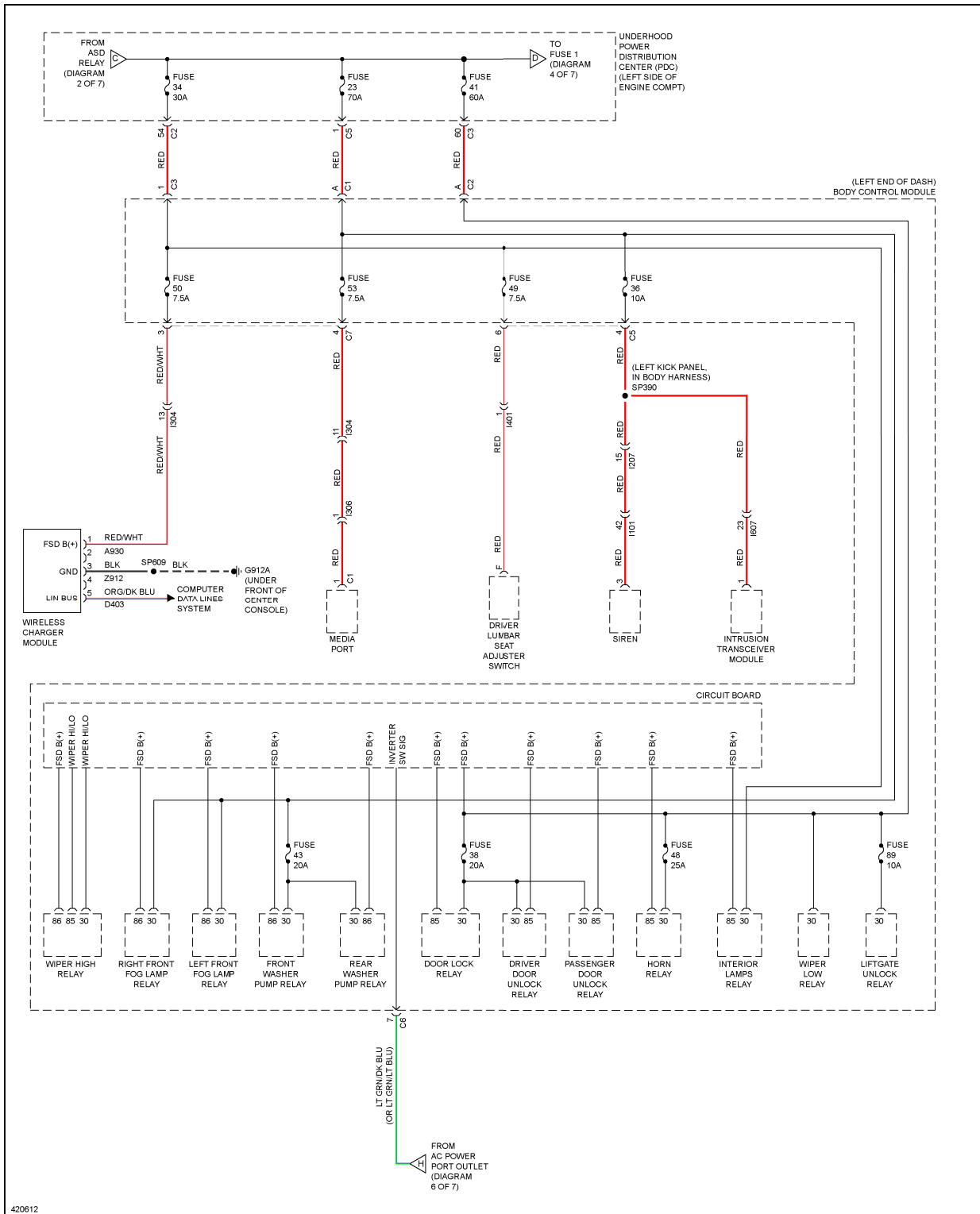


Fig. 70: Power Distribution Circuit (3 of 7)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 71: Power Distribution Circuit (4 of 7)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

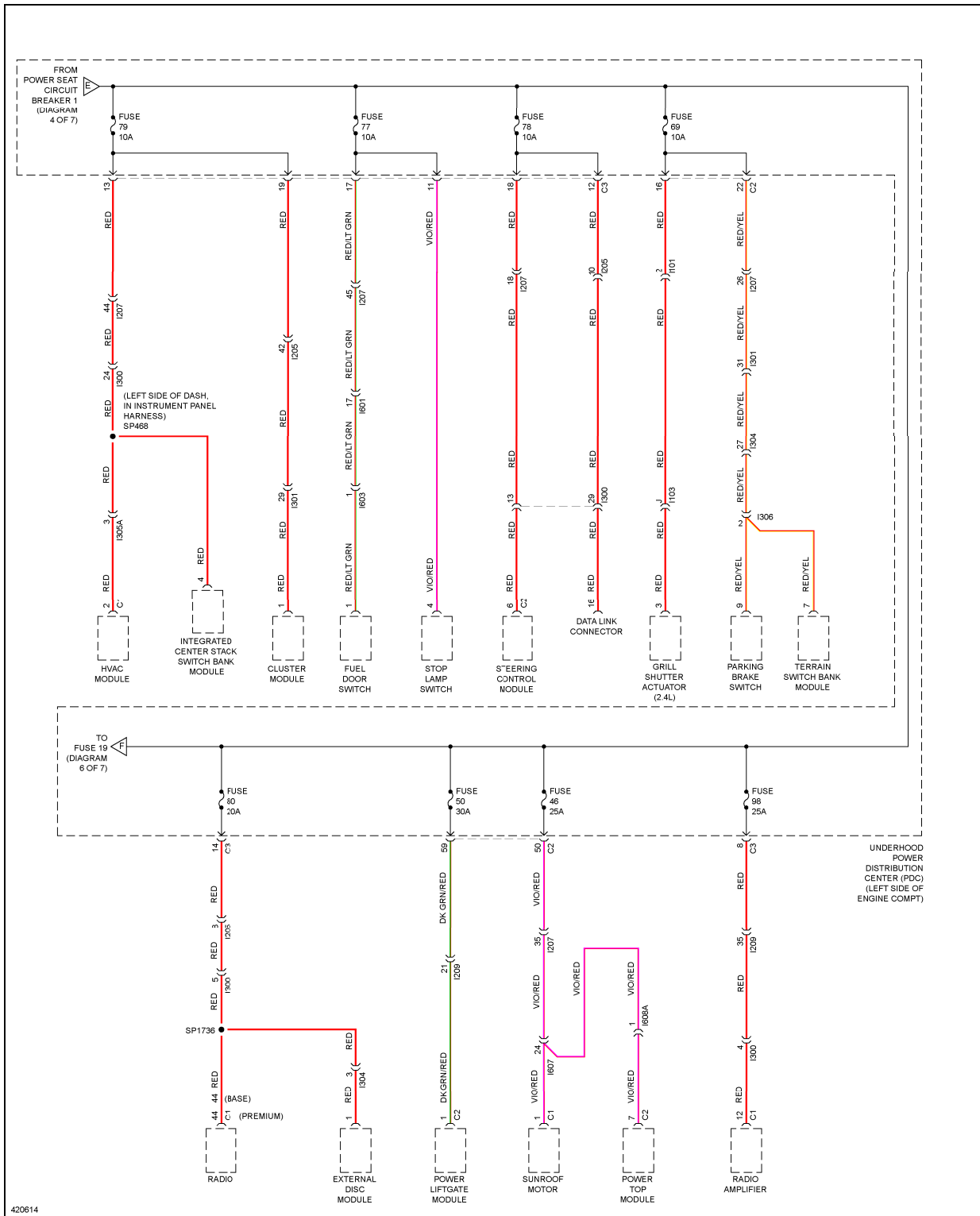
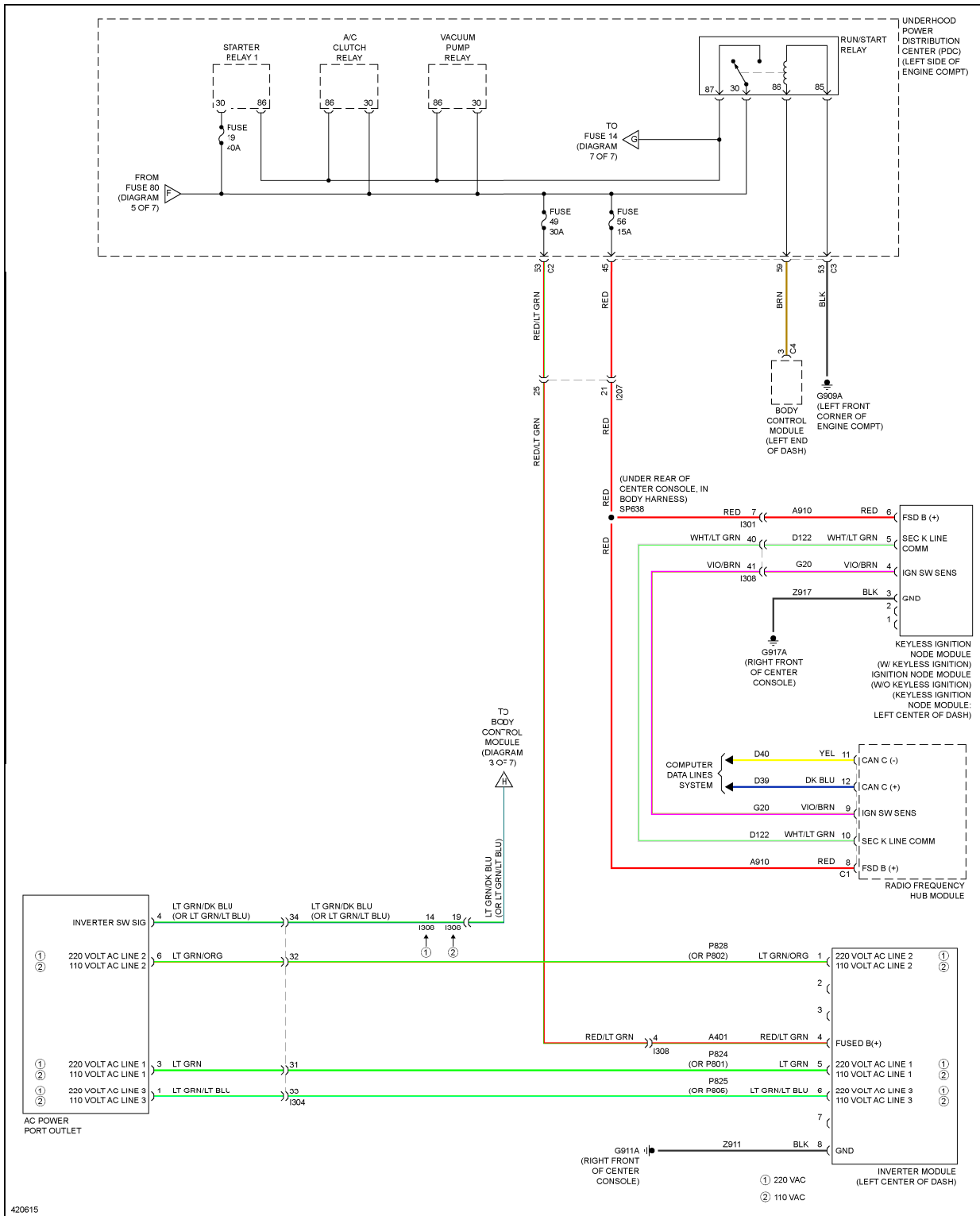


Fig. 72: Power Distribution Circuit (5 of 7)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



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Fig. 73: Power Distribution Circuit (6 of 7)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

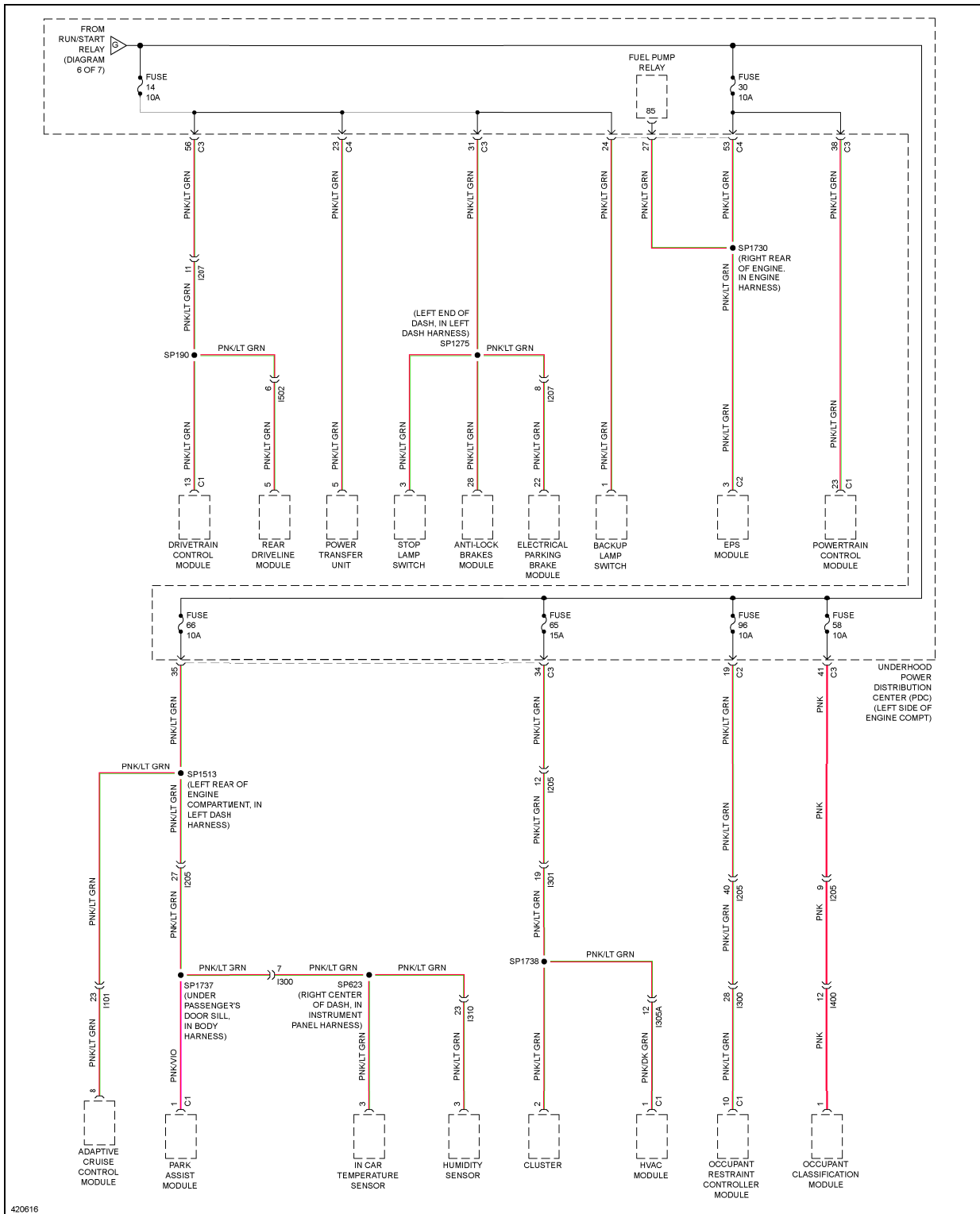


Fig. 74: Power Distribution Circuit (7 of 7)

POWER DOOR LOCKS

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

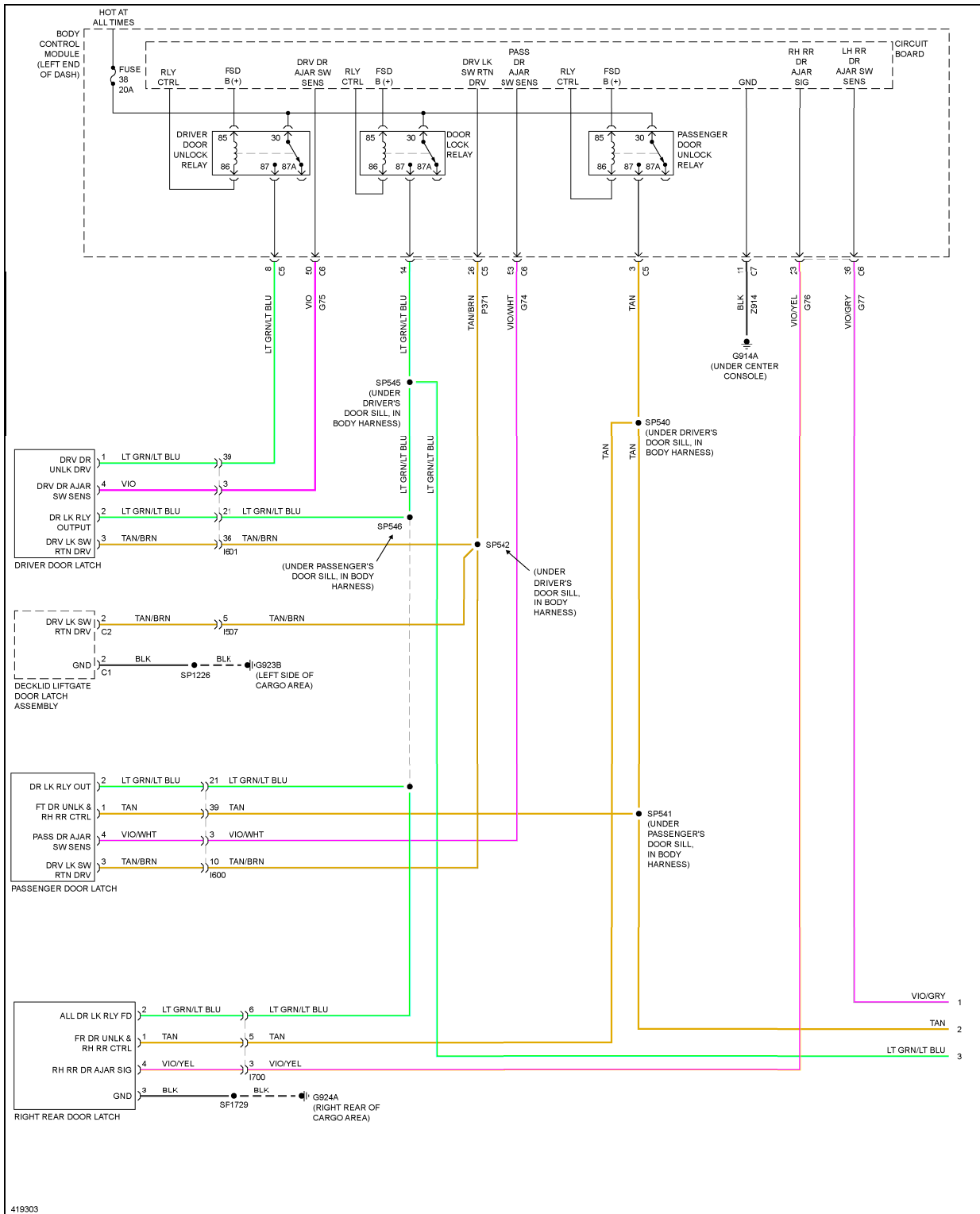
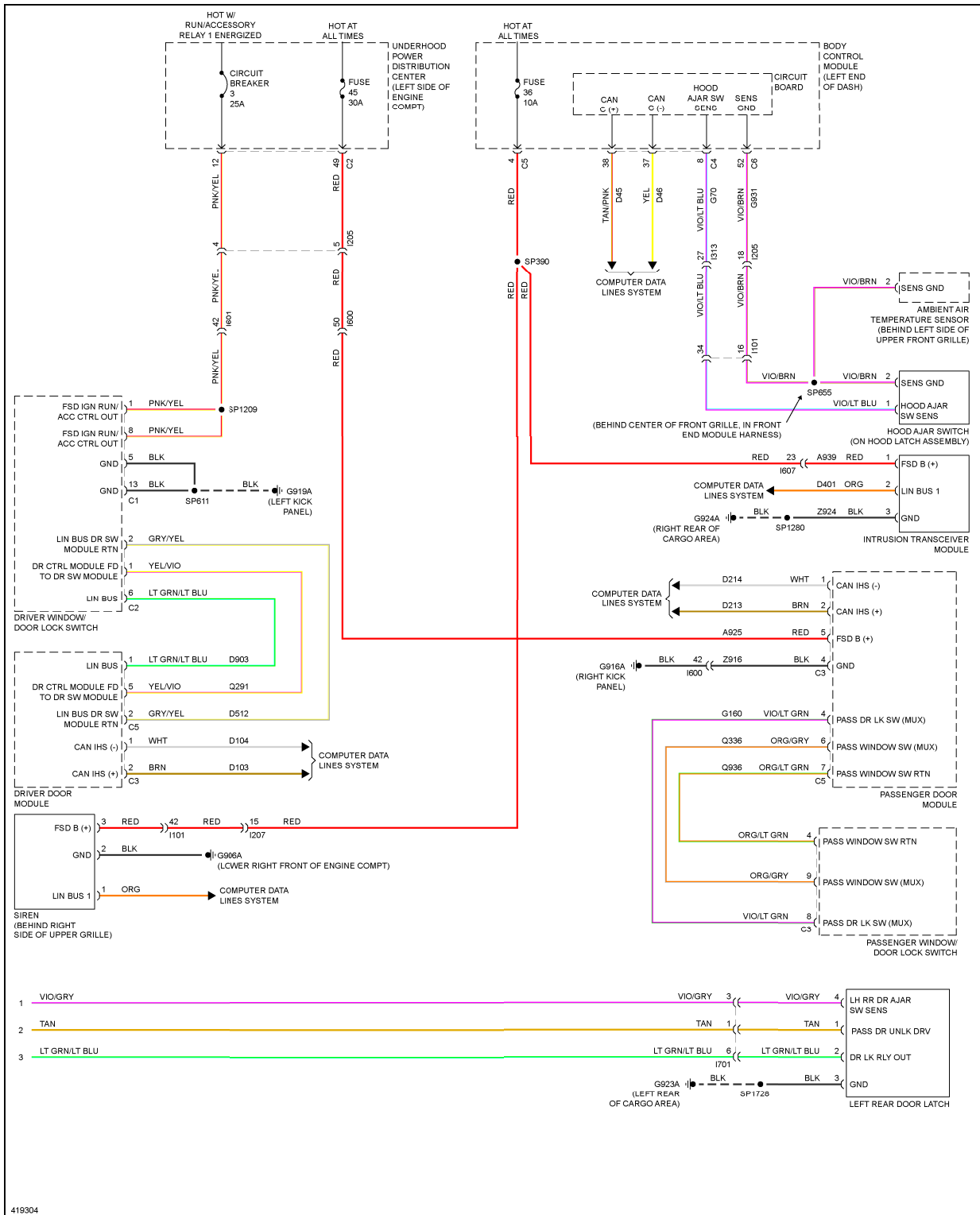


Fig. 75: Power Door Locks Circuit (1 of 2)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



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Fig. 76: Power Door Locks Circuit (2 of 2)

