

AUDIO

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AUDIO

DESCRIPTION

An audio system is standard factory-installed equipment on this model. Several combinations of radio receivers and speaker systems are offered on this model. The audio system uses an ignition switched source of battery current so that the system will only operate when the ignition switch is in the RUN or ACCESSORY positions.

The audio system includes the following components:

- Amplifier choke and relay
- Antenna
- Compact disc changer (if equipped)
- Power amplifier mounted to each front door speaker (with premium speaker system only)
 - Radio noise suppression components
 - Radio receiver
 - Remote radio switches (if equipped)
 - Speakers

Certain functions and features of the audio system rely upon resources shared with other electronic modules in the vehicle over the Programmable Communication Interface (PCI) bus network. The data bus network allows the sharing of sensor information. For diagnosis of these electronic modules or of the data bus network, the use of a DRB scan tool and the proper Diagnostic Procedures manual are recommended.

Refer to the appropriate wiring information for complete standard and premium audio system circuit diagrams. The wiring information includes 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

The audio system components are designed to provide audio entertainment and information through the reception, tuning and amplification of locally broadcast radio signals in both the Amplitude Modu-

AUDIO (Continued)

lating (AM) and Frequency Modulating (FM) commercial frequency ranges.

The audio system components operate on battery current received through a fuse in the Junction Block (JB) on a fused ignition switch output (run-acc) circuit so that the system will only operate when the ignition switch is in the Run or Accessory positions.

On vehicles that are equipped with the optional remote radio switches, the Body Control Module (BCM) receives hard wired resistor multiplexed inputs from the remote radio switches. The programming in the BCM allows it to process those inputs and send the proper messages to the radio receiver over the Programmable Communication Interface (PCI) bus network to control the radio volume up or down, station seek up or down, preset station advance, and mode advance functions.

Refer to the owner's manual for more information on the features, use and operation of each of the available audio systems.

DIAGNOSIS AND TESTING - AUDIO

Any diagnosis of the Audio system should begin with the use of the DRB diagnostic tool.

For information on the use of the DRB, refer to the appropriate Diagnostic Service Manual.

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.

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 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 TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

AUDIO SYSTEM DIAGNOSIS TABLE

CONDITION	POSSIBLE CAUSES	CORRECTION
NO AUDIO	1. Fuse faulty.	1. Check radio fuse and Ignition-Off Draw (IOD) fuse in Junction Block (JB). Replace fuses, if required.
	2. Radio connector faulty.	2. Check for loose or corroded radio connector. Repair, if required.
	3. Wiring faulty.	3. Check for shorted or open wires. Repair wiring, if required.
	4. Radio ground faulty.	4. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.
	5. Radio faulty.	5. Refer to appropriate Diagnostic Service Manual.
	6. Speakers faulty.	6. Replace speaker as necessary.
NO RADIO DISPLAY	1. Fuse faulty.	1. Check radio fuse and Ignition-Off Draw (IOD) fuse in Junction Block (JB). Replace fuses, if required.
	2. Radio connector faulty.	2. Check for loose or corroded radio connector. Repair, if required.
	3. Wiring faulty.	3. Check for battery voltage at radio connector. Repair wiring, if required.
	4. Radio ground faulty.	4. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.

AUDIO (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
	5. Radio faulty.	5. Refer to appropriate Diagnostic Service Manual.
CLOCK WILL NOT KEEP SET TIME	1. Fuse faulty.	1. Check Ignition-Off Draw (IOD) fuse in the Junction Block (JB). Replace fuse, if required.
	2. Radio connector faulty.	2. Check for loose or corroded radio connector. Repair, if required.
	3. Wiring faulty.	3. Check for battery voltage at radio connector. Repair wiring, if required.
	4. Radio ground faulty.	4. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.
	5. Radio faulty.	5. Refer to appropriate Diagnostic Service Manual.
POOR RADIO RECEPTION	1. Antenna faulty.	1. (Refer to 8 - ELECTRICAL/AUDIO/ANTENNA BODY & CABLE - DIAGNOSIS AND TESTING).
	2. Radio ground faulty.	2. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.
	3. Radio noise suppression faulty.	3. Repair or replace ground strap as necessary.
	4. Radio faulty.	4. Refer to appropriate Diagnostic Service Manual.
NO/POOR TAPE OPERATION	1. Faulty tape.	1. Insert known good tape and test operation.
	2. Foreign objects behind tape door.	2. Remove foreign objects and test operation.
	3. Dirty cassette tape head.	3. Clean head with Mopar Cassette Head Cleaner.
	4. Faulty tape deck.	4. Exchange or replace radio, if required.
NO COMPACT DISC OPERATION	1. Faulty CD.	1. Insert known good CD and test operation.
	2. Foreign material on CD.	2. Clean CD and test operation.
	3. Condensation on CD or optics.	3. Allow temperature of vehicle interior to stabilize and test operation.
	4. Faulty CD player.	4. Refer to appropriate Diagnostic Service Manual.

AMPLIFIER CHOKE AND RELAY

DESCRIPTION

Models equipped with the premium speaker package have a amplifier choke and relay. The amplifier choke and relay is mounted to the lower instrument panel above the accelerator pedal.

The amplifier choke and relay should be checked if there is no sound output from the speakers. The amplifier choke and relay can not be repaired or adjusted and, if faulty or damaged, the unit must be replaced.

OPERATION

The amplifier choke and relay is used to control the supply of fused battery current to the front door speaker-mounted dual amplifiers. The speaker relay is energized by a fused 12 volt output from the radio receiver whenever the radio is turned on. For complete circuit diagrams, 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.

AMPLIFIER CHOKE AND RELAY (Continued)

DIAGNOSIS AND TESTING - AMPLIFIER CHOKE AND RELAY

Any diagnosis of the Audio system should begin with the use of the DRB diagnostic tool. For information on the use of the DRB, refer to the appropriate Diagnostic Service Manual.

The amplifier choke and relay is used to switch power to the individual speaker amplifiers used with the premium speaker package. The amplifier choke and relay is serviced only as a unit. If all of the speakers are inoperative the amplifier choke and relay should be inspected. Before replacement, make the following inspections of the amplifier choke and relay circuits. For complete circuit diagrams, 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 fused B(+) fuse in the junction block. If OK, go to Step 2. If not OK, replace the faulty fuse.

(2) Check for battery voltage at the fused B(+) fuse in the junction block. If OK, go to Step 3. If not OK, repair the open fused B(+) circuit to the battery as required.

(3) Disconnect the instrument panel wire harness connector from the amplifier choke and relay. Check for battery voltage at the fused B(+) circuit cavity of the instrument panel wire harness connector for the amplifier choke and relay. If OK, go to Step 4. If not OK, repair the open fused B(+) circuit to the junction block fuse as required.

(4) Probe the ground circuit cavity of the instrument panel wire harness connector for the amplifier choke and relay. Check for continuity to a good ground. There should be continuity. If OK, go to Step 5. If not OK, repair the open ground circuit to ground as required.

(5) Turn the ignition switch to the RUN position and turn the radio ON. Check for battery voltage at the radio 12-volt output circuit cavity of the instrument panel wire harness connector for the amplifier choke and relay. If OK, go to Step 6. If not OK, repair the open radio 12-volt output circuit to the radio as required.

(6) Turn the radio and ignition switches to the OFF position. Reconnect the instrument panel wire harness connector to the amplifier choke and relay. Check for battery voltage at the amplified speaker (+) circuit cavity of the instrument panel wire harness connector for the amplifier choke and relay. There should be zero volts. Turn the ignition and radio switches to the ON position. There should now be battery voltage. If OK, repair the open amplified speaker (+) circuits to the speaker-mounted ampli-

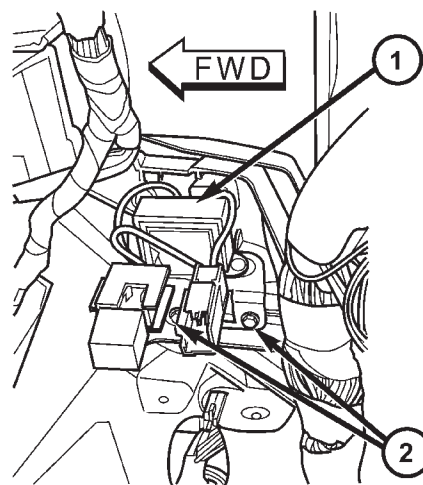
ers as required. If not OK, replace the faulty amplifier choke and relay.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove knee blocker cover and knee blocker.

(3) Disconnect the electrical harness connector from the amplifier choke and relay (Fig. 1).



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Fig. 1 RADIO CHOKE

- 1 - RADIO CHOKE
- 2 - MOUNTING SCREWS

(4) Remove mounting screws and amplifier choke and relay.

INSTALLATION

(1) Install the amplifier choke and relay.

(2) Install the mounting screws.

(3) Connect the electrical harness connector.

(4) Install knee blocker cover and knee blocker.

(5) Connect the battery negative cable.

ANTENNA BODY & CABLE**DESCRIPTION**

The antenna body and cable is secured below the fender panel by the antenna cap nut through a mounting hole in the side of the right front fender. The primary coaxial antenna cable is then routed beneath the fender sheet metal and through a entry hole in the right cowl side panel into the interior of the vehicle. Inside the vehicle, the primary coaxial cable is connected to a secondary instrument panel antenna coaxial cable with an in-line connector that is located behind the right kick panel. The secondary coaxial cable is then routed behind the instrument panel to the back of the radio.

ANTENNA BODY & CABLE (Continued)

OPERATION

The antenna body and cable connects the antenna mast to the radio. The radio antenna is an electromagnetic circuit component used to capture radio frequency signals that are broadcast by local commercial radio stations in both the Amplitude Modulating (AM) and Frequency Modulating (FM) frequency ranges. These electromagnetic radio frequency signals induce small electrical modulations into the antenna as they move past the mast. The antenna body transfers the weak electromagnetic radio waves induced into the rigid antenna mast into the center conductor of the flexible primary antenna coaxial cable. The braided outer shield of the antenna coaxial cable is grounded through both the antenna body and the radio chassis, effectively shielding the radio waves as they are conducted to the radio. The radio then tunes and amplifies the weak radio signals into stronger electrical signals in order to operate the audio system speakers.

DIAGNOSIS AND TESTING - ANTENNA BODY AND CABLE

The following four tests are used to diagnose the antenna with an ohmmeter:

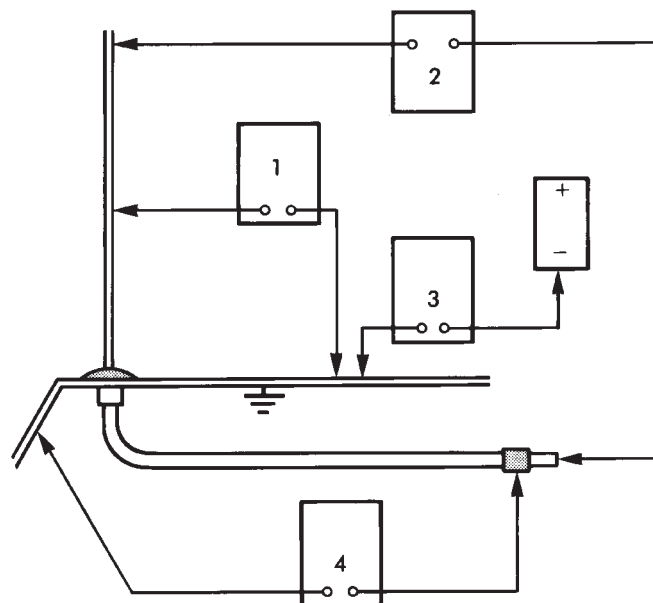
- **Test 1** - Mast to ground test
- **Test 2** - Tip-of-mast to tip-of-conductor test
- **Test 3** - Body ground to battery ground test
- **Test 4** - Body ground to antenna coaxial cable shield test.

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The ohmmeter test lead connections for each test are shown in the illustration (Fig. 2).

NOTE: This model has a two-piece antenna coaxial cable. Tests 2 and 4 must be conducted in two steps to isolate an antenna cable problem. First, test the primary antenna cable (integral to the antenna body and cable) from the coaxial cable connector behind the right side kick panel to the antenna body. Then, test the secondary antenna

cable (instrument panel antenna cable) from the coaxial cable connector behind the right side kick panel to the coaxial cable connector at the radio.



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Fig. 2 Antenna Tests - Typical

TEST 1

Test 1 determines if the antenna mast is insulated from ground. Proceed as follows:

(1) Disconnect and isolate the antenna coaxial cable connector behind the right side kick panel.

(2) Touch one ohmmeter test lead to the tip of the antenna mast. Touch the other test lead to known ground. Check the ohmmeter reading for continuity.

(3) There should be no continuity. If OK, go to Test 2. If not OK, replace the faulty antenna body and cable.

TEST 2

Test 2 checks the antenna conductor components for an open circuit. This test should be performed first on the entire antenna circuit, from the antenna mast to the center conductor of the coaxial cable connector at the radio. If an open circuit is detected, each of the three antenna conductor components (antenna mast, antenna body and cable, instrument panel antenna cable) should be isolated and tested individually to locate the exact component that is the source of the open circuit. To begin this test, proceed as follows:

(1) Disconnect the instrument panel antenna cable coaxial connector from the back of the radio.

(2) Touch one ohmmeter test lead to the tip of the antenna mast. Touch the other test lead to the center conductor pin of the instrument panel antenna cable coaxial connector for the radio. Check the ohmmeter reading for continuity.

ANTENNA BODY & CABLE (Continued)

(3) There should be continuity. The ohmmeter should register only a fraction of an ohm resistance. High or infinite resistance indicates a damaged or open antenna conductor. If OK, go to Test 3. If not OK, isolate and test each of the individual antenna conductor components. Replace only the faulty antenna conductor component.

TEST 3

Test 3 checks the condition of the vehicle body ground connection. To begin this test, proceed as follows:

(1) This test must be performed with the battery positive cable disconnected from the battery. Disconnect and isolate both battery cables, negative cable first.

(2) Reconnect the battery negative cable.

(3) Touch one ohmmeter test lead to a good clean ground point on the vehicle fender. Touch the other test lead to the battery negative terminal post. Check the ohmmeter reading for continuity.

(4) There should be continuity. The ohmmeter should register less than one ohm resistance. High or infinite resistance indicates a loose, corroded, or damaged connection between the battery negative terminal and the vehicle body. If OK, go to Test 4. If not OK, check the battery negative cable connection to the vehicle body and the radio noise suppression ground strap connections to the engine and the vehicle body for being loose or corroded. Clean or tighten these connections as required.

TEST 4

Test 4 checks the condition of the connection between the antenna coaxial cable shield and the vehicle body ground as follows:

(1) Disconnect and isolate the antenna coaxial cable connector behind the right side kick panel.

(2) Touch one ohmmeter test lead to a good clean ground point on the vehicle fender. Touch the other test lead to the outer crimp on the antenna coaxial cable connector. Check the ohmmeter reading for continuity.

(3) There should be continuity. The ohmmeter should register less than one ohm resistance. High or infinite resistance indicates a loose, corroded, or damaged connection between the antenna body and the vehicle body or between the antenna body and the antenna coaxial cable shield. If not OK, clean the antenna body to fender mating surfaces and tighten the antenna cap nut to specifications.

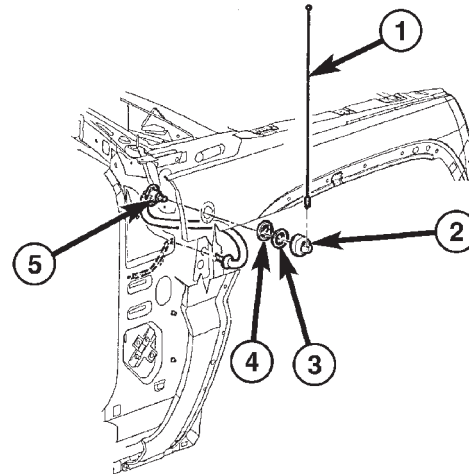
(4) Check the resistance again with an ohmmeter. If the resistance is still more than one ohm, replace the faulty antenna body and cable.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the antenna mast.

(3) Remove cover (Fig. 3).



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Fig. 3 ANTENNA BODY AND CABLE

- 1 - ANTENNA MAST
- 2 - ANTENNA COVER
- 3 - ANTENNA BASE MOUNTING NUT
- 4 - ANTENNA BEZEL ADAPTER
- 5 - ANTENNA BODY AND CABLE

(4) Remove mounting nut.

(5) Remove bezel adapter.

(6) Remove right kick panel trim.

(7) Disconnect antenna body and cable from the instrument panel cable. Attach a wire or string (approximately 2 feet in length) to the cable to aid in installation of the new cable.

(8) Remove the upper fender mounting bolts. Loosen the two fender mounting bolts located near the upper door hinge (Refer to 23 - BODY/EXTERIOR/FRONT FENDER - REMOVAL).

(9) Carefully pull fender out to access the antenna body and cable. Pull cable up through the opening with wire attached.

INSTALLATION

(1) Attached wire to new cable. Pull fender out and insert cable into opening.

(2) Pull cable through hole in kick panel area using the attached wire.

(3) Connect antenna body cable to the instrument panel cable.

(4) Install right kick panel trim.

(5) Install bezel adapter.

(6) Install mounting nut. Tighten to 12 N·m (105 in. lbs.).

(7) Install cover.

ANTENNA BODY & CABLE (Continued)

- (8) Install antenna mast.
- (9) Tighten fender mounting bolts near door hinge area.
- (10) Install and tighten the upper fender mounting bolts (Refer to 23 - BODY/EXTERIOR/FRONT FENDER - INSTALLATION).
- (11) Connect the battery negative cable.

CD CHANGER

DESCRIPTION

A factory-installed Compact Disc (CD) changer featuring a six-CD magazine is an available option on this model. The CD changer is mounted in the cargo area of the passenger compartment on the right rear quarter panel.

The controls on the radio receiver operate the CD changer through messages sent over the Programmable Communications Interface (PCI) data bus network. For diagnosis of the messaging functions of the radio receiver and the CD changer, or of the PCI data bus, a DRB scan tool and the proper Diagnostic Procedures manual are required.

The CD changer can only be serviced by an authorized radio repair station. See the latest Warranty Policies and Procedures manual for a current listing of authorized radio repair stations. 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.

OPERATION

The CD changer will only operate when the ignition switch is in the On or Accessory positions, and the radio is turned on. The six-CD magazine may be ejected with the ignition in the Off position. For more information on the features, loading procedures and radio control functions for the operation of the CD changer, refer to the owner's manual.

REMOVAL

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the right rear quarter trim panel. (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - REMOVAL).
- (3) Disconnect the electrical wire harness connector (Fig. 4).
- (4) Remove the mounting nuts.
- (5) Remove the CD Changer from the vehicle.

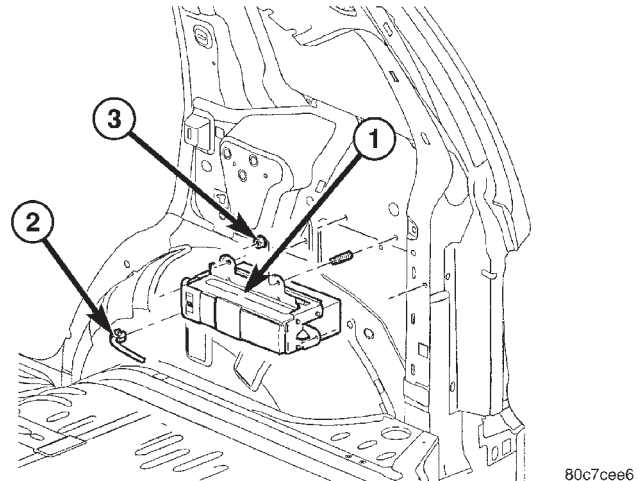


Fig. 4 CD CHANGER

- 1 - CD CHANGER
- 2 - WIRE HARNESS CONNECTOR
- 3 - MOUNTING NUT

INSTALLATION

- (1) Install the CD Changer to the vehicle.
- (2) Install the mounting nuts. Tighten to 11.8 N·m (104 in. lbs.).
- (3) Connect the wire harness connector.
- (4) Install the right rear quarter trim panel (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - INSTALLATION).
- (5) Connect the battery negative cable.

INSTRUMENT PANEL ANTENNA CABLE

REMOVAL

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- (1) Disconnect and isolate the battery negative cable.

INSTRUMENT PANEL ANTENNA CABLE (Continued)

(2) Remove the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - REMOVAL).

(3) Disconnect the antenna cable from radio by pulling the locking antenna connector away from radio (Fig. 5).

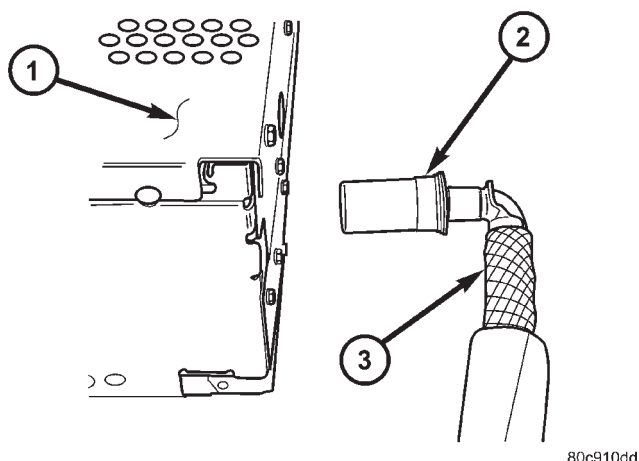


Fig. 5 ANTENNA TO RADIO

- 1 - RADIO
- 2 - LOCKING ANTENNA CONNECTOR
- 3 - INSTRUMENT PANEL ANTENNA CABLE

(4) Disengage each of the retainers that secure the cable to the instrument panel (Fig. 6).

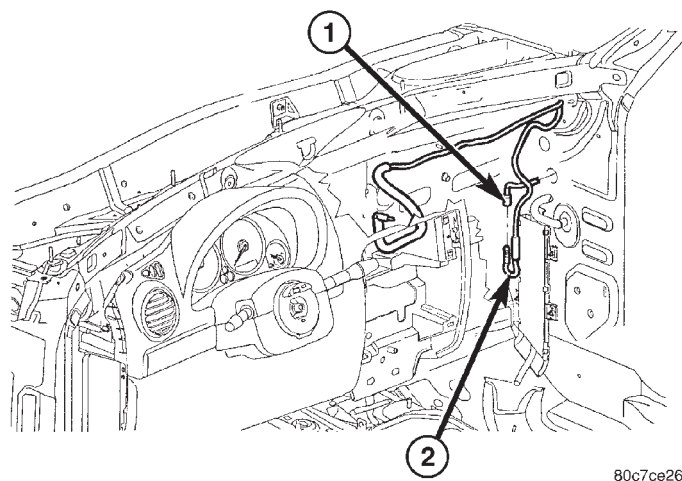


Fig. 6 INSTRUMENT PANEL ANTENNA CABLE

- 1 - INSTRUMENT PANEL ANTENNA CABLE
- 2 - ANTENNA BODY AND CABLE

(5) Remove the cable from the instrument panel.

INSTALLATION

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL,

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(1) Position the instrument panel antenna cable onto the instrument panel.

(2) Engage each of the retainers that secure the cable to the back side of the instrument panel.

(3) Connect cable to radio.

(4) Install instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).

(5) Connect the battery negative cable.

RADIO

DESCRIPTION

Available factory-installed radio receivers for this model include an AM/FM/cassette with CD changer control feature (RBB sales code), an AM/FM/cassette/CD/graphic equalizer with CD changer control feature (RBP sales code), or an AM/FM/CD/ with CD changer control feature (RBK sales code). All factory-installed radio receivers can communicate on the Programmable Communications Interface (PCI) data bus network. All factory-installed receivers are stereo Electronically Tuned Radios (ETR) and include an electronic digital clock function.

These radio receivers can only be serviced by an authorized radio repair station. See the latest Warranty Policies and Procedures manual for a current listing of authorized radio repair stations.

OPERATION

The radio receiver operates on ignition switched battery current that is available only when the ignition switch is in the On or Accessory positions. The electronic digital clock function of the radio operates on fused battery current supplied through the IOD fuse, regardless of the ignition switch position.

For more information on the features, setting procedures, and control functions for each of the available factory-installed radio receivers, refer to the owner's manual. For complete circuit diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire har-

RADIO (Continued)

ness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

REMOVAL

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the instrument panel center trim panel.
- (3) Remove the radio mounting screws (Fig. 7).

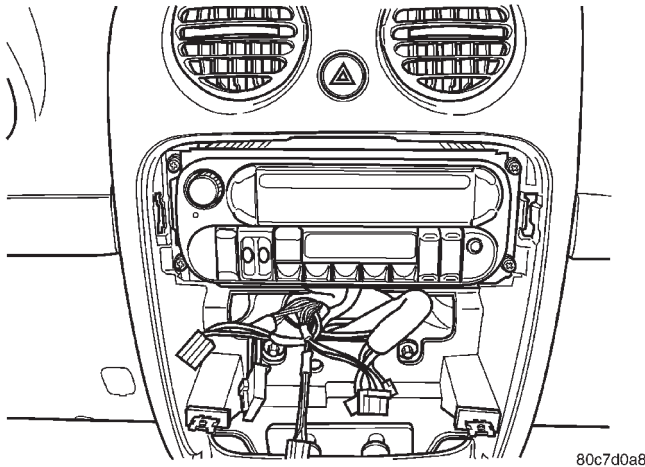


Fig. 7 RADIO

- (4) Disconnect the antenna cable by pulling the locking antenna connector away from the radio (Fig. 8).

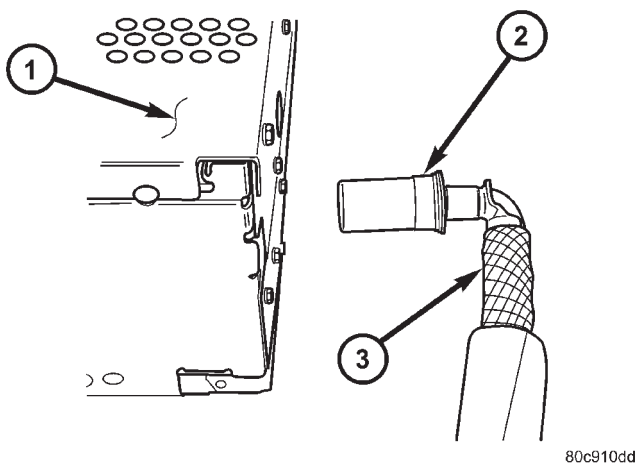


Fig. 8 ANTENNA TO RADIO

- 1 - RADIO
- 2 - LOCKING ANTENNA CONNECTOR
- 3 - INSTRUMENT PANEL ANTENNA CABLE

- (5) Disconnect the electrical harness connector(s).
- (6) Remove radio from instrument panel.

INSTALLATION

- (1) Connect the wire harness connector(s).
- (2) Connect the antenna cable.
- (3) Install the radio to the instrument panel.
- (4) Install the radio mounting screws.
- (5) Install the instrument panel center trim panel.
- (6) Connect the battery negative cable.

RADIO NOISE SUPPRESSION
GROUND STRAP

DESCRIPTION

Radio noise suppression devices are factory-installed standard equipment on this vehicle. Radio Frequency Interference (RFI) and ElectroMagnetic Interference (EMI) can be produced by any on-board or external source of electromagnetic energy. These electromagnetic energy sources can radiate electromagnetic signals through the air, or conduct them through the vehicle electrical system.

When the audio system converts RFI or EMI to an audible acoustic wave form, it is referred to as radio noise. This undesirable radio noise is generally manifested in the form of "buzzing," "hissing," "popping," "clicking," "crackling," and/or "whirring" sounds. In most cases, RFI and EMI radio noise can be suppressed using a combination of vehicle and component grounding, filtering and shielding techniques. This vehicle is equipped with factory-installed radio noise suppression devices that were designed to minimize exposure to typical sources of RFI and EMI; thereby, minimizing radio noise complaints.

Factory-installed radio noise suppression is accomplished primarily through circuitry or devices that are integral to the factory-installed radios, audio power amplifiers and other on-board electrical components such as generators, wiper motors, blower motors, and fuel pumps that have been found to be potential sources of RFI or EMI. External radio noise suppression devices that are used on this vehicle to control RFI or EMI, and can be serviced, include the following:

- **Engine-to-body ground strap** - This length of braided ground strap has an eyelet terminal connector crimped to each end. One end is secured to the engine cylinder head(s). The other is secured to the plenum.

- **Resistor-type spark plugs** - This type of spark plug has an internal resistor connected in series between the spark plug terminal and the center electrode to help reduce the production of electromagnetic radiation that can result in radio noise.

RADIO NOISE SUPPRESSION GROUND STRAP (Continued)

OPERATION

There are two common strategies that can be used to suppress Radio Frequency Interference (RFI) and ElectroMagnetic Interference (EMI) radio noise. The first suppression strategy involves preventing the production of RFI and EMI electromagnetic signals at their sources. The second suppression strategy involves preventing the reception of RFI and EMI electromagnetic signals by the audio system components.

The use of braided ground straps in key locations is part of the RFI and EMI prevention strategy. These ground straps ensure adequate ground paths, particularly for high current components such as many of those found in the starting, charging, ignition, engine control and transmission control systems. An insufficient ground path for any of these high current components may result in radio noise caused by induced voltages created as the high current seeks alternative ground paths through components or circuits intended for use by, or in close proximity to the audio system components or circuits.

Preventing the reception of RFI and EMI is accomplished by ensuring that the audio system components are correctly installed in the vehicle. Loose, corroded or improperly soldered wire harness connections, improperly routed wiring and inadequate audio system component grounding can all contribute to the reception of RFI and EMI. A properly grounded antenna body and radio chassis, as well as a shielded antenna coaxial cable with clean and tight connections will each help reduce the potential for reception of RFI and EMI.

REMOVAL

2.4L ENGINE

(1) Disconnect and isolate the battery negative cable.

(2) Remove the retaining bolt from the engine cylinder head (Fig. 9).

(3) Remove the retaining nut from the plenum (Fig. 10).

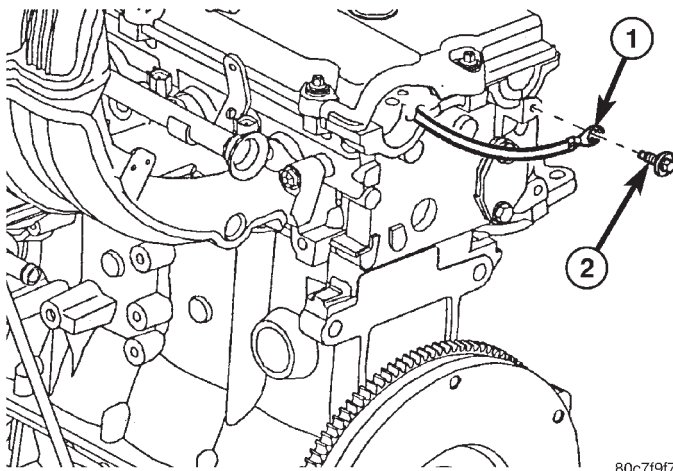


Fig. 9 GROUND STRAP TO ENGINE - 2.4L

- 1 - GROUND STRAP
2 - BOLT

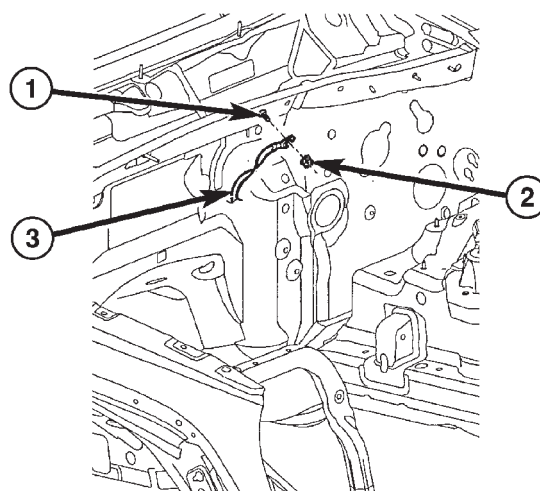


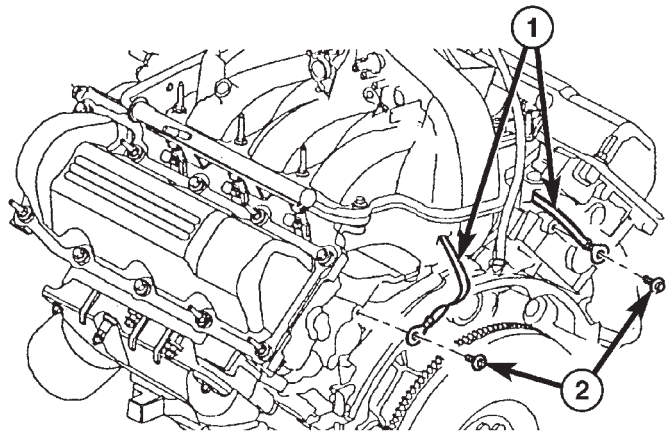
Fig. 10 GROUND STRAP TO PLENUM - 2.4L

- 1 - PLENUM
2 - RETAINING NUT
3 - GROUND STRAP

RADIO NOISE SUPPRESSION GROUND STRAP (Continued)

3.7L ENGINE

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the retaining bolts from the engine cylinder heads (Fig. 11).

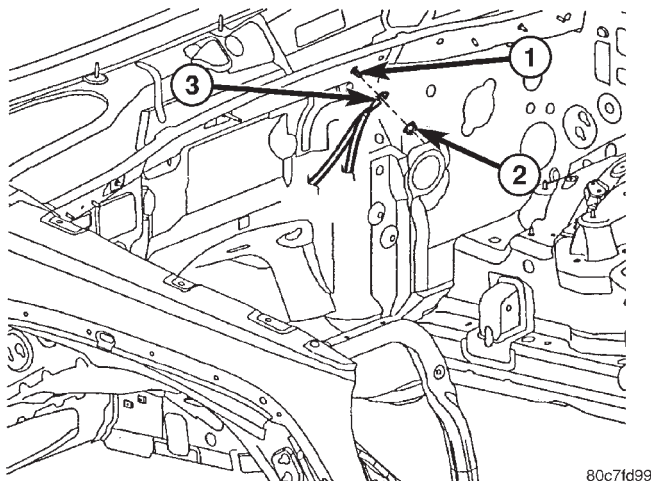


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Fig. 11 GROUND STRAP TO ENGINE - 3.7L

- 1 - GROUND STRAP
- 2 - RETAINING BOLTS

- (3) Remove the retaining nut from the plenum (Fig. 12).



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Fig. 12 GROUND STRAP TO PLENUM - 3.7L

- 1 - PLENUM
- 2 - RETAINING NUT
- 3 - GROUND STRAP

INSTALLATION

2.4L ENGINE

- (1) Install the retaining nut and ground strap to the plenum. Tighten to 12 N·m (106 in. lbs.).

- (2) Install the retaining bolt and ground strap to the engine cylinder head. Tighten to 12 N·m (106 in. lbs.).

- (3) Connect the battery negative cable.

3.7L ENGINE

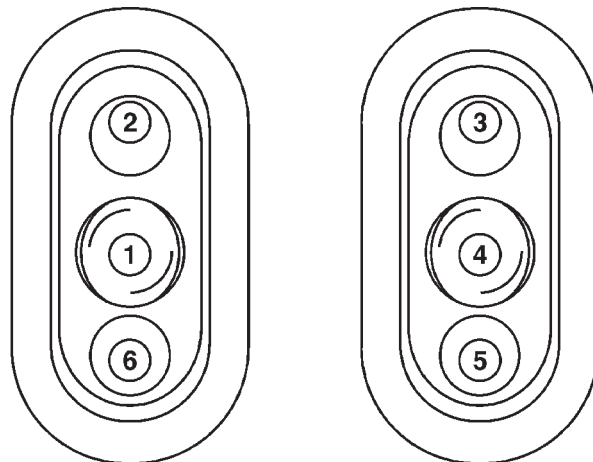
- (1) Install the retaining nut and ground strap to the plenum. Tighten to 12 N·m (106 in. lbs.).

- (2) Install the retaining bolts and ground strap to the engine cylinder heads. Tighten to 12 N·m (106 in. lbs.).

- (3) Connect the battery negative cable.

REMOTE SWITCHES

DESCRIPTION



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Fig. 13 Remote Radio Switch Operational View

- 1 - PRESET SEEK
- 2 - SEEK UP
- 3 - VOLUME UP
- 4 - MODE
- 5 - VOLUME DOWN
- 6 - SEEK DOWN

A remote radio control switch option is available on some models. Two rocker-type switches are mounted on the back (instrument panel side) of the steering wheel spokes (Fig. 13). The switch on the left spoke is the seek switch and has seek up, seek down, and preset station advance functions. The switch on the right spoke is the volume control switch and has volume up, and volume down functions. The switch on the right spoke also includes a "mode" control that allows the driver to sequentially select AM radio, FM radio, cassette player, CD player or CD changer (if equipped).

REMOTE SWITCHES (Continued)

OPERATION

The six switches in the two remote radio switch units are normally open, resistor multiplexed momentary switches that are hard wired to the Body Control Module (BCM) through the clockspring. The BCM sends a five volt reference signal to both switch units on one circuit, and senses the status of all of the switches by reading the voltage drop on a second circuit.

When the BCM senses an input (voltage drop) from any one of the remote radio switches, it sends the proper switch status messages on the Programmable Communication Interface (PCI) data bus network to the radio receiver. The electronic circuitry within the radio receiver is programmed to respond to these remote radio switch status messages by adjusting the radio settings as requested. For diagnosis of the BCM or the PCI data bus, the use of a DRB scan tool and the proper Diagnostic Procedures manual are recommended.

For more information on the features and control functions for each of the remote radio switches, refer to the owner's manual.

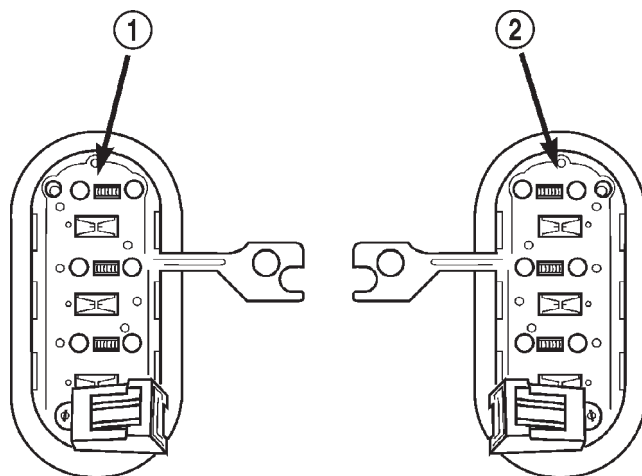
DIAGNOSIS AND TESTING - REMOTE SWITCHES

Any diagnosis of the Audio system should begin with the use of the DRB diagnostic tool. For information on the use of the DRB, refer to the appropriate Diagnostic Service Manual.

For complete circuit diagrams, 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.

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 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 TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable. Remove the remote radio switch(es) (Fig. 14) from the steering wheel (Refer to 8 - ELECTRICAL/AUDIO/REMOTE SWITCHES - REMOVAL).



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Fig. 14 Remote Radio Switches

1 - BLACK (LEFT) SWITCH

2 - WHITE (RIGHT) SWITCH

(2) Use an ohmmeter to check the switch resistances as shown in the Remote Radio Switch Test chart. If the remote radio switch resistances check OK, go to Step 3. If not OK, replace the faulty switch.

REMOTE RADIO SWITCH TEST TABLE

Switch	Switch Position	Resistance
Right (White)	Volume Up	1.210 Kilohms $\pm$ 1%
Right (White)	Volume Down	3.010 Kilohms $\pm$ 1%
Right (White)	Mode Advance	0.0511 Kilohms $\pm$ 1%
Left (Black)	Seek Up	0.261 Kilohms $\pm$ 1%
Left (Black)	Seek Down	0.681 Kilohms $\pm$ 1%
Left (Black)	Pre-Set Station Advance	0.162 Kilohms $\pm$ 1%

(3) Reconnect the battery negative cable. Turn the ignition switch to the On position. Check for 5 volts at the radio control mux circuit cavities of the steering wheel wire harness connectors for both remote radio switches. If OK, go to Step 4. If not OK, repair the open or shorted radio control mux circuit to the Body Control Module (BCM) as required.

(4) Disconnect and isolate the battery negative cable. Disconnect the 22-way instrument panel wire harness connector from the BCM. Check for continuity between the remote radio switch ground circuit cavities of the steering wheel wire harness connectors for both remote radio switches and a good

REMOTE SWITCHES (Continued)

ground. There should be no continuity. If OK, go to Step 5. If not OK, repair the shorted remote radio switch ground circuit to the BCM as required.

(5) Check for continuity between the remote radio switch ground circuit cavities of the steering wheel wire harness connectors for both remote radio switches and the 22-way instrument panel wire harness connector for the BCM. There should be continuity. If OK, refer to the proper Diagnostic Procedures manual to test the BCM and the PCI data bus. If not OK, repair the open remote radio switch ground circuit as required.

REMOVAL

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 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 TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the driver side airbag module from the vehicle (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).

(3) Remove the cruise control switches (Fig. 15).

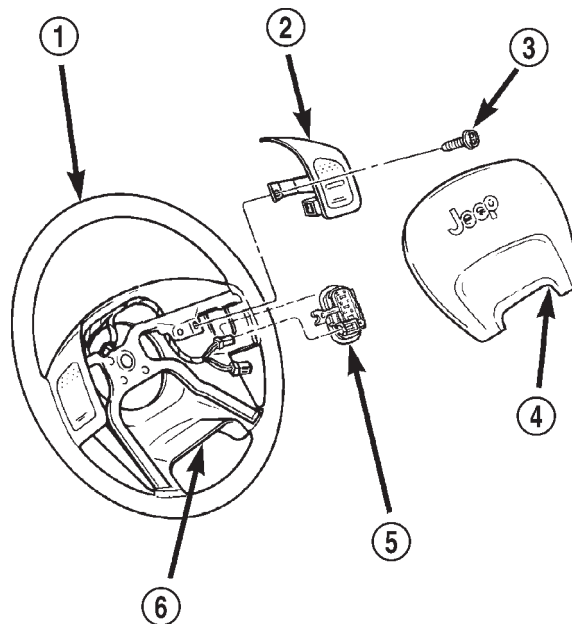
(4) Unplug the wire harness connector from the remote radio switch(es).

(5) Depress the tabs on each side of each switch and push the switch through the rear steering wheel cover.

INSTALLATION

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 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 TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Install remote radio switch to the steering wheel.



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Fig. 15 REMOTE SWITCH

- 1 - STEERING WHEEL
- 2 - SPEED CONTROL SWITCH
- 3 - SCREW
- 4 - DRIVER SIDE AIRBAG MODULE
- 5 - REMOTE RADIO SWITCH
- 6 - REAR TRIM COVER

(2) Connect the wire harness to the remote radio switch.

(3) Install the cruise control switches.

(4) Install the driver side airbag module (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - INSTALLATION).

(5) Connect the battery negative cable.

SPEAKER

DESCRIPTION

STANDARD

The standard equipment speaker system includes speakers in six locations. One 6.4 centimeter (2.50 inch) diameter speaker is installed on each end of the instrument panel top pad. One 16.5 centimeter (6.5 inch) full-range speaker is located in each front door. There is also one full-range 16.5 centimeter (6.5 inch) diameter full-range speaker located in each rear door.

PREMIUM

The optional premium speaker system features six Premium model speakers in six locations. Each of the standard speakers is replaced with Premium model speakers. One 6.4 centimeter (2.50 inch) diameter

SPEAKER (Continued)

speaker is installed on each end of the instrument panel top pad. One 16.5 centimeter (6.5 inch) Premium woofer is located in each front door. There is also one full-range 16.5 centimeter (6.5 inch) diameter Premium full-range speaker located in each rear door. The premium speaker system also includes a power amplifier mounted to each front door speaker. The total available power of the premium speaker system is about 160 watts.

OPERATION

Two wires connected to each speaker, one feed circuit (+) and one return circuit (-), allow the audio output signal electrical current to flow through the voice coil. For complete circuit diagrams, 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.

REMOVAL

FRONT DOOR

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the front door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).
- (3) Remove the speaker mounting screws (Fig. 16).
- (4) Remove the speaker from the door and disconnect the wire harness connector.

INSTRUMENT PANEL

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the A-pillar trim (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - REMOVAL).
- (3) Remove instrument panel top cover (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - REMOVAL).
- (4) Remove speaker mounting screws (Fig. 17).
- (5) Remove speaker and disconnect the wire harness connector.

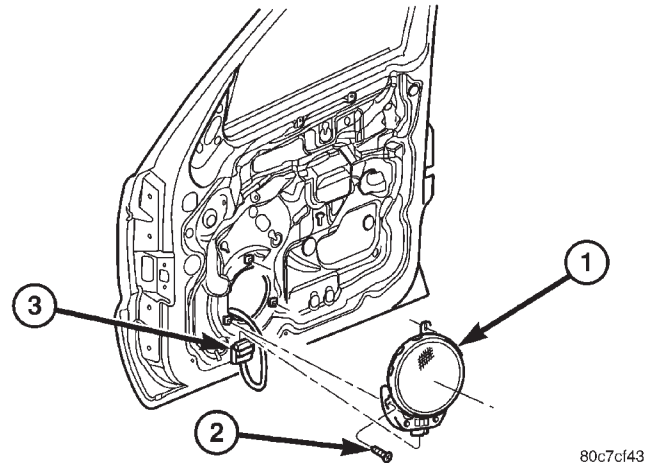


Fig. 16 FRONT DOOR SPEAKER

- 1 - FRONT DOOR SPEAKER
2 - MOUNTING SCREW
3 - WIRE HARNESS CONNECTOR

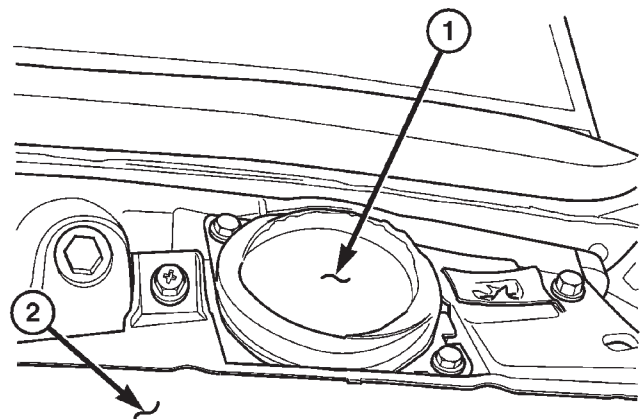


Fig. 17 INSTRUMENT PANEL SPEAKER

- 1 - INSTRUMENT PANEL SPEAKER
2 - INSTRUMENT PANEL

SPEAKER (Continued)**REAR DOOR**

(1) Disconnect and isolate the battery negative cable.

(2) Remove the rear door trim panel (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL).

(3) Remove the speaker mounting screws (Fig. 18).

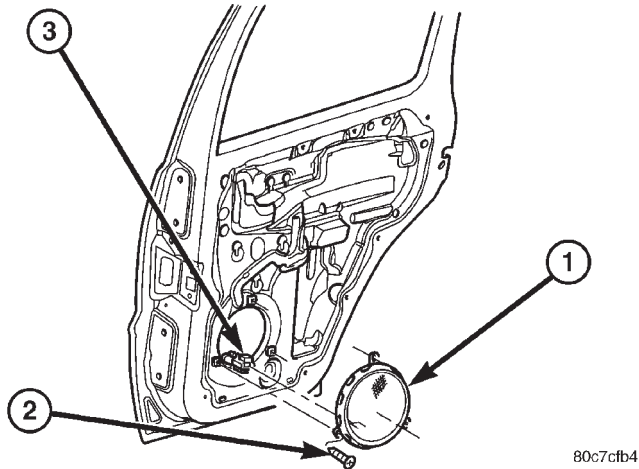


Fig. 18 REAR DOOR SPEAKER

- 1 - REAR DOOR SPEAKER
- 2 - MOUNTING SCREW
- 3 - WIRE HARNESS CONNECTOR

(4) Remove the speaker from the door and disconnect the wire harness connector.

INSTALLATION**FRONT DOOR**

(1) Connect the wire harness connector and install the speaker to the door.

(2) Install the speaker mounting screws. Tighten to 2 N·m (20 in. lbs.).

(3) Install the front door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

(4) Connect the battery negative cable.

INSTRUMENT PANEL

(1) Connect wire harness connector and install speaker.

(2) Install speaker mounting screws. Tighten to 2 N·m (20 in. lbs.).

(3) Install instrument panel top cover (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - INSTALLATION).

(4) Install the A-pillar trim (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - INSTALLATION).

(5) Connect the battery negative cable.

REAR DOOR

(1) Connect the wire harness connector and install the speaker to the door.

(2) Install the speaker mounting screws. Tighten to 2 N·m (20 in. lbs.).

(3) Install the rear door trim panel (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).

(4) Connect the battery negative cable.

CHIME/BUZZER

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CHIME WARNING SYSTEM

DESCRIPTION

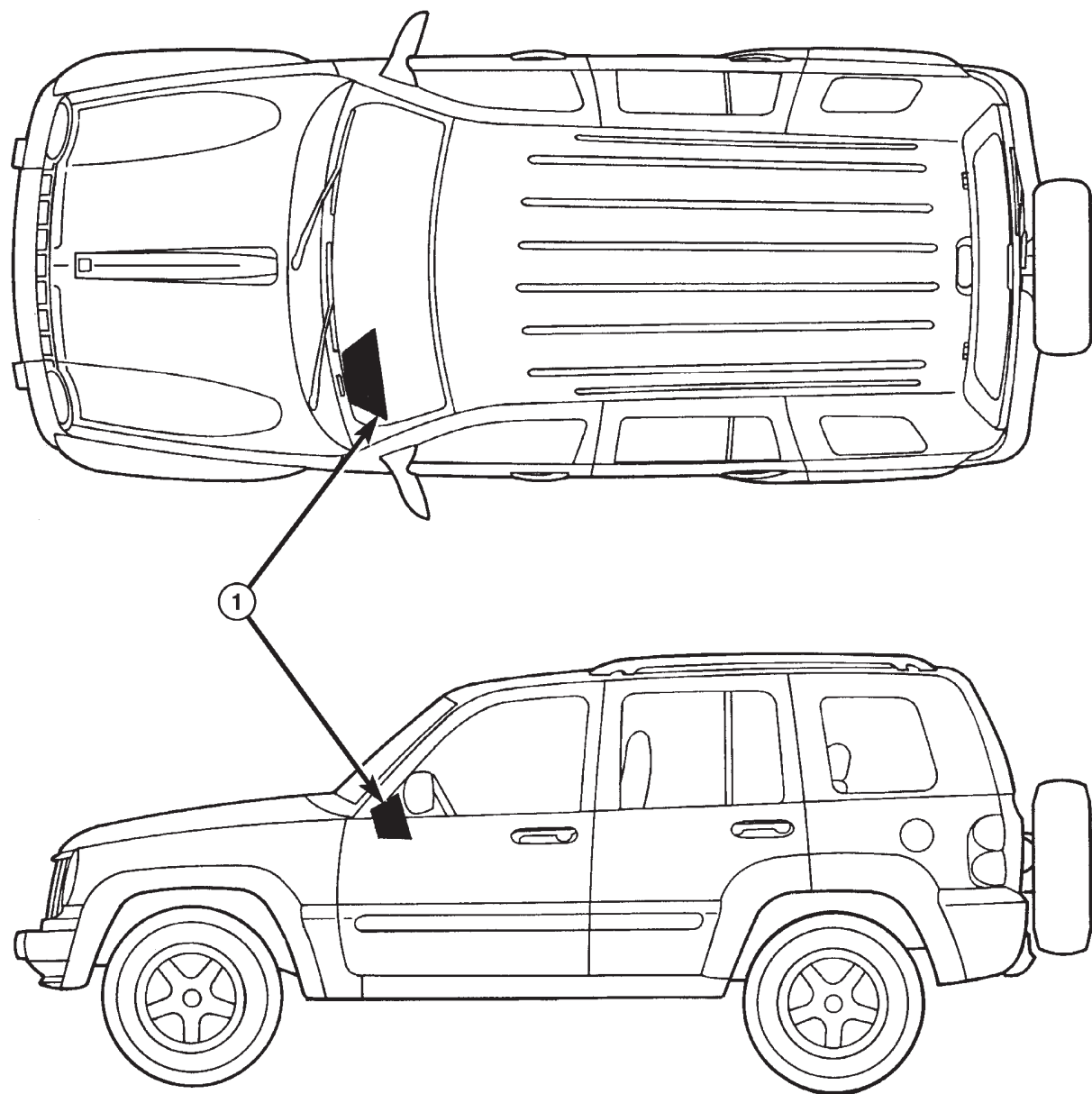


Fig. 1 Chime Warning System

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CHIME WARNING SYSTEM (Continued)

A chime warning system is standard factory-installed equipment on this model. The chime warning system uses a single chime tone generator that is soldered onto the electronic circuit board that is integral to the ElectroMechanical Instrument Cluster (EMIC) to provide an audible indication of various vehicle conditions that may require the attention of the vehicle operator or occupants (Fig. 1). The microprocessor-based EMIC utilizes electronic chime request messages received from other electronic modules in the vehicle over the Programmable Communications Interface (PCI) data bus network along with hard wired inputs to the cluster microprocessor to monitor many sensors and switches throughout the vehicle. In response to those inputs, the integrated circuitry and internal programming of the EMIC allow it to control audible outputs that are produced through its on-board chime tone generator.

The EMIC circuitry and its chime tone generator are capable of producing each of the four following audible outputs:

- **Fixed Duration Beep** - A short, sharp, single tactile "beep-like" tone that is about 150 milliseconds in duration.
- **Single Chime Tone** - A single "bong-like" chime tone.
- **Slow Rate Repetitive Chime** - Repeated chime tones that are issued at a slow rate of about 50 "bong-like" tones per minute.
- **Fast Rate Repetitive Chime** - Repeated chime tones that are issued at a fast rate of about 180 "bong-like" tones per minute.

Hard wired circuitry connects the EMIC and the various chime warning system switch and sensor inputs to their electronic modules and to each other through the electrical system of the vehicle. These hard wired circuits are integral to numerous 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 chime warning 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 EMIC chime warning system circuitry and integral chime tone generator cannot be adjusted or repaired. If the EMIC or the chime tone generator are damaged or faulty, the EMIC unit must be replaced.

OPERATION

The chime warning system is designed to provide an audible output as an indication of various conditions that may require the attention or awareness of the vehicle operator or occupants. The chime warning system components operate on battery current received through a fused B(+) fuse in the Junction Block (JB) on a non-switched fused B(+) circuit so that the system may operate regardless of the ignition switch position. However, the chime warning system also monitors the ignition switch position so that some chime features will only occur with ignition switch in the On position, while others occur regardless of the ignition switch position.

The chime warning system provides an audible indication to the vehicle operator or occupants under the following conditions:

- **Airbag Indicator Warning** - The ElectroMechanical Instrument Cluster (EMIC) chime tone generator will generate one, short, "bong-like" chime tone when the ignition switch is in the On position, and an electronic message is received over the Programmable Communications Interface (PCI) data bus from the Airbag Control Module (ACM) requesting "Airbag" indicator illumination. This warning will only occur following completion of the "Airbag" indicator bulb test, and will only occur once during an ignition cycle. The ACM uses internal programming, hard wired inputs from the front Supplemental Restraint System (SRS) components and, on vehicles so equipped, electronic messages received over the PCI data bus from each Side Impact Airbag Control Module (SIACM) to determine the proper "Airbag" indicator messages to send to the EMIC.

- **Anti-Lock Brake Indicator Warning** - The EMIC chime tone generator will generate one, short, "bong-like" chime tone when the ignition switch is in the On position, and an electronic message is received over the PCI data bus from the Controller Anti-lock Brake (CAB) requesting "Antilock Brake System (ABS)" indicator illumination. This warning will only occur following completion of the "ABS" indicator bulb test, and will only occur once during an ignition cycle. The CAB uses internal programming, hard wired inputs from the Antilock Brake System (ABS) components, and electronic messages received over the PCI data bus from the Powertrain Control Module (PCM) to determine the proper "ABS" indicator messages to send to the EMIC.

- **Compass Mini-Trip Computer Reset** - The EMIC chime tone generator will generate one, short, fixed duration "beep-like" chime tone when the ignition switch is in the On position, and an electronic message is received over the PCI data bus from the optional Compass Mini-Trip Computer (CMTTC) requesting that the CMTTC elapsed time, average fuel

CHIME WARNING SYSTEM (Continued)

economy, and/or trip odometer data has been reset. The CMTC uses internal programming, hard wired inputs from the U.S./Metric and Reset switches, and electronic messages received from the Body Control Module (BCM) to determine the proper reset messages to send to the EMIC.

- **Door Ajar Warning** - The EMIC chime tone generator will generate a single “bong-like” chime tone when the ignition switch is in the On position, and electronic messages are received over the PCI data bus from the Body Control Module (BCM) indicating that the status of any door ajar input has changed from closed to not closed, and from the PCM indicating that the vehicle is moving. The BCM uses internal programming, and hard wired inputs from the door ajar switches and the ignition switch to determine the proper door ajar switch messages to send to the EMIC. The PCM uses internal programming and a hard wired vehicle speed pulse input received from the BCM to determine the proper vehicle distance messages to send to the EMIC.

- **Electrical System Voltage Low or High Warning** - Each time the ignition switch is turned to the On position, the EMIC chime tone generator will generate a single “bong-like” chime tone the first time an electronic message is received over the PCI data bus from the PCM requesting “Charging” indicator illumination. This warning would indicate that the monitored electrical system voltage is either too low or too high. This warning will only occur once during an ignition cycle. The PCM uses internal programming and hard wired inputs from the electrical and charging systems to determine the proper “Charging” indicator messages to send to the EMIC.

- **Engine Coolant Temperature High Warning** - Each time the ignition switch is turned to the On position, the EMIC chime tone generator will generate “bong-like” chime tones the first time an electronic message is received over the PCI data bus from the PCM indicating that the engine coolant temperature is too high. This chime will sound for five consecutive single tones, unless an electronic message is received from the PCM indicating that the engine coolant temperature is not too high, or unless the ignition switch is turned to the Off position before the five single tones have completed. The PCM uses internal programming and a hard wired input from the engine coolant temperature sensor to determine the proper engine coolant temperature messages to send to the EMIC.

- **Engine Oil Pressure Low Warning** - Each time the ignition switch is turned to the On position, the EMIC chime tone generator will generate a single “bong-like” chime tone the first time three sequential sets of electronic messages are received over the PCI data bus from the PCM indicating that

the engine oil pressure is too low with the engine running. The PCM uses internal programming and hard wired inputs from the oil pressure sensor and the crankshaft position sensor to determine the proper oil pressure and engine speed messages to send to the EMIC.

- **Fasten Seat Belt Warning** - Each time the ignition switch is turned to the On position, the EMIC chime tone generator will generate repetitive “bong-like” chime tones at a slow rate the first time an electronic message is received over the PCI data bus from the ACM requesting “Seatbelt” indicator illumination. The ACM uses internal programming and hard wired inputs from the driver side front seat belt switch and the ignition switch to determine that the driver side front seat belt is not fastened with the ignition switch in the On position. These chimes will continue to sound for a duration of about six seconds each time the ignition switch is turned to the On position, or until the driver side front seat belt is fastened, whichever occurs first. This audible warning occurs independent of the visual warning provided by the EMIC “Seatbelt” indicator.

- **Gate Ajar Warning** - The EMIC chime tone generator will generate a single “bong-like” chime tone when the ignition switch is in the On position, and electronic messages are received over the PCI data bus from the BCM indicating that the status of the tailgate ajar input has changed from closed to not closed, and from the PCM indicating that the vehicle is moving. The BCM uses internal programming, and hard wired inputs from the tailgate ajar switch and the ignition switch to determine the proper tailgate ajar switch messages to send to the EMIC. The PCM uses internal programming and a hard wired vehicle speed pulse input received from the BCM to determine the proper vehicle distance messages to send to the EMIC.

- **Glass Ajar Warning** - The EMIC chime tone generator will generate a single “bong-like” chime tone when the ignition switch is in the On position, and electronic messages are received over the PCI data bus from the BCM indicating that the status of the rear flip-up glass ajar input has changed from closed to not closed, and from the PCM indicating that the vehicle is moving. The BCM uses internal programming, and hard wired inputs from the flip-up glass ajar switch and the ignition switch to determine the proper flip-up glass ajar switch messages to send to the EMIC. The PCM uses internal programming and a hard wired vehicle speed pulse input received from the BCM to determine the proper vehicle distance messages to send to the EMIC.

- **Head/Park/Fog Lights-On Warning** - The EMIC chime tone generator will generate repetitive “bong-like” chime tones at a fast rate when the igni-

CHIME WARNING SYSTEM (Continued)

tion switch is in any position except On, and electronic messages are received over the PCI data bus from the BCM indicating that the exterior lights are On with the ignition switch in any position except On, and the status of the driver side front door is not closed. The BCM uses internal programming and hard wired inputs from the left (lighting) control stalk of the multi-function switch, the ignition switch, and the driver side front door ajar switch to determine the proper messages to send to the EMIC. These chimes will continue to sound until the exterior lighting is turned Off, until the ignition switch is turned to the On position, or until the status of the driver side front door ajar input changes from not closed to closed, whichever occurs first.

- **Key-In-Ignition Warning** - The EMIC chime tone generator will generate repetitive “bong-like” chime tones at a fast rate when the ignition switch is in any position except On, and electronic messages are received over the PCI data bus from the BCM indicating that the key is in the ignition lock cylinder with the ignition switch in any position except On, and the driver side front door is not closed. The BCM internal programming and hard wired inputs from the key-in ignition circuitry of the ignition switch, the ignition switch, and the driver side front door ajar switch to determine the proper messages to send to the EMIC. These chimes will continue to sound until the key is removed from the ignition lock cylinder, until the ignition switch is turned to the On position, or until the status of the driver side front door ajar input changes from not closed to closed, whichever occurs first.

- **Low Coolant Warning** - On vehicles equipped with a diesel engine, the EMIC chime tone generator will generate a single “bong-like” chime tone when the ignition switch is first turned to the On position and a hard wired input from the engine coolant level sensor to the EMIC indicates that the coolant level is low for more than about one-quarter second. Any time after the ignition switch is first turned to the On position, the EMIC uses internal programming to check the status of the engine coolant level sensor inputs about once every second, then adjusts an internal counter up or down based upon the status of this input. When the counter accumulates thirty inputs indicating that the coolant level is low, a single chime tone is sounded. This strategy is intended to reduce the effect that coolant sloshing within the coolant reservoir can have on reliable chime warning operation. This warning will only occur once during an ignition cycle.

- **Low Fuel Warning** - Each time the ignition switch is turned to the On position, the EMIC chime tone generator will generate a single “bong-like” chime tone the first time an electronic message is

received over the PCI data bus from the PCM requesting “Low Fuel” indicator illumination. The chime will only occur a second time during the same ignition cycle if another electronic message has been received from the PCM indicating that there is an increase in the fuel level equal to about 3 liters (0.8 gallon), then a subsequent electronic message from the PCM requests “Low Fuel” indicator illumination. This strategy combined with filtering performed by the internal programming of the PCM on the fuel tank sending unit input is intended to reduce the possibility of fuel sloshing within the fuel tank causing multiple low fuel warning chimes during a given ignition cycle. The EMIC will also respond with the low fuel warning chime when electronic fuel level messages are received from the PCM indicating that the hard wired input to the PCM from the fuel tank sending unit is an open circuit (greater than full), or a short circuit (less than empty).

- **Low Washer Fluid Warning** - The EMIC chime tone generator will generate a single “bong-like” chime tone when the ignition switch is turned to the On position and a hard wired input from the washer fluid level switch to the EMIC indicates the washer fluid is low for more than about one-quarter second. Any time after the ignition switch is first turned to the On position, the EMIC uses internal programming to check the status of the washer fluid level switch inputs about once every second, then adjusts an internal counter up or down based upon the status of this input. When the counter accumulates thirty inputs indicating that the washer fluid level is low, a single chime tone is sounded. This strategy is intended to reduce the effect that fluid sloshing within the washer reservoir can have on reliable chime warning operation. This warning will only occur once during an ignition cycle.

- **Overspeed Warning** - The EMIC chime tone generator will generate repetitive “bong-like” chime tones at a slow rate when the ignition switch is in the On position, and an electronic message received over the PCI data bus from the PCM indicates that the vehicle speed is over a programmed speed value. The PCM uses internal programming and distance pulse information received over a hard wired vehicle speed pulse input from the BCM to determine the proper vehicle speed messages to send to the EMIC. The BCM uses an internally programmed electronic pinion factor and a hard wired input from the rear wheel speed sensor to calculate the proper distance pulse information to send to the PCM. The electronic pinion factor represents the proper tire size and axle ratio information for the vehicle. These chimes will continue to sound until the vehicle speed messages are below the programmed speed value, or until the ignition switch is turned to the Off position, which-

CHIME WARNING SYSTEM (Continued)

ever occurs first. The overspeed warning feature is only enabled on a BCM that has been programmed with a Middle East Gulf Coast Country (GCC) country code.

- **No Airbag Indicator Message Warning** - The EMIC chime tone generator will generate one, short, "bong-like" chime tone and turn on the "Airbag" indicator when the ignition switch is in the On position, and a PCI data bus "Airbag" indicator on or off message is not received from the ACM for six consecutive seconds.

- **No Antilock Brake Indicator Message Warning** - The EMIC chime tone generator will generate one, short, "bong-like" chime tone and turn on the "ABS" indicator when the ignition switch is in the On position, and a PCI data bus "ABS" indicator on or off message is not received from the CAB for six consecutive seconds.

- **No Fuel Level Message Warning** - The EMIC chime tone generator will generate one, short, "bong-like" chime tone and turn on the "Low Fuel" indicator when the ignition switch is in the On position, and a PCI data bus fuel level message is not received from the PCM for twelve consecutive seconds.

- **Remote Keyless Entry Transmitter Programming** - On vehicles so equipped, the EMIC chime tone generator will generate a single "bong-like" chime tone when an electronic message is received over the PCI data bus from the BCM indicating that a Remote Keyless Entry (RKE) transmitter has been successfully programmed by the customer into the RKE module memory.

- **Sentry Key Immobilizer System Transponder Programming** - On vehicles so equipped, the EMIC chime tone generator will generate a single "bong-like" chime tone when an electronic message is received over PCI data bus message from the Sentry Key Immobilizer Module (SKIM) indicating that the Sentry Key Immobilizer System (SKIS) has been placed in the "Customer Learn" programming mode, and again each time a new SKIS transponder has been successfully programmed by the customer.

- **Turn Signal Cancel Warning** - The EMIC chime tone generator will generate repetitive "bong-like" chime tones at a slow rate when the vehicle is driven for a distance of about 3.2 kilometers (about two miles) with a turn signal indicator flashing. The EMIC uses an electronic message received over the PCI data bus from the PCM, and a hard wired input from the turn signal switch circuitry of the multi-function switch to determine when to sound the turn signal cancel warning. The PCM uses internal programming and distance pulse information received over a hard wired vehicle speed pulse input from the BCM to determine the proper vehicle speed messages to send to the EMIC. The BCM uses an internally

programmed electronic pinion factor and a hard wired input from the rear wheel speed sensor to calculate the proper distance pulse information to send to the PCM. The electronic pinion factor represents the proper tire size and axle ratio information for the vehicle. These chimes will continue to sound until the turn signal is turned Off, until the hazard warning system is turned On, or until the ignition switch is turned to the Off position, whichever occurs first.

- **Water-In-Fuel Warning** - On vehicles equipped with a diesel engine, each time the ignition switch is turned to the On position, the EMIC chime tone generator will generate a single "bong-like" chime tone the first time an electronic message is received over the PCI data bus from the PCM requesting "Water-in-Fuel" indicator illumination. The PCM uses internal programming and a hard wired input from the water-in-fuel sensor to determine the proper water-in-fuel messages to send to the EMIC. This warning will only occur once during an ignition cycle.

The EMIC provides chime service for all available features in the chime warning system. The EMIC relies upon its internal programming and hard wired inputs from the turn signal (multi-function) switch, the washer fluid level switch, and the engine coolant level sensor (diesel engine only) to provide chime service for the turn signal cancel warning, the low washer fluid warning, and the low coolant warning respectively. The EMIC relies upon electronic message inputs received from other electronic modules over the PCI data bus network to provide chime service for all of the remaining chime warning system features. Upon receiving the proper inputs, the EMIC activates the integral chime tone generator to provide the audible chime warning to the vehicle operator. The internal programming of the EMIC determines the priority of each chime request input that is received, as well as the rate and duration of each chime tone that is to be generated. See the owner's manual in the vehicle glove box for more information on the features provided by the chime warning system.

The hard wired chime warning system inputs to the EMIC, as well as other hard wired circuits for this system may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the EMIC, the PCI data bus network, or the electronic message inputs used by the EMIC to provide chime warning system service. The most reliable, efficient, and accurate means to diagnose the EMIC, the PCI data bus network, and the electronic message inputs for the chime warning system requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

CHIME WARNING SYSTEM (Continued)

DIAGNOSIS AND TESTING - CHIME WARNING SYSTEM

The hard wired chime warning system inputs to the EMIC, as well as other hard wired circuits for this system may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the EMIC, the PCI data bus network, or the electronic message inputs used by the EMIC to provide chime warning system service. The most reliable, efficient, and accurate means to diagnose the EMIC, the PCI data bus network, and the electronic message inputs for the chime warning system requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

The hard wired chime warning system inputs to the ElectroMechanical Instrument Cluster (EMIC), as well as other hard wired circuits for this system may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the EMIC, the Programmable Communications Interface (PCI) data bus network, or the electronic message inputs used by the EMIC to provide chime warning system service. The most reli-

able, efficient, and accurate means to diagnose the EMIC, the PCI data bus network, and the electronic message inputs for the chime warning system requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

ELECTRONIC CONTROL MODULES

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ELECTRONIC CONTROL MODULES

STANDARD PROCEDURE - PCM/SKIM PROGRAMMING

NOTE: Before replacing the PCM for a failed driver, control circuit, or ground circuit, be sure to check the related component/circuit integrity for failures not detected due to a double fault in the circuit. Most PCM driver/control circuit failures are caused by internal component failures (i.e. relays and solenoids) and shorted circuits (i.e. pull-ups, drivers, and switched circuits). These failures are difficult to detect when a double fault has occurred and only one DTC has been set.

When a PCM (JTEC) and the SKIM are replaced at the same time, perform the following steps in order:

- (1) Program the new PCM (JTEC).

- (2) Program the new SKIM.

- (3) Replace all ignition keys and program them to the new SKIM.

PROGRAMMING THE PCM (JTEC)

The SKIS Secret Key is an ID code that is unique to each SKIM. This code is programmed and stored in the SKIM, the PCM, and the ignition key transponder chip(s). When replacing the PCM, it is necessary to program the secret key into the new PCM using the DRBIII® scan tool. Perform the following steps to program the secret key into the PCM.

- (1) Turn the ignition switch to the On position (transmission in Park/Neutral).

- (2) Use the DRBIII® and select THEFT ALARM, SKIM, then MISCELLANEOUS.

- (3) Select PCM REPLACED (GAS ENGINE).

- (4) Enter secured access mode by entering the vehicle four-digit PIN.

- (5) Select ENTER to update PCM VIN.

ELECTRONIC CONTROL MODULES (Continued)

NOTE: If three attempts are made to enter secured access mode using an incorrect PIN, secured access mode will be locked out for one hour. To exit this lockout mode, turn the ignition switch to the ON position for one hour, then enter the correct PIN. (Ensure all accessories are turned off. Also monitor the battery state and connect a battery charger if necessary).

(6) Press ENTER to transfer the secret key (the SKIM will send the secret key to the PCM).

(7) Press PAGE BACK to get to the Select System menu and select ENGINE, MISCELLANEOUS, and SRI MEMORY CHECK.

(8) The DRBIII® will ask, "Is odometer reading between XX and XX?" Select the YES or NO button on the DRBIII®. If NO is selected, the DRBIII® will read, "Enter Odometer Reading (From I.P. odometer)". Enter the odometer reading from the instrument cluster and press ENTER.

PROGRAMMING THE SKIM

(1) Turn the ignition switch to the On position (transmission in Park/Neutral).

(2) Use the DRBIII® and select THEFT ALARM, SKIM, then MISCELLANEOUS.

(3) Select PCM REPLACED (GAS ENGINE).

(4) Program the vehicle four-digit PIN into SKIM.

(5) Select COUNTRY CODE and enter the correct country.

NOTE: Be sure to enter the correct country code. If the incorrect country code is programmed into SKIM, it cannot be changed and the SKIM must be replaced.

(6) Select YES to update VIN (the SKIM will learn the VIN from the PCM).

(7) Press ENTER to transfer the secret key (the PCM will send the secret key to the SKIM).

(8) Program ignition keys to the SKIM.

NOTE: If the PCM and the SKIM are replaced at the same time, all vehicle ignition keys will need to be replaced and programmed to the new SKIM.

PROGRAMMING IGNITION KEYS TO THE SKIM

(1) Turn the ignition switch to the On position (transmission in Park/Neutral).

(2) Use the DRBIII® and select THEFT ALARM, SKIM, then MISCELLANEOUS.

(3) Select PROGRAM IGNITION KEY'S.

(4) Enter secured access mode by entering the vehicle four-digit PIN.

NOTE: A maximum of eight keys can be learned to each SKIM. Once a key is learned to a SKIM it (the key) cannot be transferred to another vehicle.

(5) Obtain ignition keys to be programmed from the customer (8 keys maximum).

(6) Using the DRBIII®, erase all ignition keys by selecting MISCELLANEOUS, and ERASE ALL CURRENT IGN. KEYS.

(7) Program all of the ignition keys.

If ignition key programming is unsuccessful, the DRBIII® will display one of the following messages:

- **Programming Not Attempted** - The DRBIII® attempts to read the programmed key status and there are no keys programmed into SKIM memory.

- **Programming Key Failed (Possible Used Key From Wrong Vehicle)** - SKIM is unable to program an ignition key transponder due to one of the following:

- The ignition key transponder is faulty.
- The ignition key transponder is or has been already programmed to another vehicle.

- **8 Keys Already Learned, Programming Not Done** - The SKIM transponder ID memory is full.

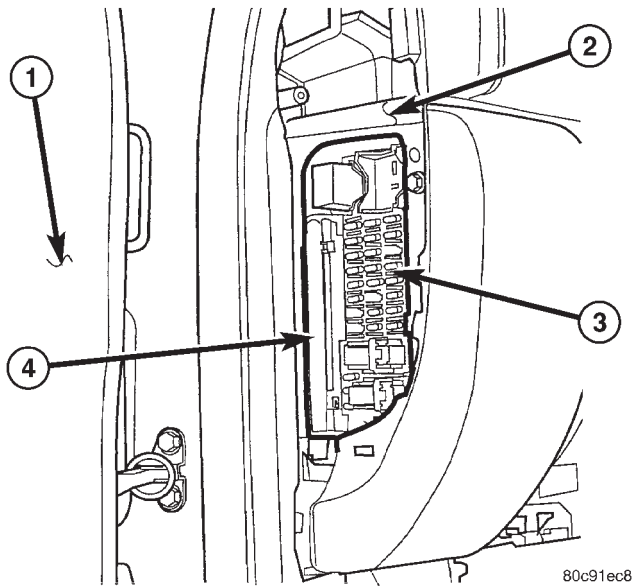
- **Learned Key In Ignition** - The ID for the ignition key transponder currently in the ignition lock cylinder is already programmed in SKIM memory.

BODY CONTROL MODULE

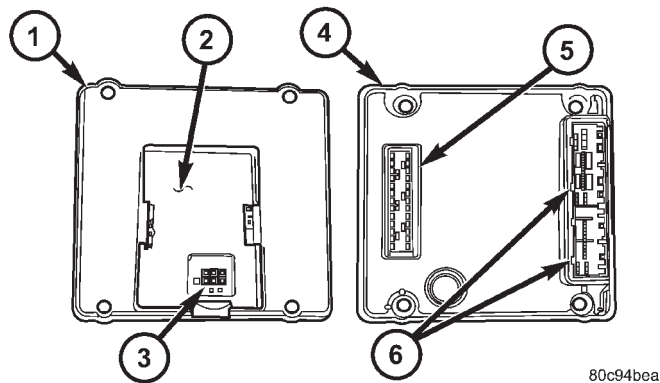
DESCRIPTION

A Body Control Module (BCM) is concealed behind the driver side end of the instrument panel in the passenger compartment, where it is secured to the fuse panel side of the Junction Block (JB) with four screws (Fig. 1). The JB is the interface between the body, the instrument panel, and the headlamp and dash wire harnesses. The JB also contains the fuses and relays used for the interior electrical system of the vehicle. The BCM is enclosed in a molded plastic housing with two integral external connector receptacles that connect it to the vehicle electrical system through two take outs with connectors from the instrument panel wire harness (Fig. 2). The BCM also has an integral interface connector concealed on the back side of the unit that joins it through a connector receptacle that is integral to the JB housing to the circuitry within the JB. This connector is referred to as the JB-BCM connector. The combined BCM and JB are sometimes referred to as the Junction Block Module (JBM).

BODY CONTROL MODULE (Continued)

**Fig. 1 Body Control Module Location**

- 1 - DRIVER DOOR
- 2 - INSTRUMENT PANEL END BRACKET
- 3 - JUNCTION BLOCK
- 4 - BODY CONTROL MODULE

**Fig. 2 Body Control Module**

- 1 - BODY CONTROL MODULE (FRONT VIEW)
- 2 - REMOTE KEYLESS ENTRY MODULE RECEPTACLE
- 3 - BCM-RKE CONNECTOR
- 4 - BODY CONTROL MODULE (BACK VIEW)
- 5 - JB-BCM CONNECTOR
- 6 - CONNECTOR RECEPTACLE (2)

There are two different versions of the BCM: base and premium. The base BCM is a subset of the components in the premium version. Basically, the base version BCM does not support the following features: Compass Mini-Trip Computer (CMTTC), fog lamps (front and/or rear), Remote Keyless Entry (RKE), remote radio switches, or Vehicle Theft Security System (VTSS). Both versions of the BCM utilize integrated circuitry and information carried on the Programmable Communications Interface (PCI) data

bus network along with many hard wired inputs to monitor many sensor and switch inputs throughout the vehicle. In response to those inputs, the internal circuitry and programming of the BCM allow it to control and integrate many electronic functions and features of the vehicle through both hard wired outputs and the transmission of electronic message outputs to other electronic modules in the vehicle over the PCI data bus. The electronic functions and features that the BCM supports or controls include the following:

- **A/C Select Switch Status** - The BCM monitors an input from, and transmits the status of the A/C switch on the heater-A/C control.

- **Ambient Temperature Data** - The premium BCM monitors and transmits the ambient temperature sensor input data.

- **Cargo Lamp Disable** - The BCM monitors an input from the cargo lamp switch to provide an interior lighting disable feature.

- **Chimes** - The chime tone generator is located on the ElectroMechanical Instrument Cluster (EMIC) circuit board, but the EMIC goes to sleep with the ignition switch in the Off position. The BCM provides a wake-up output to the EMIC based upon inputs from the key-in ignition switch or the exterior lighting switch, then sends electronic chime request messages to the EMIC for the headlamps-on warning and key-in ignition warning.

- **Door Lock Inhibit** - The BCM monitors the key-in ignition switch and the driver side front door ajar switch to provide a door lock inhibit feature.

- **Exterior Lamp Load Shedding** - The BCM provides a battery saver feature which will automatically turn off exterior lamps that remain on after a timed interval.

- **Exterior Lamp Status** - The BCM monitors the status of the park lamp, low beam, high beam or Daytime Running Lamp (DRL - Canada only), front fog lamp (optional), and rear fog lamp (in required markets only) relays.

- **Exterior Lighting Control** - The BCM provides exterior lamp control for standard head and park lamps, as well as Daytime Running Lamps (DRL - Canada only), front fog lamps (optional), and rear fog lamps (in required markets only). This includes support for features including optical horn (also known as flash-to-pass) and headlamp time delay.

- **Flip-Up Glass Control** - The BCM monitors the tailgate cylinder lock switch, the tailgate handle switch, the Remote Keyless Entry (RKE) module inputs and the rear wiper switch to provide control for the rear flip-up glass actuator.

BODY CONTROL MODULE (Continued)

- **Fog Lamp Control** - The premium BCM provides fog lamp control for front fog lamps (optional), and rear fog lamps (in required markets only).

- **Front Wiper System Status** - The BCM monitors the status of the front wiper motor park switch.

- **Fuel Economy and Distance to Empty Calculations** - The BCM calculates and transmits the fuel economy and Distance To Empty (DTE) data.

- **Headlamp Time Delay** - The BCM provides a headlamp time delay feature with the ignition switch in the Off position.

- **Heated Rear Glass Control** - The BCM provides control and timer functions for the heated rear glass feature and transmits the system status.

- **Ignition On/Off Timer** - The BCM monitors and transmits the elapsed ignition On timer data and monitors the ignition Off time.

- **Ignition Switch Position Status** - The BCM monitors and transmits the status of the ignition switch.

- **Instrument Panel Dimming** - The BCM monitors and transmits the selected illumination intensity level of the panel lamps dimmer switch.

- **Interior Lamp Load Shedding** - The BCM provides a battery saver feature which will automatically turn off all interior lamps that remain on after a timed interval.

- **Interior Lighting Control** - The BCM monitors inputs from the interior lighting switch, the door ajar switches, the flip-up glass ajar switch, the tailgate ajar switch, the cargo lamp switch, the reading lamp switches, and the Remote Keyless Entry (RKE) module to provide courtesy lamp control. This includes support for timed illuminated entry with theater-style fade-to-off and courtesy illumination defeat features.

- **Intermittent Wipe and Front Wiper System Control** - The BCM monitors inputs from the front wiper and washer switch and the front wiper motor park switch to provide front wiper system control through the wiper on/off and high/low relays. This includes support for adjustable intermittent wipe, mist wipe (also known as pulse wipe), and wipe-after-wash features.

- **Key-In-Ignition Switch Status** - The BCM monitors and transmits the status of the key-in-ignition switch.

- **Panic Mode** - The BCM provides support for the Remote Keyless Entry (RKE) system panic mode feature.

- **Parade Mode** - The BCM provides a parade mode (also known as funeral mode) that allows the interior Vacuum Fluorescent Displays (VFD) to be illuminated at full intensity while driving in daylight with the exterior lamps On.

- **Power Locks** - The BCM monitors inputs from the power lock switches and the Remote Keyless Entry (RKE) module (optional) to provide control of the power lock motors through outputs to the lock, unlock, and driver unlock (RKE only) relays. This includes support for rolling door locks (also known as automatic door locks) and a door lock inhibit mode.

- **Programmable Features** - The BCM provides support for several standard and optional programmable features, including: rolling door locks, headlamp time delay interval, Remote Keyless Entry (RKE) driver-door-only or unlock-all-doors, RKE optical chirp, and RKE audible chirp.

- **Remote Keyless Entry** - The premium BCM provides the optional Remote Keyless Entry (RKE) system features, including support for the RKE Lock, Unlock (with optional driver-door-only unlock, and unlock-all-doors), rear flip-up glass control, Panic, audible chirp, optical chirp, and illuminated entry modes, as well as the ability to be programmed to recognize up to four RKE transmitters.

- **Rolling Door Locks** - The BCM provides support for the power lock system rolling door locks feature (also known as automatic door locks).

- **Tailgate and Flip-Up Glass Ajar Status** - The BCM monitors and transmits the status of the tailgate and rear flip-up glass ajar switches.

- **Remote Radio Switch Interface** - The premium BCM monitors and transmits the status of the optional remote radio switches.

- **Self-Diagnostics** - The BCM provides support for diagnostics through communication with the DRBIII® scan tool over the PCI data bus network. Each analog and digital input can be verified, and each output can be actuated through the use of this diagnostic protocol. The BCM also stores Diagnostic Trouble Codes (DTCs) to assist in troubleshooting this unit.

- **Vacuum Fluorescent Display Synchronization** - The BCM transmits panel lamp intensity data which allows modules with Vacuum Fluorescent Displays (VFD) to coordinate their illumination intensity.

- **Vehicle Speed System** - The BCM monitors a vehicle speed input from the vehicle speed sensor (without Antilock Brake System [ABS]) or from the Controller Antilock Brake (CAB)(with ABS), calculates the vehicle speed based upon a programmed axle ratio/tire size (electronic pinion factor), and transmits the vehicle speed information to the Powertrain Control Module (PCM) on a hard wired output circuit.

- **Vehicle Theft Security System** - The premium BCM monitors inputs from the door cylinder lock switches, the tailgate cylinder lock switch, the door ajar switches, the tailgate ajar switch, the

BODY CONTROL MODULE (Continued)

flip-up glass ajar switch, the hood ajar switch (in required markets only), and the Remote Keyless Entry (RKE) module to control the features of the optional Vehicle Theft Security System (VTSS).

Hard wired circuitry connects the BCM 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 BCM 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.

Many of the electronic features in the vehicle controlled or supported by the BCM are programmable using a customer programming procedure or the DRBIII® scan tool. In addition, the BCM software is Flash compatible, which means it can be reprogrammed using Flash reprogramming procedures. However, if any of the BCM hardware components is damaged or faulty, the entire BCM unit must be replaced.

OPERATION

The microprocessor-based Body Control Module (BCM) monitors many hard wired switch and sensor inputs as well as those resources it shares with other electronic modules in the vehicle through its communication over the Programmable Communications Interface (PCI) data bus network. The internal programming and all of these inputs allow the BCM microprocessor to determine the tasks it needs to perform and their priorities, as well as both the standard and optional features that it should provide. The BCM programming then performs those tasks and provides those features through both PCI data bus communication with other electronic modules and through hard wired outputs through a number of driver circuits, relays, and actuators. These outputs allow the BCM the ability to control numerous accessory systems in the vehicle.

The BCM operates on battery current received through a fuse in the Junction Block (JB) on a non-switched fused B(+) circuit, through another fuse in the JB on a fused ignition switch output (run-start) circuit, and through a third fuse in the JB on a fused ignition switch output (run-acc) circuit. This arrangement allows the BCM to provide some features regardless of the ignition switch position, while other features will operate only with the ignition switch in

the On, Start, and/or Accessory positions. All of the battery current circuits are connected to the BCM through the JB/BCM connector. The BCM receives ground through five separate circuits. Three of these circuits are connected to the BCM through a connector and take out of the instrument panel wire harness on three separate ground circuits, while the other two circuits are connected to the BCM through the JB/BCM connector. All of these circuits are grounded through a splice block located in the instrument panel wire harness with an eyelet terminal connector that is secured by a nut to a ground stud on the driver side instrument panel end bracket near the JB.

The BCM monitors its own internal circuitry as well as many of its input and output circuits, and will store a Diagnostic Trouble Code (DTC) in electronic memory for any failure it detects. These DTCs can be retrieved and diagnosed using a DRBIII® scan tool. Refer to the appropriate diagnostic information.

HARD WIRED INPUTS The hard wired inputs to the BCM include the following:

- **A/C on/off control**
- **Ambient temperature sensor signal**
- **Body control module flash enable**
- **Door lock switch mux**
- **Driver door ajar switch sense**
- **Flip-up glass ajar switch sense**
- **Flip-up glass release switch sense**
- **Fog lamp switch sense**
- **Front wiper park switch sense**
- **Front wiper switch mux**
- **Front washer pump driver**
- **Fused B(+)**
- **Fused ignition switch output (run-acc)**
- **Fused ignition switch output (run-start)**
- **Headlamp switch mux**
- **High beam switch sense**
- **Hood ajar switch sense - premium with VTSS - in markets where required only**
- **Key-in ignition switch sense**
- **Left cylinder lock switch sense - premium with VTSS only - omitted in some markets as required**
- **Panel lamps dimmer switch mux**
- **Passenger doors ajar switch sense (input from three ajar switches connected in parallel)**
- **Radio control mux - premium with remote radio switches only**
- **Rear courtesy lamp control**
- **Rear window defogger control**
- **Rear wiper intermittent driver**
- **Rear wiper on driver**
- **Right cylinder lock switch sense - premium with VTSS only - omitted in some markets as required**

BODY CONTROL MODULE (Continued)

- **RKE antenna (two circuits) - premium with RKE only**

- Tailgate ajar switch sense
- Tailgate cylinder lock switch sense
- Vehicle speed sensor

Refer to the appropriate wiring information for additional details.

HARD WIRED OUTPUTS The hard wired outputs of the BCM include the following:

- **Courtesy lamp driver**
- **Courtesy lamp load shed**
- **Door lock relay control**
- **Driver door unlock relay control - premium with RKE only**
- **Flip-up glass release motor driver**
- **Front fog lamp relay control - premium with front fog lamps only**
- **Front wiper high/low relay control**
- **Front wiper on/off relay control**
- **Hazard lamp control**
- **High beam relay control**
- **Horn relay control - premium with RKE only**
- **Instrument cluster wake up signal**
- **Low beam relay control**
- **Park lamp relay control**
- **Passenger door unlock relay control**
- **Rear fog lamp relay control - premium with rear fog lamps in markets where required only**
- **Rear window defogger relay control**
- **RKE supply - premium with RKE only**
- **Tailgate lock driver**
- **Tailgate unlock driver**
- **Vehicle speed output**
- **Vehicle speed sensor supply**
- **VTSS indicator driver - premium with VTSS only**

Refer to the appropriate wiring information for additional details.

GROUND The BCM receives ground through five separate circuits, and also supplies a ground path to several switches through the following hard wired circuits:

- **Ambient temperature sensor return**
- **Door lock switch ground**
- **Headlamp switch return**
- **Radio control mux return**
- **RKE ground - premium with RKE only**
- **Tailgate switch ground**

Refer to the appropriate wiring information for additional details.

COMMUNICATION Not including the two RKE antenna circuits (RKE antenna + and -), which merely pass through the premium BCM from the RKE module to the external RKE antenna in the

instrument panel wire harness, the BCM has the following communication circuits:

- **PCI bus**
- **RKE program serial data - premium with RKE only**
- **RKE transmit serial data - premium with RKE only**

Refer to the appropriate wiring information for additional details.

MESSAGING The BCM uses the following messages received from other electronic modules over the PCI data bus:

- **Battery Temperature (PCM)**
- **Compass Mini-Trip Computer Button Status (CMTc) - premium only**
- **Coolant Temperature (PCM)**
- **Distance Pulses (PCM)**
- **Engine Speed (PCM)**
- **Fuel Tank Level (PCM)**
- **Fuel Used (PCM)**
- **Intrusion Transceiver Module Commands (ITM) - premium in markets where required only**
- **Manifold Absolute Pressure (PCM)**
- **OK to Lock - Rolling Locks (PCM)**
- **SKIS Status (SKIM)**
- **Vehicle Identification Number (PCM)**
- **Vehicle Speed (PCM)**

The BCM provides the following messages to other electronic modules over the PCI data bus:

- **A/C Select Switch Status (PCM)**
- **Country Code (EMIC, PCM, CMTc)**
- **Distance to Empty (CMTc) - premium only**
- **Door Ajar Status (EMIC)**
- **Exterior Lighting Status (EMIC)**
- **Flip-up Glass Ajar Status (EMIC)**
- **Fuel Economy (Average and Instantaneous) (CMTc) - premium only**
- **Hood Ajar Status (ITM) - premium in markets where required only**
- **Ignition On Timer (CMTc) - premium only**
- **Intrusion Transceiver Module Commands (ITM) - premium in markets where required only**
- **Key-In Ignition Switch Status (EMIC)**
- **Outside Temperature (CMTc) - premium only**
- **Panel Lamp Intensity (CMTc, Radio)**
- **Tailgate Ajar Status (EMIC)**
- **Radio Mode (Radio) - premium only**
- **Radio Preset Scan (Radio) - premium only**
- **Radio Seek Down (Radio) - premium only**
- **Radio Seek Up (Radio) - premium only**
- **Radio Volume Down (Radio) - premium only**
- **Radio Volume Up (Radio) - premium only**

BODY CONTROL MODULE (Continued)

- **Vacuum Fluorescent Display Synchronization (CMTC, EMIC, Radio)**
- **Vehicle Theft Security System Status (PCM, ITM) - premium only**

Refer to the appropriate diagnostic information for additional details.

DIAGNOSIS AND TESTING - BODY CONTROL MODULE

The hard wired inputs to and outputs from the Body Control Module (BCM), as well as other hard wired circuits for this module may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the BCM, the Programmable Communications Interface (PCI) data bus network, or the electronic messages received and transmitted by the BCM over the PCI data bus. The most reliable, efficient, and accurate means to diagnose the BCM and the PCI data bus network inputs to and outputs from this module requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

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.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER,

FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

NOTE: Before replacing a Body Control Module (BCM), use a DRBIII® scan tool to retrieve the current settings for the BCM programmable features and the axle ratio/tire size (electronic pinion factor). Refer to the appropriate diagnostic information. These settings should be duplicated in the replacement BCM using the DRBIII® scan tool before returning the vehicle to service.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the Junction Block Module (JBM) from the instrument panel end bracket on the driver side of the vehicle. (Refer to 8 - ELECTRICAL/POWER DISTRIBUTION/JUNCTION BLOCK - REMOVAL).

(3) Remove the four screws that secure the BCM to the Junction Block (JB) (Fig. 3).

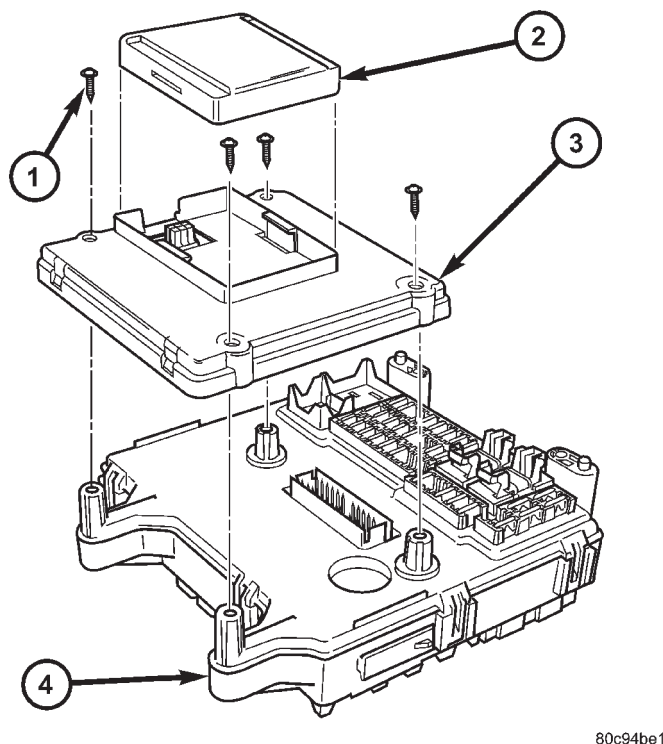
(4) Remove the BCM from the JB.

(5) If the vehicle is equipped with the optional Remote Keyless Entry (RKE) system, remove the RKE module from the receptacle on the BCM. (Refer to 8 - ELECTRICAL/POWER LOCKS/REMOTE KEYLESS ENTRY MODULE - REMOVAL).

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

BODY CONTROL MODULE (Continued)



80c94be1

Fig. 3 Body Control Module Remove/Install

- 1 - SCREW (4)
- 2 - RKE MODULE
- 3 - BODY CONTROL MODULE
- 4 - JUNCTION BLOCK

NOTE: Before replacing a Body Control Module (BCM), use a DRBIII® scan tool to retrieve the current settings for the BCM programmable features and the axle ratio/tire size (electronic pinion factor). Refer to the appropriate diagnostic information. These settings should be duplicated in the replacement BCM using the DRBIII® scan tool before returning the vehicle to service.

(1) If the vehicle is equipped with the optional Remote Keyless Entry (RKE) system, reinstall the RKE module into the receptacle on the BCM. (Refer to 8 - ELECTRICAL/POWER LOCKS/REMOTE KEYLESS ENTRY MODULE - INSTALLATION).

(2) Position the BCM onto the Junction Block (JB) (Fig. 3).

(3) Install and tighten the four screws that secure the BCM to the JB. Tighten the screws to 2 N·m (18 in. lbs.).

(4) Reinstall the Junction Block Module (JBM) onto the instrument panel end bracket on the driver side of the vehicle. (Refer to 8 - ELECTRICAL/POWER DISTRIBUTION/JUNCTION BLOCK - INSTALLATION).

(5) Reconnect the battery negative cable.

COMMUNICATION

DESCRIPTION

The DaimlerChrysler Programmable Communication Interface (PCI) data bus system is a single wire multiplex system used for vehicle communications on many DaimlerChrysler Corporation vehicles. Multiplexing is a system that enables the transmission of several messages over a single channel or circuit. All DaimlerChrysler vehicles use this principle for communication between various microprocessor-based electronic control modules. The PCI data bus exceeds the Society of Automotive Engineers (SAE) J1850 Standard for Class B Multiplexing.

Many of the electronic control modules in a vehicle require information from the same sensing device. In the past, if information from one sensing device was required by several controllers, a wire from each controller needed to be connected in parallel to that sensor. In addition, each controller utilizing analog sensors required an Analog/Digital (A/D) converter in order to "read" these sensor inputs. Multiplexing reduces wire harness complexity, sensor current loads and controller hardware because each sensing device is connected to only one controller, which reads and distributes the sensor information to the other controllers over the data bus. Also, because each controller on the data bus can access the controller sensor inputs to every other controller on the data bus, more function and feature capabilities are possible.

In addition to reducing wire harness complexity, component sensor current loads and controller hardware, multiplexing offers a diagnostic advantage. A multiplex system allows the information flowing between controllers to be monitored using a diagnostic scan tool. The DaimlerChrysler system allows an electronic control module to broadcast message data out onto the bus where all other electronic control modules can "hear" the messages that are being sent. When a module hears a message on the data bus that it requires, it relays that message to its microprocessor. Each module ignores the messages on the data bus that are being sent to other electronic control modules.

OPERATION

Data exchange between modules is achieved by serial transmission of encoded data over a single wire broadcast network. The wire colors used for the PCI data bus circuits are yellow with a violet tracer, or violet with a yellow tracer, depending upon the application. The PCI data bus messages are carried over the bus in the form of Variable Pulse Width Modulated (VPWM) signals. The PCI data bus speed is an average 10.4 Kilo-bits per second (Kbps). By compar-

COMMUNICATION (Continued)

ison, the prior two-wire Chrysler Collision Detection (CCD) data bus system is designed to run at 7.8125 Kbps.

The voltage network used to transmit messages requires biasing and termination. Each module on the PCI data bus system provides its own biasing and termination. Each module (also referred to as a node) terminates the bus through a terminating resistor and a terminating capacitor. There are two types of nodes on the bus. The dominant node terminates the bus through a 1 KW resistor and a 3300 pF capacitor. The Powertrain Control Module (PCM) is the only dominant node for the PCI data bus system. A standard node terminates the bus through an 11 KW resistor and a 330 pF capacitor.

The modules bias the bus when transmitting a message. The PCI bus uses low and high voltage levels to generate signals. Low voltage is around zero volts and the high voltage is about seven and one-half volts. The low and high voltage levels are generated by means of variable-pulse width modulation to form signals of varying length. The Variable Pulse Width Modulation (VPWM) used in PCI bus messaging is a method in which both the state of the bus and the width of the pulse are used to encode bit information. A "zero" bit is defined as a short low pulse or a long high pulse. A "one" bit is defined as a long low pulse or a short high pulse. A low (passive) state on the bus does not necessarily mean a zero bit. It also depends upon pulse width. If the width is short, it stands for a zero bit. If the width is long, it stands for a one bit. Similarly, a high (active) state does not necessarily mean a one bit. This too depends upon pulse width. If the width is short, it stands for a one bit. If the width is long, it stands for a zero bit.

In the case where there are successive zero or one data bits, both the state of the bus and the width of the pulse are changed alternately. This encoding scheme is used for two reasons. First, this ensures that only one symbol per transition and one transition per symbol exists. On each transition, every transmitting module must decode the symbol on the bus and begin timing of the next symbol. Since timing of the next symbol begins with the last transition detected on the bus, all of the modules are re-synchronized with each symbol. This ensures that there

are no accumulated timing errors during PCI data bus communication.

The second reason for this encoding scheme is to guarantee that the zero bit is the dominant bit on the bus. When two modules are transmitting simultaneously on the bus, there must be some form of arbitration to determine which module will gain control. A data collision occurs when two modules are transmitting different messages at the same time. When a module is transmitting on the bus, it is reading the bus at the same time to ensure message integrity. When a collision is detected, the module that transmitted the one bit stops sending messages over the bus until the bus becomes idle.

Each module is capable of transmitting and receiving data simultaneously. The typical PCI bus message has the following four components:

- **Message Header** - One to three bytes in length. The header contains information identifying the message type and length, message priority, target module(s) and sending module.
- **Data Byte(s)** - This is the actual message that is being sent.
- **Cyclic Redundancy Check (CRC) Byte** - This byte is used to detect errors during a message transmission.
- **In-Frame Response (IFR) byte(s)** - If a response is required from the target module(s), it can be sent during this frame. This function is described in greater detail in the following paragraph.

The IFR consists of one or more bytes, which are transmitted during a message. If the sending module requires information to be received immediately, the target module(s) can send data over the bus during the original message. This allows the sending module to receive time-critical information without having to wait for the target module to access the bus. After the IFR is received, the sending module broadcasts an End of Frame (EOF) message and releases control of the bus.

The PCI data bus can be monitored using the DRBIII® scan tool. It is possible, however, for the bus to pass all DRBIII® tests and still be faulty if the voltage parameters are all within the specified range and false messages are being sent.

CONTROLLER ANTILOCK BRAKE

REMOVAL

- (1) Install the prop rod on the brake pedal to keep pressure on the brake system.
- (2) Remove the negative battery cable from the battery.
- (3) Pull up on the CAB harness connector release (Fig. 4) and remove connector.

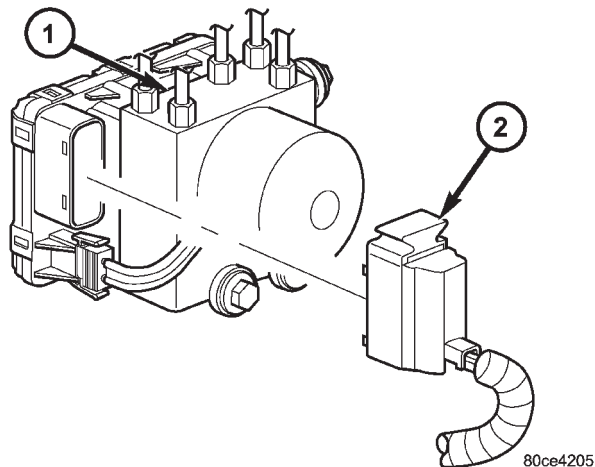


Fig. 4 CAB HARNESS CONNECTOR RELEASE

- 1 - ABS MODULE
- 2 - ELECTRICAL CONNECTOR

- (4) Remove the pump connector from the CAB.
- (5) Remove the CAB mounting bolts (Fig. 5).
- (6) Remove the CAB from the HCU (Fig. 6).

INSTALLATION

- (1) Install CAB to the HCU (Fig. 6).
- (2) Install mounting bolts. Tighten to 2 N·m (16 in. lbs.).
- (3) Install the pump electrical connector to the CAB (Fig. 6).
- (4) Install the wiring harness connector to the CAB and push down on the release to secure the connector.
- (5) Install negative battery cable to the battery.
- (6) Remove the pushrod from the vehicle.

DATA LINK CONNECTOR

DESCRIPTION - DATA LINK CONNECTOR

The data link connector is located at the lower edge of the instrument panel near the steering column (Fig. 7).

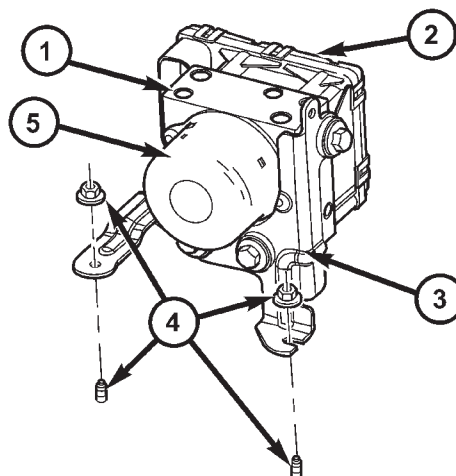


Fig. 5 HCU/CAB MOUNTING

- 1 - HCU
- 2 - CAB
- 3 - HCU/CAB BRACKET
- 4 - MOUNTING NUTS AND STUDS
- 5 - MOTOR

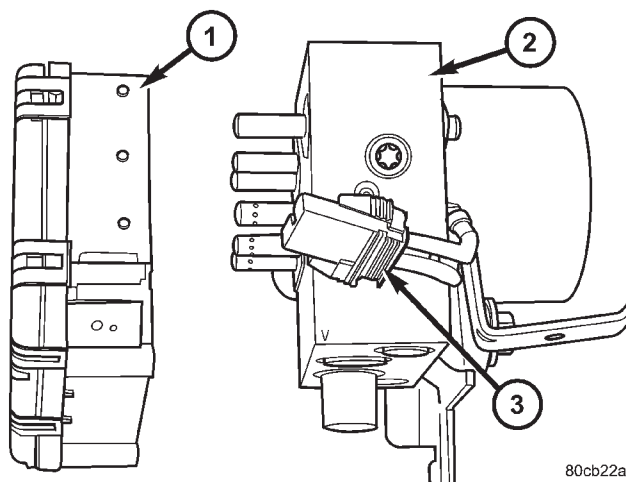


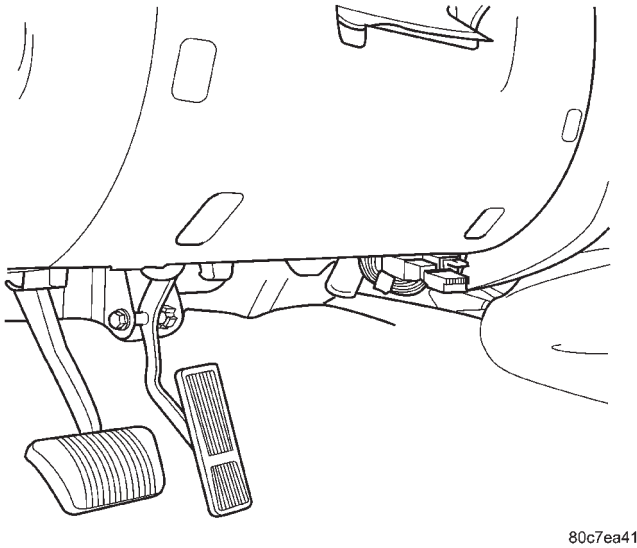
Fig. 6 CONTROLLER AND HCU

- 1 - CONTROLLER ANTILOCK BRAKE MODULE
- 2 - HYDRAULIC CONTROL UNIT (H.C.U)
- 3 - ELECTRICAL CONNECTOR

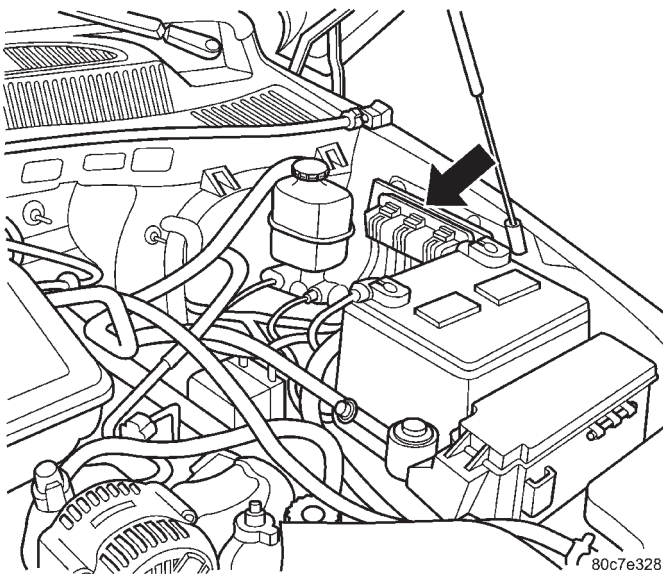
OPERATION - DATA LINK CONNECTOR

The 16-way data link connector (diagnostic scan tool connector) links the Diagnostic Readout Box (DRB) scan tool or the Mopar Diagnostic System (MDS) with the Powertrain Control Module (PCM).

DATA LINK CONNECTOR (Continued)

**Fig. 7 DATA LINK CONNECTOR LOCATION****POWERTRAIN CONTROL MODULE****DESCRIPTION****DESCRIPTION - PCM**

The Powertrain Control Module (PCM) is located in the engine compartment (Fig. 8). The PCM is referred to as JTEC.

**Fig. 8 PCM LOCATION****DESCRIPTION - MODES OF OPERATION**

As input signals to the Powertrain Control Module (PCM) change, the PCM adjusts its response to the output devices. For example, the PCM must calculate different injector pulse width and ignition timing for idle than it does for wide open throttle (WOT).

The PCM will operate in two different modes:

Open Loop and Closed Loop.

During Open Loop modes, the PCM receives input signals and responds only according to preset PCM programming. Input from the oxygen (O₂S) sensors is not monitored during Open Loop modes.

During Closed Loop modes, the PCM will monitor the oxygen (O₂S) sensors input. This input indicates to the PCM whether or not the calculated injector pulse width results in the ideal air-fuel ratio. This ratio is 14.7 parts air-to-1 part fuel. By monitoring the exhaust oxygen content through the O₂S sensor, the PCM can fine tune the injector pulse width. This is done to achieve optimum fuel economy combined with low emission engine performance.

The fuel injection system has the following modes of operation:

- Ignition switch ON
- Engine start-up (crank)
- Engine warm-up
- Idle
- Cruise
- Acceleration
- Deceleration
- Wide open throttle (WOT)
- Ignition switch OFF

The ignition switch On, engine start-up (crank), engine warm-up, acceleration, deceleration and wide open throttle modes are Open Loop modes. The idle and cruise modes, (with the engine at operating temperature) are Closed Loop modes.

IGNITION SWITCH (KEY-ON) MODE

This is an Open Loop mode. When the fuel system is activated by the ignition switch, the following actions occur:

- The PCM pre-positions the idle air control (IAC) motor.
- The PCM determines atmospheric air pressure from the MAP sensor input to determine basic fuel strategy.
- The PCM monitors the engine coolant temperature sensor input. The PCM modifies fuel strategy based on this input.
- Intake manifold air temperature sensor input is monitored.
- Throttle position sensor (TPS) is monitored.
- The auto shutdown (ASD) relay is energized by the PCM for approximately three seconds.

POWERTRAIN CONTROL MODULE (Continued)

- The fuel pump is energized through the fuel pump relay by the PCM. The fuel pump will operate for approximately three seconds unless the engine is operating or the starter motor is engaged.

- The O2S sensor heater element is energized via the ASD or O2S heater relay. The O2S sensor input is not used by the PCM to calibrate air-fuel ratio during this mode of operation.

ENGINE START-UP MODE

This is an Open Loop mode. The following actions occur when the starter motor is engaged.

The PCM receives inputs from:

- Battery voltage
- Engine coolant temperature sensor
- Crankshaft position sensor
- Intake manifold air temperature sensor
- Manifold absolute pressure (MAP) sensor
- Throttle position sensor (TPS)
- Camshaft position sensor signal

The PCM monitors the crankshaft position sensor. If the PCM does not receive a crankshaft position sensor signal within 3 seconds of cranking the engine, it will shut down the fuel injection system.

The fuel pump is activated by the PCM through the fuel pump relay.

Voltage is applied to the fuel injectors with the ASD relay via the PCM. The PCM will then control the injection sequence and injector pulse width by turning the ground circuit to each individual injector on and off.

The PCM determines the proper ignition timing according to input received from the crankshaft position sensor.

ENGINE WARM-UP MODE

This is an Open Loop mode. During engine warm-up, the PCM receives inputs from:

- Battery voltage
- Crankshaft position sensor
- Engine coolant temperature sensor
- Intake manifold air temperature sensor
- Manifold absolute pressure (MAP) sensor
- Throttle position sensor (TPS)
- Camshaft position sensor signal
- Park/neutral switch (gear indicator signal—auto. trans. only)

- Air conditioning select signal (if equipped)
- Air conditioning request signal (if equipped)

Based on these inputs the following occurs:

- Voltage is applied to the fuel injectors with the ASD relay via the PCM. The PCM will then control the injection sequence and injector pulse width by turning the ground circuit to each individual injector on and off.

- The PCM adjusts engine idle speed through the idle air control (IAC) motor and adjusts ignition timing.

- The PCM operates the A/C compressor clutch through the A/C compressor clutch relay. This is done if A/C has been selected by the vehicle operator and specified pressures are met at the high and low-pressure A/C switches. Refer to Heating and Air Conditioning for additional information.

- When engine has reached operating temperature, the PCM will begin monitoring O2S sensor input. The system will then leave the warm-up mode and go into closed loop operation.

IDLE MODE

When the engine is at operating temperature, this is a Closed Loop mode. At idle speed, the PCM receives inputs from:

- Air conditioning select signal (if equipped)
- Air conditioning request signal (if equipped)
- Battery voltage
- Crankshaft position sensor
- Engine coolant temperature sensor
- Intake manifold air temperature sensor
- Manifold absolute pressure (MAP) sensor
- Throttle position sensor (TPS)
- Camshaft position sensor signal
- Battery voltage
- Park/neutral switch (gear indicator signal—auto. trans. only)

- Oxygen sensors

Based on these inputs, the following occurs:

- Voltage is applied to the fuel injectors with the ASD relay via the PCM. The PCM will then control injection sequence and injector pulse width by turning the ground circuit to each individual injector on and off.

- The PCM monitors the O2S sensor input and adjusts air-fuel ratio by varying injector pulse width. It also adjusts engine idle speed through the idle air control (IAC) motor.

- The PCM adjusts ignition timing by increasing and decreasing spark advance.

- The PCM operates the A/C compressor clutch through the A/C compressor clutch relay. This is done if A/C has been selected by the vehicle operator and specified pressures are met at the high and low-pressure A/C switches. Refer to Heating and Air Conditioning for additional information.

CRUISE MODE

When the engine is at operating temperature, this is a Closed Loop mode. At cruising speed, the PCM receives inputs from:

- Air conditioning select signal (if equipped)
- Air conditioning request signal (if equipped)

POWERTRAIN CONTROL MODULE (Continued)

- Battery voltage
- Engine coolant temperature sensor
- Crankshaft position sensor
- Intake manifold air temperature sensor
- Manifold absolute pressure (MAP) sensor
- Throttle position sensor (TPS)
- Camshaft position sensor signal
- Park/neutral switch (gear indicator signal—auto. trans. only)

- Oxygen (O2S) sensors

Based on these inputs, the following occurs:

- Voltage is applied to the fuel injectors with the ASD relay via the PCM. The PCM will then adjust the injector pulse width by turning the ground circuit to each individual injector on and off.
- The PCM monitors the O2S sensor input and adjusts air-fuel ratio. It also adjusts engine idle speed through the idle air control (IAC) motor.
- The PCM adjusts ignition timing by turning the ground path to the coil(s) on and off.
- The PCM operates the A/C compressor clutch through the clutch relay. This happens if A/C has been selected by the vehicle operator and requested by the A/C thermostat.

ACCELERATION MODE

This is an Open Loop mode. The PCM recognizes an abrupt increase in throttle position or MAP pressure as a demand for increased engine output and vehicle acceleration. The PCM increases injector pulse width in response to increased throttle opening.

DECELERATION MODE

When the engine is at operating temperature, this is an Open Loop mode. During hard deceleration, the PCM receives the following inputs.

- Air conditioning select signal (if equipped)
- Air conditioning request signal (if equipped)
- Battery voltage
- Engine coolant temperature sensor
- Crankshaft position sensor
- Intake manifold air temperature sensor
- Manifold absolute pressure (MAP) sensor
- Throttle position sensor (TPS)
- Camshaft position sensor signal
- Park/neutral switch (gear indicator signal—auto. trans. only)
- Vehicle speed

If the vehicle is under hard deceleration with the proper rpm and closed throttle conditions, the PCM will ignore the oxygen sensor input signal. The PCM will enter a fuel cut-off strategy in which it will not supply a ground to the injectors. If a hard deceleration does not exist, the PCM will determine the proper injector pulse width and continue injection.

Based on the above inputs, the PCM will adjust engine idle speed through the idle air control (IAC) motor.

The PCM adjusts ignition timing by turning the ground path to the coil on and off.

WIDE OPEN THROTTLE MODE

This is an Open Loop mode. During wide open throttle operation, the PCM receives the following inputs.

- Battery voltage
- Crankshaft position sensor
- Engine coolant temperature sensor
- Intake manifold air temperature sensor
- Manifold absolute pressure (MAP) sensor
- Throttle position sensor (TPS)
- Camshaft position sensor signal

During wide open throttle conditions, the following occurs:

- Voltage is applied to the fuel injectors with the ASD relay via the PCM. The PCM will then control the injection sequence and injector pulse width by turning the ground circuit to each individual injector on and off. The PCM ignores the oxygen sensor input signal and provides a predetermined amount of additional fuel. This is done by adjusting injector pulse width.
- The PCM adjusts ignition timing by turning the ground path to the coil(s) on and off.

IGNITION SWITCH OFF MODE

When ignition switch is turned to OFF position, the PCM stops operating the injectors, ignition coil, ASD relay and fuel pump relay.

DESCRIPTION - 5 VOLT SUPPLIES

Two different Powertrain Control Module (PCM) five volt supply circuits are used; primary and secondary.

DESCRIPTION - IGNITION CIRCUIT SENSE

This circuit ties the ignition switch to the Powertrain Control Module (PCM).

DESCRIPTION - POWER GROUNDS

The Powertrain Control Module (PCM) has 2 main grounds. Both of these grounds are referred to as power grounds. All of the high-current, noisy, electrical devices are connected to these grounds as well as all of the sensor returns. The sensor return comes into the sensor return circuit, passes through noise suppression, and is then connected to the power ground.

The power ground is used to control ground circuits for the following PCM loads:

- Generator field winding

POWERTRAIN CONTROL MODULE (Continued)

- Fuel injectors
- Ignition coil(s)
- Certain relays/solenoids
- Certain sensors

DESCRIPTION - SENSOR RETURN

The Sensor Return circuits are internal to the Powertrain Control Module (PCM).

Sensor Return provides a low-noise ground reference for all engine control system sensors. Refer to Power Grounds for more information.

OPERATION**OPERATION - PCM**

The PCM operates the fuel system. The PCM is a pre-programmed, triple microprocessor digital computer. It regulates ignition timing, air-fuel ratio, emission control devices, charging system, certain transmission features, speed control, air conditioning compressor clutch engagement and idle speed. The PCM can adapt its programming to meet changing operating conditions.

The PCM receives input signals from various switches and sensors. Based on these inputs, the PCM regulates various engine and vehicle operations through different system components. These components are referred to as Powertrain Control Module (PCM) Outputs. The sensors and switches that provide inputs to the PCM are considered Powertrain Control Module (PCM) Inputs.

The PCM adjusts ignition timing based upon inputs it receives from sensors that react to: engine rpm, manifold absolute pressure, engine coolant temperature, throttle position, transmission gear selection (automatic transmission), vehicle speed, power steering pump pressure, and the brake switch.

The PCM adjusts idle speed based on inputs it receives from sensors that react to: throttle position, vehicle speed, transmission gear selection, engine coolant temperature and from inputs it receives from the air conditioning clutch switch and brake switch.

Based on inputs that it receives, the PCM adjusts ignition coil dwell. The PCM also adjusts the generator charge rate through control of the generator field and provides speed control operation.

NOTE: PCM Inputs:

- A/C request (if equipped with factory A/C)
- A/C select (if equipped with factory A/C)
- A/C pressure transducer
- Auto shutdown (ASD) sense
- Battery temperature
- Battery voltage
- Brake switch

- J1850 bus (+) circuits
- J1850 bus (-) circuits
- Camshaft position sensor signal
- Crankshaft position sensor
- Data link connection for DRB scan tool
- Engine coolant temperature sensor
- Fuel level (through J1850 circuitry)
- Generator (battery voltage) output
- Ignition circuit sense (ignition switch in on/off/ crank/run position)
- Intake manifold air temperature sensor
- Knock sensors (2 on 3.7L engine)
- Leak detection pump (switch) sense (if equipped)
- Manifold absolute pressure (MAP) sensor
- Oil pressure
- Oxygen sensors
- Park/neutral switch (auto. trans. only)
- Power ground
- Power steering pressure switch
- Sensor return
- Signal ground
- Speed control multiplexed single wire input
- Throttle position sensor
- Transfer case switch (4WD range position)
- Vehicle speed sensor

NOTE: PCM Outputs:

- A/C clutch relay
- Auto shutdown (ASD) relay
- J1850 bus (+/-) circuits for: speedometer, voltmeter, fuel gauge, oil pressure gauge/lamp, engine temp. gauge and speed control warn. lamp
- Clutch pedal position switch override relay
- Data link connection for DRB scan tool
- EGR valve control solenoid (if equipped)
- EVAP canister purge solenoid
- Five volt sensor supply (primary)
- Five volt sensor supply (secondary)
- Fuel injectors
- Fuel pump relay
- Generator field driver (-)
- Generator field driver (+)
- Idle air control (IAC) motor
- Ignition coil(s)
- Leak detection pump (if equipped)
- Malfunction indicator lamp (Check engine lamp). Driven through J1850 circuits.
- Oxygen sensor heater relays
- Oxygen sensors (pulse width modulated)
- Radiator cooling fan relay (pulse width modulated)
- Speed control vacuum solenoid
- Speed control vent solenoid
- Tachometer (if equipped). Driven through J1850 circuits.

POWERTRAIN CONTROL MODULE (Continued)

- Transmission convertor clutch circuit. Driven through J1850 circuits.

OPERATION - 5 VOLT SUPPLIES

Primary 5-volt supply:

- supplies the required 5 volt power source to the Crankshaft Position (CKP) sensor.
- supplies the required 5 volt power source to the Camshaft Position (CMP) sensor.
- supplies a reference voltage for the Manifold Absolute Pressure (MAP) sensor.
- supplies a reference voltage for the Throttle Position Sensor (TPS) sensor.

Secondary 5-volt supply:

- supplies the required 5 volt power source to the oil pressure sensor.
- supplies the required 5 volt power source for the Vehicle Speed Sensor (VSS) (if equipped).
- supplies the 5 volt power source to the transmission pressure sensor (certain automatic transmissions).

OPERATION - IGNITION CIRCUIT SENSE

The ignition circuit sense input tells the PCM the ignition switch has energized the ignition circuit.

Battery voltage is also supplied to the PCM through the ignition switch when the ignition is in the RUN or START position. This is referred to as the "ignition sense" circuit and is used to "wake up" the PCM. Voltage on the ignition input can be as low as 6 volts and the PCM will still function. Voltage is supplied to this circuit to power the PCM's 8-volt regulator and to allow the PCM to perform fuel, ignition and emissions control functions.

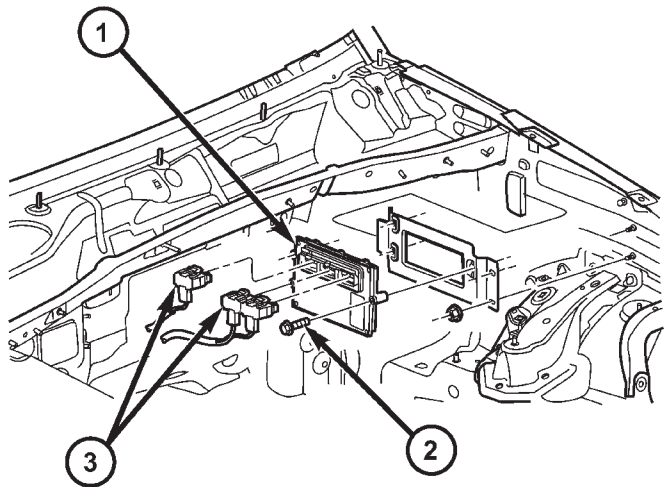
REMOVAL

USE THE DRB SCAN TOOL TO REPROGRAM THE NEW POWERTRAIN CONTROL MODULE (PCM) WITH THE VEHICLES ORIGINAL IDENTIFICATION NUMBER (VIN) AND THE VEHICLES ORIGINAL MILEAGE. IF THIS STEP IS NOT DONE, A DIAGNOSTIC TROUBLE CODE (DTC) MAY BE SET.

The PCM is located in the engine compartment near the battery (Fig. 9).

To avoid possible voltage spike damage to the PCM, ignition key must be off, and negative battery cable must be disconnected before unplugging PCM connectors.

- (1) Disconnect negative battery cable at battery.
- (2) Remove cover over electrical connectors. Cover snaps onto PCM.
- (3) Carefully unplug the three 32-way connectors from PCM.
- (4) Remove three PCM mounting bolts and remove PCM from vehicle.



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Fig. 9 PCM REMOVE/INSTALL

- 1 - PCM
2 - MOUNTING BOLTS (3)
3 - 32-WAY CONNECTORS

INSTALLATION

USE THE DRB SCAN TOOL TO REPROGRAM THE NEW POWERTRAIN CONTROL MODULE (PCM) WITH THE VEHICLES ORIGINAL IDENTIFICATION NUMBER (VIN) AND THE VEHICLES ORIGINAL MILEAGE. IF THIS STEP IS NOT DONE, A DIAGNOSTIC TROUBLE CODE (DTC) MAY BE SET.

- (1) Install PCM and 3 mounting bolts to vehicle.
- (2) Tighten bolts. Refer to torque specifications.
- (3) Check pin connectors in the PCM and the three 32-way connectors for corrosion or damage. Also, the pin heights in connectors should all be same. Repair as necessary before installing connectors.
- (4) Install three 32-way connectors.
- (5) Install cover over electrical connectors. Cover snaps onto PCM.
- (6) Install battery cable.
- (7) Use the DRB scan tool to reprogram new PCM with vehicles original Identification Number (VIN) and original vehicle mileage.

SENTRY KEY IMMOBILIZER MODULE**DESCRIPTION**

The Sentry Key Immobilizer Module (SKIM) is the primary component of the Sentry Key Immobilizer System (SKIS) (Fig. 10). The SKIM is located on the right side of the steering column, below the ignition

SENTRY KEY IMMOBILIZER MODULE (Continued)

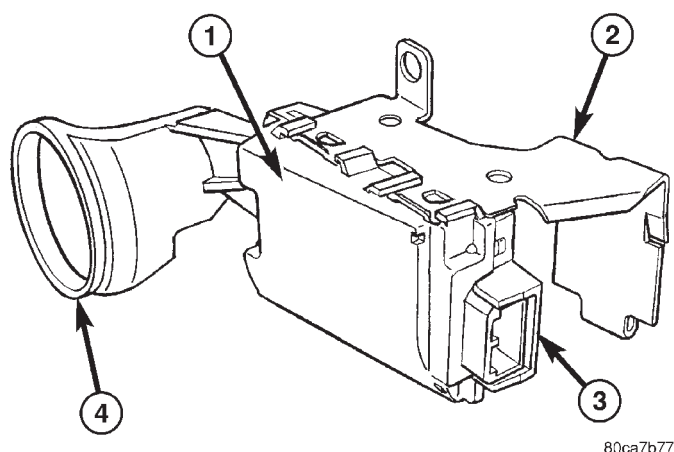


Fig. 10 Sentry Key Immobilizer Module

- 1 - SKIM
- 2 - BRACKET
- 3 - CONNECTOR RECEPTACLE
- 4 - ANTENNA RING

lock cylinder housing and is concealed beneath the steering column shrouds. The molded black plastic housing for the SKIM has an integral molded plastic halo-like antenna ring that extends from one end. When the SKIM is properly installed on the steering column, the antenna ring is oriented around the circumference of the ignition lock cylinder housing. A single integral connector receptacle containing six terminal pins is located on the opposite end of the SKIM housing from the antenna ring. A stamped metal mounting bracket secured to the SKIM housing has a U-shaped clip formation that is used to secure the unit to the right lower flange of the steering column jacket.

The SKIM cannot be adjusted or repaired. If faulty or damaged, the entire SKIM unit must be replaced.

OPERATION

The Sentry Key Immobilizer Module (SKIM) contains a Radio Frequency (RF) transceiver and a microprocessor. The SKIM transmits RF signals to, and receives RF signals from the Sentry Key transponder through a tuned antenna enclosed within the molded plastic antenna ring integral to the SKIM housing. If this antenna ring is not mounted properly around the ignition lock cylinder housing, communication problems between the SKIM and the transponder may arise. These communication problems will result in Sentry Key transponder-related faults. The SKIM also communicates over the Programmable Communications Interface (PCI) data bus with the Powertrain Control Module (PCM), the ElectroMechanical Instrument Cluster (EMIC) and/or the DRBIII® scan tool.

The SKIM retains in memory the ID numbers of any Sentry Key transponder that is programmed into it. A maximum of eight Sentry Key transponders can be programmed into the SKIM. For added system security, each SKIM is programmed with a unique Secret Key code. This code is stored in memory, sent over the PCI data bus to the PCM, and is encoded to the transponder of every Sentry Key that is programmed into the SKIM. Therefore, the Secret Key code is a common element that is found in every component of the Sentry Key Immobilizer System (SKIS). Another security code, called a PIN, is used to gain access to the SKIM Secured Access Mode. The Secured Access Mode is required during service to perform the SKIS initialization and Sentry Key transponder programming procedures. The SKIM also stores the Vehicle Identification Number (VIN) in its memory, which it learns through a PCI data bus message from the PCM during SKIS initialization.

In the event that a SKIM replacement is required, the Secret Key code can be transferred to the new SKIM from the PCM using the DRBIII® scan tool and the SKIS initialization procedure. Proper completion of the SKIS initialization will allow the existing Sentry Keys to be programmed into the new SKIM so that new keys will not be required. In the event that the original Secret Key code cannot be recovered, SKIM replacement will also require new Sentry Keys. The DRBIII® scan tool will alert the technician during the SKIS initialization procedure if new Sentry Keys are required.

When the ignition switch is turned to the On position, the SKIM transmits an RF signal to the transponder in the ignition key. The SKIM then waits for an RF signal response from the transponder. If the response received identifies the key as valid, the SKIM sends a valid key message to the PCM over the PCI data bus. If the response received identifies the key as invalid, or if no response is received from the key transponder, the SKIM sends an invalid key message to the PCM. The PCM will enable or disable engine operation based upon the status of the SKIM 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 SKIM by the PCM, the engine will be disabled and the vehicle immobilized after two seconds of running.

The SKIM also sends SKIS indicator status messages to the EMIC over the PCI data bus to tell the EMIC how to operate the SKIS indicator. This indicator status message tells the EMIC to turn the indicator on for about three seconds each time the ignition switch is turned to the On position as a bulb test. After completion of the bulb test, the SKIM sends indicator status messages to the EMIC to turn the indicator off, turn the indicator on, or to flash the

SENTRY KEY IMMOBILIZER MODULE (Continued)

indicator on and off. If the SKIS indicator flashes upon ignition On or stays on solid after the bulb test, it signifies a SKIS fault. If the SKIM detects a system malfunction and/or the SKIS has become inoperative, the SKIS indicator will stay on solid. If the SKIM detects an invalid key or if a key transponder-related fault exists, the SKIS indicator will flash. If the vehicle is equipped with the Customer Learn transponder programming feature, the SKIM will also send messages to the EMIC to flash the SKIS indicator and to generate a single audible chime tone whenever the Customer Learn programming mode is being utilized. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE - SENTRY KEY TRANSPONDER PROGRAMMING).

The SKIS performs a self-test each time the ignition switch is turned to the On position, and will store fault information in the form of Diagnostic Trouble Codes (DTC's) in SKIM memory if a system malfunction is detected. The SKIM can be diagnosed, and any stored DTC's can be retrieved using a DRBIII® scan tool. Refer to the appropriate diagnostic information.

REMOVAL

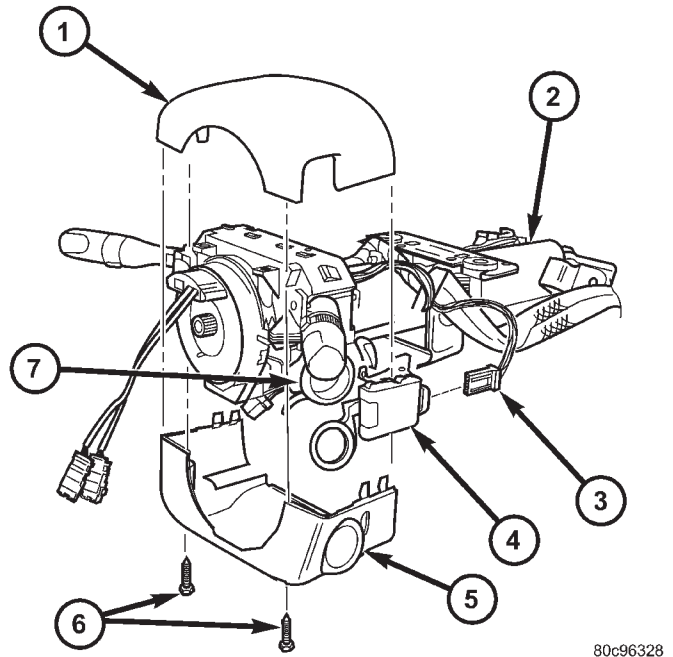
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) If the vehicle is equipped with the optional tilt steering column, move the tilt steering column to the fully lowered position and leave the tilt release lever in the released (down) position.

(3) From below the steering column, remove the two screws that secure the lower shroud to the upper shroud (Fig. 11).

(4) Using hand pressure, push gently inward on both sides of the upper shroud near the parting line between the upper and lower shrouds to release the



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Fig. 11 Sentry Key Immobilizer Module Removal/Install

- 1 - UPPER SHROUD
- 2 - STEERING COLUMN
- 3 - WIRE HARNESS CONNECTOR
- 4 - SENTRY KEY IMMOBILIZER MODULE
- 5 - LOWER SHROUD
- 6 - SCREW (2)
- 7 - IGNITION LOCK CYLINDER HOUSING

snap features that secure the two halves to each other.

(5) Remove both the upper and lower shrouds from the steering column.

(6) Disconnect the instrument panel wire harness connector for the SKIM from the module connector receptacle.

(7) The SKIM mounting bracket features a clip formation that secures the SKIM to the right lower flange of the steering column jacket. Pull downward on the connector end of the SKIM mounting bracket to release this clip from the steering column jacket.

(8) Rotate the SKIM and its mounting bracket downwards and then to the side away from the steering column to slide the SKIM antenna ring from around the ignition switch lock cylinder housing. Lift the multi-function switch upward off of the upper steering column housing far enough to remove the SKIM antenna ring formation from between the ignition key release button and the multi-function switch housing.

(9) Remove the SKIM from the steering column.

SENTRY KEY IMMOBILIZER MODULE (Continued)

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the Sentry Key Immobilizer Module (SKIM) to the right side of the steering column (Fig. 11). Lift the multi-function switch upward off of the upper steering column housing far enough to insert the SKIM antenna ring formation between the ignition key release button and the multi-function switch housing.

(2) Slide the SKIM antenna ring around the ignition switch lock cylinder housing, then rotate the SKIM and its mounting bracket upwards and toward the steering column.

(3) Align the SKIM mounting bracket clip formation with the right lower flange of the steering column jacket and, using hand pressure, push upward firmly and evenly on the connector end of the SKIM mounting bracket to engage this clip with the steering column jacket.

(4) Reconnect the instrument panel wire harness connector for the SKIM to the module connector receptacle.

(5) Position both the upper and lower shrouds onto the steering column.

(6) Align the snap features on the lower shroud with the receptacles on the upper shroud and apply hand pressure to snap them together.

(7) From below the steering column, install and tighten the two screws that secure the lower shroud to the upper shroud. Tighten the screws to 2 N·m (18 in. lbs.).

(8) If the vehicle is equipped with the optional tilt steering column, move the tilt steering column to the fully raised position and secure it in place by moving the tilt release lever back to the locked (up) position.

(9) Reconnect the battery negative cable.

NOTE: If the SKIM has been replaced with a new unit, the Sentry Key Immobilizer System (SKIS) MUST be initialized before the vehicle can be operated. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE - SKIS INITIALIZATION).

TRANSMISSION CONTROL MODULE

DESCRIPTION

The Transmission Control Module (TCM) is located in the engine compartment on the right (passenger) side and is mounted to the inner fender (Fig. 12).

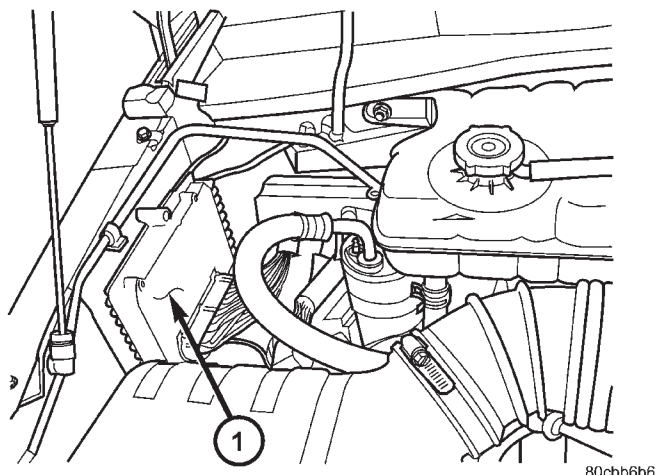


Fig. 12 Transmission Control Module Location

1 - Transmission Control Module

OPERATION

The Transmission Control Module (TCM) is the controlling unit for all electronic operations of the transmission. The TCM receives information regarding vehicle operation from both direct and indirect inputs, and selects the operational mode of the transmission. Direct inputs are hardwired to, and used specifically by the TCM. Indirect inputs originate from other components/modules, and are shared with the TCM via the vehicle communication bus.

Some examples of **direct inputs** to the TCM are:

- Battery (B+) voltage
- Ignition "ON" voltage
- Transmission Control Relay (Switched B+)
- Throttle Position Sensor
- Crankshaft Position Sensor
- Transmission Range Sensor
- Pressure Switches
- Transmission Temperature Sensor
- Input Shaft Speed Sensor

TRANSMISSION CONTROL MODULE (Continued)

- Output Shaft Speed Sensor
 - Line Pressure Sensor
- Some examples of **indirect inputs** to the TCM are:
- Engine/Body Identification
 - Manifold Pressure
 - Target Idle
 - Torque Reduction Confirmation
 - Engine Coolant Temperature
 - Ambient/Battery Temperature
 - DRB® Scan Tool Communication

Based on the information received from these various inputs, the TCM determines the appropriate shift schedule and shift points, depending on the present operating conditions and driver demand. This is possible through the control of various direct and indirect outputs.

Some examples of TCM **direct outputs** are:

- Transmission Control Relay
- Solenoids
- Torque Reduction Request

Some examples of TCM **indirect outputs** are:

- Transmission Temperature (to PCM)
- PRNDL Position (to BCM)

In addition to monitoring inputs and controlling outputs, the TCM has other important responsibilities and functions:

- Storing and maintaining Clutch Volume Indexes (CVI)
- Storing and selecting appropriate Shift Schedules
- System self-diagnostics
- Diagnostic capabilities (with DRB® scan tool)

NOTE: If the TCM has been replaced, the “Quick Learn Procedure” must be performed. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

BATTERY FEED

A fused, direct battery feed to the TCM is used for continuous power. This battery voltage is necessary to retain adaptive learn values in the TCM's RAM (Random Access Memory). When the battery (B+) is disconnected, this memory is lost. When the battery (B+) is restored, this memory loss is detected by the TCM and a Diagnostic Trouble Code (DTC) is set.

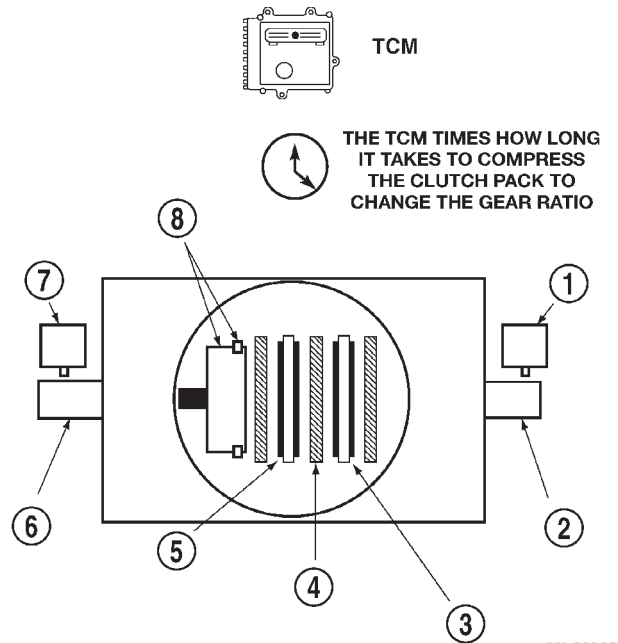
CLUTCH VOLUME INDEXES (CVI)

An important function of the TCM is to monitor Clutch Volume Indexes (CVI). CVIs represent the volume of fluid needed to compress a clutch pack.

The TCM monitors gear ratio changes by monitoring the Input and Output Speed Sensors. The Input, or Turbine Speed Sensor sends an electrical signal to the TCM that represents input shaft rpm. The Out-

put Speed Sensor provides the TCM with output shaft speed information.

By comparing the two inputs, the TCM can determine transmission gear position. This is important to the CVI calculation because the TCM determines CVIs by monitoring how long it takes for a gear change to occur (Fig. 13).



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Fig. 13 Example of CVI Calculation

- 1 - OUTPUT SPEED SENSOR
- 2 - OUTPUT SHAFT
- 3 - CLUTCH PACK
- 4 - SEPARATOR PLATE
- 5 - FRICTION DISCS
- 6 - INPUT SHAFT
- 7 - INPUT SPEED SENSOR
- 8 - PISTON AND SEAL

Gear ratios can be determined by using the DRB® Scan Tool and reading the Input/Output Speed Sensor values in the “Monitors” display. Gear ratio can be obtained by dividing the Input Speed Sensor value by the Output Speed Sensor value.

For example, if the input shaft is rotating at 1000 rpm and the output shaft is rotating at 500 rpm, then the TCM can determine that the gear ratio is 2:1. In direct drive (3rd gear), the gear ratio changes to 1:1. The gear ratio changes as clutches are applied and released. By monitoring the length of time it takes for the gear ratio to change following a shift request, the TCM can determine the volume of fluid used to apply or release a friction element.

The volume of transmission fluid needed to apply the friction elements are continuously updated for adaptive controls. As friction material wears, the volume of fluid need to apply the element increases.

TRANSMISSION CONTROL MODULE (Continued)

Certain mechanical problems within the input clutch assembly (broken return springs, out of position snap rings, excessive clutch pack clearance, improper assembly, etc.) can cause inadequate or out-of-range element volumes. Also, defective Input/Output Speed Sensors and wiring can cause these conditions. The following chart identifies the appropriate clutch volumes and when they are monitored/updated:

CLUTCH VOLUMES		
Clutch	When Updated	Proper Clutch Volume
L/R	2-1 or 3-1 downshift	45 to 134
2C	3-2 kickdown shift	25 to 85
OD	2-3 upshift	30 to 100

CLUTCH VOLUMES		
4C	3-4 upshift	30 to 85
UD	4-3 kickdown shift	30 to 100

SHIFT SCHEDULES

As mentioned earlier, the TCM has programming that allows it to select a variety of shift schedules. Shift schedule selection is dependent on the following:

- Shift lever position
- Throttle position
- Engine load
- Fluid temperature
- Software level

As driving conditions change, the TCM appropriately adjusts the shift schedule. Refer to the following chart to determine the appropriate operation expected, depending on driving conditions.

Schedule	Condition	Expected Operation
Extreme Cold	Oil temperature below -16° F	-Park, Reverse, Neutral and 1st and 3rd gear only in D position, 2nd gear only in Manual 2 or L -No EMCC
Super Cold	Oil temperature between -12° F and 10° F	- Delayed 2-3 upshift - Delayed 3-4 upshift - Early 4-3 coastdown shift - High speed 4-2, 3-2, 2-1 kickdown shifts are prevented -Shifts at high throttle openings will be early. - No EMCC
Cold	Oil temperature between 10° F and 36° F	-Shift schedule is the same as Super Cold except that the 2-3 upshifts are not delayed.
Warm	Oil temperature between 40° F and 80° F	- Normal operation (upshift, kickdowns, and coastdowns) - No EMCC
Hot	Oil temperature between 80° F and 240° F	- Normal operation (upshift, kickdowns, and coastdowns) - Normal EMCC operation

TRANSMISSION CONTROL MODULE (Continued)

Schedule	Condition	Expected Operation
Overheat	Oil temperature above 240° F or engine coolant temperature above 244° F	- Delayed 2-3 upshift - Delayed 3-4 upshift - 3rd gear FEMCC from 30-48 mph - 3rd gear PEMCC above 35 mph - Above 25 mph the torque converter will not unlock unless the throttle is closed or if a wide open throttle 2nd PEMCC to 1 kickdown is made

STANDARD PROCEDURE - TCM QUICK LEARN

The quick learn procedure requires the use of the DRB® scan tool.

This program allows the electronic transmission system to recalibrate itself. This will provide the proper transmission operation. The quick learn procedure should be performed if any of the following procedures are performed:

- Transmission Assembly Replacement
- Transmission Control Module Replacement
- Solenoid Pack Replacement
- Clutch Plate and/or Seal Replacement
- Valve Body Replacement or Recondition

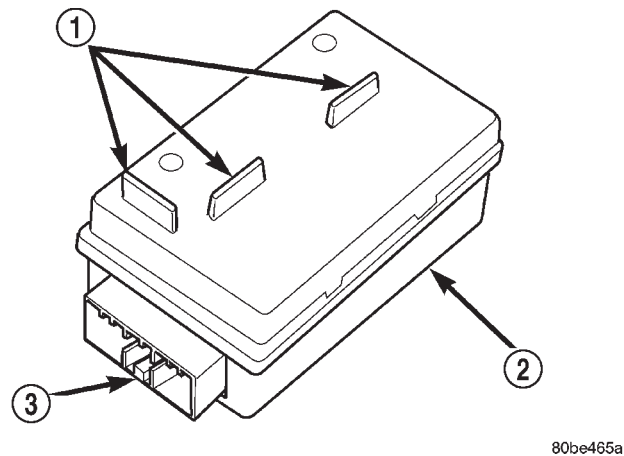
To perform the Quick Learn Procedure, the following conditions must be met:

- The brakes must be applied
- The engine speed must be above 500 rpm
- The throttle angle (TPS) must be less than 3 degrees
- The shift lever position must stay in PARK until prompted to shift to overdrive
- The shift lever position must stay in overdrive after the Shift to Overdrive prompt until the DRB® indicates the procedure is complete
- The calculated oil temperature must be above 60° and below 200°

HEATED SEAT MODULE**DESCRIPTION**

The heated seat module is also known as the Seat Heat Interface Module. The heated seat module (Fig. 14) is located under the left front seat cushion, where it is secured to a mounting bracket via two push-pin retainers. The heated seat module has a single connector receptacle that allows the module to be connected to all of the required inputs and outputs through the seat wire harness.

The heated seat module is an electronic microprocessor controlled device designed and programmed to use inputs from the heated seat relay, the two heated

**Fig. 14 Heated Seat Module**

- 1 - Mounting Tabs (Not Used On KJ)
- 2 - Heated Seat Module
- 3 - Connector Receptacle

seat switches and the two heated seat sensors to operate and control the heated seat elements in both front seats and the two heated seat indicator lamp Light-Emitting Diodes (LEDs) in each heated seat switch. The heated seat module is also programmed to perform self-diagnosis of certain heated seat system functions and provide feedback of that diagnosis through the heated seat switch indicator lamps.

The heated seat module cannot be repaired. If the heated seat module is damaged or faulty, the entire module must be replaced.

OPERATION

The heated seat module operates on fused battery current received from a fuse in the junction block. The module is grounded at all times. Inputs to the module include a resistor multiplexed heated seat switch request circuit for each of the two heated seat switches and the heated seat sensor inputs from the seat cushions of each front seat. In response to those inputs, the heated seat module controls battery current to the heated seat elements and sensors, and

HEATED SEAT MODULE (Continued)

controls the ground for the heated seat switch indicator lamps (LED's).

When a heated seat switch (Driver or Passenger) is depressed a signal is received by the heated seat module, the module energizes the proper indicator LED (Low or High) in the switch by grounding the indicator lamp circuit to indicate that the heated seat system is operating. At the same time, the heated seat module energizes the selected heated seat sensor circuit and the sensor provides the module with an input indicating the surface temperature of the selected seat cushion.

The Low heat set point is about 36° C (96.8° F), and the High heat set point is about 42° C (107.6° F). If the seat cushion surface temperature input is below the temperature set point for the selected temperature setting, the heated seat module energizes an N-channel Field Effect Transistor (N-FET) within the module which energizes the heated seat elements in the selected seat cushion and back. When the sensor input to the module indicates the correct temperature set point has been achieved, the module de-energizes the N-FET which de-energizes the heated seat elements. The heated seat module will continue to cycle the N-FET as needed to maintain the selected temperature set point.

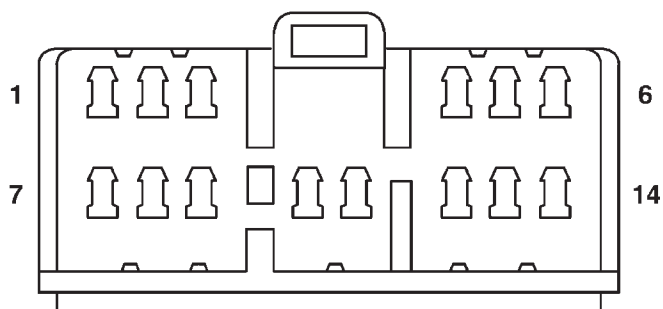
If the heated seat module detects a heated seat sensor value input that is out of range or a shorted or open heated seat element circuit, it will notify the vehicle operator or the repair technician of this condition by flashing the High and/or Low indicator lamps in the affected heated seat switch. Refer to **Diagnosis and Testing Heated Seat System** in Heated Systems for flashing LED diagnosis and testing procedures. Refer to **Diagnosis and Testing Heated Seat Module** in this section for heated seat module diagnosis and testing procedures. Also refer to the Body Diagnostic Manual for additional diagnosis and testing procedures.

DIAGNOSIS AND TESTING - HEATED SEAT MODULE

If a heated seat fails to heat and one or both of the indicator lamps on a heated seat switch flash, refer to **Heated Seat System Diagnosis and Testing** in Heated Systems for flashing LED failure identification. Refer to **Wiring Diagrams** in for complete heated seat system wiring diagrams.

(1) Remove the heated seat module from its mounting location (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/MEMORY HEATED SEAT/MIRROR MODULE - REMOVAL).

NOTE: ANY RESISTANCE VALUES (OHMS Ω) GIVEN IN THE FOLLOWING TEXT ARE SUPPLIED USING THE AUTOMATIC RANGE GENERATED BY A FLUKE® AUTOMOTIVE METER. IF ANOTHER TYPE OF MEASURING DEVICE IS USED THE VALUES GENERATED MAY NOT BE THE SAME AS THE RESULTS SHOWN HERE, OR MAY HAVE TO BE CONVERTED TO THE RANGE USED HERE.



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Fig. 15 Heated Seat Module Electrical Connector

RIGHT SEAT HEATER INOPERATIVE

(1) If a heated seat heats but one or both indicator lamps (LED's) on the heated seat switch fail to illuminate, check the driver circuit with the inoperative LED for a short to ground. If OK, replace the heated seat switch. If NOT OK repair the short to ground as required and then replace the heated seat switch.

NOTE: IF THE RIGHT SEAT CUSHION IS ALREADY WARM THE FOLLOWING STEP WILL NOT PROVE CONCLUSIVE.

(2) Back-probe the heated seat module wire harness connector (Fig. 15), do not disconnect. Check cavity #3 for battery voltage when the right heated seat switch is turned "ON", voltage should be present, If OK go to Step 3 If NOT OK, test the right heated seat switch (Refer to 8 - ELECTRICAL/HEATED SEATS/PASSENGER HEATED SEAT SWITCH - DIAGNOSIS AND TESTING). If the switch tests OK, check for continuity between the switch and control module on the MUX circuit, If OK replace the heated seat control module. If NOT OK, repair the open or shorted MUX circuit as required.

HEATED SEAT MODULE (Continued)

NOTE: BE CERTAIN THE BATTERY IS FULLY CHARGED BEFORE TESTING. FAILURE TO DO SO CAN RESULT IN INCORRECT READINGS.

(3) Back-probe the heated seat module wire harness connector, do not disconnect. Check cavity #10 for battery voltage, while observing the voltmeter depress the right heated seat switch **low** setting twice, voltage should toggle between approx.12v and 8v, If OK go to Step 4. If NOT OK check for continuity between the switch and control module on the low heat driver circuit, If OK replace the heated seat control module.

(4) Back-probe the heated seat module wire harness connector, do not disconnect. Check cavity #11 for battery voltage, while observing the voltmeter depress the right heated seat switch **high** setting twice, voltage should toggle between approx.12v and 8v, If OK go to Step 5. If NOT OK check for continuity between the switch and control module on the high heat driver circuit, If OK replace the heated seat control module.

(5) Back-probe the heated seat module wire harness connector, do not disconnect. Check cavity #2 for approx. 5v, voltage should be present, If OK go to Step 6. If NOT OK replace the heated seat control module.

(6) Back-probe the heated seat module wire harness connector, do not disconnect. Check cavity #7 for a range in voltage from 1.72v (warm seat) – 3.0v (cold seat). It should be within this range, If OK replace the heated seat module. If NOT OK test the Heated Seat Sensor. If NOT OK, replace the right heated seat element and sensor assembly. If the heated seat sensor tests OK, check for continuity between the right heated seat cushion connector and control module connector on the 5v supply circuit, If NOT OK, repair the open or shorted 5v supply circuit as required. If OK check for continuity between the right heated seat cushion connector and control module connector on the temperature sensor input circuit. If NOT OK, repair the open or shorted temperature sensor input circuit as required. If OK replace the heated seat control module.

LEFT SEAT HEATER INOPERATIVE

(1) If a heated seat heats but one or both indicator lamps (LED's) on the heated seat switch fail to illuminate, check the driver circuit with the inoperative LED for a short to ground. If OK, replace the heated seat switch. If NOT OK repair the short to ground as required and then replace the heated seat switch.

NOTE: IF THE LEFT SEAT CUSHION IS ALREADY WARM THE FOLLOWING STEP WILL NOT PROVE CONCLUSIVE.

(2) Back-probe the heated seat module wire harness connector, do not disconnect. Check cavity #5 for battery voltage when the left heated seat switch is turned "ON", voltage should be present, If OK go to Step 3. If NOT OK, test the left heated seat switch (Refer to 8 - ELECTRICAL/HEATED SEATS/ DRIVER HEATED SEAT SWITCH - DIAGNOSIS AND TESTING). If the switch tests OK, check for continuity between the switch and control module on the MUX circuit, If OK replace the heated seat control module. If NOT OK, repair the open or shorted MUX circuit as required.

(3) Back-probe the heated seat module wire harness connector, do not disconnect. Check cavity #12 for battery voltage, while observing the voltmeter depress the left heated seat switch **low** setting twice, voltage should toggle between approx.12v and 8v, If OK go to Step 4. If NOT OK check for continuity between the switch and control module on the low heat driver circuit, If OK replace the heated seat control module.

(4) Back-probe the heated seat module wire harness connector, do not disconnect. Check cavity #14 for battery voltage, while observing the voltmeter depress the left heated seat switch **high** setting twice, voltage should toggle between approx.12v and 8v, If OK go to Step 5. If NOT OK check for continuity between the switch and control module on the high heat driver circuit, If OK replace the heated seat control module.

(5) Back-probe the heated seat module wire harness connector, do not disconnect. Check cavity #2 for approx. 5v, 5 voltage should be present, If OK go to Step 6. If NOT OK replace the heated seat control module.

(6) Back-probe the heated seat module wire harness connector, do not disconnect. Check cavity #8 for a range in voltage from 1.72v (warm seat) – 3.0v (cold seat). It should be within this range, If OK replace the heated seat control module. If NOT OK, test the Heated Seat Sensor. If NOT OK, replace the left heated seat element and sensor assembly. If the heated seat sensor tests OK, check for continuity between the left heated seat cushion connector and control module connector on the 5v supply circuit, If NOT OK, repair the open or shorted 5v supply circuit as required. If OK check for continuity between the left heated seat cushion connector and control module connector on the temperature sensor input circuit. If NOT OK, repair the open or shorted temperature sensor input circuit as required. If OK replace the heated seat control module.

HEATED SEAT MODULE (Continued)

BOTH SEATS INOPERATIVE

If both seats (driver and passenger) fail to heat and the indicator lamps on the heated seat switches for both seats fail to operate, test the heated seat fuses in the junction block. If the heated seat fuses check OK, go to Step 1.

(1) Back-probe the heated seat module wire harness connector, do not disconnect. Check for continuity between the ground circuit cavity #13 of the heated seat module connector and a good ground. If OK go to Step 2. If NOT OK, repair the open or shorted ground circuit as required.

(2) Back-probe the heated seat module wire harness connector, do not disconnect. Check cavity #4 and #6 for battery voltage, voltage should be present, If OK go to Step 3. If NOT OK repair the open or shorted fused B(+) circuit as required.

(3) Back-probe the heated seat module wire harness connector, do not disconnect. Check cavity #2 for approx. 5v, voltage should be present, replace the heated seat control module with a known good module and verify system operation.

REMOVAL

(1) Working under the front seat cushion (Fig. 16), remove the heated seat module from its mounting bracket by gently prying the module off of the two mounting pushpins.

(2) Disconnect the seat wire harness connector from the connector receptacle on the side of the heated seat module.

(3) Remove the heated seat module from the vehicle.

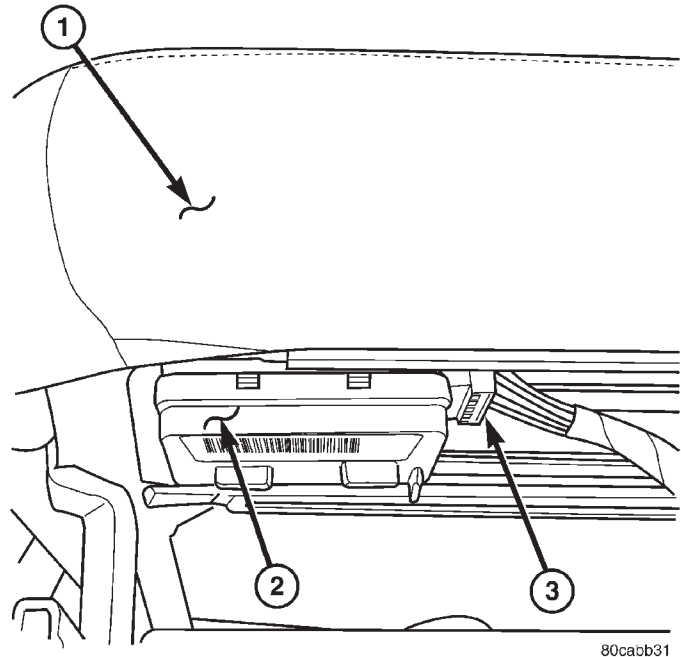


Fig. 16 Heated Seat Module Location

- 1 - Front Seat Cushion
- 2 - Heated Seat Module
- 3 - Electrical Connector

INSTALLATION

(1) Connect the seat wire harness connector to the connector receptacle on the side of the heated seat module.

(2) Install the heated seat module on its mounting bracket under the front seat.

(3) Verify heated seat system operation.

ENGINE SYSTEMS

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BATTERY SYSTEM

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BATTERY SYSTEM

DESCRIPTION

A single 12-volt battery system is standard factory-installed equipment on this model. All of the components of the battery system are located within the engine compartment of the vehicle. The service information for the battery system in this vehicle covers the following related components, which are covered in further detail elsewhere in this service manual:

- **Battery** - The storage battery provides a reliable means of storing a renewable source of electrical energy within the vehicle.

- **Battery Cable** - The battery cables connect the battery terminal posts to the vehicle electrical system.

- **Battery Holddown** - The battery holddown hardware secures the battery in the battery tray in the engine compartment.

BATTERY SYSTEM (Continued)

- **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 holddown hardware.

For battery system maintenance schedules and jump starting procedures, see the owner's manual in the vehicle glove box. Optionally, refer to Lubrication and Maintenance for the proper battery jump starting procedures. While battery charging can be considered a maintenance procedure, the battery charging procedures and related information are located in the service procedures section of this service manual. This was done because the battery must be fully-charged before any battery system diagnosis or testing procedures can be performed. Refer to Standard Procedures for the proper battery charging procedures.

OPERATION

The battery system is designed to provide a safe, efficient, reliable and mobile means of delivering and storing electrical energy. This electrical energy is required to operate the engine starting system, as well as to operate many of the other vehicle accessory systems for limited durations while the engine and/or the charging system are not operating. The battery system is also designed to provide a reserve of electrical energy to supplement the charging system for short durations while the engine is running and the electrical current demands of the vehicle exceed the output of the charging system. In addition to delivering, and storing electrical energy for the vehicle, the battery system serves as a capacitor and voltage stabilizer for the vehicle electrical system. It absorbs most abnormal or transient voltages caused by the switching of any of the electrical components or circuits in the vehicle.

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 manual 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 will store a DTC in electronic memory for any failure it detects. Refer to Charging System for the proper charging system on-board diagnostic test procedures.

MIDTRONICS ELECTRICAL SYSTEM TESTER

The Midtronics® automotive battery and charging system tester is designed to help the dealership technicians diagnose the cause of a defective battery or charging system. Follow the instruction manual supplied with the tester to properly diagnose a vehicle. If the instruction manual is not available refer to the standard procedure in this section, which includes the directions for using the midtronics electrical system tester.

BATTERY SYSTEM (Continued)

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 the IGNITION-OFF DRAW TEST Standard Procedure for the proper test procedures. Repair the excessive ignition-off draw, as required.
	2. The charging system is faulty.	2. Determine if the charging system is performing to specifications using the Midtronics battery and charging system tester. Refer to Charging System for additional charging system diagnosis and testing procedures. Repair the faulty charging system, as required.
	3. The battery is discharged.	3. Determine the battery state-of-charge using the Midtronics battery and charging system tester. Refer to the Standard Procedures in this section for additional test procedures. Charge the faulty battery, as required.
	4. The battery terminal connections are loose or corroded.	4. Refer to Battery Cables for the proper battery cable diagnosis and testing procedures. Clean and tighten the battery terminal connections, as required.
	5. The battery has an incorrect size or rating for this vehicle.	5. Refer to Battery System Specifications for the proper size and rating. Replace an incorrect battery, as required.
	6. The battery is faulty.	6. Determine the battery cranking capacity using the Midtronics battery and charging system tester. Refer to the Standard Procedures in this section for additional test procedures. Replace the faulty battery, as required.
	7. The starting system is faulty.	7. Determine if the starting system is performing to specifications. Refer to Starting System for the proper starting system diagnosis and testing procedures. Repair the faulty 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.

BATTERY SYSTEM (Continued)

BATTERY SYSTEM DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
THE BATTERY STATE OF CHARGE CANNOT BE MAINTAINED.	1. The battery has an incorrect size or rating for this vehicle. 2. The battery terminal connections are loose or corroded. 3. The electrical system ignition-off draw is excessive. 4. The battery is faulty. 5. The starting system is faulty. 6. The charging system is faulty. 7. Electrical loads exceed the output of the charging system. 8. Slow driving or prolonged idling with high-amperage draw systems in use.	1. Refer to Battery System Specifications for the proper specifications. Replace an incorrect battery, as required. 2. Refer to Battery Cable for the proper cable diagnosis and testing procedures. Clean and tighten the battery terminal connections, as required. 3. Refer to the IGNITION-OFF DRAW TEST Standard Procedure for the proper test procedures. Repair the faulty electrical system, as required. 4. Test the battery using the Midtronics battery and charging system tester. Refer to Standard Procedures for additional test procedures. Replace the faulty battery, as required. 5. Determine if the starting system is performing to specifications. Refer to Starting System for the proper starting system diagnosis and testing procedures. Repair the faulty starting system, as required. 6. Determine if the charging system is performing to specifications using the Midtronics battery and charging system tester.. Refer to Charging System for additional charging system diagnosis and testing procedures. Repair the faulty charging system, as required. 7. Inspect the vehicle for aftermarket electrical equipment which might cause excessive electrical loads. 8. Advise the vehicle operator, as required.
THE BATTERY WILL NOT ACCEPT A CHARGE.	1. The battery is faulty.	1. Test the battery using the Midtronics battery and charging system tester.. Charge or replace the faulty battery, as required.

BATTERY SYSTEM (Continued)

ABNORMAL BATTERY DISCHARGING

Any of the following conditions can result in abnormal battery discharging:

- A faulty or incorrect charging system component. Refer to Charging System for the proper charging system diagnosis and testing procedures.
- A faulty or incorrect battery. Refer to Standard Procedures for the proper battery diagnosis and testing procedures. Refer to Battery System Specifications for the proper specifications.
- A faulty circuit or component causing excessive ignition-off draw.
- Electrical loads that exceed the output of the charging system. This can be due to equipment installed after manufacture, or repeated short trip use.
- A faulty or incorrect starting system component. Refer to Starting System for the proper starting system diagnosis and testing procedures.
- Corroded or loose battery posts and terminal clamps.
- A loose or worn generator drive belt.
- Slow driving speeds (heavy traffic conditions) or prolonged idling, with high-amperage draw systems in use.

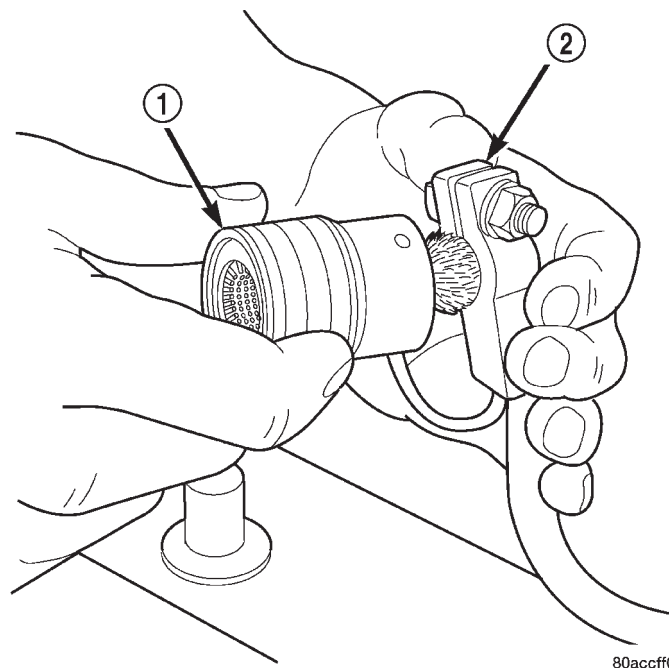
CLEANING

The following information details the recommended cleaning procedures for the battery and related components. In addition to the maintenance schedules found in this service manual 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) Clean the battery cable terminal clamps of all corrosion. Remove any corrosion using a wire brush or a post and terminal cleaning tool, and a sodium bicarbonate (baking soda) and warm water cleaning solution (Fig. 1).

(2) Clean the battery tray and battery holddown 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.

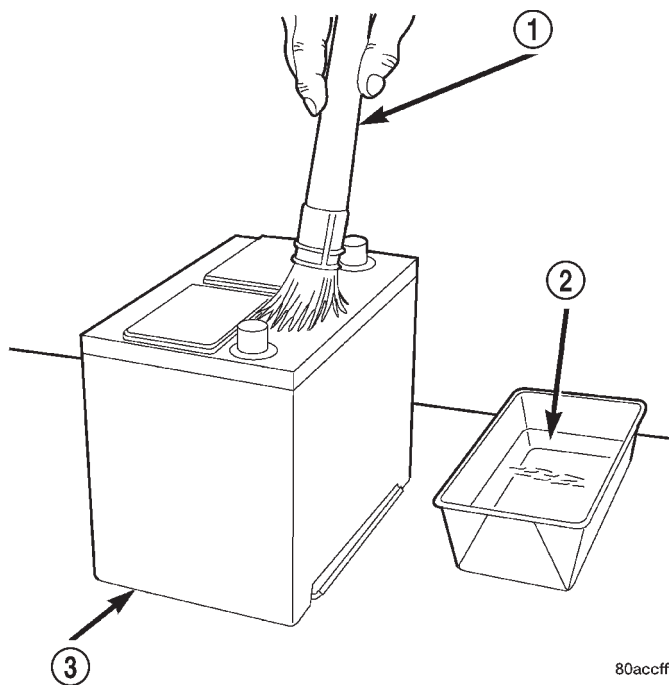
(3) If the removed battery is to be reinstalled, clean the outside of the battery case and the top cover with a sodium bicarbonate (baking soda) and warm water cleaning solution using a stiff bristle parts cleaning brush to remove any acid film (Fig. 2). Rinse the battery with clean water. Ensure that the cleaning solution does not enter the battery cells through the vent holes. If the battery is being replaced, refer to Battery System Specifications for the factory-installed battery specifications. Confirm that the replacement battery is the correct size and has the correct ratings for the vehicle.



80accff0

Fig. 1 Clean Battery Cable Terminal Clamp - Typical

- 1 - TERMINAL BRUSH
- 2 - BATTERY CABLE



80accff1

Fig. 2 Clean Battery - Typical

- 1 - CLEANING BRUSH
- 2 - WARM WATER AND BAKING SODA SOLUTION
- 3 - BATTERY

BATTERY SYSTEM (Continued)

(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.

(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 (Fig. 3).

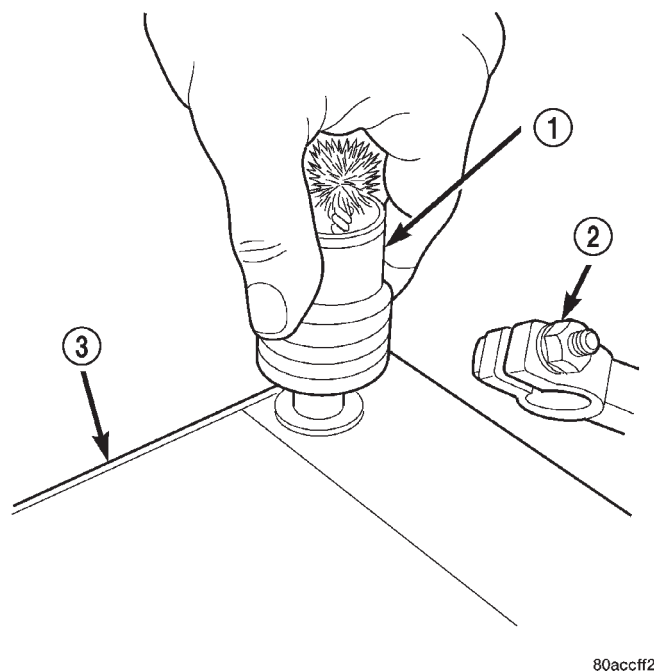


Fig. 3 Clean Battery Terminal Post - Typical

- 1 - TERMINAL BRUSH
- 2 - BATTERY CABLE
- 3 - BATTERY

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 manual 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 holddown hardware for damage. Replace any damaged parts.
- (3) Slide the thermal guard off of the battery case. 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. Replace any battery thermal guard that has been damaged.

(5) Inspect the battery built-in test indicator sight glass for an indication of the battery condition. If the battery is discharged, charge as required. Refer to Standard Procedures for the proper battery built-in indicator test procedures. Also refer to Standard Procedures for the proper battery charging procedures.

SPECIFICATIONS

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.

- **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.

BATTERY SYSTEM (Continued)

BATTERY CLASSIFICATIONS & RATINGS					
Part Number	BCI Group Size Classification	Cold Cranking Amperage	Reserve Capacity	Ampere - Hours	Load Test Amperage
56041380AA	86	525	100 Minutes	60	250

SPECIAL TOOLS

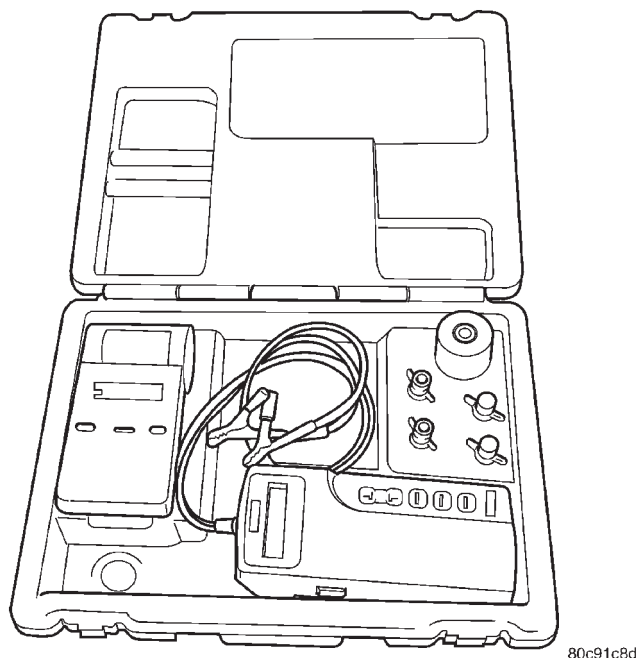


Fig. 4 MIDTRONICS BATTERY AND CHARGING SYSTEM TESTER - Micro420

BATTERY

DESCRIPTION

A large capacity, low-maintenance storage battery (Fig. 5) is standard factory-installed equipment on this model. Refer to Battery Specifications for the proper specifications of the factory-installed batteries available on this model. Male post type terminals made of a soft lead material protrude from the top of the molded plastic battery case to provide the means for connecting the battery to the vehicle electrical system. The battery positive terminal post is physically larger in diameter than the negative terminal post to ensure proper battery connection. The letters **POS** and **NEG** are also molded into the top of the battery case adjacent to their respective positive and negative terminal posts for identification confirmation. Refer to Battery Cables for more information on the battery cables that connect the battery to the vehicle electrical system.

The battery is made up of six individual cells that are connected in series. Each cell contains positively charged plate groups that are connected with lead

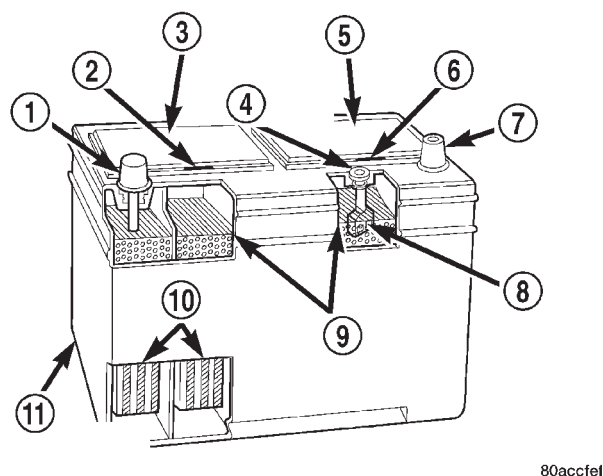


Fig. 5 Low-Maintenance Battery - Typical

- 1 - POSITIVE POST
- 2 - VENT
- 3 - CELL CAP
- 4 - VENT
- 5 - CELL CAP
- 6 - VENT
- 7 - NEGATIVE POST
- 8 - GREEN BALL
- 9 - ELECTROLYTE LEVEL
- 10 - PLATE GROUPS
- 11 - LOW-MAINTENANCE BATTERY

straps to the positive terminal post, and negatively charged plate groups that are connected with lead straps to the negative terminal post. Each plate consists of a stiff mesh framework or grid coated with lead dioxide (positive plate) or sponge lead (negative plate). Insulators or plate separators made of a non-conductive material are inserted between the positive and negative plates to prevent them from contacting or shorting against one another. These dissimilar metal plates are submerged in a sulfuric acid and water solution called an electrolyte.

The factory-installed battery has a built-in test indicator (hydrometer). The color visible in the sight glass of the indicator will reveal the battery condition. Refer to Standard Procedures for the proper built-in indicator test procedures. **The factory-installed low-maintenance battery has removable battery cell caps.** Distilled water can be added to this battery. The battery is not sealed and has vent holes in the cell caps. The chemical composition of the metal coated plates within the low-maintenance

BATTERY (Continued)

battery reduces battery gassing and water loss, at normal charge and discharge rates. Therefore, the battery should not require additional water in normal service. If the electrolyte level in this battery does become low, water must be added. However, rapid loss of electrolyte can be caused by an overcharging condition. Be certain to diagnose the charging system after replenishing the water in the battery for a low electrolyte condition and before returning the vehicle to service. Refer to Charging System for the proper charging system diagnosis and testing procedures.

DIAGNOSIS AND TESTING - BATTERY

The battery must be completely charged and the top, posts and terminal clamps should be properly cleaned and inspected before diagnostic procedures are performed. Refer to Battery System Cleaning for the proper cleaning procedures, and Battery System Inspection for the proper battery inspection procedures. Refer to Standard Procedures for the proper battery charging procedures.

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.

WARNING: IF THE BATTERY IS EQUIPPED WITH REMOVABLE CELL CAPS, BE CERTAIN THAT EACH OF THE CELL CAPS ARE 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.

The condition of a battery is determined by two criteria:

- **State-Of-Charge** - This can be determined by checking the specific gravity of the battery electrolyte (built-in indicator test or hydrometer test), or by

checking the battery voltage (open-circuit voltage test).

- **Cranking Capacity** - This can be determined by performing a battery load test, which measures the ability of the battery to supply high-amperage current.

First, determine the battery state-of-charge. This can be done in one of three ways. If the battery has a built-in test indicator, perform the built-in indicator test to determine the state-of-charge. If the battery has no built-in test indicator but does have removable cell caps, perform the hydrometer test to determine the state-of-charge. If the battery cell caps are not removable, or a hydrometer is not available, perform the open-circuit voltage test to determine the state-of-charge. Refer to open-circuit voltage test in the Standard Procedures section of this group.

Second, determine the battery cranking capacity by performing a load test. The battery must be charged before proceeding with a load test if:

- The battery built-in test indicator has a black or dark color visible.
- The temperature corrected specific gravity of the battery electrolyte is less than 1.235.
- The battery open-circuit voltage is less than 12.4 volts.

A battery that will not accept a charge is faulty, 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 faulty and must be replaced.

NOTE: Completely discharged batteries may take several hours to accept a charge. Refer to Standard Procedures for the proper battery charging procedures.

A battery is fully-charged when:

- All battery cells are gassing freely during charging.
- A green color is visible in the sight glass of the battery built-in test indicator.
- Three corrected specific gravity tests, taken at one-hour intervals, indicate no increase in the specific gravity of the battery electrolyte.
- Open-circuit voltage of the battery is 12.4 volts or greater.

STANDARD PROCEDURE**STANDARD PROCEDURE - BATTERY CHARGING**

Battery charging can be performed fast or slow, in terms of time. **Slow** battery charging is the best means of restoring a battery to full potential. Fast

BATTERY (Continued)

battery charging should only be performed when absolutely necessary due to time restraints. A battery is fully-charged when:

- All of the battery cells are gassing freely during battery charging.
- A green color is visible in the sight glass of the battery built-in test indicator.
- Three hydrometer tests, taken at one-hour intervals, indicate no increase in the temperature-corrected specific gravity of the battery electrolyte.
- Open-circuit voltage of the battery is 12.65 volts or above.

WARNING: NEVER EXCEED TWENTY AMPERES WHEN CHARGING A COLD (-1° C [30° F] OR LOWER) BATTERY. THE BATTERY MAY ARC INTERNALLY AND EXPLODE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

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.

NOTE: Models equipped with the diesel engine option are equipped with two 12-volt batteries, connected in parallel (positive-to-positive and negative-to-negative). In order to ensure proper charging of each battery, these batteries **MUST** be disconnected from each other, as well as from the vehicle electrical system, while being charged.

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.

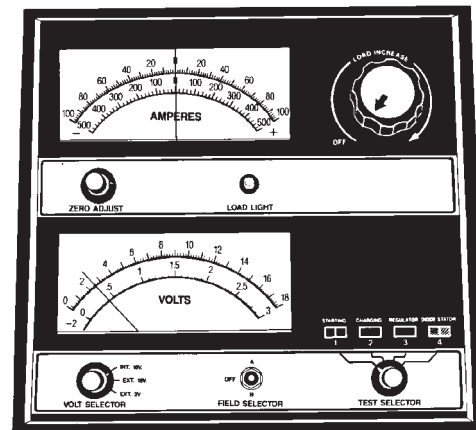
After the battery has been charged to 12.4 volts or greater, perform a load test to determine the battery cranking capacity. Refer to Standard Procedures for the proper battery load test procedures. If the battery will endure a load test, return the battery to service. If the battery will not endure a load test, it is faulty and must be replaced.

Clean and inspect the battery hold downs, tray, terminals, posts, and top before completing battery service. Refer to Battery System Cleaning for the proper battery system cleaning procedures, and Battery System Inspection for the proper battery system inspection procedures.

CHARGING A COMPLETELY DISCHARGED 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 (Fig. 6). 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.



898A-12

Fig. 6 Voltmeter - Typical

(2) Disconnect and isolate the battery negative cable. Connect the battery charger leads. 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 manufac-

BATTERY (Continued)

turer 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.

CHARGE RATE TABLE	
Voltage	Hours
16.0 volts maximum	up to 4 hours
14.0 to 15.9 volts	up to 8 hours
13.9 volts or less	up to 16 hours

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 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 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.

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

STANDARD PROCEDURE - BUILT-IN INDICATOR TEST

An indicator (hydrometer) built into the top of the battery case provides visual information for battery testing (Fig. 7). Like a hydrometer, the built-in indicator measures the specific gravity of the battery electrolyte. The specific gravity of the electrolyte reveals the battery state-of-charge; however, it will not reveal the cranking capacity of the battery. A load test must be performed to determine the battery cranking capacity. Refer to Standard Procedures for the proper battery load test procedures.

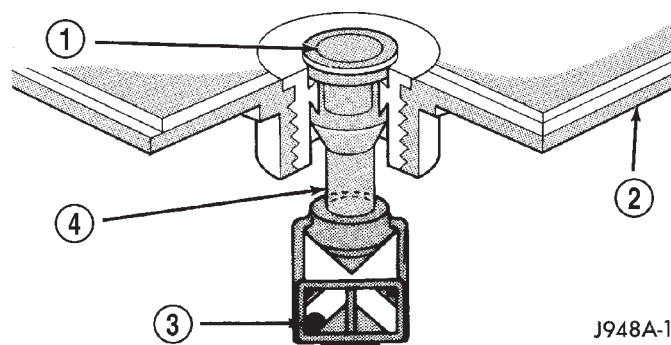


Fig. 7 Built-In Indicator

- 1 - SIGHT GLASS
- 2 - BATTERY TOP
- 3 - GREEN BALL
- 4 - PLASTIC ROD

Before testing, visually inspect the battery for any damage (a cracked case or cover, loose posts, etc.) that would cause the battery to be faulty. In order to obtain correct indications from the built-in indicator, it is important that the battery be level and have a clean sight glass. Additional light may be required to view the indicator. **Do not use open flame as a source of additional light.**

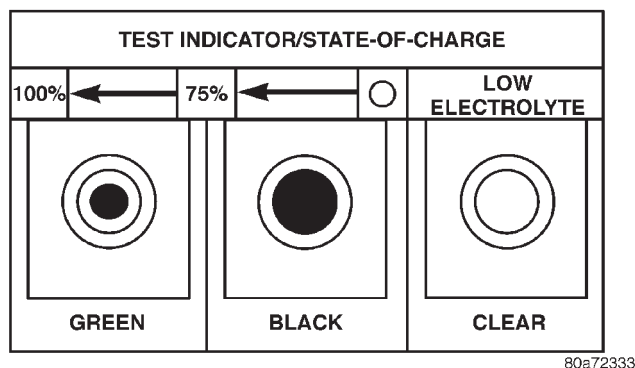
BATTERY (Continued)

To read the built-in indicator, look into the sight glass and note the color of the indication (Fig. 8). The battery condition that each color indicates is described in the following list:

- **Green** - Indicates 75% to 100% battery state-of-charge. The battery is adequately charged for further testing or return to service. If the starter will not crank for a minimum of fifteen seconds with a fully-charged battery, the battery must be load tested. Refer to Standard Procedures for the proper battery load test procedures.

- **Black or Dark** - Indicates 0% to 75% battery state-of-charge. The battery is inadequately charged and must be charged until a green indication is visible in the sight glass (12.4 volts or more), before the battery is tested further or returned to service. Refer to Standard Procedures for the proper battery charging procedures. Also refer to Diagnosis and Testing for more information on the possible causes of the discharged battery condition.

- **Clear or Bright** - Indicates a low battery electrolyte level. The electrolyte level in the battery is below the built-in indicator. A maintenance-free battery with non-removable cell caps must be replaced if the electrolyte level is low. Water must be added to a low-maintenance battery with removable cell caps before it is charged. Refer to Standard Procedures for the proper battery filling procedures. A low electrolyte level may be caused by an overcharging condition. Refer to Charging System for the proper charging system diagnosis and testing procedures.



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Fig. 8 Built-In Indicator Sight Glass Chart

STANDARD PROCEDURE - HYDROMETER TEST

The hydrometer test reveals the battery state-of-charge by measuring the specific gravity of the electrolyte. **This test cannot be performed on maintenance-free batteries with non-removable cell caps.** If the battery has non-removable cell caps, refer to Diagnosis and Testing for alternate methods of determining the battery state-of-charge.

Specific gravity is a comparison of the density of the battery electrolyte to the density of pure water.

Pure water has a specific gravity of 1.000, and sulfuric acid has a specific gravity of 1.835. Sulfuric acid makes up approximately 35% of the battery electrolyte by weight, or 24% by volume. In a fully-charged battery the electrolyte will have a temperature-corrected specific gravity of 1.260 to 1.290. However, a specific gravity of 1.235 or above is satisfactory for the battery to be load tested and/or returned to service.

Before testing, visually inspect the battery for any damage (a cracked case or cover, loose posts, etc.) that would cause the battery to be faulty. Then remove the battery cell caps and check the electrolyte level. Add distilled water if the electrolyte level is below the top of the battery plates. Refer to Battery System Cleaning for the proper battery inspection procedures.

See the instructions provided by the manufacturer of the hydrometer for recommendations on the correct use of the hydrometer that you are using. Remove only enough electrolyte from the battery cell so that the float is off the bottom of the hydrometer barrel with pressure on the bulb released. To read the hydrometer correctly, hold it with the top surface of the electrolyte at eye level (Fig. 9).

CAUTION: Exercise care when inserting the tip of the hydrometer into a battery cell to avoid damaging the plate separators. Damaged plate separators can cause early battery failure.

Hydrometer floats are generally calibrated to indicate the specific gravity correctly only at 26.7° C. When testing the specific gravity at any other temperature, a correction factor is required. The correction factor is approximately a specific gravity value of 0.004, which may also be identified as four points of specific gravity. For each 5.5° C above 26.7° C, add four points. For each 5.5° C below 26.7° C, subtract four points. Always correct the specific gravity for temperature variation.

EXAMPLE: A battery is tested at -12.2° C and has a specific gravity of 1.240. Determine the actual specific gravity as follows:

(1) Determine the number of degrees above or below 26.7° C: **26.7° C + -12.2° C = 14.5° C below the 26.7° C specification**

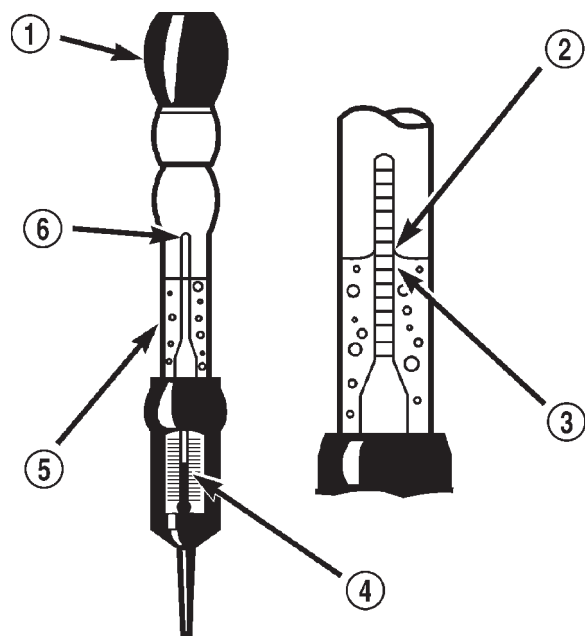
(2) Divide the result from Step 1 by 5.5° C: **14.5° C ÷ 5.5° C = 2.64**

(3) Multiply the result from Step 2 by the temperature correction factor (0.004): **2.64 X 0.004 = 0.01**

(4) The temperature at testing was below 26.7° C; therefore, the temperature correction factor is subtracted: **1.240 - 0.01 = 1.23**

(5) The corrected specific gravity of the battery cell in this example is 1.23.

BATTERY (Continued)



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Fig. 9 Hydrometer - Typical

- 1 - BULB
- 2 - SURFACE COHESION
- 3 - SPECIFIC GRAVITY READING
- 4 - TEMPERATURE READING
- 5 - HYDROMETER BARREL
- 6 - FLOAT

Test the specific gravity of the electrolyte in each battery cell. If the specific gravity of all cells is above 1.235, but the variation between cells is more than fifty points (0.050), the battery should be replaced. If the specific gravity of one or more cells is less than 1.235, charge the battery at a rate of approximately five amperes. Continue charging the battery until three consecutive specific gravity tests, taken at one-hour intervals, are constant. If the cell specific gravity variation is more than fifty points (0.050) at the end of the charge period, replace the battery.

When the specific gravity of all cells is above 1.235, and the cell variation is less than fifty points (0.050), the battery may be load tested to determine its cranking capacity. Refer to Standard Procedures for the proper battery load test procedures.

STANDARD PROCEDURE - OPEN-CIRCUIT VOLTAGE TEST

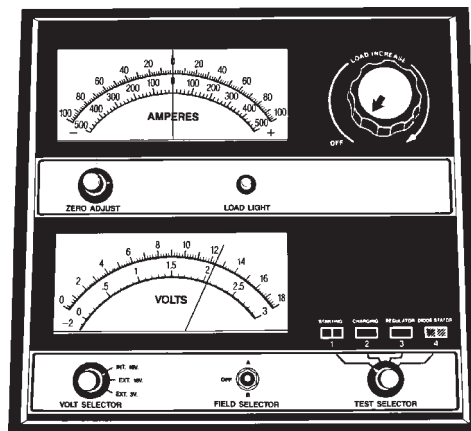
A battery open-circuit voltage (no load) test will show the approximate state-of-charge of a battery. This test can be used in place of the hydrometer test when a hydrometer is not available, or for maintenance-free batteries with non-removable cell caps.

Before proceeding with this test, completely charge the battery (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD 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 (Fig. 10).



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Fig. 10 Testing Open-Circuit Voltage - Typical

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 (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE).

OPEN CIRCUIT VOLTAGE TABLE	
Open Circuit Voltage	Charge Percentage
11.7 volts or less	0%
12.0 volts	25%
12.2 volts	50%
12.4 volts	75%
12.6 volts or more	100%

STANDARD PROCEDURE - LOAD TEST

A battery load test will verify the battery cranking capacity. The test is based on the Cold Cranking Amperage (CCA) rating of the battery. To determine the battery CCA rating, see the label affixed to the battery case or refer to Battery Specifications for the proper factory-installed specifications.

Before proceeding with this test, completely charge the battery (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE).

BATTERY (Continued)

(1) Disconnect and isolate both battery cables, negative cable first. The battery top and posts should be clean (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - CLEANING).

(2) Connect a suitable volt-ammeter-load tester (Fig. 11) to the battery posts (Fig. 12). See the instructions provided by the manufacturer of the tester you are using. Check the open-circuit voltage (no load) of the battery (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE). The battery open-circuit voltage must be 12.4 volts or greater.

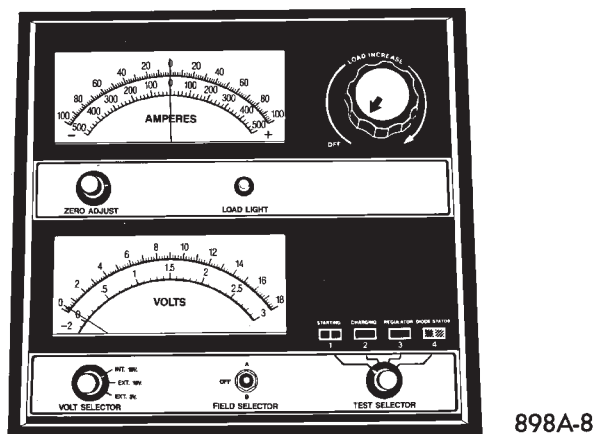


Fig. 11 Volt-Ammeter-Load Tester - Typical

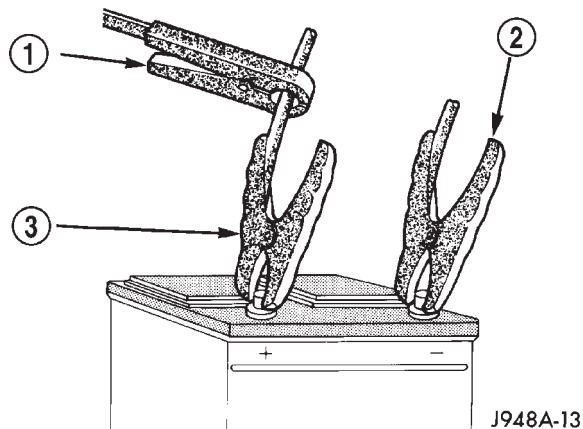


Fig. 12 Volt-Ammeter-Load

- 1 - INDUCTION AMMETER CLAMP
- 2 - NEGATIVE CLAMP
- 3 - POSITIVE CLAMP

(3) Rotate the load control knob (carbon pile rheostat) to apply a 300 ampere load to the battery for fifteen seconds, then return the control knob to the Off position (Fig. 13). This will remove the surface charge from the battery.

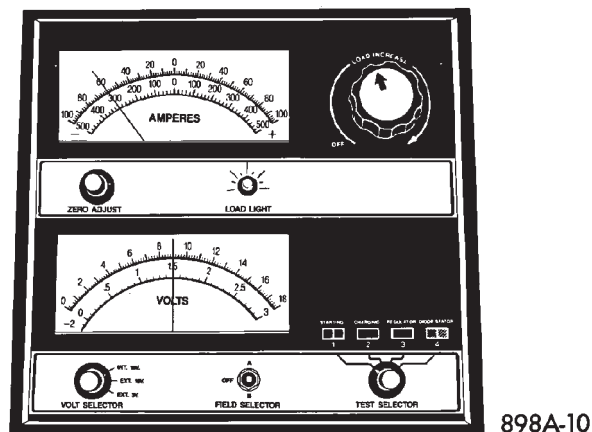


Fig. 13 Remove Surface Charge from Battery

(4) Allow the battery to stabilize to open-circuit voltage. It may take up to five minutes for the battery voltage to stabilize.

(5) Rotate the load control knob to maintain a load equal to 50% of the CCA rating of the battery (Fig. 14). After fifteen seconds, record the loaded voltage reading, then return the load control knob to the Off position.

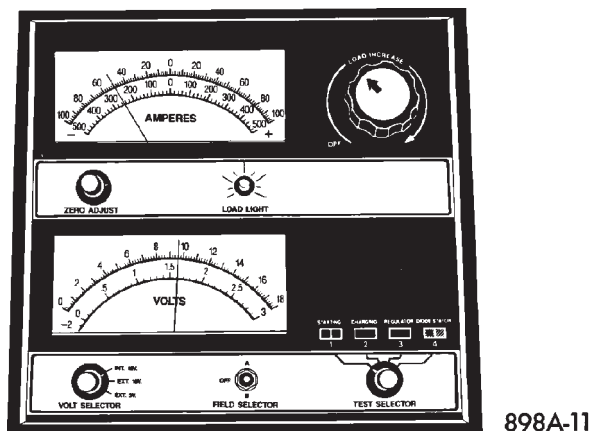


Fig. 14 Load 50% CCA Rating - Note Voltage - Typical

(6) The voltage drop will vary with the battery temperature at the time of the load test. The battery temperature can be estimated by using the ambient temperature during the past several hours. If the battery has been charged, boosted, or loaded a few minutes prior to the test, the battery will be somewhat warmer. See the Load Test Temperature Table for the proper loaded voltage reading.

BATTERY (Continued)

LOAD TEST TEMPERATURE TABLE		
Minimum Voltage	Temperature	
	°F	°C
9.6 volts	70° and above	21° and above
9.5 volts	60°	16°
9.4 volts	50°	10°
9.3 volts	40°	4°
9.1 volts	30°	-1°
8.9 volts	20°	-7°
8.7 volts	10°	-12°
8.5 volts	0°	-18°

(7) If the voltmeter reading falls below 9.6 volts, at a minimum battery temperature of 21° C (70° F), the battery is faulty and must be replaced.

STANDARD PROCEDURE - 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 Con-

trol Module (PCM), digital clock, electronically tuned radio, and other modules which may vary with the vehicle equipment.

A vehicle that has not been operated for approximately twenty days, may discharge the battery to an inadequate level. When a vehicle will not be used for twenty days or more (stored), remove the IOD fuse from the Power Distribution Center (PDC). This will reduce battery discharging.

Excessive IOD can be caused by:

- Electrical items left on.
- Faulty or improperly adjusted switches.
- Faulty 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 three minutes. See the Electronic Module Ignition-Off Draw Table for more information.

ELECTRONIC MODULE IGNITION-OFF DRAW (IOD) 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 milliamperes	N/A
Body Control Module (BCM)	No	4.75 milliamperes (max.)	N/A
Powertrain Control Module (PCM)	No	0.95 milliamperes	N/A
ElectroMechanical Instrument Cluster (EMIC)	No	0.44 milliamperes	N/A
Combination Flasher	No	0.08 milliamperes	N/A
Automatic Transmission Controller (EATX)	Yes, 20 minutes	120 milliamperes	0.70 ma

BATTERY (Continued)

(2) Determine that the underhood lamp is operating properly, then disconnect the lamp wire harness connector or remove the lamp bulb.

(3) Disconnect the battery negative cable.

(4) Set an electronic digital multi-meter to its highest amperage scale. Connect the multi-meter between the disconnected battery negative cable terminal clamp and the battery negative terminal post. Make sure that the doors remain closed so that the illuminated entry system is not activated. The multi-meter amperage reading may remain high for up to three minutes, or may not give any reading at all while set in the highest amperage scale, depending upon the electrical equipment in the vehicle. The multi-meter leads must be securely clamped to the battery negative cable terminal clamp and the battery negative terminal post. If continuity 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.

(5) After about three minutes, the high-amperage IOD reading on the multi-meter should become 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 Power Distribution Center (PDC) and then in the Junction Block (JB), one at a time until the amperage reading becomes very low, or nonexistent. Refer to the appropriate wiring information in this service manual for complete PDC and JB fuse, 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 and circuit breaker, disconnect the wire harness from the generator. If the amperage reading now becomes very low or nonexistent, refer to Charging System for the proper charging system diagnosis and testing procedures. 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 milliamperage scale of the multi-meter to check the low-amperage IOD.

CAUTION: Do not open any doors, or turn on any electrical accessories with the lowest milliamperage scale selected, or the multi-meter may be damaged.

(6) 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 5. 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 a component failure is at fault.

STANDARD PROCEDURE - USING MIDTRONICS ELECTRICAL TESTER

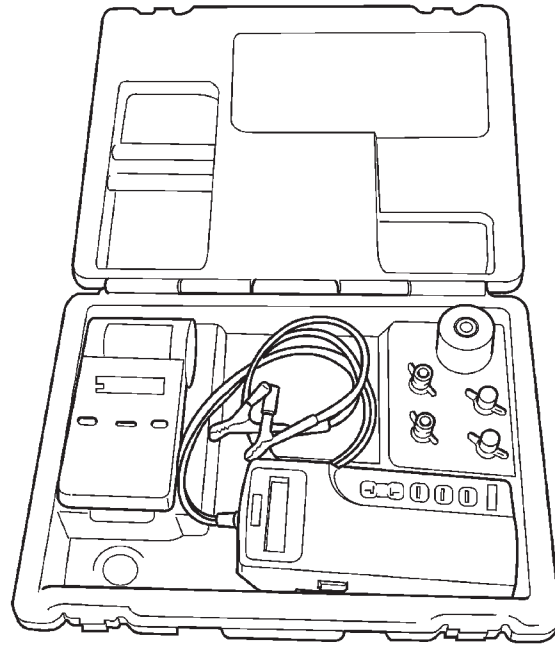


Fig. 15 MIDTRONICS BATTERY AND CHARGING SYSTEM TESTER - Micro420

Always use the Midtronics 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

(1) If testing the battery OUT-OF-VEHICLE, clean the battery terminals with a wire brush before testing. 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. **The preferred test position is at the battery terminal.** If the battery is not accessible, you may test using both the positive and

BATTERY (Continued)

negative jumper posts. Select TESTING AT JUMPER POST when connecting to that location.

(3) Connect the tester to the battery or jumper posts, the red clamp to positive (+) and the black clamp to negative (-).

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.

NOTE: When testing the battery in a PT Cruiser, always test at the battery terminals

(4) Using the ARROW key select **in** or **out** of vehicle testing and press ENTER to make a selection.

(5) 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.

CAUTION: If REPLACE BATTERY is the result of the test, this may mean a poor connection between the vehicle's cables and battery exists. After disconnecting the vehicle's battery cables from the battery, retest the battery using the OUT-OF-VEHICLE test before replacing.

(6) 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.

BATTERY TEST RESULTS	
GOOD BATTERY	Return to service
GOOD - RECHARGE	Fully charge battery and return to service
CHARGE & RETEST	Fully charge battery and retest battery
REPLACE BATTERY	Replace the battery and retest complete system
BAD-CELL REPLACE	Replace the battery and retest complete system

NOTE: The SERVICE CODE is required on every warranty claim submitted for battery replacement.

REMOVAL

(1) Turn the ignition switch to the Off position. Be certain that all electrical accessories are turned off.

(2) Loosen the battery negative cable terminal clamp pinch-bolt hex nut.

(3) Disconnect the battery negative cable terminal clamp from the battery negative terminal post. If necessary, use a battery terminal puller to remove the terminal clamp from the battery post (Fig. 16).

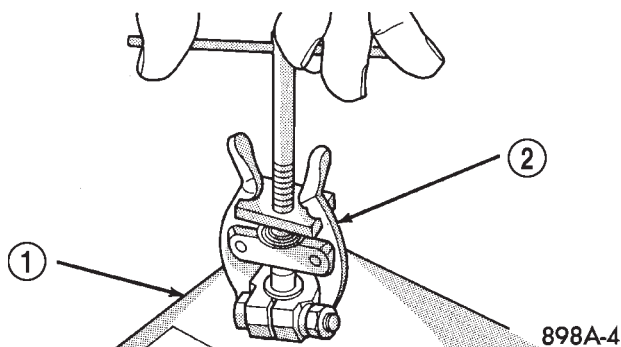


Fig. 16 Remove Battery Cable Terminal Clamp - Typical

1 - BATTERY

2 - BATTERY TERMINAL PULLER

(4) Loosen the battery positive cable terminal clamp pinch-bolt hex nut.

(5) Disconnect the battery positive cable terminal clamp from the battery positive terminal post. If necessary, use a battery terminal puller to remove the terminal clamp from the battery post.

(6) Remove the battery holddowns from the battery. Refer to Battery Holddown for the proper battery holddown removal procedures.

WARNING: WEAR A SUITABLE PAIR OF RUBBER GLOVES (NOT THE HOUSEHOLD TYPE) WHEN REMOVING A BATTERY BY HAND. SAFETY GLASSES SHOULD ALSO BE WORN. IF THE BATTERY IS CRACKED OR LEAKING, THE ELECTROLYTE CAN BURN THE SKIN AND EYES.

(7) Remove the battery and the battery thermal guard from the battery tray as a unit.

(8) Remove the battery thermal guard from the battery case. Refer to Thermal Guard for the proper battery thermal guard removal procedures.

INSTALLATION

(1) Clean and inspect all of the battery system components. Refer to Battery System Cleaning for the proper cleaning procedures, and refer to Battery System Inspection for the proper inspection procedures.

BATTERY (Continued)

(2) Reinstall the battery thermal guard onto the battery case. Refer to Thermal Guard for the proper battery thermal guard installation procedures.

(3) Position the battery and the battery thermal guard onto the battery tray as a unit. Ensure that the battery positive and negative terminal posts are correctly positioned. The battery cable terminal clamps must reach the correct battery terminal post without stretching the cables (Fig. 17).

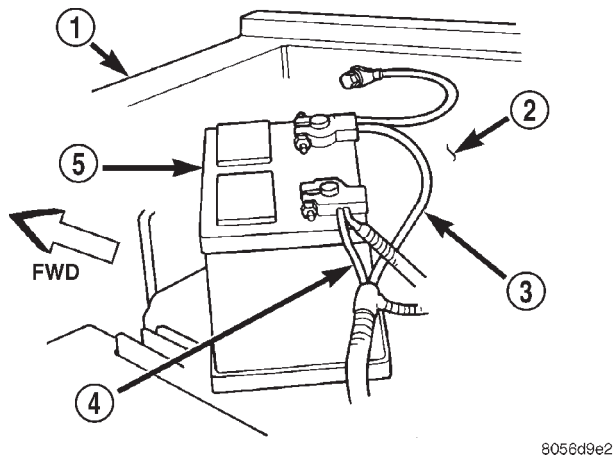


Fig. 17 Battery Cables - Typical

- 1 - RADIATOR CROSSMEMBER
- 2 - WHEELHOUSE INNER PANEL
- 3 - NEGATIVE CABLE
- 4 - POSITIVE CABLE
- 5 - BATTERY

(4) Reinstall the battery holddowns onto the battery. Refer to Battery Holddown for the proper installation procedure.

CAUTION: Be certain that the battery cable terminal clamps are connected to the correct battery terminal posts. Reversed battery polarity may damage electrical components of the vehicle.

(5) Clean the battery cable terminal clamps and the battery terminal posts. Refer to Battery System Cleaning for cleaning procedure.

(6) Reconnect the battery positive cable terminal clamp to the battery positive terminal post. Tighten the terminal clamp pinch-bolt hex nut to 45 in. lbs.

(7) Reconnect the battery negative cable terminal clamp to the battery negative terminal post. Tighten the terminal clamp pinch-bolt hex nut to 45 in. lbs.

(8) Apply a thin coating of petroleum jelly or chassis grease to the exposed surfaces of the battery cable terminal clamps and the battery terminal posts.

BATTERY HOLDDOWN

DESCRIPTION

The battery holddown hardware includes a plastic holddown bracket and retaining bolt. The battery holddown bracket meshes with the battery tray to secure the battery to the battery tray.

When installing a battery into the battery tray, it is important that the holddown hardware is properly installed and that the fastener is tightened to the proper specifications. Improper holddown fastener tightness, whether too loose or too tight, can result in damage to the battery, the vehicle, or both. Refer to Battery Holddown for the proper installation procedure, including the proper holddown fastener torque specifications.

OPERATION

The battery holddown secures the battery in the battery tray. This holddown is designed to prevent battery movement during the most extreme vehicle operation conditions. Periodic removal and lubrication of the battery holddown hardware is recommended to prevent hardware seizure at a later date.

CAUTION: Never operate a vehicle without a battery holddown device properly installed. Damage to the vehicle, components and battery could result.

REMOVAL

(1) Turn the ignition switch to the Off position. Be certain that all electrical accessories are turned off.

(2) Loosen the battery negative cable terminal clamp pinch-bolt hex nut.

(3) Disconnect the battery negative cable terminal clamp from the battery negative terminal post. If necessary, use a battery terminal puller to remove the terminal clamp from the battery post.

(4) Remove the battery hold down bracket retaining bolt from the threaded insert in the battery tray assembly.

INSTALLATION

(1) Clean and inspect the battery hold down hardware. Refer to Battery Cleaning for the proper battery system component cleaning procedures, and Battery Inspection for the proper battery system component inspection procedures.

(2) Position the battery hold down bracket onto the battery tray.

BATTERY HOLDDOWN (Continued)

(3) Install and tighten the battery hold down bracket retaining bolt. Tighten the bolt to 4 N·m (20 in. lbs.).

(4) Reconnect the battery negative cable terminal clamp to the battery negative terminal post. Tighten the terminal clamp pinch-bolt hex nut to 8.4 N·m (75 in. lbs.).

BATTERY CABLES

DESCRIPTION

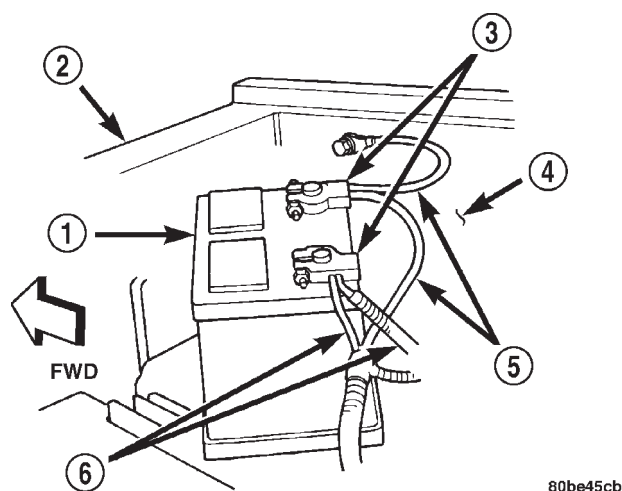


Fig. 18 Battery Cables - Typical

- 1 - Battery
- 2 - Radiator Crossmember
- 3 - Terminal Clamps
- 4 - Fender Inner Shield
- 5 - Negative Cable
- 6 - Positive Cable

The battery cables (Fig. 18) are large gauge, stranded copper wires sheathed within a heavy plastic or synthetic rubber insulating jacket. 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 soft lead that is die cast onto one end of the battery cable wire. A square headed pinch-bolt and hex 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 solder-dipped. The battery positive cable wires have a red insulating jacket to provide visual identification

and feature a larger female battery terminal clamp to allow connection to the larger battery positive terminal post. The battery negative cable wires have a black insulating jacket and a smaller female battery terminal clamp.

The battery cables cannot be repaired and, if damaged or faulty they must be replaced. Both the battery positive and negative cables are available for service replacement only as a unit with the battery wire harness, which may include portions of the wiring circuits for the generator and other components on some models. Refer to the appropriate wiring information in this service manual for the location of the proper battery cable wire harness diagrams. The wiring information also includes 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

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.

The battery positive cable terminal clamp is die cast onto the ends of two wires. One wire has an eyelet terminal that connects the battery positive cable to the B(+) terminal studs of the Power Distribution Center (PDC), 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 is also die cast onto the ends of two wires. One wire has an eyelet terminal that connects the battery negative cable to the vehicle powertrain through a stud on the left side of the engine cylinder block. The other wire has an eyelet terminal that connects the battery negative cable to the vehicle body through a ground stud on the left wheel house, near the battery.

BATTERY CABLES (Continued)

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 Procedures 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 is located in the Power Distribution Center (PDC), in the engine compartment. See the fuse and relay layout label affixed to the underside of the PDC cover for ASD relay identification and location.

(1) Connect the positive lead of the voltmeter to the battery negative terminal post. Connect the negative lead of the voltmeter to the battery negative cable terminal clamp (Fig. 19). 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.

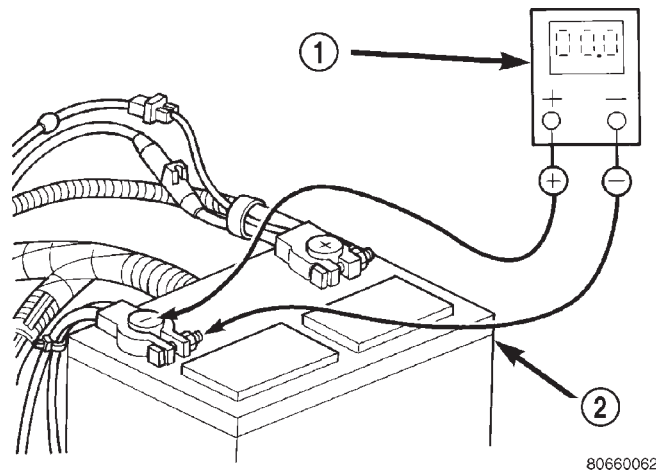


Fig. 19 TEST BATTERY NEGATIVE CONNECTION RESISTANCE - TYPICAL

- 1 - VOLTMETER
2 - BATTERY

(2) Connect the positive lead of the voltmeter to the battery positive terminal post. Connect the negative lead of the voltmeter to the battery positive cable terminal clamp (Fig. 20). 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.

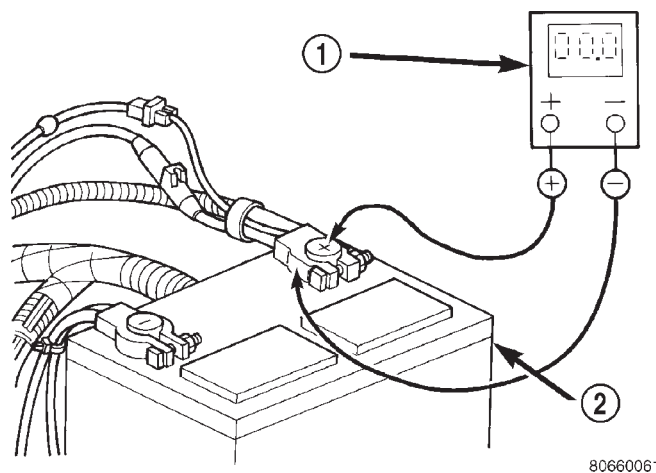


Fig. 20 TEST BATTERY POSITIVE CONNECTION RESISTANCE - TYPICAL

- 1 - VOLTMETER
2 - BATTERY

(3) Connect the voltmeter to measure between the battery positive cable terminal clamp and the starter solenoid B(+) terminal stud (Fig. 21). 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 con-

BATTERY CABLES (Continued)

nection 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.

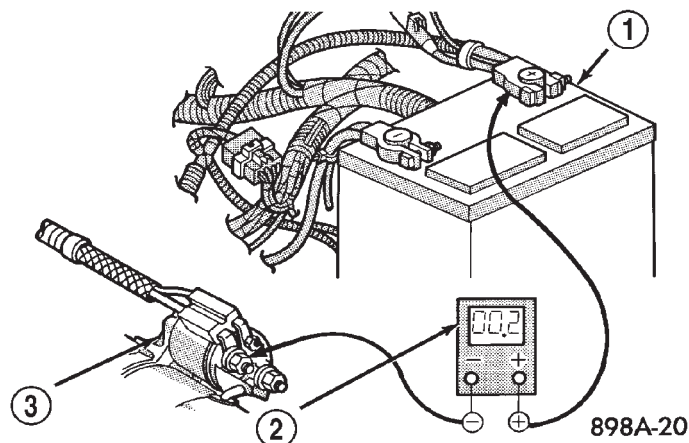


Fig. 21 TEST BATTERY POSITIVE CABLE RESISTANCE - TYPICAL

- 1 - BATTERY
- 2 - VOLTMETER
- 3 - STARTER MOTOR

(4) Connect the voltmeter to measure between the battery negative cable terminal clamp and a good clean ground on the engine block (Fig. 22). 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.

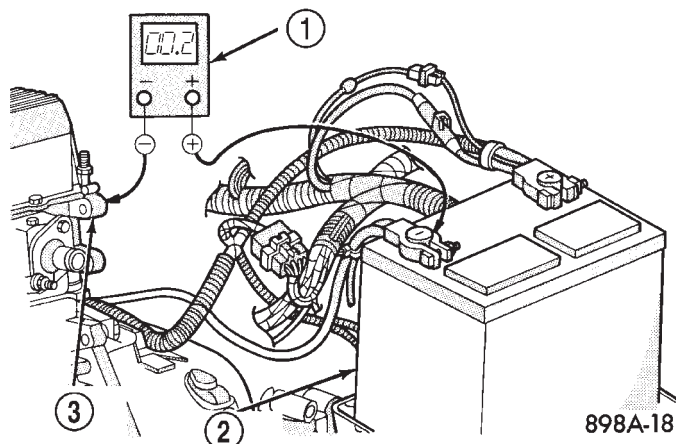


Fig. 22 TEST GROUND CIRCUIT RESISTANCE - TYPICAL

- 1 - VOLTMETER
- 2 - BATTERY
- 3 - ENGINE GROUND

THERMAL GUARD

DESCRIPTION

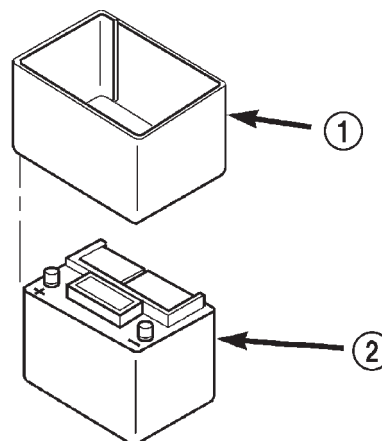


Fig. 23 Battery Thermal guard

- 1 - THERMAL GUARD
- 2 - BATTERY

A flexible plastic bubble-wrap style thermal guard (Fig. 23) slides over the battery case to enclose the sides of the battery. The thermal guard consists of a heavy black plastic outer skin and two lighter plies of plastic that have been formed into a sheet with hundreds of small air pockets entrapped between them. The resulting material is very similar to the bubble-wrap used to protect items in many parcel packaging and shipping applications.

OPERATION

The thermal guard protects the battery from engine compartment temperature extremes. The temperature of the battery can affect battery performance. The air trapped between the plastic plies of the thermal guard create a dead air space, which helps to insulate the sides of the battery case from the air temperature found in the surrounding engine compartment.

REMOVAL

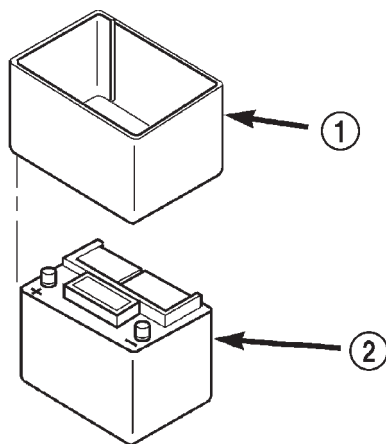
(1) Remove the battery and the battery thermal guard from the battery tray as a unit. Refer to Battery Removal for the proper battery removal procedures.

(2) Carefully and evenly slide the battery thermal guard up off of the battery case (Fig. 24).

INSTALLATION

(1) Clean and inspect the battery thermal guard. Refer to Battery System Cleaning for the proper cleaning procedures, and refer to Battery System Inspection for the proper inspection procedures.

THERMAL GUARD (Continued)



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Fig. 24 Battery thermal guard

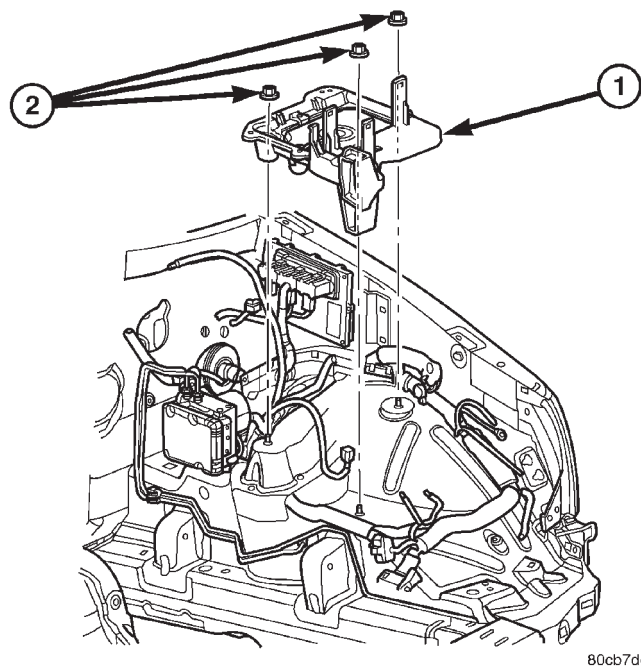
- 1 - THERMAL GUARD
2 - BATTERY

(2) Carefully and evenly slide the battery thermal guard down over the battery case.

(3) Install the battery and the battery thermal guard into the battery tray as a unit. Refer to Battery Installation for the proper battery installation procedures.

BATTERY TRAY

DESCRIPTION



80cb7ddb

Fig. 25 Battery Tray Location

- 1 - Battery Tray
2 - Battery Tray Retaining Nuts

The battery is placed in a molded plastic tray located in the left front corner of the engine compartment (Fig. 25). The battery hold down hardware is contained within the battery tray. A hole in the bottom of the battery tray is fitted with a battery temperature sensor. Refer to Charging System for more information on the battery temperature sensor. Refer to Battery Hold down for more information on hold down hardware.

OPERATION

The battery tray provides a secure mounting location and supports the battery. On some vehicles, the battery tray also provides the anchor point/s for the battery holddown hardware. The battery tray and the battery holddown hardware combine to secure and stabilize the battery in the engine compartment, which prevents battery movement during vehicle operation. Unrestrained battery movement during vehicle operation could result in damage to the vehicle, the battery, or both.

REMOVAL

(1) Remove the battery from the battery tray (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - REMOVAL).

(2) Unlatch and remove the PDC from the battery tray.

(3) Remove the battery temperature sensor from the battery tray (Refer to 8 - ELECTRICAL/CHARGING/BATTERY TEMPERATURE SENSOR - REMOVAL).

(4) Remove the three nuts that secure the battery tray to the weld studs on the front extension of the left front wheelhouse inner panel (Fig. 25).

(5) Remove the battery tray from the vehicle.

INSTALLATION

(1) Clean and inspect the battery tray (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - CLEANING).

(2) Position the battery tray onto the weld studs on the front extension of the left front wheelhouse inner panel.

(3) Install the battery temperature sensor onto the battery tray (Refer to 8 - ELECTRICAL/CHARGING/BATTERY TEMPERATURE SENSOR - INSTALLATION).

(4) Install and tighten the three nuts that secure the battery tray to the weld studs on the front extension of the left front wheelhouse inner panel. Tighten the nuts to 5 N·m (45 in. lbs.).

(5) Install the PDC on the battery tray.

(6) Install the battery onto the battery tray (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - INSTALLATION).

CHARGING SYSTEM

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CHARGING SYSTEM

DESCRIPTION

The charging system consists of:

- Generator
- Electronic Voltage Regulator (EVR) circuitry within the Powertrain Control Module (PCM)
- Ignition switch
- Battery (refer to 8, Battery for information)
- Battery temperature sensor
- Generator Lamp (if equipped)
- Check Gauges Lamp (if equipped)
- Wiring harness and connections (refer to 8, Wiring for information)

OPERATION

The charging system is turned on and off with the ignition switch. The system is on when the engine is running and the ASD relay is energized. When the ASD relay is on, voltage is supplied to the ASD relay sense circuit at the PCM. This voltage is connected through the PCM and supplied to one of the generator field terminals (Gen. Source +) at the back of the generator.

The amount of DC current produced by the generator is controlled by the EVR (field control) circuitry contained within the PCM. This circuitry is connected in series with the second rotor field terminal and ground.

A battery temperature sensor, located in the battery tray housing, is used to sense battery tempera-

ture. This temperature data, along with data from monitored line voltage, is used by the PCM to vary the battery charging rate. This is done by cycling the ground path to control the strength of the rotor magnetic field. The PCM then compensates and regulates generator current output accordingly.

All vehicles are equipped with On-Board Diagnostics (OBD). All OBD-sensed systems, including EVR (field control) circuitry, are monitored by the PCM. Each monitored circuit is assigned a Diagnostic Trouble Code (DTC). The PCM will store a DTC in electronic memory for certain failures it detects. Refer to Diagnostic Trouble Codes in; Powertrain Control Module; Electronic Control Modules for more DTC information.

The Check Gauges Lamp (if equipped) monitors: **charging system voltage**, engine coolant temperature and engine oil pressure. If an extreme condition is indicated, the lamp will be illuminated. This is done as reminder to check the three gauges. The signal to activate the lamp is sent via the CCD bus circuits. The lamp is located on the instrument panel. Refer to 8, Instrument Cluster for additional information.

DIAGNOSIS AND TESTING - CHARGING SYSTEM

The following procedures may be used to diagnose the charging system if:

- the check gauges lamp (if equipped) is illuminated with the engine running

CHARGING SYSTEM (Continued)

- 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 in 8, Battery for more information.

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; Powertrain Control Module; Electronic Control Modules for more DTC information. This will include a complete list of DTC's including DTC's for the charging system.

To perform a complete test of the charging system, refer to the appropriate Powertrain Diagnostic Procedures service manual and the DRB® scan tool. Per-

form the following inspections before attaching the scan tool.

(1) Inspect the battery condition. Refer to 8, Battery for procedures.

(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 both the fuseblock and Power Distribution Center (PDC) 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 section of this group for torque specifications.

(5) Inspect generator drive belt condition and tension. Tighten or replace belt as required. Refer to Belt Tension Specifications in 7, Cooling System.

(6) Inspect automatic belt tensioner (if equipped). Refer to 7, Cooling System for information.

(7) 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 and tight. Repair as required.

SPECIFICATIONS**TORQUE - EXCEPT DIESEL**

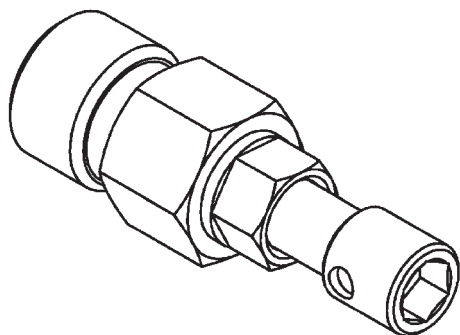
DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Generator Horizontal Mounting Bolts - 3.7L	57	42	-
Generator Vertical Mounting Bolt - 3.7L	40	29	-
Generator Mounting Bolts - 2.4L	57	42	-
B+ Terminal Nut at Top of Generator	13	-	115
Generator Decoupler	110	81	-

GENERATOR RATINGS - GAS ENGINES

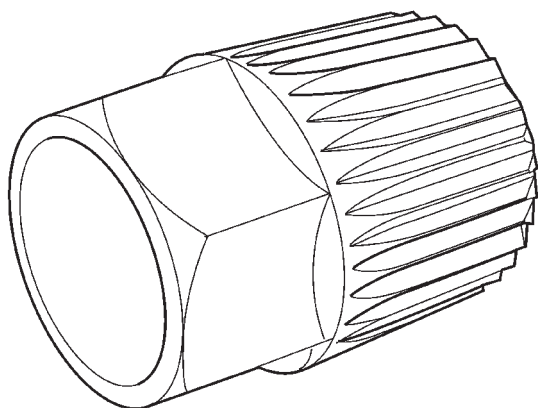
TYPE	PART NUMBER	RATED SAE AMPS	ENGINES	MINIMUM TEST AMPS
DENSO	56044530AB	124	2.4L	88
DENSO	56044532AB	136	2.4L	96
DENSO	56041693AA	136	3.7L	96
DENSO	56029914AA	160	3.7L	112

CHARGING SYSTEM (Continued)

SPECIAL TOOLS



GENERATOR DECOUPLER TOOL #8433



80cb8152

GENERATOR DECOUPLER TOOL #8823

BATTERY TEMPERATURE SENSOR

DESCRIPTION

The Battery Temperature Sensor (BTS) is attached to the battery tray located under the battery.

OPERATION

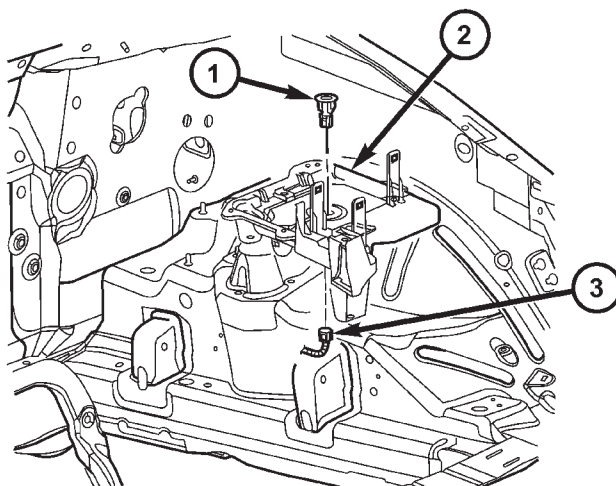
The BTS is used to determine the battery temperature and control battery charging rate. This temperature data, along with data from monitored line voltage, is used by the PCM to vary the battery charging rate. System voltage will be higher at colder temperatures and is gradually reduced at warmer temperatures.

The PCM sends 5 volts to the sensor and is grounded through the sensor return line. As temperature increases, resistance in the sensor decreases and the detection voltage at the PCM increases.

The BTS is also used for OBD II diagnostics. Certain faults and OBD II monitors are either enabled or disabled, depending upon BTS input (for example, disable purge and enable Leak Detection Pump (LDP) and O2 sensor heater tests). Most OBD II monitors are disabled below 20 degrees F.

REMOVAL

The battery temperature sensor is located under the vehicle battery (Fig. 1) and is attached to a mounting hole on battery tray.



80c7eb91

Fig. 1 BATTERY TEMPERATURE SENSOR

1 - BATTERY TEMPERATURE SENSOR

2 - BATTERY TRAY

3 - ELECTRICAL CONNECTOR

(1) Remove battery. Refer to 8, Battery for procedures.

(2) Disconnect sensor pigtail harness from engine wire harness electrical connector.

(3) Pry sensor straight up from battery tray mounting hole.

INSTALLATION

The battery temperature sensor is located under vehicle battery and is attached to a mounting hole on battery tray.

(1) Feed pigtail harness through hole in top of battery tray and press sensor into top of battery tray.

(2) Connect pigtail harness.

(3) Install battery. Refer to 8, Battery for procedures.

GENERATOR

DESCRIPTION

The generator is belt-driven by the engine using a serpentine type drive belt. It is serviced only as a complete assembly. If the generator fails for any reason, the entire assembly must be replaced.

OPERATION

As the energized rotor begins to rotate within the generator, the spinning magnetic field induces a current into the windings of the stator coil. Once the generator begins producing sufficient current, it also provides the current needed to energize the rotor.

The stator winding connections deliver the induced AC current to 3 positive and 3 negative diodes for rectification. From the diodes, rectified DC current is delivered to the vehicle electrical system through the generator battery terminal.

Although the generators appear the same externally, different generators with different output ratings are used on this vehicle. Be certain that the replacement generator has the same output rating and part number as the original unit. Refer to Specifications and see Generator Ratings for amperage ratings and part numbers.

Noise emitting from the generator may be caused by: worn, loose or defective bearings; a loose or defective drive pulley; incorrect, worn, damaged or misadjusted fan drive belt; loose mounting bolts; a misaligned drive pulley or a defective stator or diode.

REMOVAL

Gasoline Powered Engines

CAUTION: DISCONNECT NEGATIVE CABLE FROM BATTERY BEFORE REMOVING BATTERY OUTPUT WIRE FROM GENERATOR. FAILURE TO DO SO CAN RESULT IN INJURY.

(1) Disconnect and isolate negative battery cable at battery.

CAUTION: Never force a belt over a pulley rim using a screwdriver. The synthetic fiber of the belt can be damaged.

CAUTION: When installing a serpentine accessory drive belt, the belt MUST be routed correctly. The water pump will be rotating in the wrong direction if the belt is installed incorrectly, causing the engine to overheat. Refer to belt routing label in engine compartment, or refer to Belt Schematics in Cooling System.

(2) Remove generator drive belt. Refer to 7, Cooling System for procedures.

(3) Unsnap plastic protective cover (Fig. 2) from B+ mounting stud.

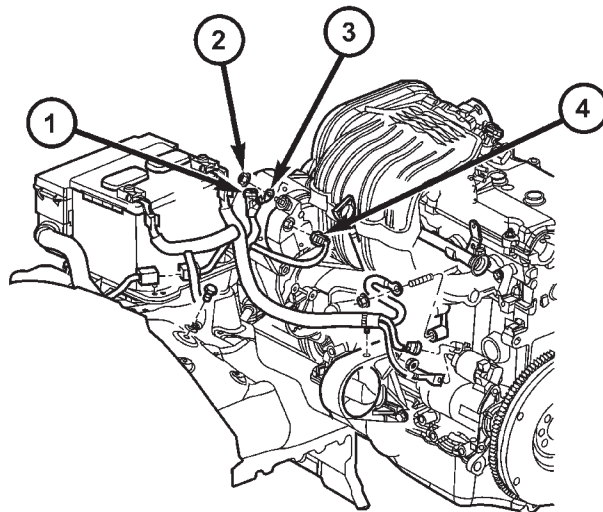
(4) Remove B+ terminal mounting nut (Fig. 2) at top of generator.

(5) Disconnect field wire electrical connector at rear of generator (Fig. 2) by pushing on connector tab.

(6) 2.4L Engine: Remove 2 generator mounting bolts (Fig. 3).

(7) 3.7L Engine: Remove 1 vertical generator mounting bolt and 2 horizontal mounting bolts (Fig. 4).

(8) Remove generator from vehicle.

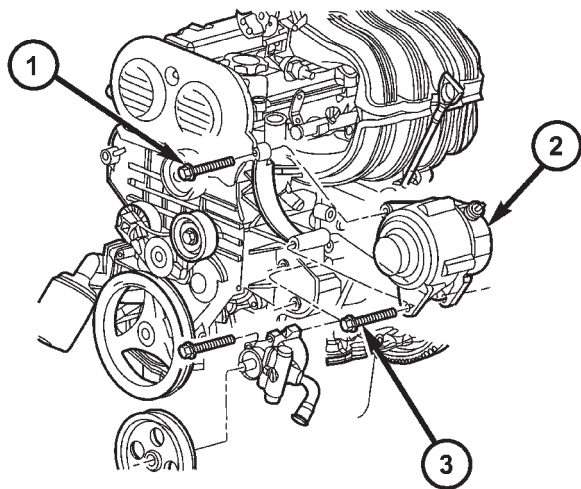


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Fig. 2 GENERATOR ELECTRICAL CONNECTORS - TYPICAL

- 1 - PROTECTIVE CAP
- 2 - B+ NUT
- 3 - B+ TERMINAL
- 4 - FIELD ELECTRICAL CONNECTOR

GENERATOR (Continued)



80c7ebf9

Fig. 3 GENERATOR - 2.4L

- 1 - UPPER MOUNTING BOLT
- 2 - GENERATOR
- 3 - LOWER MOUNTING BOLT

INSTALLATION**Gasoline Powered Engines**

(1) 2.4L Engine: Position generator to engine and install 2 mounting bolts. Refer to torque specifications.

(2) 3.7L Engine: Position generator to engine and install 3 mounting bolts. Tighten 2 horizontal mounting bolts to specified torque. Tighten 1 vertical mounting bolt to specified torque. Refer to torque specifications.

(3) Snap field wire connector into rear of generator.

(4) Install B+ terminal and nut to generator mounting stud. Refer to torque specifications.

(5) Snap plastic protective cover to B+ terminal.

CAUTION: Never force a belt over a pulley rim using a screwdriver. The synthetic fiber of the belt can be damaged.

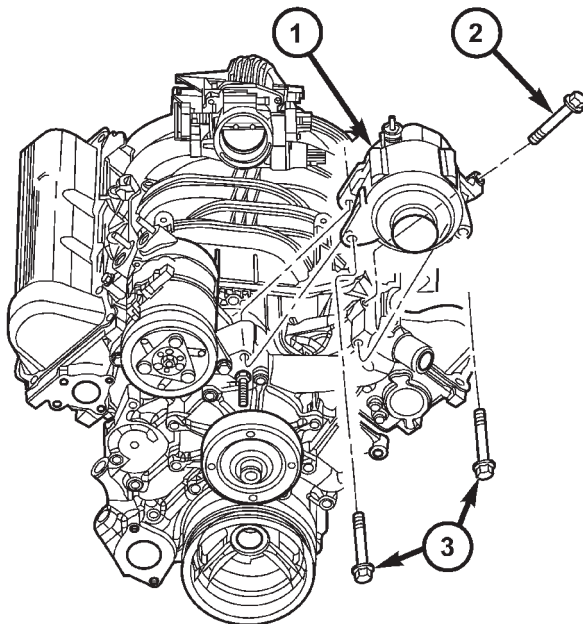
CAUTION: When installing a serpentine accessory drive belt, the belt **MUST** be routed correctly. The water pump will be rotating in the wrong direction if the belt is installed incorrectly, causing the engine to overheat. Refer to belt routing label in engine compartment, or refer to Belt Schematics in 7, Cooling System.

(6) Install drive belt Refer to 7, Cooling System for belt routing, belt adjustment and bolt tightening procedures.

(7) Install negative battery cable to battery.

GENERATOR DECOUPLER PULLEY**DESCRIPTION**

The generator decoupler is used only with certain engines. The decoupler is used in place of the standard generator drive pulley (Fig. 5).

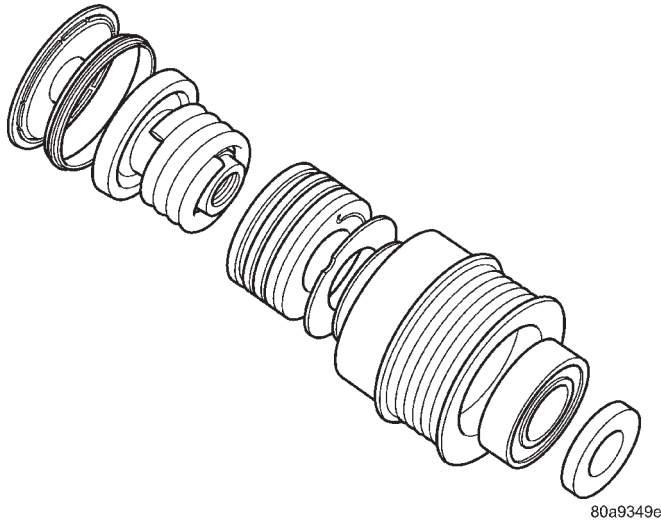


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Fig. 4 GENERATOR - 3.7L

- 1 - GENERATOR
- 2 - VERTICAL MOUNTING BOLT
- 3 - HORIZONTAL MOUNTING BOLTS

GENERATOR DECOUPLER PULLEY (Continued)



80a9349e

**Fig. 5 GENERATOR DECOUPLER PULLEY
(TYPICAL)**

OPERATION

The generator decoupler is used only with certain engines. The decoupler (Fig. 5). is a one-way clutch designed to help reduce belt tension fluctuation, vibration, reduce fatigue loads, improve belt life, reduce hubloads on components, and reduce noise. Dry operation is used (no grease or lubricants). The decoupler is not temperature sensitive and also has a low sensitivity to electrical load. The decoupler is a non-serviceable item and is to be replaced as an assembly.

DIAGNOSIS AND TESTING - GENERATOR DECOUPLER

CONDITION	POSSIBLE CAUSES	CORRECTION
Does not drive generator (generator not charging)	Internal failure	Replace decoupler
Noise coming from decoupler	Internal failure	Replace decoupler

REMOVAL

The generator decoupler is used only with certain engines.

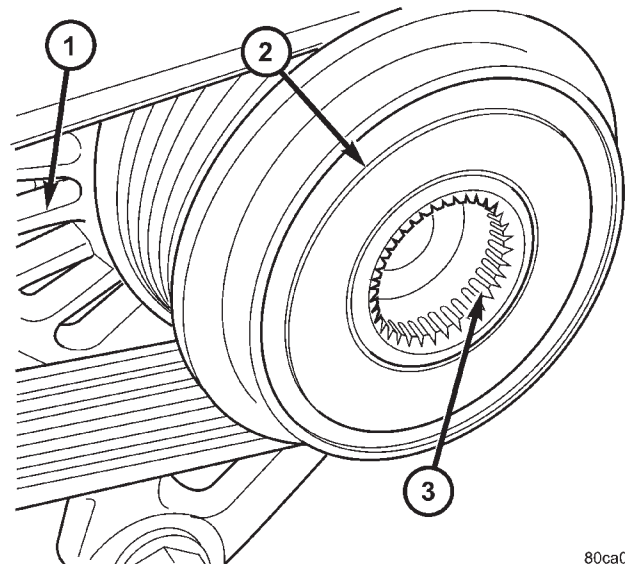
Two different type generator decoupler pulleys are used. One can be identified by the use of machined splines (Fig. 6). The other can be identified by a hex opening (Fig. 7) and will not use splines.

Different special tools are required to service each different decoupler. Refer to following procedure.

INA Decoupler

- (1) Disconnect negative battery cable.
- (2) Remove generator and accessory drive belt. Refer to Generator Removal.
- (3) Position Special Tool #8823 (VM.1048) into decoupler (Fig. 8).
- (4) Determine if end of generator shaft is hex shaped (Fig. 9) or is splined (Fig. 10). If hex is used, insert a 10MM deep socket into tool #8823 (VM.1048) (Fig. 11). If splined, insert a 5/16" 6-point hex driver, or a 10MM 12-point triple square driver into tool #8823 (VM.1048) (Fig. 12).

(5) The generator shaft uses conventional right-hand threads to attach decoupler. To break decoupler loose from generator threads, rotate end of tool clockwise (Fig. 11) or, (Fig. 12).



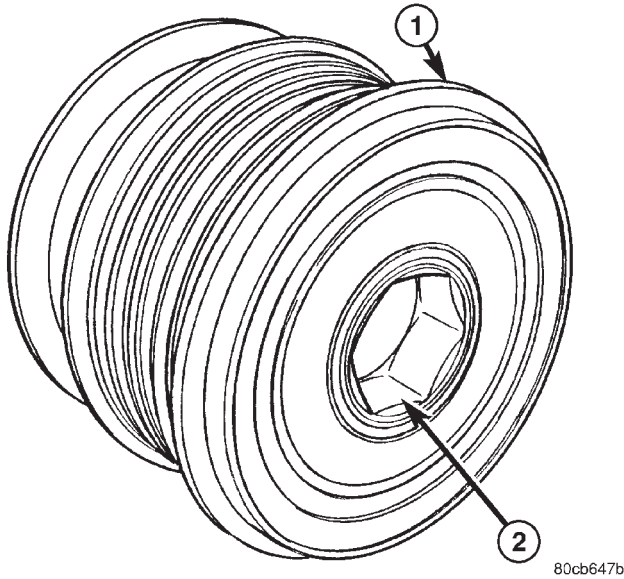
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Fig. 6 GENERATOR DECOUPLER PULLEY (INA)

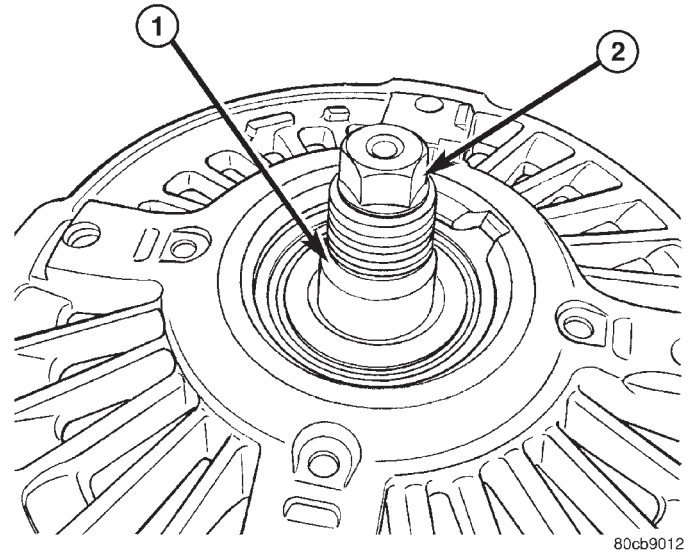
- 1 - GENERATOR
- 2 - DECOUPLER (INA)
- 3 - MACHINED SPLINES

(6) After breaking loose with tool, unthread decoupler by hand from generator.

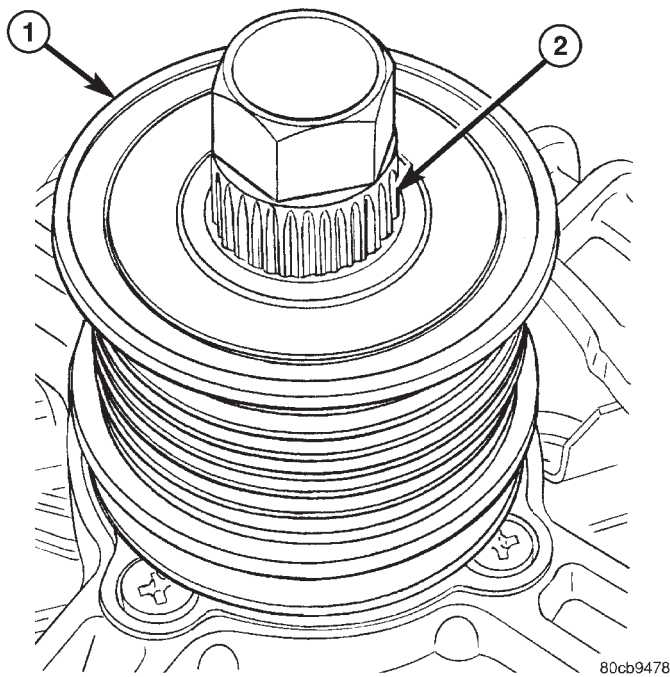
GENERATOR DECOUPLER PULLEY (Continued)

**Fig. 7 GENERATOR DECOUPLER PULLEY (LITENS)**

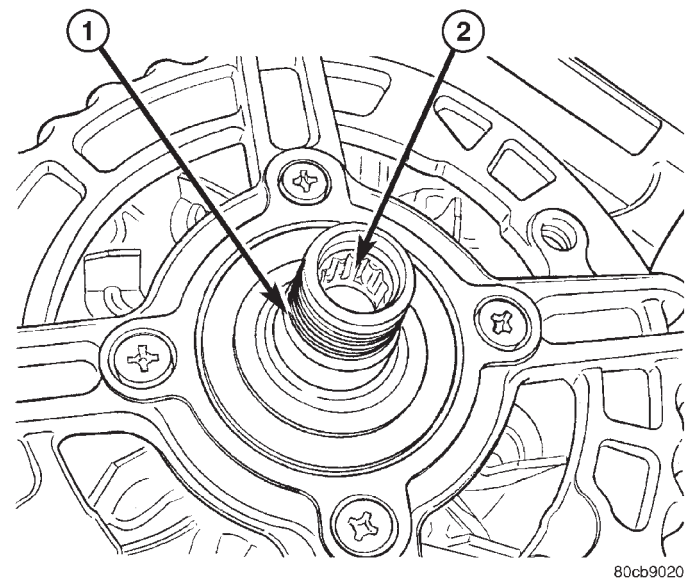
- 1 - DECOUPLER (LITENS)
2 - HEX OPENING

**Fig. 9 END OF GENERATOR SHAFT (HEX)**

- 1 - GENERATOR SHAFT
2 - HEX

**Fig. 8 #8823 (VM.1048) TOOL AND INA DECOUPLER**

- 1 - INA DECOUPLER
2 - TOOL #8823 (VM.1048)

**Fig. 10 END OF GENERATOR SHAFT (SPLINED)**

- 1 - GENERATOR SHAFT
2 - SPLINES

GENERATOR DECOUPLER PULLEY (Continued)

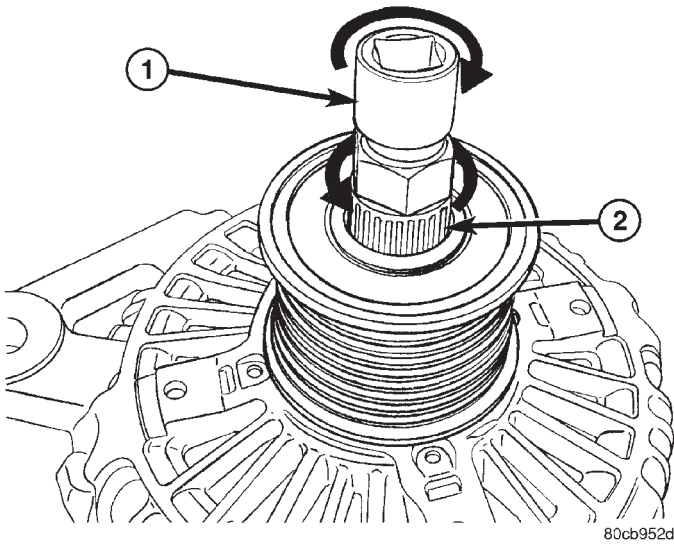


Fig. 11 DECOUPLER REMOVAL (INA-HEX)

- 1 - DEEP 10 MM SOCKET
- 2 - TOOL #8823 (VM.1048)

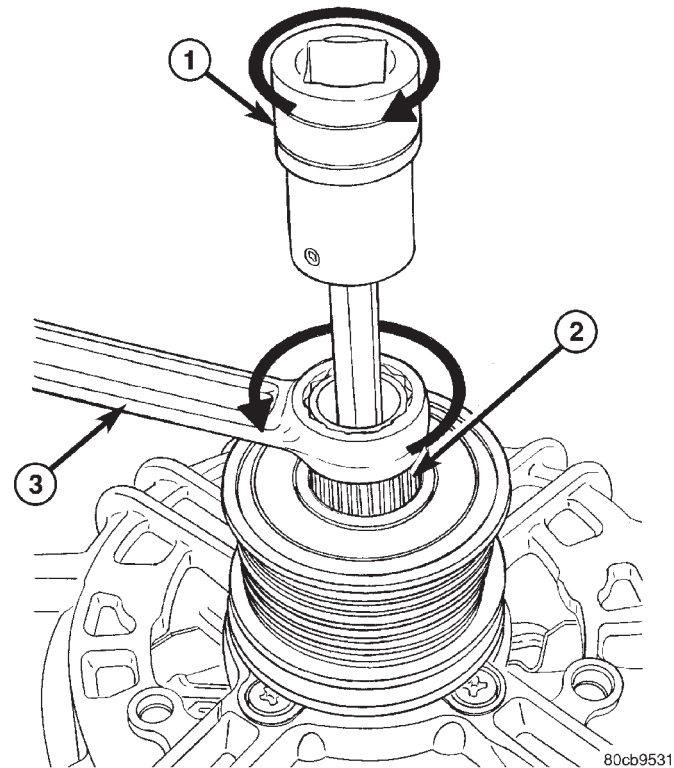


Fig. 12 DECOUPLER REMOVAL (INA-SPLINED)

- 1 - DRIVER
- 2 - TOOL #8823 (VM.1048)
- 3 - 17 MM WRENCH

Litens Decoupler

- (1) Disconnect negative battery cable.

(2) Remove generator and accessory drive belt. Refer to Generator Removal.

(3) Position Special Tool #8433 (Fig. 13) into decoupler. Align to hex end of generator shaft.

(4) The generator shaft uses conventional right-hand threads to attach decoupler. To break decoupler loose from generator threads, rotate end of tool clockwise (Fig. 14).

(5) After breaking loose with tool, unthread decoupler by hand from generator.

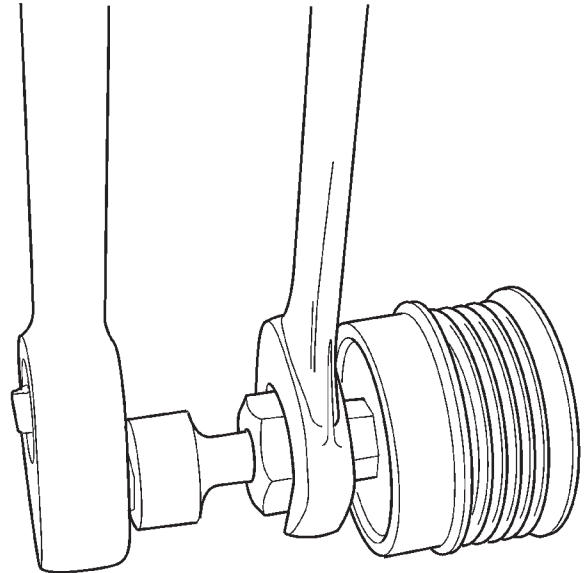


Fig. 13 # 8433 TOOL AND LITENS DECOUPLER

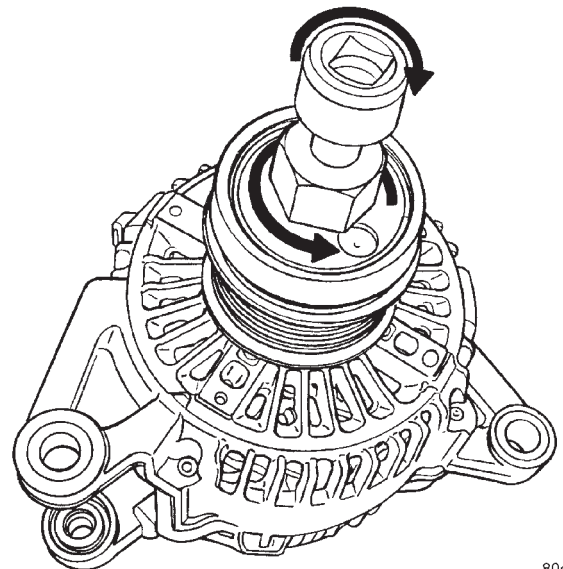


Fig. 14 DECOUPLER REMOVAL (LITENS)

GENERATOR DECOUPLER PULLEY (Continued)

INSTALLATION

INA Decoupler

(1) Thread decoupler pulley onto generator shaft by hand (right-hand threads).

(2) Position Special Tool #8823 (VM.1048) into decoupler (Fig. 8).

(3) Determine if end of generator shaft is hex shaped (Fig. 9) or is splined (Fig. 10). If hex is used, insert a 10MM deep socket into tool #8823 (VM.1048) (Fig. 15). If splined, insert a 5/16" 6-point hex driver, or a 10MM 12-point triple square driver into tool #8823 (VM.1048) (Fig. 16).

(4) **Do not use an adjustable, ratcheting "click type" torque wrench. Most "click type" wrenches will only allow torque to be applied in a clockwise rotation. Use a dial-type or beam-type wrench.** Tighten in counter-clockwise rotation (Fig. 15) or, (Fig. 16). Refer to torque specifications.

(5) Install accessory drive belt, and generator. Refer to Generator Installation.

(6) Connect negative battery cable.

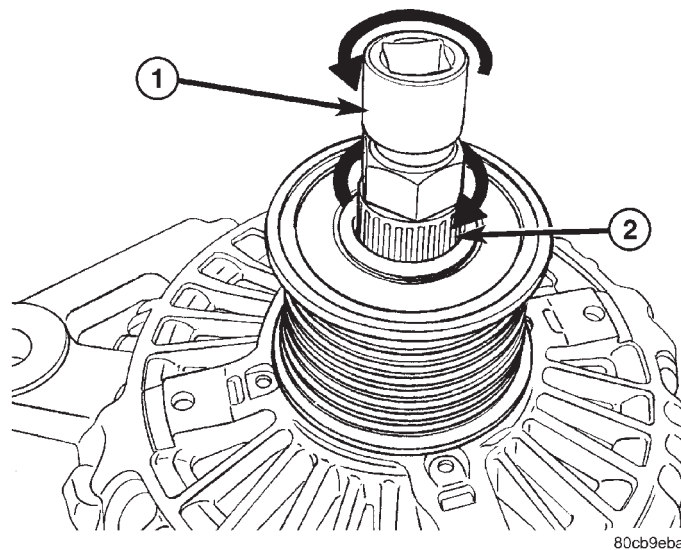


Fig. 15 DECOUPLER INSTALLATION (INA-HEX)

- 1 - 10MM DEEP SOCKET
2 - TOOL # 8823 (VM.1048)

Litens Decoupler

(1) Thread decoupler pulley onto generator shaft by hand (right-hand threads).

(2) Position Special Tool 8433 (Fig. 13) into decoupler. Align tool to hex end of generator shaft.

(3) **Do not use an adjustable, ratcheting "click type" torque wrench. Most "click type" wrenches will only allow torque to be applied in a clockwise rotation. Use a dial-type or**

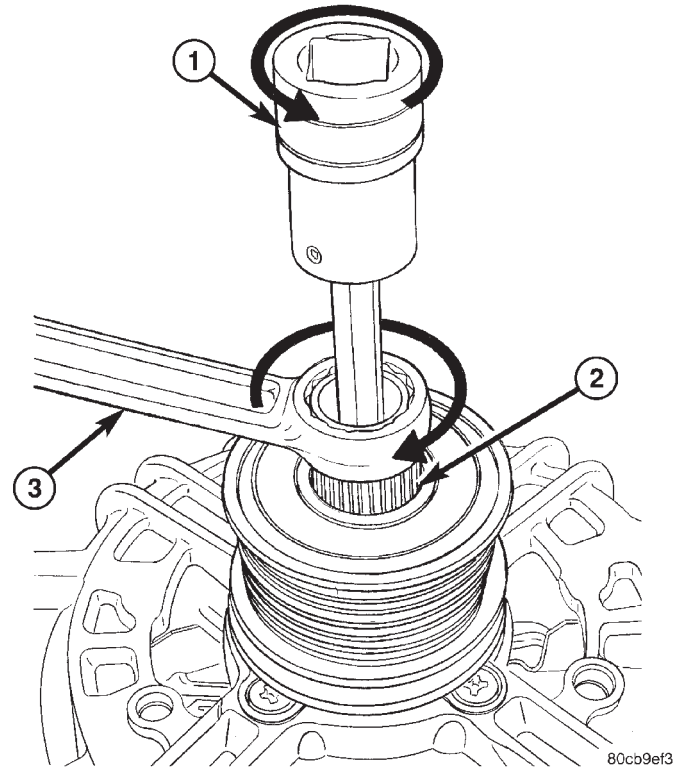


Fig. 16 DECOUPLER INSTALLATION (INA SPLINED)

- 1 - DRIVER
2 - TOOL # 8823 (VM.1048)

beam-type wrench. Tighten in counter-clockwise rotation (Fig. 17). Refer to torque specifications.

(4) Install accessory drive belt, and generator. Refer to Generator Installation.

(5) Connect negative battery cable.

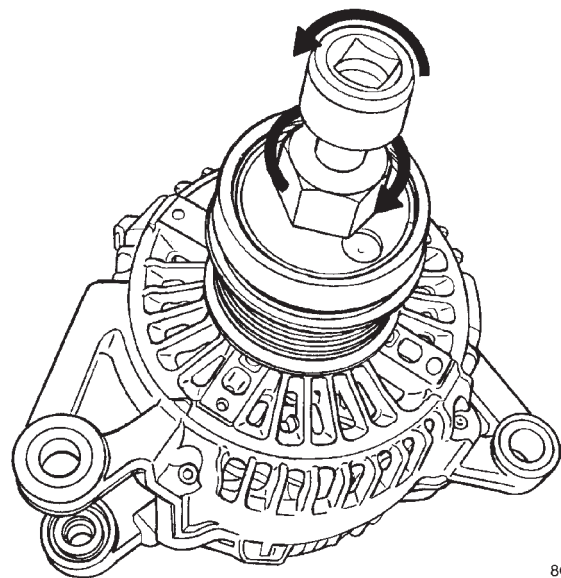


Fig. 17 DECOUPLER INSTALLATION (Litens)

VOLTAGE REGULATOR

DESCRIPTION

The Electronic Voltage Regulator (EVR) is not a separate component. It is actually a voltage regulating circuit located within the Powertrain Control Module (PCM). The EVR is not serviced separately. If replacement is necessary, the PCM must be replaced.

OPERATION

The amount of DC current produced by the generator is controlled by EVR circuitry contained within the Powertrain Control Module (PCM). This circuitry is connected in series with the generator's second rotor field terminal and its ground.

Voltage is regulated by cycling the ground path to control the strength of the rotor magnetic field. The

EVR circuitry monitors system line voltage (B+) and battery temperature (refer to Battery Temperature Sensor for more information). It then determines a target charging voltage. If sensed battery voltage is 0.5 volts or lower than the target voltage, the PCM grounds the field winding until sensed battery voltage is 0.5 volts above target voltage. A circuit in the PCM cycles the ground side of the generator field up to 100 times per second (100Hz), but has the capability to ground the field control wire 100% of the time (full field) to achieve the target voltage. If the charging rate cannot be monitored (limp-in), a duty cycle of 25% is used by the PCM in order to have some generator output. Also refer to Charging Operation for additional information.

STARTING SYSTEM

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STARTER MOTOR			
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STARTING SYSTEM

DESCRIPTION

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)
- 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 each of these groups 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.

Certain starting system components are monitored by the PCM and may produce a Diagnostic Trouble Code (DTC). Refer to Emission Control. See Diagnostic Trouble Codes for additional information and a list of codes.

OPERATION

The starting system components form two separate circuits. A high-amperage feed circuit that feeds the starter motor between 150 and 350 amperes (700 amperes - diesel engine), and a low-amperage control circuit that operates on less than 20 amperes. The high-amperage feed circuit components include the battery, the battery cables, the contact disc portion of the starter solenoid, and the starter motor. The low-amperage control circuit components include the ignition switch, the clutch pedal position switch (manual transmission), the park/neutral position switch (automatic transmission), the starter relay, the electromagnetic windings of the starter solenoid, and the connecting wire harness components.

If the vehicle is equipped with a manual transmission, it has a clutch pedal position switch installed in series between the ignition switch and the coil battery terminal of the starter relay. This normally open switch prevents the starter relay from being energized when the ignition switch is turned to the momentary Start position, unless the clutch pedal is depressed. This feature prevents starter motor operation while the clutch disc and the flywheel are engaged. The starter relay coil ground terminal is always grounded on vehicles with a manual transmission.

STARTING SYSTEM (Continued)

If the vehicle is equipped with an automatic transmission, battery voltage is supplied through the low-amperage control circuit to the coil battery terminal of the starter relay when the ignition switch is turned to the momentary Start position. The park/neutral position switch is installed in series between the starter relay coil ground terminal and ground. This normally open switch prevents the starter relay from being energized and the starter motor from operating unless the automatic transmission gear selector is in the Neutral or Park positions.

When the starter relay coil is energized, the normally open relay contacts close. The relay contacts connect the relay common feed terminal to the relay normally open terminal. The closed relay contacts energize the starter solenoid coil windings.

The energized solenoid pull-in coil pulls in the solenoid plunger. The solenoid plunger pulls the shift lever in the starter motor. This engages the starter overrunning clutch and pinion gear with the starter ring gear on the manual transmission flywheel or on the automatic transmission torque converter or torque converter drive plate.

As the solenoid plunger reaches the end of its travel, the solenoid contact disc completes the high-amperage starter feed circuit and energizes the solenoid plunger hold-in coil. Current now flows between

the solenoid battery terminal and the starter motor, energizing the starter.

Once the engine starts, the overrunning clutch protects the starter motor from damage by allowing the starter pinion gear to spin faster than the pinion shaft. When the driver releases the ignition switch to the On position, the starter relay coil is de-energized. This causes the relay contacts to open. When the relay contacts open, the starter solenoid plunger hold-in coil is de-energized.

When the solenoid plunger hold-in coil is de-energized, the solenoid plunger return spring returns the plunger to its relaxed position. This causes the contact disc to open the starter feed circuit, and the shift lever to disengage the overrunning clutch and pinion gear from the starter ring gear.

DIAGNOSIS AND TESTING - STARTING SYSTEM

The battery, starting, and charging systems operate in conjunction with one another, and must be tested as a complete system. For correct starting/charging system operation, all of the components involved in these 3 systems must perform within specifications.

Starting System Diagnosis		
CONDITION	POSSIBLE CAUSE	CORRECTION
STARTER FAILS TO OPERATE.	1. Battery discharged or faulty.	1. Refer to Battery. Charge or replace battery, if required.
	2. Starting circuit wiring faulty.	2. Refer to 8, Wiring Diagrams. Test and repair starter feed and/or control circuits, if required.
	3. Starter relay faulty.	3. Refer to Starter Relay in Diagnosis and Testing. Replace starter relay if required.
	4. Ignition switch faulty.	4. Refer to Ignition Switch and Key Lock Cylinder. Replace ignition switch if required.
	5. Clutch pedal position switch faulty.	5. Refer to Clutch Pedal Position Switch.
	6. Park/Neutral position switch faulty or misadjusted.	6. Refer to Park/Neutral Position Switch. Replace park/neutral position switch if required.
	7. Starter solenoid faulty.	7. Refer to Starter Motor. Replace starter motor assembly if required.
	8. Starter motor faulty.	8. If all other starting system components and circuits test OK, replace starter motor.

STARTING SYSTEM (Continued)

Starting System Diagnosis		
CONDITION	POSSIBLE CAUSE	CORRECTION
STARTER ENGAGES, FAILS TO TURN ENGINE.	1. Battery discharged or faulty.	1. Refer to Battery. Charge or replace battery if required.
	2. Starting circuit wiring faulty.	2. Refer to 8, Wiring Diagrams. Test and repair starter feed and/or control circuits if required.
	3. Starter motor faulty.	3. If all other starting system components and circuits test OK, replace starter motor assembly.
	4. Engine seized.	4. Refer to Engine Diagnosis in the Diagnosis and Testing section of 9, Engine.
STARTER ENGAGES, SPINS OUT BEFORE ENGINE STARTS.	1. Starter ring gear faulty.	1. Refer to Starter Motor Removal and Installation. Remove starter motor to inspect starter ring gear. Replace starter ring gear if required.
	2. Starter motor faulty.	2. If all other starting system components and circuits test OK, replace starter motor assembly.
STARTER DOES NOT DISENGAGE.	1. Starter motor improperly installed.	1. Refer to Starter Motor Removal and Installation. Tighten starter mounting hardware to correct torque specifications.
	2. Starter relay faulty.	2. Refer to Starter Relay Diagnosis and Testing. Replace starter relay if required.
	3. Ignition switch faulty.	3. Refer to Ignition Switch and Key Lock Cylinder. Replace ignition switch if required.
	4. Starter motor faulty.	4. If all other starting system components and circuits test OK, replace starter motor.

INSPECTION

For complete starter wiring circuit diagrams, refer to 8, Wiring Diagrams. Before removing any unit from starting system for repair or diagnosis, perform the following inspections:

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO 8, PASSIVE RESTRAINT SYSTEMS, BEFORE ATTEMPTING ANY 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.

- **Battery** - Visually inspect battery for indications of physical damage and loose or corroded cable connections. Determine state-of-charge and cranking capacity of battery. Charge or replace battery if required. Refer to **Battery** in 8, Battery. **Note: If equipped with diesel engine, a dual battery system may be used, and both batteries must be inspected.**

- **Ignition Switch** - Visually inspect ignition switch for indications of physical damage and loose or corroded wire harness connections. Refer to **Ignition Switch and Key Lock Cylinder**.

- **Clutch Pedal Position Switch** - If equipped with manual transmission, visually inspect clutch pedal position switch for indications of physical damage and loose or corroded wire harness connections. Refer to **Clutch Pedal Position Switch** in 6, Clutch.

- **Park/Neutral Position Switch** - If equipped with automatic transmission, visually inspect park/neutral position switch for indications of physical damage and loose or corroded wire harness connections. Refer to **Park/Neutral Position Switch** in 21, Transmission.

- **Starter Relay** - Visually inspect starter relay for indications of physical damage and loose or corroded wire harness connections.

- **Starter Motor** - Visually inspect starter motor for indications of physical damage and loose or corroded wire harness connections.

- **Starter Solenoid** - Visually inspect starter solenoid for indications of physical damage and loose or corroded wire harness connections.

- **Wiring** - Visually inspect wire harnesses for damage. Repair or replace any faulty wiring, as required. Refer to 8, Wiring Diagrams.

STARTING SYSTEM (Continued)

TESTING

COLD CRANKING TEST

For complete starter wiring circuit diagrams, refer to 8, Wiring Diagrams. The battery must be fully-charged and load-tested before proceeding. Refer to **Battery** in 8, Battery.

(1) Connect volt-ampere tester to battery terminals (Fig. 1). See instructions provided by manufacturer of volt-ampere tester being used. **Note: Certain diesel equipped models use dual batteries. If equipped with dual battery system, tester should be connected to battery on left side of vehicle only. Also, tester current reading must be taken from positive battery cable lead that connects to starter motor.**

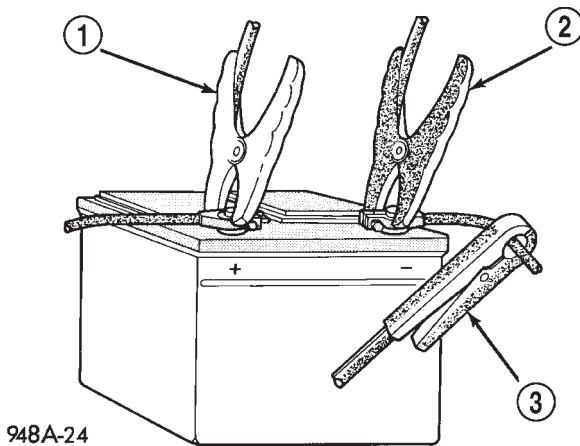


Fig. 1 Volts-Amps Tester Connections - Typical

- 1 - POSITIVE CLAMP
- 2 - NEGATIVE CLAMP
- 3 - INDUCTION AMMETER CLAMP

(2) Fully engage parking brake.

(3) If equipped with manual transmission, place gearshift selector lever in Neutral position and block clutch pedal in fully depressed position. If equipped with automatic transmission, place gearshift selector lever in Park position.

(4) Verify that all lamps and accessories are turned off.

(5) To prevent a gasoline engine from starting, remove Automatic ShutDown (ASD) relay. To prevent a diesel engine from starting, remove Fuel Pump Relay. These relays are located in Power Distribution Center (PDC). Refer to label on PDC cover for relay location.

WARNING: IF EQUIPPED WITH DIESEL ENGINE, ATTEMPT TO START ENGINE A FEW TIMES BEFORE PROCEEDING WITH FOLLOWING STEP.

(6) Rotate and hold ignition switch in Start position. Note cranking voltage and current (amperage) draw readings shown on volt-ampere tester.

(a) If voltage reads below 9.6 volts, refer to **Starter Motor** in Diagnosis and Testing. If starter motor is OK, refer to **Engine Diagnosis** in 9, Engine for further testing of engine. If starter motor is not OK, replace faulty starter motor.

(b) If voltage reads above 9.6 volts and current (amperage) draw reads below specifications, refer to **Feed Circuit Test** in this section.

(c) If voltage reads 12.5 volts or greater and starter motor does not turn, refer to **Control Circuit Testing** in this section.

(d) If voltage reads 12.5 volts or greater and starter motor turns very slowly, refer to **Feed Circuit Test** in this section.

NOTE: A cold engine will increase starter current (amperage) draw reading, and reduce battery voltage reading.

FEED CIRCUIT TEST

The starter feed circuit test (voltage drop method) will determine if there is excessive resistance in high-amperage feed circuit. For complete starter wiring circuit diagrams, refer 8, Wiring Diagrams.

When performing these tests, it is important to remember that voltage drop is giving an indication of resistance between two points at which voltmeter probes are attached.

Example: When testing resistance of positive battery cable, touch voltmeter leads to positive battery cable clamp and cable connector at starter solenoid. If you probe positive battery terminal post and cable connector at starter solenoid, you are reading combined voltage drop in positive battery cable clamp-to-terminal post connection and positive battery cable.

The following operation will require a voltmeter accurate to 1/10 (0.10) volt. Before performing tests, be certain that following procedures are accomplished:

- Battery is fully-charged and load-tested. Refer to **Battery** in 8, Battery.
- Fully engage parking brake.
- If equipped with manual transmission, place gearshift selector lever in Neutral position and block clutch pedal in fully depressed position. If equipped with automatic transmission, place gearshift selector lever in Park position.
- Verify that all lamps and accessories are turned off.
- To prevent a gasoline engine from starting, remove Automatic ShutDown (ASD) relay. To prevent a diesel engine from starting, remove Fuel Pump Relay. These relays are located in Power Distribution

STARTING SYSTEM (Continued)

Center (PDC). Refer to label on PDC cover for relay location.

(1) Connect positive lead of voltmeter to negative battery cable terminal post. Connect negative lead of voltmeter to negative battery cable clamp (Fig. 2). Rotate and hold ignition switch in Start position. Observe voltmeter. If voltage is detected, correct poor contact between cable clamp and terminal post. **Note: Certain diesel equipped models use dual batteries. If equipped with dual battery system, procedure must be performed twice, once for each battery.**

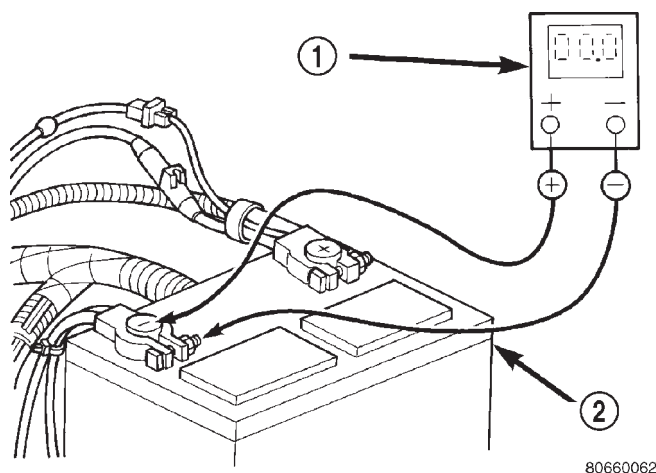


Fig. 2 Test Negative Battery Cable Connection Resistance - Typical

1 - VOLTMETER
2 - BATTERY

(2) Connect positive lead of voltmeter to positive battery terminal post. Connect negative lead of voltmeter to battery positive cable clamp (Fig. 3). Rotate and hold ignition switch in Start position. Observe voltmeter. If voltage is detected, correct poor contact between cable clamp and terminal post. **Note: Certain diesel equipped models use dual batteries. If equipped with dual battery system, this procedure must be performed twice, once for each battery.**

(3) Connect voltmeter to measure between battery positive terminal post and starter solenoid battery terminal stud (Fig. 4). Rotate and hold ignition switch in Start position. Observe voltmeter. If reading is above 0.2 volt, clean and tighten battery cable connection at solenoid. Repeat test. If reading is still above 0.2 volt, replace faulty positive battery cable. **Note: Certain diesel equipped models use dual batteries. If equipped with dual battery system, this procedure must be performed on driver side battery only.**

(4) Connect voltmeter to measure between negative battery terminal post and a good clean ground

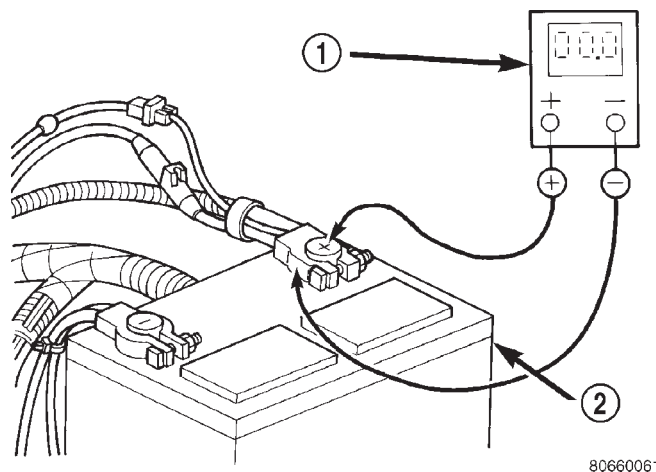


Fig. 3 Test Positive Battery Cable Connection Resistance - Typical

1 - VOLTMETER
2 - BATTERY

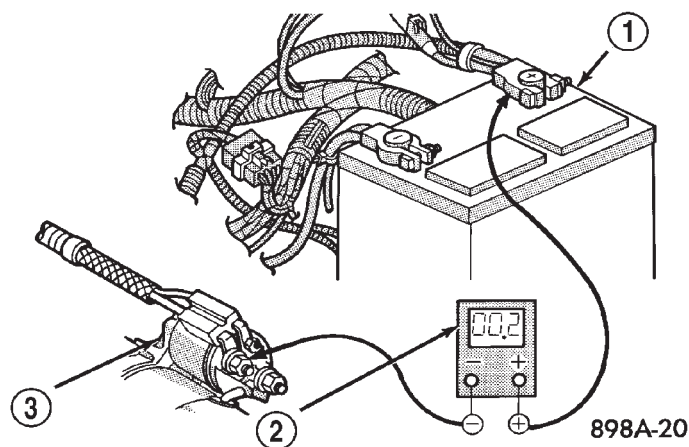


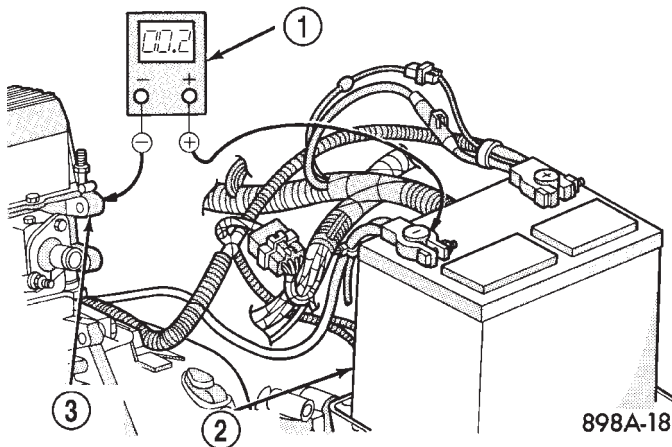
Fig. 4 Test Positive Battery Cable

1 - BATTERY
2 - VOLTMETER
3 - STARTER MOTOR

on engine block (Fig. 5). Rotate and hold ignition switch in Start position. Observe voltmeter. If reading is above 0.2 volt, clean and tighten negative battery cable attachment on engine block. Repeat test. If reading is still above 0.2 volt, replace faulty negative battery cable. **Note: Certain diesel equipped models use dual batteries. If equipped with dual battery system, this procedure must be performed twice, once for each battery.**

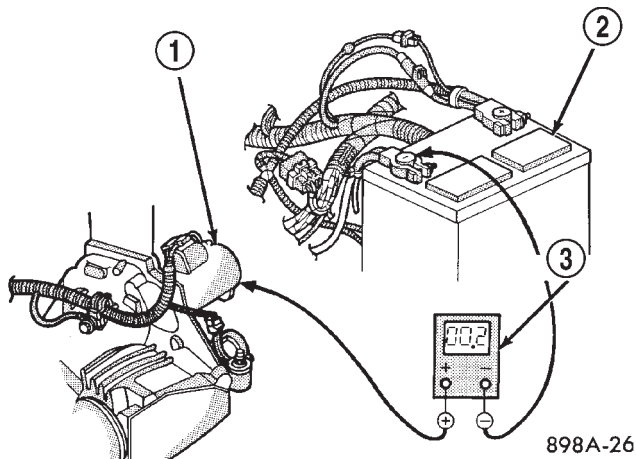
(5) Connect positive lead of voltmeter to starter housing. Connect negative lead of voltmeter to negative battery terminal post (Fig. 6). Rotate and hold ignition switch in Start position. Observe voltmeter. If reading is above 0.2 volt, correct poor starter to engine block ground contact. **Note: Certain diesel**

STARTING SYSTEM (Continued)

**Fig. 5 Test Ground Circuit Resistance - Typical**

- 1 - VOLTMETER
2 - BATTERY
3 - ENGINE GROUND

equipped models use dual batteries. If equipped with dual battery system, this procedure must be performed on driver side battery only.

**Fig. 6 Test Starter Ground - Typical**

- 1 - STARTER MOTOR
2 - BATTERY
3 - VOLTMETER

(6) If equipped with dual battery system (certain diesel equipped models), connect positive lead of voltmeter to positive battery cable clamp on battery located on left side of vehicle. Connect negative lead of voltmeter to positive battery terminal post on battery located on right side of vehicle. Rotate and hold ignition switch in Start position. Observe voltmeter. If reading is above 0.2 volt, clean and tighten battery cables at both batteries. Repeat test. If reading is still above 0.2 volt, replace faulty positive battery cable.

If resistance tests detect no feed circuit problems, refer to **Starter Motor** in the Diagnosis and Testing.

CONTROL CIRCUIT TESTING

The starter control circuit components should be tested in the order in which they are listed, as follows:

- **Starter Relay** - Refer to **Starter Relay** Diagnosis and Testing.
- **Starter Solenoid** - Refer to **Starter Motor** Diagnosis and Testing.
- **Ignition Switch** - Refer to **Ignition Switch and Key Lock Cylinder**
- **Clutch Pedal Position Switch** - If equipped with manual transmission, refer to **Clutch Pedal Position Switch** in 6, Clutch.
- **Park/Neutral Position Switch** - If equipped with automatic transmission, refer to **Park/Neutral Position Switch** in 21, Transmission.
- **Wire harnesses and connections** - Refer to 8, Wiring Diagrams.

INSPECTION - STARTING SYSTEM

The following starting system components should be carefully inspected whenever any starting system problem is encountered.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE AIRBAG SYSTEM. FAILURE TO TAKE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

Battery

- Visually inspect battery for indications of physical damage and loose or corroded cable connections. Determine state-of-charge and cranking capacity of battery. Charge or replace battery, if required. Refer to **Battery** for battery cleaning and inspection procedures.

Ignition Switch

- Visually inspect ignition switch for indications of physical damage and loose or corroded wire harness connections. Clean corroded connections as required. Refer to **Wiring Diagrams**. Refer to **Ignition Switch and Key Lock Cylinder** for ignition switch service procedures.

STARTING SYSTEM (Continued)

Clutch Pedal Position Switch

- If vehicle is equipped with a manual transmission, visually inspect clutch pedal position switch for indications of physical damage and loose or corroded wire harness connections. Clean corroded connections as required. Refer to **Clutch Hydraulic Linkage** for clutch pedal position switch service procedures.

Park/Neutral Position Switch

- If vehicle is equipped with an automatic transmission, visually inspect park/neutral position switch for indications of physical damage and loose or corroded wire harness connections. Clean corroded connections as required. Refer to **Park/Neutral Position Switch** for park/neutral position switch service procedures.

Starter Relay

- Visually inspect starter relay for indications of physical damage and loose or corroded wire harness connections. Clean corroded connections as required. Refer to **Starter Relay** for starter relay service procedures.

Starter Motor

- Visually inspect starter motor for indications of physical damage and loose or corroded wire harness connections. Clean corroded connections as required. If problem being diagnosed involves improper starter engagement, disengagement or noise complaints, starter motor should be removed. With starter motor removed, inspect starter pinion and ring gears for damaged or missing teeth. Replace faulty components as required. Refer to **Starter Motor** for removal/installation procedures.

Starter Solenoid

- Visually inspect starter solenoid for indications of physical damage and loose or corroded wire harness connections. Clean corroded connections as required. Refer to **Starter Motor** for starter solenoid service procedures.

Wiring

- Visually inspect starting system wire harnesses for indications of physical damage. Repair or replace any faulty wiring, as required. Refer to **Wiring Diagrams** for repair or connector and terminal service procedures.

SPECIFICATIONS

TORQUE - GAS POWERED

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Starter Solenoid Battery Cable Nut	11	-	100
Starter Mounting Bolts - 2.4L	54	40	-
Starter Mounting Bolts -3.7L	54	40	-
Starter Heat Shield Mounting Bolts	6	-	55

STARTING SYSTEM (Continued)**STARTER MOTOR - GAS POWERED**

Starter Motor and Solenoid	
Manufacturer	Mitsubishi
Engine Application	2.4L / 3.7L
Power Rating	1.4 Kilowatt (1.9 Horsepower)
Voltage	12 Volts
** Number of Permanent Magnets	6
Number of Brushes	4
Drive Type	Planetary Gear Reduction
Free Running Test Voltage	11.2 Volts
Free Running Test Maximum Amperage Draw	90 Amperes
Free Running Test Minimum Speed	2400 rpm
Solenoid Closing Maximum Voltage Required	7.8 Volts
* Cranking Amperage Draw Test	160 Amperes
*Test at operating temperature. Cold engine, tight (new) engine, or heavy oil will increase starter amperage draw.	
**The starter is equipped with permanent magnets. Never strike the starter case to attempt to loosen a sticking/ stuck armature as permanent magnets may crack or break.	

STARTER MOTOR**DIAGNOSIS AND TESTING - STARTER MOTOR**

Correct starter motor operation can be confirmed by performing the following free running bench test. This test can only be performed with starter motor removed from vehicle. Refer to Specifications for starter motor specifications.

(1) Remove starter motor from vehicle. Refer to Starter Motor Removal and Installation.

(2) Mount starter motor securely in a soft-jawed bench vise. The vise jaws should be clamped on the mounting flange of starter motor. Never clamp on starter motor by field frame.

(3) Connect a suitable volt-ampere tester and a 12-volt battery to starter motor in series, and set ammeter to 100 ampere scale. See instructions provided by manufacturer of volt-ampere tester being used.

(4) Install jumper wire from solenoid terminal to solenoid battery terminal. The starter motor should operate. If starter motor fails to operate, replace faulty starter motor assembly.

(5) Adjust carbon pile load of tester to obtain free running test voltage. Refer to Specifications for starter motor free running test voltage specifications.

(6) Note reading on ammeter and compare reading to free running test maximum amperage draw. Refer to Specifications for starter motor free running test maximum amperage draw specifications.

(7) If ammeter reading exceeds maximum amperage draw specification, replace faulty starter motor assembly.

STARTER SOLENOID

This test can only be performed with starter motor removed from vehicle.

(1) Remove starter motor from vehicle. Refer to Starter Motor Removal and Installation.

(2) Disconnect wire from solenoid field coil terminal.

(3) Check for continuity between solenoid terminal and solenoid field coil terminal with a continuity tester (Fig. 7). There should be continuity. If OK, go to Step 4. If not OK, replace faulty starter motor assembly.

(4) Check for continuity between solenoid terminal and solenoid case (Fig. 8). There should be continuity. If not OK, replace faulty starter motor assembly.

REMOVAL**2.4L 4-Cylinder**

- (1) Disconnect and isolate negative battery cable.
- (2) Raise and support vehicle.
- (3) Remove solenoid wire from solenoid terminal (Fig. 11).
- (4) Remove battery cable from stud on starter solenoid (Fig. 11).
- (5) Remove 2 starter mounting bolts (Fig. 9) and remove starter from vehicle.

STARTER MOTOR (Continued)

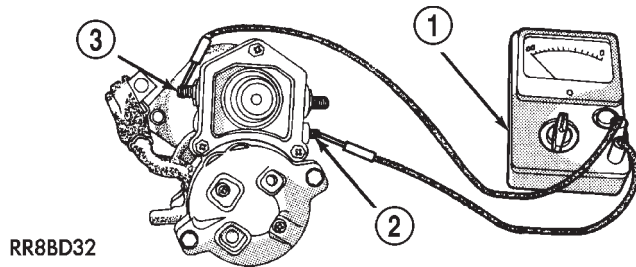


Fig. 7 CONTINUITY BETWEEN SOLENOID AND FIELD COIL TERMINALS - TYPICAL

- 1 - OHMMETER
2 - SOLENOID TERMINAL
3 - FIELD COIL TERMINAL

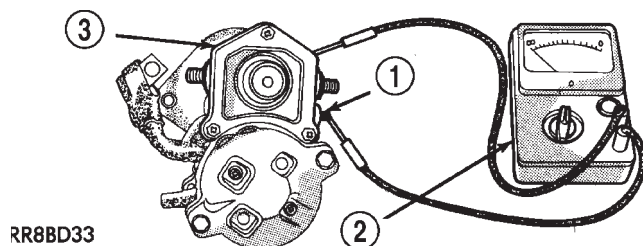


Fig. 8 CONTINUITY BETWEEN SOLENOID TERMINAL AND CASE - TYPICAL

- 1 - SOLENOID TERMINAL
2 - OHMMETER
3 - SOLENOID

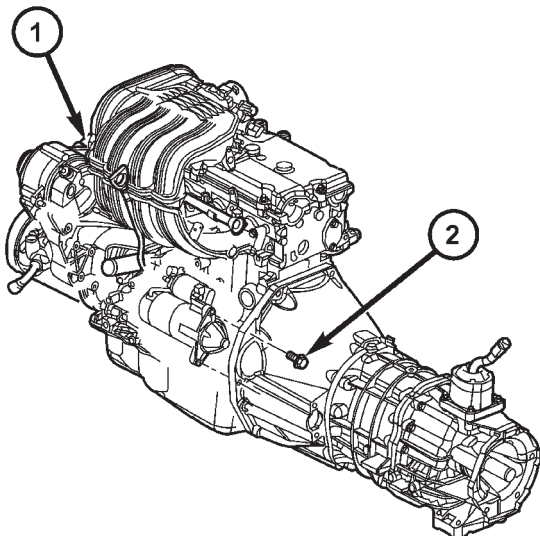
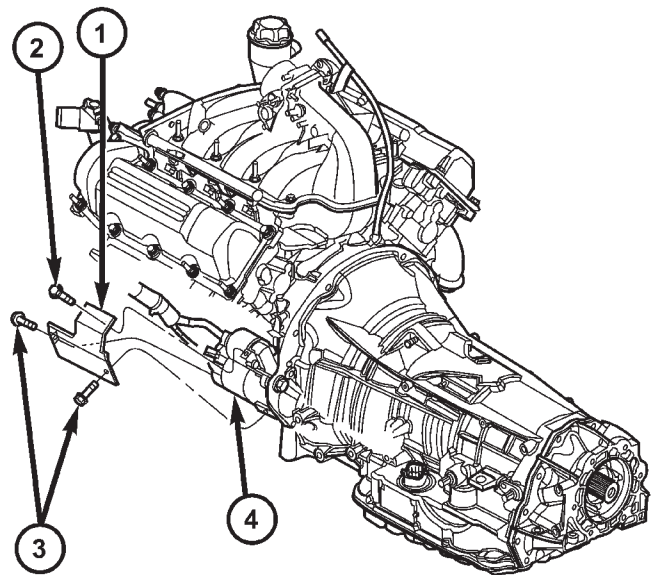


Fig. 9 STARTER - 2.4L

- 1 - STARTER
2 - MOUNTING BOLTS (2)

3.7L V-6

- (1) Disconnect and isolate negative battery cable.
- (2) Raise and support vehicle.
- (3) Remove 2 flange bolts securing left exhaust downpipe to crossover pipe. Lower pipe slightly to allow front propeller shaft removal.
- (4) Remove front propeller shaft.
- (5) Remove 2 starter heat shield bolts at side of starter (Fig. 10).
- (6) Remove starter heat shield nut at front of starter (Fig. 10).



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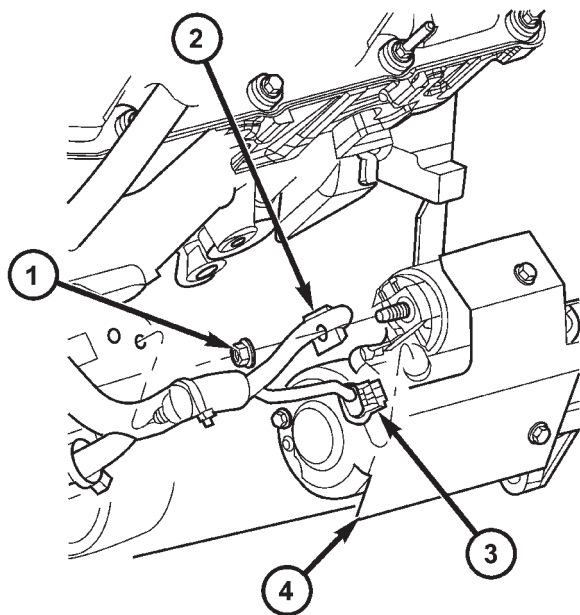
Fig. 10 STARTER HEAT SHIELD - 3.7L

- 1 - STARTER HEAT SHIELD
2 - HEAT SHIELD BOLTS
3 - HEAT SHIELD BOLTS
4 - STARTER

- (7) Remove starter heat shield.
- (8) Remove solenoid wire from solenoid terminal (Fig. 11).
- (9) Remove battery cable from stud on starter solenoid (Fig. 11).
- (10) Remove 2 starter mounting bolts (Fig. 12).
- (11) Position front of starter to face rear of vehicle. Rotate starter until solenoid position is located below starter.
- (12) Remove starter from vehicle by passing it between exhaust pipe and transmission bellhousing.

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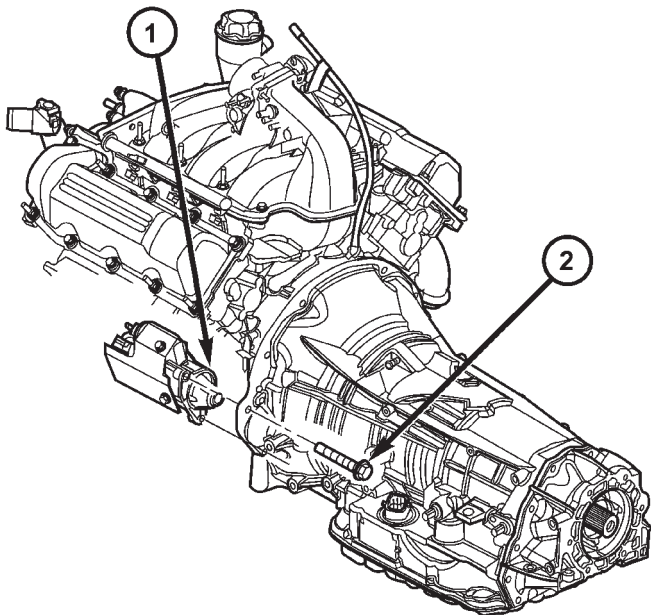
STARTER MOTOR (Continued)



80c7f534

**Fig. 11 STARTER ELECTRICAL CONNECTORS -
2.4L/3.7L**

- 1 - BATTERY CABLE NUT
- 2 - BATTERY CABLE
- 3 - SOLENOID CONNECTOR
- 4 - HEAT SHIELD



80c7f52a

Fig. 12 STARTER - 3.7L

- 1 - STARTER
- 2 - MOUNTING BOLTS (2)

INSTALLATION

2.4L 4-Cylinder

- (1) Position starter into bellhousing and install 2 bolts. Refer to torque specifications.
- (2) Install battery cable and nut to stud on starter solenoid. Refer to torque specifications.
- (3) Install solenoid wire connector to solenoid terminal.
- (4) Lower vehicle.
- (5) Connect negative battery cable.

3.7L V-6

- (1) Position front of starter towards rear of vehicle with solenoid position rotated until it is located below starter. Install starter by passing it between exhaust pipe and transmission bellhousing.
- (2) Position starter into bellhousing and install 2 bolts. Refer to torque specifications.
- (3) Install battery cable and nut to stud on starter solenoid. Refer to torque specifications.
- (4) Install solenoid wire connector to solenoid terminal.
- (5) Position starter heat shield and install nut at front of starter.
- (6) Install 2 starter heat shield bolts at side of starter.
- (7) Install front propeller shaft.
- (8) Install 2 flange bolts securing left exhaust downpipe to crossover pipe.
- (9) Lower vehicle.
- (10) Connect negative battery cable.

STARTER MOTOR RELAY

DESCRIPTION

The starter relay is an electromechanical device that switches battery current to the pull-in coil of the starter solenoid when ignition switch is turned to Start position. The starter relay is located in the Power Distribution Center (PDC) in the engine compartment. See PDC cover for relay identification and location.

The starter relay is a International Standards Organization (ISO) relay. Relays conforming to ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions.

The starter relay cannot be repaired or adjusted and, if faulty or damaged, it must be replaced.

STARTER MOTOR RELAY (Continued)

OPERATION

The ISO relay consists of an electromagnetic coil, a resistor or diode, and three (two fixed and one movable) electrical contacts. The movable (common feed) relay contact is held against one of the fixed contacts (normally closed) by spring pressure. When electromagnetic coil is energized, it draws the movable contact away from normally closed fixed contact, and holds it against the other (normally open) fixed contact.

When electromagnetic coil is de-energized, spring pressure returns movable contact to normally closed position. The resistor or diode is connected in parallel with electromagnetic coil within relay, and helps to dissipate voltage spikes produced when coil is de-energized.

DIAGNOSIS AND TESTING - STARTER RELAY

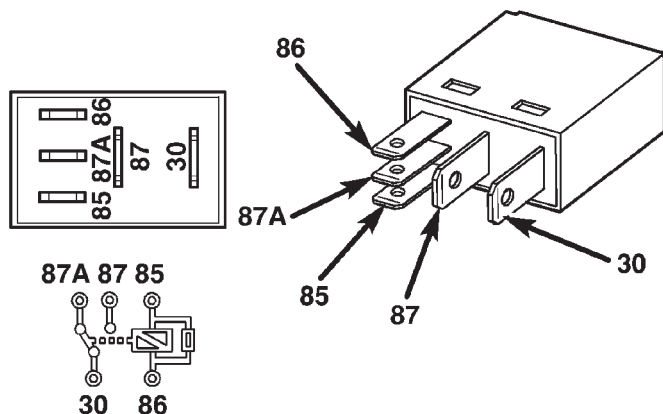
The starter relay is located in the Power Distribution Center (PDC) in engine compartment. Refer to label on PDC cover for relay location.

RELAY TEST

- (1) Remove starter relay (Fig. 13) from PDC.
- (2) A relay in de-energized position should have continuity between terminals 87A and 30, and no continuity between terminals 87 and 30. If OK, go to Step 3. If not OK, replace faulty relay.
- (3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 5 ohms. If OK, go to Step 4. If not OK, replace faulty relay.
- (4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, perform following Relay Circuit Test. If not OK, replace faulty relay.

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 Step 2. If not OK, repair open circuit to fused B(+) fuse in PDC as required.
- (2) The relay normally closed terminal (87A) is connected to terminal 30 in de-energized position, but is not used for this application. Go to Step 3.
- (3) The relay normally open terminal (87) is connected to common feed terminal (30) in energized position. This terminal supplies battery voltage to starter solenoid field coil. There should be continuity between cavity for relay terminal 87 and starter solenoid terminal at all times. If OK, go to Step 4. If not OK, repair open engine starter motor relay output circuit to starter solenoid as required.
- (4) The coil battery terminal (86) is connected to electromagnet in relay. It is energized when ignition switch is held in Start position. On vehicles with a



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Fig. 13 STARTER RELAY (ISO MICRO RELAY)

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

manual transmission, the clutch pedal must be blocked in fully depressed position for this test. Check for battery voltage at cavity for relay terminal 86 with ignition switch in Start position, and no voltage when ignition switch is released to On position. If OK, go to Step 5. If not OK with a manual transmission, disconnect clutch pedal position switch wire harness connector and install a jumper wire between two cavities in body half of connector and check for battery voltage again at cavity for relay terminal 86. If now OK, replace faulty clutch pedal position switch. If still not OK with a manual transmission or if not OK with an automatic transmission, check for open or shorted fused ignition switch output (start) circuit to ignition switch and repair as required. If fused ignition switch output (start) circuit is OK, refer to **Ignition Switch and Key Lock Cylinder**.

- (5) The coil ground terminal (85) is connected to electromagnet in relay. On vehicles with manual transmission, it is grounded at all times. On vehicles with automatic transmission, it is grounded through park/neutral position switch only when gearshift selector lever is in Park or Neutral positions. Check for continuity to ground at cavity for relay terminal 85. If not OK with a manual transmission, repair open park/neutral position switch sense circuit to ground as required. If not OK with an automatic transmission, check for open or shorted park/neutral position switch sense circuit to park/neutral position switch and repair, as required. If park/neutral position switch sense circuit checks OK, refer to **Park/Neutral Position Switch**.

STARTER MOTOR RELAY (Continued)

REMOVAL

The starter relay is located in the Power Distribution Center (PDC) (Fig. 14). Refer to label on PDC cover for relay location.

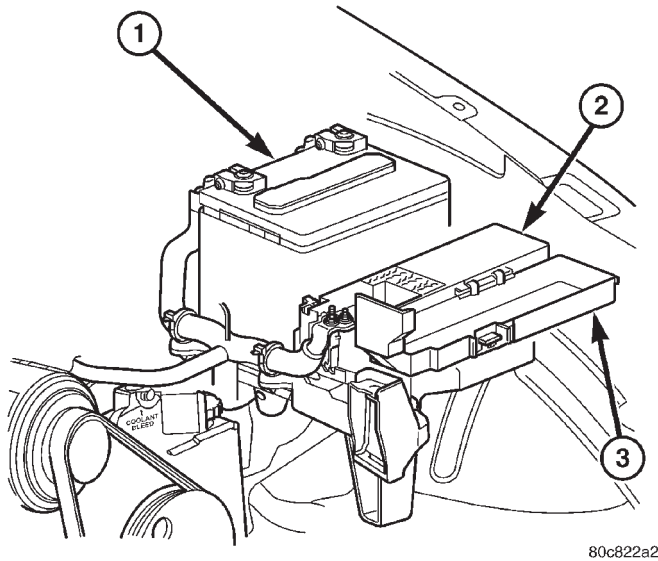


Fig. 14 POWER DISTRIBUTION CENTER (PDC)

- 1 - BATTERY
- 2 - PDC
- 3 - PDC COVER

- (1) Remove PDC cover.
- (2) Remove relay from PDC.
- (3) Check condition of relay terminals and PDC connector terminals for damage or corrosion. Repair if necessary before installing relay.
- (4) Check for pin height (pin height should be the same for all terminals within the PDC connector). Repair if necessary before installing relay.

INSTALLATION

- (1) Refer to Power Distribution Center (PDC) cover for starter relay location.
- (2) Install relay to PDC.
- (3) Install cover to PDC.

HEATED SYSTEMS

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HEATED MIRRORS

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HEATED MIRRORS

DESCRIPTION

Vehicles equipped with the optional heated mirror package have an electric heating grid located behind the mirror glass of each outside rear view mirror. The heated mirrors are controlled by the rear window defogger switch. Electrical current is directed to the heating grid inside the mirror only when the rear window defogger switch is in the On position.

If the outside mirror heating grids and the rear window heating grid are all inoperative, (Refer to 8 - ELECTRICAL/HEATED GLASS - DIAGNOSIS AND TESTING). If the outside mirror heating grids are inoperative, but the rear window heating grid is operating as designed, (Refer to 8 - ELECTRICAL/HEATED MIRRORS - DIAGNOSIS AND TESTING).

The heating grid behind each outside mirror glass cannot be repaired and, if faulty or damaged, the entire power mirror unit must be replaced (Refer to 8 - ELECTRICAL/POWER MIRRORS/SIDEVIEW MIRROR - REMOVAL) and (Refer to 8 - ELECTRICAL/POWER MIRRORS/SIDEVIEW MIRROR - INSTALLATION).

OPERATION

The heated mirror is controlled by the rear window defogger switch. The only time that the heated mirror is on is when the rear window defogger is on. The mirror should become warm to the touch.

DIAGNOSIS AND TESTING - HEATED MIRRORS

For circuit descriptions and diagrams (Refer to Appropriate Wiring Information).

(1) Check the fuse in the junction block. If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(2) Turn the ignition switch to the On position. Check for battery voltage at the fuse in the junction block. If OK, go to Step 3. If not OK, repair the open circuit to the ignition switch as required.

(3) Disconnect and isolate the battery negative cable. Remove the front door trim panel on the side of the vehicle with the inoperative mirror heating grid. Unplug the wire harness connector at the mirror. Check for continuity between the ground circuit cavity in the body half of the power mirror wire harness connector and a good ground. If OK, go to Step 4. If not OK, repair the open circuit to ground as required.

(4) Connect the battery negative cable. Turn the ignition switch to the On position. Turn on the rear window defogger system. Check for battery voltage at the rear window defogger relay output circuit cavity in the body half of the power mirror wire harness connector. If OK, go to Step 5. If not OK, repair the open circuit to the rear window defogger relay as required.

HEATED MIRRORS (Continued)

(5) Check for continuity between the ground circuit and the rear window defogger relay output circuit cavities in the mirror half of the power mirror wire harness connector. There should be continuity. If not OK, replace the faulty power mirror(Refer to 8 - ELECTRICAL/POWER MIRRORS/SIDEVIEW MIRROR - REMOVAL) and (Refer to 8 - ELECTRICAL/POWER MIRRORS/SIDEVIEW MIRROR - INSTALLATION). If OK, check the resistance

through the electric heating grid circuit. Correct resistance through the electric heating grid should be from 10 to 16 ohms when measured at an ambient temperature of 21° C (70° F). If not OK, replace the faulty power mirror(Refer to 8 - ELECTRICAL/POWER MIRRORS/SIDEVIEW MIRROR - REMOVAL) and (Refer to 8 - ELECTRICAL/POWER MIRRORS/SIDEVIEW MIRROR - INSTALLATION).

WINDOW DEFOGGER

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WINDOW DEFOGGER

DESCRIPTION - REAR WINDOW DEFOGGER

The rear window defogger system will only operate when the ignition switch is in the run position. When the defogger switch is in the run position, an electric heater grid on the rear window glass is energized. Vehicles with the heated mirror options also have heater grids located behind the outside rear view mirror glass. Each of these grids produce heat to help clear the rear window glass and outside rear view mirrors of ice, snow, or fog.

OPERATION - REAR WINDOW DEFOGGER

The rear window defogger system is controlled by a switch installed with the HVAC control assembly. An amber indicator lamp in the switch button will light to indicate when the rear window defogger system is turned on. The HVAC control head circuitry, which contains the defogger system timer logic, monitors the state of the defogger switch through a hard-wired input. The instrument cluster circuitry controls the

rear window defogger system through a hard-wired control output to the rear window defogger relay. The rear window defogger timer and logic circuitry cannot be adjusted or repaired and, if faulty or damaged, the HVAC control head assembly must be replaced.

The rear window defogger system will be automatically turned off after a programmed time interval of about ten minutes. After the initial time interval has expired, if the rear window defogger switch is turned on again during the same ignition cycle, the defogger system will automatically turn off after about five minutes.

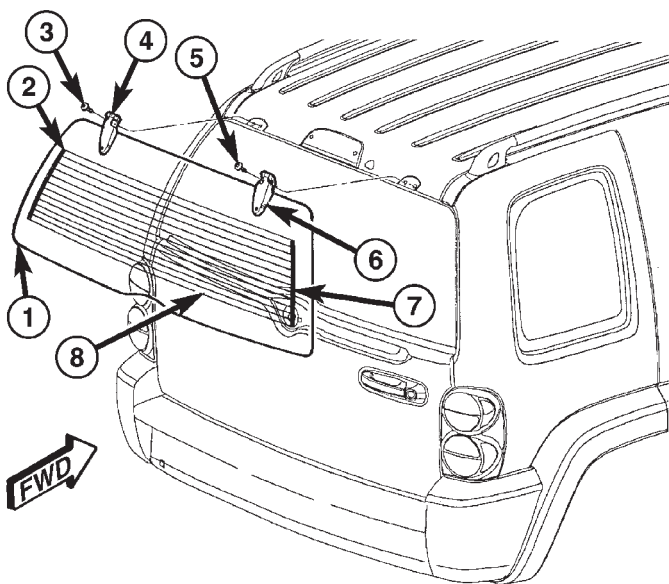
The rear window defogger system will automatically shut off if the ignition switch is turned to the Off position, or it can be turned off manually by depressing the instrument panel switch. Following are general descriptions of the major components in the rear window defogger system. Refer to the owner's manual in the vehicle glove box for more information on the features, use and operation of the defogger system.

WINDOW DEFOGGER (Continued)

DIAGNOSIS AND TESTING - REAR WINDOW DEFOGGER SYSTEM

For circuit descriptions and diagrams, (Refer to Appropriate Wiring Information). The operation of the electrically heated rear window defogger system can be confirmed in one of the following manners:

- Turn the ignition switch to the run position.
- Set the defogger switch in the run position. The rear window defogger operation can be checked by feeling the rear window or outside rear view mirror glass. A distinct difference in temperature between the grid lines and the adjacent clear glass or the mirror glass can be detected within three to four minutes of operation.
- Using a 12-volt DC voltmeter, contact the rear glass heating grid terminal B (right side) with the negative lead, and terminal A (left side) with the positive lead (Fig. 1). The voltmeter should read battery voltage.



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Fig. 1 REAR WINDOW DEFOGGER

- 1 - DEFOGGER BACKGLASS
- 2 - HEATED GLASS CONNECTOR "A"
- 3 - HINDGE MOUNTING SCREWS (2)
- 4 - HINDGE (LEFT SIDE)
- 5 - HINDGE MOUNTING SCREWS (2)
- 6 - HINDGE (RIGHT SIDE)
- 7 - HEATED GLASS CONNECTOR "B"
- 8 - BACKGLASS DEFOGGER GRID

The above checks will confirm system operation. Illumination of the defogger switch indicator lamp means that there is electrical current available at the output of the defogger relay, but does not confirm

that the electrical current is reaching the rear glass heating grid lines.

If the defogger system does not operate, the problem should be isolated in the following manner:

- (1) Confirm that the ignition switch is in the run position.
- (2) Ensure that the rear glass heating grid feed and ground wires are connected to the glass. Confirm that the ground wire has continuity to ground.
- (3) Check the fuses in the Power Distribution Center (PDC) and in the junction block. The fuses must be tight in their receptacles and all electrical connections must be secure.

When the above steps have been completed and the rear glass or outside rear view mirror heating grid is still inoperative, one or more of the following is faulty:

- Defogger switch
- Defogger relay
- HVAC control head circuitry
- Rear window grid lines (all grid lines would have to be broken or one of the feed wires disconnected for the entire system to be inoperative)
- Outside rear view mirror heating grid.

If setting the defogger switch to the On position produces a severe voltmeter deflection, check for a short circuit between the defogger relay output and the rear glass or outside rear view mirror heating grids.

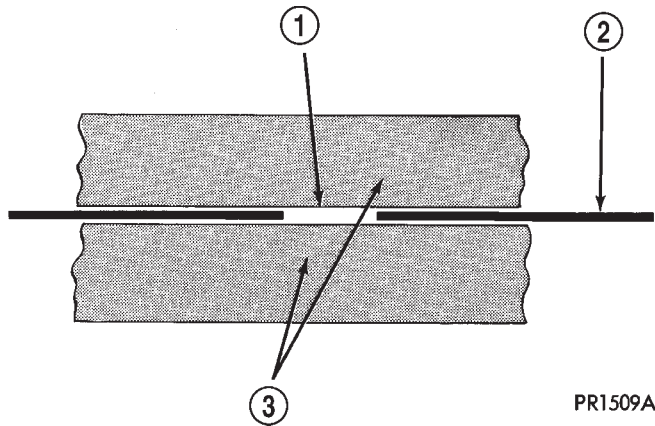
STANDARD PROCEDURE - REAR GLASS HEATING GRID REPAIR

Repair of the rear glass heating grid lines, bus bars, terminals or pigtail wires can be accomplished using a Mopar Rear Window Defogger Repair Kit (Part Number 4267922) or equivalent.

WARNING: MATERIALS CONTAINED IN THE REPAIR KIT 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.

- (1) Mask the repair area so that the conductive epoxy can be applied neatly. Extend the epoxy application onto the grid line or the bus bar on each side of the break (Fig. 2).

WINDOW DEFOGGER (Continued)



PR1509A

Fig. 2 GRID LINE REPAIR

- 1 - BREAK
- 2 - GRID LINE
- 3 - MASKING TAPE

(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) For grid line repairs, mask the area to be repaired with masking tape or a template.

(5) 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).

(6) 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.

(7) 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.

(8) Carefully remove the masking tape or template.

CAUTION: Do not allow the glass surface to exceed 204° C (400° F) or the glass may fracture.

(9) Allow the epoxy to cure 24 hours at room temperature, or use a heat gun that will not over heat the glass. Hold the heat gun approximately 25.4 centimeters (10 inches) from the repair.

(10) After the conductive epoxy is properly cured, remove the wedge or clamp from the terminal or pigtail wire. Do not attach the wire harness connectors until the curing process is complete.

(11) Check the operation of the rear window defogger glass heating grid.

REAR WINDOW DEFOGGER GRID

DESCRIPTION

The heated rear window glass has two electrically conductive vertical bus bars and a series of 11 horizontal grid lines made of a silver-ceramic material, which is baked on and bonded to the inside surface of the glass. The grid lines and bus bars comprise a parallel electrical circuit.

OPERATION

When the rear window defogger switch is placed in the On position, electrical current is directed to the rear window grid lines through the bus bars. The grid lines heat the rear window to clear the surface of fog or snow. Protection for the heated grid circuit is provided by a fuse in the Power Distribution Center (PDC).

The grid lines and bus bars are highly resistant to abrasion. However, it is possible for an open circuit to occur in an individual grid line, resulting in no current flow through the line.

The grid lines can be damaged or scraped off with sharp instruments. Care should be taken when cleaning the glass or removing foreign materials, decals, or stickers from the glass. Normal glass cleaning solvents or hot water used with rags or toweling is recommended.

A repair kit is available to repair the grid lines and bus bars, or to reinstall the heated glass pigtail wires.

DIAGNOSIS AND TESTING - REAR WINDOW DEFOGGER GRID

For circuit descriptions and diagrams, (Refer to Appropriate Wiring Information). To detect breaks in the grid lines, the following procedure is required:

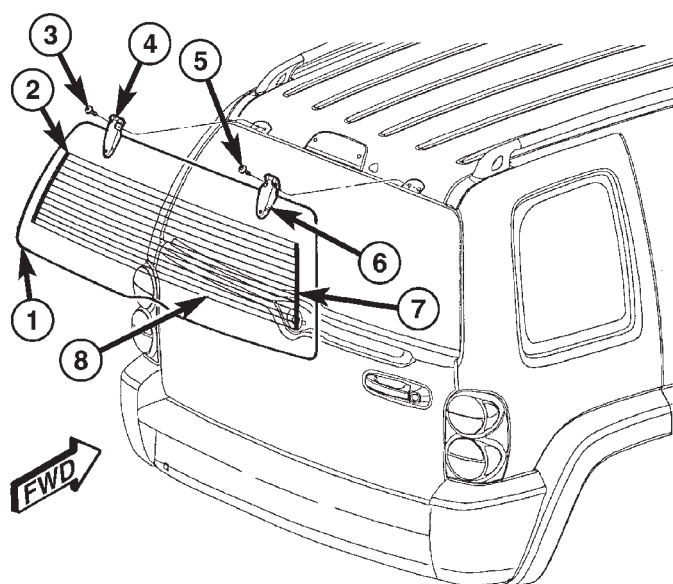
(1) Turn the ignition switch to the run position. Set the defogger switch in the On position. The indicator lamp should light. If OK, go to Step 2. If not OK, (Refer to 8 - ELECTRICAL/HEATED GLASS/REAR WINDOW DEFOGGER RELAY - DIAGNOSIS AND TESTING)

(2) Using a 12-volt DC voltmeter, contact the vertical bus bar on the right side of the vehicle with the negative lead. With the positive lead, contact the vertical bus bar on the left side of the vehicle. The voltmeter should read battery voltage. If OK, go to Step 3. If not OK, repair the open circuit to the defogger relay as required.

(3) With the negative lead of the voltmeter, contact a good body ground point. The voltage reading should not change. If OK, go to Step 4. If not OK, repair the circuit to ground as required.

REAR WINDOW DEFOGGER GRID (Continued)

(4) Connect the negative lead of the voltmeter to the right side bus bar and touch each grid line at its midpoint with the positive lead (Fig. 3). A reading of approximately six volts indicates a line is good. A reading of zero volts indicates a break in the grid line between the midpoint of the grid line and the left side bus bar. A reading of ten to fourteen volts indicates a break between the midpoint of the grid line and the right side bus bar. Move the positive lead on the grid line towards the break and the voltage reading will change as soon as the break is crossed.



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Fig. 3 REAR WINDOW DEFOGGER

- 1 - DEFOGGER BACKGLASS
- 2 - HEATED GLASS CONNECTOR "A"
- 3 - HINDGE MOUNTING SCREWS (2)
- 4 - HINDGE (LEFT SIDE)
- 5 - HINDGE MOUNTING SCREWS (2)
- 6 - HINDGE (RIGHT SIDE)
- 7 - HEATED GLASS CONNECTOR "B"
- 8 - BACKGLASS DEFOGGER GRID

REAR WINDOW DEFOGGER RELAY

DESCRIPTION

The rear window defogger relay is a International Standards Organization (ISO)-type relay. The rear window defogger relay is a electromechanical device that switches fused battery current to the rear glass and outside mirror heating grids, and the indicator lamp of the defogger switch, when the HVAC control head rear window defogger timer and logic circuitry

grounds the relay coil. (Refer to 8 - ELECTRICAL/HEATED GLASS/REAR WINDOW DEFOGGER RELAY - DIAGNOSIS AND TESTING)

The rear window defogger relay is located in the junction block, on the left side of the instrument panel inboard to the center of the vehicle (just to the left and above the brake pedal or behind the knee blocker). The rear window defogger relay cannot be repaired and, if faulty or damaged, it must be replaced.

OPERATION

The ISO relay consists of an electromagnetic coil, a resistor or diode, and three (two fixed and one movable) electrical contacts. The movable (common feed) relay contact is held against one of the fixed contacts (normally closed) by spring pressure. When the electromagnetic coil is energized, it draws the movable contact away from the normally closed fixed contact, and holds it against the other (normally open) fixed contact.

When the electromagnetic coil is de-energized, spring pressure returns the movable contact to the normally closed position. The resistor is connected in parallel with the electromagnetic coil in the relay, and helps to dissipate voltage spikes that are produced when the coil is de-energized.

DIAGNOSIS AND TESTING - REAR WINDOW DEFOGGER RELAY

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, 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 TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

RELAY TEST

The defogger relay (Fig. 4) is located in the junction block, on the left side of the instrument panel inboard to the center of the vehicle (just to the right and above the brake pedal or behind the knee blocker). Remove the defogger relay from the junction block to perform the following tests:

(1) A relay in the de-energized position should have continuity between terminals 87A and 30, and

REAR WINDOW DEFOGGER RELAY (Continued)

no continuity between terminals 87 and 30. If OK, go to Step 2. If not OK, replace the faulty relay.

(2) Resistance between terminals 85 and 86 (electromagnet) should be 60.7 to 80.3 ohms. If OK, go to Step 3. If not OK, replace the faulty relay.

(3) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, see the Relay Circuit Test in this group. If not OK, replace the faulty relay.

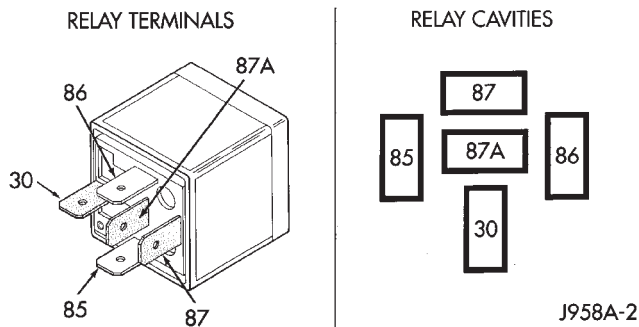


Fig. 4 DEFOGGER RELAY- TERMINAL LEGEND

30 - COMMON FEED
85 - COIL GROUND
86 - COIL BATTERY
87 - NORMALLY OPEN
87A - NORMALLY CLOSED

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 Step 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 Step 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 rear glass and outside rear view mirror heating grids and the defogger switch indicator lamp. There should be continuity between the cavity for relay terminal 87 and the rear window defogger relay output circuit cavities of the rear glass heating grid connector, both outside rear view mirror heating grid connectors, and the defogger switch connector at all times. If OK, go to Step 4. If not OK, repair the open circuit(s) as required.

(4) The coil ground terminal (85) is connected to the electromagnet in the relay. This terminal is provided with ground by the instrument cluster rear window defogger timer and logic circuitry to energize the defogger relay. There should be continuity to ground at the cavity for relay terminal 85 when the defogger switch is turned On. However, with the defogger relay removed, the defogger switch indicator lamp will not light to show that the defogger system is turned On. Be certain that you depress the defogger switch at least twice to confirm that the system is turned on during this test. If OK, go to Step 5. If not OK, repair the open circuit to the HVAC control head as required.

(5) The coil battery terminal (86) is connected to the electromagnet in the relay. It is connected to fused ignition switch output voltage and should be hot when the ignition switch is in the run position. Check for battery voltage at the cavity for relay terminal 86 with the ignition switch in the run position. If OK, see the diagnosis for Instrument Cluster in this group. If not OK, repair the open circuit to the fuse in the junction block as required.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, 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 TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Unplug the rear window defogger relay from the junction block.

INSTALLATION

(1) Install the rear window defogger relay by aligning the relay terminals with the cavities in the junction block and pushing the relay firmly into place.

(2) Connect the battery negative cable.

(3) Test the relay operation.

REAR WINDOW DEFOGGER SWITCH

DESCRIPTION

The rear window defogger switch is installed in the instrument panel HVAC control head assembly. The momentary-type switch provides a hard-wired ground signal to the HVAC control head each time it is depressed. The instrument cluster rear window defogger timer and logic circuitry responds by energizing or de-energizing the rear window defogger relay.

OPERATION

Energizing the rear window defogger relay provides electrical current to the rear window defogger grid and, if the vehicle is so equipped, the outside rear view mirror heating grids. An amber indicator lamp in the defogger switch, which lights to indicate when the defogger system is turned On, is also powered by the defogger relay output.

The defogger switch illumination lamp and indicator lamp bulbs are serviceable. The defogger switch cannot be repaired and, if faulty or damaged the entire HVAC control head assembly must be replaced.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - REAR WINDOW DEFOGGER SWITCH

For circuit descriptions and diagrams, (Refer to Appropriate Wiring Information).

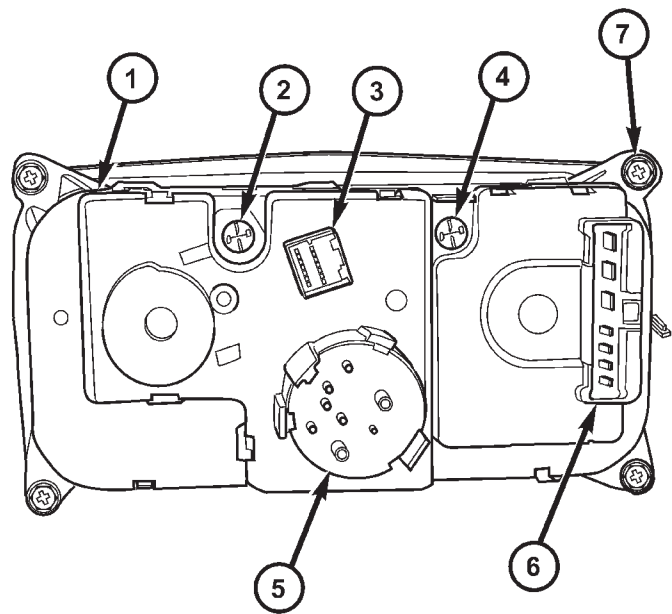
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable. Remove the HVAC control head assembly from the instrument panel and unplug the defogger switch wire harness connector-B.

(2) Check for continuity between the ground circuit cavity of the defogger switch wire harness con-

necter and a good ground. There should be continuity. If OK, go to Step 3. If not OK, repair the open circuit as required.

(3) Check for continuity between the ground circuit terminal and the rear window defogger switch sense circuit terminal on the back of the defogger switch housing (Fig. 5). There should be momentary continuity as the defogger switch button is depressed, and then no continuity. If OK, (Refer to 8 - ELECTRICAL/HEATED GLASS/REAR WINDOW DEFOGGER SWITCH - DIAGNOSIS AND TESTING - INSTRUMENT CLUSTER REAR WINDOW DEFOGGER FUNCTION) If not OK, replace the faulty switch (Fig. 5).



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Fig. 5 A/C HEATER CONTROL HEAD (Rear View)

- 1 - A/C HEATER CONTROL HEAD
- 2 - A/C HEATER CONTROL HEAD LIGHT
- 3 - REAR WINDOW DEFOGGER SWITCH AND TEMPERATURE BLEND DOOR- CONNECTOR B (12 PIN)
- 4 - A/C HEATER CONTROL HEAD LIGHT
- 5 - MODE SELECT CONTROL
- 6 - BLOWER SPEED CONTROL- CONNECTOR A (7 PIN)
- 7 - MOUNTING SCREWS (4)

(4) Check switch position continuity between:

	CONTACT PINS
1 - OFF LAMPS	A-1 - A-7
2 - ON MOMENTARY	B-6 - B-8
3 - ILLUMINATION LAMP	A-7 - A-1
4 - INDICATOR LAMP	B-12 - B-7

REAR WINDOW DEFOGGER SWITCH (Continued)

**DIAGNOSIS AND TESTING - REAR HVAC
CONTROL ASSEMBLY WINDOW DEFOGGER
FUNCTION**

Before performing this test, complete the Defogger Switch and Defogger Relay tests as described in this group. For circuit descriptions and diagrams, (Refer to Appropriate Wiring Information).

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, 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 TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable. Remove the defogger relay from the junction block and unplug the defogger switch wire harness connector.

(2) Remove the HVAC control head from the instrument panel. This is accomplished by removing the ashtray and the screw behind the ashtray and unclipping the center bezel.

(3) Check for continuity between the rear window defogger switch sense circuit cavity of the cluster wire harness connector (connector B) and a good ground. There should be no continuity. If OK, go to Step 4. If not OK, repair the short circuit as required.

(4) Check for continuity between the rear window defogger switch sense circuit cavity of the right instrument cluster wire harness connector (connector B) and the defogger switch wire harness connector. There should be continuity. If OK, go to Step 5. If not OK, repair the open circuit as required.

(5) Check for continuity between the rear window defogger relay control circuit cavity of the right instrument cluster wire harness connector (connector

B) and a good ground. There should be no continuity. If OK, go to Step 6. If not OK, repair the short circuit as required.

(6) Check for continuity between the rear window defogger relay control circuit cavities of the right instrument cluster wire harness connector (connector B) and the defogger relay receptacle (the cavity for ISO relay terminal 85) in the junction block. There should be continuity. If OK, replace the faulty HVAC control head. If not OK, repair the open circuit as required.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, 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 TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) The Rear Window Defogger switch is part of the HVAC assembly and if damaged or inoperative the entire HVAC control assembly must be replaced (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/A/C HEATER CONTROL - REMOVAL).

INSTALLATION

(1) The Rear Window Defogger switch is part of the HVAC control assembly and if damaged or inoperative you must replace the entire HVAC control head assembly (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/A/C HEATER CONTROL - INSTALLATION).

(2) Connect the battery negative cable.

HEATED SEAT SYSTEM

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HEATED SEAT SYSTEM

DESCRIPTION

Individually controlled electrically heated front seats are available on models that are also equipped with the optional leather trim package. Vehicles with this option can be visually identified by the two separate heated seat switches mounted on the outboard seat cushion side shields. The heated seat system allows the front seat driver and passenger to select from two different levels of supplemental electrical seat heating, or no seat heating to suit their individual comfort requirements. The heated seat system for this vehicle includes the following major components:

- **Heated Seat Switches** - Two heated seat switches are used per vehicle, including two Light-Emitting Diode (LED) indicator lamps and an incandescent back lighting bulb for each switch. One switch for the driver and one for the passenger front seats. The switches are mounted on the outboard seat cushion side shields.
- **Heated Seat Module** - also referred to as the Seat Heat Interface Module (SHIM), this module contains the solid state electronic control and diagnostic logic circuitry for the heated seat system. One heated seat module is used per vehicle and is mounted under the left front seat cushion. Refer to the Electronic Control Modules section of the service manual for heated seat module information.
- **Heated Seat Elements** - Four heated seat elements are used per vehicle, one for each front seat back and one for each front seat cushion. The elements are integral to the individual front seat and

seat back cushions and cannot be removed from the cushions, once installed at the factory.

- **Heated Seat Sensors** - Two heated seat sensors are used per vehicle, one for each front seat. The sensors are integral to the individual front seat heating elements.

Following are general descriptions of the major components in the heated seat system. See the owner's manual in the vehicle glove box for more information on the features, use and operation of the heated seat system. Refer to **Wiring Diagrams** for the location of complete heated seat system wiring diagrams.

OPERATION

The heated seat module receives fused battery current through fuse #29 in the Junction Block (JB) when the ignition switch is in the "ON" position. The heated seat switches receive battery current through fuse #25 in the Junction Block also, when the ignition switch is in the "ON" position. The heated seat module shares a common ground circuit with each of the heated seat elements. The heated seat elements will only operate when the surface temperature of the seat cushion is below the designed temperature set points of the system.

The heated seat system will also be turned off automatically whenever the ignition switch is turned to any position except On. If the ignition switch is turned to the Off position while a heated seat is turned ON, the heated seat will remain Off after the ignition switch is turned back "ON" until a heated seat switch is depressed again.

HEATED SEAT SYSTEM (Continued)

The heated seat module monitors inputs from the heated seat sensors and the heated seat switches. In response to these inputs the heated seat module uses its internal programming to control outputs to the heated seat elements in both front seats and to control the heated seat LED indicator lamps located in both of the heated seat switches. The heated seat module is also programmed to provide self-diagnostic capability. When the module detects certain failures within the heated seat system, it will provide a visual indication of the failure by flashing the indicator lamps in the affected heated seat switch. The heated seat module will automatically turn off the heated seat elements if it detects a short or open in the heated seat element circuit or a heated seat sensor value that is out of range.

DIAGNOSIS AND TESTING - HEATED SEAT SYSTEM

HEATED SEAT SYSTEM SELF-DIAGNOSIS

The heated seat system is capable of performing some self-diagnostics. The following table depicts the various monitored failures which will be reported to the vehicle operator or technician by flashing the individual heated seat switch Light Emitting Diode (LED) indicator lamps. Refer to the Heated Seat System Self-Diagnosis table for failure identification. The driver side heated seat switch indicator lamps will flash if a failure occurs in the driver side heated seat, and the passenger side heated seat switch indicator lamps will flash for a passenger side heated seat failure. If a monitored heated seat system failure occurs, the switch indicator lamps will flash at a pulse rate of about one-half second on, followed by about one-half second off for a duration of about one minute after the switch for the faulty heated seat is depressed in either the Low or High direction. This process will repeat every time the faulty heated seat switch is actuated until the problem has been corrected.

Heated Seat System Self-Diagnosis		
Monitored Failure	Switch High Indicator Lamp	Switch Low Indicator Lamp
Heated Seat Element Shorted	Flashing	Flashing
Heated Seat Element Open	Flashing	Off
Heated Seat Sensor Value Out of Range	Off	Flashing

If the heated seat system failure is identified by flashing heated seat switch indicator lamps, go to the appropriate diagnosis and testing procedure in this section and confirm the condition, using the step by step procedure. If the monitored failure is confirmed, replace the component. If the monitored failure is not confirmed, replace the heated seat module with a known good unit and retest the system.

HEATED SEAT SYSTEM TESTING

Refer to **Wiring Diagrams** for the location of complete heated seat system wiring diagrams. Before testing the individual components in the heated seat system, perform the following preliminary checks:

- If a single indicator lamp for one heated seat switch does not operate and the heated seat elements do heat, refer to **Diagnosis and Testing the Heated Seat Switch** in this section for the location of heated seat switch diagnosis and testing procedures.
- If both indicator lamps for a heated seat switch operate, but the heated seat elements do not heat, refer to **Diagnosis and Testing the Heated Seat Module** in Electronic Control Modules for the location of heated seat module diagnosis and testing procedures.
- If an indicator lamp on either heated seat switch remains illuminated after the heated seat has been turned Off, refer to **Diagnosis and Testing the Heated Seat Module** in Electronic Control Modules for the location of heated seat module diagnosis and testing procedures. Also refer to the Body Diagnostic Manual for additional diagnosis and testing procedures.

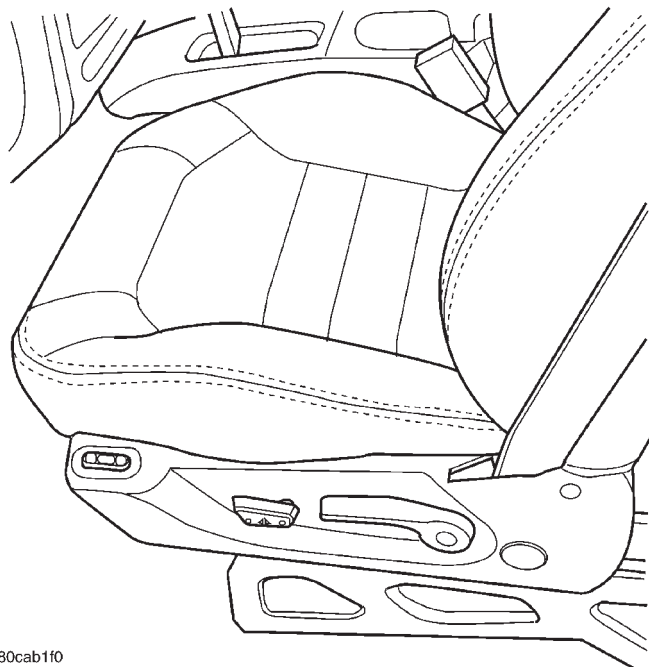
DRIVER SEAT HEATER SWITCH

DESCRIPTION

The heated seat switches are located on the out-board cushion side shield of the driver and passenger front seats (Fig. 1). The two, three-position rocker type switches provide a resistor multiplexed signal to the Heated Seat Module through separate hard wired circuits. Each switch has an Off, Low and High setting. Each switch contains two light emitting diodes (LED), one for each High and Low setting to let the occupant know that the seat heater system is on.

The heated seat switches and their LED's cannot be repaired. If either switch is faulty or damaged the entire switch must be replaced.

DRIVER SEAT HEATER SWITCH (Continued)



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Fig. 1 KJ POWER / HEATED SEAT

OPERATION

There are three positions that can be selected with each of the heated seat switches: Off, Low, and High. When the front of the switch rocker is fully depressed, the High position is selected and the high position LED indicator illuminates. When the rear of the switch rocker is fully depressed, the Low position is selected and the low position LED indicator illuminates. When the switch rocker is depressed a second time in either direction, Off is selected and both LED indicators are extinguished.

Both switches provide separate resistor multiplexed hard wire inputs to the Heated Seat Module to indicate the selected switch position. The heated seat module monitors the switch inputs and responds to the heated seat switch status messages by controlling the output to the seat heater elements of the selected seat. The Low heat position set point is about 36° C (97° F), and the High heat position set point is about 41° C (105° F).

DIAGNOSIS AND TESTING - HEATED SEAT SWITCH

If a heated seat fails to heat and one or both of the indicator lamps on a heated seat switch flash, refer to **Heated Seat System Diagnosis and Testing** in this section for flashing LED failure identification. Refer to **Wiring Diagrams** for complete heated seat system wiring diagrams.

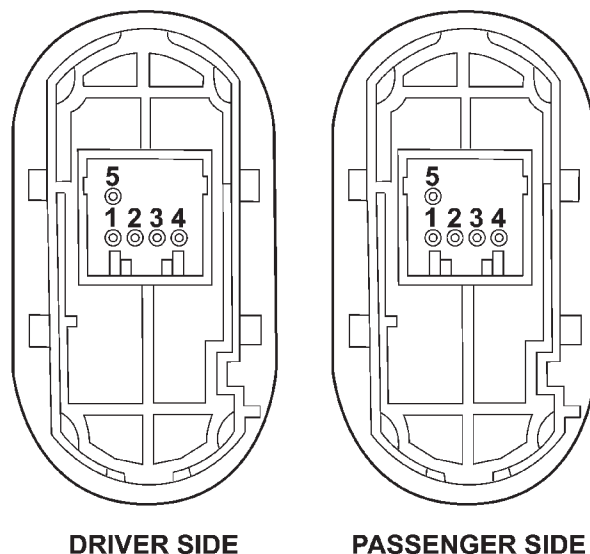
(1) If the problem being diagnosed involves a heated seat switch indicator lamp that remains illuminated after the heated seat has been turned Off,

refer to **Diagnosis and Testing the Heated Seat Module** in the Electronic Control Modules section for heated seat module diagnosis and testing procedures. If not, go to Step 2

(2) Remove the heated seat switch (Refer to 8 - ELECTRICAL/HEATED SEATS/DRIVER HEATED SEAT SWITCH - REMOVAL). Check for continuity between the ground circuit cavity #5 of the heated seat switch connector and a good ground. There should be continuity. If OK, go to Step 3. If not OK, repair the open ground circuit as required.

(3) Turn the ignition switch to the ON position. Check for battery voltage at the fused ignition switch output circuit cavity #1 of the heated seat switch connector. If OK, go to Step 4. If not OK, repair the open fused ignition switch output circuit as required.

(4) Check the continuity between pin #1 and pin #3 of the heated seat switch (Fig. 2). If the readings do not correspond to those in the Heated Seat Switch Continuity table below, replace the heated seat switch. If OK, and the heated seat system is still not operating properly refer to **Diagnosis and Testing the Heated Seat Module**.



DRIVER SIDE

PASSENGER SIDE

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Fig. 2 Heated Seat Switches

NOTE: ANY RESISTANCE VALUES (OHMS Ω) GIVEN IN THE FOLLOWING TEXT ARE SUPPLIED USING THE AUTOMATIC RANGE GENERATED BY A FLUKE® AUTOMOTIVE METER. IF ANOTHER TYPE OF MEASURING DEVICE IS USED, THE VALUES GENERATED MAY NOT BE THE SAME AS THE RESULTS SHOWN HERE, OR MAY HAVE TO BE CONVERTED TO THE RANGE USED HERE.

DRIVER SEAT HEATER SWITCH (Continued)

HEATED SEAT SWITCH CONTINUITY

CONTINUITY BETWEEN	SWITCH POSITION	OHMS READING +/- 10%
PIN 1 AND 3	OFF	2.2 K (2200) OHMS
PIN 1 AND 3	LO	.415 K (415) OHMS
PIN 1 AND 3	HI	33 OHMS

REMOVAL

- (1) Disconnect and isolate the negative battery cable.
- (2) Remove the appropriate seat cushion side shield (Refer to 23 - BODY/SEATS/SEAT CUSHION SIDE COVERS - REMOVAL).
- (3) Disconnect the heated seat switch electrical connector. Depress the locking tab and pull straight apart.
- (4) Working from the underside of the switch, gently rock the switch back and forth out of its mounting location.

INSTALLATION

- (1) Gently rock the switch back and forth in to its mounting location.
- (2) Connect the heated seat switch electrical connector.
- (3) Install the appropriate seat cushion side shield. Refer to the Body section of the service manual for the procedure.
- (4) Connect the negative battery cable.

HEATED SEAT ELEMENT

DESCRIPTION

The heated seat system includes four seat heating elements. Two are located in each front seat, one for the seat cushion and the other for the seat back. All models use two resistor wire heating elements for each seat that are connected in series with the Heated Seat Module (HSM). The temperature sensor is a Negative Temperature Coefficient (NTC) thermistor. One temperature sensor is used for each seat, and it is located on the seat cushion heating element for all models.

The seat heating elements are permanently attached to the seat cushions. The heated seat elements and the temperature sensor cannot be adjusted or repaired and, if faulty or damaged, the seat cushions must be replaced. Refer to the Body section for the seat cushion service procedures.

OPERATION

The heated seat elements resist the flow of electrical current. When battery current is passed through the elements, the energy lost by the resistance of the elements to the current flow is released in the form of heat. When the temperature of the seat cushion cover rises, the resistance of the sensor decreases. The Heated Seat Module supplies a five-volt current to one side of each sensor, and monitors the voltage drop through the sensor on a return circuit. The Heated Seat Module uses this temperature sensor input to monitor the temperature of the seat, and regulates the current flow to the seat heating elements accordingly.

DIAGNOSIS AND TESTING - HEATED SEAT ELEMENT

SEAT CUSHION ELEMENT

- (1) Disconnect and isolate the battery negative cable. Disconnect the green heated seat cushion element wire harness connector from the power seat wire harness. The power seat wire harness connectors for the seat cushion heating elements are secured to a bracket located under the seat cushion frame. Refer to **Wiring** for connector pin information.
- (2) Check for continuity between the two heated seat element circuit cavities. There should be continuity. If OK, the elements within the seat assembly test OK, go to Step 3. If not OK, replace the faulty seat heating element and cushion assembly.
- (3) Test the seat wire harness between the heated seat module connector and the heated seat wire harness element connector for a shorted or open circuit. If OK, element is OK, proceed with testing the heated seat sensor and module. If not OK, repair the shorted or open seat wire harness as required.

SEAT BACK ELEMENT

- (1) Disconnect and isolate the battery negative cable. Disconnect the green heated seat back element wire harness connector from the power seat wire harness. The power seat wire harness connectors for the seat cushion heating elements are secured to a bracket located under the seat cushion frame. Refer to **Wiring** for connector pin information.
- (2) Check for continuity between the two heated seat element circuit cavities. There should be continuity. If OK, the elements within the seat assembly test OK, go to Step 3. If not OK, replace the faulty seat heating element and cushion assembly.
- (3) Test the seat wire harness between the heated seat module connector and the heated seat wire harness element connector for a shorted or open circuit. If OK, element is OK, proceed with testing the heated seat sensor and module. If not OK, repair the shorted or open seat wire harness as required.

HEATED SEAT SENSOR

DIAGNOSIS AND TESTING - HEATED SEAT SENSOR

For complete circuit diagrams, refer to **WIRING**.

NOTE: ANY RESISTANCE VALUES (OHMS Ω) GIVEN IN THE FOLLOWING TEXT ARE SUPPLIED USING THE AUTOMATIC RANGE GENERATED BY A FLUKE® AUTOMOTIVE METER. IF ANOTHER TYPE OF MEASURING DEVICE IS USED THE VALUES GENERATED MAY NOT BE THE SAME AS THE RESULTS SHOWN HERE, OR MAY HAVE TO BE CONVERTED TO THE RANGE USED HERE.

(1) Disconnect the heated seat wire harness connector from under the seat. Using an ohmmeter, check the resistance between the heated seat sensor input circuit cavity and the heated seat sensor feed circuit cavity in the heated seat wire harness connector. The heated seat sensor resistance should be between 1 kilohm and 100 kilohms. If OK, go to Step 2. If not OK, replace the faulty seat heating element assembly.

(2) Test the seat wire harness between the heated seat module connector and the heated seat wire harness connector for a shorted or open circuit. If OK, refer to **Diagnosis and Testing the Heated Seat Module** in Electronic Control Modules, for the proper heated seat module diagnosis and testing procedures. If not OK, repair the shorted or open heated seat wire harness as required.

PASSENGER SEAT HEATER SWITCH

DESCRIPTION

The heated seat switches are located on the out-board cushion side shield of the driver and passenger front seats (Fig. 3). The two, three-position rocker type switches provide a resistor multiplexed signal to the Heated Seat Module through separate hard wired circuits. Each switch has an Off, Low and High setting. Each switch contains two light emitting diodes (LED), one for each High and Low setting to let the occupant know that the seat heater system is on.

The heated seat switches and their LED's cannot be repaired. If either switch is faulty or damaged the entire switch must be replaced.

OPERATION

There are three positions that can be selected with each of the heated seat switches: Off, Low, and High. When the front of the switch rocker is fully

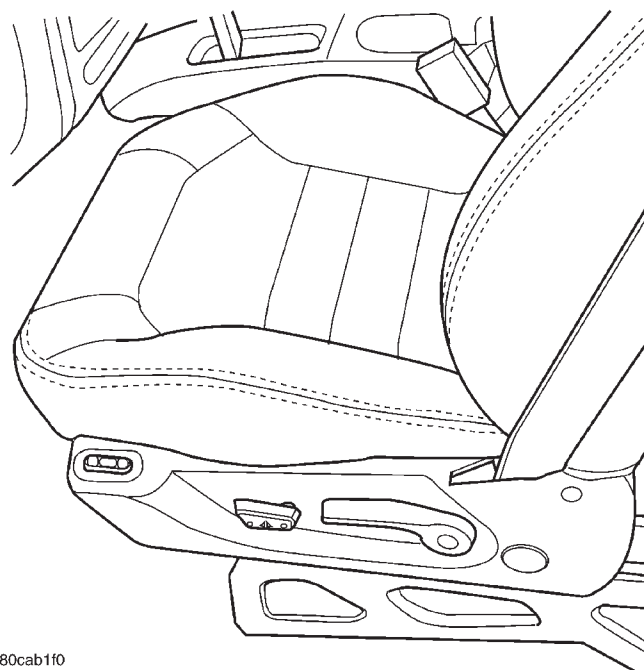


Fig. 3 KJ POWER / HEATED SEAT

depressed, the High position is selected and the high position LED indicator illuminates. When the rear of the switch rocker is fully depressed, the Low position is selected and the low position LED indicator illuminates. When the switch rocker is depressed a second time in either direction, Off is selected and both LED indicators are extinguished.

Both switches provide separate resistor multiplexed hard wire inputs to the Heated Seat Module to indicate the selected switch position. The heated seat module monitors the switch inputs and responds to the heated seat switch status messages by controlling the output to the seat heater elements of the selected seat. The Low heat position set point is about 36° C (97° F), and the High heat position set point is about 41° C (105° F).

DIAGNOSIS AND TESTING - HEATED SEAT SWITCH

If a heated seat fails to heat and one or both of the indicator lamps on a heated seat switch flash, refer to **Heated Seat System Diagnosis and Testing** in this section for flashing LED failure identification. Refer to **Wiring Diagrams** for complete heated seat system wiring diagrams.

(1) If the problem being diagnosed involves a heated seat switch indicator lamp that remains illuminated after the heated seat has been turned Off, refer to **Diagnosis and Testing the Heated Seat Module** in the Electronic Control Modules section for heated seat module diagnosis and testing procedures. If not, go to Step 2

PASSENGER SEAT HEATER SWITCH (Continued)

(2) Remove the heated seat switch (Refer to 8 - ELECTRICAL/HEATED SEATS/DRIVER HEATED SEAT SWITCH - REMOVAL). Check for continuity between the ground circuit cavity #5 of the heated seat switch connector and a good ground. There should be continuity. If OK, go to Step 3. If not OK, repair the open ground circuit as required.

(3) Turn the ignition switch to the ON position. Check for battery voltage at the fused ignition switch output circuit cavity #1 of the heated seat switch connector. If OK, go to Step 4. If not OK, repair the open fused ignition switch output circuit as required.

(4) Check the continuity between pin #1 and pin #3 of the heated seat switch (Fig. 4). If the readings do not correspond to those in the Heated Seat Switch Continuity table below, replace the heated seat switch. If OK, and the heated seat system is still not operating properly refer to **Diagnosis and Testing the Heated Seat Module**.

NOTE: ANY RESISTANCE VALUES (OHMS Ω) GIVEN IN THE FOLLOWING TEXT ARE SUPPLIED USING THE AUTOMATIC RANGE GENERATED BY A FLUKE® AUTOMOTIVE METER. IF ANOTHER TYPE OF MEASURING DEVICE IS USED, THE VALUES GENERATED MAY NOT BE THE SAME AS THE RESULTS SHOWN HERE, OR MAY HAVE TO BE CONVERTED TO THE RANGE USED HERE.

HEATED SEAT SWITCH CONTINUITY

CONTINUITY BETWEEN	SWITCH POSITION	OHMS READING +/- 10%
PIN 1 AND 3	OFF	2.2 K (2200) OHMS
PIN 1 AND 3	LO	.415 K (415) OHMS
PIN 1 AND 3	HI	33 OHMS

REMOVAL

(1) Disconnect and isolate the negative battery cable.

(2) Remove the appropriate seat cushion side shield (Refer to 23 - BODY/SEATS/SEAT CUSHION SIDE COVERS - REMOVAL).

(3) Disconnect the heated seat switch electrical connector. Depress the locking tab and pull straight apart.

(4) Working from the underside of the switch, gently rock the switch back and forth out of its mounting location.

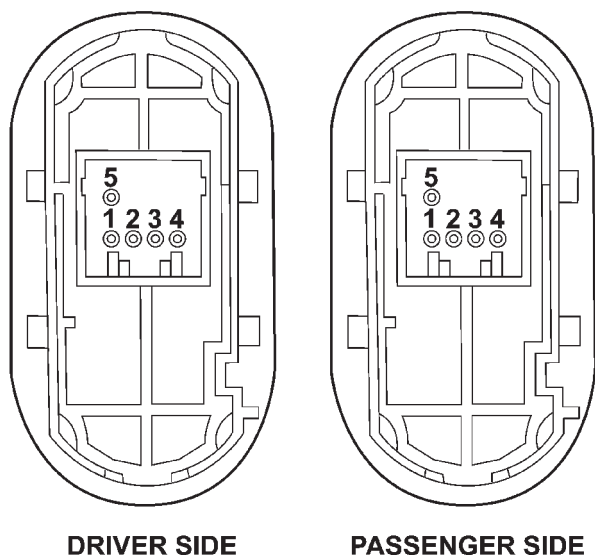
INSTALLATION

(1) Gently rock the switch back and forth in to its mounting location.

(2) Connect the heated seat switch electrical connector.

(3) Install the appropriate seat cushion side shield. Refer to the Body section of the service manual for the procedure.

(4) Connect the negative battery cable.



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Fig. 4 Heated Seat Switches

HORN

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HORN SYSTEM

DESCRIPTION

A dual-note electric horn system is standard factory-installed equipment on this model (Fig. 1).

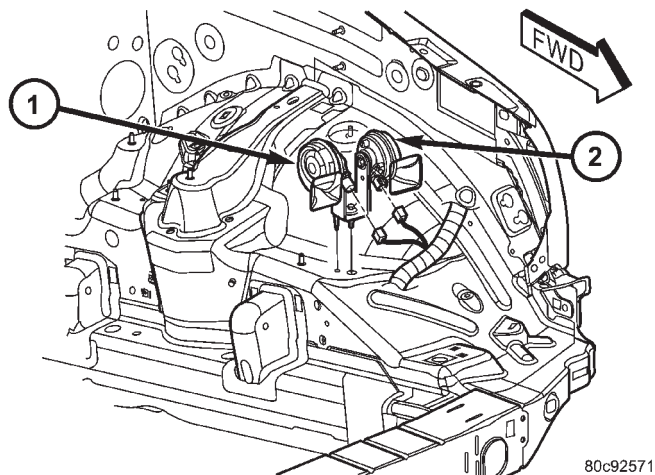


Fig. 1 HORN LOCATION

- 1 - HIGH NOTE HORN
2 - LOW NOTE HORN

The dual-note horn system features dual electromagnetic horn units. The horn system includes the following major components:

- **Horn** - The two horns are located below the Power Distribution Center (PDC).
- **Horn Relay** - The horn relay is located in the Junction Block (JB).

- **Horn Switch** - The horn switch is molded into the driver airbag assembly.

OPERATION

The horn system operates on battery current received through fuse 3 in the Junction Block (JB). The horn system circuit is designed so that the system will remain operational, regardless of the ignition switch position.

DIAGNOSIS AND TESTING - HORN SYSTEM

In most cases, any problem involving continually sounding horns can be quickly alleviated by removing the horn relay from the Junction Block (JB). Refer to horn relay for the removal procedure. 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.

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 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 TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

HORN SYSTEM (Continued)

HORN SYSTEM DIAGNOSIS TABLE

CONDITION	POSSIBLE CAUSES	CORRECTION
BOTH HORNS INOPERATIVE	1. Faulty fuse. 2. Faulty horn relay. 3. Faulty horn switch. 4. Faulty horns.	1. Check the fuse in the Junction Block (JB). Replace the fuse and repair the shorted circuit or component, if required. 2. Refer to horn relay for the proper diagnosis and testing procedures. Replace the horn relay or repair the open horn relay circuit, if required. 3. Refer to horn switch for the proper diagnosis and testing procedure. Replace the horn switch or repair the open horn switch circuit, if required. 4. Refer to horn for the proper diagnosis and testing procedure. Replace the horns or repair the open horn circuit, if required.
ONE HORN INOPERATIVE	1. Faulty horn.	1. Refer to horn for the proper diagnosis and testing procedures. Replace the horn or repair the open horn circuit, if required.
HORN SOUNDS CONTINUOUSLY	1. Faulty horn relay. 2. Faulty horn switch.	1. Refer to horn relay for the proper diagnosis and testing procedure. Replace the horn relay or repair the shorted horn relay control circuit, if required. 2. Refer to horn switch for the proper diagnosis and testing procedure. Replace the horn switch or repair the shorted horn switch circuit, if required.

HORN

DIAGNOSIS AND TESTING - HORN

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 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 TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

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.

(1) Disconnect the wire harness connector from the horn. Measure the resistance between the horn ground circuit cavity of the wire harness connector and a good ground. There should be no measurable resistance. If OK, go to Step 2. If not OK, replace wiring as necessary.

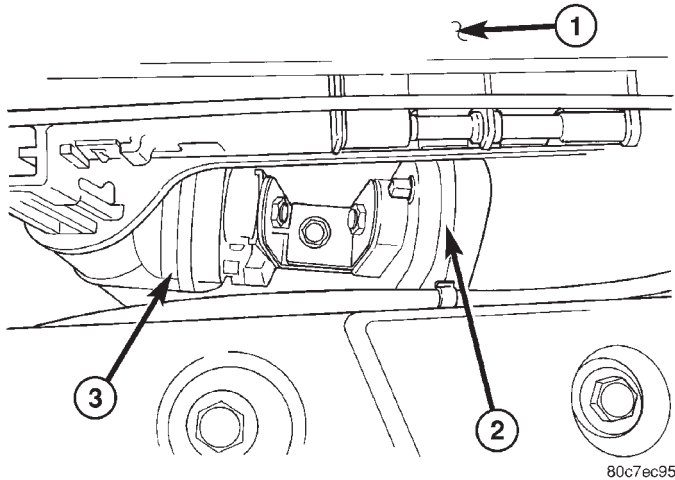
(2) Check for battery voltage at the horn relay output circuit cavity of the wire harness connector for the horn. There should be zero volts. If OK, go to Step 3. If not OK, refer to horn relay and horn relay circuit for the proper diagnosis and testing procedures.

(3) Depress the horn switch. There should now be battery voltage at the horn relay output circuit cavity of the wire harness connector for the horn. If OK, but the horn does not sound, replace the faulty horn. If not OK, refer to horn relay and horn relay circuit for the proper diagnosis and testing procedures.

HORN (Continued)

REMOVAL

- (1) Disconnect and isolate the battery negative cable.
- (2) Disconnect the electrical harness connector from the horns.
- (3) Remove the mounting bolt (Fig. 2).
- (4) Remove the horns.

**Fig. 2 HORN MOUNTING**

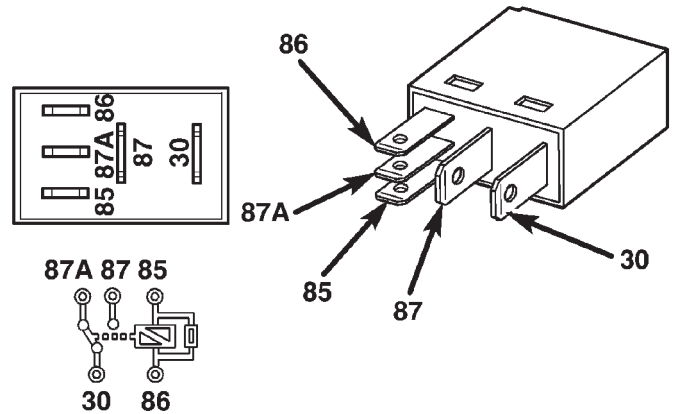
- 1 - POWER DISTRIBUTION CENTER
 2 - LOW NOTE HORN
 3 - HIGH NOTE HORN

INSTALLATION

- (1) Install the horns.
- (2) Install the mounting bolt. Tighten bolt to 25 N·m (19 lb. ft.).
- (3) Connect the electrical harness connector to the horns
- (4) Connect the battery negative cable.

HORN RELAY**DIAGNOSIS AND TESTING - HORN RELAY**

- (1) Remove horn relay (Refer to 8 - ELECTRICAL/HORN/HORN RELAY - REMOVAL).
- (2) Using ohmmeter, test between relay connector terminals 85 to 86 for 75 ± 8 ohms resistance. If resistance not OK, replace relay (Fig. 3).
- (3) Test for continuity between ground and terminal 85 of horn relay.
 - (a) When the horn switch is not depressed, no continuity should be present.
 - (b) Continuity to ground when horn switch is depressed.
 - (c) If continuity is not correct replace horn switch or wiring as necessary, 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.

**Fig. 3 Horn Relay**

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- 30 - COMMON FEED
 85 - COIL GROUND
 86 - COIL BATTERY
 87 - NORMALLY OPEN
 87A - NORMALLY CLOSED

ing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

- (4) Using voltmeter, test voltage at:

(a) Terminals 30 and 86 of the horn relay to body ground.

(b) If NO voltage check fuse 3 of the Junction Block (JB).

(c) If incorrect voltage, repair as necessary. 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.

- (5) Insert a jumper wire between terminal 30 and 87 of the Junction Block (JB).

(a) If horn sounds replace relay.

(b) If the horn does not sound, install horn relay and test horn (Refer to 8 - ELECTRICAL/HORN/HORN - DIAGNOSIS AND TESTING).

REMOVAL

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the instrument panel end cap.
- (3) Locate and pull the horn relay from the Junction Block (JB).

INSTALLATION

- (1) Locate proper connector, and press relay into position.
- (2) Install instrument panel end cap.
- (3) Connect battery negative cable.

HORN SWITCH

DESCRIPTION

The horn switch is molded into the driver airbag assembly. The horn switch can not be serviced separately. For service procedures, (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).

DIAGNOSIS AND TESTING - HORN SWITCH

For complete circuit diagrams, 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.

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 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 TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

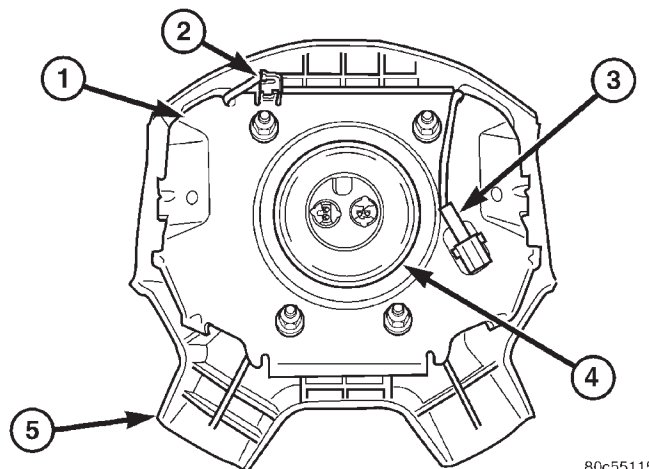
(1) Disconnect and isolate the battery negative cable.

(2) Remove the steering column opening cover.

(3) Check for continuity between the metal steering column jacket and a good ground. There should be continuity. If OK, go to Step 4. If not OK, (Refer to 19 - STEERING/COLUMN - INSTALLATION) for proper installation of the steering column.

(4) Remove the driver side airbag module from the steering wheel (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL). Disconnect the horn switch wire harness connectors from the driver side airbag module (Fig. 4).

(5) Remove the horn relay from the Junction Block (JB). Check for continuity between the steering col-



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Fig. 4 Driver Airbag Housing

- 1 - HOUSING
- 2 - HORN SWITCH GROUND WIRE
- 3 - HORN SWITCH FEED WIRE
- 4 - INFLATOR
- 5 - TRIM COVER

umn half of the horn switch feed wire harness connector and a good ground. There should be no continuity. If OK, go to Step 6. If not OK, repair the shorted horn relay control circuit to the horn relay in the Junction Block as required.

(6) Check for continuity between the steering column half of the horn switch feed wire harness connector and the horn relay control circuit cavity for the horn relay in the Junction Block. There should be continuity. If OK, go to Step 7. If not OK, repair the open horn relay control circuit to the horn relay in the Junction Block as required.

(7) Check for continuity between the horn switch feed wire and the horn switch ground wire on the driver side airbag module. There should be no continuity. If OK, go to Step 8. If not OK, replace the faulty horn switch.

(8) Depress the center of the driver side airbag module trim cover and check for continuity between the horn switch feed wire and the horn switch ground wire on the driver side airbag module. There should now be continuity. If not OK, replace the faulty horn switch (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).

IGNITION CONTROL

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IGNITION CONTROL

DESCRIPTION

The ignition system consists of:

- Spark Plugs
- Ignition Coil(s)
- Powertrain Control Module (PCM)
- Crankshaft Position Sensor
- 2 Knock Sensors (3.7L only)
- Camshaft Position Sensor
- The MAP, TPS, IAC and ECT also have an effect

on the control of the ignition system.

OPERATION

2.4L

A common ignition coil divided into 2 halves is used. Secondary, high-tension spark plug cables are also used. One half of the coil fires two spark plugs simultaneously (one plug is the cylinder under com-

pression, and the other plug is the cylinder on the exhaust stroke). Coil half number one fires cylinders 1 and 4. Coil half number two fires cylinders 2 and 3. The PCM determines which of the coils to charge and fire at the correct time.

The Auto Shutdown (ASD) relay provides battery voltage to the ignition coil. The PCM provides a ground contact (circuit) for energizing the coil. When the PCM breaks the contact, the energy in the coil primary transfers to the secondary causing a spark. The PCM will de-energize the ASD relay if it does not receive inputs from either the crankshaft or camshaft position sensors.

A distributor is not used with the 2.4L engine.

3.7L

The 3.7L V6 engine uses a separate ignition coil for each cylinder. The one-piece coil bolts directly to the cylinder head. Rubber boots seal the secondary terminal ends of the coils to the top of all 6 spark plugs. A separate electrical connector is used for each coil.

