

WARNING > WARNING

WARNING:

All the operations should be carried out taking great care to avoid personal injury. The engine compartment contains many moving parts, components at high temperatures and live wires. Follow the warnings given below very carefully when working in the engine compartment: Turn off the engine and wait for it to cool down, do not smoke, do not use naked flames and ensure a fire extinguisher is available nearby. The use of special equipment is required for certain procedures. The use of these tools is vital for working safely. Follow the current workshop safety regulations. Where necessary, this service information contains specific procedures to be followed to prevent dangerous situations from arising. When using chemical products, carefully follow the safety instructions on the safety card. The safety card must be provided to the consumer by the supplier. The electronic ignition system produces voltages of 20, 000 V and above which could be very hazardous to people especially if they are suffering from a heart condition. Therefore take great care when working on these systems or in the vicinity of their components.

CAUTION > CAUTION

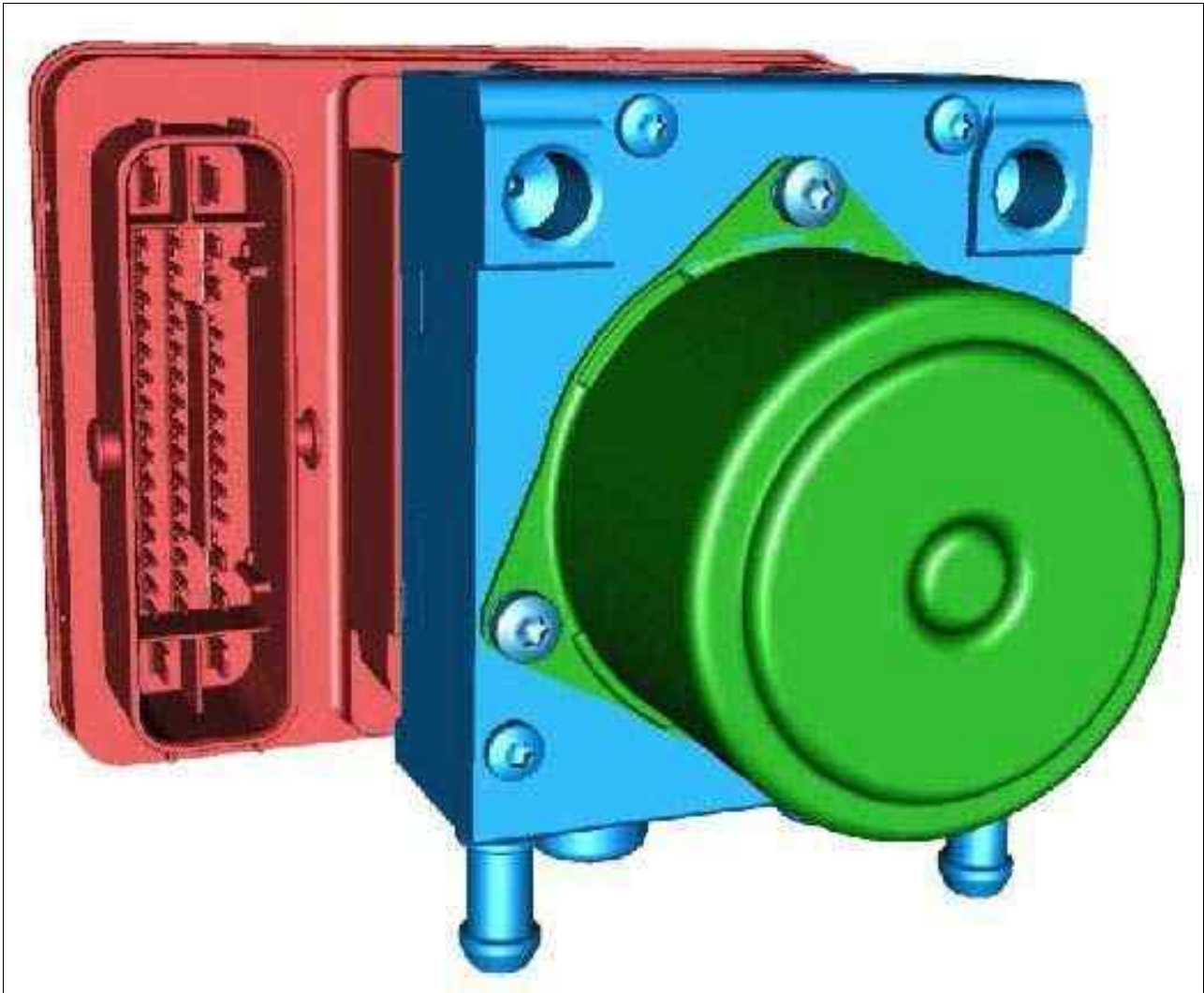
CAUTION:

All the operations should be carried out taking great care to avoid damaging components. To release parts that are sticking, tap gently using an aluminum or lead hammer if iron materials are involved; use a wooden or resin hammer for light alloy parts. When dismantling, check that components that should be marked have the appropriate references. When refitting, lubricate the parts, where necessary, to prevent seizing or binding during the initial operating period. When refitting it is vital to respect the adjustment nut tightening torques. Each time they are refitted, replace gaskets, oil seals, flexible washers, safety washers, self-locking nuts, pretreated screws, shear bolts and all parts that have deteriorated. Use adhesive paper or a clean cloth to suitably protect those parts of the engine which, if they remain uncovered after dismantling, will allow dust or foreign bodies to enter. Only genuine spare parts should be used to replace units or components that have been removed: this is the only way of ensuring the interchangeability and perfect operation of the various components.