POWER MIRRORS

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

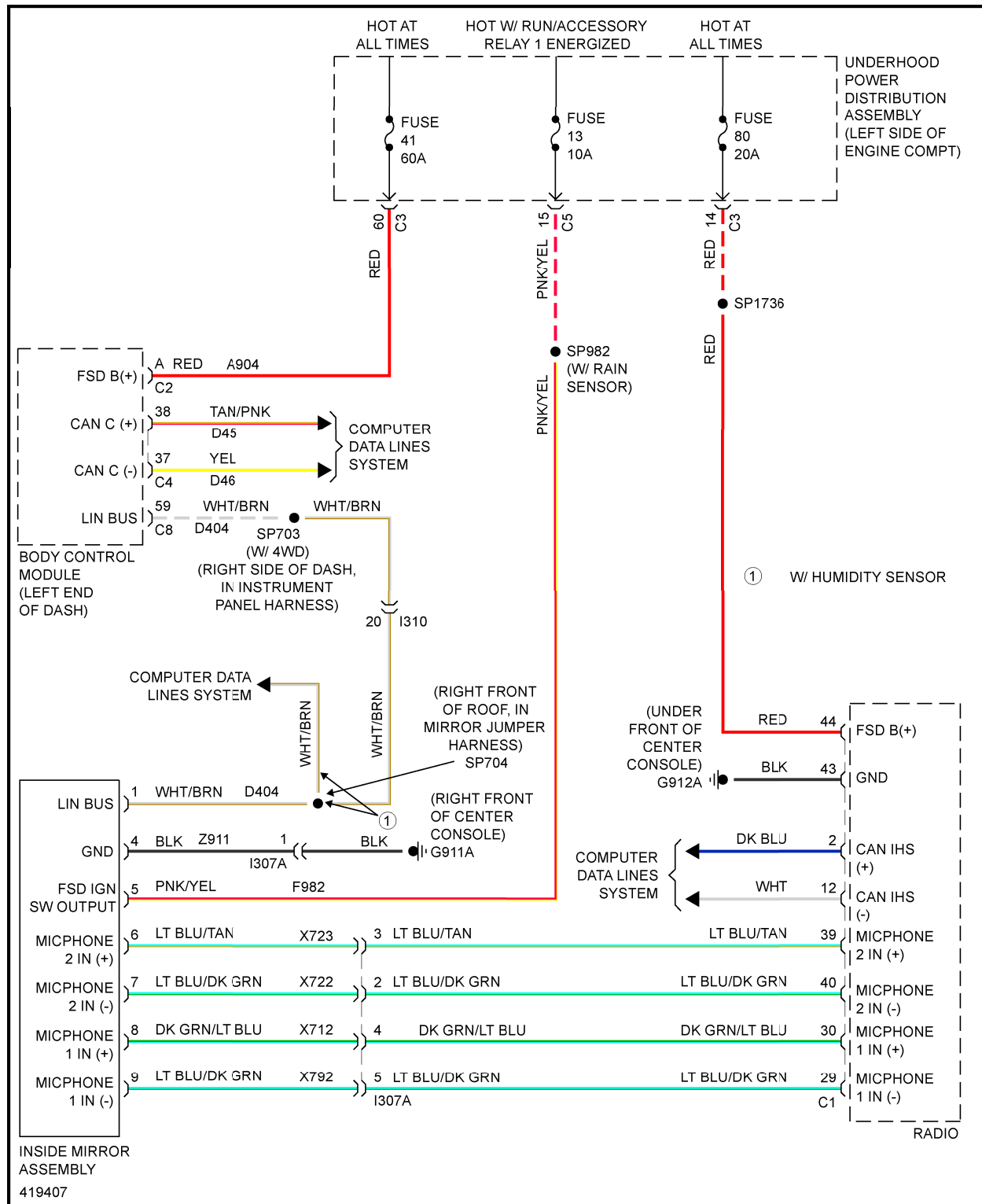


Fig. 77: Automatic Day/Night Mirror Circuit

Fig. 78: Power Mirrors Circuit, Base

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

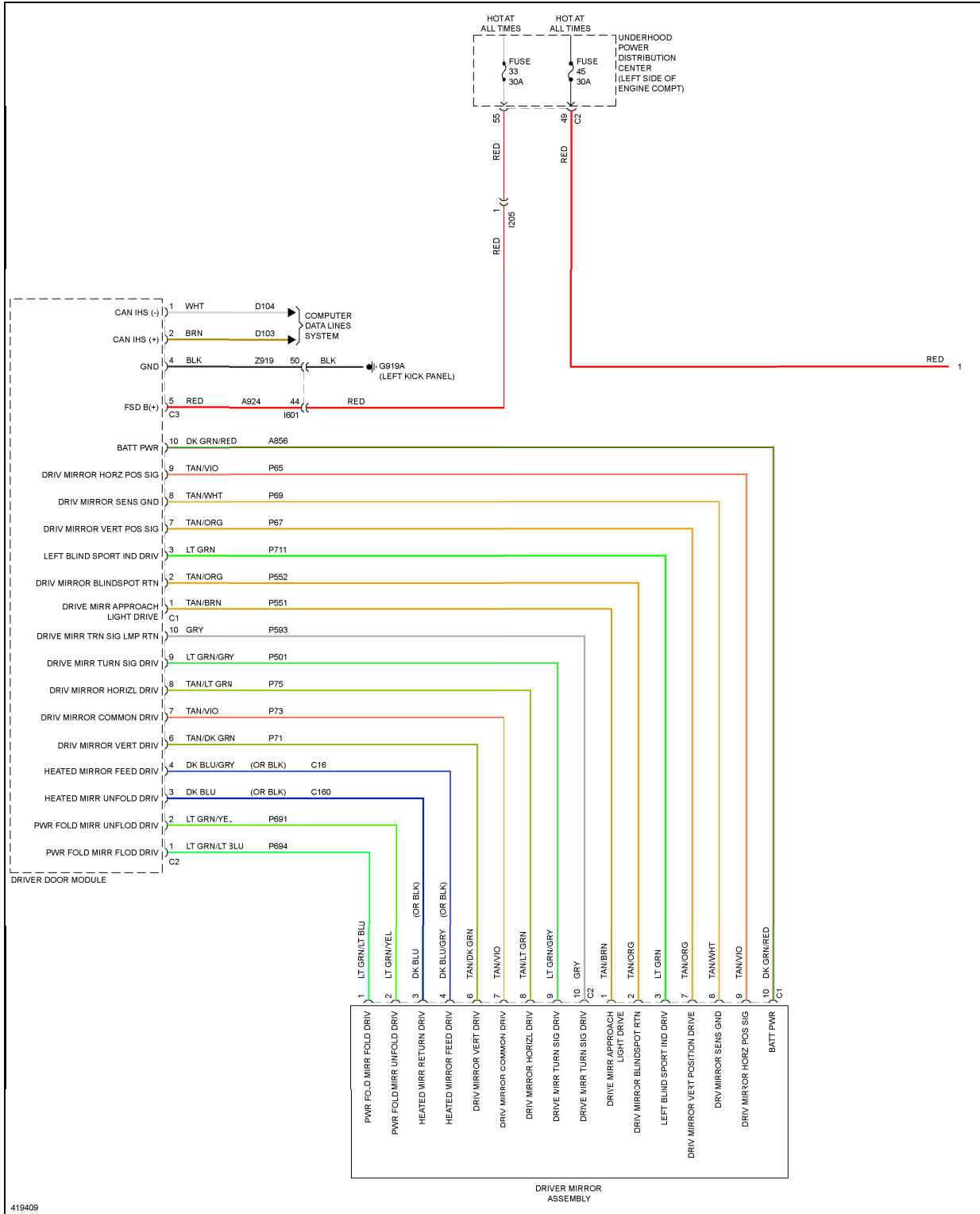


Fig. 79: Power Mirrors Circuit, Premium (1 of 2)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 80: Power Mirrors Circuit, Premium (2 of 2)

POWER SEATS

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

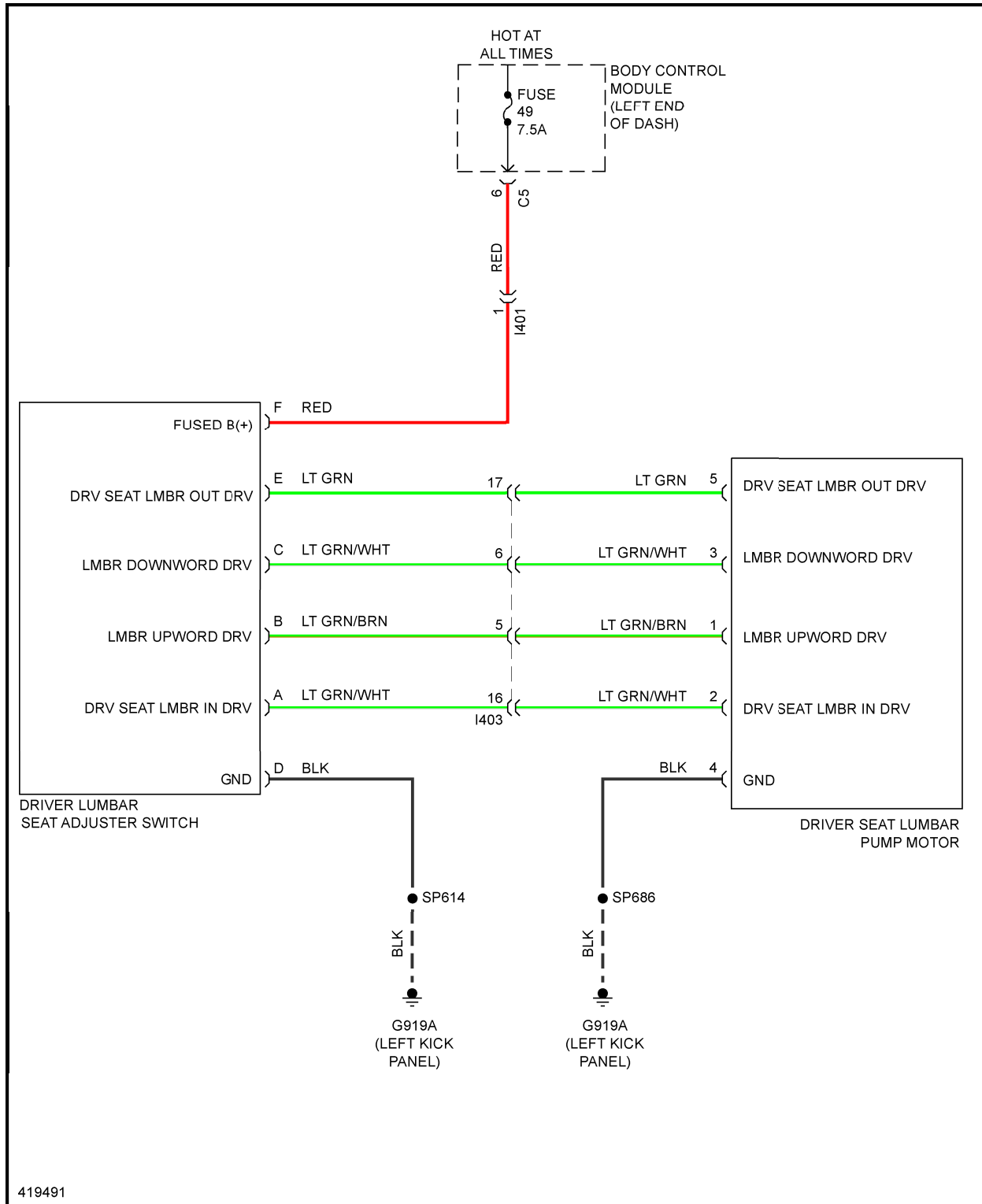


Fig. 81: Driver's Lumbar Circuit

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 82: Heated Seats Circuit

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

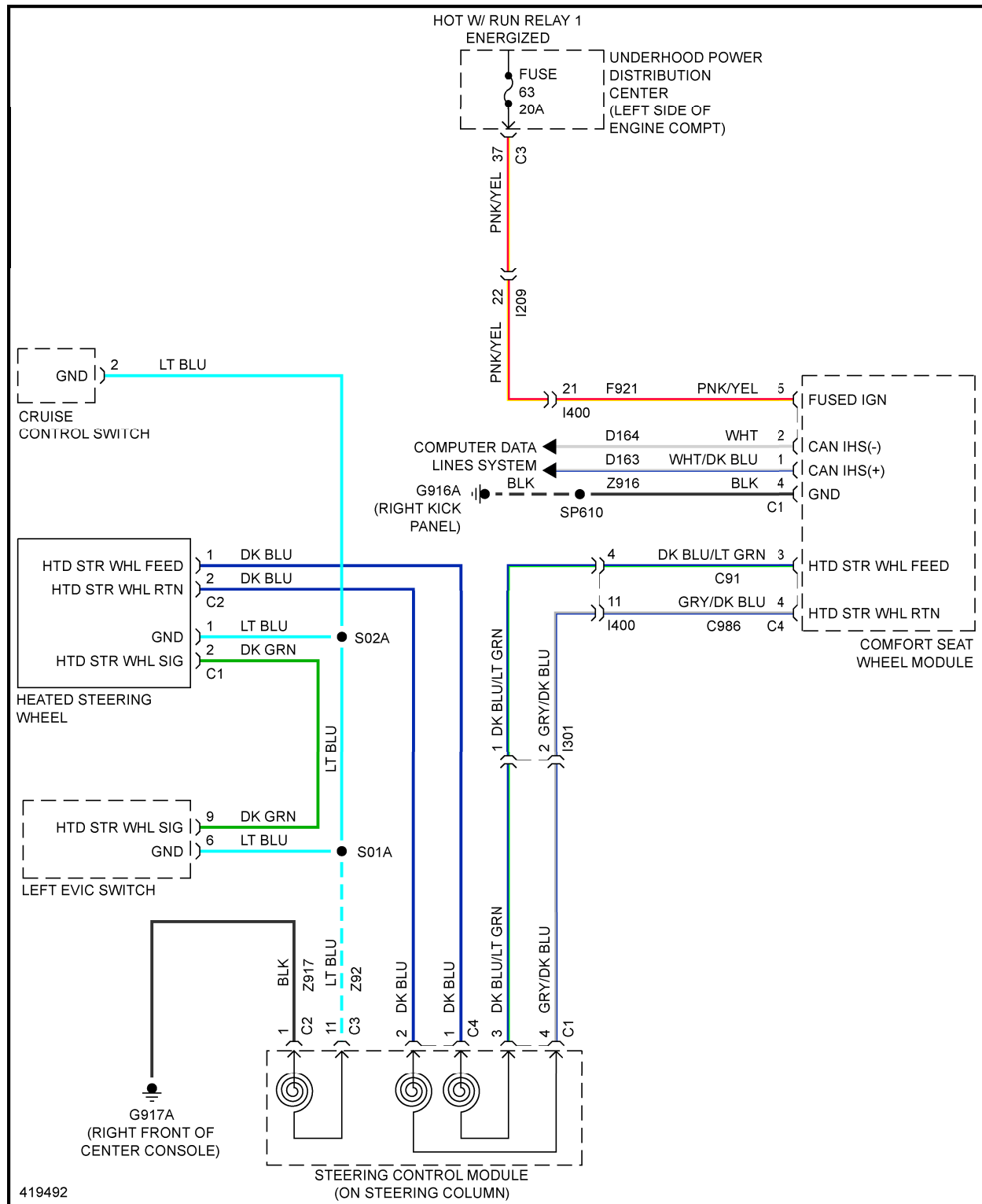


Fig. 83: Heated Steering Wheel Circuit

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

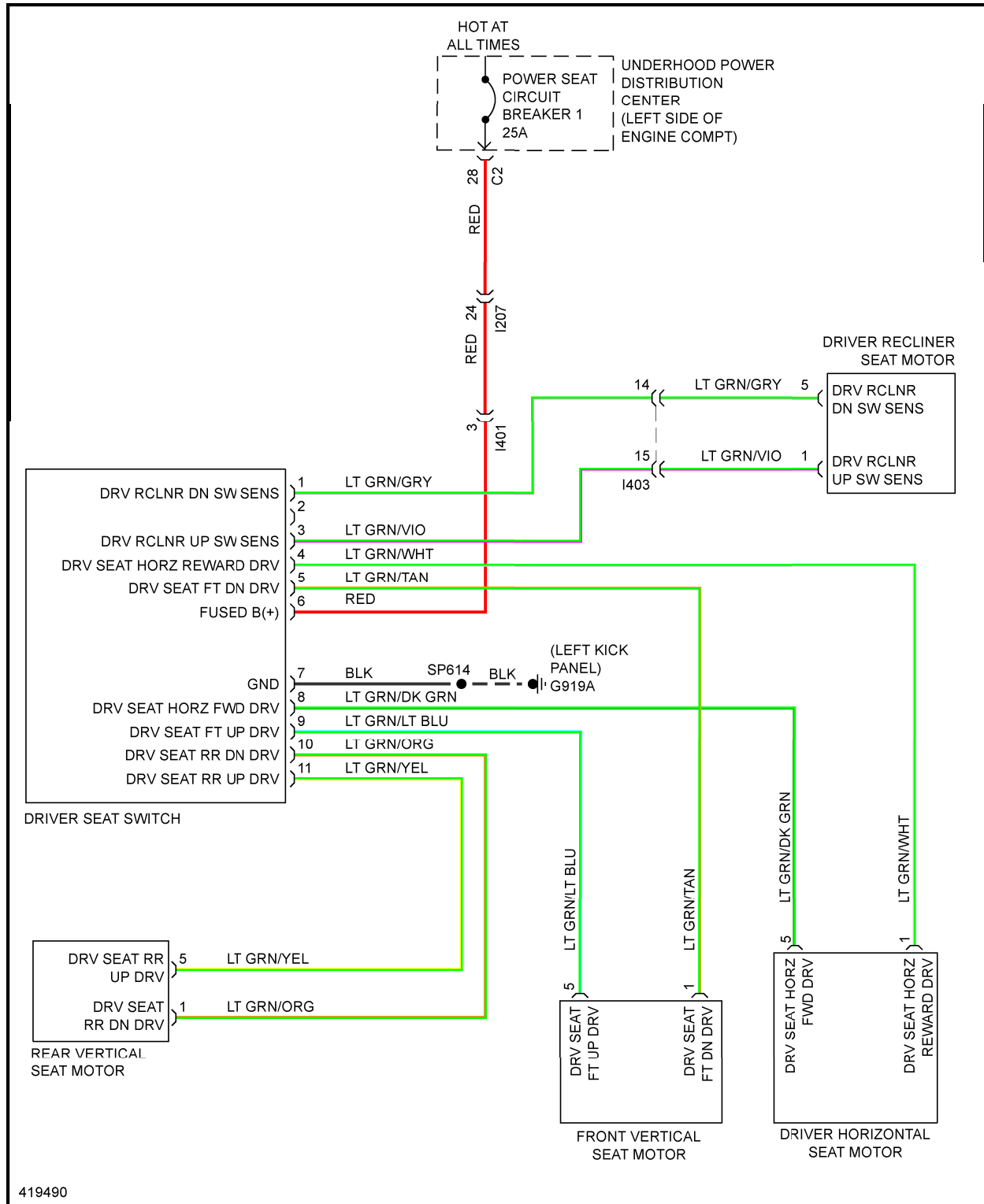


Fig. 84: Power Seats Circuit

POWER TOP/SUNROOF

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

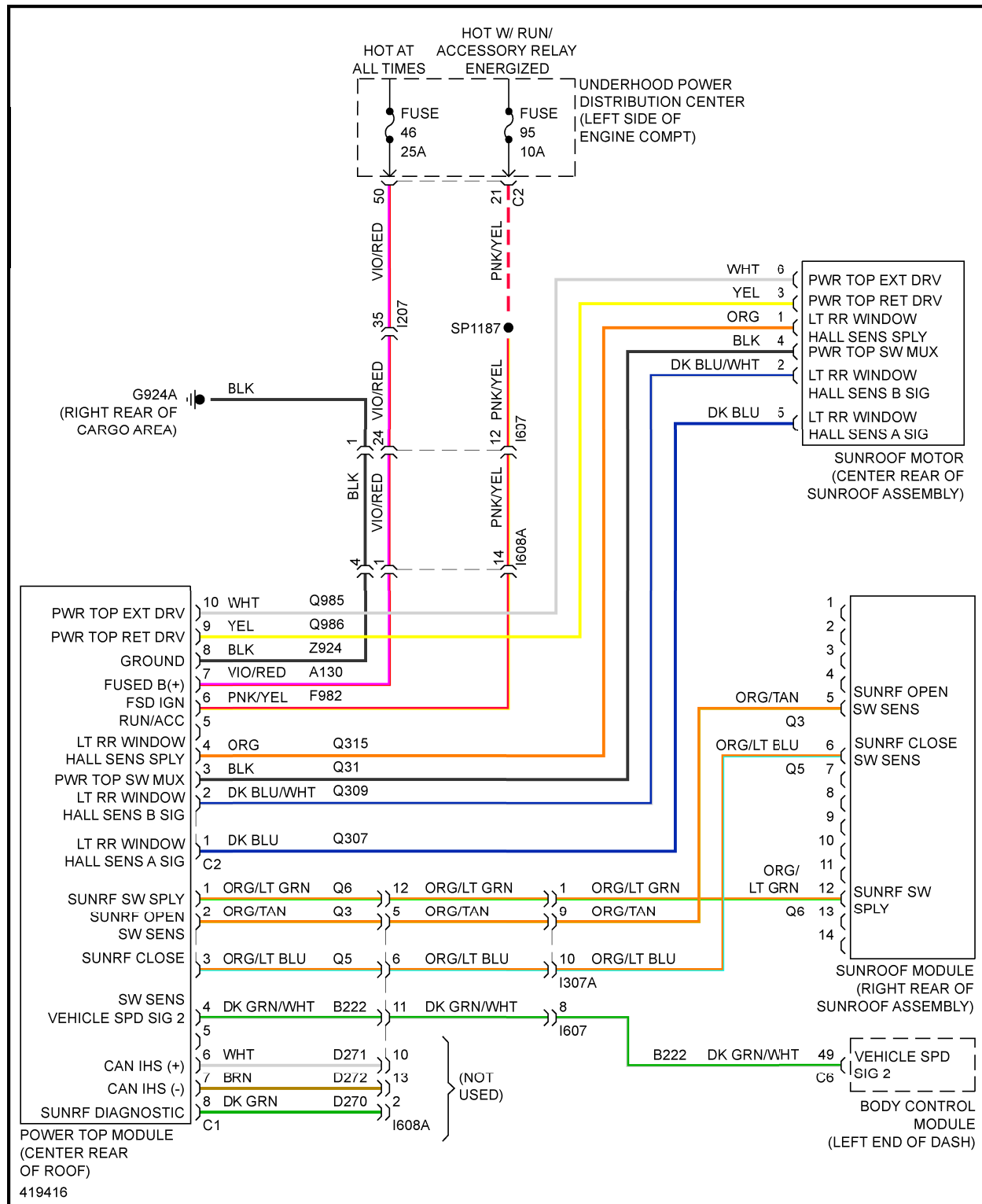


Fig. 85: Retractable Roof Circuit

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

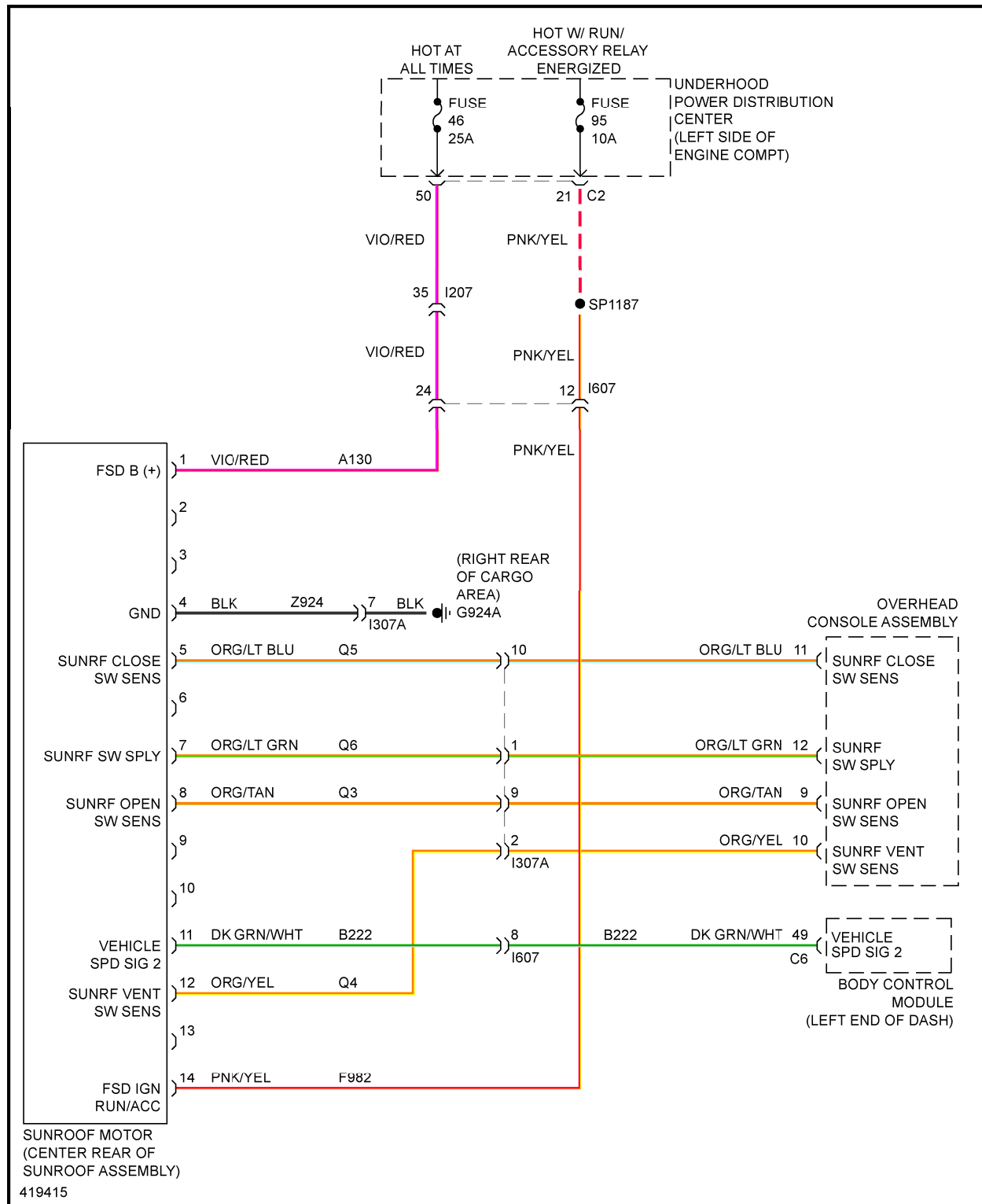


Fig. 86: Sunroof Circuit

POWER WINDOWS

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 87: Power Windows Circuit, Base

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 88: Power Windows Circuit, Premium

RADIO

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 89: Radio Circuit, Base

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

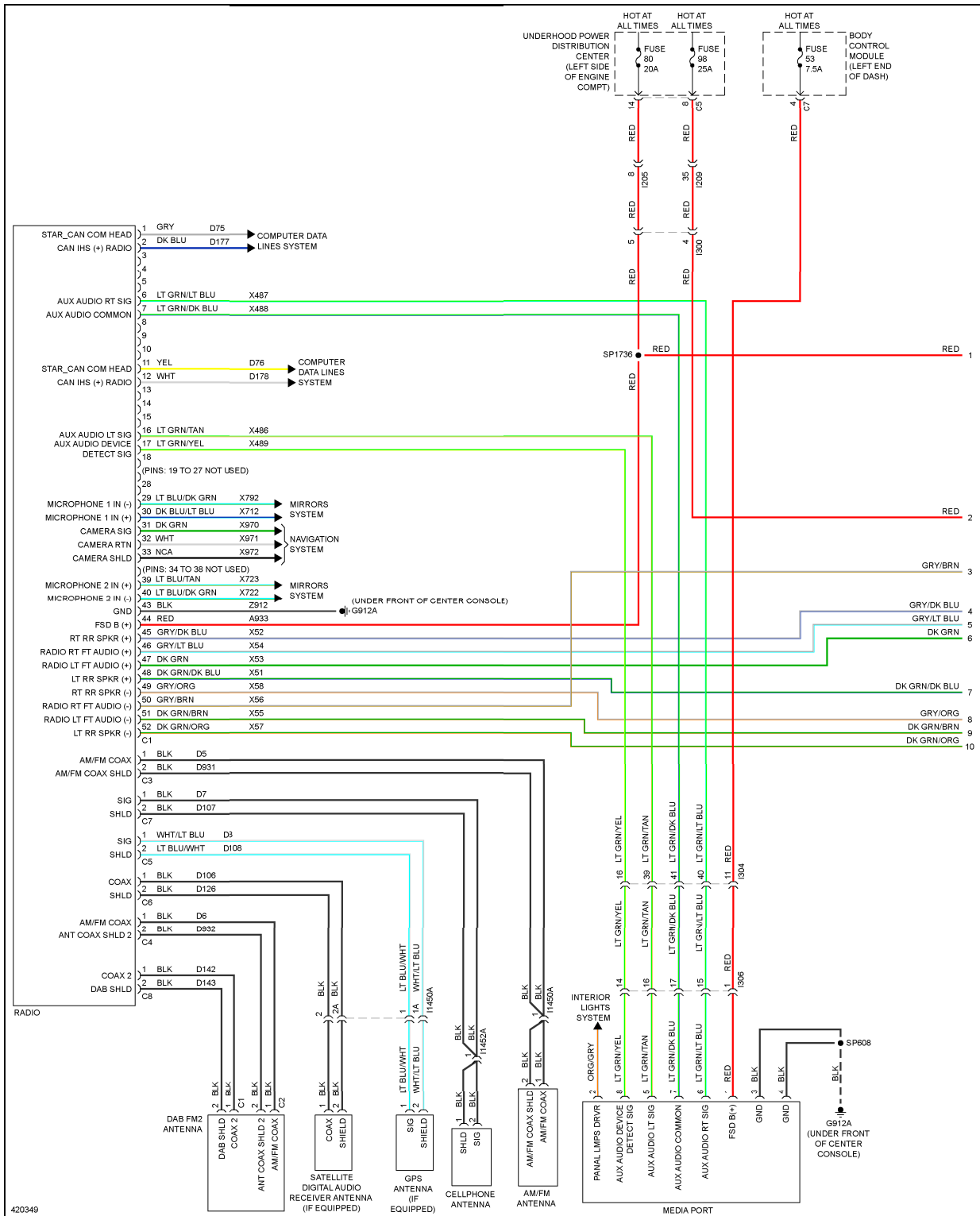


Fig. 90: Radio Circuit, Premium (1 of 3)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