IGNITION CONTROL (Continued)

Because of coil design, spark plug cables (secondary cables) are not used. A distributor is not used with the 3.7L engine.

Two knock sensors (one for each cylinder bank) are used to help control spark knock.

The Auto Shutdown (ASD) relay provides battery voltage to each ignition coil. The Powertrain Control Module (PCM) provides a ground contact (circuit) for energizing each coil. When the PCM breaks the contact, the energy in the coil primary transfers to the secondary causing a spark. The PCM will de-energize the ASD relay if it does not receive inputs from either the crankshaft or camshaft position sensors.

SPECIFICATIONS

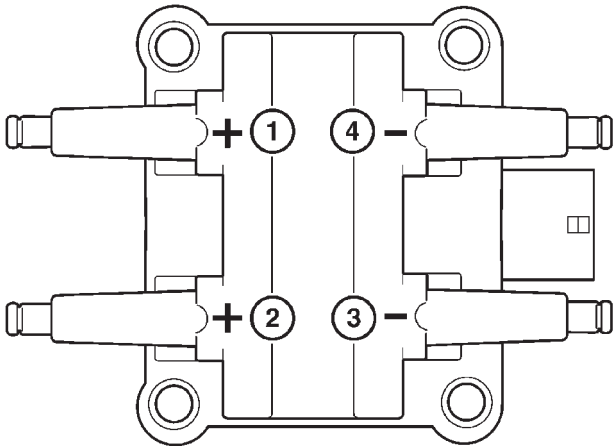
SPECIFICATIONS - IGNITION TIMING
Ignition timing is not adjustable on any engine.

ENGINE FIRING ORDER - 2.4L 4-CYLINDER 1 - 3 - 4 - 2

ENGINE FIRING ORDER - 3.7L V-6 1 - 6 - 5 - 4 - 3 - 2

IGNITION COIL RESISTANCE - 2.4L

Engine	Coil Manufacture	Primary Resistance at 21°C-27°C (70°F-80°F)	Secondary Resistance at 21°C-27°C (70°F-80°F)
2.4L	Toyodenso or Diamond	0.51 to 0.61 Ohms	11,500 to 13,500 Ohms



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Fig. 1 IGNITION COIL - 2.4L

IGNITION CONTROL (Continued)**IGNITION COIL RESISTANCE - 3.7L V-6**

PRIMARY RESISTANCE 21-27°C (70-80°F)	SECONDARY RESISTANCE 21-27°C (70-80°F)
0.6 - 0.9 Ohms	6,000 - 9,000 Ohms

SPARK PLUGS

ENGINE	PLUG TYPE	ELECTRODE GAP
2.4L	RE14MCC5 (Champion #)	1.24 to 1.37 mm (0.048 to 0.053 in.)
3.7L V-6	2FR6F - 11G (NGK #)	1.1 mm (0.042 in.)

SPARK PLUG CABLE RESISTANCE - 2.4L

MINIMUM	MAXIMUM
250 Ohms Per Inch	1000 Ohms Per Inch
3000 Ohms Per Foot	12,000 Ohms Per Foot

TORQUE - IGNITION SYSTEM

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Camshaft Position Sensor-2.4L	23	21	205
Camshaft Position Sensor-3.7L	12	-	106
Crankshaft Position Sensor Bolt-2.4L	12	-	106
Crankshaft Position Sensor Nut/Bolt-3.7L	23	21	205
* Knock Sensor Bolt - 3.7L	* 20	* 15	
Ignition Coil Mounting Bolts - 2.4L	11	-	105
Ignition Coil Mounting Nuts - 3.7L	8	-	70
Ignition Coil Capacitor Nuts- 3.7L	8	-	70
** Spark Plugs - 2.4L	** 15	** 11	-
Spark Plugs - 3.7L	27	20	-
* Do not apply any sealant, thread-locker or adhesive to bolts. Poor sensor performance may result.			
** Torque critical tapered design. Do not exceed 15 ft. lbs.			

AUTO SHUT DOWN RELAY

DESCRIPTION - PCM OUTPUT

The 5-pin, 12-volt, Automatic Shutdown (ASD) relay is located in the Power Distribution Center (PDC). Refer to label on PDC cover for relay location.

OPERATION

OPERATION - ASD SENSE - PCM INPUT

A 12 volt signal at this input indicates to the PCM that the ASD has been activated. The relay is used to connect the oxygen sensor heater elements, oxygen sensor heater relay, ignition coil and fuel injectors to 12 volt + power supply.

This input is used only to sense that the ASD relay is energized. If the Powertrain Control Module (PCM) does not see 12 volts at this input when the ASD should be activated, it will set a Diagnostic Trouble Code (DTC).

OPERATION - PCM OUTPUT

The ASD relay supplies battery voltage (12+ volts) to the fuel injectors and ignition coil(s). With certain emissions packages it also supplies 12-volts to the oxygen sensor heating elements and the oxygen sensor heater relay.

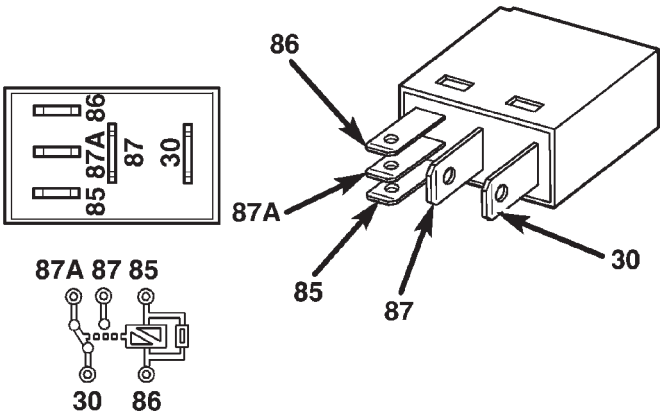
The ground circuit for the coil within the ASD relay is controlled by the Powertrain Control Module (PCM). The PCM operates the ASD relay by switching its ground circuit on and off.

The ASD relay will be shut-down, meaning the 12-volt power supply to the ASD relay will be de-activated by the PCM if the ignition key is left in the ON position. This is if the engine has not been running for approximately 1.8 seconds.

DIAGNOSIS AND TESTING - ASD AND FUEL PUMP RELAYS

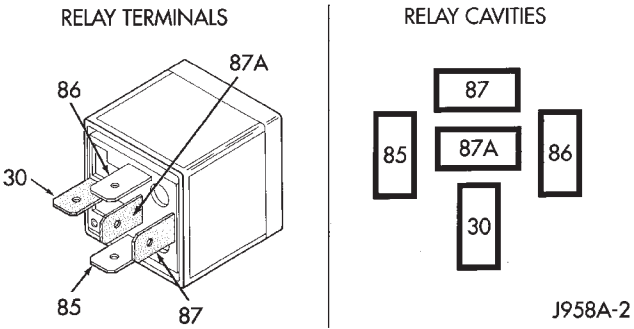
The following description of operation and tests apply only to the Automatic Shutdown (ASD) and fuel pump relays. The terminals on the bottom of each relay are numbered. Two different types of relays may be used, (Fig. 2) or (Fig. 3).

- Terminal number 30 is connected to battery voltage. For both the ASD and fuel pump relays, terminal 30 is connected to battery voltage at all times.
- The PCM grounds the coil side of the relay through terminal number 85.
- Terminal number 86 supplies voltage to the coil side of the relay.
- When the PCM de-energizes the ASD and fuel pump relays, terminal number 87A connects to terminal 30. This is the Off position. In the off position,



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Fig. 2 TYPE 1 RELAY (ISO MICRO RELAY)



J958A-2

Fig. 3 ASD AND FUEL PUMP RELAY TERMINALS—TYPE 2

TERMINAL LEGEND	
NUMBER	IDENTIFICATION
30	COMMON FEED
85	COIL GROUND
86	COIL BATTERY
87	NORMALLY OPEN
87A	NORMALLY CLOSED

voltage is not supplied to the rest of the circuit. Terminal 87A is the center terminal on the relay.

- When the PCM energizes the ASD and fuel pump relays, terminal 87 connects to terminal 30. This is the On position. Terminal 87 supplies voltage to the rest of the circuit.

The following procedure applies to the ASD and fuel pump relays.

- (1) Remove relay from connector before testing.
- (2) With the relay removed from the vehicle, use an ohmmeter to check the resistance between terminals 85 and 86. The resistance should be 75 ohms +/- 5 ohms.
- (3) Connect the ohmmeter between terminals 30 and 87A. The ohmmeter should show continuity between terminals 30 and 87A.

AUTO SHUT DOWN RELAY (Continued)

(4) Connect the ohmmeter between terminals 87 and 30. The ohmmeter should not show continuity at this time.

(5) Connect one end of a jumper wire (16 gauge or smaller) to relay terminal 85. Connect the other end of the jumper wire to the ground side of a 12 volt power source.

(6) Connect one end of another jumper wire (16 gauge or smaller) to the power side of the 12 volt power source. **Do not attach the other end of the jumper wire to the relay at this time.**

WARNING: DO NOT ALLOW OHMMETER TO CONTACT TERMINALS 85 OR 86 DURING THIS TEST. DAMAGE TO OHMMETER MAY RESULT.

(7) Attach the other end of the jumper wire to relay terminal 86. This activates the relay. The ohmmeter should now show continuity between relay terminals 87 and 30. The ohmmeter should not show continuity between relay terminals 87A and 30.

(8) Disconnect jumper wires.

(9) Replace the relay if it did not pass the continuity and resistance tests. If the relay passed the tests, it operates properly. Check the remainder of the ASD and fuel pump relay circuits. Refer to 8, Wiring Diagrams.

REMOVAL

The ASD relay is located in the Power Distribution Center (PDC) (Fig. 4). Refer to label on PDC cover for relay location.

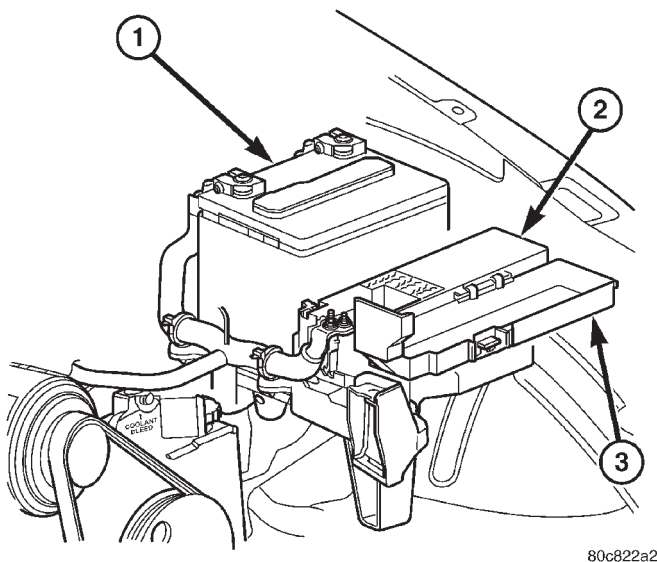


Fig. 4 POWER DISTRIBUTION CENTER (PDC)

- 1 - BATTERY
- 2 - PDC
- 3 - PDC COVER

- (1) Remove PDC cover.
- (2) Remove relay from PDC.
- (3) Check condition of relay terminals and PDC connector terminals for damage or corrosion. Repair if necessary before installing relay.
- (4) Check for pin height (pin height should be the same for all terminals within the PDC connector). Repair if necessary before installing relay.

INSTALLATION

The ASD relay is located in the Power Distribution Center (PDC). Refer to label on PDC cover for relay location.

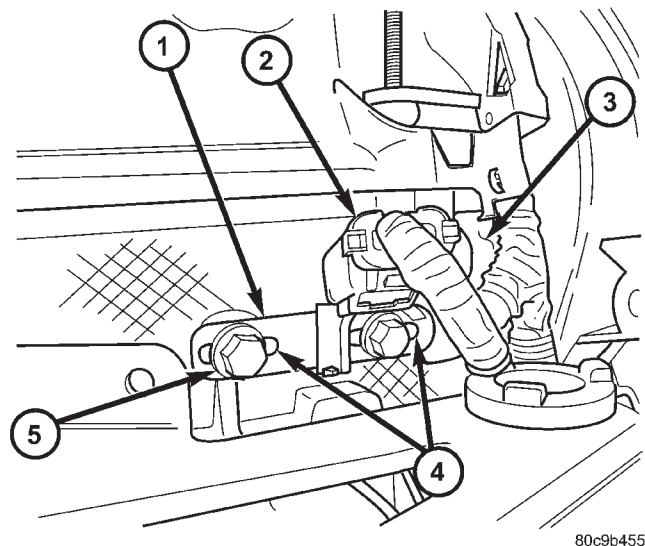
- (1) Install relay to PDC.
- (2) Install cover to PDC.

CAMSHAFT POSITION SENSOR

DESCRIPTION

DESCRIPTION - 2.4L

The Camshaft Position Sensor (CMP) on the 2.4L 4-cylinder engine is bolted to the right-front side of the cylinder head (Fig. 5).



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Fig. 5 CMP LOCATION - 2.4L

- 1 - CMP SENSOR
- 2 - ELECTRICAL CONNECTOR
- 3 -
- 4 - SLOTTED HOLES
- 5 - MOUNTING BOLTS (2)

CAMSHAFT POSITION SENSOR (Continued)

DESCRIPTION-3.7L

The Camshaft Position Sensor (CMP) on the 3.7L 6-cylinder engine is bolted to the right-front side of the right cylinder head (Fig. 6).

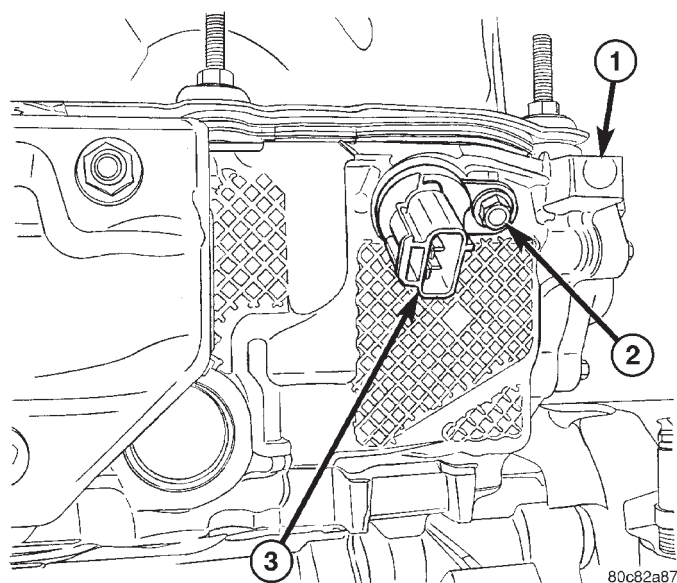


Fig. 6 CAMSHAFT POSITION SENSOR - 3.7L

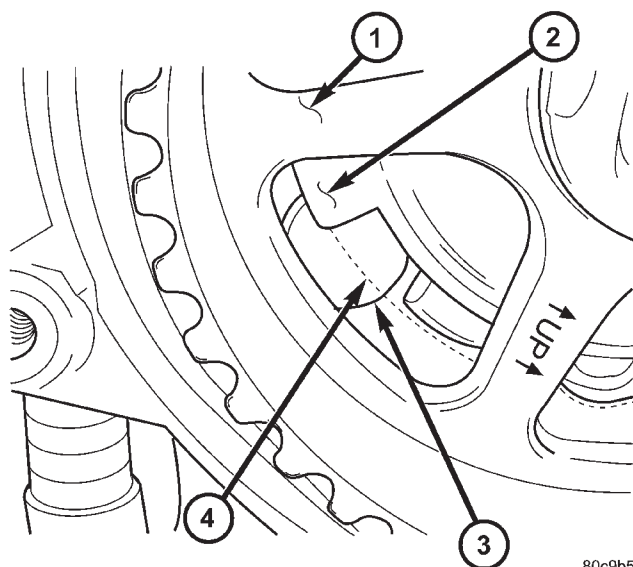
- 1 - RIGHT/FRONT OF RIGHT CYLINDER HEAD
- 2 - CMP MOUNTING BOLT
- 3 - CMP LOCATION

OPERATION**OPERATION - 2.4L**

The Camshaft Position Sensor (CMP) sensor contains a hall effect device referred to as a sync signal generator. A rotating target wheel (tonewheel) for the CMP is located behind the exhaust valve-camshaft drive gear (Fig. 7). The target wheel is equipped with a cutout (notch) around 180 degrees of the wheel. The CMP detects this cutout every 180 degrees of camshaft gear rotation. Its signal is used in conjunction with the Crankshaft Position Sensor (CKP) to differentiate between fuel injection and spark events. It is also used to synchronize the fuel injectors with their respective cylinders.

When the leading edge of the target wheel cutout enters the tip of the CMP, the interruption of magnetic field causes the voltage to switch high, resulting in a sync signal of approximately 5 volts.

When the trailing edge of the target wheel cutout leaves the tip of the CMP, the change of the magnetic field causes the sync signal voltage to switch low to 0 volts.



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Fig. 7 CMP FACE AT TARGET WHEEL-2.4L

- 1 - CAMSHAFT DRIVE GEAR
- 2 - TARGETWHEEL (TONEWHEEL)
- 3 - FACE OF CMP SENSOR
- 4 - CUTOUT (NOTCH)

OPERATION - 3.7L

The Camshaft Position Sensor (CMP) sensor contains a hall effect device referred to as a sync signal generator. A rotating target wheel (tonewheel) for the CMP is located at the front of the camshaft for the right cylinder head (Fig. 8). This sync signal generator detects notches located on a tonewheel. As the tonewheel rotates, the notches pass through the sync signal generator. The signal from the CMP sensor is used in conjunction with the Crankshaft Position Sensor (CKP) to differentiate between fuel injection and spark events. It is also used to synchronize the fuel injectors with their respective cylinders.

When the leading edge of the tonewheel notch enters the tip of the CMP, the interruption of magnetic field causes the voltage to switch high, resulting in a sync signal of approximately 5 volts.

When the trailing edge of the tonewheel notch leaves the tip of the CMP, the change of the magnetic field causes the sync signal voltage to switch low to 0 volts.

CAMSHAFT POSITION SENSOR (Continued)

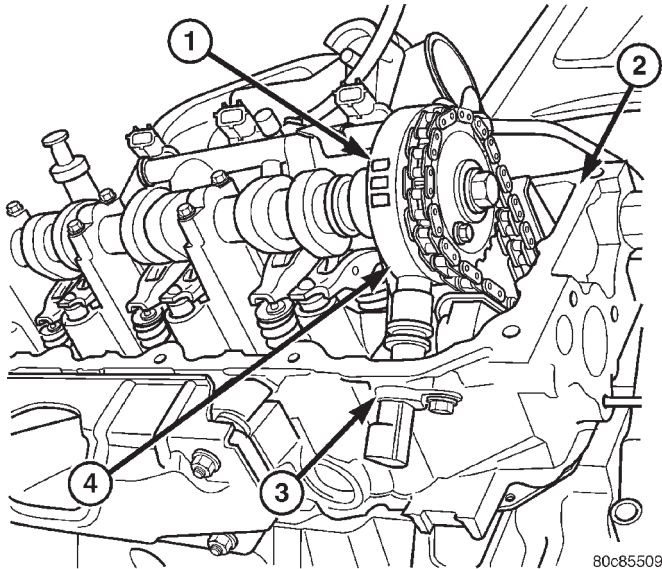


Fig. 8 CAMSHAFT POSITION SENSOR LOCATION - 3.7L

- 1 - NOTCHES
- 2 - RIGHT CYLINDER HEAD
- 3 - CMP
- 4 - TONEWHEEL (TARGET WHEEL)

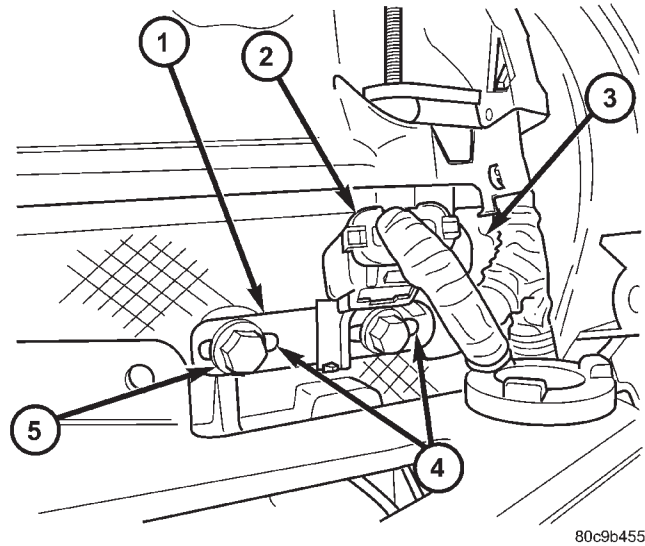


Fig. 9 CMP LOCATION - 2.4L

- 1 - CMP SENSOR
- 2 - ELECTRICAL CONNECTOR
- 3 - SLOTTED HOLES
- 4 - MOUNTING BOLTS (2)
- 5 - MOUNTING BOLTS (2)

REMOVAL

2.4L

The Camshaft Position Sensor (CMP) on the 2.4L 4-cylinder engine is bolted to the right-front side of the cylinder head (Fig. 9). Sensor position (depth) is adjustable.

- (1) Disconnect electrical connector at CMP sensor.
- (2) Remove 2 sensor mounting bolts.
- (3) Remove sensor from cylinder head by sliding towards rear of engine.

3.7L

The Camshaft Position Sensor (CMP) on the 3.7L V-6 engine is bolted to the front/top of the right cylinder head (Fig. 10).

- (1) Disconnect electrical connector at CMP sensor.
- (2) Remove sensor mounting bolt (Fig. 10).
- (3) Carefully remove sensor from cylinder head in a rocking and twisting action. Twisting sensor eases removal.
- (4) Check condition of sensor o-ring.

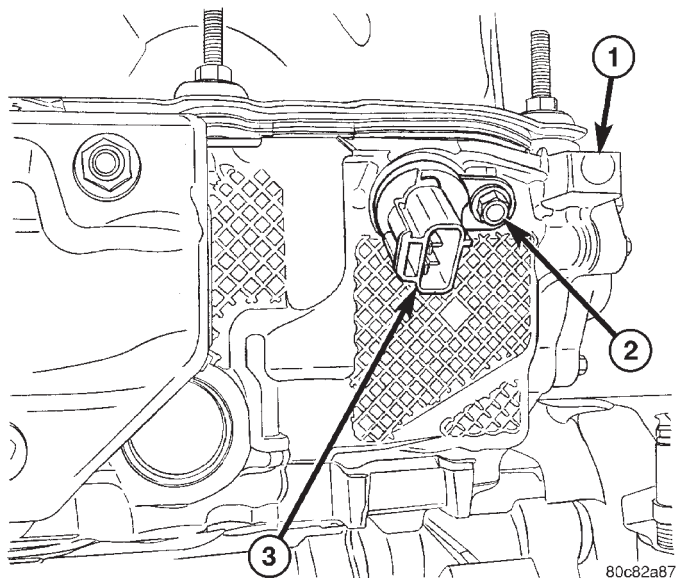


Fig. 10 CAMSHAFT POSITION SENSOR (CMP) - 3.7L

- 1 - RIGHT/FRONT OF RIGHT CYLINDER HEAD
- 2 - CMP MOUNTING BOLT
- 3 - CMP LOCATION

CAMSHAFT POSITION SENSOR (Continued)

INSTALLATION

2.4L

The Camshaft Position Sensor (CMP) on the 2.4L 4-cylinder engine is bolted to the right-front side of the cylinder head. **Sensor position (depth) is adjustable.**

(1) Remove plastic, upper timing belt cover (timing gear cover) (Fig. 11) by removing 3 bolts. Before attempting to remove cover, remove electrical connector from Engine Coolant Temperature (ECT) sensor (Fig. 11). This will prevent damage to sensor.

(2) Rotate (bump over) engine until camshaft timing gear and target wheel (tonewheel) are positioned and aligned to face of sensor as shown in (Fig. 12). **If not positioned as shown in (Fig. 12), damage to both sensor and target wheel will occur when attempting to start engine. Face of sensor MUST be behind target wheel while adjusting.**

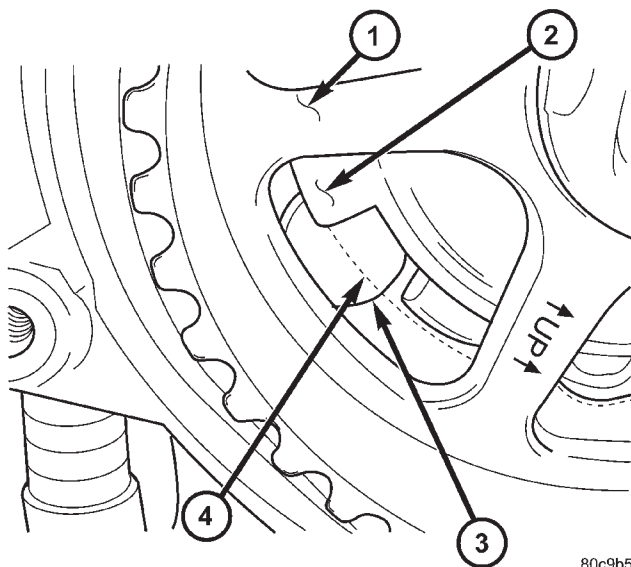
(3) Position sensor to cylinder head and install 2 sensor mounting bolts finger tight.

(4) **SENSOR AIR GAP: .030"** Set air gap between rear of target wheel and face of sensor to .030". This can best be accomplished using an L-shaped, wire-type spark plug gapping gauge (Fig. 13). A piece of .030" brass shim stock may also be used.

(5) Gently push sensor forward until it contacts gapping gauge. **Do not push hard on sensor.** Tighten 2 sensor mounting bolts. Refer to torque specifications.

CAUTION: After tightening sensor mounting bolts, recheck air gap and adjust as necessary. Retorque bolts.

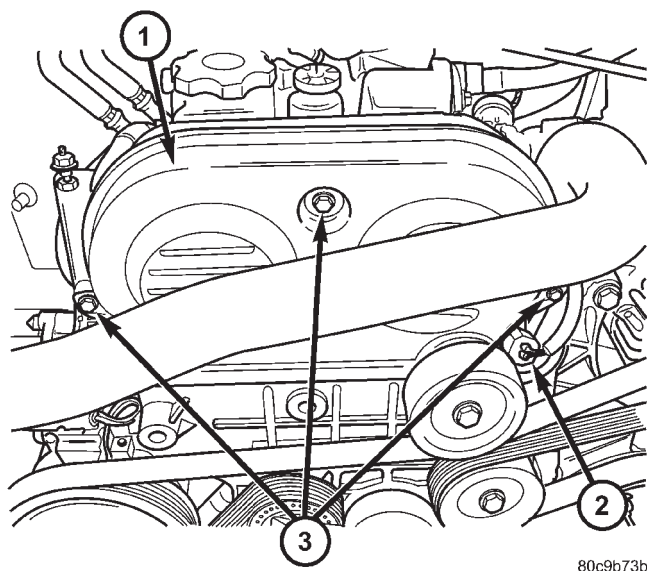
- (6) Install upper timing belt cover and 3 bolts.
- (7) Connect electrical connector to ECT sensor.
- (8) Connect electrical connector to CMP sensor.



80c9b582

Fig. 12 CMP FACE AT TARGET WHEEL-2.4L

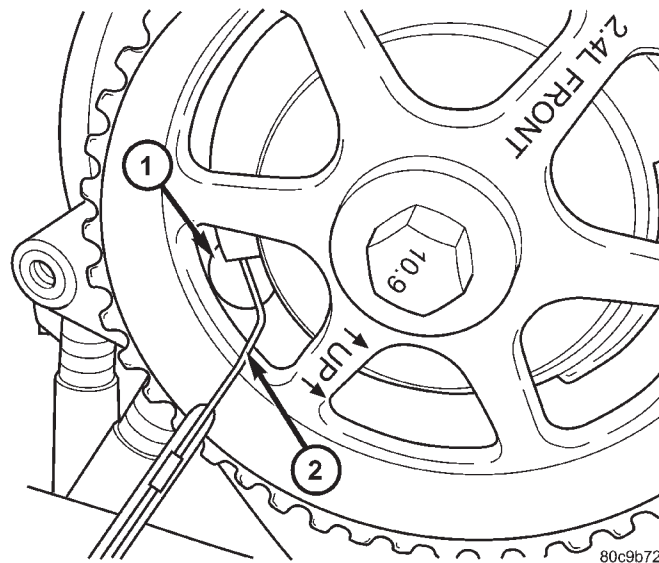
- 1 - CAMSHAFT DRIVE GEAR
- 2 - TARGETWHEEL (TONEWHEEL)
- 3 - FACE OF CMP SENSOR
- 4 - CUTOUT (NOTCH)



80c9b73b

Fig. 11 UPPER TIMING BELT COVER/BOLTS-2.4L

- 1 - UPPER TIMING BELT COVER
- 2 - ELECTRICAL CONNECTOR (ECT)
- 3 - MOUNTING BOLTS (3)



80c9b72f

Fig. 13 CMP ADJUSTMENT - 2.4L

- 1 - FACE OF SENSOR
- 2 - WIRE GAPPING TOOL

CAMSHAFT POSITION SENSOR (Continued)

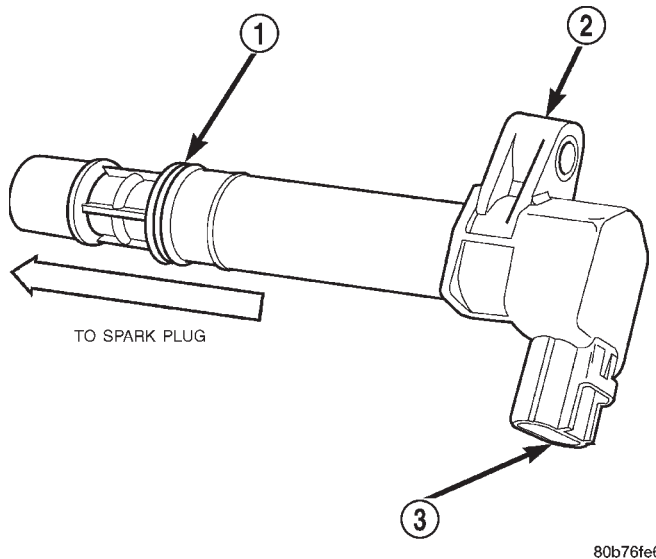
3.7L

The Camshaft Position Sensor (CMP) on the 3.7L V-6 engine is bolted to the front/top of the right cylinder head.

- (1) Clean out machined hole in cylinder head.
- (2) Apply a small amount of engine oil to sensor o-ring.
- (3) Install sensor into cylinder head with a slight rocking and twisting action.

CAUTION: Before tightening sensor mounting bolt, be sure sensor is completely flush to cylinder head. If sensor is not flush, damage to sensor mounting tang may result.

- (4) Install mounting bolt and tighten. Refer to torque specifications.
- (5) Connect electrical connector to sensor.



80b76fe6

Fig. 15 IGNITION COIL - 3.7L

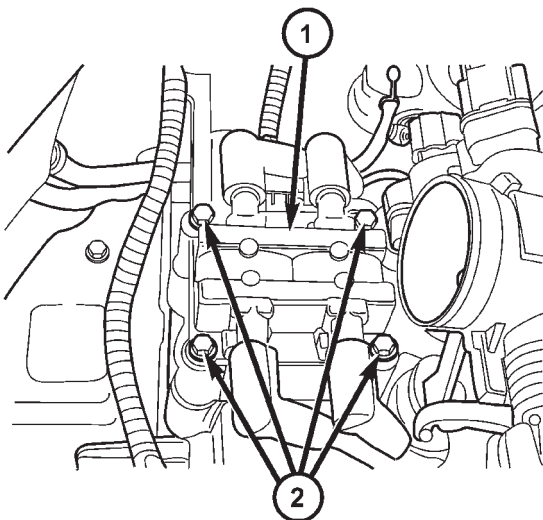
- 1 - O-RING
2 - IGNITION COIL
3 - ELECTRICAL CONNECTOR

IGNITION COIL

DESCRIPTION

2.4L

The coil assembly consists of 2 different coils molded together. The assembly is mounted to the top of the engine (Fig. 14).



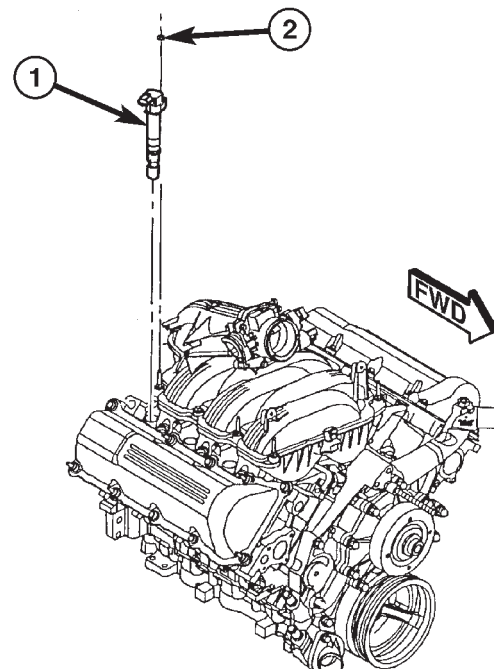
80c9d64f

Fig. 14 IGNITION COIL - 2.4L

- 1 - IGNITION COIL
2 - MOUNTING BOLTS (4)

3.7L

The 3.7L V-6 engine uses 6 dedicated, and individually fired coil for each spark plug (Fig. 15). Each coil is mounted directly into the cylinder head and onto the top of each spark plug (Fig. 16).



80cea309

Fig. 16 IGNITION COIL LOCATION - 3.7L

- 1 - IGNITION COIL
2 - COIL MOUNTING NUT

OPERATION

2.4L

The coil fires two spark plugs simultaneously. One plug is under compression, the other plug fires on the exhaust stroke (lost spark). Coil number one fires

IGNITION COIL (Continued)

cylinders 1 and 4, and coil number two fires cylinders 2 and 3.

The Auto Shutdown (ASD) relay provides battery voltage to the ignition coil. The PCM provides a ground contact (circuit) for energizing the coil(s). The PCM will de-energize the ASD relay if it does not receive the crankshaft position sensor and camshaft position sensor inputs.

Base ignition timing is not adjustable. By controlling the coil ground circuit, the PCM is able to set the base timing and adjust the ignition timing advance. This is done to meet changing engine operating conditions.

The ignition coil is not oil filled. The windings are embedded in an epoxy compound. This provides heat and vibration resistance that allows the ignition coil to be mounted on the engine.

Spark plug cables (secondary wires or cables) are used with the 2.4L engine.

3.7L

Battery voltage is supplied to the 6 ignition coils from the ASD relay. The Powertrain Control Module (PCM) opens and closes each ignition coil ground circuit at a determined time for ignition coil operation.

Base ignition timing is not adjustable. By controlling the coil ground circuit, the PCM is able to set the base timing and adjust the ignition timing advance. This is done to meet changing engine operating conditions.

The ignition coil is not oil filled. The windings are embedded in an epoxy compound. This provides heat and vibration resistance that allows the ignition coil to be mounted on the engine.

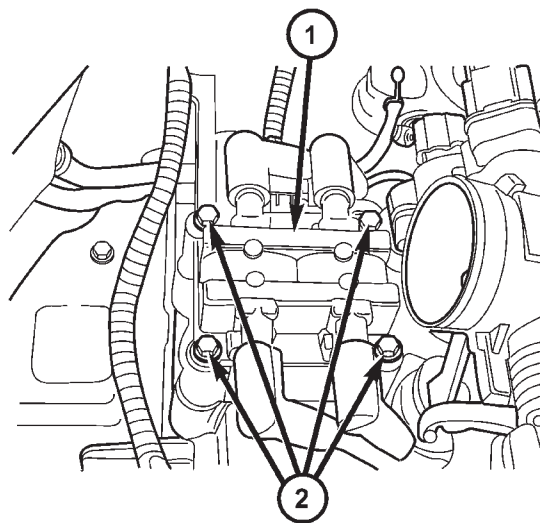
Because of coil design, spark plug cables (secondary cables) are not used with the 3.7L engine.

REMOVAL**2.4L**

- (1) Disconnect electrical connector at rear of coil.
- (2) Remove all secondary cables from coil.
- (3) Remove 4 coil mounting bolts (Fig. 17).
- (4) Remove coil from vehicle.

3.7L

An individual ignition coil is used for each spark plug (Fig. 19). The coil fits into machined holes in the cylinder head. A mounting stud/nut secures each coil to the top of the intake manifold (Fig. 18). The bottom of the coil is equipped with a rubber boot to seal the spark plug to the coil. Inside each rubber boot is a spring. The spring is used for a mechanical contact between the coil and the top of the spark plug. These rubber boots and springs are a permanent part of the coil and are not serviced separately. An o-ring (Fig.



80c9d64f

Fig. 17 IGNITION COIL - 2.4L

- 1 - IGNITION COIL
- 2 - MOUNTING BOLTS (4)

19) is used to seal the coil at the opening into the cylinder head.

(1) Depending on which coil is being removed, the throttle body air intake tube or intake box may need to be removed to gain access to coil.

(2) Disconnect electrical connector from coil by pushing downward on release lock on top of connector and pull connector from coil.

(3) Clean area at base of coil with compressed air before removal.

(4) Remove coil mounting nut from mounting stud (Fig. 18).

(5) Carefully pull up coil from cylinder head opening with a slight twisting action.

(6) Remove coil from vehicle.

INSTALLATION**2.4L**

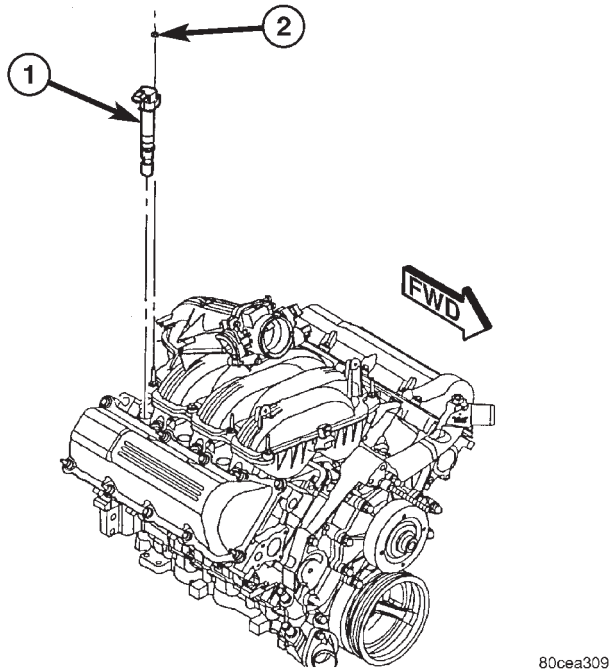
- (1) Position coil to engine.
- (2) Install 4 mounting bolts. Refer to torque specifications.
- (3) Install secondary cables.
- (4) Install electrical connector at rear of coil.
- (5) Install air cleaner tube and housing.

3.7L

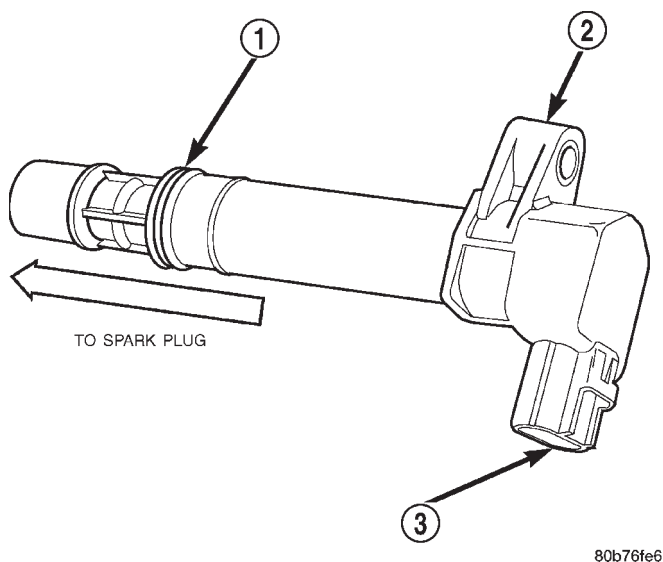
(1) Using compressed air, blow out any dirt or contaminants from around top of spark plug.

(2) Check condition of coil o-ring and replace as necessary. To aid in coil installation, apply silicone to coil o-ring.

IGNITION COIL (Continued)

**Fig. 18 IGNITION COIL LOCATION - 3.7L**

- 1 - IGNITION COIL
2 - COIL MOUNTING NUT

**Fig. 19 IGNITION COIL - 3.7L**

- 1 - O-RING
2 - IGNITION COIL
3 - ELECTRICAL CONNECTOR

(3) Position ignition coil into cylinder head opening and push onto spark plug. Do this while guiding coil base over mounting stud.

(4) Install coil mounting stud nut. Refer to torque specifications.

(5) Connect electrical connector to coil by snapping into position.

(6) If necessary, install throttle body air tube or box.

KNOCK SENSOR

DESCRIPTION

The 2 knock sensors are bolted into the cylinder block under the intake manifold. The sensors are used only with the 3.7L engine.

OPERATION

Two knock sensors are used on the 3.7L V-6 engine; one for each cylinder bank. When the knock sensor detects a knock in one of the cylinders on the corresponding bank, it sends an input signal to the Powertrain Control Module (PCM). In response, the PCM retards ignition timing for all cylinders by a scheduled amount.

Knock sensors contain a piezoelectric material which constantly vibrates and sends an input voltage (signal) to the PCM while the engine operates. As the intensity of the crystal's vibration increases, the knock sensor output voltage also increases.

The voltage signal produced by the knock sensor increases with the amplitude of vibration. The PCM receives the knock sensor voltage signal as an input. If the signal rises above a predetermined level, the PCM will store that value in memory and retard ignition timing to reduce engine knock. If the knock sensor voltage exceeds a preset value, the PCM retards ignition timing for all cylinders. It is not a selective cylinder retard.

The PCM ignores knock sensor input during engine idle conditions. Once the engine speed exceeds a specified value, knock retard is allowed.

Knock retard uses its own short term and long term memory program.

Long term memory stores previous detonation information in its battery-backed RAM. The maximum authority that long term memory has over timing retard can be calibrated.

Short term memory is allowed to retard timing up to a preset amount under all operating conditions (as long as rpm is above the minimum rpm) except at Wide Open Throttle (WOT). The PCM, using short term memory, can respond quickly to retard timing when engine knock is detected. Short term memory is lost any time the ignition key is turned off.

KNOCK SENSOR (Continued)

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.

REMOVAL

The 2 knock sensors are bolted into the cylinder block under the intake manifold (Fig. 20).

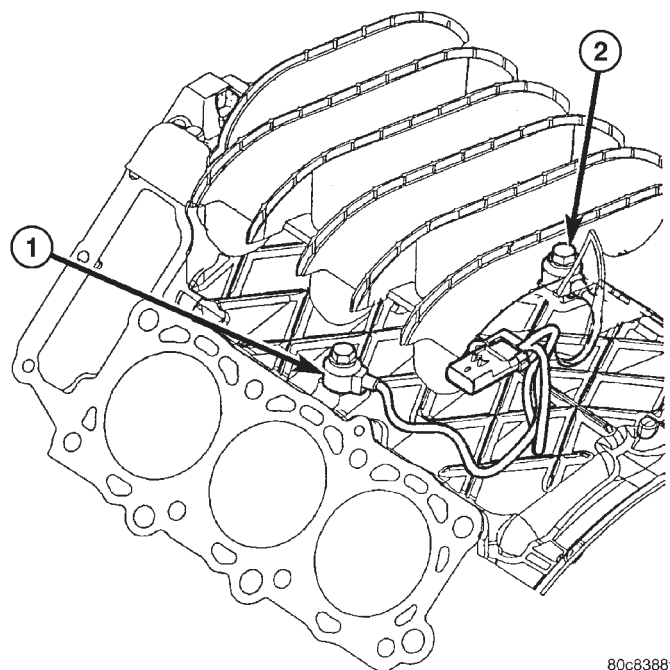
NOTE: The left sensor is identified by an identification tag (LEFT). It is also identified by a larger bolt head. The Powertrain Control Module (PCM) must have and know the correct sensor left/right positions. Do not mix the sensor locations.

(1) Disconnect knock sensor dual pigtail harness from engine wiring harness. this connection is made near rear of left valve cover (Fig. 20).

(2) Remove intake manifold. Refer to Engine section.

(3) Remove sensor mounting bolts (Fig. 20). Note foam strip on bolt threads. This foam is used only to retain the bolts to sensors for plant assembly. It is not used as a sealant. Do not apply any adhesive, sealant or thread locking compound to these bolts.

(4) Remove sensors from engine.



80c8388f

Fig. 20 KNOCK SENSOR LOCATION

- 1 - KNOCK SENSORS (2)
2 - MOUNTING BOLTS

INSTALLATION

NOTE: The left sensor is identified by an identification tag (LEFT). It is also identified by a larger bolt head. The Powertrain Control Module (PCM) must have and know the correct sensor left/right positions. Do not mix the sensor locations.

- (1) Thoroughly clean knock sensor mounting holes.
- (2) Install sensors into cylinder block.

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 for the knock sensor bolt is relatively light for an 8mm bolt.

NOTE: Note foam strip on bolt threads. This foam is used only to retain the bolts to sensors for plant assembly. It is not used as a sealant. Do not apply any adhesive, sealant or thread locking compound to these bolts.

(3) Install and tighten mounting bolts. Refer to torque specification.

(4) Install intake manifold. Refer to Engine section.

(5) Connect knock sensor wiring harness to engine harness at rear of intake manifold.

SPARK PLUG

DESCRIPTION

Resistor type spark plugs are used.

Spark plug resistance values range from 6,000 to 20,000 ohms (when checked with at least a 1000 volt spark plug tester). **Do not use an ohmmeter to check the resistance values of the spark plugs. Inaccurate readings will result.**

OPERATION

To prevent possible pre-ignition and/or mechanical engine damage, the correct type/heat range/number spark plug must be used.

Always use the recommended torque when tightening spark plugs. This is especially true when plugs are equipped with tapered seats. Incorrect torque can distort the spark plug and change plug gap. It can also pull the plug threads and do possible damage to both the spark plug and the cylinder head.

Remove the spark plugs and examine them for burned electrodes and fouled, cracked or broken porcelain insulators. Keep plugs arranged in the order in which they were removed from the engine. A sin-

SPARK PLUG (Continued)

gle plug displaying an abnormal condition indicates that a problem exists in the corresponding cylinder. Replace spark plugs at the intervals recommended in the Lubrication and Maintenance section.

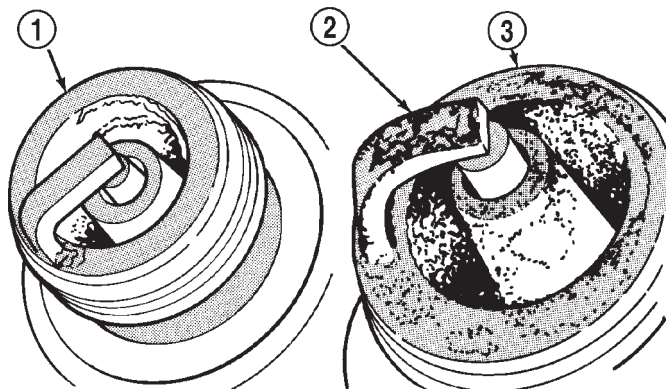
Spark plugs that have low mileage may be cleaned and reused if not otherwise defective, carbon or oil fouled. Also refer to Spark Plug Conditions.

CAUTION: Never use a motorized wire wheel brush to clean the spark plugs. Metallic deposits will remain on the spark plug insulator and will cause plug misfire.

DIAGNOSIS AND TESTING - SPARK PLUG CONDITIONS

NORMAL OPERATING

The few deposits present on the spark plug will probably be light tan or slightly gray in color. This is evident with most grades of commercial gasoline (Fig. 21). There will not be evidence of electrode burning. Gap growth will not average more than approximately 0.025 mm (.001 in) per 3200 km (2000 miles) of operation. Spark plugs that have normal wear can usually be cleaned, have the electrodes filed, have the gap set and then be installed.



J908D-15

Fig. 21 Normal Operation and Cold (Carbon) Fouling

- 1 - NORMAL
- 2 - DRY BLACK DEPOSITS
- 3 - COLD (CARBON) FOULING

Some fuel refiners in several areas of the United States have introduced a manganese additive (MMT) for unleaded fuel. During combustion, fuel with MMT causes the entire tip of the spark plug to be coated with a rust colored deposit. This rust color can be misdiagnosed as being caused by coolant in the com-

bustion chamber. Spark plug performance may be affected by MMT deposits.

COLD FOULING/CARBON FOULING

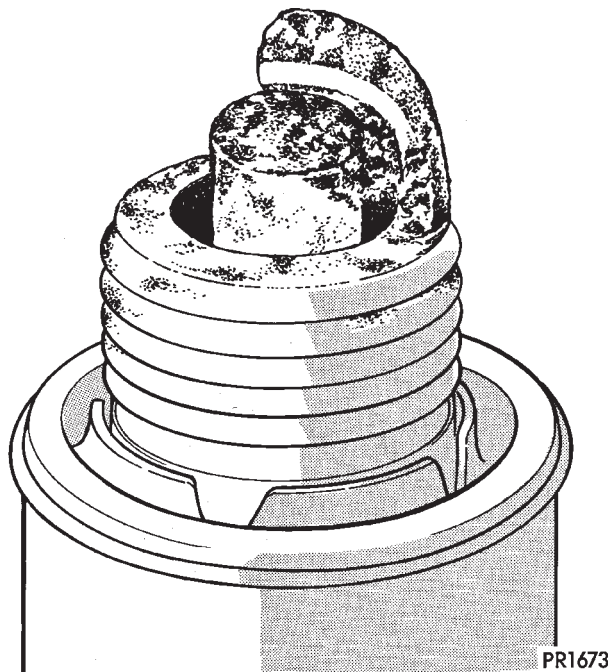
Cold fouling is sometimes referred to as carbon fouling. The deposits that cause cold fouling are basically carbon (Fig. 21). A dry, black deposit on one or two plugs in a set may be caused by sticking valves or defective spark plug cables. Cold (carbon) fouling of the entire set of spark plugs may be caused by a clogged air cleaner element or repeated short operating times (short trips).

WET FOULING OR GAS FOULING

A spark plug coated with excessive wet fuel or oil is wet fouled. In older engines, worn piston rings, leaking valve guide seals or excessive cylinder wear can cause wet fouling. In new or recently overhauled engines, wet fouling may occur before break-in (normal oil control) is achieved. This condition can usually be resolved by cleaning and reinstalling the fouled plugs.

OIL OR ASH ENCRUSTED

If one or more spark plugs are oil or oil ash encrusted (Fig. 22), evaluate engine condition for the cause of oil entry into that particular combustion chamber.



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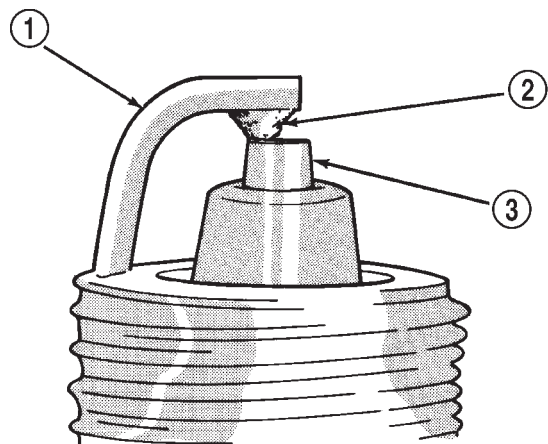
Fig. 22 Oil or Ash Encrusted

ELECTRODE GAP BRIDGING

Electrode gap bridging may be traced to loose deposits in the combustion chamber. These deposits accumulate on the spark plugs during continuous stop-and-go driving. When the engine is suddenly

SPARK PLUG (Continued)

subjected to a high torque load, deposits partially liquefy and bridge the gap between electrodes (Fig. 23). This short circuits the electrodes. Spark plugs with electrode gap bridging can be cleaned using standard procedures.



J908D-11

Fig. 23 Electrode Gap Bridging

- 1 - GROUND ELECTRODE
- 2 - DEPOSITS
- 3 - CENTER ELECTRODE

SCAVENGER DEPOSITS

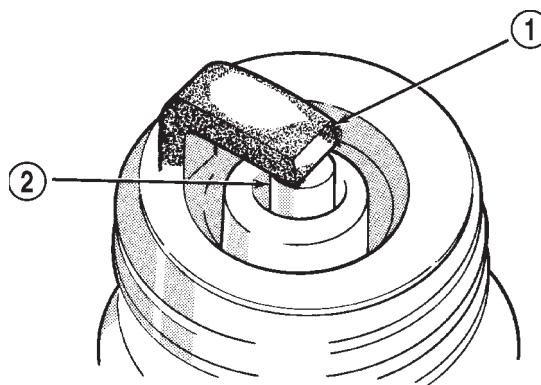
Fuel scavenger deposits may be either white or yellow (Fig. 24). They may appear to be harmful, but this is a normal condition caused by chemical additives in certain fuels. These additives are designed to change the chemical nature of deposits and decrease spark plug misfire tendencies. Notice that accumulation on the ground electrode and shell area may be heavy, but the deposits are easily removed. Spark plugs with scavenger deposits can be considered normal in condition and can be cleaned using standard procedures.

CHIPPED ELECTRODE INSULATOR

A chipped electrode insulator usually results from bending the center electrode while adjusting the spark plug electrode gap. Under certain conditions, severe detonation can also separate the insulator from the center electrode (Fig. 25). Spark plugs with this condition must be replaced.

PREIGNITION DAMAGE

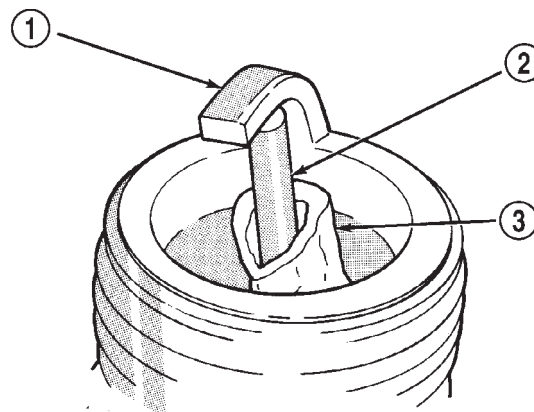
Preignition damage is usually caused by excessive combustion chamber temperature. The center electrode dissolves first and the ground electrode dissolves somewhat latter (Fig. 26). Insulators appear relatively deposit free. Determine if the spark plug has the correct heat range rating for the engine. Determine if ignition timing is over advanced or if other operating conditions are causing engine over-



J908D-12

Fig. 24 Scavenger Deposits

- 1 - GROUND ELECTRODE COVERED WITH WHITE OR YELLOW DEPOSITS
- 2 - CENTER ELECTRODE



J908D-13

Fig. 25 Chipped Electrode Insulator

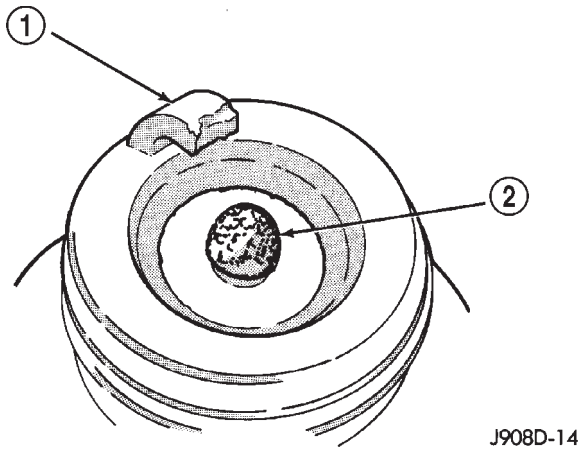
- 1 - GROUND ELECTRODE
- 2 - CENTER ELECTRODE
- 3 - CHIPPED INSULATOR

heating. (The heat range rating refers to the operating temperature of a particular type spark plug. Spark plugs are designed to operate within specific temperature ranges. This depends upon the thickness and length of the center electrodes porcelain insulator.)

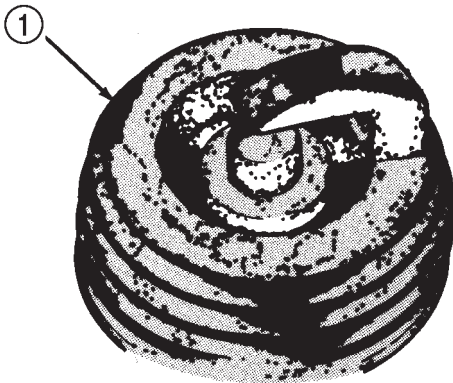
SPARK PLUG OVERHEATING

Overheating is indicated by a white or gray center electrode insulator that also appears blistered (Fig. 27). The increase in electrode gap will be considerably in excess of 0.001 inch per 2000 miles of operation. This suggests that a plug with a cooler heat range rating should be used. Over advanced ignition timing, detonation and cooling system malfunctions can also cause spark plug overheating.

SPARK PLUG (Continued)

**Fig. 26 Preignition Damage**

- 1 - GROUND ELECTRODE STARTING TO DISSOLVE
2 - CENTER ELECTRODE DISSOLVED

**Fig. 27 Spark Plug Overheating**

- 1 - BLISTERED WHITE OR GRAY COLORED INSULATOR

REMOVAL**2.4L**

If spark plug for #2 or #3 cylinder is being removed, throttle body must be removed. Refer to Throttle Body Removal.

- (1) Remove air cleaner tube and housing.
- (2) Twist secondary cable at cylinder head to break loose at spark plug. Remove cable from plug.
- (3) Prior to removing spark plug, spray compressed air into cylinder head opening. This will help prevent foreign material from entering combustion chamber.
- (4) Remove spark plug from cylinder head using a quality socket with a rubber or foam insert.
- (5) Inspect spark plug condition. Refer to Spark Plug Conditions.

3.7L

Each individual spark plug is located under each ignition coil. Each individual ignition coil must be removed to gain access to each spark plug. Refer to Ignition Coil Removal/Installation.

- (1) Prior to removing ignition coil, spray compressed air around coil base at cylinder head.
- (2) Prior to removing spark plug, spray compressed air into cylinder head opening. This will help prevent foreign material from entering combustion chamber.
- (3) Remove spark plug from cylinder head using a quality socket with a rubber or foam insert. Also check condition of ignition coil o-ring and replace as necessary.
- (4) Inspect spark plug condition. Refer to Spark Plug Conditions.

CLEANING SPARK PLUGS

The plugs may be cleaned using commercially available spark plug cleaning equipment. After cleaning, file the center electrode flat with a small point file or jewelers file before adjusting gap.

CAUTION: Never use a motorized wire wheel brush to clean the spark plugs. Metallic deposits will remain on the spark plug insulator and will cause plug misfire.

INSTALLATION**2.4L**

CAUTION: Spark plug tightening on the 2.4L is torque critical. The plugs are equipped with tapered seats. Do not exceed 15 ft. lbs. torque.

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.

Always tighten spark plugs to the specified torque. Over tightening can cause distortion resulting in a change in the spark plug gap or a cracked porcelain insulator.

- (1) Start the spark plug into the cylinder head by hand to avoid cross threading.
- (2) Tighten spark plugs. Refer to torque specifications.
- (3) Install throttle body. Refer to Throttle Body Installation.
- (4) Install air cleaner tube and housing.

3.7L

Special care should be taken when installing spark plugs into the cylinder head spark plug wells. Be

SPARK PLUG (Continued)

sure the plugs do not drop into the plug wells as electrodes can be damaged.

Always tighten spark plugs to the specified torque. Over tightening can cause distortion resulting in a change in the spark plug gap or a cracked porcelain insulator.

(1) Start the spark plug into the cylinder head by hand to avoid cross threading.

(2) Tighten spark plugs. Refer to torque specifications.

(3) Before installing coil(s), check condition of coil o-ring and replace as necessary. To aid in coil installation, apply silicone to coil o-ring.

(4) Install ignition coil(s). Refer to Ignition Coil Removal/Installation.

IGNITION COIL CAPACITOR

DESCRIPTION

One coil capacitor is used. It is located in the engine compartment and attached (clipped) to a wiring trough near the brake power booster.

OPERATION

The coil capacitor(s) help dampen the amount of conducted electrical noise to the camshaft position sensor, crankshaft position sensor, and throttle position sensor. This noise is generated on the 12V supply wire to the ignition coils and fuel injectors.

REMOVAL

The coil capacitor is located in the engine compartment and is attached (clipped) to a wiring harness trough near the brake power booster (graphic not available).

(1) Unclip capacitor from wiring harness trough.

(2) Disconnect electrical connector at capacitor.

INSTALLATION

(1) Connect electrical connector to coil capacitor.

(2) Position capacitor into v-clip on wiring harness trough.

INSTRUMENT CLUSTER

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INSTRUMENT CLUSTER

DESCRIPTION

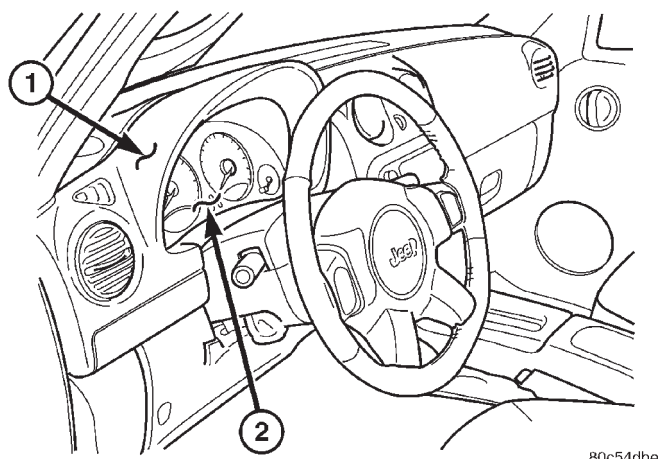


Fig. 1 Instrument Cluster

- 1 - INSTRUMENT PANEL
2 - INSTRUMENT CLUSTER

The instrument cluster for this model is an ElectroMechanical Instrument Cluster (EMIC) module that is located in the instrument panel above the steering column opening, directly in front of the driver (Fig. 1). The remainder of the EMIC, including the mounts and the electrical connections, are concealed behind the cluster bezel. The EMIC gauges and indicators are protected by an integral clear plastic cluster lens, and are visible through a dedicated opening in the cluster bezel on the instrument panel. Just behind the cluster lens is the cluster hood and an integral cluster mask, which are constructed of molded black plastic. Two cluster masks are used; a base black version is used on base models, while a premium black version features a chrome trim ring around the perimeter of each gauge opening is used on premium models. The cluster hood serves as a visor and shields the face of the cluster from ambient light and reflections to reduce glare, while the cluster mask serves to separate and define the individual gauges and indicators of the EMIC. On the lower edge of the cluster lens just right of the speedometer, the black plastic odometer/trip odometer switch button protrudes through dedicated holes in the cluster

mask and the cluster lens. The molded plastic EMIC lens, hood and mask unit has three integral mounting tabs, one each on the lower outboard corners of the unit and one on the upper surface of the hood near the center. These mounting tabs are used to secure the EMIC to the molded plastic instrument panel cluster carrier with two screws at the top, and one screw at each outboard tab. A single molded connector receptacle located on the EMIC electronic circuit board is accessed from the back of the cluster housing and is connected to the vehicle electrical system through a single dedicated take out and connector of the instrument panel wire harness.

Behind the cluster lens, hood, and mask unit is the cluster overlay and gauges. The overlay is a laminated plastic unit. The dark, visible, outer surface of the overlay is marked with all of the gauge dial faces and graduations, but this layer is also translucent. The darkness of this outer layer prevents the cluster from appearing cluttered or busy by concealing the cluster indicators that are not illuminated, while the translucence of this layer allows those indicators and icons that are illuminated to be readily visible. The underlying layer of the overlay is opaque and allows light from the various indicators and illumination lamps behind it to be visible through the outer layer of the overlay only through predetermined cutouts. The orange gauge pointers are each illuminated internally. The EMIC electronic circuitry is protected by a molded plastic rear cover that features several round access holes for service of the cluster illumination lighting and a single rectangular access hole for the EMIC connector receptacle. The EMIC housing, circuit board, gauges, and overlay unit are sandwiched between the lens, hood, and mask unit and the rear cover with screws.

Twelve versions of the EMIC module are offered on this model, six base and six premium. These versions accommodate all of the variations of optional equipment and regulatory requirements for the various markets in which the vehicle will be offered. This module utilizes integrated circuitry and information carried on the Programmable Communications Interface (PCI) data bus network for control of all gauges and many of the indicators. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/COMMUNICATION - DESCRIPTION - PCI BUS). The EMIC also uses several hard wired inputs in order to

INSTRUMENT CLUSTER (Continued)

perform its many functions. The EMIC module incorporates a blue-green digital Vacuum Fluorescent Display (VFD) for displaying odometer and trip odometer information, as well as several warning messages and certain diagnostic information. In addition to instrumentation and indicators, the EMIC has the hardware and software needed to provide the following features:

- **Chime Warning Service** - A chime tone generator on the EMIC electronic circuit board provides audible alerts to the vehicle operator and eliminates the need for a separate chime module. (Refer to 8 - ELECTRICAL/CHIME WARNING SYSTEM - DESCRIPTION).

- **Panel Lamps Dimming Service** - The EMIC provides a hard wired 12-volt Pulse-Width Modulated (PWM) output that synchronizes the dimming level of the radio display, gear selector indicator, heater-air conditioner control, and all other dimmable lighting on the panel lamps dimmer circuit with that of the cluster illumination lamps and VFD.

The EMIC houses four analog gauges and has provisions for up to twenty-four indicators (Fig. 2). The EMIC includes the following analog gauges:

- **Coolant Temperature Gauge**
- **Fuel Gauge**
- **Speedometer**
- **Tachometer**

Some of the EMIC indicators are automatically configured when the EMIC is connected to the vehicle electrical system for compatibility with certain optional equipment or equipment required for regulatory purposes in certain markets. While each EMIC may have provisions for indicators to support every available option, the configurable indicators will not be functional in a vehicle that does not have the equipment that an indicator supports. The EMIC includes provisions for the following indicators (Fig. 2):

- **Airbag Indicator (with Airbag System only)**
- **Antilock Brake System (ABS) Indicator (with ABS only)**
- **Brake Indicator**
- **Charging Indicator**
- **Coolant Low Indicator (with Diesel Engine only)**
- **Cruise Indicator (with Speed Control System only)**
- **Four-Wheel Drive Full Time Indicator (with Selec-Trac Transfer Case only)**
- **Four-Wheel Drive Low Mode Indicator**
- **Four-Wheel Drive Part Time Indicator**
- **Front Fog Lamp Indicator (with Front Fog Lamps only)**
- **High Beam Indicator**
- **Low Fuel Indicator**

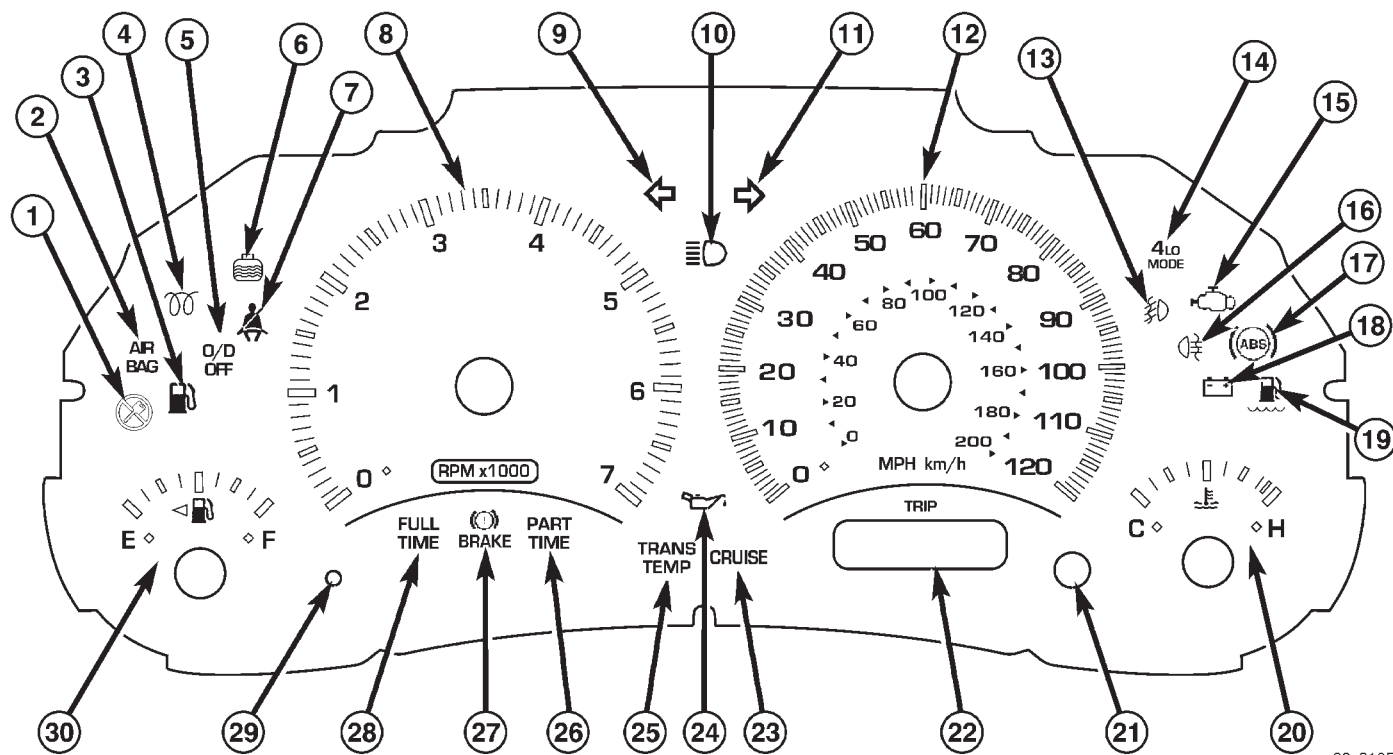
- **Low Oil Pressure Indicator**
- **Malfunction Indicator Lamp (MIL)**
- **Overdrive-Off Indicator (with Automatic Transmission only)**
- **Rear Fog Lamp Indicator (with Rear Fog Lamps only)**
- **Seatbelt Indicator**
- **Security Indicator (with Vehicle Theft Security System only)**
- **Sentry Key Immobilizer System (SKIS) Indicator (with SKIS only)**
- **Transmission Overtemp Indicator (with Automatic Transmission only)**
- **Turn Signal (Right and Left) Indicators**
- **Wait-To-Start Indicator (with Diesel Engine only)**
- **Water-In-Fuel Indicator (with Diesel Engine only)**

Each indicator in the EMIC is illuminated by a dedicated Light Emitting Diode (LED) that is soldered onto the EMIC electronic circuit board. The LEDs are not available for service replacement and, if damaged or faulty, the entire EMIC must be replaced. Cluster illumination is accomplished by dimmable incandescent back lighting, which illuminates the gauges for visibility when the exterior lighting is turned on. Each of the incandescent bulbs is secured by an integral bulb holder to the electronic circuit board from the back of the cluster housing. The incandescent bulb/bulb holder units are available for service replacement.

Hard wired circuitry connects the EMIC 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 EMIC 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 EMIC modules for this model are serviced only as complete units. The EMIC module cannot be adjusted or repaired. If a gauge, an LED indicator, the VFD, the electronic circuit board, the circuit board hardware, the cluster overlay, or the EMIC housing are damaged or faulty, the entire EMIC module must be replaced. The cluster lens, hood and mask unit and the individual incandescent lamp bulbs with holders are available for service replacement.

INSTRUMENT CLUSTER (Continued)



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Fig. 2 EMIC Gauges & Indicators

- | | |
|---------------------------------------|---|
| 1 - SKIS INDICATOR | 16 - REAR FOG LAMP INDICATOR |
| 2 - AIRBAG INDICATOR | 17 - ABS INDICATOR |
| 3 - LOW FUEL INDICATOR | 18 - CHARGING INDICATOR |
| 4 - WAIT-TO-START INDICATOR | 19 - WATER-IN-FUEL INDICATOR |
| 5 - OVERDRIVE-OFF INDICATOR | 20 - ENGINE TEMPERATURE GAUGE |
| 6 - COOLANT LOW INDICATOR | 21 - ODOMETER/TRIP ODOMETER SWITCH BUTTON |
| 7 - SEATBELT INDICATOR | 22 - ODOMETER/TRIP ODOMETER DISPLAY |
| 8 - TACHOMETER | 23 - CRUISE INDICATOR |
| 9 - LEFT TURN INDICATOR | 24 - LOW OIL PRESSURE INDICATOR |
| 10 - HIGH BEAM INDICATOR | 25 - TRANSMISSION OVERTEMP INDICATOR |
| 11 - RIGHT TURN INDICATOR | 26 - PART TIME 4WD INDICATOR |
| 12 - SPEEDOMETER | 27 - BRAKE INDICATOR |
| 13 - FRONT FOG LAMP INDICATOR | 28 - FULL TIME 4WD INDICATOR |
| 14 - 4WD LOW MODE INDICATOR | 29 - SECURITY INDICATOR |
| 15 - MALFUNCTION INDICATOR LAMP (MIL) | 30 - FUEL GAUGE |

OPERATION

The ElectroMechanical Instrument Cluster (EMIC) is designed to allow the vehicle operator to monitor the conditions of many of the vehicle components and operating systems. The gauges and indicators in the EMIC provide valuable information about the various standard and optional powertrains, fuel and emissions systems, cooling systems, lighting systems, safety systems and many other convenience items. The EMIC is installed in the instrument panel so that all of these monitors can be easily viewed by the vehicle operator when driving, while still allowing relative ease of access for service. The microproces-

sor-based EMIC hardware and software uses various inputs to control the gauges and indicators visible on the face of the cluster. Some of these inputs are hard wired, but most are in the form of electronic messages that are transmitted by other electronic modules over the Programmable Communications Interface (PCI) data bus network. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/COMMUNICATION - OPERATION).

The EMIC microprocessor smooths the input data using algorithms to provide gauge readings that are accurate, stable and responsive to operating conditions. These algorithms are designed to provide

INSTRUMENT CLUSTER (Continued)

gauge readings during normal operation that are consistent with customer expectations. However, when abnormal conditions exist such as high coolant temperature, the algorithm can drive the gauge pointer to an extreme position and the microprocessor can sound a chime through the on-board chime tone generator to provide distinct visual and audible indications of a problem to the vehicle operator. The instrument cluster circuitry may also perform chime service for other electronic modules in the vehicle based upon electronic chime tone request messages received over the PCI data bus to provide the vehicle operator with an audible alert to supplement a visual indication. One such alert is a door ajar warning chime, which the EMIC provides by monitoring PCI bus messages from the Body Control Module (BCM).

The EMIC circuitry operates on battery current received through a fused B(+) fuse in the Junction Block (JB) on a non-switched fused B(+) circuit, and on battery current received through a fused ignition switch output (run-start) fuse in the JB on a fused ignition switch output (run-start) circuit. This arrangement allows the EMIC to provide some features regardless of the ignition switch position, while other features will operate only with the ignition switch in the On or Start positions. The EMIC receives a ground input from the BCM as a wake-up signal in order to provide the ignition-off features. The EMIC circuitry is grounded through a ground circuit and take out of the instrument panel wire harness with an eyelet terminal connector that is secured by a nut to a ground stud located on the left instrument panel end bracket.

The EMIC also has a self-diagnostic actuator test capability, which will test each of the PCI bus message-controlled functions of the cluster by lighting the appropriate indicators (except the airbag indicator), sweeping the gauge needles to several calibration points across the gauge faces, and stepping the odometer display sequentially from all ones through all nines. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). See the owner's manual in the vehicle glove box for more information on the features, use and operation of the EMIC.

GAUGES All gauges receive battery current through the EMIC circuitry when the ignition switch is in the On or Start positions. With the ignition switch in the Off position battery current is not supplied to any gauges, and the EMIC circuitry is programmed to move all of the gauge needles back to the low end of their respective scales. Therefore, the gauges do not accurately indicate any vehicle condition unless the ignition switch is in the On or Start positions. All of the EMIC gauges, except the odometer, are air core magnetic units. Two fixed electro-

magnetic coils are located within each gauge. These coils are wrapped at right angles to each other around a movable permanent magnet. The movable magnet is suspended within the coils on one end of a pivot shaft, while the gauge needle is attached to the other end of the shaft. One of the coils has a fixed current flowing through it to maintain a constant magnetic field strength. Current flow through the second coil changes, which causes changes in its magnetic field strength. The current flowing through the second coil is changed by the EMIC circuitry in response to messages received over the PCI data bus. The gauge needle moves as the movable permanent magnet aligns itself to the changing magnetic fields created around it by the electromagnets.

The gauges are diagnosed using the EMIC self-diagnostic actuator test. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). Proper testing of the PCI data bus and the electronic data bus message inputs to the EMIC that control each gauge require the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information. Specific operation details for each gauge may be found elsewhere in this service information.

VACUUM-FLUORESCENT DISPLAY The Vacuum-Fluorescent Display (VFD) module is soldered to the EMIC circuit board. The display is active when the driver door is opened with the ignition switch in the Off or Accessory positions (Rental Car mode), and with the ignition switch in the On or Start positions. The VFD is inactive when the ignition switch is in the Off or Accessory positions and the driver door is closed. The illumination intensity of the VFD is controlled by the EMIC circuitry based upon electronic dimming level messages received from the BCM over the PCI data bus, and is synchronized with the illumination intensity of other VFDs in the vehicle. The BCM provides dimming level messages based upon internal programming and inputs it receives from the control knob and control ring on the left (lighting) control stalk of the multi-function switch on the steering column.

The VFD has several display capabilities including odometer, trip odometer, and warning messages whenever the appropriate conditions exist. The VFD warning messages include:

- **“door”** - indicating a door is ajar.
- **“gate”** - indicating the tailgate is ajar.
- **“glass”** - indicating the tailgate glass is ajar.
- **“lowash”** - indicating that the washer fluid level is low.
- **“no bus”** - indicating there is no PCI data bus communication detected.

An odometer/trip odometer switch on the EMIC circuit board is used to control the display modes. This switch is actuated manually by depressing the odom-

INSTRUMENT CLUSTER (Continued)

eter/trip odometer switch button that extends through the lower edge of the cluster lens, just right of the speedometer. Actuating this switch momentarily with the ignition switch in the On position will toggle the VFD between the odometer and trip odometer modes. Depressing the switch button for about two seconds while the VFD is in the trip odometer mode will reset the trip odometer value to zero. Holding this switch depressed while turning the ignition switch from the Off position to the On position will initiate the EMIC self-diagnostic actuator test. The VFD will also display the cluster software version level near the completion of the EMIC self-diagnostic actuator test. Refer to the appropriate diagnostic information for additional details on this VFD function.

The VFD is diagnosed using the EMIC self-diagnostic actuator test. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). Proper testing of the PCI data bus and the electronic data bus message inputs to the EMIC that control some of the VFD functions requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information. Specific operation details for the odometer, the trip odometer, and the various warning message functions of the VFD may be found elsewhere in this service information.

INDICATORS Indicators are located in various positions within the EMIC and are all connected to the EMIC circuit board. The turn signal indicators, security indicator, washer fluid indicator, and coolant low indicator (diesel engine only) use hard wired inputs to the EMIC. The brake indicator is controlled by PCI data bus messages from the Controller Antilock Brake (CAB) as well as by hard wired park brake switch and brake fluid level switch inputs to the EMIC. The Malfunction Indicator Lamp (MIL) is normally controlled by PCI data bus messages from the Powertrain Control Module (PCM); however, if the EMIC loses PCI data bus communication, the EMIC circuitry will automatically turn the MIL on until PCI data bus communication is restored. The EMIC uses PCI data bus messages from the Body Control Module (BCM), the PCM, the Airbag Control Module (ACM), and the CAB to control all of the remaining indicators.

The various indicators are controlled by different strategies; some receive fused ignition switch output from the EMIC circuitry and have a switched ground, others are grounded through the EMIC circuitry and have a switched battery feed, while still others are completely controlled by the EMIC microprocessor based upon various hard wired and electronic message inputs. Some indicators are illuminated at a fixed intensity, while the illumination intensity of

others is synchronized with that of the EMIC general illumination lamps.

In addition, certain indicators in this instrument cluster are automatically configured or self-configured. This feature allows the configurable indicators to be enabled by the EMIC circuitry for compatibility with certain optional equipment. The ABS indicator, airbag indicator, SKIS indicator are automatically configured by PCI data bus messages received by the EMIC from the CAB, ACM, or Sentry Key Immobilizer Module (SKIM) after the EMIC is installed in the vehicle. Once these configuration settings are learned by the EMIC, the DRBIII® scan tool must be used to remove these settings from the EMIC non-volatile memory. The self-configured indicators remain latent in each EMIC at all times and will be activated only when the EMIC receives the appropriate PCI message inputs for the optional system or equipment.

The hard wired indicators are diagnosed using conventional diagnostic methods. The EMIC and PCI bus message controlled indicators are diagnosed using the EMIC self-diagnostic actuator test. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). Proper testing of the PCI data bus and the electronic data bus message inputs to the EMIC that control each indicator require the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information. Specific details of the operation for each indicator may be found elsewhere in this service information.

CLUSTER ILLUMINATION The EMIC has several illumination lamps that are illuminated when the exterior lighting is turned on with the headlamp (multi-function) switch. The illumination intensity of these lamps is adjusted by a 12-volt Pulse Width Modulated (PWM) output of the EMIC when the interior lighting control ring on the left control stalk of the multi-function switch is rotated (down to dim, up to brighten) to one of six available minor detent positions. The BCM provides electronic dimming level messages based upon internal programming and inputs it receives from the control knob and control ring on the left (lighting) control stalk of the multi-function switch on the steering column, then provides a control output to energize or de-energize the park lamp relay as appropriate. The energized park lamp relay provides battery current to the EMIC on the hard wired fused park lamp relay output circuit, and the BCM provides the electronic dimming level message to the EMIC over the PCI data bus. The EMIC electronic circuitry provides the proper PWM output to the cluster illumination lamps and the VFD on the EMIC circuit board, then provides a synchronized PWM output on the hard wired

INSTRUMENT CLUSTER (Continued)

fused panel lamps dimmer switch signal circuit. The cluster illumination lamps are grounded at all times.

In addition, the control ring on the left (lighting) control stalk of the multi-function switch has a Parade Mode position to provide a parade mode. The BCM monitors the request for this mode from the multi-function switch, then sends an electronic dimming level message to the EMIC over the PCI data bus to illuminate all VFDs in the vehicle at full intensity for easier visibility when driving in daylight with the exterior lighting turned On.

The hard wired cluster illumination lamp circuits may be diagnosed using conventional diagnostic methods. However, proper testing of the PWM output of the EMIC and the electronic dimming level messages sent by the BCM over the PCI data bus requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

CHIME WARNING SERVICE The EMIC is programmed to provide chime service when certain indicators are illuminated. When the programmed conditions are met, the EMIC generates an electronic chime tone through its integral chime tone generator. In addition, the EMIC is programmed to provide chime service for other electronic modules in the vehicle when it receives the proper electronic chime request messages over the PCI data bus. Upon receiving the proper chime request message, the EMIC activates the integral chime tone generator to provide the audible chime tone to the vehicle operator. (Refer to 8 - ELECTRICAL/CHIME/BUZZER - OPERATION). Proper testing of the EMIC and the PCI data bus chime request message functions requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING - INSTRUMENT CLUSTER

If all of the instrument cluster gauges and/or indicators are inoperative, refer to **PRELIMINARY DIAGNOSIS** . If an individual gauge or Programmable Communications Interface (PCI) data bus message-controlled indicator is inoperative, refer to **ACTUATOR TEST** . If an individual hard wired indicator is inoperative, refer to the diagnosis and testing information for that specific indicator. If the instrument cluster chime service is inoperative, refer to **CHIME SERVICE DIAGNOSIS** . If the instrument cluster illumination lighting is inoperative, refer to **CLUSTER ILLUMINATION DIAGNOSIS** . 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.

NOTE: Certain indicators in this instrument cluster are automatically configured. This feature allows those indicators to be activated for compatibility with certain optional equipment. If the problem being diagnosed involves illumination of the ABS indicator, the airbag indicator, or the SKIS indicator when the vehicle does not have this equipment, a DRBIII® scan tool must be used to disable the erroneous indicator(s). Refer to the appropriate diagnostic information.

PRELIMINARY DIAGNOSIS

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Check the fused B(+) fuse (Fuse 34 - 15 ampere) in the Junction Block (JB). If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(2) Check for battery voltage at the fused B(+) fuse (Fuse 34 - 15 ampere) in the JB. If OK, go to Step 3. If not OK, repair the open fused B(+) circuit between the JB and the Power Distribution Center (PDC) as required.

(3) Disconnect and isolate the battery negative cable. Remove the instrument cluster. Reconnect the battery negative cable. Check for battery voltage at the fused B(+) circuit cavity of the instrument panel wire harness connector for the instrument cluster. If OK, go to Step 4. If not OK, repair the open fused B(+) circuit between the instrument cluster and the JB as required.

(4) Check the fused ignition switch output (run-start) fuse (Fuse 13 - 10 ampere) in the JB. If OK, go to Step 5. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(5) Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run-start) fuse (Fuse 13 - 10 ampere) in the JB. If OK, go to Step 6. If not OK, repair the open

INSTRUMENT CLUSTER (Continued)

fused ignition switch output (run-start) circuit between the JB and the ignition switch as required.

(6) With the ignition switch still in the On position, check for battery voltage at the fused ignition switch output (run-start) circuit cavity of the instrument panel wire harness connector for the instrument cluster. If OK, go to Step 7. If not OK, repair the open fused ignition switch output circuit (run-start) between the instrument cluster and the JB as required.

(7) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Check for continuity between the ground circuit cavity of the instrument panel wire harness connector for the instrument cluster and a good ground. There should be continuity. If OK, refer to ACTUATOR TEST . If not OK, repair the open ground circuit between the instrument cluster and ground (G202) as required.

ACTUATOR TEST

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

The instrument cluster actuator test will put the instrument cluster into its self-diagnostic mode. In this mode the instrument cluster can perform a self-diagnostic test that will confirm that the instrument cluster circuitry, the gauges, the PCI data bus message controlled indicator lamps, and the chime tone generator are capable of operating as designed. During the actuator test the instrument cluster circuitry will sound the chime tone generator, position each of the gauge needles at various specified calibration points, illuminate each of the segments in the Vacu-

um-Fluorescent Display (VFD), and turn all of the PCI data bus message-controlled indicators on and off again.

Successful completion of the actuator test will confirm that the instrument cluster is operational. However, there may still be a problem with the PCI data bus, the Powertrain Control Module (PCM), the Airbag Control Module (ACM), the Sentry Key Immobilizer Module (SKIM), or the inputs to one of these electronic control modules. Use a DRBIII® scan tool to diagnose these components. Refer to the appropriate diagnostic information.

(1) Begin the test with the ignition switch in the Off position.

(2) Depress the odometer/trip odometer switch button.

(3) While still holding the odometer/trip odometer switch button depressed, turn the ignition switch to the On position, but do not start the engine.

(4) Release the odometer/trip odometer switch button.

(5) The instrument cluster will automatically begin the actuator test sequence, as follows:

(a) The cluster will turn on, then off again each of the PCI data bus message controlled indicators to confirm the functionality of the indicator and the cluster control circuitry:

(b) The cluster will sweep the needles for each of the gauges to several calibration points in sequence to confirm the functionality of the gauge and the cluster control circuitry:

(c) The cluster will sequentially step the odometer/trip odometer VFD display from all ones (111111) through all nines (999999) to confirm the functionality of all VFD segments and their control circuitry, then display the software version number.

(d) The cluster will generate five (5) chime tones to confirm the functionality of the chime tone generator and the chime control circuitry.

(6) The actuator test is now completed. The instrument cluster will automatically exit the self-diagnostic mode and return to normal operation at the completion of the test, if the ignition switch is turned to the Off position during the test, or if an engine rpm message indicating that the engine is running is received from the PCM over the PCI data bus during the test.

(7) Go back to Step 1 to repeat the test, if required.

INSTRUMENT CLUSTER (Continued)

CHIME SERVICE DIAGNOSIS

The most reliable, efficient, and accurate means to diagnose the Chime Service function of the instrument cluster requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

CLUSTER ILLUMINATION DIAGNOSIS

If the problem being diagnosed is a single inoperative illumination lamp, be certain that the bulb and bulb holder unit are properly installed in the instrument cluster electronic circuit board. If no installation problems are found replace the faulty bulb and bulb holder unit. If all of the cluster illumination lamps are inoperative, the most reliable, efficient, and accurate means to diagnose the cluster illumination function of the instrument cluster requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the cluster bezel from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/CLUSTER BEZEL - REMOVAL).

(3) Remove the four screws that secure the instrument cluster to the instrument panel (Fig. 3).

(4) Pull the instrument cluster rearward far enough to access and disconnect the instrument panel wire harness connector for the cluster from the cluster connector receptacle.

(5) Remove the instrument cluster from the instrument panel.

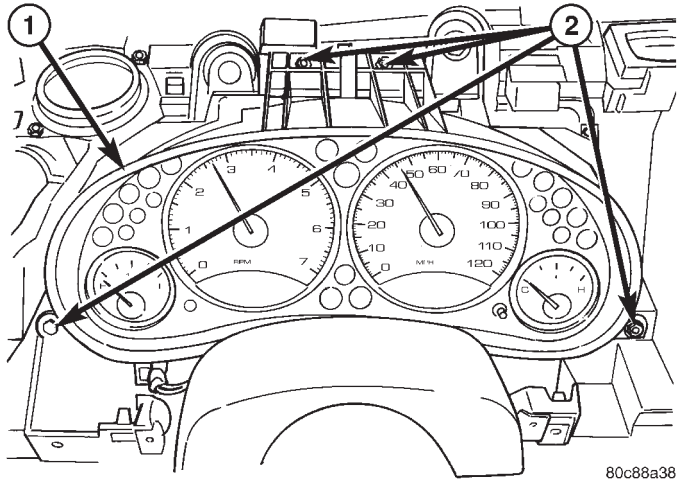


Fig. 3 Instrument Cluster Remove/Install

1 - INSTRUMENT CLUSTER

2 - SCREW (4)

DISASSEMBLY

Some of the components for the instrument cluster used in this vehicle are serviced individually. The serviced components include the incandescent instrument cluster illumination lamp bulbs (including the integral bulb holders), and the cluster lens, hood and mask unit. Following are the procedures for disassembling these components from the instrument cluster unit.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

INSTRUMENT CLUSTER (Continued)

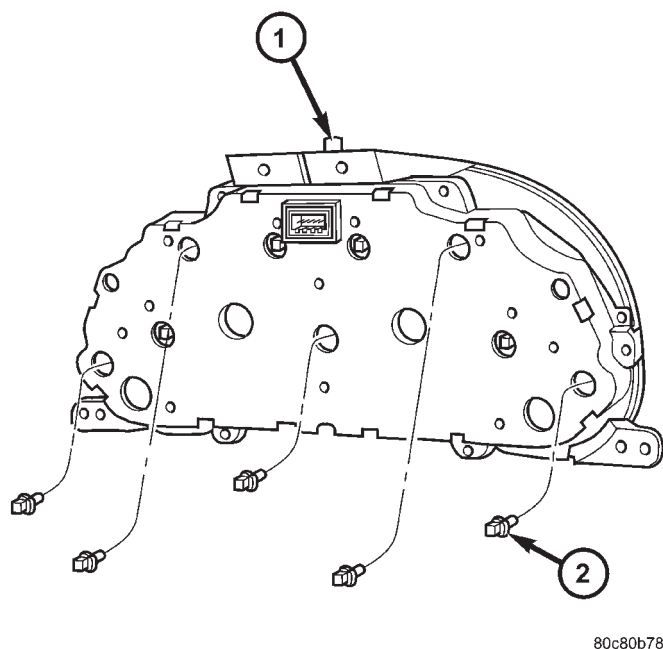
CLUSTER BULB

This procedure applies to each of the incandescent cluster illumination lamp and bulb holder units.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the instrument cluster from the instrument panel. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - REMOVAL).

(3) Turn the bulb holder counterclockwise about sixty degrees on the cluster electronic circuit board (Fig. 4).



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Fig. 4 Cluster Bulb Remove/Install

- 1 - INSTRUMENT CLUSTER
- 2 - BULB & HOLDER (9)

(4) Pull the bulb and bulb holder unit straight back to remove it from the bulb mounting hole in the cluster electronic circuit board.

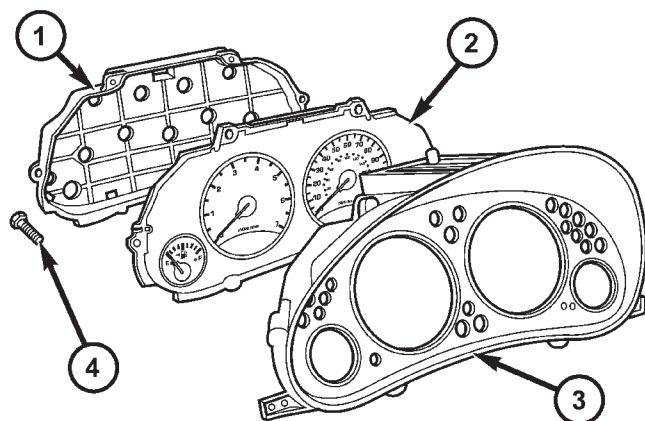
CLUSTER LENS, HOOD, AND MASK

(1) Disconnect and isolate the battery negative cable.

(2) Remove the instrument cluster from the instrument panel. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - REMOVAL).

(3) From the back of the instrument cluster, remove the six screws that secure the rear cover and the lens, hood, and mask unit to the cluster housing (Fig. 5).

(4) Remove the lens, hood, and mask unit from the face of the instrument cluster.



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Fig. 5 Instrument Cluster Components

- 1 - REAR COVER
- 2 - CLUSTER HOUSING
- 3 - LENS, HOOD & MASK
- 4 - SCREW (6)

ASSEMBLY

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

CLUSTER BULB

This procedure applies to each of the incandescent cluster illumination lamp and bulb holder units.

CAUTION: Always use the correct bulb size and type for replacement. An incorrect bulb size or type may overheat and cause damage to the instrument cluster, the electronic circuit board and/or the gauges.

(1) Insert the bulb and bulb holder unit straight into the correct bulb mounting hole in the cluster electronic circuit board (Fig. 4).

INSTRUMENT CLUSTER (Continued)

(2) With the bulb holder fully seated against the cluster electronic circuit board, turn the bulb holder clockwise about sixty degrees to lock it into place.

(3) Reinstall the instrument cluster onto the instrument panel. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - INSTALLATION).

(4) Reconnect the battery negative cable.

CLUSTER LENS, HOOD, AND MASK

(1) Position the cluster lens, hood, and mask unit over the face of the instrument cluster (Fig. 5). Be certain that the odometer/trip odometer switch button is inserted through the proper clearance holes in the mask and the lens.

(2) From the back of the instrument cluster, install and tighten the six screws that secure the rear cover and the lens, hood, and mask unit to the cluster housing. Tighten the screws to 1 N·m (10 in. lbs.).

(3) Reinstall the instrument cluster onto the instrument panel. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - INSTALLATION).

(4) Reconnect the battery negative cable.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the instrument cluster to the instrument panel.

(2) Reconnect the instrument panel wire harness connector for the cluster to the cluster connector receptacle.

(3) Position the instrument cluster into the instrument panel.

(4) Install and tighten the four screws that secure the instrument cluster to the instrument panel (Fig. 3). Tighten the screws to 2 N·m (17 in. lbs.).

(5) Reinstall the cluster bezel onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/CLUSTER BEZEL - INSTALLATION).

(6) Reconnect the battery negative cable.

NOTE: Some of the indicators in this instrument cluster are self configured or automatically configured when the cluster is connected to the vehicle electrical system. This feature allows those indicators to be enabled for compatibility with certain optional equipment. However, if an instrument cluster was previously connected to another vehicle with different equipment options than the current vehicle, some of the automatically configured indicator settings may have to be disabled using a DRBIII® scan tool. Refer to the appropriate diagnostic information.

ABS INDICATOR

DESCRIPTION

An Antilock Brake System (ABS) indicator is standard equipment on all instrument clusters. However, the instrument cluster is programmed to automatically enable this indicator only on vehicles equipped with the optional antilock brake system. The ABS indicator is located above the engine temperature gauge and to the right of the speedometer in the instrument cluster. The ABS indicator consists of a stencil-like cutout of the International Control and Display Symbol icon for "Failure of Anti-lock Braking System" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the icon to appear in amber through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. The ABS indicator is serviced as a unit with the instrument cluster.

OPERATION

The ABS indicator gives an indication to the vehicle operator when the ABS system is faulty or inoperative. This indicator is controlled by a transistor on the instrument cluster circuit board based upon cluster programming and electronic messages received by the cluster from the Controller Antilock Brake (CAB) over the Programmable Communications Interface (PCI) data bus. The ABS indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only

ABS INDICATOR (Continued)

illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the ABS indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the ABS indicator is illuminated by the cluster for about three seconds as a bulb test.

- **ABS Lamp-On Message** - Each time the cluster receives a lamp-on message from the CAB, the ABS indicator will be illuminated. The indicator remains illuminated until the cluster receives a lamp-off message from the CAB, or until the ignition switch is turned to the Off position, whichever occurs first.

- **Communication Error** - If the cluster receives no lamp-on or lamp-off messages from the CAB for six consecutive seconds, the ABS indicator is illuminated. The indicator remains illuminated until the cluster receives a valid message from the CAB, or until the ignition switch is turned to the Off position, whichever occurs first.

- **Actuator Test** - Each time the instrument cluster is put through the actuator test, the ABS indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

- **ABS Diagnostic Test** - The ABS indicator is blinked on and off by lamp-on and lamp-off messages from the CAB during the performance of the ABS diagnostic tests.

The CAB continually monitors the ABS circuits and sensors to decide whether the system is in good operating condition. The CAB then sends the proper lamp-on or lamp-off messages to the instrument cluster. If the CAB sends a lamp-on message after the bulb test, it indicates that the CAB has detected a system malfunction and/or that the ABS system has become inoperative. The CAB will each store a Diagnostic Trouble Code (DTC) for any malfunction it detects. Each time the ABS indicator fails to light due to an open or short in the cluster ABS indicator circuit, the cluster sends a message notifying the CAB of the condition, then the instrument cluster and the CAB will each store a DTC. For proper diagnosis of the antilock brake system, the CAB, the PCI data bus, or the message inputs to the instrument cluster that control the ABS indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

AIRBAG INDICATOR

DESCRIPTION

An airbag indicator is standard equipment on all instrument clusters. However, the instrument cluster is programmed to automatically enable this indicator only on vehicles equipped with the airbag system, which is not available in some markets. The airbag indicator is located above the fuel gauge and to the left of the tachometer in the instrument cluster. The airbag indicator consists of a stencil-like cutout of the words "AIR BAG" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A red Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the "AIR BAG" text to appear in red through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. The airbag indicator is serviced as a unit with the instrument cluster.

OPERATION

The airbag indicator gives an indication to the vehicle operator when the airbag system is faulty or inoperative. The airbag indicator is controlled by a transistor on the instrument cluster circuit board based upon cluster programming and electronic messages received by the cluster from the Airbag Control Module (ACM) over the Programmable Communications Interface (PCI) data bus. The airbag indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the airbag indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the airbag indicator is illuminated for about six seconds. The entire six second bulb test is a function of the ACM.

- **ACM Lamp-On Message** - Each time the cluster receives a lamp-on message from the ACM, the airbag indicator will be illuminated. The indicator remains illuminated for about twelve seconds or until the cluster receives a lamp-off message from the ACM, whichever is longer.

- **Communication Error** - If the cluster receives no airbag messages for six consecutive seconds, the airbag indicator is illuminated. The indicator

AIRBAG INDICATOR (Continued)

remains illuminated until the cluster receives a single lamp-off message from the ACM.

- **Actuator Test** - Each time the cluster is put through the actuator test, the airbag indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry. The actuator test illumination of the airbag indicator is a function of the instrument cluster.

The ACM continually monitors the airbag system circuits and sensors to decide whether the system is in good operating condition. The ACM then sends the proper lamp-on or lamp-off messages to the instrument cluster. If the ACM sends a lamp-on message after the bulb test, it indicates that the ACM has detected a system malfunction and/or that the airbags and driver seat belt tensioner may not deploy when required, or may deploy when not required. The ACM will store a Diagnostic Trouble Code (DTC) for any malfunction it detects. Each time the airbag indicator fails to illuminate due to an open or short in the cluster airbag indicator circuit, the cluster sends a message notifying the ACM of the condition, then the instrument cluster and the ACM will each store a DTC. For proper diagnosis of the airbag system, the ACM, the PCI data bus, or the message inputs to the instrument cluster that control the airbag indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

BRAKE/PARK BRAKE INDICATOR

DESCRIPTION

A brake indicator is standard equipment on all instrument clusters. The brake indicator is located near the lower edge of the tachometer dial face in the instrument cluster. The brake indicator consists of stencil-like cutouts of the word "BRAKE" and the International Control and Display Symbol icon for "Brake Failure" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A red Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the "BRAKE" text and the icon to appear in red through the translucent outer layer of the overlay when the indicator is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. The brake indicator is serviced as a unit with the instrument cluster.

OPERATION

The brake indicator gives an indication to the vehicle operator when the parking brake is applied, when there are certain brake hydraulic system malfunctions as indicated by a low brake hydraulic fluid level condition, or when the brake fluid level switch is disconnected. On models equipped with an optional Antilock Brake System (ABS), the brake indicator can also give an indication when certain faults are detected in the ABS. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon cluster programming, electronic messages received by the cluster from the Controller Antilock Brake (CAB) over the Programmable Communications Interface (PCI) data bus (ABS only), and hard wired inputs from the park brake switch and the brake fluid level switch. The brake indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the brake indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the brake indicator is illuminated by the instrument cluster for about three seconds as a bulb test.

- **Brake Lamp-On Message** - Each time the cluster receives a lamp-on message from the CAB, the brake indicator will be illuminated. The indicator remains illuminated until the cluster receives a lamp-off message from the CAB, or until the ignition switch is turned to the Off position, whichever occurs first.

- **Park Brake Switch Input** - Each time the cluster detects ground on the park brake switch sense circuit (park brake switch closed = park brake applied or not fully released) the brake indicator is illuminated. The indicator remains illuminated until the park brake switch sense input to the cluster is an open circuit (park brake switch open = park brake fully released), or until the ignition switch is turned to the Off position, whichever occurs first.

- **Brake Fluid Level Switch Input** - Each time the cluster detects ground on the red brake warning indicator driver circuit (brake fluid level switch closed = brake hydraulic system fluid level low) the brake indicator is illuminated solid. The indicator remains illuminated until the status of the red brake warning indicator driver input to the cluster is off (brake fluid level switch off = brake hydraulic system

BRAKE/PARK BRAKE INDICATOR (Continued)

fluid level is not low), or until the ignition switch is turned to the Off position, whichever occurs first.

- **Brake Fluid Level Switch Input Fault** - The brake fluid level switch also features a 1 kilohm diagnostic resistor connected in parallel between the switch input and output to provide the cluster with verification that the red brake warning indicator driver circuit is not open. If the cluster does not see a proper input on the red brake warning indicator driver circuit, it will turn on the brake indicator. The indicator remains illuminated until the red brake warning indicator driver circuit fault is resolved, or until the ignition switch is turned to the Off position, whichever occurs first.

- **Actuator Test** - Each time the instrument cluster is put through the actuator test, the brake indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The park brake switch on the park brake pedal mechanism provides a hard wired ground input to the instrument cluster circuitry through the park brake switch sense circuit whenever the park brake is applied or not fully released. The brake fluid level switch on the brake master cylinder reservoir provides a hard wired ground input to the instrument cluster circuitry through the red brake warning indicator driver circuit whenever the fluid level in the reservoir becomes low. On models equipped with the optional ABS, the CAB sends the proper lamp-on or lamp-off messages to the instrument cluster. If the CAB sends a lamp-on message after the bulb test, it indicates that the CAB has detected a brake hydraulic system malfunction and/or that the ABS system has become inoperative. The CAB will store a Diagnostic Trouble Code (DTC) for any malfunction it detects.

For further diagnosis of the brake indicator or the instrument cluster circuitry that controls the LED, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). The park brake switch input to the instrument cluster can be diagnosed using conventional diagnostic tools and methods. For proper diagnosis of the brake fluid level switch input to the instrument cluster, the antilock brake system, the CAB, the PCI data bus, or the electronic message inputs to the instrument cluster that control the brake indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING - BRAKE INDICATOR

The diagnosis found here addresses an inoperative brake indicator condition. If there are problems with several indicators in the instrument cluster, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAG-

NOSIS AND TESTING). If the brake indicator stays on with the ignition switch in the On position and the park brake released, or comes on while driving, (Refer to 5 - BRAKES - DIAGNOSIS AND TESTING). If no brake system problem is found, the following procedures will help to locate a shorted or open circuit, or a faulty park brake switch input. 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.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

INDICATOR ILLUMINATES DURING BULB TEST, BUT DOES NOT WHEN PARK BRAKE APPLIED

(1) Disconnect and isolate the battery negative cable. Disconnect the front body wire harness connector for the park brake switch from the switch terminal. Apply the parking brake. Check for continuity between the park brake switch terminal and a good ground. There should be continuity. If OK, go to Step 2. If not OK, replace the faulty park brake switch.

(2) Disconnect the instrument panel wire harness connector for the instrument cluster from the cluster connector receptacle. Check for continuity between the park brake switch sense circuit cavities of the front body wire harness connector for the park brake switch and the instrument panel wire harness connector for the instrument cluster. There should be continuity. If not OK, repair the open park brake switch sense circuit between the park brake switch and the instrument cluster as required.

INDICATOR REMAINS ILLUMINATED - BRAKE SYSTEM CHECKS OK

(1) Disconnect and isolate the battery negative cable. Disconnect the front body wire harness connec-

BRAKE/PARK BRAKE INDICATOR (Continued)

tor for the park brake switch from the switch terminal. Check for continuity between the terminal of the park brake switch and a good ground. There should be no continuity with the park brake released, and continuity with the park brake applied. If OK, go to Step 2. If not OK, replace the faulty park brake switch.

(2) Disconnect the instrument panel wire harness connector for the instrument cluster from the cluster connector receptacle. Check for continuity between the park brake switch sense circuit cavity of the front body wire harness connector for the park brake switch and a good ground. There should be no continuity. If not OK, repair the shorted park brake switch sense circuit between the park brake switch and the instrument cluster as required.

CHARGING INDICATOR

DESCRIPTION

A charging indicator is standard equipment on all instrument clusters. The charging indicator is located above the engine temperature gauge and to the right of the speedometer in the instrument cluster. The charging indicator consists of a stencil-like cutout of the International Control and Display Symbol icon for "Battery Charging Condition" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A red Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the icon to appear in red through the translucent outer layer of the overlay when the indicator is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. The charging indicator is serviced as a unit with the instrument cluster.

OPERATION

The charging indicator gives an indication to the vehicle operator when the electrical system voltage is too low or too high. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus. The charging indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any posi-

tion except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the charging indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the charging indicator is illuminated by the instrument cluster for about three seconds as a bulb test.

- **Charge Fail Message** - Each time the cluster receives a charge fail message from the PCM (system voltage is nine volts or lower, the charging indicator will be illuminated. The indicator remains illuminated until the cluster receives a message from the PCM indicating there is no charge fail condition (system voltage is twelve volts or higher, but lower than sixteen volts), or until the ignition switch is turned to the Off position, whichever occurs first.

- **Voltage High Message** - Each time the cluster receives a message from the PCM indicating a voltage high condition (system voltage is sixteen volts or higher), the lamp will be illuminated. The lamp remains illuminated until the cluster receives a message from the PCM indicating there is no voltage high condition (system voltage is lower than sixteen volts, but higher than nine volts), or until the ignition switch is turned to the Off position, whichever occurs first.

- **Actuator Test** - Each time the cluster is put through the actuator test, the charging indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The PCM continually monitors the electrical system voltage to control the generator output. The PCM then sends the proper system voltage messages to the instrument cluster. If the instrument cluster turns on the indicator after the bulb test, it may indicate that the charging system requires service. For further diagnosis of the charging indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the charging system, the PCI data bus, or the electronic message inputs to the instrument cluster that control the charging indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

COOLANT LOW INDICATOR

DESCRIPTION

A coolant low indicator is only found in the instrument clusters of vehicles equipped with an optional diesel engine. The coolant low indicator is located

COOLANT LOW INDICATOR (Continued)

above the fuel gauge and to the left of the tachometer in the instrument cluster. The coolant low indicator consists of a stencil-like cutout of the International Control and Display Symbol icon for "Low Engine Coolant" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the icon to appear in amber through the translucent outer layer of the overlay when the indicator is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. The coolant low indicator is serviced as a unit with the instrument cluster.

OPERATION

The coolant low indicator gives an indication to the vehicle operator when the diesel engine coolant level is low. This indicator is controlled by a transistor on the instrument cluster circuit board based upon cluster programming and a hard wired input received by the cluster from the engine coolant level switch. The coolant low indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the coolant low indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the coolant low indicator is illuminated for about three seconds as a bulb test.
- **Engine Coolant Level Switch Input** - Each time the cluster detects ground on the low coolant fluid level sense circuit (engine coolant level switch closed = engine coolant level low) the cluster applies an algorithm to confirm that the input is correct and not the result of coolant sloshing in the coolant bottle. The cluster tests the status of the circuit about seven milliseconds after ignition On, and about once every second thereafter, then uses an internal counter to count up or down. When the counter accumulates thirty ground inputs on the circuit, the coolant low indicator will be illuminated. The indicator remains illuminated until the low coolant fluid level sense input to the cluster is an open circuit (engine coolant level switch open = engine coolant level full), or until the ignition switch is turned to the Off position, whichever occurs first.

- **Engine Coolant Level Switch Input Fault** -

The engine coolant level switch also features a 3.3 kilohm diagnostic resistor connected in parallel between the switch input and output to provide the cluster with verification that the low coolant fluid level sense circuit is not open or shorted. If the cluster does not see a proper input on the low coolant fluid level sense circuit, it will suspend coolant low indicator operation. The indicator operation remains suspended until the low coolant fluid level sense circuit fault is resolved.

- **Actuator Test** - Each time the cluster is put through the actuator test, the coolant low indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The engine coolant level switch on the coolant bottle provides a hard wired ground input to the instrument cluster circuitry through the low coolant fluid level sense circuit whenever the level of the coolant in the bottle is low. For further diagnosis of the coolant low indicator or the instrument cluster circuitry that controls the LED, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the engine coolant level switch input to the instrument cluster that control the coolant low indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

CRUISE INDICATOR

DESCRIPTION

A cruise indicator is standard equipment on all instrument clusters, but is only functional on vehicles equipped with the optional speed control system. The cruise indicator is located near the lower edge of the instrument cluster, between the tachometer and the speedometer. The cruise indicator consists of a stencil-like cutout of the word "CRUISE" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A green Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the "CRUISE" text to appear in green through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. When the exterior lighting is turned On, the illumination intensity of the cruise indicator is dimmable, which is adjusted using the panel lamps dimmer control ring on the left control stalk of the multi-function switch. The cruise indicator is serviced as a unit with the instrument cluster.

CRUISE INDICATOR (Continued)

OPERATION

The cruise indicator gives an indication to the vehicle operator when the speed control system is turned On, regardless of whether the speed control is engaged. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus. The cruise indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the cruise indicator for the following reasons:

- **Cruise Lamp-On Message** - Each time the cluster receives a cruise lamp-on message from the PCM indicating the speed control system has been turned On, the cruise indicator is illuminated. The indicator remains illuminated until the cluster receives a cruise lamp-off message from the PCM or until the ignition switch is turned to the Off position, whichever occurs first.

- **Actuator Test** - Each time the cluster is put through the actuator test, the cruise indicator will be turned on, then off again during the bulb check portion of the test in order to confirm the functionality of the LED and the cluster control circuitry.

The PCM continually monitors the speed control switches to determine the proper outputs to the speed control servo. The PCM then sends the proper cruise indicator lamp-on and lamp-off messages to the instrument cluster. For further diagnosis of the cruise indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the speed control system, the PCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the cruise indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

DOOR AJAR INDICATOR

DESCRIPTION

A door ajar indicator is standard equipment on all instrument clusters. The door ajar indicator consists of the word "door", which appears in place of the odometer/trip odometer information in the Vacuum-

Fluorescent Display (VFD) of the instrument cluster. The VFD is part of the cluster electronic circuit board, and is visible through a cutout located near the lower edge of the speedometer dial face in the instrument cluster. The dark outer layer of the overlay prevents the VFD from being clearly visible when it is not illuminated. The word "door" appears in the same blue-green color and at the same lighting level as the odometer/trip odometer information through the translucent outer layer of the overlay when it is illuminated by the instrument cluster electronic circuit board. The door ajar indicator is serviced as a unit with the instrument cluster.

OPERATION

The door ajar indicator gives an indication to the vehicle operator that one or more of the passenger compartment doors may be open or not completely latched. This indicator is controlled by the instrument cluster electronic circuit board based upon cluster programming and electronic messages received by the cluster from the Body Control Module (BCM) over the Programmable Communications Interface (PCI) data bus. The door ajar indicator function of the Vacuum Fluorescent Display (VFD) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the VFD door ajar indication will always be off when the ignition switch is in any position except On or Start. The instrument cluster will turn on the door ajar indicator for the following reasons:

- **Door Ajar Lamp-On Message** - Each time the cluster receives a door ajar lamp-on message from the BCM indicating that a door is open or not completely latched, the door ajar indicator will be illuminated. If the vehicle is not moving when the door ajar lamp-on message is received, the VFD will repeatedly and sequentially cycle its indication in two second intervals with the odometer/trip odometer information, the door ajar warning, and any other active warnings including: gate ajar, glass ajar, and low washer fluid. If the vehicle is moving, or once the cluster of a non-moving vehicle receives an electronic vehicle speed message from the Powertrain Control Module (PCM) indicating a speed greater than zero, the warning sequence will consist of three complete display cycles, then revert to only the odometer/trip odometer display until the door ajar switch is cycled. The door ajar indicator will also be extinguished when the cluster receives a door ajar lamp-off message from the BCM, or if the ignition switch is turned to the Off position, whichever occurs first.

DOOR AJAR INDICATOR (Continued)

The BCM continually monitors the door ajar switches that are integral to each door latch to determine the status of the doors. The BCM then sends the proper door ajar lamp-on and lamp-off messages to the instrument cluster. For further diagnosis of the door ajar indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the door ajar switches and circuits, the BCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the door ajar indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

ENGINE TEMPERATURE GAUGE

DESCRIPTION

An engine coolant temperature gauge is standard equipment on all instrument clusters. The engine coolant temperature gauge is located in the right lower corner of the instrument cluster, to the right of the speedometer. The engine coolant temperature gauge consists of a movable gauge needle or pointer controlled by the instrument cluster circuitry and a fixed 90 degree scale on the cluster overlay that reads left-to-right from "C" (or Cold) to "H" (or Hot) for all engines. An International Control and Display Symbol icon for "Engine Coolant Temperature" is located on the cluster overlay, in the center of the gauge directly above the hub of the gauge needle. The engine coolant temperature gauge graphics are dark blue and black against a beige field, except for a single light blue graduation at the far left (Cold) end of the gauge scale and a single red graduation at the far right (Hot) end of the gauge scale, making them clearly visible within the instrument cluster in daylight. When illuminated from behind by the panel lamps dimmer controlled cluster illumination lighting with the exterior lamps turned On, the blue graphics appear blue and the red graphics appear red. The orange gauge needle is internally illuminated. Gauge illumination is provided by replaceable incandescent bulb and bulb holder units located on the instrument cluster electronic circuit board. The engine coolant temperature gauge is serviced as a unit with the instrument cluster.

OPERATION

The engine coolant temperature gauge gives an indication to the vehicle operator of the engine coolant temperature. This gauge is controlled by the instrument cluster circuit board based upon cluster programming and electronic messages received by

the cluster from the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus. The engine coolant temperature gauge is an air core magnetic unit that receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (run-start) circuit whenever the ignition switch is in the On or Start positions. The cluster is programmed to move the gauge needle back to the low end of the scale after the ignition switch is turned to the Off position. The instrument cluster circuitry controls the gauge needle position and provides the following features:

- **Engine Temperature Normal Message** - Each time the cluster receives a message from the PCM indicating the engine coolant temperature is within the normal operating range [up to about 124° C (255° F) for gasoline engines, or about 110° C (230° F) for diesel engines], the gauge needle is moved to the relative temperature position of the gauge scale.

- **Engine Temperature High Message** - Each time the cluster receives a message from the PCM indicating the engine coolant temperature is high [above about 127° C (260° F) for gasoline engines, or 112° C (233° F) for diesel engines], the gauge needle is moved into the center of the red warning zone on the gauge scale.

- **Engine Temperature Critical Message** - Each time the cluster receives a message from the PCM indicating the engine coolant temperature is critical [above about 132° C (269° F) for gasoline engines, or 115° C (239° F) for diesel engines], the gauge needle is moved to the high end of the red warning zone on the gauge scale.

- **Actuator Test** - Each time the cluster is put through the actuator test, the gauge needle will be swept to the gauge calibration points on the gauge scale in sequence in order to confirm the functionality of the gauge and the cluster control circuitry.

The PCM continually monitors the engine coolant temperature sensor to determine the engine operating temperature. The PCM then sends the proper engine coolant temperature messages to the instrument cluster. For further diagnosis of the engine coolant temperature gauge or the instrument cluster circuitry that controls the gauge, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). If the instrument cluster moves the engine coolant temperature gauge needle to indicate a high or critical engine temperature, it may indicate that the engine or the engine cooling system requires service. For proper diagnosis of the engine coolant temperature sensor, the PCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the engine coolant temperature

ENGINE TEMPERATURE GAUGE (Continued)

gauge, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

FRONT FOG LAMP INDICATOR

DESCRIPTION

A front fog lamp indicator is standard equipment on all instrument clusters, but is only functional on vehicles equipped with the optional front fog lamps. The front fog lamp indicator is located above the engine temperature gauge and to the right of the speedometer in the instrument cluster. The front fog lamp indicator consists of a stencil-like cutout of the International Control and Display Symbol icon for "Front Fog Light" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A green Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the icon to appear in green through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. When the exterior lighting is turned On, the illumination intensity of the front fog lamp indicator is dimmable, which is adjusted using the panel lamps dimmer control ring on the left control stalk of the multi-function switch. The front fog lamp indicator is serviced as a unit with the instrument cluster.

OPERATION

The front fog lamp indicator gives an indication to the vehicle operator whenever the front fog lamps are illuminated. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon the cluster programming and electronic messages received by the cluster from the Body Control Module (BCM) over the Programmable Communications Interface (PCI) data bus. The front fog lamp indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will allow this indicator to operate whenever the instrument cluster receives a battery current input on the fused B(+) circuit. Therefore, the LED can be illuminated regardless of the ignition switch position. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the front fog lamp indicator for the following reasons:

- **Front Fog Lamp-On Message** - Each time the cluster receives a front fog lamp-on message from the BCM indicating the front fog lamps are turned On, the front fog lamp indicator will be illuminated. The

indicator remains illuminated until the cluster receives a front fog lamp-off message from the BCM.

- **Actuator Test** - Each time the cluster is put through the actuator test, the front fog lamp indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The BCM continually monitors the exterior lighting (multi-function) switch to determine the proper outputs to the front fog lamp relay. The BCM then sends the proper front fog lamp indicator lamp-on and lamp-off messages to the instrument cluster. For further diagnosis of the front fog lamp indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the front fog lamp system, the BCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the front fog lamp indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

FUEL GAUGE

DESCRIPTION

A fuel gauge is standard equipment on all instrument clusters. The fuel gauge is located in the left lower corner of the instrument cluster, to the left of the tachometer. The fuel gauge consists of a movable gauge needle or pointer controlled by the instrument cluster circuitry and a fixed 90 degree scale on the cluster overlay that reads left-to-right from E (or Empty) to F (or Full). An International Control and Display Symbol icon for "Fuel" is located on the cluster overlay, in the center of the gauge directly above the hub of the gauge needle. An arrowhead pointed to the left side of the vehicle is imprinted on the cluster overlay next to the "Fuel" icon in the fuel gauge to provide the driver with a reminder as to the location of the fuel filler access. The fuel gauge graphics are dark blue and black against a beige field, except for a single red graduation at the far left (Empty) end of the gauge scale, making them clearly visible within the instrument cluster in daylight. When illuminated from behind by the panel lamps dimmer controlled cluster illumination lighting with the exterior lamps turned On, the blue graphics appear blue and the red graphics appear red. The orange gauge needle is internally illuminated. Gauge illumination is provided by replaceable incandescent bulb and bulb holder units located on the instrument cluster electronic circuit board. The fuel gauge is serviced as a unit with the instrument cluster.

FUEL GAUGE (Continued)

OPERATION

The fuel gauge gives an indication to the vehicle operator of the level of fuel in the fuel tank. This gauge is controlled by the instrument cluster circuit board based upon cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus. The fuel gauge is an air core magnetic unit that receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (run-start) circuit whenever the ignition switch is in the On or Start positions. The cluster is programmed to move the gauge needle back to the low end of the scale after the ignition switch is turned to the Off position. The instrument cluster circuitry controls the gauge needle position and provides the following features:

- **Percent Tank Full Message** - Each time the cluster receives a message from the PCM indicating the percent tank full, the cluster moves the gauge needle to the relative fuel level position on the gauge scale. The PCM applies an algorithm to the input from the fuel tank sender to dampen gauge needle movement against the negative effect that fuel sloshing within the fuel tank can have on accurate inputs to the PCM.

- **Less Than 12.5 Percent Tank Full Message** - Each time the cluster receives messages from the PCM indicating the percent tank full is less than 12.5 (one-eighth), the gauge needle is moved to the proper position on the gauge scale and the low fuel indicator is illuminated. The low fuel indicator remains illuminated until the cluster receives messages from the PCM indicating that the percent tank full is greater than 12.5 (one-eighth), or until the ignition switch is turned to the Off position, whichever occurs first.

- **Less Than Empty Percent Tank Full Message** - Each time the cluster receives a message from the PCM indicating the percent tank full is less than empty, the gauge needle is moved to the far left (low) end of the gauge scale and the low fuel indicator is illuminated immediately. This message would indicate that the fuel tank sender input to the PCM is a short circuit.

- **More Than Full Percent Tank Full Message** - Each time the cluster receives a message from the PCM indicating the percent tank full is more than full, the gauge needle is moved to the far left (low) end of the gauge scale and the low fuel indicator is illuminated immediately. This message would indicate that the fuel tank sender input to the PCM is an open circuit.

- **Actuator Test** - Each time the cluster is put through the actuator test, the gauge needle will be

swept to the gauge calibration points on the gauge scale in sequence in order to confirm the functionality of the gauge and the cluster control circuitry.

The PCM continually monitors the fuel tank sender input to determine the fuel level. The PCM then applies an algorithm to the input and sends the proper percent tank full messages to the instrument cluster. For further diagnosis of the fuel gauge or the instrument cluster circuitry that controls the gauge, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the fuel tank sender, the PCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the fuel gauge, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

GATE AJAR INDICATOR

DESCRIPTION

A gate ajar indicator is standard equipment on all instrument clusters. The gate ajar indicator consists of the word "gate", which appears in place of the odometer/trip odometer information in the Vacuum-Fluorescent Display (VFD) of the instrument cluster. The VFD is part of the cluster electronic circuit board, and is visible through a cutout located near the lower edge of the speedometer dial face in the instrument cluster. The dark outer layer of the overlay prevents the VFD from being clearly visible when it is not illuminated. The word "gate" appears in the same blue-green color and at the same lighting level as the odometer/trip odometer information through the translucent outer layer of the overlay when it is illuminated by the instrument cluster electronic circuit board. The gate ajar indicator is serviced as a unit with the instrument cluster.

OPERATION

The gate ajar indicator gives an indication to the vehicle operator that the rear tailgate may be open or not completely latched. This indicator is controlled by the instrument cluster electronic circuit board based upon cluster programming and electronic messages received by the cluster from the Body Control Module (BCM) over the Programmable Communications Interface (PCI) data bus. The gate ajar indicator function of the Vacuum Fluorescent Display (VFD) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the VFD gate ajar indicator will always be off when the ignition switch is in any position except On or Start. The

GATE AJAR INDICATOR (Continued)

instrument cluster will turn on the gate ajar indicator for the following reasons:

- **Gate Ajar Lamp-On Message** - Each time the cluster receives a gate ajar lamp-on message from the BCM indicating that the rear tailgate is open or not completely latched, the gate ajar indicator will be illuminated. If the vehicle is not moving when the gate ajar lamp-on message is received, the VFD will repeatedly and sequentially cycle its indication in two second intervals with the odometer/trip odometer information, the gate ajar warning, and any other active warnings including: door ajar, glass ajar, and low washer fluid. If the vehicle is moving, or once the cluster of a non-moving vehicle receives an electronic vehicle speed message from the Powertrain Control Module (PCM) indicating a speed greater than zero, the warning sequence will consist of three complete display cycles, then revert to only the odometer/trip odometer display until the tailgate ajar switch is cycled. The gate ajar indicator will also be extinguished when the cluster receives a gate ajar lamp-off message from the BCM, or if the ignition switch is turned to the Off position, whichever occurs first.

The BCM continually monitors the tailgate ajar switch that is integral to the tailgate latch to determine the status of the rear tailgate. The BCM then sends the proper gate ajar lamp-on and lamp-off messages to the instrument cluster. For further diagnosis of the gate ajar indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the tailgate ajar switch and circuit, the BCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the gate ajar indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

GLASS AJAR INDICATOR

DESCRIPTION

A glass ajar indicator is standard equipment on all instrument clusters. The glass ajar indicator consists of the word "glass", which appears in place of the odometer/trip odometer information in the Vacuum-Fluorescent Display (VFD) of the instrument cluster. The VFD is part of the cluster electronic circuit board, and is visible through a cutout located near the lower edge of the speedometer dial face in the instrument cluster. The dark outer layer of the overlay prevents the VFD from being clearly visible when it is not illuminated. The word "glass" appears in the same blue-green color and at the same lighting level as the odometer/trip odometer information through the translucent outer layer of the overlay when it is

illuminated by the instrument cluster electronic circuit board. The glass ajar indicator is serviced as a unit with the instrument cluster.

OPERATION

The glass ajar indicator gives an indication to the vehicle operator that the rear flip-up glass may be open or not completely latched. This indicator is controlled by the instrument cluster electronic circuit board based upon cluster programming and electronic messages received by the cluster from the Body Control Module (BCM) over the Programmable Communications Interface (PCI) data bus. The glass ajar indicator function of the Vacuum Fluorescent Display (VFD) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the VFD glass ajar indicator will always be off when the ignition switch is in any position except On or Start. The instrument cluster will turn on the glass ajar indicator for the following reasons:

- **Glass Ajar Lamp-On Message** - Each time the cluster receives a glass ajar lamp-on message from the BCM indicating that the rear flip-up glass is open or not completely latched, the glass ajar indicator will be illuminated. If the vehicle is not moving when the glass ajar lamp-on message is received, the VFD will repeatedly and sequentially cycle its indication in two second intervals with the odometer/trip odometer information, the glass ajar warning, and any other active warnings including: door ajar, gate ajar, and low washer fluid. If the vehicle is moving, or once the cluster of a non-moving vehicle receives an electronic vehicle speed message from the Powertrain Control Module (PCM) indicating a speed greater than zero, the warning sequence will consist of three complete display cycles, then revert to only the odometer/trip odometer display until the glass ajar switch is cycled. The glass ajar indicator will also be extinguished when the cluster receives a glass ajar lamp-off message from the BCM, or if the ignition switch is turned to the Off position, whichever occurs first.

The BCM continually monitors the glass ajar switch that is integral to the flip-up glass latch to determine the status of the rear flip-up glass. The BCM then sends the proper glass ajar lamp-on and lamp-off messages to the instrument cluster. For further diagnosis of the glass ajar indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the glass ajar switch and circuit, the BCM, the PCI data bus, or the electronic mes-

GLASS AJAR INDICATOR (Continued)

sage inputs to the instrument cluster that control the glass ajar indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

HIGH BEAM INDICATOR

DESCRIPTION

A high beam indicator lamp is standard equipment on all instrument clusters. The high beam indicator is located near the upper edge of the instrument cluster overlay, between the tachometer and the speedometer. The high beam indicator consists of a stencil-like cutout of the International Control and Display Symbol icon for "High Beam" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when the it is not illuminated. A blue Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the icon to appear in blue through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. The high beam indicator is serviced as a unit with the instrument cluster.

OPERATION

The high beam indicator gives an indication to the vehicle operator whenever the headlamp high beams are illuminated. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon the cluster programming and electronic messages received by the cluster from the Body Control Module (BCM) over the Programmable Communications Interface (PCI) data bus. The high beam indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will allow this indicator to operate whenever the instrument cluster receives a battery current input on the fused B(+) circuit. Therefore, the LED can be illuminated regardless of the ignition switch position. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the high beam indicator for the following reasons:

- **High Beam Headlamps-On Message** - Each time the cluster receives a high beam headlamps-on message from the BCM indicating the headlamp high beams are turned On, the high beam indicator will be illuminated. The indicator remains illuminated until the cluster receives a high beam headlamps-off message from the BCM.
- **Actuator Test** - Each time the cluster is put through the actuator test, the high beam indicator will be turned on, then off again during the bulb

check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The BCM continually monitors the exterior lighting (multi-function) switch to determine the proper outputs to the headlamp low beam and high beam relays. The BCM then sends the proper high beam indicator lamp-on and lamp-off messages to the instrument cluster. For further diagnosis of the high beam indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the headlamp system, the BCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the high beam indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

LOW FUEL INDICATOR

DESCRIPTION

A low fuel indicator is standard equipment on all instrument clusters. The low fuel indicator is located above the fuel gauge and to the left of the tachometer in the instrument cluster. The low fuel indicator consists of a stencil-like cutout of the International Control and Display Symbol icon for "Fuel" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the icon to appear in amber through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. The low fuel indicator is serviced as a unit with the instrument cluster.

OPERATION

The low fuel indicator gives an indication to the vehicle operator when the level of fuel in the fuel tank becomes low. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus. The low fuel indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates

LOW FUEL INDICATOR (Continued)

when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the low fuel indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the low fuel indicator is illuminated for about three seconds as a bulb test.

- **Less Than 12.5 Percent Tank Full Message** - Each time the cluster receives a message from the PCM indicating that the percent tank full is less than 12.5 (one-eighth), the low fuel indicator is illuminated. The indicator remains illuminated until the cluster receives messages from the PCM indicating that the percent tank full has increased to greater than 12.5 (one-eighth). The PCM applies an algorithm to the input from the fuel tank sender to dampen the illumination of the low fuel indicator against the negative effect that fuel sloshing within the fuel tank can have on accurate inputs to the PCM.

- **Less Than Empty Percent Tank Full Message** - Each time the cluster receives a message from the PCM indicating the percent tank full is less than empty, the low fuel indicator is illuminated immediately. This message would indicate that the fuel tank sender input to the PCM is a short circuit.

- **More Than Full Percent Tank Full Message** - Each time the cluster receives a message from the PCM indicating the percent tank full is more than full, the low fuel indicator is illuminated immediately. This message would indicate that the fuel tank sender input to the PCM is an open circuit.

- **Communication Error** - If the cluster fails to receive a percent tank full message for more than about twelve seconds, the cluster control circuitry will illuminate the low fuel indicator until a new percent tank full message is received, or until the ignition switch is turned to the Off position, whichever occurs first.

- **Actuator Test** - Each time the cluster is put through the actuator test, the low fuel indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The PCM continually monitors the fuel tank sender input to determine the fuel level. The PCM then applies an algorithm to the input and sends the proper percent tank full messages to the instrument cluster. For further diagnosis of the low fuel indicator or the instrument cluster circuitry that controls the LED, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the fuel tank sender, the PCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the low fuel indi-

cator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

LOW OIL PRESSURE INDICATOR

DESCRIPTION

A low oil pressure indicator is standard equipment on all instrument clusters. The low oil pressure indicator is located near the lower edge of the instrument cluster, between the tachometer and the speedometer. The low oil pressure indicator consists of a stencil-like cutout of the International Control and Display Symbol icon for "Engine Oil" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A red Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the icon to appear in red through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. The low oil pressure indicator is serviced as a unit with the instrument cluster.

OPERATION

The low oil pressure indicator gives an indication to the vehicle operator when the engine oil pressure is low. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus. The low oil pressure indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the low oil pressure indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the low oil pressure indicator is illuminated as a bulb test. The indicator will remain illuminated until the engine is started (engine speed is greater than 450 rpm), or until the ignition switch is turned to the Off position, whichever occurs first.

- **Engine Oil Pressure Low Message** - Once the engine has been started (engine speed has been greater than 450 rpm), each time the cluster receives

LOW OIL PRESSURE INDICATOR (Continued)

three consecutive messages from the PCM indicating that the engine oil pressure is about 4 kPa or lower (about 0.6 psi or lower), the low oil pressure indicator is illuminated. The indicator remains illuminated until the cluster receives a single message from the PCM indicating that the engine oil pressure is about 76 kPa or higher (about 11 psi or higher), or until the ignition switch is turned to the Off position, whichever occurs first. Once the cluster monitors and engine speed of greater than 450 rpm, the cluster logic will ignore engine speed in determining low oil pressure indicator operation for the remainder of the current ignition cycle.

- **Actuator Test** - Each time the cluster is put through the actuator test, the low oil pressure indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The PCM continually monitors the engine oil pressure sensor to determine the engine oil pressure. The PCM then sends the proper engine oil pressure messages to the instrument cluster. For further diagnosis of the low oil pressure indicator or the instrument cluster circuitry that controls the LED, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). If the instrument cluster turns on the indicator after the bulb test, it may indicate that the engine or the engine oiling system requires service. For proper diagnosis of the engine oil pressure sensor, the PCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the low oil pressure indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

MALFUNCTION INDICATOR LAMP (MIL)

DESCRIPTION

A Malfunction Indicator Lamp (MIL) is standard equipment on all instrument clusters. The MIL is located above the coolant temperature gauge and to the right of the speedometer in the instrument cluster. The MIL consists of a stencil-like cutout of the International Control and Display Symbol icon for "Engine" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the icon to appear in amber through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit

board. The MIL is serviced as a unit with the instrument cluster.

OPERATION

The Malfunction Indicator Lamp (MIL) gives an indication to the vehicle operator when the Powertrain Control Module (PCM) has recorded a Diagnostic Trouble Code (DTC) for an On-Board Diagnostics II (OBDII) emissions-related circuit or component malfunction. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon cluster programming and electronic messages received by the cluster from the PCM over the Programmable Communications Interface (PCI) data bus. The MIL Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the MIL for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the MIL is illuminated for about seven seconds as a bulb test.

- **PCM Lamp-On Message** - Each time the cluster receives a malfunction indicator lamp-on message from the PCM, the indicator will be illuminated. The indicator can be flashed on and off, or illuminated solid, as dictated by the PCM message. For some DTC's, if a problem does not recur, the PCM will send a lamp-off message automatically. Other DTC's may require that a fault be repaired and the PCM be reset before a lamp-off message will be sent. For more information on the PCM and the DTC set and reset parameters, (Refer to 25 - EMISSIONS CONTROL - OPERATION).

- **Communication Error** - If the cluster receives no malfunction indicator lamp-on or lamp-off message from the PCM for twenty consecutive seconds, the MIL is illuminated by the instrument cluster. The indicator remains controlled and illuminated by the cluster until a valid malfunction indicator lamp-on or lamp-off message is received from the PCM.

- **Actuator Test** - Each time the cluster is put through the actuator test, the MIL will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The PCM continually monitors each of the many fuel and emissions system circuits and sensors to decide whether the system is in good operating con-

MALFUNCTION INDICATOR LAMP (MIL) (Continued)

dition. The PCM then sends the proper malfunction indicator lamp-on or lamp-off messages to the instrument cluster. For further diagnosis of the MIL or the instrument cluster circuitry that controls the LED, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). If the instrument cluster turns on the MIL after the bulb test, it may indicate that a malfunction has occurred and that the fuel and emissions system may require service. For proper diagnosis of the fuel and emissions systems, the PCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the MIL, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

ODOMETER

DESCRIPTION

An odometer and trip odometer are standard equipment in all instrument clusters. The odometer and trip odometer information are displayed in a common electronic, blue-green Vacuum Fluorescent Display (VFD), which is located in the lower edge of the speedometer dial face in the instrument cluster and, when illuminated, is visible through a small window cutout in the cluster overlay. However, the odometer and trip odometer information are not displayed simultaneously. The trip odometer reset switch on the instrument cluster electronic circuit board toggles the display between odometer and trip odometer modes by depressing the odometer/trip odometer switch knob that extends through the lower edge of the cluster lens, just right of the odometer VFD. Both the odometer and trip odometer information is stored in the instrument cluster memory.

All odometer and trip odometer distance information is stored in the instrument cluster. This distance information can be increased when the proper inputs are provided to the instrument cluster, but the distance information cannot be decreased. The odometer can display values up to 864,004 kilometers (536,870 miles). The odometer will not roll over, but will latch at the maximum value. The trip odometer can display values up to 9999.9 kilometers (9999.9 miles) before it rolls over to zero. The odometer display does not have a decimal point and will not show values less than a full unit (kilometer or mile), the trip odometer display does have a decimal point and will show tenths of a unit (kilometer or mile). When the trip odometer is active, the word "TRIP" will also illuminate near the bottom of the VFD. The unit of measure for the odometer and trip odometer display is not shown in the VFD. If the instrument cluster has a kilometers-per-hour primary speedometer scale, the odometer/trip odometer registers kilome-

ters; and if the cluster features a miles-per-hour primary speedometer scale, the odometer/trip odometer registers miles. In this instrument cluster, the odometer/trip odometer VFD is also used to display certain warning messages and diagnostic information.

The odometer/trip odometer has a "Rental Car" mode, which will illuminate the odometer information in the VFD whenever the driver side front door is opened with the ignition switch in the Off or Accessory positions. During daylight hours (exterior lamps Off) the VFD is illuminated at full brightness for clear visibility. At night (exterior lamps are On) the instrument cluster converts an electronic dimming level message received from the Body Control Module (BCM) over the Programmable Communications Interface (PCI) data bus to a digital dimming level signal for controlling the lighting level of the VFD. However, a "Parade" mode position of the panel lamps dimmer control ring on the multi-function switch left control stalk allows the VFD to be illuminated at full brightness if the exterior lamps are turned On during daylight hours.

The VFD, the trip odometer switch, and the trip odometer switch button are serviced as a unit with the instrument cluster.

OPERATION

The odometer and trip odometer give an indication to the vehicle operator of the distance the vehicle has traveled. This gauge is controlled by the instrument cluster electronic circuitry based upon cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus. The odometer and trip odometer information is displayed by the instrument cluster Vacuum Fluorescent Display (VFD). The VFD will display the odometer information whenever the driver side front door is opened with the ignition switch in the Off or Accessory positions, and will display the last previously selected odometer or trip odometer information when the ignition switch is in the On or Start positions. The instrument cluster circuitry controls the VFD and provides the following features:

- **Odometer/Trip Odometer Display Toggling** - Actuating the trip odometer reset switch momentarily with the VFD illuminated will toggle the display between the odometer and trip odometer information. Each time the VFD is illuminated with the ignition switch in the On or Start positions, the display will automatically return to the last mode previously selected (odometer or trip odometer).

- **Trip Odometer Reset** - When the trip odometer reset switch is pressed and held for longer than about two seconds with the ignitions switch in the

ODOMETER (Continued)

On or Start positions, the trip odometer will be reset to 0.0 kilometers (miles). The VFD must be displaying the trip odometer information in order for the trip odometer information to be reset.

- **Warning Display** - The odometer or trip odometer information will be toggled at two second intervals with a warning display when certain monitored conditions are active. If multiple conditions are active, the VFD will toggle each active warning and the odometer/trip odometer information at two second intervals. Once the vehicle is moving and a vehicle speed input is received by the instrument cluster, each active warning will be displayed for three two-second intervals before the VFD reverts to displaying only the selected odometer or trip odometer information. The warnings and monitored conditions include:

- **“door”** - A door is open or not fully latched.
- **“gate”** - The tailgate is open or not fully latched.
- **“glass”** - The rear flip-up glass is open or not fully latched.
- **“lowash”** - The fluid level in the washer reservoir is low.
- **“no bus”** - The instrument cluster can detect no PCI bus communication. This message is illuminated solid when there is no PCI bus communication, and will override the display of all other active warning displays.

- **Communication Error** - If the cluster fails to receive a distance message during normal operation, it will hold and display the last data received until the ignition switch is turned to the Off position. If the cluster does not receive a distance message within one second after the ignition switch is turned to the On position, it will display the last distance message stored in the cluster memory. If the cluster is unable to display distance information due to an error internal to the cluster, “error” will be displayed in the VFD.

- **Actuator Test** - Each time the cluster is put through the actuator test, the VFD will step sequentially through a display of “111111” through “999999”, then display the cluster software version number to confirm the functionality of the VFD and the cluster control circuitry.

The PCM continually monitors the vehicle speed pulse information received from the Body Control Module (BCM), then sends the proper distance messages to the instrument cluster. For further diagnosis of the odometer/trip odometer or the instrument cluster circuitry that controls these functions, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the vehicle speed sensor, the BCM, the PCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the odometer/trip

odometer, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

OVERDRIVE OFF INDICATOR

DESCRIPTION

An overdrive off indicator is standard equipment on all instrument clusters, but is only functional on vehicles equipped with the optional overdrive automatic transmission. The overdrive off indicator is located above the fuel gauge and to the left of the tachometer in the instrument cluster. The overdrive off indicator consists of a stencil-like cutout of the text “O/D OFF” in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the “O/D OFF” text to appear in amber through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. When the exterior lighting is turned On, the illumination intensity of the overdrive off indicator is dimmable, which is adjusted using the panel lamps dimmer control ring on the left control stalk of the multi-function switch. The overdrive off indicator is serviced as a unit with the instrument cluster.

OPERATION

The overdrive off indicator gives an indication to the vehicle operator when the Off position of the overdrive off switch has been selected, disabling the electronically controlled overdrive feature of the automatic transmission. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus. The overdrive off indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the overdrive off indicator for the following reasons:

- **Overdrive Off Lamp-On Message** - Each time the cluster receives an overdrive off lamp-on message

OVERDRIVE OFF INDICATOR (Continued)

from the PCM indicating that the Off position of the overdrive off switch has been selected, the overdrive off indicator will be illuminated. The indicator remains illuminated until the cluster receives an overdrive off lamp-off message from the PCM or until the ignition switch is turned to the Off position, whichever occurs first.

- **Actuator Test** - Each time the cluster is put through the actuator test, the overdrive off indicator will be turned on, then off again during the bulb check portion of the test in order to confirm the functionality of the LED and the cluster control circuitry.

The PCM continually monitors the overdrive off switch to determine the proper outputs to the automatic transmission. The PCM then sends the proper overdrive off lamp-on and lamp-off messages to the instrument cluster. For further diagnosis of the overdrive off indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the overdrive control system, the PCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the overdrive off indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

REAR FOG LAMP INDICATOR

DESCRIPTION

A rear fog lamp indicator is standard equipment on all instrument clusters, but is only functional on vehicles equipped with the optional rear fog lamps, which are available only in certain markets where they are required. The rear fog lamp indicator is located above the engine temperature gauge and to the right of the speedometer in the instrument cluster. The rear fog lamp indicator consists of a stencil-like cutout of the International Control and Display Symbol icon for "Rear Fog Light" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the icon to appear in amber through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. When the exterior lighting is turned On, the illumination intensity of the rear fog lamp indicator is dimmable, which is adjusted using the panel lamps dimmer control ring on the left control stalk of the multi-function switch. The rear fog lamp indicator is serviced as a unit with the instrument cluster.

OPERATION

The rear fog lamp indicator gives an indication to the vehicle operator whenever the rear fog lamps are illuminated. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon the cluster programming and electronic messages received by the cluster from the Body Control Module (BCM) over the Programmable Communications Interface (PCI) data bus. The rear fog lamp indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will allow this indicator to operate whenever the instrument cluster receives a battery current input on the fused B(+) circuit. Therefore, the LED can be illuminated regardless of the ignition switch position. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the rear fog lamp indicator for the following reasons:

- **Rear Fog Lamp-On Message** - Each time the cluster receives a rear fog lamp-on message from the BCM indicating the rear fog lamps are turned On, the rear fog lamp indicator will be illuminated. The indicator remains illuminated until the cluster receives a rear fog lamp-off message from the BCM.

- **Actuator Test** - Each time the cluster is put through the actuator test, the rear fog lamp indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The BCM continually monitors the exterior lighting (multi-function) switch to determine the proper outputs to the rear fog lamp relay. The BCM then sends the proper rear fog lamp indicator lamp-on and lamp-off messages to the instrument cluster. For further diagnosis of the rear fog lamp indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the rear fog lamp system, the BCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the rear fog lamp indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

SEATBELT INDICATOR

DESCRIPTION

A seatbelt indicator is standard equipment on all instrument clusters. The seatbelt indicator is located above the fuel gauge and to the right of the tachometer in the instrument cluster. The seatbelt indicator consists of a stencil-like cutout of the International Control and Display Symbol icon for "Seat Belt" in the opaque layer of the instrument cluster overlay.

SEATBELT INDICATOR (Continued)

The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A red Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the icon to appear in red through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. The seatbelt indicator is serviced as a unit with the instrument cluster.

OPERATION

The seatbelt indicator gives an indication to the vehicle operator of the status of the driver side front seatbelt. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon the cluster programming and electronic messages received by the cluster from the Airbag Control Module (ACM) over the Programmable Communications Interface (PCI) data bus. The seatbelt indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the seatbelt indicator for the following reasons:

- **Seatbelt Reminder Function** - Each time the cluster receives a battery current input on the fused ignition switch output (run-start) circuit, the indicator will be illuminated as a seatbelt reminder for about seven seconds, or until the ignition switch is turned to the Off position, whichever occurs first. This reminder function will occur regardless of the status of the electronic seat belt lamp-on or lamp-off messages received by the cluster from the ACM.

- **Seat Belt Lamp-On Message** - Following the seatbelt reminder function, each time the cluster receives a seat belt lamp-on message from the ACM indicating the driver side front seat belt is not fastened with the ignition switch in the Start or On positions, the indicator will be illuminated. The seatbelt indicator remains illuminated until the cluster receives a seat belt lamp-off message, or until the ignition switch is turned to the Off position, whichever occurs first.

- **Actuator Test** - Each time the cluster is put through the actuator test, the seatbelt indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The ACM continually monitors the status of both front seat belt switches to determine the proper airbag system response to a frontal impact of the vehicle. The ACM then sends the proper seatbelt indicator lamp-on and lamp-off messages to the instrument cluster based upon the status of the driver side front seat belt switch input. For further diagnosis of the seatbelt indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the seatbelt switches, the ACM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the seatbelt indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

SECURITY INDICATOR**DESCRIPTION**

A security indicator is standard equipment on all instrument clusters, but is only functional on vehicles equipped with the optional Vehicle Theft Security System (VTSS). The security indicator is located near the lower edge of the instrument cluster below the tachometer and to the right of the fuel gauge. The security indicator consists of a small stencil-like round cutout in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A red Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the indicator to appear in red through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. The security indicator is serviced as a unit with the instrument cluster.

OPERATION

The security indicator gives an indication to the vehicle operator when the Vehicle Theft Alarm (VTA) portion of the Vehicle Theft Security System (VTSS) is arming or is armed. This indicator is controlled on the instrument cluster circuit board based upon a hard wired input to the cluster from the Body Control Module (BCM) on the VTSS indicator driver circuit. The security indicator Light Emitting Diode (LED) receives battery current on the instrument cluster electronic circuit board through the fused B(+) circuit at all times; therefore, the LED will remain functional regardless of the ignition switch position. The LED only illuminates when it is provided a path to ground by the BCM. The security

SECURITY INDICATOR (Continued)

indicator will be illuminated for the following reasons:

- **VTSS Indication** - During the sixteen second VTA pre-arming function, the BCM will flash the security indicator on and off repeatedly at a steady, fast rate to indicate that the VTA is in the process of arming. Following successful VTA arming, the BCM flashes the security indicator on and off continuously at a slower rate to indicate that the VTA is armed. The security indicator continues flashing at the slower rate until the VTA is disarmed.

The BCM provides a hard wired ground input to the instrument cluster circuitry through the VTSS indicator driver circuit whenever the ignition switch is in the Off position and the VTA is arming, armed, or triggered. The VTSS indicator driver circuit between the BCM and the instrument cluster can be diagnosed using conventional diagnostic tools and methods. However, for proper diagnosis of the VTA and the BCM, or the hard wired inputs to the instrument cluster that control the security indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

SHIFT INDICATOR (TRANSFER CASE)

DESCRIPTION

DESCRIPTION - PART TIME INDICATOR

A part time indicator is standard equipment on all instrument clusters. The part time indicator is located near the lower edge of the tachometer dial face in the instrument cluster. The part time indicator consists of a stencil-like cutout of the words "PART TIME" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the "PART TIME" text to appear in amber through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. When the exterior lighting is turned On, the illumination intensity of the part time indicator is dimmable, which is adjusted using the panel lamps dimmer control ring on the left control stalk of the multi-function switch. The part time indicator is serviced as a unit with the instrument cluster.

DESCRIPTION - FULL TIME INDICATOR

A full time indicator is standard equipment on all instrument clusters, but is only functional on vehicles equipped with the optional Selec-Trac four-wheel drive system. The full time indicator is located near the lower edge of the tachometer dial face in the instrument cluster. The full time indicator consists of a stencil-like cutout of the words "FULL TIME" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A green Light Emitting Diode (LED) behind the cutout in the opaque layer of the cluster overlay causes the "FULL TIME" text to appear in green through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. When the exterior lighting is turned On, the illumination intensity of the full time indicator is dimmable, which is adjusted using the panel lamps dimmer control ring on the left control stalk of the multi-function switch. The full time indicator is serviced as a unit with the instrument cluster.

DESCRIPTION - FOUR LOW MODE INDICATOR

A four low mode indicator is standard equipment on all instrument clusters. The four low mode indicator is located above the coolant temperature gauge and to the right of the speedometer in the instrument cluster. The four low mode indicator consists of a stencil-like cutout of the words "4 LO MODE" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the "4 LO MODE" text to appear in amber through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. The four low mode indicator is serviced as a unit with the instrument cluster.

OPERATION

OPERATION - PART TIME INDICATOR

The part time indicator gives an indication to the vehicle operator that a four-wheel drive part time operating mode of the transfer case is selected. On vehicles equipped with the standard Command-Trac four-wheel drive system, the part time indicator lights when the transfer case is engaged in the 4H or 4L positions. On vehicles equipped with the optional Selec-Trac four-wheel drive system, the part time

SHIFT INDICATOR (TRANSFER CASE) (Continued)

indicator lights when the transfer case is engaged in the 4 X 4 Part Time position. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus. The instrument cluster must be configured for the type of transfer case in the vehicle using a DRBIII® scan tool in order to provide proper operation of the part time indicator. The part time indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the part time indicator for the following reasons:

- **Part Time Lamp-On Message** - Each time the cluster receives a part time lamp-on message from the PCM indicating that a four-wheel drive part time position of the transfer case has been selected, the part time indicator will be illuminated. The indicator remains illuminated until the cluster receives a part time lamp-off message from the PCM or until the ignition switch is turned to the Off position, whichever occurs first.

- **Actuator Test** - Each time the cluster is put through the actuator test, the part time indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The PCM continually monitors the transfer case switch to determine the driveline operating mode. The PCM then sends the proper part time lamp-on and lamp-off messages to the instrument cluster. For further diagnosis of the part time indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the transfer case switch, the PCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the part time indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

OPERATION - FULL TIME INDICATOR

The full time indicator gives an indication to the vehicle operator that a four-wheel drive full time operating mode of the transfer case is selected. On vehicles equipped with the optional Selec-Trac four-

wheel drive system, the full time indicator lights when the transfer case is engaged in the 4 X 4 Full Time position. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus. The instrument cluster must be configured for the type of transfer case in the vehicle using a DRBIII® scan tool in order to provide proper operation of the full time indicator. The full time indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the full time indicator for the following reasons:

- **Full Time Lamp-On Message** - Each time the cluster receives a full time lamp-on message from the PCM indicating that a four-wheel drive full time position of the transfer case has been selected, the full time indicator will be illuminated. The indicator remains illuminated until the cluster receives a full time lamp-off message from the PCM or until the ignition switch is turned to the Off position, whichever occurs first.

- **Actuator Test** - Each time the cluster is put through the actuator test, the full time indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The PCM continually monitors the transfer case switch to determine the driveline operating mode. The PCM then sends the proper full time lamp-on and lamp-off messages to the instrument cluster. For further diagnosis of the full time indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the transfer case switch, the PCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the full time indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

OPERATION - FOUR LOW MODE INDICATOR

The four low mode indicator gives an indication to the vehicle operator that a four-wheel drive low operating mode of the transfer case is selected. On vehicles equipped with the standard Command-Trac four-

SHIFT INDICATOR (TRANSFER CASE) (Continued)

wheel drive system, the four low mode indicator lights when the transfer case is engaged in the 4L position. On vehicles equipped with the optional Selec-Trac four-wheel drive system, the four low mode indicator lights when the transfer case is engaged in the 4 Lo position. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus. The instrument cluster must be configured for the type of transfer case in the vehicle using a DRBIII® scan tool in order to provide proper operation of the four low mode indicator. The four low mode indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the four low mode indicator for the following reasons:

- **Four Low Mode Lamp-On Message** - Each time the cluster receives a four low mode lamp-on message from the PCM indicating that a four-wheel drive low position of the transfer case has been selected, the four low mode indicator will be illuminated. The indicator remains illuminated until the cluster receives a four low mode lamp-off message from the PCM or until the ignition switch is turned to the Off position, whichever occurs first.

- **Actuator Test** - Each time the cluster is put through the actuator test, the four low mode indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The PCM continually monitors the transfer case switch to determine the driveline operating mode. The PCM then sends the proper four low mode lamp-on and lamp-off messages to the instrument cluster. For further diagnosis of the four low mode indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the transfer case switch, the PCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the four low mode indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

SKIS INDICATOR

DESCRIPTION

A Sentry Key Immobilizer System (SKIS) indicator is standard equipment on all instrument clusters, but is only operational on vehicles equipped with the optional SKIS. The SKIS indicator is located above the fuel gauge and to the left of the tachometer in the instrument cluster. The SKIS indicator consists of a stencil-like cutout of a graphical representation or icon of a key that is circled and crossed-out in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the indicator to appear in amber through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. The SKIS indicator is serviced as a unit with the instrument cluster.

OPERATION

The Sentry Key Immobilizer System (SKIS) indicator gives an indication to the vehicle operator of the status of the SKIS. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon the cluster programming and electronic messages received by the cluster from the Sentry Key Immobilizer Module (SKIM) over the Programmable Communications Interface (PCI) data bus. The SKIS indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is switched to ground by the instrument cluster transistor. The instrument cluster will turn on the SKIS indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position, the SKIM tells the cluster to illuminate the SKIS indicator for about three seconds as a bulb test.

- **SKIS Lamp-On Message** - Each time the cluster receives a SKIS lamp-on message from the SKIM, the SKIS indicator will be illuminated. The indicator can be flashed on and off, or illuminated solid, as dictated by the SKIM message. For more information on the SKIS and the SKIS indicator control parameters, (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - OPERATION). The indicator remains illuminated until the cluster receives a SKIS lamp-off

SKIS INDICATOR (Continued)

message from the SKIM or until the ignition switch is turned to the Off position, whichever occurs first.

- **Communication Error** - If the cluster receives no SKIS lamp-on or lamp-off messages from the SKIM for twenty consecutive seconds, the SKIS indicator is illuminated by the instrument cluster. The indicator remains controlled and illuminated by the cluster until a valid SKIS lamp-on or lamp-off message is received from the SKIM.

- **Actuator Test** - Each time the cluster is put through the actuator test, the SKIS indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The SKIM performs a self-test each time the ignition switch is turned to the On position to decide whether the system is in good operating condition and whether a valid key is present in the ignition lock cylinder. The SKIM then sends the proper SKIS lamp-on or lamp-off messages to the instrument cluster. For further diagnosis of the SKIS indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). If the instrument cluster flashes the SKIS indicator upon ignition On, or turns on the SKIS indicator solid after the bulb test, it indicates that a SKIS malfunction has occurred or that the SKIS is inoperative. For proper diagnosis of the SKIS, the PCI data bus, or the electronic message inputs to the instrument cluster that control the SKIS indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

SPEEDOMETER

DESCRIPTION

A speedometer is standard equipment on all instrument clusters. The speedometer is located to the right of the tachometer in the instrument cluster. The speedometer consists of a movable gauge needle or pointer controlled by the instrument cluster circuitry, and a fixed 255 degree primary scale on the gauge dial face that reads left-to-right either from 0 to 120 mph, or from 0 to 240 km/h, depending upon the market for which the vehicle is manufactured. Most models also have a smaller secondary inner scale on the gauge dial face that provides the equivalent opposite measurement units from the primary scale. Text appearing on the cluster overlay just below the hub of the speedometer needle abbreviates the unit of measure for the primary scale first (i.e.: MPH or km/h), followed by the unit of measure for the secondary scale (i.e.: MPH or km/h). The speedometer graphics are dark blue (primary scale) and

light blue (secondary scale) against a beige field, making them clearly visible within the instrument cluster in daylight. When illuminated from behind by the panel lamps dimmer controlled cluster illumination lighting with the exterior lamps turned On, both the dark blue and light blue graphics retain their blue colors. The orange gauge needle is internally illuminated. Gauge illumination is provided by replaceable incandescent bulb and bulb holder units located on the instrument cluster electronic circuit board. The speedometer is serviced as a unit with the instrument cluster.

OPERATION

The speedometer gives an indication to the vehicle operator of the vehicle road speed. This gauge is controlled by the instrument cluster electronic circuit board based upon cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus. The speedometer is an air core magnetic unit that receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (run-start) circuit whenever the ignition switch is in the On or Start positions. The cluster is programmed to move the gauge needle back to the low end of the scale after the ignition switch is turned to the Off position. The instrument cluster circuitry controls the gauge needle position and provides the following features:

- **Vehicle Speed Message** - Each time the cluster receives a vehicle speed message from the PCM it will calculate the correct vehicle speed reading and position the gauge needle at that speed position on the gauge scale. The cluster will receive a new vehicle speed message and reposition the gauge pointer accordingly about every 86 milliseconds. The gauge needle will continue to be positioned at the actual vehicle speed position on the gauge scale until the ignition switch is turned to the Off position.

- **Communication Error** - If the cluster fails to receive a speedometer message, it will hold the gauge needle at the last indication for about six seconds, or until the ignition switch is turned to the Off position, whichever occurs first. If a new speed message is not received after about six seconds, the gauge needle will return to the far left (low) end of the scale.

- **Actuator Test** - Each time the cluster is put through the actuator test, the gauge needle will be swept to several calibration points on the gauge scale in sequence in order to confirm the functionality of the gauge and the cluster control circuitry.

The PCM continually monitors the vehicle speed information received from the Body Control Module (BCM) to determine the vehicle road speed, then

SPEEDOMETER (Continued)

sends the proper vehicle speed messages to the instrument cluster. For further diagnosis of the speedometer or the instrument cluster circuitry that controls the gauge, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the BCM, the PCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the speedometer, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

TACHOMETER

DESCRIPTION

A tachometer is standard equipment on all instrument clusters. The tachometer is located to the left of the speedometer in the instrument cluster. The tachometer consists of a movable gauge needle or pointer controlled by the instrument cluster circuitry, and a fixed 255 degree scale on the gauge dial face that reads left-to-right from 0 to 7 for gasoline engines, or from 0 to 5 for diesel engines. The text "RPM X 1000" imprinted on the cluster overlay directly below the hub of the tachometer needle identifies that each number on the tachometer scale is to be multiplied by 1000 rpm. The gasoline engine tachometer has a red zone beginning at 5800 RPM, while the red zone for the diesel engine tachometer begins at 4300 RPM. The tachometer graphics are dark blue and red against a beige field, making them clearly visible within the instrument cluster in daylight. When illuminated from behind by the panel lamps dimmer controlled cluster illumination lighting with the exterior lamps turned On, the dark blue graphics appear blue and the red graphics appear red. The orange gauge needle is internally illuminated. Gauge illumination is provided by replaceable incandescent bulb and bulb holder units located on the instrument cluster electronic circuit board. The tachometer is serviced as a unit with the instrument cluster.

OPERATION

The tachometer gives an indication to the vehicle operator of the engine speed. This gauge is controlled by the instrument cluster electronic circuit board based upon cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus. The tachometer is an air core magnetic unit that receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (run-start) circuit whenever the ignition switch is in the On or Start positions. The cluster is programmed to

move the gauge needle back to the low end of the scale after the ignition switch is turned to the Off position. The instrument cluster circuitry controls the gauge needle position and provides the following features:

- **Engine Speed Message** - Each time the cluster receives an engine speed message from the PCM it will calculate the correct engine speed reading and position the gauge needle at that speed position on the gauge scale. The cluster will receive a new engine speed message and reposition the gauge pointer accordingly about every 86 milliseconds. The gauge needle will continue to be positioned at the actual engine speed position on the gauge scale until the ignition switch is turned to the Off position.

- **Communication Error** - If the cluster fails to receive an engine speed message, it will hold the gauge needle at the last indication for about six seconds, or until the ignition switch is turned to the Off position, whichever occurs first. If a new engine speed message is not received after about six seconds, the gauge needle will return to the far left (low) end of the scale.

- **Actuator Test** - Each time the cluster is put through the actuator test, the gauge needle will be swept to several calibration points on the gauge scale in sequence in order to confirm the functionality of the gauge and the cluster control circuitry.

The PCM continually monitors the crankshaft position sensor to determine the engine speed, then sends the proper engine speed messages to the instrument cluster. For further diagnosis of the tachometer or the instrument cluster circuitry that controls the gauge, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the crankshaft position sensor, the PCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the tachometer, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

TRANS TEMP INDICATOR

DESCRIPTION

A transmission over-temperature indicator is standard equipment on all instrument clusters, but is only functional on vehicles equipped with an optional automatic transmission. The transmission over-temperature indicator is located near the lower edge of the instrument cluster, between the tachometer and the speedometer. The transmission over-temperature indicator consists of a stencil-like cutout of the words "TRANS TEMP" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly vis-

TRANS TEMP INDICATOR (Continued)

ible when it is not illuminated. An amber Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the "TRANS TEMP" text to appear in amber through the translucent outer layer of the overlay when the indicator is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. The transmission over-temperature indicator is serviced as a unit with the instrument cluster.

OPERATION

The transmission over-temperature indicator gives an indication to the vehicle operator when the transmission fluid temperature is excessive, which may lead to accelerated transmission component wear or failure. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus. The transmission over-temperature indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the transmission over-temperature indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the transmission over-temperature indicator is illuminated for about three seconds as a bulb test.

- **Trans Over-Temp Lamp-On Message** - Each time the cluster receives a trans over-temp lamp-on message from the PCM indicating that the transmission fluid temperature is 135° C (275° F) or higher, the indicator will be illuminated. The indicator remains illuminated until the cluster receives a trans over-temp lamp-off message from the PCM, or until the ignition switch is turned to the Off position, whichever occurs first.

- **Actuator Test** - Each time the cluster is put through the actuator test, the trans over-temp indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The PCM continually monitors the transmission temperature sensor to determine the transmission operating condition. The PCM then sends the proper trans over-temp lamp-on and lamp-off messages to the instrument cluster. If the instrument cluster

turns on the transmission over-temperature indicator due to a high transmission oil temperature condition, it may indicate that the transmission and/or the transmission cooling system are being overloaded or that they require service. For further diagnosis of the transmission over-temperature indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the transmission temperature sensor, the PCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the transmission over-temperature indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

TURN SIGNAL INDICATOR

DESCRIPTION

Two turn signal indicators, one right and one left, are standard equipment on all instrument clusters. The turn signal indicators are located near the upper edge of the instrument cluster, between the speedometer and the tachometer. Each turn signal indicator consists of a stencil-like cutout of the International Control and Display Symbol icon for "Turn Warning" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents these icons from being clearly visible when they are not illuminated. A green Light-Emitting Diode (LED) behind each cutout in the opaque layer of the cluster overlay causes the indicator to appear in green through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. The turn signal indicators are serviced as a unit with the instrument cluster.

OPERATION

The turn signal indicators give an indication to the vehicle operator that the turn signal (left or right indicator flashing) or hazard warning (both left and right indicators flashing) have been selected and are operating. These indicators are controlled by two individual hard wired inputs from the combination flasher circuitry within the hazard switch to the instrument cluster electronic circuit board. Each turn signal indicator Light Emitting Diode (LED) is grounded on the instrument cluster electronic circuit board at all times; therefore, these indicators remain functional regardless of the ignition switch position. Each LED will only illuminate when it is provided battery current by the combination flasher circuitry of the hazard switch.

TURN SIGNAL INDICATOR (Continued)

The turn signal indicators are connected in parallel with the other turn signal circuits. This arrangement allows the turn signal indicators to remain functional, regardless of the condition of the other circuits in the turn signal and hazard warning systems. The combination flasher outputs of the hazard switch to the instrument cluster turn signal indicator inputs can be diagnosed using conventional diagnostic tools and methods. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HAZARD SWITCH - DESCRIPTION) for more information on the combination flasher and hazard switch operation.

WAIT-TO-START INDICATOR

DESCRIPTION

A wait-to-start indicator is only found in the instrument clusters of vehicles equipped with an optional diesel engine. The wait-to-start indicator is located above the fuel gauge and to the left of the tachometer in the instrument cluster. The wait-to-start indicator consists of a stencil-like cutout of the International Control and Display Symbol icon for "Diesel Preheat" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the icon to appear in amber through the translucent outer layer of the overlay when it is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. The wait-to-start indicator is serviced as a unit with the instrument cluster.

OPERATION

The wait-to-start indicator gives an indication to the vehicle operator when the diesel engine glow plugs are energized in their pre-heat operating mode. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus. The wait-to-start indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will

turn on the wait-to-start indicator for the following reasons:

- **Wait-To-Start Lamp-On Message** - Each time the cluster receives a wait-to-start lamp-on message from the PCM indicating the glow plugs are heating and the driver must wait to start the engine, the wait-to-start indicator will be illuminated. The indicator remains illuminated until the cluster receives a wait-to-start lamp-off message, or until the ignition switch is turned to the Off position, whichever occurs first.

- **Actuator Test** - Each time the cluster is put through the actuator test, the wait-to-start indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The PCM continually monitors the ambient temperature and the glow plug pre-heater circuits to determine how long the glow plugs must be heated in the pre-heat operating mode. The PCM then sends the proper wait-to-start lamp-on and lamp-off messages to the instrument cluster. For further diagnosis of the wait-to-start indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the glow plug pre-heater control circuits, the PCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the wait-to-start indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

WASHER FLUID INDICATOR

DESCRIPTION

A washer fluid indicator is standard equipment on all instrument clusters. The washer fluid indicator consists of the text "lowash", which appears in place of the odometer/trip odometer information in the Vacuum-Fluorescent Display (VFD) of the instrument cluster. The VFD is part of the cluster electronic circuit board, and is visible through a cutout located near the lower edge of the speedometer dial face in the instrument cluster. The dark outer layer of the overlay prevents the VFD from being clearly visible when it is not illuminated. The text message "lowash" appears in the same blue-green color and at the same lighting level as the odometer/trip odometer information through the translucent outer layer of the overlay when it is illuminated by the instrument cluster electronic circuit board. The washer fluid indicator is serviced as a unit with the instrument cluster.

WASHER FLUID INDICATOR (Continued)

OPERATION

The washer fluid indicator gives an indication to the vehicle operator that the fluid level in the washer reservoir is low. This indicator is controlled by the instrument cluster electronic circuit board based upon cluster programming and a hard wired input received by the cluster from the washer fluid level switch mounted on the washer reservoir. The washer fluid indicator function of the Vacuum Fluorescent Display (VFD) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The instrument cluster will turn on the washer fluid indicator for the following reasons:

- **Washer Fluid Level Switch Input** - Each time the cluster detects ground on the low washer fluid sense circuit (washer fluid level switch closed = washer fluid level low) the cluster applies an algorithm to confirm that the input is correct and not the result of fluid sloshing in the washer reservoir. The cluster tests the status of the circuit about seven milliseconds after ignition On, and about once every second thereafter, then uses an internal counter to count up or down. When the counter accumulates thirty ground inputs on the circuit, the washer fluid indicator will be illuminated. If the vehicle is not moving when the washer fluid level switch input counter reaches thirty, the VFD will repeatedly and sequentially cycle its indication in two second intervals with the odometer/trip odometer information, the low washer fluid warning, and any other active warnings including: door ajar, gate ajar, and glass ajar. If the vehicle is moving, or once the cluster of a non-moving vehicle receives an electronic vehicle speed message from the Powertrain Control Module (PCM) indicating a speed greater than zero, the warning sequence will consist of three complete display cycles, then revert to only the odometer/trip odometer display. Once the washer fluid indicator warning has completed, the washer fluid indicator is extinguished and will not repeat until the ignition switch is cycled.

The instrument cluster continually monitors the washer fluid level switch in the washer reservoir to determine the status of the washer fluid level. For further diagnosis of the washer fluid indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). The washer fluid level switch and circuits can be diagnosed using conventional diagnostic tools and methods. The washer fluid level switch also features a 3.3

kilohm diagnostic resistor connected in parallel between the switch input and output to provide the cluster with verification that the low washer fluid sense circuit is not open or shorted. This input can be monitored using a DRBIII® scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING - WASHER FLUID INDICATOR

The diagnosis found here addresses an inoperative washer fluid indicator condition. If the problem being diagnosed is related to indicator accuracy, be certain to confirm that the problem is with the indicator or washer fluid level switch input and not with a damaged or empty washer fluid reservoir, or inoperative instrument cluster indicator control circuitry. Inspect the washer fluid reservoir for proper fluid level and signs of damage or distortion that could affect washer fluid level switch performance and perform the instrument cluster actuator test before you proceed with the following diagnosis. If no washer fluid reservoir or instrument cluster control circuitry problem is found, the following procedure will help to locate a short or open in the washer fluid switch sense circuit. 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.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

INDICATOR DOES NOT ILLUMINATE WITH WASHER RESERVOIR EMPTY

(1) Disconnect and isolate the battery negative cable. Disconnect the headlamp and dash wire harness connector for the washer fluid level switch from the washer fluid level switch connector receptacle. Check for continuity between the ground circuit cav-

WASHER FLUID INDICATOR (Continued)

ity of the headlamp and dash wire harness connector for the washer fluid level switch and a good ground. There should be continuity. If OK, go to Step 2. If not OK, repair the open ground circuit to ground (G111) as required.

(2) Remove the instrument cluster from the instrument panel. Check for continuity between the washer fluid sense circuit cavities of the headlamp and dash wire harness connector for the washer fluid level switch and the instrument panel wire harness connector (Connector C2) for the instrument cluster. If OK, replace the faulty washer fluid level switch. If not OK, repair the open washer fluid switch sense circuit between the washer fluid level switch and the instrument cluster as required.

INDICATOR STAYS ILLUMINATED WITH WASHER RESERVOIR FULL

(1) Disconnect and isolate the battery negative cable. Disconnect the headlamp and dash wire harness connector for the washer fluid level switch from the washer fluid level switch connector receptacle. Check for continuity between the ground circuit terminal and the washer fluid sense terminal in the washer fluid level switch connector receptacle. There should be no continuity. If OK, go to Step 2. If not OK, replace the faulty washer fluid level switch.

(2) Remove the instrument cluster from the instrument panel. Check for continuity between the washer fluid sense circuit cavity of the headlamp and dash wire harness connector for the washer fluid level switch and a good ground. There should be no continuity. If not OK, repair the shorted washer fluid switch sense circuit between the washer fluid level switch and the instrument cluster as required.

WATER-IN-FUEL INDICATOR

DESCRIPTION

A water-in-fuel indicator is only found in the instrument clusters of vehicles equipped with an optional diesel engine. The water-in-fuel indicator is located above the coolant temperature gauge and to the right of the speedometer in the instrument cluster. The water-in-fuel indicator consists of a stencil-like cutout of the International Control and Display Symbol icon for "Water In Fuel" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A red Light Emitting Diode (LED) behind the cutout in the opaque layer of the overlay causes the icon to appear in red through the translucent outer layer of the overlay when the indicator is illuminated from behind by the LED, which is soldered onto the instrument cluster electronic circuit board. The

water-in-fuel indicator is serviced as a unit with the instrument cluster.

OPERATION

The water-in-fuel indicator gives an indication to the vehicle operator when there is excessive water in the fuel system. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus. The water-in-fuel indicator Light Emitting Diode (LED) is completely controlled by the instrument cluster logic circuit, and that logic will only allow this indicator to operate when the instrument cluster receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the water-in-fuel indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the water-in-fuel indicator is illuminated for about three seconds as a bulb test.
- **Water-In-Fuel Lamp-On Message** - Each time the cluster receives a water-in-fuel lamp-on message from the PCM indicating there is excessive water in the diesel fuel system, the water-in-fuel indicator will be illuminated. The indicator remains illuminated until the cluster receives a water-in-fuel lamp-off message, or until the ignition switch is turned to the Off position, whichever occurs first.
- **Actuator Test** - Each time the cluster is put through the actuator test, the water-in-fuel indicator will be turned on, then off again during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The PCM continually monitors the water-in-fuel sensor to determine whether there is excessive water in the diesel fuel. The PCM then sends the proper water-in-fuel lamp-on and lamp-off messages to the instrument cluster. For further diagnosis of the water-in-fuel indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the water-in-fuel-sensor, the PCM, the PCI data bus, or the electronic message inputs to the instrument cluster that control the water-in-fuel indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

LAMPS

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LAMPS/LIGHTING - EXTERIOR**DESCRIPTION**

The exterior lighting system for this model includes the following exterior lamps (Fig. 1):

- **Backup Lamps** - The backup (or reverse) lamps are integral to the rear lamp units mounted to the back of the quarter panel on each side of the tailgate at the rear of the vehicle.
- **Brake Lamps** - The brake (or stop) lamps include a lamp that is integral to the rear lamp units mounted to the back of the quarter panel on each side of the tailgate, and the Center High Mounted Stop Lamp (CHMSL) that is centered on the rear edge of the roof panel above the flip-up glass opening at the rear of the vehicle.

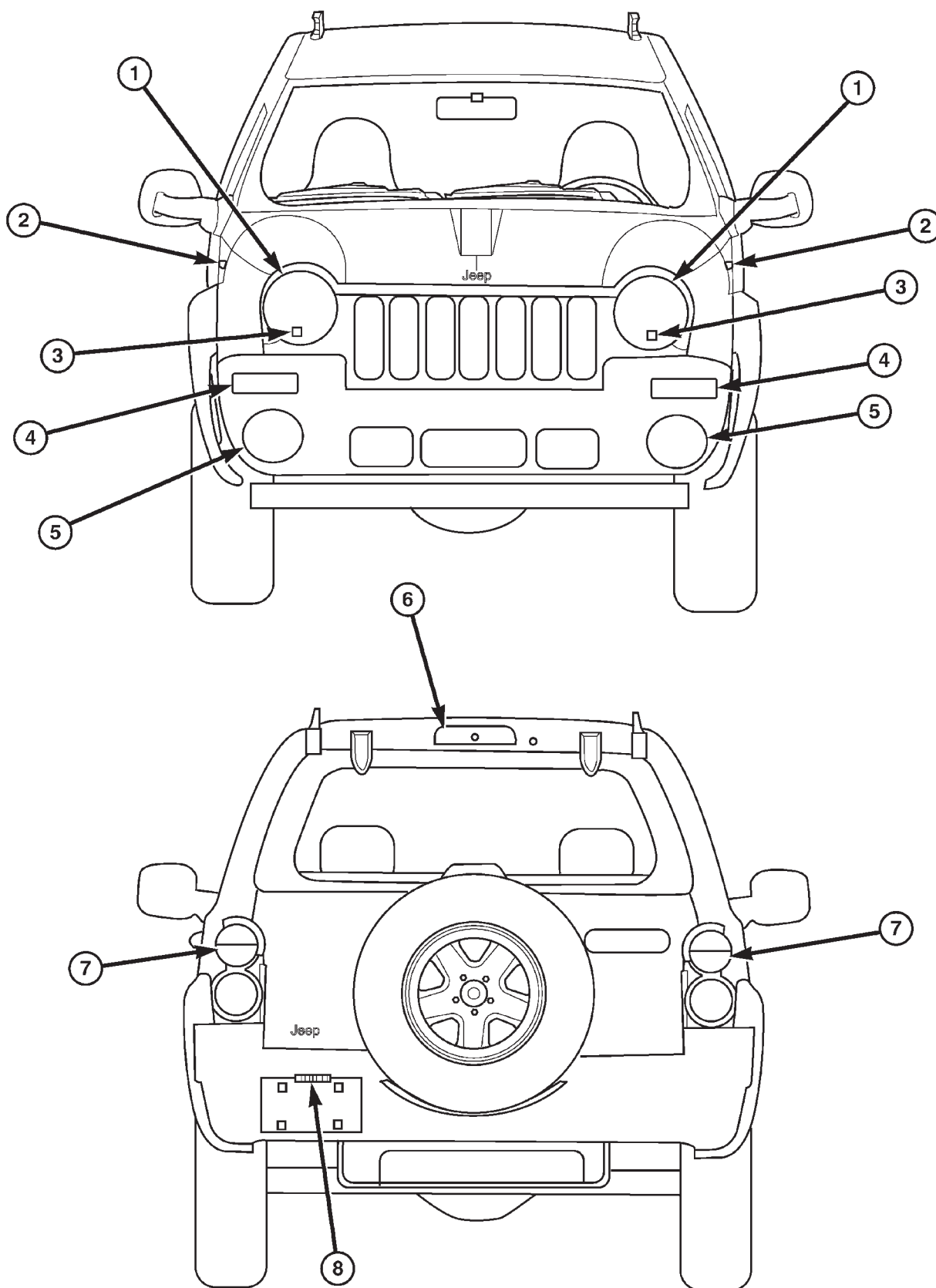
- **Daytime Running Lamps** - Vehicles manufactured for sale in Canada illuminate the high beam filament in each headlamp bulb serves as the Daytime Running Lamps (DRL).

- **Front Fog Lamps** - Optional front fog lamps include a single round front fog lamp unit with an adjustable reflector and a removable bulb that is secured behind a dedicated opening on each forward-facing end of the front bumper fascia.

- **Hazard Warning Lamps** - The hazard warning lamps include all of the right and left turn signal lamps.

- **Headlamps** - A single round headlamp housing with a fixed lens, an adjustable reflector, and a single removable halogen bulb is secured to the grille opening panel on each side of the grille opening at the

LAMPS/LIGHTING - EXTERIOR (Continued)



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Fig. 1 Exterior Lamps

LAMPS/LIGHTING - EXTERIOR (Continued)

- 1 - HEADLAMP UNIT (2)
- 2 - REPEATER LAMP UNIT (2)
- 3 - FRONT POSITION LAMP (2)
- 4 - FRONT LAMP UNIT (2)
- 5 - FRONT FOG LAMP (2)

- 6 - CENTER HIGH MOUNTED STOP LAMP UNIT
- 7 - REAR LAMP UNIT
- 8 - LICENSE PLATE LAMP UNIT

front of the vehicle. In certain markets where required, a headlamp leveling actuator motor is included on each headlamp.

- **Park Lamps** - The park lamps include the front park lamps and front side marker lamps that are integral to the front lamp units mounted at each end of the bumper fascia at the front of the vehicle, as well as the rear park lamps and rear side marker lamps that are integral to the rear lamp units mounted to the back of the quarter panel on each side of the tailgate at the rear of the vehicle. The park lamps include a license plate lamp or lamps, depending upon the requirements of the market for which the vehicle is manufactured. Vehicles with a license plate tub located near the left end of the rear bumper fascia have a single lamp, while vehicles with a license plate module located on the spare tire carrier have two license plate lamps. In certain markets where required, a front position lamp that is integral to each headlamp unit is illuminated instead of the front park lamps and front side marker lamps in the park lamps circuit; and, a rectangular, red reflector is located on the rear bumper fascia just inboard and below each rear lamp unit.

- **Rear Fog Lamps** - Rear fog lamps are available only in certain markets where they are required equipment. The rear fog lamps are integral to the rear lamp units mounted to the back of the quarter panel on each side of the tailgate at the rear of the vehicle.

- **Turn Signal Lamps** - The turn signal lamps include the front turn signal and front side marker lamps that are integral to the front lamp units mounted at each end of the bumper fascia at the front of the vehicle, as well as rear turn signal lamps that are integral to the rear lamp units mounted to the back of the quarter panel on each side of the tailgate at the rear of the vehicle. In certain markets where required, a repeater lamp unit mounted to each front fender just behind the front wheel opening is illuminated instead of the front side marker lamp in each turn signal lamp circuit.

Other components of the exterior lighting system for this model include:

- **Combination Flasher** - An electronic combination flasher is integral to the hazard warning switch in the center of the instrument panel.

- **Backup Lamp Switch** - Vehicles equipped with a manual transmission have a plunger-type backup lamp switch located on the transmission housing. A

Transmission Range Sensor (TRS) integral to the solenoid pack on the valve body of the optional electronic automatic transmission performs the backup lamp switch function on models that are so equipped.

- **Brake Lamp Switch** - A plunger-type brake lamp switch is located on the steering column support bracket under the instrument panel and actuated by the brake pedal arm.

- **Body Control Module** - The Body Control Module (BCM) is located on the Junction Block (JB) under the driver side outboard end of the instrument panel. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/BODY CONTROL MODULE - DESCRIPTION).

- **Daytime Running Lamp Relay** - Vehicles manufactured for sale in Canada use a solid state Daytime Running Lamps (DRL) relay installed in the Junction Block (JB) instead of the conventional high beam relay.

- **Front Fog Lamp Relay** - Vehicles equipped with the optional front fog lamps have a front fog lamp relay located in the Junction Block (JB).

- **Hazard Switch** - The hazard switch is located near the center of the instrument panel and includes the integral electronic combination flasher circuitry for the hazard warning system and the turn signal system.

- **Headlamp Leveling Motor** - A headlamp leveling actuator motor is located on the back of each headlamp housing of vehicles manufactured for certain markets where this equipment is required.

- **Headlamp Leveling Switch** - A thumbwheel actuated headlamp leveling switch is mounted in the driver side inboard instrument panel trim bezel of vehicles manufactured for certain markets where this equipment is required.

- **High Beam Relay** - A high beam relay is located in the Junction Block (JB) of all vehicles except those that are manufactured for sale in Canada. Canadian vehicles have a solid state Daytime Running Lamps (DRL) relay in the JB instead of the high beam relay.

- **Low Beam Relay** - A low beam relay is located in the Junction Block (JB) of all vehicles.

- **Multi-Function Switch** - The multi-function switch is located on the top of the steering column, just below the steering wheel. The multi-function switch includes a left (lighting) control stalk and a right (wiper) control stalk. The left control stalk is dedicated to providing almost all of the driver con-

LAMPS/LIGHTING - EXTERIOR (Continued)

trols for both the exterior and interior lighting systems.

- **Park Lamp Relay** - A park lamp relay is located in the Junction Block (JB) of all vehicles.

- **Rear Fog Lamp Relay** - Vehicles manufactured for certain markets where rear fog lamps are required equipment have a rear fog lamp relay located in the Junction Block (JB).

- **Trailer Tow Adapter** - Vehicles equipped with a factory-installed trailer towing package have an adapter provided that adapts the factory-installed heavy duty 7-way trailer tow connector to a conventional 4-way light duty connector.

- **Trailer Tow Connector** - Vehicles equipped with a factory-installed trailer towing package have a heavy duty 7-way trailer tow connector installed in a bracket on the trailer hitch receiver.

- **Trailer Tow Relays** - Vehicles equipped with a factory-installed trailer towing package have a connector bank containing four relays located behind the right quarter trim panel and over the right rear wheel housing. The four relays are used to supply fused ignition switch output (run), brake lamps, right turn signal, and left turn signal outputs to a trailer through the trailer tow wiring and connectors.

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 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

Following are paragraphs that briefly describe the operation of each of the major exterior lighting systems. The hard wired circuits and components of the exterior lighting systems may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the Body Control Module (BCM), the ElectroMechanical Instrument Cluster (EMIC), the Powertrain Control Module (PCM), or the Programmable Communications Interface (PCI) data bus network. The most reliable, efficient, and accurate means to diagnose the BCM, the EMIC, the PCM, and the PCI data bus

network inputs and outputs related to the various exterior lighting systems requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

BACKUP LAMPS

The backup (or reverse) lamps have a path to ground at all times through their connection to the rear lighting wire harness from a take out of the rear body wire harness with an eyelet terminal connector that is secured by a ground screw to the base of the right D-pillar behind the quarter trim panel. The backup lamps receive battery current from a fused ignition switch output (run) fuse in the Junction Block (JB) on the back-up lamp feed circuit only when the backup lamp switch (manual transmission), or backup lamp switch circuit of the Transmission Range Sensor (TRS - electronic automatic transmission) is closed by the gearshift mechanism within the transmission.

BRAKE LAMPS

The brake (or stop) lamps have a path to ground at all times through their connection to the rear lighting wire harness from a take out of the rear body wire harness with an eyelet terminal connector that is secured by a screw to the base of the right D-pillar behind the quarter trim panel. The Center High Mounted Stop Lamp (CHMSL) has a path to ground at all times through its connection to the rear body wire harness from a take out of the rear body wire harness with an eyelet terminal connector that is secured by a ground screw to the driver side D-pillar (left side D-pillar for left-hand drive, right side D-pillar for right-hand drive) behind the quarter trim panel. The brake lamps and CHMSL receive battery current from a fused B(+) fuse in the Junction Block (JB) on the brake lamp switch output circuit only when the brake lamp switch circuit of the brake lamp switch is closed by the brake pedal arm.

DAYTIME RUNNING LAMPS

Vehicles manufactured for sale in Canada illuminate the high beam filament at a reduced intensity when the engine is running and the exterior lamps are turned off. This feature is enabled by the Body Control Module (BCM) and a solid state Daytime Running Lamps (DRL) relay, which is installed in the Junction Block (JB) and the high beam relay is omitted. When the BCM monitors an engine speed signal of greater than 450 RPM and the status of the exterior lighting switch input from the multi-function switch is Off, the BCM duty cycles the DRL relay to produce illumination of the headlamp high beam filaments at a reduced intensity. The BCM also provides normal headlamp high beam operation through the DRL relay on vehicles so equipped. When the

LAMPS/LIGHTING - EXTERIOR (Continued)

DRL relay is energized, it provides battery current from a fused B(+) fuse in the JB to the headlamp high beam filament through the DRL relay output circuit.

FRONT FOG LAMPS

Vehicles equipped with optional front fog lamps have a premium Body Control Module (BCM), a front fog lamp relay installed in the Junction Block (JB), and a front fog lamp switch integral to the left (lighting) control stalk of the multi-function switch. The front fog lamps have a path to ground at all times through their connection to the front fascia wire harness from two take outs of the headlamp and dash wire harness with eyelet terminal connectors that are secured by ground screws to the left inner fender shield in the engine compartment. The BCM controls front fog lamp operation by monitoring the exterior lighting switch input from the multi-function switch, then energizing or de-energizing the front fog lamp relay control coil; and, by sending the appropriate electronic message to the instrument cluster over the Programmable Communications Interface (PCI) data bus to turn the front fog lamp indicator on or off. When the front fog lamp relay is energized, it provides battery current from a fused B(+) fuse in the JB to the front fog lamps through the front fog lamp relay output circuit. The BCM 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 with the ignition switch in the Off position. In certain markets where required, the front fog lamps are also turned off by the BCM whenever the headlamp high beams are selected. Each front fog lamp includes an integral adjustment screw to be used for static aiming the fog lamp beams.

HAZARD WARNING LAMPS

With the hazard switch in the On position, the hazard warning system is activated causing the hazard switch button illumination lamp, the right and left turn signal indicators, and the right and left turn signal lamps to flash on and off. When the hazard warning system is activated, the circuitry within the hazard switch and electronic combination flasher unit will repeatedly energize and de-energize two internal relays that switch battery current from a fused B(+) fuse in the Junction Block (JB) to the right side and left side turn signal indicators, and turn signal lamps through the right and left turn signal circuits. The flashing of the hazard switch button illumination lamp is performed internally by the hazard switch and combination flasher unit circuit board. The hazard warning lamps can also be energized by the Body Control Module (BCM) through a

hazard lamp control circuit input to the hazard switch and combination flasher unit.

HEADLAMPS

The headlamp system includes the Body Control Module (BCM), a low beam relay installed in the Junction Block (JB), a high beam relay installed in the JB (except Canada), a solid state Daytime Running Lamps (DRL) relay installed in the JB (Canada only), and the exterior lighting (headlamp and dimmer) switches integral to the left (lighting) control stalk of the multi-function switch. The headlamp bulbs have a path to ground at all times through their connection to the grille opening reinforcement wire harness from two take outs of the headlamp and dash wire harness with eyelet terminal connectors that are secured by ground screws to the left inner fender shield in the engine compartment. The BCM controls the headlamp operation by monitoring the exterior lighting switch inputs from the multi-function switch, then energizing or de-energizing the control coils of the low beam relay, the high beam relay, or the solid state circuitry of the DRL relay; and, by sending the appropriate electronic message to the instrument cluster over the Programmable Communications Interface (PCI) data bus to turn the high beam indicator on or off. When each respective relay is energized, it provides battery current from a fused B(+) fuse in the Power Distribution Center (PDC) through a relay (low beam, high beam, or DRL) output circuit and four separate fuses in the JB through individual fused right and left, low and high beam output circuits to the appropriate headlamp bulb filaments. 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 with the ignition switch in the Off position; and, a headlamp delay feature with a DRBIII® scan tool programmable delay interval. Each headlamp includes an integral adjustment screw to be used for static aiming of the headlamp beams.

HEADLAMP LEVELING

In certain markets where required, a headlamp leveling system is provided on the vehicle. The headlamp leveling system includes unique headlamp units equipped with a headlamp leveling actuator motor, and a rotary thumbwheel actuated headlamp leveling switch 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 actuator motors are mechanically connected through an integral pushrod to an adjustable headlamp reflector. The headlamp

LAMPS/LIGHTING - EXTERIOR (Continued)

leveling switch is a resistor multiplexed unit that provides one of four voltage outputs to the headlamp leveling motors. The headlamp leveling motors will move the headlamps to the selected position based upon the voltage input received from the switch. The headlamp leveling motors and switch have a path to ground at all times. The headlamp leveling components operate on battery current received through the fused park lamp relay output circuit so that the system will only operate when the exterior lighting is turned on.

PARK LAMPS

The park lamps system includes the Body Control Module (BCM), a park lamp relay installed in the Junction Block (JB), and the exterior lighting switch integral to the left (lighting) control stalk of the multi-function switch. The front park lamp and side marker or, if equipped, the front position lamp bulbs each have a path to ground at all times through their connections to the grille opening reinforcement wire harness from two take outs of the headlamp and dash wire harness with eyelet terminal connectors that are secured by ground screws to the left inner fender shield in the engine compartment. The rear park lamp bulbs and license plate lamp have a path to ground at all times through their connection to the rear lighting wire harness from a take out of the rear body wire harness with an eyelet terminal connector that is secured by a ground screw to the base of the right D-pillar behind the quarter trim panel. The BCM controls the park lamp operation by monitoring the exterior lighting switch inputs from the multi-function switch, then energizing or de-energizing the control coil of the park lamp relay. When the park lamp relay is energized, it provides battery current from a fused B(+) fuse in the Power Distribution Center (PDC) through a park lamp relay output circuit and a separate fuse in the JB through a fused park lamp relay output circuit to the appropriate lamp bulb filaments. 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 with the ignition switch in the Off position.

REAR FOG LAMPS

Rear fog lamps are installed on vehicles manufactured for certain markets where they are required. The rear fog lamp system includes a premium Body Control Module (BCM), a rear fog lamp relay installed in the Junction Block (JB), and a rear fog lamp switch integral to the left (lighting) control stalk of the multi-function switch. The rear fog lamps have a path to ground at all times through their connection to the rear lighting wire harness from a take

out of the rear body wire harness with an eyelet terminal connector that is secured by a ground screw to the base of the right D-pillar behind the quarter trim panel. The BCM controls rear fog lamp operation by monitoring the exterior lighting switch input from the multi-function switch, then energizing or de-energizing the rear fog lamp relay control coil; and, by sending the appropriate electronic message to the instrument cluster over the Programmable Communications Interface (PCI) data bus to turn the rear fog lamp indicator on or off. When the rear fog lamp relay is energized, it provides battery current from a fused B(+) fuse in the JB to the rear fog lamps through the rear fog lamp relay output circuit. The BCM provides a battery saver (load shedding) feature for the rear fog lamps, which will turn these lamps off if they are left on for more than about eight minutes with the ignition switch in the Off position.

TURN SIGNAL LAMPS

When the left control stalk of the multi-function switch is moved up (right turn) or down (left turn), the turn signal system is activated causing the selected right or left turn signal indicator, and right or left turn signal lamps to flash on and off. When the turn signal system is activated, the circuitry within the turn signal switch and the hazard switch/electronic combination flasher unit will repeatedly energize and de-energize one of two internal relays that switch battery current from a fused ignition switch output (run) fuse in the Junction Block (JB) to the right side or left side turn signal indicators and turn signal lamps through the right or left turn signal circuits. The ElectroMechanical Instrument Cluster (EMIC) chime tone generator will generate an audible turn signal cancel warning each time the vehicle is driven for a distance of about 3.2 kilometers (about two miles) with a turn signal indicator flashing. The EMIC uses Programmable Communications Interface (PCI) data bus distance messages from the Powertrain Control Module (PCM) and a hard wired input from the turn signal switch circuitry of the multi-function switch to determine when to sound the turn signal cancel warning.

DIAGNOSIS AND TESTING - LAMPS/LIGHTING - EXTERIOR

The hard wired circuits and components of the exterior lighting systems may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the Body Control Module (BCM), the ElectroMechanical Instrument Cluster (EMIC), the Powertrain Control Module (PCM), or the Programmable Communications Interface (PCI) data bus network. The most

LAMPS/LIGHTING - EXTERIOR (Continued)

reliable, efficient, and accurate means to diagnose the BCM, the EMIC, the PCM, and the PCI data bus network inputs and outputs related to the various exterior lighting systems requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

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 being diagnosed, be certain to diagnose and repair the battery and charging system as required. Also keep in mind that 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. For complete circuit diagrams, 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.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

BACKUP LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
BACKUP LAMP DOES NOT ILLUMINATE	1. Faulty or missing fuse. 2. Faulty or missing bulb. 3. Faulty switch. 4. Faulty ground circuit. 5. Faulty feed circuit.	1. Test and replace backup lamp fuse as required. 2. Test and replace backup lamp bulb as required. 3. Test and replace backup lamp switch (manual transmission) or transmission range sensor (automatic transmission) as required. 4. Test and repair backup lamp ground circuit as required. 5. Test and repair open back-up lamp feed circuit as required.
BACKUP LAMP DOES NOT EXTINGUISH	1. Faulty switch. 2. Faulty feed circuit.	1. Test and replace backup lamp switch (manual transmission) or transmission range sensor (automatic transmission) as required. 2. Test and repair shorted back-up lamp feed circuit as required.

LAMPS/LIGHTING - EXTERIOR (Continued)

BRAKE LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
BRAKE LAMP DOES NOT ILLUMINATE	1. Faulty or missing fuse. 2. Faulty or missing bulb. 3. Faulty switch. 4. Faulty ground circuit. 5. Faulty feed circuit.	1. Test and replace brake lamp fuse as required. 2. Test and replace brake lamp bulb as required. 3. Test and replace brake lamp switch as required. 4. Test and repair brake lamp ground circuit as required. 5. Test and repair open brake lamp switch output circuit as required.
BRAKE LAMP DOES NOT EXTINGUISH	1. Faulty switch. 2. Faulty feed circuit.	1. Test and replace brake lamp switch as required. 2. Test and repair shorted brake lamp switch output circuit as required.

DAYTIME RUNNING LAMPS

Before performing the following tests, determine whether the headlamp low and high beams operate.

If the headlamp high and low beams are also inoperative, diagnose and repair that problem before attempting to repair the Daytime Running Lamps.

CONDITION	POSSIBLE CAUSES	CORRECTION
DAYTIME RUNNING LAMPS WILL NOT ILLUMINATE	1. High beam relay installed. 2. Faulty or missing DRL relay. 3. Incorrect BCM programming. 4. Faulty BCM inputs or outputs.	1. Remove high beam relay as required. 2. Replace DRL relay with a known good unit and check operation. Replace DRL relay as required. 3. Use a DRBIII® scan tool to check and program correct country code into BCM as required. 4. Use a DRBIII® scan tool to test the BCM inputs or outputs. Refer to the appropriate diagnostic information.

LAMPS/LIGHTING - EXTERIOR (Continued)

FRONT FOG LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
FRONT FOG LAMP DOES NOT ILLUMINATE	1. Faulty or missing fuse. 2. Faulty or missing bulb. 3. Faulty or missing relay. 4. Faulty switch. 5. Faulty ground circuit. 6. Faulty feed circuit. 7. Faulty BCM inputs or outputs.	1. Test and replace front fog lamp fuse as required. 2. Test and replace front fog lamp bulb as required. 3. Test and replace front fog lamp relay as required. 4. Test and replace multi-function switch as required. 5. Test and repair front fog lamp ground circuit as required. 6. Test and repair open front fog lamp relay output circuit as required. 7. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
FRONT FOG LAMP DOES NOT EXTINGUISH	1. Faulty relay. 2. Faulty switch. 3. Faulty feed circuit. 4. Faulty BCM inputs or outputs.	1. Test and replace front fog lamp relay as required. 2. Test and replace multi-function switch as required. 3. Test and repair shorted front fog lamp relay output circuit as required. 4. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

HAZARD WARNING LAMPS

Before performing the following tests, confirm whether the left and right turn signals operate satisfactorily. If the turn signals are inoperative or oper-

ate improperly, diagnose and repair that problem before attempting to repair the Hazard Warning Lamps.

CONDITION	POSSIBLE CAUSES	CORRECTION
HAZARD WARNING LAMPS DO NOT FLASH	1. Faulty or missing fuse. 2. Faulty ground circuit. 3. Faulty feed circuit. 4. Faulty switch/flasher.	1. Test and replace hazard warning fuse as required. 2. Test and repair hazard switch ground circuit as required. 3. Test and repair open hazard switch fused B(+) circuit as required. 4. Replace hazard switch/combination flasher with a known good unit and check operation. Replace hazard switch/combination flasher unit if required.

LAMPS/LIGHTING - EXTERIOR (Continued)

HEADLAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
HEADLAMP DOES NOT ILLUMINATE	1. Faulty or missing fuse. 2. Faulty or missing bulb. 3. Faulty or missing relay. 4. Faulty switch. 5. Faulty ground circuit. 6. Faulty feed circuit. 7. Faulty BCM inputs or outputs.	1. Test and replace headlamp fuse as required. 2. Test and replace headlamp bulb as required. 3. Test and replace low beam or high beam relay as required. (Note: Vehicles with a DRL relay do not use a high beam relay. The DRL relay cannot be tested. Replace DRL relay with a known good unit and check operation. Replace DRL relay as required.) 4. Test and replace multi-function switch as required. 5. Test and repair open headlamp ground circuit as required. 6. Test and repair open headlamp low beam, high beam, or DRL relay output circuit as required. 7. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
HEADLAMP DOES NOT EXTINGUISH	1. Faulty relay. 2. Faulty switch. 3. Faulty feed circuit. 4. Faulty BCM inputs or outputs.	1. Test and replace low beam or high beam relay as required. (Note: Vehicles with a DRL relay do not use a high beam relay. The DRL relay cannot be tested. Replace DRL relay with a known good unit and check operation. Replace DRL relay as required.) 2. Test and replace multi-function switch as required. 3. Test and repair shorted headlamp low beam, high beam, or DRL relay output circuit as required. 4. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
HEADLAMPS WILL NOT SWITCH FROM HIGH TO LOW BEAMS, OR FROM LOW TO HIGH BEAMS	1. Faulty relay. 2. Faulty switch. 3. Faulty BCM inputs or outputs.	1. Test and replace low beam or high beam relay as required. (Note: Vehicles with a DRL relay do not use a high beam relay. The DRL relay cannot be tested. Replace DRL relay with a known good unit and check operation. Replace DRL relay as required.) 2. Test and replace multi-function switch as required. 3. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

LAMPS/LIGHTING - EXTERIOR (Continued)

HEADLAMP LEVELING

Before performing the following tests, confirm whether the park lamps operate satisfactorily. If the

park lamps are inoperative, diagnose and repair that problem before attempting to repair the Headlamp Leveling System.

CONDITION	POSSIBLE CAUSES	CORRECTION
ONE LEVELING MOTOR IS INOPERATIVE	1. Faulty ground circuit. 2. Faulty feed circuit. 3. Faulty signal circuit. 4. Faulty motor.	1. Test and repair open leveling motor ground circuit as required. 2. Test and repair open leveling motor feed circuit as required. 3. Test and repair open headlamp adjust signal circuit as required. 4. Test and replace headlamp leveling motor as required.
BOTH LEVELING MOTORS ARE INOPERATIVE	1. Faulty switch ground circuit. 2. Faulty motor ground circuit. 3. Faulty switch feed circuit. 4. Faulty motor feed circuit. 5. Faulty signal circuit. 6. Faulty switch. 7. Faulty motors.	1. Test and repair open leveling switch ground circuit as required. 2. Test and repair open leveling motor ground circuit as required. 3. Test and repair open leveling switch feed circuit as required. 4. Test and repair open leveling motor feed circuit as required. 5. Test and repair open or shorted leveling motor signal circuit as required. 6. Test and replace leveling switch as required. 7. Test and replace leveling motors as required.

PARK LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
PARK LAMP DOES NOT ILLUMINATE	1. Faulty or missing fuse. 2. Faulty or missing bulb. 3. Faulty or missing relay. 4. Faulty switch. 5. Faulty ground circuit. 6. Faulty feed circuit. 7. Faulty BCM inputs or outputs.	1. Test and replace park lamp fuse as required. 2. Test and replace park lamp bulb as required. 3. Test and replace park lamp relay as required. 4. Test and replace multi-function switch as required. 5. Test and repair open park lamp ground circuit as required. 6. Test and repair open park lamp relay output circuit as required. 7. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

LAMPS/LIGHTING - EXTERIOR (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
PARK LAMP DOES NOT EXTINGUISH	1. Faulty relay. 2. Faulty switch. 3. Faulty feed circuit. 4. Faulty BCM inputs or outputs.	1. Test and replace park lamp relay as required. 2. Test and replace multi-function switch as required. 3. Test and repair shorted park lamp relay output circuit as required. 4. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

REAR FOG LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
REAR FOG LAMP DOES NOT ILLUMINATE	1. Faulty or missing fuse. 2. Faulty or missing bulb. 3. Faulty or missing relay. 4. Faulty switch. 5. Faulty ground circuit. 6. Faulty feed circuit. 7. Faulty BCM inputs or outputs.	1. Test and replace rear fog lamp fuse as required. 2. Test and replace rear fog lamp bulb as required. 3. Test and replace rear fog lamp relay as required. 4. Test and replace multi-function switch as required. 5. Test and repair open rear fog lamp ground circuit as required. 6. Test and repair open rear fog lamp relay output circuit as required. 7. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
REAR FOG LAMP DOES NOT EXTINGUISH	1. Faulty relay. 2. Faulty switch. 3. Faulty feed circuit. 4. Faulty BCM inputs or outputs.	1. Test and replace rear fog lamp relay as required. 2. Test and replace multi-function switch as required. 3. Test and repair shorted rear fog lamp relay output circuit as required. 4. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

LAMPS/LIGHTING - EXTERIOR (Continued)

TURN SIGNAL LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
ONE TURN SIGNAL LAMP DOES NOT ILLUMINATE	1. Faulty or missing bulb. 2. Faulty ground circuit. 3. Faulty feed circuit.	1. Test and replace turn signal bulb as required. 2. Test and repair open ground circuit as required. 3. Test and repair open right or left turn signal circuit as required.
ALL RIGHT SIDE AND/OR ALL LEFT SIDE TURN SIGNAL LAMPS DO NOT FLASH	1. Faulty sense circuit. 2. Faulty switch. 3. Faulty flasher. 4. Faulty signal circuit.	1. Test and repair open right or left turn switch sense circuit as required. 2. Test and replace multi-function switch as required. 3. Replace hazard switch/combination flasher with a known good unit and check operation. Replace hazard switch/combination flasher unit as required. 4. Test and repair open right or left turn signal circuit as required.
ALL RIGHT SIDE OR ALL LEFT SIDE TURN SIGNALS FLASH TOO RAPIDLY (MORE THAN 100 FLASHES PER MINUTE)	1. Faulty or missing bulb. 2. Faulty ground circuit. 3. Faulty signal circuit 4. Faulty flasher.	1. Test and replace faulty bulb as required. 2. Test and repair open ground circuit as required. 3. Test and repair open right or left turn signal circuit as required. 4. Replace hazard switch/combination flasher with a known good unit and check operation. Replace hazard switch/combination flasher unit as required.

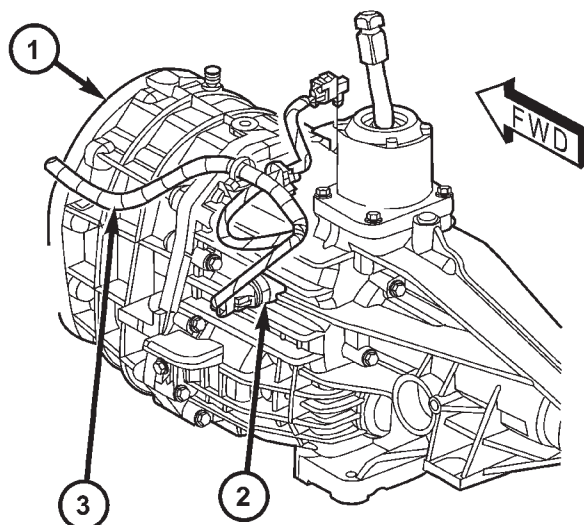
LAMPS/LIGHTING - EXTERIOR (Continued)

SPECIFICATIONS - LAMPS/LIGHTING - EXTERIOR*BULB SPECIFICATIONS*

LAMP	BULB
Backup	3157 P27/7W
Brake	3157 P27/7W
Center High Mounted Stop	921/W16W
Front Fog	9145
Front Park	3157 P27/7W
Front Position	W5W
Front Side Marker	168
Front Turn	3157 P27/7W
Headlamp (North America)	9007QL
Headlamp (Rest-Of-World)	H-4 W0W6
License Plate (North America)	168
License Plate (Rest-Of-World)	W5W
Rear Fog	3157 P27/7W
Rear Park/Tail	3157 P27/7W
Rear Turn	3157 P27/7W
Side Repeater	W5W

BACKUP LAMP SWITCH**DESCRIPTION**

Vehicles equipped with a manual transmission have a normally open, spring-loaded plunger type back-up lamp switch (Fig. 2). The backup lamp switch is located in a threaded hole on the side of the manual transmission housing, beneath the floor panel of the vehicle. The backup lamp switch has a threaded body and a hex formation near the plunger end of the switch, and an integral connector receptacle at the opposite end of the switch. When installed, only the connector receptacle and the hex formation are visible on the outside of the transmission housing. Vehicles with an optional electronic automatic transmission have a Transmission Range Sensor (TRS) that is used to perform several functions, including that of the backup lamp switch. The TRS is described in further detail elsewhere in this service information. The backup lamp switch cannot be adjusted or repaired and, if faulty or damaged, the entire switch unit must be replaced.



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Fig. 2 Backup Lamp Switch - Typical

- 1 - MANUAL TRANSMISSION
- 2 - BACKUP LAMP SWITCH
- 3 - ENGINE WIRE HARNESS

OPERATION

The backup lamp switch controls the flow of battery current to the backup lamp bulbs at the back of the vehicle through an output on the back-up lamp feed circuit. The 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 receives battery current through a fuse in the Junction Block (JB) on a fused ignition switch output (run) circuit whenever the ignition switch is in the On position. A take out of the engine wire harness connects the backup lamp switch to the vehicle electrical system. The backup lamp switch and circuits can be tested using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - BACKUP LAMP SWITCH

- (1) Disconnect and isolate the battery negative cable.
- (2) Raise and support the vehicle.
- (3) Locate and disconnect the engine wire harness connector for the backup lamp switch from the switch connector receptacle.
- (4) 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.

BRAKE LAMP SWITCH

DESCRIPTION

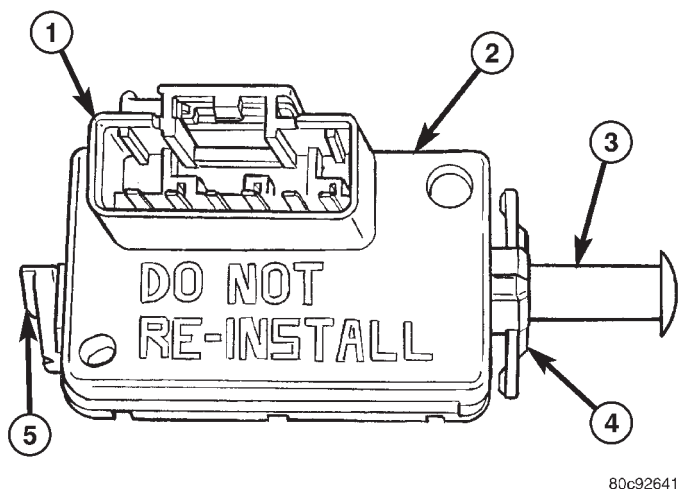


Fig. 3 Brake Lamp Switch

- 1 - CONNECTOR RECEPTACLE
- 2 - BRAKE LAMP SWITCH
- 3 - PLUNGER
- 4 - COLLAR
- 5 - LEVER

The brake lamp switch is a three circuit, spring-loaded plunger actuated switch that is secured to the steering column support bracket under the driver side of the instrument panel (Fig. 3). The brake lamp switch is contained within a rectangular molded plastic housing with an integral connector receptacle featuring six terminal pins and a red plastic Connector Position Assurance (CPA) lock. The switch is connected to the vehicle electrical system through a dedicated take out and connector of the instrument panel wire harness. The switch plunger extends through a mounting collar on one end of the switch housing. The plunger has a one time telescoping self-adjustment feature that is achieved after the switch is installed by moving an adjustment release lever on the opposite end of the switch housing clockwise, until it locks in a position that is parallel to the connector receptacle. The brake lamp switch self-adjustment is a one time feature. Once the feature has been used, the switch cannot be readjusted. A "DO NOT RE-INSTALL" warning is molded into the switch housing below the connector receptacle.

An installed brake lamp switch cannot be readjusted or repaired. If the switch is damaged, faulty, or removed from its mounting position for any reason, it must be replaced with a new unit.

OPERATION

The brake lamp switch controls three different circuits, one normally open and two normally closed. These circuits are described as follows:

- **Brake Lamp Switch Circuit** - A normally open brake lamp switch circuit receives battery current on a fused B(+) circuit from a fuse in the Junction Block (JB), and supplies battery current to the brake lamps and the Controller Antilock Brake (CAB) on a brake lamp switch output circuit when the brake pedal is depressed (brake lamp switch plunger released).

- **Brake Lamp Switch Signal Circuit** - A normally closed brake lamp switch signal circuit receives a path to ground through a splice block located in the instrument panel wire harness with an eyelet terminal connector that is secured by a nut to a ground stud on the driver side instrument panel end bracket near the Junction Block (JB). This circuit supplies a ground input to the Powertrain Control Module (PCM) on a brake lamp switch sense circuit when the brake pedal is released (brake lamp switch plunger is depressed).

- **Speed Control Circuit** - A normally closed speed control circuit receives battery current from the Powertrain Control Module on a speed control supply circuit, and supplies battery current to the speed control servo solenoids (dump, vacuum, and vent) on a speed control brake switch output circuit when the speed control system is turned on and the brake pedal is released (brake lamp switch plunger is depressed).

Concealed within the brake lamp switch housing the components of the self-adjusting brake switch plunger consist of a two-piece telescoping plunger, a split plunger locking collar, and a release wedge. The release lever has an integral shaft with a wedge that spreads the plunger locking collar to an open or released position. After the switch is installed and the brake pedal is released, the plunger telescopes to the correct adjustment position. When the release lever is moved to the release position, the wedge is disengaged from the locking collar causing the collar to apply a clamping pressure to the two plunger halves fixing the plunger length.

The brake lamp switch can be diagnosed using conventional diagnostic tools and methods.

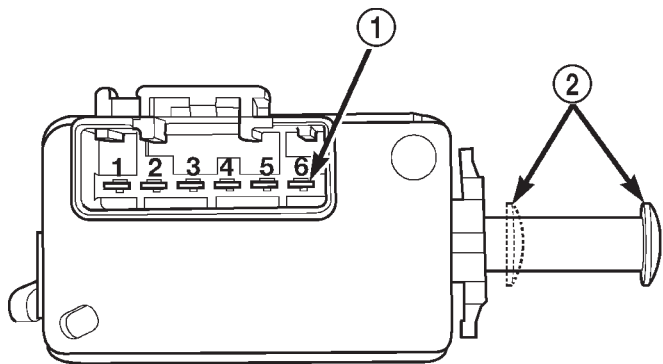
BRAKE LAMP SWITCH (Continued)

DIAGNOSIS AND TESTING - BRAKE LAMP SWITCH

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable. Disconnect the instrument panel wire harness connector for the brake lamp switch from the switch connector receptacle.

(2) Using an ohmmeter, perform the continuity tests at the terminal pins in the brake lamp switch connector receptacle (Fig. 4) as shown in the Brake Lamp Switch Tests table.



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Fig. 4 Brake Lamp Switch Terminal Identification

- 1 - TERMINAL PINS
2 - PLUNGER TEST POSITIONS

BRAKE LAMP SWITCH TESTS	
PLUNGER POSITION	CONTINUITY BETWEEN
Released (Extended)	Pins 1 & 2
Compressed (Retracted)	Pins 3 & 4, 5 & 6

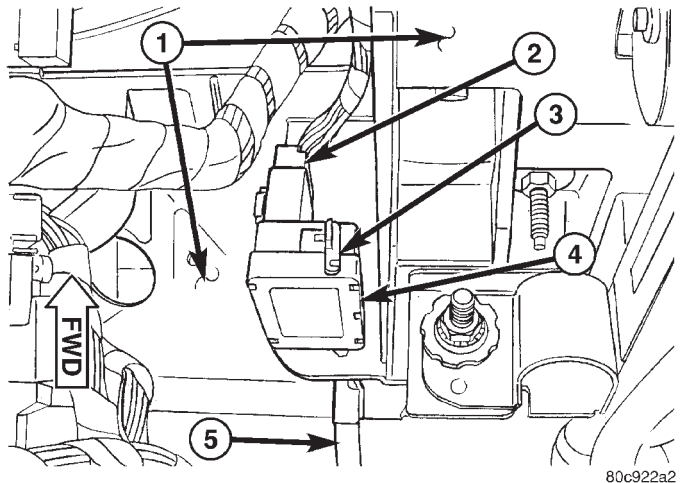
(3) If the switch fails any of the continuity tests, replace the faulty brake lamp switch as required.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Disconnect the instrument panel wire harness connector for the brake lamp switch from the switch connector receptacle (Fig. 5).



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Fig. 5 Brake Lamp Switch Remove/Install

- 1 - STEERING COLUMN SUPPORT
2 - WIRE HARNESS CONNECTOR
3 - LEVER
4 - BRAKE LAMP SWITCH
5 - BRAKE PEDAL ARM

(3) Grasp the brake lamp switch housing firmly and rotate the switch counterclockwise about 30 degrees to align the tabs on the locking collar with the keyed mounting hole in the steering column support bracket.

(4) Pull the switch straight back from the mounting hole to remove it from the steering column support bracket.

BRAKE LAMP SWITCH (Continued)

- (5) Discard the removed brake lamp switch.

CAUTION: Always replace a removed brake lamp switch with a new unit. This is a one time component and is not intended for reinstallation.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

CAUTION: Always replace a removed brake lamp switch with a new unit. This is a one time component and is not intended for reinstallation.

(1) While holding the brake pedal depressed, align the tabs on the brake lamp switch locking collar with the keyed mounting hole in the steering column support bracket (Fig. 5).

(2) Still holding the brake pedal depressed, insert the tabs on the brake lamp switch housing through the keyed mounting hole in the steering column support bracket until the switch is firmly seated against the bracket.

(3) Still holding the brake pedal depressed, rotate the switch clockwise about 30 degrees to lock the tabs on the brake lamp switch locking collar to the keyed mounting hole in the steering column support bracket.

- (4) Release the brake pedal.

CAUTION: Do not pull up on the brake pedal before the switch plunger adjustment has been completed.

(5) Rotate the plunger adjustment release lever clockwise until it locks into place parallel to the brake lamp switch connector receptacle. This action will set the switch plunger length to a final adjustment position and cannot be undone. If not performed properly the first time, a new brake lamp switch **must** be installed.

(6) Reconnect the instrument panel wire harness connector for the brake lamp switch to the switch connector receptacle.

- (7) Reconnect the battery negative cable.

CENTER HIGH MOUNTED STOP LAMP BULB

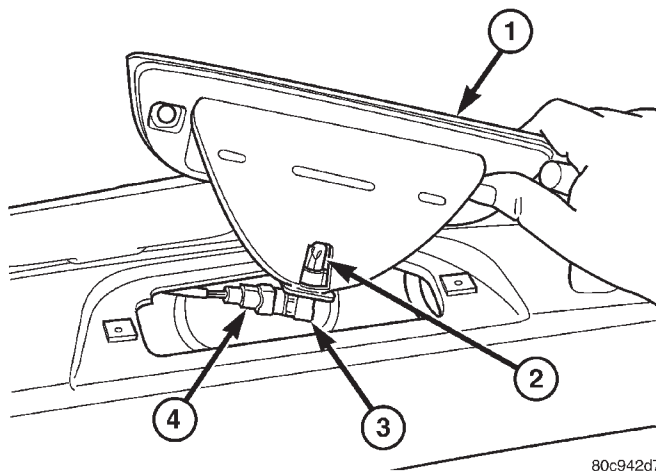
REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the Center High Mounted Stop Lamp (CHMSL) unit from the roof panel. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/CENTER HIGH MOUNTED STOP LAMP UNIT - REMOVAL).

(3) Firmly grasp the socket on the back of the CHMSL unit housing.

(4) Rotate the socket on the back of the CHMSL unit housing counterclockwise about 30 degrees (Fig. 6).



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Fig. 6 Center High Mounted Stop Lamp Bulb Remove/Install

- 1 - CHMSL UNIT
- 2 - BULB
- 3 - SOCKET
- 4 - BODY WIRE HARNESS CONNECTOR

(5) Pull the socket and bulb straight out of the back of CHMSL unit housing.

(6) Pull the bulb straight out of the CHMSL unit socket.

CENTER HIGH MOUNTED STOP LAMP BULB (Continued)

INSTALLATION

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 and/or the lamp wiring.

(1) Align the base of the bulb with the receptacle in the Center High Mounted Stop Lamp (CHMSL) unit socket.

(2) Push the bulb straight into the CHMSL unit socket until it is firmly seated.

(3) Align the socket and bulb with the socket opening on the back of CHMSL unit housing.

(4) Push the socket and bulb straight into the CHMSL unit housing until it is firmly seated (Fig. 6).

(5) Rotate the socket on the back of the CHMSL unit housing clockwise about 30 degrees.

(6) Reinstall the CHMSL unit onto the roof panel. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/CENTER HIGH MOUNTED STOP LAMP UNIT - INSTALLATION).

(7) Reconnect the battery negative cable.

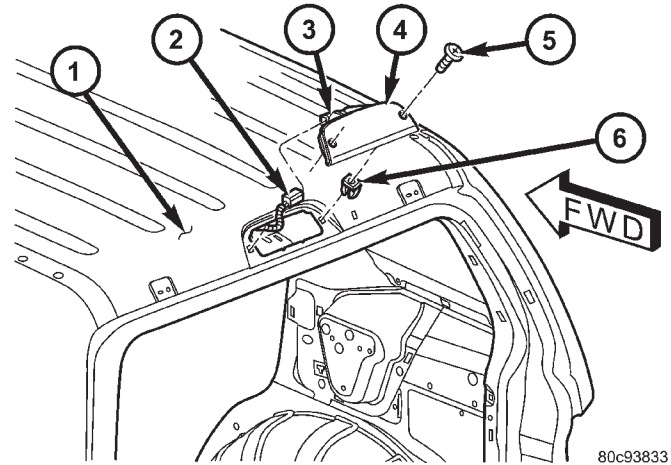


Fig. 7 Center High Mounted Stop Lamp Remove/Install

- 1 - ROOF PANEL
- 2 - BODY WIRE HARNESS CONNECTOR
- 3 - BULB SOCKET
- 4 - CHMSL
- 5 - SCREW (2)
- 6 - PLASTIC NUT (2)

CENTER HIGH MOUNTED STOP LAMP UNIT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the two screws that secure the Center High Mounted Stop Lamp (CHMSL) unit to the rear of the roof panel (Fig. 7).

(3) Pull the CHMSL unit away from the roof panel far enough to access and disconnect the wire harness connector for the CHMSL unit from the lamp socket pigtail wire.

(4) Remove the CHMSL unit from the roof panel.

INSTALLATION

(1) Position the Center High Mounted Stop Lamp (CHMSL) unit to the roof panel.

(2) Reconnect the wire harness connector for the CHMSL unit to the lamp socket pigtail wire (Fig. 7).

(3) Position the CHMSL unit into the roof panel opening.

(4) Install and tighten the two screws that secure the CHMSL unit to the rear of the roof panel. Tighten the screws to 2 N·m (21 in. lbs.).

(5) Reconnect the battery negative cable.

COMBINATION FLASHER

DESCRIPTION

The combination flasher for this model is integral to the hazard switch located in the center of the instrument panel, just above the radio. The combination flasher is a smart relay that functions as both the turn signal system and the hazard warning system flasher. The combination flasher contains active electronic Integrated Circuitry (IC) elements. This flasher is designed to handle the current flow requirements of the factory-installed lighting. If supplemental lighting is added to the turn signal lamp circuits, such as when towing a trailer with lights, the combination flasher will automatically try to compensate to keep the flash rate the same.

The combination flasher cannot be repaired or adjusted and, if faulty or damaged, the hazard switch unit must be replaced.

OPERATION

The combination flasher has the following inputs and outputs: fused B(+), fused ignition switch output, right turn signal sense, left turn signal sense, and one output each for the right and left turn signal circuits. The combination flasher also receives an internal input through the closed contacts of the hazard switch and, on vehicles equipped with the optional Vehicle Theft Security System (VTSS), the flasher receives an input from the Body Control Module (BCM) in order to flash the turn signal lamps as an optical alert feature of that system. Con-

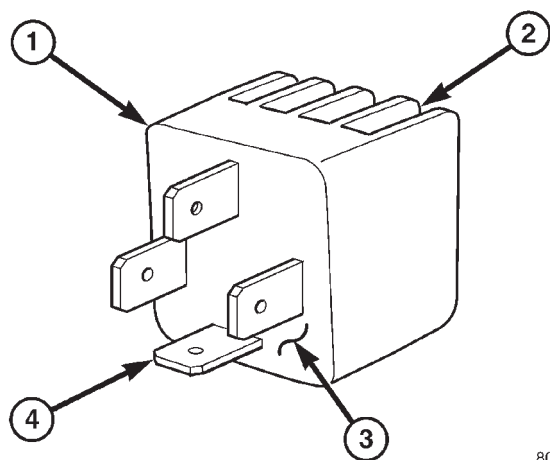
COMBINATION FLASHER (Continued)

stant battery voltage is supplied to the flasher so that it can perform the hazard warning function, and ignition switched battery voltage is supplied for the turn signal function. The Integrated Circuit (IC) within the combination flasher contains the logic that controls the flasher operation and the flash rate. The IC receives separate sense ground inputs from the multi-function switch for the right and left turn signals, and from the hazard switch contacts or the BCM for the hazard warning signals. A special design feature of the combination flasher allows it to "sense" that a turn signal circuit or bulb is not operating, and provide the driver an indication of the condition by flashing the remaining bulbs in the affected circuit at a higher rate (120 flashes-per-minute or higher). Conventional flashers either continue flashing at their typical rate (heavy-duty type), or discontinue flashing the affected circuit entirely (standard-duty type).

Because of the active electronic elements within the combination flasher, it cannot be tested with conventional automotive electrical test equipment. If the combination flasher is believed to be faulty, test the turn signal and hazard warning system. Then replace the hazard switch with a known good unit to confirm system operation.

DAYTIME RUNNING LAMP RELAY

DESCRIPTION



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Fig. 8 Daytime Running Lamp Relay

- 1 - DRL RELAY
- 2 - HEAT SINK
- 3 - POTTING MATERIAL
- 4 - TERMINAL (4)

The Daytime Running Lamp (DRL) relay (Fig. 8) is a solid state relay that is used only on vehicles manufactured for sale in Canada. The DRL relay features a die cast aluminum housing with integral cooling fins that act as a heat sink for the solid state DRL circuitry. Four male spade terminals extend from the base of the relay through a potting material that encloses and protects the DRL circuitry. Although the DRL relay has four terminals that are laid out in a footprint that is similar to that of a conventional International Standards Organization (ISO) relay, a standard ISO relay should never be installed in place of the DRL relay. The DRL relay is installed in the Junction Block (JB) on the driver side outboard end of the instrument panel. Vehicles equipped with this relay do not have a headlamp high beam relay installed in the JB.

The DRL relay cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

OPERATION

The Daytime Running Lamp (DRL) relay is a solid state relay that controls the flow of battery current to the high beam filaments of both headlamp bulbs based upon a duty cycled control input received from the Body Control Module (BCM) of vehicles equipped with the DRL feature. By cycling the DRL relay output, the BCM controls the illumination intensity of the high beam filaments. The DRL relay terminals are connected to the vehicle electrical system through a connector receptacle in the Junction Block (JB). The inputs and outputs of the DRL relay include:

- **Battery Current Input** - The DRL relay receives battery current on a fused B(+) circuit from a fuse in the Power Distribution Center (PDC).

- **Ground Input** - The DRL relay receives a path to ground through a splice block located in the instrument panel wire harness with an eyelet terminal connector that is secured by a nut to a ground stud on the driver side instrument panel end bracket near the Junction Block (JB).

- **Control Input** - The DRL relay control input is received from the BCM and/or the momentary optical horn (flash-to-pass) output of the multi-function switch through a high beam relay control circuit.

- **Control Output** - The DRL relay supplies battery current output to the headlamp high beam filaments through the high beam relay output circuit.

Because of active electronic elements within the DRL relay, it cannot be tested with conventional automotive electrical test equipment. If the DRL relay is believed to be faulty, replace the relay with a known good unit to confirm system operation.

DAYTIME RUNNING LAMP RELAY (Continued)

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the end cap from the driver side outboard end of the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - REMOVAL).
- (3) Remove the Daytime Running Lamp (DRL) relay by grasping it firmly and pulling it straight out from the receptacle in the Junction Block (JB) (Fig. 9).

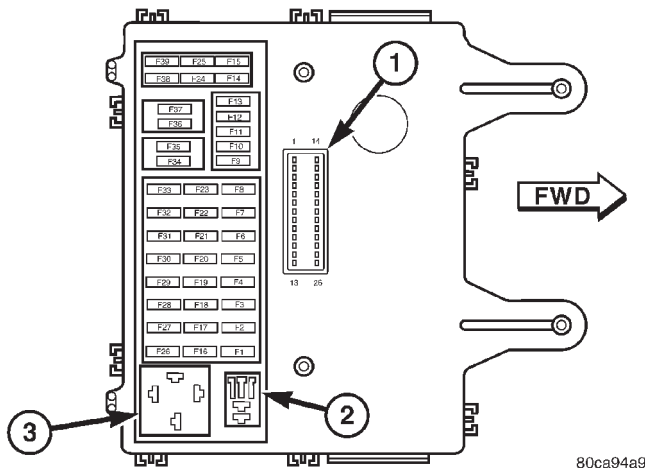


Fig. 9 Junction Block - Outboard Side (RHD Shown - Rotate 180° for LHD)

- 1 - JB/BCM CONNECTOR
- 2 - HIGH BEAM RELAY
- 3 - DRL RELAY

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Position the Daytime Running Lamp (DRL) relay to the proper receptacle in the Junction Block (JB) (Fig. 9).
- (2) Align the DRL relay terminals with the terminal cavities in the JB receptacle.
- (3) Push firmly and evenly on the top of the DRL relay until the terminals are fully seated in the terminal cavities in the JB receptacle.
- (4) Reinstall the end cap onto the driver side outboard end of the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - INSTALLATION).
- (5) Reconnect the battery negative cable.

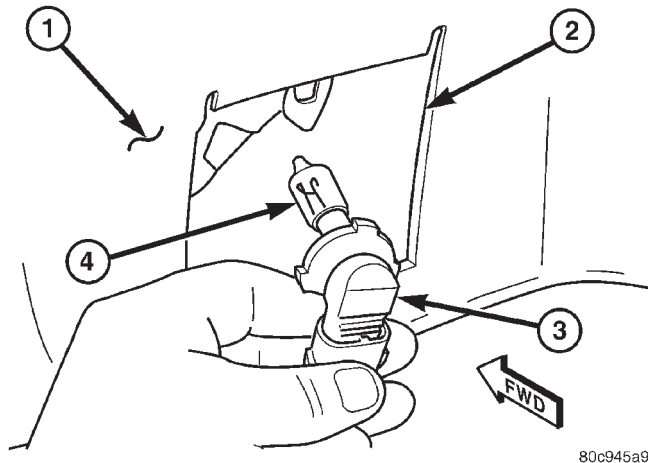
FRONT FOG LAMP BULB

REMOVAL

- (1) Turn the front wheels full lock in the direction of the fog lamp bulb that is to be changed.
- (2) Disconnect and isolate the battery negative cable.
- (3) Reach into the front wheel opening to unsnap and lift the cover over the access hole at the front of the front wheelhouse splash shield (Fig. 10).
- (4) Reach through the access hole and firmly grasp the socket on the back of the front fog lamp unit housing.
- (5) Rotate the socket on the back of the front fog lamp unit housing counterclockwise about 30 degrees.

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.

FRONT FOG LAMP BULB (Continued)



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Fig. 10 Front Fog Lamp Bulb Remove/Install

- 1 - FRONT WHEELHOUSE SPLASH SHIELD
- 2 - ACCESS HOLE
- 3 - SOCKET
- 4 - BULB

(6) Pull the socket and bulb straight out of the front fog lamp unit housing and through the access hole into the front wheel opening area.

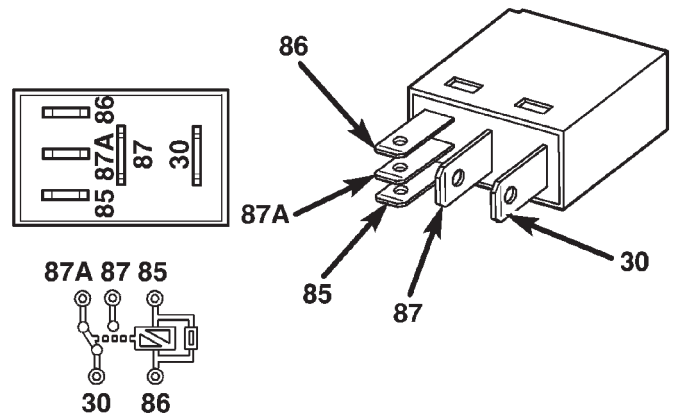
(7) Pull the bulb straight out of the front fog lamp unit socket.

INSTALLATION

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 and/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) Align the base of the bulb with the receptacle in the front fog lamp unit socket.
- (2) Push the bulb straight into the front fog lamp unit socket until it is firmly seated.
- (3) Position the socket and bulb through the access hole in the front wheelhouse splash shield and align it with the socket opening on the back of the front fog lamp unit housing (Fig. 10).
- (4) Push the socket and bulb straight into the front fog lamp unit housing until it is firmly seated.
- (5) Rotate the socket on the back of the front fog lamp unit housing clockwise about 30 degrees.
- (6) Lower and snap shut the access cover over the hole at the front of the front wheelhouse splash shield.
- (7) Reconnect the battery negative cable.

FRONT FOG LAMP RELAY**DESCRIPTION**

80ce807b

Fig. 11 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

The front fog lamp relay is located in the Junction Block (JB) on the driver side outboard end of the instrument panel in the passenger compartment of the vehicle. The front fog lamp relay is a conventional International Standards Organization (ISO) micro relay (Fig. 11). Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions. The relay is contained within a small, rectangular, molded plastic housing and is connected to all of the required inputs and outputs by five integral male spade-type terminals that extend from the bottom of the relay base.

The front fog lamp relay cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

OPERATION

The front fog lamp relay is an electromechanical switch that uses a low current input from the Body Control Module (BCM) to control a high current output to the front fog lamps. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact

FRONT FOG LAMP RELAY (Continued)

point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The front fog lamp relay terminals are connected to the vehicle electrical system through a connector receptacle in the Junction Block (JB). The inputs and outputs of the front fog lamp relay include:

- **Common Feed Terminal** - The common feed terminal (30) receives battery current at all times from a fuse in the JB through a fused B(+) circuit.
- **Coil Ground Terminal** - The coil ground terminal (85) is connected to a control output of the premium Body Control Module (BCM) through a front fog lamp relay control circuit. The BCM controls front fog lamp operation by controlling a ground path through this circuit.
- **Coil Battery Terminal** - The coil battery terminal (86) receives battery current at all times from a fuse in the JB through a fused B(+) circuit.
- **Normally Open Terminal** - The normally open terminal (87) is connected to the front fog lamps through a front fog lamp relay output circuit and provides battery current to the front fog lamps whenever the relay is energized.
- **Normally Closed Terminal** - The normally closed terminal (87A) is not connected in this application.

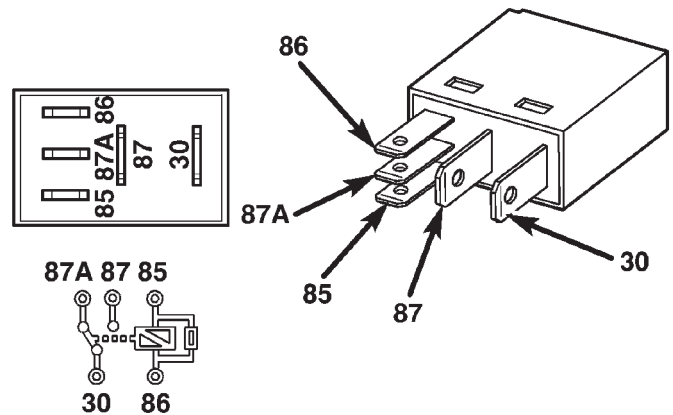
The front fog lamp relay can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - FRONT FOG LAMP RELAY

The front fog lamp relay (Fig. 12) is located in the Junction Block (JB) under the driver side outboard end of the instrument panel. 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.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACI-

TOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.



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Fig. 12 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

(1) Remove the front fog lamp relay from the JB. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/FRONT FOG LAMP RELAY - REMOVAL).

(2) 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 Step 3. If not OK, replace the faulty relay.

(3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 8 ohms. If OK, go to Step 4. If not OK, replace the faulty relay.

(4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, reinstall the relay and use a DRBIII® scan tool to perform further testing. Refer to the appropriate diagnostic information.

FRONT FOG LAMP RELAY (Continued)

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

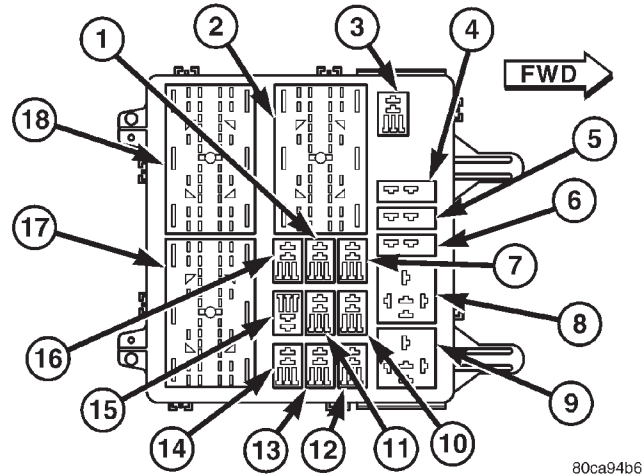
(1) Disconnect and isolate the battery negative cable.

(2) Remove the steering column opening cover from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - REMOVAL).

(3) Remove the front fog lamp relay by grasping it firmly and pulling it straight out from the receptacle in the Junction Block (JB) (Fig. 13).

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.



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Fig. 13 Junction Block - Inboard Side (LHD Shown - Rotate 180° for RHD)

- 1 - PASSENGER DOOR UNLOCK RELAY
- 2 - JB C3 CONNECTOR RECEPTACLE
- 3 - LOW BEAM RELAY
- 4 - CIRCUIT BREAKER #1
- 5 - CIRCUIT BREAKER #2
- 6 - CIRCUIT BREAKER #3
- 7 - DOOR LOCK RELAY
- 8 - DEFOGGER RELAY
- 9 - SPARE
- 10 - FRONT FOG LAMP RELAY
- 11 - HORN RELAY
- 12 - SPARE
- 13 - SPARE
- 14 - REAR FOG LAMP RELAY
- 15 - PARK LAMP RELAY
- 16 - DRIVER DOOR UNLOCK RELAY
- 17 - JB C1 CONNECTOR RECEPTACLE
- 18 - JB C2 CONNECTOR RECEPTACLE

(1) Position the front fog lamp relay to the proper receptacle in the Junction Block (JB) (Fig. 13).

(2) Align the front fog lamp relay terminals with the terminal cavities in the JB receptacle.

(3) Push firmly and evenly on the top of the front fog lamp relay until the terminals are fully seated in the terminal cavities in the JB receptacle.

(4) Reinstall the steering column opening cover onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - INSTALLATION).

(5) Reconnect the battery negative cable.

FRONT FOG LAMP UNIT

REMOVAL

- (1) Turn the front wheels full lock in the direction of the fog lamp bulb that is to be changed.
- (2) Disconnect and isolate the battery negative cable.
- (3) Reach into the front wheel opening to unsnap and lift the cover over the access hole at the front of the front wheelhouse splash shield (Fig. 14).

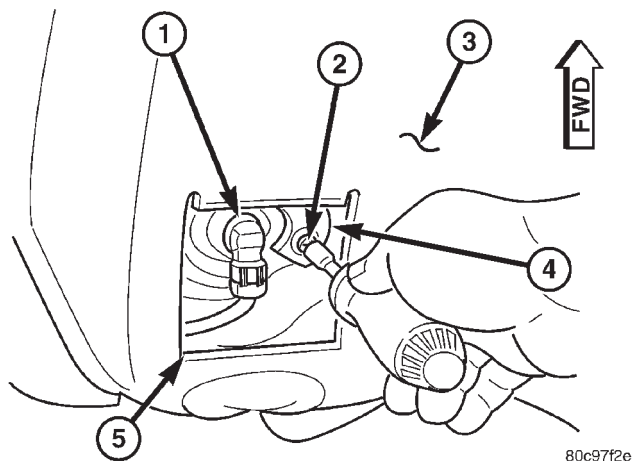


Fig. 14 Front Fog Lamp Unit Remove/Install

- 1 - FRONT FOG LAMP UNIT
- 2 - SCREW (3)
- 3 - FRONT WHEELHOUSE SPLASH SHIELD
- 4 - FRONT BUMPER FASCIA
- 5 - ACCESS HOLE

(4) Reach through the access hole to remove the three screws that secure the front fog lamp unit to the front bumper fascia.

(5) From the front of the vehicle, pull the front fog lamp unit out of the front bumper fascia far enough to access and disconnect the wire harness connector for the front fog lamp unit from the lamp socket connector receptacle (Fig. 15).

(6) Remove the front fog lamp unit from the front bumper fascia.

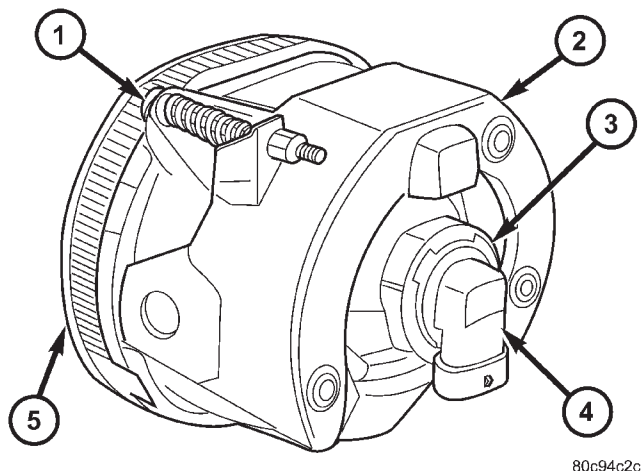
INSTALLATION

(1) Position the front fog lamp unit to the front bumper fascia.

(2) Reconnect the wire harness connector for the front fog lamp to the lamp socket connector receptacle (Fig. 15).

(3) Position the front fog lamp unit into the front bumper fascia.

(4) Reach into the front wheel opening and through the access hole to install and tighten the three screws that secure the front fog lamp unit



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Fig. 15 Front Fog Lamp Unit

- 1 - ADJUSTING SCREW
- 2 - MOUNTING BRACKET
- 3 - HOUSING
- 4 - SOCKET & BULB
- 5 - LENS

housing to the front bumper fascia (Fig. 14). Tighten the screws to 3 N·m (25 in. lbs.).

(5) Lower and snap shut the cover over the access hole at the front of the front wheelhouse splash shield.

(6) Reconnect the battery negative cable.

(7) Confirm proper front fog lamp unit alignment. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/FRONT FOG LAMP UNIT - ADJUSTMENTS).

ADJUSTMENTS

ADJUSTMENT - FRONT FOG LAMP UNIT

VEHICLE PREPARATION FOR FOG LAMP ALIGNMENT

- (1) Repair or replace any faulty or damaged components that could hinder proper lamp alignment.
- (2) Verify proper tire inflation.
- (3) Clean the front fog lamp lenses.
- (4) Verify that the cargo area is not heavily loaded.
- (5) 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.

FOG LAMP ALIGNMENT

Prepare an alignment screen as illustrated. A properly aligned 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.

FRONT FOG LAMP UNIT (Continued)

(1) Position the vehicle on a level surface perpendicular to a flat wall 7.62 meters (25 feet) away from the front of the front fog lamp lens (Fig. 16). If necessary, tape a line on the floor 7.62 meters (25 feet) away from and parallel to the wall.

(2) Measure up on the wall 1.27 meters (5 feet) from the floor and tape a vertical line on the alignment screen at the centerline of the vehicle. Sight along the centerline of the vehicle (from the rear of the vehicle forward) to verify the accuracy of the centerline placement.

(3) Rock the vehicle from side-to-side three times to allow the suspension to stabilize, then jounce the front suspension three times by pushing downward on the front bumper and releasing. Measure the distance from the center of the front fog lamp lens to the floor. Transfer this measurement to the alignment screen and tape a horizontal line on the wall at this mark. This line will be used for up-and-down adjustment reference.

(4) Measure the distance from the centerline of the vehicle to the center of each front fog lamp being

aligned. Transfer these measurements to the alignment screen and tape a vertical line this distance to each side of the vehicle centerline. These lines will be used for left/right reference.

(5) Rotate the front fog lamp adjusting screws to adjust the beam height as required (Fig. 17).

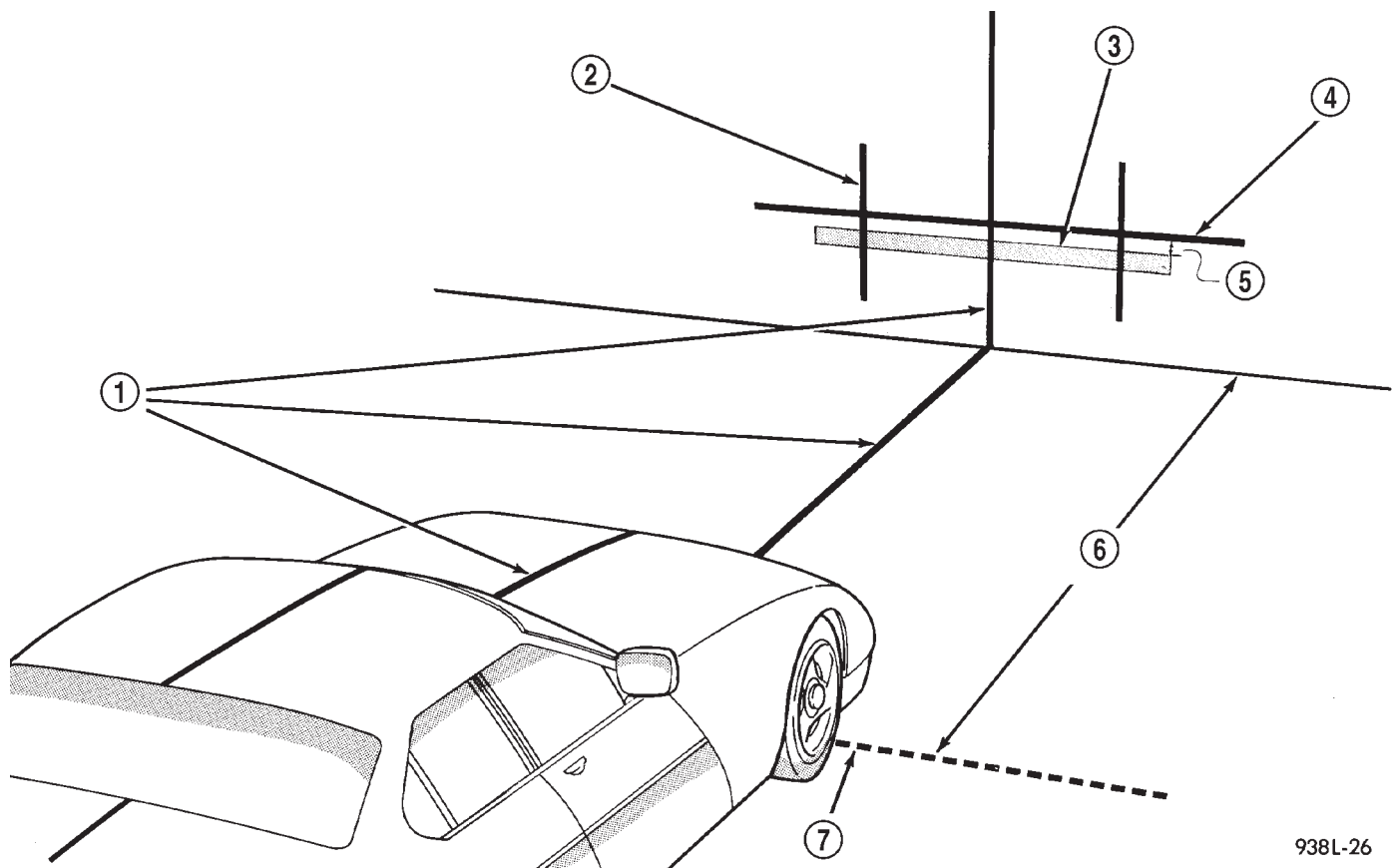
FRONT LAMP BULB

REMOVAL

The front lamp unit may contain either one or two bulbs, depending upon the market for which the vehicle was manufactured. The service procedures for one bulb or for both bulbs is the same, only the bulb sizes and types may differ. Be certain any removed bulb is replaced with the same bulb size and type that was removed.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the front lamp unit from the front bumper fascia. (Refer to 8 - ELECTRICAL/LAMPS/



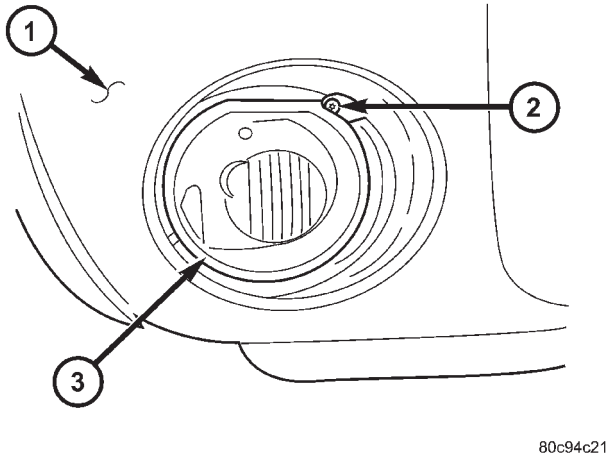
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Fig. 16 Front Fog Lamp Alignment - Typical

- 1 - VEHICLE CENTERLINE
- 2 - CENTER OF VEHICLE TO CENTER OF FOG LAMP LENS
- 3 - HIGH-INTENSITY AREA
- 4 - FLOOR TO CENTER OF FOG LAMP LENS

- 5 - 100 MILLIMETERS (4 INCHES)
- 6 - 7.62 METERS (25 FEET)
- 7 - FRONT OF FOG LAMP

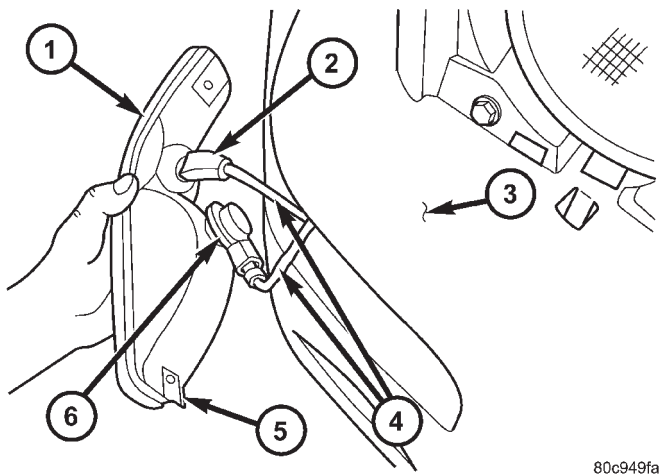
FRONT LAMP BULB (Continued)

**Fig. 17 Front Fog Lamp Adjusting Screw**

- 1 - FRONT BUMPER FASCIA
 2 - ADJUSTING SCREW
 3 - FRONT FOG LAMP UNIT

LIGHTING - EXTERIOR/FRONT LAMP UNIT - REMOVAL).

(3) Firmly grasp the socket on the back of the front lamp unit housing for the bulb that is being removed (Fig. 18).

**Fig. 18 Front Lamp Bulb Remove/Install**

- 1 - FRONT LAMP UNIT
 2 - SIDE MARKER SOCKET
 3 - FRONT FASCIA
 4 - HEADLAMP & DASH WIRE HARNESS
 5 - MOUNTING TAB
 6 - PARK/TURN SIGNAL SOCKET

(4) Rotate the socket on the back of the front lamp unit housing counterclockwise about 30 degrees.

(5) Pull the socket and bulb straight out of the back of the front lamp unit housing.

(6) Pull the bulb straight out of the front lamp unit socket.

INSTALLATION

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 and/or the lamp wiring.

(1) Align the base of the bulb with the receptacle in the front lamp unit socket.

(2) Push the bulb straight into the front lamp unit socket until it is firmly seated.

(3) Align the socket and bulb with the socket opening on the back of the front lamp unit housing (Fig. 18).

(4) Push the socket and bulb straight into the front lamp unit housing until it is firmly seated.

(5) Rotate the socket on the back of the front lamp unit housing clockwise about 30 degrees.

(6) Reinstall the front lamp unit into the front bumper fascia. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/FRONT LAMP UNIT - INSTALLATION).

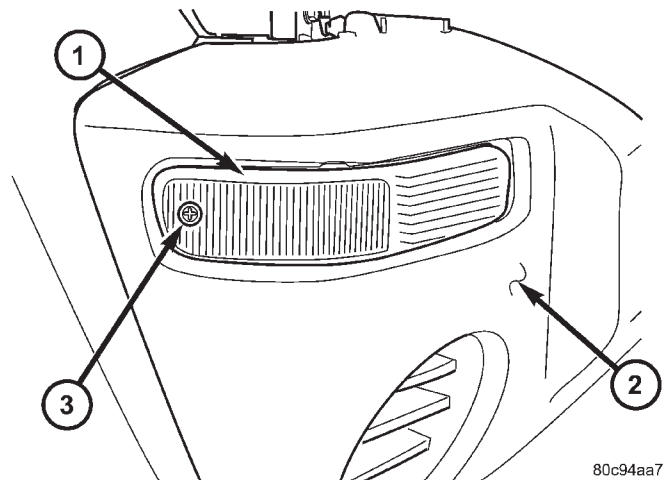
(7) Reconnect the battery negative cable.

FRONT LAMP UNIT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the screw that secures the outboard end of the front lamp unit to the front bumper fascia (Fig. 19).

**Fig. 19 Front Lamp Unit Remove/Install**

- 1 - FRONT LAMP UNIT
 2 - FRONT BUMPER FASCIA
 3 - SCREW (1)

(3) Pull the outboard end of the front lamp unit away from the front bumper fascia far enough to dis-

FRONT LAMP UNIT (Continued)

engage the tab on the inboard end of the front lamp unit housing from the receptacle in the fascia.

(4) Pull the front lamp unit away from the front bumper fascia far enough to access and disconnect the wire harness connector(s) for the front lamp unit from the lamp socket pigtail wire(s).

(5) Remove the front lamp unit from the front bumper fascia.

INSTALLATION

(1) Position the front lamp unit to the front bumper fascia.

(2) Reconnect the wire harness connector(s) for the front lamp unit to the lamp socket pigtail wire(s).

(3) Engage the tab on the inboard end of the front lamp unit housing into the receptacle in the front bumper fascia.

(4) Position the outboard end of the front lamp unit housing to the front bumper fascia.

(5) Install and tighten the screw that secures the outboard end of the front lamp unit housing to the front bumper fascia (Fig. 19). Tighten the screw to 2 N·m (20 in. lbs.).

(6) Reconnect the battery negative cable.

FRONT POSITION LAMP BULB

REMOVAL

The front position lamps are integral to the headlamp units on vehicles manufactured for certain markets where these lamps are required.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the headlamp unit from the front grille opening reinforcement. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).

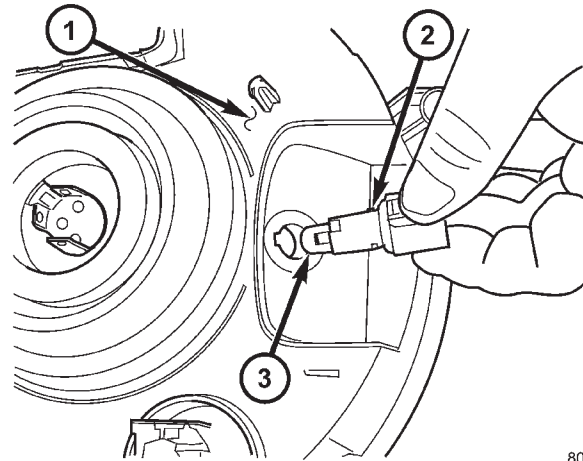
(3) Rotate the front position lamp socket near the bottom of the headlamp unit housing counterclockwise about 30 degrees (Fig. 20).

(4) Pull the socket and bulb straight out of the headlamp unit housing.

(5) Pull the bulb straight out of the front position lamp socket.

INSTALLATION

The front position lamps are integral to the headlamp units on vehicles manufactured for certain markets where these lamps are required.



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Fig. 20 Front Position Lamp Bulb Remove/Install

1 - HEADLAMP HOUSING

2 - SOCKET

3 - 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 and/or the lamp wiring.

(1) Align the base of the bulb with the receptacle in the front position lamp socket.

(2) Push the bulb straight into the front position lamp socket until it is firmly seated.

(3) Align the socket and bulb with the socket opening near the bottom of the headlamp unit housing (Fig. 20).

(4) Push the socket and bulb straight into the headlamp unit housing until it is firmly seated

(5) Rotate the front position lamp socket near the bottom of the headlamp unit housing clockwise about 30 degrees.

(6) Reinstall the headlamp unit onto the grille opening reinforcement. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).

(7) Reconnect the battery negative cable.

(8) Confirm proper headlamp unit alignment. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - ADJUSTMENTS).

HAZARD SWITCH

DESCRIPTION

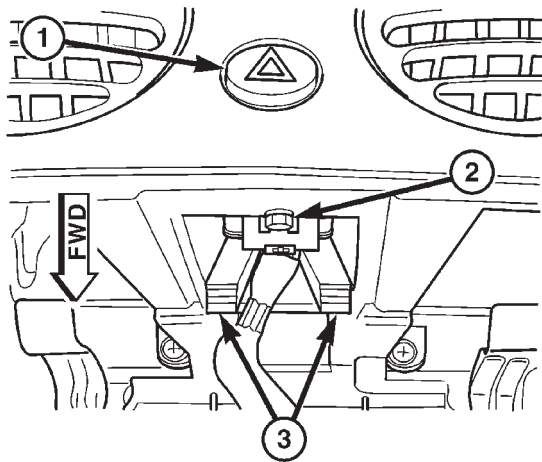


Fig. 21 Hazard Switch

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- 1 - HAZARD SWITCH BUTTON
- 2 - SCREW (1)
- 3 - MOUNTING BRACKET TABS

The hazard switch is integral to the hazard switch module, which is secured near the center of instrument panel just above the radio (Fig. 21). Only the hazard switch button is visible through a dedicated, round, beveled opening on the outer surface of the instrument panel between the two center panel outlets of the heater and air conditioning system. A red, stencil-like International Control and Display Symbol icon for "Hazard Warning" identifies the hazard switch button. On the opposite end of the black, molded plastic hazard switch module housing from the switch button is an integral connector receptacle and a stamped steel mounting bracket with two latch feature tabs that extend downward, while a short dowel-like alignment pin is integral to each side of the housing just below the switch button. The switch module is connected to the vehicle electrical system through a dedicated take out and connector of the instrument panel wire harness. Within the hazard switch module housing is the hazard switch circuitry and an electronic circuit board with the integral combination flasher circuitry. The electronic combination flasher circuitry performs both the hazard flasher and turn signal flasher functions.

The hazard switch module cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

OPERATION

The hazard switch button is slightly recessed in the instrument panel when the switch is in the Off position, and latches at a position that is flush with the outer surface of the instrument panel when in the On posi-

tion. The hazard switch module produces an audible clicking sound that emulates the sound of a conventional flasher whenever the turn signals or the hazard warning system are activated. The hazard switch module receives battery current on a fused B(+) circuit from a fuse in the Junction Block (JB) at all times for operation of the hazard warning, and on a fused ignition switch output (run) circuit from another fuse in the JB whenever the ignition switch is in the On position for operation of the turn signals. The module receives a path to ground through a splice block located in the instrument panel wire harness with an eyelet terminal connector that is secured by a nut to a ground stud on the driver side instrument panel end bracket near the JB. Inputs to and outputs from the hazard switch module include:

- **Panel Lamps Dimmer Input** - A non-serviceable incandescent bulb soldered onto the hazard switch module circuit board provides illumination of the switch button when the exterior lighting is turned On through an input received on the fused panel lamps dimmer switch signal circuit. However, this bulb flashes on and off at full intensity whenever the hazard switch button is in the On position, regardless of the status of the exterior lighting.

- **Hazard Switch Input** - The combination flasher circuitry of the hazard switch module receives an internal ground input from the hazard switch to request hazard flasher operation.

- **Multi-Function Switch Input** - The combination flasher circuitry of the hazard switch module receives separate ground inputs from the turn signal switch circuitry of the multi-function switch on right and left turn switch sense circuits to request right or left turn signal flasher operation.

- **Body Control Module Input** - The Body Control Module (BCM) can request hazard flasher operation by providing a ground path to the combination flasher circuitry of the hazard switch module through a hazard lamp control circuit.

- **Turn Signal Output** - The combination flasher circuitry within the hazard switch module responds to the flasher request inputs by energizing and de-energizing two miniature relays on the module circuit board. These relays control the switch output through the right and left turn signal circuits. One relay controls the right lamps, while the other controls the left.

Because of active electronic elements within the hazard switch module, it cannot be tested with conventional automotive electrical test equipment. If the hazard switch module is believed to be faulty, replace the switch with a known good unit to confirm system operation.

HAZARD SWITCH (Continued)

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the radio from the instrument panel. (Refer to 8 - ELECTRICAL/AUDIO/RADIO - REMOVAL).
- (3) Remove the screw at the top of the instrument panel radio opening that secures the hazard switch to the instrument panel trim (Fig. 22).

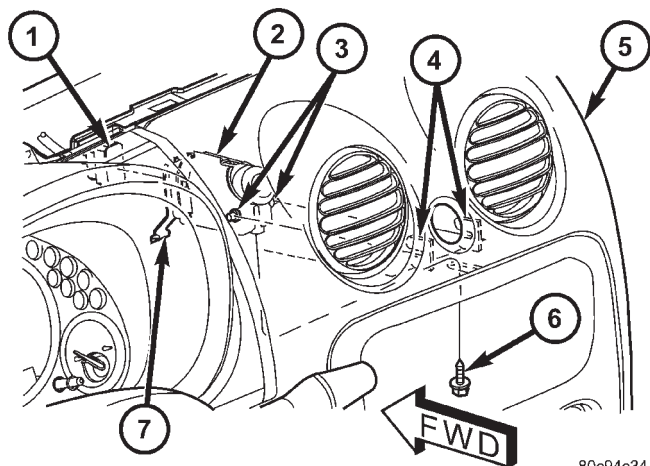


Fig. 22 Hazard Switch Remove/Install

- 1 - WIRE HARNESS CONNECTOR
- 2 - HAZARD SWITCH
- 3 - ALIGNMENT PIN (2)
- 4 - STANCHION (2)
- 5 - INSTRUMENT PANEL
- 6 - SCREW (1)
- 7 - MOUNTING BRACKET LATCH TAB (2)

(4) Reach through and above the instrument panel radio opening to access the two latch tabs of the stamped metal hazard switch mounting bracket.

(5) Using two fingertips, pull rearward and downward on the latch tabs on the back of the hazard switch until it is disengaged from the instrument panel trim.

(6) Push the hazard switch button through the button opening of the instrument panel far enough to disengage the alignment pins on each side of the switch housing from the saddle formations of the two stanchions on the back of the instrument panel trim, just below and to either side of the button opening.

(7) Disconnect the instrument panel wire harness connector for the hazard switch from the switch connector receptacle.

(8) Remove the hazard switch through the instrument panel radio opening.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the hazard switch through the instrument panel radio opening.

(2) Reconnect the instrument panel wire harness connector for the hazard switch to the switch connector receptacle.

(3) Reach through and above the instrument panel radio opening to position the hazard switch for installation.

(4) Guide the hazard switch button through the button opening of the instrument panel, which will engage the alignment pins on each side of the switch housing with the saddle formations of the two stanchions on the back of the instrument panel trim, just below and to either side of the button opening.

(5) Using hand pressure, press upward on the back of the hazard switch until the latch tabs of the mounting bracket on the back of the switch are both engaged with the instrument panel trim (Fig. 22).

(6) Install and tighten the screw at the top of the instrument panel radio opening that secures the hazard switch to the instrument panel trim. Tighten the screw to 2 N·m (17 in. lbs.).

(7) Reinstall the radio into the instrument panel. (Refer to 8 - ELECTRICAL/AUDIO/RADIO - INSTALLATION).

(8) Reconnect the battery negative cable.

HEADLAMP BULB

REMOVAL

NORTH AMERICA

(1) Disconnect and isolate the battery negative cable.

(2) Reach behind the headlamp unit from the engine compartment side of the upper radiator cross-member to access the headlamp bulb lock ring (Fig. 23).

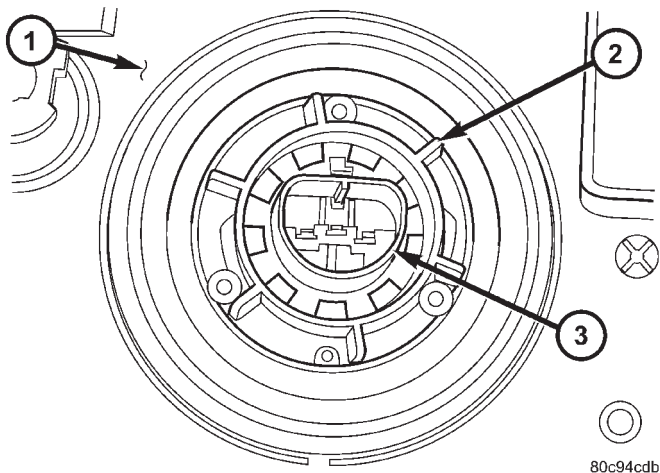


Fig. 23 Headlamp Bulb Lock Ring

- 1 - HEADLAMP UNIT HOUSING
- 2 - LOCK RING
- 3 - SOCKET & BULB

(3) Firmly grasp the lock ring on the back of the headlamp unit housing.

(4) Rotate the lock ring on the back of the headlamp unit housing counterclockwise about 30 degrees.

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.

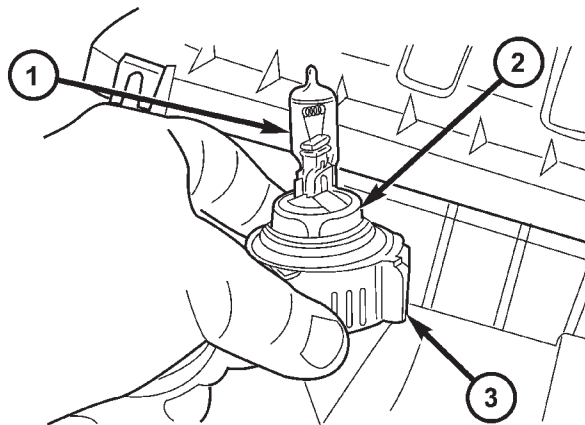
(5) Pull the lock ring, socket, and bulb straight out of the headlamp unit housing and up from behind the upper radiator crossmember (Fig. 24).

(6) Disconnect the grille opening reinforcement wire harness connector for the headlamp bulb from the connector receptacle on the bulb socket.

(7) Remove the bulb and bulb socket from the lock ring as a unit.

REST-OF-WORLD

(1) Disconnect and isolate the battery negative cable.



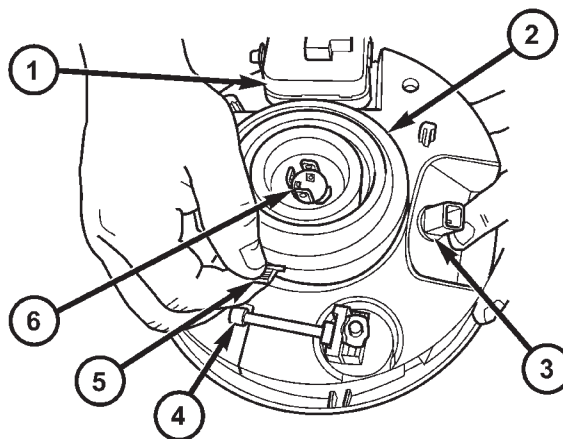
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Fig. 24 Headlamp Bulb Remove/Install

- 1 - HEADLAMP BULB
- 2 - SOCKET
- 3 - LOCK RING

(2) Remove the headlamp unit from the grille opening reinforcement. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).

(3) Firmly grasp the tab of the headlamp boot seal on the back of the headlamp unit housing (Fig. 25).



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Fig. 25 Headlamp Bulb Boot Seal Remove

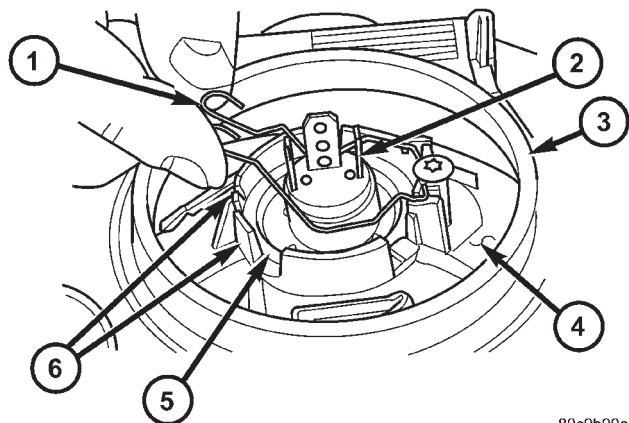
- 1 - LEVELING MOTOR (IF EQUIPPED)
- 2 - BOOT SEAL
- 3 - FRONT POSITION LAMP
- 4 - ADJUSTING SCREW
- 5 - TAB
- 6 - BULB BASE

(4) Pull the tab away from the back of the headlamp unit housing to remove the boot seal from the housing and the bulb base.

HEADLAMP BULB (Continued)

(5) Pinch the two hooked ends of the wire headlamp bulb retainer clip together and disengage them from the slots in the flange of the reflector (Fig. 26).

(6) Pivot the headlamp bulb retainer clip up off of



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Fig. 26 Headlamp Bulb Retainer Clip Engage/Disengage

- 1 - RETAINER CLIP
- 2 - BULB BASE
- 3 - HEADLAMP HOUSING
- 4 - REFLECTOR
- 5 - BULB FLANGE
- 6 - RETAINER SLOTS

the bulb flange and out of the way.

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.

(7) Pull the bulb straight out of the headlamp unit reflector (Fig. 27).

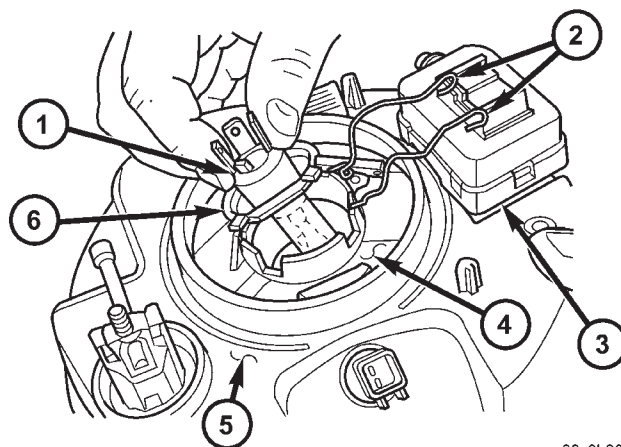
INSTALLATION

NORTH AMERICA

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 and/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 and socket unit into the lock ring (Fig. 24).



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Fig. 27 Headlamp Bulb Remove/Install

- 1 - BULB BASE
- 2 - RETAINER CLIP
- 3 - LEVELING MOTOR (IF EQUIPPED)
- 4 - REFLECTOR
- 5 - HEADLAMP HOUSING
- 6 - BULB FLANGE

(2) Reconnect the grille opening reinforcement wire harness connector for the headlamp bulb to the connector receptacle on the bulb socket.

(3) Position the lock ring, socket, and bulb down behind the upper radiator crossmember and align them with the socket opening on the back of the headlamp unit housing.

(4) Push the socket and bulb straight into the headlamp unit housing until they are firmly seated.

(5) Position the lock ring over the socket and engage it with the flange on the back of the headlamp unit housing (Fig. 23).

(6) Rotate the lock ring on the back of the headlamp unit housing clockwise about 30 degrees.

(7) Reconnect the battery negative cable.

REST-OF-WORLD

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 and/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 bulb into the headlamp unit reflector (Fig. 27).

(2) Pivot the headlamp bulb retainer clip back over the bulb flange.

HEADLAMP BULB (Continued)

(3) Pinch the two hooked ends of the wire headlamp bulb retainer clip together and engage them into the slots in the flange of the reflector (Fig. 26).

(4) Position the center opening of the boot seal over the base of the headlamp bulb and pull it downward until the seal is fully engaged over the bulb base (Fig. 25).

(5) Position the outer circumference of the boot seal over the flange on the back of the headlamp unit housing and pull it downward until the seal is fully engaged over the flange.

(6) Reinstall the headlamp unit onto the grille opening reinforcement. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).

(7) Reconnect the battery negative cable.

(8) Confirm proper headlamp unit alignment. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - ADJUSTMENTS).

HEADLAMP HIGH BEAM RELAY

DESCRIPTION

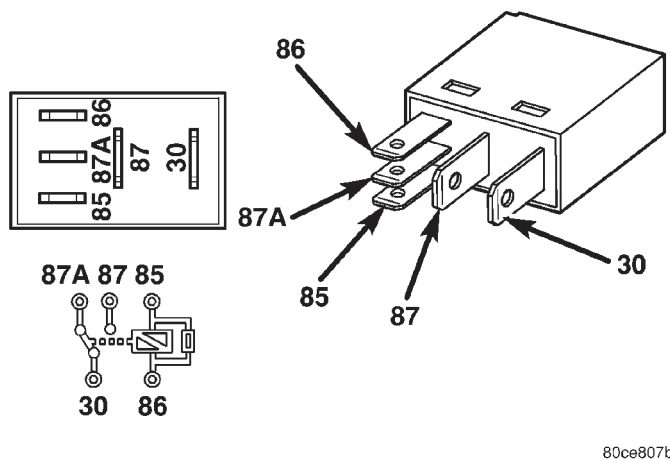


Fig. 28 ISO Micro Relay

- 30 - COMMON FEED
85 - COIL GROUND
86 - COIL BATTERY
87 - NORMALLY OPEN
87A - NORMALLY CLOSED

The headlamp high beam relay is located in the Junction Block (JB) on the driver side outboard end of the instrument panel in the passenger compartment of the vehicle. The headlamp high beam relay is omitted from vehicles manufactured for sale in Canada, which have a Daytime Running Lamp (DRL) solid state relay installed in the JB that also per-

forms the function of the headlamp high beam relay. The headlamp high beam relay is a conventional International Standards Organization (ISO) micro relay (Fig. 28). Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions. The relay is contained within a small, rectangular, molded plastic housing and is connected to all of the required inputs and outputs by five integral male spade-type terminals that extend from the bottom of the relay base.

The headlamp high beam relay cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

OPERATION

The headlamp high beam relay is an electromechanical switch that uses a low current input from the Body Control Module (BCM) to control a high current output to the headlamp high beam filaments. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The headlamp high beam relay terminals are connected to the vehicle electrical system through a connector receptacle in the Junction Block (JB). The inputs and outputs of the headlamp high beam relay include:

- **Common Feed Terminal** - The common feed terminal (30) receives battery current at all times from a fuse in the Power Distribution Center (PDC) through a fused B(+) circuit.

- **Coil Ground Terminal** - The coil ground terminal (85) receives battery current at all times from a fuse in the PDC through a fused B(+) circuit.

- **Coil Battery Terminal** - The coil battery terminal (86) is connected to a control output of the Body Control Module (BCM) and to the momentary optical horn (flash-to-pass) output of the multi-function switch through a high beam relay control circuit. The BCM and/or the multi-function switch controls headlamp high beam operation by controlling a ground path through this circuit.

HEADLAMP HIGH BEAM RELAY (Continued)

• **Normally Open Terminal** - The normally open terminal (87) is connected to the headlamp high beam filaments through the high beam relay output circuit and provides battery current to the headlamp high beams whenever the relay is energized.

• **Normally Closed Terminal** - The normally closed terminal (87A) is not connected in this application.

The headlamp high beam relay can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - HEADLAMP HIGH BEAM RELAY

The headlamp high beam relay (Fig. 29) is located in the Junction Block (JB) on the driver side out-board end of the instrument panel. 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.

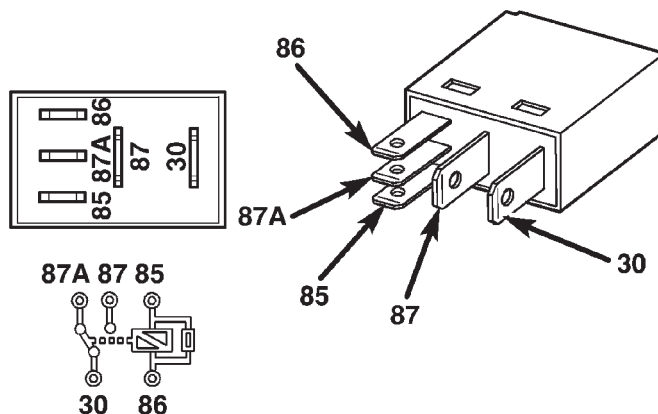
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Remove the headlamp high beam relay from the JB. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP HIGH BEAM RELAY - REMOVAL).

(2) 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 Step 3. If not OK, replace the faulty relay.

(3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 8 ohms. If OK, go to Step 4. If not OK, replace the faulty relay.

(4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, reinstall the relay and use a DRBIII®



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Fig. 29 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

scan tool to perform further testing. Refer to the appropriate diagnostic information.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the end cap from the driver side out-board end of the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - REMOVAL).

(3) Remove the headlamp high beam relay by grasping it firmly and pulling it straight out from the receptacle in the Junction Block (JB) (Fig. 30).

HEADLAMP HIGH BEAM RELAY (Continued)

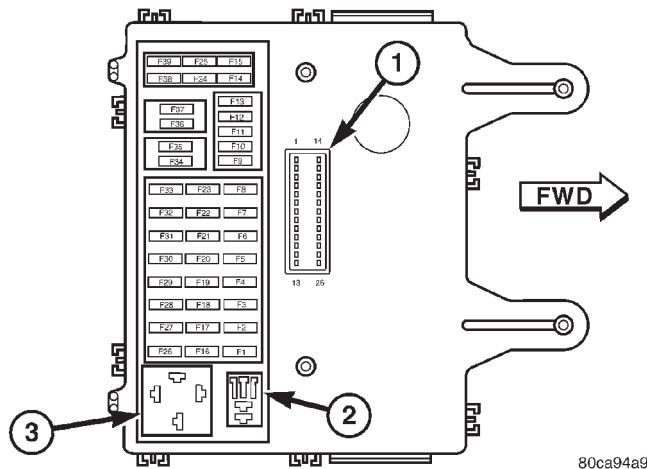


Fig. 30 Junction Block - Outboard Side (RHD Shown - Rotate 180° for LHD)

- 1 - JB/BCM CONNECTOR
- 2 - HIGH BEAM RELAY
- 3 - DRL RELAY

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Position the headlamp high beam relay to the proper receptacle in the Junction Block (JB) (Fig. 30).
- (2) Align the headlamp high beam relay terminals with the terminal cavities in the JB receptacle.
- (3) Push firmly and evenly on the top of the headlamp high beam relay until the terminals are fully seated in the terminal cavities in the JB receptacle.
- (4) Reinstall the end cap onto the driver side outboard end of the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - INSTALLATION).
- (5) Reconnect the battery negative cable.

HEADLAMP LEVELING MOTOR

DESCRIPTION

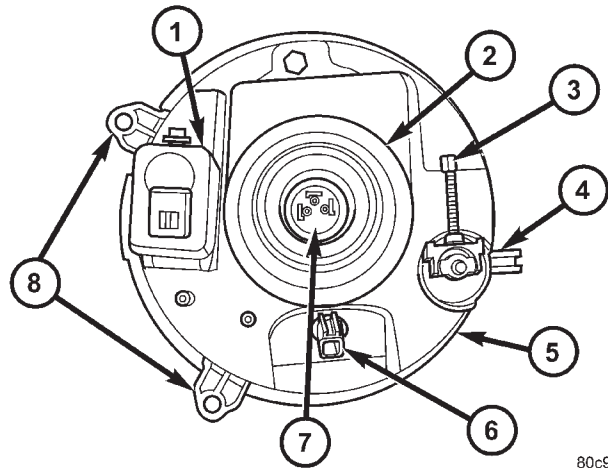


Fig. 31 Headlamp Unit - With Leveling

- 1 - LEVELING MOTOR (IF EQUIPPED)
- 2 - BOOT SEAL
- 3 - ADJUSTING SCREW
- 4 - LOCATOR TAB
- 5 - HOUSING
- 6 - FRONT POSITION LAMP SOCKET & BULB
- 7 - HEADLAMP BULB
- 8 - MOUNTING TAB (2)

The headlamp leveling motor is located on the rear inboard side of each headlamp unit on models equipped with the headlamp leveling system, which is available only in certain markets where required (Fig. 31). The motor is encased within a molded plastic housing and is secured by an integral wedge-type mounting boss on its forward surface to a flanged receptacle on the back of the headlamp unit housing. A rubber seal around the circumference of the mounting boss is compressed and seals the motor to the headlamp unit when the boss is properly installed in the flanged receptacle. The outside of the motor housing features an integral molded connector receptacle on its rearward surface, a hex-headed adjusting screw extends from the top of the housing, and a plastic pushrod with a ball formation on its free end extends from the center of the mounting boss at the front. 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 fascia wire harness.

The headlamp leveling motor cannot be repaired and, if faulty or damaged, the unit must be replaced.

HEADLAMP LEVELING MOTOR (Continued)

OPERATION

The controller board and logic circuitry of the headlamp leveling motor will energize the motor and extend or retract the motor pushrod through the integral screw-drive transmission based upon the voltage signal input received from the resistor multiplexed headlamp leveling switch. The ball formation on the end of the headlamp leveling motor pushrod is snapped into a socket formation on the back of the movable reflector within the headlamp unit housing. The headlamp leveling motors and switch have a path to ground at all times. The headlamp leveling components operate on battery current received through the fused park lamp relay output circuit so that the system will only operate when the exterior lighting is turned On.

Because of active electronic elements within the headlamp leveling motor, it cannot be tested with conventional automotive electrical test equipment. If the headlamp leveling motor is believed to be faulty, replace the motor with a known good unit to confirm system operation.

REMOVAL

The headlamp leveling motors are integral to the headlamp units on vehicles manufactured for certain markets where headlamp leveling is required.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the headlamp bulb from the headlamp unit housing. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP BULB - REMOVAL).

(3) Rotate the headlamp leveling motor on the back of the headlamp unit housing counterclockwise about 30 degrees (Fig. 32).

(4) Firmly grasp the motor with one hand while stabilizing the headlamp unit housing with the other hand.

(5) Firmly, steadily, and forcefully pull the headlamp leveling motor straight away from the back of the headlamp unit housing to unsnap the ball formation on the end of the motor pushrod from the socket on the headlamp unit reflector (Fig. 33).

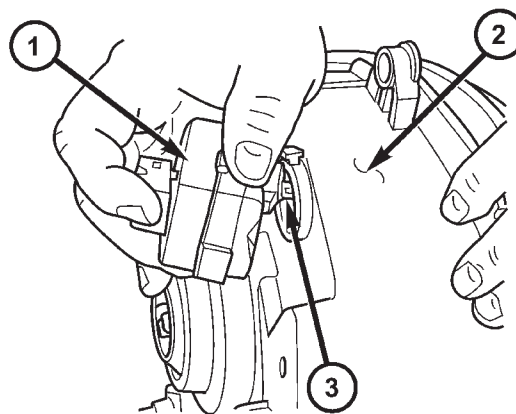
(6) Remove the headlamp leveling motor and pushrod from the back of the headlamp unit housing.

INSTALLATION

The headlamp leveling motors are integral to the headlamp units on vehicles manufactured for certain markets where headlamp leveling is required.

(1) Position the headlamp leveling motor and pushrod from the mounting hole on the back of the headlamp unit housing.

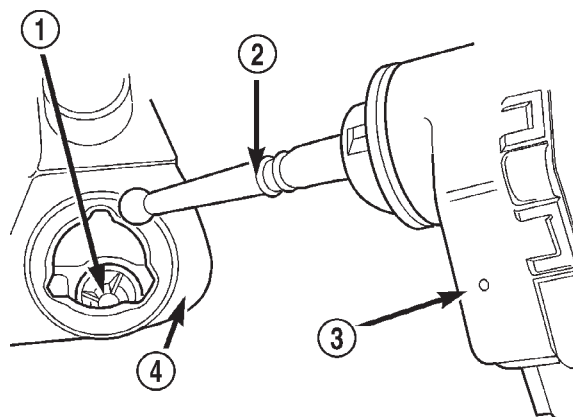
(2) Insert two fingers through the bulb mounting hole in the center of the headlamp reflector and pull



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Fig. 32 Headlamp Leveling Motor Remove/Install

- 1 - LEVELING MOTOR
- 2 - HEADLAMP HOUSING
- 3 - PUSHROD



80a47176

Fig. 33 Leveling Motor Pushrod - Typical

- 1 - REFLECTOR PUSHROD SOCKET
- 2 - PUSHROD
- 3 - LEVELING MOTOR
- 4 - HEADLAMP HOUSING

the reflector upwards toward the headlamp leveling motor.

(3) Align the ball formation on the end of the leveling motor pushrod with the socket on the headlamp unit reflector (Fig. 33).

(4) While continuing to pulling the reflector toward the motor, firmly, steadily, and forcefully push the headlamp leveling motor straight into the back of the headlamp unit housing to snap the ball formation on the end of the motor pushrod into the socket on the headlamp unit reflector.

(5) After the pushrod is engaged to the reflector, remove your fingers from the bulb mounting hole in

HEADLAMP LEVELING MOTOR (Continued)

the center of the headlamp reflector and thoroughly clean any fingerprints from the reflector.

(6) Push the mounting flange of the headlamp leveling motor into the mounting hole on the back of headlamp unit housing unit the motor is firmly seated (Fig. 32).

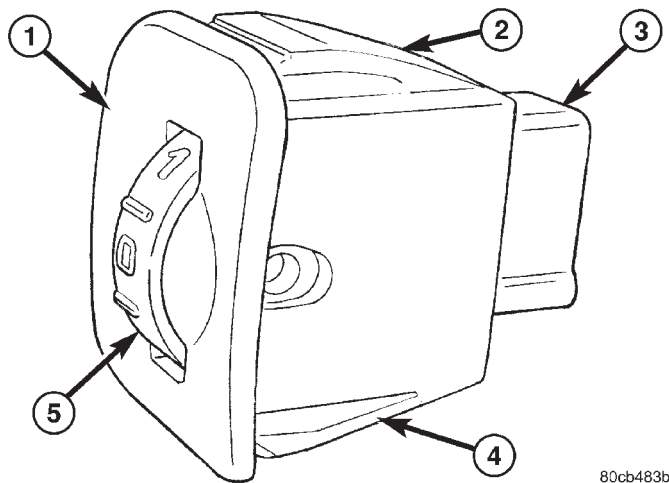
(7) Rotate the headlamp leveling motor on the back of the headlamp unit housing clockwise about 30 degrees.

(8) Reinstall the headlamp bulb into the headlamp unit housing. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP BULB - INSTALLATION).

(9) Reconnect the battery negative cable.

HEADLAMP LEVELING SWITCH

DESCRIPTION



80cb483b

Fig. 34 Headlamp Leveling Switch

- 1 - SWITCH
- 2 - UPPER LATCH FEATURE (1)
- 3 - CONNECTOR RECEPTACLE
- 4 - LOWER LATCH FEATURE (2)
- 5 - THUMBWHEEL

The headlamp leveling switch (Fig. 34) is used only on vehicles manufactured for certain markets where the headlamp leveling system is required. The headlamp leveling switch is mounted in the driver side inboard trim bezel on the instrument panel, where it is secured by molded latch features that are integral to the switch housing. Only the switch bezel and thumbwheel are visible on the outer surface of the instrument panel trim bezel. The black plastic switch thumbwheel is marked with white numbers "0," "1," "2," and "3," each of which indicates one of the four switch detent positions. Each higher number repre-

sents a lower aiming position of the headlamp beam relative to the road surface. The black, molded plastic switch housing has an integral connector receptacle on the back, a single latch feature on the top, and two latch features (one on each side) on the bottom. The switch is connected to the vehicle electrical system through a dedicated take out and connector of the instrument panel wire harness. Within the switch housing is the leveling switch circuitry including the switch contacts and a series resistor configuration.

The headlamp leveling switch cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

OPERATION

The headlamp leveling switch receives battery current on a fused park lamp relay output circuit from a fuse in the Junction Block (JB) whenever the park lamp relay is energized (park lamps are turned On). The switch receives a path to ground through a splice block located in the instrument panel wire harness with an eyelet terminal connector that is secured by a nut to a ground stud on the driver side instrument panel end bracket near the JB. The only output from the switch is a voltage signal that it provides to the headlamp leveling motors on a headlamp adjust signal circuit. Each switch position selects a different tap on a series resistor within the switch to provide a different voltage signal to the leveling motors. The higher the switch position number, the higher the output voltage level.

The headlamp leveling switch can be tested using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - HEADLAMP LEVELING SWITCH

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

HEADLAMP LEVELING SWITCH (Continued)

- (1) Disconnect and isolate the battery negative cable. Disconnect the instrument panel wire harness connector for the headlamp leveling switch from the switch connector receptacle.
- (2) Using an ohmmeter, perform the resistance tests at the terminal pins in the headlamp leveling switch connector receptacle (Fig. 35) as shown in the Headlamp Leveling Switch Tests table.

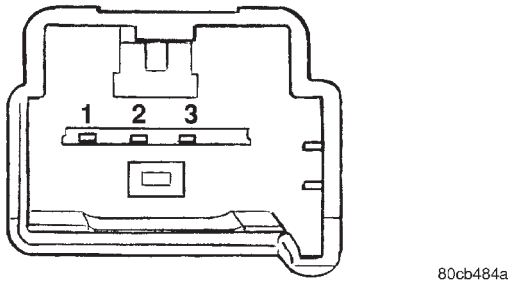


Fig. 35 Headlamp Leveling Switch Connector Receptacle

HEADLAMP LEVELING SWITCH TESTS	
SWITCH POSITION	RESISTANCE (OHMS) BETWEEN PINS 1 & 3
0	0.5 ± 0.5
1	301 ± 1
2	595 ± 1
3	739 ± 1

- (3) If the switch fails any of the resistance tests, replace the faulty headlamp leveling switch as required.

REMOVAL

The headlamp leveling switch is used only on vehicles manufactured for certain markets where headlamp leveling is required.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the driver side inboard bezel from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL DRIVER SIDE BEZEL - REMOVAL).
- (3) Disconnect the instrument panel wire harness connector for the headlamp leveling switch from the switch connector receptacle (Fig. 36).

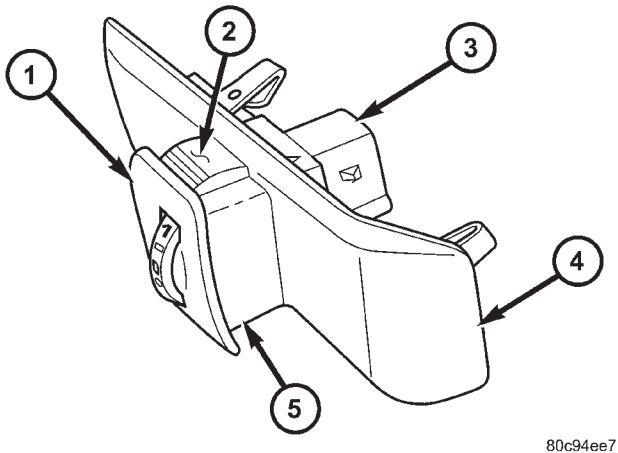


Fig. 36 Headlamp Leveling Switch Remove/Install

- 1 - HEADLAMP LEVELING SWITCH
2 - UPPER LATCH TAB
3 - RECEPTACLE
4 - DRIVER SIDE INBOARD BEZEL
5 - LOWER LATCH TAB (2)

- (4) From the back of the trim bezel, depress the two lower latch features on the headlamp leveling switch housing and rock the bottom of the switch out through the face of the bezel.
- (5) From the back of the trim bezel, depress the upper latch feature on the headlamp leveling switch housing and push the switch out through the face of the bezel.

INSTALLATION

The headlamp leveling switch is used only on vehicles manufactured for certain markets where headlamp leveling is required.

HEADLAMP LEVELING SWITCH (Continued)

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) From the face of the driver side inboard bezel, align the headlamp leveling switch housing to the mounting hole in the bezel (Fig. 36).

(2) Push the headlamp leveling switch into the mounting hole until it is fully seated and the upper latch and two lower latch features on the switch housing are engaged on the back of the bezel.

(3) Position the switch and bezel unit to the instrument panel.

(4) Reconnect the instrument panel wire harness connector for the headlamp leveling switch to the switch connector receptacle.

(5) Reinstall the driver side inboard bezel onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL DRIVER SIDE BEZEL - INSTALLATION).

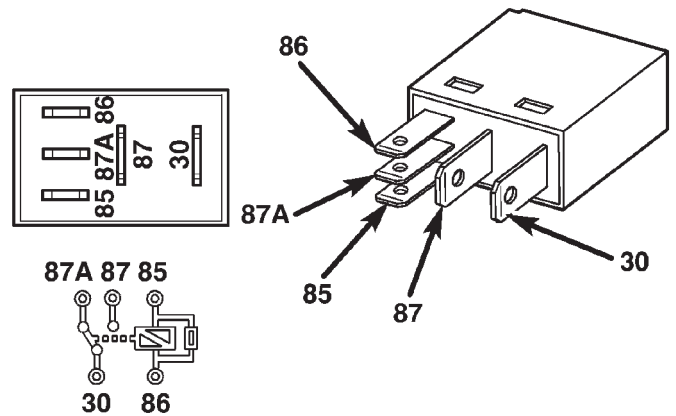
(6) Reconnect the battery negative cable.

HEADLAMP LOW BEAM RELAY

DESCRIPTION

The headlamp low beam relay is located in the Junction Block (JB) below the driver side outboard end of the instrument panel in the passenger compartment of the vehicle. The headlamp low beam relay is a conventional International Standards Organization (ISO) micro relay (Fig. 37). Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions. The relay is contained within a small, rectangular, molded plastic housing and is connected to all of the required inputs and outputs by five integral male spade-type terminals that extend from the bottom of the relay base.

The headlamp low beam relay cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.



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Fig. 37 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

OPERATION

The headlamp low beam relay is an electromechanical switch that uses a low current input from the Body Control Module (BCM) to control a high current output to the headlamp low beam filaments. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The headlamp low beam relay terminals are connected to the vehicle electrical system through a connector receptacle in the Junction Block (JB). The inputs and outputs of the headlamp low beam relay include:

- **Common Feed Terminal** - The common feed terminal (30) receives battery current at all times from a fuse in the Power Distribution Center (PDC) through a fused B(+) circuit.
- **Coil Ground Terminal** - The coil ground terminal (85) receives battery current at all times from a fuse in the PDC through a fused B(+) circuit.

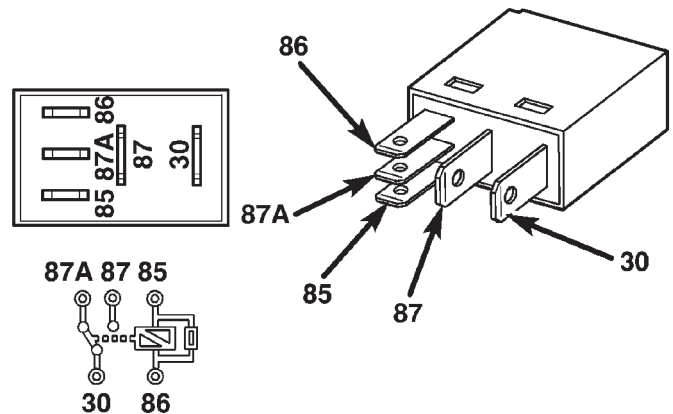
HEADLAMP LOW BEAM RELAY (Continued)

- **Coil Battery Terminal** - The coil battery terminal (86) is connected to a control output of the Body Control Module (BCM) through a low beam relay control circuit. The BCM controls headlamp low beam operation by controlling a ground path through this circuit.

- **Normally Open Terminal** - The normally open terminal (87) is connected to the headlamp low beam filaments through the low beam relay output circuit and provides battery current to the headlamp low beams whenever the relay is energized.

- **Normally Closed Terminal** - The normally closed terminal (87A) is not connected in this application.

The headlamp low beam relay can be diagnosed using conventional diagnostic tools and methods.



80ce807b

Fig. 38 ISO Micro Relay**DIAGNOSIS AND TESTING - HEADLAMP LOW BEAM RELAY**

The headlamp low beam relay (Fig. 38) is located in the Junction Block (JB) under the driver side out-board end of the instrument panel. 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.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Remove the headlamp low beam relay from the JB. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP LOW BEAM RELAY - REMOVAL).

(2) 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 Step 3. If not OK, replace the faulty relay.

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

(3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 8 ohms. If OK, go to Step 4. If not OK, replace the faulty relay.

(4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, reinstall the relay and use a DRBIII® scan tool to perform further testing. Refer to the appropriate diagnostic information.

REMOVAL

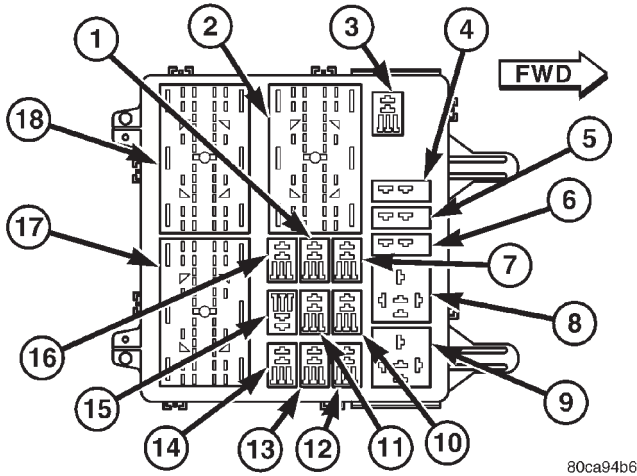
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

HEADLAMP LOW BEAM RELAY (Continued)

(2) Remove the steering column opening cover from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - REMOVAL).

(3) Remove the headlamp low beam relay by grasping it firmly and pulling it straight out from the receptacle in the Junction Block (JB) (Fig. 39).



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Fig. 39 Junction Block - Inboard Side (LHD Shown - Rotate 180° for RHD)

- 1 - PASSENGER DOOR UNLOCK RELAY
- 2 - JB C3 CONNECTOR RECEPTACLE
- 3 - LOW BEAM RELAY
- 4 - CIRCUIT BREAKER #1
- 5 - CIRCUIT BREAKER #2
- 6 - CIRCUIT BREAKER #3
- 7 - DOOR LOCK RELAY
- 8 - DEFOGGER RELAY
- 9 - SPARE
- 10 - FRONT FOG LAMP RELAY
- 11 - HORN RELAY
- 12 - SPARE
- 13 - SPARE
- 14 - REAR FOG LAMP RELAY
- 15 - PARK LAMP RELAY
- 16 - DRIVER DOOR UNLOCK RELAY
- 17 - JB C1 CONNECTOR RECEPTACLE
- 18 - JB C2 CONNECTOR RECEPTACLE

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 FUR-

THER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the headlamp low beam relay to the proper receptacle in the Junction Block (JB) (Fig. 39).

(2) Align the headlamp low beam relay terminals with the terminal cavities in the JB receptacle.

(3) Push firmly and evenly on the top of the headlamp low beam relay until the terminals are fully seated in the terminal cavities in the JB receptacle.

(4) Reinstall the steering column opening cover onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - INSTALLATION).

(5) Reconnect the battery negative cable.

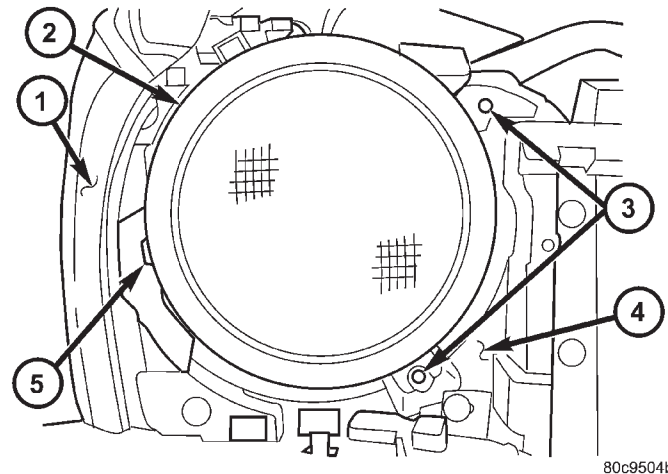
HEADLAMP UNIT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the grille panel from the grille opening reinforcement. (Refer to 23 - BODY/EXTERIOR/GRILLE - REMOVAL).

(3) Remove the two screws that secure the mounting tabs on the inboard side of the headlamp unit housing to the grille opening reinforcement (Fig. 40).



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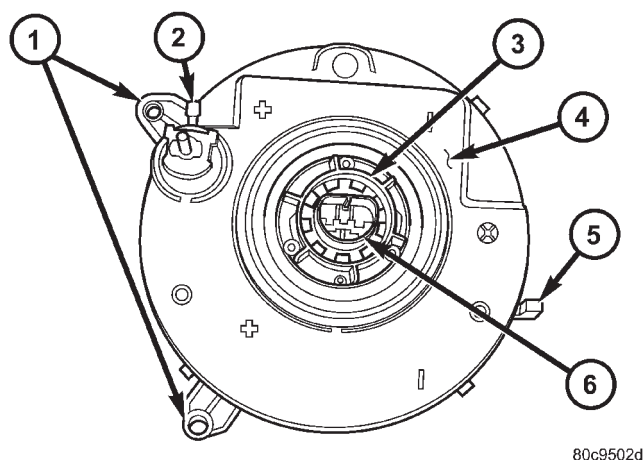
Fig. 40 Headlamp Unit Remove/Install

- 1 - FENDER PANEL
- 2 - HEADLAMP UNIT
- 3 - MOUNTING TAB (2)
- 4 - MOUNTING PANEL
- 5 - LOCATOR TAB

(4) Pull the inboard side of the headlamp unit away from the grille opening reinforcement far

HEADLAMP UNIT (Continued)

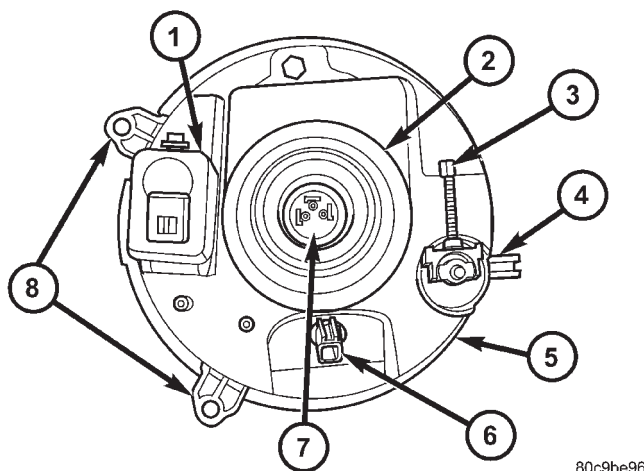
enough to disengage the locator tab on the outboard side of the unit (Fig. 41) or (Fig. 42) from the engagement slot in the outboard edge of the reinforcement.



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Fig. 41 Headlamp Unit - North America

- 1 - MOUNTING TAB (2)
- 2 - ADJUSTING SCREW
- 3 - LOCK RING
- 4 - HOUSING
- 5 - LOCATOR TAB
- 6 - SOCKET & BULB



80c9be96

Fig. 42 Headlamp Unit - Rest-Of-World

- 1 - LEVELING MOTOR (IF EQUIPPED)
- 2 - BOOT SEAL
- 3 - ADJUSTING SCREW
- 4 - LOCATOR TAB
- 5 - HOUSING
- 6 - FRONT POSITION LAMP SOCKET & BULB
- 7 - HEADLAMP BULB
- 8 - MOUNTING TAB (2)

(5) Pull the headlamp unit away from the grille opening reinforcement far enough to disconnect the wire harness connectors from the headlamp bulb

socket (North America), the headlamp bulb base (Rest-Of-World), the front position lamp socket (if equipped), and the headlamp leveling motor (if equipped).

(6) Remove the headlamp unit from the grille opening reinforcement.

INSTALLATION

(1) Position the headlamp unit to the grille opening reinforcement.

(2) Reconnect the wire harness connectors to the headlamp bulb socket (North America), the headlamp bulb base (Rest-Of-World), the front position lamp socket (if equipped), and the headlamp leveling motor (if equipped) (Fig. 41) or (Fig. 42).

(3) Engage the locator tab on the outboard side of the headlamp unit into the engagement slot in the outboard edge of the grille opening reinforcement.

(4) Align the two mounting tabs on the inboard side of the headlamp unit housing to the mounting holes in the grille opening reinforcement (Fig. 40).

(5) Install and tighten the two screws that secure the mounting tabs on the inboard side of the headlamp unit housing to the grille opening reinforcement. Tighten the screws to 3 N·m (30 in. lbs.).

(6) Reinstall the grille panel onto the grille opening reinforcement. (Refer to 23 - BODY/EXTERIOR/GRILLE - INSTALLATION).

(7) Reconnect the battery negative cable.

(8) Confirm proper headlamp unit alignment. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - ADJUSTMENTS).

ADJUSTMENTS

ADJUSTMENT - HEADLAMP UNIT

VEHICLE PREPARATION FOR HEADLAMP ALIGNMENT

(1) Verify headlamp dimmer (multi-function) switch and high beam indicator operation.

(2) If the vehicle is equipped with headlamp leveling, be certain that the headlamp leveling switch is in the "0" position.

(3) Repair or replace any faulty or damaged components that could hinder proper lamp alignment.

(4) Verify proper tire inflation.

(5) Clean headlamp lenses.

(6) Verify that cargo area is not heavily loaded.

(7) 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.

HEADLAMP ALIGNMENT SCREEN PREPARATION

Prepare an alignment screen as illustrated.

(1) Position the vehicle on a level surface perpendicular to a flat wall 7.62 meters (25 feet) away from

HEADLAMP UNIT (Continued)

the front of the headlamp lens for North American vehicles, or 10.0 meters (32.81 feet) away from the front of the headlamp lens for Rest-Of-World vehicles (Fig. 43). If necessary, tape a line on the floor at the appropriate distance away from and parallel to the wall.

(2) Measure up on the wall 1.27 meters (5 feet) from the floor and tape a vertical line on the alignment screen at the centerline of the vehicle. Sight along the centerline of the vehicle (from the rear of the vehicle forward) to verify the accuracy of the centerline placement.

(3) Rock the vehicle from side-to-side three times to allow the suspension to stabilize, then jounce the front suspension three times by pushing downward on the front bumper and releasing. Measure the distance from the center of the headlamp lens to the floor. Transfer this measurement to the alignment screen and tape a horizontal line on the wall at this mark. This line will be used for up-and-down adjustment reference.

(4) Measure the distance from the centerline of the vehicle to the center of each headlamp being aligned. Transfer these measurements to the alignment screen and tape a vertical line this distance to each side of the vehicle centerline. These lines will be used for left/right reference.

HEADLAMP ADJUSTMENT

A properly aligned headlamp will project a pattern on the alignment screen from just below horizontal to 75 millimeters (3 inches) below the headlamp centerline for vehicles in North America, or from just below horizontal to 125 millimeters (5 inches) below the headlamp horizontal centerline for vehicles in Rest-Of-World.

(1) Vehicles for all markets except Japan should have the headlamp low beams selected with the dimmer (multi-function) switch during the adjustment procedure. Vehicles for the Japanese market should have the headlamp high beams selected.

(2) Cover the lens of the headlamp that is not being adjusted.

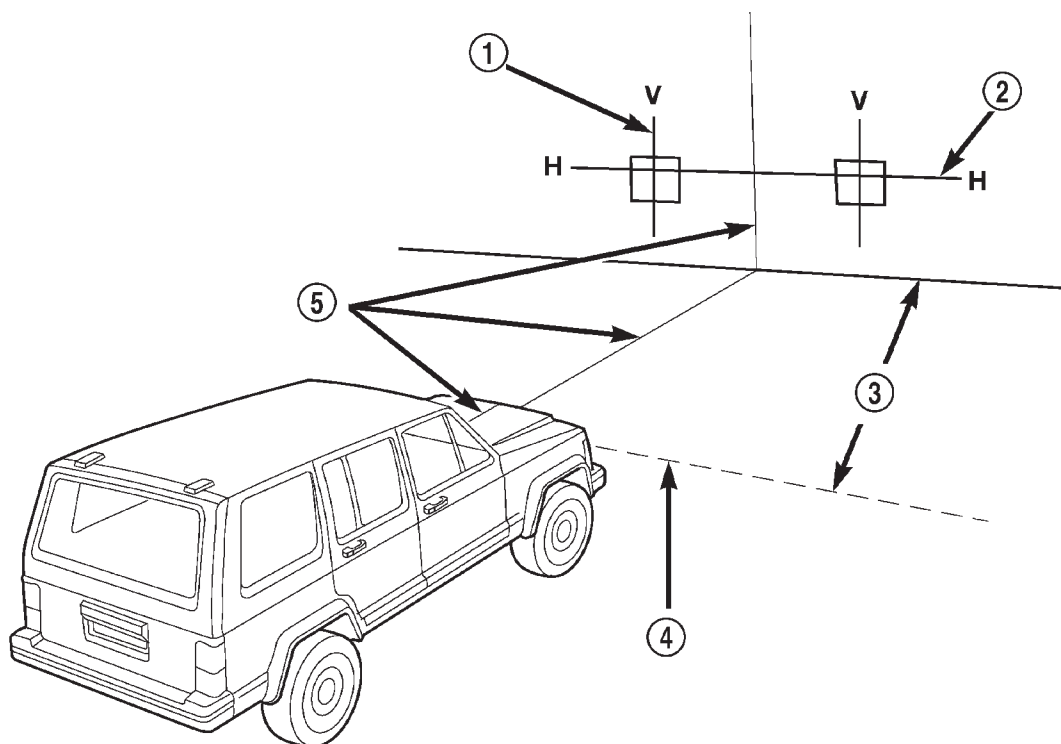


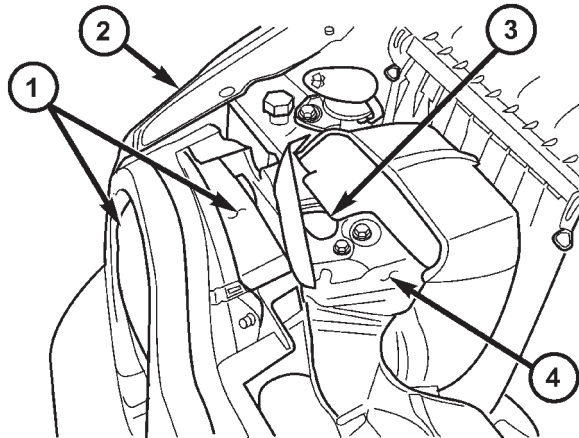
Fig. 43 Headlamp Alignment Screen - Typical

1 - CENTER OF VEHICLE TO CENTER OF HEADLAMP LENS
 2 - FLOOR TO CENTER OF HEADLAMP LENS
 3 - 7.62 METERS (25 FEET) NORTH AMERICA/10.0 METERS (32.81 FEET) REST-OF-WORLD

4 - FRONT OF HEADLAMP
 5 - VEHICLE CENTERLINE

HEADLAMP UNIT (Continued)

(3) Turn the adjusting screw (Fig. 44) until the top edge of the beam intensity pattern is positioned from just below horizontal to 75 millimeters (3 inches) below the headlamp horizontal centerline for vehicles in North America, or from just below horizontal to 125 millimeters (5 inches) below the headlamp horizontal centerline for vehicles in Rest-Of-World.



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Fig. 44 Headlamp Adjusting Screw

- 1 - HEADLAMP UNIT
- 2 - FENDER PANEL
- 3 - ADJUSTING SCREW ACCESS HOLE
- 4 - UPPER RADIATOR CROSSMEMBER

(4) Repeat the adjustment procedure for the opposite headlamp.

LICENSE PLATE LAMP BULB

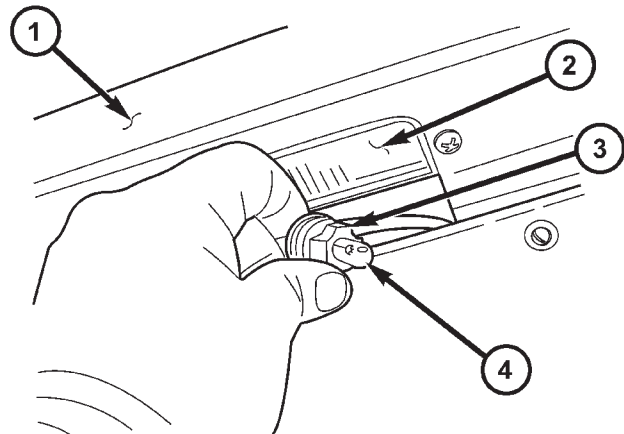
REMOVAL

NORTH AMERICA

- (1) Disconnect and isolate the battery negative cable.
- (2) Reach through the opening in the rear bumper fascia between the license plate and the lamp to access and firmly grasp the socket on the back of the license plate lamp unit housing (Fig. 45).
- (3) Pull the socket and bulb straight out of the back of the license plate lamp unit housing.
- (4) Pull the bulb straight out of the license plate lamp unit socket.

REST-OF-WORLD

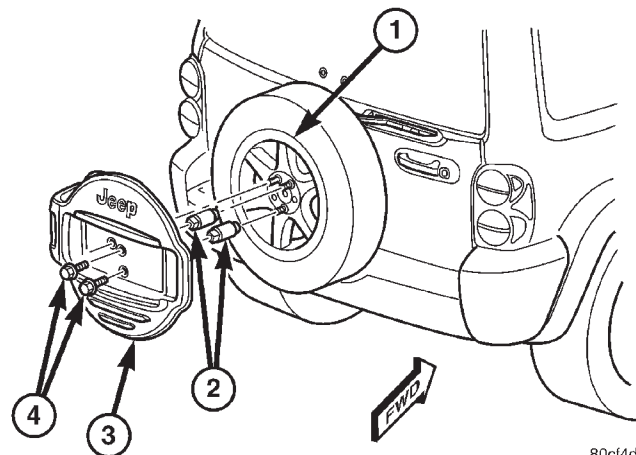
- (1) Disconnect and isolate the battery negative cable.
- (2) Unsnap and lift up the bottom of the license mounting plate far enough to access and remove the two screws that secure the license plate bracket to the special lug nuts on the spare tire (Fig. 46).



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Fig. 45 License Plate Lamp Bulb Remove/Install - North America

- 1 - REAR BUMPER FASCIA
- 2 - LICENSE PLATE LAMP
- 3 - SOCKET
- 4 - BULB



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Fig. 46 License Plate Bracket - Rest-Of-World

- 1 - SPARE TIRE
- 2 - SPECIAL LUG NUT (2)
- 3 - LICENSE PLATE BRACKET
- 4 - SCREW (2)

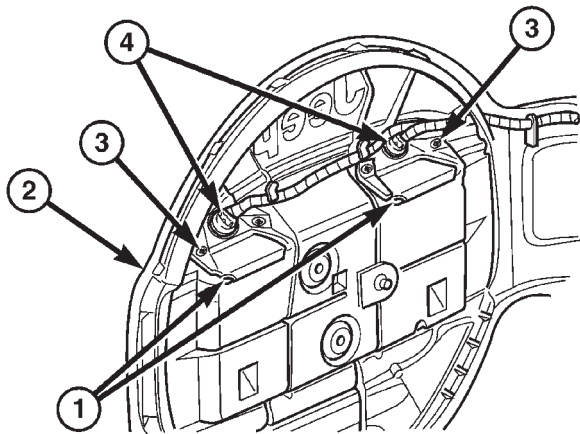
(3) Swing the license plate bracket away from the spare tire far enough to access the license plate lamp bulb sockets.

(4) Firmly grasp the socket on the top of the license plate lamp unit housing for the bulb that is being removed (Fig. 47).

(5) Rotate the socket on the top of the license plate lamp unit housing counterclockwise about 30 degrees.

(6) Pull the socket and bulb straight out of the top of the license plate lamp unit housing.

LICENSE PLATE LAMP BULB (Continued)



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Fig. 47 License Plate Lamp Bulb Remove/Install - Rest-Of-World

- 1 - LAMP UNIT (2)
- 2 - LICENSE PLATE BRACKET
- 3 - SCREW (4)
- 4 - BULB & SOCKET (2)

(7) Pull the bulb straight out of the license plate lamp unit socket.

INSTALLATION

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 and/or the lamp wiring.

NORTH AMERICA

- (1) Align the base of the bulb with the receptacle in the license plate lamp unit socket.
- (2) Push the bulb straight into the license plate lamp unit socket until it is firmly seated.
- (3) Reach through the opening in the rear bumper fascia between the license plate and the lamp to align the socket and bulb with the socket opening on the back of the lamp unit housing (Fig. 45).
- (4) Push the socket and bulb straight into the license plate lamp unit housing until it is firmly seated.
- (5) Reconnect the battery negative cable.

REST-OF-WORLD

- (1) Align the base of the bulb with the receptacle in the license plate lamp unit socket.
- (2) Push the bulb straight into the license plate lamp unit socket until it is firmly seated.
- (3) Align the socket and bulb with the socket opening on the top of the license plate lamp unit housing (Fig. 47).

(4) Push the socket and bulb straight into the license plate lamp unit housing until it is firmly seated.

(5) Rotate the socket on the top of the license plate lamp unit housing clockwise about 30 degrees.

(6) Swing the license plate bracket back against the spare tire (Fig. 46).

(7) Lift up the bottom of the license mounting plate far enough to install and tighten the two screws that secure the license plate bracket to the special lug nuts on the spare tire. Tighten the screws to 28 N·m (21 ft. lbs.).

(8) Lower the bottom of the license mounting plate and, using hand pressure, snap it into place on the license plate bracket.

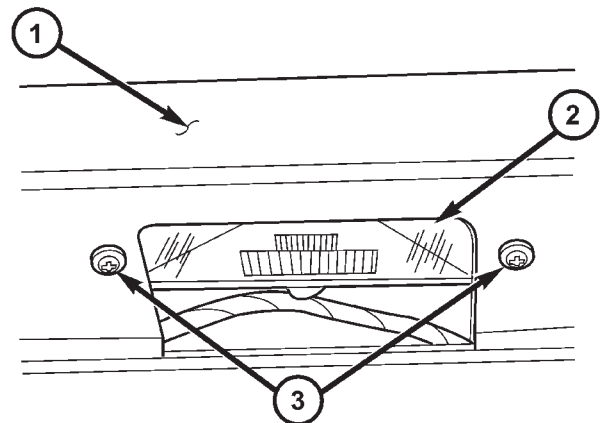
(9) Reconnect the battery negative cable.

LICENSE PLATE LAMP UNIT

REMOVAL

NORTH AMERICA

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the two screws that secure the license plate lamp unit to the rear bumper fascia (Fig. 48).



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Fig. 48 License Plate Lamp Unit Remove/Install

- 1 - REAR BUMPER FASCIA
- 2 - LICENSE PLATE LAMP UNIT
- 3 - SCREW (2)

(3) Pull the license plate lamp unit down and out through the mounting hole in the rear bumper fascia far enough to access and disconnect the wire harness connector for the lamp socket pigtail wire.

(4) Remove the license plate lamp unit from the rear bumper fascia.

LICENSE PLATE LAMP UNIT (Continued)

REST-OF-WORLD

(1) Disconnect and isolate the battery negative cable.

(2) Remove the bulb and socket unit from the license plate lamp unit housing that is being removed. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/LICENSE PLATE LAMP BULB - REMOVAL - REST-OF-WORLD).

(3) Remove the two screws that secure the license plate lamp unit to the back of the license plate bracket (Fig. 49).

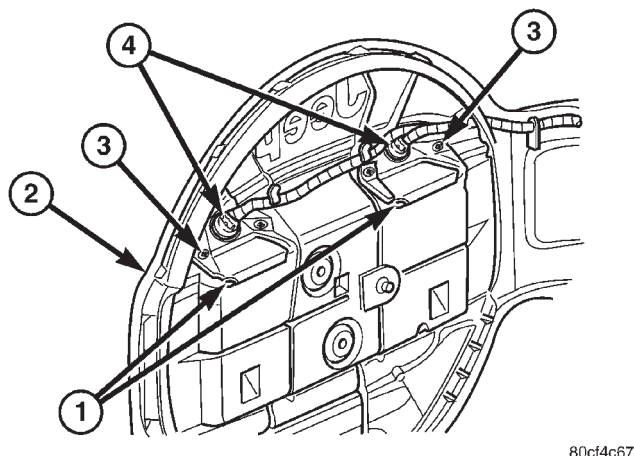


Fig. 49 License Plate Lamp Bulb Remove/Install - Rest-Of-World

- 1 - LAMP UNIT (2)
- 2 - LICENSE PLATE BRACKET
- 3 - SCREW (4)
- 4 - BULB & SOCKET (2)

(1) Remove the license plate lamp unit from the back of the license plate bracket.

INSTALLATION**NORTH AMERICA**

(1) Position the license plate lamp unit to the rear bumper fascia.

(2) Reconnect the wire harness connector for the license plate lamp unit to the lamp socket pigtail wire.

(3) Position the license plate lamp unit into the mounting hole in the rear bumper fascia (Fig. 48).

(4) Install and tighten the two screws that secure the license plate lamp unit housing to the rear bumper fascia. Tighten the screws to 2 N·m (20 in. lbs.).

(5) Reconnect the battery negative cable.

REST-OF-WORLD

(1) Position the license plate lamp unit onto the back of the license plate bracket (Fig. 49).

(2) Install and tighten the two screws that secure the license plate lamp unit to the back of the license plate bracket. Tighten the screws to 2 N·m (20 in. lbs.).

(3) Reinstall the bulb and socket unit into the license plate lamp unit housing that is being replaced. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/LICENSE PLATE LAMP BULB - INSTALLATION - REST-OF-WORLD).

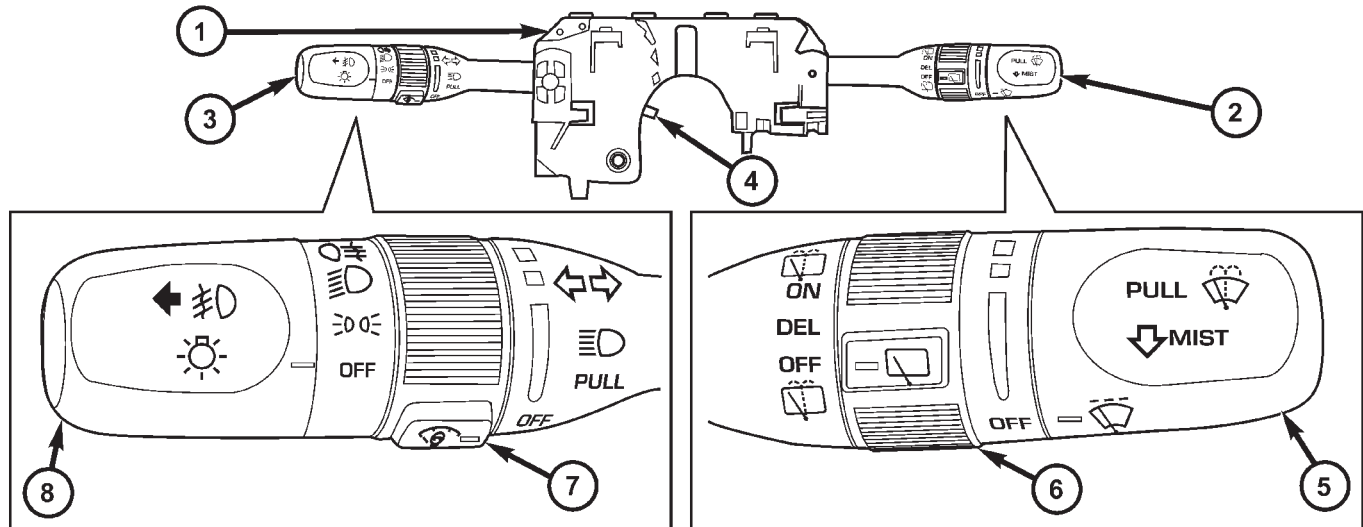
(4) Reconnect the battery negative cable.

MULTI-FUNCTION SWITCH**DESCRIPTION**

The multi-function switch is located on the steering column, just below the steering wheel (Fig. 50). The only visible components of the multi-function switch are two levers, or control stalks that extend through dedicated openings in each side of the steering column shrouds. The remainder of the switch, its mounting provisions, and its electrical connections are all concealed beneath the steering column shrouds. The switch housing and controls are constructed of molded black plastic. A saddle-like formation in the center of the multi-function switch housing straddles the steering column tube just below the column lock housing, and two posts integral to the lower surface of the switch housing engage two holes on the forward-facing side of the lock housing. Two integral ledge-like locating tabs near the top of the rearward facing switch housing surface are supported and located by two upright stanchions that extend upward from the top of the lock housing. Also on the rearward facing switch housing surface near the center, an integral ledge-like mounting tab rests on a similar ledge-like tab that extends from each side of the steering column lock housing. When the steering column shrouds are installed on the column, the switch mounting tabs are clamped along with the mounting tabs of the clockspring between the integral mounting stanchions of the upper shroud and the lock housing tabs, and are secured to the steering column lock housing by the same two screws that secure the two shroud halves to each other and the column.

There are several versions of the multi-function switch to support both optional equipment and equipment that is required only in certain markets. Each multi-function switch control stalk has both white nomenclature and International Control and Display Symbol graphics applied to it, which clearly identify its many functions. Each control stalk has a control knob on its end with a flattened face to allow it to be easily rotated. On vehicles equipped with optional front fog lamps, the knob on the end of left control

MULTI-FUNCTION SWITCH (Continued)



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Fig. 50 Multi-Function Switch

- 1 - MULTI-FUNCTION SWITCH
- 2 - RIGHT (WIPER) CONTROL STALK
- 3 - LEFT (LIGHTING) CONTROL STALK
- 4 - TURN SIGNAL CANCEL ACTUATOR
- 5 - RIGHT (WIPER) CONTROL KNOB

- 6 - RIGHT (WIPER) CONTROL RING
- 7 - LEFT (LIGHTING) CONTROL RING
- 8 - LEFT (LIGHTING) CONTROL KNOB

stalk can also be pulled outward to select those lamps. Each control stalk also features a knurled control ring located just below the control knob. The left control stalk is dedicated to providing driver controls for the interior and exterior lighting systems, while the right control stalk is dedicated to providing driver controls for the front and rear wiper systems. Two integral connector receptacles on the forward facing surface of the multi-function switch housing connect the switch to the vehicle electrical system through two take outs and connectors of the instrument panel wire harness. The left connector receptacle contains nine terminal pins for the lighting control circuits of the switch, while the right connector receptacle contains six terminal pins for the wiper control circuits of the switch. The multi-function switch cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

LEFT CONTROL STALK The left (lighting) control stalk of the multi-function switch supports the following functions and features:

- **Front Fog Lamps** - For vehicles so equipped, the internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide detent switching for the optional front fog lamps.
- **Headlamps** - The internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide detent switching for the headlamps.

- **Headlamp Beam Selection** - The internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide detent switching for selection of the headlamp high or low beams.

- **Headlamp Optical Horn** - The internal circuitry and hardware of the multi-function switch left (lighting) 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.

- **Interior Lamps Defeat** - The internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide detent switching to defeat the illumination of all interior courtesy lamps when a door, the rear flip-up glass, or the tailgate are opened.

- **Interior Lamps On** - The internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide detent switching to simultaneously illuminate all interior courtesy lamps.

- **Panel Lamps Dimming** - The internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide simultaneous adjustable control of the illumination intensity of all instrument panel lighting at one of six available illumination intensity levels.

- **Parade Mode** - The internal circuitry and hardware of the multi-function switch left (lighting) con-

MULTI-FUNCTION SWITCH (Continued)

trol stalk provide detent switching for a parade mode that maximizes the illumination intensity of all instrument panel lighting for visibility when driving in daylight with the exterior lamps turned on.

- **Park Lamps** - The internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide detent switching for the park lamps.

- **Rear Fog Lamps** - For vehicles so equipped, the internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide detent switching for the optional rear fog lamps. Rear fog lamps are optional only for vehicles manufactured for certain markets, where they are required.

- **Turn Signal Control** - The internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide both momentary non-detent switching and detent switching with automatic cancellation for both the left and right turn signal lamps.

RIGHT CONTROL STALK The right (wiper) control stalk of the multi-function switch supports the following functions and features:

- **Continuous Front Wipe Modes** - The internal circuitry and hardware of the multi-function switch right (wiper) control stalk provide two continuous front wipe switch positions, low speed or high speed.

- **Continuous Rear Wipe Mode** - The internal circuitry and hardware of the multi-function switch right (wiper) control stalk provide one continuous rear wipe switch position.

- **Front Washer Mode** - The internal circuitry and hardware of the multi-function switch right (wiper) control stalk switch provide front washer system operation.

- **Front Wipe-After-Wash Mode** - The internal circuitry and hardware of the multi-function switch right (wiper) control stalk provide a wipe-after-wash mode.

- **Front Wiper Mist Mode** - The internal circuitry and hardware of the multi-function switch right (wiper) control stalk provide a front wiper system mist mode.

- **Intermittent Front Wipe Mode** - The internal circuitry and hardware of the multi-function switch right (wiper) control stalk provide an intermittent front wipe mode with five delay interval positions.

- **Intermittent Rear Wipe Mode** - The internal circuitry and hardware of the multi-function switch right (wiper) control stalk provide one fixed interval intermittent rear wipe mode switch position.

- **Rear Washer Mode** - The internal circuitry and hardware of the multi-function switch right (wiper) control stalk provide rear washer system operation.

OPERATION

The multi-function switch uses a combination of resistor multiplexed and conventionally switched outputs to control the many functions and features it provides. The switch receives battery current on a fused ignition switch output (run-acc) circuit from a fuse in the Junction Block (JB) whenever the ignition switch is in the On or Accessory positions. The switch receives a path to ground at all times through a splice block located in the instrument panel wire harness with an eyelet terminal connector that is secured by a nut to a ground stud on the driver side instrument panel end bracket near the Junction Block (JB). Following are descriptions of how each of the two multi-function switch control stalks operate to control the functions and features they provide.

LEFT CONTROL STALK The left (lighting) control stalk of the multi-function switch operates as follows:

- **Front Fog Lamps** - For vehicles so equipped, the control knob on the end of the multi-function switch left (lighting) control stalk is pulled outward to activate the optional front fog lamps. The control knob is mechanically keyed so that it cannot be pulled outward unless it is first rotated to turn on the exterior lighting. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a fog lamp switch sense circuit, and the BCM responds by energizing or de-energizing the front fog lamp relay in the Junction Block (JB) as required.

- **Headlamps** - The control knob on the end of the multi-function switch left (lighting) control stalk is rotated forward (counterclockwise) to its second detent position to activate the headlamps. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a headlamp switch sense circuit, and the BCM responds by energizing or de-energizing the selected low or high beam relay (Daytime Running Lamp relay in Canadian vehicles) in the Junction Block (JB) as required.

- **Headlamp Beam Selection** - The left (lighting) control stalk of the multi-function switch is pulled towards the steering wheel past a detent to actuate the integral beam select switch circuitry. Each time the control stalk is activated in this manner, the opposite headlamp beam from what is currently selected will be energized. The multi-function switch provides a ground output to the Body Control Module (BCM) on a high beam switch sense circuit, and the BCM responds by energizing or de-energizing the selected low or high beam relay (Daytime Running Lamp relay in Canadian vehicles) in the Junction Block (JB) as required.

- **Headlamp Optical Horn** - The left (lighting) control stalk of the multi-function switch is pulled

MULTI-FUNCTION SWITCH (Continued)

towards the steering wheel to just before a detent, to momentarily activate the headlamp optical horn feature. The high beams will remain illuminated until the control stalk is released. The multi-function switch provides a ground output on a high beam relay control circuit to energize the headlamp high beam relay (Daytime Running Lamp relay in Canadian vehicles) in the Junction Block (JB) as required.

- **Interior Lamps Defeat** - The control ring on the multi-function switch left (lighting) control stalk is rotated to a full rearward (clockwise) detent to defeat the illumination of all interior courtesy lamps. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a panel lamps dimmer switch mux circuit, and the BCM responds by de-energizing its internal courtesy lamp driver circuit.

- **Interior Lamps On** - The control ring on the multi-function switch left (lighting) control stalk is rotated to a full forward (counterclockwise) detent to illuminate all interior courtesy lamps. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a panel lamps dimmer switch mux circuit, and the BCM responds by energizing its internal courtesy lamp driver circuit.

- **Panel Lamps Dimming** - The control ring on the multi-function switch left (lighting) control stalk is rotated to one of six minor intermediate detents to simultaneously select the desired illumination intensity of all adjustable instrument panel and instrument cluster lighting. The control ring is rotated rearward (clockwise) to dim, or forward (counterclockwise) to brighten. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a panel lamps dimmer switch mux circuit, and the BCM responds by sending an electronic panel lamps dimming level message to the ElectroMechanical Instrument Cluster (EMIC) over the Programmable Communications Interface (PCI) data bus. The EMIC electronic circuitry then provides the proper PWM output to the cluster illumination lamps and the VFD on the EMIC circuit board, then provides a matching PWM output on the hard wired fused panel lamps dimmer switch signal circuit.

- **Parade Mode** - The control ring on the multi-function switch left (lighting) control stalk is rotated to an intermediate detent that is one detent rearward (clockwise) from the full forward (counterclockwise) detent to select the Parade mode. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a panel lamps dimmer switch mux circuit, and the BCM responds by sending an electronic panel lamps dimming level message to the ElectroMechanical Instru-

ment Cluster (EMIC) over the Programmable Communications Interface (PCI) data bus. The EMIC electronic circuitry then provides the proper PWM output to the cluster illumination lamps and the VFD on the EMIC circuit board, then provides a matching PWM output on the hard wired fused panel lamps dimmer switch signal circuit to illuminate all lamps at full (daylight) intensity with the exterior lamps turned On.

- **Park Lamps** - The control knob on the end of the multi-function switch left (lighting) control stalk is rotated forward (counterclockwise) to its first detent from the Off position to activate the park lamps. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a headlamp switch sense circuit, and the BCM responds by energizing or de-energizing the park lamp relay in the Junction Block (JB) as required.

- **Rear Fog Lamps** - For vehicles so equipped, the control knob on the end of the multi-function switch left (lighting) control stalk is rotated forward (counterclockwise) to its third detent position to activate the rear fog lamps. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a headlamp switch sense circuit, and the BCM responds by energizing or de-energizing the rear fog lamp relay in the Junction Block (JB) as required. Rear fog lamps are optional only for vehicles manufactured for certain markets, where they are required.

- **Turn Signal Control** - The left (lighting) control stalk of the multi-function switch is moved upward to activate the right turn signal circuitry, and, downward to activate the left turn signal circuitry. The turn signal switch has a detent position in each direction that provides turn signals with automatic cancellation, and an intermediate, momentary position in each direction that provides turn signals only until the left multi-function switch control stalk is released. When the control stalk is moved to a turn signal switch detent position, the cancel actuator extends toward the center of the steering column. A turn signal cancel cam that is integral to the clockspring rotates with the steering wheel and the cam lobes contact the cancel actuator when it is extended from the left multi-function switch. When the steering wheel is rotated during a turning maneuver, one of the two 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. In other words, 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 actua-

MULTI-FUNCTION SWITCH (Continued)

tor 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. When a turn signal is activated, the multi-function switch provides a ground output on a right or left turn switch sense circuit to the combination flasher circuitry within the hazard switch, and the combination flasher flashes the turn signal lamps.

RIGHT CONTROL STALK The right (wiper) control stalk of the multi-function switch operates as follows:

- **Continuous Front Wipe Modes** - The control knob on the end of the multi-function switch right (wiper) control stalk is rotated to an intermediate detent that is one detent rearward (counterclockwise) from the full forward (clockwise) detent to select the low speed continuous front wiper mode, or to its full forward (clockwise) detent to select the high speed continuous front wiper mode. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a front wiper switch mux circuit, and the BCM responds by energizing the wiper on/off relay in the Power Distribution Center (PDC) for the front low speed continuous wipe mode, or the wiper on/off relay and the wiper high/low relay in the PDC for the front high speed continuous wipe mode as required.

- **Continuous Rear Wipe Mode** - The control ring on the multi-function switch right (wiper) control stalk is rotated to the most forward (clockwise) detent to select the continuous rear wiper mode. The multi-function switch provides a battery current output to the rear wiper motor on a rear wiper on driver circuit to signal the rear wiper motor to operate in the continuous wipe mode.

- **Front Washer Mode** - The right (wiper) control stalk of the multi-function switch is pulled towards the steering wheel to momentarily activate the washer pump in the front washer mode. The washer pump will continue to operate in the front washer mode until the control stalk is released. The multi-function switch provides a ground output on a washer pump sense circuit, and battery current on a washer pump driver circuit to energize the washer pump in the front washer mode.

- **Front Wiper Mist Mode** - The right (wiper) control stalk of the multi-function switch is pushed towards the floor to momentarily activate the front wiper motor in the mist mode. The front wiper motor will continue to operate in the mist mode until the control stalk is released. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a front wiper switch mux circuit, and the BCM responds by energizing the wiper on/off relay in the Power Distribution Center

(PDC) to operate the front wiper motor momentarily at low speed to provide the front wiper mist mode.

- **Intermittent Front Wipe Mode** - The control knob on the end of the multi-function switch right (wiper) control stalk is rotated to one of five minor intermediate detents to select the desired intermittent front wipe delay interval. The control knob is rotated rearward (counterclockwise) to increase the delay, or forward (clockwise) to decrease the delay. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a front wiper switch mux circuit, and the BCM responds by energizing the wiper on/off relay in the Power Distribution Center (PDC) to operate the front wiper motor at the selected delay intervals.

- **Intermittent Rear Wipe Mode** - The control ring on the multi-function switch right (wiper) control stalk is rotated to the center detent to select the intermittent rear wiper mode. The multi-function switch provides a battery current output to the rear wiper motor on a rear wiper intermittent driver circuit to signal the rear wiper motor to operate in the intermittent wipe mode.

- **Rear Washer Mode** - The control ring on the multi-function switch right (wiper) control stalk is rotated to either the full forward (clockwise) or full rearward (counterclockwise) momentary positions to activate the washer pump in the rear washer mode. The washer pump will continue to operate in the rear washer mode until the control ring is released. The multi-function switch provides a ground output on a washer pump driver circuit, and battery current on a washer pump sense circuit to energize the washer pump in the rear washer mode.

DIAGNOSIS AND TESTING - MULTI-FUNCTION SWITCH

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.

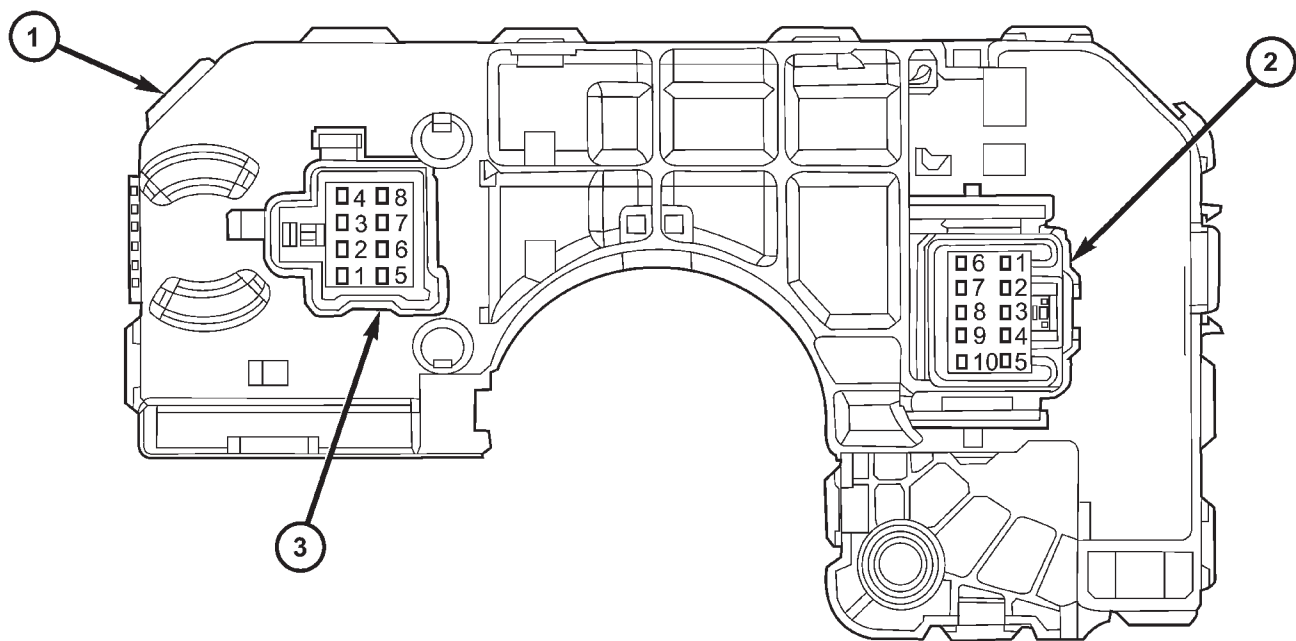
MULTI-FUNCTION SWITCH (Continued)

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the multi-function switch from the steering column. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/MULTI-FUNCTION SWITCH - REMOVAL).

(3) Using an ohmmeter, perform the continuity and resistance tests at the terminals (Fig. 51) in the multi-function switch connector receptacles as shown in the Multi-Function Switch Tests table.



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Fig. 51 Multi-Function Switch Connector Receptacle Pin-Out

1 - MULTI-FUNCTION SWITCH

2 - C-1 (LIGHTING) CONNECTOR RECEPTACLE

3 - C-2 (WIPER) CONNECTOR RECEPTACLE

MULTI-FUNCTION SWITCH (Continued)

MULTI-FUNCTION SWITCH TESTS		
EXTERIOR LIGHTING FUNCTIONS		
SWITCH POSITION	CONNECTOR C-1 PINS	RESISTANCE (OHMS) $\pm 10\%$
Off	4 & 5	3781
Park Lamps On	4 & 5	911
Headlamp Low Beams On	4 & 5	349
Rear Fog Lamps On	4 & 5	75
Headlamp High Beams On	8 & 9	0 - 1
Front Fog Lamps On	2 & 4	0 - 1
Optical Horn (Flash-to-Pass) On	7 & 8	0 - 1
Turn Signal Neutral	6 & 8, 8 & 10	Infinite (Open)
Turn Signal Left	6 & 8	0 - 1
Turn Signal Right	8 & 10	0 - 1
INTERIOR LIGHTING FUNCTIONS		
SWITCH POSITION	CONNECTOR C-1 PINS	RESISTANCE (OHMS) $\pm 10\%$
Off (Courtesy Disable)	1 & 4	63
Dimming 1	1 & 4	200
Dimming 2	1 & 4	557
Dimming 3	1 & 4	914
Dimming 4	1 & 4	1271
Dimming 5	1 & 4	1628
Dimming 6	1 & 4	1985
Parade Mode On	1 & 4	3565
Courtesy On	1 & 4	7885
FRONT WIPER FUNCTIONS		
SWITCH POSITION	CONNECTOR C-1 & C-2 PINS	RESISTANCE (OHMS) $\pm 10\%$
Front Wiper Off	C-1 Pin 4 & C-2 Pin 4	4587
Delay 1	C-1 Pin 4 & C-2 Pin 4	1267
Delay 2	C-1 Pin 4 & C-2 Pin 4	792
Delay 3	C-1 Pin 4 & C-2 Pin 4	531
Delay 4	C-1 Pin 4 & C-2 Pin 4	369
Delay 5	C-1 Pin 4 & C-2 Pin 4	262
Front Wiper Low	C-1 Pin 4 & C-2 Pin 4	125
Front Wiper High	C-1 Pin 4 & C-2 Pin 4	38
Front Wiper Mist	C-1 Pin 4 & C-2 Pin 4	125
Front Washer On	C-2 Pins 5 & 7	0 - 1
REAR WIPER FUNCTIONS		
SWITCH POSITION	CONNECTOR C-2 PINS	RESISTANCE (OHMS) $\pm 10\%$
Rear Wiper Off	1 & 5, 2 & 5	Infinite (Open)
Rear Wiper Intermittent	2 & 5	0 - 1
Rear Wiper On	1 & 5	0 - 1
Rear Washer On	2 & 5, 3 & 5	0 - 1

MULTI-FUNCTION SWITCH (Continued)

(4) If the multi-function switch fails any of the continuity or resistance tests, replace the faulty switch unit as required.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) If the vehicle is equipped with the optional tilt steering column, move the tilt steering column to the fully lowered position and leave the tilt release lever in the released (down) position.

(3) From below the steering column, remove the two screws that secure the lower shroud to the upper shroud (Fig. 52).

(4) Using hand pressure, push gently inward on both sides of the upper shroud near the parting line between the upper and lower shrouds to release the snap features that secure the two halves to each other.

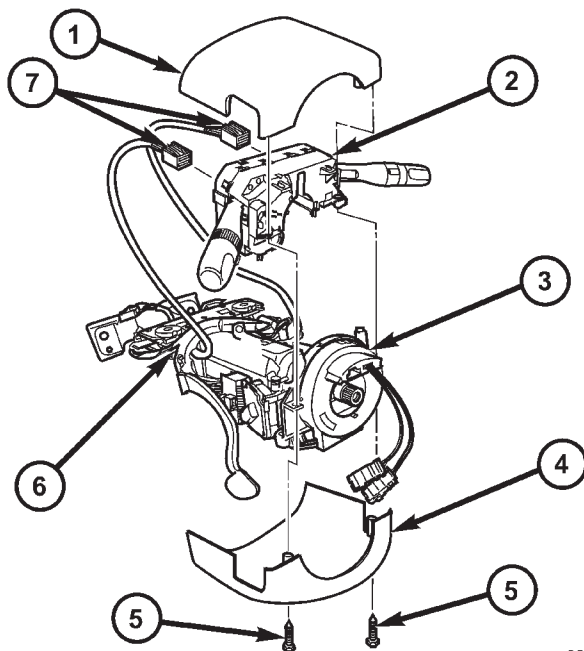
(5) Remove both the upper and lower shrouds from the steering column.

(6) Disconnect the two instrument panel wire harness connectors for the multi-function switch from the two connector receptacles on the back of the switch housing.

(7) Remove the multi-function switch from the steering column lock housing by carefully rocking the switch and pulling the switch housing upward far enough to disengage its alignment posts and locator tabs from the lock housing.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER,



80c96010

Fig. 52 Multi-Function Switch Remove/Install

- 1 - UPPER SHROUD
- 2 - MULTI-FUNCTION SWITCH
- 3 - CLOCKSPrING
- 4 - LOWER SHROUD
- 5 - SCREW (2)
- 6 - STEERING COLUMN
- 7 - WIRE HARNESS CONNECTOR (2)

FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

CAUTION: Before attempting to install the multi-function switch, be certain that the left control stalk is in the neutral turn signal position and the turn signal cancel actuator is in the retracted (neutral) position.

(1) Position the multi-function switch to the steering column.

(2) Reconnect the two instrument panel wire harness connectors for the multi-function switch to the two connector receptacles on the back of the switch housing (Fig. 52).

MULTI-FUNCTION SWITCH (Continued)

(3) Position the multi-function switch onto the steering column lock housing. Be certain that the switch alignment posts and locator tabs are fully seated on the lock housing.

(4) Position the upper and lower shrouds onto the steering column.

(5) Align the snap features on the lower shroud with the receptacles on the upper shroud and apply hand pressure to snap them together.

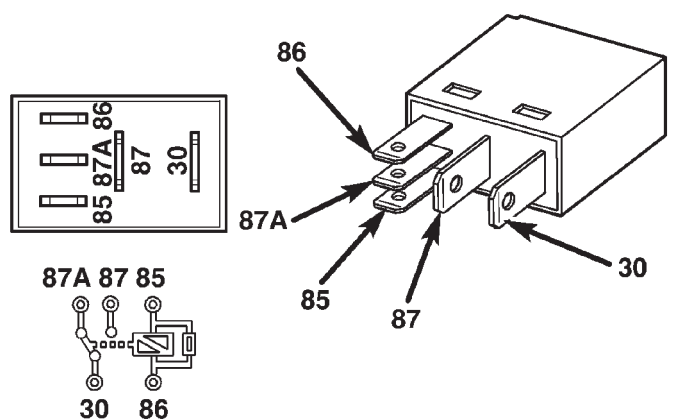
(6) From below the steering column, install and tighten the two screws that secure the lower shroud to the upper shroud. Tighten the screws to 2 N·m (20 in. lbs.).

(7) If the vehicle is equipped with the optional tilt steering column, move the tilt steering column back to the fully raised position and move the tilt release lever into the locked (up) position.

(8) Reconnect the battery negative cable.

PARK LAMP RELAY

DESCRIPTION



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Fig. 53 ISO Micro Relay

- 30 - COMMON FEED
 85 - COIL GROUND
 86 - COIL BATTERY
 87 - NORMALLY OPEN
 87A - NORMALLY CLOSED

The park lamp relay is located in the Junction Block (JB) below the driver side outboard end of the instrument panel in the passenger compartment of the vehicle. The park lamp relay is a conventional International Standards Organization (ISO) micro relay (Fig. 53). Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions. The relay is contained within a small, rectangular, molded plastic housing and is connected to all of the

required inputs and outputs by five integral male spade-type terminals that extend from the bottom of the relay base.

The park lamp relay cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

OPERATION

The park lamp relay is an electromechanical switch that uses a low current input from the Body Control Module (BCM) to control a high current output to the park lamps. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The park lamp relay terminals are connected to the vehicle electrical system through a connector receptacle in the Junction Block (JB). The inputs and outputs of the headlamp low beam relay include:

- **Common Feed Terminal** - The common feed terminal (30) is connected to the park lamps through the park lamp relay output circuit and provides ground to the park lamps when the relay is de-energized, and battery current to the park lamps whenever the relay is energized.

- **Coil Ground Terminal** - The coil ground terminal (85) is connected to a control output of the Body Control Module (BCM) through a park lamp relay control circuit. The BCM controls park lamp operation by controlling a ground path through this circuit.

- **Coil Battery Terminal** - The coil battery terminal (86) receives battery current at all times from a fuse in the PDC through a fused B(+) circuit.

- **Normally Open Terminal** - The normally open terminal (87) receives battery current at all times from a fuse in the Power Distribution Center (PDC) through a fused B(+) circuit.

- **Normally Closed Terminal** - The normally closed terminal (87A) is connected to ground at all times through a ground circuit that receives ground through a splice block located in the instrument panel wire harness with an eyelet terminal connector that is secured by a nut to a ground stud on the

PARK LAMP RELAY (Continued)

driver side instrument panel end bracket near the Junction Block (JB).

The park lamp relay can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - PARK LAMP RELAY

The park lamp relay (Fig. 54) is located in the Junction Block (JB) under the driver side outboard end of the instrument panel. 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.

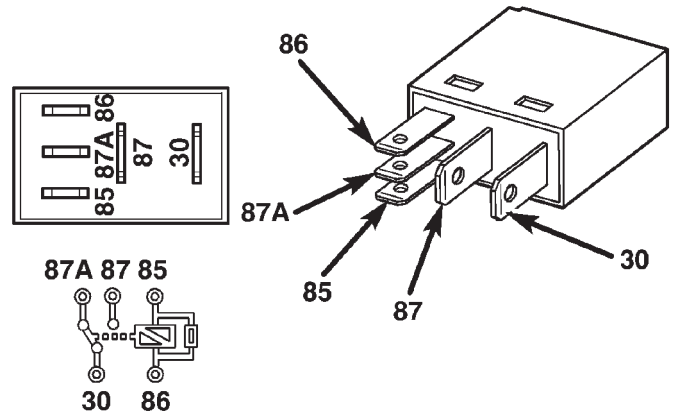
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Remove the park lamp relay from the JB. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/PARK LAMP RELAY - REMOVAL).

(2) 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 Step 3. If not OK, replace the faulty relay.

(3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 8 ohms. If OK, go to Step 4. If not OK, replace the faulty relay.

(4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, reinstall the relay and use a DRBIII® scan tool to perform further testing. Refer to the appropriate diagnostic information.



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Fig. 54 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

REMOVAL

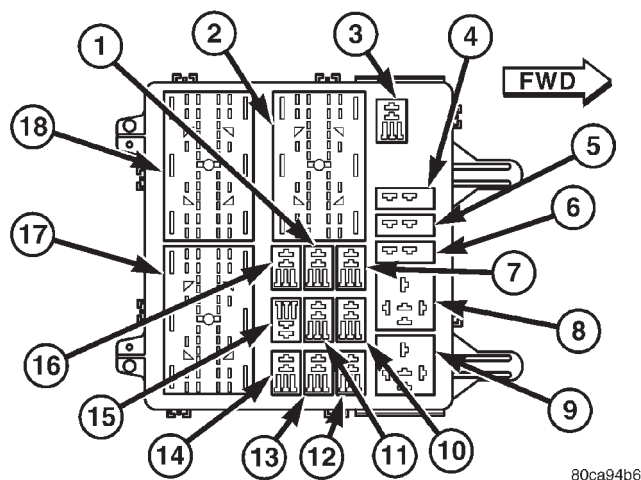
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(1) Disconnect and isolate the battery negative cable.

(2) Remove the steering column opening cover from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - REMOVAL).

(3) Remove the park lamp relay by grasping it firmly and pulling it straight out from the receptacle in the Junction Block (JB) (Fig. 55).

PARK LAMP RELAY (Continued)



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Fig. 55 Junction Block - Inboard Side (LHD Shown - Rotate 180° for RHD)

- 1 - PASSENGER DOOR UNLOCK RELAY
- 2 - JB C3 CONNECTOR RECEPTACLE
- 3 - LOW BEAM RELAY
- 4 - CIRCUIT BREAKER #1
- 5 - CIRCUIT BREAKER #2
- 6 - CIRCUIT BREAKER #3
- 7 - DOOR LOCK RELAY
- 8 - DEFOGGER RELAY
- 9 - SPARE
- 10 - FRONT FOG LAMP RELAY
- 11 - HORN RELAY
- 12 - SPARE
- 13 - SPARE
- 14 - REAR FOG LAMP RELAY
- 15 - PARK LAMP RELAY
- 16 - DRIVER DOOR UNLOCK RELAY
- 17 - JB C1 CONNECTOR RECEPTACLE
- 18 - JB C2 CONNECTOR RECEPTACLE

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the park lamp relay to the proper receptacle in the Junction Block (JB) (Fig. 55).

(2) Align the park lamp relay terminals with the terminal cavities in the JB receptacle.

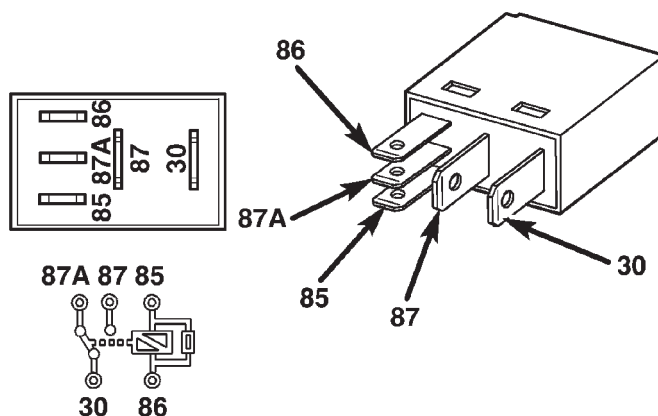
(3) Push firmly and evenly on the top of the park lamp relay until the terminals are fully seated in the terminal cavities in the JB receptacle.

(4) Reinstall the steering column opening cover onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - INSTALLATION).

(5) Reconnect the battery negative cable.

REAR FOG LAMP RELAY

DESCRIPTION



80ce807b

Fig. 56 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

The rear fog lamp relay is located in the Junction Block (JB) on the driver side outboard end of the instrument panel in the passenger compartment of the vehicle. The rear fog lamp relay is a conventional International Standards Organization (ISO) micro relay (Fig. 56). Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions. The relay is contained within a small, rectangular, molded plastic housing and is connected to all of the required inputs and outputs by five integral male spade-type terminals that extend from the bottom of the relay base.

The rear fog lamp relay cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

REAR FOG LAMP RELAY (Continued)

OPERATION

The rear fog lamp relay is an electromechanical switch that uses a low current input from the Body Control Module (BCM) to control a high current output to the rear fog lamps. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The rear fog lamp relay terminals are connected to the vehicle electrical system through a connector receptacle in the Junction Block (JB). The inputs and outputs of the rear fog lamp relay include:

- **Common Feed Terminal** - The common feed terminal (30) receives battery current at all times from a fuse in the JB through a fused B(+) circuit.
- **Coil Ground Terminal** - The coil ground terminal (85) is connected to a control output of the premium Body Control Module (BCM) through a rear fog lamp relay control circuit. The BCM controls rear fog lamp operation by controlling a ground path through this circuit.
- **Coil Battery Terminal** - The coil battery terminal (86) receives battery current at all times from a fuse in the JB through a fused B(+) circuit.
- **Normally Open Terminal** - The normally open terminal (87) is connected to the rear fog lamps through a rear fog lamp relay output circuit and provides battery current to the rear fog lamps whenever the relay is energized.
- **Normally Closed Terminal** - The normally closed terminal (87A) is not connected in this application.

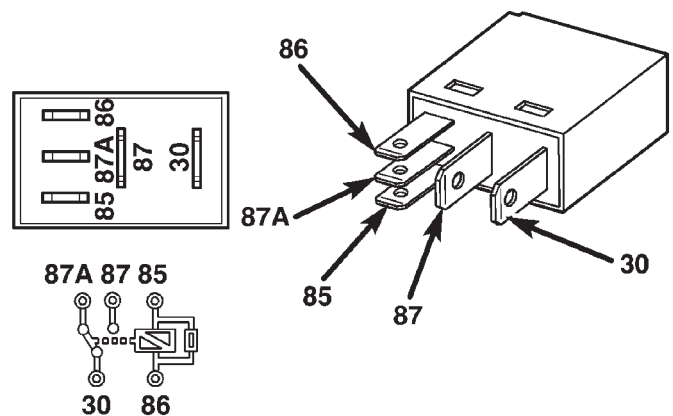
The rear fog lamp relay can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - REAR FOG LAMP RELAY

The rear fog lamp relay (Fig. 57) is located in the Junction Block (JB) under the driver side outboard end of the instrument panel. 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.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.



80ce807b

Fig. 57 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

(1) Remove the rear fog lamp relay from the JB. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/REAR FOG LAMP RELAY - REMOVAL).

(2) 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 Step 3. If not OK, replace the faulty relay.

(3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 8 ohms. If OK, go to Step 4. If not OK, replace the faulty relay.

(4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A

REAR FOG LAMP RELAY (Continued)

and 30. If OK, reinstall the relay and use a DRBIII® scan tool to perform further testing. Refer to the appropriate diagnostic information.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

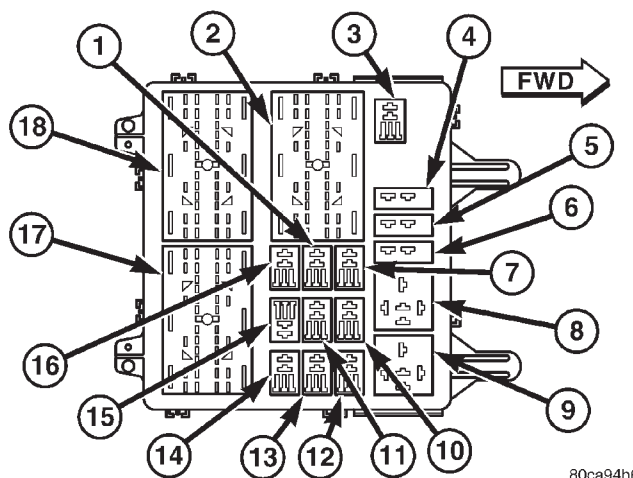
(2) Remove the steering column opening cover from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - REMOVAL).

(3) Remove the rear fog lamp relay by grasping it firmly and pulling it straight out from the receptacle in the Junction Block (JB) (Fig. 58).

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the rear fog lamp relay to the proper receptacle in the Junction Block (JB) (Fig. 58).



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Fig. 58 Junction Block - Inboard Side (LHD Shown - Rotate 180° for RHD)

- 1 - PASSENGER DOOR UNLOCK RELAY
- 2 - JB C3 CONNECTOR RECEPTACLE
- 3 - LOW BEAM RELAY
- 4 - CIRCUIT BREAKER #1
- 5 - CIRCUIT BREAKER #2
- 6 - CIRCUIT BREAKER #3
- 7 - DOOR LOCK RELAY
- 8 - DEFOGGER RELAY
- 9 - SPARE
- 10 - FRONT FOG LAMP RELAY
- 11 - HORN RELAY
- 12 - SPARE
- 13 - SPARE
- 14 - REAR FOG LAMP RELAY
- 15 - PARK LAMP RELAY
- 16 - DRIVER DOOR UNLOCK RELAY
- 17 - JB C1 CONNECTOR RECEPTACLE
- 18 - JB C2 CONNECTOR RECEPTACLE

(2) Align the rear fog lamp relay terminals with the terminal cavities in the JB receptacle.

(3) Push firmly and evenly on the top of the rear fog lamp relay until the terminals are fully seated in the terminal cavities in the JB receptacle.

(4) Reinstall the steering column opening cover onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - INSTALLATION).