DESCRIPTION AND OPERATION > DESCRIPTION AND OPERATION

DESCRIPTION

Fig 1: ABS Module



Courtesy of CHRYSLER GROUP, LLC

BRAKING SYSTEM MODULE (ABS MODULE)

The electronic stability control system (ESC) on the vehicle is a sophisticated four-channel (independent control of all four wheels on the vehicle) active management system. The dynamic control system helps the driver to maintain control in difficult or adverse conditions such as wet, snow-covered or icy roads, tight corners and evasive maneuvers.

The ESC system determines the driver's intentions and maintains dynamic control of the vehicle in general to keep the dynamic forces within the safety limits in all driving conditions, doing this nearly transparently, so that the control seems almost intuitive.

The ESC system primarily complements the ABS and traction control, to control all four wheels of the vehicle independently in accordance with the signals from the yaw sensor and steering angle sensor. The algorithm of the system determines when to intervene on the basis of the data received from the following sensors: wheel speed, yaw, lateral acceleration, master cylinder pressure, steering angle and vehicle speed.

If the driver pushes the vehicle so that it exceeds the grip limits of the road surface and that the vehicle oversteers or understeers, the system instantaneously analyses the data input from the sensors and

corrects the loss of control by applying one, several or all of the brakes to adjust the yaw rate, maintaining the vehicle in the direction set by the driver.

OPERATION

The ESC system includes the following functions:

- **Panic Brake Assist (PBA)** detects emergency braking by measuring the brake operation speed and increases the braking power if necessary. In certain conditions, the braking assistance may activate the ABS more rapidly compared to vehicles that don't have this function. The more rapid intervention of the ABS has the potential to reduce the stopping distance, compensating for the delayed intervention of the driver on the brakes.
- **Electronic Traction Control (BLD - Electronic Brake Differential)** applies braking force to the wheel of a single axle which is slipping in order to permit both wheels on the axle to receive a sufficient drive torque value, thus improving the traction in all road and weather conditions.
- **Hill Start Assist (HSA)** allows the driver to move their foot from the brake pedal to the accelerator and keep the vehicle braked in the process. The system maintains the braking pressure for about two seconds after the release of the brake pedal. The system reduces the braking pressure on the wheel's calipers in accordance with the pressure on the accelerator pedal.
- **Rollover mitigation (ERM - Electronic Roll Mitigation)** uses the information from the ESC system sensors to determine in advance whether the vehicle is at risk of entering a potential rollover situation, then activates the brakes individually and requests that the Powertrain Control Module reduce the torque provided if necessary.
- **Trailer Sway Control (TSC)** reduces the sway of the vehicle caused by the trailer that may occur in adverse conditions (side wind and traffic). The system monitors the motion of the vehicle with respect to the trajectory envisaged by the driver and applies alternate pressure to the brakes to slow down the vehicle then increases the pressure on a front wheel to counteract the effect of the trailer.
- **Hydraulic Boost Failure Compensation (HBFC)** detects failure in the brake servo (vacuum loss) through a sensor. If failure is detected, the brake module activates the ABS pump to assist braking.
- **Electronic Brake Prefill (EBP)** detects whether the driver raises their foot from the accelerator pedal and, if detected, the brake module applies light braking pressure (not enough to decelerate the vehicle) to ensure that the brake pads are aligned correctly in anticipation of emergency braking.
- **Activation of brake lights above a deceleration threshold** permits the indication of vehicle deceleration to other vehicles by simulating braking.

This function permits the activation of the brake lights for at least 1 second in two situations: during the operation of the Adaptive Cruise Control (ACC), Hill Descent Control (HDC) or Hill Start Assist (HSA), the brake lights are activated when the brake fluid pressure exceeds a minimum threshold value; during Electronic Stability Control (ESC) or Trailer Sway Control (TSC), when the deceleration exceeds the set threshold.

- **Dynamic steering control (DST - Dynamic Steering Torque)** uses the integration of the ESC system with the electric power steering to increase the level of safety on the whole vehicle. In critical situations (understeer, oversteer, braking on surfaces with different grip conditions), through the DST function, the ESC system controls the steering, providing additional torque on the steering wheel, to suggest the most appropriate maneuver to the driver. The coordinated action of the brakes and steering increases the sensation of safety and control of the vehicle.