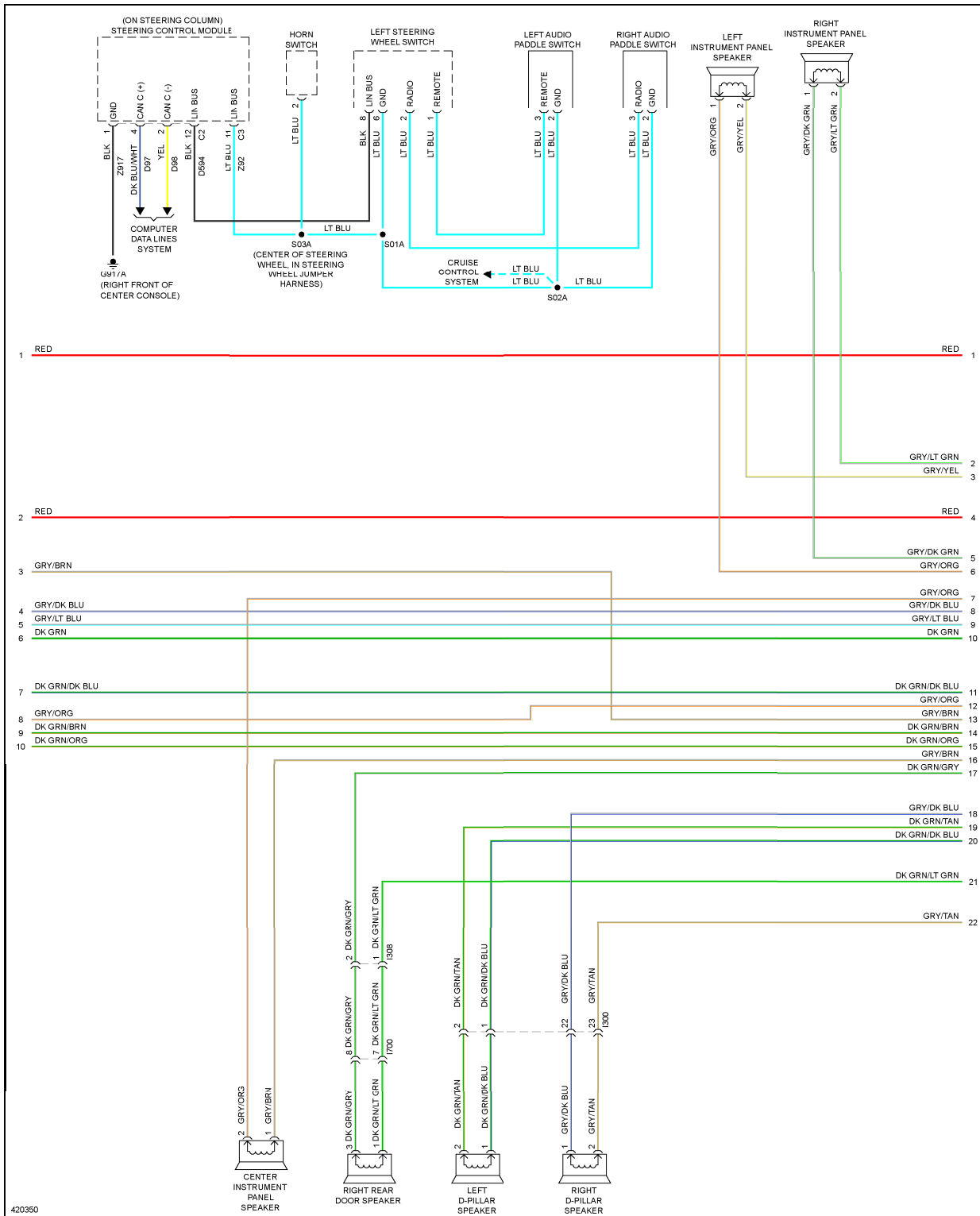


Fig. 91: Radio Circuit, Premium (2 of 3)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 92: Radio Circuit, Premium (3 of 3)

SHIFT INTERLOCK

Fig. 93: Park Brake Release Circuit

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

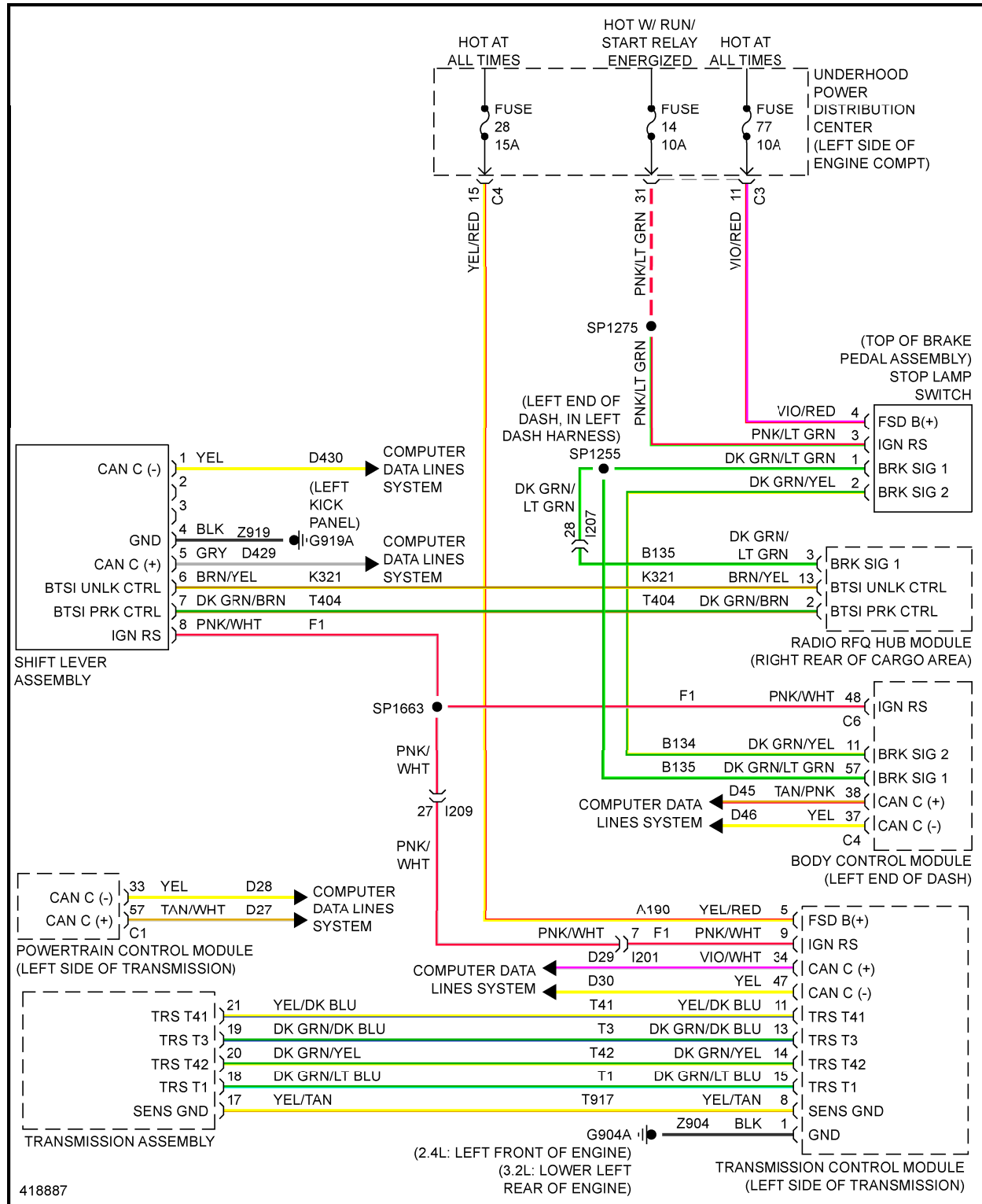


Fig. 94: Shift Interlock Circuit

STARTING/CHARGING

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

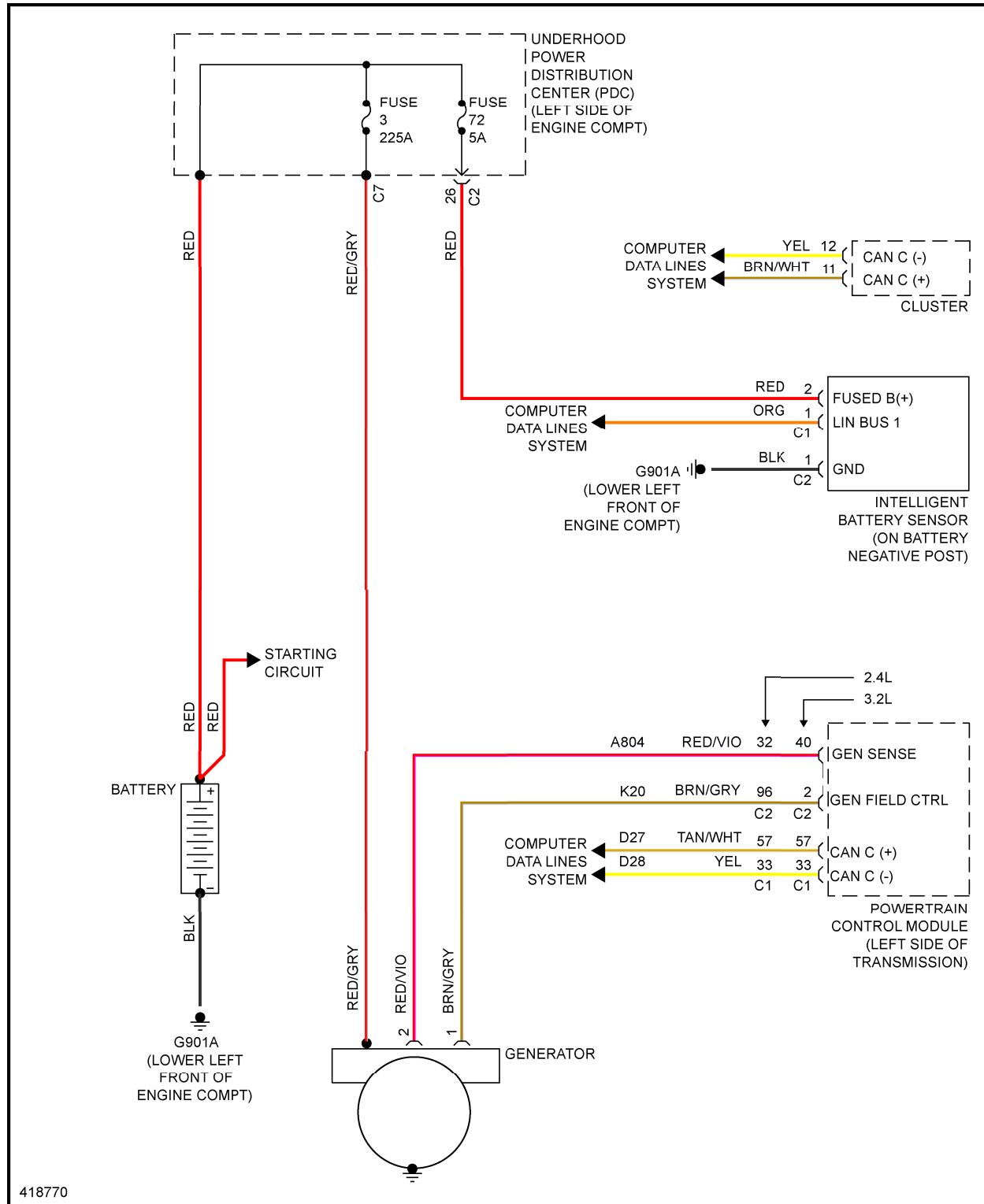


Fig. 95: Charging Circuit

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

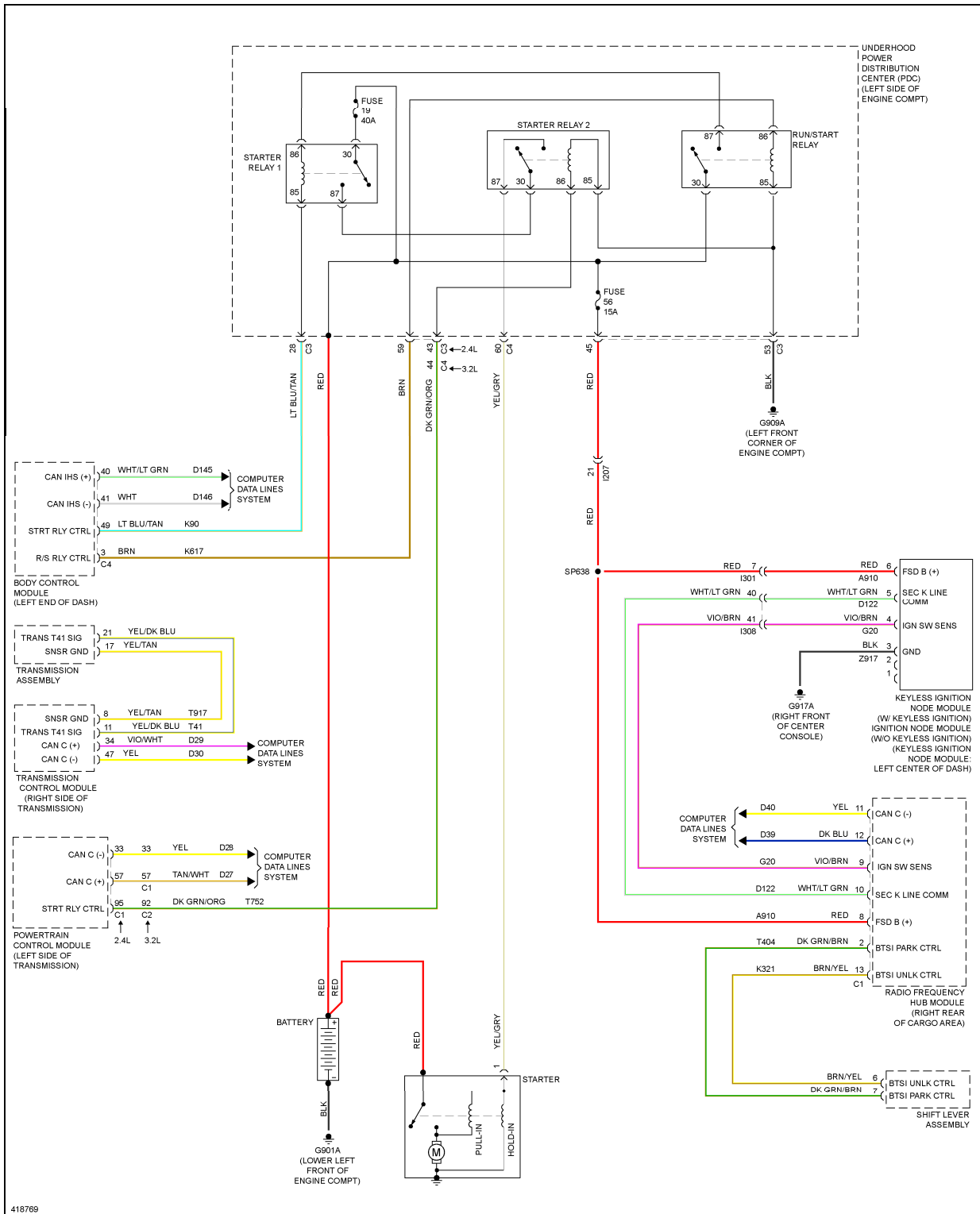


Fig. 96: Starting Circuit

SUPPLEMENTAL RESTRAINTS

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

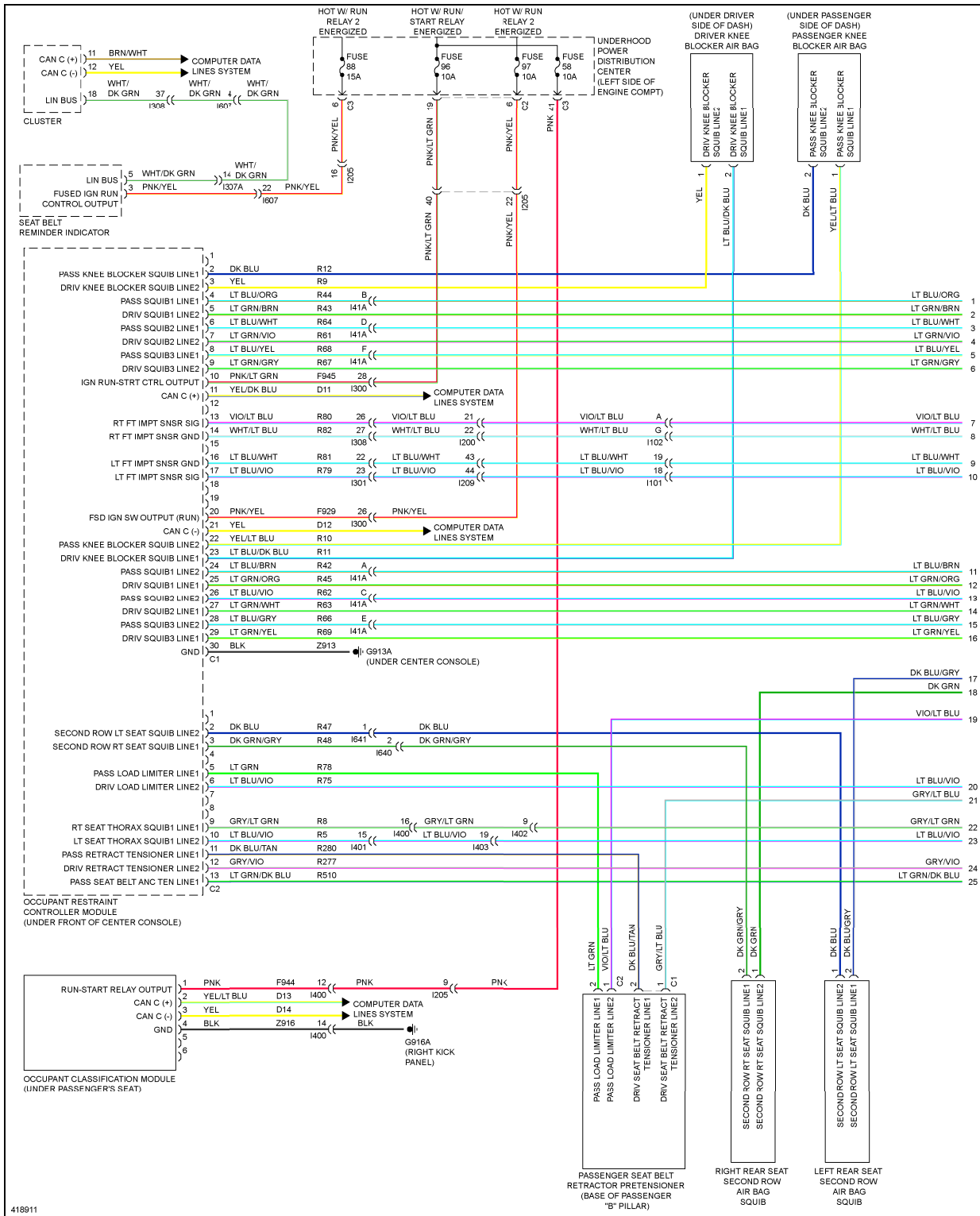
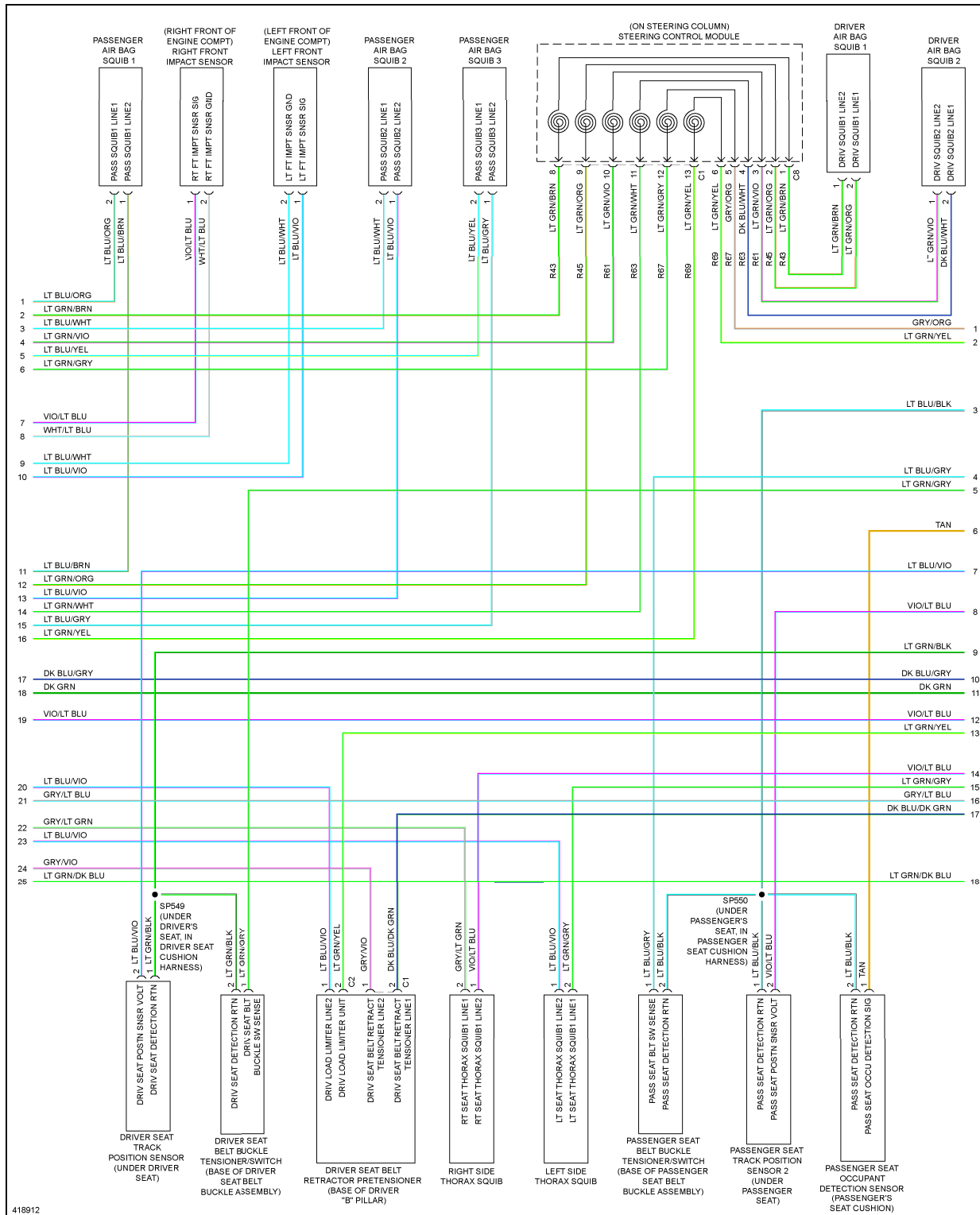


Fig. 97: Supplemental Restraints Circuit (1 of 3)

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



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Fig. 98: Supplemental Restraints Circuit (2 of 3)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 99: Supplemental Restraints Circuit (3 of 3)