(5) Reconnect the battery negative cable.

REAR LAMP BULB

REMOVAL

The rear lamp unit may contain up to four bulbs, depending upon the market for which the vehicle was manufactured. The service procedures for each bulb is the same, only the bulb sizes and types may differ.

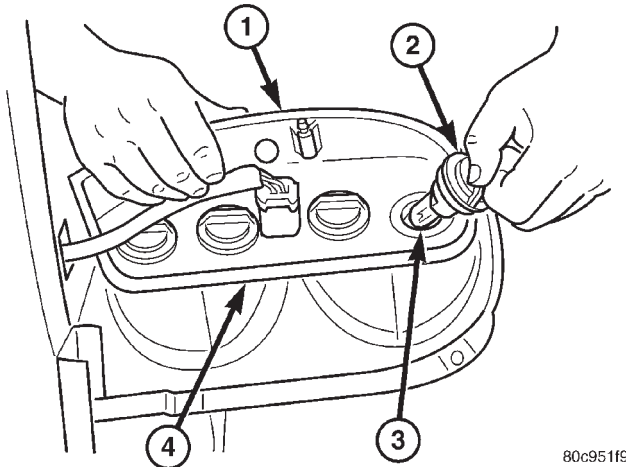
REAR LAMP BULB (Continued)

Be certain any removed bulb is replaced with the same bulb size and type that was removed.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the rear lamp unit from the end of the quarter panel. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/REAR LAMP UNIT - REMOVAL).

(3) Firmly grasp the socket on the socket plate at the back of the rear lamp unit housing for the bulb that is being removed (Fig. 59).



80c95119

Fig. 59 Rear Lamp Bulb Remove/Install

- 1 - REAR LAMP HOUSING
- 2 - BULB HOLDER
- 3 - BULB
- 4 - SOCKET PLATE

(4) Rotate the socket on the socket plate at the back of the rear lamp unit housing counterclockwise about 30 degrees.

(5) Pull the socket and bulb straight out of the back of the rear lamp unit housing.

(6) Pull the bulb straight out of the rear lamp unit socket.

INSTALLATION

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 and/or the lamp wiring.

(1) Align the base of the bulb with the receptacle in the rear lamp unit socket.

(2) Push the bulb straight into the rear lamp unit socket until it is firmly seated.

(3) Align the socket and bulb with the opening in the socket plate on the back of the rear lamp unit housing (Fig. 59).

(4) Push the socket and bulb straight into the rear lamp unit housing until the socket is firmly seated against the socket plate.

(5) Rotate the socket on the socket plate at the back of the rear lamp unit housing clockwise about 30 degrees.

(6) Reinstall the rear lamp unit onto the end of the quarter panel. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/REAR LAMP UNIT - INSTALLATION).

(7) Reconnect the battery negative cable.

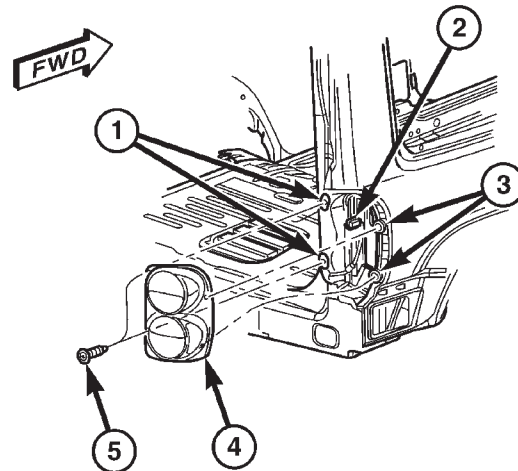
REAR LAMP UNIT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Open the tailgate to access and remove the two screws that secure the inboard side of the rear lamp unit to the side jamb of the tailgate opening (Fig. 60).

(3) Pull the outboard side of the rear lamp unit



80c95299

Fig. 60 Rear Lamp Unit Remove/Install

- 1 - PLASTIC NUT (2)
- 2 - WIRE HARNESS CONNECTOR
- 3 - PLASTIC NUT (2)
- 4 - REAR LAMP UNIT
- 5 - SCREW (2)

rearward (away from the end of the quarter panel) far enough to unsnap the two ball studs on the outboard side of the lamp housing from the plastic nuts in the quarter panel.

(4) Pull the rear lamp unit away from the quarter panel far enough to access and disconnect the wire harness connector for the lamp unit from the connector receptacle on the lamp socket plate.

(5) Remove the rear lamp unit from the quarter panel.

REAR LAMP UNIT (Continued)

(6) Remove the plastic nuts from the quarter panel and discard.

INSTALLATION

(1) Install new plastic nuts into the quarter panel (Fig. 60).

(2) Position the rear lamp unit to the quarter panel.

(3) Reconnect the wire harness connector for the rear lamp unit to the connector receptacle on the lamp socket plate.

(4) Align the two ball studs on the outboard side of the rear lamp unit housing with the plastic nuts in the quarter panel.

(5) Using hand pressure, push the outboard side of the rear lamp unit forward (towards the end of the quarter panel) far enough to snap the two ball studs on the outboard side of the lamp housing into the plastic nuts in the quarter panel.

(6) Align the mounting holes on the inboard side of the rear lamp unit housing with the plastic nuts in the side jamb of the tailgate opening.

(7) Install and tighten the two screws that secure the inboard side of the rear lamp unit housing to the plastic nuts in the side jamb of the tailgate opening. Tighten the screws to 2 N·m (20 in. lbs.).

(8) Reconnect the battery negative cable.

REPEATER LAMP BULB

REMOVAL

Side repeater lamps are used only on vehicles manufactured for certain markets where these lamps are required.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the repeater lamp unit from the front fender panel. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/REPEATER LAMP UNIT - REMOVAL).

(3) Rotate the repeater lamp socket in the lamp lens counterclockwise about 30 degrees (Fig. 61).

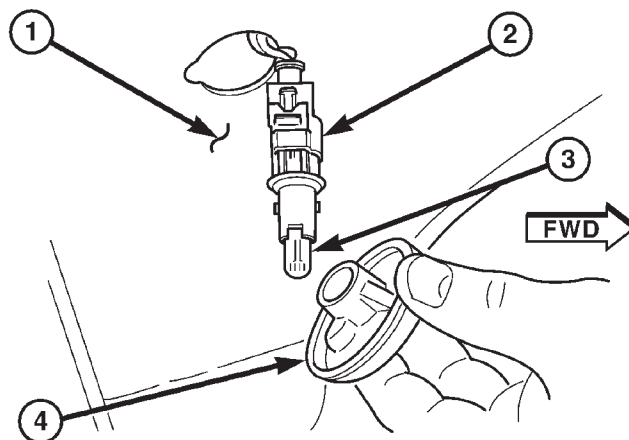
(4) Pull the socket and bulb straight out of the repeater lamp lens.

(5) Pull the bulb straight out of the repeater lamp socket.

INSTALLATION

Side repeater lamps are used only on vehicles manufactured for certain markets where these lamps are required.

CAUTION: Always use the correct bulb size and type for replacement. An incorrect bulb size or type



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Fig. 61 Repeater Lamp Bulb Remove/Install

1 - FRONT FENDER

2 - SOCKET

3 - BULB

4 - LENS

may overheat and cause damage to the lamp, the socket and/or the lamp wiring.

(1) Align the base of the bulb with the receptacle in the repeater lamp socket.

(2) Push the bulb straight into the repeater lamp socket until it is firmly seated.

(3) Align the socket and bulb with the socket opening in the repeater lamp lens (Fig. 61).

(4) Push the socket and bulb straight into the repeater lamp lens until it is firmly seated.

(5) Rotate the repeater lamp socket in the lamp lens clockwise about 30 degrees.

(6) Reinstall the repeater lamp unit onto the front fender panel. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/REPEATER LAMP UNIT - INSTALLATION).

(7) Reconnect the battery negative cable.

REPEATER LAMP UNIT

REMOVAL

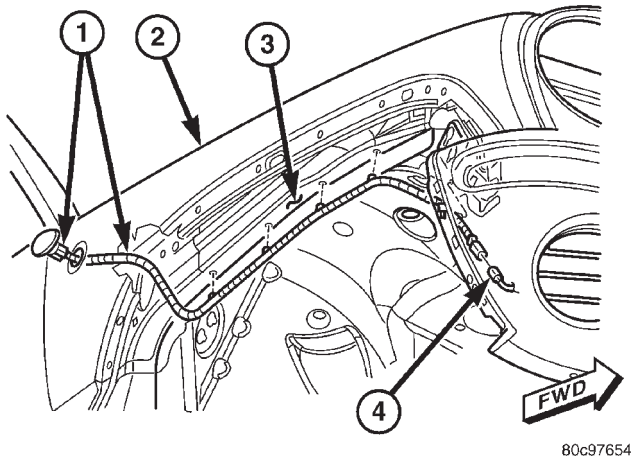
Side repeater lamps are used only on vehicles manufactured for certain markets where these lamps are required.

(1) Disconnect and isolate the battery negative cable.

(2) Using a trim stick or another suitable wide flat-bladed tool, carefully pry at the clearance notch in the lower edge of the repeater lamp lens to disengage the snap features of the lens from the mounting hole in the front fender panel (Fig. 62).

(3) Pull the repeater lamp unit out from the front fender panel far enough to access and disconnect the

REPEATER LAMP UNIT (Continued)

**Fig. 62 Repeater Lamp Unit Remove/Install**

- 1 - REPEATER LAMP UNIT
- 2 - FRONT FENDER PANEL
- 3 - INNER FENDER
- 4 - FRONT FASCIA WIRE HARNESS

repeater lamp wire harness connector from the connector receptacle on the back of the repeater lamp unit socket.

(4) Remove the repeater lamp unit from the front fender panel.

INSTALLATION

Side repeater lamps are used only on vehicles manufactured for certain markets where these lamps are required.

(1) Position the repeater lamp unit to the front fender panel (Fig. 62).

(2) Reconnect the repeater lamp wire harness connector to the connector receptacle on the back of the repeater lamp unit socket.

(3) Position the repeater lamp unit into the mounting hole in the front fender panel. Be certain that the clearance notch on the edge of the repeater lamp lens is oriented toward the bottom.

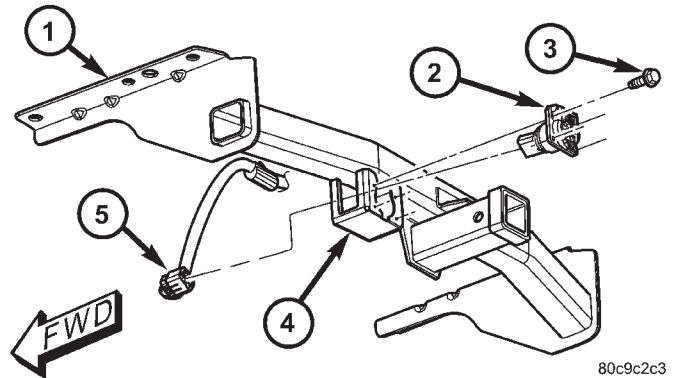
(4) Using hand pressure, press on the repeater lamp unit firmly and evenly until the snap features of the lens are fully engaged in the mounting hole of the front fender panel.

(5) Reconnect the battery negative cable.

TRAILER TOW CONNECTOR**REMOVAL**

(1) Disconnect and isolate the battery negative cable.

(2) Remove the four screws that secure the trailer tow connector to the bracket on the trailer hitch receiver (Fig. 63).

**Fig. 63 Trailer Tow Connector Remove/Install**

- 1 - HITCH RECEIVER
- 2 - 7-WAY TRAILER TOW CONNECTOR
- 3 - SCREW (4)
- 4 - BRACKET
- 5 - WIRE HARNESS CONNECTOR

(3) Pull the trailer tow connector rearward from the bracket on the trailer hitch receiver far enough to access and disconnect the rear body wire harness connector from the receptacle on the back of the trailer tow connector.

(4) Remove the trailer tow connector from the trailer hitch receiver.

INSTALLATION

(1) Position the trailer tow connector to the trailer hitch receiver (Fig. 63).

(2) Reconnect the rear body wire harness connector to the receptacle on the back of the trailer tow connector.

(3) Position the trailer tow connector into the bracket on the trailer hitch receiver.

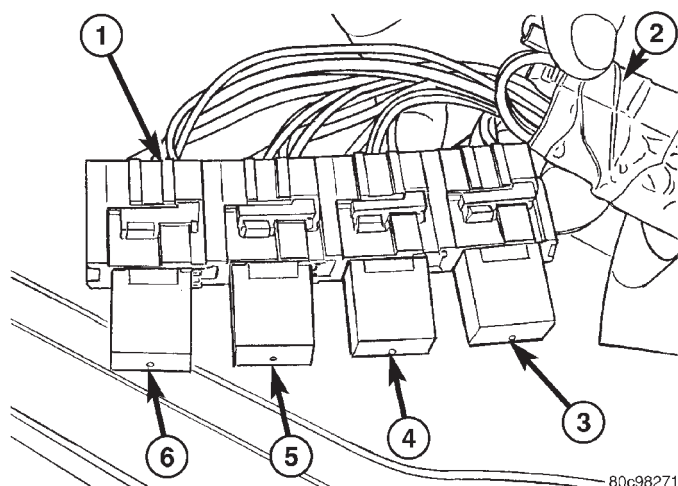
(4) Install and tighten the four screws that secure the trailer tow connector to the bracket on the trailer hitch receiver. Tighten the screws to 4 N·m (35 in. lbs.).

(5) Reconnect the battery negative cable.

TRAILER TOW RELAY**DESCRIPTION**

The trailer tow relays are located in a connector bank above the right rear wheelhouse and behind the quarter trim panel on vehicles equipped with the optional factory-installed trailer towing package. Four individual relays are used, one each for fused ignition switch output (run), brake lamps, right turn signal, and left turn signal outputs to a trailer through the rear body wiring and connectors. The trailer tow relays are conventional International Standards Organization (ISO) micro relays (Fig. 64).

TRAILER TOW RELAY (Continued)

**Fig. 64 Trailer Tow Relays**

- 1 - RELAY CONNECTOR BANK
- 2 - REAR BODY WIRE HARNESS
- 3 - LEFT TURN RELAY
- 4 - RIGHT TURN RELAY
- 5 - BRAKE LAMP RELAY
- 6 - FUSED IGNITION SWITCH OUTPUT (RUN) RELAY

Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions. The relay is contained within a small, rectangular, molded plastic housing and is connected to all of the required inputs and outputs by five integral male spade-type terminals that extend from the bottom of the relay base.

The trailer tow relays cannot be adjusted or repaired and, if faulty or damaged, the inoperative relay must be replaced.

OPERATION

The trailer tow relays are electromechanical switches. The relays each use an input from the circuit that they isolate from the trailer wiring to control a high current output to the trailer. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The terminals of each trailer tow relay are connected to the vehicle electrical system through a con-

necter bank in the rear lighting wire harness above the right rear wheelhouse. 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. The trailer tow relays can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - TRAILER TOW RELAY

The trailer tow relays (Fig. 65) are located in a connector bank above the right rear wheelhouse. 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.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

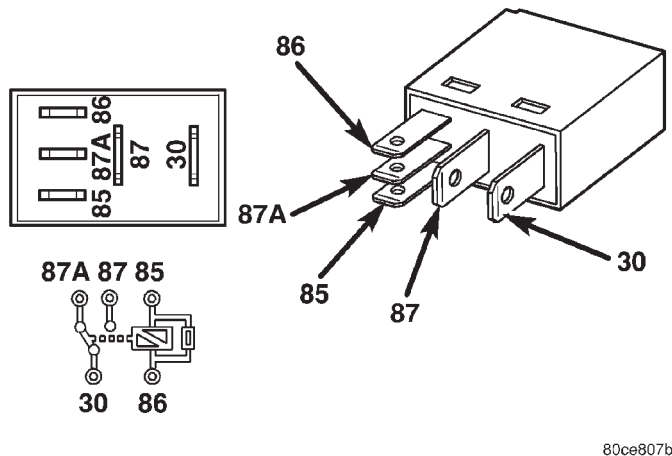
(1) Remove the trailer tow relay from the connector bank. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/TRAILER TOW RELAY - REMOVAL).

(2) 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 Step 3. If not OK, replace the faulty relay.

(3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 8 ohms. If OK, go to Step 4. If not OK, replace the faulty relay.

(4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, test the input and output circuits of the relay. Refer to the appropriate wiring information.

TRAILER TOW RELAY (Continued)

**Fig. 65 ISO Micro Relay**

30 - COMMON FEED
 85 - COIL GROUND
 86 - COIL BATTERY
 87 - NORMALLY OPEN
 87A - NORMALLY CLOSED

REMOVAL

The trailer tow relay bank contains four relays. The service procedures for each relay are the same. Be certain any removed relay is replaced with the same relay size and type that was removed.

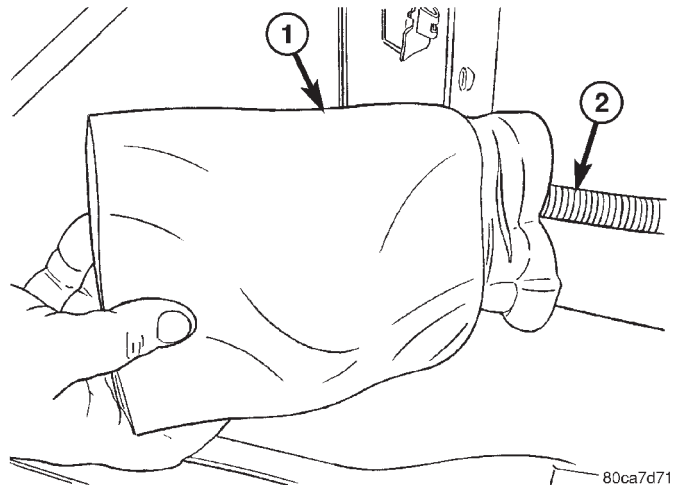
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the trim from the right side quarter inner panel. (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - REMOVAL).

(3) Reach through the access hole in the quarter inner panel behind the right rear wheelhouse to locate and retrieve the trailer tow relay connector bank, which is enveloped in foam rubber and placed

on the top of the right rear wheelhouse between the quarter inner and outer panels (Fig. 66).

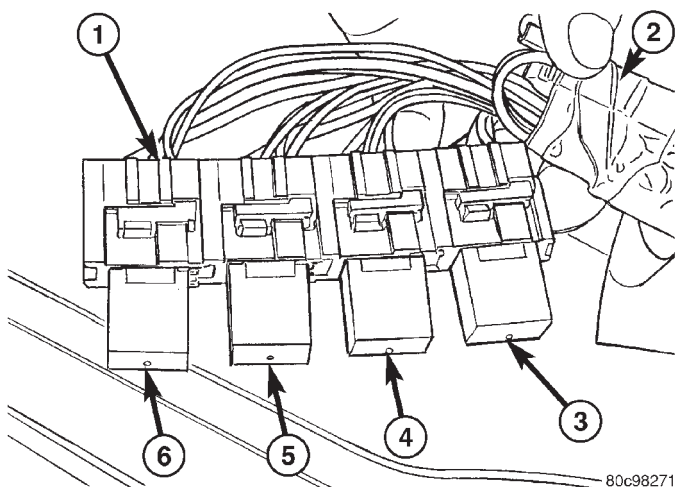
**Fig. 66 Trailer Tow Relay Wrap**

1 - FOAM WRAP
 2 - REAR BODY WIRE HARNESS

(4) Pull the trailer tow relay connector bank into the cargo area far enough to access the unit for service.

(5) Carefully remove the trailer tow relay connector bank from the foam wrap.

(6) Remove the trailer tow relay by grasping it firmly and pulling it straight out from the connector bank (Fig. 67).

**Fig. 67 Trailer Tow Relay Remove/Install**

1 - RELAY CONNECTOR BANK
 2 - REAR BODY WIRE HARNESS
 3 - LEFT TURN RELAY
 4 - RIGHT TURN RELAY
 5 - BRAKE LAMP RELAY
 6 - FUSED IGNITION SWITCH OUTPUT (RUN) RELAY

TRAILER TOW RELAY (Continued)

INSTALLATION

The trailer tow relay bank contains four relays. The service procedures for each relay are the same. Be certain any removed relay is replaced with the same relay size and type that was removed.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the trailer tow relay to the proper connector in the connector bank (Fig. 67).

(2) Align the trailer tow relay terminals with the terminal cavities in the connector.

(3) Push firmly and evenly on the top of the trailer tow relay until the terminals are fully seated in the terminal cavities in the connector.

(4) Carefully restore the foam wrap around the trailer tow relay connector bank (Fig. 66).

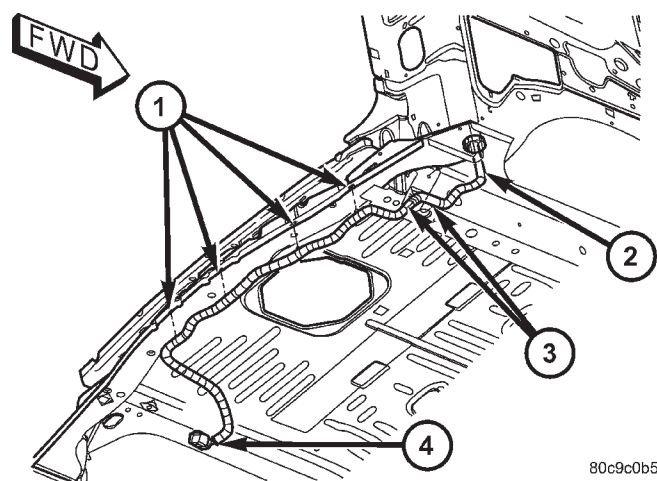
(5) Reach through the access hole in the quarter inner panel behind the right rear wheelhouse to place the trailer tow relay connector bank on the top of the right rear wheelhouse between the quarter inner and outer panels.

(6) Reinstall the trim onto the right side quarter inner panel. (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - INSTALLATION).

(7) Reconnect the battery negative cable.

TRAILER TOW WIRING

DESCRIPTION



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Fig. 68 Trailer Tow Wiring

- 1 - RETAINER CLIP (4)
- 2 - REAR BODY HARNESS (TRAILER TOW TAKE OUT)
- 3 - RETAINER CLIP (2)
- 4 - WIRE HARNESS CONNECTOR

Vehicles equipped with an optional factory-installed (not dealer-installed or port-installed) trailer towing package have a rear body wire harness that includes an integral trailer tow wiring take out that connects to a heavy duty, sealed, 7-pin trailer tow connector located on a bracket on the trailer hitch receiver (Fig. 68). This harness includes a second take out with a trailer tow relay connector bank and four trailer tow relays that isolate the right turn signal, left turn signal, and brake lamp circuits of the vehicle from the electrical system of the trailer. The fourth relay in the connector bank provides a fused ignition switch output (run) source of battery current to the trailer tow connector through a trailer tow relay output circuit. The package also includes an adapter harness (stored beneath the left rear seat cushion of the vehicle when it is shipped from the factory) that adapts the 7-pin trailer tow connector to a standard, light-duty, 4-pin trailer tow connector. 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.

LAMPS/LIGHTING - INTERIOR

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LAMPS/LIGHTING - INTERIOR

DESCRIPTION

The interior lighting system (Fig. 1) for this model includes the following incandescent interior lamps:

- **Ash Receiver Lamp** - An available ash receiver lamp is located above the ash receiver housing behind the instrument panel center bezel, and is controlled by the panel lamps dimmer circuit.
- **Cargo Lamp** - An available cargo lamp with an integral lens-actuated courtesy disable switch is located in the headliner near the rear roof header, and is controlled by the courtesy lamp circuit.
- **Courtesy Lamps** - Available courtesy lamps are located below both the right and left side of the instrument panel, and are controlled by the courtesy lamp circuit.

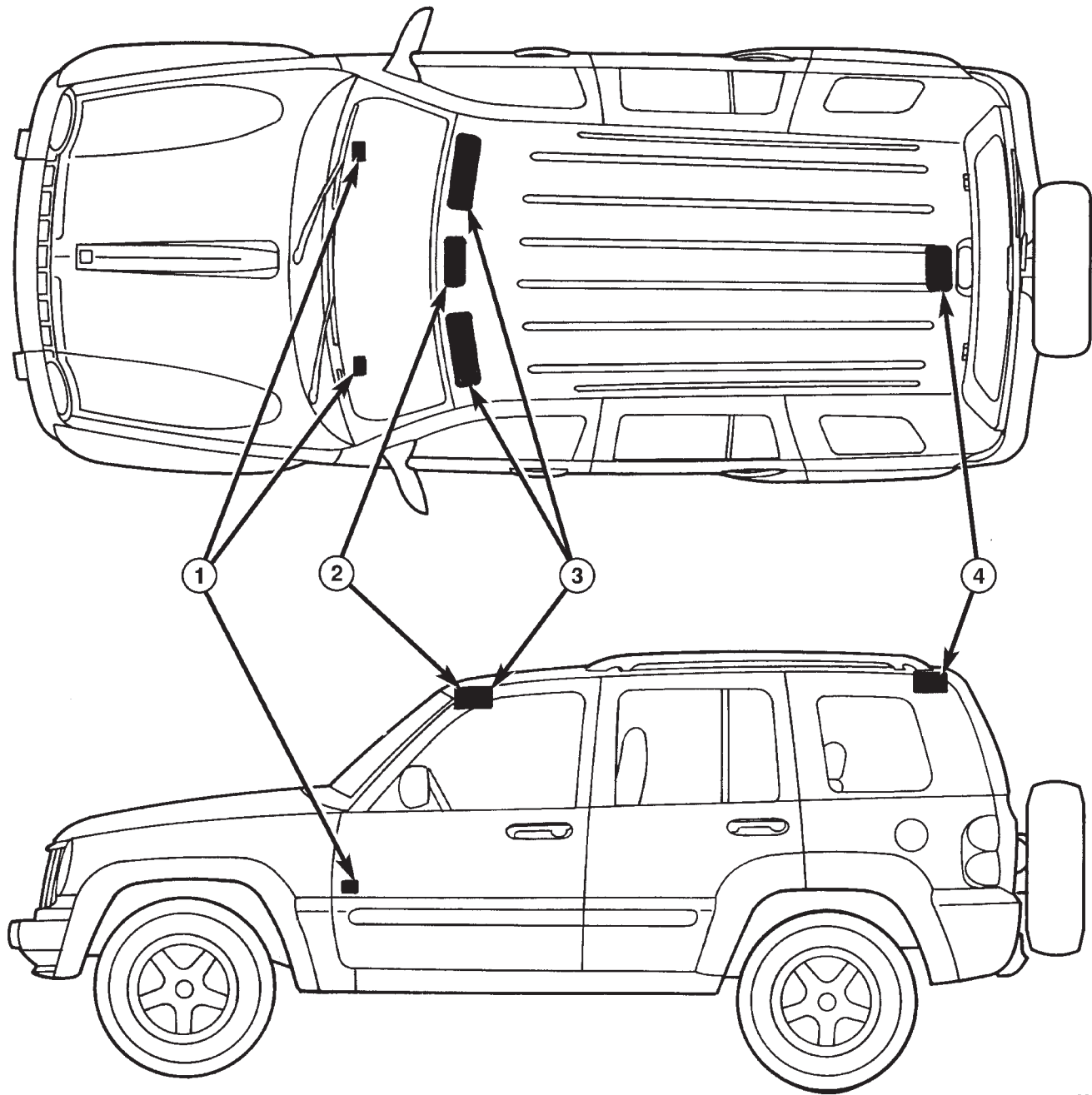
- **Compass Mini-Trip Control Illumination Lamps** - The optional Compass Mini-Trip Computer (CMTC) has three replaceable control illumination bulb/bulb holder units on its circuit board that are controlled by the panel lamps dimmer circuit.

- **Dome Lamp** - A standard front dome lamp that does not include an on-off switch is located in the headliner near the windshield header, and is controlled by the courtesy lamp circuit.

- **Hazard Switch Illumination/Indicator Lamp** - The hazard switch control button has a non-replaceable illumination/indicator bulb soldered onto its circuit board that is controlled by both the hazard switch circuitry and the panel lamps dimmer circuit. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HAZARD SWITCH - DESCRIPTION).

- **Heater-Air Conditioner Control Illumination Lamps** - The heater-air conditioner control has

LAMPS/LIGHTING - INTERIOR (Continued)



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Fig. 1 Courtesy Lamps

1 - COURTESY LAMP (2)
2 - DOME OR READING LAMP

3 - VANITY LAMP (2)
4 - CARGO LAMP

two replaceable control illumination bulb/bulb holder units on its circuit board that are controlled by the panel lamps dimmer circuit.

• **Instrument Cluster Illumination Lamps** - The ElectroMechanical Instrument Cluster (EMIC) has nine replaceable general illumination bulb/bulb holder units on its circuit board that are controlled by the panel lamps dimmer circuit. (Refer to 8 -

ELECTRICAL/INSTRUMENT CLUSTER - DESCRIPTION).

• **Reading Lamps** - Available front seat driver side and passenger side reading lamps located in the headliner near the windshield header are controlled by both the courtesy lamp circuit and independent lens-actuated switches.

• **Transmission Range Indicator Illumination Lamp** - Vehicles equipped with an automatic trans-

LAMPS/LIGHTING - INTERIOR (Continued)

mission have an illuminated transmission range indicator integral to the console mounted gearshift mechanism, and controlled by the panel lamps dimmer circuit.

- **Vanity Lamps** - Available single intensity vanity lamps are located on each side of a covered mirror on both the right and left sun visors, and are controlled by an integral vanity mirror cover-actuated switch on the courtesy lamp circuit.

Other components of the interior lighting system for this model include:

- **Body Control Module** - The Body Control Module (BCM) is located on the Junction Block (JB) under the driver side outboard end of the instrument panel. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/BODY CONTROL MODULE - DESCRIPTION).

- **Door Ajar Switches** - A door ajar switch is integral to the door latch mechanism of each front and rear door.

- **Flip-Up Glass Ajar Switch** - A flip-up glass ajar switch is integral to the flip-up glass latch mechanism on the top of the tailgate inner panel.

- **Multi-Function Switch** - The multi-function switch is located on the top of the steering column, just below the steering wheel. The multi-function switch includes a left (lighting) control stalk and a right (wiper) control stalk. The left control stalk is dedicated to providing almost all of the driver controls for both the exterior and interior lighting systems. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/MULTI-FUNCTION SWITCH - DESCRIPTION).

- **Tailgate Ajar Switch** - A tailgate ajar switch is integral to the latch mechanism of the tailgate.

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 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

The interior lighting systems can be divided into two general classifications based upon the circuit that controls their operation: The courtesy lamp circuit,

or the panel lamps dimmer circuit. Following are paragraphs that briefly describe the operation of each of the major interior lighting systems. The hard wired circuits and components of the interior lighting systems may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the Body Control Module (BCM), the ElectroMechanical Instrument Cluster (EMIC), or the Programmable Communications Interface (PCI) data bus network. The most reliable, efficient, and accurate means to diagnose the BCM, the EMIC, and the PCI data bus network inputs and outputs related to the various interior lighting systems requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

COURTESY LAMP CIRCUIT Depending upon the selected vehicle options the courtesy lamp circuit may include the courtesy lamps located below the instrument panel, the dome or map/reading lamps located in the headliner near the windshield, the cargo lamp located in the headliner near the rear roof header, and the vanity lamps located in the sun visors. The lamps in the courtesy lamp circuit are provided with battery current at all times from a fused B(+) fuse in the Junction Block (JB) through a fused B(+) circuit. The Body Control Module (BCM) controls the ground path for these lamps using an internal driver through the courtesy lamp driver circuit based upon hard wired inputs from the door ajar switches, the flip-up glass ajar switch, and the tailgate ajar switch. After all of the ajar switch inputs to the BCM transition to open, the BCM will keep the lamps illuminated for about 27 seconds, then fade the lamps to off (theater dimming) over about three seconds.

The BCM also provides courtesy lamp operation based upon a resistor multiplexed input from the interior lighting control ring on the left (lighting) control stalk of the multi-function switch through the headlamp switch mux circuit, and in response to certain inputs from the optional Remote Keyless Entry (RKE) system. A resistor multiplexed courtesy lamp defeat input from the control ring on the left (lighting) control stalk of the multi-function switch will cause the BCM to override normal courtesy lamp operation based upon inputs from all of the ajar switches. A hard wired input from the courtesy lamp defeat switch in the optional cargo lamp through a rear courtesy lamp control circuit will cause the BCM to override normal courtesy lamp operation based upon inputs from only the flip-up glass and tailgate ajar switches.

For those lamps on the courtesy lamp circuit with independent switching, such as the optional reading lamps and vanity lamps, the BCM provides a ground

LAMPS/LIGHTING - INTERIOR (Continued)

path to the switches using another internal driver through the courtesy lamp load shed circuit. The BCM provides a battery saver (load shedding) feature for all courtesy lamps, which will automatically turn these lamps off if they are left on for more than about eight minutes with the ignition switch in the Off position.

PANEL LAMPS DIMMER CIRCUIT The panel lamps dimmer circuit includes the ElectroMechanical Instrument Cluster (EMIC), heater-air conditioner control, hazard switch and, depending upon the selected vehicle options, ash receiver, and automatic transmission range indicator illumination lamps. All lamps in the panel lamps dimmer circuit are provided a path to ground at all times through a hard wired ground circuit. These lamps illuminate based upon inputs to the Body Control Module (BCM) from the exterior lighting control knob and the interior lighting control ring on the left (lighting) control stalk of the multi-function switch. The control knob on the left control stalk of the multi-function switch selects the exterior lights, while the control ring selects the panel lamps intensity (dimming) level.

When the exterior lighting is turned On, the BCM energizes the park lamp relay and provides an electronic dimming level message to the ElectroMechanical Instrument Cluster (EMIC), the radio, and the Compass Mini-Trip Computer (CMTC) over the Programmable Communications Interface (PCI) data bus. The energized park lamp relay provides a hard wired battery current signal input to the EMIC on the park lamp relay output circuit. The EMIC responds to these inputs by supplying a 12-volt Pulse Width Modulated (PWM) output to all of the incandescent lamps in the panel lamps dimmer circuit over the fused panel lamps dimmer switch signal circuit. This shared PWM output synchronizes the selected illumination intensity level of all of the incandescent lamps in the panel lamps dimmer circuit.

The EMIC and the radio each use the electronic dimming level message from the BCM to control and synchronize the illumination intensity of their own Vacuum Fluorescent Display (VFD), while the CMTC uses the dimming level message to control the illumination intensity of both its VFD and its incandescent lighting. In addition, when the control ring on the left (lighting) control stalk of the multi-function switch is moved to the Parade Mode detent position, all of the VFDs are illuminated at their full intensity levels for increased visibility when the vehicle is driven during daylight hours with the exterior lights turned On.

DIAGNOSIS AND TESTING - LAMPS/LIGHTING - INTERIOR

The hard wired circuits and components of the interior lighting system may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the Body Control Module (BCM), the ElectroMechanical Instrument Cluster (EMIC), or the Programmable Communications Interface (PCI) data bus network. The most reliable, efficient, and accurate means to diagnose the BCM, the EMIC, and the PCI data bus network inputs and outputs related to the various interior lighting systems requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

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 being diagnosed, be certain to diagnose and repair the battery and charging system as required. Also keep in mind that 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. For complete circuit diagrams, 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.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

LAMPS/LIGHTING - INTERIOR (Continued)

COURTESY LAMP CIRCUIT

CONDITION	POSSIBLE CAUSES	CORRECTION
A SINGLE LAMP IN THE COURTESY LAMP CIRCUIT DOES NOT ILLUMINATE	1. Faulty or missing bulb. 2. Faulty lamp switch. 3. Faulty ground circuit. 4. Faulty ground circuit (independently switched lamps only). 5. Faulty feed circuit.	1. Test and replace the courtesy lamp bulb as required. 2. Test and replace a faulty map/reading lamp switch, cargo lamp switch, or sunvisor (vanity lamp switch) as required. 3. Test and repair the open courtesy lamp driver circuit as required. 4. Test and repair the open courtesy lamp load shed circuit as required. 5. Test and repair the open fused B(+) circuit as required.
ALL LAMPS IN THE COURTESY LAMP CIRCUIT DO NOT ILLUMINATE	1. Faulty or missing fuse. 2. Faulty ground circuit. 3. Faulty feed circuit. 4. Faulty cargo lamp (courtesy defeat) switch. 5. Faulty rear courtesy lamp control circuit. 6. Faulty multi-function switch. 7. Faulty Body Control Module (BCM), BCM input, or BCM output.	1. Test and replace the fused B(+) fuse (IOD) in the Junction Block (JB) as required. 2. Test and repair the open courtesy lamp driver circuit as required. 3. Test and repair the open fused B(+) circuit as required. 4. Test and replace the cargo lamp switch as required. 5. Test and repair the shorted courtesy lamp control circuit as required. 6. Test and replace the multi-function switch as required. 7. Use a DRBIII® scan tool to test the BCM, its inputs, and its outputs. Refer to the appropriate diagnostic information.
A SINGLE LAMP IN THE COURTESY LAMP CIRCUIT DOES NOT EXTINGUISH	1. Faulty lamp switch. 2. Faulty ground circuit.	1. Test and replace a faulty map/reading lamp switch, cargo lamp switch, or sunvisor (vanity lamp switch) as required. 2. Test and repair the shorted courtesy lamp driver circuit as required.
ALL LAMPS IN THE COURTESY LAMP CIRCUIT DO NOT EXTINGUISH	1. Faulty ajar switch. 2. Faulty ajar switch sense circuit. 3. Faulty ground circuit. 4. Faulty Body Control Module (BCM), BCM input, or BCM output.	1. Test and replace a faulty door, tailgate, or liftglass ajar switch as required. 2. Test and repair the shorted ajar switch sense circuit as required. 3. Test and repair the shorted courtesy lamp driver circuit as required. 4. Use a DRBIII® scan tool to test the BCM, its inputs, and its outputs. Refer to the appropriate diagnostic information.

LAMPS/LIGHTING - INTERIOR (Continued)

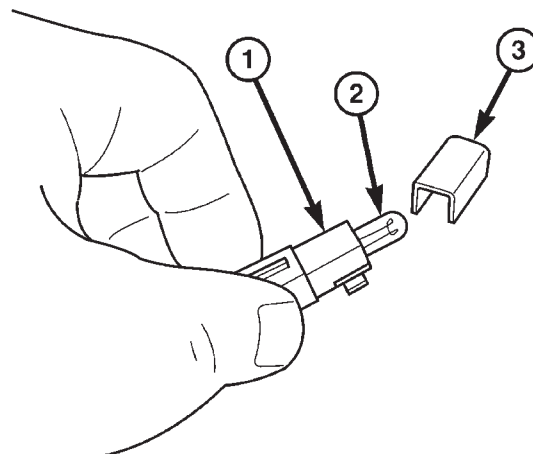
PANEL LAMPS DIMMER CIRCUIT

CONDITION	POSSIBLE CAUSES	CORRECTION
A SINGLE LAMP DOES NOT ILLUMINATE	1. Faulty or missing bulb. 2. Faulty ground circuit. 3. Faulty feed circuit.	1. Test and replace lamp bulb as required. 2. Test and repair lamp ground circuit as required. 3. Test and repair open fused panel lamps dimmer switch signal circuit as required.
A SINGLE LAMP DOES NOT EXTINGUISH	1. Faulty feed circuit.	1. Test and repair shorted fused panel lamps dimmer switch signal circuit as required.
ALL LAMPS DO NOT ILLUMINATE	1. Faulty fused park lamp relay output circuit. 2. Faulty or missing park lamp relay. 3. Faulty fused panel lamps dimmer switch signal circuit. 4. Faulty Body Control Module (BCM), BCM input, or BCM output. 5. Faulty ElectroMechanical Instrument Cluster (EMIC), EMIC input, or EMIC output. 6. Faulty multi-function switch.	1. Test and repair open fused park lamp relay output circuit as required. 2. Test and replace park lamp relay as required. 3. Test and repair open fused panel lamps dimmer switch signal circuit as required. 4. Use a DRBIII® scan tool to test the BCM, its inputs, and its outputs. Refer to the appropriate diagnostic information. 5. Use a DRBIII® scan tool to test the EMIC, its inputs, and its outputs. Refer to the appropriate diagnostic information. 6. Test and replace the multi-function switch as required.
ALL LAMPS EXCEPT CLUSTER ILLUMINATION DO NOT EXTINGUISH	1. Faulty feed circuit.	1. Test and repair shorted fused panel lamps dimmer switch signal circuit as required.

LAMPS/LIGHTING - INTERIOR (Continued)

SPECIFICATIONS - LAMPS/LIGHTING - INTERIOR*BULB SPECIFICATIONS*

LAMP	BULB
Ash Receiver	161
Cargo	214-2
Cluster Illumination	103
Compass Mini-Trip Illumination	MOPAR 4437661
Courtesy	906
Heater-A/C Control Illumination	74
Map/Reading	192
Transmission Range Indicator Illumination	S14V
Vanity Mirror	MOPAR 6501966



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Fig. 2 Ash Receiver Lamp Bulb Remove/Install

- 1 - SOCKET
2 - BULB
3 - HOOD

ASH RECEIVER LAMP BULB**REMOVAL**

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the ash receiver lamp unit from the top of the ash receiver housing. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - INTERIOR/ASH RECEIVER LAMP UNIT - REMOVAL).

(3) Carefully disengage the ash receiver lamp hood from the integral snap features on each side of the lamp unit socket and remove the hood (Fig. 2).

(4) Pull the ash receiver lamp bulb straight out of the lamp unit socket.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

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 and/or the lamp wiring.

(1) Align the base of the ash receiver lamp bulb with the receptacle in the lamp unit socket.

(2) Push the ash receiver lamp bulb straight into the lamp unit socket until it is firmly seated (Fig. 2).

(3) Carefully slide the ash receiver lamp hood onto the lamp unit socket until it is fully engaged with the integral snap features on each side of the socket.

(4) Reinstall the ash receiver lamp unit onto the top of the ash receiver housing. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - INTERIOR/ASH RECEIVER LAMP UNIT - INSTALLATION).

(5) Reconnect the battery negative cable.

ASH RECEIVER LAMP UNIT

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the center bezel from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL).

(3) While pulling the ash receiver lamp unit away from the top of the ash receiver housing, from inside the housing carefully release the four integral latches that secure the lamp unit to the mounting hole in the top of the housing.

(4) Remove the ash receiver lamp unit from the top of the ash receiver housing (Fig. 3).

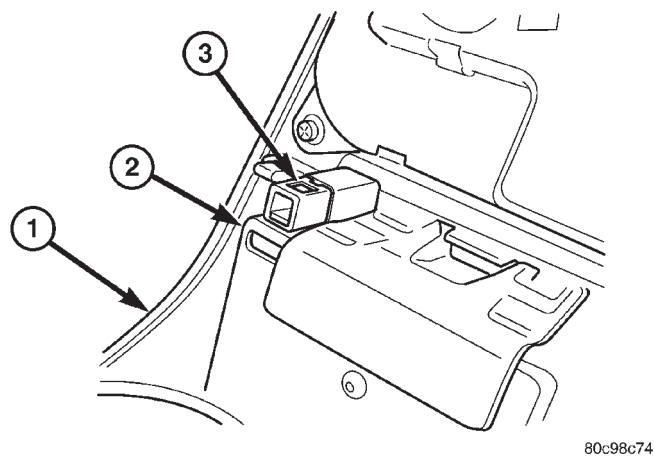


Fig. 3 Ash Receiver Lamp Unit Remove/Install

- 1 - CENTER BEZEL
- 2 - ASH RECEIVER HOUSING
- 3 - ASH RECEIVER LAMP UNIT

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Align the four integral latches of the ash receiver lamp unit to the mounting hole on the top of the ash receiver housing (Fig. 3).

(2) Using hand pressure, press firmly and evenly on the ash receiver lamp unit until the four integral latches snap into place in the ash receiver housing mounting hole.

(3) Reinstall the center bezel onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).

(4) Reconnect the battery negative cable.

CARGO LAMP BULB

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Using a small thin-bladed screwdriver, gently pry outward on either side near the top of the cargo lamp lens until the lens pivot unsnaps from the pivot pin within the lamp unit housing (Fig. 4).

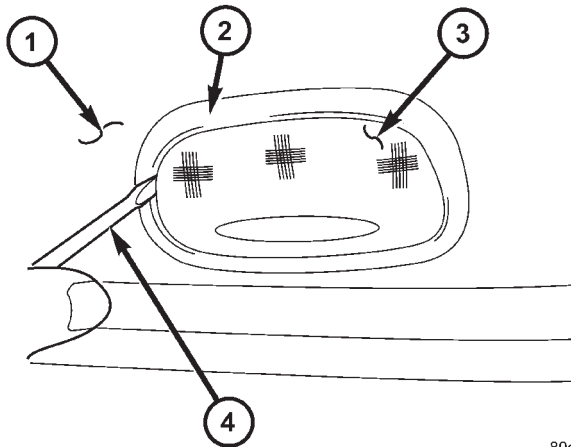
(3) Move the cargo lamp lens upward far enough to disengage the switch tab at the bottom of the lens from between the switch plunger and the lamp unit housing.

(4) Remove the cargo lamp lens from the lamp unit housing.

(5) Firmly grasp the cargo lamp bulb and pull each end outward until it is disengaged from its respective bulb holder within the lamp unit housing (Fig. 5).

(6) Remove the cargo lamp bulb from the lamp unit housing.

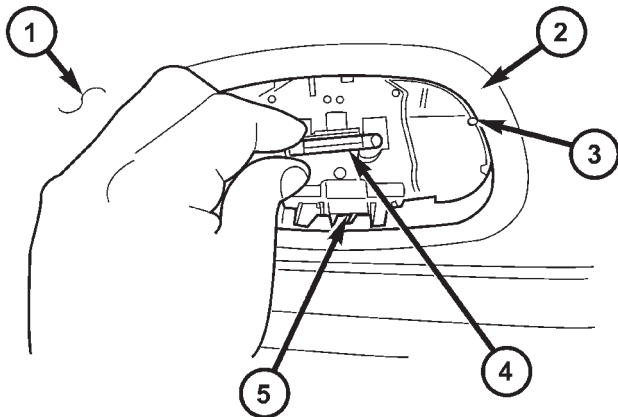
CARGO LAMP BULB (Continued)



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Fig. 4 Cargo Lamp Lens Remove

- 1 - HEADLINER
- 2 - CARGO LAMP
- 3 - LENS
- 4 - SCREWDRIVER



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Fig. 5 Cargo Lamp Bulb Remove/Install

- 1 - HEADLINER
- 2 - CARGO LAMP
- 3 - LENS PIVOT PIN
- 4 - BULB
- 5 - SWITCH

INSTALLATION

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 and/or the lamp wiring.

(1) Position the cargo lamp bulb into the lamp unit housing.

(2) Align the ends of the cargo lamp bulb with each of the bulb holders within the lamp unit housing (Fig. 5).

(3) Using hand pressure, press firmly and evenly on both ends of the cargo lamp bulb until they snap into their respective bulb holders within the lamp unit housing.

(4) Position the cargo lamp lens to the lamp unit housing.

(5) Insert the switch tab at the bottom of the cargo lamp lens between the switch plunger and the lamp unit housing.

(6) Align the pivots on each side near the top of the cargo lamp lens with the pivot pins within the lamp unit housing.

(7) Using hand pressure, press firmly and evenly on the cargo lamp lens over both pivots until they snap into place over the pivot pins within the lamp unit housing.

(8) Reconnect the battery negative cable.

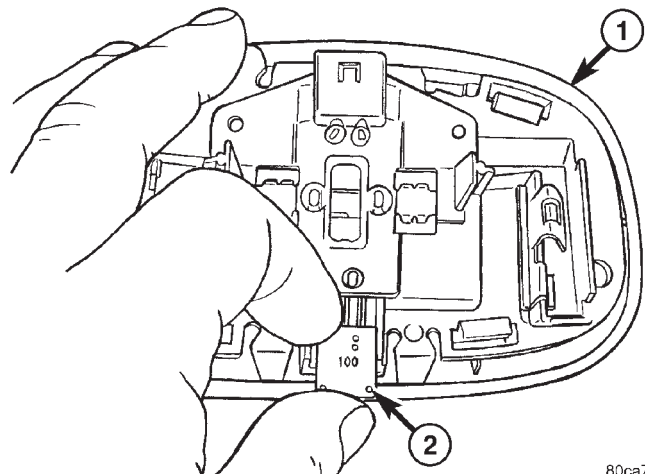
CARGO LAMP SWITCH

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the cargo lamp unit from the headliner near the rear roof header. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - INTERIOR/CARGO LAMP UNIT - REMOVAL).

(3) From the back of the cargo lamp unit housing, firmly grasp the switch body (Fig. 6).



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Fig. 6 Cargo Lamp Switch Remove/Install

- 1 - CARGO LAMP UNIT HOUSING
- 2 - SWITCH

CARGO LAMP SWITCH (Continued)

(4) Using hand pressure, pull the cargo lamp switch toward the outside of the lamp unit housing until it unsnaps from the housing.

(5) Continue sliding the cargo lamp switch away from the terminal pins and out of the lamp unit housing.

INSTALLATION

(1) Align the terminal receptacles in the cargo lamp switch with the terminal pins of the lamp unit housing (Fig. 6).

(2) Using hand pressure, push the cargo lamp switch toward the terminals of the lamp unit housing until it snaps into the housing.

(3) Reinstall the cargo lamp unit onto the headliner near the rear roof header. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - INTERIOR/CARGO LAMP UNIT - INSTALLATION).

(4) Reconnect the battery negative cable.

CARGO LAMP UNIT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Using a trim stick or another suitable wide flat-bladed tool, gently pry between the flange around the edge of the cargo lamp unit housing and the headliner to release the metal snap clip on each side of the housing from the receptacles in the rear roof header (Fig. 7).

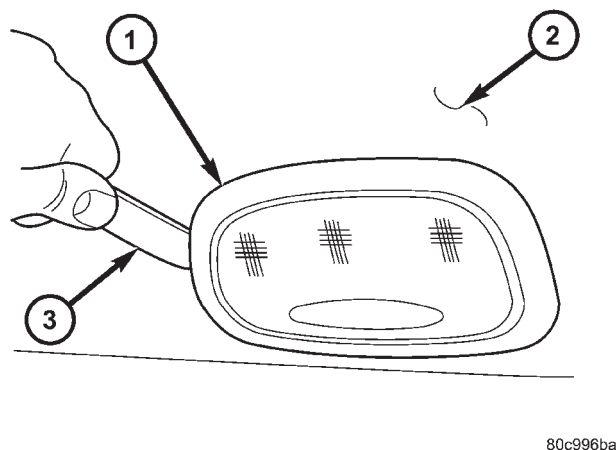


Fig. 7 Cargo Lamp Unit Remove/Install

- 1 - CARGO LAMP UNIT
- 2 - HEADLINER
- 3 - TRIM STICK

(3) Pull the cargo lamp unit away from the headliner far enough to access and disconnect the rear body wire harness connector for the lamp from the connector receptacle on the lamp unit housing.

(4) Remove the cargo lamp unit from the mounting hole in the headliner.

INSTALLATION

(1) Position the cargo lamp unit to the mounting hole in the headliner.

(2) Reconnect the rear body wire harness connector for the cargo lamp to the connector receptacle on the lamp unit housing.

(3) With the finger depression in the cargo lamp lens oriented towards the rear of the vehicle, position the cargo lamp unit housing into the headliner mounting hole and align the metal snap clip on each side of the housing with their receptacles in the rear roof header (Fig. 7).

(4) Using hand pressure, press upward firmly and evenly on both ends of the cargo lamp unit until both snap clips are fully engaged in their receptacles.

(5) Reconnect the battery negative cable.

COMPASS MINI-TRIP ILLUMINATION BULB

REMOVAL

The Compass Mini-Trip Computer (CMTC) in the overhead console includes either two or three incandescent illumination bulb and bulb holder units. Three bulbs are used only on models that also feature the optional Universal Garage Door Opener (UGDO).

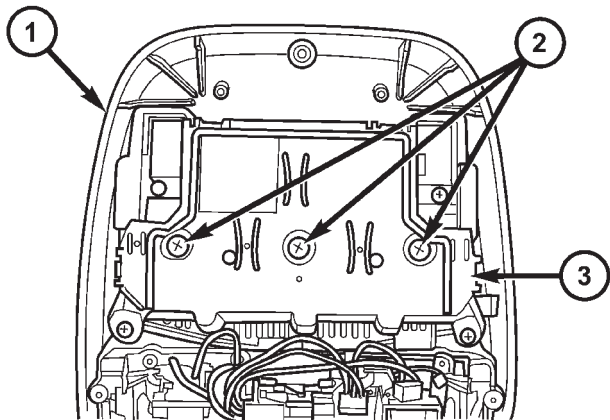
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

COMPASS MINI-TRIP ILLUMINATION BULB (Continued)

(1) Disconnect and isolate the battery negative cable.

(2) Remove the overhead console from the headliner. (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).

(3) From the back of the unit, use a small thin-bladed screwdriver to rotate the compass mini-trip illumination bulb holder counterclockwise about 30 degrees on the circuit board (Fig. 8).



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Fig. 8 Compass Mini-Trip Illumination Bulb Remove/Install

- 1 - OVERHEAD CONSOLE
2 - BULB & HOLDER (3)
3 - COMPASS MINI-TRIP COMPUTER

(4) Pull the compass mini-trip illumination bulb holder and bulb unit straight out of the circuit board bulb mounting hole.

INSTALLATION

The Compass Mini-Trip Computer (CMTC) in the overhead console includes either two or three incandescent illumination bulb and bulb holder units. Three bulbs are used only on models that also feature the optional Universal Garage Door Opener (UGDO).

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL

RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

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 and/or the lamp wiring.

(1) Align the compass mini-trip illumination bulb holder and bulb unit with the circuit board bulb mounting hole.

(2) Insert the compass mini-trip illumination bulb holder and bulb unit straight into the circuit board bulb mounting hole until it is firmly seated (Fig. 8).

(3) Using a small thin-bladed screwdriver, rotate the compass mini-trip illumination bulb holder clockwise about 30 degrees on the circuit board.

(4) Reinstall the overhead console onto the headliner. (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - INSTALLATION).

(5) Reconnect the battery negative cable.

COURTESY LAMP BULB

REMOVAL

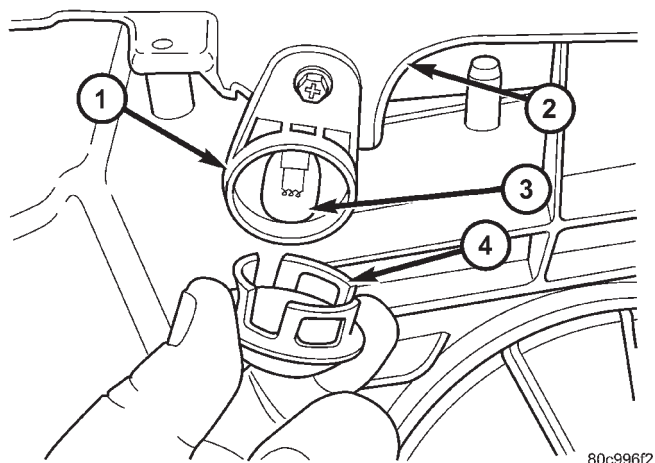
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Support the courtesy lamp unit housing with one hand while firmly grasping the flange on the outer circumference of the lens with the other hand, then pull the lens straight down to unsnap it from the housing (Fig. 9).

(3) Pull the courtesy lamp bulb straight out of the lamp unit socket.

COURTESY LAMP BULB (Continued)



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Fig. 9 Courtesy Lamp Lens Remove/Install

- 1 - COURTESY LAMP
- 2 - LOWER INSTRUMENT PANEL
- 3 - BULB
- 4 - LENS

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIR-BAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

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 and/or the lamp wiring.

- (1) Align the base of the courtesy lamp bulb with the receptacle in the lamp unit socket.
- (2) Push the courtesy lamp bulb straight into the lamp unit socket until it is firmly seated (Fig. 9).
- (3) Align the courtesy lamp lens with the lamp unit housing.
- (4) Support the courtesy lamp unit housing with one hand while firmly and evenly pushing the lens

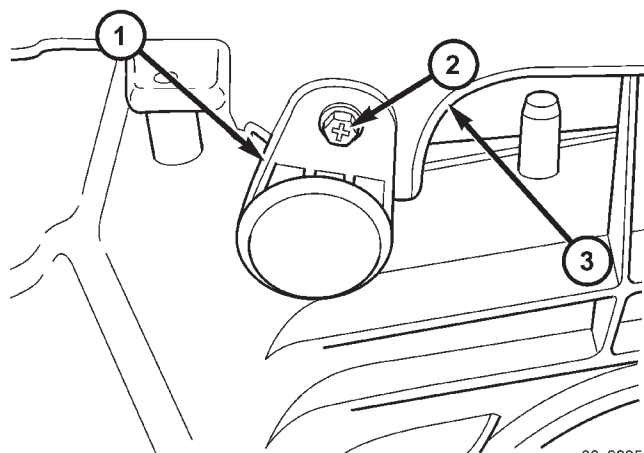
into the housing with the other hand, until the lens snaps into place.

- (5) Reconnect the battery negative cable.

COURTESY LAMP UNIT**REMOVAL**

WARNING: ON VEHICLES EQUIPPED WITH AIR-BAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the screw that secures the integral mounting tab of the courtesy lamp unit to the lower instrument panel (Fig. 10).



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Fig. 10 Courtesy Lamp Unit Remove/Install

- 1 - COURTESY LAMP UNIT
- 2 - SCREW (1)
- 3 - LOWER INSTRUMENT PANEL

- (3) Pull the courtesy lamp unit down from the lower instrument panel far enough to access and disconnect the instrument panel wire harness connector

COURTESY LAMP UNIT (Continued)

for the courtesy lamp from the connector receptacle on the back of the lamp unit housing.

(4) Remove the courtesy lamp unit from under the instrument panel.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the courtesy lamp unit under the instrument panel.

(2) Reconnect the instrument panel wire harness connector for the courtesy lamp to the connector receptacle on the back of the lamp unit housing.

(3) Position the courtesy lamp unit to the lower instrument panel (Fig. 10).

(4) Install and tighten the screw that secures the integral mounting tab of the courtesy lamp unit to the lower instrument panel.

(5) Reconnect the battery negative cable.

DOOR AJAR SWITCH

DESCRIPTION

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 units that are actuated by the door latch mechanisms. A short pigtail wire and connector on each door latch connects the door ajar switch to the vehicle electrical system through its respective door wire harness. The door ajar switches cannot be adjusted or repaired and, if faulty or damaged, the door latch unit must be replaced. (Refer to 23 - BODY/DOOR - FRONT/LATCH - REMOVAL) or (Refer to 23 - BODY/DOOR - REAR/LATCH - REMOVAL).

OPERATION

The door ajar switches are actuated by the door latch mechanisms. 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 between a body ground and the Body Control Module (BCM). The driver side front door ajar switch is connected to the BCM through a driver door ajar switch sense circuit, while the remaining three door ajar switches are connected to the BCM through a passenger door ajar switch sense circuit in a parallel-series arrangement. The BCM reads the door ajar switch status through an internal pull-up, then uses these inputs to control many electronic functions and features of the vehicle. The door ajar switches can be diagnosed using conventional diagnostic tools and methods; however, for proper diagnosis of the BCM, and both the hard wired and electronic BCM outputs affected by the door ajar switch inputs, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

FLIP-UP GLASS AJAR SWITCH

DESCRIPTION

A flip-up glass ajar switch is standard equipment in this vehicle. This switch is concealed within and integral to the flip-up glass latch unit. The switch is a momentary leaf contact-type unit that is actuated by the flip-up glass latch mechanism. A dedicated connector receptacle on the flip-up glass latch unit connects the flip-up glass ajar switch to the vehicle electrical system through the tailgate wire harness. The flip-up glass ajar switch cannot be adjusted or repaired and, if faulty or damaged, the flip-up glass latch unit must be replaced. (Refer to 23 - BODY/SWING GATE/FLIP-UP GLASS LATCH - REMOVAL).

OPERATION

The flip-up glass ajar switch is actuated by the flip-up glass latch mechanism. When the flip-up glass is closed and properly latched, the flip-up glass ajar switch is an open circuit. When the flip-up glass is open or only partially latched, the flip-up glass ajar switch is a closed circuit. The flip-up glass ajar switch is hard wired between a body ground, the Body Control Module (BCM), and the rear wiper motor. The output of the switch is connected to the BCM and rear wiper motor through a flip-up glass ajar switch sense circuit. The BCM reads the flip-up glass ajar switch status through an internal pull-up, then uses this input to control many electronic func-

FLIP-UP GLASS AJAR SWITCH (Continued)

tions and features of the vehicle. The rear wiper motor uses this input to restrict rear wiper operation when the flip-up glass is ajar. The flip-up glass ajar switch can be diagnosed using conventional diagnostic tools and methods; however, for proper diagnosis of the BCM, and both the hard wired and electronic BCM outputs affected by the flip-up glass ajar switch input, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

HEATER-A/C CONTROL ILLUMINATION BULB

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

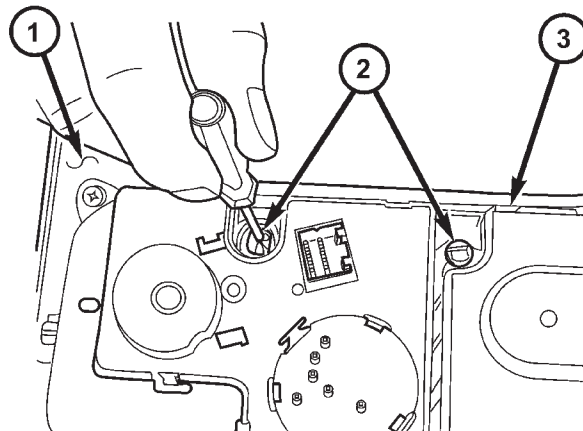
(2) Remove the center bezel from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL).

(3) From the back of the center bezel, use a small thin-bladed screwdriver to rotate the heater-A/C control illumination bulb holder counterclockwise about 30 degrees on the circuit board (Fig. 11).

(4) Pull the heater-A/C illumination bulb holder and bulb unit straight out of the circuit board bulb mounting hole.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG,



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Fig. 11 Heater-A/C Control Illumination Bulb Remove/Install

- 1 - CENTER BEZEL
- 2 - BULB HOLDER & BULB (2)
- 3 - HEATER-A/C CONTROL

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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

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 and/or the lamp wiring.

(1) Align the heater-A/C control illumination bulb holder and bulb unit with the circuit board bulb mounting hole.

(2) Insert the heater-A/C control illumination bulb holder and bulb unit straight into the circuit board bulb mounting hole until it is firmly seated (Fig. 11).

(3) Using a small thin-bladed screwdriver, rotate the heater-A/C control illumination bulb holder clockwise about 30 degrees on the circuit board.

(4) Reinstall the center bezel onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).

(5) Reconnect the battery negative cable.

READING LAMP BULB

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) If the vehicle is not equipped with the optional Compass Mini-Trip Computer (CMTC), remove the reading lamp unit from the headliner mounting hole. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - INTERIOR/READING LAMP UNIT - REMOVAL). If the vehicle is equipped with the optional CMTC, remove the overhead console from the headliner. (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).

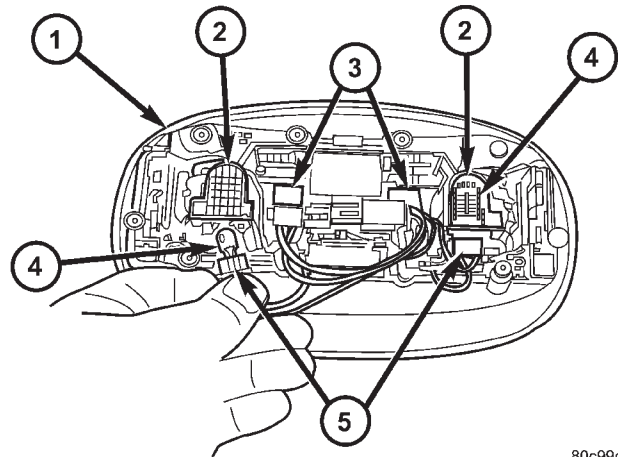
(3) From the back of the unit while pulling the reading lamp socket away from the outside of the lamp unit bulb housing, use a small thin-bladed screwdriver to release the integral latch tabs of the socket from the inside of the bulb housing (Fig. 12).

(4) Pull the reading lamp socket and bulb unit straight out from the lamp unit bulb housing.

(5) Pull the ash reading lamp bulb straight out of the lamp unit socket.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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



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Fig. 12 Reading Lamp Bulb Remove/Install

- 1 - BEZEL
- 2 - BULB HOUSING
- 3 - SWITCH (2)
- 4 - BULB (2)
- 5 - SOCKET (2)

THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

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 and/or the lamp wiring.

(1) Align the base of the reading lamp bulb with the receptacle in the lamp unit socket.

(2) Push the reading lamp bulb straight into the lamp unit socket until it is firmly seated.

(3) Align the reading lamp socket and bulb unit with the mounting hole in the bulb housing (Fig. 12).

(4) Push the reading lamp socket and bulb unit straight into the bulb housing until it is firmly seated and the integral socket latches are engaged within the bulb housing.

(5) If the vehicle is not equipped with the optional Compass Mini-Trip Computer (CMTC), reinstall the reading lamp unit into the headliner mounting hole. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - INTERIOR/READING LAMP - INSTALLATION). If the vehicle is equipped with the optional CMTC, reinstall the overhead console onto the headliner. (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - INSTALLATION).

(6) Reconnect the battery negative cable.

READING LAMP SWITCH

REMOVAL

The reading lamp switches are serviced as a unit with the reading lamp sockets, wire harness, and connector.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove both reading lamp sockets and their bulbs from the lamp unit housing. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - INTERIOR/READING LAMP BULB - REMOVAL).

(3) From the back of the reading lamp unit housing, carefully depress the blocking tab that engages the terminal end of the reading lamp wire harness connector, then slide the connector over the tab and off of the mount near the center of the lamp unit housing.

(4) From the back of the reading lamp unit housing, firmly press each switch body toward the large end of the keyed hole into which it is secured until it unsnaps from the housing (Fig. 13).

(5) Remove the connector, wire harness, both sockets, and both switches from the back of the reading lamp unit housing.

INSTALLATION

The reading lamp switches are serviced as a unit with the reading lamp sockets, wire harness, and connector.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG,

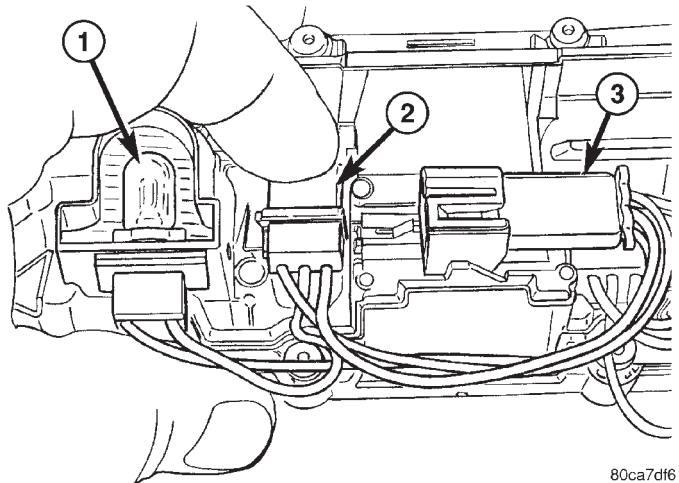


Fig. 13 Reading Lamp Switch Remove/Install

- 1 - READING LAMP BULB
- 2 - SWITCH
- 3 - WIRE HARNESS CONNECTOR

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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the connector, wire harness, both sockets, and both switches onto the back of the reading lamp unit housing.

(2) Insert the plunger of each switch into the large end of the keyed hole in the reading lamp unit housing.

(3) Firmly press each switch body toward the small end of the keyed hole into which it is secured until it snaps into the housing (Fig. 13).

(4) Engage the wire end of the reading lamp wire harness connector onto the connector mount near the center of the lamp unit housing, then slide the connector over the mount until the blocking tab snaps up into place.

(5) Reinstall both reading lamp bulbs and their sockets into the lamp unit housing. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - INTERIOR/READING LAMP BULB - INSTALLATION).

(6) Reconnect the battery negative cable.

READING LAMP UNIT

REMOVAL

If the vehicle is equipped with an optional Compass Mini-Trip Computer (CMTc), the reading lamps are housed in the overhead console. (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Using a trim stick or another suitable wide flat-bladed tool, gently pry between the flange around the edge of the reading lamp unit housing and the headliner to release the metal snap clip on each side of the housing from the receptacles in the mounting bracket above the headliner (Fig. 14).

(3) Pull the reading lamp unit away from the headliner far enough to access and disconnect the body wire harness connector for the lamp from the connector on the lamp unit housing.

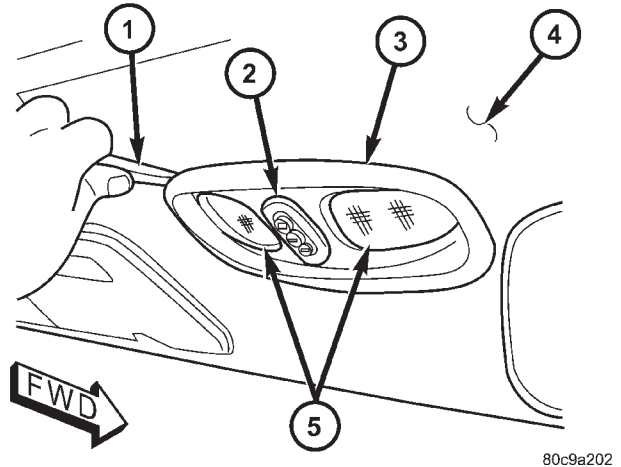
(4) If the vehicle is equipped with an optional power sunroof, disconnect the body wire harness connector for the sunroof switch from the connector receptacle on the back of the switch.

(5) Remove the reading lamp unit from the mounting hole in the headliner.

INSTALLATION

If the vehicle is equipped with an optional Compass Mini-Trip Computer (CMTc), the reading lamps are housed in the overhead console. (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - INSTALLATION).

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING



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Fig. 14 Reading Lamp Unit Remove/Install

- 1 - TRIM STICK
- 2 - SUNROOF SWITCH
- 3 - READING LAMP UNIT
- 4 - HEADLINER
- 5 - LENS (2)

WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the reading lamp unit to the mounting hole in the headliner.

(2) If the vehicle is equipped with an optional power sunroof, reconnect the body wire harness connector for the sunroof switch to the connector receptacle on the back of the switch.

(3) Reconnect the body wire harness connector for the reading lamp to the connector on the lamp unit housing.

(4) With the curved corners of the reading lamp lenses oriented towards the rear of the vehicle, position the reading lamp unit housing into the headliner mounting hole and align the metal snap clip on each side of the housing with their receptacles in the mounting bracket above the headliner (Fig. 14).

(5) Using hand pressure, press upward firmly and evenly on both ends of the reading lamp unit until both snap clips are fully engaged in their receptacles.

(6) Reconnect the battery negative cable.

TAILGATE AJAR SWITCH

DESCRIPTION

A tailgate ajar switch is standard equipment in this vehicle. This switch is concealed within and integral to the tailgate latch unit. The switch is a momentary leaf contact-type unit that is actuated by the tailgate latch mechanism. A pigtail wire harness and connector on the tailgate latch unit connects the tailgate ajar switch to the vehicle electrical system through the tailgate wire harness. The tailgate ajar switch cannot be adjusted or repaired and, if faulty or damaged, the tailgate latch unit must be replaced. (Refer to 23 - BODY/SWING GATE/LATCH - REMOVAL).

OPERATION

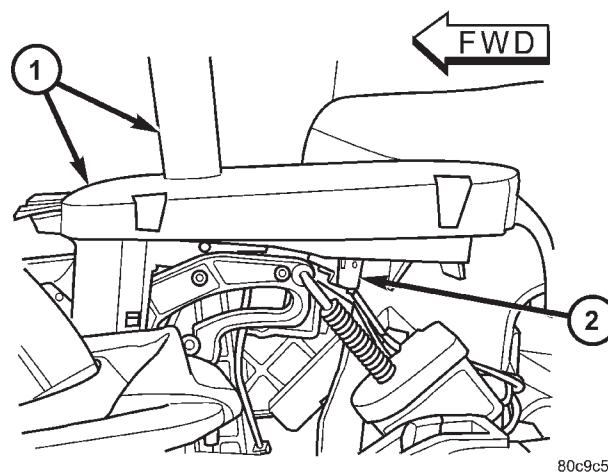
The tailgate switch is actuated by the tailgate latch mechanism. When the tailgate is closed and properly latched, the tailgate ajar switch is an open circuit. When the tailgate is open or only partially latched, the tailgate ajar switch is a closed circuit. The tailgate ajar switch is hard wired between a body ground and the Body Control Module (BCM). The output of the switch is connected to the BCM through a tailgate ajar switch sense circuit. The BCM reads the tailgate ajar switch status through an internal pull-up, then uses this input to control many electronic functions and features of the vehicle. The tailgate ajar switch can be diagnosed using conventional diagnostic tools and methods; however, for proper diagnosis of the BCM, and both the hard wired and electronic BCM outputs affected by the tailgate ajar switch input, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

TRANSMISSION RANGE INDICATOR ILLUMINATION BULB

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the center console from the floor panel transmission tunnel. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL).
- (3) From the left side of the vehicle, reach between transmission range indicator and the floor panel transmission tunnel to grasp the illumination lamp socket (Fig. 15).



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Fig. 15 Transmission Range Indicator Illumination Bulb Remove/Install

- 1 - AUTOMATIC TRANSMISSION SHIFT MECHANISM
2 - ILLUMINATION LAMP SOCKET

TRANSMISSION RANGE INDICATOR ILLUMINATION BULB (Continued)

(4) Rotate the transmission range indicator illumination lamp socket counterclockwise about 30 degrees on the bottom of the range indicator.

(5) Pull the transmission range indicator illumination lamp socket and bulb unit straight out of the bulb mounting hole in the bottom of the indicator.

(6) Pull the transmission range indicator illumination lamp bulb straight out of the socket.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

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 and/or the lamp wiring.

(1) Align the base of the transmission range indicator illumination lamp bulb with the receptacle in the lamp socket.

(2) Push the transmission range indicator illumination lamp bulb straight into the lamp socket until it is firmly seated.

(3) Align the transmission range indicator illumination lamp socket and bulb unit with the mounting hole on the bottom of the indicator (Fig. 15).

(4) Push the transmission range indicator illumination lamp socket and bulb unit straight into the bottom of the indicator until it is firmly seated.

(5) Rotate the transmission range indicator illumination lamp socket clockwise about 30 degrees on the bottom of the indicator.

(6) Reinstall the center console onto the floor panel transmission tunnel. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION).

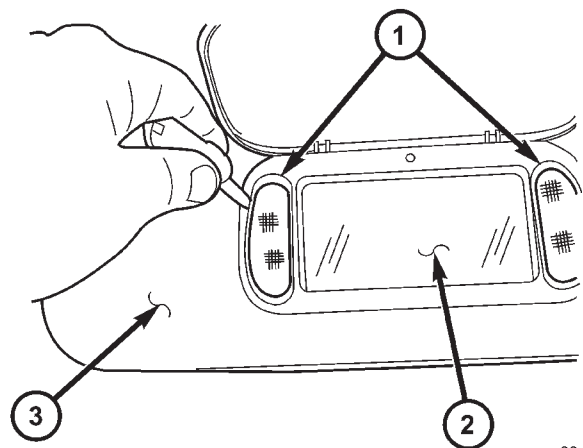
(7) Reconnect the battery negative cable.

VANITY LAMP BULB**REMOVAL**

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Using a small thin-bladed tool, gently pry outward on either side near the top or bottom of the vanity lamp lens until the lens unsnaps from the lamp unit housing (Fig. 16).



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Fig. 16 Vanity Lamp Lens Remove

- 1 - LENS (2)
- 2 - MIRROR
- 3 - SUN VISOR

VANITY LAMP BULB (Continued)

(3) Using small needle-nose pliers, carefully pull the vanity lamp bulb straight out from the lamp socket (Fig. 17).

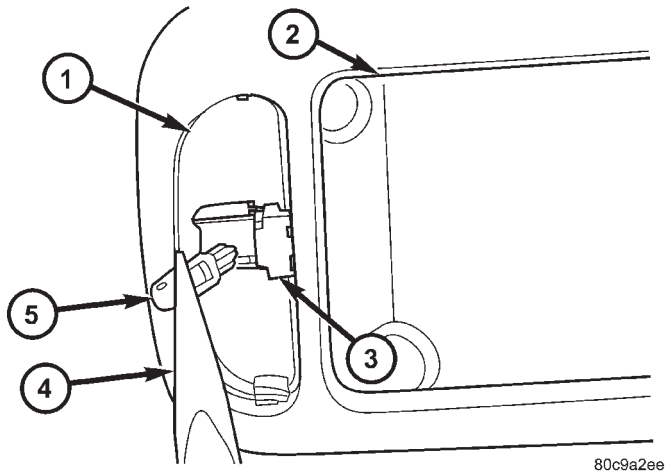


Fig. 17 Vanity Lamp Bulb Remove/Install

- 1 - HOUSING
- 2 - MIRROR
- 3 - SOCKET
- 4 - NEEDLE-NOSE PLIERS
- 5 - BULB

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

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 and/or the lamp wiring.

(1) Using small needle-nose pliers, carefully grasp the vanity lamp bulb and align the base of the bulb with the receptacle in the lamp socket (Fig. 17).

(2) Carefully push the vanity lamp bulb base straight into the lamp socket until it is fully seated.

(3) Insert one tab on the top or the bottom of the vanity lamp lens into the proper slot in the lamp unit housing.

(4) Carefully flex the vanity lamp lens far enough to engage the loose tab into its slot in the lamp unit housing.

(5) Reconnect the battery negative cable.

LAMPS

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LAMPS/LIGHTING - EXTERIOR

DESCRIPTION

The exterior lighting system for this model includes the following exterior lamps (Fig. 1):

- **Backup Lamps** - The backup (or reverse) lamps are integral to the rear lamp units mounted to the back of the quarter panel on each side of the tailgate at the rear of the vehicle.
- **Brake Lamps** - The brake (or stop) lamps include a lamp that is integral to the rear lamp units mounted to the back of the quarter panel on each side of the tailgate, and the Center High Mounted Stop Lamp (CHMSL) that is centered on the rear edge of the roof panel above the flip-up glass opening at the rear of the vehicle.
- **Daytime Running Lamps** - Vehicles manufactured for sale in Canada illuminate the high beam filament in each headlamp bulb serves as the Daytime Running Lamps (DRL).

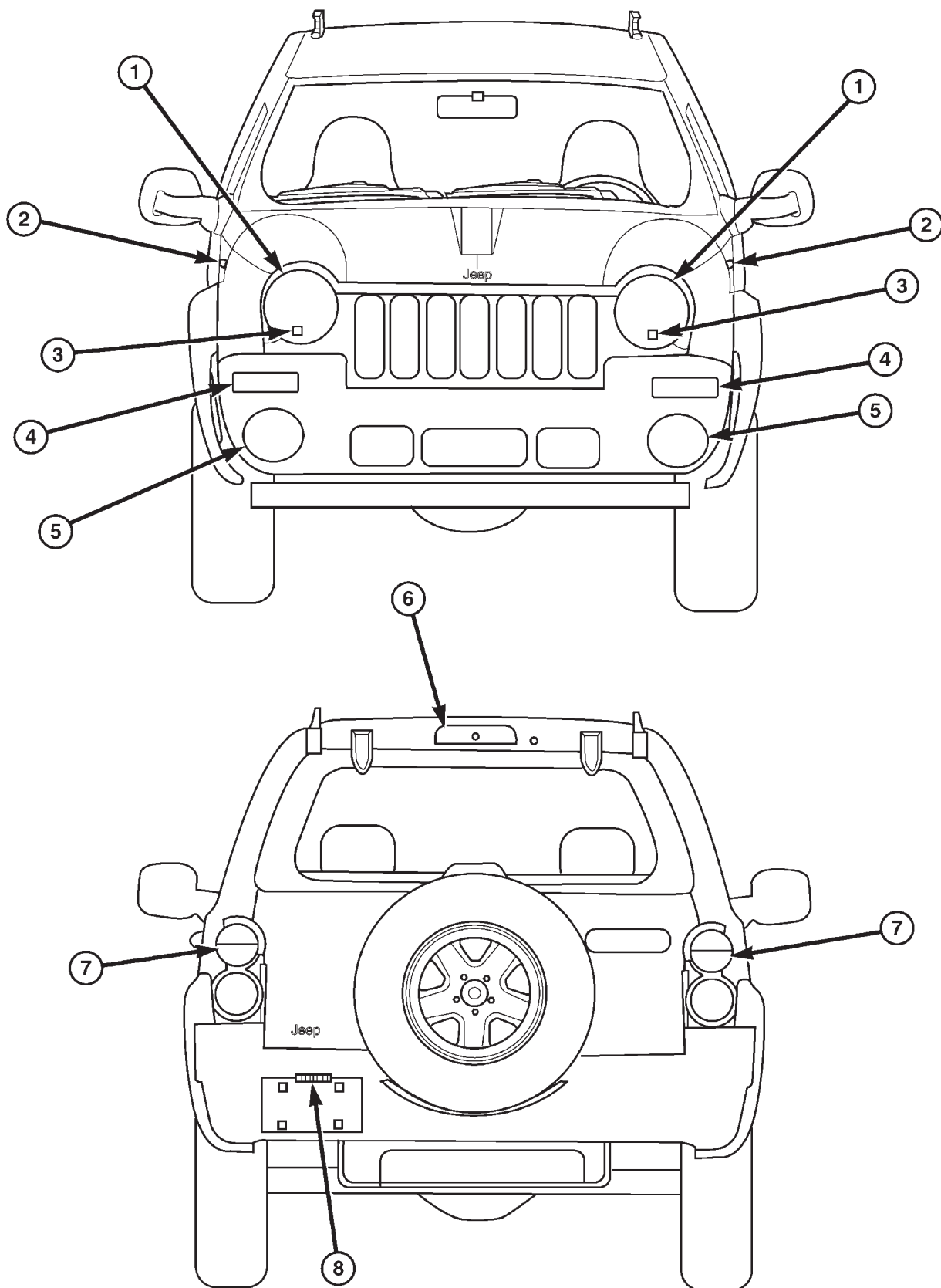
- **Front Fog Lamps** - Optional front fog lamps include a single round front fog lamp unit with an adjustable reflector and a removable bulb that is secured behind a dedicated opening on each forward-facing end of the front bumper fascia.

- **Hazard Warning Lamps** - The hazard warning lamps include all of the right and left turn signal lamps.

- **Headlamps** - A single round headlamp housing with a fixed lens, an adjustable reflector, and a single removable halogen bulb is secured to the grille opening panel on each side of the grille opening at the front of the vehicle. In certain markets where required, a headlamp leveling actuator motor is included on each headlamp.

- **Park Lamps** - The park lamps include the front park lamps and front side marker lamps that are integral to the front lamp units mounted at each end of the bumper fascia at the front of the vehicle, as well as the rear park lamps and rear side marker lamps that are integral to the rear lamp units

LAMPS/LIGHTING - EXTERIOR (Continued)



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Fig. 1 Exterior Lamps

LAMPS/LIGHTING - EXTERIOR (Continued)

- 1 - HEADLAMP UNIT (2)
- 2 - REPEATER LAMP UNIT (2)
- 3 - FRONT POSITION LAMP (2)
- 4 - FRONT LAMP UNIT (2)

- 5 - FRONT FOG LAMP (2)
- 6 - CENTER HIGH MOUNTED STOP LAMP UNIT
- 7 - REAR LAMP UNIT
- 8 - LICENSE PLATE LAMP UNIT

mounted to the back of the quarter panel on each side of the tailgate at the rear of the vehicle. The park lamps include a license plate lamp or lamps, depending upon the requirements of the market for which the vehicle is manufactured. Vehicles with a license plate tub located near the left end of the rear bumper fascia have a single lamp, while vehicles with a license plate module located on the spare tire carrier have two license plate lamps. In certain markets where required, a front position lamp that is integral to each headlamp unit is illuminated instead of the front park lamps and front side marker lamps in the park lamps circuit; and, a rectangular, red reflector is located on the rear bumper fascia just inboard and below each rear lamp unit.

- **Rear Fog Lamps** - Rear fog lamps are available only in certain markets where they are required equipment. The rear fog lamps are integral to the rear lamp units mounted to the back of the quarter panel on each side of the tailgate at the rear of the vehicle.

- **Turn Signal Lamps** - The turn signal lamps include the front turn signal and front side marker lamps that are integral to the front lamp units mounted at each end of the bumper fascia at the front of the vehicle, as well as rear turn signal lamps that are integral to the rear lamp units mounted to the back of the quarter panel on each side of the tailgate at the rear of the vehicle. In certain markets where required, a repeater lamp unit mounted to each front fender just behind the front wheel opening is illuminated instead of the front side marker lamp in each turn signal lamp circuit.

Other components of the exterior lighting system for this model include:

- **Combination Flasher** - An electronic combination flasher is integral to the hazard warning switch in the center of the instrument panel.

- **Backup Lamp Switch** - Vehicles equipped with a manual transmission have a plunger-type backup lamp switch located on the transmission housing. A Transmission Range Sensor (TRS) integral to the solenoid pack on the valve body of the optional electronic automatic transmission performs the backup lamp switch function on models that are so equipped.

- **Brake Lamp Switch** - A plunger-type brake lamp switch is located on the steering column support bracket under the instrument panel and actuated by the brake pedal arm.

- **Body Control Module** - The Body Control Module (BCM) is located on the Junction Block (JB) under the driver side outboard end of the instrument panel. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/BODY CONTROL MODULE - DESCRIPTION).

- **Daytime Running Lamp Relay** - Vehicles manufactured for sale in Canada use a solid state Daytime Running Lamps (DRL) relay installed in the Junction Block (JB) instead of the conventional high beam relay.

- **Front Fog Lamp Relay** - Vehicles equipped with the optional front fog lamps have a front fog lamp relay located in the Junction Block (JB).

- **Hazard Switch** - The hazard switch is located near the center of the instrument panel and includes the integral electronic combination flasher circuitry for the hazard warning system and the turn signal system.

- **Headlamp Leveling Motor** - A headlamp leveling actuator motor is located on the back of each headlamp housing of vehicles manufactured for certain markets where this equipment is required.

- **Headlamp Leveling Switch** - A thumbwheel actuated headlamp leveling switch is mounted in the driver side inboard instrument panel trim bezel of vehicles manufactured for certain markets where this equipment is required.

- **High Beam Relay** - A high beam relay is located in the Junction Block (JB) of all vehicles except those that are manufactured for sale in Canada. Canadian vehicles have a solid state Daytime Running Lamps (DRL) relay in the JB instead of the high beam relay.

- **Low Beam Relay** - A low beam relay is located in the Junction Block (JB) of all vehicles.

- **Multi-Function Switch** - The multi-function switch is located on the top of the steering column, just below the steering wheel. The multi-function switch includes a left (lighting) control stalk and a right (wiper) control stalk. The left control stalk is dedicated to providing almost all of the driver controls for both the exterior and interior lighting systems.

- **Park Lamp Relay** - A park lamp relay is located in the Junction Block (JB) of all vehicles.

- **Rear Fog Lamp Relay** - Vehicles manufactured for certain markets where rear fog lamps are required equipment have a rear fog lamp relay located in the Junction Block (JB).

LAMPS/LIGHTING - EXTERIOR (Continued)

- **Trailer Tow Adapter** - Vehicles equipped with a factory-installed trailer towing package have an adapter provided that adapts the factory-installed heavy duty 7-way trailer tow connector to a conventional 4-way light duty connector.

- **Trailer Tow Connector** - Vehicles equipped with a factory-installed trailer towing package have a heavy duty 7-way trailer tow connector installed in a bracket on the trailer hitch receiver.

- **Trailer Tow Relays** - Vehicles equipped with a factory-installed trailer towing package have a connector bank containing four relays located behind the right quarter trim panel and over the right rear wheel housing. The four relays are used to supply fused ignition switch output (run), brake lamps, right turn signal, and left turn signal outputs to a trailer through the trailer tow wiring and connectors.

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 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

Following are paragraphs that briefly describe the operation of each of the major exterior lighting systems. The hard wired circuits and components of the exterior lighting systems may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the Body Control Module (BCM), the ElectroMechanical Instrument Cluster (EMIC), the Powertrain Control Module (PCM), or the Programmable Communications Interface (PCI) data bus network. The most reliable, efficient, and accurate means to diagnose the BCM, the EMIC, the PCM, and the PCI data bus network inputs and outputs related to the various exterior lighting systems requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

BACKUP LAMPS

The backup (or reverse) lamps have a path to ground at all times through their connection to the rear lighting wire harness from a take out of the rear body wire harness with an eyelet terminal connector that is secured by a ground screw to the base of the right D-pillar behind the quarter trim panel. The backup lamps receive battery current from a fused ignition switch output (run) fuse in the Junction Block (JB) on the back-up lamp feed circuit only when the backup lamp switch (manual transmission), or backup lamp switch circuit of the Transmission Range Sensor (TRS - electronic automatic transmission) is closed by the gearshift mechanism within the transmission.

BRAKE LAMPS

The brake (or stop) lamps have a path to ground at all times through their connection to the rear lighting wire harness from a take out of the rear body wire harness with an eyelet terminal connector that is secured by a screw to the base of the right D-pillar behind the quarter trim panel. The Center High Mounted Stop Lamp (CHMSL) has a path to ground at all times through its connection to the rear body wire harness from a take out of the rear body wire harness with an eyelet terminal connector that is secured by a ground screw to the driver side D-pillar (left side D-pillar for left-hand drive, right side D-pillar for right-hand drive) behind the quarter trim panel. The brake lamps and CHMSL receive battery current from a fused B(+) fuse in the Junction Block (JB) on the brake lamp switch output circuit only when the brake lamp switch circuit of the brake lamp switch is closed by the brake pedal arm.

DAYTIME RUNNING LAMPS

Vehicles manufactured for sale in Canada illuminate the high beam filament at a reduced intensity when the engine is running and the exterior lamps are turned off. This feature is enabled by the Body Control Module (BCM) and a solid state Daytime Running Lamps (DRL) relay, which is installed in the Junction Block (JB) and the high beam relay is omitted. When the BCM monitors an engine speed signal of greater than 450 RPM and the status of the exterior lighting switch input from the multi-function switch is Off, the BCM duty cycles the DRL relay to produce illumination of the headlamp high beam filaments at a reduced intensity. The BCM also provides normal headlamp high beam operation through the DRL relay on vehicles so equipped. When the DRL relay is energized, it provides battery current from a fused B(+) fuse in the JB to the headlamp high beam filament through the DRL relay output circuit.

LAMPS/LIGHTING - EXTERIOR (Continued)

FRONT FOG LAMPS

Vehicles equipped with optional front fog lamps have a premium Body Control Module (BCM), a front fog lamp relay installed in the Junction Block (JB), and a front fog lamp switch integral to the left (lighting) control stalk of the multi-function switch. The front fog lamps have a path to ground at all times through their connection to the front fascia wire harness from two take outs of the headlamp and dash wire harness with eyelet terminal connectors that are secured by ground screws to the left inner fender shield in the engine compartment. The BCM controls front fog lamp operation by monitoring the exterior lighting switch input from the multi-function switch, then energizing or de-energizing the front fog lamp relay control coil; and, by sending the appropriate electronic message to the instrument cluster over the Programmable Communications Interface (PCI) data bus to turn the front fog lamp indicator on or off. When the front fog lamp relay is energized, it provides battery current from a fused B(+) fuse in the JB to the front fog lamps through the front fog lamp relay output circuit. The BCM 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 with the ignition switch in the Off position. In certain markets where required, the front fog lamps are also turned off by the BCM whenever the headlamp high beams are selected. Each front fog lamp includes an integral adjustment screw to be used for static aiming the fog lamp beams.

HAZARD WARNING LAMPS

With the hazard switch in the On position, the hazard warning system is activated causing the hazard switch button illumination lamp, the right and left turn signal indicators, and the right and left turn signal lamps to flash on and off. When the hazard warning system is activated, the circuitry within the hazard switch and electronic combination flasher unit will repeatedly energize and de-energize two internal relays that switch battery current from a fused B(+) fuse in the Junction Block (JB) to the right side and left side turn signal indicators, and turn signal lamps through the right and left turn signal circuits. The flashing of the hazard switch button illumination lamp is performed internally by the hazard switch and combination flasher unit circuit board. The hazard warning lamps can also be energized by the Body Control Module (BCM) through a hazard lamp control circuit input to the hazard switch and combination flasher unit.

HEADLAMPS

The headlamp system includes the Body Control Module (BCM), a low beam relay installed in the Junction Block (JB), a high beam relay installed in the JB (except Canada), a solid state Daytime Running Lamps (DRL) relay installed in the JB (Canada only), and the exterior lighting (headlamp and dimmer) switches integral to the left (lighting) control stalk of the multi-function switch. The headlamp bulbs have a path to ground at all times through their connection to the grille opening reinforcement wire harness from two take outs of the headlamp and dash wire harness with eyelet terminal connectors that are secured by ground screws to the left inner fender shield in the engine compartment. The BCM controls the headlamp operation by monitoring the exterior lighting switch inputs from the multi-function switch, then energizing or de-energizing the control coils of the low beam relay, the high beam relay, or the solid state circuitry of the DRL relay; and, by sending the appropriate electronic message to the instrument cluster over the Programmable Communications Interface (PCI) data bus to turn the high beam indicator on or off. When each respective relay is energized, it provides battery current from a fused B(+) fuse in the Power Distribution Center (PDC) through a relay (low beam, high beam, or DRL) output circuit and four separate fuses in the JB through individual fused right and left, low and high beam output circuits to the appropriate headlamp bulb filaments. 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 with the ignition switch in the Off position; and, a headlamp delay feature with a DRBIII® scan tool programmable delay interval. Each headlamp includes an integral adjustment screw to be used for static aiming of the headlamp beams.

HEADLAMP LEVELING

In certain markets where required, a headlamp leveling system is provided on the vehicle. The headlamp leveling system includes unique headlamp units equipped with a headlamp leveling actuator motor, and a rotary thumbwheel actuated headlamp leveling switch 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 actuator motors are mechanically connected through an integral pushrod to an adjustable headlamp reflector. The headlamp leveling switch is a resistor multiplexed unit that provides one of four voltage outputs to the headlamp leveling motors. The headlamp leveling motors will

LAMPS/LIGHTING - EXTERIOR (Continued)

move the headlamps to the selected position based upon the voltage input received from the switch. The headlamp leveling motors and switch have a path to ground at all times. The headlamp leveling components operate on battery current received through the fused park lamp relay output circuit so that the system will only operate when the exterior lighting is turned on.

PARK LAMPS

The park lamps system includes the Body Control Module (BCM), a park lamp relay installed in the Junction Block (JB), and the exterior lighting switch integral to the left (lighting) control stalk of the multi-function switch. The front park lamp and side marker or, if equipped, the front position lamp bulbs each have a path to ground at all times through their connections to the grille opening reinforcement wire harness from two take outs of the headlamp and dash wire harness with eyelet terminal connectors that are secured by ground screws to the left inner fender shield in the engine compartment. The rear park lamp bulbs and license plate lamp have a path to ground at all times through their connection to the rear lighting wire harness from a take out of the rear body wire harness with an eyelet terminal connector that is secured by a ground screw to the base of the right D-pillar behind the quarter trim panel. The BCM controls the park lamp operation by monitoring the exterior lighting switch inputs from the multi-function switch, then energizing or de-energizing the control coil of the park lamp relay. When the park lamp relay is energized, it provides battery current from a fused B(+) fuse in the Power Distribution Center (PDC) through a park lamp relay output circuit and a separate fuse in the JB through a fused park lamp relay output circuit to the appropriate lamp bulb filaments. 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 with the ignition switch in the Off position.

REAR FOG LAMPS

Rear fog lamps are installed on vehicles manufactured for certain markets where they are required. The rear fog lamp system includes a premium Body Control Module (BCM), a rear fog lamp relay installed in the Junction Block (JB), and a rear fog lamp switch integral to the left (lighting) control stalk of the multi-function switch. The rear fog lamps have a path to ground at all times through their connection to the rear lighting wire harness from a take out of the rear body wire harness with an eyelet terminal connector that is secured by a ground screw to the base of the right D-pillar behind the quarter trim

panel. The BCM controls rear fog lamp operation by monitoring the exterior lighting switch input from the multi-function switch, then energizing or de-energizing the rear fog lamp relay control coil; and, by sending the appropriate electronic message to the instrument cluster over the Programmable Communications Interface (PCI) data bus to turn the rear fog lamp indicator on or off. When the rear fog lamp relay is energized, it provides battery current from a fused B(+) fuse in the JB to the rear fog lamps through the rear fog lamp relay output circuit. The BCM provides a battery saver (load shedding) feature for the rear fog lamps, which will turn these lamps off if they are left on for more than about eight minutes with the ignition switch in the Off position.

TURN SIGNAL LAMPS

When the left control stalk of the multi-function switch is moved up (right turn) or down (left turn), the turn signal system is activated causing the selected right or left turn signal indicator, and right or left turn signal lamps to flash on and off. When the turn signal system is activated, the circuitry within the turn signal switch and the hazard switch/electronic combination flasher unit will repeatedly energize and de-energize one of two internal relays that switch battery current from a fused ignition switch output (run) fuse in the Junction Block (JB) to the right side or left side turn signal indicators and turn signal lamps through the right or left turn signal circuits. The ElectroMechanical Instrument Cluster (EMIC) chime tone generator will generate an audible turn signal cancel warning each time the vehicle is driven for a distance of about 3.2 kilometers (about two miles) with a turn signal indicator flashing. The EMIC uses Programmable Communications Interface (PCI) data bus distance messages from the Powertrain Control Module (PCM) and a hard wired input from the turn signal switch circuitry of the multi-function switch to determine when to sound the turn signal cancel warning.

DIAGNOSIS AND TESTING - LAMPS/LIGHTING - EXTERIOR

The hard wired circuits and components of the exterior lighting systems may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the Body Control Module (BCM), the ElectroMechanical Instrument Cluster (EMIC), the Powertrain Control Module (PCM), or the Programmable Communications Interface (PCI) data bus network. The most reliable, efficient, and accurate means to diagnose the BCM, the EMIC, the PCM, and the PCI data bus network inputs and outputs related to the various

LAMPS/LIGHTING - EXTERIOR (Continued)

exterior lighting systems requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

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 being diagnosed, be certain to diagnose and repair the battery and charging system as required. Also keep in mind that 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. For complete circuit diagrams, 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.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

BACKUP LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
BACKUP LAMP DOES NOT ILLUMINATE	1. Faulty or missing fuse. 2. Faulty or missing bulb. 3. Faulty switch. 4. Faulty ground circuit. 5. Faulty feed circuit.	1. Test and replace backup lamp fuse as required. 2. Test and replace backup lamp bulb as required. 3. Test and replace backup lamp switch (manual transmission) or transmission range sensor (automatic transmission) as required. 4. Test and repair backup lamp ground circuit as required. 5. Test and repair open back-up lamp feed circuit as required.
BACKUP LAMP DOES NOT EXTINGUISH	1. Faulty switch. 2. Faulty feed circuit.	1. Test and replace backup lamp switch (manual transmission) or transmission range sensor (automatic transmission) as required. 2. Test and repair shorted back-up lamp feed circuit as required.

LAMPS/LIGHTING - EXTERIOR (Continued)

BRAKE LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
BRAKE LAMP DOES NOT ILLUMINATE	1. Faulty or missing fuse. 2. Faulty or missing bulb. 3. Faulty switch. 4. Faulty ground circuit. 5. Faulty feed circuit.	1. Test and replace brake lamp fuse as required. 2. Test and replace brake lamp bulb as required. 3. Test and replace brake lamp switch as required. 4. Test and repair brake lamp ground circuit as required. 5. Test and repair open brake lamp switch output circuit as required.
BRAKE LAMP DOES NOT EXTINGUISH	1. Faulty switch. 2. Faulty feed circuit.	1. Test and replace brake lamp switch as required. 2. Test and repair shorted brake lamp switch output circuit as required.

DAYTIME RUNNING LAMPS

Before performing the following tests, determine whether the headlamp low and high beams operate.

If the headlamp high and low beams are also inoperative, diagnose and repair that problem before attempting to repair the Daytime Running Lamps.

CONDITION	POSSIBLE CAUSES	CORRECTION
DAYTIME RUNNING LAMPS WILL NOT ILLUMINATE	1. High beam relay installed. 2. Faulty or missing DRL relay. 3. Incorrect BCM programming. 4. Faulty BCM inputs or outputs.	1. Remove high beam relay as required. 2. Replace DRL relay with a known good unit and check operation. Replace DRL relay as required. 3. Use a DRBIII® scan tool to check and program correct country code into BCM as required. 4. Use a DRBIII® scan tool to test the BCM inputs or outputs. Refer to the appropriate diagnostic information.

LAMPS/LIGHTING - EXTERIOR (Continued)

FRONT FOG LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
FRONT FOG LAMP DOES NOT ILLUMINATE	1. Faulty or missing fuse. 2. Faulty or missing bulb. 3. Faulty or missing relay. 4. Faulty switch. 5. Faulty ground circuit. 6. Faulty feed circuit. 7. Faulty BCM inputs or outputs.	1. Test and replace front fog lamp fuse as required. 2. Test and replace front fog lamp bulb as required. 3. Test and replace front fog lamp relay as required. 4. Test and replace multi-function switch as required. 5. Test and repair front fog lamp ground circuit as required. 6. Test and repair open front fog lamp relay output circuit as required. 7. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
FRONT FOG LAMP DOES NOT EXTINGUISH	1. Faulty relay. 2. Faulty switch. 3. Faulty feed circuit. 4. Faulty BCM inputs or outputs.	1. Test and replace front fog lamp relay as required. 2. Test and replace multi-function switch as required. 3. Test and repair shorted front fog lamp relay output circuit as required. 4. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

HAZARD WARNING LAMPS

Before performing the following tests, confirm whether the left and right turn signals operate satisfactorily. If the turn signals are inoperative or oper-

ate improperly, diagnose and repair that problem before attempting to repair the Hazard Warning Lamps.

CONDITION	POSSIBLE CAUSES	CORRECTION
HAZARD WARNING LAMPS DO NOT FLASH	1. Faulty or missing fuse. 2. Faulty ground circuit. 3. Faulty feed circuit. 4. Faulty switch/flasher.	1. Test and replace hazard warning fuse as required. 2. Test and repair hazard switch ground circuit as required. 3. Test and repair open hazard switch fused B(+) circuit as required. 4. Replace hazard switch/combination flasher with a known good unit and check operation. Replace hazard switch/combination flasher unit if required.

LAMPS/LIGHTING - EXTERIOR (Continued)

HEADLAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
HEADLAMP DOES NOT ILLUMINATE	1. Faulty or missing fuse. 2. Faulty or missing bulb. 3. Faulty or missing relay. 4. Faulty switch. 5. Faulty ground circuit. 6. Faulty feed circuit. 7. Faulty BCM inputs or outputs.	1. Test and replace headlamp fuse as required. 2. Test and replace headlamp bulb as required. 3. Test and replace low beam or high beam relay as required. (Note: Vehicles with a DRL relay do not use a high beam relay. The DRL relay cannot be tested. Replace DRL relay with a known good unit and check operation. Replace DRL relay as required.) 4. Test and replace multi-function switch as required. 5. Test and repair open headlamp ground circuit as required. 6. Test and repair open headlamp low beam, high beam, or DRL relay output circuit as required. 7. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
HEADLAMP DOES NOT EXTINGUISH	1. Faulty relay. 2. Faulty switch. 3. Faulty feed circuit. 4. Faulty BCM inputs or outputs.	1. Test and replace low beam or high beam relay as required. (Note: Vehicles with a DRL relay do not use a high beam relay. The DRL relay cannot be tested. Replace DRL relay with a known good unit and check operation. Replace DRL relay as required.) 2. Test and replace multi-function switch as required. 3. Test and repair shorted headlamp low beam, high beam, or DRL relay output circuit as required. 4. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

LAMPS/LIGHTING - EXTERIOR (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
HEADLAMPS WILL NOT SWITCH FROM HIGH TO LOW BEAMS, OR FROM LOW TO HIGH BEAMS	1. Faulty relay. 2. Faulty switch. 3. Faulty BCM inputs or outputs.	1. Test and replace low beam or high beam relay as required. (Note: Vehicles with a DRL relay do not use a high beam relay. The DRL relay cannot be tested. Replace DRL relay with a known good unit and check operation. Replace DRL relay as required.) 2. Test and replace multi-function switch as required. 3. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

HEADLAMP LEVELING

Before performing the following tests, confirm whether the park lamps operate satisfactorily. If the

park lamps are inoperative, diagnose and repair that problem before attempting to repair the Headlamp Leveling System.

CONDITION	POSSIBLE CAUSES	CORRECTION
ONE LEVELING MOTOR IS INOPERATIVE	1. Faulty ground circuit. 2. Faulty feed circuit. 3. Faulty signal circuit. 4. Faulty motor.	1. Test and repair open leveling motor ground circuit as required. 2. Test and repair open leveling motor feed circuit as required. 3. Test and repair open headlamp adjust signal circuit as required. 4. Test and replace headlamp leveling motor as required.
BOTH LEVELING MOTORS ARE INOPERATIVE	1. Faulty switch ground circuit. 2. Faulty motor ground circuit. 3. Faulty switch feed circuit. 4. Faulty motor feed circuit. 5. Faulty signal circuit. 6. Faulty switch. 7. Faulty motors.	1. Test and repair open leveling switch ground circuit as required. 2. Test and repair open leveling motor ground circuit as required. 3. Test and repair open leveling switch feed circuit as required. 4. Test and repair open leveling motor feed circuit as required. 5. Test and repair open or shorted leveling motor signal circuit as required. 6. Test and replace leveling switch as required. 7. Test and replace leveling motors as required.

LAMPS/LIGHTING - EXTERIOR (Continued)

PARK LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
PARK LAMP DOES NOT ILLUMINATE	1. Faulty or missing fuse. 2. Faulty or missing bulb. 3. Faulty or missing relay. 4. Faulty switch. 5. Faulty ground circuit. 6. Faulty feed circuit. 7. Faulty BCM inputs or outputs.	1. Test and replace park lamp fuse as required. 2. Test and replace park lamp bulb as required. 3. Test and replace park lamp relay as required. 4. Test and replace multi-function switch as required. 5. Test and repair open park lamp ground circuit as required. 6. Test and repair open park lamp relay output circuit as required. 7. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.
PARK LAMP DOES NOT EXTINGUISH	1. Faulty relay. 2. Faulty switch. 3. Faulty feed circuit. 4. Faulty BCM inputs or outputs.	1. Test and replace park lamp relay as required. 2. Test and replace multi-function switch as required. 3. Test and repair shorted park lamp relay output circuit as required. 4. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

REAR FOG LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
REAR FOG LAMP DOES NOT ILLUMINATE	1. Faulty or missing fuse. 2. Faulty or missing bulb. 3. Faulty or missing relay. 4. Faulty switch. 5. Faulty ground circuit. 6. Faulty feed circuit. 7. Faulty BCM inputs or outputs.	1. Test and replace rear fog lamp fuse as required. 2. Test and replace rear fog lamp bulb as required. 3. Test and replace rear fog lamp relay as required. 4. Test and replace multi-function switch as required. 5. Test and repair open rear fog lamp ground circuit as required. 6. Test and repair open rear fog lamp relay output circuit as required. 7. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

LAMPS/LIGHTING - EXTERIOR (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
REAR FOG LAMP DOES NOT EXTINGUISH	1. Faulty relay. 2. Faulty switch. 3. Faulty feed circuit. 4. Faulty BCM inputs or outputs.	1. Test and replace rear fog lamp relay as required. 2. Test and replace multi-function switch as required. 3. Test and repair shorted rear fog lamp relay output circuit as required. 4. Use a DRBIII® scan tool to test the BCM inputs and outputs. Refer to the appropriate diagnostic information.

TURN SIGNAL LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
ONE TURN SIGNAL LAMP DOES NOT ILLUMINATE	1. Faulty or missing bulb. 2. Faulty ground circuit. 3. Faulty feed circuit.	1. Test and replace turn signal bulb as required. 2. Test and repair open ground circuit as required. 3. Test and repair open right or left turn signal circuit as required.
ALL RIGHT SIDE AND/OR ALL LEFT SIDE TURN SIGNAL LAMPS DO NOT FLASH	1. Faulty sense circuit. 2. Faulty switch. 3. Faulty flasher. 4. Faulty signal circuit.	1. Test and repair open right or left turn switch sense circuit as required. 2. Test and replace multi-function switch as required. 3. Replace hazard switch/combination flasher with a known good unit and check operation. Replace hazard switch/combination flasher unit as required. 4. Test and repair open right or left turn signal circuit as required.
ALL RIGHT SIDE OR ALL LEFT SIDE TURN SIGNALS FLASH TOO RAPIDLY (MORE THAN 100 FLASHES PER MINUTE)	1. Faulty or missing bulb. 2. Faulty ground circuit. 3. Faulty signal circuit 4. Faulty flasher.	1. Test and replace faulty bulb as required. 2. Test and repair open ground circuit as required. 3. Test and repair open right or left turn signal circuit as required. 4. Replace hazard switch/combination flasher with a known good unit and check operation. Replace hazard switch/combination flasher unit as required.

LAMPS/LIGHTING - EXTERIOR (Continued)

SPECIFICATIONS - LAMPS/LIGHTING - EXTERIOR

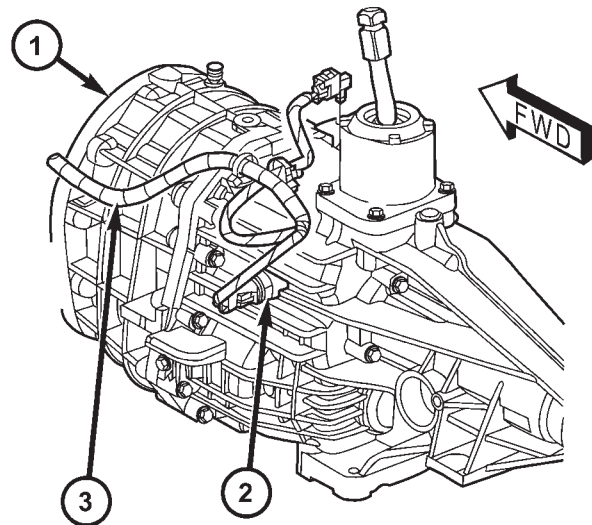
BULB SPECIFICATIONS

LAMP	BULB
Backup	3157 P27/7W
Brake	3157 P27/7W
Center High Mounted Stop	921/W16W
Front Fog	9145
Front Park	3157 P27/7W
Front Position	W5W
Front Side Marker	168
Front Turn	3157 P27/7W
Headlamp (North America)	9007QL
Headlamp (Rest-Of-World)	H-4 W0W6
License Plate (North America)	168
License Plate (Rest-Of-World)	W5W
Rear Fog	3157 P27/7W
Rear Park/Tail	3157 P27/7W
Rear Turn	3157 P27/7W
Side Repeater	W5W

BACKUP LAMP SWITCH

DESCRIPTION

Vehicles equipped with a manual transmission have a normally open, spring-loaded plunger type back-up lamp switch (Fig. 2). The backup lamp switch is located in a threaded hole on the side of the manual transmission housing, beneath the floor panel of the vehicle. The backup lamp switch has a threaded body and a hex formation near the plunger end of the switch, and an integral connector receptacle at the opposite end of the switch. When installed, only the connector receptacle and the hex formation are visible on the outside of the transmission housing. Vehicles with an optional electronic automatic transmission have a Transmission Range Sensor (TRS) that is used to perform several functions, including that of the backup lamp switch. The TRS is described in further detail elsewhere in this service information. The backup lamp switch cannot be adjusted or repaired and, if faulty or damaged, the entire switch unit must be replaced.



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Fig. 2 Backup Lamp Switch - Typical

- 1 - MANUAL TRANSMISSION
- 2 - BACKUP LAMP SWITCH
- 3 - ENGINE WIRE HARNESS

OPERATION

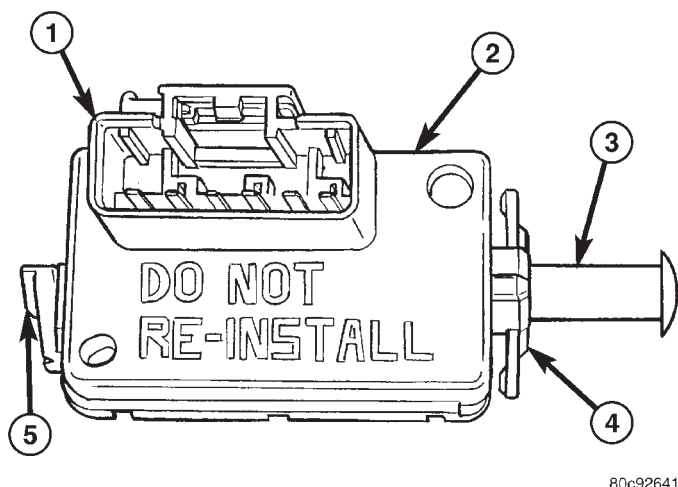
The backup lamp switch controls the flow of battery current to the backup lamp bulbs at the back of the vehicle through an output on the back-up lamp feed circuit. The switch plunger is mechanically actuated by the gearshift mechanism within the transmission, which will depress the switch plunger and close the switch contacts whenever the reverse gear has been selected. The switch receives battery current through a fuse in the Junction Block (JB) on a fused ignition switch output (run) circuit whenever the ignition switch is in the On position. A take out of the engine wire harness connects the backup lamp switch to the vehicle electrical system. The backup lamp switch and circuits can be tested using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - BACKUP LAMP SWITCH

- (1) Disconnect and isolate the battery negative cable.
- (2) Raise and support the vehicle.
- (3) Locate and disconnect the engine wire harness connector for the backup lamp switch from the switch connector receptacle.
- (4) 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.

BRAKE LAMP SWITCH

DESCRIPTION



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Fig. 3 Brake Lamp Switch

- 1 - CONNECTOR RECEPTACLE
- 2 - BRAKE LAMP SWITCH
- 3 - PLUNGER
- 4 - COLLAR
- 5 - LEVER

The brake lamp switch is a three circuit, spring-loaded plunger actuated switch that is secured to the steering column support bracket under the driver side of the instrument panel (Fig. 3). The brake lamp switch is contained within a rectangular molded plastic housing with an integral connector receptacle featuring six terminal pins and a red plastic Connector Position Assurance (CPA) lock. The switch is connected to the vehicle electrical system through a dedicated take out and connector of the instrument panel wire harness. The switch plunger extends through a mounting collar on one end of the switch housing. The plunger has a one time telescoping self-adjustment feature that is achieved after the switch is installed by moving an adjustment release lever on the opposite end of the switch housing clockwise, until it locks in a position that is parallel to the connector receptacle. The brake lamp switch self-adjustment is a one time feature. Once the feature has been used, the switch cannot be readjusted. A "DO NOT RE-INSTALL" warning is molded into the switch housing below the connector receptacle.

An installed brake lamp switch cannot be readjusted or repaired. If the switch is damaged, faulty, or removed from its mounting position for any reason, it must be replaced with a new unit.

OPERATION

The brake lamp switch controls three different circuits, one normally open and two normally closed. These circuits are described as follows:

- **Brake Lamp Switch Circuit** - A normally open brake lamp switch circuit receives battery current on a fused B(+) circuit from a fuse in the Junction Block (JB), and supplies battery current to the brake lamps and the Controller Antilock Brake (CAB) on a brake lamp switch output circuit when the brake pedal is depressed (brake lamp switch plunger released).

- **Brake Lamp Switch Signal Circuit** - A normally closed brake lamp switch signal circuit receives a path to ground through a splice block located in the instrument panel wire harness with an eyelet terminal connector that is secured by a nut to a ground stud on the driver side instrument panel end bracket near the Junction Block (JB). This circuit supplies a ground input to the Powertrain Control Module (PCM) on a brake lamp switch sense circuit when the brake pedal is released (brake lamp switch plunger is depressed).

- **Speed Control Circuit** - A normally closed speed control circuit receives battery current from the Powertrain Control Module on a speed control supply circuit, and supplies battery current to the speed control servo solenoids (dump, vacuum, and vent) on a speed control brake switch output circuit when the speed control system is turned on and the brake pedal is released (brake lamp switch plunger is depressed).

Concealed within the brake lamp switch housing the components of the self-adjusting brake switch plunger consist of a two-piece telescoping plunger, a split plunger locking collar, and a release wedge. The release lever has an integral shaft with a wedge that spreads the plunger locking collar to an open or released position. After the switch is installed and the brake pedal is released, the plunger telescopes to the correct adjustment position. When the release lever is moved to the release position, the wedge is disengaged from the locking collar causing the collar to apply a clamping pressure to the two plunger halves fixing the plunger length.

The brake lamp switch can be diagnosed using conventional diagnostic tools and methods.

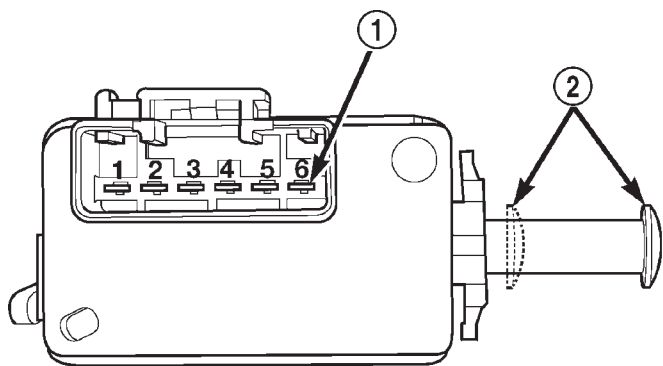
BRAKE LAMP SWITCH (Continued)

DIAGNOSIS AND TESTING - BRAKE LAMP SWITCH

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable. Disconnect the instrument panel wire harness connector for the brake lamp switch from the switch connector receptacle.

(2) Using an ohmmeter, perform the continuity tests at the terminal pins in the brake lamp switch connector receptacle (Fig. 4) as shown in the Brake Lamp Switch Tests table.



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Fig. 4 Brake Lamp Switch Terminal Identification

- 1 - TERMINAL PINS
2 - PLUNGER TEST POSITIONS

BRAKE LAMP SWITCH TESTS	
PLUNGER POSITION	CONTINUITY BETWEEN
Released (Extended)	Pins 1 & 2
Compressed (Retracted)	Pins 3 & 4, 5 & 6

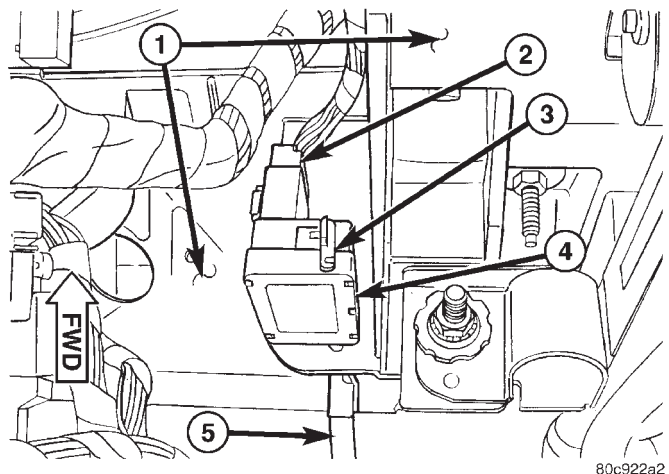
(3) If the switch fails any of the continuity tests, replace the faulty brake lamp switch as required.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Disconnect the instrument panel wire harness connector for the brake lamp switch from the switch connector receptacle (Fig. 5).



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Fig. 5 Brake Lamp Switch Remove/Install

- 1 - STEERING COLUMN SUPPORT
2 - WIRE HARNESS CONNECTOR
3 - LEVER
4 - BRAKE LAMP SWITCH
5 - BRAKE PEDAL ARM

(3) Grasp the brake lamp switch housing firmly and rotate the switch counterclockwise about 30 degrees to align the tabs on the locking collar with the keyed mounting hole in the steering column support bracket.

(4) Pull the switch straight back from the mounting hole to remove it from the steering column support bracket.

(5) Discard the removed brake lamp switch.

BRAKE LAMP SWITCH (Continued)

CAUTION: Always replace a removed brake lamp switch with a new unit. This is a one time component and is not intended for reinstallation.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

CAUTION: Always replace a removed brake lamp switch with a new unit. This is a one time component and is not intended for reinstallation.

(1) While holding the brake pedal depressed, align the tabs on the brake lamp switch locking collar with the keyed mounting hole in the steering column support bracket (Fig. 5).

(2) Still holding the brake pedal depressed, insert the tabs on the brake lamp switch housing through the keyed mounting hole in the steering column support bracket until the switch is firmly seated against the bracket.

(3) Still holding the brake pedal depressed, rotate the switch clockwise about 30 degrees to lock the tabs on the brake lamp switch locking collar to the keyed mounting hole in the steering column support bracket.

(4) Release the brake pedal.

CAUTION: Do not pull up on the brake pedal before the switch plunger adjustment has been completed.

(5) Rotate the plunger adjustment release lever clockwise until it locks into place parallel to the brake lamp switch connector receptacle. This action will set the switch plunger length to a final adjustment position and cannot be undone. If not performed properly the first time, a new brake lamp switch **must** be installed.

(6) Reconnect the instrument panel wire harness connector for the brake lamp switch to the switch connector receptacle.

(7) Reconnect the battery negative cable.

CENTER HIGH MOUNTED STOP LAMP BULB

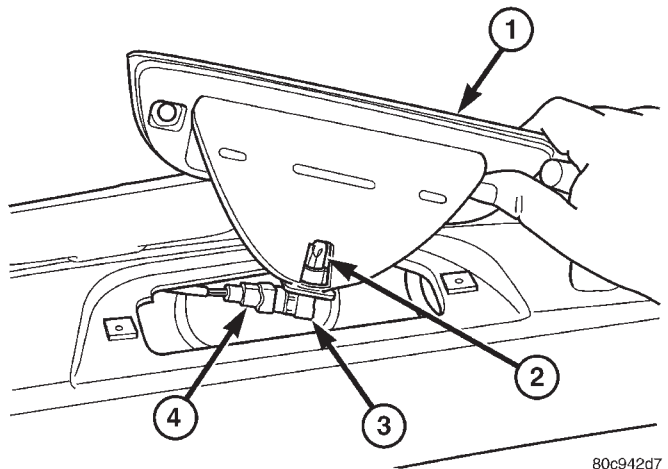
REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the Center High Mounted Stop Lamp (CHMSL) unit from the roof panel. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/CENTER HIGH MOUNTED STOP LAMP UNIT - REMOVAL).

(3) Firmly grasp the socket on the back of the CHMSL unit housing.

(4) Rotate the socket on the back of the CHMSL unit housing counterclockwise about 30 degrees (Fig. 6).



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Fig. 6 Center High Mounted Stop Lamp Bulb Remove/Install

- 1 - CHMSL UNIT
- 2 - BULB
- 3 - SOCKET
- 4 - BODY WIRE HARNESS CONNECTOR

(5) Pull the socket and bulb straight out of the back of CHMSL unit housing.

(6) Pull the bulb straight out of the CHMSL unit socket.

CENTER HIGH MOUNTED STOP LAMP BULB (Continued)

INSTALLATION

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 and/or the lamp wiring.

(1) Align the base of the bulb with the receptacle in the Center High Mounted Stop Lamp (CHMSL) unit socket.

(2) Push the bulb straight into the CHMSL unit socket until it is firmly seated.

(3) Align the socket and bulb with the socket opening on the back of CHMSL unit housing.

(4) Push the socket and bulb straight into the CHMSL unit housing until it is firmly seated (Fig. 6).

(5) Rotate the socket on the back of the CHMSL unit housing clockwise about 30 degrees.

(6) Reinstall the CHMSL unit onto the roof panel. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/CENTER HIGH MOUNTED STOP LAMP UNIT - INSTALLATION).

(7) Reconnect the battery negative cable.

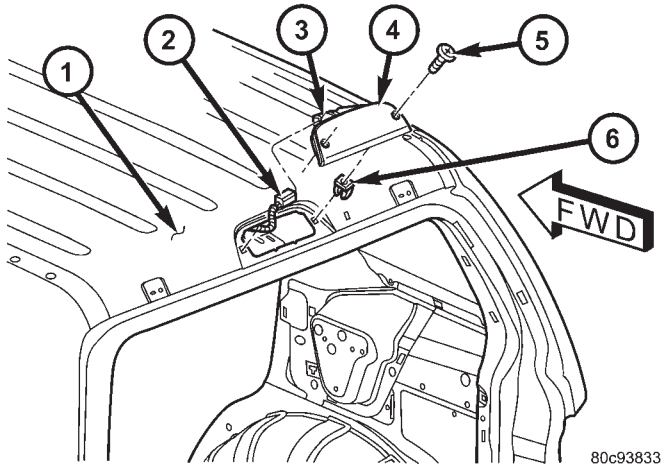


Fig. 7 Center High Mounted Stop Lamp Remove/Install

- 1 - ROOF PANEL
- 2 - BODY WIRE HARNESS CONNECTOR
- 3 - BULB SOCKET
- 4 - CHMSL
- 5 - SCREW (2)
- 6 - PLASTIC NUT (2)

CENTER HIGH MOUNTED STOP LAMP UNIT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the two screws that secure the Center High Mounted Stop Lamp (CHMSL) unit to the rear of the roof panel (Fig. 7).

(3) Pull the CHMSL unit away from the roof panel far enough to access and disconnect the wire harness connector for the CHMSL unit from the lamp socket pigtail wire.

(4) Remove the CHMSL unit from the roof panel.

INSTALLATION

(1) Position the Center High Mounted Stop Lamp (CHMSL) unit to the roof panel.

(2) Reconnect the wire harness connector for the CHMSL unit to the lamp socket pigtail wire (Fig. 7).

(3) Position the CHMSL unit into the roof panel opening.

(4) Install and tighten the two screws that secure the CHMSL unit to the rear of the roof panel. Tighten the screws to 2 N·m (21 in. lbs.).

(5) Reconnect the battery negative cable.

COMBINATION FLASHER

DESCRIPTION

The combination flasher for this model is integral to the hazard switch located in the center of the instrument panel, just above the radio. The combination flasher is a smart relay that functions as both the turn signal system and the hazard warning system flasher. The combination flasher contains active electronic Integrated Circuitry (IC) elements. This flasher is designed to handle the current flow requirements of the factory-installed lighting. If supplemental lighting is added to the turn signal lamp circuits, such as when towing a trailer with lights, the combination flasher will automatically try to compensate to keep the flash rate the same.

The combination flasher cannot be repaired or adjusted and, if faulty or damaged, the hazard switch unit must be replaced.

OPERATION

The combination flasher has the following inputs and outputs: fused B(+), fused ignition switch output, right turn signal sense, left turn signal sense, and one output each for the right and left turn signal circuits. The combination flasher also receives an internal input through the closed contacts of the hazard switch and, on vehicles equipped with the optional Vehicle Theft Security System (VTSS), the flasher receives an input from the Body Control Module (BCM) in order to flash the turn signal lamps as an optical alert feature of that

COMBINATION FLASHER (Continued)

system. Constant battery voltage is supplied to the flasher so that it can perform the hazard warning function, and ignition switched battery voltage is supplied for the turn signal function. The Integrated Circuit (IC) within the combination flasher contains the logic that controls the flasher operation and the flash rate. The IC receives separate sense ground inputs from the multi-function switch for the right and left turn signals, and from the hazard switch contacts or the BCM for the hazard warning signals. A special design feature of the combination flasher allows it to "sense" that a turn signal circuit or bulb is not operating, and provide the driver an indication of the condition by flashing the remaining bulbs in the affected circuit at a higher rate (120 flashes-per-minute or higher). Conventional flashers either continue flashing at their typical rate (heavy-duty type), or discontinue flashing the affected circuit entirely (standard-duty type).

Because of the active electronic elements within the combination flasher, it cannot be tested with conventional automotive electrical test equipment. If the combination flasher is believed to be faulty, test the turn signal and hazard warning system. Then replace the hazard switch with a known good unit to confirm system operation.

DAYTIME RUNNING LAMP RELAY

DESCRIPTION

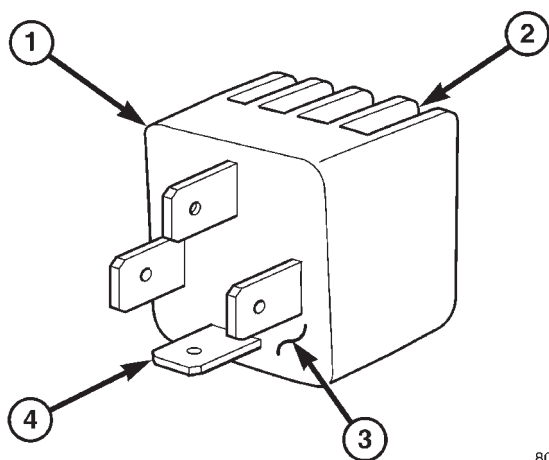


Fig. 8 Daytime Running Lamp Relay

- 1 - DRL RELAY
- 2 - HEAT SINK
- 3 - POTTING MATERIAL
- 4 - TERMINAL (4)

a die cast aluminum housing with integral cooling fins that act as a heat sink for the solid state DRL circuitry. Four male spade terminals extend from the base of the relay through a potting material that encloses and protects the DRL circuitry. Although the DRL relay has four terminals that are laid out in a footprint that is similar to that of a conventional International Standards Organization (ISO) relay, a standard ISO relay should never be installed in place of the DRL relay. The DRL relay is installed in the Junction Block (JB) on the driver side outboard end of the instrument panel. Vehicles equipped with this relay do not have a headlamp high beam relay installed in the JB.

The DRL relay cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

OPERATION

The Daytime Running Lamp (DRL) relay is a solid state relay that controls the flow of battery current to the high beam filaments of both headlamp bulbs based upon a duty cycled control input received from the Body Control Module (BCM) of vehicles equipped with the DRL feature. By cycling the DRL relay output, the BCM controls the illumination intensity of the high beam filaments. The DRL relay terminals are connected to the vehicle electrical system through a connector receptacle in the Junction Block (JB). The inputs and outputs of the DRL relay include:

- **Battery Current Input** - The DRL relay receives battery current on a fused B(+) circuit from a fuse in the Power Distribution Center (PDC).

- **Ground Input** - The DRL relay receives a path to ground through a splice block located in the instrument panel wire harness with an eyelet terminal connector that is secured by a nut to a ground stud on the driver side instrument panel end bracket near the Junction Block (JB).

- **Control Input** - The DRL relay control input is received from the BCM and/or the momentary optical horn (flash-to-pass) output of the multi-function switch through a high beam relay control circuit.

- **Control Output** - The DRL relay supplies battery current output to the headlamp high beam filaments through the high beam relay output circuit.

Because of active electronic elements within the DRL relay, it cannot be tested with conventional automotive electrical test equipment. If the DRL relay is believed to be faulty, replace the relay with a known good unit to confirm system operation.

The Daytime Running Lamp (DRL) relay (Fig. 8) is a solid state relay that is used only on vehicles manufactured for sale in Canada. The DRL relay features

DAYTIME RUNNING LAMP RELAY (Continued)

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the end cap from the driver side outboard end of the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - REMOVAL).
- (3) Remove the Daytime Running Lamp (DRL) relay by grasping it firmly and pulling it straight out from the receptacle in the Junction Block (JB) (Fig. 9).

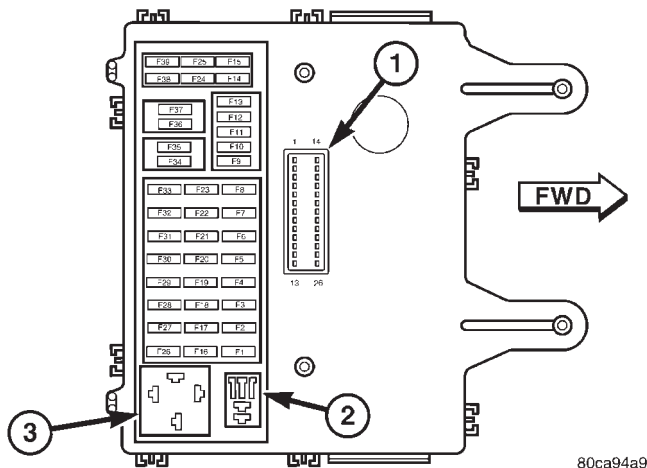


Fig. 9 Junction Block - Outboard Side (RHD Shown - Rotate 180° for LHD)

- 1 - JB/BCM CONNECTOR
- 2 - HIGH BEAM RELAY
- 3 - DRL RELAY

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Position the Daytime Running Lamp (DRL) relay to the proper receptacle in the Junction Block (JB) (Fig. 9).
- (2) Align the DRL relay terminals with the terminal cavities in the JB receptacle.
- (3) Push firmly and evenly on the top of the DRL relay until the terminals are fully seated in the terminal cavities in the JB receptacle.
- (4) Reinstall the end cap onto the driver side outboard end of the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - INSTALLATION).
- (5) Reconnect the battery negative cable.

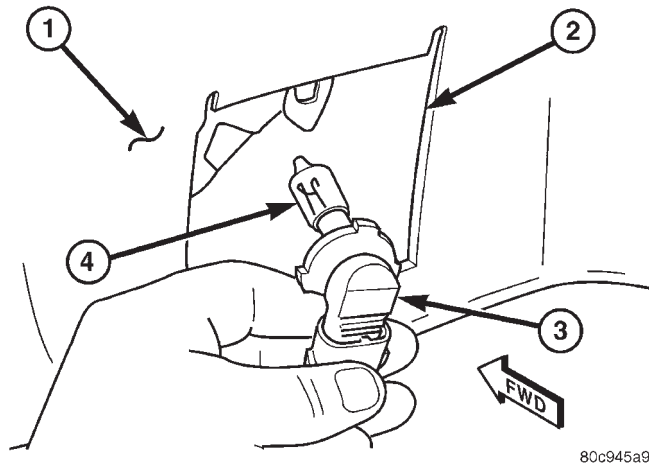
FRONT FOG LAMP BULB

REMOVAL

- (1) Turn the front wheels full lock in the direction of the fog lamp bulb that is to be changed.
- (2) Disconnect and isolate the battery negative cable.
- (3) Reach into the front wheel opening to unsnap and lift the cover over the access hole at the front of the front wheelhouse splash shield (Fig. 10).
- (4) Reach through the access hole and firmly grasp the socket on the back of the front fog lamp unit housing.
- (5) Rotate the socket on the back of the front fog lamp unit housing counterclockwise about 30 degrees.

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.

FRONT FOG LAMP BULB (Continued)



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Fig. 10 Front Fog Lamp Bulb Remove/Install

- 1 - FRONT WHEELHOUSE SPLASH SHIELD
- 2 - ACCESS HOLE
- 3 - SOCKET
- 4 - BULB

(6) Pull the socket and bulb straight out of the front fog lamp unit housing and through the access hole into the front wheel opening area.

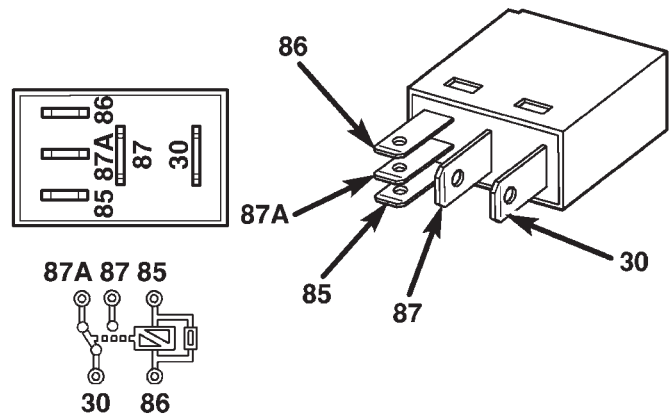
(7) Pull the bulb straight out of the front fog lamp unit socket.

INSTALLATION

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 and/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) Align the base of the bulb with the receptacle in the front fog lamp unit socket.
- (2) Push the bulb straight into the front fog lamp unit socket until it is firmly seated.
- (3) Position the socket and bulb through the access hole in the front wheelhouse splash shield and align it with the socket opening on the back of the front fog lamp unit housing (Fig. 10).
- (4) Push the socket and bulb straight into the front fog lamp unit housing until it is firmly seated.
- (5) Rotate the socket on the back of the front fog lamp unit housing clockwise about 30 degrees.
- (6) Lower and snap shut the access cover over the hole at the front of the front wheelhouse splash shield.
- (7) Reconnect the battery negative cable.

FRONT FOG LAMP RELAY**DESCRIPTION**

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Fig. 11 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

The front fog lamp relay is located in the Junction Block (JB) on the driver side outboard end of the instrument panel in the passenger compartment of the vehicle. The front fog lamp relay is a conventional International Standards Organization (ISO) micro relay (Fig. 11). Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions. The relay is contained within a small, rectangular, molded plastic housing and is connected to all of the required inputs and outputs by five integral male spade-type terminals that extend from the bottom of the relay base.

The front fog lamp relay cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

OPERATION

The front fog lamp relay is an electromechanical switch that uses a low current input from the Body Control Module (BCM) to control a high current output to the front fog lamps. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact

FRONT FOG LAMP RELAY (Continued)

point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The front fog lamp relay terminals are connected to the vehicle electrical system through a connector receptacle in the Junction Block (JB). The inputs and outputs of the front fog lamp relay include:

- **Common Feed Terminal** - The common feed terminal (30) receives battery current at all times from a fuse in the JB through a fused B(+) circuit.
- **Coil Ground Terminal** - The coil ground terminal (85) is connected to a control output of the premium Body Control Module (BCM) through a front fog lamp relay control circuit. The BCM controls front fog lamp operation by controlling a ground path through this circuit.
- **Coil Battery Terminal** - The coil battery terminal (86) receives battery current at all times from a fuse in the JB through a fused B(+) circuit.
- **Normally Open Terminal** - The normally open terminal (87) is connected to the front fog lamps through a front fog lamp relay output circuit and provides battery current to the front fog lamps whenever the relay is energized.
- **Normally Closed Terminal** - The normally closed terminal (87A) is not connected in this application.

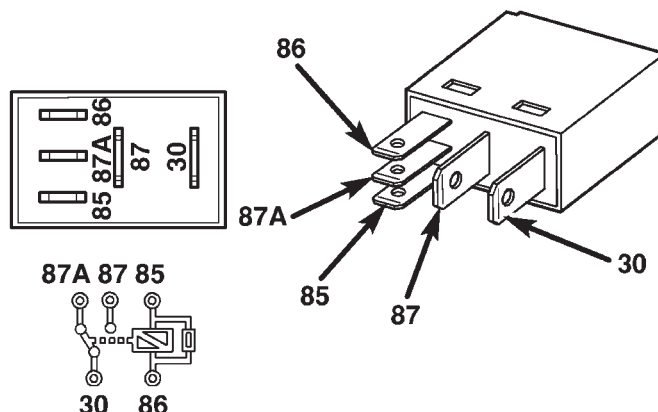
The front fog lamp relay can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - FRONT FOG LAMP RELAY

The front fog lamp relay (Fig. 12) is located in the Junction Block (JB) under the driver side outboard end of the instrument panel. 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.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACI-

TOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.



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Fig. 12 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

(1) Remove the front fog lamp relay from the JB. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/FRONT FOG LAMP RELAY - REMOVAL).

(2) 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 Step 3. If not OK, replace the faulty relay.

(3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 8 ohms. If OK, go to Step 4. If not OK, replace the faulty relay.

(4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, reinstall the relay and use a DRBIII® scan tool to perform further testing. Refer to the appropriate diagnostic information.

FRONT FOG LAMP RELAY (Continued)

REMOVAL

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(1) Disconnect and isolate the battery negative cable.

(2) Remove the steering column opening cover from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - REMOVAL).

(3) Remove the front fog lamp relay by grasping it firmly and pulling it straight out from the receptacle in the Junction Block (JB) (Fig. 13).

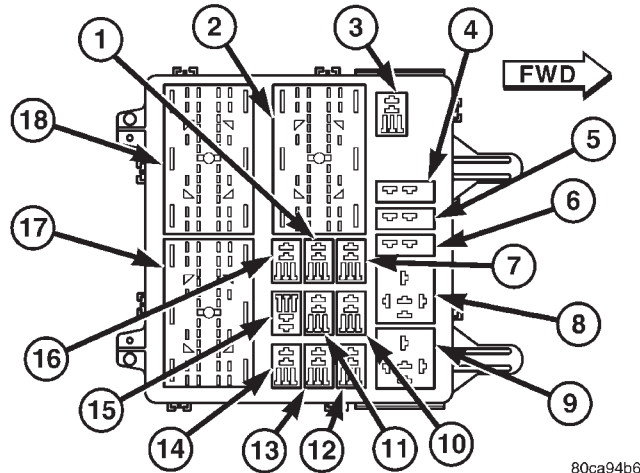
INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the front fog lamp relay to the proper receptacle in the Junction Block (JB) (Fig. 13).

(2) Align the front fog lamp relay terminals with the terminal cavities in the JB receptacle.

(3) Push firmly and evenly on the top of the front fog lamp relay until the terminals are fully seated in the terminal cavities in the JB receptacle.



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Fig. 13 Junction Block - Inboard Side (LHD Shown - Rotate 180° for RHD)

- 1 - PASSENGER DOOR UNLOCK RELAY
- 2 - JB C3 CONNECTOR RECEPTACLE
- 3 - LOW BEAM RELAY
- 4 - CIRCUIT BREAKER #1
- 5 - CIRCUIT BREAKER #2
- 6 - CIRCUIT BREAKER #3
- 7 - DOOR LOCK RELAY
- 8 - DEFOGGER RELAY
- 9 - SPARE
- 10 - FRONT FOG LAMP RELAY
- 11 - HORN RELAY
- 12 - SPARE
- 13 - SPARE
- 14 - REAR FOG LAMP RELAY
- 15 - PARK LAMP RELAY
- 16 - DRIVER DOOR UNLOCK RELAY
- 17 - JB C1 CONNECTOR RECEPTACLE
- 18 - JB C2 CONNECTOR RECEPTACLE

(4) Reinstall the steering column opening cover onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - INSTALLATION).

(5) Reconnect the battery negative cable.

FRONT FOG LAMP UNIT

REMOVAL

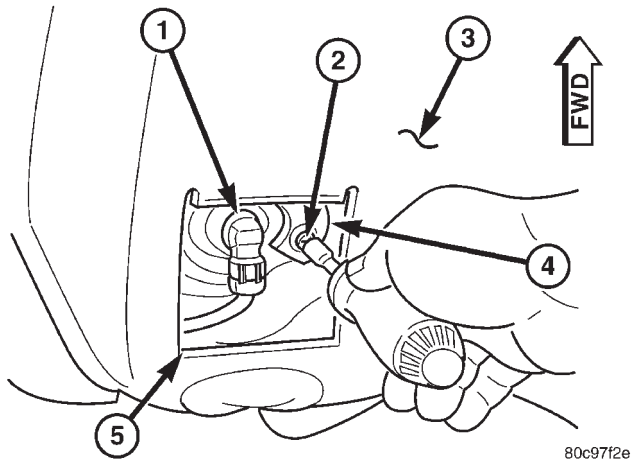
(1) Turn the front wheels full lock in the direction of the fog lamp bulb that is to be changed.

(2) Disconnect and isolate the battery negative cable.

(3) Reach into the front wheel opening to unsnap and lift the cover over the access hole at the front of the front wheelhouse splash shield (Fig. 14).

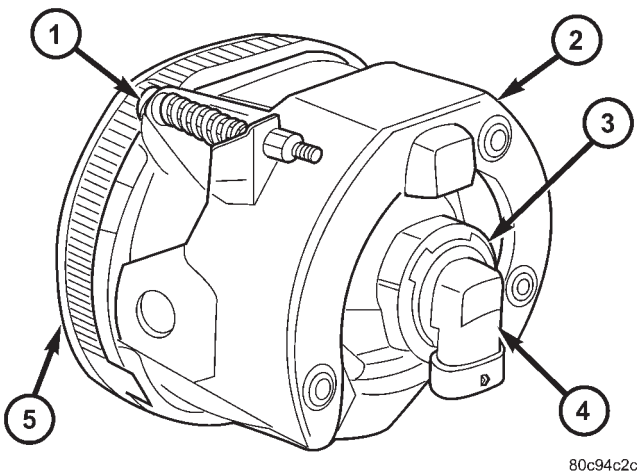
(4) Reach through the access hole to remove the three screws that secure the front fog lamp unit to the front bumper fascia.

FRONT FOG LAMP UNIT (Continued)

**Fig. 14 Front Fog Lamp Unit Remove/Install**

- 1 - FRONT FOG LAMP UNIT
- 2 - SCREW (3)
- 3 - FRONT WHEELHOUSE SPLASH SHIELD
- 4 - FRONT BUMPER FASCIA
- 5 - ACCESS HOLE

(5) From the front of the vehicle, pull the front fog lamp unit out of the front bumper fascia far enough to access and disconnect the wire harness connector for the front fog lamp unit from the lamp socket connector receptacle (Fig. 15).

**Fig. 15 Front Fog Lamp Unit**

- 1 - ADJUSTING SCREW
- 2 - MOUNTING BRACKET
- 3 - HOUSING
- 4 - SOCKET & BULB
- 5 - LENS

(6) Remove the front fog lamp unit from the front bumper fascia.

INSTALLATION

(1) Position the front fog lamp unit to the front bumper fascia.

(2) Reconnect the wire harness connector for the front fog lamp to the lamp socket connector receptacle (Fig. 15).

(3) Position the front fog lamp unit into the front bumper fascia.

(4) Reach into the front wheel opening and through the access hole to install and tighten the three screws that secure the front fog lamp unit housing to the front bumper fascia (Fig. 14). Tighten the screws to 3 N·m (25 in. lbs.).

(5) Lower and snap shut the cover over the access hole at the front of the front wheelhouse splash shield.

(6) Reconnect the battery negative cable.

(7) Confirm proper front fog lamp unit alignment. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/FRONT FOG LAMP UNIT - ADJUSTMENTS).

ADJUSTMENTS**ADJUSTMENT - FRONT FOG LAMP UNIT****VEHICLE PREPARATION FOR FOG LAMP ALIGNMENT**

(1) Repair or replace any faulty or damaged components that could hinder proper lamp alignment.

(2) Verify proper tire inflation.

(3) Clean the front fog lamp lenses.

(4) Verify that the cargo area is not heavily loaded.

(5) 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.

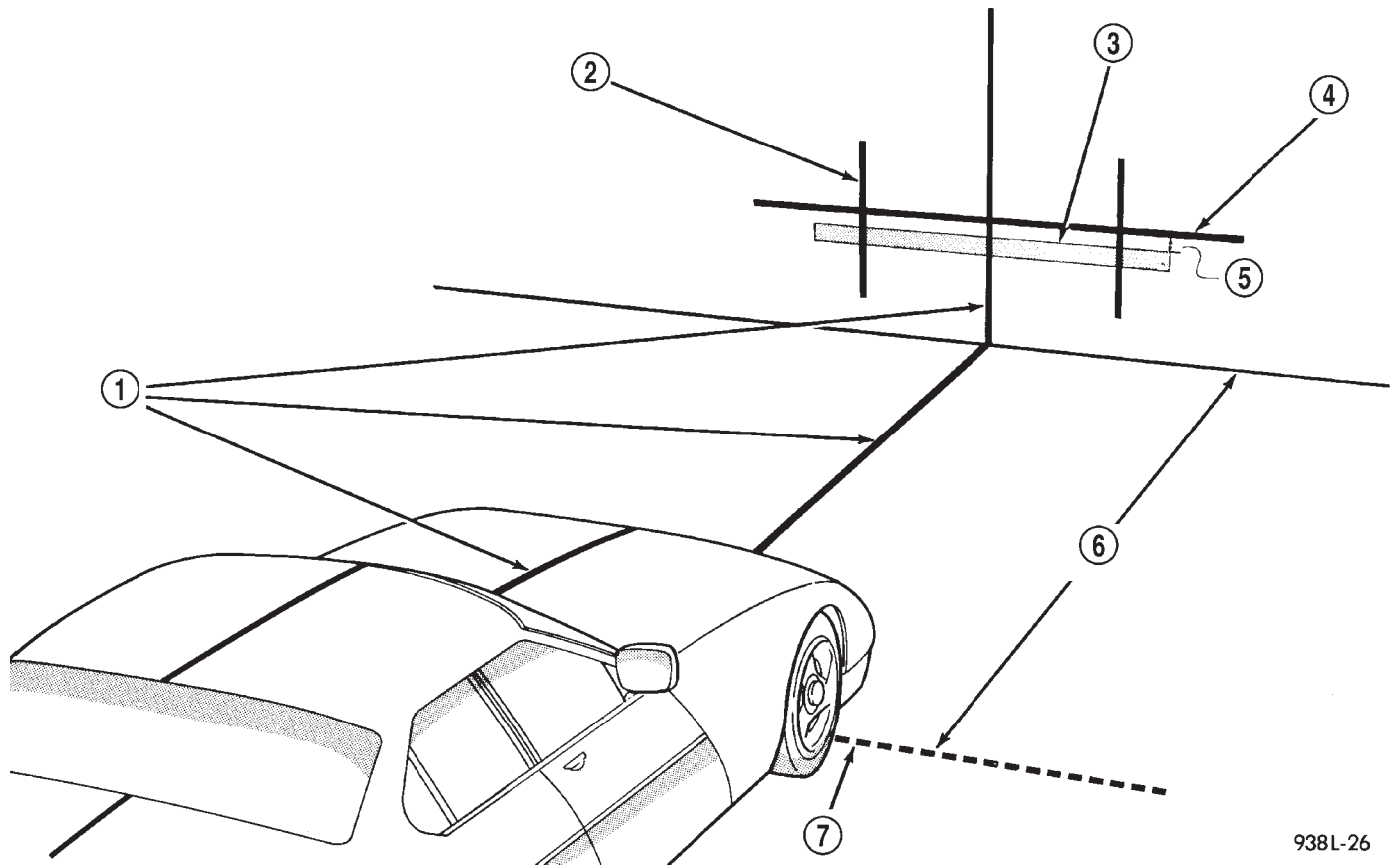
FOG LAMP ALIGNMENT

Prepare an alignment screen as illustrated. A properly aligned 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.

(1) Position the vehicle on a level surface perpendicular to a flat wall 7.62 meters (25 feet) away from the front of the front fog lamp lens (Fig. 16). If necessary, tape a line on the floor 7.62 meters (25 feet) away from and parallel to the wall.

(2) Measure up on the wall 1.27 meters (5 feet) from the floor and tape a vertical line on the alignment screen at the centerline of the vehicle. Sight along the centerline of the vehicle (from the rear of the vehicle forward) to verify the accuracy of the centerline placement.

FRONT FOG LAMP UNIT (Continued)



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Fig. 16 Front Fog Lamp Alignment - Typical

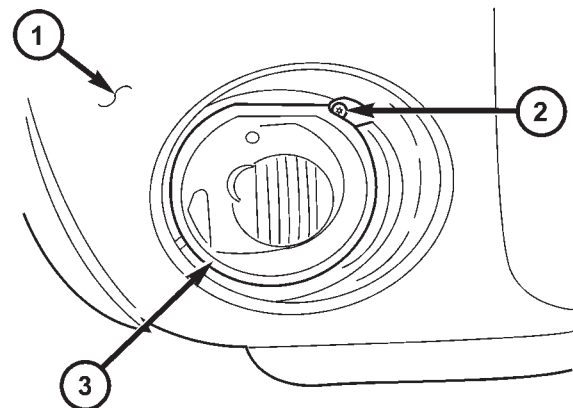
- 1 - VEHICLE CENTERLINE
- 2 - CENTER OF VEHICLE TO CENTER OF FOG LAMP LENS
- 3 - HIGH-INTENSITY AREA
- 4 - FLOOR TO CENTER OF FOG LAMP LENS

- 5 - 100 MILLIMETERS (4 INCHES)
- 6 - 7.62 METERS (25 FEET)
- 7 - FRONT OF FOG LAMP

(3) Rock the vehicle from side-to-side three times to allow the suspension to stabilize, then jounce the front suspension three times by pushing downward on the front bumper and releasing. Measure the distance from the center of the front fog lamp lens to the floor. Transfer this measurement to the alignment screen and tape a horizontal line on the wall at this mark. This line will be used for up-and-down adjustment reference.

(4) Measure the distance from the centerline of the vehicle to the center of each front fog lamp being aligned. Transfer these measurements to the alignment screen and tape a vertical line this distance to each side of the vehicle centerline. These lines will be used for left/right reference.

(5) Rotate the front fog lamp adjusting screws to adjust the beam height as required (Fig. 17).



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Fig. 17 Front Fog Lamp Adjusting Screw

- 1 - FRONT BUMPER FASCIA
- 2 - ADJUSTING SCREW
- 3 - FRONT FOG LAMP UNIT

FRONT LAMP BULB

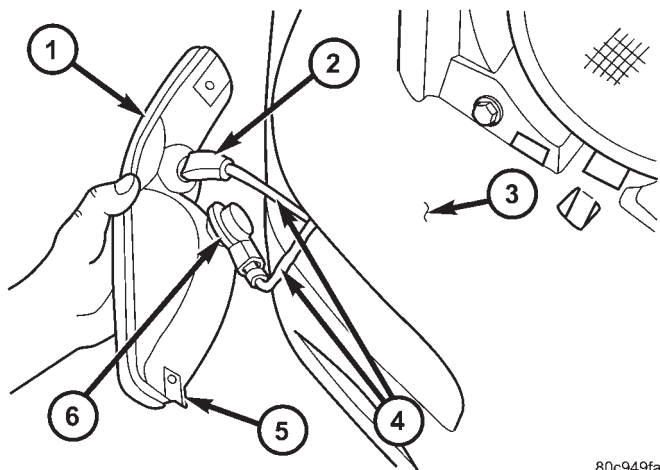
REMOVAL

The front lamp unit may contain either one or two bulbs, depending upon the market for which the vehicle was manufactured. The service procedures for one bulb or for both bulbs is the same, only the bulb sizes and types may differ. Be certain any removed bulb is replaced with the same bulb size and type that was removed.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the front lamp unit from the front bumper fascia. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/FRONT LAMP UNIT - REMOVAL).

(3) Firmly grasp the socket on the back of the front lamp unit housing for the bulb that is being removed (Fig. 18).



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Fig. 18 Front Lamp Bulb Remove/Install

- 1 - FRONT LAMP UNIT
- 2 - SIDE MARKER SOCKET
- 3 - FRONT FASCIA
- 4 - HEADLAMP & DASH WIRE HARNESS
- 5 - MOUNTING TAB
- 6 - PARK/TURN SIGNAL SOCKET

(4) Rotate the socket on the back of the front lamp unit housing counterclockwise about 30 degrees.

(5) Pull the socket and bulb straight out of the back of the front lamp unit housing.

(6) Pull the bulb straight out of the front lamp unit socket.

INSTALLATION

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 and/or the lamp wiring.

(1) Align the base of the bulb with the receptacle in the front lamp unit socket.

(2) Push the bulb straight into the front lamp unit socket until it is firmly seated.

(3) Align the socket and bulb with the socket opening on the back of the front lamp unit housing (Fig. 18).

(4) Push the socket and bulb straight into the front lamp unit housing until it is firmly seated.

(5) Rotate the socket on the back of the front lamp unit housing clockwise about 30 degrees.

(6) Reinstall the front lamp unit into the front bumper fascia. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/FRONT LAMP UNIT - INSTALLATION).

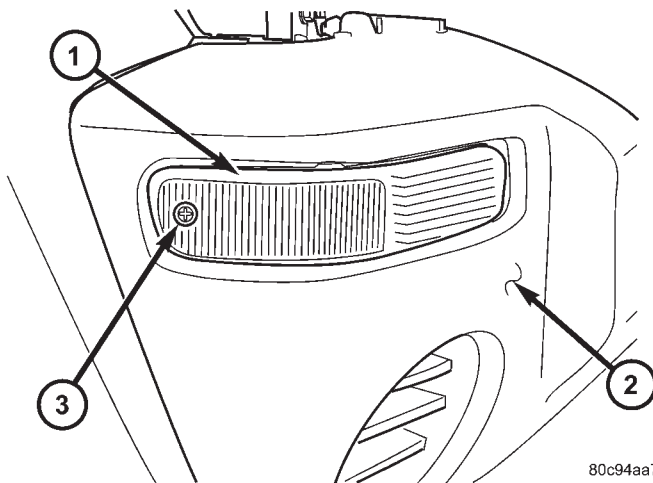
(7) Reconnect the battery negative cable.

FRONT LAMP UNIT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the screw that secures the outboard end of the front lamp unit to the front bumper fascia (Fig. 19).



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Fig. 19 Front Lamp Unit Remove/Install

- 1 - FRONT LAMP UNIT
- 2 - FRONT BUMPER FASCIA
- 3 - SCREW (1)

(3) Pull the outboard end of the front lamp unit away from the front bumper fascia far enough to disengage the tab on the inboard end of the front lamp unit housing from the receptacle in the fascia.

(4) Pull the front lamp unit away from the front bumper fascia far enough to access and disconnect the wire harness connector(s) for the front lamp unit from the lamp socket pigtail wire(s).

(5) Remove the front lamp unit from the front bumper fascia.

FRONT LAMP UNIT (Continued)

INSTALLATION

(1) Position the front lamp unit to the front bumper fascia.

(2) Reconnect the wire harness connector(s) for the front lamp unit to the lamp socket pigtail wire(s).

(3) Engage the tab on the inboard end of the front lamp unit housing into the receptacle in the front bumper fascia.

(4) Position the outboard end of the front lamp unit housing to the front bumper fascia.

(5) Install and tighten the screw that secures the outboard end of the front lamp unit housing to the front bumper fascia (Fig. 19). Tighten the screw to 2 N·m (20 in. lbs.).

(6) Reconnect the battery negative cable.

FRONT POSITION LAMP BULB

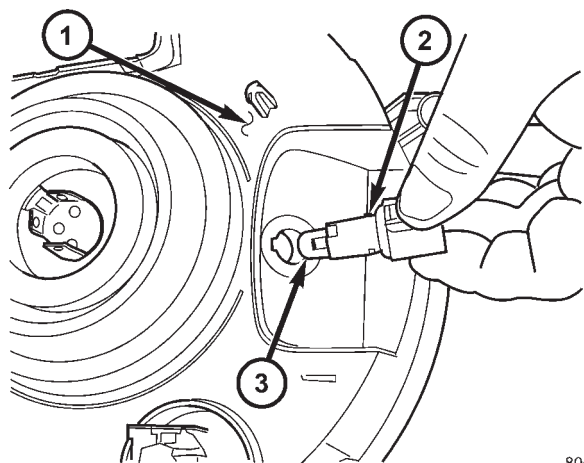
REMOVAL

The front position lamps are integral to the headlamp units on vehicles manufactured for certain markets where these lamps are required.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the headlamp unit from the front grille opening reinforcement. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).

(3) Rotate the front position lamp socket near the bottom of the headlamp unit housing counterclockwise about 30 degrees (Fig. 20).



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Fig. 20 Front Position Lamp Bulb Remove/Install

- 1 - HEADLAMP HOUSING
- 2 - SOCKET
- 3 - BULB

(4) Pull the socket and bulb straight out of the headlamp unit housing.

(5) Pull the bulb straight out of the front position lamp socket.

INSTALLATION

The front position lamps are integral to the headlamp units on vehicles manufactured for certain markets where these lamps are required.

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 and/or the lamp wiring.

(1) Align the base of the bulb with the receptacle in the front position lamp socket.

(2) Push the bulb straight into the front position lamp socket until it is firmly seated.

(3) Align the socket and bulb with the socket opening near the bottom of the headlamp unit housing (Fig. 20).

(4) Push the socket and bulb straight into the headlamp unit housing until it is firmly seated.

(5) Rotate the front position lamp socket near the bottom of the headlamp unit housing clockwise about 30 degrees.

(6) Reinstall the headlamp unit onto the grille opening reinforcement. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).

(7) Reconnect the battery negative cable.

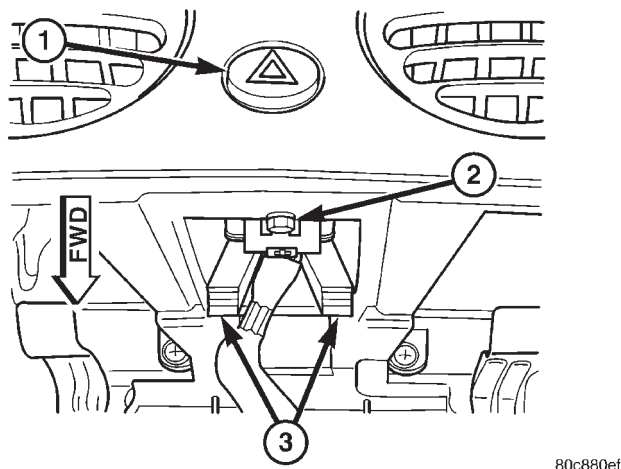
(8) Confirm proper headlamp unit alignment. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - ADJUSTMENTS).

HAZARD SWITCH

DESCRIPTION

The hazard switch is integral to the hazard switch module, which is secured near the center of instrument panel just above the radio (Fig. 21). Only the hazard switch button is visible through a dedicated, round, beveled opening on the outer surface of the instrument panel between the two center panel outlets of the heater and air conditioning system. A red, stencil-like International Control and Display Symbol icon for "Hazard Warning" identifies the hazard switch button. On the opposite end of the black, molded plastic hazard switch module housing from the switch button is an integral connector receptacle and a stamped steel mounting bracket with two latch feature tabs that extend downward, while a short dowel-like alignment pin is integral to each side of the housing just below the switch button. The switch module is connected to the vehicle electrical system through a dedicated take out and connector of the instrument panel wire harness. Within the hazard

HAZARD SWITCH (Continued)

**Fig. 21 Hazard Switch**

- 1 - HAZARD SWITCH BUTTON
- 2 - SCREW (1)
- 3 - MOUNTING BRACKET TABS

switch module housing is the hazard switch circuitry and an electronic circuit board with the integral combination flasher circuitry. The electronic combination flasher circuitry performs both the hazard flasher and turn signal flasher functions.

The hazard switch module cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

OPERATION

The hazard switch button is slightly recessed in the instrument panel when the switch is in the Off position, and latches at a position that is flush with the outer surface of the instrument panel when in the On position. The hazard switch module produces an audible clicking sound that emulates the sound of a conventional flasher whenever the turn signals or the hazard warning system are activated. The hazard switch module receives battery current on a fused B(+) circuit from a fuse in the Junction Block (JB) at all times for operation of the hazard warning, and on a fused ignition switch output (run) circuit from another fuse in the JB whenever the ignition switch is in the On position for operation of the turn signals. The module receives a path to ground through a splice block located in the instrument panel wire harness with an eyelet terminal connector that is secured by a nut to a ground stud on the driver side instrument panel end bracket near the JB. Inputs to and outputs from the hazard switch module include:

- **Panel Lamps Dimmer Input** - A non-serviceable incandescent bulb soldered onto the hazard switch module circuit board provides illumination of the switch button when the exterior lighting is turned On through an input received on the fused

panel lamps dimmer switch signal circuit. However, this bulb flashes on and off at full intensity whenever the hazard switch button is in the On position, regardless of the status of the exterior lighting.

- **Hazard Switch Input** - The combination flasher circuitry of the hazard switch module receives an internal ground input from the hazard switch to request hazard flasher operation.

- **Multi-Function Switch Input** - The combination flasher circuitry of the hazard switch module receives separate ground inputs from the turn signal switch circuitry of the multi-function switch on right and left turn switch sense circuits to request right or left turn signal flasher operation.

- **Body Control Module Input** - The Body Control Module (BCM) can request hazard flasher operation by providing a ground path to the combination flasher circuitry of the hazard switch module through a hazard lamp control circuit.

- **Turn Signal Output** - The combination flasher circuitry within the hazard switch module responds to the flasher request inputs by energizing and de-energizing two miniature relays on the module circuit board. These relays control the switch output through the right and left turn signal circuits. One relay controls the right lamps, while the other controls the left.

Because of active electronic elements within the hazard switch module, it cannot be tested with conventional automotive electrical test equipment. If the hazard switch module is believed to be faulty, replace the switch with a known good unit to confirm system operation.

REMOVAL

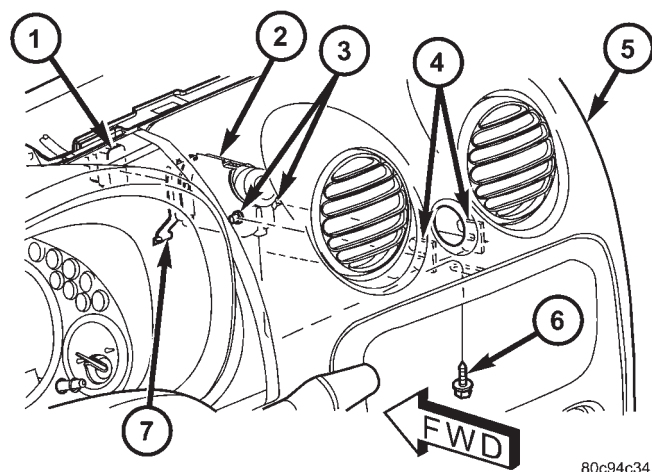
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Disconnect and isolate the battery negative cable.

HAZARD SWITCH (Continued)

(2) Remove the radio from the instrument panel. (Refer to 8 - ELECTRICAL/AUDIO/RADIO - REMOVAL).

(3) Remove the screw at the top of the instrument panel radio opening that secures the hazard switch to the instrument panel trim (Fig. 22).



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Fig. 22 Hazard Switch Remove/Install

- 1 - WIRE HARNESS CONNECTOR
- 2 - HAZARD SWITCH
- 3 - ALIGNMENT PIN (2)
- 4 - STANCHION (2)
- 5 - INSTRUMENT PANEL
- 6 - SCREW (1)
- 7 - MOUNTING BRACKET LATCH TAB (2)

(4) Reach through and above the instrument panel radio opening to access the two latch tabs of the stamped metal hazard switch mounting bracket.

(5) Using two fingertips, pull rearward and downward on the latch tabs on the back of the hazard switch until it is disengaged from the instrument panel trim.

(6) Push the hazard switch button through the button opening of the instrument panel far enough to disengage the alignment pins on each side of the switch housing from the saddle formations of the two stanchions on the back of the instrument panel trim, just below and to either side of the button opening.

(7) Disconnect the instrument panel wire harness connector for the hazard switch from the switch connector receptacle.

(8) Remove the hazard switch through the instrument panel radio opening.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG,

PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the hazard switch through the instrument panel radio opening.

(2) Reconnect the instrument panel wire harness connector for the hazard switch to the switch connector receptacle.

(3) Reach through and above the instrument panel radio opening to position the hazard switch for installation.

(4) Guide the hazard switch button through the button opening of the instrument panel, which will engage the alignment pins on each side of the switch housing with the saddle formations of the two stanchions on the back of the instrument panel trim, just below and to either side of the button opening.

(5) Using hand pressure, press upward on the back of the hazard switch until the latch tabs of the mounting bracket on the back of the switch are both engaged with the instrument panel trim (Fig. 22).

(6) Install and tighten the screw at the top of the instrument panel radio opening that secures the hazard switch to the instrument panel trim. Tighten the screw to 2 N·m (17 in. lbs.).

(7) Reinstall the radio into the instrument panel. (Refer to 8 - ELECTRICAL/AUDIO/RADIO - INSTALLATION).

(8) Reconnect the battery negative cable.

HEADLAMP BULB

REMOVAL

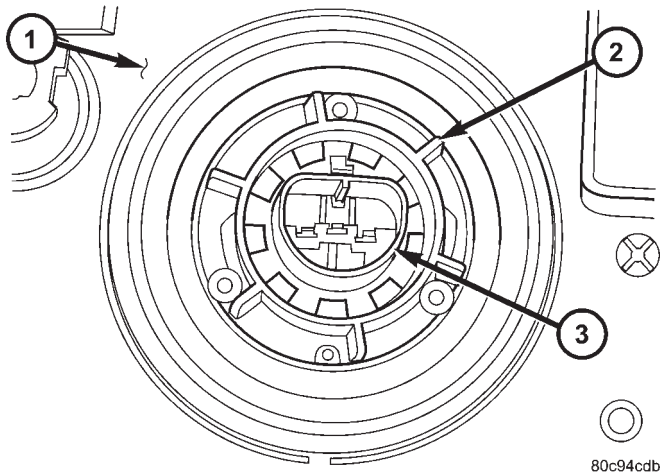
NORTH AMERICA

(1) Disconnect and isolate the battery negative cable.

(2) Reach behind the headlamp unit from the engine compartment side of the upper radiator cross-member to access the headlamp bulb lock ring (Fig. 23).

(3) Firmly grasp the lock ring on the back of the headlamp unit housing.

HEADLAMP BULB (Continued)

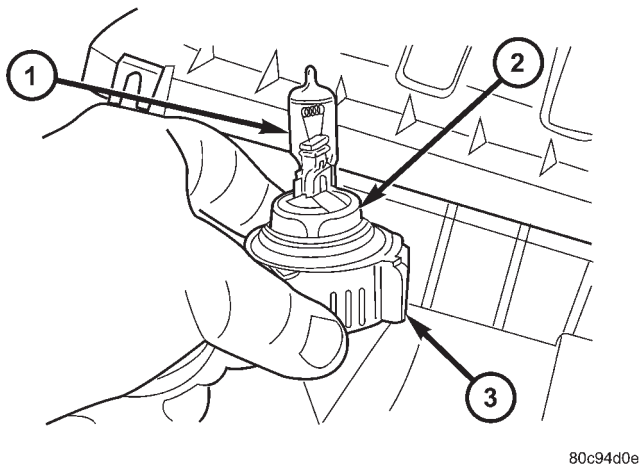
**Fig. 23 Headlamp Bulb Lock Ring**

- 1 - HEADLAMP UNIT HOUSING
2 - LOCK RING
3 - SOCKET & BULB

(4) Rotate the lock ring on the back of the headlamp unit housing counterclockwise about 30 degrees.

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.

(5) Pull the lock ring, socket, and bulb straight out of the headlamp unit housing and up from behind the upper radiator crossmember (Fig. 24).

**Fig. 24 Headlamp Bulb Remove/Install**

- 1 - HEADLAMP BULB
2 - SOCKET
3 - LOCK RING

(6) Disconnect the grille opening reinforcement wire harness connector for the headlamp bulb from the connector receptacle on the bulb socket.

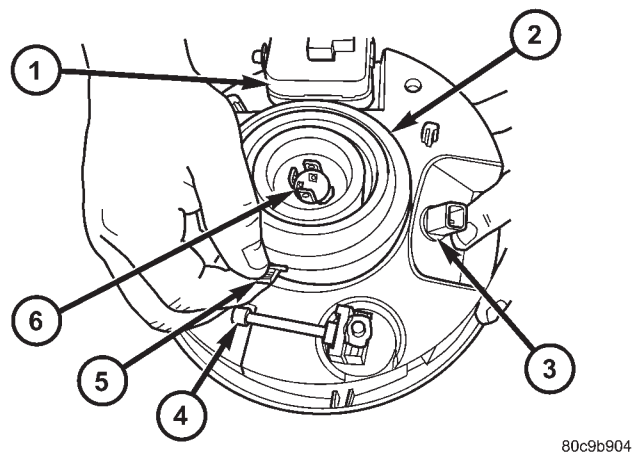
(7) Remove the bulb and bulb socket from the lock ring as a unit.

REST-OF-WORLD

(1) Disconnect and isolate the battery negative cable.

(2) Remove the headlamp unit from the grille opening reinforcement. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).

(3) Firmly grasp the tab of the headlamp boot seal on the back of the headlamp unit housing (Fig. 25).

**Fig. 25 Headlamp Bulb Boot Seal Remove**

- 1 - LEVELING MOTOR (IF EQUIPPED)
2 - BOOT SEAL
3 - FRONT POSITION LAMP
4 - ADJUSTING SCREW
5 - TAB
6 - BULB BASE

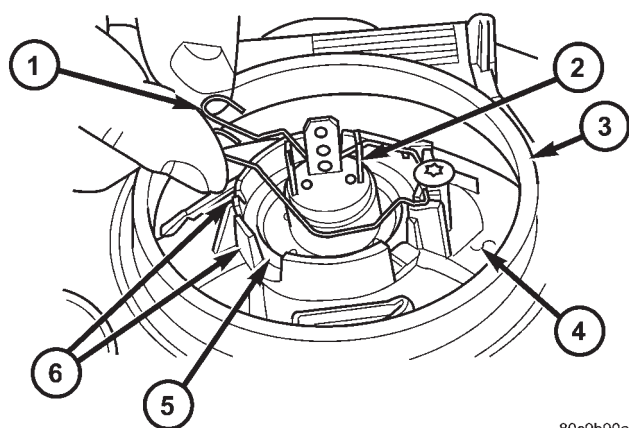
(4) Pull the tab away from the back of the headlamp unit housing to remove the boot seal from the housing and the bulb base.

(5) Pinch the two hooked ends of the wire headlamp bulb retainer clip together and disengage them from the slots in the flange of the reflector (Fig. 26).

(6) Pivot the headlamp bulb retainer clip up off of the bulb flange and out of the way.

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.

HEADLAMP BULB (Continued)

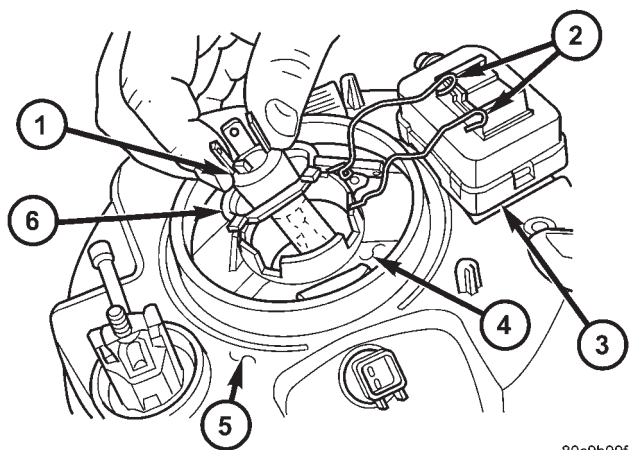


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Fig. 26 Headlamp Bulb Retainer Clip Engage/Disengage

- 1 - RETAINER CLIP
- 2 - BULB BASE
- 3 - HEADLAMP HOUSING
- 4 - REFLECTOR
- 5 - BULB FLANGE
- 6 - RETAINER SLOTS

(7) Pull the bulb straight out of the headlamp unit reflector (Fig. 27).



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Fig. 27 Headlamp Bulb Remove/Install

- 1 - BULB BASE
- 2 - RETAINER CLIP
- 3 - LEVELING MOTOR (IF EQUIPPED)
- 4 - REFLECTOR
- 5 - HEADLAMP HOUSING
- 6 - BULB FLANGE

INSTALLATION

NORTH AMERICA

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 and/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 and socket unit into the lock ring (Fig. 24).

(2) Reconnect the grille opening reinforcement wire harness connector for the headlamp bulb to the connector receptacle on the bulb socket.

(3) Position the lock ring, socket, and bulb down behind the upper radiator crossmember and align them with the socket opening on the back of the headlamp unit housing.

(4) Push the socket and bulb straight into the headlamp unit housing until they are firmly seated.

(5) Position the lock ring over the socket and engage it with the flange on the back of the headlamp unit housing (Fig. 23).

(6) Rotate the lock ring on the back of the headlamp unit housing clockwise about 30 degrees.

(7) Reconnect the battery negative cable.

REST-OF-WORLD

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 and/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 bulb into the headlamp unit reflector (Fig. 27).

(2) Pivot the headlamp bulb retainer clip back over the bulb flange.

(3) Pinch the two hooked ends of the wire headlamp bulb retainer clip together and engage them into the slots in the flange of the reflector (Fig. 26).

(4) Position the center opening of the boot seal over the base of the headlamp bulb and pull it downward until the seal is fully engaged over the bulb base (Fig. 25).

HEADLAMP BULB (Continued)

(5) Position the outer circumference of the boot seal over the flange on the back of the headlamp unit housing and pull it downward until the seal is fully engaged over the flange.

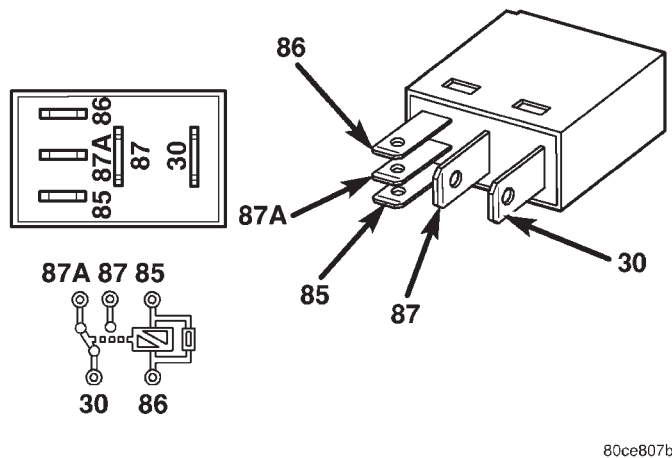
(6) Reinstall the headlamp unit onto the grille opening reinforcement. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).

(7) Reconnect the battery negative cable.

(8) Confirm proper headlamp unit alignment. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - ADJUSTMENTS).

HEADLAMP HIGH BEAM RELAY

DESCRIPTION



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Fig. 28 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

The headlamp high beam relay is located in the Junction Block (JB) on the driver side outboard end of the instrument panel in the passenger compartment of the vehicle. The headlamp high beam relay is omitted from vehicles manufactured for sale in Canada, which have a Daytime Running Lamp (DRL) solid state relay installed in the JB that also performs the function of the headlamp high beam relay. The headlamp high beam relay is a conventional International Standards Organization (ISO) micro relay (Fig. 28). Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions. The relay is contained within a small, rectangular,

molded plastic housing and is connected to all of the required inputs and outputs by five integral male spade-type terminals that extend from the bottom of the relay base.

The headlamp high beam relay cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

OPERATION

The headlamp high beam relay is an electromechanical switch that uses a low current input from the Body Control Module (BCM) to control a high current output to the headlamp high beam filaments. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The headlamp high beam relay terminals are connected to the vehicle electrical system through a connector receptacle in the Junction Block (JB). The inputs and outputs of the headlamp high beam relay include:

- **Common Feed Terminal** - The common feed terminal (30) receives battery current at all times from a fuse in the Power Distribution Center (PDC) through a fused B(+) circuit.
- **Coil Ground Terminal** - The coil ground terminal (85) is connected to a control output of the Body Control Module (BCM) through a head lamp relay control circuit. The BCM controls head lamp operation by controlling a ground path through this circuit.
- **Coil Battery Terminal** - The coil battery terminal (86) is connected to a control output of the Body Control Module (BCM) and to the momentary optical horn (flash-to-pass) output of the multi-function switch through a high beam relay control circuit. The BCM and/or the multi-function switch controls headlamp high beam operation by controlling a ground path through this circuit.
- **Normally Open Terminal** - The normally open terminal (87) is connected to the headlamp high beam filaments through the high beam relay output circuit and provides battery current to the headlamp high beams whenever the relay is energized.

HEADLAMP HIGH BEAM RELAY (Continued)

• **Normally Closed Terminal** - The normally closed terminal (87A) is not connected in this application.

The headlamp high beam relay can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - HEADLAMP HIGH BEAM RELAY

The headlamp high beam relay (Fig. 29) is located in the Junction Block (JB) on the driver side out-board end of the instrument panel. 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.

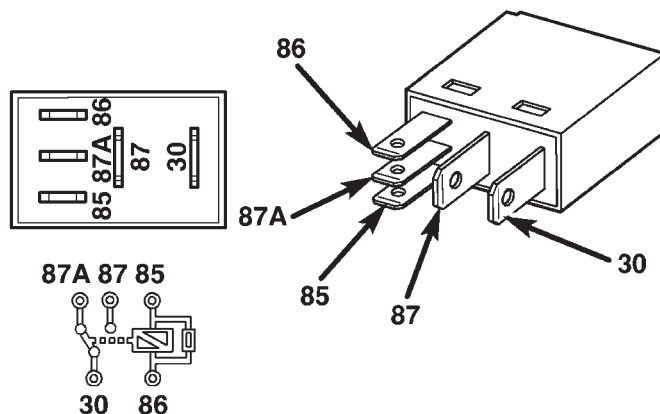
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Remove the headlamp high beam relay from the JB. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP HIGH BEAM RELAY - REMOVAL).

(2) 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 Step 3. If not OK, replace the faulty relay.

(3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 8 ohms. If OK, go to Step 4. If not OK, replace the faulty relay.

(4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, reinstall the relay and use a DRBIII® scan tool to perform further testing. Refer to the appropriate diagnostic information.



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Fig. 29 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the end cap from the driver side out-board end of the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - REMOVAL).

(3) Remove the headlamp high beam relay by grasping it firmly and pulling it straight out from the receptacle in the Junction Block (JB) (Fig. 30).

HEADLAMP HIGH BEAM RELAY (Continued)

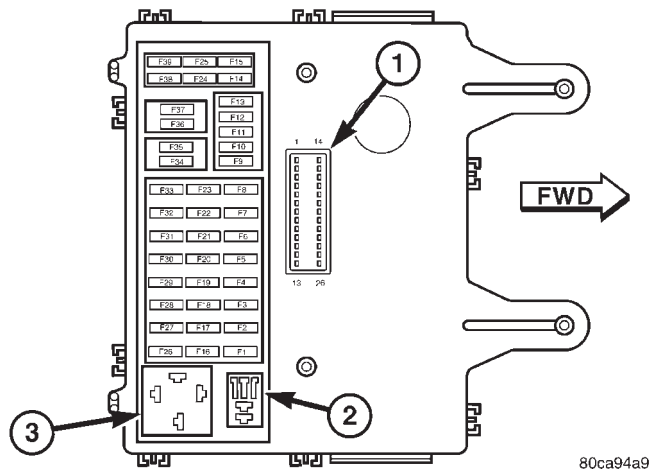


Fig. 30 Junction Block - Outboard Side (RHD Shown - Rotate 180° for LHD)

- 1 - JB/BCM CONNECTOR
- 2 - HIGH BEAM RELAY
- 3 - DRL RELAY

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Position the headlamp high beam relay to the proper receptacle in the Junction Block (JB) (Fig. 30).
- (2) Align the headlamp high beam relay terminals with the terminal cavities in the JB receptacle.
- (3) Push firmly and evenly on the top of the headlamp high beam relay until the terminals are fully seated in the terminal cavities in the JB receptacle.
- (4) Reinstall the end cap onto the driver side outboard end of the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - INSTALLATION).
- (5) Reconnect the battery negative cable.

HEADLAMP LEVELING MOTOR

DESCRIPTION

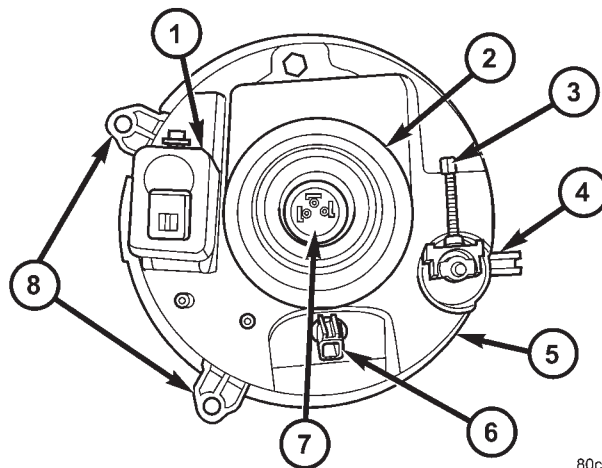


Fig. 31 Headlamp Unit - With Leveling

- 1 - LEVELING MOTOR (IF EQUIPPED)
- 2 - BOOT SEAL
- 3 - ADJUSTING SCREW
- 4 - LOCATOR TAB
- 5 - HOUSING
- 6 - FRONT POSITION LAMP SOCKET & BULB
- 7 - HEADLAMP BULB
- 8 - MOUNTING TAB (2)

The headlamp leveling motor is located on the rear inboard side of each headlamp unit on models equipped with the headlamp leveling system, which is available only in certain markets where required (Fig. 31). The motor is encased within a molded plastic housing and is secured by an integral wedge-type mounting boss on its forward surface to a flanged receptacle on the back of the headlamp unit housing. A rubber seal around the circumference of the mounting boss is compressed and seals the motor to the headlamp unit when the boss is properly installed in the flanged receptacle. The outside of the motor housing features an integral molded connector receptacle on its rearward surface, a hex-headed adjusting screw extends from the top of the housing, and a plastic pushrod with a ball formation on its free end extends from the center of the mounting boss at the front. 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 fascia wire harness.

The headlamp leveling motor cannot be repaired and, if faulty or damaged, the unit must be replaced.

HEADLAMP LEVELING MOTOR (Continued)

OPERATION

The controller board and logic circuitry of the headlamp leveling motor will energize the motor and extend or retract the motor pushrod through the integral screw-drive transmission based upon the voltage signal input received from the resistor multiplexed headlamp leveling switch. The ball formation on the end of the headlamp leveling motor pushrod is snapped into a socket formation on the back of the movable reflector within the headlamp unit housing. The headlamp leveling motors and switch have a path to ground at all times. The headlamp leveling components operate on battery current received through the fused park lamp relay output circuit so that the system will only operate when the exterior lighting is turned On.

Because of active electronic elements within the headlamp leveling motor, it cannot be tested with conventional automotive electrical test equipment. If the headlamp leveling motor is believed to be faulty, replace the motor with a known good unit to confirm system operation.

REMOVAL

The headlamp leveling motors are integral to the headlamp units on vehicles manufactured for certain markets where headlamp leveling is required.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the headlamp bulb from the headlamp unit housing. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP BULB - REMOVAL).

(3) Rotate the headlamp leveling motor on the back of the headlamp unit housing counterclockwise about 30 degrees (Fig. 32).

(4) Firmly grasp the motor with one hand while stabilizing the headlamp unit housing with the other hand.

(5) Firmly, steadily, and forcefully pull the headlamp leveling motor straight away from the back of the headlamp unit housing to unsnap the ball formation on the end of the motor pushrod from the socket on the headlamp unit reflector (Fig. 33).

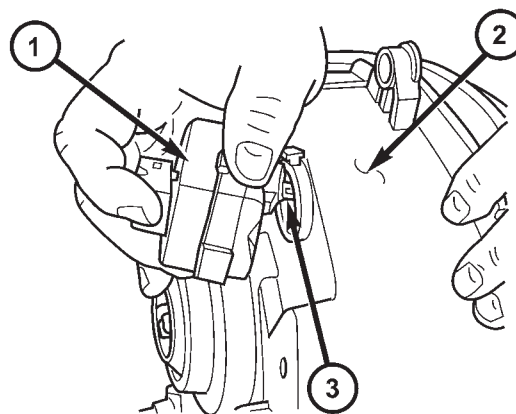
(6) Remove the headlamp leveling motor and pushrod from the back of the headlamp unit housing.

INSTALLATION

The headlamp leveling motors are integral to the headlamp units on vehicles manufactured for certain markets where headlamp leveling is required.

(1) Position the headlamp leveling motor and pushrod from the mounting hole on the back of the headlamp unit housing.

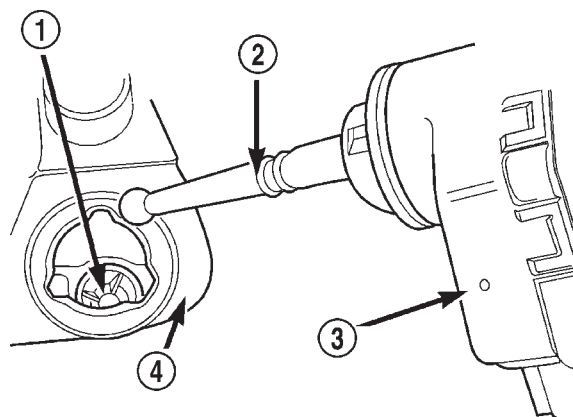
(2) Insert two fingers through the bulb mounting hole in the center of the headlamp reflector and pull



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Fig. 32 Headlamp Leveling Motor Remove/Install

- 1 - LEVELING MOTOR
- 2 - HEADLAMP HOUSING
- 3 - PUSHROD



80a47176

Fig. 33 Leveling Motor Pushrod - Typical

- 1 - REFLECTOR PUSHROD SOCKET
- 2 - PUSHROD
- 3 - LEVELING MOTOR
- 4 - HEADLAMP HOUSING

the reflector upwards toward the headlamp leveling motor.

(3) Align the ball formation on the end of the leveling motor pushrod with the socket on the headlamp unit reflector (Fig. 33).

(4) While continuing to pulling the reflector toward the motor, firmly, steadily, and forcefully push the headlamp leveling motor straight into the back of the headlamp unit housing to snap the ball formation on the end of the motor pushrod into the socket on the headlamp unit reflector.

(5) After the pushrod is engaged to the reflector, remove your fingers from the bulb mounting hole in

HEADLAMP LEVELING MOTOR (Continued)

the center of the headlamp reflector and thoroughly clean any fingerprints from the reflector.

(6) Push the mounting flange of the headlamp leveling motor into the mounting hole on the back of headlamp unit housing until the motor is firmly seated (Fig. 32).

(7) Rotate the headlamp leveling motor on the back of the headlamp unit housing clockwise about 30 degrees.

(8) Reinstall the headlamp bulb into the headlamp unit housing. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP BULB - INSTALLATION).

(9) Reconnect the battery negative cable.

HEADLAMP LEVELING SWITCH

DESCRIPTION

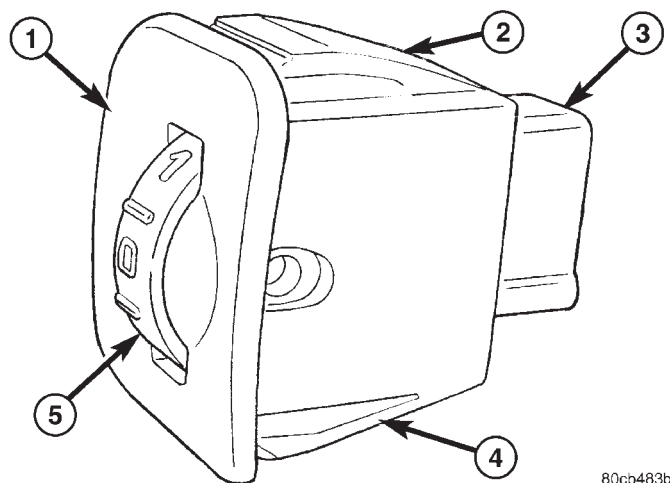


Fig. 34 Headlamp Leveling Switch

- 1 - SWITCH
- 2 - UPPER LATCH FEATURE (1)
- 3 - CONNECTOR RECEPTACLE
- 4 - LOWER LATCH FEATURE (2)
- 5 - THUMBWHEEL

The headlamp leveling switch (Fig. 34) is used only on vehicles manufactured for certain markets where the headlamp leveling system is required. The headlamp leveling switch is mounted in the driver side inboard trim bezel on the instrument panel, where it is secured by molded latch features that are integral to the switch housing. Only the switch bezel and thumbwheel are visible on the outer surface of the instrument panel trim bezel. The black plastic switch thumbwheel is marked with white numbers "0," "1," "2," and "3," each of which indicates one of the four switch detent positions. Each higher number repre-

sents a lower aiming position of the headlamp beam relative to the road surface. The black, molded plastic switch housing has an integral connector receptacle on the back, a single latch feature on the top, and two latch features (one on each side) on the bottom. The switch is connected to the vehicle electrical system through a dedicated take out and connector of the instrument panel wire harness. Within the switch housing is the leveling switch circuitry including the switch contacts and a series resistor configuration.

The headlamp leveling switch cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

OPERATION

The headlamp leveling switch receives battery current on a fused park lamp relay output circuit from a fuse in the Junction Block (JB) whenever the park lamp relay is energized (park lamps are turned On). The switch receives a path to ground through a splice block located in the instrument panel wire harness with an eyelet terminal connector that is secured by a nut to a ground stud on the driver side instrument panel end bracket near the JB. The only output from the switch is a voltage signal that it provides to the headlamp leveling motors on a headlamp adjust signal circuit. Each switch position selects a different tap on a series resistor within the switch to provide a different voltage signal to the leveling motors. The higher the switch position number, the higher the output voltage level.

The headlamp leveling switch can be tested using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - HEADLAMP LEVELING SWITCH

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

HEADLAMP LEVELING SWITCH (Continued)

- (1) Disconnect and isolate the battery negative cable. Disconnect the instrument panel wire harness connector for the headlamp leveling switch from the switch connector receptacle.
- (2) Using an ohmmeter, perform the resistance tests at the terminal pins in the headlamp leveling switch connector receptacle (Fig. 35) as shown in the Headlamp Leveling Switch Tests table.

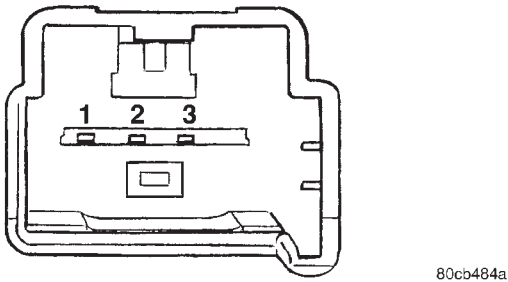


Fig. 35 Headlamp Leveling Switch Connector Receptacle

HEADLAMP LEVELING SWITCH TESTS	
SWITCH POSITION	RESISTANCE (OHMS) BETWEEN PINS 1 & 3
0	0.5 ± 0.5
1	301 ± 1
2	595 ± 1
3	739 ± 1

- (3) If the switch fails any of the resistance tests, replace the faulty headlamp leveling switch as required.

REMOVAL

The headlamp leveling switch is used only on vehicles manufactured for certain markets where headlamp leveling is required.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the driver side inboard bezel from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL DRIVER SIDE BEZEL - REMOVAL).
- (3) Disconnect the instrument panel wire harness connector for the headlamp leveling switch from the switch connector receptacle (Fig. 36).

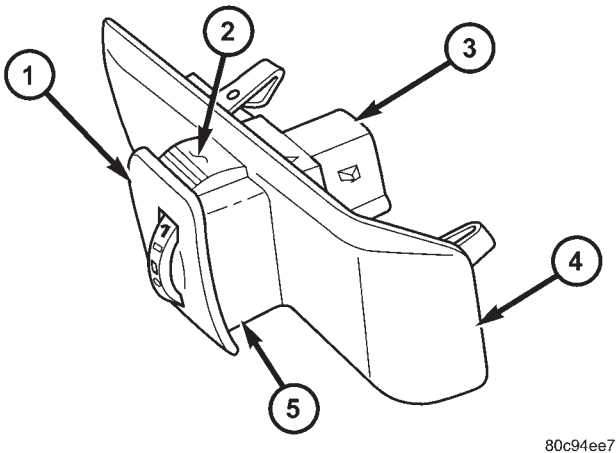


Fig. 36 Headlamp Leveling Switch Remove/Install

- 1 - HEADLAMP LEVELING SWITCH
2 - UPPER LATCH TAB
3 - RECEPTACLE
4 - DRIVER SIDE INBOARD BEZEL
5 - LOWER LATCH TAB (2)

- (4) From the back of the trim bezel, depress the two lower latch features on the headlamp leveling switch housing and rock the bottom of the switch out through the face of the bezel.
- (5) From the back of the trim bezel, depress the upper latch feature on the headlamp leveling switch housing and push the switch out through the face of the bezel.

INSTALLATION

The headlamp leveling switch is used only on vehicles manufactured for certain markets where headlamp leveling is required.

HEADLAMP LEVELING SWITCH (Continued)

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) From the face of the driver side inboard bezel, align the headlamp leveling switch housing to the mounting hole in the bezel (Fig. 36).

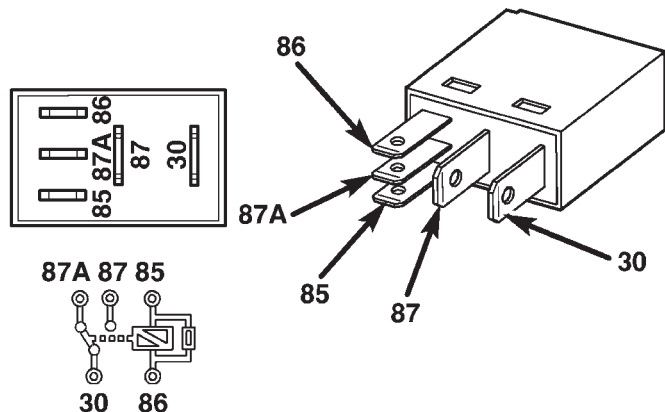
(2) Push the headlamp leveling switch into the mounting hole until it is fully seated and the upper latch and two lower latch features on the switch housing are engaged on the back of the bezel.

(3) Position the switch and bezel unit to the instrument panel.

(4) Reconnect the instrument panel wire harness connector for the headlamp leveling switch to the switch connector receptacle.

(5) Reinstall the driver side inboard bezel onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL DRIVER SIDE BEZEL - INSTALLATION).

(6) Reconnect the battery negative cable.



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Fig. 37 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

OPERATION

The headlamp low beam relay is an electromechanical switch that uses a low current input from the Body Control Module (BCM) to control a high current output to the headlamp low beam filaments. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The headlamp low beam relay terminals are connected to the vehicle electrical system through a connector receptacle in the Junction Block (JB). The inputs and outputs of the headlamp low beam relay include:

- **Common Feed Terminal** - The common feed terminal (30) receives battery current at all times from a fuse in the Power Distribution Center (PDC) through a fused B(+) circuit.
- **Coil Ground Terminal** - The coil ground terminal (85) receives battery current at all times from a fuse in the PDC through a fused B(+) circuit.

HEADLAMP LOW BEAM RELAY

DESCRIPTION

The headlamp low beam relay is located in the Junction Block (JB) below the driver side outboard end of the instrument panel in the passenger compartment of the vehicle. The headlamp low beam relay is a conventional International Standards Organization (ISO) micro relay (Fig. 37). Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions. The relay is contained within a small, rectangular, molded plastic housing and is connected to all of the required inputs and outputs by five integral male spade-type terminals that extend from the bottom of the relay base.

The headlamp low beam relay cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

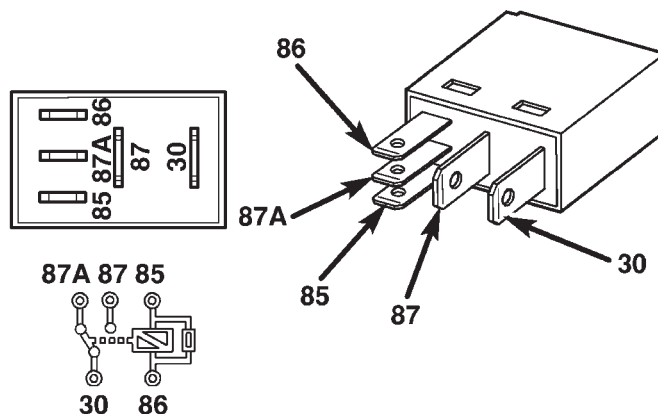
HEADLAMP LOW BEAM RELAY (Continued)

- **Coil Battery Terminal** - The coil battery terminal (86) is connected to a control output of the Body Control Module (BCM) through a low beam relay control circuit. The BCM controls headlamp low beam operation by controlling a ground path through this circuit.

- **Normally Open Terminal** - The normally open terminal (87) is connected to the headlamp low beam filaments through the low beam relay output circuit and provides battery current to the headlamp low beams whenever the relay is energized.

- **Normally Closed Terminal** - The normally closed terminal (87A) is not connected in this application.

The headlamp low beam relay can be diagnosed using conventional diagnostic tools and methods.



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DIAGNOSIS AND TESTING - HEADLAMP LOW BEAM RELAY

The headlamp low beam relay (Fig. 38) is located in the Junction Block (JB) under the driver side out-board end of the instrument panel. 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.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Remove the headlamp low beam relay from the JB. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP LOW BEAM RELAY - REMOVAL).

(2) 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 Step 3. If not OK, replace the faulty relay.

Fig. 38 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

(3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 8 ohms. If OK, go to Step 4. If not OK, replace the faulty relay.

(4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, reinstall the relay and use a DRBIII® scan tool to perform further testing. Refer to the appropriate diagnostic information.

REMOVAL

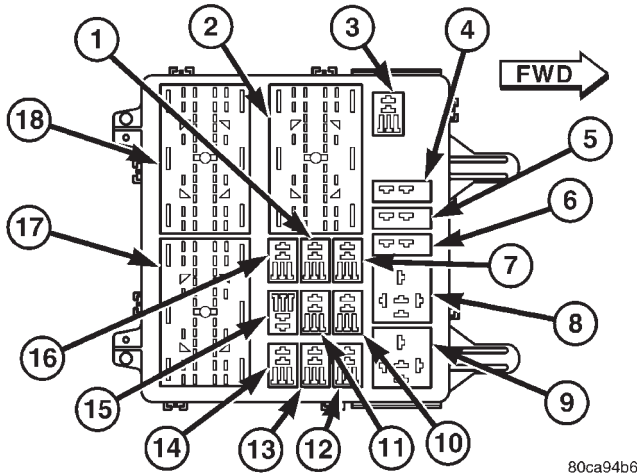
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

HEADLAMP LOW BEAM RELAY (Continued)

(2) Remove the steering column opening cover from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - REMOVAL).

(3) Remove the headlamp low beam relay by grasping it firmly and pulling it straight out from the receptacle in the Junction Block (JB) (Fig. 39).



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Fig. 39 Junction Block - Inboard Side (LHD Shown - Rotate 180° for RHD)

- 1 - PASSENGER DOOR UNLOCK RELAY
- 2 - JB C3 CONNECTOR RECEPTACLE
- 3 - LOW BEAM RELAY
- 4 - CIRCUIT BREAKER #1
- 5 - CIRCUIT BREAKER #2
- 6 - CIRCUIT BREAKER #3
- 7 - DOOR LOCK RELAY
- 8 - DEFOGGER RELAY
- 9 - SPARE
- 10 - FRONT FOG LAMP RELAY
- 11 - HORN RELAY
- 12 - SPARE
- 13 - SPARE
- 14 - REAR FOG LAMP RELAY
- 15 - PARK LAMP RELAY
- 16 - DRIVER DOOR UNLOCK RELAY
- 17 - JB C1 CONNECTOR RECEPTACLE
- 18 - JB C2 CONNECTOR RECEPTACLE

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 FUR-

THER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the headlamp low beam relay to the proper receptacle in the Junction Block (JB) (Fig. 39).

(2) Align the headlamp low beam relay terminals with the terminal cavities in the JB receptacle.

(3) Push firmly and evenly on the top of the headlamp low beam relay until the terminals are fully seated in the terminal cavities in the JB receptacle.

(4) Reinstall the steering column opening cover onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - INSTALLATION).

(5) Reconnect the battery negative cable.

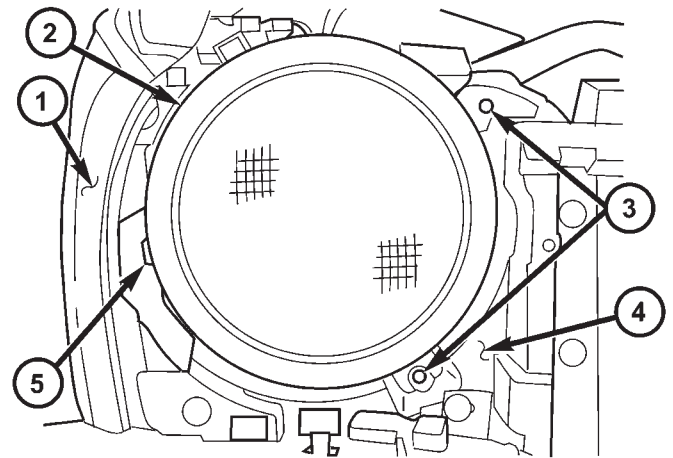
HEADLAMP UNIT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the grille panel from the grille opening reinforcement. (Refer to 23 - BODY/EXTERIOR/GRILLE - REMOVAL).

(3) Remove the two screws that secure the mounting tabs on the inboard side of the headlamp unit housing to the grille opening reinforcement (Fig. 40).



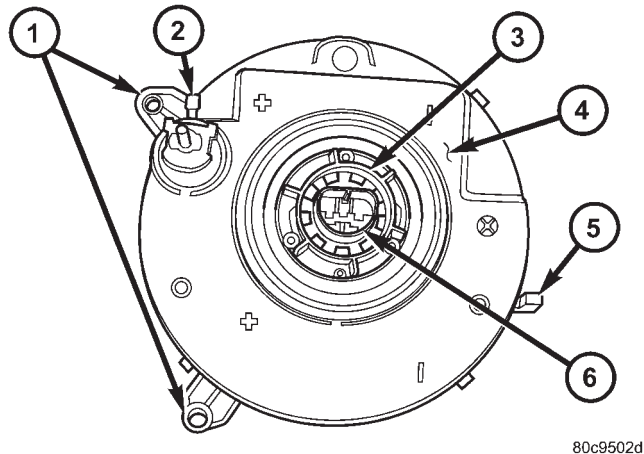
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Fig. 40 Headlamp Unit Remove/Install

- 1 - FENDER PANEL
- 2 - HEADLAMP UNIT
- 3 - MOUNTING TAB (2)
- 4 - MOUNTING PANEL
- 5 - LOCATOR TAB

HEADLAMP UNIT (Continued)

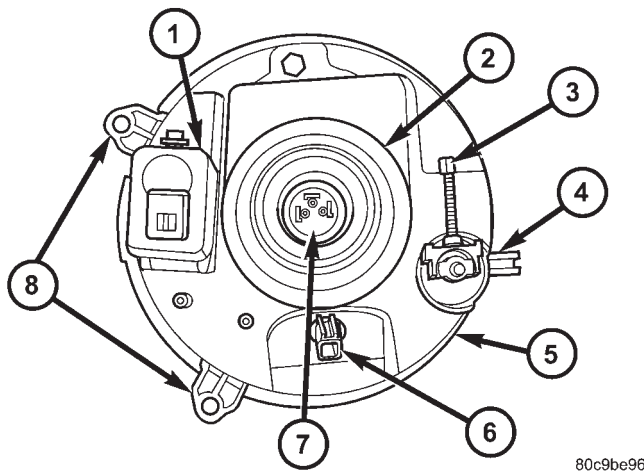
(4) Pull the inboard side of the headlamp unit away from the grille opening reinforcement far enough to disengage the locator tab on the outboard side of the unit (Fig. 41) or (Fig. 42) from the engagement slot in the outboard edge of the reinforcement.



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Fig. 41 Headlamp Unit - North America

- 1 - MOUNTING TAB (2)
- 2 - ADJUSTING SCREW
- 3 - LOCK RING
- 4 - HOUSING
- 5 - LOCATOR TAB
- 6 - SOCKET & BULB



80c9be96

Fig. 42 Headlamp Unit - Rest-Of-World

- 1 - LEVELING MOTOR (IF EQUIPPED)
- 2 - BOOT SEAL
- 3 - ADJUSTING SCREW
- 4 - LOCATOR TAB
- 5 - HOUSING
- 6 - FRONT POSITION LAMP SOCKET & BULB
- 7 - HEADLAMP BULB
- 8 - MOUNTING TAB (2)

(5) Pull the headlamp unit away from the grille opening reinforcement far enough to disconnect the wire harness connectors from the headlamp bulb socket (North America), the headlamp bulb base (Rest-Of-World), the front position lamp socket (if equipped), and the headlamp leveling motor (if equipped).

(6) Remove the headlamp unit from the grille opening reinforcement.

INSTALLATION

(1) Position the headlamp unit to the grille opening reinforcement.

(2) Reconnect the wire harness connectors to the headlamp bulb socket (North America), the headlamp bulb base (Rest-Of-World), the front position lamp socket (if equipped), and the headlamp leveling motor (if equipped) (Fig. 41) or (Fig. 42).

(3) Engage the locator tab on the outboard side of the headlamp unit into the engagement slot in the outboard edge of the grille opening reinforcement.

(4) Align the two mounting tabs on the inboard side of the headlamp unit housing to the mounting holes in the grille opening reinforcement (Fig. 40).

(5) Install and tighten the two screws that secure the mounting tabs on the inboard side of the headlamp unit housing to the grille opening reinforcement. Tighten the screws to 3 N·m (30 in. lbs.).

(6) Reinstall the grille panel onto the grille opening reinforcement. (Refer to 23 - BODY/EXTERIOR/GRILLE - INSTALLATION).

(7) Reconnect the battery negative cable.

(8) Confirm proper headlamp unit alignment. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - ADJUSTMENTS).

ADJUSTMENTS

ADJUSTMENT - HEADLAMP UNIT

VEHICLE PREPARATION FOR HEADLAMP ALIGNMENT

(1) Verify headlamp dimmer (multi-function) switch and high beam indicator operation.

(2) If the vehicle is equipped with headlamp leveling, be certain that the headlamp leveling switch is in the "0" position.

(3) Repair or replace any faulty or damaged components that could hinder proper lamp alignment.

(4) Verify proper tire inflation.

(5) Clean headlamp lenses.

(6) Verify that cargo area is not heavily loaded.

(7) 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.

HEADLAMP UNIT (Continued)

HEADLAMP ALIGNMENT SCREEN PREPARATION

Prepare an alignment screen as illustrated.

(1) Position the vehicle on a level surface perpendicular to a flat wall 7.62 meters (25 feet) away from the front of the headlamp lens for North American vehicles, or 10.0 meters (32.81 feet) away from the front of the headlamp lens for Rest-Of-World vehicles (Fig. 43). If necessary, tape a line on the floor at the appropriate distance away from and parallel to the wall.

(2) Measure up on the wall 1.27 meters (5 feet) from the floor and tape a vertical line on the alignment screen at the centerline of the vehicle. Sight along the centerline of the vehicle (from the rear of the vehicle forward) to verify the accuracy of the centerline placement.

(3) Rock the vehicle from side-to-side three times to allow the suspension to stabilize, then jounce the front suspension three times by pushing downward on the front bumper and releasing. Measure the distance from the center of the headlamp lens to the floor. Transfer this measurement to the alignment screen and tape a horizontal line on the wall at this mark. This line will be used for up-and-down adjustment reference.

(4) Measure the distance from the centerline of the vehicle to the center of each headlamp being aligned. Transfer these measurements to the alignment screen and tape a vertical line this distance to each side of the vehicle centerline. These lines will be used for left/right reference.

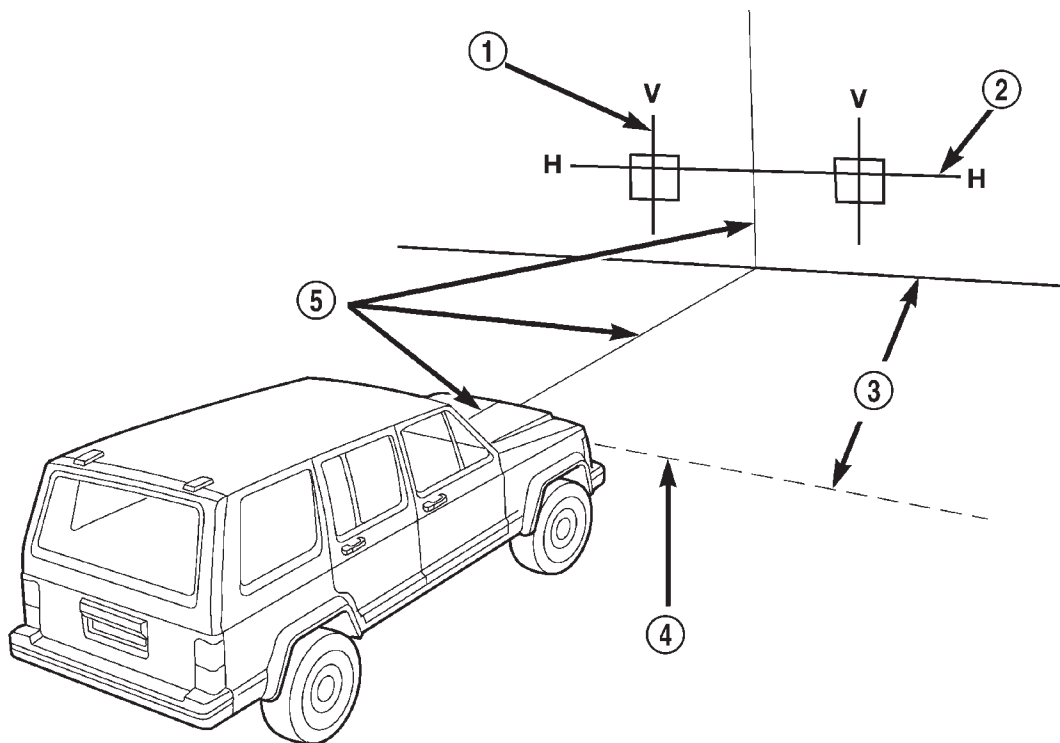
HEADLAMP ADJUSTMENT

A properly aligned headlamp will project a pattern on the alignment screen from just below horizontal to 75 millimeters (3 inches) below the headlamp centerline for vehicles in North America, or from just below horizontal to 125 millimeters (5 inches) below the headlamp horizontal centerline for vehicles in Rest-Of-World.

(1) Vehicles for all markets except Japan should have the headlamp low beams selected with the dimmer (multi-function) switch during the adjustment procedure. Vehicles for the Japanese market should have the headlamp high beams selected.

(2) Cover the lens of the headlamp that is not being adjusted.

(3) Turn the adjusting screw (Fig. 44) until the top edge of the beam intensity pattern is positioned from just below horizontal to 75 millimeters (3 inches)



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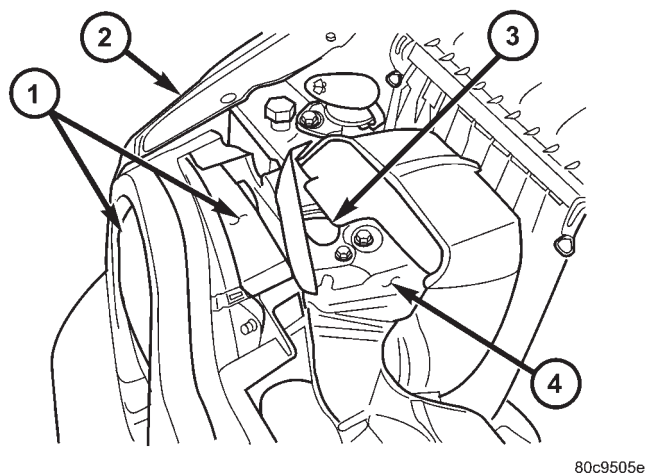
Fig. 43 Headlamp Alignment Screen - Typical

1 - CENTER OF VEHICLE TO CENTER OF HEADLAMP LENS
2 - FLOOR TO CENTER OF HEADLAMP LENS
3 - 7.62 METERS (25 FEET) NORTH AMERICA/10.0 METERS (32.81 FEET) REST-OF-WORLD

4 - FRONT OF HEADLAMP
5 - VEHICLE CENTERLINE

HEADLAMP UNIT (Continued)

below the headlamp horizontal centerline for vehicles in North America, or from just below horizontal to 125 millimeters (5 inches) below the headlamp horizontal centerline for vehicles in Rest-Of-World.



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Fig. 44 Headlamp Adjusting Screw

- 1 - HEADLAMP UNIT
- 2 - FENDER PANEL
- 3 - ADJUSTING SCREW ACCESS HOLE
- 4 - UPPER RADIATOR CROSSMEMBER

(4) Repeat the adjustment procedure for the opposite headlamp.

LICENSE PLATE LAMP BULB

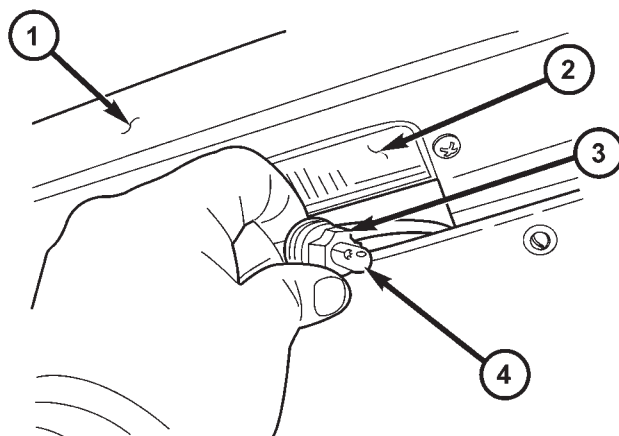
REMOVAL

NORTH AMERICA

- (1) Disconnect and isolate the battery negative cable.
- (2) Reach through the opening in the rear bumper fascia between the license plate and the lamp to access and firmly grasp the socket on the back of the license plate lamp unit housing (Fig. 45).
- (3) Pull the socket and bulb straight out of the back of the license plate lamp unit housing.
- (4) Pull the bulb straight out of the license plate lamp unit socket.

REST-OF-WORLD

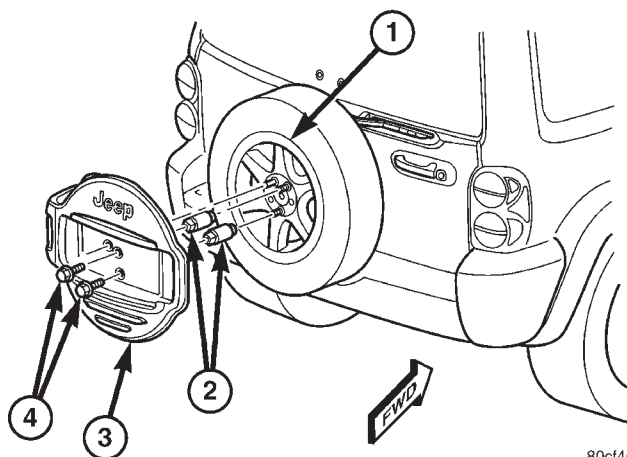
- (1) Disconnect and isolate the battery negative cable.
- (2) Unsnap and lift up the bottom of the license mounting plate far enough to access and remove the two screws that secure the license plate bracket to the special lug nuts on the spare tire (Fig. 46).
- (3) Swing the license plate bracket away from the spare tire far enough to access the license plate lamp bulb sockets.



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Fig. 45 License Plate Lamp Bulb Remove/Install - North America

- 1 - REAR BUMPER FASCIA
- 2 - LICENSE PLATE LAMP
- 3 - SOCKET
- 4 - BULB



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Fig. 46 License Plate Bracket - Rest-Of-World

- 1 - SPARE TIRE
- 2 - SPECIAL LUG NUT (2)
- 3 - LICENSE PLATE BRACKET
- 4 - SCREW (2)

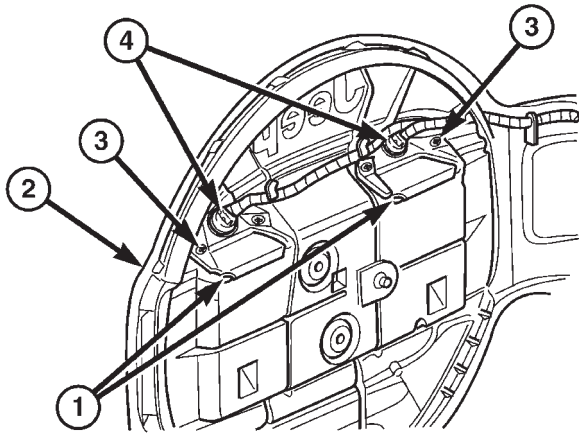
(4) Firmly grasp the socket on the top of the license plate lamp unit housing for the bulb that is being removed (Fig. 47).

(5) Rotate the socket on the top of the license plate lamp unit housing counterclockwise about 30 degrees.

(6) Pull the socket and bulb straight out of the top of the license plate lamp unit housing.

(7) Pull the bulb straight out of the license plate lamp unit socket.

LICENSE PLATE LAMP BULB (Continued)



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Fig. 47 License Plate Lamp Bulb Remove/Install - Rest-Of-World

- 1 - LAMP UNIT (2)
- 2 - LICENSE PLATE BRACKET
- 3 - SCREW (4)
- 4 - BULB & SOCKET (2)

INSTALLATION

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 and/or the lamp wiring.

NORTH AMERICA

- (1) Align the base of the bulb with the receptacle in the license plate lamp unit socket.
- (2) Push the bulb straight into the license plate lamp unit socket until it is firmly seated.
- (3) Reach through the opening in the rear bumper fascia between the license plate and the lamp to align the socket and bulb with the socket opening on the back of the lamp unit housing (Fig. 45).
- (4) Push the socket and bulb straight into the license plate lamp unit housing until it is firmly seated.
- (5) Reconnect the battery negative cable.

REST-OF-WORLD

- (1) Align the base of the bulb with the receptacle in the license plate lamp unit socket.
- (2) Push the bulb straight into the license plate lamp unit socket until it is firmly seated.
- (3) Align the socket and bulb with the socket opening on the top of the license plate lamp unit housing (Fig. 47).
- (4) Push the socket and bulb straight into the license plate lamp unit housing until it is firmly seated.

(5) Rotate the socket on the top of the license plate lamp unit housing clockwise about 30 degrees.

(6) Swing the license plate bracket back against the spare tire (Fig. 46).

(7) Lift up the bottom of the license mounting plate far enough to install and tighten the two screws that secure the license plate bracket to the special lug nuts on the spare tire. Tighten the screws to 28 N·m (21 ft. lbs.).

(8) Lower the bottom of the license mounting plate and, using hand pressure, snap it into place on the license plate bracket.

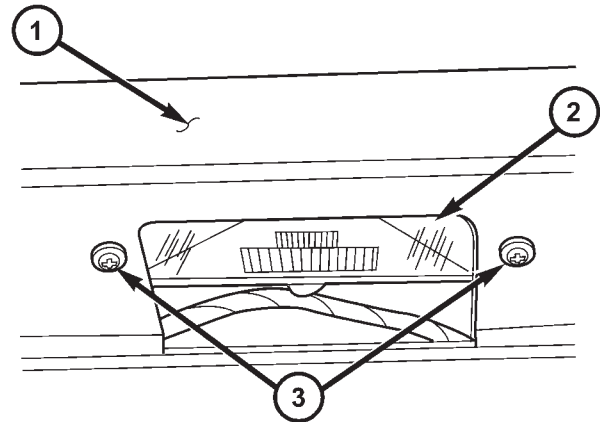
(9) Reconnect the battery negative cable.

LICENSE PLATE LAMP UNIT

REMOVAL

NORTH AMERICA

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the two screws that secure the license plate lamp unit to the rear bumper fascia (Fig. 48).



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Fig. 48 License Plate Lamp Unit Remove/Install

- 1 - REAR BUMPER FASCIA
- 2 - LICENSE PLATE LAMP UNIT
- 3 - SCREW (2)

(3) Pull the license plate lamp unit down and out through the mounting hole in the rear bumper fascia far enough to access and disconnect the wire harness connector for the lamp socket pigtail wire.

(4) Remove the license plate lamp unit from the rear bumper fascia.

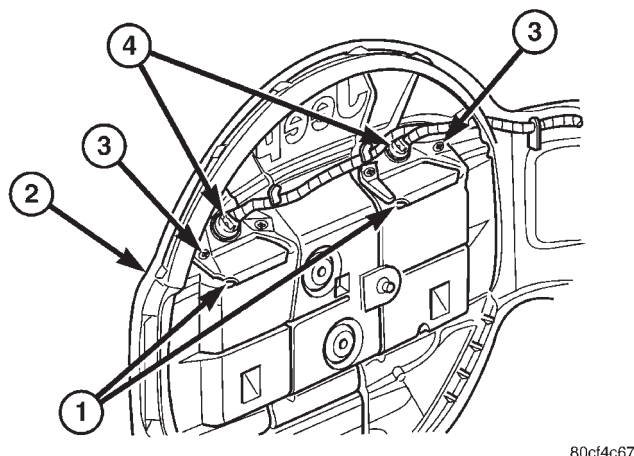
LICENSE PLATE LAMP UNIT (Continued)

REST-OF-WORLD

(1) Disconnect and isolate the battery negative cable.

(2) Remove the bulb and socket unit from the license plate lamp unit housing that is being removed. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/LICENSE PLATE LAMP BULB - REMOVAL - REST-OF-WORLD).

(3) Remove the two screws that secure the license plate lamp unit to the back of the license plate bracket (Fig. 49).



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Fig. 49 License Plate Lamp Bulb Remove/Install - Rest-Of-World

- 1 - LAMP UNIT (2)
- 2 - LICENSE PLATE BRACKET
- 3 - SCREW (4)
- 4 - BULB & SOCKET (2)

(1) Remove the license plate lamp unit from the back of the license plate bracket.

INSTALLATION

NORTH AMERICA

(1) Position the license plate lamp unit to the rear bumper fascia.

(2) Reconnect the wire harness connector for the license plate lamp unit to the lamp socket pigtail wire.

(3) Position the license plate lamp unit into the mounting hole in the rear bumper fascia (Fig. 48).

(4) Install and tighten the two screws that secure the license plate lamp unit housing to the rear bumper fascia. Tighten the screws to 2 N·m (20 in. lbs.).

(5) Reconnect the battery negative cable.

REST-OF-WORLD

(1) Position the license plate lamp unit onto the back of the license plate bracket (Fig. 49).

(2) Install and tighten the two screws that secure the license plate lamp unit to the back of the license plate bracket. Tighten the screws to 2 N·m (20 in. lbs.).

(3) Reinstall the bulb and socket unit into the license plate lamp unit housing that is being replaced. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/LICENSE PLATE LAMP BULB - INSTALLATION - REST-OF-WORLD).

(4) Reconnect the battery negative cable.

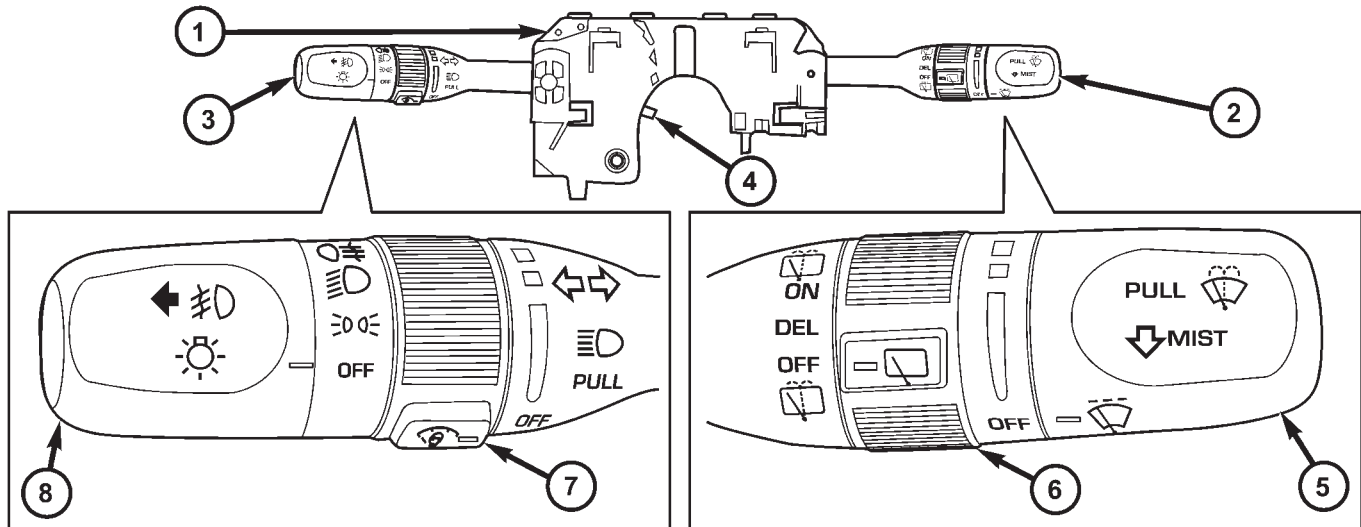
MULTI-FUNCTION SWITCH

DESCRIPTION

The multi-function switch is located on the steering column, just below the steering wheel (Fig. 50). The only visible components of the multi-function switch are two levers, or control stalks that extend through dedicated openings in each side of the steering column shrouds. The remainder of the switch, its mounting provisions, and its electrical connections are all concealed beneath the steering column shrouds. The switch housing and controls are constructed of molded black plastic. A saddle-like formation in the center of the multi-function switch housing straddles the steering column tube just below the column lock housing, and two posts integral to the lower surface of the switch housing engage two holes on the forward-facing side of the lock housing. Two integral ledge-like locating tabs near the top of the rearward facing switch housing surface are supported and located by two upright stanchions that extend upward from the top of the lock housing. Also on the rearward facing switch housing surface near the center, an integral ledge-like mounting tab rests on a similar ledge-like tab that extends from each side of the steering column lock housing. When the steering column shrouds are installed on the column, the switch mounting tabs are clamped along with the mounting tabs of the clockspring between the integral mounting stanchions of the upper shroud and the lock housing tabs, and are secured to the steering column lock housing by the same two screws that secure the two shroud halves to each other and the column.

There are several versions of the multi-function switch to support both optional equipment and equipment that is required only in certain markets. Each multi-function switch control stalk has both white nomenclature and International Control and Display Symbol graphics applied to it, which clearly identify its many functions. Each control stalk has a control

MULTI-FUNCTION SWITCH (Continued)



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Fig. 50 Multi-Function Switch

- 1 - MULTI-FUNCTION SWITCH
- 2 - RIGHT (WIPER) CONTROL STALK
- 3 - LEFT (LIGHTING) CONTROL STALK
- 4 - TURN SIGNAL CANCEL ACTUATOR

- 5 - RIGHT (WIPER) CONTROL KNOB
- 6 - RIGHT (WIPER) CONTROL RING
- 7 - LEFT (LIGHTING) CONTROL RING
- 8 - LEFT (LIGHTING) CONTROL KNOB

knob on its end with a flattened face to allow it to be easily rotated. On vehicles equipped with optional front fog lamps, the knob on the end of left control stalk can also be pulled outward to select those lamps. Each control stalk also features a knurled control ring located just below the control knob. The left control stalk is dedicated to providing driver controls for the interior and exterior lighting systems, while the right control stalk is dedicated to providing driver controls for the front and rear wiper systems. Two integral connector receptacles on the forward facing surface of the multi-function switch housing connect the switch to the vehicle electrical system through two take outs and connectors of the instrument panel wire harness. The left connector receptacle contains nine terminal pins for the lighting control circuits of the switch, while the right connector receptacle contains six terminal pins for the wiper control circuits of the switch. The multi-function switch cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

LEFT CONTROL STALK The left (lighting) control stalk of the multi-function switch supports the following functions and features:

- **Front Fog Lamps** - For vehicles so equipped, the internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide detent switching for the optional front fog lamps.
- **Headlamps** - The internal circuitry and hardware of the multi-function switch left (lighting) con-

trol stalk provide detent switching for the headlamps.

- **Headlamp Beam Selection** - The internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide detent switching for selection of the headlamp high or low beams.

- **Headlamp Optical Horn** - The internal circuitry and hardware of the multi-function switch left (lighting) 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.

- **Interior Lamps Defeat** - The internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide detent switching to defeat the illumination of all interior courtesy lamps when a door, the rear flip-up glass, or the tailgate are opened.

- **Interior Lamps On** - The internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide detent switching to simultaneously illuminate all interior courtesy lamps.

- **Panel Lamps Dimming** - The internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide simultaneous adjustable control of the illumination intensity of all instrument panel lighting at one of six available illumination intensity levels.

MULTI-FUNCTION SWITCH (Continued)

- **Parade Mode** - The internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide detent switching for a parade mode that maximizes the illumination intensity of all instrument panel lighting for visibility when driving in daylight with the exterior lamps turned on.

- **Park Lamps** - The internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide detent switching for the park lamps.

- **Rear Fog Lamps** - For vehicles so equipped, the internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide detent switching for the optional rear fog lamps. Rear fog lamps are optional only for vehicles manufactured for certain markets, where they are required.

- **Turn Signal Control** - The internal circuitry and hardware of the multi-function switch left (lighting) control stalk provide both momentary non-detent switching and detent switching with automatic cancellation for both the left and right turn signal lamps.

RIGHT CONTROL STALK The right (wiper) control stalk of the multi-function switch supports the following functions and features:

- **Continuous Front Wipe Modes** - The internal circuitry and hardware of the multi-function switch right (wiper) control stalk provide two continuous front wipe switch positions, low speed or high speed.

- **Continuous Rear Wipe Mode** - The internal circuitry and hardware of the multi-function switch right (wiper) control stalk provide one continuous rear wipe switch position.

- **Front Washer Mode** - The internal circuitry and hardware of the multi-function switch right (wiper) control stalk switch provide front washer system operation.

- **Front Wipe-After-Wash Mode** - The internal circuitry and hardware of the multi-function switch right (wiper) control stalk provide a wipe-after-wash mode.

- **Front Wiper Mist Mode** - The internal circuitry and hardware of the multi-function switch right (wiper) control stalk provide a front wiper system mist mode.

- **Intermittent Front Wipe Mode** - The internal circuitry and hardware of the multi-function switch right (wiper) control stalk provide an intermittent front wipe mode with five delay interval positions.

- **Intermittent Rear Wipe Mode** - The internal circuitry and hardware of the multi-function switch right (wiper) control stalk provide one fixed interval intermittent rear wipe mode switch position.

- **Rear Washer Mode** - The internal circuitry and hardware of the multi-function switch right (wiper) control stalk provide rear washer system operation.

OPERATION

The multi-function switch uses a combination of resistor multiplexed and conventionally switched outputs to control the many functions and features it provides. The switch receives battery current on a fused ignition switch output (run-acc) circuit from a fuse in the Junction Block (JB) whenever the ignition switch is in the On or Accessory positions. The switch receives a path to ground at all times through a splice block located in the instrument panel wire harness with an eyelet terminal connector that is secured by a nut to a ground stud on the driver side instrument panel end bracket near the Junction Block (JB). Following are descriptions of how each of the two multi-function switch control stalks operate to control the functions and features they provide.

LEFT CONTROL STALK The left (lighting) control stalk of the multi-function switch operates as follows:

- **Front Fog Lamps** - For vehicles so equipped, the control knob on the end of the multi-function switch left (lighting) control stalk is pulled outward to activate the optional front fog lamps. The control knob is mechanically keyed so that it cannot be pulled outward unless it is first rotated to turn on the exterior lighting. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a fog lamp switch sense circuit, and the BCM responds by energizing or de-energizing the front fog lamp relay in the Junction Block (JB) as required.

- **Headlamps** - The control knob on the end of the multi-function switch left (lighting) control stalk is rotated forward (counterclockwise) to its second detent position to activate the headlamps. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a headlamp switch sense circuit, and the BCM responds by energizing or de-energizing the selected low or high beam relay (Daytime Running Lamp relay in Canadian vehicles) in the Junction Block (JB) as required.

- **Headlamp Beam Selection** - The left (lighting) control stalk of the multi-function switch is pulled towards the steering wheel past a detent to actuate the integral beam select switch circuitry. Each time the control stalk is activated in this manner, the opposite headlamp beam from what is currently selected will be energized. The multi-function switch provides a ground output to the Body Control Module (BCM) on a high beam switch sense circuit, and the BCM responds by energizing or de-energizing the selected low or high beam relay (Daytime Running Lamp relay in Canadian vehicles) in the Junction Block (JB) as required.

MULTI-FUNCTION SWITCH (Continued)

- **Headlamp Optical Horn** - The left (lighting) control stalk of the multi-function switch is pulled towards the steering wheel to just before a detent, to momentarily activate the headlamp optical horn feature. The high beams will remain illuminated until the control stalk is released. The multi-function switch provides a ground output on a high beam relay control circuit to energize the headlamp high beam relay (Daytime Running Lamp relay in Canadian vehicles) in the Junction Block (JB) as required.

- **Interior Lamps Defeat** - The control ring on the multi-function switch left (lighting) control stalk is rotated to a full rearward (clockwise) detent to defeat the illumination of all interior courtesy lamps. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a panel lamps dimmer switch mux circuit, and the BCM responds by de-energizing its internal courtesy lamp driver circuit.

- **Interior Lamps On** - The control ring on the multi-function switch left (lighting) control stalk is rotated to a full forward (counterclockwise) detent to illuminate all interior courtesy lamps. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a panel lamps dimmer switch mux circuit, and the BCM responds by energizing its internal courtesy lamp driver circuit.

- **Panel Lamps Dimming** - The control ring on the multi-function switch left (lighting) control stalk is rotated to one of six minor intermediate detents to simultaneously select the desired illumination intensity of all adjustable instrument panel and instrument cluster lighting. The control ring is rotated rearward (clockwise) to dim, or forward (counterclockwise) to brighten. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a panel lamps dimmer switch mux circuit, and the BCM responds by sending an electronic panel lamps dimming level message to the ElectroMechanical Instrument Cluster (EMIC) over the Programmable Communications Interface (PCI) data bus. The EMIC electronic circuitry then provides the proper PWM output to the cluster illumination lamps and the VFD on the EMIC circuit board, then provides a matching PWM output on the hard wired fused panel lamps dimmer switch signal circuit.

- **Parade Mode** - The control ring on the multi-function switch left (lighting) control stalk is rotated to an intermediate detent that is one detent rearward (clockwise) from the full forward (counterclockwise) detent to select the Parade mode. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a panel lamps dimmer switch mux circuit, and the BCM

responds by sending an electronic panel lamps dimming level message to the ElectroMechanical Instrument Cluster (EMIC) over the Programmable Communications Interface (PCI) data bus. The EMIC electronic circuitry then provides the proper PWM output to the cluster illumination lamps and the VFD on the EMIC circuit board, then provides a matching PWM output on the hard wired fused panel lamps dimmer switch signal circuit to illuminate all lamps at full (daylight) intensity with the exterior lamps turned On.

- **Park Lamps** - The control knob on the end of the multi-function switch left (lighting) control stalk is rotated forward (counterclockwise) to its first detent from the Off position to activate the park lamps. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a headlamp switch sense circuit, and the BCM responds by energizing or de-energizing the park lamp relay in the Junction Block (JB) as required.

- **Rear Fog Lamps** - For vehicles so equipped, the control knob on the end of the multi-function switch left (lighting) control stalk is rotated forward (counterclockwise) to its third detent position to activate the rear fog lamps. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a headlamp switch sense circuit, and the BCM responds by energizing or de-energizing the rear fog lamp relay in the Junction Block (JB) as required. Rear fog lamps are optional only for vehicles manufactured for certain markets, where they are required.

- **Turn Signal Control** - The left (lighting) control stalk of the multi-function switch is moved upward to activate the right turn signal circuitry, and, downward to activate the left turn signal circuitry. The turn signal switch has a detent position in each direction that provides turn signals with automatic cancellation, and an intermediate, momentary position in each direction that provides turn signals only until the left multi-function switch control stalk is released. When the control stalk is moved to a turn signal switch detent position, the cancel actuator extends toward the center of the steering column. A turn signal cancel cam that is integral to the clockspring rotates with the steering wheel and the cam lobes contact the cancel actuator when it is extended from the left multi-function switch. When the steering wheel is rotated during a turning maneuver, one of the two 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. In other words, if the left turn signal detent is selected, the lobes of the cancel cam will ratchet past

MULTI-FUNCTION SWITCH (Continued)

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. When a turn signal is activated, the multi-function switch provides a ground output on a right or left turn switch sense circuit to the combination flasher circuitry within the hazard switch, and the combination flasher flashes the turn signal lamps.

RIGHT CONTROL STALK The right (wiper) control stalk of the multi-function switch operates as follows:

- **Continuous Front Wipe Modes** - The control knob on the end of the multi-function switch right (wiper) control stalk is rotated to an intermediate detent that is one detent rearward (counterclockwise) from the full forward (clockwise) detent to select the low speed continuous front wiper mode, or to its full forward (clockwise) detent to select the high speed continuous front wiper mode. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a front wiper switch mux circuit, and the BCM responds by energizing the wiper on/off relay in the Power Distribution Center (PDC) for the front low speed continuous wipe mode, or the wiper on/off relay and the wiper high/low relay in the PDC for the front high speed continuous wipe mode as required.

- **Continuous Rear Wipe Mode** - The control ring on the multi-function switch right (wiper) control stalk is rotated to the most forward (clockwise) detent to select the continuous rear wiper mode. The multi-function switch provides a battery current output to the rear wiper motor on a rear wiper on driver circuit to signal the rear wiper motor to operate in the continuous wipe mode.

- **Front Washer Mode** - The right (wiper) control stalk of the multi-function switch is pulled towards the steering wheel to momentarily activate the washer pump in the front washer mode. The washer pump will continue to operate in the front washer mode until the control stalk is released. The multi-function switch provides a ground output on a washer pump sense circuit, and battery current on a washer pump driver circuit to energize the washer pump in the front washer mode.

- **Front Wiper Mist Mode** - The right (wiper) control stalk of the multi-function switch is pushed towards the floor to momentarily activate the front wiper motor in the mist mode. The front wiper motor will continue to operate in the mist mode until the control stalk is released. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a front wiper switch mux

circuit, and the BCM responds by energizing the wiper on/off relay in the Power Distribution Center (PDC) to operate the front wiper motor momentarily at low speed to provide the front wiper mist mode.

- **Intermittent Front Wipe Mode** - The control knob on the end of the multi-function switch right (wiper) control stalk is rotated to one of five minor intermediate detents to select the desired intermittent front wipe delay interval. The control knob is rotated rearward (counterclockwise) to increase the delay, or forward (clockwise) to decrease the delay. The multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a front wiper switch mux circuit, and the BCM responds by energizing the wiper on/off relay in the Power Distribution Center (PDC) to operate the front wiper motor at the selected delay intervals.

- **Intermittent Rear Wipe Mode** - The control ring on the multi-function switch right (wiper) control stalk is rotated to the center detent to select the intermittent rear wiper mode. The multi-function switch provides a battery current output to the rear wiper motor on a rear wiper intermittent driver circuit to signal the rear wiper motor to operate in the intermittent wipe mode.

- **Rear Washer Mode** - The control ring on the multi-function switch right (wiper) control stalk is rotated to either the full forward (clockwise) or full rearward (counterclockwise) momentary positions to activate the washer pump in the rear washer mode. The washer pump will continue to operate in the rear washer mode until the control ring is released. The multi-function switch provides a ground output on a washer pump driver circuit, and battery current on a washer pump sense circuit to energize the washer pump in the rear washer mode.

DIAGNOSIS AND TESTING - MULTI-FUNCTION SWITCH

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.

MULTI-FUNCTION SWITCH (Continued)

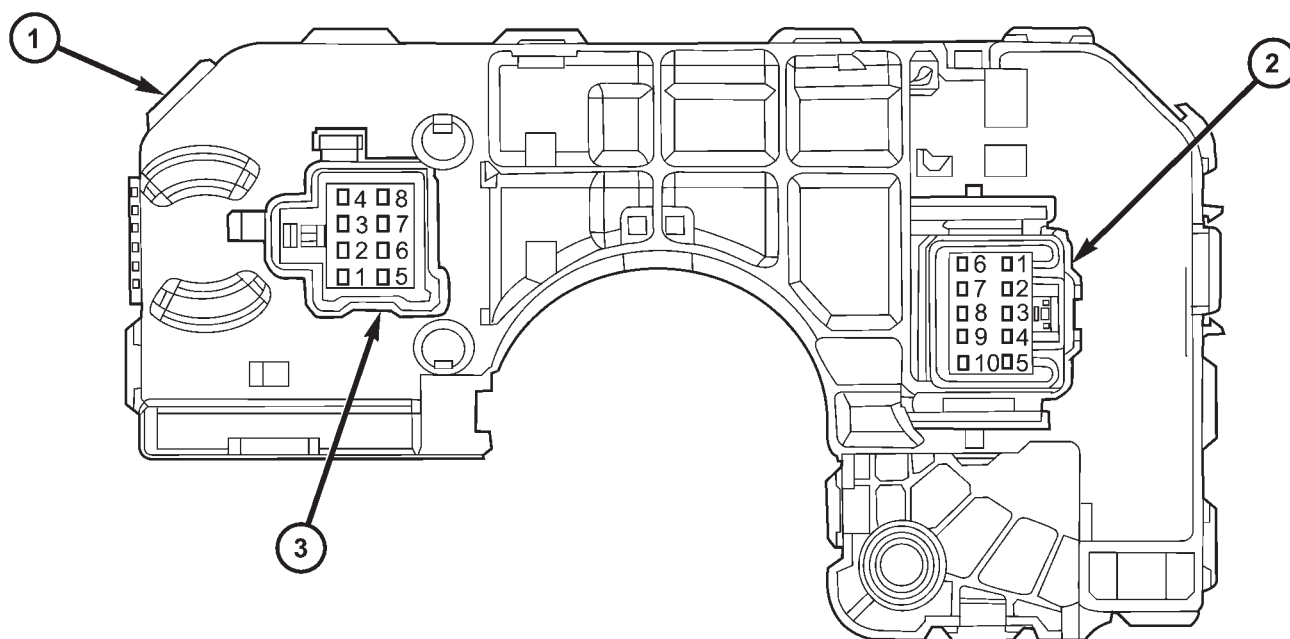
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE

PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the multi-function switch from the steering column. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/MULTI-FUNCTION SWITCH - REMOVAL).

(3) Using an ohmmeter, perform the continuity and resistance tests at the terminals (Fig. 51) in the multi-function switch connector receptacles as shown in the Multi-Function Switch Tests table.



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Fig. 51 Multi-Function Switch Connector Receptacle Pin-Out

1 - MULTI-FUNCTION SWITCH

2 - C-1 (LIGHTING) CONNECTOR RECEPTACLE

3 - C-2 (WIPER) CONNECTOR RECEPTACLE

MULTI-FUNCTION SWITCH (Continued)

MULTI-FUNCTION SWITCH TESTS		
EXTERIOR LIGHTING FUNCTIONS		
SWITCH POSITION	CONNECTOR C-1 PINS	RESISTANCE (OHMS) $\pm 10\%$
Off	4 & 5	3781
Park Lamps On	4 & 5	911
Headlamp Low Beams On	4 & 5	349
Rear Fog Lamps On	4 & 5	75
Headlamp High Beams On	8 & 9	0 - 1
Front Fog Lamps On	2 & 4	0 - 1
Optical Horn (Flash-to-Pass) On	7 & 8	0 - 1
Turn Signal Neutral	6 & 8, 8 & 10	Infinite (Open)
Turn Signal Left	6 & 8	0 - 1
Turn Signal Right	8 & 10	0 - 1
INTERIOR LIGHTING FUNCTIONS		
SWITCH POSITION	CONNECTOR C-1 PINS	RESISTANCE (OHMS) $\pm 10\%$
Off (Courtesy Disable)	1 & 4	63
Dimming 1	1 & 4	200
Dimming 2	1 & 4	557
Dimming 3	1 & 4	914
Dimming 4	1 & 4	1271
Dimming 5	1 & 4	1628
Dimming 6	1 & 4	1985
Parade Mode On	1 & 4	3565
Courtesy On	1 & 4	7885
FRONT WIPER FUNCTIONS		
SWITCH POSITION	CONNECTOR C-1 & C-2 PINS	RESISTANCE (OHMS) $\pm 10\%$
Front Wiper Off	C-1 Pin 4 & C-2 Pin 4	4587
Delay 1	C-1 Pin 4 & C-2 Pin 4	1267
Delay 2	C-1 Pin 4 & C-2 Pin 4	792
Delay 3	C-1 Pin 4 & C-2 Pin 4	531
Delay 4	C-1 Pin 4 & C-2 Pin 4	369
Delay 5	C-1 Pin 4 & C-2 Pin 4	262
Front Wiper Low	C-1 Pin 4 & C-2 Pin 4	125
Front Wiper High	C-1 Pin 4 & C-2 Pin 4	38
Front Wiper Mist	C-1 Pin 4 & C-2 Pin 4	125
Front Washer On	C-2 Pins 5 & 7	0 - 1
REAR WIPER FUNCTIONS		
SWITCH POSITION	CONNECTOR C-2 PINS	RESISTANCE (OHMS) $\pm 10\%$
Rear Wiper Off	1 & 5, 2 & 5	Infinite (Open)
Rear Wiper Intermittent	2 & 5	0 - 1
Rear Wiper On	1 & 5	0 - 1
Rear Washer On	2 & 5, 3 & 5	0 - 1

MULTI-FUNCTION SWITCH (Continued)

(4) If the multi-function switch fails any of the continuity or resistance tests, replace the faulty switch unit as required.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) If the vehicle is equipped with the optional tilt steering column, move the tilt steering column to the fully lowered position and leave the tilt release lever in the released (down) position.

(3) From below the steering column, remove the two screws that secure the lower shroud to the upper shroud (Fig. 52).

(4) Using hand pressure, push gently inward on both sides of the upper shroud near the parting line between the upper and lower shrouds to release the snap features that secure the two halves to each other.

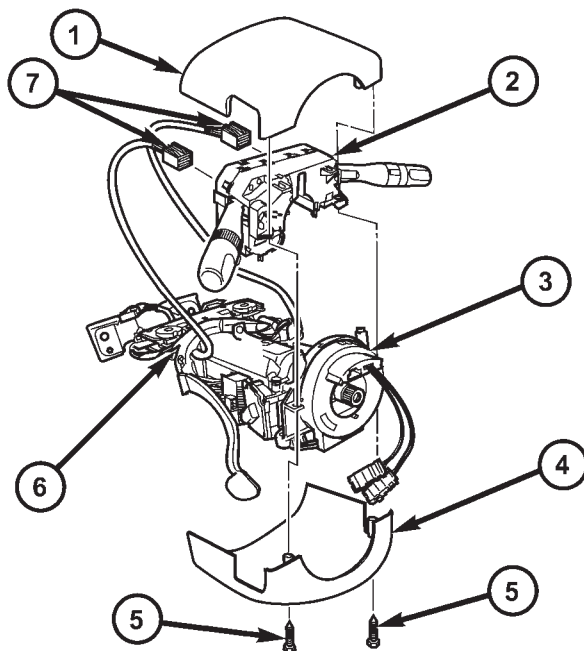
(5) Remove both the upper and lower shrouds from the steering column.

(6) Disconnect the two instrument panel wire harness connectors for the multi-function switch from the two connector receptacles on the back of the switch housing.

(7) Remove the multi-function switch from the steering column lock housing by carefully rocking the switch and pulling the switch housing upward far enough to disengage its alignment posts and locator tabs from the lock housing.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER,



80c96010

Fig. 52 Multi-Function Switch Remove/Install

- 1 - UPPER SHROUD
- 2 - MULTI-FUNCTION SWITCH
- 3 - CLOCKSPrING
- 4 - LOWER SHROUD
- 5 - SCREW (2)
- 6 - STEERING COLUMN
- 7 - WIRE HARNESS CONNECTOR (2)

FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

CAUTION: Before attempting to install the multi-function switch, be certain that the left control stalk is in the neutral turn signal position and the turn signal cancel actuator is in the retracted (neutral) position.

(1) Position the multi-function switch to the steering column.

(2) Reconnect the two instrument panel wire harness connectors for the multi-function switch to the two connector receptacles on the back of the switch housing (Fig. 52).

MULTI-FUNCTION SWITCH (Continued)

(3) Position the multi-function switch onto the steering column lock housing. Be certain that the switch alignment posts and locator tabs are fully seated on the lock housing.

(4) Position the upper and lower shrouds onto the steering column.

(5) Align the snap features on the lower shroud with the receptacles on the upper shroud and apply hand pressure to snap them together.

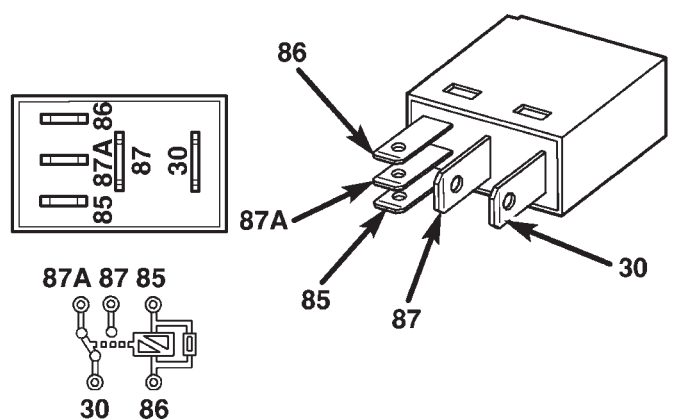
(6) From below the steering column, install and tighten the two screws that secure the lower shroud to the upper shroud. Tighten the screws to 2 N·m (20 in. lbs.).

(7) If the vehicle is equipped with the optional tilt steering column, move the tilt steering column back to the fully raised position and move the tilt release lever into the locked (up) position.

(8) Reconnect the battery negative cable.

PARK LAMP RELAY

DESCRIPTION



80ce807b

Fig. 53 ISO Micro Relay

- 30 - COMMON FEED
 85 - COIL GROUND
 86 - COIL BATTERY
 87 - NORMALLY OPEN
 87A - NORMALLY CLOSED

The park lamp relay is located in the Junction Block (JB) below the driver side outboard end of the instrument panel in the passenger compartment of the vehicle. The park lamp relay is a conventional International Standards Organization (ISO) micro relay (Fig. 53). Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions. The relay is contained within a small, rectangular, molded plastic housing and is connected to all of the

required inputs and outputs by five integral male spade-type terminals that extend from the bottom of the relay base.

The park lamp relay cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

OPERATION

The park lamp relay is an electromechanical switch that uses a low current input from the Body Control Module (BCM) to control a high current output to the park lamps. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The park lamp relay terminals are connected to the vehicle electrical system through a connector receptacle in the Junction Block (JB). The inputs and outputs of the park lamp relay include:

- **Common Feed Terminal** - The common feed terminal (30) is connected to the park lamps through the park lamp relay output circuit and provides ground to the park lamps when the relay is de-energized, and battery current to the park lamps when the relay is energized.

- **Coil Ground Terminal** - The coil ground terminal (85) is connected to a control output of the Body Control Module (BCM) through a park lamp relay control circuit. The BCM controls park lamp operation by controlling a ground path through this circuit.

- **Coil Battery Terminal** - The coil battery terminal (86) receives battery current at all times from a fuse in the PDC through a fused B(+) circuit.

- **Normally Open Terminal** - The normally open terminal (87) receives battery current at all times from a fuse in the Power Distribution Center (PDC) through a fused B(+) circuit.

- **Normally Closed Terminal** - The normally closed terminal (87A) is connected to ground at all times through a ground circuit that receives ground through a splice block located in the instrument panel wire harness with an eyelet terminal connector that is secured by a nut to a ground stud on the driver side instrument panel end bracket near the Junction Block (JB).

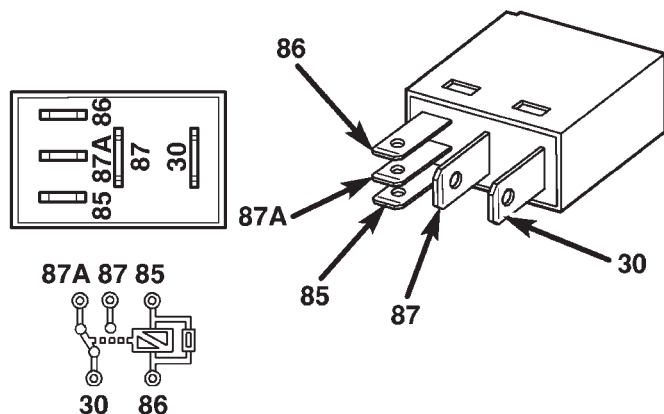
PARK LAMP RELAY (Continued)

The park lamp relay can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - PARK LAMP RELAY

The park lamp relay (Fig. 54) is located in the Junction Block (JB) under the driver side outboard end of the instrument panel. 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.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.



80ce807b

Fig. 54 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

(1) Remove the park lamp relay from the JB. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/PARK LAMP RELAY - REMOVAL).

(2) 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 Step 3. If not OK, replace the faulty relay.

(3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 8 ohms. If OK, go to Step 4. If not OK, replace the faulty relay.

(4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, reinstall the relay and use a DRBIII® scan tool to perform further testing. Refer to the appropriate diagnostic information.

REMOVAL

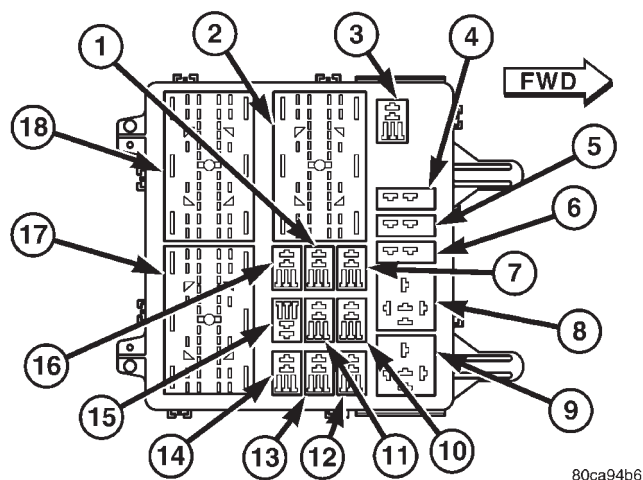
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the steering column opening cover from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - REMOVAL).

(3) Remove the park lamp relay by grasping it firmly and pulling it straight out from the receptacle in the Junction Block (JB) (Fig. 55).

PARK LAMP RELAY (Continued)



80ca94b6

Fig. 55 Junction Block - Inboard Side (LHD Shown - Rotate 180° for RHD)

- 1 - PASSENGER DOOR UNLOCK RELAY
- 2 - JB C3 CONNECTOR RECEPTACLE
- 3 - LOW BEAM RELAY
- 4 - CIRCUIT BREAKER #1
- 5 - CIRCUIT BREAKER #2
- 6 - CIRCUIT BREAKER #3
- 7 - DOOR LOCK RELAY
- 8 - DEFOGGER RELAY
- 9 - SPARE
- 10 - FRONT FOG LAMP RELAY
- 11 - HORN RELAY
- 12 - SPARE
- 13 - SPARE
- 14 - REAR FOG LAMP RELAY
- 15 - PARK LAMP RELAY
- 16 - DRIVER DOOR UNLOCK RELAY
- 17 - JB C1 CONNECTOR RECEPTACLE
- 18 - JB C2 CONNECTOR RECEPTACLE

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the park lamp relay to the proper receptacle in the Junction Block (JB) (Fig. 55).

(2) Align the park lamp relay terminals with the terminal cavities in the JB receptacle.

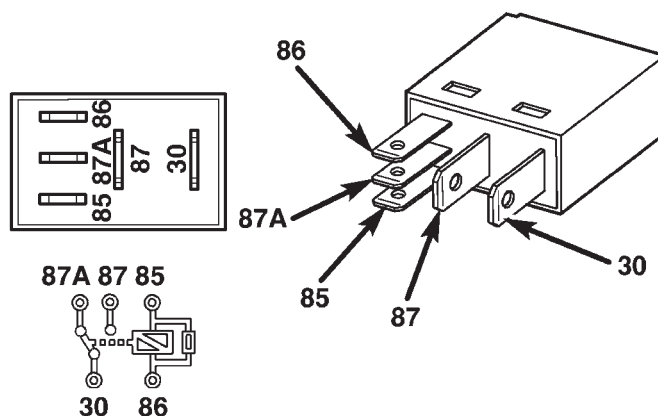
(3) Push firmly and evenly on the top of the park lamp relay until the terminals are fully seated in the terminal cavities in the JB receptacle.

(4) Reinstall the steering column opening cover onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - INSTALLATION).

(5) Reconnect the battery negative cable.

REAR FOG LAMP RELAY

DESCRIPTION



80ce807b

Fig. 56 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

The rear fog lamp relay is located in the Junction Block (JB) on the driver side outboard end of the instrument panel in the passenger compartment of the vehicle. The rear fog lamp relay is a conventional International Standards Organization (ISO) micro relay (Fig. 56). Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions. The relay is contained within a small, rectangular, molded plastic housing and is connected to all of the required inputs and outputs by five integral male spade-type terminals that extend from the bottom of the relay base.

The rear fog lamp relay cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

REAR FOG LAMP RELAY (Continued)

OPERATION

The rear fog lamp relay is an electromechanical switch that uses a low current input from the Body Control Module (BCM) to control a high current output to the rear fog lamps. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The rear fog lamp relay terminals are connected to the vehicle electrical system through a connector receptacle in the Junction Block (JB). The inputs and outputs of the rear fog lamp relay include:

- **Common Feed Terminal** - The common feed terminal (30) receives battery current at all times from a fuse in the JB through a fused B(+) circuit.
- **Coil Ground Terminal** - The coil ground terminal (85) is connected to a control output of the premium Body Control Module (BCM) through a rear fog lamp relay control circuit. The BCM controls rear fog lamp operation by controlling a ground path through this circuit.
- **Coil Battery Terminal** - The coil battery terminal (86) receives battery current at all times from a fuse in the JB through a fused B(+) circuit.
- **Normally Open Terminal** - The normally open terminal (87) is connected to the rear fog lamps through a rear fog lamp relay output circuit and provides battery current to the rear fog lamps whenever the relay is energized.
- **Normally Closed Terminal** - The normally closed terminal (87A) is not connected in this application.

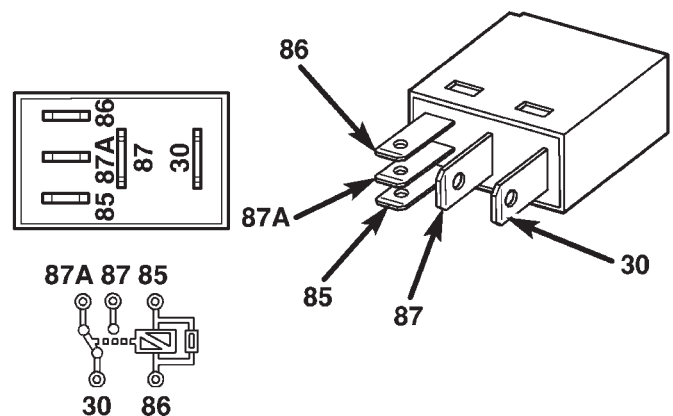
The rear fog lamp relay can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - REAR FOG LAMP RELAY

The rear fog lamp relay (Fig. 57) is located in the Junction Block (JB) under the driver side outboard end of the instrument panel. 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.

WARNING: ON VEHICLES EQUIPPED WITH AIR-BAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.



80ce807b

Fig. 57 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

(1) Remove the rear fog lamp relay from the JB. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/REAR FOG LAMP RELAY - REMOVAL).

(2) 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 Step 3. If not OK, replace the faulty relay.

(3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 8 ohms. If OK, go to Step 4. If not OK, replace the faulty relay.

REAR FOG LAMP RELAY (Continued)

(4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, reinstall the relay and use a DRBIII® scan tool to perform further testing. Refer to the appropriate diagnostic information.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

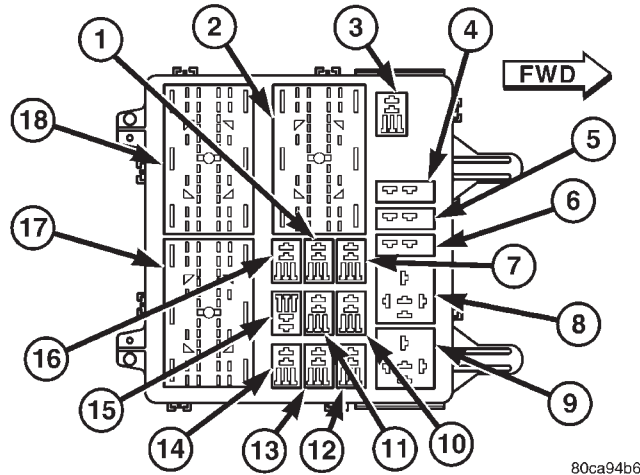
(1) Disconnect and isolate the battery negative cable.

(2) Remove the steering column opening cover from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - REMOVAL).

(3) Remove the rear fog lamp relay by grasping it firmly and pulling it straight out from the receptacle in the Junction Block (JB) (Fig. 58).

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.



80ca94b6

Fig. 58 Junction Block - Inboard Side (LHD Shown - Rotate 180° for RHD)

- 1 - PASSENGER DOOR UNLOCK RELAY
- 2 - JB C3 CONNECTOR RECEPTACLE
- 3 - LOW BEAM RELAY
- 4 - CIRCUIT BREAKER #1
- 5 - CIRCUIT BREAKER #2
- 6 - CIRCUIT BREAKER #3
- 7 - DOOR LOCK RELAY
- 8 - DEFOGGER RELAY
- 9 - SPARE
- 10 - FRONT FOG LAMP RELAY
- 11 - HORN RELAY
- 12 - SPARE
- 13 - SPARE
- 14 - REAR FOG LAMP RELAY
- 15 - PARK LAMP RELAY
- 16 - DRIVER DOOR UNLOCK RELAY
- 17 - JB C1 CONNECTOR RECEPTACLE
- 18 - JB C2 CONNECTOR RECEPTACLE

(1) Position the rear fog lamp relay to the proper receptacle in the Junction Block (JB) (Fig. 58).

(2) Align the rear fog lamp relay terminals with the terminal cavities in the JB receptacle.

(3) Push firmly and evenly on the top of the rear fog lamp relay until the terminals are fully seated in the terminal cavities in the JB receptacle.

(4) Reinstall the steering column opening cover onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - INSTALLATION).

(5) Reconnect the battery negative cable.

REAR LAMP BULB

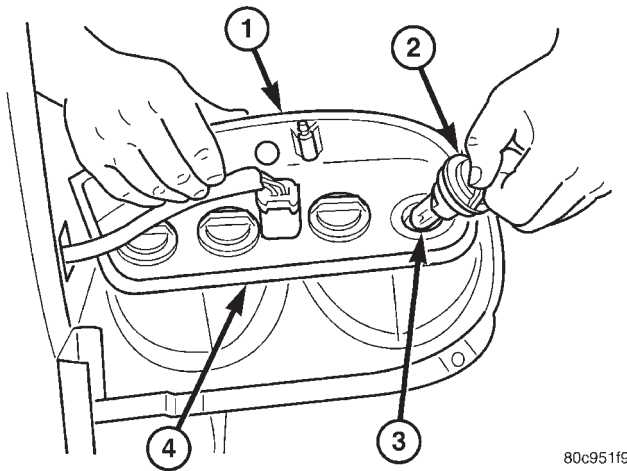
REMOVAL

The rear lamp unit may contain up to four bulbs, depending upon the market for which the vehicle was manufactured. The service procedures for each bulb is the same, only the bulb sizes and types may differ. Be certain any removed bulb is replaced with the same bulb size and type that was removed.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the rear lamp unit from the end of the quarter panel. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/REAR LAMP UNIT - REMOVAL).

(3) Firmly grasp the socket on the socket plate at the back of the rear lamp unit housing for the bulb that is being removed (Fig. 59).



80c95119

Fig. 59 Rear Lamp Bulb Remove/Install

- 1 - REAR LAMP HOUSING
- 2 - BULB HOLDER
- 3 - BULB
- 4 - SOCKET PLATE

(4) Rotate the socket on the socket plate at the back of the rear lamp unit housing counterclockwise about 30 degrees.

(5) Pull the socket and bulb straight out of the back of the rear lamp unit housing.

(6) Pull the bulb straight out of the rear lamp unit socket.

INSTALLATION

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 and/or the lamp wiring.

(1) Align the base of the bulb with the receptacle in the rear lamp unit socket.

(2) Push the bulb straight into the rear lamp unit socket until it is firmly seated.

(3) Align the socket and bulb with the opening in the socket plate on the back of the rear lamp unit housing (Fig. 59).

(4) Push the socket and bulb straight into the rear lamp unit housing until the socket is firmly seated against the socket plate.

(5) Rotate the socket on the socket plate at the back of the rear lamp unit housing clockwise about 30 degrees.

(6) Reinstall the rear lamp unit onto the end of the quarter panel. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/REAR LAMP UNIT - INSTALLATION).

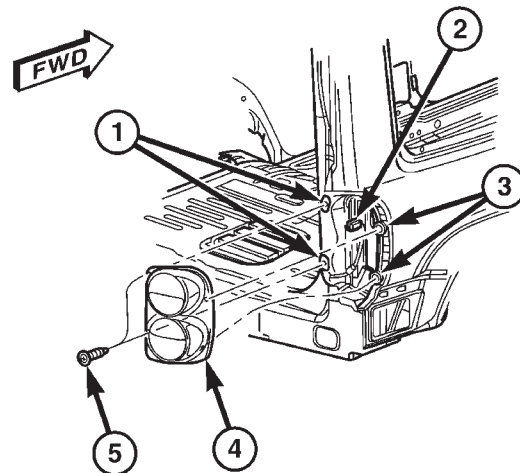
(7) Reconnect the battery negative cable.

REAR LAMP UNIT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Open the tailgate to access and remove the two screws that secure the inboard side of the rear lamp unit to the side jamb of the tailgate opening (Fig. 60).



80c95299

Fig. 60 Rear Lamp Unit Remove/Install

- 1 - PLASTIC NUT (2)
- 2 - WIRE HARNESS CONNECTOR
- 3 - PLASTIC NUT (2)
- 4 - REAR LAMP UNIT
- 5 - SCREW (2)

(3) Pull the outboard side of the rear lamp unit rearward (away from the end of the quarter panel) far enough to unsnap the two ball studs on the outboard side of the lamp housing from the plastic nuts in the quarter panel.

REAR LAMP UNIT (Continued)

(4) Pull the rear lamp unit away from the quarter panel far enough to access and disconnect the wire harness connector for the lamp unit from the connector receptacle on the lamp socket plate.

(5) Remove the rear lamp unit from the quarter panel.

(6) Remove the plastic nuts from the quarter panel and discard.

INSTALLATION

(1) Install new plastic nuts into the quarter panel (Fig. 60).

(2) Position the rear lamp unit to the quarter panel.

(3) Reconnect the wire harness connector for the rear lamp unit to the connector receptacle on the lamp socket plate.

(4) Align the two ball studs on the outboard side of the rear lamp unit housing with the plastic nuts in the quarter panel.

(5) Using hand pressure, push the outboard side of the rear lamp unit forward (towards the end of the quarter panel) far enough to snap the two ball studs on the outboard side of the lamp housing into the plastic nuts in the quarter panel.

(6) Align the mounting holes on the inboard side of the rear lamp unit housing with the plastic nuts in the side jamb of the tailgate opening.

(7) Install and tighten the two screws that secure the inboard side of the rear lamp unit housing to the plastic nuts in the side jamb of the tailgate opening. Tighten the screws to 2 N·m (20 in. lbs.).

(8) Reconnect the battery negative cable.

REPEATER LAMP BULB

REMOVAL

Side repeater lamps are used only on vehicles manufactured for certain markets where these lamps are required.

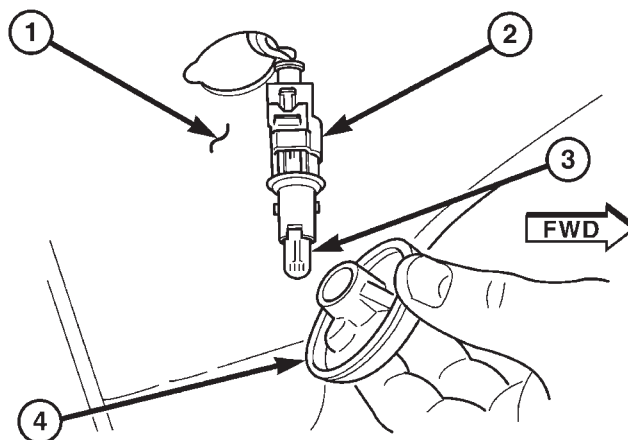
(1) Disconnect and isolate the battery negative cable.

(2) Remove the repeater lamp unit from the front fender panel. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/REPEATER LAMP UNIT - REMOVAL).

(3) Rotate the repeater lamp socket in the lamp lens counterclockwise about 30 degrees (Fig. 61).

(4) Pull the socket and bulb straight out of the repeater lamp lens.

(5) Pull the bulb straight out of the repeater lamp socket.



80c97599

Fig. 61 Repeater Lamp Bulb Remove/Install

- 1 - FRONT FENDER
- 2 - SOCKET
- 3 - BULB
- 4 - LENS

INSTALLATION

Side repeater lamps are used only on vehicles manufactured for certain markets where these lamps are required.

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 and/or the lamp wiring.

(1) Align the base of the bulb with the receptacle in the repeater lamp socket.

(2) Push the bulb straight into the repeater lamp socket until it is firmly seated.

(3) Align the socket and bulb with the socket opening in the repeater lamp lens (Fig. 61).

(4) Push the socket and bulb straight into the repeater lamp lens until it is firmly seated.

(5) Rotate the repeater lamp socket in the lamp lens clockwise about 30 degrees.

(6) Reinstall the repeater lamp unit onto the front fender panel. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/REPEATER LAMP UNIT - INSTALLATION).

(7) Reconnect the battery negative cable.

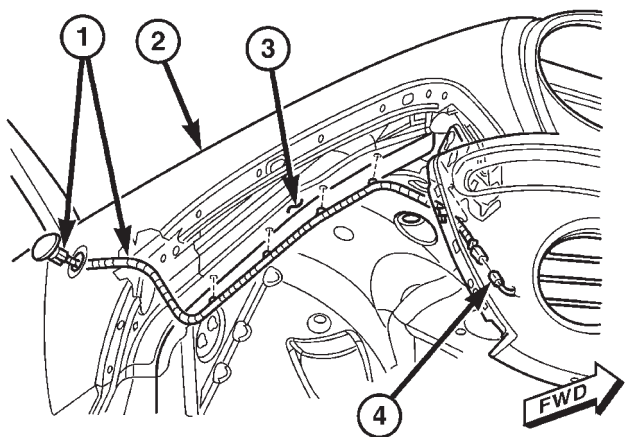
REPEATER LAMP UNIT

REMOVAL

Side repeater lamps are used only on vehicles manufactured for certain markets where these lamps are required.

(1) Disconnect and isolate the battery negative cable.

(2) Using a trim stick or another suitable wide flat-bladed tool, carefully pry at the clearance notch in the lower edge of the repeater lamp lens to disengage the snap features of the lens from the mounting hole in the front fender panel (Fig. 62).



80c97654

Fig. 62 Repeater Lamp Unit Remove/Install

- 1 - REPEATER LAMP UNIT
- 2 - FRONT FENDER PANEL
- 3 - INNER FENDER
- 4 - FRONT FASCIA WIRE HARNESS

(3) Pull the repeater lamp unit out from the front fender panel far enough to access and disconnect the repeater lamp wire harness connector from the connector receptacle on the back of the repeater lamp unit socket.

(4) Remove the repeater lamp unit from the front fender panel.

INSTALLATION

Side repeater lamps are used only on vehicles manufactured for certain markets where these lamps are required.

(1) Position the repeater lamp unit to the front fender panel (Fig. 62).

(2) Reconnect the repeater lamp wire harness connector to the connector receptacle on the back of the repeater lamp unit socket.

(3) Position the repeater lamp unit into the mounting hole in the front fender panel. Be certain that the clearance notch on the edge of the repeater lamp lens is oriented toward the bottom.

(4) Using hand pressure, press on the repeater lamp unit firmly and evenly until the snap features of the lens are fully engaged in the mounting hole of the front fender panel.

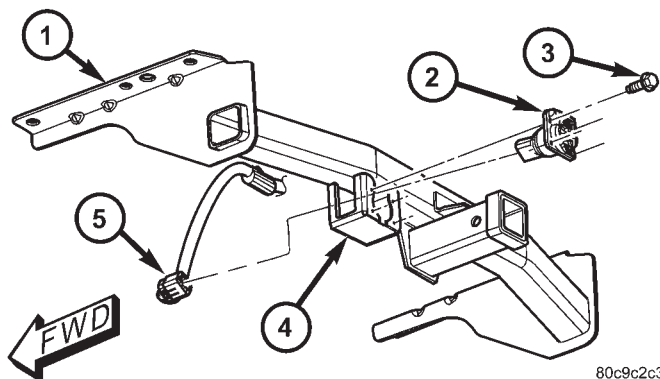
(5) Reconnect the battery negative cable.

TRAILER TOW CONNECTOR

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the four screws that secure the trailer tow connector to the bracket on the trailer hitch receiver (Fig. 63).



80c9c2c3

Fig. 63 Trailer Tow Connector Remove/Install

- 1 - HITCH RECEIVER
- 2 - 7-WAY TRAILER TOW CONNECTOR
- 3 - SCREW (4)
- 4 - BRACKET
- 5 - WIRE HARNESS CONNECTOR

(3) Pull the trailer tow connector rearward from the bracket on the trailer hitch receiver far enough to access and disconnect the rear body wire harness connector from the receptacle on the back of the trailer tow connector.

(4) Remove the trailer tow connector from the trailer hitch receiver.

INSTALLATION

(1) Position the trailer tow connector to the trailer hitch receiver (Fig. 63).

(2) Reconnect the rear body wire harness connector to the receptacle on the back of the trailer tow connector.

(3) Position the trailer tow connector into the bracket on the trailer hitch receiver.

(4) Install and tighten the four screws that secure the trailer tow connector to the bracket on the trailer hitch receiver. Tighten the screws to 4 N·m (35 in. lbs.).

(5) Reconnect the battery negative cable.

TRAILER TOW RELAY

DESCRIPTION

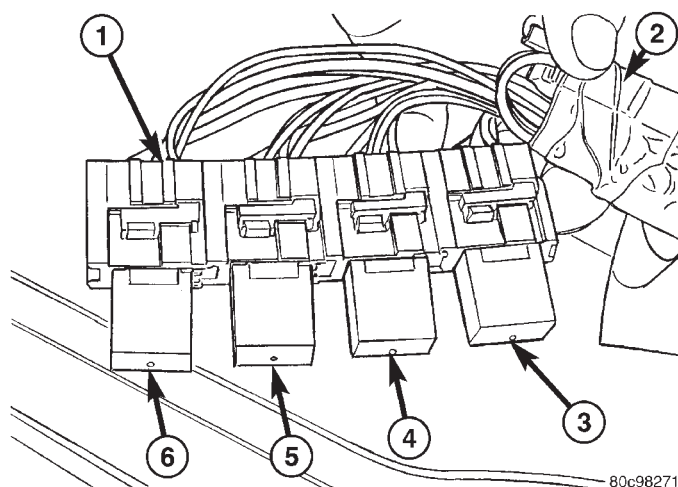


Fig. 64 Trailer Tow Relays

- 1 - RELAY CONNECTOR BANK
- 2 - REAR BODY WIRE HARNESS
- 3 - LEFT TURN RELAY
- 4 - RIGHT TURN RELAY
- 5 - BRAKE LAMP RELAY
- 6 - FUSED IGNITION SWITCH OUTPUT (RUN) RELAY

The trailer tow relays are located in a connector bank above the right rear wheelhouse and behind the quarter trim panel on vehicles equipped with the optional factory-installed trailer towing package. Four individual relays are used, one each for fused ignition switch output (run), brake lamps, right turn signal, and left turn signal outputs to a trailer through the rear body wiring and connectors. The trailer tow relays are conventional International Standards Organization (ISO) micro relays (Fig. 64). Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions. The relay is contained within a small, rectangular, molded plastic housing and is connected to all of the required inputs and outputs by five integral male spade-type terminals that extend from the bottom of the relay base.

The trailer tow relays cannot be adjusted or repaired and, if faulty or damaged, the inoperative relay must be replaced.

OPERATION

The trailer tow relays are electromechanical switches. The relays each use an input from the circuit that they isolate from the trailer wiring to control a high current output to the trailer. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure.

When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

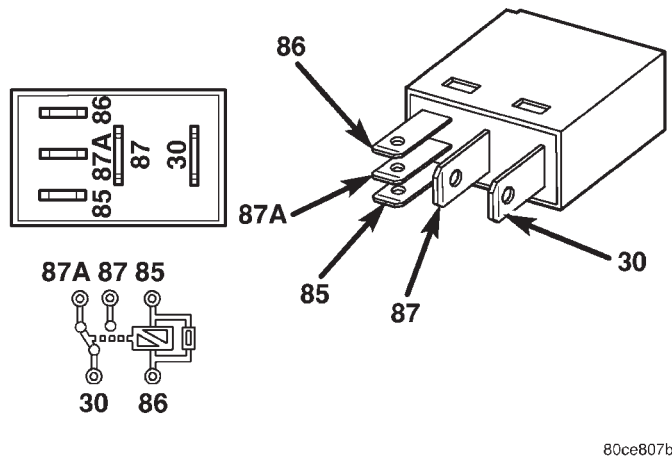
The terminals of each trailer tow relay are connected to the vehicle electrical system through a connector bank in the rear lighting wire harness above the right rear wheelhouse. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds. The trailer tow relays can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - TRAILER TOW RELAY

The trailer tow relays (Fig. 65) are located in a connector bank above the right rear wheelhouse. 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.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

TRAILER TOW RELAY (Continued)



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Fig. 65 ISO Micro Relay

30 - COMMON FEED
 85 - COIL GROUND
 86 - COIL BATTERY
 87 - NORMALLY OPEN
 87A - NORMALLY CLOSED

(1) Remove the trailer tow relay from the connector bank. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/TRAILER TOW RELAY - REMOVAL).

(2) 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 Step 3. If not OK, replace the faulty relay.

(3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 8 ohms. If OK, go to Step 4. If not OK, replace the faulty relay.

(4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, test the input and output circuits of the relay. Refer to the appropriate wiring information.

REMOVAL

The trailer tow relay bank contains four relays. The service procedures for each relay are the same. Be certain any removed relay is replaced with the same relay size and type that was removed.

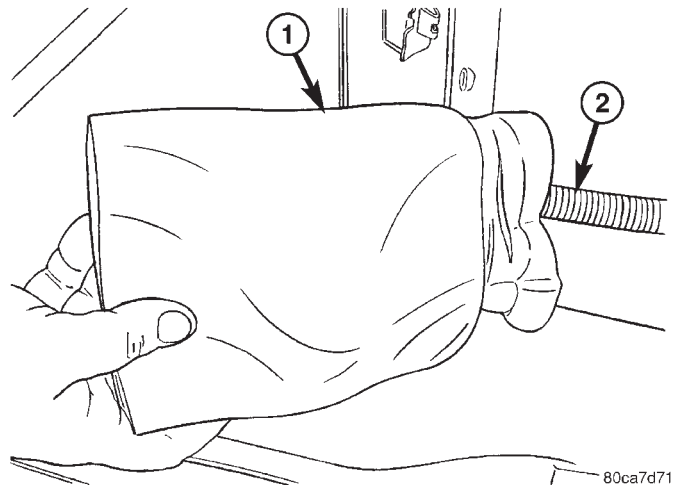
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the trim from the right side quarter inner panel. (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - REMOVAL).

(3) Reach through the access hole in the quarter inner panel behind the right rear wheelhouse to locate and retrieve the trailer tow relay connector bank, which is enveloped in foam rubber and placed on the top of the right rear wheelhouse between the quarter inner and outer panels (Fig. 66).



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Fig. 66 Trailer Tow Relay Wrap

1 - FOAM WRAP
 2 - REAR BODY WIRE HARNESS

(4) Pull the trailer tow relay connector bank into the cargo area far enough to access the unit for service.

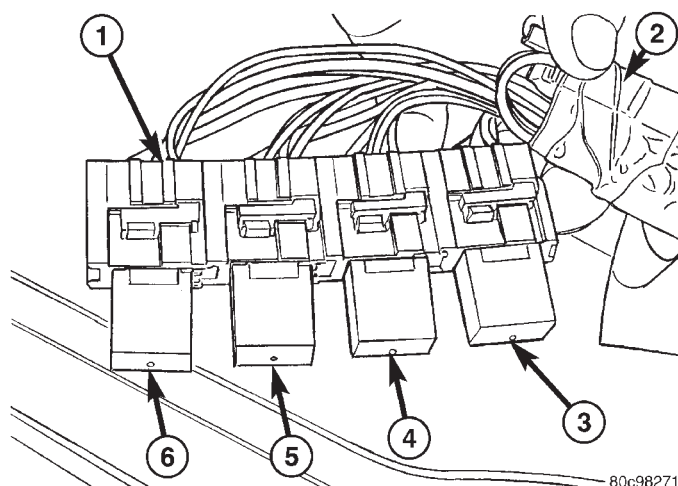
(5) Carefully remove the trailer tow relay connector bank from the foam wrap.

(6) Remove the trailer tow relay by grasping it firmly and pulling it straight out from the connector bank (Fig. 67).

INSTALLATION

The trailer tow relay bank contains four relays. The service procedures for each relay are the same. Be certain any removed relay is replaced with the same relay size and type that was removed.

TRAILER TOW RELAY (Continued)

**Fig. 67 Trailer Tow Relay Remove/Install**

- 1 - RELAY CONNECTOR BANK
- 2 - REAR BODY WIRE HARNESS
- 3 - LEFT TURN RELAY
- 4 - RIGHT TURN RELAY
- 5 - BRAKE LAMP RELAY
- 6 - FUSED IGNITION SWITCH OUTPUT (RUN) RELAY

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the trailer tow relay to the proper connector in the connector bank (Fig. 67).

(2) Align the trailer tow relay terminals with the terminal cavities in the connector.

(3) Push firmly and evenly on the top of the trailer tow relay until the terminals are fully seated in the terminal cavities in the connector.

(4) Carefully restore the foam wrap around the trailer tow relay connector bank (Fig. 66).

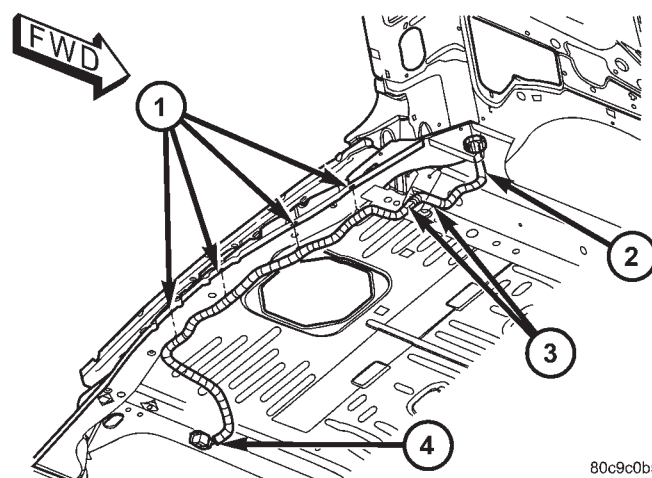
(5) Reach through the access hole in the quarter inner panel behind the right rear wheelhouse to place the trailer tow relay connector bank on the top of the right rear wheelhouse between the quarter inner and outer panels.

(6) Reinstall the trim onto the right side quarter inner panel. (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - INSTALLATION).

(7) Reconnect the battery negative cable.

TRAILER TOW WIRING

DESCRIPTION

**Fig. 68 Trailer Tow Wiring**

- 1 - RETAINER CLIP (4)
- 2 - REAR BODY HARNESS (TRAILER TOW TAKE OUT)
- 3 - RETAINER CLIP (2)
- 4 - WIRE HARNESS CONNECTOR

Vehicles equipped with an optional factory-installed (not dealer-installed or port-installed) trailer towing package have a rear body wire harness that includes an integral trailer tow wiring take out that connects to a heavy duty, sealed, 7-pin trailer tow connector located on a bracket on the trailer hitch receiver (Fig. 68). This harness includes a second take out with a trailer tow relay connector bank and four trailer tow relays that isolate the right turn signal, left turn signal, and brake lamp circuits of the vehicle from the electrical system of the trailer. The fourth relay in the connector bank provides a fused ignition switch output (run) source of battery current to the trailer tow connector through a trailer tow relay output circuit. The package also includes an adapter harness (stored beneath the left rear seat cushion of the vehicle when it is shipped from the factory) that adapts the 7-pin trailer tow connector to a standard, light-duty, 4-pin trailer tow connector. 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.

LAMP BAR

DESCRIPTION

The lamp bar is used to better illuminate the drivers field of vision under certain driving conditions. It consists of a cover, two or four lamp assemblies (depending upon which market), and a wiring harness. These components are mounted to a reinforcement, then sealed and secured to the roof panel. Lamp bar illumination is controlled by a manually operated momentary rocker switch, mounted to the instrument panel. The lamps are adjustable in the vertical position only.

OPERATION

Battery and ignition voltage are supplied to the lamp bar switch assembly. When the switch is in the on position the internal relay contacts close, completing the circuit through the lamp bar bulbs, to ground. The lamp bar assembly is grounded to the chassis. The hard wired circuits of the lamp bar may be diagnosed and tested using conventional methods and procedures.

DIAGNOSIS AND TESTING - LAMP BAR

CONDITION	POSSIBLE CAUSES	CORRECTION
LAMP BAR LAMPS INOPERATIVE	Faulty or missing fuse Faulty feed circuit Faulty ground circuit Faulty lamp bar sense circuit Faulty switch	Test and replace lamp bar fuse as required Test and repair open battery or ignition feed circuit. Test and repair high resistance or open lamp bar ground circuit Test and repair short to voltage in lamp bar sense circuit Test and replace lamp bar switch
LAMP BAR LAMPS ON AT ALL TIMES	Faulty switch Lamp bar feed circuit	Test and replace lamp bar switch Test and repair short to voltage in lamp bar feed circuit
ONE OR MORE LAMPS INOPERATIVE	Faulty or missing bulb Faulty lamp bar wiring harness	Test and repair lamp bar lamp bulb(s) as required Test and repair short/open lamp bar wiring harness

STANDARD PROCEDURE - LAMP BAR AIMING

NOTE: The lamp bar lamps are adjustable to the vertical position only.

- (1) Remove lamp bar cover.
- (2) Using a fairly dark and level area, drive the vehicle perpendicular to and 25 ft. away from a wall.
- (3) Measure up the wall 7ft. 9in. and place tape on the wall parallel to the ground.
- (4) Turn on the lamp bar lamps.
- (5) Using the adjustment screw in the rear of each lamp, adjust the lamp beam to the center of the tape.

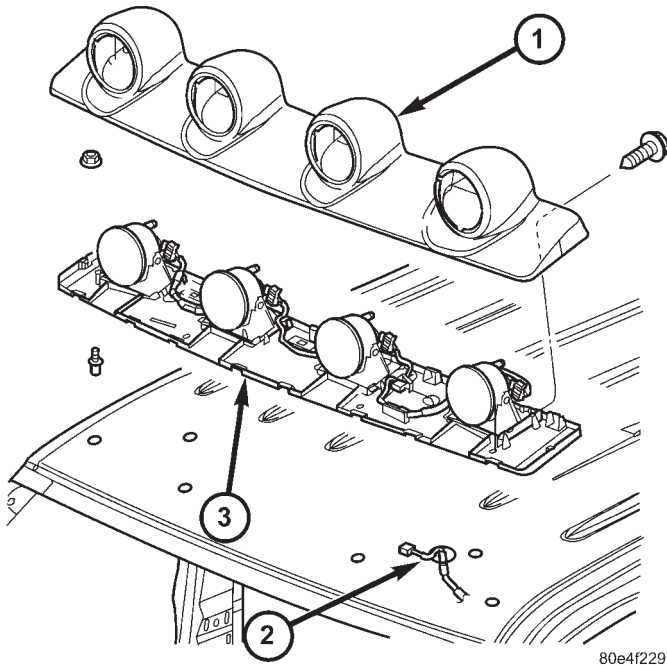
REMOVAL

REMOVAL - LAMP BAR

- (1) Disconnect the negative battery cable.
- (2) Remove the lamp bar cover retaining screws, slide the cover forward and up to remove.
- (3) Disconnect lamp electrical connector.
- (4) Remove the lamp bar reinforcement to roof stud retainers.

CAUTION: The reinforcement is held to the roof by protective tape. Remove the tape carefully to prevent damage to roof panel. After removal, the area must be cleaned with the appropriate solvent.

LAMP BAR (Continued)

**Fig. 69 LAMP BAR**

- 1 - Cover
- 2 - Electrical Connector
- 3 - Lamp Bar

- (5) Remove lamp bar reinforcement from roof.

REMOVAL - LAMP

- (1) Disconnect negative battery cable.
- (2) Remove the lamp bar cover screws, slide the cover forward and up to remove (Fig. 69).

NOTE: There is a hook arrangement for the forward lamp attachment. Pick the lamp up by the bulb connector.

- (3) Remove the lamp to base retaining screws.
- (4) Lift the lamp up and slide backward to remove.

INSTALLATION**INSTALLATION - LAMP BAR**

NOTE: Lamp bar is held to roof by protective tape. Mounting area must be clean and dry before installation.

- (1) Remove tape protective strips on new lamp bar.
- (2) Position lamp bar over roof studs (Fig. 69).
- (3) Press the lamp bar reinforcement into place making sure the tape strips are securely seated on roof.
- (4) Install the reinforcement nuts and tighten to 20 lbs. in.
- (5) Connect electrical connector.
- (6) Reconnect negative battery cable.
- (7) Aim lamps (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/LAMP BAR - STANDARD PROCEDURE) .
- (8) Position the cover over lamp bar, slide rearward and secure with screws.

INSTALLATION - LAMP

NOTE: There is a hook arrangement for the forward lamp attachment. Pick the lamp up by the bulb connector.

- (1) Position the lamp assembly on the base (Fig. 69).
- (2) Slide the lamp forward and seat.
- (3) Install the lamp retaining screws.
- (4) Reconnect negative battery cable.
- (5) Align the lamps (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/LAMP BAR - STANDARD PROCEDURE).
- (6) Install the lamp bar cover.

LAMP BAR SWITCH

DESCRIPTION

The lamp bar switch is intended to close the electrical circuit which feeds the lamp bar. The switch assembly contains a relay unit that is energized or de-energized by a manually operated momentary rocker switch. The switch is mounted on the instrument panel left of the steering wheel.

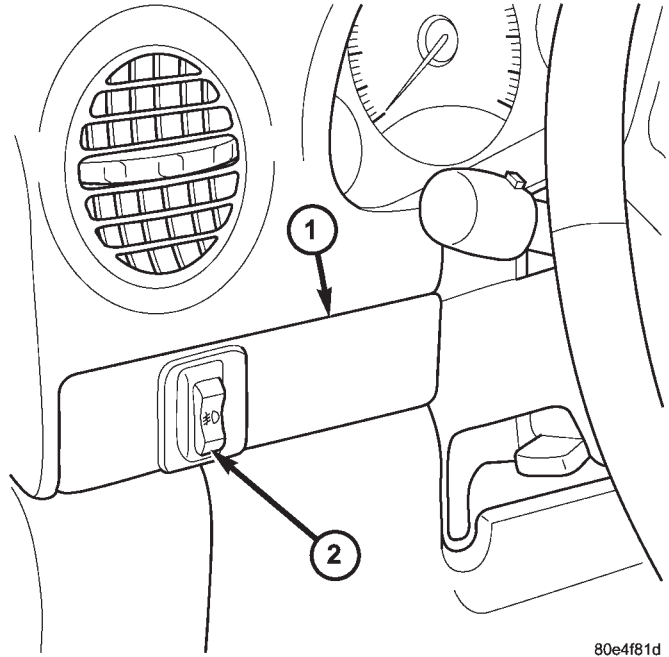
REMOVAL

CAUTION: Care must be taken not to damage the dash or instrument panel when removing the lamp bar switch bezel.

- (1) Disconnect negative battery cable.
- (2) Using a suitable pry tool, carefully remove the lamp bar switch bezel from the instrument panel.
- (3) Disconnect the electrical connector.
- (4) Depress the lamp bar switch retaining tabs and remove the switch from the bezel.

INSTALLATION

- (1) Press the lamp bar switch into the instrument panel bezel and assure that the switch is seated properly (Fig. 70).
- (2) Connect the electrical connector.
- (3) Press the instrument panel bezel into position and seat the bezel retaining clips.



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Fig. 70 LAMP BAR SWITCH

- 1 - Bezel
2 - Lamp Bar Switch

- (4) Reconnect negative battery cable.

MESSAGE SYSTEMS

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OVERHEAD CONSOLE

DESCRIPTION

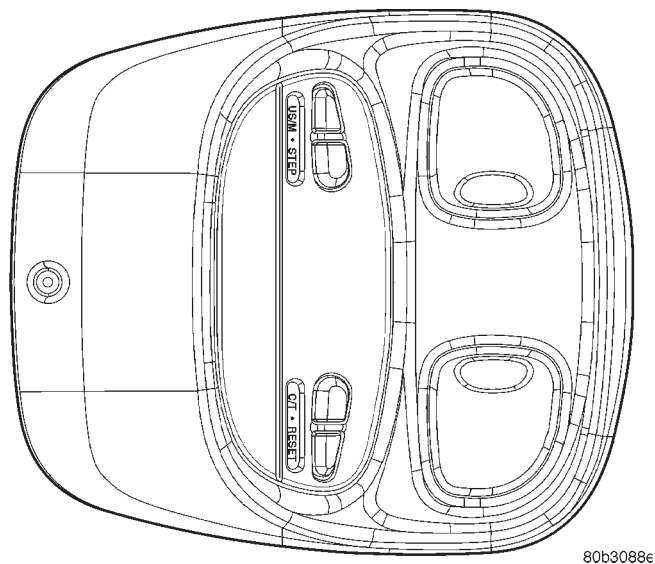


Fig. 1 Overhead Console Without Universal Transmitter

An overhead console is standard factory-installed equipment on this model. The available overhead

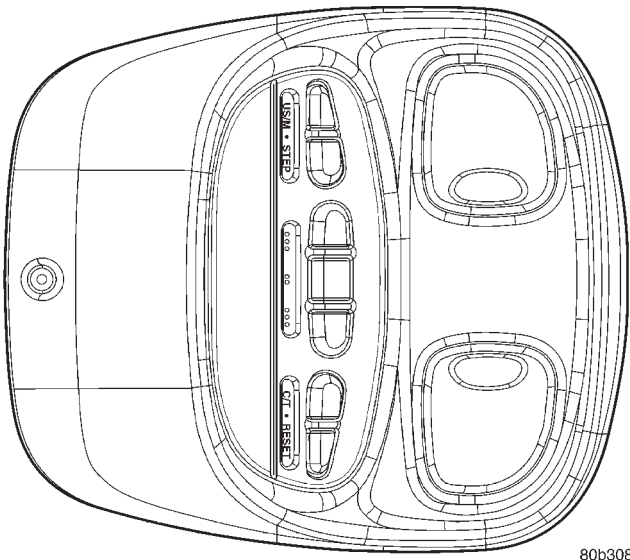
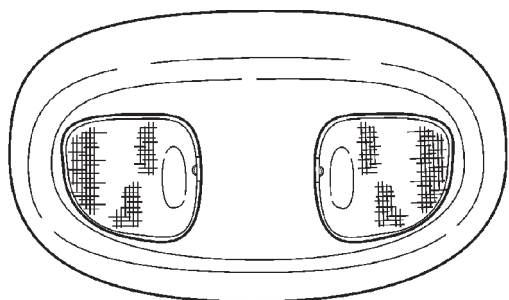


Fig. 2 Overhead Console With Universal Transmitter

consoles can include the Compass Mini-Trip Computer with universal transmitter (Fig. 2), without the universal transmitter (Fig. 1), or base console with only two reading and courtesy lamps (Fig. 3). All overhead consoles are equipped with two reading and courtesy lamps. On vehicles equipped with a power

OVERHEAD CONSOLE (Continued)



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Fig. 3 Base Console

sunroof, the sunroof switch is located between the two reading and courtesy lamps. The overhead console is mounted with one screw and two snap clips to a molded plastic retainer bracket located above the headliner.

OPERATION

Refer to the vehicle Owner's Manual for specific operation of each overhead console and its systems.

STANDARD PROCEDURE**STANDARD PROCEDURE - CMTC LAMP REPLACEMENT**

- (1) Open hood, disconnect and isolate the negative battery cable.
- (2) Remove overhead console (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).
- (3) Using a flat blade screwdriver twist out the lamp socket.
- (4) Replace lamp(s) as necessary.

STANDARD PROCEDURE - COURTESY LAMP REPLACEMENT

- (1) Open hood, disconnect and isolate the negative battery cable.
- (2) Remove the overhead console from the headliner (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).
- (3) Remove the lamp and socket assembly from the overhead console.
- (4) Remove the lamp bulb by pulling it straight out of its socket.

STANDARD PROCEDURE - COMPASS CALIBRATION

CAUTION: Do not place any external magnets, such as magnetic roof mount antennas, in the vicinity of the compass. Do not use magnetic tools when servicing the overhead console.

The electronic compass unit features a self-calibrating design, which simplifies the calibration procedure. This feature automatically updates the compass calibration while the vehicle is being driven. This allows the compass unit to compensate for small changes in the residual magnetism that the vehicle may acquire during normal use. If the compass readings appear to be erratic or out of calibration, perform the following calibration procedure. Also, new service replacement Compass Mini-Trip Computer (CMTC) modules must have their compass calibrated using this procedure. Do not attempt to calibrate the compass near large metal objects such as other vehicles, large buildings, or bridges; or, near overhead or underground power lines.

NOTE: Whenever the compass is calibrated manually, the variance number must also be reset. Refer to Compass Variation Adjustment in this group.

Calibrate the compass manually as follows:

- (1) Turn the ignition switch to the On position. If the compass/thermometer data is not currently being displayed, momentarily depress and release the C/T push button to reach the compass/thermometer display.
- (2) Depress the Reset push button and hold the button down until "CAL" appears in the display. This takes about ten seconds, and appears about five seconds after "VARIANCE = XX" is displayed.
- (3) Release the Reset push button.
- (4) Drive the vehicle on a level surface, away from large metal objects and power lines, through three or more complete circles at between five and eight kilometers-per-hour (three and five miles-per-hour) in not less than 48 seconds. The "CAL" message will disappear from the display to indicate that the compass is now calibrated.

NOTE: If the "CAL" message remains in the display, either there is excessive magnetism near the compass, or the unit is faulty. Repeat the calibration procedure one more time.

NOTE: If the wrong direction is still indicated in the compass display, the area selected for calibration may be too close to a strong magnetic field. Repeat the calibration procedure in another location.

STANDARD PROCEDURE - COMPASS DEMAGNETIZING

A degaussing tool (Special Tool 6029) is used to demagnetize, or degauss, the overhead console forward mounting screw and the roof panel above the overhead console. Equivalent units must be rated as

OVERHEAD CONSOLE (Continued)

continuous duty for 110/115 volts and 60 Hz. They must also have a field strength of over 350 gauss at 7 millimeters (0.25 inch) beyond the tip of the probe.

To demagnetize the roof panel and the overhead console forward mounting screw, proceed as follows:

(1) Be certain that the ignition switch is in the Off position, before you begin the demagnetizing procedure.

(2) Connect the degaussing tool to an electrical outlet, while keeping the tool at least 61 centimeters (2 feet) away from the compass unit.

(3) Slowly approach the head of the overhead console forward mounting screw with the degaussing tool connected.

(4) Contact the head of the screw with the plastic coated tip of the degaussing tool for about two seconds.

(5) With the degaussing tool still energized, slowly back it away from the screw. When the tip of the tool is at least 61 centimeters (2 feet) from the screw head, disconnect the tool.

(6) Place a piece of paper approximately 22 by 28 centimeters (8.5 by 11 inches), oriented on the vehicle lengthwise from front to rear, on the center line of the roof at the windshield header (Fig. 4). The purpose of the paper is to protect the roof panel from scratches, and to define the area to be demagnetized.

(7) Connect the degaussing tool to an electrical outlet, while keeping the tool at least 61 centimeters (2 feet) away from the compass unit.

(8) Slowly approach the center line of the roof panel at the windshield header, with the degaussing tool connected.

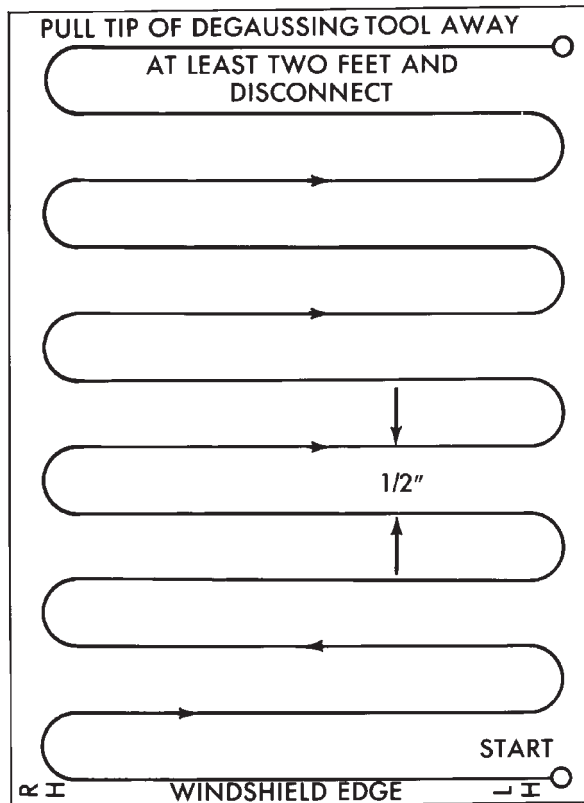
(9) Contact the roof panel with the plastic coated tip of the degaussing tool. Be sure that the template is in place to avoid scratching the roof panel. Using a slow, back-and-forth sweeping motion, and allowing 13 millimeters (0.50 inch) between passes, move the tool at least 11 centimeters (4 inches) to each side of the roof center line, and 28 centimeters (11 inches) back from the windshield header.

(10) With the degaussing tool still energized, slowly back it away from the roof panel. When the tip of the tool is at least 61 centimeters (2 feet) from the roof panel, disconnect the tool.

(11) Calibrate the compass and adjust the compass variance (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - STANDARD PROCEDURE).

STANDARD PROCEDURE - COMPASS VARIATION ADJUSTMENT

Compass variance, also known as magnetic declination, is the difference in angle between magnetic north and true geographic north. In some geographic locations, the difference between magnetic and geographic north is great enough to cause the compass



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Fig. 4 Roof Demagnetizing Pattern

to give false readings. If this problem occurs, the compass variance setting may need to be changed.

To set the compass variance:

(1) Using the Variance Settings map, find your geographic location and note the zone number (Fig. 5).

(2) Turn the ignition switch to the On position. If the compass/thermometer data is not currently being displayed, momentarily depress and release the C/T push button to reach the compass/thermometer display.

(3) Depress the Reset push button and hold the button down until "VARIANCE = XX" appears in the display. This takes about five seconds.

(4) Release the Reset push button. "VARIANCE = XX" will remain in the display. "XX" equals the current variance zone setting.

(5) Momentarily depress and release the Step push button to step through the zone numbers, until the zone number for your geographic location appears in the display.

(6) Momentarily depress and release the Reset push button to enter the displayed zone number into the CMTC module memory.

(7) Confirm that the correct directions are now indicated by the compass.

OVERHEAD CONSOLE (Continued)

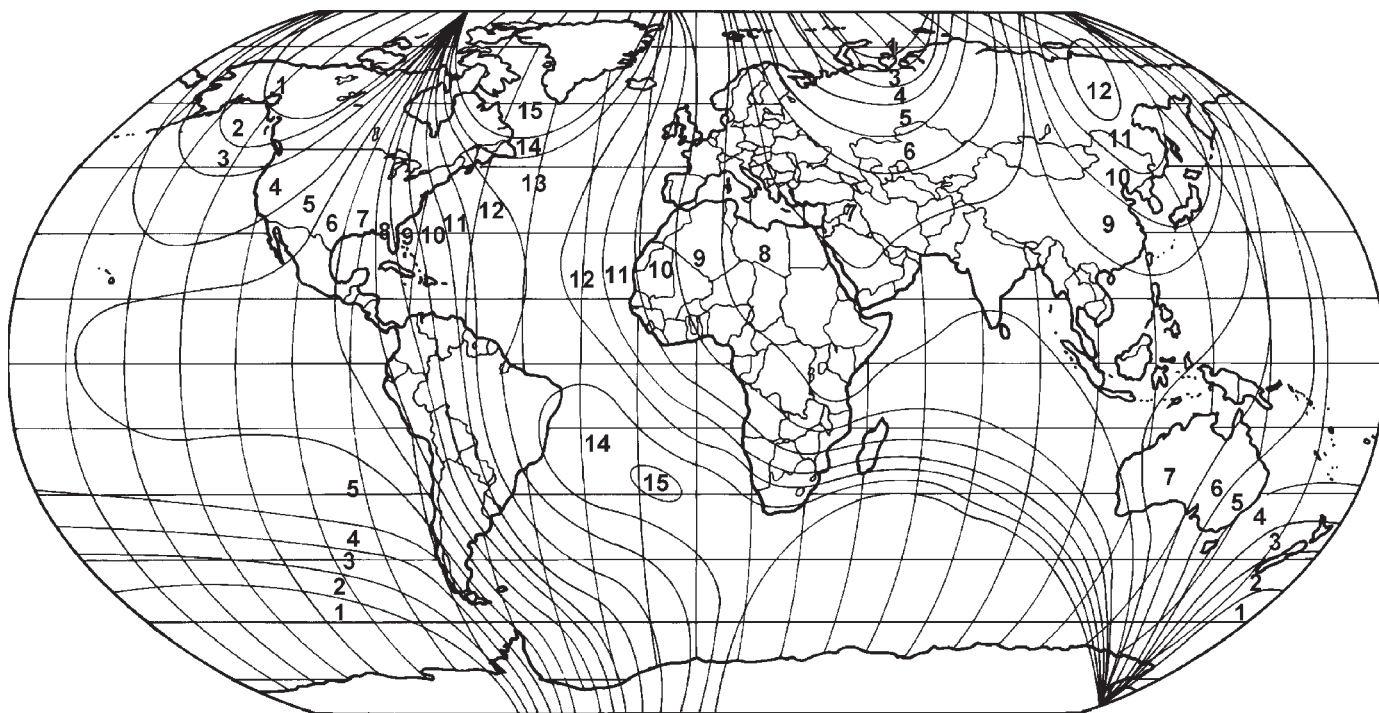


Fig. 5 Variance Settings

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REMOVAL

OVERHEAD CONSOLE - REMOVAL

- (1) Disconnect and isolate the negative battery cable.
- (2) Remove the overhead console retaining screw, located in the front of console near the windshield.
- (3) Using your fingertips, grasp the sides of the overhead console and pull straight down evenly to disengage the two snap clips at the rear of the unit.
- (4) Lower the overhead console far enough to access the wire harness connectors.
- (5) Disconnect the control module, courtesy lamps and power sunroof switch electrical connectors, if equipped.
- (6) Remove the overhead console assembly from the vehicle.

INSTALLATION

- (1) Position the overhead console in the vehicle and connect the wire harness connectors.
- (2) Connect the control module, courtesy lamps and power sunroof switch electrical connectors, if equipped.
- (3) Grasp the sides of the overhead console and push straight up evenly to engage the two snap clips at the rear of the unit.
- (4) Install the overhead console retaining screw, located in the front of console near the windshield. Torque the screw to 1.2 N·m (10 in. lbs.).
- (5) Connect the negative battery cable.

COMPASS/MINI-TRIP COMPUTER**DESCRIPTION**

The Compass Mini-Trip Computer (CMTC) is located in the overhead console on models equipped with this option. The Compass Mini-Trip Computer module features a large Vacuum Fluorescent Display (VFD) screen for displaying information, and four back-lit push button function switches labeled C/T (compass/thermometer), RESET, STEP, and US/M (United States/Metric Scale).

The Compass Mini-Trip Computer module contains a central processing unit and interfaces with other electronic modules in the vehicle over the Programmable Communications Interface (PCI) data bus network. The PCI data bus network allows the sharing of sensor information. This helps to reduce wire harness complexity, reduce internal controller hardware, and reduce component sensor current loads. At the same time, this system provides increased reliability, enhanced diagnostics, and allows the addition of many new feature capabilities.

The Compass Mini-Trip Computer module contains six informational displays which can be displayed using the four outer buttons on the overhead console. When the vehicle is first turned ON:

- CMTC blanks the display for a half second
- Displays whatever was being viewed when the ignition was last turned OFF

COMPASS/MINI-TRIP COMPUTER (Continued)

The CMTC may also be integrated with the Universal Transmitter. If so, your CMTC module will have three buttons centered together between the outer four buttons. Below the three buttons are corresponding dots to indicate which button you are using.

The Compass Mini-Trip Computer includes the following display options:

- **Compass and thermometer** - provides the outside temperature and one of eight compass readings to indicate the direction the vehicle is facing.
- **Average fuel economy** - shows the average fuel economy since the last trip computer reset.
- **Distance to empty** - shows the estimated distance that can be travelled with the fuel remaining in the fuel tank. This estimated distance is computed using the average miles-per-gallon from the last 30 gallons of fuel used.
- **Instant fuel economy** - shows the present fuel economy based upon the current vehicle distance and fuel used information.
- **Trip odometer** - shows the distance travelled since the last trip computer reset.
- **Elapsed time** - shows the accumulated ignition-on time since the last trip computer reset.
- **Blank screen** - the CMTC compass/thermometer/trip computer VFD is turned off.

If the vehicle is equipped with the optional Universal Transmitter transceiver, the CMTC will also display messages and an icon indicating when the Universal Transmitter is being trained, which of the three transmitter buttons is transmitting, and when the transceiver is cleared.

Data input for all CMTC functions, including VFD dimming level, is received through PCI data bus messages. The CMTC module uses its internal programming and all of its data inputs to calculate and display the requested data. If the data displayed is incorrect, perform the self-diagnostic tests as described in this group. If these tests prove inconclusive, the use of a DRBIII® scan tool and the proper Diagnostic Procedures manual are recommended for further testing of the CMTC module and the PCI data bus.

The CMTC module cannot be repaired, and is available for service only as a unit. This unit includes the push button switches and the plastic module and display lens. If any of these components is faulty or damaged, the complete CMTC module must be replaced. The incandescent bulbs used for CMTC push button back-lighting are available for service replacement.

DESCRIPTION - COMPASS

While in the compass/thermometer mode, the compass will display the direction in which the vehicle is

pointed using the eight major compass headings (Examples: north is N, northeast is NE). The self-calibrating compass unit requires no adjusting in normal use. The only calibration that may prove necessary is to drive the vehicle in three complete circles at 5 to 8 kilometers-per-hour (3 to 5 miles-per-hour), on level ground, in not less than forty-eight seconds. This will reorient the compass unit to its vehicle.

The compass unit also will compensate for magnetism the body of the vehicle may acquire during normal use. However, avoid placing anything magnetic directly on the roof of the vehicle. Magnetic mounts for an antenna, a repair order hat, or a funeral procession flag can exceed the compensating ability of the compass unit if placed on the roof panel. Magnetic bit drivers used on the fasteners that hold the overhead console assembly to the roof header can also affect compass operation. If the vehicle roof should become magnetized, the demagnetizing and calibration procedures found in this group may be required to restore proper compass operation.

DESCRIPTION - THERMOMETER

The thermometer displays the outside ambient temperature in whole degrees. The temperature display can be toggled from Fahrenheit to Celsius by using the U.S./Metric button. The displayed temperature is not an instant reading of conditions, but an average temperature. It may take the thermometer display several minutes to respond to a major temperature change, such as driving out of a heated garage into winter temperatures.

When the ignition switch is turned to the Off position, the last displayed temperature reading stays in the Body Control Module (BCM) unit memory. When the ignition switch is turned to the On position again, the CMTC will display the memory temperature for one minute; then update the display to the current average temperature reading within five minutes.

The thermometer function is supported by an ambient temperature sensor. The sensor is mounted outside the passenger compartment near the front and center of the vehicle, and is hard wired to the Body Control Module (BCM). The BCM sends temperature status messages to the CMTC module over the PCI data bus network. The ambient temperature sensor is available as a separate service item, refer to additional information later in this section.

OPERATION

The compass mini-trip computer operates when the ignition is in the ON position. The VFD will display the last display before ignition was turned OFF. The four outer buttons operate:

COMPASS/MINI-TRIP COMPUTER (Continued)

- STEP
- C/T - Compass/Temperature
- US/M - English/Metric
- RESET

1. STEP BUTTON

Pressing the STEP button selects one of the following 6 displays:

- Average fuel economy
- Distance to empty
- Instantaneous fuel economy
- Trip odometer
- Elapsed time
- Blank Screen

2. C/T (COMPASS/TEMPERATURE) BUTTON

Pressing the C/T button selects the Compass/Temperature display.

3. US/M (ENGLISH/METRIC MEASUREMENT) BUTTON

Pressing the US/M button switches the display units between English and Metric readings.

4. RESET BUTTON

Pressing the RESET button resets the function on the display, provided that function can be reset. The functions which can be reset are Average fuel economy, Trip odometer and Elapsed time.

Global Reset This feature allows all three displays (Average fuel economy, Trip odometer and Elapsed time) to be reset easily, by pressing the RESET button twice within three seconds with any of the screens in display. This eliminates the need to reset each display individually.

The RESET button is also used to set the variance and/or calibrate the compass. Refer to the Variance Procedure and Calibration Procedure in this section.

For more information on the features, control functions and setting procedures for the CMTC module, see the owner's manual in the vehicle glove box.

DIAGNOSIS AND TESTING - COMPASS MINI-TRIP COMPUTER

The following diagnostic procedure can be used if the compass mini-trip computer is not operational in any way. If the problem is specific to a individual CMTC display, go to the appropriate display title noted below and diagnose using the information provided on how these displays are generated.

(1) Remove the overhead console from the headliner (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).

(2) Using a ohmmeter, check the ground circuit cavity of the compass mini-trip computer electrical

connector for proper continuity to ground. Continuity should be present, If OK go to Step 3, If not OK repair the open or shorted ground circuit as required.

NOTE: Connect the negative battery cable before proceeding.

(3) Using a voltmeter, check the fused (B+) circuit cavity of the compass mini-trip computer electrical connector for 12v. Voltage should be present, If OK go to Step 4, If not OK repair the open or shorted fused (B+) circuit as required.

(4) Using a voltmeter, check the fused ignition switch output circuit cavity of the compass mini-trip computer electrical connector for 12v with Key ON. Voltage should be present, If OK, replace the inoperative CMTC module, If not OK repair the open or shorted fused ignition switch output circuit as required.

TEMPERATURE

The compass mini-trip computer receives Programmable Communications Interface bus (PCI bus) messages from the Body Control Module (BCM) for all displayed information except the compass display. If a dash (-) is displayed, the compass mini-trip computer is not receiving a PCI bus message from the BCM. To check out the PCI bus line and the BCM, use the DRB III® scan tool and proper Body Diagnostic Procedure Manual.

If the compass mini-trip computer displays a temperature more than 54° C (130° F), check for a short circuit between the temperature sensor and the BCM.

If the compass mini-trip computer displays a temperature less than -40° C (-67° F), check for an open circuit between the temperature sensor and the BCM.

AVERAGE FUEL ECONOMY

The compass mini-trip computer receives average fuel economy information from the BCM over the PCI bus line. If the compass mini-trip computer displays -.- instead of an average fuel economy value, it is not receiving a PCI bus message for the average fuel economy from the BCM. To check out the PCI bus line and the BCM use the DRB III® scan tool and proper Body Diagnostic Procedure Manual.

DISTANCE TO EMPTY

The compass mini-trip computer receives distance to empty information from the BCM over the PCI bus line. If compass mini-trip computer displays a dash (-) instead of a distance to empty value, it is not receiving a PCI bus message for the distance to empty from the BCM. To check out the PCI bus line

COMPASS/MINI-TRIP COMPUTER (Continued)

and the BCM use the DRB III® scan tool and proper Body Diagnostic Procedure Manual.

INSTANTANEOUS FUEL ECONOMY

The compass mini-trip computer receives instantaneous fuel economy information from the BCM over the PCI bus line. If compass mini-trip computer displays a dash (-) instead of an instantaneous fuel economy value, it is not receiving a PCI bus message for the instantaneous fuel economy from the BCM. To check out the PCI bus line and the BCM use the DRB III® scan tool and proper Body Diagnostic Procedure Manual.

TRIP ODOMETER

The compass mini-trip computer receives trip odometer information from the Cluster over the PCI bus line. If compass mini-trip computer displays dashes - - instead of the trip odometer value, it is not receiving a PCI bus message for the trip odometer from the cluster. To check out the PCI bus line and the Cluster, use the DRB III® scan tool and proper Body Diagnostic Procedure Manual.

ELAPSED TIME

The compass mini-trip computer receives a PCI bus message containing elapsed time information. If compass mini-trip computer displays dashes -- instead of the elapsed time, it is not receiving a PCI bus message for the elapsed time from the BCM. To check out the PCI bus line and the BCM, use the DRB III® scan tool and proper Body Diagnostic Procedure Manual.

COMPASS DISPLAY

To display the vehicle direction, the compass mini-trip computer processes information from a sensor internal to the module. The compass mini-trip computer is self-calibrating and requires only variance adjustments dependent upon location. The compass mini-trip computer displays the label CAL whenever the compass is in the fast calibration mode.

If all three of the following conditions listed below occur, the vehicle must be demagnetized.

- Compass portion of the display is blank
- Temperature portion of the display is OK
- The label CAL is illuminated

If demagnetizing the vehicle is needed, refer to the demagnetizing procedure in this section. After demagnetizing, to calibrate the compass refer to Calibration Procedure and to set the variance refer to Variance Procedure, both within this section. If the compass portion of the display is still blank, replace the compass mini-trip computer.

COMPASS MINI-TRIP COMPUTER - SELF DIAGNOSTIC TEST

(1) With the ignition switch in the OFF position simultaneously press the C/T and STEP buttons and hold.

(2) Turn the ignition switch ON, then release C/T and STEP buttons.

(3) The Compass mini-trip computer should light all segments on the VF Display Screen for 2-4 seconds. Check for segments that are not illuminated.

(4) If the compass mini-trip computer displays PASS, the module is OK.

(5) If the compass mini-trip computer displays FAIL, replace the module.

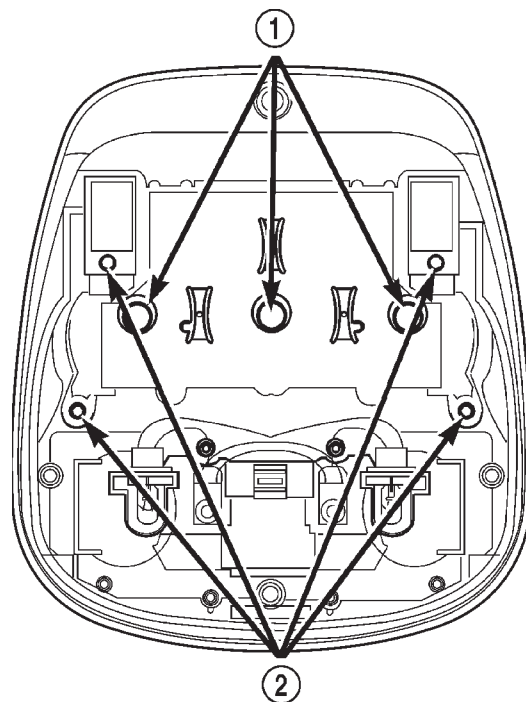
(6) If the compass mini-trip computer displays bUS, check for an open or a short on the PCI bus communication circuit.

(7) Press the C/T or the STEP button to exit the self-diagnostic test.

REMOVAL

(1) Remove overhead console, refer to Console Removal and Installation in this section.

(2) Remove mounting screws and release the map lamp wire connector from the compass mini-trip computer. (Fig. 6).



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Fig. 6 Compass Mini-Trip Computer Retaining Screws

- 1 - LAMPS
2 - MOUNTING SCREWS

COMPASS/MINI-TRIP COMPUTER (Continued)

(3) Remove the compass mini-trip computer from the overhead console.

INSTALLATION

(1) Install the compass mini-trip computer in the overhead console. Align the compass mini-trip computer guides on the housing with the grooves of the console.

(2) Install the mounting screws and install the map lamp wire connector on the compass mini-trip computer. Make sure the LOOP of wire that was clipped into the compass mini-trip computer module housing is properly clipped into the new module before the console is placed back into the headliner.

(3) Install the overhead console, refer to Console Installation in this section.

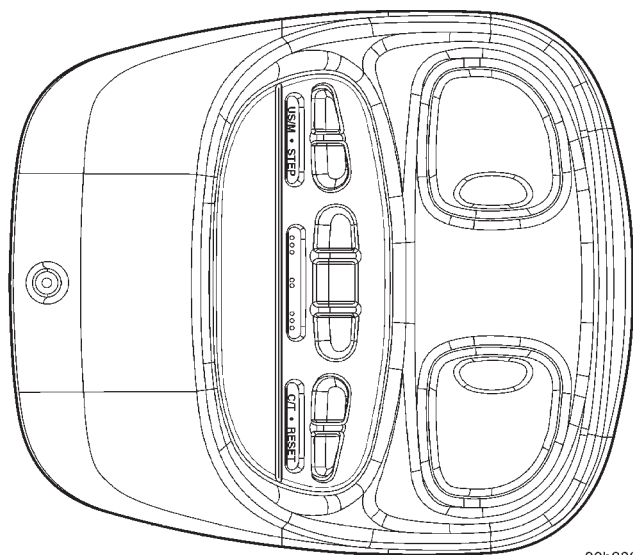
UNIVERSAL TRANSMITTER**DESCRIPTION**

Fig. 7 Overhead Console With Universal Transmitter

On some KJ models a Universal Transmitter transceiver is standard factory-installed equipment. The universal transmitter transceiver is integral to the Compass Mini-Trip Computer (CMTC), which is located in the overhead console. The only visible component of the universal transmitter are the three transmitter push buttons (Fig. 7) centered between the four CMTC push buttons located just rearward of the CMTC display screen in the overhead console. The three universal transmitter push buttons are identified with one, two or three light indicators so that they be easily identified by sight or by feel.

Each of the three universal transmitter push buttons controls an independent radio transmitter channel. Each of these three channels can be trained to

transmit a different radio frequency signal for the remote operation of garage door openers, motorized gate openers, home or office lighting, security systems or just about any other device that can be equipped with a radio receiver in the 286 to 399 MegaHertz (MHz) frequency range for remote operation. The universal transmitter is capable of operating systems using either rolling code or non-rolling code technology.

The CMTC module displays messages and a small house-shaped icon with one, two or three dots corresponding to the three transmitter buttons to indicate the status of the Universal Transmitter.

The Universal Transmitter cannot be repaired, and is available for service only as a unit with the CMTC module. This unit includes the push button switches and the plastic module and display lens. If any of these components is faulty or damaged, the complete CMTC module must be replaced.

OPERATION

The universal transmitter operates on a non-switched source of battery current so the unit will remain functional, regardless of the ignition switch position. For more information on the features, programming procedures and operation of the universal transmitter, see the owner's manual in the vehicle glove box.

DIAGNOSIS AND TESTING - UNIVERSAL TRANSMITTER

If the Universal Transmitter is inoperative, but the Compass Mini-Trip Computer (CMTC) is operating normally, see the owner's manual in the vehicle glove box for instructions on training the universal transmitter. Retrain the universal transmitter with a known good transmitter as instructed in the owner's manual and test the universal transmitter operation again. If the unit is still inoperative, replace the faulty universal transmitter and CMTC module as a unit. If both the universal transmitter and the CMTC module are inoperative, refer to **Diagnosis and Testing the Compass Mini-Trip Computer** in this section for further diagnosis. For complete circuit diagrams, refer to **Overhead Console** in Wiring Diagrams.

STANDARD PROCEDURE**STANDARD PROCEDURE - ERASING TRANSMITTER CODES**

To erase the universal transmitter codes, simply hold down buttons 1 and 3 until the two green dots below the house symbol begin to flash.

UNIVERSAL TRANSMITTER (Continued)

NOTE: Individual channels cannot be erased. Erasing the transmitter codes will erase ALL programmed codes.

STANDARD PROCEDURE - SETTING TRANSMITTER CODES

- (1) Turn off the engine.
- (2) Erase the factory test codes by pressing buttons 1 and 3. Release the buttons when the two green lights begin to flash (about 20 seconds).
- (3) Choose one of the three buttons to train. Place the hand-held transmitter within one inch of the universal transmitter and push the buttons on both transmitters. The green dot below the house symbol will begin to flash slowly.
- (4) When the red light on the universal transmitter begins to flash rapidly (this may take as long as 60 seconds), release both buttons. Your universal transmitter is now "trained". To train the other buttons, repeat Step 3 and Step 4. Be sure to keep your hand-held transmitter in case you need to retrain the universal transmitter.

AMBIENT TEMP SENSOR

DESCRIPTION

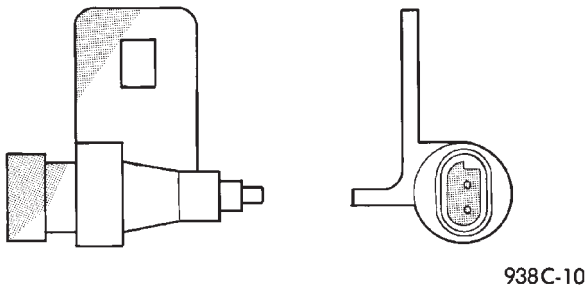


Fig. 8 Ambient Temperature Sensor

Ambient air temperature is monitored by the Compass Mini-Trip Computer (CMTc) through ambient temperature sensor messages received from the Body Control Module (BCM) over the Programmable Communications Interface (PCI) data bus network. The BCM receives a hard wired input from the ambient temperature sensor. The ambient temperature sensor (Fig. 8) is a variable resistor mounted in front the radiator, behind the grille, near the center of the vehicle.

Refer to **Body Control Module** in Electronic Control Modules. For complete circuit diagrams, refer to the appropriate wiring information. The ambient temperature sensor cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

OPERATION

The ambient temperature sensor is a variable resistor that operates on a five-volt reference signal sent to it by the BCM. The resistance in the sensor changes as temperature changes, changing the temperature sensor signal circuit voltage to the BCM. Based upon the resistance in the sensor, the BCM senses a specific voltage on the temperature sensor signal circuit, which it is programmed to correspond to a specific temperature. The BCM then sends the proper ambient temperature messages to the CMTc over the PCI data bus.

The thermometer function is supported by the ambient temperature sensor, a wiring circuit, the Body Control Module (BCM), the Programmable Communications Interface (PCI) data bus, and a portion of the Compass Mini-Trip Computer module.

The ambient temperature sensor circuit can also be diagnosed by referring to **Diagnosis and Testing - Ambient Temperature Sensor**, and **Diagnosis and Testing - Ambient Temperature Sensor Circuit**. If the temperature sensor and circuit are confirmed to be OK, but the temperature display is inoperative or incorrect, refer to **Diagnosis and Testing - Compass Mini-Trip Computer** in this section. For complete circuit diagrams, refer to the appropriate wiring information.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - AMBIENT TEMPERATURE SENSOR

(1) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Disconnect the ambient temperature sensor wire harness connector.

(2) Measure the resistance of the ambient temperature sensor. At -40°C (-40°F), the sensor resistance is 336 kilohms. At 55°C (140°F), the sensor resistance is 2.488 kilohms. The sensor resistance should read between these two values. If OK, refer to **Diagnosis and Testing - Ambient Temperature Sensor Circuit** in this group. If not OK, replace the faulty ambient temperature sensor.

DIAGNOSIS AND TESTING - AMBIENT TEMPERATURE SENSOR CIRCUIT

(1) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Disconnect the ambient temperature sensor wire harness connector and the Body Control Module wire harness connector.

(2) Connect a jumper wire between the two terminals in the body half of the ambient temperature sensor wire harness connector.

AMBIENT TEMP SENSOR (Continued)

(3) Check for continuity between the sensor return circuit and the ambient temperature sensor signal circuit cavities of the BCM wire harness connector. There should be continuity. If OK, go to Step 4. If not OK, repair the open sensor return circuit or ambient temperature sensor signal circuit to the ambient temperature sensor as required.

(4) Remove the jumper wire from the body half of the ambient temperature sensor wire harness connector. Check for continuity between the sensor return circuit cavity of the BCM wire harness connector and a good ground. There should be no continuity. If OK, go to Step 5. If not OK, repair the shorted sensor return circuit as required.

(5) Check for continuity between the ambient temperature sensor signal circuit cavity of the BCM wire harness connector and a good ground. There should be no continuity. If OK, refer to **Diagnosis and Testing - Compass Mini-Trip Computer** in this group. If not OK, repair the shorted ambient temperature sensor signal circuit as required.

REMOVAL

(1) Open hood, disconnect and isolate the negative battery cable.

(2) Remove the grille from the vehicle (Refer to 23 - BODY/EXTERIOR/GRILLE - REMOVAL).

(3) Disconnect the ambient temperature sensor electrical connector.

(4) Remove the ambient temperature sensor retaining screw and remove the sensor from the vehicle.

INSTALLATION

(1) Position the ambient temperature sensor and install the retaining screw.

(2) Connect the ambient temperature sensor electrical connector.

(3) Install the grille on the vehicle (Refer to 23 - BODY/EXTERIOR/GRILLE - INSTALLATION).

(4) Connect the negative battery cable.

POWER SYSTEMS

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POWER LOCKS

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POWER LOCKS

DESCRIPTION

POWER LOCKS

A power operated door and tailgate lock system is available factory-installed equipment on this model. The power lock system allows all of the doors and the

tailgate to be locked or unlocked electrically by operating a switch on either front door trim panel. The power lock system receives non-switched battery current through a fuse in the Junction Block (JB), so that the power locks remain operational, regardless of the ignition switch position.

The Body Control Module (BCM) locks the doors and tailgate automatically when the vehicle is driven beyond the speed of 25.7 Km/h (15 mph), all doors

POWER LOCKS (Continued)

are closed and the accelerator pedal is depressed. The rolling door lock feature can be disabled if desired.

This vehicle also offers several customer programmable features, which allows the selection of several optional electronic features to suit individual preferences.

The power lock system for this vehicle can also be operated remotely using the available Remote Keyless Entry (RKE) system radio frequency transmitters, if equipped.

Certain functions and features of the power lock system rely upon resources shared with other electronic modules in the vehicle over the Programmable Communications Interface (PCI) data bus network. For proper diagnosis of these electronic modules or of the PCI data bus network, the use of a DRBIII® scan tool and the appropriate diagnostic information are required.

REMOTE KEYLESS ENTRY

A Radio Frequency (RF) type Remote Keyless Entry (RKE) system is an available factory-installed option on this model. The RKE system allows the use of a remote battery-powered radio transmitter to signal the Body Control Module (BCM) to actuate the power lock system. The RKE receiver operates on non-switched battery current through a fuse in the Junction Block (JB), so that the system remains operational, regardless of the ignition switch position.

The RKE transmitters are also equipped with a Panic button. If the Panic button on the RKE transmitter is depressed, the horn will sound and the exterior lights will flash on the vehicle for about three minutes, or until the Panic button is depressed a second time. A vehicle speed of about 25.7 kilometers-per-hour (15 miles-per-hour) will also cancel the panic event.

The RKE system can also perform other functions on this vehicle. If the vehicle is equipped with the optional Vehicle Theft Security System (VTSS), the RKE transmitter will arm the VTSS when the Lock button is depressed, and disarm the VTSS when the Unlock button is depressed.

The RKE system includes two transmitters when the vehicle is shipped from the factory, but the system can retain the vehicle access codes of up to four transmitters. The transmitter codes are retained in the RKE receiver memory, even if the battery is disconnected. If an RKE transmitter is faulty or lost, new transmitter vehicle access codes can be programmed into the system using a DRBIII® scan tool.

This vehicle also offers several customer programmable features, which allows the selection of several optional electronic features to suit individual preferences.

Customer programmable feature options affecting the RKE system include:

- **Remote Unlock Sequence** - Allows the option of having only the driver side front door unlock when the RKE transmitter Unlock button is depressed the first time. The remaining doors and the tailgate unlock when the button is depressed a second time within 5 seconds of the first unlock press. Another option is having all doors and the tailgate unlock upon the first depression of the RKE transmitter Unlock button.

- **Sound Horn on Lock** - Allows the option of having the horn sound a short chirp as an audible verification that the RKE system received a valid Lock request from the RKE transmitter, or having no audible verification.

- **Flash Lights with Lock and Unlock** - Allows the option of having the lights flash as an optical verification that the RKE system received a valid Lock request or Unlock request from the RKE transmitter, or having no optical verification.

- **Programming Additional Transmitters** - Allows up to four transmitter vehicle access codes to be stored in the receiver memory.

Certain functions and features of the RKE system rely upon resources shared with other electronic modules in the vehicle over the Programmable Communications Interface (PCI) data bus network. The PCI data bus network allows the sharing of sensor information. This helps to reduce wire harness complexity, internal controller hardware, and component sensor current loads. For diagnosis of these electronic modules or of the PCI data bus network, the use of a DRBIII® scan tool and the appropriate diagnostic information are required.

TAILGATE / FLIP-UP GLASS POWER RELEASE SYSTEM

A power operated tailgate / flip-up glass release system is standard factory installed equipment on this model. The entire system is controlled by the Body Control Module (BCM). The tailgate / flip-up glass power release system allows the flip-up glass latch to be released electrically by actuating a switch located integral to the outside tailgate handle. By pulling the handle to the first detent or turning the key cylinder to unlock, the flip-up glass will open. Pulling the handle to the second detent will allow the tailgate to open.

The tailgate / flip-up glass release system operates on non-switched battery current supplied through a fuse in the junction block so that the system remains functional, regardless of the ignition switch position. However, the BCM prevents the flip-up glass latch from being actuated when the tailgate latch is locked.

POWER LOCKS (Continued)

The tailgate will lock and can not be unlocked if the rear wiper switch is activated. The tailgate will also lock if battery power is lost and then restored.

The tailgate/flip-up glass will not function with the battery discharged or disconnected.

COMBINATION FLASHER

This flasher can be energized by the BCM to flash all of the park/turn signal lamps as a optical alert for the RKE panic function and, if the Flash Lights with Lock programmable feature is enabled, as an optical verification for the RKE lock event.

HORN RELAY

This relay can be energized by the BCM to sound the horns as an audible alert for the RKE panic function and, if the Sound Horn on Lock programmable feature is enabled, as an audible verification for the RKE lock event.

LOW BEAM HEADLAMP RELAY

This relay can be energized by the BCM to flash the headlamp low beams as an optical alert for the RKE panic function.

OPERATION

POWER LOCKS

The Body Control Module (BCM) locks or unlocks the doors when an actuation input signal from a door lock switch or Remote Keyless Entry Module (RKE) is received. The BCM turns on the output drivers and provides a voltage level to the door lock motor for a specified time. All passenger doors can be locked or unlocked using a mechanical button mounted on the door trim panel. The front passenger doors and tailgate can be locked or unlocked by using the key cylinder (tailgate cylinder does not lock/unlock vehicle. It only unlocks the tailgate). The tailgate will lock and can not be unlocked if the rear wiper switch is activated (this prevents the wiper from operating when the tailgate is ajar). The tailgate will also lock if battery power is lost and then restored.

AUTOMATIC DOOR LOCKS

When the automatic door locks are ENABLED the door locks will lock when the vehicle is moving at about 25.7 Km/h (15 mph), all doors are closed and the accelerator pedal is depressed. This feature can be switched ON or OFF as desired. When the system is DISABLED the door locks will operate normally, but will not lock automatically when the vehicle is rolling. Once the automatic door locks have been actuated, they will not try to lock the doors again until a door is opened.

DOOR LOCK INHIBIT

If the key is in the ignition, in any position, and either front door is ajar, the doors can not be locked, but the unlock function still operates. Pressing the RKE lock/unlock button under these conditions will result in a normal lock/unlock activation.

After the key is removed from the Ignition Switch, or the doors are closed, the power door locks will operate normally.

DOOR LOCK CIRCUIT PROTECTION

The BCM controls the door lock relays. If the door lock switch is actuated continuously for more than five seconds the BCM will turn the output driver OFF (the BCM would consider the switch stuck). Each lock motor is protected with a Positive Temperature Coefficient device that prevents motor burn out.

REMOTE KEYLESS ENTRY

- **LOCK:** Pressing the LOCK button locks all doors, sounds horn (chirp) if enabled, and arms the Vehicle Theft Security System, if enabled. The chirp verifies that the RKE receiver has sent a message to the BCM for door lock operation. If a door has not been closed before pressing the LOCK button, the vehicle may not be secured and the VTSS (if equipped) will not arm until the door is closed.

- **UNLOCK:** Pressing the UNLOCK button once will unlock the driver's door and activate the illuminated entry system and disarm Vehicle Theft Security System, if equipped. Pressing the UNLOCK button twice within five seconds will unlock all doors.

- **TAILGATE:** Pressing the TAILGATE BUTTON unlocks the tailgate remotely and opens the flip-up glass.

- **PANIC:** Pressing the PANIC button sounds the horns at half second intervals, flashes the exterior lamps, and turns ON the interior lamps. The panic alarm will remain on for three minutes, or until the PANIC button is actuated again or the ignition switch is turned to the RUN position.

The Remote Keyless Entry Module is capable of retaining the transmitter Vehicle Access Code(s) in its memory even after vehicle power has been interrupted.

DIAGNOSIS AND TESTING - POWER LOCKS

The Body Control Module (BCM) enters a reduced power mode after the key is turned OFF. All diagnosis and testing of the power lock system must be done with the key in the ON position unless otherwise stated.

The most reliable, efficient, and accurate means to diagnose the power lock system requires the use of a DRBIII® scan tool and the

POWER LOCKS (Continued)

proper Diagnostic Procedures manual. The DRBIII® scan tool can provide confirmation that the PCI data bus is functional, that all of the electronic modules are sending and receiving the proper messages on the PCI data bus, and that the power lock motors are being sent the proper hard wired outputs by the relays for them to perform their power lock system functions.

Following are tests that will 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 Programmable Communications Interface (PCI) data bus network and all of the electronic modules that provide inputs to, or receive outputs from the power lock system components must be checked.

The Body Control Module (BCM) will set Diagnostic Trouble Codes (DTC) for the power lock system.

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. Then, proceed as follows:

- If the entire power lock system fails to function with either the power lock switches or the RKE transmitter, check the fused B(+) fuse in the junction Block (JB).

- If the power lock system functions with both power lock switches, but not with the RKE transmitter, proceed to diagnosis of the Remote Keyless Entry (RKE) system. (Refer to 8 - ELECTRICAL/POWER LOCKS/KEYLESS ENTRY TRANSMITTER - DIAGNOSIS AND TESTING) or (Refer to 8 - ELECTRICAL/POWER LOCKS/REMOTE KEYLESS ENTRY MODULE - DIAGNOSIS AND TESTING).

- If the power lock system functions with the RKE transmitter, but not with one or both power lock switches, proceed to diagnosis of the door lock switches. (Refer to 8 - ELECTRICAL/POWER LOCKS/POWER LOCK SWITCH - DIAGNOSIS AND TESTING).

- If the driver side power lock switch operates only the driver side front door power lock motor, but all other power lock motors operate with the passenger side power lock switch or the RKE transmitter, use a DRBIII® scan tool and the appropriate diagnos-

tic information to diagnose the Programmable Communications Interface (PCI) data bus.

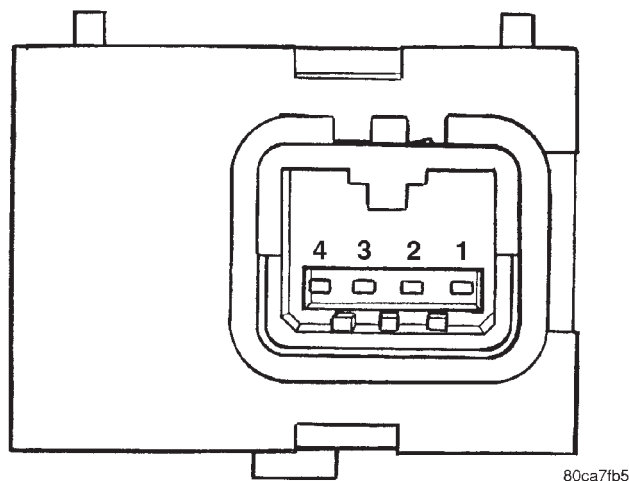
- If only one power lock motor fails to operate with both power lock switches and the RKE transmitter, proceed to diagnosis of the power lock motor. (Refer to 8 - ELECTRICAL/POWER LOCKS/POWER LOCK MOTOR - DIAGNOSIS AND TESTING).

DOOR LOCK / UNLOCK SWITCH

DIAGNOSIS AND TESTING - DOOR LOCK/ UNLOCK SWITCH

(1) Remove the switch to be tested (Refer to 8 - ELECTRICAL/POWER LOCKS/POWER LOCK SWITCH - REMOVAL).

(2) Using an ohmmeter, Test switch for resistance values (Fig. 1).



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Fig. 1 DOOR LOCK/UNLOCK SWITCH

DOOR LOCK SWITCH TEST

SWITCH POSITION	PINS	RESISTANCE VALUE
UNACTUATED	1 AND 4	5.0K OHM $\pm$ 10 %
LOCK	1 AND 4	1.4K OHM $\pm$ 10 %
UNLOCK	1 AND 4	426 OHM $\pm$ 10 %

(3) If test results are not obtained as shown in the test table, replace the switch.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

DOOR LOCK / UNLOCK SWITCH (Continued)

(2) Remove the door trim panel (Fig. 2) (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

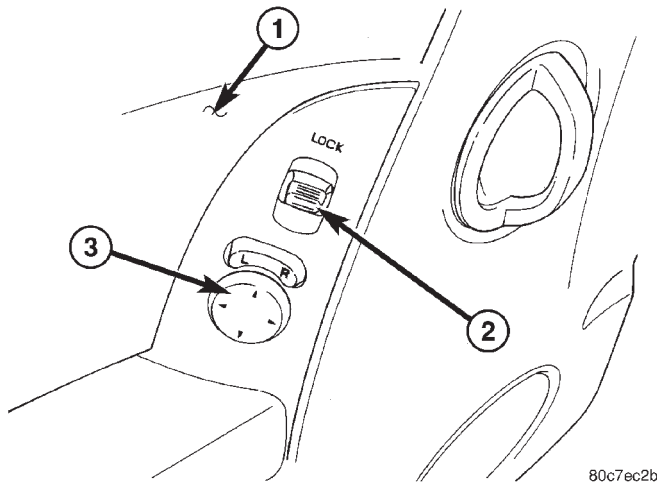


Fig. 2 DOOR LOCK SWITCH

- 1 - DOOR TRIM PANEL
- 2 - DOOR LOCK SWITCH
- 3 - POWER MIRROR SWITCH

(3) Disconnect electrical harness connector from switch.

(4) From behind the door trim panel, gently pry the switch from the door trim panel (Fig. 3).

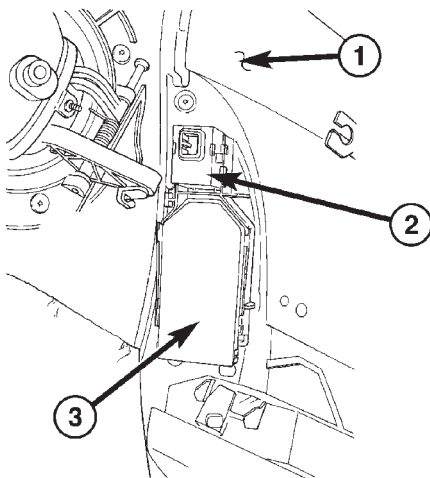


Fig. 3 DOOR LOCK/MIRROR SWITCH

- 1 - DOOR TRIM PANEL
- 2 - DOOR LOCK SWITCH
- 3 - POWER MIRROR SWITCH

INSTALLATION

- (1) Press the switch into place.
- (2) Connect the electrical harness connector to the switch.

(3) Install the door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

(4) Connect the battery negative cable.

DOOR LOCK MOTOR

DESCRIPTION

The lock mechanisms are actuated by a reversible electric motor mounted within each door and tailgate. The power lock motors are integral to the door latch units.

The power lock motors cannot be adjusted or repaired and, if faulty or damaged, the door latch unit must be replaced.

OPERATION

The door lock motors are controlled by relays. A positive and negative battery connection to the two motor terminals will cause the motor to move in one direction. Reversing the current will cause the motor to move in the opposite direction.

DIAGNOSIS AND TESTING - DOOR LOCK MOTOR

The most reliable, efficient, and accurate means to diagnose the power lock system requires the use of a DRBIII® scan tool and the proper Diagnostic Procedures manual. The DRBIII® scan tool can provide confirmation that the PCI data bus is functional, that all of the electronic modules are sending and receiving the proper messages on the PCI data bus, and that the power lock motors are being sent the proper hard wired outputs by the door modules 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.

FLIP-UP GLASS RELEASE SWITCH

DIAGNOSIS AND TESTING - FLIP-UP GLASS RELEASE SWITCH

(1) Disconnect and isolate the battery negative cable.

(2) Remove the tailgate trim panel (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILOUTLET/ TRIM PANEL - REMOVAL).

(3) Disconnect the wire harness connector.

FLIP-UP GLASS RELEASE SWITCH (Continued)

(4) Using an ohmmeter, check for continuity between the pins of the wire harness connector while pulling on the tailgate handle.

(5) If no continuity is found, replace the tailgate handle assembly (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/EXTERIOR HANDLE - REMOVAL).

DOOR LOCK RELAY

DESCRIPTION

The power door lock system uses the following relays for the front and rear passenger doors only:

- Driver door unlock relay
- Door lock relay
- Passenger Doors unlock relay

The tailgate uses outputs from the Body Control Module (BCM).

The relays are electromechanical devices that switch battery current to the door lock circuit when the Body Control Module (BCM) grounds the relay coil. These relays are located in the Junction Block (JB). For complete circuit diagrams, 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.

The relays are a International Standards Organization (ISO) micro-relay. Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions. The ISO micro-relay terminal functions are the same as a conventional ISO relay. However, the ISO micro-relay terminal pattern (or footprint) is different, the current capacity is lower, and the physical dimensions are smaller than those of the conventional ISO relay.

The relay cannot be repaired or adjusted and, if faulty or damaged, it must be replaced.

OPERATION

The ISO relay consists of an electromagnetic coil, a resistor and three (two fixed and one movable) electrical contacts. The movable (common feed) relay contact is held against one of the fixed contacts (normally closed) by spring pressure. When the electromagnetic coil is energized, it draws the movable contact away from the normally closed fixed contact, and holds it against the other (normally open) fixed contact.

When the electromagnetic coil is de-energized, spring pressure returns the movable contact to the normally closed position. The resistor is connected in parallel with the electromagnetic coil in the relay, and helps to dissipate voltage spikes that are produced when the coil is de-energized.

DIAGNOSIS AND TESTING - DOOR LOCK RELAY

The power lock relays (Fig. 4) are located in the Junction Block (JB) under the instrument panel. For complete circuit diagrams, 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.

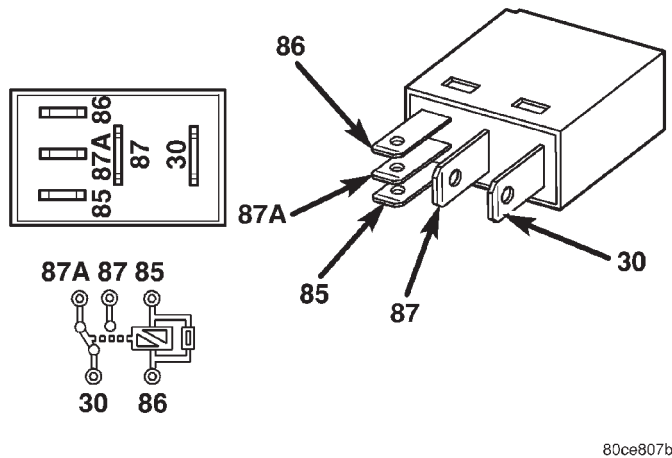
WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Remove suspected faulty relay from the (JB).
- (2) 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 Step 3. If not OK, replace the faulty relay.
- (3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 8 ohms. If OK, go to Step 4. If not OK, replace the faulty relay.
- (4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If not OK, replace the faulty relay.

REMOVAL

- (1) Disconnect and isolate the battery negative cable.
- (2) Reach up under instrument panel and remove the relay from Junction Block (JB).

DOOR LOCK RELAY (Continued)

**Fig. 4 Power Lock Relay**

- 30 - COMMON FEED
 85 - COIL GROUND
 86 - COIL BATTERY
 87 - NORMALLY OPEN
 87A - NORMALLY CLOSED

INSTALLATION

- (1) Position the horn relay in the proper receptacle in the Junction Block (JB).
- (2) Push down firmly on the relay until the terminals are fully seated.
- (3) Connect the battery negative cable.

REMOTE KEYLESS ENTRY MODULE**DESCRIPTION**

When an RKE lock message is sent to the Body Control Module (BCM), the BCM actuates the doors and the tailgate lock, the interior lighting is turned off, the horn chirps (if this feature is enabled), the exterior lamps flash (if this feature is enabled) and, if the vehicle is so equipped, the Vehicle Theft Security System (VTSS) is armed. When an RKE unlock message is sent to the BCM, the BCM actuates the driver side front door (or all doors and the tailgate if this feature is enabled) unlock, the interior lighting is turned on and, if the vehicle is so equipped, the VTSS is disarmed.

When an RKE panic message is sent to the BCM, the BCM actuates the driver side front door (or all doors and the tailgate if this feature is enabled) unlock, the interior lighting is turned on and, if the vehicle is so equipped, the VTSS is disarmed. The panic message will also cause the exterior lamps (including the headlights) to flash, and the horn to pulse for about three minutes, or until a second panic message is sent to the BCM. A vehicle speed of about 25.7 kilometers-per-hour (15 miles-per-hour) will also cancel the panic event.

Refer to the owner's manual for more information on the features, use and operation of the RKE system.

OPERATION

Whenever the vehicle battery power is interrupted, the Remote Keyless Module (RKE) Module will retain all vehicle access codes in its memory. When replacing or adding a key fob transmitter (maximum of 4) a DRB III® scan tool is required to program the RKE Module to accept the new Vehicle Access Code if a customer owned transmitter is not available.

If a functioning transmitter is available, (Refer to 8 - ELECTRICAL/POWER LOCKS/KEYLESS ENTRY TRANSMITTER - STANDARD PROCEDURE)

DIAGNOSIS AND TESTING - REMOTE KEYLESS ENTRY MODULE

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. Refer to the proper Body Diagnostic Procedures Manual for testing the Remote Keyless Entry system using a DRB III® scan tool.

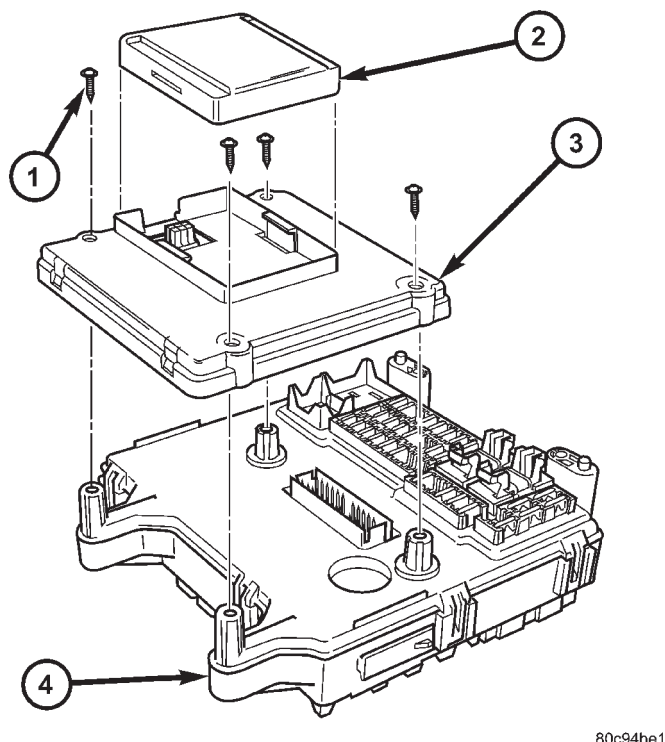
REMOVAL

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the Junction Block (JB) (Refer to 8 - ELECTRICAL/POWER DISTRIBUTION/JUNCTION BLOCK - REMOVAL).
- (3) Remove Remote Keyless Entry module from Body Control Module (Fig. 5).

INSTALLATION

- (1) Install Remote Keyless Entry module to Body Control Module.
- (2) Install Junction Block (JB) (Refer to 8 - ELECTRICAL/POWER DISTRIBUTION/JUNCTION BLOCK - INSTALLATION).
- (3) Connect the battery negative cable.

REMOTE KEYLESS ENTRY MODULE (Continued)



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Fig. 5 RKE Module Remove/Install

- 1 - SCREW (4)
- 2 - RKE MODULE
- 3 - BODY CONTROL MODULE
- 4 - JUNCTION BLOCK

REMOTE KEYLESS ENTRY TRANSMITTER

DIAGNOSIS AND TESTING - REMOTE KEYLESS ENTRY TRANSMITTER

The most reliable, efficient, and accurate means to diagnose the remote keyless entry transmitter requires the use of a DRBIII® scan tool and the proper Diagnostic Procedures manual. The DRBIII® scan tool can provide confirmation that the PCI data bus is functional, and that all of the electronic modules are sending and receiving the proper messages on the PCI data bus.

STANDARD PROCEDURE

STANDARD PROCEDURE - RKE TRANSMITTER BATTERIES

The Remote Keyless Entry (RKE) transmitter case snaps open and shut for battery access. To replace the RKE transmitter batteries:

(1) Using a thin coin, gently pry at the notch in the center seam of the RKE transmitter case halves near the key ring until the two halves unsnap.

(2) Lift the back half of the transmitter case off of the RKE transmitter.

(3) Remove the two batteries from the RKE transmitter.

(4) Replace the two batteries with new Panasonic 2016, or equivalent. Be certain that the batteries are installed with their polarity correctly oriented.

(5) Align the two RKE transmitter case halves with each other, and squeeze them firmly and evenly together until they snap back into place.

STANDARD PROCEDURE - RKE TRANSMITTER CUSTOMER PREFERENCES

AUTOMATIC (ROLLING) LOCKS

The rolling locks feature can be toggled ON/OFF by using the DRB III® only.

HORN CHIRP DISABLING / ENABLING

The horn chirp can be toggled using a DRB III® or by using the Remote Keyless Entry (RKE) transmitter.

To DISABLE (cancel) the horn chirp feature, press and hold the transmitter LOCK button for four to ten seconds. While pressing the LOCK button in, press the UNLOCK button. Release both buttons.

To ENABLE the horn chirp feature, repeat the above procedure.

OPTICAL CHIRP (FLASH) DISABLING / ENABLING

The optical chirp can be toggled using a DRB III® or by using the Remote Keyless Entry (RKE) transmitter.

To DISABLE (cancel) the optical chirp feature, press and hold the transmitter LOCK button for four to ten seconds. While pressing the LOCK button in, press the TAILGATE RELEASE button. Release both buttons.

To ENABLE the optical chirp feature, repeat the above procedure.

TAIL GATE RELEASE DELAY

Press the UNLOCK button for four to ten seconds. While pressing the UNLOCK button, press the TAIL GATE RELEASE button. Release both buttons.

This will toggle between PRESS AND HOLD and PRESS (no delay).

UNLOCK SEQUENCE

The unlock sequence can be toggled using a DRB III® or by using the Remote Keyless Entry (RKE) transmitter.

REMOTE KEYLESS ENTRY TRANSMITTER (Continued)

Press and hold the transmitter UNLOCK button for four to ten seconds. While pressing the UNLOCK button in, press the LOCK button. Release both buttons.

This will toggle between Driver door first and Unlock all doors function.

STANDARD PROCEDURE - RKE TRANSMITTER PROGRAMING

New Remote Keyless Entry (RKE) transmitters can be programed using the DRBIII® scan tool and the proper Diagnostic Procedures manual. The DRBIII® scan tool can provide confirmation that the PCI data bus is functional, and that all of the electronic modules are sending and receiving the proper messages on the PCI data bus.

The following procedure can be used as long as one functioning transmitter is available:

- (1) Using the original transmitter, press the UNLOCK button for 4 to 10 seconds.
- (2) Without releasing the UNLOCK button, press the PANIC button (within the 4 to 10 second interval).
- (3) Release both buttons.
- (4) Press LOCK and UNLOCK simultaneously on the original transmitter.
- (5) Release both buttons.
- (6) Press any button on the ORIGINAL transmitter. A chime tone from the instrument cluster will confirm the programming of the ORIGINAL transmitter.
- (7) On NEW transmitter, press LOCK and UNLOCK simultaneously.
- (8) Release both buttons.
- (9) Press any button on the NEW transmitter. A chime tone from the instrument cluster will confirm the programming of the NEW transmitter.
- (10) Up to four transmitters can be programed for one vehicle.

SPECIFICATIONS - REMOTE KEYLESS ENTRY TRANSMITTER**RANGE**

Normal operation range is up to a distance of 3 to 7 meters (10 to 23 ft.) of the vehicle. Range may be better or worse depending on the environment around the vehicle.

TAILGATE CYLINDER LOCK SWITCH**DESCRIPTION**

The tailgate cylinder lock switch is integral to the key lock cylinder inside the tailgate. The tailgate cylinder lock switch is a normally-open momentary switch that is hard wired directly to the Body Control Module (BCM), and closes a path to ground through an internal resistor when the lock cylinder is rotated to the unlock or lock position.

The tailgate cylinder lock switch cannot be adjusted or repaired.