DIAGNOSIS AND TESTING > DIAGNOSIS AND TESTING - INSPECTION AND ROAD TEST > DIAGNOSIS AND TESTING - INSPECTION AND ROAD TEST

1. Visually inspect the ABS for damaged or disconnected components and connectors.
2. Verify the brake lamps are operational. If they are not, repair them prior to continuing.
3. Connect a scan tool to the Data Link Connector located under the instrument panel to the left of the steering column. If the scan tool does not power-up, check the power and ground supplies to the connector.
4. Turn the ignition key to the ON position.
5. Using the scan tool, read and record any Diagnostic Trouble Codes (DTCs). If any DTCs are present, refer to the appropriate diagnostic information.

If no problems are observed, it will be necessary to road test the vehicle.

Many ABS conditions judged to be a problem by the driver may be normal operating conditions. To become familiarized with the normal operating characteristics of this anti-lock brake system. Refer to DESCRIPTION AND OPERATION .



WARNING:

Conditions that result in turning on the red brake warning indicator lamp may indicate reduced braking ability.

Before road testing a brake complaint vehicle, note whether the red BRAKE warning indicator lamp, amber ABS warning indicator lamp, or both are turned on. If it is the red BRAKE warning indicator, there is a brake hydraulic problem that must be corrected before driving the vehicle

Refer to DIAGNOSIS AND TESTING .

The following conditions will cause the red BRAKE lamp to illuminate:

1. Low fluid in the brake reservoir
2. Park Brake engaged
3. Brake hydraulic problem
4. ABS issue that will not allow the Brake Proportioning function

If the amber ABS warning indicator is on, road test the vehicle as described below. While only the amber ABS warning indicator is on, the ABS is not functional. The ability to stop the car using the base brake system should not be affected.

6. Turn the key to the OFF position and then back to the ON position. Note whether the amber ABS warning indicator lamp continues to stay on.
7. If the amber ABS warning indicator lamp stays on, shift into gear and drive the car to a speed of approximately 25 km/h (15 mph) to complete the ABS Start-Up and Drive-Off Cycles. If at

this time the amber ABS warning indicator lamp stays on, refer to the appropriate diagnostic information.

8. If the amber ABS warning indicator lamp goes out at any time, drive the vehicle a short distance. Accelerate the vehicle to a speed of at least 50 km/h (31 mph). Bring the vehicle to a complete stop, braking hard enough to cause the ABS to cycle. Repeat this action several times. Using the scan tool, read and record any (DTCs). If any DTCs are present, refer to the appropriate diagnostic information.

VEHICLE STABILITY CONTROL SYSTEM ESP / ESC

Perform a road test looking for a square or a round free.

Making sure not to cause any obstruction or danger to traffic, run a curved path in order to activate the ESP system: we must cause the ESP warning light for 2-3 seconds.

SPECIFICATIONS > TORQUE SPECIFICATIONS

For brake torque specifications, refer to SPECIFICATIONS .

ELECTRICAL > SENSOR, DYNAMICS > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > REMOVAL

The dynamic sensor is built into the Occupant Restraint Control Module (ORC) for removal. Refer to MODULE, OCCUPANT RESTRAINT CONTROLLER, REMOVAL AND INSTALLATION .

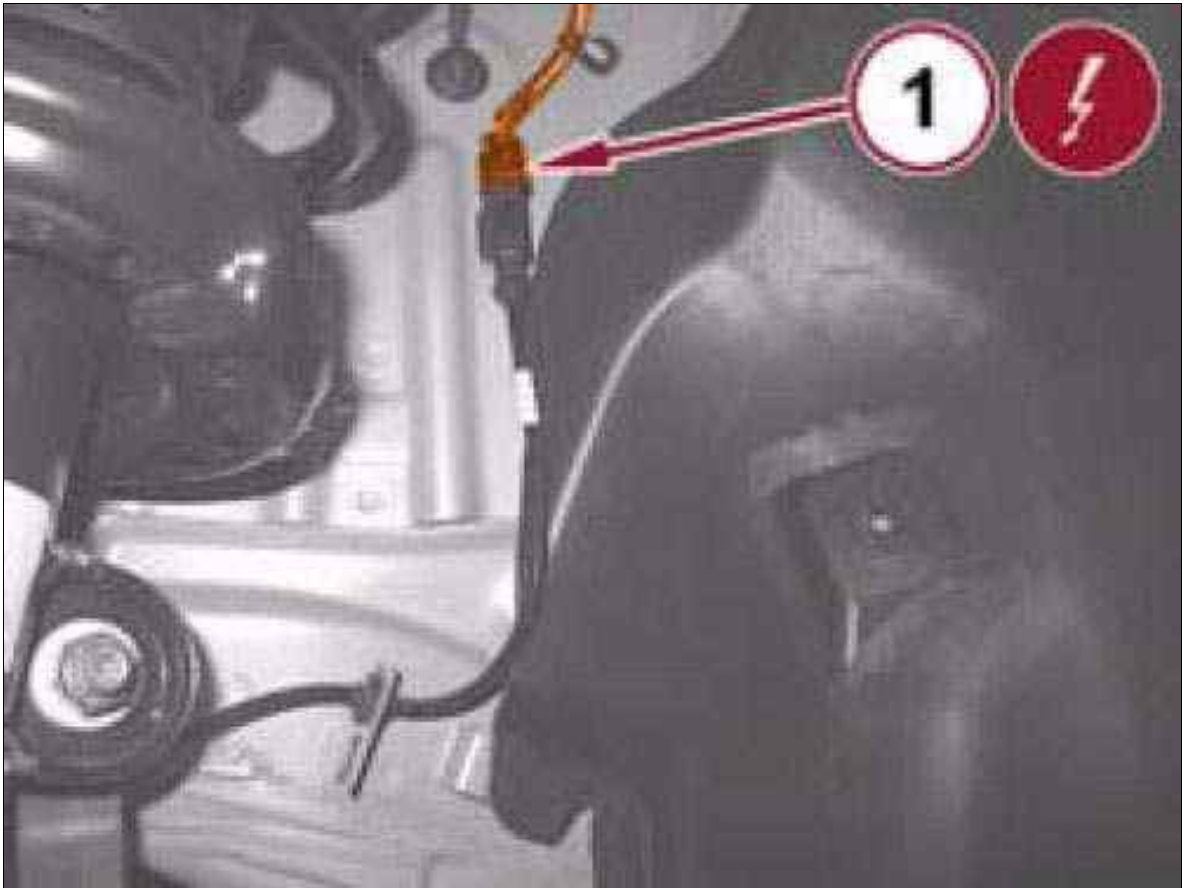
ELECTRICAL > SENSOR, DYNAMICS > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > INSTALLATION