TRANSMISSION

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

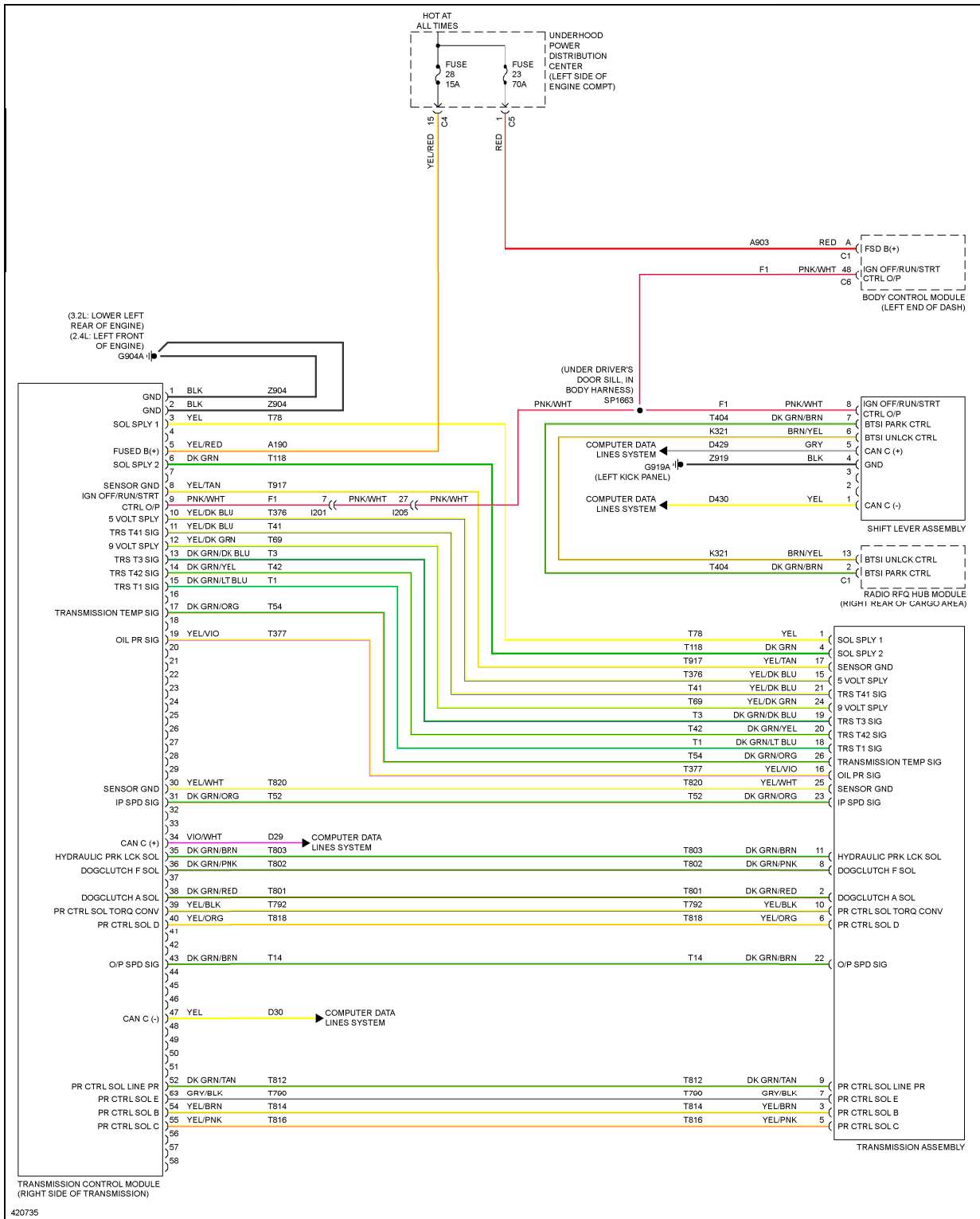


Fig. 100: A/T Circuit

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 101: Transfer Case Circuit

TRUNK, TAILGATE, FUEL DOOR

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

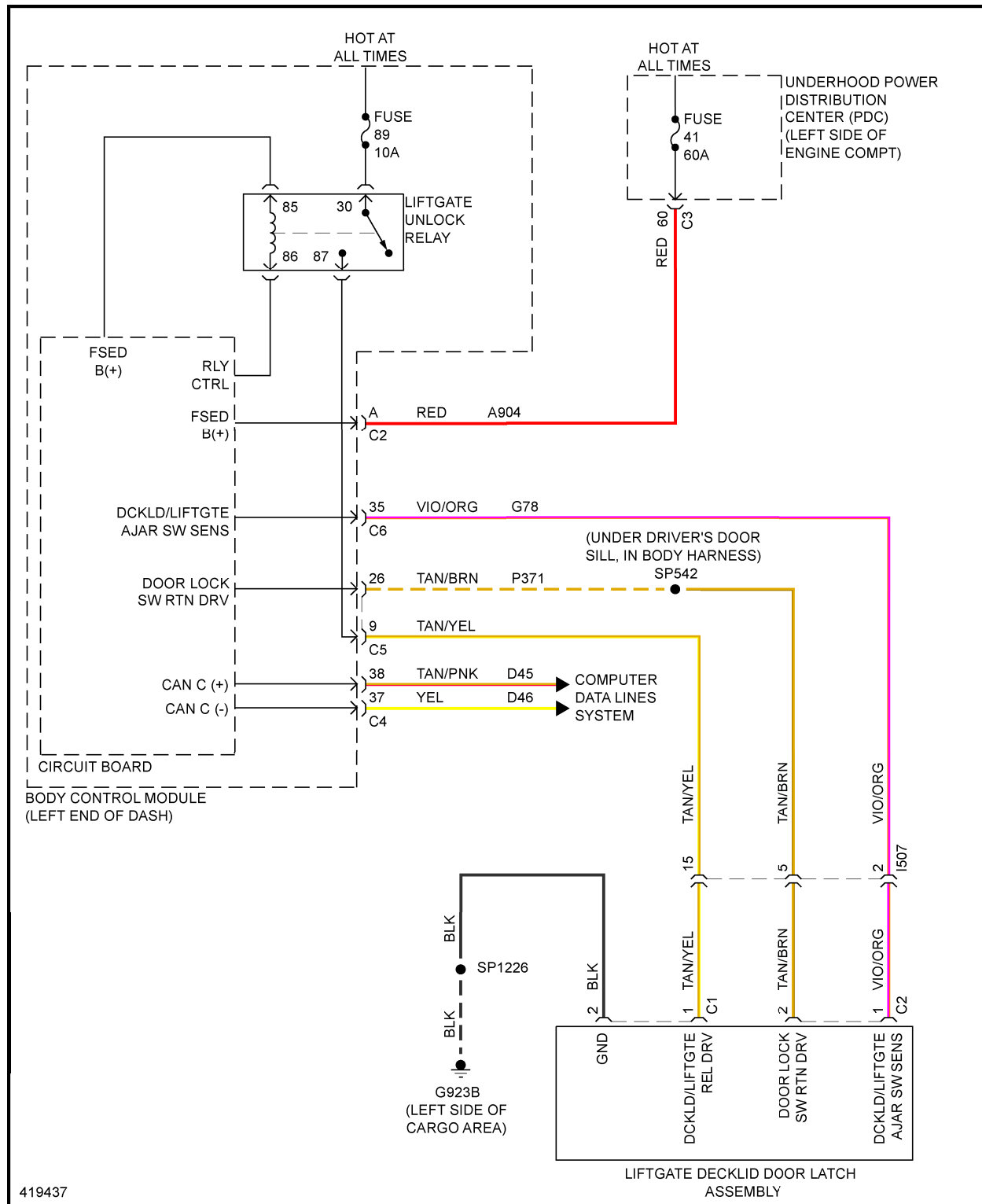


Fig. 102: Deck Lid Release Circuit

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

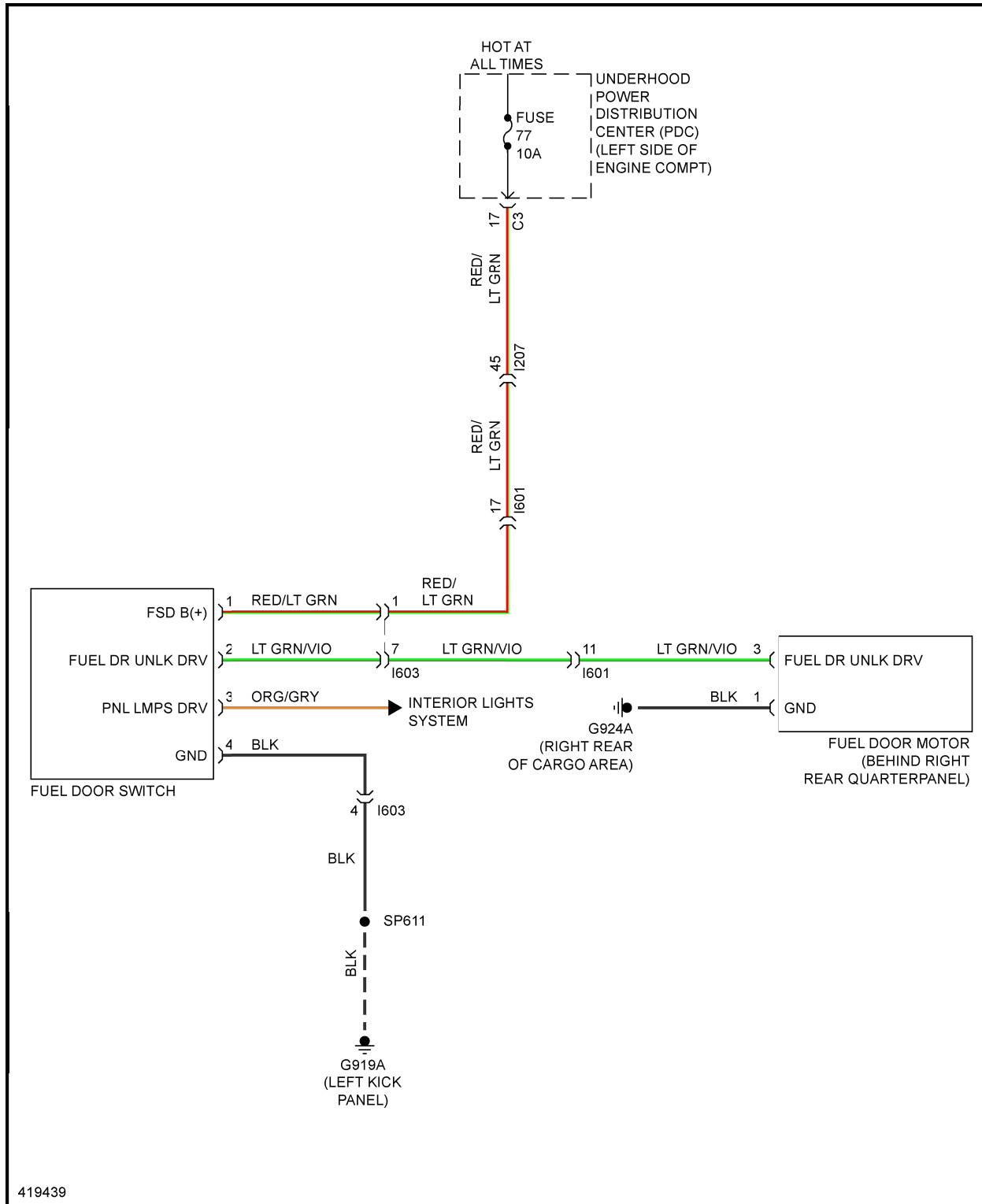


Fig. 103: Fuel Door Release Circuit

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 104: Power Liftgate Circuit

WARNING SYSTEMS

2014 Jeep Cherokee Trailhawk

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee

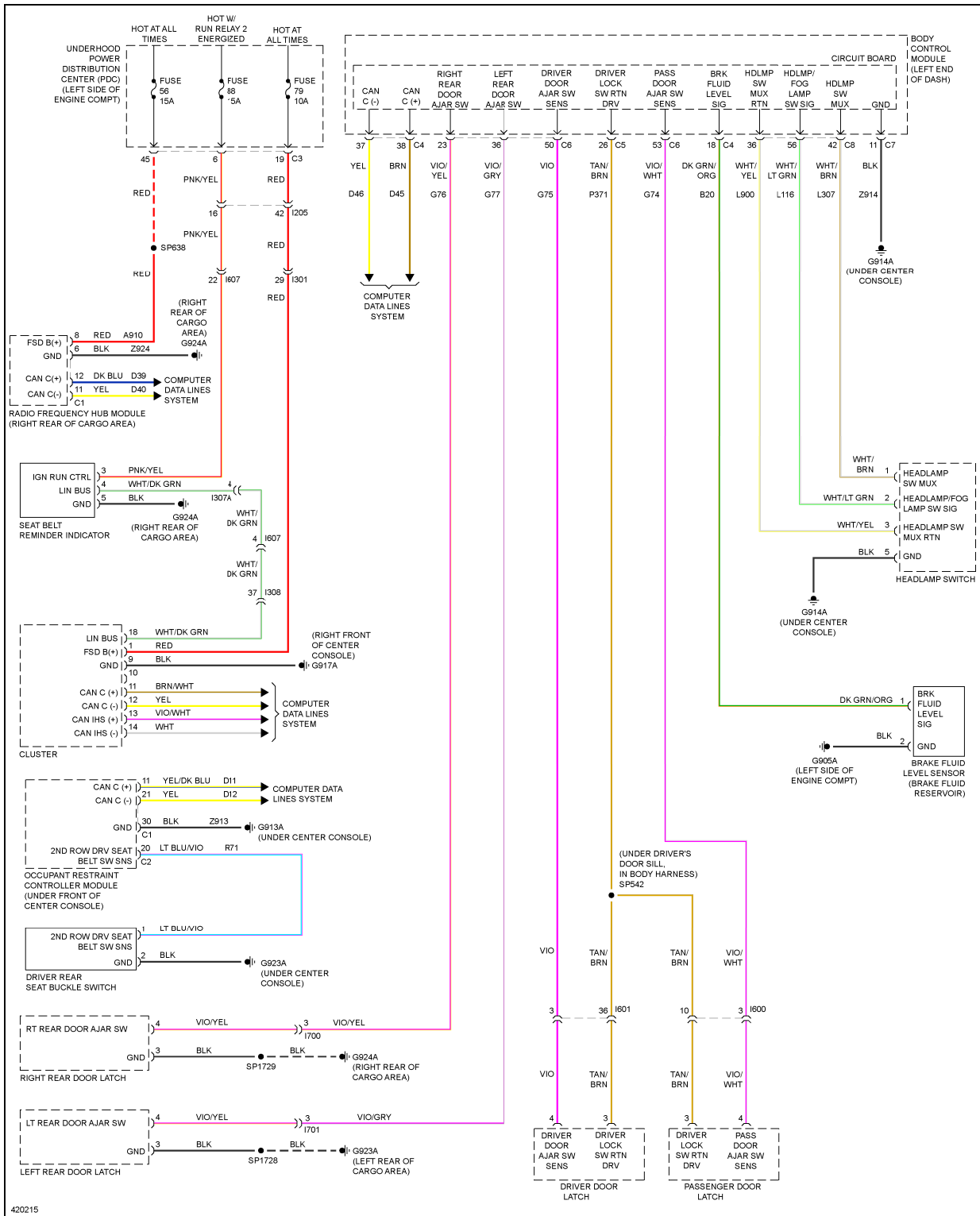


Fig. 105: Warning Systems Circuit

WIPER/WASHER

Fig. 106: Wiper/Washer Circuit (1 of 2)

2014 SYSTEM WIRING DIAGRAMS Jeep - Cherokee



Fig. 107: Wiper/Washer Circuit (2 of 2)

2014 TRANSFER CASE

Power Transfer Unit - Service Information - Cherokee

DESCRIPTION

DESCRIPTION

ONE SPEED PTU

The one Speed Power Transfer Unit (PTU) is a **service as an assembly component** when mechanical faults are evident. The shift actuator is a serviceable component, and if leaking, the input shaft seal(s), drive pinion seal, and case gasket can be serviced. Special tools have been developed to service the seals in the one speed PTU.

NOTE: There are two one speed PTU's in use, one for the automatic transmission and one for the manual transmission, they have unique mounting provisions, and are not interchangeable. The manual transmission version also has two opposed seals on the input shaft, the automatic transmission version has a single seal on the input shaft.

TWO SPEED PTU

The two Speed Power Transfer Unit (PTU) is a **service as assembly component** when mechanical faults and some oil leaks are evident. The shift actuator, rear output seal, right halfshaft outer seal, and the plug are serviceable. Special tools have been developed to service the seals in the two speed PTU. If hypoid fluid is leaking from the weep-hole between the transaxle and the PTU, the two speed PTU must be replaced.

STANDARD PROCEDURE

STANDARD PROCEDURE - PTU FLUID FILL

1. Raise vehicle on hoist. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Position a drain pan under the fill plug.
3. Remove the Power Transfer Unit (PTU) fill plug. The fill plug is located on the right side of the case.
4. Fill the PTU to the bottom of the fill plug hole using the specified fluid.

Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS**.

NOTE: It may take several minutes for the fluid to equalize in the PTU before a final fluid level check can be determined.

5. Install fill plug and tighten to the proper specification. Refer to **SPECIFICATIONS**.
6. Lower vehicle.

SPECIFICATIONS

ONE SPEED PTU SPECIFICATIONS

ONE SPEED PTU SPECIFICATIONS

PTU SPECIFIC	SPECIFICATIONS
Fluid Type	75-W 90 Gear Lube
Fluid Capacity	0.7 L (0.74 qt.)
Weight	23 kg (50 lb.)
Gear Ratio	2.734:1
Hypoid Gear Ratio	2.231 (13:29)*
Helical Gear Ratio	1.226 (31:38)*
Ring Gear Diameter	131 mm (5.2 in)
* = Gear to Gear Count Ratio	

TWO SPEED PTU SPECIFICATIONS

TWO SPEED PTU SPECIFICATIONS

PTU SPECIFIC	SPECIFICATIONS
Fluid Type	75-W 90 Gear Lube
Fluid Capacity	1.2 L (1.27 qt.)
Weight	30 kg (63 lb.)
Hi Range Gear Ratio	2.734:1
Overall Low Range Gear Ratio	2.91:1
Ring Gear Diameter	131 mm (5.2 in)
* = Gear to Gear Count Ratio	

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Fastener	N.m	in. lbs.	ft. lbs.
Damper to PTU	26.2	-	19.5
Exhaust Support to PTU Bracket (3.2 liter engine)	12	106	-
Heat Shield to PTU	13.7	121	-
Intake Manifold Support to PTU Bracket	11.5	102	-
Mounting Bracket to PTU	22	-	16
PTU Fill Plug	40	-	29.5
PTU to Transaxle Flange	48	-	35
On used fasteners that have a thread locker patch use Mopar® Lock & Seal Adhesive			

2014 Jeep Cherokee Trailhawk

2014 TRANSFER CASE Power Transfer Unit - Service Information - Cherokee

ONE SPEED PTU BENCH TIGHTENING REFERENCE

ONE SPEED PTU BENCH TIGHTENING REFERENCE

Fastener	N.m	ft. lbs.	in. lbs.
Shift Actuator to PTU (Use new fasteners)	10	-	88.5
Fill Plug to PTU	40	29.5	-
Right to Left Housing (M-8 x 1.25)	55	41	-
On used fasteners that have a thread locker patch use Mopar® Lock & Seal Adhesive			

TWO SPEED PTU BENCH TIGHTENING REFERENCE

TWO SPEED PTU BENCH TIGHTENING REFERENCE

Fastener	N.m	ft. lbs.	in. lbs.
Shift Actuator to PTU (Use new fasteners)	10	-	88.5
Fill Plug to PTU	40	29.5	-
Lower Cover to PTU (M-10 x 1.5)	90	66	-
Lower Cover to PTU (M-8 x 1.25)	55	41	-
Outer Cover to PTU (M-8 x 1.25)	55	41	-
On used fasteners that have a thread locker patch use Mopar® Lock & Seal Adhesive			

REMOVAL

REMOVAL

1. Position the vehicle on a suitable hoist with the transaxle in neutral. Refer to **HOISTING, STANDARD PROCEDURE**.
2. Disconnect the battery negative cable clamp from the battery.
3. Remove the right front wheel. Refer to **REMOVAL**.
4. Remove the right front halfshaft. Refer to **REMOVAL**.
5. If equipped with a 2.4L, remove the intake manifold. Refer to **MANIFOLD, INTAKE, REMOVAL**.
6. Remove the rear propeller shaft. Refer to **REMOVAL**.
7. Remove the bolts holding the rear maniverter to the cylinder head. Refer to **MANIFOLD, EXHAUST, REMOVAL**.
8. Separate the rear catalytic converter from the cylinder head and wire it up and out of the way.
9. Remove the crossunder exhaust pipe. Refer to **PIPE, EXHAUST CROSSUNDER, REMOVAL**.

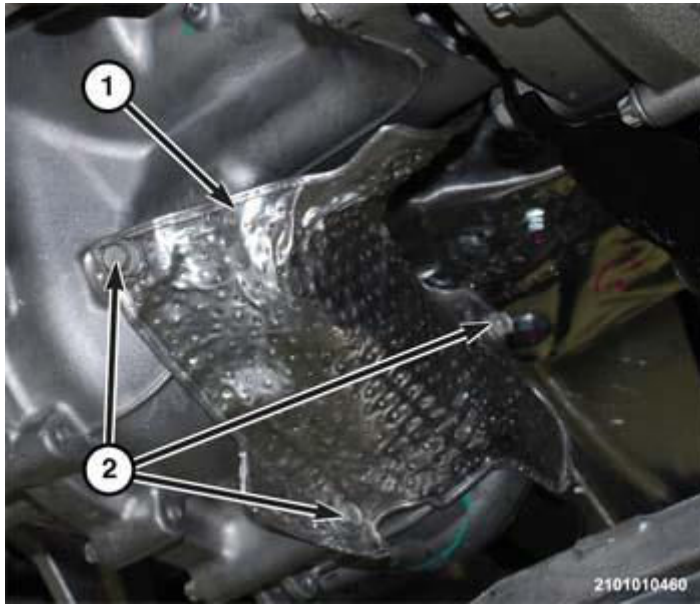


Fig. 1: Heat Shield & Bolts

Courtesy of CHRYSLER GROUP, LLC

10. Remove the bolts (2) holding the heat shield (1) to the PTU.
11. Separate the heat shield (1) from the PTU.

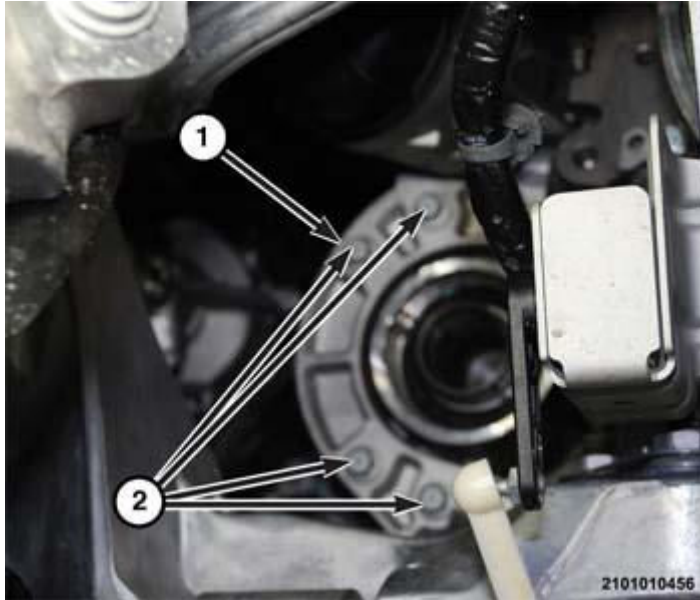


Fig. 2: PTU Support Bracket & Bolts At PTU

Courtesy of CHRYSLER GROUP, LLC

12. Remove the bolts (2) holding the PTU support bracket (1) to the PTU.

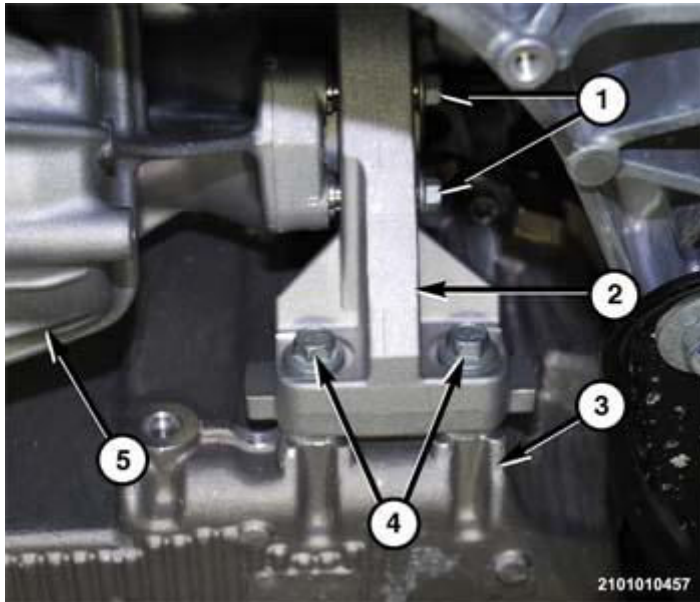


Fig. 3: PTU Support Bracket & Bolts At Block & Oil Pan
Courtesy of CHRYSLER GROUP, LLC

13. Remove the bolts (4) holding the PTU support bracket (2) to the engine block and the oil pan (3).
14. Separate the PTU support bracket (2) from the PTU (5).

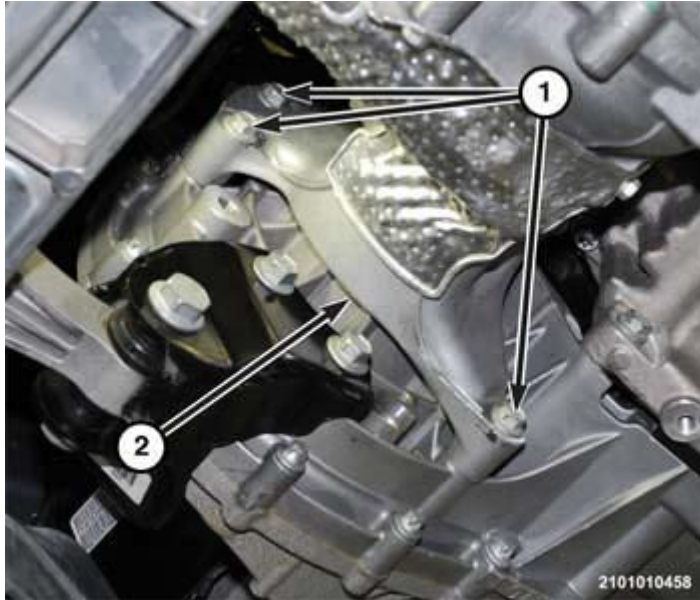


Fig. 4: PTU & Bolts At Transaxle
Courtesy of CHRYSLER GROUP, LLC

15. Remove the bolts (1) holding the PTU (2) to the transaxle.

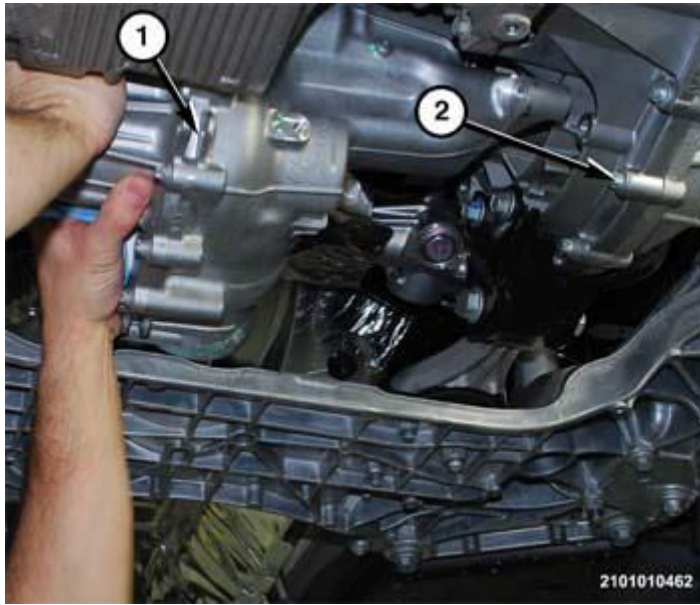


Fig. 5: Shifting PTU To Right Away From Transaxle
Courtesy of CHRYSLER GROUP, LLC

16. Shift the PTU (1) to the right away from the transaxle (2) and separate the spline shaft from the transaxle output shaft.