OPERATION

The tailgate cylinder lock switch is actuated when the key is inserted in the lock cylinder and turned to the unlock or lock position. The tailgate cylinder lock switch closes a path to ground through an internal resistor for the Body Control Module (BCM) when the tailgate key lock cylinder is in the lock or unlock position, and opens the ground path when the lock cylinder is in the neutral position. The BCM reads the switch status, then sends the proper switch status messages to other electronic modules over the Programmable Communications Interface (PCI) data bus network. The tailgate cylinder lock switch unlock status message is used by the BCM as an input for Vehicle Theft Security System (VTSS) operation and to tell the BCM to lock or unlock the tailgate. There is no mechanical linkage between the tailgate key cylinder and the latches.

DIAGNOSIS AND TESTING - TAILGATE CYLINDER LOCK SWITCH

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove tailgate trim panel (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/TRIM PANEL - REMOVAL).
- (3) Disconnect tailgate cylinder lock switch harness connector.
- (4) Using a ohmmeter, test for resistances as shown in the Tailgate Cylinder Lock Switch Table.

TAILGATE CYLINDER LOCK SWITCH (Continued)

TAILGATE CYLINDER LOCK SWITCH TABLE

SWITCH POSITION	RESISTANCE
NEUTRAL	0 OHMS
LOCK (CLOCKWISE)	2 K OHMS $\pm$ 10 %
UNLOCK (COUNTER-CLOCKWISE)	470 OHMS $\pm$ 10 %

(5) If switch resistance is not correct, replace switch.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the tailgate trim panel.(Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/TRIM PANEL - REMOVAL).

(3) Remove the retainer clip from the pin on the back of the door lock cylinder (Fig. 6).

(4) Remove the washer from the pin on the back of the door lock cylinder.

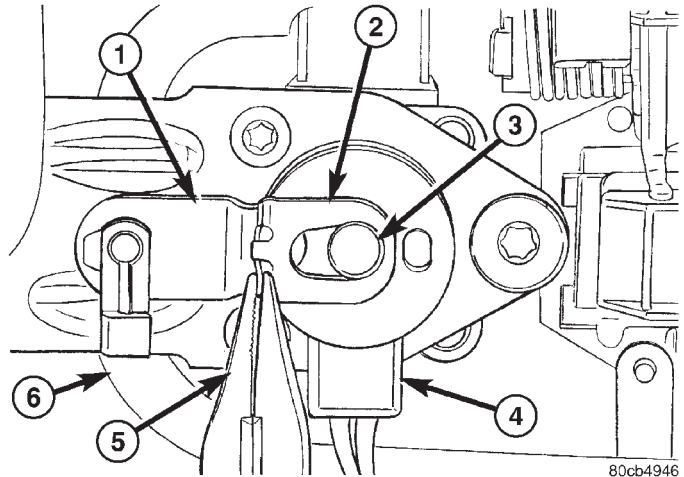
(5) Remove the door cylinder lock switch from the back of the lock cylinder.

INSTALLATION

(1) Position the tailgate cylinder lock switch onto the back of the lock cylinder with the wire harness oriented toward the bottom.

(2) Position the washer over the switch.

(3) Install the retainer clip onto the pin on the back of the tailgate lock cylinder. Be certain that the



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Fig. 6 Lock Cylinder Switch Remove/Install -Typical

- 1 - LEVER
- 2 - RETAINER
- 3 - LOCK CYLINDER
- 4 - SWITCH
- 5 - PLIERS
- 6 - OUTSIDE DOOR HANDLE

center tab of the retainer is engaged in the retention hole on the lock lever.

(4) Install the trim panel (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/TRIM PANEL - INSTALLATION).

(5) Connect the battery negative cable.

POWER MIRRORS

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POWER MIRRORS

DESCRIPTION

The available power operated sideview mirrors allow the driver to adjust both outside mirrors electrically from the drivers seat by operating a switch on the driver side front door trim panel (Fig. 1).

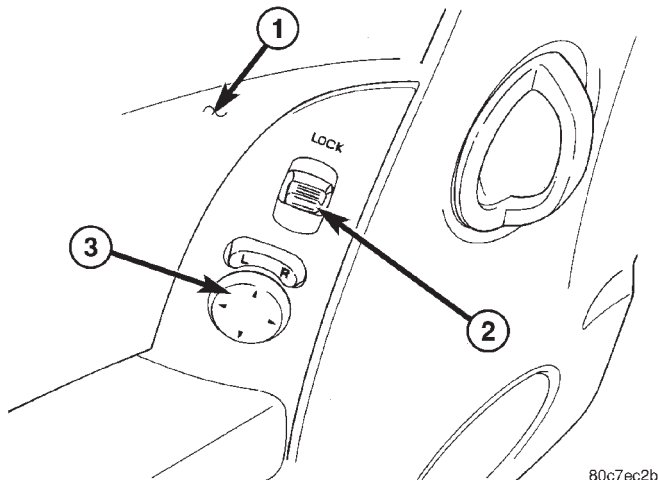


Fig. 1 POWER MIRROR SWITCH

- 1 - DOOR TRIM PANEL
- 2 - DOOR LOCK SWITCH
- 3 - POWER MIRROR SWITCH

OPERATION

The power mirrors receive ignition current through a fuse in the junction block, and will only operate when the ignition switch is in the Run position.

DIAGNOSIS AND TESTING - POWER MIRRORS

WIRING VOLTAGE TEST

The following wiring test determines whether or not voltage is continuous through the body harness to switch.

- (1) Remove the power mirror switch (Refer to 8 - ELECTRICAL/POWER MIRRORS/POWER MIRROR SWITCH - REMOVAL).
- (2) Disconnect wire connector from back of power mirror switch.
- (3) Switch ignition to the RUN position.
- (4) Connect the clip end of a 12 volt test light to Pin 5 in the harness connector at the mirror switch. Touch the test light probe to Pin 3.

If the test light illuminates, the wiring circuit between the battery and switch is OK.

If the lamp does not illuminate, first check fuse 25 in the Junction Block (JB). If fuse 25 is OK, then check for a broken wire.

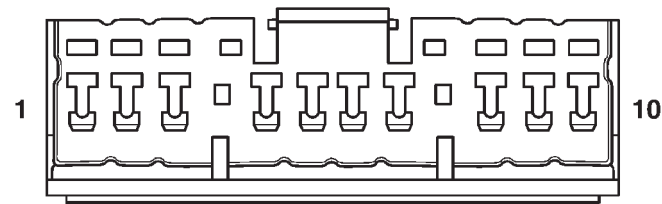
Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

POWER MIRROR MOTOR TEST

If the power mirror switch is receiving proper current and ground and mirrors do not operate, proceed with power mirror motor test. 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 MIRRORS (Continued)

- (1) Remove front door trim panel to gain access to power mirror wire connector (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).
- (2) Disconnect wire harness connector to power mirror switch (Fig. 2).
- (3) Using two jumper wires:
 - Connect one to a 12 volt source
 - Connect the other to a good body ground
 - Refer to the Mirror Motor Test Chart for proper wire connections at the switch connector



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Fig. 2 POWER MIRROR SWITCH CONNECTOR
MIRROR MOTOR TEST CHART

12 VOLTS	GROUND	MIRROR REACTION	
SWITCH CONNECTOR		RIGHT	LEFT
PIN 2	PIN 6	-	UP
PIN 6	PIN 1	-	LEFT
PIN 6	PIN 2	-	DOWN
PIN 1	PIN 6	-	RIGHT
PIN 9	PIN 6	UP	-
PIN 6	PIN 10	LEFT	-
PIN 6	PIN 9	DOWN	-
PIN 10	PIN 6	RIGHT	-

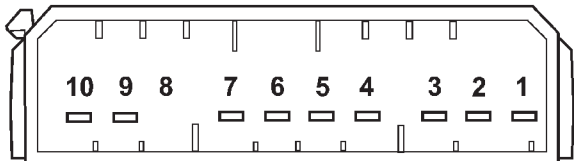
(4) If results shown in table are not obtained, check for open or shorted circuit. Replace mirror assembly as necessary.

POWER MIRROR SWITCH

DIAGNOSIS AND TESTING - POWER MIRROR SWITCH

- (1) Remove power mirror switch (Refer to 8 - ELECTRICAL/POWER MIRRORS/POWER MIRROR SWITCH - REMOVAL).

- (2) Disconnect wiring harness connector from switch.
- (3) Using a ohmmeter, test for continuity between the terminals of the switch (Fig. 3).
- (4) If results shown in the table are not obtained, replace the switch.



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Fig. 3 POWER MIRROR SWITCH
POWER MIRROR SWITCH TEST

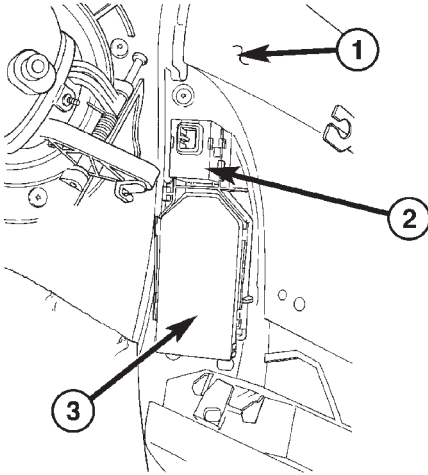
SWITCH POSITION	CONTINUITY BETWEEN
MIRROR SELECT SWITCH IN "LEFT" POSITION	
UP	5 AND 2
	3 AND 6
DOWN	5 AND 6
	3 AND 2
LEFT	5 AND 6
	3 AND 1
RIGHT	5 AND 1
	3 AND 6
MIRROR SELECT SWITCH IN "RIGHT" POSITION	
UP	5 AND 9
	3 AND 6
DOWN	5 AND 6
	3 AND 9
LEFT	5 AND 6
	3 AND 10
RIGHT	5 AND 10
	3 AND 6

POWER MIRROR SWITCH (Continued)**REMOVAL**

(1) Disconnect and isolate the battery negative cable.

(2) Remove door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(3) Disconnect wire harness connector from switch (Fig. 4).



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Fig. 4 DOOR LOCK/MIRROR SWITCH

- 1 - DOOR TRIM PANEL
 - 2 - DOOR LOCK SWITCH
 - 3 - POWER MIRROR SWITCH
-

(4) Remove switch from door trim panel.

INSTALLATION

(1) Install switch to door trim panel.

(2) Connect wire harness connector to switch.

(3) Install door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

(4) Connect battery negative cable.

SIDEVIEW MIRROR**REMOVAL**

(1) For removal procedures, (Refer to 23 - BODY/EXTERIOR/SIDE VIEW MIRROR - REMOVAL).

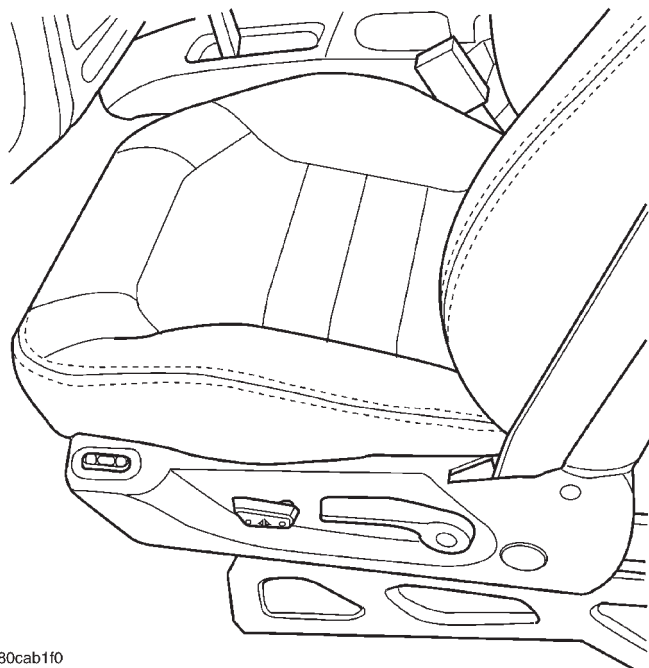
POWER SEATS

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POWER SEATS

DESCRIPTION



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Fig. 1 KJ Heated/Power Seat

Individually controlled, electrically powered front seats are available as factory-installed equipment on this model. Vehicles with this option can be visually identified by the two separate power seat switches, mounted on each of the front seat cushion side shields (Fig. 1). The power seat system option allows the front seating positions to be electrically adjusted

for optimum vehicle control and comfort. The power seat cushion can be adjusted forward, rearward, front up, front down, rear up, or rear down. The power seat system for this vehicle includes the following major components, which are described in further detail later in this section:

- **Power Seat Switches** - Two power seat switches are used per vehicle, one for the driver and one for the front seat passenger. Refer to the left and right power seat switch information later in this section.

- **Power Seat Tracks** - Two power seat tracks are used per vehicle, one for the driver and one for the front seat passenger seats. Refer to the power seat track information later in this section.

- **Circuit Breaker** - An automatic resetting circuit breaker (# 1) is located in the Junction Block and is used to protect the power seat system from current overload.

Hard wired circuitry connects the power seat 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, to the vehicle electrical system and to the power seat 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 **Wiring** section of this manual for more 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 SEATS (Continued)

OPERATION

The power seat system receives battery current through a fuse in the Power Distribution Center (PDC) and a circuit breaker in the Junction Block, regardless of the ignition switch position.

When a power seat switch control knob or knobs are actuated, a battery feed and a ground path are applied through the switch contacts to the appropriate power seat track adjuster motor. The selected adjuster motor operates to move the seat track through its drive unit in the selected direction until the switch is released, or until the travel limit of the seat track 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.

Refer to the owner's manual in the vehicle glove box for more information on the features, use and operation of the power seat system.

DIAGNOSIS AND TESTING - POWER SEATS

Before any testing of the power seat system is attempted, the battery should be fully-charged and all wire harness connections and pins cleaned and tightened to ensure proper continuity and grounds. 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 joint connector location views for the various wire harness connectors, splices and grounds.

(1) If all power seats are inoperative, check the automatic resetting circuit breaker in the Junction Block. (Refer to 8 - ELECTRICAL/POWER DISTRIBUTION/CIRCUIT BREAKER - DIAGNOSIS AND TESTING).

(2) With the dome lamp on, apply the power seat switch in the direction of the failure.

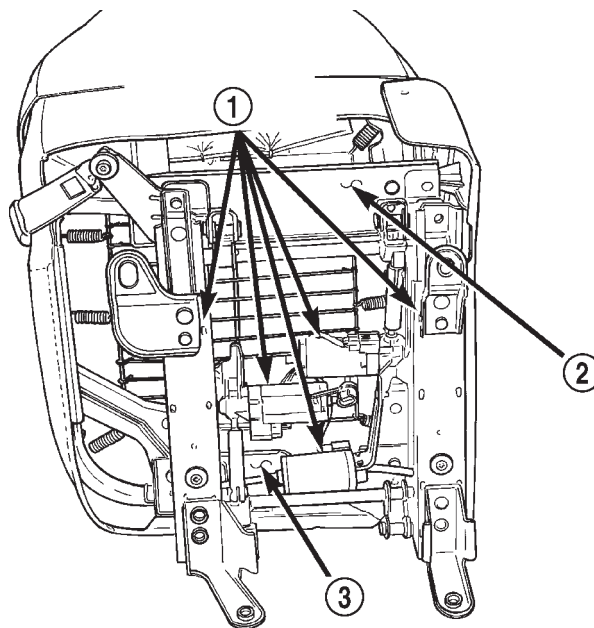
(3) If the dome lamp dims, the seat or the power seat track may be jammed. Check under and behind the seat for binding or obstructions.

(4) If the dome lamp does not dim, proceed with testing of the individual power seat system components and circuits.

SEAT TRACK

DESCRIPTION

The six-way power seat option includes a power seat track assembly located under each front seat (Fig. 2). The power seat track assembly replaces the standard manually operated seat tracks. The lower half of the power seat track is secured at the front



80abd270

Fig. 2 Power Seat Track - Typical

- 1 - POWER SEAT ADJUSTER AND MOTORS
- 2 - SEAT CUSHION FRAME
- 3 - POWER SEAT TRACK ASSEMBLY

with two bolts to the floor panel seat cross member, and at the rear with one bolt and one nut to the floor panel. Four bolts secure the bottom of the seat cushion frame to the upper half of the power seat track unit.

The power seat track assembly cannot be repaired, and is serviced only as a complete assembly. If any component in this assembly is faulty or damaged, the entire power seat track must be replaced.

OPERATION

The power seat track unit includes three reversible electric motors that are secured to the upper half of the track unit. Each motor moves the seat adjuster through a combination of worm-drive gearboxes and screw-type drive units. Each of the three driver side power seat track motors also has a position potentiometer integral to the motor assembly, which electronically monitors the motor position.

The front and rear of the seat are operated by two separate vertical adjustment motors. These motors can be operated independently of each other, tilting the entire seat assembly forward or rearward; or, they can be operated in unison by selecting the proper power seat switch functions, which will raise or lower the entire seat assembly. The third motor is the horizontal adjustment motor, which moves the seat track in the forward and rearward directions.

SEAT TRACK (Continued)

DIAGNOSIS AND TESTING - SEAT TRACK

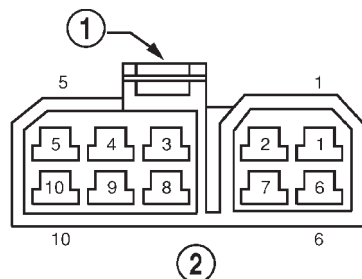
(1) Remove the power seat switch from the seat (Refer to 8 - ELECTRICAL/POWER SEATS/DRIVER SEAT SWITCH - REMOVAL).

(2) Checking the body harness side of the power seat switch electrical connector (Fig. 3), check Pin 1 for ground and Pin 5 for battery voltage. If either of these two are not present repair the body harness as required.

(3) To test the seat motors and verify proper seat responses, refer to the Seat Motor Test table below. Using two jumper wires, connect one to a battery supply and the second to a ground. Connect the other ends to the seat wire harness connector as described in the Seat Motor Test table.

SEAT MOTOR TEST

SEAT SWITCH CONNECTOR			
CONNECT JUMPER		SEAT ACTION	
B(+)	B(-)	LEFT SIDE	RIGHT SIDE
PIN 9	PIN 8	FRONT RISER UP	FRONT RISER DOWN
PIN 8	PIN 9	FRONT RISER DOWN	FRONT RISER UP
PIN 3	PIN 6	FORWARD	FORWARD
PIN 6	PIN 3	REARWARD	REARWARD
PIN 10	PIN 7	REAR RISER UP	REAR RISER DOWN
PIN 7	PIN 10	REAR RISER DOWN	REAR RISER UP

REMOVAL

80b30851

Fig. 3 POWER SEAT SWITCH HARNESS PIN IDENTIFICATION

1 - CONNECTOR RETAINING TAB

2 - VIEWED FROM BODY HARNESS END

(1) Remove the appropriate seat from the vehicle. (Refer to 23 - BODY/SEATS/SEAT - REMOVAL).

(2) Remove the seat cushion side shield from the seat (Refer to 23 - BODY/SEATS/SEAT CUSHION SIDE COVERS - REMOVAL).

(3) Remove four seat track mounting bolts from cushion pan.

(4) Disconnect the power seat electrical and remove the seat track from the seat cushion.

INSTALLATION

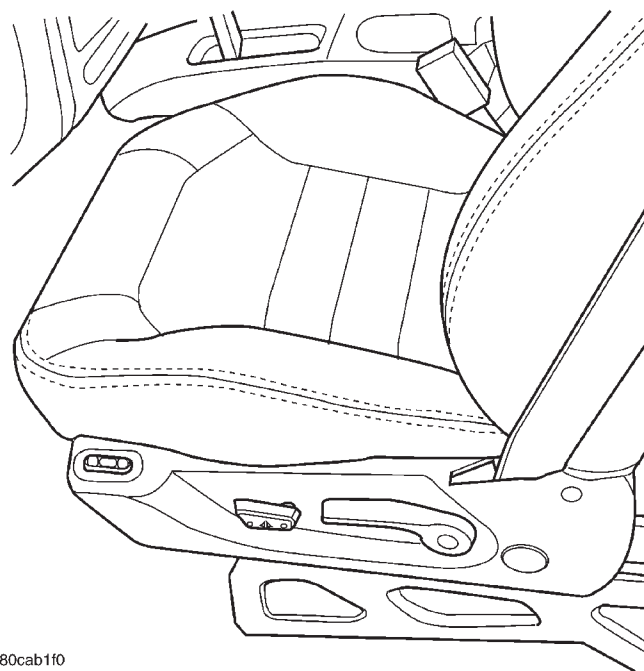
(1) Position the seat track and install the retaining bolts in the seat cushion pan. Torque the bolts to 45-60 N·m.

(2) Route and connect the power seat electrical on the seat track and cushion pan.

(3) Install the seat cushion side shield on the seat. Refer to the Body section for the procedure.

(4) Install the seat in the vehicle (Refer to 23 - BODY/SEATS/SEAT - INSTALLATION).

(5) Connect the negative battery cable.

LEFT POWER SEAT SWITCH**DESCRIPTION****Fig. 4 KJ Heated/Power Seat**

Vehicles equipped with the power seat option utilize a six-way power seat switch. This six-way power seat switch features one seat cushion shaped knob, visible on the outboard seat cushion side shield (Fig. 4).

The switch is secured to the back of the seat cushion side shield with two screws. However, the control knob must be removed before the seat switch can be removed from the side shield.

LEFT POWER SEAT SWITCH (Continued)

The individual switches internal to the power seat switch cannot be repaired. If one switch is damaged or faulty, the entire power seat switch unit must be replaced.

OPERATION

The power seat tracks can be adjusted in six different ways using the power seat switches. See the owner's manual in the vehicle glove box for more information on the power seat switch functions and the seat adjusting procedures.

When a power seat switch control knob or knobs are 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 track through its drive unit in the selected direction until the switch is released, or until the travel limit of the seat track 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.

No power seat switch should be held applied in any direction after the seat track 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 must not be allowed to continue, or the motor may be damaged.

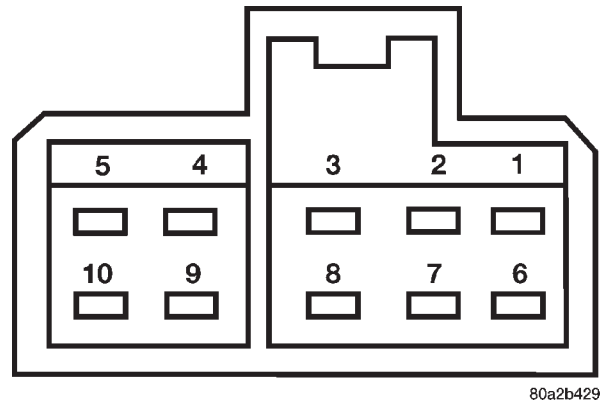
DIAGNOSIS AND TESTING - LEFT POWER SEAT SWITCH

For complete circuit diagrams, refer to **Power Seat** in Wiring Diagrams.

(1) Disconnect and isolate the battery negative cable.

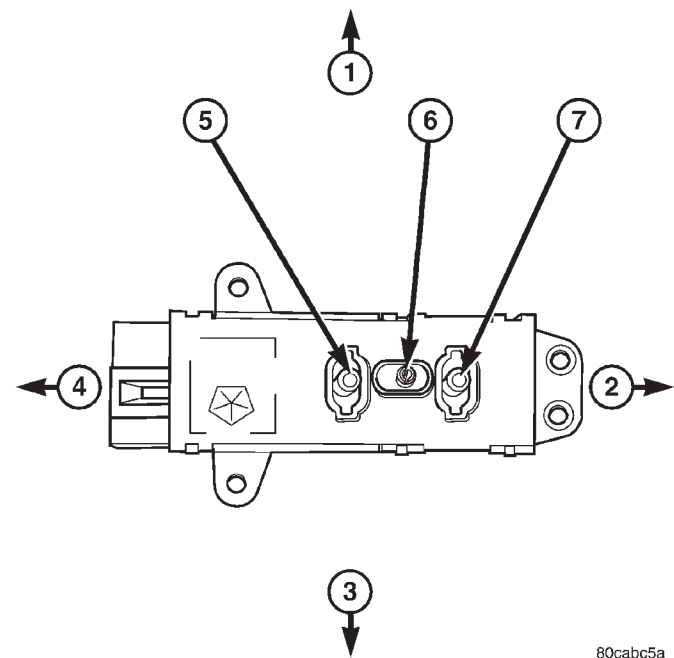
(2) Remove the power seat switch from the outboard seat cushion side shield.

(3) Use an ohmmeter to test the continuity of the power seat switch in each switch position. See the Power Seat Switch Continuity chart (Fig. 5) and switch (Fig. 6) below. If OK, refer to **Diagnosis and Testing the Power Seat Track** in this section. If not OK, replace the faulty power seat switch unit.



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Fig. 5 SIX-WAY POWER SEAT SWITCH CONTINUITY



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Fig. 6 DIAGNOSING POWER SEAT SWITCH

- 1 - UP
- 2 - REARWARD
- 3 - DOWN
- 4 - FORWARD
- 5 - FRONT RISER SWITCH
- 6 - CENTER SEAT SWITCH
- 7 - REAR RISER SWITCH

LEFT POWER SEAT SWITCH (Continued)

SWITCH POSITION	CONTINUITY BETWEEN PINS	
	DRIVER SEAT	PASSENGER SEAT
OFF	PIN 1 to 3	PIN 1 to 3
	PIN 1 to 6	PIN 1 to 6
	PIN 1 to 7	PIN 1 to 7
	PIN 1 to 8	PIN 1 to 8
	PIN 1 to 9	PIN 1 to 9
	PIN 1 to 10	PIN 1 to 10
FRONT RISER UP	PIN 1 to 8	PIN 1 to 8
	PIN 5 to 9	PIN 5 to 9
FRONT RISER DOWN	PIN 1 to 9	PIN 1 to 9
	PIN 5 to 8	PIN 5 to 8
CENTER SWITCH FORWARD	PIN 1 to 6	PIN 1 to 6
	PIN 5 to 3	PIN 5 to 3
CENTER SWITCH REARWARD	PIN 1 to 3	PIN 1 to 3
	PIN 5 to 6	PIN 5 to 6
REAR RISER UP	PIN 1 to 7	PIN 1 to 7
	PIN 5 to 10	PIN 5 to 10
REAR RISER DOWN	PIN 1 to 10	PIN 1 to 10
	PIN 5 to 7	PIN 5 to 7

REMOVAL

(1) Disconnect and isolate the negative battery cable.

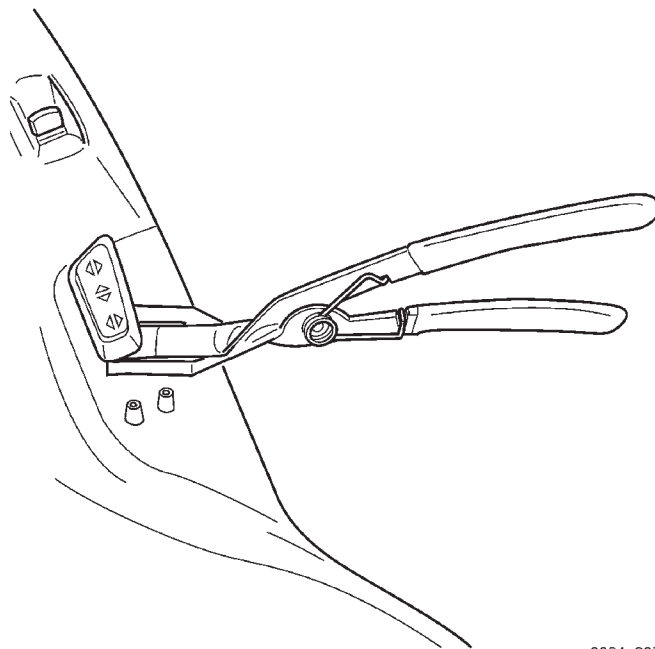
(2) Using a push pin remover or another suitable wide flat-bladed tool, gently pry the power seat switch knob off of the switch control levers (Fig. 7).

(3) Remove the two forward-most screws that secure the outboard seat cushion side shield to the seat cushion frame.

(4) Remove the recliner handle retaining screw and remove the recliner handle.

(5) Pull the outboard seat cushion side shield away from the seat cushion frame far enough to access the power seat switch wire harness tiestrap and connector. Cut the tiestrap, if equipped.

(6) Disconnect the power seat wire harness connector from the power seat switch connector receptacle. Depress the connector retaining tab and pull straight apart.



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Fig. 7 REMOVING SWITCH CONTROL KNOB - TYPICAL

(7) Using a very short phillips-headed screwdriver, remove the two screws that secure the power seat switch to the inside of the outboard seat cushion side shield.

(8) Remove the power seat switch from the outboard seat cushion side shield.

INSTALLATION

(1) Reconnect the power seat wire harness connector to the power seat switch connector receptacle.

(2) Position the power seat switch onto the outboard seat cushion side shield. Make certain the alignment dowel is inserted into the corresponding hole in the power seat switch.

(3) Install and tighten the two screws that secure the power seat switch to the inside of the outboard seat cushion side shield. Tighten the screws to 1.5 N·m (14 in. lbs.).

(4) Position the outboard seat cushion side shield onto the seat cushion frame

(5) Install and tighten the two screws that secure the outboard seat cushion side shield to the seat cushion frame. Tighten the screws to 1.5 N·m (14 in. lbs.).

(6) Install the recliner handle and retaining screw. Tighten the screws to 1.5 N·m (14 in. lbs.).

(7) Position the power seat switch knob onto the switch control levers and push firmly and evenly until it snaps into place.

(8) Reconnect the battery negative cable.

RIGHT POWER SEAT SWITCH

DESCRIPTION

Vehicles equipped with the power seat option utilize a six-way power seat switch. This six-way power seat switch features one seat cushion shaped knob, visible on the outboard seat cushion side shield.

The switch is secured to the back of the seat cushion side shield with two screws. However, the control knob must be removed before the seat switch can be removed from the side shield.

The individual switches internal to the power seat switch cannot be repaired. If one switch is damaged or faulty, the entire power seat switch unit must be replaced.

OPERATION

The power seat tracks can be adjusted in six different ways using the power seat switches. See the owner's manual in the vehicle glove box for more information on the power seat switch functions and the seat adjusting procedures.

When a power seat switch control knob or knobs are 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 track through its drive unit in the selected direction until the switch is released, or until the travel limit of the seat track 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.

No power seat switch should be held applied in any direction after the seat track 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 must not be allowed to continue, or the motor may be damaged.

DIAGNOSIS AND TESTING - RIGHT POWER SEAT SWITCH

For complete circuit diagrams, refer to **Power Seat** in Wiring Diagrams.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the power seat switch from the outboard seat cushion side shield.

(3) Use an ohmmeter to test the continuity of the power seat switch in each switch position. See the Power Seat Switch Continuity chart (Fig. 8) and switch (Fig. 9) below. If OK, refer to **Diagnosis and Testing the Power Seat Track** in this section. If not OK, replace the faulty power seat switch unit.

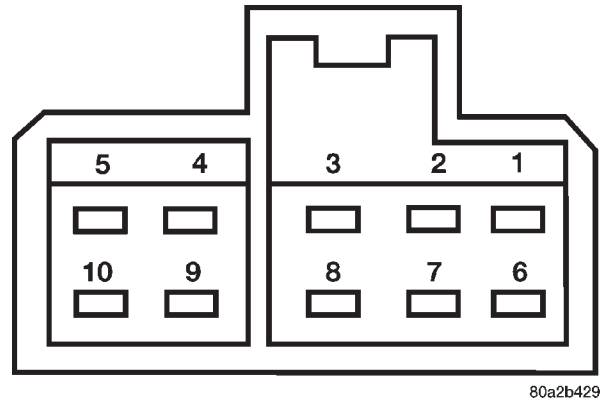


Fig. 8 SIX-WAY POWER SEAT SWITCH CONTINUITY

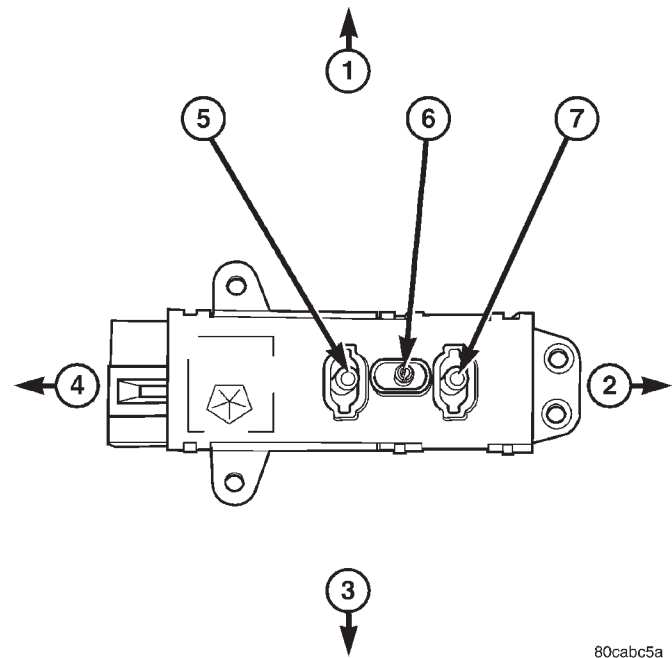


Fig. 9 DIAGNOSING POWER SEAT SWITCH

- 1 - UP
- 2 - REARWARD
- 3 - DOWN
- 4 - FORWARD
- 5 - FRONT RISER SWITCH
- 6 - CENTER SEAT SWITCH
- 7 - REAR RISER SWITCH

RIGHT POWER SEAT SWITCH (Continued)

SWITCH POSITION	CONTINUITY BETWEEN PINS	
	DRIVER SEAT	PASSENGER SEAT
OFF	PIN 1 to 3	PIN 1 to 3
	PIN 1 to 6	PIN 1 to 6
	PIN 1 to 7	PIN 1 to 7
	PIN 1 to 8	PIN 1 to 8
	PIN 1 to 9	PIN 1 to 9
	PIN 1 to 10	PIN 1 to 10
FRONT RISER UP	PIN 1 to 8	PIN 1 to 8
	PIN 5 to 9	PIN 5 to 9
FRONT RISER DOWN	PIN 1 to 9	PIN 1 to 9
	PIN 5 to 8	PIN 5 to 8
CENTER SWITCH FORWARD	PIN 1 to 6	PIN 1 to 6
	PIN 5 to 3	PIN 5 to 3
CENTER SWITCH REARWARD	PIN 1 to 3	PIN 1 to 3
	PIN 5 to 6	PIN 5 to 6
REAR RISER UP	PIN 1 to 7	PIN 1 to 7
	PIN 5 to 10	PIN 5 to 10
REAR RISER DOWN	PIN 1 to 10	PIN 1 to 10
	PIN 5 to 7	PIN 5 to 7

REMOVAL

(1) Disconnect and isolate the negative battery cable.

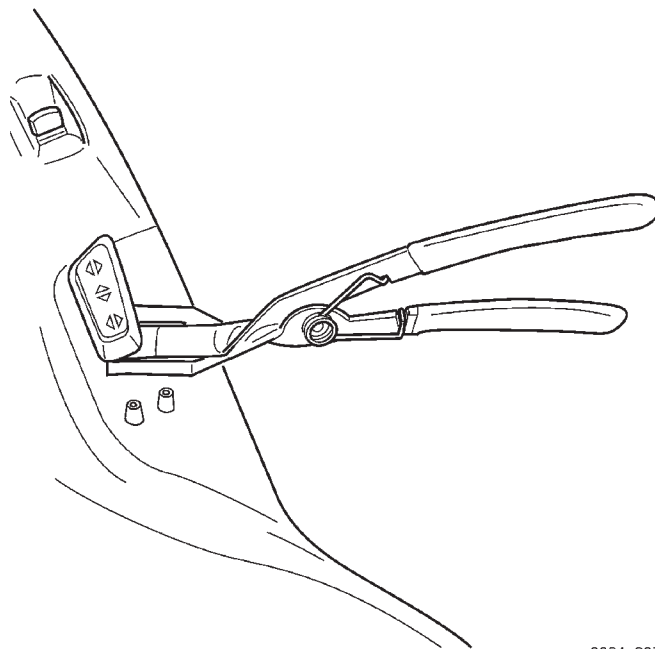
(2) Using a push pin remover or another suitable wide flat-bladed tool, gently pry the power seat switch knob off of the switch control levers (Fig. 10).

(3) Remove the two forward-most screws that secure the outboard seat cushion side shield to the seat cushion frame.

(4) Remove the recliner handle retaining screw and remove the recliner handle.

(5) Pull the outboard seat cushion side shield away from the seat cushion frame far enough to access the power seat switch wire harness tiestrap and connector. Cut the tiestrap, if equipped.

(6) Disconnect the power seat wire harness connector from the power seat switch connector receptacle. Depress the connector retaining tab and pull straight apart.



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Fig. 10 REMOVING SWITCH CONTROL KNOB - TYPICAL

(7) Using a very short phillips-headed screwdriver, remove the two screws that secure the power seat switch to the inside of the outboard seat cushion side shield.

(8) Remove the power seat switch from the outboard seat cushion side shield.

INSTALLATION

(1) Reconnect the power seat wire harness connector to the power seat switch connector receptacle.

(2) Position the power seat switch onto the outboard seat cushion side shield. Make certain the alignment dowel is inserted into the corresponding hole in the power seat switch.

(3) Install and tighten the two screws that secure the power seat switch to the inside of the outboard seat cushion side shield. Tighten the screws to 1.5 N·m (14 in. lbs.).

(4) Position the outboard seat cushion side shield onto the seat cushion frame

(5) Install and tighten the two screws that secure the outboard seat cushion side shield to the seat cushion frame. Tighten the screws to 1.5 N·m (14 in. lbs.).

(6) Install the recliner handle and retaining screw. Tighten the screws to 1.5 N·m (14 in. lbs.).

(7) Position the power seat switch knob onto the switch control levers and push firmly and evenly until it snaps into place.

(8) Reconnect the battery negative cable.

POWER WINDOWS

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POWER WINDOWS

DESCRIPTION

The power window system allows each of the door windows to be raised and lowered electrically by actuating a switch on the center console. A master switch on the front of the center console allows the driver to raise or lower each of the passenger door windows and to lock out the individual switches on the rear of the center console from operation. The power window system receives battery feed through fuse 13 in the Power Distribution Center (PDC), only when the ignition switch is in the RUN or ACCESSORY position.

OPERATION

WINDOW SWITCH

The power window switches control the battery and ground feeds to the power window motors. Both of the rear door power window switches receive their battery and ground feeds through the circuitry of the front window switch. When the power window lock-out switch is in the Lock position, the battery feed for the rear door window switches is interrupted.

WINDOW MOTOR

Front door window lift motors use permanent type magnets. The B+ and ground applied at the motor terminal pins will cause the motor to rotate in one direction. Reversing current through the motor terminals will cause the motor to rotate in the opposite direction.

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 - POWER WINDOWS

WIRING VOLTAGE TEST

The following wiring test determines whether or not voltage is continuous through the body harness to the front switch.

(1) Remove the power window switch and bezel (Refer to 8 - ELECTRICAL/POWER WINDOWS/POWER WINDOW SWITCH - REMOVAL).

(2) Disconnect wire connector from back of power window switch.

(3) Switch ignition to the ON position.

(4) Connect the clip end of a 12 volt test light to Pin 14 of the window switch harness connector. Touch the test light probe to Pin 10.

- If the test light illuminates, the wiring circuit between the battery and switch is OK.

- If the lamp does not illuminate, first check fuse 13 in the Power Distribution Center (PDC). If fuse 13 is OK, then check for a broken wire.

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 WINDOW MOTOR TEST

If the power window motor is receiving proper current and ground and does not operate, proceed with motor test. 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 front door trim panel as necessary to gain access to power window motor wire connector

POWER WINDOWS (Continued)

(Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(2) Disconnect power window motor wire connector from door harness.

(3) Using two jumper wires, connect one to a battery (+) source and the other to a good ground (-).

(4) Connect the Negative (-) jumper probe to one of the motor connector terminals.

(5) Momentarily touch the Positive (+) jumper probe to the other motor connector terminal.

When positive probe is connected the motor should rotate in one direction to either move window up or down. If window is all the way up or down the motor will grunt and the inner door panel will flex when actuated in that one direction.

(6) Reverse jumper probes at the motor connector terminals and window should now move in opposite direction. If window does not move or grunt, replace the motor.

If window moved completely up or down, reverse the jumper probes and cycle window to the opposite position to verify full operation.

If motor grunts and does not move, verify that regulator is not binding.

WINDOW MOTOR

REMOVAL

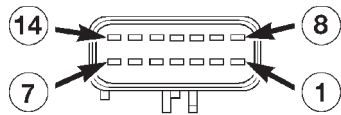
The window motor is incorporated into the window regulator assembly. If the window motor requires replacement, the window regulator must be replaced. (Refer to 23 - BODY/DOOR - FRONT/WINDOW REGULATOR - REMOVAL) or (Refer to 23 - BODY/DOORS - REAR/WINDOW REGULATOR - REMOVAL).

WINDOW SWITCH

DIAGNOSIS AND TESTING - WINDOW SWITCH

(1) Remove the switch to be tested (Refer to 8 - ELECTRICAL/POWER WINDOWS/POWER WINDOW SWITCH - REMOVAL).

(2) Using an ohmmeter, Test front switch for continuity (Fig. 1).



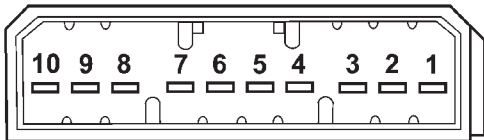
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Fig. 1 FRONT WINDOW SWITCH
POWER WINDOW FRONT SWITCH TEST

SWITCH POSITION	CONTINUITY BETWEEN
OFF	14 AND 4
	14 AND 5
	14 AND 6
	14 AND 7
	14 AND 9
	14 AND 11
	14 AND 12
	14 AND 13
LEFT FRONT UP	10 AND 11
LEFT FRONT DOWN	10 AND 9
RIGHT FRONT UP	10 AND 12
RIGHT FRONT DOWN	10 AND 13
LEFT REAR UP	10 AND 5
LEFT REAR DOWN	10 AND 4
RIGHT REAR UP	10 AND 7
RIGHT REAR DOWN	10 AND 6
LOCKOUT (LOCKED)	NO CONTINUITY BETWEEN 10 AND 2
LOCKOUT (UNLOCKED)	10 AND 2

(3) If the proper results are not obtained, replace the front window switch.

(4) Test rear switch for continuity (Fig. 2).



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Fig. 2 REAR WINDOW SWITCH

WINDOW SWITCH (Continued)

POWER WINDOW REAR SWITCH TEST

SWITCH POSITION	CONTINUITY BETWEEN
OFF	1 AND 3
	4 AND 2
	7 AND 10
	8 AND 9
LEFT UP	10 AND 6
LEFT DOWN	6 AND 8
RIGHT UP	5 AND 2
RIGHT DOWN	5 AND 3

(5) If the proper results are not obtained, replace the rear window switch.

The power window master switch has a Auto-Down feature on both front windows. The switch is equipped with two detent positions when actuating the power window OPEN. The first detent position allows the window to roll down and stop when the switch is released. The second detent position actuates an integral express roll down relay that rolls the window down after the switch is released. When the express down circuit senses stall current (window has reached end of down travel), the switch will turn current off to the motor. The AUTO feature can be cancelled by actuating the switch UP or DOWN while window is in motion. If the electronic circuit in the switch fails to detect a stall current, the auto down circuit will time out within 9 to 14 seconds.

REMOVAL

FRONT

- (1) Disconnect and isolate the battery negative cable.
- (2) Using a trim stick, gently pry the switch from the console (Fig. 3).
- (3) Disconnect electrical harness connector.

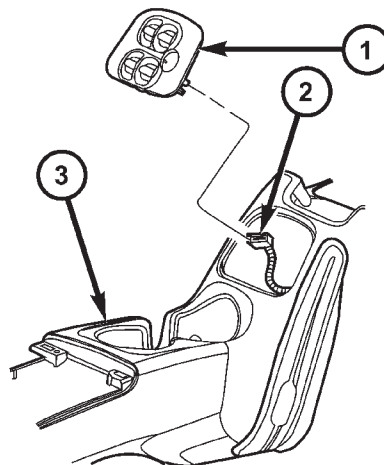
REAR

- (1) Disconnect and isolate the battery negative cable.
- (2) Using a trim stick, gently pry the switch from the console (Fig. 4).
- (3) Disconnect electrical harness connector.

INSTALLATION

FRONT

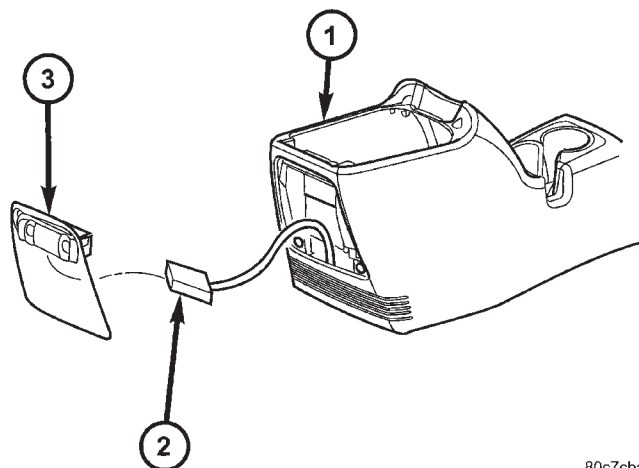
- (1) Connect electrical harness connector to switch. Slide connector lock into position.
- (2) Install switch into opening in console and press into place.



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Fig. 3 FRONT WINDOW SWITCH

- 1 - FRONT WINDOW SWITCH
- 2 - ELECTRICAL CONNECTOR
- 3 - CENTER CONSOLE



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Fig. 4 REAR WINDOW SWITCH

- 1 - CENTER CONSOLE
- 2 - ELECTRICAL CONNECTOR
- 3 - REAR WINDOW SWITCH

- (3) Connect battery negative cable.

REAR

- (1) Connect electrical harness connector to switch.
- (2) Install switch into opening in console and press into place.
- (3) Connect battery negative cable.

RESTRAINTS

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RESTRAINTS

DESCRIPTION



80cda62c

Fig. 1 Supplemental Restraint System

1 - FRONT IMPACT SENSOR (2)
2 - AIRBAG CONTROL MODULE
3 - PASSENGER AIRBAG
4 - DRIVER AIRBAG

5 - SIDE CURTAIN AIRBAG (2)
6 - DRIVER SEAT BELT TENSIONER
7 - SIDE IMPACT AIRBAG CONTROL MODULE (2)

RESTRAINTS (Continued)

An occupant restraint system is standard factory-installed safety equipment on this model. Available occupant restraints for this model include both active and passive types. Active restraints are those which require the vehicle occupants to take some action to employ, such as fastening a seat belt; while passive restraints require no action by the vehicle occupants to be employed (Fig. 1).

ACTIVE RESTRAINTS The active restraints for this model include:

- **Front Seat Belts** - Both front seating positions are equipped with three-point seat belt systems employing a lower B-pillar mounted inertia latch-type retractor, height-adjustable upper B-pillar mounted turning loops, a traveling lower seat belt anchor secured to the outboard side of the seat frame, and a traveling end-release seat belt buckle secured to the inboard side of the seat frame. Both front seat belt buckles include an integral Hall-effect seat belt switch that detects whether its respective seat belt has been fastened.

- **Rear Seat Belts** - All three rear seating positions are equipped with three-point seat belt systems. The outboard seating position belts employ a lower C-pillar mounted inertia latch-type retractor, a fixed position upper C-pillar mounted turning loop, and a fixed lower seat belt anchor secured to the floor panel. The rear seat center seating position belt has an inertia latch-type retractor that is integral to the rear seat back panel, and a cable from the seat back latch locks the center belt retractor spool unless the seat back is fully latched. The rear seat center seating position belt lower anchor is secured to the floor panel. All three rear seat belts have fixed end-release seat belt buckles secured to the floor panel, a single buckle unit on the right side and a double buckle unit on the left side.

- **Child Seat Tether Anchors** - All vehicles are equipped with three, fixed-position, child seat tether anchors. Two anchors are integral to the back of the right rear seat back panel, and one is integral to the left rear seat back panel.

PASSIVE RESTRAINTS The passive restraints available for this model include the following:

- **Dual Front Airbags** - Multistage driver and front passenger airbags are available for this model. This airbag system is a passive, inflatable, Supplemental Restraint System (SRS) and vehicles with this equipment can be readily identified by the "SRS - AIRBAG" logo molded into the driver airbag trim cover in the center of the steering wheel and also into the passenger airbag door on the instrument panel above the glove box (Fig. 2). Vehicles with the airbag system can also be identified by the airbag indicator, which will illuminate in the instrument cluster for about seven seconds as a bulb test each

time the ignition switch is turned to the On position. A pyrotechnic-type seat belt tensioner is integral to the driver side front seat belt retractor mounted on the lower B-pillar of all models equipped with dual front airbags.

- **Side Curtain Airbags** - Optional side curtain airbags are available for this model when it is also equipped with dual front airbags. This airbag system is a passive, inflatable, Supplemental Restraint System (SRS) and vehicles with this equipment can be readily identified by a molded identification trim button with the "SRS - AIRBAG" logo located on the headliner above each B-pillar (Fig. 2).



8098029e

Fig. 2 SRS Logo

The supplemental restraint system includes the following major components, which are described in further detail elsewhere in this service information:

- **Airbag Control Module** - The Airbag Control Module (ACM) is also sometimes referred to as the Occupant Restraint Controller (ORC). The ACM is located on a mount on the floor panel transmission tunnel, below the center of the instrument panel.

- **Airbag Indicator** - The airbag indicator is integral to the ElectroMechanical Instrument Cluster (EMIC), 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 is located in the center of the steering wheel, beneath the driver airbag trim cover.

- **Driver Knee Blocker** - The driver knee blocker is a structural unit secured to the back side of and integral to the instrument panel steering column opening 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

RESTRAINTS (Continued)

is located on the back side of each vertical member of the radiator support.

- **Passenger Airbag** - The passenger airbag is located on the instrument panel, beneath the passenger airbag door on the instrument panel above the glove box on the passenger side of the vehicle.

- **Passenger Knee Blocker** - The passenger knee blocker is a structural reinforcement that is integral to and concealed within the glove box door.

- **Seat Belt Tensioner** - The seat belt tensioner is integral to the driver side front seat belt retractor unit on vehicles equipped with dual front airbags.

- **Side Impact Airbag Control Module** - Two Side Impact Airbag Control Modules (SIACM) are used on vehicles with the optional side curtain airbags, one left side and one right side. One SIACM is located behind the B-pillar trim near the base of each B-pillar.

- **Side Curtain Airbag** - In vehicles equipped with this option, a side curtain airbag is located on each inside roof side rail above the headliner, and extends from the A-pillar to just beyond the C-pillar.

The ACM, both SIACMs, and the EMIC each contain a central processing unit and programming that allow them to communicate with each other using the Programmable Communication Interface (PCI) data bus network. This method of communication is used by the ACM for control of the airbag indicator on all models equipped with dual front airbags. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/COMMUNICATION - DESCRIPTION).

Hard wired circuitry connects the supplemental restraint 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, to the vehicle electrical system, and to the supplemental restraint 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

ACTIVE RESTRAINTS The primary passenger restraints in this or any other vehicle are the standard equipment factory-installed seat belts. Seat belts are referred to as an active restraint because the vehicle occupants are required to physically fas-

ten and properly adjust these restraints in order to benefit from them. See the owner's manual in the vehicle glove box for more information on the features, use and operation of all of the factory-installed active restraints.

PASSIVE RESTRAINTS The passive restraints system is referred to as a supplemental restraint system because they were designed and are intended to enhance the protection for the vehicle occupants of the vehicle **only** when used in conjunction with the seat belts. They are referred to as passive systems 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 supplemental restraint systems.

The supplemental restraint system electrical circuits are continuously monitored and controlled by a microprocessor and software contained within the Airbag Control Module (ACM) and, on vehicles equipped with the side curtain airbags, both Side Impact Airbag Control Modules (SIACM). An airbag indicator in the ElectroMechanical Instrument Cluster (EMIC) illuminates for about seven seconds as a bulb test each time the ignition switch is turned to the On or Start positions. Following the bulb test, the airbag indicator is turned on or off by the ACM to indicate the status of the supplemental restraint system. If the airbag indicator comes on at any time other than during the bulb test, it indicates that there is a problem in the supplemental restraint system electrical circuits. Such a problem may cause airbags not to deploy when required, or to deploy when not required.

Deployment of the supplemental restraints 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 (G force) upon the impact sensors. When an impact is severe enough, the microprocessor in the ACM or the SIACM signals the inflator unit of the airbag module to deploy the airbag. The seat belt tensioner is provided with a deployment signal by the ACM in conjunction with the driver airbag. During a frontal vehicle impact, the knee blockers 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 knee blockers 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 tensioner removes the slack from the driver side front seat belt to provide further assurance that the driver is properly positioned and restrained for an airbag deployment.

RESTRAINTS (Continued)

Typically, the vehicle occupants recall more about the events preceding and following a collision than they have of an airbag deployment itself. This is because the airbag deployment and deflation occur so 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 ACM monitors a problem in any of the dual front airbag system circuits or components, including the seat belt tensioner, it stores a fault code or Diagnostic Trouble Code (DTC) in its memory circuit and sends an electronic message to the EMIC to turn on the airbag indicator. When the SIACM monitors a problem in any of the side curtain airbag system circuits or component, it stores a fault code or Diagnostic Trouble Code (DTC) in its memory circuit and sends an electronic message to the ACM, and the ACM sends an electronic message to the EMIC to turn on the airbag indicator. Proper testing of the airbag system components, the Programmable Communication Interface (PCI) data bus, the data bus message inputs to and outputs from the EMIC, the SIACM, or the ACM, as well as the retrieval or erasure of a DTC from the ACM, SIACM, or EMIC requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

See the owner's manual in the vehicle glove box for more information on the features, use and operation of all of the factory-installed passive restraints.

WARNING - RESTRAINT SYSTEM

WARNING: DURING AND FOLLOWING ANY SEAT BELT SERVICE, CAREFULLY INSPECT ALL SEAT BELTS, BUCKLES, MOUNTING HARDWARE, AND RETRACTORS 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 INOPERATIVE BUCKLE OR RETRACTOR. REPLACE ANY BELT THAT HAS A BENT OR DAMAGED LATCH PLATE OR ANCHOR PLATE. NEVER ATTEMPT TO REPAIR A SEAT BELT COMPONENT. ALWAYS REPLACE DAMAGED OR FAULTY SEAT BELT COMPONENTS WITH THE CORRECT, NEW AND UNUSED REPLACEMENT PARTS LISTED IN THE DAIMLERCHRYSLER MOPAR PARTS CATALOG.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSOR, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: 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 2500 PSI. 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).

WARNING: WHEN HANDLING A SEAT BELT TENSIONER RETRACTOR, PROPER CARE SHOULD BE EXERCISED TO KEEP FINGERS OUT FROM UNDER THE RETRACTOR COVER AND AWAY FROM THE SEAT BELT WEBBING WHERE IT EXITS FROM THE RETRACTOR COVER.

WARNING: REPLACE ALL RESTRAINT SYSTEM COMPONENTS ONLY WITH PARTS SPECIFIED IN THE DAIMLERCHRYSLER MOPAR PARTS CATALOG. SUBSTITUTE PARTS MAY APPEAR INTERCHANGEABLE, BUT INTERNAL DIFFERENCES MAY RESULT IN INFERIOR OCCUPANT PROTECTION.

RESTRAINTS (Continued)

WARNING: THE FASTENERS, SCREWS, AND BOLTS ORIGINALLY USED FOR THE RESTRAINT SYSTEM COMPONENTS HAVE SPECIAL COATINGS AND ARE SPECIFICALLY DESIGNED FOR THE RESTRAINT SYSTEM. THEY MUST NEVER BE REPLACED WITH ANY SUBSTITUTES. ANY TIME A NEW FASTENER IS NEEDED, REPLACE IT WITH THE CORRECT FASTENERS PROVIDED IN THE SERVICE PACKAGE OR SPECIFIED IN THE DAIMLERCHRYSLER MOPAR PARTS CATALOG.

WARNING: 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.

DIAGNOSIS AND TESTING - SUPPLEMENTAL RESTRAINT SYSTEM

Proper diagnosis and testing of the supplemental restraint system components, the PCI data bus, the data bus message inputs to and outputs from the ElectroMechanical Instrument Cluster (EMIC), the Airbag Control Module (ACM), or the Side Impact Airbag Control Module (SIACM) as well as the retrieval or erasure of a Diagnostic Trouble Code (DTC) from the ACM or SIACM requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

STANDARD PROCEDURE

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 cover and away from the seat belt webbing where it exits from the retractor cover. In addition, the supplemental restraint system should be disarmed whenever any steering wheel, steering column, seat belt tensioner, driver airbag, passenger airbag, front impact sensor, side curtain airbag, 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, faulty 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 faulty or damaged and non-deployed, refer to the Hazardous Substance Control System for proper disposal. Dispose of all non-deployed and deployed airbags and seat belt tensioners in a manner consistent with state, provincial, local and federal regulations.

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.

STANDARD PROCEDURE - SERVICE AFTER A SUPPLEMENTAL RESTRAINT DEPLOYMENT

Any vehicle which is to be returned to use following a supplemental restraint deployment, must have the deployed restraints replaced. In addition, if the driver airbag has been deployed, the clockspring must be replaced. If the passenger airbag is deployed, the passenger airbag door and both passenger airbag mounting brackets must be replaced. If a side curtain airbag has been deployed, the complete

RESTRAINTS (Continued)

airbag unit, the headliner, as well as the upper A, B, and C-pillar trim must be replaced. These components are not intended for reuse and will be damaged or weakened as a result of a supplemental restraint deployment, which may or may not be obvious during a visual inspection.

On vehicles with an optional sunroof, the sunroof drain tubes and hoses must be closely inspected following a side curtain airbag deployment. It is also critical that the mounting surfaces and/or mounting brackets for the Airbag Control Module (ACM), Side Impact Airbag Control Module (SIACM), and front impact sensors be closely inspected and restored to their original conditions following any vehicle impact damage. Because the ACM, SIACM, and each front impact sensor are used by the supplemental restraint system 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. All other vehicle components should be closely inspected following any other supplemental restraint deployment, but are to be replaced only as required by the extent of the visible damage incurred.

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 and passenger airbags in this model are deployed by electrical signals generated by the Airbag Control Module (ACM) 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 due to an airbag system fault; 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 DRBIII® 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 sure of complete deployment. Refer to the Hazardous Substance Control System for proper disposal procedures. Dispose of all non-deployed and deployed airbags in a manner consistent with state, provincial, local, and federal regulations.

(1) Be certain that the DRBIII® scan tool contains the latest version of the proper DRBIII® software. Connect the DRBIII® 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) Turn the ignition switch to the On position.

(3) Using the DRBIII®, 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 driver and/or passenger airbag 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.

RESTRAINTS (Continued)

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

Following a supplemental restraint 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 supplemental restraint. 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 sure to wear safety glasses, rubber gloves, and a long-sleeved shirt during cleanup (Fig. 3).

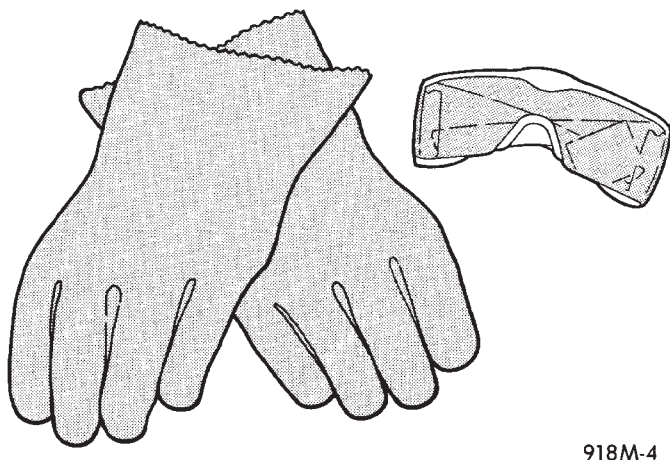


Fig. 3 Wear Safety Glasses and Rubber Gloves - Typical

WARNING: 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.

(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 (Fig. 4). 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

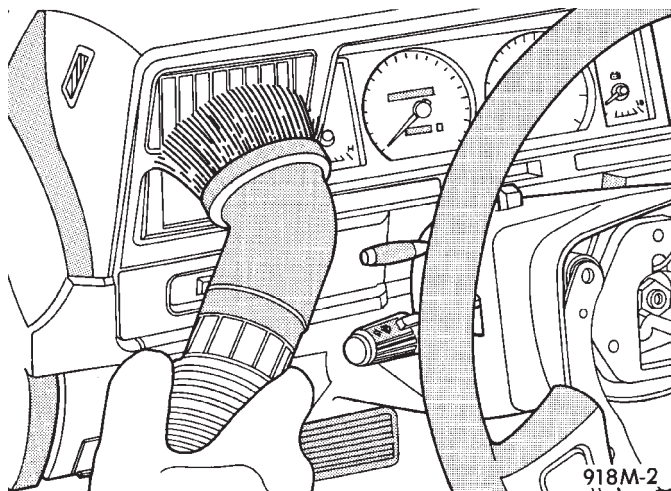


Fig. 4 Vacuum Heater and A/C Outlets - Typical

pyrotechnic material within the inflator. Do not dispose of these airbags unless you are sure of complete deployment. Refer to AIRBAG SQUIB STATUS. Refer to the Hazardous Substance Control System for proper disposal procedures. Dispose of all non-deployed and deployed airbags in a manner consistent with state, provincial, local, and federal regulations.

(3) Next, remove the deployed supplemental restraints 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.

STANDARD PROCEDURE - VERIFICATION TEST

The following procedure should be performed using a DRBIII® scan tool to verify proper supplemental restraint system operation following the service or replacement of any supplemental restraint system component.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

RESTRAINTS (Continued)

(1) During the following test, the battery negative cable remains disconnected and isolated, as it was during the airbag component removal and installation procedures.

(2) Be certain that the DRBIII® scan tool contains the latest version of the proper DRBIII® software. Connect the DRBIII® 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 (Fig. 5).

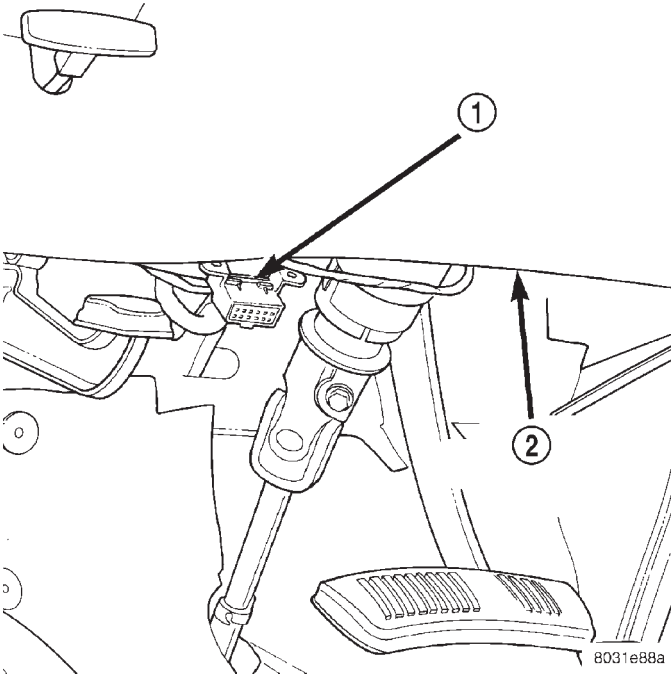


Fig. 5 16-Way Data Link Connector - Typical

- 1 - 16-WAY DATA LINK CONNECTOR
- 2 - BOTTOM OF INSTRUMENT PANEL

(3) Turn the ignition switch to the On position and exit the vehicle with the DRBIII® scan tool.

(4) Check to be certain that nobody is in the vehicle, then reconnect the battery negative cable.

(5) Using the DRBIII®, read and record the active (current) Diagnostic Trouble Code (DTC) data.

(6) Next, use the DRBIII® 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.

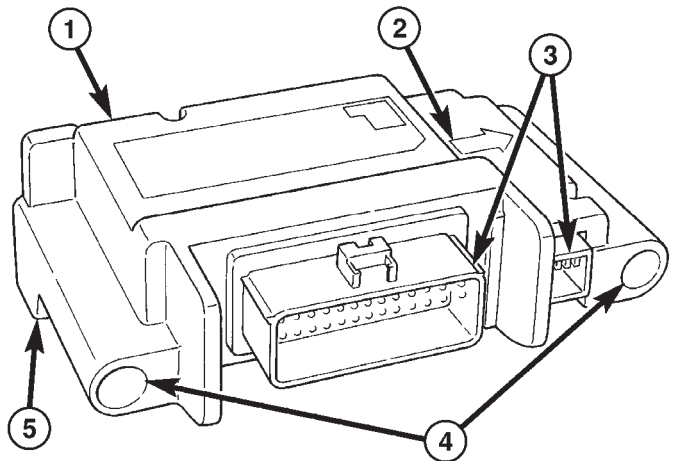
(8) Use the DRBIII® to erase the stored DTC data. If any problems remain, the stored DTC data will not erase. Refer to the appropriate diagnostic information to diagnose any stored DTC that will not erase. If the stored DTC information is successfully erased, go to Step 9.

(9) Turn the ignition switch to the Off position for about fifteen seconds, and then back to the On position. Observe the airbag indicator in the instrument cluster. It should illuminate for six to eight seconds,

and then go out. This indicates that the supplemental restraint system 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 supplemental restraint system fault or malfunction. Refer to the appropriate diagnostic information to diagnose the problem.

AIRBAG CONTROL MODULE

DESCRIPTION



80c58f3d

Fig. 6 Airbag Control Module

- 1 - AIRBAG CONTROL MODULE
- 2 - ORIENTATION ARROW
- 3 - CONNECTOR RECEPTACLES
- 4 - MOUNTING HOLES
- 5 - GROUND LUG

The Airbag Control Module (ACM) is also sometimes referred to as the Occupant Restraint Controller (ORC) (Fig. 6). The ACM is secured with two long screws within a tray-like stamped steel mounting bracket welded onto the top of the floor panel transmission tunnel forward of the instrument panel center support bracket and below the instrument panel center stack in the passenger compartment of the vehicle.

Concealed within a hollow in the center of the die cast aluminum ACM housing is the electronic circuitry of the ACM which includes a microprocessor, an electronic impact sensor, an electromechanical safing sensor, and an energy storage capacitor. A stamped metal cover plate is secured to the bottom of the ACM housing with four screws to enclose and protect the internal electronic circuitry and components. An arrow cast into the top of the ACM housing near the front provides a visual verification of the proper orientation of the unit, and should always be pointed toward the front of the vehicle.

AIRBAG CONTROL MODULE (Continued)

The ACM housing also has an integral ground lug with a tapped hole that protrudes from the lower left rear corner of the unit. This lug provides a case ground to the ACM when a ground screw is installed through the left side of the mounting bracket. Two molded plastic electrical connector receptacles exit the right side of the ACM housing. The smaller of the two receptacles contains twelve terminal pins, while the larger one contains twenty-three. These terminal pins connect the ACM to the vehicle electrical system through two dedicated take outs and connectors of the instrument panel wire harness.

A molded rubber protective cover is installed loosely over the ACM to protect the unit from condensation or coolant leaking from a damaged or faulty heater-air conditioner unit housing. An integral flange on the left side of the cover is secured to the floor panel transmission tunnel with a short piece of double-faced tape as an assembly aid during the manufacturing process, but this tape does not require replacement following service removal.

The impact sensor and safing sensor internal to the ACM are calibrated for the specific vehicle, and are only serviced as a unit with the ACM. The ACM cannot be repaired or adjusted and, if damaged or faulty, it must be replaced. The ACM cover is available for separate service replacement.

OPERATION

The microprocessor in the Airbag Control Module (ACM) contains the front supplemental restraint system logic circuits and controls all of the front supplemental restraint system components. The ACM uses On-Board Diagnostics (OBD) and can communicate with other electronic modules in the vehicle as well as with the DRBIII® scan tool using the Programmable Communications Interface (PCI) data bus network. This method of communication is used for control of the airbag indicator in the ElectroMechanical Instrument Cluster (EMIC) and for supplemental restraint system diagnosis and testing through the 16-way data link connector located on the driver side lower edge of the instrument panel. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER/AIRBAG INDICATOR - OPERATION).

The ACM microprocessor continuously monitors all of the front supplemental restraint system electrical circuits to determine the system readiness. If the ACM detects a monitored system fault, it sets an active and stored Diagnostic Trouble Code (DTC) and sends electronic messages to the EMIC over the PCI data bus to turn on the airbag indicator. An active fault only remains for the duration of the fault or in some cases the duration of the current ignition switch cycle, while a stored fault causes a DTC to be stored in memory by the ACM. For some DTCs, if a

fault does not recur for a number of ignition cycles, the ACM will automatically erase the stored DTC. For other internal faults, the stored DTC is latched forever.

On models equipped with optional side curtain airbags, the ACM communicates with both the left and right Side Impact Airbag Control Modules (SIACM) over the PCI data bus. The SIACM notifies the ACM when it has detected a monitored system fault and stored a DTC in memory for its respective side curtain airbag system, and the ACM sets a DTC and controls the airbag indicator operation accordingly. The ACM also monitors a Hall effect-type seat belt switch located in the buckle of each front seat belt to determine whether the seatbelts are buckled, and provides an input to the EMIC over the PCI data bus to control the seatbelt indicator operation based upon the status of the driver side front seat belt switch.

The ACM receives battery current through two circuits; a fused ignition switch output (run) circuit through a fuse in the Junction Block (JB), and a fused ignition switch output (run-start) circuit through a second fuse in the JB. The ACM has a case ground through a lug on the bottom of the ACM housing that is secured with a ground screw to the left side of the ACM mounting bracket. The ACM also receives a power ground through a ground circuit and take out of the instrument panel wire harness. This take out has a single eyelet terminal connector that is secured by a second ground screw to the left side of the ACM mounting bracket. These connections allow the ACM to be operational whenever the ignition switch is in the Start or On positions. The ACM also contains an energy-storage capacitor. When the ignition switch is in the Start or On positions, this capacitor is continually being charged with enough electrical energy to deploy the airbags for up to one second following a battery disconnect or failure. The purpose of the capacitor is to provide backup supplemental restraint system protection in case there is a loss of battery current supply to the ACM during an impact.

Two sensors are contained within the ACM, an electronic impact sensor and a safing sensor. The ACM also monitors inputs from two remote front impact sensors located on the back of the right and left vertical members of the radiator support 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 safing sensor is an electromechanical sensor within the ACM that provides an additional logic input to the ACM microprocessor. The safing sensor is a normally open switch that is used to verify the need for an airbag deployment by detecting impact energy of a lesser

AIRBAG CONTROL MODULE (Continued)

magnitude than that of the electronic impact sensors, and must be closed in order for the airbags/seat belt tensioner to deploy. A pre-programmed decision algorithm in the ACM microprocessor determines when the deceleration rate as signaled by the impact sensors and the safing sensor indicate an impact that is severe enough to require front supplemental restraint system protection and, based upon the status of the seatbelt switch inputs and the severity of the monitored impact, determines what combination of driver seat belt tensioner and/or front airbag deployment is required for each front seating position. When the programmed conditions are met, the ACM sends the proper electrical signals to deploy the driver seat belt tensioner and/or the multistage dual front airbags at the programmed force levels.

The hard wired inputs and outputs for the ACM may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the ACM, the PCI data bus network, or the electronic message inputs to and outputs from the ACM. The most reliable, efficient, and accurate means to diagnose the ACM, the PCI data bus network, and the electronic message inputs to and outputs from the ACM requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

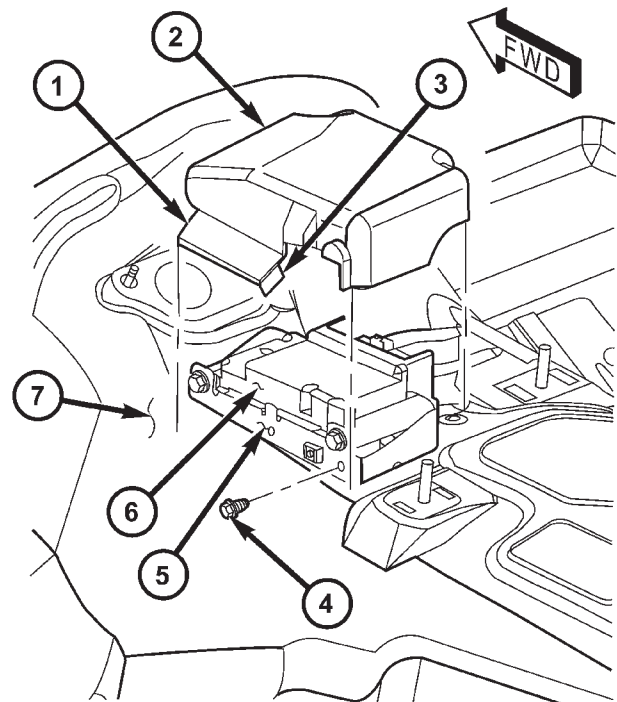
WARNING: THE AIRBAG CONTROL MODULE CONTAINS THE IMPACT SENSOR, WHICH ENABLES THE SYSTEM TO DEPLOY THE FRONT SUPPLEMENTAL RESTRAINTS. NEVER STRIKE OR DROP THE AIRBAG CONTROL MODULE, AS IT CAN DAMAGE THE IMPACT SENSOR OR AFFECT ITS CALIBRATION. IF AN AIRBAG CONTROL MODULE IS

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 FRONT SUPPLEMENTAL RESTRAINT DEPLOYMENT AND POSSIBLE OCCUPANT INJURIES.

(1) Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.

(2) Remove the center console from the top of the floor panel transmission tunnel. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL).

(3) From the left side of the floor panel transmission tunnel, remove the Airbag Control Module (ACM) cover from the ACM (Fig. 7). The cover flange is secured to the silencer pad on the floor panel transmission tunnel with double-faced tape.



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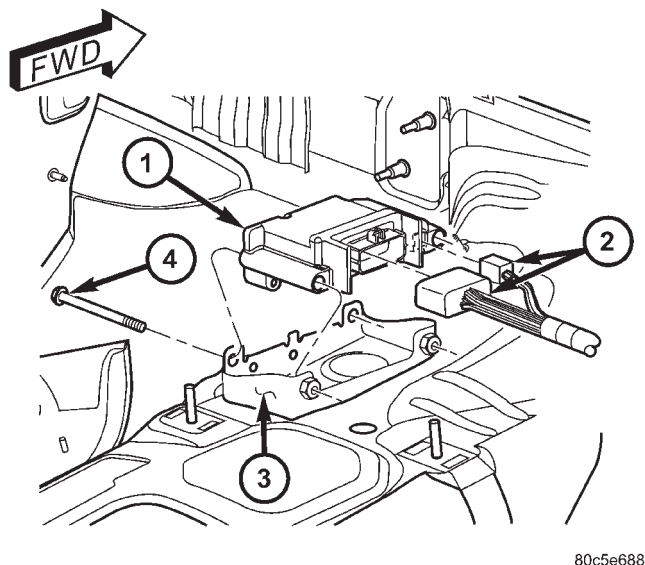
Fig. 7 ACM Cover Remove/Install

- 1 - FLANGE
- 2 - COVER
- 3 - TAPE
- 4 - SCREW
- 5 - BRACKET
- 6 - AIRBAG CONTROL MODULE
- 7 - FLOOR PANEL TRANSMISSION TUNNEL

(4) Remove the ground screw that secures the ground lug on the left rear corner of the ACM housing to the ACM bracket on the floor panel transmission tunnel.

AIRBAG CONTROL MODULE (Continued)

(5) Remove the two screws that secure the ACM to the ACM bracket that is welded onto the top of the floor panel transmission tunnel (Fig. 8).



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Fig. 8 Airbag Control Module Remove/Install

- 1 - AIRBAG CONTROL MODULE
- 2 - WIRE HARNESS CONNECTOR (2)
- 3 - BRACKET
- 4 - SCREW (2)

(6) Lift the ACM from the ACM bracket on the top of the floor panel transmission tunnel and move the unit to the left far enough to access the ACM wire harness connectors.

(7) Disconnect the two instrument panel wire harness connectors for the ACM from the ACM connector receptacles on the right side of the module. To disconnect the large instrument panel wire harness connector from the ACM:

(a) Slide the red Connector Position Assurance (CPA) lock on the top of the connector toward the side of the connector.

(b) Depress the connector latch tab and pull the connector straight away from the ACM connector receptacle.

(8) Remove the ACM from the left side of the floor panel transmission tunnel.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: THE AIRBAG CONTROL MODULE CONTAINS THE IMPACT SENSOR, WHICH ENABLES THE SYSTEM TO DEPLOY THE FRONT SUPPLEMENTAL RESTRAINTS. NEVER STRIKE OR DROP THE AIRBAG CONTROL MODULE, AS IT CAN DAMAGE THE IMPACT SENSOR OR AFFECT ITS CALIBRATION. IF AN AIRBAG CONTROL MODULE 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 FRONT SUPPLEMENTAL RESTRAINT DEPLOYMENT AND POSSIBLE OCCUPANT INJURIES.

(1) Position the Airbag Control Module (ACM) to the left side of the floor panel transmission tunnel near the ACM bracket (Fig. 8).

(2) Reconnect the instrument panel wire harness connectors for the ACM to the ACM connector receptacles on the right side of the module. Be certain that the latches on both connectors and the red Connector Position Assurance (CPA) lock on the large connector are each fully engaged.

(3) Carefully position the ACM into the ACM bracket on the top of the floor panel transmission tunnel. When the ACM is correctly positioned, the arrow on the ACM housing will be pointed forward in the vehicle.

(4) Install and tighten the two screws that secure the ACM to the ACM bracket that is welded onto the floor panel transmission tunnel. Tighten the screws to 36 N·m (26 ft. lbs.).

(5) Install and tighten the ground screw that secures the ground lug on the left rear corner of the ACM housing to the ACM bracket on the floor panel transmission tunnel (Fig. 7). Tighten the screw to 12 N·m (105 in. lbs.).

(6) From the left side of the floor panel transmission tunnel, carefully position the ACM cover back over the top of the ACM.

AIRBAG CONTROL MODULE (Continued)

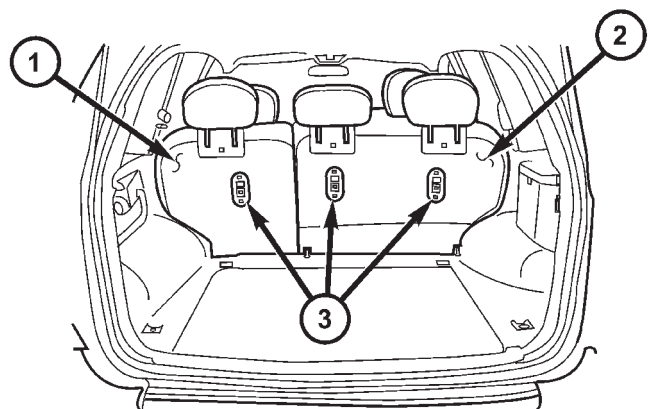
NOTE: The integral flange on the left side of the ACM cover is secured to the floor panel transmission tunnel with a short piece of double-faced tape as an assembly aid during the manufacturing process, but this tape does not require replacement following service removal.

(7) Reinstall the center console onto the top of the floor panel transmission tunnel. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION).

(8) Do not reconnect the battery negative cable at this time. The airbag system verification test procedure should be performed following service of any supplemental restraint system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).

CHILD TETHER ANCHOR

DESCRIPTION



80c9ece3

Fig. 9 Child Tether Anchors

- 1 - REAR SEAT BACK (LEFT)
- 2 - REAR SEAT BACK (RIGHT)
- 3 - CHILD TETHER ANCHOR (3)

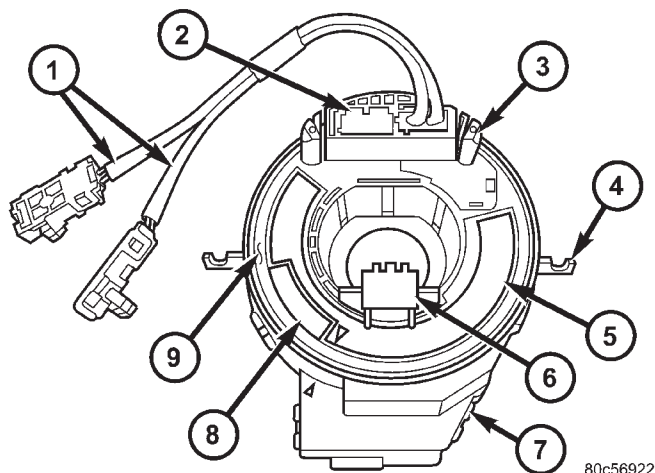
All vehicles are equipped with three, fixed-position, child seat tether anchors (Fig. 9). Two anchors are integral to the back of the right rear seat back panel, and one is integral to the left rear seat back panel. The child seat tether anchors cannot be adjusted or repaired and, if faulty or damaged, they must be replaced as a unit with the rear seat back panel.

OPERATION

See the owner's manual in the vehicle glove box for more information on the proper use of the factory-installed child seat tether anchors.

CLOCKSPRING

DESCRIPTION



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Fig. 10 Clockspring

- 1 - PIGTAIL WIRE (2)
- 2 - UPPER CONNECTOR RECEPTACLE
- 3 - BUMPER (2)
- 4 - BRACKET (2)
- 5 - LABEL
- 6 - SHIELD
- 7 - CASE
- 8 - WINDOW
- 9 - ROTOR

The clockspring assembly is secured with two integral plastic latches onto the upper steering column housing near the top of the steering column behind the steering wheel (Fig. 10). The clockspring consists of a flat, round molded plastic case with a stubby tail that hangs below the steering column and contains two connector receptacles that face toward the instrument panel (Fig. 11). Within the plastic housing is a spool-like molded plastic rotor with a large exposed hub and several plastic rollers. The upper surface of the rotor hub has a large center hole, a release button, a clear plastic inspection window, two short pigtail wires with connectors, and a connector receptacle that faces toward the steering wheel. Two versions of the clockspring are used on this model, one is a seven circuit unit for vehicles not equipped with optional remote radio switches on the steering wheel and can be visually identified by the use of yellow heat-shrink tubing on the pigtail wires, while the other is a nine circuit unit for vehicles with remote radio switches and can be visually identified by the use of black heat-shrink tubing on the pigtail wires.

A rubber bumper block is located on each side of the tower formation that contains the connector receptacle and pigtail wires on the upper surface of the rotor hub. The lower surface of the rotor hub has

CLOCKSPRING (Continued)

a molded plastic turn signal cancel cam with a single lobe that is integral to the rotor. Within the plastic case and wound around the rotor spool is a long ribbon-like tape that consists of several thin copper wire leads sandwiched between two thin plastic membranes. The outer end of the tape terminates at the connector receptacles that face the instrument panel, while the inner end of the tape terminates at the pigtail wires and connector receptacle on the hub of the clockspring rotor that face the steering wheel.

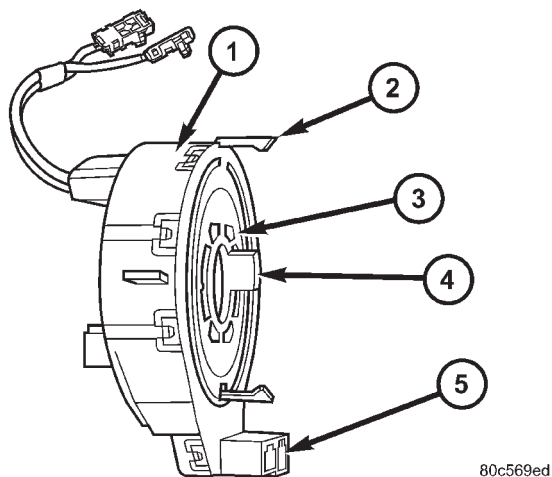


Fig. 11 Clockspring Latches

- 1 - CASE
- 2 - LATCH (2)
- 3 - ROTOR
- 4 - CANCEL CAM
- 5 - LOWER CONNECTOR RECEPTACLE (2)

Service replacement clocksprings are shipped pre-centered and with a molded plastic shield that snaps onto the rotor over the release button. The release button secures the centered clockspring rotor to the clockspring case and the shield prevents the release button from being inadvertently depressed during shipment and handling, but the shield must be removed from the clockspring after it is installed on the steering column. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - STANDARD PROCEDURE - CLOCKSPRING CENTERING).

The clockspring cannot be repaired. If the clockspring is faulty, damaged, or if the driver airbag has been deployed, the clockspring must be replaced.

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 the electrical components mounted on or in the rotating steering wheel. On this model the rotating electrical components include the driver airbag, the horn switch, the speed control switches,

and the remote radio switches, if the vehicle is so equipped. The clockspring case is positioned and secured to the upper steering column housing near the top of the steering column. The connector receptacles on the tail of the fixed clockspring case connect the clockspring to the vehicle electrical system through two take outs with connectors from the instrument panel wire harness. The clockspring rotor is movable and is keyed by the tower formation that is molded onto the upper surface of the rotor hub to an opening that is cast into the steering wheel armature. Rubber bumper blocks on either side of the clockspring tower formation eliminate contact noise between the clockspring tower and the steering wheel. The lobe of the turn signal cancel cam on the lower surface of the clockspring rotor hub contacts a turn signal cancel actuator of the multi-function switch to provide automatic turn signal cancellation. The yellow-sleeved pigtail wires on the upper surface of the clockspring rotor connect the clockspring to the driver airbag, while a steering wheel wire harness connects the connector receptacle on the upper surface of the clockspring rotor to the horn switch and, if the vehicle is so equipped, to the optional speed control switches and remote radio switches on the steering wheel.

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 clockspring is removed from the steering column or if the steering shaft is disconnected from the steering gear, the clockspring spool can change position relative to the movable steering components and must be re-centered following completion of the service or the tape may be damaged. Service replacement clocksprings are shipped pre-centered and with a plastic shield installed over the clockspring release button. This shield should not be removed and the release button should not be depressed until the clockspring has been installed on the steering column. If the release button is depressed before the clockspring is installed on a steering column, the clockspring centering procedure must be performed. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - STANDARD PROCEDURE - CLOCKSPRING CENTERING).

STANDARD PROCEDURE - CLOCKSPRING CENTERING

The clockspring is designed to wind and unwind when the steering wheel is rotated, but is only

CLOCKSPRING (Continued)

designed to rotate the same number of turns (about five complete rotations) as the steering wheel can be turned from stop to stop. Centering the clockspring indexes the clockspring tape to other steering components so that it can operate within its designed travel limits. The rotor of a centered clockspring can be rotated two and one-half turns in either direction from the centered position, without damaging the clockspring tape.

However, if the clockspring is removed for service or if the steering column is disconnected from the steering gear, the clockspring tape can change position relative to the other steering components. The clockspring must then be re-centered following completion of such service or the clockspring tape may be damaged. Service replacement clocksprings are shipped pre-centered, with the release button engaged (raised) and a molded plastic shield installed over the release button. This release button should not be disengaged and the shield should not be removed until the clockspring has been installed on the steering column. If the release button is disengaged before the clockspring is installed on a steering column, the clockspring centering procedure must be performed.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

NOTE: Before starting this procedure, be certain to turn the steering wheel until the front wheels are in the straight-ahead position.

(1) Place the front wheels in the straight-ahead position.

(2) Remove the clockspring from the steering column. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - REMOVAL).

(3) Depress the release button (Fig. 12).

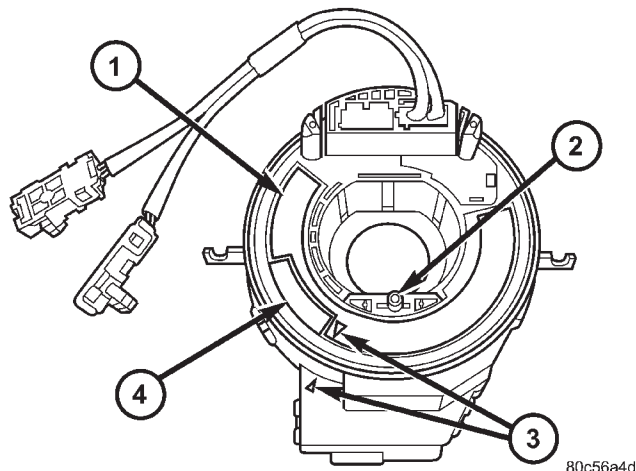


Fig. 12 Clockspring Centering

- 1 - ROTOR LABEL
- 2 - RELEASE BUTTON
- 3 - ALIGNMENT ARROWS
- 4 - INSPECTION WINDOW

(4) Keeping the release button depressed, rotate the clockspring rotor clockwise to the end of its travel. **Do not apply excessive torque.**

(5) From the end of the clockwise travel, rotate the rotor about two and one-half turns counterclockwise, then release the release button. The clockspring tower formation with the pigtail wires for the driver airbag and the connector receptacle for the steering wheel wire harness should end up at the top, the blue roller should be visible through the inspection window, and the printed arrow on the label of the clockspring rotor should be aligned with the arrow molded into the clockspring case. The clockspring is now centered.

(6) The front wheels should still be in the straight-ahead position. Reinstall the clockspring onto the steering column. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - INSTALLATION).

REMOVAL

The clockspring cannot be repaired. It must be replaced if faulty or damaged, or if the driver airbag has been deployed.

CLOCKSPRING (Continued)

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

NOTE: Before starting this procedure, be certain to turn the steering wheel until the front wheels are in the straight-ahead position.

(1) Place the front wheels in the straight ahead position.

(2) Remove the driver airbag from the steering wheel. (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).

(3) Disconnect the steering wheel wire harness connector from the upper clockspring connector receptacle.

(4) Remove the steering wheel from the steering column. (Refer to 19 - STEERING/COLUMN/STEERING WHEEL - REMOVAL).

(5) If the vehicle is equipped with the optional tilt steering column, move the tilt steering column to the fully lowered position and leave the tilt release lever in the released (down) position.

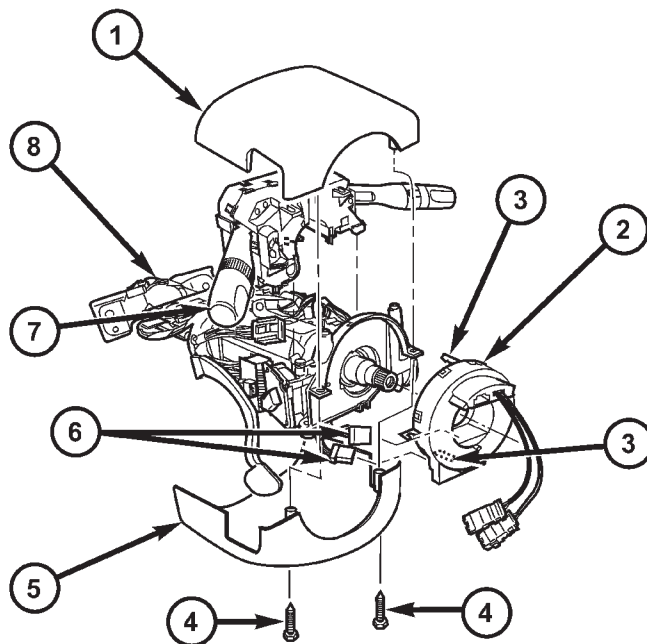
(6) From below the steering column, remove the two screws that secure the lower shroud to the upper shroud (Fig. 13).

(7) Using hand pressure, push gently inward on both sides of the upper shroud near the parting line between the upper and lower shrouds to release the snap features that secure the two halves to each other.

(8) Remove both the upper and lower shrouds from the steering column.

(9) Disconnect the two instrument panel wire harness connectors for the clockspring from the two connector receptacles below the steering column on the back of the clockspring housing.

(10) Using a small thin-bladed screwdriver, release the two integral plastic latches that secure the back of the clockspring housing to the steering column lock housing.



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Fig. 13 Clockspring Remove/Install

- 1 - UPPER SHROUD
- 2 - CLOCKSPRING
- 3 - LATCH (2)
- 4 - SCREW (2)
- 5 - LOWER SHROUD
- 6 - WIRE HARNESS CONNECTOR (2)
- 7 - MULTI-FUNCTION SWITCH
- 8 - STEERING COLUMN

(11) Remove the clockspring from the steering column lock housing. The clockspring cannot be repaired. It must be replaced if faulty or damaged, or if the driver airbag has been deployed.

(12) If the removed clockspring is to be reused, be certain that the release button on the clockspring rotor is raised and latched to secure the rotor to the clockspring case to maintain clockspring centering until it is reinstalled on the steering column. If clockspring centering is not maintained, the clockspring must be centered again before it is reinstalled. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - STANDARD PROCEDURE - CLOCKSPRING CENTERING).

INSTALLATION

The clockspring cannot be repaired. It must be replaced if faulty or damaged, or if the driver airbag has been deployed.

If the clockspring is not properly centered in relation to the steering wheel, steering shaft and steering gear, it may be damaged. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - STANDARD PROCEDURE - CLOCKSPRING CEN-

CLOCKSPRING (Continued)

TERING). Service replacement clocksprings are shipped pre-centered, with the release button engaged (raised) and a molded plastic shield installed over the release button. This release button should not be disengaged and the shield should not be removed until the clockspring has been installed on the steering column. If the release button is disengaged before the clockspring is installed on a steering column, the clockspring centering procedure must be performed.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

NOTE: Before starting this procedure, be certain to turn the steering wheel until the front wheels are in the straight-ahead position.

(1) Carefully slide the centered clockspring down over the steering column upper shaft until the two integral plastic latches on the back of the clockspring housing are fully engaged through their openings in the steering column lock housing (Fig. 13).

(2) Reconnect the two instrument panel wire harness connectors for the clockspring to the two connector receptacles below the steering column on the back of the clockspring housing.

(3) Position the upper and lower shrouds onto the steering column.

(4) Align the snap features on the lower shroud with the receptacles on the upper shroud and apply hand pressure to snap them together.

(5) From below the steering column, install and tighten the two screws that secure the lower shroud to the upper shroud. Tighten the screws to 2 N·m (18 in. lbs.).

(6) If the vehicle is equipped with the optional tilt steering column, move the tilt steering column back to the fully raised position and move the tilt release lever back to the locked (up) position.

(7) Reinstall the steering wheel onto the steering column. (Refer to 19 - STEERING/COLUMN/STEERING WHEEL - INSTALLATION).

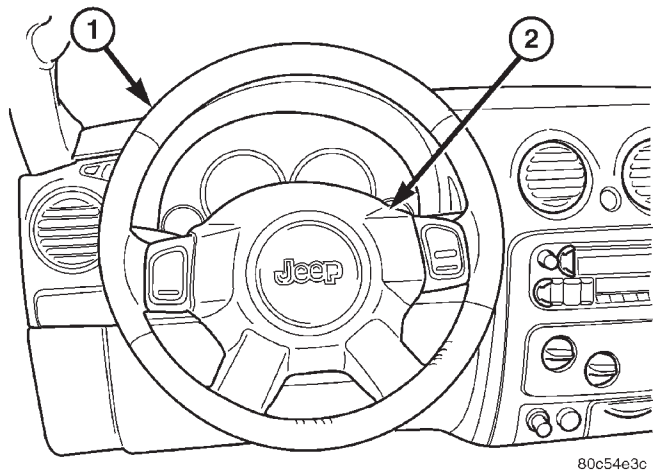
NOTE: Be certain that the steering wheel mounting screw is tightened to the proper torque specification to ensure proper clockspring operation.

(8) Reconnect the steering wheel wire harness connector to the upper clockspring connector receptacle.

(9) Reinstall the driver airbag onto the steering wheel. (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - INSTALLATION).

DRIVER AIRBAG

DESCRIPTION



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Fig. 14 Driver Airbag Trim Cover

- 1 - STEERING WHEEL
2 - TRIM COVER

The black, injection molded, thermoplastic driver airbag protective trim cover is the most visible part of the driver airbag (Fig. 14). The driver airbag is located in the center of the steering wheel, where it is secured with two screws to the two horizontal spokes of the four-spoke steering wheel armature. Base models have a Jeep® logo embossed in the center of the trim cover, while premium models feature a stamped, satin polished emblem with the Jeep® logo applied to the center of the trim cover. Concealed beneath the driver airbag trim cover are the horn switch, the folded airbag cushion, the airbag retainer or housing, the airbag inflator, and the retainers that secure the inflator to the airbag housing. The airbag cushion, housing, and inflator are secured within an integral receptacle molded into the back of the trim cover.

DRIVER AIRBAG (Continued)

The resistive membrane-type horn switch is secured with heat stakes to the inside surface of the driver airbag trim cover, between the trim cover and the folded airbag cushion. The horn switch ground pigtail wire has a female spade terminal connector that receives a path to ground through a male spade terminal that is integral to the driver airbag housing stamping and is located near the upper right corner on the back of the housing (Fig. 15). The horn switch feed pigtail wire has a white, molded plastic insulator that is secured by an integral retainer to a mounting hole located near the lower left corner on the back of the housing, and is connected to the vehicle electrical system through a take out and connector of the steering wheel wire harness.

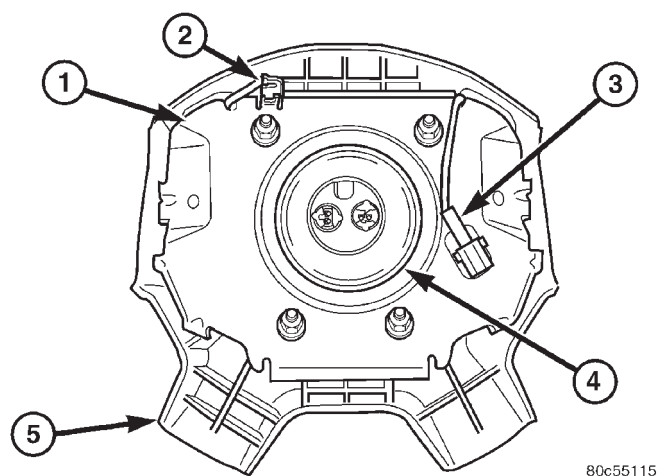


Fig. 15 Driver Airbag Housing

- 1 - HOUSING
- 2 - HORN SWITCH GROUND WIRE
- 3 - HORN SWITCH FEED WIRE
- 4 - INFLATOR
- 5 - TRIM COVER

The airbag used in this model is a multistage, Next Generation-type that complies with revised federal airbag standards to deploy with less force than those used in some prior models. A 67 centimeter (26.5 inch) diameter, radial deploying fabric cushion with tethers is used. The airbag inflator is a dual-initiator, non-azide, pyrotechnic-type unit with four mounting studs and is secured to the stamped metal airbag housing using four hex nuts with washers. Two keyed and color-coded connector receptacles on the driver airbag inflator connect the two inflator initiators to the vehicle electrical system through two yellow-jacketed, two-wire pigtail harnesses of the clockspring. The driver airbag and horn switch unit cannot be repaired, and must be replaced if deployed or in any way damaged.

OPERATION

The multistage driver airbag is deployed by electrical signals generated by the Airbag Control Module (ACM) through the driver airbag squib 1 and squib 2 circuits to the two initiators in the airbag inflator. By using two initiators, the airbag can be deployed at multiple levels of force. The force level is controlled by the ACM to suit the monitored impact conditions by providing one of three delay intervals between the electrical signals provided to the two initiators. The longer the delay between these signals, the less forcefully the airbag will deploy. When the ACM 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 nitrogen gas. The inflator is sealed to the back of the airbag housing and a diffuser in the inflator directs all of the nitrogen gas into the airbag cushion, causing the cushion to inflate. As the cushion inflates, the driver airbag trim cover will split at pre-determined breakout lines, then fold back out of the way along with the horn switch unit. Following an airbag deployment, the airbag cushion quickly deflates by venting the nitrogen gas towards the instrument panel through vent holes within the fabric used to construct the back (steering wheel side) panel of the airbag cushion.

Some of the chemicals used to create the nitrogen 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 an airbag system 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 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - SERVICE AFTER A SUPPLEMENTAL RESTRAINT DEPLOYMENT). The nitrogen gas that is produced when the chemicals are burned 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 breathe. If the irritation is not alleviated by these actions, contact a physician.

DRIVER AIRBAG (Continued)

REMOVAL

The following procedure is for replacement of a faulty or damaged driver airbag. If the driver airbag has been deployed, review the recommended procedures for service after a passive restraint deployment before removing the airbag from the vehicle. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - SERVICE AFTER A SUPPLEMENTAL RESTRAINT DEPLOYMENT).

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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

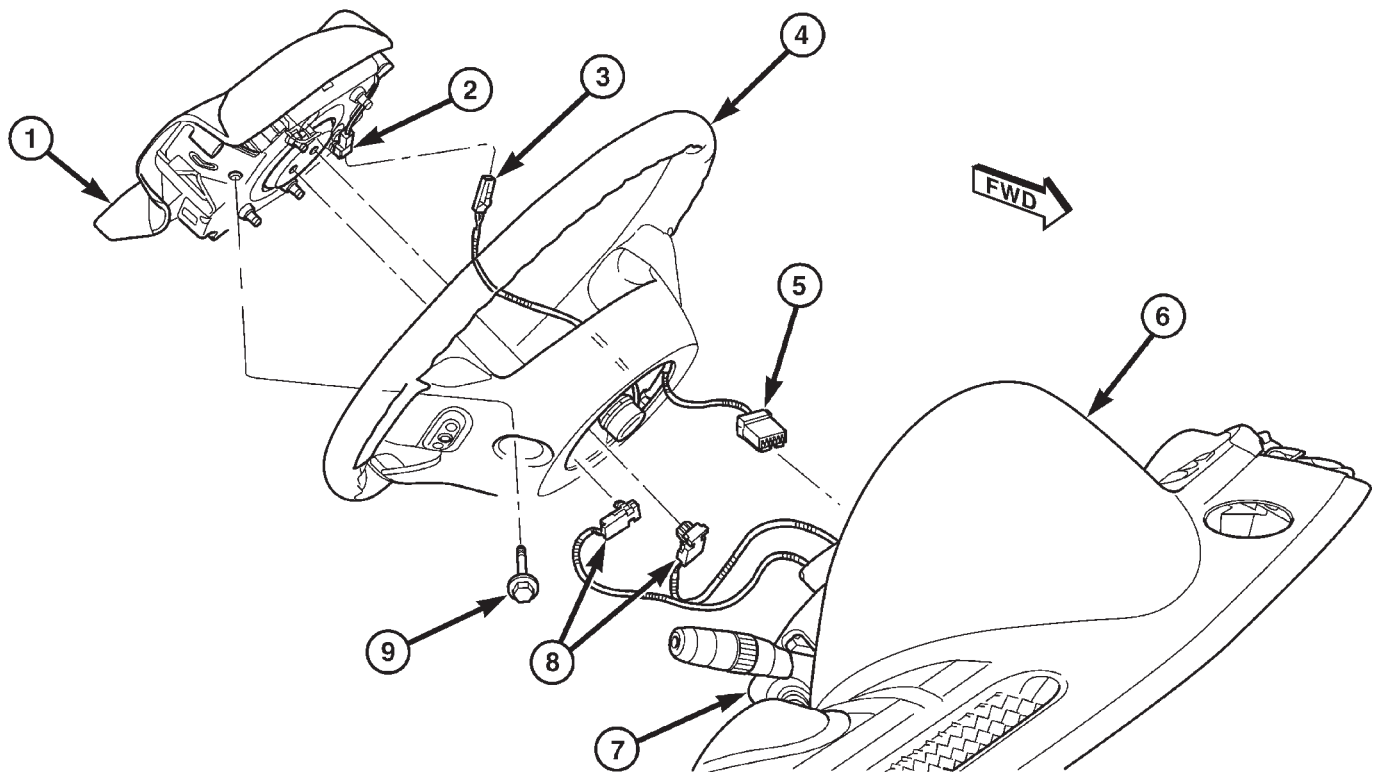
SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: 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.

(1) Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.

(2) From the underside of the steering wheel, remove the two screws that secure the driver airbag to the steering wheel armature (Fig. 16).

(3) Pull the driver airbag away from the steering wheel far enough to access the three electrical connections on the back of the airbag housing.



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Fig. 16 Driver Airbag Remove/Install

- | | |
|-------------------------------------|--|
| 1 - DRIVER AIRBAG | 6 - INSTRUMENT PANEL |
| 2 - HORN SWITCH FEED WIRE CONNECTOR | 7 - STEERING COLUMN |
| 3 - WIRE HARNESS CONNECTOR | 8 - CLOCKSPRING PIGTAIL WIRE CONNECTOR (2) |
| 4 - STEERING WHEEL | 9 - SCREW (2) |
| 5 - TO CLOCKSPRING | |

DRIVER AIRBAG (Continued)

(4) Disconnect the steering wheel wire harness connector for the horn switch from the horn switch feed pigtail wire connector, which is located on the back of the driver airbag housing.

CAUTION: Do not pull on the clockspring pigtail wires or pry on the connector insulator to disengage the connector from the driver airbag inflator connector receptacle. Improper removal of these pigtail wires and their connector insulators can result in damage to the airbag circuits or connector insulators.

(5) The clockspring driver airbag pigtail wire connectors are secured by integral latches to the airbag inflator connector receptacles, which are located on the back of the driver airbag housing. Depress the latches on each side of each connector insulator and pull the insulators straight out from the airbag inflator to disconnect them from the connector receptacles.

(6) Remove the driver airbag from the steering wheel.

(7) If the driver airbag has been deployed, the clockspring must be replaced. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - REMOVAL).

INSTALLATION

The following procedure is for replacement of a faulty or damaged driver airbag. If the driver airbag has been deployed, the clockspring must also be replaced. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - INSTALLATION).

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: USE EXTREME CARE TO PREVENT ANY FOREIGN MATERIAL FROM ENTERING THE DRIVER AIRBAG, OR BECOMING ENTRAPPED BETWEEN THE DRIVER AIRBAG CUSHION AND THE DRIVER AIRBAG TRIM COVER. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN OCCUPANT INJURIES UPON AIRBAG DEPLOYMENT.

WARNING: THE DRIVER AIRBAG TRIM COVER MUST NEVER BE PAINTED. REPLACEMENT AIRBAGS ARE SERVICED IN THE ORIGINAL COLORS. PAINT MAY CHANGE THE WAY IN WHICH THE MATERIAL OF THE TRIM COVER RESPONDS TO AN AIRBAG DEPLOYMENT. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN OCCUPANT INJURIES UPON AIRBAG DEPLOYMENT.

(1) Position the driver airbag close enough to the steering wheel to reconnect all three electrical connections on the back of the airbag housing.

(2) When installing the driver airbag, reconnect the two clockspring driver airbag pigtail wire connectors to the airbag inflator connector receptacles by pressing straight in on the connectors (Fig. 16). Be certain to engage each keyed and color-coded connector to the matching connector receptacle. You can be certain that each connector is fully engaged in its receptacle by listening carefully for a distinct, audible click as the connector latches snap into place.

(3) Reconnect the steering wheel wire harness connector for the horn switch to the horn switch feed pigtail wire connector, which is located at the back of the driver airbag housing.

(4) Carefully position the driver airbag in the steering wheel. Be certain that the clockspring pigtail wires and steering wheel wire harness in the steering wheel hub area are not pinched between the driver airbag and the steering wheel armature.

(5) From the underside of the steering wheel, install and tighten the two screws that secure the driver airbag to the steering wheel armature. Tighten the screws to 10 N·m (90 in. lbs.).

(6) Do not reconnect the battery negative cable at this time. The airbag system verification test procedure should be performed following service of any supplemental restraint system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).

FRONT IMPACT SENSOR

DESCRIPTION

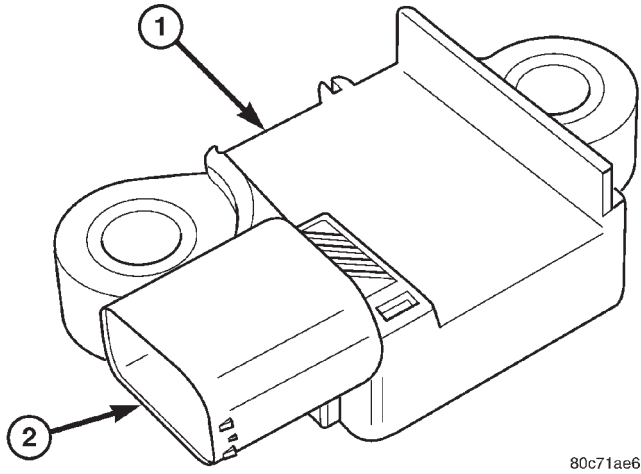


Fig. 17 Front Impact Sensor

- 1 - SENSOR
2 - CONNECTOR RECEPTACLE

Two front impact sensors are used on this model, one each for the left and right sides of the vehicle (Fig. 17). These sensors are mounted remotely from the impact sensor that is internal to the Airbag Control Module (ACM). Each front sensor is secured with two screws to the backs of the right and left vertical members of the radiator support within the engine compartment. The sensor housing has an integral connector receptacle and two integral mounting points each with a metal sleeve to provide crush protection.

The right and left front impact sensors are identical in construction and calibration with two exceptions:

- On models equipped with an optional 2.4L gasoline engine, the left front impact sensor includes a shim that moves the sensor three millimeters toward the rear of the vehicle on the left vertical member of the radiator support for additional clearance that is required for that application.
- On models equipped with an optional diesel engine, the left front impact sensor includes a stamped metal mounting bracket that rotates the

connector receptacle end of the sensor toward the outboard side of the vehicle for additional clearance that is required for that application.

A cavity in the center of the molded black plastic impact sensor housing contains the electronic circuitry of the sensor which includes an electronic communication chip and an electronic impact sensor. Potting material fills the cavity to seal and protect the internal electronic circuitry and components. The front impact sensors are each connected to the vehicle electrical system through a dedicated take out and connector of the headlamp and dash wire harness.

The impact sensors cannot be repaired or adjusted and, if damaged or faulty, they must be replaced. The mounting bracket for the left front impact sensor on models with a diesel engine is serviced as a unit with that sensor.

OPERATION

The front 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 microprocessor in the Airbag Control Module (ACM). The ACM microprocessor continuously monitors all of the front passive restraint system electrical circuits to determine the system readiness. If the ACM 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 ACM. The impact sensors and the ACM communicate by modulating the voltage in the sensor plus circuit. The hard wired circuits between the front impact sensors and the ACM may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the ACM or the impact sensors. The most reliable, efficient, and accurate means to diagnose the impact sensors, the ACM, and the electronic message communication between the sensors and the ACM requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

FRONT IMPACT SENSOR (Continued)

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: THE FRONT IMPACT SENSOR ENABLES THE SYSTEM TO DEPLOY THE FRONT SUPPLEMENTAL RESTRAINTS. NEVER STRIKE OR DROP THE FRONT IMPACT SENSOR, AS IT CAN DAMAGE THE IMPACT SENSOR OR AFFECT ITS CALIBRATION. 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 AND POSSIBLE OCCUPANT INJURIES.

(1) Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.

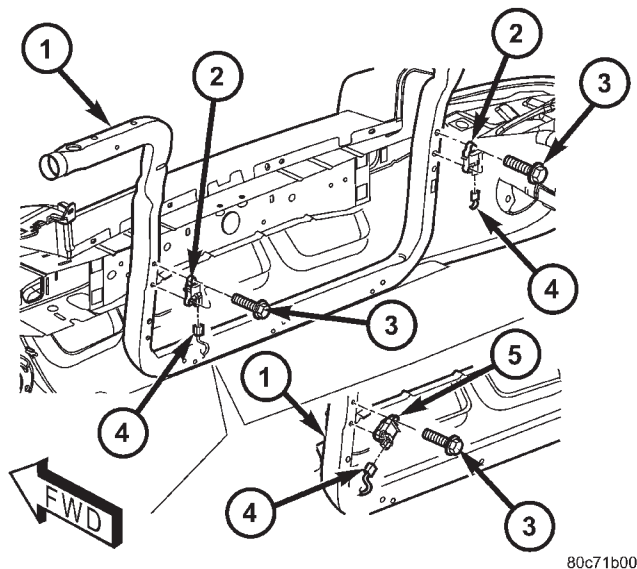
(2) Remove the two screws that secure the right or left front impact sensor, left impact sensor and shim (2.4L engine only), or left impact sensor and bracket unit (diesel engine only) to the back of the right or left radiator support vertical member (Fig. 18).

(3) Disconnect the headlamp and dash wire harness connector for the front impact sensor from the sensor connector receptacle.

(4) Remove the right or left front impact sensor, left impact sensor and shim (2.4L engine only), or left impact sensor and bracket unit (diesel engine only) from the engine compartment.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG,



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Fig. 18 Front Impact Sensor Remove/Install

- 1 - RADIATOR SUPPORT
- 2 - IMPACT SENSOR OR LEFT IMPACT SENSOR & SHIM (2.4L ENGINE ONLY)
- 3 - SCREW (4)
- 4 - WIRE HARNESS CONNECTOR
- 5 - LEFT IMPACT SENSOR & BRACKET (DIESEL ENGINE ONLY)

PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: THE FRONT IMPACT SENSOR ENABLES THE SYSTEM TO DEPLOY THE FRONT SUPPLEMENTAL RESTRAINTS. NEVER STRIKE OR DROP THE FRONT IMPACT SENSOR, AS IT CAN DAMAGE THE IMPACT SENSOR OR AFFECT ITS CALIBRATION. 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 AND POSSIBLE OCCUPANT INJURIES.

(1) Position the right or left front impact sensor, left impact sensor and shim (2.4L engine only), or left

FRONT IMPACT SENSOR (Continued)

impact sensor and bracket unit (diesel engine only) into the engine compartment (Fig. 18).

(2) Reconnect the headlamp and dash wire harness connector for the front impact sensor to the sensor connector receptacle.

(3) Position the right or left front impact sensor, left impact sensor and shim (2.4L engine only), or left impact sensor and bracket unit (diesel engine only) onto the back of the right or left radiator support vertical member.

(4) Loosely install the upper screw that secures the right or left front impact sensor, left impact sensor and shim (2.4L engine only), or left impact sensor and bracket unit (diesel engine only) to the back of the right or left radiator support vertical member.

(5) Install and tighten the lower screw that secures the right or left front impact sensor, left impact sensor and shim (2.4L engine only), or left impact sensor and bracket unit (diesel engine only) to the back of the right or left radiator support vertical member. Tighten the screw to 7 N·m (65 in. lbs.).

(6) Tighten the upper screw that secures the right or left front impact sensor, left impact sensor and shim (2.4L engine only), or left impact sensor and bracket unit (diesel engine only) to the back of the right or left radiator support vertical member. Tighten the screw to 7 N·m (65 in. lbs.).

(7) Do not reconnect the battery negative cable at this time. The airbag system verification test procedure should be performed following service of any airbag system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).

FRONT SEAT BELT & RETRACTOR

REMOVAL

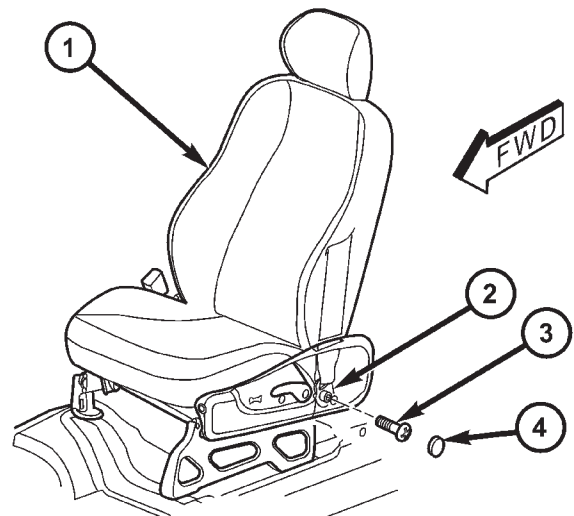
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: DURING AND FOLLOWING ANY SEAT BELT SERVICE, CAREFULLY INSPECT ALL SEAT BELTS, BUCKLES, MOUNTING HARDWARE, AND RETRACTORS 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 INOPERATIVE BUCKLE OR RETRACTOR. REPLACE ANY BELT THAT HAS A BENT OR DAMAGED LATCH PLATE OR ANCHOR PLATE. NEVER ATTEMPT TO REPAIR A SEAT BELT COMPONENT. ALWAYS REPLACE DAMAGED OR FAULTY SEAT BELT COMPONENTS WITH THE CORRECT, NEW AND UNUSED REPLACEMENT PARTS LISTED IN THE MOPAR PARTS CATALOG.

(1) Adjust the front seat to its most forward position for easiest access to the front seat belt lower anchor and the B-pillar trim.

(2) Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.

(3) Using a trim stick or another suitable wide flat-bladed tool, gently pry the plug that covers the front seat belt lower anchor screw to remove it from the rear of the outboard seat side shield (Fig. 19).



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Fig. 19 Front Seat Belt Lower Anchor Remove/Install

- 1 - FRONT SEAT
- 2 - LOWER ANCHOR
- 3 - SCREW
- 4 - PLUG

FRONT SEAT BELT & RETRACTOR (Continued)

(4) Remove the screw that secures the lower anchor to the bracket on the outboard side of the front seat cushion frame.

(5) Unsnap and lift the trim cover to access the nut that secures the front seat belt turning loop to the height adjuster on the upper B-pillar (Fig. 20).

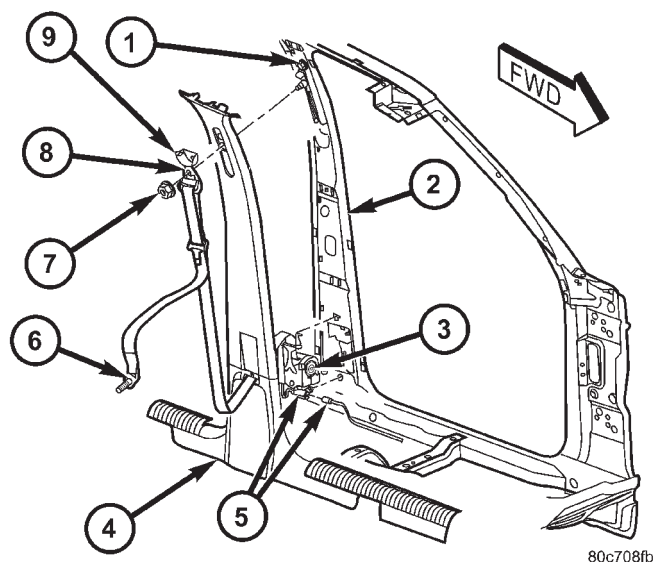


Fig. 20 Front Seat Belt Retractor Remove/Install

- 1 - ADJUSTER
- 2 - B-PILLAR
- 3 - RETRACTOR
- 4 - B-PILLAR TRIM
- 5 - CONNECTOR (DRIVER SIDE ONLY)
- 6 - LOWER ANCHOR
- 7 - NUT
- 8 - TURNING LOOP
- 9 - COVER

(6) Remove the nut that secures the seat belt turning loop to the height adjuster stud on the upper B-pillar.

(7) Remove the seat belt turning loop from the height adjuster stud.

(8) Remove the upper and lower trim from the inside of the B-pillar. (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - REMOVAL) and (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - REMOVAL).

(9) On the driver side only, disconnect the seat belt tensioner pigtail wire connector from the body wire harness connector.

(10) Remove the screw that secures the lower retractor bracket to the lower B-pillar.

(11) Disengage the engagement tab on the upper retractor bracket/seat belt web guide from the engagement slot in the lower B-pillar.

(12) Remove the front seat belt and retractor from the B-pillar as a unit.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: DURING AND FOLLOWING ANY SEAT BELT SERVICE, CAREFULLY INSPECT ALL SEAT BELTS, BUCKLES, MOUNTING HARDWARE, AND RETRACTORS 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 INOPERATIVE BUCKLE OR RETRACTOR. REPLACE ANY BELT THAT HAS A BENT OR DAMAGED LATCH PLATE OR ANCHOR PLATE. NEVER ATTEMPT TO REPAIR A SEAT BELT COMPONENT. ALWAYS REPLACE DAMAGED OR FAULTY SEAT BELT COMPONENTS WITH THE CORRECT, NEW AND UNUSED REPLACEMENT PARTS LISTED IN THE MOPAR PARTS CATALOG.

(1) Position the front seat belt and retractor to the B-pillar as a unit (Fig. 20). Be certain to engage the engagement tab on the upper retractor bracket/seat belt web guide into the engagement slot in the lower B-pillar.

(2) Install and tighten the screw that secures the lower retractor bracket to the lower B-pillar. Tighten the screw to 43 N·m (32 ft. lbs.).

(3) On the driver side only, reconnect the seat belt tensioner pigtail wire connector to the body wire harness connector.

(4) Reinstall the upper and lower trim onto the inside of the B-pillar. (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - INSTALLATION) and (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - INSTALLATION).

(5) Position the seat belt turning loop onto the height adjuster stud on the upper B-pillar.

FRONT SEAT BELT & RETRACTOR (Continued)

(6) Install and tighten the nut that secures the seat belt turning loop to the height adjuster stud. Tighten the nut to 34 N·m (25 ft. lbs.).

(7) Fold and snap the trim cover back into place to conceal the nut that secures the front seat belt turning loop to the height adjuster on the upper B-pillar.

(8) Position the front seat belt lower anchor to the bracket on the outboard side of the front seat cushion frame (Fig. 19).

(9) Install and tighten the screw that secures the lower anchor to the bracket on the outboard side of the front seat cushion frame. Tighten the screw to 43 N·m (32 ft. lbs.).

(10) Align the plug that covers the front seat belt lower anchor screw with the hole near the rear of the outboard seat side shield. Using hand pressure, press firmly and evenly on the plug until it snaps into place.

(11) Do not reconnect the battery negative cable at this time. The airbag system verification test procedure should be performed following service of any supplemental restraint system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).

FRONT SEAT BELT BUCKLE

REMOVAL

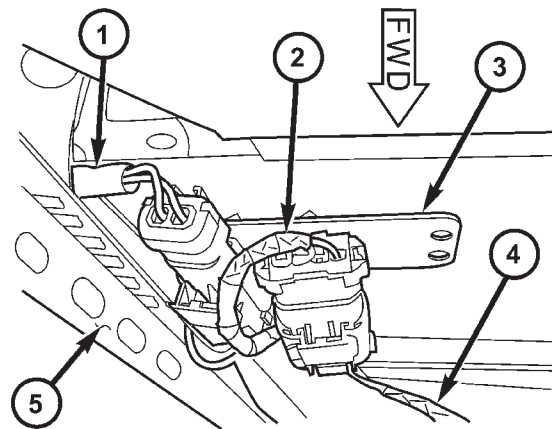
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(1) Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.

(2) Remove the front seat and seat track from the floor panel as a unit. (Refer to 23 - BODY/SEATS/SEAT - FRONT - REMOVAL).

(3) Disconnect the seat belt switch pigtail wire connector from the seat wire harness connector on the seat cushion frame bracket located under the rear edge of the seat cushion near the inboard side of the seat (Fig. 21).



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Fig. 21 Seat Belt Switch Connector

- 1 - PIGTAIL WIRE
- 2 - SEAT WIRE HARNESS
- 3 - SEAT CUSHION FRAME BRACKET
- 4 - BODY WIRE HARNESS
- 5 - INBOARD SEAT TRACK

FRONT SEAT BELT BUCKLE (Continued)

(4) Remove the screw that secures the front seat belt buckle anchor to the bracket near the rear of the inboard seat track (Fig. 22).

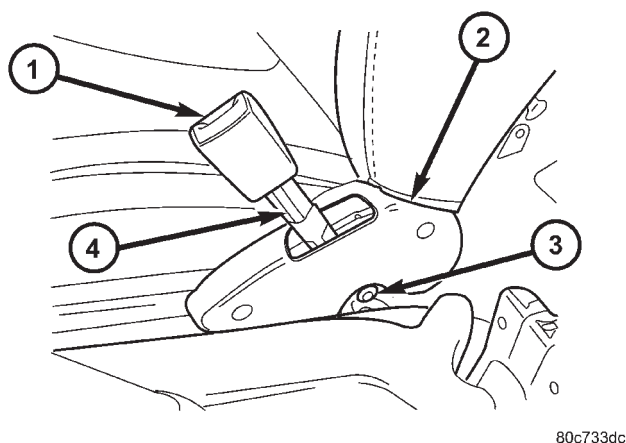


Fig. 22 Front Seat Belt Buckle Remove/Install

- 1 - FRONT SEAT BELT BUCKLE
- 2 - INBOARD SIDE SHIELD
- 3 - SCREW
- 4 - PIGTAIL WIRE

(5) Remove the two screws that secure the inboard seat cushion side shield to the seat cushion frame.

(6) Remove the two screws that secure the inboard seat track to the rear inboard corner of the seat cushion frame.

(7) Disconnect the seat belt switch pigtail wire routing clip from the locating hole in the seat cushion frame.

(8) Remove the seat belt switch pigtail wire from between the seat cushion frame and the seat track by gently prying the inboard seat track away from the inboard rear corner of the seat cushion frame far enough to slide the pigtail wire from between them.

(9) Remove the front seat belt buckle from the inboard seat cushion side shield.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN

ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: DURING AND FOLLOWING ANY SEAT BELT SERVICE, CAREFULLY INSPECT ALL SEAT BELTS, BUCKLES, MOUNTING HARDWARE, AND RETRACTORS 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 INOPERATIVE BUCKLE OR RETRACTOR. REPLACE ANY BELT THAT HAS A BENT OR DAMAGED LATCH PLATE OR ANCHOR PLATE. NEVER ATTEMPT TO REPAIR A SEAT BELT COMPONENT. ALWAYS REPLACE DAMAGED OR FAULTY SEAT BELT COMPONENTS WITH THE CORRECT, NEW AND UNUSED REPLACEMENT PARTS LISTED IN THE MOPAR PARTS CATALOG.

(1) Position the front seat belt buckle to the inboard seat cushion side shield (Fig. 22).

(2) Position the seat belt switch pigtail wire between the seat cushion frame and the seat track by gently prying the inboard seat track away from the inboard rear corner of the seat cushion frame far enough to slide the pigtail wire into position between them.

(3) Engage the seat belt switch pigtail wire routing clip into the locating hole in the seat cushion frame.

(4) Install and tighten the two screws that secure the inboard seat track to the rear inboard corner of the seat cushion frame. Tighten the screws to 28 N·m (21 ft. lbs.).

(5) Position the inboard seat cushion side shield to the seat cushion frame.

(6) Install and tighten the two screws that secure the inboard seat cushion side shield to the seat cushion frame. Tighten the screws to 1 N·m (9 in. lbs.).

(7) Position the front seat belt buckle anchor to the bracket on the inboard side of the seat track.

(8) Install and tighten the screw that secures the front seat belt buckle anchor to the bracket on the inboard side of the seat track. Tighten the screw to 43 N·m (32 ft. lbs.).

(9) Reconnect the seat belt switch pigtail wire connector to the seat wire harness connector on the seat cushion frame bracket located under the rear edge of the seat cushion near the inboard side of the seat (Fig. 21).

(10) Reinstall the front seat and seat track to the floor panel as a unit. (Refer to 23 - BODY/SEATS/SEAT - FRONT - INSTALLATION).

(11) Do not reconnect the battery negative cable at this time. The airbag system verification test procedure should be performed following service of any supplemental restraint system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).

PASSENGER AIRBAG

DESCRIPTION

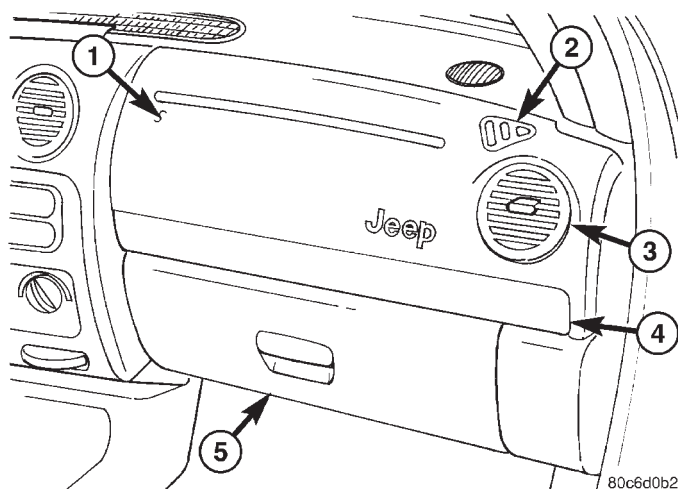
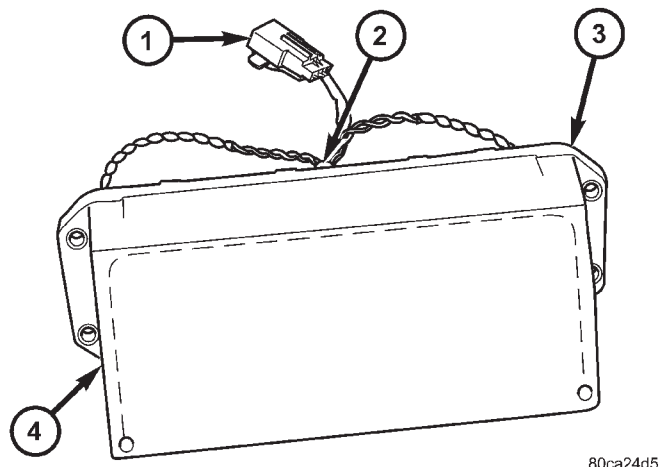


Fig. 23 Passenger Airbag Door

- 1 - PASSENGER AIRBAG DOOR
- 2 - DEMISTER OUTLET
- 3 - PANEL OUTLET
- 4 - BEZEL
- 5 - GLOVE BOX

The rearward facing surface of the injection molded, thermoplastic passenger airbag door is the most visible part of the passenger airbag (Fig. 23). The passenger airbag door is located above the glove box opening in front of the front seat passenger seating position on the instrument panel. The integral upper mounting flange is secured with five screws and the lower mounting flange with six screws to the instrument panel structural support. The passenger airbag door includes an integral air conditioning panel outlet housing and an integral side window demister outlet. An integral stamped metal bracket that reinforces the upper airbag door mounting flange is secured to the back of the door unit with heat stakes. The upper airbag door fasteners and mounting flange are concealed beneath the instrument panel top cover, while the lower fasteners and mounting flange are concealed beneath a bezel on the instrument panel above the glove box opening.

Located behind the passenger airbag door within the instrument panel is the passenger airbag unit (Fig. 24). The passenger airbag unit used in this model is a multistage, Next Generation-type that complies with revised federal airbag standards to deploy with less force than those used in some prior models. The passenger airbag unit consists of a molded, glass-filled nylon plastic housing, a molded plastic inner airbag cushion cover, the airbag cushion, and the airbag inflator. The airbag housing con-



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Fig. 24 Passenger Airbag Unit

- 1 - PIGTAIL WIRE CONNECTOR
- 2 - RETAINER
- 3 - HOUSING
- 4 - INNER COVER

tains the airbag inflator, while the inner cover contains the folded airbag cushion. The inner cover completely encloses the airbag cushion and is permanently retained to the housing. The passenger airbag unit is secured by two screws on each side to two stamped metal mounting brackets that are fastened with screws to the instrument panel structural support. The airbag cushion is constructed of a coated nylon fabric. The airbag inflator is a dual-initiator, hybrid-type unit that is secured to and sealed within the airbag housing. A short four-wire pigtail harness with a keyed, yellow connector insulator connects the two inflator initiators to the vehicle electrical system through a dedicated take out and connector of the instrument panel wire harness.

The passenger airbag cannot be repaired, and must be replaced if deployed, faulty, or in any way damaged. The passenger airbag door and the passenger airbag mounting brackets are available for separate service replacement.

OPERATION

The multistage passenger airbag is deployed by electrical signals generated by the Airbag Control Module (ACM) through the passenger airbag squib 1 and squib 2 circuits to the two initiators in the airbag inflator. By using two initiators, the airbag can be deployed at multiple levels of force. The force level is controlled by the ACM to suit the monitored impact conditions by providing one of three delay intervals between the electrical signals provided to the two initiators. The longer the delay between these signals, the less forcefully the airbag will deploy.

PASSENGER AIRBAG (Continued)

The hybrid-type inflator assembly includes a small canister of highly compressed gas. When the ACM sends the proper electrical signal to the airbag inflator, the initiator converts the electrical energy into chemical energy. This chemical energy opens up a burst disk to allow the inert gas to flow into the airbag cushion. The inflator is sealed to the airbag cushion so that all of the released inert gas is directed into the airbag cushion, causing the cushion to inflate. As the cushion inflates, the passenger airbag door will split at predetermined tear seam lines on the inside surface of the door and the door will pivot downwards out of the way. Following a passenger airbag deployment, the airbag cushion quickly deflates by venting the inert gas through vent holes within the fabric used to construct the sides of the airbag cushion.

Typically, both initiators are used during an airbag 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 both initiators have been used in order to avoid the improper disposal of potentially live pyrotechnic materials. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - SERVICE AFTER A SUPPLEMENTAL RESTRAINT DEPLOYMENT).

REMOVAL

The following procedure is for replacement of a faulty or damaged passenger airbag. If the passenger airbag has been deployed, review the recommended procedures for service after a supplemental restraint deployment before removing the airbag from the vehicle. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - SERVICE AFTER A SUPPLEMENTAL RESTRAINT DEPLOYMENT).

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: 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 battery negative cable. Wait two minutes for the system capacitor to discharge before further service.

(2) Remove the passenger airbag door from the instrument panel. (Refer to 8 - ELECTRICAL/RESTRAINTS/PASSENGER AIRBAG DOOR - REMOVAL).

(3) Remove the two screws on each side of the passenger airbag that secure the passenger airbag to the metal brackets on the instrument panel support structure (Fig. 25).

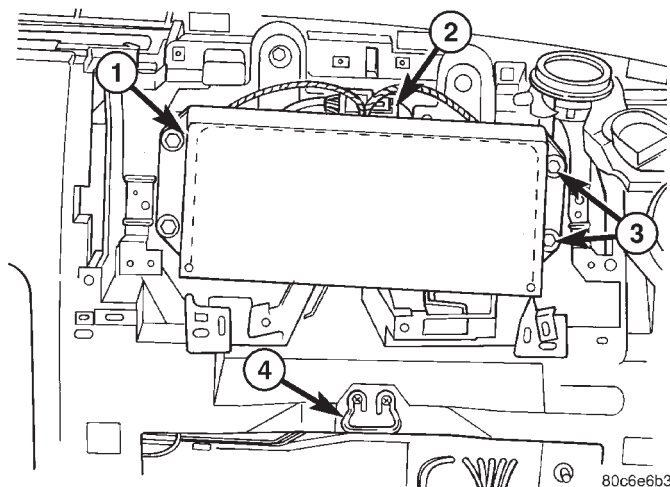


Fig. 25 Passenger Airbag Remove/Install

- 1 - PASSENGER AIRBAG
- 2 - WIRE HARNESS CONNECTOR
- 3 - SCREW (4)
- 4 - GLOVE BOX LATCH STRIKER

(4) Disengage the passenger airbag wire harness connector from the retainer securing the connector to the metal bracket on the instrument panel support structure above the airbag by sliding both halves of the connector to the left.

(5) Disconnect the passenger airbag pigtail wire connector from the instrument panel wire harness connector for the airbag. To disconnect the connector:

(a) Slide the red Connector Position Assurance (CPA) lock on the top of the connector toward the side of the connector.

(b) Depress the connector latch tab and pull the two halves of the connector straight away from each other.

PASSENGER AIRBAG (Continued)

(6) Remove the passenger airbag from the instrument panel as a unit.

(7) If the passenger airbag has been deployed, both passenger airbag mounting brackets on the instrument panel must be replaced. (Refer to 8 - ELECTRICAL/RESTRAINTS/PASSENGER AIRBAG MOUNTING BRACKET - REMOVAL).

INSTALLATION

The following procedure is for replacement of a faulty or damaged passenger airbag. If the passenger airbag has been deployed, both passenger airbag mounting brackets on the instrument panel must also be replaced. (Refer to 8 - ELECTRICAL/RESTRAINTS/PASSENGER AIRBAG MOUNTING BRACKET - INSTALLATION).

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: 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: USE EXTREME CARE TO PREVENT ANY FOREIGN MATERIAL FROM ENTERING THE PASSENGER AIRBAG, OR BECOMING ENTRAPPED BETWEEN THE PASSENGER AIRBAG CUSHION AND THE PASSENGER AIRBAG DOOR. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN OCCUPANT INJURIES UPON AIRBAG DEPLOYMENT.

(1) Position the passenger airbag unit into the instrument panel (Fig. 25).

(2) Reconnect the passenger airbag pigtail wire connector to the instrument panel wire harness connector for the airbag. Be certain that the latch on the connector and the red Connector Position Assurance (CPA) lock are each fully engaged.

(3) Engage the passenger airbag wire harness connector onto the retainer that secures the connector to the metal bracket on the instrument panel support structure above the airbag by aligning the right end of the connector slot with the left end of the retainer and sliding both halves of the connector to the right.

(4) Carefully position the passenger airbag unit onto the two metal brackets on the instrument panel support structure, being certain that the alignment pin features on each side of the airbag are engaged in the alignment holes in the metal brackets.

(5) Install and tighten the two screws on each side of the passenger airbag that secure the passenger airbag to the metal brackets on the instrument panel support structure. Tighten the screws to 6 N·m (55 in. lbs.).

(6) Reinstall the passenger airbag door onto the instrument panel. (Refer to 8 - ELECTRICAL/RESTRAINTS/PASSENGER AIRBAG DOOR - INSTALLATION).

(7) Do not reconnect the battery negative cable at this time. The airbag system verification test procedure should be performed following service of any supplemental restraint system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).

PASSENGER AIRBAG DOOR

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

PASSENGER AIRBAG DOOR (Continued)

WARNING: 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 battery negative cable. Wait two minutes for the system capacitor to discharge before further service.

(2) Remove the top cover from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - REMOVAL).

(3) Remove the passenger side bezel from the upper glove box opening of the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/IP PASSENGER SIDE BEZEL - REMOVAL).

(4) Remove the three small screws that secure the passenger airbag door to the glove box opening upper reinforcement (Fig. 26).

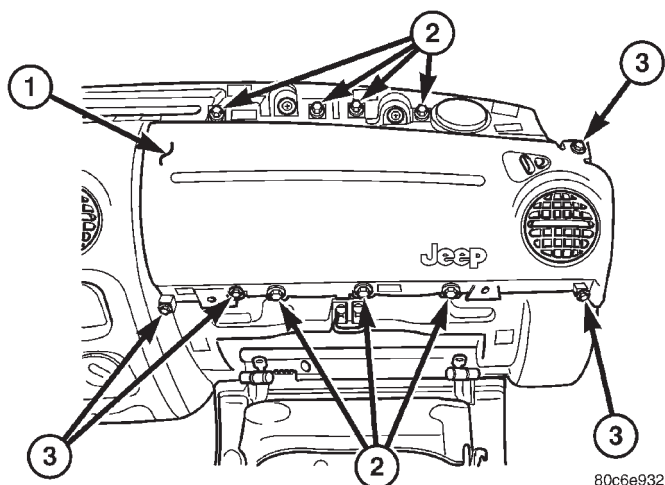


Fig. 26 Passenger Airbag Door Remove/Install

- 1 - PASSENGER AIRBAG DOOR
- 2 - LARGE SCREW (7)
- 3 - SMALL SCREW (4)

(5) Remove the three large screws that secure the passenger airbag door to the glove box opening upper reinforcement.

(6) Remove the one small screw that secures the passenger airbag door to the top of the instrument panel.

(7) Remove the four large screws that secure the passenger airbag door to the top of the instrument panel.

(8) Remove the passenger airbag door from the instrument panel.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: THE PASSENGER AIRBAG DOOR MUST NEVER BE PAINTED. REPLACEMENT PASSENGER AIRBAG DOORS ARE SERVICED IN THE ORIGINAL COLORS. PAINT MAY CHANGE THE WAY IN WHICH THE MATERIAL OF THE AIRBAG DOOR RESPONDS TO AN AIRBAG DEPLOYMENT. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN OCCUPANT INJURIES UPON AIRBAG DEPLOYMENT.

(1) Position the passenger airbag door onto the instrument panel (Fig. 26).

(2) Install and tighten the four large screws that secure the passenger airbag door to the top of the instrument panel. Tighten the screws to 4 N·m (35 in. lbs.).

(3) Install and tighten the one small screw that secures the passenger airbag door to the top of the instrument panel. Tighten the screw to 2 N·m (20 in. lbs.).

(4) Install and tighten the three large screws that secure the passenger airbag door to the glove box opening upper reinforcement. Tighten the screws to 4 N·m (35 in. lbs.).

(5) Install and tighten the three small screws that secure the passenger airbag door to the glove box opening upper reinforcement. Tighten the screws to 2 N·m (20 in. lbs.).

(6) Reinstall the passenger side bezel onto the upper glove box opening of the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/IP PASSENGER SIDE BEZEL - INSTALLATION).

(7) Reinstall the top cover onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - INSTALLATION).

(8) Reconnect the battery negative cable.

PASSENGER AIRBAG MOUNTING BRACKET

REMOVAL

The passenger airbag mounting brackets cannot be repaired. They must be replaced if faulty or damaged, or if the passenger airbag has been deployed.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Remove the passenger airbag from the instrument panel. (Refer to 8 - ELECTRICAL/RESTRAINTS/PASSENGER AIRBAG - REMOVAL).

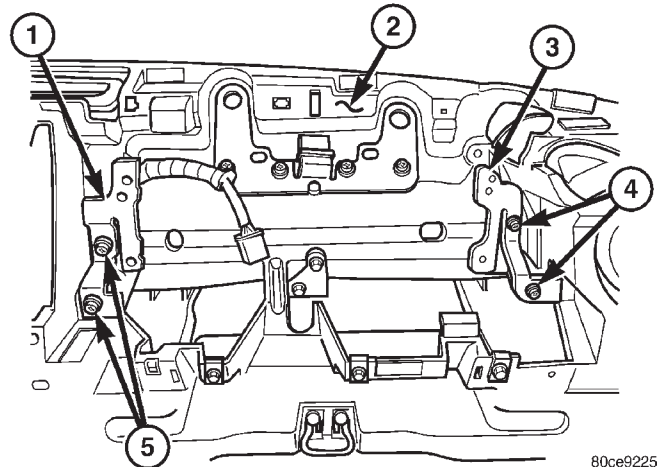
(2) Remove the two screws that secure the inboard and/or outboard passenger airbag mounting bracket(s) to the instrument panel support structure (Fig. 27).

(3) Remove the inboard and/or outboard passenger airbag mounting bracket(s) from the instrument panel support structure.

INSTALLATION

The passenger airbag mounting brackets cannot be repaired. They must be replaced if faulty or damaged, or if the passenger airbag has been deployed.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG,



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**Fig. 27 Passenger Airbag Mounting Brackets
Remove/Install**

- 1 - INBOARD BRACKET
- 2 - I/P SUPPORT STRUCTURE
- 3 - OUTBOARD BRACKET
- 4 - SCREW (2)
- 5 - SCREW (2)

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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Position the inboard and/or outboard passenger airbag mounting bracket(s) to the instrument panel support structure (Fig. 27).

(2) Install and tighten the two screws that secure the inboard and/or outboard passenger airbag mounting bracket(s) to the instrument panel support structure. Tighten the screws to 2 N·m (20 in. lbs.).

(3) Reinstall the passenger airbag to the instrument panel. (Refer to 8 - ELECTRICAL/RESTRAINTS/PASSENGER AIRBAG - INSTALLATION).

REAR CENTER SEAT BELT & RETRACTOR

REMOVAL

WARNING: DURING AND FOLLOWING ANY SEAT BELT SERVICE, CAREFULLY INSPECT ALL SEAT BELTS, BUCKLES, MOUNTING HARDWARE, AND RETRACTORS 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 INOPERATIVE BUCKLE OR RETRACTOR. REPLACE ANY BELT THAT HAS A BENT OR DAMAGED LATCH PLATE OR ANCHOR PLATE. NEVER ATTEMPT TO REPAIR A SEAT BELT COMPONENT. ALWAYS REPLACE DAMAGED OR FAULTY SEAT BELT COMPONENTS WITH THE CORRECT, NEW AND UNUSED REPLACEMENT PARTS LISTED IN THE MOPAR PARTS CATALOG.

(1) Remove the right center seat belt buckle unit from the floor panel. (Refer to 8 - ELECTRICAL/RESTRAINTS/REAR SEAT BELT BUCKLE - REMOVAL).

(2) Unlatch and fold the right rear seat back forward and separate the cargo area carpet from the base of the seat back panel.

(3) Reach between the base of the right rear seat back and the forward edge of the rear cargo floor to access and remove the screw that secures the rear center seat belt lower anchor to the floor panel (Fig. 28).

(4) Lift the rear center seat belt lower anchor off of the stud on the rear floor panel.

(5) Remove the two screws that secure the belt web guide to the top of the right rear seat back panel.

(6) Remove the right rear seat back panel from the vehicle. (Refer to 23 - BODY/SEATS/SEAT BACK - REAR - REMOVAL).

(7) Remove the two screws that secure the belt web guide to the top of the right rear seat back panel.

(8) Remove the trim from the right rear seat back. (Refer to 23 - BODY/SEATS/SEAT BACK COVER - REAR - REMOVAL).

(9) Route the rear seat belt lower anchor and belt web guide through the top of the seat back panel.

(10) Disengage the seat back latch cable fitting from the cable support on the retractor, which is a light snap fit (Fig. 29).

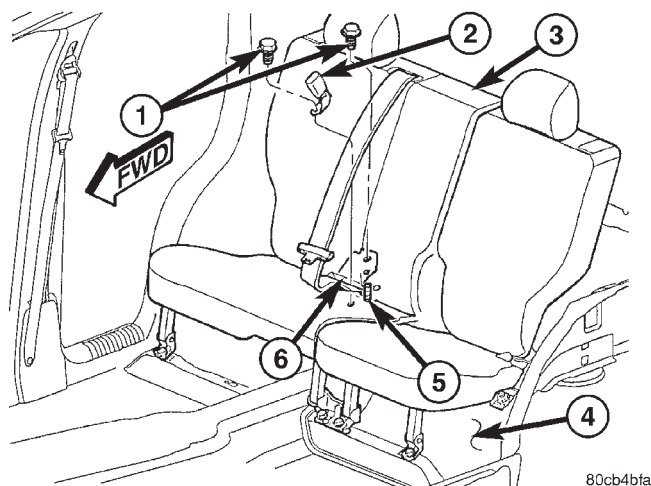


Fig. 28 Rear Center Seat Belt Anchor Plate Remove/Install

- 1 - SCREW (2)
- 2 - BUCKLE UNIT
- 3 - REAR SEAT BACK
- 4 - REAR FLOOR PANEL
- 5 - STUD (1)
- 6 - ANCHOR PLATE

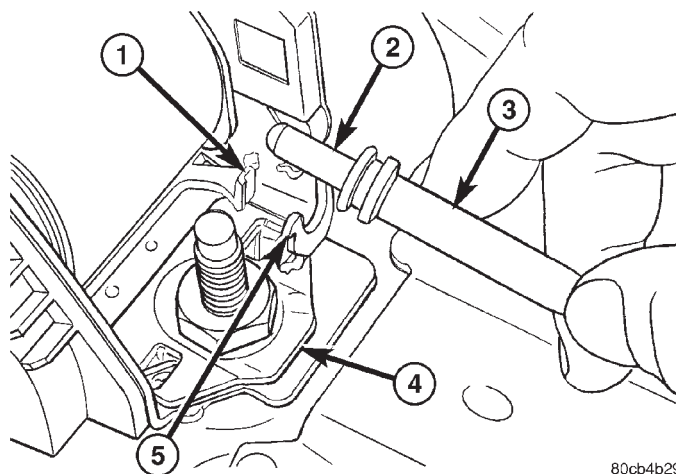


Fig. 29 Seat Back Latch Cable Disengage/Engage

- 1 - LEVER
- 2 - PLUNGER
- 3 - LATCH CABLE FITTING
- 4 - REAR CENTER RETRACTOR
- 5 - SUPPORT

REAR CENTER SEAT BELT & RETRACTOR (Continued)

(11) Remove the screw that secures the retractor to the rear seat back panel (Fig. 30).

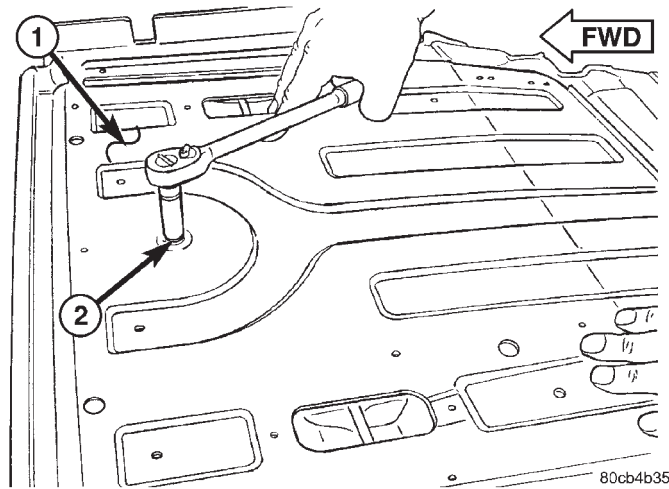


Fig. 30 Rear Center Retractor Remove/Install

- 1 - REAR SEAT BACK PANEL
- 2 - SCREW (1)

(12) Remove the rear center seat belt and retractor unit from the seat back panel.

INSTALLATION

WARNING: DURING AND FOLLOWING ANY SEAT BELT SERVICE, CAREFULLY INSPECT ALL SEAT BELTS, BUCKLES, MOUNTING HARDWARE, AND RETRACTORS 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 INOPERATIVE BUCKLE OR RETRACTOR. REPLACE ANY BELT THAT HAS A BENT OR DAMAGED LATCH PLATE OR ANCHOR PLATE. NEVER ATTEMPT TO REPAIR A SEAT BELT COMPONENT. ALWAYS REPLACE DAMAGED OR FAULTY SEAT BELT COMPONENTS WITH THE CORRECT, NEW AND UNUSED REPLACEMENT PARTS LISTED IN THE MOPAR PARTS CATALOG.

- (1) Position the rear center seat belt and retractor unit onto the seat back panel.
- (2) Install and tighten the screw that secures the retractor to the rear seat back panel (Fig. 30). Tighten the screw to 27 N·m (20 ft. lbs.).
- (3) Position the seat back latch cable plunger against the retractor latch lever, then engage the cable fitting into the cable support on the retractor, which is a light snap fit (Fig. 29).
- (4) Route the rear seat belt lower anchor and belt web guide through the top of the seat back panel.

(5) Reinstall the trim onto the right rear seat back. (Refer to 23 - BODY/SEATS/SEAT BACK COVER - REAR - INSTALLATION).

(6) Install and tighten the two screws that secure the belt web guide to the top of the right rear seat back panel. Tighten the screws to 2 N·m (20 in. lbs.).

(7) Reinstall the right rear seat back panel into the vehicle. (Refer to 23 - BODY/SEATS/SEAT BACK - REAR - INSTALLATION).

(8) Position the rear center seat belt lower anchor off of the stud on the rear floor panel (Fig. 28).

(9) Reach between the base of the right rear seat back and the forward edge of the rear cargo floor to install and tighten the screw that secures the rear center seat belt lower anchor to the floor panel. Tighten the screw to 43 N·m (32 ft. lbs.).

(10) Restore the cargo area carpet to the base of the seat back panel and unfold the right rear seat back to its upright position.

(11) Reinstall the right center seat belt buckle unit onto the floor panel. (Refer to 8 - ELECTRICAL/RE-STRRAINTS/SEAT BELT BUCKLE - INSTALLATION).

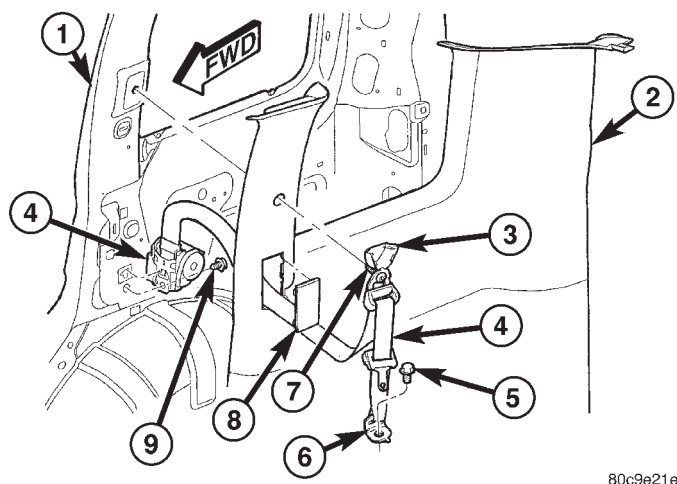
REAR OUTBOARD SEAT BELT & RETRACTOR

REMOVAL

WARNING: DURING AND FOLLOWING ANY SEAT BELT SERVICE, CAREFULLY INSPECT ALL SEAT BELTS, BUCKLES, MOUNTING HARDWARE, AND RETRACTORS 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 INOPERATIVE BUCKLE OR RETRACTOR. REPLACE ANY BELT THAT HAS A BENT OR DAMAGED LATCH PLATE OR ANCHOR PLATE. NEVER ATTEMPT TO REPAIR A SEAT BELT COMPONENT. ALWAYS REPLACE DAMAGED OR FAULTY SEAT BELT COMPONENTS WITH THE CORRECT, NEW AND UNUSED REPLACEMENT PARTS LISTED IN THE MOPAR PARTS CATALOG.

- (1) Unsnap and lift the trim cover to access the screw that secures the rear outboard seat belt turning loop to the upper C-pillar (Fig. 31).
- (2) Remove the screw that secures the seat belt turning loop to the upper C-pillar.
- (3) Remove the screw that secures the lower seat belt anchor to the bracket on the outboard side of the rear seat cushion frame.

REAR OUTBOARD SEAT BELT & RETRACTOR (Continued)



**Fig. 31 Rear Outboard Seat Belt & Retractor
Remove/Install**

- 1 - C-PILLAR
- 2 - QUARTER TRIM PANEL
- 3 - COVER
- 4 - SEAT BELT & RETRACTOR
- 5 - SCREW (1)
- 6 - LOWER ANCHOR
- 7 - SCREW (1)
- 8 - ACCESS COVER
- 9 - SCREW (1)

(4) Remove the quarter trim panel from the C-pillar. (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - REMOVAL).

(5) Route the seat belt lower anchor and turning loop through the access hole in the quarter trim panel.

(6) Remove the screw that secures the retractor bracket to the lower C-pillar.

(7) Lift the retractor upward far enough to disengage the retractor tab from the engagement hole in the lower C-pillar.

(8) Remove the rear outboard seat belt and retractor from the C-pillar as a unit.

INSTALLATION

WARNING: DURING AND FOLLOWING ANY SEAT BELT SERVICE, CAREFULLY INSPECT ALL SEAT BELTS, BUCKLES, MOUNTING HARDWARE, AND RETRACTORS 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 INOPERATIVE BUCKLE OR RETRACTOR. REPLACE ANY BELT THAT HAS A BENT OR DAMAGED LATCH PLATE OR ANCHOR PLATE. NEVER ATTEMPT TO REPAIR A SEAT BELT COMPONENT. ALWAYS REPLACE DAMAGED OR

FAULTY SEAT BELT COMPONENTS WITH THE CORRECT, NEW AND UNUSED REPLACEMENT PARTS LISTED IN THE MOPAR PARTS CATALOG.

(1) Position the rear outboard seat belt and retractor to the C-pillar as a unit (Fig. 31).

(2) Engage the retractor tab into the engagement hole in the lower C-pillar.

(3) Install and tighten the screw that secures the retractor bracket to the lower C-pillar. Tighten the screw to 43 N·m (32 ft. lbs.).

(4) Route the seat belt lower anchor and turning loop through the access hole in the quarter trim panel.

(5) Reinstall the quarter trim panel onto the C-pillar. (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - INSTALLATION).

(6) Position the lower seat belt anchor to the bracket on the outboard side of the rear seat cushion frame. Be certain that the anti-rotation tab on the anchor is engaged in the slot in the seat bracket.

(7) Install and tighten the screw that secures the lower seat belt anchor to the bracket on the outboard side of the rear seat cushion frame. Tighten the screw to 43 N·m (32 ft. lbs.).

(8) Position the seat belt turning loop to the upper C-pillar.

(9) Install and tighten the screw that secures the seat belt turning loop to the upper C-pillar. Tighten the screw to 43 N·m (32 ft. lbs.).

(10) Fold and snap the trim cover back into place to conceal the screw that secures the rear outboard seat belt turning loop to the upper C-pillar.

REAR SEAT BELT BUCKLE

REMOVAL

WARNING: DURING AND FOLLOWING ANY SEAT BELT SERVICE, CAREFULLY INSPECT ALL SEAT BELTS, BUCKLES, MOUNTING HARDWARE, AND RETRACTORS 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 INOPERATIVE BUCKLE OR RETRACTOR. REPLACE ANY BELT THAT HAS A BENT OR DAMAGED LATCH PLATE OR ANCHOR PLATE. NEVER ATTEMPT TO REPAIR A SEAT BELT COMPONENT. ALWAYS REPLACE DAMAGED OR FAULTY SEAT BELT COMPONENTS WITH THE CORRECT, NEW AND UNUSED REPLACEMENT PARTS LISTED IN THE MOPAR PARTS CATALOG.

REAR SEAT BELT BUCKLE (Continued)

(1) Unlatch the rear seat back and fold it forward far enough to access the screw that secures the rear seat belt buckle anchor to the rear floor panel between the rear seat back and the rear seat cushion.

(2) Remove the screw that secures the rear seat belt buckle anchor to the rear floor panel (Fig. 32).

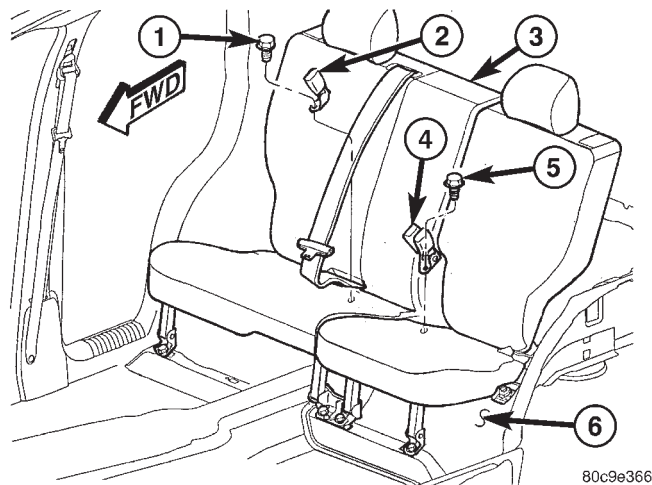


Fig. 32 Rear Seat Belt Buckle Remove/Install

- 1 - SCREW (1)
- 2 - BUCKLE (SINGLE)
- 3 - REAR SEAT
- 4 - BUCKLE (DOUBLE)
- 5 - SCREW (1)
- 6 - REAR FLOOR PANEL

(3) Lift the rear seat belt buckle anchor off of the stud on the rear floor panel.

(4) Remove the rear seat belt buckle and anchor from between the rear seat back and the rear seat cushion as a unit.

INSTALLATION

WARNING: DURING AND FOLLOWING ANY SEAT BELT SERVICE, CAREFULLY INSPECT ALL SEAT BELTS, BUCKLES, MOUNTING HARDWARE, AND RETRACTORS 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 INOPERATIVE BUCKLE OR RETRACTOR. REPLACE ANY BELT THAT HAS A BENT OR DAMAGED LATCH PLATE OR ANCHOR PLATE. NEVER ATTEMPT TO REPAIR A SEAT BELT COMPONENT. ALWAYS REPLACE DAMAGED OR FAULTY SEAT BELT COMPONENTS WITH THE CORRECT, NEW AND UNUSED REPLACEMENT PARTS LISTED IN THE MOPAR PARTS CATALOG.

(1) Unlatch the rear seat back and fold it forward far enough to access the mounting location for the rear seat belt buckle anchor to the rear floor panel between the rear seat back and the rear seat cushion.

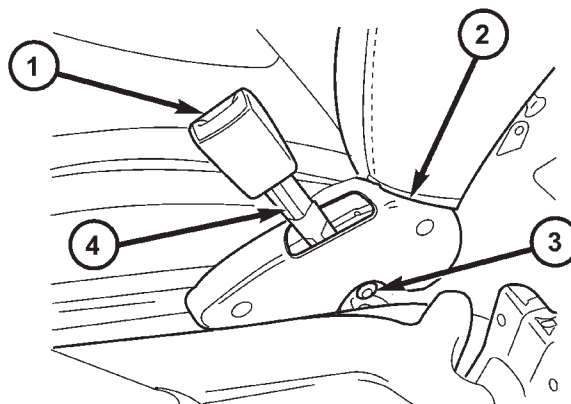
(2) Position the rear seat belt buckle and anchor between the rear seat back and the rear seat cushion as a unit (Fig. 32).

(3) Lower the rear seat belt buckle anchor over the stud on the rear floor panel.

(4) Install and tighten the screw that secures the rear seat belt buckle anchor to the rear floor panel. Tighten the screw to 43 N·m (32 ft. lbs.).

SEAT BELT SWITCH

DESCRIPTION



80c733dc

Fig. 33 Front Seat Belt Buckle

- 1 - FRONT SEAT BELT BUCKLE
- 2 - INBOARD SIDE SHIELD
- 3 - SCREW
- 4 - PIGTAIL WIRE

The seat belt switch for this model is actually a Hall Effect-type sensor. This sensor consists of a fixed-position, Hall Effect Integrated Circuit (IC) chip and a small, movable, permanent magnet that are integral to each front seat belt buckle. The front seat belt buckles are each located on a stamped steel stanchion secured with a screw to the inboard side of each front seat cushion frame between the seat and the floor panel transmission tunnel (Fig. 33). The seat belt switches are connected to the vehicle electrical system through a two-lead 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 beneath the rear edge of the seat cushion frame. A diagnostic resistor is connected

SEAT BELT SWITCH (Continued)

in parallel with the IC where the two pigtail wire leads connect to the IC pins.

The seat belt switch cannot be adjusted or repaired and, if faulty or damaged, the entire seat belt buckle-half unit must be replaced.

OPERATION

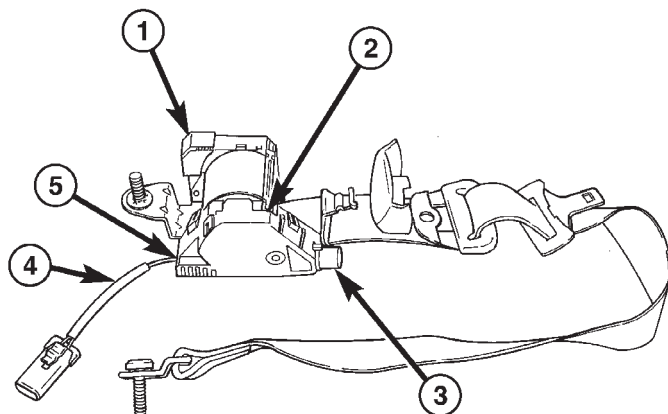
The seat belt switches are designed to provide a status signal to the seat belt switch sense inputs of the Airbag Control Module (ACM) indicating whether the front seat belts are fastened. The ACM uses the seat belt switch inputs as a factor in determining what level of force with which it should deploy the multistage driver and passenger airbags. In addition, the ACM sends electronic messages to the ElectroMechanical Instrument Cluster (EMIC) to control the seat belt indicator based upon the status of the driver side front seat belt switch. A spring-loaded plastic slide with a small, enclosed permanent magnet is integral to the buckle latch mechanism. When a seat belt tip-half is inserted and latched into the seat belt buckle, the slide is pushed downward and into close proximity of the Hall Effect Integrated Circuit (IC) chip within the buckle, which induces a current within the chip. The chip provides this induced current as an output to the ACM, which monitors the current to determine the status of the front seat belts. When the seat belt is unbuckled, the spring-loaded slide and permanent magnet move upward and away from the IC, causing the output current from the seat belt switch to be reduced.

The seat belt switch receives a supply current from the ACM, and the ACM senses the status of the front seat belts through its pigtail wire connection to the seat wire harness. The ACM also monitors the condition of the seat belt switch circuits through circuit resistance created by the diagnostic resistor. The ACM will illuminate the airbag indicator in the EMIC and store a Diagnostic Trouble Code (DTC) for any fault that is detected in either seat belt switch circuit. For proper diagnosis of the seat belt switches, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

SEAT BELT TENSIONER

DESCRIPTION

A driver side seat belt tensioner supplements the driver airbag system for all versions of this model (Fig. 34). The seat belt tensioner is integral to the driver side front seat belt and retractor unit, which is secured to the B-pillar on the left side of the vehicle. The retractor is concealed beneath the molded plastic B-pillar trim. The seat belt tensioner consists primarily of a molded plastic tensioner housing, a tubular



80c717be

Fig. 34 Seat Belt Tensioner

- 1 - RETRACTOR
- 2 - TENSIONER HOUSING
- 3 - PISTON HOUSING
- 4 - PIGTAIL WIRE
- 5 - GAS GENERATOR

metal piston housing, a piston, a short rack gear, a set of pinion gears, a pyrotechnically activated gas generator, and a short pigtail wire. All of these components are located on one side of the retractor spool on the outside of the retractor housing. The seat belt tensioner is controlled by the Airbag Control Module (ACM) and is connected to the vehicle electrical system through a dedicated take out of the body wire harness by a keyed and latching molded plastic connector insulator to ensure a secure connection.

The seat belt tensioner cannot be repaired and, if faulty or damaged, the entire driver side front seat belt and retractor unit must be replaced. The seat belt tensioner is not intended for reuse and must be replaced following a deployment. A locked retractor that will not allow the seat belt webbing to be retracted or extracted is a sure indication that the seat belt tensioner has been deployed and requires replacement. (Refer to 8 - ELECTRICAL/RESTRAINTS/FRONT SEAT BELT & RETRACTOR - REMOVAL).

OPERATION

The seat belt tensioner is deployed by a signal generated by the Airbag Control Module (ACM) through the driver seat belt tensioner line 1 and line 2 (or squib) circuits. When the ACM sends the proper electrical signal to the tensioner, the electrical energy generates enough heat to initiate a small pyrotechnic gas generator. The gas generator is installed in one end of the tubular metal piston housing, which contains a piston and a small rack gear. As the gas expands, it pushes the piston and the rack gear

SEAT BELT TENSIONER (Continued)

through the tube. The rack gear engages a pinion gear that drives a gear set in the tensioner housing, which drives the seat belt retractor spool causing the slack to be removed from the driver side front seat belt. Removing excess slack from the driver side front seat belt not only keeps the occupant properly positioned for an airbag deployment following a frontal impact of the vehicle, but also helps to reduce injuries that the occupant of the driver side front seat might experience in these situations as a result of a harmful contact with the steering wheel and/or steering column. Also, the seat belt tensioner has a torsion bar mechanism that is designed to deform in order to control the loading being applied to the occupant of the driver side front seat by the seat belt during a frontal impact, further reducing the potential for occupant injuries.

The ACM monitors the condition of the seat belt tensioner through circuit resistance, and will illuminate the airbag indicator in the ElectroMechanical Instrument Cluster (EMIC) and store a Diagnostic Trouble Code (DTC) for any fault that is detected. For proper diagnosis of the seat belt tensioner, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

SEAT BELT TURNING LOOP ADJUSTER

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: DURING AND FOLLOWING ANY SEAT BELT SERVICE, CAREFULLY INSPECT ALL SEAT BELTS, BUCKLES, MOUNTING HARDWARE, AND RETRACTORS 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 INOPERATIVE BUCKLE OR RETRACTOR. REPLACE ANY BELT THAT HAS A BENT OR DAMAGED LATCH PLATE OR ANCHOR PLATE. NEVER ATTEMPT TO REPAIR A SEAT BELT COMPONENT. ALWAYS REPLACE DAMAGED OR FAULTY SEAT BELT COMPONENTS WITH THE CORRECT, NEW AND UNUSED REPLACEMENT PARTS LISTED IN THE MOPAR PARTS CATALOG.

(1) Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.

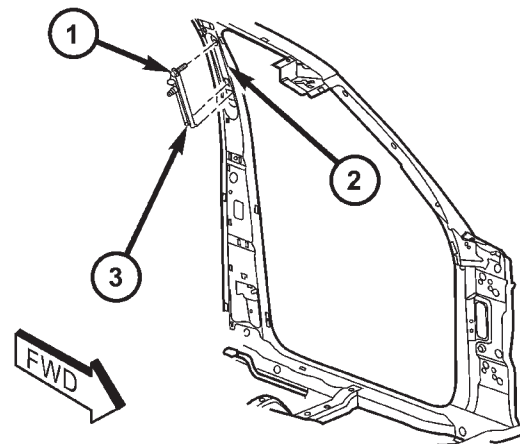
(2) Unsnap and lift the trim cover to access the nut that secures the front seat belt turning loop to the height adjuster on the upper B-pillar.

(3) Remove the nut that secures the seat belt turning loop to the height adjuster stud on the upper B-pillar.

(4) Remove the seat belt turning loop from the height adjuster stud.

(5) Remove the upper trim from the inside of the B-pillar. (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - REMOVAL).

(6) Remove the screw that secures the seat belt turning loop adjuster to the upper B-pillar (Fig. 35).



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Fig. 35 Seat Belt Turning Loop Adjuster Remove/Install

- 1 - SCREW
- 2 - B-PILLAR
- 3 - ADJUSTER

(7) Pull the upper end of the turning loop adjuster away from the B-pillar far enough to disengage the hooks on the lower end of the adjuster from the slots in the B-pillar.

(8) Remove the seat belt turning loop adjuster from the B-pillar.

SEAT BELT TURNING LOOP ADJUSTER (Continued)

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: DURING AND FOLLOWING ANY SEAT BELT SERVICE, CAREFULLY INSPECT ALL SEAT BELTS, BUCKLES, MOUNTING HARDWARE, AND RETRACTORS 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 INOPERATIVE BUCKLE OR RETRACTOR. REPLACE ANY BELT THAT HAS A BENT OR DAMAGED LATCH PLATE OR ANCHOR PLATE. NEVER ATTEMPT TO REPAIR A SEAT BELT COMPONENT. ALWAYS REPLACE DAMAGED OR FAULTY SEAT BELT COMPONENTS WITH THE CORRECT, NEW AND UNUSED REPLACEMENT PARTS LISTED IN THE MOPAR PARTS CATALOG.

(1) Position the seat belt turning loop adjuster to the B-pillar (Fig. 35).

(2) Engage the hooks on the lower end of the adjuster into the slots in the B-pillar.

(3) Tilt the upper end of the turning loop adjuster up into position against the B-pillar.

(4) Install and tighten the screw that secures the seat belt turning loop adjuster to the upper B-pillar. Tighten the screw to 34 N·m (25 ft. lbs.).

(5) Reinstall the upper trim onto the inside of the B-pillar. (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - INSTALLATION).

(6) Position the seat belt turning loop onto the height adjuster stud on the upper B-pillar.

(7) Install and tighten the nut that secures the seat belt turning loop to the height adjuster stud. Tighten the nut to 34 N·m (25 ft. lbs.).

(8) Fold and snap the trim cover back into place to conceal the nut that secures the front seat belt turning loop to the height adjuster on the upper B-pillar.

(9) Reconnect the battery negative cable.

SIDE CURTAIN AIRBAG

DESCRIPTION



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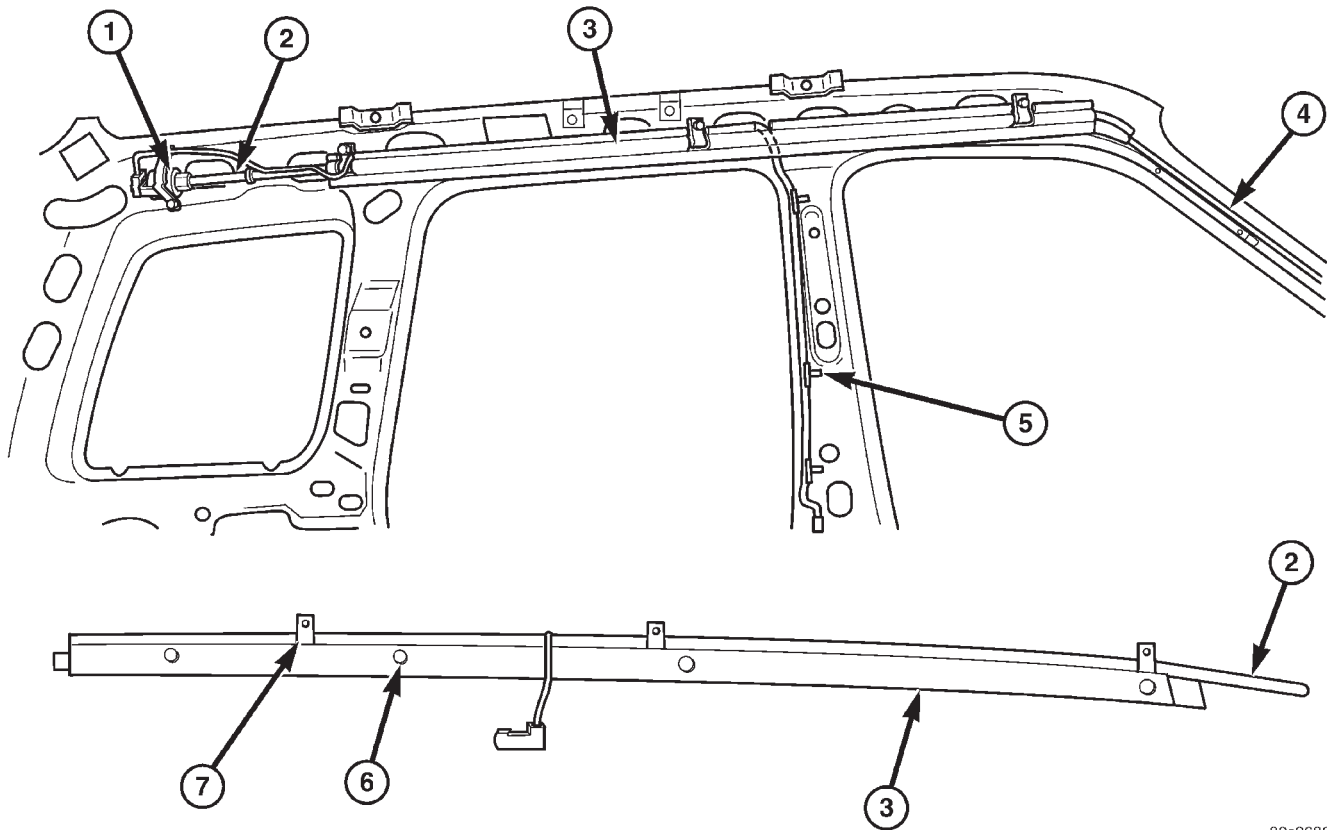
Fig. 36 SRS Logo

Optional side curtain airbags are available for this model when it is also equipped with dual front airbags. These airbags are passive, inflatable, Supplemental Restraint System (SRS) components, and vehicles with this equipment can be readily identified by a molded identification trim button with the "SRS - AIRBAG" logo located on the headliner above each B-pillar (Fig. 36). This system is designed to reduce injuries to the vehicle occupants in the event of a side impact collision.

Vehicles equipped with side curtain airbags have two individually controlled curtain airbag units. These airbag units are concealed and mounted above the headliner where they are each secured to one of the roof side rails (Fig. 37). Each folded airbag cushion is contained within a long extruded plastic channel that extends along the roof rail from the A-pillar at the front of the vehicle to just behind the C-pillar at the rear of the vehicle. The channel is secured with plastic push-in fasteners to the roof rail. A tether extends down the A-pillar from the front of the airbag cushion, where it is retained to the pillar with plastic push-in routing clips and it is secured to the base of the A-pillar near the belt line with a screw.

The hybrid-type inflator for each airbag is secured to the roof rail at the rear of the airbag unit between the C-pillar and the D-pillar, and is connected to the airbag cushion by a long tubular manifold. The bracket holding the inflator and three other brackets holding the manifold are secured to the roof rail with

SIDE CURTAIN AIRBAG (Continued)



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Fig. 37 Side Curtain Airbag

- 1 - INFLATOR
- 2 - MANIFOLD
- 3 - CHANNEL
- 4 - TETHER

- 5 - PIGTAIL WIRE RETAINER (3)
- 6 - PUSH-IN FASTENER (4)
- 7 - BRACKET (3)

screws. A two-wire pigtail harness is routed forward from the airbag inflator through a trough along the top of the plastic airbag channel on the roof rail and down the B-pillar, where it is retained by three routing clips. The pigtail harness is connected to a take out and connector of the body wire harness on the B-pillar, which connects to the respective right or left Side Impact Airbag Control Module (SIACM) on the sill panel at the base of the B-pillar.

The side curtain airbag unit cannot be adjusted or repaired and must be replaced if deployed, faulty, or in any way damaged. Once a side curtain airbag has been deployed, the complete airbag unit, the headliner, the upper A, B, and C-pillar trim, and all other visibly damaged components must be replaced.

OPERATION

Each side curtain airbag is deployed individually by an electrical signal generated by the left or right Side Impact Airbag Control Module (SIACM) to which it is connected through left or right curtain airbag line 1 and line 2 (or squib) circuits. The hybrid-type inflator

assembly for each airbag contains a small canister of highly compressed helium gas. When the SIACM 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 helium gas canister. The inflator and helium gas canister are sealed and connected to a tubular manifold so that all of the released gas is directed into the folded curtain airbag cushion, causing the cushion to inflate.

As the airbag 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. The front tether keeps the front portion of the bag taut, thus ensuring that the bag will deploy in the proper position. Following the airbag deployment, the airbag cushion quickly deflates by venting the helium gas through the loose weave of the cushion fabric, and the deflated cushion hangs down loosely from the roof rail.

SIDE CURTAIN AIRBAG (Continued)

REMOVAL

The following procedure is for replacement of a faulty or damaged side curtain airbag. 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 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - SERVICE AFTER A SUPPLEMENTAL RESTRAINT DEPLOYMENT).

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: 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.

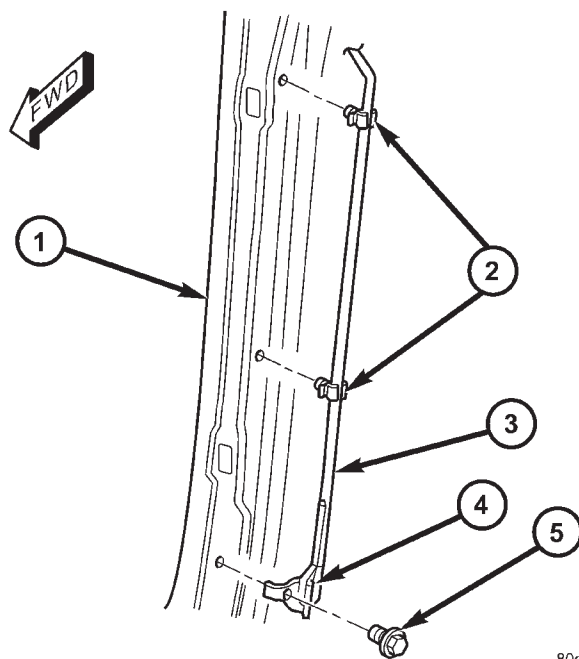
WARNING: USE EXTREME CARE TO PREVENT ANY FOREIGN MATERIAL FROM ENTERING THE SIDE CURTAIN AIRBAG, OR BECOMING ENTRAPPED BETWEEN THE SIDE CURTAIN AIRBAG CUSHION AND THE HEADLINER. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN OCCUPANT INJURIES UPON AIRBAG DEPLOYMENT.

(1) Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.

(2) Remove the lower trim from the inside of the B-pillar. (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - REMOVAL).

(3) Remove the headliner from the vehicle. (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).

(4) Remove the screw that secures the side curtain airbag tether retainer to the base of the A-pillar near the belt line (Fig. 38).



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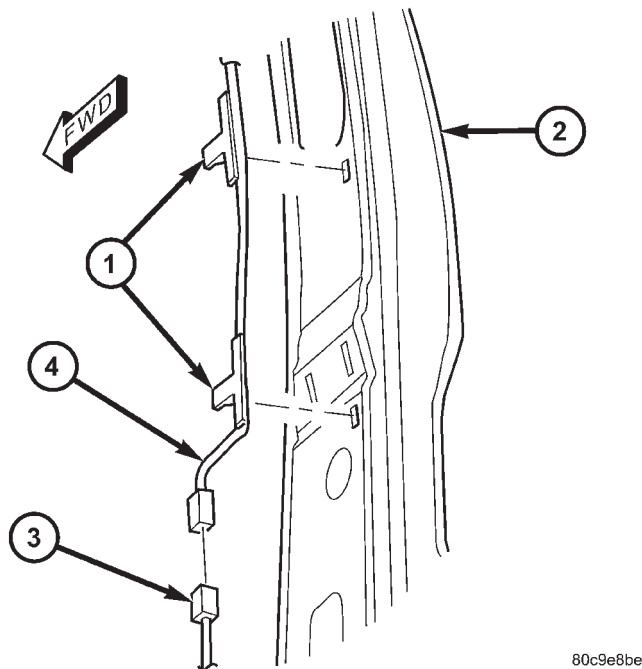
Fig. 38 Side Curtain Airbag Tether Remove/Install

- 1 - A-PILLAR
- 2 - CLIP (2)
- 3 - TETHER
- 4 - RETAINER (1)
- 5 - SCREW (1)

SIDE CURTAIN AIRBAG (Continued)

(5) Disengage the two side curtain airbag tether plastic retainer clips from the A-pillar.

(6) Disconnect the side curtain airbag pigtail wire connector from the body wire harness connector near the base of the B-pillar (Fig. 39).



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Fig. 39 Side Curtain Airbag Pigtail Wire Remove/Install

- 1 - RETAINER (3)
- 2 - B-PILLAR
- 3 - WIRE HARNESS CONNECTOR
- 4 - PIGTAIL WIRE

(7) Disengage the three side curtain airbag pigtail wire retainer clips from the B-pillar.

(8) Remove the three screws that secure the side curtain airbag manifold tube brackets to the U-nuts in the roof rail (Fig. 40) and (Fig. 41).

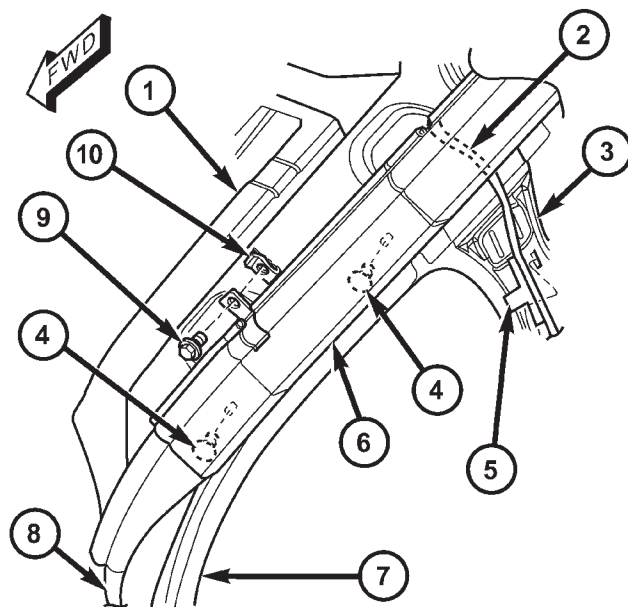
(9) Remove the two screws that secure the side curtain airbag inflator bracket to the U-nuts in the roof rail (Fig. 42).

(10) Grasp the extruded plastic side curtain airbag channel firmly and pull it straight away from the roof rail far enough to disengage all four plastic push-in fasteners that secure it.

(11) Remove the side curtain airbag from the vehicle as a unit.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER,



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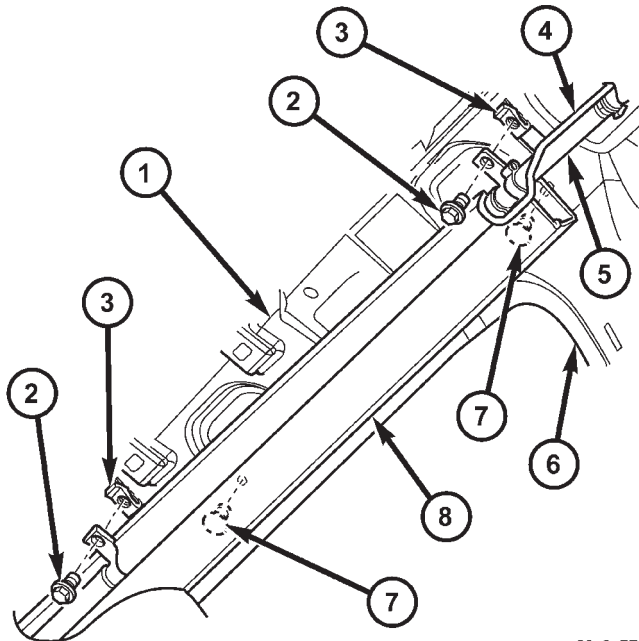
Fig. 40 Side Curtain Airbag (Front) Remove/Install

- 1 - ROOF PANEL
- 2 - PIGTAIL WIRE
- 3 - B-PILLAR
- 4 - PUSH-IN FASTENER (4)
- 5 - RETAINER
- 6 - CHANNEL
- 7 - A-PILLAR
- 8 - TETHER
- 9 - SCREW (3)
- 10 - U-NUT (5)

FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: 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.

SIDE CURTAIN AIRBAG (Continued)



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Fig. 41 Side Curtain Airbag (Rear) Remove/Install

- 1 - ROOF PANEL
- 2 - SCREW (3)
- 3 - U-NUT (5)
- 4 - PIGTAIL WIRE
- 5 - MANIFOLD
- 6 - C-PILLAR
- 7 - PUSH-IN FASTENER (4)
- 8 - CHANNEL

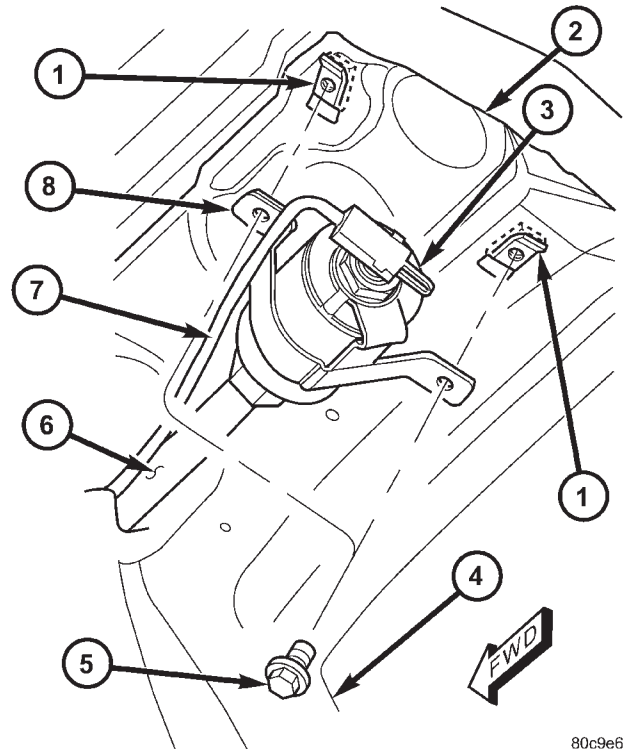
WARNING: USE EXTREME CARE TO PREVENT ANY FOREIGN MATERIAL FROM ENTERING THE SIDE CURTAIN AIRBAG, OR BECOMING ENTRAPPED BETWEEN THE SIDE CURTAIN AIRBAG CUSHION AND THE HEADLINER. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN OCCUPANT INJURIES UPON AIRBAG DEPLOYMENT.

(1) Position the side curtain airbag into the vehicle as a unit.

(2) Align all four plastic push-in fasteners that secure the extruded plastic side curtain airbag channel with their holes in the roof side rail and push them straight into the roof rail until they are fully seated (Fig. 40) and (Fig. 41).

(3) Install and tighten the upper screw that secures the side curtain airbag inflator bracket to the U-nut in the roof rail, followed by the lower screw (Fig. 42). Tighten the screws to 12 N·m (105 in. lbs.).

(4) Working from the rear of the vehicle to the front, install and tighten each of the three screws that secure the side curtain airbag manifold tube brackets to the U-nuts in the roof rail. Tighten the screws to 12 N·m (105 in. lbs.).



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Fig. 42 Side Curtain Airbag Inflator Remove/Install

- 1 - U-NUT (5)
- 2 - ROOF PANEL
- 3 - INFLATOR
- 4 - C-PILLAR
- 5 - SCREW (2)
- 6 - MANIFOLD
- 7 - PIGTAIL WIRE
- 8 - BRACKET

(5) Route the side curtain airbag pigtail wire through the trough along the top of the extruded plastic airbag channel on the roof side rail, then between the channel and the body down the B-pillar.

NOTE: Be certain that the side curtain airbag pigtail wire is routed behind the airbag channel, between the channel and the body above the B-pillar.

(6) Engage the three side curtain airbag pigtail wire retainer clips into the B-pillar (Fig. 39).

(7) Reconnect the side curtain airbag pigtail wire connector to the body wire harness connector near the base of the B-pillar.

(8) Engage the two side curtain airbag tether plastic retainer clips into the A-pillar (Fig. 38).

(9) Install and tighten the screw that secures the side curtain airbag tether retainer to the base of the A-pillar near the belt line. Tighten the screw to 14 N·m (120 in. lbs.).

SIDE CURTAIN AIRBAG (Continued)

(10) Reinstall the headliner into the vehicle. (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).

(11) Reinstall the lower trim onto the inside of the B-pillar. (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - INSTALLATION).

(12) Do not reconnect the battery negative cable at this time. The airbag system verification test procedure should be performed following service of any supplemental restraint system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).

SIDE IMPACT AIRBAG CONTROL MODULE

DESCRIPTION

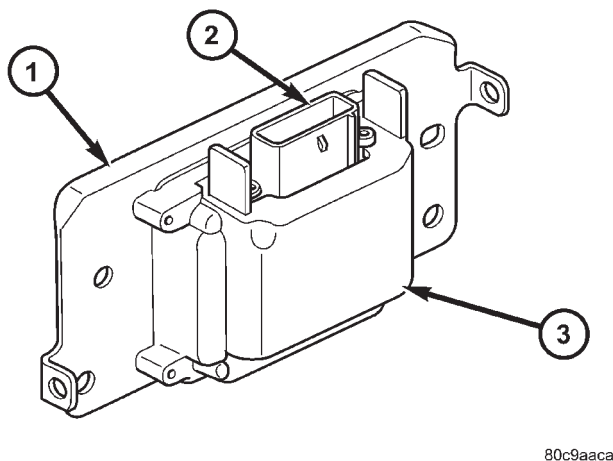


Fig. 43 Side Impact Airbag Control Module

- 1 - BRACKET (RIGHT SHOWN)
- 2 - CONNECTOR RECEPTACLE
- 3 - SIACM

On vehicles equipped with the optional side curtain airbags, a Side Impact Airbag Control Module (SIACM) and its mounting bracket are secured with four screws to the sill panel at the base of each B-pillar behind the lower B-pillar trim (Fig. 43). Concealed within a hollow in the center of the die cast aluminum SIACM housing is the electronic circuitry of the SIACM which includes a microprocessor and an electronic impact sensor. The SIACM housing is secured to a stamped steel mounting bracket, which is unique for the right or left side application of this component. The SIACM should never be removed from its mounting bracket. The housing also receives a case ground through this mounting bracket when it is secured to the vehicle. A molded plastic electrical connector receptacle that exits the top of the SIACM

housing connects the unit to the vehicle electrical system through a dedicated take out and connector of the body wire harness. Both the SIACM housing and its electrical connection are sealed to protect the internal electronic circuitry and components against moisture intrusion.

The impact sensor internal to the SIACM is calibrated for the specific vehicle, and is only serviced as a unit with the SIACM. The SIACM cannot be repaired or adjusted and, if damaged or faulty, it must be replaced.

OPERATION

The microprocessor in the Side Impact Airbag Control Module (SIACM) contains the side curtain airbag system logic circuits and controls all of the features of only the side curtain airbag mounted on the same side of the vehicle as the SIACM. The SIACM uses On-Board Diagnostics (OBD) and can communicate with other electronic modules in the vehicle as well as with the DRBIII® scan tool using the Programmable Communications Interface (PCI) data bus network. This method of communication is used by the SIACM to communicate with the Airbag Control Module (ACM) and for supplemental restraints system diagnosis and testing through the 16-way data link connector located on the driver side lower edge of the instrument panel. The ACM communicates with both the left and right SIACM over the PCI data bus.

The SIACM microprocessor continuously monitors all of the side curtain airbag electrical circuits to determine the system readiness. If the SIACM detects a monitored system fault, it sets an active and stored Diagnostic Trouble Code (DTC) and sends electronic messages to the ACM over the PCI data bus. The ACM will respond by sending an electronic message to the EMIC to turn on the airbag indicator, and by storing a DTC that will indicate whether the left or the right SIACM has stored the DTC that initiated the airbag indicator illumination. An active fault only remains for the current ignition switch cycle, while a stored fault causes a DTC to be stored in memory by the SIACM. For some DTCs, if a fault does not recur for a number of ignition cycles, the SIACM will automatically erase the stored DTC. For other internal faults, the stored DTC is latched forever.

The SIACM receives battery current on a fused ignition switch output (run-start) circuit through a fuse in the Junction Block (JB). The SIACM has a case ground through its mounting bracket and also receives a power ground through a ground circuit and take out of the body wire harness. This take out has a single eyelet terminal connector that is secured by a ground screw to the front seat front crossmem-

SIDE IMPACT AIRBAG CONTROL MODULE (Continued)

ber beneath the respective right or left front seat. These connections allow the SIACM to be operational whenever the ignition switch is in the Start or On positions. An electronic impact sensor is contained within the SIACM. The electronic impact sensor is an accelerometer that senses the rate of vehicle deceleration, which provides verification of the direction and severity of an impact. A pre-programmed decision algorithm in the SIACM microprocessor determines when the deceleration rate as signaled by the impact sensor indicates a side impact that is severe enough to require side curtain airbag protection. When the programmed conditions are met, the SIACM sends the proper electrical signals to deploy the side curtain airbag.

The hard wired inputs and outputs for the SIACM may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the SIACM, the PCI data bus network, or the electronic message inputs to and outputs from the SIACM. The most reliable, efficient, and accurate means to diagnose the SIACM, the PCI data bus network, and the electronic message inputs to and outputs from the SIACM requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: THE SIDE IMPACT AIRBAG CONTROL MODULE CONTAINS THE IMPACT SENSOR, WHICH ENABLES THE SYSTEM TO DEPLOY THE SIDE CURTAIN AIRBAGS. NEVER STRIKE OR DROP THE SIDE IMPACT AIRBAG CONTROL MODULE, AS IT CAN DAMAGE THE IMPACT SENSOR OR AFFECT ITS CALIBRATION. IF A SIDE IMPACT AIRBAG CONTROL MODULE IS ACCIDENTALLY DROPPED DURING

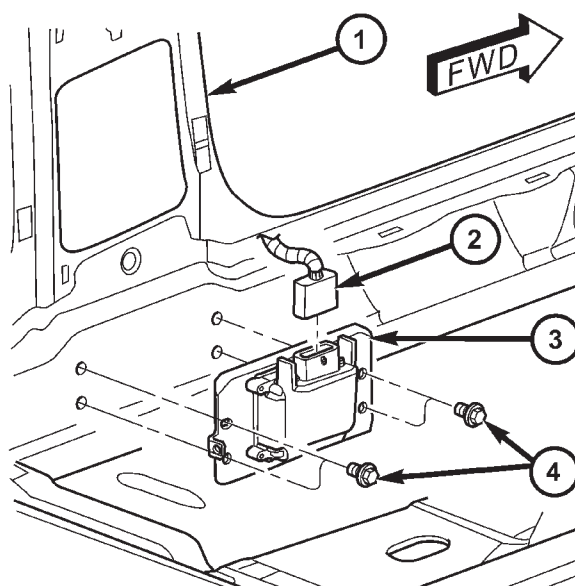
SERVICE, THE MODULE MUST BE SCRAPPED AND REPLACED WITH A NEW UNIT. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN ACCIDENTAL, INCOMPLETE, OR IMPROPER SIDE CURTAIN AIRBAG DEPLOYMENT AND POSSIBLE OCCUPANT INJURIES.

(1) Adjust the front seat to its most forward position for easiest access to the lower B-pillar trim.

(2) Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.

(3) Remove the lower trim from the inside of the B-pillar. (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - REMOVAL).

(4) Disconnect the body wire harness connector for the Side Impact Airbag Control Module (SIACM) from the module connector receptacle (Fig. 44).



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Fig. 44 Side Impact Airbag Control Module Remove/Install

- 1 - B-PILLAR
- 2 - WIRE HARNESS CONNECTOR
- 3 - SIACM
- 4 - SCREW (4)

(5) Disengage the body wire harness retainer from the tab on the SIACM mounting bracket.

(6) Remove the four screws that secure the SIACM mounting bracket to the sill panel at the base of the B-pillar.

(7) Remove the SIACM and its mounting bracket from the sill panel as a unit.

SIDE IMPACT AIRBAG CONTROL MODULE (Continued)

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: THE SIDE IMPACT AIRBAG CONTROL MODULE CONTAINS THE IMPACT SENSOR, WHICH ENABLES THE SYSTEM TO DEPLOY THE SIDE CURTAIN AIRBAGS. NEVER STRIKE OR DROP THE SIDE IMPACT AIRBAG CONTROL MODULE, AS IT CAN DAMAGE THE IMPACT SENSOR OR AFFECT ITS CALIBRATION. IF A SIDE IMPACT AIRBAG CONTROL MODULE 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 SIDE CURTAIN AIRBAG DEPLOYMENT AND POSSIBLE OCCUPANT INJURIES.

(1) Position the Side Impact Airbag Control Module (SIACM) and its mounting bracket to the sill panel as a unit (Fig. 44).

(2) Loosely install the four screws that secure the SIACM mounting bracket to the sill panel at the base of the B-pillar.

(3) Tighten the four screws that secure the SIACM mounting bracket to the sill panel in the following sequence: upper front, upper rear, lower front, lower rear. Tighten the screws to 12 N·m (105 in. lbs.).

(4) Engage the body wire harness retainer to the tab on the SIACM mounting bracket.

(5) Reconnect the body wire harness connector for the SIACM to the module connector receptacle.

(6) Reinstall the lower trim onto the inside of the B-pillar. (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - INSTALLATION).

(7) Do not reconnect the battery negative cable at this time. The airbag system verification test procedure should be performed following service of any supplemental restraint system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).

SPEED CONTROL

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SPEED CONTROL

DESCRIPTION

The speed control system is electronically controlled and vacuum operated. Electronic control of the speed control system is integrated into the Powertrain Control Module (PCM). The controls consist of two steering wheel mounted switches. The switches are labeled: ON/OFF, RES/ACCEL, SET, COAST, and CANCEL.

The system is designed to operate at speeds above 30 mph (50 km/h).

WARNING: THE USE OF SPEED CONTROL IS NOT RECOMMENDED WHEN DRIVING CONDITIONS DO NOT PERMIT MAINTAINING A CONSTANT SPEED, SUCH AS IN HEAVY TRAFFIC OR ON ROADS THAT ARE WINDING, ICY, SNOW COVERED, OR SLIPPERY.

OPERATION

When speed control is selected by depressing the ON switch, the PCM allows a set speed to be stored in PCM RAM for speed control. To store a set speed, depress the SET switch while the vehicle is moving at a speed between 35 and 85 mph. In order for the speed control to engage, the brakes cannot be applied, nor can the gear selector be indicating the transmission is in Park or Neutral.

The speed control can be disengaged manually by:

- Stepping on the brake pedal
- Depressing the OFF switch

- Depressing the CANCEL switch.
- Depressing the clutch pedal (if equipped).

NOTE: Depressing the OFF switch or turning off the ignition switch will erase the set speed stored in the PCM.

For added safety, the speed control system is programmed to disengage for any of the following conditions:

- An indication of Park or Neutral
- A rapid increase rpm (indicates that the clutch has been disengaged)
- Excessive engine rpm (indicates that the transmission may be in a low gear)
- The speed signal increases at a rate of 10 mph per second (indicates that the coefficient of friction between the road surface and tires is extremely low)
- The speed signal decreases at a rate of 10 mph per second (indicates that the vehicle may have decelerated at an extremely high rate)

Once the speed control has been disengaged, depressing the RES/ACCEL switch (when speed is greater than 30 mph) restores the vehicle to the target speed that was stored in the PCM.

While the speed control is engaged, the driver can increase the vehicle speed by depressing the RES/ACCEL switch. The new target speed is stored in the PCM when the RES/ACCEL is released. The PCM also has a "tap-up" feature in which vehicle speed increases at a rate of approximately 2 mph for each momentary switch activation of the RES/ACCEL switch.

SPEED CONTROL (Continued)

A “tap down” feature is used to decelerate without disengaging the speed control system. To decelerate from an existing recorded target speed, momentarily depress the COAST switch. For each switch activation, speed will be lowered approximately 1 mph.

OVERSHOOT/UNDERSHOOT

If the vehicle operator repeatedly presses and releases the SET button with their foot off of the accelerator (referred to as a “lift foot set”), the vehicle may accelerate and exceed the desired set speed by up to 5 mph (8 km/h). It may also decelerate to less than the desired set speed, before finally achieving the desired set speed.

The Speed Control System has an adaptive strategy that compensates for vehicle-to-vehicle variations in speed control cable lengths. When the speed control is set with the vehicle operators foot off of the accelerator pedal, the speed control thinks there is excessive speed control cable slack and adapts accordingly. If the “lift foot sets” are continually used, a speed control overshoot/undershoot condition will develop.

To “unlearn” the overshoot/undershoot condition, the vehicle operator has to press and release the set button while maintaining the desired set speed using the accelerator pedal (not decelerating or accelerating), and then turning the cruise control switch to the OFF position (or press the CANCEL button if equipped) after waiting 10 seconds. This procedure must be performed approximately 10–15 times to completely unlearn the overshoot/undershoot condition.

DIAGNOSIS AND TESTING - ROAD TEST

Perform a vehicle road test to verify reports of speed control system malfunction. The road test

should include attention to the speedometer. Speedometer operation should be smooth and without flutter at all speeds.

Flutter in the speedometer indicates a problem which might cause surging in the speed control system. The cause of any speedometer problems should be corrected before proceeding. Refer to Group 8J, Instrument Cluster for speedometer diagnosis.

If a road test verifies a system problem and the speedometer operates properly, check for:

- A Diagnostic Trouble Code (DTC). If a DTC exists, conduct tests per the Powertrain Diagnostic Procedures service manual.
- A misadjusted brake (stop) lamp switch. This could also cause an intermittent problem.
- Loose, damaged or corroded electrical connections at the servo. Corrosion should be removed from electrical terminals and a light coating of Mopar MultiPurpose Grease, or equivalent, applied.
- Leaking vacuum reservoir.
- Loose or leaking vacuum hoses or connections.
- Defective one-way vacuum check valve.
- Secure attachment of both ends of the speed control servo cable.
- Smooth operation of throttle linkage and throttle body air valve.
- Failed speed control servo. Do the servo vacuum test.

CAUTION: When test probing for voltage or continuity at electrical connectors, care must be taken not to damage connector, terminals or seals. If these components are damaged, intermittent or complete system failure may occur.

SPECIFICATIONS

TORQUE - SPEED CONTROL

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Servo Mounting Bracket-to-Servo Nuts	9	-	75
Servo Mounting Bracket-to-Body Bolts	12	-	105
Speed Control Switch Mounting Screws	1.5	-	14
Vacuum Reservoir Mounting Screws	3	-	20

CABLE

DESCRIPTION

The speed control servo cable is connected between the speed control vacuum servo diaphragm and the throttle body control linkage.

OPERATION

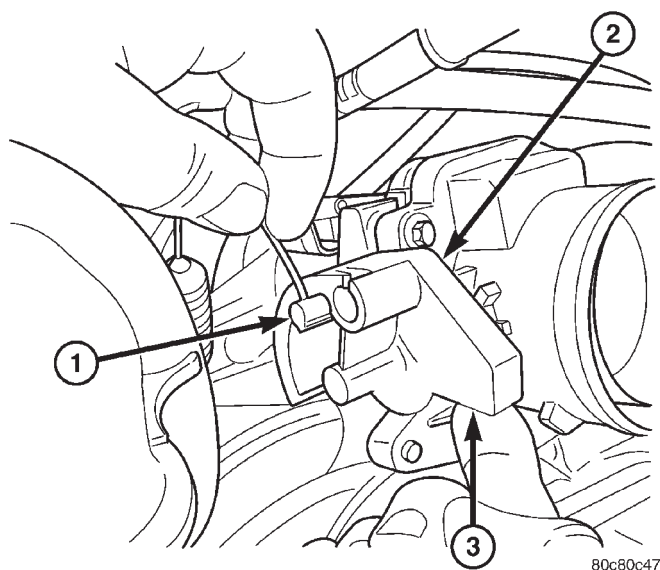
This cable causes the throttle control linkage to open or close the throttle valve in response to movement of the vacuum servo diaphragm.

REMOVAL - 3.7L

- (1) Disconnect negative battery cable at battery.
- (2) Remove air filter resonator at throttle body.

The accelerator cable must be partially removed to gain access to speed control cable.

- (3) Hold throttle in wide open position. While held in this position, slide throttle cable pin (Fig. 1) from throttle body bellcrank.

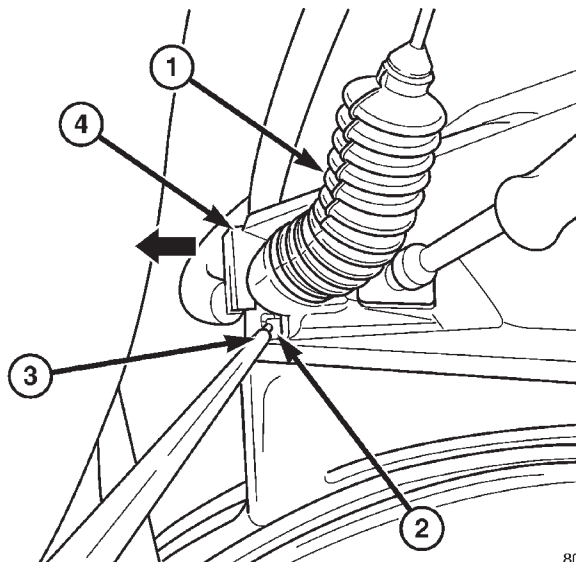


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Fig. 1 THROTTLE CABLE PIN

- 1 - THROTTLE CABLE PIN
- 2 - THROTTLE BODY BELLCRANK
- 3 - PUSH UP HERE

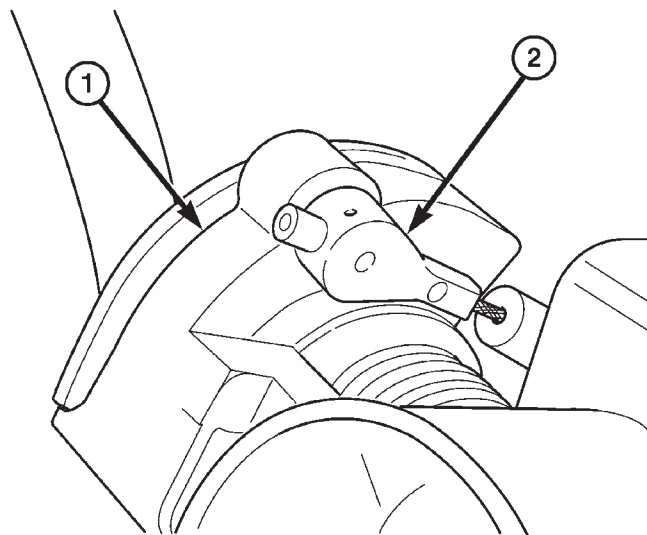
- (4) Using a pick or small screwdriver, press release tab (Fig. 2) to release plastic cable mount from bracket. **Press on tab only enough to release cable from bracket. If tab is pressed too much, it will be broken.** Slide plastic mount (Fig. 2) towards right side of vehicle to remove throttle cable from throttle body bracket.



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Fig. 2 THROTTLE CABLE RELEASE TAB

- 1 - THROTTLE CABLE
- 2 - RELEASE TAB
- 3 - PICK OR SCREWDRIVER
- 4 - PLASTIC CABLE MOUNT



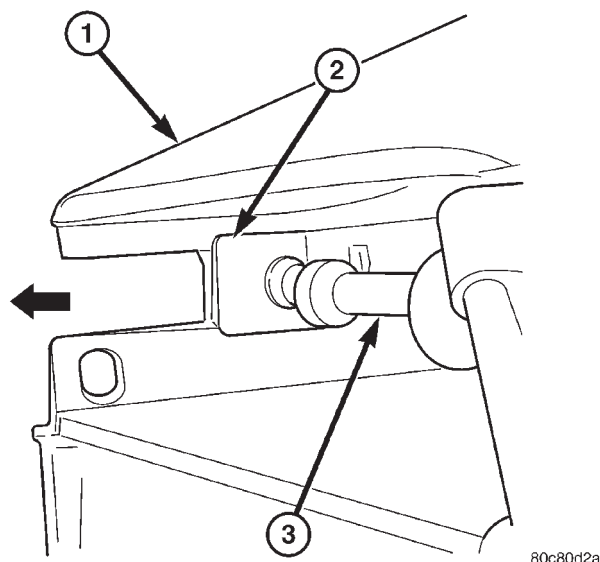
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Fig. 3 SPEED CONTROL CABLE AT BELLCRANK

- 1 - THROTTLE BODY BELLCRANK
- 2 - SPEED CONTROL CABLE CONNECTOR

- (5) Using finger pressure only, disconnect servo cable connector (Fig. 3) at throttle body bellcrank pin by pushing connector off bellcrank pin towards front of vehicle. **DO NOT try to pull connector off perpendicular to the bellcrank pin. Connector will be broken.**

CABLE (Continued)

**Fig. 4 SPEED CONTROL CABLE AT BRACKET**

- 1 - THROTTLE CABLE BRACKET
 2 - PLASTIC CABLE MOUNT
 3 - SPEED CONTROL CABLE

(6) Slide speed control cable plastic mount towards right of vehicle to remove cable from throttle body bracket (Fig. 4).

(7) Remove servo cable from servo. Refer to Servo Removal/Installation.

INSTALLATION - 3.7L

(1) Install end of cable to speed control servo. Refer to Servo Removal/Installation.

(2) Slide speed control cable plastic mount into throttle body bracket.

(3) Install speed control cable connector onto throttle body bellcrank pin (push rearward to snap into location).

(4) Slide throttle (accelerator) cable plastic mount into throttle body bracket. Continue sliding until cable release tab is aligned to hole in throttle body mounting bracket.

(5) While holding throttle to wide open position, place throttle cable pin into throttle body bellcrank.

(6) Install air filter resonator box to throttle body.

(7) Connect negative battery cable at battery.

(8) Before starting engine, operate accelerator pedal to check for any binding.

SERVO**DESCRIPTION**

The servo unit consists of a solenoid valve body, and a vacuum chamber. The solenoid valve body contains three solenoids:

- Vacuum
- Vent
- Dump

The vacuum chamber contains a diaphragm with a cable attached to control the throttle linkage.

OPERATION

The Powertrain Control Module (PCM) controls the solenoid valve body. The solenoid valve body controls the application and release of vacuum to the diaphragm of the vacuum servo. The servo unit cannot be repaired and is serviced only as a complete assembly.

Power is supplied to the servo's by the PCM through the brake switch. The PCM controls the ground path for the vacuum and vent solenoids.

The dump solenoid is energized anytime it receives power. If power to the dump solenoid is interrupted, the solenoid dumps vacuum in the servo. This provides a safety backup to the vent and vacuum solenoids.

The vacuum and vent solenoids must be grounded at the PCM to operate. When the PCM grounds the vacuum servo solenoid, the solenoid allows vacuum to enter the servo and pull open the throttle plate using the cable. When the PCM breaks the ground, the solenoid closes and no more vacuum is allowed to enter the servo. The PCM also operates the vent solenoid via ground. The vent solenoid opens and closes a passage to bleed or hold vacuum in the servo as required.

The PCM duty cycles the vacuum and vent solenoids to maintain the set speed, or to accelerate and decelerate the vehicle. To increase throttle opening, the PCM grounds the vacuum and vent solenoids. To decrease throttle opening, the PCM removes the grounds from the vacuum and vent solenoids. When the brake is released, if vehicle speed exceeds 30 mph to resume, 35 mph to set, and the RES/ACCEL switch has been depressed, ground for the vent and vacuum circuits is restored.

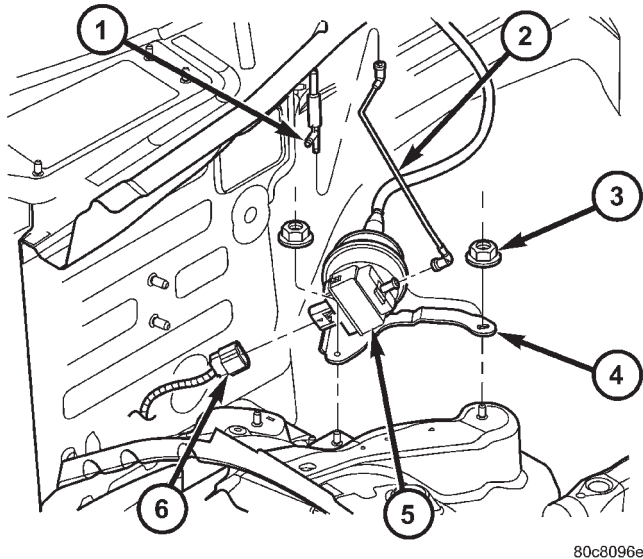
REMOVAL

- (1) Disconnect negative battery cable at battery.
- (2) Disconnect vacuum line at servo (Fig. 5).
- (3) Disconnect electrical connector at servo (Fig. 5).
- (4) Remove coolant bottle nuts/bolts. Position bottle forward a few inches.
- (5) Disconnect servo cable at throttle body. Refer to servo Cable Removal/Installation.
- (6) Remove servo bracket mounting nuts (Fig. 5).
- (7) Remove 2 mounting nuts holding servo cable sleeve to bracket (Fig. 6).
- (8) Pull speed control cable sleeve and servo away from servo mounting bracket to expose cable retaining clip (Fig. 6) and remove clip. Note: The servo

SERVO (Continued)

mounting bracket displayed in (Fig. 6) is a typical bracket and may/may not be applicable to this model vehicle.

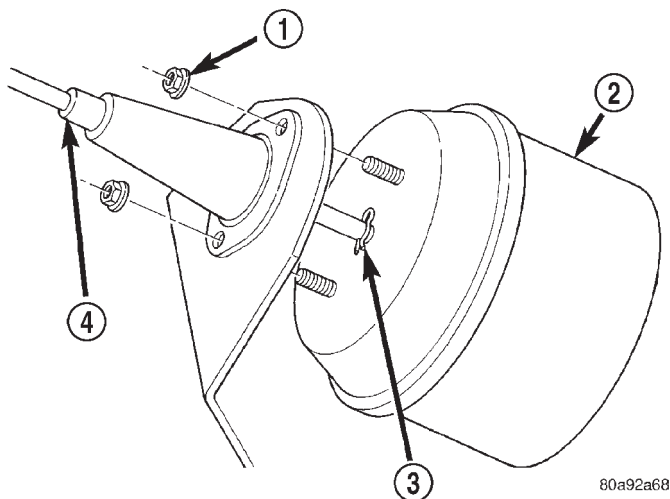
(9) Remove servo from mounting bracket. While removing, note orientation of servo to bracket.



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Fig. 5 SPEED CONTROL SERVO

- 1 - "T" FITTING
- 2 - VACUUM LINE
- 3 - SERVO BRACKET MOUNTING NUTS
- 4 - SERVO MOUNTING BRACKET
- 5 - SERVO
- 6 - SERVO ELECTRICAL CONNECTOR



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Fig. 6 SERVO CABLE CLIP REMOVE/INSTALL TYPICAL

- 1 - SERVO MOUNTING NUTS (2)
- 2 - SERVO
- 3 - CABLE RETAINING CLIP
- 4 - SERVO CABLE AND SLEEVE

INSTALLATION

- (1) Position servo to mounting bracket.
- (2) Align hole in cable connector with hole in servo pin. Install cable-to-servo retaining clip.
- (3) Insert servo mounting studs through holes in servo mounting bracket.
- (4) Install servo-to-mounting bracket nuts and tighten. Refer to torque specifications.
- (5) Install servo mounting bracket-to-body nuts and tighten. Refer to torque specifications.
- (6) Connect vacuum line at servo.
- (7) Connect electrical connector at servo.
- (8) Connect servo cable to throttle body. Refer to servo Cable Removal/Installation.
- (9) Install coolant bottle.
- (10) Connect negative battery cable to battery.
- (11) Before starting engine, operate accelerator pedal to check for any binding.

SWITCH**DESCRIPTION**

There are two separate switch pods that operate the speed control system. The steering-wheel-mounted switches use multiplexed circuits to provide inputs to the PCM for ON, OFF, RESUME, ACCELERATE, SET, DECEL and CANCEL modes. Refer to the owner's manual for more information on speed control switch functions and setting procedures.

The individual switches cannot be repaired. If one switch fails, the entire switch module must be replaced.

OPERATION

When speed control is selected by depressing the ON, OFF switch, the PCM allows a set speed to be stored in its RAM for speed control. To store a set speed, depress the SET switch while the vehicle is moving at a speed between approximately 35 and 85 mph. In order for the speed control to engage, the brakes cannot be applied, nor can the gear selector be indicating the transmission is in Park or Neutral.

The speed control can be disengaged manually by:

- Stepping on the brake pedal
- Depressing the OFF switch
- Depressing the CANCEL switch.

The speed control can be disengaged also by any of the following conditions:

- An indication of Park or Neutral
- The VSS signal increases at a rate of 10 mph per second (indicates that the co-efficient of friction between the road surface and tires is extremely low)
 - Depressing the clutch pedal.
 - Excessive engine rpm (indicates that the transmission may be in a low gear)

SWITCH (Continued)

- The VSS signal decreases at a rate of 10 mph per second (indicates that the vehicle may have decelerated at an extremely high rate)

- If the actual speed is not within 20 mph of the set speed

The previous disengagement conditions are programmed for added safety.

Once the speed control has been disengaged, depressing the ACCEL switch restores the vehicle to the target speed that was stored in the PCM's RAM.

NOTE: Depressing the OFF switch will erase the set speed stored in the PCM's RAM.

If, while the speed control is engaged, the driver wishes to increase vehicle speed, the PCM is programmed for an acceleration feature. With the ACCEL switch held closed, the vehicle accelerates slowly to the desired speed. The new target speed is stored in the PCM's RAM when the ACCEL switch is released. The PCM also has a "tap-up" feature in which vehicle speed increases at a rate of approximately 2 mph for each momentary switch activation of the ACCEL switch.

The PCM also provides a means to decelerate without disengaging speed control. To decelerate from an existing recorded target speed, depress and hold the COAST switch until the desired speed is reached. Then release the switch. The ON, OFF switch operates two components: the PCM's ON, OFF input, and the battery voltage to the brake switch, which powers the speed control servo.

Multiplexing

The PCM sends out 5 volts through a fixed resistor and monitors the voltage change between the fixed resistor and the switches. If none of the switches are depressed, the PCM will measure 5 volts at the sensor point (open circuit). If a switch with no resistor is closed, the PCM will measure 0 volts (grounded circuit). Now, if a resistor is added to a switch, then the PCM will measure some voltage proportional to the size of the resistor. By adding a different resistor to each switch, the PCM will see a different voltage depending on which switch is pushed.

Another resistor has been added to the 'at rest circuit' causing the PCM to never see 5 volts. This was done for diagnostic purposes. If the switch circuit should open (bad connection), then the PCM will see the 5 volts and know the circuit is bad. The PCM will then set an open circuit fault.

REMOVAL

WARNING: BEFORE ATTEMPTING TO DIAGNOSE, REMOVE OR INSTALL ANY AIRBAG SYSTEM OR RELATED STEERING WHEEL AND STEERING COLUMN COMPONENTS YOU MUST FIRST DISCONNECT AND ISOLATE THE NEGATIVE (GROUND) BATTERY CABLE. WAIT 2 MINUTES FOR SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

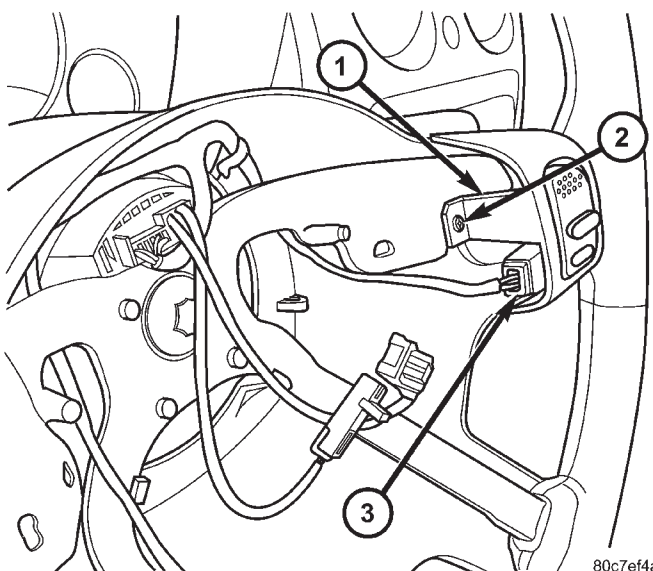


Fig. 7 SPEED CONTROL SWITCH

- 1 - SWITCH
- 2 - SCREW
- 3 - ELECTRICAL CONNECTOR

- (1) Disconnect and isolate negative battery cable from battery.
- (2) Remove airbag module. Refer to Restraint Systems.
- (3) Unplug electrical connector (Fig. 7).
- (4) Remove speed control switch mounting screw (Fig. 7) and remove switch from steering wheel.

INSTALLATION

- (1) Position switch to steering wheel.
- (2) Install switch mounting screw and tighten. Refer to torque specifications.
- (3) Plug electrical connector into switch.
- (4) Install airbag module. Refer to Restraint Systems.
- (5) Connect negative battery cable to battery.

VACUUM RESERVOIR

DESCRIPTION

The vacuum reservoir is a plastic storage tank connected to an engine vacuum source by vacuum lines.

OPERATION

The vacuum reservoir is used to supply the vacuum needed to maintain proper speed control operation when engine vacuum drops, such as in climbing a grade while driving. A one-way check valve is used in the vacuum line between the reservoir and the vacuum source. This check valve is used to trap engine vacuum in the reservoir. On certain vehicle applications, this reservoir is shared with the heating/air-conditioning system. The vacuum reservoir cannot be repaired and must be replaced if faulty.

DIAGNOSIS AND TESTING - VACUUM RESERVOIR

(1) Disconnect vacuum hose at speed control servo and install a vacuum gauge into the disconnected hose.

(2) Start engine and observe gauge at idle. Vacuum gauge should read at least ten inches of mercury.

(3) If vacuum is less than ten inches of mercury, determine source of leak. Check vacuum line to engine for leaks. Also check actual engine intake manifold vacuum. If manifold vacuum does not meet this requirement, check for poor engine performance and repair as necessary.

(4) If vacuum line to engine is not leaking, check for leak at vacuum reservoir. To locate and gain access to reservoir, refer to Vacuum Reservoir Removal/Installation in this group. Disconnect vacuum line at reservoir and connect a hand-operated vacuum pump to reservoir fitting. Apply vacuum. Reservoir vacuum should not bleed off. If vacuum is being lost, replace reservoir.

(5) Verify operation of one-way check valve and check it for leaks. **Certain models may be equipped with 2 check-valves.**

(a) Locate one-way check valve. The valve is located in vacuum line between vacuum reservoir and engine vacuum source. Disconnect vacuum hoses (lines) at each end of valve.

(b) Connect a hand-operated vacuum pump to reservoir end of check valve. Apply vacuum. Vacuum should not bleed off. If vacuum is being lost, replace one-way check valve.

(c) Connect a hand-operated vacuum pump to vacuum source end of check valve. Apply vacuum. Vacuum should flow through valve. If vacuum is not flowing, replace one-way check valve. Seal the

fitting at opposite end of valve with a finger and apply vacuum. If vacuum will not hold, diaphragm within check valve has ruptured. Replace valve.

REMOVAL

The vacuum reservoir is located behind, and at the outer end of the instrument panel (Fig. 8). To gain access for testing or removal, remove glovebox assembly. Also remove fuse box access cover panel at end of instrument panel. On vehicles equipped with LHD (Left Hand Drive), this fuse access panel is located at right end of instrument panel. On vehicles equipped with RHD (Right Hand Drive), this access panel is located at left end of instrument panel.

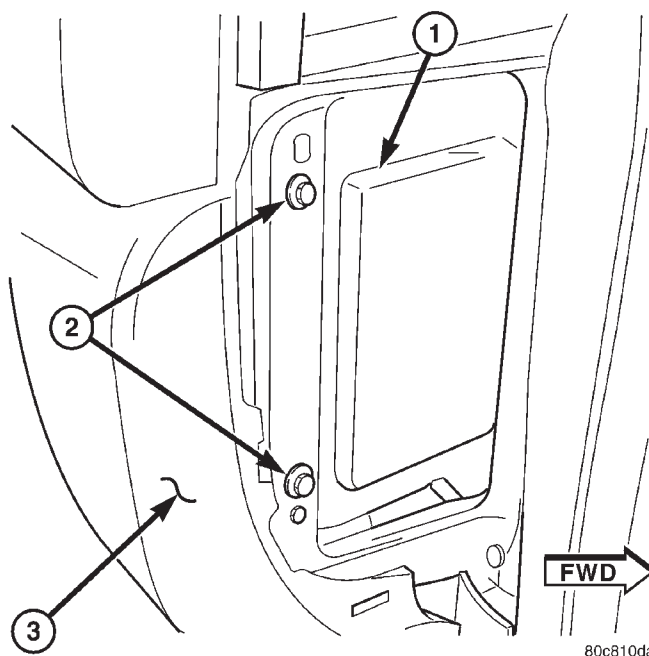


Fig. 8 VACUUM RESERVOIR LOCATION

- 1 - VACUUM RESERVOIR
- 2 - HORIZONTAL MOUNTING SCREWS
- 3 - OUTBOARD END OF I.P.

(1) Remove glovebox assembly. Access to reservoir vacuum line and fitting can now be made.

(2) Remove vacuum line at reservoir.

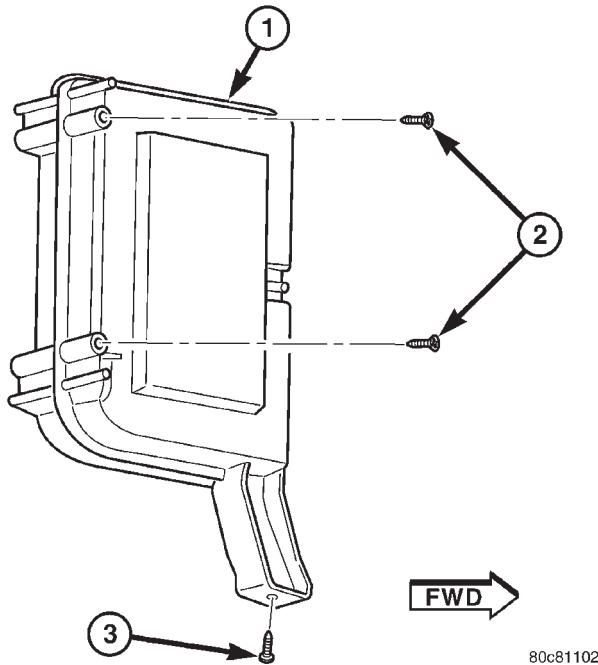
(3) Remove fuse access cover panel at end of instrument panel.

(4) Through fuse access opening, remove 2 horizontally mounted screws (Fig. 8).

(5) From bottom of instrument panel, remove 1 vertically mounted screw (Fig. 9).

(6) Remove reservoir from instrument panel.

VACUUM RESERVOIR (Continued)

**INSTALLATION**

The vacuum reservoir is located behind, and at the outer end of the instrument panel. To gain access for testing or removal, remove glovebox assembly. Also remove fuse box access cover panel at end of instrument panel. On vehicles equipped with LHD (Left Hand Drive), this fuse access panel is located at right end of instrument panel. On vehicles equipped with RHD (Right Hand Drive), this access panel is located at left end of instrument panel.

- (1) Position reservoir to instrument panel.
- (2) Install 3 mounting screws and tighten. Refer to torque specifications.
- (3) Connect vacuum line to reservoir fitting.
- (4) Install glovebox assembly.
- (5) Install fuse box access cover panel.

Fig. 9 VACUUM RESERVOIR REMOVE/INSTALL

- 1 - VACUUM RESERVOIR
2 - HORIZONTAL MOUNTING SCREWS (2)
3 - VERTICAL MOUNTING SCREW (1)

VEHICLE THEFT SECURITY

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VEHICLE THEFT SECURITY

DESCRIPTION

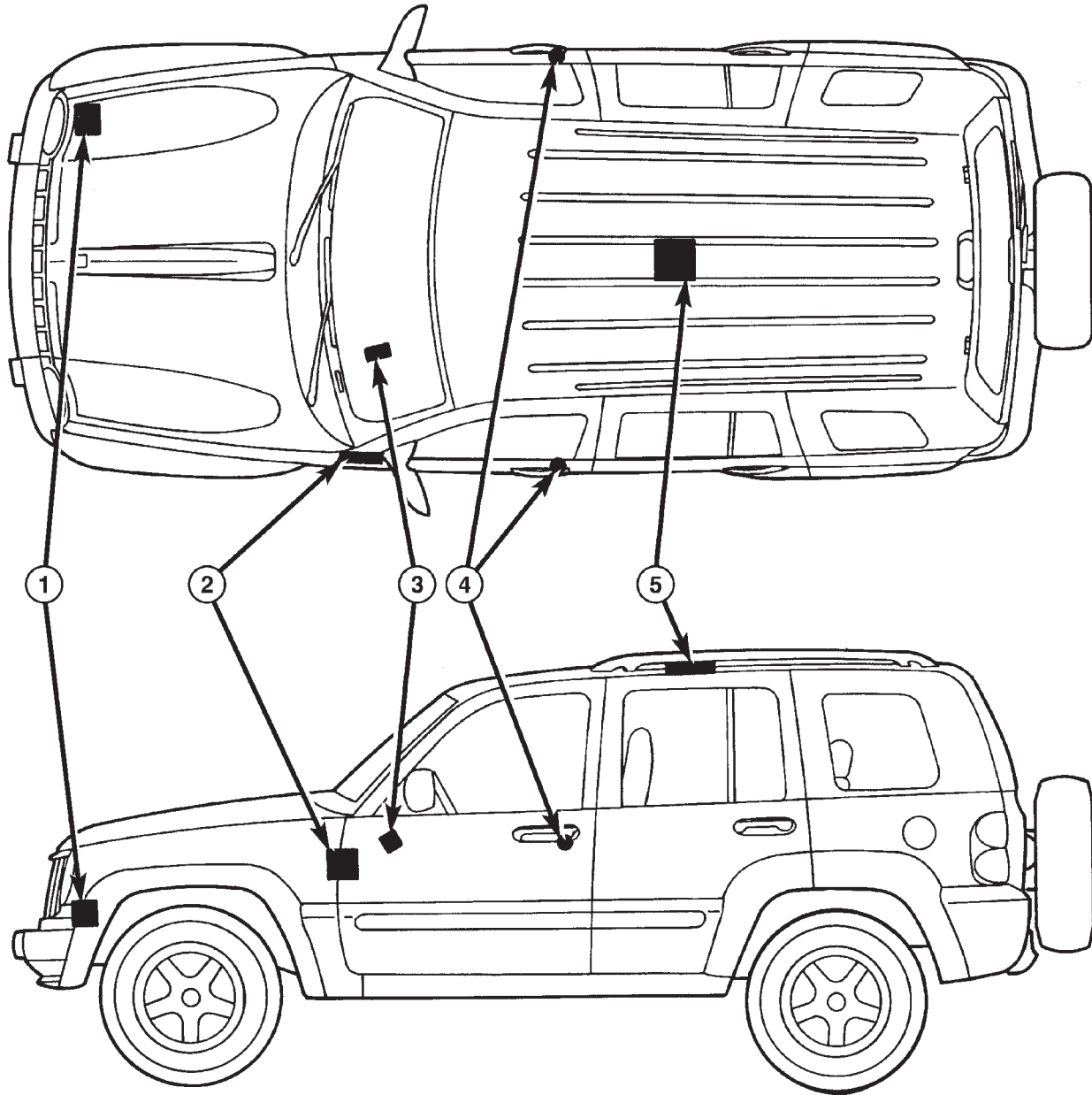
The Vehicle Theft Security System (VTSS) is an available factory-installed option on this model (Fig. 1). The VTSS is comprised of two primary subsystems: Vehicle Theft Alarm (VTA) and Sentry Key Immobilizer System (SKIS). The VTA is an active system that provides visual and audible responses as deterrents to and warnings of unauthorized vehicle tampering. The SKIS is a passive system that effectively immobilizes the vehicle against unauthorized operation. Following are paragraphs which describe the various components that are included in each of these subsystems of the VTSS.

Hard wired circuitry connects many of the VTSS 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 VTSS 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.

VEHICLE THEFT ALARM The VTA is available in two different configurations for this vehicle: One configuration is designed for vehicles manufactured for sale in North America; while, the other configuration is designed for vehicles manufactured for sale in markets outside of North America, also referred to as Rest-Of-World or ROW. In addition, the VTA for ROW is available in two versions: base and premium. All vehicles equipped with VTA are also equipped with the Remote Keyless Entry (RKE) system and the Sentry Key Immobilizer System (SKIS), regardless of their market destination. The North American and ROW base version of the VTA provides perimeter vehicle protection by monitoring the vehicle doors, the tailgate, the rear flip-up glass and, for vehicles built for certain markets where it is required equipment, the hood. If unauthorized vehicle use or tampering is detected, these systems respond by pulsing the horn and flashing certain exterior lamps. The ROW premium version of the VTA is only available

VEHICLE THEFT SECURITY (Continued)



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Fig. 1 Vehicle Theft Security System

- 1 - SIREN MODULE
- 2 - BODY CONTROL MODULE
- 3 - SENTRY KEY IMMOBILIZER MODULE

- 4 - DOOR CYLINDER LOCK SWITCH (2)
- 5 - INTRUSION TRANSCIVER MODULE

in vehicles manufactured for sale in certain markets where it is required equipment. The ROW premium version of the VTA provides the same perimeter protection features as the base version, but adds interior vehicle intrusion protection. The ROW premium VTA also replaces the pulsing horn feature of the base version with an alarm siren as the audible deterrent, while retaining the flashing exterior lamps visual deterrent.

The VTA 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 on the Junction Block (JB) under the driver side outboard end of the instrument panel. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/BODY CONTROL MODULE - DESCRIPTION).

VEHICLE THEFT SECURITY (Continued)

- **Combination Flasher** - An electronic combination flasher is integral to the hazard switch located in the center of the instrument panel above the radio. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/COMBINATION FLASHER - DESCRIPTION).

- **Door Ajar Switch** - A door ajar switch is integral to the latch of each door in the vehicle. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - INTERIOR/DOOR AJAR SWITCH - DESCRIPTION).

- **Door Cylinder Lock Switch** - For North American vehicles only, a door cylinder lock switch is located on the back of the lock cylinder of each front door. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY/DOOR CYLINDER LOCK SWITCH - DESCRIPTION).

- **Flip-Up Glass Ajar Switch** - A flip-up glass ajar switch is integral to the rear flip-up glass latch, located on the top of the tailgate near the center. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - INTERIOR/FLIP-UP GLASS AJAR SWITCH - DESCRIPTION).

- **Hood Ajar Switch** - A hood ajar switch is located beneath the hood panel on the right inner fender side shield of vehicles built for sale in certain markets where it is required equipment. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY/HOOD AJAR SWITCH - DESCRIPTION).

- **Horn Relay** - A horn relay is located on the Junction Block (JB) under the driver side outboard end of the instrument panel. (Refer to 8 - ELECTRICAL/HORN/HORN RELAY - DESCRIPTION).

- **Intrusion Transceiver Module** - An Intrusion Transceiver Module (ITM) is located near the center of the headliner in the passenger compartment of vehicles built for sale in certain markets where it is required equipment. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY/UK SECURITY SYSTEM MODULE - DESCRIPTION).

- **Security Indicator** - A security indicator is located in the ElectroMechanical Instrument Cluster (EMIC) on the instrument panel in front of the driver side front seat. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER/SECURITY INDICATOR - DESCRIPTION).

- **Siren** - An alarm siren is located on the front extension of the right front wheel house panel in the engine compartment of vehicles built for sale in certain markets where it is required equipment. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY/SIREN - DESCRIPTION).

- **Tailgate Ajar Switch** - A tailgate ajar switch is integral to the latch for the tailgate in the vehicle. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - INTERIOR/TAILGATE AJAR SWITCH - DESCRIPTION).

SENTRY KEY IMMOBILIZER SYSTEM The Sentry Key Immobilizer System (SKIS) is available as a factory-installed option on this model. Vehicles equipped with the Vehicle Theft Alarm (VTA) are also equipped with SKIS. The SKIS provides passive vehicle protection by preventing the engine from operating unless a valid electronically encoded key is detected in the ignition lock cylinder. The SKIS includes the following major components, which are described in further detail elsewhere in this service information:

- **Powertrain Control Module** - The Powertrain Control Module (PCM) is located on the left inner fender shield in the engine compartment near the dash panel. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - DESCRIPTION).

- **Sentry Key Immobilizer Module** - The Sentry Key Immobilizer Module (SKIM) is located beneath the steering column shrouds on the right side of the steering column near the ignition lock cylinder housing. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/SENTRY KEY IMMOBILIZER MODULE - DESCRIPTION).

- **Sentry Key Transponder** - The Sentry Key transponder is molded into the head of the ignition key, and concealed by a gray molded rubber cap. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY/TRANSPONDER KEY - DESCRIPTION).

- **SKIS Indicator** - The SKIS indicator is located in the ElectroMechanical Instrument Cluster (EMIC) on the instrument panel in front of the driver side front seat. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER/SPEED CONTROL INDICATOR - DESCRIPTION).

OPERATION

The Vehicle Theft Security System (VTSS) is divided into two basic subsystems: Vehicle Theft Alarm (VTA) and Sentry Key Immobilizer System (SKIS). Following are paragraphs that briefly describe the operation of each of these two subsystems.

VEHICLE THEFT ALARM The Body Control Module (BCM) is used on this model to control and integrate many of the electronic functions and features included in the Vehicle Theft Alarm (VTA). The BCM receives hard wired inputs indicating the status of the door ajar switches, the door cylinder lock switches, the ignition switch, the tailgate ajar switch, the tailgate cylinder lock switch, the flip-up glass ajar switch, the power lock switches and, in vehicles built for certain markets where it is required, the hood ajar switch. The programming in the BCM allows it to process the information from all of these inputs and send control outputs to energize or de-en-

VEHICLE THEFT SECURITY (Continued)

ergize the combination flasher, the horn relay (except vehicles with the Rest-Of-World or ROW premium version of the VTA), and the security indicator. In addition, in vehicles built for certain markets where the ROW premium version of the VTA is required, the BCM also exchanges electronic messages with the Intrusion Transceiver Module (ITM) over the Programmable Communications Interface (PCI) data bus network to provide the features found in this version of the VTA.

The hard wired circuits and components of the VTA may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the Body Control Module (BCM), the ElectroMechanical Instrument Cluster (EMIC), the Intrusion Transceiver Module (ITM), or the Programmable Communications Interface (PCI) data bus network. The most reliable, efficient, and accurate means to diagnose the BCM, the EMIC, the ITM, and the PCI data bus network inputs and outputs related to the VTA requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information. Following are paragraphs that briefly describe the operation of each of the VTA features. See the owner's manual in the vehicle glove box for more information on the features, use and operation of the VTA.

- **ENABLING** - The BCM must have the VTA function electronically enabled in order for the VTA to perform as designed. The logic in the BCM keeps its VTA function dormant until it is enabled using a DRBIII® scan tool. The VTA function of the BCM is enabled on vehicles equipped with the VTA option at the factory, but a service replacement BCM must be VTA-enabled by the dealer using a DRBIII® scan tool. Refer to the appropriate diagnostic information.

- **PRE-ARMING** - The VTA has a pre-arming sequence. Pre-arming occurs when a door, the tailgate, or the flip-up glass is open when the vehicle is locked using a power lock switch, or when the "Lock" button on the Remote Keyless Entry (RKE) transmitter is depressed. The power lock switch will not initiate the pre-arming sequence if the key is in the ignition switch. When the VTA is pre-armed, the arming sequence is delayed until all of the doors, the tailgate, and the flip-up glass are closed.

- **ARMING** - Passive arming of the VTA occurs when the vehicle is exited with the key removed from the ignition switch and the doors are locked while they are open using the power lock switch (see Pre-Arming). Active arming of the VTA occurs when the "Lock" button on the Remote Keyless Entry (RKE) transmitter is depressed to lock the vehicle after all of the doors, the tailgate, and the flip-up glass are closed. The VTA will not arm if the doors are locked

using the key in a lock cylinder or using a mechanical lock button. Once the VTA begins the passive or active arming sequence, the security indicator in the instrument cluster will flash rapidly for about sixteen seconds. This indicates that the VTA arming sequence is in progress. If the ignition switch is turned to the On position, if a door is unlocked with the power lock switch or the RKE transmitter, or if the tailgate is unlocked by any means during the sixteen second arming sequence, the security indicator will stop flashing and the VTA arming sequence will abort. 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 underhood area will not be protected unless the hood is closed when the VTA arming sequence begins. Also, if the status of the hood ajar switch changes from open (hood closed) to closed (hood open) during the sixteen second arming sequence, the security indicator will stop flashing and the VTA arming sequence will abort. Once the sixteen second arming sequence is successfully completed, the security indicator will flash at a slower rate, indicating that the VTA is armed.

- **DISARMING** - For vehicles built for the North American market, disarming of the VTA occurs when the vehicle is unlocked using the key to unlock a door or the tailgate. Disarming of the VTA for any market also occurs when the vehicle is unlocked by depressing the "Unlock" button of the Remote Keyless Entry (RKE) transmitter, or by turning the ignition switch to the On position using a valid Sentry Key Immobilizer System (SKIS) key. Once the alarm has been activated, any of these disarming methods will also deactivate the alarm.

- **POWER-UP MODE** - When the armed VTA senses that the battery has been disconnected and reconnected, it enters its power-up mode. In the power-up mode the alarm system returns to the mode that was last selected prior to the battery failure or disconnect. If the VTA was armed prior to the battery disconnect or failure, the technician or vehicle operator will have to actively or passively disarm the 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 then attempted. The VTA will remain armed until the technician or vehicle operator has actively or passively disarmed the 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.

- **ALARM** - The VTA alarm output varies by the version of the VTA with which the vehicle is equipped. In all cases, the alarm provides both visual and audible outputs; however, the time intervals of

VEHICLE THEFT SECURITY (Continued)

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. For vehicles equipped with the North American or the ROW base version of the VTA, the audible output will be a pulsing of the horn. For vehicles with the ROW premium version of the VTA, the audible output will be a cycling of the alarm siren. See the owner's manual in the vehicle glove box for details of the alarm output requirements of the specific market for which the vehicle was manufactured. The inputs that will trigger the alarm include the door ajar switches, the tailgate ajar switch, the flip-up glass ajar switch, and in vehicles built for certain markets where they are required, the hood ajar switch and the Intrusion Transceiver Module (ITM).

- **TAMPER ALERT** - The VTA tamper alert feature will pulse the horn (or the alarm siren for the ROW premium version of the VTA) three times upon VTA disarming, if the alarm was triggered and has since timed-out. This feature alerts the vehicle operator that the VTA alarm was activated while the vehicle was unattended.

- **INTRUSION ALARM** - The intrusion alarm is an exclusive feature of the ROW premium version of the VTA, which is only available in certain markets where it is required. When the VTA is armed, a motion sensor in the Intrusion Transceiver Module (ITM) monitors the interior of the vehicle for movement. If motion is detected, the ITM sends an electronic message to the BCM over the PCI data bus to invoke the visual alarm feature, and sends an electronic message to the alarm siren in the engine compartment over a dedicated serial bus to invoke the audible alarm feature. The motion detect feature of the ITM can be disabled by depressing the "Lock" button on the RKE transmitter three times within fifteen seconds during VTA arming, while the security indicator is still flashing rapidly. The VTA provides a single short siren "chirp" as an audible confirmation that the motion detect disable request has been received. The ITM must be electronically enabled in order for the intrusion alarm to perform as designed. The logic in the ITM keeps its intrusion alarm function dormant until it is enabled using a DRBIII® scan tool. The intrusion alarm function of the ITM is enabled on vehicles equipped with this

option at the factory, but a service replacement ITM must be configured and enabled by the dealer using a DRBIII® scan tool. Refer to the appropriate diagnostic 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 after about two seconds of running, whenever any method other than a valid Sentry Key is used to start the vehicle. 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 SKIS uses Radio Frequency (RF) communication to obtain confirmation that the key in the ignition switch is a valid key for operating the vehicle. The microprocessor-based SKIS hardware and software also use electronic messages to communicate with other electronic modules in the vehicle over the Programmable Communications Interface (PCI) data bus. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/COMMUNICATION - OPERATION).

Pre-programmed Sentry Key transponders are provided with the vehicle from the factory. Each Sentry Key Immobilizer Module (SKIM) will recognize a maximum of eight Sentry Keys. If the customer would like additional keys other than those provided with the vehicle, they may be purchased from any authorized dealer. These additional keys must be programmed to the SKIM in the vehicle in order for the system to recognize them as valid keys. This can be done by the dealer using a DRBIII® scan tool or, if Customer Learn programming is an available SKIS feature in the market where the vehicle was purchased, the customer can program the additional keys, as long as at least two valid Sentry Keys are already available. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE - TRANSPONDER PROGRAMMING).

The SKIS performs a self-test each time the ignition switch is turned to the On position, and will store fault information in the form of Diagnostic Trouble Codes (DTC's) if a system malfunction is detected. The SKIS can be diagnosed, and any stored DTC's can be retrieved using a DRBIII® scan tool. Refer to the appropriate diagnostic information.

VEHICLE THEFT SECURITY (Continued)

DIAGNOSIS AND TESTING - VEHICLE THEFT SECURITY SYSTEM

The Vehicle Theft Security System (VTSS) is divided into two basic subsystems: Vehicle Theft Alarm (VTA) and Sentry Key Immobilizer System (SKIS). Following are the recommended procedures for diagnosis and testing of each of these two subsystems.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, FRONT IMPACT SENSORS, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

VEHICLE THEFT ALARM

Models equipped with the Rest-Of-World (ROW) premium version of the Vehicle Theft Alarm (VTA) provide some preliminary diagnostic feedback by illu-

minating the security indicator located in the ElectroMechanical Instrument Cluster (EMIC). If the security indicator illuminates with the ignition switch in the On position, it indicates that there is a communication problem between the Intrusion Transceiver Module (ITM) and the Body Control Module (BCM), or between the ITM and the siren module. The BCM will also turn on the security indicator if it receives a message from the ITM indicating that the ITM has stored a Diagnostic Trouble Code (DTC) for a siren module fault.

The hard wired circuits and components of the VTA may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the Body Control Module (BCM), the ElectroMechanical Instrument Cluster (EMIC), the Intrusion Transceiver Module (ITM), or the Programmable Communications Interface (PCI) data bus network. The most reliable, efficient, and accurate means to diagnose the BCM, the EMIC, the ITM, and the PCI data bus network inputs and outputs related to the VTA requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

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.

VEHICLE THEFT SECURITY (Continued)

SENTRY KEY IMMOBILIZER SYSTEM

SENTRY KEY IMMOBILIZER SYSTEM DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
SKIS INDICATOR FAILS TO LIGHT DURING BULB TEST	1. SKIS indicator faulty. 2. Fuse faulty. 3. Ground circuit faulty. 4. Fused B(+) circuit faulty. 5. Fused ignition switch output circuit faulty.	1. Test and replace the instrument cluster as required. 2. Test and replace the SKIM fused B(+) and fused ignition switch output (run-start) fuses in the Junction Block (JB) as required. 3. Test and repair the SKIM ground circuit as required. 4. Test and repair the SKIM fused B(+) circuit as required. 5. Test and repair the SKIM fused ignition switch output (run-start) circuit as required.
SKIS INDICATOR FLASHES WHEN IGNITION SWITCH IS TURNED TO "ON" POSITION	1. Invalid key in ignition switch lock cylinder. 2. Key-related fault.	1. Replace the key with a known valid key. 2. Use a DRBIII® scan tool to diagnose the key-related fault. Refer to the appropriate diagnostic information.
SKIS INDICATOR LIGHTS SOLID FOLLOWING BULB TEST	1. SKIS system malfunction/ fault detected. 2. SKIS system inoperative.	1. Use a DRBIII® scan tool to diagnose the SKIS. Refer to the appropriate diagnostic information. 2. Use a DRBIII® scan tool to diagnose the SKIS. Refer to the appropriate diagnostic information.

SKIS INDICATOR FAILS TO LIGHT DURING BULB TEST

If the Sentry Key Immobilizer System (SKIS) indicator in the instrument cluster fails to illuminate for about three seconds after the ignition switch is turned to the On position (bulb test), perform the instrument cluster actuator test. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). If the SKIS indicator still fails to light during the bulb test, a wiring problem resulting in the loss of battery current or ground to the Sentry Key Immobilizer Module (SKIM) should be suspected, and the following procedure should be used for diagnosis. 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.

NOTE: The following tests may not prove conclusive in the diagnosis of this system. The most reliable, efficient, and accurate means to diagnose the Sentry Key Immobilizer System requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

(1) Check the fused B(+) fuse (Fuse 33 - 10 ampere) in the Junction Block (JB). If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(2) Check for battery voltage at the fused B(+) fuse (Fuse 33 - 10 ampere) in the JB. If OK, go to Step 3. If not OK, repair the open B(+) circuit between the JB and the battery as required.

(3) Check the fused ignition switch output (run-start) fuse (Fuse 15 - 10 ampere) in the JB. If OK, go to Step 4. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(4) Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run-start) fuse (Fuse 15 - 10 ampere) in the JB. If OK, go to Step 5. If not OK, repair the open fused ignition switch output (run-start) circuit between the JB and the ignition switch as required.

(5) Disconnect and isolate the battery negative cable. Disconnect the instrument panel wire harness connector for the Sentry Key Immobilizer Module (SKIM) from the SKIM connector receptacle. Check for continuity between each of the two ground circuit cavities of the instrument panel wire harness connector for the SKIM and a good ground. There should be

VEHICLE THEFT SECURITY (Continued)

continuity. If OK, go to Step 6. If not OK, repair the open ground circuit(s) to ground (G202) as required.

(6) Reconnect the battery negative cable. Check for battery voltage at the fused B(+) circuit cavity of the instrument panel wire harness connector for the SKIM. If OK, go to Step 7. If not OK, repair the open fused B(+) circuit between the SKIM and the JB as required.

(7) Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run-start) circuit cavity of the instrument panel wire harness connector for the SKIM. If OK, use a DRBIII® scan tool to complete the diagnosis of the SKIS. Refer to the appropriate diagnostic information. If not OK, repair the open fused ignition switch output (run-start) circuit between the SKIM and the JB as required.

SKIS INDICATOR FLASHES UPON IGNITION "ON" OR LIGHTS SOLID FOLLOWING BULB TEST

A SKIS indicator that flashes following the ignition switch being turned to the On position indicates that an invalid key has been detected, or that a key-related fault has been set. A SKIS indicator that lights solid following a successful bulb test indicates that the SKIM has detected a system malfunction or that the SKIS is inoperative. In either case, fault information will be stored in the SKIM memory. For retrieval of this fault information and further diagnosis of the SKIS, the PCI data bus, the SKIM electronic message outputs to the instrument cluster that control the SKIS indicator and chime, or the electronic message inputs and outputs between the SKIM and the Powertrain Control Module (PCM) that control engine operation, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information. Following are preliminary troubleshooting guidelines to be followed during diagnosis using a DRBIII® scan tool:

(1) Using the DRBIII® scan tool, read and record the faults as they exist in the SKIM when you first begin your diagnosis of the vehicle. It is important to document these faults because the SKIM does not differentiate between historical faults (those that have occurred in the past) and active faults (those that are currently present). If this problem turns out to be an intermittent condition, this information may become invaluable to your diagnosis.

(2) Using the DRBIII® scan tool, erase all of the faults from the SKIM.

(3) Cycle the ignition switch to the Off position, then back to the On position.

(4) Using the DRBIII® scan tool, read any faults that are now present in the SKIM. These are the active faults.

(5) Using this active fault information, refer to the proper procedure in the appropriate diagnostic information for the specific additional diagnostic steps.

STANDARD PROCEDURE

**STANDARD PROCEDURE - SKIS
INITIALIZATION**

The Sentry Key Immobilizer System (SKIS) must be initialized following a Sentry Key Immobilizer Module (SKIM) replacement. SKIS initialization requires the use of a DRBIII® scan tool. Initialization will also require that you have access to the unique four-digit PIN code that was assigned to the original SKIM. The PIN code **must** be used to enter the Secured Access Mode in the SKIM. This PIN number may be obtained from the vehicle owner, from the original vehicle invoice, or from the DaimlerChrysler Customer Center. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE - PCM/SKIM PROGRAMMING).

NOTE: If a Powertrain Control Module (PCM) is replaced on a vehicle equipped with the Sentry Key Immobilizer System (SKIS), the unique Secret Key data must be transferred from the Sentry Key Immobilizer Module (SKIM) to the new PCM using the PCM replacement procedure. This procedure also requires the use of a DRBIII® scan tool and the unique four-digit PIN code to enter the Secured Access Mode in the SKIM. Refer to the appropriate diagnostic information for the proper PCM replacement procedures.

**STANDARD PROCEDURE - SENTRY KEY
TRANSPONDER PROGRAMMING**

All Sentry Keys included with the vehicle are pre-programmed to work with the Sentry Key Immobilizer System (SKIS) when it is shipped from the factory. The Sentry Key Immobilizer Module (SKIM) can be programmed to recognize up to a total of eight Sentry Keys. When programming a blank Sentry Key transponder, the key must first be cut to match the ignition switch lock cylinder in the vehicle for which it will be used. Once the additional or new key has been cut, the SKIM must be programmed to recognize it as a valid key. There are two possible methods to program the SKIM to recognize a new or additional valid key, the Secured Access Method and the Customer Learn Method. Following are the details of these two programming methods.

VEHICLE THEFT SECURITY (Continued)

SECURED ACCESS METHOD

The Secured Access method applies to all vehicles. This method requires the use of a DRBIII® scan tool. This method will also require that you have access to the unique four-digit PIN code that was assigned to the original SKIM. The PIN code **must** be used to enter the Secured Access Mode in the SKIM. This PIN number may be obtained from the vehicle owner, from the original vehicle invoice, or from the DaimlerChrysler Customer Center. Refer to the appropriate diagnostic information for the proper Secured Access method programming procedures.

CUSTOMER LEARN METHOD

The Customer Learn feature is only available on domestic vehicles, or those vehicles which have a U.S. country code designator. This programming method also requires access to at least two valid Sentry Keys. If two valid Sentry Keys are not available, or if the vehicle does not have a U.S. country code designator, the Secured Access Method **must** be used to program new or additional valid keys to the SKIM. The Customer Learn programming method procedures are as follows:

(1) Obtain the blank Sentry Key(s) that are to be programmed as valid keys for the vehicle. Cut the blank key(s) to match the ignition switch lock cylinder mechanical key codes.

(2) Insert one of the two valid Sentry Keys into the ignition switch and turn the ignition switch to the On position.

(3) After the ignition switch has been in the On position for longer than three seconds, but no more than fifteen seconds, cycle the ignition switch back to the Off position. Replace the first valid Sentry Key in the ignition switch lock cylinder with the second valid Sentry Key and turn the ignition switch back to the On position. The second valid Sentry Key must be inserted in the lock cylinder within fifteen seconds of removing the first valid key.

(4) About ten seconds after the completion of Step 3, the SKIS indicator in the instrument cluster will start to flash and a single audible chime tone will sound to indicate that the system has entered the Customer Learn programming mode.

(5) Within sixty seconds of entering the Customer Learn programming mode, turn the ignition switch to the Off position, replace the valid Sentry Key with a blank Sentry Key transponder, and turn the ignition switch back to the On position.

(6) About ten seconds after the completion of Step 5, a single audible chime tone will sound and the SKIS indicator will stop flashing, stay on solid for three seconds, then turn off to indicate that the blank Sentry Key has been successfully programmed. The SKIS will immediately exit the Customer Learn programming

mode and the vehicle may now be started using the newly programmed valid Sentry Key.

Each of these steps must be repeated and completed in their entirety for each additional Sentry Key that is to be programmed. If the above steps are not completed in the given sequence, or within the allotted time, the SKIS will exit the Customer Learn programming mode and the programming will be unsuccessful. The SKIS will also automatically exit the Customer Learn programming mode if it sees a non-blank Sentry Key transponder when it should see a blank, if it has already programmed eight (8) valid Sentry Keys, or if the ignition switch is turned to the Off position for more than about fifty seconds.

NOTE: If an attempt is made to start the vehicle while in the Customer Learn mode (SKIS indicator flashing), the SKIS will respond as though the vehicle were being started with an invalid key. In other words, the engine will stall after about two seconds of operation. No faults will be set.

NOTE: Once a Sentry Key has been programmed as a valid key to a vehicle, it cannot be programmed as a valid key for use on any other vehicle.

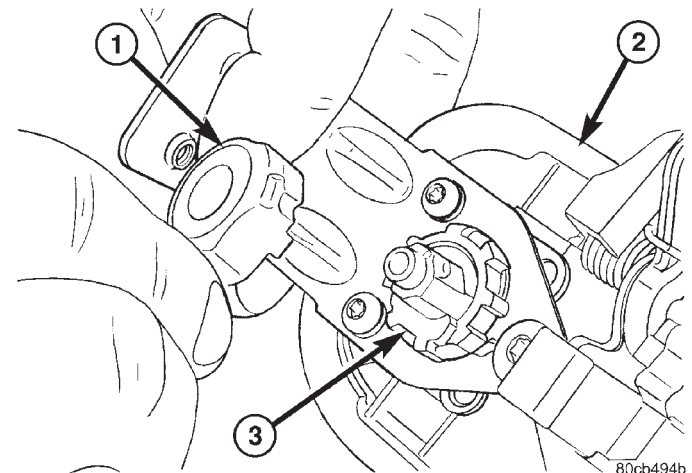
DOOR CYLINDER LOCK SWITCH**DESCRIPTION**

Fig. 2 Door Cylinder Lock Switch

- 1 - SWITCH
- 2 - OUTSIDE DOOR HANDLE
- 3 - DOOR LOCK CYLINDER

Vehicles manufactured for North American markets that are equipped with the optional Vehicle

DOOR CYLINDER LOCK SWITCH (Continued)

Theft Security System (VTSS) have a door cylinder lock switch secured to the back of the key lock cylinder inside each front door (Fig. 2). The door cylinder lock switch is a resistor multiplexed momentary switch that is hard wired in series between the door lock switch ground and right or left cylinder lock switch mux circuits of the Body Control Module (BCM) through the front door wire harness. The door cylinder lock switches are driven by the key lock cylinders and contain two internal resistors. One resistor value is used for the Lock position, and one for the Unlock position.

The door cylinder lock switches cannot be adjusted or repaired and, if faulty or damaged, they must be replaced.

OPERATION

The door cylinder lock switches are actuated by the key lock cylinder when the key is inserted in the lock cylinder and turned to the lock or unlock positions. The door cylinder lock switch close a circuit between the door lock switch ground circuit and the left or right cylinder lock switch mux circuits through one of two internal resistors for the Body Control Module (BCM) when either front door key lock cylinder is in the Lock, or Unlock positions. The BCM reads the switch status through an internal pull-up, then uses this information as an input for the Vehicle Theft Security System (VTSS) operation.

The door cylinder lock switches and circuits can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - DOOR CYLINDER LOCK SWITCH

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.

(1) Disconnect the door cylinder lock switch pigtail wire connector from the wire harness connector.

(2) Using a ohmmeter, check the switch resistance checks between the two terminals in the door cylinder lock switch pigtail wire connector. Actuate the switch by rotating the key in the door lock cylinder to test for the proper resistance values in each of the two switch positions, as shown in the Door Cylinder Lock Switch Test table.

DOOR CYLINDER LOCK SWITCH TEST		
Switch Position		Resistance (±10%)
Left Side	Right Side	
Lock (Clockwise)	Unlock (Counterclockwise)	473 Ohms
Unlock (Counterclockwise)	Lock (Clockwise)	1.994 Kilohms

(3) If a door cylinder lock switch fails either of the resistance tests, replace the faulty switch.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the outside door handle unit from the outer door panel. (Refer to 23 - BODY/DOOR - FRONT/EXTERIOR HANDLE - REMOVAL).

(3) Remove the retainer clip from the pin on the back of the door lock cylinder (Fig. 3).

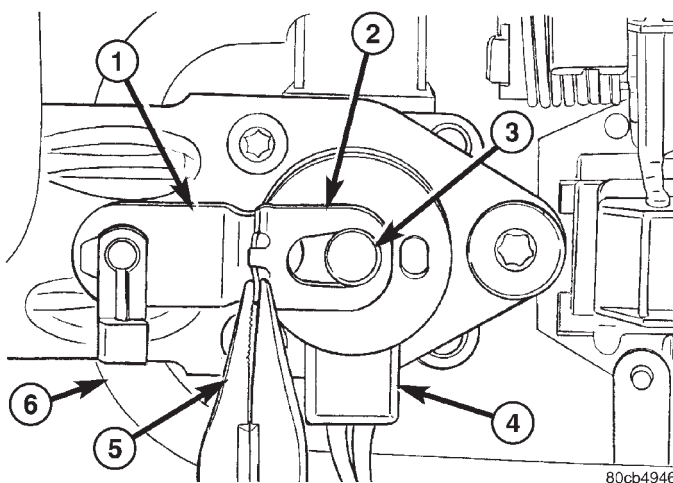


Fig. 3 Lock Cylinder Lever Retainer Remove/Install

- 1 - LEVER
- 2 - RETAINER
- 3 - LOCK CYLINDER
- 4 - SWITCH
- 5 - PLIERS
- 6 - OUTSIDE DOOR HANDLE

(4) Remove the lock lever from the pin on the back of the door lock cylinder.

(5) Remove the door cylinder lock switch from the back of the lock cylinder.

INSTALLATION

(1) Position the door cylinder lock switch onto the back of the lock cylinder with its pigtail wire harness oriented toward the bottom (Fig. 3).

DOOR CYLINDER LOCK SWITCH (Continued)

(2) Position the lock lever onto the pin on the back of the door lock cylinder with the lever oriented toward the rear.

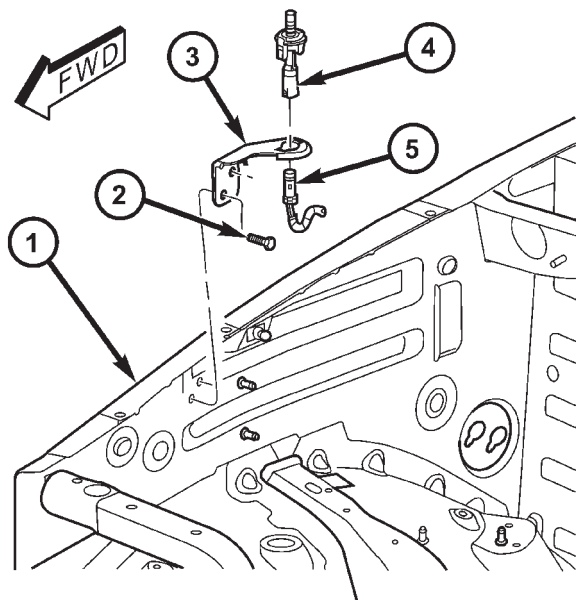
(3) Install the retainer clip onto the pin on the back of the door lock cylinder. Be certain that the center tab of the retainer is engaged in the retention hole on the lock lever.

(4) Reinstall the outside door handle unit onto the outer door panel. (Refer to 23 - BODY/DOOR - FRONT/EXTERIOR HANDLE - INSTALLATION).

(5) Reconnect the battery negative cable.

HOOD AJAR SWITCH

DESCRIPTION



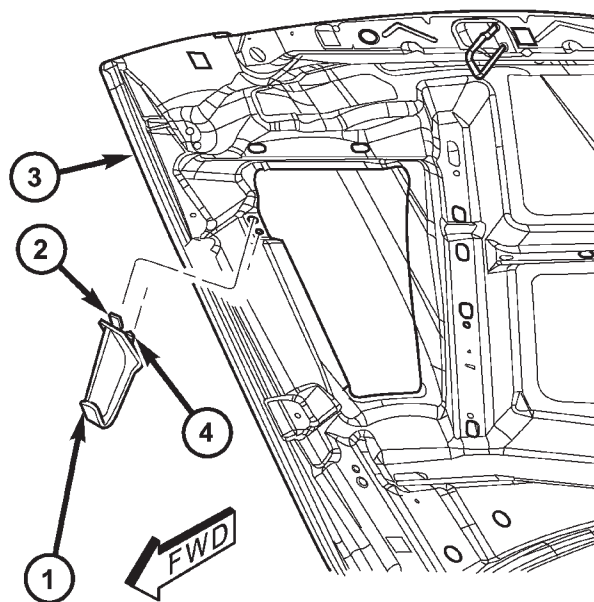
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Fig. 4 Hood Ajar Switch

- 1 - INNER FENDER
- 2 - SCREW (2)
- 3 - BRACKET
- 4 - HOOD AJAR SWITCH
- 5 - WIRE HARNESS CONNECTOR

The hood ajar switch is a normally closed, single pole momentary switch that is used only on vehicles equipped with the Vehicle Theft Security System (VTSS) for sale in certain markets where it is required equipment (Fig. 4). This switch consists of a molded plastic body with a molded plastic mounting bezel. The switch body has an integral molded con-

ductor receptacle on the lower end, while the spring-loaded switch plunger extends from the upper end. Two external latches integral to the mounting bezel lock the switch into a keyed mounting hole in the stamped steel switch mounting bracket. The mounting bracket is fastened with two screws to the right inner fender shield near the fender ledge in the engine compartment. A molded plastic striker with an integral retainer and mounting tab is secured to the underside of the hood panel inner reinforcement to actuate the switch plunger as the hood panel is closed (Fig. 5). A single take out of the headlamp and dash wire harness connects the switch to the vehicle electrical system. The switch receives a path to ground at all times through another take out of the headlamp and dash wire harness with an eyelet terminal connector that is secured by a ground screw to the left inner fender shield in the engine compartment.



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Fig. 5 Hood Ajar Switch Striker

- 1 - STRIKER
- 2 - TAB
- 3 - INNER HOOD REINFORCEMENT
- 4 - RETAINER

The hood ajar switch cannot be adjusted or repaired and, if faulty or damaged, it must be replaced. The hood ajar switch striker is not intended for reuse. If the striker is removed from the hood inner reinforcement for any reason, it must be replaced with a new unit.

HOOD AJAR SWITCH (Continued)

OPERATION

The hood ajar switch is normally held open as the spring-loaded switch plunger is depressed by the striker on the hood panel when the hood panel is closed and latched. When the hood is opened, the spring-loaded switch plunger extends from the switch body and the switch contacts are closed. The hood ajar switch is connected in series between ground and the hood ajar switch sense input of the Body Control Module (BCM). The BCM uses an internal resistor pull up to monitor the state of the hood ajar switch contacts. The hood ajar switch can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - HOOD AJAR SWITCH

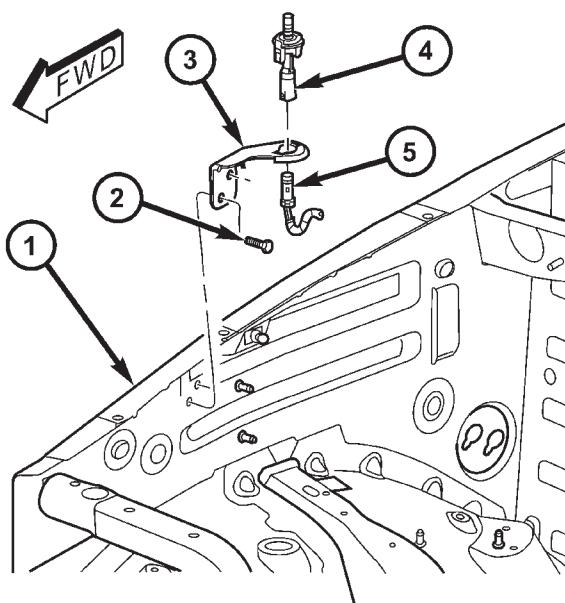
Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

(1) Disconnect the headlamp and dash wire harness connector for the hood ajar switch from the switch connector receptacle.

(2) Check for continuity between the two terminals in the connector receptacle of the hood ajar switch. There should be continuity with the switch plunger extended, and no continuity with the switch plunger depressed. If not OK, replace the faulty hood ajar switch.

REMOVAL

- (1) Unlatch and open the hood.
- (2) Disconnect and isolate the battery negative cable.
- (3) From the top of the hood ajar switch mounting bracket, squeeze the two switch latch tabs together and pull the switch upward (Fig. 6).
- (4) Pull the hood ajar switch up through the hole in the mounting bracket far enough to access and disconnect the headlamp and dash wire harness connector for the hood ajar switch from the switch connector receptacle.



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Fig. 6 Hood Ajar Switch Remove/Install

- 1 - INNER FENDER
- 2 - SCREW (2)
- 3 - BRACKET
- 4 - HOOD AJAR SWITCH
- 5 - WIRE HARNESS CONNECTOR

(5) Remove the hood ajar switch from the mounting bracket.

INSTALLATION

- (1) Position the hood ajar switch near the hole in the mounting bracket (Fig. 6).
- (2) Reconnect the headlamp and dash wire harness connector for the hood ajar switch to the switch connector receptacle.
- (3) From the top of the hood ajar switch mounting bracket, use hand pressure to press the switch downward into the mounting bracket until the latch tabs lock it into place.
- (4) Reconnect the battery negative cable.
- (5) Close and latch the hood.

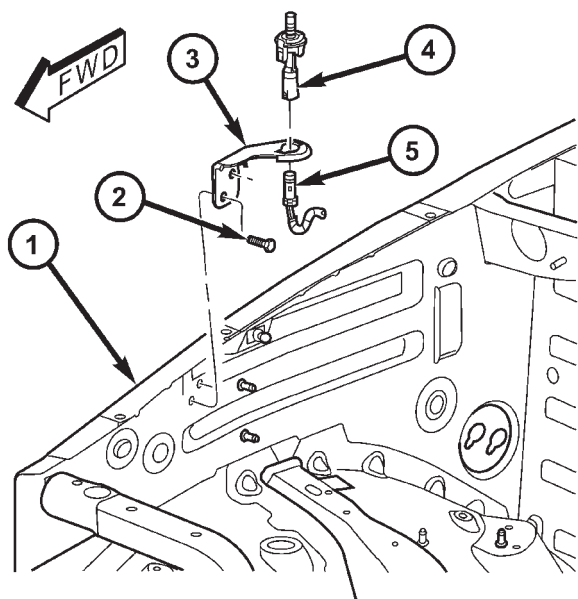
HOOD AJAR SWITCH BRACKET

REMOVAL

(1) Remove the hood ajar switch from the mounting bracket. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY/HOOD AJAR SWITCH - REMOVAL).

(2) If necessary, remove and set aside the engine air cleaner housing for access to the hood ajar switch mounting bracket screws.

(3) Remove the two screws that secure the hood ajar switch bracket to the right fender inner shield (Fig. 7).



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Fig. 7 Hood Ajar Switch Bracket Remove/Install

- 1 - INNER FENDER
- 2 - SCREW (2)
- 3 - BRACKET
- 4 - HOOD AJAR SWITCH
- 5 - WIRE HARNESS CONNECTOR

(4) Remove the hood ajar switch bracket from the right fender inner shield.

INSTALLATION

(1) Position the hood ajar switch bracket onto the right fender inner shield (Fig. 7).

(2) Install and tighten the two screws that secure the hood ajar switch bracket to the right fender inner shield. Tighten the screws to 7 N·m (60 in. lbs.).

(3) If removed, reinstall the engine air cleaner housing.

(4) Reinstall the hood ajar switch into the mounting bracket. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY/HOOD AJAR SWITCH - INSTALLATION).

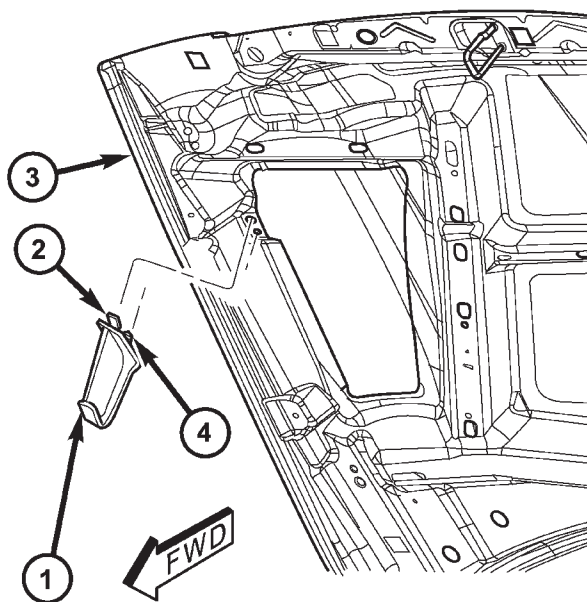
HOOD AJAR SWITCH STRIKER

REMOVAL

The hood ajar switch striker is not intended for reuse. If the striker is removed from the hood inner reinforcement for any reason, it must be replaced with a new unit.

(1) Unlatch and open the hood.

(2) Using a trim stick or another suitable wide flat-bladed tool, gently pry the rearward end of the hood ajar switch striker away from the inner hood panel reinforcement far enough to disengage the integral retainer from its mounting hole (Fig. 8).



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Fig. 8 Hood Ajar Switch Striker Remove/Install

- 1 - STRIKER
- 2 - TAB
- 3 - INNER HOOD REINFORCEMENT
- 4 - RETAINER

(3) Move the hood ajar switch striker slightly rearward to disengage the integral mounting tab from the forward mounting hole.

(4) Remove the hood ajar switch striker from the inner hood panel reinforcement and discard.

HOOD AJAR SWITCH STRIKER (Continued)

INSTALLATION

The hood ajar switch striker is not intended for reuse. If the striker is removed from the hood inner reinforcement for any reason, it must be replaced with a new unit.

- (1) Position the new hood ajar switch striker to the inner hood panel reinforcement (Fig. 8).
- (2) Insert the integral mounting tab on the front of the hood ajar switch striker into the forward mounting hole in the inner hood panel reinforcement.
- (3) Align the integral retainer on the rear of the hood ajar switch striker with the rearward mounting hole in the inner hood panel reinforcement.
- (4) Using hand pressure, firmly press the hood ajar switch striker rearward and upward against the inner hood panel reinforcement until the hood ajar switch striker retainer is fully engaged in the rearward mounting hole in the inner hood panel reinforcement.
- (5) Close and latch the hood.

INTRUSION TRANSCIEVER MODULE

DESCRIPTION

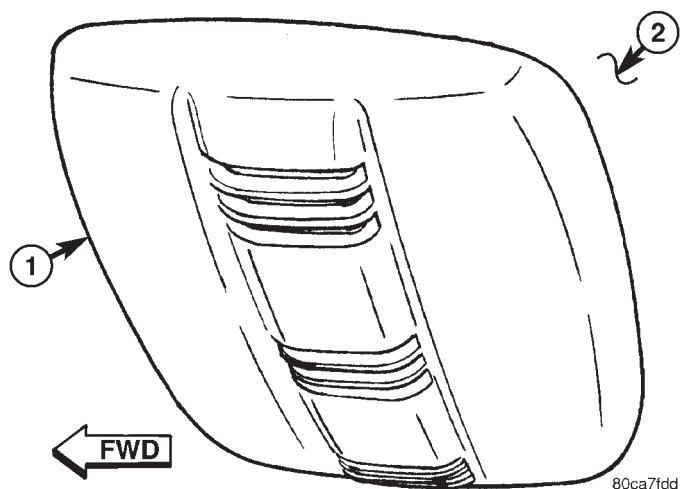


Fig. 9 Intrusion Transceiver Module

- 1 - ITM
- 2 - HEADLINER

An Intrusion Transceiver Module (ITM) is part of the Rest-Of-World (ROW) premium version of the Vehicle Theft Alarm (VTA) in the Vehicle Theft Security System (VTSS) (Fig. 9). The ROW premium version of the VTA is only available in vehicles built for certain markets, where the additional features offered by this system are required. The ITM is located in the passenger compartment, on the lower surface of the headliner near the center of the vehi-

cle. This unit is designed to provide interior motion detection, and serve as an interface between the Body Control Module (BCM) and the alarm siren module.

The ITM is concealed beneath a dedicated molded plastic trim cover that approximates the size and shape of a typical dome lamp housing. However, rather than a lens, the ITM features three sets of louvered openings in a molded lateral center rib formation. One set of louvered openings is located at each outboard end of the center rib, while the third set is centered. Each of the louvered openings is covered on the inside by a single molded black plastic sight shield that extends the length of the center rib for appearance. The module is secured to a molded plastic mounting bracket above the headliner by four latch features that are integral to the underside of the module housing. Besides the ITM, the trim cover also conceals two plastic pins integral to the mounting bracket that are used to secure the bracket to the headliner with two stamped nuts that are installed from below. An adhesive-backed foam pad is installed above the ITM bracket between the headliner and the roof panel to provide additional headliner stabilization and support for the ITM mounting. Two small notch-like service holes on the rear edge of the trim cover afford access to the two integral rear latches of the ITM for service removal (Fig. 10).

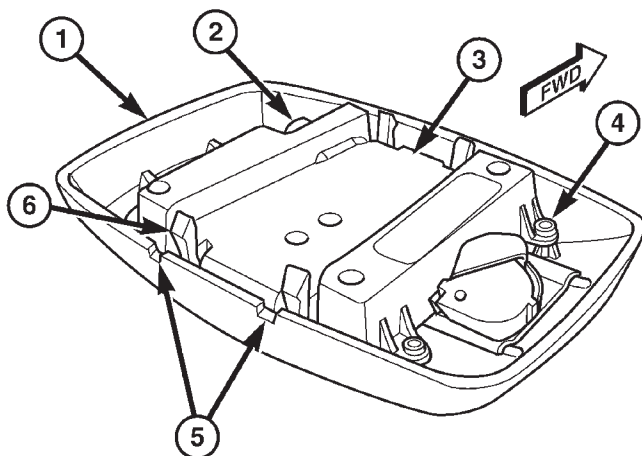


Fig. 10 Intrusion Transceiver Module

- 1 - TRIM COVER
- 2 - CONNECTOR RECEPTACLE
- 3 - HOUSING
- 4 - SCREW (4)
- 5 - SERVICE HOLE (2)
- 6 - LATCH FEATURE (4)

The ITM circuitry is contained within a black molded plastic housing with four integral mounting tabs that are secured to the back of the trim cover with four screws. Concealed within the housing is the

INTRUSION TRANSCIEVER MODULE (Continued)

electronic circuitry of the ITM which includes a microprocessor, and an ultrasonic receive transducer. A molded plastic connector receptacle containing six terminal pins that is soldered to a small circuit board and extends through a clearance hole in the left front corner of the ITM housing, and an ultrasonic transmit transducer housing extends from the center of the right side of the ITM housing. Both the transmit transducer on the right side of the module and the receive transducer on the ITM circuit board are aimed through two small round holes in the sight shield of the trim cover. The ITM is connected to the vehicle electrical system by a dedicated take out and connector of the overhead wire harness that is integral to the headliner.

The ITM unit cannot be adjusted or repaired and, if faulty or damaged, it must be replaced. The ITM is serviced as a unit with the trim cover.

OPERATION

The microprocessor in the Intrusion Transceiver Module (ITM) contains the motion sensor logic circuits and controls all of the features of the premium version of the Vehicle Theft Alarm (VTA). The ITM uses On-Board Diagnostics (OBD) and can communicate with other electronic modules in the vehicle as well as with the DRBIII® scan tool using the Programmable Communications Interface (PCI) data bus network. This method of communication is used by the ITM to communicate with the Body Control Module (BCM) and for diagnosis and testing through the 16-way data link connector located on the driver side lower edge of the instrument panel. The ITM also communicates with the alarm siren over a dedicated serial bus circuit.

The ITM microprocessor continuously monitors inputs from its on-board motion sensor circuitry as well as inputs from the BCM and the alarm siren module. The on-board ITM motion sensor circuitry transmits ultrasonic signals into the vehicle cabin through a transmit transducer, then listens to the returning signals as the bounce off of objects in the vehicle interior. If an object is moving in the interior, a detection circuit in the ITM senses this movement through the modulation of the returning ultrasonic signals that occurs due to the Doppler effect. The motion detect function of the ITM can be disabled by depressing the "Lock" button on the Remote Keyless Entry (RKE) transmitter three times within fifteen seconds, while the security indicator is still flashing rapidly. The ITM will signal the alarm siren module to provide a single siren "chirp" as an audible confirmation that the motion sensor function has been disabled.

If movement is detected, the ITM sends an electronic message to the BCM over the PCI data bus to

flash the exterior lighting and sends an electronic message to the alarm siren module over a dedicated serial bus line to sound the siren. When the BCM detects a breach in the perimeter protection through a door, tailgate, flip-up glass, or hood ajar switch input, it sends an electronic message to the ITM and the ITM sends an electronic message to the BCM over the PCI data bus to flash the exterior lighting and sends an electronic message to the alarm siren module over a dedicated serial bus line to sound the siren. The ITM also monitors inputs from the alarm siren module for siren battery or siren input/output circuit tamper alerts, and siren battery condition alerts, then sets active and stored Diagnostic Trouble Codes (DTC) for any monitored system faults it detects. An active fault only remains for the current ignition switch cycle, while a stored fault causes a DTC to be stored in memory by the ITM. If a fault does not recur for fifty ignition cycles, the ITM will automatically erase the stored DTC.

The ITM is connected to the vehicle electrical system through a dedicated take out and connector of the overhead wire harness. The ITM receives battery current on a fused B(+) circuit through a fuse in the Junction Block (JB), and receives ground through a ground circuit and take out of the body wire harness. This ground take out has a single eyelet terminal connector that is secured by a ground screw to the base of the left D-pillar behind the quarter trim panel. These connections allow the ITM to remain operational, regardless of the ignition switch position. The hard wired inputs and outputs for the ITM may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the ITM, the PCI data bus network, or the electronic message inputs to and outputs from the ITM. The most reliable, efficient, and accurate means to diagnose the ITM, the PCI data bus network, and the electronic message inputs to and outputs from the ITM requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

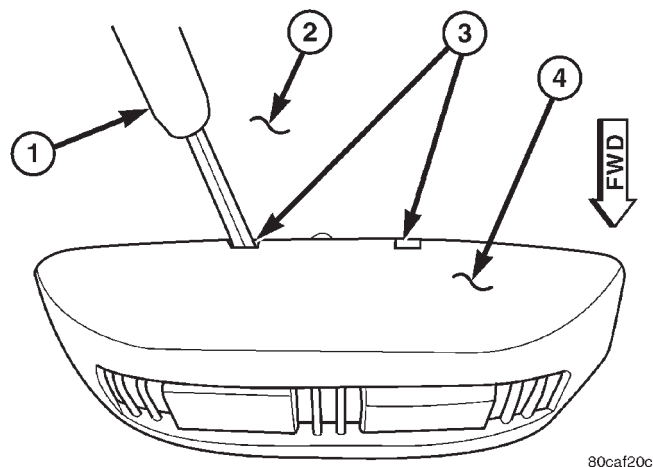
REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) While pulling downward lightly on either rear corner of the Intrusion Transceiver Module (ITM) trim cover, insert a small thin-bladed screwdriver through each of the service holes on the rear edge of the trim cover to depress and release the two integral rear latch features of the module from the mounting bracket above the headliner (Fig. 11).

(3) Pull the ITM trim cover rearward far enough to disengage the two integral front latch features of

INTRUSION TRANSCIVER MODULE (Continued)

**Fig. 11 Intrusion Transceiver Module Remove**

- 1 - SMALL SCREWDRIVER
- 2 - HEADLINER
- 3 - SERVICE HOLES
- 4 - ITM

the module from the mounting bracket above the headliner.

(4) Pull the ITM and trim cover down from the headliner far enough to access and disconnect the overhead wire harness connector for the ITM from the module connector receptacle.

(5) Remove the ITM from the headliner.

INSTALLATION

(1) Position the Intrusion Transceiver Module (ITM) to the headliner.

(2) Reconnect the overhead wire harness connector for the ITM to the module connector receptacle.

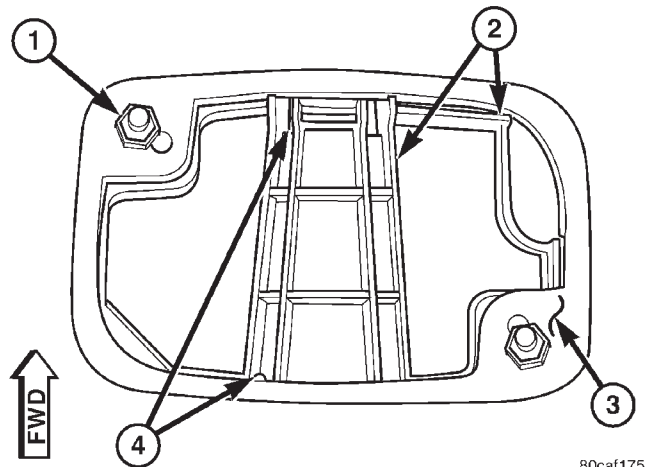
(3) Align the two integral front latch features of the ITM with the two front latch receptacles of the mounting bracket above the headliner (Fig. 12).

(4) Push the ITM trim cover forward far enough to insert the two integral rear latch features of the module into the two rear latch receptacles of the mounting bracket above the headliner.

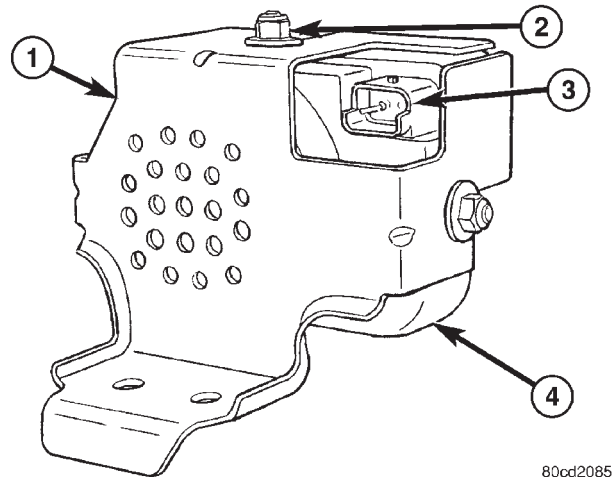
(5) Push upward firmly and evenly on the rear edge of the ITM trim cover until the two integral rear latch features of the module are engaged in the latch receptacles of the mounting bracket above the headliner.

(6) Reconnect the battery negative cable.

NOTE: If the Intrusion Transceiver Module (ITM) has been replaced with a new unit, the new ITM **MUST** be initialized before the Vehicle Theft Security System can operate as designed. The use of a DRBIII® scan tool is required to initialize the ITM. Refer to the appropriate diagnostic information.

**Fig. 12 Intrusion Transceiver Module Mounting Bracket**

- 1 - STAMPED NUT (2)
- 2 - MOUNTING BRACKET
- 3 - HEADLINER
- 4 - LATCH RECEPTACLES (4)

SIREN**DESCRIPTION****Fig. 13 Siren Module**

- 1 - BRACKET
- 2 - NUT (3)
- 3 - CONNECTOR RECEPTACLE
- 4 - SIREN MODULE

An alarm siren module is part of the Rest-Of-World (ROW) premium version of the Vehicle Theft Alarm (VTA) in the Vehicle Theft Security System (VTSS) (Fig. 13). The ROW premium version of the VTA is only available in vehicles built for certain markets, where the additional features offered by this system are required. The alarm siren module is located in

SIREN (Continued)

the engine compartment, on the front extension of the right front wheel house panel below and behind the right headlamp. This unit is designed to provide the audible alert requirements for the ROW premium VTA.

The alarm siren module consists of microprocessor-based electronic control circuitry, the siren, and a nickel metal hydride backup battery. All of the alarm module components are protected and sealed within a black molded plastic housing. A stamped steel mounting bracket is secured to the module with three stud plates and nuts that fit into slotted holes at the top and each side of the bracket. The front surface of the bracket features a tightly grouped series of small holes that serves as an outlet for the audible output of the alarm siren. The bottom of the mounting bracket is bent at a right angle and has an integral locating tab feature. Two mounting holes in the horizontal surface of the bracket are used to secure the alarm siren module to the wheel house extension with two screws. An integral connector receptacle extends forward from the upper left corner of the alarm siren housing, and connects the unit to the vehicle electrical system through a dedicated take out and connector of the headlamp and dash wire harness.

The alarm siren module cannot be repaired or adjusted and, if faulty or damaged, it must be replaced.

OPERATION

The microprocessor within the alarm siren module performs the tasks required to provide the siren unit features and functions based upon internal programming and electronic arm and disarm message inputs received from the Intrusion Transceiver Module (ITM) over a dedicated serial bus communication circuit. 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 ITM upon receiving a request from the ITM. The ITM will store a Diagnostic Trouble Code (DTC) for a detected alarm siren module fault that can be retrieved with the DRBIII® scan tool over the Programmable Communications Interface (PCI) data bus network through the 16-way data link connector located on the driver side lower edge of the instrument panel.

When the Rest-Of-World (ROW) premium version of the Vehicle Theft Alarm (VTA) is armed, the alarm siren module microprocessor continuously monitors inputs from the ITM for messages to sound its internal siren and enters its auto-detect mode. While in the auto-detect mode, if the alarm siren module detects that its power supply or communication circuits are being tampered with or have been sabo-

taged, it will sound an alarm and continue to operate through its on-board backup battery. If the arm siren module is in its disarmed mode when its power supply or communication circuits are interrupted, the siren will not sound. The alarm module will also notify the ITM when the backup battery requires charging, and the ITM will send a message that will allow the backup battery to be charged through the battery current and ground circuits to the alarm module only when the ignition switch is in the On position and the engine is running. This will prevent the charging of the alarm backup battery from depleting the charge in the main vehicle battery while the vehicle is not being operated.

The alarm siren module receives battery current on a fused B(+) circuit through a fuse in the Power Distribution Center (PDC), and receives ground through a ground circuit and take out of the headlamp and dash wire harness. This ground take out has a single eyelet terminal connector that is secured by a ground screw to the left inner fender shield in the engine compartment. These connections allow the alarm siren module to remain operational, regardless of the ignition switch position. The hard wired inputs and outputs for the alarm siren module may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the internal circuitry or the backup battery of the alarm siren module, the ITM, the serial bus communication line, or the electronic message inputs to and outputs from the alarm siren module. The most reliable, efficient, and accurate means to diagnose the alarm siren module, the ITM, the serial bus communication line, and the electronic message inputs to and outputs from the alarm siren module requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

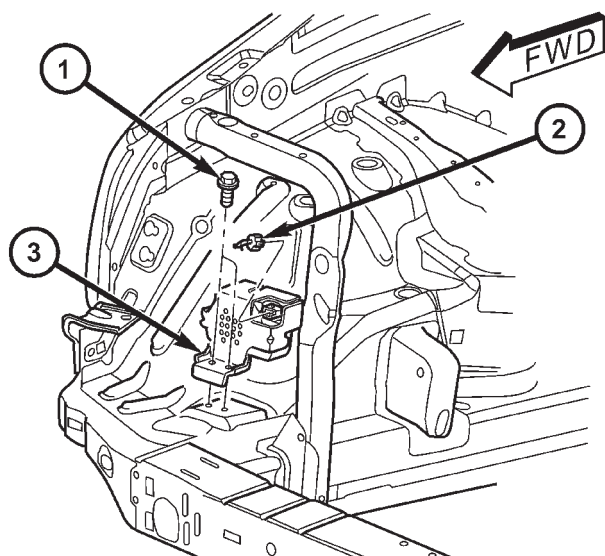
REMOVAL

- (1) Disconnect and isolate the battery negative cable.
- (2) Disconnect the headlamp and dash wire harness connector for the alarm siren module from the module connector receptacle (Fig. 14).
- (3) Remove the two screws that secure the alarm siren module to the front extension of the right front wheel house panel.
- (4) Remove the alarm siren module from the front extension of the right front wheel house panel.

INSTALLATION

- (1) Position the alarm siren module onto the front extension of the right front wheel house panel (Fig. 14).

SIREN (Continued)



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Fig. 14 Siren Remove/Install

- 1 - SCREW (2)
- 2 - WIRE HARNESS CONNECTOR
- 3 - SIREN

(2) Install and tighten the two screws that secure the alarm siren module to the front extension of the right front wheel house panel. Tighten the screws to 6 N·m (50 in. lbs.).

(3) Reconnect the headlamp and dash wire harness connector for the alarm siren module to the module connector receptacle.

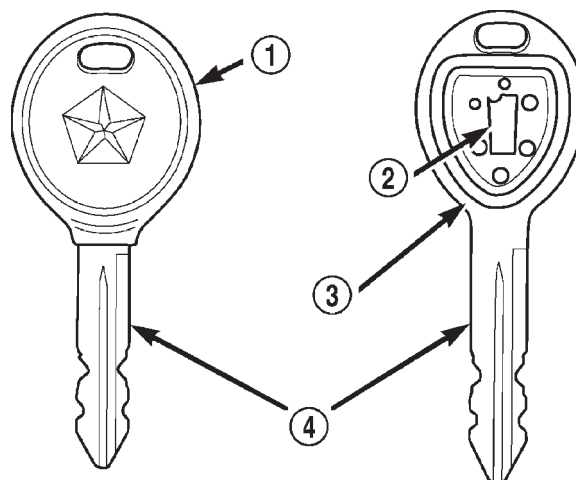
(4) Reconnect the battery negative cable.

NOTE: If the alarm siren module has been replaced with a new unit, the new unit **MUST** be configured in the Intrusion Transceiver Module (ITM) before the Vehicle Theft Security System can operate as designed. The use of a DRBIII® scan tool is required to configure the alarm siren module settings in the ITM. Refer to the appropriate diagnostic information.

TRANSPONDER KEY

DESCRIPTION

Each ignition key used in the Sentry Key Immobilizer System (SKIS) has an integral transponder chip (Fig. 15). Ignition keys with this feature can be readily identified by a gray rubber cap molded onto the head of the key, while conventional ignition keys have a black molded rubber cap. The transponder



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Fig. 15 Sentry Key Immobilizer Transponder

- 1 - MOLDED CAP
- 2 - TRANSPONDER CHIP
- 3 - MOLDED CAP REMOVED
- 4 - TRANSPONDER KEY

chip is concealed beneath the molded rubber cap, where it is molded within a plastic mount into the head of the metal key. In addition to being cut to match the mechanical coding of the ignition lock cylinder, each new Sentry Key has a unique transponder identification code permanently programmed into it by the manufacturer. The Sentry Key transponder cannot be adjusted or repaired. If faulty or damaged, the entire key must be replaced.

OPERATION

When the ignition switch is turned to the On position, the Sentry Key Immobilizer Module (SKIM) communicates through its antenna with the Sentry Key transponder using a Radio Frequency (RF) signal. The SKIM then listens for a RF response from the transponder through the same antenna. The Sentry Key transponder chip is within the range of the SKIM transceiver antenna ring when it is inserted into the ignition lock cylinder. The SKIM determines whether a valid key is present in the ignition lock cylinder based upon the response from the transponder. If a valid key is detected, that fact is communicated by the SKIM to the Powertrain Control Module (PCM) over the Programmable Communications Interface (PCI) data bus, and the PCM allows the engine to continue running. If the PCM receives an invalid key message, or receives no message from the SKIM over the PCI data bus, the engine will be disabled after about two seconds of operation. The ElectroMechanical Instrument Cluster (EMIC) will also respond to the invalid key message on the PCI data bus by flashing the SKIS indicator on and off.

TRANSPONDER KEY (Continued)

Each Sentry Key has a unique transponder identification code permanently programmed into it by the manufacturer. Likewise, the SKIM has a unique Secret Key code programmed into it by the manufacturer. When a Sentry Key is programmed into the memory of the SKIM, the SKIM stores the transponder identification code from the Sentry Key, and the Sentry Key learns the Secret Key code from the SKIM. Once the Sentry Key learns the Secret Key code of the SKIM, 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 8 -

ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE - TRANSPONDER PROGRAMMING).

The SKIS performs a self-test each time the ignition switch is turned to the On position, and will store key-related fault information in the form of Diagnostic Trouble Codes (DTC's) in SKIM memory if a Sentry Key transponder problem is detected. The Sentry Key transponder chip can be diagnosed, and any stored DTC's can be retrieved using a DRBIII® scan tool. Refer to the appropriate diagnostic information.

WIPERS/WASHERS

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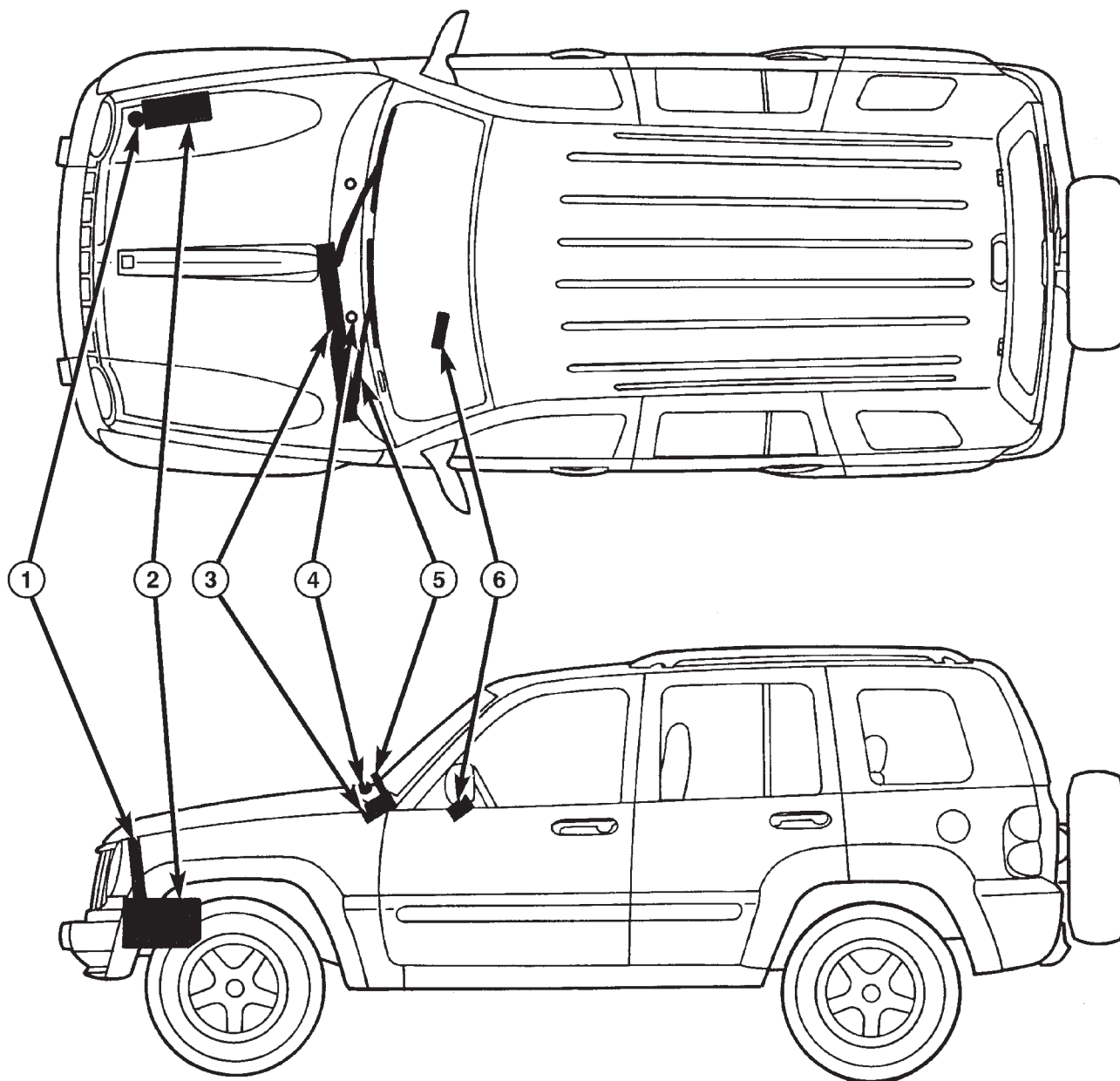
FRONT WIPERS/WASHERS

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FRONT WIPERS/WASHERS

DESCRIPTION



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Fig. 1 Front Wiper & Washer System

- 1 - WASHER RESEVOIR FILLER TUBE
- 2 - WASHER RESERVOIR, PUMP/MOTOR, FLUID LEVEL SWITCH
- 3 - WIPER MODULE
- 4 - WASHER NOZZLE (2)

- 5 - WIPER ARM & BLADE (2)
- 6 - MULTI-FUNCTION SWITCH RIGHT (WIPER) CONTROL STALK

FRONT WIPERS/WASHERS (Continued)

An electrically operated intermittent front wiper and washer system is standard factory-installed safety equipment on this model (Fig. 1). The front wiper and washer 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 on the Junction Block (JB) under the driver side outboard end of the instrument panel. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/BODY CONTROL MODULE - DESCRIPTION).

- **Front Check Valve** - The front washer system check valve is integral to the wye fitting located in the washer plumbing between the cowl plenum washer hose and the front washer nozzles, and is concealed beneath the cowl plenum cover/grille panel at the base of the windshield.

- **Front Washer Nozzle** - Two fluidic front washer nozzles are secured with integral snap features to dedicated openings in the cowl plenum cover/grille panel located near the base of the windshield.

- **Front Washer Plumbing** - The plumbing for the front washer system consists of rubber hoses and molded plastic fittings. The plumbing is routed along the right side of the engine compartment from the washer reservoir, and through the dash panel into the cowl plenum to the front washer nozzle fittings beneath the cowl plenum cover/grille panel.

- **Front Wiper Arm** - The two front wiper arms are secured with nuts to the threaded studs on the ends of the two wiper pivot shafts, which extend through the cowl plenum cover/grille panel located near the base of the windshield.

- **Front Wiper Blade** - The two front wiper blades are secured to the two front wiper arms 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.

- **Front Wiper Module** - The front wiper pivot shafts are the only visible components of the front wiper module. The remainder of the module is concealed within the cowl plenum area beneath the cowl plenum cover/grille panel. The front wiper module includes the wiper module bracket, four rubber-isolated wiper module mounts, the front wiper motor, the wiper motor crank arm, the two wiper drive links, and the two front wiper pivots.

- **Multi-Function Switch** - The multi-function switch is located on the top of the steering column, just below the steering wheel. The multi-function switch includes a left (lighting) control stalk and a right (wiper) control stalk. The right control stalk is dedicated to providing all of the driver controls for both the front and rear wiper systems. (Refer to 8 -

ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/MULTI-FUNCTION SWITCH - DESCRIPTION).

- **Washer Fluid Level Switch** - The washer fluid level switch is located in a dedicated hole near the center of the rearward facing surface of the washer reservoir, behind the right front wheel house splash shield.

- **Washer Pump/Motor** - The reversible electric washer pump/motor unit is located in a dedicated hole on the lower outboard side of the washer reservoir, behind the right front wheel house splash shield. This single reversible washer pump/motor provides washer fluid to either the front or rear washer system plumbing, depending upon the direction of the pump motor rotation.

- **Washer Reservoir** - The washer reservoir is concealed behind the right front wheel house splash shield ahead of the right front wheel. The washer reservoir filler neck is the only visible portion of the reservoir, and it is accessed from the right front corner of the engine compartment.

- **Wiper High-Low Relay** - The wiper high-low relay is an International Standards Organization (ISO) micro relay located in the Power Distribution Center (PDC) in the engine compartment near the battery.

- **Wiper On-Off Relay** - The wiper on-off relay is an International Standards Organization (ISO) micro relay located in the Power Distribution Center (PDC) in the engine compartment near the battery.

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.

OPERATING MODES The components of the front wiper and washer system are designed to work in concert to provide the following operating modes:

- **Continuous Wipe Mode** - The control knob on the right (wiper) control stalk of the multi-function switch has two continuous wipe positions, Low and High. When selected, these switch positions will cause the two-speed front wiper motor to operate in a continuous low or high speed cycle.

FRONT WIPERS/WASHERS (Continued)

- **Intermittent Wipe Mode** - The control knob on the right (wiper) control stalk of the multi-function switch has five minor detent intermittent wipe positions. When selected, these switch positions will cause the front wiper system to operate with one of five delay intervals between complete wipe cycles.

- **Mist Wipe Mode** - The right (wiper) control stalk of the multi-function switch has a momentary Mist position. When selected, this switch position will operate the front wipers in a low speed continuous cycle for as long as the switch is held closed, then will complete the current wipe cycle and park the front wiper blades near the base of the windshield when the switch is released.

- **Washer Mode** - When the momentary front wash position of the right (wiper) control stalk of the multi-function switch is selected with the front wiper system operating in a continuous wipe mode, washer fluid will be dispensed onto the windshield glass through the washer nozzles for as long as the washer switch is held closed. When the front washer switch is actuated with the front wiper system operating in an intermittent wipe mode, washer fluid is still dispensed until the switch is released; however, the front wipers will operate in a low speed continuous cycle from the time the washer switch is closed until several wipe cycles after the switch is released, before returning to the selected intermittent wipe mode.

- **Wipe-After-Wash Mode** - When the momentary front wash position of the right (wiper) control stalk of the multi-function switch is selected with the front wiper system turned Off, the internal circuitry of the BCM provides a wipe-after-wash feature. When selected, this feature will operate the washer pump/motor and the front wipers for as long as the front washer switch is held closed, then provide several additional wipe cycles after the switch is released before parking the front wiper blades near the base of the windshield.

OPERATION

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 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 outside windshield glass surface that might be encountered while driving the vehicle under numerous types of inclement operating conditions.

The vehicle operator initiates all front wiper and washer system functions with the right (wiper) control stalk of the multi-function 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, 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 five intermittent wipe Delay intervals. Pulling the right control stalk downwards actuates the momentary front wiper system Mist mode switch, while pulling the right control stalk towards the steering wheel actuates the momentary front washer system switch. The multi-function switch provides hard wired resistor multiplexed inputs to the Body Control Module (BCM) for all of the front wiper system functions, as well as a separate hard wired sense input to the BCM for the front washer system function.

The front wiper and washer system will only operate when the ignition switch is in the Accessory or On positions. Battery current is directed from a B(+) fuse in the Power Distribution Center (PDC) to the wiper and washer system circuit breaker in the Junction Block (JB) through a fused ignition switch output (run-acc) circuit. The automatic resetting circuit breaker then provides battery current through a fused ignition switch output (run-acc) circuit to the wiper high/low relay, the wiper on/off relay, and the park switch within the front wiper motor. A separate fuse in the JB provides battery current through another fused ignition switch output (run-acc) circuit to the multi-function switch. The multi-function switch circuitry uses this battery feed and a ground circuit input to directly control the operation and direction of the reversible electric washer pump/motor unit. The BCM uses low side drivers to control front wiper system operation by energizing or de-energizing the wiper high/low and wiper on/off relays.

The hard wired circuits and components of the front wiper and washer system may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the Body Control Module (BCM), or the inputs to or outputs from the BCM that control the front wiper and washer system operating modes. The most reliable, efficient, and accurate means to diagnose the BCM, or the BCM inputs and outputs related to the various front wiper and washer system operating modes requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

FRONT WIPERS/WASHERS (Continued)

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 right (wiper) control stalk of the multi-function switch is selected, the Body Control Module (BCM) energizes the wiper on/off relay. This directs battery current through the normally open contacts of the energized wiper on/off relay and the normally closed contacts of the de-energized wiper high/low relay to the low speed brush of the front wiper motor, causing the front wipers to cycle at low speed. When the High position of the control knob is selected, the BCM energizes both the wiper on/off relay and the wiper high/low relay. This directs battery current through the normally open contacts of the energized wiper on/off relay and the normally open contacts of the energized wiper high/low relay to the high speed brush of the front wiper motor, causing the front wipers to cycle at high speed.

When the Off position of the control knob is selected, the BCM de-energizes both the wiper on/off and wiper high low relays, 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 front wiper motor is closed to ground 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 closed to battery current from the fused ignition switch output (run-acc) circuit of the front wiper motor. The park switch directs this battery current to the low speed brush of the wiper motor through the wiper park switch sense circuit and the normally closed contacts of the de-energized wiper on/off and wiper high/low relays. This causes the wiper motor to continue running at low speed until the wiper blades are in the down position on the windshield and the park switch is again closed to ground.

INTERMITTENT WIPE MODE When the control knob on the right (wiper) control stalk of the multi-function switch is moved to one of the Delay interval positions, 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 front wiper park switch sense circuit input. This input allows the BCM to determine the proper intervals at which to energize and de-energize the wiper on/off relay to operate the front wiper

motor intermittently for one low speed cycle at a time. The BCM logic is also programmed to provide an immediate wipe cycle and begin a new delay interval timing cycle each time a shorter delay interval is selected, and to add the remaining delay timing interval to the new delay interval timing before the next wipe cycle occurs each time a longer delay interval is selected.

MIST WIPE MODE When the right (wiper) control stalk of the multi-function switch is moved to the momentary Mist position, the BCM energizes the wiper on/off relay for as long as the Mist switch is held closed, then de-energizes the relay when the state of the Mist switch input changes to open. The BCM can operate the front 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 Mist switch is held closed.

WASH MODE When the right (wiper) control stalk of the multi-function switch is moved to the momentary front Wash position while the control knob is in the Low or High positions, the circuitry within the switch directs battery current and ground to the washer pump/motor unit. This will cause the washer pump/motor unit to be energized for as long as the front Wash switch is held closed, and to de-energize when the front Wash switch is released. When the right (wiper) control stalk of the multi-function switch is moved to the momentary front Wash position while the control knob is in one of the Delay interval positions, the front washer pump/motor operation is the same. However, the BCM energizes the wiper on/off relay to override the selected delay interval and operate the front wiper motor in a continuous low speed mode for as long as the front Wash switch is held closed, then de-energizes the relay and reverts to the selected delay mode interval several wipe cycles after the front Wash switch is released. The BCM detects the front Wash switch state through a hard wired washer pump driver circuit input from the multi-function switch.

WIPE-AFTER-WASH MODE When the right (wiper) control stalk of the multi-function switch is moved to the momentary front Wash position while the control knob is in the Off position, the BCM detects that switch state through a hard wired washer pump driver circuit input from the multi-function switch. The BCM responds to this input by energizing the wiper on/off relay for as long as the Wash switch is held closed, then de-energizes the relay several wipe cycles after the front Wash switch is released. The BCM monitors the changing state of the wiper motor park switch through a hard wired front wiper park switch sense circuit input. This input allows the BCM to count the number of wipe

FRONT WIPERS/WASHERS (Continued)

cycles that occur after the front Wash switch state changes to open, and to determine the proper interval at which to de-energize the wiper on/off relay to complete the wipe-after-wash mode cycle.

DIAGNOSIS AND TESTING - FRONT WIPER & WASHER SYSTEM**FRONT WIPER SYSTEM**

If the front wiper motor operates, but the wipers do not move on the windshield, replace the faulty front wiper module. If the wipers operate, but chatter, lift, or do not clear the glass, clean and inspect the front wiper system components as required. (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS - INSPECTION) and (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS - CLEANING). For diagnosis and testing of the multi-function switch (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/MULTI-FUNCTION SWITCH - DIAGNOSIS AND TESTING). 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.

The hard wired circuits and components of the front wiper and washer system may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the Body Control Module (BCM), or the inputs to or outputs from the BCM that control the various front wiper and washer system operating modes. The most reliable, efficient, and accurate means to diagnose the BCM, or the BCM inputs and outputs related to the various front wiper and washer system operating modes requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD

RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

FRONT WASHER SYSTEM

The diagnosis found here addresses an electrically inoperative front washer system. If the washer pump/motor operates, but no washer fluid is emitted from the front washer nozzles, be certain to check the fluid level in the reservoir. Also inspect the front washer system components as required. (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS - INSPECTION). 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.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Turn the ignition switch to the On position. Turn the control knob on the right (wiper) control stalk of the multi-function switch to the On position. Check whether the front wiper system is operating. If OK, go to Step 2. If not OK, test and repair the front wiper system before continuing with these tests. Refer to FRONT WIPER SYSTEM .

(2) Turn the control ring on the right (wiper) control stalk of the multi-function switch to the rear Wash position. Check whether the rear washer system is operating. If OK, test the multi-function switch. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/MULTI-FUNCTION SWITCH - DIAGNOSIS AND TESTING). If the multi-function switch tests OK, go to Step 3. If the multi-function switch does not test OK, replace the faulty switch.

(3) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Disconnect the headlamp and dash wire harness connector for the washer pump/motor unit from the pump/motor unit connector receptacle. Check for continuity between the washer pump driver circuit cavity

FRONT WIPERS/WASHERS (Continued)

ity of the headlamp and dash wire harness connector for the washer pump/motor unit and a good ground. There should be no continuity. If OK, go to Step 4. If not OK, repair the shorted washer pump driver circuit between the washer pump/motor unit and the multi-function switch as required.

(4) Check for continuity between the washer pump driver circuit cavities of the headlamp and dash wire harness connector for the washer pump/motor unit and the instrument panel wire harness connector for the multi-function switch (Connector C-2). There should be continuity. If OK, go to Step 5. If not OK, repair the open washer pump driver circuit between the washer pump/motor unit and the multi-function switch as required.

(5) Check for continuity between the washer pump sense circuit cavity of the headlamp and dash wire harness connector for the washer pump/motor unit and a good ground. There should be no continuity. If OK, go to Step 6. If not OK, repair the shorted washer pump sense circuit between the washer pump/motor unit and the multi-function switch as required.

(6) Check for continuity between the washer pump sense circuit cavities of the headlamp and dash wire harness connector for the washer pump/motor unit and the instrument panel wire harness connector for the multi-function switch (Connector C-2). There should be continuity. If OK, replace the faulty washer pump/motor unit. If not OK, repair the open washer pump sense circuit between the washer pump/motor unit and the multi-function switch as required.

CLEANING - FRONT WIPER & WASHER SYSTEM

FRONT WIPER SYSTEM

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.

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.

FRONT WASHER SYSTEM

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 hoses from the washer nozzles, then running the washer pump/motor to run clean washer fluid or water through the system. Plugged or restricted washer nozzles should be carefully back-flushed using compressed air. If the washer nozzle obstruction cannot be cleared, replace the washer nozzle.

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.

INSPECTION - FRONT WIPER & WASHER SYSTEM

FRONT WIPER SYSTEM

The front 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) Inspect the wiper arms for any indications of damage, or contamination. If the wiper arms are contaminated with any foreign material, clean them as required. (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS - CLEANING). If a wiper arm is damaged or corrosion is evident, replace the wiper arm with a new unit. Do not attempt to repair a wiper arm 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.

FRONT WIPERS/WASHERS (Continued)

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. 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.

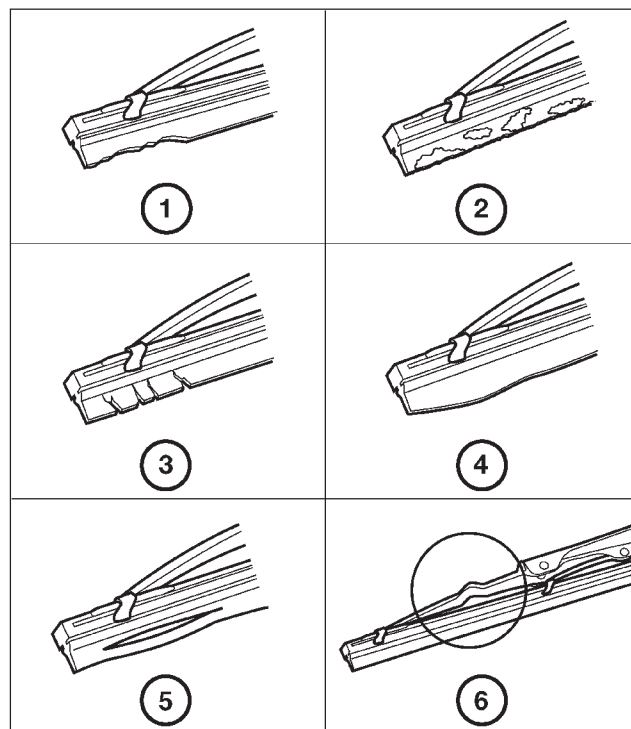
(4) Inspect the wiper blades and squeegees for any indications of damage, contamination, or rubber deterioration (Fig. 2). If the wiper blades or squeegees are contaminated with any foreign material, clean them and the glass as required. (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS - CLEANING). After cleaning the wiper blade and the glass, if the wiper blade still fails to clear the glass without smearing, streaking, chattering, hazing, or beading, replace the wiper blade. Also, if a wiper blade is damaged or the squeegee rubber is damaged or deteriorated, replace the wiper blade with a new unit. Do not attempt to repair a wiper blade that is damaged.

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 8 - ELECTRICAL/FRONT WIPERS/WASHERS - 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.



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Fig. 2 Wiper Blade Inspection

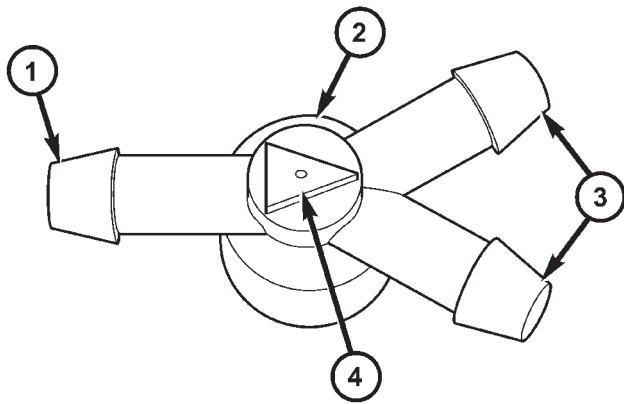
- 1 - WORN OR UNEVEN EDGES
- 2 - ROAD FILM OR FOREIGN MATERIAL DEPOSITS
- 3 - HARD, BRITTLE, OR CRACKED
- 4 - DEFORMED OR FATIGUED
- 5 - SPLIT
- 6 - DAMAGED SUPPORT COMPONENTS

FRONT CHECK VALVE

DESCRIPTION

A front washer system check valve (Fig. 3) is standard equipment on this model. The front check valve is integral to the front washer nozzle plumbing wye fitting located in the cowl plenum area beneath on the back of the cowl plenum cover/grille panel near the base of the windshield. The check valve consists of a molded plastic body with a round center section. An arrow formation molded into the center section of the valve body indicates the direction of flow through the valve. Three barbed hose nipples are formed in a wye configuration on the outside circumference of the center section of the valve body. The front check valve cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

FRONT CHECK VALVE (Continued)



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Fig. 3 Front Check Valve

- 1 - INLET NIPPLE
- 2 - FRONT CHECK VALVE
- 3 - OUTLET NIPPLE (2)
- 4 - FLOW DIRECTION ARROW

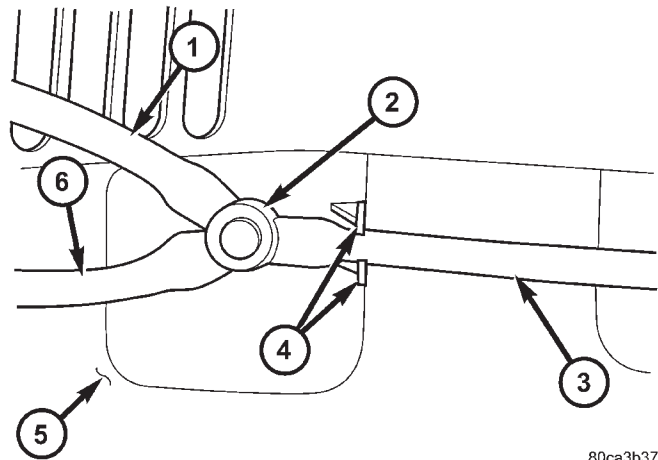
OPERATION

The front check valve provides more than one function in this application. It serves as a wye connector fitting between the cowl grille panel and washer nozzle sections of the front washer supply hose. It also prevents washer fluid from draining out of the front washer supply hoses back to the washer reservoir. This drain-back would result in a lengthy delay when the front washer switch is actuated until washer fluid was dispensed through the front washer nozzles, because the washer pump would have to refill the front washer plumbing from the reservoir to the nozzles. Finally, the front check valve prevents washer fluid from siphoning through the front washer nozzles after the front washer system is turned Off.

Within the check valve body, a small check valve is held in place against a seat by a small coiled spring to restrict flow through the unit until the valve is unseated by a predetermined inlet fluid pressure. When the washer pump pressurizes and pumps washer fluid from the reservoir through the front washer plumbing, the fluid pressure overrides the spring pressure applied to the check valve and unseats the valve, allowing washer fluid to flow toward the front washer nozzles. When the washer pump stops operating, spring pressure seats the check valve and fluid flow in either direction within the front washer plumbing is prevented.

REMOVAL

- (1) Unlatch and open the hood.
- (2) Remove both front wiper arms from the wiper pivots. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - FRONT/FRONT WIPER ARM - REMOVAL).
- (3) Remove the cowl plenum cover/grille panel from over the cowl plenum. (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - REMOVAL).
- (4) From the underside of the cowl plenum cover/grille panel, disconnect the cowl plenum and washer nozzle hoses from the three barbed nipples of the front check valve (Fig. 4).



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Fig. 4 Front Check Valve Remove/Install

- 1 - WASHER NOZZLE HOSE (RIGHT)
- 2 - FRONT CHECK VALVE
- 3 - COWL PLENUM WASHER HOSE
- 4 - ROUTING CLIP
- 5 - COWL GRILLE COVER (UNDERSIDE)
- 6 - WASHER NOZZLE HOSE (LEFT)

- (5) Remove the front check valve from the underside of the cowl plenum cover/grille panel.

INSTALLATION

(1) Position the front check valve to the underside of the cowl plenum cover/grille panel (Fig. 4). Be certain that the flow direction arrow molded into the front check valve body is oriented towards the front washer nozzles.

(2) From the underside of the cowl plenum cover/grille panel, reconnect the cowl plenum and washer nozzle hoses to the three barbed nipples of the front check valve.

(3) Reinstall the cowl plenum cover/grille panel over the cowl plenum. (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - INSTALLATION).

(4) Reinstall both front wiper arms onto the wiper pivots. (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS/FRONT WIPER ARM - INSTALLATION).

- (5) Close and latch the hood.

FRONT WASHER HOSES/ TUBES

DESCRIPTION

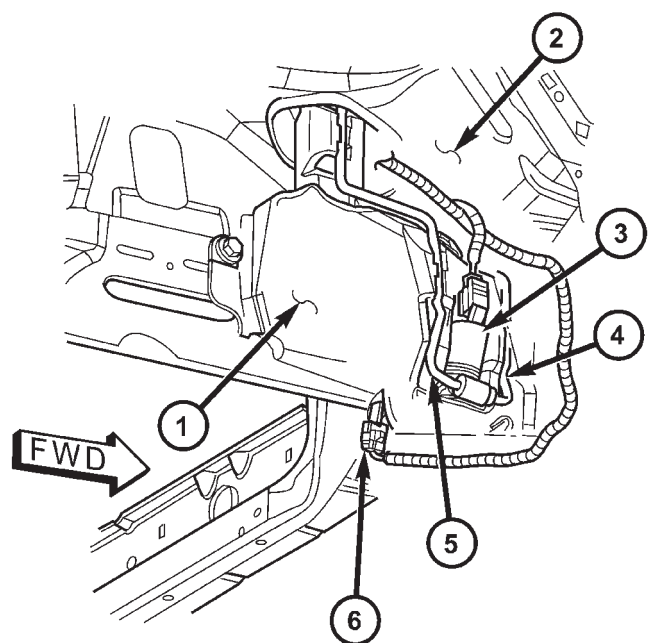
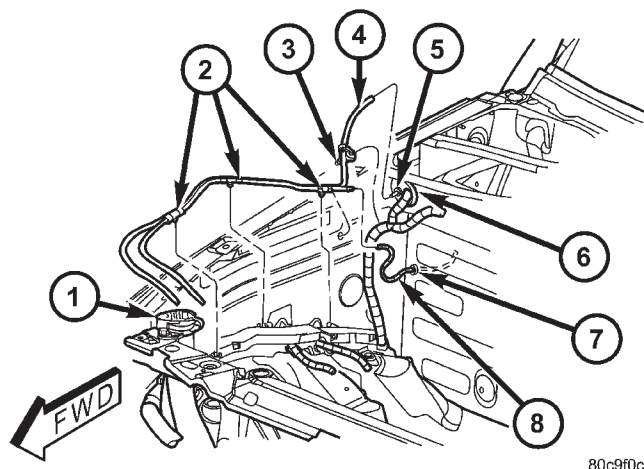


Fig. 5 Reservoir Washer Hose

- 1 - WASHER RESERVOIR
- 2 - RIGHT FRONT WHEEL HOUSE
- 3 - WASHER PUMP
- 4 - FRONT WASHER HOSE
- 5 - RESERVOIR REAR WASHER HOSE
- 6 - WASHER FLUID LEVEL SWITCH

The front washer plumbing consists of a small diameter rubber hose that is routed from the barbed outlet nipple of the reversible electric washer pump/motor unit on the washer reservoir through a trough molded into the reservoir forward of the washer pump and along the reservoir filler neck into the engine compartment (Fig. 5). Within the engine compartment, the front washer hose is routed side by side with the engine compartment rear washer hose along the top of the right front fender wheel house to the dash panel. Molded plastic routing clips secure the hoses to the headlamp and dash wire harness in the engine compartment (Fig. 6).

The front washer hose is connected in the engine compartment to the barbed nipple of a molded plastic in-line fitting installed through a rubber grommet in a hole in the right side of the dash plenum panel. The barbed nipple of the in-line fitting protrudes through the other side of the rubber grommet into the cowl plenum area, where the cowl plenum washer hose joins the front washer hose to the front



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Fig. 6 Engine Compartment Washer Hose

- 1 - RESERVOIR FILLER CAP
- 2 - ROUTING CLIP (3)
- 3 - ROUTING CLIP (1)
- 4 - FRONT WASHER HOSE
- 5 - IN-LINE HOSE FITTING
- 6 - PLENUM PANEL GROMMET
- 7 - DASH PANEL GROMMET
- 8 - REAR WASHER HEADLINER HOSE

check valve/wye fitting. The cowl plenum washer hose is routed through integral routing clips on the underside of the cowl plenum cover/grille panel to the molded plastic wye fitting. The cowl plenum washer hose is connected to one nipple on the wye fitting and the two washer nozzle hoses are connected to the other two wye fitting nipples. The washer nozzle hoses are then routed along the underside of the cowl plenum cover/grille panel to the two front washer nozzles.

Washer hose is available for service only as roll stock, which must then be cut to length. The molded plastic washer hose fittings cannot be repaired. If these fittings are faulty or damaged, they must be replaced.

OPERATION

Washer fluid in the washer reservoir is pressurized and fed by the washer pump/motor through the front washer system plumbing and fittings to the two front washer nozzles. Whenever routing the washer hose or a wire harness containing a washer hose, it must be routed away from hot, sharp, or moving parts; and, sharp bends that might pinch the hose must be avoided.

FRONT WASHER NOZZLE

DESCRIPTION

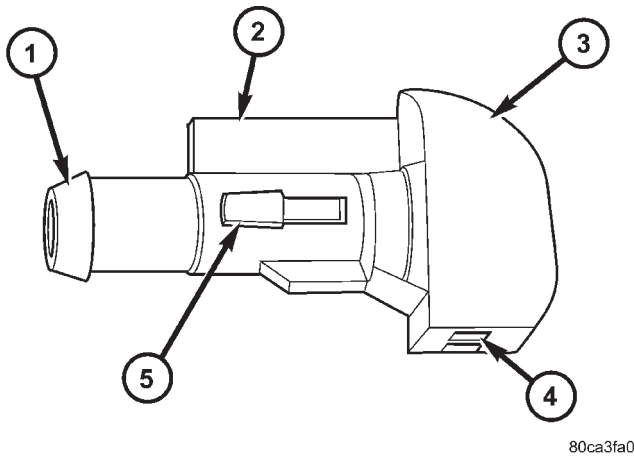


Fig. 7 Front Washer Nozzle

- 1 - NIPPLE
- 2 - ANTI-ROTATION TAB
- 3 - FRONT WASHER NOZZLE
- 4 - ORIFICE
- 5 - LATCH (2)

The two front washer nozzles have integral snap features and an anti-rotation tab that secure them in dedicated holes in the cowl plenum cover/grille panel located near the base of the windshield (Fig. 7). The domed upper surface of the washer nozzle is visible on the top of the plenum cover/grille panel, and the nozzle orifice is oriented towards the windshield glass. The washer plumbing fittings for the washer nozzles are concealed beneath the cowl plenum cover/grille panel. These fluidic washer nozzles are constructed of molded plastic. The cowl plenum cover/grille panel must be removed from the vehicle to access the nozzles for service. The washer nozzles cannot be adjusted or repaired. If faulty or damaged, they must be replaced.

OPERATION

The two front washer nozzles are designed to disperse 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 hose, which is attached to a barbed nipple on each front washer nozzle below the cowl plenum cover/grille panel. The washer nozzles incorporate a fluidic design, which causes the nozzle to emit the pressurized washer fluid as an oscillating stream to more effectively cover a larger area of the glass area to be cleaned.

REMOVAL

- (1) Unlatch and open the hood.
- (2) Remove both front wiper arms from the wiper pivots. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/FRONT WIPER ARM - REMOVAL).
- (3) Remove the cowl plenum cover/grille panel from over the cowl plenum. (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - REMOVAL).
- (4) From the underside of the cowl plenum cover/grille panel, disconnect the washer nozzle hose from the barbed nipple of the front washer nozzle (Fig. 8).
- (5) From the underside of the cowl grille cover, release the integral snap features of the front washer nozzle and push the nozzle out through the mounting hole toward the top side of the cowl plenum cover/grille panel.

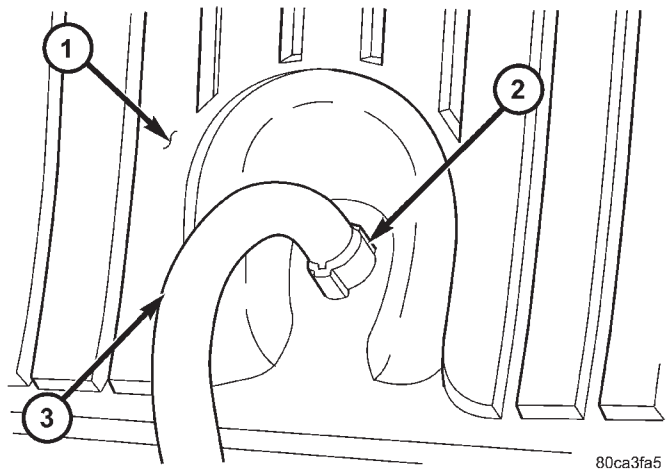


Fig. 8 Front Washer Nozzle Remove/Install

- 1 - COWL GRILLE COVER (UNDERSIDE)
- 2 - FRONT WASHER NOZZLE
- 3 - WASHER NOZZLE HOSE

- (6) Remove the front washer nozzle from the top of the cowl plenum cover/grille panel.

INSTALLATION

- (1) From the top of the cowl plenum cover/grille panel, position the nipple end of the front washer nozzle through the mounting hole and engage the anti-rotation tab of the nipple into the anti-rotation notch in the mounting hole.
- (2) Push firmly and evenly on the top of the front washer nozzle until the integral snap features lock into place on the underside of the cowl plenum cover/grille panel.
- (3) From the underside of the cowl grille cover, reconnect the washer hose to the barbed nipple of the front washer nozzle (Fig. 8).
- (4) Reinstall the washer hose for the front washer nozzle into its routing clips on the underside of the cowl plenum cover/grille panel.

FRONT WASHER NOZZLE (Continued)

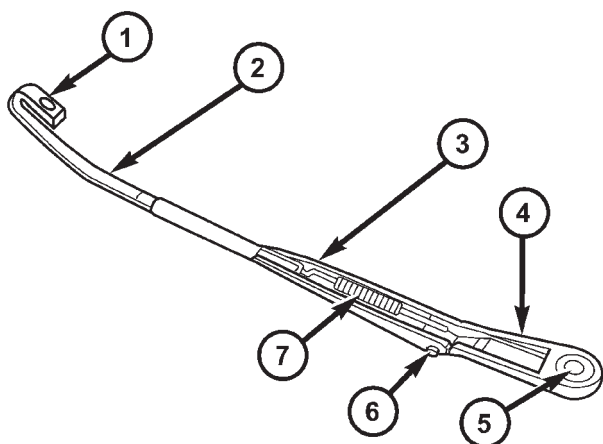
(5) Reinstall the cowl plenum cover/grille panel over the cowl plenum. (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - INSTALLATION).

(6) Reinstall both front wiper arms onto the wiper pivots. (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS/FRONT WIPER ARM - INSTALLATION).

(7) Close and latch the hood.

FRONT WIPER ARM

DESCRIPTION



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Fig. 9 Front Wiper Arm

- 1 - HOOK
- 2 - STRAP
- 3 - CHANNEL
- 4 - PIVOT END
- 5 - PIVOT HOLE
- 6 - HINGE PIN
- 7 - TENSION SPRING

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 (Fig. 9). These wiper arms feature an over-center hinge that allows easy access to the windshield glass for cleaning. The wiper arm has a die cast metal pivot end with a large tapered mounting hole at one end. A molded black plastic cap fits over the wiper arm retaining nut to conceal the nut and this mounting hole following wiper arm installation. The wide end of a tapered, stamped steel channel hinges on and is secured with a hinge pin to the blade end of the wiper arm pivot end. One end of a long, rigid, stamped steel strap, with a small hole near its pivot end, 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. Concealed within the stamped steel channel, one end of a long spring is engaged with a wire hook on the underside of the die

cast pivot end, while the other end of the spring is hooked through the small hole in the steel strap. The entire wiper arm has a satin black finish applied to all of its visible surfaces.

A wiper arm cannot be adjusted or repaired. If damaged or faulty, the entire wiper arm unit must be replaced.

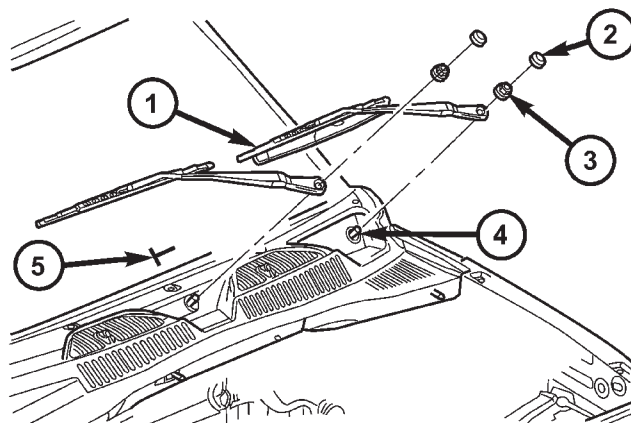
OPERATION

The front wiper arms are designed to mechanically transmit the motion from the wiper pivots to the wiper blades. The 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 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 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.

REMOVAL

(1) 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 wiper pivot shaft connection.

(2) Carefully pry the plastic nut cap off of the pivot end of the wiper arm (Fig. 10).



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Fig. 10 Front Wiper Arm Remove/Install

- 1 - FRONT WIPER BLADE & ARM (2)
- 2 - CAP (2)
- 3 - NUT (2)
- 4 - PIVOT SHAFT (2)
- 5 - T-SHAPED ALIGNMENT MARK (2)

(3) Remove the nut that secures the wiper arm to the wiper pivot shaft.

FRONT WIPER ARM (Continued)

(4) If necessary, use a suitable battery terminal puller to disengage the wiper arm from the wiper pivot shaft (Fig. 11).

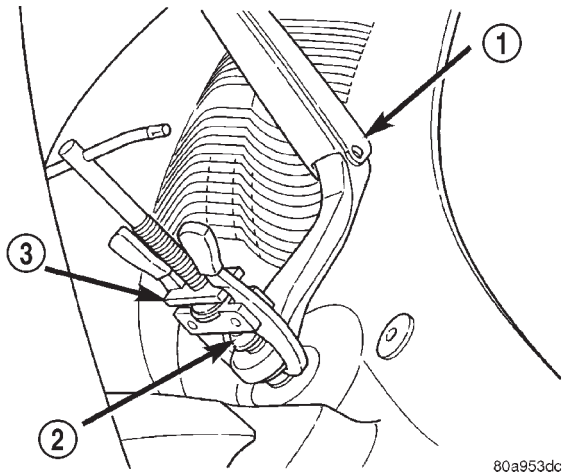


Fig. 11 Wiper Arm Puller - Typical

- 1 - WIPER ARM
- 2 - WIPER PIVOT SHAFT
- 3 - BATTERY TERMINAL PULLER

(5) Remove the front wiper arm pivot end from the wiper pivot shaft.

INSTALLATION

NOTE: Be certain that the wiper motor is in the park position before attempting to install the front wiper arms. Turn the ignition switch to the On position and move the control knob on the right (wiper) control stalk of the multi-function switch to its Off position. If the wiper pivots move, wait until they stop moving, then turn the ignition switch back to the Off position. The wiper motor is now in its park position.

(1) The front wiper arms must be indexed to the wiper pivot shafts with the wiper motor in the park position to be properly installed. Position the front wiper arm pivot ends onto the wiper pivot shafts so that the tip of the wiper blade is aligned with the T-shaped wiper alignment lines located in the lower edge of the windshield glass (Fig. 10).

(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 hole on the end of the wiper arm down firmly and evenly over the wiper pivot shaft.

(3) Install and tighten the nut that secures the wiper arm to the wiper pivot shaft. Tighten the nut to 24 N·m (18 ft. lbs.).

(4) Wet the windshield glass, then operate the front wipers. Turn the front wipers Off, then check

for the correct wiper arm position and readjust as required.

(5) Reinstall the plastic nut cap onto the wiper arm pivot nut.

FRONT WIPER BLADE

DESCRIPTION

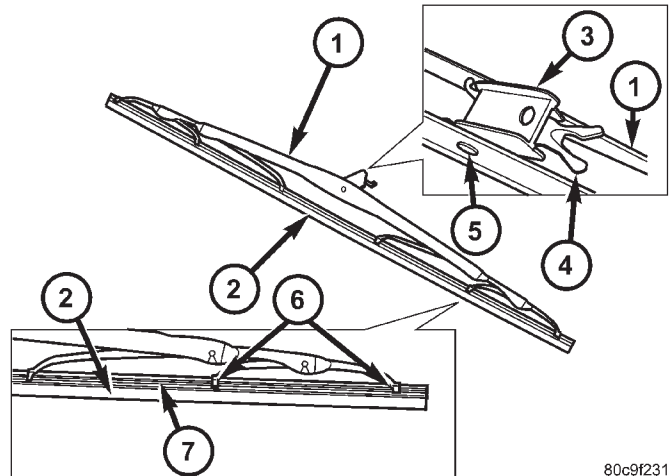


Fig. 12 Front Wiper Blade

- 1 - SUPERSTRUCTURE
- 2 - ELEMENT
- 3 - PIVOT BLOCK
- 4 - RELEASE TAB
- 5 - PIVOT PIN
- 6 - CLAWS
- 7 - FLEXOR

Each front wiper blade is secured by an integral latching pivot block to the hook formation on the tip of the front wiper arms, and rests on the glass near the base of the windshield when the wipers are not in operation (Fig. 12). The wiper blade consists of the following components:

- **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. The driver side front wiper blade has an additional molded black plastic airfoil secured to the superstructure, which is oriented toward the base of the windshield when the front wipers are in their parked position. All of the metal components of the wiper blade have a satin black finish applied.

- **Element** - 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

FRONT WIPER BLADE (Continued)

element where it is gripped by the claws of the superstructure.

All models have two 47.50 centimeter (18.70 inch) long front wiper blades with non-replaceable rubber elements (squeegees). The wiper blades cannot be adjusted or repaired. If faulty, worn, or damaged the entire wiper blade unit must be replaced.

OPERATION

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 resilient enough to conform to the glass surface and flip from one cleaning edge to the other each time the wiper blade changes directions. The airfoil used on the driver side wiper blade is designed to reduce the lifting effect caused by air moving over the vehicle at higher highway speeds.

REMOVAL

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 front wiper arm to raise the wiper blade and element off of the glass, until the wiper arm hinge is in its over-center position.

(2) To remove the wiper blade from the wiper arm, depress the pivot block latch release tab under the tip of the arm and 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 (Fig. 13).

(3) Extract the hook formation on the tip of the wiper arm through the opening in the wiper blade superstructure just ahead of the wiper blade pivot block/latch unit.

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.

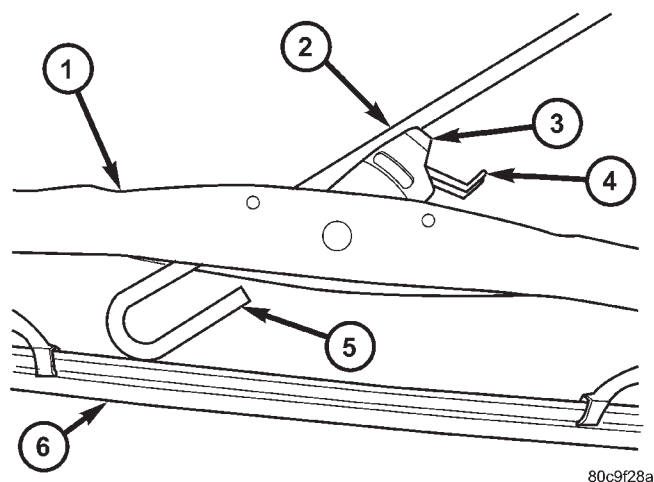


Fig. 13 Front Wiper Blade Remove/Install

- 1 - SUPERSTRUCTURE
- 2 - WIPER ARM
- 3 - PIVOT BLOCK
- 4 - RELEASE TAB
- 5 - HOOK
- 6 - ELEMENT

(4) Gently lower the tip of the wiper arm onto the glass.

INSTALLATION

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 front wiper arm off of the windshield glass, until the wiper arm hinge is in its over-center position.

(2) Position the front wiper blade 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.

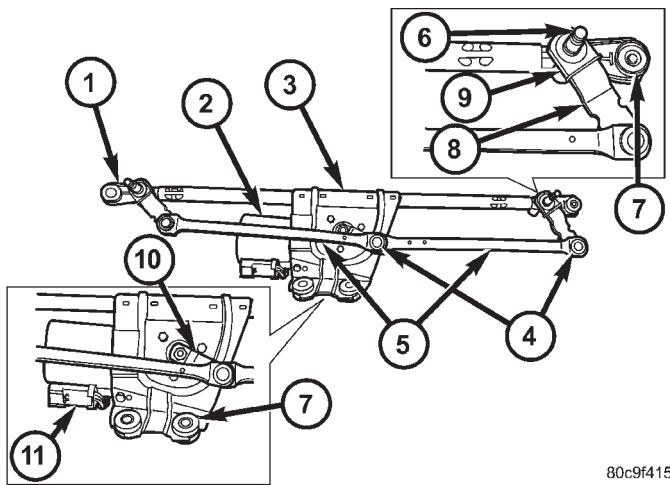
(3) Insert the hook formation on the tip of the wiper arm through the opening in the wiper blade superstructure ahead of the wiper blade pivot block/latch unit far enough to engage the pivot block into the hook (Fig. 13).

(4) Slide the wiper blade pivot block/latch up into the hook formation on the tip of the wiper arm until the latch release tab snaps into its locked position. Latch engagement will be accompanied by an audible click.

(5) Gently lower the wiper blade onto the glass.

FRONT WIPER MODULE

DESCRIPTION



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Fig. 14 Front Wiper Module

- 1 - PIVOT BRACKET (2)
- 2 - MOTOR COVER
- 3 - MOTOR BRACKET
- 4 - LINKAGE BUSHING (4)
- 5 - DRIVE LINK (2)
- 6 - PIVOT SHAFT (2)
- 7 - INSULATOR (4)
- 8 - PIVOT CRANK ARM (2)
- 9 - PIVOT COVER
- 10 - MOTOR CRANK ARM
- 11 - PIGTAIL WIRE CONNECTOR

The front wiper module bracket is secured with two nuts below the wiper motor through rubber insulators to two weld studs on the bottom of the cowl plenum panel beneath the cowl plenum cover/grille panel (Fig. 14). Two screws secure the top of the module bracket to the cowl plenum panel through rubber insulators located on the outboard end of each pivot bracket. The ends of the wiper pivot shafts that protrude through dedicated openings in the cowl plenum cover/grille panel to drive the wiper arms and blades are the only visible components of the front wiper module. The front wiper module consists of the following major components:

- **Bracket** - The front wiper module bracket consists of a long tubular steel main member that has a die cast pivot bracket formation near each end where the two wiper pivots are secured. A stamped steel mounting plate for the wiper motor is secured with welds near the center of the main member. A short stamped steel tab that extends laterally from one side of the mounting plate provides a mounting location for the wiper motor pigtail wire connector.

- **Crank Arm** - The front 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** - Two stamped steel drive links connect the wiper motor crank arm to the wiper pivot lever arms. The right side drive link has a plastic socket-type bushing on each end. The left side drive link has a plastic socket-type bushing on one end, and a plastic sleeve-type bushing on the other end. The socket-type bushing on one end of each drive link is snap-fit over the ball stud on the lever arm of its respective pivot. The left side drive link sleeve-type bushing end is then fit over the motor crank arm ball stud, and the other socket-type bushing of the right side drive link is snap-fit over the exposed end of the wiper motor crank arm ball stud.

- **Motor** - The front wiper motor is secured with three screws to the motor mounting plate near the center of the wiper module bracket. The wiper motor output shaft passes through a hole in the module bracket, where a nut secures the wiper motor crank arm to the motor output shaft. The two-speed permanent magnet wiper motor features an integral transmission, an internal park switch, and an internal automatic resetting circuit breaker. A molded plastic shield covers the top of the motor.

- **Pivots** - The two front wiper pivots are secured within the die cast pivot brackets on the outboard ends of the wiper module main member. The lever arms that extend from the center of the pivot shafts each have a ball stud on their end. 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 lower ends of the pivot shafts are installed through lubricated bushings in the pivot brackets and are secured with snap rings. A molded plastic shield covers each pivot shaft where it enters the pivot bracket.

The front wiper module cannot be adjusted or repaired. If any component of the module is faulty or damaged, the entire front wiper module unit must be replaced.

OPERATION

The front wiper module operation is controlled by the battery current inputs received by the wiper motor from the wiper on/off and wiper high/low relays. 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

FRONT WIPER MODULE (Continued)

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.

REMOVAL

- (1) Unlatch and open the hood.
- (2) Disconnect and isolate the battery negative cable.
- (3) Remove both front wiper arms from the wiper pivots. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - FRONT/FRONT WIPER ARM - REMOVAL).
- (4) Remove the cowl plenum cover/grille panel from over the cowl plenum. (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - REMOVAL).
- (5) Disconnect the headlamp and dash wire harness connector for the front wiper motor from the motor pigtail wire connector (Fig. 15).

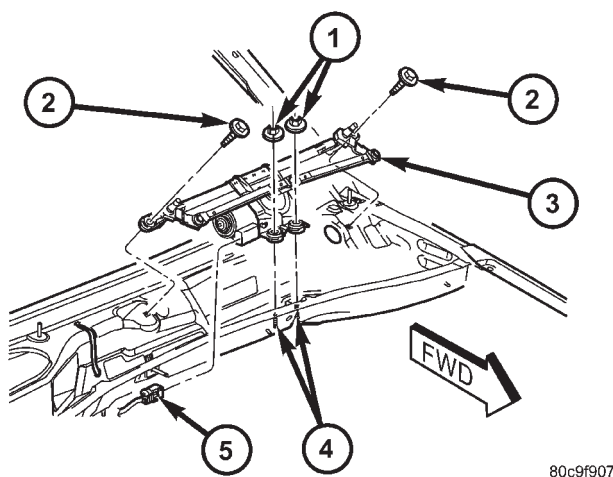


Fig. 15 Front Wiper Module Remove/Install

- 1 - NUT (2)
- 2 - SCREW (2)
- 3 - FRONT WIPER MODULE
- 4 - STUD (2)
- 5 - WIRE HARNESS CONNECTOR

(6) Remove the two screws that secure the front wiper module to the top of the cowl plenum panel at the pivot brackets.

(7) Remove the two nuts that secure the front wiper module to the two weld studs on the bottom of the cowl plenum panel.

(8) Lift the front wiper module up from the cowl plenum panel far enough to disengage the two lower insulators from the weld studs on the bottom of the plenum panel.

(9) Remove the front wiper module from the cowl plenum panel as a unit.

INSTALLATION

(1) Position the front wiper module to the cowl plenum as a unit (Fig. 15).

(2) Lower the front wiper module lower mounting insulators over the two weld studs on the bottom of the cowl plenum panel.

(3) Install the two screws that secure the front wiper module to the top of the cowl plenum panel at the pivot brackets. Tighten the screw on the driver side, followed by the screw on the passenger side. Tighten the screws to 8 N·m (72 in. lbs.).

(4) Install and tighten the two nuts that secure the front wiper module to the two weld studs on the bottom of the cowl plenum panel. Tighten the nuts to 8 N·m (72 in. lbs.).

(5) Reconnect the headlamp and dash wire harness connector for the front wiper motor to the motor pigtail wire connector.

(6) Reinstall the cowl plenum cover/grille panel over the cowl plenum. (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - INSTALLATION).

(7) Close and latch the hood.

(8) Reinstall both front wiper arms onto the wiper pivots. (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS/FRONT WIPER ARM - INSTALLATION).

(9) Reconnect the battery negative cable.

FRONT WIPER/WASHER SWITCH**DESCRIPTION**

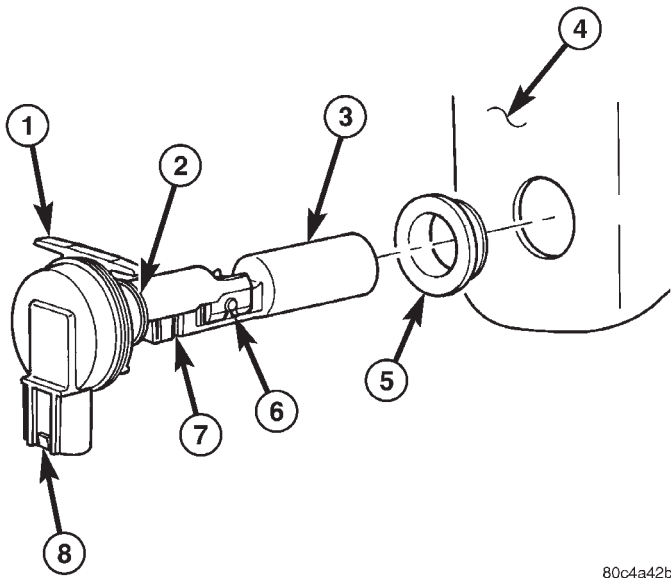
The front wiper and washer switches are integral to the right (wiper) control stalk of the multi-function switch. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/MULTI-FUNCTION SWITCH - DESCRIPTION).

OPERATION

The front wiper and washer switches are integral to the right (wiper) control stalk of the multi-function switch. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/MULTI-FUNCTION SWITCH - OPERATION).

WASHER FLUID LEVEL SWITCH

DESCRIPTION



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Fig. 16 Washer Fluid Level Switch

- 1 - MOUNTING FLANGE
- 2 - BARBED NIPPLE
- 3 - FLOAT
- 4 - RESERVOIR
- 5 - GROMMET SEAL
- 6 - PIVOT
- 7 - MAGNET
- 8 - CONNECTOR RECEPTACLE

The washer fluid level switch is a single pole, single throw reed-type switch mounted at the rear of the sump area near the bottom of the washer reservoir (Fig. 16). Only the molded plastic switch mounting flange and the integral connector receptacle are visible when the switch is installed in the reservoir. A short nipple formation extends from the inner surface of the switch mounting flange, and a barb on the nipple near the switch mounting flange is pressed through a rubber grommet seal installed in the mounting hole of the reservoir. A small, molded plastic float has two pivot pins near its center that are snapped into two receptacles near the ends of two stanchions that extend toward the float from the switch nipple formation. A small magnet is secured within the end of the float nearest the switch nipple formation, and a reed switch is concealed within the nipple. A diagnostic resistor is connected between the two switch terminals within the switch mounting flange. The washer fluid level switch cannot be adjusted or repaired. If faulty or damaged, the switch must be replaced.

OPERATION

The washer fluid level switch uses a pivoting, oblong float to monitor the level of the washer fluid in the washer reservoir. The float contains a small magnet. When the float pivots, the proximity of this magnet to a stationary reed switch within the nipple formation of the switch changes. When the fluid level in the washer reservoir is at or above the float level, the float moves to a vertical position, the influence of the float magnetic field is removed from the reed switch, and the normally open reed switch contacts open. When the fluid level in the washer reservoir falls below the level of the pivoting float, the float moves to a horizontal position, the influence of the float magnetic field is applied to the reed switch, and the contacts of the normally open reed switch close.

The washer fluid level switch is connected to the vehicle electrical system through a dedicated take out and connector of the headlamp and dash wire harness. The switch is connected in series between ground and the washer fluid switch sense input to the ElectroMechanical Instrument Cluster (EMIC). The switch receives a path to ground at all times through another take out of the headlamp and dash wire harness with a single eyelet terminal connector that is secured under a ground screw near the front of the left front fender inner shield in the engine compartment. When the switch closes, the EMIC senses the ground on the washer fluid switch sense circuit. The EMIC is programmed to respond to this input by illuminating the washer fluid indicator and by sounding an audible chime tone warning.

The washer fluid level switch input to the EMIC can be diagnosed using conventional diagnostic tools and methods. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER/WASHER FLUID INDICATOR - DIAGNOSIS AND TESTING).

REMOVAL

The washer fluid level switch can be removed from the washer reservoir without removing the reservoir from the vehicle.

(1) Disconnect and isolate the battery negative cable.

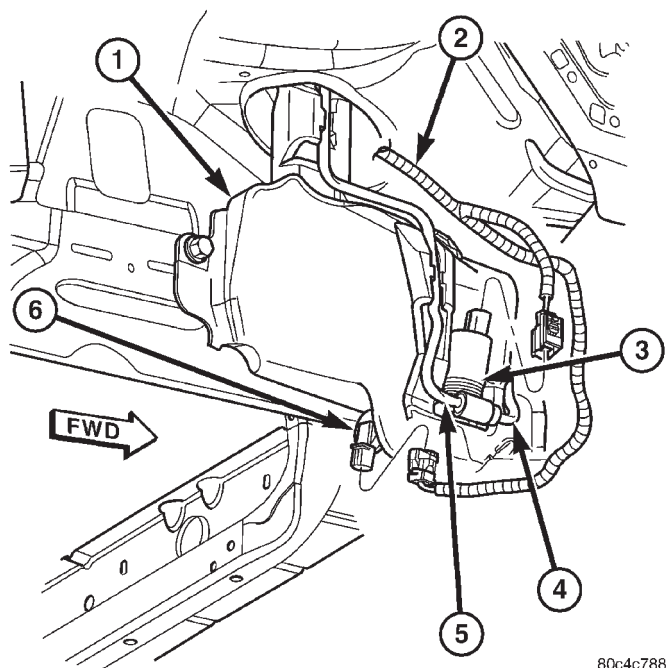
(2) Raise and support the vehicle.

(3) Remove the splash shield from the right front fender wheel house. (Refer to 23 - BODY/EXTERIOR/FRONT WHEELHOUSE SPLASH SHIELD - REMOVAL).

(4) Disconnect the front or rear washer hose from one of the barbed outlet nipples of the washer pump/motor unit and allow the washer fluid to drain into a clean container for reuse.

(5) Disconnect the headlamp and dash wire harness connector for the washer fluid level switch from the switch connector receptacle (Fig. 17).

WASHER FLUID LEVEL SWITCH (Continued)



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Fig. 17 Washer Fluid Level Switch Remove/Install

- 1 - WASHER RESERVOIR
- 2 - WIRE HARNESS
- 3 - WASHER PUMP/MOTOR
- 4 - FRONT WASHER HOSE
- 5 - REAR WASHER HOSE
- 6 - WASHER FLUID LEVEL SWITCH

NOTE: The pivoting float of the washer fluid level switch must be in a horizontal position within the reservoir in order to be removed. With the reservoir empty and in an upright position, the pivoting float will orient itself to the horizontal position when the switch connector receptacle is pointed straight downwards.

(6) Using a trim stick or another suitable wide flat-bladed tool, gently pry the barbed nipple of the washer fluid level switch out of the rubber grommet seal on the back of the reservoir sump. Care must be taken not to damage the reservoir.

(7) Remove the washer fluid level switch from the washer reservoir.

(8) Remove the rubber grommet seal from the washer fluid level switch mounting hole in the washer reservoir and discard.

INSTALLATION

(1) Install a new rubber grommet seal into the washer fluid level switch mounting hole in the washer reservoir. Always use a new rubber grommet seal on the reservoir.

(2) Insert the float of the washer fluid level switch through the rubber grommet seal and into the

washer reservoir. The connector receptacle of the washer fluid level switch should be pointed downward.

(3) Using hand pressure, press firmly and evenly on the washer fluid level switch mounting flange until the barbed nipple is fully seated in the rubber grommet seal in the washer reservoir mounting hole.

(4) Reconnect the headlamp and dash wire harness connector for the washer fluid level switch to the switch connector receptacle (Fig. 17).

(5) Reconnect the removed washer hose to the barbed outlet nipple of the washer pump/motor unit.

(6) Reinstall the splash shield into the right front fender wheel house. (Refer to 23 - BODY/EXTERIOR/FRONT WHEELHOUSE SPLASH SHIELD - INSTALLATION).

(7) Lower the vehicle.

(8) Refill the washer reservoir with the washer fluid drained from the reservoir during the removal procedure.

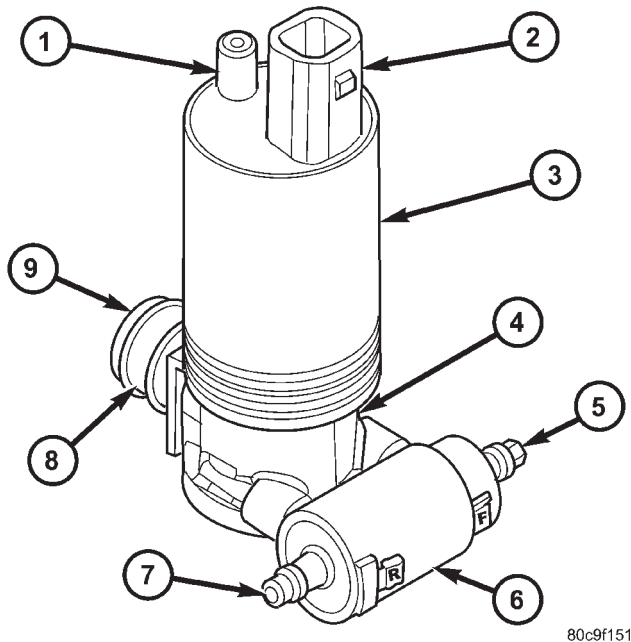
(9) Reconnect the battery negative cable.

WASHER PUMP/MOTOR**DESCRIPTION**

The washer pump/motor unit (Fig. 18) is located on the outboard side of the washer reservoir, on the outboard side of the right front frame rail behind the right front wheel house splash shield. A small permanently lubricated and sealed reversible electric motor is coupled to the rotor-type washer pump. The use of an integral shuttle valve 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 motor/pump impeller rotation. A seal flange with a barbed inlet nipple on the pump housing passes through a rubber grommet seal installed in a dedicated mounting hole of the washer reservoir. When the pump is installed in the reservoir the front barbed outlet nipple on the pump shuttle valve housing connects the unit to the front washer hose and the rear barbed outlet nipple connects the unit to the rear washer hose. The letters "F" and "R" molded into the shuttle valve 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 barbed 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 post on the motor and a snap post receptacle molded into the reservoir that allows for mounting of the washer pump without the use of fasteners. An integral connector receptacle on the top of the motor

WASHER PUMP/MOTOR (Continued)



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Fig. 18 Washer Pump/Motor

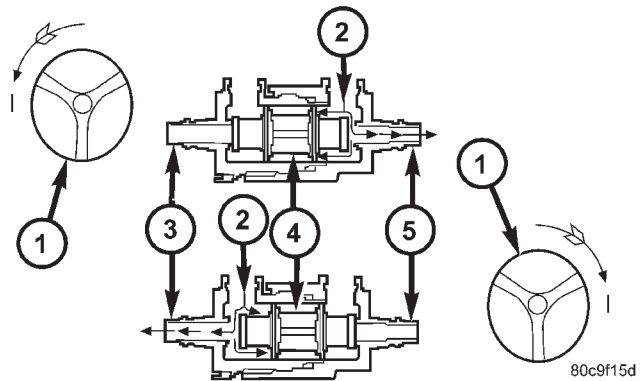
- 1 - SNAP POST
- 2 - CONNECTOR RECEPTACLE
- 3 - MOTOR
- 4 - PUMP
- 5 - FRONT WASHER OUTLET NIPPLE
- 6 - SHUTTLE VALVE
- 7 - REAR WASHER OUTLET NIPPLE
- 8 - INLET NIPPLE
- 9 - FILTER SCREEN

housing connects the unit to the vehicle electrical system through a dedicated take out and connector of the headlamp and dash wire harness. The washer pump/motor unit cannot be repaired. If faulty or damaged, the entire washer pump/motor unit must be replaced.