The dynamic sensor is built into the Occupant Restraint Control Module (ORC) for installation. Refer to MODULE, OCCUPANT RESTRAINT CONTROLLER, REMOVAL AND INSTALLATION .

ELECTRICAL > SENSOR, WHEEL SPEED, FRONT > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > REMOVAL

1. Disconnect and isolate the negative battery cable.
2. Raise and support the vehicle. Refer to HOISTING, STANDARD PROCEDURE .
3. Remove the tire and wheel assembly. Refer to REMOVAL AND INSTALLATION .

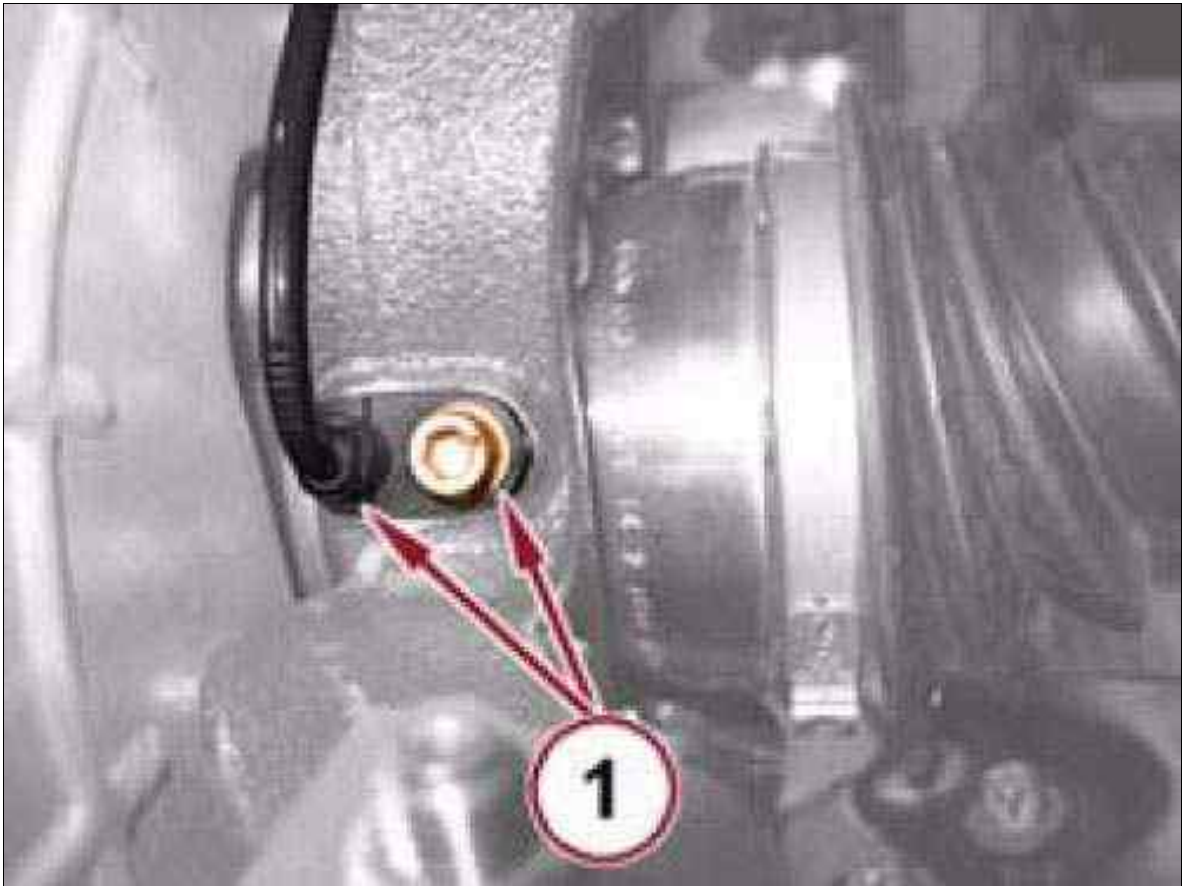
Fig 1: Wheel Speed Sensor Electrical Connector



Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the wheel speed sensor electrical connector (1). Detach the wiring from the routing retainers.

Fig 2: Wheel Speed Sensor Bolt

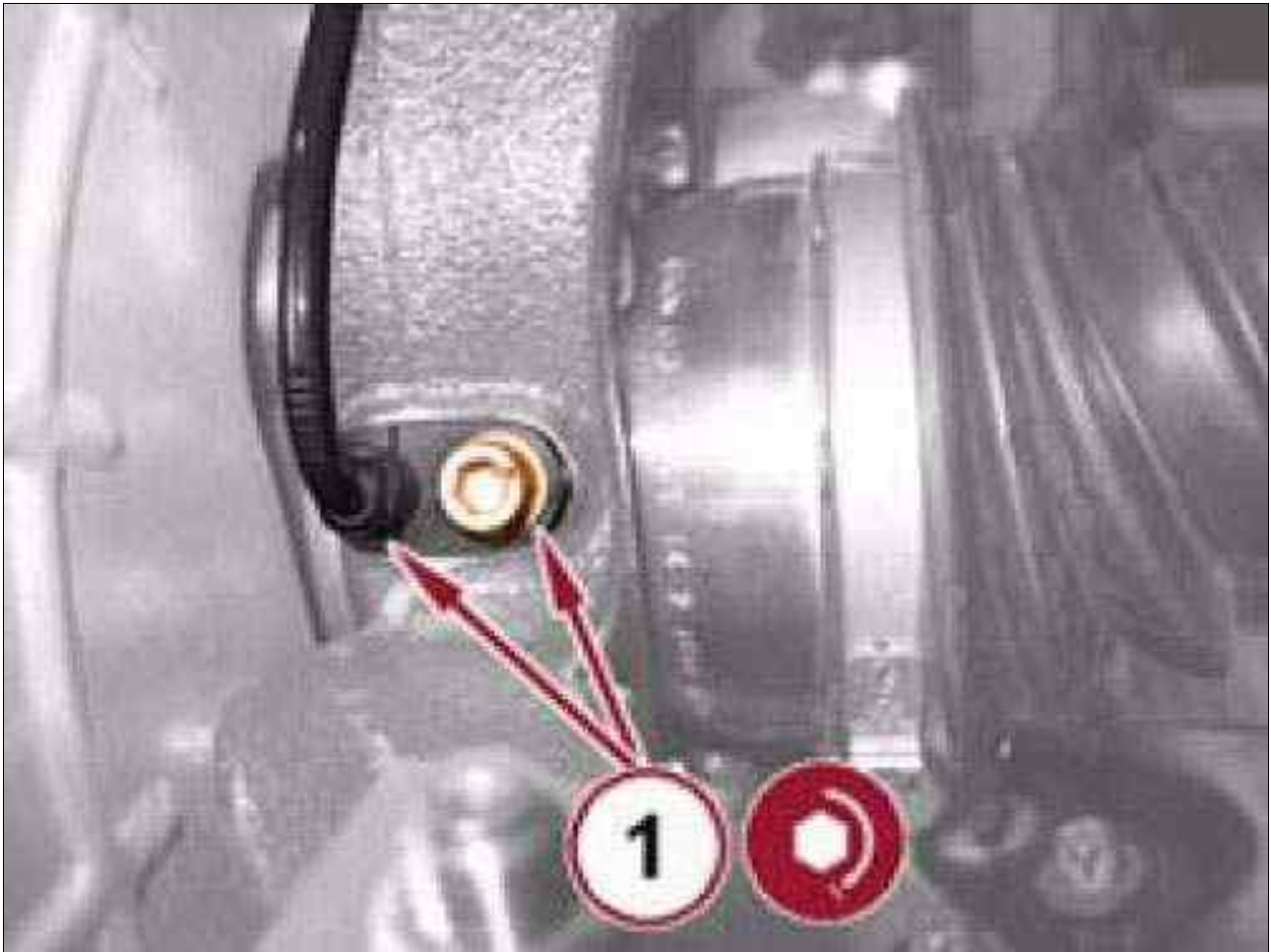


Courtesy of CHRYSLER GROUP, LLC

5. Remove wheel speed sensor bolt (1) and remove the wheel speed sensor from the knuckle.

ELECTRICAL > SENSOR, WHEEL SPEED, FRONT > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > INSTALLATION

Fig 1: Wheel Speed Sensor Bolt



Courtesy of CHRYSLER GROUP, LLC

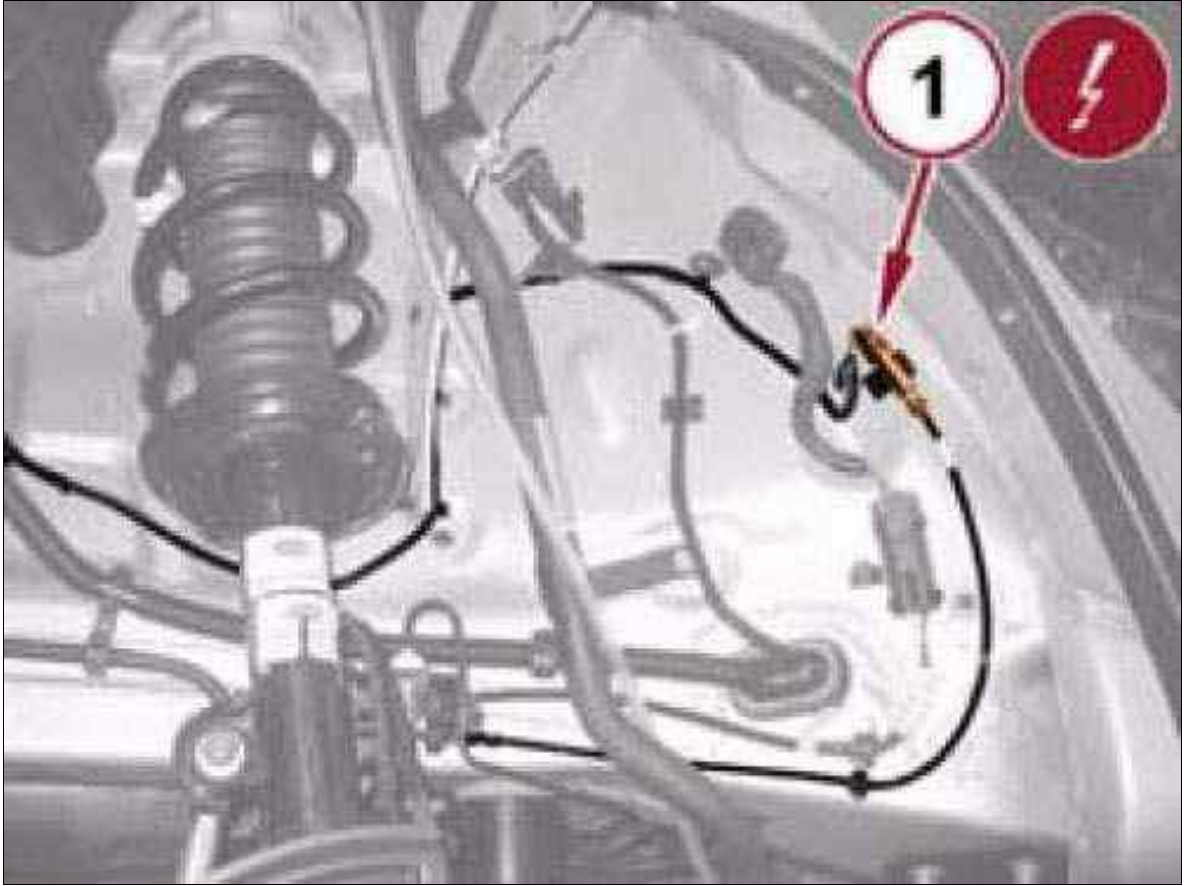
1. Install the wheel speed sensor (1) and the wheel speed sensor bolt (1). Tighten the wheel speed sensor bolt to the proper torque specification. Refer to SPECIFICATIONS .
2. Connect the wheel speed sensor wiring to the routing retainers.
3. Connect wheel speed sensor electrical connector.
4. Install the tire and wheel assembly. Refer to REMOVAL AND INSTALLATION .
5. Remove the support and lower the vehicle.
6. Connect the negative battery cable.

ELECTRICAL > SENSOR, WHEEL SPEED, REAR > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > REMOVAL

1. Disconnect and isolate the negative battery cable.
2. Raise and support the vehicle. Refer to HOISTING, STANDARD PROCEDURE .