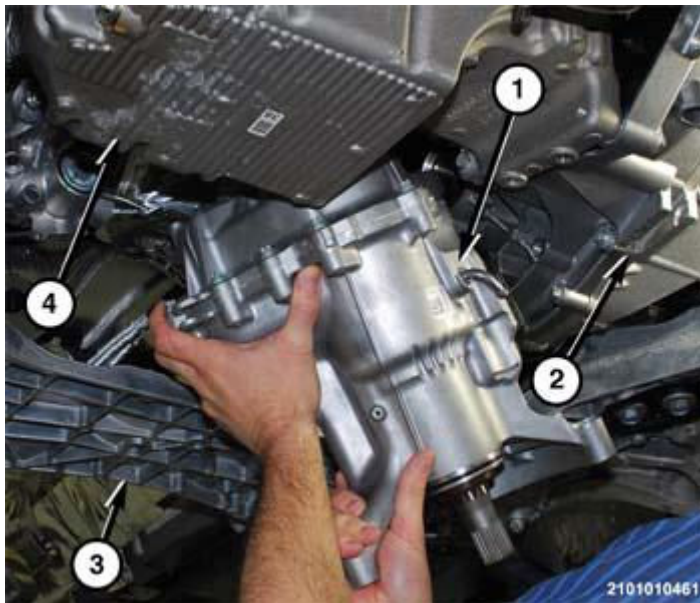


Fig. 6: Removing/Installing PTU
Courtesy of CHRYSLER GROUP, LLC

17. Push the PTU (1) to the right side of the vehicle and tip the left side downward and out of the vehicle.

DISASSEMBLY

ONE SPEED PTU DISASSEMBLY

NOTE: **The PTU is a service by replacement component. If the PTU is leaking fluid, the lip seals can be replaced.**

1. Remove the Power Transfer Unit (PTU) from the vehicle.
2. Place the PTU on a suitable, clean and stable work surface.
3. Drain the fluid from the PTU into a suitable drain pan.

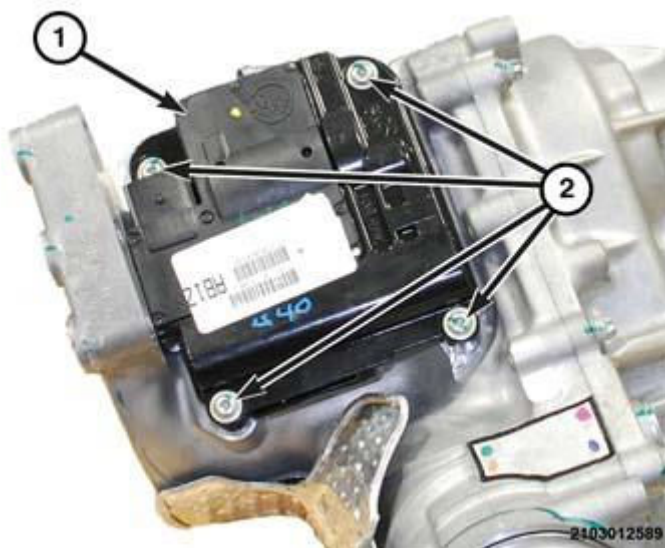
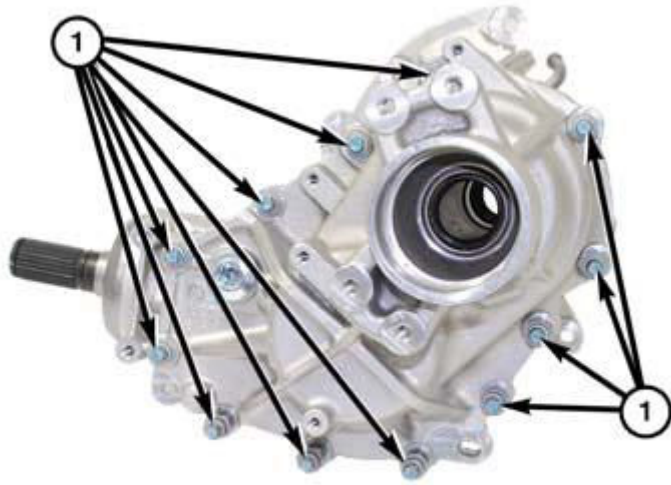


Fig. 7: PTU Shift Actuator & Screws
Courtesy of CHRYSLER GROUP, LLC

4. Remove the screws holding the shift actuator to the PTU and discard screws.
5. Remove the PTU shift actuator.

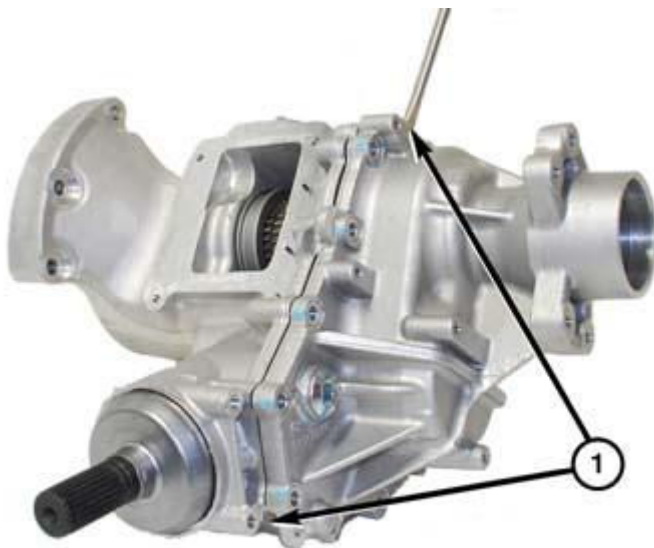


2103012347

Fig. 8: Locating PTU Housing Bolts
Courtesy of CHRYSLER GROUP, LLC

NOTE: It is not necessary to remove the intermediate shaft from the PTU to service the seals.

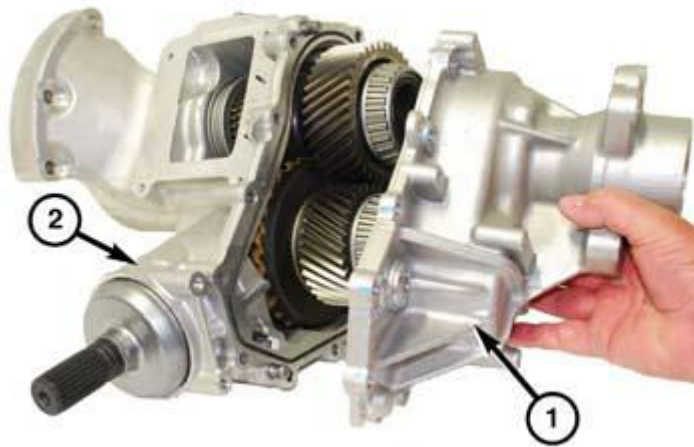
6. Remove the bolts (1) holding the PTU housing halves together.



2103012350

Fig. 9: Prying PTU Housing Halves Apart
Courtesy of CHRYSLER GROUP, LLC

7. Using a suitable pry bar, pry (1) the PTU housing halves apart.



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Fig. 10: Separating/Installing Right Housing At PTU Housing
Courtesy of CHRYSLER GROUP, LLC

NOTE: When separating the housing, bearings and preload shims may dislodge. Make note of bearing cup and shim location for proper reassembly.

8. Carefully separate the right housing (1) from the PTU housing (2).



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Fig. 11: PTU Housing & Gasket
Courtesy of CHRYSLER GROUP, LLC

9. Remove the gasket (1) from the groove in the PTU housing (2).

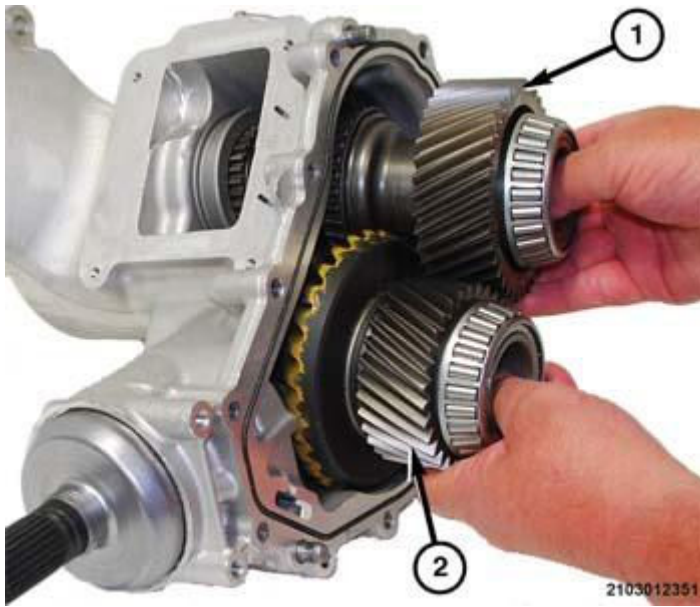


Fig. 12: Removing/Installing Input Gear & Output Ring Gear At PTU Housing
Courtesy of CHRYSLER GROUP, LLC

10. In unison, pull the input gear (1) and output ring gear (2) from the PTU housing.



Fig. 13: Locating Dog Clutch Sleeve
Courtesy of CHRYSLER GROUP, LLC

11. Remove the dog clutch sleeve (1) from the input shaft.

NOTE: Note the orientation of the tapered splines in the dog clutch sleeve for reassembly.



Fig. 14: Removing/Installing Input Shaft & Bearing At PTU Housing
Courtesy of CHRYSLER GROUP, LLC

12. Remove the input shaft (1) and bearing from the PTU housing.



Fig. 15: Removing Seal(s) From PTU Housing
Courtesy of CHRYSLER GROUP, LLC

13. Using a suitable screw driver, remove both the inner and outer input shaft seals if a manual transmission vehicle, or the single seal if an automatic transmission equipped vehicle from the PTU housing (1).

NOTE: The inner lip seal keeps PTU fluid from entering the transmission, the outer lip seal keeps transmission fluid from entering the PTU when

equipped with a manual transmission. There is a weep hole in the cavity between the two seals.



Fig. 16: Removing Seal(s) From Input Shaft
Courtesy of CHRYSLER GROUP, LLC

14. Using a suitable screw driver, remove the inner and outer seals if a manual transmission vehicle, or the single seal if an automatic transmission equipped vehicle from the inside of the input shaft (1).

NOTE: The inner lip seal keeps PTU fluid from entering the transmission, the outer lip seal keeps transmission fluid from entering the PTU when equipped with a manual transmission. There is a weep hole in the cavity between the two seals.

ASSEMBLY

ONE SPEED PTU ASSEMBLY

Clean the Power Transfer Unit (PTU) components using a suitable solvent. Blow the components dry using regulated 344 kPa (50 psi) shop air. Inspect all sealing surfaces for excessive wear or scratches the may cause damage to new seals. If damage is evident replace the PTU assembly.



Fig. 17: Installing Outer Seal In Input Gear
Courtesy of CHRYSLER GROUP, LLC

1. If a manual transmission equipped vehicle, using tool (special tool #10517, Installer, Seal) (1), with the long side (4) toward the seal (2), install the outer seal (2) in the input gear (3) with the tension spring facing outward. The shoulder on the tool will stop against the input shaft (3) roller bearing.
2. For both automatic and manual transmission equipped vehicle, using tool (special tool #10517, Installer, Seal) (1), with the short side (4) toward the seal (2), install the inner seal (2) in the input gear (3) with the tension spring facing the tool. The shoulder on the tool will stop against the input shaft (3) roller bearing.

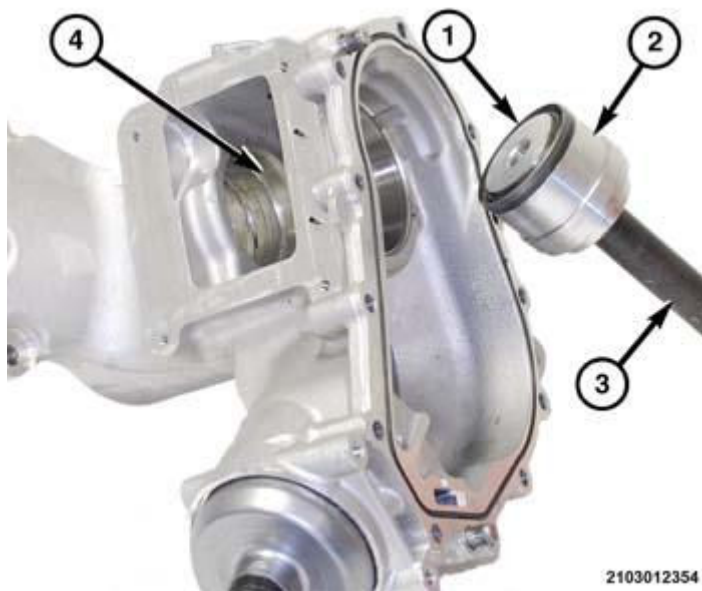


Fig. 18: Installing Outer Seal Into Housing
Courtesy of CHRYSLER GROUP, LLC

3. If a manual transmission equipped vehicle, using tool (special tool #10515, Installer, Seal) and (special tool #C-4171, Driver Handle, Universal), with the long side (2) toward the seal (1), install the outer seal (1) in the housing (4) with the tension spring facing outward. The shoulder on the tool will stop against the top of the bore in the housing (4).
4. For both automatic and manual transmission equipped vehicle, using tool (special tool #10515, Installer, Seal) and (special tool #C-4171, Driver Handle, Universal), with the short side (2) toward the seal (1), install the inner seal (1) in the housing (4) with the tension spring facing the tool. The shoulder on the tool will stop against the top of the bore in the housing (4).



Fig. 19: Removing/Installing Input Shaft & Bearing At PTU Housing
Courtesy of CHRYSLER GROUP, LLC

5. Install the input shaft (1) and bearing into the PTU housing.



Fig. 20: Locating Dog Clutch Sleeve
Courtesy of CHRYSLER GROUP, LLC

6. Install the dog clutch sleeve (1) onto the input shaft



Fig. 21: Ensuring Proper Orientation Of Tapered Splines On Dog Clutch Sleeve
Courtesy of CHRYSLER GROUP, LLC

NOTE: Ensure that the dog clutch sleeve is oriented so that the tapered splines (1) are facing the input gear (towards the interior of the case).

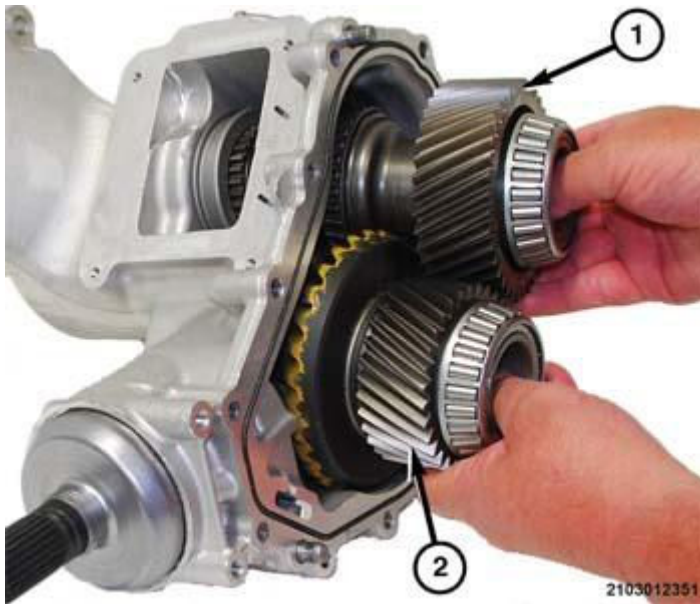


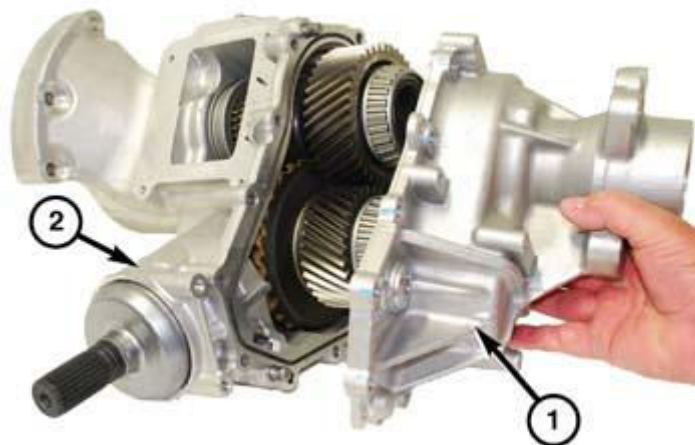
Fig. 22: Removing/Installing Input Gear & Output Ring Gear At PTU Housing
Courtesy of CHRYSLER GROUP, LLC

7. In unison, install the input gear (1) and output ring gear (2) into the PTU housing.



Fig. 23: PTU Housing & Gasket
Courtesy of CHRYSLER GROUP, LLC

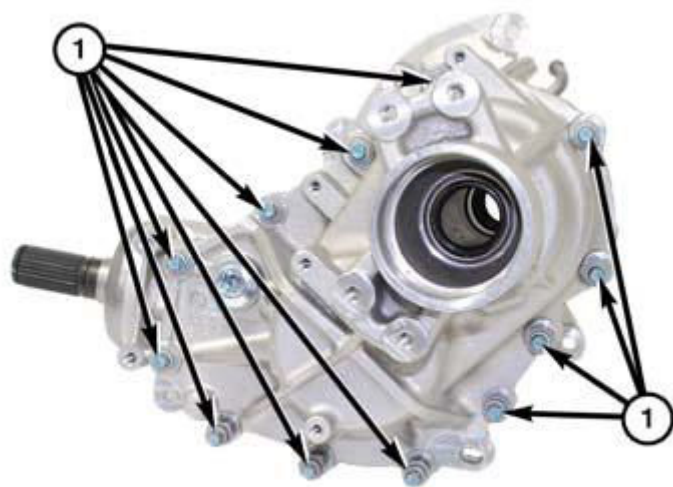
8. Install the gasket (1) into the groove in the PTU housing (2).



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Fig. 24: Separating/Installing Right Housing At PTU Housing
Courtesy of CHRYSLER GROUP, LLC

9. If necessary, install the bearing cups and shims into their proper bores of the right PTU housing. Use a light grease to retain the cups in their bores.
10. Place the right housing (1) onto the PTU housing (2).



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Fig. 25: Locating PTU Housing Bolts
Courtesy of CHRYSLER GROUP, LLC

11. Install the bolts (1) to hold the PTU housing halves together. Refer to **SPECIFICATIONS**.
12. Lubricate the intermediate shaft splines.

13. Install the PTU in the vehicle.
14. Fill the PTU to the proper level with Mopar® 75W-90 fluid.
15. Road test the vehicle to verify the repair.

INSTALLATION

INSTALLATION

1. If manual transmission equipped, install a new O-ring in the groove around the outside of the Power Transfer Unit (PTU) input shaft housing.

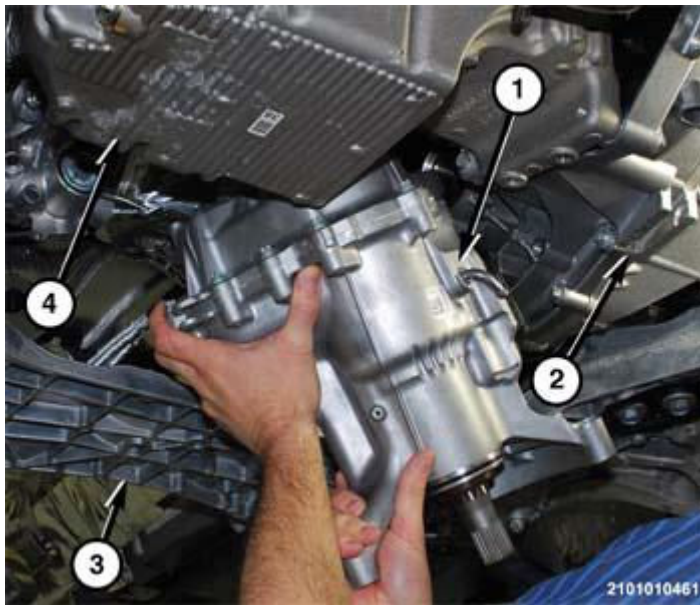


Fig. 26: Removing/Installing PTU
Courtesy of CHRYSLER GROUP, LLC

2. Tip the right side upward and into the gap over the suspension cradle and align the PTU (1) with the transaxle output shaft.

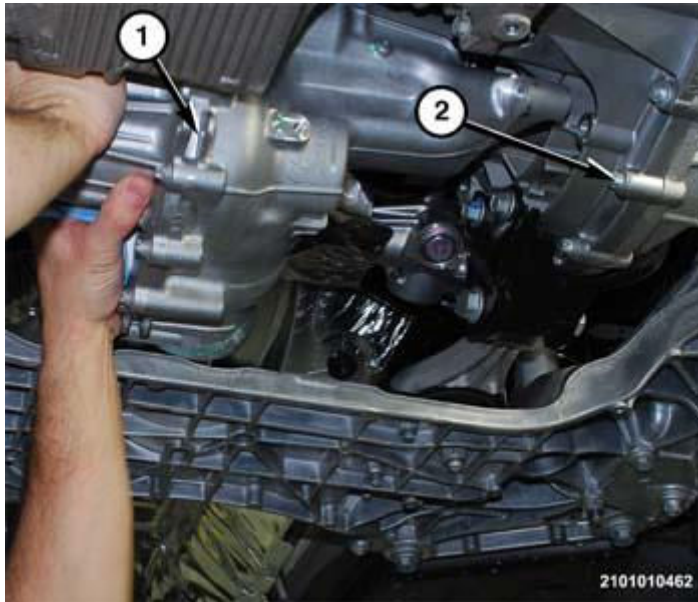


Fig. 27: Shifting PTU To Right Away From Transaxle
Courtesy of CHRYSLER GROUP, LLC

3. Shift the PTU (1) to the left onto transaxle (2) and engage the spline shaft into the transaxle output shaft adapter.

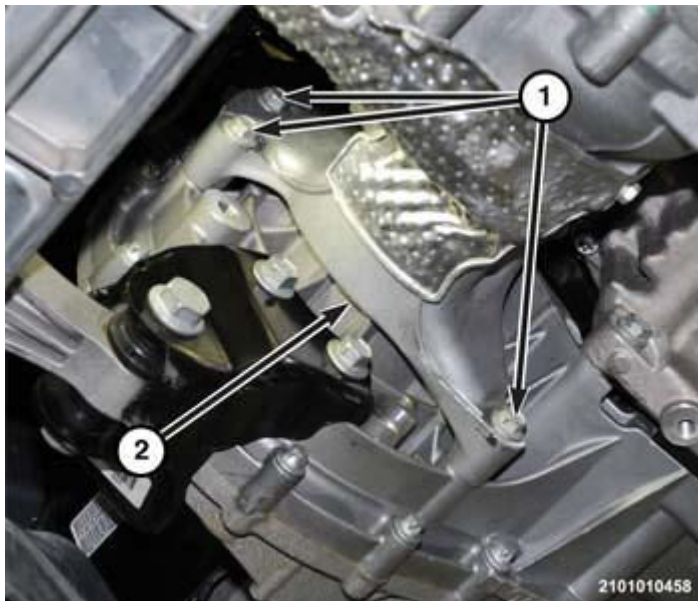


Fig. 28: PTU & Bolts At Transaxle
Courtesy of CHRYSLER GROUP, LLC

4. Install the bolts (1) to hold the PTU (2) to the transaxle. Refer to **SPECIFICATIONS**.

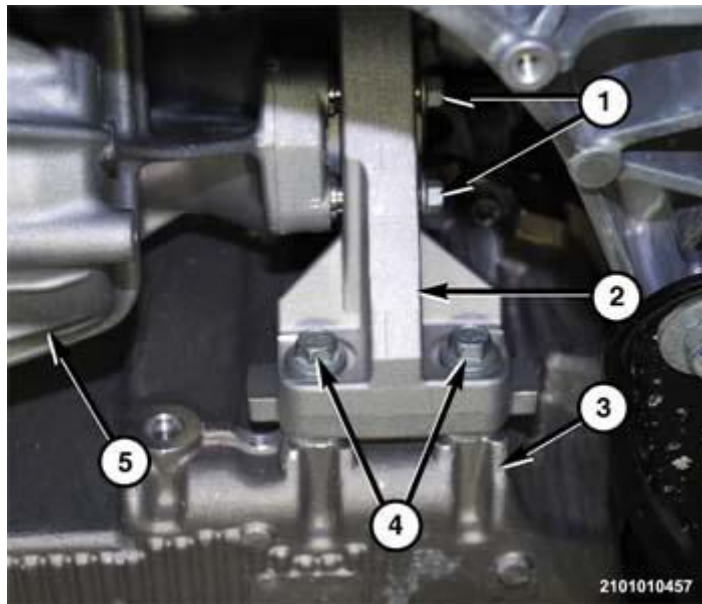


Fig. 29: PTU Support Bracket & Bolts At Block & Oil Pan
Courtesy of CHRYSLER GROUP, LLC

NOTE: The PTU to block bracket has a sleeve that slides in the bracket, if the sleeve is seized in the bracket, the bracket must be replaced.

5. Place the PTU support bracket (2) in position on the PTU (5).
6. Install the bolts (4) to hold the PTU support bracket (2) to the engine block (3). Refer to **SPECIFICATIONS**.