OPERATION

The washer pump/motor unit features a reversible electric motor. The direction of the motor is controlled by hard wired outputs from the momentary front and rear washer switch circuitry contained within the right (wiper) control stalk of the multi-function switch. 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.

Washer fluid is gravity-fed from the washer reservoir to the inlet port of the washer pump housing. An integral shuttle valve is located in a housing on the outlet port side of the pump housing (Fig. 19). This shuttle valve controls which washer system plumbing receives the washer fluid being pressurized by the pump. When the pump impeller rotates in the counterclockwise direction (viewed from the bottom), pressurized washer fluid is pushed out the front washer system port and biases the shuttle valve to the left, sealing off the rear washer system outlet nipple. When the pump impeller rotates in the clockwise direction (viewed from the bottom), pressurized washer fluid is pushed out the rear washer system port and biases the shuttle valve to the right, sealing off the front washer system outlet nipple.



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Fig. 19 Washer Pump Fluid Flow

- 1 - IMPELLER ROTATION (VIEWED FROM BOTTOM)
- 2 - IMPELLER OUTPUT
- 3 - REAR WASHER OUTLET NIPPLE
- 4 - SHUTTLE VALVE
- 5 - FRONT WASHER OUTLET NIPPLE

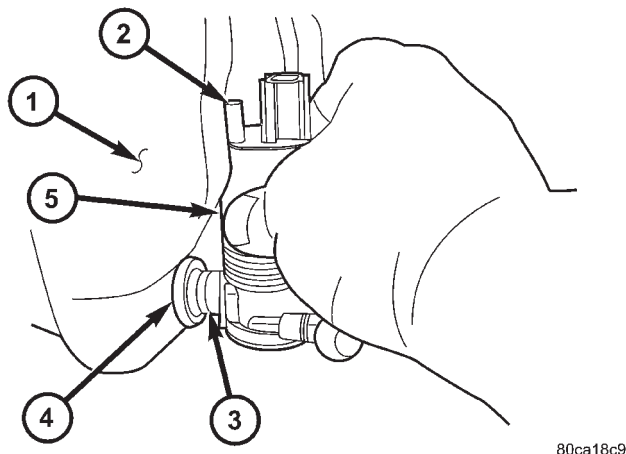
The washer pump/motor unit can be diagnosed using conventional diagnostic tools and methods.

REMOVAL

- (1) Turn the front wheels full lock to the right.
- (2) Disconnect and isolate the battery negative cable.
- (3) Raise and support the vehicle.
- (4) Unsnap and lift the cover over the access hole at the front of the right front wheel house splash shield.
- (5) Place a clean container on the floor beneath the washer pump/motor location to catch any washer fluid that is spilled during the following procedure.
- (6) Reach through the access hole and firmly grasp the top of the washer pump/motor housing.

WASHER PUMP/MOTOR (Continued)

(7) Pull lightly outward on the top of the washer pump/motor housing away from the washer reservoir far enough to disengage the snap post on the top of the motor from the receptacle in the reservoir (Fig. 20).



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Fig. 20 Washer Pump/Motor Remove/Install

- 1 - WASHER RESERVOIR
- 2 - SNAP POST
- 3 - INLET NIPPLE
- 4 - GROMMET SEAL
- 5 - WASHER PUMP/MOTOR

(8) Pull the washer pump/motor unit straight out from the washer reservoir far enough to disengage the barbed pump inlet nipple from the rubber grommet seal in the reservoir.

(9) Disconnect the headlamp and dash wire harness connector from the washer pump/motor unit connector receptacle on the top of the motor housing (Fig. 21).

(10) Disconnect the two washer hoses from the two washer pump/motor unit outlet nipples.

(11) Remove washer pump/motor unit through the access hole at the front of the right front fender wheel house splash shield.

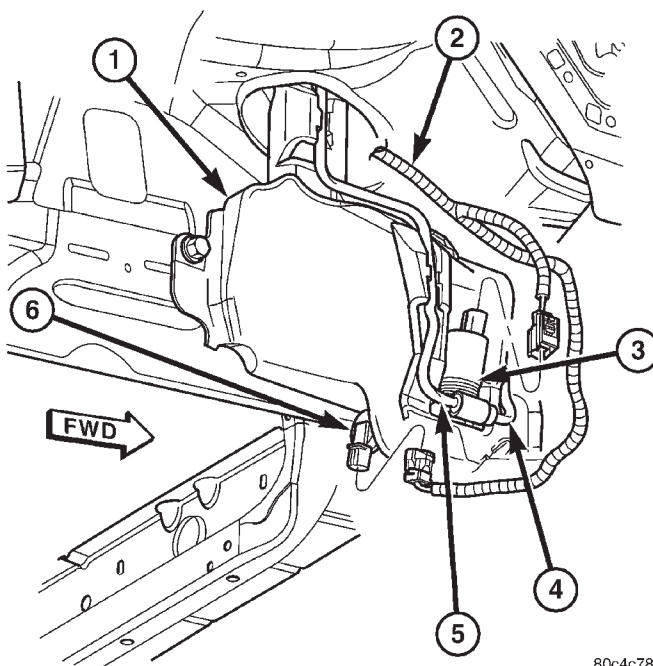
(12) Remove the rubber grommet seal from the washer reservoir and discard.

INSTALLATION

(1) Install a new rubber grommet seal into the washer pump mounting hole in the washer reservoir. Always use a new rubber grommet seal on the reservoir.

(2) Position the barbed inlet nipple of the washer pump to the rubber grommet seal in the washer reservoir (Fig. 20).

(3) Using hand pressure, press on the washer pump/motor unit firmly and evenly until the barbed inlet nipple is fully seated in the rubber grommet seal in the washer reservoir mounting hole.



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Fig. 21 Washer Pump/Motor Connections

- 1 - WASHER RESERVOIR
- 2 - WIRE HARNESS
- 3 - WASHER PUMP/MOTOR
- 4 - FRONT WASHER HOSE
- 5 - REAR WASHER HOSE
- 6 - WASHER FLUID LEVEL SWITCH

(4) Align the washer pump/motor 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 washer pump/motor unit until the snap post snaps into the washer reservoir receptacle.

(6) Reconnect the headlamp and dash wire harness connector for the washer pump/motor unit to the connector receptacle on the top of the motor housing (Fig. 21).

(7) Reconnect the front and rear washer hoses to the two barbed pump outlet nipples. Be certain that the hose in the trough of the reservoir behind the pump is connected to the rear nipple, and the hose in the trough in front of the pump is connected to the front nipple.

(8) Lower and snap shut the cover over the access hole at the front of the right front wheel house splash shield.

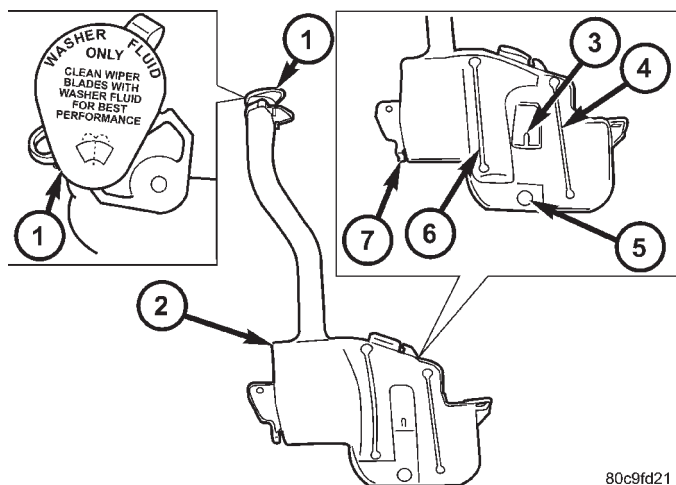
(9) Lower vehicle.

(10) Reconnect the battery negative cable.

(11) Refill the washer reservoir with clean washer fluid.

WASHER RESERVOIR

DESCRIPTION



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Fig. 22 Washer Reservoir

- 1 - CAP
- 2 - RESERVOIR
- 3- SNAP POST RECEPTACLE
- 4 - FRONT HOSE TROUGH
- 5 - WASHER PUMP HOLE
- 6 - REAR HOSE TROUGH
- 7 - HOOK

A single washer fluid reservoir is used for both the front and rear washer systems (Fig. 22). The molded plastic washer fluid reservoir is mounted on the outboard side of the right front frame rail in front of the right front wheel, where it is concealed by the right front wheel house splash shield. The only visible component of the washer reservoir is the filler neck and cap unit, which extends through a hole in the right front wheel house extension panel into the engine compartment. A bright yellow plastic filler cap with an integral bail strap and filler neck mounting bracket is labeled with an International Control and Display Symbol icon for "Windshield Washer" and the text "Washer Fluid Only" molded into it. The cap snaps over the open end of the filler neck.

There is a dedicated hole on the outboard side of the reservoir provided for the mounting of the washer pump/motor unit, and another dedicated hole on the rear of the reservoir for the washer fluid level switch. A snap post receptacle molded into the reservoir allows for mounting of the washer pump without the use of fasteners. The reservoir also features integral hose routing troughs on its outboard side and integral routing clips along its top. The washer reservoir is secured to the outboard side of the right front frame rail by two screws and an integral molded tab that engages in a slot in the right front frame rail. Another screw secures the reservoir filler

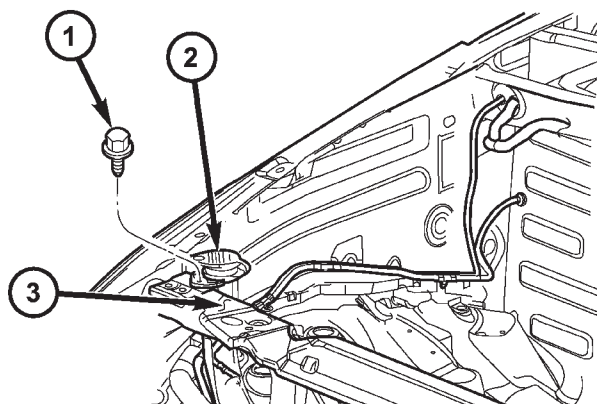
neck to the upper radiator crossmember in the front of the engine compartment. The right front fender wheel house splash shield must be removed to access the washer reservoir for service.

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 washer/pump motor unit is located in a sump area near the front 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 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 washer system will no longer operate.

REMOVAL

- (1) Turn the front wheels full lock to the right.
- (2) Unlatch and open the hood.
- (3) Disconnect and isolate the battery negative cable.
- (4) Remove the air cleaner housing from the top of the right front fender wheel house. (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER ELEMENT - REMOVAL).
- (5) Remove the screw that secures the washer reservoir filler neck support to upper radiator crossmember (Fig. 23).



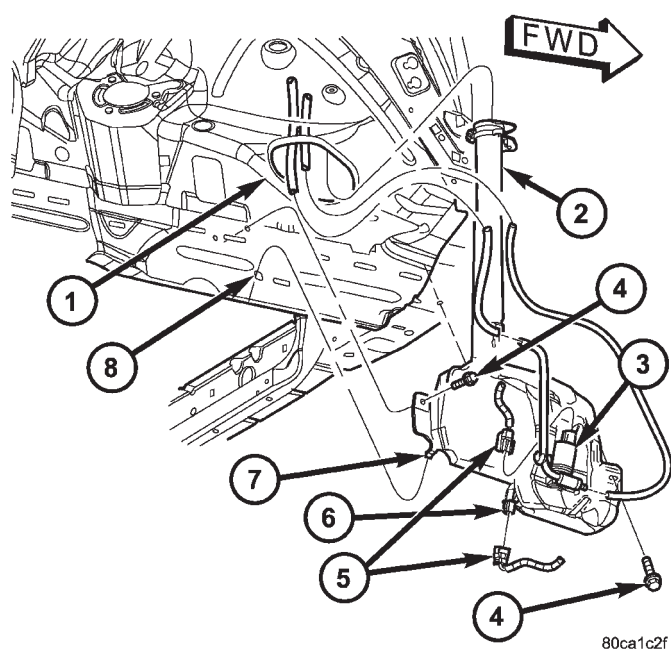
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Fig. 23 Washer Reservoir Cap Remove/Install

- 1 - SCREW (1)
- 2 - CAP
- 3 - UPPER RADIATOR CROSSMEMBER

WASHER RESERVOIR (Continued)

- (6) Raise and support the vehicle.
- (7) Remove the splash shield from the right front fender wheel house. (Refer to 23 - BODY/EXTERIOR/WHEELHOUSE SPLASH SHIELD - REMOVAL).
- (8) Release the "W" clip that secures the front bumper fascia to the front bumper support. This clip is located behind the bumper support and below the right front lamp unit.
- (9) Place a clean container on the floor beneath the washer pump/motor location to catch any washer fluid that is spilled during the following procedure.
- (10) Disconnect the front and rear washer hoses from the washer pump/motor unit outlet nipples and allow the washer fluid to drain into the container for reuse (Fig. 24).

**Fig. 24 Washer Reservoir Remove/Install**

- 1 - FRONT WHEEL HOUSE INNER PANEL
- 2 - WASHER RESERVOIR
- 3 - WASHER PUMP/MOTOR
- 4 - SCREW (2)
- 5 - WIRE HARNESS CONNECTOR (2)
- 6 - WASHER FLUID LEVEL SWITCH
- 7 - MOUNTING TAB
- 8 - SLOT

(11) Disconnect the headlamp and dash wire harness connector for the washer pump/motor unit from the connector receptacle on the top of the motor housing.

(12) Disconnect the headlamp and dash wire harness connector for the washer fluid level switch from the connector receptacle on the bottom of the switch.

(13) Disengage the front and rear washer hoses from the integral washer reservoir troughs and routing clips.

(14) Using a long extension with a swivel socket and pulling forward on the front bumper fascia, remove the screw that secures the washer reservoir to the right front frame rail.

(15) Remove the screw that secures the rear of the washer reservoir to the right front frame rail.

(16) Disengage the mounting tab at the back of the washer reservoir from the slot in the right front frame rail.

(17) Lower the washer reservoir far enough for the filler neck to be removed from the clearance hole in the right front fender wheel house panel extension.

(18) Remove the washer reservoir from the right front fender wheel house.

INSTALLATION

(1) Position the washer reservoir into the right front fender wheel house.

(2) Insert the washer reservoir filler neck through the clearance hole in the right front fender wheel house panel extension (Fig. 24).

(3) Raise the washer reservoir far enough to engage the mounting tab at the back of the reservoir into the slot in the right front frame rail.

(4) Install and tighten the screw that secures the rear of the washer reservoir to the right front frame rail. Tighten the screw to 7 N·m (65 in. lbs.).

(5) Using a long extension with a swivel socket and pulling forward on the front bumper fascia, install and tighten the screw that secures the washer reservoir to the right front frame rail. Tighten the screw to 7 N·m (65 in. lbs.).

(6) Engage the front and rear washer hoses into the integral washer reservoir troughs and routing clips. Be certain that the rear washer hose is routed rearward of the washer pump/motor unit, and the front washer hose is routed forward of the washer pump/motor unit. The rear washer hose can be identified by an in-line hose connector that joins the reservoir hose to the engine compartment hose located near the top of main body of the reservoir.

(7) Reconnect the headlamp and dash wire harness connector for the washer fluid level switch to the connector receptacle on the bottom of the switch.

(8) Reconnect the headlamp and dash wire harness connector for the washer pump/motor unit to the connector receptacle on the top of the motor housing.

(9) Reconnect the front and rear washer hoses to the washer pump/motor unit outlet nipples. Be certain that the rear washer hose in the trough rearward of the washer pump/motor unit is connected to the rear nipple, and the hose in the trough forward

WASHER RESERVOIR (Continued)

of the washer pump/motor unit is connected to the front nipple.

(10) Engage the "W" clip that secures the front bumper fascia to the front bumper support. This clip is located behind the bumper support and below the right front lamp unit.

(11) Reinstall the splash shield into the right front fender wheel house. (Refer to 23 - BODY/EXTERIOR/WHEELHOUSE SPLASH SHIELD - INSTALLATION).

(12) Lower the vehicle.

(13) Install and tighten the screw that secures the washer reservoir filler neck support to upper radiator crossmember (Fig. 23). Tighten the screw to 7 N·m (65 in. lbs.).

(14) Reinstall the air cleaner housing onto the top of the right front fender wheel house. (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER ELEMENT - INSTALLATION).

(15) Refill the washer reservoir with the washer fluid drained from the reservoir during the removal procedure.

(16) Reconnect the battery negative cable.

WIPER HIGH/LOW RELAY

DESCRIPTION

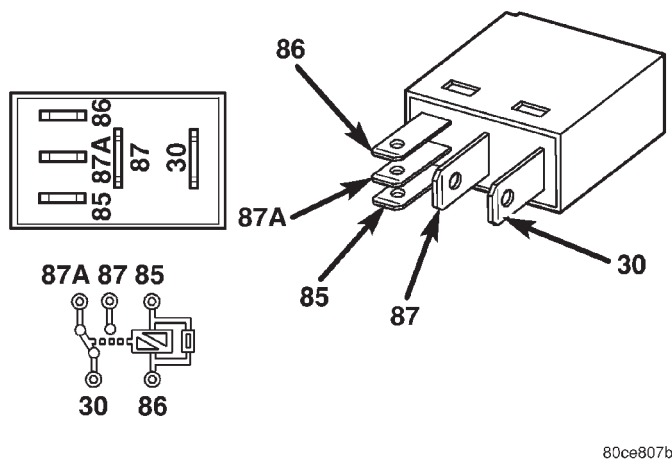


Fig. 25 ISO Micro Relay

- 30 - COMMON FEED
 85 - COIL GROUND
 86 - COIL BATTERY
 87 - NORMALLY OPEN
 87A - NORMALLY CLOSED

The wiper high/low relay is located in the Power Distribution Center (PDC) in the engine compartment near the battery. The wiper high/low relay is a conventional International Standards Organization (ISO) micro relay (Fig. 25). Relays conforming to the

ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions. The relay is contained within a small, rectangular, molded plastic housing and is connected to all of the required inputs and outputs by five integral male spade-type terminals that extend from the bottom of the relay base.

The wiper high/low relay cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

OPERATION

The wiper high/low relay is an electromechanical switch that uses a low current input from the Body Control Module (BCM) to control a high current output to the front wiper motor. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The wiper high/low relay terminals are connected to the vehicle electrical system through a connector receptacle in the Power Distribution Center (PDC). The inputs and outputs of the wiper high/low relay include:

- **Common Feed Terminal** - The common feed terminal (30) is connected to the output of the wiper on/off relay at all times through the wiper on/off relay output circuit.
- **Coil Ground Terminal** - The coil ground terminal (85) is connected to a control output of the Body Control Module (BCM) through a front wiper high/low relay control circuit. The BCM controls front wiper motor operation by controlling a ground path through this circuit.
- **Coil Battery Terminal** - The coil battery terminal (86) receives battery current at all times from a circuit breaker in the Junction Block (JB) through a fused ignition switch output (run-acc) circuit.
- **Normally Open Terminal** - The normally open terminal (87) is connected to the high speed brush of the front wiper motor through a front wiper high/low relay high speed output circuit, and is connected to the high speed brush whenever the relay is energized.

WIPER HIGH/LOW RELAY (Continued)

• **Normally Closed Terminal** - The normally closed terminal (87A) is connected to the low speed brush of the front wiper motor through a front wiper high/low relay low speed output circuit, and is connected to the low speed brush whenever the relay is de-energized.

The wiper high/low relay can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - WIPER HIGH/LOW RELAY

The wiper high/low relay (Fig. 26) is located in the Power Distribution Center (PDC) in the engine compartment near the battery. 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.

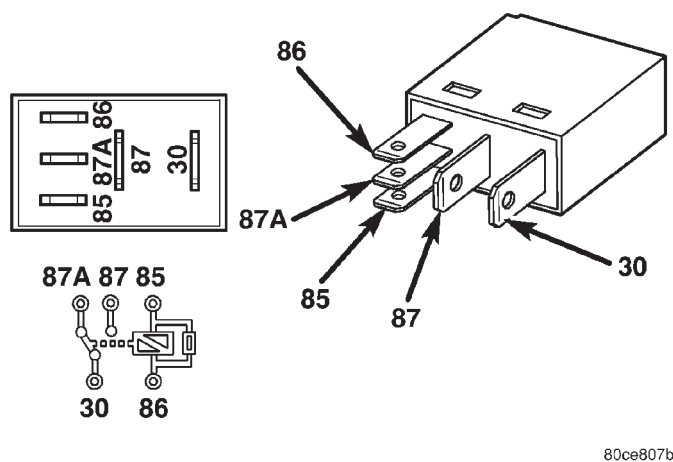


Fig. 26 ISO Micro Relay

- 30 - COMMON FEED
85 - COIL GROUND
86 - COIL BATTERY
87 - NORMALLY OPEN
87A - NORMALLY CLOSED

(1) Remove the wiper high/low relay from the PDC. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER HIGH/LOW RELAY - REMOVAL).

(2) 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 Step 3. If not OK, replace the faulty relay.

(3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 8 ohms. If OK, go to Step 4. If not OK, replace the faulty relay.

(4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals

30 and 87, and no continuity between terminals 87A and 30. If OK, reinstall the relay and use a DRBIII® scan tool to perform further testing. Refer to the appropriate diagnostic information.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the cover from the Power Distribution Center (PDC) (Fig. 27).

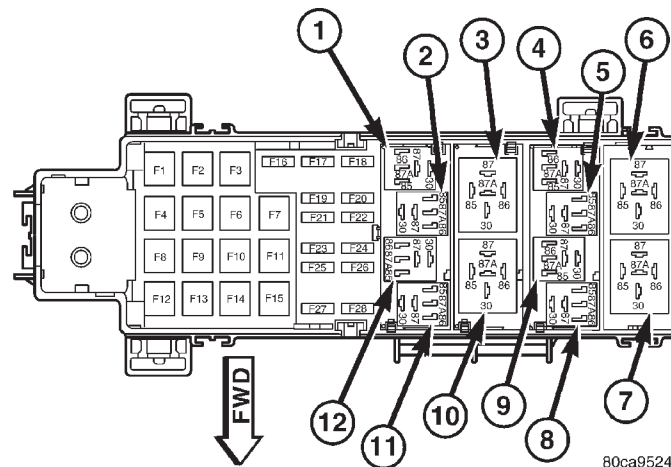


Fig. 27 Power Distribution Center

- 1 - FUEL PUMP RELAY
2 - STARTER MOTOR RELAY
3 - BLOWER MOTOR RELAY
4 - A/C COMPRESSOR CLUTCH RELAY
5 - OXYGEN SENSOR DOWNSTREAM RELAY
6 - AUTO SHUT DOWN RELAY
7 - SPARE
8 - SPARE
9a - (M/T) CLUTCH INTERLOCK RELAY
9b - (A/T) TRANSMISSION CONTROL RELAY
10 - SPARE
11 - WIPER HIGH/LOW RELAY
12 - WIPER ON/OFF RELAY

(3) Remove the wiper high/low relay by grasping it firmly and pulling it straight out from the receptacle in the PDC.

INSTALLATION

(1) Position the wiper high/low relay to the proper receptacle in the Power Distribution Center (PDC) (Fig. 27).

(2) Align the wiper high/low relay terminals with the terminal cavities in the PDC receptacle.

(3) Push firmly and evenly on the top of the wiper high/low relay until the terminals are fully seated in the terminal cavities in the PDC receptacle.

(4) Reinstall the cover onto the PDC.

(5) Reconnect the battery negative cable.

WIPER ON/OFF RELAY

DESCRIPTION

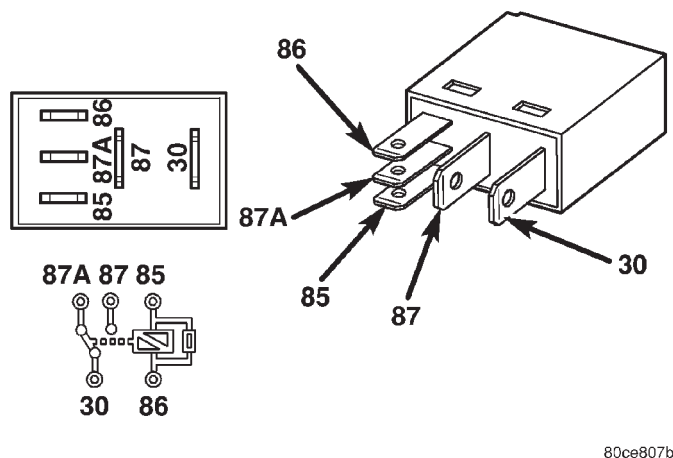


Fig. 28 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

The wiper on/off relay is located in the Power Distribution Center (PDC) in the engine compartment near the battery. The wiper on/off relay is a conventional International Standards Organization (ISO) micro relay (Fig. 28). Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions. The relay is contained within a small, rectangular, molded plastic housing and is connected to all of the required inputs and outputs by five integral male spade-type terminals that extend from the bottom of the relay base.

The wiper on/off relay cannot be adjusted or repaired and, if faulty or damaged, the unit must be replaced.

OPERATION

The wiper on/off relay is an electromechanical switch that uses a low current input from the Body Control Module (BCM) to control a high current out-

put to the front wiper motor. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The wiper on/off relay terminals are connected to the vehicle electrical system through a connector receptacle in the Power Distribution Center (PDC). The inputs and outputs of the wiper on/off relay include:

- **Common Feed Terminal** - The common feed terminal (30) is connected to the common feed terminal of the wiper high/low relay at all times through the wiper on/off relay output circuit.

- **Coil Ground Terminal** - The coil ground terminal (85) is connected to a control output of the Body Control Module (BCM) through a front wiper on/off relay control circuit. The BCM controls front wiper motor operation by controlling a ground path through this circuit.

- **Coil Battery Terminal** - The coil battery terminal (86) receives battery current at all times from a circuit breaker in the Junction Block (JB) through a fused ignition switch output (run-acc) circuit.

- **Normally Open Terminal** - The normally open terminal (87) receives battery current at all times from a circuit breaker in the Junction Block (JB) through a fused ignition switch output (run-acc) circuit, and provides battery current to the front wiper on/off relay output circuit whenever the relay is energized.

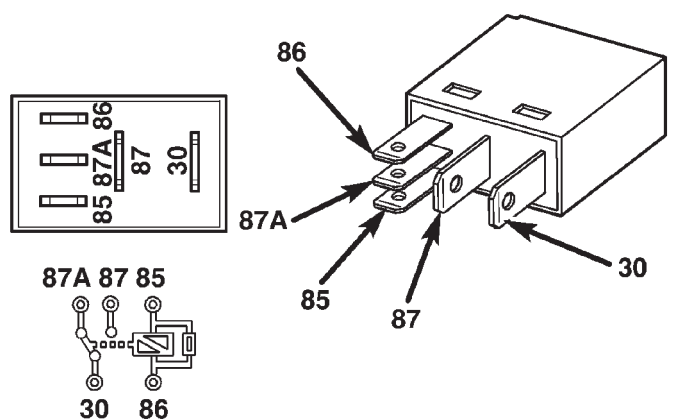
- **Normally Closed Terminal** - The normally closed terminal (87A) is connected to the wiper park switch in the front wiper motor through the front wiper park switch sense circuit, and is connected to the wiper park switch whenever the relay is de-energized.

The wiper on/off relay can be diagnosed using conventional diagnostic tools and methods.

WIPER ON/OFF RELAY (Continued)

DIAGNOSIS AND TESTING - WIPER ON/OFF RELAY

The wiper on/off relay (Fig. 29) is located in the Power Distribution Center (PDC) in the engine compartment near the battery. 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.



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Fig. 29 ISO Micro Relay

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

(1) Remove the wiper on/off relay from the PDC. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER ON/OFF RELAY - REMOVAL).

(2) 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 Step 3. If not OK, replace the faulty relay.

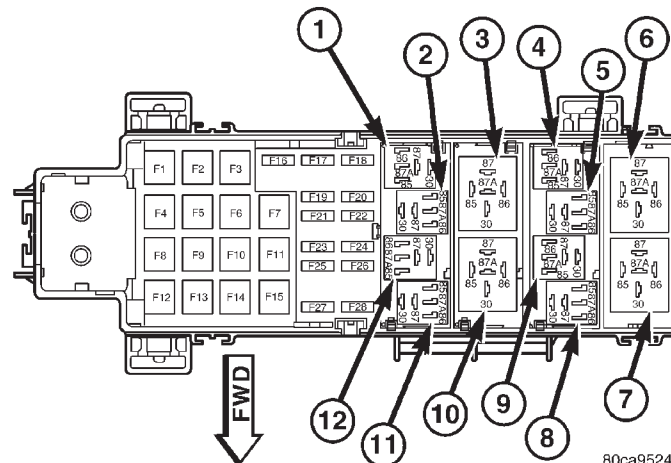
(3) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 8 ohms. If OK, go to Step 4. If not OK, replace the faulty relay.

(4) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, reinstall the relay and use a DRBIII® scan tool to perform further testing. Refer to the appropriate diagnostic information.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the cover from the Power Distribution Center (PDC) (Fig. 30).



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Fig. 30 Power Distribution Center

- 1 - FUEL PUMP RELAY
- 2 - STARTER MOTOR RELAY
- 3 - BLOWER MOTOR RELAY
- 4 - A/C COMPRESSOR CLUTCH RELAY
- 5 - OXYGEN SENSOR DOWNSTREAM RELAY
- 6 - AUTO SHUT DOWN RELAY
- 7 - SPARE
- 8 - SPARE
- 9a - (M/T) CLUTCH INTERLOCK RELAY
- 9b - (A/T) TRANSMISSION CONTROL RELAY
- 10 - SPARE
- 11 - WIPER HIGH/LOW RELAY
- 12 - WIPER ON/OFF RELAY

(3) Remove the wiper on/off relay by grasping it firmly and pulling it straight out from the receptacle in the PDC.

INSTALLATION

(1) Position the wiper on/off relay to the proper receptacle in the Power Distribution Center (PDC) (Fig. 30).

(2) Align the wiper on/off relay terminals with the terminal cavities in the PDC receptacle.

(3) Push firmly and evenly on the top of the wiper on/off relay until the terminals are fully seated in the terminal cavities in the PDC receptacle.

(4) Reinstall the cover onto the PDC.

(5) Reconnect the battery negative cable.

REAR WIPERS/WASHERS

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REAR WIPERS/WASHERS

DESCRIPTION

An electrically operated fixed interval intermittent rear wiper and washer system is standard factory-installed equipment on this model (Fig. 1). The rear wiper and washer system includes the following major components, which are described in further detail elsewhere in this service information:

- **Multi-Function Switch** - The multi-function switch is located on the top of the steering column, just below the steering wheel. The multi-function switch includes a left (lighting) control stalk and a right (wiper) control stalk. The right control stalk is dedicated to providing all of the driver controls for both the front and rear wiper systems. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/MULTI-FUNCTION SWITCH - DESCRIPTION).

- **Rear Check Valve** - The rear washer system check valve is located in the washer plumbing between the rear roof header and the roof outer panel near the rear washer nozzle.

- **Rear Washer Nozzle** - The rear washer nozzle is secured by a snap fit into a mounting hole in the roof outer panel above the rear flip-up glass opening.

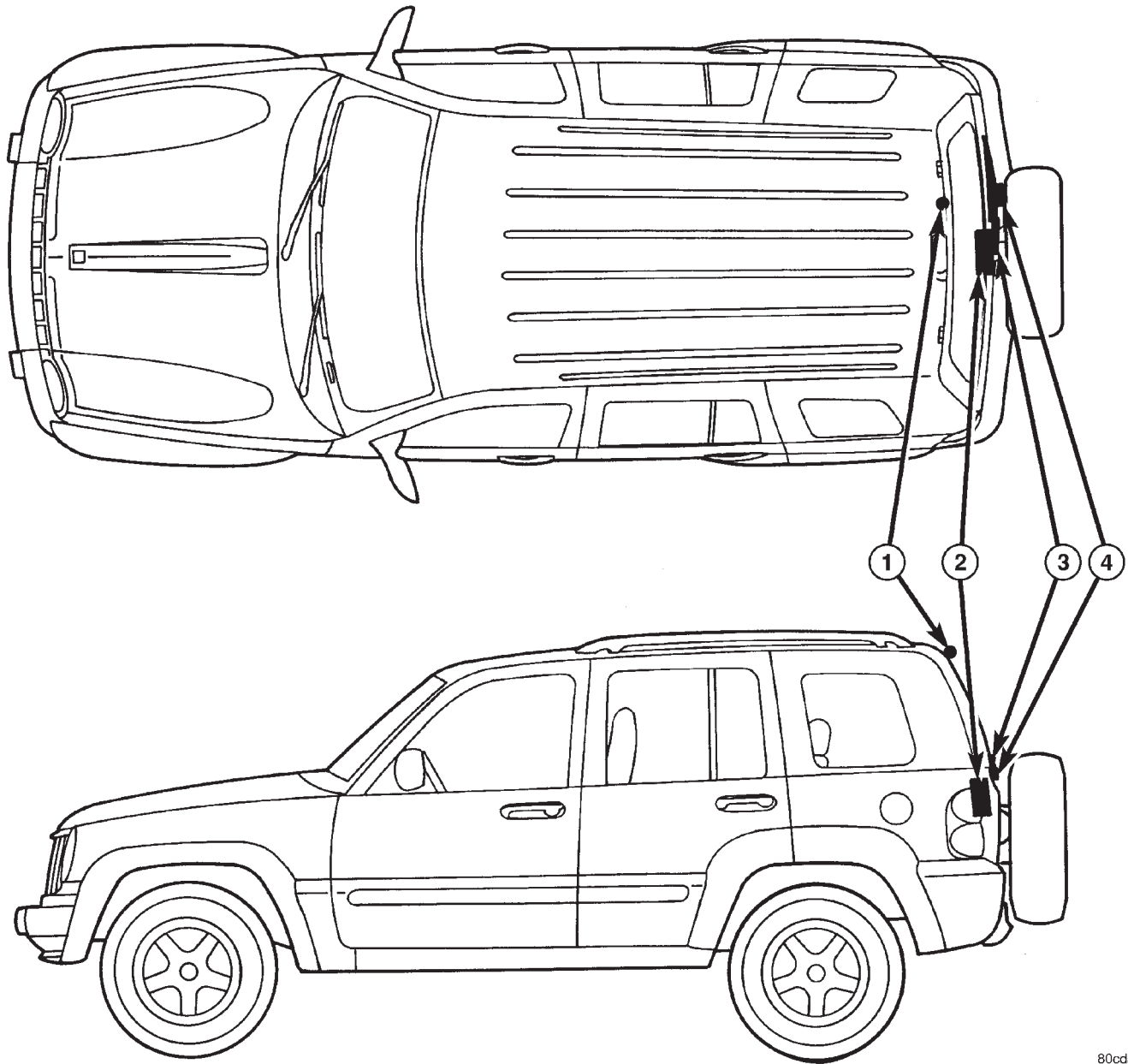
- **Rear Washer Plumbing** - The plumbing for the rear washer system consists of rubber hoses and molded plastic fittings. The plumbing is routed along the right side of the engine compartment from the washer reservoir, through the dash into the passenger compartment, up the right cowl side and A-pillar to the headliner, and above the headliner to the rear washer nozzle fitting within the rear roof header.

- **Rear Wiper Arm** - The single rear wiper arm is secured by a nut directly to the rear wiper motor output shaft, which extends through the center of the tailgate outer panel near the base of the rear flip-up glass.

- **Rear Wiper Arm Park Ramp** - The molded rubber rear wiper arm park ramp is secured with a screw to the tailgate outer panel to the right of the rear wiper motor output shaft bezel. When the rear wiper system is not in operation, the rear wiper arm is parked off of the rear flip-up glass on this ramp so that it will not interfere with or be damaged by the flip-up glass operation.

- **Rear Wiper Blade** - The single rear wiper blade is secured to the rear wiper arm with an integral latch, and is parked off of the rear flip-up glass when the rear wiper system is not in operation.

REAR WIPERS/WASHERS (Continued)



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Fig. 1 Rear Wiper & Washer System

1 - WASHER NOZZLE
2 - WIPER MODULE

3 - WIPER ARM & BLADE
4 - PARK RAMP

REAR WIPERS/WASHERS (Continued)

- **Rear Wiper Module** - The rear wiper motor output shaft is the only visible component of the rear wiper module. The remainder of the module is concealed within the tailgate below the rear flip-up glass opening. The rear wiper module includes the module bracket, the rear wiper motor, and the rear wiper electronic control circuitry.

- **Washer Pump/Motor** - The reversible electric washer pump/motor unit is located in a dedicated hole on the lower outboard side of the washer reservoir, behind the right front wheel house splash shield. This single reversible washer pump/motor provides washer fluid to either the front or rear washer system plumbing, depending upon the direction of the pump motor rotation. (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS/WASHER PUMP MOTOR - DESCRIPTION).

- **Washer Reservoir** - The washer reservoir is concealed behind the right front wheel house splash shield ahead of the right front wheel. The washer reservoir filler neck is the only visible portion of the reservoir, and it is accessed from the right front corner of the engine compartment. This single washer reservoir is shared by both the front and rear washer systems. (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS/WASHER RESERVOIR - 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.

OPERATING MODES The components of the rear wiper and washer system are designed to work in concert to provide the following operating modes:

- **Continuous Wipe Mode** - The control ring on the right (wiper) control stalk of the multi-function switch has an On position. When selected, this switch position will cause the rear wiper motor to operate in a continuous manner at a fixed wipe cycle speed.

- **Intermittent Wipe Mode** - The control ring on the right (wiper) control stalk of the multi-function switch has a Delay position. When selected, this

switch position will cause the rear wiper motor to operate in an intermittent manner at a fixed interval wipe cycle speed.

- **Washer Mode** - The control ring on the right (wiper) control stalk of the multi-function switch has two momentary Wash positions, one at the end of each direction of control ring rotation. When the control ring is rotated to the downward (counterclockwise) Wash position, the rear washer system will dispense washer fluid onto the flip-up glass and the rear wiper motor will operate in a continuous mode for as long as the switch is held closed, then provide several additional wipe cycles after the washer switch is released (wipe-after-wash mode). When the control ring is rotated to the upward (clockwise) Wash position, the rear washer system will dispense washer fluid onto the flip-up glass and the rear wiper motor will operate in a continuous mode for as long as the switch is held closed, then return to fixed wipe mode operation after the washer switch is released.

- **Wipe-After-Wash Mode** - The control ring on the right (wiper) control stalk of the multi-function switch has two momentary Wash positions, one at the end of each direction of control ring rotation. When the control ring is rotated to the downward (counterclockwise) Wash position, the rear washer system will dispense washer fluid onto the flip-up glass and the rear wiper motor will operate in a continuous mode for as long as the switch is held closed, then provide several additional wipe cycles after the washer switch is released.

OPERATION

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 rear flip-up 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 swing gate flip up glass surface 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 right (wiper) control stalk of the multi-function switch that extends from the right side of the steering column, just below the steering wheel. Rotating the control ring on the

REAR WIPERS/WASHERS (Continued)

control stalk to a detent position selects the Off, Delay, or On rear wiper system operating modes. Rotating the control ring on the control stalk to either of two Wash positions actuates the momentary rear washer system switch. The multi-function switch provides hard wired outputs to the rear wiper module and the washer pump/motor unit for all rear wiper and washer system functions.

The rear wiper and washer system will only operate when the ignition switch is in the Accessory or On positions, and the rear flip-up glass and tailgate ajar switches are closed. Battery current is directed from a fuse in the Junction Block (JB) to the multi-function switch through a fused ignition switch output (run-acc) circuit. The internal circuitry of the right (wiper) control stalk of the multi-function switch then provides battery current signals through a rear wiper on driver circuit and a rear wiper intermittent driver circuit to the rear wiper module and to the Body Control Module (BCM). The BCM uses these rear wiper system inputs as a signal to lock the rear flip-up glass and the tailgate to prevent the rear flip-up glass or tailgate from being opened for as long as the rear wiper is operating. The multi-function switch circuitry also uses this battery current and a ground circuit input to directly control the operation and direction of the reversible electric washer pump/motor unit.

A separate fuse in the JB provides battery current to the electronic control circuitry of the rear wiper module through a fused B(+) circuit. The rear wiper module uses this fused B(+) input to park the rear wiper blade off of the rear flip-up glass if the ignition switch is turned to the Off position while the rear wiper is operating, or if the ignition switch is turned to the Off position before the rear wiper blade has parked. However, if the ignition switch is turned to the Off position while the rear wiper is operating, then turned back On, the rear wiper switch must be cycled to the Off position and back to the On or Delay position before the rear wiper will operate again. In addition, the rear wiper module receives an input from the rear flip-up glass ajar switch on a flip-up glass ajar switch sense circuit, which prevents the rear wiper from operating when the flip-up glass is not closed or fully latched.

The hard wired circuits and components of the rear wiper and washer system may be diagnosed and tested using conventional diagnostic tools and procedures. Following are paragraphs that briefly describe the operation of each of the rear wiper and washer system operating modes.

CONTINUOUS WIPE MODE When the On position of the control ring on the right (wiper) control stalk of the multi-function switch is selected, the multi-function switch circuitry directs a battery cur-

rent signal to the rear wiper module through the rear wiper on driver circuit, causing the rear wiper to cycle continuously at a fixed speed.

INTERMITTENT WIPE MODE When the Delay position of the control ring on the right (wiper) control stalk of the multi-function switch is selected, the multi-function switch circuitry directs a battery current signal to the rear wiper module through the rear wiper intermittent driver circuit, causing the rear wiper to cycle intermittently at a fixed delay interval.

WASH MODE When the momentary Wash (after On) position of the control ring on the right (wiper) control stalk of the multi-function switch is selected, the multi-function switch circuitry directs both battery current and ground to the washer pump/motor unit, and a battery current signal to be provided to the rear wiper module through the rear wiper on driver circuit. This will cause the washer pump/motor unit to be energized and the rear wiper to cycle continuously at a fixed speed for as long as the rear Wash switch is held closed.

WIPE-AFTER-WASH MODE When the momentary Wash (before Off) position of the control ring on the right (wiper) control stalk of the multi-function switch is selected, the multi-function switch circuitry directs both battery current and ground to the washer pump/motor unit, and a battery current signal to be provided to the rear wiper module through the rear wiper on driver circuit. This will cause the washer pump/motor unit to be energized and the rear wiper to cycle continuously at a fixed speed for as long as the rear Wash switch is held closed. When the control ring is released to the Off position, the washer pump/motor is de-energized, but the circuitry within the rear wiper module will provide several additional wipe cycles to complete the wipe-after-wash mode cycle.

DIAGNOSIS AND TESTING - REAR WIPER & WASHER SYSTEM

REAR WIPER SYSTEM

The diagnosis found here addresses an electrically inoperative rear wiper system. If the rear wiper motor operates, but the wiper does not move on the rear flip-up glass, inspect the mechanical connection between the rear wiper arm and the rear wiper motor output shaft. If OK, replace the faulty rear wiper module. If the wiper operates, but chatters, lifts, or does not clear the glass, clean and inspect the rear wiper system components as required. (Refer to 8 - ELECTRICAL/REAR WIPERS/WASHERS - INSPECTION) and (Refer to 8 - ELECTRICAL/REAR WIPERS/WASHERS - CLEANING). Refer to the appropriate wiring information. The wiring infor-

REAR WIPERS/WASHERS (Continued)

mation 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.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Check that the interior lighting switch on the left (lighting) control stalk of the multi-function switch is not in the dome lamp disable position. With all four doors and the tailgate closed, open the rear flip-up glass. The interior lamps should light. Close the rear flip-up glass. Note whether the interior lamps remain lighted. They should turn off after about thirty seconds. If OK, go to Step 2. If not OK, go to Step 9.

(2) Check the fused B(+) fuse (Fuse 17 - 15 ampere) in the Junction Block (JB). If OK, go to Step 3. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(3) Check for battery voltage at the fused B(+) fuse (Fuse 17 - 15 ampere) in the JB. If OK, go to Step 4. If not OK, repair the open fused B(+) circuit between the JB and the Power Distribution Center (PDC) as required.

(4) Check the fused ignition switch output (run-acc) fuse (Fuse 22 - 10 ampere) in the JB. If OK, go to Step 5. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(5) Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run-acc) fuse (Fuse 22 - 10 ampere) in the JB. If OK, turn the ignition switch to the Off position and go to Step 6. If not OK, repair the open fused ignition switch output (run-acc) circuit between the JB and the ignition switch as required.

(6) Disconnect and isolate the battery negative cable. Disconnect the instrument panel wire harness connector for the multi-function switch (Connector C-2) from the switch connector receptacle. Reconnect the battery negative cable. Turn the ignition switch

to the On position. Check for battery voltage at the fused ignition switch output (run-acc) circuit cavity of the instrument panel wire harness connector for the multi-function switch (Connector C-2). If OK, go to Step 7. If not OK, repair the open fused ignition switch output (run-acc) circuit between the multi-function switch and the JB as required.

(7) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Test the multi-function switch. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/MULTI-FUNCTION SWITCH - DIAGNOSIS AND TESTING). If the multi-function switch tests OK, reconnect the instrument panel wire harness connectors for the multi-function switch to the switch connector receptacles and go to Step 8. If the multi-function switch does not test OK, replace the faulty switch.

(8) Remove the tailgate inner trim panel. Disconnect the tailgate wire harness connector for the rear wiper module from the module connector receptacle. Check for continuity between the ground circuit cavity of the tailgate wire harness connector for the rear wiper module and a good ground. There should be continuity. If OK, go to Step 9. If not OK, repair the open ground circuit to ground (G312) as required.

(9) Check for continuity between the flip-up glass ajar switch sense circuit cavity of the tailgate wire harness connector for the rear wiper module and a good ground. There should be continuity with the rear flip-up glass open, and no continuity with the rear flip-up glass closed. If OK, go to Step 10. If not OK, repair the open flip-up glass ajar circuit between the rear wiper module and the flip-up glass ajar switch as required.

(10) Reconnect the battery negative cable. Check for battery voltage at the fused B(+) circuit cavity of the tailgate wire harness connector for the rear wiper module. If OK, go to Step 11. If not OK, repair the open fused B(+) circuit between the rear wiper module and the JB as required.

(11) Turn the ignition switch to the On position. Turn the control ring on the right (wiper) control stalk of the multi-function switch to the Delay position. Check for battery voltage at the rear wiper intermittent driver circuit cavity of the tailgate wire harness connector for the rear wiper module. If OK, go to Step 12. If not OK, repair the open rear wiper intermittent driver circuit between the rear wiper module and the multi-function switch as required.

(12) Turn the control ring on the right (wiper) control stalk of the multi-function switch to the On position. Check for battery voltage at the rear wiper on driver circuit cavity of the tailgate wire harness connector for the rear wiper module. If OK, replace the faulty rear wiper module. If not OK, repair the open

REAR WIPERS/WASHERS (Continued)

rear wiper on driver circuit between the rear wiper module and the multi-function switch as required.

REAR WASHER SYSTEM

The diagnosis found here addresses an electrically inoperative rear washer system. If the washer pump/motor operates, but no washer fluid is emitted from the rear washer nozzle, be certain to check the fluid level in the reservoir. Also inspect the rear washer system components as required. (Refer to 8 - ELECTRICAL/REAR WIPERS/WASHERS - INSPECTION). 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.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, SIDE CURTAIN AIRBAG, 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 SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Turn the ignition switch to the On position. Turn the control ring on the right (wiper) control stalk of the multi-function switch to the On position. Check whether the rear wiper system is operating. If OK, go to Step 2. If not OK, test and repair the rear wiper system before continuing with these tests. Refer to REAR WIPER SYSTEM .

(2) Pull the right (wiper) control stalk of the multi-function switch toward the steering wheel. Check whether the front washer system is operating. If OK, test the multi-function switch. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/MULTI-FUNCTION SWITCH - DIAGNOSIS AND TESTING). If the multi-function switch tests OK, go to Step 3. If the multi-function switch does not test OK, replace the faulty switch.

(3) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Disconnect the headlamp and dash wire harness connector for the washer pump/motor unit from the pump/motor unit connector receptacle. Check for continuity between the washer pump driver circuit cav-

ity of the headlamp and dash wire harness connector for the washer pump/motor unit and a good ground. There should be no continuity. If OK, go to Step 4. If not OK, repair the shorted washer pump driver circuit between the washer pump/motor unit and the multi-function switch as required.

(4) Check for continuity between the washer pump driver circuit cavities of the headlamp and dash wire harness connector for the washer pump/motor unit and the instrument panel wire harness connector for the multi-function switch (Connector C-2). There should be continuity. If OK, go to Step 5. If not OK, repair the open washer pump driver circuit between the washer pump/motor unit and the multi-function switch as required.

(5) Check for continuity between the washer pump sense circuit cavity of the headlamp and dash wire harness connector for the washer pump/motor unit and a good ground. There should be no continuity. If OK, go to Step 6. If not OK, repair the shorted washer pump sense circuit between the washer pump/motor unit and the multi-function switch as required.

(6) Check for continuity between the washer pump sense circuit cavities of the headlamp and dash wire harness connector for the washer pump/motor unit and the instrument panel wire harness connector for the multi-function switch (Connector C-2). There should be continuity. If OK, replace the faulty washer pump/motor unit. If not OK, repair the open washer pump sense circuit between the washer pump/motor unit and the multi-function switch as required.

CLEANING - REAR WIPER & WASHER SYSTEM**REAR WIPER SYSTEM**

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 rear flip-up 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.

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.

REAR WIPERS/WASHERS (Continued)

REAR WASHER SYSTEM

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 washer nozzle, then running the washer pump/motor to run clean washer fluid or water through the system. A plugged or restricted washer nozzle should be carefully back-flushed using compressed air. If the washer nozzle obstruction cannot be cleared, replace the washer nozzle.

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.

INSPECTION - REAR WIPER & WASHER SYSTEM

REAR WIPER SYSTEM

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:

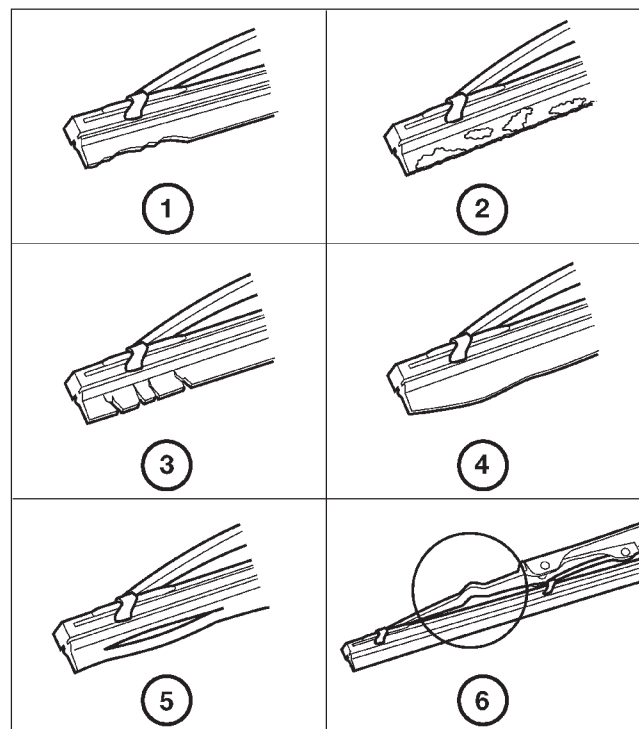
(1) Inspect the wiper arm for any indications of damage, or contamination. If the wiper arm is contaminated with any foreign material, clean as required. (Refer to 8 - ELECTRICAL/REAR WIPERS/WASHERS - CLEANING). If a wiper arm is damaged or corrosion is evident, replace the wiper arm with a new unit. Do not attempt to repair a wiper arm that is damaged or corroded.

(2) Carefully lift the wiper arm off of the park ramp. 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 low or no spring tension.

(4) Inspect the wiper blade and squeegee for any indications of damage, contamination, or rubber deterioration (Fig. 2). If the wiper blade or squeegee is contaminated with any foreign material, clean them and the glass as required. (Refer to 8 - ELECTRICAL/REAR WIPERS/WASHERS - CLEANING). If after cleaning the wiper blade and the glass, the wiper blade fails to clear the glass without smearing, streaking, chattering, hazing, or beading, replace the wiper blade. Also, if a wiper blade is damaged or if the squeegee rubber is damaged or deteriorated, replace the wiper blade with a new unit. Do not attempt to repair a wiper blade that is damaged.



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Fig. 2 Wiper Blade Inspection

- 1 - WORN OR UNEVEN EDGES
- 2 - ROAD FILM OR FOREIGN MATERIAL DEPOSITS
- 3 - HARD, BRITTLE, OR CRACKED
- 4 - DEFORMED OR FATIGUED
- 5 - SPLIT
- 6 - DAMAGED SUPPORT COMPONENTS

REAR WIPERS/WASHERS (Continued)

REAR WASHER SYSTEM

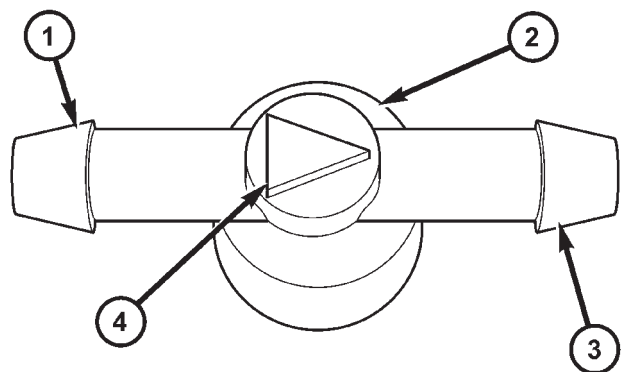
The washer system components should be inspected periodically, not just when washer performance problems are experienced. This inspection should include the following points:

(1) Check for ice or other foreign material in the washer reservoir. If contaminated, clean and flush the washer system. (Refer to 8 - ELECTRICAL/REAR WIPERS/WASHERS - 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 CHECK VALVE

DESCRIPTION



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Fig. 3 Rear Check Valve

- 1 - INLET NIPPLE
- 2 - REAR CHECK VALVE
- 3 - OUTLET NIPPLE
- 4 - FLOW DIRECTION ARROW

A rear washer system check valve is standard equipment on this model (Fig. 3). The rear check valve is located in the washer plumbing between the rear roof header and the roof outer panel near the rear washer nozzle. The rear check valve consists of a molded plastic body with a round center section

and barbed hose nipples at each end. An arrow formation molded into the center section of the valve body indicates the direction of flow through the valve. The rear check valve cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

OPERATION

The rear check valve prevents washer fluid from draining out of the rear washer supply hoses back to the washer reservoir. This drain-back would result in a lengthy delay from when the rear washer switch is actuated until washer fluid was dispensed through the rear washer nozzle, because the washer pump would have to refill the rear washer plumbing from the reservoir to the nozzle. The check valve also prevents washer fluid from siphoning through the rear washer nozzle after the rear washer system is turned Off.

Within the check valve body, a small check valve is held in place against a seat by a small coiled spring to restrict flow through the unit until the valve is unseated by a predetermined inlet fluid pressure. When the washer pump pressurizes and pumps washer fluid from the reservoir through the rear washer plumbing, the fluid pressure overrides the spring pressure applied to the check ball within the valve and unseats the valve, allowing washer fluid to flow toward the rear washer nozzle. When the washer pump stops operating, spring pressure seats the check valve and fluid flow in either direction within the rear washer plumbing is prevented.

REMOVAL

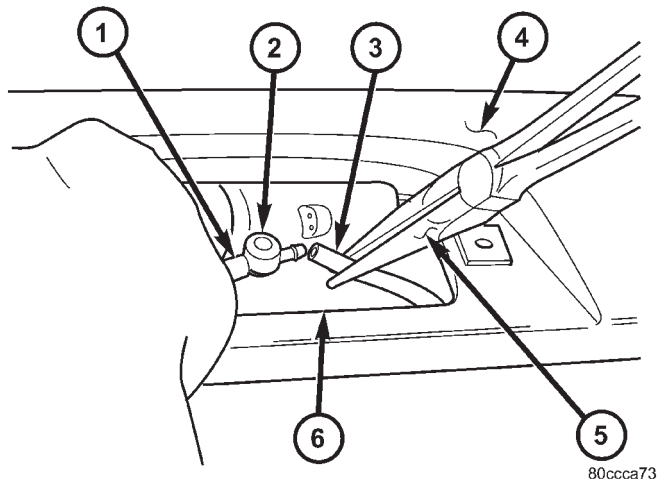
- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the Center High Mounted Stop Lamp (CHMSL) unit from the rear of the roof panel. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/CENTER HIGH MOUNTED STOP LAMP UNIT - REMOVAL).

WARNING: THE EDGES OF THE SHEET METAL AROUND THE CENTER HIGH MOUNTED STOP LAMP MOUNTING HOLE IN THE ROOF PANEL. TAKE THE PROPER PRECAUTIONS TO AVOID PERSONAL INJURY.

(3) Reach through the CHMSL unit mounting hole in the rear of the roof panel to access and disconnect the rear washer hose at the barbed nipple of the rear washer nozzle (Fig. 4).

(4) Pull the rear washer hose through the CHMSL unit mounting hole far enough to access and disconnect the headliner washer hose from the barbed nipple of the rear check valve.

REAR CHECK VALVE (Continued)

**Fig. 4 Rear Check Valve Remove/Install**

- 1 - WASHER NOZZLE HOSE
- 2 - REAR CHECK VALVE
- 3 - HEADLINER HOSE
- 4 - ROOF PANEL
- 5 - NEEDLE NOSE PLIERS
- 6 - CHMSL MOUNTING HOLE

(5) Remove the rear check valve and rear washer nozzle hose as a unit through the CHMSL mounting hole.

(6) Disconnect the rear washer nozzle hose from the barbed nipple of the rear check valve.

INSTALLATION

(1) Reconnect the rear washer nozzle hose to the barbed nipple of the rear check valve. Be certain that the flow direction arrow molded into the rear check valve body is oriented towards the rear washer nozzle hose.

WARNING: THE EDGES OF THE SHEET METAL AROUND THE CENTER HIGH MOUNTED STOP LAMP MOUNTING HOLE IN THE ROOF PANEL. TAKE THE PROPER PRECAUTIONS TO AVOID PERSONAL INJURY.

(2) Reach through the CHMSL unit mounting hole in the rear of the roof panel to access and pull the headliner washer hose into the Center High Mounted Stop Lamp (CHMSL) unit mounting hole (Fig. 4).

(3) Reconnect the headliner washer hose to the barbed nipple of the rear check valve.

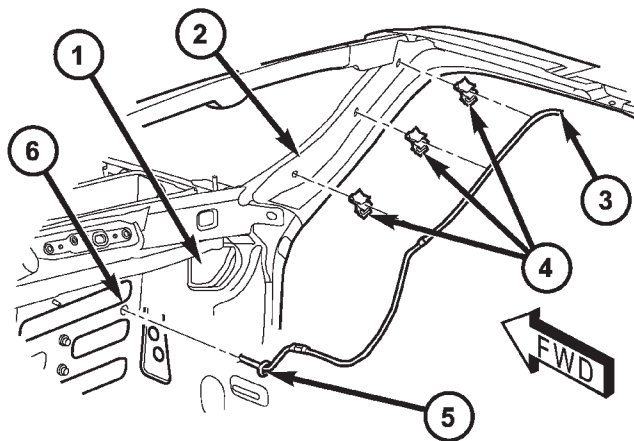
(4) Reach through the CHMSL unit mounting hole in the rear of the roof panel to access and reconnect the rear washer nozzle hose to the barbed nipple of the rear washer nozzle.

(5) Reinstall the CHMSL unit to the rear of the roof panel. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/CENTER HIGH MOUNTED STOP LAMP UNIT - INSTALLATION).

(6) Reconnect the battery negative cable.

REAR WASHER HOSES/TUBES

DESCRIPTION

**Fig. 5 Rear Washer Headliner Hose**

- 1 - COWL SIDE INNER PANEL
- 2 - A-PILLAR
- 3 - HEADLINER HOSE
- 4 - CLIP (3)
- 5 - GROMMET
- 6 - DASH PANEL

The rear washer plumbing consists of small diameter rubber hose routed from the barbed outlet nipple of the reversible electric washer pump/motor unit on the washer reservoir through a trough molded into the reservoir rearward of the washer pump up to the top of the reservoir. Near the base of the reservoir filler neck an in-line plastic fitting connects the reservoir rear washer hose to the engine compartment rear washer hose, which is routed through the reservoir filler neck opening in the front extension of the right front fender wheel house panel in to the engine compartment. The engine compartment rear washer hose is routed side by side with the front washer hose along the top of the right front fender wheel house to the dash panel. Molded plastic routing clips secure the hoses to the headlamp and dash wire harness in the engine compartment.

The engine compartment rear washer hose is connected to the headliner washer hose near the right side of the dash panel with a molded plastic in-line fitting (Fig. 5). The headliner hose has a rubber grommet that allows it to pass through the dash panel from the passenger compartment into the engine compartment. The headliner hose is routed below the instrument panel in the passenger compartment near the right cowl side inner panel. The hose is routed up the right A-pillar to the headliner. Mounting clips secure the hose to the A-pillar. The

REAR WASHER HOSES/TUBES (Continued)

headliner hose is glued to top of the headliner and routed along the right roof side rail to the rear of the vehicle. At the rear of the vehicle, the headliner hose passes through a hole at the rear portion of the roof rear inner header panel and is connected to the rear check valve. From the rear check valve, there is a short section of hose that connects the rear check valve to the rear washer nozzle.

Washer hose is available for service only as roll stock, which must then be cut to length. The headliner washer hose is integral to the headliner unit and, if faulty or damaged, the headliner unit must be replaced. However, the headliner hose is marked with a white cut line on the A-pillar where the hose should be cut and spliced with a plastic in-line connector fitting to facilitate headliner removal without the need to remove the instrument panel. (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL AND INSTALLATION). The molded plastic washer hose fittings cannot be repaired. If these fittings are faulty or damaged, they must be replaced.

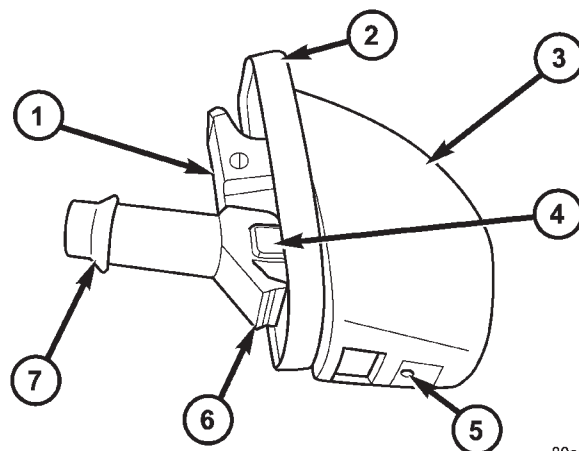
OPERATION

Washer fluid in the washer reservoir is pressurized and fed by the washer pump/motor through the rear washer system plumbing and fittings to the rear washer nozzle located on the roof panel above the rear flip-up glass opening. Whenever routing the washer hose or a wire harness containing a washer hose, it must be routed away from hot, sharp, or moving parts; and, sharp bends that might pinch the hose must be avoided.

REAR WASHER NOZZLE

DESCRIPTION

The rear washer nozzle is a fluidic-type unit constructed of molded plastic (Fig. 6). The nozzle is secured by a snap fit in a dedicated mounting hole located in the rear edge of the roof panel above the rear flip-up glass opening and to the right of the Center High Mounted Stop Lamp (CHMSL) unit. A rubber gasket on the back of the nozzle seals the nozzle to the roof panel opening. The back of the nozzle includes an integral alignment feature on the left side, an integral engagement tab on the top, an integral latch feature on the bottom, and the washer plumbing nipple which are all concealed between the outer roof panel and the rear roof inner header. The rear washer nozzle latch feature is a one time component, and will be damaged if the nozzle is removed from its mounting hole for service. The rear washer nozzle cannot be adjusted or repaired. If faulty or damaged, the entire nozzle unit must be replaced.



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Fig. 6 Rear Washer Nozzle

- 1 - ENGAGEMENT TAB (TOP)
- 2 - GASKET
- 3 - REAR WASHER NOZZLE
- 4 - ALIGNMENT FEATURE
- 5 - ORIFICE
- 6 - LATCH FEATURE (BOTTOM)
- 7 - NIPPLE

OPERATION

The rear washer nozzle is designed to dispense washer fluid into the wiper pattern area on the outside of the rear flip-up glass. Pressurized washer fluid is fed to the nozzle from the washer reservoir by the washer pump/motor through a single hose, which is attached to a barbed nipple on the back of the rear washer nozzle. The rear washer nozzle incorporates a fluidic design, which causes the nozzle to emit the pressurized washer fluid as an oscillating stream to more effectively cover a larger area of the glass area to be cleaned.

REMOVAL

NOTE: The rear washer nozzle latch feature is a one time component, and will be damaged if the nozzle is removed from its mounting hole for service. If removed from its mounting hole for any reason, the rear washer nozzle must be replaced with a new unit.

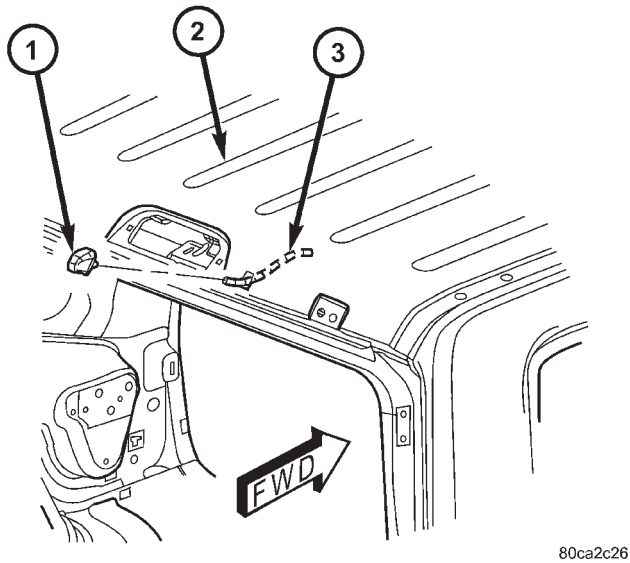
(1) Using a trim stick or another suitable wide flat-bladed tool, gently pry the bottom of the rear washer nozzle away from the roof panel until the latch feature at the bottom of the nozzle that secures it in the mounting hole of the roof panel snaps.

(2) Pull the rear washer nozzle out from the roof panel far enough to access the washer hose (Fig. 7).

(3) Disconnect the washer hose from the barbed nipple on the back of the rear washer nozzle.

(4) Discard the rear washer nozzle.

REAR WASHER NOZZLE (Continued)

**Fig. 7 Rear Washer Nozzle Remove/Install**

- 1 - NOZZLE
- 2 - ROOF PANEL
- 3 - HEADLINER HOSE

INSTALLATION

NOTE: The rear washer nozzle latch feature is a one time component, and will be damaged if the nozzle is removed from its mounting hole for service. If removed from its mounting hole for any reason, the rear washer nozzle must be replaced with a new unit.

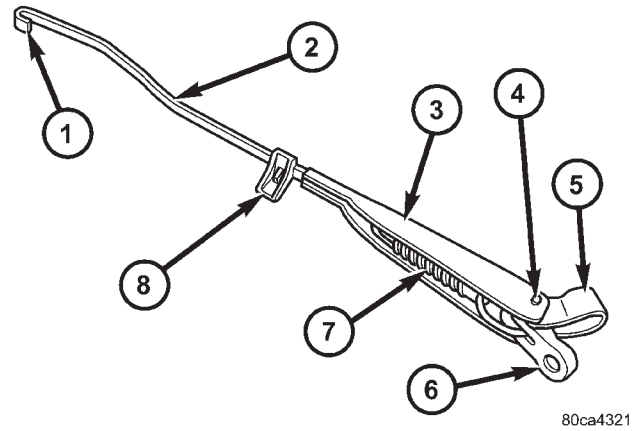
(1) Position the new rear washer nozzle to the roof panel (Fig. 7). Be certain that a new rubber gasket is in position on the back of the nozzle.

(2) Reconnect the washer hose to the barbed nipple on the back of the rear washer nozzle.

(3) Insert the rear washer nozzle supply hose and nipple into the mounting hole in the roof panel and align the nozzle with the hole.

(4) Engage the tab at the top of the nozzle behind the sheet metal at the top of the roof panel mounting hole.

(5) Using hand pressure, press firmly and evenly on the hood of the rear washer nozzle until the lower latch feature snaps into place behind the sheet metal at the bottom of the roof panel mounting hole.

REAR WIPER ARM**DESCRIPTION****Fig. 8 Rear Wiper Arm**

- 1 - HOOK
- 2 - STRAP
- 3 - CHANNEL
- 4 - HINGE PIN
- 5 - COVER
- 6 - PIVOT END
- 7 - TENSION SPRING
- 8 - SUPPORT

The rear wiper arm is the rigid member located between the rear wiper motor output shaft that protrudes from the outer tailgate panel near the base of the rear flip-up glass opening and the rear wiper blade (Fig. 8). This wiper arm features an over-center hinge that allows easy access to the tailgate and rear flip-up glass for cleaning, after the spare tire is removed. The wiper arm has a die cast metal pivot end with a large tapered mounting hole at one end. A molded plastic pivot cover is secured loosely to and pivots on the wiper arm hinge pin to conceal the wiper arm retaining nut. The wide end of a tapered, stamped steel channel is secured with a hinge pin to the pivot end of the wiper arm. One end of a long, rigid, stamped steel strap, with a small hole near its pivot end, 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. Concealed within the stamped steel channel, one end of a long spring is engaged with a wire hook on the underside of the die cast pivot end, while the other end of the spring is hooked through the small hole in the steel strap. A molded plastic wiper arm support is snapped onto the wiper arm strap where it exits the channel. The entire wiper arm has a satin black finish applied to all of its visible surfaces.

REAR WIPER ARM (Continued)

A wiper arm cannot be adjusted or repaired. If damaged or faulty, the entire wiper arm unit must be replaced.

OPERATION

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 wiper arm support is designed to lift and support the rear wiper arm and blade off of the glass when the rear wiper blade is parked. This support and the park ramp on the tailgate outer panel below the glass also provide an alignment reference to ensure accurate rear wiper arm and blade installation. The tapered hole in the wiper arm pivot end is 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 pivot cover hinges and 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 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.

REMOVAL

(1) Lift the rear wiper arm pivot cover by lifting it at the rear wiper motor output shaft end of the arm (Fig. 9).

(2) Remove the nut that secures the rear wiper arm to the rear wiper motor output shaft.

(3) If necessary, use a battery terminal puller to disengage the wiper arm from the rear wiper motor output shaft splines (Fig. 10).

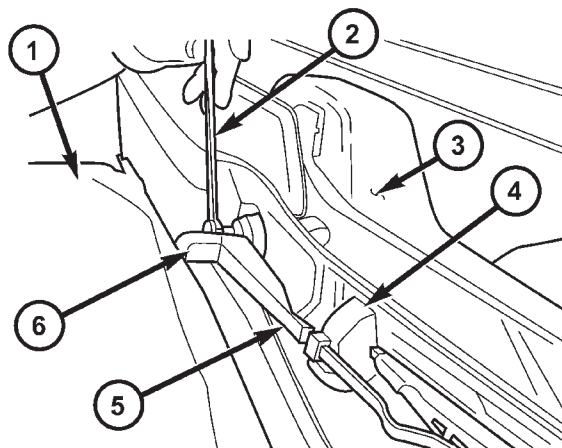
NOTE: Depending upon the size and type of puller used, it may be necessary to remove the spare tire from the tailgate. Refer to the owner's manual in the vehicle glove box for information on removing the spare tire from the tailgate.

(4) Remove the rear wiper arm pivot end from the motor output shaft.

INSTALLATION

NOTE: Always install the wiper arm and blade with the wiper motor in the Park position.

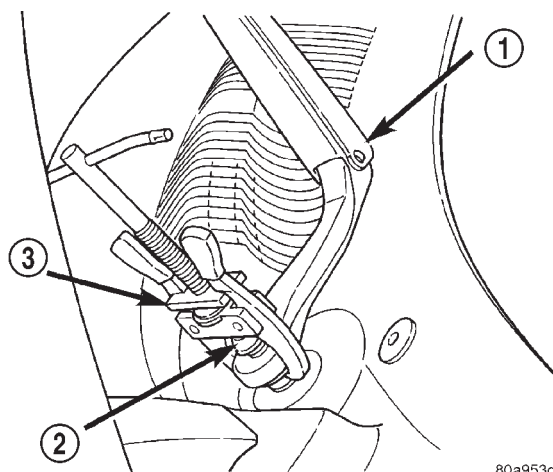
(1) The rear wiper arm must be indexed to the motor output shaft with the rear wiper motor in the park position to be properly installed. Place the



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Fig. 9 Rear Wiper Arm Remove/Install

- 1 - SPARE TIRE
- 2 - WRENCH
- 3 - FLIP-UP GLASS
- 4 - PARK RAMP
- 5 - REAR WIPER ARM
- 6 - PIVOT COVER



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Fig. 10 Wiper Arm Puller - Typical

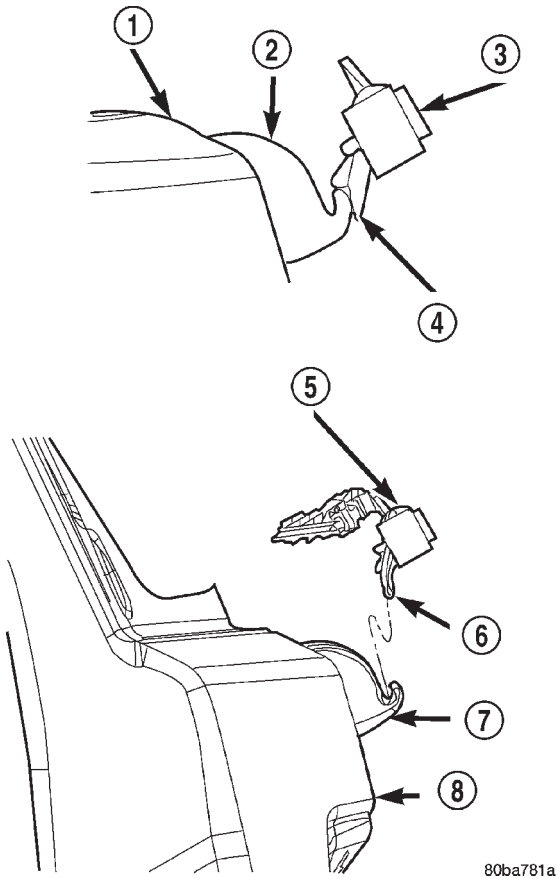
- 1 - WIPER ARM
- 2 - WIPER PIVOT
- 3 - BATTERY TERMINAL PULLER

wiper arm onto the tailgate with the wiper arm support positioned on the park ramp and the tapered mounting hole on the pivot end of the arm positioned over the rear wiper motor output shaft.

(2) Position the tab on the back of the rear wiper arm support on the tailgate park ramp in the Installation Position (Fig. 11).

(3) With the wiper arm in the Installation Position, push the tapered mounting hole on the pivot end of the wiper arm down over the rear wiper motor output shaft.

REAR WIPER ARM (Continued)

**Fig. 11 Rear Wiper Arm Installation**

- 1 - TAILGATE
- 2 - PARK RAMP
- 3 - REAR WIPER ARM
- 4 - INSTALLATION POSITION
- 5 - REAR WIPER ARM AND BLADE
- 6 - PARK POSITION
- 7 - PARK RAMP
- 8 - TAILGATE

(4) Install and tighten the nut that secures the rear wiper arm to the rear wiper motor output shaft. Tighten the nut to 18 N·m (13 ft. lbs.).

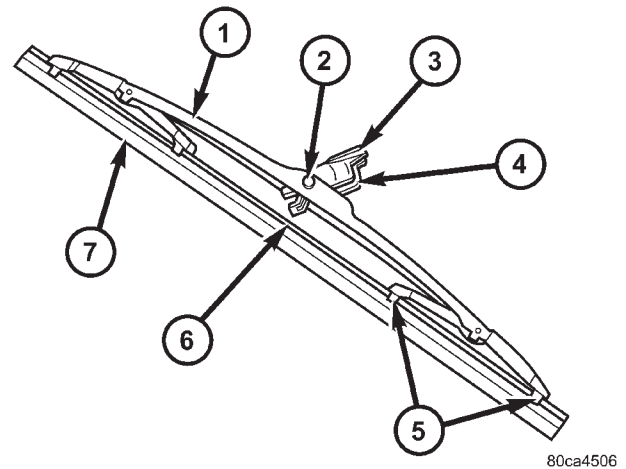
(5) Close the rear wiper arm pivot cover.

(6) Lift the rear wiper arm support away from the park ramp, then place the wiper arm support in the park ramp in the Park Position (Fig. 11).

REAR WIPER BLADE

DESCRIPTION

The rear wiper blade is secured by an integral latching pivot block to the hook formation on the tip of the rear wiper arm, and rests off the glass on a park ramp on the tailgate near the base of the rear flip-up glass opening when the wiper is not in oper-

**Fig. 12 Rear Wiper Blade**

- 1 - SUPERSTRUCTURE
- 2 - PIVOT PIN
- 3 - LATCH RELEASE
- 4 - PIVOT BLOCK
- 5 - CLAW
- 6 - FLEXOR
- 7 - ELEMENT

ation (Fig. 12). The rear wiper blade consists of the following components:

- **Superstructure** - The superstructure includes a stamped steel bridge and plastic 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.

- **Element** - 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.

All models have a single 28.00 centimeter (11.00 inch) rear wiper blade with a non-replaceable rubber element (squeegee). The wiper blade cannot be adjusted or repaired. If faulty, worn, or damaged the entire wiper blade unit must be replaced.

OPERATION

The wiper blade is moved back and forth across the glass by the wiper arm when the 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

REAR WIPER BLADE (Continued)

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.

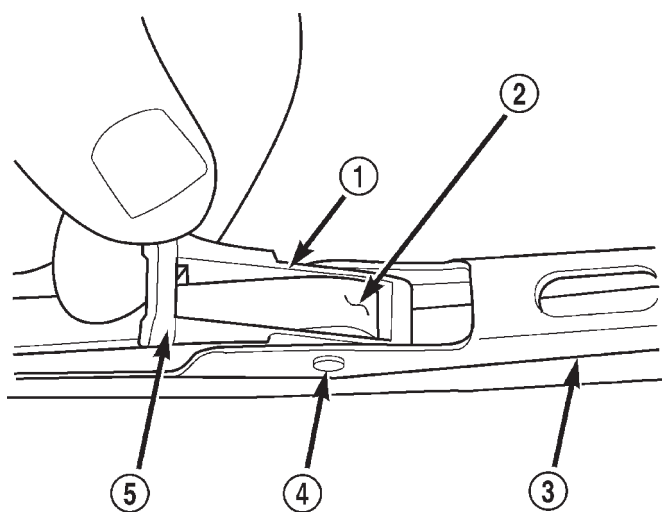
REMOVAL

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 motor output shaft.

(1) Disengage the rear wiper arm support from the rear wiper arm park ramp on the right side of the tailgate just below the rear flip-up glass.

(2) Lift the rear wiper arm to raise the wiper blade and element off of the tailgate and the rear flip-up glass.

(3) To remove the wiper blade from the wiper arm, carefully lift up the pivot block latch release tab on the top of the wiper arm to unlatch it from the arm (Fig. 13).

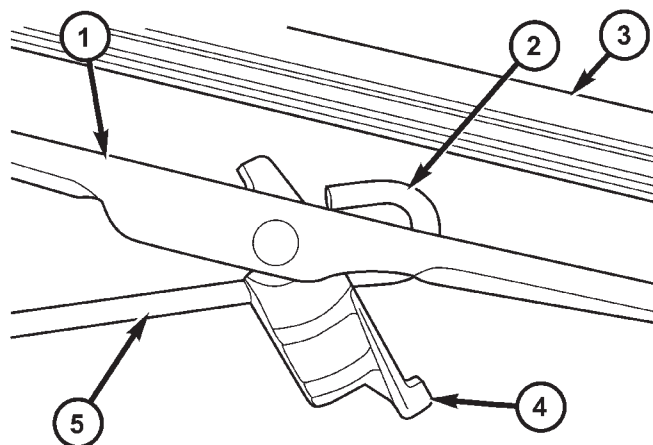


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Fig. 13 Rear Wiper Blade Release

- 1 - PIVOT BLOCK WINDOW
- 2 - TIP OF REAR WIPER ARM
- 3 - SUPERSTRUCTURE
- 4 - PIVOT BLOCK HINGE PIN
- 5 - LATCH RELEASE TAB

(4) Raise the pivot block latch release tab until it is perpendicular to the rear wiper blade superstructure (Fig. 14).



80ca44ab

Fig. 14 Rear Wiper Blade Remove/Install

- 1 - SUPERSTRUCTURE
- 2 - HOOK
- 3 - ELEMENT
- 4 - LATCH RELEASE
- 5 - REAR WIPER ARM

(5) Slide the rear wiper blade away from the tip of the arm towards the pivot end of the arm far enough to disengage the pivot block from the hook formation on the end of the arm.

(6) Extract the hook formation on the tip of the wiper arm from the window in the wiper blade pivot block/latch unit.

CAUTION: Do not allow the wiper arm to spring back against the tailgate or the flip-up glass without the wiper blade in place or they may be damaged.

(7) Gently lower the wiper arm and place the arm support in the park ramp.

INSTALLATION

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 motor output shaft.

(1) Lift the rear wiper arm support out of the tailgate park ramp.

(2) Position the rear wiper blade 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 motor output shaft.

REAR WIPER BLADE (Continued)

(3) Raise the pivot block latch release tab until it is perpendicular to the rear wiper blade superstructure (Fig. 14).

(4) Insert the hook formation on the tip of the wiper arm through the window in the wiper blade pivot block/latch unit.

(5) Slide the wiper blade pivot block/latch up into the hook formation on the tip of the wiper arm until the hook is firmly seated against the pivot block.

(6) Press the pivot block latch release tab downward until it snaps into its locked position over the top of the wiper arm.

(7) Gently lower the wiper arm and place the arm support in the tailgate park ramp.

REAR WIPER MOTOR

DESCRIPTION

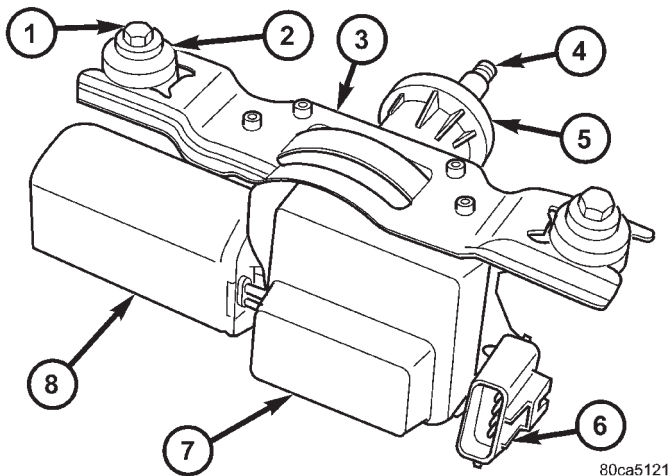


Fig. 15 Rear Wiper Motor

- 1 - SCREW (2)
- 2 - INSULATOR (2)
- 3 - BRACKET
- 4 - OUTPUT SHAFT
- 5 - SEAL
- 6 - CONNECTOR RECEPTACLE
- 7 - COVER
- 8 - MOTOR

The rear wiper motor is concealed within the tailgate, below the rear flip-up glass opening and behind the tailgate inner trim panel. The end of the motor output shaft that protrudes through the tailgate outer panel to drive the rear wiper arm and blade is the only visible component of the rear wiper motor (Fig. 15). A rubber gasket, a bezel, and a nut secure and seal the motor output shaft to the tailgate outer panel. A molded plastic nut cover snaps onto the bezel to conceal the nut and improve appearance. An integral connector receptacle connects the rear wiper

motor to the vehicle electrical system through a dedicated take out and connector of the tailgate wire harness. The rear wiper motor consists of the following major components:

- **Bracket** - The rear wiper motor bracket consists of a stamped steel mounting plate for the wiper motor that is secured with screws through two rubber insulators to the tailgate inner panel.

- **Rear Wiper Module** - The rear wiper motor electronic controls are concealed beneath a molded plastic cover and includes the rear wiper system electronic logic and rear wiper motor electronic controls.

- **Motor** - The permanent magnet rear wiper motor is secured with screws to the rear wiper motor bracket. The wiper motor includes an integral transmission, and the motor output shaft.

The rear wiper motor cannot be adjusted or repaired. If any component of the motor is faulty or damaged, the entire rear wiper motor unit must be replaced. The motor output shaft gasket, bezel, nut, and nut cover are available for service replacement.

OPERATION

The rear wiper motor receives non-switched battery current through a fuse in the Junction Block (JB) on a fused B(+) circuit and is connected to ground at all times. The rear wiper motor operation is controlled by the vehicle operator through battery current signal inputs received by the rear wiper motor electronic control module from the rear wiper switch circuitry that is integral to the right (wiper) control stalk of the multi-function switch on the steering column. The module also receives an external control input from the flip-up glass ajar switch sense circuit. If the rear wiper module senses that the flip-up glass is ajar, it will not allow the rear wiper motor to operate.

The rear wiper module electronic control logic uses these inputs, its internal inputs, and its programming to provide a continuous wipe mode, an intermittent wipe mode, a wipe-after-wash mode, and off-the-glass wiper blade parking. The wiper blade cycling is controlled by the internal electronic controls of the module. The module controls current flow to the wiper motor brushes and provides an electronic speed control that speeds the wiper blade near the center of the glass, but slows the wiper blade during directional reversals at each end of the wipe pattern and during wiper blade off-the-glass parking for quieter operation. The 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 rear flip-up glass.

REAR WIPER MOTOR (Continued)

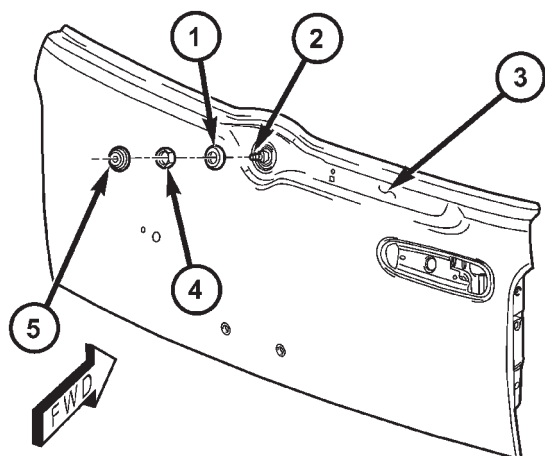
REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the rear wiper arm from the rear wiper motor output shaft. (Refer to 8 - ELECTRICAL/REAR WIPERS/WASHERS/REAR WIPER ARM - REMOVAL).

(3) Using a small thin-bladed tool, gently pry at the notch in the base of the rear wiper motor output shaft bezel to unsnap the nut cover from the bezel (Fig. 16). **Be certain to take proper precautions to protect the outer tailgate panel and its paint finish from damage during this procedure.**

(4) Remove the nut that secures the rear wiper motor output shaft to the outer swing gate panel (Fig. 16).



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Fig. 16 Rear Wiper Motor Output Shaft Nut Remove/Install

- 1 - BEZEL AND GASKET
- 2 - OUTPUT SHAFT
- 3 - TAILGATE OUTER PANEL
- 4 - NUT
- 5 - NUT COVER

(5) Remove the bezel and gasket from the rear wiper motor output shaft.

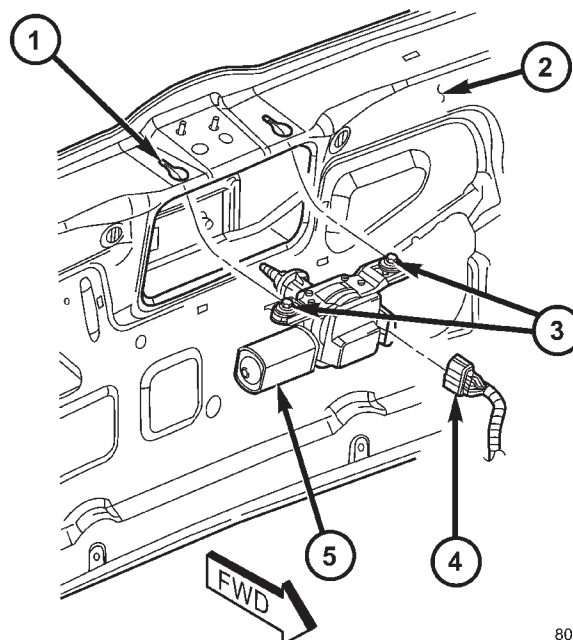
(6) Remove the trim panel from the tailgate inner panel. (Refer to 23 - BODY/SWING GATE/TRIM PANEL - REMOVAL).

(7) Disconnect the tailgate wire harness connector for the flip-up glass ajar switch from the flip-up glass latch connector receptacle.

(8) Disconnect the tailgate wire harness connector for the rear wiper motor from the motor connector receptacle (Fig. 17).

(9) Loosen the two screws that secure the rear wiper motor mounting bracket to the top of the tailgate inner panel.

(10) Slide the rear wiper motor and mounting bracket back far enough to disengage the two mount-



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Fig. 17 Rear Wiper Motor Remove/Install

- 1 - KEYED SLOT (2)
- 2 - SWING GATE INNER PANEL
- 3 - SCREW (2)
- 4 - REAR WIPER MOTOR ELECTRICAL CONNECTOR
- 5 - REAR WIPER MOTOR

ing screws from the keyed slots in the top of the tailgate inner panel.

(11) Remove the rear wiper motor and mounting bracket from the tailgate as a unit.

INSTALLATION

(1) Position the rear wiper motor and bracket into the tailgate as a unit (Fig. 17).

(2) Insert the rear wiper motor output shaft through the hole in the tailgate outer panel and engage the two mounting screws into the keyed slots in the top of tailgate inner panel.

(3) From the outside of the tailgate, center the rear wiper motor output shaft in the tailgate outer panel clearance hole and install the gasket and bezel over the centered shaft (Fig. 16).

(4) Install and tighten the nut that secures the rear wiper motor output shaft to the outer tailgate panel. Tighten the nut to 5 N·m (43 in. lbs.).

(5) From the inside of the tailgate, tighten the two screws that secure the rear wiper motor mounting bracket to the top of the tailgate inner panel. Tighten the screws to 6 N·m (57 in. lbs.).

(6) Reconnect the tailgate wire harness connector for the rear wiper motor to the motor connector receptacle.

REAR WIPER MOTOR (Continued)

(7) Reconnect the tailgate wire harness connector for the flip-up glass ajar switch to the flip-up glass latch connector receptacle.

(8) Reinstall the trim panel onto the tailgate inner panel. (Refer to 23 - BODY/SWING GATE/TRIM PANEL - INSTALLATION).

(9) From the outside of the tailgate, press the nut cover firmly and evenly over the rear wiper motor output shaft bezel using hand pressure until it snaps into place.

(10) Reinstall the rear wiper arm onto the rear wiper motor output shaft. (Refer to 8 - ELECTRICAL/REAR WIPERS/WASHERS/REAR WIPER ARM - INSTALLATION).

(11) Reconnect the battery negative cable.

REAR WIPER/WASHER SWITCH

DESCRIPTION

The rear wiper and washer switches are integral to the right (wiper) control stalk of the multi-function switch. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/MULTI-FUNCTION SWITCH - DESCRIPTION).

OPERATION

The rear wiper and washer switches are integral to the right (wiper) control stalk of the multi-function switch. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/MULTI-FUNCTION SWITCH - OPERATION).

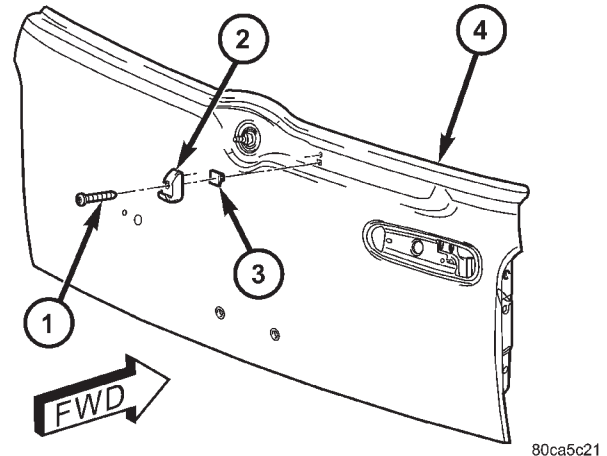
WIPER ARM PARK RAMP

REMOVAL

(1) Disengage the rear wiper arm support from the wiper arm park ramp on the right side of the tailgate just below the rear flip-up glass.

(2) Lift the wiper arm and blade away from the tailgate until the wiper arm hinge is in its over-center position.

Remove the screw that secures the wiper arm park ramp to the tailgate outer panel (Fig. 18).



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Fig. 18 Wiper Arm Park Ramp Remove/Install

- 1 - SCREW (1)
- 2 - PARK RAMP
- 3 - RIVET NUT (1)
- 4 - TAILGATE OUTER PANEL

(3) Remove the wiper arm park ramp from the tailgate outer panel.

INSTALLATION

(1) Position the wiper arm park ramp onto the tailgate outer panel (Fig. 18).

(2) Install and tighten the screw that secures the wiper arm park ramp to the tailgate outer panel. Tighten the screw to 5 N·m (45 in. lbs.).

(3) Lower the rear wiper arm and blade and place the wiper arm support onto the wiper arm park ramp.

WIRING

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8W-01 WIRING DIAGRAM INFORMATION

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DESCRIPTION - HOW TO USE WIRING		SHORT TO GROUND	9
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DESCRIPTION - CIRCUIT INFORMATION	5	SHORT TO GROUND ON FUSES	
DESCRIPTION - CIRCUIT FUNCTIONS	5	POWERING SEVERAL LOADS	9
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WIRING DIAGRAM
INFORMATION

DESCRIPTION

DESCRIPTION - HOW TO USE WIRING
DIAGRAMS

DaimlerChrysler Corporation wiring diagrams are designed to provide information regarding the vehicles wiring content. In order to effectively use the wiring diagrams to diagnose and repair DaimlerChrysler Corporation vehicles, it is important to understand all of their features and characteristics.

Diagrams are arranged such that the power (B+) side of the circuit is placed near the top of the page, and the ground (B-) side of the circuit is placed near the bottom of the page (Fig. 1).

All switches, components, and modules are shown in the at rest position with the doors closed and the key removed from the ignition (Fig. 2).

Components are shown two ways. A solid line around a component indicates that the component is complete. A dashed line around the component indicates that the component is being shown is not complete. Incomplete components have a reference number to indicate the page where the component is shown complete.

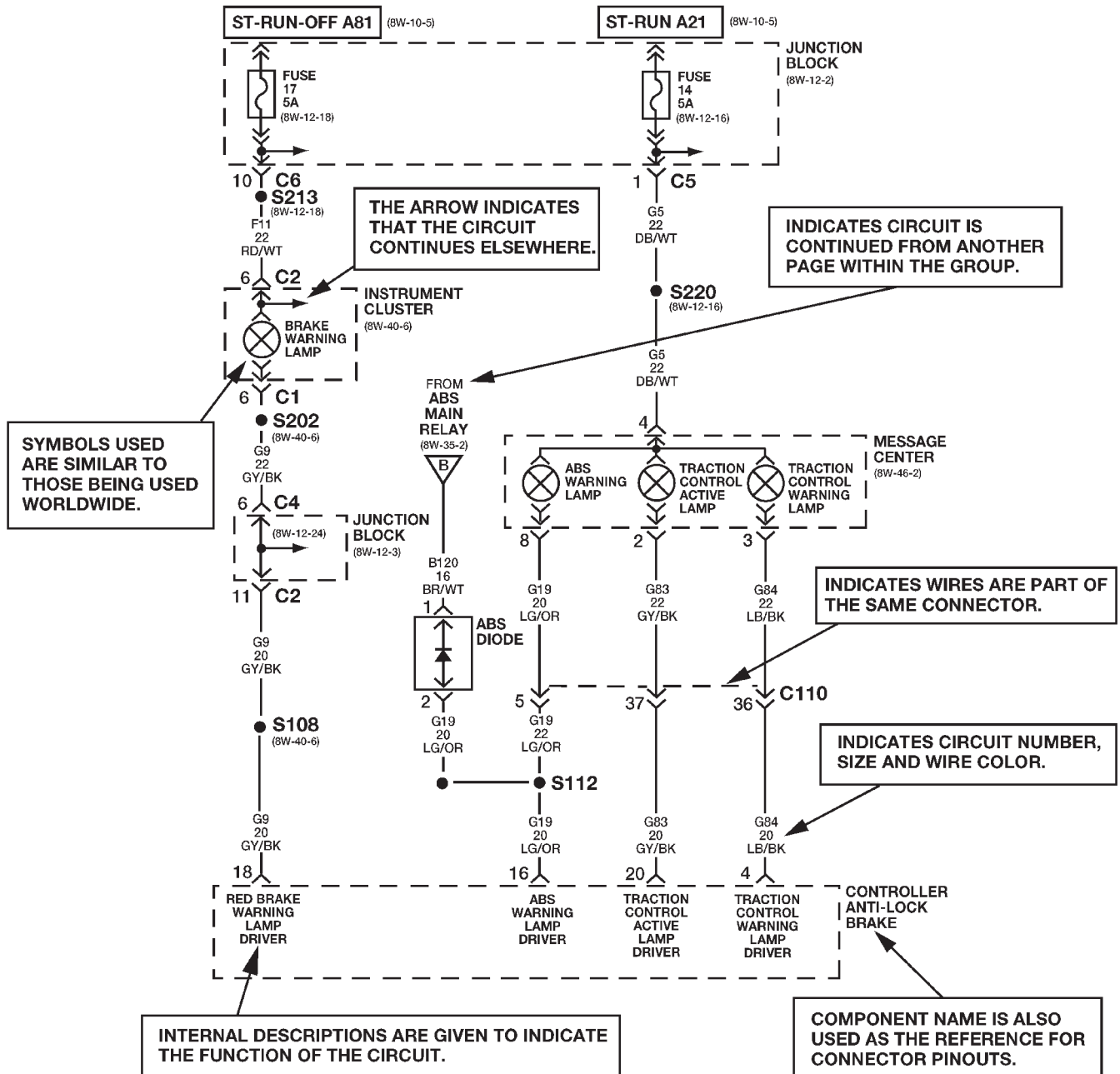
It is important to realize that no attempt is made on the diagrams to represent components and wiring as they appear on the vehicle. For example, a short piece of wire is treated the same as a long one. In addition, switches and other components are shown as simply as possible, with regard to function only.

SYMBOLS

International symbols are used throughout the wiring diagrams. These symbols are consistent with those being used around the world (Fig. 3).

WIRING DIAGRAM INFORMATION (Continued)

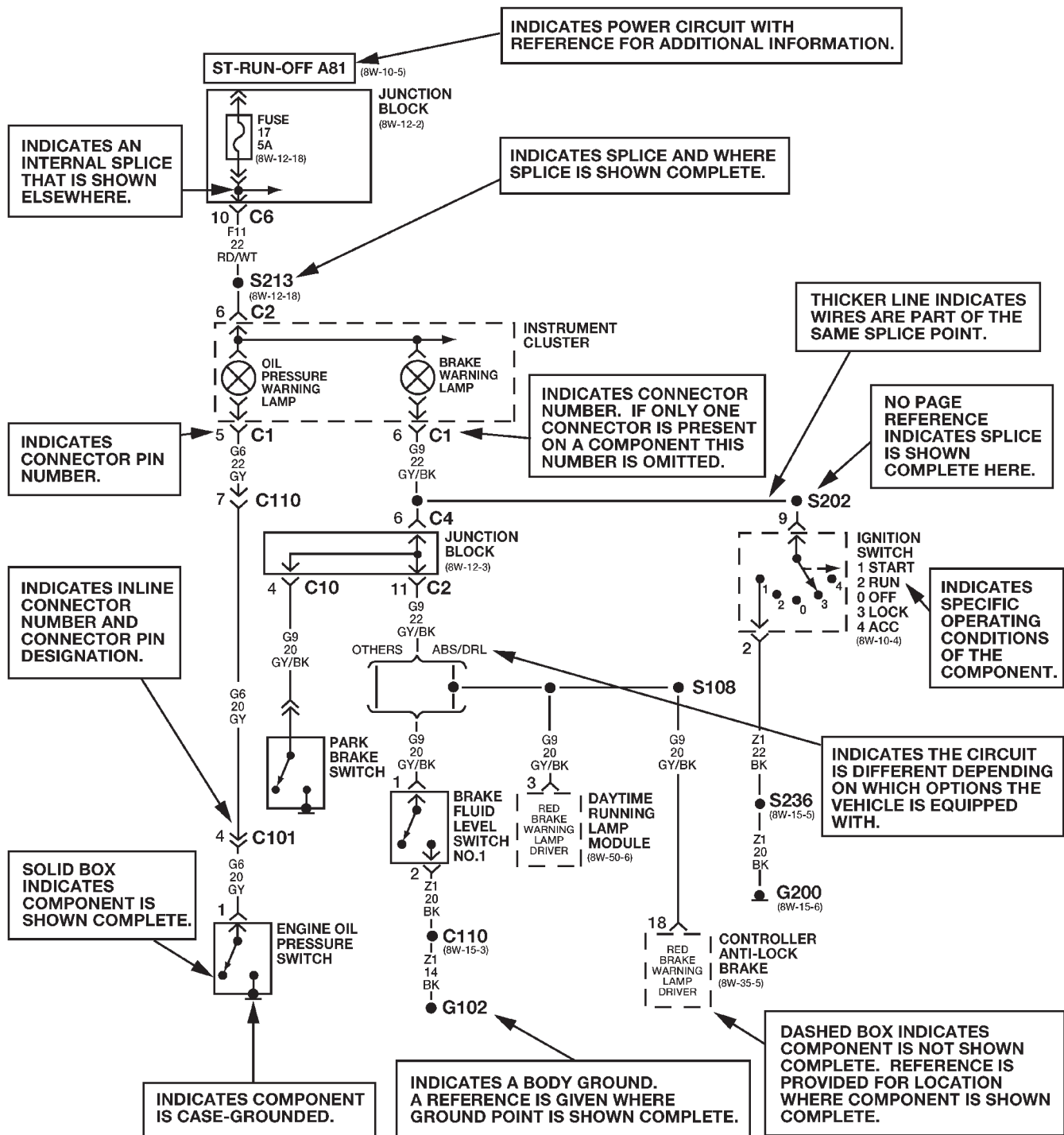
DIAGRAMS ARE ARRANGED WITH THE POWER B+ SIDE OF THE CIRCUIT NEAR THE TOP OF THE PAGE, AND THE GROUND SIDE OF THE CIRCUIT NEAR THE BOTTOM OF THE PAGE.



The System shown here is an **EXAMPLE ONLY**. It does not represent the actual circuit shown in the **WIRING DIAGRAM SECTION**.

Fig. 1 WIRING DIAGRAM EXAMPLE 1

WIRING DIAGRAM INFORMATION (Continued)



The System shown here is an **EXAMPLE ONLY**. It does not represent the actual circuit shown in the **WIRING DIAGRAM SECTION**.

Fig. 2 WIRING DIAGRAM EXAMPLE 2

WIRING DIAGRAM INFORMATION (Continued)

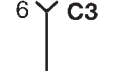
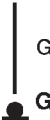
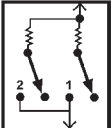
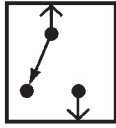
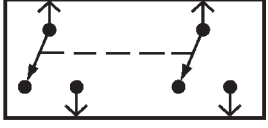
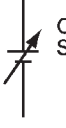
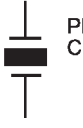
 FUSIBLE LINK  FUSE  CIRCUIT BREAKER OR PTC PROTECTION DEVICE	 BATTERY  IN-LINE CONNECTORS
 BATT A0 HOT BAR  CHOICE BRACKET (8W-30-10) PAGE REFERENCE	 MULTIPLE CONNECTOR  MALE CONNECTOR  FEMALE CONNECTOR
 CLOCKSPRING  GROUND G101  SCREW TERMINAL	 SINGLE FILAMENT LAMP  DUAL FILAMENT LAMP  ANTENNA
 RESISTIVE MULTIPLEX SWITCH	 NPN TRANSISTOR  PNP TRANSISTOR  TONE GENERATOR
 OPEN SWITCH  CLOSED SWITCH	 LED  PHOTODIODE  DIODE  ZENER DIODE
 GANGED SWITCH  SLIDING DOOR CONTACT	 OXYGEN SENSOR  GAUGE  PIEZOELECTRIC CELL
 WIRE ORIGIN & DESTINATION SHOWN WITHIN CELL  WIRE DESTINATION SHOWN IN ANOTHER CELL	 RESISTOR  POTENTIOMETER  VARIABLE RESISTOR OR THERMISTOR  HEATER ELEMENT
 EXTERNAL SPLICE S350  INTERNAL SPLICE  INCOMPLETE SPLICE (INTERNAL)	 NON-POLARIZED CAPACITOR  POLARIZED CAPACITOR  VARIABLE CAPACITOR
 ONE SPEED MOTOR  TWO SPEED MOTOR  REVERSIBLE MOTOR	 COIL  SOLENOID  SOLENOID VALVE

Fig. 3 WIRING DIAGRAM SYMBOLS

WIRING DIAGRAM INFORMATION (Continued)

TERMINOLOGY

This is a list of terms and definitions used in the wiring diagrams.

LHD Left Hand Drive Vehicles

RHD Right Hand Drive Vehicles

ATX . . Automatic Transmissions-Front Wheel Drive

MTX . . . Manual Transmissions-Front Wheel Drive

AT . . . Automatic Transmissions-Rear Wheel Drive

MT Manual Transmissions-Rear Wheel Drive

SOHC Single Over Head Cam Engine

DOHC Double Over Head Cam Engine

Built-Up-Export Vehicles Built For Sale In

Markets Other Than North America

Except-Built-Up-Export . . Vehicles Built For Sale In

North America

DESCRIPTION - CIRCUIT INFORMATION

Each wire shown in the diagrams contains a code which identifies the main circuit, part of the main circuit, gage of wire, and color (Fig. 4).

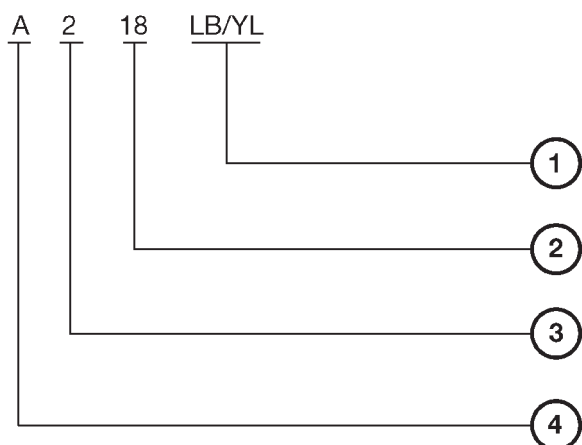


Fig. 4 WIRE CODE IDENTIFICATION

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- 1 - COLOR OF WIRE (LIGHT BLUE WITH YELLOW TRACER)
- 2 - GAGE OF WIRE (18 GAGE)
- 3 - PART OF MAIN CIRCUIT (VARIES DEPENDING ON EQUIPMENT)
- 4 - MAIN CIRCUIT IDENTIFICATION

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

COLOR CODE	COLOR
OR	ORANGE
PK	PINK
RD	RED
TN	TAN
VT	VIOLET
WT	WHITE
YL	YELLOW
*	WITH TRACER

DESCRIPTION - CIRCUIT FUNCTIONS

All circuits in the diagrams use an alpha/numeric code to identify the wire and it's function. To identify which circuit code applies to a system, refer to the Circuit Identification Code Chart. 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	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	OPEN
I	NOT USED
J	OPEN
K	POWERTRAIN CONTROL MODULE
L	EXTERIOR LIGHTING
M	INTERIOR LIGHTING
N	NOT USED
O	NOT USED
P	POWER OPTION (BATTERY FEED)
Q	POWER OPTIONS (IGNITION FEED)
R	PASSIVE RESTRAINT
S	SUSPENSION/STEERING
T	TRANSMISSION/TRANSAXLE/ TRANSFER CASE

WIRING DIAGRAM INFORMATION (Continued)

CIRCUIT	FUNCTION
U	OPEN
V	SPEED CONTROL, WIPER/ WASHER
W	OPEN
X	AUDIO SYSTEMS
Y	OPEN
Z	GROUND

DESCRIPTION - SECTION IDENTIFICATION AND INFORMATION

The wiring diagrams are grouped into individual sections. If a component is most likely found in a particular group, it will be shown complete (all wires, connectors, and pins) within that group. For example, the Auto Shutdown Relay is most likely to be found in Group 30, so it is shown there complete. It can, however, be shown partially in another group if it contains some associated wiring.

Splice diagrams in Section 8W-70 show the entire splice and provide references to other sections the splices serves. Section 8W-70 only contains splice diagrams that are not shown in their entirety somewhere else in the wiring diagrams.

Section 8W-80 shows each connector and the circuits involved with that connector. The connectors are identified using the name/number on the diagram pages.

WIRING SECTION CHART

GROUP	TOPIC
8Wa-01 thru 8W-09	General information and Diagram Overview
8Wa-10 thru 8W-19	Main Sources of Power and Vehicle Grounding
8Wa-20 thru 8W-29	Starting and Charging
8Wa-30 thru 8W-39	Powertrain/Drivetrain Systems
8Wa-40 thru 8W-49	Body Electrical items and A/C
8Wa-50 thru 8W-59	Exterior Lighting, Wipers and Trailer Tow
8Wa-60 thru 8W-69	Power Accessories
8Wa-70	Splice Information
8Wa-80	Connector Pin Outs
8Wa-91	Connector, Ground and Splice Locations

DESCRIPTION - CONNECTOR, GROUND AND SPLICE INFORMATION

CAUTION: Not all connectors are serviced. Some connectors are serviced only with a harness. A typical example might be the Supplemental Restraint System connectors. Always check parts availability before attempting a repair.

IDENTIFICATION

In-line connectors are identified by a number, as follows:

- In-line connectors located in the engine compartment are C100 series numbers
- In-line connectors located in the Instrument Panel area are C200 series numbers.
- In-line connectors located in the body are C300 series numbers.
- Jumper harness connectors are C400 series numbers.
- Grounds and ground connectors are identified with a "G" and follow the same series numbering as the in-line connectors.
- Splices are identified with an "S" and follow the same series numbering as the in-line connectors.
- Component connectors are identified by the component name instead of a number. Multiple connectors on a component use a C1, C2, etc. identifier.

LOCATIONS

Section 8W-91 contains connector/ground/splice location illustrations. The illustrations contain the connector name (or number)/ground number/splice number and component identification. Connector/ground/splice location charts in section 8W-91 reference the figure numbers of the illustrations.

The abbreviation T/O is used in the component location section to indicate a point in which the wiring harness branches out to a component. The abbreviation N/S means Not Shown in the illustrations

WARNINGS - GENERAL

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.

WIRING DIAGRAM INFORMATION (Continued)

WARNING: BE SURE THAT THE IGNITION SWITCH ALWAYS IS 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.

DIAGNOSIS AND TESTING - WIRING HARNESS

TROUBLESHOOTING TOOLS

When diagnosing a problem in an electrical circuit there are several common tools necessary. These tools are listed and explained below.

- Jumper Wire - This is a test wire used to connect two points of a circuit. It can be used to bypass an open in a circuit.

WARNING: NEVER USE A JUMPER WIRE ACROSS A LOAD, SUCH AS A MOTOR, CONNECTED BETWEEN A BATTERY FEED AND GROUND.

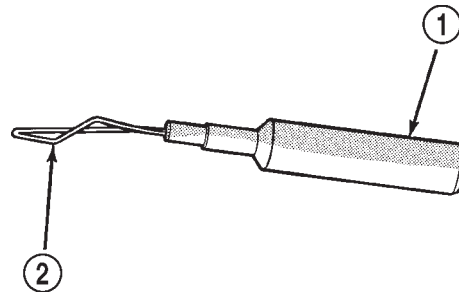
- Voltmeter - Used to check for voltage on a circuit. Always connect the black lead to a known good ground and the red lead to the positive side of the circuit.

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 - Used to check the resistance between two points of a circuit. Low or no resistance in a circuit means good continuity.

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.

- Probing Tools - These tools are used for probing terminals in connectors (Fig. 5). Select the proper size tool from Special Tool Package 6807, and insert it into the terminal being tested. Use the other end of the tool to insert the meter probe.



948W-233

Fig. 5 PROBING TOOL

- 1 - SPECIAL TOOL 6801
2 - PROBING END

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

WIRING DIAGRAM INFORMATION (Continued)

TROUBLESHOOTING WIRING PROBLEMS

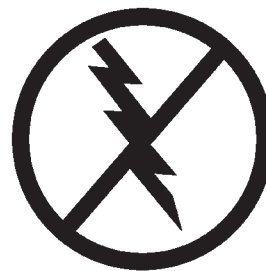
When troubleshooting wiring problems there are six steps which can aid in the procedure. The steps are listed and explained below. Always check for non-factory items added to the vehicle before doing any diagnosis. If the vehicle is equipped with these items, disconnect them to verify these add-on items are not the cause of the problem.

- (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 the 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 the wiring diagrams.

STANDARD PROCEDURE**STANDARD PROCEDURE - ELECTROSTATIC DISCHARGE (ESD) SENSITIVE DEVICES**

All ESD sensitive components are solid state and a symbol (Fig. 6) 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 part is ESD sensitive, assume that it is.

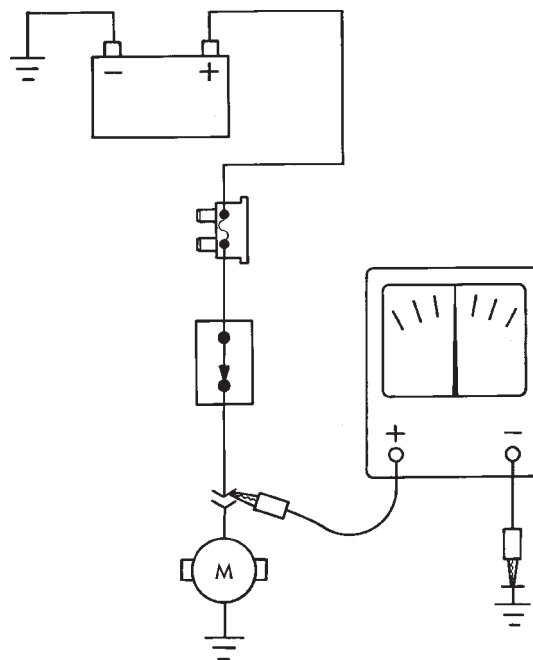
- (1) Always touch a known good ground before handling the part. This should be repeated while handling the part and more frequently after sliding across a seat, sitting down from a standing position, or walking a distance.
- (2) Avoid touching electrical terminals of the part, unless instructed to do so by a written procedure.
- (3) When using a voltmeter, be sure to connect the ground lead first.
- (4) Do not remove the part from its protective packing until it is time to install the part.
- (5) Before removing the part from its package, ground the package to a known good ground on the vehicle.



80ce3d47

Fig. 6 ELECTROSTATIC DISCHARGE SYMBOL**STANDARD PROCEDURE - TESTING OF VOLTAGE POTENTIAL**

- (1) Connect the ground lead of a voltmeter to a known good ground (Fig. 7).
- (2) Connect the other lead of the voltmeter to the selected test point. The vehicle ignition may need to be turned ON to check voltage. Refer to the appropriate test procedure.

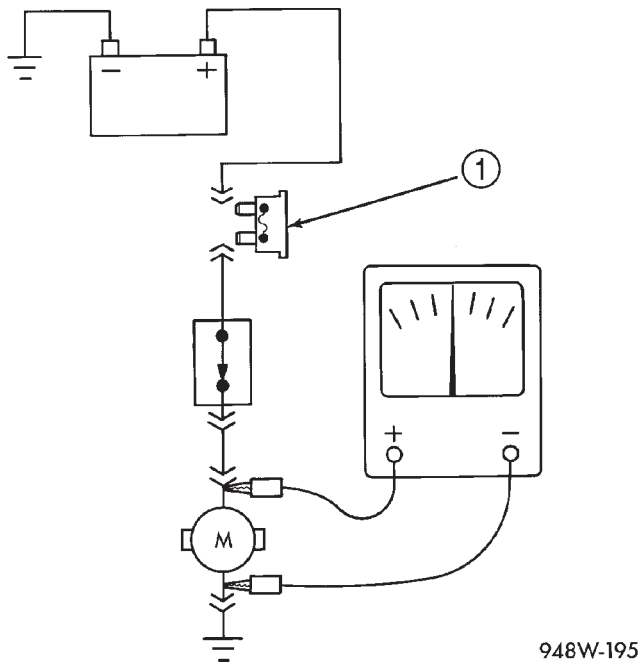


948W-194

Fig. 7 TESTING FOR VOLTAGE POTENTIAL**STANDARD PROCEDURE - TESTING FOR CONTINUITY**

- (1) Remove the fuse for the circuit being checked or, disconnect the battery.
- (2) Connect one lead of the ohmmeter to one side of the circuit being tested (Fig. 8).
- (3) Connect the other lead to the other end of the circuit being tested. Low or no resistance means good continuity.

WIRING DIAGRAM INFORMATION (Continued)



948W-195

Fig. 8 TESTING FOR CONTINUITY

1 - FUSE REMOVED FROM CIRCUIT

STANDARD PROCEDURE - TESTING FOR A SHORT TO GROUND

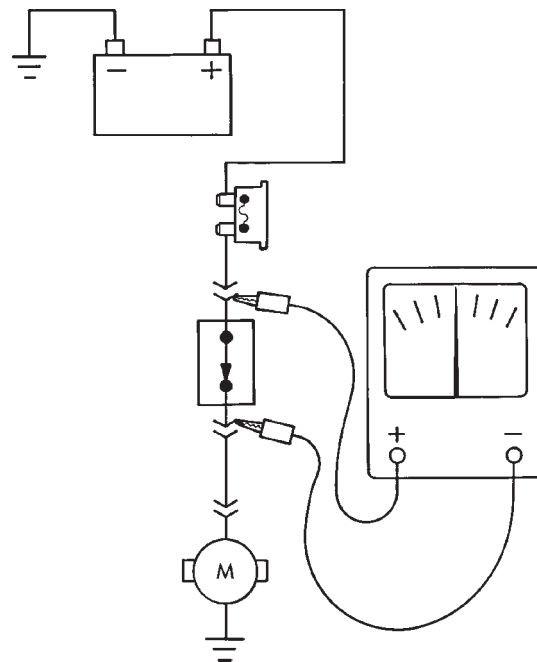
- (1) Remove the fuse and disconnect all items involved with the fuse.
- (2) Connect a test light or a voltmeter across the terminals of the fuse.
- (3) Starting at the fuse block, wiggle the wiring harness about six to eight inches apart and watch the voltmeter/test lamp.
- (4) If the voltmeter registers voltage or the test lamp glows, there is a short to ground in that general area of the wiring harness.

STANDARD PROCEDURE - TESTING FOR A SHORT TO GROUND ON FUSES POWERING SEVERAL LOADS

- (1) Refer to the wiring diagrams and disconnect or isolate all items on the suspected fused circuits.
- (2) Replace the blown fuse.
- (3) Supply power to the fuse by turning ON the ignition switch or re-connecting the battery.
- (4) Start connecting or energizing the items in the fuse circuit one at a time. When the fuse blows the circuit with the short to ground has been isolated.

STANDARD PROCEDURE - TESTING FOR A VOLTAGE DROP

- (1) Connect the positive lead of the voltmeter to the side of the circuit closest to the battery (Fig. 9).
- (2) Connect the other lead of the voltmeter to the other side of the switch, component or circuit.
- (3) Operate the item.
- (4) The voltmeter will show the difference in voltage between the two points.



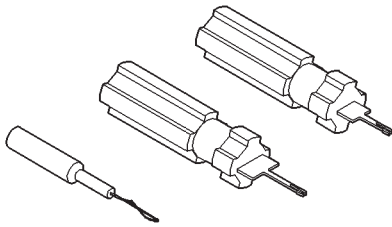
948W-196

Fig. 9 TESTING FOR VOLTAGE DROP

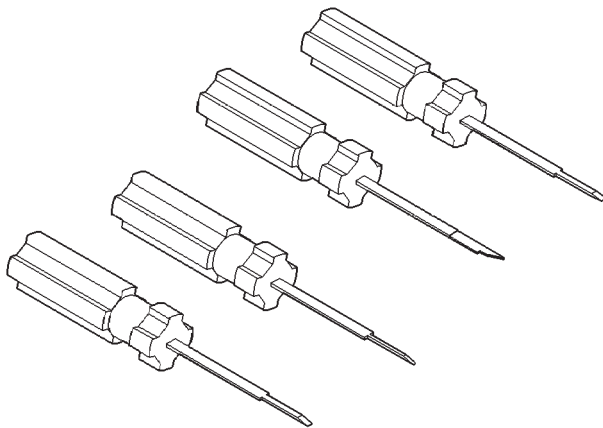
WIRING DIAGRAM INFORMATION (Continued)

SPECIAL TOOLS

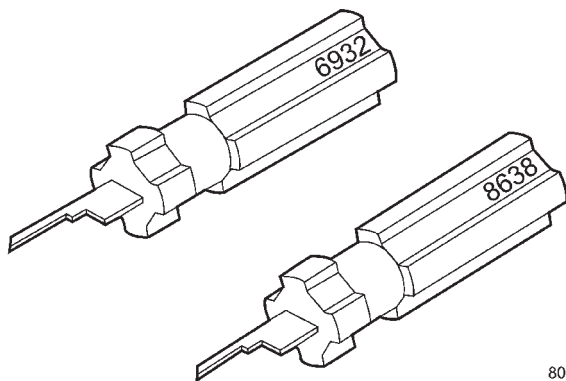
WIRING/TERMINAL



PROBING TOOL PACKAGE 6807

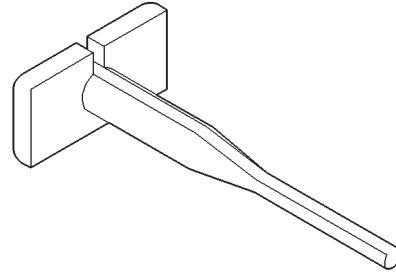


TERMINAL PICK TOOL SET 6680



8091c8da

TERMINAL REMOVING TOOLS 6932 AND 8638

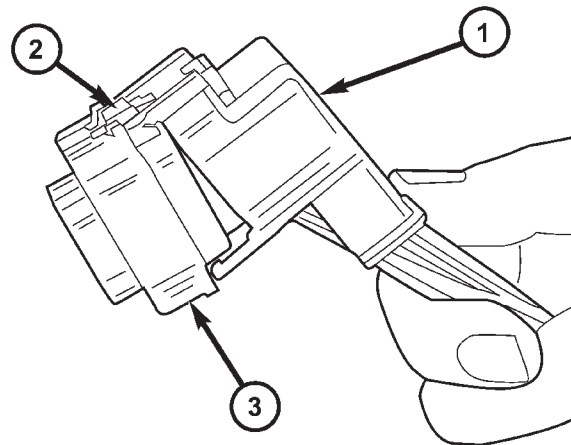


TERMINAL REMOVING TOOL 6934

CONNECTOR

REMOVAL

- (1) Disconnect battery.
- (2) Release Connector Lock (Fig. 10).
- (3) Disconnect the connector being repaired from its mating half/component.
- (4) Remove the dress cover (if applicable) (Fig. 10).



80c97bac

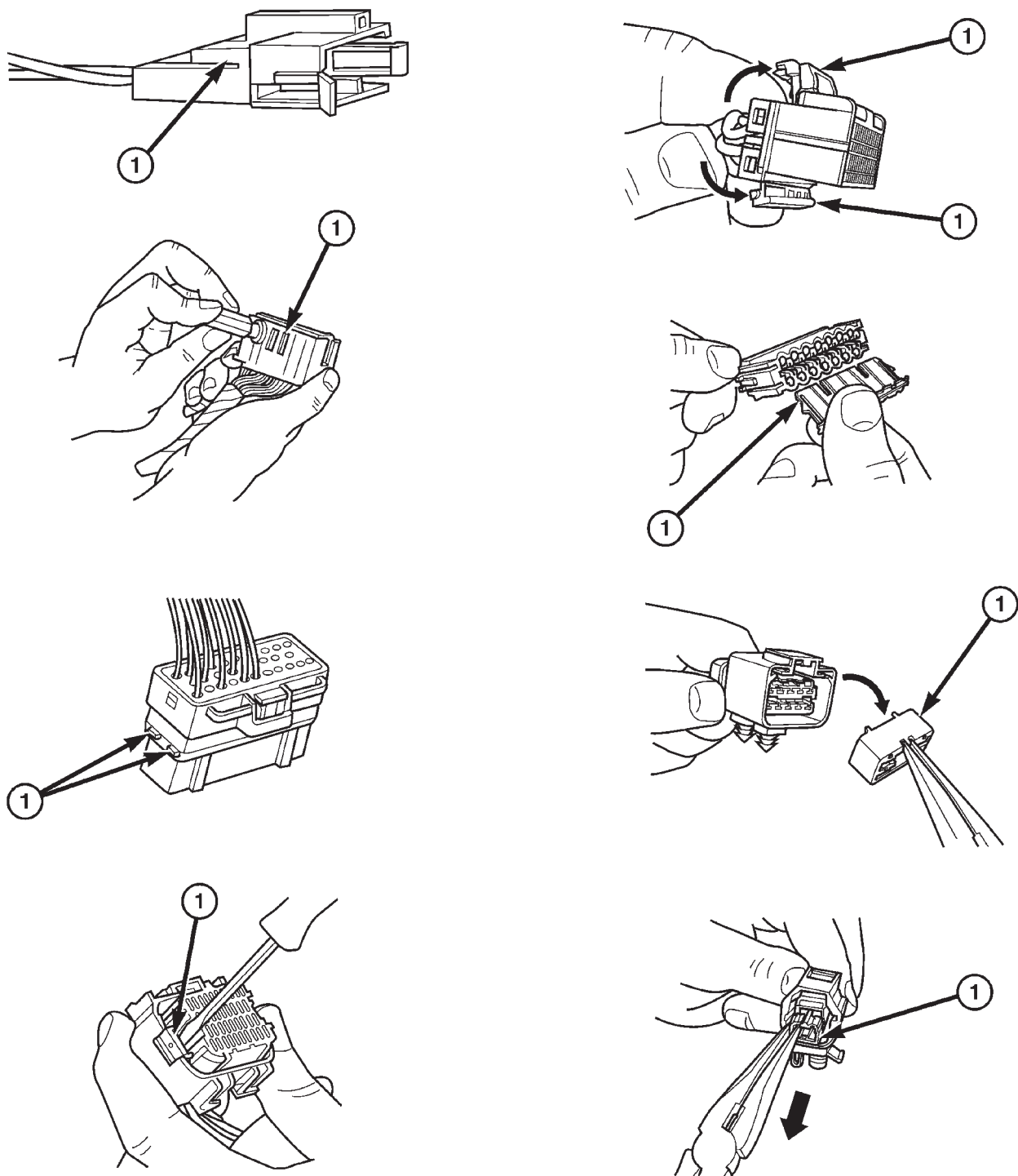
Fig. 10 REMOVAL OF DRESS COVER

- 1 - DRESS COVER
- 2 - CONNECTOR LOCK
- 3 - CONNECTOR

(5) Release the Secondary Terminal Lock, if required (Fig. 11).

(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 (Fig. 12).

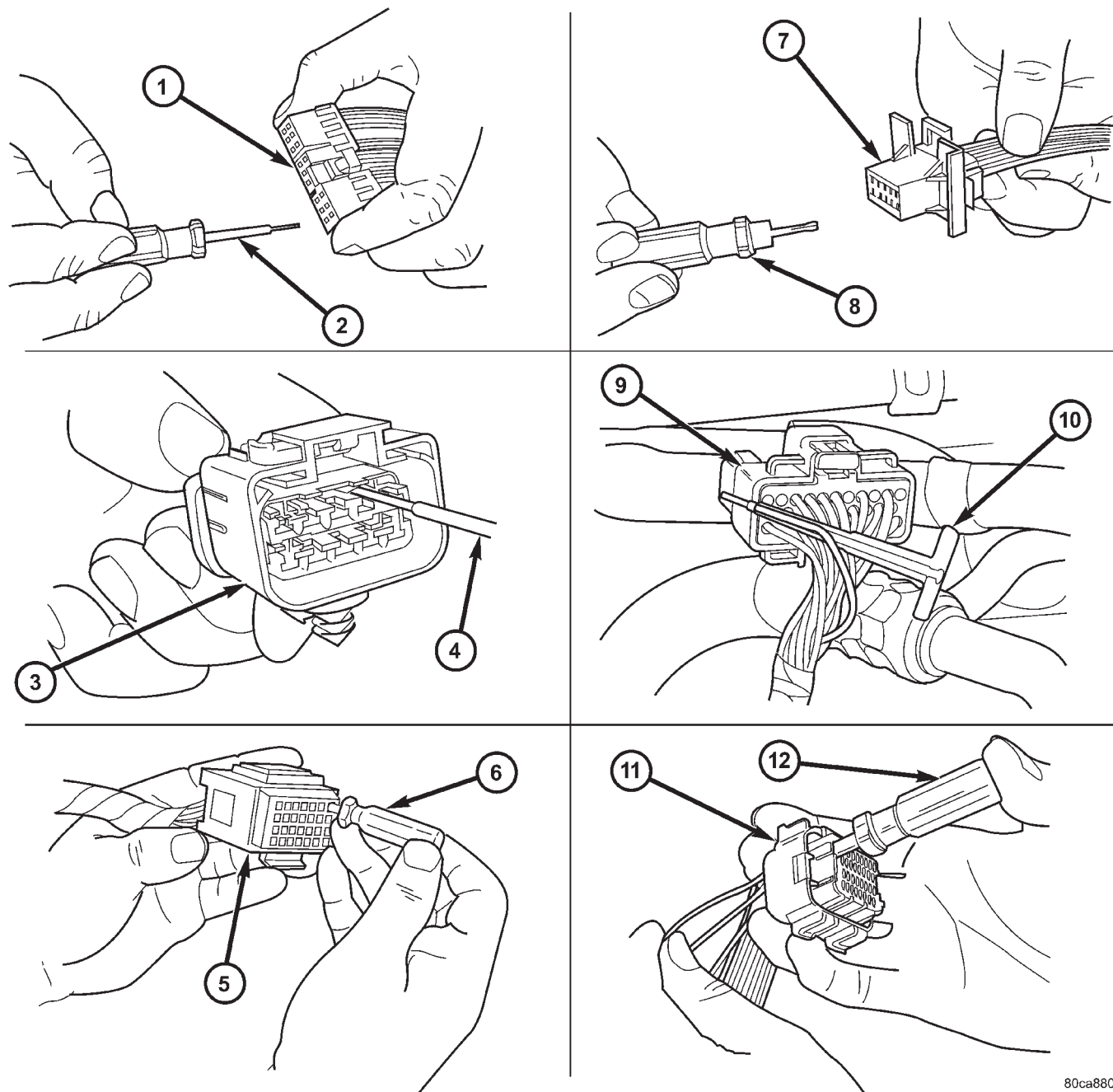
CONNECTOR (Continued)



80ca8802

Fig. 11 EXAMPLES OF CONNECTOR SECONDARY TERMINAL LOCKS

CONNECTOR (Continued)



80ca8809

Fig. 12 TERMINAL REMOVAL

- 1 - TYPICAL CONNECTOR
- 2 - PICK FROM SPECIAL TOOL KIT 6680
- 3 - APEX CONNECTOR
- 4 - PICK FROM SPECIAL TOOL KIT 6680
- 5 - AUGAT CONNECTOR
- 6 - SPECIAL TOOL 6932
- 7 - MOLEX CONNECTOR

- 8 - SPECIAL TOOL 6742
- 9 - THOMAS AND BETTS CONNECTOR
- 10 - SPECIAL TOOL 6934
- 11 - TYCO CONNECTOR
- 12 - SPECIAL TOOL 8638

CONNECTOR (Continued)

INSTALLATION

(1) Insert the removed terminal in the same cavity on the repair connector.

(2) Repeat steps for each terminal in the connector, being sure that all wires are inserted into the proper cavities. For additional connector pin-out identification, refer to the wiring diagrams.

(3) When the connector is re-assembled, the secondary terminal lock must be placed in the locked position to prevent terminal push out.

(4) Replace dress cover (if applicable).

(5) Connect connector to its mating half/component.

(6) Connect battery and test all affected systems.

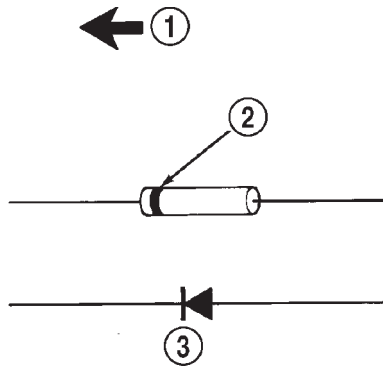
DIODE

REMOVAL

(1) Disconnect the battery.

(2) Locate the diode in the harness, and remove the protective covering.

(3) Remove the diode from the harness, pay attention to the current flow direction (Fig. 13).



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Fig. 13 DIODE IDENTIFICATION

1 - CURRENT FLOW

2 - BAND AROUND DIODE INDICATES CURRENT FLOW

3 - DIODE AS SHOWN IN THE DIAGRAMS

INSTALLATION

(1) Remove the insulation from the wires in the harness. Only remove enough insulation to solder in the new diode.

(2) Install the new diode in the harness, making sure current flow is correct. If necessary, refer to the appropriate wiring diagram for current flow (Fig. 13).

(3) Solder the connection together using rosin core type solder only. **Do not use acid core solder.**

(4) Tape the diode to the harness using electrical tape. Make sure the diode is completely sealed from the elements.

(5) Re-connect the battery and test affected systems.

TERMINAL

REMOVAL

(1) Follow steps for removing terminals described in the connector removal section.

(2) Cut the wire 6 inches from the back of the connector.

INSTALLATION

(1) Select a wire from the terminal repair kit that best matches the color and gage 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).

(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.

WIRE

STANDARD PROCEDURE - WIRE SPLICING

When splicing a wire, it is important that the correct gage be used as shown in the wiring diagrams.

(1) Remove one-half (1/2) inch of insulation from each wire that needs to be spliced.

(2) Place a piece of adhesive lined heat shrink tubing on one side of the wire. Make sure the tubing will be long enough to cover and seal the entire repair area.

WIRE (Continued)

(3) Place the strands of wire overlapping each other inside of the splice clip (Fig. 14).

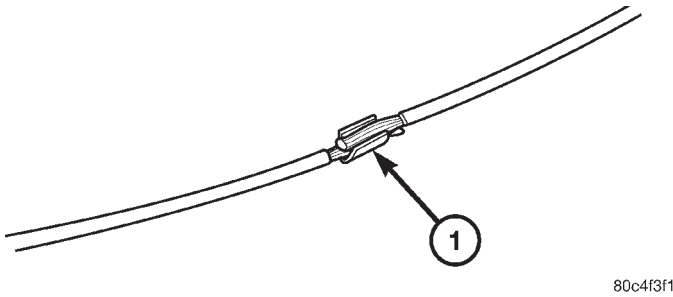


Fig. 14 SPLICE BAND

1 - SPLICE BAND

(4) Using crimping tool, Mopar p/n 05019912AA, crimp the splice clip and wires together (Fig. 15).

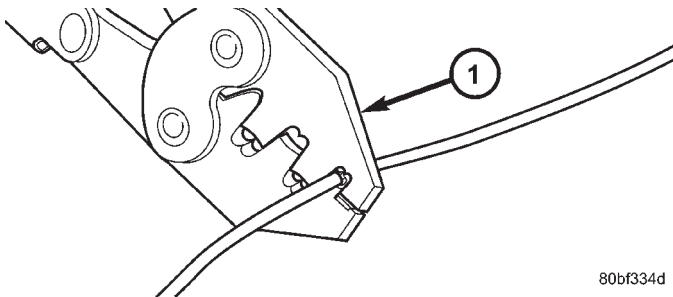


Fig. 15 CRIMPING TOOL

1 - CRIMPING TOOL

(5) Solder the connection together using rosin core type solder only (Fig. 16).

CAUTION: DO NOT USE ACID CORE SOLDER.

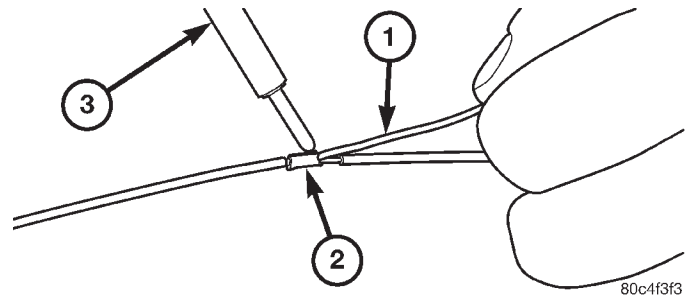


Fig. 16 SOLDER SPLICE

1 - SOLDER
2 - SPLICE BAND
3 - SOLDERING IRON

(6) Center the heat shrink tubing over the joint and heat using a heat gun. Heat the joint until the tubing is tightly sealed and sealant comes out of both ends of the tubing (Fig. 17).

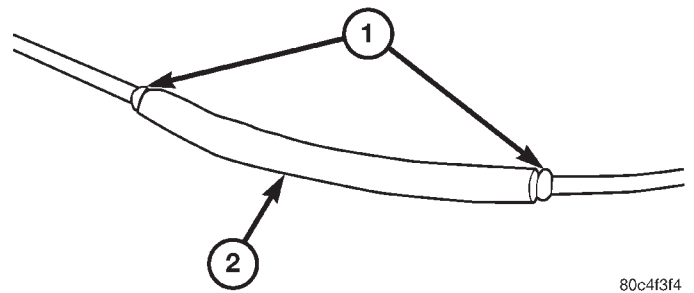


Fig. 17 HEAT SHRINK TUBE

1 - SEALANT
2 - HEAT SHRINK TUBE

8W-02 COMPONENT INDEX

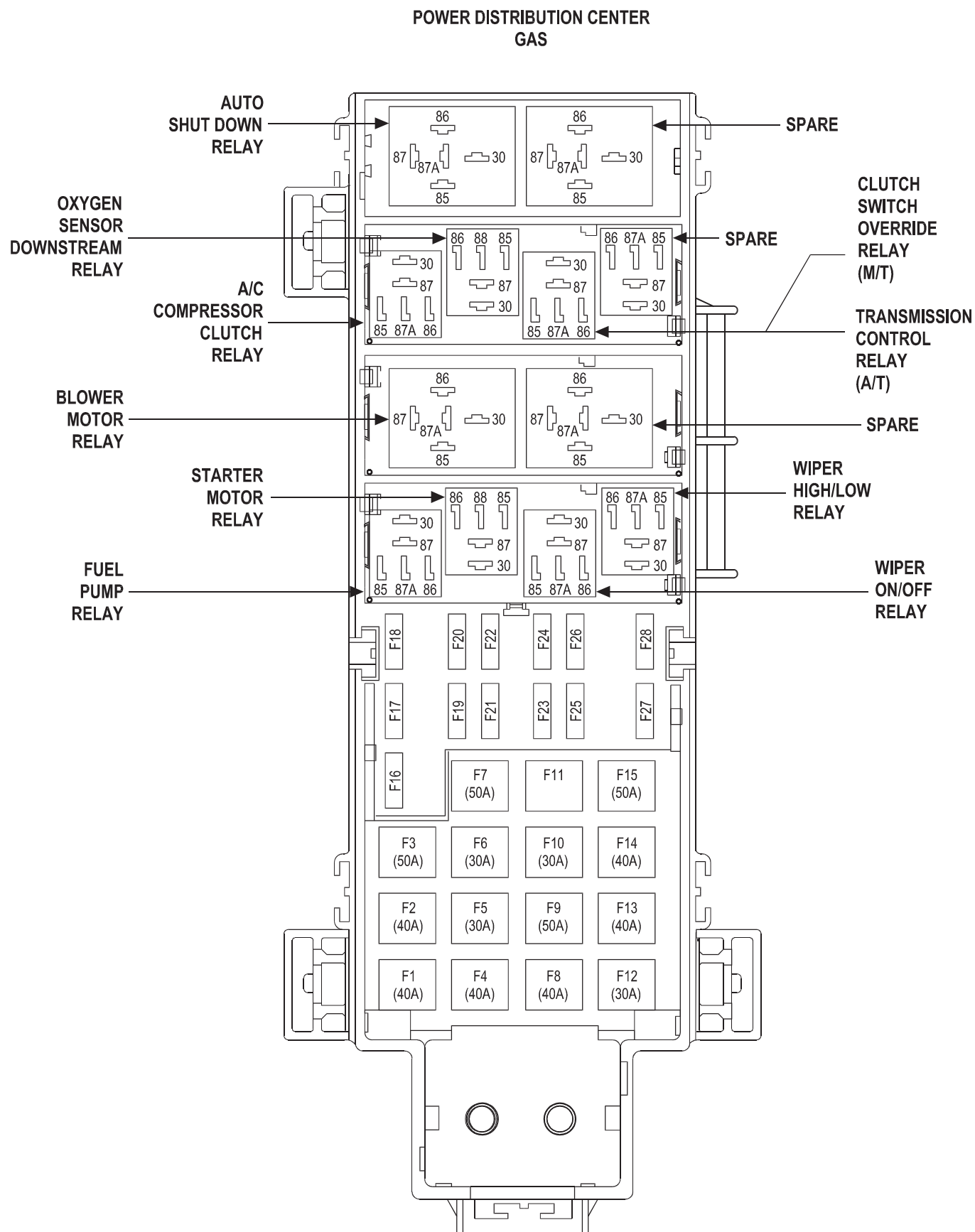
Component	Page	Component	Page
A/C Compressor Clutch Relay	8Wa-42	Door Lock Switches	8Wa-61
A/C Compressor Clutch	8Wa-42	Door Speakers	8Wa-47
A/C-Heater Control	8Wa-42	Driver Airbag Squib 1	8Wa-43
A/C High Pressure Switch	8Wa-42	Driver Airbag Squib 2	8Wa-43
A/C Low Pressure Switch	8Wa-42	Driver Door Unlock Relay	8Wa-61
A/C Pressure Transducer	8Wa-42	Driver Seat Belt Switch	8Wa-40
Accelerator Pedal Position Sensor	8Wa-30	Driver Seat Belt Tensioner	8Wa-43
Airbag Control Module	8Wa-43	EGR Solenoid	8Wa-30
Ambient Temperature Sensor	8Wa-45	Electric Brake Provision	8Wa-54
Antenna Module	8Wa-47	Engine Control Module	8Wa-30
Antenna	8Wa-47	Engine Coolant Level Sensor	8Wa-40
Ash Receiver Lamp	8Wa-44	Engine Coolant Temperature Sensor	8Wa-30
Auto Shut Down Relay	8Wa-30	Engine Oil Pressure Sensor	8Wa-30
Back-Up Lamp Switch	8Wa-31	EVAP/Purge Solenoid	8Wa-30
Battery Temperature Sensor	8Wa-20, 30	Flip-Up Glass Release Motor	8Wa-61
Battery	8Wa-20	Flip-Up Glass Release Switch	8Wa-61
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Blower Motor Relay	8Wa-42	Front Fog Lamp Relay	8Wa-50
Blower Motor Resistor Block	8Wa-42	Front Wiper Motor	8Wa-53
Blower Motor	8Wa-42	Fuel Heater Relay	8Wa-30
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Brake Lamp Switch	8Wa-33	Fuel Pressure Sensor	8Wa-30
Brake Pressure Switch	8Wa-35	Fuel Pressure Solenoid	8Wa-30
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Cabin Heater	8Wa-42	Fuel Pump Relay	8Wa-30
Camshaft Position Sensor	8Wa-30	Fuses	8Wa-10, 12
Capacitor	8Wa-30	Fusible Link	8Wa-20
Cargo Lamp	8Wa-44	Grounds	8Wa-15
CD Changer	8Wa-47	Generator	8Wa-20
Center High Mounted Stop Lamp	8Wa-51	Glow Plugs	8Wa-30
Cigar Lighter	8Wa-41	Hazard Switch/Combination Flasher	8Wa-52
Circuit Breakers	8Wa-12	Headlamp Leveling Switch	8Wa-50
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Clutch Switch Override Relay	8Wa-21	High Beam Relay	8Wa-50
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Coil Rail	8Wa-30	Hood Ajar Switch	8Wa-45
Compass Mini-Trip Computer	8Wa-49	Idle Air Control Motor	8Wa-30
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Crankshaft Position Sensor	8Wa-30	Input Speed Sensor	8Wa-31
Curtain Airbags	8Wa-43	Instrument Cluster	8Wa-40
Cylinder Lock Switches	8Wa-61	Instrument Panel Speakers	8Wa-47
Data Link Connector	8Wa-18	Intake Air Temperature Sensor	8Wa-30
Daytime Running Lamp Relay	8Wa-50	Intrusion Sensor	8Wa-49
Defogger Relay	8Wa-48	Junction Block	8Wa-12
Diagnostic Junction Port	8Wa-18	Knock Sensor	8Wa-30
Dome Lamp	8Wa-44	Leak Detection Pump	8Wa-30
Door Ajar Switches	8Wa-45	Leveling Motors	8Wa-50
Door Lock Motor/Ajar Switches	8Wa-61	License Lamp	8Wa-51
Door Lock Relay	8Wa-61	Line Pressure Sensor	8Wa-31

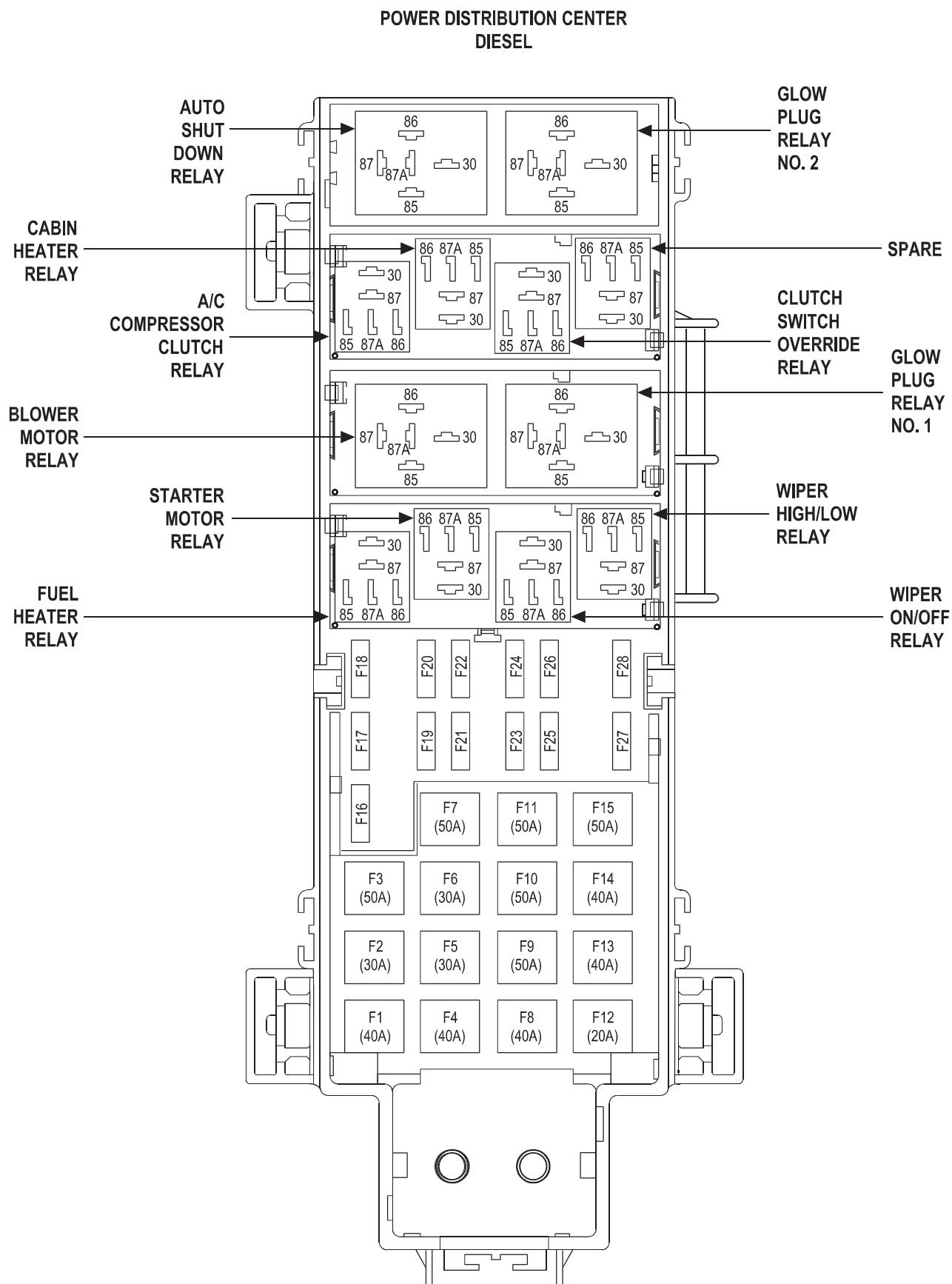
Component	Page
Low Beam Relay	8Wa-50
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Output Speed Sensor	8Wa-31
Overhead Map/Reading Lamp	8Wa-44
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Rear Wheel Speed Sensor	8Wa-35
Rear Window Defogger	8Wa-48
Rear Wiper Motor	8Wa-53
Red Brake Warning Indicator Switch	8Wa-40

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Transmission Solenoid/TRS Assembly	8Wa-31
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Washer Fluid Level Switch	8Wa-53
Washer Pump	8Wa-53
Water In Fuel Sensor	8Wa-30
Wheel Speed Sensors	8Wa-35
Wiper High/Low Relay	8Wa-53

8W-10 POWER DISTRIBUTION

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A/C Compressor Clutch	8Wa-10-26	Fuse 17	8Wa-10-24
Auto Shut Down Relay	8Wa-10-10, 12, 19, 22	Fuse 18	8Wa-10-24
Battery	8Wa-10-10, 12	Fuse 19	8Wa-10-11, 13, 24
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Blower Motor	8Wa-10-14	Fuse 21	8Wa-10-11, 13, 26
Body Control Module	8Wa-10-23	Fuse 22	8Wa-10-27
Cabin Heater Relay	8Wa-10-13, 22, 26	Fuse 24	8Wa-10-11, 26, 29
Cabin Heater	8Wa-10-26	Fuse 25	8Wa-10-11, 13, 14, 29
Camshaft Position Sensor	8Wa-10-22	Fuse 26	8Wa-10-12, 19, 20, 22
Capacitor	8Wa-10-19, 21	Fuse 28	8Wa-10-28
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Circuit Breaker No. 3 (JB)	8Wa-10-27	Fuse 30	8Wa-10-24
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Coil On Plug No. 2	8Wa-10-21	Fuse 34	8Wa-10-15
Coil On Plug No. 3	8Wa-10-21	Fuse 36	8Wa-10-27
Coil On Plug No. 4	8Wa-10-21	Fuse 37	8Wa-10-29
Coil On Plug No. 5	8Wa-10-21	Fuse 38	8Wa-10-29
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Defogger Relay	8Wa-10-24	Glow Plug Assembly	8Wa-10-18
EGR Solenoid	8Wa-10-22	Glow Plug Relay No. 1	8Wa-10-13, 18, 22
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Fuel Injector No. 4	8Wa-10-20	Oxygen Sensor 1/1 Upstream	8Wa-10-19
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Fuel Injector No. 6	8Wa-10-20	Oxygen Sensor 2/1 Upstream	8Wa-10-19
Fuel Pressure Solenoid	8Wa-10-22	Oxygen Sensor 2/2 Downstream	8Wa-10-20
Fuel Pump Module	8Wa-10-26	Oxygen Sensor Downstream Relay . .	8Wa-10-19, 20
Fuel Pump Relay	8Wa-10-11, 26	Park Lamp Relay	8Wa-10-16
Fuse 1	8Wa-10-10, 12, 14, 25	Power Distribution Center .	8Wa-10-2, 3, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27, 28
Fuse 2	8Wa-10-10, 12, 14, 15	Power Window Master Switch	8Wa-10-29
Fuse 3	8Wa-10-10, 12, 16, 25	Powertrain Control Module . .	8Wa-10-11, 19, 26, 28
Fuse 4	8Wa-10-10, 12, 14	Radiator Fan Relay	8Wa-10-10, 14
Fuse 5	8Wa-10-10, 12, 17, 18	Starter Motor Relay	8Wa-10-23, 28
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Fuse 7	8Wa-10-10, 12, 15	Trailer Tow Circuit Breaker	8Wa-10-10, 12, 15
Fuse 8	8Wa-10-10, 12, 23	Trailer Tow Circuit Breaker	8Wa-10-15
Fuse 9	8Wa-10-10, 12, 13, 24	Trailer Tow Connector	8Wa-10-15
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Fuse 12	8Wa-10-10, 11, 13, 15, 17, 18	Transmission Control Relay	8Wa-10-10, 17
Fuse 13	8Wa-10-10, 11, 13, 23, 27	Transmission Solenoid/TRS Assembly . . .	8Wa-10-17
Fuse 14	8Wa-10-11, 13, 23		
Fuse 15	8Wa-10-11, 13, 25, 27		





**FUSES
(GAS)**

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	40A	A122 12OR	FUSED B(+)
2	40A	C24 12DB/PK	FUSED B(+)
3	50A	A13 10PK/WT	FUSED B(+)
4	40A	A10 12RD/DG ■	FUSED B(+)
5	30A	A30 14RD/WT ■■	FUSED B(+)
		A30 14RD/WT ■■	FUSED B(+)
6	30A	A9 14RD/YL	FUSED B(+)
7	50A	A7 10RD/BK	FUSED B(+)
8	40A	A2 12PK/BK	FUSED B(+)
9	50A	A18 10PK	FUSED B(+)
10	30A	A99 14RD/VT	FUSED B(+)
11	-	-	-
12	30A	A32 14RD/DB ■■■	FUSED B(+)
13	40A	A25 12DB	FUSED B(+)
14	40A	A1 12RD	FUSED B(+)
15	50A	A12 10RD/TN	FUSED B(+)
16	15A	A71 18DG/RD	FUSED AUTO SHUT DOWN RELAY OUTPUT
		A71 18DG/RD	FUSED AUTO SHUT DOWN RELAY OUTPUT
17	-	-	-
18	-	-	-
19	30A	A4 12BK/PK	FUSED B(+)
20	-	-	-
21	20A	A17 18RD/BK	FUSED B(+)
22	-	-	-
23	-	-	-
24	20A	A14 16RD/WT	FUSED B(+)
		A14 16RD/WT	FUSED B(+)
25	20A	A20 12RD/DB ■	FUSED B(+)
26	15A	F142 18OR/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
		F142 18OR/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
27	-	-	-
28	15A	F45 18YL/BR	FUSED IGNITION SWITCH OUTPUT (START)
		F45 18YL/BR	FUSED IGNITION SWITCH OUTPUT (START)

■ ABS
 ■■ A/T
 ■■■ SECURITY A/T

**FUSES
(DIESEL)**

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	40A	A122 12OR	FUSED B(+)
2	30A	A99 14RD/VT	FUSED B(+)
3	50A	A13 10PK/WT	FUSED B(+)
4	40A	A10 12RD/DG	FUSED B(+)
5	30A	A32 14RD/DB	FUSED B(+)
6	30A	A9 14RD/YL	FUSED B(+)
		A9 14RD/YL	FUSED B(+)
7	50A	A7 10RD/BK	FUSED B(+)
8	40A	A2 12PK/BK	FUSED B(+)
9	50A	A18 10PK	FUSED B(+)
10	50A	A54 10RD	FUSED B(+)
11	50A	A58 10RD/GY	FUSED B(+)
12	20A	A34 16LB/RD	FUSED B(+)
13	40A	A25 12DB	FUSED B(+)
14	40A	A1 12RD	FUSED B(+)
15	50A	A12 10RD/TN	FUSED B(+)
16	15A	A71 18DG/RD	FUSED AUTO SHUT DOWN RELAY OUTPUT
17	-	-	-
18	-	-	-
19	30A	A4 12BK/PK	FUSED B(+)
20	-	-	-
21	20A	A17 18RD/BK	FUSED B(+)
		A17 18RD/BK	FUSED B(+)
22	-	-	-
23	-	-	-
24	-	-	-
25	20A	A20 12RD/DB	FUSED B(+)
26	10A	F92 18YL/BR	FUSED B(+)
27	-	-	-
28	15A	F45 18YL/BR	FUSED IGNITION SWITCH OUTPUT (START)
		F45 18YL/BR	FUSED IGNITION SWITCH OUTPUT (START)

A/C
COMPRESSOR
CLUTCH
RELAY

CAVITY	CIRCUIT	FUNCTION
30	A17 18RD/BK	FUSED B(+)
85	C13 18DG $\Delta \Delta$	A/C COMPRESSOR CLUTCH RELAY CONTROL
85	C13 18DB/OR Δ	A/C COMPRESSOR CLUTCH RELAY CONTROL
86	F1 18DB $\bullet$	FUSED IGNITION SWITCH OUTPUT (RUN-START)
	F1 18DB $\bullet$	FUSED IGNITION SWITCH OUTPUT (RUN-START)
86	A71 18DG/RD $\bullet \bullet$	FUSED AUTO SHUT DOWN RELAY OUTPUT
87	C3 18DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
87A	-	-

AUTO
SHUT
DOWN
RELAY

CAVITY	CIRCUIT	FUNCTION
30	A9 14RD/YL	FUSED B(+)
	A9 14RD/YL $\bullet \bullet$	FUSED B(+)
85	K51 18DB/YL	AUTO SHUT DOWN RELAY CONTROL
86	F1 18DB $\bullet$	FUSED IGNITION SWITCH OUTPUT (RUN-START)
	F1 18DB $\bullet$	FUSED IGNITION SWITCH OUTPUT (RUN-START)
86	A9 14RD/YL $\bullet \bullet$	FUSED B(+)
87	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
	A142 14DG/OR $\bullet \bullet$	AUTO SHUT DOWN RELAY OUTPUT
87A	-	-

BLOWER
MOTOR
RELAY

CAVITY	CIRCUIT	FUNCTION
30	A122 12OR	FUSED B(+)
85	Z142 18BK/WT	GROUND
86	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN)
	F20 18WT $\bullet \bullet$	FUSED IGNITION SWITCH OUTPUT (RUN)
87	A111 12RD/LB	BLOWER MOTOR RELAY OUTPUT
87A	-	-

CABIN
HEATER
RELAY
(DIESEL)

CAVITY	CIRCUIT	FUNCTION
30	A17 18RD/BK	FUSED B(+)
85	K132 18DG/LB	CABIN HEATER RELAY CONTROL
86	A71 18DG/RD	FUSED AUTO SHUT DOWN RELAY OUTPUT
87	C151 18DB/WT	CABIN HEATER RELAY OUTPUT
87A	-	-

Δ RHD A/T
 $\Delta \Delta$ EXCEPT RHD A/T

$\bullet$ GAS
 $\bullet \bullet$ DIESEL

**CLUTCH
SWITCH
OVERRIDE
RELAY
(M/T)**

CAVITY	CIRCUIT	FUNCTION
30	F45 18YL/BR	FUSED IGNITION SWITCH OUTPUT (START)
	F45 18YL/BR	FUSED IGNITION SWITCH OUTPUT (START)
85	K90 18TN	CLUTCH SWITCH OVERRIDE RELAY CONTROL
86	A21 12RD/DB	IGNITION SWITCH OUTPUT (RUN-START)
87	T141 18YL/RD	CLUTCH SWITCH OVERRIDE RELAY OUTPUT
	T141 18YL/RD	CLUTCH SWITCH OVERRIDE RELAY OUTPUT
87A	-	-

**FUEL
HEATER
RELAY
(DIESEL)**

CAVITY	CIRCUIT	FUNCTION
30	A34 16LB/RD	FUSED B(+)
85	Z142 18BK/WT	GROUND
86	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN)
87	A93 16RD/BK	FUEL HEATER RELAY OUTPUT
87A	-	-

**FUEL
PUMP
RELAY
(GAS)**

CAVITY	CIRCUIT	FUNCTION
30	A14 16RD/WT	FUSED B(+)
85	K31 18BR	FUEL PUMP RELAY CONTROL
86	F1 18DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
	F1 18DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
87	A141 16DG/WT	FUEL PUMP RELAY OUTPUT
87A	-	-

**GLOW
PLUG
RELAY NO. 1
(DIESEL)**

CAVITY	CIRCUIT	FUNCTION
30	A54 10RD	FUSED B(+)
85	K152 18WT	GLOW PLUG RELAY NO. 1 CONTROL
86	A71 18DG/RD	FUSED AUTO SHUT DOWN RELAY OUTPUT
87	K154 10GY	GLOW PLUG RELAY NO. 1 OUTPUT
87A	-	-

**GLOW
PLUG
RELAY NO. 2
(DIESEL)**

CAVITY	CIRCUIT	FUNCTION
30	A58 10RD/GY	FUSED B(+)
85	K236 18GY/PK	GLOW PLUG RELAY NO. 2 CONTROL
86	A71 18DG/RD	FUSED AUTO SHUT DOWN RELAY OUTPUT
87	K104 10RD/WT	GLOW PLUG RELAY NO. 2 OUTPUT
87A	-	-

**OXYGEN
SENSOR
DOWNSTREAM
RELAY
(GAS)**

CAVITY	CIRCUIT	FUNCTION
30	A71 18DG/RD	FUSED AUTO SHUT DOWN RELAY OUTPUT
	A71 18DG/RD	FUSED AUTO SHUT DOWN RELAY OUTPUT
85	K512 18RD/YL	OXYGEN SENSOR DOWNSTREAM RELAY CONTROL
86	A71 18DG/RD	FUSED AUTO SHUT DOWN RELAY OUTPUT
87	F18 18LG/BK	OXYGEN SENSOR DOWNSTREAM RELAY OUTPUT
87A	-	-

**STARTER
MOTOR
RELAY**

CAVITY	CIRCUIT	FUNCTION
30	A2 12PK/BK	FUSED B(+)
85	T41 18BK/WT ■	PARK/NEUTRAL POSITION SWITCH SENSE
	Z142 18BK/WT ■■	GROUND
86	F45 18YL/BR ■	FUSED IGNITION SWITCH OUTPUT (START)
86	T141 18YL/RD ■■	CLUTCH INTERLOCK RELAY OUTPUT
	T141 18YL/RD ■■	CLUTCH INTERLOCK RELAY OUTPUT
87	T40 12BR	STARTER MOTOR RELAY OUTPUT
87A	-	-

■ A/T
■■ M/T

**TRANSMISSION
CONTROL
RELAY
(A/T)**

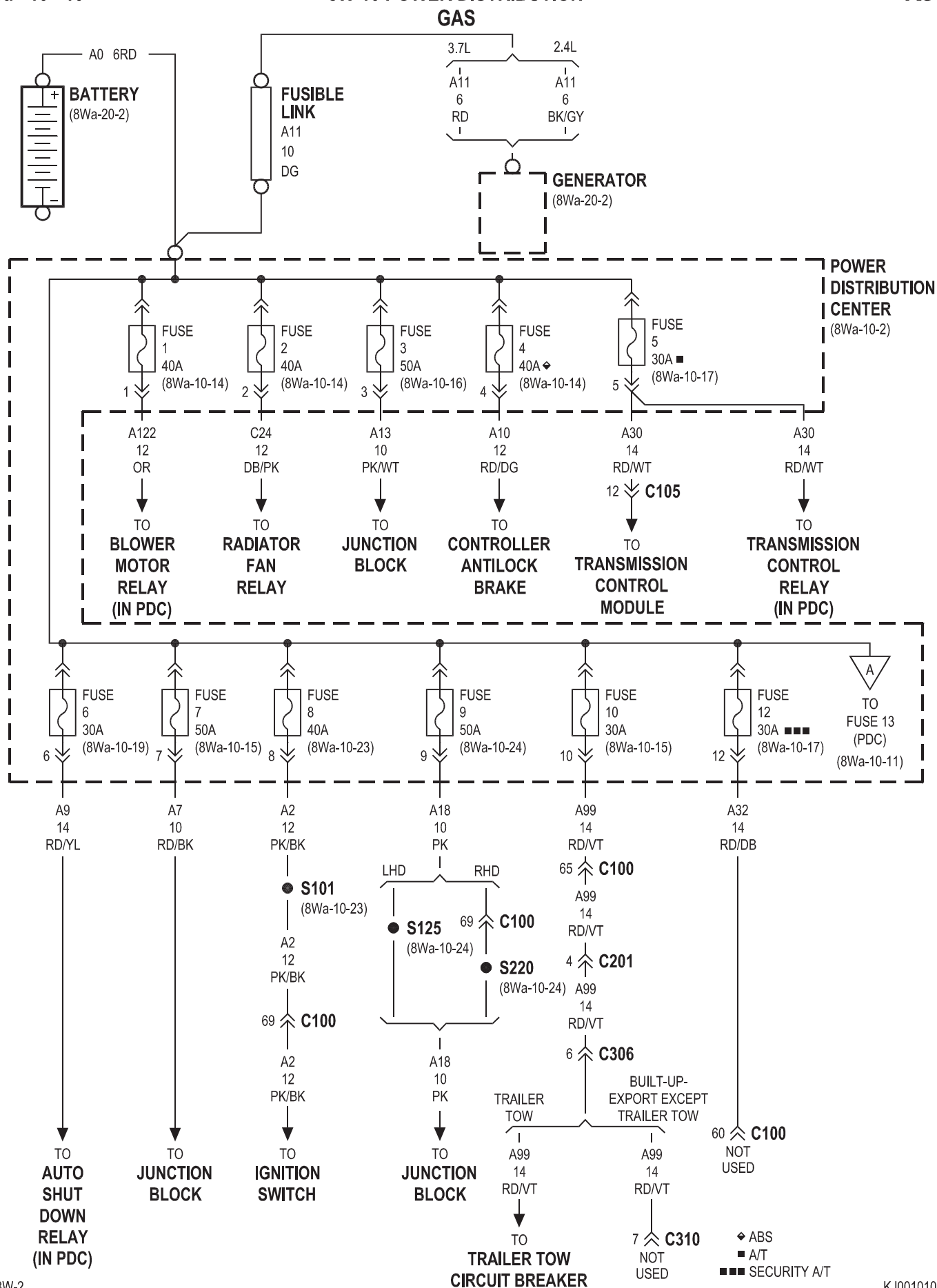
CAVITY	CIRCUIT	FUNCTION
30	A30 14RD/WT	FUSED B(+)
85	Z142 18BK/WT	GROUND
86	K30 18PK	TRANSMISSION CONTROL RELAY CONTROL
87	T16 14RD	TRANSMISSION CONTROL RELAY OUTPUT
87A	-	-

**WIPER
HIGH/LOW
RELAY**

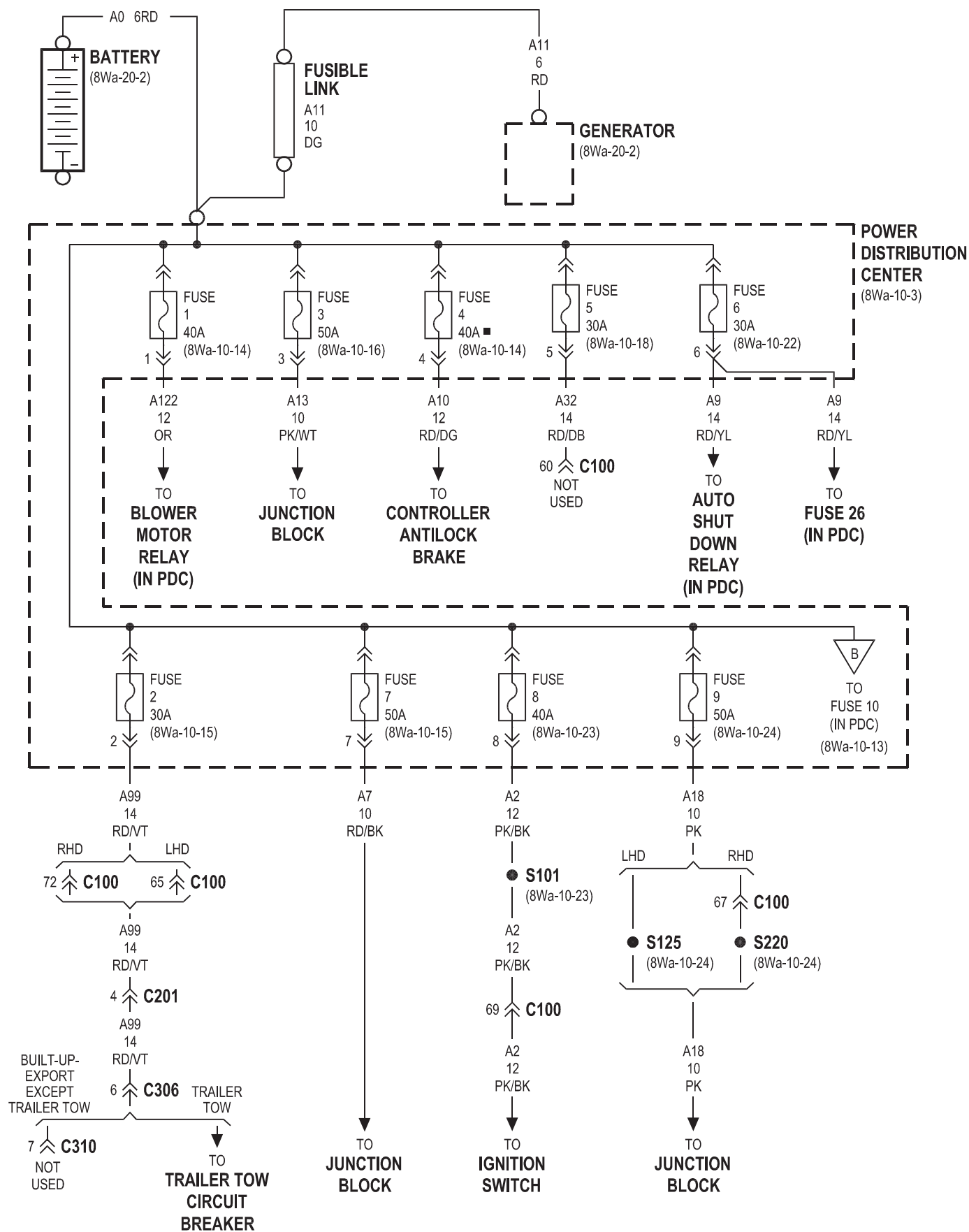
CAVITY	CIRCUIT	FUNCTION
30	V60 16YL/DG	FRONT WIPER ON/OFF RELAY OUTPUT
85	V16 18VT/YL	FRONT WIPER HIGH/LOW RELAY CONTROL
86	V6 16DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
	V6 16DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
87	V4 14RD/YL	FRONT WIPER HIGH/LOW RELAY HIGH SPEED OUTPUT
87A	V3 14BR/WT	FRONT WIPER HIGH/LOW RELAY LOW SPEED OUTPUT

**WIPER
ON/OFF
RELAY**

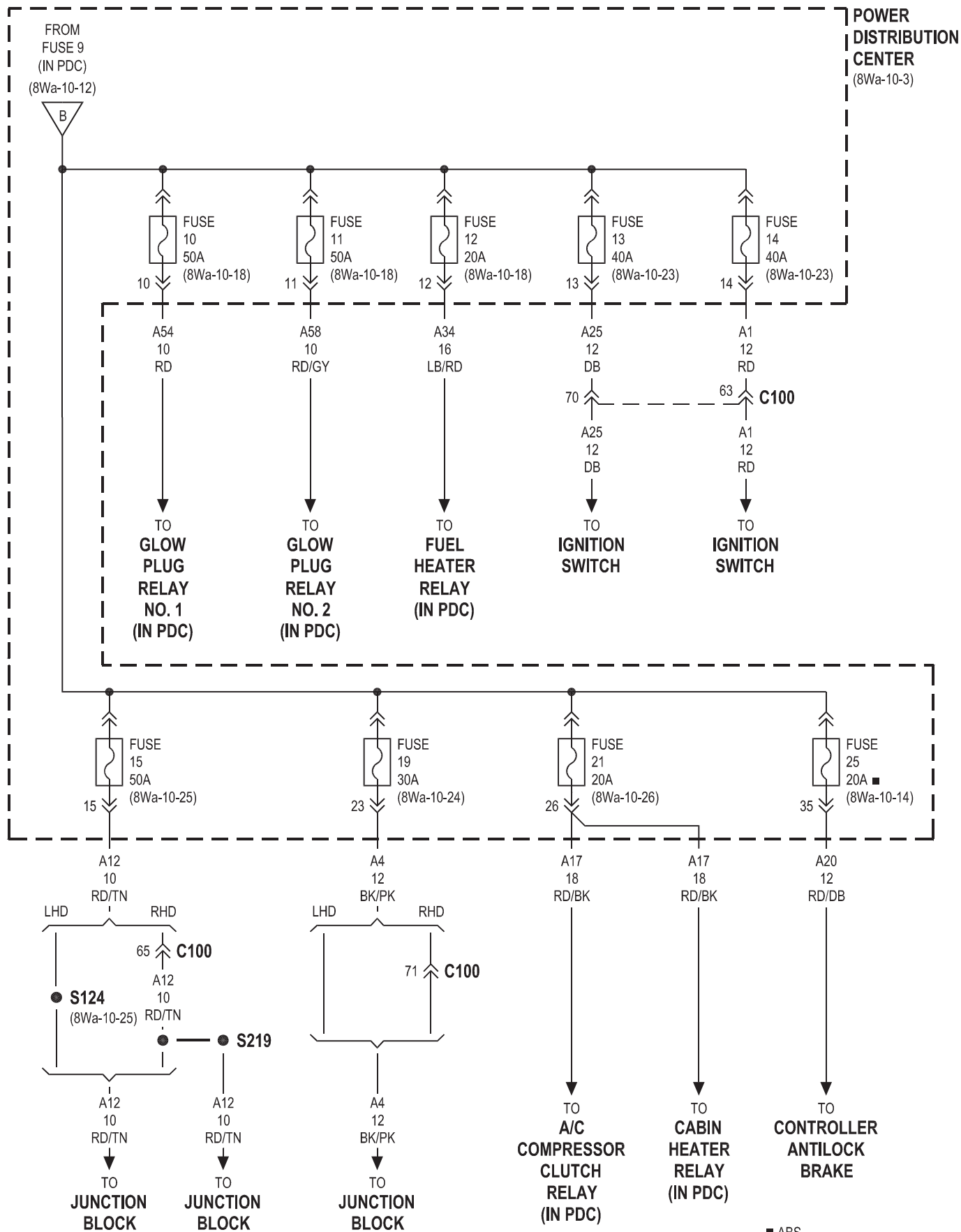
CAVITY	CIRCUIT	FUNCTION
30	V60 16YL/DG	FRONT WIPER ON/OFF RELAY OUTPUT
85	V14 18RD/VT	FRONT WIPER ON/OFF RELAY CONTROL
86	V6 16DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
	V6 16DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
87	V6 16DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
	V6 16DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
87A	V55 16TN/RD	FRONT WIPER PARK SWITCH SENSE
	V55 16TN/RD	FRONT WIPER PARK SWITCH SENSE

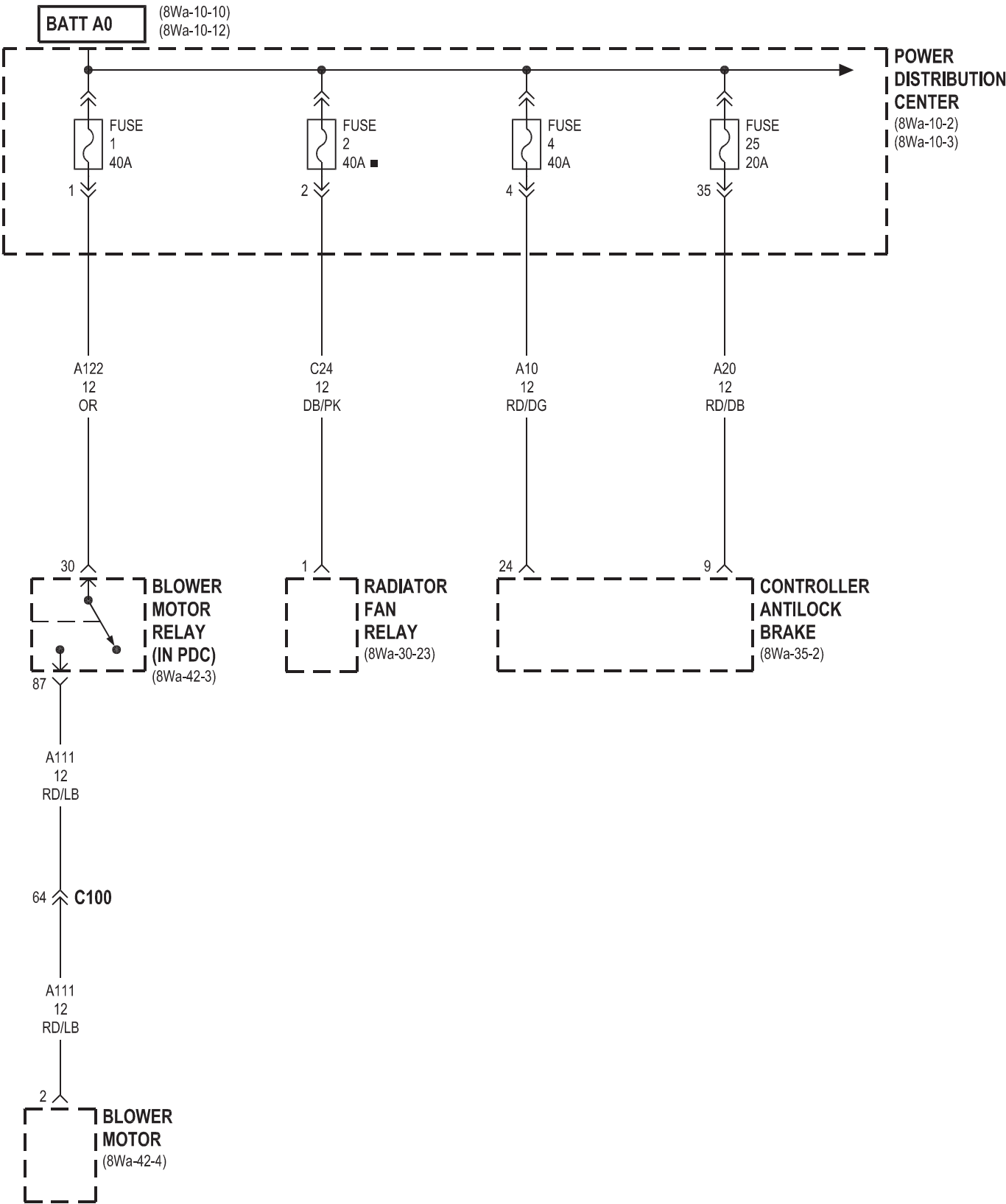


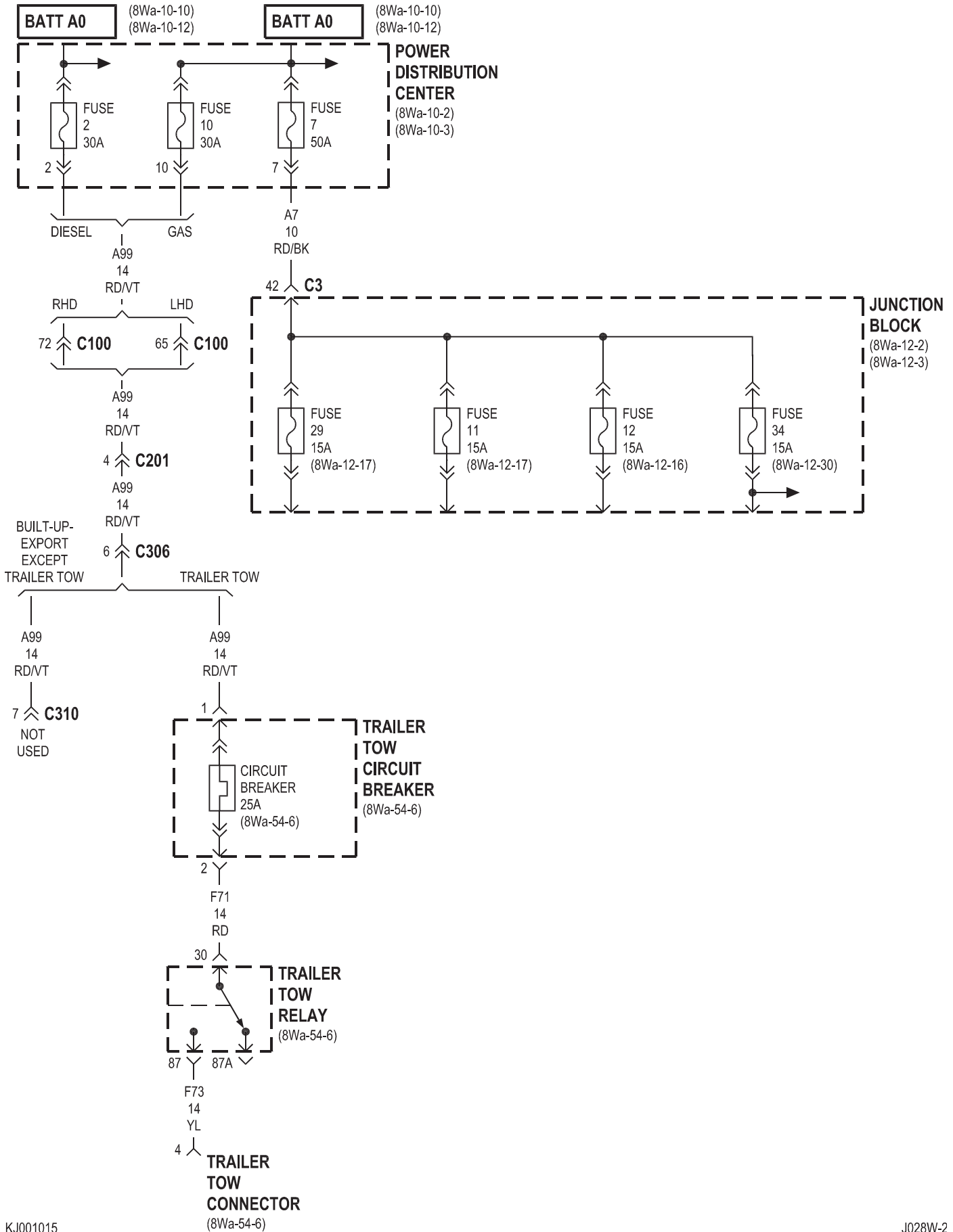


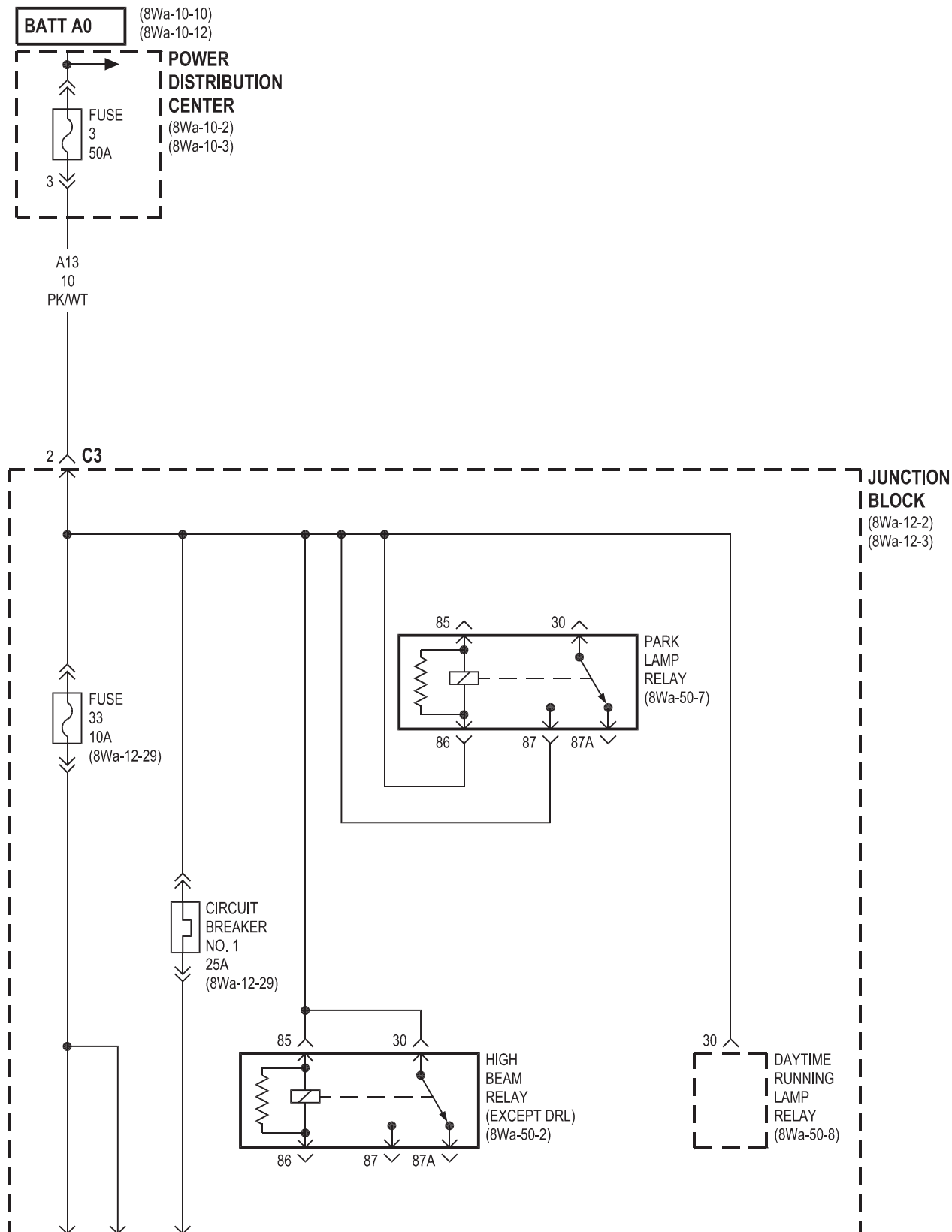


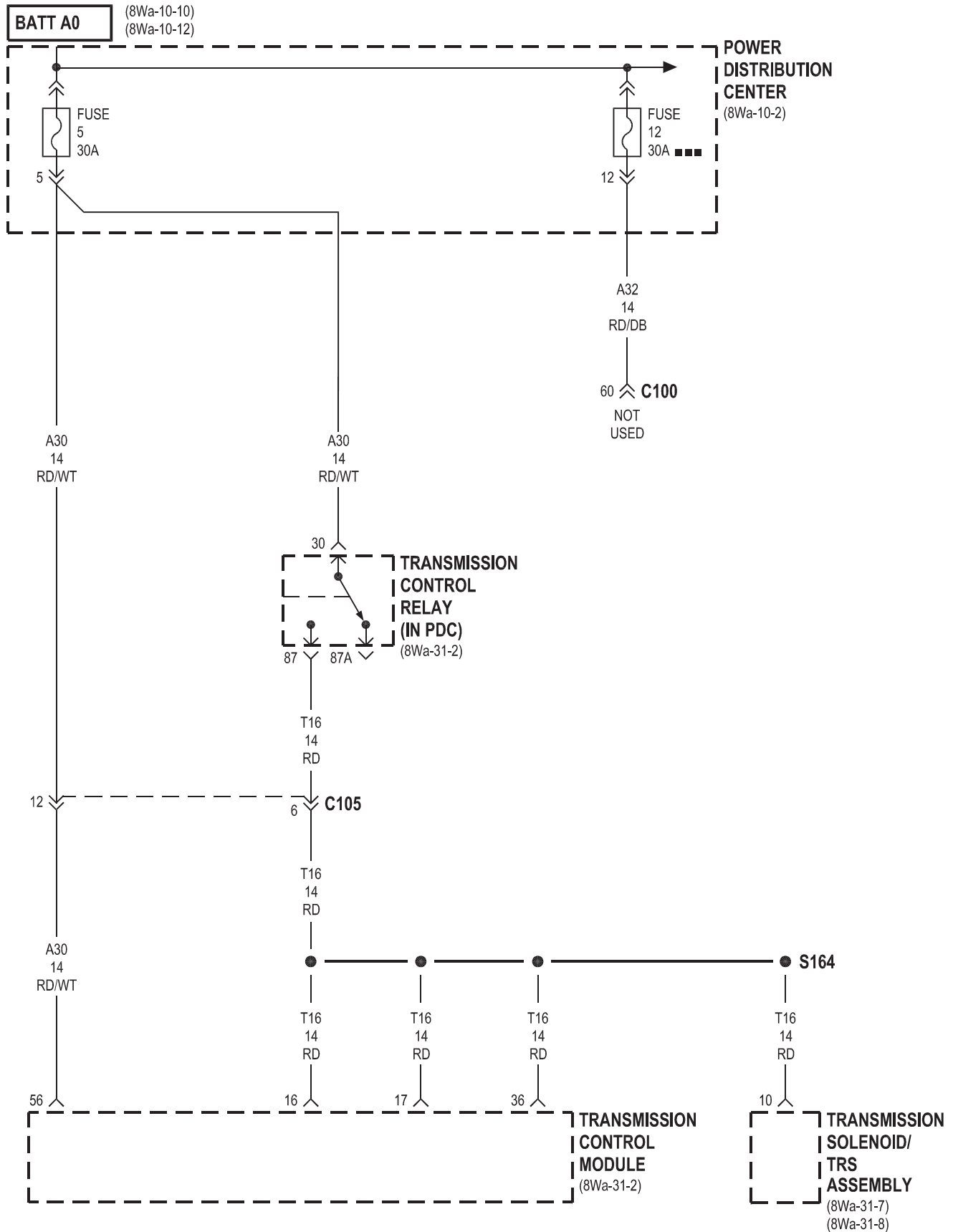
- ABS

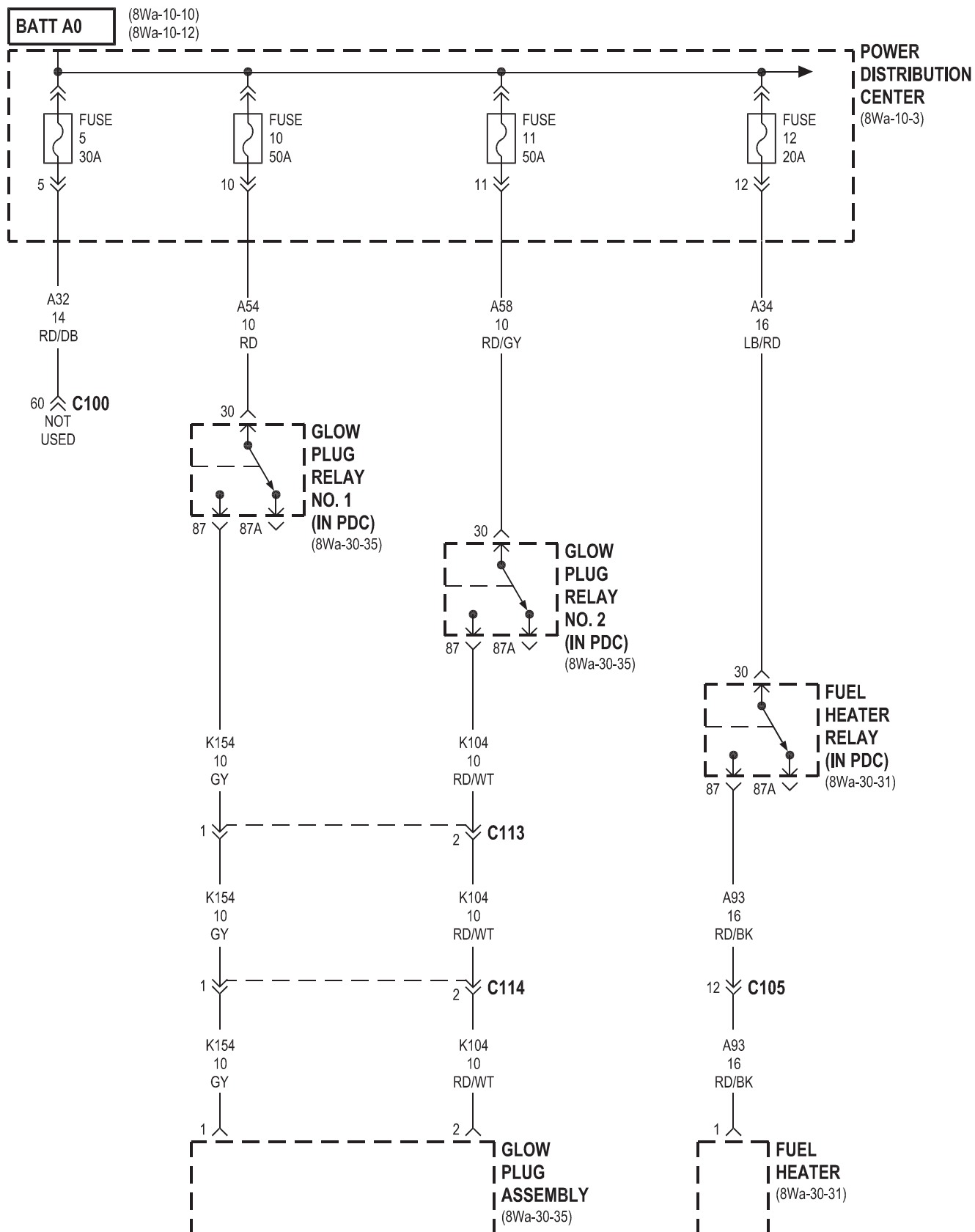


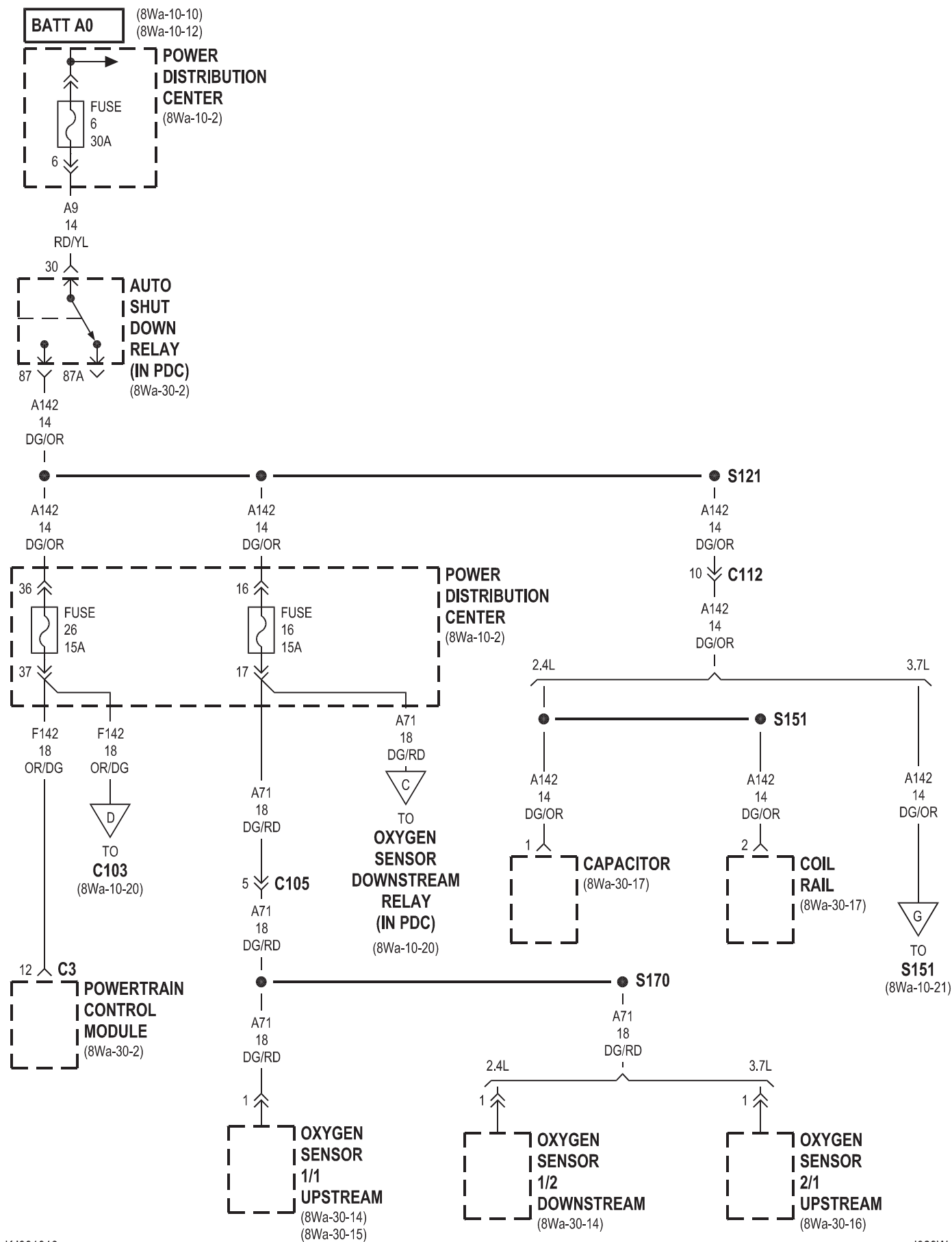


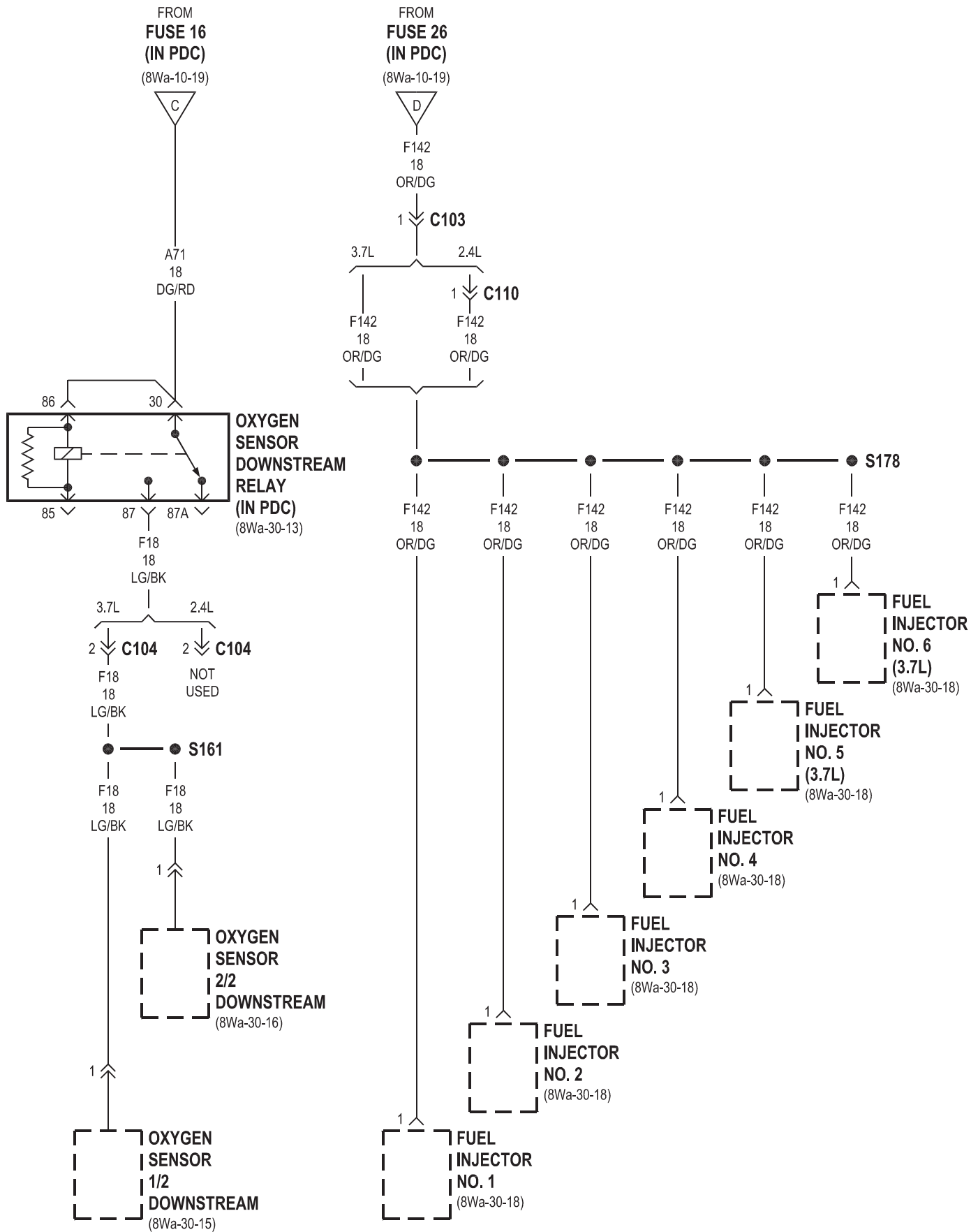


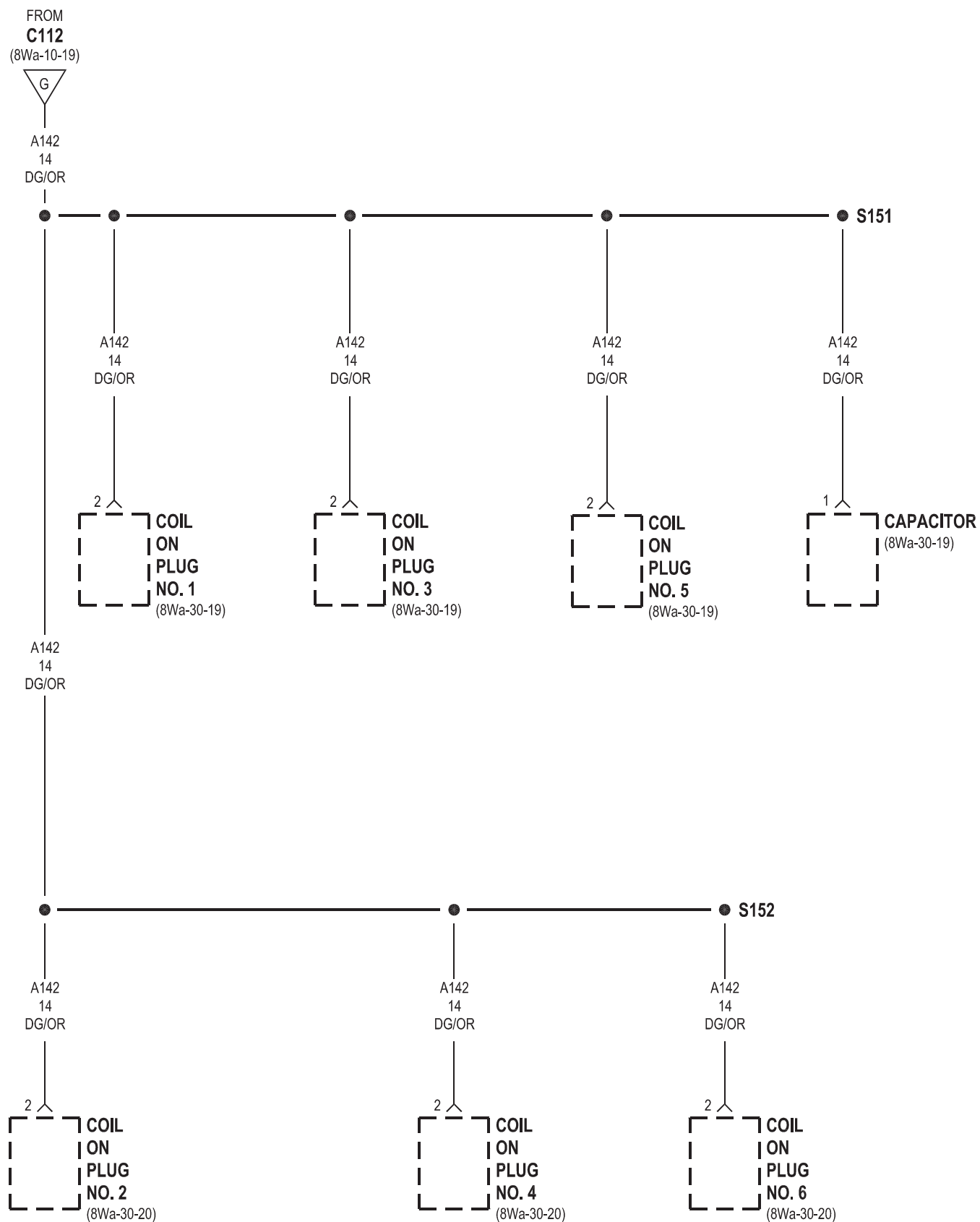


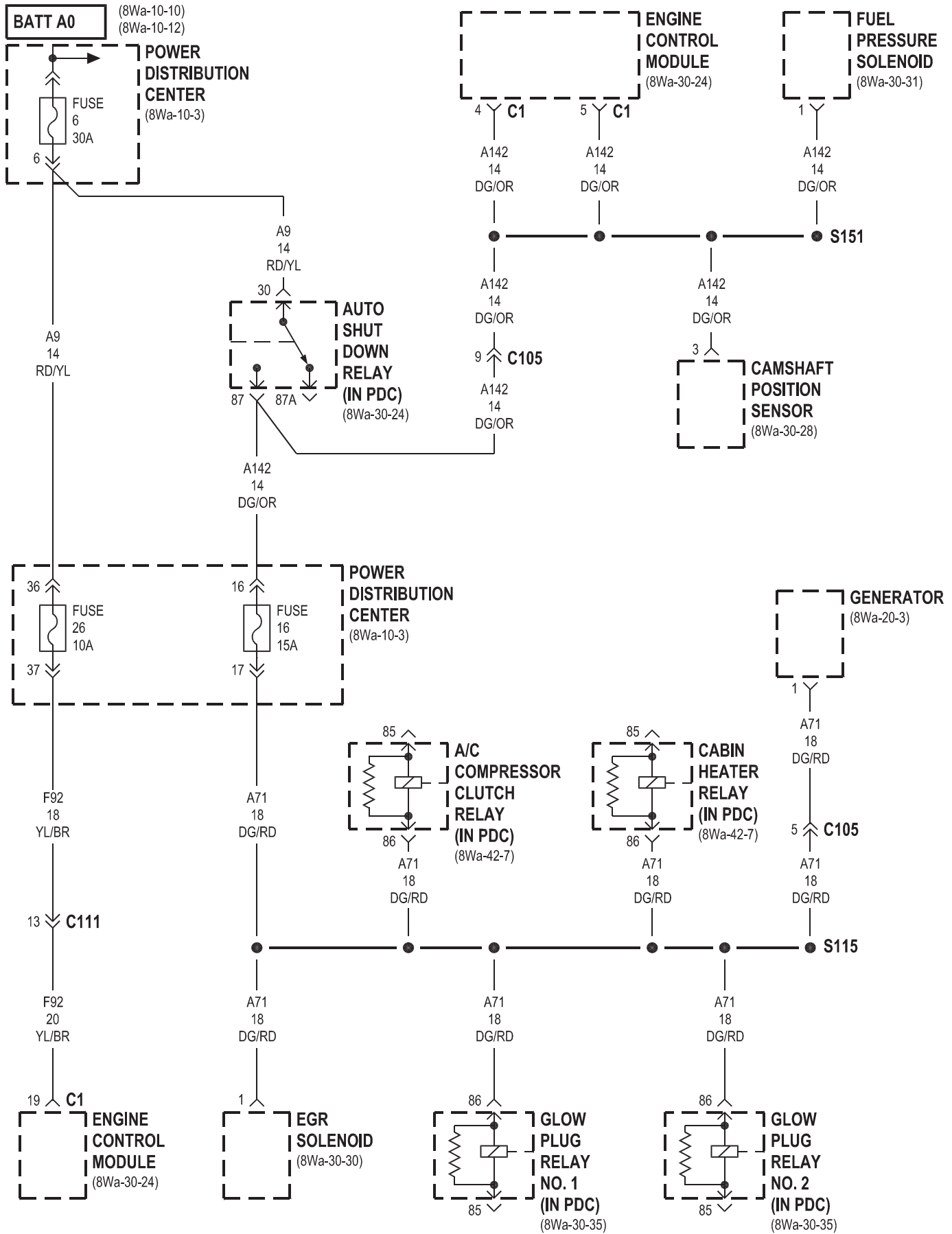


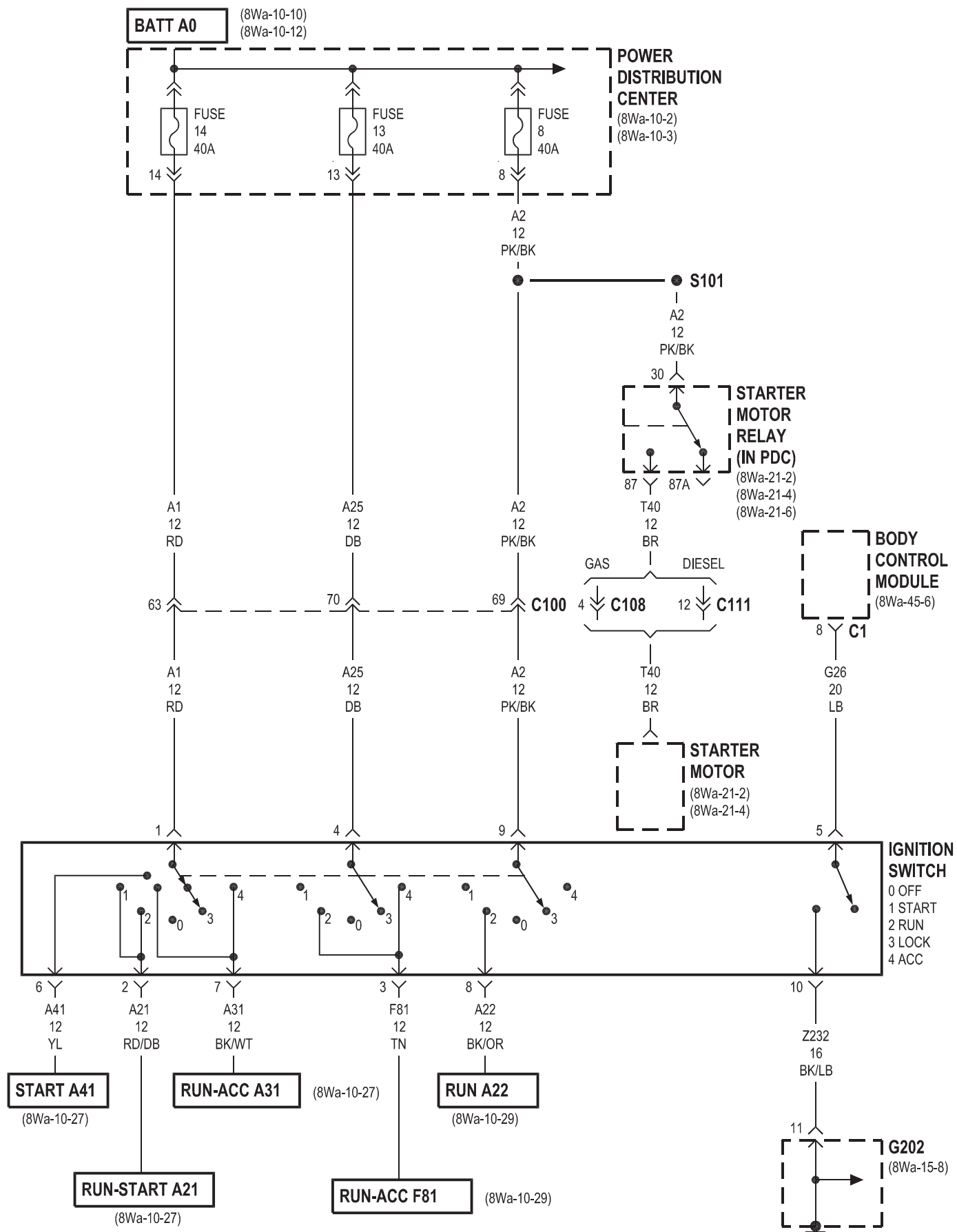


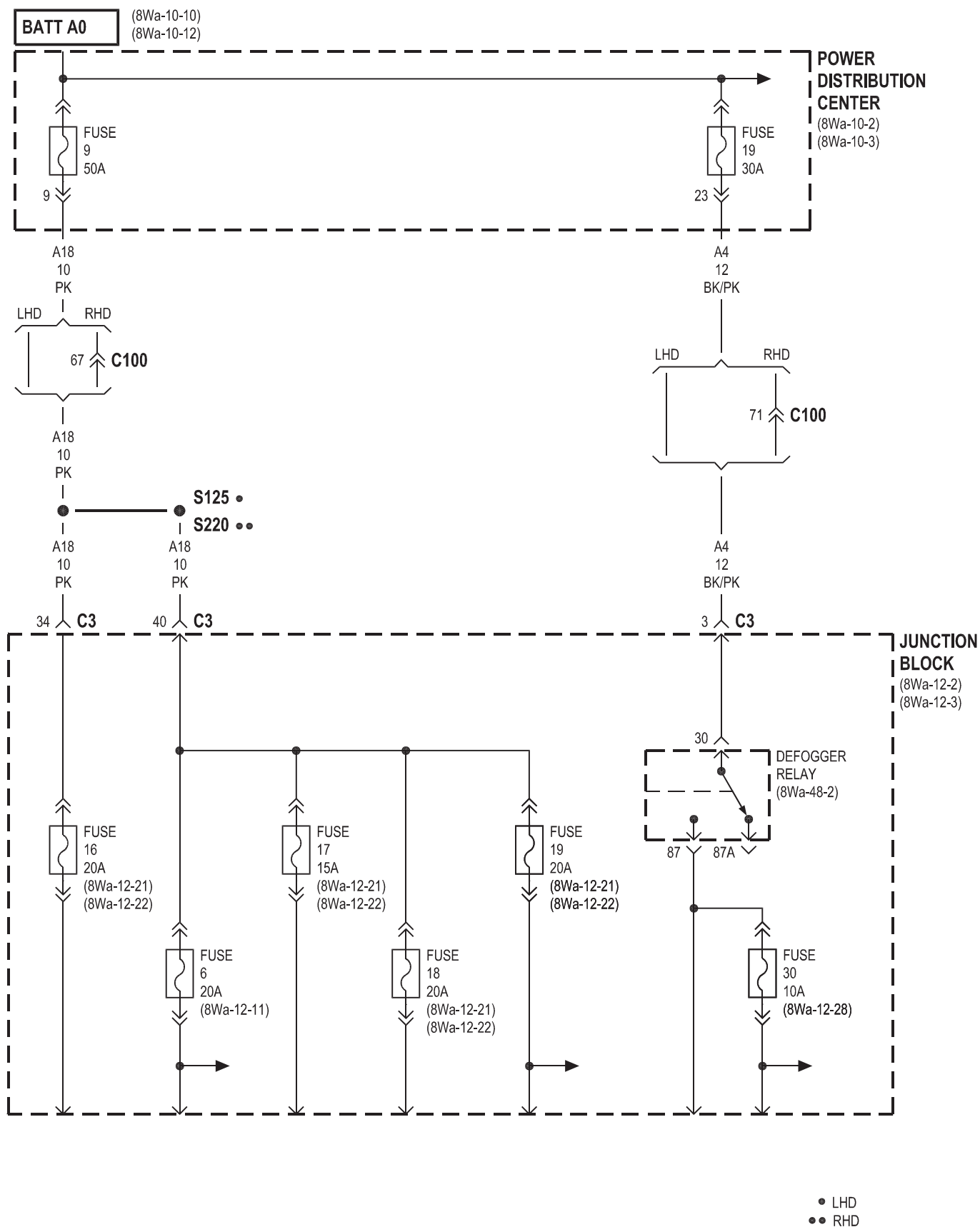


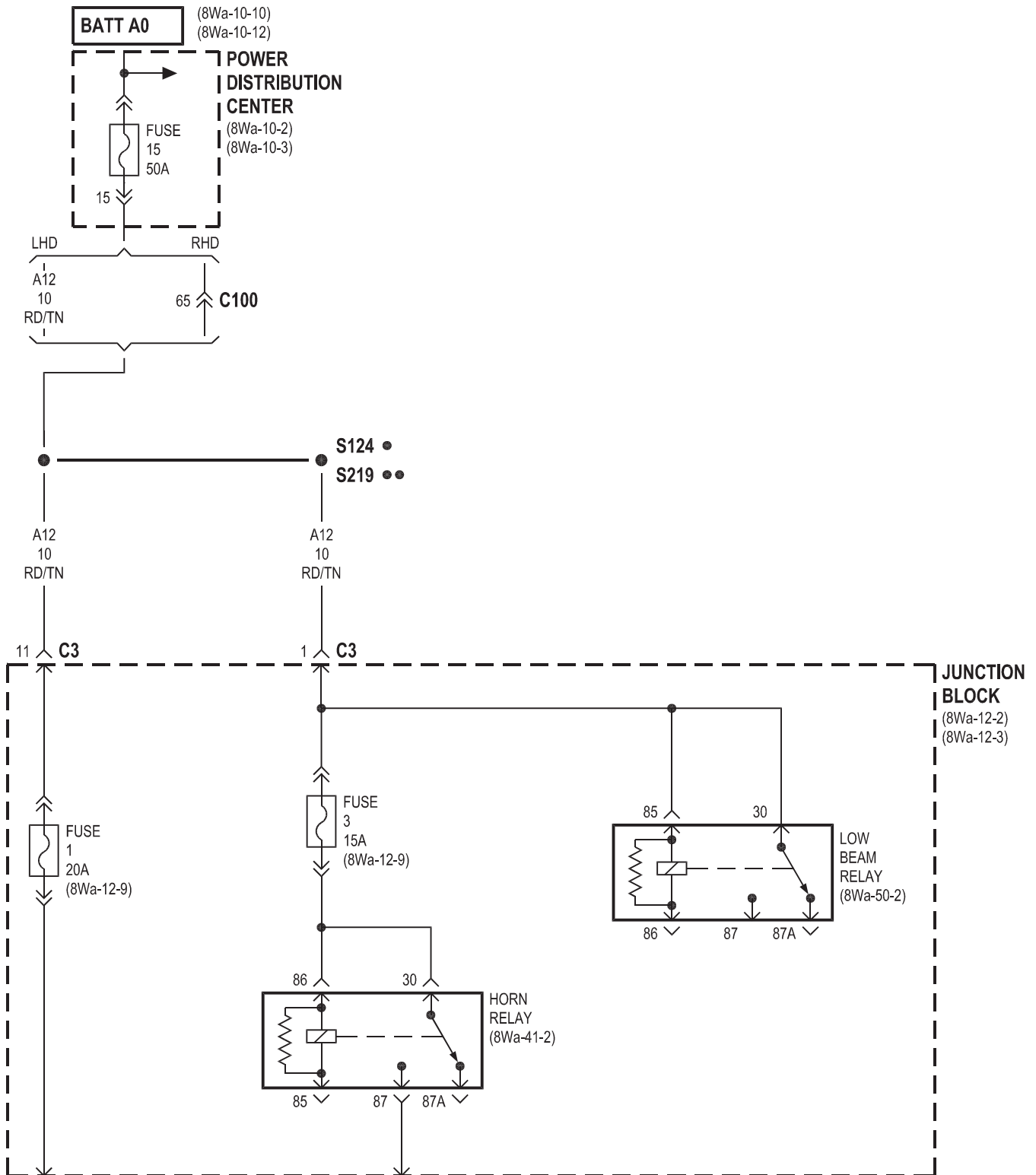




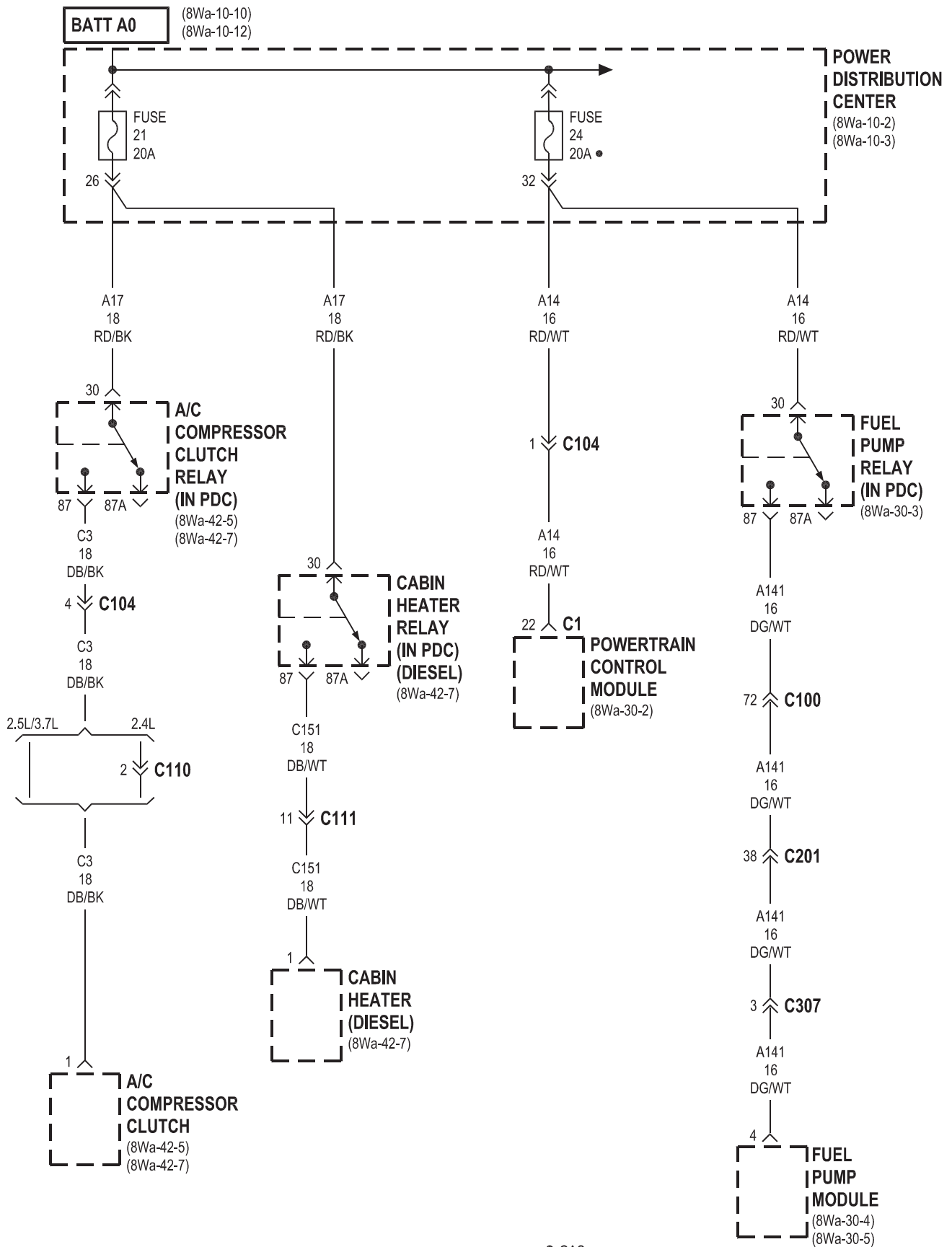


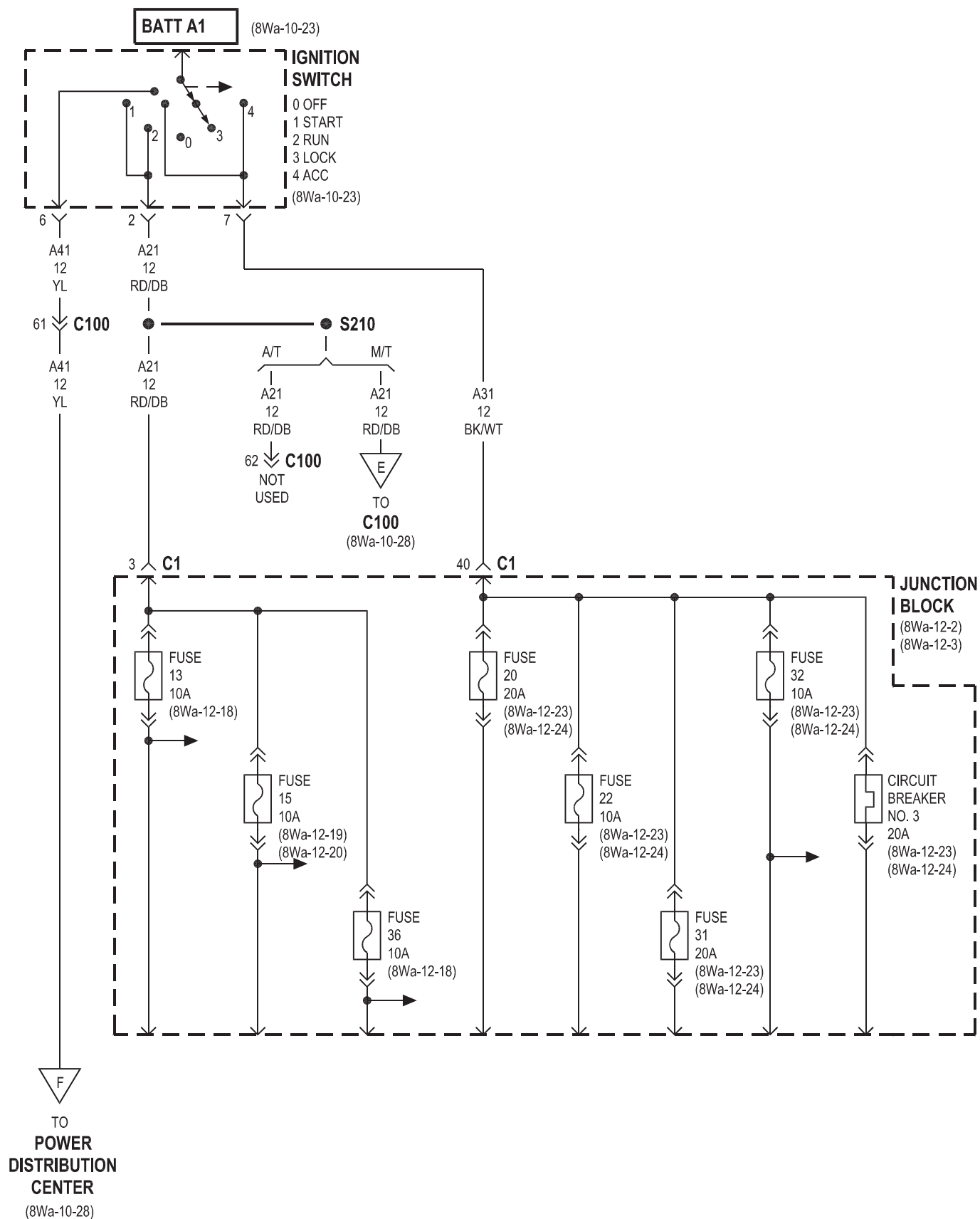


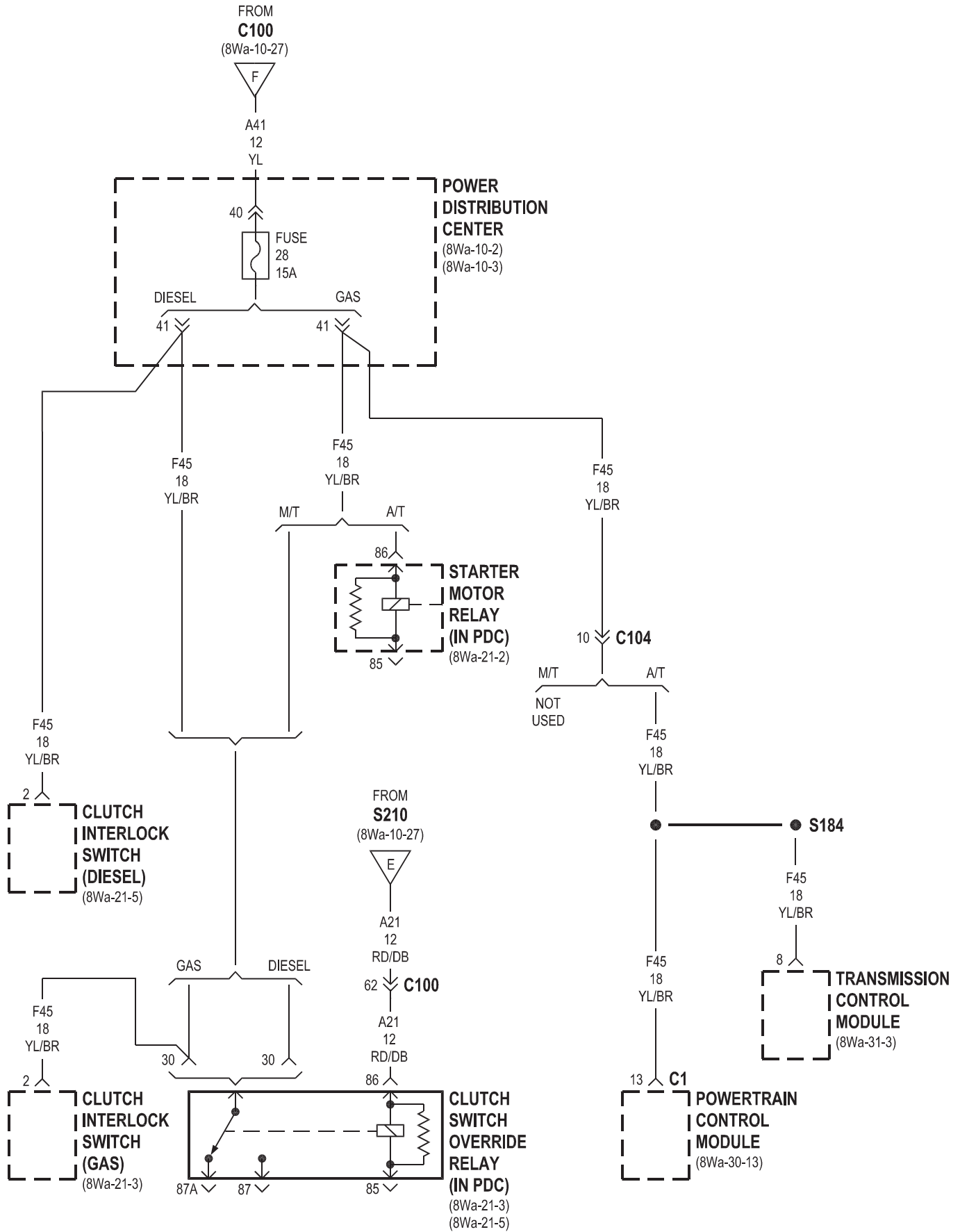


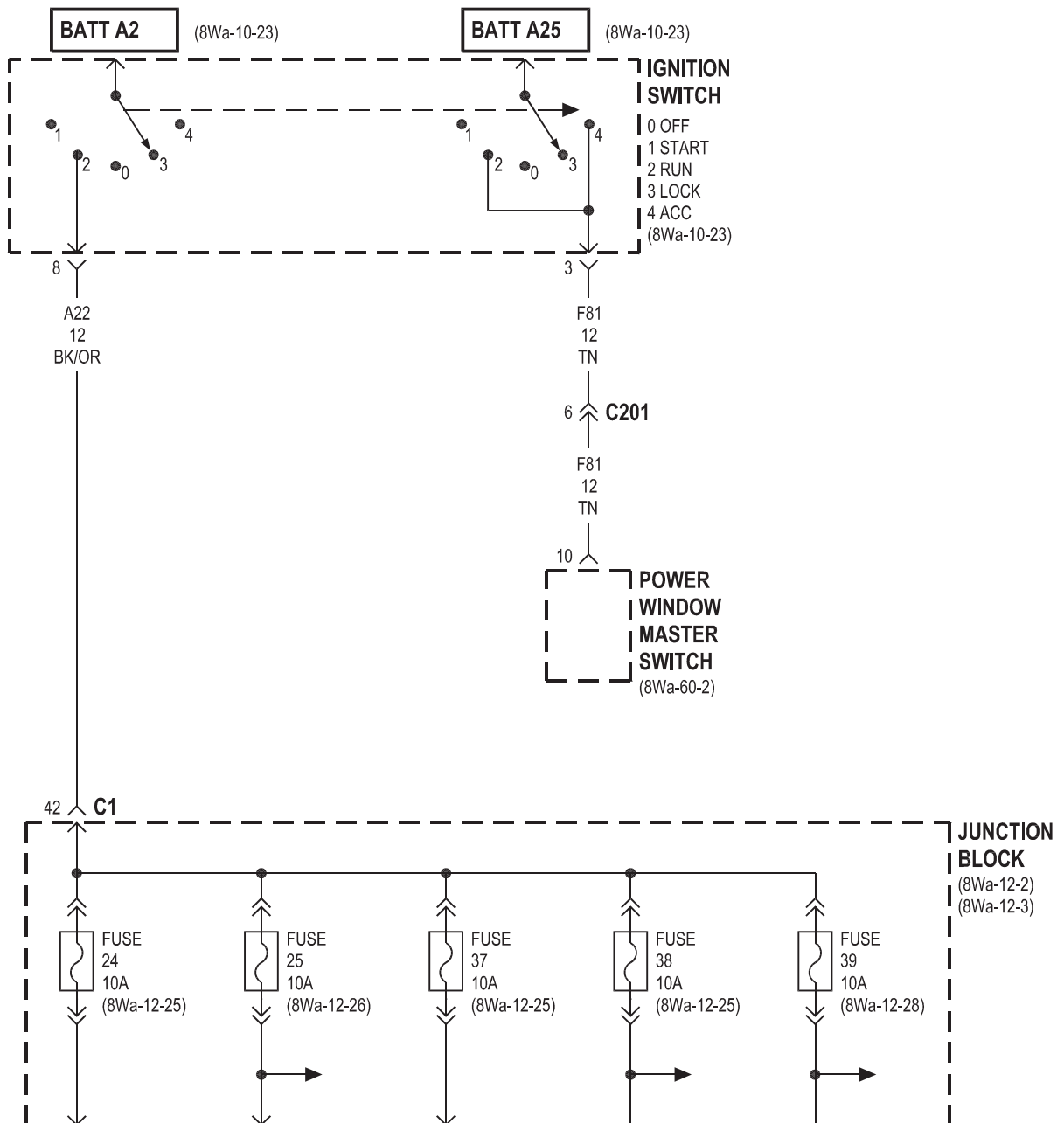


● LHD
●● RHD





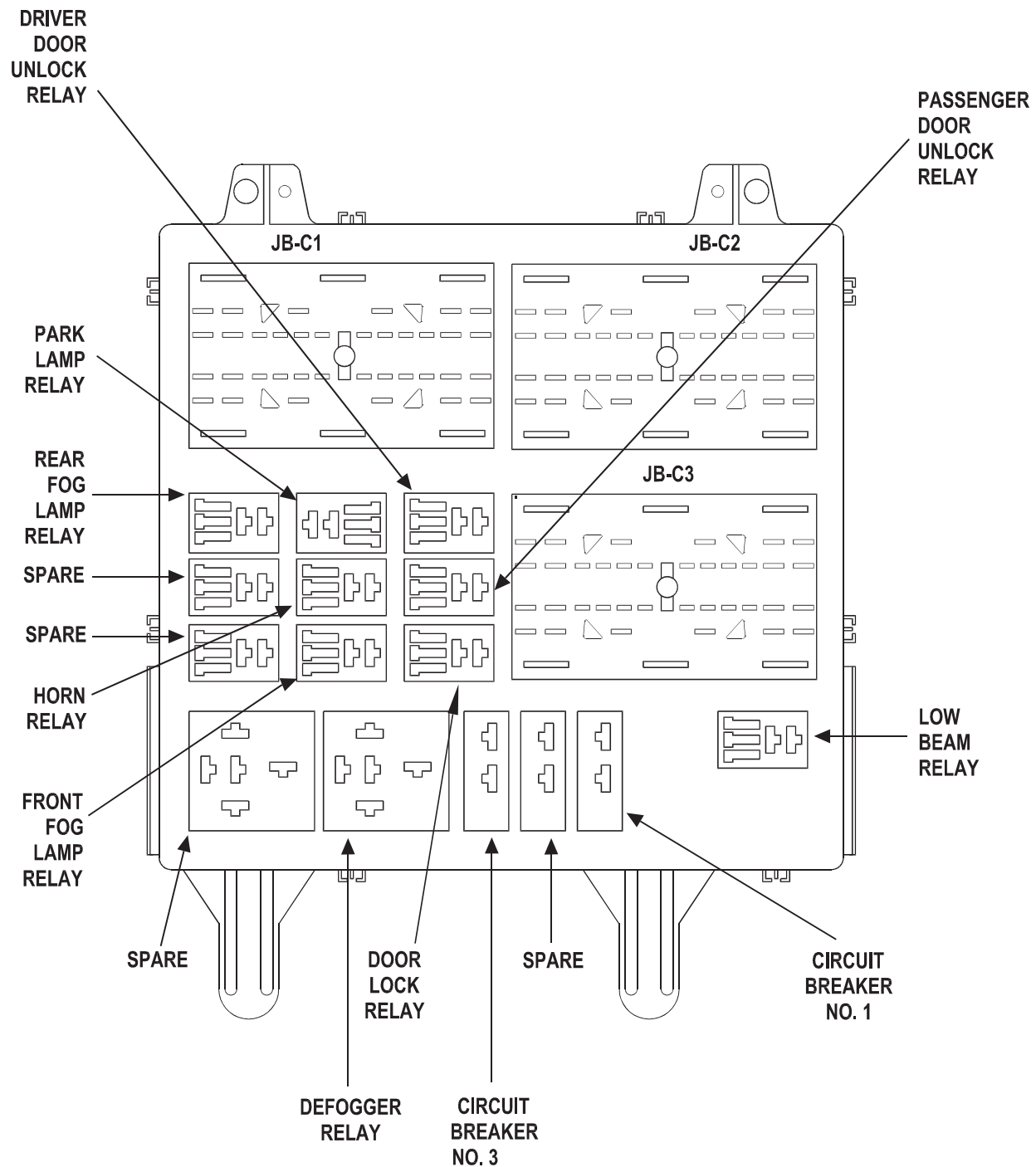


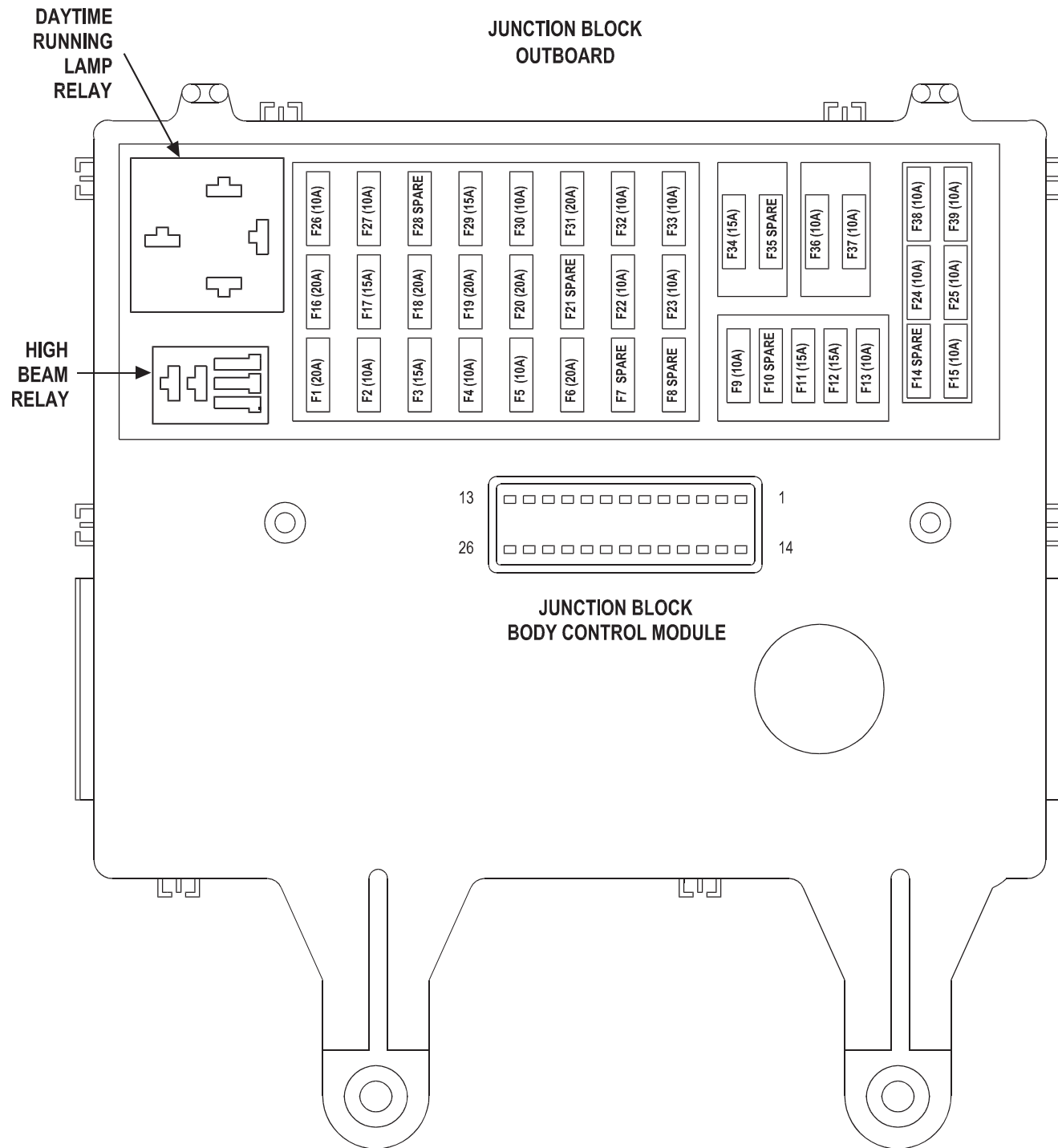


8W-12 JUNCTION BLOCK

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Fuse 26	8Wa-12-27
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Right Heated Seat Switch	8Wa-12-26
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Right Power Seat Switch	8Wa-12-29
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JUNCTION BLOCK
INBOARD



FUSES

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	20A	F38 16RD/WT	FUSED B(+)
2	10A	INTERNAL	FUSED B(+)
3	15A	INTERNAL	FUSED B(+)
4	10A	L44 18VT/RD	FUSED B(+)
5	10A	L43 18VT	FUSED (B+)
6	20A	INTERNAL	FUSED B(+)
7	-	SPARE	-
8	-	SPARE	-
9	10A	INTERNAL	FUSED PARK LAMP RELAY OUTPUT
10	-	SPARE	-
11	15A	A15 18PK/OR	FUSED B(+)
12	15A	F32 18PK/DB	FUSED B(+)
13	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
14	-	SPARE	-
15	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
16	20A	F41 16PK/VT	FUSED B(+)
17	15A	F70 18PK/BK	FUSED B(+)
18	20A	F60 16DG/RD	FUSED B(+)
19	20A	INTERNAL	FUSED B(+)
20	20A	F85 16VT/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
21	-	SPARE	-
22	10A	F88 20BR/RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
23	10A	INTERNAL	FUSED PARK LAMP RELAY OUTPUT
24	10A	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN)
25	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN)
26	10A	L34 18RD/OR	FUSED RIGHT HIGH BEAM OUTPUT
27	10A	L33 18LG/BR	FUSED LEFT HIGH BEAM OUTPUT
28	-	SPARE	-
29 ○○	15A	A3 16RD/WT	FUSED B(+)
30	10A	INTERNAL	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT

○○ HIGHLINE

FUSES (CONTINUED)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
31	20A	F30 16RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
32	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
33	10A	INTERNAL	FUSED B(+)
34	15A	INTERNAL	FUSED B(+)
35	-	SPARE	-
36	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
37	10A	F23 18DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
38	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN)
39	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN)

CIRCUIT BREAKERS

C.B.	AMPS	FUSED CIRCUIT	FUNCTION
1	25A	F37 14RD/LB	FUSED B(+)
2	-	SPARE	-
3	20A	V6 18VT/YL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)

**DAYTIME
RUNNING
LAMP RELAY**

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	INTERNAL	GROUND
86	INTERNAL	HIGH BEAM RELAY CONTROL
87	INTERNAL	DAYTIME RUNNING LAMP RELAY OUTPUT
87A	-	-

**DEFOGGER
RELAY**

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	INTERNAL	REAR WINDOW DEFOGGER RELAY CONTROL
86	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN)
87	INTERNAL	REAR WINDOW DEFOGGER RELAY OUTPUT
87A	-	-

**DOOR
LOCK
RELAY**

CAVITY	CIRCUIT	FUNCTION
30	P33 18OR/BK	DOOR LOCK RELAY OUTPUT
85	INTERNAL	FUSED B(+)
86	INTERNAL	DOOR LOCK RELAY CONTROL
87	INTERNAL	FUSED B(+)
87A	INTERNAL	GROUND

**DRIVER
DOOR
UNLOCK RELAY**

CAVITY	CIRCUIT	FUNCTION
30	P34 18PK/BK	DRIVER DOOR UNLOCK RELAY OUTPUT
85	INTERNAL	DRIVER DOOR UNLOCK RELAY CONTROL
86	INTERNAL	FUSED B(+)
87	INTERNAL	FUSED B(+)
87A	INTERNAL	GROUND

**FRONT FOG
LAMP
RELAY**

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	INTERNAL	FRONT FOG LAMP RELAY CONTROL
86	INTERNAL	FUSED B(+)
87	L39 16LB	FRONT FOG LAMP RELAY OUTPUT
87A	-	-

**HIGH
BEAM
RELAY**

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	INTERNAL	FUSED B(+)
86	INTERNAL	HIGH BEAM RELAY CONTROL
87	INTERNAL	HIGH BEAM RELAY OUTPUT
87A	-	-

**HORN
RELAY**

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	INTERNAL	HORN RELAY CONTROL
86	INTERNAL	FUSED B(+)
87	X2 18DG/RD	HORN RELAY OUTPUT
87A	-	-

**LOW
BEAM
RELAY**

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	INTERNAL	FUSED B(+)
86	INTERNAL	LOW BEAM RELAY CONTROL
87	INTERNAL	LOW BEAM RELAY OUTPUT
87A	-	-

**PARK
LAMP
RELAY**

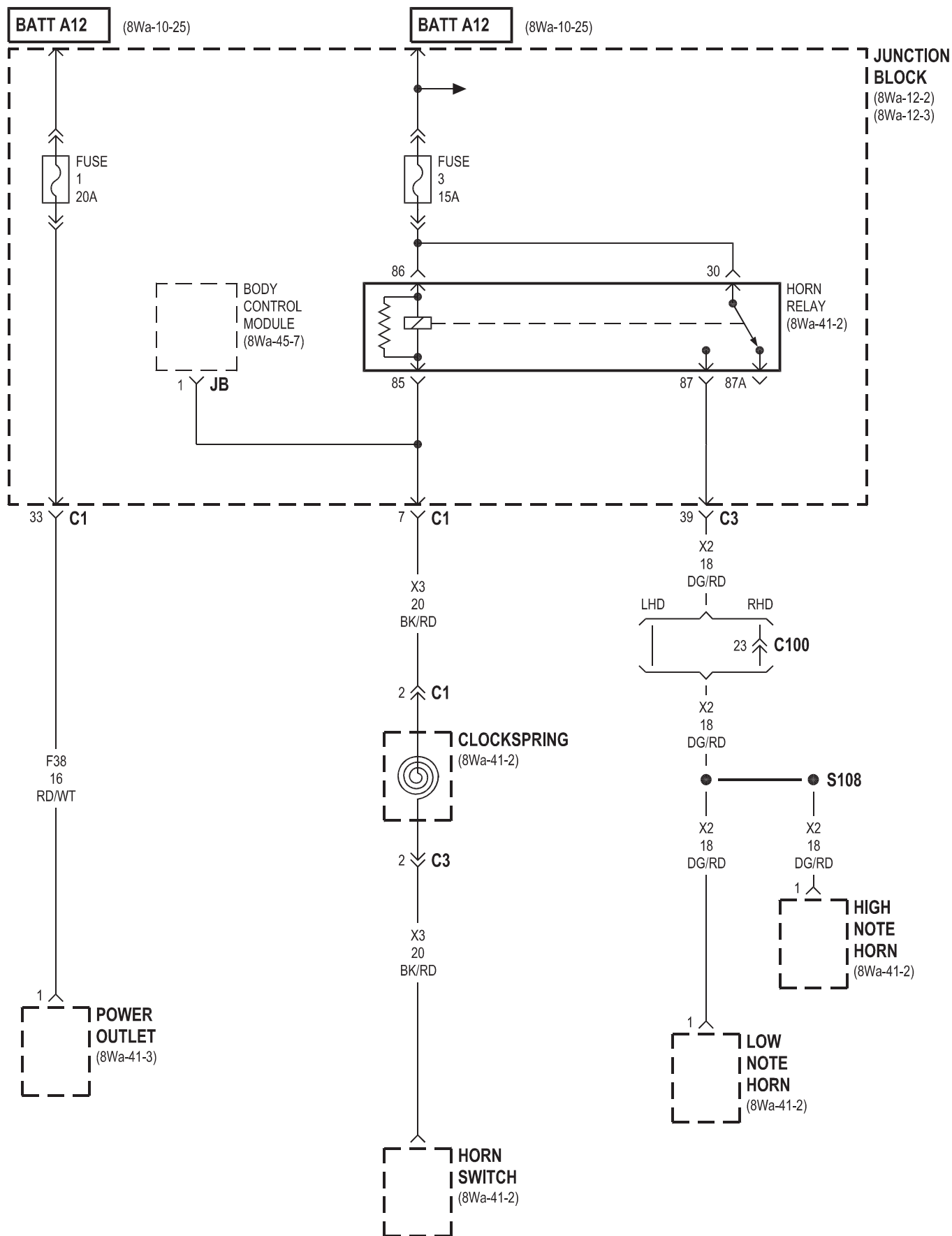
CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	PARK LAMP RELAY OUTPUT
85	INTERNAL	PARK LAMP RELAY CONTROL
86	INTERNAL	FUSED B(+)
87	INTERNAL	FUSED B(+)
87A	INTERNAL	GROUND

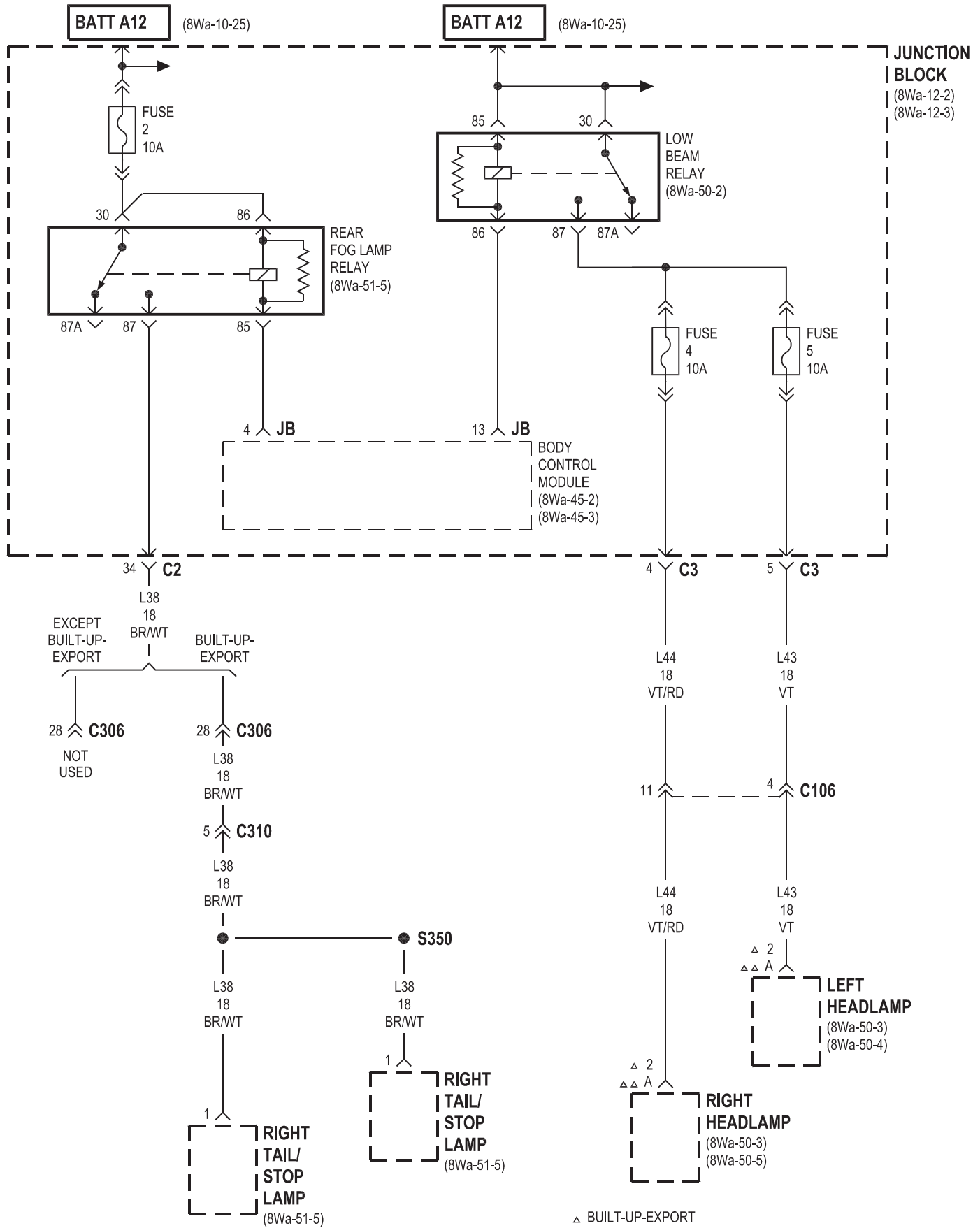
**PASSENGER
DOOR
UNLOCK
RELAY**

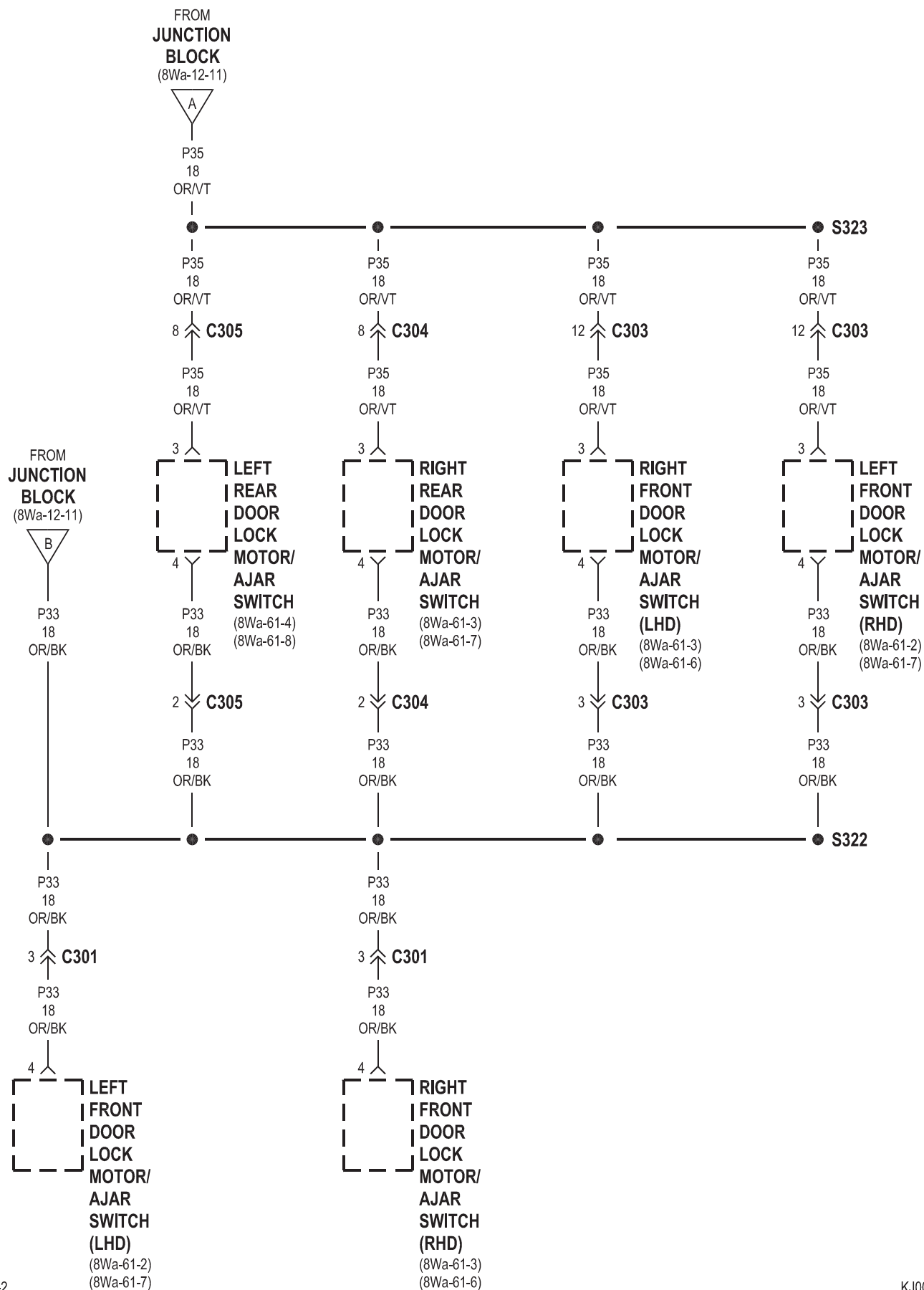
CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	PASSENGER DOOR UNLOCK RELAY OUTPUT
85	INTERNAL	PASSENGER DOOR UNLOCK RELAY CONTROL
86	INTERNAL	FUSED B(+)
87	INTERNAL	FUSED B(+)
87A	INTERNAL	GROUND

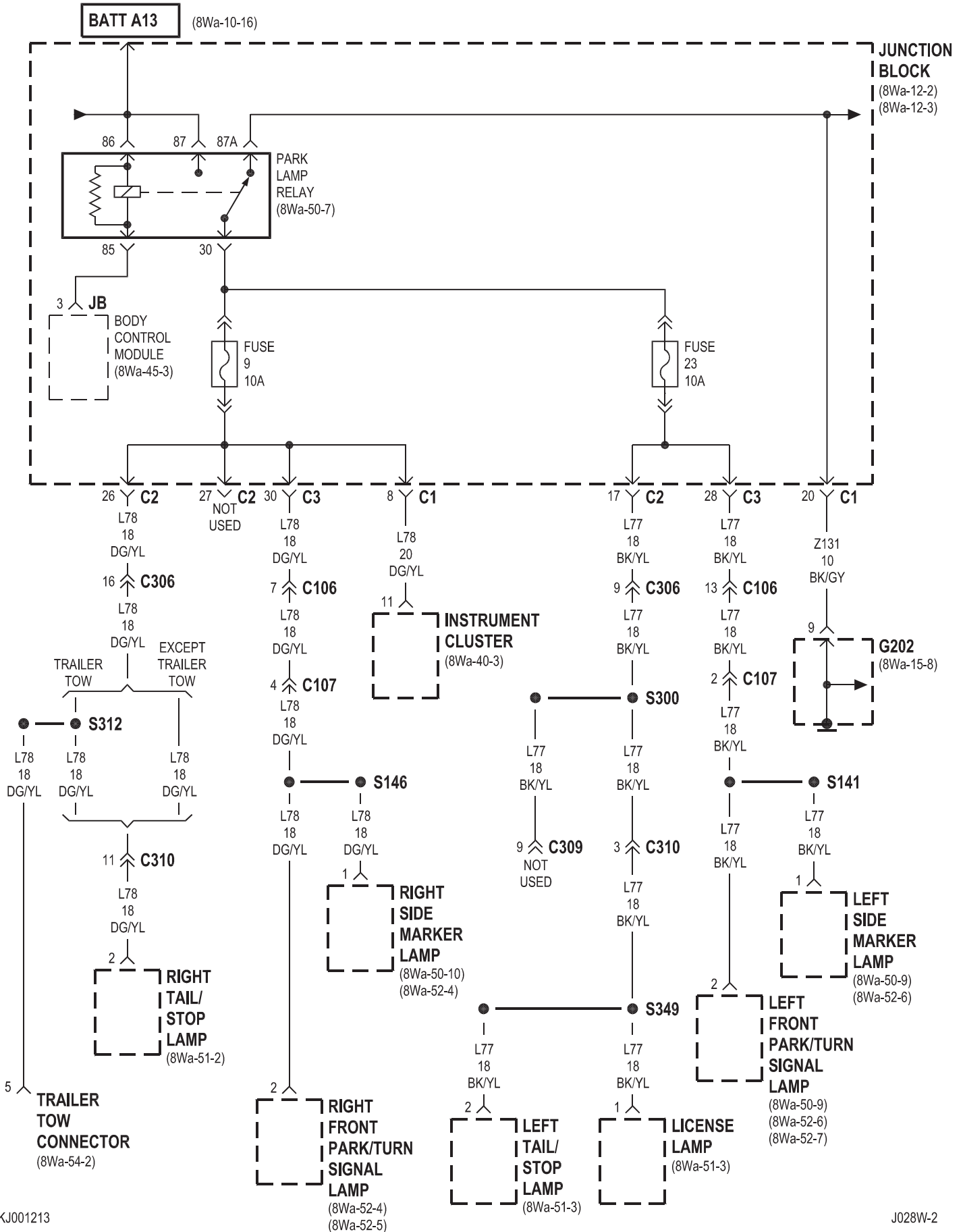
**REAR
FOG LAMP
RELAY**

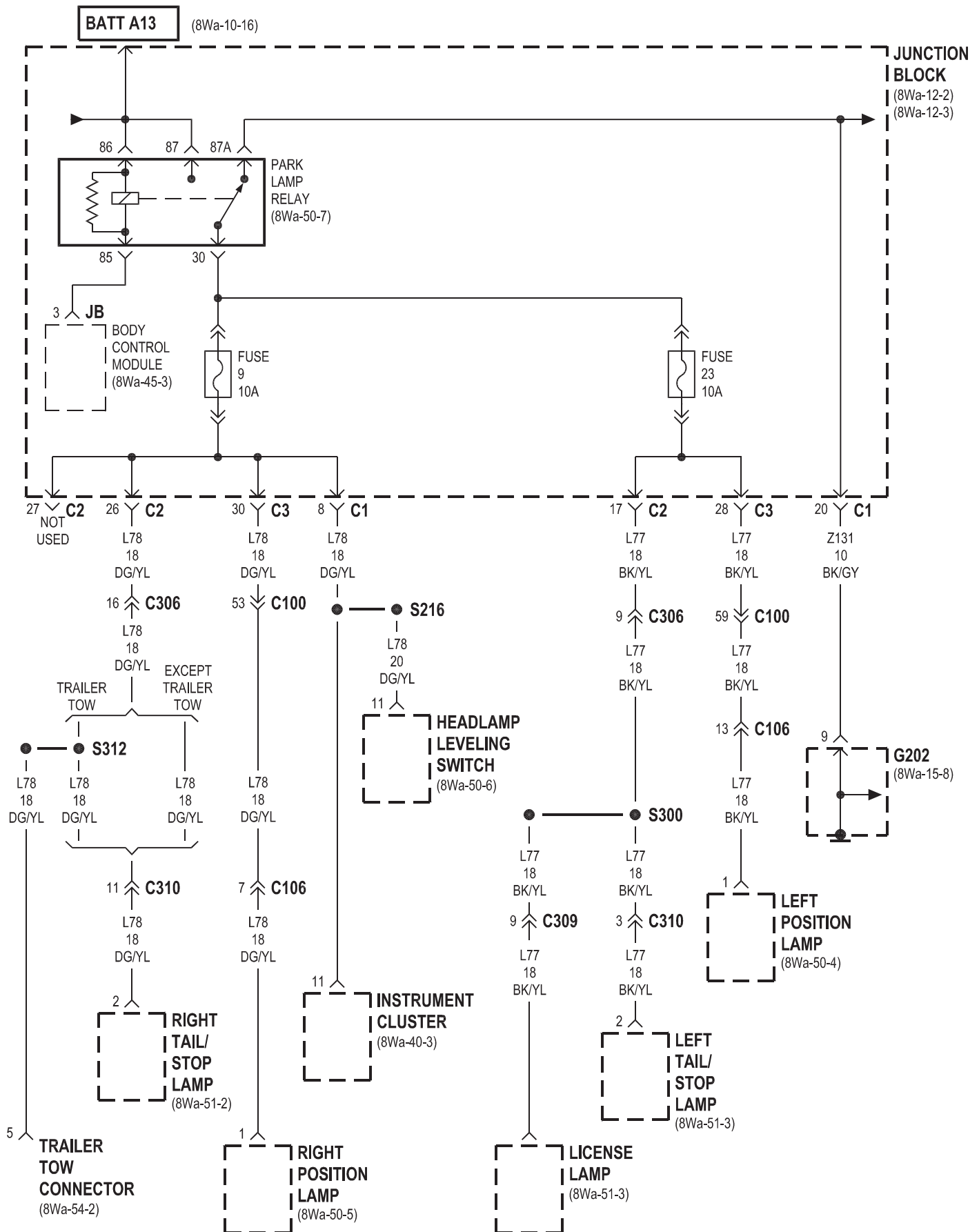
CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	INTERNAL	REAR FOG LAMP RELAY CONTROL
86	INTERNAL	FUSED B(+)
86	INTERNAL	FUSED B(+)
87	L38 18BR/WT	REAR FOG LAMP RELAY OUTPUT
87A	-	-

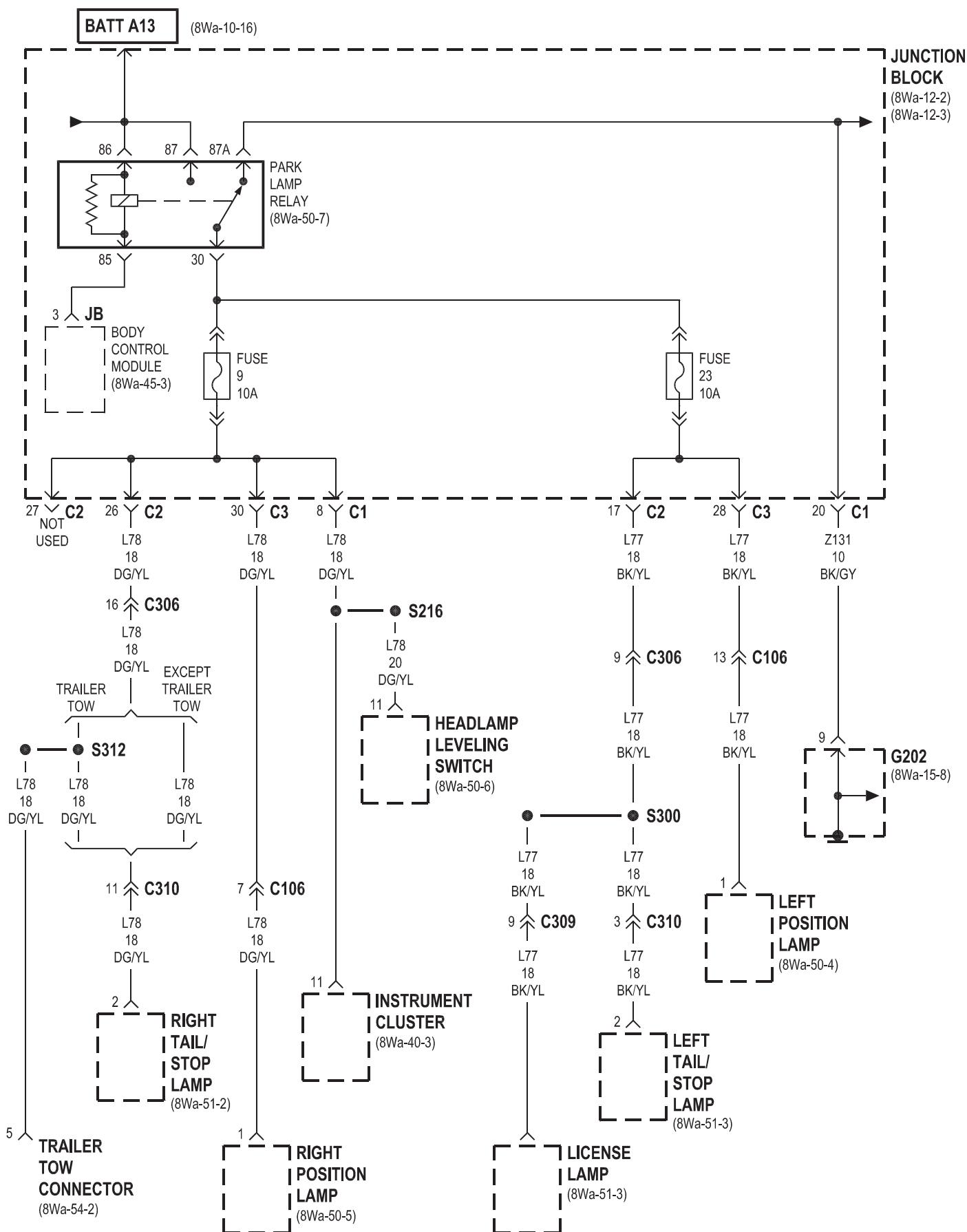


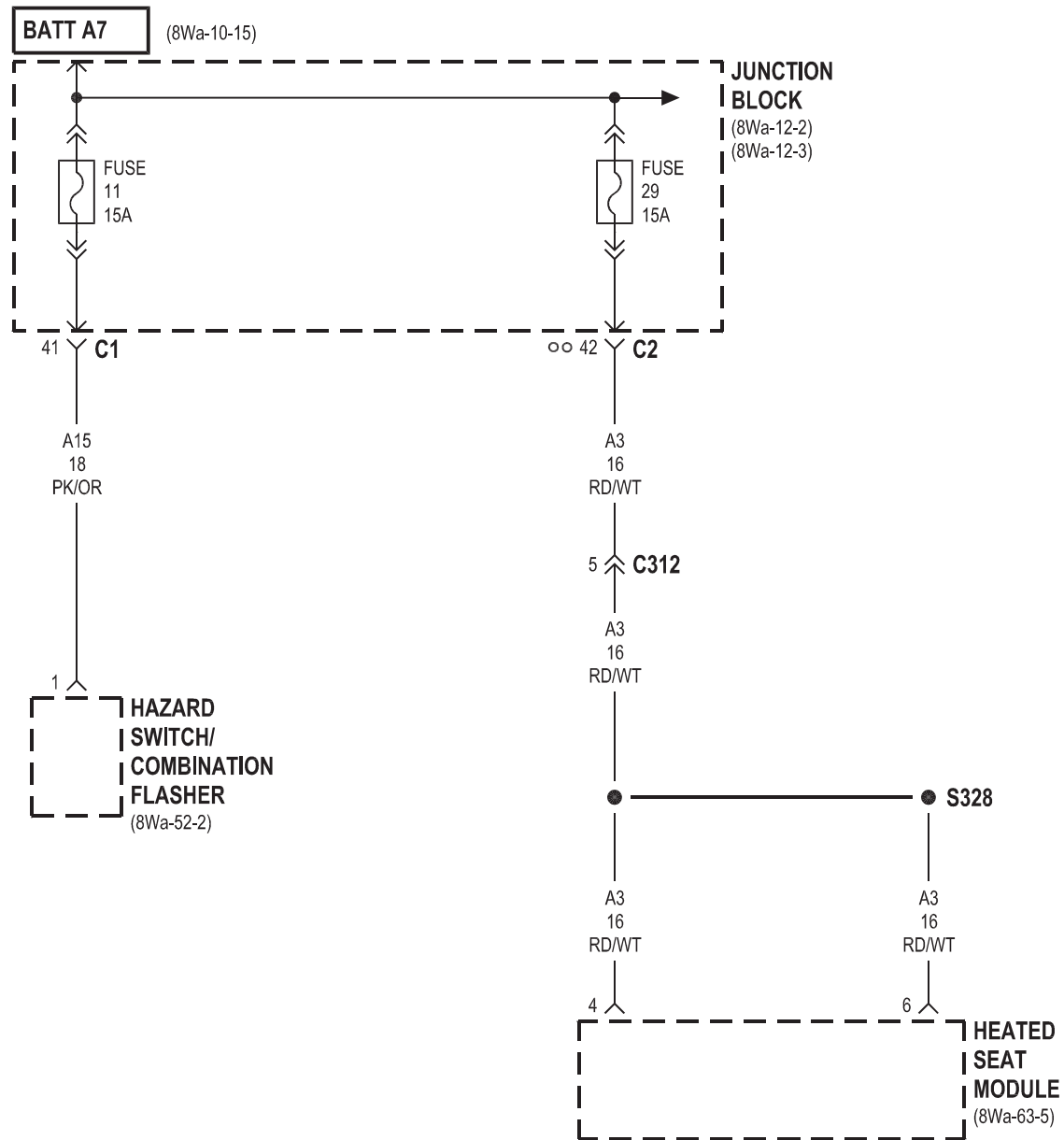


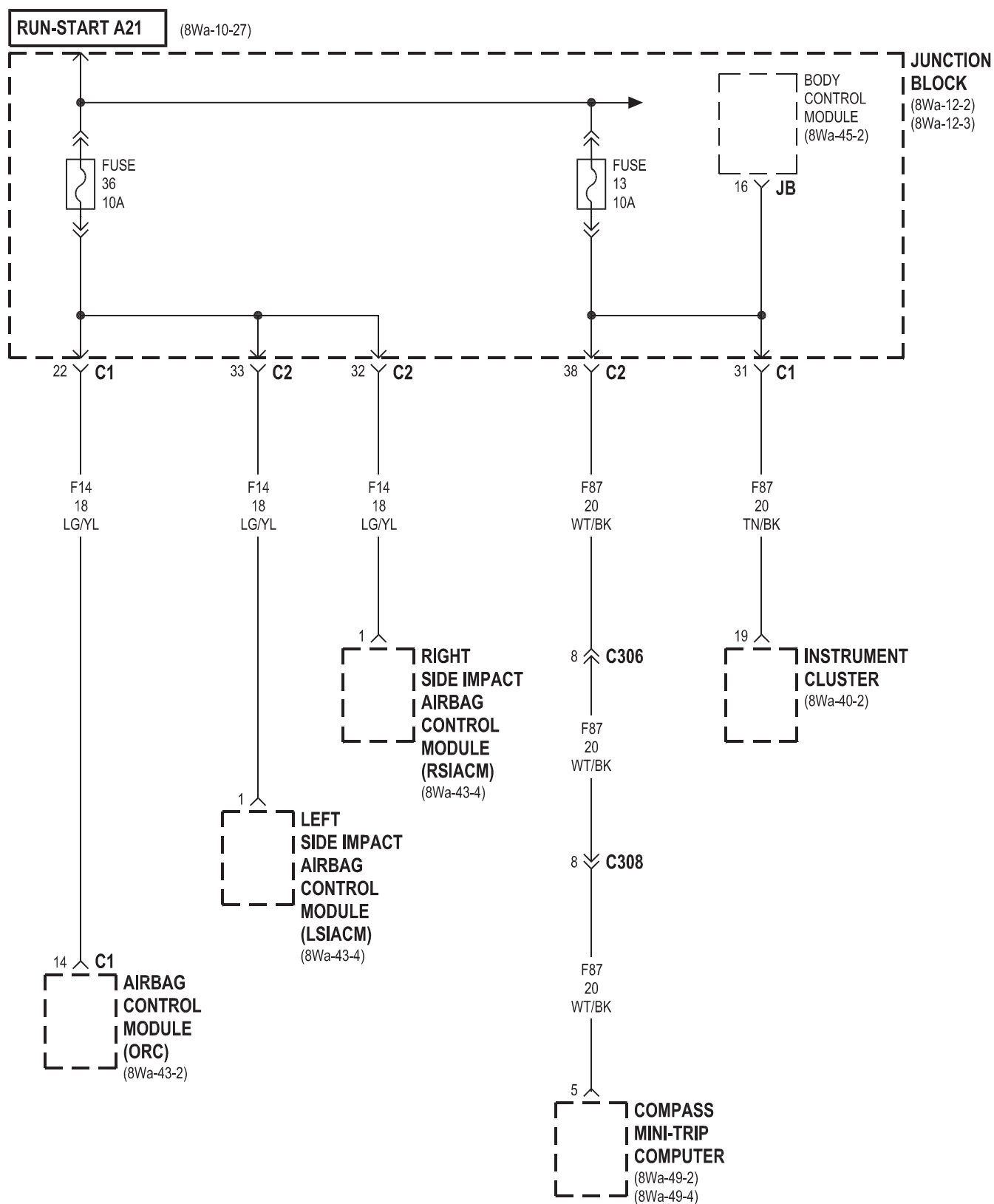


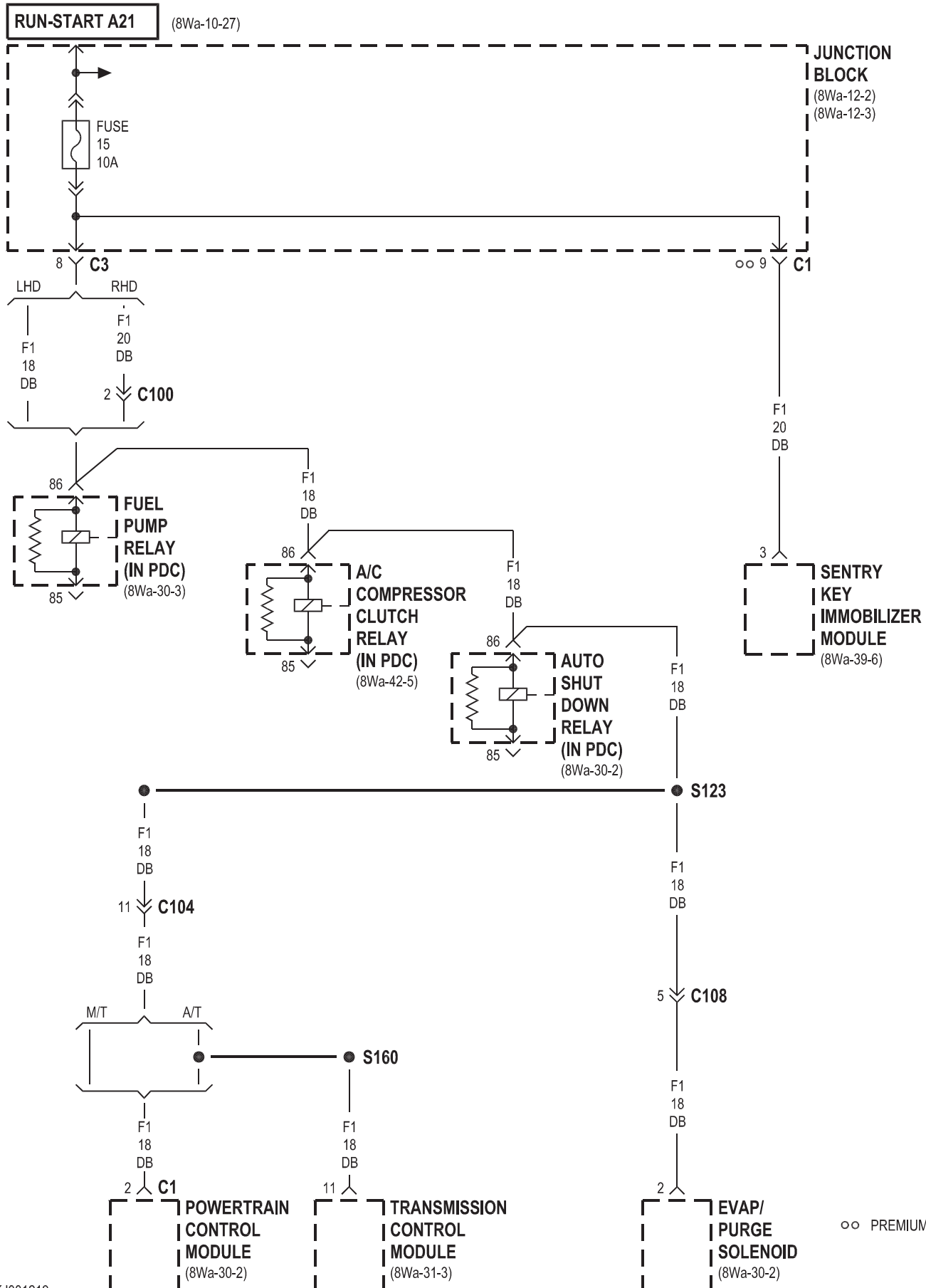


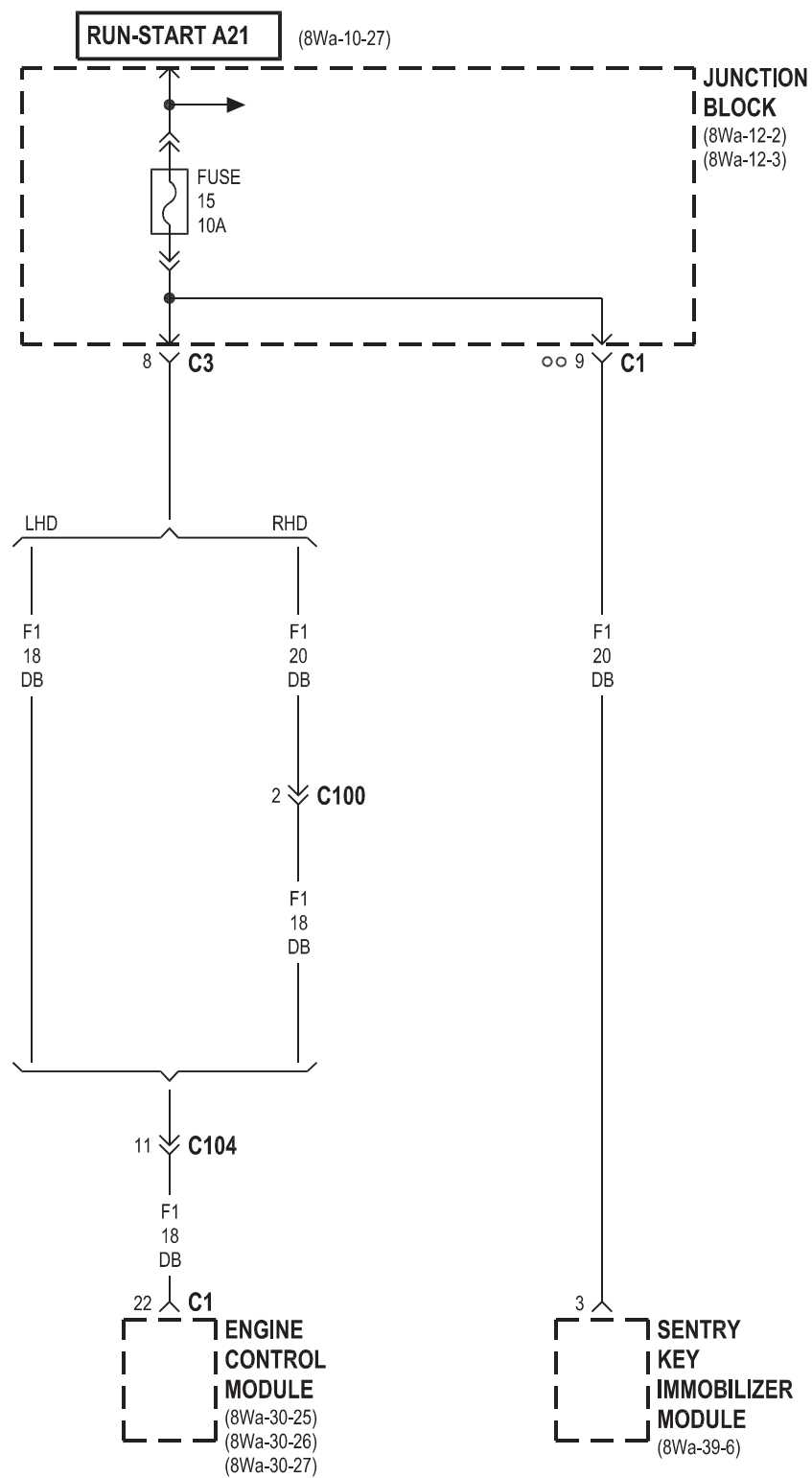








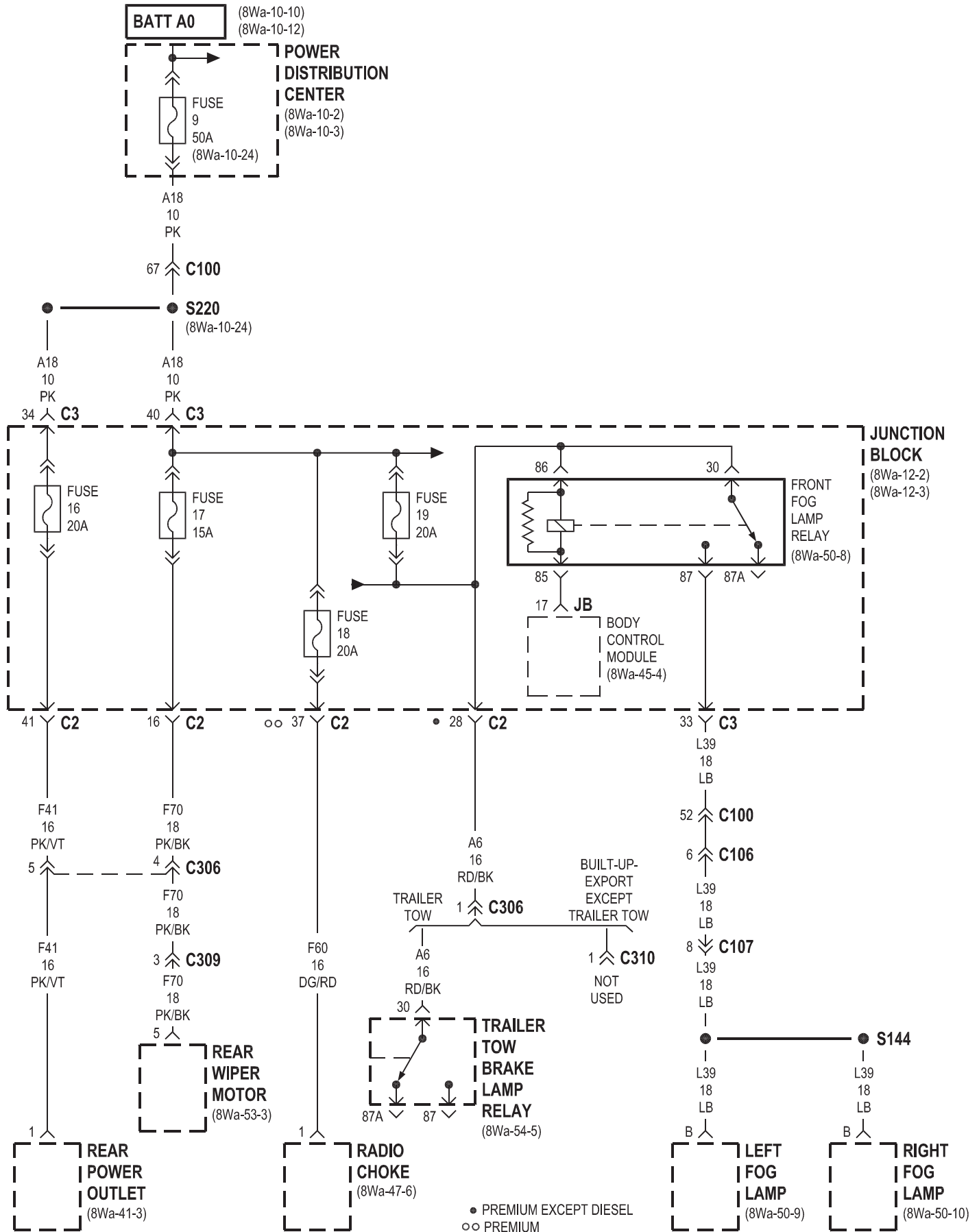


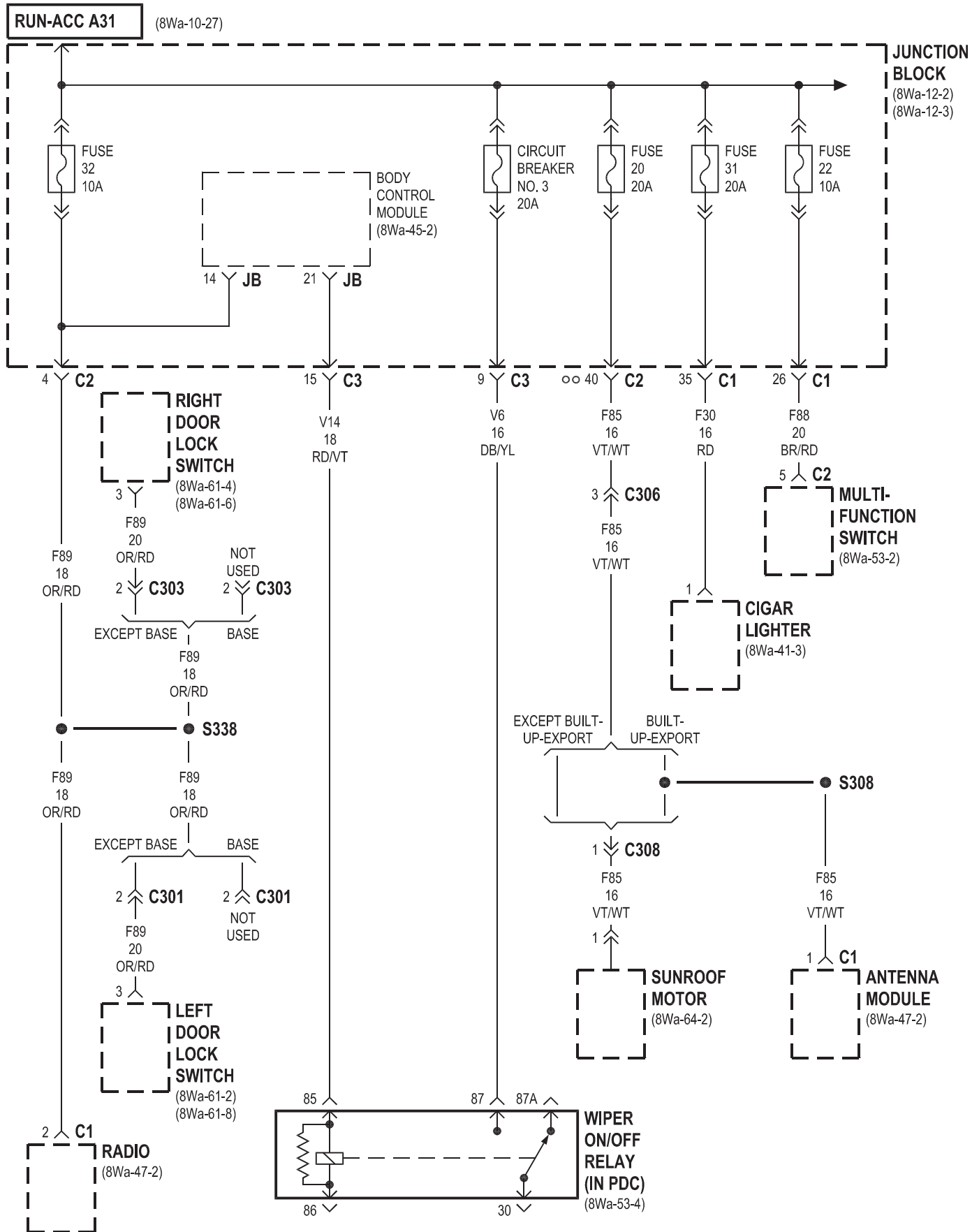


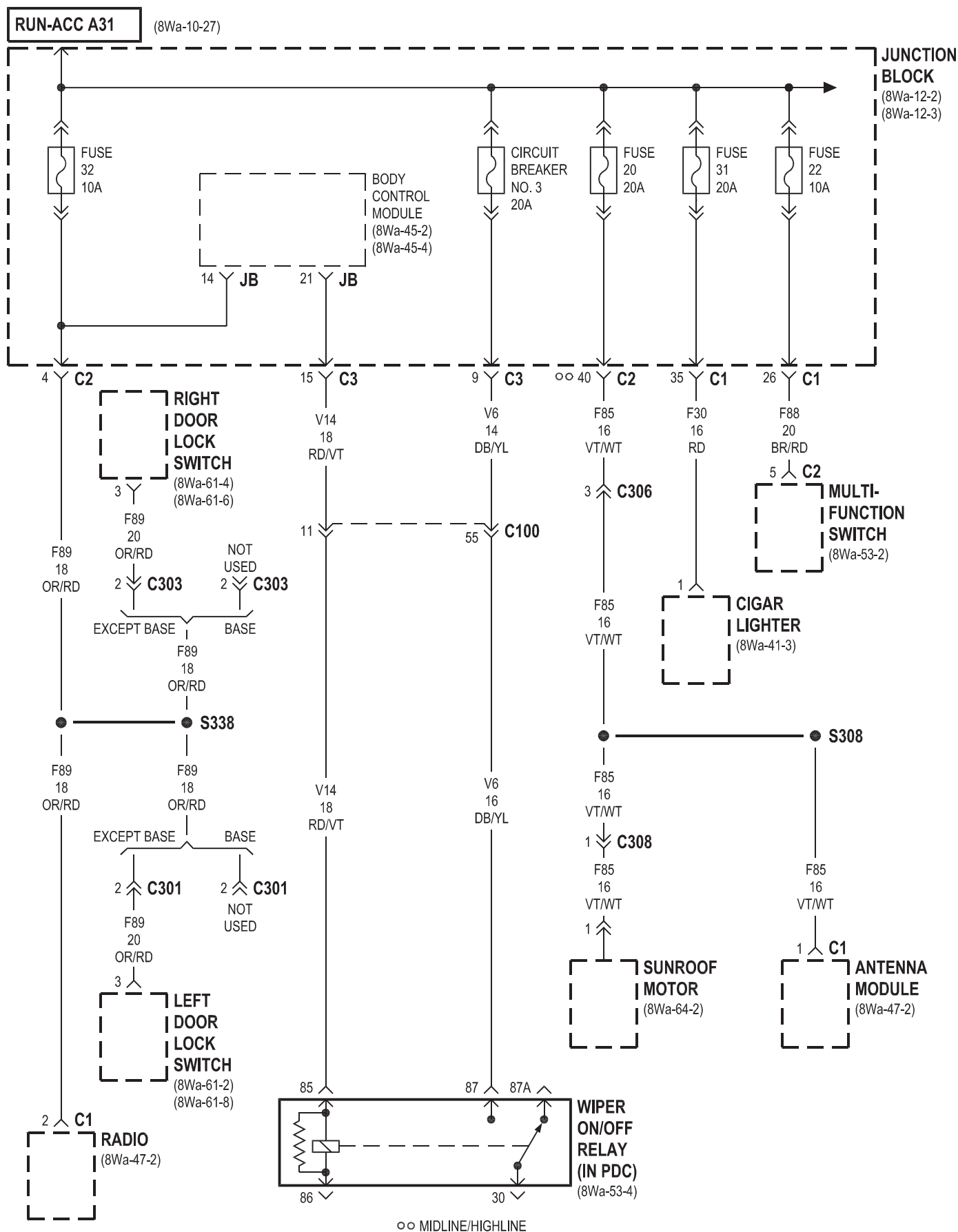
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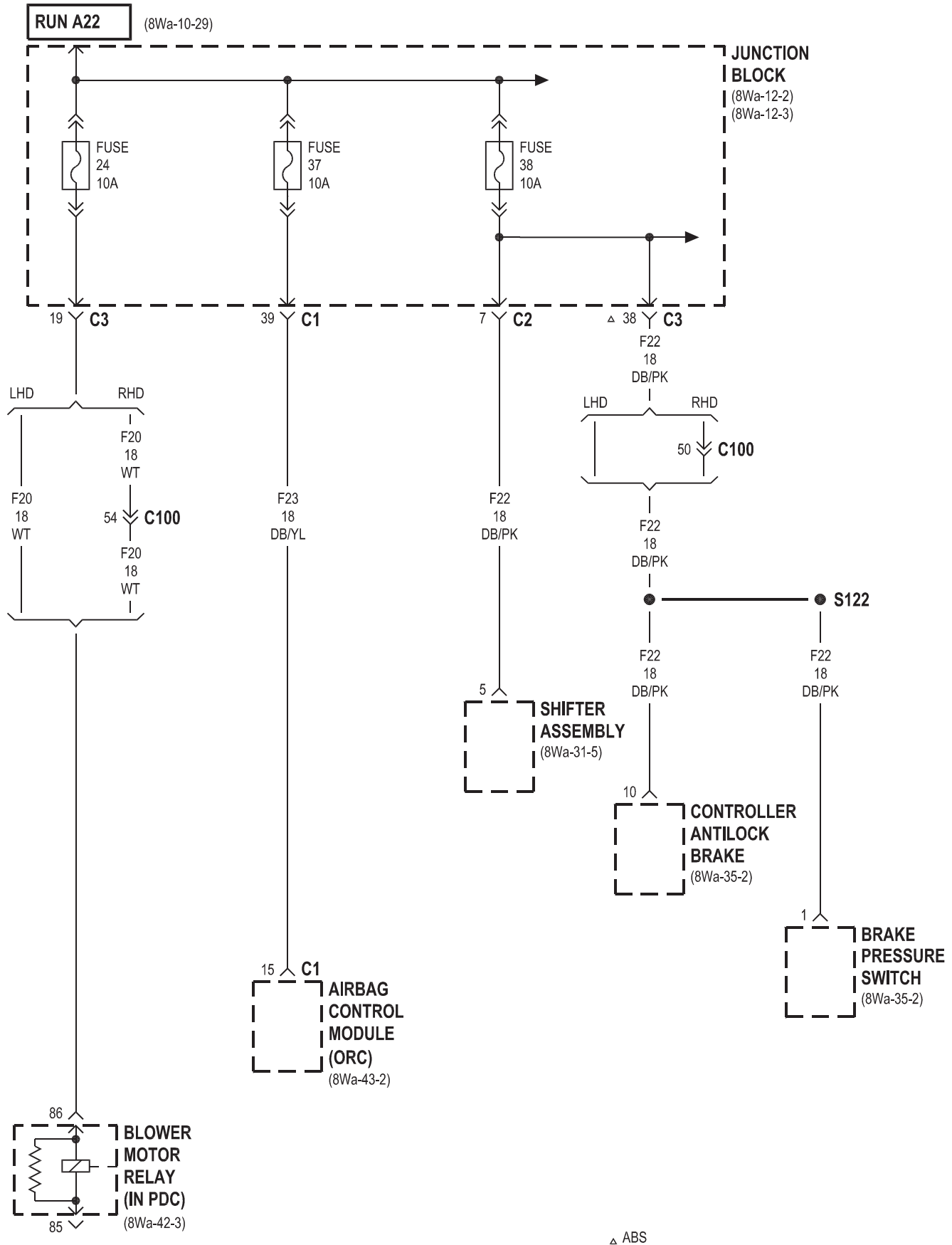
- PREMIUM EXCEPT DIESEL
- PREMIUM

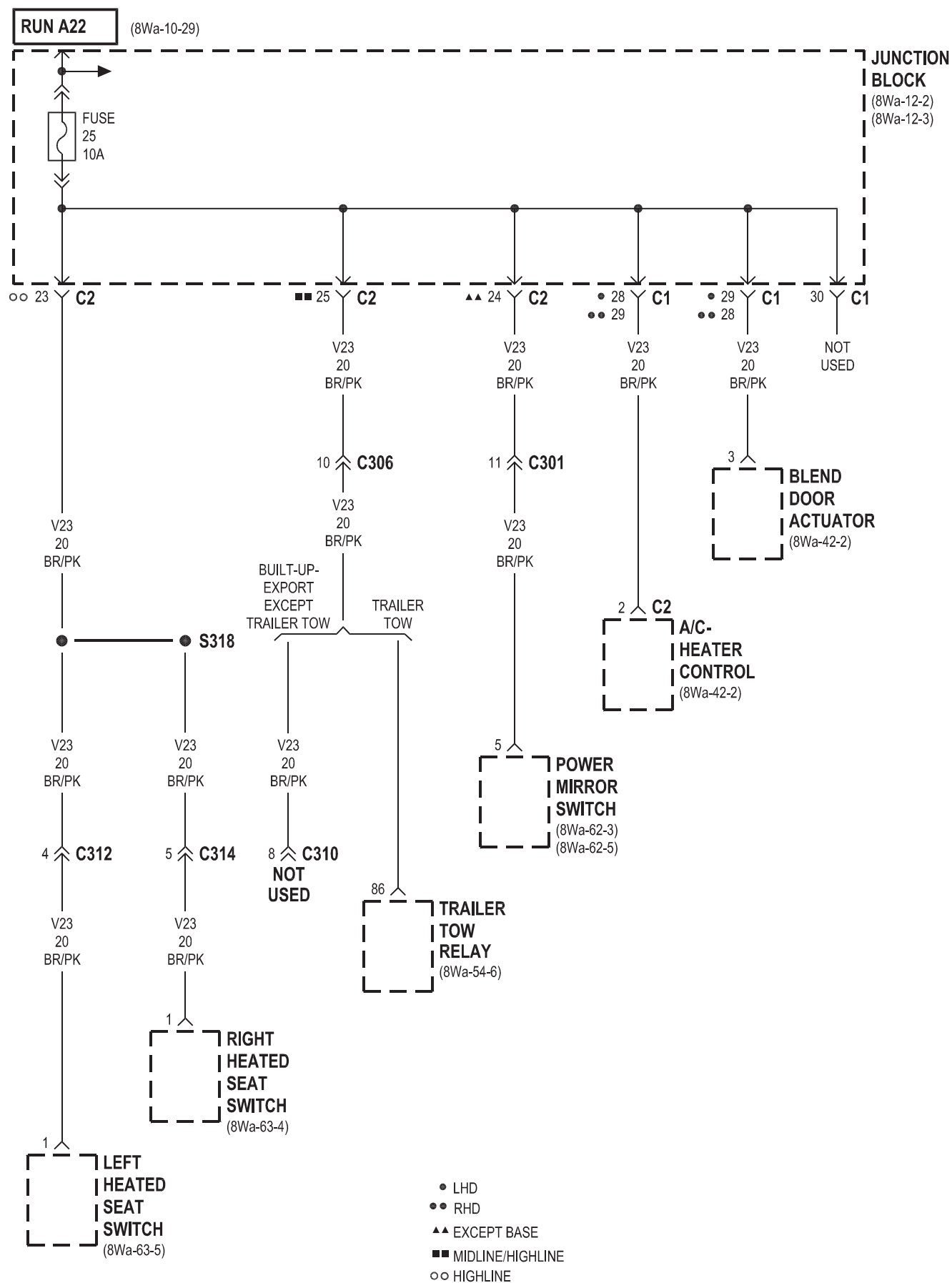


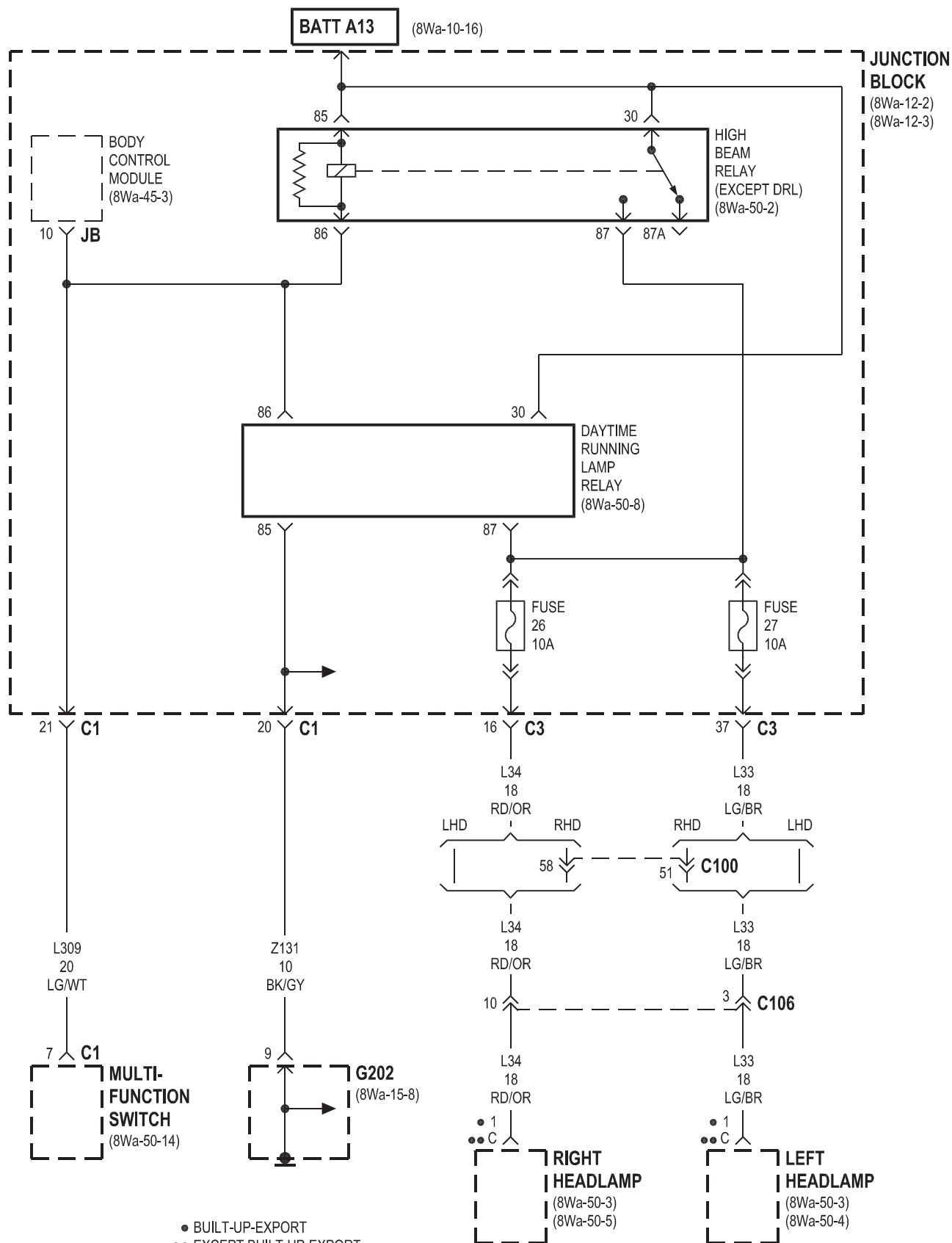


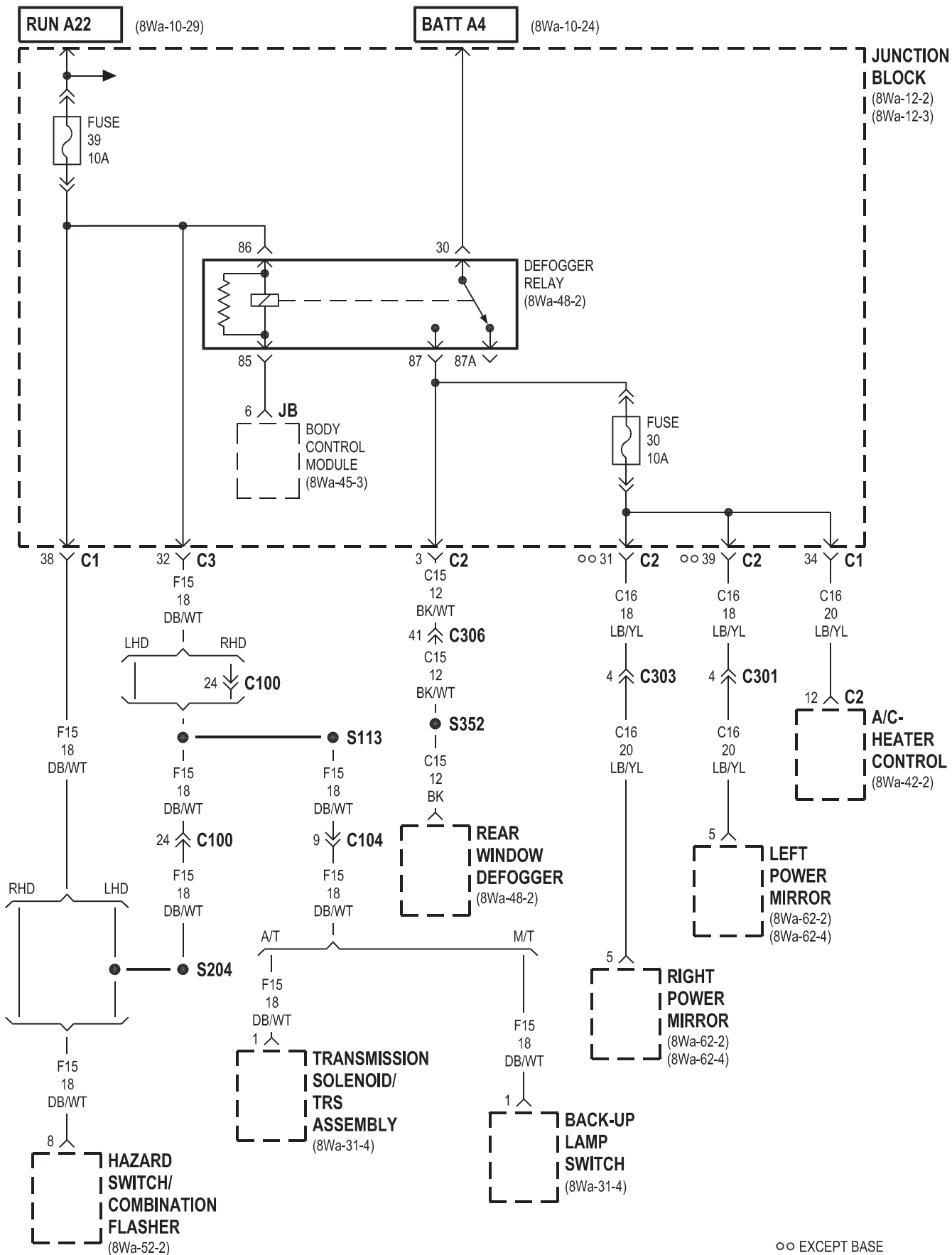


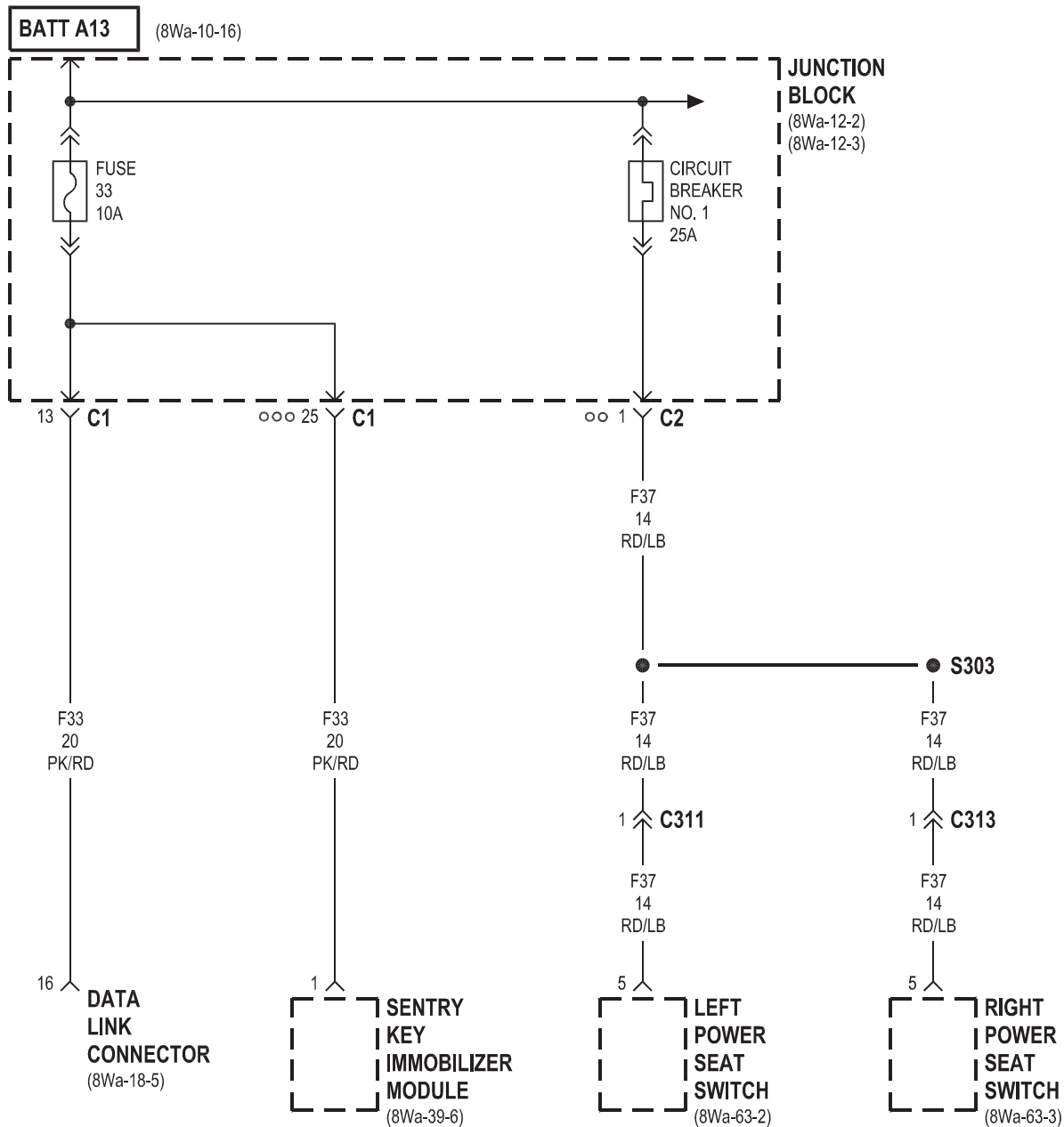




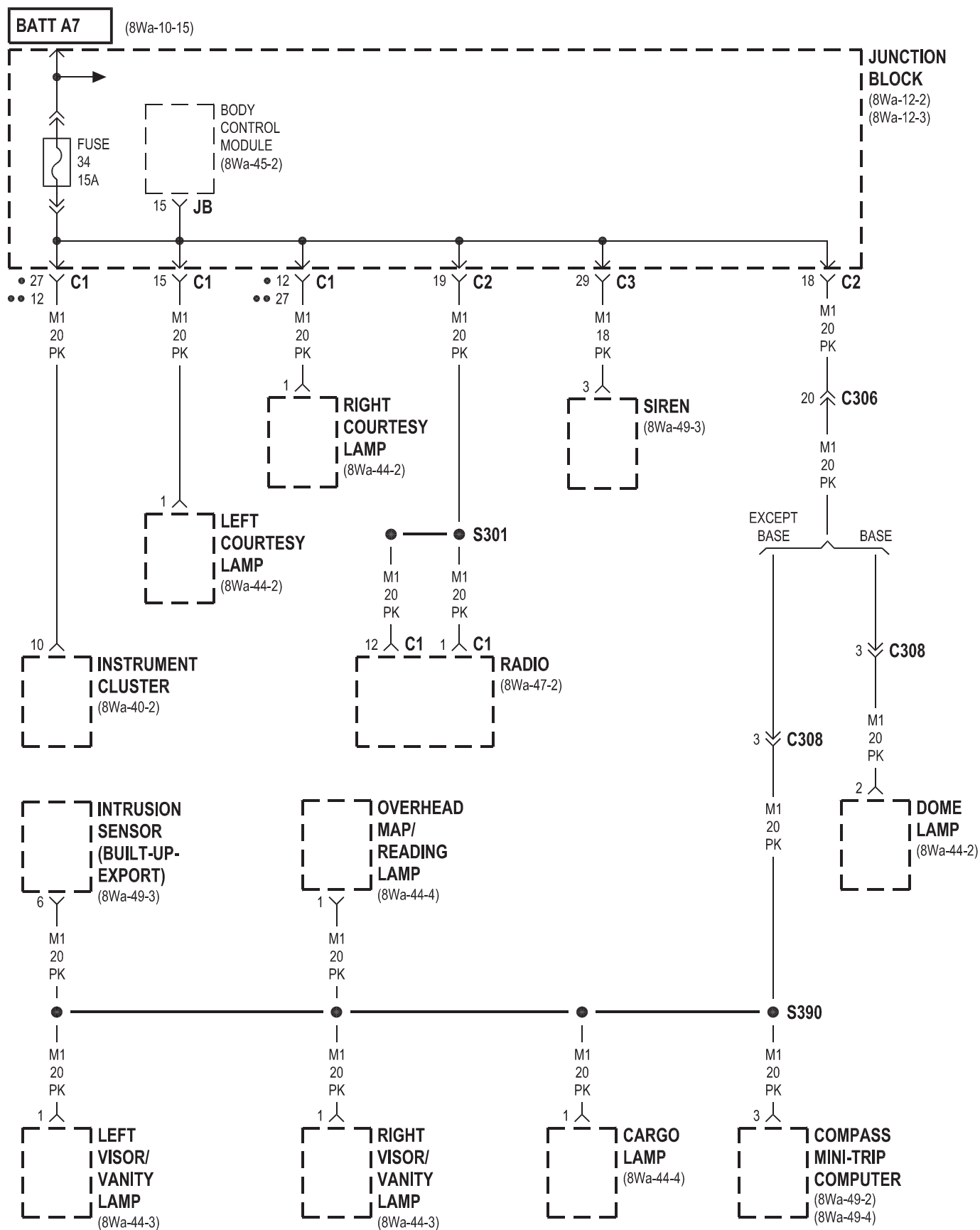




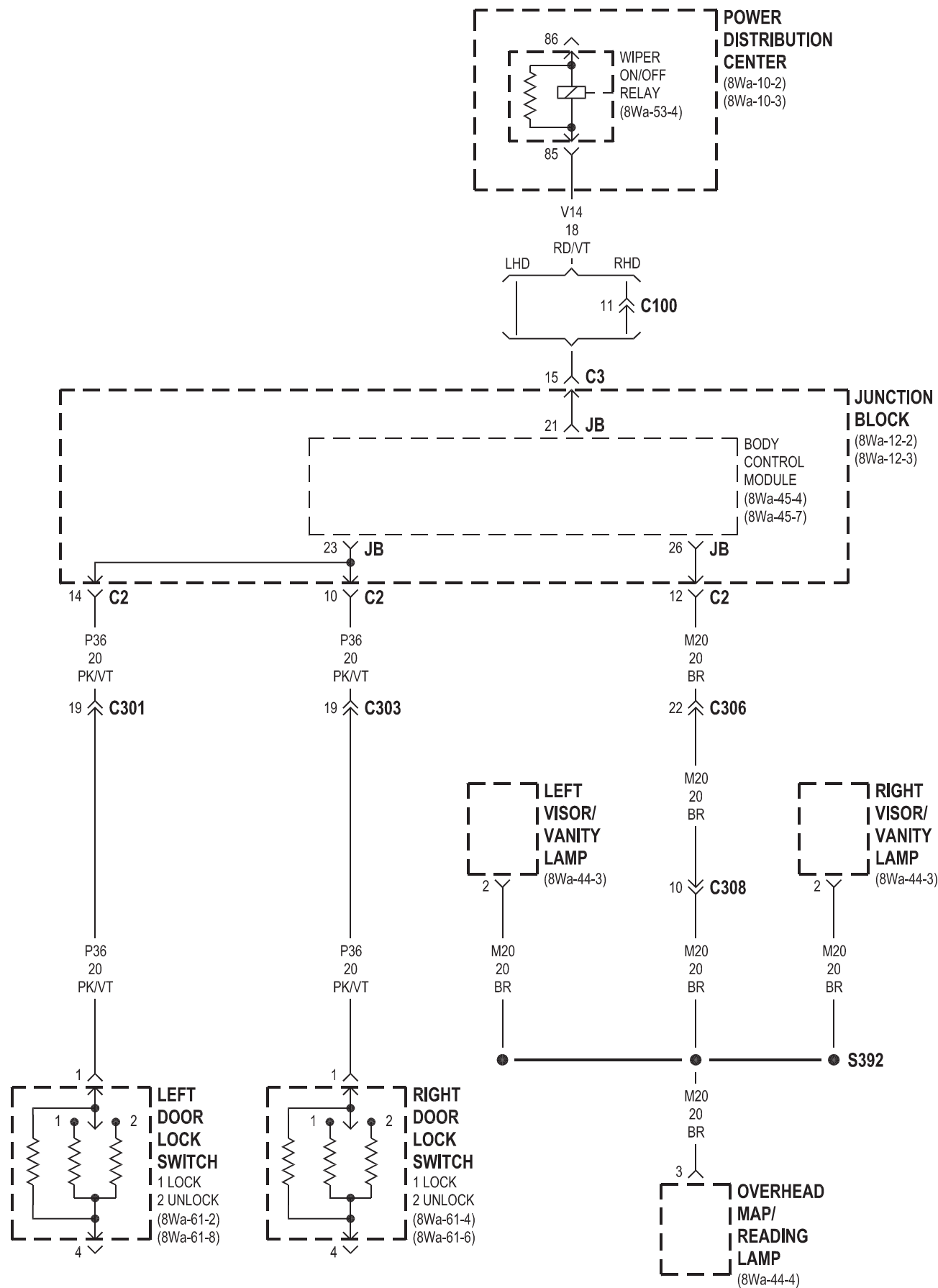


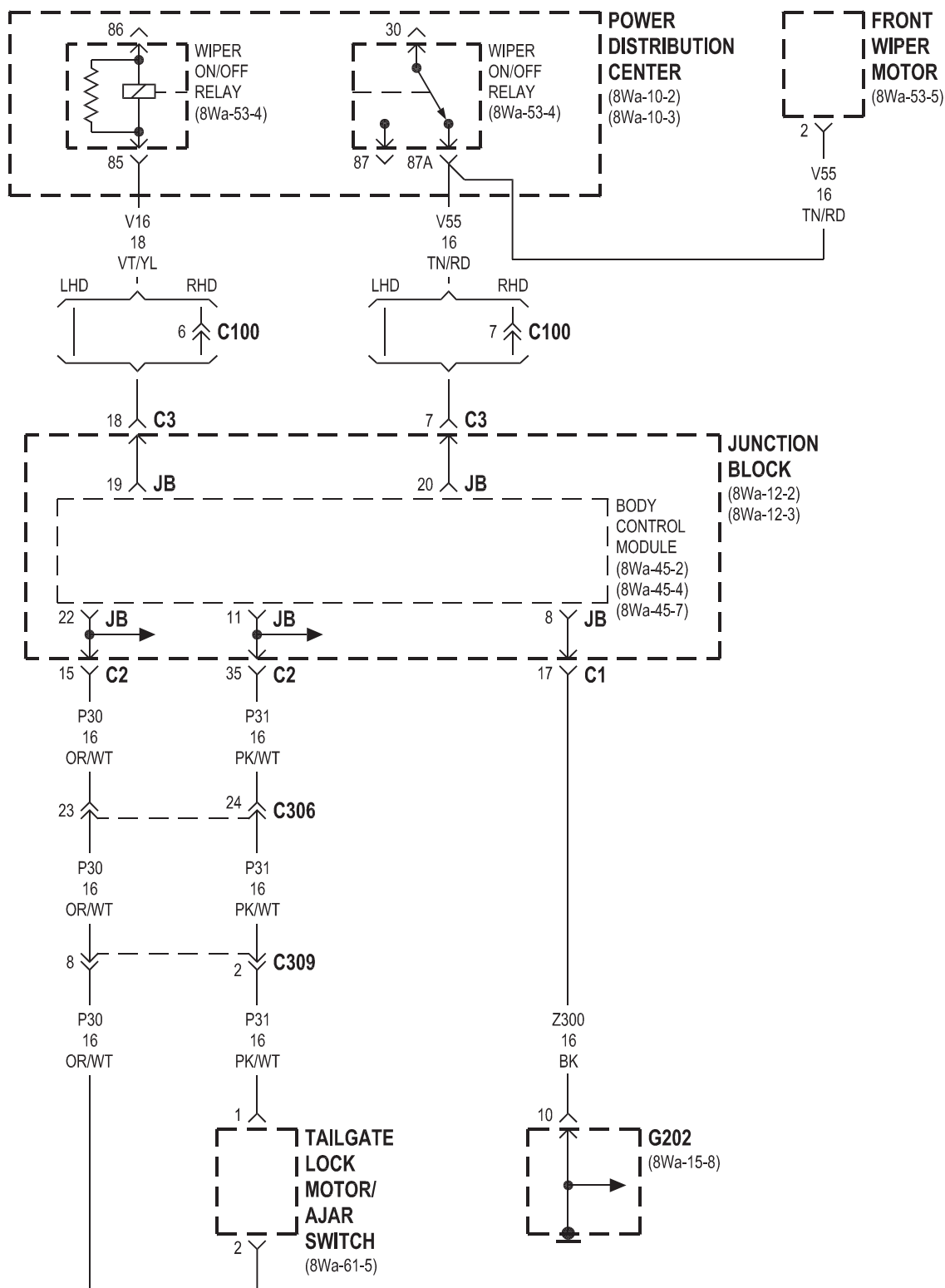


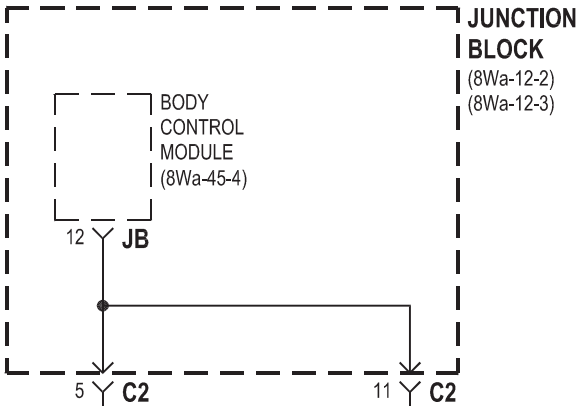
○○ MIDLINE/HIGHLINE
 ○○○ PREMIUM

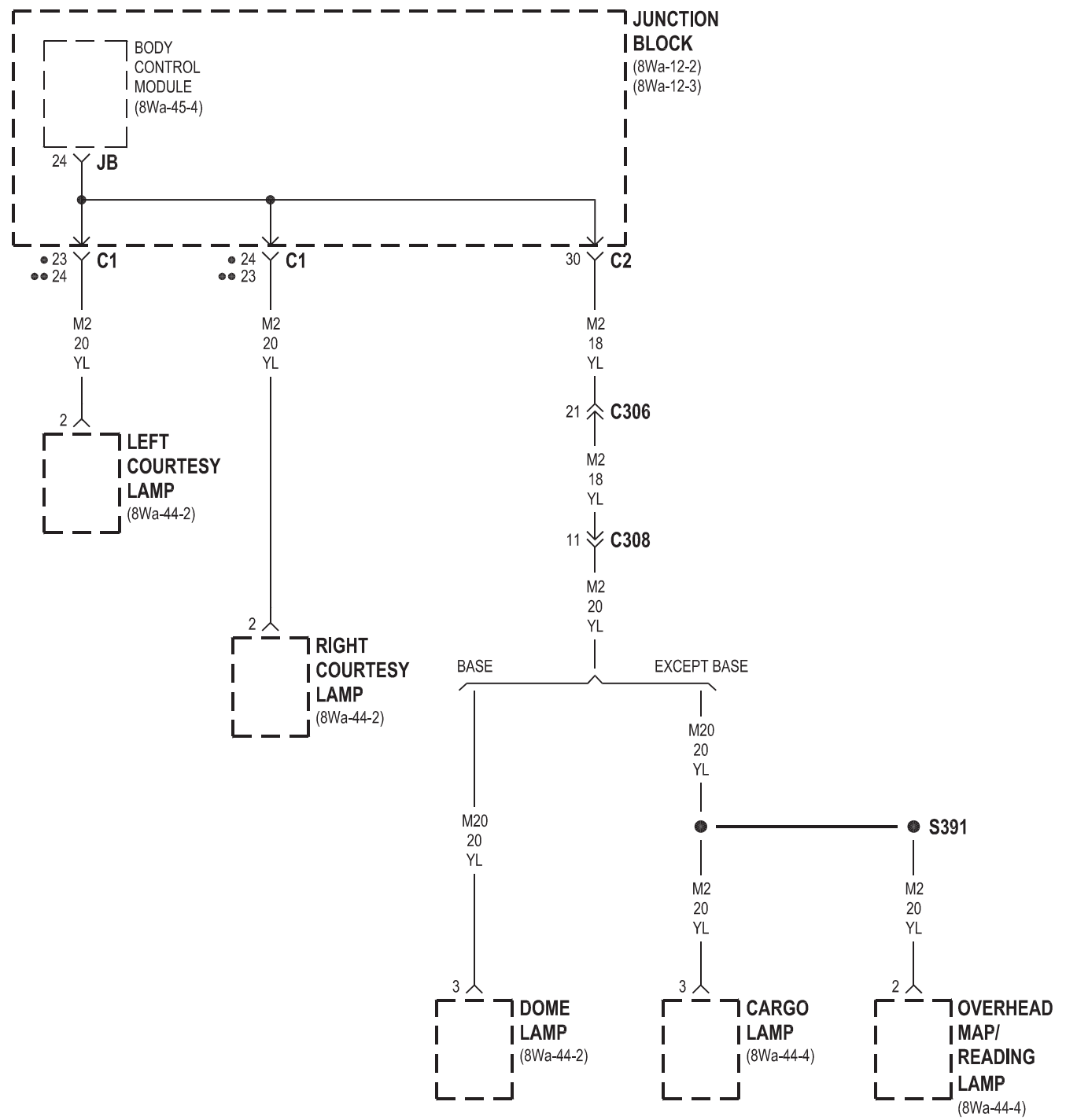


- LHD
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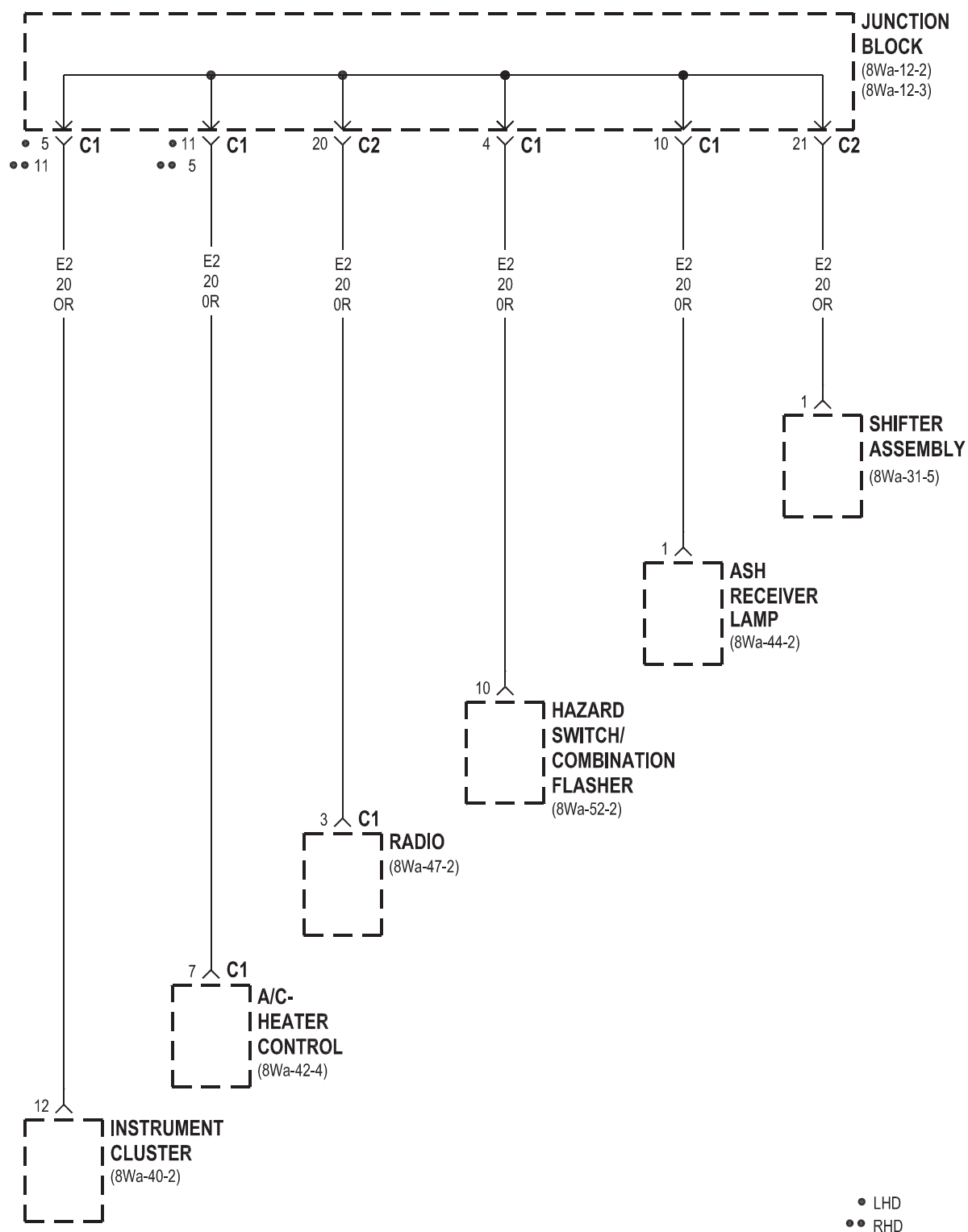






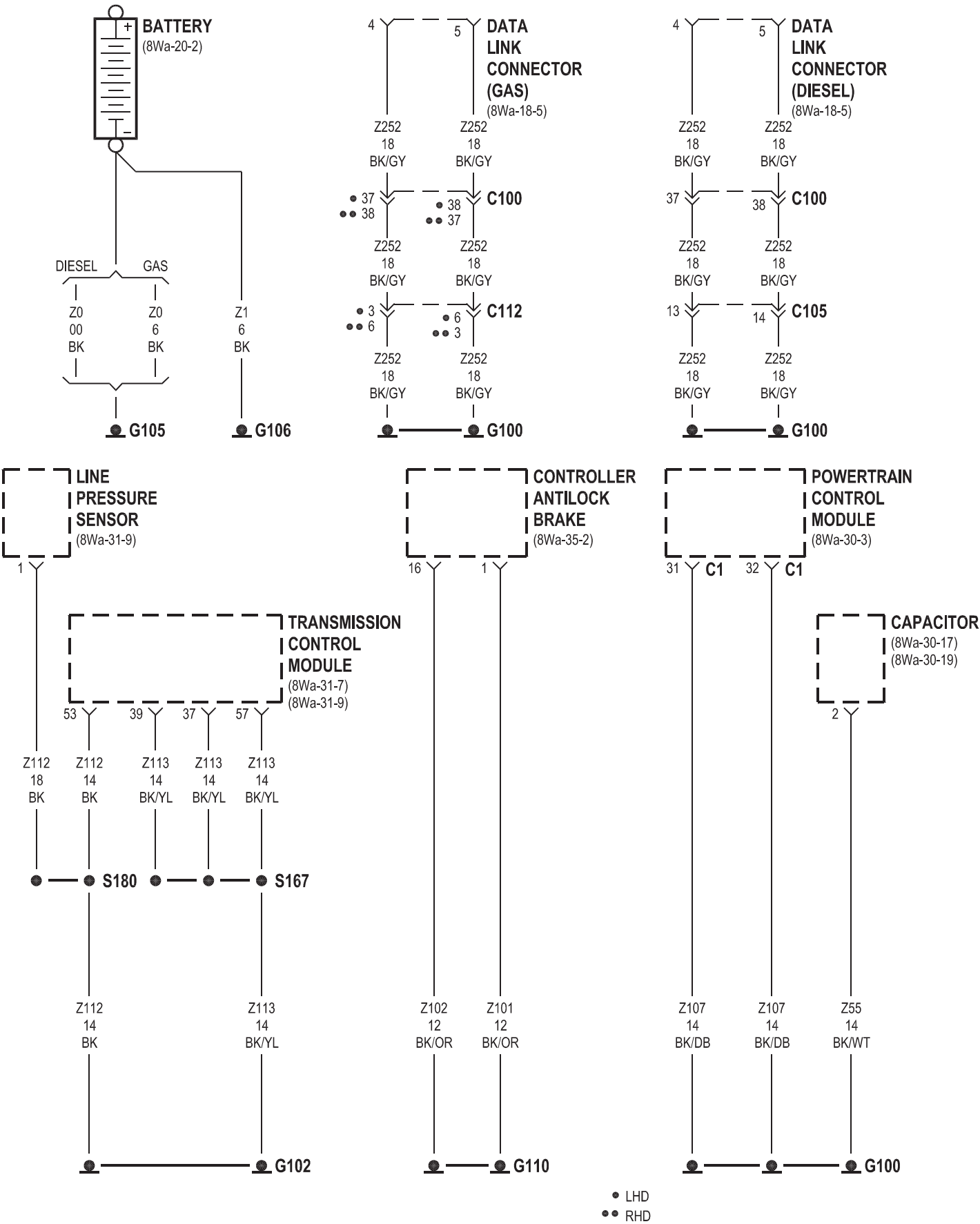


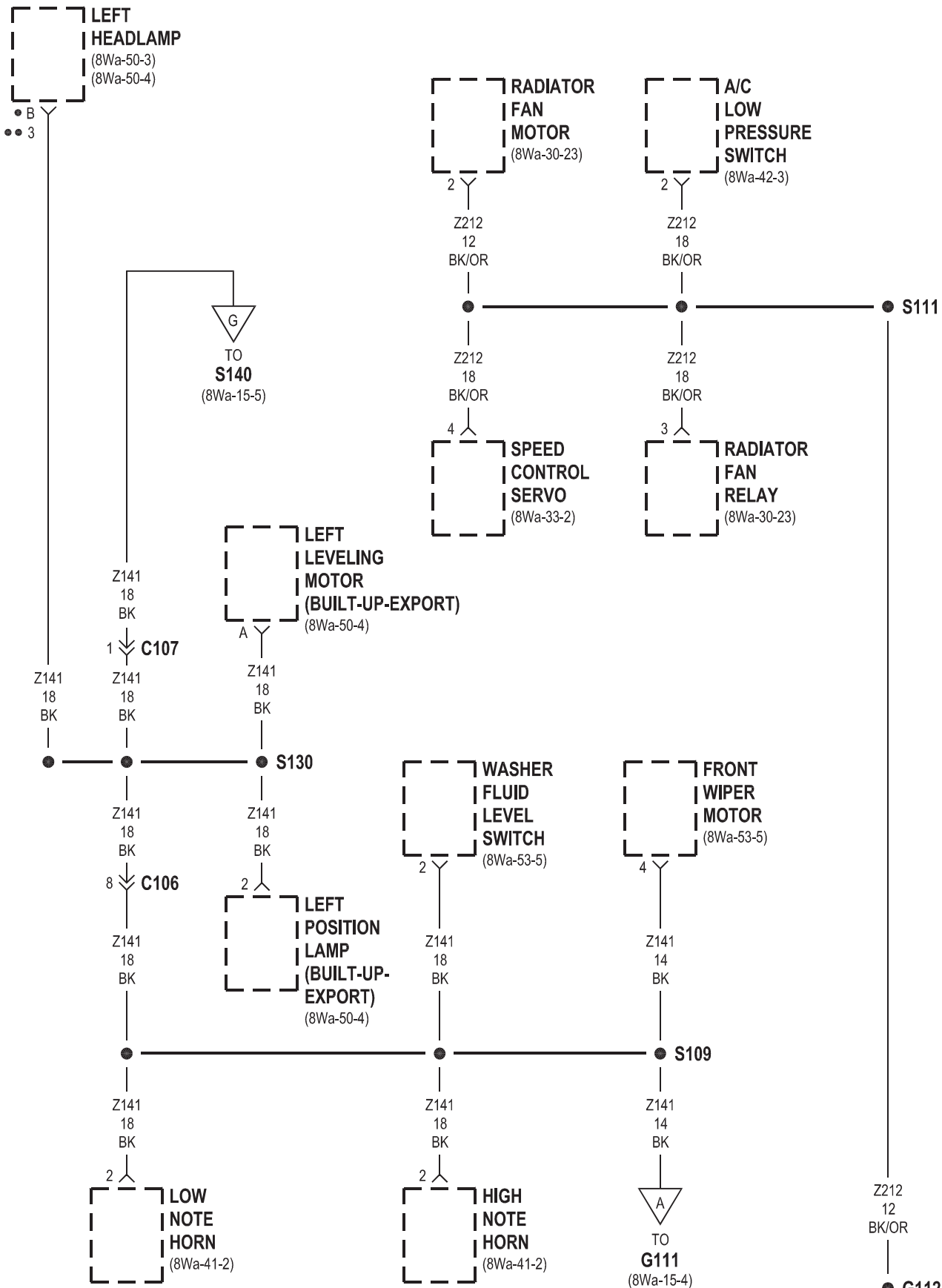
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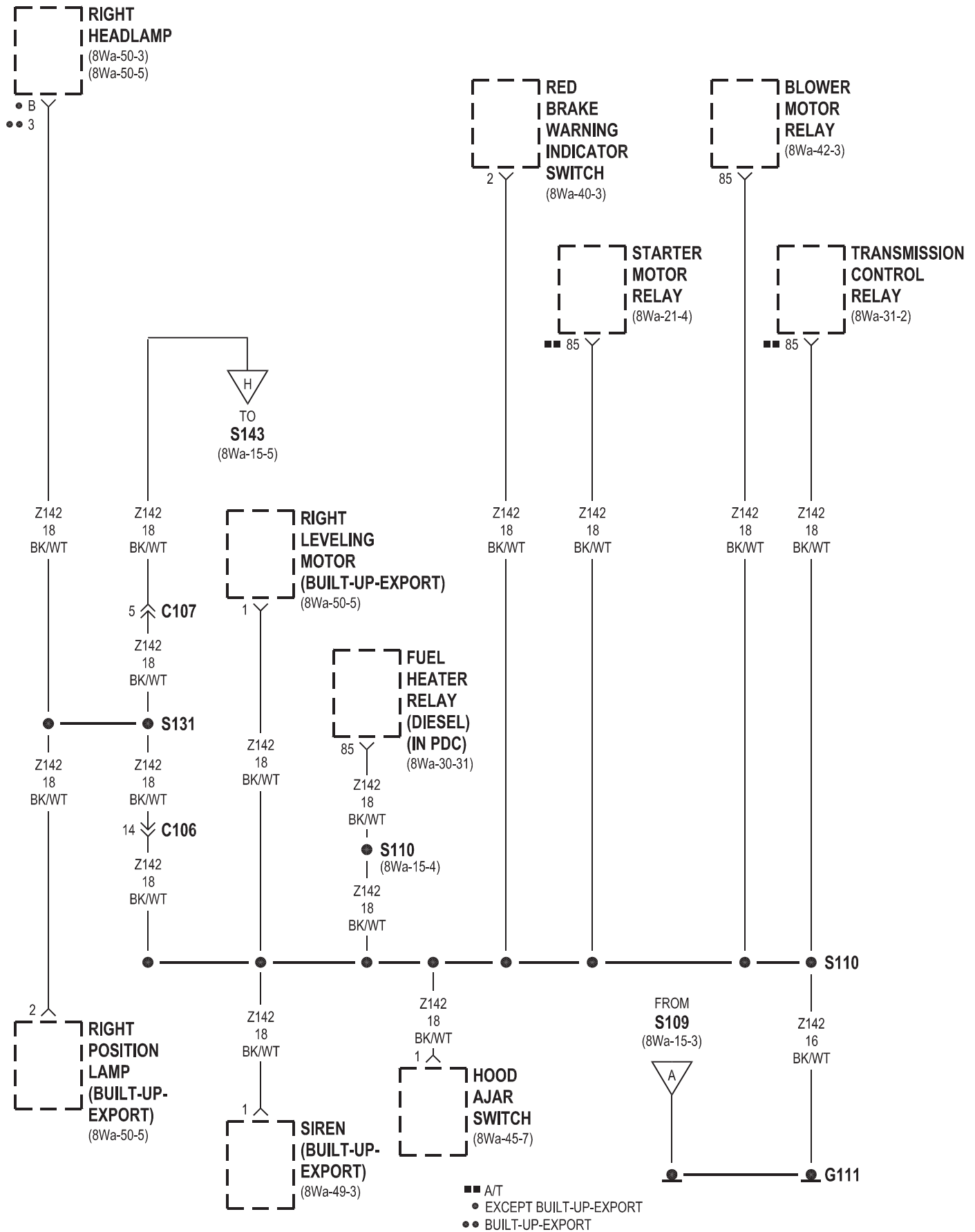


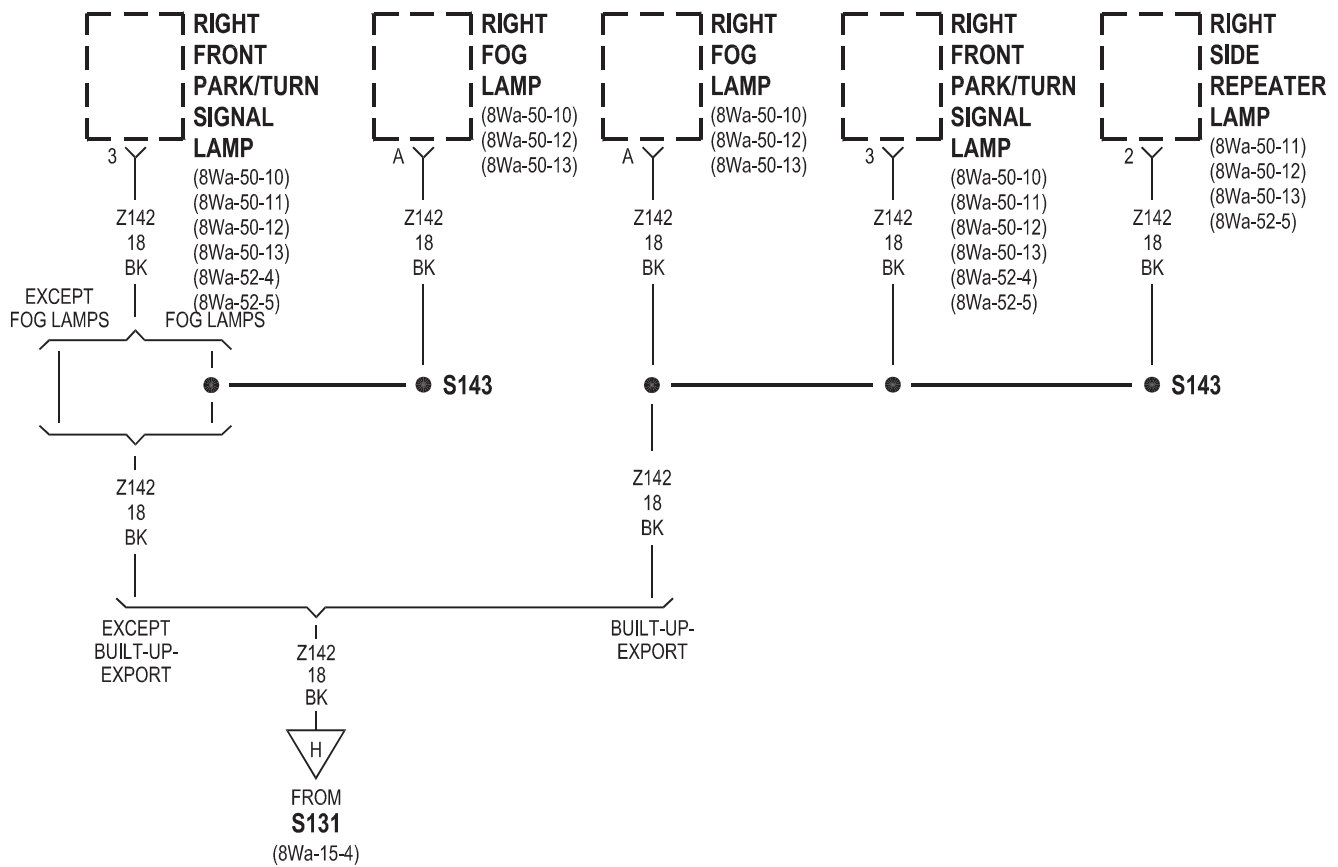
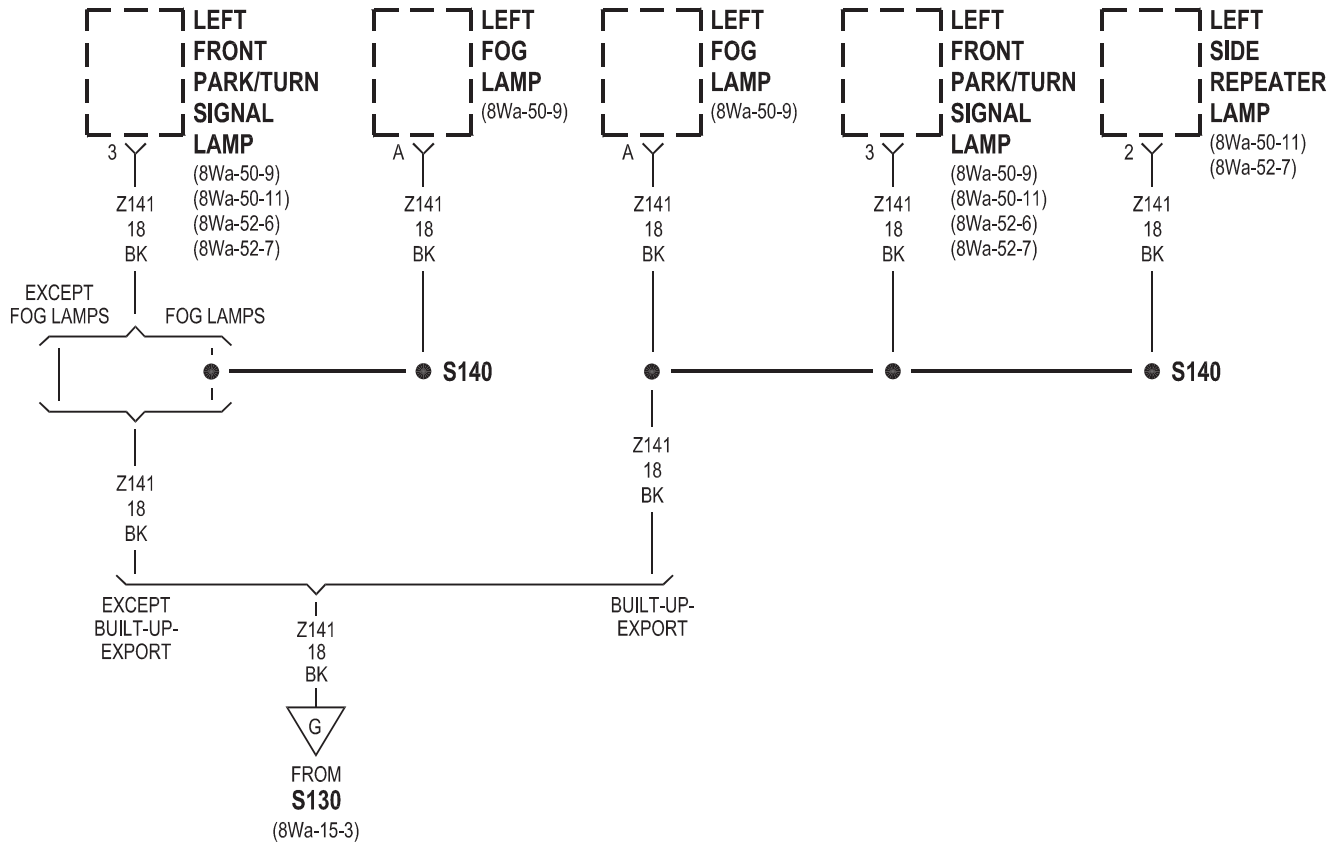
8W-15 GROUND DISTRIBUTION

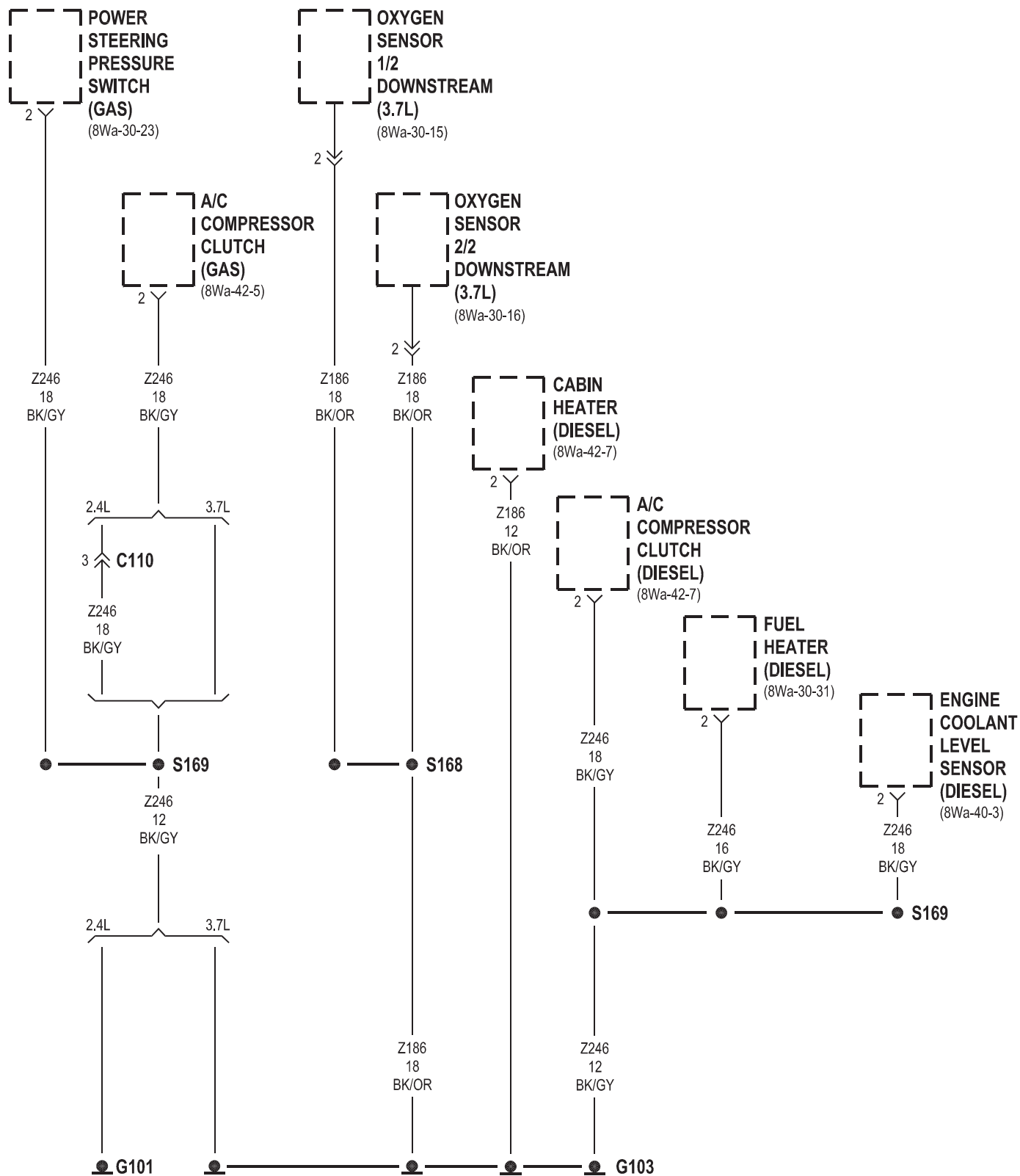
Component	Page	Component	Page
A/C Compressor Clutch	8Wa-15-6	Left Leveling Motor	8Wa-15-3
A/C Low Pressure Switch	8Wa-15-3	Left Position Lamp	8Wa-15-3
A/C- Heater Control	8Wa-15-7, 8	Left Power Mirror	8Wa-15-11
Airbag Control Module	8Wa-15-7	Left Power Seat Switch	8Wa-15-10
Ash Receiver Lamp	8Wa-15-8	Left Rear Door Ajar Switch	8Wa-15-11
Battery	8Wa-15-2	Left Rear Door Lock Motor/Ajar Switch	8Wa-15-11
Blend Door Actuator	8Wa-15-8	Left Side Impact Airbag Control Module	8Wa-15-9
Blower Motor Relay	8Wa-15-4	Left Side Repeater Lamp	8Wa-15-5
Body Control Module	8Wa-15-8	Left Tail/Stop Lamp	8Wa-15-15
Brake Lamp Switch	8Wa-15-8	License Lamp	8Wa-15-15
Cabin Heater	8Wa-15-6	Line Pressure Sensor	8Wa-15-2
Capacitor	8Wa-15-2	Low Note Horn	8Wa-15-3
Center High Mounted Stop Lamp	8Wa-15-14	Multi- Function Switch	8Wa-15-8
Cigar Lighter	8Wa-15-8	Oxygen Sensor 1/2 Downstream	8Wa-15-6
Compass Mini-Trip Computer	8Wa-15-14	Oxygen Sensor 2/2 Downstream	8Wa-15-6
Controller Antilock Brake	8Wa-15-2	Power Mirror Switch	8Wa-15-11, 12
Data Link Connector	8Wa-15-2	Power Outlet	8Wa-15-8
Engine Control Module	8Wa-15-7	Power Steering Pressure Switch	8Wa-15-6
Engine Coolant Level Sensor	8Wa-15-6	Power Window Master Switch	8Wa-15-10
Flip-Up Glass Release Motor	8Wa-15-14	Powertrain Control Module	8Wa-15-2
Front Wiper Motor	8Wa-15-3	Radiator Fan Motor	8Wa-15-3
Fuel Heater	8Wa-15-6	Radiator Fan Relay	8Wa-15-3
Fuel Heater Relay	8Wa-15-4	Radio	8Wa-15-7
Fuel Pump Module	8Wa-15-15	Radio Choke	8Wa-15-9
G100	8Wa-15-2, 7	Rear Power Outlet	8Wa-15-15
G101	8Wa-15-6	Rear Window Defogger	8Wa-15-14
G102	8Wa-15-2	Rear Wiper Motor	8Wa-15-14
G103	8Wa-15-6	Red Brake Warning Indicator Switch	8Wa-15-4
G104	8Wa-15-7	Right Door Lock Switch	8Wa-15-12
G105	8Wa-15-2	Right Fog Lamp	8Wa-15-5
G106	8Wa-15-2	Right Front Door Ajar Switch	8Wa-15-12
G110	8Wa-15-2	Right Front Door Lock Motor/Ajar Switch	8Wa-15-12
G111	8Wa-15-3, 4	Right Front Door Speaker	8Wa-15-7
G112	8Wa-15-3	Right Front Park/Turn Signal Lamp	8Wa-15-5
G200	8Wa-15-7	Right Headlamp	8Wa-15-4
G201	8Wa-15-7	Right Heated Seat Assembly	8Wa-15-10
G202	8Wa-15-8	Right Heated Seat Switch	8Wa-15-10
G300	8Wa-15-9, 11	Right Leveling Motor	8Wa-15-4
G301	8Wa-15-9, 10	Right Position Lamp	8Wa-15-4
G302	8Wa-15-9, 12	Right Power Mirror	8Wa-15-12
G310	8Wa-15-13, 14, 15	Right Power Seat Switch	8Wa-15-10
G311	8Wa-15-14	Right Rear Door Ajar Switch	8Wa-15-12
G312	8Wa-15-14	Right Rear Door Lock Motor/Ajar Switch	8Wa-15-12
G320	8Wa-15-15	Right Side Impact Airbag Control Module	8Wa-15-9
Hazard Switch/Combination Flasher	8Wa-15-8	Right Side Repeater Lamp	8Wa-15-5
Headlamp Leveling Switch	8Wa-15-8	Right Tail/Stop Lamp	8Wa-15-15
Heated Seat Module	8Wa-15-10	Sentry Key Immobilizer Module	8Wa-15-8
High Note Horn	8Wa-15-3	Shifter Assembly	8Wa-15-9
Hood Ajar Switch	8Wa-15-4	Siren	8Wa-15-4
Ignition Switch	8Wa-15-8	Speed Control Servo	8Wa-15-3
Instrument Cluster	8Wa-15-8	Starter Motor Relay	8Wa-15-4
Intrusion Sensor	8Wa-15-14	Sunroof Motor	8Wa-15-14
Junction Block	8Wa-15-8	Tailgate Flip-Up Ajar Switch	8Wa-15-14
Left Door Lock Switch	8Wa-15-11	Trailer Tow Brake Lamp Relay	8Wa-15-13
Left Fog Lamp	8Wa-15-5	Trailer Tow Connector	8Wa-15-13
Left Front Door Ajar Switch	8Wa-15-11	Trailer Tow Left Turn Relay	8Wa-15-13
Left Front Door Lock Motor/Ajar Switch	8Wa-15-11	Trailer Tow Relay	8Wa-15-13
Left Front Door Speaker	8Wa-15-7	Trailer Tow Right Turn Relay	8Wa-15-13
Left Front Park/Turn Signal Lamp	8Wa-15-5	Transmission Control Module	8Wa-15-2
Left Headlamp	8Wa-15-3	Transmission Control Relay	8Wa-15-4
Left Heated Seat Assembly	8Wa-15-10	Washer Fluid Level Switch	8Wa-15-3
Left Heated Seat Switch	8Wa-15-10		