3. Remove the tire and wheel assembly. Refer to REMOVAL AND INSTALLATION .

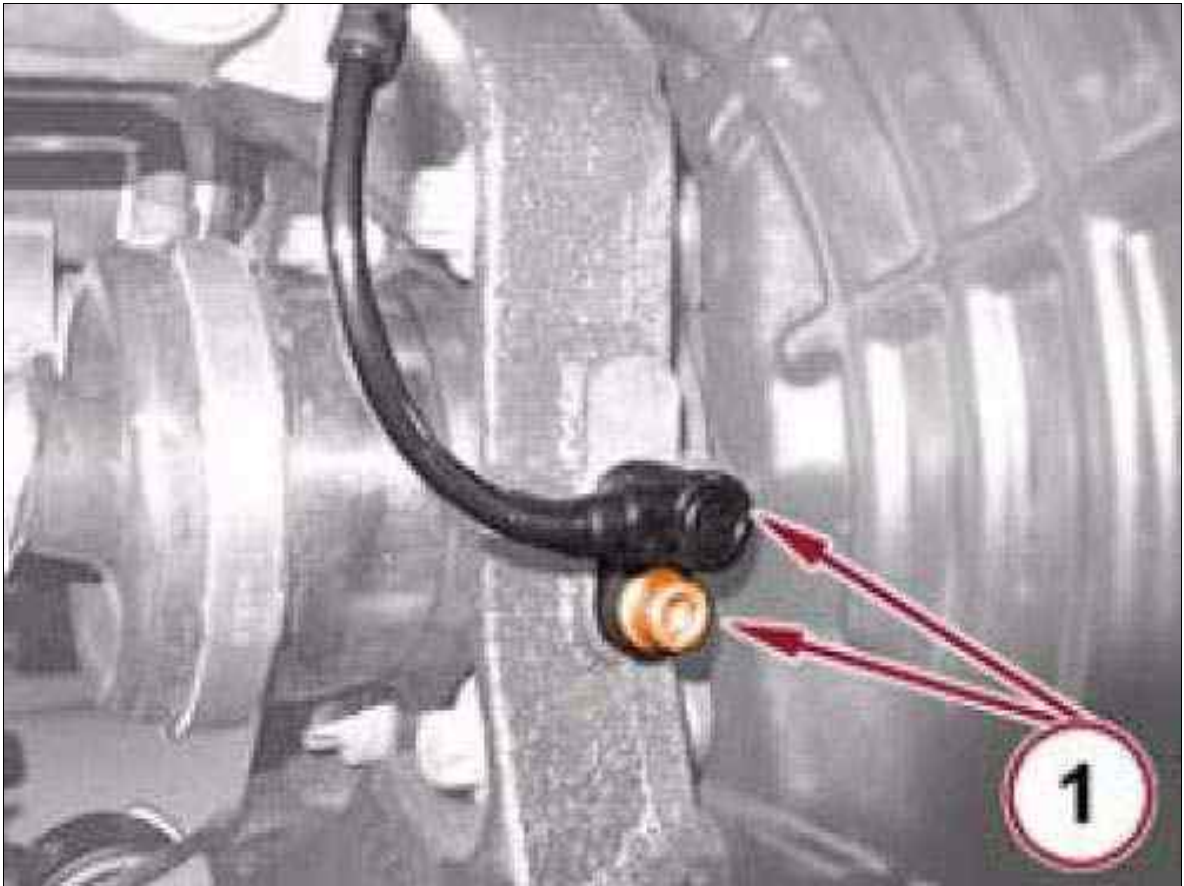
Fig 1: Rear Wheel Speed Sensor Connector