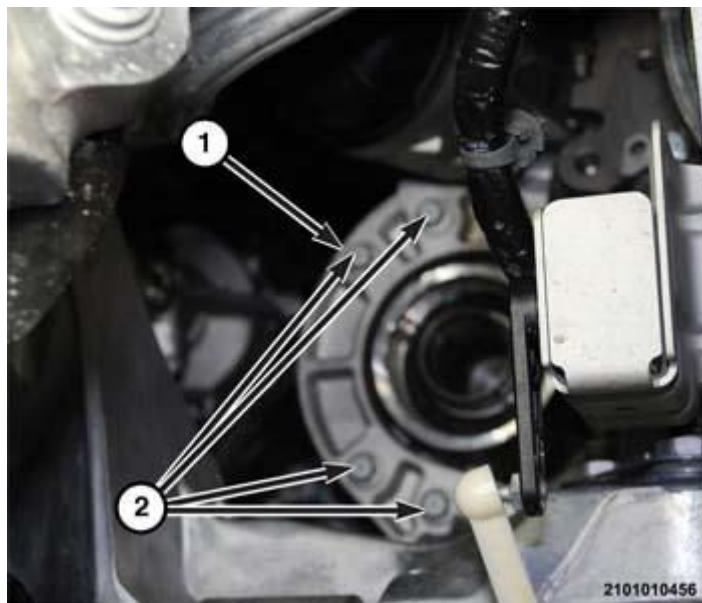


Fig. 30: PTU Support Bracket & Bolts At PTU
Courtesy of CHRYSLER GROUP, LLC

7. Install the bolts (2) to hold the PTU support bracket (1) to the PTU. Refer to **SPECIFICATIONS**.

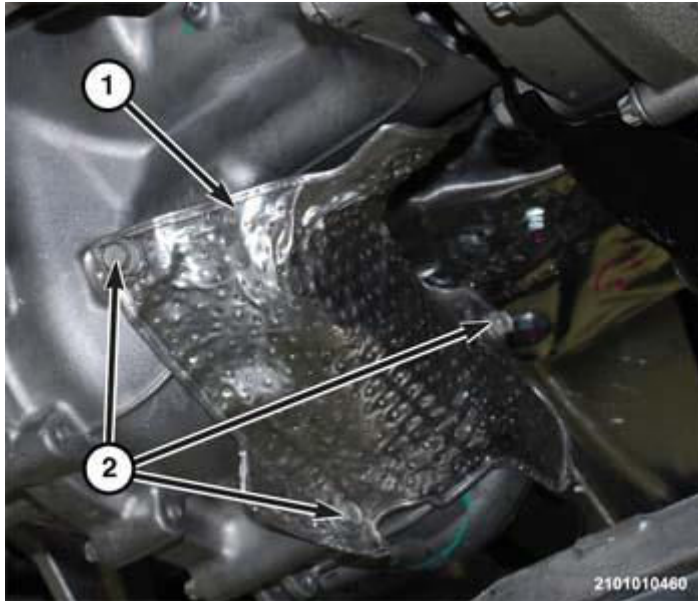


Fig. 31: Heat Shield & Bolts

Courtesy of CHRYSLER GROUP, LLC

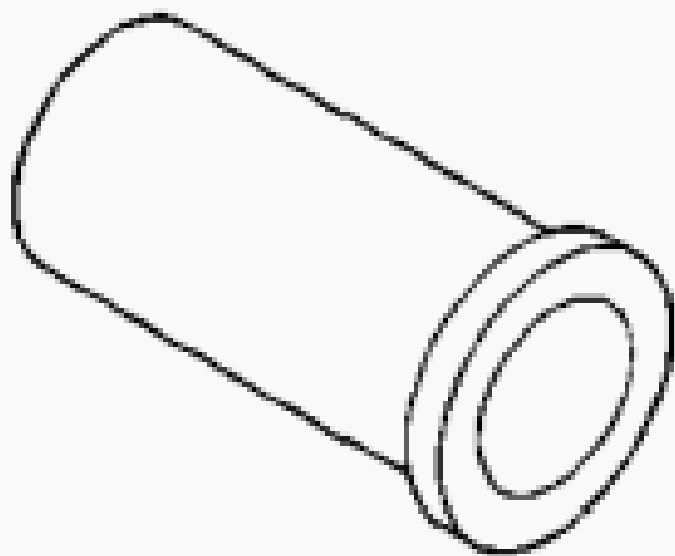
8. Place the heat shield (1) in position on the PTU.
9. Install the bolts (2) to hold the heat shield (1) to the PTU. Refer to **SPECIFICATIONS**.
10. Install the crossunder exhaust pipe. Refer to **PIPE, EXHAUST CROSSUNDER, INSTALLATION**.
11. If equipped with a 3.2L, place the rear catalytic converter in position the cylinder head.
12. Install the bolts holding the rear maniverter to the cylinder head. Install the rear propeller shaft. Refer to **INSTALLATION**.
13. If equipped with a 2.4L, install the intake manifold. Refer to **MANIFOLD, INTAKE, INSTALLATION**.

NOTE: The right halfshaft passes through multiple seals in manual transmission equipped vehicles, use care when installing the halfshaft.

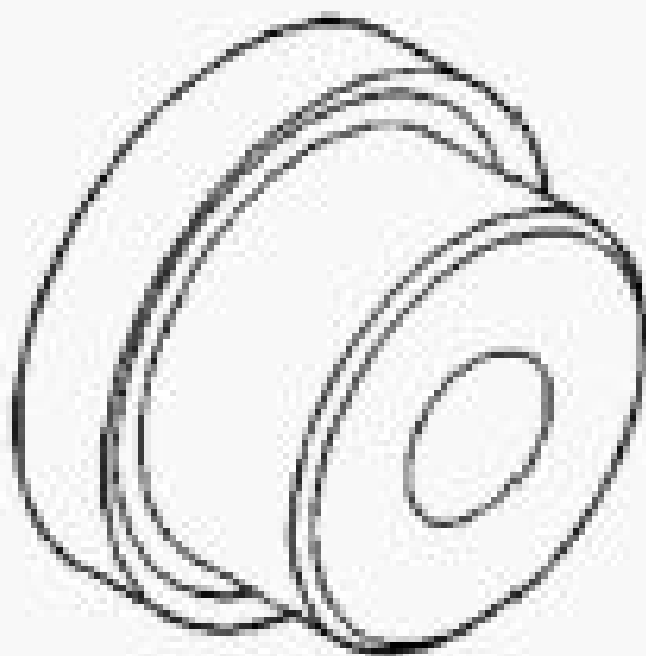
14. Install the right front halfshaft. Refer to **INSTALLATION**.
15. Install the right front wheel. Refer to **INSTALLATION**.
16. Verify that the PTU and transaxle are filled to the specified fluid level. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, SPECIFICATIONS**.
17. Lower the vehicle.
18. Connect the battery negative cable clamp to the battery.
19. Road test the vehicle to verify the repair.

SPECIAL TOOLS

SPECIAL TOOLS



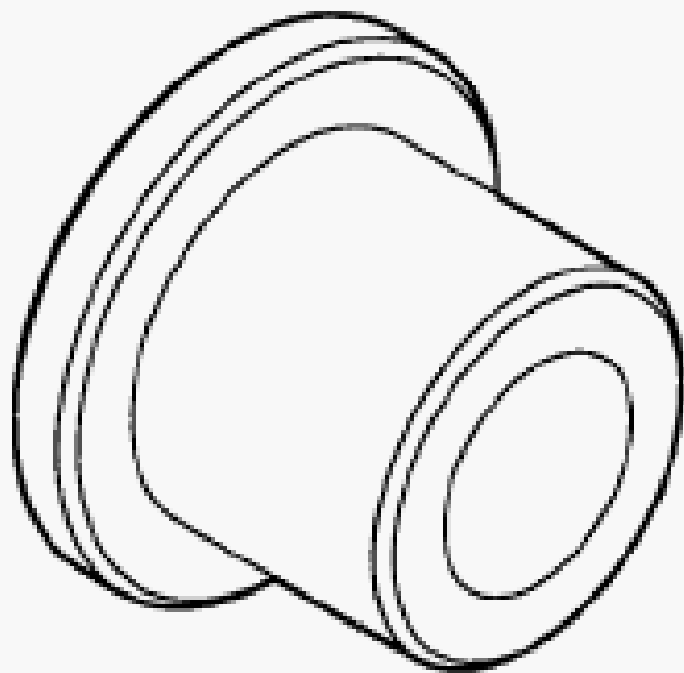
6342 - Installer, Seal
(Originally Shipped In Kit Number(s)
6672.)



7828-A - Installer, Bearing
(Originally Shipped In Kit Number(s)
9960.)

2014 Jeep Cherokee Trailhawk

2014 TRANSFER CASE Power Transfer Unit - Service Information - Cherokee



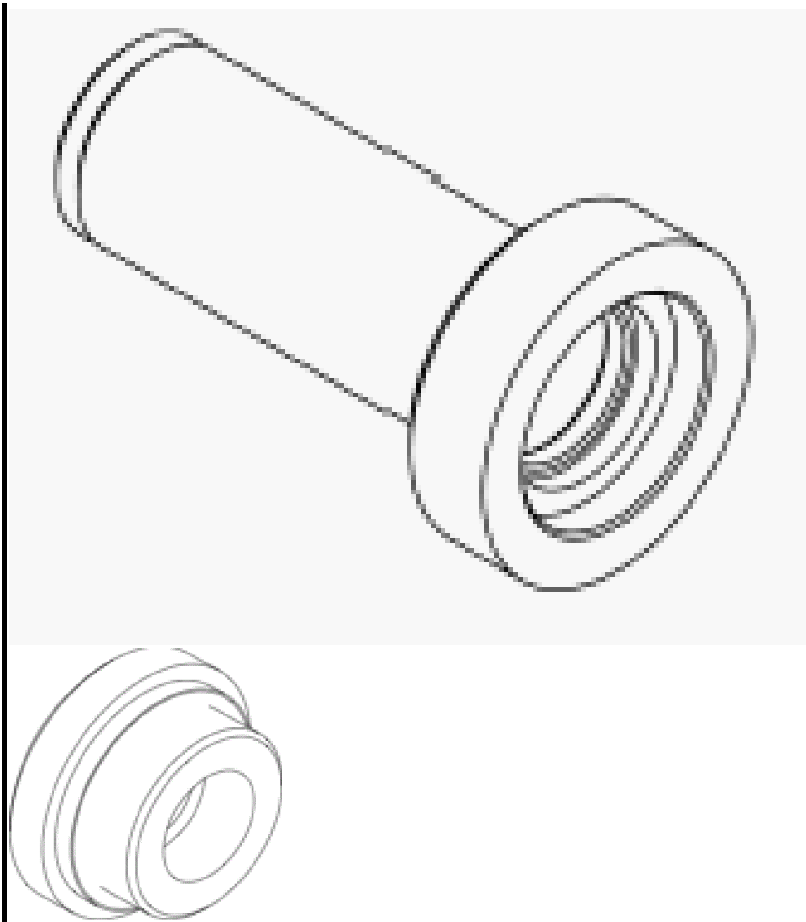
8239 - Installer, Bushing
(Originally Shipped In Kit Number(s)
8295, 8295CC, 8636.)



9684 - Installer, Seal
(Originally Shipped In Kit Number(s)
9656.)

2014 Jeep Cherokee Trailhawk

2014 TRANSFER CASE Power Transfer Unit - Service Information - Cherokee



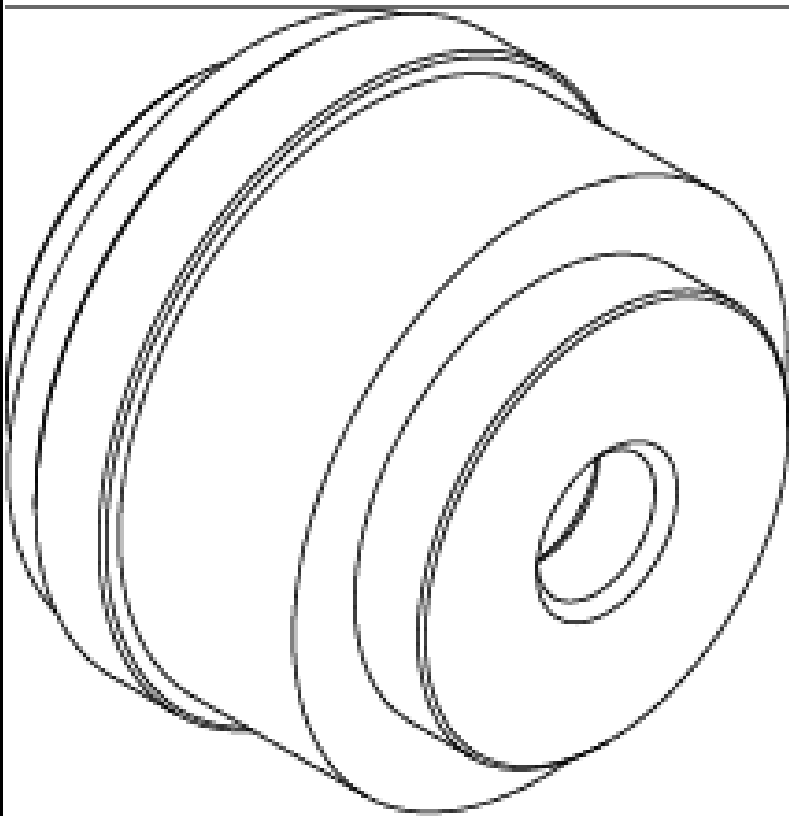
10117 - Installer, Seal
(Originally Shipped In Kit Number(s)
10075-CHRYSLER, 10075-DODGE.)

10382 - Installer, Oil Pump Housing
Needle Bearing
(Originally Shipped In Kit Number(s)
10394A, 10394-UPD.)

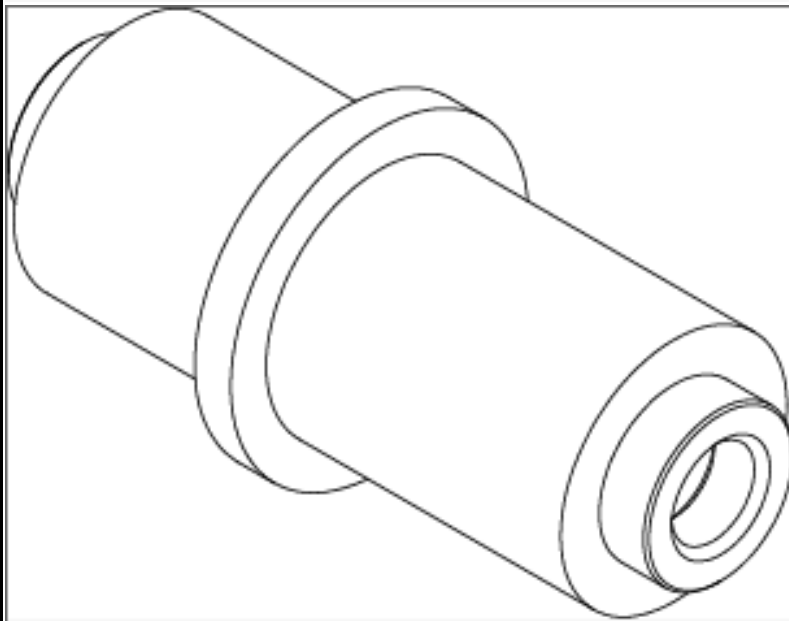
10515 - Installer, Seal

2014 Jeep Cherokee Trailhawk

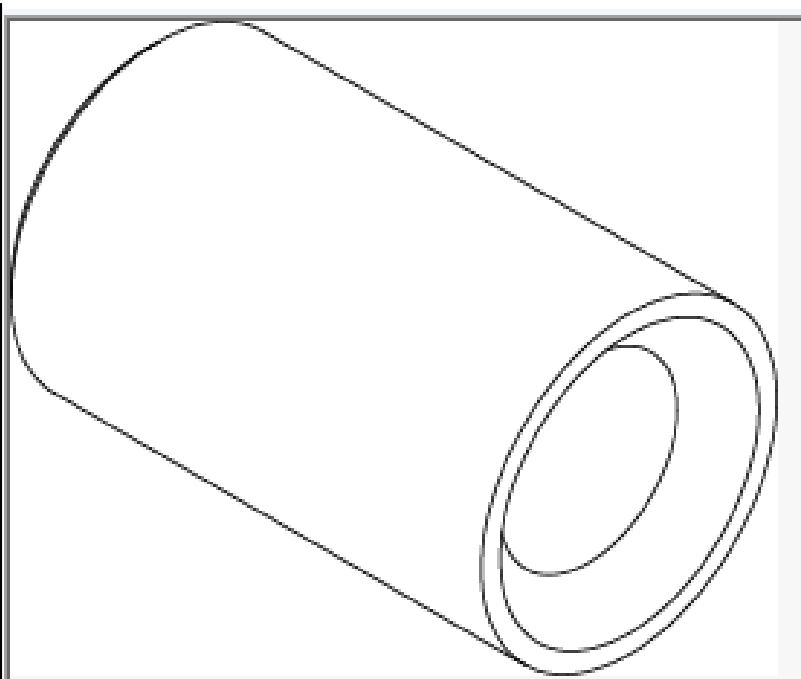
2014 TRANSFER CASE Power Transfer Unit - Service Information - Cherokee



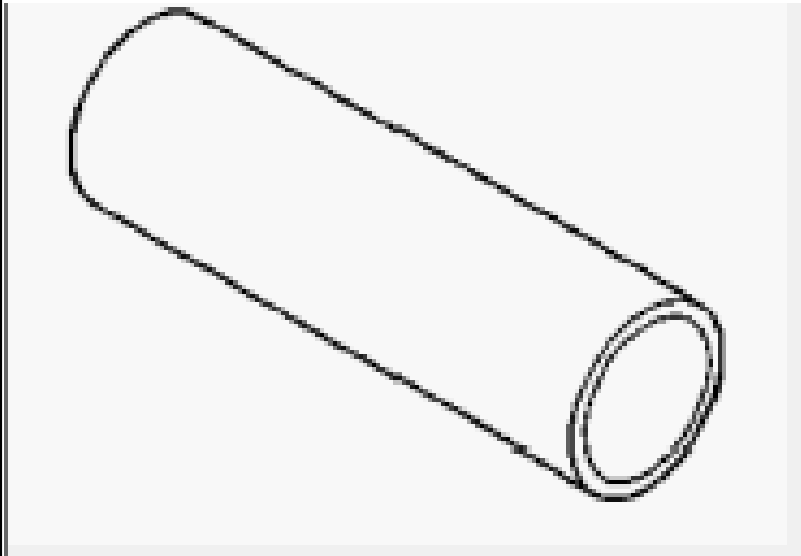
(Originally Shipped In Kit Number(s).)



10517 - Installer, Seal
(Originally Shipped In Kit Number(s).)



10518 - Installer, Oil Slinger
(Originally Shipped In Kit Number(s).)



D-389 - Installer, Bearing
(Originally Shipped In Kit Number(s)
6745.)

ACTUATOR, SHIFT

REMOVAL

ONE SPEED PTU

1. Remove the Power Transfer Unit (PTU) from the vehicle.
2. Place the PTU on a suitable, clean and stable work surface.
3. Drain the fluid from the PTU into a suitable drain pan.

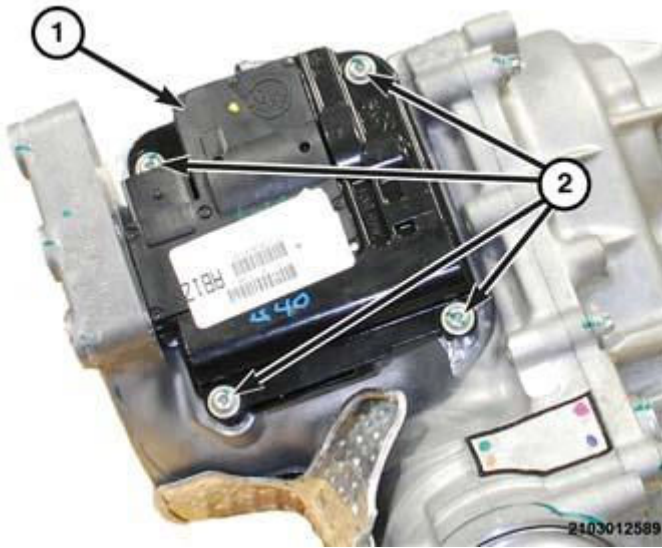


Fig. 32: PTU Shift Actuator & Screws
Courtesy of CHRYSLER GROUP, LLC

4. Remove the screws (2) holding the shift actuator (1) to the PTU. Discard the screws.
5. Separate the shift actuator from the PTU.



Fig. 33: Shift Actuator, Shift Fork & Gasket
Courtesy of CHRYSLER GROUP, LLC

6. Remove the gasket (2) from the groove in the shift actuator (1).

TWO SPEED PTU

NOTE: If the PTU actuator is functional and is being removed to correct a fluid leak, the PTU should be placed in the 2WD mode before removing the PTU from the vehicle. If the actuator is not functional the actuator can be removed when the PTU is not in the 2WD mode, but it will be difficult to install the shift forks on the shift sleeves.

1. Remove the PTU from the vehicle.
2. Place the PTU on a suitable work surface

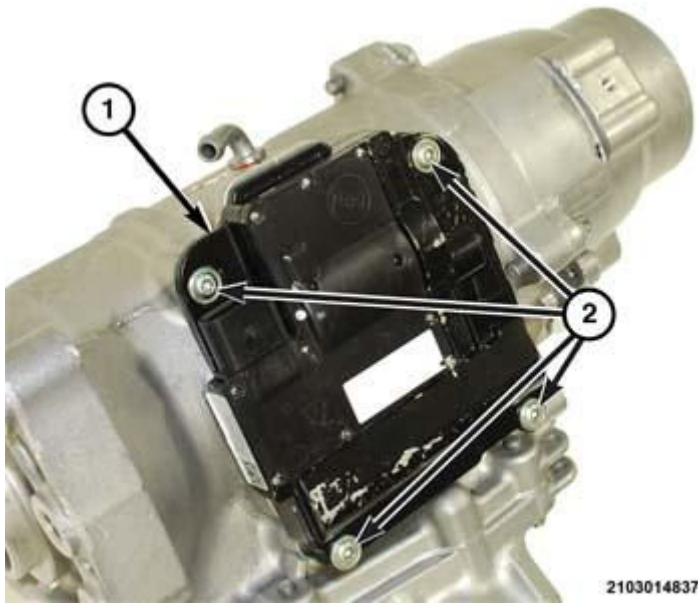


Fig. 34: Shift Actuator & Screws
Courtesy of CHRYSLER GROUP, LLC

3. Remove the screws (2) holding the shift actuator (1) to the PTU housing. Discard the screws.

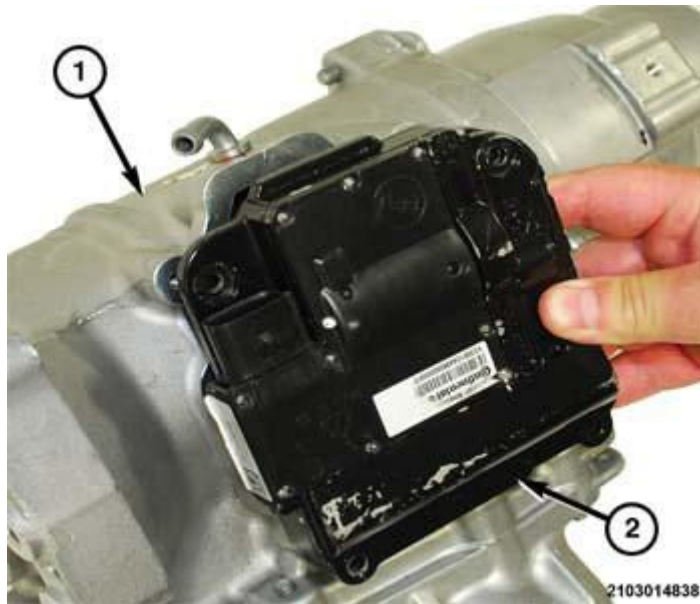


Fig. 35: Removing/Installing Shift Actuator At PTU
Courtesy of CHRYSLER GROUP, LLC

4. Separate the shift actuator (2) from the PTU (1).

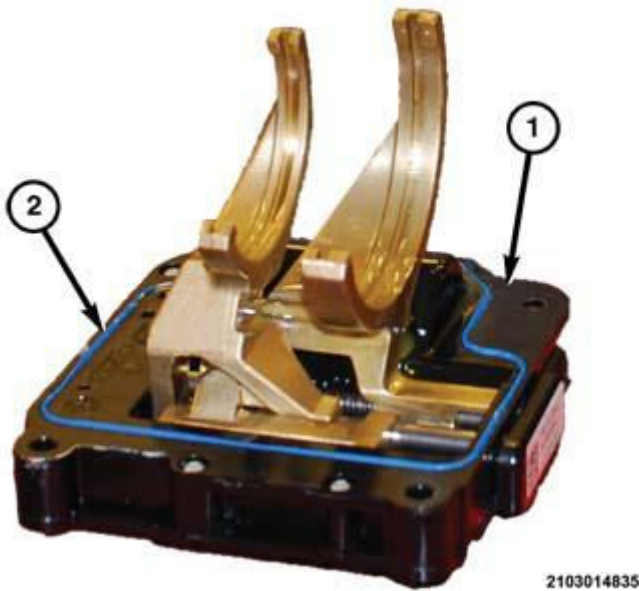


Fig. 36: Locating Gasket At Shift Actuator Sealing Surface Groove
Courtesy of CHRYSLER GROUP, LLC

5. Remove the gasket (2) from the groove in the shift actuator sealing surface (1).

INSTALLATION

ONE SPEED PTU

NOTE: If installing a new actuator, there are two locating dowels that may have stayed in the case, remove them from the case as the dowels will come installed in the new actuator.

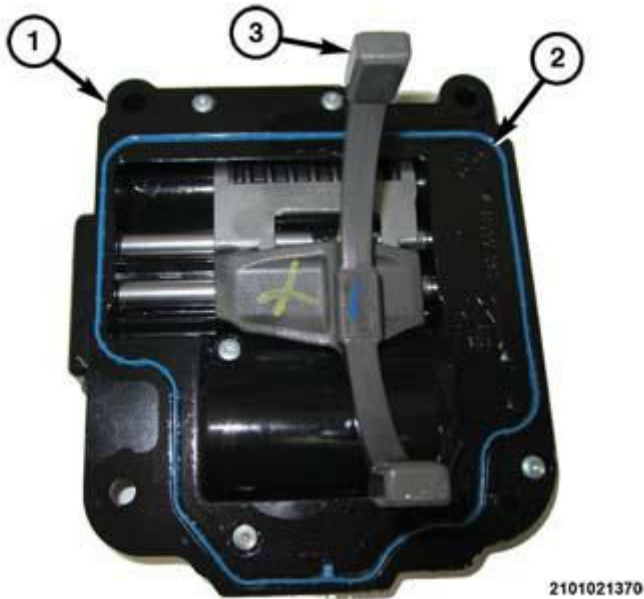


Fig. 37: Shift Actuator, Shift Fork & Gasket
Courtesy of CHRYSLER GROUP, LLC

1. Using a clean lint free cloth, wipe the sealing surfaces clean.

NOTE: Do not use solvent to clean the PTU components.

2. Install a NEW gasket (2) in the groove on the shift actuator.
3. Place the shift actuator in position on the PTU.
4. Engage the shift fork in the groove on the shift sleeve in the PTU and align the locating dowels.