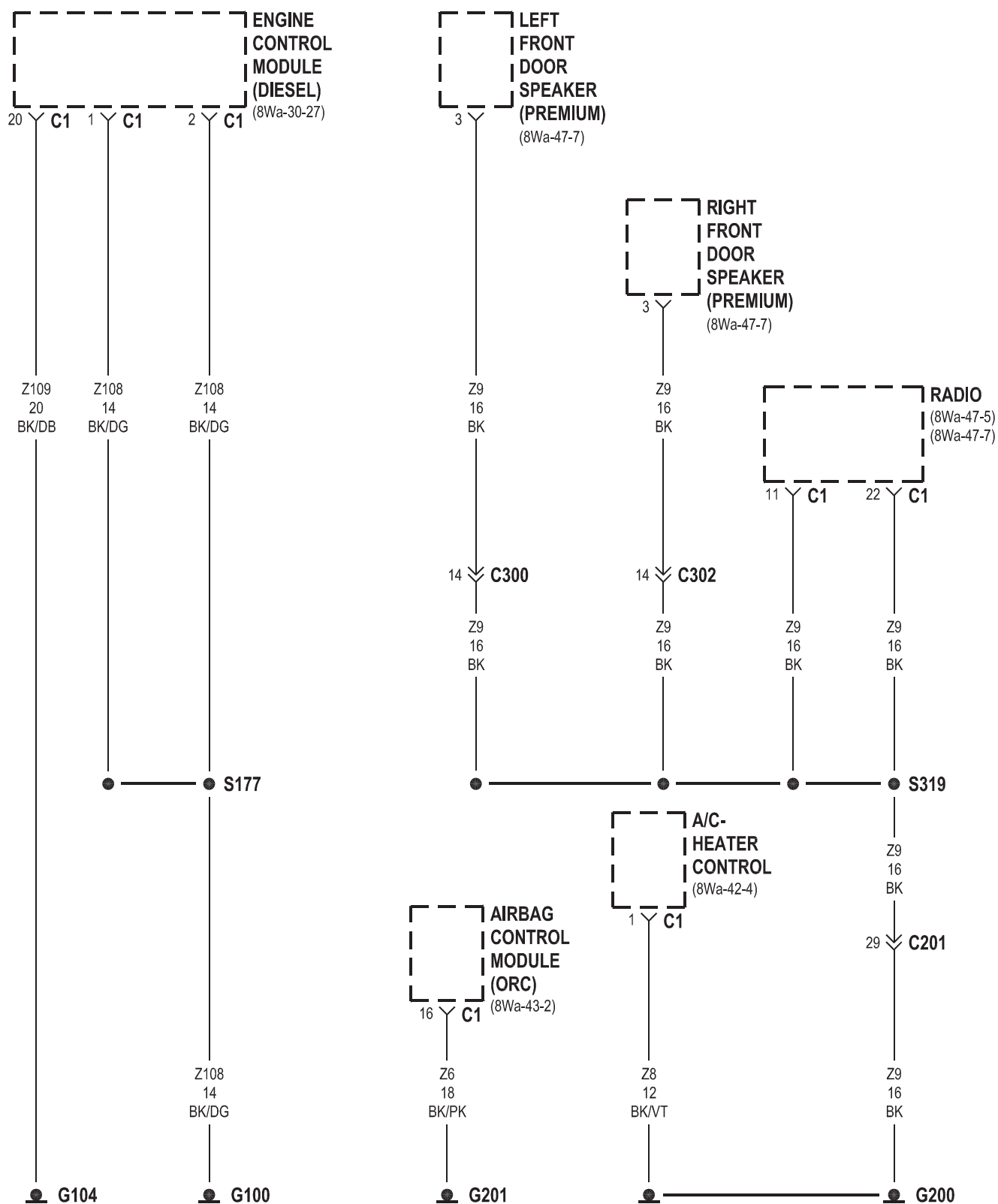


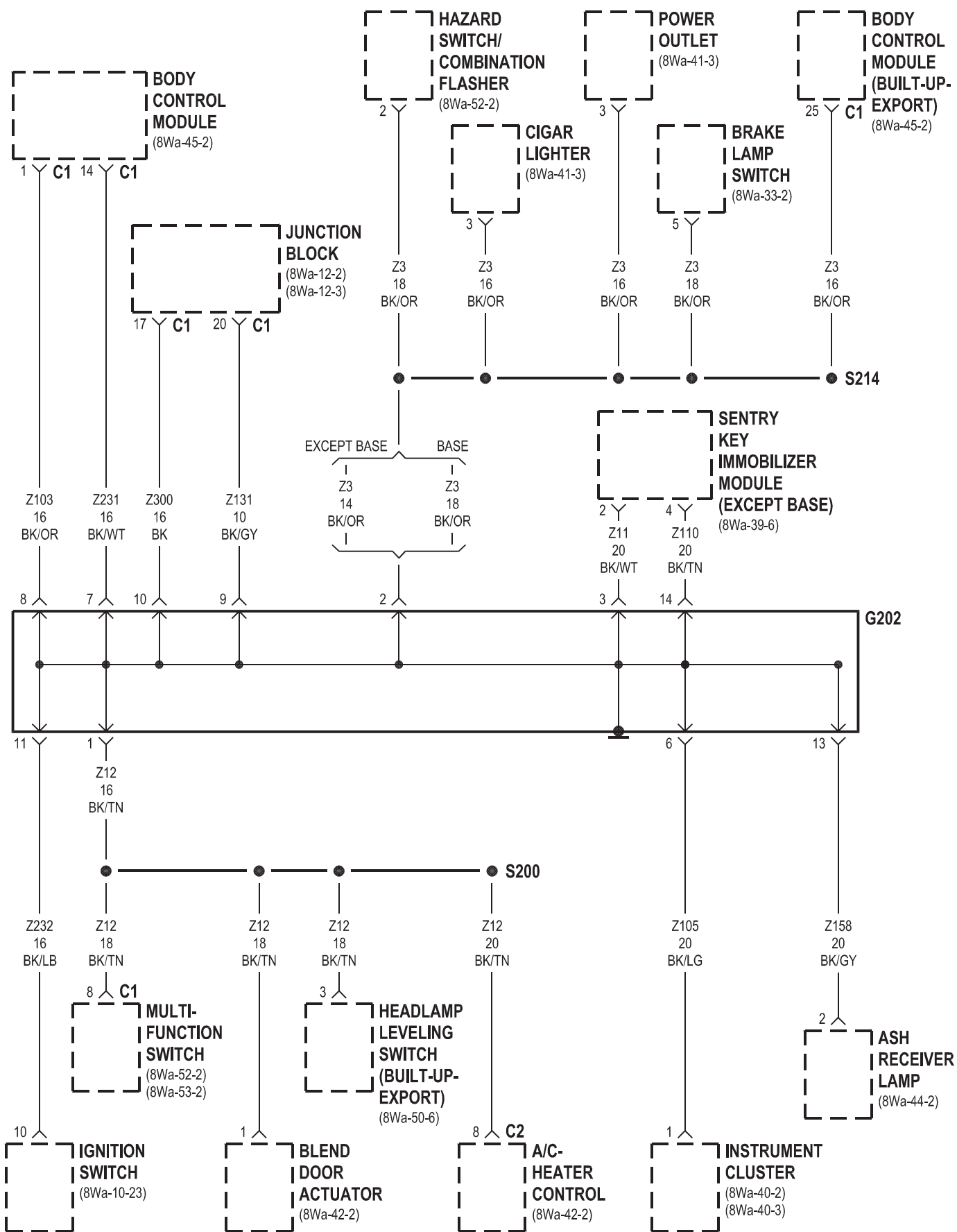


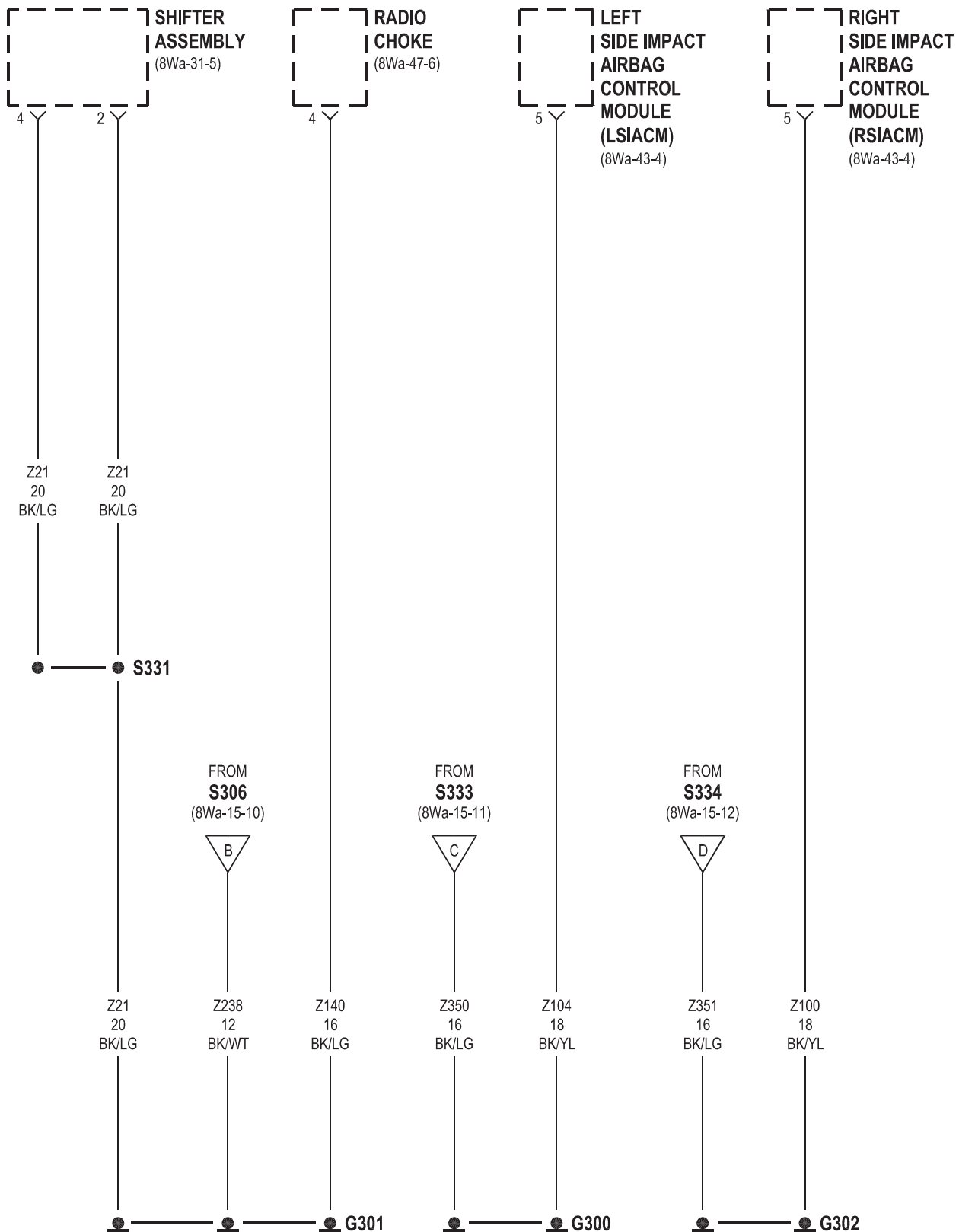


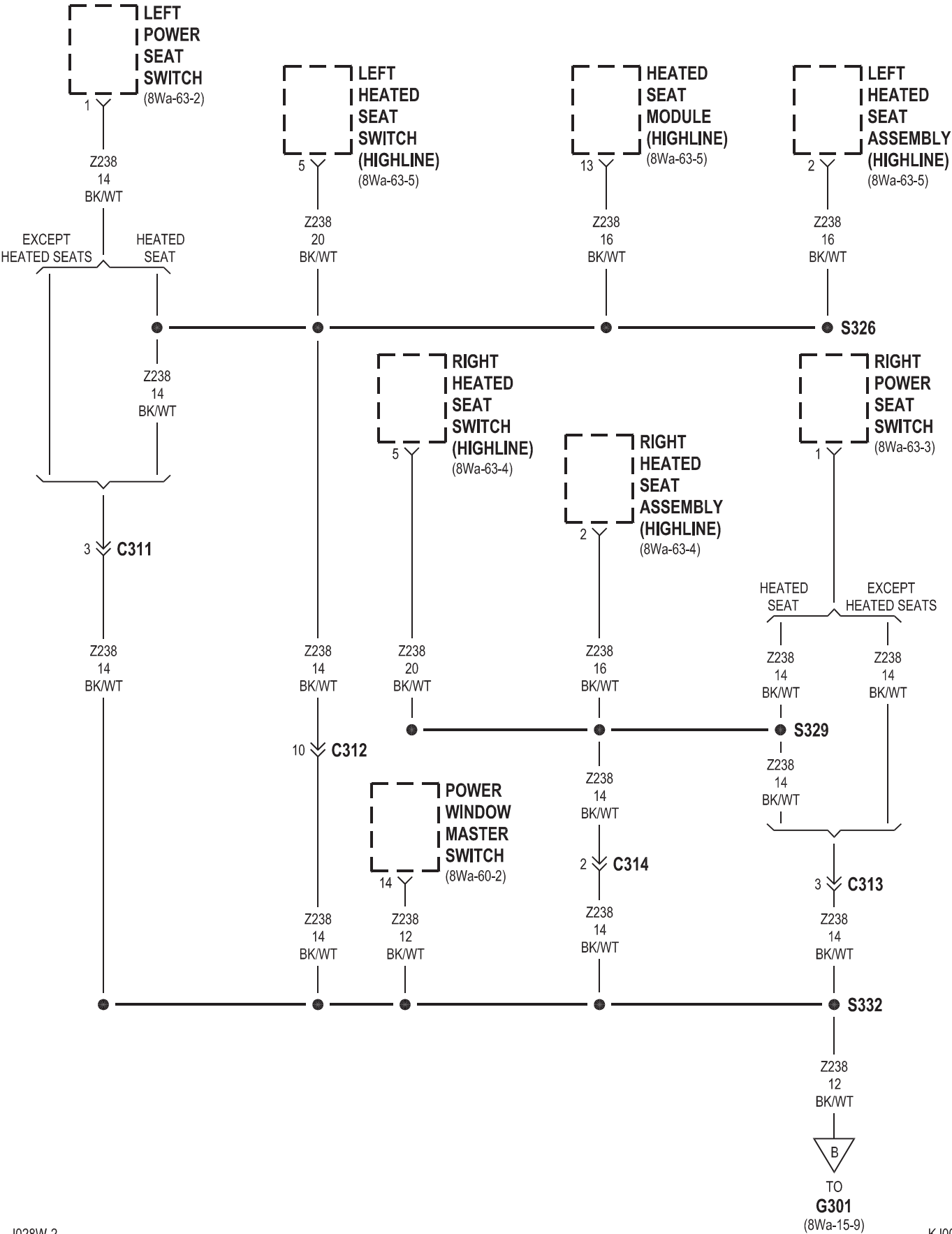


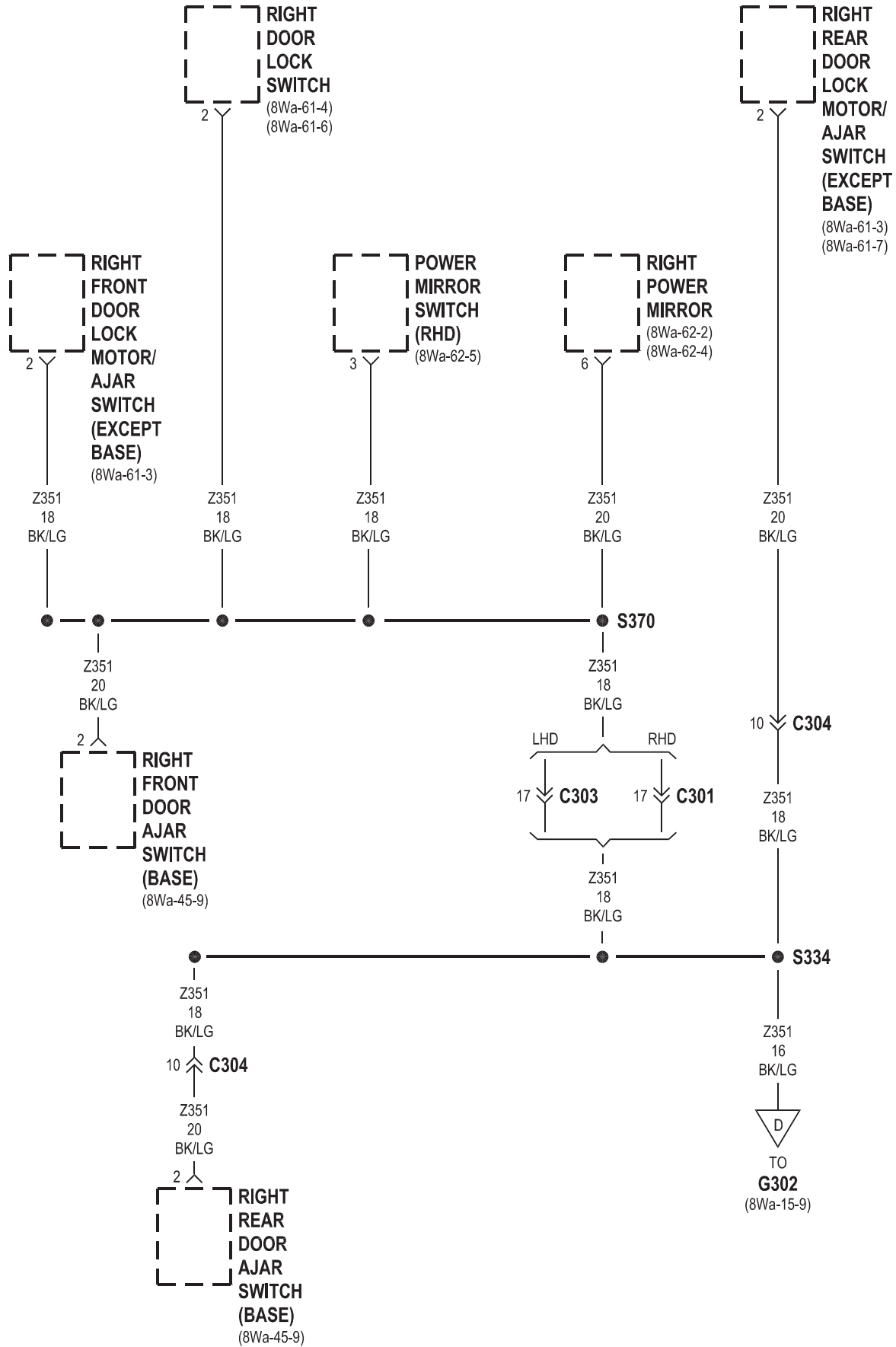


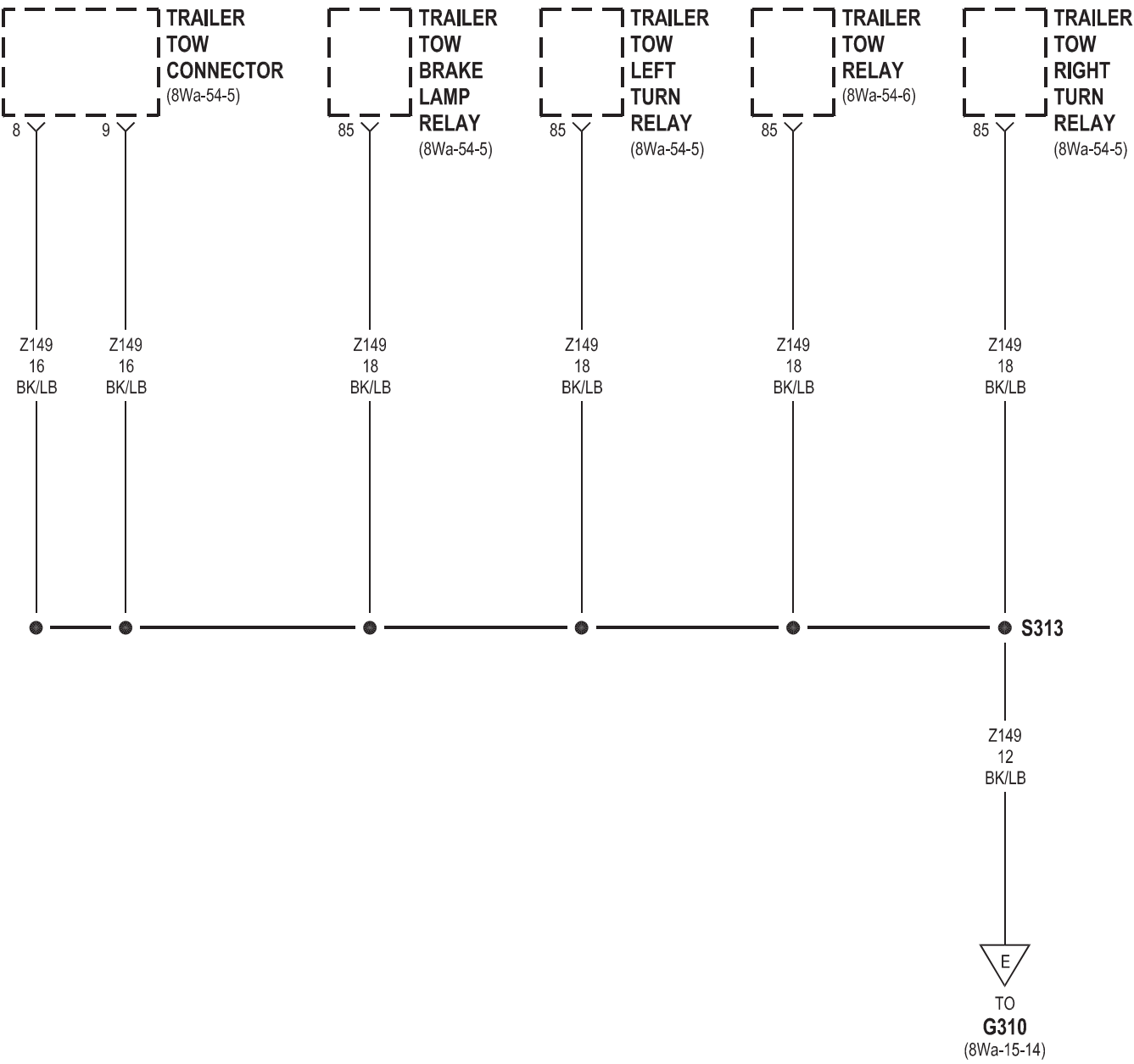


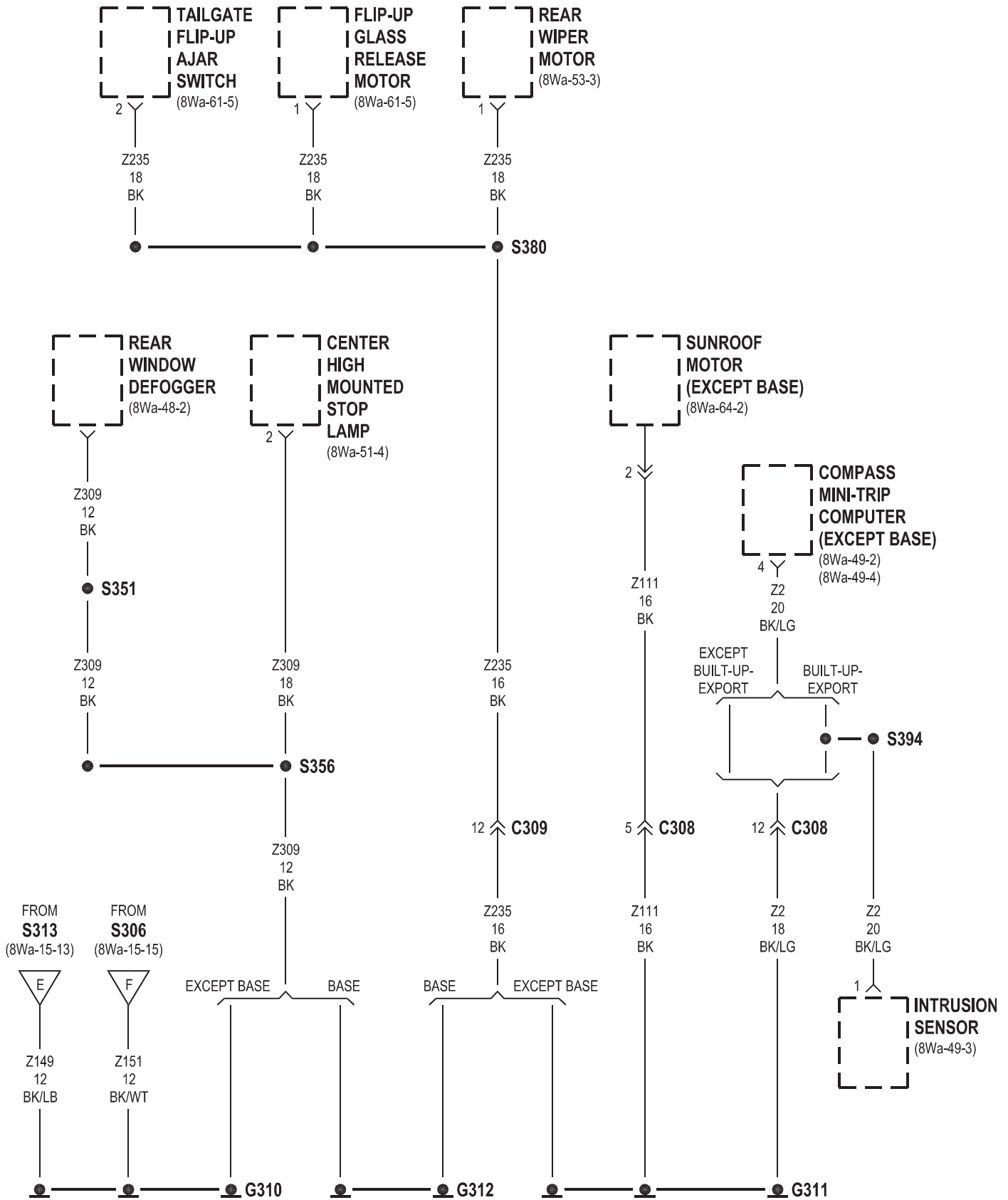


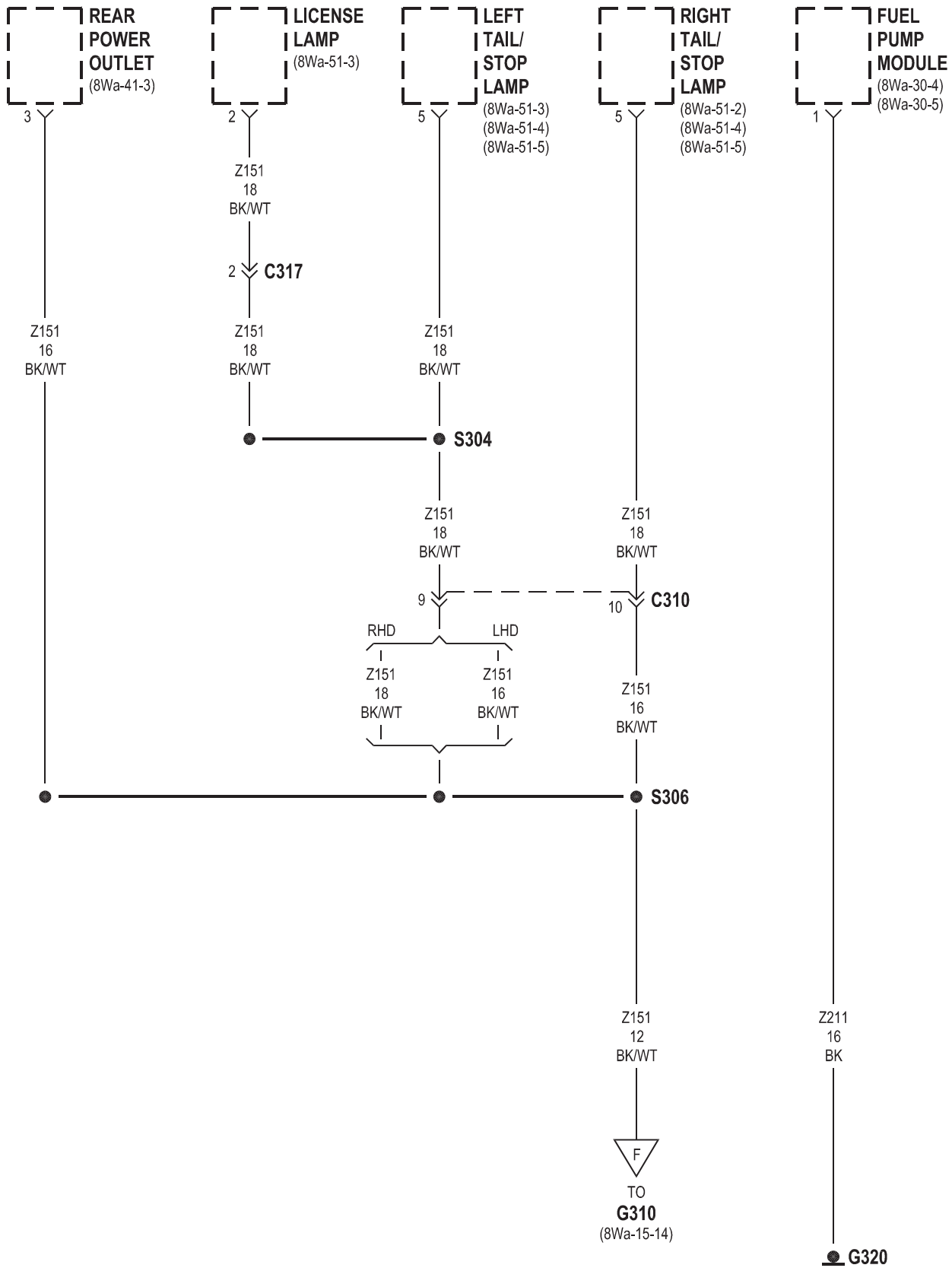






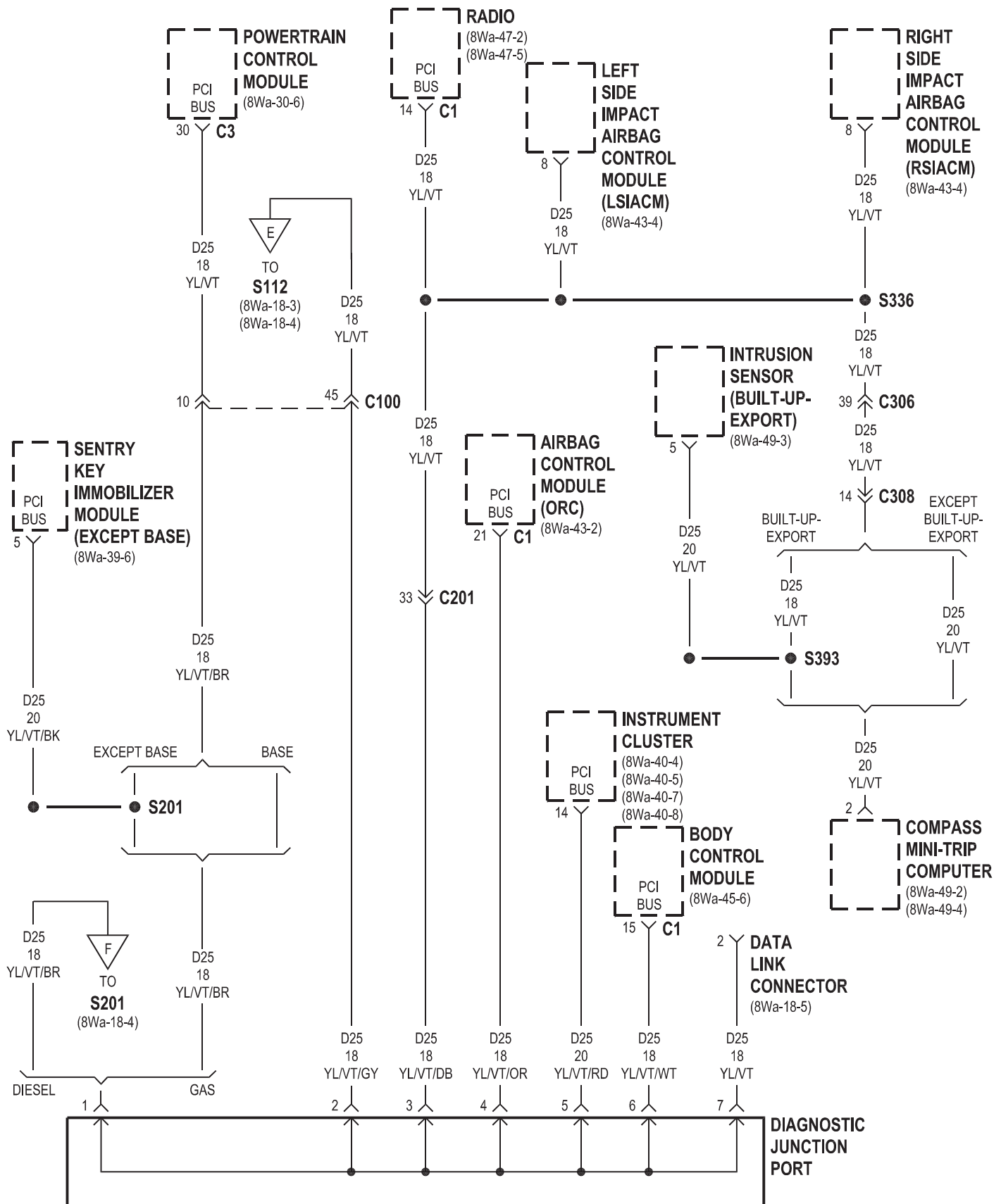


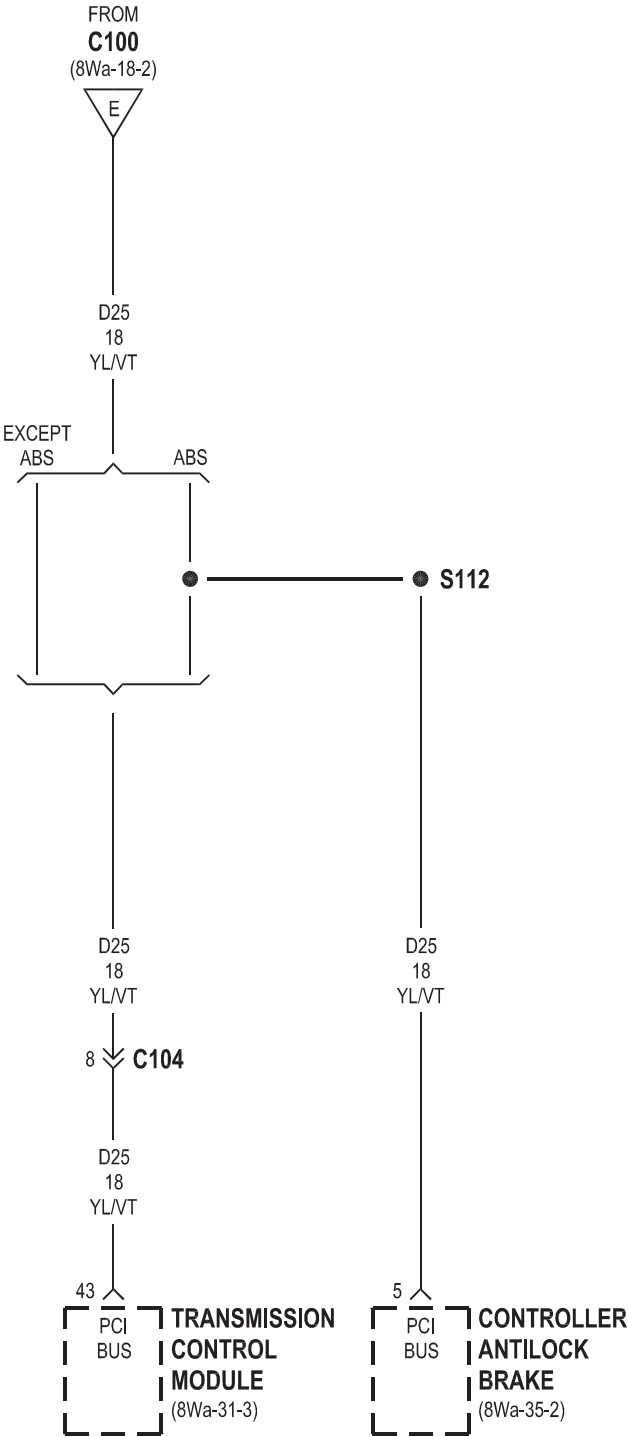


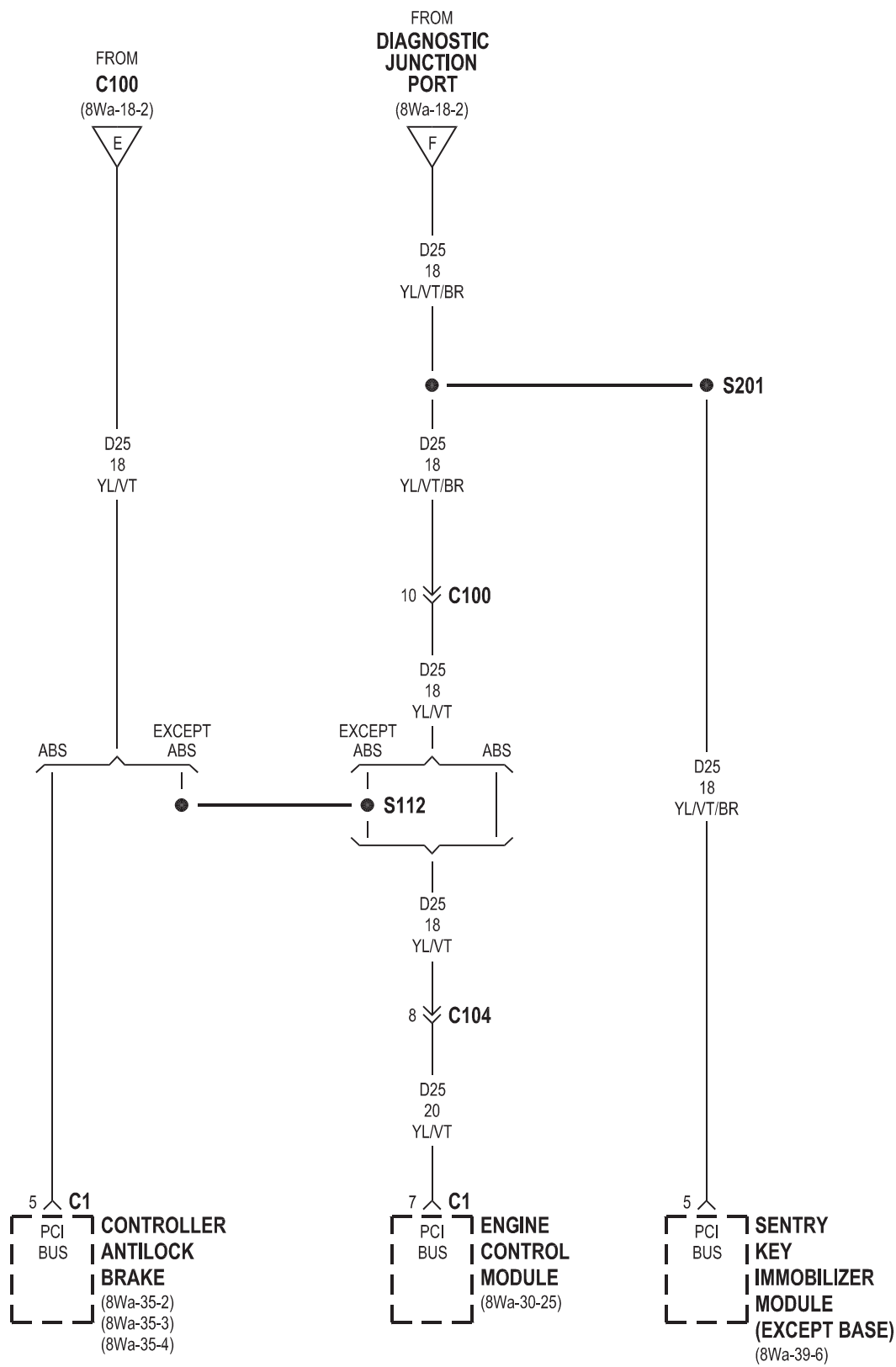


8W-18 BUS COMMUNICATIONS

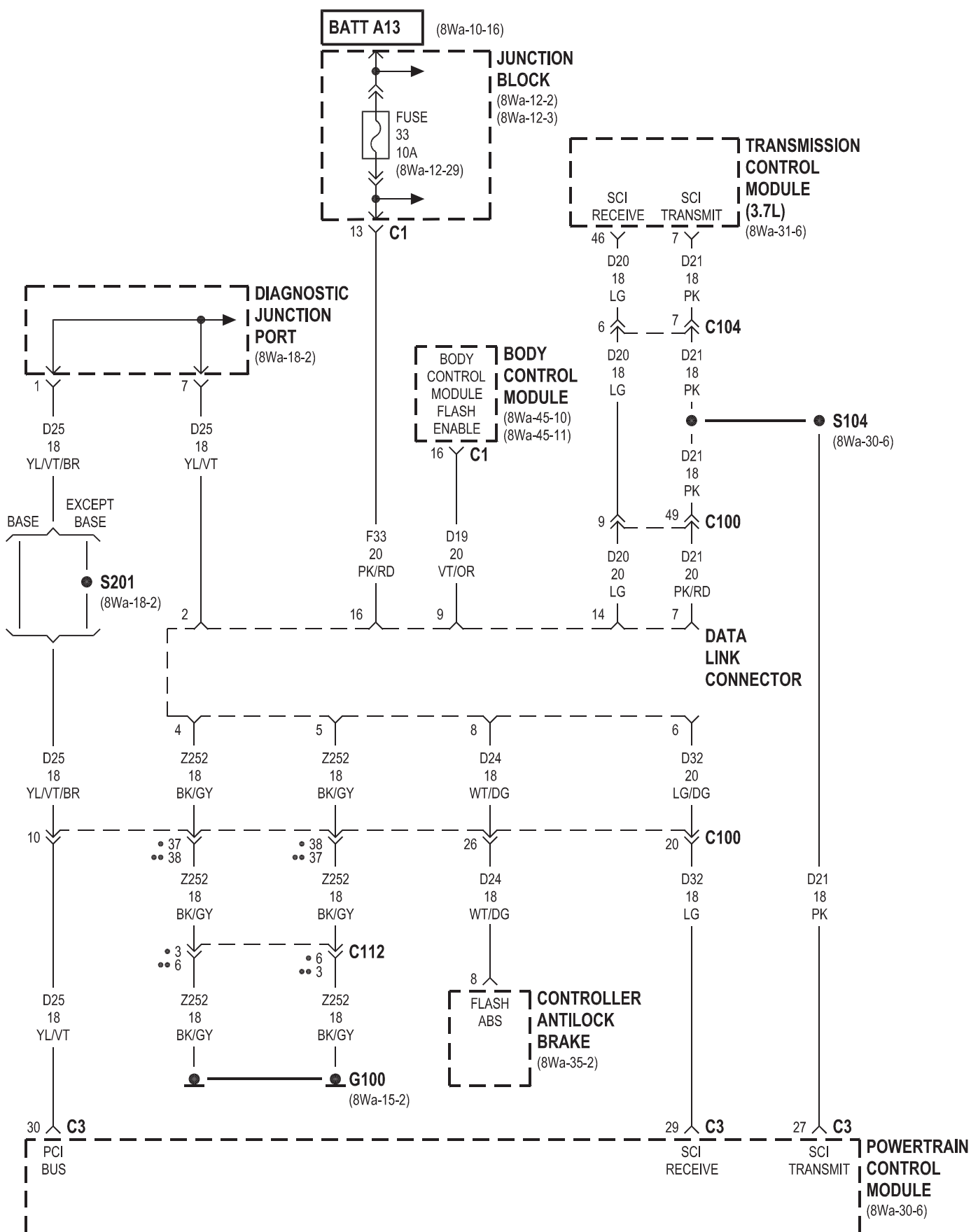
Component	Page	Component	Page
Airbag Control Module	8Wa-18-2	Instrument Cluster	8Wa-18-2
Body Control Module	8Wa-18-2, 5, 6	Intrusion Sensor	8Wa-18-2
Compass Mini-Trip Computer	8Wa-18-2	Junction Block	8Wa-18-5, 6
Controller Antilock Brake	8Wa-18-3, 4, 5, 6	Left Side Impact Airbag Control Module . .	8Wa-18-2
Data Link Connector	8Wa-18-2, 5, 6	Powertrain Control Module	8Wa-18-2, 5
Diagnostic Junction Port	8Wa-18-2, 4, 5, 6	Radio	8Wa-18-2
Engine Control Module	8Wa-18-4, 6	Right Side Impact Airbag Control Module .	8Wa-18-2
Fuse 33	8Wa-18-5, 6	Sentry Key Immobilizer Module	8Wa-18-2, 4
G100	8Wa-18-5, 6	Transmission Control Module	8Wa-18-3, 5



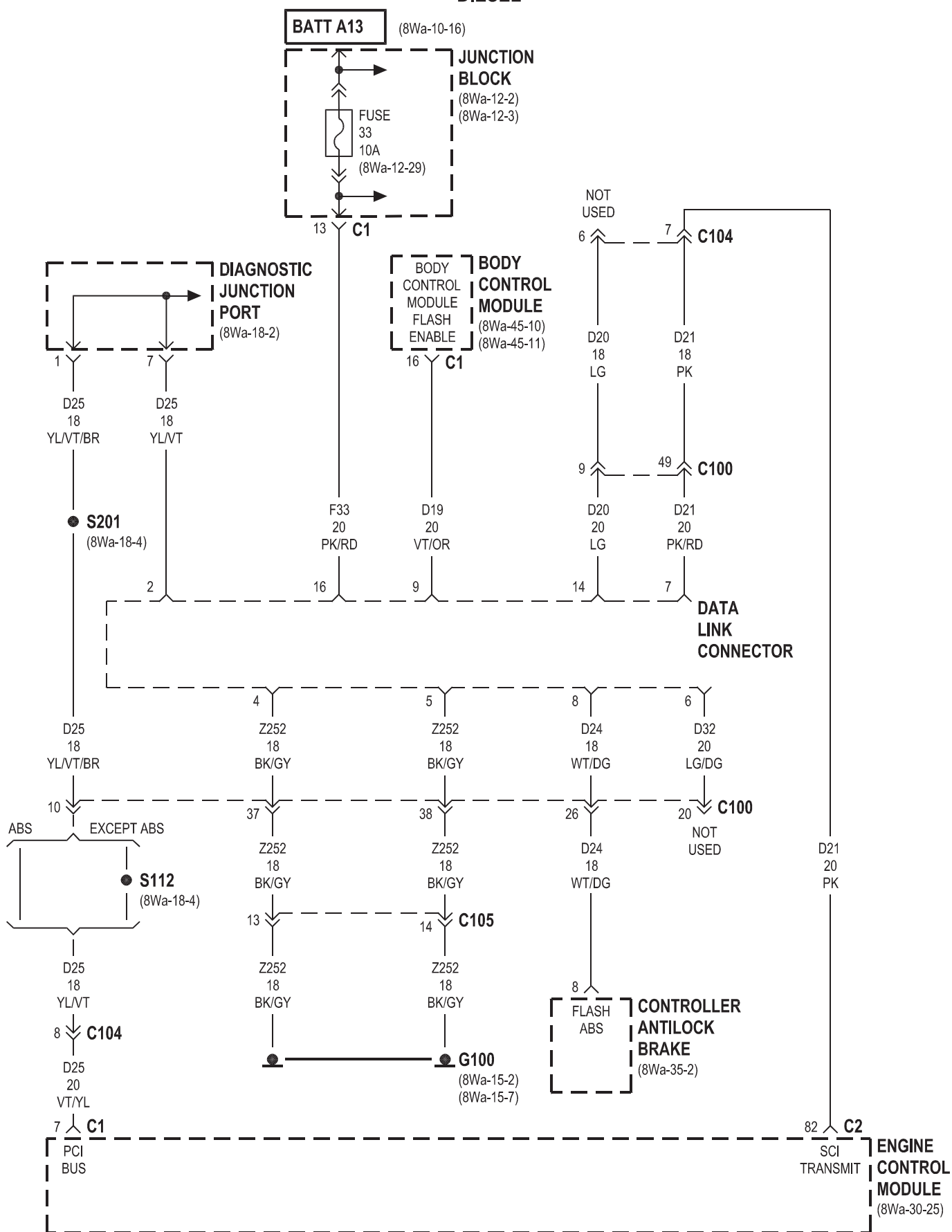




GAS



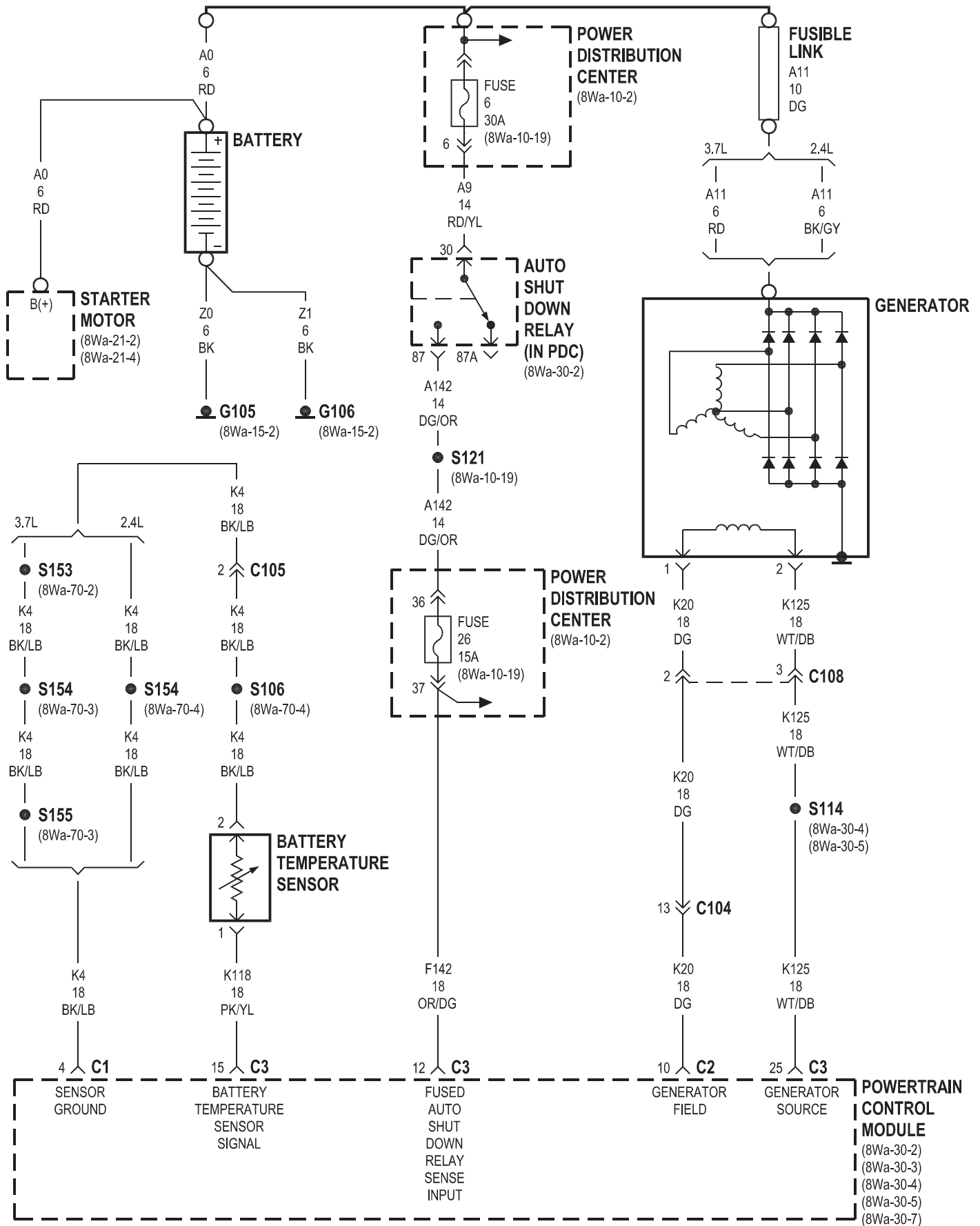
DIESEL



8W-20 CHARGING SYSTEM

Component	Page	Component	Page
Auto Shut Down Relay	8Wa-20-2, 3	Fusible Link	8Wa-20-2, 3
Battery	8Wa-20-2, 3	G105	8Wa-20-2, 3
Battery Temperature Sensor	8Wa-20-2, 3	G106	8Wa-20-2, 3
Engine Control Module	8Wa-20-3	Generator	8Wa-20-2, 3
Fuse 6	8Wa-20-2, 3	Power Distribution Center	8Wa-20-2, 3
Fuse 16	8Wa-20-3	Powertrain Control Module	8Wa-20-2
Fuse 26	8Wa-20-2	Starter Motor	8Wa-20-2, 3

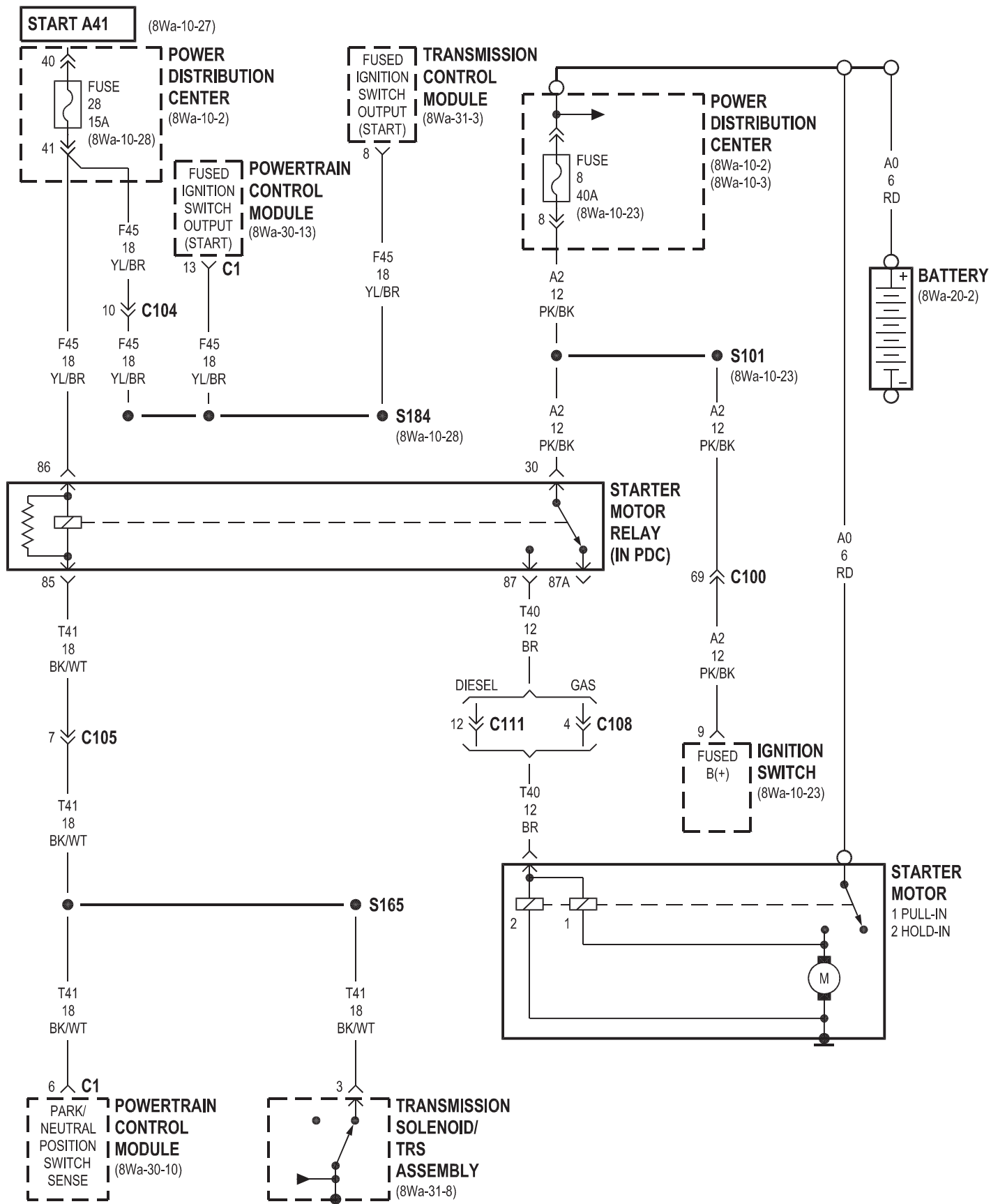
GAS

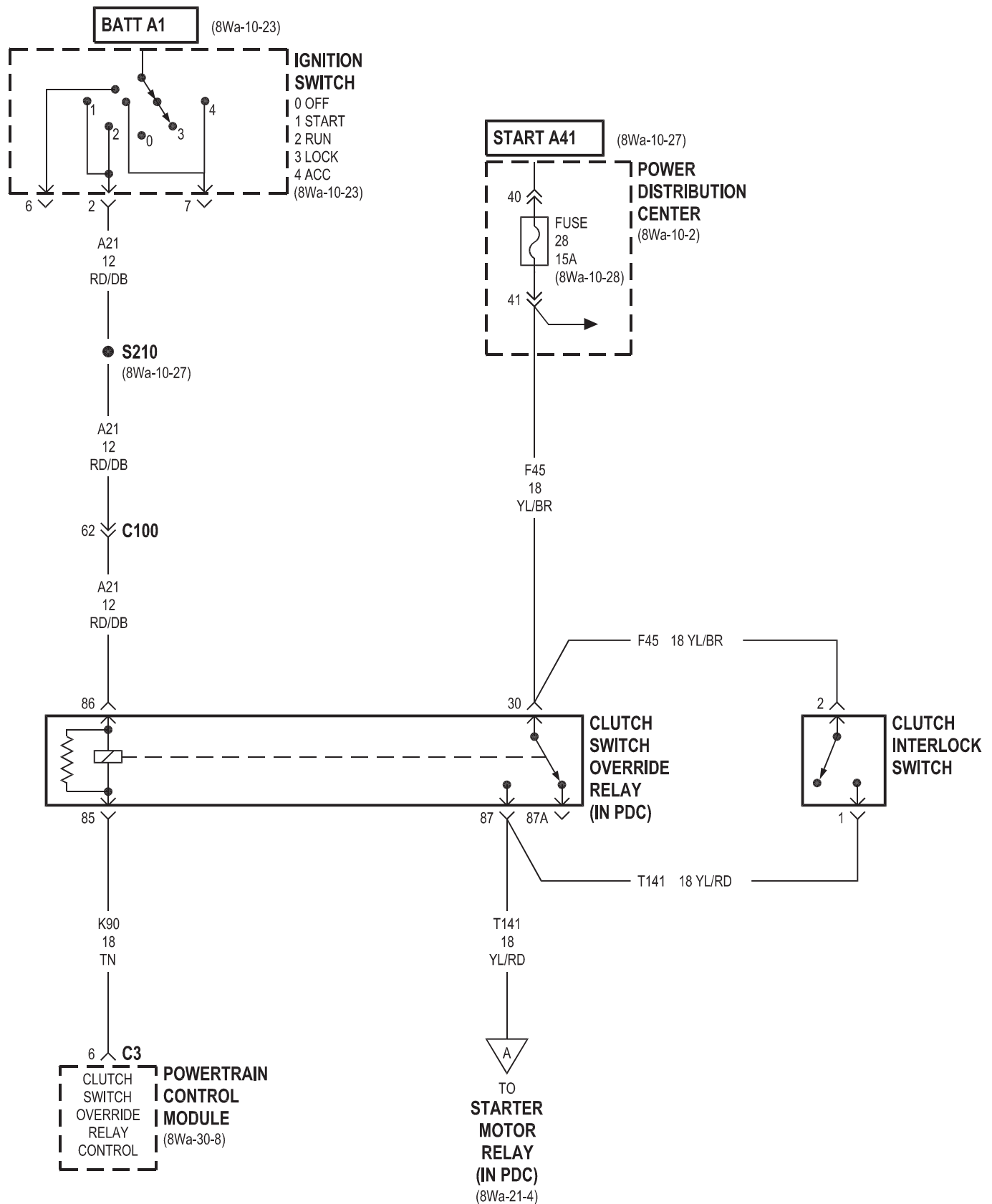


8W-21 STARTING SYSTEM

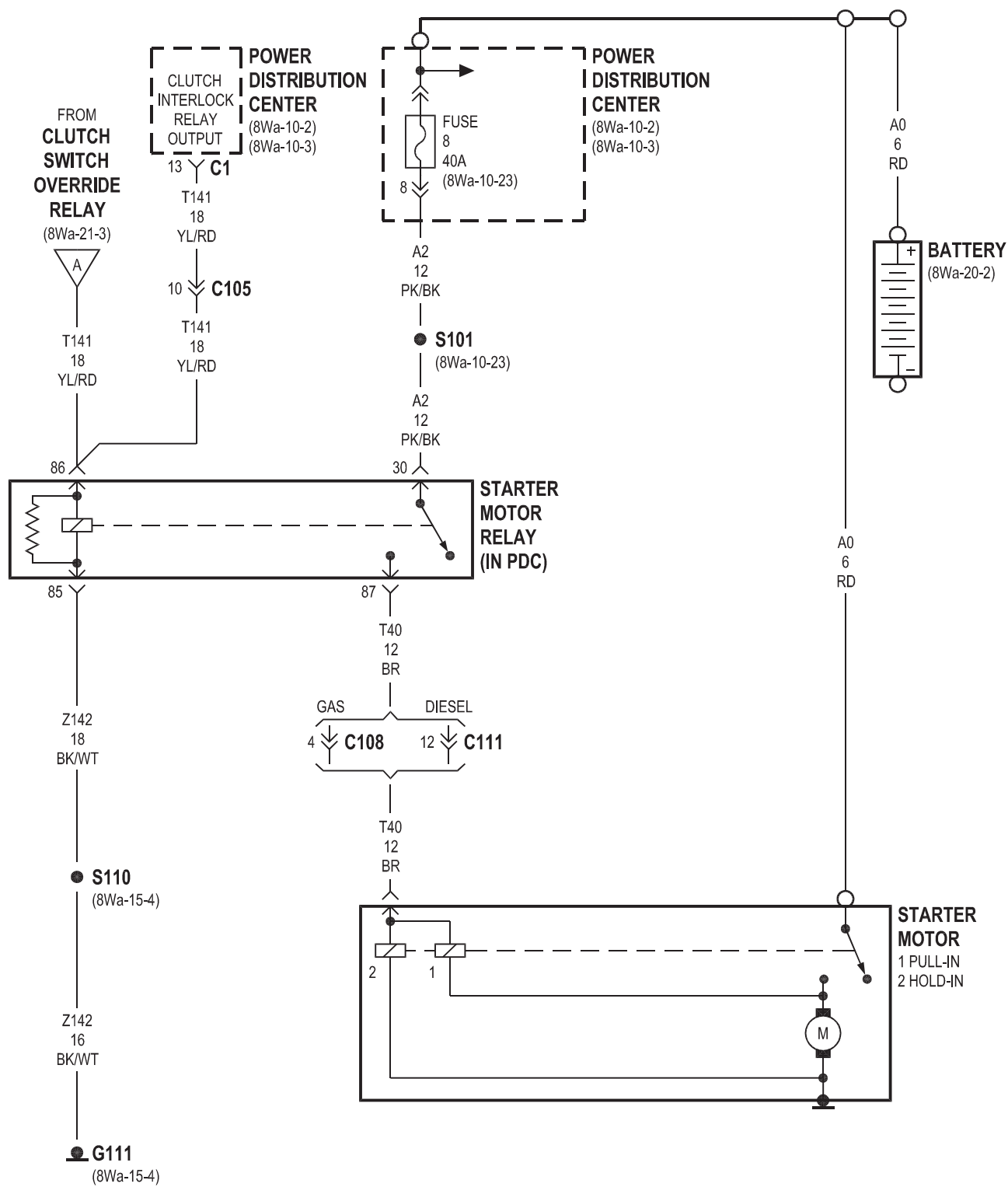
Component	Page	Component	Page
Battery	8Wa-21-2, 4, 6	Ignition Switch	8Wa-21-2, 3, 5
Clutch Interlock Switch	8Wa-21-3, 5	Power Distribution Center	8Wa-21-2, 3, 4, 5, 6
Clutch Switch Override Relay	8Wa-21-3, 4, 5, 6	Powertrain Control Module	8Wa-21-2, 3
Engine Control Module	8Wa-21-5	Starter Motor	8Wa-21-2, 4, 6
Fuse 8	8Wa-21-2, 4, 6	Starter Motor Relay	8Wa-21-2, 3, 4, 5, 6
Fuse 28	8Wa-21-2, 3, 5	Transmission Control Module	8Wa-21-2
G111	8Wa-21-4, 6	Transmission Solenoid/Trs Assembly	8Wa-21-2

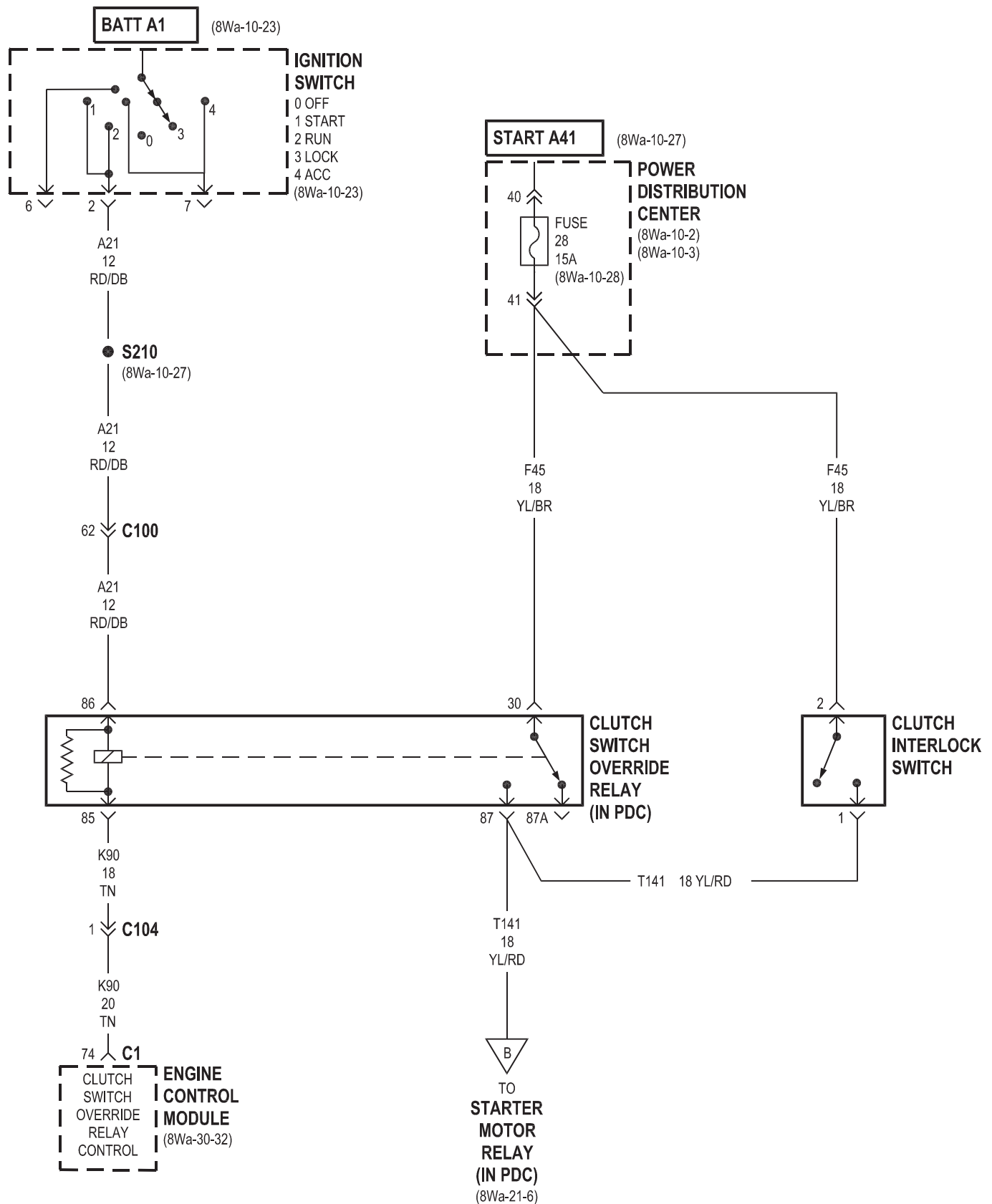
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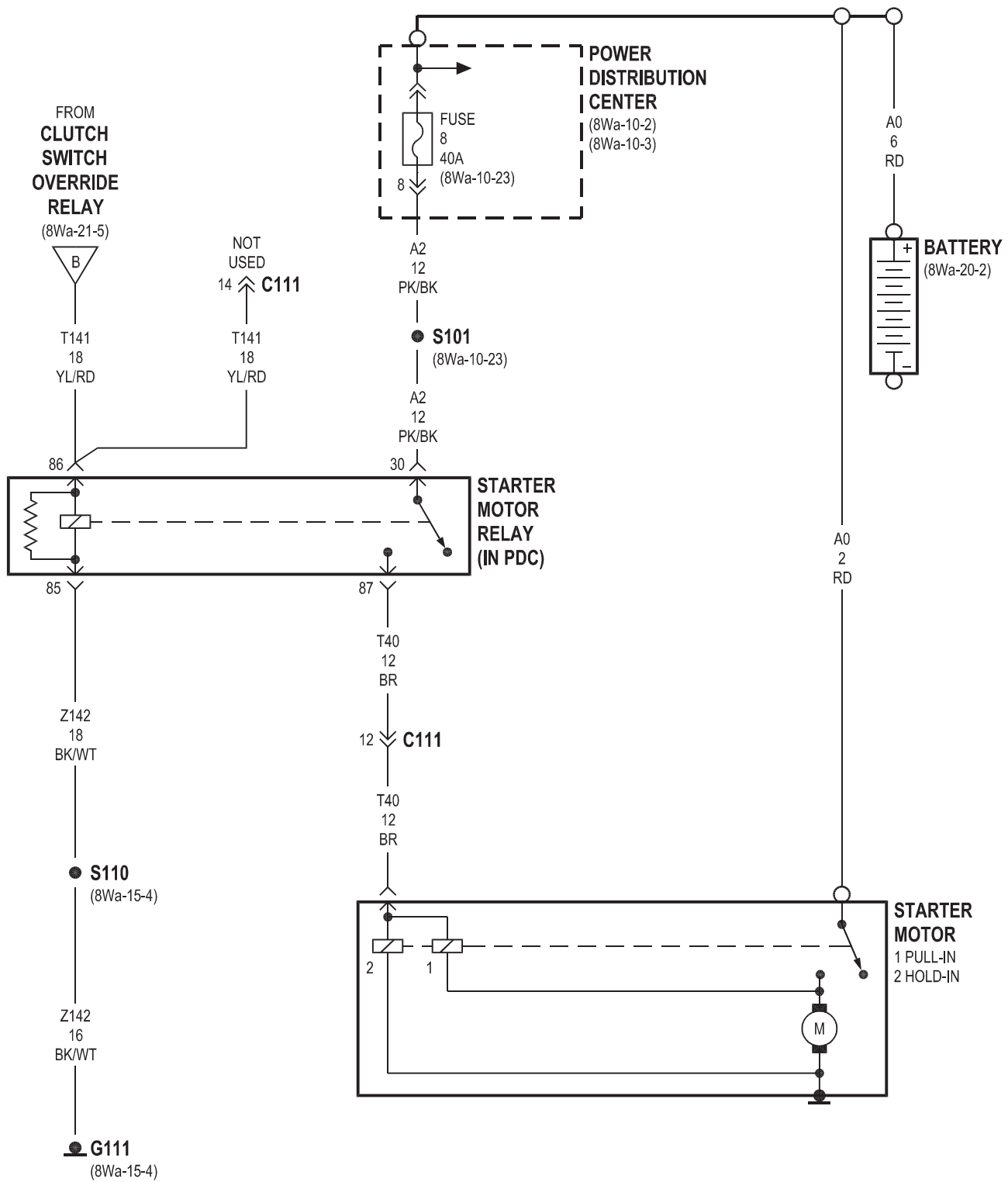




M/T

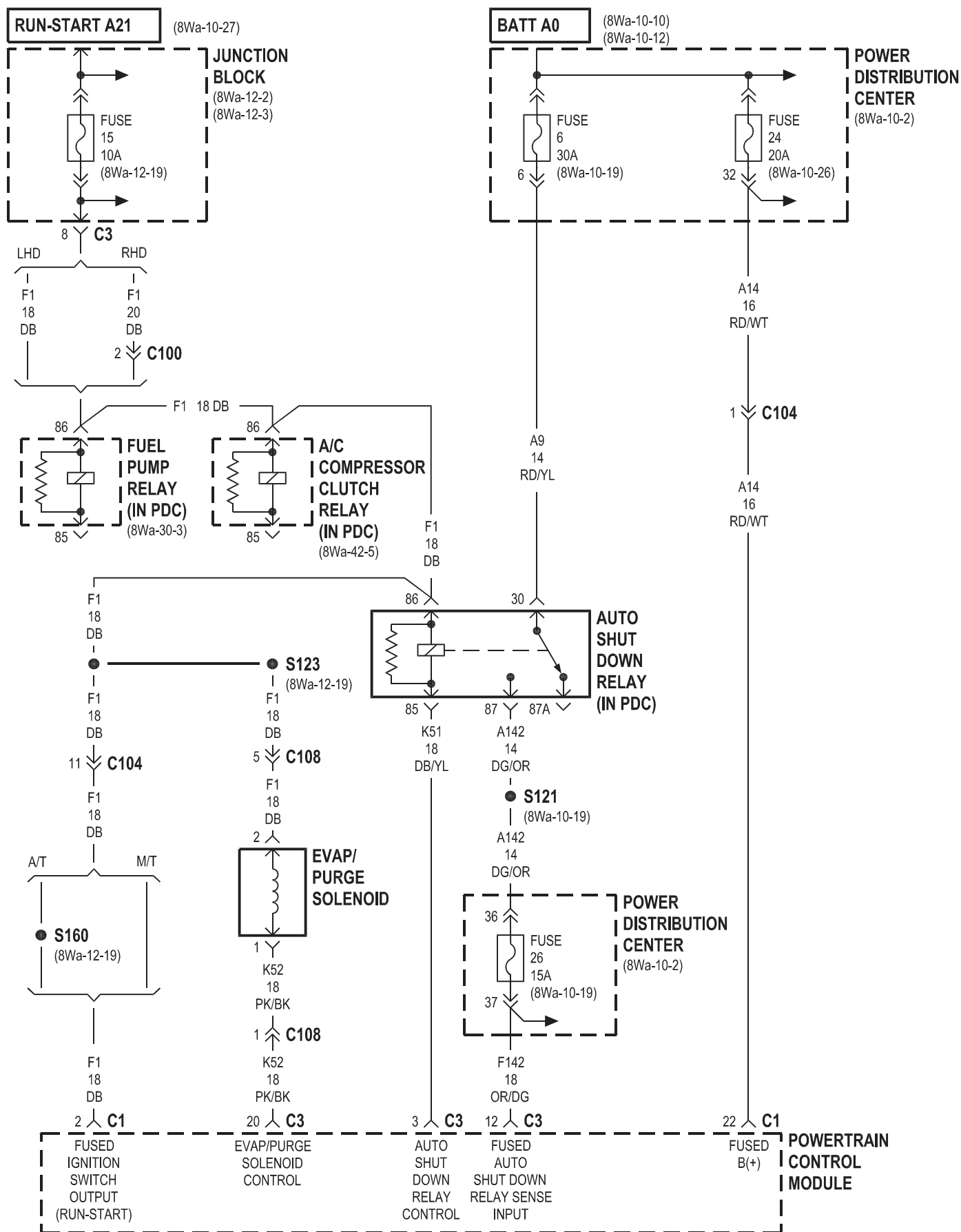


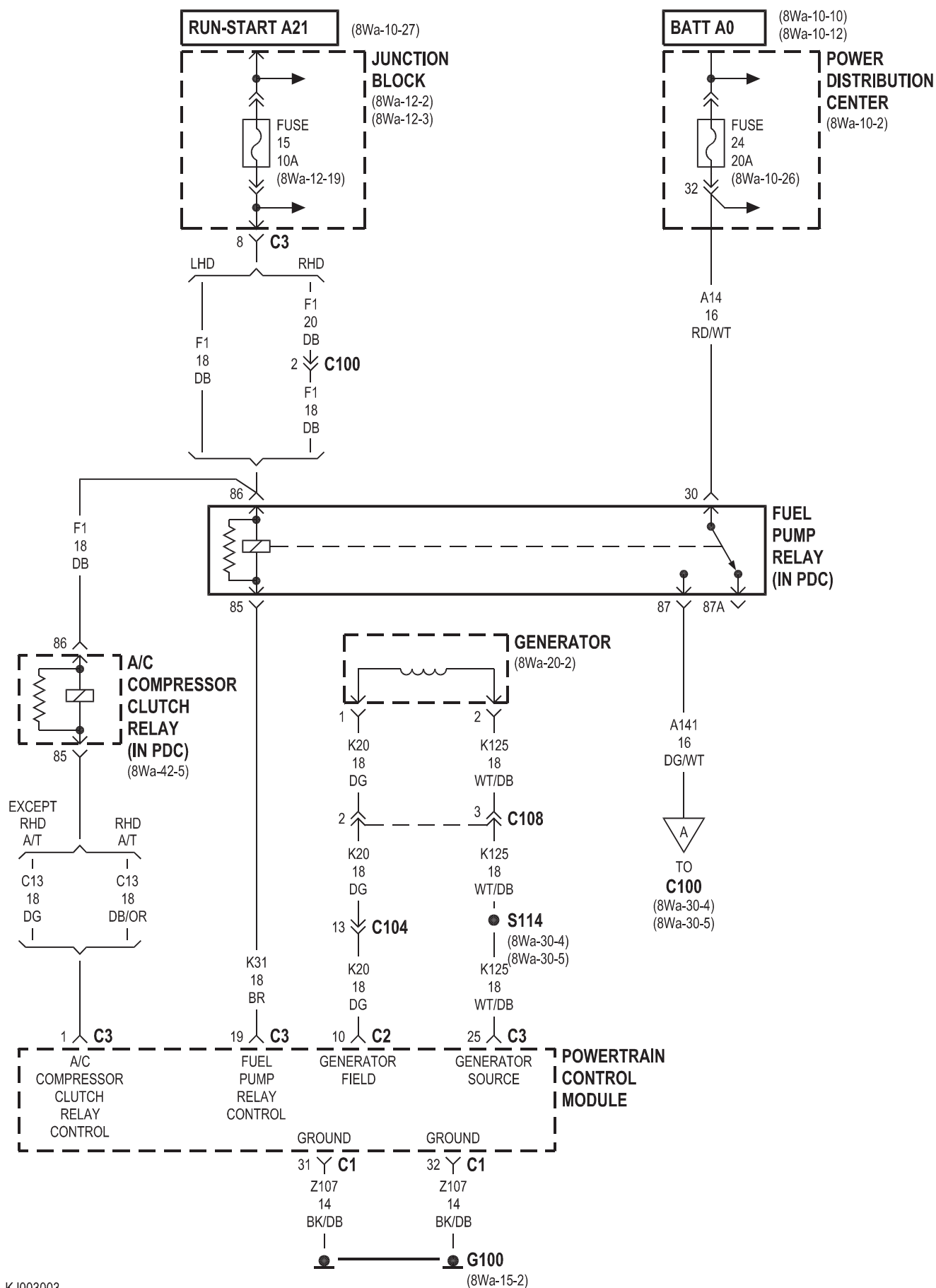




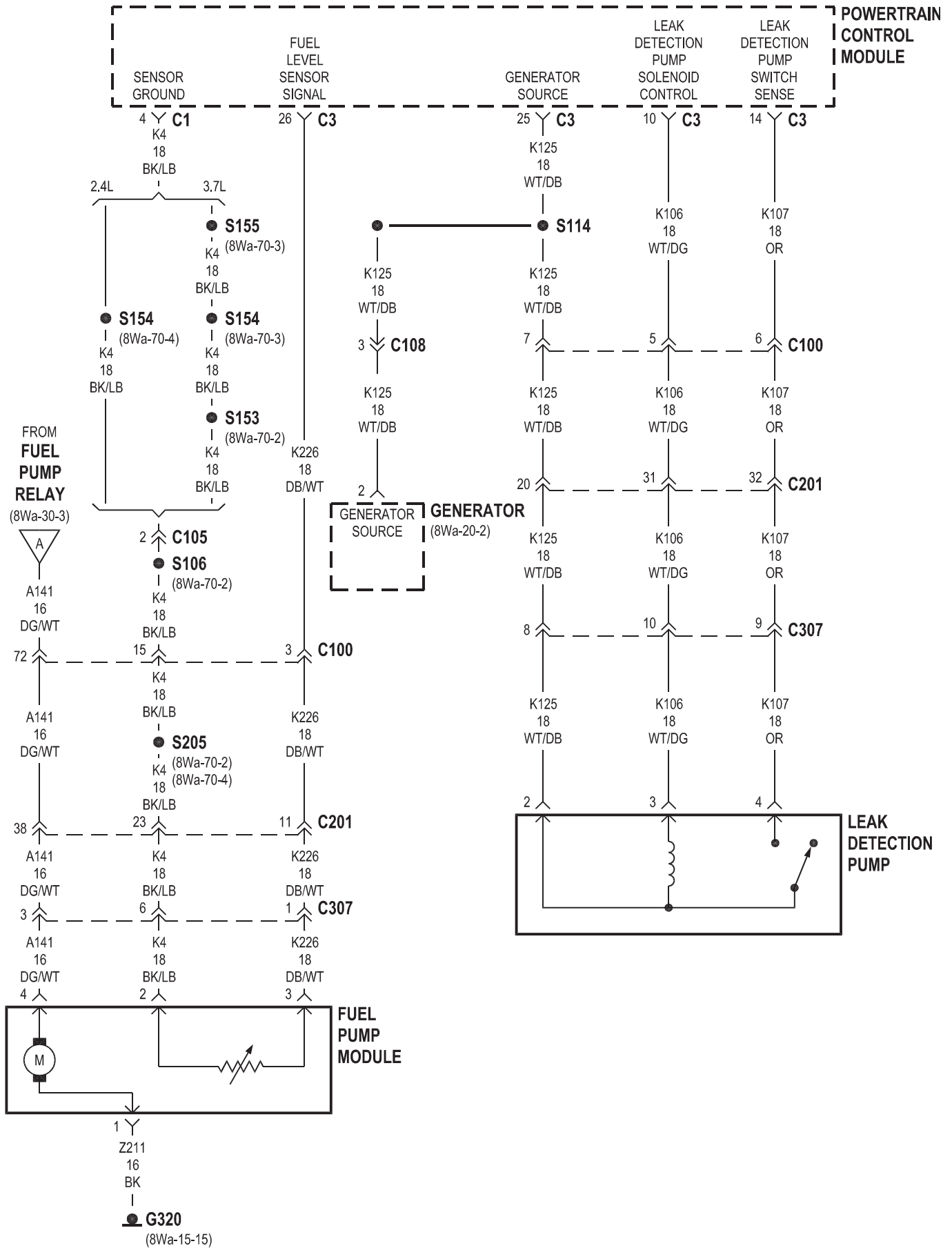
8W-30 FUEL/IGNITION SYSTEM

Component	Page	Component	Page
A/C Compressor Clutch	8Wa-30-34	Fuse 10	8Wa-30-35
A/C Compressor Clutch Relay	8Wa-30-34, 2, 3	Fuse 11	8Wa-30-35
A/C High Pressure Switch	8Wa-30-29	Fuse 12	8Wa-30-31, 33
A/C Low Pressure Switch	8Wa-30-8, 29	Fuse 15	8Wa-30-25, 2, 3
A/C Pressure Transducer	8Wa-30-11, 23, 12	Fuse 16	8Wa-30-13, 14, 15, 24, 30, 34, 35, 16
Accelerator Pedal Position Sensor	8Wa-30-27	Fuse 21	8Wa-30-34
Auto Shut Down Relay	8Wa-30-13, 14, 15, 24, 28, 31, 16, 17, 2	Fuse 24	8Wa-30-31, 2, 3
Battery Temperature Sensor	8Wa-30-30, 7	Fuse 26	8Wa-30-18, 24, 17, 2
Blower Motor Relay	8Wa-30-31	Fuse 28	8Wa-30-13
Body Control Module	8Wa-30-8, 33	G100	8Wa-30-19, 27, 17, 3
Boost Pressure Sensor	8Wa-30-26, 28	G101	8Wa-30-23
Brake Lamp Switch	8Wa-30-8, 32, 33	G103	8Wa-30-15, 23, 31, 34, 16
Cabin Heater	8Wa-30-34	G104	8Wa-30-27
Cabin Heater Relay	8Wa-30-34	G111	8Wa-30-31
Camshaft Position Sensor	8Wa-30-10, 9, 28	G112	8Wa-30-8, 23
Capacitor	8Wa-30-19, 17	G320	8Wa-30-4, 5
Clockspring	8Wa-30-33, 7	Generator	8Wa-30-24, 4, 3, 5
Clutch Switch Override Relay	8Wa-30-13, 8, 32	Glow Plug Assembly	8Wa-30-35
Coil On Plug No. 1	8Wa-30-19	Glow Plug Relay No. 1	8Wa-30-35
Coil On Plug No. 2	8Wa-30-20	Glow Plug Relay No. 2	8Wa-30-35
Coil On Plug No. 3	8Wa-30-19	Idle Air Control Motor	8Wa-30-21, 22
Coil On Plug No. 4	8Wa-30-20	Ignition Switch	8Wa-30-32
Coil On Plug No. 5	8Wa-30-19	Intake Air Temperature Sensor	8Wa-30-11, 12
Coil On Plug No. 6	8Wa-30-20	Junction Block	8Wa-30-25, 31, 33, 2, 3
Coil Rail	8Wa-30-17	Knock Sensor	8Wa-30-8
Controller Antilock Brake	8Wa-30-33	Leak Detection Pump	8Wa-30-4, 5
Crankshaft Position Sensor	8Wa-30-10, 9, 27	Left Speed Control Switch	8Wa-30-33, 7
Data Link Connector	8Wa-30-25, 6	Manifold Absolute Pressure Sensor	8Wa-30-11, 12
Diagnostic Junction Port	8Wa-30-25, 6	Oxygen Sensor 1/1 Upstream	8Wa-30-14, 15
EGR Solenoid	8Wa-30-30	Oxygen Sensor 1/2 Downstream	8Wa-30-13, 14, 15
Engine Control Module	8Wa-30-24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36	Oxygen Sensor 2/1 Upstream	8Wa-30-16
Engine Coolant Temperature Sensor	8Wa-30-11, 28, 12	Oxygen Sensor 2/2 Downstream	8Wa-30-13, 16
Engine Oil Pressure Sensor	8Wa-30-11, 28, 12	Oxygen Sensor Downstream Relay	8Wa-30-13, 15, 16
Evap/Purge Solenoid	8Wa-30-2	Power Distribution Center	8Wa-30-13, 14, 15, 23, 24, 28, 30, 31, 34, 35, 16, 17, 2, 3
Fuel Heater	8Wa-30-31	Power Steering Pressure Switch	8Wa-30-23
Fuel Heater Relay	8Wa-30-31	Powertrain Control Module	8Wa-30-10, 13, 20, 8, 11, 14, 15, 18, 19, 21, 9, 23, 4, 12, 16, 17, 2, 22, 3, 6, 7, 5
Fuel Injector No. 1	8Wa-30-18, 36	Radiator Fan Motor	8Wa-30-23
Fuel Injector No. 2	8Wa-30-18, 36	Radiator Fan Relay	8Wa-30-23
Fuel Injector No. 3	8Wa-30-18, 36	Right Speed Control Switch	8Wa-30-33, 7
Fuel Injector No. 4	8Wa-30-18, 36	Shifter Assembly	8Wa-30-8, 32
Fuel Injector No. 5	8Wa-30-18	Speed Control Servo	8Wa-30-8
Fuel Injector No. 6	8Wa-30-18	Starter Motor Relay	8Wa-30-13
Fuel Pressure Sensor	8Wa-30-36	Throttle Position Sensor	8Wa-30-21, 22
Fuel Pressure Solenoid	8Wa-30-31	Transfer Case Position Sensor	8Wa-30-9, 23, 32
Fuel Pump Module	8Wa-30-30, 4, 5	Transmission Control Module	8Wa-30-10, 8, 22, 6
Fuel Pump Relay	8Wa-30-4, 2, 3, 5	Transmission Solenoid/Trs Assembly	8Wa-30-10
Fuse 2	8Wa-30-23	Water In Fuel Sensor	8Wa-30-29
Fuse 6	8Wa-30-24, 28, 31, 2		

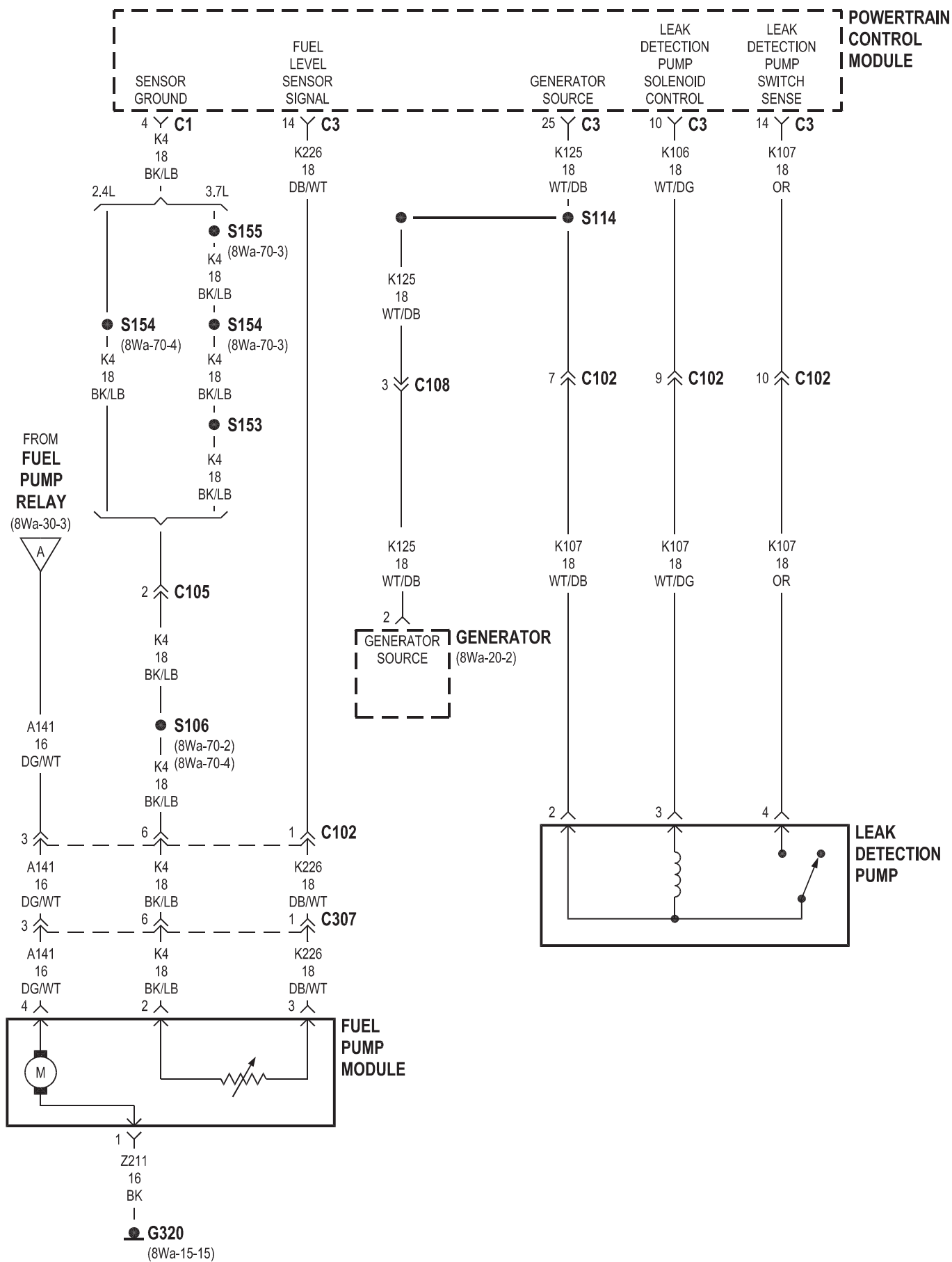


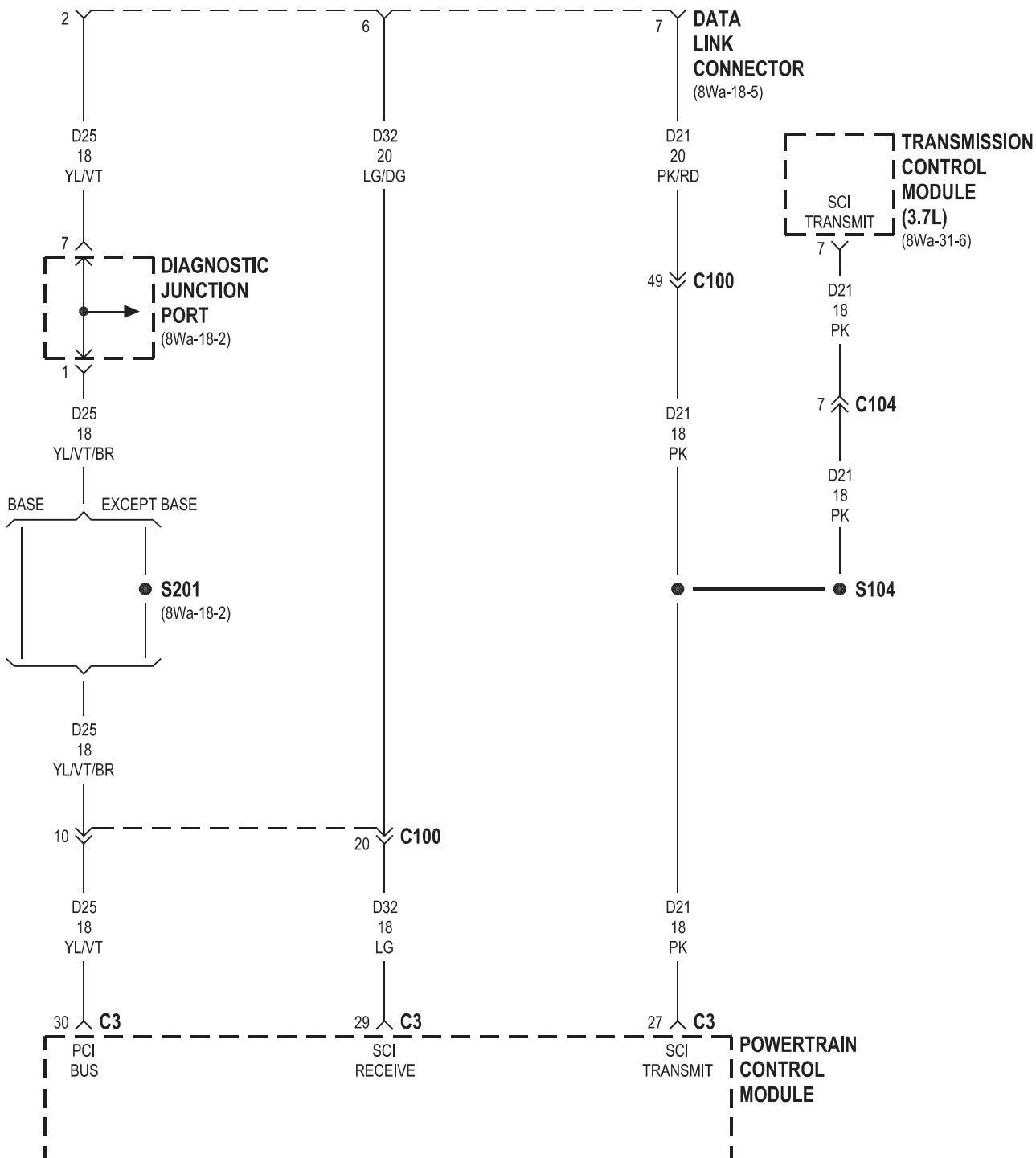


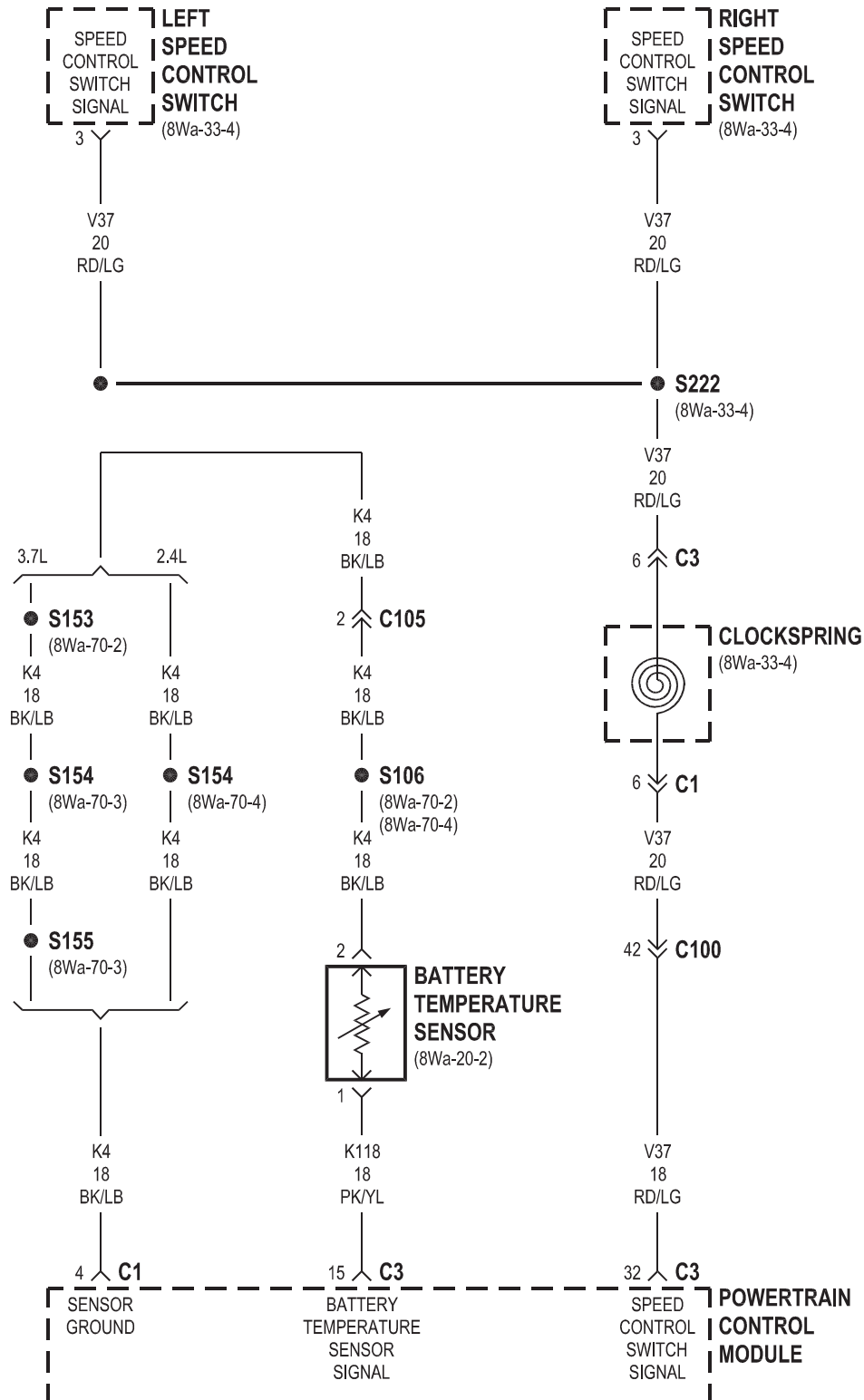
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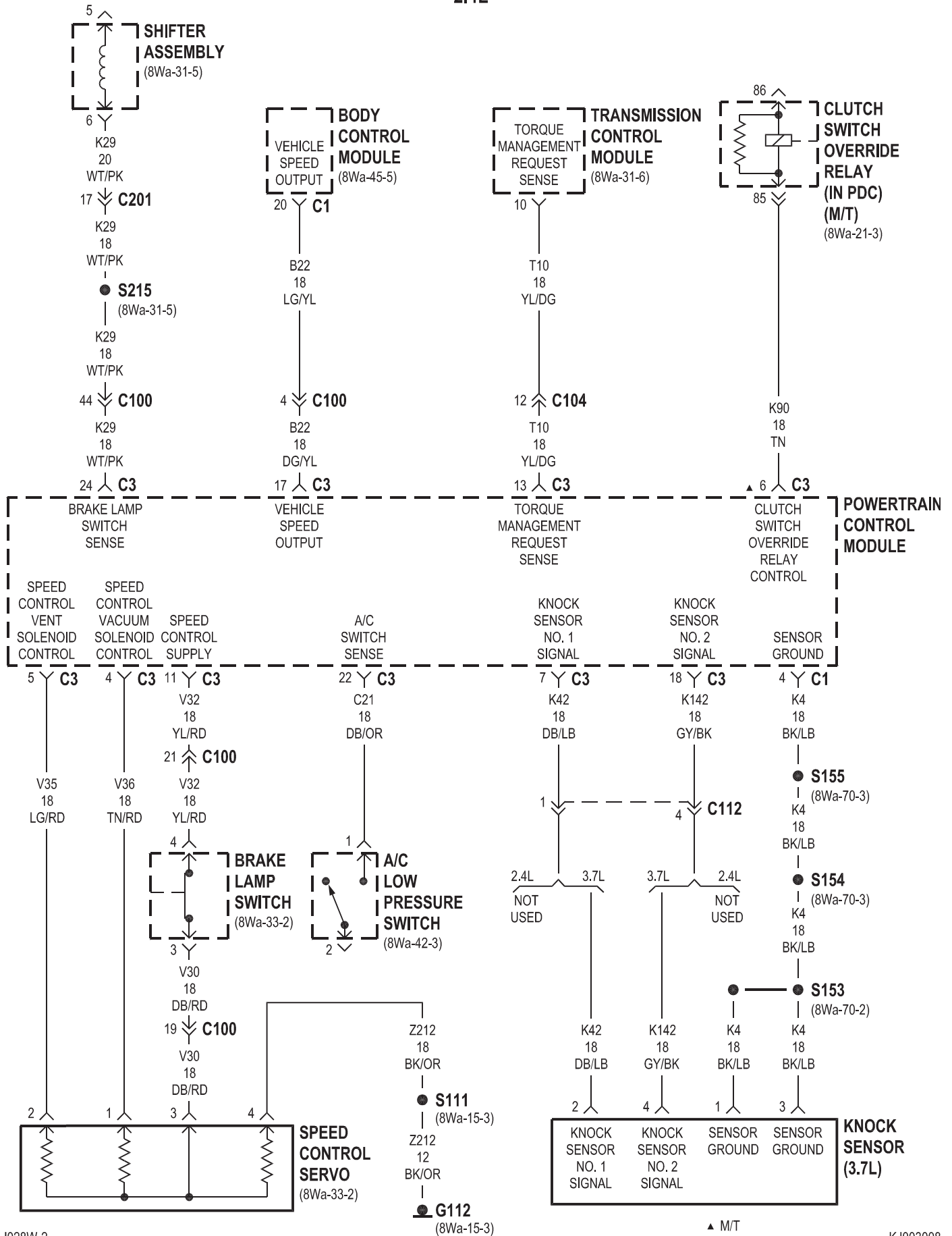
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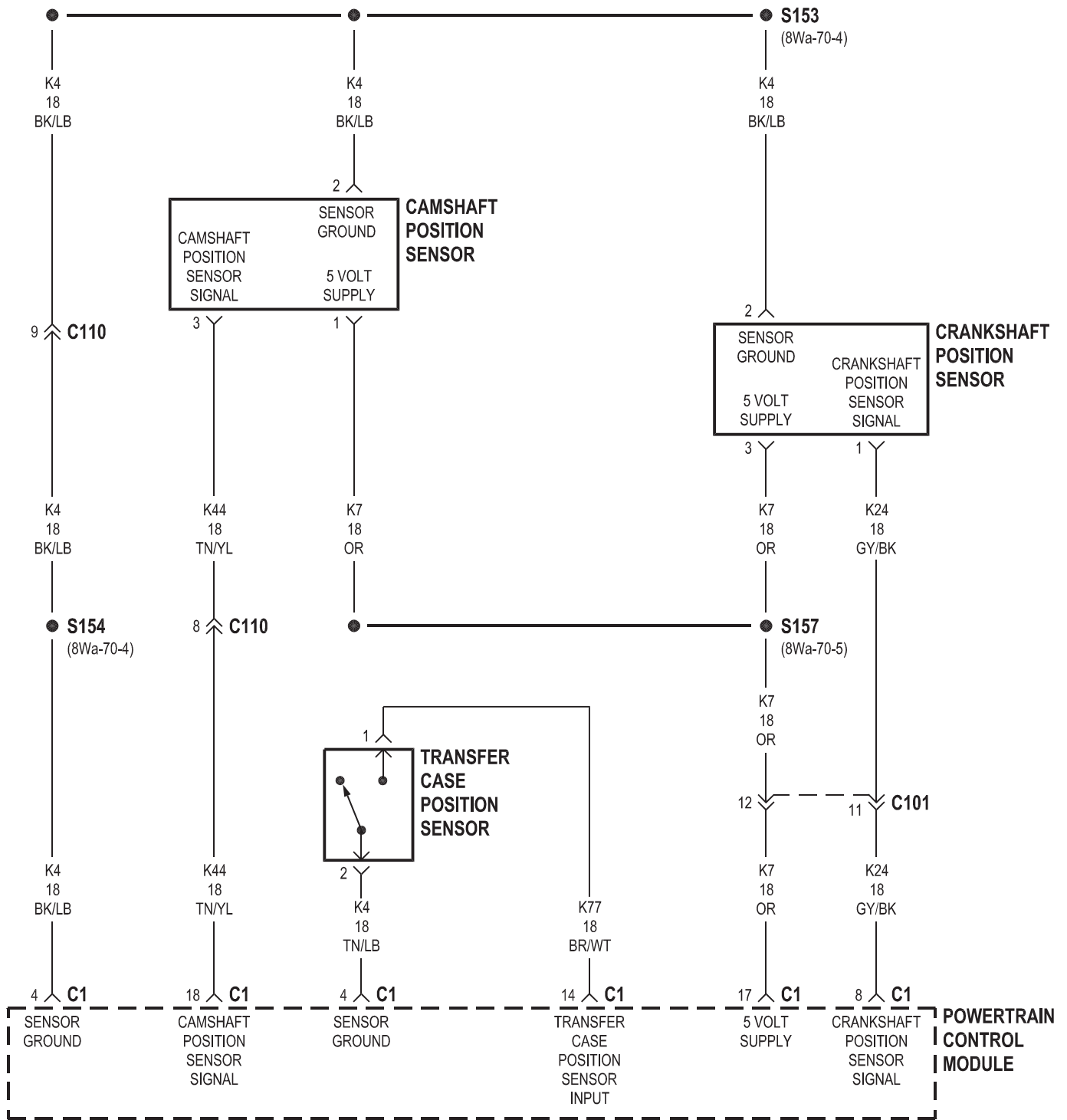


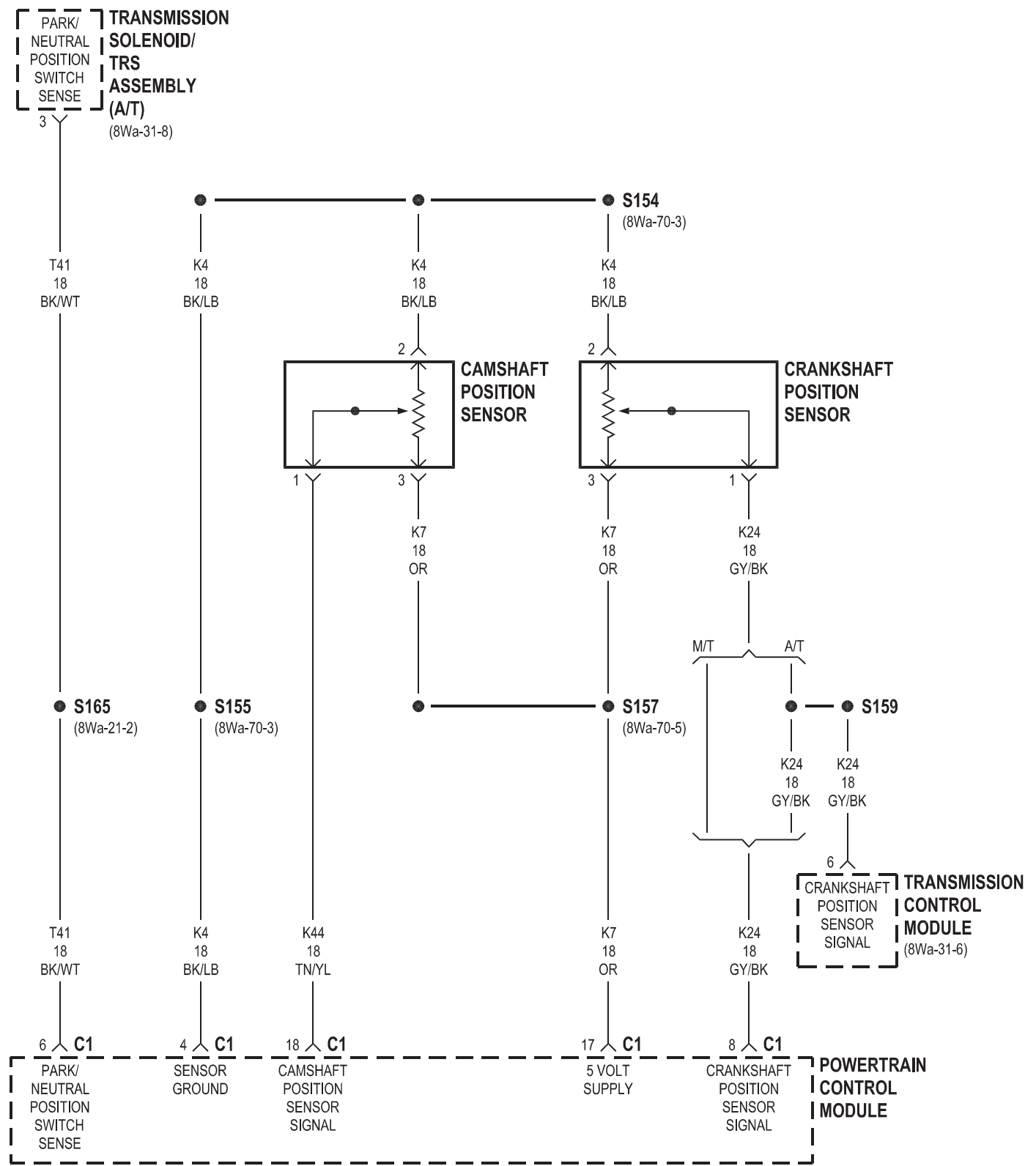


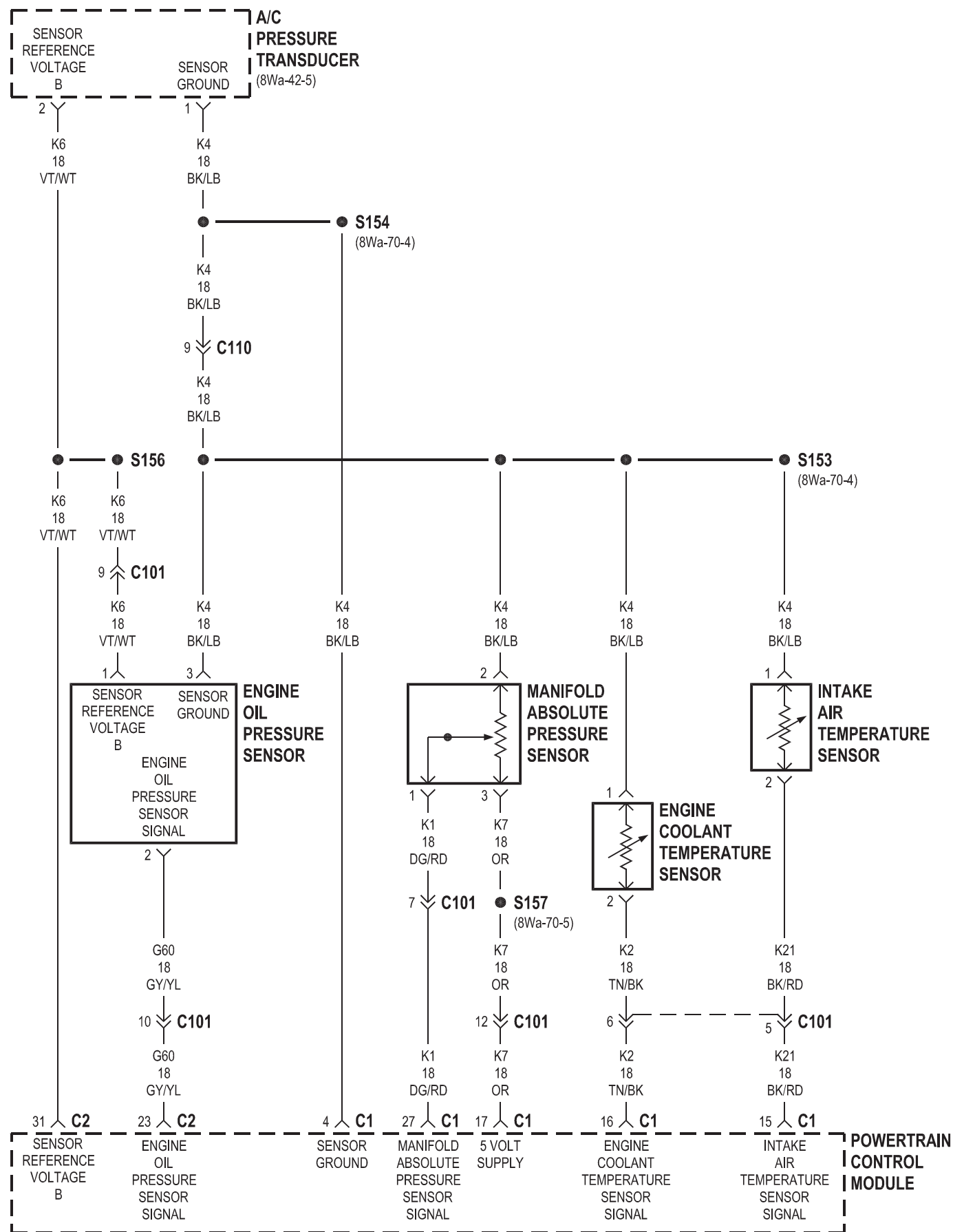


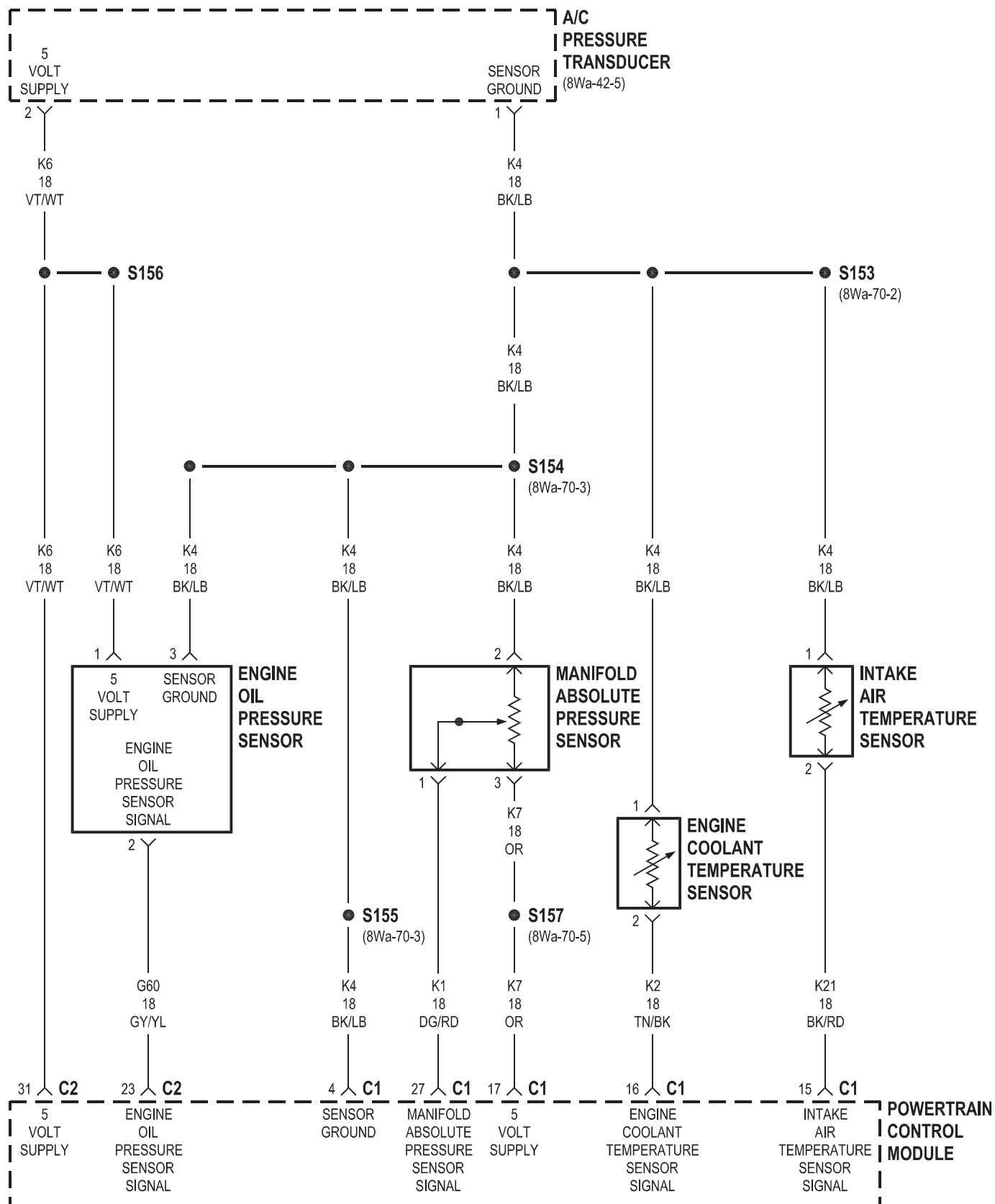
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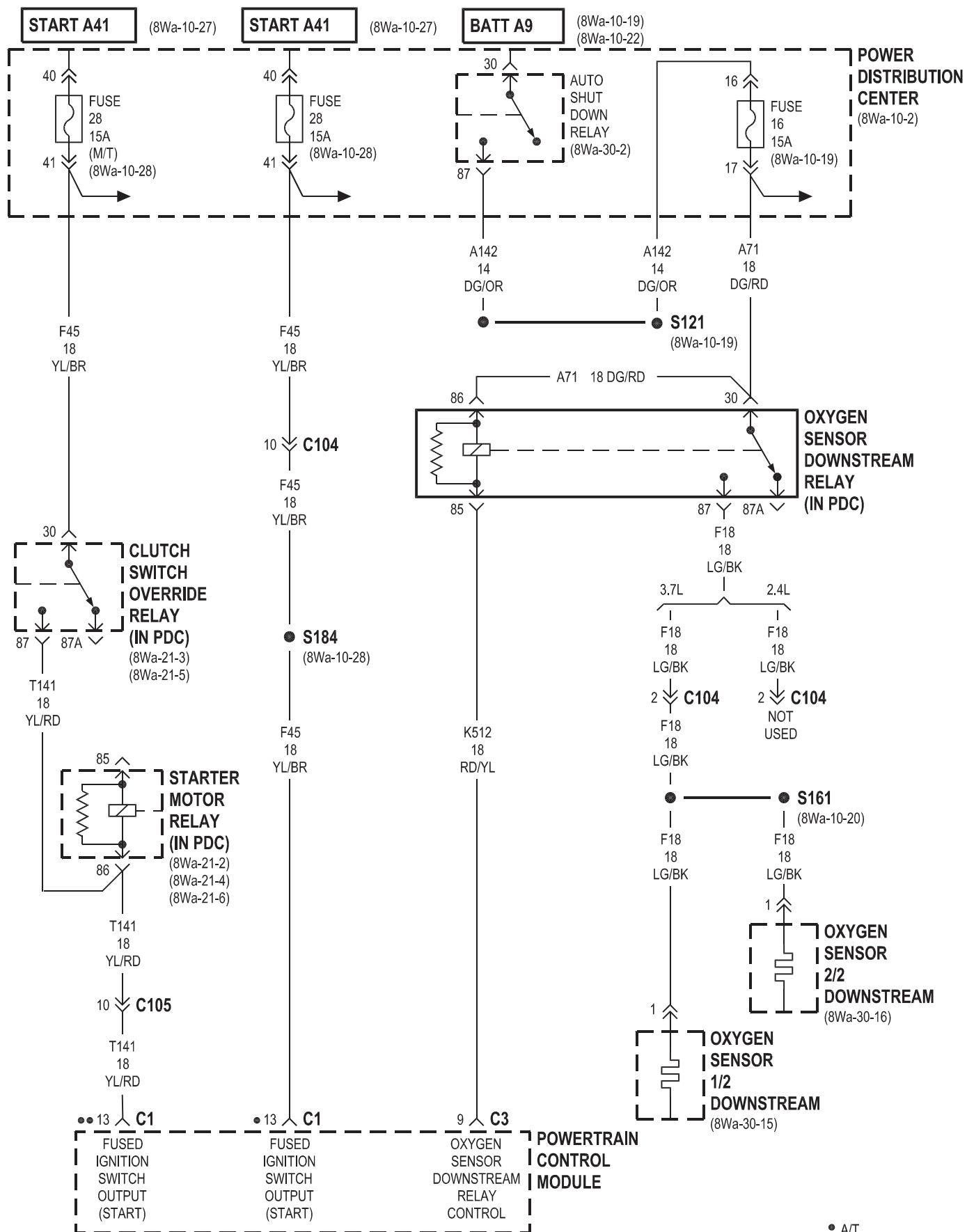




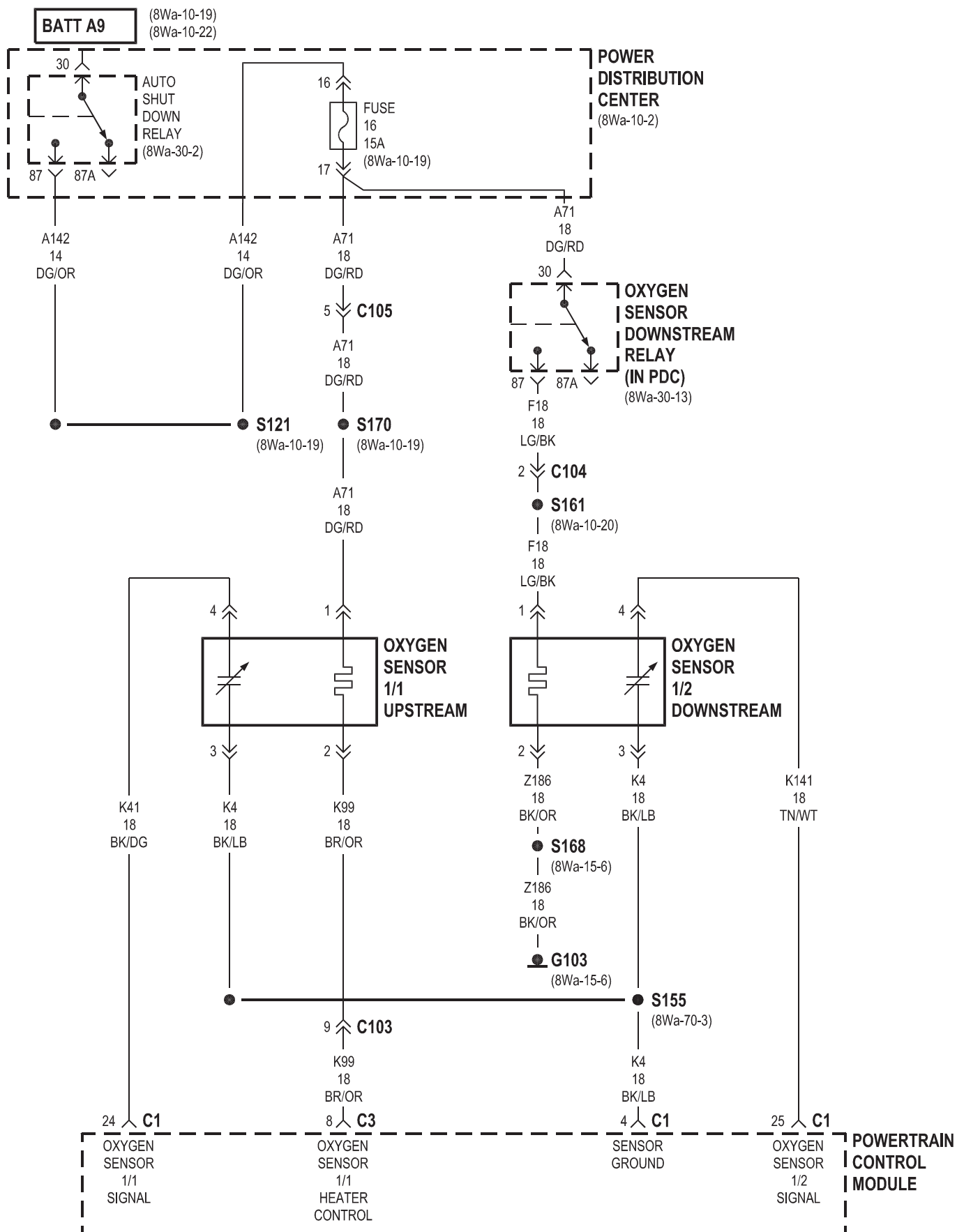


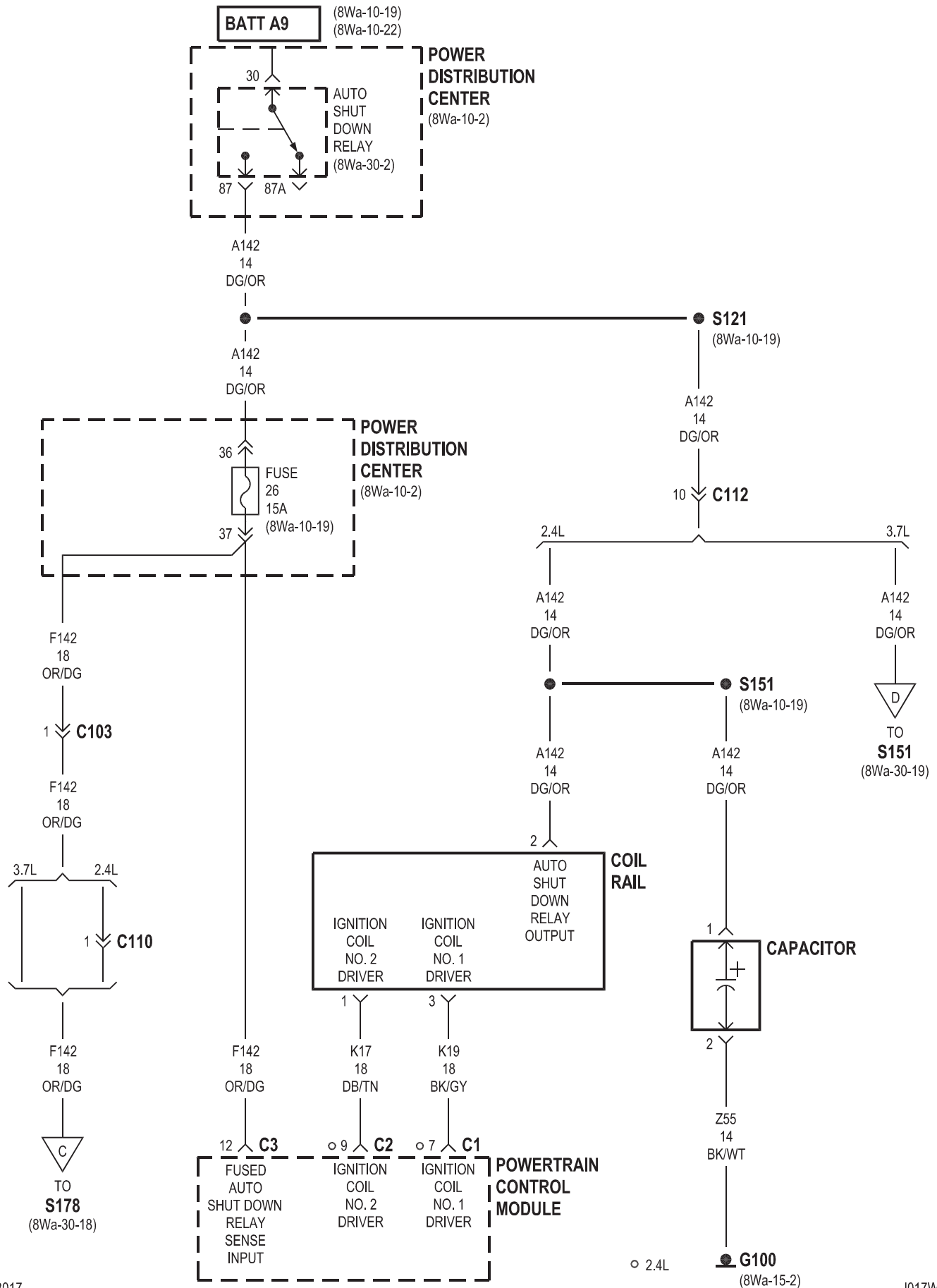


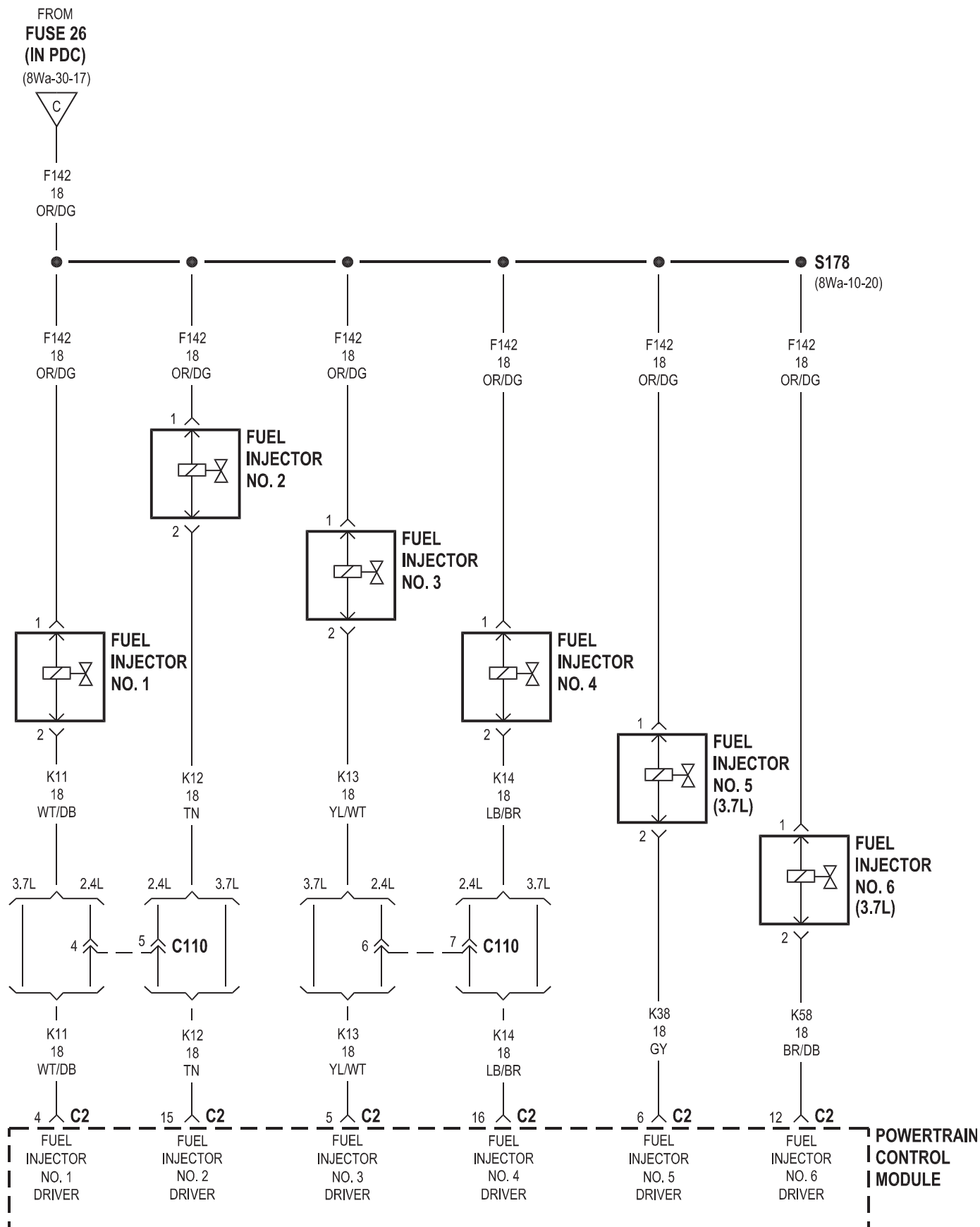
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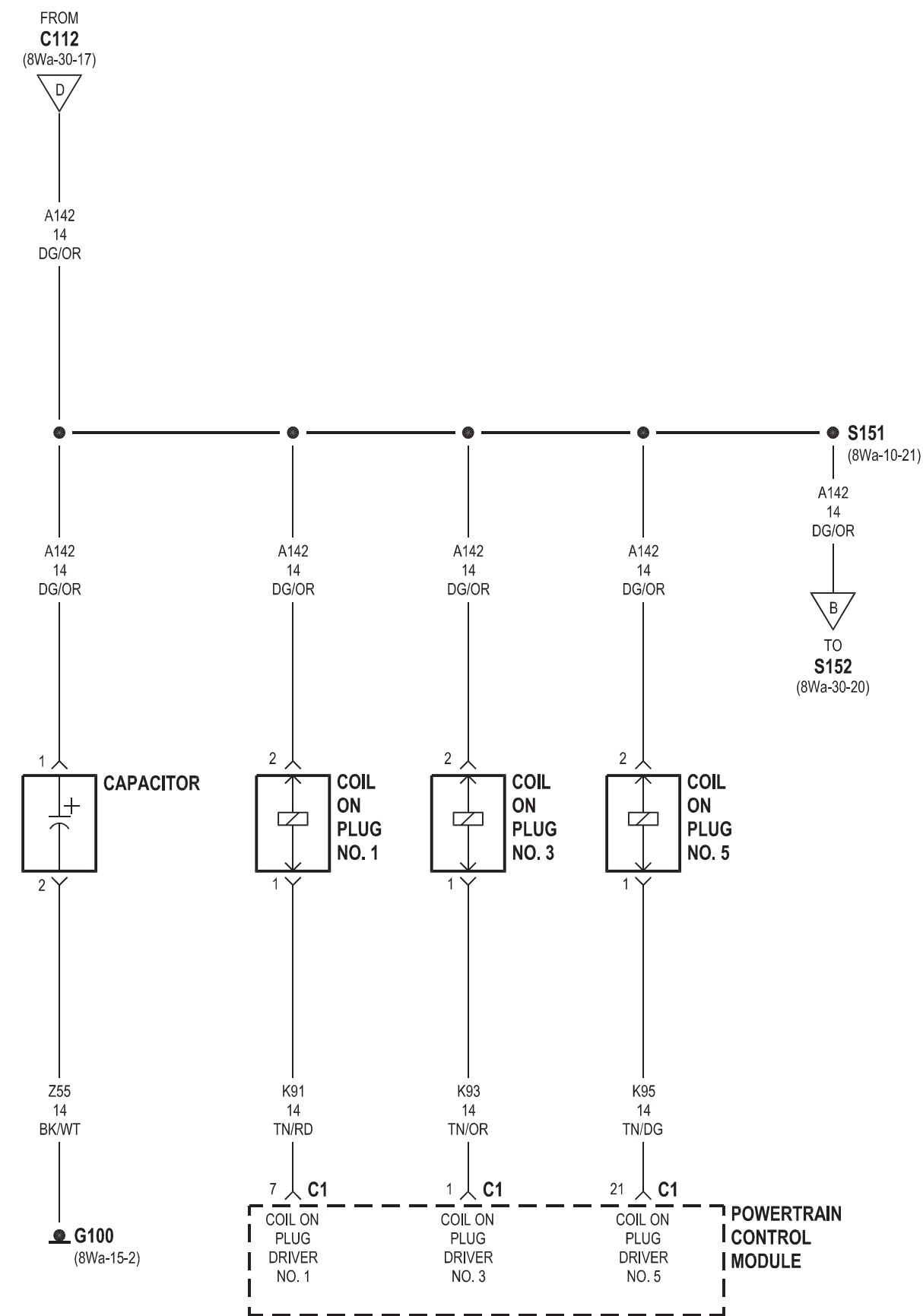


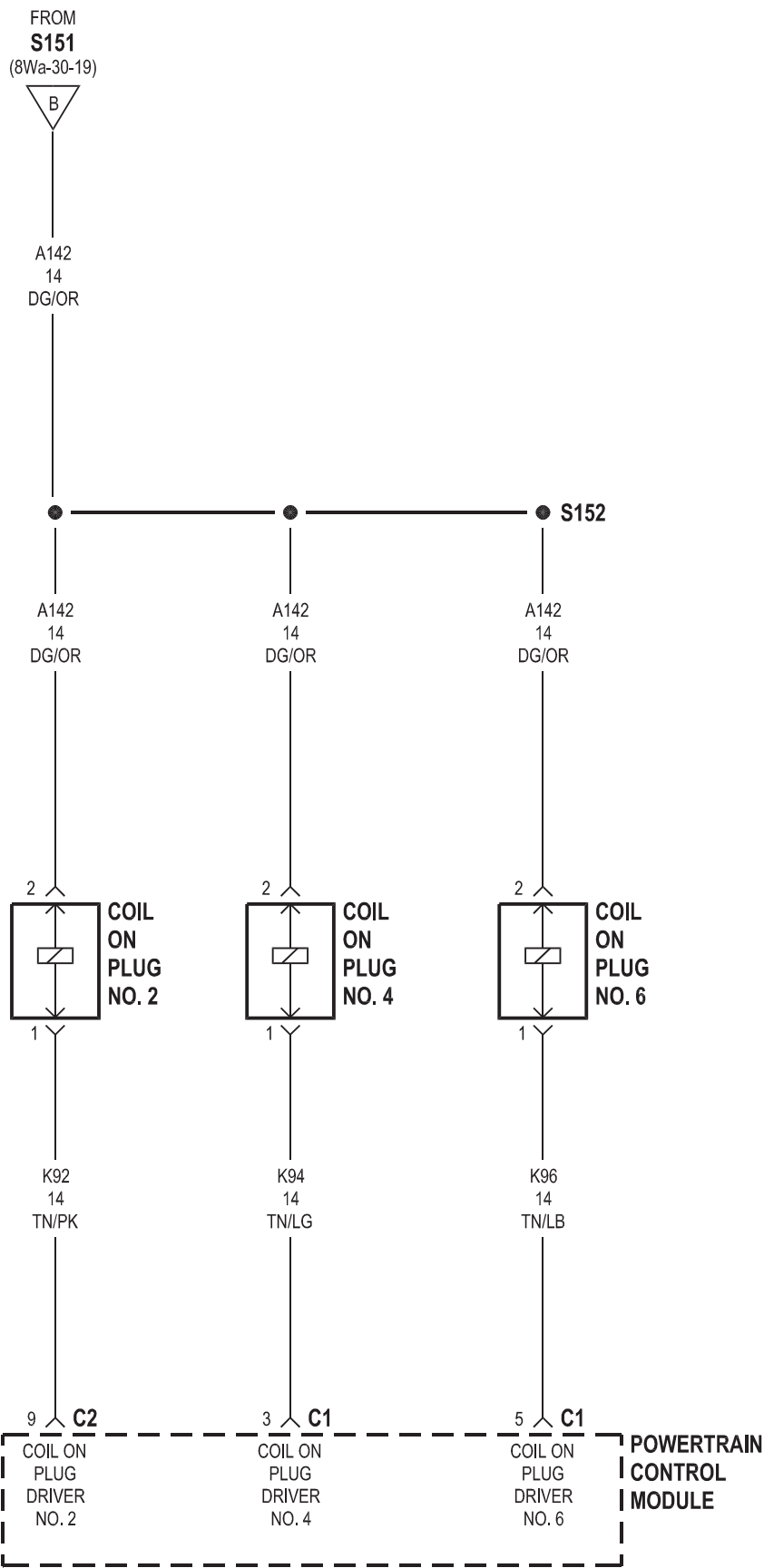
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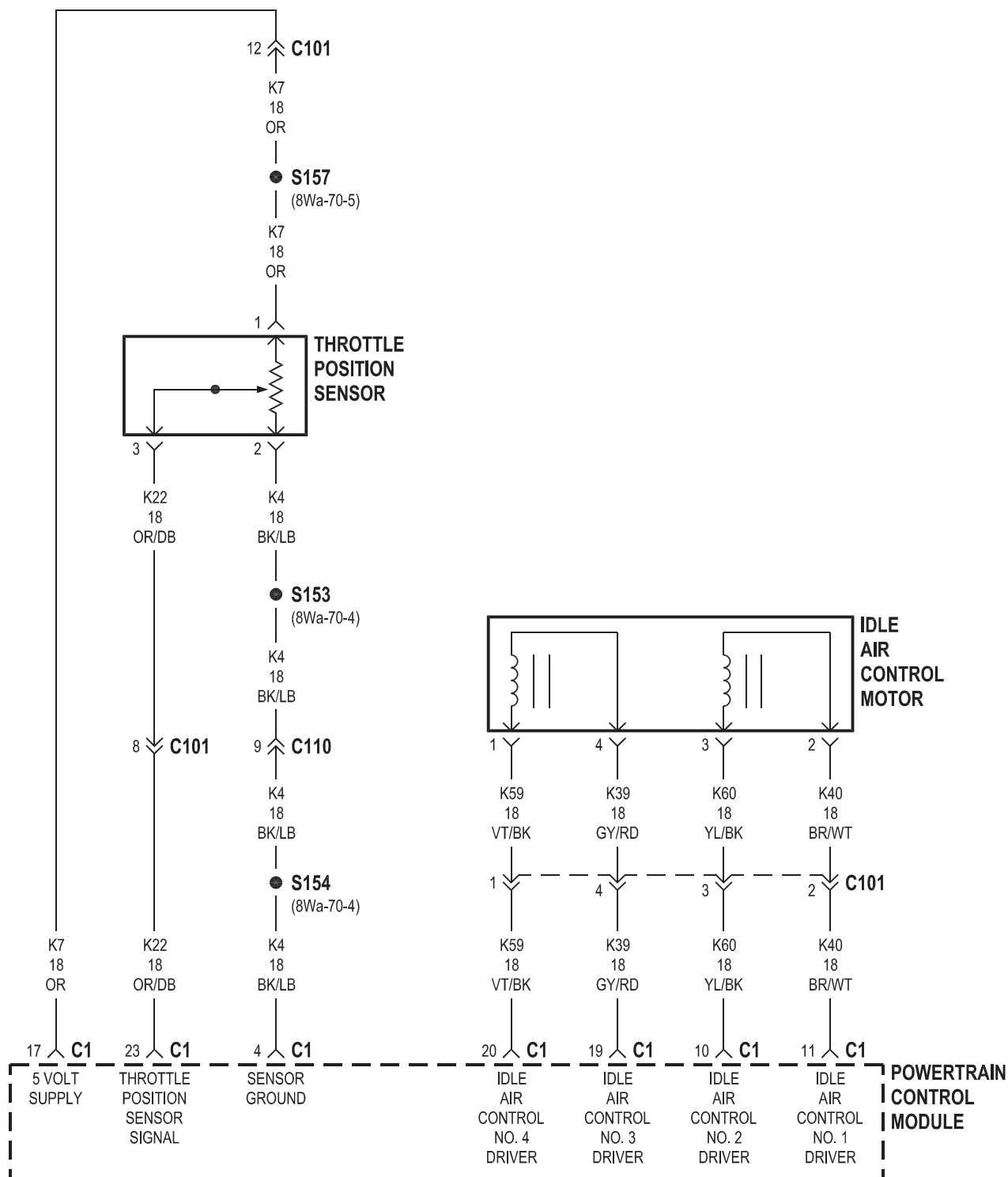


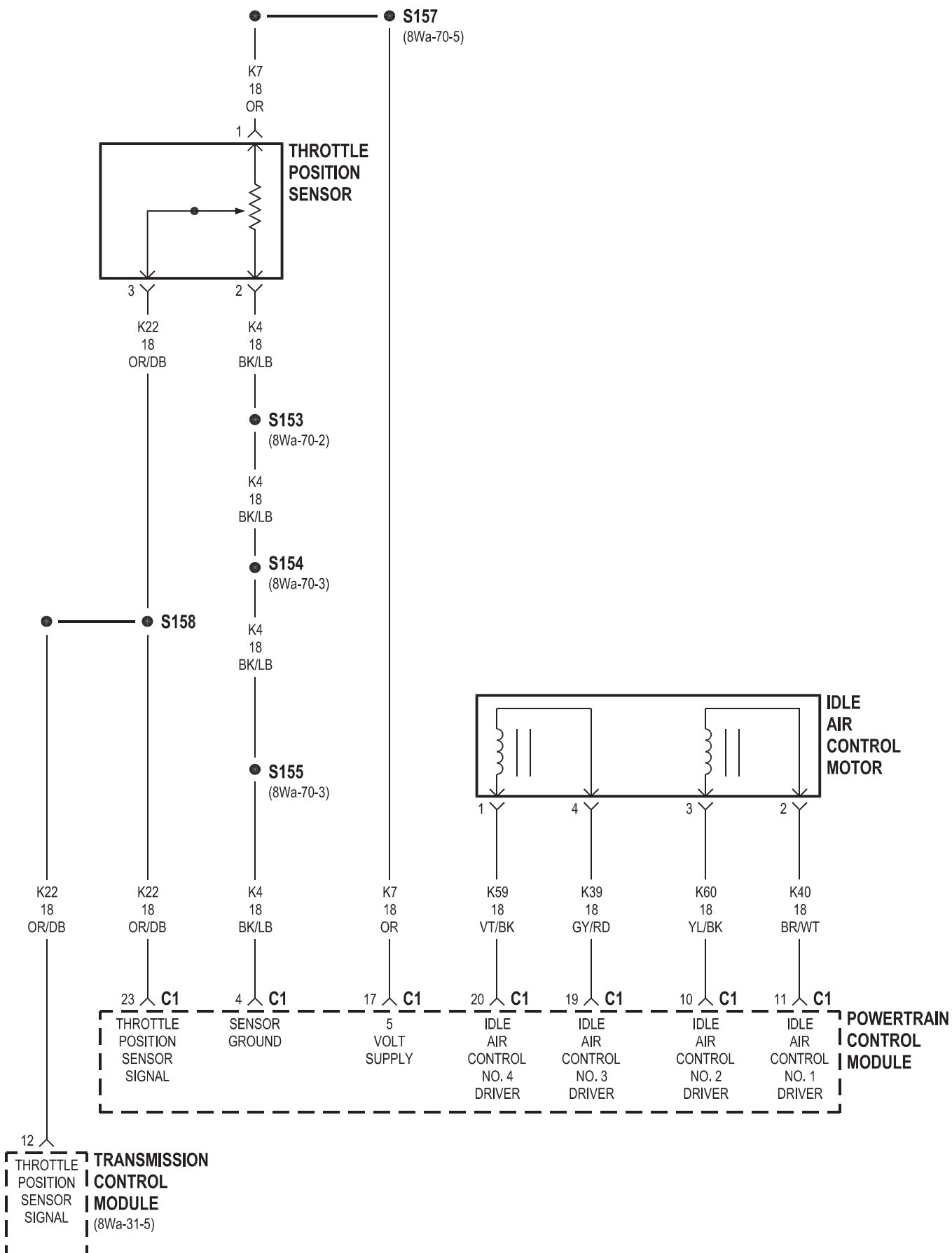


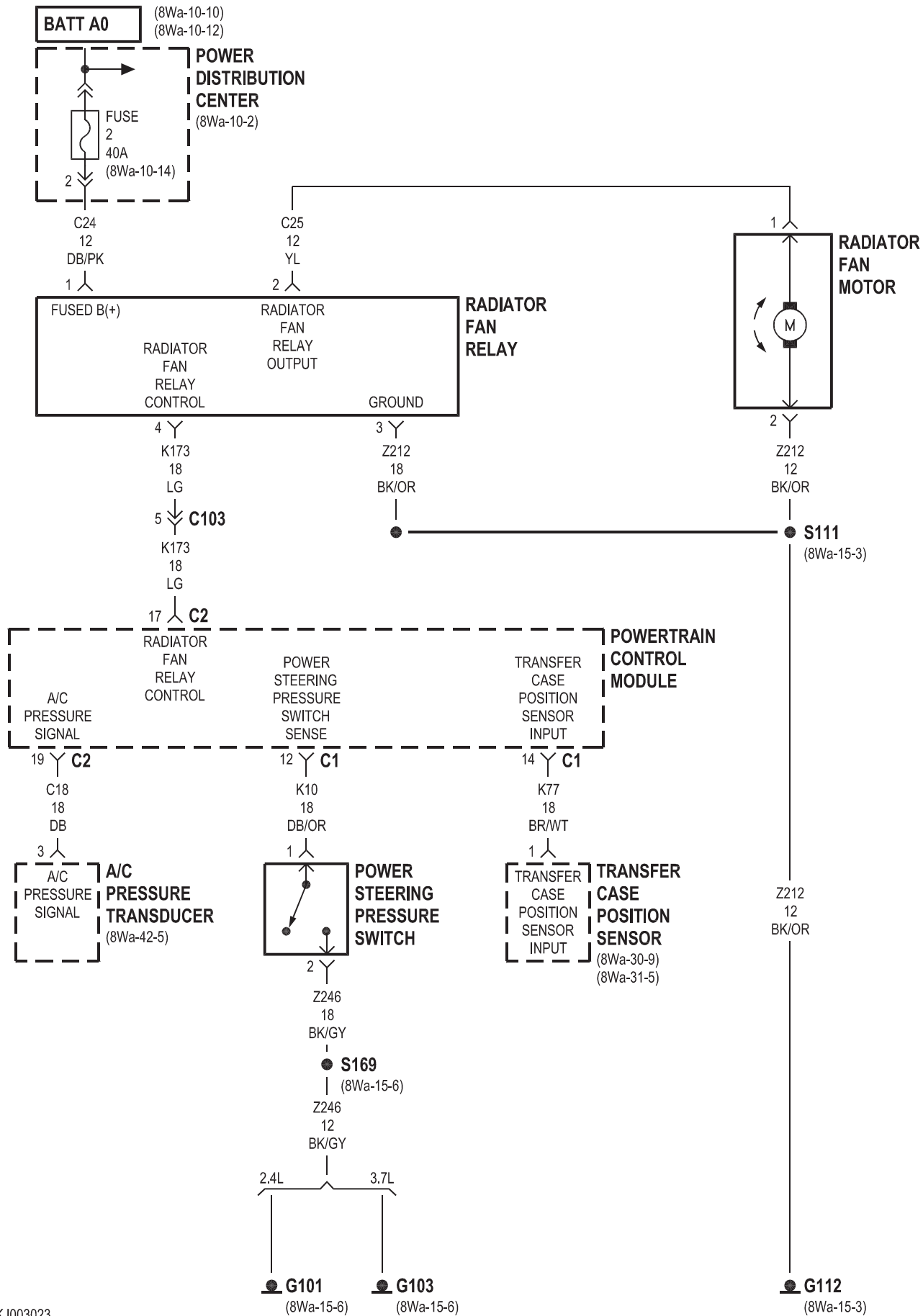




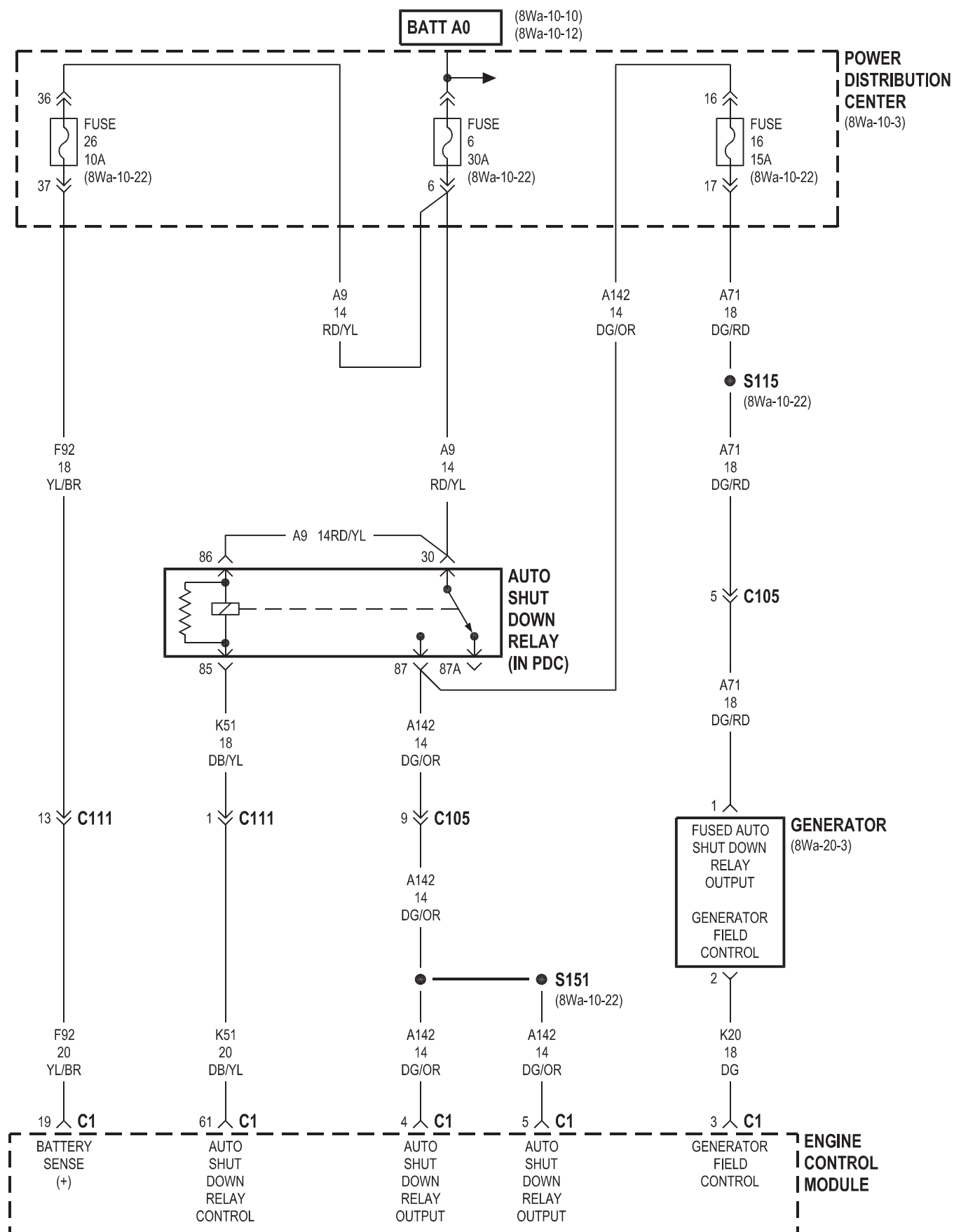


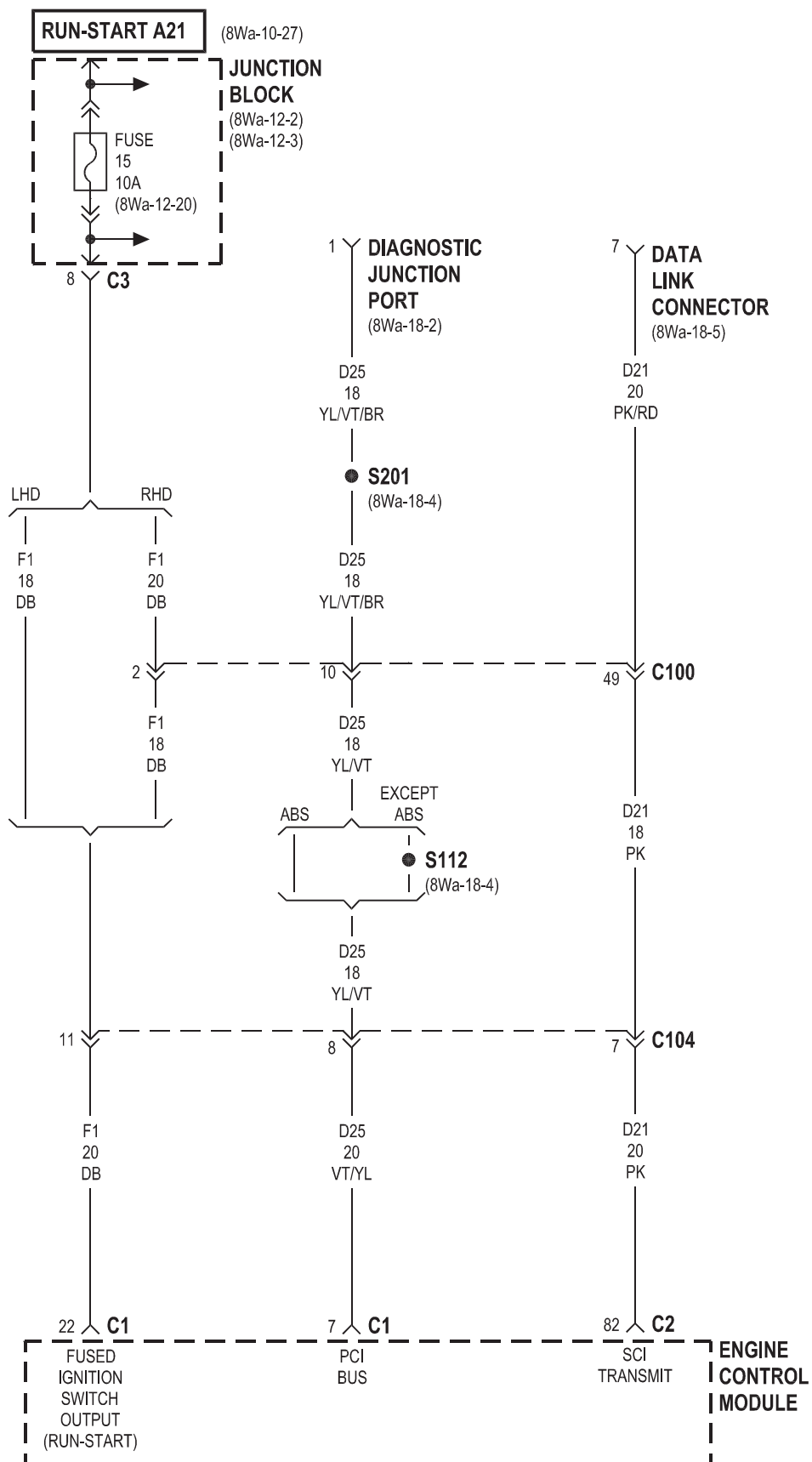


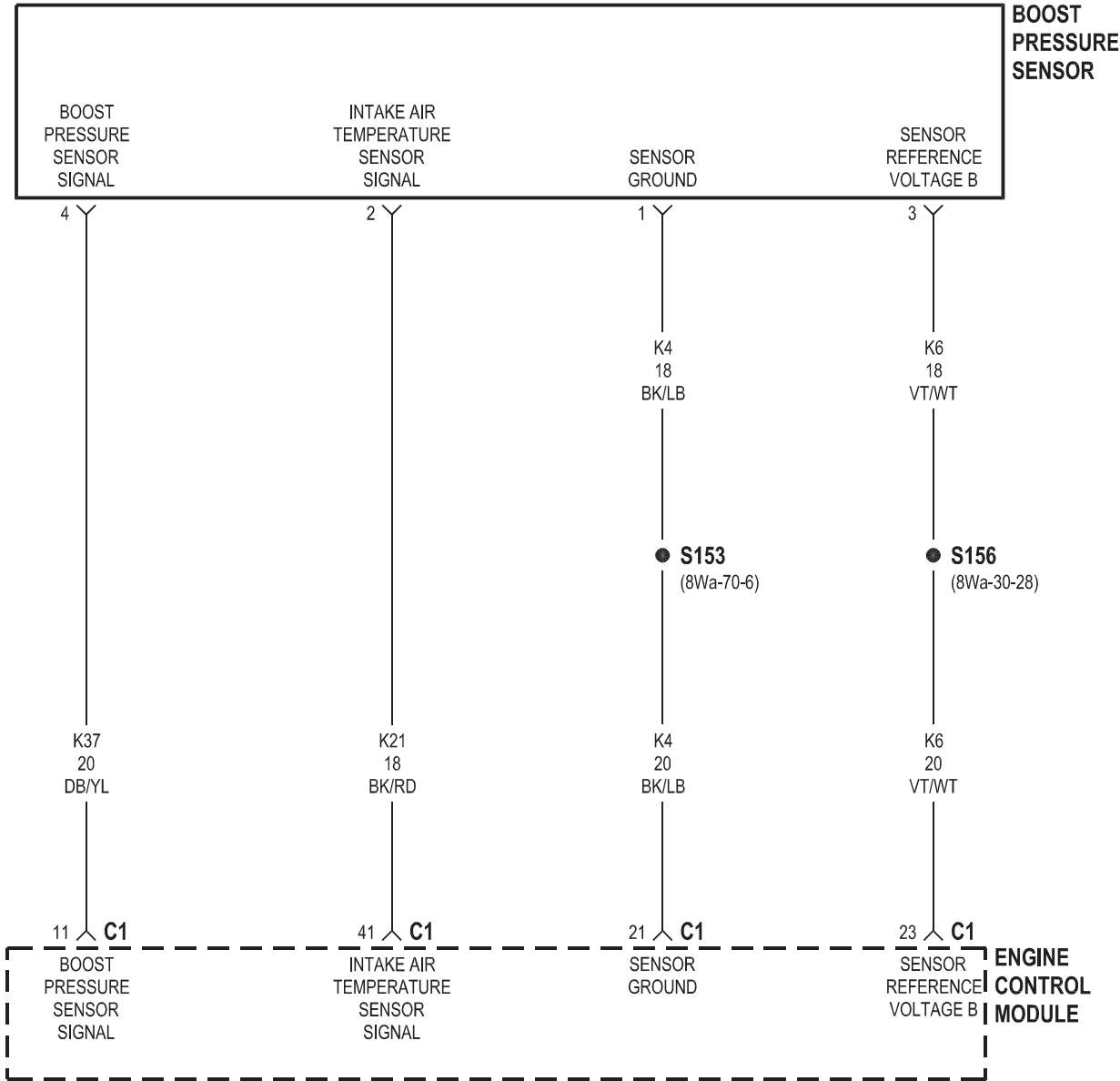


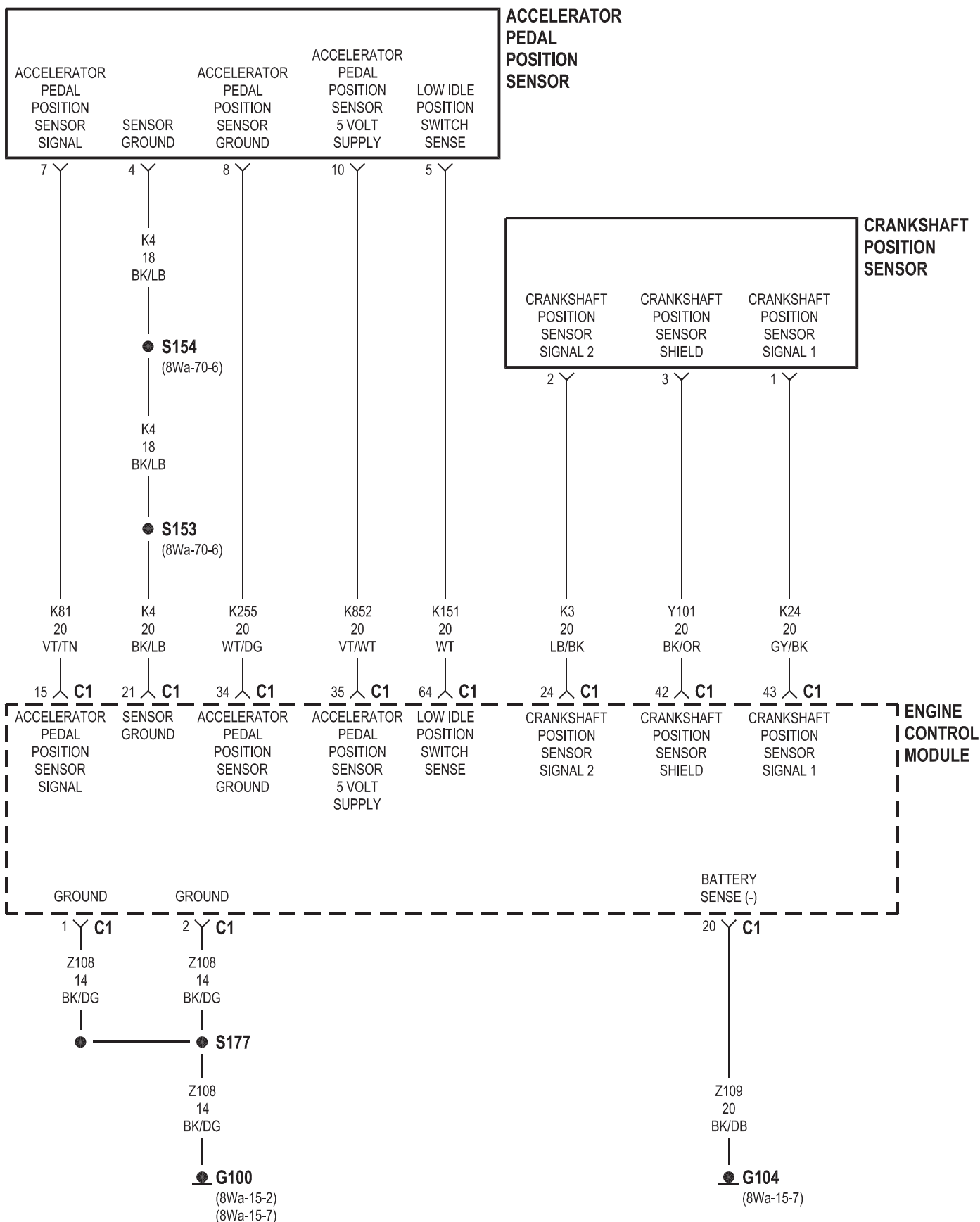


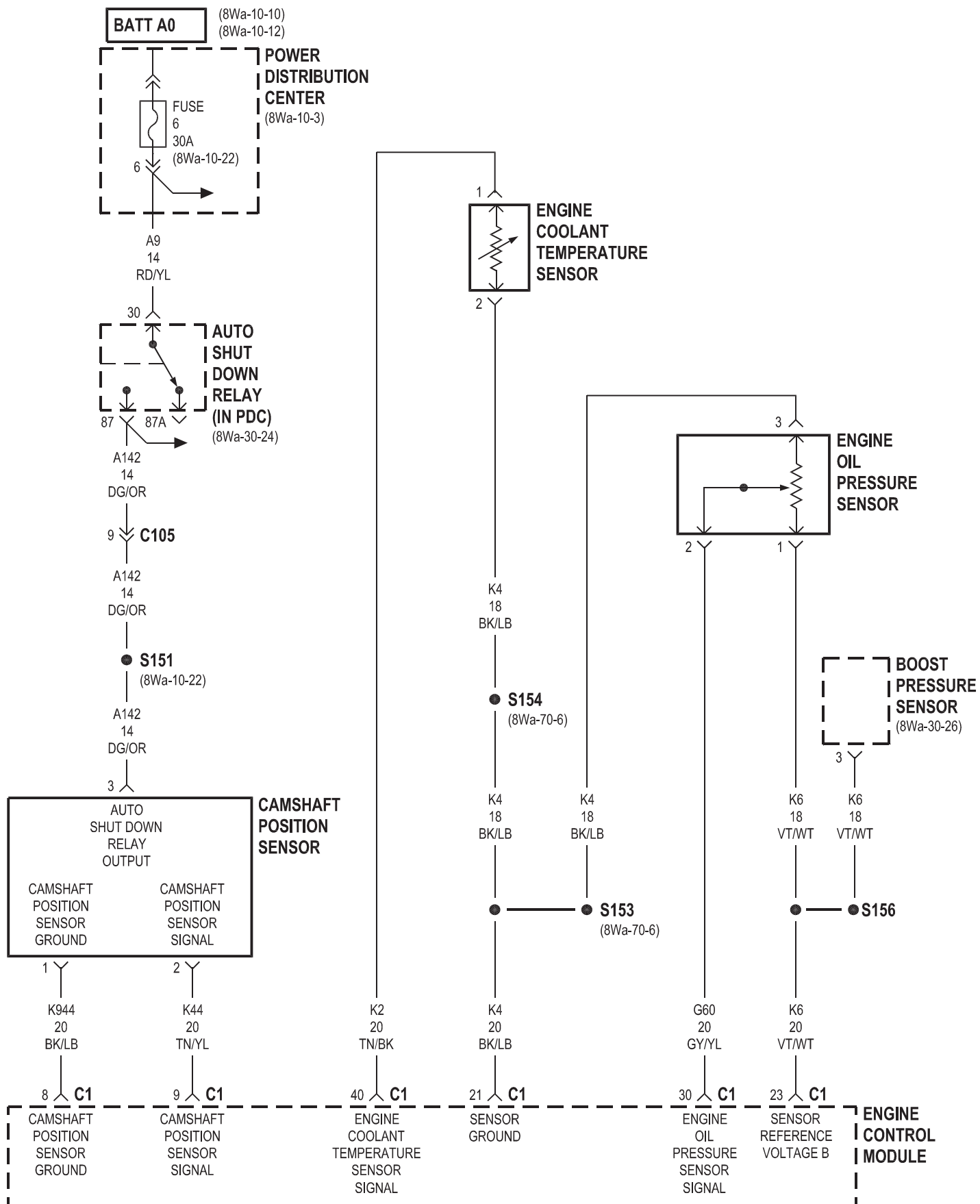
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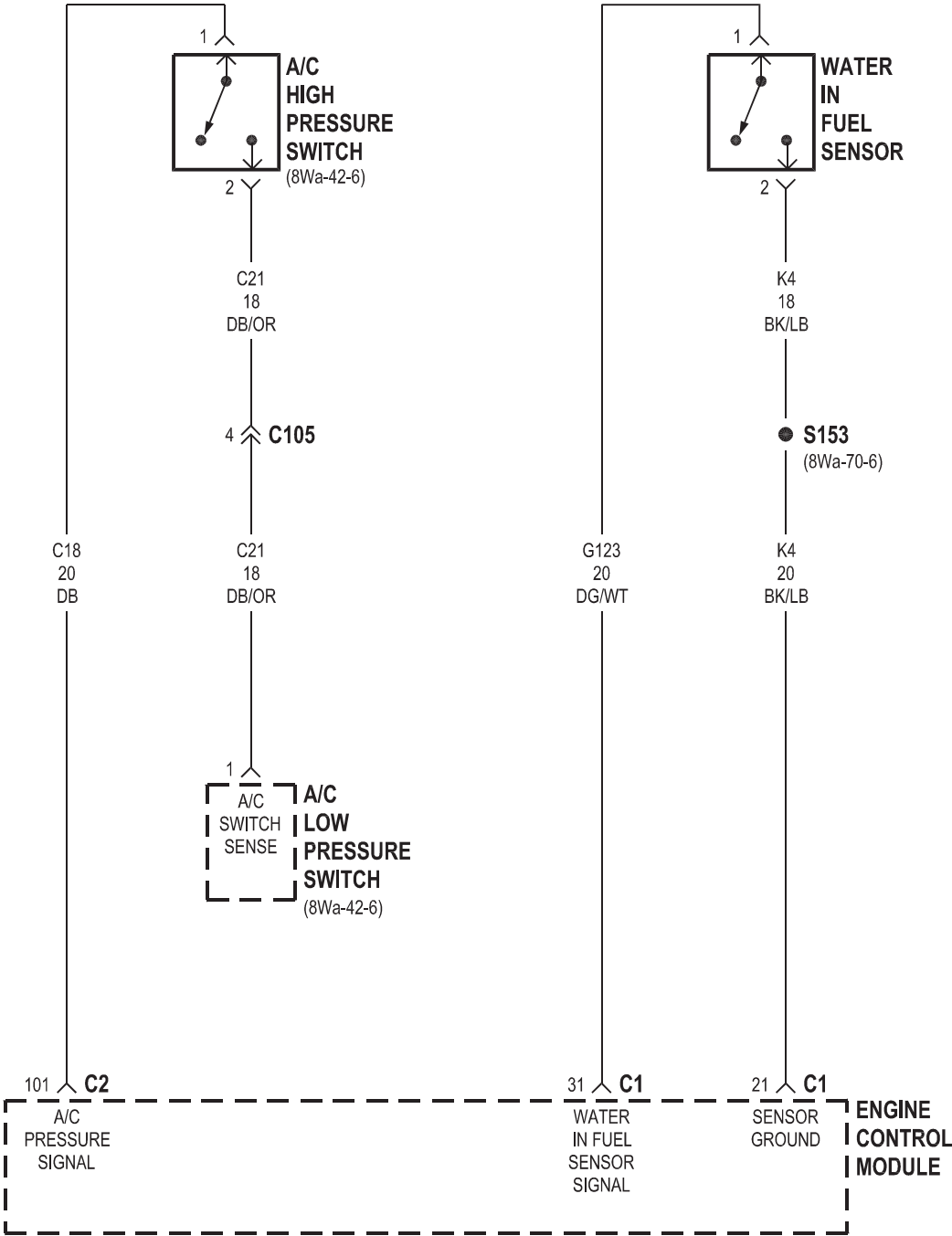


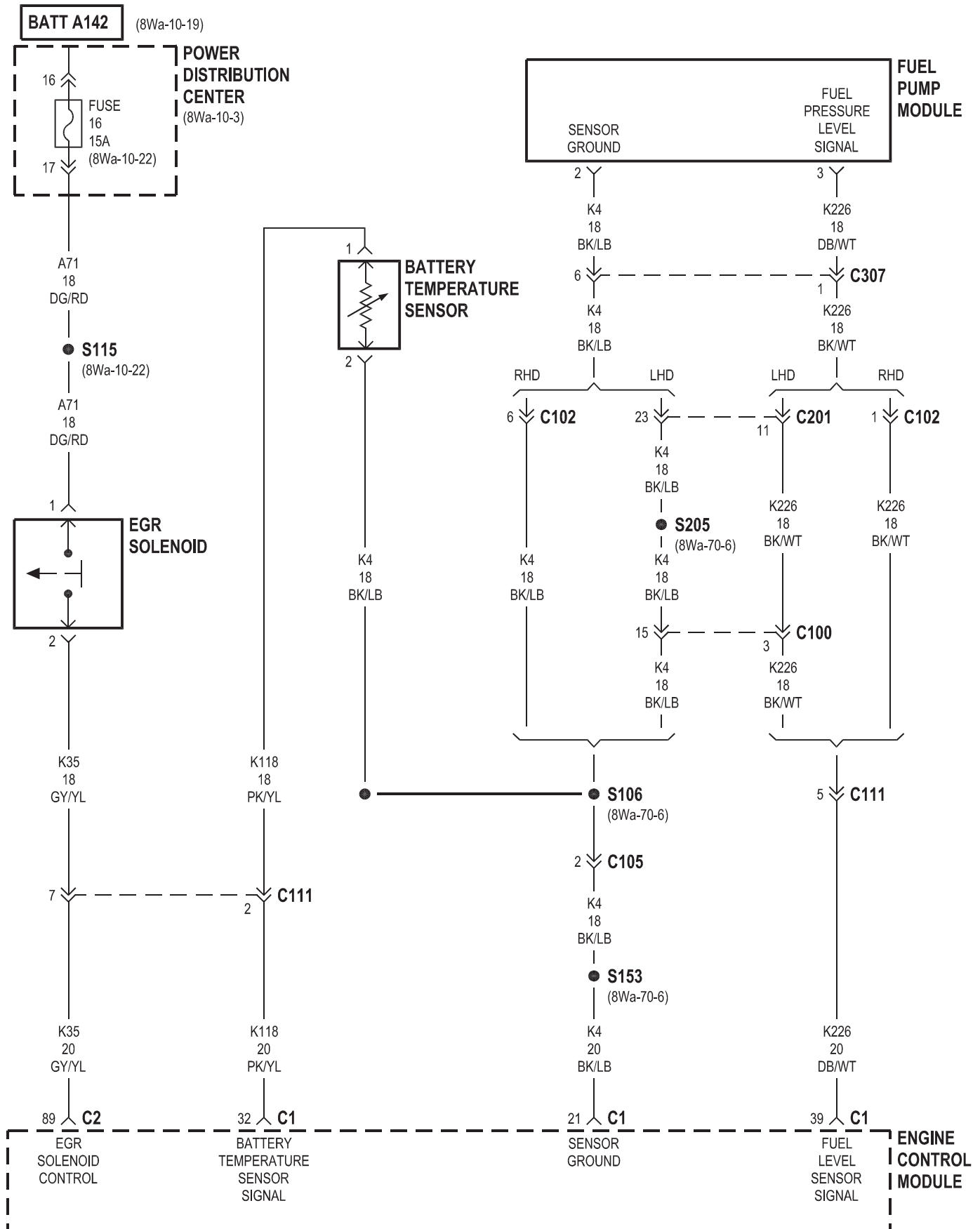


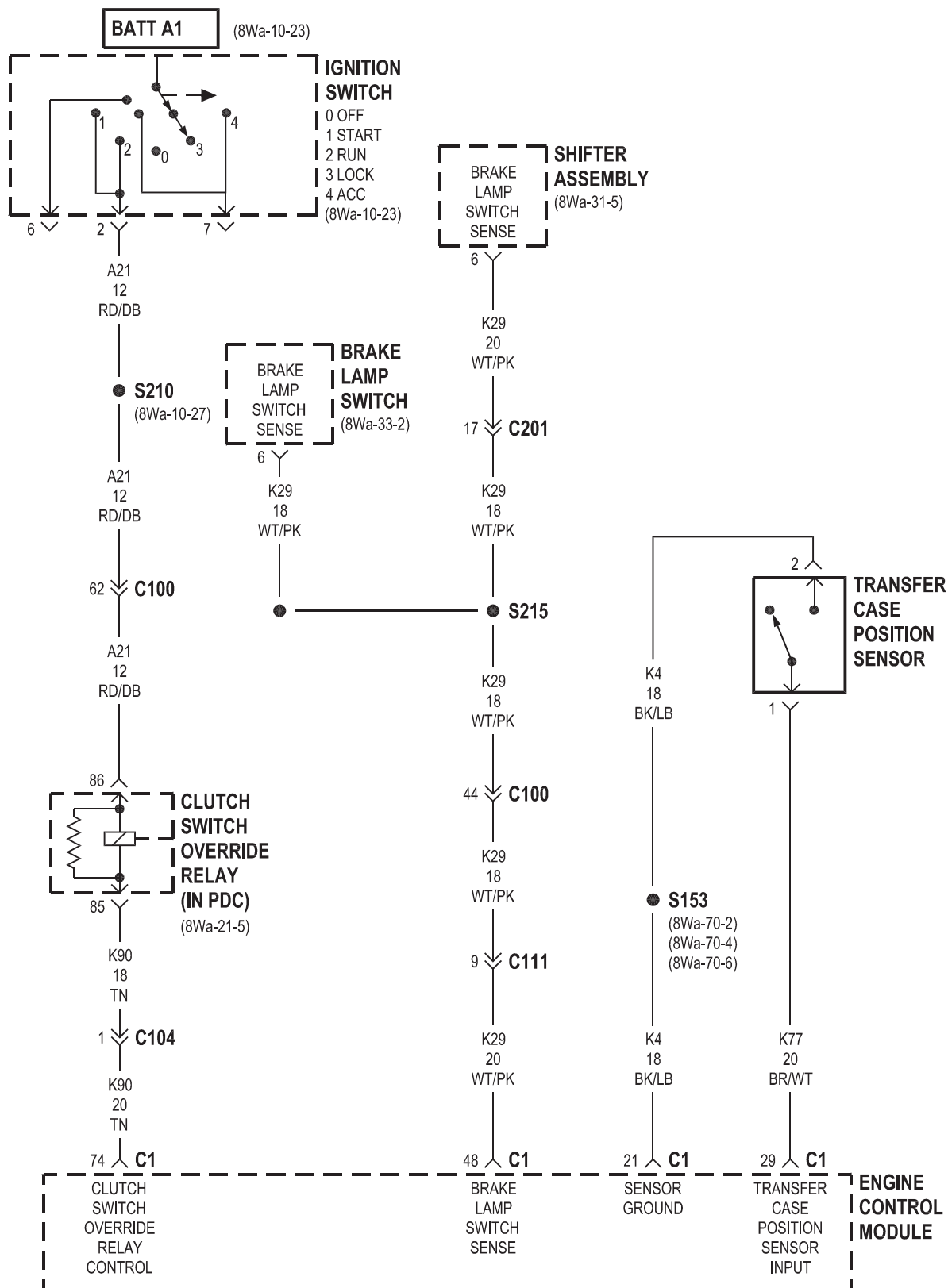


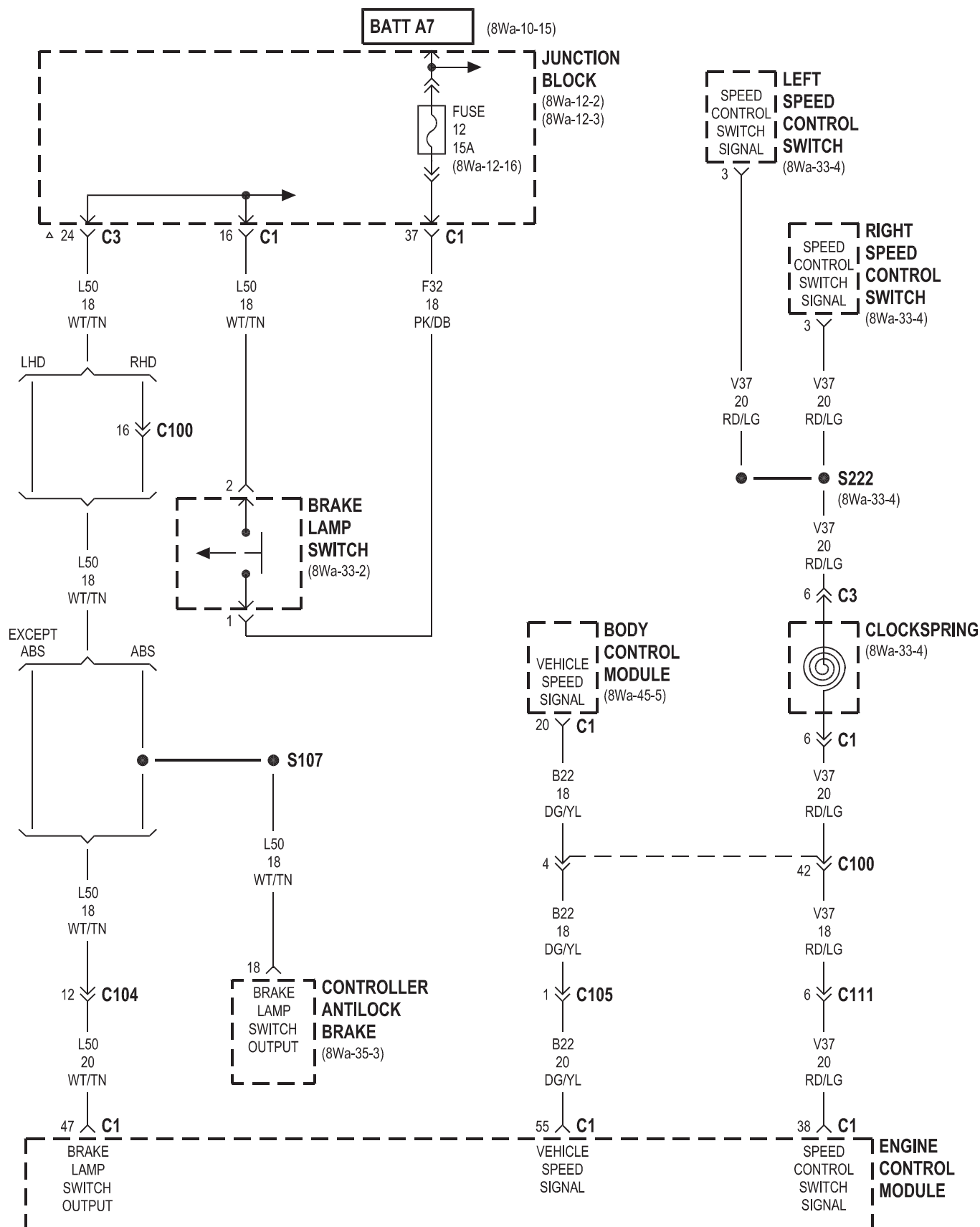


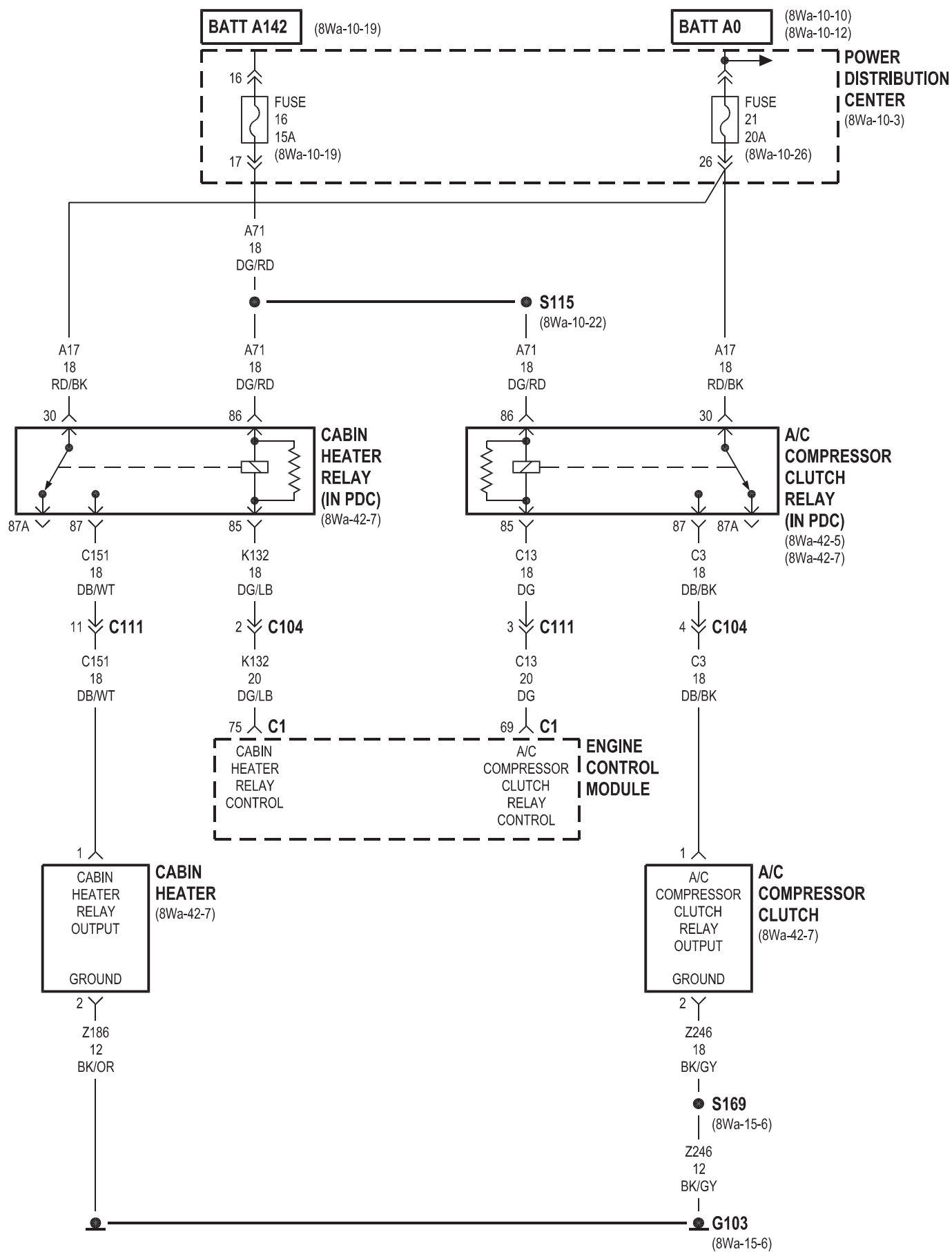


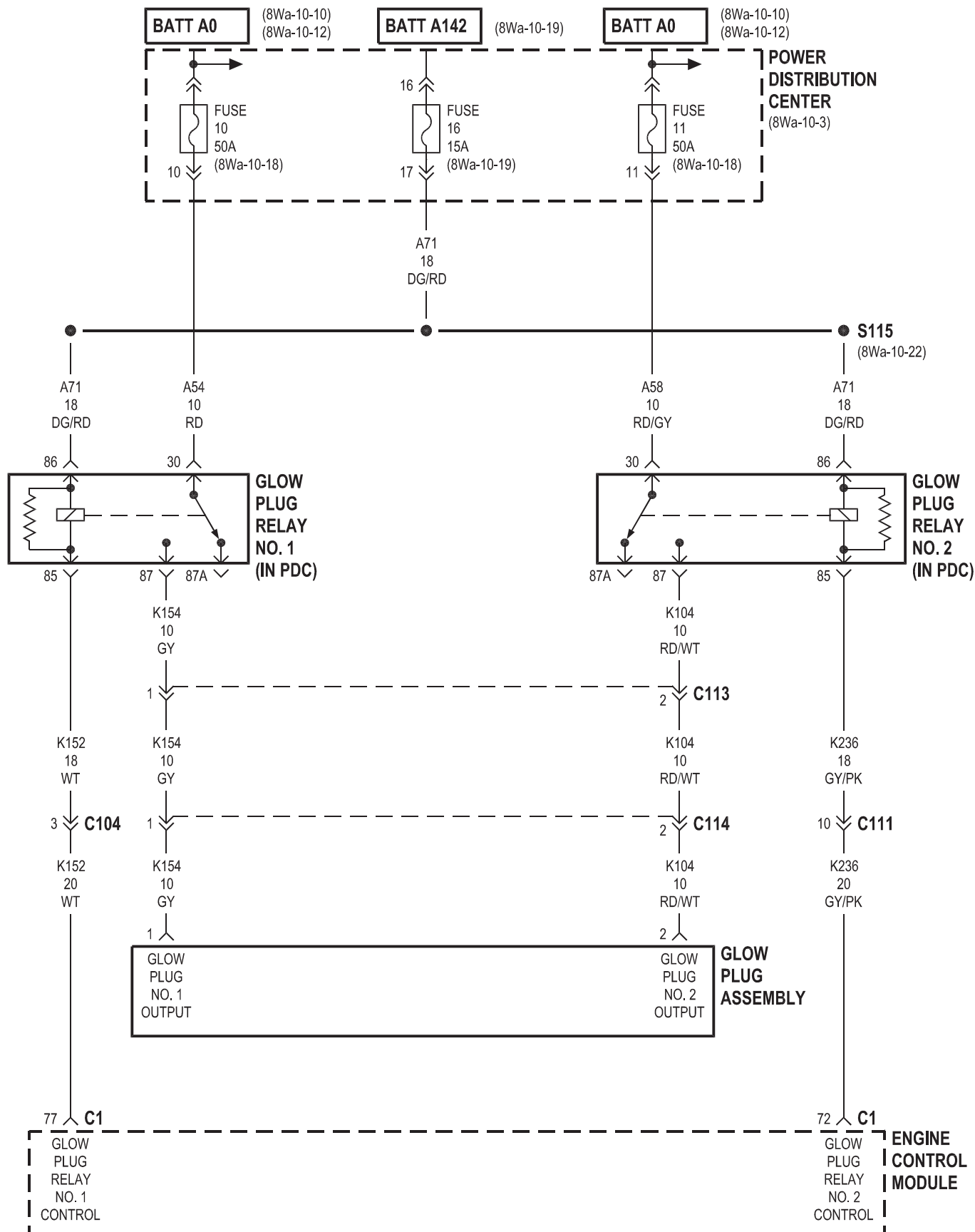


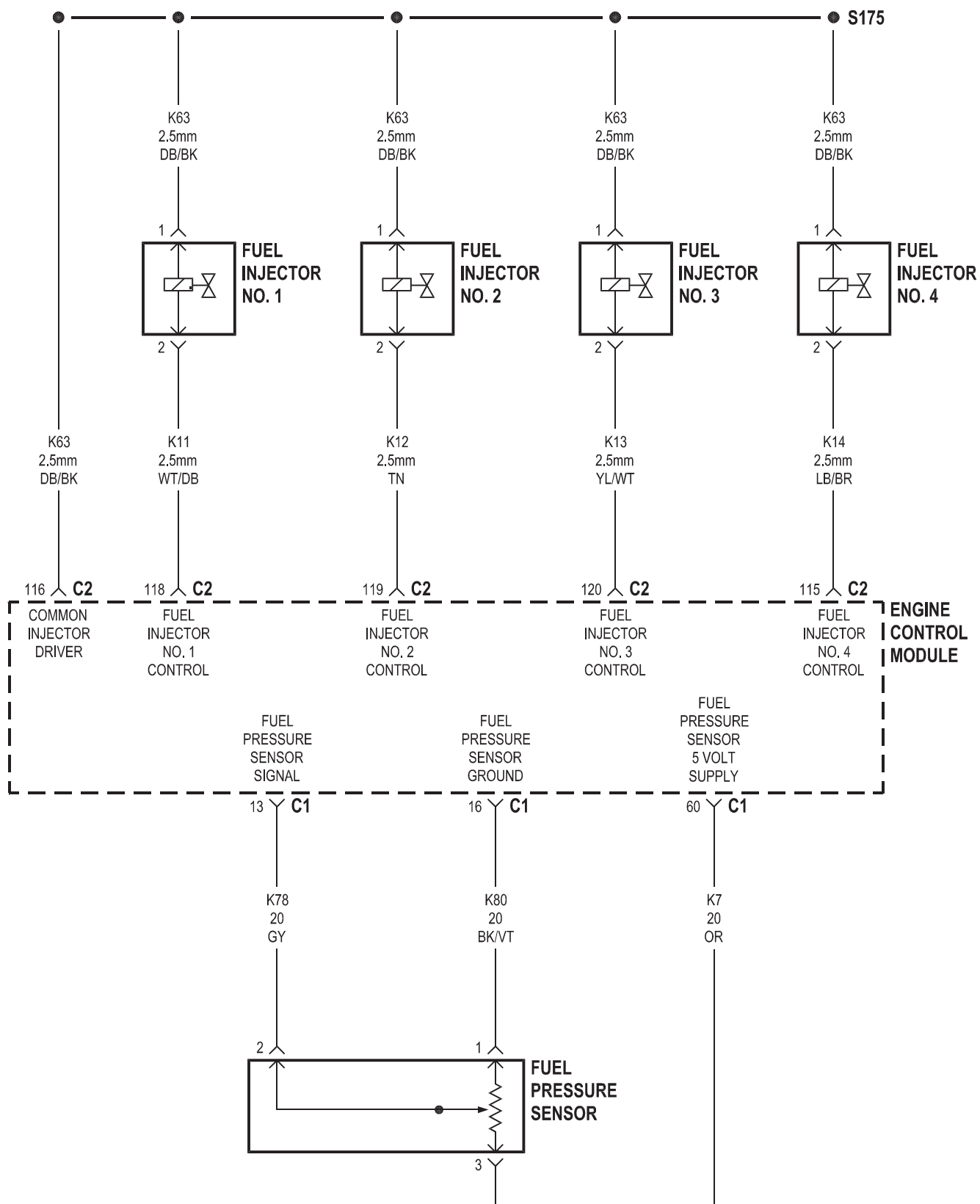






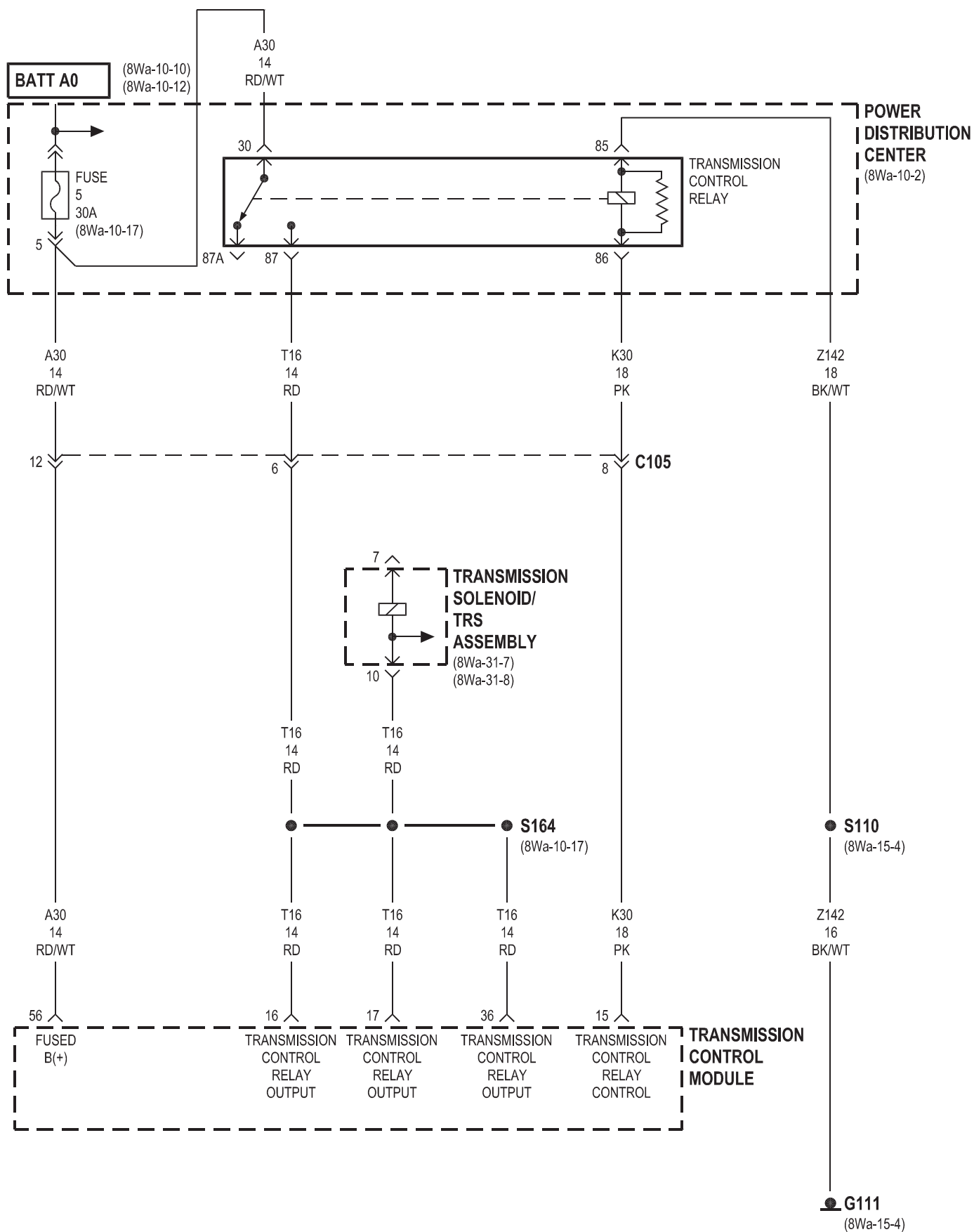


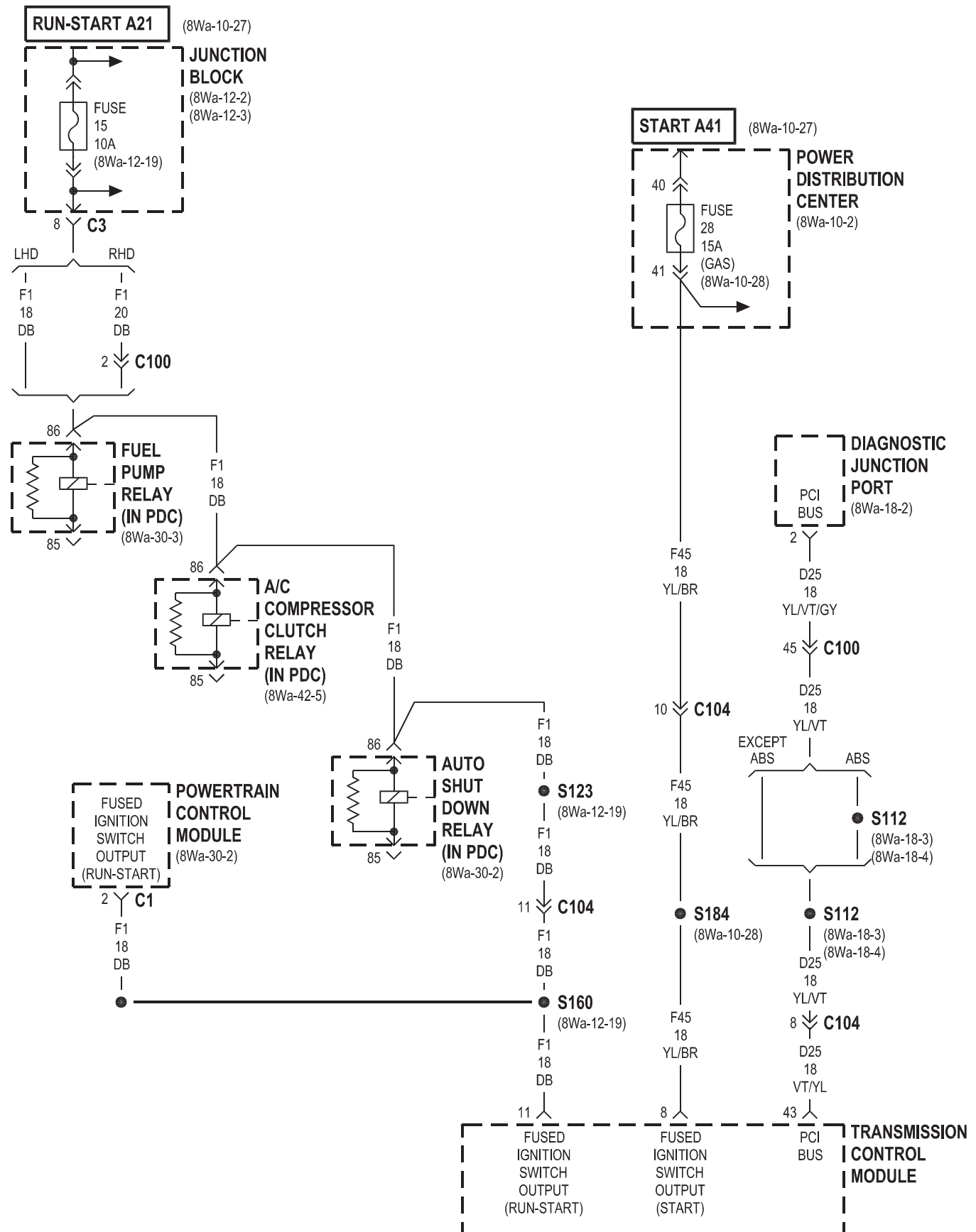


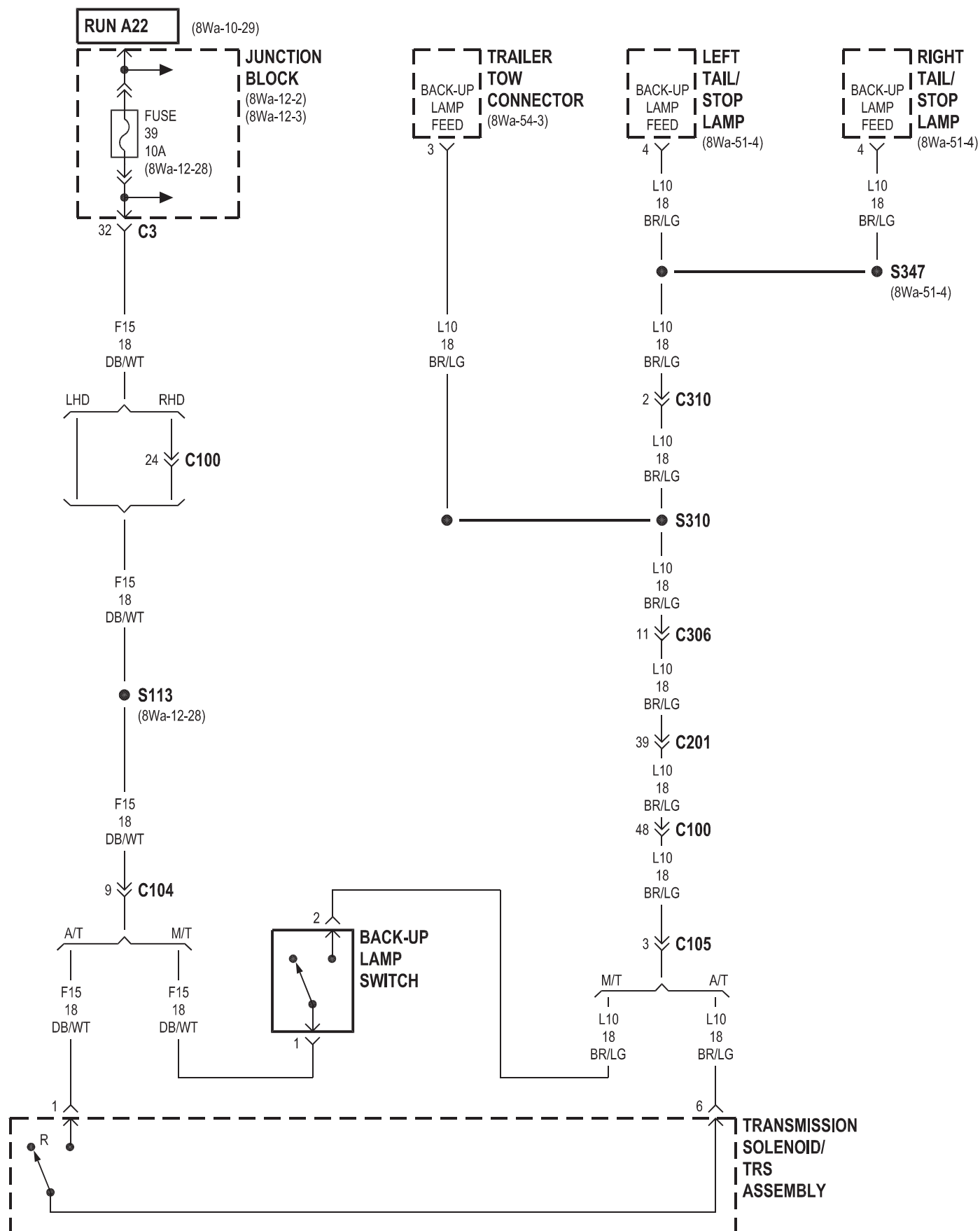


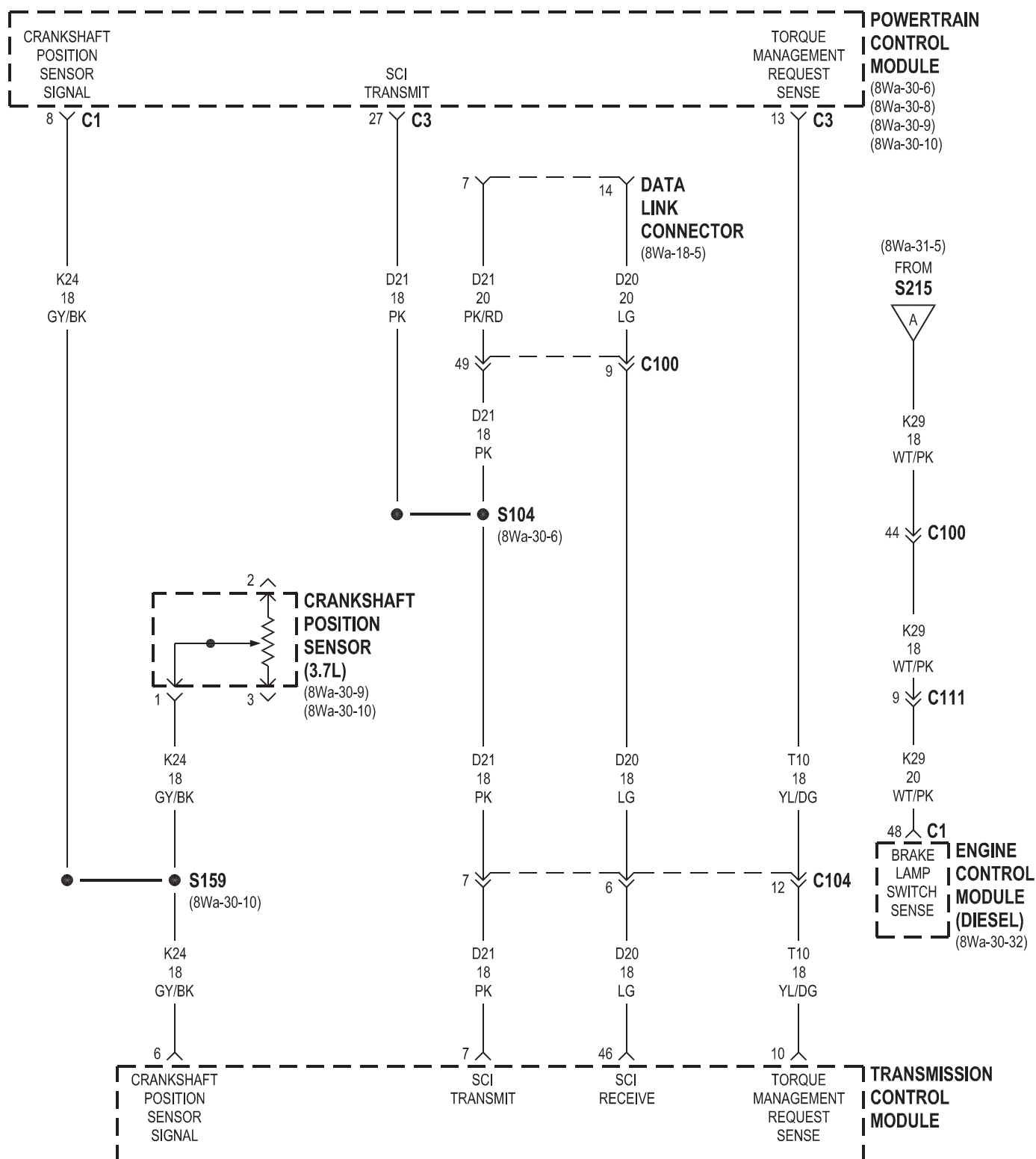
8W-31 TRANSMISSION CONTROL SYSTEM

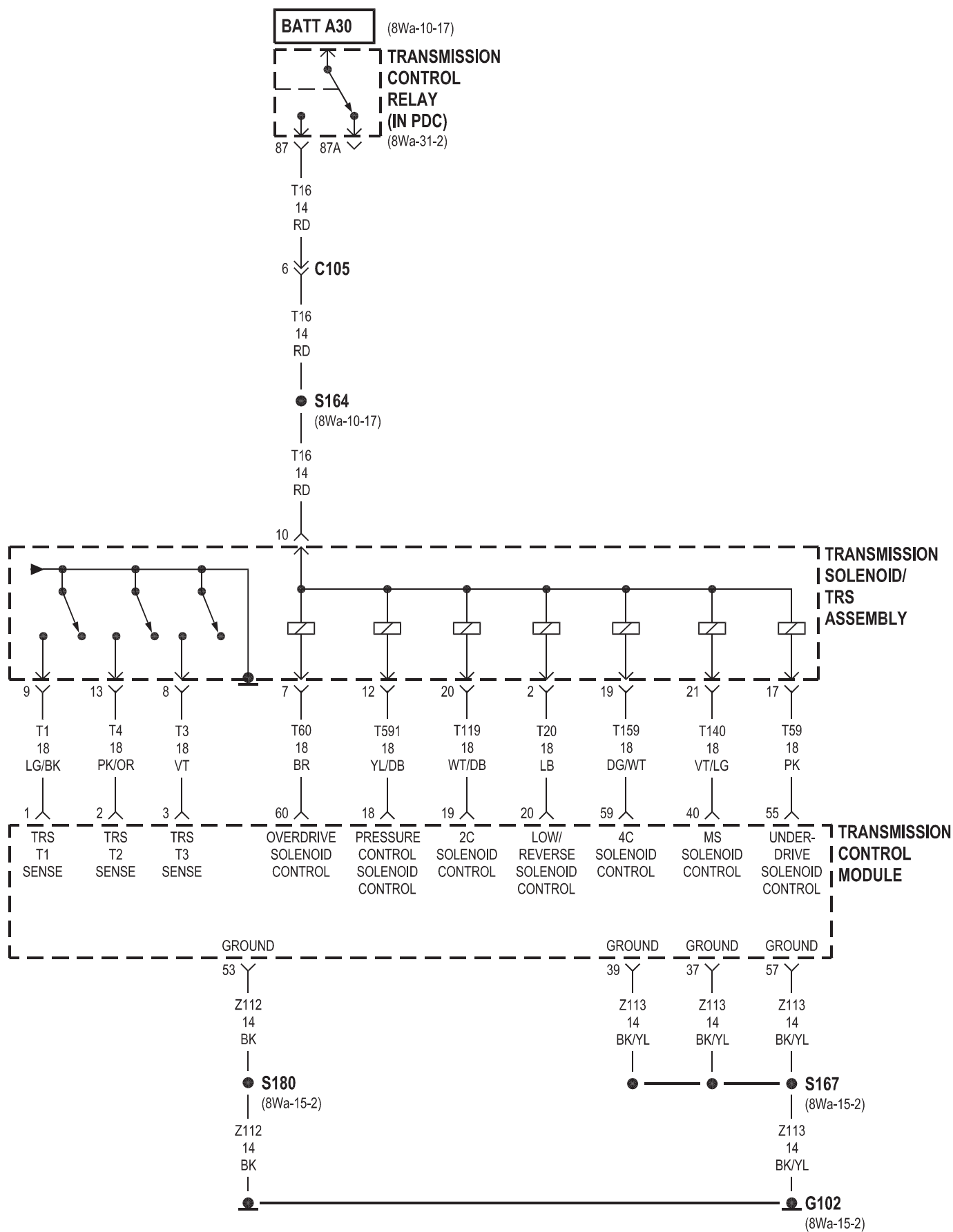
Component	Page	Component	Page
A/C Compressor Clutch Relay	8Wa-31-3	Instrument Cluster	8Wa-31-5
Auto Shut Down Relay	8Wa-31-3	Junction Block	8Wa-31-3, 4, 5
Back-Up Lamp Switch	8Wa-31-4	Left Tail/Stop Lamp	8Wa-31-4
Brake Lamp Switch	8Wa-31-5	Line Pressure Sensor	8Wa-31-9
Crankshaft Position Sensor	8Wa-31-6	Output Speed Sensor	8Wa-31-9
Data Link Connector	8Wa-31-6	Power Distribution Center	8Wa-31-2, 3
Diagnostic Junction Port	8Wa-31-3	Powertrain Control Module	8Wa-31-3, 5, 6
Engine Control Module	8Wa-31-6	Right Tail/Stop Lamp	8Wa-31-4
Fuel Pump Relay	8Wa-31-3	Shifter Assembly	8Wa-31-5
Fuse 5	8Wa-31-2	Starter Motor Relay	8Wa-31-8
Fuse 15	8Wa-31-3	Throttle Position Sensor	8Wa-31-5
Fuse 28	8Wa-31-3	Trailer Tow Connector	8Wa-31-4
Fuse 38	8Wa-31-5	Transfer Case Position Sensor	8Wa-31-5
Fuse 39	8Wa-31-4	Transmission Control Module	8Wa-31-2, 3, 5, 6, 7, 8, 9
G102	8Wa-31-7, 9	Transmission Control Relay	8Wa-31-2, 7, 8
G111	8Wa-31-2	Transmission Solenoid/Trs Assembly	8Wa-31-2, 4, 7, 8, 9
G301	8Wa-31-5		
Input Speed Sensor	8Wa-31-9		

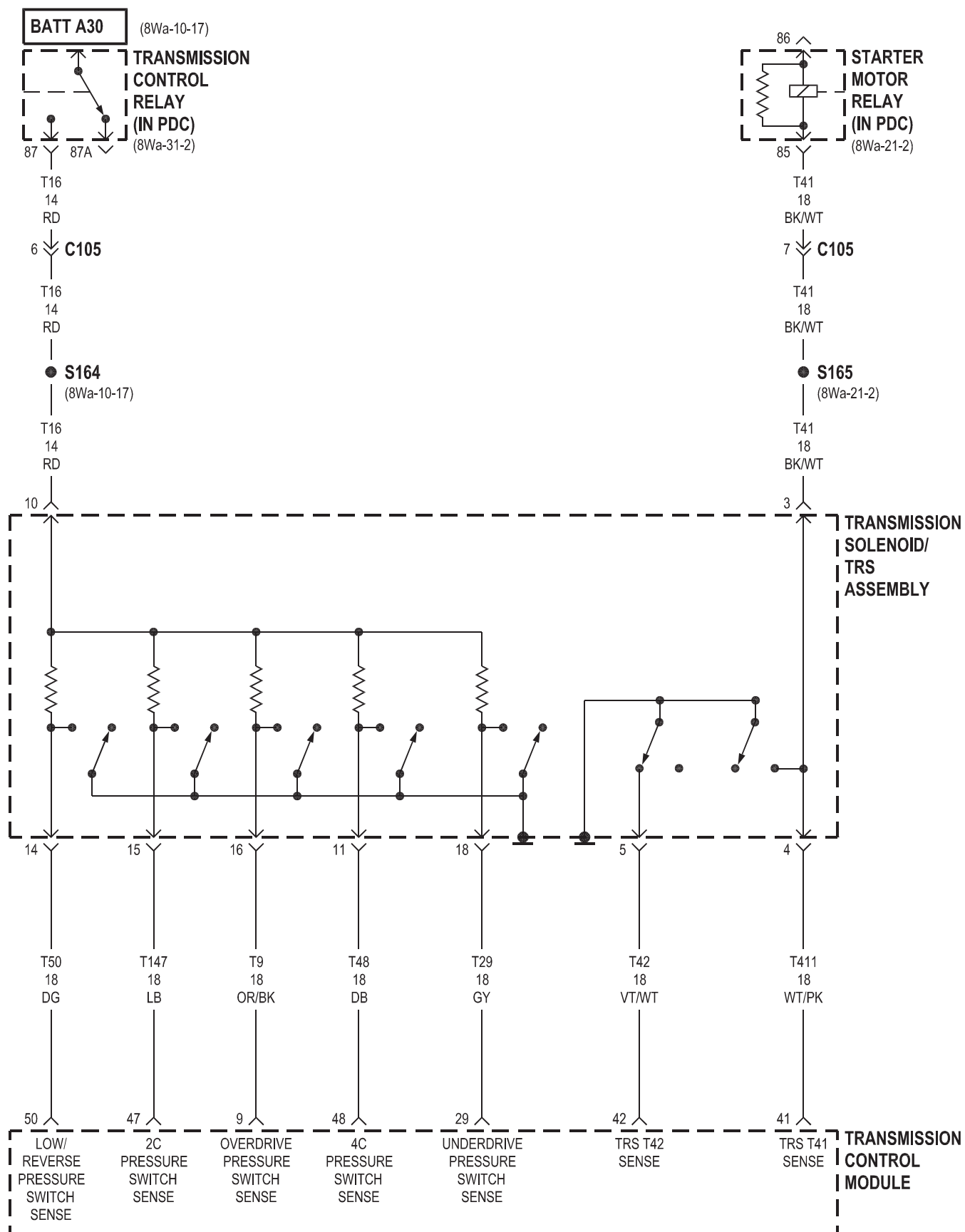


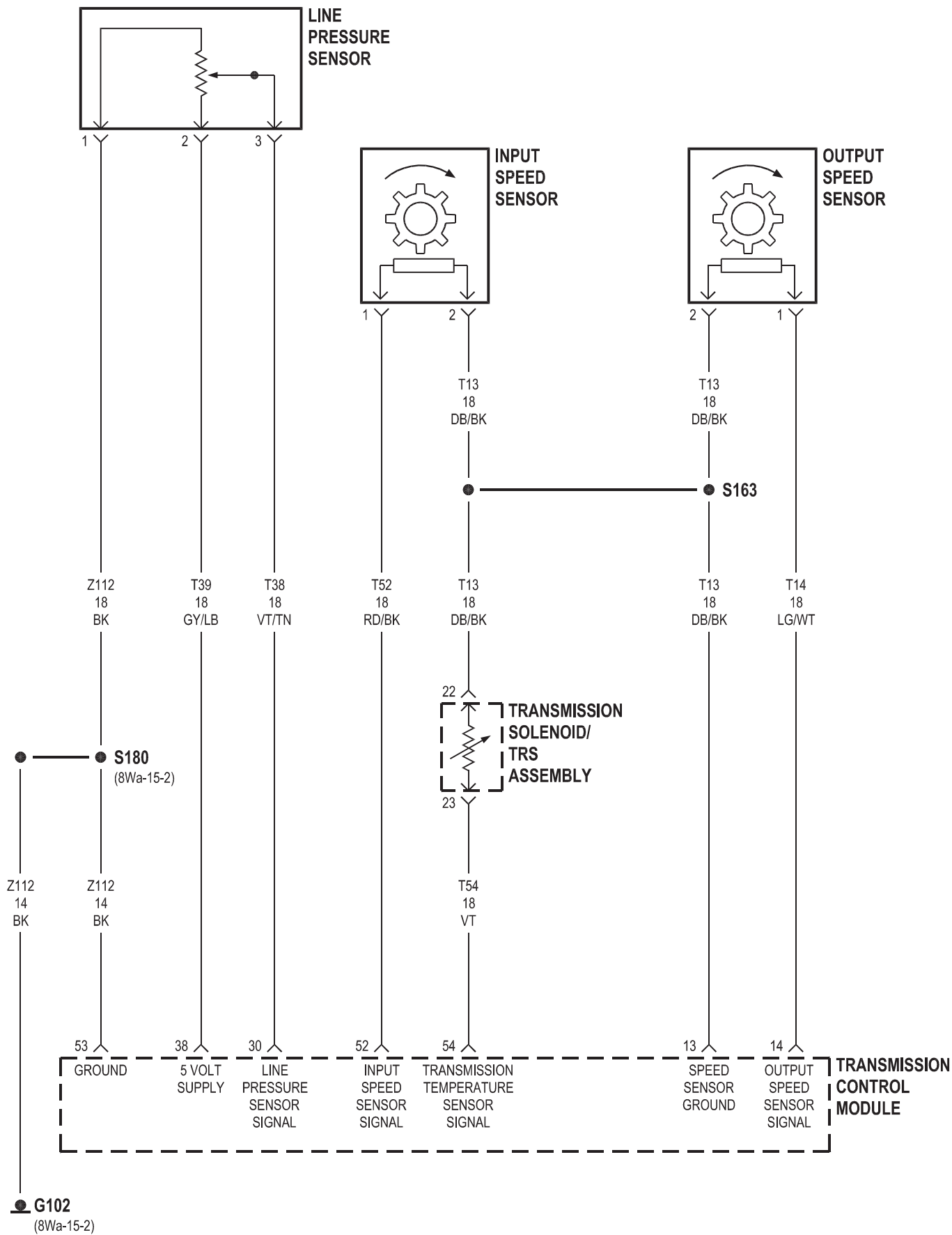






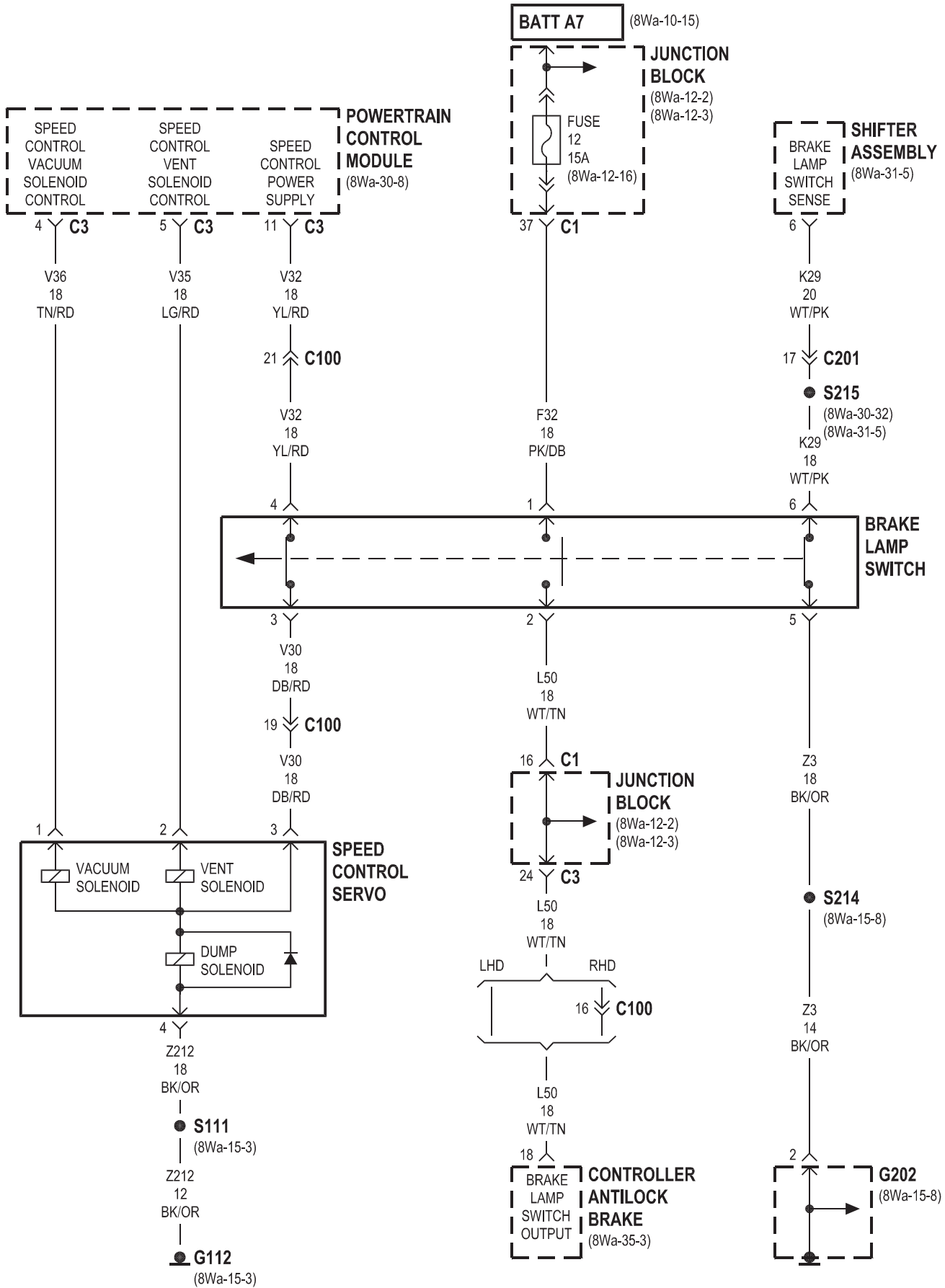




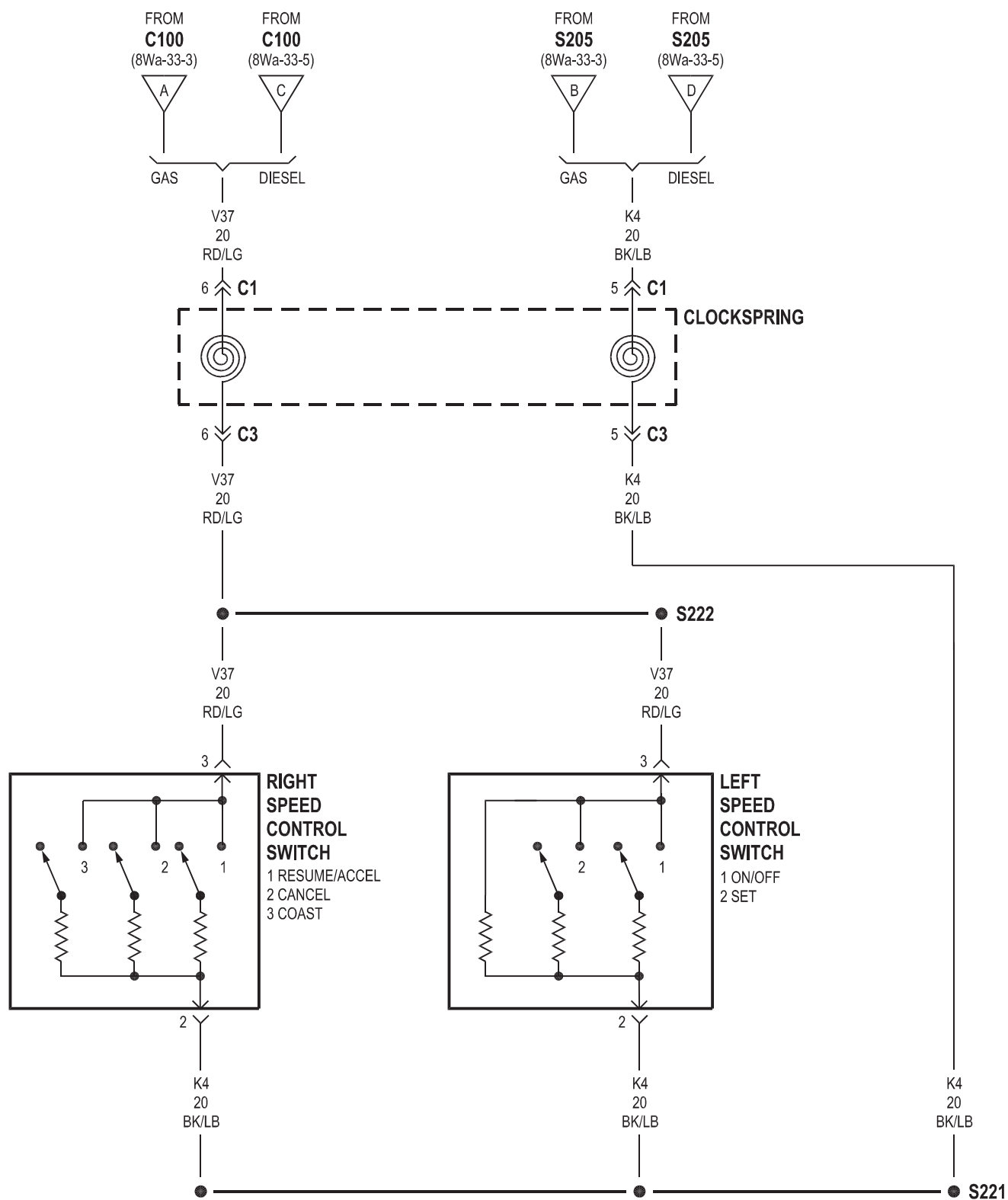


8W-33 VEHICLE SPEED CONTROL

Component	Page	Component	Page
Body Control Module	8Wa-33-5	G202	8Wa-33-2
Brake Lamp Switch	8Wa-33-2	Junction Block	8Wa-33-2
Clockspring	8Wa-33-3, 4, 5	Left Speed Control Switch	8Wa-33-4
Controller Antilock Brake	8Wa-33-2	Powertrain Control Module	8Wa-33-2, 3
Engine Control Module	8Wa-33-5	Right Speed Control Switch	8Wa-33-4
Fuse 12	8Wa-33-2	Shifter Assembly	8Wa-33-2
G112	8Wa-33-2	Speed Control Servo	8Wa-33-2

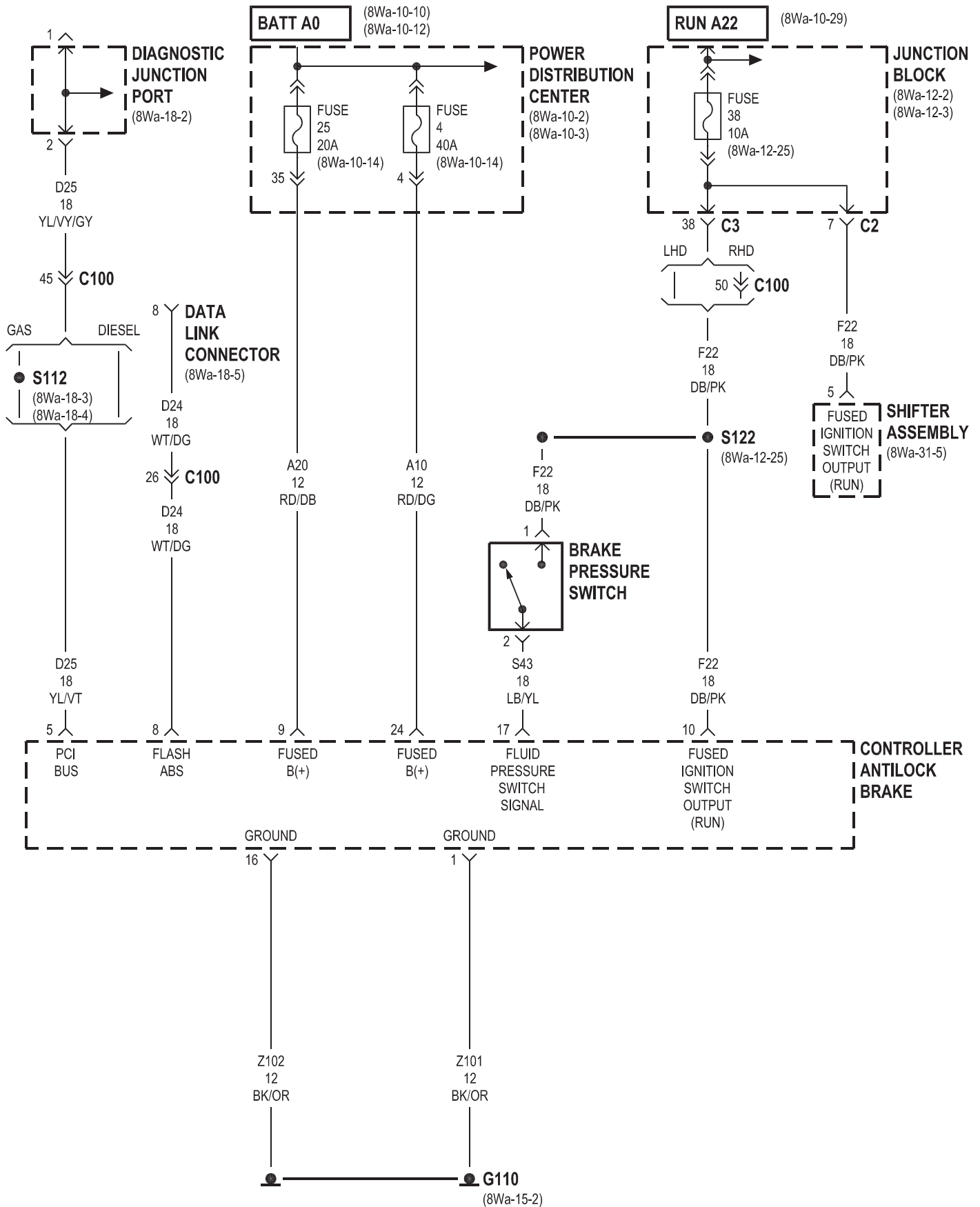


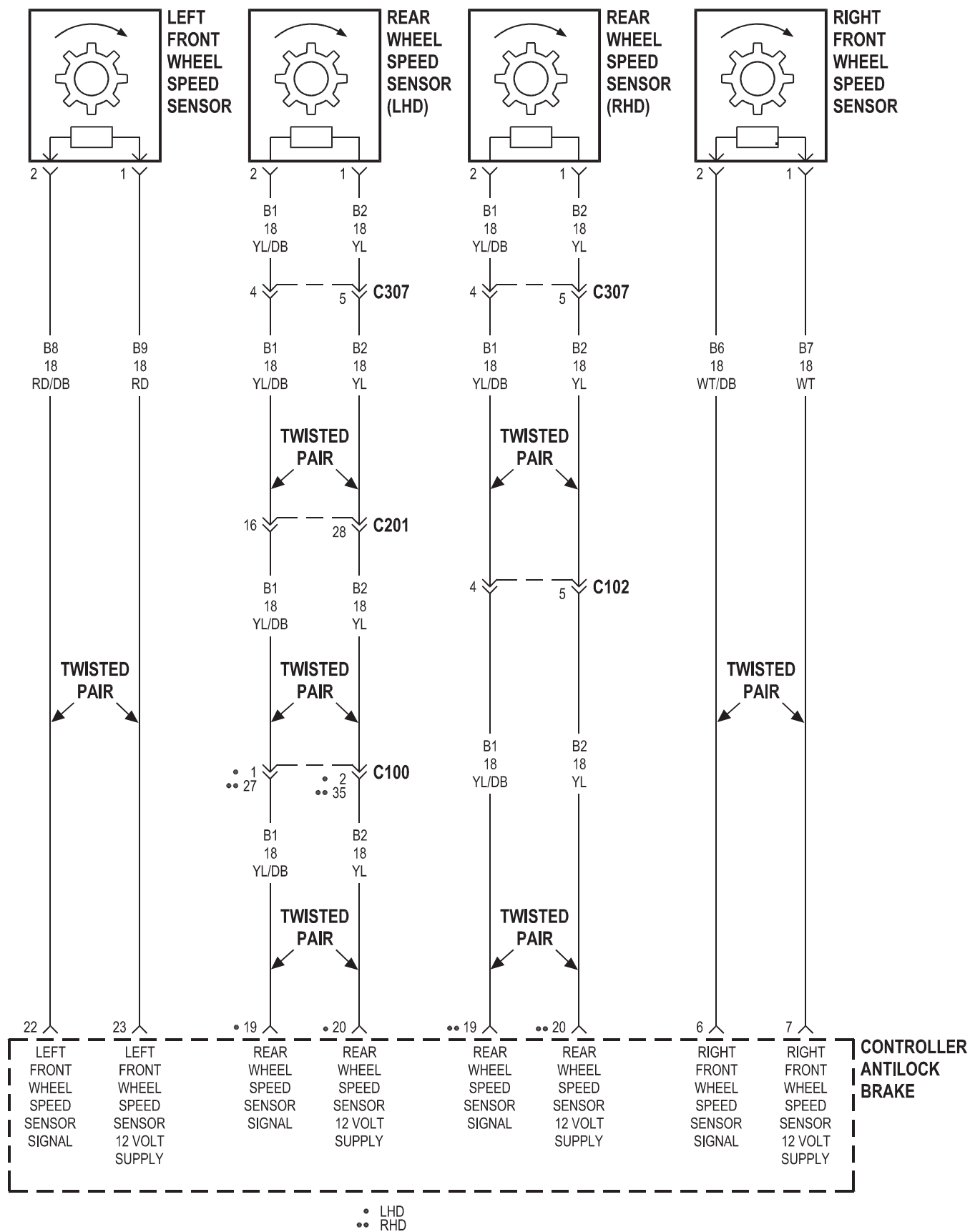




8W-35 ANTILOCK BRAKES

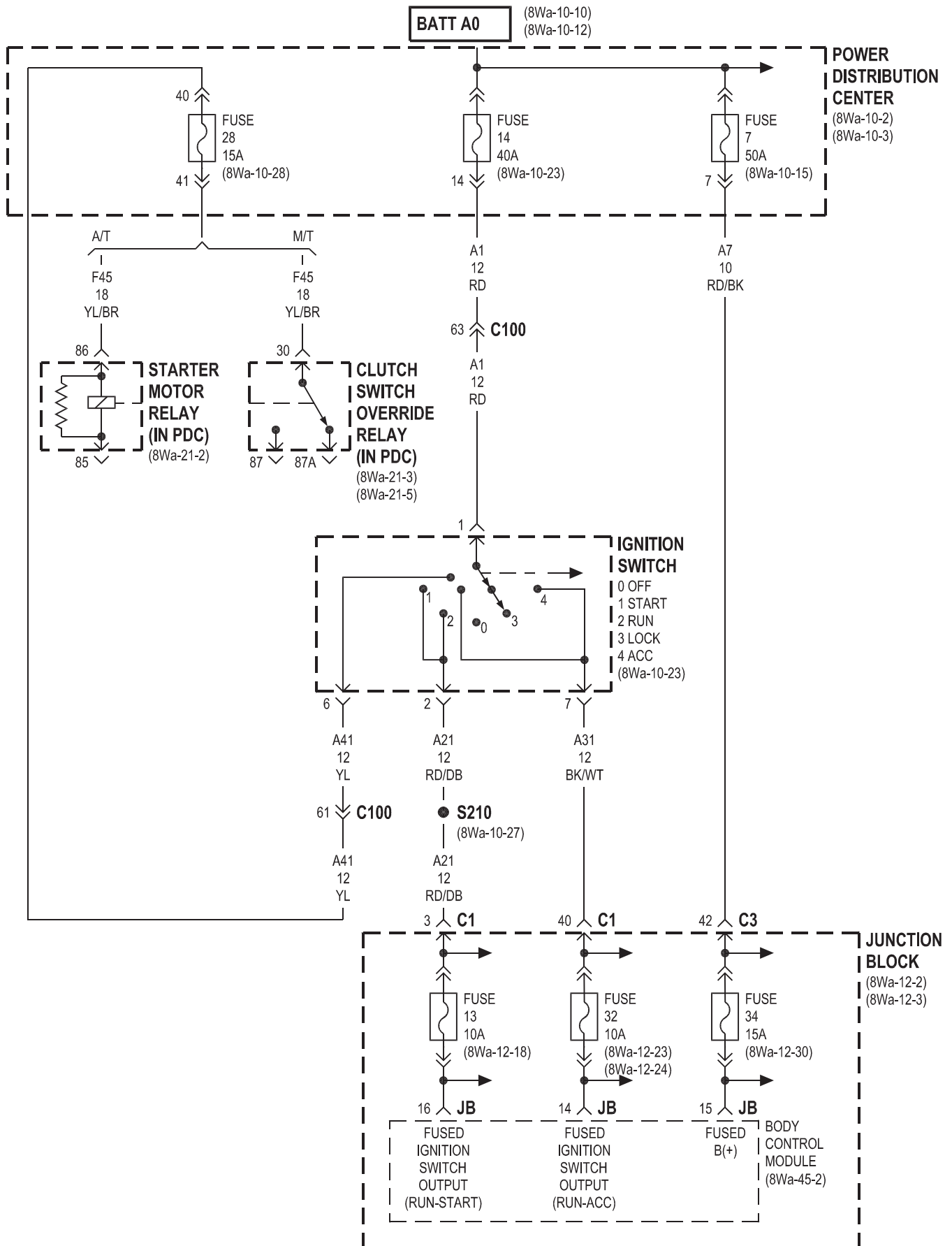
Component	Page	Component	Page
Body Control Module	8Wa-35-3	G110	8Wa-35-2
Brake Lamp Switch	8Wa-35-3	Junction Block	8Wa-35-2, 3
Brake Pressure Switch	8Wa-35-2	Left Front Wheel Speed Sensor	8Wa-35-4
Controller Antilock Brake	8Wa-35-2, 3, 4	Power Distribution Center	8Wa-35-2
Data Link Connector	8Wa-35-2	Powertrain Control Module	8Wa-35-3
Diagnostic Junction Port	8Wa-35-2	Rear Wheel Speed Sensor	8Wa-35-4
Fuse 4	8Wa-35-2	Right Front Wheel Speed Sensor	8Wa-35-4
Fuse 12	8Wa-35-3	Shifter Assembly	8Wa-35-2, 3
Fuse 25	8Wa-35-2	Speed Control Servo	8Wa-35-3
Fuse 38	8Wa-35-2		

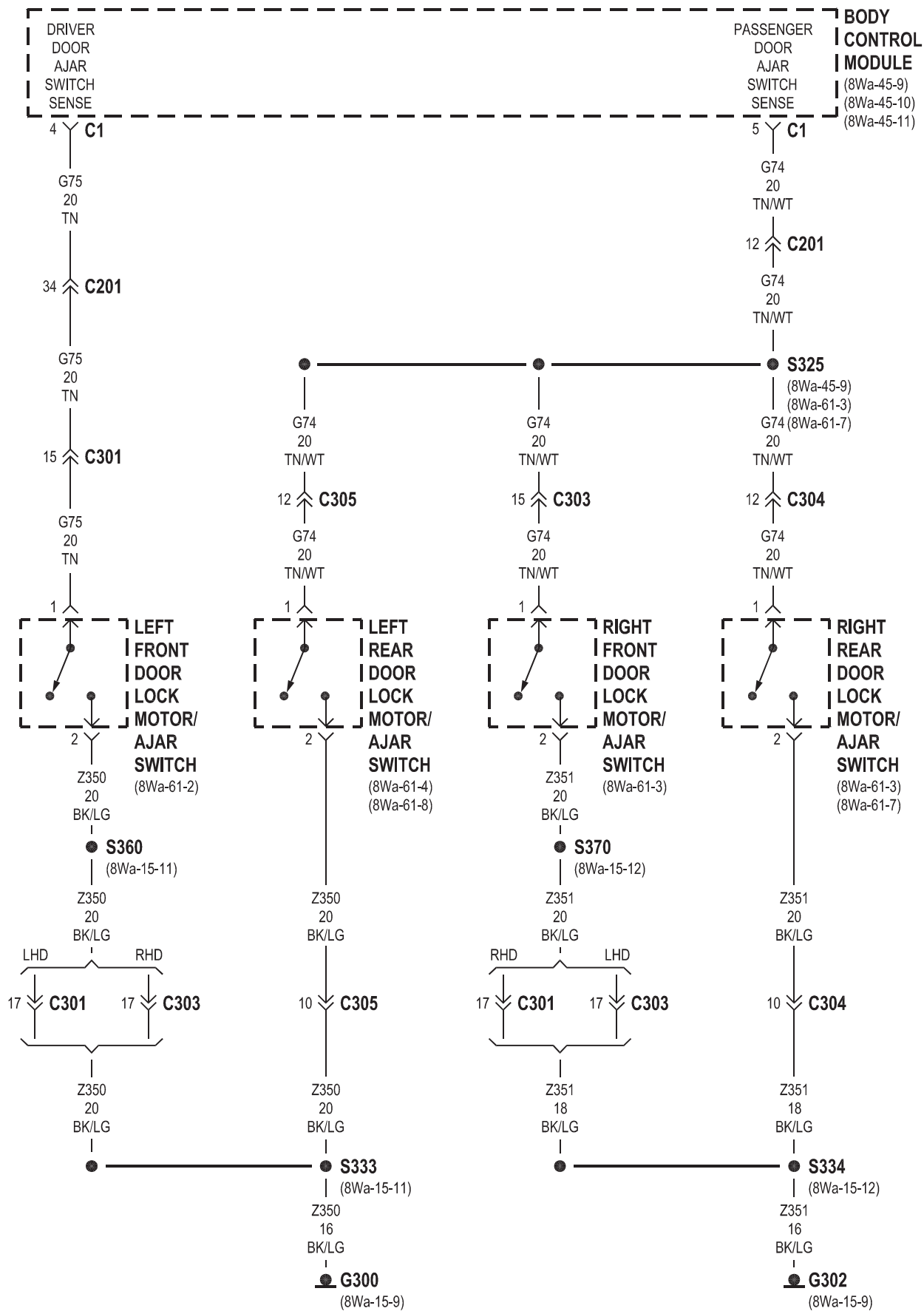


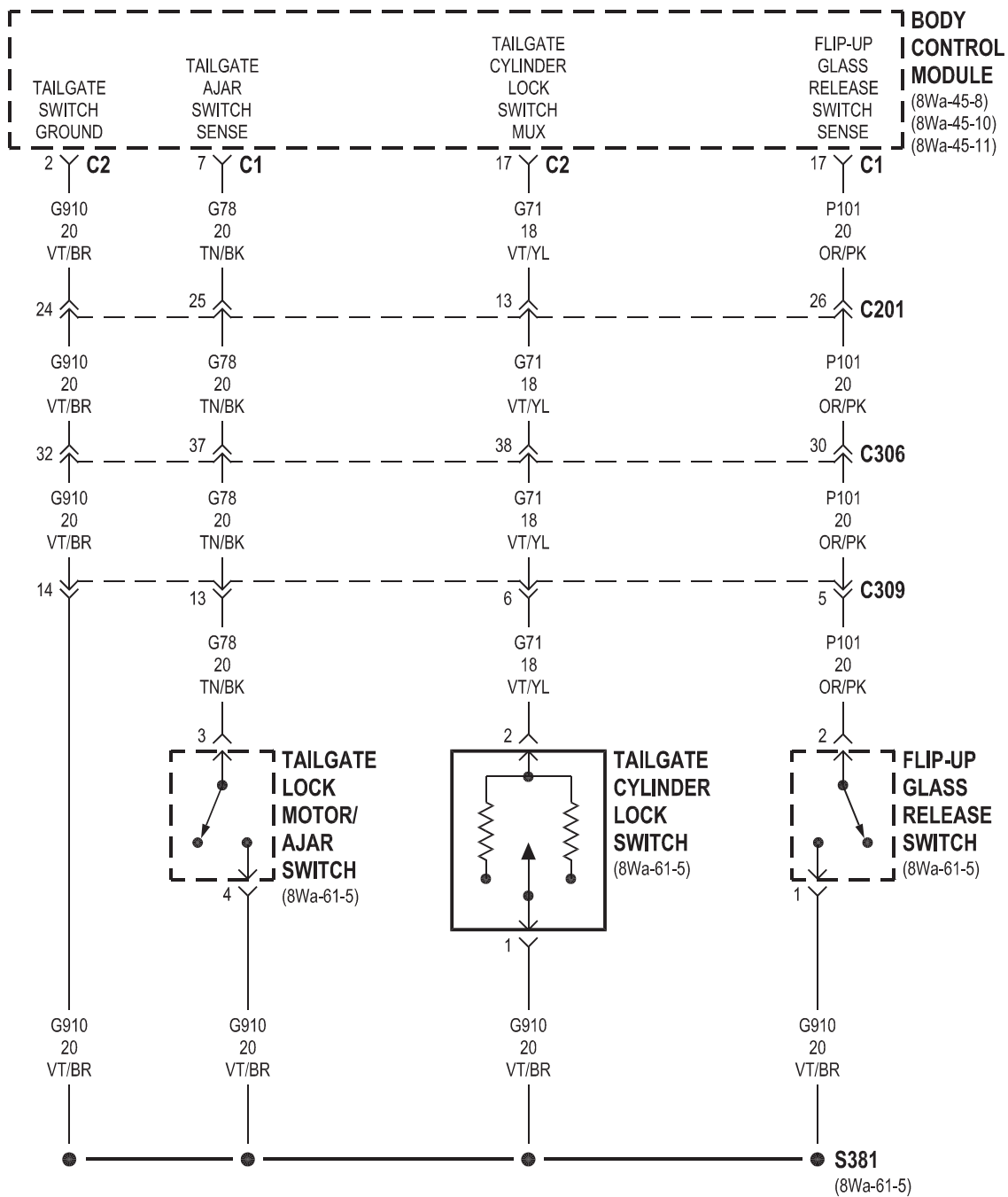


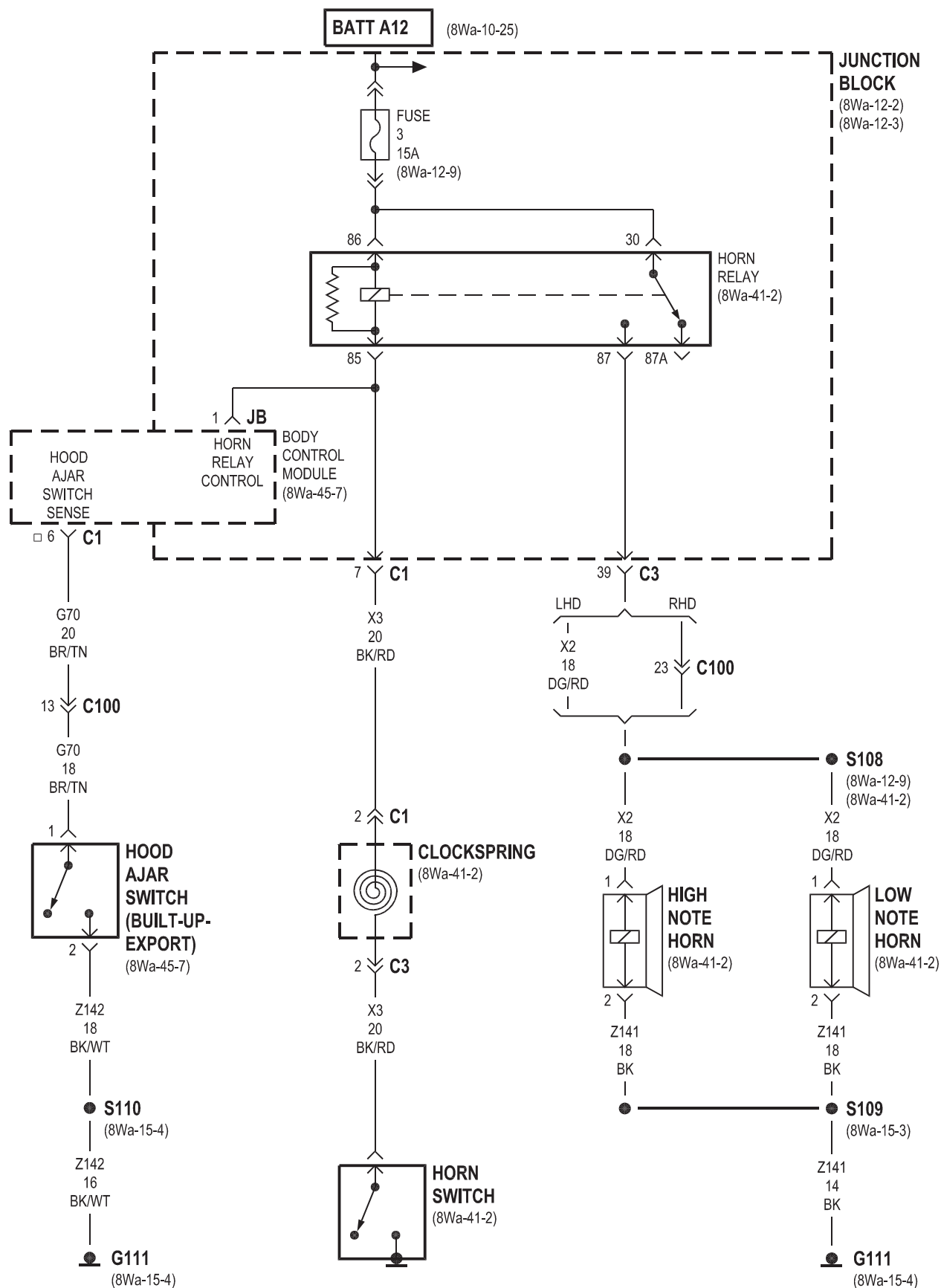
8W-39 VEHICLE THEFT SECURITY SYSTEM

Component	Page	Component	Page
Body Control Module	8Wa-39-2, 3, 4, 5, 9	Hood Ajar Switch	8Wa-39-5
Clockspring	8Wa-39-5	Horn Relay	8Wa-39-5
Clutch Switch Override Relay	8Wa-39-2	Horn Switch	8Wa-39-5
Compass Mini-Trip Computer	8Wa-39-8	Ignition Switch	8Wa-39-2
Diagnostic Junction Port	8Wa-39-6, 8	Intrusion Sensor	8Wa-39-7, 8
Flip-Up Glass Release Switch	8Wa-39-4	Junction Block	8Wa-39-2, 5, 6, 7, 8, 9
Fuse 3	8Wa-39-5	Left Cylinder Lock Switch	8Wa-39-9
Fuse 7	8Wa-39-2	Left Door Lock Switch	8Wa-39-9
Fuse 13	8Wa-39-2, 8	Left Front Door Lock Motor/Ajar Switch . .	8Wa-39-3
Fuse 14	8Wa-39-2	Left Rear Door Lock Motor/Ajar Switch . .	8Wa-39-3
Fuse 15	8Wa-39-6	Low Note Horn	8Wa-39-5
Fuse 28	8Wa-39-2	Power Distribution Center	8Wa-39-2
Fuse 32	8Wa-39-2	Right Cylinder Lock Switch	8Wa-39-9
Fuse 33	8Wa-39-6	Right Door Lock Switch	8Wa-39-9
Fuse 34	8Wa-39-2, 7, 8	Right Front Door Lock Motor/Ajar Switch .	8Wa-39-3
G111	8Wa-39-5, 7	Right Rear Door Lock Motor/Ajar Switch .	8Wa-39-3
G202	8Wa-39-6	Sentry Key Immobilizer Module	8Wa-39-6
G300	8Wa-39-3	Siren	8Wa-39-7
G302	8Wa-39-3	Starter Motor Relay	8Wa-39-2
G311	8Wa-39-8	Tailgate Cylinder Lock Switch	8Wa-39-4
High Note Horn	8Wa-39-5	Tailgate Lock Motor/Ajar Switch	8Wa-39-4

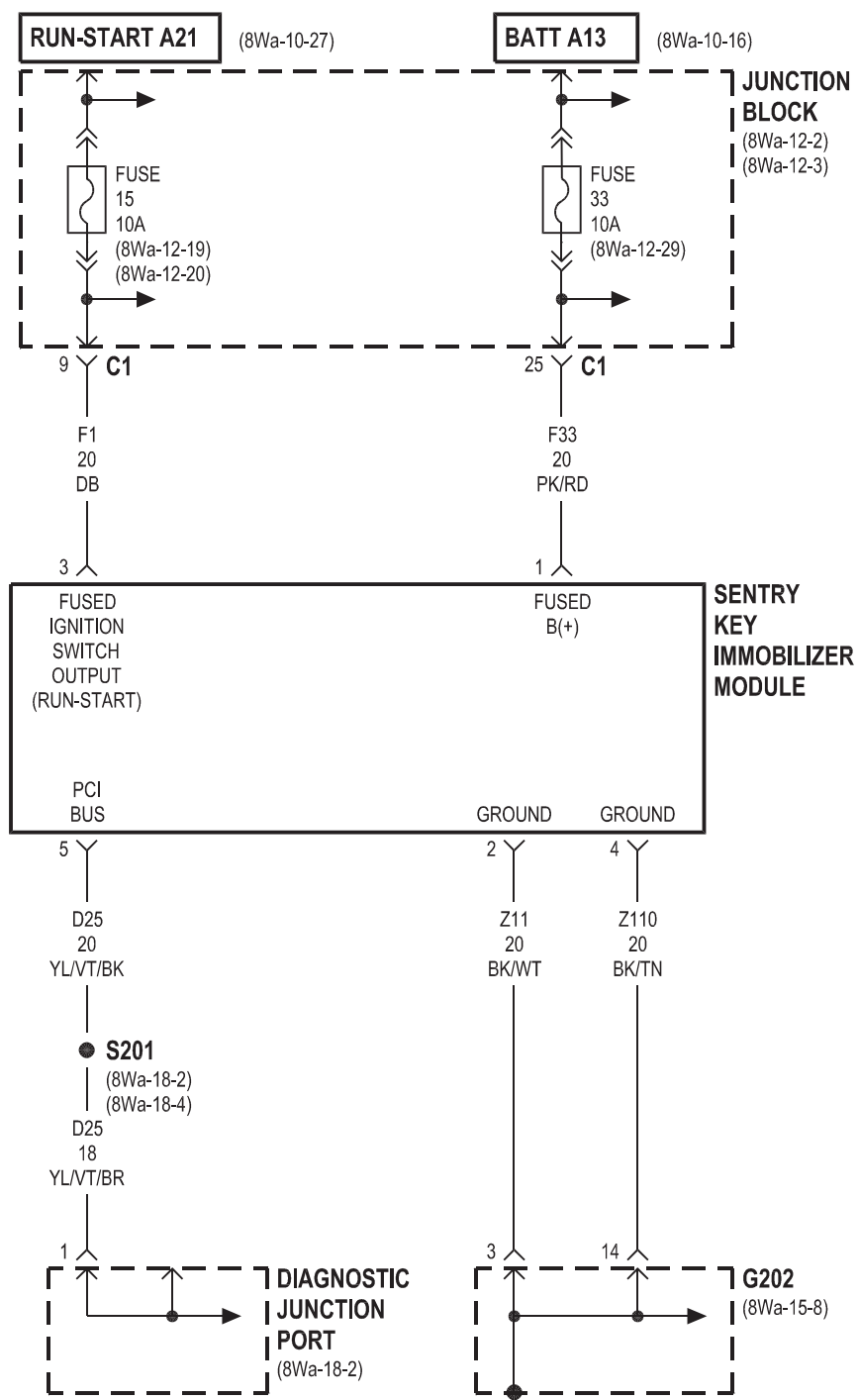


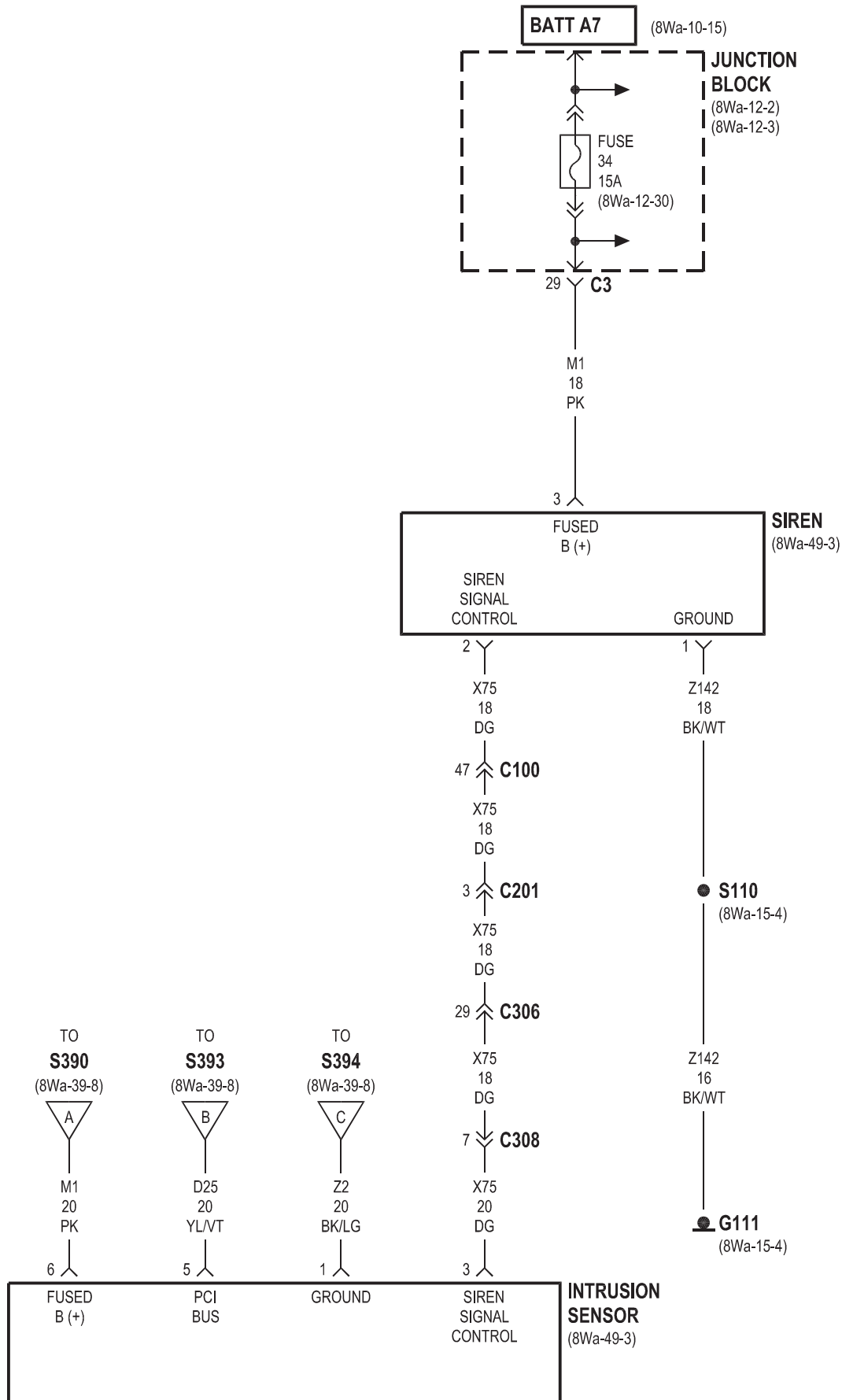


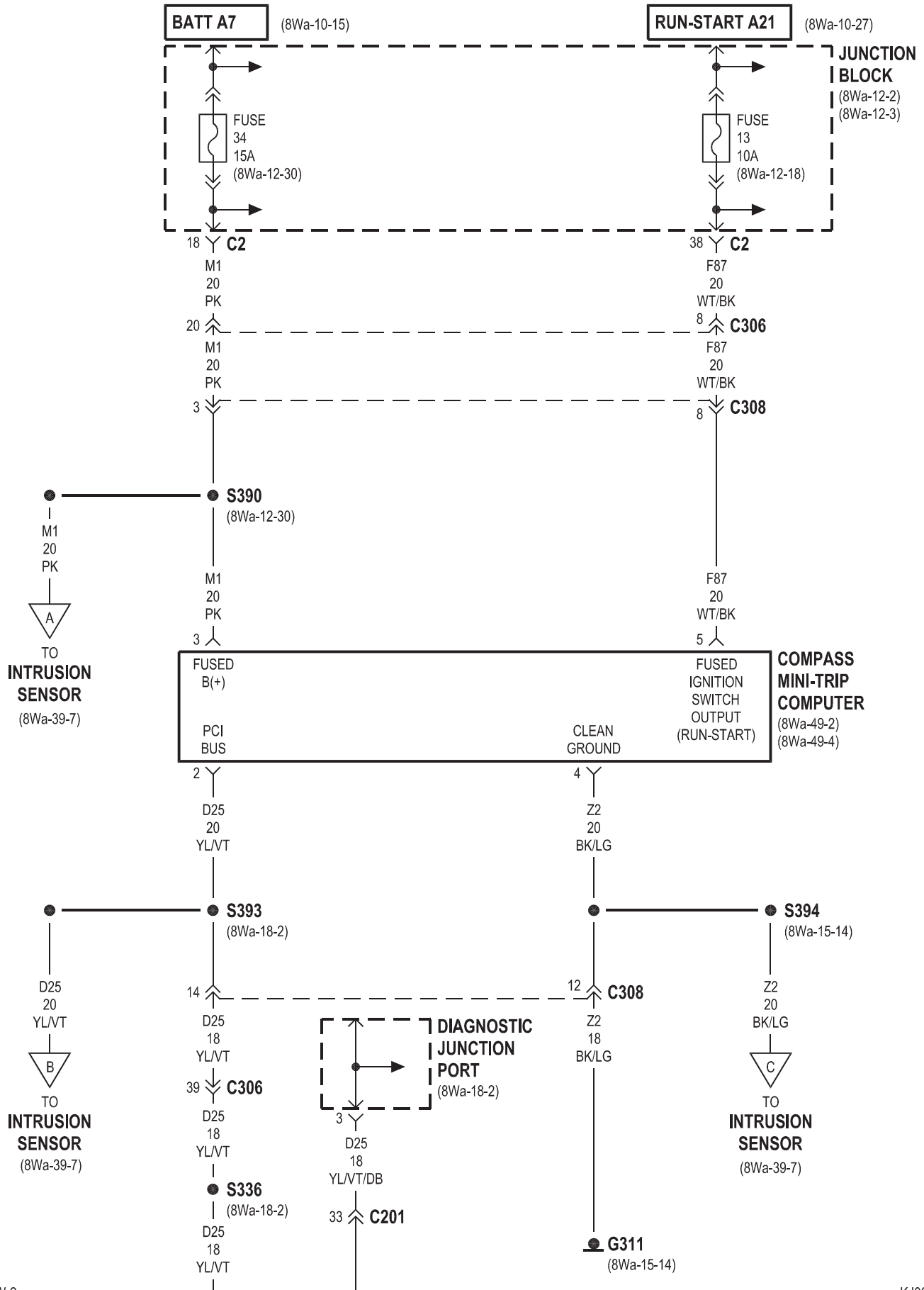


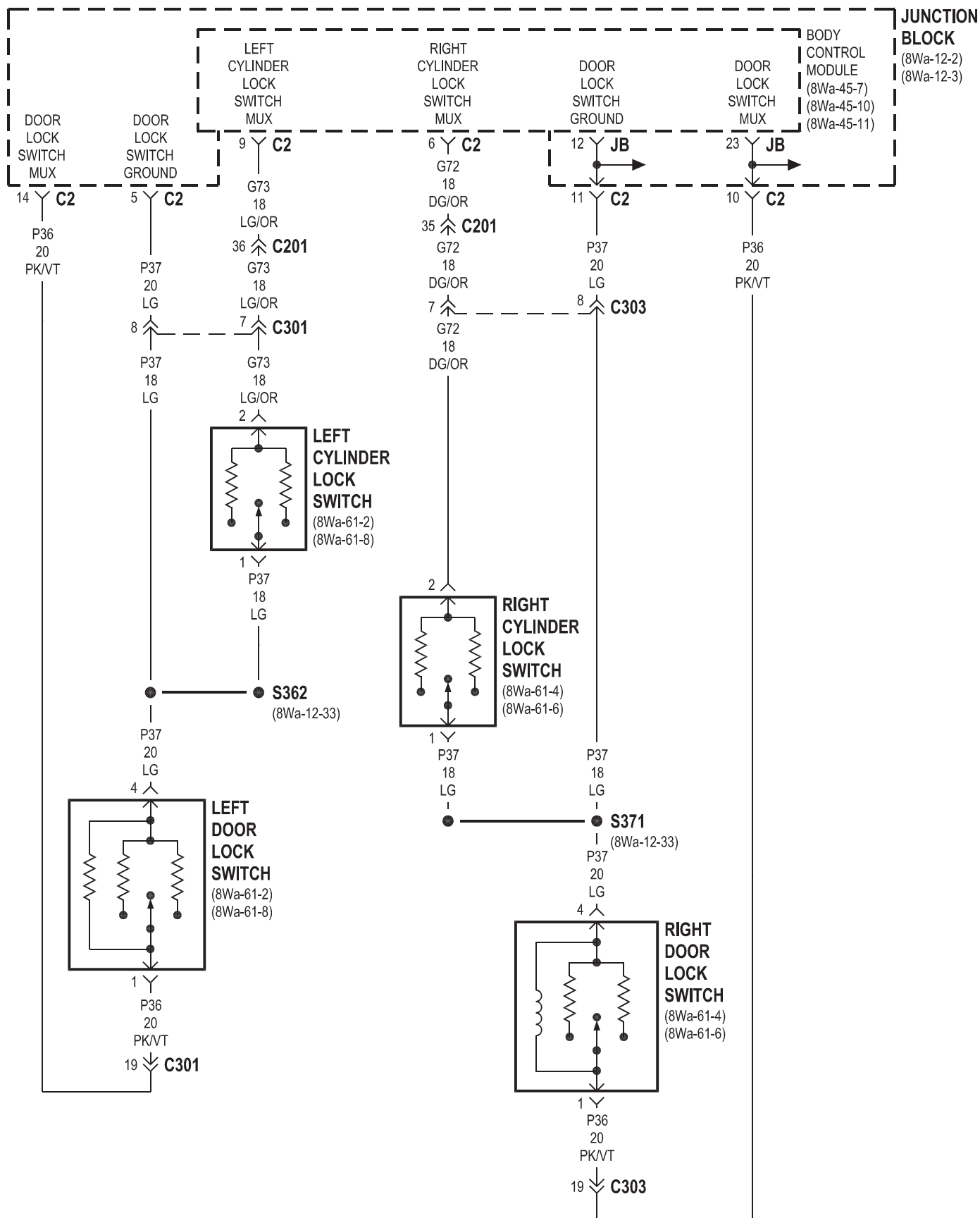


□ BUILT-UP-EXPORT



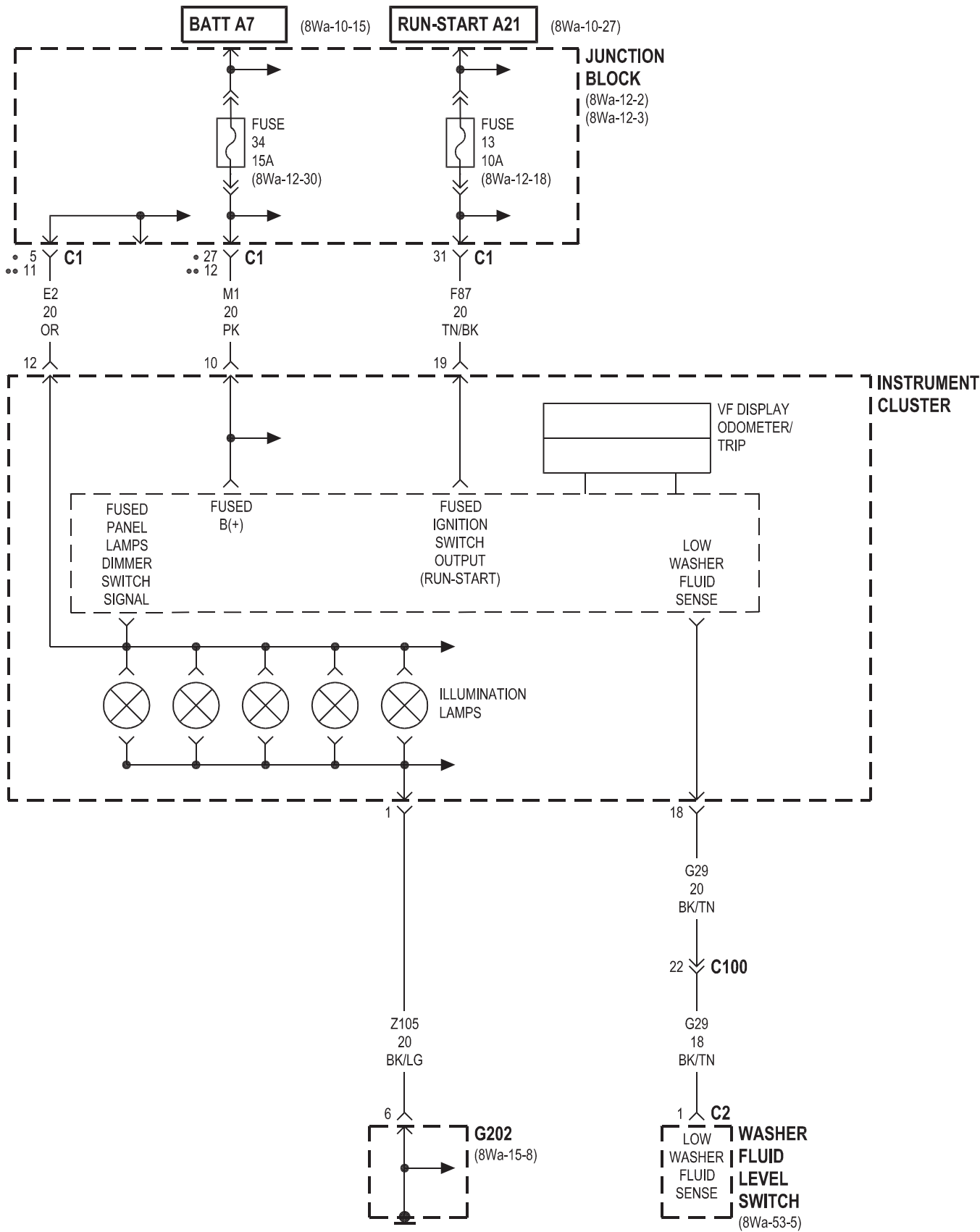




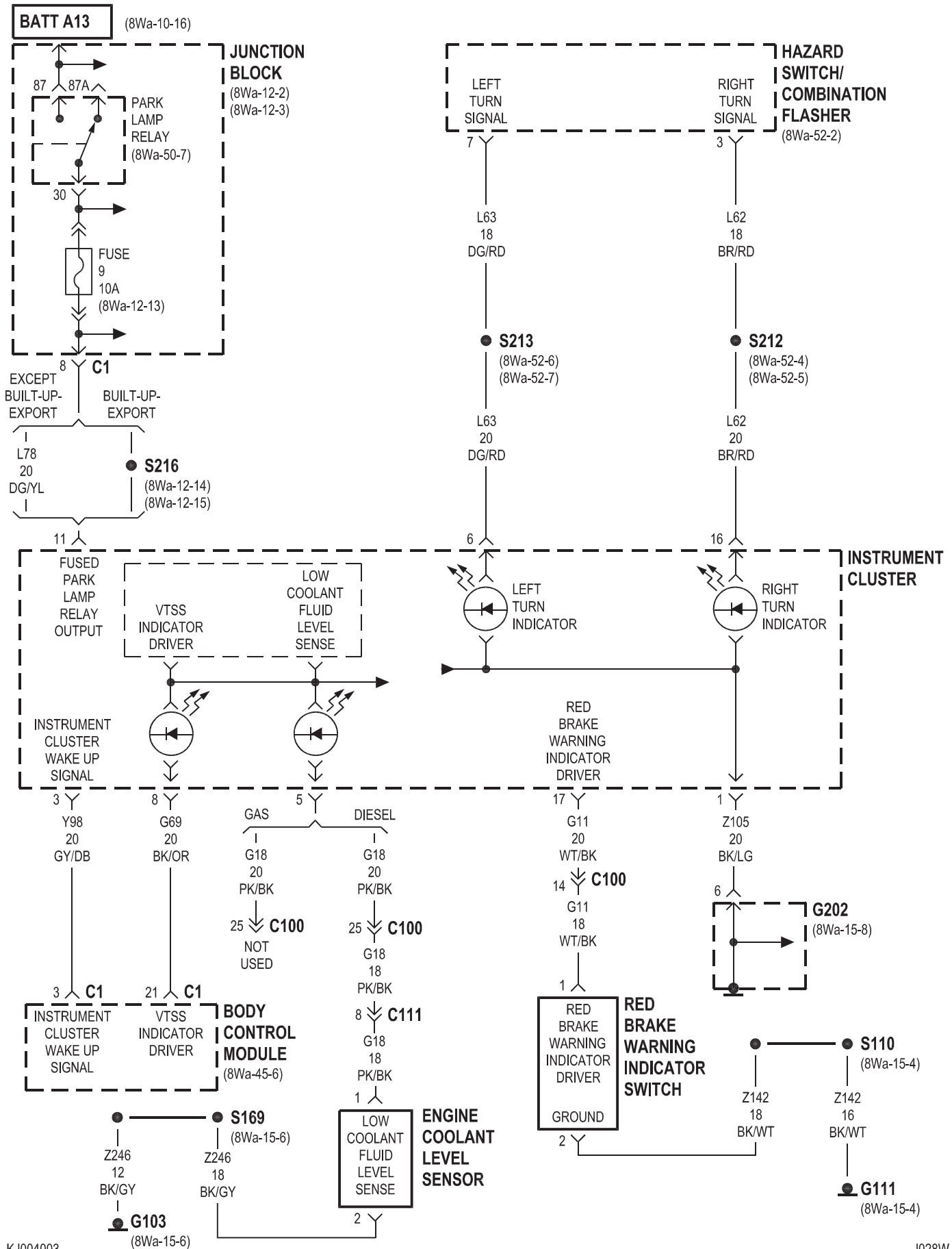


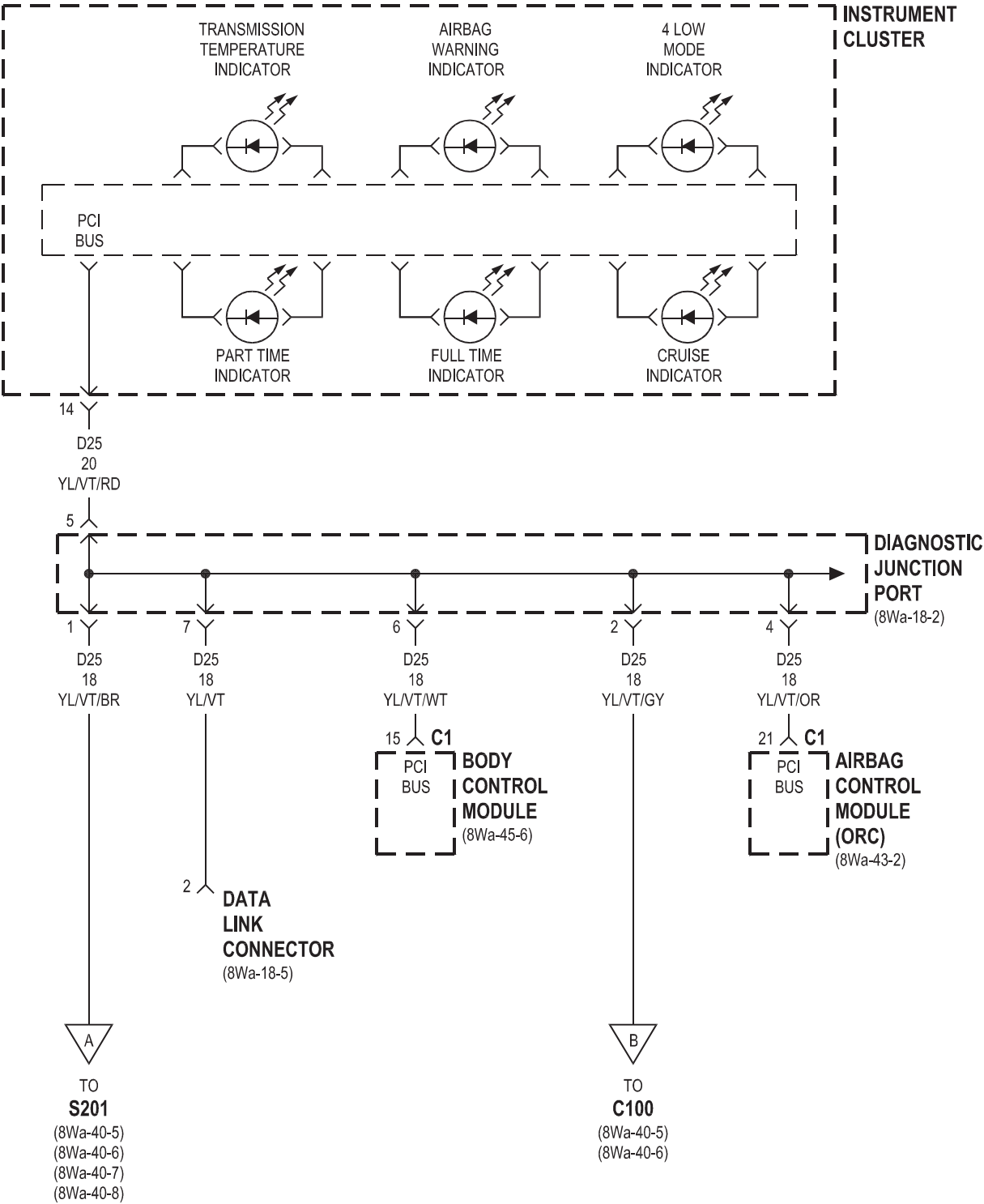
8W-40 INSTRUMENT CLUSTER

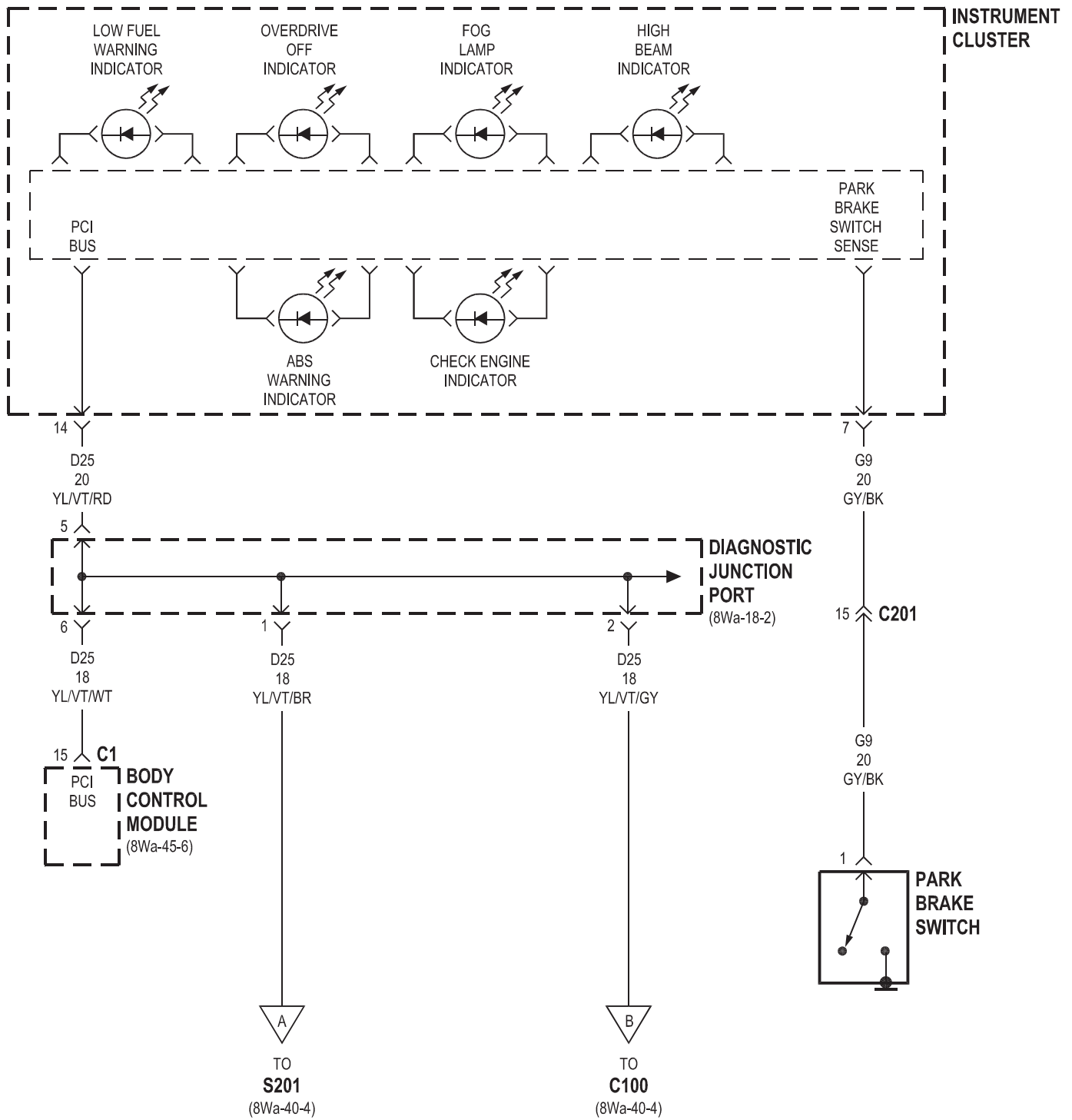
Component	Page	Component	Page
Airbag Control Module	8Wa-40-4, 8	G111	8Wa-40-3
Body Control Module	8Wa-40-3, 4, 5, 8	G202	8Wa-40-2, 3
Controller Antilock Brake	8Wa-40-6	Hazard Switch/Combination Flasher	8Wa-40-3
Data Link Connector	8Wa-40-4	Instrument Cluster	8Wa-40-2, 3, 4, 5, 7, 8
Diagnostic Junction Port	8Wa-40-4, 5, 6, 7, 8	Junction Block	8Wa-40-2, 3
Driver Seat Belt Switch	8Wa-40-8	Park Brake Switch	8Wa-40-5
Engine Control Module	8Wa-40-6	Park Lamp Relay	8Wa-40-3
Engine Coolant Level Sensor	8Wa-40-3	Passenger Seat Belt Switch	8Wa-40-8
Fuse 9	8Wa-40-3	Powertrain Control Module	8Wa-40-6
Fuse 13	8Wa-40-2	Red Brake Warning Indicator Switch	8Wa-40-3
Fuse 34	8Wa-40-2	Transmission Control Module	8Wa-40-6
G103	8Wa-40-3	Washer Fluid Level Switch	8Wa-40-2

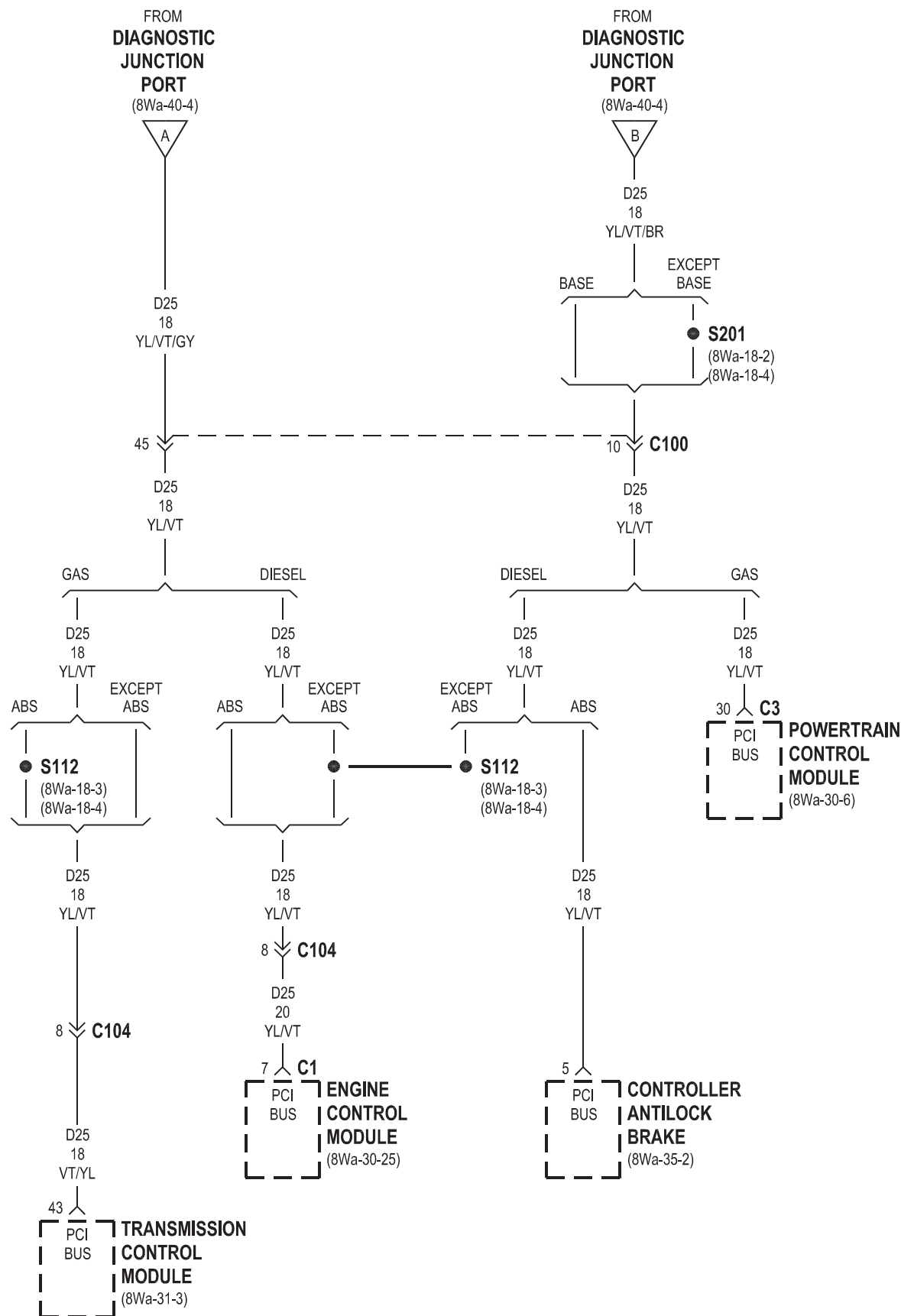


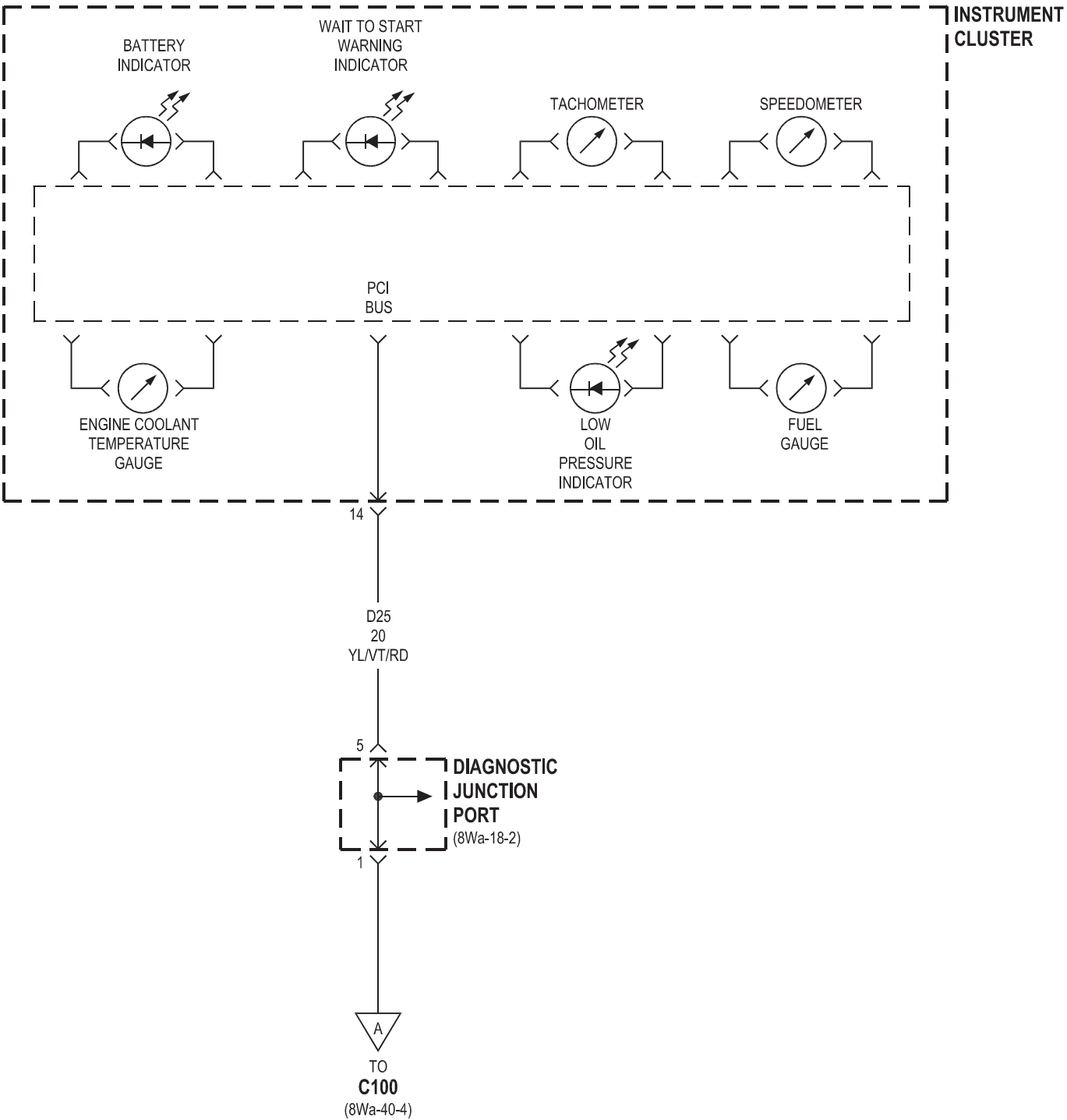
• LHD
•• RHD

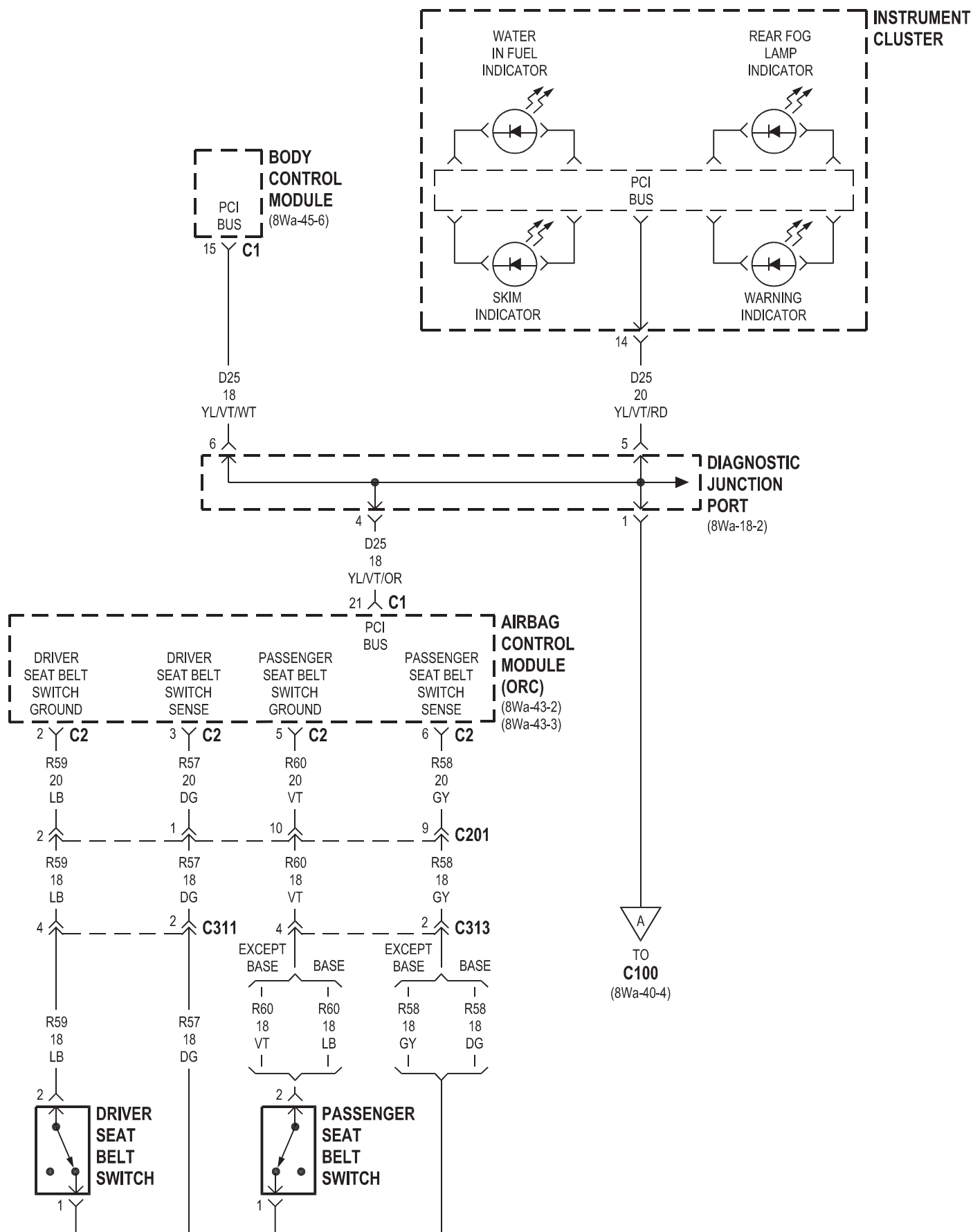






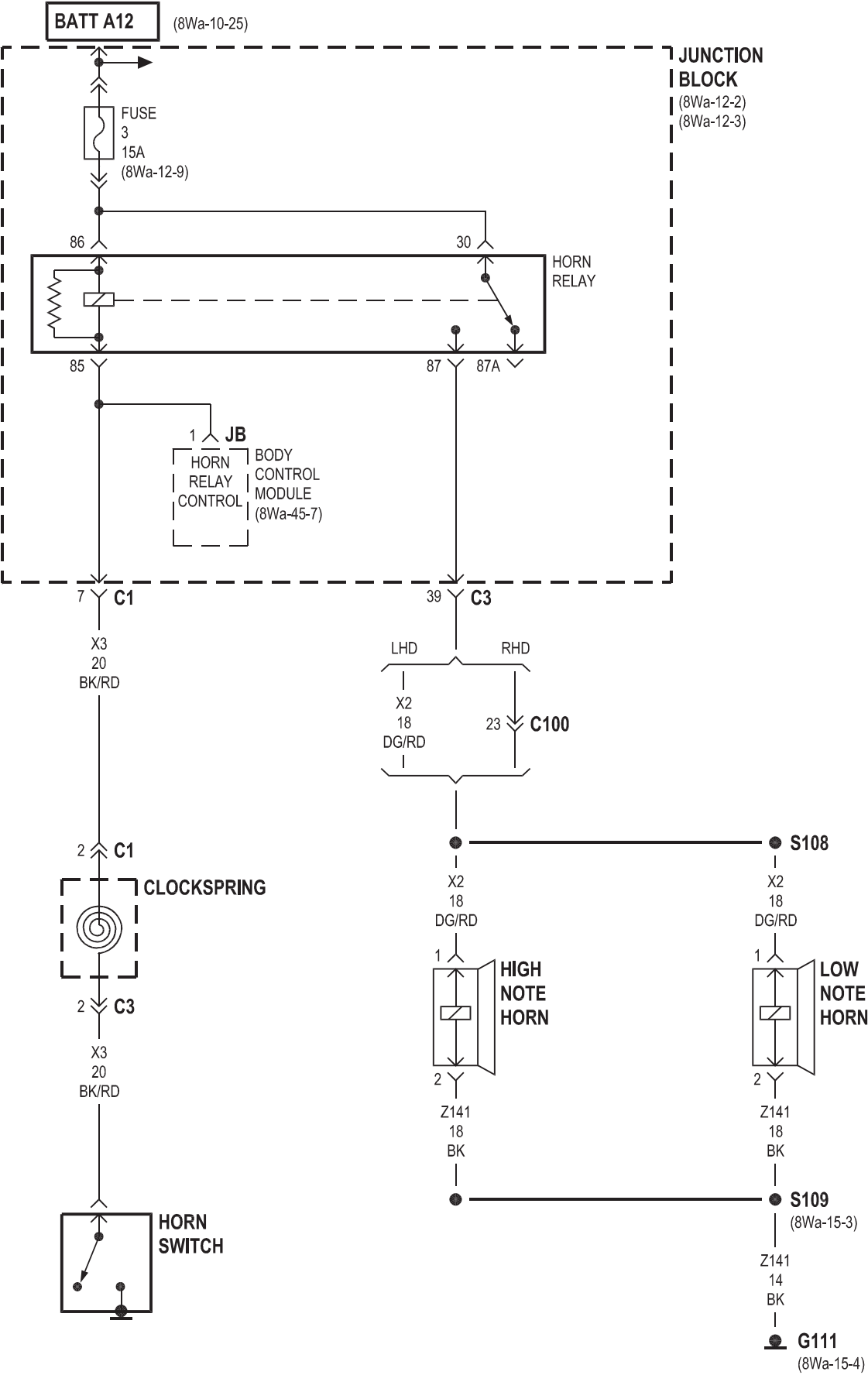


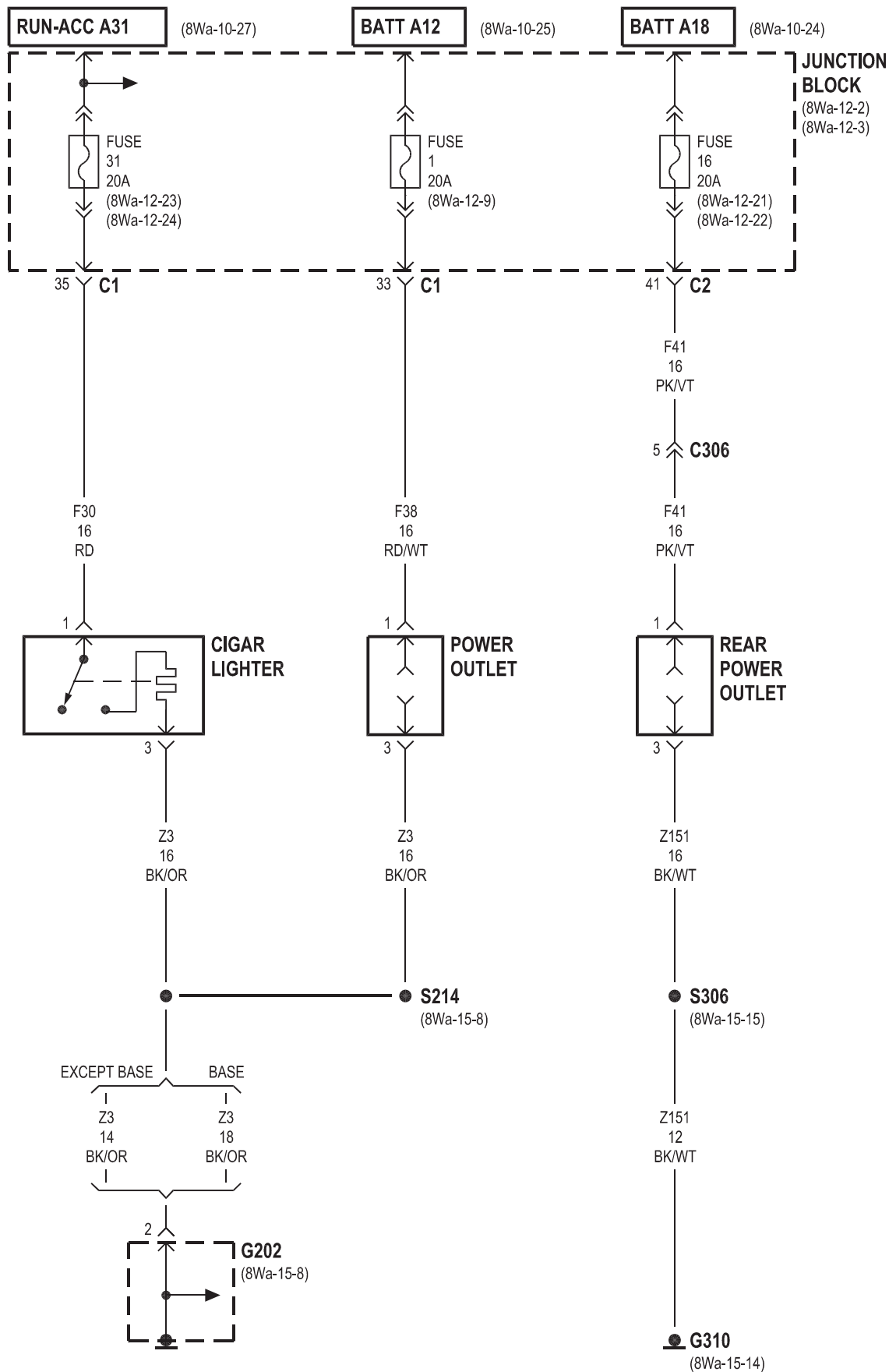




8W-41 HORN/CIGAR LIGHTER/POWER OUTLET

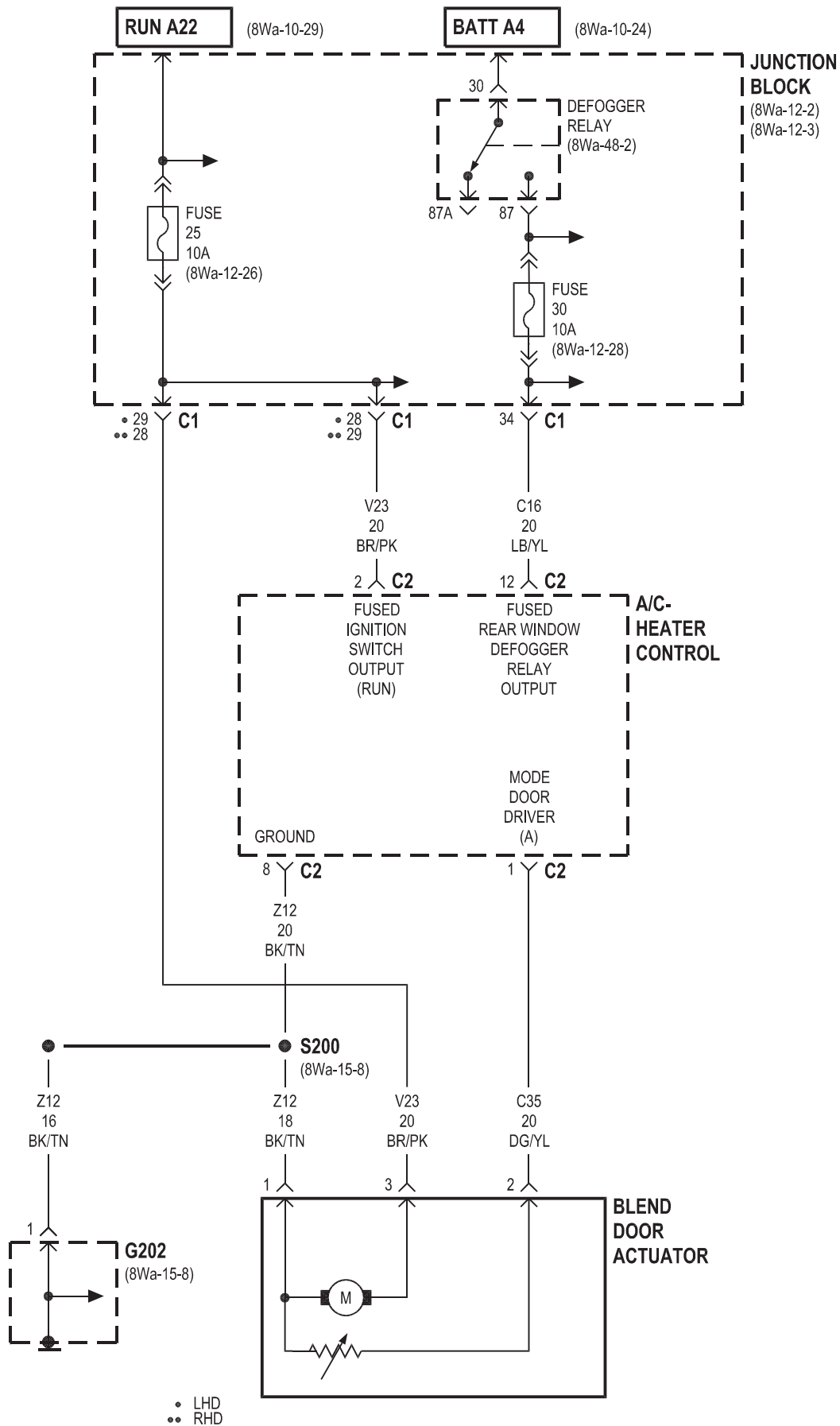
Component	Page	Component	Page
Body Control Module	8Wa-41-2	G310	8Wa-41-3
Cigar Lighter	8Wa-41-3	High Note Horn	8Wa-41-2
Clockspring	8Wa-41-2	Horn Relay	8Wa-41-2
Fuse 1	8Wa-41-3	Horn Switch	8Wa-41-2
Fuse 3	8Wa-41-2	Junction Block	8Wa-41-2, 3
Fuse 16	8Wa-41-3	Low Note Horn	8Wa-41-2
Fuse 31	8Wa-41-3	Power Outlet	8Wa-41-3
G111	8Wa-41-2	Rear Power Outlet	8Wa-41-3
G202	8Wa-41-3		

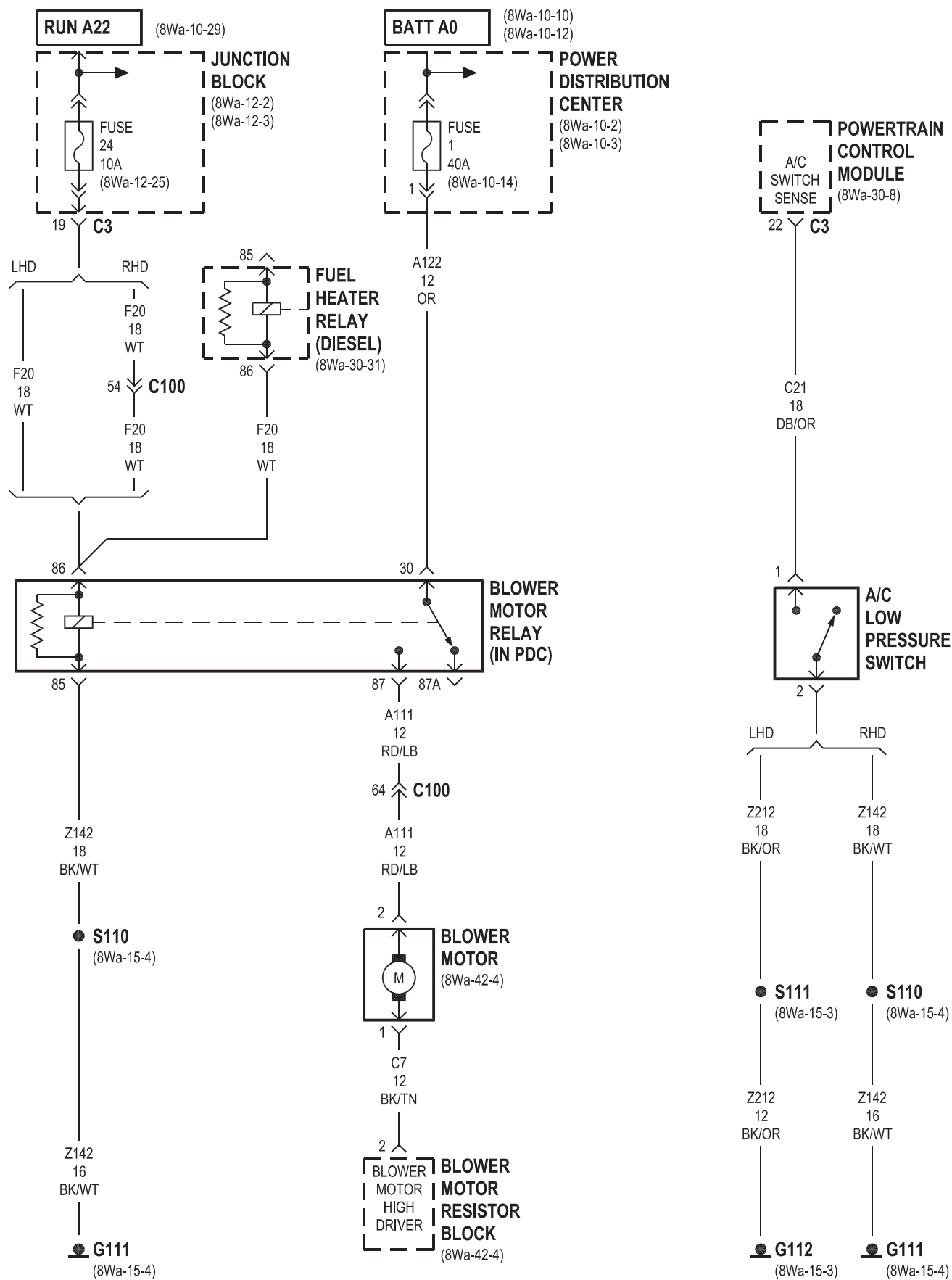


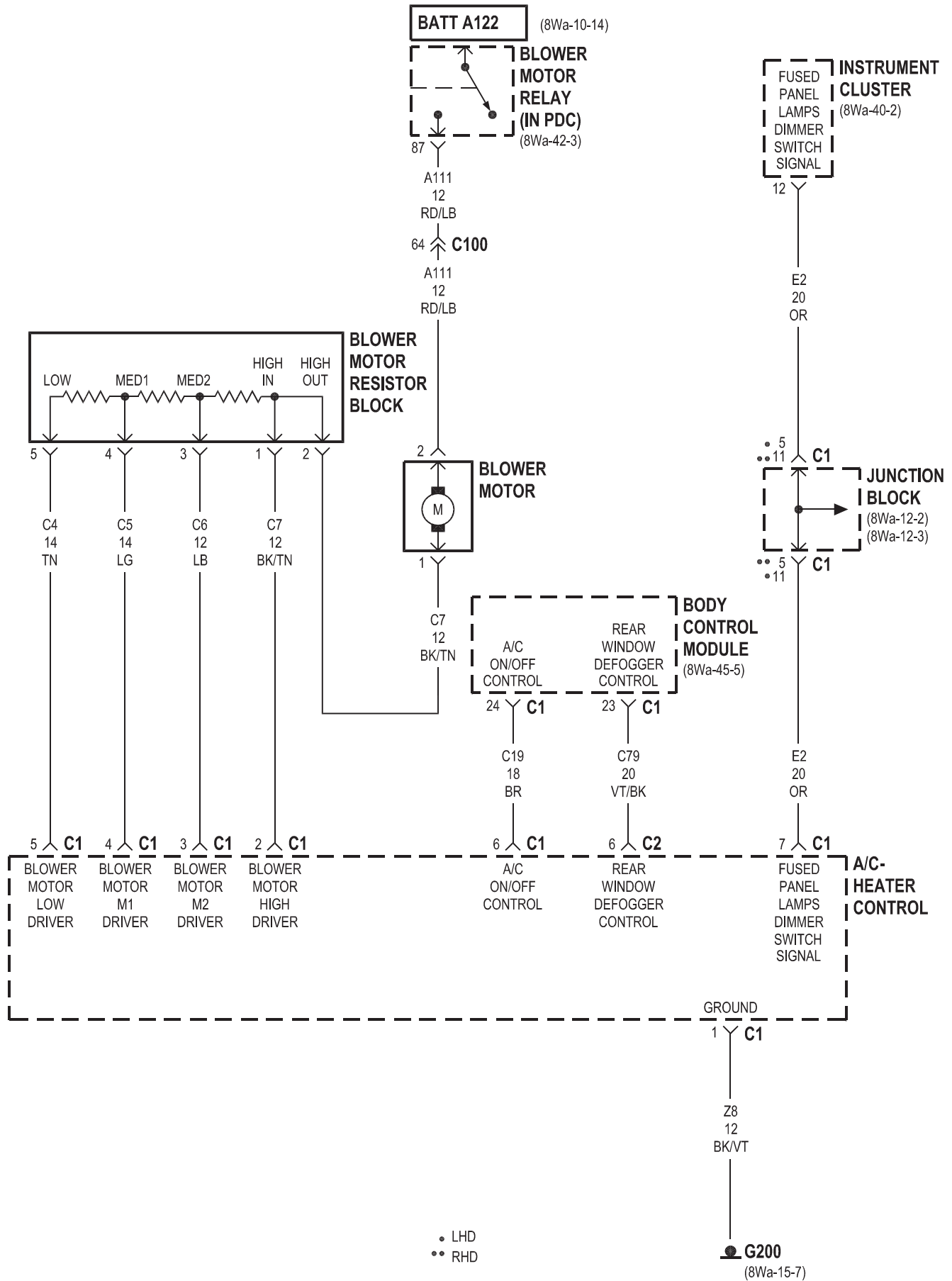


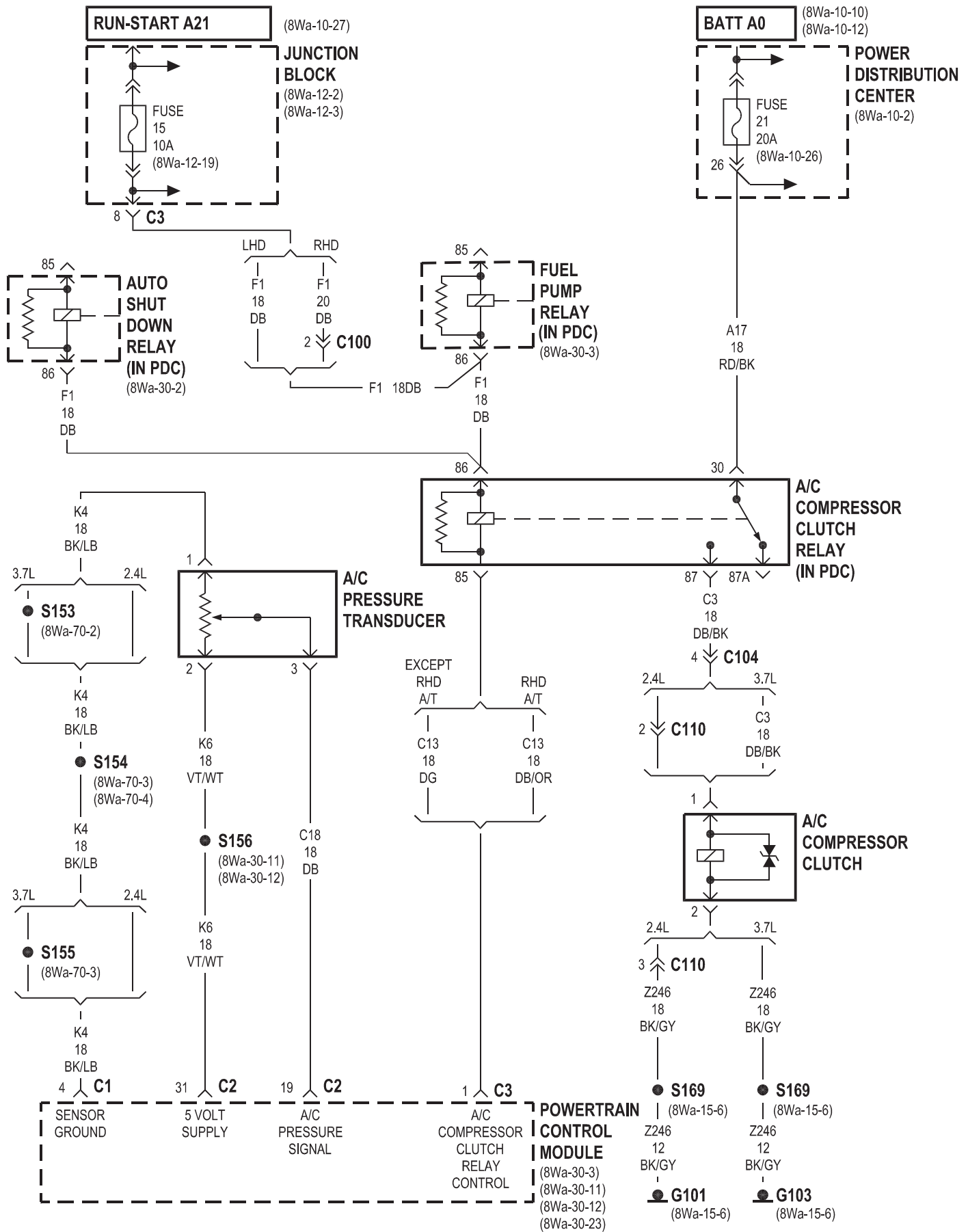
8W-42 AIR CONDITIONING-HEATER

Component	Page	Component	Page
A/C Compressor Clutch	8Wa-42-5, 7	Fuse 1	8Wa-42-3, 6
A/C Compressor Clutch Relay	8Wa-42-5, 7	Fuse 15	8Wa-42-5
A/C High Pressure Switch	8Wa-42-6	Fuse 16	8Wa-42-7
A/C Low Pressure Switch	8Wa-42-3, 6	Fuse 19	8Wa-42-6
A/C Pressure Transducer	8Wa-42-5	Fuse 21	8Wa-42-5, 7
A/C- Heater Control	8Wa-42-2, 4	Fuse 24	8Wa-42-3
Auto Shut Down Relay	8Wa-42-5	Fuse 25	8Wa-42-2
Blend Door Actuator	8Wa-42-2	Fuse 30	8Wa-42-2
Blower Motor	8Wa-42-3, 4, 6	G101	8Wa-42-5
Blower Motor Relay	8Wa-42-3, 4, 6	G103	8Wa-42-5, 7
Blower Motor Resistor Block	8Wa-42-3, 4, 6	G111	8Wa-42-3, 6
Body Control Module	8Wa-42-4	G112	8Wa-42-3, 6
Cabin Heater	8Wa-42-7	G200	8Wa-42-4
Cabin Heater Relay	8Wa-42-7	G202	8Wa-42-2
Defogger Relay	8Wa-42-2	Instrument Cluster	8Wa-42-4
Engine Control Module	8Wa-42-6, 7	Junction Block	8Wa-42-2, 3, 4, 5, 6
Fuel Heater Relay	8Wa-42-3, 6	Power Distribution Center	8Wa-42-3, 5, 6, 7
Fuel Pump Relay	8Wa-42-5	Powertrain Control Module	8Wa-42-3, 5

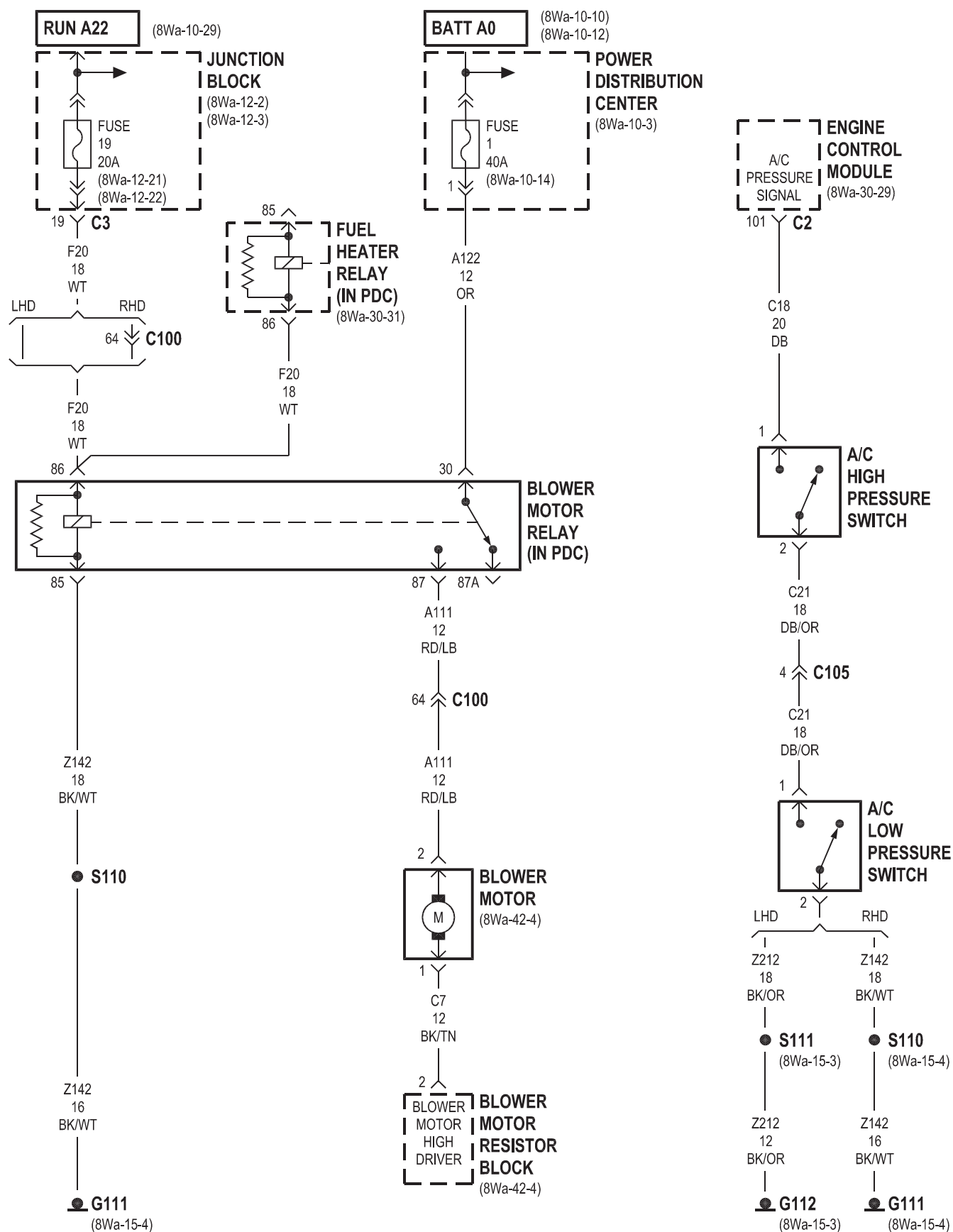








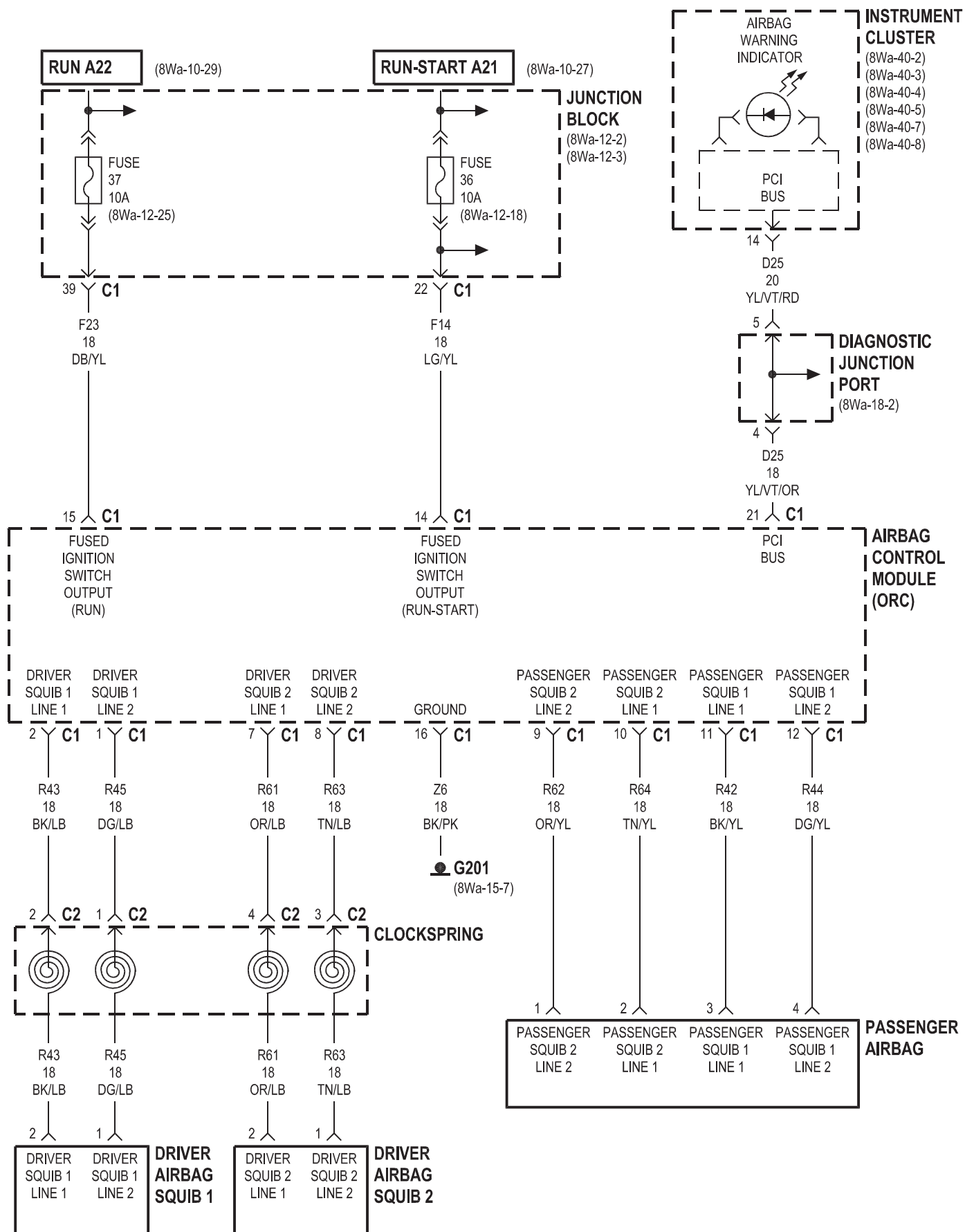
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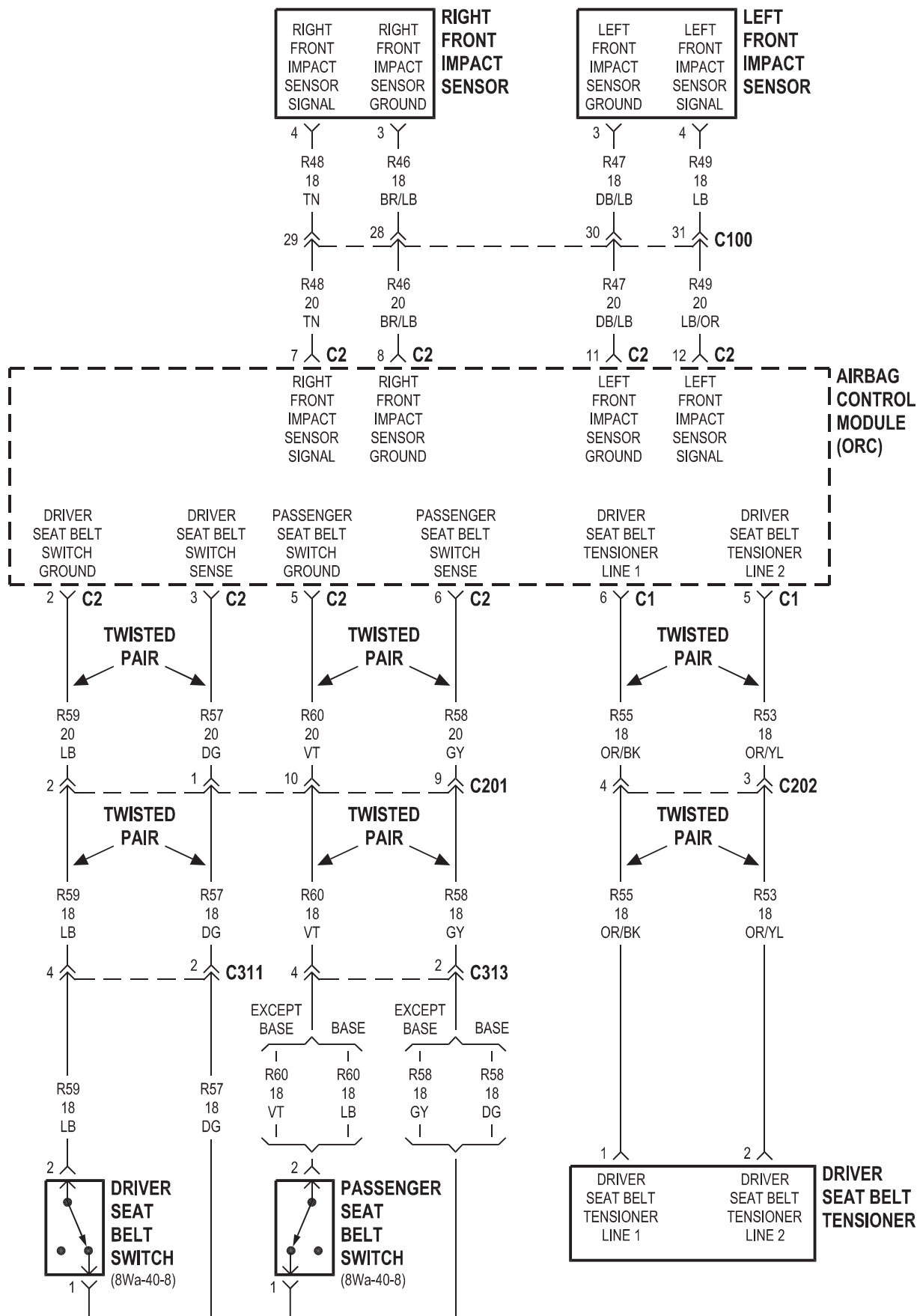


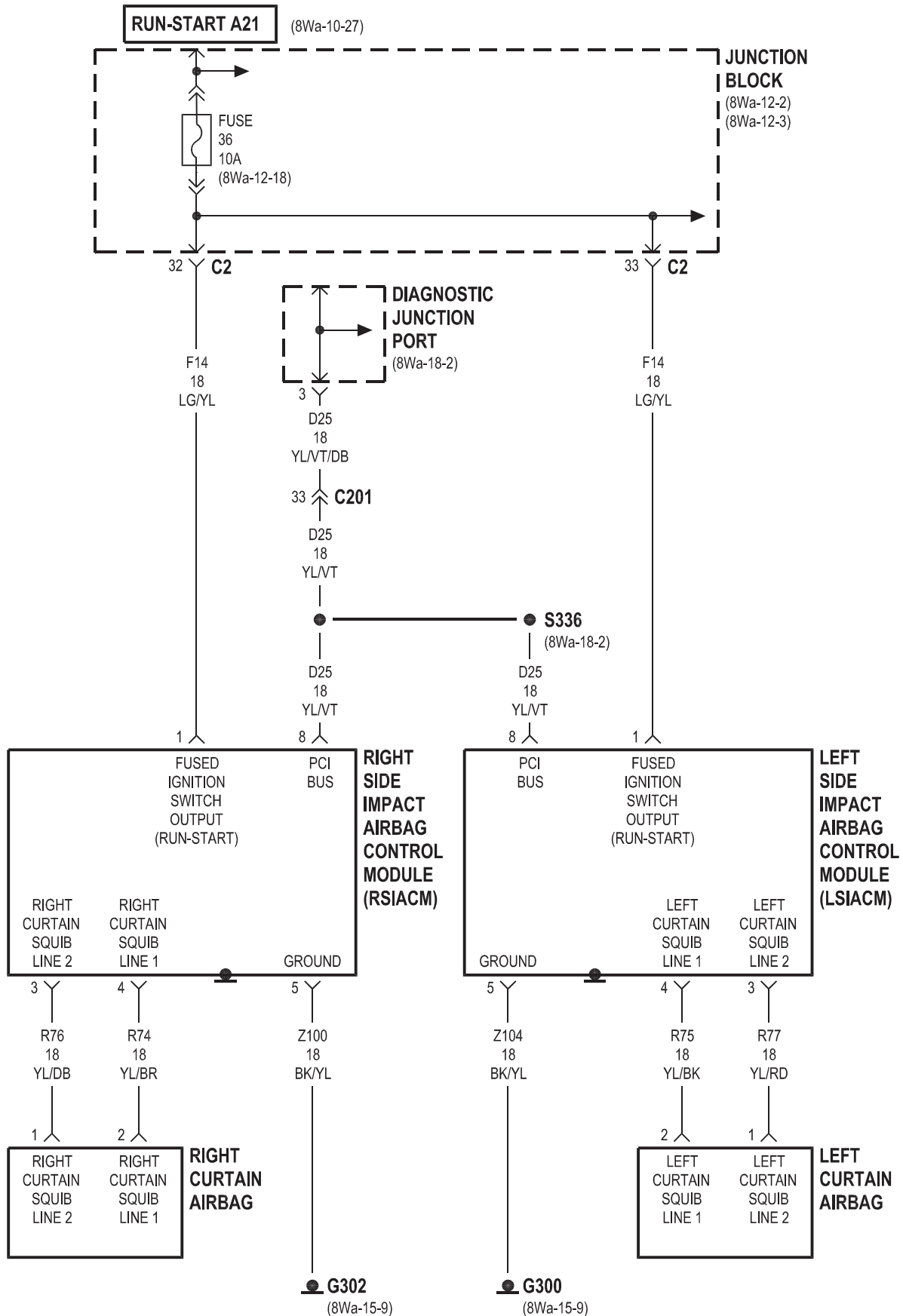


8W-43 AIRBAG SYSTEM

Component	Page	Component	Page
Airbag Control Module	8Wa-43-2, 3	G302	8Wa-43-4
Clockspring	8Wa-43-2	Instrument Cluster	8Wa-43-2
Diagnostic Junction Port	8Wa-43-2, 4	Junction Block	8Wa-43-2, 4
Driver Airbag Squib 1	8Wa-43-2	Left Curtain Airbag	8Wa-43-4
Driver Airbag Squib 2	8Wa-43-2	Left Front Impact Sensor	8Wa-43-3
Driver Seat Belt Switch	8Wa-43-3	Left Side Impact Airbag Control Module . .	8Wa-43-4
Driver Seat Belt Tensioner	8Wa-43-3	Passenger Airbag	8Wa-43-2
Fuse 36	8Wa-43-2, 4	Passenger Seat Belt Switch	8Wa-43-3
Fuse 37	8Wa-43-2	Right Curtain Airbag	8Wa-43-4
G201	8Wa-43-2	Right Front Impact Sensor	8Wa-43-3
G300	8Wa-43-4	Right Side Impact Airbag Control Module .	8Wa-43-4

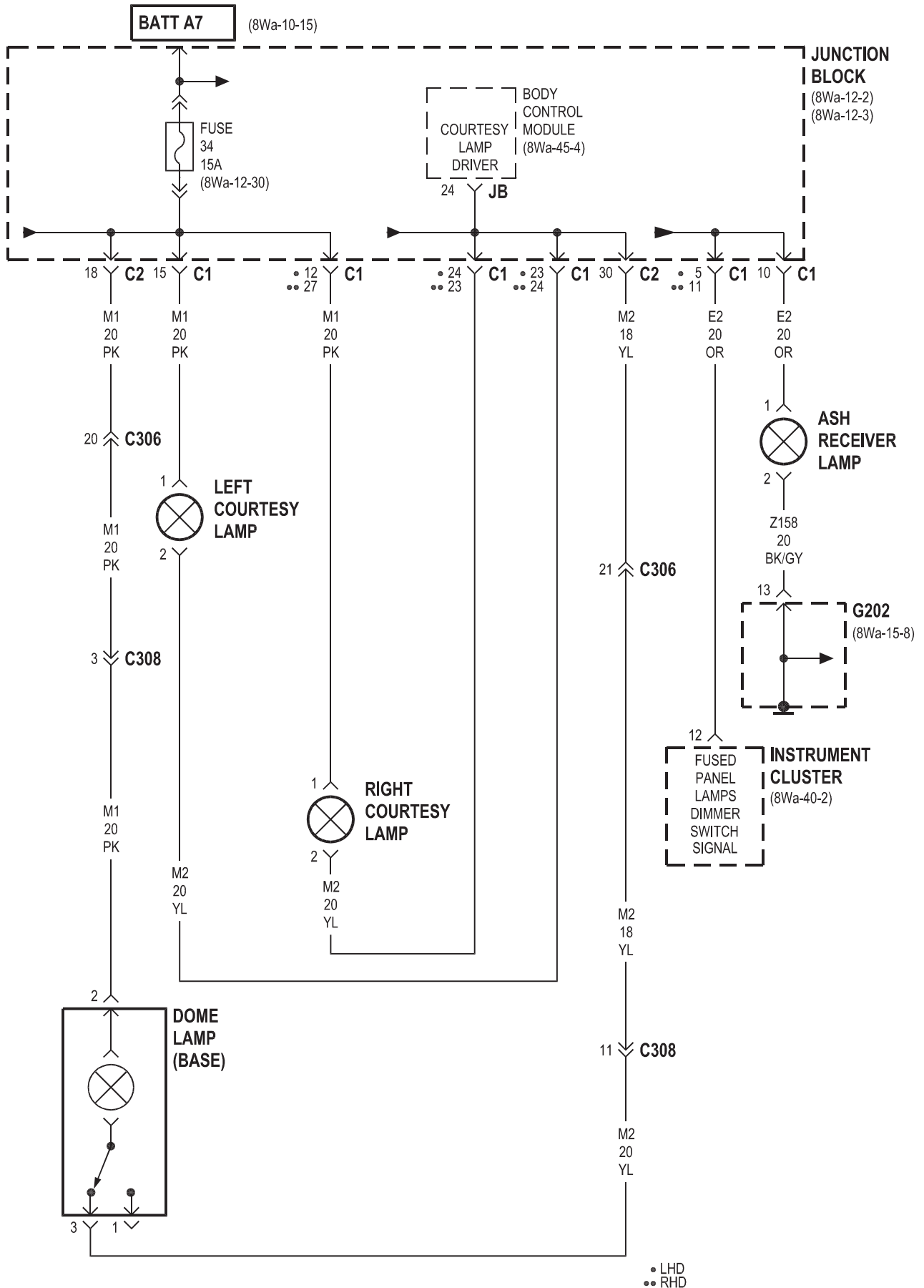


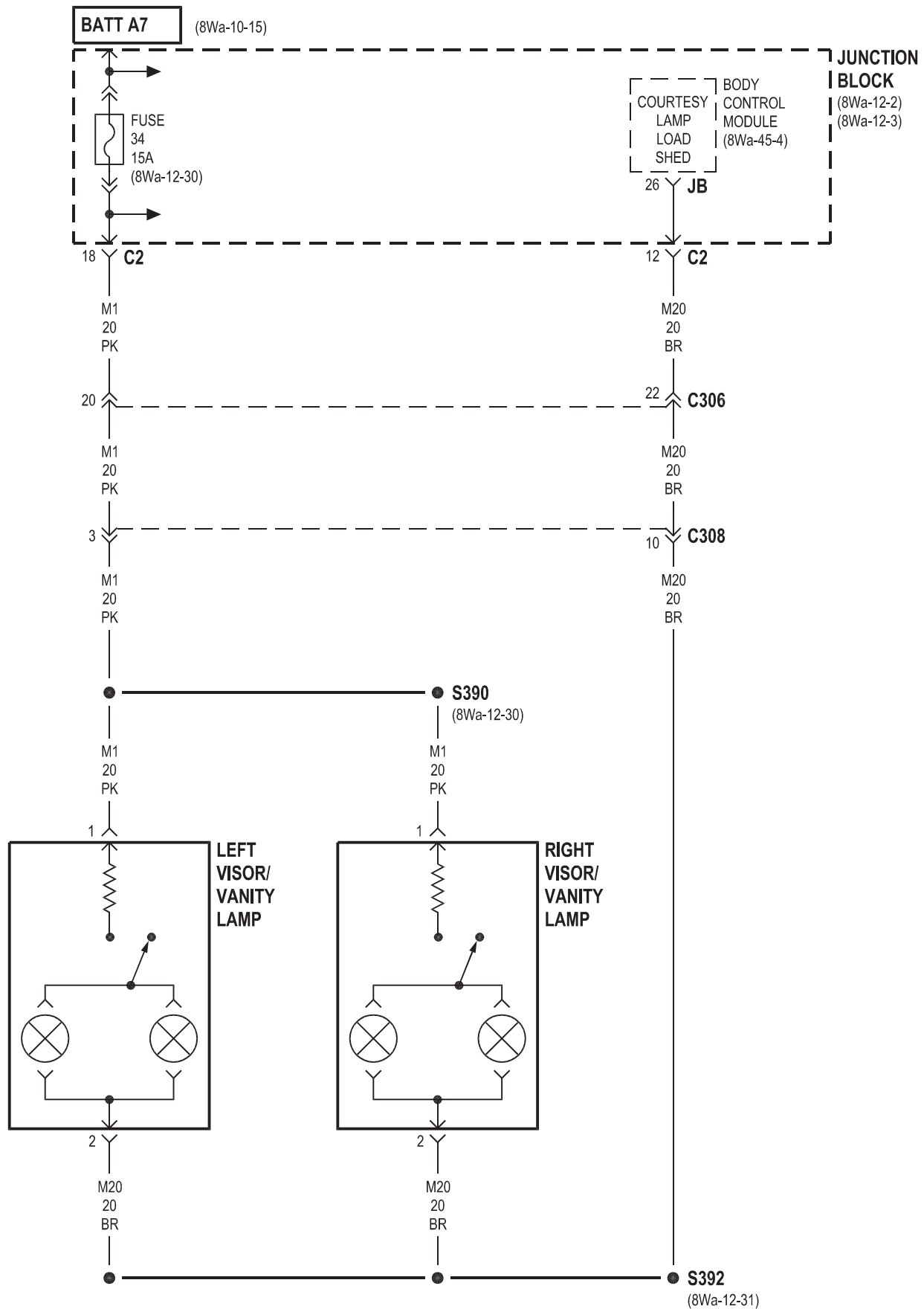


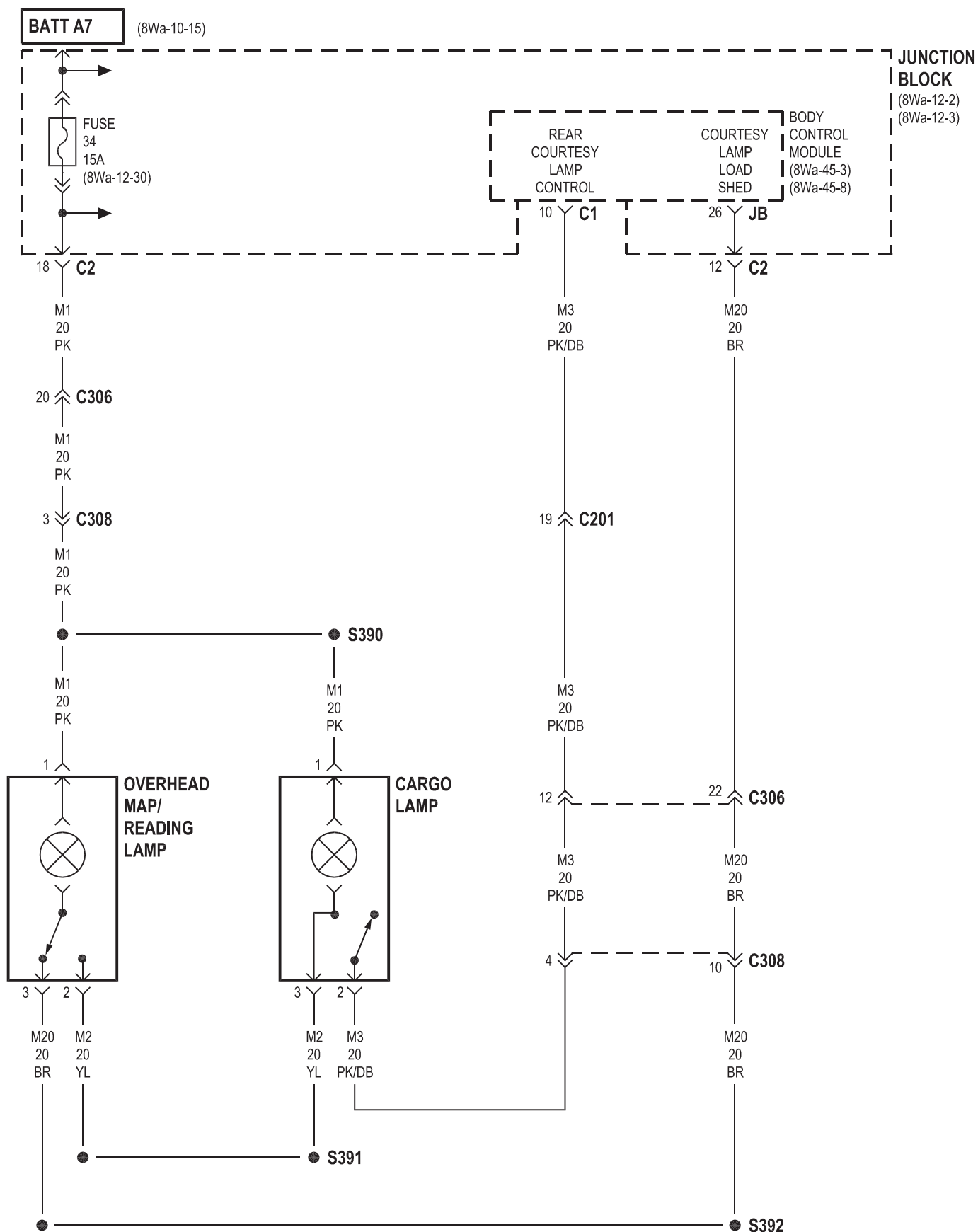


8W-44 INTERIOR LIGHTING

Component	Page	Component	Page
Ash Receiver Lamp	8Wa-44-2	Junction Block	8Wa-44-2, 3, 4
Body Control Module	8Wa-44-2, 3, 4	Left Courtesy Lamp	8Wa-44-2
Cargo Lamp	8Wa-44-4	Left Visor/Vanity Lamp	8Wa-44-3
Dome Lamp	8Wa-44-2	Overhead Map/Reading Lamp	8Wa-44-4
Fuse 34	8Wa-44-2, 3, 4	Right Courtesy Lamp	8Wa-44-2
G202	8Wa-44-2	Right Visor/Vanity Lamp	8Wa-44-3
Instrument Cluster	8Wa-44-2		