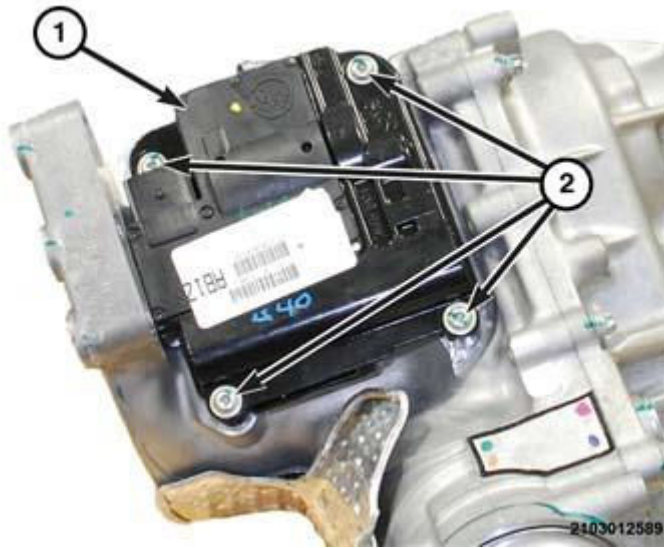


Fig. 38: PTU Shift Actuator & Screws
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not reuse the actuator mounting screws.

5. Install **NEW** screws (2) to hold the shaft actuator to the PTU. Refer to **SPECIFICATIONS**.
6. Install the PTU in the vehicle.
7. Verify that the PTU is properly filled with Mopar® 75W-90 fluid.
8. Road test the vehicle to verify the repair.

TWO SPEED PTU

NOTE: If the actuator was inoperative and was not in the 2WD mode before it was removed, the shift forks can be aligned by placing a large plastic loom tie between the shift fork and the actuator housing to position the fork closer to the center of the actuator. Do not attempt to join the ends of the loop tie around the shift mechanism. The loom tie will serve as a shim and can be pulled out after the actuator is in position on the PTU.

NOTE: If installing a new actuator, there are two locating dowels that may have stayed in the case, remove them from the case as the dowels will come installed in the new actuator.

1. Using a clean lint free cloth, wipe the sealing surfaces clean.

NOTE: Do not use solvent to clean the PTU components.

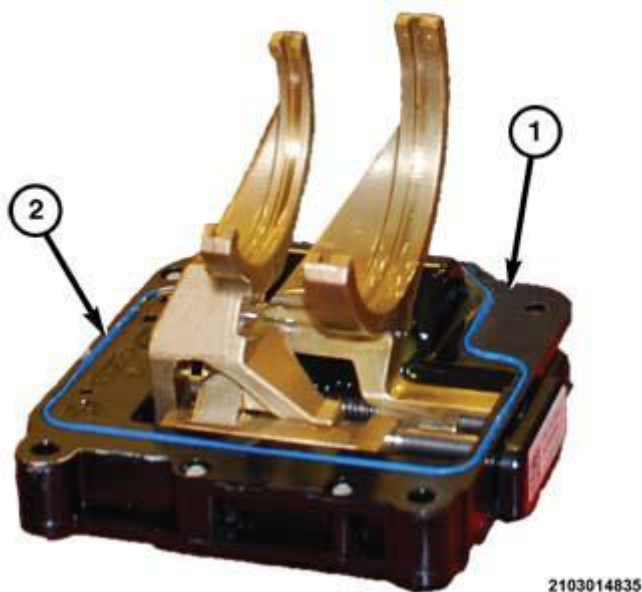


Fig. 39: Locating Gasket At Shift Actuator Sealing Surface Groove
Courtesy of CHRYSLER GROUP, LLC

2. Install a NEW gasket (2) in the groove in the sealing surface of the shaft actuator (1).

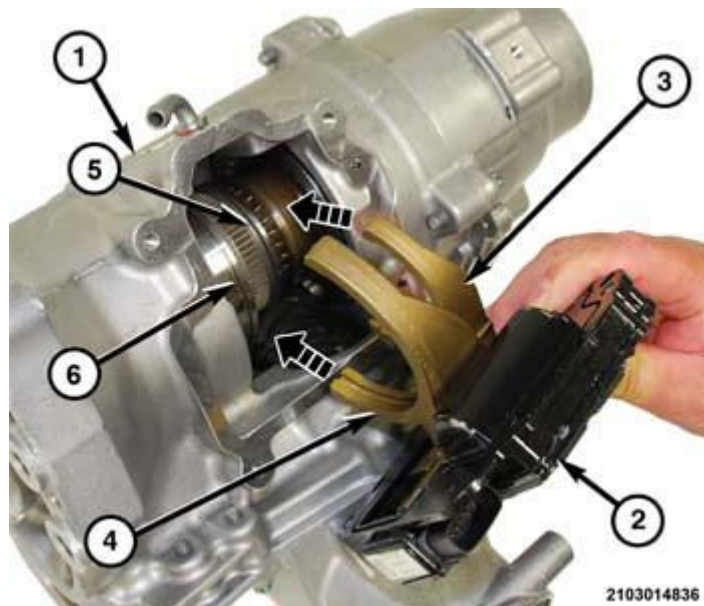


Fig. 40: Actuator, Shift Forks, Shifts Sleeves & PTU
Courtesy of CHRYSLER GROUP, LLC

3. While carefully guiding the shift forks (3 and 4) into the PTU housing, align the grooves in the shift forks (3 and 4) to the rails on the shift sleeves (5 and 6).

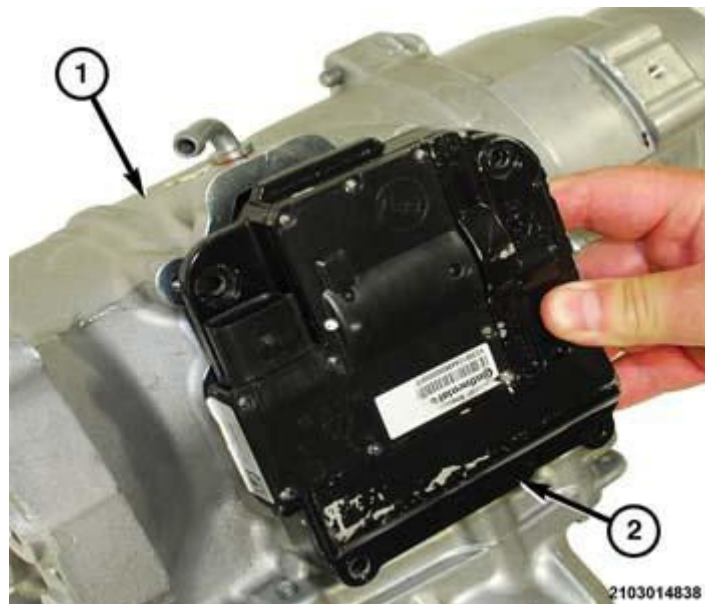


Fig. 41: Removing/Installing Shift Actuator At PTU
Courtesy of CHRYSLER GROUP, LLC

4. Push the actuator (2) downward until the sealing surfaces mate and the locating dowels line up with the PTU (1).
5. If a loom tie was used as a shim, pull the loom tie out from under the actuator.

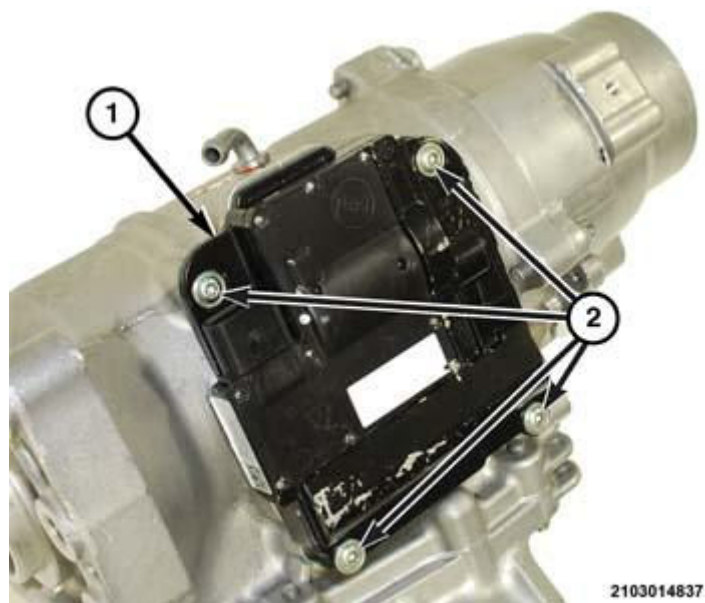


Fig. 42: Shift Actuator & Screws
Courtesy of CHRYSLER GROUP, LLC

NOTE: Do not reuse the actuator mounting screws.

6. Install **new** screws (2) to hold the shift actuator to the PTU housing. Refer to **SPECIFICATIONS**.

NOTE: Prior to fully installing the PTU in vehicle, use the scan tool to actuate the actuator to all positions to verify the shift forks properly engaged the hubs in the PTU. It may be necessary to manually manipulate the output shafts to allow the actuator to engage in all positions.

7. Install the PTU in the vehicle. Refer to **INSTALLATION**.
8. Fill the PTU to the proper level with the specified fluid.
9. Road test the vehicle to verify the repair.

PLUG, RING GEAR SHAFT

REMOVAL

REMOVAL

1. Remove the PTU from the vehicle.
2. Place the PTU on a suitable work surface.

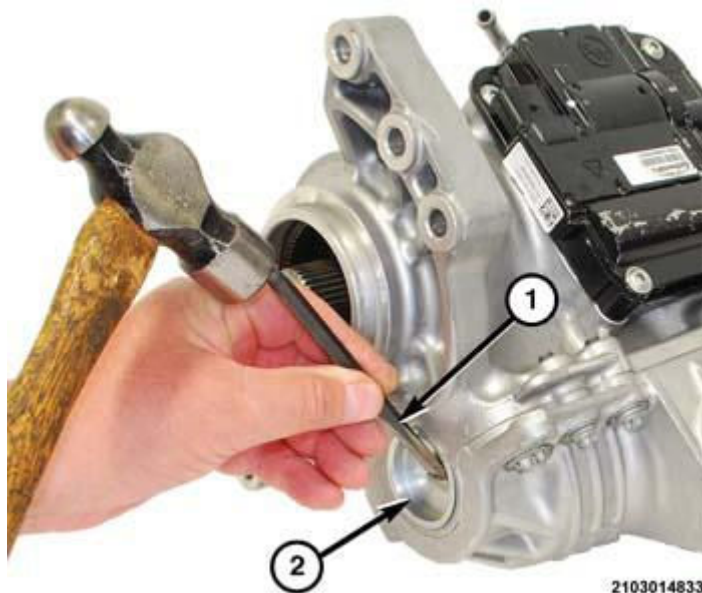


Fig. 43: Piercing Hole In Center Of Plug Using Chisel
Courtesy of CHRYSLER GROUP, LLC

3. Using a suitable sharp chisel (1), pierce a hole in the center of the plug (2).

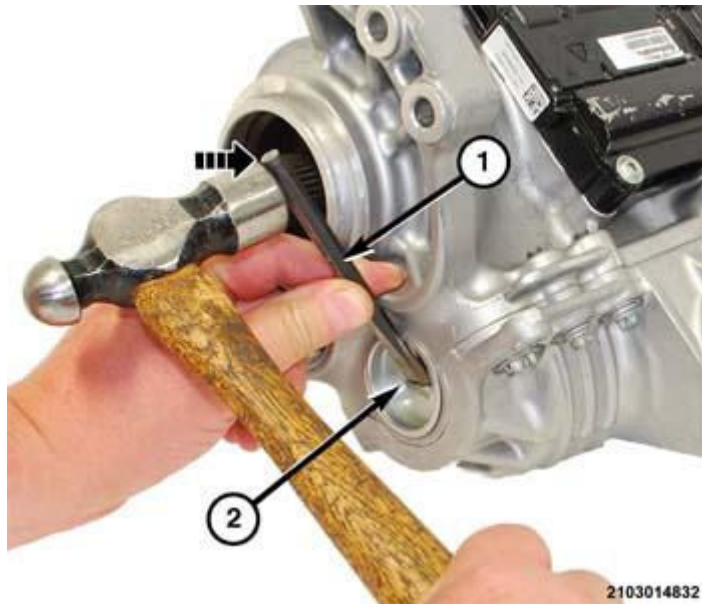


Fig. 44: Driving Chisel Side Ways To Lever Plug Out Of PTU
Courtesy of CHRYSLER GROUP, LLC

4. Drive the chisel (1) side ways to lever the plug (2) out of the PTU.



Fig. 45: Separating Plug From PTU
Courtesy of CHRYSLER GROUP, LLC

5. Separate the plug (1) from the PTU.

INSTALLATION

INSTALLATION

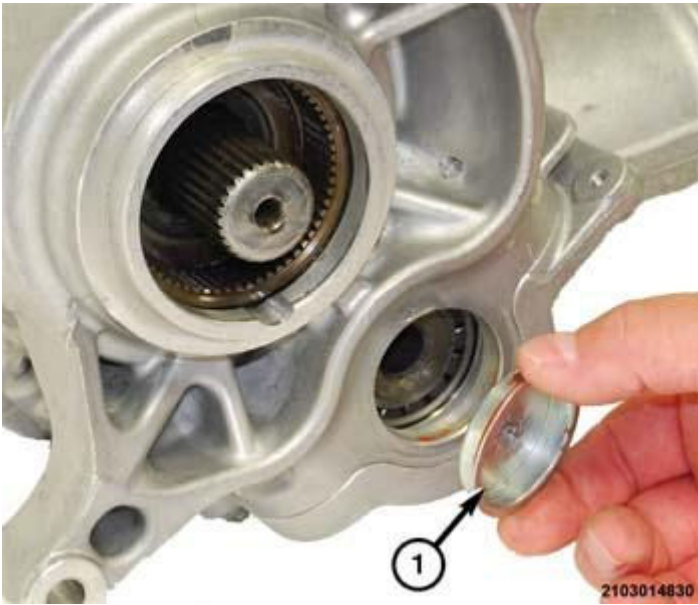


Fig. 46: Placing New Plug Into Hole In PTU
Courtesy of CHRYSLER GROUP, LLC

1. Using the clean lint free cloth, wipe the circumference of the plug hole free of debris and oil.
2. Place a NEW plug into the hole in the PTU.

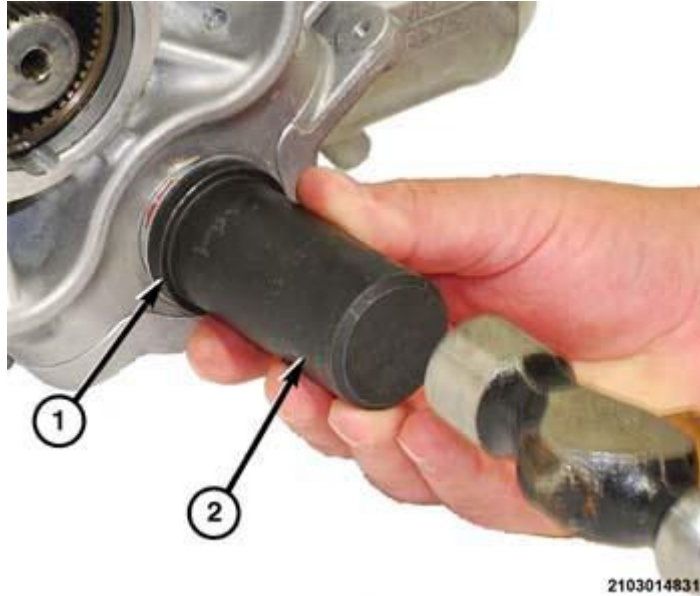


Fig. 47: Driving New Plug Into Hole In PTU
Courtesy of CHRYSLER GROUP, LLC

3. Using tool (special tool #6342, Installer, Seal), drive the new plug into the hole in the PTU until the lip of the plug is flush against the outer surface of the PTU.
4. Install the PTU in the vehicle.

5. Verify that the PTU fluid is at the specified level.
6. Road test the vehicle to verify the repair.

SEAL, AXLE DRIVE SHAFT, OUTER

REMOVAL

REMOVAL

1. Position the vehicle on a suitable hoist with the transaxle in neutral.
2. Place a suitable drain pan under the PTU to catch fluid that may spill when the seal is removed.
3. Remove right halfshaft. Refer to **REMOVAL** .

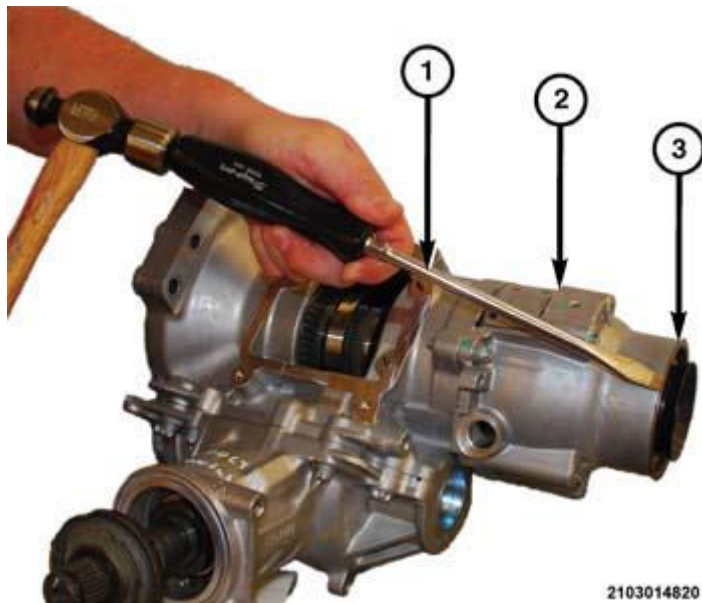


Fig. 48: Removing Output Shaft Seal From PTU Housing
Courtesy of CHRYSLER GROUP, LLC

4. Using a suitable screw driver (1), remove the output shaft seal (3) from the PTU housing (2).

INSTALLATION

INSTALLATION

1. Using a clean lint free cloth, wipe the seal cavity clean of oil and debris.
2. Inspect the seal bore for scratches or cracks. If damage is evident replace the PTU.



Fig. 49: Placing New Lip Seal Into Position On PTU Housing
Courtesy of CHRYSLER GROUP, LLC

3. Place the new lip seal (1) in position on the PTU housing (2).

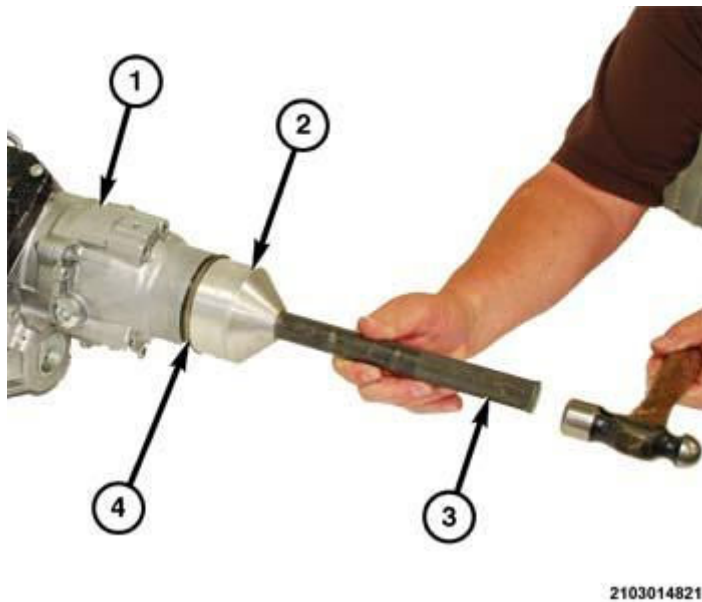


Fig. 50: Installing New Lip Seal Into PTU Housing
Courtesy of CHRYSLER GROUP, LLC

4. Using tool (special tool #9684, Installer, Seal) (2) and (special tool #C-4171, Driver Handle, Universal) (3), install the new seal in the PTU housing (1).
5. Install the right side halfshaft. Refer to **INSTALLATION** .
6. Remove the drain pan from under the vehicle.

7. Fill the PTU with the proper fluid.
8. Lower the vehicle.
9. Road test the vehicle to verify the repair.

SEAL, REAR OUTPUT SHAFT

REMOVAL

ONE SPEED PTU

1. Position the vehicle on a suitable hoist with the transaxle in neutral.
2. Raise the vehicle to gain access to the rear drive shaft. Refer to **HOISTING, STANDARD PROCEDURE** .
3. Remove the rear drive shaft from the vehicle. Refer to **REMOVAL** .

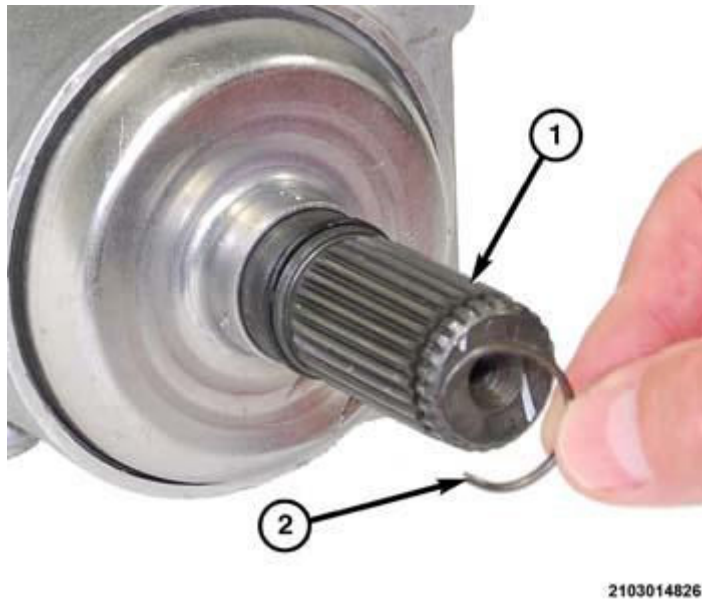


Fig. 51: Removing/Installing Circlip At Rear Output Shaft
Courtesy of CHRYSLER GROUP, LLC

4. Remove the c-clip (2) from the groove in the rear output shaft (1).



Fig. 52: Removing/Installing O-Ring At Rear Output Shaft
Courtesy of CHRYSLER GROUP, LLC

5. Remove the O-ring seal (1) from the groove in the rear output shaft (2).

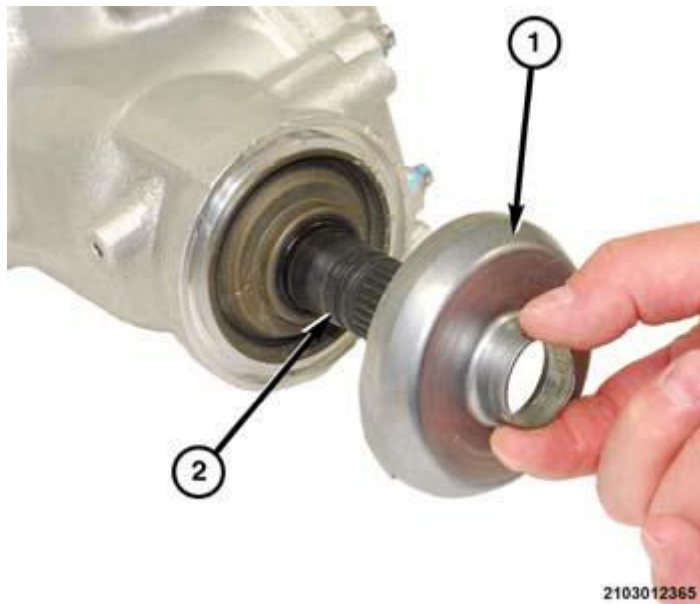


Fig. 53: Dust Deflector & Rear Output Shaft
Courtesy of CHRYSLER GROUP, LLC

6. Using suitable prying tools, pry the dust deflector from the rear output shaft.

NOTE: It may be necessary to punch a hole in the metal deflector to enable removal.

7. Place a suitable drain pan under the PTU output shaft to catch fluid that may spill from PTU when the seal is removed.



Fig. 54: Removing Seal From PTU Housing
Courtesy of CHRYSLER GROUP, LLC

8. Using tool (special tool #9082A, Remover, Bearing), remove the seal from the PTU housing.

NOTE: It may be necessary to squeeze the spring fingers on tool (special tool #9082A, Remover, Bearing) with suitable pliers to lock the jaws into the shoulder on the lip seal.

9. Clean and inspect the sealing surface and the seal bore, if any damage is present, it will be necessary to replace the PTU.

TWO SPEED PTU

1. Position the vehicle on a suitable hoist with the transaxle in neutral.
2. Raise the vehicle to gain access to the rear drive shaft. Refer to **HOISTING, STANDARD PROCEDURE**.
3. Remove the rear drive shaft from the vehicle. Refer to **REMOVAL**.



Fig. 55: Removing/Installing Circlip At Rear Output Shaft
Courtesy of CHRYSLER GROUP, LLC

4. Remove the circlip (2) from the groove in the rear output shaft (1).



Fig. 56: Removing/Installing O-Ring At Rear Output Shaft
Courtesy of CHRYSLER GROUP, LLC

5. Remove the O-ring seal (1) from the groove in the rear output shaft (2).

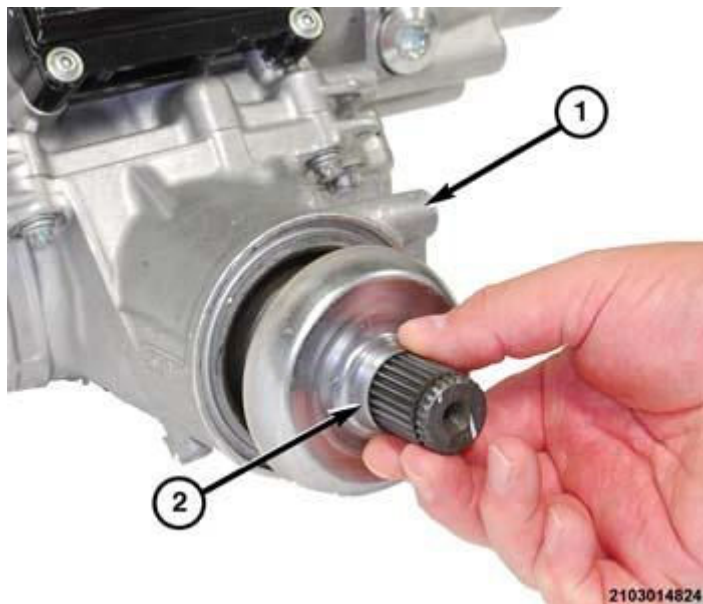


Fig. 57: Dust Deflector & PTU Housing
Courtesy of CHRYSLER GROUP, LLC

6. Using suitable prying tools, pry the dust deflector (2) from the rear output shaft.

NOTE: It may be necessary to punch a hole in the dust deflector to enable removal.

7. Place a suitable drain pan under the PTU output shaft to catch fluid that may spill from PTU when the seal is removed.

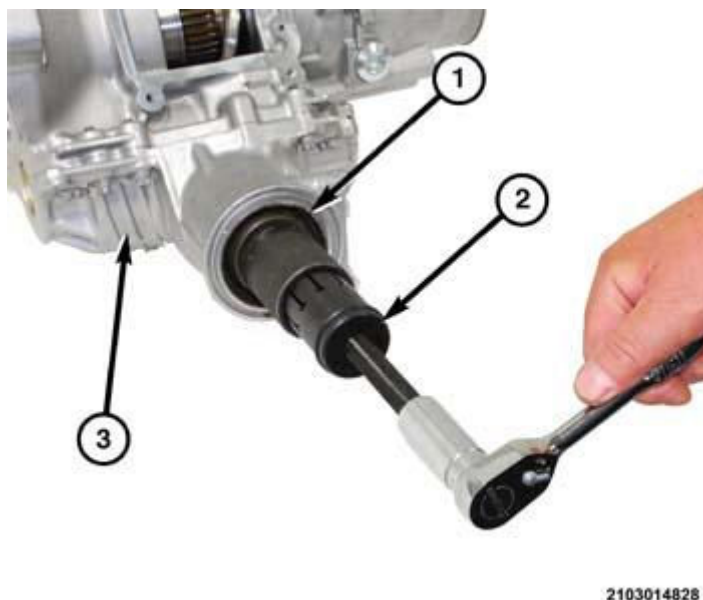


Fig. 58: Removing Seal From PTU Lower Housing
Courtesy of CHRYSLER GROUP, LLC

- Using tool (special tool #9082A, Remover, Bearing) (2), remove the seal (1) from the PTU lower housing (3).

NOTE: It may be necessary to squeeze the spring fingers on tool (special tool #9082A, Remover, Bearing) with suitable pliers to lock the jaws into the shoulder on the lip seal.

- Clean and inspect the sealing surfaces and the seal bore, if any damage is present it will be necessary to replace the PTU.

INSTALLATION

ONE SPEED PTU



Fig. 59: Placing New Seal In Position On PTU Output Shaft
Courtesy of CHRYSLER GROUP, LLC

- Apply assembly lube on the lip of the seal to aid installation onto the output shaft.
- Place the NEW seal (1) in position on the PTU output shaft.



Fig. 60: Installing New Seal Into PTU Housing
Courtesy of CHRYSLER GROUP, LLC

3. Using tool (2) (special tool #10117, Installer, Seal), install the NEW seal (1) into the PTU housing
4. Remove the drain pan from under the PTU output shaft.

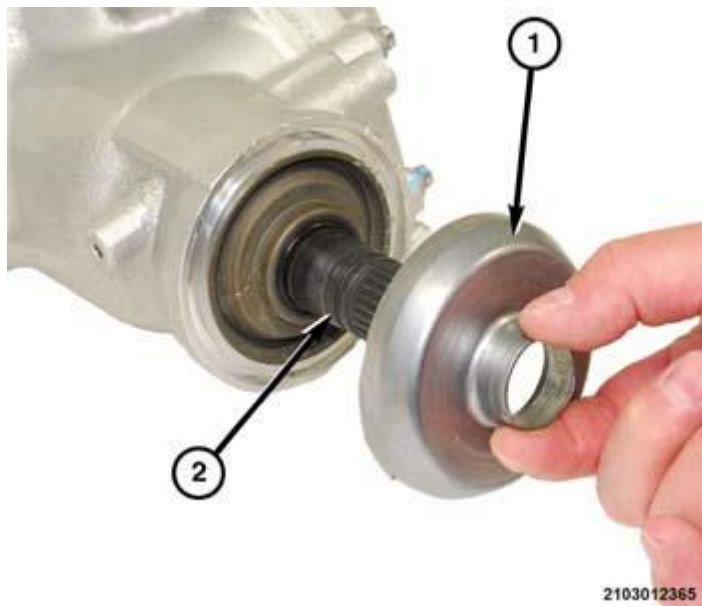


Fig. 61: Dust Deflector & Rear Output Shaft
Courtesy of CHRYSLER GROUP, LLC

5. Place the dust deflector (1) in position on the rear output shaft (2).

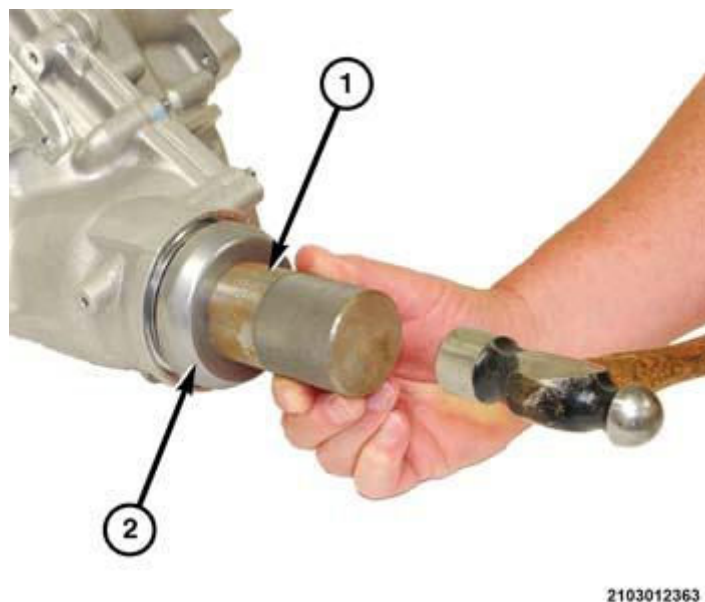


Fig. 62: Installing Dust Deflector
Courtesy of CHRYSLER GROUP, LLC

6. Using tool (special tool #10518, Installer, Oil Slinger) (1), install the dust deflector (2).



Fig. 63: Removing/Installing O-Ring At Rear Output Shaft
Courtesy of CHRYSLER GROUP, LLC

7. Install the O-ring seal (1) in the groove in the rear output shaft (2).

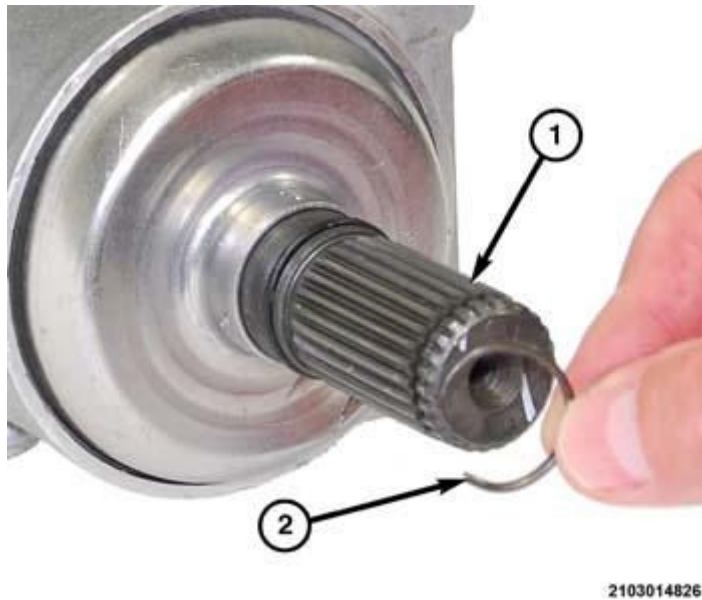


Fig. 64: Removing/Installing Circlip At Rear Output Shaft
Courtesy of CHRYSLER GROUP, LLC

8. Install the circlip (2) in the groove in the rear output shaft (1).
9. Install the rear drive shaft in the vehicle. Refer to **INSTALLATION**.
10. Fill the PTU to the proper level with the Mopar® 75W90 fluid.
11. Lower the vehicle.
12. Road test the vehicle to verify the repair.

TWO SPEED PTU

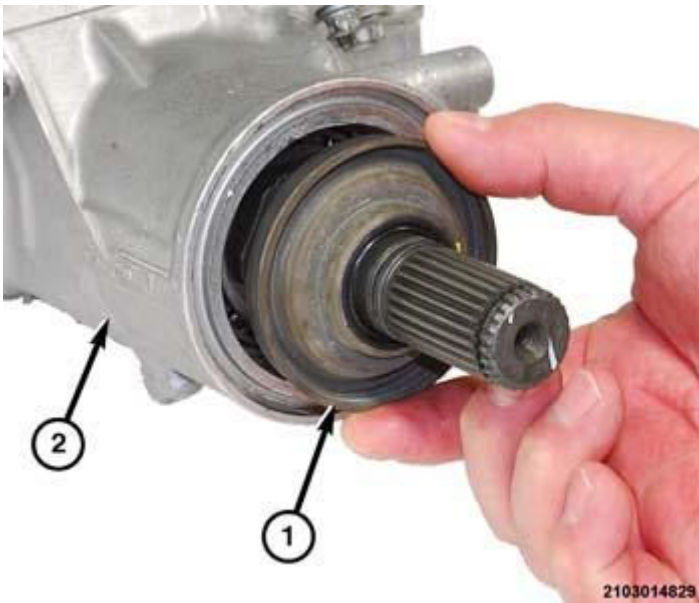


Fig. 65: Placing New Seal In Position On PTU Rear Output Shaft

Courtesy of CHRYSLER GROUP, LLC

1. Apply assembly lube on the lip of the seal to aid installation onto the output shaft.
2. Place the NEW seal (1) in position on the PTU (2) rear output shaft.

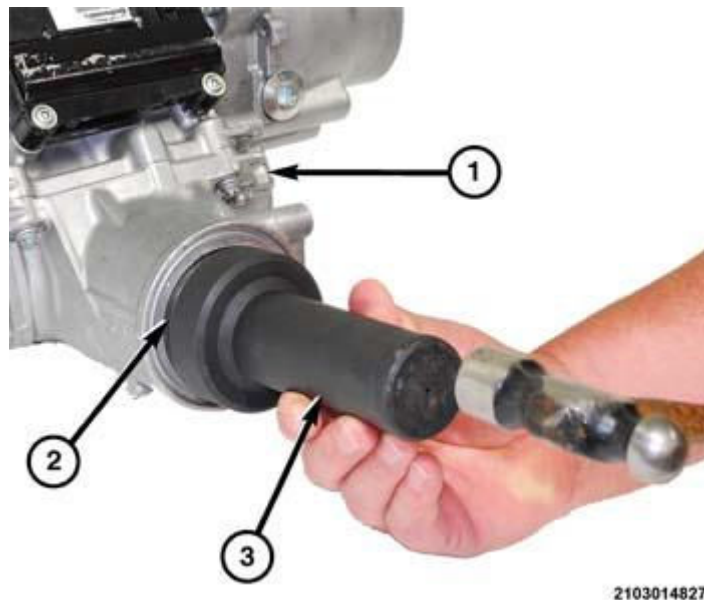


Fig. 66: Installing New Seal Into PTU Lower Housing
Courtesy of CHRYSLER GROUP, LLC

3. Using tool (3) (special tool #10117, Installer, Seal), install the NEW seal (2) into the PTU lower housing (1).
4. Remove the drain pan from under the PTU output shaft.



Fig. 67: Dust Deflector & PTU Housing

Courtesy of CHRYSLER GROUP, LLC

5. Place the dust deflector (2) in position on the rear output shaft (1).

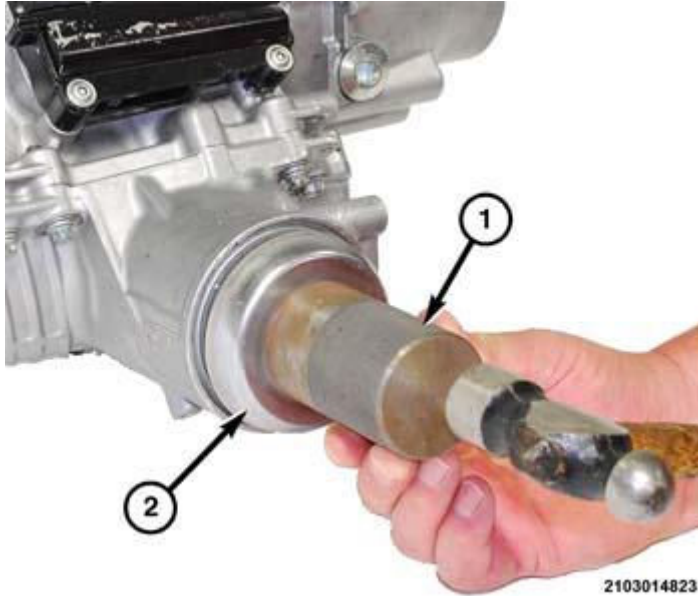


Fig. 68: Installing Dust Deflector
Courtesy of CHRYSLER GROUP, LLC

6. Using tool (special tool #10518, Installer, Oil Slinger) (1), Install the dust deflector (2).



Fig. 69: Removing/Installing O-Ring At Rear Output Shaft
Courtesy of CHRYSLER GROUP, LLC

7. Install the O-ring seal (1) in the groove in the rear output shaft (2).

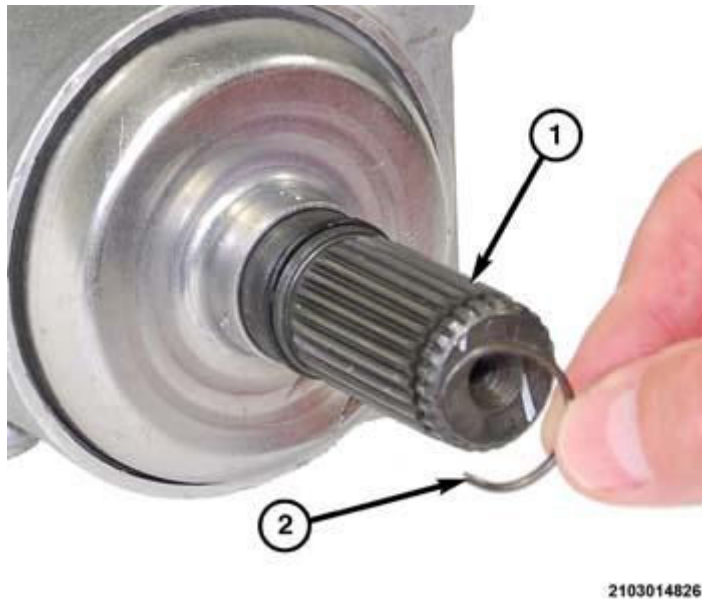


Fig. 70: Removing/Installing Circlip At Rear Output Shaft
Courtesy of CHRYSLER GROUP, LLC

8. Install the Circlip (2) in the groove in the rear output shaft (1).
9. Install the rear drive shaft in the vehicle. Refer to **INSTALLATION** .
10. Fill the PTU to the proper level with the Mopar® 75W90 fluid.
11. Lower the vehicle.
12. Road test the vehicle to verify the repair.

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REMINDER INDICATOR RESET PROCEDURES Jeep - 1988-14

REMINDER INDICATOR RESET PROCEDURES

Jeep - 1988-14

CHANGE OIL/OIL LIFE MONITOR

NOTE: To determine the appropriate reset procedure, refer to CHANGE OIL/OIL LIFE MONITOR RESET INDEX.

CHANGE OIL/OIL LIFE MONITOR RESET INDEX

Model & Year	Reset Procedure
Cherokee	
2014	<u>Change Oil/Oil Life Monitor Reset - Procedure 1</u>
Commander	
2008-10	<u>Change Oil/Oil Life Monitor Reset - Procedure 1</u>
Compass	
2008-14	<u>Change Oil/Oil Life Monitor Reset - Procedure 1</u>
Grand Cherokee	
2008-14	<u>Change Oil/Oil Life Monitor Reset - Procedure 1</u>
Liberty	
2008-12	<u>Change Oil/Oil Life Monitor Reset - Procedure 1</u>
Patriot	
2008-14	<u>Change Oil/Oil Life Monitor Reset - Procedure 1</u>
Wrangler	
2008-14	<u>Change Oil/Oil Life Monitor Reset - Procedure 1</u>

CHANGE OIL/OIL LIFE MONITOR RESET - PROCEDURE 1

1. Turn ignition on, with engine off.

NOTE: On vehicles with Keyless Enter-N-Go™, push the ENGINE START/STOP button and cycle the ignition to the ON/ RUN position.

2. Fully depress the accelerator pedal, slowly, 3 times within 10 seconds.
3. Turn ignition switch to OFF/LOCK position.

NOTE: On vehicles with Keyless Enter-N-Go™, push the ENGINE START/STOP button once to return the ignition to the OFF/LOCK position.

4. If indicator message illuminates when engine is started, repeat the reset procedure.

EMISS MAINT INDICATOR LIGHT

2014 Jeep Cherokee Trailhawk**REMINDER INDICATOR RESET PROCEDURES Jeep - 1988-14**

NOTE: To determine the appropriate reset procedure, refer to **EMISS MAINT INDICATOR LIGHT RESET INDEX**.

EMISS MAINT INDICATOR LIGHT RESET INDEX

Model & Year	Reset Procedure
Cherokee	
1988-90	<u>Emiss Maint Indicator Light Reset - Procedure 1</u>
Comanche	
1988-90	<u>Emiss Maint Indicator Light Reset - Procedure 1</u>
Wagoneer	
1988-90	<u>Emiss Maint Indicator Light Reset - Procedure 1</u>
Wrangler	
1988-90	<u>Emiss Maint Indicator Light Reset - Procedure 1</u>

EMISS MAINT INDICATOR LIGHT RESET - PROCEDURE 1

1. Vehicles are equipped with a EMISS MAINT indicator light on the instrument cluster. This light will come on one time at 82,500 miles to alert driver that emission service is required. At this time, oxygen sensor and PCV valve must be replaced and all other emission components should be inspected, and serviced or replaced as necessary.
2. The Service Reminder Indicator (SRI) timer is located under dash, near accelerator pedal or to right of steering column. Timer cannot be reset. To turn off light, timer must be replaced or disconnected. Since timer and sensor are interdependent, if timer should fail prematurely, oxygen sensor should be replaced at same time to preserve correct replacement interval.
3. To replace timer on Cherokee, Comanche and Wagoneer models, remove cruise control module (if equipped). Remove timer mounting screws. Disconnect electrical connector. On Wrangler models, remove timer mounting screws. Disconnect electrical connector. To install, reverse removal procedure.

MAINT REQD INDICATOR LIGHT

NOTE: To determine the appropriate reset procedure, refer to **MAINT REQD INDICATOR LIGHT RESET INDEX**.

MAINT REQD INDICATOR LIGHT RESET INDEX

Model & Year	Reset Procedure
Cherokee	
1991-92	<u>Maint Reqd Indicator Light Reset - Procedure 1</u>
Comanche	
1991-92	<u>Maint Reqd Indicator Light Reset - Procedure 1</u>
Grand Cherokee	
1993	<u>Maint Reqd Indicator Light Reset - Procedure 1</u>
Wrangler	

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REMINDER INDICATOR RESET PROCEDURES Jeep - 1988-14

1991-92

Maint Req'd Indicator Light Reset - Procedure 1

MAINT REQD INDICATOR LIGHT RESET - PROCEDURE 1

Vehicles may be equipped with a MAINT REQD on the instrument cluster. This light will come on one time at 82,500 miles to alert driver that emission service is required. At this time, oxygen sensor must be replaced and all other emission components should be inspected, and serviced or replaced as necessary. Chrysler's Diagnostic Readout Box (DRB-II) tester is required to reset the service reminder indicator system.

Using DRB-II tester, access SELECT SYSTEMS. Select appropriate engine. Select with or without A/C. Select FUEL & IGNITION. Select ADJUSTMENTS. Select RESET SRI LIGHT. Reset SRI light. When DRB-II is finished resetting light, DRB-II display will read SRI LIGHT IS RESET.

PERFORM SERVICE MESSAGE

NOTE: To determine the appropriate reset procedure, refer to **PERFORM SERVICE MESSAGE RESET INDEX**.

PERFORM SERVICE MESSAGE RESET INDEX

Model & Year	Reset Procedure
Grand Cherokee	
1994-98	<u>Perform Service Message Reset - Procedure 1</u>
1999-07	<u>Perform Service Message Reset - Procedure 2</u>
Liberty	
2003-07	<u>Perform Service Message Reset - Procedure 2</u>

PERFORM SERVICE MESSAGE RESET - PROCEDURE 1

This vehicle may be equipped with an optional Vehicle Information Center (VIC). A PERFORM SERVICE message is displayed when "miles/kms to service" is zero, indicating that regular service and maintenance is due. To reset counter, turn ignition on, then press SELECT button momentarily, then press and hold SET button for at least 2 seconds.

PERFORM SERVICE MESSAGE RESET - PROCEDURE 2

1. The Electronic Vehicle Information Center (EVIC) displays a PERFORM SERVICE message when distance to service interval has been reached, indicating that regular service and maintenance is due. After performing necessary services, reset service distance by selecting a distance to service interval.
2. To program EVIC, turn ignition switch to ON position. Depress and release MENU push button until SERVICE INTV. = is displayed. Press and release STEP button to step through available options. The last selected distance option displayed becomes the service interval at which the PERFORM SERVICE message will be displayed.
3. If a new distance interval is selected, RESET SERVICE DISTANCE? with a yes or no option. When YES is selected, the accumulated distance since the last previous PERFORM SERVICE message will be

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REMINDER INDICATOR RESET PROCEDURES Jeep - 1988-14

reset to zero because the service interval has been changed. When NO is selected, the distance until the next PERFORM SERVICE message is reduced by the accumulated distance since the last previous message.

4. EVIC exits programming mode and returns to its normal operation mode when the C/T button is depressed or when the end of the programmable feature menu list is reached, whichever occurs first.

TIRE PRESSURE MONITOR SYSTEM (TPMS)

NOTE: To determine the appropriate reset procedure, refer to TPMS RESET INDEX.

TPMS RESET INDEX

Model & Year	Reset Procedure
Cherokee	
2014	<u>TPMS Reset - Procedure 1</u>
Commander	
2006-10	<u>TPMS Reset - Procedure 1</u>
Compass	
2007-14	<u>TPMS Reset - Procedure 1</u>
Grand Cherokee	
2002-04	<u>TPMS Reset - Procedure 2</u>
2005-14	<u>TPMS Reset - Procedure 1</u>
Liberty	
2002-04	<u>TPMS Reset - Procedure 2</u>
2005-12	<u>TPMS Reset - Procedure 1</u>
Patriot	
2007-14	<u>TPMS Reset - Procedure 1</u>
Wrangler	
2007-14	<u>TPMS Reset - Procedure 1</u>

TPMS RESET - PROCEDURE 1

NOTE: There is no formal retraining procedure necessary. Each sensor transmits tire pressure data approximately once every minute. Each sensor's (transmitter) broadcast is uniquely coded so that the WCM can monitor the state of each of the sensors on the 4 rotating road wheels. The WCM automatically learns and stores the sensor's ID while driving after a sensor has been replaced.

Once the vehicle has remained stationary for more than 20 minutes, drive vehicle for a minimum of 10 minutes while maintaining a continuous speed above 15 mph (24 km/h). During this time, the system will learn the new sensor ID.

TPMS RESET - PROCEDURE 2

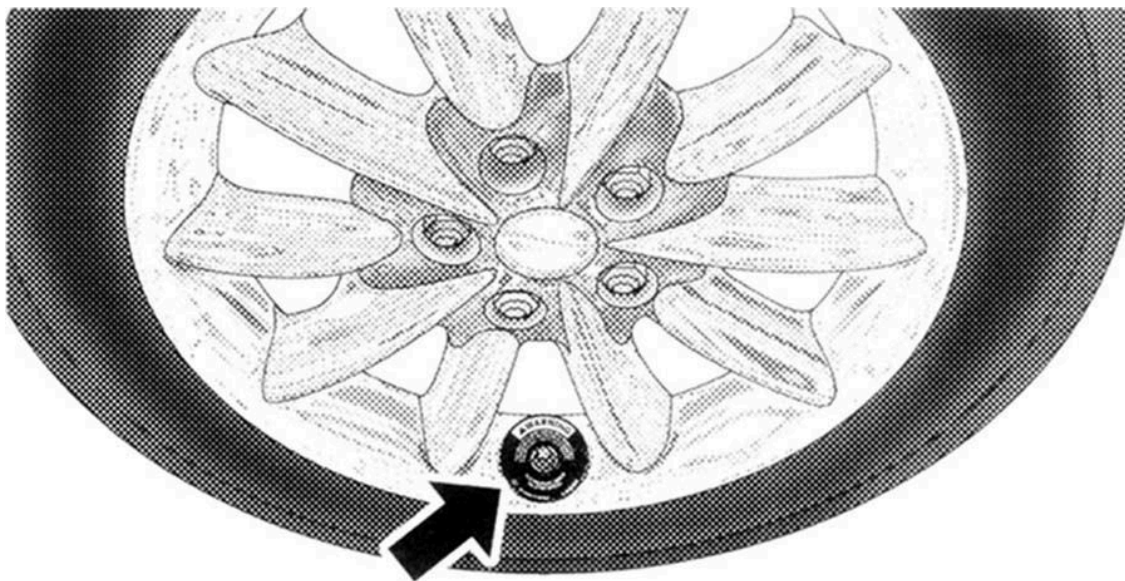
NOTE: Use the following procedure to retrain all 4 road wheel tire pressure sensors. No attempt should be made to retrain individual sensors.

1. Retrieve Relearn Magnet (8821).
2. Press MENU Button on EVIC until "RETRAIN TIRE SENSORS - NO" is displayed.
3. Press STEP button to select "YES".

NOTE: There is a 60-second timer for training the first sensor, and a 30-second timer between training the remaining sensors. If either of these timers expire, the EVIC will abort the training procedure.

NOTE: If at any time the EVIC display reads "TRAINING ABORTED", move the vehicle ahead at least one foot and repeat the entire retraining procedure.

4. Press MENU button to start retraining. Display will read "TRAIN LEFT FRONT TIRE". The order for retraining all 5 sensors is:
 - Left Front.
 - Right Front.
 - Right Rear.
 - Left Rear.
 - Spare (if so equipped).
5. Starting at left front tire, place relearn magnet over valve stem. See **Fig. 1**. Within approximately 5 seconds, vehicle horn will chirp indicating training complete at that particular sensor. Remove the magnet.
6. Repeat this step on remaining sensors as indicated by EVIC until all TPM sensors positions are trained.
7. Once EVIC displays "TRAINING COMPLETE", pressing either STEP, C/T, RESET or MENU button will exit training routine.



Relearn Magnet

G00170162

Fig. 1: Placing Training Magnet Around Valve Stem

Courtesy of DAIMLERCHRYSLER CORPORATION