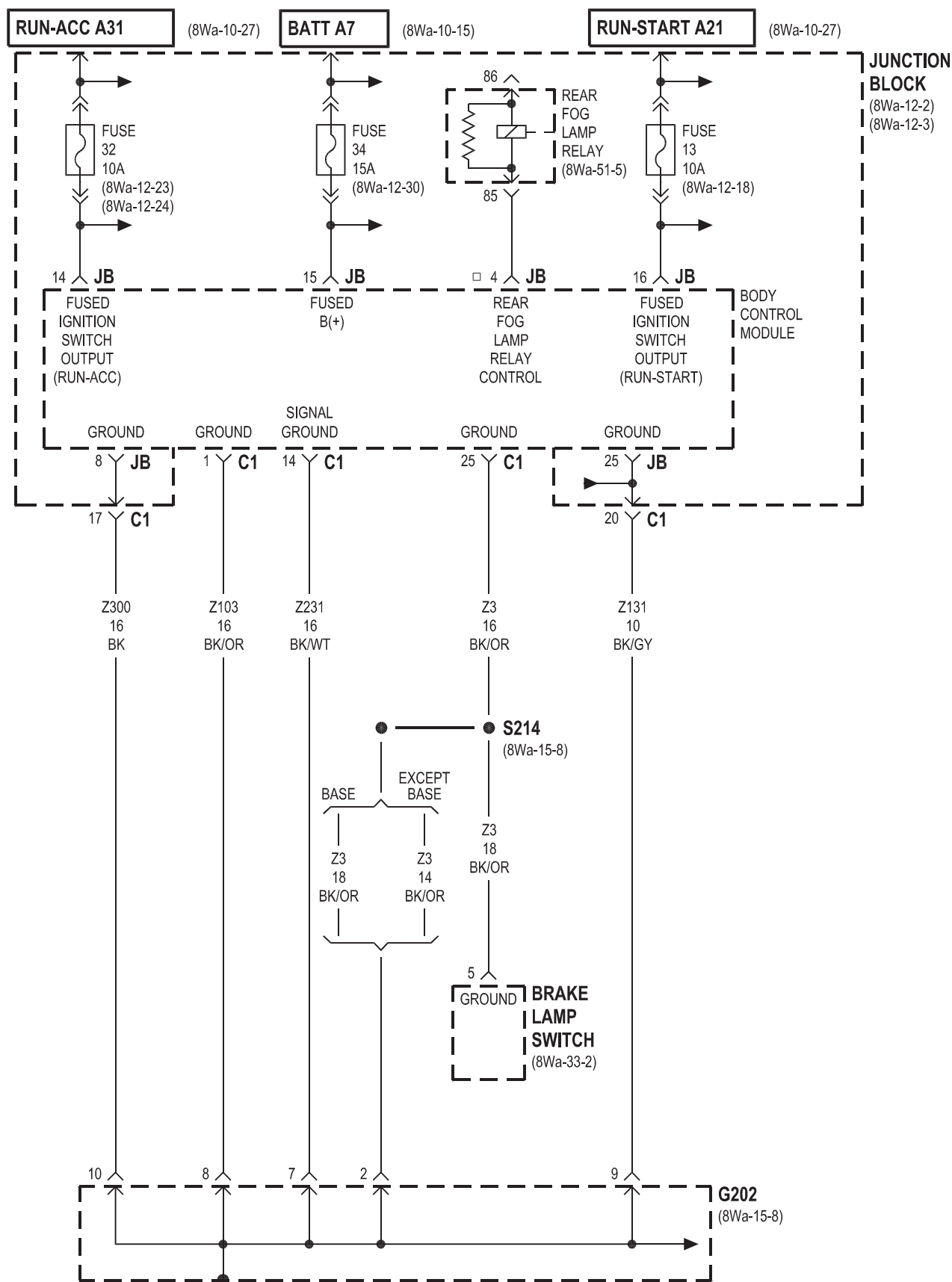




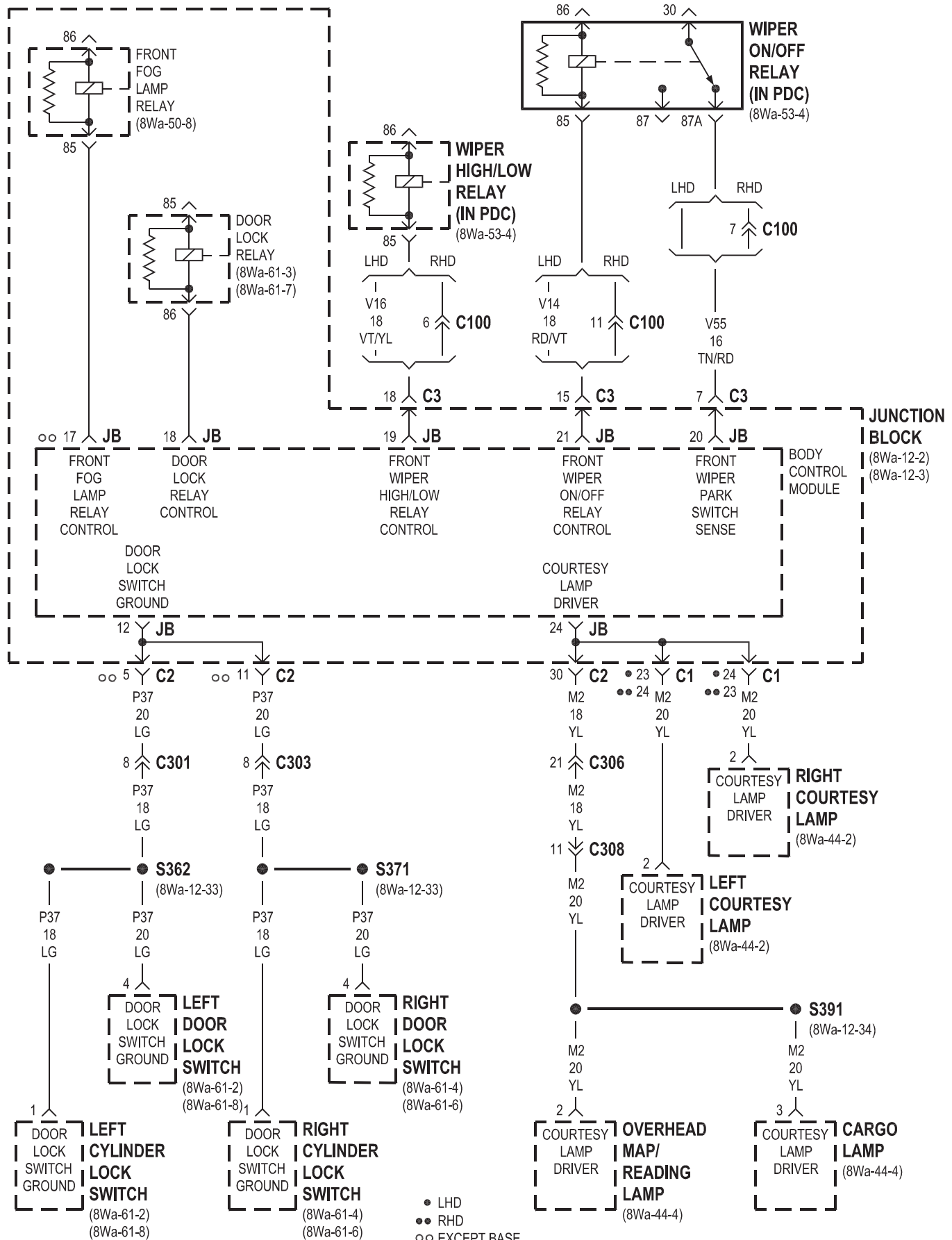


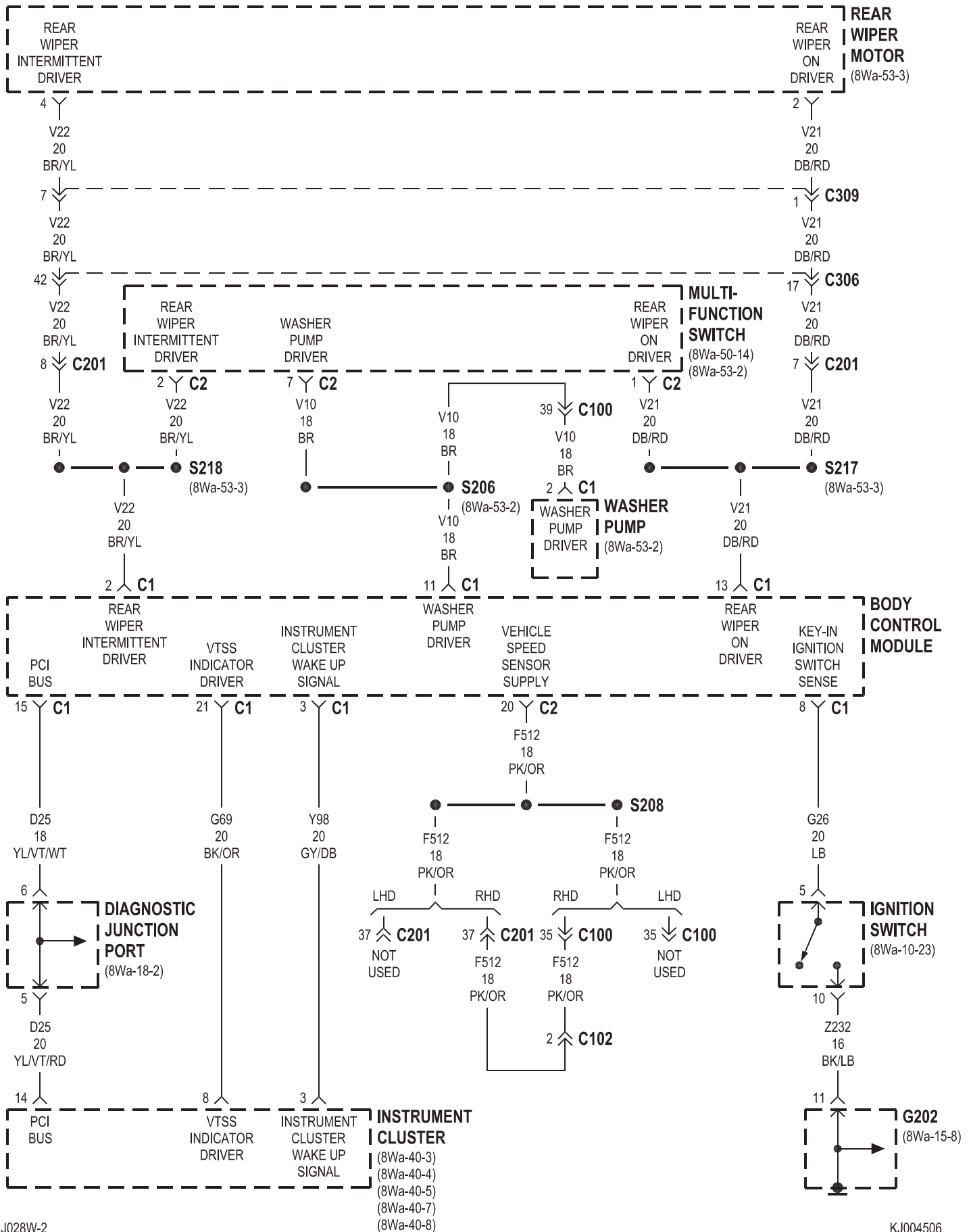
8W-45 BODY CONTROL MODULE

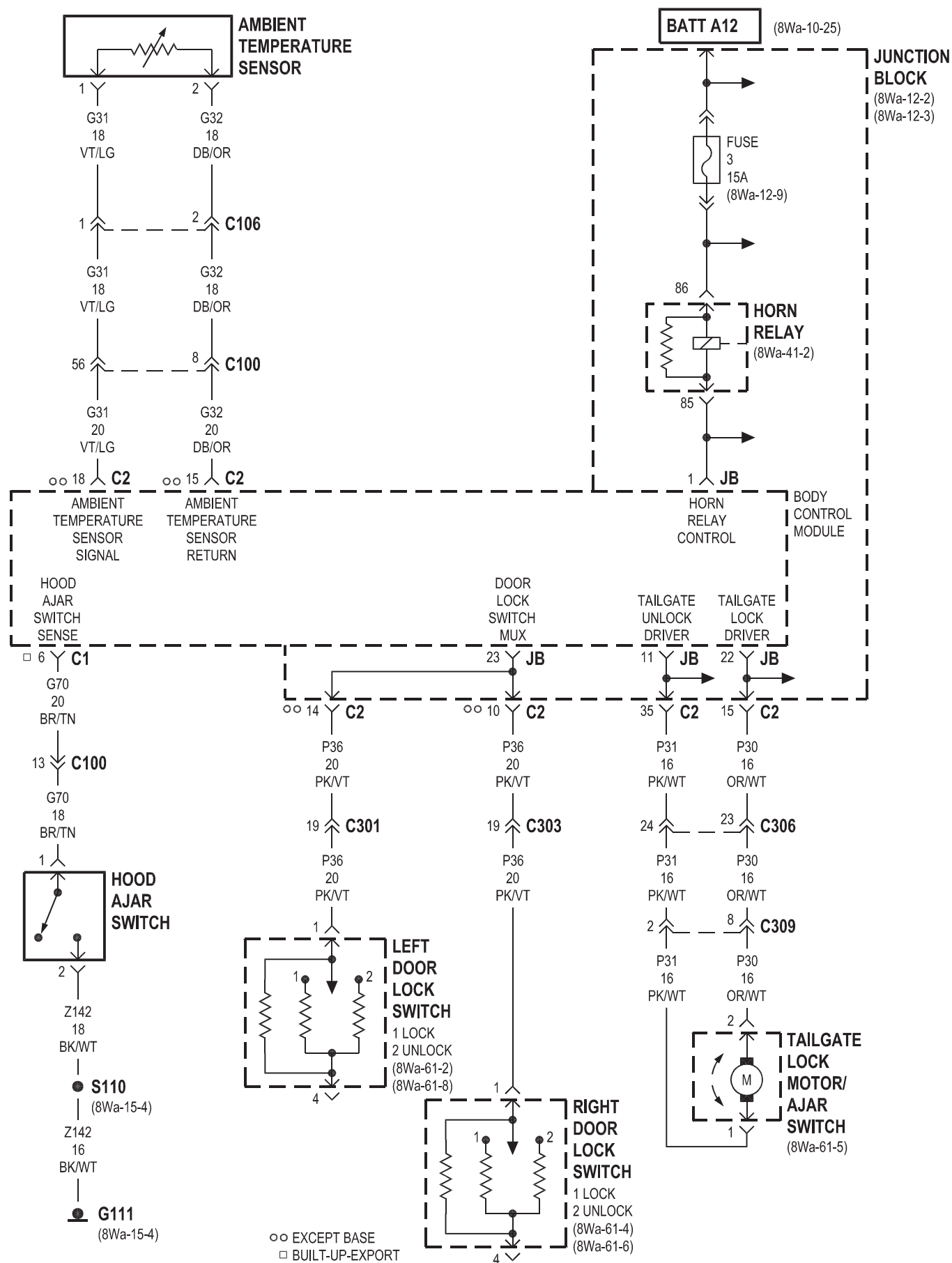
Component	Page	Component	Page
A/C- Heater Control	8Wa-45-5	Junction Block	8Wa-45-2, 3, 4, 7, 8
Ambient Temperature Sensor	8Wa-45-7	Left Courtesy Lamp	8Wa-45-4
Body Control Module . 8Wa-45-10, 11, 2, 3, 4, 5, 6, 7, 8, 9		Left Cylinder Lock Switch	8Wa-45-10, 11, 4
Brake Lamp Switch	8Wa-45-2	Left Door Lock Switch	8Wa-45-4, 7
Cargo Lamp	8Wa-45-4, 8	Left Front Door Ajar Switch	8Wa-45-9
Clockspring	8Wa-45-5	Left Front Door Lock Motor/Ajar Switch	8Wa-45-10, 11
Controller Antilock Brake	8Wa-45-5	Left Rear Door Ajar Switch	8Wa-45-9
Data Link Connector	8Wa-45-10, 11	Left Visor/Vanity Lamp	8Wa-45-3
Defogger Relay	8Wa-45-3	Low Beam Relay	8Wa-45-3
Diagnostic Junction Port	8Wa-45-6	Multi- Function Switch	8Wa-45-3, 5, 6
Door Lock Relay	8Wa-45-4	Overhead Map/Reading Lamp	8Wa-45-3, 4
Driver Door Unlock Relay	8Wa-45-3	Park Lamp Relay	8Wa-45-3
Engine Control Module	8Wa-45-5	Passenger Door Unlock Relay	8Wa-45-3
Flip-Up Glass Release Motor	8Wa-45-8	Powertrain Control Module	8Wa-45-5
Flip-Up Glass Release Switch	8Wa-45-8	Rear Fog Lamp Relay	8Wa-45-2
Front Fog Lamp Relay	8Wa-45-4	Rear Wiper Motor	8Wa-45-6, 8
Fuse 3	8Wa-45-7	Remote Keyless Entry Module	8Wa-45-8
Fuse 6	8Wa-45-3	Right Courtesy Lamp	8Wa-45-4
Fuse 13	8Wa-45-2	Right Cylinder Lock Switch	8Wa-45-10, 11, 4
Fuse 32	8Wa-45-2	Right Door Lock Switch	8Wa-45-4, 7
Fuse 34	8Wa-45-2	Right Front Door Ajar Switch	8Wa-45-9
G111	8Wa-45-7	Right Front Door Lock Motor/Ajar Switch	8Wa-45-10, 11
G202	8Wa-45-2, 6	Right Rear Door Ajar Switch	8Wa-45-9
G300	8Wa-45-9	Right Remote Radio Switch	8Wa-45-5
G302	8Wa-45-9	Right Visor/Vanity Lamp	8Wa-45-3
Hazard Switch/Combination Flasher	8Wa-45-5	Tailgate Cylinder Lock Switch	8Wa-45-10, 11, 8
High Beam Relay	8Wa-45-3	Tailgate Lock Motor/Ajar Switch	8Wa-45-7, 8
Hood Ajar Switch	8Wa-45-7	Washer Pump	8Wa-45-6
Horn Relay	8Wa-45-7	Wiper High/Low Relay	8Wa-45-4
Ignition Switch	8Wa-45-6	Wiper On/Off Relay	8Wa-45-4
Instrument Cluster	8Wa-45-6		

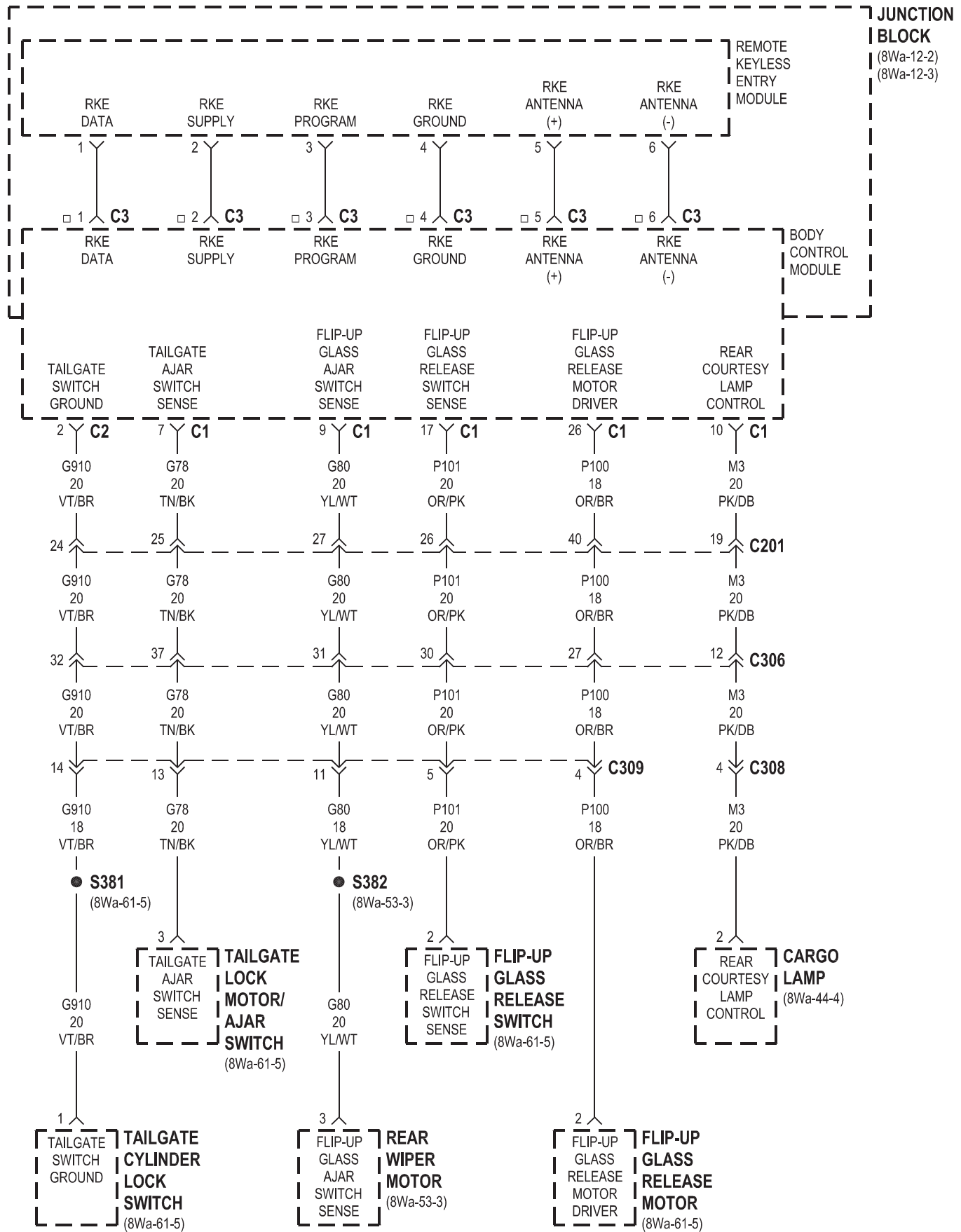


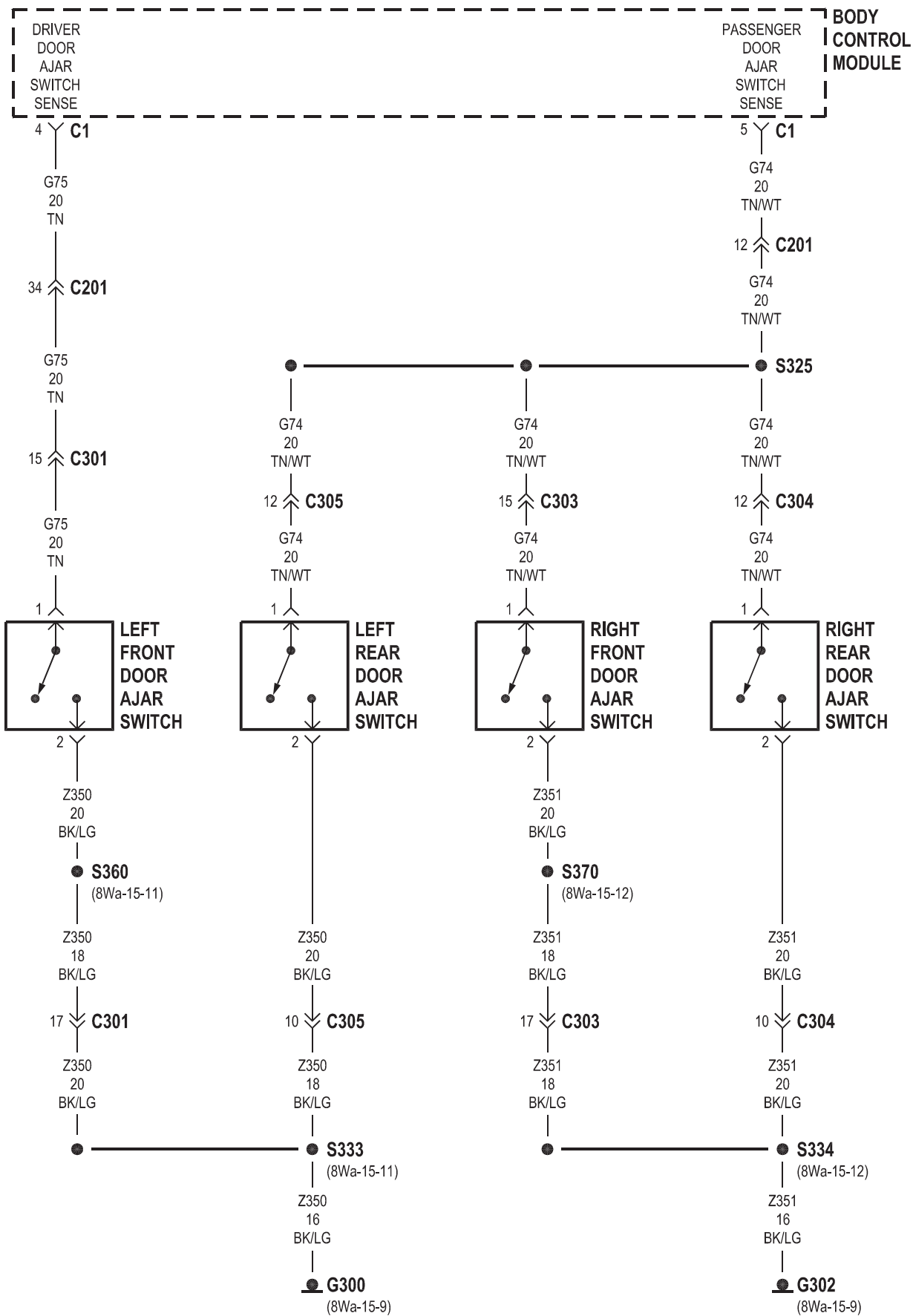


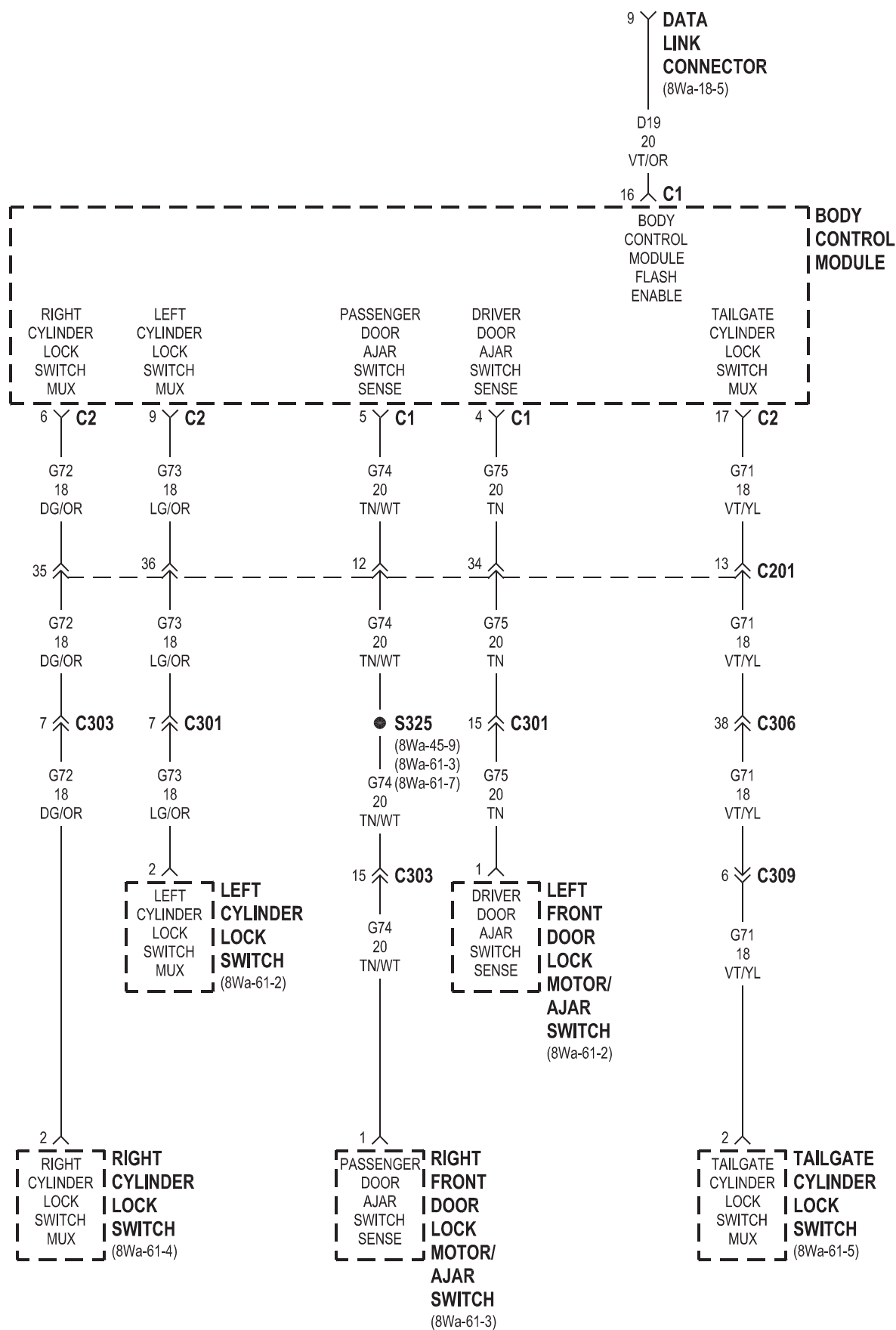








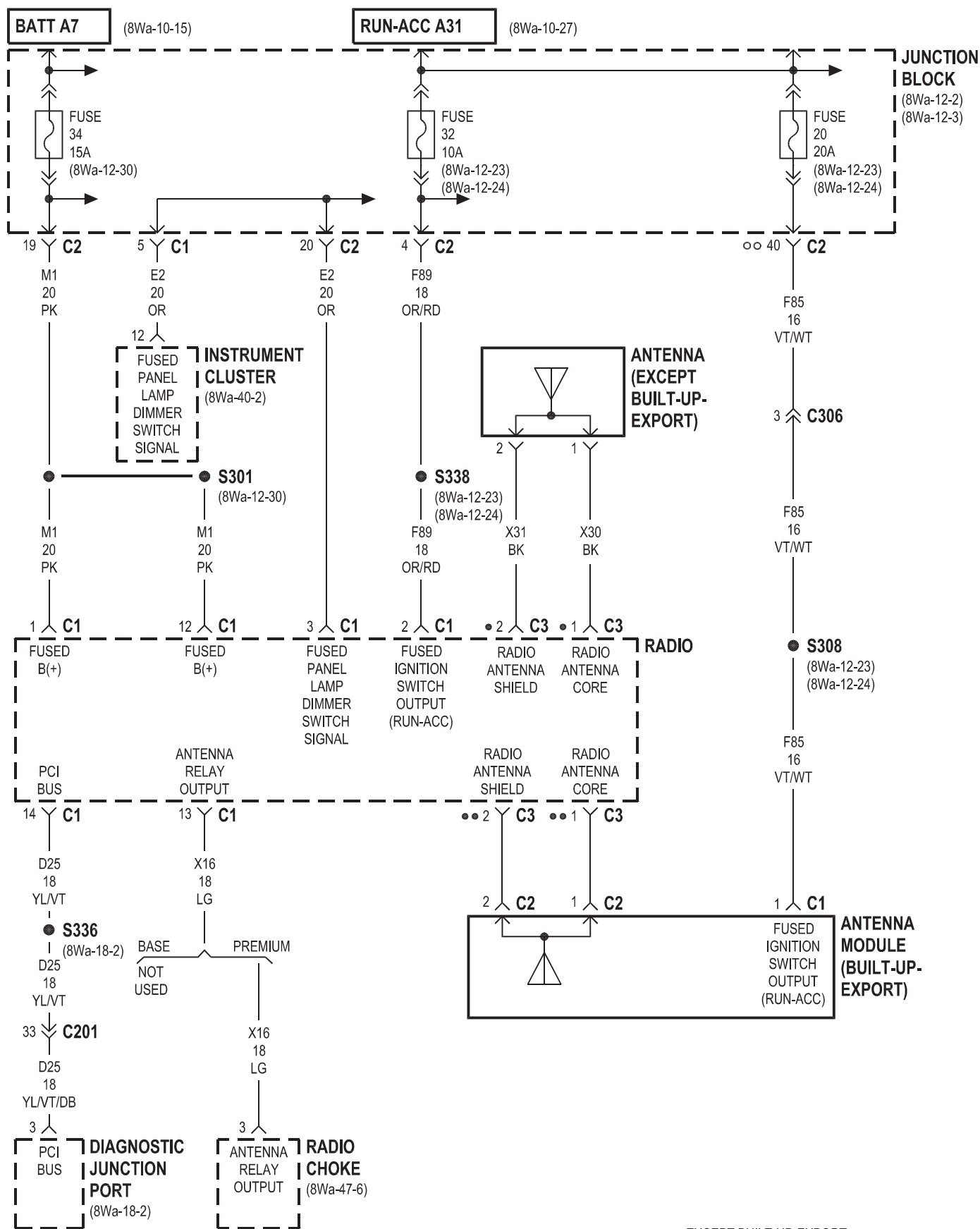


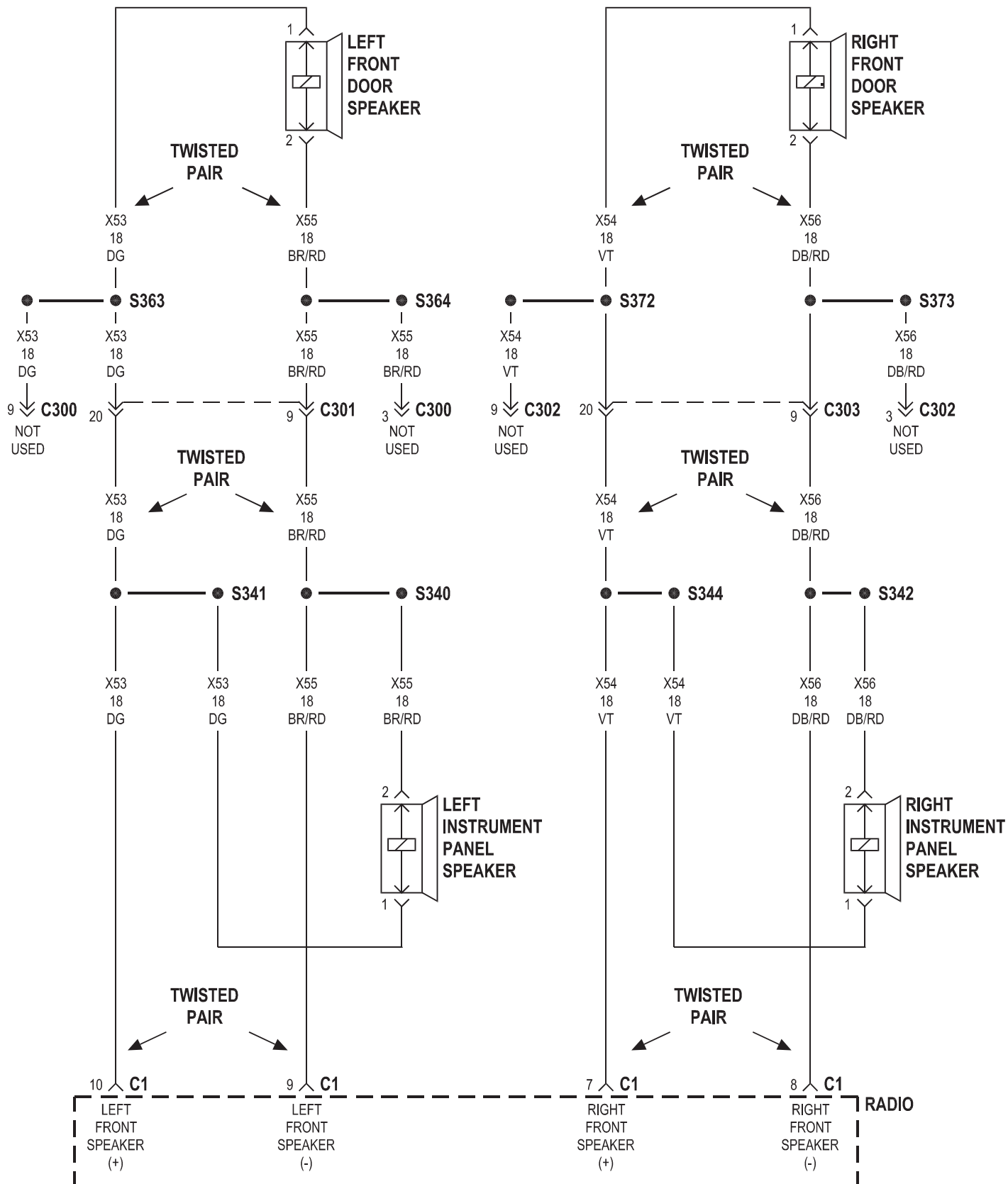


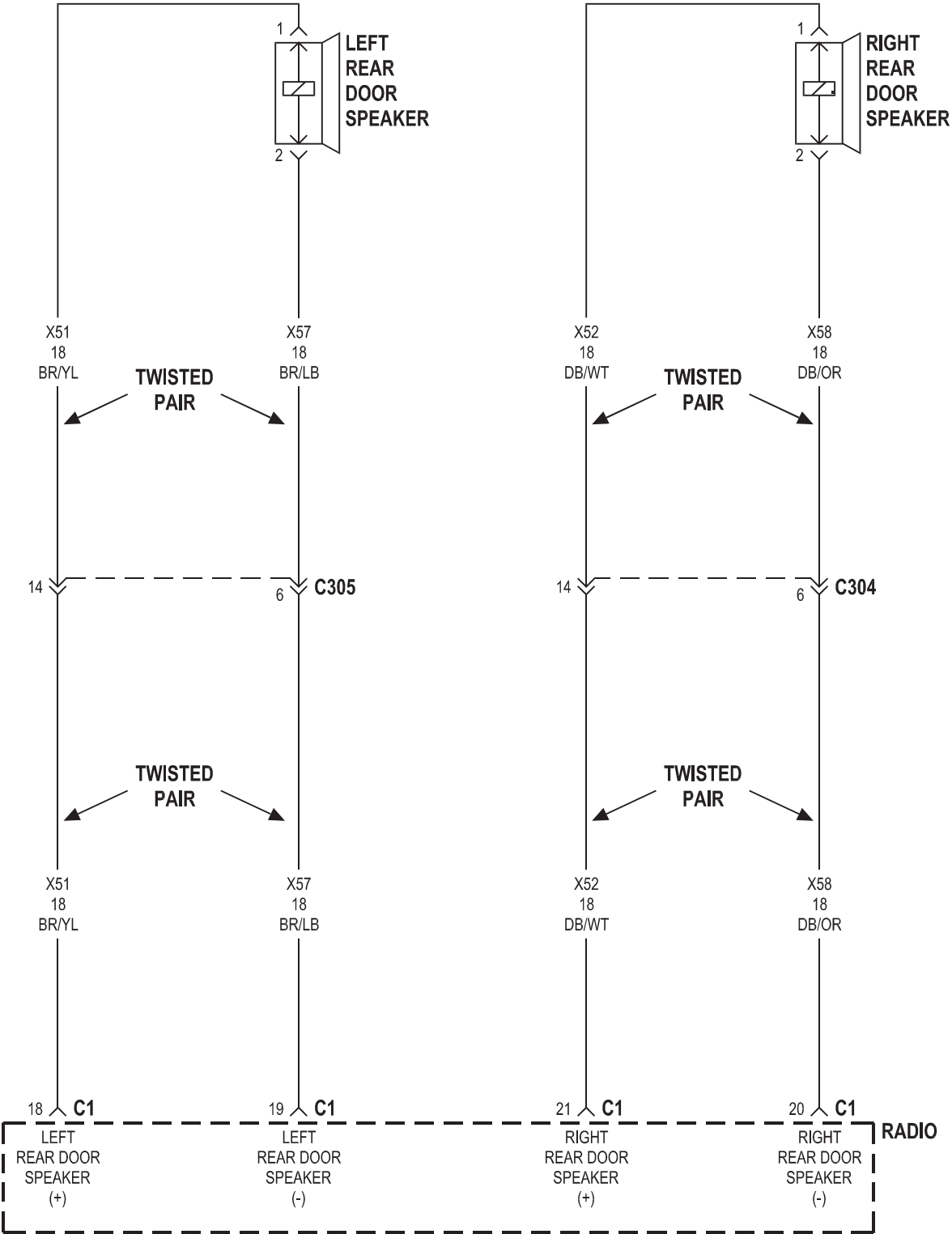


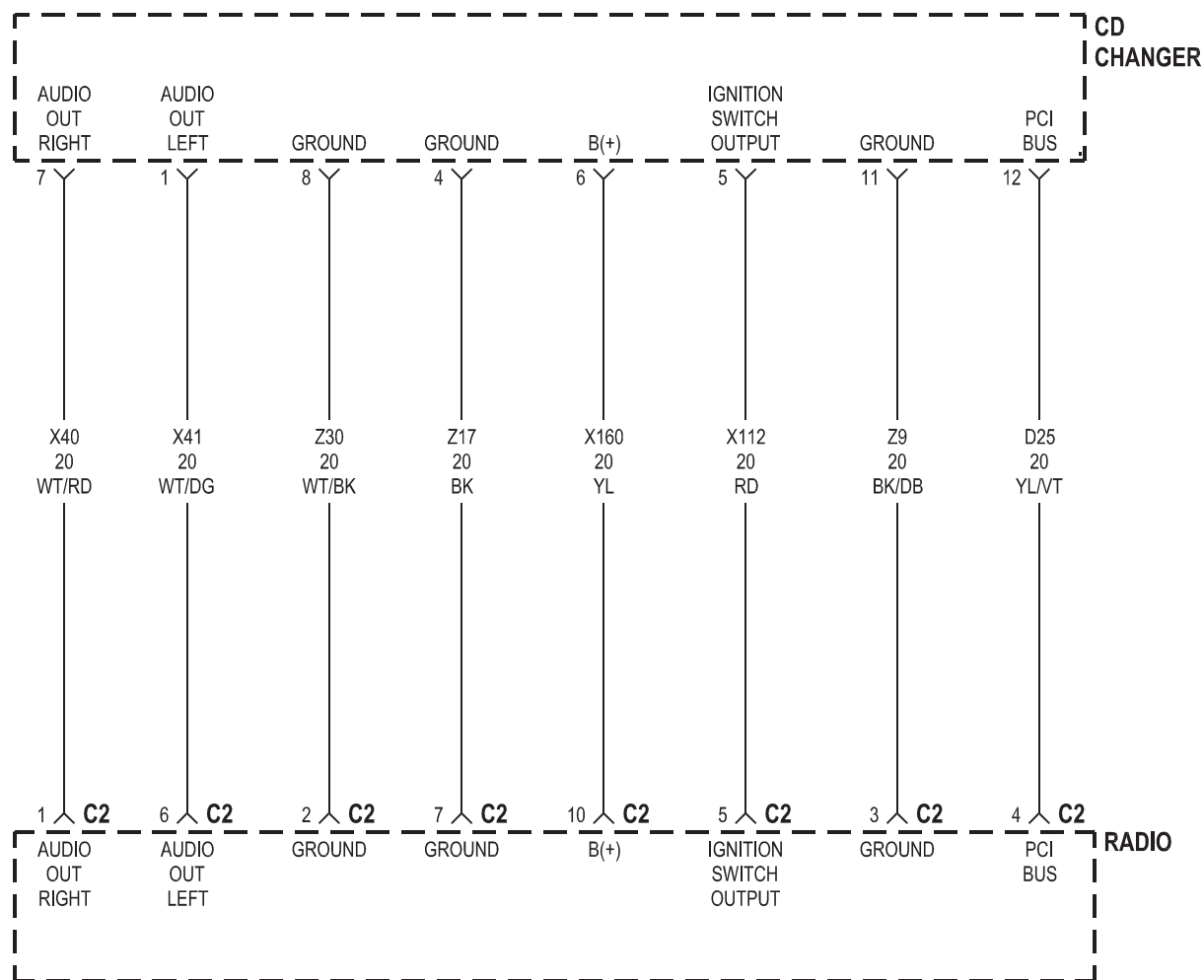
8W-47 AUDIO SYSTEM

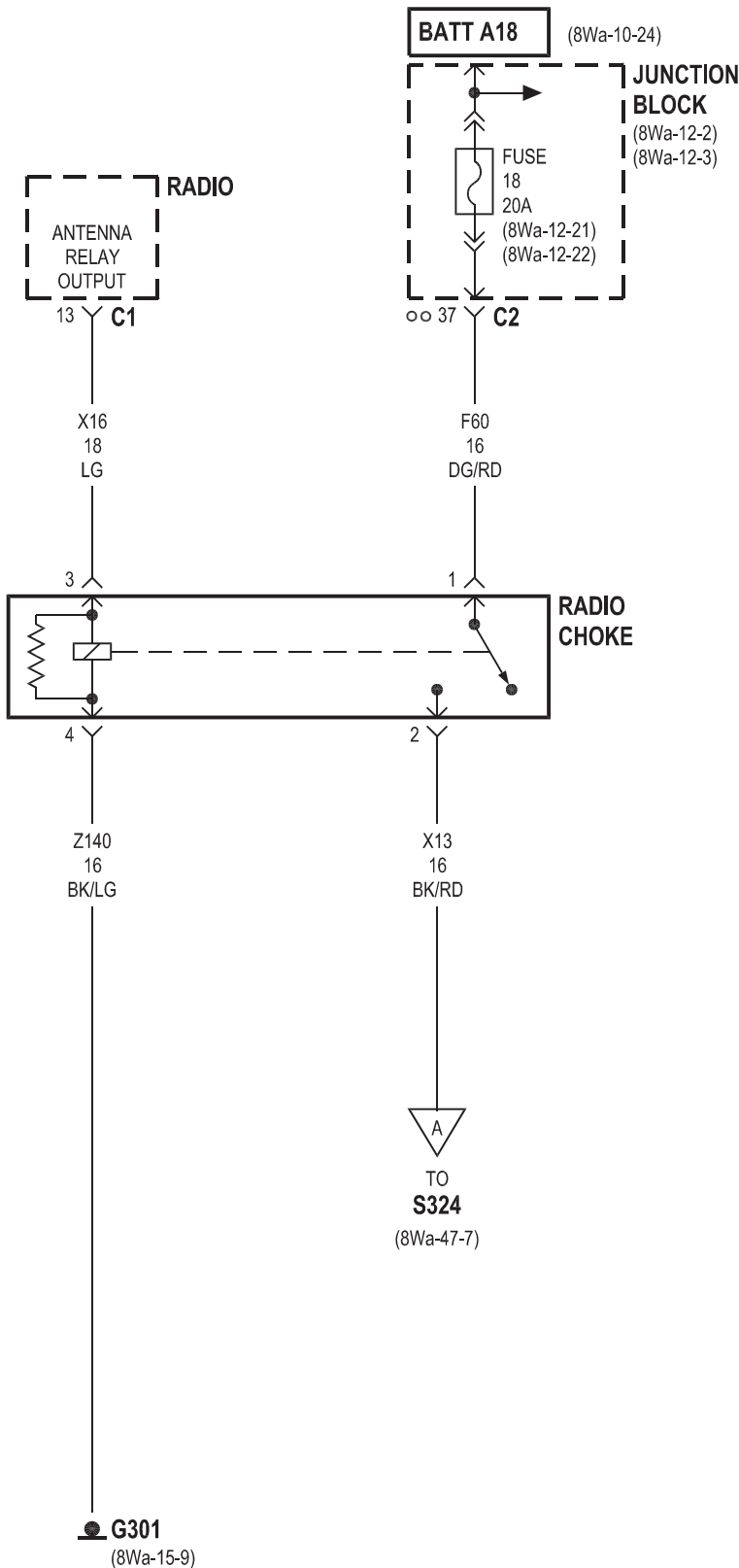
Component	Page	Component	Page
Antenna	8Wa-47-2	Instrument Cluster	8Wa-47-2
Antenna Module	8Wa-47-2	Junction Block	8Wa-47-2, 6
Body Control Module	8Wa-47-9	Left Front Door Speaker	8Wa-47-3, 7, 8
Cd Changer	8Wa-47-5	Left Instrument Panel Speaker	8Wa-47-3, 7
Clockspring	8Wa-47-9	Left Rear Door Speaker	8Wa-47-4, 8
Diagnostic Junction Port	8Wa-47-2, 9	Left Remote Radio Switch	8Wa-47-9
Fuse 18	8Wa-47-6	Radio	8Wa-47-2, 3, 4, 5, 6, 7, 8, 9
Fuse 20	8Wa-47-2	Radio Choke	8Wa-47-2, 6, 7
Fuse 32	8Wa-47-2	Right Front Door Speaker	8Wa-47-3, 7, 8
Fuse 34	8Wa-47-2	Right Instrument Panel Speaker	8Wa-47-3, 7
G200	8Wa-47-7	Right Rear Door Speaker	8Wa-47-4, 8
G301	8Wa-47-6	Right Remote Radio Switch	8Wa-47-9

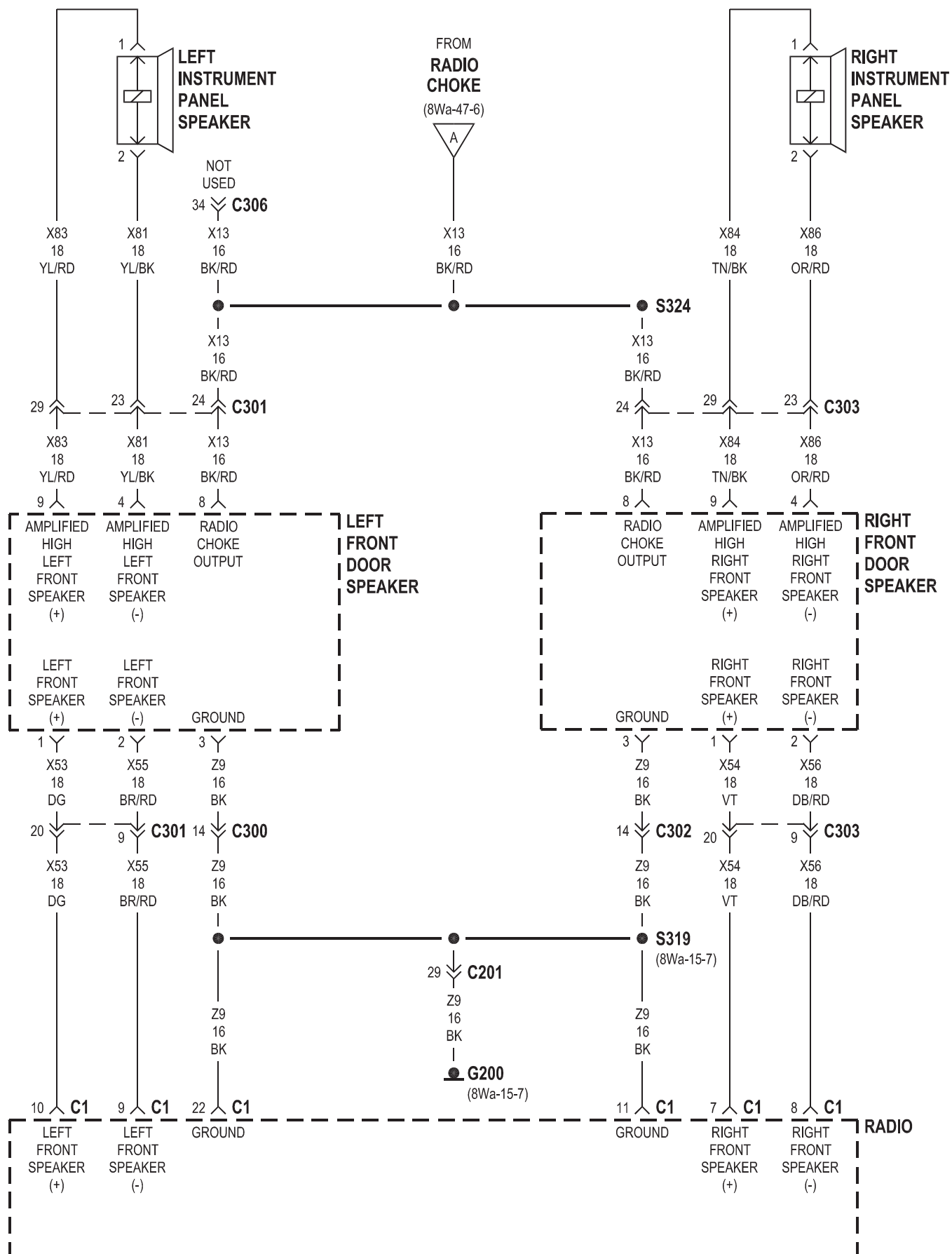


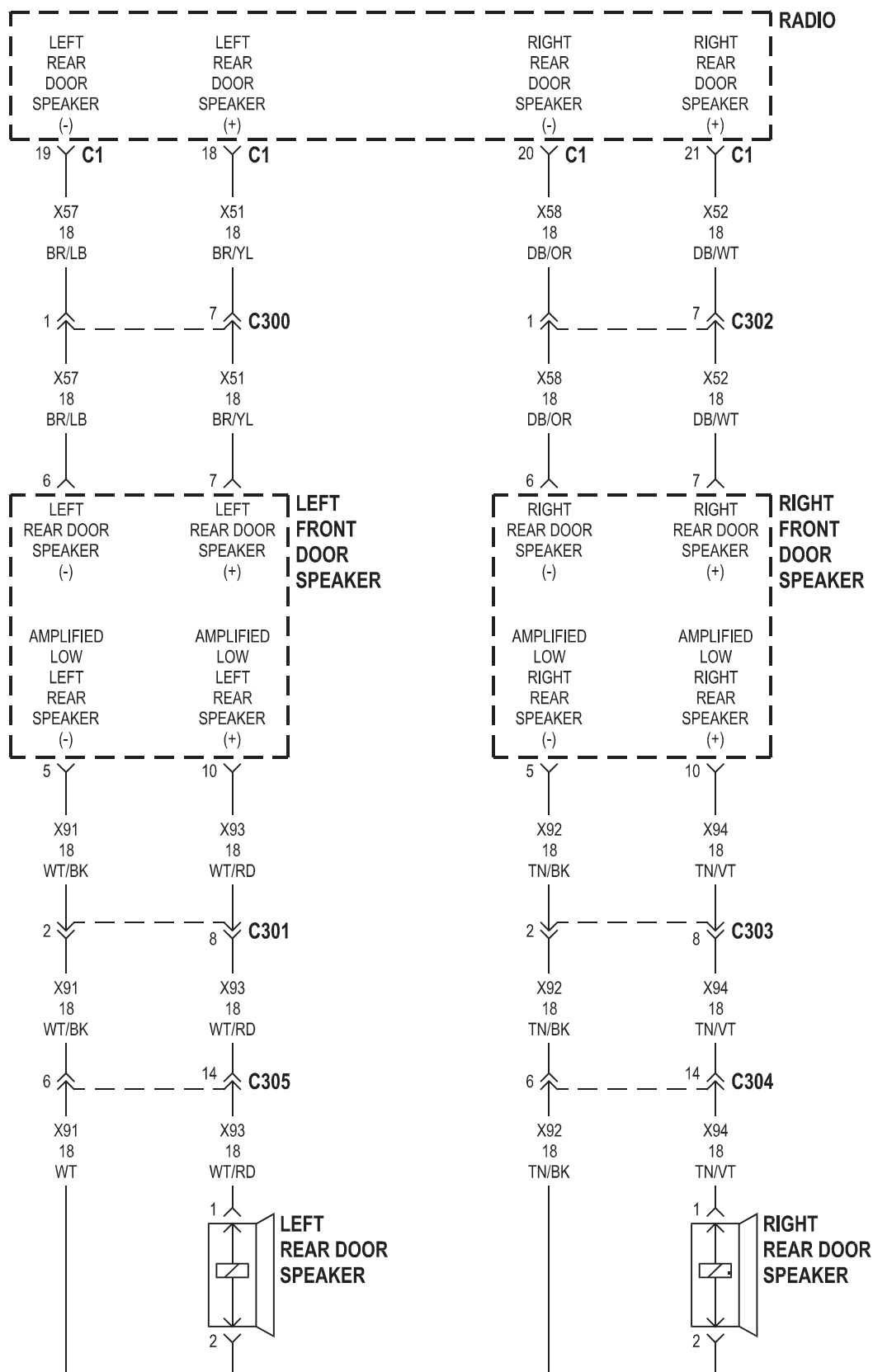


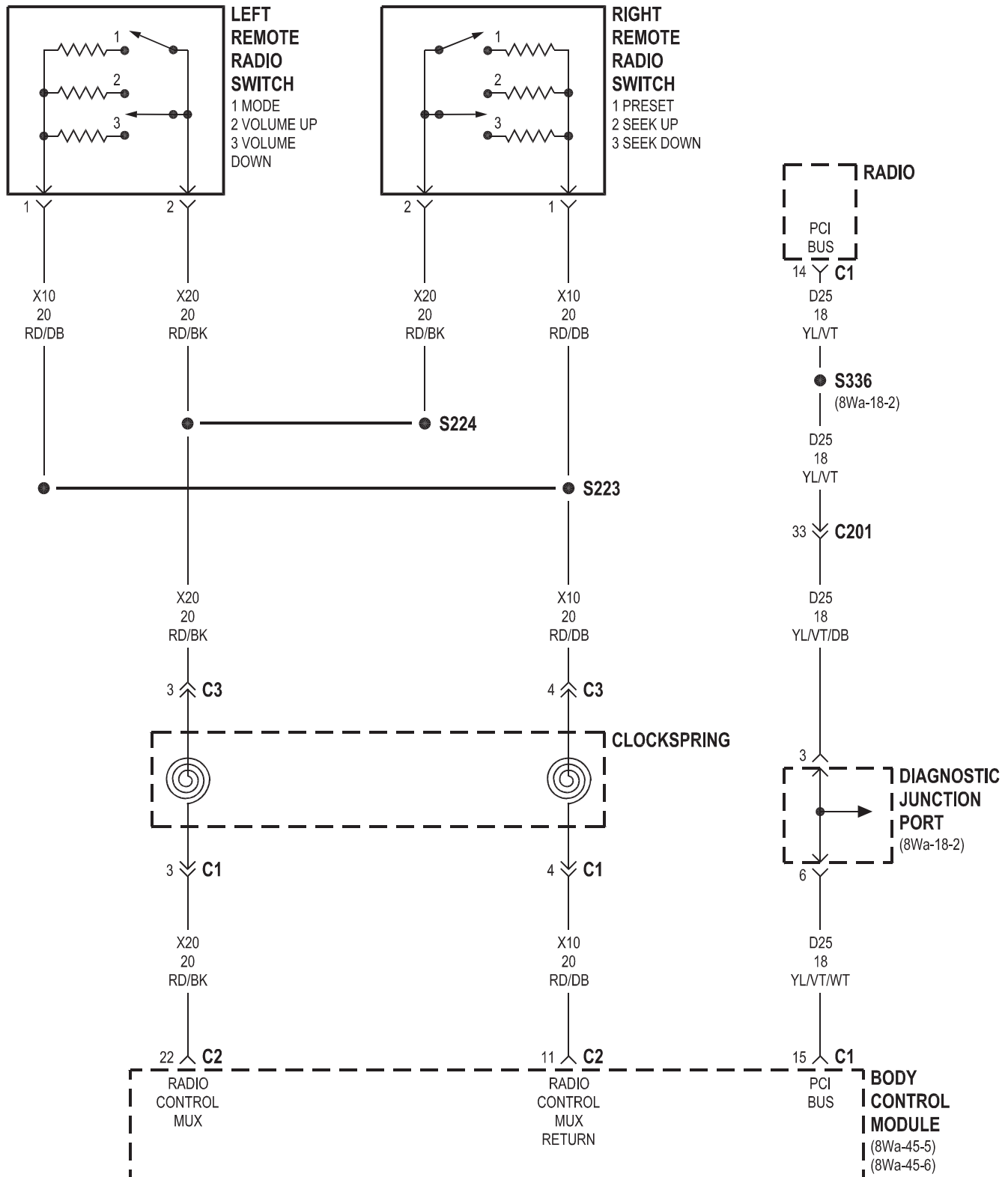






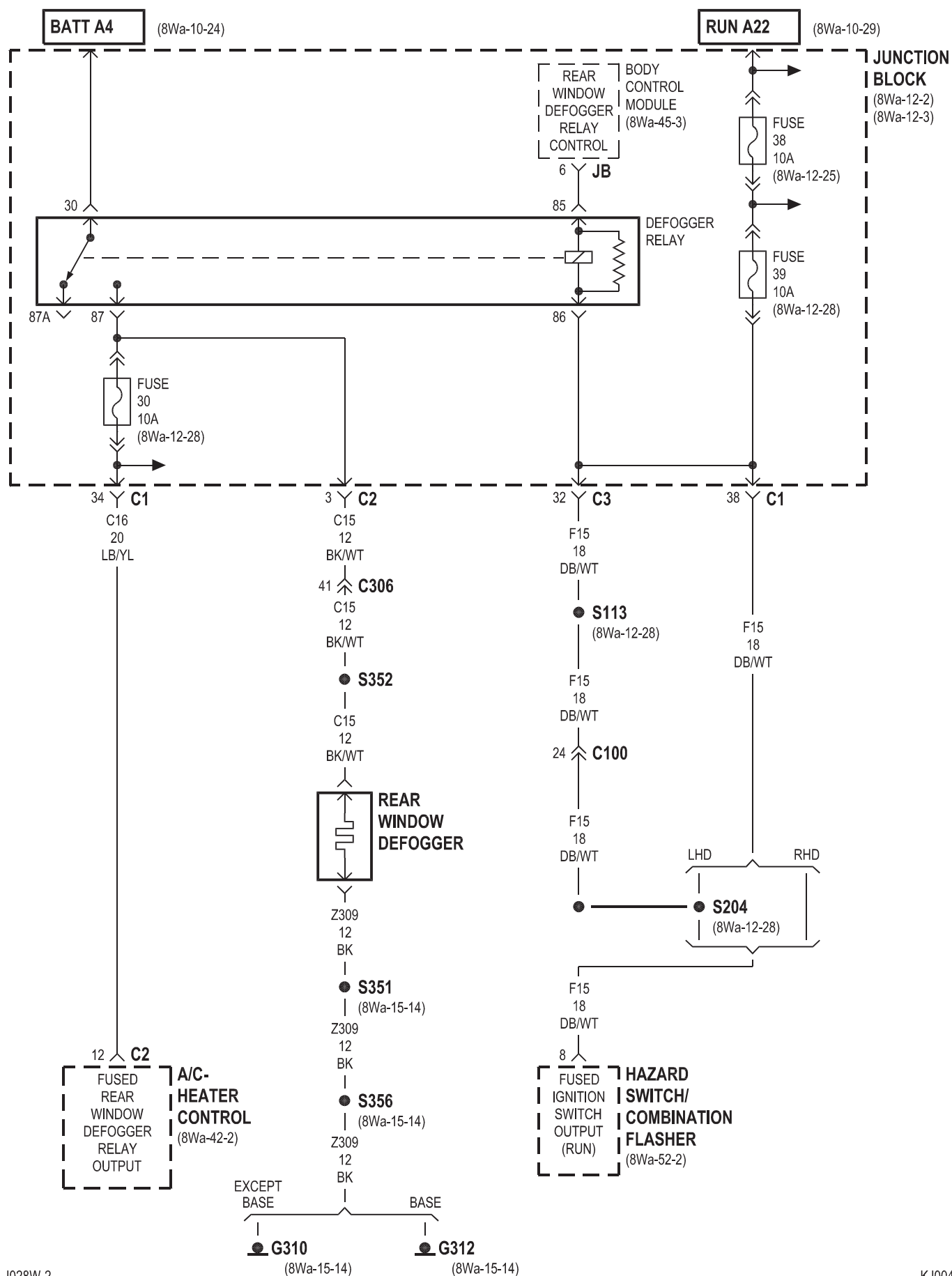






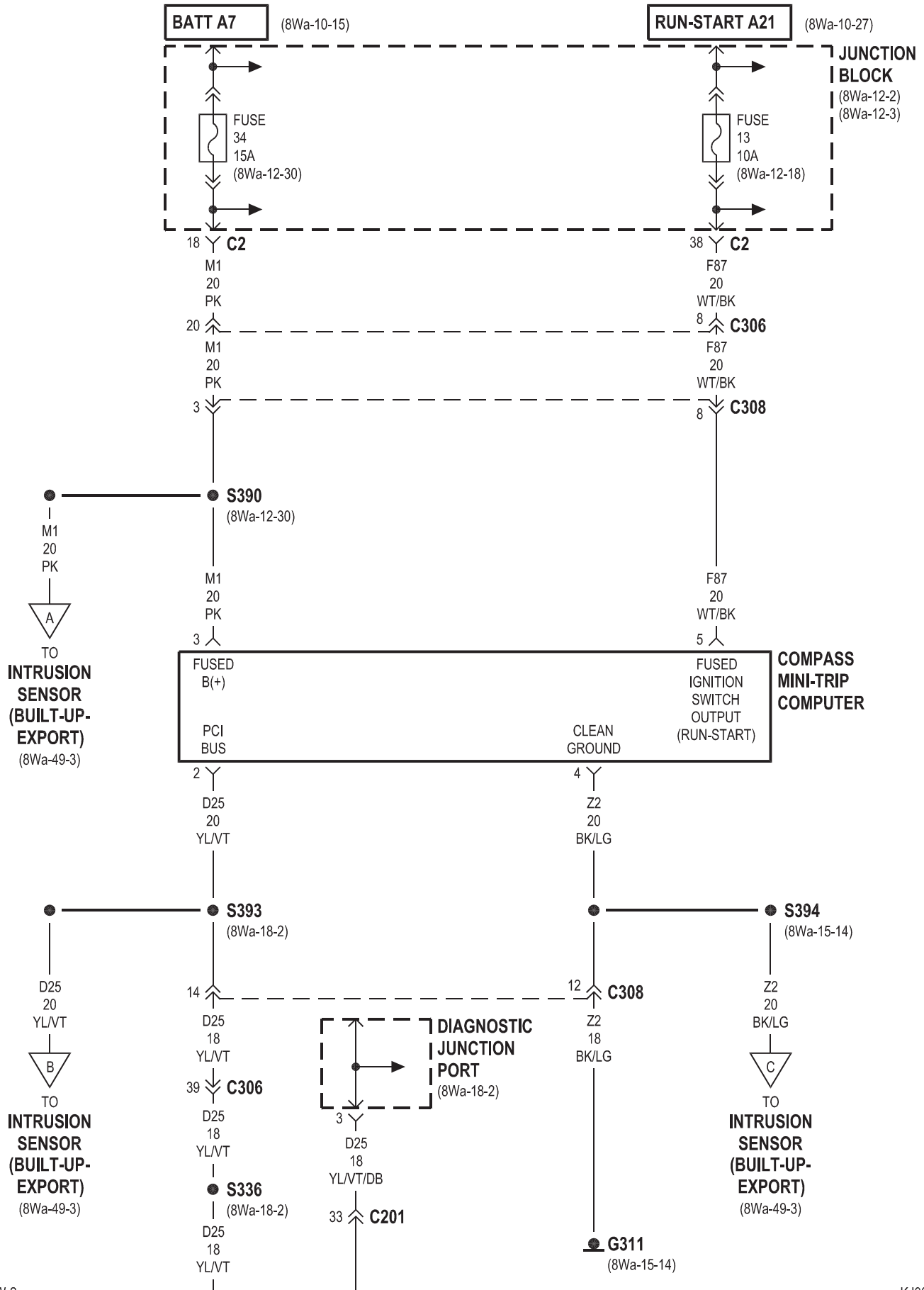
8W-48 REAR WINDOW DEFOGGER

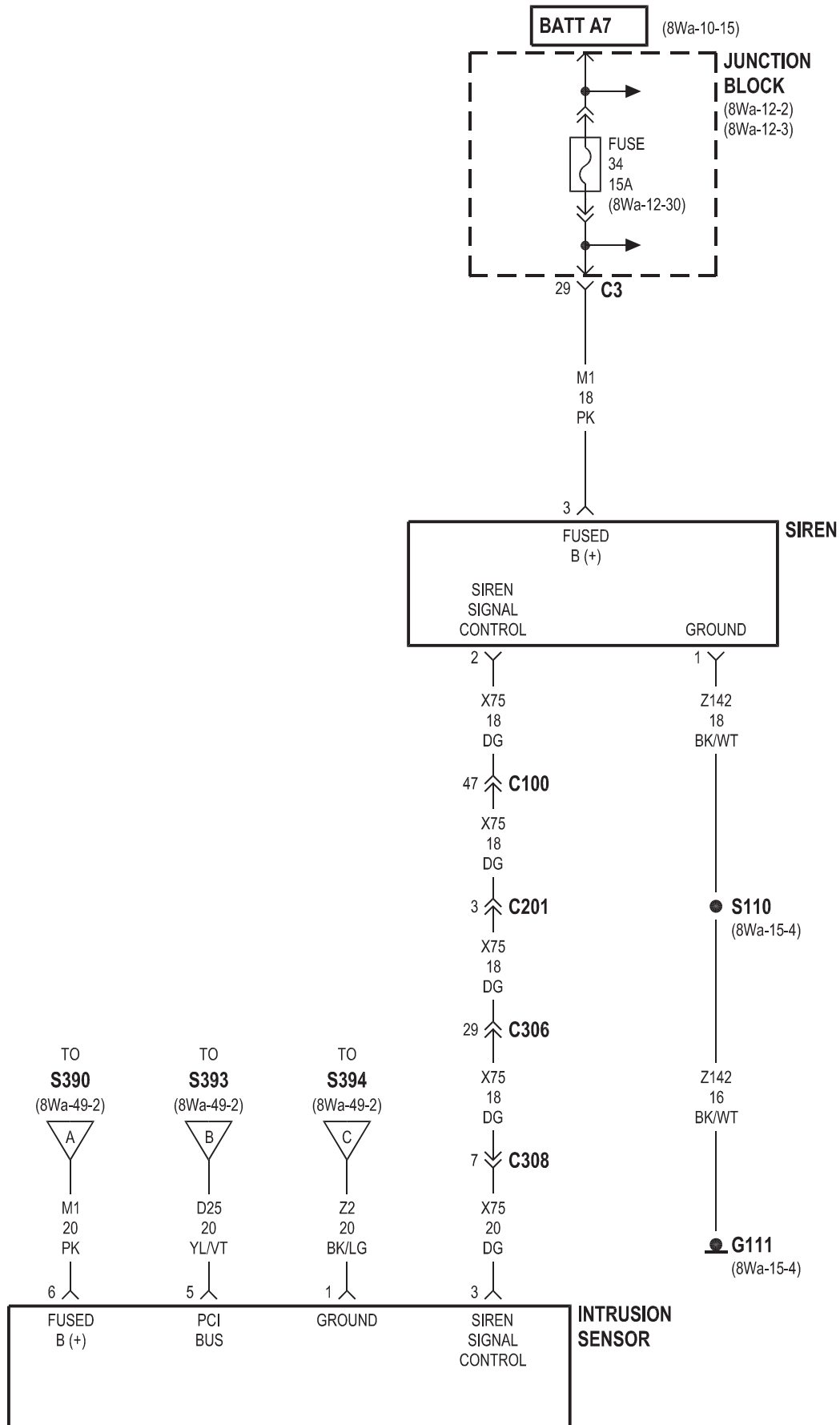
Component	Page	Component	Page
A/C- Heater Control	8Wa-48-2	G310	8Wa-48-2
Body Control Module	8Wa-48-2	G312	8Wa-48-2
Defogger Relay	8Wa-48-2	Hazard Switch/Combination Flasher	8Wa-48-2
Fuse 30	8Wa-48-2	Junction Block	8Wa-48-2
Fuse 38	8Wa-48-2	Rear Window Defogger	8Wa-48-2
Fuse 39	8Wa-48-2		

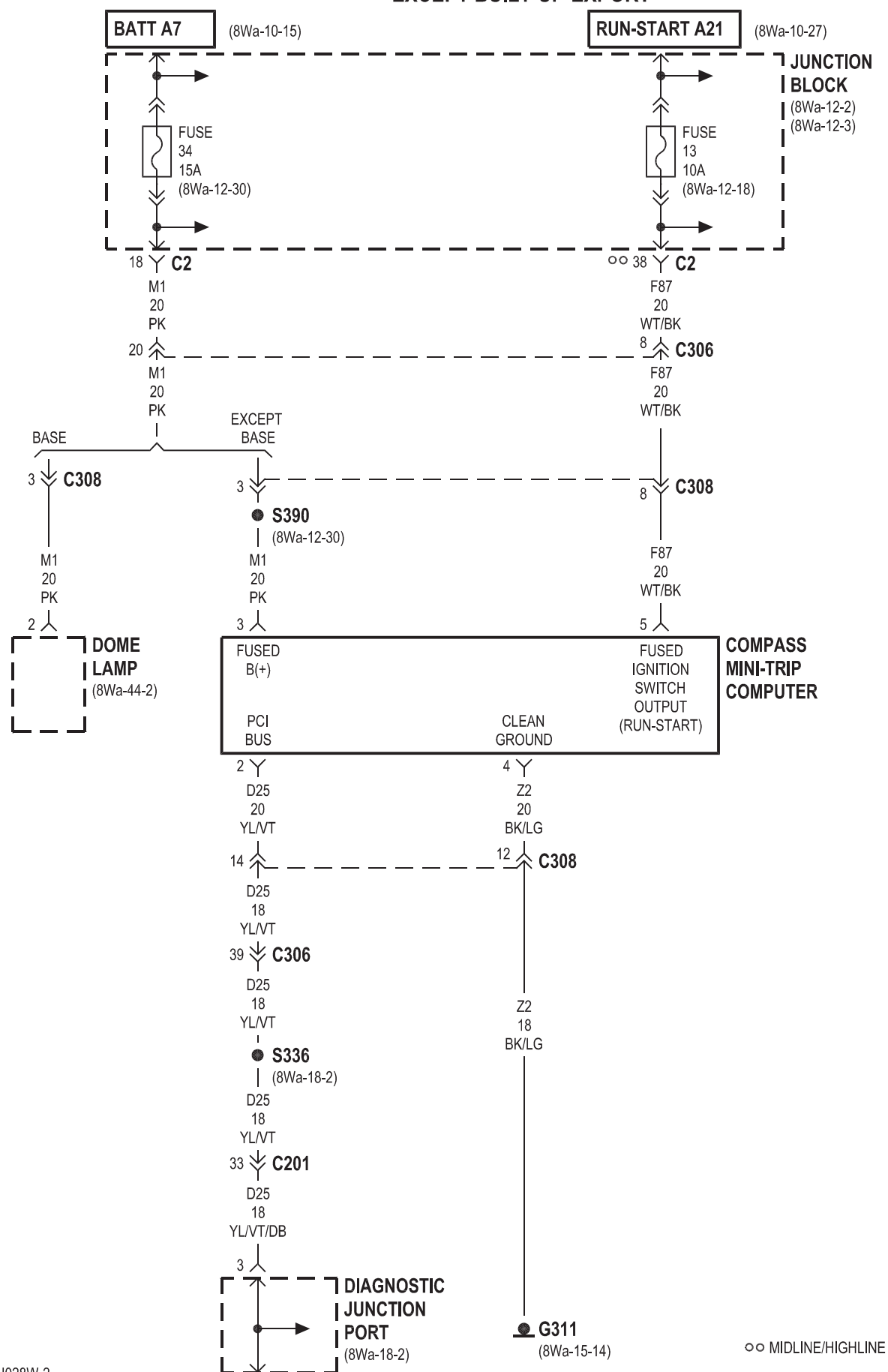


8W-49 OVERHEAD CONSOLE

Component	Page	Component	Page
Compass Mini-Trip Computer	8Wa-49-2, 4	G111	8Wa-49-3
Diagnostic Junction Port	8Wa-49-2, 4	G311	8Wa-49-2, 4
Dome Lamp	8Wa-49-4	Intrusion Sensor	8Wa-49-2, 3
Fuse 13	8Wa-49-2, 4	Junction Block	8Wa-49-2, 3, 4
Fuse 34	8Wa-49-2, 3, 4	Siren	8Wa-49-3

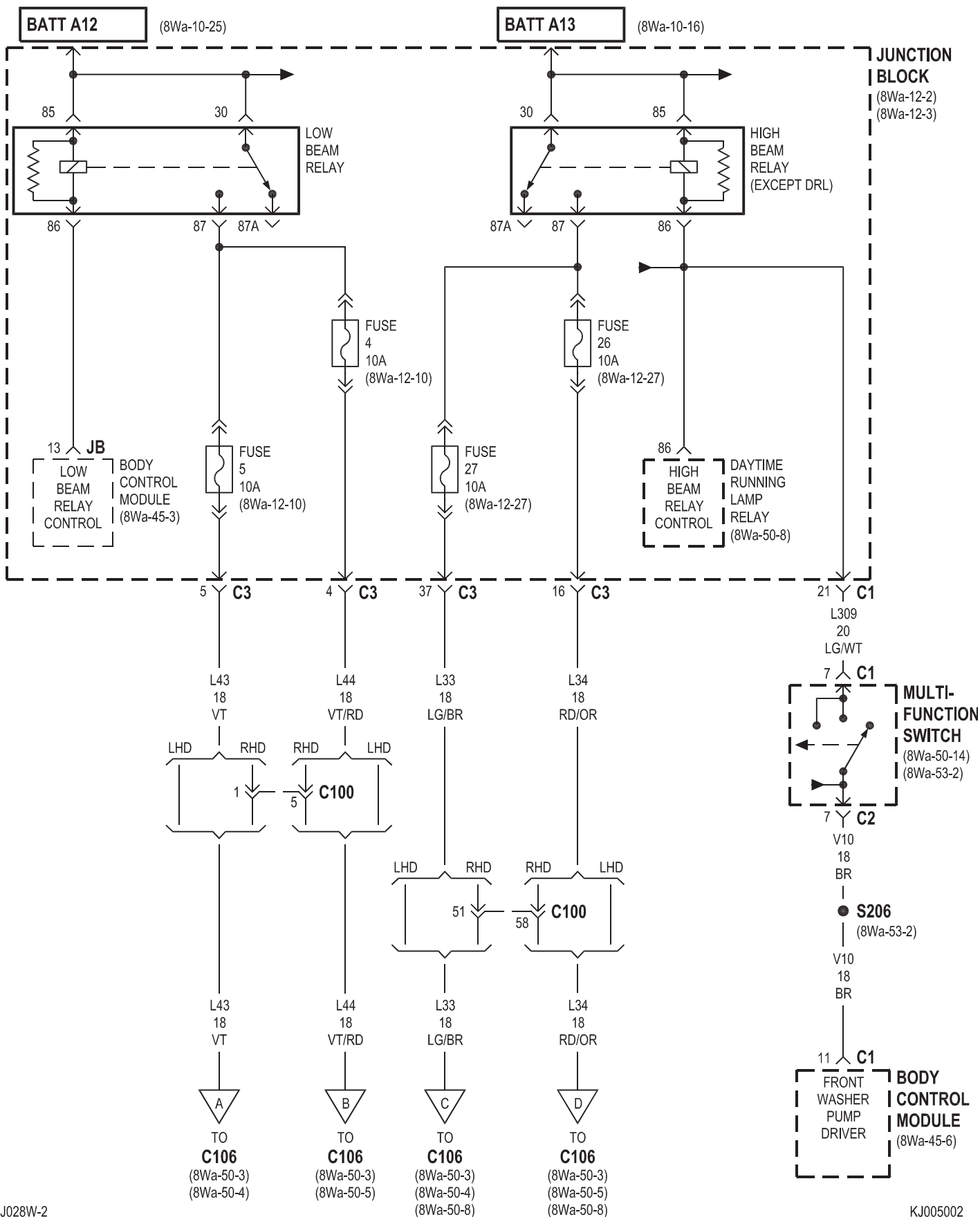


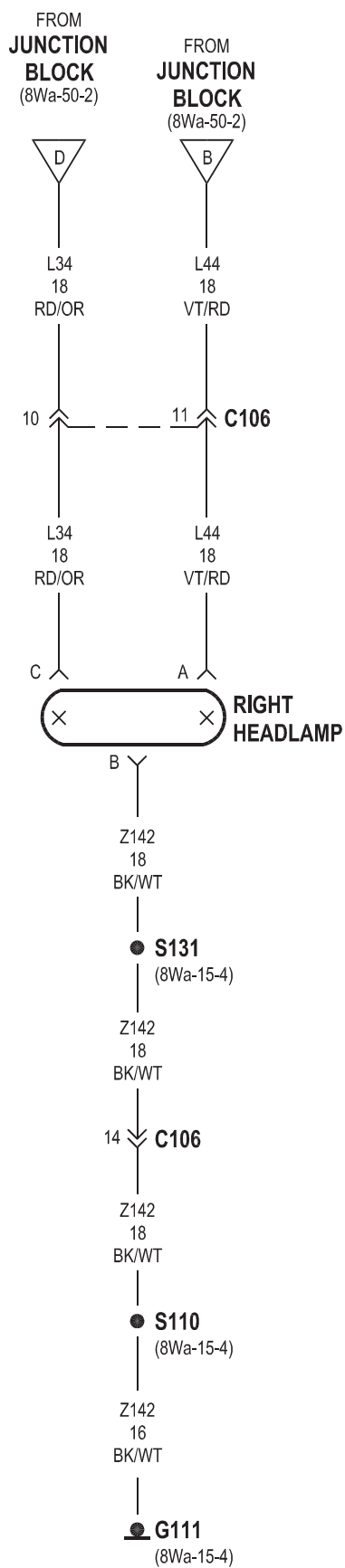
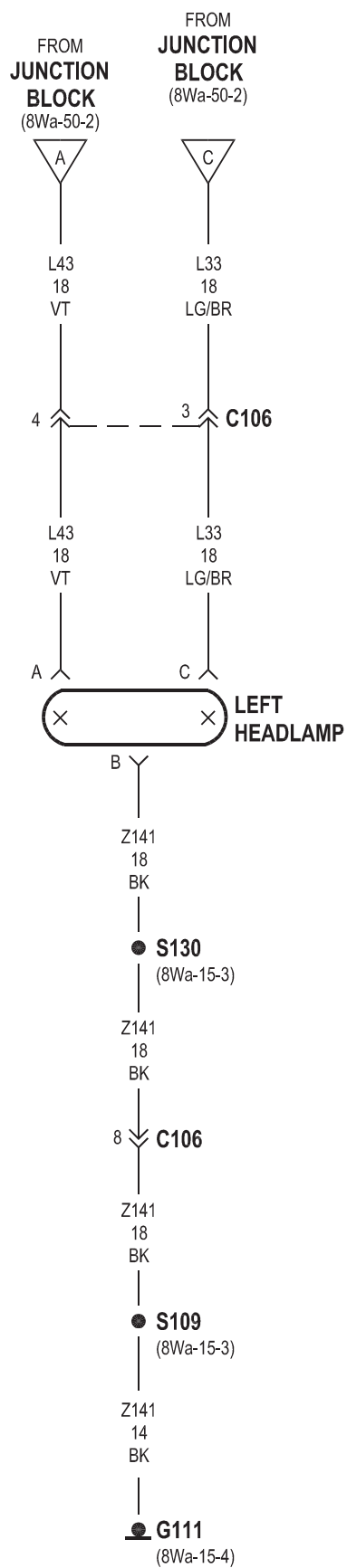


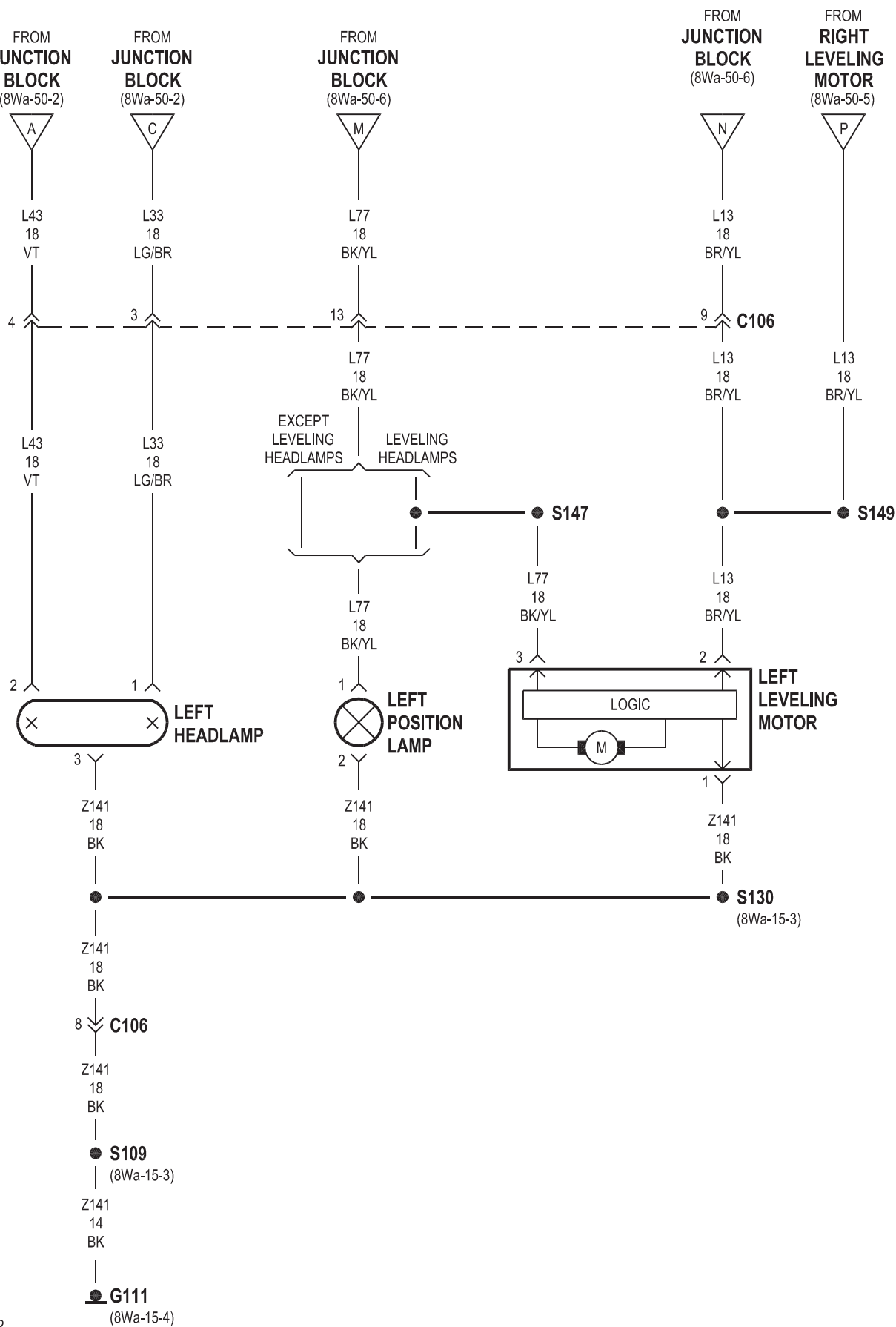


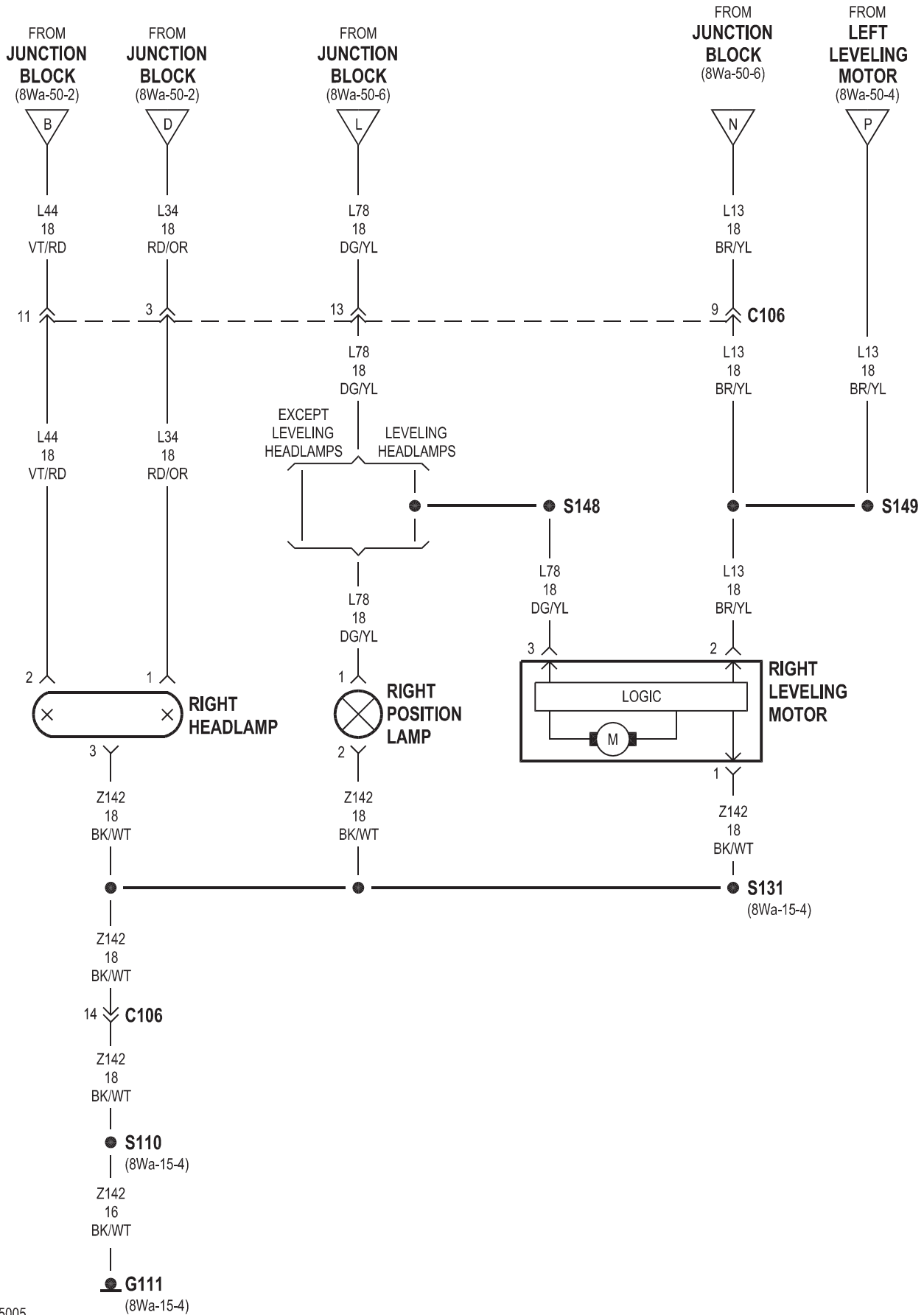
8W-50 FRONT LIGHTING

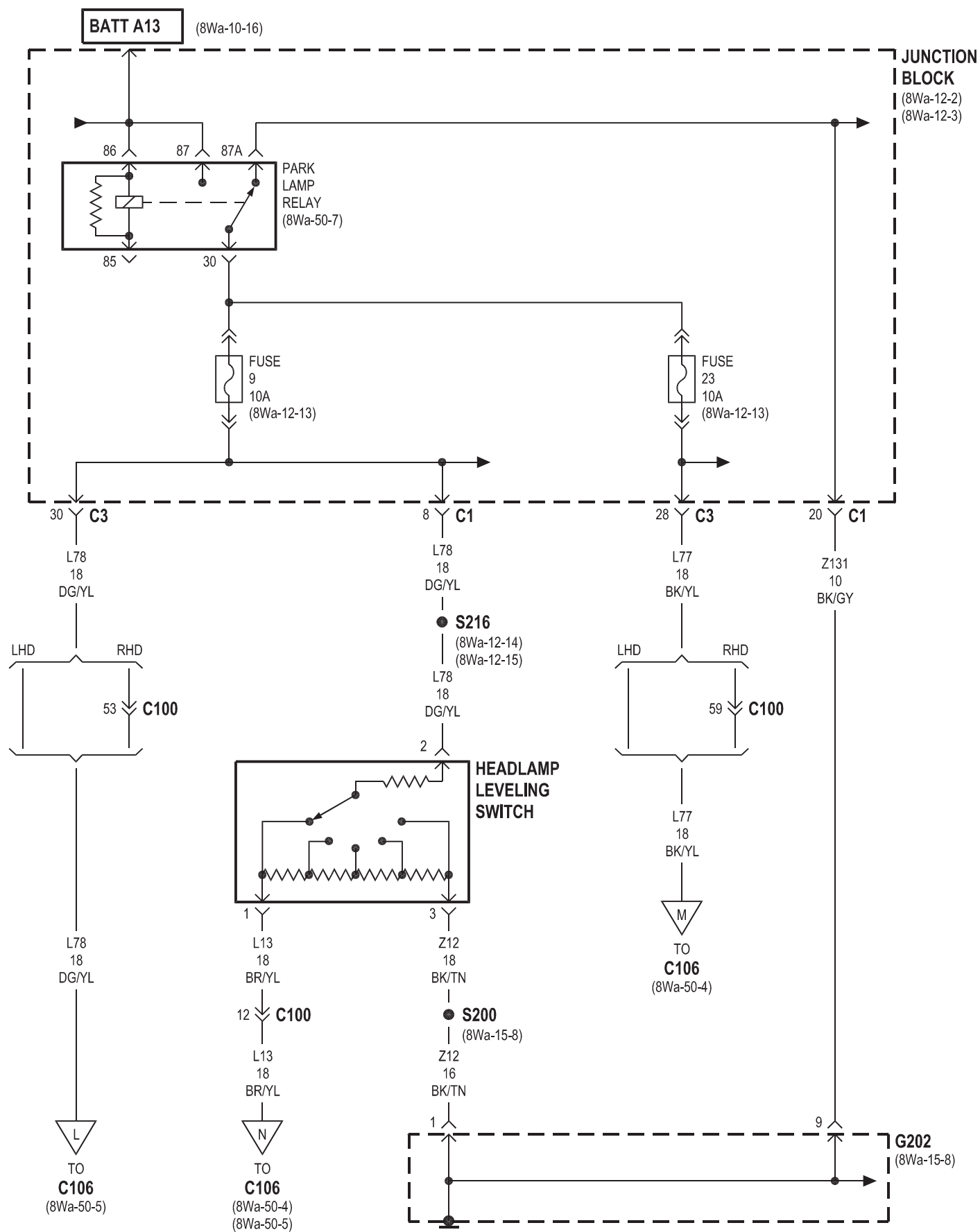
Component	Page	Component	Page
Body Control Module	8Wa-50-14, 2, 7, 8	Left Front Park/Turn Signal Lamp . . .	8Wa-50-11, 9
Daytime Running Lamp Relay	8Wa-50-14, 2, 8	Left Headlamp	8Wa-50-3, 4
Front Fog Lamp Relay	8Wa-50-8	Left Leveling Motor	8Wa-50-4, 5
Fuse 3	8Wa-50-8	Left Position Lamp	8Wa-50-4
Fuse 4	8Wa-50-2	Left Side Marker Lamp	8Wa-50-9
Fuse 5	8Wa-50-2	Left Side Repeater Lamp	8Wa-50-11
Fuse 9	8Wa-50-6, 7, 8	Low Beam Relay	8Wa-50-2
Fuse 19	8Wa-50-8	Multi- Function Switch	8Wa-50-14, 2
Fuse 23	8Wa-50-6, 7	Park Lamp Relay	8Wa-50-6, 7
Fuse 26	8Wa-50-2, 8	Power Distribution Center	8Wa-50-8
Fuse 27	8Wa-50-2, 8	Right Fog Lamp	8Wa-50-10, 12, 13, 8
G111	8Wa-50-10, 11, 12, 13, 3, 4, 5, 9	Right Front Park/Turn Signal Lamp .	8Wa-50-10, 11, 12, 13
G202	8Wa-50-6	Right Headlamp	8Wa-50-3, 5
Hazard Switch/Combination Flasher	8Wa-50-7	Right Leveling Motor	8Wa-50-4, 5
Headlamp Leveling Switch	8Wa-50-6	Right Position Lamp	8Wa-50-5
High Beam Relay	8Wa-50-14, 2	Right Side Marker Lamp	8Wa-50-10
Junction Block . 8Wa-50-10, 11, 12, 13, 14, 2, 3, 4, 5, 6, 7, 8, 9		Right Side Repeater Lamp	8Wa-50-11, 12, 13
Left Fog Lamp	8Wa-50-8, 9		

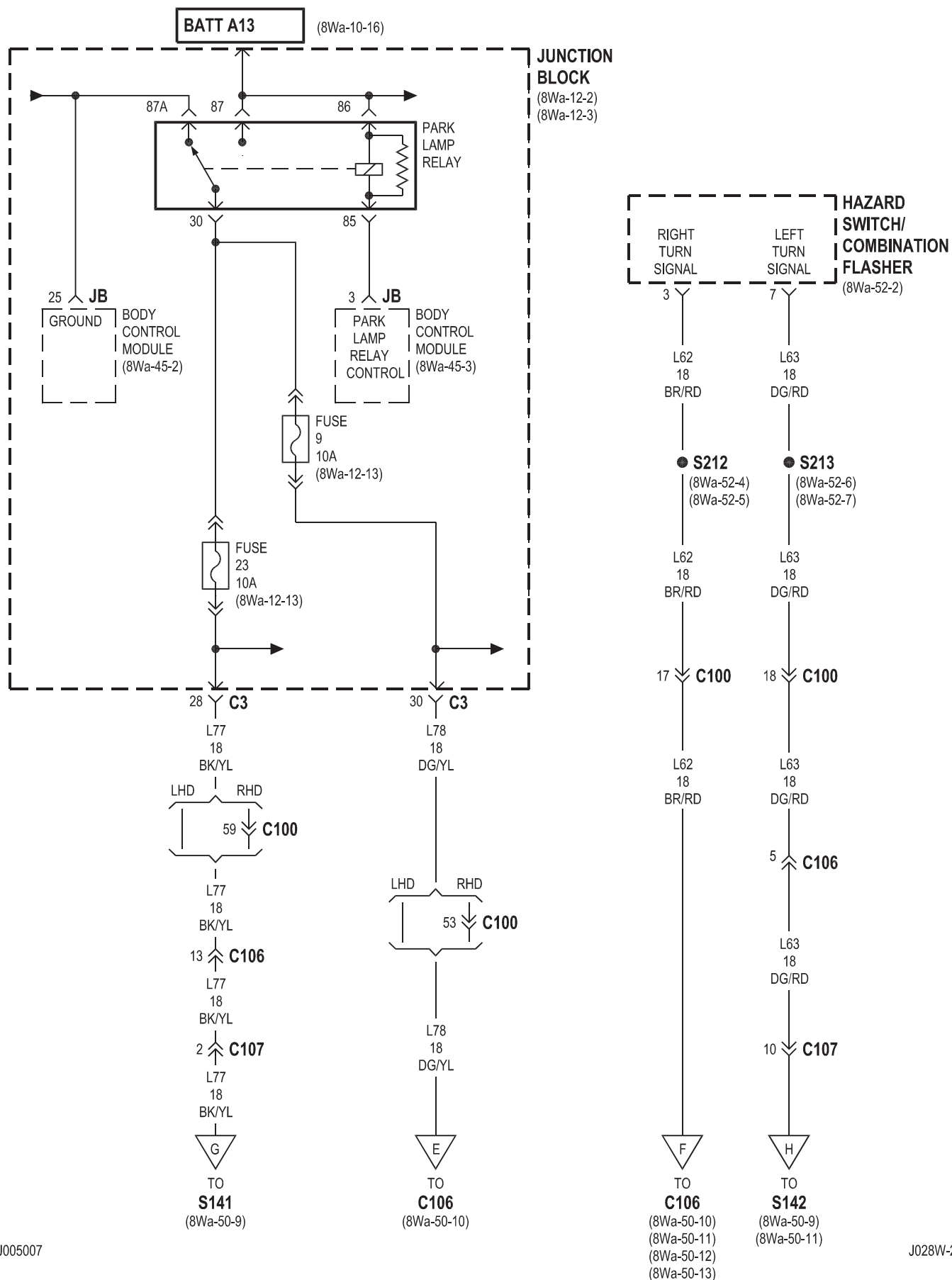




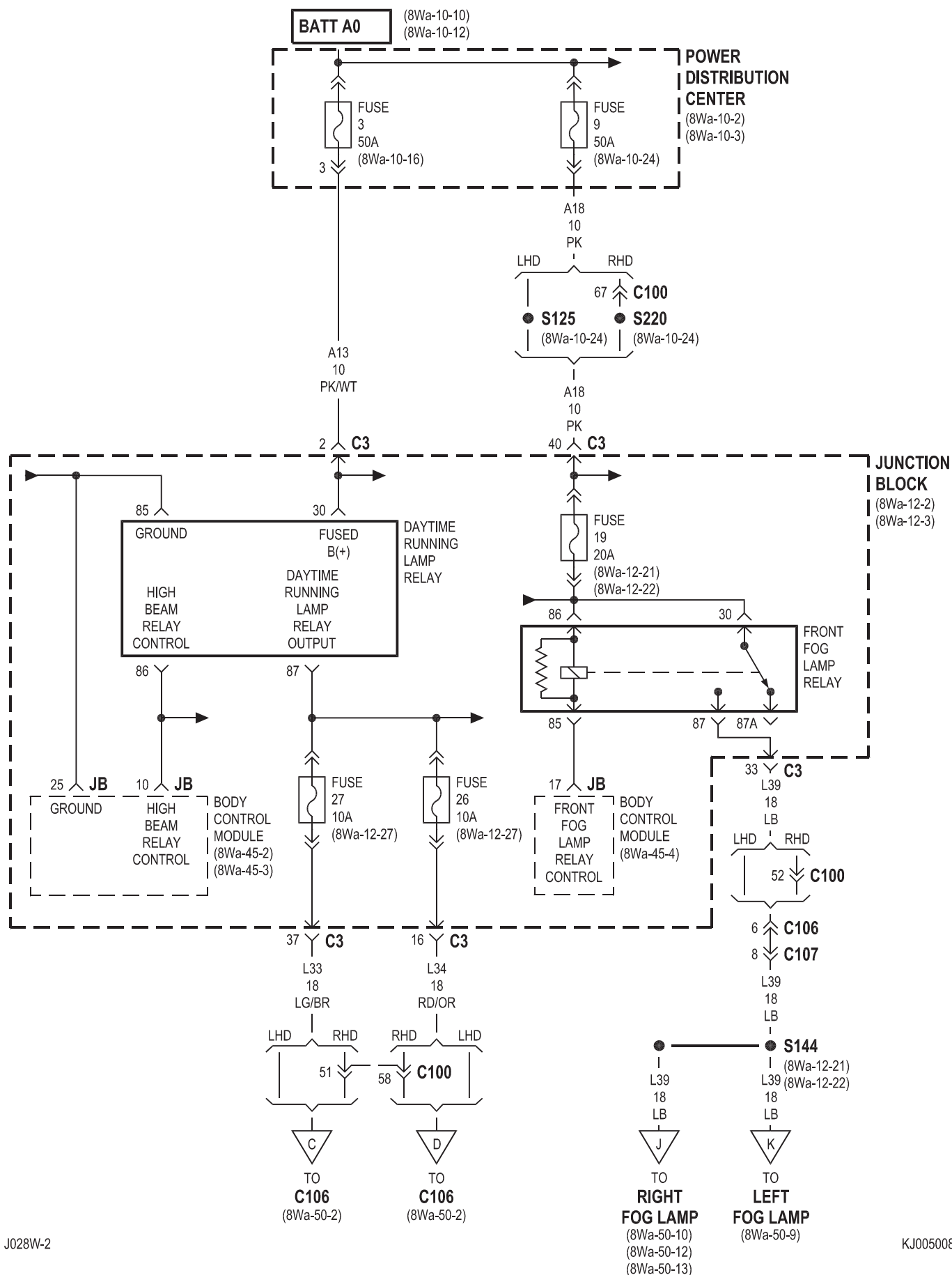


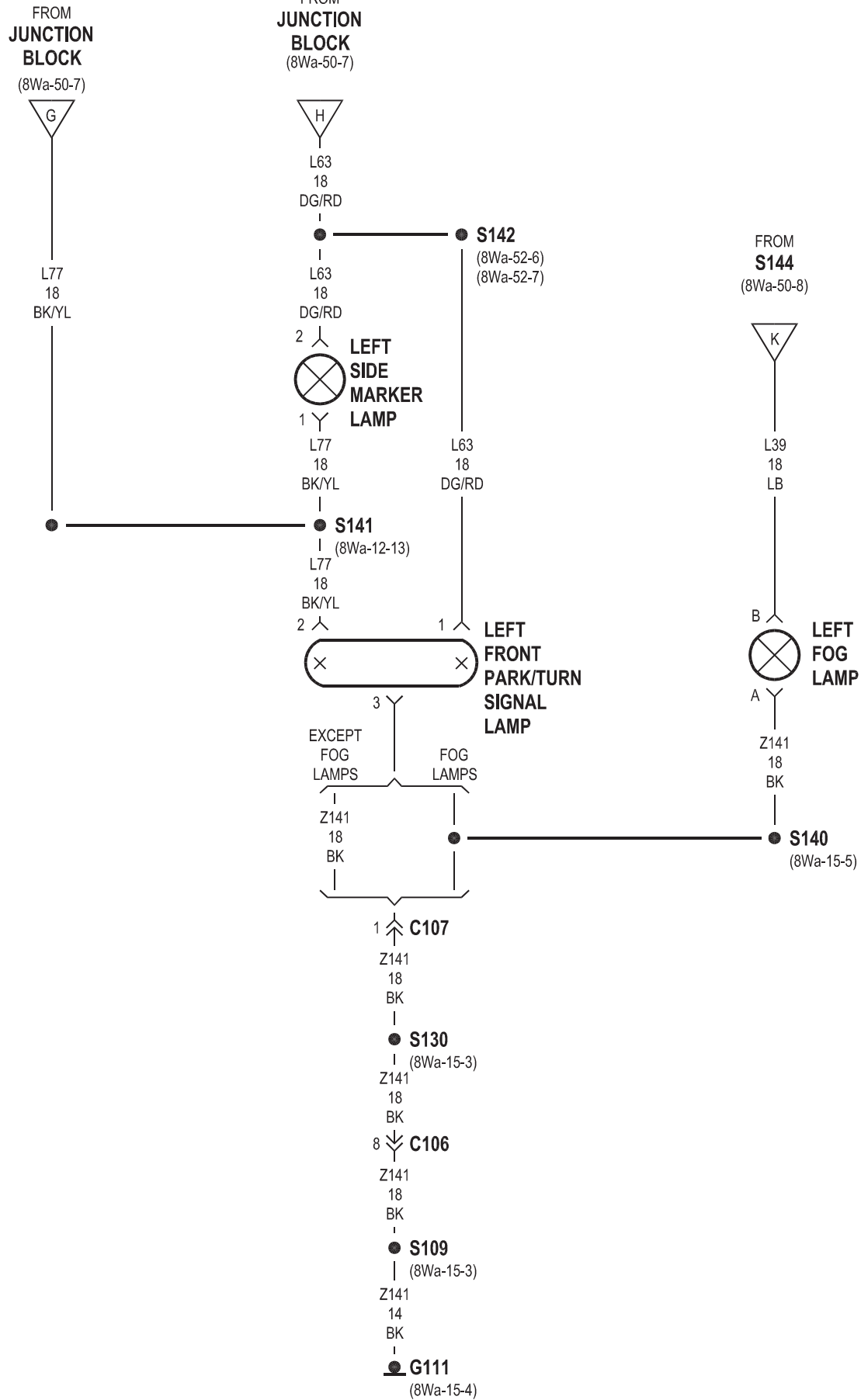


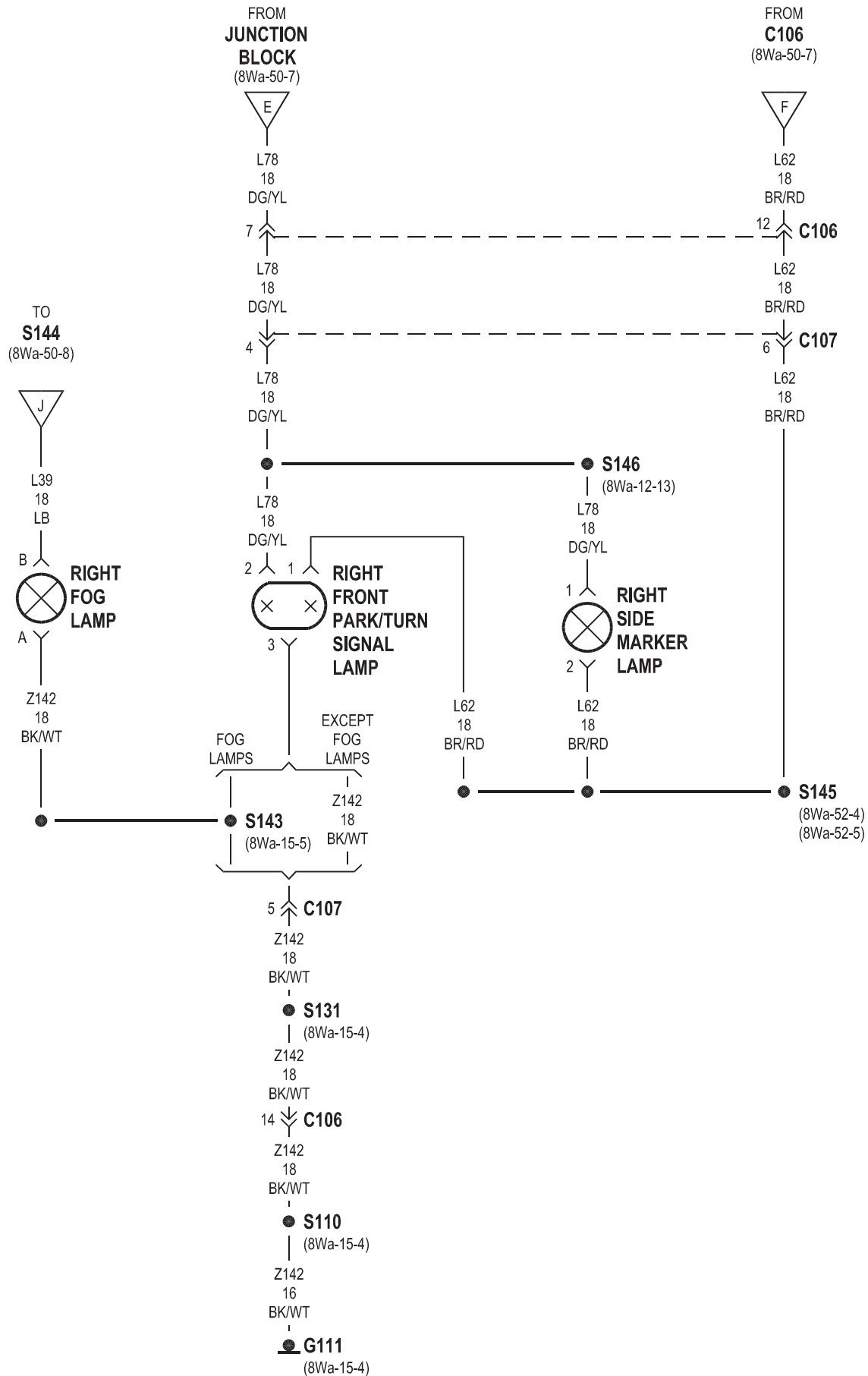


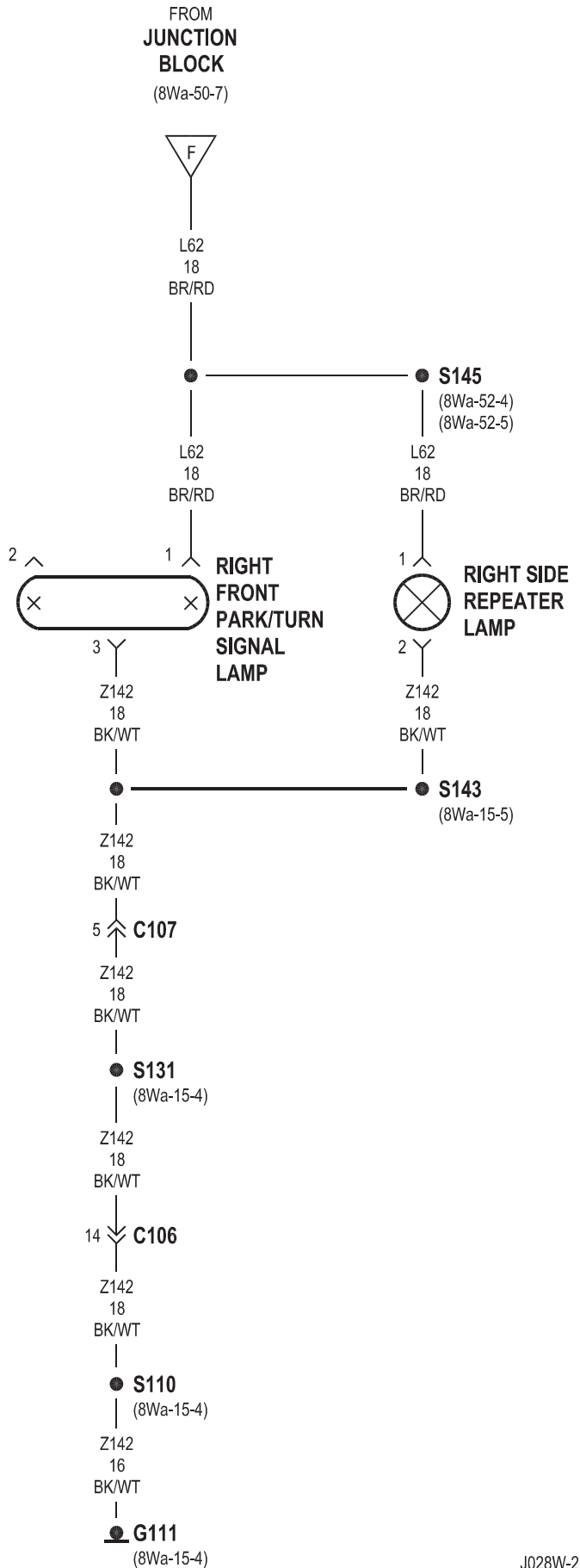
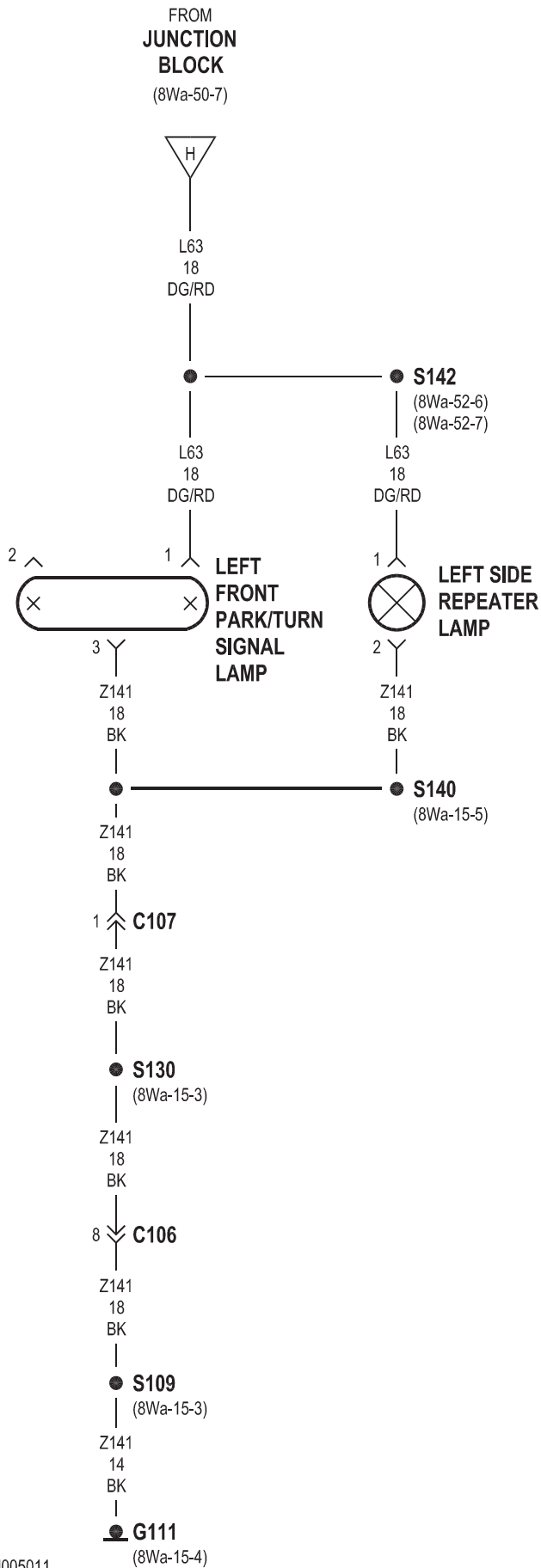


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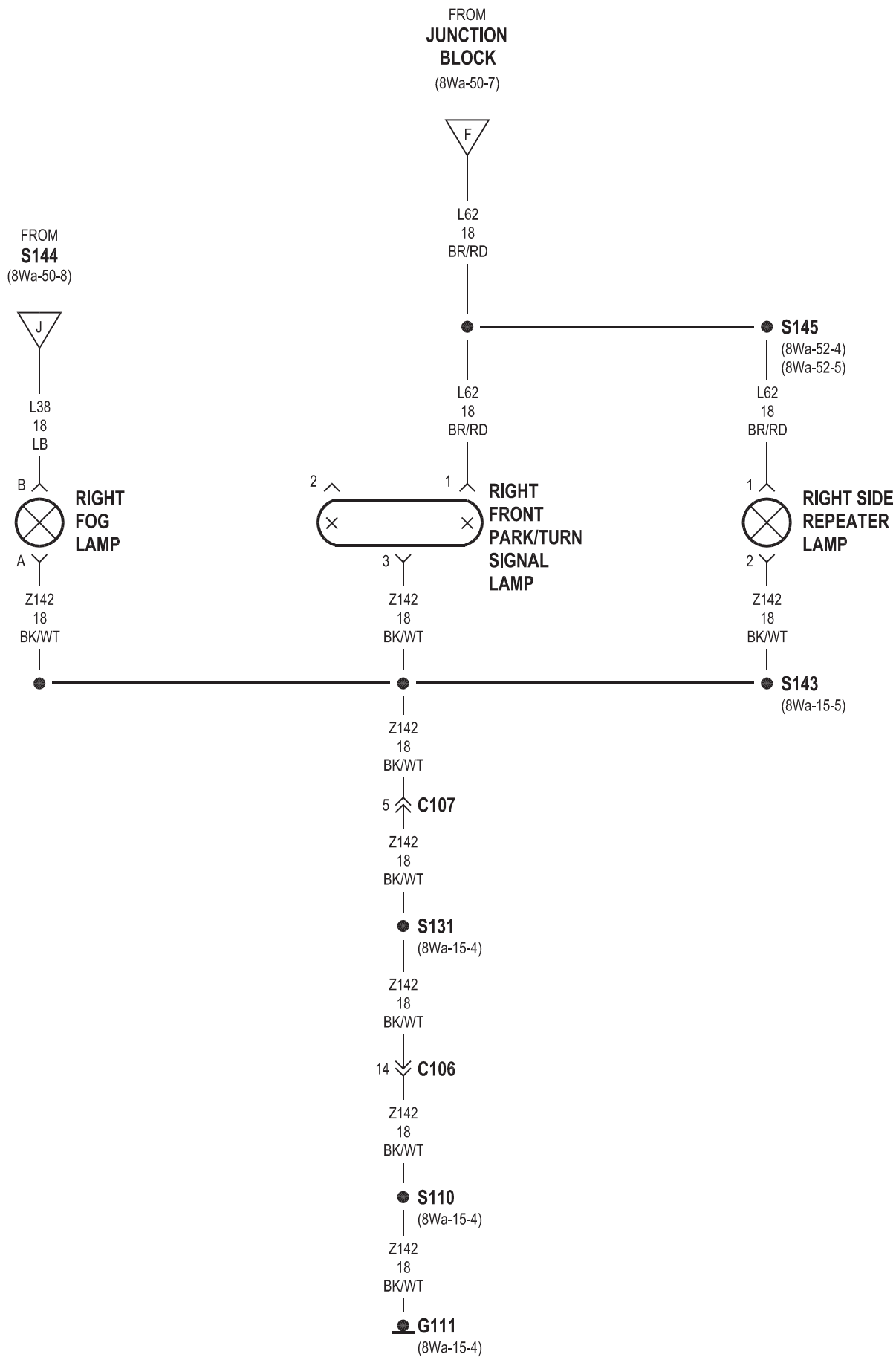


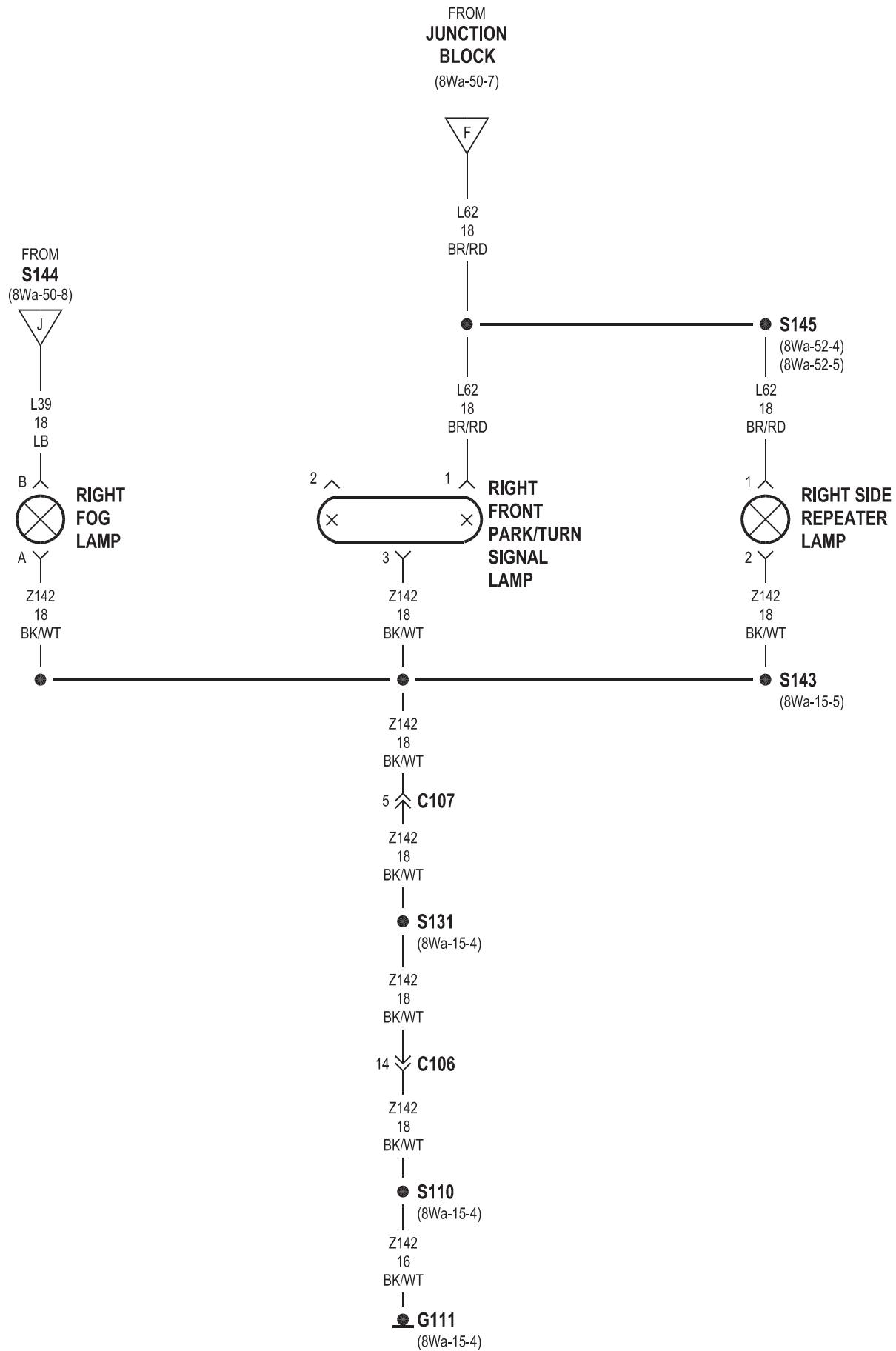


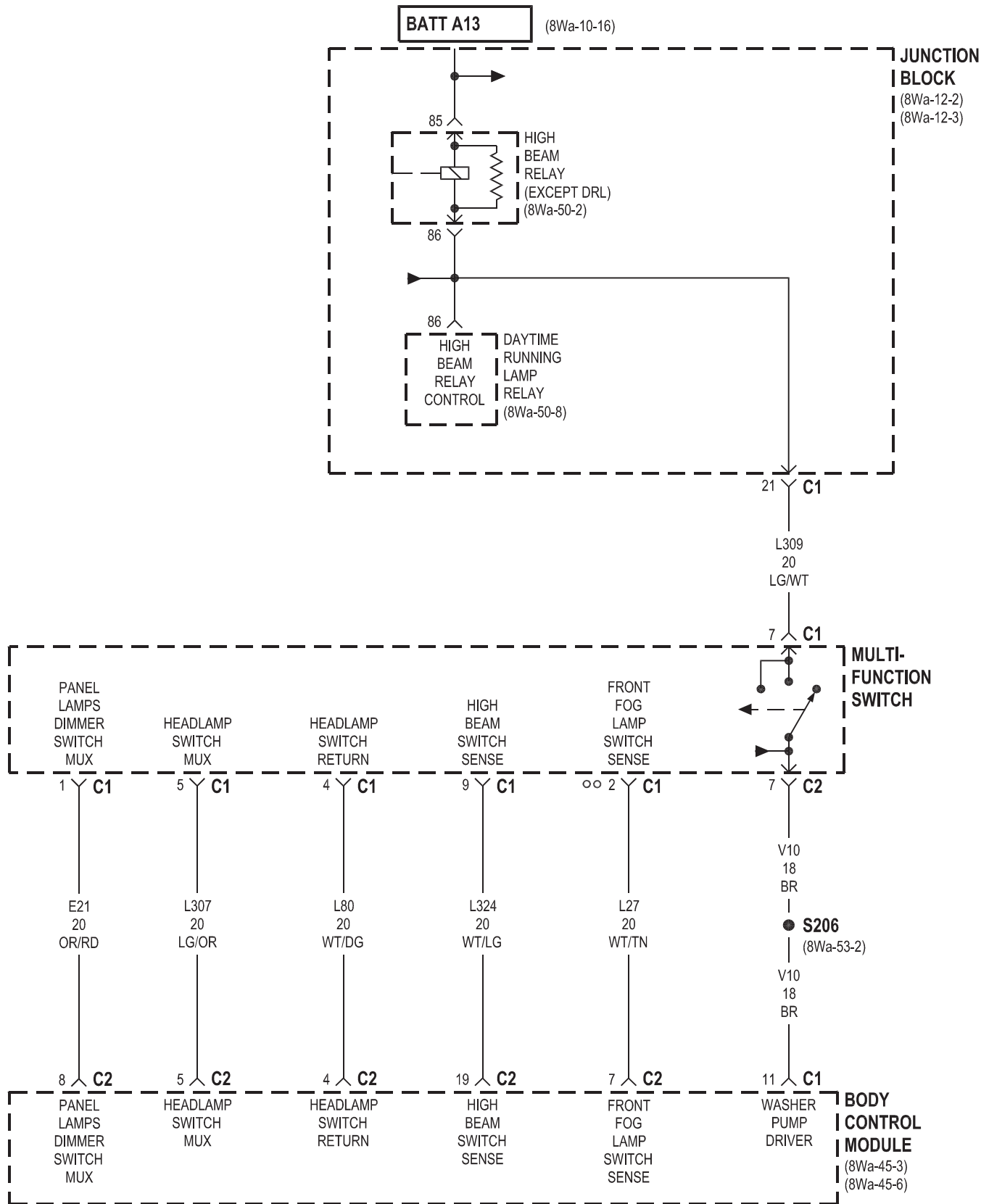




8W-50 FRONT LIGHTING BUILT-UP-EXPORT FOG LAMPS



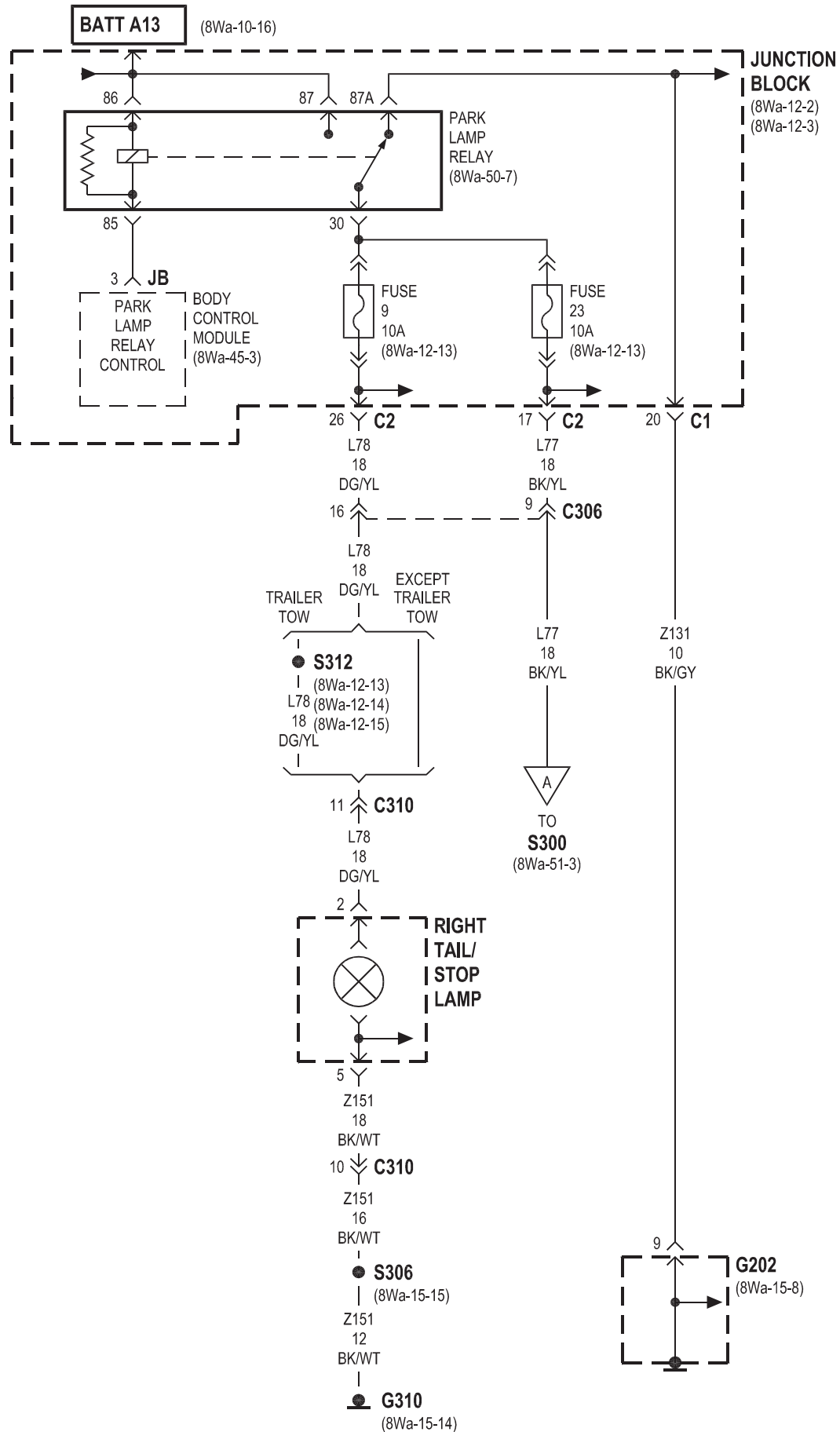


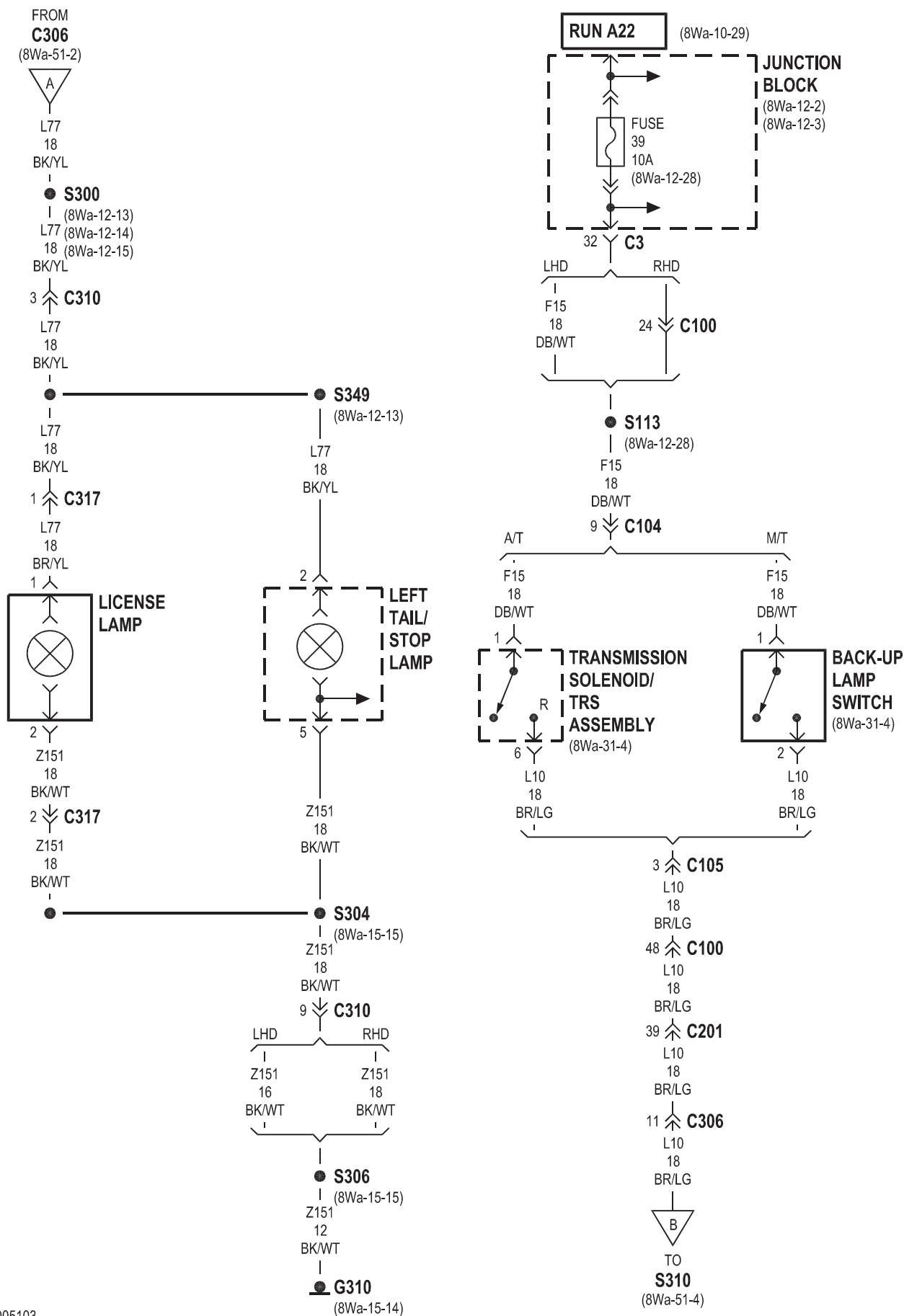


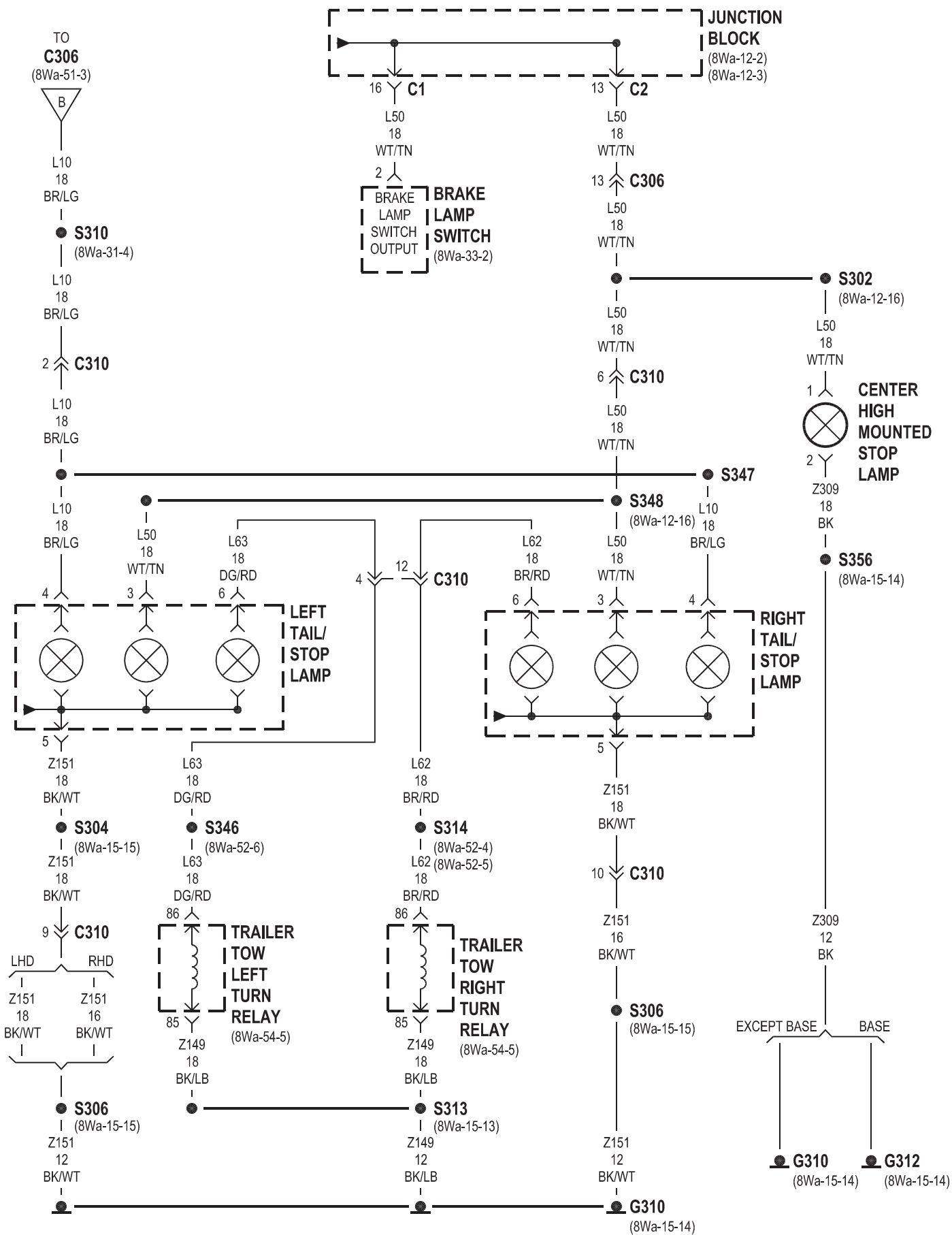
EXCEPT BASE

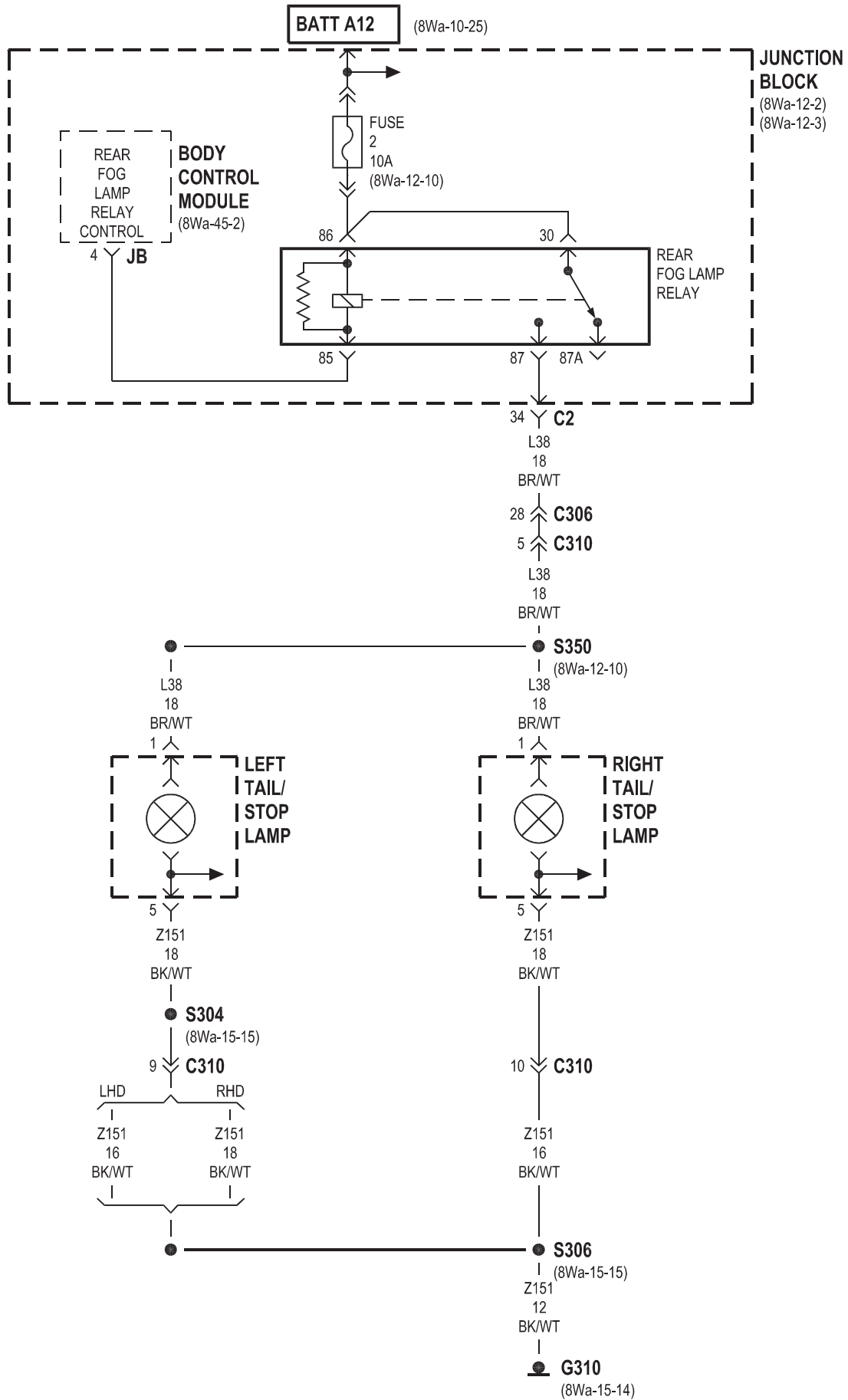
8W-51 REAR LIGHTING

Component	Page	Component	Page
Back-Up Lamp Switch	8Wa-51-3	G312	8Wa-51-4
Body Control Module	8Wa-51-2, 5	Junction Block	8Wa-51-2, 3, 4, 5
Brake Lamp Switch	8Wa-51-4	Left Tail/Stop Lamp	8Wa-51-3, 4, 5
Center High Mounted Stop Lamp	8Wa-51-4	License Lamp	8Wa-51-3
Fuse 2	8Wa-51-5	Park Lamp Relay	8Wa-51-2
Fuse 9	8Wa-51-2	Rear Fog Lamp Relay	8Wa-51-5
Fuse 23	8Wa-51-2	Right Tail/Stop Lamp	8Wa-51-2, 4, 5
Fuse 39	8Wa-51-3	Trailer Tow Left Turn Relay	8Wa-51-4
G202	8Wa-51-2	Trailer Tow Right Turn Relay	8Wa-51-4
G310	8Wa-51-2, 3, 4, 5	Transmission Solenoid/Trs Assembly	8Wa-51-3



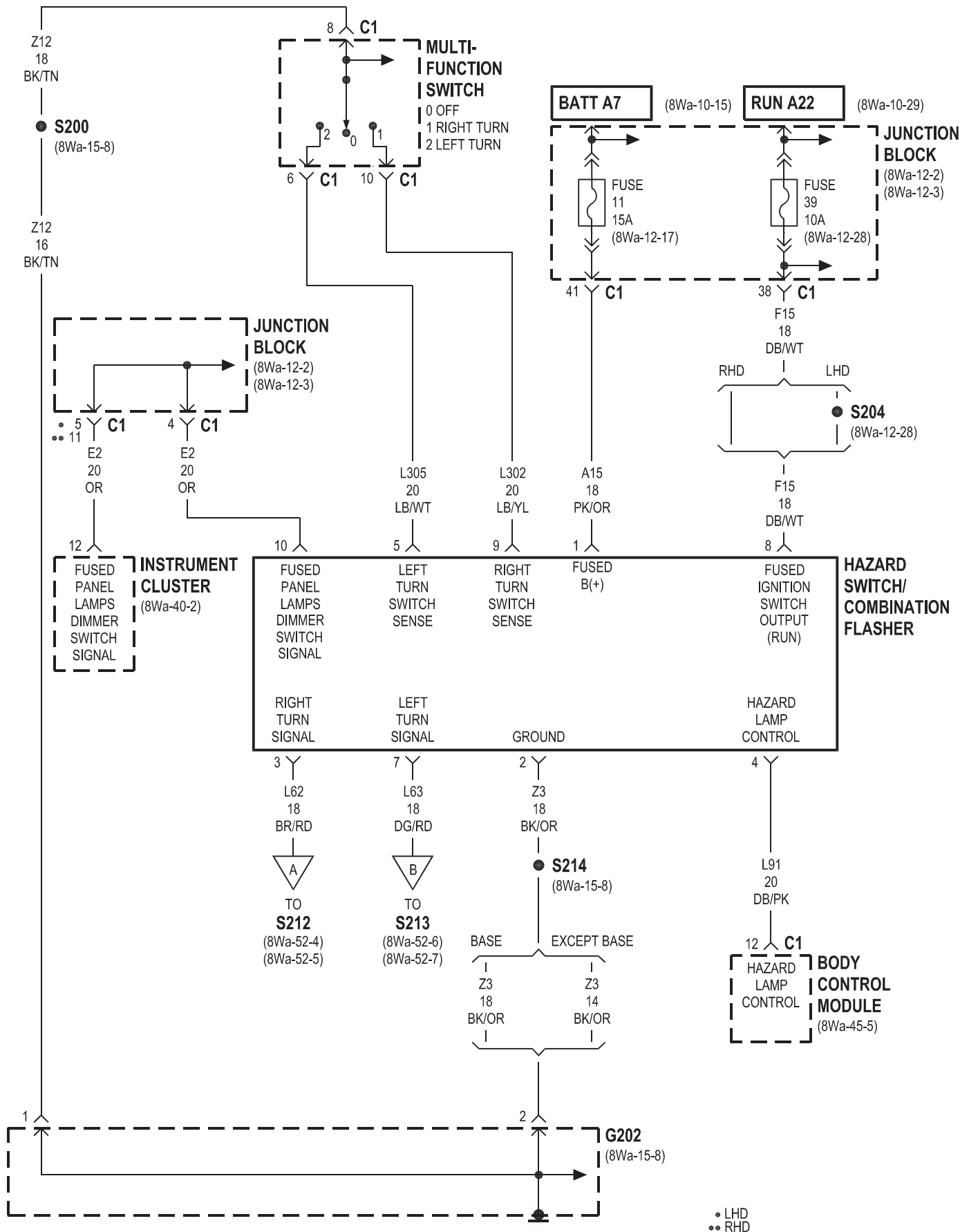


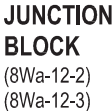


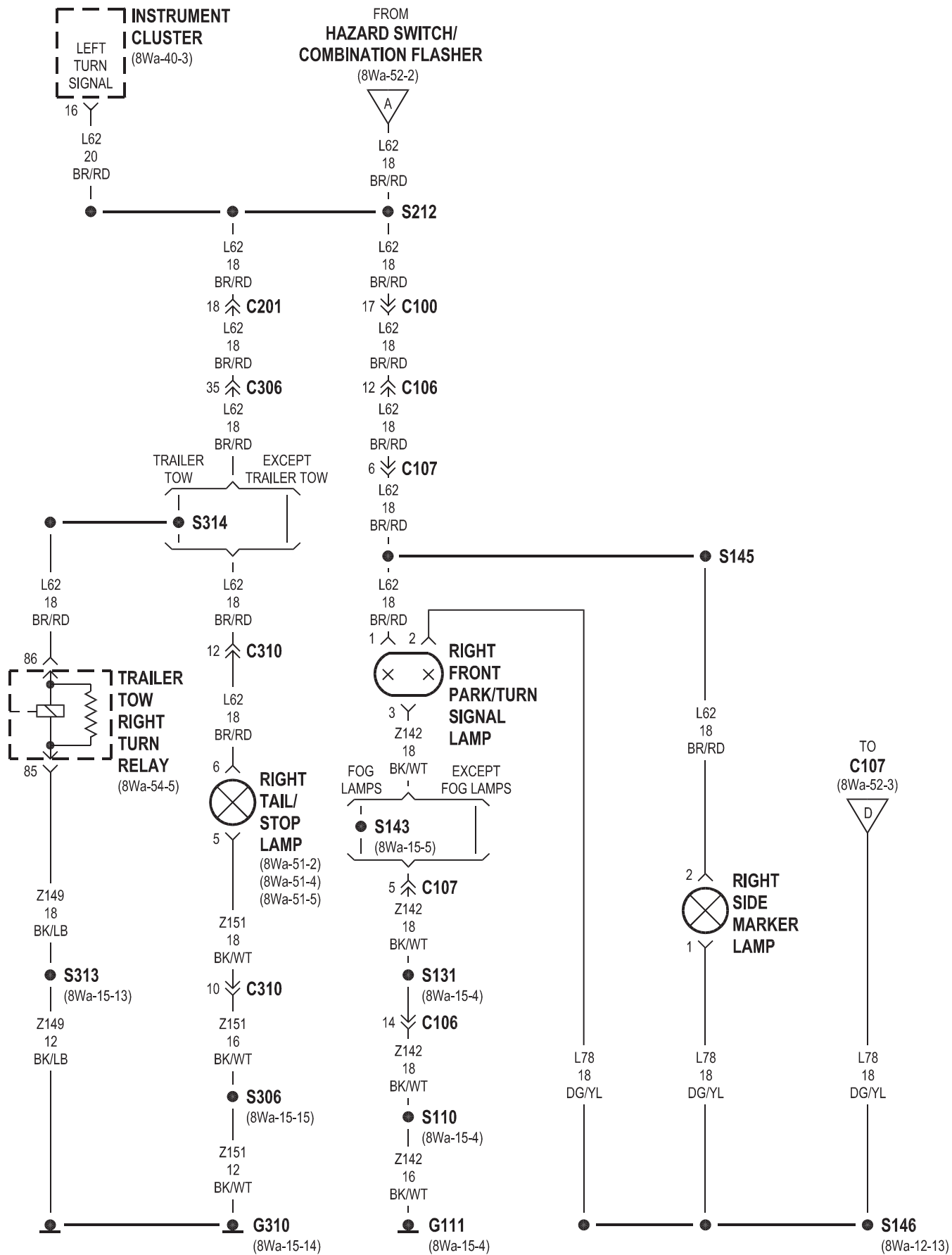


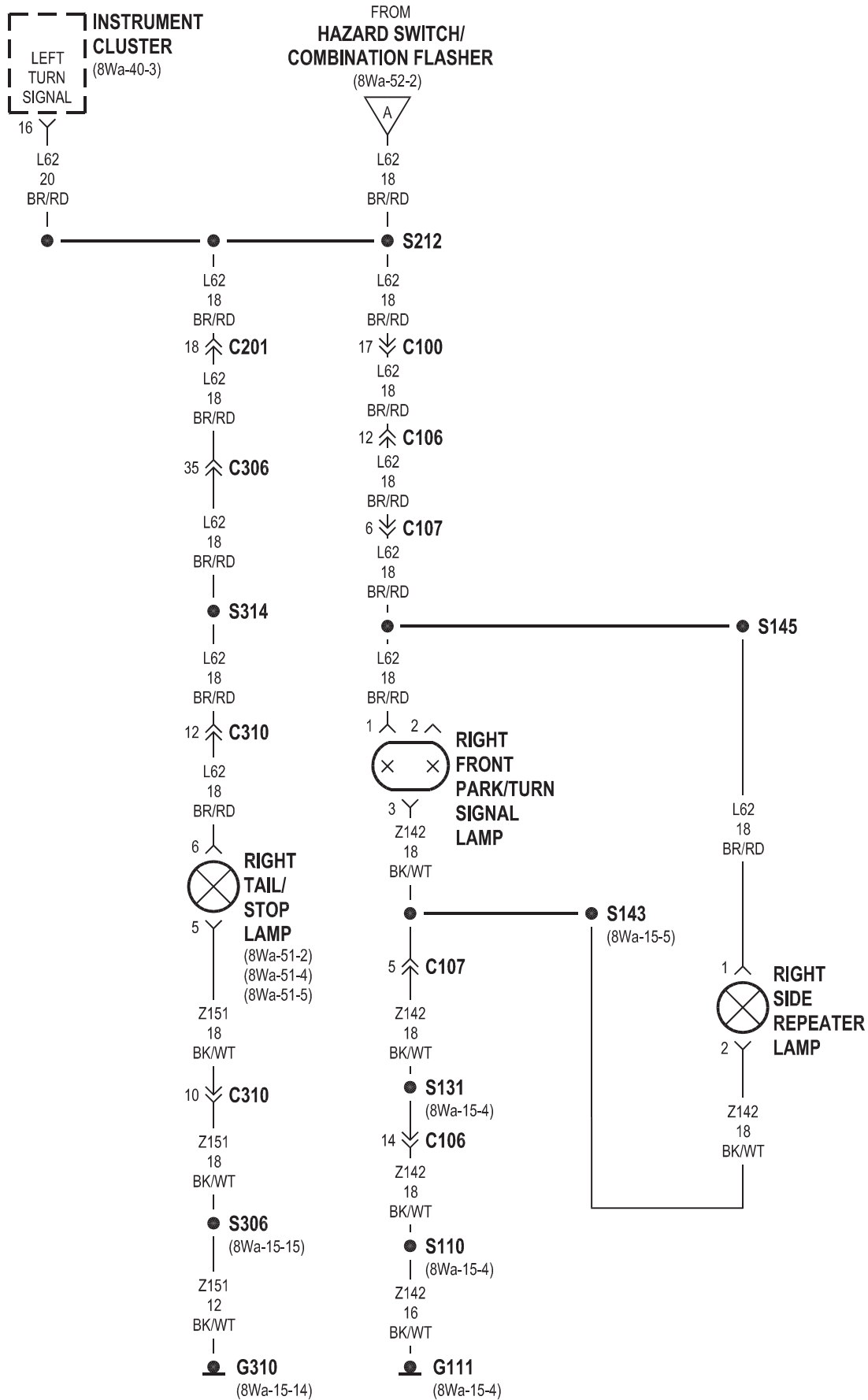
8W-52 TURN SIGNALS

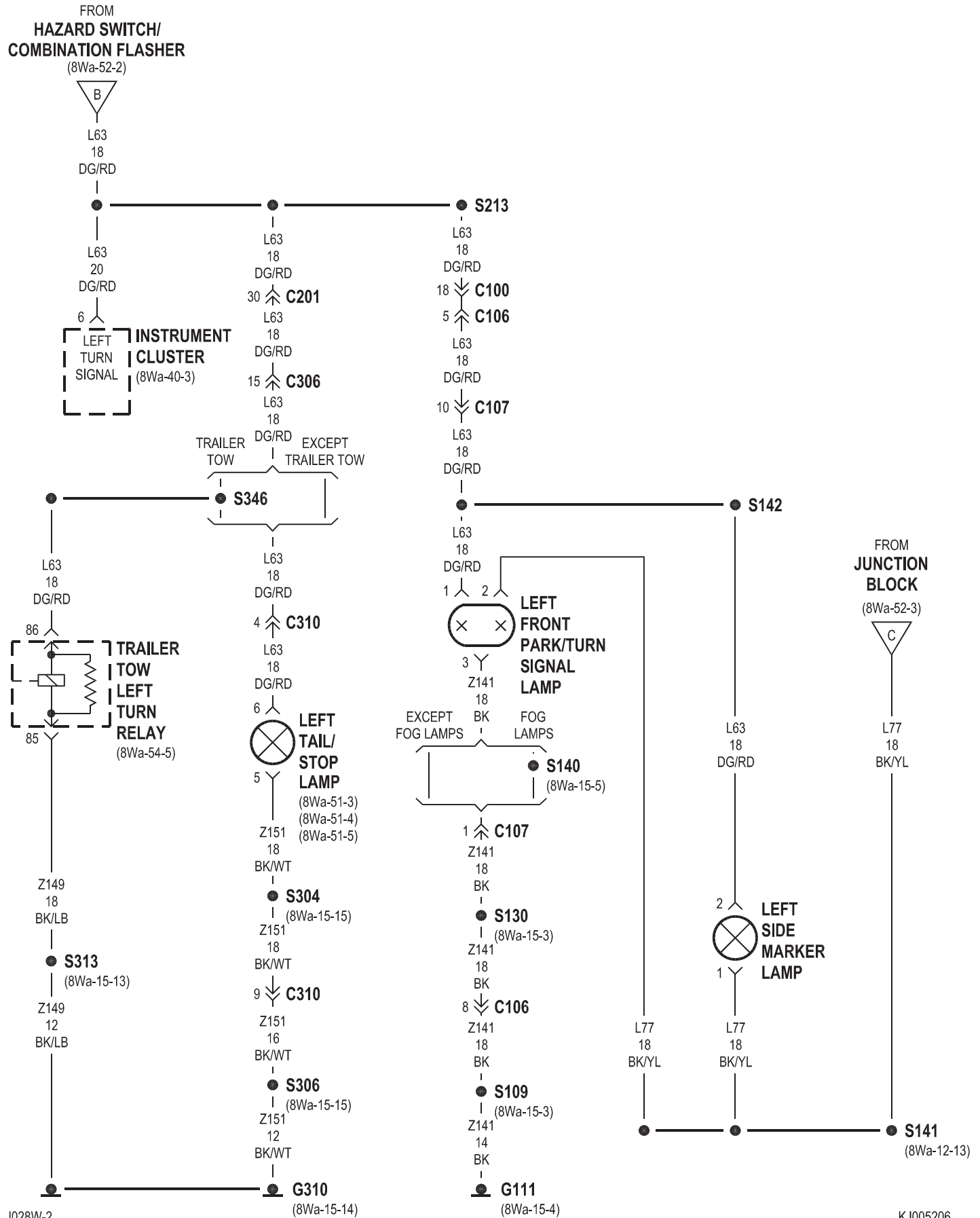
Component	Page	Component	Page
Body Control Module	8Wa-52-2, 3	Left Front Park/Turn Signal Lamp	8Wa-52-6, 7
Fuse 9	8Wa-52-3	Left Side Marker Lamp	8Wa-52-6
Fuse 11	8Wa-52-2	Left Side Repeater Lamp	8Wa-52-7
Fuse 23	8Wa-52-3	Left Tail/Stop Lamp	8Wa-52-6, 7
Fuse 39	8Wa-52-2	Multi- Function Switch	8Wa-52-2
G111	8Wa-52-4, 5, 6, 7	Park Lamp Relay	8Wa-52-3
G202	8Wa-52-2, 3	Right Front Park/Turn Signal Lamp . . .	8Wa-52-4, 5
G310	8Wa-52-4, 5, 6, 7	Right Side Marker Lamp	8Wa-52-4
Hazard Switch/Combination Flasher . .	8Wa-52-2, 4, 5, 6, 7	Right Side Repeater Lamp	8Wa-52-5
Instrument Cluster	8Wa-52-2, 4, 5, 6, 7	Right Tail/Stop Lamp	8Wa-52-4, 5
Junction Block	8Wa-52-2, 3, 6	Trailer Tow Left Turn Relay	8Wa-52-6
		Trailer Tow Right Turn Relay	8Wa-52-4

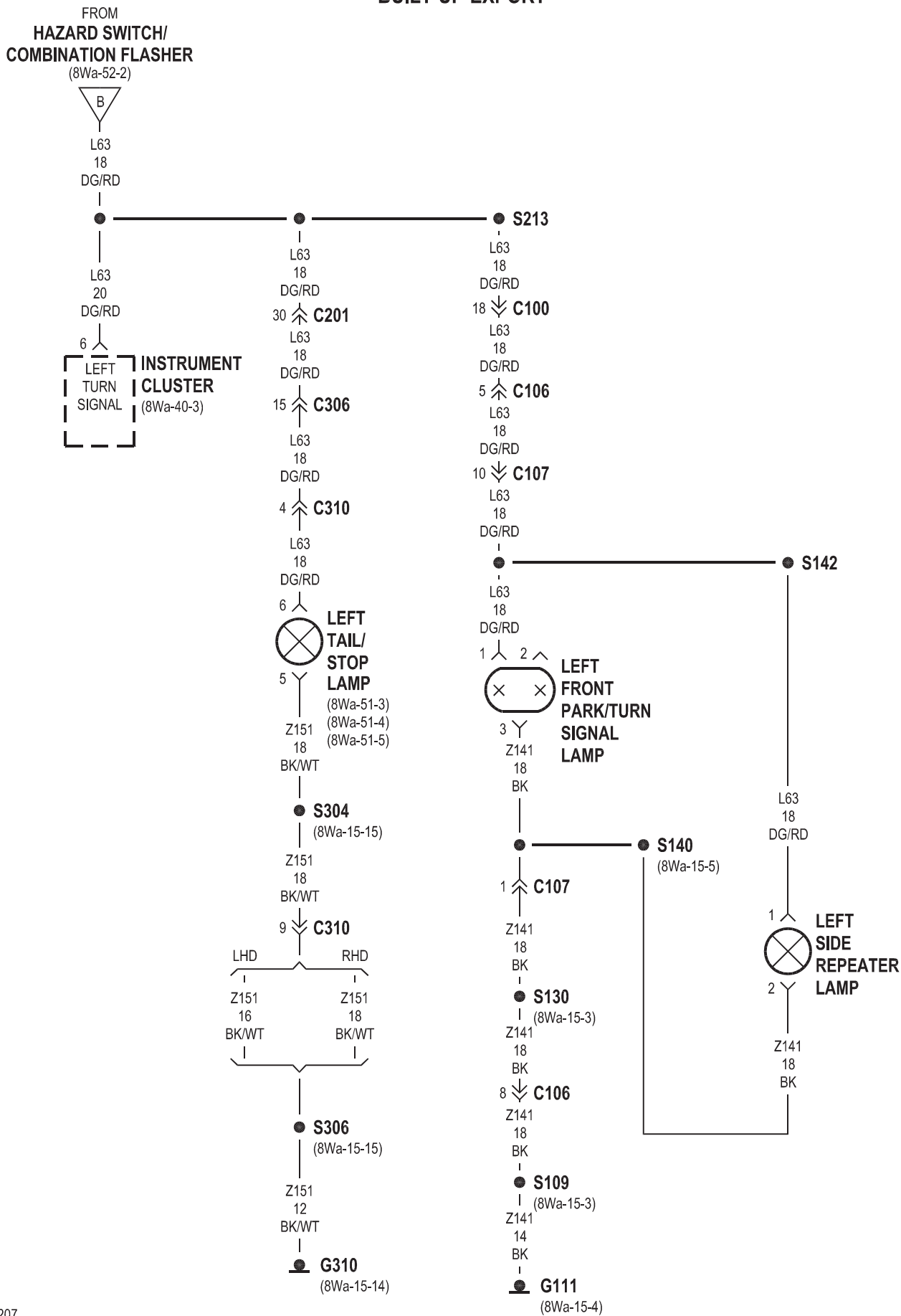






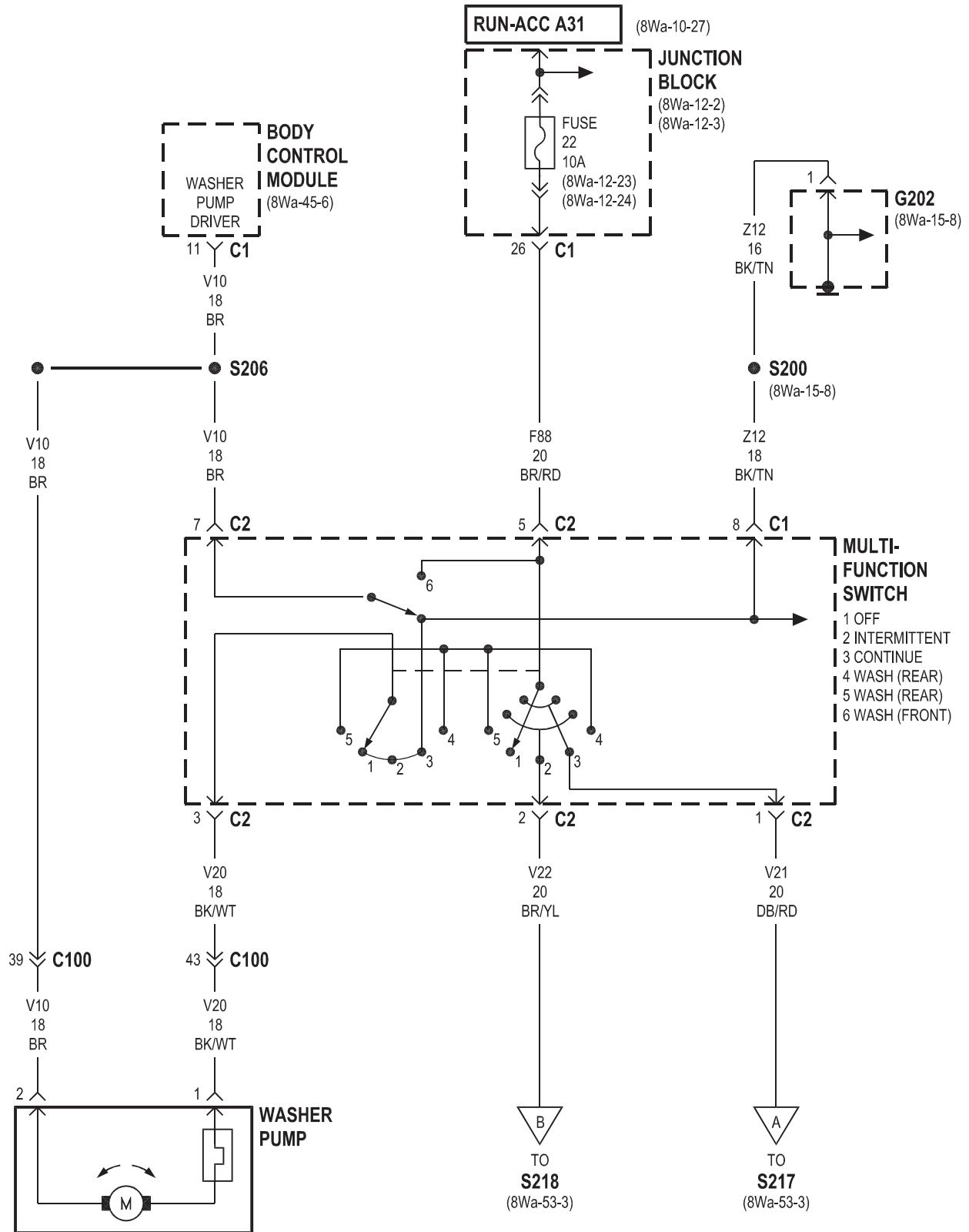


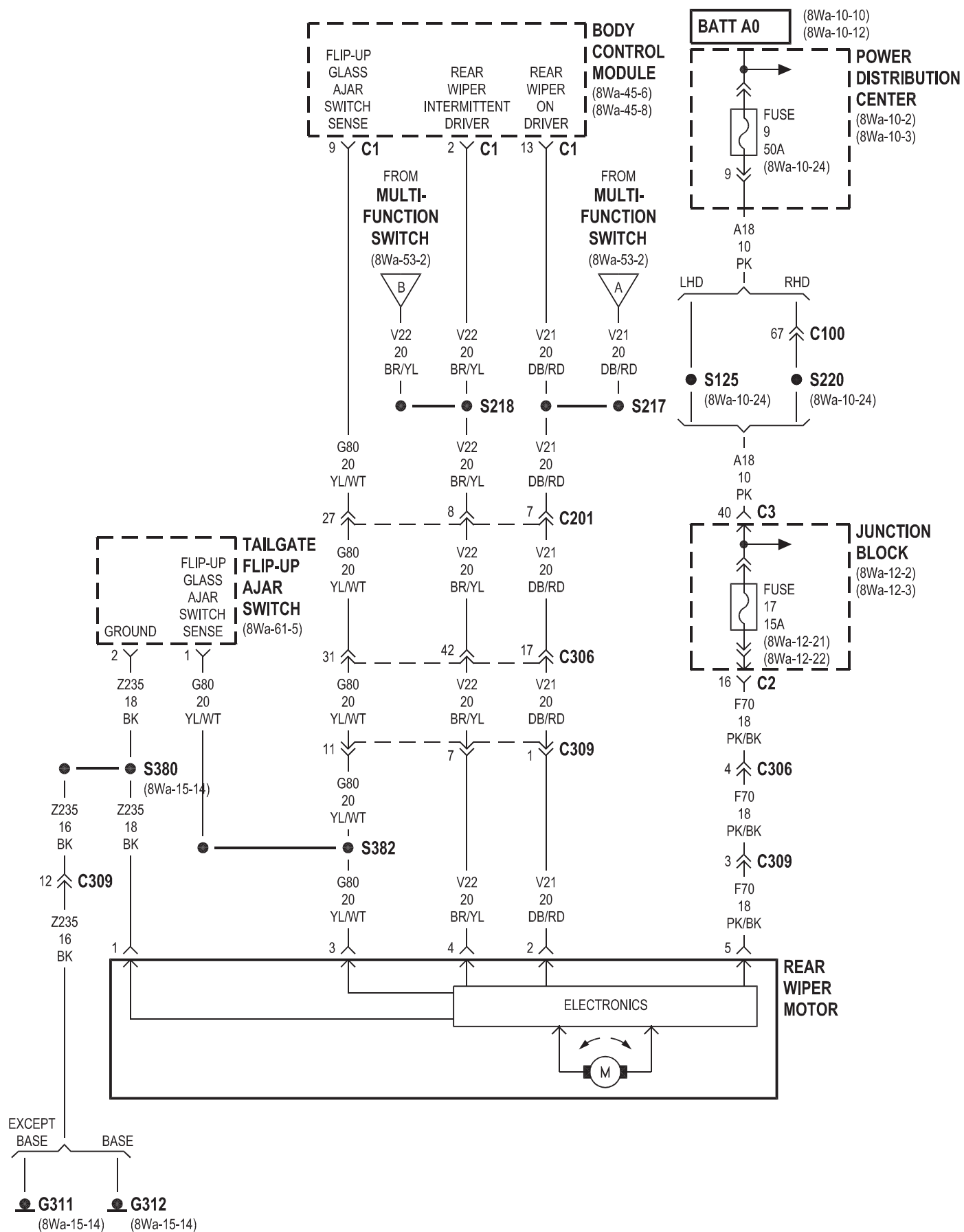


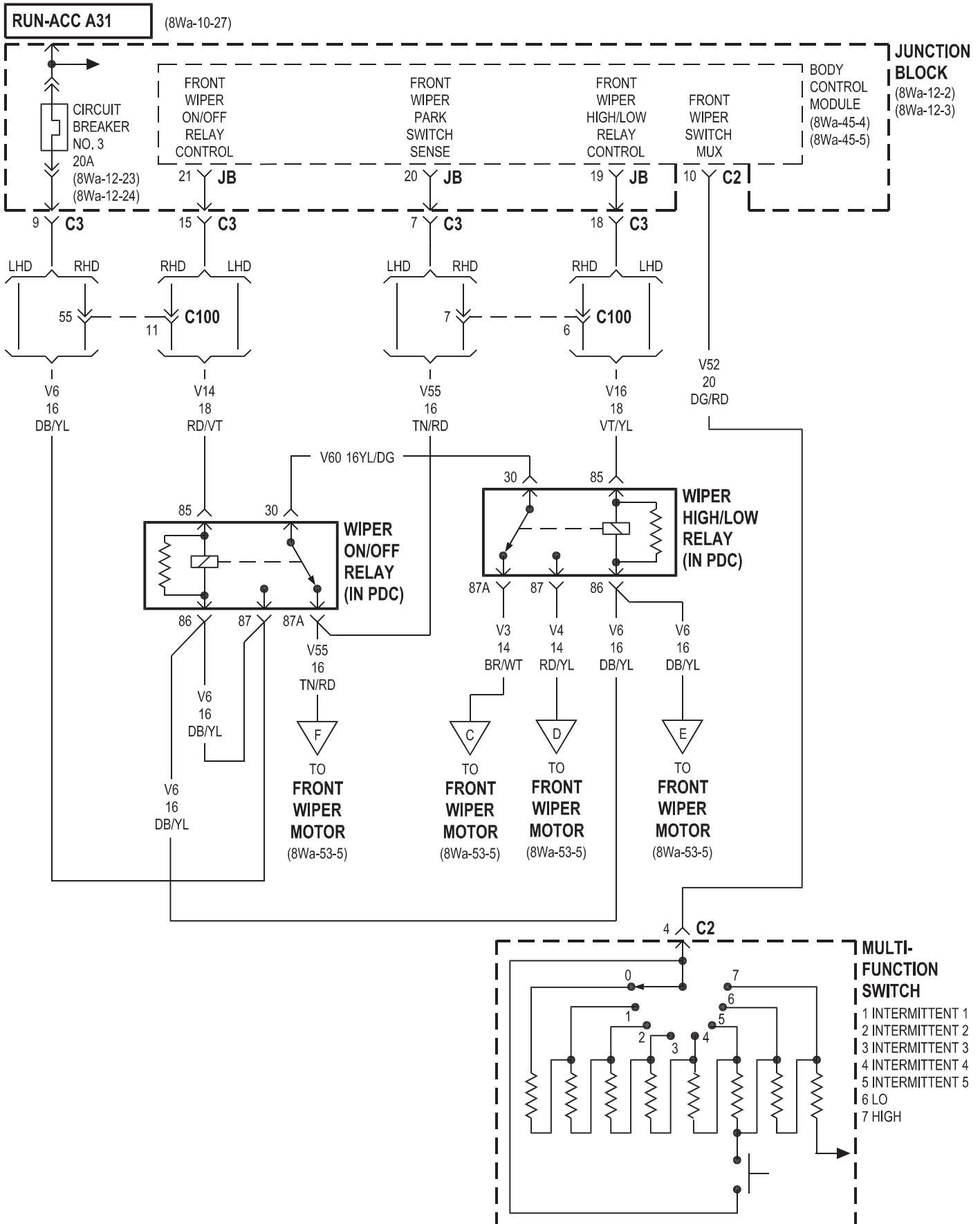


8W-53 WIPERS

Component	Page	Component	Page
Body Control Module	8Wa-53-2, 3, 4	Instrument Cluster	8Wa-53-5
Circuit Breaker No. 3 (JB)	8Wa-53-4	Junction Block	8Wa-53-2, 3, 4
Front Wiper Motor	8Wa-53-4, 5	Multi- Function Switch	8Wa-53-2, 3, 4
Fuse 9	8Wa-53-3	Power Distribution Center	8Wa-53-3
Fuse 17	8Wa-53-3	Rear Wiper Motor	8Wa-53-3
Fuse 22	8Wa-53-2	Tailgate Flip-Up Ajar Switch	8Wa-53-3
G111	8Wa-53-5	Washer Fluid Level Switch	8Wa-53-5
G202	8Wa-53-2	Washer Pump	8Wa-53-2
G311	8Wa-53-3	Wiper High/Low Relay	8Wa-53-4, 5
G312	8Wa-53-3	Wiper On/Off Relay	8Wa-53-4, 5

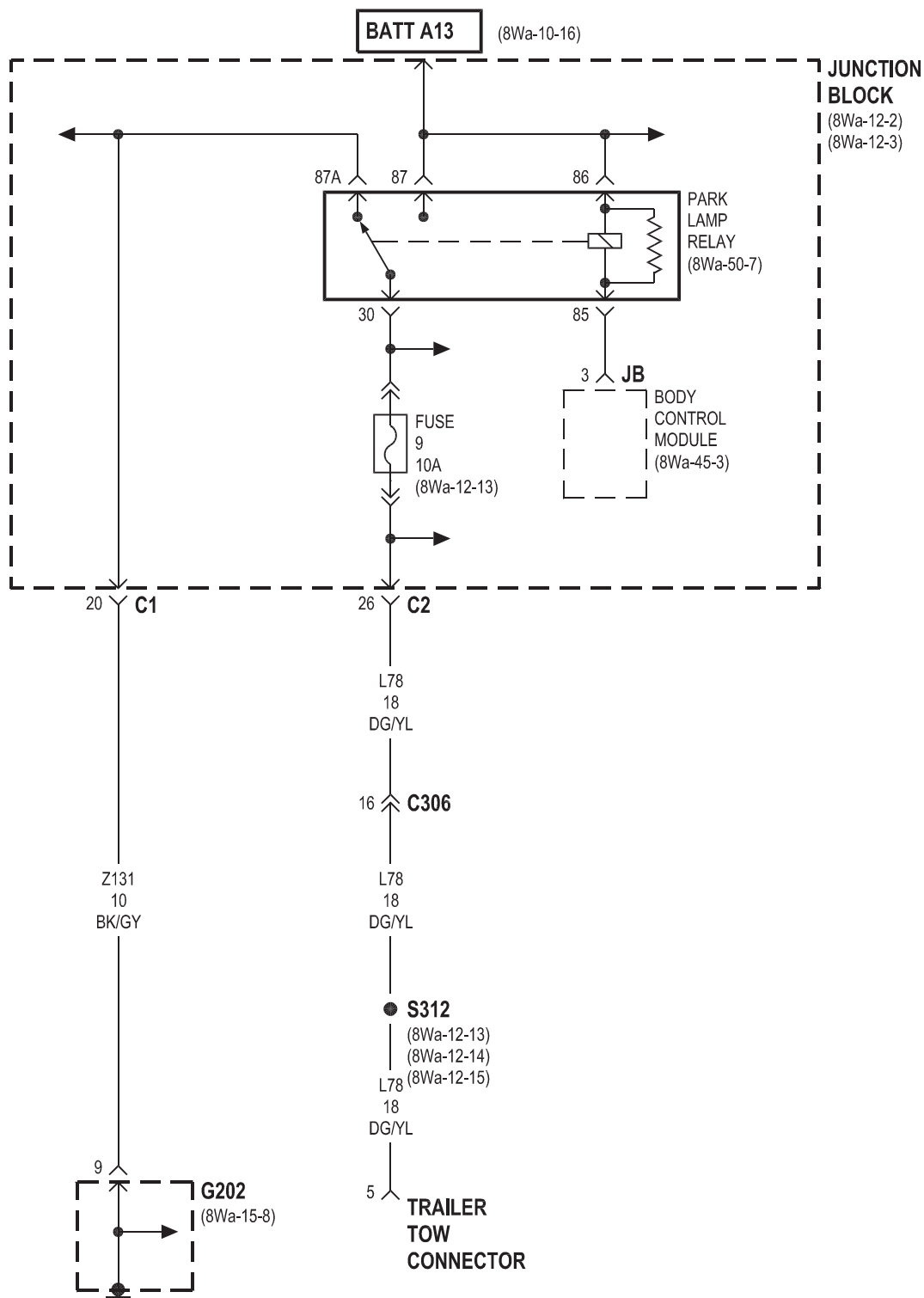


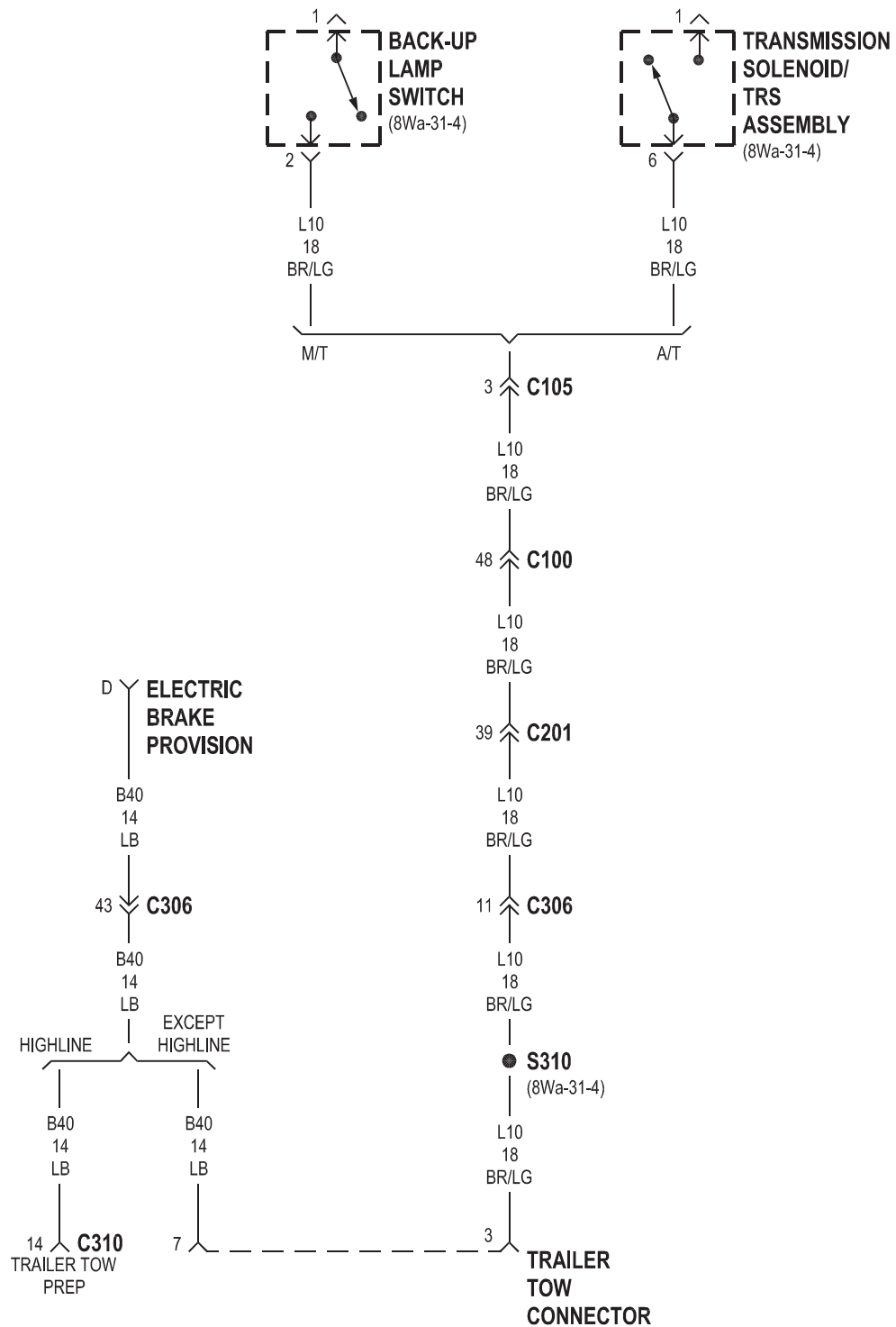


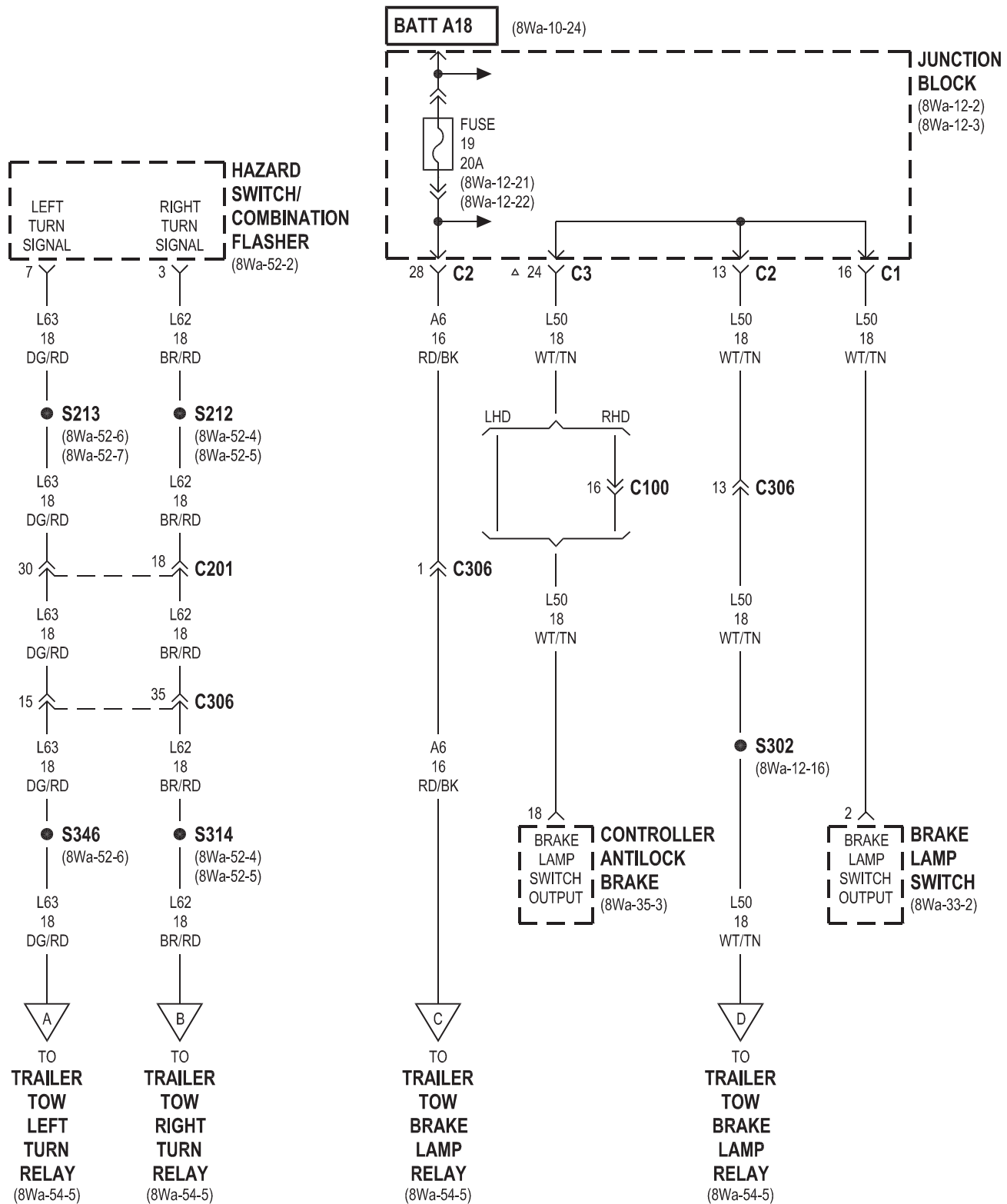


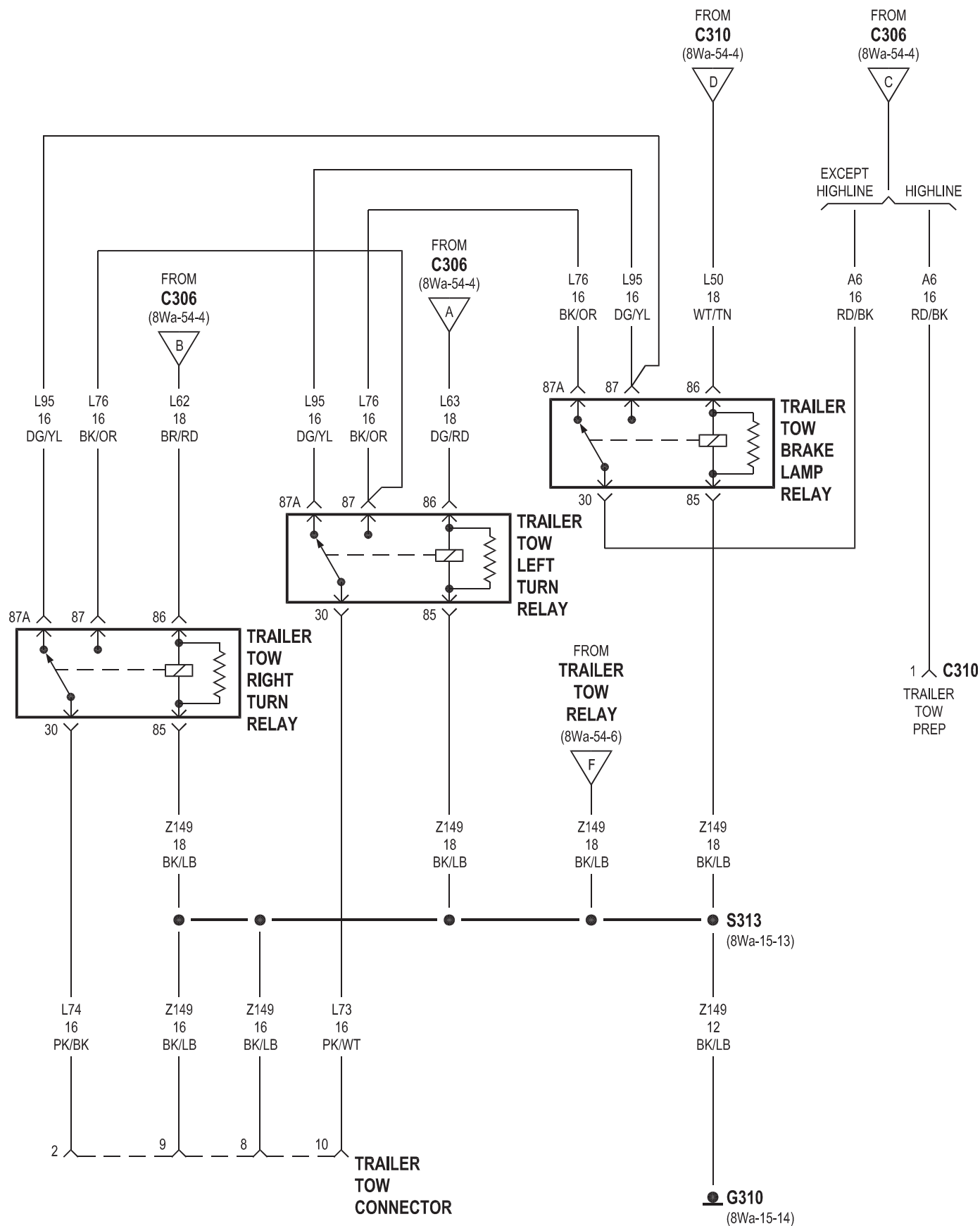
8W-54 TRAILER TOW

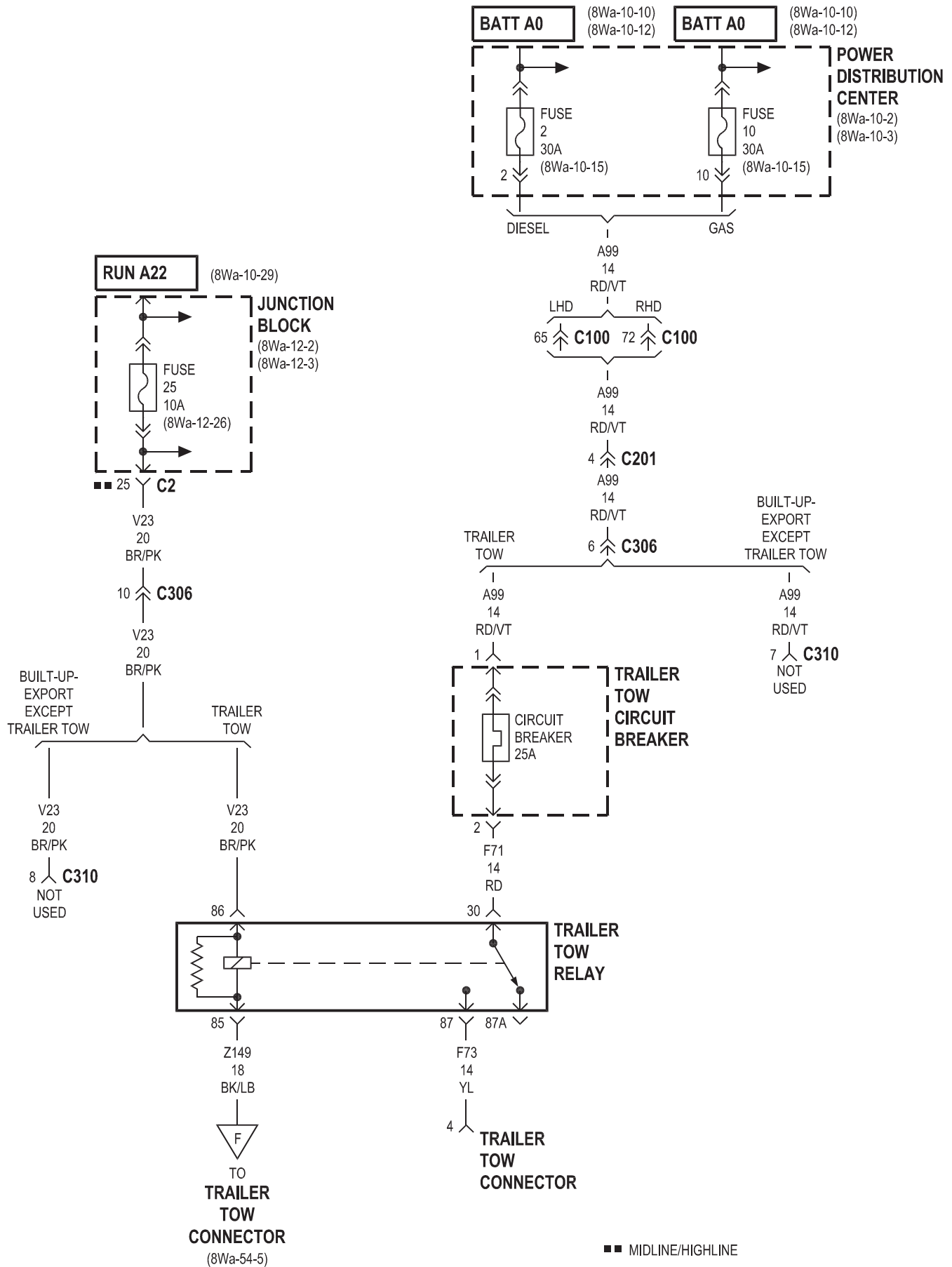
Component	Page	Component	Page
Back-Up Lamp Switch	8Wa-54-3	G310	8Wa-54-5
Body Control Module	8Wa-54-2	Hazard Switch/Combination Flasher	8Wa-54-4
Brake Lamp Switch	8Wa-54-4	Junction Block	8Wa-54-2, 4, 6
Trailer Tow Circuit Breaker	8Wa-54-6	Park Lamp Relay	8Wa-54-2
Controller Antilock Brake	8Wa-54-4	Power Distribution Center	8Wa-54-6
Electric Brake Provision	8Wa-54-3	Trailer Tow Brake Lamp Relay	8Wa-54-4, 5
Fuse 2	8Wa-54-6	Trailer Tow Circuit Breaker	8Wa-54-6
Fuse 9	8Wa-54-2	Trailer Tow Connector	8Wa-54-2, 3, 5, 6
Fuse 10	8Wa-54-6	Trailer Tow Left Turn Relay	8Wa-54-4, 5
Fuse 19	8Wa-54-4	Trailer Tow Relay	8Wa-54-5, 6
Fuse 25	8Wa-54-6	Trailer Tow Right Turn Relay	8Wa-54-4, 5
G202	8Wa-54-2	Transmission Solenoid/Trs Assembly	8Wa-54-3





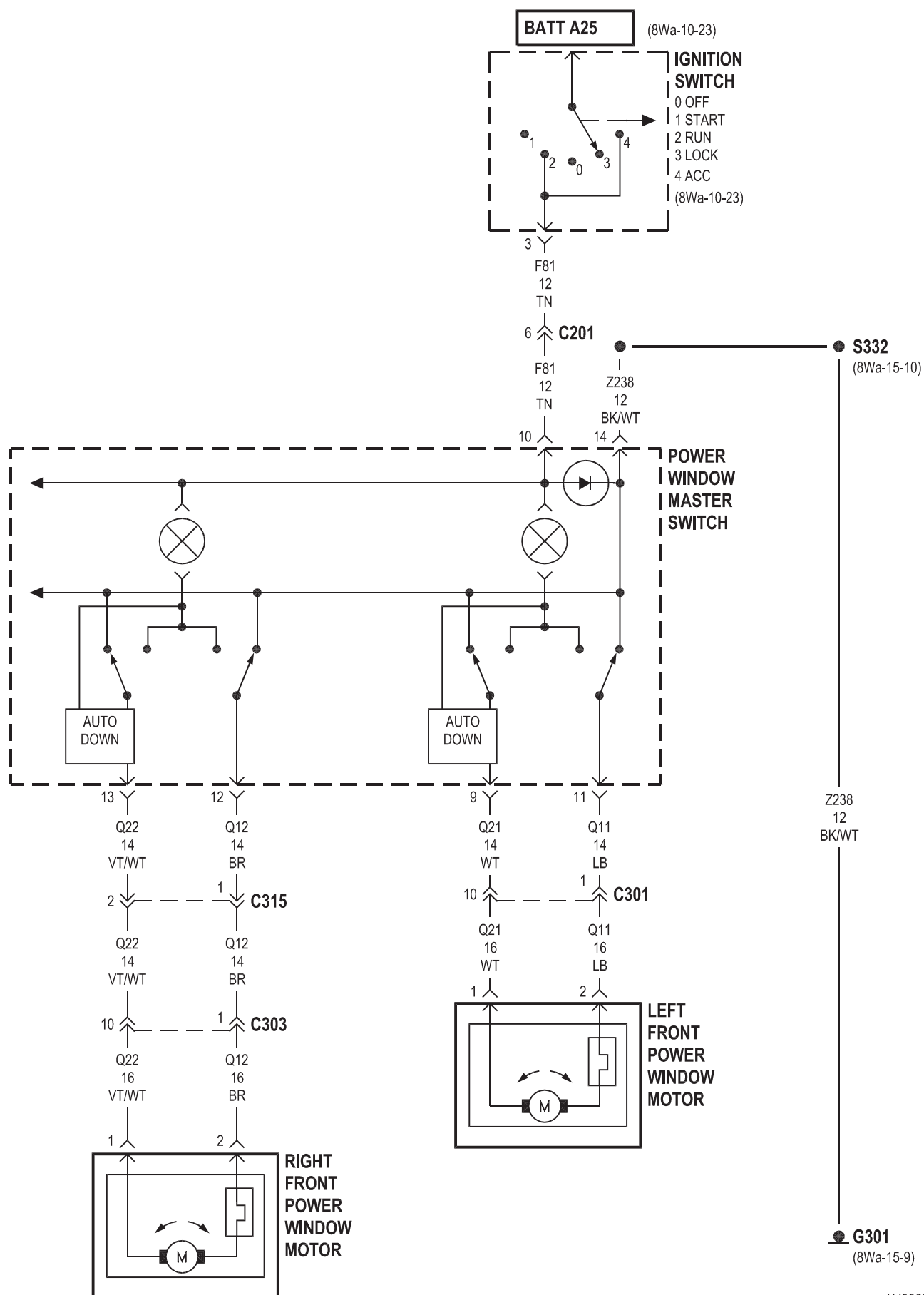


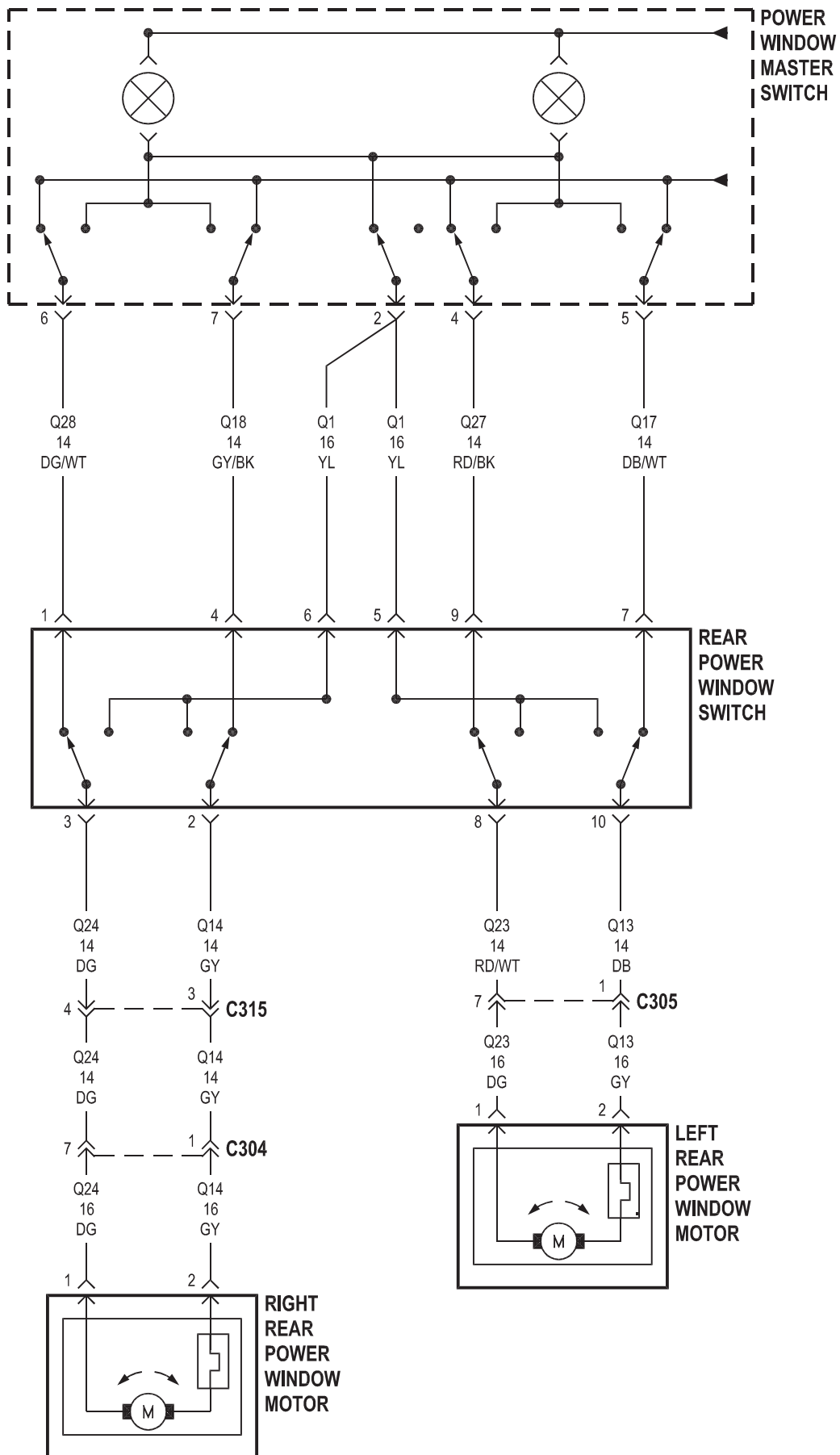




8W-60 POWER WINDOWS

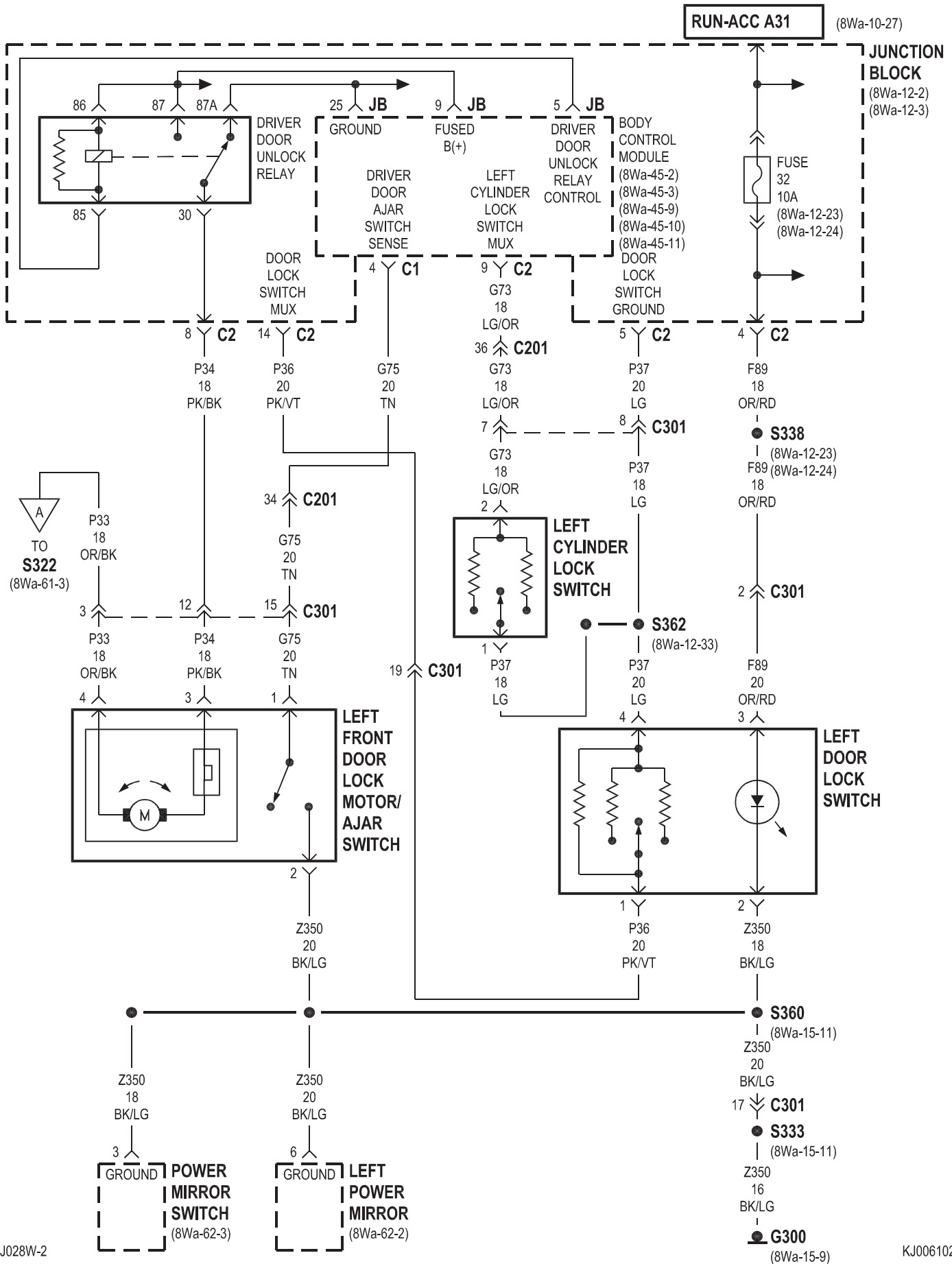
Component	Page	Component	Page
G301	8Wa-60-2	Power Window Master Switch	8Wa-60-2, 3
Ignition Switch	8Wa-60-2	Rear Power Window Switch	8Wa-60-3
Left Front Power Window Motor	8Wa-60-2	Right Front Power Window Motor	8Wa-60-2
Left Rear Power Window Motor	8Wa-60-3	Right Rear Power Window Motor	8Wa-60-3

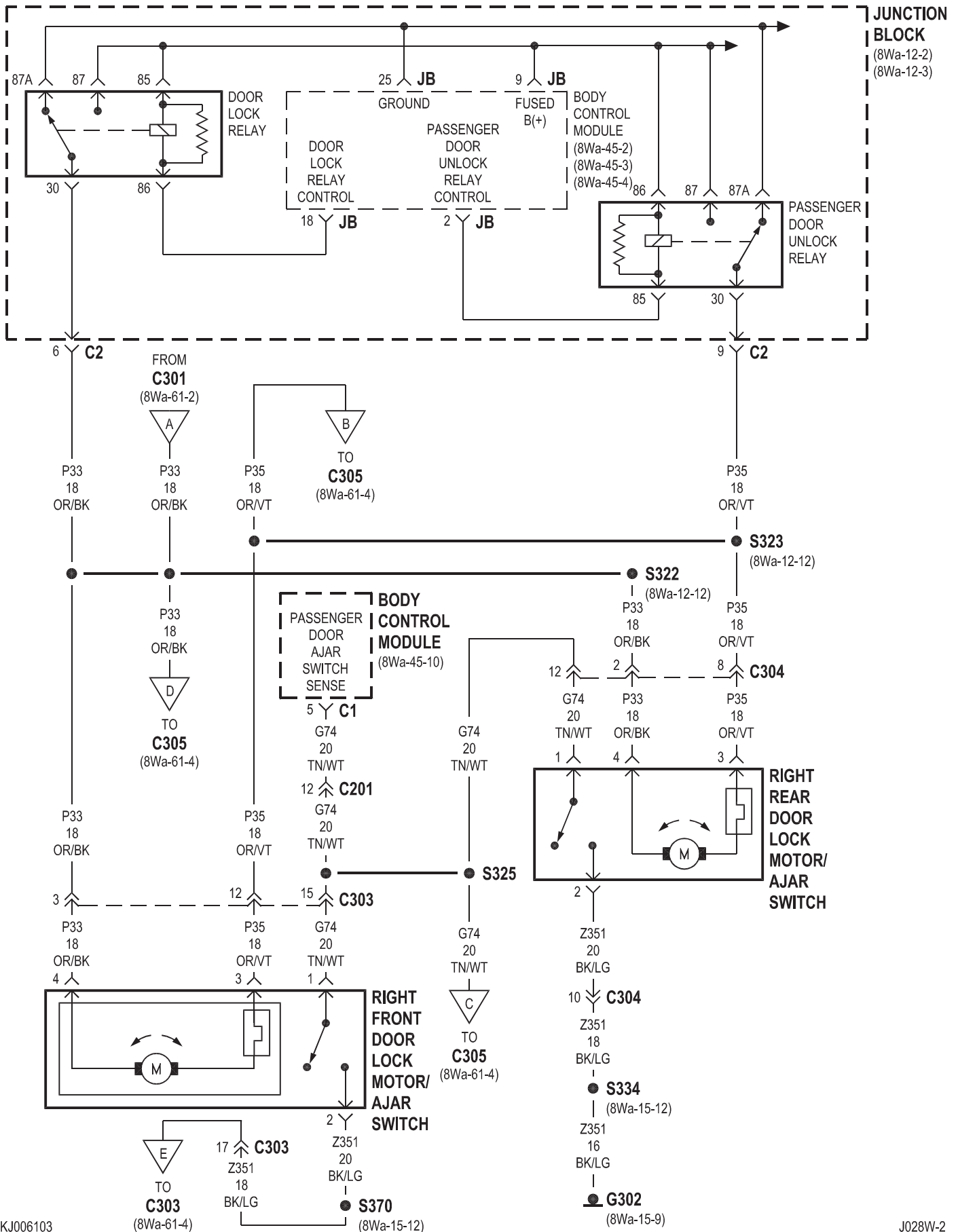


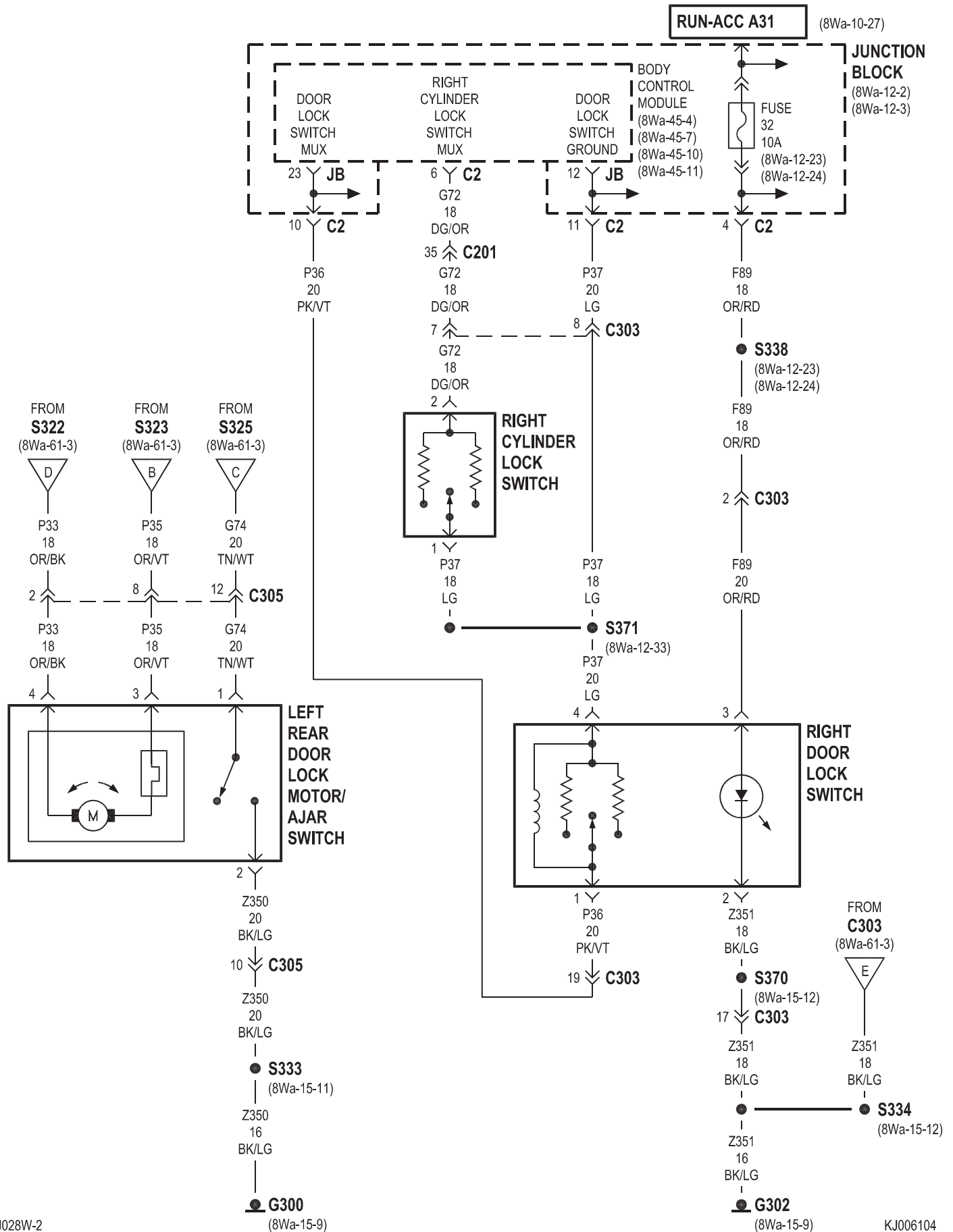


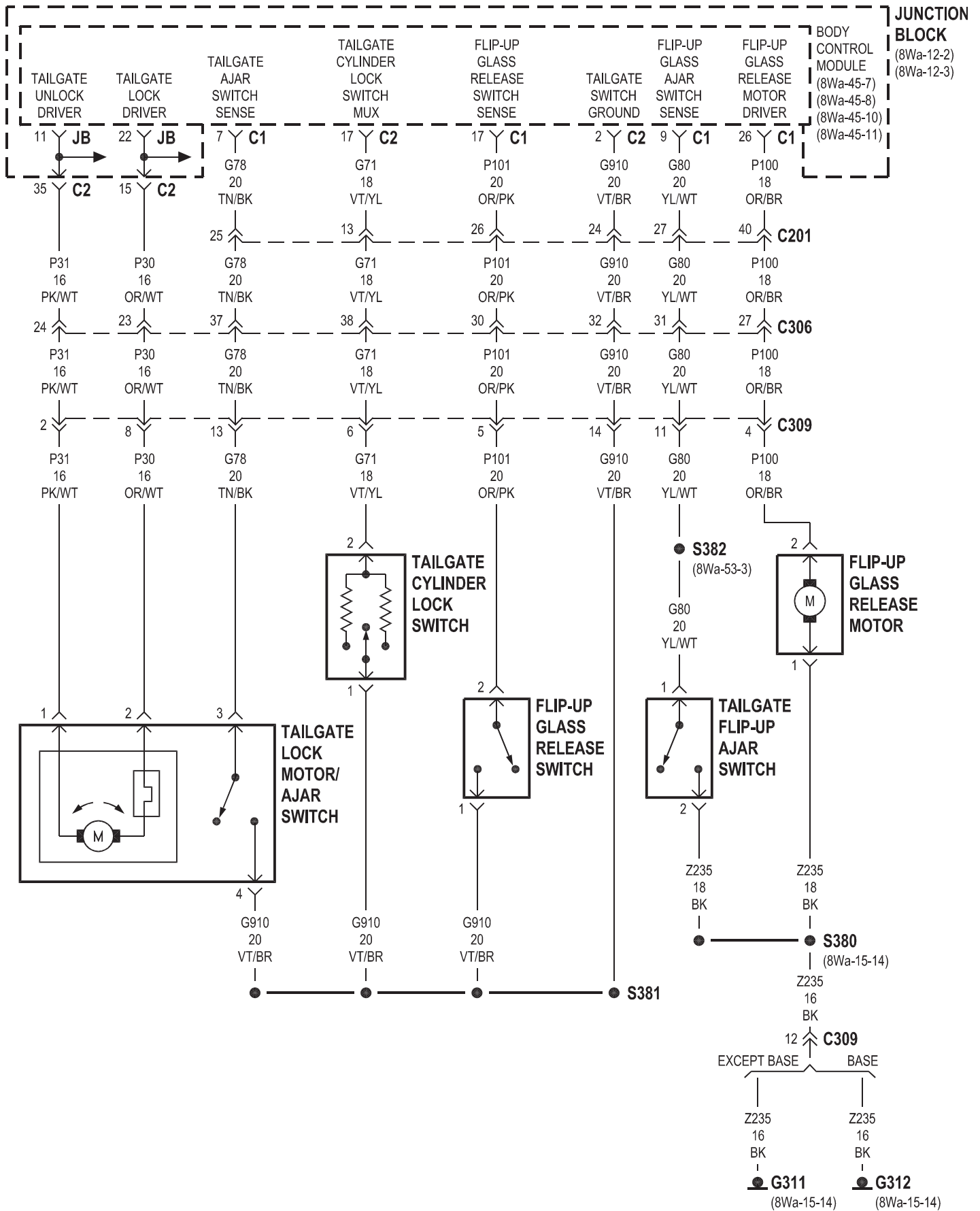
8W-61 POWER DOOR LOCKS

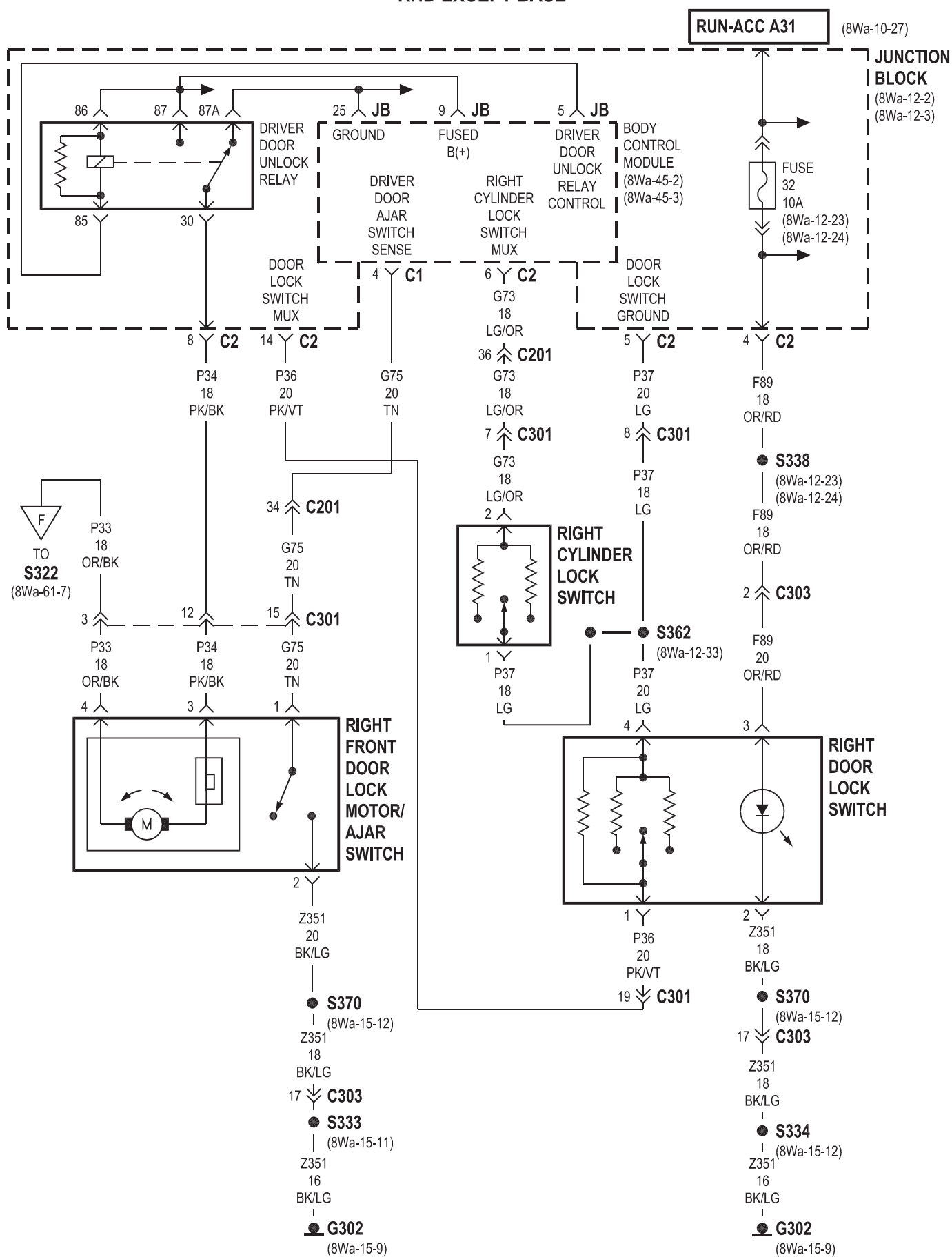
Component	Page	Component	Page
Body Control Module	8Wa-61-2, 3, 4, 5, 6, 7, 8	Left Power Mirror	8Wa-61-2
Door Lock Relay	8Wa-61-3, 7	Left Rear Door Lock Motor/Ajar	
Driver Door Unlock Relay	8Wa-61-2, 6	Switch	8Wa-61-4, 8
Flip-Up Glass Release Motor	8Wa-61-5	Passenger Door Unlock Relay	8Wa-61-3, 7
Flip-Up Glass Release Switch	8Wa-61-5	Power Mirror Switch	8Wa-61-2
Fuse 32	8Wa-61-2, 4, 6, 8	Right Cylinder Lock Switch	8Wa-61-4, 6
G300	8Wa-61-2, 4, 7, 8	Right Door Lock Switch	8Wa-61-4, 6
G302	8Wa-61-3, 4, 6, 7	Right Front Door Lock Motor/Ajar	
G311	8Wa-61-5	Switch	8Wa-61-3, 6
G312	8Wa-61-5	Right Rear Door Lock Motor/Ajar	
Junction Block	8Wa-61-2, 3, 4, 5, 6, 7, 8	Switch	8Wa-61-3, 7
Left Cylinder Lock Switch	8Wa-61-2, 8	Tailgate Cylinder Lock Switch	8Wa-61-5
Left Door Lock Switch	8Wa-61-2, 8	Tailgate Flip-Up Ajar Switch	8Wa-61-5
Left Front Door Lock Motor/Ajar		Tailgate Lock Motor/Ajar Switch	8Wa-61-5
Switch	8Wa-61-2, 7		



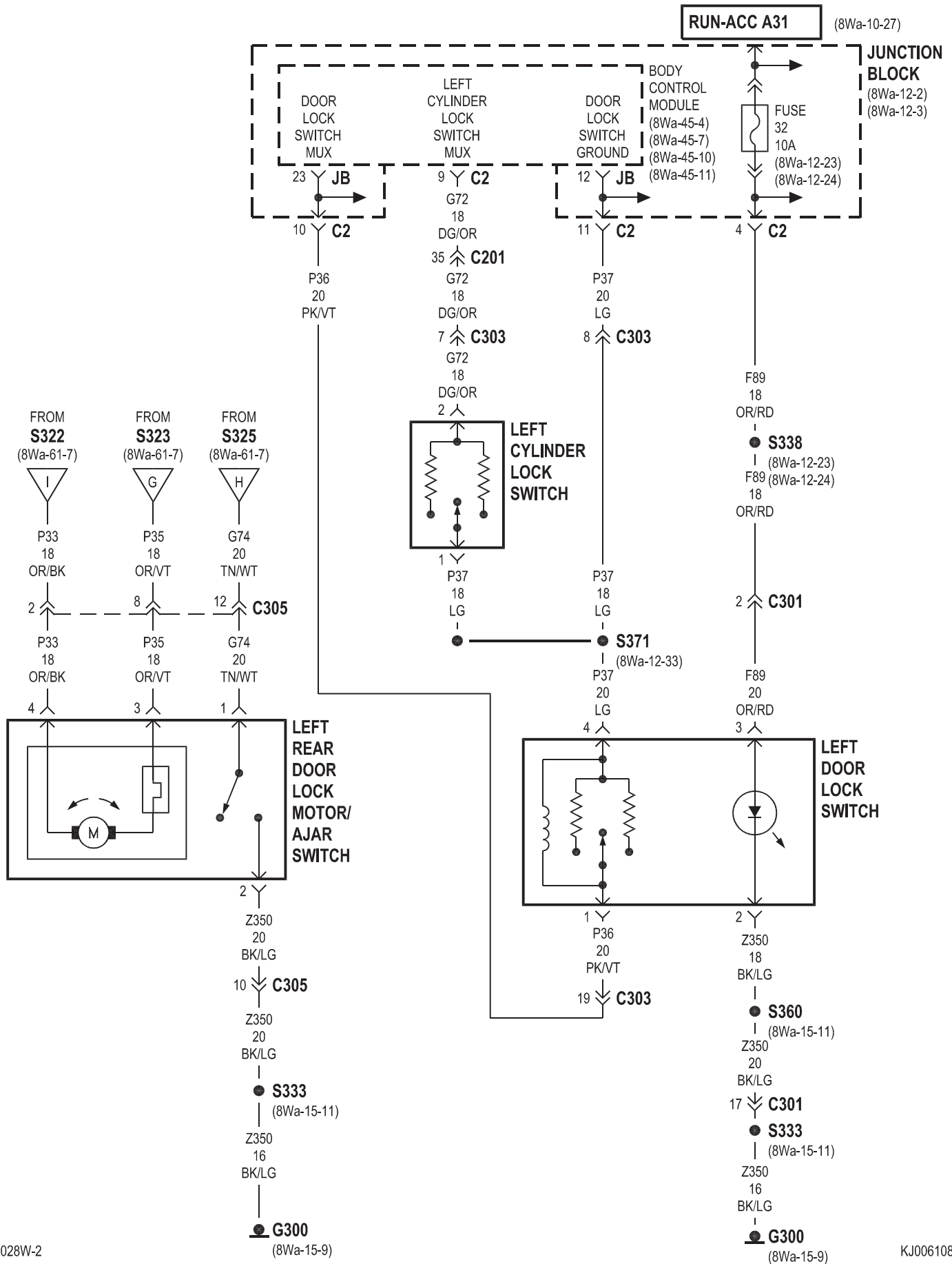






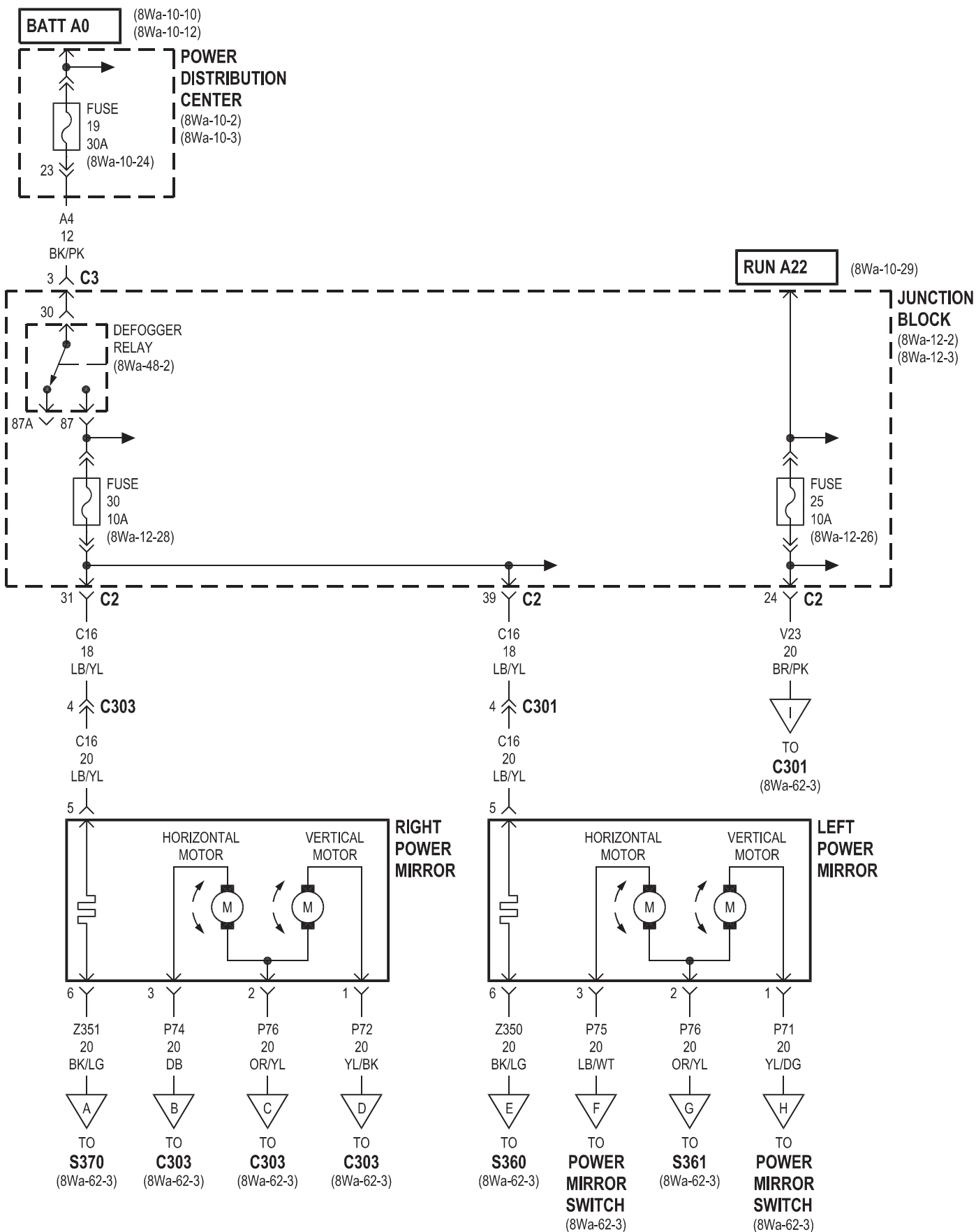


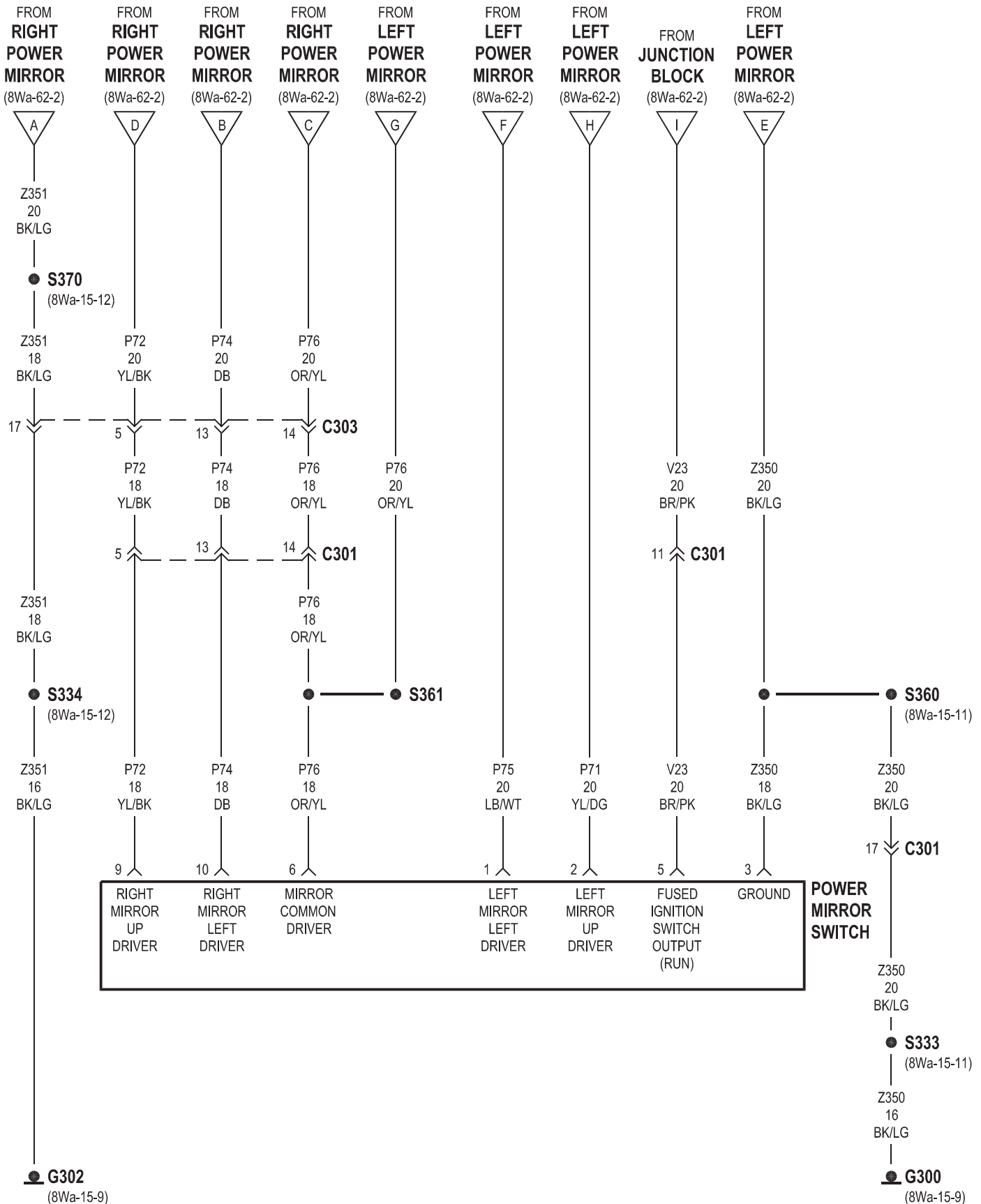


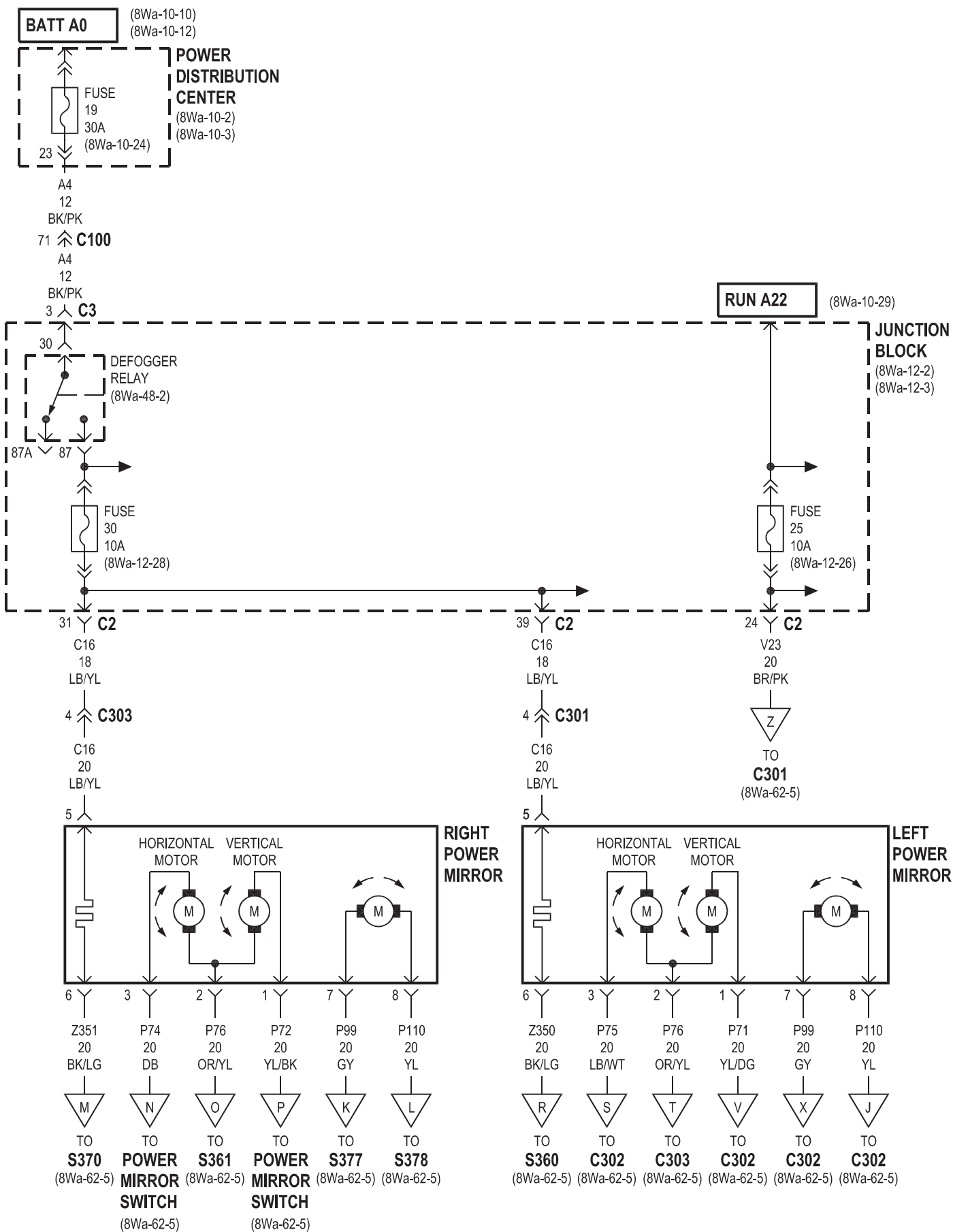


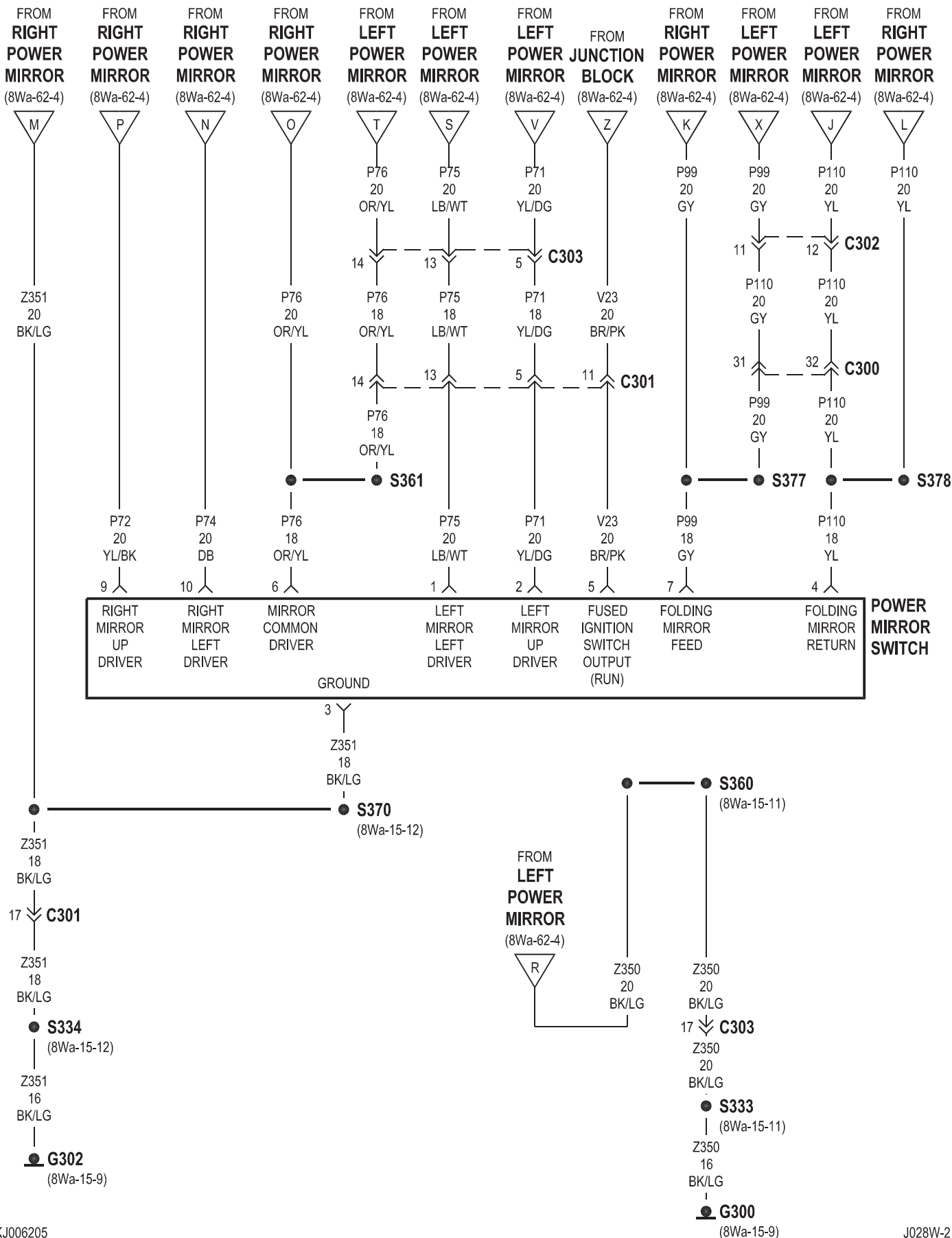
8W-62 POWER MIRRORS

Component	Page	Component	Page
Defogger Relay	8Wa-62-2, 4	Junction Block	8Wa-62-2, 3, 4, 5
Fuse 19	8Wa-62-2, 4	Left Power Mirror	8Wa-62-2, 3, 4, 5
Fuse 25	8Wa-62-2, 4	Power Distribution Center	8Wa-62-2, 4
Fuse 30	8Wa-62-2, 4	Power Mirror Switch	8Wa-62-2, 3, 4, 5
G300	8Wa-62-3, 5	Right Power Mirror	8Wa-62-2, 3, 4, 5
G302	8Wa-62-3, 5		



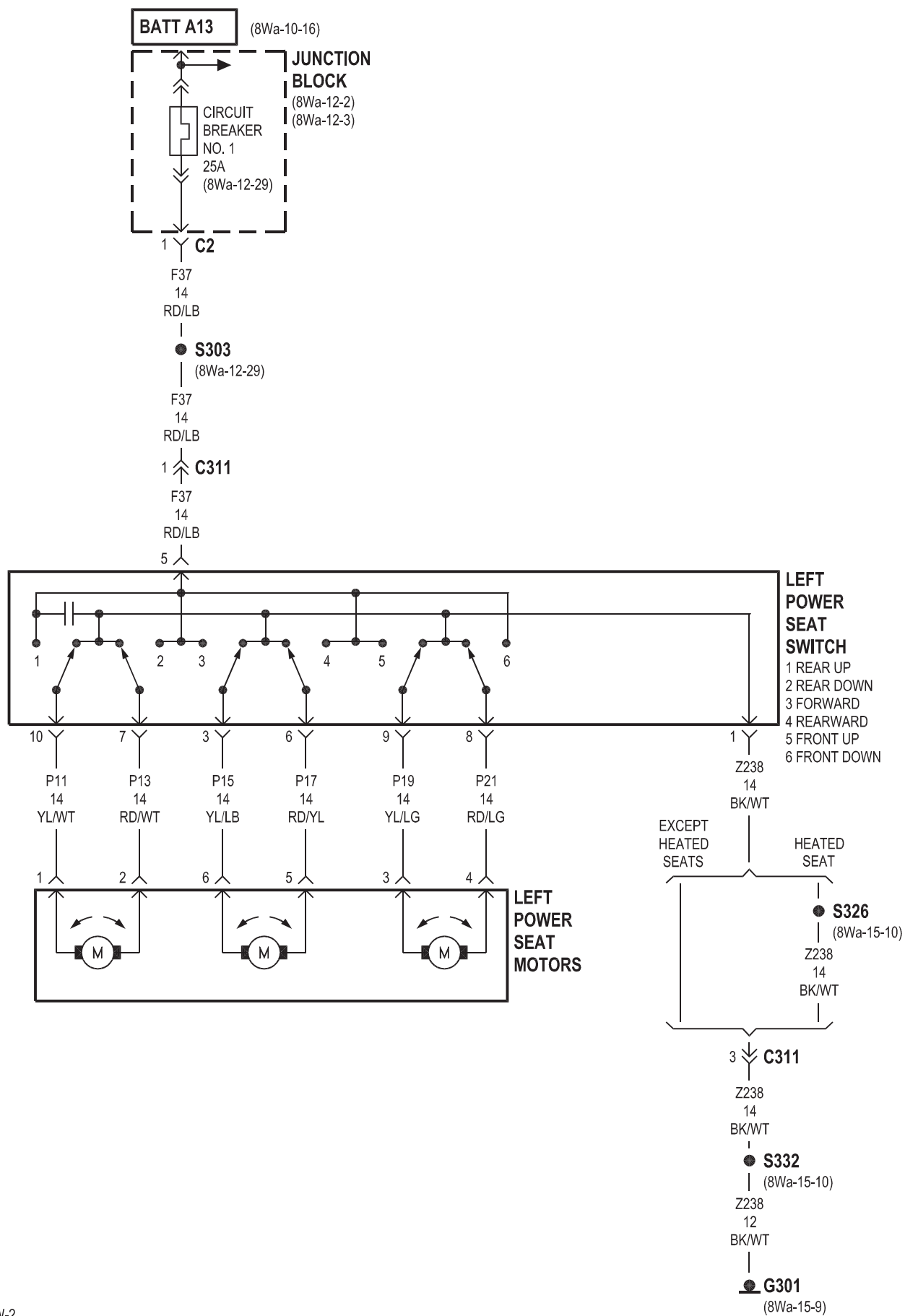


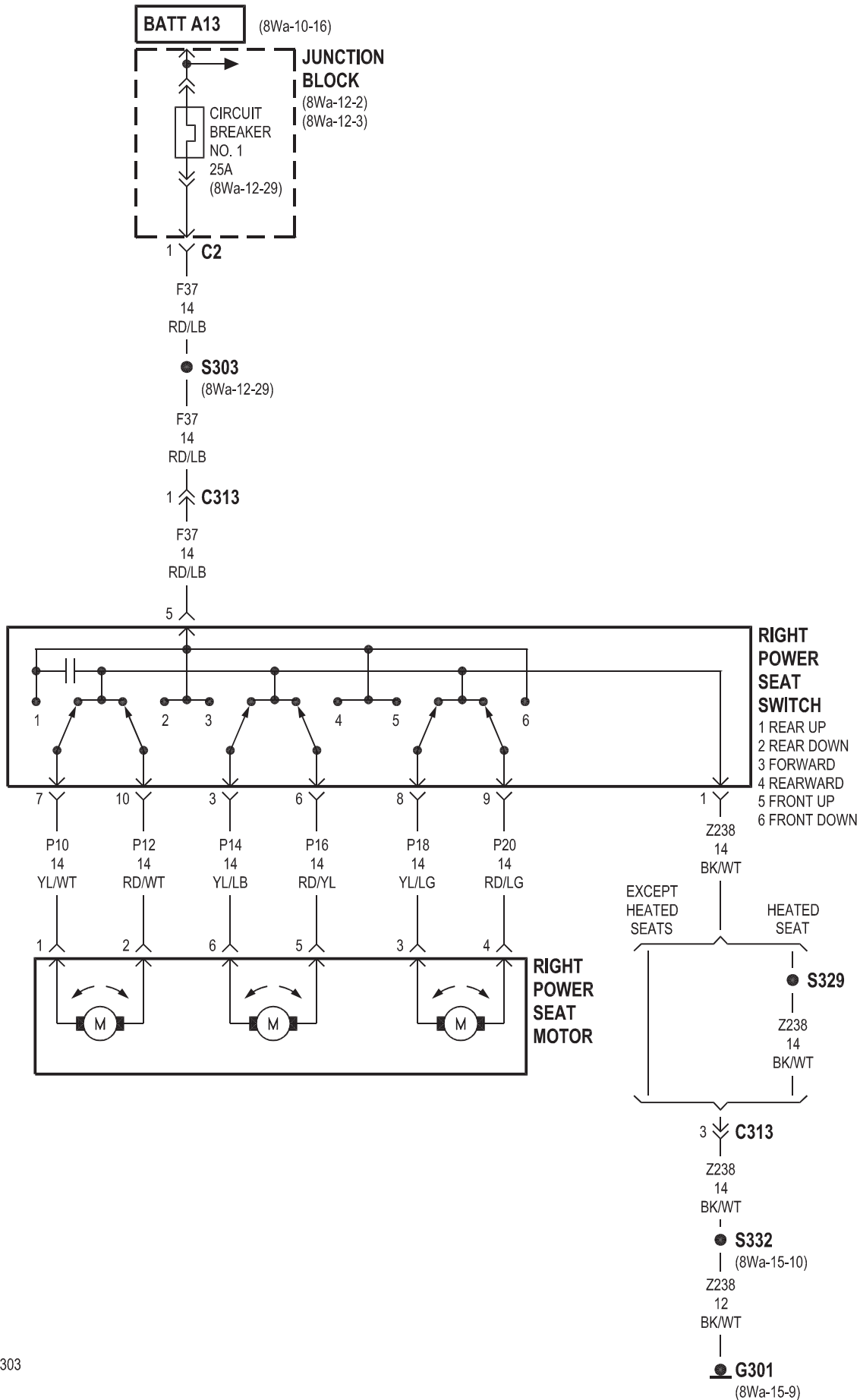


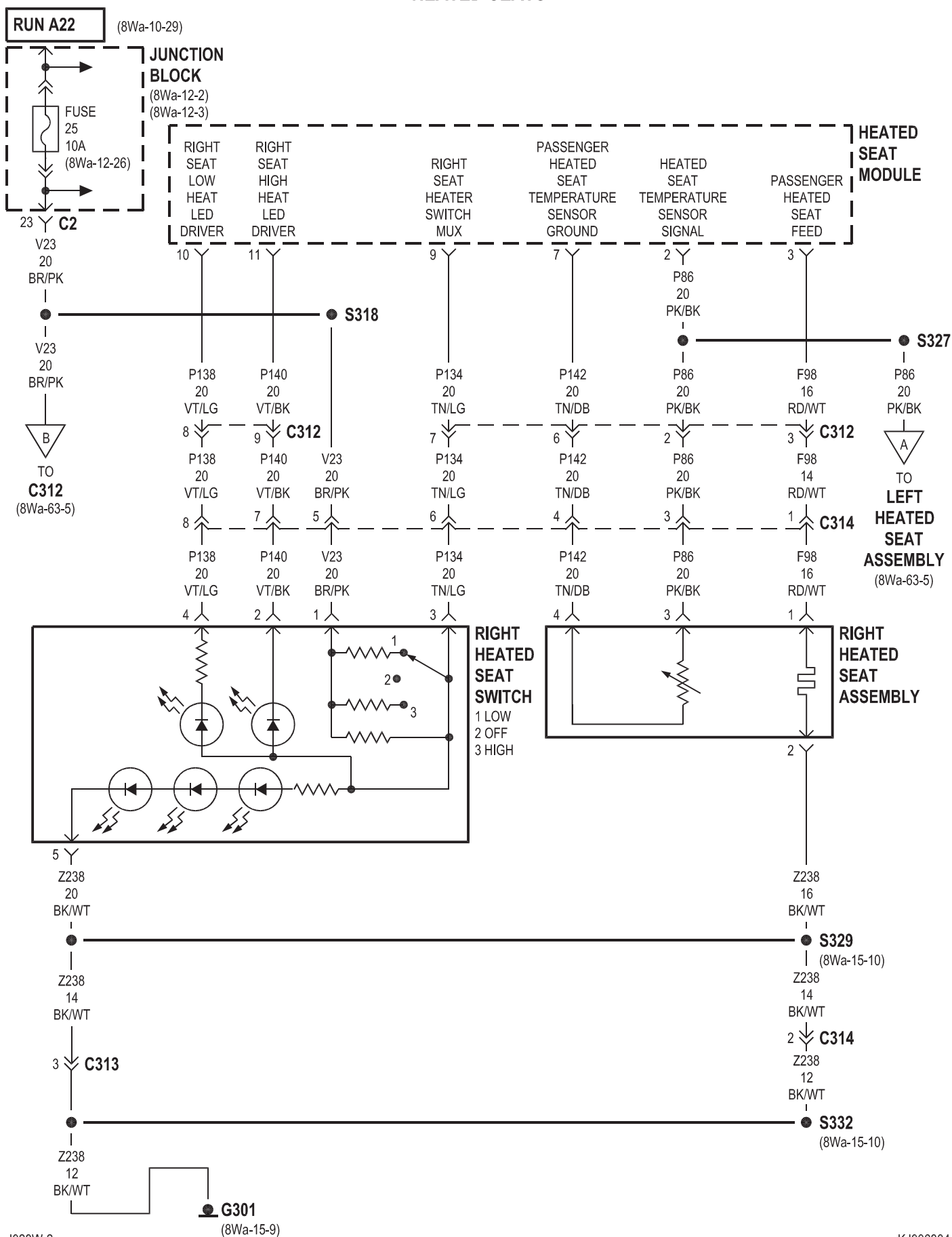


8W-63 POWER SEAT

Component	Page	Component	Page
Circuit Breaker No. 1	8Wa-63-2, 3	Left Heated Seat Switch	8Wa-63-5
Fuse 25	8Wa-63-4	Left Power Seat Motors	8Wa-63-2
Fuse 29	8Wa-63-5	Left Power Seat Switch	8Wa-63-2
G301	8Wa-63-2, 3, 4, 5	Right Heated Seat Assembly	8Wa-63-4
Heated Seat Module	8Wa-63-4, 5	Right Heated Seat Switch	8Wa-63-4
Junction Block	8Wa-63-2, 3, 4, 5	Right Power Seat Motor	8Wa-63-3
Left Heated Seat Assembly	8Wa-63-4, 5	Right Power Seat Switch	8Wa-63-3



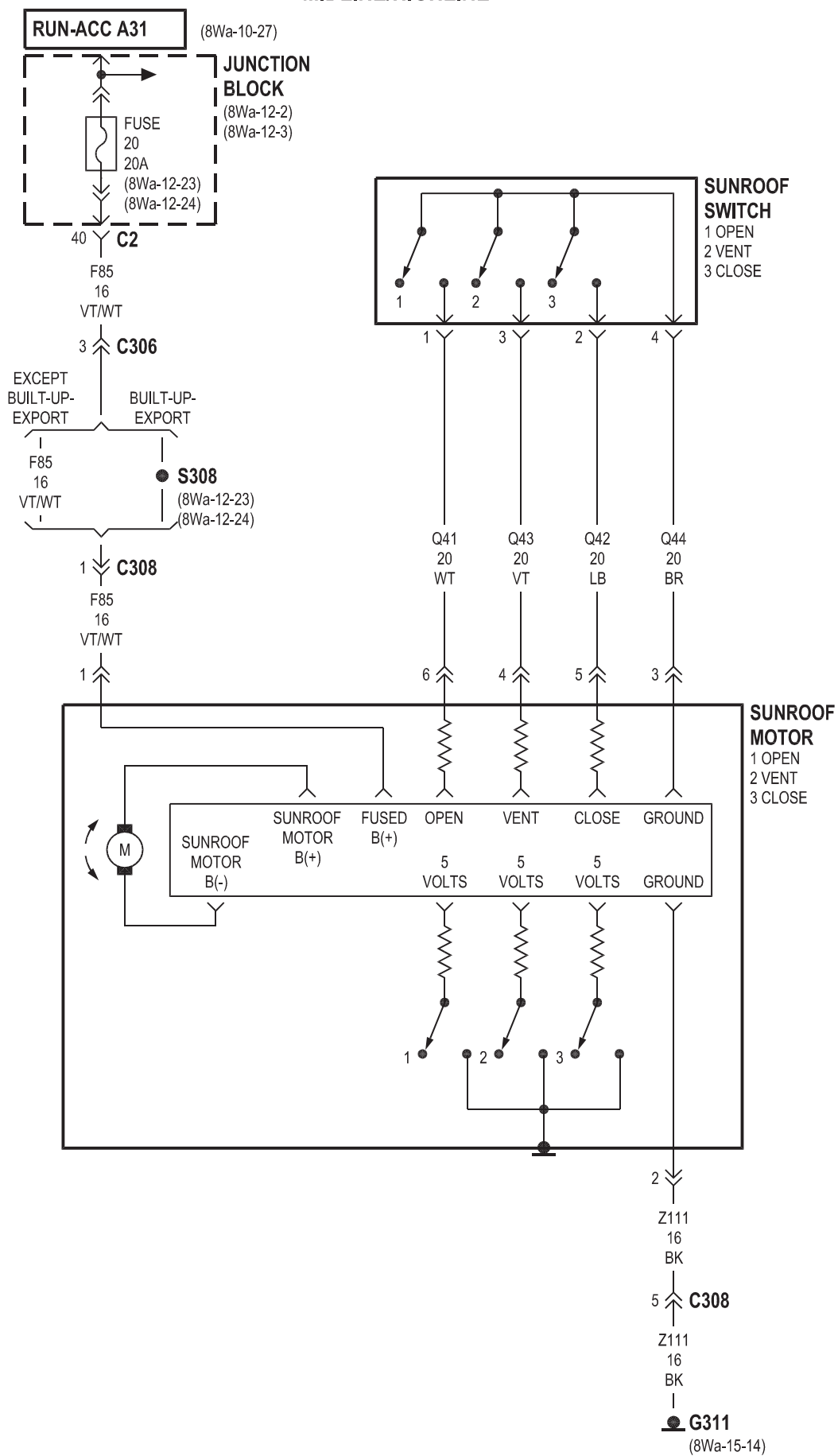






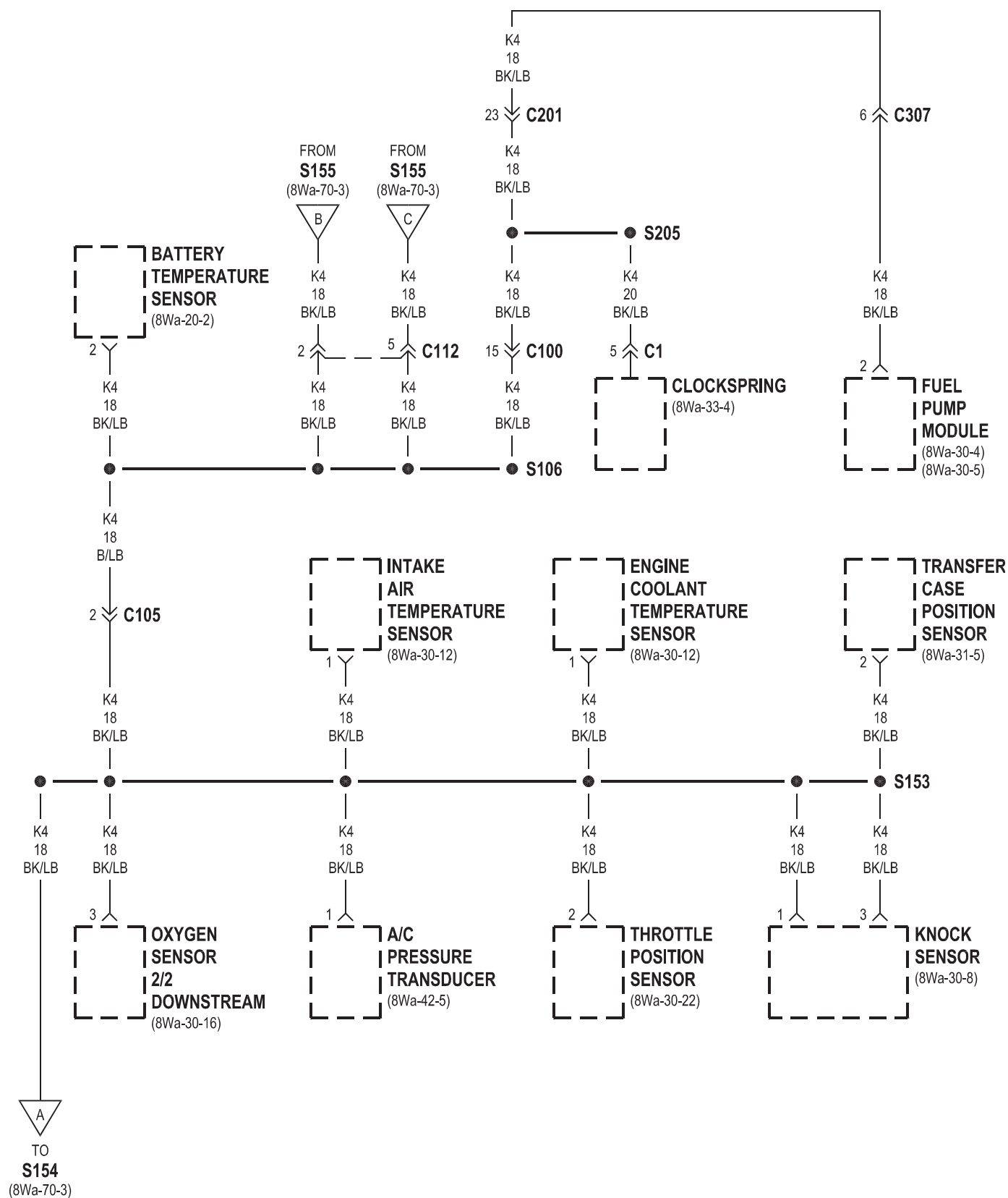
8W-64 POWER SUNROOF

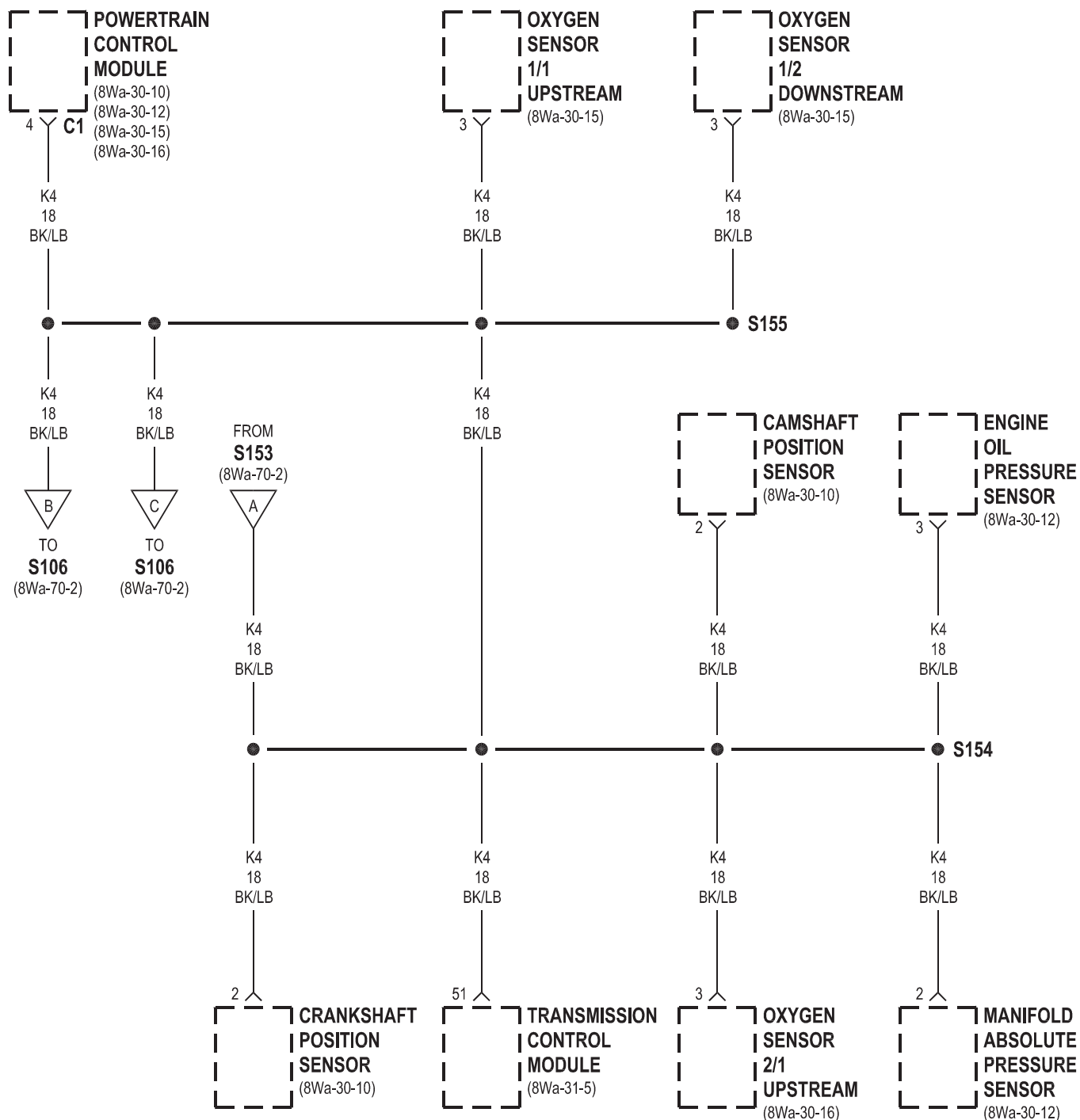
Component	Page	Component	Page
Fuse 20	8Wa-64-2	Sunroof Motor	8Wa-64-2
G311	8Wa-64-2	Sunroof Switch	8Wa-64-2
Junction Block	8Wa-64-2		



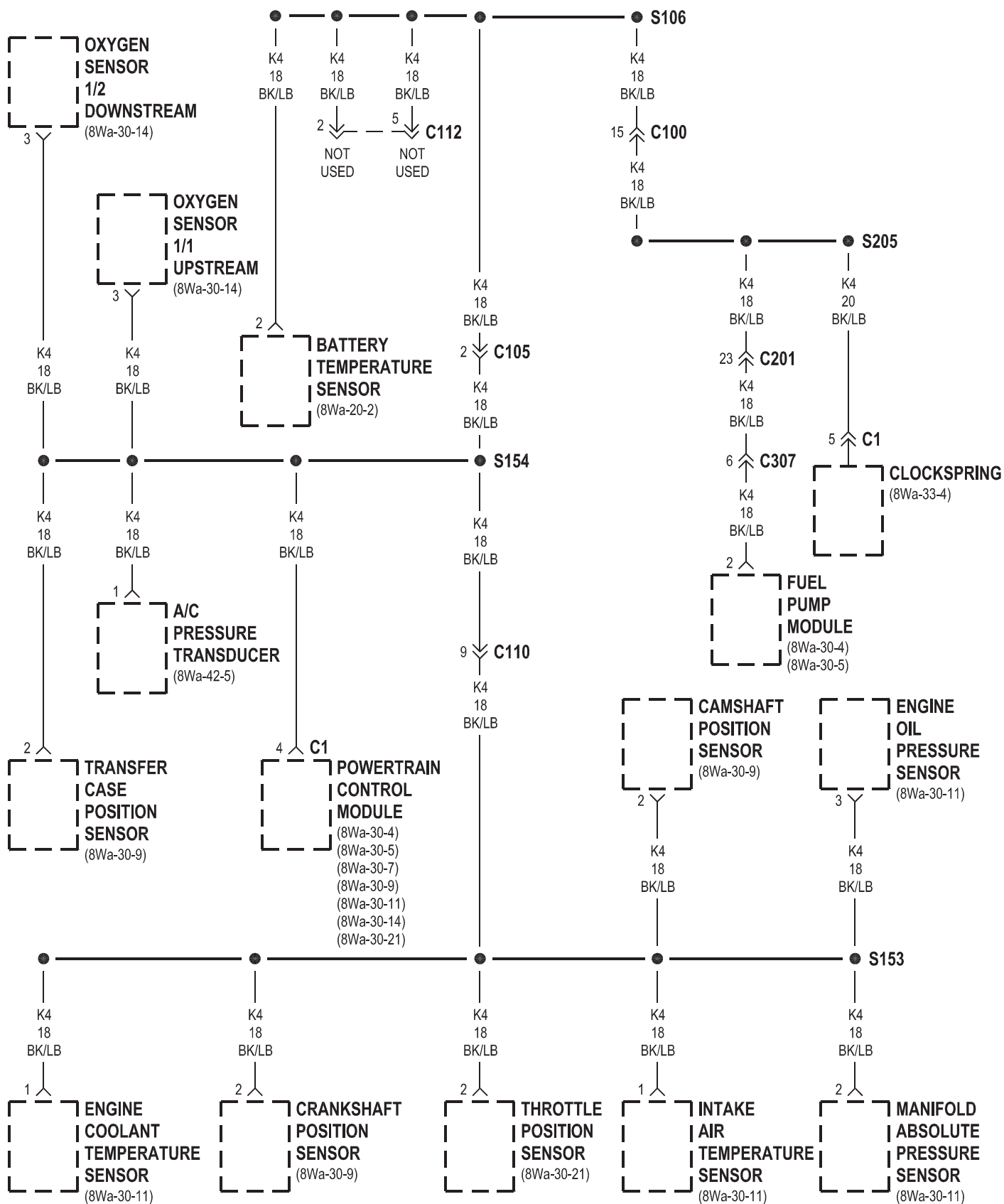
8W-70 SPLICE INFORMATION

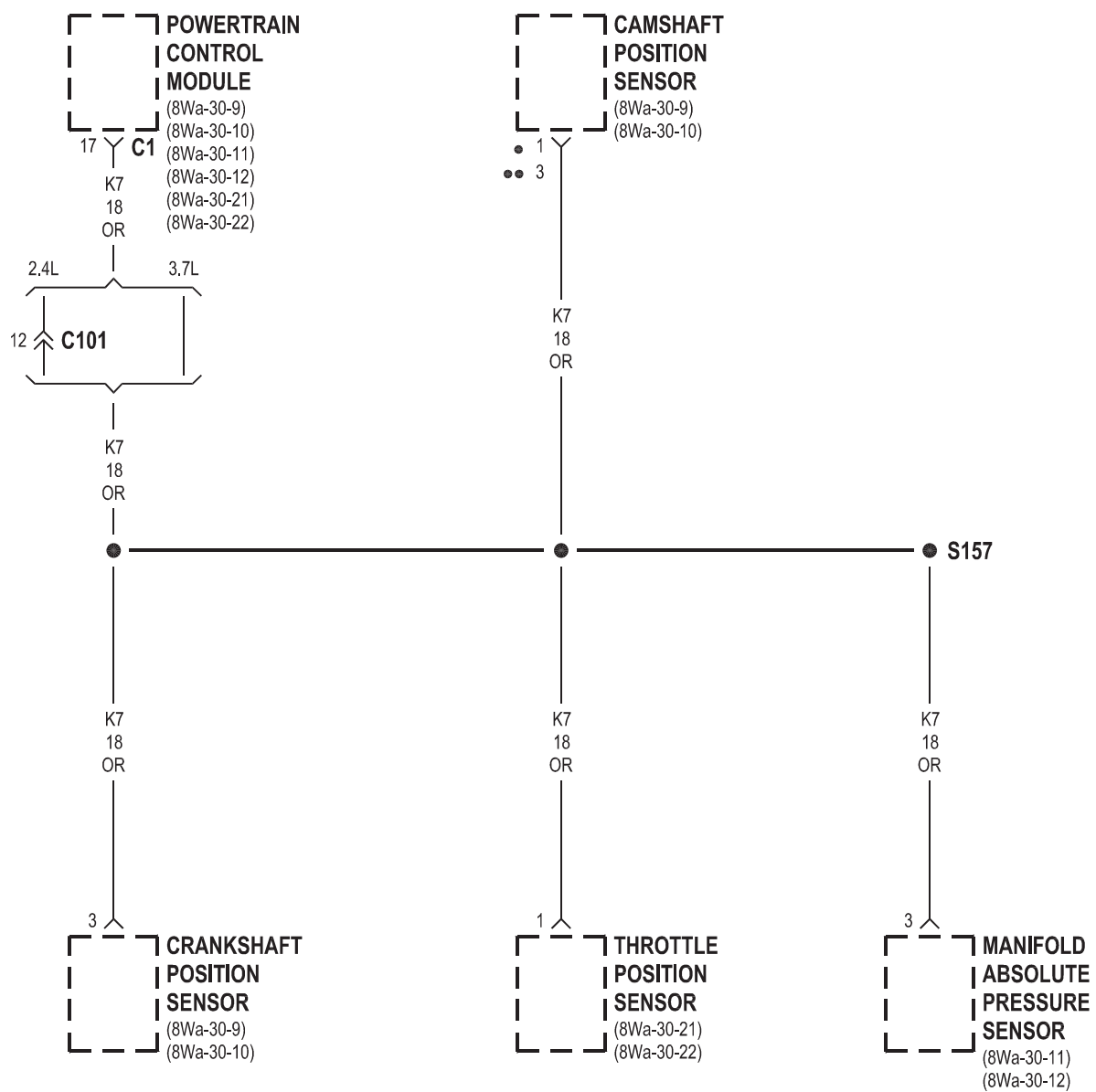
Component	Page	Component	Page
S101	8Wa-10-23	S217	8Wa-53-3
S104	8Wa-30-6	S218	8Wa-53-3
S106	8Wa-70-2, 4, 6	S219	8Wa-10-13, 25
S107	8Wa-30-33	S220	8Wa-10-24
S108	8Wa-12-9	S221	8Wa-33-4
S108	8Wa-41-2	S222	8Wa-33-4
S109	8Wa-15-3	S223	8Wa-47-9
S110	8Wa-15-4	S224	8Wa-47-9
S111	8Wa-15-3	S300	8Wa-12-13, 14, 15
S112	8Wa-18-3, 4	S301	8Wa-12-30
S113	8Wa-12-28	S302	8Wa-12-16
S114	8Wa-30-4, 5	S303	8Wa-12-29
S115	8Wa-10-22	S304	8Wa-15-15
S118	8Wa-45-5	S306	8Wa-15-15
S121	8Wa-10-19	S308	8Wa-12-23, 24
S122	8Wa-12-25	S310	8Wa-31-4
S123	8Wa-12-19	S312	8Wa-12-13, 14, 15
S124	8Wa-10-25	S313	8Wa-15-13
S125	8Wa-10-24	S314	8Wa-52-4, 5
S130	8Wa-15-3	S318	8Wa-12-26
S131	8Wa-15-4	S318	8Wa-63-4
S140	8Wa-15-5	S319	8Wa-15-7
S141	8Wa-12-13	S322	8Wa-12-12
S142	8Wa-52-6, 7	S323	8Wa-12-12
S143	8Wa-15-5	S324	8Wa-47-7
S144	8Wa-12-21, 22	S325	8Wa-45-9
S145	8Wa-52-4, 5	S325	8Wa-61-3, 7
S146	8Wa-12-13	S326	8Wa-15-10
S147	8Wa-50-4	S327	8Wa-63-4
S148	8Wa-50-5	S328	8Wa-12-17
S149	8Wa-50-4, 5	S329	8Wa-15-10
S151	8Wa-10-19, 21, 22	S331	8Wa-15-9
S152	8Wa-10-21	S332	8Wa-15-10
S153	8Wa-70-2, 4, 6	S333	8Wa-15-11
S154	8Wa-70-3, 4, 6	S334	8Wa-15-12
S155	8Wa-70-3	S336	8Wa-18-2
S156	8Wa-30-11, 12, 28	S338	8Wa-12-23, 24
S157	8Wa-70-5	S340	8Wa-47-3
S158	8Wa-30-22	S341	8Wa-47-3
S159	8Wa-30-10	S342	8Wa-47-3
S160	8Wa-12-19	S344	8Wa-47-3
S161	8Wa-10-20	S346	8Wa-52-6
S163	8Wa-31-9	S347	8Wa-51-4
S164	8Wa-10-17	S348	8Wa-12-16
S165	8Wa-21-2	S349	8Wa-12-13
S167	8Wa-15-2	S350	8Wa-12-10
S168	8Wa-15-6	S351	8Wa-15-14
S169	8Wa-15-6	S352	8Wa-12-28
S170	8Wa-10-19	S352	8Wa-48-2
S175	8Wa-30-36	S356	8Wa-15-14
S177	8Wa-15-7	S360	8Wa-15-11
S177	8Wa-30-27	S361	8Wa-62-3, 5
S178	8Wa-10-20	S362	8Wa-12-33
S180	8Wa-15-2	S363	8Wa-47-3
S181	8Wa-30-31	S364	8Wa-47-3
S184	8Wa-10-28	S370	8Wa-15-12
S200	8Wa-15-8	S371	8Wa-12-33
S201	8Wa-18-2, 4	S372	8Wa-47-3
S204	8Wa-12-28	S373	8Wa-47-3
S205	8Wa-70-2, 4, 6	S377	8Wa-62-5
S206	8Wa-53-2	S378	8Wa-62-5
S207	8Wa-45-5	S380	8Wa-15-14
S208	8Wa-45-6	S381	8Wa-61-5
S210	8Wa-10-27	S382	8Wa-53-3
S212	8Wa-52-4, 5	S390	8Wa-12-30
S213	8Wa-52-6, 7	S391	8Wa-12-34
S214	8Wa-15-8	S392	8Wa-12-31
S215	8Wa-30-32	S393	8Wa-18-2
S215	8Wa-31-5	S394	8Wa-15-14
S216	8Wa-12-14, 15		

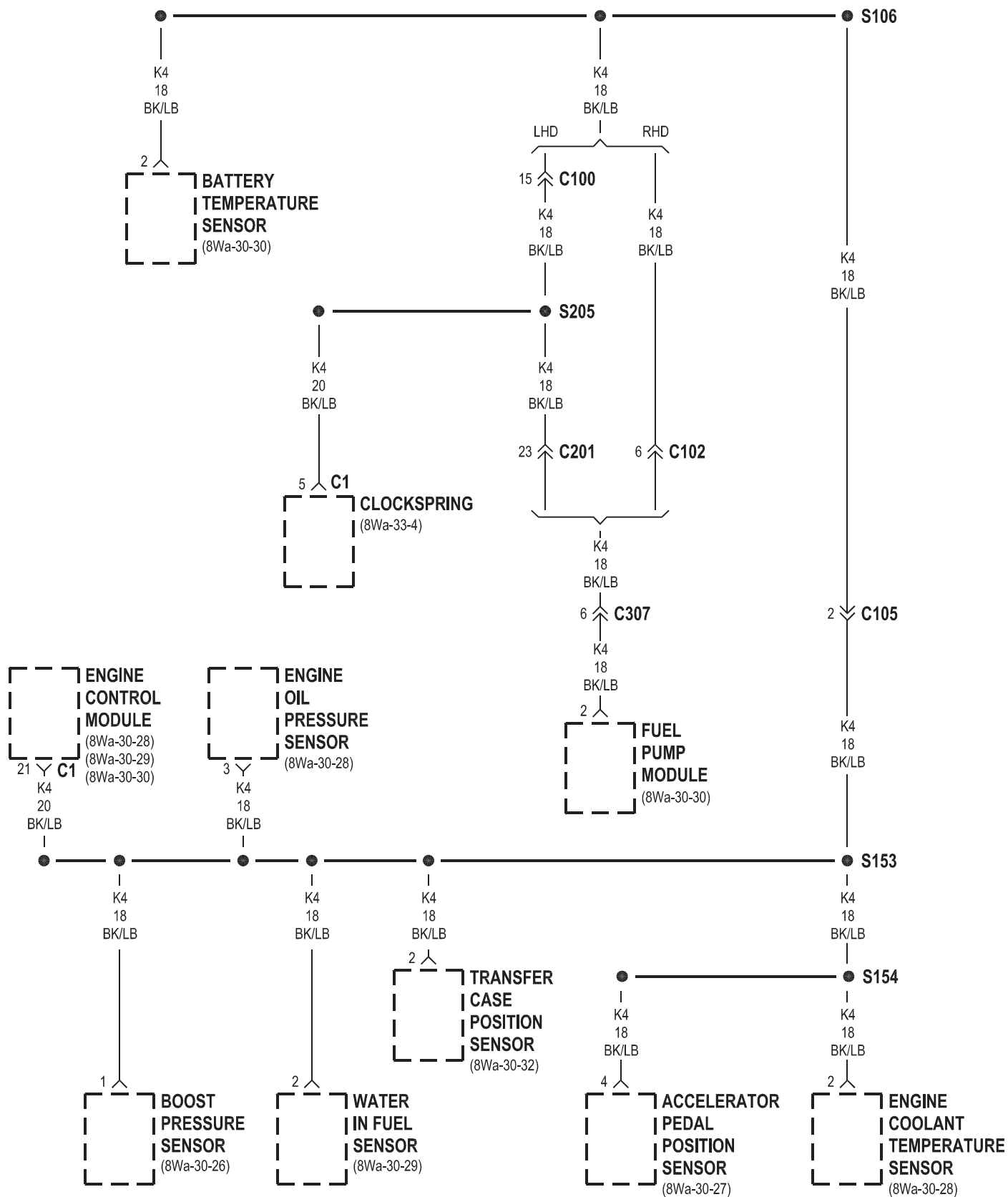




2.4L







8W-80 CONNECTOR PIN-OUTS

Component	Page	Component	Page
A/C Compressor Clutch	8Wa-80-5	C111 (Diesel)	8Wa-80-25
A/C High Pressure Switch (Diesel)	8Wa-80-5	C111 (Diesel)	8Wa-80-25
A/C Low Pressure Switch	8Wa-80-5	C112 (Gas)	8Wa-80-26
A/C Pressure Transducer (Gas)	8Wa-80-5	C112 (Gas)	8Wa-80-26
A/C-Heater Control C1	8Wa-80-5	C113 (Diesel)	8Wa-80-26
A/C-Heater Control C2	8Wa-80-6	C113 (Diesel)	8Wa-80-26
Accelerator Pedal Position Sensor (Diesel)	8Wa-80-6	C114 (Diesel)	8Wa-80-27
Airbag Control Module C1 (ORC C1)	8Wa-80-6	C114 (Diesel)	8Wa-80-27
Airbag Control Module C2 (ORC C2)	8Wa-80-7	C201	8Wa-80-27
Ambient Temperature Sensor	8Wa-80-7	C201	8Wa-80-28
Antenna (Except Built-Up-Export)	8Wa-80-7	C202	8Wa-80-29
Antenna Module C1 (Built-Up-Export)	8Wa-80-8	C202	8Wa-80-29
Antenna Module C2 (Built-Up-Export)	8Wa-80-8	C300 (LHD)	8Wa-80-29
Ash Receiver Lamp	8Wa-80-8	C300 (LHD)	8Wa-80-30
Back-Up Lamp Switch (M/T)	8Wa-80-8	C300 (RHD)	8Wa-80-30
Battery Temperature Sensor	8Wa-80-8	C300 (RHD)	8Wa-80-31
Blend Door Actuator	8Wa-80-9	C301 (LHD)	8Wa-80-31
Blower Motor	8Wa-80-9	C301 (LHD)	8Wa-80-32
Blower Motor Resistor Block	8Wa-80-9	C301 (RHD)	8Wa-80-32
Body Control Module C1	8Wa-80-9	C301 (RHD)	8Wa-80-33
Body Control Module C2	8Wa-80-10	C302 (LHD)	8Wa-80-33
Body Control Module C3 (Premium)	8Wa-80-10	C302 (LHD)	8Wa-80-34
Boost Pressure Sensor (Diesel)	8Wa-80-11	C302 (RHD)	8Wa-80-34
Brake Lamp Switch	8Wa-80-11	C302 (RHD)	8Wa-80-35
Brake Pressure Switch (ABS)	8Wa-80-11	C303 (LHD)	8Wa-80-35
C100 (RHD)	8Wa-80-11	C303 (LHD)	8Wa-80-36
C100 (LHD)	8Wa-80-13	C303 (RHD)	8Wa-80-36
C100 (LHD)	8Wa-80-14	C303 (RHD)	8Wa-80-37
C100 (RHD)	8Wa-80-16	C304	8Wa-80-37
C101 (2.4L)	8Wa-80-17	C304	8Wa-80-37
C101 (2.4L)	8Wa-80-18	C305	8Wa-80-38
C102 (RHD)	8Wa-80-18	C305	8Wa-80-38
C102 (RHD)	8Wa-80-18	C306	8Wa-80-39
C103 (Gas)	8Wa-80-19	C306	8Wa-80-40
C103 (Gas)	8Wa-80-19	C307	8Wa-80-40
C104 (Diesel)	8Wa-80-19	C307	8Wa-80-41
C104 (Diesel)	8Wa-80-20	C308	8Wa-80-41
C104 (Gas)	8Wa-80-20	C308	8Wa-80-41
C104 (Gas)	8Wa-80-20	C309	8Wa-80-42
C105 (Diesel)	8Wa-80-21	C309	8Wa-80-42
C105 (Diesel)	8Wa-80-21	C310	8Wa-80-43
C105 (Gas)	8Wa-80-22	C310	8Wa-80-43
C105 (Gas)	8Wa-80-22	C311	8Wa-80-43
C106	8Wa-80-22	C311	8Wa-80-44
C106	8Wa-80-23	C312 (Highline)	8Wa-80-44
C107	8Wa-80-23	C312 (Highline)	8Wa-80-44
C107	8Wa-80-23	C313	8Wa-80-44
C108 (Gas)	8Wa-80-24	C313	8Wa-80-45
C108 (Gas)	8Wa-80-24	C314 (Highline)	8Wa-80-45
C110 (2.4L)	8Wa-80-24	C314 (Highline)	8Wa-80-45
C110 (2.4L)	8Wa-80-25	C315 (Midline/Highline)	8Wa-80-46
		C315 (Midline/Highline)	8Wa-80-46

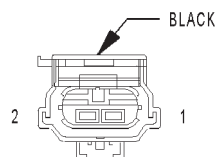
Component	Page
C316 (Built-Up-Export)	8Wa-80-46
C316 (Built-Up-Export)	8Wa-80-46
C317 (Except Built-Up-Export)	8Wa-80-47
C317 (Except Built-Up-Export)	8Wa-80-47
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Camshaft Position Sensor (2.4L)	8Wa-80-47
Camshaft Position Sensor (3.7L)	8Wa-80-47
Camshaft Position Sensor (Diesel)	8Wa-80-48
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Cigar Lighter	8Wa-80-49
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Coil On Plug No. 2 (3.7L)	8Wa-80-50
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Driver Airbag Squib 1	8Wa-80-54
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Driver Seat Belt Switch	8Wa-80-54
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Engine Oil Pressure Sensor	8Wa-80-58
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Flip-Up Glass Release Switch	8Wa-80-58
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Fuel Injector No. 1 (Gas)	8Wa-80-59
Fuel Injector No. 2 (Diesel)	8Wa-80-59
Fuel Injector No. 2 (Gas)	8Wa-80-60

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Fuel Injector No. 3 (Gas)	8Wa-80-60
Fuel Injector No. 4 (Diesel)	8Wa-80-60
Fuel Injector No. 4 (Gas)	8Wa-80-60
Fuel Injector No. 5 (3.7L)	8Wa-80-61
Fuel Injector No. 6 (3.7L)	8Wa-80-61
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Fuel Pressure Solenoid (Diesel)	8Wa-80-61
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Generator	8Wa-80-62
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Headlamp Leveling Switch (Built-Up-Export)	8Wa-80-63
Heated Seat Module (Highline)	8Wa-80-63
High Note Horn	8Wa-80-63
Hood Ajar Switch (Except Base)	8Wa-80-63
Idle Air Control Motor	8Wa-80-64
Ignition Switch	8Wa-80-64
Input Speed Sensor (3.7L)	8Wa-80-64
Instrument Cluster	8Wa-80-64
Intake Air Temperature Sensor (Gas)	8Wa-80-65
Intrusion Sensor (Built-Up-Export)	8Wa-80-65
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Left Curtain Airbag	8Wa-80-69
Left Cylinder Lock Switch (Except Base)	8Wa-80-69
Left Door Lock Switch (Except Base)	8Wa-80-70
Left Fog Lamp	8Wa-80-70
Left Front Door Ajar Switch (Base)	8Wa-80-70
Left Front Door Lock Motor/Ajar Switch (Except Base)	8Wa-80-70
Left Front Door Speaker (Base)	8Wa-80-70
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Left Front Impact Sensor	8Wa-80-71
Left Front Park/Turn Signal Lamp	8Wa-80-71
Left Front Power Window Motor (Midline/Highline)	8Wa-80-71
Left Front Wheel Speed Sensor (ABS)	8Wa-80-72
Left Headlamp (Built-Up-Export)	8Wa-80-72
Left Headlamp (Except Built-Up-Export)	8Wa-80-72
Left Heated Seat Assembly (Highline)	8Wa-80-72
Left Heated Seat Switch (Highline)	8Wa-80-72
Left Instrument Panel Speaker	8Wa-80-73
Left Leveling Motor (Built-Up-Export)	8Wa-80-73
Left Position Lamp (Built-Up-Export)	8Wa-80-73
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Left Power Seat Switch	
(Midline/Highline)	8Wa-80-74
Left Rear Door Ajar Switch (Base)	8Wa-80-74
Left Rear Door Lock Motor/Ajar Switch	
(Except Base)	8Wa-80-74
Left Rear Door Speaker	8Wa-80-75
Left Rear Power Window Motor	
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Left Remote Radio Switch (Premium)	8Wa-80-75
Left Side Impact Airbag Control	
Module (LSIACM)	8Wa-80-75
Left Side Marker Lamp (Except	
Built-Up-Export)	8Wa-80-76
Left Side Repeater Lamp	
(Built-Up-Export)	8Wa-80-76
Left Speed Control Switch (Except Base)	8Wa-80-76
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Left Visor/Vanity Lamp (Except Base)	8Wa-80-76
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Line Pressure Sensor (3.7L)	8Wa-80-77
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Manifold ABSolute Pressure Sensor	8Wa-80-77
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(Except Base)	8Wa-80-78
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Oxygen Sensor 1/2 Downstream	8Wa-80-79
Oxygen Sensor 2/1 Upstream (3.7L)	8Wa-80-79
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Passenger Airbag	8Wa-80-79
Passenger Seat Belt Switch	8Wa-80-80
Power Mirror Switch (Except Base)	8Wa-80-80
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(Midline/Highline)	8Wa-80-81
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Powertrain Control Module-C1 (3.7L)	8Wa-80-82
Powertrain Control Module-C2 (Gas)	8Wa-80-82
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Radio C3	8Wa-80-85
Radio Choke (Premium)	8Wa-80-85
Rear Power Outlet	8Wa-80-85
Rear Power Window Switch	
(Midline/Highline)	8Wa-80-86
Rear Wheel Speed Sensor	8Wa-80-86

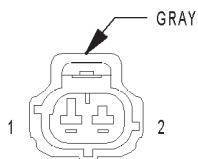
Component	Page
Rear Wiper Motor	8Wa-80-86
Red Brake Warning Indicator Switch	8Wa-80-86
Remote Keyless Entry Module	
(Except Base)	8Wa-80-86
Right Courtesy Lamp	8Wa-80-87
Right Curtain Airbag	8Wa-80-87
Right Cylinder Lock Switch	
(Except Base)	8Wa-80-87
Right Door Lock Switch (Except Base)	8Wa-80-87
Right Fog Lamp	8Wa-80-87
Right Front Door Ajar Switch (Base)	8Wa-80-88
Right Front Door Lock Motor/Ajar Switch	
(Except Base)	8Wa-80-88
Right Front Door Speaker (Base)	8Wa-80-88
Right Front Door Speaker (Premium)	8Wa-80-88
Right Front Impact Sensor	8Wa-80-88
Right Front Park/ Turn Signal Lamp	8Wa-80-89
Right Front Power Window Motor	
(Midline/Highline)	8Wa-80-89
Right Front Wheel Speed Sensor (ABS)	8Wa-80-89
Right Headlamp (Built-Up-Export)	8Wa-80-89
Right Headlamp (Except Built-Up-Export)	8Wa-80-89
Right Heated Seat Assembly (Highline)	8Wa-80-90
Right Heated Seat Switch (Highline)	8Wa-80-90
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Right Power Seat Switch	
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Right Rear Door Ajar Switch (Base)	8Wa-80-92
Right Rear Door Lock Motor/Ajar Switch	
(Except Base)	8Wa-80-92
Right Rear Door Speaker	8Wa-80-92
Right Rear Power Window Motor	
(Midline/Highline)	8Wa-80-92
Right Remote Radio Switch (Premium)	8Wa-80-92
Right Side Impact Airbag Control Module	
(RSIACM)	8Wa-80-93
Right Side Marker Lamp	
(Except Built-Up-Export)	8Wa-80-93
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(Built-Up-Export)	8Wa-80-93
Right Speed Control Switch	
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Right Tail/Stop Lamp	8Wa-80-93
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Component	Page	Component	Page
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Tailgate Cylinder Lock Switch	8Wa-80-95	Trailer Tow Right Turn Relay	8Wa-80-97
Tailgate Flip-Up Ajar Switch	8Wa-80-95	Transfer Case Position Sensor	8Wa-80-97
Tailgate Lock Motor/Ajar Switch	8Wa-80-95	Transmission Control Module (3.7L)	8Wa-80-98
Throttle Position Sensor	8Wa-80-96	Transmission Solenoid/TRS Assembly (3.7L)	8Wa-80-99
Trailer Tow Brake Lamp Relay	8Wa-80-96	Washer Fluid Level Switch	8Wa-80-99
Trailer Tow Circuit Breaker	8Wa-80-96	Washer Pump	8Wa-80-100
Trailer Tow Connector	8Wa-80-96	Water In Fuel Sensor (Diesel)	8Wa-80-100
Trailer Tow Left Turn Relay	8Wa-80-97		



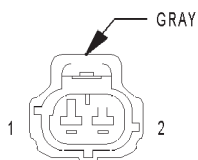
A/C
COMPRESSOR
CLUTCH

A/C COMPRESSOR CLUTCH - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	C3 18DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
2	Z246 18BK/GY	GROUND



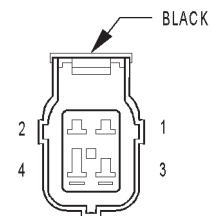
A/C HIGH
PRESSURE
SWITCH
(DIESEL)

A/C HIGH PRESSURE SWITCH (DIESEL) - GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	C18 20DB	A/C PRESSURE SIGNAL
2	C21 18DB/OR	A/C SWITCH SENSE



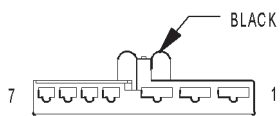
A/C LOW
PRESSURE
SWITCH

A/C LOW PRESSURE SWITCH - GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	C21 18DB/OR	A/C SWITCH SENSE
2	Z142 18BK/WT (RHD)	GROUND
2	Z212 18BK/OR (LHD)	GROUND



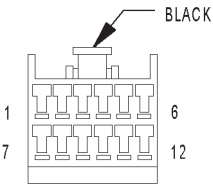
A/C
PRESSURE
TRANSDUCER
(GAS)

A/C PRESSURE TRANSDUCER (GAS) - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	K4 18BK/LB	SENSOR GROUND
2	K6 18VT/WT	5 VOLT SUPPLY
3	C18 18DB	A/C PRESSURE SIGNAL
4	-	-



A/C-HEATER
CONTROL
C1

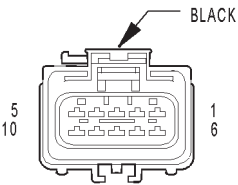
A/C-HEATER CONTROL C1 - BLACK 7 WAY		
CAV	CIRCUIT	FUNCTION
1	Z8 12BK/VT	GROUND
2	C7 12BK/TN	BLOWER MOTOR HIGH DRIVER
3	C6 12LB	BLOWER MOTOR M2 DRIVER
4	C5 14LG	BLOWER MOTOR M1 DRIVER
5	C4 14TN	BLOWER MOTOR LOW DRIVER
6	C19 18BR	A/C ON/OFF CONTROL
7	E2 20OR	FUSED PANEL LAMPS DIMMER SWITCH SIGNAL



A/C-HEATER
CONTROL
C2

A/C-HEATER CONTROL C2 - BLACK 12 WAY

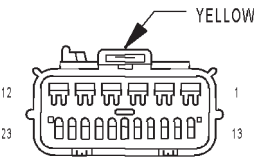
CAV	CIRCUIT	FUNCTION
1	C35 20DG/YL	MODE DOOR DRIVER (A)
2	V23 20BR/PK	FUSED IGNITION SWITCH OUTPUT (RUN)
3	-	-
4	-	-
5	-	-
6	C79 20VT/BK	REAR WINDOW DEFOGGER CONTROL
7	-	-
8	Z12 20BK/TN	GROUND
9	-	-
10	-	-
11	-	-
12	C16 20LB/YL	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT



ACCELERATOR
PEDAL
POSITION
SENSOR
(DIESEL)

ACCELERATOR PEDAL POSITION SENSOR (DIESEL) - BLACK 10 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	K4 18BK/LB	SENSOR GROUND
5	K151 20WT	LOW IDLE POSITION SWITCH SENSE
6	-	-
7	K81 20VT/TN	ACCELERATOR PEDAL POSITION SENSOR SIGNAL
8	K255 20WT/DG	ACCELERATOR PEDAL POSITION SENSOR GROUND
9	-	-
10	K852 20VT/WT	ACCELERATOR PEDAL POSITION SENSOR 5 VOLT SUPPLY



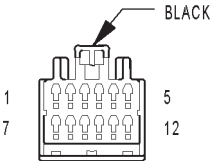
AIRBAG
CONTROL
MODULE C1
(ORC C1)

AIRBAG CONTROL MODULE C1 (ORC C1) - YELLOW 23 WAY

CAV	CIRCUIT	FUNCTION
1	R45 18DG/LB	DRIVER SQUIB 1 LINE 2
2	R43 18BK/LB	DRIVER SQUIB 1 LINE 1
3	-	-
4	-	-
5	R53 18OR/YL	DRIVER SEAT BELT TENSIONER LINE 2
6	R55 18OR/BK	DRIVER SEAT BELT TENSIONER LINE 1
7	R61 18OR/LB	DRIVER SQUIB 2 LINE 1
8	R63 18TN/LB	DRIVER SQUIB 2 LINE 2
9	R62 18OR/YL	PASSENGER SQUIB 2 LINE 2
10	R64 18TN/YL	PASSENGER SQUIB 2 LINE 1
11	R42 18BK/YL	PASSENGER SQUIB 1 LINE 1
12	R44 18DG/YL	PASSENGER SQUIB 1 LINE 2
13	-	-
14	F14 18LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
15	F23 18DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
16	Z6 18BK/PK	GROUND

AIRBAG CONTROL MODULE C1 (ORC C1) - YELLOW 23 WAY

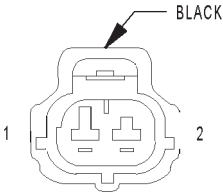
CAV	CIRCUIT	FUNCTION
17	-	-
18	-	-
19	-	-
20	-	-
21	D25 18YL/VT/OR	PCI BUS
22	-	-
23	-	-



AIRBAG
CONTROL
MODULE C2
(ORC C2)

AIRBAG CONTROL MODULE C2 (ORC C2) - BLACK 12 WAY

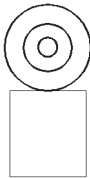
CAV	CIRCUIT	FUNCTION
1	-	-
2	R59 20LB	DRIVER SEAT BELT SWITCH GROUND
3	R57 20DG	DRIVER SEAT BELT SWITCH SENSE
4	-	-
5	R60 20VT	PASSENGER SEAT BELT SWITCH GROUND
6	R58 20GY	PASSENGER SEAT BELT SWITCH SENSE
7	R48 20TN	RIGHT FRONT IMPACT SENSOR SIGNAL
8	R46 20BR/LB	RIGHT FRONT IMPACT SENSOR GROUND
9	-	-
10	-	-
11	R47 20DB/LB	LEFT FRONT IMPACT SENSOR GROUND
12	R49 20LB/OR	LEFT FRONT IMPACT SENSOR SIGNAL



AMBIENT
TEMPERATURE
SENSOR

AMBIENT TEMPERATURE SENSOR - BLACK 2 WAY

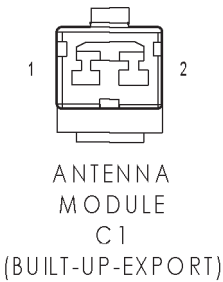
CAV	CIRCUIT	FUNCTION
1	G31 18VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
2	G32 18DB/OR	AMBIENT TEMPERATURE SENSOR RETURN



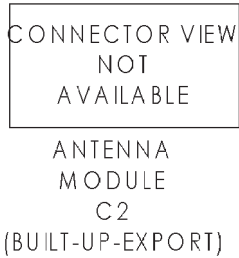
ANTENNA
(EXCEPT
BUILT-UP-
EXPORT)

ANTENNA (EXCEPT BUILT-UP-EXPORT) - 2 WAY

CAV	CIRCUIT	FUNCTION
1	X30 BK	RADIO ANTENNA CORE
2	X31 BK	RADIO ANTENNA SHIELD



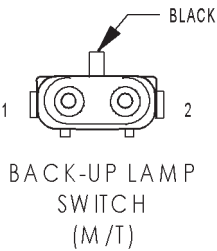
ANTENNA MODULE C1 (BUILT-UP-EXPORT) - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	F85 16VT/WT	FUSED IGNITION SWITCH OUTPUT (RUN--ACC)
2	-	-



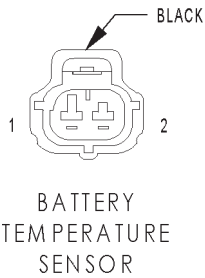
ANTENNA MODULE C2 (BUILT-UP-EXPORT) - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	X30 BK	RADIO ANTENNA CORE
2	X31 BK	RADIO ANTENNA SHIELD



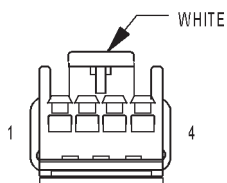
ASH RECEIVER LAMP - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	E2 200R	FUSED PANEL LAMPS DIMMER SWITCH SIGNAL
2	Z158 20BK/GY	GROUND



BACK-UP LAMP SWITCH (M/T) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	F15 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN)
2	L10 18BR/LG	BACK-UP LAMP FEED



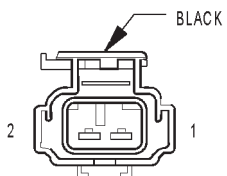
BATTERY TEMPERATURE SENSOR - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	K118 18PK/YL	BATTERY TEMPERATURE SENSOR SIGNAL
2	K4 18BK/LB	SENSOR GROUND



BLEND
DOOR
ACTUATOR

BLEND DOOR ACTUATOR - WHITE 4 WAY

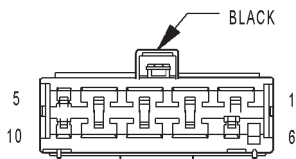
CAV	CIRCUIT	FUNCTION
1	Z12 18BK/TN	GROUND
2	C35 20DG/YL	MODE DOOR DRIVER (A)
3	V23 20BR/PK	FUSED IGNITION SWITCH OUTPUT (RUN)
4	-	-



BLOWER
MOTOR

BLOWER MOTOR - BLACK 2 WAY

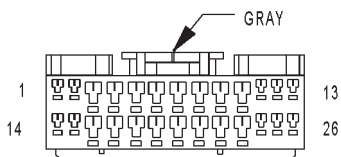
CAV	CIRCUIT	FUNCTION
1	C7 12BK/TN	BLOWER MOTOR HIGH DRIVER
2	A111 12RD/LB	BLOWER MOTOR RELAY OUTPUT



BLOWER MOTOR
RESISTOR BLOCK

BLOWER MOTOR RESISTOR BLOCK - BLACK 10 WAY

CAV	CIRCUIT	FUNCTION
1	C7 12BK/TN	BLOWER MOTOR HIGH DRIVER
2	C7 12BK/TN	BLOWER MOTOR HIGH DRIVER
3	C6 12LB	BLOWER MOTOR M2 DRIVER
4	C5 14LG	BLOWER MOTOR M1 DRIVER
5	C4 14TN	BLOWER MOTOR LOW DRIVER
6	-	-
7	-	-
8	-	-
9	-	-
10	-	-



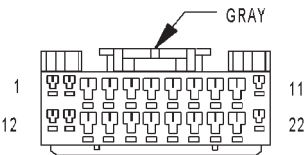
BODY
CONTROL
MODULE C1

BODY CONTROL MODULE C1 - GRAY 26 WAY

CAV	CIRCUIT	FUNCTION
1	Z103 16BK/OR	GROUND
2	V22 20BR/YL	REAR WIPER INTERMITTENT DRIVER
3	Y98 20GY/DB	INSTRUMENT CLUSTER WAKE UP SIGNAL
4	G75 20TN	DRIVER DOOR AJAR SWITCH SENSE
5	G74 20TN/WT	PASSENGER DOOR AJAR SWITCH SENSE
6	G70 20BR/TN (EXCEPT BASE)	HOOD AJAR SWITCH SENSE
7	G78 20TN/BK	TAILGATE AJAR SWITCH SENSE
8	G26 20LB	KEY-IN IGNITION SWITCH SENSE
9	G80 20YL/WT	FLIP-UP GLASS AJAR SWITCH SENSE
10	M3 20PK/DB	REAR COURTESY LAMP CONTROL
11	V10 18BR	WASHER PUMP DRIVER
12	L91 20DB/PK	HAZARD LAMP CONTROL
13	V21 20DB/RD	REAR WIPER ON DRIVER
14	Z231 16BK/WT	SIGNAL GROUND
15	D25 18YL/VT/WT	PCI BUS

BODY CONTROL MODULE C1 - GRAY 26 WAY

CAV	CIRCUIT	FUNCTION
16	D19 20VT/OR	BODY CONTROL MODULE FLASH ENABLE
17	P101 200R/PK	FLIP-UP GLASS RELEASE SWITCH SENSE
18	-	-
19	-	-
20	B22 18LG/YL	VEHICLE SPEED OUTPUT
21	G69 20BK/OR	VTSS INDICATOR DRIVER
22	-	-
23	C79 20VT/BK	REAR WINDOW DEFOGGER CONTROL
24	C19 18BR	A/C ON/OFF CONTROL
25	Z3 16BK/OR	GROUND
26	P100 18OR/BR	FLIP-UP GLASS RELEASE MOTOR DRIVER



BODY
CONTROL
MODULE C2

BODY CONTROL MODULE C2 - GRAY 22 WAY

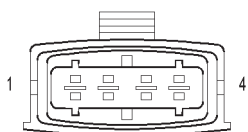
CAV	CIRCUIT	FUNCTION
1	Y66 20GY (EXCEPT BASE)	RKE ANTENNA
2	G910 20VT/BR	TAILGATE SWITCH GROUND
3	-	-
4	L80 20WT/DG	HEADLAMP SWITCH RETURN
5	L307 20LG/OR	HEADLAMP SWITCH MUX
6	G72 18DG/OR (LHD PREMIUM)	RIGHT CYLINDER LOCK SWITCH MUX
6	G73 18LG/OR (RHD)	RIGHT CYLINDER LOCK SWITCH MUX
7	L27 20WT/TN (EXCEPT BASE)	FRONT FOG LAMP SWITCH SENSE
8	E21 200R/RD	PANEL LAMPS DIMMER SWITCH MUX
9	G72 18DG/OR (RHD)	LEFT CYLINDER LOCK SWITCH MUX
9	G73 18LG/OR (LHD PREMIUM)	LEFT CYLINDER LOCK SWITCH MUX
10	V52 20DG/RD	FRONT WIPER SWITCH MUX
11	X10 20RD/DB (EXCEPT BASE)	RADIO CONTROL MUX RETURN
12	Y66 20GY (EXCEPT BASE)	RKE ANTENNA
13	-	-
14	-	-
15	G32 20DB/OR (EXCEPT BASE)	AMBIENT TEMPERATURE SENSOR RETURN
16	-	-
17	G71 18VT/YL	TAILGATE CYLINDER LOCK SWITCH MUX
18	G31 20VT/LG (EXCEPT BASE)	AMBIENT TEMPERATURE SENSOR SIGNAL
19	L324 20WT/LG	HIGH BEAM SWITCH SENSE
20	F512 18PK/OR	VEHICLE SPEED SENSOR SUPPLY
21	B12 18DG/OR	VEHICLE SPEED SIGNAL
22	X20 20RD/BK (EXCEPT BASE)	RADIO CONTROL MUX

CONNECTOR VIEW
NOT
AVAILABLE

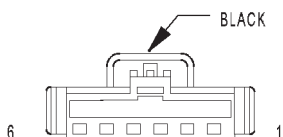
BODY
CONTROL
MODULE C3
(PREMIUM)

BODY CONTROL MODULE C3 (PREMIUM) - 6 WAY

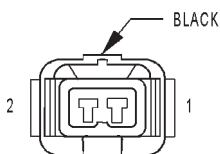
CAV	CIRCUIT	FUNCTION
1	Y60	RKE DATA
2	Y62	RKE SUPPLY
3	Y61	RKE PROGRAM
4	Y63	RKE GROUND
5	Y64	RKE ANTENNA (+)
6	Y65	RKE ANTENNA (-)



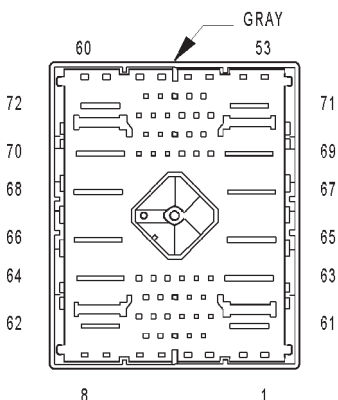
BOOST
PRESSURE
SENSOR
(DIESEL)



BRAKE
LAMP
SWITCH



BRAKE
PRESSURE
SWITCH
(ABS)



C100
(RHD)

BOOST PRESSURE SENSOR (DIESEL) - 4 WAY

CAV	CIRCUIT	FUNCTION
1	K4 18BK/LB	SENSOR GROUND
2	K21 18BK/RD	INTAKE AIR TEMPERATURE SENSOR SIGNAL
3	K6 18VT/WT	SENSOR REFERENCE VOLTAGE B
4	K37 20DB/YL	BOOST PRESSURE SENSOR SIGNAL

BRAKE LAMP SWITCH - BLACK 6 WAY

CAV	CIRCUIT	FUNCTION
1	F32 18PK/DB	FUSED B(+)
2	L50 18WT/TN (GAS)	BRAKE LAMP SWITCH OUTPUT
2	L50 18WT/TN (DIESEL)	PRIMARY BRAKE SWITCH SIGNAL
3	V30 18DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
4	V32 18YL/RD	SPEED CONTROL SUPPLY
5	Z3 18BK/OR	GROUND
6	K29 18WT/PK (GAS)	BRAKE SWITCH SENSE
6	K29 18WT/PK (DIESEL)	SECONDARY BRAKE SWITCH SIGNAL

BRAKE PRESSURE SWITCH (ABS) - BLACK 2 WAY

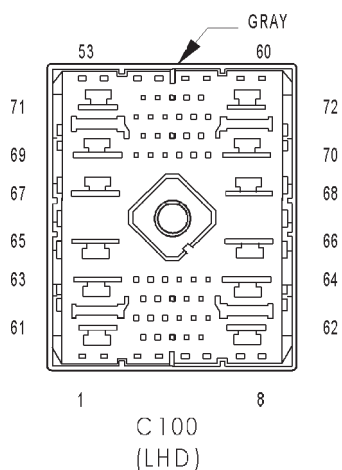
CAV	CIRCUIT	FUNCTION
1	F22 18DB/PK	FUSED IGNITION SWITCH OUTPUT (RUN)
2	S43 18LB/YL	FLUID PRESSURE SWITCH SIGNAL

C100 (RHD) - GRAY (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	L43 18VT
2	F1 20DB
3	M1 18PK
4	B22 18LG/YL
5	L44 18VT/RD
6	V16 18VT/YL
7	V55 16TN/RD
8	G32 20DB/OR
9	D20 20LG
10	D25 18YL/VT/BR
11	V14 18RD/VT
12	L13 18BR/YL
13	G70 20BR/TN
14	G11 20WT/BK
15	K4 20BK/LB
16	L50 18WT/TN
17	L62 18BR/RD

C100 (RHD) - GRAY (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
18	L62 18DG/RD
19	V30 18DB/RD
20	D32 20LG/DG
21	V32 18YL/RD
22	G29 20BK/TN
23	X2 18DG/RD
24	F15 18DB/WT
25	G18 20PK/BK
26	D24 18WT/DG
27	B12 18DG/OR
28	R46 20BR/LB
29	R48 20TN
30	R47 20DB/LB
31	R49 20LB/OR
32	-
33	-
34	-
35	F512 18PK/OR
36	-
37	Z252 18BK/GY
38	Z252 18BK/GY
39	V10 18BR
40	-
41	T6 20VT/WT
42	V37 20RD/LG
43	V20 18BK/WT
44	K29 18WT/PK
45	D25 18YL/VT/GY
46	-
47	X75 18DG
48	L10 18BR/LG
49	D21 20PK/RD
50	F22 18DB/PK
51	L33 18LG/BR
52	L39 18LB
53	L78 18DG/YL
54	F20 18WT
55	V6 14DB/YL
56	G31 20VT/LG
57	-
58	L34 18RD/OR
59	L77 18BK/YL
60	-
61	A41 12YL
62	A21 12RD/DB
63	A1 12RD
64	A111 12RD/LB
65	A12 10RD/TN
66	A13 10PK/WT
67	A18 10PK
68	A7 10RD/BK
69	A2 12PK/BK
70	A25 12DB
71	A4 12BK/PK
72	A99 14RD/VT

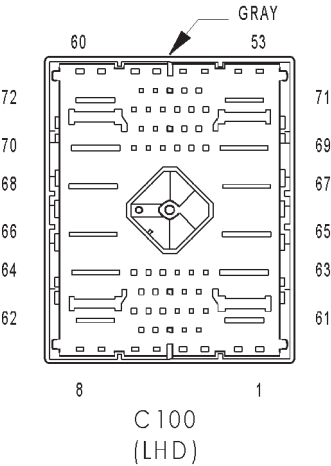


C100 (LHD) - GRAY (HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
1	B1 18YL/DB
2	B2 18YL
3	K226 18DB/WT
4	B22 18DG/YL
5	K106 18WT/DG (GAS)
6	K107 18OR (GAS)
7	K125 18WT/DB (GAS)
8	G32 18DB/OR
9	D20 18LG (GAS)
10	D25 18YL/VT
11	-
12	L13 18BR/YL (BUILT-UP-EXPORT)
13	G70 18BR/TN (BUILT-UP-EXPORT)
14	G11 18WT/BK
15	K4 18BK/LB
16	-
17	L62 18BR/RD
18	L63 18DG/RD
19	V30 18DB/RD (GAS)
20	D32 18LG (GAS)
21	V32 18YL/RD (GAS)
22	G29 18BK/TN
23	-
24	F15 18DB/WT
25	G18 18PK/BK (DIESEL)
26	D24 18WT/DG (ABS)
27	B12 18DG/OR (ABS)
27	B1 18YL/DB (EXCEPT ABS)
28	R46 18BR/LB
29	R48 18TN
30	R47 18DB/LB
31	R49 18LB
32	-
33	-
34	-
35	B2 18YL (EXCEPT ABS)
36	-
37	Z252 18BK/GY
38	Z252 18BK/GY
39	V10 18BR
40	T138 18GY/LB (DIESEL)(M/T)
41	T6 18VT/WT (GAS)
42	V37 18RD/LG
43	V20 18BK/WT
44	K29 18WT/PK
45	D25 18YL/VT
46	-
47	X75 18DG (BUILT-UP-EXPORT)
48	L10 18BR/LG
49	D21 18PK
50	-
51	-
52	-

C100 (LHD) - GRAY (HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
53	-
54	-
55	-
56	G31 18VT/LG
57	-
58	-
59	-
60	A32 14RD/DB (A/T)
61	A41 12YL
62	A21 12RD/DB (M/T)
63	A1 12RD
64	A111 12RD/LB
65	A99 14RD/VT
66	-
67	-
68	-
69	A2 12PK/BK
70	A25 12DB
71	-
72	A141 16DG/WT (GAS)

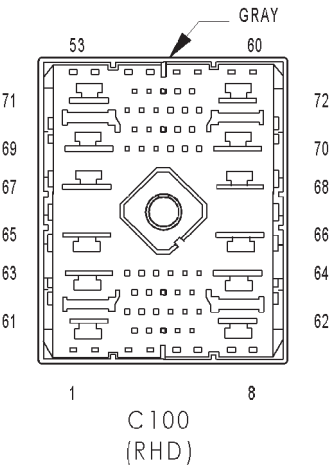


C100 (LHD) - GRAY (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	B1 18YL/DB
2	B2 18YL
3	K226 18DB/WT
4	B22 18LG/YL
5	K106 18WT/DG
6	K107 18OR
7	K125 18WT/DB
8	G32 20DB/OR (EXCEPT BASE)
9	D20 20LG
10	D25 18YL/VT/BR
11	-
12	L13 18BR/YL (BUILT-UP-EXPORT)
13	G70 20BR/TN (EXCEPT BASE)
14	G11 20WT/BK
15	K4 18BK/LB
16	-
17	L62 18BR/RD
18	L63 18DG/RD
19	V30 18DB/RD
20	D32 20LG/DG
21	V32 18YL/RD
22	G29 20BK/TN
23	-
24	F15 18DB/WT
25	G18 20PK/BK
26	D24 18WT/DG
27	B12 18DG/OR

C100 (LHD) - GRAY (INSTRUMENT PANEL
SIDE)

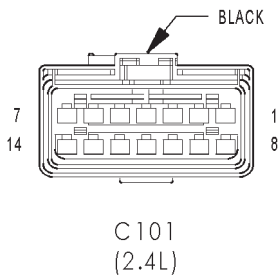
CAV	CIRCUIT
28	R46 20BR/LB
29	R48 20TN
30	R47 20DB/LB
31	R49 20LB/OR
32	-
33	-
34	-
35	F512 18PK/OR
36	-
37	Z252 18BK/GY
38	Z252 18BK/GY
39	V10 18BR
40	-
41	T6 20VT/WT
42	V37 20RD/LG
43	V20 18BK/WT
44	K29 18WT/PK
45	D25 18YL/VT/GY
46	-
47	X75 18 DG (EXCEPT BASE)
48	L10 18BR/LG
49	D21 20PK/RD
50	-
51	-
52	-
53	-
54	-
55	-
56	G31 20VT/LG (EXCEPT BASE)
57	-
58	-
59	--
60	-
61	A41 12YL
62	A21 12 RD/DB
63	A1 12RD
64	A111 12RD/LB
65	A99 14RD/VT
66	-
67	-
68	-
69	A2 12PK/BK
70	A25 12DB
71	-
72	A141 16DG/WT



C100 (RHD) - GRAY (HEADLAMP AND DASH SIDE)	
CAV	CIRCUIT
1	L43 18VT
2	F1 18DB
3	M1 18PK
4	B22 18DG/YL
5	L44 18VT/RD
6	V16 18VT/YL
7	V55 16TN/RD
8	G32 18DB/OR
9	D20 18LG
10	D25 18YL/VT
11	V14 18RD/VT
12	L13 18BR/YL
13	G70 18BR/TN
14	G11 18WT/BK
15	K4 18BK/LB
16	L50 18WT/TN (ABS)
17	L62 18BR/RD
18	L63 18DG/RD
19	V30 18DB/RD
20	D32 18LG
21	V32 18YL/RD
22	G29 18BK/TN
23	X2 18DG/RD
24	F15 18DB/WT
25	-
26	D24 18WT/DG (ABS)
27	B1 18YL/DB (EXCEPT ABS)
27	B12 18DG/OR (ABS)
28	R46 18BR/LB
29	R48 18TN
30	R47 18DB/LB
31	R49 18LB
32	-
33	-
34	-
35	B2 18YL (EXCEPT ABS)
35	F512 18PK/OR (ABS)
36	-
37	Z252 18BK/GY
38	Z252 18BK/GY
39	V10 18BR
40	-
41	T6 18VT/WT
42	V37 18RD/LG
43	V20 18BK/WT
44	K29 18WT/PK
45	D25 18YL/VT (ABS)
45	D25 18YL/VT (EXCEPT ABS)
46	-
47	X75 18DG
48	L10 18BR/LG
49	D21 18PK
50	F22 18DB/PK (ABS)

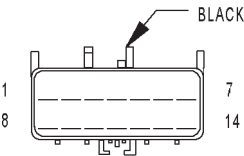
C100 (RHD) - GRAY (HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
51	L33 18LG/BR
52	L39 18LB
53	L78 18DG/YL
54	F20 18WT
55	V6 16DB/YL
56	G31 18VT/LG
57	-
58	L34 18RD/OR
59	L77 18BK/YL
60	A32 14RD/DB (A/T)
61	A41 12YL
62	A21 12RD/DB (M/T)
63	A1 12RD
64	A111 12RD/LB
65	A12 10RD/TN
66	A13 10PK/WT
67	A18 10PK
68	A7 10RD/BK
69	A2 12PK/BK
70	A25 12DB
71	A4 12BK/PK
72	A99 14RD/VT



C101 (2.4L) - BLACK (ENGINE TO HEADLAMP AND DASH SIDE)

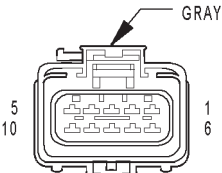
CAV	CIRCUIT
1	K59 18VT/BK
2	K40 18BR/WT
3	K60 18YL/BK
4	K39 18GY/RD
5	K21 18BK/RD
6	K2 18TN/BK
7	K1 18DG/RD
8	K22 18OR/DB
9	K6 18VT/WT
10	G60 18GY/YL
11	K24 18GY/BK
12	K7 18OR
13	-
14	-



C 101
(2.4L)

C101 (2.4L) - BLACK (ENGINE TO FUEL INJECTOR SIDE)

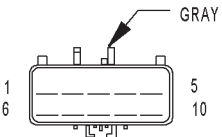
CAV	CIRCUIT
1	K59 18VT/BK
2	K40 18BR/WT
3	K60 18YL/BK
4	K39 18GY/RD
5	K21 18BK/RD
6	K2 18TN/BK
7	K1 18DG/RD
8	K22 18OR/DB
9	K6 18VT/WT
10	G60 18GY/YL
11	K24 18GY/BK
12	K7 18OR
13	-
14	-



C 102
(RHD)

C102 (RHD) - GRAY (HEADLAMP AND DASH SIDE)

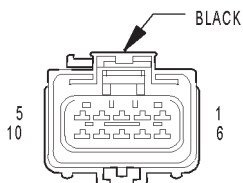
CAV	CIRCUIT
1	K226 18DB/WT
2	K512 18PK/OR
3	A141 16DG/WT (GAS)
4	B1 18YL/DB
5	B2 18YL
6	K4 18BK/LB
7	B12 18DG/OR
8	K125 18WT/DB (GAS)
9	K107 18OR (GAS)
10	K106 18WT/DG (GAS)



C 102
(RHD)

C102 (RHD) - GRAY (FRONT BODY SIDE)

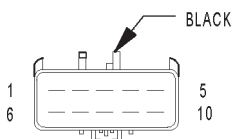
CAV	CIRCUIT
1	K226 18DB/WT
2	F512 18PK/OR
3	A141 16DG/WT
4	B1 18YL/DB
5	B2 18YL
6	K4 18BK/LB
7	B12 18DG/OR
8	K125 18WT/DB
9	K107 18OR
10	K105 18WT/DG



C 103
(GAS)

C103 (GAS) - BLACK (ENGINE SIDE)

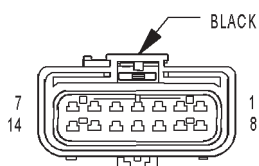
CAV	CIRCUIT
1	F142 18OR/DG
2	-
3	K299 18BR/WT
4	-
5	K173 18LG
6	-
7	-
8	-
9	K99 18BR/OR
10	-



C 103
(GAS)

C103 (GAS) - BLACK (HEADLAMP AND DASH
SIDE)

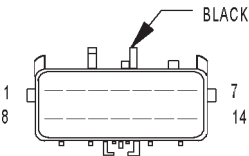
CAV	CIRCUIT
1	F142 18OR/DG
2	-
3	K299 18BR/WT
4	-
5	K173 18LG
6	-
7	-
8	-
9	K99 18BR/OR
10	-



C 104
(DIESEL)

C104 (DIESEL) - BLACK (ENGINE SIDE)

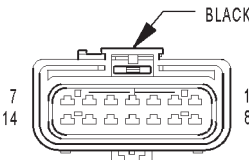
CAV	CIRCUIT
1	K90 20TN
2	K132 20DG/LB
3	K152 20WT
4	C3 18DB/BK
5	-
6	-
7	D21 20PK
8	D25 20VT/YL
9	F15 18DB/WT
10	-
11	F1 20DB
12	L50 20WT/TN
13	-
14	-



C104
(DIESEL)

C104 (DIESEL) - BLACK (HEADLAMP AND DASH SIDE)

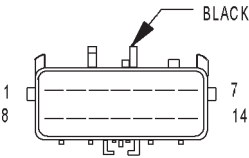
CAV	CIRCUIT
1	K90 18TN
2	K132 18DG/LB
3	K152 18WT
4	C3 18DB/BK
5	-
6	-
7	-
8	-
9	F15 18DB/WT
10	-
11	F1 18DB
12	L50 18WT/TN
13	-
14	-



C104
(GAS)

C104 (GAS) - BLACK (ENGINE SIDE)

CAV	CIRCUIT
1	A14 16RD/WT
2	F18 18LG/BK (3.7L)
3	-
4	C3 18DB/BK
5	-
6	D20 18LG (A/T)
7	D21 18PK (A/T)
8	D25 18VT/YL (A/T)
9	F15 18DB/WT
10	F45 18YL/BR (A/T)
11	F1 18DB
12	T10 18YL/DG (A/T)
13	K20 18DG
14	T6 18OR/WT (A/T)



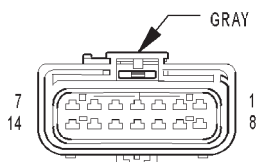
C104
(GAS)

C104 (GAS) - BLACK (HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
1	A14 16RD/WT (GAS)
2	F18 18LG/BK (GAS)
3	-
4	C3 18DB/BK
5	-
6	D20 18LG
7	D21 18PK
8	D25 18YL/VT
9	F15 18DB/WT

C104 (GAS) - BLACK (HEADLAMP AND DASH SIDE)

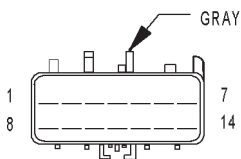
CAV	CIRCUIT
10	F45 18YL/BR
11	F1 18DB
12	T10 18YL/DG
13	K20 18DG
14	T6 18VT/WT



C 105
(DIESEL)

C105 (DIESEL) - GRAY (ENGINE SIDE)

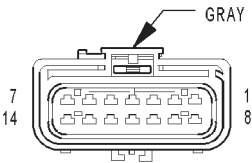
CAV	CIRCUIT
1	B22 20DG/YL
2	K4 18BK/LB
3	L10 18BR/LG
4	C21 18DB/OR
5	A71 18DG/RD
6	-
7	-
8	-
9	A142 14DG/OR
10	-
11	-
12	A93 16RD/BK
13	Z252 18BK/GY
14	Z252 18BK/GY



C 105
(DIESEL)

C105 (DIESEL) - GRAY (HEADLAMP AND DASH SIDE)

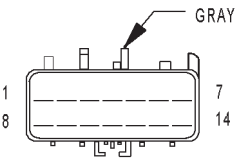
CAV	CIRCUIT
1	B22 18DG/YL
2	K4 18BK/LB
3	L10 18BR/LG
4	C21 18DB/OR
5	A71 18DG/RD
6	-
7	-
8	-
9	A142 16DG/OR
10	T138 18GY/LB
11	-
12	A93 16RD/BK
13	Z252 18BK/GY
14	Z252 18BK/GY



C 105
(GAS)

C105 (GAS) - GRAY (ENGINE SIDE)

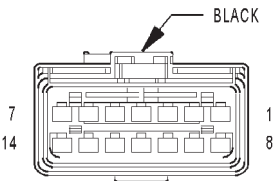
CAV	CIRCUIT
1	-
2	K4 18BK/LB
3	L10 18BR/LG
4	-
5	A71 18DG/RD
6	T16 14RD (A/T)
7	T41 18BK/WT (A/T)
8	K30 18PK (A/T)
9	-
10	T141 18YL/RD (M/T)
11	-
12	A30 14RD/WT (A/T)
13	-
14	-



C 105
(GAS)

C105 (GAS) - GRAY (HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
1	-
2	K4 18BK/LB
3	L10 18BR/LG
4	-
5	A71 18DG/RD
6	T16 14RD (A/T)
7	T41 18BK/WT (A/T)
8	K30 18PK (A/T)
9	-
10	T141 18YL/RD (M/T)
11	-
12	A30 14RD/WT (A/T)
13	-
14	-



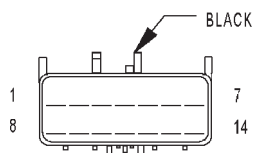
C 106

C106 - BLACK (HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
1	G31 18VT/LG
2	G32 18DB/OR
3	L33 18LG/BR
4	L43 18VT
5	L63 18DG/RD
6	L39 18LB
7	L78 18DG/YL
8	Z141 18BK
9	L13 18BR/YL (BUILT-UP-EXPORT))
10	L34 18RD/OR

C106 - BLACK (HEADLAMP AND DASH SIDE)

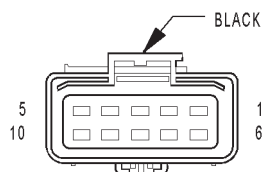
CAV	CIRCUIT
11	L44 18VT/RD
12	L62 18BR/RD
13	L77 18BK/YL
14	Z142 18BK/WT



C 106

C106 - BLACK (FRONT END LIGHTING SIDE)

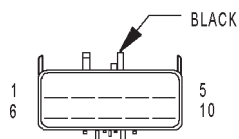
CAV	CIRCUIT
1	G31 18VT/LG
2	G32 18DB/OR
3	L33 18LG/BR
4	L43 18VT
5	L63 18DG/RD
6	L39 18LB
7	L78 18DG/YL
8	Z141 18BK
9	-
10	L34 18RD/OR
11	L44 18VT/RD
12	L62 18BR/RD
13	L77 18BK/YL
14	Z142 18BK/WT



C 107

C107 - BLACK (HEADLAMP AND DASH SIDE)

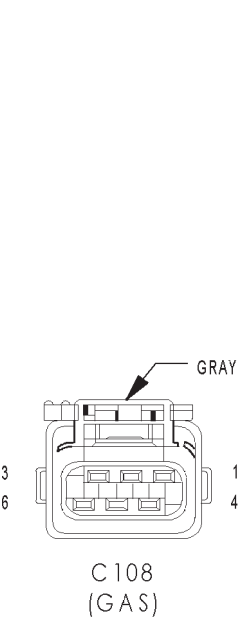
CAV	CIRCUIT
1	Z141 18BK
2	L77 18BK/YL
3	-
4	L78 18DG/YL
5	Z142 18BK/WT
6	L62 18BR/RD
7	-
8	L39 18LB
9	-
10	L63 18DG/RD



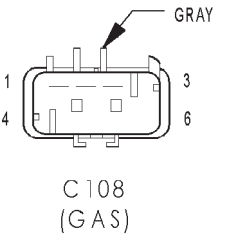
C 107

C107 - BLACK (FRONT END LIGHTING SIDE)

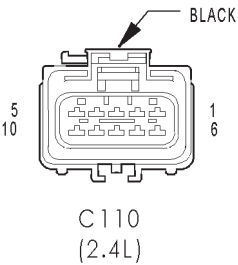
CAV	CIRCUIT
1	Z141 18BK
2	L77 18BK/YL
3	-
4	L78 18DG/YL
5	Z142 18BK/WT



C107 - BLACK (FRONT END LIGHTING SIDE)	
CAV	CIRCUIT
6	L62 18BR/RD
7	-
8	L39 18LB (FOG LAMPS)
9	-
10	L63 18DG/RD

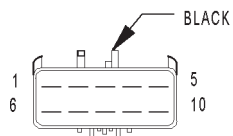


C108 (GAS) - GRAY (BATTERY SIDE)	
CAV	CIRCUIT
1	K52 18PK/BK
2	K20 18DG
3	K125 18WT/DB
4	T40 12BR
5	F1 18DB
6	-



C108 (GAS) - GRAY (HEADLAMP AND DASH SIDE)	
CAV	CIRCUIT
1	K52 18PK/BK
2	K20 18DG
3	K125 18WT/DB
4	T40 12BR
5	F1 18DB
6	-

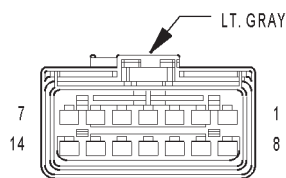
C110 (2.4L) - BLACK (ENGINE TO HEADLAMP AND DASH SIDE)	
CAV	CIRCUIT
1	F142 18OR/DG
2	C3 18DB/BK
3	Z246 18BK/GY
4	K11 18WT/DB
5	K12 18TN
6	K13 18YL/WT
7	K14 18LB/BR
8	K44 18TN/YL
9	K4 18BK/LB
10	-



C110
(2.4L)

C110 (2.4L) - BLACK (ENGINE TO FUEL INJECTORS SIDE)

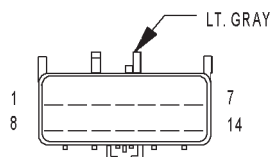
CAV	CIRCUIT
1	F142 18OR/DG
2	C3 18DB/BK
3	Z246 18BK/GY
4	K11 18WT/DB
5	K12 18TN
6	K13 18YL/WT
7	K14 18LB/BR
8	K44 18TN/YL
9	K4 18BK/LB
10	-



C111
(DIESEL)

C111 (DIESEL) - LT. GRAY (ENGINE SIDE)

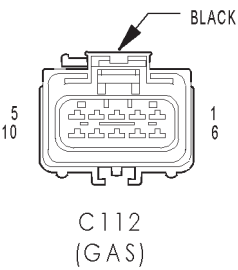
CAV	CIRCUIT
1	K51 20DB/YL
2	K118 20PK/YL
3	C13 20DG
4	-
5	K226 20DB/WT
6	V37 20RD/LG
7	K35 20GY/YL
8	G18 18PK/BK
9	K29 20WT/PK
10	K236 20GY/PK
11	C151 18DB/WT
12	T40 12BR
13	F92 20YL/BR
14	-



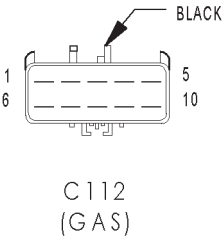
C111
(DIESEL)

C111 (DIESEL) - LT. GRAY (HEADLAMP AND DASH SIDE)

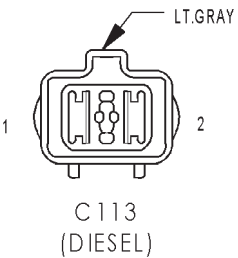
CAV	CIRCUIT
1	K51 18DB/YL
2	K118 18PK/YL
3	C13 18DG
4	-
5	K226 18DB/WT
6	V37 18RD/LG
7	K35 18GY/YL
8	G18 18PK/BK
9	K29 18WT/PK
10	K236 18GY/PK
11	C151 18DB/WT
12	T40 12BR
13	F92 18YL/BR
14	T141 14YL/RD



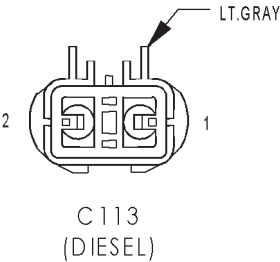
C112 (GAS) - BLACK (ENGINE SIDE)	
CAV	CIRCUIT
1	K42 18DB/LB (3.7L)
2	K4 18BK/LB (3.7L)
3	Z252 18BK/GY
4	K142 18GY/BK (3.7L)
5	K4 18BK/LB (3.7L)
6	Z252 18BK/GY
7	-
8	-
9	-
10	A142 14DG/OR



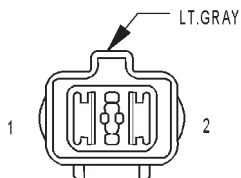
C112 (GAS) - BLACK (HEADLAMP AND DASH SIDE)	
CAV	CIRCUIT
1	K42 18DB/LB
2	K4 18BK/LB
3	Z252 18BK/GY
4	K142 18GY/BK
5	K4 18BK/LB
6	Z252 18BK/GY
7	-
8	-
9	-
10	A142 14DG/OR



C113 (DIESEL) - LT.GRAY (GLOW PLUG SIDE)	
CAV	CIRCUIT
1	K154 10GY
2	K104 10RD/WT



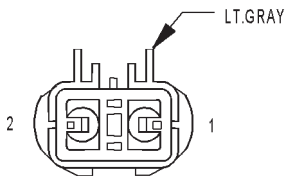
C113 (DIESEL) - LT.GRAY (BATTERY SIDE)	
CAV	CIRCUIT
1	K154 10GY
2	K104 10RD/WT



C 114
(DIESEL)

C114 (DIESEL) - LT. GRAY (BATTERY SIDE)

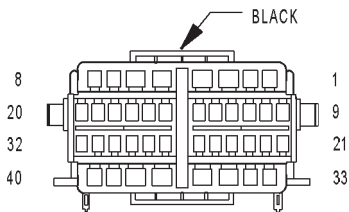
CAV	CIRCUIT
1	K154 10GY
2	K104 10RD/WT



C 114
(DIESEL)

C114 (DIESEL) - LT. GRAY (GLOW PLUG SIDE)

CAV	CIRCUIT
1	K154 10GY
2	K104 10RD/WT



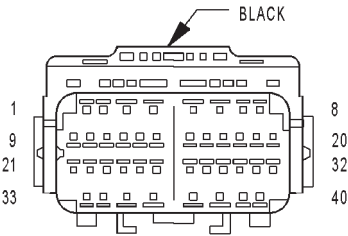
C 201

C201 - BLACK (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	R57 20DG
2	R59 20LB
3	X75 18DG (EXCEPT BASE)
4	A99 14RD/VT
5	B12 18DG/OR
6	F81 12TN
7	V21 20DB/RD
8	V22 20BR/YL
9	R58 20GY
10	R60 20VT
11	K226 18DB/WT (LHD)
12	G74 20TN/WT
13	G71 18VT/YL
14	T6 20VT/WT
15	G9 20GY/BK
16	B1 18YL/DB (LHD)
17	K29 18WT/PK
18	L62 18BR/RD
19	M3 20PK/DB
20	K125 18WT/DB (LHD)
21	-
22	-
23	K4 18BK/LB (LHD)
24	G910 20VT/BR
25	G78 20TN/BK
26	P101 20OR/PK
27	G80 20YL/WT
28	B2 18YL (LHD)
29	Z9 16BK
30	L63 18DG/RD
31	K106 18WT/DG (LHD)
32	K107 18OR (LHD)
33	D25 18YL/V/DB
34	G75 20TN
35	G72 18DG/OR (PREMIUM)

C201 - BLACK (INSTRUMENT PANEL SIDE)

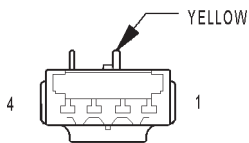
CAV	CIRCUIT
36	G73 18LG/OR (PREMIUM)
37	F512 18PK/OR
38	A141 16DG/WT (LHD)
39	L10 18BR/LG
40	P100 18OR/BR



C 201

C201 - BLACK (BODY SIDE)

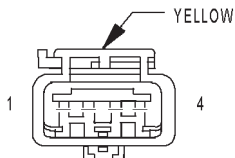
CAV	CIRCUIT
1	R57 18DG
2	R59 18LB
3	X75 18DG (HIGHLINE)
4	A99 14RD/VT (MIDLINE/HIGHLINE)
5	B12 18DG/OR (RHD)
6	F81 12TN (MIDLINE/HIGHLINE)
7	V21 20DB/RD
8	V22 20BR/YL
9	R58 18GY
10	R60 18VT
11	K226 18DB/WT (LHD)
12	G74 20TN/WT
13	G71 18VT/YL
14	T6 20VT/WT
15	G9 20GY/BK
16	B1 18YL/DB (LHD)
17	K29 20WT/PK
18	L62 18BR/RD
19	M3 20PK/DB
20	K125 18WT/DB (LHD)
21	-
22	-
23	K4 18BK/LB (LHD)
24	G910 20VT/BR
25	G78 20TN/BK
26	P101 20OR/PK
27	G80 20YL/WT
28	B2 18YL (LHD)
29	Z9 16BK
30	L63 18DG/RD
31	K106 18WT/DG (LHD)
32	K107 18OR (LHD)
33	D25 18YL/VT
34	G75 20TN
35	G72 18DG/OR (MIDLINE/HIGHLINE)
36	G73 18LG/OR (MIDLINE/HIGHLINE)
37	F512 18PK/OR (RHD)
38	A141 16DG/WT (LHD)
39	L10 18BR/LG
40	P100 18OR/BR



C 202

C202 - YELLOW (INSTRUMENT PANEL SIDE)

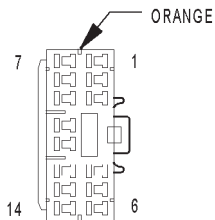
CAV	CIRCUIT
1	-
2	-
3	R53 18OR/YL
4	R55 18OR/BK



C 202

C202 - YELLOW (MAIN BODY SIDE)

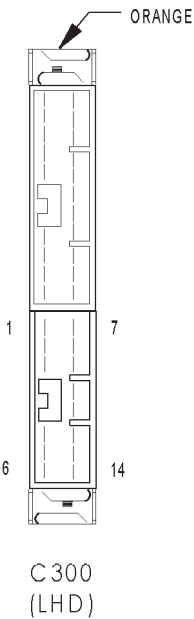
CAV	CIRCUIT
1	-
2	-
3	R53 18OR/YL
4	R55 18OR/BK



C 300
(LHD)

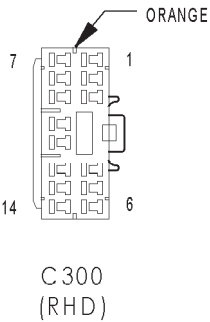
C300 (LHD) - ORANGE (MAIN BODY SIDE)

CAV	CIRCUIT
1	X57 18BR/LB (MIDLINE/HIGHLINE)
2	X91 18WT/BK (MIDLINE/HIGHLINE)
3	X81 18YL/BK (MIDLINE/HIGHLINE)
4	X13 16BK/RD (MIDLINE/HIGHLINE)
5	-
6	-
7	X51 18BR/YL (MIDLINE/HIGHLINE)
8	X93 18WT/RD (MIDLINE/HIGHLINE)
9	X83 18YL/RD (MIDLINE/HIGHLINE)
10	-
11	-
12	-
13	-
14	Z9 16BK (MIDLINE/HIGHLINE)



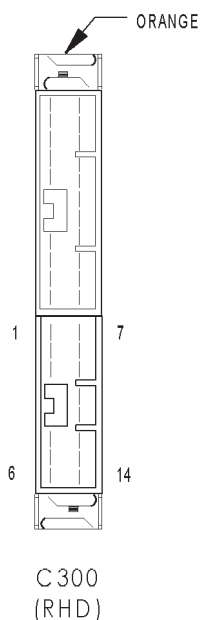
C300 (LHD) - ORANGE (DRIVER DOOR SIDE)

CAV	CIRCUIT
1	X57 18BR/LB
2	X57 18BR/LB (BASE)
2	X91 18WT/BK (PREMIUM)
3	X55 18BR/RD (BASE)
3	X81 18YL/BK (PREMIUM)
4	X13 16BK/RD (PREMIUM)
5	-
6	-
7	X51 18BR/YL
8	X93 18WT/RD (PREMIUM)
8	X51 18BR/YL (BASE)
9	X53 18DG (BASE)
9	X83 18YL/RD (PREMIUM)
10	-
11	-
12	-
13	-
14	Z9 16BK (PREMIUM)



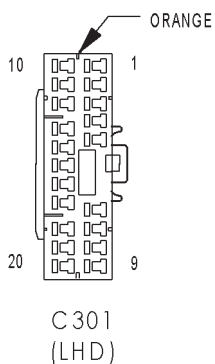
C300 (RHD) - ORANGE (MAIN BODY SIDE)

CAV	CIRCUIT
1	X58 18DB/OR
2	X92 18TN/BK
3	X86 18OR/RD
4	X13 16BK/RD
5	-
6	-
7	X52 18DB/WT
8	X94 18TN/VT
9	X84 18TN/BK
10	-
11	P99 18GY
12	P110 18YL
13	-
14	Z9 16BK



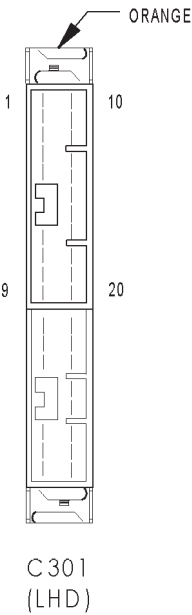
C300 (RHD) - ORANGE (DRIVER DOOR SIDE)

CAV	CIRCUIT
1	X58 18DB/OR
2	X58 18DB/OR (BASE)
2	X92 18TN/BK (PREMIUM)
3	X56 18DB/RD (BASE)
3	X86 18OR/RD (PREMIUM)
4	X13 16BK/RD (PREMIUM)
5	-
6	-
7	X52 18DB/WT
8	X94 18TN/VT (PREMIUM)
8	X52 18DB/WT (BASE)
9	X54 18VT (BASE)
9	X84 18TN/BK (PREMIUM)
10	-
11	P99 18GY
12	P110 18YL
13	-
14	Z9 16BK (PREMIUM)



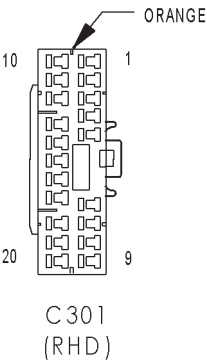
C301 (LHD) - ORANGE (MAIN BODY SIDE)

CAV	CIRCUIT
1	Q11 14LB (MIDLINE/HIGHLINE)
2	F89 18OR/RD (EXCEPT BASE)
3	P33 18OR/BK (EXCEPT BASE)
4	C16 18LB/YL (EXCEPT BASE)
5	P72 18YL/BK (EXCEPT BASE)
6	-
7	G73 18LG/OR (MIDLINE/HIGHLINE)
8	P37 20LG (EXCEPT BASE)
9	X55 18BR/RD
10	Q21 14WT (MIDLINE/HIGHLINE)
11	V23 20BR/PK (EXCEPT BASE)
12	P34 18PK/BK (EXCEPT BASE)
13	P74 18DB (EXCEPT BASE)
14	P76 18OR/YL (EXCEPT BASE)
15	G75 20TN
16	Z21 20BK/LG (MIDLINE/HIGHLINE)
17	Z350 20BK/LG
18	-
19	P36 20PK/VT (EXCEPT BASE)
20	X53 18DG



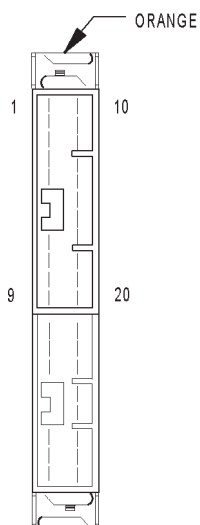
C301 (LHD) - ORANGE (DRIVER DOOR SIDE)

CAV	CIRCUIT
1	Q11 16LB (POWER WINDOWS)
2	F89 20OR/RD (EXCEPT BASE)
3	P33 18OR/BK (EXCEPT BASE)
4	C16 20LB/YL (EXCEPT BASE)
5	P72 18YL/BK (EXCEPT BASE)
6	-
7	G73 18LG/OR (EXCEPT BASE)
8	P37 18LG (EXCEPT BASE)
9	X55 18BR/RD
10	Q21 16WT (POWER WINDOWS)
11	V23 20BR/PK (EXCEPT BASE)
12	P34 18PK/BK (EXCEPT BASE)
13	P74 18DB (EXCEPT BASE)
14	P76 18OR/YL (EXCEPT BASE)
15	G75 20TN
16	-
17	Z350 20BK/LG
18	-
19	P36 20PK/VT (EXCEPT BASE)
20	X53 18DG



C301 (RHD) - ORANGE (MAIN BODY SIDE)

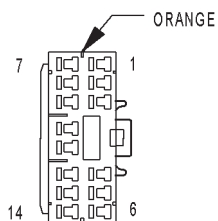
CAV	CIRCUIT
1	Q12 14BR
2	F89 18OR/RD
3	P33 18OR/BK
4	C16 18LB/YL
5	P71 18YL/DG
6	-
7	G73 18LG/OR
8	P37 20LG
9	X56 18DB/RD
10	Q22 14VT/WT
11	V23 20BR/PK
12	P34 18PK/BK
13	P75 18LB/WT
14	P76 18OR/YL
15	G75 20TN
16	-
17	Z351 18BK/LG
18	-
19	P36 20PK/VT
20	X54 18VT



C 301
(RHD)

C301 (RHD) - ORANGE (DRIVER DOOR SIDE)

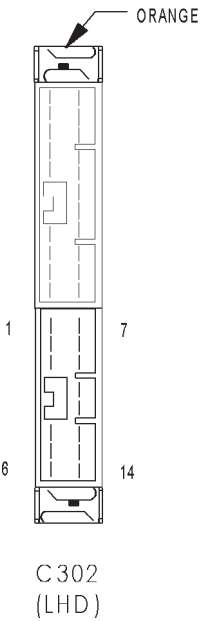
CAV	CIRCUIT
1	Q12 16BR
2	F89 20OR/RD
3	P33 18OR/BK
4	C16 20LB/YL
5	P71 20YL/DG
6	-
7	G73 18LG/OR
8	P37 18LG
9	X56 18BR/RD
10	Q22 16VT/WT
11	V23 20BR/PK
12	P34 18PK/BK
13	P75 20LB/WT
14	P76 18OR/YL
15	G75 20TN
16	-
17	Z351 18BK/LG
18	-
19	P36 20PK/VT
20	X54 18VT



C 302
(LHD)

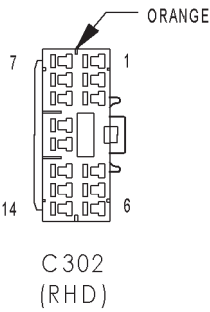
C302 (LHD) - ORANGE (MAIN BODY SIDE)

CAV	CIRCUIT
1	X58 18DB/OR (MIDLINE/HIGHLINE)
2	X92 18TN/BK (MIDLINE/HIGHLINE)
3	X86 18OR/RD (MIDLINE/HIGHLINE)
4	X13 16BK/RD (MIDLINE/HIGHLINE))
5	-
6	-
7	X52 18DB/WT (MIDLINE/HIGHLINE)
8	X94 18TN/VT (MIDLINE/HIGHLINE)
9	X84 18TN/BK (MIDLINE/HIGHLINE)
10	-
11	-
12	-
13	-
14	Z9 16BK (MIDLINE/HIGHLINE)



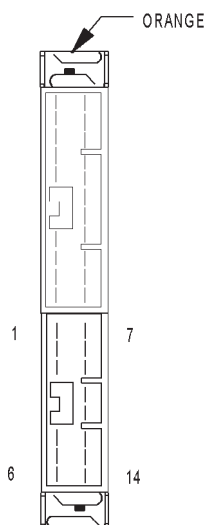
C302 (LHD) - ORANGE (PASSENGER DOOR SIDE)

CAV	CIRCUIT
1	X58 18DB/OR
2	X58 18DB/OR (BASE)
2	X92 18TN/BK (PREMIUM)
3	X56 18DB/RD (BASE)
3	X86 18OR/RD (PREMIUM)
4	X13 16BK/RD (PREMIUM)
5	-
6	-
7	X52 18DB/WT
8	X94 18TN/VT (PREMIUM)
8	X52 18DB/WT (BASE)
9	X54 18VT (BASE)
9	X84 18TN/BK (PREMIUM)
10	-
11	-
12	-
13	-
14	Z9 16BK (PREMIUM)



C302 (RHD) - ORANGE (MAIN BODY SIDE)

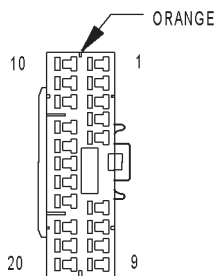
CAV	CIRCUIT
1	X57 18BR/LB
2	X91 18WT/BK
3	X81 18YL/BK
4	X13 16BK/RD
5	-
6	-
7	X51 18BR/YL
8	X93 18WT/RD
9	X83 18YL/RD
10	-
11	P99 18GY
12	P110 18YL
13	-
14	Z9 16BK



C 302
(RHD)

C302 (RHD) - ORANGE (PASSENGER DOOR
SIDE)

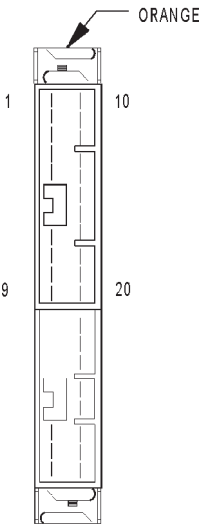
CAV	CIRCUIT
1	X57 18BR/LB
2	X57 18BR/LB (BASE)
2	X91 18WT/BK (PREMIUM)
3	X55 18BR/RD (BASE)
3	X81 18YL/BK (PREMIUM)
4	X13 16BK/RD (PREMIUM)
5	-
6	-
7	X51 18BR/YL
8	X93 18WT/RD (PREMIUM)
8	X51 18BR/YL (BASE)
9	X53 18DG (BASE)
9	X83 18YL/RD (PREMIUM)
10	-
11	P99 20GY
12	P110 20YL
13	-
14	Z9 16BK (PREMIUM)



C 303
(LHD)

C303 (LHD) - ORANGE (MAIN BODY SIDE)

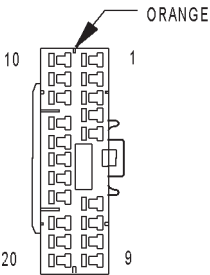
CAV	CIRCUIT
1	Q12 14BR (MIDLINE/HIGHLINE)
2	F89 18OR/RD (EXCEPT BASE)
3	P33 18OR/BK (EXCEPT BASE)
4	C16 18LB/YL (EXCEPT BASE)
5	P72 18YL/BK (EXCEPT BASE)
6	-
7	G72 18DG/OR (MIDLINE/HIGHLINE)
8	P37 20LG (EXCEPT BASE)
9	X56 18DB/RD
10	Q22 14VT/WT (MIDLINE/HIGHLINE)
11	-
12	P35 18OR/VT (EXCEPT BASE)
13	P74 18DB (EXCEPT BASE)
14	P76 18OR/YL (EXCEPT BASE)
15	G74 20TN/WT
16	-
17	Z351 18BK/LG
18	-
19	P36 20PK/VT (EXCEPT BASE)
20	X54 18VT



C303
(LHD)

C303 (LHD) - ORANGE (PASSENGER DOOR
SIDE)

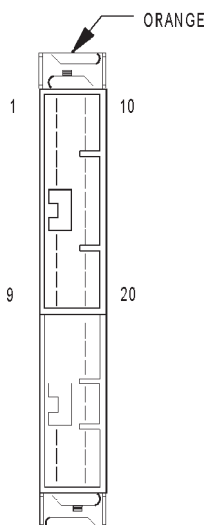
CAV	CIRCUIT
1	Q12 16BR (POWER WINDOWS)
2	F89 20OR/RD (EXCEPT BASE)
3	P33 18OR/BK (EXCEPT BASE)
4	C16 20LB/YL (EXCEPT BASE)
5	P72 20YL/BK (EXCEPT BASE)
6	-
7	G72 18DG/OR (EXCEPT BASE)
8	P37 18LG (EXCEPT BASE)
9	X56 18DB/RD
10	Q22 16VT/WT (POWER WINDOWS)
11	-
12	P35 18OR/VT (EXCEPT BASE)
13	P74 20DB (EXCEPT BASE)
14	P76 20OR/YL (EXCEPT BASE)
15	G74 20TN/WT
16	-
17	Z351 18BK/LG
18	-
19	P36 20PK/VT (EXCEPT BASE)
20	X54 18VT



C303
(RHD)

C303 (RHD) - ORANGE (MAIN BODY SIDE)

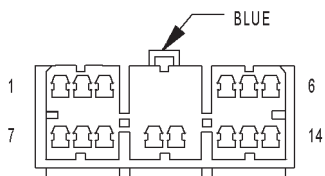
CAV	CIRCUIT
1	Q11 14LB
2	F89 18OR/RD
3	P33 18OR/BK
4	C16 18LB/YL
5	P71 18YL/DG
6	-
7	G72 18DG/OR
8	P37 20LG
9	X55 18BR/RD
10	Q21 14WT
11	-
12	P35 18OR/VT
13	P75 18LB/WT
14	P76 18OR/YL
15	G74 20TN/WT
16	Z21 20BK/LG
17	Z350 18BK/LG
18	-
19	P36 20PK/VT
20	X53 18DG



C303
(RHD)

C303 (RHD) - ORANGE (PASSENGER DOOR
SIDE)

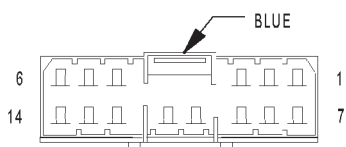
CAV	CIRCUIT
1	Q11 16LB
2	F89 20OR/RD
3	P33 18OR/BK
4	C16 20LB/YL
5	P71 20YL/DG
6	-
7	G72 18DG/OR
8	P37 18LG
9	X55 18BR/RD
10	Q21 16WT
11	-
12	P35 18OR/VT
13	P75 20LB/WT
14	P76 20OR/YL
15	G74 20TN/WT
16	-
17	Z350 18BK/LB
18	-
19	P36 20PK/VT
20	X53 18DG



C304

C304 - BLUE (MAIN BODY SIDE)

CAV	CIRCUIT
1	Q14 14GY (MIDLINE/HIGHLINE)
2	P33 18OR/BK (EXCEPT BASE)
3	-
4	-
5	-
6	X92 18TN/BK (MIDLINE/HIGHLINE)
6	X58 18DB/OR (BASE/LOWLINE)
7	Q24 14DG (MIDLINE/HIGHLINE)
8	P35 18OR/VT (EXCEPT BASE)
9	-
10	Z351 20BK/LG
11	-
12	G74 20TN/WT
13	-
14	X94 18TN/VT (MIDLINE/HIGHLINE)
14	X52 18DB/WT (BASE/LOWLINE)



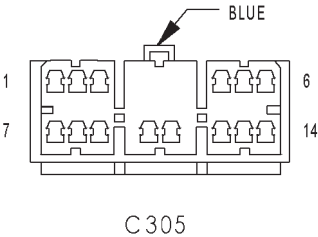
C304

C304 - BLUE (RIGHT REAR DOOR SIDE)

CAV	CIRCUIT
1	Q14 16GY (MIDLINE II/HIGHLINE)
2	P33 18OR/BK (EXCEPT BASE)
3	-
4	-

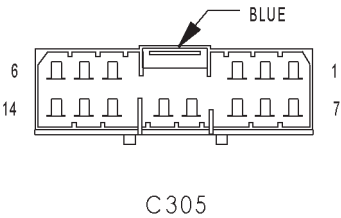
C304 - BLUE (RIGHT REAR DOOR SIDE)

CAV	CIRCUIT
5	-
6	X92 18TN/BK (PREMIUM)
6	X58 18DB/OR (BASE)
7	Q24 16DG (MIDLINE II/HIGHLINE)
8	P35 18OR/VT (EXCEPT BASE)
9	-
10	Z351 20BK/LG
11	-
12	G74 20TN/WT
13	-
14	X94 18TN/VT (PREMIUM)
14	X52 18DB/WT (BASE)



C305 - BLUE (MAIN BODY SIDE)

CAV	CIRCUIT
1	Q13 14DB (MIDLINE/HIGHLINE)
2	P33 18OR/BK (EXCEPT BASE)
3	-
4	-
5	-
6	X91 18WT/BK (MIDLINE/HIGHLINE)
6	X57 18BR/LB (BASE/LOWLINE)
7	Q23 14RD/WT (MIDLINE/HIGHLINE)
8	P35 18OR/VT (EXCEPT BASE)
9	-
10	Z350 20BK/LG (RHD)
10	Z350 18BK/LG (LHD)
11	-
12	G74 20TN/WT
13	-
14	X93 18WT/RD (MIDLINE/HIGHLINE)
14	X51 18BR/YL (BASE/LOWLINE)

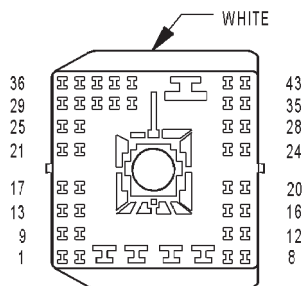


C305 - BLUE (LEFT REAR DOOR SIDE)

CAV	CIRCUIT
1	Q13 16GY (MIDLINE II/HIGHLINE)
2	P33 18OR/BK (EXCEPT BASE)
3	-
4	-
5	-
6	X91 18TN/BK (PREMIUM)
6	X57 18DB/OR (BASE)
7	Q23 16DG (MIDLINE II/HIGHLINE)
8	P35 18OR/VT (EXCEPT BASE)
9	-
10	Z350 20BK/LG
11	-

C305 - BLUE (LEFT REAR DOOR SIDE)

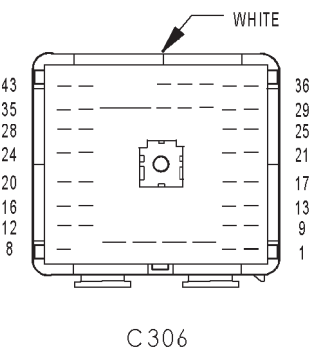
CAV	CIRCUIT
12	G74 20TN/WT
13	-
14	X93 18TN/VT (PREMIUM)
14	X51 18DB/WT (BASE)



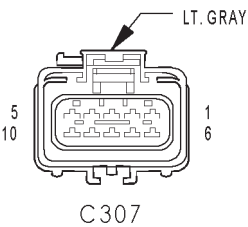
C 306

C306 - WHITE (MAIN BODY SIDE)

CAV	CIRCUIT
1	A6 16RD/BK (MIDLINE/HIGHLINE)
2	-
3	F85 16VT/WT (MIDLINE/HIGHLINE)
4	F70 18PK/BK
5	F41 16PK/VT
6	A99 14RD/VT (MIDLINE/HIGHLINE)
7	-
8	F87 20WT/BK (EXCEPT BASE)
9	L77 18BK/YL
10	V23 20BR/PK (MIDLINE/HIGHLINE)
11	L10 18BR/LG
12	M3 20PK/DB
13	L50 18WT/TN
14	-
15	L63 18DG/RD
16	L78 18DG/YL
17	V21 20DB/RD
18	-
19	-
20	M1 20PK
21	M2 18YL
22	M20 20BR
23	P30 16OR/WT
24	P31 16PK/WT
25	-
26	-
27	P100 18OR/BR
28	L38 18BR/WT (HIGHLINE)
29	X75 18DG (HIGHLINE)
30	P101 20OR/PK
31	G80 20YL/WT
32	G910 20VT/BR
33	-
34	X13 16BK/RD (HIGHLINE)
35	L62 18BR/RD
36	-
37	G78 20TN/BK
38	G71 18VT/YL
39	D25 18YL/VT (MIDLINE/HIGHLINE)
40	-
41	C15 12BK/WT
42	V22 20BR/YL
43	B40 14LB (MIDLINE/HIGHLINE)



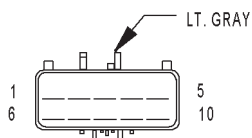
C306 - WHITE (REAR BODY SIDE)	
CAV	CIRCUIT
1	A6 16RD/BK (EXCEPT BASE)
2	-
3	F85 16VT/WT (EXCEPT BASE)
4	F70 18PK/BK
5	F41 16PK/VT
6	A99 14RD/VT (EXCEPT BASE)
7	-
8	F87 20WT/BK (EXCEPT BASE)
9	L77 18BK/YL
10	V23 20BR/PK (EXCEPT BASE)
11	L10 18BR/LG
12	M3 20PK/DB
13	L50 18WT/TN
14	-
15	L63 18DG/RD
16	L78 18DG/YL
17	V21 20DB/RD
18	-
19	-
20	M1 20PK
21	M2 18YL
22	M20 20BR
23	P30 16OR/WT
24	P31 16PK/WT
25	-
26	-
27	P100 18OR/BR
28	L38 18BR/WT (BUILT-UP-EXPORT)
29	X75 18DG (EXCEPT BASE)
30	P101 20OR/PK
31	G80 20YL/WT
32	G910 20VT/BR
33	-
34	-
35	L62 18BR/RD
36	-
37	G78 20TN/BK
38	G71 18VT/YL
39	D25 18YL/VT (EXCEPT BASE)
40	-
41	C15 12BK/WT
42	V22 20BR/YL
43	B40 14LB (EXCEPT BASE)



C307 - LT. GRAY (MAIN BODY SIDE)	
CAV	CIRCUIT
1	K226 18DB/WT
2	F512 18PK/OR (RHD)
3	A141 16DG/WT

C307 - LT. GRAY (MAIN BODY SIDE)

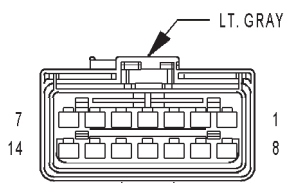
CAV	CIRCUIT
4	B1 18YL/DB
5	B2 18YL
6	K4 18BK/LB
7	B12 18DG/OR (RHD)
8	K125 18WT/DB
9	K107 18OR
10	K106 18WT/DG



C 307

C307 - LT. GRAY (FUEL TANK SIDE)

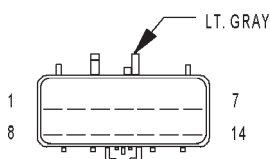
CAV	CIRCUIT
1	K226 18DB/WT
2	-
3	A141 16DG/WT (GAS)
4	B1 18YL/DB
5	B2 18YL
6	K4 18BK/LB
7	-
8	K125 18WT/DB (GAS)
9	K107 18OR (GAS)
10	K106 18WT/DG (GAS)



C 308

C308 - LT. GRAY (OVERHEAD SIDE)

CAV	CIRCUIT
1	F85 16VT/WT (SUNROOF)
2	-
3	M1 20PK
4	M3 20PK/DB (EXCEPT BASE)
5	Z111 16BK (SUNROOF)
6	-
7	X75 20GY/LG (BUILT-UP-EXPORT)
8	F87 20WT/BK (HIGHLINE)
9	-
10	M20 20BR (EXCEPT BASE)
11	M2 20YL
12	Z2 20BK/LG (HIGHLINE)
13	-
14	D25 20YL/V (HIGHLINE)



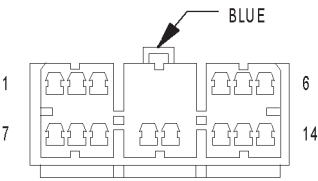
C 308

C308 - LT. GRAY (REAR BODY SIDE)

CAV	CIRCUIT
1	F85 16VT/WT (EXCEPT BASE)
2	-
3	M1 20PK
4	M3 20PK/DB

C308 - LT. GRAY (REAR BODY SIDE)

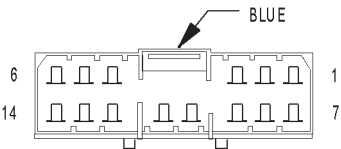
CAV	CIRCUIT
5	Z111 16BK (EXCEPT BASE)
6	-
7	X75 18DG (EXCEPT BASE)
8	F87 20WT/BK (EXCEPT BASE)
9	-
10	M20 20BR
11	M2 18YL
12	Z2 18BK/LG (EXCEPT BASE)
13	-
14	D25 18YL/VT (EXCEPT BASE)



C 309

C309 - BLUE (REAR BODY SIDE)

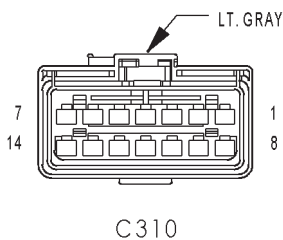
CAV	CIRCUIT
1	V21 20DB/RD
2	P31 16PK/WT
3	F70 18PK/BK
4	P100 18OR/BR
5	P101 20OR/PK
6	G71 18VT/YL
7	V22 20BR/YL
8	P30 16OR/WT
9	L77 18BK/YL
10	-
11	G80 20YL/WT
12	Z235 16BK
13	G78 20TN/BK
14	G910 20VT/BR



C 309

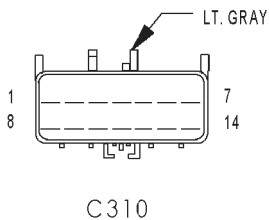
C309 - BLUE (SPLITGATE SIDE)

CAV	CIRCUIT
1	V21 20DB/RD
2	P31 16PK/WT
3	F70 18PK/BK
4	P100 18OR/BR
5	P101 20OR/PK
6	G71 18VT/YL
7	V22 20BR/YL
8	P30 16OR/WT
9	L77 18BK/YL (BUILT-UP-EXPORT)
10	-
11	G80 20YL/WT
12	Z235 16BK
13	G78 20TN/BK
14	G910 20VT/BR



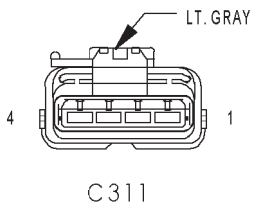
C310 - LT. GRAY (REAR BODY SIDE)

CAV	CIRCUIT
1	A6 16RD/BK (BUILT-UP-EXPORT)
2	L10 18BR/LG
3	L77 18BK/YL
4	L63 18DG/RD
5	L38 18BR/WT (BUILT-UP-EXPORT)
6	L50 18WT/TN
7	A99 14RD/VT (BUILT-UP-EXPORT)
8	V23 20BR/PK (BUILT-UP-EXPORT)
9	Z151 16BK/WT (LHD)
9	Z151 18BK/WT (RHD)
10	Z151 18BK/WT (RHD)
10	Z151 16BK/WT (LHD)
11	L78 18DG/YL
12	L62 18BR/RD
13	-
14	B40 14LB (BUILT-UP-EXPORT)



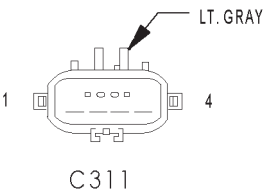
C310 - LT. GRAY (REAR LIGHTING SIDE)

CAV	CIRCUIT
1	-
2	L10 18BR/LG
3	L77 18BK/YL
4	L63 18DG/RD
5	L38 18BR/WT (BUILT-UP-EXPORT)
6	L50 18WT/TN
7	-
8	-
9	Z151 18BK/WT
10	Z151 18BK/WT
11	L78 18DG/YL
12	L62 18BR/RD
13	-
14	-



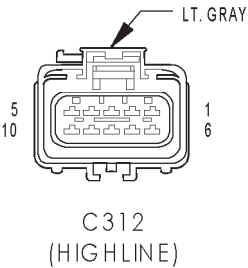
C311 - LT. GRAY (MAIN BODY SIDE)

CAV	CIRCUIT
1	F37 14RD/LB (MIDLINE/HIGHLINE)
2	R58 18GY (RHD)
2	R57 18DG (LHD)
3	Z238 14BK/WT (MIDLINE/HIGHLINE)
4	R60 18VT (RHD)
4	R59 18LB (LHD)



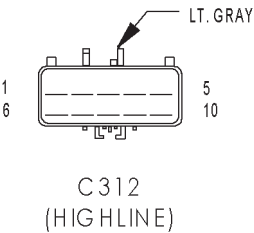
C311 - LT. GRAY (LEFT FRONT SEAT SIDE)

CAV	CIRCUIT
1	F37 18RD/LB (EXCEPT BASE)
2	R58 18GY (RHD)
2	R57 18DG (LHD)
3	Z238 14BK/WT (EXCEPT BASE)
4	R60 18VT (RHD)
4	R59 18LB (LHD)



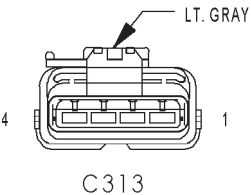
C312 (HIGHLINE) - LT. GRAY (MAIN BODY SIDE)

CAV	CIRCUIT
1	-
2	P86 20PK/BK
3	F98 14RD/WT
4	V23 20BR/PK
5	A3 16RD/WT
6	P142 20TN/DB
7	P134 20TN/LG
8	P138 20VT/LG
9	P140 20VT/BK
10	Z238 14BK/WT



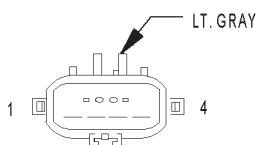
C312 (HIGHLINE) - LT. GRAY (LEFT FRONT SEAT SIDE)

CAV	CIRCUIT
1	P141 20TN/LB
2	P86 20PK/BK
3	F98 16RD/WT
4	V23 1BR/PK
5	A3 20RD/WT
6	P142 20TN/DB
7	P134 20TN/LG
8	P138 20VT/LG
9	P140 20VT/BK
10	Z238 14BK/WT



C313 - LT. GRAY (MAIN BODY SIDE)

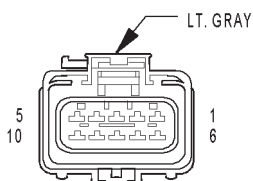
CAV	CIRCUIT
1	F37 14RD/LB (HIGHLINE)
2	R57 18DG (RHD)
2	R58 18GY (LHD)
3	Z238 14BK/WT (HIGHLINE)
4	R59 18LB (RHD)
4	R60 18VT (LHD)



C313

C313 - LT. GRAY (RIGHT FRONT SEAT SIDE)

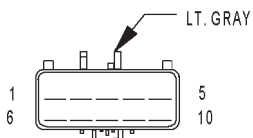
CAV	CIRCUIT
1	F34 14RD/LB (HIGHLINE)
2	R58 18DG (LHD BASE)
2	R57 DG (RHD)
2	R58 18GY (LHD EXCEPT BASE)
3	Z238 14BK/WT (HIGHLINE)
4	R60 18LB (LHD BASE)
4	R59 18LB (RHD)
4	R60 18VT (LHD EXCEPT BASE))



C314
(HIGHLINE)

C314 (HIGHLINE) - LT. GRAY (MAIN BODY SIDE)

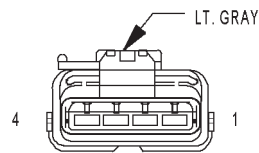
CAV	CIRCUIT
1	F98 14RD/WT
2	Z238 14BK/WT
3	P86 18PK/BK
4	P142 20TN/DB
5	V23 20BR/PK
6	P134 20TN/LG
7	P140 20VT/BK
8	P138 20VT/LG
9	-
10	-



C314
(HIGHLINE)

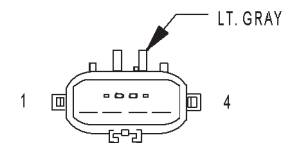
C314 (HIGHLINE) - LT. GRAY (RIGHT FRONT SEAT SIDE)

CAV	CIRCUIT
1	F98 16RD/WT
2	Z238 14BK/WT
3	P86 20PK/BK
4	P142 20TN/DB
5	V23 20BR/PK
6	P134 20TN/LG
7	P140 20VT/BK
8	P138 20VT/LG
9	-
10	-



C315
(MIDLINE/HIGHLINE)

C315 (MIDLINE/HIGHLINE) - LT. GRAY (RIGHT SIDE)	
CAV	CIRCUIT
1	Q12 14BR (LHD)
1	Q11 14LB (RHD)
2	Q22 14VT/WT (LHD)
2	Q21 14WT (RHD)
3	Q14 14GY (LHD)
3	Q13 14DB (RHD)
4	Q24 14DG (LHD)
4	Q23 14RD/WT (RHD)



C315
(MIDLINE/HIGHLINE)

C315 (MIDLINE/HIGHLINE) - LT. GRAY (LEFT SIDE)	
CAV	CIRCUIT
1	Q12 14BR (LHD)
1	Q11 14LB (RHD)
2	Q22 14VT/WT (LHD)
2	Q21 14WT (RHD)
3	Q14 14GY (LHD)
3	Q13 14DB (RHD)
4	Q24 14DG (LHD)
4	Q23 14RD/WT (RHD)

CONNECTOR VIEW
NOT
AVAILABLE

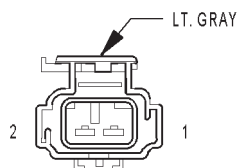
C316
(BUILT-UP-EXPORT)

C316 (BUILT-UP-EXPORT) - (MAIN BODY SIDE)	
CAV	CIRCUIT
1	X30 10BK
2	X31 10BK

CONNECTOR VIEW
NOT
AVAILABLE

C316
(BUILT-UP-EXPORT)

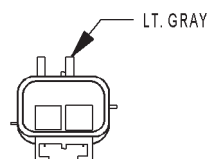
C316 (BUILT-UP-EXPORT) - (REAR BODY SIDE)	
CAV	CIRCUIT
1	X30 BK
2	X31 BK



C317
(EXCEPT BUILT-UP-EXPORT)

C317 (EXCEPT BUILT-UP-EXPORT) - LT. GRAY
(REAR LIGHTING SIDE)

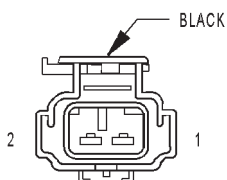
CAV	CIRCUIT
1	L77 18BK/YL
2	Z151 18BK/WT



C317
(EXCEPT BUILT-UP-EXPORT)

C317 (EXCEPT BUILT-UP-EXPORT) - LT. GRAY
(LICENSE LAMP SIDE)

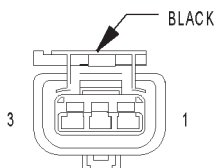
CAV	CIRCUIT
1	L77 18BR/YL
2	Z151 18BK/WT



CABIN
HEATER
(DIESEL)

CABIN HEATER (DIESEL) - BLACK 2 WAY

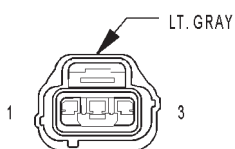
CAV	CIRCUIT	FUNCTION
1	C151 18DB/WT	CABIN HEATER RELAY OUTPUT
2	Z186 12BK/OR	GROUND



CAMSHAFT
POSITION
SENSOR
(2.4L)

CAMSHAFT POSITION SENSOR (2.4L) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	K7 18OR	5 VOLT SUPPLY
2	K4 18BK/LB	SENSOR GROUND
3	K44 18TN/YL	CAMSHAFT POSITION SENSOR SIGNAL



CAMSHAFT
POSITION
SENSOR
(3.7L)

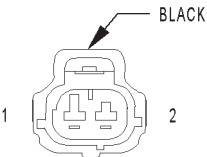
CAMSHAFT POSITION SENSOR (3.7L) - LT. GRAY 3 WAY

CAV	CIRCUIT	FUNCTION
1	K44 18TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
2	K4 18BK/LB	SENSOR GROUND
3	K7 18OR	5 VOLT SUPPLY



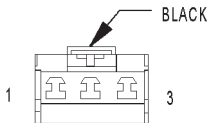
CAMSHAFT
POSITION
SENSOR
(DIESEL)

CAMSHAFT POSITION SENSOR (DIESEL) - 3 WAY		
CAV	CIRCUIT	FUNCTION
1	K944 20BK/LB	CAMSHAFT POSITION SENSOR GROUND
2	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
3	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT



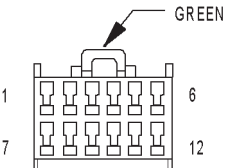
CAPACITOR

CAPACITOR - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
2	Z55 14BK/WT	GROUND



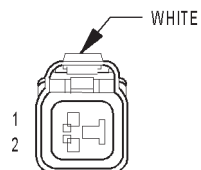
CARGO
LAMP
(EXCEPT BASE)

CARGO LAMP (EXCEPT BASE) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	M3 20PK/DB	REAR COURTESY LAMP CONTROL
3	M2 20YL	COURTESY LAMP DRIVER



CD
CHANGER

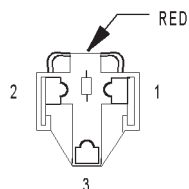
CD CHANGER - GREEN 12 WAY		
CAV	CIRCUIT	FUNCTION
1	X41 20WT/DG	AUDIO OUT LEFT
2	-	-
3	-	-
4	Z17 20BK	GROUND
5	X112 20RD	IGNITION SWITCH OUTPUT
6	X160 20YL	B(+)
7	X40 20WT/RD	AUDIO OUT RIGHT
8	Z30 20WT/BK	GROUND
9	-	-
10	-	-
11	Z9 20BK/DB	GROUND
12	D25 20YL/VT	PCI BUS



CENTER HIGH MOUNTED STOP LAMP - WHITE 2 WAY

CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	Z309 18BK	GROUND

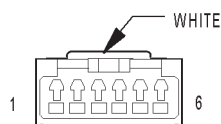
CENTER HIGH
MOUNTED
STOP LAMP



CIGAR LIGHTER - RED 3 WAY

CAV	CIRCUIT	FUNCTION
1	F30 16RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
2	-	-
3	Z3 16BK/OR	GROUND

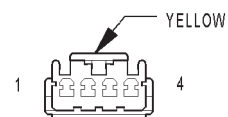
CIGAR
LIGHTER



CLOCKSPRING C1 - WHITE 6 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	X3 20BK/RD	HORN RELAY CONTROL
3	X20 20RD/BK (PREMIUM)	RADIO CONTROL MUX
4	X10 20RD/DB (PREMIUM)	RADIO CONTROL MUX RETURN
5	K4 20BK/LB	SENSOR GROUND
6	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL

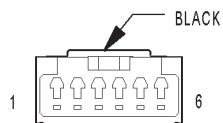
CLOCKSPRING
C1



CLOCKSPRING C2 - YELLOW 4 WAY

CAV	CIRCUIT	FUNCTION
1	R45 18DG/LB	DRIVER SQUIB 1 LINE 2
2	R43 18BK/LB	DRIVER SQUIB 1 LINE 1
3	R63 18TN/LB	DRIVER SQUIB 2 LINE 2
4	R61 18OR/LB	DRIVER SQUIB 2 LINE 1

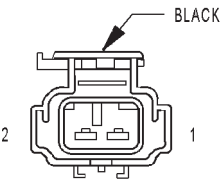
CLOCKSPRING
C2



CLOCKSPRING C3 - BLACK 6 WAY

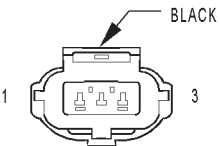
CAV	CIRCUIT	FUNCTION
1	-	-
2	X3 20BK/RD	HORN RELAY CONTROL
3	X20 20RD/BK (PREMIUM)	RADIO CONTROL MUX
4	X10 20RD/DB (PREMIUM)	RADIO CONTROL MUX RETURN
5	K4 20BK/LB (EXCEPT BASE)	SENSOR GROUND
6	V37 20RD/LG (EXCEPT BASE)	SPEED CONTROL SWITCH SIGNAL

CLOCKSPRING
C3



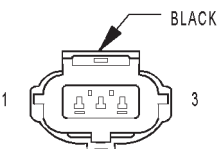
CLUTCH
INTERLOCK
SWITCH
(M /T)

CLUTCH INTERLOCK SWITCH (M/T) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	T141 18YL/RD	CLUTCH SWITCH OVERRIDE RELAY OUTPUT
2	F45 18YL/BR	FUSED IGNITION SWITCH OUTPUT (START)



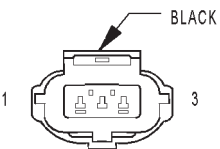
COIL ON
PLUG
NO. 1
(3.7L)

COIL ON PLUG NO. 1 (3.7L) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	K91 14TN/RD	COIL ON PLUG DRIVER NO.1
2	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
3	-	-



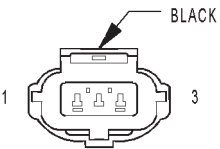
COIL ON
PLUG
NO. 2
(3.7L)

COIL ON PLUG NO. 2 (3.7L) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	K92 14TN/PK	COIL ON PLUG DRIVER NO. 2
2	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
3	-	-



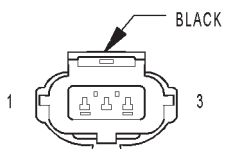
COIL ON
PLUG
NO. 3
(3.7L)

COIL ON PLUG NO. 3 (3.7L) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	K93 14TN/OR	COIL ON PLUG DRIVER NO. 3
2	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
3	-	-



COIL ON
PLUG
NO. 4
(3.7L)

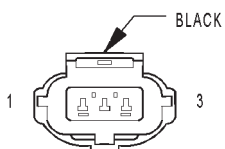
COIL ON PLUG NO. 4 (3.7L) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	K94 14TN/LG	COIL ON PLUG DRIVER NO. 4
2	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
3	-	-



COIL ON
PLUG
NO. 5
(3.7L)

COIL ON PLUG NO. 5 (3.7L) - BLACK 3 WAY

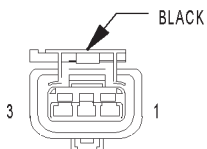
CAV	CIRCUIT	FUNCTION
1	K95 14TN/DG	COIL ON PLUG DRIVER NO. 5
2	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
3	-	-



COIL ON
PLUG
NO. 6
(3.7L)

COIL ON PLUG NO. 6 (3.7L) - BLACK 3 WAY

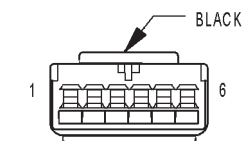
CAV	CIRCUIT	FUNCTION
1	K96 14TN/LB	COIL ON PLUG DRIVER NO. 6
2	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
3	-	-



COIL RAIL
(2.4L)

COIL RAIL (2.4L) - BLACK 3 WAY

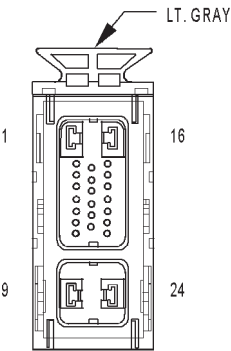
CAV	CIRCUIT	FUNCTION
1	K17 18DB/TN	IGNITION COIL DRIVER NO. 2
2	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
3	K19 18BK/GY	IGNITION COIL DRIVER NO. 1



COMPASS MINI-TRIP
COMPUTER
(PREMIUM)

COMPASS MINI-TRIP COMPUTER (PREMIUM) - BLACK 6 WAY

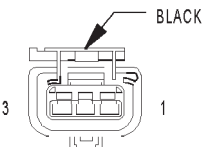
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20YL/VT	PCI BUS
3	M1 20PK	FUSED B(+)
4	Z2 20BK/LG	CLEAN GROUND
5	F87 20WT/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
6	-	-



CONTROLLER
ANTILOCK
BRAKE

CONTROLLER ANTILOCK BRAKE - LT.GRAY 24 WAY

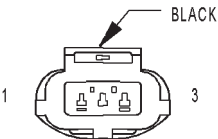
CAV	CIRCUIT	FUNCTION
1	Z101 12BK/OR	GROUND
2	-	-
3	-	-
4	-	-
5	D25 18YL/V	PCI BUS
6	B6 18WT/DB	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
7	B7 18WT	RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
8	D24 18WT/DG	FLASH ABS
9	A20 12RD/DB	FUSED B(+)
10	F22 18DB/PK	FUSED IGNITION SWITCH OUTPUT (RUN)
11	-	-
12	-	-
13	B12 18DG/OR	VEHICLE SPEED SIGNAL
14	-	-
15	-	-
16	Z102 12BK/OR	GROUND
17	S43 18LB/YL	FLUID PRESSURE SWITCH SIGNAL
18	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
19	B1 18YL/DB	REAR WHEEL SPEED SENSOR SIGNAL
20	B2 18YL	REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
21	-	-
22	B8 18RD/DB	LEFT FRONT WHEEL SPEED SENSOR SIGNAL
23	B9 18RD	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
24	A10 12RD/DG	FUSED B(+)



CRANKSHAFT
POSITION
SENSOR
(2.4L)

CRANKSHAFT POSITION SENSOR (2.4L) - BLACK 3 WAY

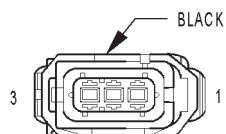
CAV	CIRCUIT	FUNCTION
1	K24 18GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
2	K4 18BK/LB	SENSOR GROUND
3	K7 18OR	5 VOLT SUPPLY



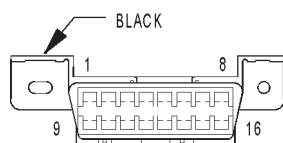
CRANKSHAFT
POSITION
SENSOR
(3.7L)

CRANKSHAFT POSITION SENSOR (3.7L) - BLACK 3 WAY

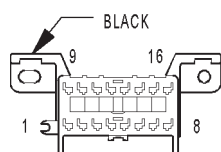
CAV	CIRCUIT	FUNCTION
1	K24 18GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
2	K4 18BK/LB	SENSOR GROUND
3	K7 18OR	5 VOLT SUPPLY



CRANKSHAFT
POSITION
SENSOR
(DIESEL)



DATA
LINK
CONNECTOR



DIAGNOSTIC
JUNCTION
PORT

CRANKSHAFT POSITION SENSOR (DIESEL) - BLACK 3 WAY

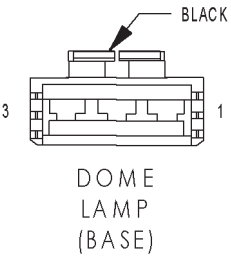
CAV	CIRCUIT	FUNCTION
1	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL 1
2	K3 20LB/BK	CRANKSHAFT POSITION SENSOR SIGNAL 2
3	Y101 20BK/OR	CRANKSHAFT POSITION SENSOR SHIELD

DATA LINK CONNECTOR - BLACK 16 WAY

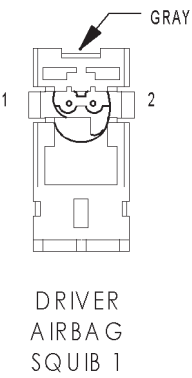
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 18YL/VT	PCI BUS
3	-	-
4	Z252 18BK/GY	GROUND
5	Z252 18BK/GY	GROUND
6	D32 20LG/DG (GAS)	SCI RECEIVE
6	D32 20LG/DG (DIESEL)	NOT USED
7	D21 20PK/RD	SCI TRANSMIT
8	D24 18WT/DG	FLASH ABS
9	D19 20VT/OR	BODY CONTROL MODULE FLASH ENABLE
10	-	-
11	-	-
12	-	-
13	-	-
14	D20 20LG (DIESEL)	NOT USED
14	D20 20LG (GAS)	SCI RECEIVE
15	-	-
16	F33 20PK/RD	FUSED B(+)

DIAGNOSTIC JUNCTION PORT - BLACK 16 WAY

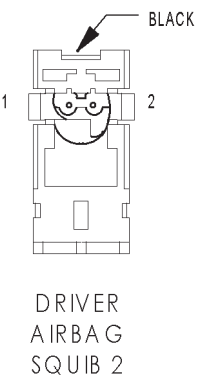
CAV	CIRCUIT	FUNCTION
1	D25 18YL/VT/BR	PCI BUS (PCM TCM CAB SKIM)
2	D25 18YL/VT/GY	PCI BUS (PCM TCM CAB SKIM)
3	D25 18YL/VT/DB	PCI BUS (O/C RADIO LSIACM RSIACM)
4	D25 18YL/VT/OR	PCI BUS (ACM)
5	D25 20YL/VT/RD	PCI BUS (EMIC)
6	D25 18YL/VT/WT	PCI BUS (BCM)
7	D25 18YL/VT	PCI BUS (DLC)
8	-	-
9	-	-
10	-	-
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	-	-



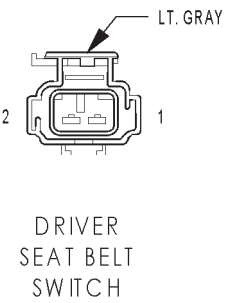
DOME LAMP (BASE) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	-	-
2	M1 20PK	FUSED B(+)
3	M2 20YL	COURTESY LAMP DRIVER



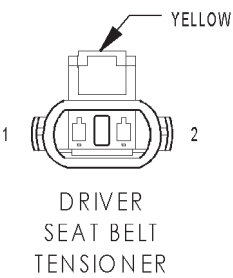
DRIVER AIRBAG SQUIB 1 - GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	R45 18DG/LB	DRIVER SQUIB 1 LINE 2
2	R43 18BK/LB	DRIVER SQUIB 1 LINE 1



DRIVER AIRBAG SQUIB 2 - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	R63 18TN/LB	DRIVER SQUIB 2 LINE 2
2	R61 18OR/LB	DRIVER SQUIB 2 LINE 1



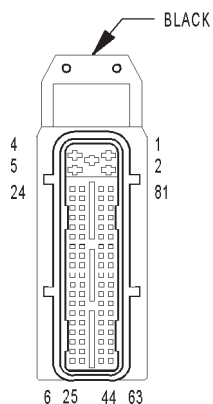
DRIVER SEAT BELT SWITCH - LT. GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	R57 18DG	DRIVER SEAT BELT SWITCH SENSE
2	R59 18LB	DRIVER SEAT BELT SWITCH GROUND



DRIVER SEAT BELT TENSIONER - YELLOW 2 WAY		
CAV	CIRCUIT	FUNCTION
1	R55 18OR/BK	DRIVER SEAT BELT TENSIONER LINE 1
2	R53 18OR/YL	DRIVER SEAT BELT TENSIONER LINE 2

CONNECTOR VIEW
NOT
AVAILABLE

EGR
SOLENOID
(DIESEL)



ENGINE
CONTROL
MODULE C1
(DIESEL)

EGR SOLENOID (DIESEL) - 2 WAY

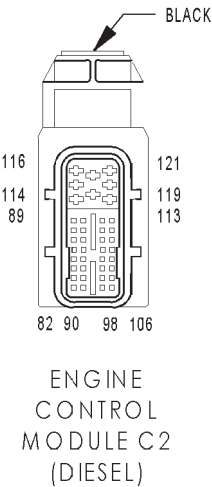
CAV	CIRCUIT	FUNCTION
1	A71 18DG/RD	FUSED AUTO SHUT DOWN RELAY OUTPUT
2	K35 18GY/YL	EGR SOLENOID CONTROL

ENGINE CONTROL MODULE C1 (DIESEL) - BLACK 81 WAY

CAV	CIRCUIT	FUNCTION
1	Z108 14BK/DG	GROUND
2	Z108 14BK/DG	GROUND
3	K20 18DG	GENERATOR FIELD CONTROL
4	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
5	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
6	-	-
7	D25 20VT/YL	PCI BUS
8	K944 20BK/LB	CAMSHAFT POSITION SENSOR GROUND
9	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
10	-	-
11	K37 20DB/YL	BOOST PRESSURE SENSOR SIGNAL
12	-	-
13	K78 20GY	FUEL PRESSURE SENSOR SIGNAL
14	-	-
15	K81 20VT/TN	ACCELERATOR PEDAL POSITION SENSOR SIGNAL
16	K80 20BK/VT	FUEL PRESSURE SENSOR GROUND
17	-	-
18	-	-
19	F92 20YL/BR	BATTERY SENSE (+)
20	Z109 20BK/DB	BATTERY SENSE (-)
21	K4 20BK/LB	SENSOR GROUND
22	F1 20DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
23	K6 20VT/WT	SENSOR REFERENCE VOLTAGE B
24	K3 20LB/BK	CRANKSHAFT POSITION SENSOR SIGNAL 2
25	-	-
26	-	-
27	-	-
28	-	-
29	K77 20BR/WT	TRANSFER CASE POSITION SENSOR INPUT
30	G60 20GY/YL	ENGINE OIL PRESSURE SENSOR SIGNAL
31	G123 20DG/WT	WATER IN FUEL SENSOR SIGNAL
32	K118 20PK/YL	BATTERY TEMPERATURE SENSOR SIGNAL
33	-	-
34	K255 20WT/DG	ACCELERATOR PEDAL POSITION SENSOR GROUND
35	K852 20VT/WT	ACCELERATOR PEDAL POSITION SENSOR 5 VOLT SUPPLY
36	-	-
37	-	-
38	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL
39	K226 20DB/WT	FUEL LEVEL SENSOR SIGNAL
40	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
41	K21 18BK/RD	INTAKE AIR TEMPERATURE SENSOR SIGNAL
42	Y101 20BK/OR	CRANKSHAFT POSITION SENSOR SHIELD
43	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL 1

ENGINE CONTROL MODULE C1 (DIESEL) - BLACK 81 WAY

CAV	CIRCUIT	FUNCTION
44	-	-
45	-	-
46	-	-
47	L50 20WT/TN	BRAKE LAMP SWITCH OUTPUT
48	K29 20WT/PK	BRAKE SWITCH SENSE
49	-	-
50	-	-
51	-	-
52	-	-
53	-	-
54	-	-
55	B22 20DG/YL	VEHICLE SPEED SIGNAL
56	-	-
57	-	-
58	-	-
59	-	-
60	K7 20OR	FUEL PRESSURE SENSOR 5 VOLT SUPPLY
61	K51 20DB/YL	AUTO SHUT DOWN RELAY CONTROL
62	-	-
63	-	-
64	K151 20WT	LOW IDLE POSITION SWITCH SENSE
65	-	-
66	-	-
67	-	-
68	-	-
69	C13 20DG	A/C COMPRESSOR CLUTCH RELAY CONTROL
70	-	-
71	-	-
72	K236 20GY/PK	GLOW PLUG RELAY RELAY NO. 2 CONTROL
73	-	-
74	K90 20TN	CLUTCH SWITCH OVERRIDE RELAY CONTROL
75	K132 20DG/LB	CABIN HEATER RELAY CONTROL
76	-	-
77	K152 20WT	GLOW PLUG RELAY NO. 1 CONTROL
78	-	-
79	-	-
80	K46 20OR/BK	FUEL PRESSURE SOLENOID CONTROL
81	K46 20OR/BK	FUEL PRESSURE SOLENOID CONTROL

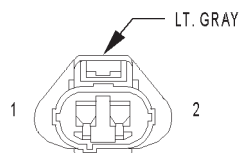


ENGINE CONTROL MODULE C2 (DIESEL) - BLACK 40 WAY

CAV	CIRCUIT	FUNCTION
82	D21 20PK	SCI TRANSMIT
83	-	-
84	-	-
85	-	-
86	-	-
87	-	-
88	-	-
89	K35 20GY/YL	EGR SOLENOID CONTROL
90	-	-
91	-	-
92	-	-
93	-	-

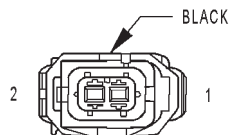
ENGINE CONTROL MODULE C2 (DIESEL) - BLACK 40 WAY

CAV	CIRCUIT	FUNCTION
94	-	-
95	-	-
96	-	-
97	-	-
98	-	-
99	-	-
100	-	-
101	C18 20DB	A/C PRESSURE SIGNAL
102	-	-
103	-	-
104	-	-
105	-	-
106	-	-
107	-	-
108	-	-
109	-	-
110	-	-
111	-	-
112	-	-
113	-	-
114	-	-
115	K14 2.5mmLB/BR	FUEL INJECTOR NO. 4 CONTROL
116	K63 2.5mmDB/BK	COMMON INJECTOR DRIVER
117	-	-
118	K11 2.5mmWT/DB	FUEL INJECTOR NO. 1 CONTROL
119	K12 2.5mmTN	FUEL INJECTOR NO. 2 CONTROL
120	K13 2.5mmYL/WT	FUEL INJECTOR NO. 3 CONTROL
121	-	-


ENGINE COOLANT
LEVEL
SENSOR
(DIESEL)

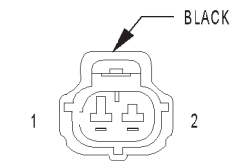
ENGINE COOLANT LEVEL SENSOR (DIESEL) - LT. GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
1	G18 18PK/BK	COOLANT LEVEL SENSOR SIGNAL
2	Z246 18BK/GY	SENSOR GROUND


ENGINE COOLANT
TEMP
SENSOR
(DIESEL)

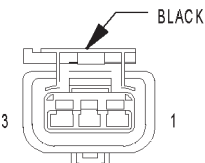
ENGINE COOLANT TEMP SENSOR (DIESEL) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
2	K4 18BK/LB	SENSOR GROUND



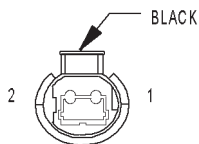
ENGINE COOLANT
TEMPERATURE
SENSOR
(GAS)

ENGINE COOLANT TEMPERATURE SENSOR (GAS) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	K4 18BK/LB	SENSOR GROUND
2	K2 18TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL



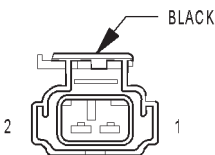
ENGINE OIL
PRESSURE
SENSOR

ENGINE OIL PRESSURE SENSOR - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	K6 18VT/WT	SENSOR REFERENCE VOLTAGE B
2	G60 20GY/YL (DIESEL)	ENGINE OIL PRESSURE SENSOR SIGNAL
2	G60 18GY/YL (GAS)	ENGINE OIL PRESSURE SENSOR SIGNAL
3	K4 18BK/LB	SENSOR GROUND



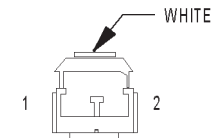
EVAP/PURGE
SOLENOID

EVAP/PURGE SOLENOID - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	K52 18PK/BK	EVAP/PURGE SOLENOID CONTROL
2	F1 18DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)



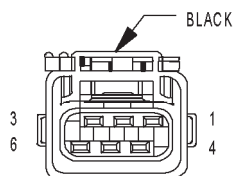
FLIP-UP
GLASS RELEASE
MOTOR

FLIP-UP GLASS RELEASE MOTOR - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Z235 18BK	GROUND
2	P100 18OR/BR	FLIP-UP GLASS RELEASE MOTOR DRIVER



FLIP-UP
GLASS RELEASE
SWITCH

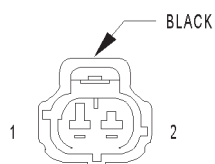
FLIP-UP GLASS RELEASE SWITCH - WHITE 2 WAY		
CAV	CIRCUIT	FUNCTION
1	G910 20VT/BR	TAILGATE SWITCH GROUND
2	P101 20OR/PK	FLIP-UP GLASS RELEASE SWITCH SENSE



FRONT WIPER
MOTOR

FRONT WIPER MOTOR - BLACK 6 WAY

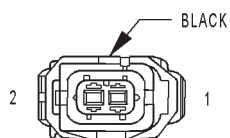
CAV	CIRCUIT	FUNCTION
1	V6 16DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
2	V55 16TN/RD	FRONT WIPER PARK SWITCH SENSE
3	-	-
4	Z141 14BK	GROUND
5	V3 14BR/WT	FRONT WIPER HIGH/LOW RELAY LOW SPEED OUT-PUT
6	V4 14RD/YL	FRONT WIPER HIGH/LOW RELAY HIGH SPEED OUT-PUT



FUEL
HEATER
(DIESEL)

FUEL HEATER (DIESEL) - BLACK 2 WAY

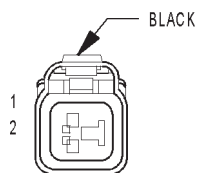
CAV	CIRCUIT	FUNCTION
1	A93 16RD/BK	FUEL HEATER RELAY OUTPUT
2	Z246 16BK/GY	GROUND



FUEL
INJECTOR
NO. 1
(DIESEL)

FUEL INJECTOR NO. 1 (DIESEL) - BLACK 2 WAY

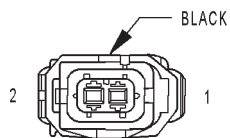
CAV	CIRCUIT	FUNCTION
1	K63 2.5mmDB/BK	COMMON INJECTOR DRIVER
2	K11 2.5mmWT/DB	FUEL INJECTOR NO. 1 CONTROL



FUEL
INJECTOR
NO. 1
(GAS)

FUEL INJECTOR NO. 1 (GAS) - BLACK 2 WAY

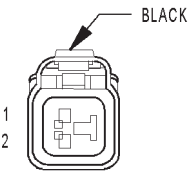
CAV	CIRCUIT	FUNCTION
1	F142 18OR/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
2	K11 18WT/DB	FUEL INJECTOR NO. 1 DRIVER



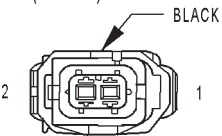
FUEL
INJECTOR
NO. 2
(DIESEL)

FUEL INJECTOR NO. 2 (DIESEL) - BLACK 2 WAY

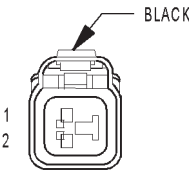
CAV	CIRCUIT	FUNCTION
1	K63 2.5mmDB/BK	COMMON INJECTOR DRIVER
2	K12 2.5mmTN	FUEL INJECTOR NO. 2 CONTROL



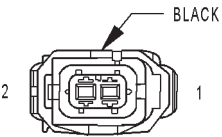
FUEL
INJECTOR
NO. 2
(GAS)



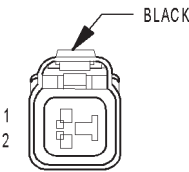
FUEL
INJECTOR
NO. 3
(DIESEL)



FUEL
INJECTOR
NO. 3
(GAS)



FUEL
INJECTOR
NO. 4
(DIESEL)



FUEL
INJECTOR
NO. 4
(GAS)

FUEL INJECTOR NO. 2 (GAS) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F142 180R/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
2	K12 18TN	FUEL INJECTOR NO. 2 DRIVER

FUEL INJECTOR NO. 3 (DIESEL) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K63 2.5mmDB/BK	COMMON INJECTOR DRIVER
2	K13 2.5mmYL/WT	FUEL INJECTOR NO. 3 CONTROL

FUEL INJECTOR NO. 3 (GAS) - BLACK 2 WAY

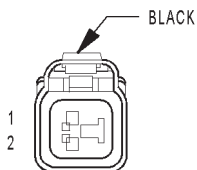
CAV	CIRCUIT	FUNCTION
1	F142 180R/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
2	K13 18YL/WT	FUEL INJECTOR NO. 3 DRIVER

FUEL INJECTOR NO. 4 (DIESEL) - BLACK 2 WAY

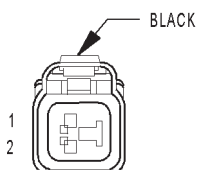
CAV	CIRCUIT	FUNCTION
1	K63 2.5mmDB/BK	COMMON INJECTOR DRIVER
2	K14 2.5mmLB/BR	FUEL INJECTOR NO. 4 CONTROL

FUEL INJECTOR NO. 4 (GAS) - BLACK 2 WAY

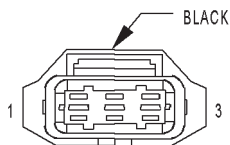
CAV	CIRCUIT	FUNCTION
1	F142 180R/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
2	K14 18LB/BR	FUEL INJECTOR NO. 4 DRIVER



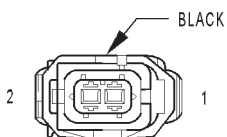
FUEL
INJECTOR
NO. 5
(3.7L)



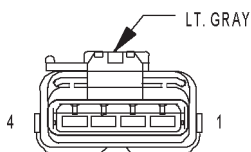
FUEL
INJECTOR
NO. 6
(3.7L)



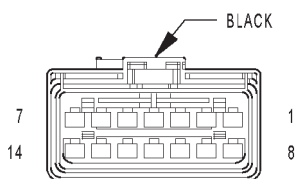
FUEL
PRESSURE
SENSOR
(DIESEL)



FUEL
PRESSURE
SOLENOID
(DIESEL)



FUEL PUMP
MODULE



G 202

FUEL INJECTOR NO. 5 (3.7L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F142 18OR/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
2	K38 18GY	FUEL INJECTOR NO. 5 DRIVER

FUEL INJECTOR NO. 6 (3.7L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F142 18OR/DG	FUSED AUTO SHUT DOWN RELAY OUTPUT
2	K58 18BR/DB	FUEL INJECTOR NO. 6 DRIVER

FUEL PRESSURE SENSOR (DIESEL) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	K80 20BK/VT	FUEL PRESSURE SENSOR GROUND
2	K78 20GY	FUEL PRESSURE SENSOR SIGNAL
3	K7 20OR	FUEL PRESSURE SENSOR 5 VOLT SUPPLY

FUEL PRESSURE SOLENOID (DIESEL) - BLACK 2 WAY

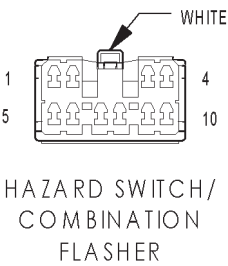
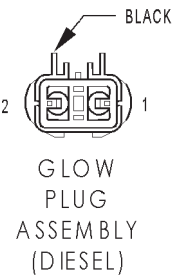
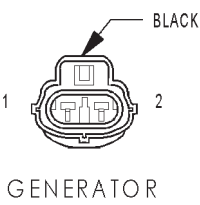
CAV	CIRCUIT	FUNCTION
1	A142 14DG/OR	AUTO SHUT DOWN RELAY OUTPUT
2	K46 18OR/BK	FUEL PRESSURE SOLENOID CONTROL

FUEL PUMP MODULE - LT. GRAY 4 WAY

CAV	CIRCUIT	FUNCTION
1	Z211 16BK (GAS)	GROUND
2	K4 18BK/LB	SENSOR GROUND
3	K226 18DB/WT	FUEL LEVEL SENSOR SIGNAL
4	A141 16DG/WT (GAS)	FUEL PUMP RELAY OUTPUT

G 202 - BLACK 14 WAY

CAV	CIRCUIT	FUNCTION
1	Z12 16BK/TN	GROUND
2	Z3 18BK/OR (BASE)	GROUND
2	Z3 14BK/OR (EXCEPT BASE)	GROUND
3	Z11 20BK/WT (EXCEPT BASE)	GROUND

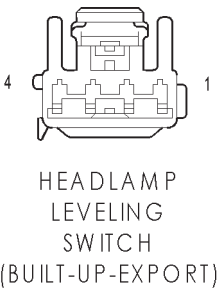


G 202 - BLACK 14 WAY		
CAV	CIRCUIT	FUNCTION
4	-	-
5	-	-
6	Z105 20BK/LG	GROUND
7	Z231 16BK/WT	GROUND
8	Z103 16BK/OR	GROUND
9	Z131 10BK/GY	GROUND
10	Z300 16BK	GROUND
11	Z232 16BK/LB	GROUND
12	-	-
13	Z158 20BK/GY	GROUND
14	Z110 20BK/TN (EXCEPT BASE)	GROUND

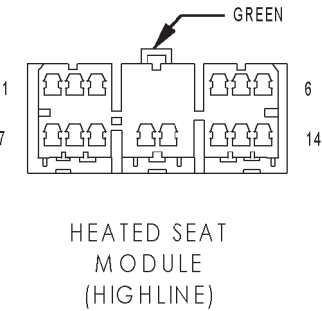
GENERATOR - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	A71 18DG/RD (DIESEL)	FUSED AUTO SHUT DOWN RELAY OUTPUT
1	K20 18DG (GAS)	GENERATOR FIELD DRIVER
2	K20 18DG (DIESEL)	GENERATOR FIELD CONTROL
2	K125 18WT/DB (GAS)	GENERATOR SOURCE

GLOW PLUG ASSEMBLY (DIESEL) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	K154 10GY	GLOW PLUG RELAY NO. 1 OUTPUT
2	K104 10RD/WT	GLOW PLUG RELAY NO. 2 OUTPUT

HAZARD SWITCH/COMBINATION FLASHER - WHITE 10 WAY		
CAV	CIRCUIT	FUNCTION
1	A15 18PK/OR	FUSED B(+)
2	Z3 18BK/OR	GROUND
3	L62 18BR/RD	RIGHT TURN SIGNAL
4	L91 20DB/PK	HAZARD LAMP CONTROL
5	L305 20LB/WT	LEFT TURN SWITCH SENSE
6	-	-
7	L63 18DG/RD	LEFT TURN SIGNAL
8	F15 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN)
9	L302 20LB/YL	RIGHT TURN SWITCH SENSE
10	E2 20OR	FUSED PANEL LAMPS DIMMER SWITCH SIGNAL



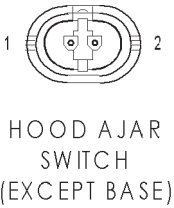
HEADLAMP LEVELING SWITCH (BUILT-UP-EXPORT) - 4 WAY		
CAV	CIRCUIT	FUNCTION
1	L13 18BR/YL	HEADLAMP ADJUST SIGNAL
2	L78 18DG/YL	FUSED PARK LAMP RELAY OUTPUT
3	Z12 18BK/TN	GROUND
4	-	-



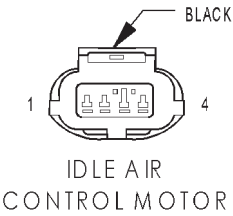
HEATED SEAT MODULE (HIGHLINE) - GREEN 14 WAY		
CAV	CIRCUIT	FUNCTION
1	P133 20TN/DG	LEFT SEAT HEATER SWITCH MUX
2	P86 20PK/BK	HEATED SEAT TEMPERATURE SENSOR SIGNAL
3	F98 16RD/WT	PASSENGER HEATED SEAT FEED
4	A3 16RD/WT	FUSED B(+)
5	F99 16RD/YL	DRIVER HEATED SEAT FEED
6	A3 16RD/WT	FUSED B(+)
7	P142 20TN/DB	PASSENGER HEATED SEAT TEMPERATURE SENSOR GROUND
8	P141 20TN/LB	DRIVER HEATED SEAT TEMPERATURE SENSOR GROUND
9	P134 20TN/LG	RIGHT SEAT HEATER SWITCH MUX
10	P138 20VT/LG	RIGHT SEAT LOW HEAT LED DRIVER
11	P140 20VT/BK	RIGHT SEAT HIGH HEAT LED DRIVER
12	P137 20VT/DG	LEFT SEAT LOW HEAT LED DRIVER
13	Z238 16BK/WT	GROUND
14	P139 20VT/WT	LEFT SEAT HIGH HEAT LED DRIVER



HIGH NOTE HORN - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	X2 18DG/RD	HORN RELAY OUTPUT
2	Z141 18BK	GROUND

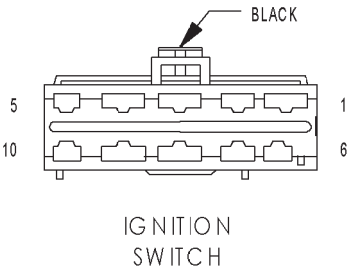


HOOD AJAR SWITCH (EXCEPT BASE) - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	G70 18BR/TN	HOOD AJAR SWITCH SENSE
2	Z142 18BK/WT	GROUND



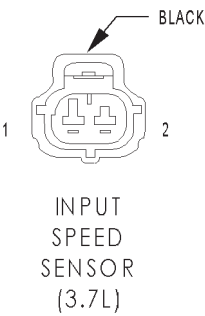
IDLE AIR CONTROL MOTOR - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	K59 18VT/BK	IDLE AIR CONTROL MOTOR NO. 4 DRIVER
2	K40 18BR/WT	IDLE AIR CONTROL MOTOR NO. 1 DRIVER
3	K60 18YL/BK	IDLE AIR CONTROL MOTOR NO. 2 DRIVER
4	K39 18GY/RD	IDLE AIR CONTROL MOTOR NO. 3 DRIVER



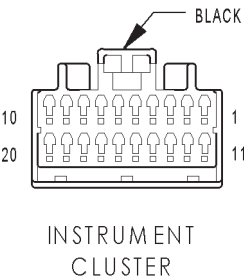
IGNITION SWITCH - BLACK 10 WAY

CAV	CIRCUIT	FUNCTION
1	A1 12RD	FUSED (+)
2	A21 12RD/DB	IGNITION SWITCH OUTPUT (RUN-START)
3	F81 12TN	IGNITION SWITCH OUTPUT (RUN-ACC)
4	A25 12DB	FUSED B(+)
5	G26 20LB	KEY-IN IGNITION SWITCH SENSE
6	A41 12YL	IGNITION SWITCH OUTPUT (START)
7	A31 12BK/WT	IGNITION SWITCH OUTPUT (RUN-ACC)
8	A22 12BK/OR	IGNITION SWITCH OUTPUT (RUN)
9	A2 12PK/BK	FUSED B (+)
10	Z232 16BK/LB	GROUND



INPUT SPEED SENSOR (3.7L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	T52 18RD/BK	INPUT SPEED SENSOR SIGNAL
2	T13 18DB/BK	SPEED SENSOR GROUND

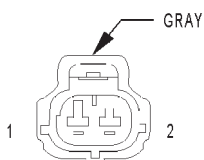


INSTRUMENT CLUSTER - BLACK 20 WAY

CAV	CIRCUIT	FUNCTION
1	Z105 20BK/LG	GROUND
2	-	-
3	Y98 20GY/DB	INSTRUMENT CLUSTER WAKE UP SIGNAL
4	-	-
5	G18 20PK/BK	LOW COOLANT FLUID LEVEL SENSE
6	L63 20DG/RD	LEFT TURN SIGNAL
7	G9 20GY/BK	PARK BRAKE SWITCH SENSE
8	G69 20BK/OR	VTSS INDICATOR DRIVER
9	-	-
10	M1 20PK	FUSED B(+)
11	L78 20DG/YL	FUSED PARK LAMP RELAY OUTPUT
12	E2 20OR	FUSED PANEL LAMPS DIMMER SWITCH SIGNAL
13	-	-
14	D25 20YL/VT/RD	PCI BUS
15	-	-

INSTRUMENT CLUSTER - BLACK 20 WAY

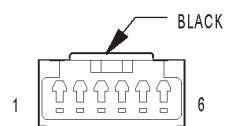
CAV	CIRCUIT	FUNCTION
16	L62 20BR/RD	RIGHT TURN SIGNAL
17	G11 20WT/BK	RED BRAKE WARNING INDICATOR DRIVER
18	G29 20BK/TN	LOW WASHER FLUID SENSE
19	F87 20TN/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
20	-	-



INTAKE AIR
TEMPERATURE
SENSOR
(GAS)

INTAKE AIR TEMPERATURE SENSOR (GAS) - GRAY 2 WAY

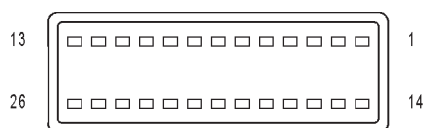
CAV	CIRCUIT	FUNCTION
1	K4 18BK/LB	SENSOR GROUND
2	K21 18BK/RD	INTAKE AIR TEMPERATURE SENSOR SIGNAL



INTRUSION
SENSOR
(BUILT-UP-EXPORT)

INTRUSION SENSOR (BUILT-UP-EXPORT) - BLACK 6 WAY

CAV	CIRCUIT	FUNCTION
1	Z2 20BK/LG	GROUND
2	-	-
3	X75 20DG	SIREN SIGNAL CONTROL
4	-	-
5	D25 20YL/VT	PCI BUS
6	M1 20PK	FUSED B(+)



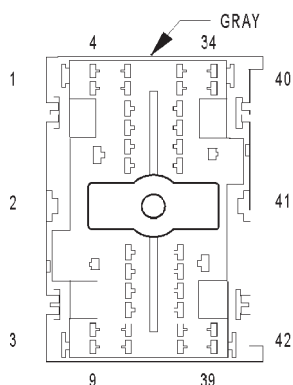
JUNCTION BLOCK
BODY CONTROL MODULE-JB

JUNCTION BLOCK BODY CONTROL MODULE-JB - 26 WAY

CAV	CIRCUIT	FUNCTION
1	X3 (PREMIUM)	HORN RELAY CONTROL
2	P334	DOOR UNLOCK RELAY CONTROL
3	L308	PARK LAMP RELAY CONTROL
4	L96 (PREMIUM)	REAR FOG LAMP RELAY CONTROL
5	P109 (EXCEPT BASE)	DRIVER DOOR UNLOCK RELAY CONTROL
6	C80	REAR WINDOW DEFOGGER RELAY CONTROL
7	-	-
8	Z300	GROUND
9	F35	FUSED B(+)
10	L309	HIGH BEAM RELAY CONTROL
11	P31	TAILGATE UNLOCK DRIVER
12	P37	DOOR LOCK SWITCH GROUND
13	L94	LOW BEAM RELAY CONTROL
14	F89	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
15	M1	FUSED B(+)
16	F87	FUSED IGNITION SWITCH OUTPUT (RUN-START)
17	L26 (EXCEPT BASE)	FRONT FOG LAMP RELAY CONTROL
18	P333	DOOR LOCK RELAY CONTROL
19	V16	FRONT WIPER HIGH/LOW RELAY CONTROL
20	V55	FRONT WIPER PARK SWITCH SENSE

JUNCTION BLOCK BODY CONTROL MODULE-JB - 26 WAY

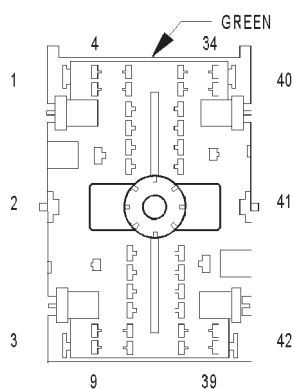
CAV	CIRCUIT	FUNCTION
21	V14	FRONT WIPER ON/OFF RELAY CONTROL
22	P30	TAILGATE LOCK DRIVER
23	P36	DOOR LOCK SWITCH MUX
24	M2	COURTESY LAMP DRIVER
25	Z131	GROUND
26	M20	COURTESY LAMP LOAD SHED



JUNCTION BLOCK C1

JUNCTION BLOCK C1 - GRAY 42 WAY

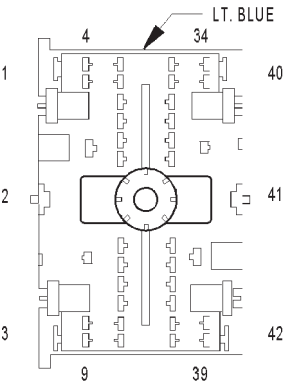
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	A21 12RD/DB	IGNITION SWITCH OUTPUT (RUN-START)
4	E2 20OR	FUSED PANEL LAMPS DIMMER SWITCH SIGNAL
5	E2 20OR	FUSED PANEL LAMPS DIMMER SWITCH SIGNAL
6	-	-
7	X3 20BK/RD	HORN RELAY CONTROL
8	L78 20DG/YL (EXCEPT BUILT-UP-EXPORT)	FUSED PARK LAMP RELAY OUTPUT
8	L78 18DG/YL (BUILT-UP-EXPORT)	FUSED PARK LAMP RELAY OUTPUT
9	F1 20DB (PREMIUM)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
10	E2 20OR	FUSED PANEL LAMPS DIMMER SWITCH SIGNAL
11	E2 20OR	FUSED PANEL LAMPS DIMMER SWITCH SIGNAL
12	M1 20PK	FUSED B(+)
13	F33 20PK/RD	FUSED B(+)
14	-	-
15	M1 20PK	FUSED B(+)
16	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
17	Z300 16BK	GROUND
18	-	-
19	-	-
20	Z131 10BK/GY	GROUND
21	L309 20LG/WT	HIGH BEAM RELAY CONTROL
22	F14 18LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
23	M2 20YL	COURTESY LAMP DRIVER
24	M2 20YL	COURTESY LAMP DRIVER
25	F33 20PK/RD (PREMIUM)	FUSED B(+)
26	F88 20BR/RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
27	M1 20PK	FUSED B(+)
28	V23 20BR/PK	FUSED IGNITION SWITCH OUTPUT (RUN)
29	V23 20BR/PK	FUSED IGNITION SWITCH OUTPUT (RUN)
30	-	-
31	F87 20TN/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
32	-	-
33	F38 16RD/WT	FUSED B(+)
34	C16 20LB/YL	FUSED DEFOGGER RELAY OUTPUT
35	F30 16RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
36	-	-
37	F32 18PK/DB	FUSED B(+)
38	F15 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN)
39	F23 18DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
40	A31 12BK/WT	IGNITION SWITCH OUTPUT (RUN-ACC)
41	A15 18PK/OR	FUSED B(+)
42	A22 12BK/OR	IGNITION SWITCH OUTPUT (RUN)



JUNCTION BLOCK C2

JUNCTION BLOCK C2 - GREEN 42 WAY

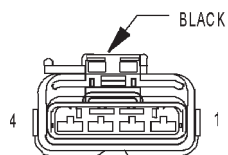
CAV	CIRCUIT	FUNCTION
1	F37 14RD/LB (MIDLINE/HIGHLINE)	FUSED B(+)
2	-	-
3	C15 12BK/WT	DEFOGGER RELAY OUTPUT
4	F89 18OR/RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
5	P37 20LG (EXCEPT BASE)	DOOR LOCK SWITCH GROUND
6	P33 18OR/BK (EXCEPT BASE)	DOOR LOCK RELAY OUTPUT
7	F22 18DB/PK	FUSED IGNITION SWITCH OUTPUT (RUN)
8	P34 18PK/BK (EXCEPT BASE)	DRIVER DOOR UNLOCK RELAY OUTPUT
9	P35 18OR/VT (EXCEPT BASE)	PASSENGER DOOR UNLOCK RELAY OUTPUT
10	P36 20PK/VT (EXCEPT BASE)	DOOR LOCK SWITCH MUX
11	P37 20LG (EXCEPT BASE)	DOOR LOCK SWITCH GROUND
12	M20 20BR	COURTESY LAMP LOAD SHED
13	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
14	P36 20PK/VT (EXCEPT BASE)	DOOR LOCK SWITCH MUX
15	P30 16OR/WT	TAILGATE LOCK DRIVER
16	F70 18PK/BK	FUSED B(+)
17	L77 18BK/YL	FUSED LEFT INBOARD TAIL LAMP
18	M1 20PK	FUSED B(+)
19	M1 20PK	FUSED B(+)
20	E2 20OR	FUSED PANEL LAMPS DIMMER SWITCH SIGNAL
21	E2 20OR	FUSED PANEL LAMPS DIMMER SWITCH SIGNAL
22	-	-
23	V23 20BR/PK (HIGHLINE)	FUSED IGNITION SWITCH OUTPUT (RUN)
24	V23 20BR/PK (EXCEPT BASE)	FUSED IGNITION SWITCH OUTPUT (RUN)
25	V23 20BR/PK (MIDLINE/HIGHLINE)	FUSED IGNITION SWITCH OUTPUT (RUN)
26	L78 18DG/YL	FUSED PARK LAMP RELAY OUTPUT
27	-	-
28	A6 16RD/BK (PREMIUM GAS)	FUSED B(+)
29	-	-
30	M2 18YL	COURTESY LAMP DRIVER
31	C16 18LB/YL (EXCEPT BASE)	FUSED DEFOGGER RELAY OUTPUT
32	F14 18LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
33	F14 18LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
34	L38 18BR/WT (HIGHLINE)	REAR FOG LAMP RELAY OUTPUT
35	P31 16PK/WT	TAILGATE UNLOCK DRIVER
36	-	-
37	F60 16DG/RD (PREMIUM)	FUSED B(+)
38	F87 20WT/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
39	C16 18LB/YL (EXCEPT BASE)	FUSED DEFOGGER RELAY OUTPUT
40	F85 16VT/WT (MIDLINE/HIGHLINE)	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
41	F41 16PK/VT	FUSED B(+)
42	A3 16RD/WT (HIGHLINE)	FUSED B(+)



JUNCTION BLOCK C3

JUNCTION BLOCK C3 - LT. BLUE 42 WAY

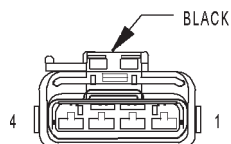
CAV	CIRCUIT	FUNCTION
1	A12 10RD/TN	FUSED B(+)
2	A13 10PK/WT	FUSED B(+)
3	A4 12BK/PK	FUSED B(+)
4	L44 18VT/RD	FUSED RIGHT LOW BEAM OUTPUT
5	L43 18VT	FUSED LEFT LOW BEAM OUTPUT
6	-	-
7	V55 16TN/RD	FRONT WIPER PARK SWITCH SENSE
8	F1 18DB (LHD)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
8	F1 20DB (RHD)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
9	V6 14DB/YL (RHD)	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
9	VG 16DB/YL (LHD)	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
10	-	-
11	A12 10RD/TN	FUSED B(+)
12	-	-
13	-	-
14	-	-
15	V14 18RD/VT	FRONT WIPER ON/OFF RELAY CONTROL
16	L34 18RD/OR	FUSED RIGHT HIGH BEAM OUTPUT
17	-	-
18	V16 18VT/YL	WIPER HIGH/LOW RELAY CONTROL
19	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN)
20	-	-
21	-	-
22	-	-
23	-	-
24	L50 18WT/TN (ABS)	BRAKE LAMP SWITCH OUTPUT
25	-	-
26	-	-
27	-	-
28	L77 18BK/YL	FUSED LEFT INBOARD TAIL LAMP
29	M1 18PK	FUSED B(+)
30	L78 18DG/YL	FUSED PARK LAMP RELAY OUTPUT
31	-	-
32	F15 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN)
33	L39 18LB	FRONT FOG LAMP RELAY OUTPUT
34	A18 10PK	FUSED B(+)
35	-	-
36	-	-
37	L33 18LG/BR	FUSED LEFT HIGH BEAM OUTPUT
38	F22 18DB/PK (ABS)	FUSED IGNITION SWITCH OUTPUT (RUN)
39	X2 18DG/RD	HORN RELAY OUTPUT
40	A18 10PK	FUSED B(+)
41	-	-
42	A7 10RD/BK	FUSED B(+)



KNOCK
SENSOR
(3.7L)

KNOCK SENSOR (3.7L) - BLACK 4 WAY

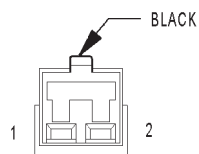
CAV	CIRCUIT	FUNCTION
1	K4 18BK/LB	SENSOR GROUND
2	K42 18DB/LB	KNOCK SENSOR NO. 1 SIGNAL
3	K4 18BK/LB	SENSOR GROUND
4	K142 18GY/BK	KNOCK SENSOR NO. 2 SIGNAL



LEAK DETECTION
PUMP

LEAK DETECTION PUMP - BLACK 4 WAY

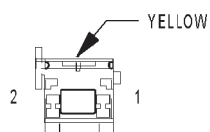
CAV	CIRCUIT	FUNCTION
1	-	-
2	K125 18WT/DB	GENERATOR SOURCE
3	K106 18WT/DG	LEAK DETECTION PUMP SOLENOID CONTROL
4	K107 18OR	LEAK DETECTION PUMP SWITCH SENSE



LEFT
COURTESY
LAMP

LEFT COURTESY LAMP - BLACK 2 WAY

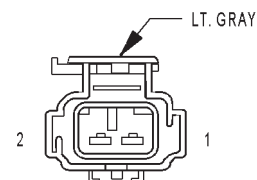
CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	M2 20YL	COURTESY LAMP DRIVER



LEFT
CURTAIN
AIRBAG

LEFT CURTAIN AIRBAG - YELLOW 2 WAY

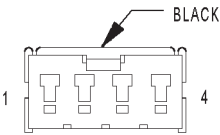
CAV	CIRCUIT	FUNCTION
1	R77 18YL/RD	LEFT CURTAIN SQUIB LINE 2
2	R75 18YL/BK	LEFT CURTAIN SQUIB LINE 1



LEFT
CYLINDER LOCK
SWITCH
(EXCEPT BASE)

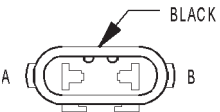
LEFT CYLINDER LOCK SWITCH (EXCEPT BASE) - LT. GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
1	P37 18LG	DOOR LOCK SWITCH GROUND
2	G73 18LG/OR (LHD)	LEFT CYLINDER LOCK SWITCH MUX
2	G72 18DG/OR (RHD)	LEFT CYLINDER LOCK SWITCH MUX



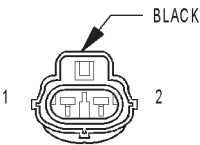
LEFT
DOOR LOCK
SWITCH
(EXCEPT BASE)

LEFT DOOR LOCK SWITCH (EXCEPT BASE) - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	P36 20PK/VT	DOOR LOCK SWITCH MUX
2	Z350 18BK/LG	GROUND
3	F89 200R/RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
4	P37 20LG	DOOR LOCK SWITCH GROUND



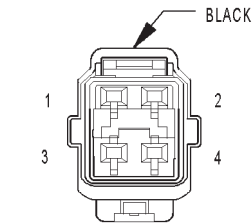
LEFT
FOG LAMP

LEFT FOG LAMP - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
A	Z141 18BK	GROUND
B	L39 18LB	FRONT FOG LAMP RELAY OUTPUT



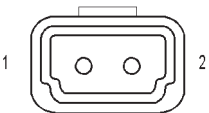
LEFT FRONT
DOOR AJAR
SWITCH
(BASE)

LEFT FRONT DOOR AJAR SWITCH (BASE) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	G75 20TN	DRIVER DOOR AJAR SWITCH SENSE
2	Z350 20BK/LG	GROUND



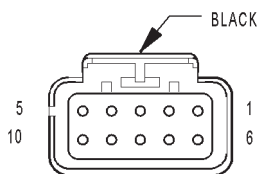
LEFT FRONT
DOOR LOCK MOTOR/
AJAR SWITCH
(EXCEPT BASE)

LEFT FRONT DOOR LOCK MOTOR/AJAR SWITCH (EXCEPT BASE) - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	G74 20TN/WT (RHD)	PASSENGER DOOR AJAR SWITCH SENSE
1	G75 20TN (LHD)	DRIVER DOOR AJAR SWITCH SENSE
2	Z350 20BK/LG	GROUND
3	P35 18OR/VT (RHD)	PASSENGER DOOR UNLOCK RELAY OUTPUT
3	P34 18PK/BK (LHD)	DRIVER DOOR UNLOCK RELAY OUTPUT
4	P33 18OR/BK	DOOR LOCK RELAY OUTPUT



LEFT FRONT
DOOR SPEAKER
(BASE)

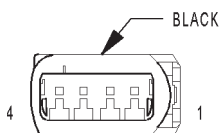
LEFT FRONT DOOR SPEAKER (BASE) - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	X53 18DG	LEFT FRONT SPEAKER (+)
2	X55 18BR/RD	LEFT FRONT SPEAKER (-)



LEFT FRONT
DOOR SPEAKER
(PREMIUM)

LEFT FRONT DOOR SPEAKER (PREMIUM) - BLACK 10 WAY

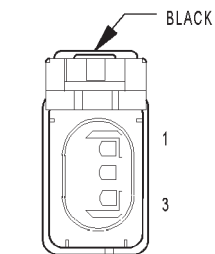
CAV	CIRCUIT	FUNCTION
1	X53 18DG	LEFT FRONT SPEAKER (+)
2	X55 18BR/RD	LEFT FRONT SPEAKER (-)
3	Z9 16BK	GROUND
4	X81 18YL/BK	AMPLIFIED HIGH LEFT FRONT SPEAKER (-)
5	X91 18WT/BK	AMPLIFIED LOW LEFT REAR SPEAKER (-)
6	X57 18BR/LB	LEFT REAR SPEAKER (-)
7	X51 18BR/YL	LEFT REAR SPEAKER (+)
8	X13 16BK/RD	RADIO CHOKE OUTPUT
9	X83 18YL/RD	AMPLIFIED HIGH LEFT FRONT SPEAKER (+)
10	X93 18WT/RD	AMPLIFIED LOW LEFT REAR SPEAKER (+)



LEFT FRONT
IMPACT
SENSOR

LEFT FRONT IMPACT SENSOR - BLACK 4 WAY

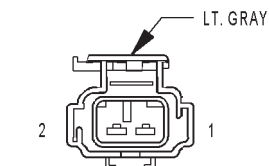
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	R47 18DB/LB	LEFT FRONT IMPACT SENSOR GROUND
4	R49 18LB	LEFT FRONT IMPACT SENSOR SIGNAL



LEFT FRONT
PARK/TURN
SIGNAL LAMP

LEFT FRONT PARK/TURN SIGNAL LAMP - BLACK 3 WAY

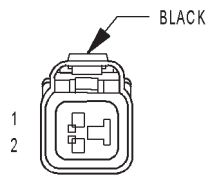
CAV	CIRCUIT	FUNCTION
1	L63 18DG/RD	LEFT TURN SIGNAL
2	L77 18BK/YL (EXCEPT BUILT-UP-EXPORT)	PARK LAMP RELAY OUTPUT
3	Z141 18BK	GROUND



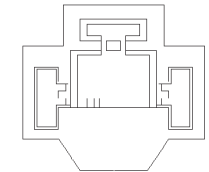
LEFT FRONT
POWER WINDOW
MOTOR
(MIDLINE/HIGHLINE)

LEFT FRONT POWER WINDOW MOTOR (MIDLINE/HIGHLINE) - LT. GRAY 2 WAY

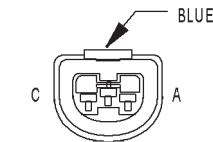
CAV	CIRCUIT	FUNCTION
1	Q21 16WT	LEFT FRONT WINDOW DRIVER DOWN
2	Q11 16LB	LEFT FRONT WINDOW DRIVER UP



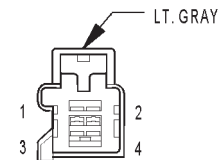
LEFT FRONT
WHEEL SPEED
SENSOR
(ABS)



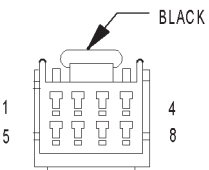
LEFT
HEADLAMP
(BUILT-UP-EXPORT)



LEFT
HEADLAMP
(EXCEPT
BUILT-UP-EXPORT)



LEFT
HEATED SEAT
ASSEMBLY
(HIGHLINE)



LEFT
HEATED SEAT
SWITCH
(HIGHLINE)

LEFT FRONT WHEEL SPEED SENSOR (ABS) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	B9 18RD	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B8 18RD/DB	LEFT FRONT WHEEL SPEED SENSOR SIGNAL

LEFT HEADLAMP (BUILT-UP-EXPORT) - 3 WAY

CAV	CIRCUIT	FUNCTION
1	L33 18LG/BR	FUSED LEFT HIGH BEAM OUTPUT
2	L43 18VT	FUSED LEFT LOW BEAM OUTPUT
3	Z141 18BK	GROUND

LEFT HEADLAMP (EXCEPT BUILT-UP-EXPORT) - BLUE 3 WAY

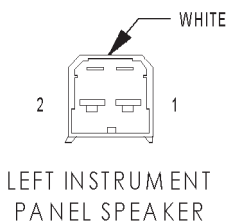
CAV	CIRCUIT	FUNCTION
A	L43 18VT	FUSED LEFT LOW BEAM OUTPUT
B	Z141 18BK	GROUND
C	L33 18LG/BR	FUSED LEFT HIGH BEAM OUTPUT

LEFT HEATED SEAT ASSEMBLY (HIGHLINE) - LT. GRAY 4 WAY

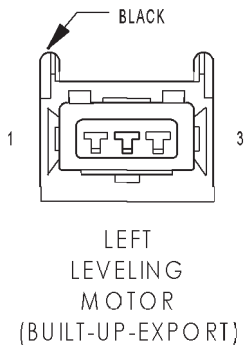
CAV	CIRCUIT	FUNCTION
1	F99 16RD/YL	DRIVER HEATED SEAT FEED
2	Z238 16BK/WT	GROUND
3	P86 20PK/BK	HEATED SEAT TEMPERATURE SENSOR SIGNAL
4	P141 20TN/LB	DRIVER HEATED SEAT TEMPERATURE SENSOR GROUND

LEFT HEATED SEAT SWITCH (HIGHLINE) - BLACK 8 WAY

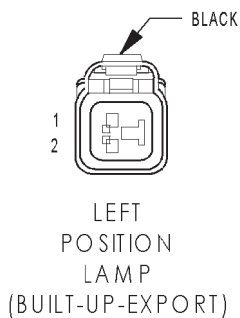
CAV	CIRCUIT	FUNCTION
1	V23 20BR/PK	FUSED IGNITION SWITCH OUTPUT (RUN)
2	P139 20VT/WT	LEFT SEAT HIGH HEAT LED DRIVER
3	P133 20TN/DG	LEFT SEAT HEATER SWITCH MUX
4	P137 20VT/DG	LEFT SEAT LOW HEAT LED DRIVER
5	Z238 20BK/WT	GROUND
6	-	-
7	-	-
8	-	-



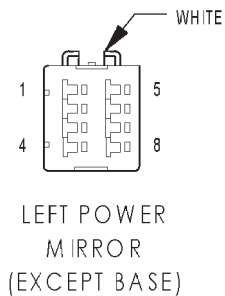
LEFT INSTRUMENT PANEL SPEAKER - WHITE 2 WAY		
CAV	CIRCUIT	FUNCTION
1	X53 18DG (BASE)	LEFT FRONT SPEAKER (+)
1	X83 18YL/RD (PREMIUM)	AMPLIFIED HIGH LEFT FRONT SPEAKER (+)
2	X55 18BR/RD (BASE)	LEFT FRONT SPEAKER (-)
2	X81 18YL/BK (PREMIUM)	AMPLIFIED HIGH LEFT FRONT SPEAKER (-)



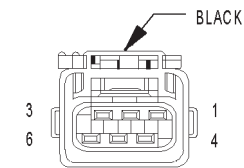
LEFT LEVELING MOTOR (BUILT-UP-EXPORT) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	Z141 18BK	GROUND
2	L13 18BR/YL	HEADLAMP ADJUST SIGNAL
3	L77 18BK/YL	FUSED PARK LAMP RELAY OUTPUT



LEFT POSITION LAMP (BUILT-UP-EXPORT) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L77 18BK/YL	FUSED PARK LAMP RELAY OUTPUT
2	Z141 18BK	GROUND

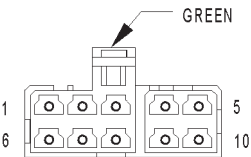


LEFT POWER MIRROR (EXCEPT BASE) - WHITE 8 WAY		
CAV	CIRCUIT	FUNCTION
1	P71 20YL/DG	LEFT MIRROR UP DRIVER
2	P76 20OR/YL	MIRROR COMMON DRIVER
3	P75 20LB/WT	LEFT MIRROR LEFT DRIVER
4	-	-
5	C16 20LB/YL	FUSED DEFOGGER RELAY OUTPUT
6	Z350 20BK/LG	GROUND
7	P99 20GY (WITH FOLD)	FOLDING MIRROR FEED
8	P110 20YL (WITH FOLD)	FOLDING MIRROR RETURN



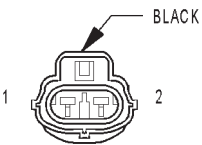
LEFT
POWER SEAT
MOTORS
(MIDLINE/HIGHLINE)

LEFT POWER SEAT MOTORS (MIDLINE/HIGHLINE) - BLACK 6 WAY		
CAV	CIRCUIT	FUNCTION
1	P11 14YL/WT	DRIVER SEAT REAR UP DRIVER
2	P13 14RD/WT	DRIVER SEAT REAR DOWN DRIVER
3	P19 14YL/LG	DRIVER SEAT FRONT UP DRIVER
4	P21 14RD/LG	DRIVER SEAT FRONT DOWN DRIVER
5	P17 14RD/YL	DRIVER SEAT HORIZONTAL REARWARD DRIVER
6	P15 14YL/LB	DRIVER SEAT HORIZONTAL FORWARD DRIVER



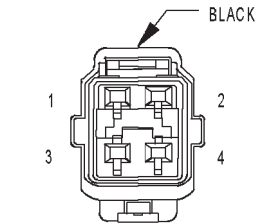
LEFT
POWER SEAT
SWITCH
(MIDLINE/HIGHLINE)

LEFT POWER SEAT SWITCH (MIDLINE/HIGHLINE) - GREEN 10 WAY		
CAV	CIRCUIT	FUNCTION
1	Z238 14BK/WT	GROUND
2	-	-
3	P15 14YL/LB	DRIVER SEAT HORIZONTAL FORWARD DRIVER
4	-	-
5	F37 14RD/LB	FUSED B(+)
6	P17 14RD/YL	DRIVER SEAT HORIZONTAL REARWARD DRIVER
7	P13 14RD/WT	DRIVER SEAT REAR DOWN DRIVER
8	P21 14RD/LG	DRIVER SEAT FRONT DOWN DRIVER
9	P19 14YL/LG	DRIVER SEAT FRONT UP DRIVER
10	P11 14YL/WT	DRIVER SEAT REAR UP DRIVER



LEFT REAR
DOOR AJAR
SWITCH
(BASE)

LEFT REAR DOOR AJAR SWITCH (BASE) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	G74 20TN/WT	PASSENGER DOOR AJAR SWITCH SENSE
2	Z350 20BK/LG	GROUND



LEFT REAR
DOOR LOCK MOTOR/
AJAR SWITCH
(EXCEPT BASE)

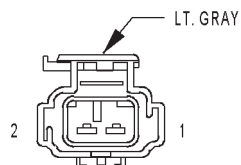
LEFT REAR DOOR LOCK MOTOR/AJAR SWITCH (EXCEPT BASE) - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	G74 20TN/WT	PASSENGER DOOR AJAR SWITCH SENSE
2	Z350 20BK/LG	GROUND
3	P35 18OR/VT	PASSENGER DOOR UNLOCK RELAY OUTPUT
4	P33 18OR/BK	DOOR LOCK RELAY OUTPUT



LEFT REAR
DOOR SPEAKER

LEFT REAR DOOR SPEAKER - 2 WAY

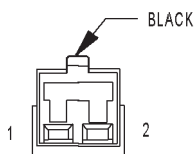
CAV	CIRCUIT	FUNCTION
1	X51 18BR/YL (BASE)	LEFT REAR DOOR SPEAKER (+)
1	X93 18WT/RD (PREMIUM)	AMPLIFIED LOW LEFT REAR SPEAKER (+)
2	X57 18BR/LB (BASE)	LEFT REAR DOOR SPEAKER (-)
2	X91 18WT (PREMIUM)	AMPLIFIED LOW LEFT REAR SPEAKER (-)



LEFT REAR
POWER WINDOW
MOTOR
(MIDLINE/HIGHLINE)

LEFT REAR POWER WINDOW MOTOR (MIDLINE/HIGHLINE) - LT. GRAY 2 WAY

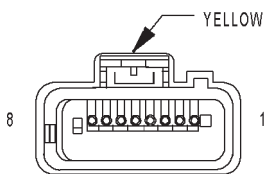
CAV	CIRCUIT	FUNCTION
1	Q23 16DG	LEFT REAR WINDOW DRIVER DOWN
2	Q13 16GY	LEFT REAR WINDOW DRIVER UP



LEFT
REMOTE RADIO
SWITCH
(PREMIUM)

LEFT REMOTE RADIO SWITCH (PREMIUM) - BLACK 2 WAY

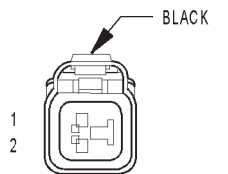
CAV	CIRCUIT	FUNCTION
1	X10 20RD/DB	RADIO CONTROL MUX RETURN
2	X20 20RD/BK	RADIO CONTROL MUX



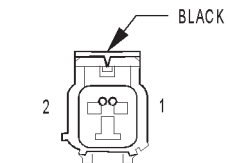
LEFT SIDE IMPACT
AIRBAG CONTROL
MODULE (LSIACM)

LEFT SIDE IMPACT AIRBAG CONTROL MODULE (LSIACM) - YELLOW 8 WAY

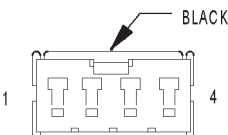
CAV	CIRCUIT	FUNCTION
1	F14 18LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
2	-	-
3	R77 18YL/RD	LEFT CURTAIN SQUIB LINE 2
4	R75 18YL/BK	LEFT CURTAIN SQUIB LINE 1
5	Z104 18BK/YL	GROUND
6	-	-
7	-	-
8	D25 18YL/VT	PCI BUS



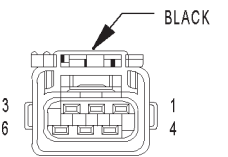
LEFT SIDE
MARKER LAMP
(EXCEPT
BUILT-UP-
EXPORT)



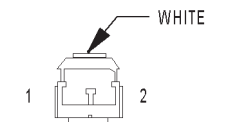
LEFT SIDE
REPEATER
LAMP
(BUILT-UP-EXPORT)



LEFT
SPEED CONTROL
SWITCH
(EXCEPT BASE)



LEFT TAIL/
STOP LAMP



LEFT VISOR/
VANITY LAMP
(EXCEPT BASE)

LEFT SIDE MARKER LAMP (EXCEPT BUILT-UP-EXPORT) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L77 18BK/YL	FUSED PARK LAMP RELAY OUTPUT
2	L63 18DG/RD	LEFT TURN SIGNAL

LEFT SIDE REPEATER LAMP (BUILT-UP-EXPORT) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L63 18DG/RD	LEFT TURN SIGNAL
2	Z141 18BK	GROUND

LEFT SPEED CONTROL SWITCH (EXCEPT BASE) - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	-	-
2	K4 20BK/LB	SENSOR GROUND
3	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL
4	-	-

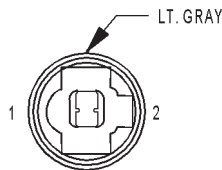
LEFT TAIL/STOP LAMP - BLACK 6 WAY		
CAV	CIRCUIT	FUNCTION
1	L38 18BR/WT (BUILT-UP-EXPORT)	REAR FOG LAMP RELAY OUTPUT
2	L77 18BK/YL	FUSED PARK LAMP RELAY OUTPUT
3	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
4	L10 18BR/LG	BACK-UP LAMP FEED
5	Z151 18BK/WT	GROUND
6	L63 18DG/RD	LEFT TURN SIGNAL

LEFT VISOR/VANITY LAMP (EXCEPT BASE) - WHITE 2 WAY		
CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	M20 20BR	COURTESY LAMP LOAD SHED



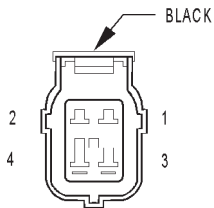
LICENSE LAMP
(BUILT-UP-EXPORT)

LICENSE LAMP (BUILT-UP-EXPORT) - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L77 18BK/YL	FUSED LEFT INBOARD TAIL LAMP
2	Z235 18BK	GROUND



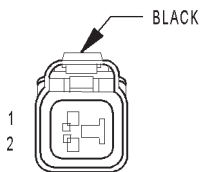
LICENSE
LAMP
(EXCEPT BUILT-
UP-EXPORT)

LICENSE LAMP (EXCEPT BUILT-UP-EXPORT) - LT. GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L77 18BR/YL	FUSED PARK LAMP RELAY OUTPUT
2	Z151 18BK/WT	GROUND



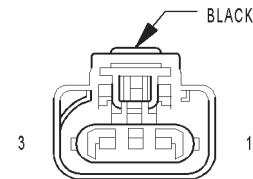
LINE
PRESSURE
SENSOR
(3.7L)

LINE PRESSURE SENSOR (3.7L) - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	Z112 18BK	GROUND
2	T39 18GY/LB	5 VOLT SUPPLY
3	T38 18VT/TN	LINE PRESSURE SENSOR SIGNAL
4	-	-



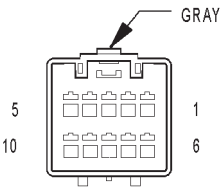
LOW NOTE
HORN

LOW NOTE HORN - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	X2 18DG/RD	HORN RELAY OUTPUT
2	Z141 18BK	GROUND



MANIFOLD ABSOLUTE
PRESSURE
SENSOR

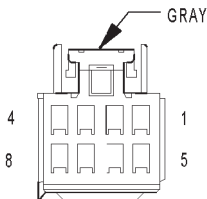
MANIFOLD ABSOLUTE PRESSURE SENSOR - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	K1 18DG/RD	MANIFOLD ABOLUTE PRESSURE SENSOR SIGNAL
2	K4 18BK/LB	SENSOR GROUND
3	K7 18OR	5 VOLT SUPPLY



MULTI-FUNCTION
SWITCH
C1

MULTI-FUNCTION SWITCH C1 - GRAY 10 WAY

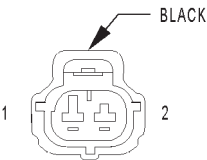
CAV	CIRCUIT	FUNCTION
1	E21 20OR/RD	PANEL LAMPS DIMMER SWITCH MUX
2	L27 20WT/TN (EXCEPT BASE)	FRONT FOG LAMP SWITCH SENSE
3	-	-
4	L80 20WT/DG	HEADLAMP SWITCH RETURN
5	L307 20LG/OR	HEADLAMP SWITCH MUX
6	L305 20LB/WT	LEFT TURN SWITCH SENSE
7	L309 20LG/WT	HIGH BEAM RELAY CONTROL
8	Z12 18BK/TN	GROUND
9	L324 20WT/LG	HIGH BEAM SWITCH SENSE
10	L302 20LB/YL	RIGHT TURN SWITCH SENSE



MULTI-FUNCTION
SWITCH
C2

MULTI-FUNCTION SWITCH C2 - GRAY 8 WAY

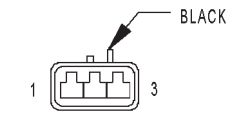
CAV	CIRCUIT	FUNCTION
1	V21 20DB/RD	REAR WIPER ON DRIVER
2	V22 20BR/YL	REAR WIPER INTERMITTENT DRIVER
3	V20 18BK/WT	WASHER MOTOR SENSE
4	V52 20DG/RD	FRONT WIPER SWITCH MUX
5	F88 20BR/RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
6	-	-
7	V10 18BR	WASHER PUMP DRIVER
8	-	-



OUTPUT
SPEED
SENSOR
(3.7L)

OUTPUT SPEED SENSOR (3.7L) - BLACK 2 WAY

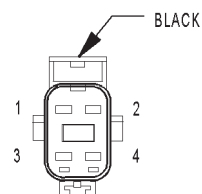
CAV	CIRCUIT	FUNCTION
1	T14 18LG/WT	OUTPUT SPEED SENSOR SIGNAL
2	T13 18DB/BK	SPEED SENSOR GROUND



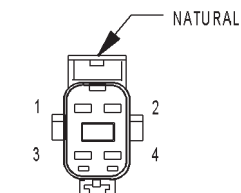
OVERHEAD
MAP/READING
LAMP
(EXCEPT BASE)

OVERHEAD MAP/READING LAMP (EXCEPT BASE) - BLACK 3 WAY

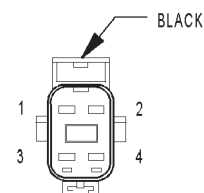
CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	M2 20YL	REAR COURTESY LAMP CONTROL
3	M20 20BR	COURTESY LAMPS LOAD SHEED



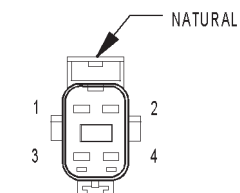
OXYGEN
SENSOR 1/1
UPSTREAM



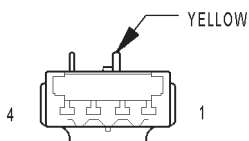
OXYGEN
SENSOR 1/2
DOWNSTREAM



OXYGEN
SENSOR 2/1
UPSTREAM
(3.7L)



OXYGEN
SENSOR 2/2
DOWNSTREAM
(3.7L)



PASSENGER
AIRBAG

OXYGEN SENSOR 1/1 UPSTREAM - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	A71 18DG/RD	FUSED AUTO SHUT DOWN RELAY OUTPUT
2	K99 18BR/OR	OXYGEN SENSOR 1/1 HEATER CONTROL
3	K4 18BK/LB	SENSOR GROUND
4	K41 18BK/DG	OXYGEN SENSOR 1/1 SIGNAL

OXYGEN SENSOR 1/2 DOWNSTREAM - NATURAL 4 WAY

CAV	CIRCUIT	FUNCTION
1	A71 18DG/RD (2.4L)	FUSED AUTO SHUT DOWN RELAY OUTPUT
1	F18 18LG/BK (3.7L)	OXYGEN SENSOR DOWNSTREAM RELAY
2	K299 18BR/WT (2.4L)	OXYGEN SENSOR 1/2 HEATER CONTROL
2	Z186 18BK/OR (3.7L)	GROUND
3	K4 18BK/LB	SENSOR GROUND
4	K141 18TN/WT	OXYGEN SENSOR 1/2 SIGNAL

OXYGEN SENSOR 2/1 UPSTREAM (3.7L) - BLACK 4 WAY

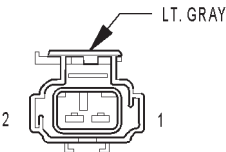
CAV	CIRCUIT	FUNCTION
1	A71 18DG/RD	FUSED AUTO SHUT DOWN RELAY OUTPUT
2	K299 18BR/WT	OXYGEN SENSOR 2/1 HEATER CONTROL
3	K4 18BK/LB	SENSOR GROUND
4	K241 18LG/RD	OXYGEN SENSOR 2/1 SIGNAL

OXYGEN SENSOR 2/2 DOWNSTREAM (3.7L) - NATURAL 4 WAY

CAV	CIRCUIT	FUNCTION
1	F18 18LG/BK	OXYGEN SENSOR DOWNSTREAM RELAY OUTPUT
2	Z186 18BK/OR	GROUND
3	K4 18BK/LB	SENSOR GROUND
4	K341 18TN/WT	OXYGEN SENSOR 2/2 SIGNAL

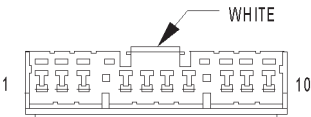
PASSENGER AIRBAG - YELLOW 4 WAY

CAV	CIRCUIT	FUNCTION
1	R62 18OR/YL	PASSENGER SQUIB 2 LINE 2
2	R64 18TN/YL	PASSENGER SQUIB 2 LINE 1
3	R42 18BK/YL	PASSENGER SQUIB 1 LINE 1
4	R44 18DG/YL	PASSENGER SQUIB 1 LINE 2



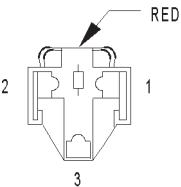
PASSENGER
SEAT BELT
SWITCH

PASSENGER SEAT BELT SWITCH - LT. GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	R58 18GY (EXCEPT BASE)	PASSENGER SEAT BELT SWITCH SENSE
1	R58 18DG (BASE)	PASSENGER SEAT BELT SWITCH SENSE
2	R60 18LB (BASE)	PASSENGER SEAT BELT SWITCH GROUND
2	R60 18VT (EXCEPT BASE)	PASSENGER SEAT BELT SWITCH GROUND



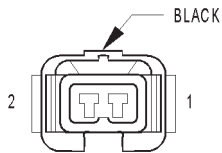
POWER MIRROR
SWITCH
(EXCEPT BASE)

POWER MIRROR SWITCH (EXCEPT BASE) - WHITE 10 WAY		
CAV	CIRCUIT	FUNCTION
1	P75 20LB/WT	LEFT MIRROR LEFT DRIVER
2	P71 20YL/DG	LEFT MIRROR UP DRIVER
3	Z351 18BK/LG (RHD)	GROUND
3	Z350 18BK/LG (LHD)	GROUND
4	P110 18YL (FOLD)	FOLDING MIRROR RETURN
5	V23 20BR/PK	FUSED IGNITION SWITCH OUTPUT (RUN)
6	P76 18OR/YL	MIRROR COMMON DRIVER
7	P99 18GY (FOLD)	FOLDING MIRROR FEED
8	-	-
9	P72 20YL/BK (FOLD)	RIGHT MIRROR UP DRIVER
9	P72 18YL/BK (WITHOUT FOLD)	RIGHT MIRROR UP DRIVER
10	P74 20DB (FOLD)	RIGHT MIRROR LEFT DRIVER
10	P74 18DB (WITHOUT FOLD)	RIGHT MIRROR LEFT DRIVER



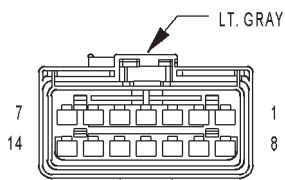
POWER
OUTLET

POWER OUTLET - RED 3 WAY		
CAV	CIRCUIT	FUNCTION
1	F38 16RD/WT	FUSED B(+)
1	F41 16PK/VT	FUSED B(+)
2	-	-
2	-	-
3	Z3 16BK/OR	GROUND
3	Z151 16BK/WT	GROUND



POWER STEERING
PRESSURE
SWITCH

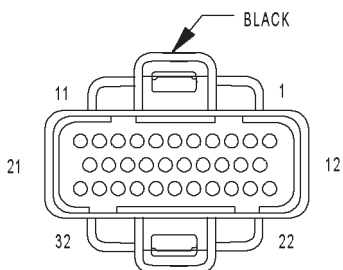
POWER STEERING PRESSURE SWITCH - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	K10 18DB/OR	POWER STEERING PRESSURE SWITCH SENSE
2	Z246 18BK/GY	GROUND



POWER WINDOW
MASTER
SWITCH
(MIDLINE/HIGHLINE)

POWER WINDOW MASTER SWITCH (MIDLINE/HIGHLINE) - LT. GRAY 14 WAY

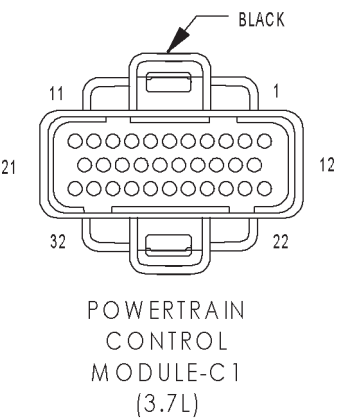
CAV	CIRCUIT	FUNCTION
1	-	-
2	Q1 16YL	POWER WINDOW SWITCH FEED
2	Q1 16YL	POWER WINDOW SWITCH FEED
3	-	-
4	Q27 14RD/BK	LEFT REAR WINDOW DRIVER DOWN
5	Q17 14DB/WT	LEFT REAR WINDOW DRIVER UP
6	Q28 14DG/WT	RIGHT REAR WINDOW DRIVER DOWN
7	Q18 14GY/BK	RIGHT REAR WINDOW DRIVER UP
8	-	-
9	Q21 14WT	LEFT FRONT WINDOW DRIVER DOWN
10	F81 12TN	FUSED B(+)
11	Q11 14LB	LEFT FRONT WINDOW DRIVER UP
12	Q12 14BR	RIGHT FRONT WINDOW DRIVER UP
13	Q22 14VT/WT	RIGHT FRONT WINDOW DRIVER DOWN
14	Z238 12BK/WT	GROUND



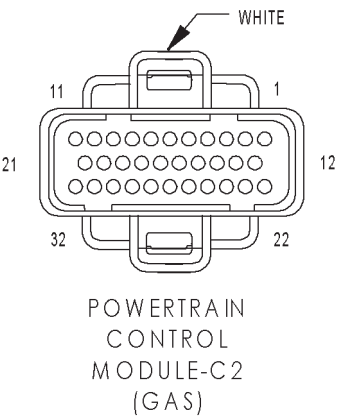
POWERTRAIN
CONTROL
MODULE-C1
(2.4L)

POWERTRAIN CONTROL MODULE-C1 (2.4L) - BLACK 32 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	F1 18DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	-	-
4	K4 18BK/LB	SENSOR GROUND
5	-	-
6	-	-
7	K19 18BK/GY	IGNITION COIL NO. 1 DRIVER
8	K24 18GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
9	-	-
10	K60 18YL/BK	IDLE AIR CONTROL NO. 2 DRIVER
11	K40 18BR/WT	IDLE AIR CONTROL NO. 1 DRIVER
12	K10 18DB/OR	POWER STEERING PRESSURE SWITCH SENSE
13	-	-
14	K77 18BR/WT	TRANSFER CASE POSITION SENSOR INPUT
15	K21 18BK/RD	INTAKE AIR TEMPERATURE SENSOR SIGNAL
16	K2 18TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
17	K7 18OR	5 VOLT SUPPLY
18	K44 18TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
19	K39 18GY/RD	IDLE AIR CONTROL NO. 3 DRIVER
20	K59 18VT/BK	IDLE AIR CONTROL NO. 4 DRIVER
21	-	-
22	A14 16RD/WT	FUSED B(+)
23	K22 18OR/DB	THROTTLE POSITION SENSOR SIGNAL
24	K41 18BK/DG	OXYGEN SENSOR 1/1 SIGNAL
25	K141 18TN/WT	OXYGEN SENSOR 1/2 SIGNAL
26	-	-
27	K1 18DG/RD	MANIFOLD ABSOLUTE PRESSURE SENSOR SIGNAL
28	-	-
29	-	-
30	-	-
31	Z107 14BK/DB	GROUND
32	Z107 14BK/DB	GROUND



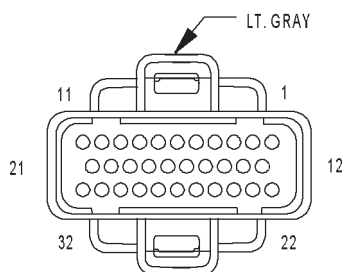
POWERTRAIN CONTROL MODULE-C1 (3.7L) - BLACK 32 WAY		
CAV	CIRCUIT	FUNCTION
1	K93 14TN/OR	COIL ON PLUG DRIVER NO. 3
2	F1 18DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	K94 14TN/LG	COIL ON PLUG DRIVER NO. 4
4	K4 18BK/LB	SENSOR GROUND
5	K96 14TN/LB	COIL ON PLUG DRIVER NO. 6
6	T41 18BK/WT (A/T)	PARK/NEUTRAL POSITION SWITCH SENSE
7	K91 14TN/RD	COIL ON PLUG DRIVER NO.1
8	K24 18GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
9	-	-
10	K60 18YL/BK	IDLE AIR CONTROL NO. 2 DRIVER
11	K40 18BR/WT	IDLE AIR CONTROL NO. 1 DRIVER
12	K10 18DB/OR	POWER STEERING PRESSURE SWITCH SENSE
13	T141 18 YL/RD (M/T)	FUSED IGNITION SWITCH OUTPUT (START)
13	F45 18YL/BR (A/T)	FUSED IGNITION SWITCH OUTPUT (START)
14	K77 18BR/WT	TRANSFER CASE POSITION SENSOR INPUT
15	K21 18BK/RD	INTAKE AIR TEMPERATURE SENSOR SIGNAL
16	K2 18TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
17	K7 18OR	5 VOLT SUPPLY
18	K44 18TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
19	K39 18GY/RD	IDLE AIR CONTROL NO. 3 DRIVER
20	K59 18VT/BK	IDLE AIR CONTROL NO. 4 DRIVER
21	K95 14TN/DG	COIL ON PLUG DRIVER NO. 5
22	A14 16RD/WT	FUSED B(+)
23	K22 18OR/DB	THROTTLE POSITION SENSOR SIGNAL
24	K41 18BK/DG	OXYGEN SENSOR 1/1 SIGNAL
25	K141 18TN/WT	OXYGEN SENSOR 1/2 SIGNAL
26	K241 18LG/RD	OXYGEN SENSOR 2/1 SIGNAL
27	K1 18DG/RD	MANIFOLD ABOLUTE PRESSURE SENSOR SIGNAL
28	-	-
29	K341 18TN/WT	OXYGEN SENSOR 2/2 SIGNAL
30	-	-
31	Z107 14BK/DB	GROUND
32	Z107 14BK/DB	GROUND



POWERTRAIN CONTROL MODULE-C2 (GAS) - WHITE 32 WAY		
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	K11 18WT/DB	FUEL INJECTOR NO. 1 DRIVER
5	K13 18YL/WT	FUEL INJECTOR NO. 3 DRIVER
6	K38 18GY (3.7L)	FUEL INJECTOR NO. 5 DRIVER
7	-	-
8	-	-
9	K92 14TN/PK (3.7L)	COIL ON PLUG DRIVER NO. 2
9	K17 18DB/TN (2.4L)	IGNITION COIL NO. 2 DRIVER
10	K20 18DG	GENERATOR FIELD
11	-	-
12	K58 18BR/DB (3.7L)	FUEL INJECTOR NO. 6 DRIVER

POWERTRAIN CONTROL MODULE-C2 (GAS) - WHITE 32 WAY

CAV	CIRCUIT	FUNCTION
13	-	-
14	-	-
15	K12 18TN	FUEL INJECTOR NO. 2 DRIVER
16	K14 18LB/BR	FUEL INJECTOR NO. 4 DRIVER
17	K173 18LG	RADIATOR FAN RELAY CONTROL
18	-	-
19	C18 18DB	A/C PRESSURE SIGNAL
20	-	-
21	-	-
22	-	-
23	G60 18GY/YL	ENGINE OIL PRESSURE SENSOR SIGNAL
24	-	-
25	-	-
26	-	-
27	-	-
28	-	-
29	-	-
30	-	-
31	K6 18VT/WT	5 VOLT SUPPLY
32	-	-



POWERTRAIN
CONTROL
MODULE-C3
(GAS)

POWERTRAIN CONTROL MODULE-C3 (GAS) - LT. GRAY 32 WAY

CAV	CIRCUIT	FUNCTION
1	C13 18DG	A/C COMPRESSOR CLUTCH RELAY CONTROL
2	-	-
3	K51 18DB/YL	AUTO SHUT DOWN RELAY CONTROL
4	V36 18TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
5	V35 18LG/RD	SPEED CONTROL VENT SOLENOID CONTROL
6	K90 18TN (M/T)	CLUTCH INTERLOCK RELAY CONTROL
7	K42 18DB/LB (3.7L)	KNOCK SENSOR NO. 1 SIGNAL
7	K42 18DB/LB (2.4L)	NOT USED
8	K99 18BR/OR	OXYGEN SENSOR 1/1 HEATER CONTROL
9	K512 18RD/YL	OXYGEN SENSOR DOWNSTREAM RELAY CONTROL
10	K106 18WT/DG	LEAK DETECTION PUMP SOLENOID CONTROL
11	V32 18YL/RD	SPEED CONTROL SUPPLY
12	F142 18OR/DG	FUSED AUTO SHUT DOWN RELAY SENSE INPUT
13	T10 18YL/DG	TORQUE MANAGEMENT REQUEST SENSE
14	K107 18OR	LEAK DETECTION PUMP SWITCH SENSE
15	K118 18PK/YL	BATTERY TEMPERATURE SENSOR SIGNAL
16	K299 18BR/WT (2.4L)	OXYGEN SENSOR 1/2 HEATER CONTROL
16	K299 18BR/WT (3.7L)	OXYGEN SENSOR 2/1 HEATER CONTROL
17	B22 18DG/YL	VEHICLE SPEED OUTPUT
18	K142 18GY/BK (2.4L)	NOT USED
18	K142 18GY/BK (3.7L)	KNOCK SENSOR NO. 2 SIGNAL
19	K31 18BR	FUEL PUMP RELAY CONTROL
20	K52 18PK/BK	EVAP PURGE/SOLENOID CONTROL
21	-	-
22	C21 18DB/OR	A/C SWITCH SENSE
23	-	-
24	K29 18WT/PK	BRAKE LAMP SWITCH SENSE
25	K125 18WT/DB	GENERATOR SOURCE

POWERTRAIN CONTROL MODULE-C3 (GAS) - LT. GRAY 32 WAY

CAV	CIRCUIT	FUNCTION
26	K226 18DB/WT	FUEL LEVEL SENSOR SIGNAL
27	D21 18PK	SCI TRANSMIT
28	-	-
29	D32 18LG	SCI RECEIVE (PCM)
30	D25 18YL/VT	PCI BUS
31	-	-
32	V37 18RD/LG	SPEED CONTROL SWITCH SIGNAL

RADIATOR FAN MOTOR - BLACK 2 WAY

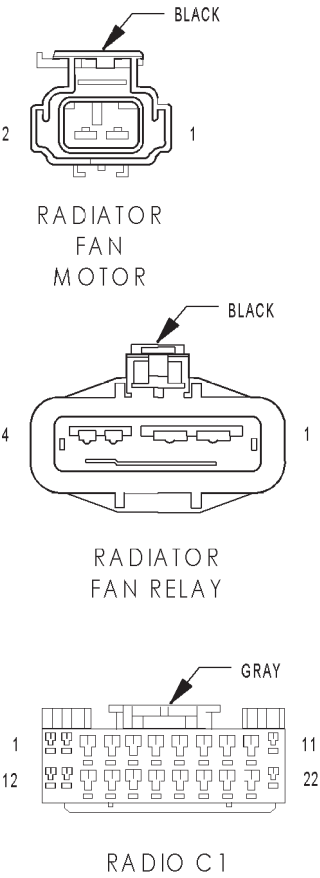
CAV	CIRCUIT	FUNCTION
1	C25 12YL	RADIATOR FAN RELAY OUTPUT
2	Z212 12BK/OR	GROUND

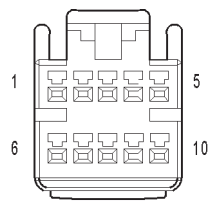
RADIATOR FAN RELAY - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	C24 12DB/PK	FUSED B(+)
2	C25 12YL	RADIATOR FAN RELAY OUTPUT
3	Z212 18BK/OR	GROUND
4	K173 18LG	RADIATOR FAN RELAY CONTROL

RADIO C1 - GRAY 22 WAY

CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	F89 18OR/RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
3	E2 20OR	FUSED PANEL LAMPS DIMMER SWITCH SIGNAL
4	-	-
5	-	-
6	-	-
7	X54 18VT	RIGHT FRONT DOOR SPEAKER (+)
8	X56 18DB/RD	RIGHT FRONT DOOR SPEAKER (-)
9	X55 18BR/RD	LEFT FRONT DOOR SPEAKER (-)
10	X53 18DG	LEFT FRONT DOOR SPEAKER (+)
11	Z9 16BK	GROUND
12	M1 20PK	FUSED B(+)
13	X16 18LG (PREMIUM)	ANTENNA RELAY OUTPUT
14	D25 18YL/VT	PCI BUS
15	-	-
16	-	-
17	-	-
18	X51 18BR/YL	LEFT REAR SPEAKER (+)
19	X57 18BR/LB	LEFT REAR SPEAKER (-)
20	X58 18DB/OR	RIGHT REAR SPEAKER (-)
21	X52 18DB/WT	RIGHT REAR SPEAKER (+)
22	Z9 16BK	GROUND





RADIO C2

RADIO C2 - 10 WAY

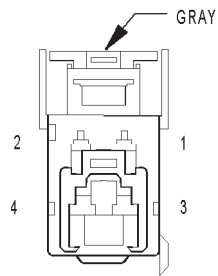
CAV	CIRCUIT	FUNCTION
1	X40 20WT/RD	AUDIO OUT RIGHT
2	Z30 20WT/BK	GROUND
3	Z9 20BK/DB	GROUND
4	D25 20YL/VT	PCI BUS
5	X112 20RD	IGNITION SWITCH OUTPUT
6	X41 20WT/DG	AUDIO OUT LEFT
7	Z17 20BK	GROUND
8	-	-
9	-	-
10	X160 20YL	B(+)



RADIO C3

RADIO C3 - 2 WAY

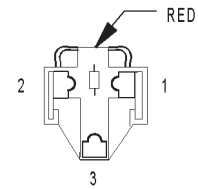
CAV	CIRCUIT	FUNCTION
1	X30 BK	RADIO ANTENNA CORE
2	X31 BK	RADIO ANTENNA SHIELD



RADIO CHOKE
(PREMIUM)

RADIO CHOKE (PREMIUM) - GRAY 4 WAY

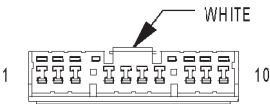
CAV	CIRCUIT	FUNCTION
1	F60 16DG/RD	FUSED B(+)
2	X13 16BK/RD	RADIO CHOKE OUTPUT
3	X16 18LG	ANTENNA RELAY OUTPUT
4	Z140 16BK/LG	GROUND



REAR POWER
OUTLET

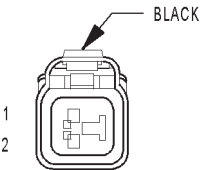
REAR POWER OUTLET - RED 3 WAY

CAV	CIRCUIT	FUNCTION
1	F41 16PK/VT	FUSED B(+)
2	-	-
3	Z151 16BK/WT	GROUND



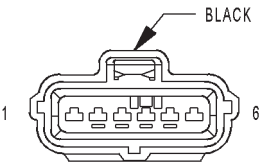
REAR POWER
WINDOW
SWITCH
(MIDLINE/HIGHLINE)

REAR POWER WINDOW SWITCH (MIDLINE/HIGHLINE) - WHITE 10 WAY		
CAV	CIRCUIT	FUNCTION
1	Q28 14DG/WT	RIGHT REAR WINDOW DRIVER DOWN
2	Q14 14GY	RIGHT REAR WINDOW DRIVER UP
3	Q24 14DG	RIGHT REAR WINDOW DRIVER DOWN
4	Q18 14GY/BK	RIGHT REAR WINDOW DRIVER UP
5	Q1 16YL	POWER WINDOW SWITCH FEED
6	Q1 16YL	POWER WINDOW SWITCH FEED
7	Q17 14DB/WT	LEFT REAR WINDOW DRIVER UP
8	Q23 14RD/WT	LEFT REAR WINDOW DRIVER DOWN
9	Q27 14RD/BK	LEFT REAR WINDOW DRIVER DOWN
10	Q13 14DB	LEFT REAR WINDOW DRIVER UP



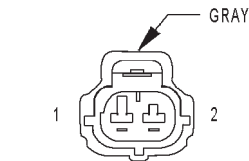
REAR
WHEEL SPEED
SENSOR

REAR WHEEL SPEED SENSOR - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	B2 18YL	REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B1 18YL/DB	REAR WHEEL SPEED SENSOR SIGNAL



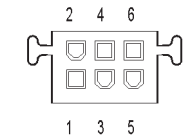
REAR
WIPER
MOTOR

REAR WIPER MOTOR - BLACK 6 WAY		
CAV	CIRCUIT	FUNCTION
1	Z235 18BK	GROUND
2	V21 20DB/RD	REAR WIPER ON DRIVER
3	G80 20YL/WT	FLIP-UP GLASS AJAR SWITCH SENSE
4	V22 20BR/YL	REAR WIPER INTERMITTENT DRIVER
5	F70 18PK/BK	FUSED B(+)
6	-	-



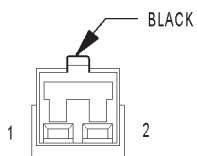
RED BRAKE
WARNING INDICATOR
SWITCH

RED BRAKE WARNING INDICATOR SWITCH - GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	G11 18WT/BK	RED BRAKE WARNING INDICATOR DRIVER
2	Z142 18BK/WT	GROUND

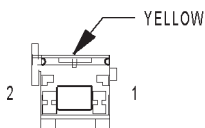


REMOTE KEYLESS
ENTRY MODULE
(EXCEPT BASE)

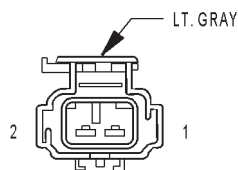
REMOTE KEYLESS ENTRY MODULE (EXCEPT BASE) - 6 WAY		
CAV	CIRCUIT	FUNCTION
1	Y60	RKE DATA
2	Y62	RKE SUPPLY
3	Y61	RKE PROGRAM
4	Y63	RKE GROUND
5	Y64	RKE ANTENNA (+)
6	Y65	RKE ANTENNA (-)



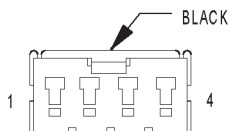
RIGHT
COURTESY
LAMP



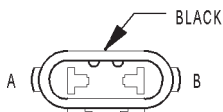
RIGHT
CURTAIN
AIRBAG



RIGHT
CYLINDER LOCK
SWITCH
(EXCEPT BASE)



RIGHT
DOOR LOCK
SWITCH
(EXCEPT BASE)



RIGHT
FOG LAMP

RIGHT COURTESY LAMP - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	M2 20YL	COURTESY LAMP DRIVER

RIGHT CURTAIN AIRBAG - YELLOW 2 WAY

CAV	CIRCUIT	FUNCTION
1	R76 18YL/DB	RIGHT CURTAIN SQUIB LINE 2
2	R74 18YL/BR	RIGHT CURTAIN SQUIB LINE 1

RIGHT CYLINDER LOCK SWITCH (EXCEPT BASE) - LT. GRAY 2 WAY

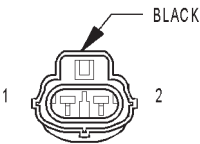
CAV	CIRCUIT	FUNCTION
1	P37 18LG	DOOR LOCK SWITCH GROUND
2	G72 18DG/OR (LHD)	RIGHT CYLINDER LOCK SWITCH MUX
2	G73 18LG/OR (RHD)	RIGHT CYLINDER LOCK SWITCH MUX

RIGHT DOOR LOCK SWITCH (EXCEPT BASE) - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	P36 20PK/VT	DOOR LOCK SWITCH MUX
2	Z351 18BK/LG	GROUND
3	F89 20OR/RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
4	P37 20LG	DOOR LOCK SWITCH GROUND

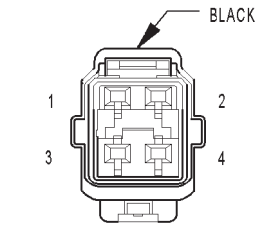
RIGHT FOG LAMP - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
A	Z142 18BK/WT	GROUND
B	L39 18LB	FOG LAMP RELAY OUTPUT



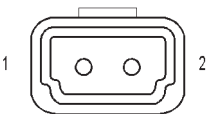
RIGHT FRONT
DOOR AJAR
SWITCH
(BASE)

RIGHT FRONT DOOR AJAR SWITCH (BASE) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	G74 20TN/WT	PASSENGER DOOR AJAR SWITCH SENSE
2	Z351 20BK/LG	GROUND



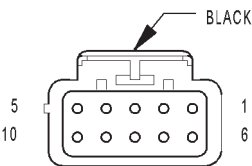
RIGHT FRONT
DOOR LOCK MOTOR/
AJAR SWITCH
(EXCEPT BASE)

RIGHT FRONT DOOR LOCK MOTOR/AJAR SWITCH (EXCEPT BASE) - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	G75 20TN (RHD)	DRIVER DOOR AJAR SWITCH SENSE
1	G74 20TN/WT (LHD)	PASSENGER DOOR AJAR SWITCH SENSE
2	Z351 20BK/LG	GROUND
3	P34 18PK/BK (RHD)	DRIVER DOOR UNLOCK RELAY OUTPUT
3	P35 18OR/VT (LHD)	PASSENGER DOOR UNLOCK RELAY OUTPUT
4	P33 18OR/BK	DOOR LOCK RELAY OUTPUT



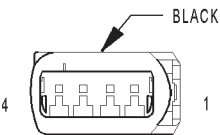
RIGHT FRONT
DOOR SPEAKER
(BASE)

RIGHT FRONT DOOR SPEAKER (BASE) - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	X54 18VT	RIGHT FRONT SPEAKER (+)
2	X56 18DB/RD	RIGHT FRONT SPEAKER (-)



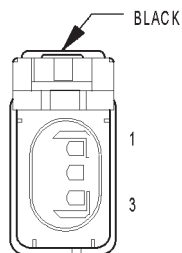
RIGHT FRONT
DOOR SPEAKER
(PREMIUM)

RIGHT FRONT DOOR SPEAKER (PREMIUM) - BLACK 10 WAY		
CAV	CIRCUIT	FUNCTION
1	X54 18VT	RIGHT FRONT SPEAKER (+)
2	X56 18DB/RD	RIGHT FRONT SPEAKER (-)
3	Z9 16BK	GROUND
4	X86 18OR/RD	AMPLIFIED HIGH RIGHT FRONT SPEAKER (-)
5	X92 18TN/BK	AMPLIFIED LOW RIGHT REAR SPEAKER (-)
6	X58 18DB/OR	RIGHT REAR DOOR SPEAKER (-)
7	X52 18DB/WT	RIGHT REAR DOOR SPEAKER (+)
8	X13 16BK/RD	RADIO CHOKE OUTPUT
9	X84 18TN/BK	AMPLIFIED HIGH RIGHT FRONT SPEAKER (+)
10	X94 18TN/VT	AMPLIFIED LOW RIGHT REAR SPEAKER (+)



RIGHT FRONT
IMPACT
SENSOR

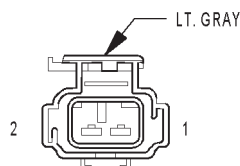
RIGHT FRONT IMPACT SENSOR - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	R46 18BR/LB	RIGHT FRONT IMPACT SENSOR GROUND
4	R48 18TN	RIGHT FRONT IMPACT SENSOR SIGNAL



RIGHT FRONT
PARK/TURN
SIGNAL LAMP

RIGHT FRONT PARK/ TURN SIGNAL LAMP - BLACK 3 WAY

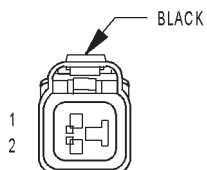
CAV	CIRCUIT	FUNCTION
1	L62 18BR/RD	RIGHT TURN SIGNAL
2	L78 18DG/YL (EXCEPT BUILT-UP-EXPORT)	FUSED PARK LAMP RELAY OUTPUT
3	Z142 18BK/WT	GROUND



RIGHT FRONT
POWER WINDOW
MOTOR
(MIDLINE/HIGHLINE)

RIGHT FRONT POWER WINDOW MOTOR (MIDLINE/HIGHLINE) - LT. GRAY 2 WAY

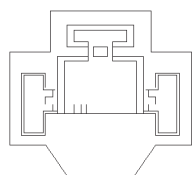
CAV	CIRCUIT	FUNCTION
1	Q22 16VT/WT	RIGHT FRONT WINDOW DRIVER DOWN
2	Q12 16BR	RIGHT FRONT WINDOW DRIVER UP



RIGHT FRONT
WHEEL SPEED
SENSOR
(ABS)

RIGHT FRONT WHEEL SPEED SENSOR (ABS) - BLACK 2 WAY

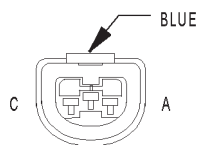
CAV	CIRCUIT	FUNCTION
1	B7 18WT	RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B6 18WT/DB	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL



RIGHT
HEADLAMP
(BUILT-UP-EXPORT)

RIGHT HEADLAMP (BUILT-UP-EXPORT) - 3 WAY

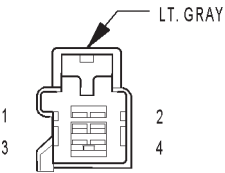
CAV	CIRCUIT	FUNCTION
1	L34 18RD/OR	FUSED RIGHT HIGH BEAM OUTPUT
2	L44 18VT/RD	FUSED RIGHT LOW BEAM OUTPUT
3	Z142 18BK/WT	GROUND



RIGHT
HEADLAMP
(EXCEPT
BUILT-UP-EXPORT)

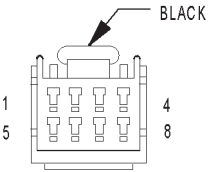
RIGHT HEADLAMP (EXCEPT BUILT-UP-EXPORT) - BLUE 3 WAY

CAV	CIRCUIT	FUNCTION
A	L44 18VT/RD	FUSED RIGHT LOW BEAM OUTPUT
B	Z142 18BK/WT	GROUND
C	L34 18RD/OR	FUSED RIGHT HIGH BEAM OUTPUT



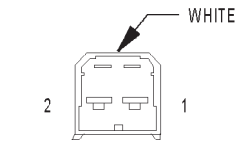
RIGHT
HEATED SEAT
ASSEMBLY
(HIGHLINE)

RIGHT HEATED SEAT ASSEMBLY (HIGHLINE) - LT. GRAY 4 WAY		
CAV	CIRCUIT	FUNCTION
1	F98 16RD/WT	PASSENGER HEATED SEAT FEED
2	Z238 16BK/WT	GROUND
3	P86 20PK/BK	HEATED SEAT TEMPERATURE SENSOR SIGNAL
4	P142 20TN/DB	PASSENGER HEATED SEAT TEMPERATURE SENSOR GROUND



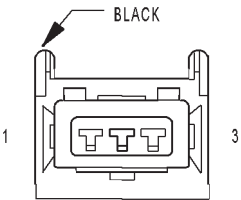
RIGHT
HEATED SEAT
SWITCH
(HIGHLINE)

RIGHT HEATED SEAT SWITCH (HIGHLINE) - BLACK 8 WAY		
CAV	CIRCUIT	FUNCTION
1	V23 20BR/PK	FUSED IGNITION SWITCH OUTPUT (RUN)
2	P140 20VT/BK	RIGHT SEAT HIGH HEAT LED DRIVER
3	P134 20TN/LG	RIGHT SEAT HEATER SWITCH MUX
4	P138 20VT/LG	RIGHT SEAT LOW HEAT LED DRIVER
5	Z238 20BK/WT	GROUND
6	-	-
7	-	-
8	-	-



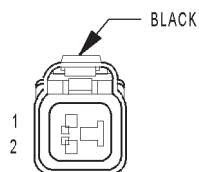
RIGHT INSTRUMENT
PANEL SPEAKER

RIGHT INSTRUMENT PANEL SPEAKER - WHITE 2 WAY		
CAV	CIRCUIT	FUNCTION
1	X84 18TN/BK (PREMIUM)	AMPLIFIED HIGH RIGHT FRONT SPEAKER (+)
1	X54 18VT (BASE)	RIGHT FRONT SPEAKER (+)
2	X86 18OR/RD (PREMIUM)	AMPLIFIED HIGH RIGHT FRONT SPEAKER (-)
2	X56 18DB/RD (BASE)	RIGHT FRONT SPEAKER (-)

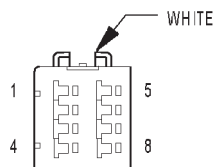


RIGHT
LEVELING
MOTOR
(BUILT-UP-EXPORT)

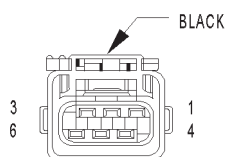
RIGHT LEVELING MOTOR (BUILT-UP-EXPORT) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	Z142 18BK/WT	GROUND
2	L13 18BR/YL	HEADLAMP ADJUST SIGNAL
3	L78 18DG/YL	FUSED PARK LAMP RELAY OUTPUT



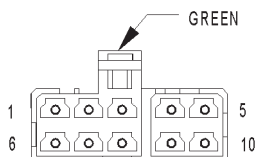
RIGHT
POSITION
LAMP
(BUILT-UP-EXPORT)



RIGHT POWER
MIRROR
(EXCEPT BASE)



RIGHT
POWER SEAT
MOTORS
(MIDLINE/HIGHLINE)



RIGHT
POWER SEAT
SWITCH
(MIDLINE/HIGHLINE)

RIGHT POSITION LAMP (BUILT-UP-EXPORT) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	L78 18DG/YL	FUSED PARK LAMP RELAY OUTPUT
2	Z142 18BK/WT	GROUND

RIGHT POWER MIRROR (EXCEPT BASE) - WHITE 8 WAY

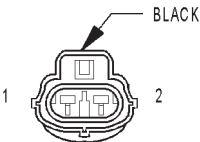
CAV	CIRCUIT	FUNCTION
1	P72 20YL/BK	RIGHT MIRROR UP DRIVER
2	P76 20OR/YL	MIRROR COMMON DRIVER
3	P74 20DB	RIGHT MIRROR LEFT DRIVER
4	-	-
5	C16 20LB/YL	FUSED DEFOGGER RELAY OUTPUT
6	Z351 20BK/LG	GROUND
7	P99 20GY (WITH FOLD)	FOLDING MIRROR FEED
8	P110 20YL (WITH FOLD)	FOLDING MIRROR RETURN

RIGHT POWER SEAT MOTORS (MIDLINE/HIGHLINE) - BLACK 6 WAY

CAV	CIRCUIT	FUNCTION
1	P10 14YL/WT	PASSENGER SEAT REAR UP DRIVER
2	P12 14RD/WT	PASSENGER SEAT REAR DOWN DRIVER
3	P18 14YL/LG	PASSENGER SEAT FRONT UP DRIVER
4	P20 14RD/LG	PASSENGER SEAT FRONT DOWN DRIVER
5	P16 14RD/YL	PASSENGER SEAT HORIZONTAL REARWARD DRIVER
6	P14 14YL/LB	PASSENGER SEAT HORIZONTAL FORWARD DRIVER

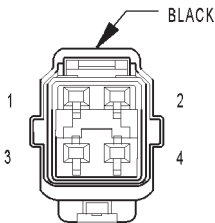
RIGHT POWER SEAT SWITCH (MIDLINE/HIGHLINE) - GREEN 10 WAY

CAV	CIRCUIT	FUNCTION
1	Z238 14BK/WT	GROUND
2	-	-
3	P14 14YL/LB	PASSENGER SEAT HORIZONTAL FORWARD DRIVER
4	-	-
5	F37 14RD/LB	FUSED B(+)
6	P16 14RD/YL	PASSENGER SEAT HORIZONTAL REARWARD DRIVER
7	P10 14YL/WT	PASSENGER SEAT REAR UP DRIVER
8	P18 14YL/LG	PASSENGER SEAT FRONT UP DRIVER
9	P20 14RD/LG	PASSENGER SEAT FRONT DOWN DRIVER
10	P12 14RD/WT	PASSENGER SEAT REAR DOWN DRIVER



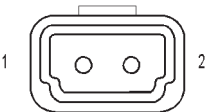
RIGHT REAR
DOOR AJAR
SWITCH
(BASE)

RIGHT REAR DOOR AJAR SWITCH (BASE) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	G74 20TN/WT	PASSENGER DOOR AJAR SWITCH SENSE
2	Z351 20BK/LG	GROUND



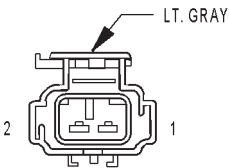
RIGHT REAR
DOOR LOCK MOTOR/
AJAR SWITCH
(EXCEPT BASE)

RIGHT REAR DOOR LOCK MOTOR/AJAR SWITCH (EXCEPT BASE) - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	G74 20TN/WT	PASSENGER DOOR AJAR SWITCH SENSE
2	Z351 20BK/LG	GROUND
3	P35 18OR/VT	PASSENGER DOOR UNLOCK RELAY OUTPUT
4	P33 18OR/BK	DOOR LOCK RELAY OUTPUT



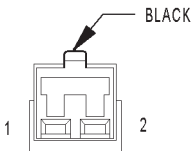
RIGHT REAR
DOOR SPEAKER

RIGHT REAR DOOR SPEAKER - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	X52 18DB/WT (BASE)	RIGHT REAR DOOR SPEAKER (+)
1	X94 18TN/VT (PREMIUM)	AMPLIFIED LOW RIGHT REAR SPEAKER (+)
2	X58 18DB/OR (BASE)	RIGHT REAR DOOR SPEAKER (-)
2	X92 18TN/BK (PREMIUM)	AMPLIFIED LOW RIGHT REAR SPEAKER (-)



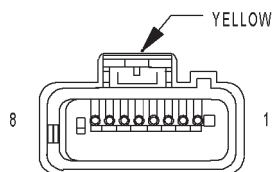
RIGHT REAR
POWER WINDOW
MOTOR
(MIDLINE/HIGHLINE)

RIGHT REAR POWER WINDOW MOTOR (MIDLINE/HIGHLINE) - LT. GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Q24 16DG	RIGHT REAR WINDOW DRIVER DOWN
2	Q14 16GY	RIGHT REAR WINDOW DRIVER UP



RIGHT
REMOTE RADIO
SWITCH
(PREMIUM)

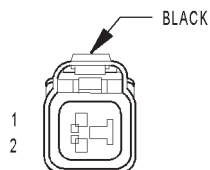
RIGHT REMOTE RADIO SWITCH (PREMIUM) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	X10 20RD/DB	RADIO CONTROL MUX RETURN
2	X20 20RD/BK	RADIO CONTROL MUX



RIGHT SIDE IMPACT
AIRBAG CONTROL
MODULE (RSIACM)

RIGHT SIDE IMPACT AIRBAG CONTROL MODULE (RSIACM) - YELLOW 8 WAY

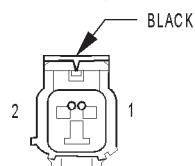
CAV	CIRCUIT	FUNCTION
1	F14 18LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
2	-	-
3	R76 18YL/DB	RIGHT CURTAIN SQUIB LINE 2
4	R74 18YL/BR	RIGHT CURTAIN SQUIB LINE 1
5	Z100 18BK/YL	GROUND
6	-	-
7	-	-
8	D25 18YL/VT	PCI BUS



RIGHT SIDE
MARKER LAMP
(EXCEPT
BUILT-UP-
EXPORT)

RIGHT SIDE MARKER LAMP (EXCEPT BUILT-UP-EXPORT) - BLACK 2 WAY

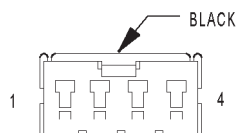
CAV	CIRCUIT	FUNCTION
1	L78 18DG/YL	FUSED PARK LAMP RELAY OUTPUT
2	L62 18BR/RD	RIGHT TURN SIGNAL



RIGHT SIDE
REPEATER
LAMP
(BUILT-UP-EXPORT)

RIGHT SIDE REPEATER LAMP (BUILT-UP-EXPORT) - BLACK 2 WAY

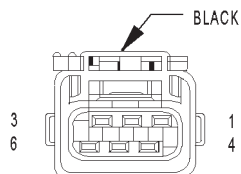
CAV	CIRCUIT	FUNCTION
1	L62 18BR/RD	RIGHT TURN SIGNAL
2	Z142 18BK/WT	GROUND



RIGHT
SPEED CONTROL
SWITCH
(EXCEPT BASE)

RIGHT SPEED CONTROL SWITCH (EXCEPT BASE) - BLACK 4 WAY

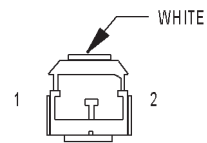
CAV	CIRCUIT	FUNCTION
1	-	-
2	K4 20BK/LB	SENSOR GROUND
3	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL
4	-	-



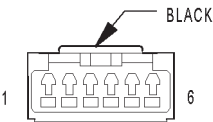
RIGHT TAIL/
STOP LAMP

RIGHT TAIL/STOP LAMP - BLACK 6 WAY

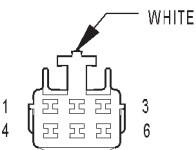
CAV	CIRCUIT	FUNCTION
1	L38 18BR/WT (BUILT-UP-EXPORT)	REAR FOG LAMP RELAY OUTPUT
2	L78 18DG/YL	FUSED PARK LAMP RELAY OUTPUT
3	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
4	L10 18BR/LG	BACK-UP LAMP FEED
5	Z151 18BK/WT	GROUND
6	L62 18BR/RD	RIGHT TURN SIGNAL



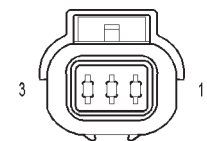
RIGHT VISOR/
VANITY LAMP
(EXCEPT BASE)



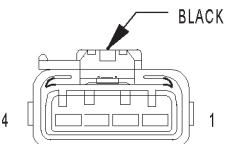
SENTRY KEY
IMMOBILIZER
MODULE
(EXCEPT BASE)



SHIFTER
ASSEMBLY



SIREN
(BUILT-UP-EXPORT)



SPEED
CONTROL
SERVO

RIGHT VISOR/VANITY LAMP (EXCEPT BASE) - WHITE 2 WAY

CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	M20 20BR	COURTESY LAMP LOAD SHED

SENTRY KEY IMMOBILIZER MODULE (EXCEPT BASE) - BLACK 6 WAY

CAV	CIRCUIT	FUNCTION
1	F33 20PK/RD	FUSED B(+)
2	Z11 20BK/WT	GROUND
3	F1 20DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
4	Z110 20BK/TN	GROUND
5	D25 20YL/VT/BK	PCI BUS
6	-	-

SHIFTER ASSEMBLY - WHITE 6 WAY

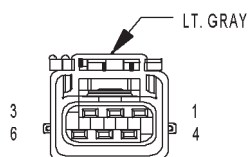
CAV	CIRCUIT	FUNCTION
1	E2 20OR	FUSED PANEL LAMPS DIMMER SWITCH SIGNAL
2	Z21 20BK/LG	GROUND
3	T6 20VT/WT	OVERDRIVE OFF SWITCH SENSE
4	Z21 20BK/LG	GROUND
5	F22 18DB/PK	FUSED IGNITION SWITCH OUTPUT (RUN)
6	K29 20WT/PK	BRAKE SWITCH SENSE

SIREN (BUILT-UP-EXPORT) - 3 WAY

CAV	CIRCUIT	FUNCTION
1	Z142 18BK/WT	GROUND
2	X75 18DG	SIREN SIGNAL CONTROL
3	M1 18PK	FUSED B(+)

SPEED CONTROL SERVO - BLACK 4 WAY

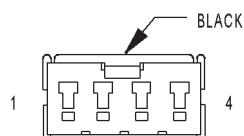
CAV	CIRCUIT	FUNCTION
1	V36 18TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
2	V35 18LG/RD	SPEED CONTROL VENT SOLENOID CONTROL
3	V30 18DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
4	Z212 18BK/OR	GROUND



SUNROOF
MOTOR

SUNROOF MOTOR - LT. GRAY 6 WAY

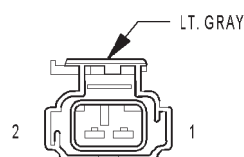
CAV	CIRCUIT	FUNCTION
1	F85 16VT/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
2	Z111 16BK	GROUND
3	Q44 20BR	SUNROOF SWITCH GROUND
4	Q43 20VT	SUNROOF VENT
5	Q42 20LB	SUNROOF CLOSE
6	Q41 20WT	SUNROOF OPEN



SUNROOF
SWITCH

SUNROOF SWITCH - BLACK 4 WAY

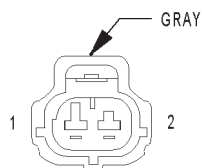
CAV	CIRCUIT	FUNCTION
1	Q41 20WT	SUNROOF OPEN
2	Q42 20LB	SUNROOF CLOSE
3	Q43 20VT	SUNROOF VENT
4	Q44 20BR	SUNROOF SWITCH GROUND



TAILGATE
CYLINDER LOCK
SWITCH

TAILGATE CYLINDER LOCK SWITCH - LT. GRAY 2 WAY

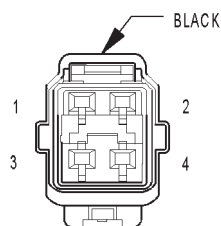
CAV	CIRCUIT	FUNCTION
1	G910 20VT/BR	TAILGATE SWITCH GROUND
2	G71 18VT/YL	TAILGATE CYLINDER LOCK SWITCH MUX



TAILGATE
FLIP-UP AJAR
SWITCH

TAILGATE FLIP-UP AJAR SWITCH - GRAY 2 WAY

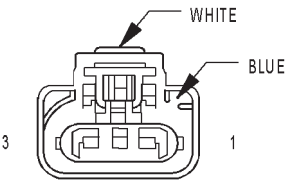
CAV	CIRCUIT	FUNCTION
1	G80 20YL/WT	FLIP-UP GLASS AJAR SWITCH SENSE
2	Z235 18BK	GROUND



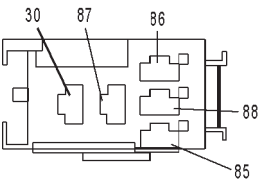
TAILGATE
LOCK MOTOR/
AJAR SWITCH

TAILGATE LOCK MOTOR/AJAR SWITCH - BLACK 4 WAY

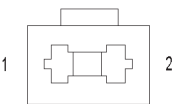
CAV	CIRCUIT	FUNCTION
1	P31 16PK/WT	TAILGATE UNLOCK DRIVER
2	P30 16OR/WT	TAILGATE LOCK DRIVER
3	G78 20TN/BK	TAILGATE AJAR SWITCH SENSE
4	G910 20VT/BR	TAILGATE SWITCH GROUND



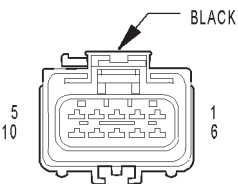
THROTTLE
POSITION
SENSOR



TRAILER
TOW BRAKE
LAMP RELAY



TRAILER TOW
CIRCUIT
BREAKER



TRAILER TOW
CONNECTOR

THROTTLE POSITION SENSOR - WHITE/BLUE 3 WAY

CAV	CIRCUIT	FUNCTION
1	K7 18OR	5 VOLT SUPPLY
2	K4 18BK/LB	SENSOR GROUND
3	K22 18OR/DB	THROTTLE POSITION SENSOR SIGNAL

TRAILER TOW BRAKE LAMP RELAY - 5 WAY

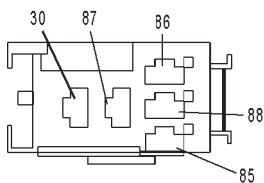
CAV	CIRCUIT	FUNCTION
30	A6 16RD/BK	FUSED B(+)
85	Z149 18BK/LB	GROUND
86	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
87	L95 16DG/YL	TRAILER TOW BRAKE LAMP RELAY OUTPUT
87A	L76 16BK/OR	TRAILER TOW BRAKE LAMP RELAY OUTPUT
87	L95 16DG/YL	TRAILER TOW BRAKE LAMP RELAY OUTPUT

TRAILER TOW CIRCUIT BREAKER - 2 WAY

CAV	CIRCUIT	FUNCTION
1	A99 14RD/VT	FUSED B(+)
2	F71 14RD	FUSED B(+)

TRAILER TOW CONNECTOR - BLACK 10 WAY

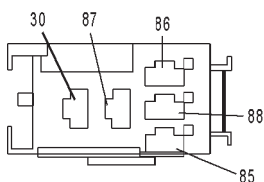
CAV	CIRCUIT	FUNCTION
1	-	-
2	L74 16PK/BK	RIGHT TURN SIGNAL
3	L10 18BR/LG	BACK-UP LAMP FEED
4	F73 14YL	TRAILER TOW RELAY OUTPUT
5	L78 18DG/YL	FUSED PARK LAMP RELAY OUTPUT
6	-	-
7	B40 14LB	TRAILER TOW BRAKE B(+)
8	Z149 16BK/LB	GROUND
9	Z149 16BK/LB	GROUND
10	L73 16PK/WT	LEFT TURN SIGNAL



TRAILER
TOW LEFT
TURN RELAY

TRAILER TOW LEFT TURN RELAY - 5 WAY

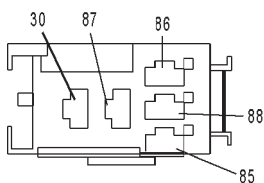
CAV	CIRCUIT	FUNCTION
30	L73 16PK/WT	LEFT TURN SIGNAL
85	Z149 18BK/LB	GROUND
86	L63 18DG/RD	LEFT TURN SIGNAL
87	L76 16BK/OR	TRAILER TOW BRAKE LAMP RELAY OUTPUT
87A	L95 16DG/YL	TRAILER TOW BRAKE LAMP RELAY OUTPUT
87	L76 16BK/OR	TRAILER TOW BRAKE LAMP RELAY OUTPUT



TRAILER
TOW
RELAY

TRAILER TOW RELAY - 5 WAY

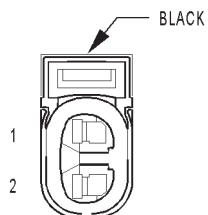
CAV	CIRCUIT	FUNCTION
30	F71 14RD	FUSED B(+)
85	Z149 18BK/LB	GROUND
86	V23 20BR/PK	FUSED IGNITION SWITCH OUTPUT (RUN)
87A	-	-
87	F73 14YL	TRAILER TOW RELAY OUTPUT



TRAILER
TOW RIGHT
TURN RELAY

TRAILER TOW RIGHT TURN RELAY - 5 WAY

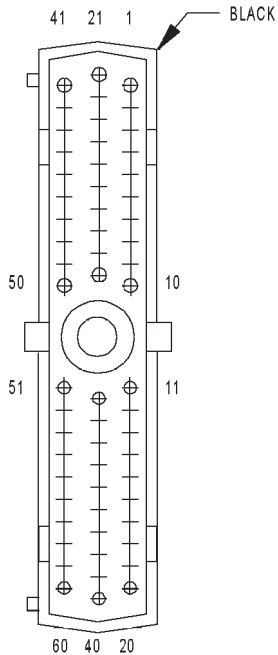
CAV	CIRCUIT	FUNCTION
30	L74 16PK/BK	RIGHT TURN SIGNAL
85	Z149 18BK/LB	GROUND
86	L62 18BR/RD	RIGHT TURN SIGNAL
87A	L95 16DG/YL	TRAILER TOW BRAKE LAMP RELAY OUTPUT
87	L76 16BK/OR	TRAILER TOW BRAKE LAMP RELAY OUTPUT



TRANSFER CASE
POSITION
SENSOR

TRANSFER CASE POSITION SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K77 20BR/WT (DIESEL)	TRANSFER CASE POSITION SENSOR INPUT
1	K77 18BR/WT (GAS)	TRANSFER CASE POSITION SENSOR INPUT
2	K4 18BK/LB	SENSOR GROUND



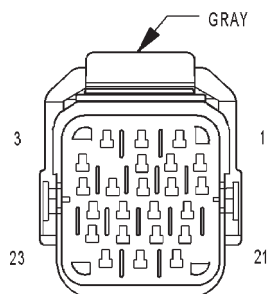
TRANSMISSION
CONTROL
MODULE

TRANSMISSION CONTROL MODULE (3.7L) - BLACK 60 WAY

CAV	CIRCUIT	FUNCTION
1	T1 18LG/BK	TRS T1 SENSE
2	T4 18PK/OR	TRS T2 SENSE
3	T3 18VT	TRS T3 SENSE
4	-	-
5	-	-
6	K24 18GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
7	D21 18PK	SCI TRANSMIT
8	F45 18YL/BR	FUSED IGNITION SWITCH OUTPUT (START)
9	T9 18OR/BK	OVERDRIVE PRESSURE SWITCH SENSE
10	T10 18YL/DG	TORQUE MANAGEMENT REQUEST SENSE
11	F1 18DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	K22 18OR/DB	THROTTLE POSITION SENSOR SIGNAL
13	T13 18DB/BK	SPEED SENSOR GROUND
14	T14 18LG/WT	OUTPUT SPEED SENSOR SIGNAL
15	K30 18PK	TRANSMISSION CONTROL RELAY CONTROL
16	T16 14RD	TRANSMISSION CONTROL RELAY OUTPUT
17	T16 14RD	TRANSMISSION CONTROL RELAY OUTPUT
18	T591 18YL/DB	PRESSURE CONTROL SOLENOID CONTROL
19	T119 18WT/DB	2C SOLENOID CONTROL
20	T20 18LB	LOW/REVERSE SOLENOID CONTROL
21	-	-
22	-	-
23	-	-
24	-	-
25	-	-
26	-	-
27	-	-
28	-	-
29	T29 18GY	UNDERDRIVE PRESSURE SWITCH SENSE
30	T38 18VT/TN	LINE PRESSURE SENSOR SIGNAL
31	-	-
32	-	-
33	-	-
34	-	-
35	-	-
36	T16 14RD	TRANSMISSION CONTROL RELAY OUTPUT
37	Z113 14BK/YL	GROUND
38	T39 18GY/LB	5 VOLT SUPPLY
39	Z113 14BK/YL	GROUND
40	T140 18VT/LG	MS SOLENOID CONTROL
41	T411 18WT/PK	TRS T41 SENSE
42	T42 18VT/WT	TRS T42 SENSE
43	D25 18VT/YL	PCI BUS
44	-	-
45	-	-
46	D20 18LG	SCI RECEIVE
47	T147 18LB	2C PRESSURE SWITCH SENSE
48	T48 18DB	4C PRESSURE SWITCH SENSE
49	T6 18OR/WT	OVERDRIVE OFF SWITCH SENSE
50	T50 18DG	LOW/REVERSE PRESSURE SWITCH SENSE
51	K4 18BK/LB	SENSOR GROUND
52	T52 18RD/BK	INPUT SPEED SENSOR SIGNAL
53	Z112 14BK	GROUND

TRANSMISSION CONTROL MODULE (3.7L) - BLACK 60 WAY

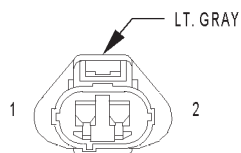
CAV	CIRCUIT	FUNCTION
54	T54 18VT	TRANSMISSION TEMPERATURE SENSOR SIGNAL
55	T59 18PK	UNDERDRIVE SOLENOID CONTROL
56	A30 14RD/WT	FUSED B(+)
57	Z113 14BK/YL	GROUND
58	-	-
59	T159 18DG/WT	4C SOLENOID CONTROL
60	T60 18BR	OVERDRIVE SOLENOID CONTROL



TRANSMISSION
SOLENOID/TRS
ASSEMBLY
(3.7L)

TRANSMISSION SOLENOID/TRS ASSEMBLY (3.7L) - GRAY 23 WAY

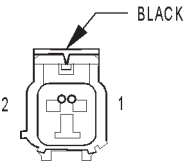
CAV	CIRCUIT	FUNCTION
1	F15 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN)
2	T20 18LB	LOW/REVERSE SOLENOID CONTROL
3	T41 18BK/WT	PARK/NEUTRAL POSITION SWITCH SENSE
4	T411 18WT/PK	TRS T41 SENSE
5	T42 18VT/WT	TRS T42 SENSE
6	L10 18BR/LG	BACK-UP LAMP FEED
7	T60 18BR	OVERDRIVE SOLENOID CONTROL
8	T3 18VT	TRS T3 SENSE
9	T1 18LG/BK	TRS T1 SENSE
10	T16 14RD	TRANSMISSION CONTROL RELAY OUTPUT
11	T48 18DB	4C PRESSURE SWITCH SENSE
12	T591 18YL/DB	PRESSURE CONTROL SOLENOID CONTROL
13	T4 18PK/OR	TRS T2 SENSE
14	T50 18DG	LOW/REVERSE PRESSURE SWITCH SENSE
15	T147 18LB	2C PRESSURE SWITCH SENSE
16	T9 18OR/BK	OVERDRIVE PRESSURE SWITCH SENSE
17	T59 18PK	UNDERDRIVE SOLENOID CONTROL
18	T29 18GY	UNDERDRIVE PRESSURE SWITCH SENSE
19	T159 18DG/WT	4C SOLENOID CONTROL
20	T119 18WT/DB	2C SOLENOID CONTROL
21	T140 18VT/LG	MS SOLENOID CONTROL
22	T13 18DB/BK	SPEED SENSOR GROUND
23	T54 18VT	TRANSMISSION TEMPERATURE SENSOR SIGNAL



WASHER FLUID
LEVEL
SWITCH

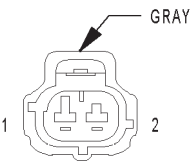
WASHER FLUID LEVEL SWITCH - LT. GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
1	G29 18BK/TN	LOW WASHER FLUID SENSE
2	Z141 18BK	GROUND



WASHER
PUMP

WASHER PUMP - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	V20 18BK/WT	WASHER MOTOR SENSE
2	V10 18BR	WASHER PUMP DRIVER



WATER
IN FUEL
SENSOR
(DIESEL)

WATER IN FUEL SENSOR (DIESEL) - GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	G123 20DG/WT	WATER IN FUEL SENSOR SIGNAL
2	K4 18BK/LB	SENSOR GROUND

8W-91 CONNECTOR/GROUND/SPLICE LOCATION

TABLE OF CONTENTS

page

CONNECTOR/GROUND/SPLICE LOCATION

DESCRIPTION 1

**CONNECTOR/GROUND/SPLICE
LOCATION****DESCRIPTION**

This section provides illustrations identifying connector, ground, and splice locations in the vehicle.

Connector, ground, and splice indexes are provided. Use the wiring diagrams in each section for connector, ground, and splice identification. Refer to the appropriate index for the proper figure number. For items that are not shown in this section N/S is placed in the Fig. column.

CONNECTORS

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
A/C Compressor Clutch	BK	At A/C Compressor	2, 20
A/C Heater Control C1	BK	Center of Dash, Behind A/C-Heater Controls	N/S
A/C Heater Control C2	WT	Center of Dash, Behind A/C-Heater Controls	N/S
A/C High Pressure Switch (Diesel)	GY	Left Front Side of Engine Compartment	20
A/C Low Pressure Switch (LHD)	GY	Left Rear Side of Engine Compartment	31
A/C Low Pressure Switch (RHD)	GY	Right Rear Side of Engine Compartment	24
A/C Pressure Transducer (2.4L)	BK	Front Side of Engine	12, 15
A/C Pressure Transducer (3.7L)	BK	Front Side of Engine	2
Accelerator Pedal Position Sensor (Diesel)	BK	Left Rear Side of Engine Compartment	19
Airbag Control Module C1 (ORC C1)	YL	Under Center Console	33, 37
Airbag Control Module C2 (ORC C2)	BK	Under Center Console	33, 37
Ambient Temperature Sensor	BK	Front of Engine Compartment	N/S
Antenna Module C1 (BUX)		Above Right Quarter Window	44, 45
Antenna Module C2 (BUX)		Above Right Quarter Window	N/S
Ash Receiver Lamp		Center of Dash	N/S
Back-Up Lamp Switch (2.4L)	BK	Right Side of Transmission	12
Back-Up Lamp Switch (M/T) (3.7L) (Diesel)	BK	Left Side of Transmission	7, 22
Battery Temperature Sensor	BK	Left Side of Engine Compartment	30

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Blend Door Actuator	BK	Behind Right Side of Instrument Panel	N/S
Blower Motor	BK	Behind Right Side of Instrument Panel	N/S
Blower Motor Resistor Block	BK	Behind Right Side of Instrument Panel	N/S
Body Control Module C1	GY	Under Left Side of Instrument Panel	N/S
Body Control Module C2	GY	Under Left Side of Instrument Panel	N/S
Body Control Module C3 (Premium)		Under Left Side of Instrument Panel	N/S
Boost Pressure Sensor (Diesel)		Left Side of Engine	22
Brake Lamp Switch	BK	At Brake Pedal	N/S
Brake Pressure Switch (ABS)	BK	On Master Cylinder	N/S
C100	GY	Left Kick Panel	32, 33, 37
C101 (2.4L)	BK	Left Side of Engine Compartment	11, 12
C102 (RHD)		Left Kick Panel	32
C103 (Gas)	BK	Right Rear Side of Engine Compartment	8, 9, 10, 13, 14, 16
C104	BK	Right Rear Side of Engine Compartment	8, 9, 10, 13, 14, 16, 17, 18
C105	GY	Right Rear Side of Engine Compartment	8, 9, 10, 13, 14, 16, 17, 18
C106	BK	Left Front Side of Engine Compartment	29
C107	BK	Left Front Side of Engine Compartment	N/S
C108 (Gas)	GY	Left Front Side of Engine	30
C110 (2.4L)	BK	Left Side of Engine	11, 12
C111 (Diesel)	LG	Right Rear Side of Engine Compartment	17, 18
C112 (Gas)	BK	Right Side of Engine Compartment	8, 9, 10, 13, 14, 31
C113 (Diesel)	LG	Left Rear Side of Engine Compartment	N/S
C114 (Diesel)	LG	Top of Engine	N/S
C201	BK	Behind Center of Instrument Panel	N/S
C202	YL	Behind Center of Instrument Panel	N/S
C300 (LHD)	OR	Left A-Pillar	35, 41
C300 (RHD)	OR	Right A-Pillar	39, 41
C301 (LHD)	OR	Left A-Pillar	35, 41
C301 (RHD)	OR	Right A-Pillar	39, 41

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
C302 (LHD)	OR	Right A-Pillar	34, 41, 42
C302 (RHD)	OR	Left A-Pillar	38, 41
C303 (LHD)	OR	Right A-Pillar	34, 41, 42
C303 (RHD)	OR	Left A-Pillar	38, 41
C304	DB	Right Mid B-Pillar	34, 39
C305	DB	Left Mid B-Pillar	35, 38
C306 (LHD)	WT	Left Lower B-Pillar	35, 43
C306 (RHD)	WT	Right Lower B-Pillar	39, 45
C307 (LHD)	LG	Left Lower B-Pillar	35, 38, 44
C308	LG	Left Rear Quarter Panel	43
C309	DB	Left Rear Quarter Panel	43, 46
C310	LG	Right Rear Quarter Panel	44, 45, 47
C311	LG	Left Front Seat	35, 38
C312 (Highline)	LG	Left Front Seat	35, 38
C313	LG	Right Front Seat	36, 39, 40
C314	LG	Right Front Seat	36, 39, 40
C315 (Midline/Highline) (LHD)	LG	Right Front Seat	34
C315 (Midline/Highline) (RHD)	LG	Left Front Seat	38
C317 (Except BUX)	LG	On Rear Bumper	45
Cabin Heater (Diesel)	BK	Right Front Side of Engine	21
Camshaft Position Sensor (2.4L)	BK	Top of Engine	N/S
Camshaft Position Sensor (3.7L)	LG	Right Side of Engine	4
Camshaft Position Sensor (Diesel)		Top of Engine	22
Capacitor (3.7L)	BK	Rear Side of Engine Compartment	9, 10
Capacitor (2.4L)	BK	Left Rear Side of Engine	11, 12
CD Changer	GN	At CD Changer	N/S
Center High Mounted Stop Lamp	WT	At Lamp	46
Cigar Lighter	RD	Behind Cigar Lighter	N/S
Clockspring C1	WT	Behind Steering Wheel	N/S
Clockspring C2	YL	Behind Steering Wheel	N/S
Clockspring C3	BK	At Steering Wheel	N/S
Clutch Interlock Switch (LHD)	BK	Left Rear Side of Engine Compartment	31
Clutch Interlock Switch (RHD)	BK	Right Rear Side of Engine Compartment	26
Coil On Plug No.1 (3.7L)	BK	Left Side of Engine Near Fuel Injector No.1	1
Coil On Plug No.2 (3.7L)	BK	Right Side of Engine Near Fuel Injector No.2	2
Coil On Plug No.3 (3.7L)	BK	Left Side of Engine Near Fuel Injector No.3	1
Coil On Plug No.4 (3.7L)	BK	Right Side of Engine Near Fuel Injector No.4	2

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Coil On Plug No.5 (3.7L)	BK	Left Side of Engine Near Fuel Injector No.5	1
Coil On Plug No.6 (3.7L)	BK	Right Side of Engine Near Fuel Injector No.6	2
Coil Rail (2.4L)	BK	Right Side of Engine	11, 12
Combination Flasher	WT	Under Left Side of Instrument Panel	N/S
Compass Mini-Trip Computer	BK	At Overhead Console	N/S
Controller Antilock Brake	BK	Left Side of Engine Compartment	30
Crankshaft Position Sensor (2.4L)	BK	Top of Engine	N/S
Crankshaft Position Sensor (3.7L)	BK	Right Lower Side of Engine	4
Crankshaft Position Sensor (Diesel)	BK	Right Rear Side of Engine	17
Data Link Connector	BK	Under Center of Instrument Panel	N/S
Diagnostic Junction Port	BK	Under Center of Instrument Panel	49
Dome Lamp (Base)	BK	On Headliner	N/S
Driver Airbag Squib 1	GY	In Steering Wheel	N/S
Driver Airbag Squib 2	BK	In Steering Wheel	N/S
Driver Seat Belt Switch	LG	At Drive Seat	N/S
Driver Seat Belt Tensioner (LHD)	YL	Lower Left B-Pillar	35
Driver Seat Belt Tensioner (RHD)	YL	Lower Right B-Pillar	39
EGR Solenoid		Right Rear Side of Engine Compartment	27
Engine Control Module C1	BK	Left Rear Side of Engine Compartment	19
Engine Control Module C2	BK	Left Rear Side of Engine Compartment	19
Engine Coolant Level Sensor (Diesel)	LG	Rear Side of Engine Compartment	18
Engine Coolant Temperature Sensor (Diesel)	BK	Left Side of Engine	20
Engine Coolant Temperature Sensor (Gas)	BK	Front Side of Engine	2
Engine Oil Pressure Sensor (2.4L)	BK	Top of Engine	N/S
Engine Oil Pressure Sensor (3.7L)	BK	Left Front Side of Engine	3
Engine Oil Pressure Sensor (Diesel)	BK	Right Rear Side of Engine	17
Engine Starter Motor		Right Front Side of Engine	20
Evap/Purge Solenoid	BK	At Solenoid	N/S
Flip-Up Glass Release Motor	BK	In Tailgate	46
Flip-Up Glass Release Switch	WT	In Tailgate	46
Front Washer Pump	BK	Right Front Side of Engine Compartment	28
Front Wiper Motor (LHD)	BK	Left Side of Cowl	24

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Front Wiper Motor (RHD)	BK	Right Side of Cowl	24
Fuel Heater (Diesel)	BK	Left Rear Side of Engine Compartment	19
Fuel Injector No.1 (Diesel)	BK	At Fuel Injector	23
Fuel Injector No.1 (Gas)	BK	At Fuel Injector	1
Fuel Injector No.2 (Diesel)	BK	At Fuel Injector	23
Fuel Injector No.2 (Gas)	BK	At Fuel Injector	2
Fuel Injector No.3 (Diesel)	BK	At Fuel Injector	23
Fuel Injector No.3 (Gas)	BK	At Fuel Injector	1
Fuel Injector No.4 (Diesel)	BK	At Fuel Injector	22
Fuel Injector No.4 (Gas)	BK	At Fuel Injector	2
Fuel Injector No.5 (3.7L)	BK	At Fuel Injector	1
Fuel Injector No.6 (3.7L)	BK	At Fuel Injector	2
Fuel Pressure Sensor (Diesel)		Left Side of Engine	22
Fuel Pressure Solenoid (Diesel)	BK	Left Side of Engine	20
Fuel Pump Module	LG	At Fuel Tank	N/S
Generator	BK	Left Front Side of Engine	20
Glow Plug Assembly (Diesel)		Top of Engine	N/S
Headlamp Leveling Switch (BUX)	BK	Center of Instrument Panel	N/S
Heated Seat Module (Highline)	GN	At Left Seat	N/S
High Note Horn	BK	Left Front Side of Engine Compartment	29
Hood Ajar Switch		Right Side of Engine Compartment	25
Idle Air Control Motor	BK	On Throttle Body	1
Ignition Switch		At Steering Column	N/S
Input Speed Sensor (3.7L)	BK	Left Side of Transmission	5
Instrument Cluster	BK	Rear of Cluster	N/S
Intake Air Temperature Sensor	GY	Left Side of Intake Manifold	1
Intrusion Sensor (BUX)	BK	Overhead Console	N/S
Junction Block Body Control Module - JB		Under Left Side of Instrument Panel	N/S
Junction Block C1	GY	Under Left Side of Instrument Panel	N/S
Junction Block C2	GN	Under Left Side of Instrument Panel	N/S
Junction Block C3	LB	Under Left Side of Instrument Panel	N/S
Knock Sensor (3.7L)	BK	Near Fuel Injector No.5	1
Leak Detection Pump	BK	Near Fuel Tank	N/S
Left Curtain Airbag	YL	Left Mid B-Pillar	35, 38
Left Cylinder Lock Switch	LG	In Left Front Door	41
Left Door Lock Switch	BK	In Left Front Door	41
Left Fog Lamp	BK	Left Side of Front Bumper	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Left Front Door Ajar Switch (Base)	BK	In Left Front Door	N/S
Left Front Door Lock Motor/Ajar Switch (Except Base)	BK	In Left Front Door	41
Left Front Door Speaker	BK	Behind Left Front Door Panel	41
Left Front Impact Sensor	BK	Front Side of Engine Compartment	28
Left Front Park/Turn Signal Lamp	BK	Behind Left Turn Signal Lamp	N/S
Left Front Power Window Motor	LG	In Left Front Door	41
Left Front Wheel Speed Sensor	BK	Left Side of Engine Compartment	30
Left Headlamp (BUX)		Behind Left Headlamp	N/S
Left Headlamp (Except BUX)	DB	Behind Left Headlamp	N/S
Left Heated Seat Assembly	LG	At Left Seat	N/S
Left Heated Seat Switch	BK	At Left Seat	N/S
Left Instrument Panel Lamp	BK	Left Side of Instrument Panel	N/S
Left Instrument Panel Speaker	BK	Left Side of Instrument Panel	33, 37
Left Leveling Motor (BUX)	BK	At Left Headlamp	N/S
Left Position Lamp (BUX)	BK	Left Front Side of Vehicle	N/S
Left Power Mirror	WT	In Left Front Door	41
Left Power Seat Motors	BK	At Left Seat	N/S
Left Power Seat Switch	GN	At Left Seat	N/S
Left Rear Door Ajar Switch (Base)	BK	In Left Rear Door	N/S
Left Rear Door Lock Motor/Ajar Switch (Except Base)	BK	In Left Rear Door	N/S
Left Rear Door Speaker		In Left Rear Door	
Left Rear Power Window Motor	LG	In Left Rear Door	N/S
Left Remote Radio Switch	BK	On Steering Wheel	N/S
Left Side Impact Airbag Control Module (LSIACM)	YL	Left Lower B-Pillar	35, 38
Left Side Marker Lamp	BK	Left Front Fender	N/S
Left Side Repeater Lamp (BUX)	BK	Left Front Fender	N/S
Left Speed Control Switch	BK	On Steering Wheel	N/S
Left Tail/Stop Lamp	BK	Left Rear Quarter Panel	45
Left Visor/Vanity Lamp	WT	Left Front of Headliner	N/S
License Lamp (BUX)	LG	In Tailgate	46
License Lamp (Except BUX)	LG	On Bumper	N/S
Line Pressure Sensor (3.7L)	BK	Right Side of Transmission	6
Low Note Horn	BK	Left Front Side of Engine Compartment	29
Manifold Absolute Pressure Sensor	BK	Front Side of Engine	2
Mass Air Flow Sensor (Diesel)		Top of Engine	21
Multi-Function Switch C1	GY	At Steering Column	N/S
Multi-Function Switch C2	GY	At Steering Column	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Output Speed Sensor	BK	Left Side of Transmission	5
Overhead Map/Courtesy Lamp	BK	Overhead Console	N/S
Oxygen Sensor 1/1 Upstream (2.4L)	BK	Right Side of Engine	12
Oxygen Sensor 1/1 Upstream (3.7L)	BK	Lower Left Side of Engine	3
Oxygen Sensor 1/2 Downstream (2.4L)	NAT	Right Side of Transmission	11, 12
Oxygen Sensor 1/2 Downstream (3.7L)	NAT	Left Side of Transmission	5, 7
Oxygen Sensor 2/1 Upstream (3.7L)	BK	Lower Right Side of Engine	4
Oxygen Sensor 2/2 Downstream (3.7L)	NAT	Right Side of Transmission	6
Park Brake Switch	BK	Center Console	36, 40
Passenger Airbag	YL	Right Side Instrument Panel	N/S
Passenger Seat Belt Switch	LG	At Passenger Seat	N/S
Power Mirror Switch	WT	In Left Front Door	41
Power Outlet	RD	Center of Instrument Panel	N/S
Power Steering Pressure Switch	BK	Left Front Side of Engine	3, 15
Power Window Master Switch	LG	Center Console	36, 40
Powertrain Control Module C1 (2.4L)	BK	At Powertrain Control Module	13, 14
Powertrain Control Module C1 (3.7L)	BK	At Powertrain Control Module	8, 9, 10
Powertrain Control Module C2	WT	At Powertrain Control Module	8, 9, 10, 13, 14
Powertrain Control Module C3	GY	At Powertrain Control Module	31
Radiator Fan Motor	BK	Right Front Side of Engine Compartment	28
Radiator Fan Relay	BK	Left Front Side of Engine Compartment	29
Radio C1	GY	Rear of Radio	N/S
Radio C2		Rear of Radio	N/S
Radio C3		Rear of Radio	N/S
Radio Choke	GY	Center of Instrument Panel	N/S
Rear Map/Reading Lamp	BK	Overhead Console	N/S
Rear Power Outlet	RD	Right Rear Quarter Panel	44, 45, 48
Rear Power Window Switch	WT	Center Console	36, 40
Rear Wheel Speed Sensor	BK	On Rear Axle	N/S
Rear Window Defogger	BK	At Rear Window	46
Rear Wiper Motor	BK	In Tailgate	46
Red Brake Warning Indicator Switch (LHD)	GY	Left Rear Side of Engine Compartment	31
Red Brake Warning Indicator Switch (RHD)	GY	Right Rear Side of Engine Compartment	26
Right Curtain Airbag	YL	Right Mid B-Pillar	34, 39
Right Cylinder Lock Switch (Except Base)	LG	In Right Front Door	41

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Right Door Lock Switch (Except Base)	BK	In Right Front Door	41
Right Fog Lamp	BK	Right Side of Bumper	N/S
Right Front Door Ajar Switch (Base)	BK	In Right Front Door	N/S
Right Front Door Lock Motor/Ajar Switch (Except Base)	BK	In Right Front Door	41
Right Front Door Speaker	BK	In Right Front Door	41
Right Front Impact Sensor	BK	Right Front Side of Engine Compartment	28
Right Front Park/Turn Signal Lamp	BK	At Lamp	N/S
Right Front Power Window Motor	LG	In Right Front Door	41
Right Front Wheel Speed Sensor	BK	Right Rear Lower Side of Engine Compartment	25
Right Headlamp (BUX)		Right Front Side of Engine Compartment	N/S
Right Headlamp (Except BUX)	DB	Right Front Side of Engine Compartment	N/S
Right Heated Seat Assembly	LG	At Right Seat	N/S
Right Heated Seat Switch	BK	At Right Seat	N/S
Right Instrument Panel Lamp	BK	Right Side of Instrument Panel	N/S
Right Instrument Panel Speaker	WT	Right Side of Instrument Panel	33, 37
Right Leveling Motor (BUX)	BK	At Right Headlamp	N/S
Right Position Lamp (BUX)	BK	Right Front Corner of Vehicle	N/S
Right Power Mirror	WT	In Right Front Door	41
Right Power Seat Motors	BK	At Right Seat	N/S
Right Power Seat Switch	GN	At Right Seat	N/S
Right Rear Door Ajar Switch (Base)	BK	In Right Rear Door	N/S
Right Rear Door Lock Motor/Ajar Switch (Except Base)	BK	In Right Rear Door	42
Right Rear Door Speaker		At Speaker	42
Right Rear Power Window Motor	LG	In Right Rear Door	42
Right Remote Radio Switch	BK	On Steering Wheel	N/S
Right Side Impact Airbag Control Module (RSIACM)	YL	Lower Right B-Pillar	34, 39
Right Side Marker Lamp	BK	Right Front Fender	N/S
Right Side Repeater Lamp (BUX)	BK	Right Front Fender	N/S
Right Speed Control Switch	WT	On Steering Wheel	N/S
Right Tail/Stop Lamp	BK	Right Rear Quarter Panel	45
Right Visor/Vanity Lamp	WT	On Visor	N/S
Sentry Key Immobilizer Module	BK	Under Left Side of Instrument Panel	N/S
Shifter Assembly	WT	Center Console	36, 40

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Siren (BUX)		Right Front Side of Engine Compartment	28
Speed Control Servo	BK	Right Rear Side of Engine Compartment	27
Sunroof Motor	LG	Overhead Console	N/S
Sunroof Switch	BK	Overhead Console	N/S
Tailgate Cylinder Lock Switch	LG	In Tailgate	46
Tailgate Flip-Up Ajar Switch	GY	In Tailgate	46
Tailgate Lock Motor/Ajar Switch	BK	In Tailgate	46
Throttle Position Sensor	WT	On Throttle Body	1
Trailer Tow Brake Lamp Relay		Right Quarter Panel	47
Trailer Tow Circuit Breaker		Right Quarter Panel	N/S
Trailer Tow Connector	BK	At Trailer Hitch	47, 48
Trailer Tow Right Turn Relay		Right Quarter Panel	47
Trailer Tow Relay		Right Quarter Panel	47
Trailer Tow Left Turn Relay		Right Quarter Panel	47
Transfer Case Position Sensor	BK	Rear Side of Transmission	5, 7, 11, 12, 22
Transmission Control Module (3.7L) (LHD)	BK	Right Rear Side of Engine Compartment	8, 9
Transmission Control Module (3.7L) (RHD)	BK	Left Rear Side of Engine Compartment	10
Transmission Solenoid/TRS Assembly (3.7L)	GY	Left Side of Transmission	5
Under Hood Lamp	BK	Underside of Hood	24
Washer Fluid Level Switch	LG	At Washer Fluid Reservoir	28
Water In Fuel Sensor (Diesel)		Left Rear Side of Engine Compartment	19

GROUNDS

GROUND NUMBER	LOCATION	FIG.
G100	Left Side of Engine Compartment	8, 9, 10, 14, 19
G101 (2.4L)	Left Side of Engine Compartment	11
G102 (LHD)	Right Rear Side of Engine Compartment	9
G102 (RHD)	Left Rear Side of Engine Compartment	10
G103 (3.7L)	Right Front Side of Engine	4
G103 (Diesel)	Right Front Side of Engine	20
G104	Near Engine Control Module C2	19
G105	Left Side of Engine Compartment	N/S
G106	Left Side of Engine Compartment	N/S
G110	Left Side of Engine Compartment	30
G111	Left Front Side of Engine Compartment	29
G112	Left Front Side of Engine Compartment	29
G200	Near Body Control Module	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

GROUND NUMBER	LOCATION	FIG.
G201	Under Center Console	33, 37
G202	Left Kick Panel (Black Connector)	N/S
G203	Under Center of Instrument Panel	N/S
G300	Left Front Seat	35
G301	Under Center Console	N/S
G302	Right Front Seat	39
G310	Right Quarter Panel	44, 45
G311	Left Quarter Panel	43
G312	Left Quarter Panel	N/S
G320	At Fuel Tank	N/S

SPLICES

SPLICE NUMBER	LOCATION	FIG.
S101	Near T/O to Power Distribution Center	N/S
S104	Near T/O to Power Distribution Center	N/S
S106	Near T/O for G112	N/S
S107 (Diesel)	In T/O for C100	32
S108	Near T/O for C106	29
S109	In Trough Near T/O for Radiator Fan Relay	N/S
S110	Near T/O for C106	29
S111	In Trough Near T/O for Radiator Fan Relay	N/S
S112	Near T/O to Power Distribution Center	N/S
S113 (LHD)	In T/O for C100	32
S114	In T/O for C100	N/S
S115	Near T/O for Engine Control Module	N/S
S118	In T/O for C100	32
S121	Near T/O to Power Distribution Center	N/S
S122	In T/O for Controller Antilock Brake	30
S123	In Trough, Front of Engine Compartment	N/S
S124	In T/O for Junction Block C3	N/S
S125	In T/O for Junction Block C3	N/S
S130	Near T/O for Left Headlamp	N/S
S131	In T/O for Right Headlamp	N/S
S140	Near T/O for Left Front Park/Turn Signal Lamp	N/S
S141	Near T/O for Left Fog Lamp	N/S
S142	Near T/O for Left Front Park/Turn Signal Lamp	N/S
S143	Near T/O for Right Front Park/Turn Signal Lamp	N/S
S144	Near T/O for Left Fog Lamp	N/S
S145	Near T/O for Right Front Park/Turn Signal Lamp	N/S
S146	Near T/O for Right Front Park/Turn Signal Lamp	N/S
S151 (2.4L)	Near T/O for C110	11, 12
S151 (3.7L)	In Trough Near T/O for Fuel Injector No.3	1

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

SPLICE NUMBER	LOCATION	FIG.
S151 (Diesel)	In Trough Near T/O for Accelerator Pedal Position Sensor	19
S152	In Trough Near T/O for Fuel Injector No.4	2
S153 (2.4L)	Near T/O for Coil Rail	11, 12
S153 (3.7L)	Near T/O for Idle Air Control Motor	1
S153 (Diesel)	In Trough Near T/O for Generator	20, 23
S154	Near T/O for Engine Starter Motor	2, 4, 20
S155	Near T/O for Knock Sensor	1
S156 (2.4L)	In Trough Near T/O for C112	13, 14
S156 (3.7L)	Near T/O for Powertrain Control Module C1	8
S156 (Diesel)	Near T/O for A/C Compressor Clutch	20
S157	Near T/O for Oxygen Sensor 2/2 Downstream	N/S
S158	In Trough Near T/O for C112	8
S159	Near T/O for Knock Sensor	1, 8
S160	In T/O for C104	10
S161	Near T/O for Oxygen Sensor 1/2 Downstream	5, 7
S163	In T/O for Transmission Control Module	10
S164	In Trough on Right Rear Side of Engine Compartment	10
S165	In Trough on Right Rear Side of Engine Compartment	10
S167	In T/O for Transmission Control Module	10
S168	Near T/O for Fuel Injector No.6	2
S169 (2.4L)	Near T/O for C101	11
S169 (3.7L)	Near T/O for Oxygen Sensor 1/1 Upstream	1, 3
S169 (Diesel)	Near T/O for Generator	20
S170	Near T/O for C103	8, 13, 16
S175	In Trough on Top of Engine	22, 23
S177	In Trough Near T/O for G100	19
S178	Near T/O for Oxygen Sensor 2/2 Downstream	6
S180	Near T/O for C103	8
S181	In Trough Near T/O for G100	19
S184	Near T/O for Powertrain Control Module C1	8
S200	Near T/O for C201	N/S
S201	Near T/O for Left Instrument Panel Lamp	N/S
S204	Near T/O for Data Link Connector	N/S
S205	In T/O for C100	N/S
S206	Near T/O for Multifunction Switch C2	N/S
S207	In T/O for C100	N/S
S208	Near T/O for G202	N/S
S210	Near T/O for Left Instrument Panel Lamp	N/S
S212	Near T/O for Diagnostic Junction Port	N/S
S213	Near T/O for Diagnostic Junction Port	N/S
S214	Near T/O for Airbag Control Module C1 (ORC C1)	N/S
S215	Near T/O for Multifunction Switch C2	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

SPLICE NUMBER	LOCATION	FIG.
S216	In T/O for Instrument Cluster	N/S
S217	Near T/O for Multifunction Switch C2	N/S
S218	Near T/O for Multifunction Switch C2	N/S
S219	In T/O for Junction Block C3	N/S
S220	In T/O for Junction Block C3	N/S
S221	Near T/O for Left Speed Control Switch	N/S
S222	Near T/O for Right Speed Control Switch	N/S
S223	Near T/O for Left Remote Radio Switch	N/S
S224	Near T/O for Right Remote Radio Switch	N/S
S300 (LHD)	Near T/O for C309	43
S300 (RHD)	Near T/O for C310	45
S301	In T/O For Radio C1	N/S
S302	Near T/O for Rear Power Outlet	45
S303	Near T/O for Shifter Assembly	36
S304	Near T/O for License Lamp	45
S306 (LHD)	Near T/O for G315	44
S306 (RHD)	In T/O for C319	45
S308 (LHD)	Near T/O for C309	43
S308 (RHD)	Near T/O for Rear Power Outlet	45
S310	Near T/O for C310	N/S
S312	Near T/O for G315	N/S
S313	In T/O for Trailer Tow Relays	47
S314	In T/O for Trailer Tow Relays	47
S318 (LHD)	Near T/O for G309	35
S318 (RHD)	In T/O for C201	39
S319 (LHD)	Near T/O for C201	33
S319 (RHD)	Near T/O for Left Instrument Panel	37
S322	Near T/O for Left Instrument Panel	33, 37
S323 (LHD)	Near T/O for Left Instrument Panel	33
S323 (RHD)	Near T/O for Right Instrument Panel Speaker	37
S324 (Premium)	Near T/O for Right Instrument Panel Speaker	33, 37
S325	Near T/O for C201	33, 37
S326	Near T/O for Heated Seat Module	N/S
S327	Near T/O for Left Heated Seat Assembly	N/S
S328	In T/O for Heated Seat Module	N/S
S329	Near T/O for Right Heated Seat Switch	N/S
S330	Near T/O for Heated Seat Module	N/S
S331	Near T/O for Shifter Assembly	N/S
S333 (LHD)	Near T/O for G300	35
S333 (RHD)	Near T/O for C307	38
S334	Near T/O for G302	34, 39
S336 (LHD)	Near T/O for Left Instrument Panel	33

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

SPLICE NUMBER	LOCATION	FIG.
S336 (RHD)	Near T/O for Right Instrument Panel Speaker	37
S338	Near T/O for C201	33, 37
S340	Near T/O for C201	33
S341	Near T/O for C201	33
S342 (Base)	Near T/O for Right Instrument Panel Speaker	33
S344	Near T/O for Right Instrument Panel Speaker	33
S346	In T/O for Trailer Tow Relays	47
S347	Near T/O for Right Tail/Stop Lamp	45
S348	Near T/O for Right Tail/Stop Lamp	45
S349	Near T/O for License Lamp	45
S350	Near T/O for License Lamp	45
S351	In T/O for Rear Window Defogger	46
S352	In T/O for Rear Window Defogger	N/S
S356	Near T/O for Center High Mounted Stop Lamp	N/S
S360	Near T/O for Left Power Mirror	41
S361	Near T/O for Left Power Mirror	41
S362	Near T/O for Power Mirror Switch	41
S363	Near T/O for Left Front Door Speaker	N/S
S364	Near T/O for Left Front Door Speaker	N/S
S370	Near T/O for Right Power Mirror	41
S371	Near T/O for Right Door Lock Switch	41
S372	Near T/O for Right Front Door Speaker	N/S
S373	Near T/O for Right Front Door Speaker	N/S
S380	Near T/O for Rear Wiper Motor	N/S
S381	Near T/O for Tailgate Cylinder Lock Switch	N/S
S382	Near T/O for License Lamp	N/S
S390	Near T/O for Intrusion Sensor	N/S
S391	Near T/O for Left Visor/Vanity Lamp	N/S
S392	Near T/O for Left Visor/Vanity Lamp	N/S
S393	Near T/O for Intrusion Sensor	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

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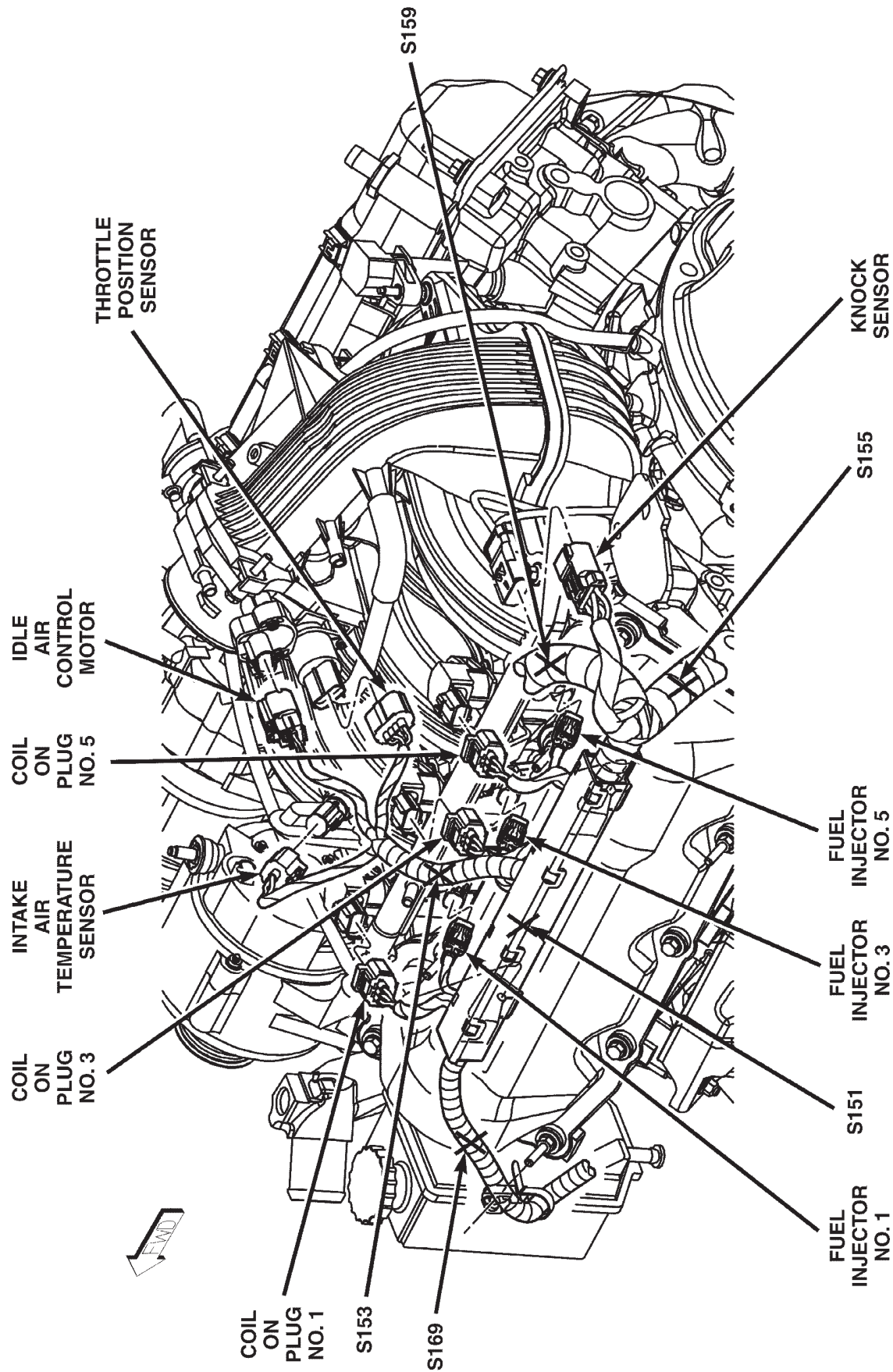
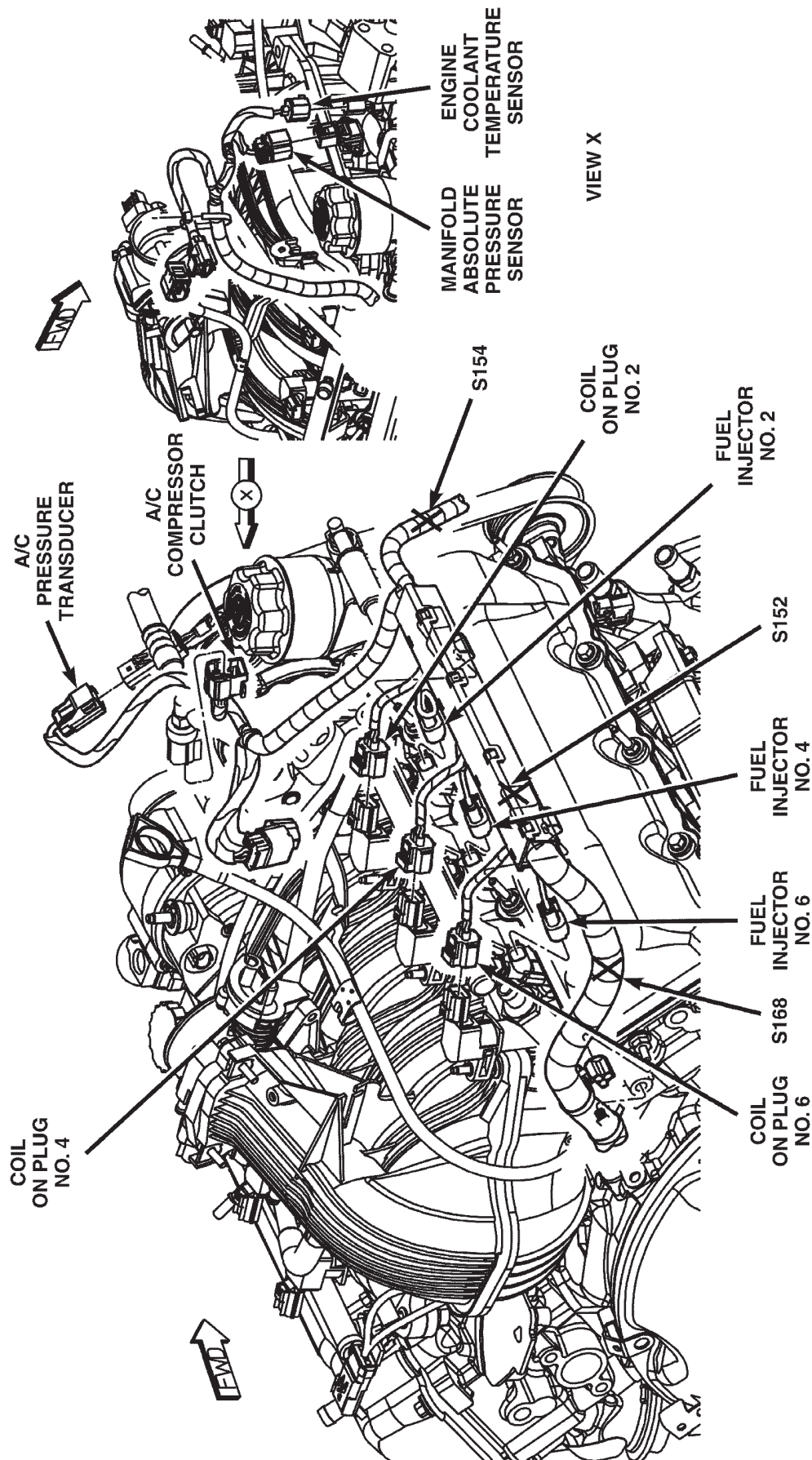


Fig. 1 LEFT SIDE ENGINE, 3.7L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4ce9

Fig. 2 RIGHT SIDE ENGINE, 3.7L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

80ce4ced

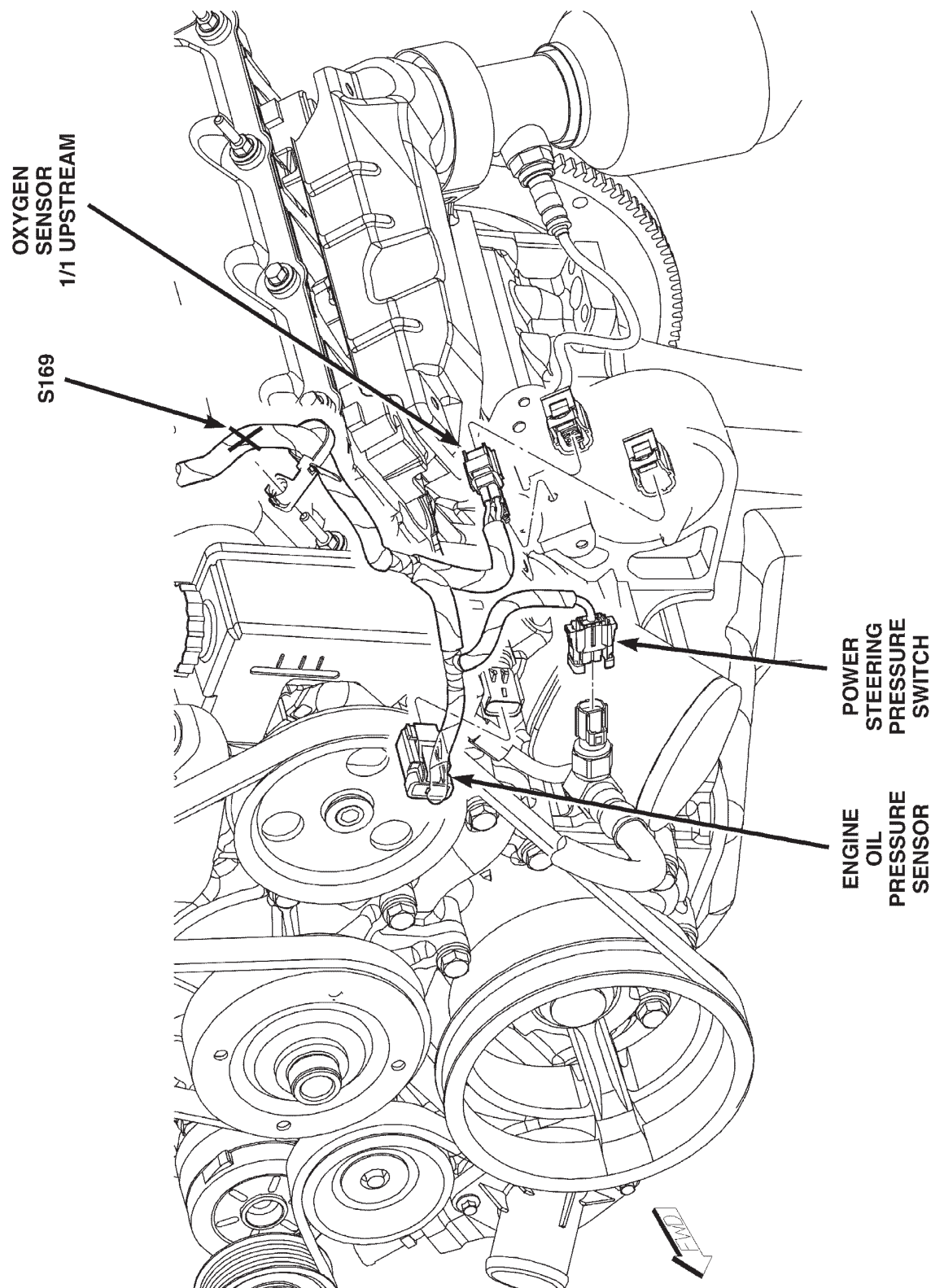


Fig. 3 LOWER LEFT ENGINE, 3.7L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

80ce4d1a

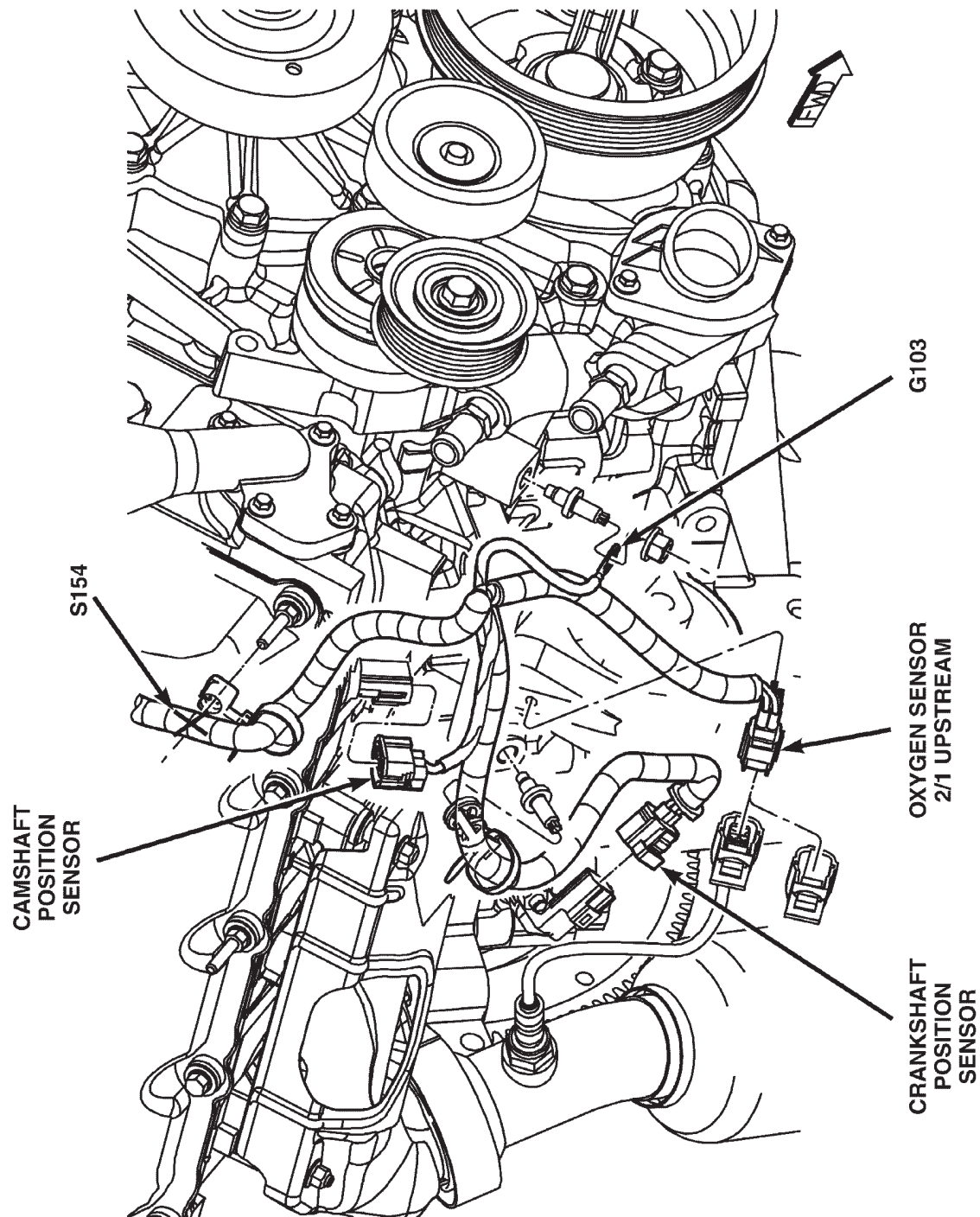
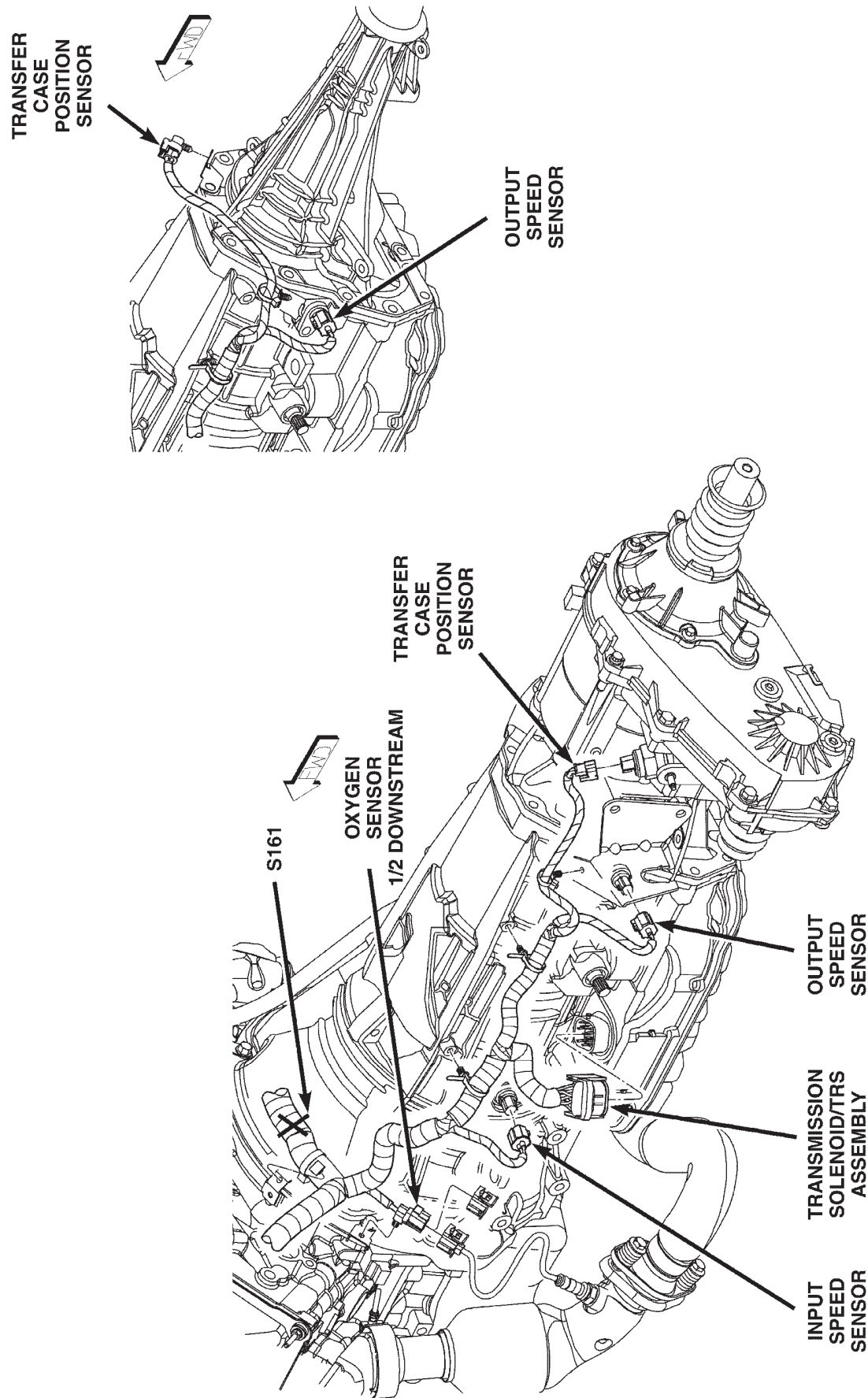


Fig. 4 LOWER RIGHT ENGINE, 3.7L

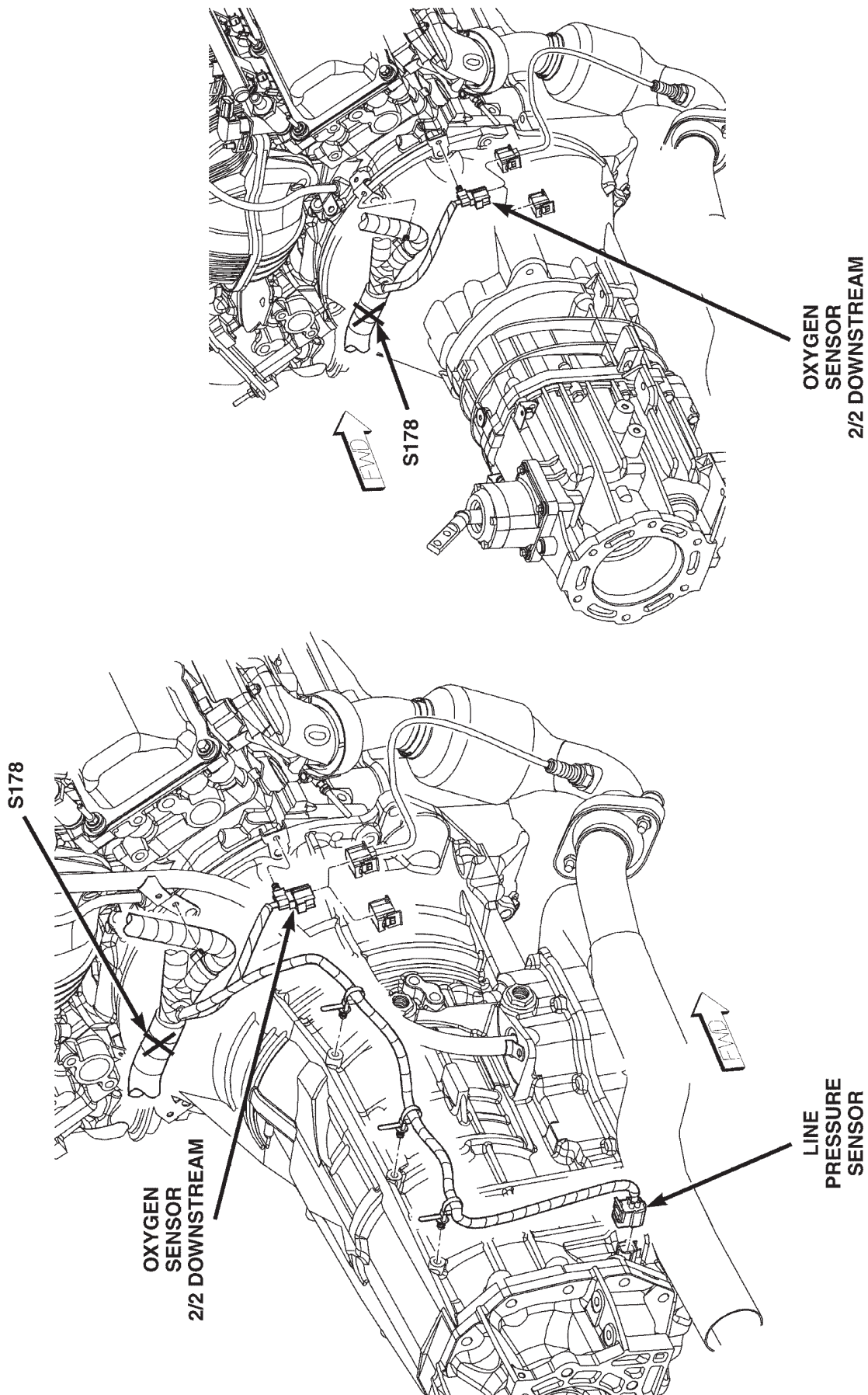
CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4d5d

Fig. 5 LEFT SIDE TRANSMISSION, 3.7L

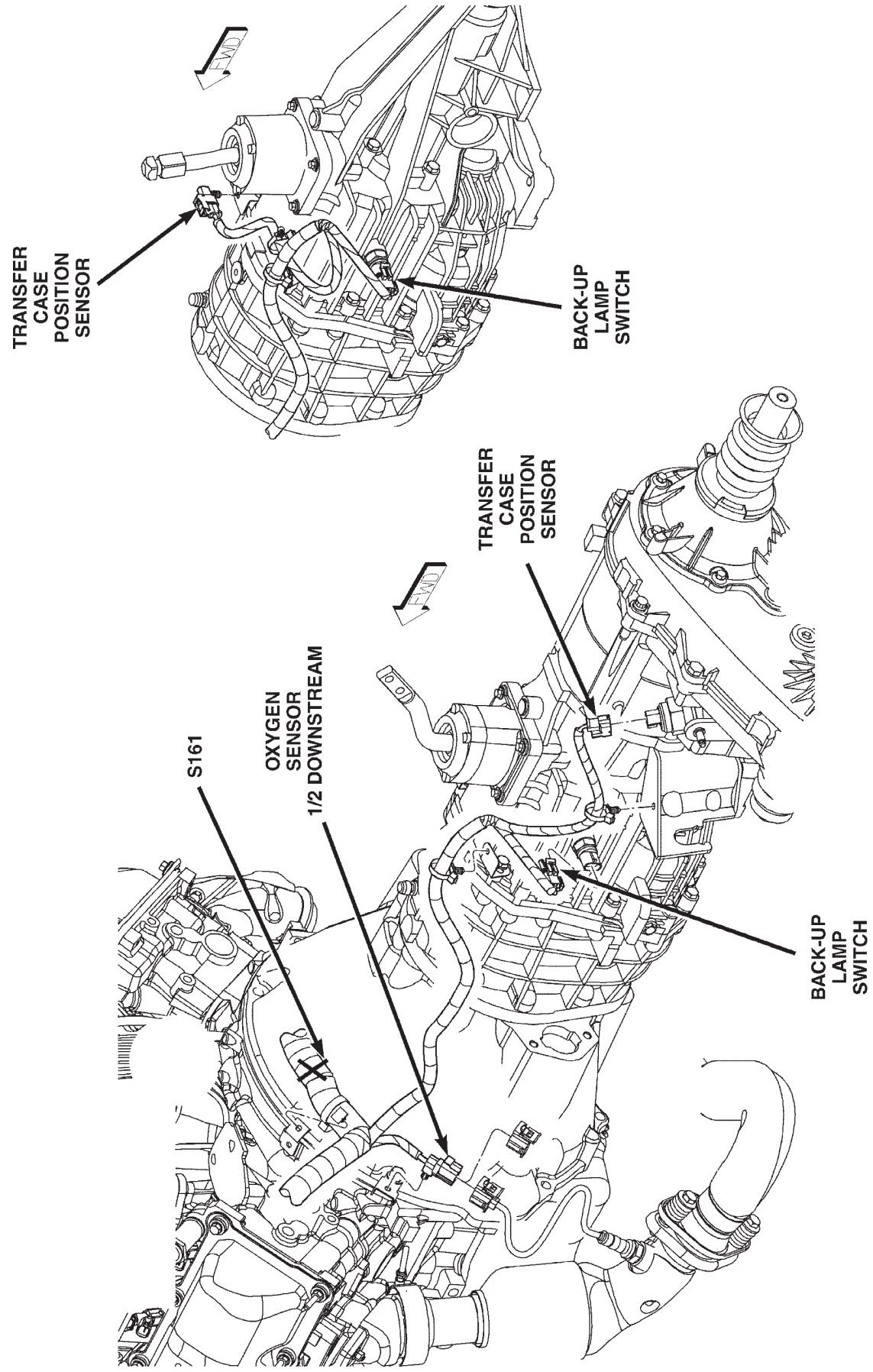
CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4d9d

Fig. 6 RIGHT SIDE TRANSMISSION, 3.7L

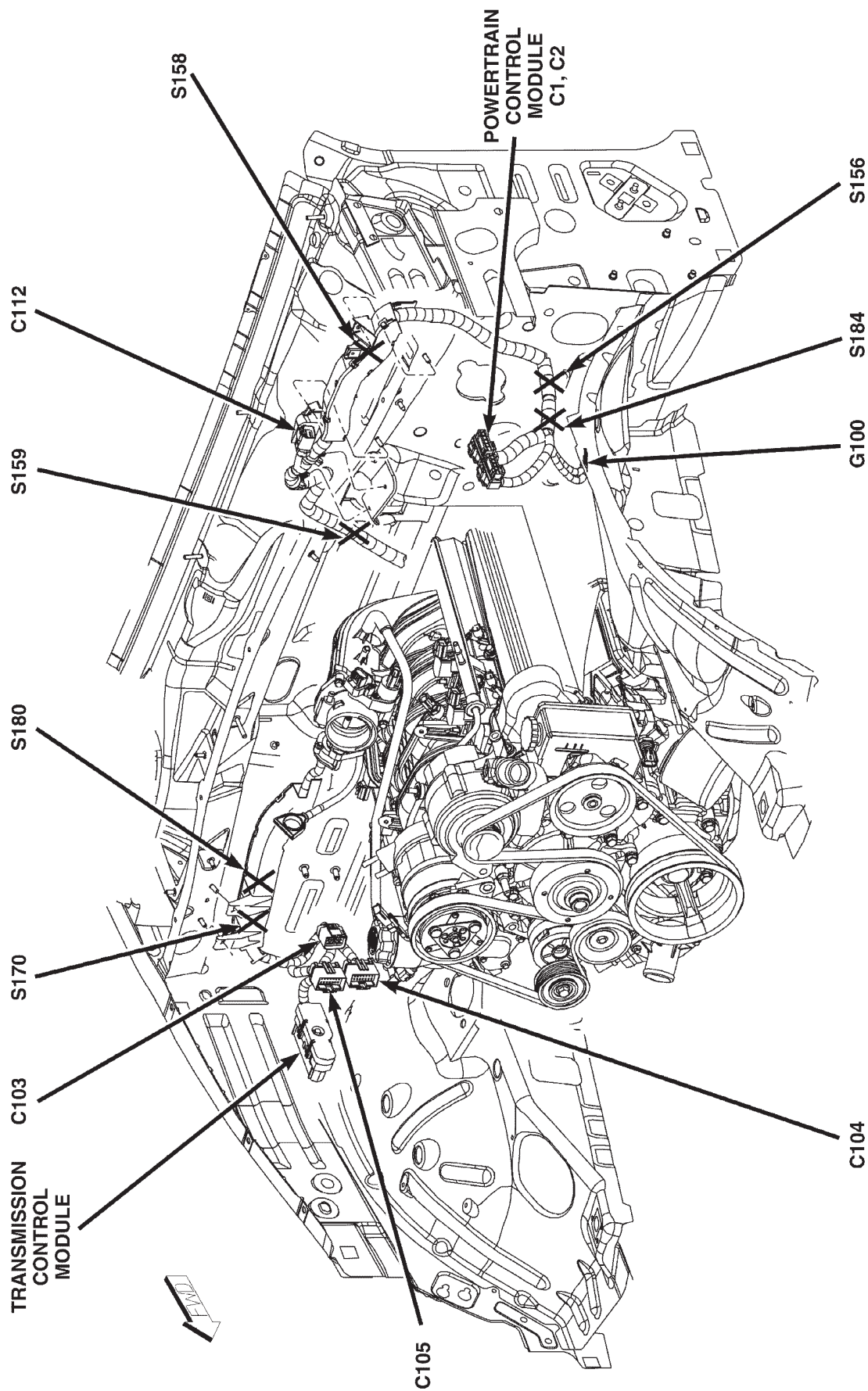
CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4dc1

Fig. 7 MANUAL TRANSMISSION, 3.7L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4dc5

Fig. 8 RIGHT SIDE ENGINE COMPARTMENT, 3.7L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

80ce4dcd

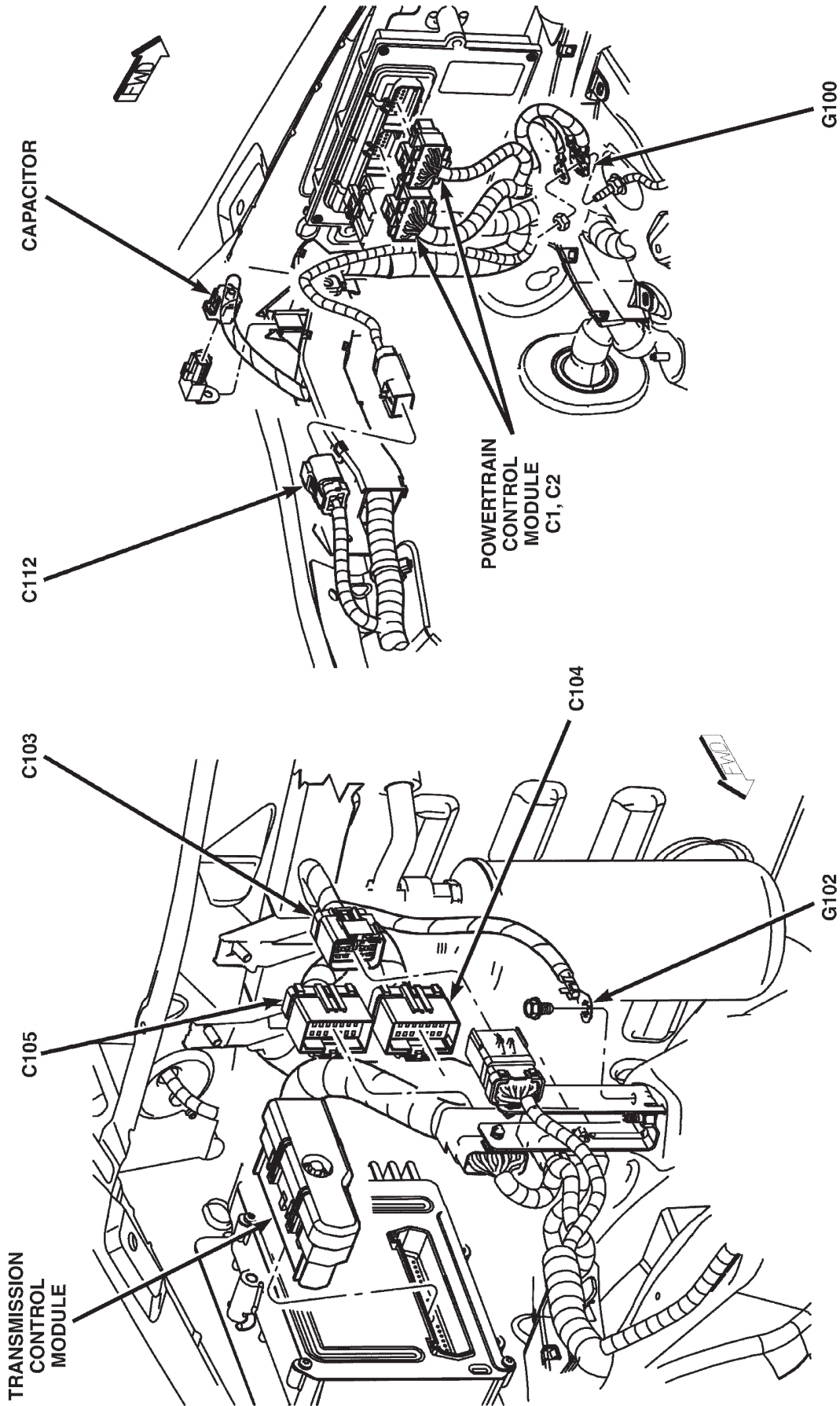
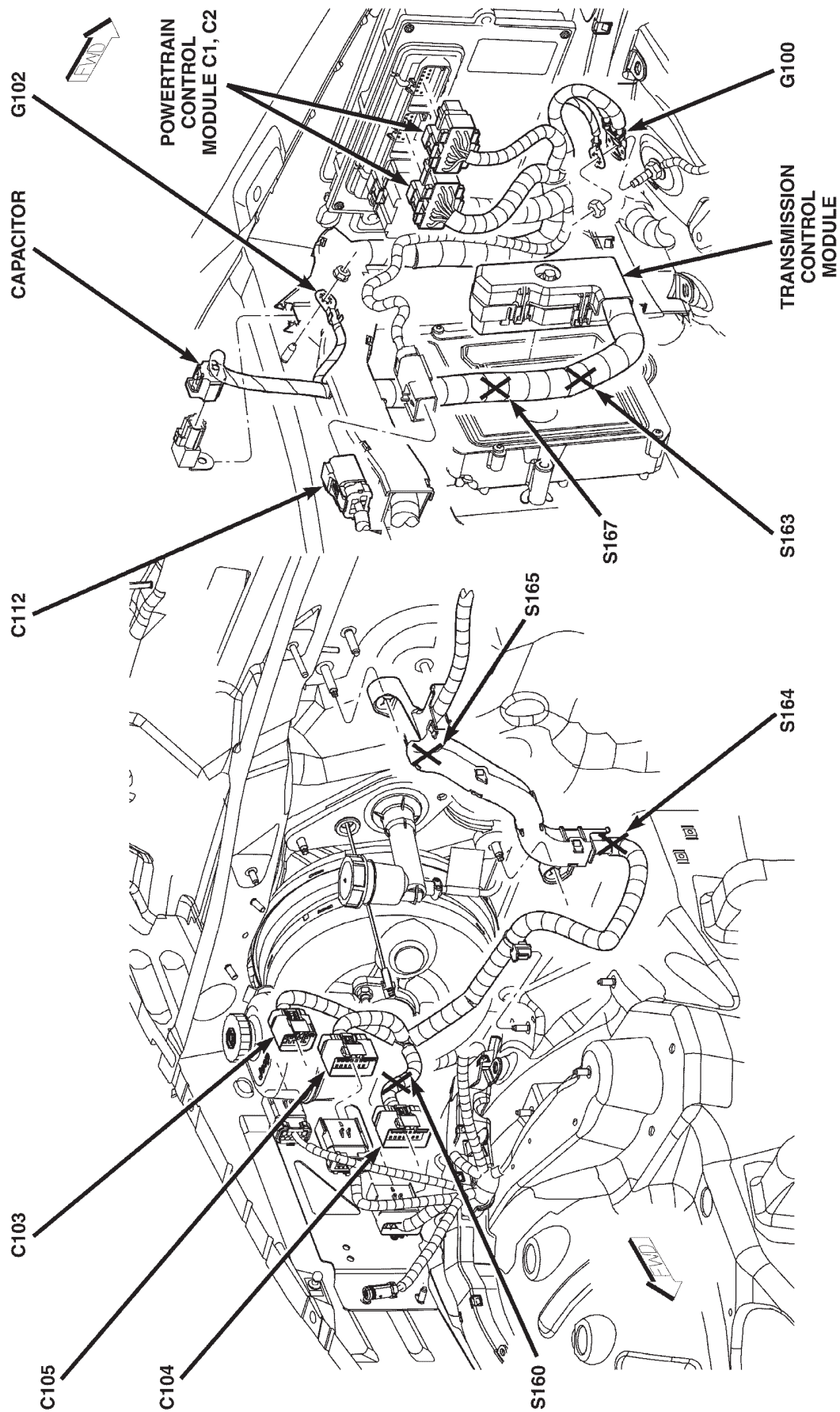


Fig. 9 LEFT SIDE ENGINE COMPARTMENT, 3.7L

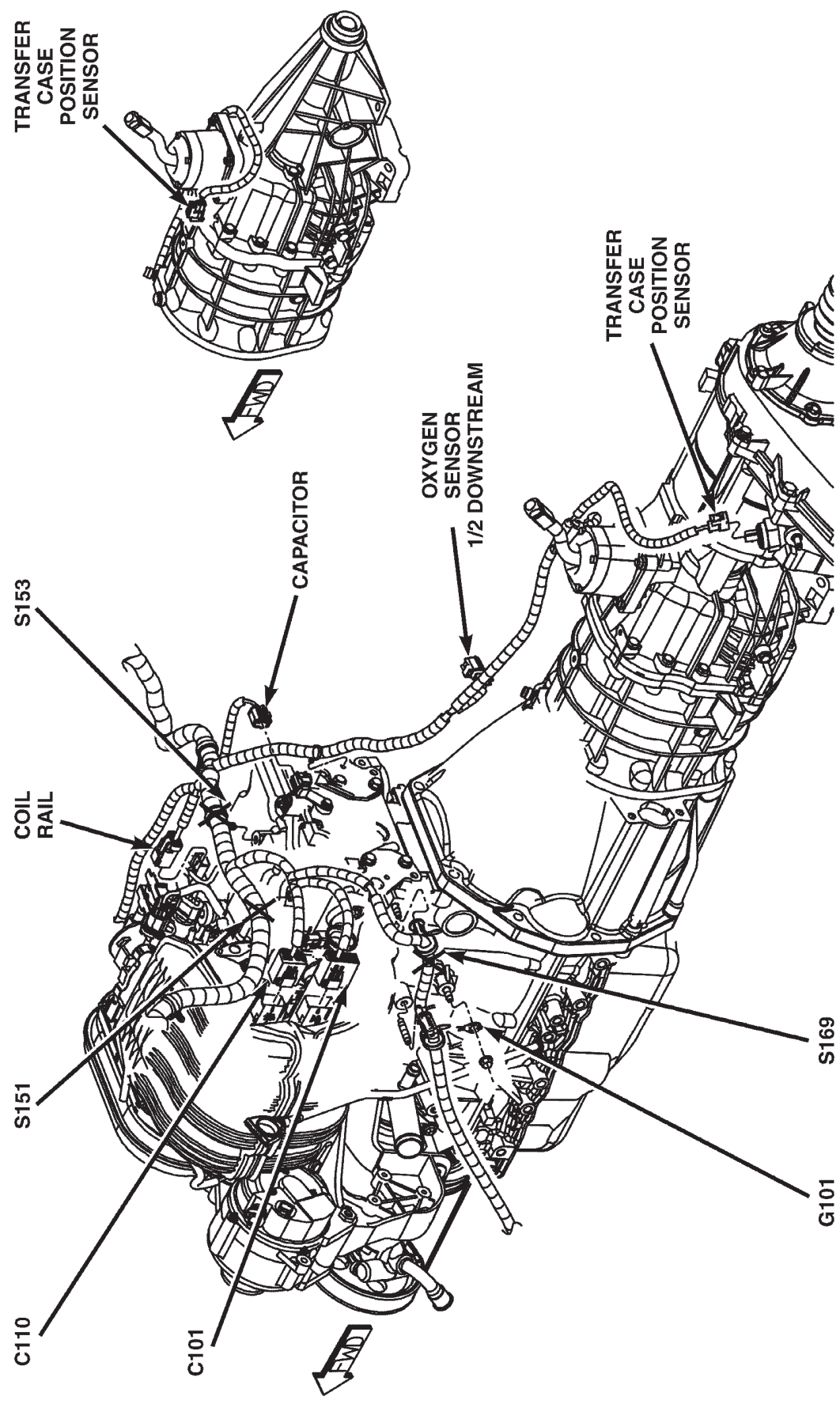
CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4dc9

Fig. 10 RIGHT SIDE ENGINE COMPARTMENT, 3.7L, RHD

CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4dd7

Fig. 11 ENGINE/TRANSMISSION, 2.4L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

80ce4cddb

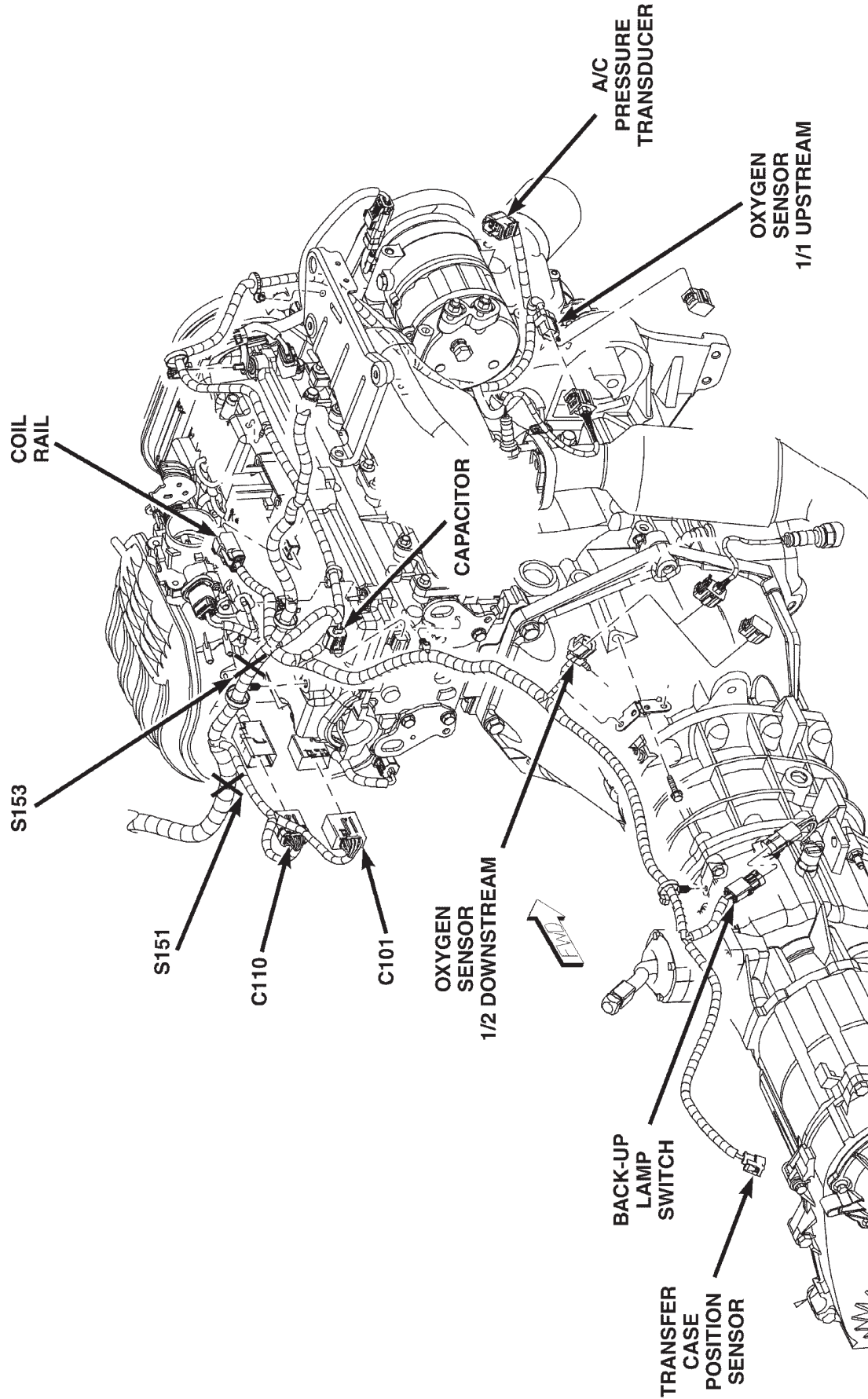
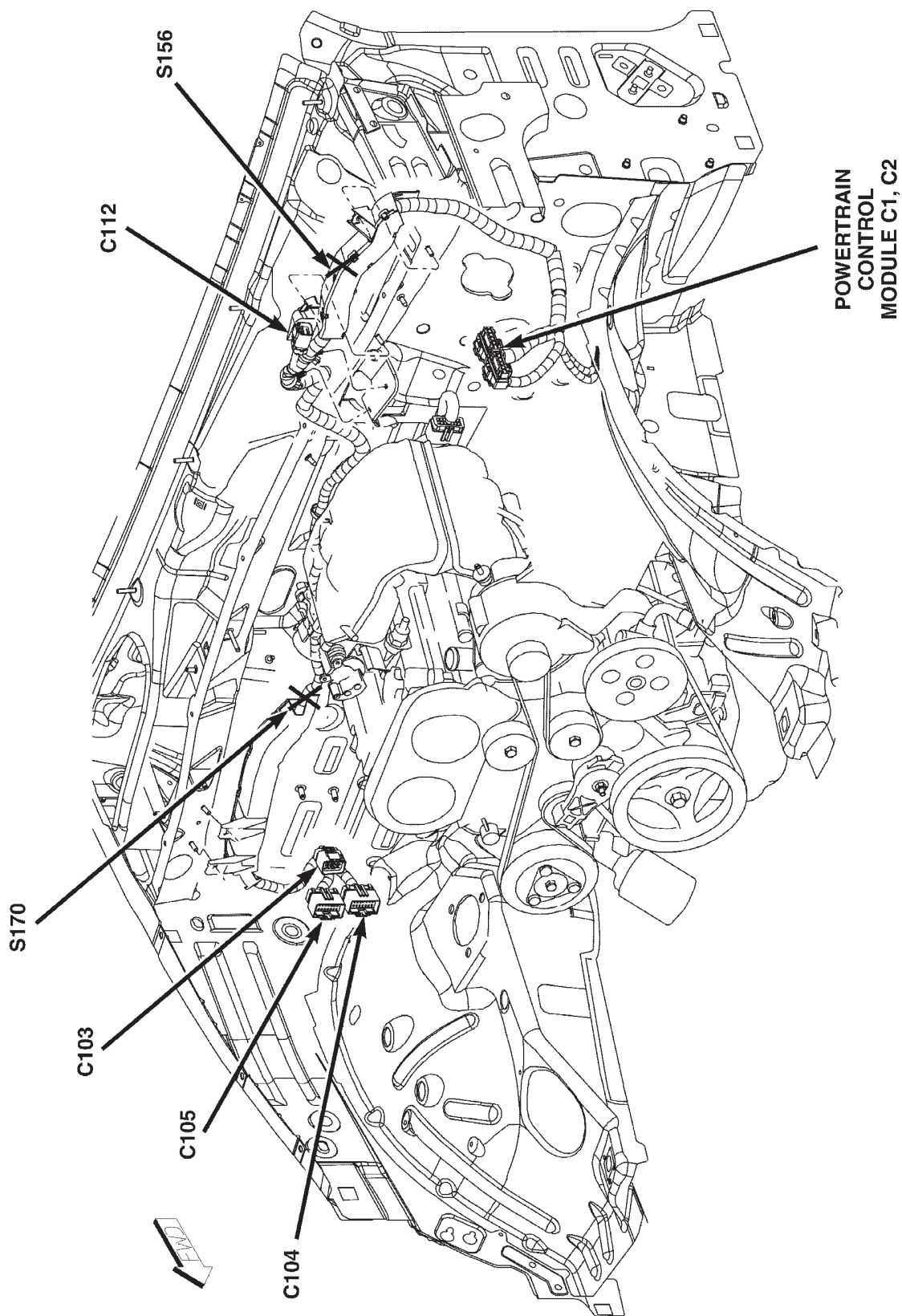


Fig. 12 ENGINE/TRANSMISSION, 2.4L

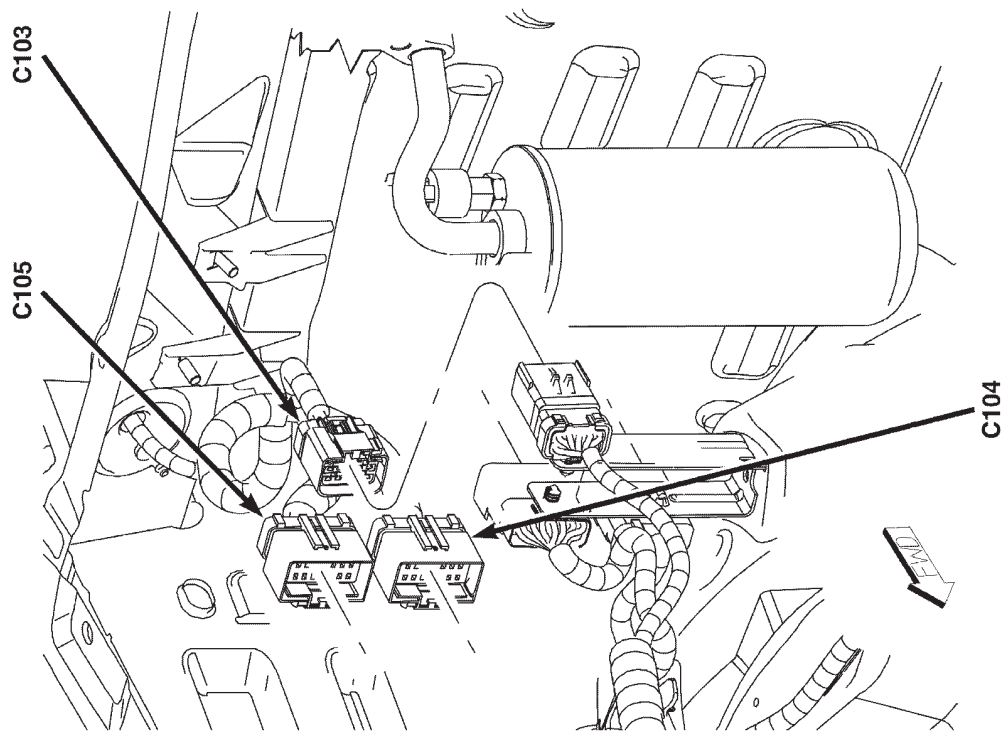
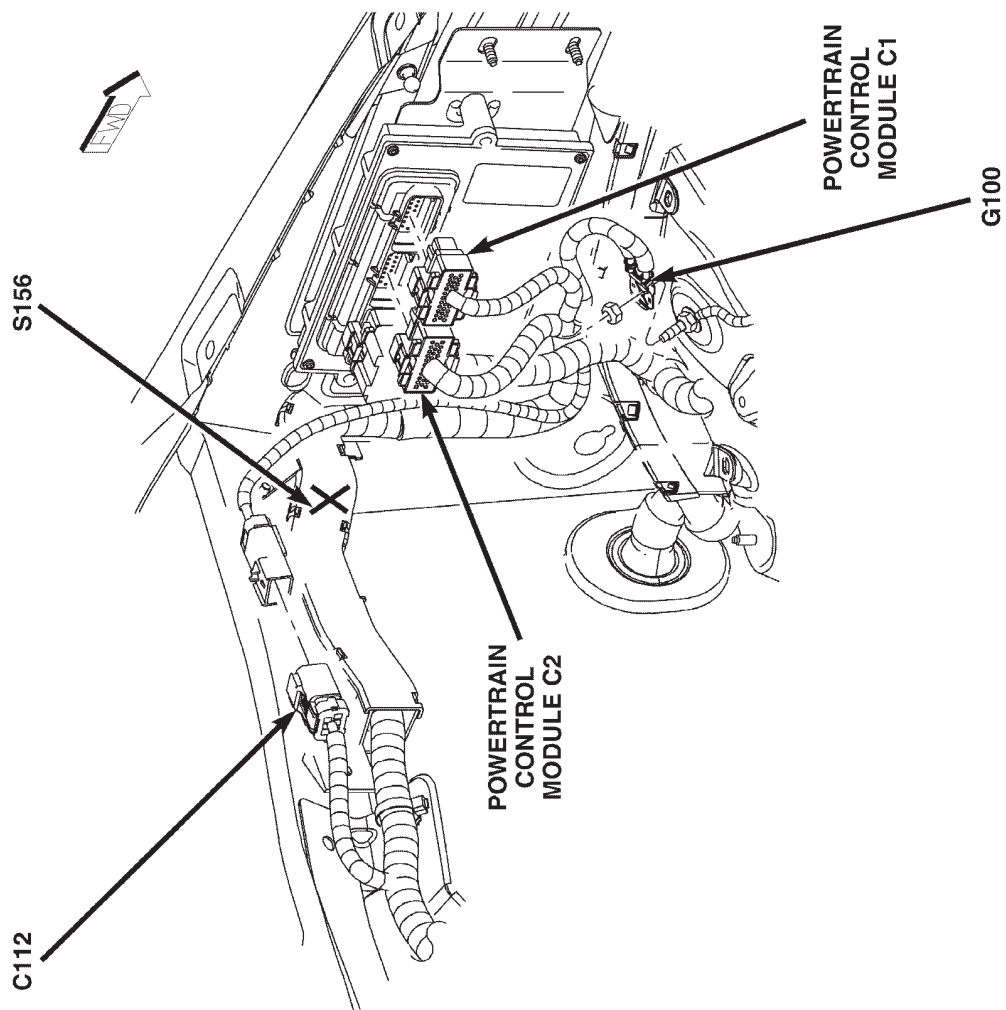
CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4de0

Fig. 13 ENGINE COMPARTMENT, 2.4L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4de7

Fig. 14 RIGHT REAR ENGINE COMPARTMENT, 2.4L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

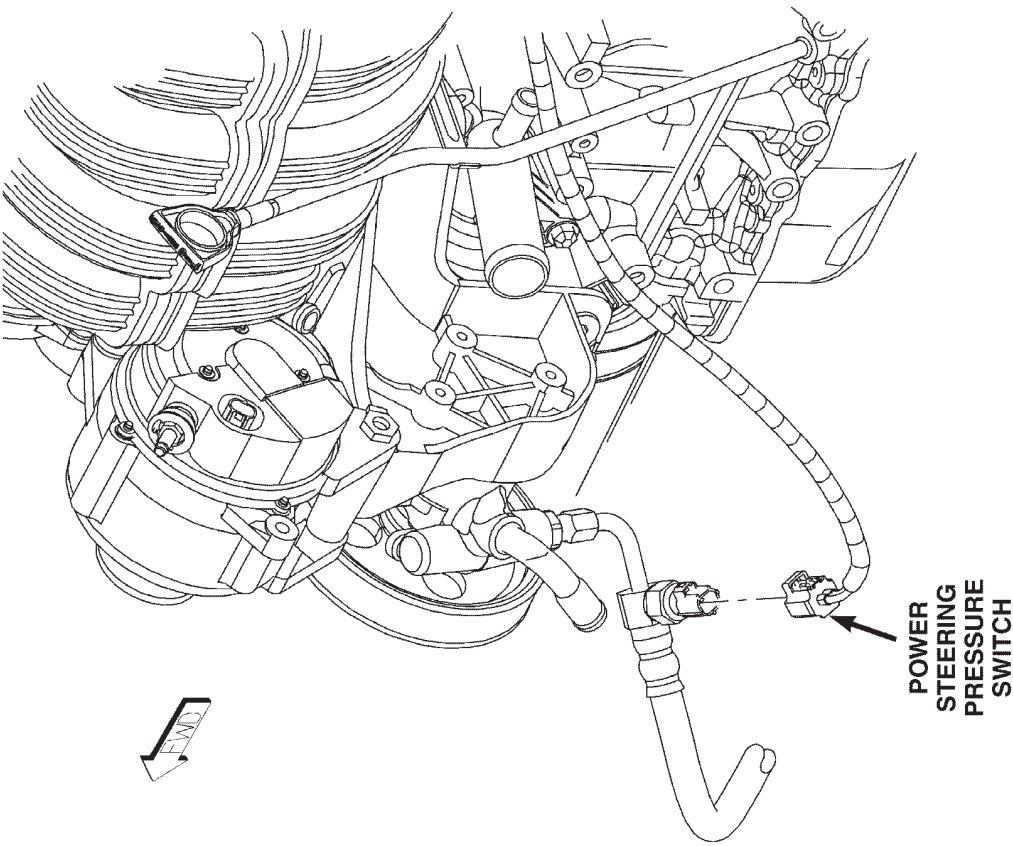
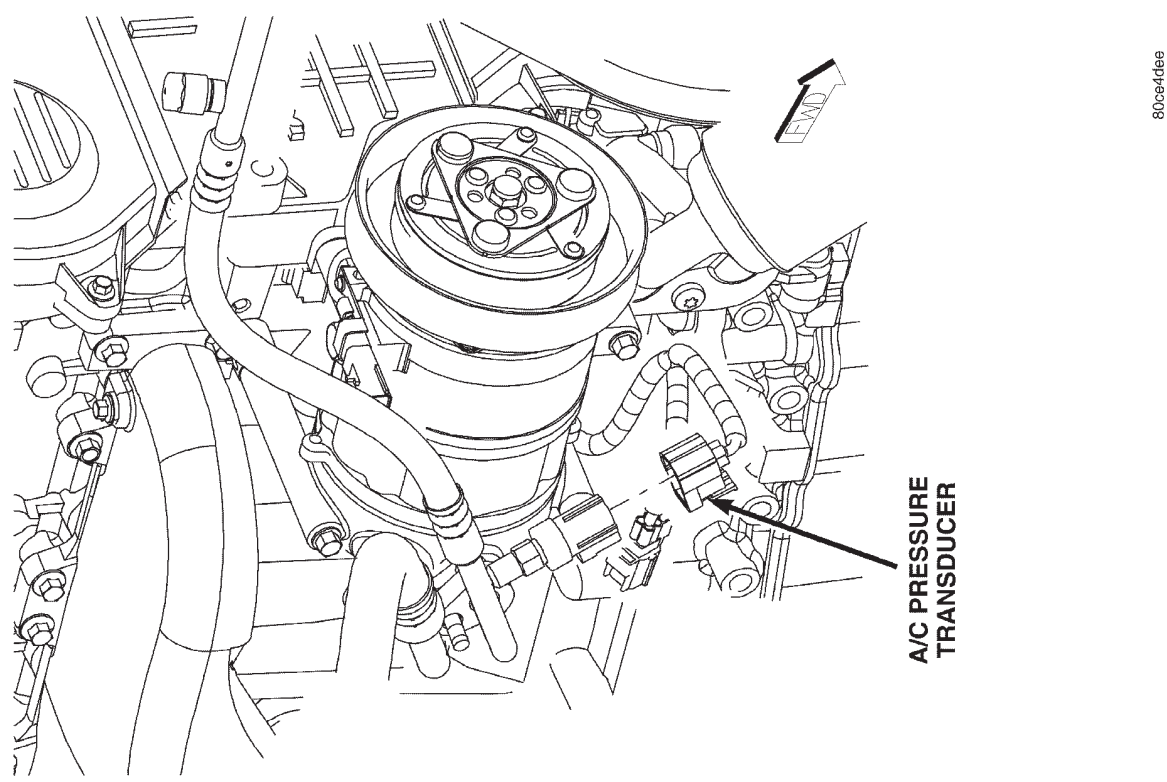
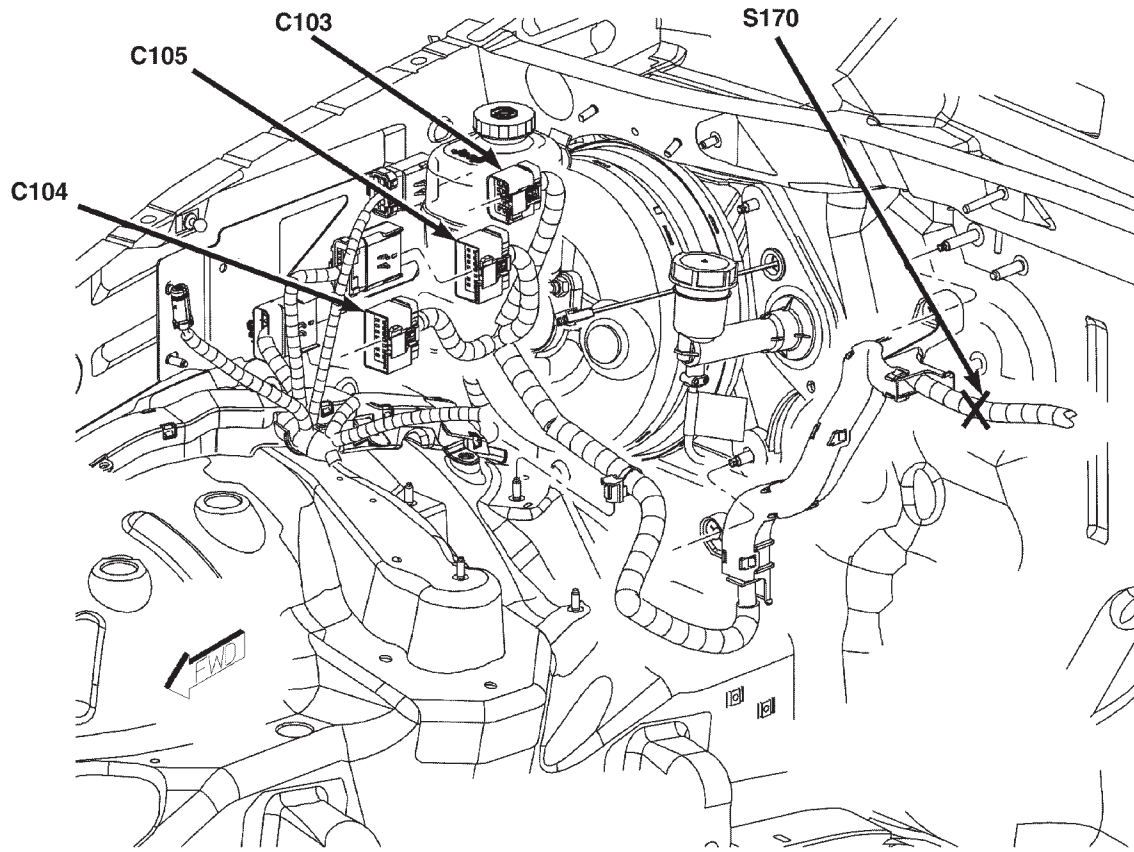


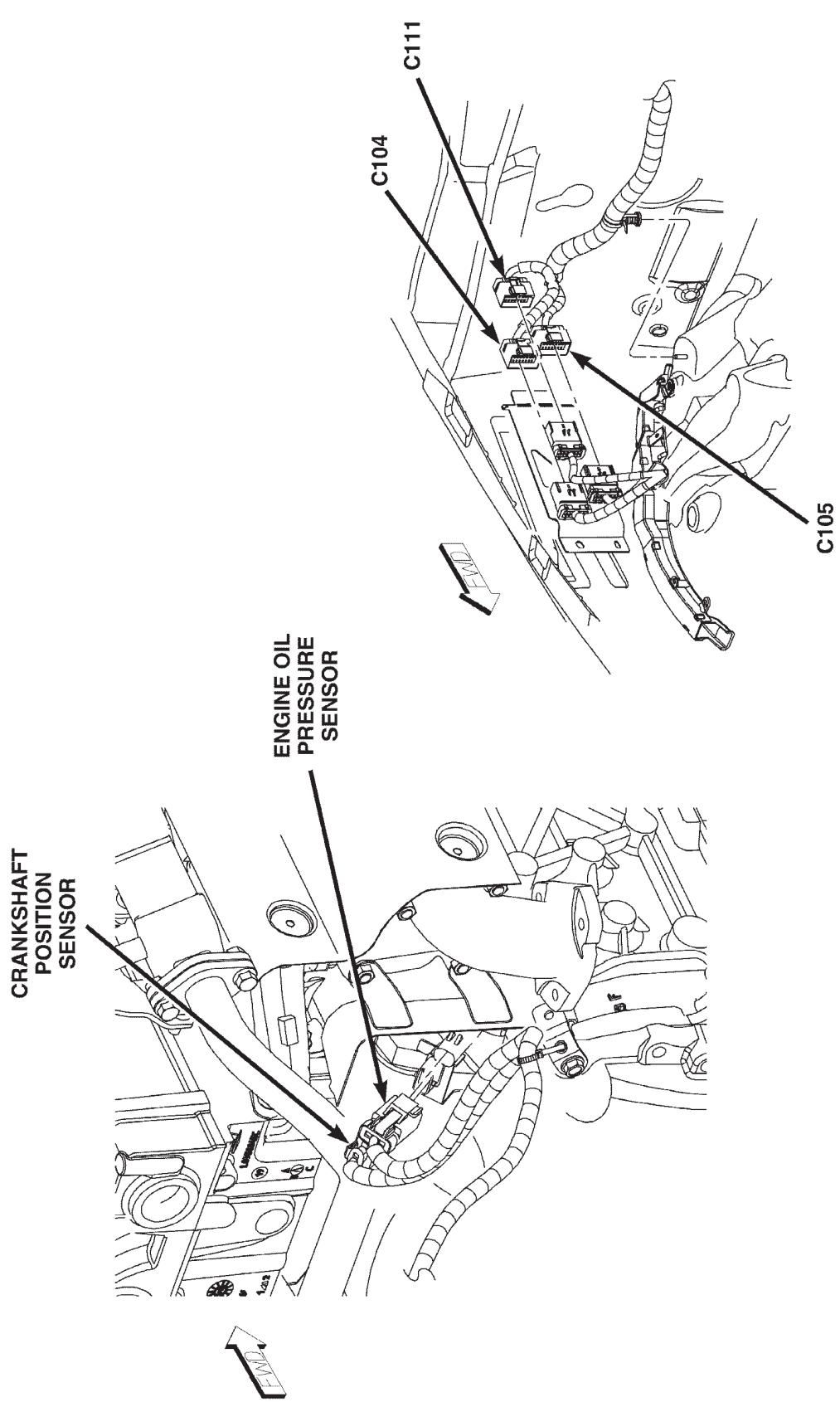
Fig. 15 ENGINE, 2.4L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4df6

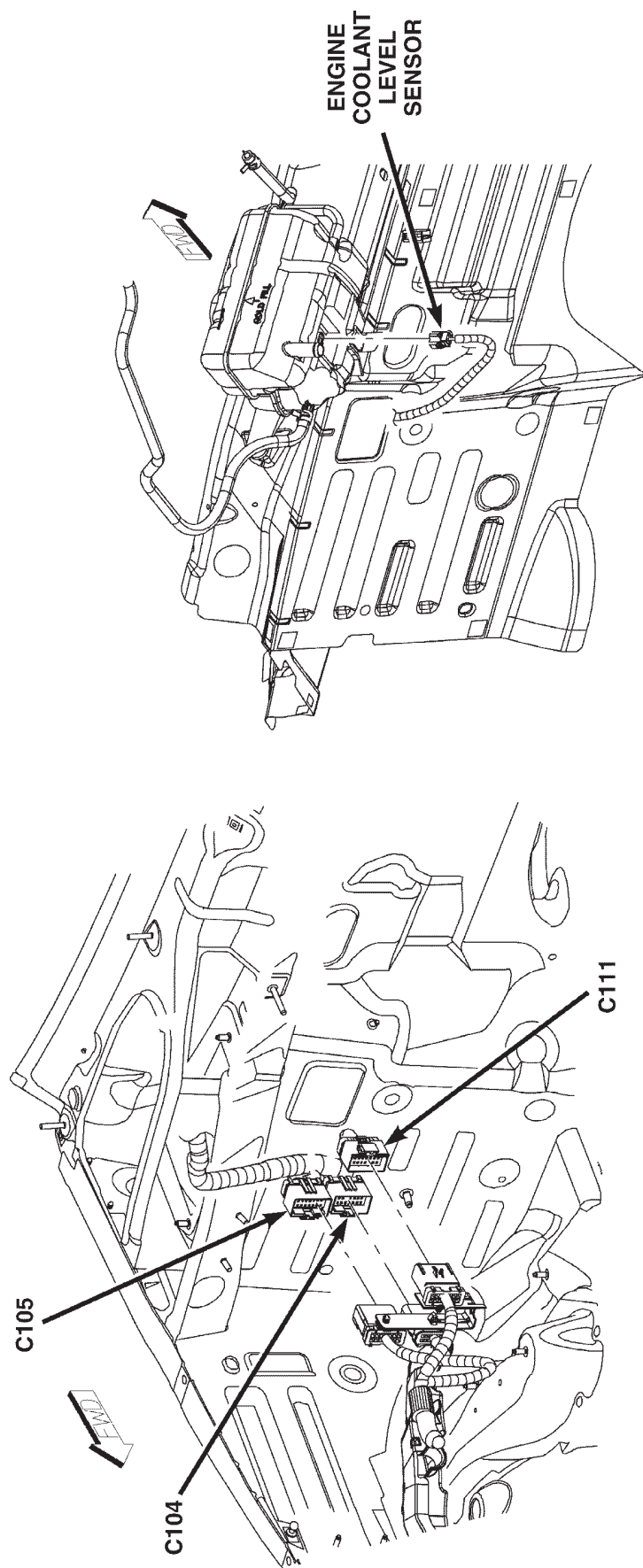
Fig. 16 RIGHT REAR ENGINE COMPARTMENT, 2.4L



80ce4dfc

Fig. 17 DIESEL ENGINE

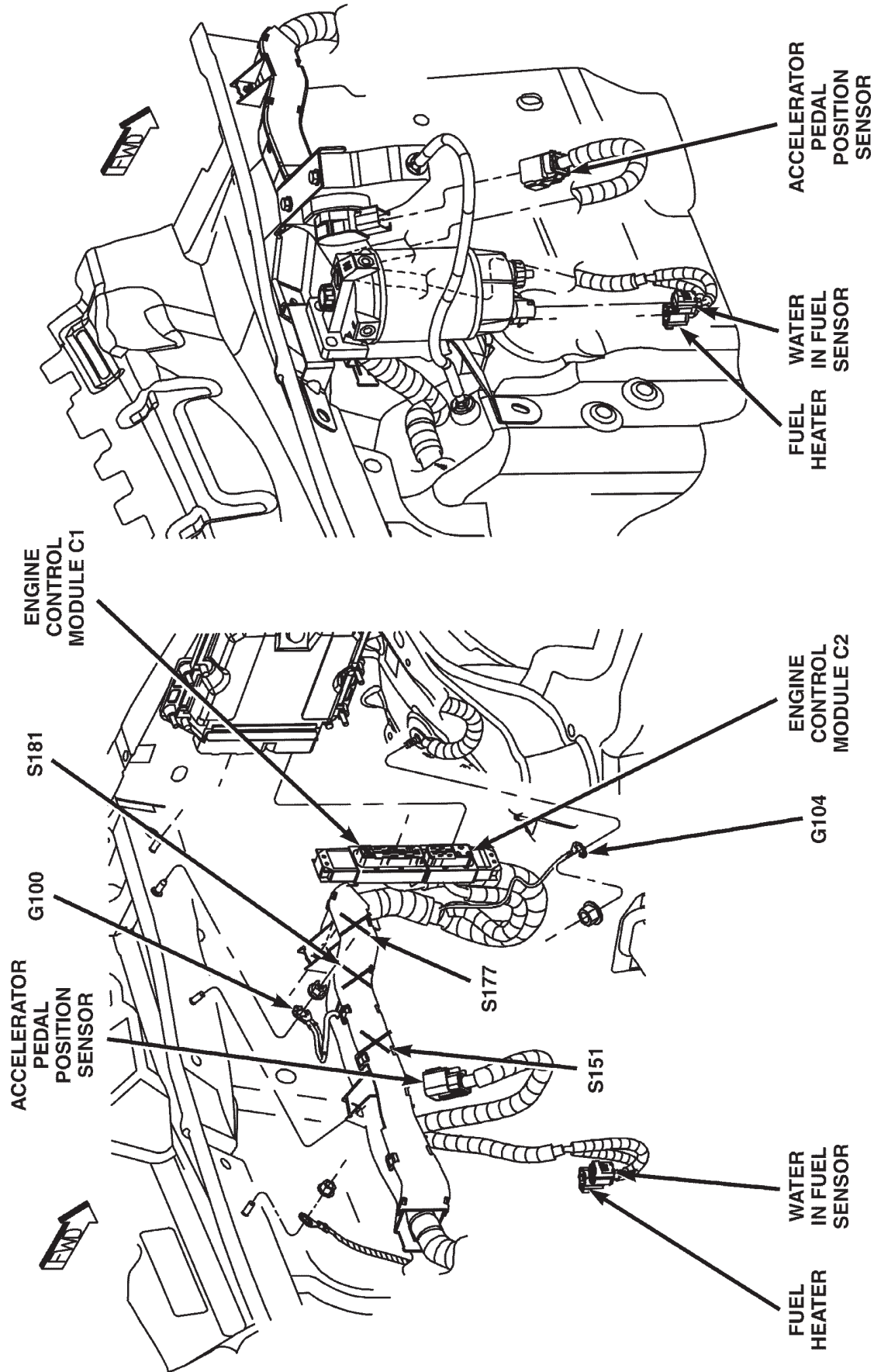
CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4e02

Fig. 18 DIESEL ENGINE COMPARTMENT

CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4e09

Fig. 19 DIESEL ENGINE COMPARTMENT

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

80ce4e10

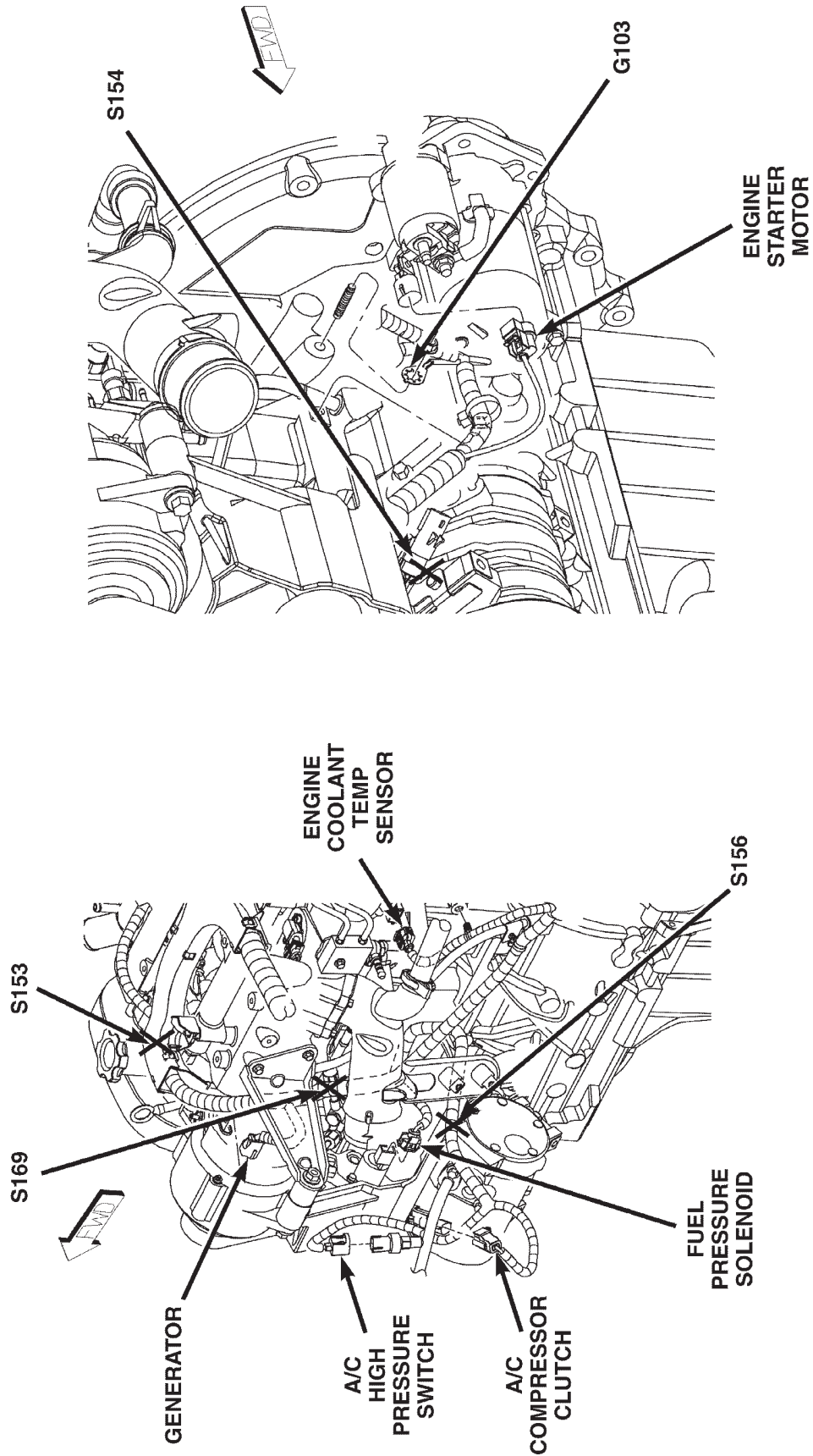


Fig. 20 LEFT SIDE DIESEL ENGINE

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

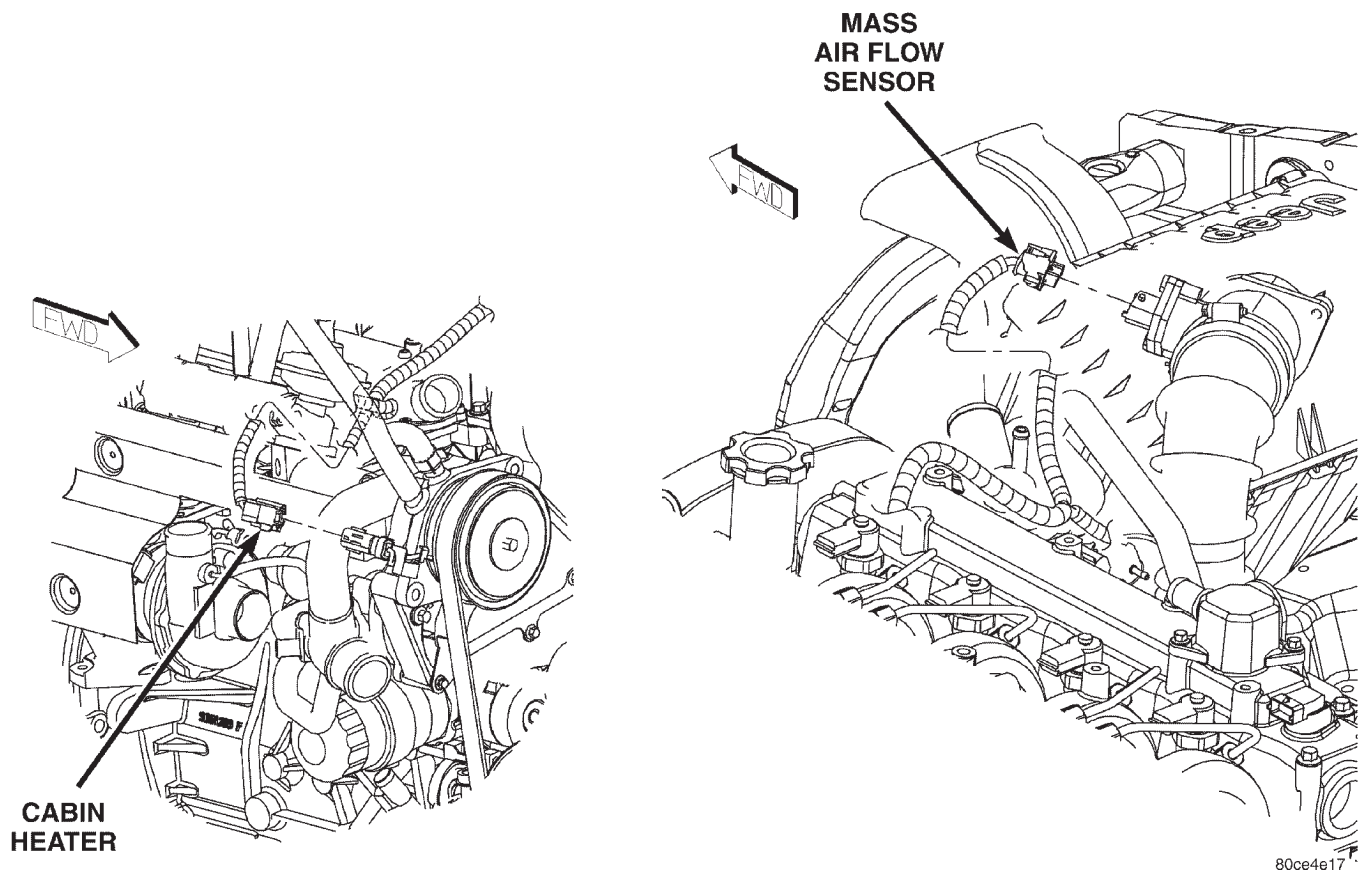
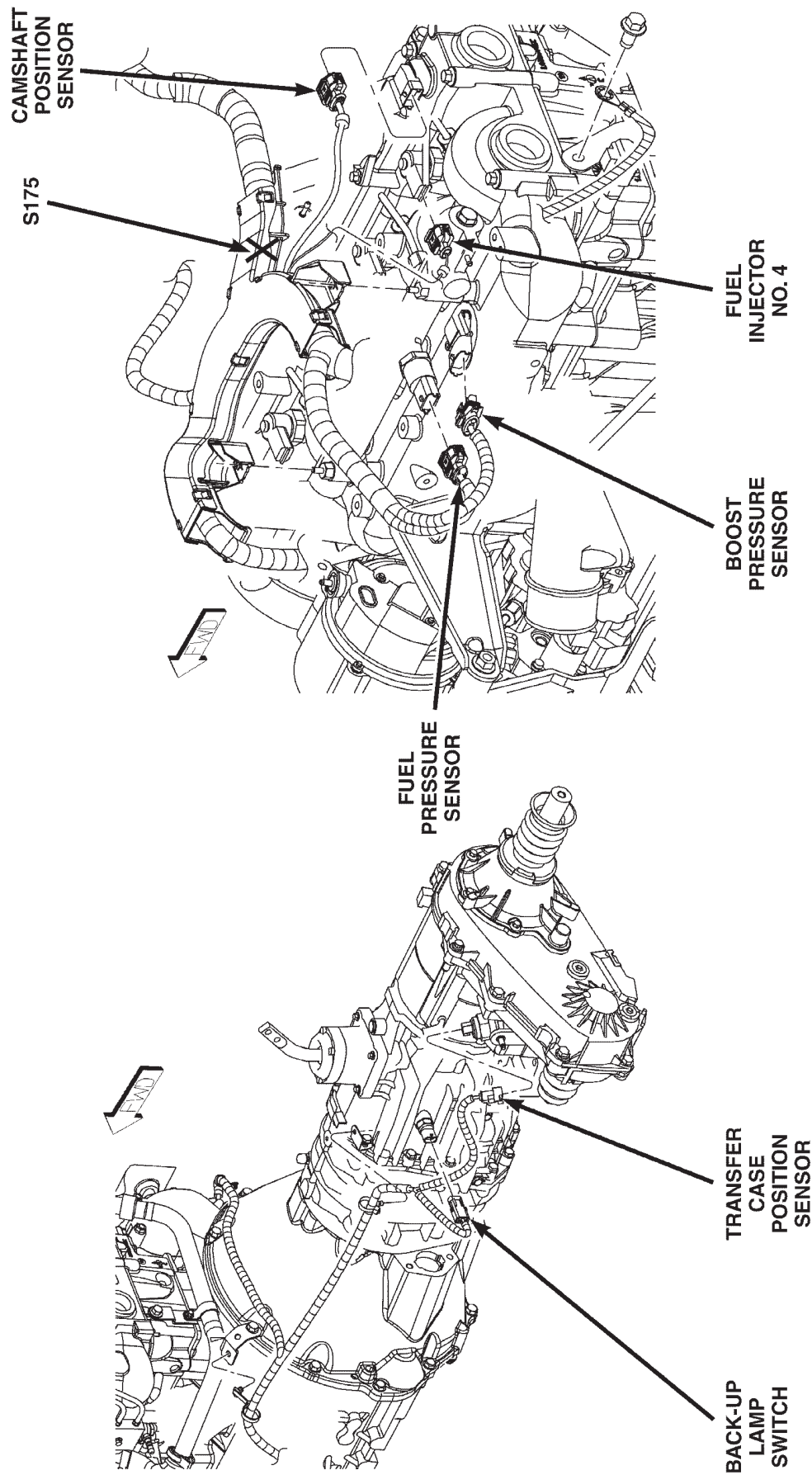


Fig. 21 FRONT DIESEL ENGINE

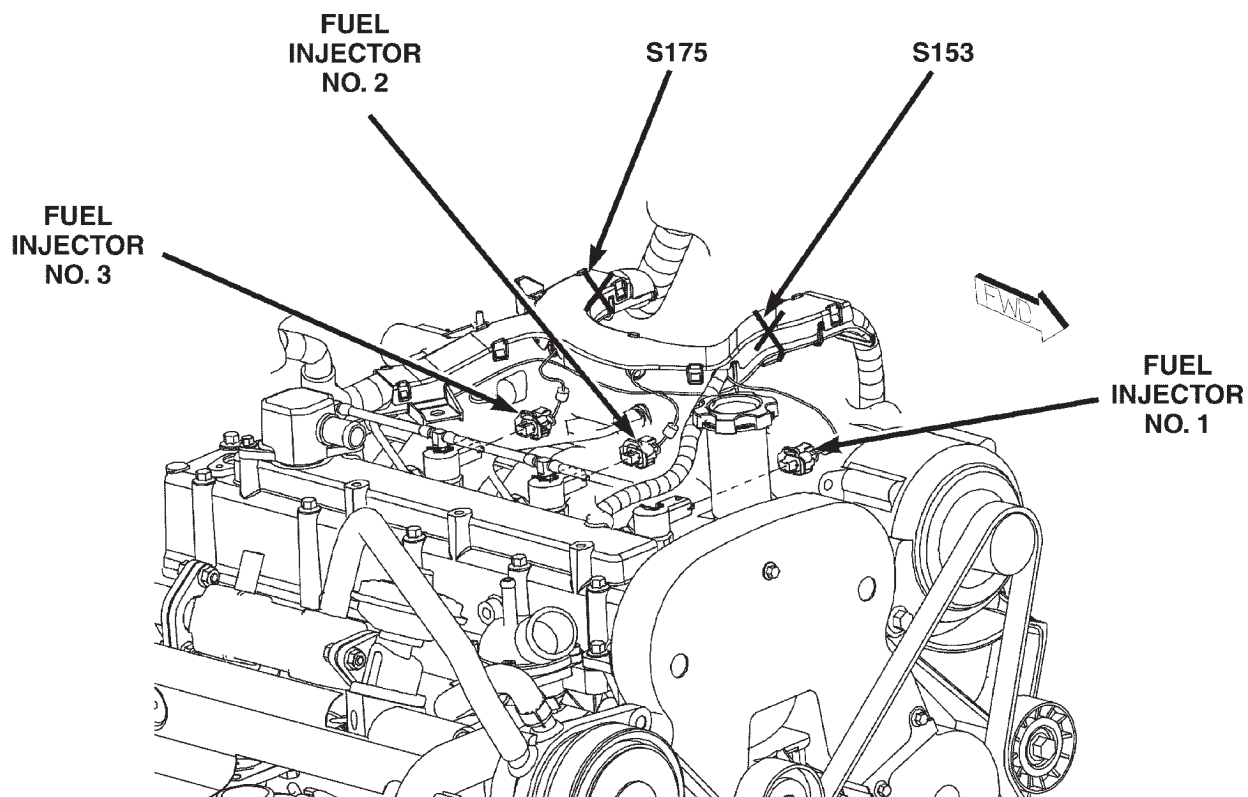
CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4e25

Fig. 22 REAR DIESEL ENGINE

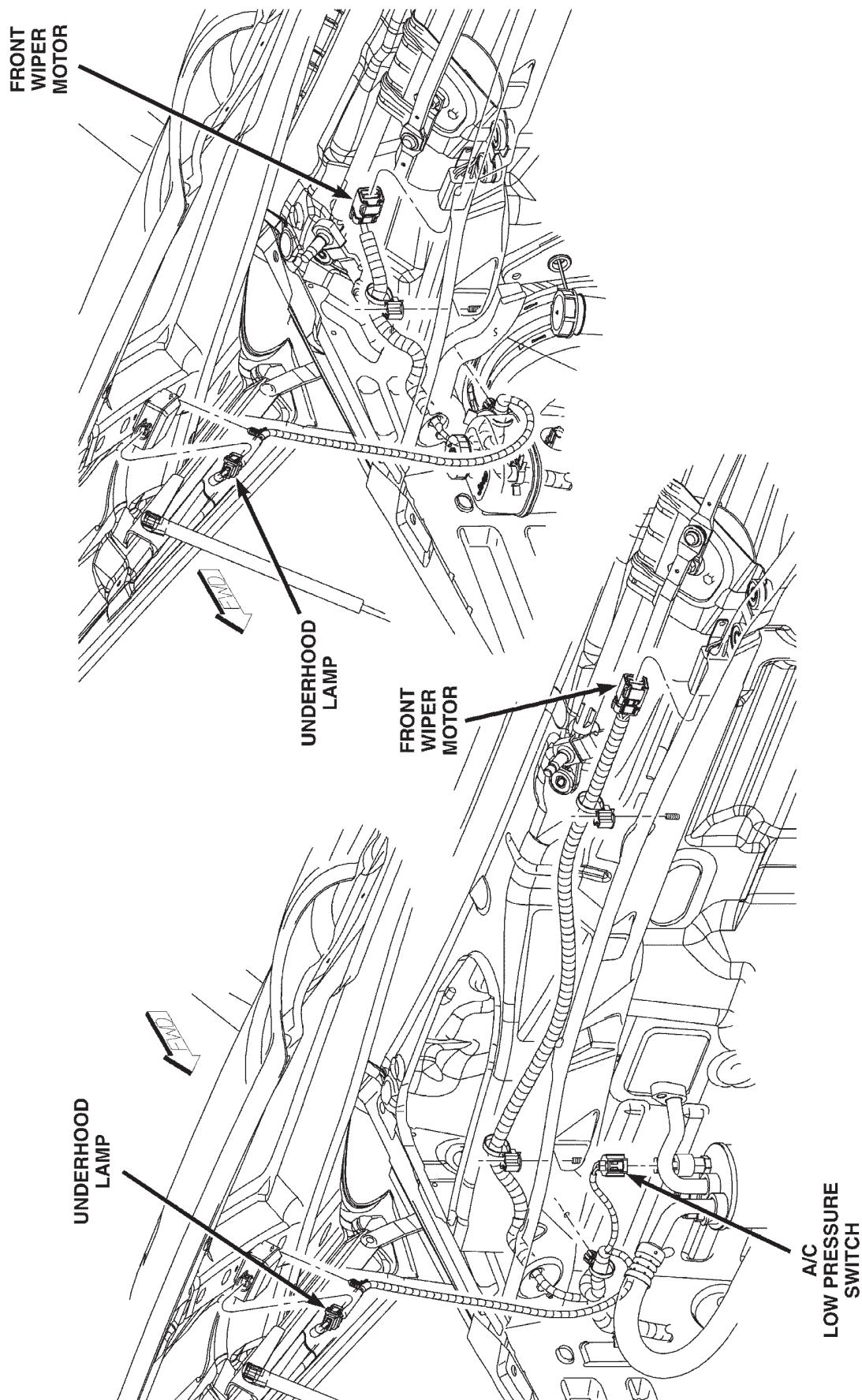
CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4e32

Fig. 23 TOP DIESEL ENGINE

CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4e43

Fig. 24 LEFT SIDE ENGINE COMPARTMENT

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

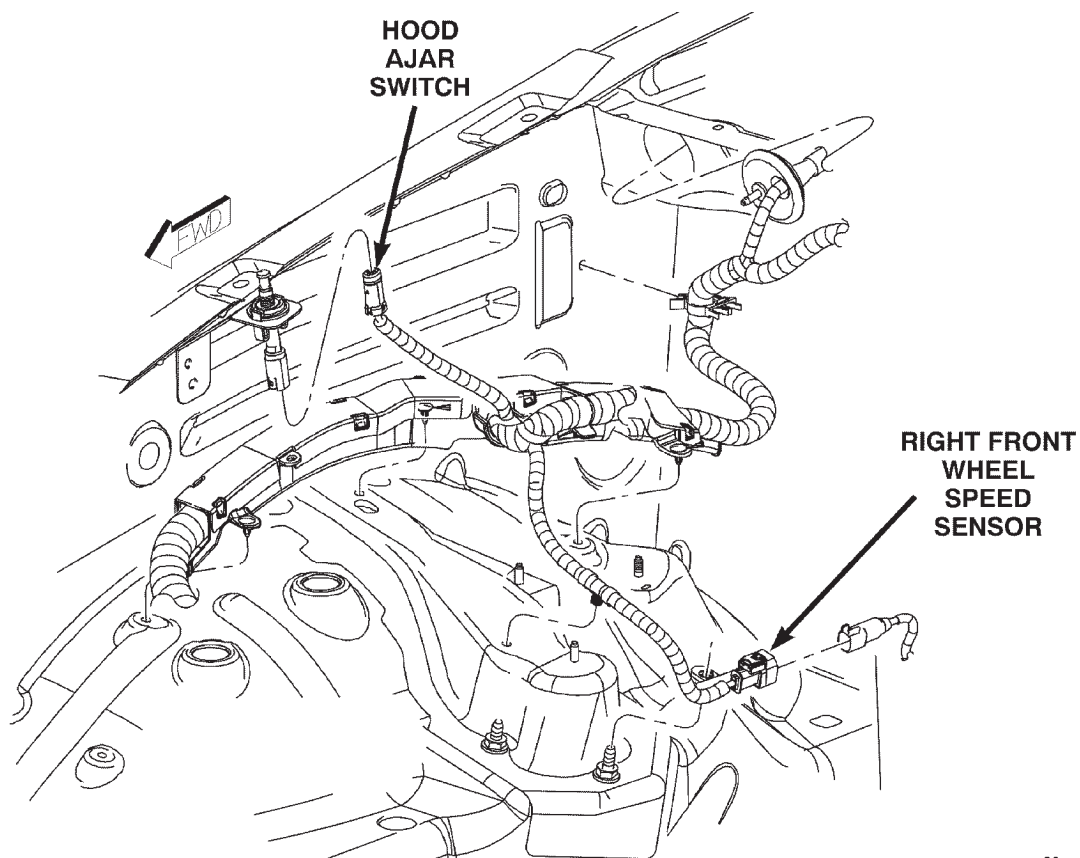


Fig. 25 RIGHT SIDE ENGINE COMPARTMENT

80ce4e53

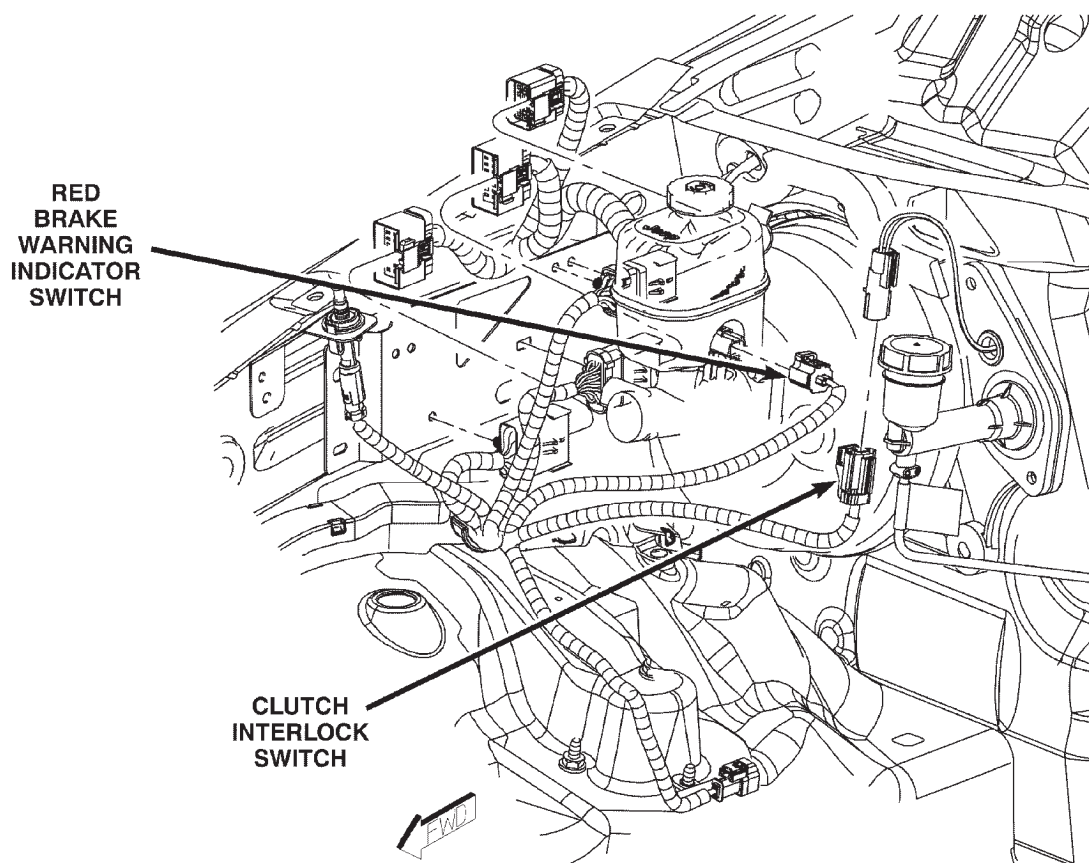
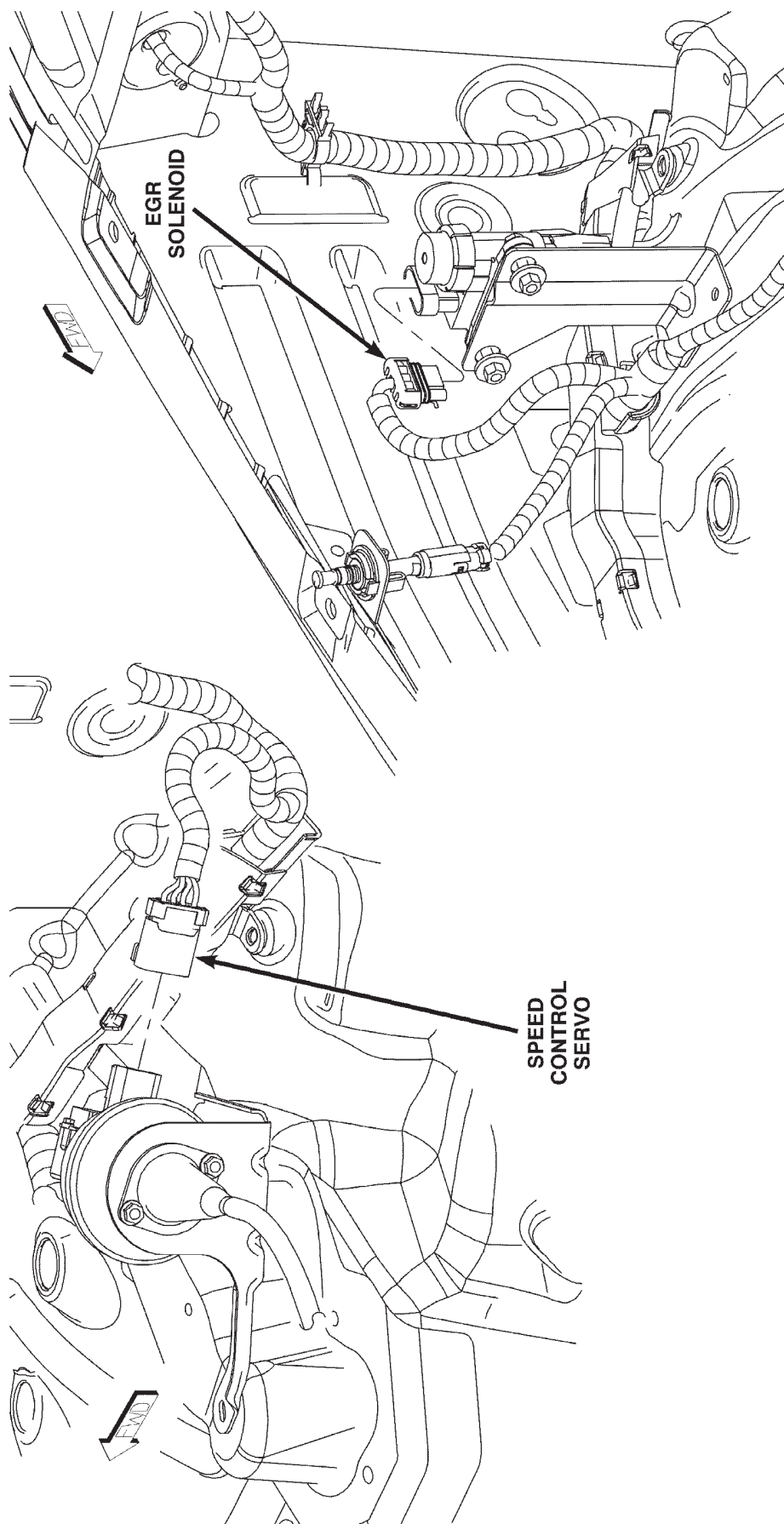


Fig. 26 RIGHT SIDE ENGINE COMPARTMENT, RHD

80ce4e5a

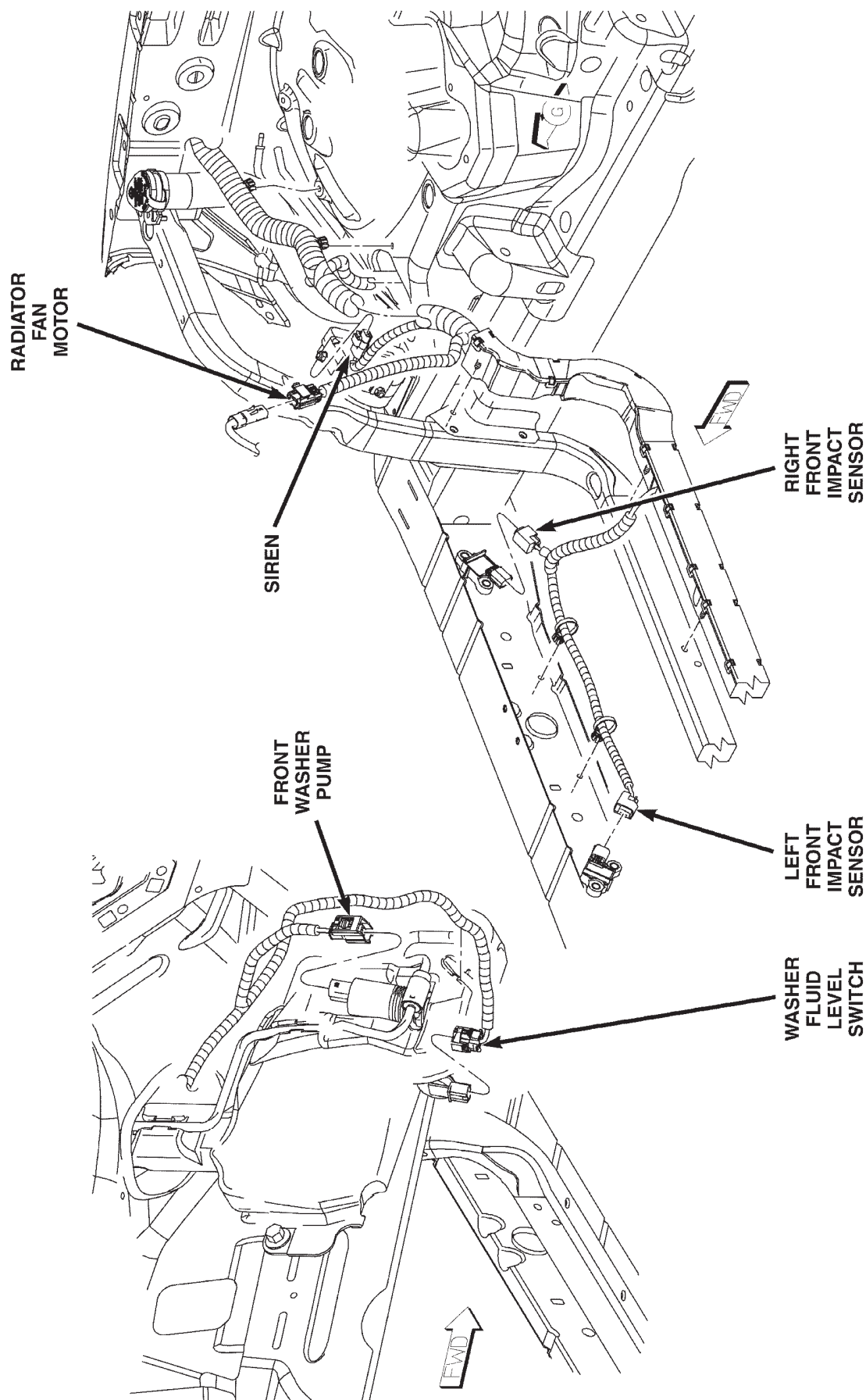
CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4e5e

Fig. 27 ENGINE COMPARTMENT

CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4e89

Fig. 28 ENGINE COMPARTMENT

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

80ce4e96

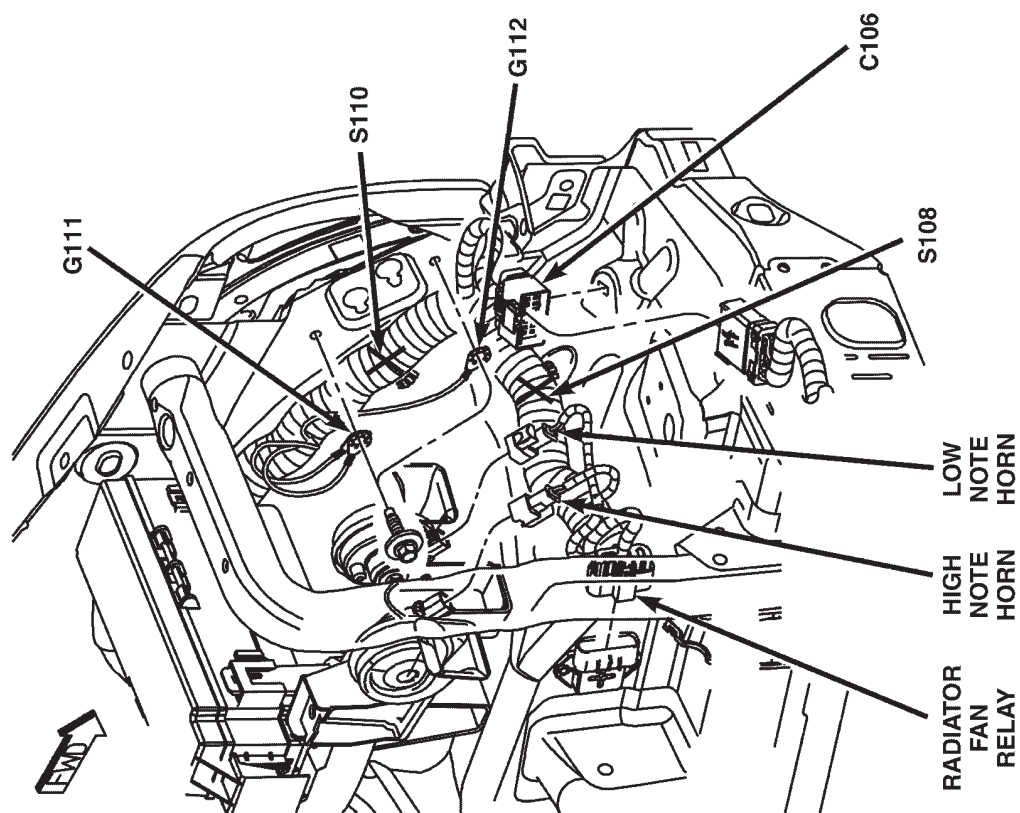
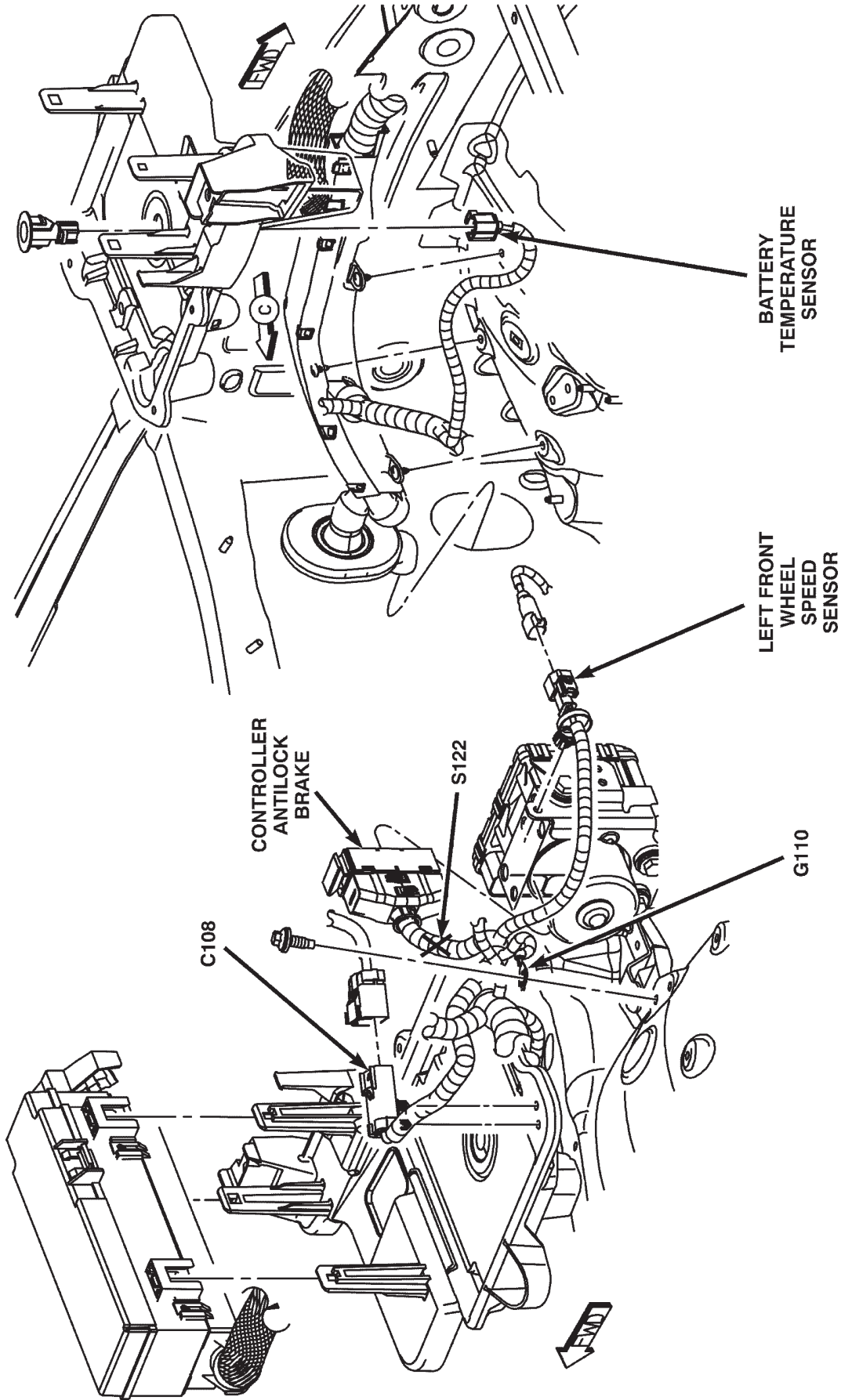


Fig. 29 FRONT ENGINE COMPARTMENT

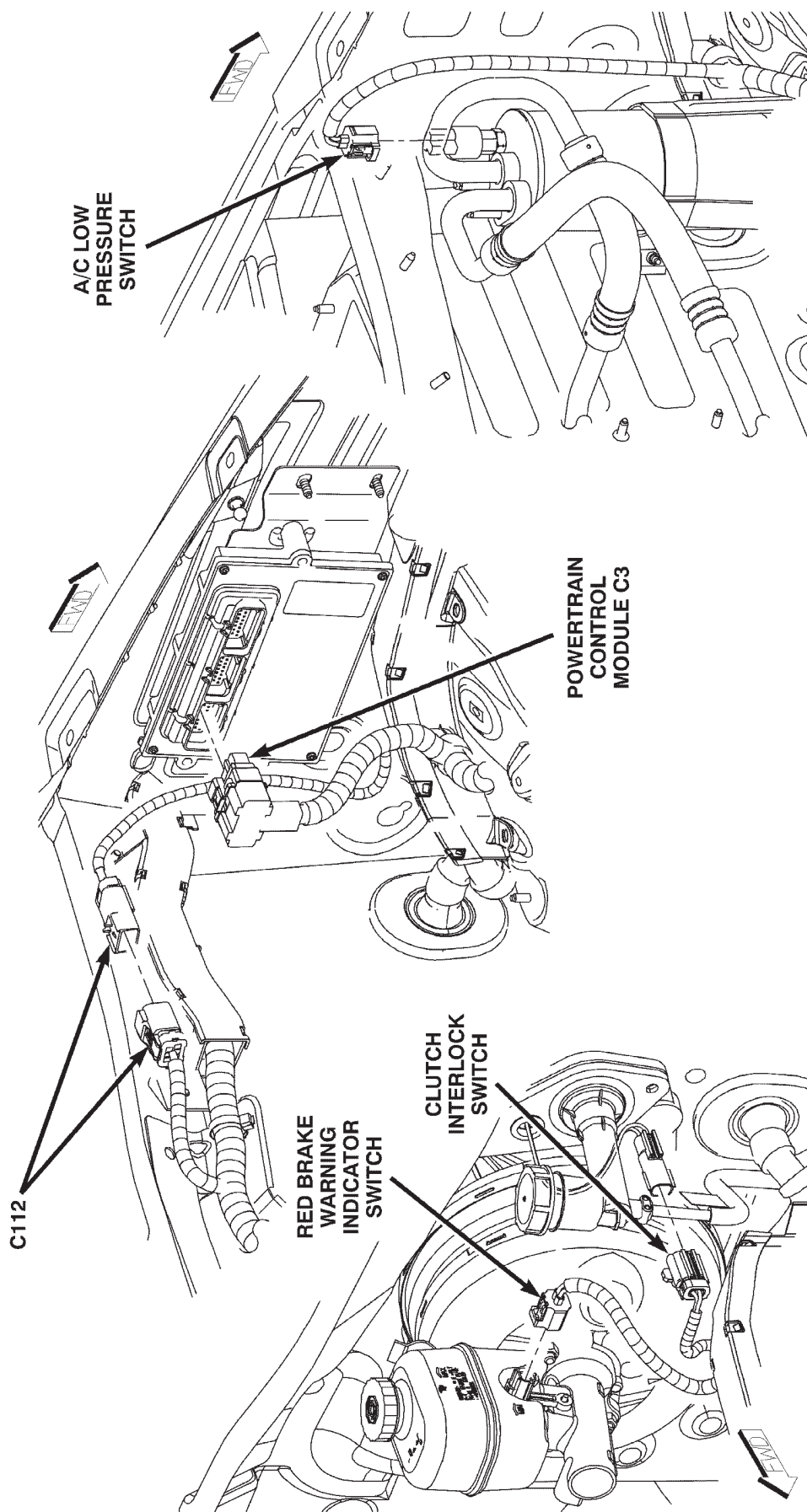
CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4ea1

Fig. 30 LEFT SIDE ENGINE COMPARTMENT

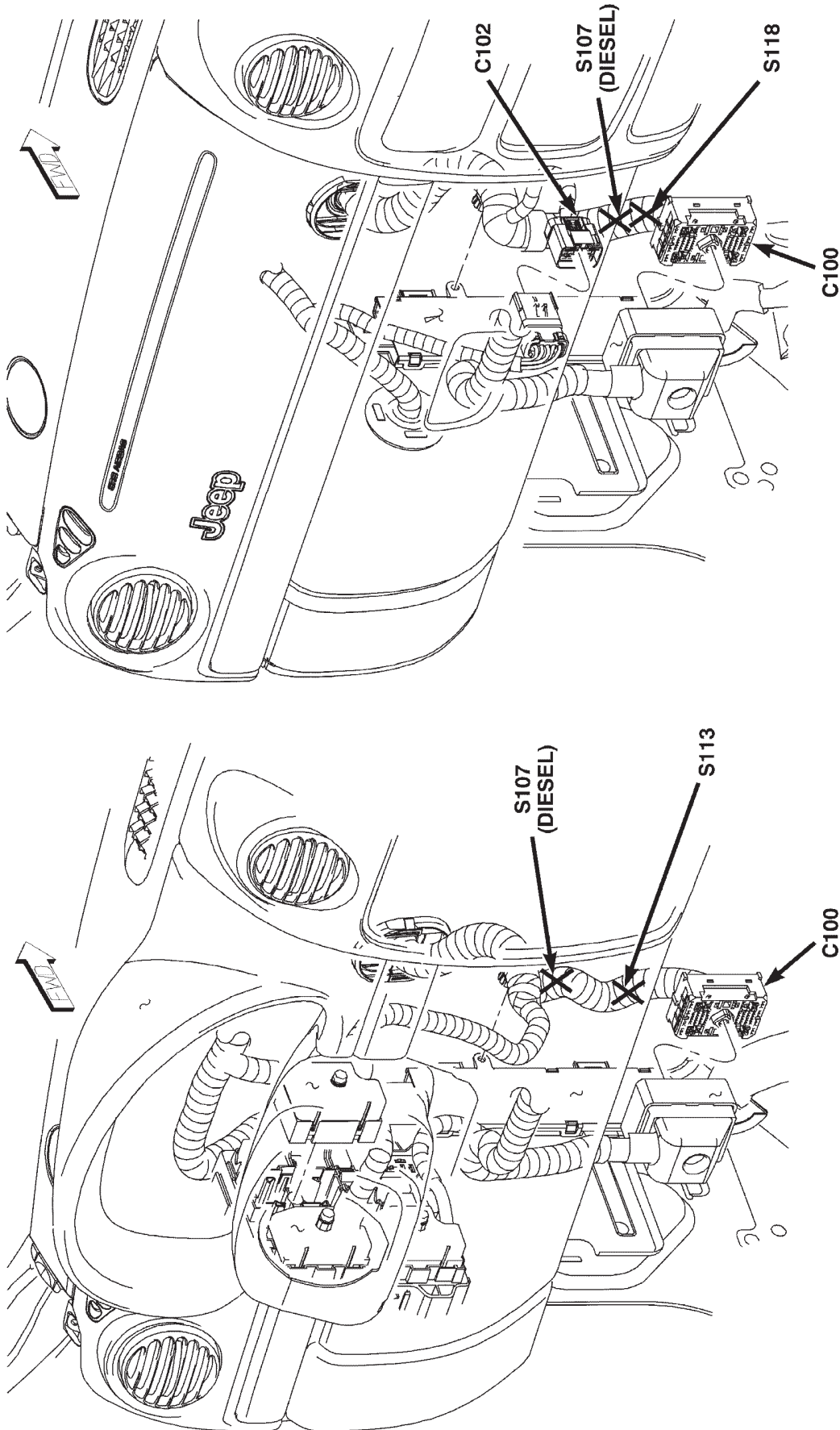
CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4ea5

Fig. 31 REAR ENGINE COMPARTMENT, RHD

CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4eb8

Fig. 32 ENGINE TO INSTRUMENT PANEL

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

80ce4ef9

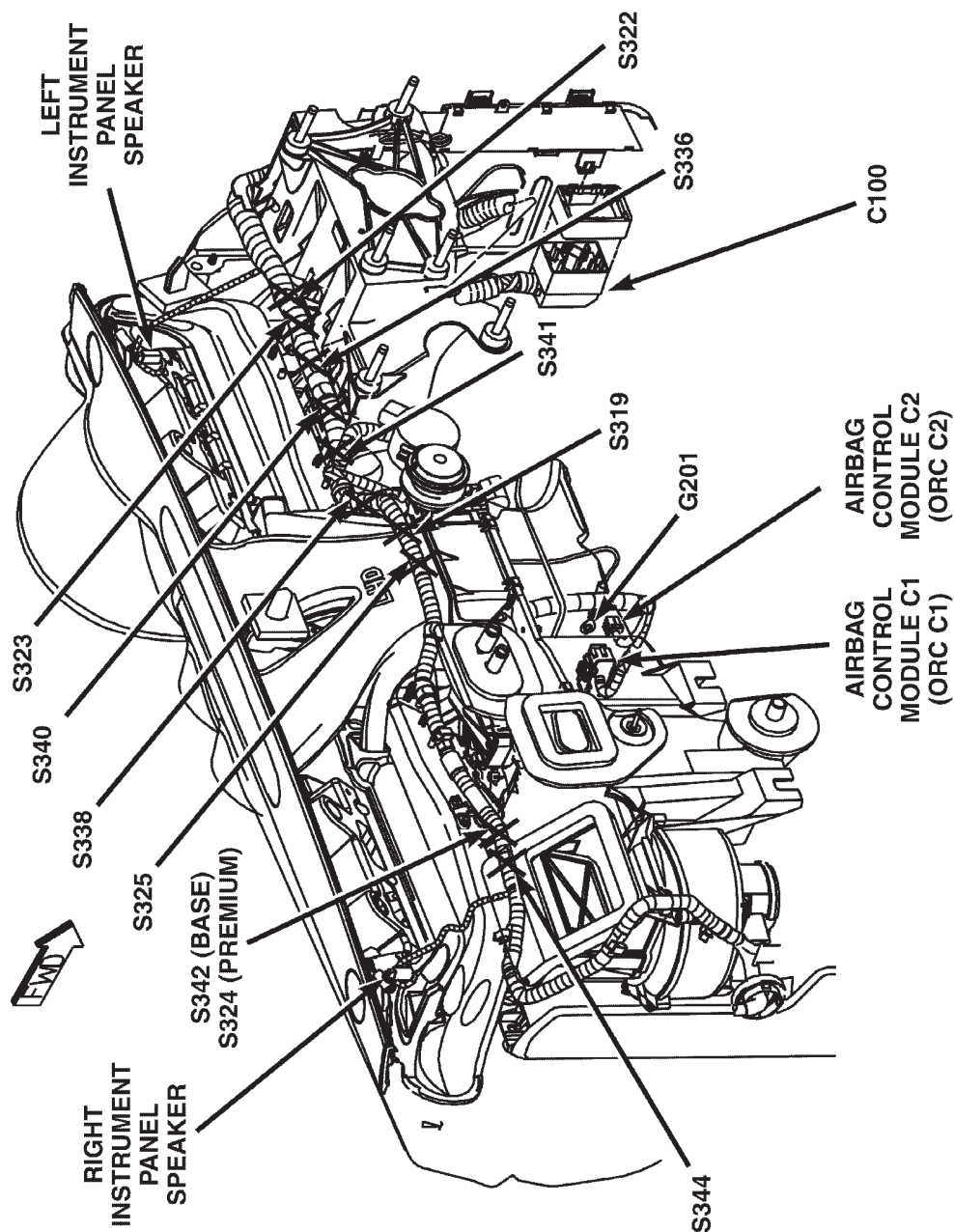


Fig. 33 INSTRUMENT PANEL, LHD

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

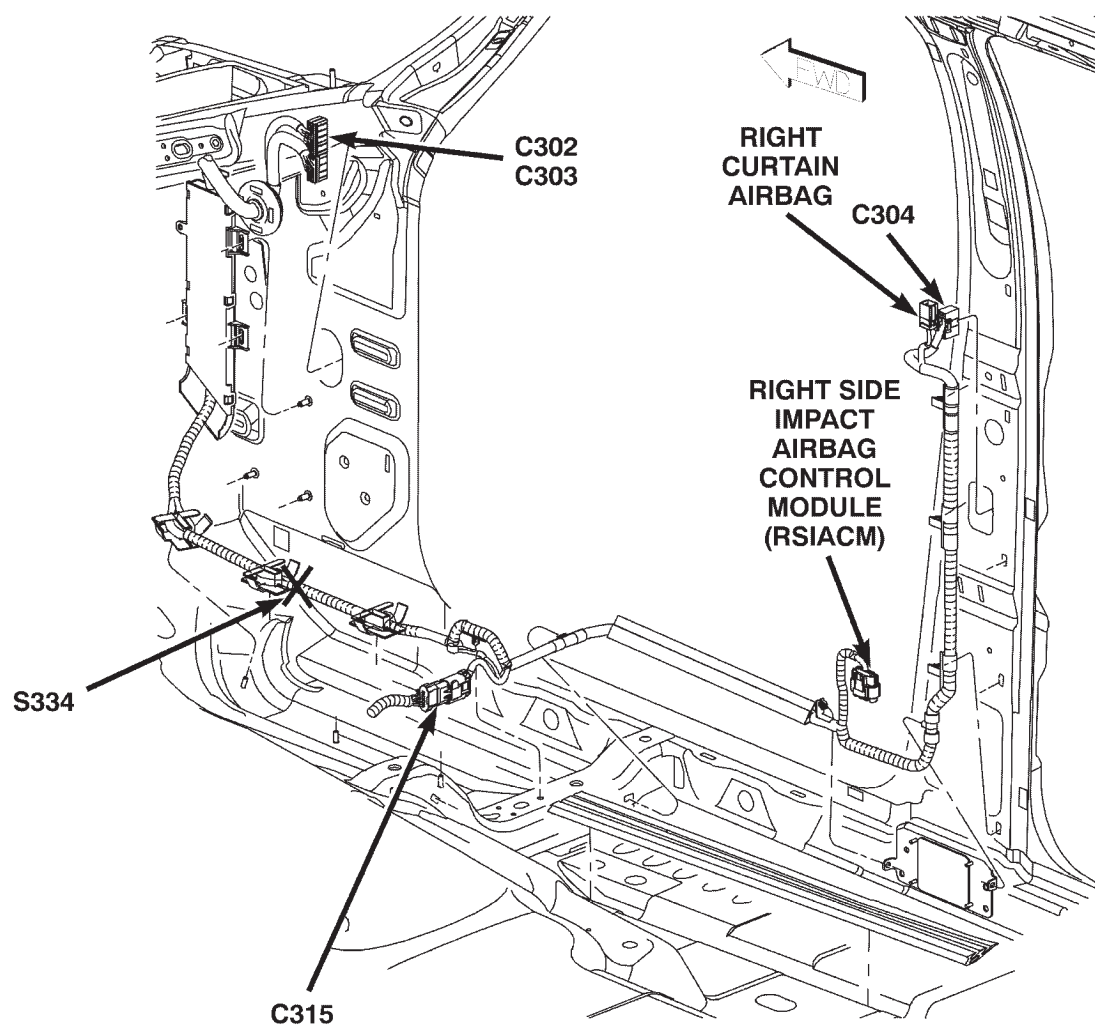
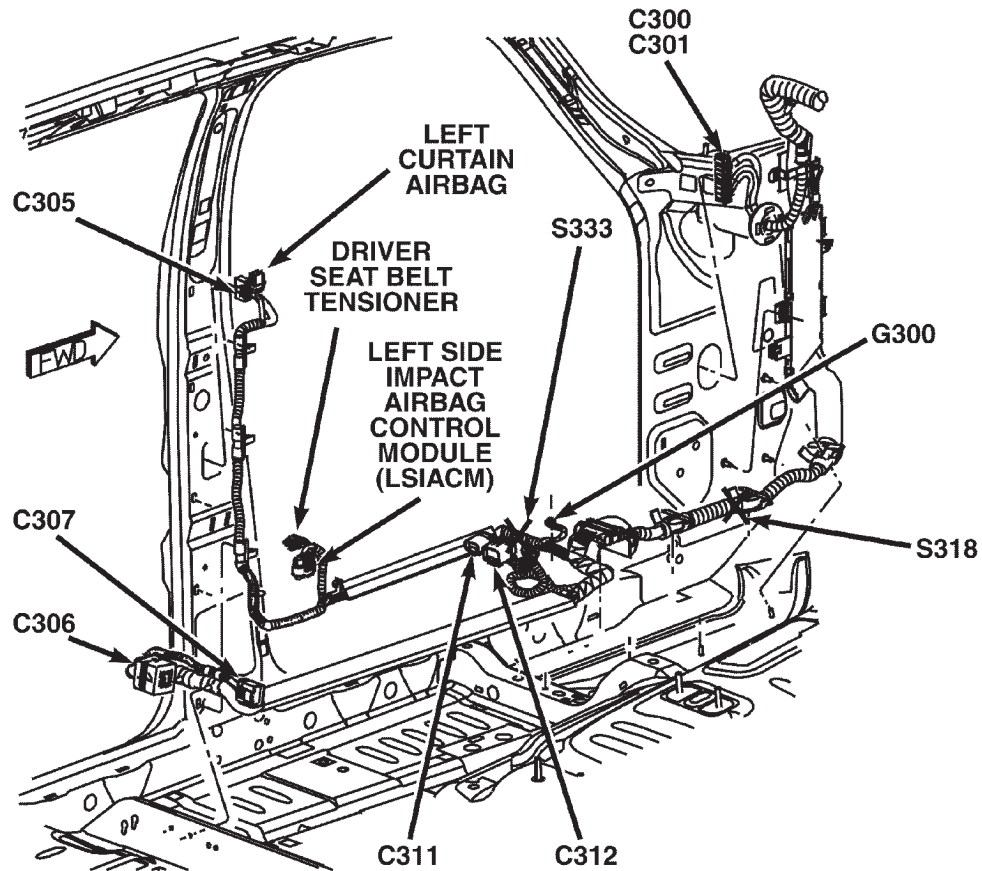


Fig. 34 RIGHT FRONT BODY, LHD

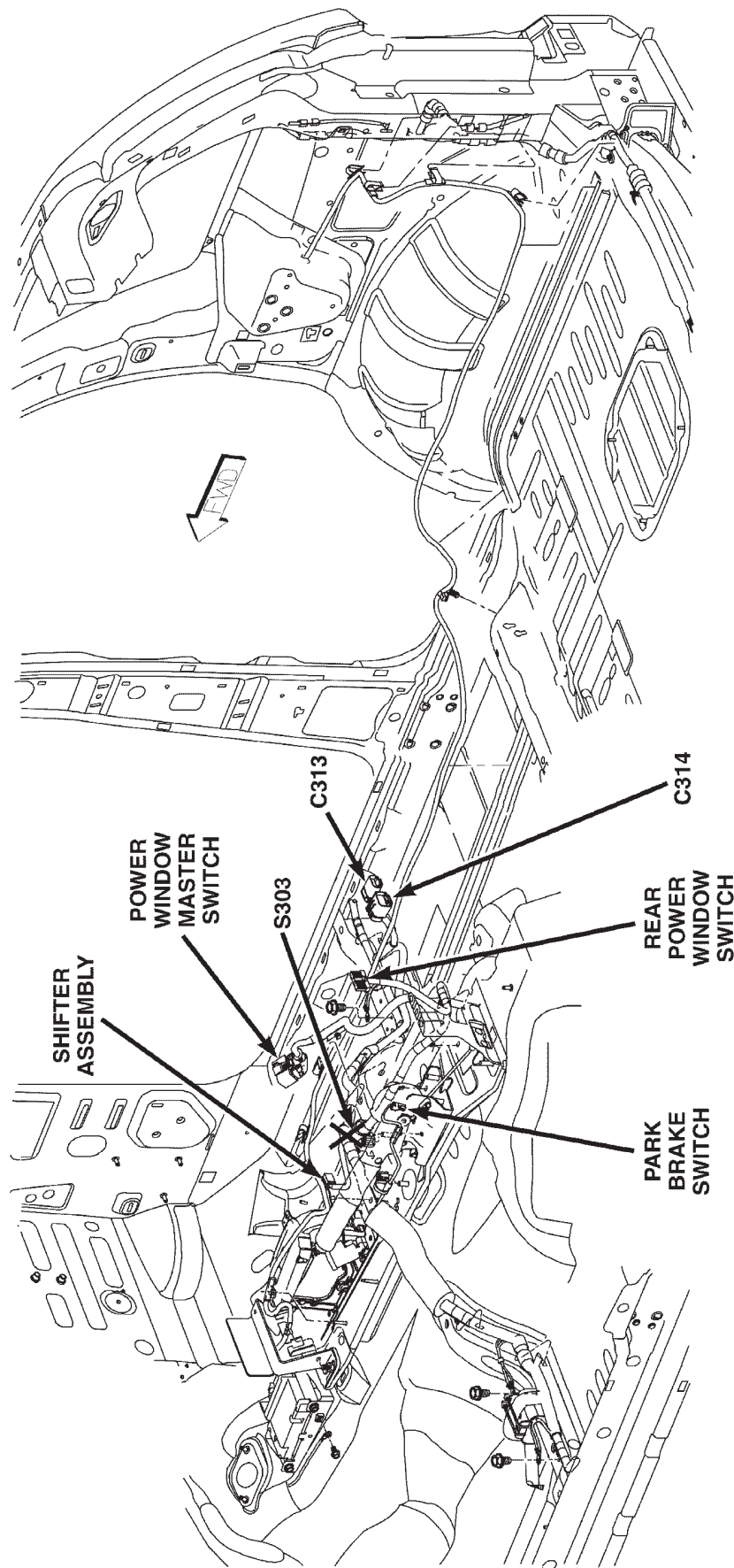
CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4eca

Fig. 35 LEFT FRONT BODY, LHD

CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4ed7

Fig. 36 RIGHT FRONT BODY, LHD

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

80ce4ee2

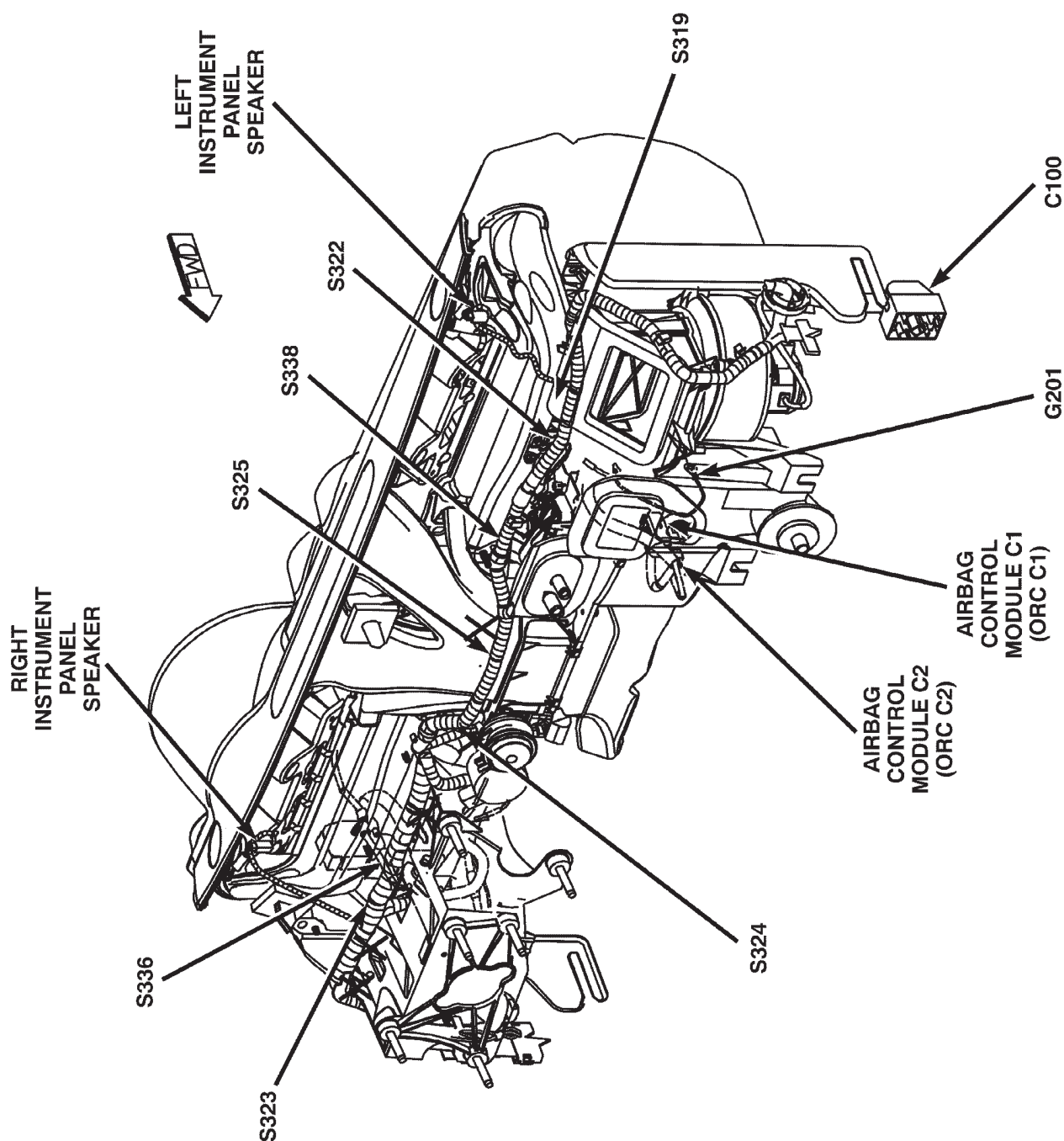


Fig. 37 INSTRUMENT PANEL, RHD

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

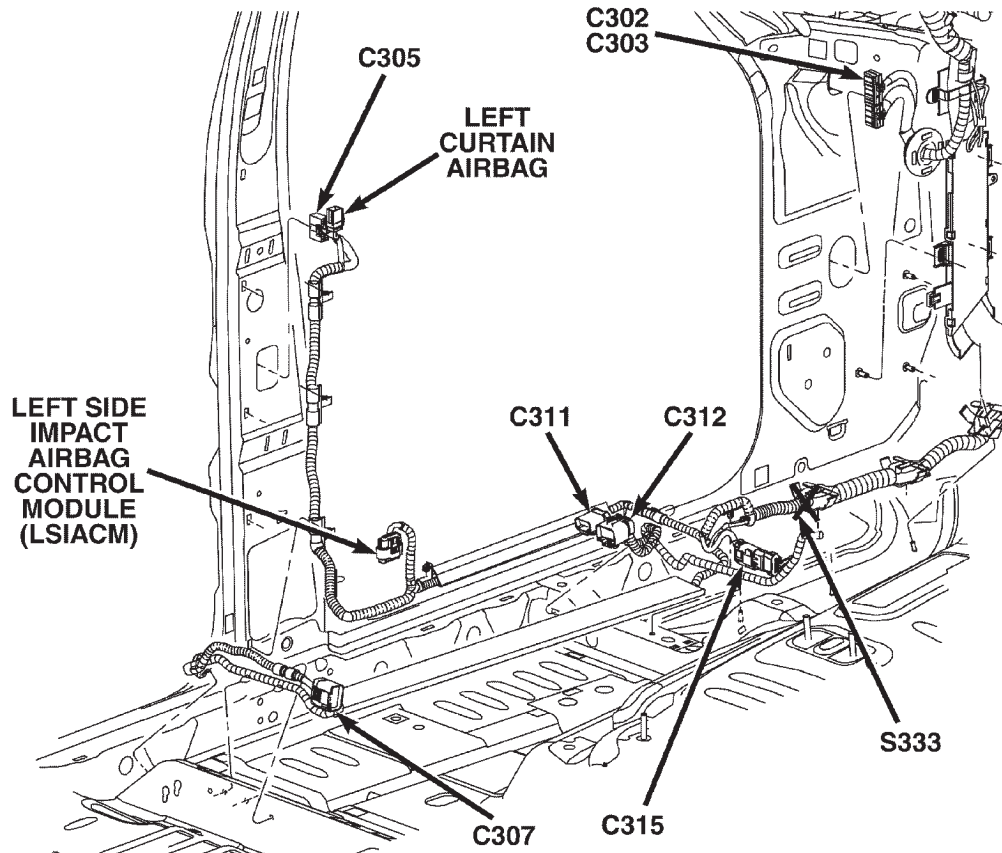


Fig. 38 LEFT FRONT BODY, RHD

80ce4eef

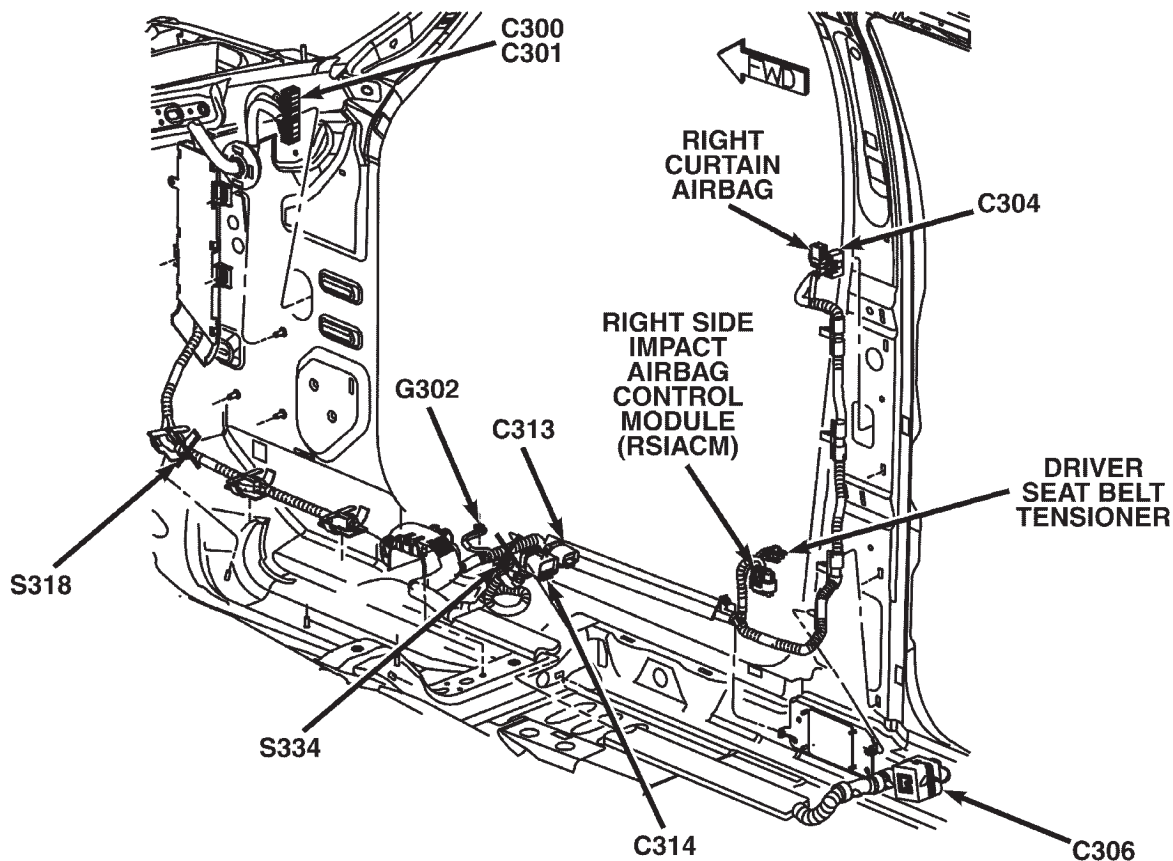
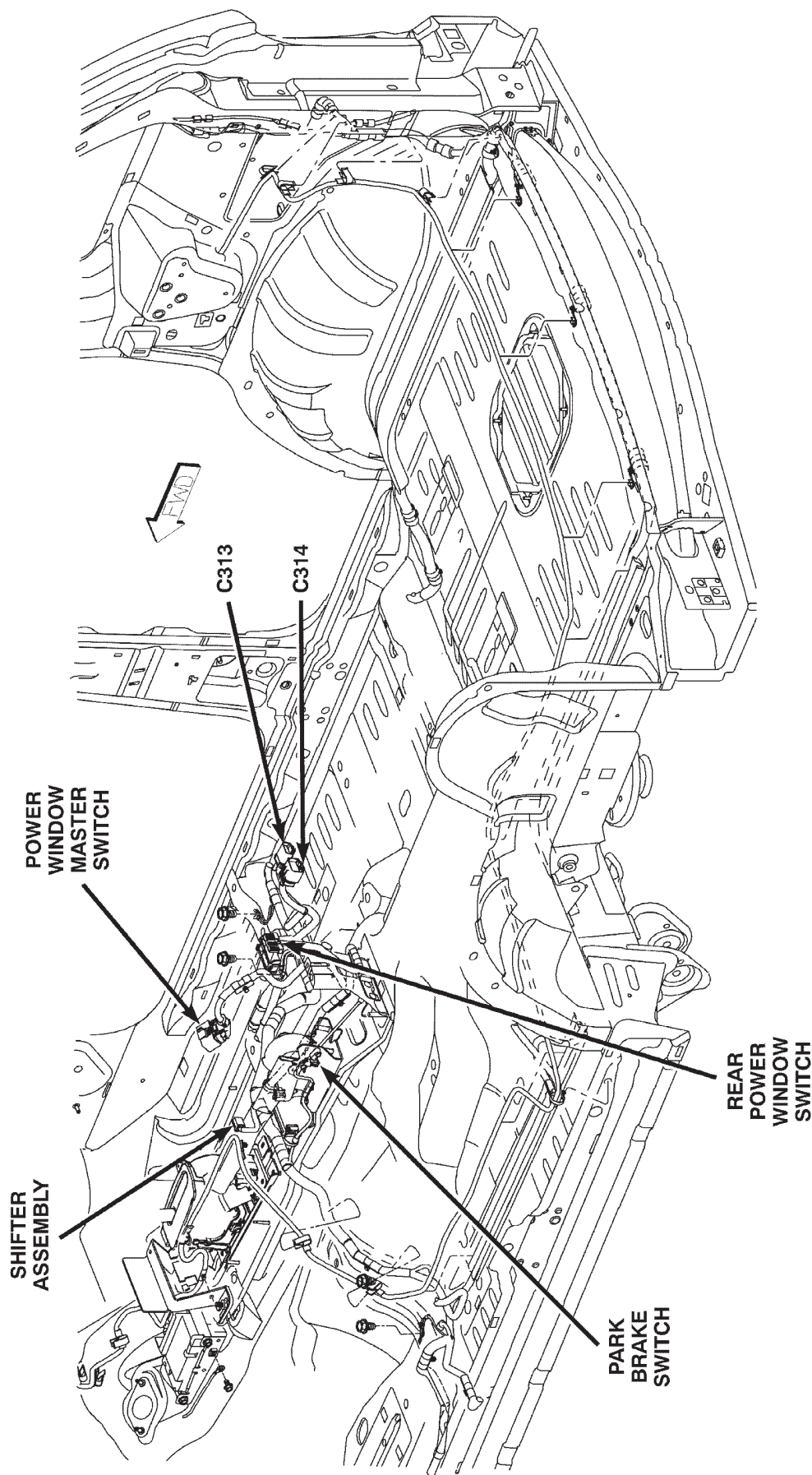


Fig. 39 RIGHT FRONT BODY, RHD

80ce4f0a

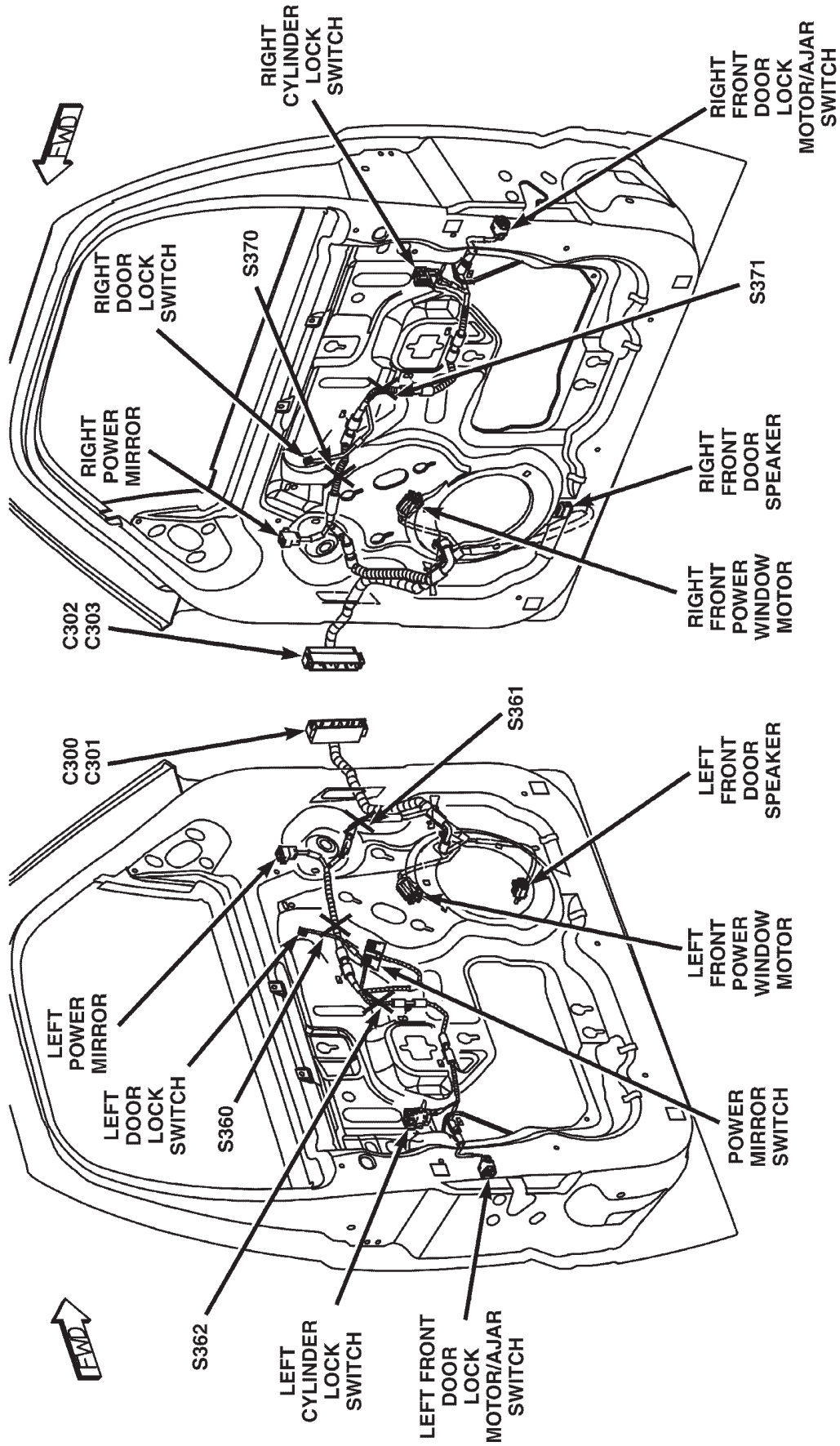
CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4f23

Fig. 40 RIGHT FRONT BODY, RHD

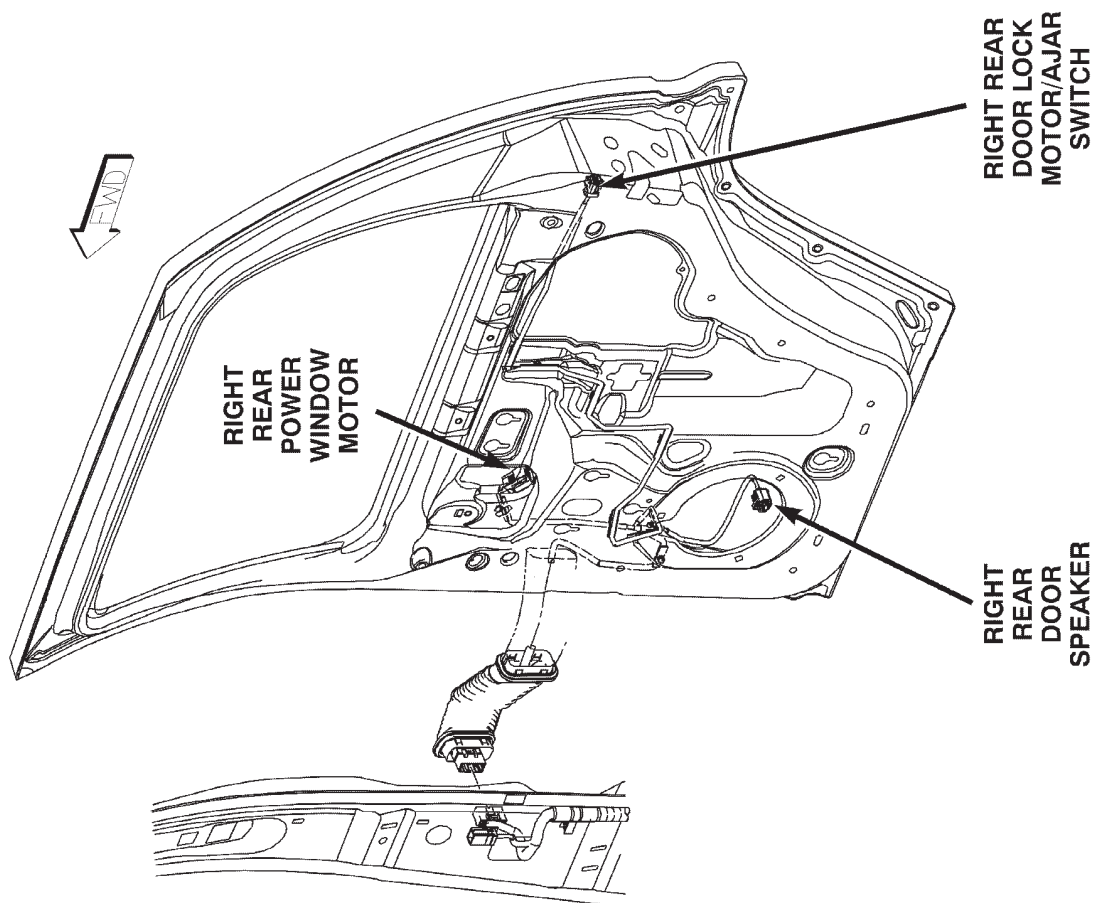
CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce4f59

Fig. 41 FRONT DOORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce418c

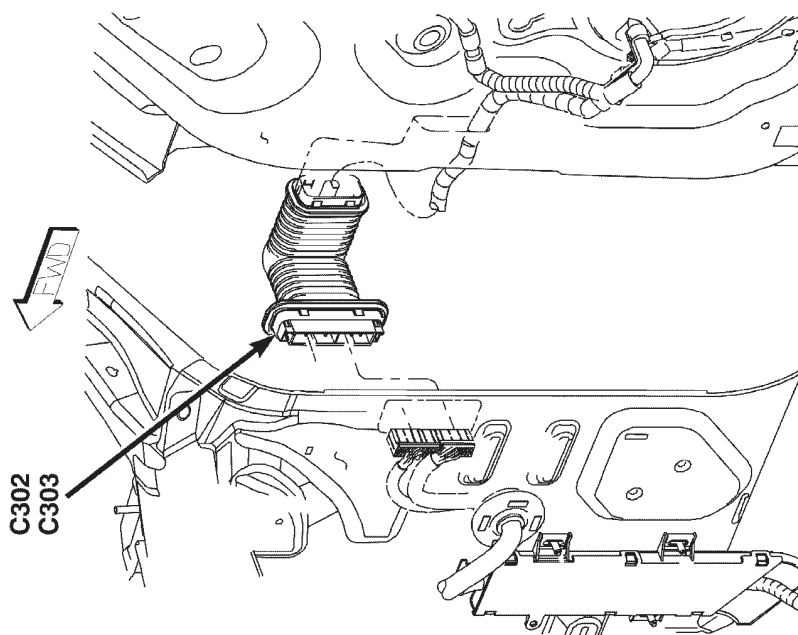
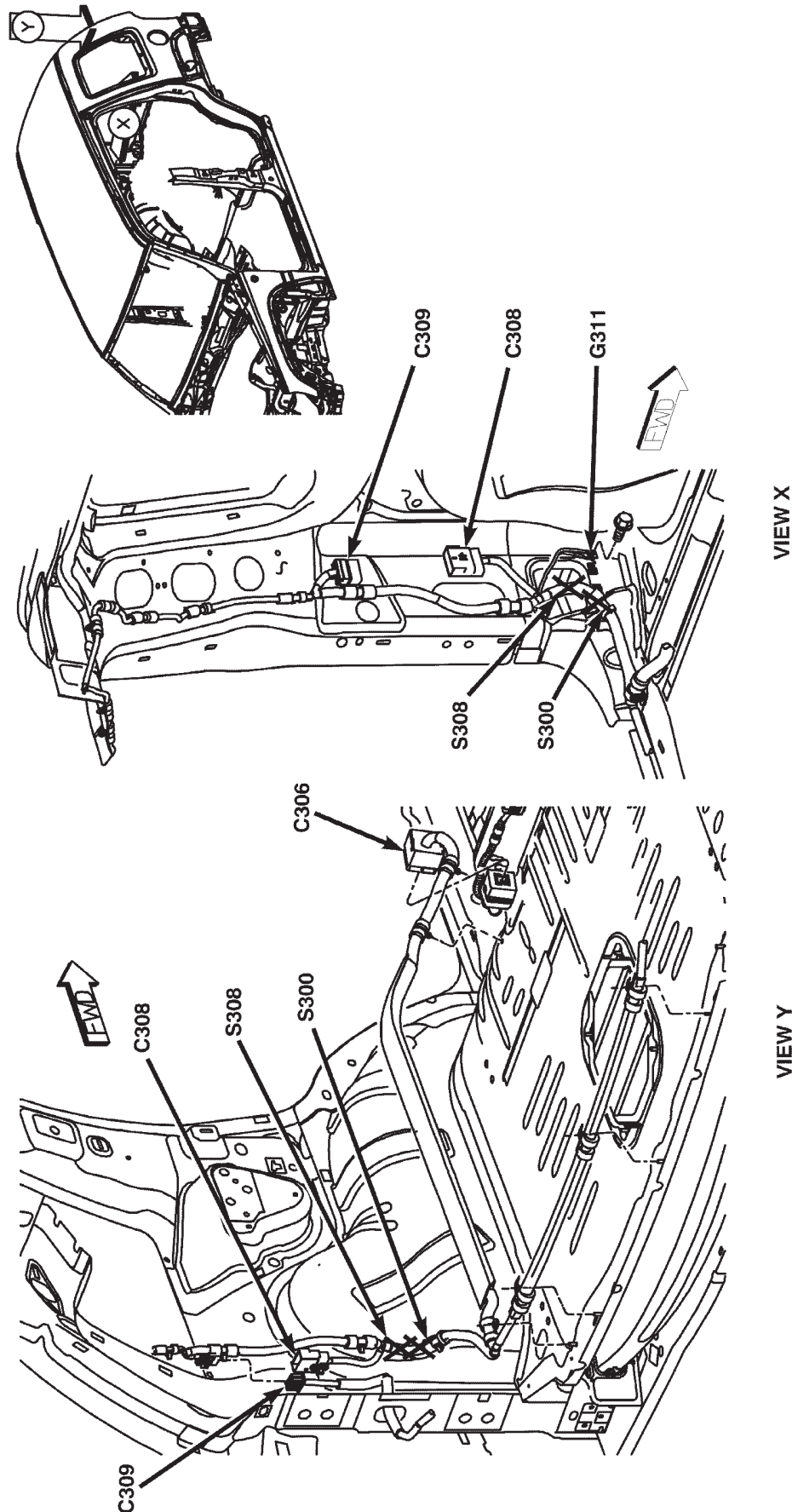


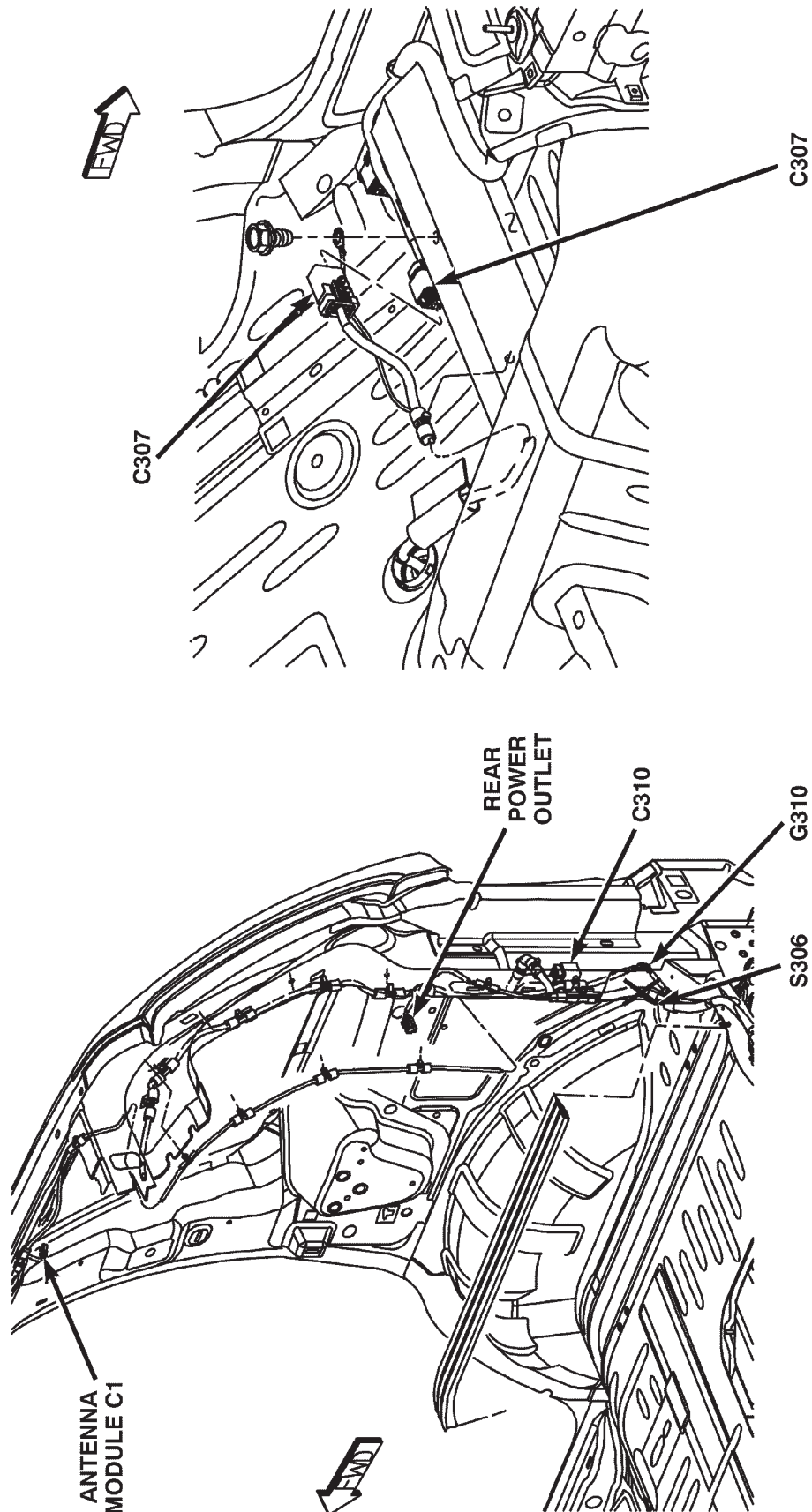
Fig. 42 REAR DOOR



80ce5192

Fig. 43 LEFT REAR BODY

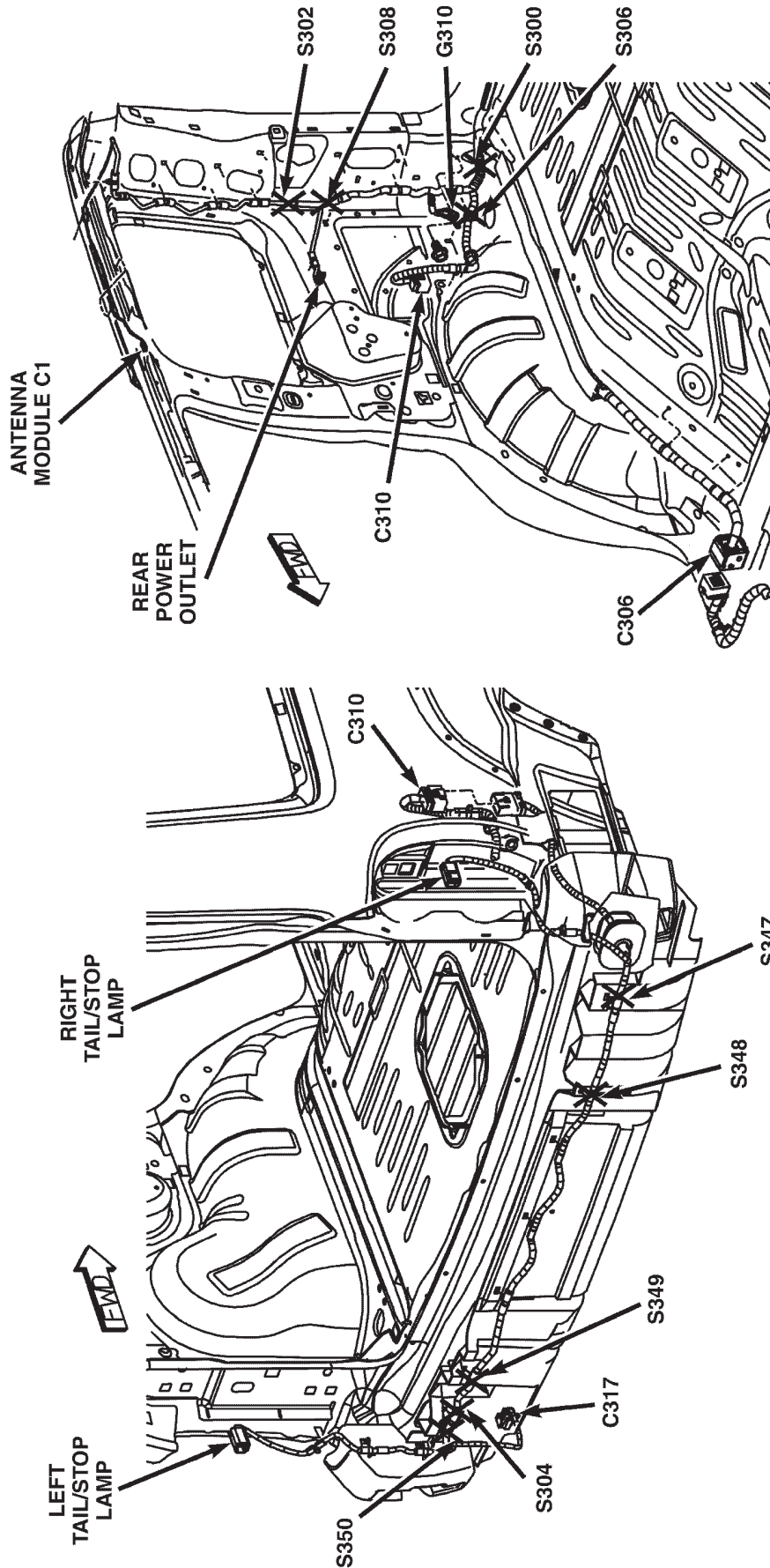
CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ca51a7

Fig. 44 RIGHT REAR BODY

CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce51b4

Fig. 45 REAR BODY

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

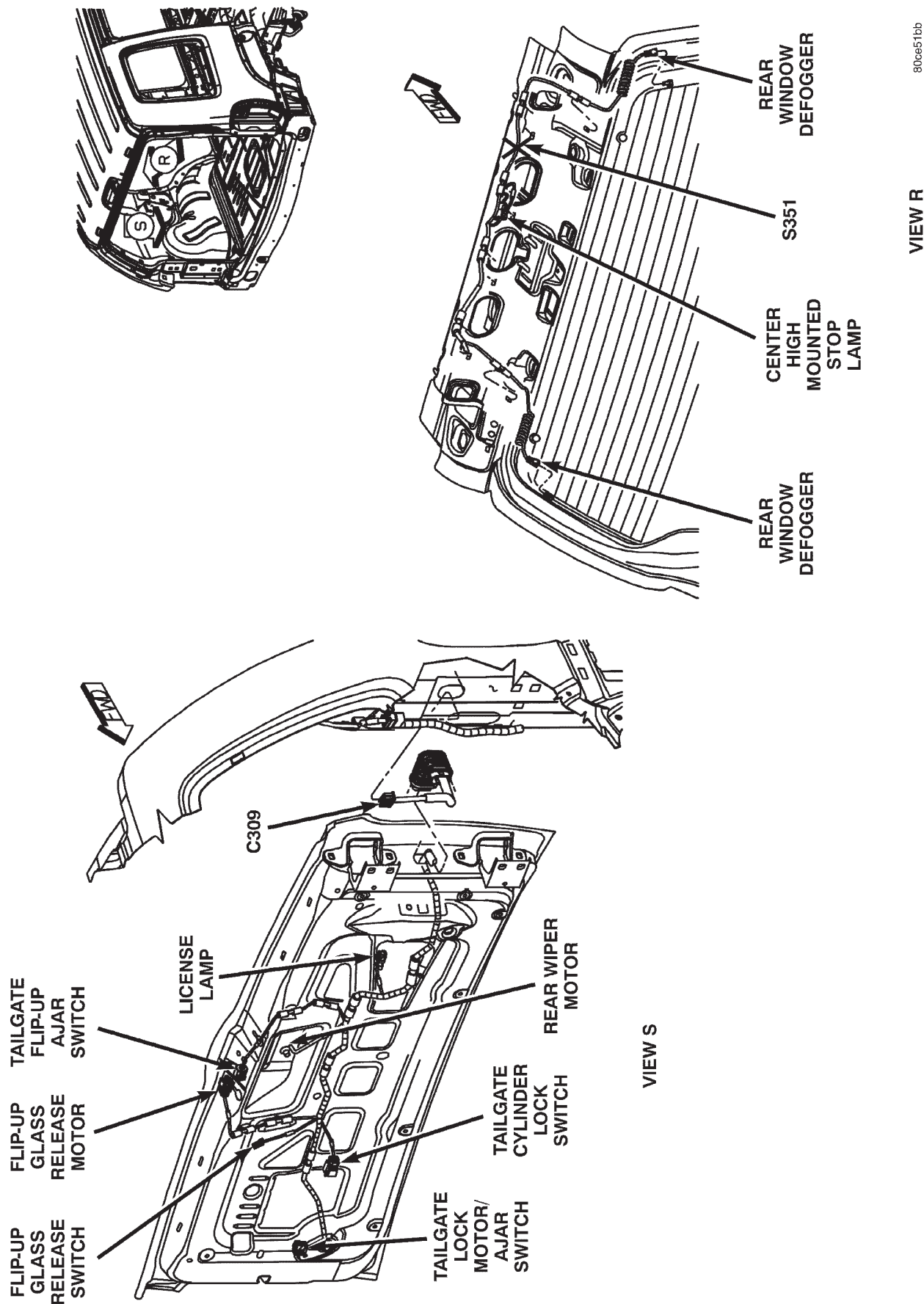
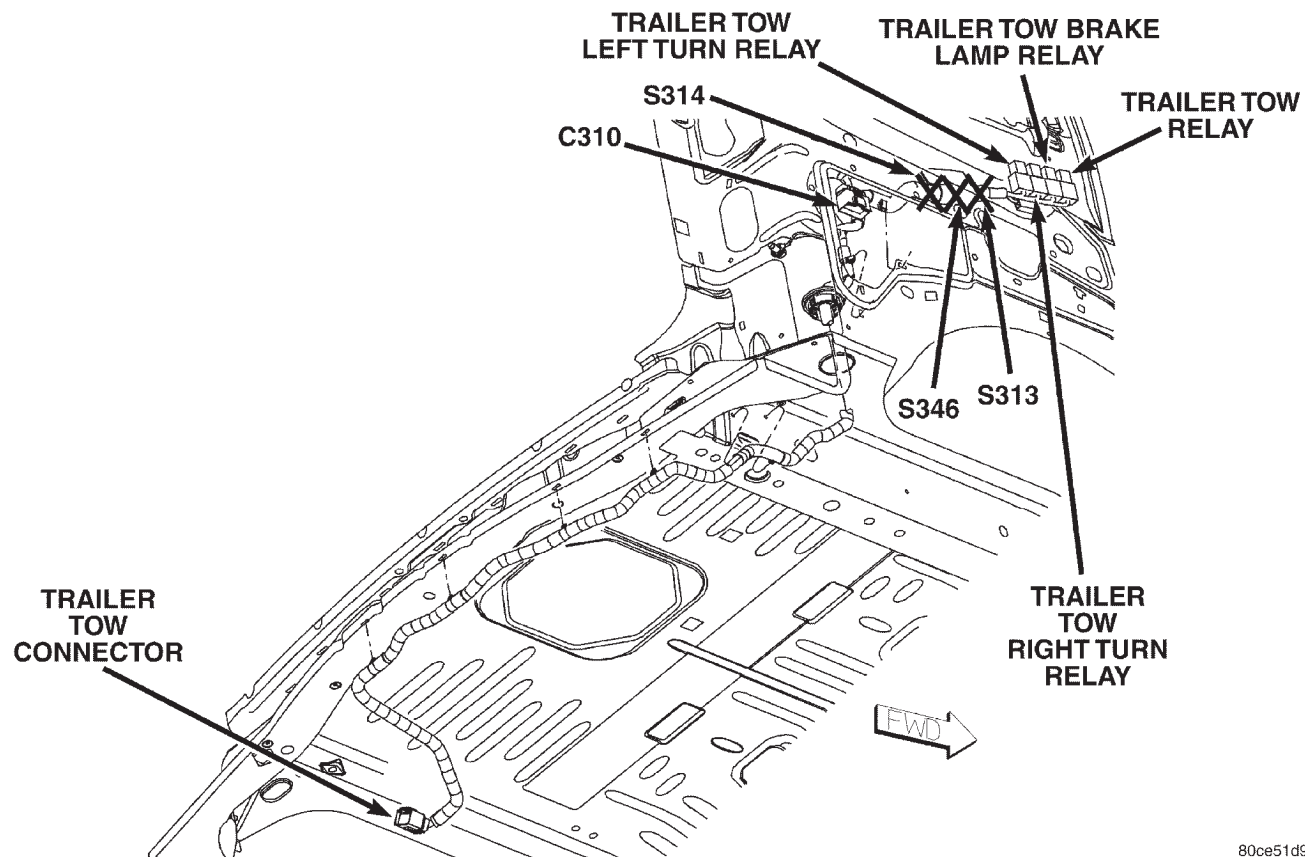


Fig. 46 TAILGATE

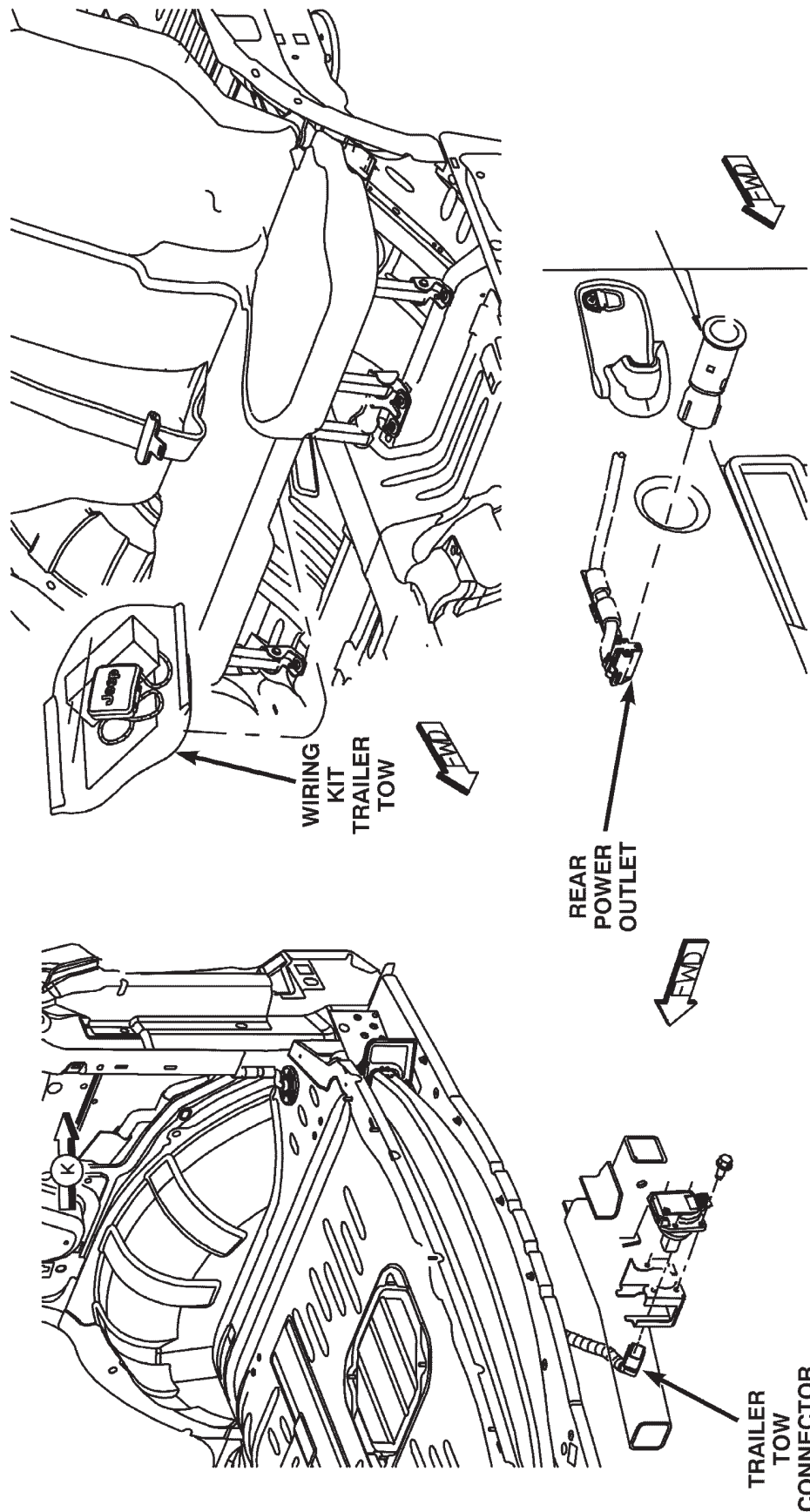
CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce51d9

Fig. 47 TRAILER TOW CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80ce51f0

Fig. 48 REAR BODY

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

80ce51fb

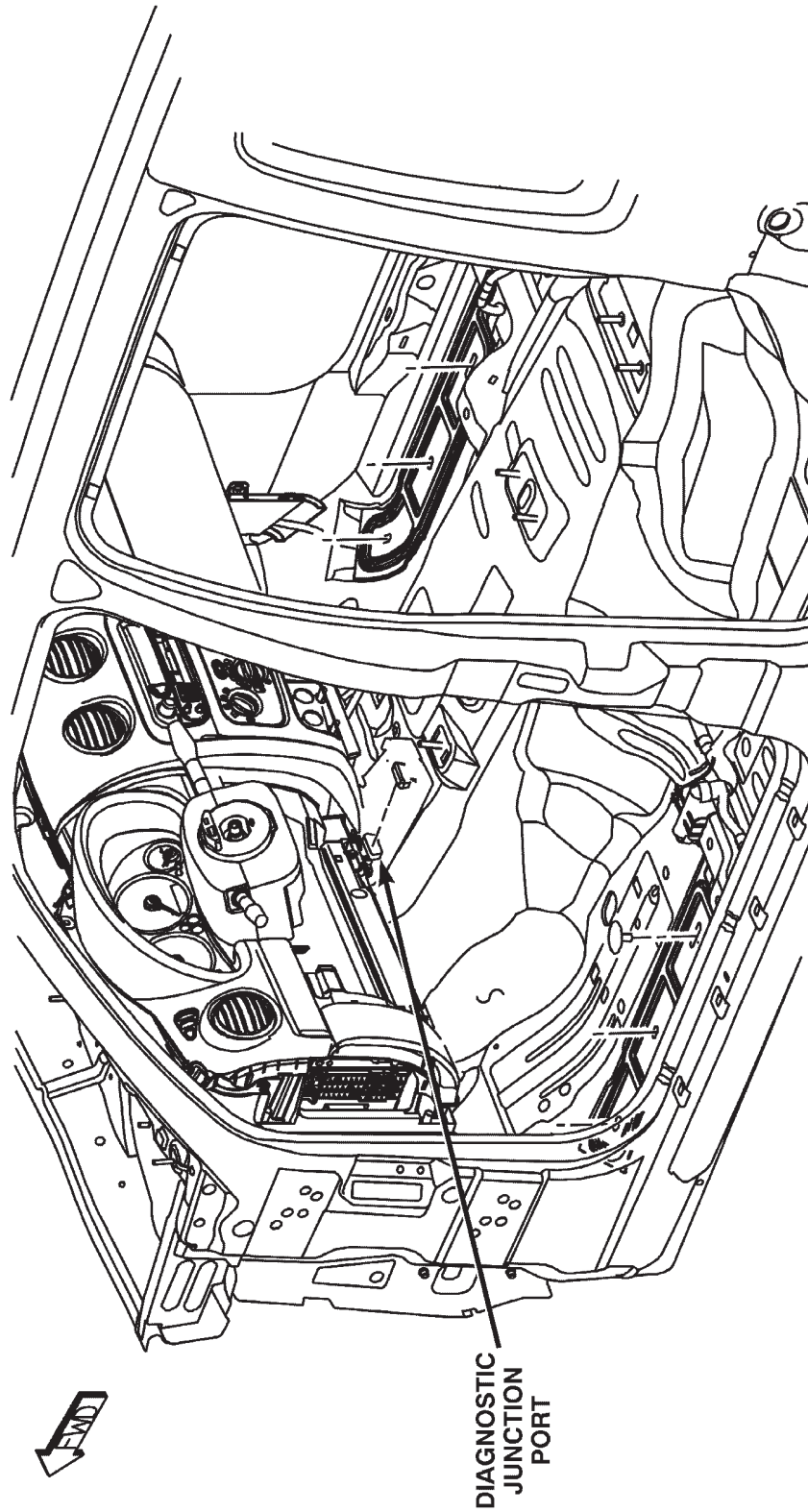


Fig. 49 DIAGNOSTIC JUNCTION PORT