Courtesy of CHRYSLER GROUP, LLC

4. Disconnect the rear wheel speed sensor connector (1). Detach the wiring from the body retainers.

Fig 2: Rear Wheel Speed Sensor Bolt

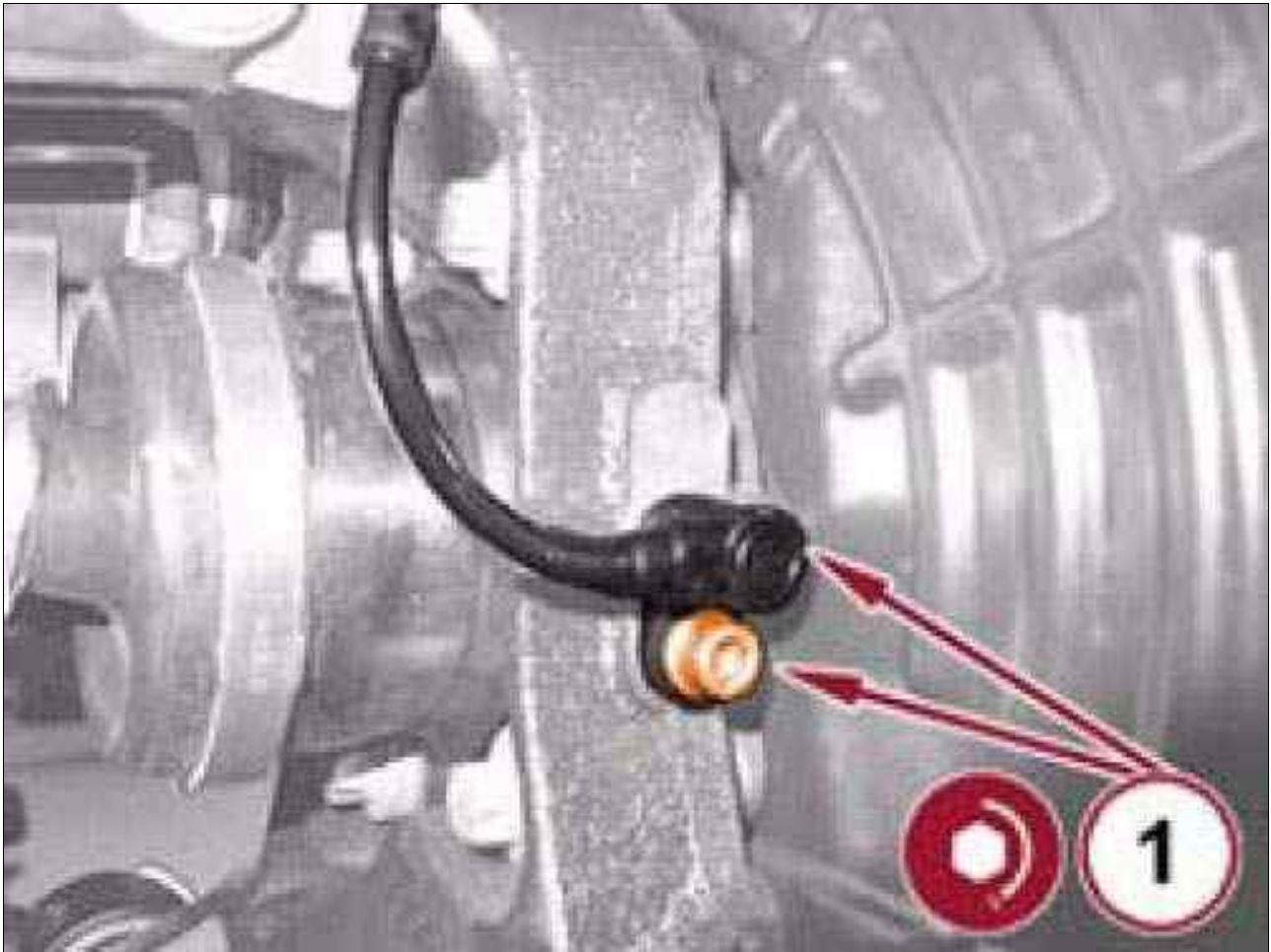


Courtesy of CHRYSLER GROUP, LLC

5. Remove the rear wheel speed sensor bolt (1) and the wheel speed sensor (1) from the knuckle.

ELECTRICAL > SENSOR, WHEEL SPEED, REAR > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > INSTALLATION

Fig 1: Rear Wheel Speed Sensor And Bolt



Courtesy of CHRYSLER GROUP, LLC

1. Install the rear wheel speed sensor and bolt (1). Tighten the rear wheel speed sensor bolt to the proper torque specification. Refer to SPECIFICATIONS .
2. Connect wheel speed sensor wiring to the body.
3. Connect the wheel speed sensor electrical connector.
4. Install the tire and wheel assembly. Refer to REMOVAL AND INSTALLATION .
5. Remove the support and lower the vehicle.
6. Connect the negative battery cable.

ELECTRICAL > SWITCH, ELECTRONIC STABILITY PROGRAM (ESP) > DESCRIPTION > DESCRIPTION AND OPERATION



NOTE:

The Electronic Stability Control (ESC) may also be referred to as Electronic Stability

Program (ESP) depending on the vehicle model year and configuration. Certain components may also reference ESP, ESC, or use the traction control symbol.

The Electronic Stability Control off Switch is an integral part of the instrument panel switch pod located in center of the instrument panel. The ESC Off switch turns the Electronic Stability Control off whenever the switch is depressed. Depressing the switch a second time turns the ESC back on. The switch resets itself each time the ignition is cycled.

When the ESC Off switch is depressed and released, turning ESC off, it does not completely turn the system off. The ESC system reduces torque management to a lesser amount, but ESC function can still occur if the system perceives the need.

The ESC function lamp is illuminated in the cluster whenever the ESC system is turned off.

ELECTRICAL > SWITCH, ELECTRONIC STABILITY PROGRAM (ESP) > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > REMOVAL



NOTE:

The Electronic Stability Control (ESC) may also be referred to as Electronic Stability Program (ESP) depending on the vehicle model year and configuration. Certain components may also reference ESP, ESC, or use the traction control symbol.

The ESC Off Switch is an integral part of the instrument panel switch pod located in center of the instrument panel. Refer to POD, SWITCH, REMOVAL AND INSTALLATION .

ELECTRICAL > SWITCH, ELECTRONIC STABILITY PROGRAM (ESP) > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > INSTALLATION



NOTE:

The Electronic Stability Control (ESC) may also be referred to as Electronic Stability Program (ESP) depending on the vehicle model year and configuration. Certain components may also reference ESP, ESC, or use the traction control symbol.

The ESC Off Switch is an integral part of the instrument panel switch pod located in center of the instrument panel. Refer to POD, SWITCH, REMOVAL AND INSTALLATION .

HYDRAULIC/MECHANICAL > INTEGRATED CONTROL UNIT (ICU) > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > REMOVAL

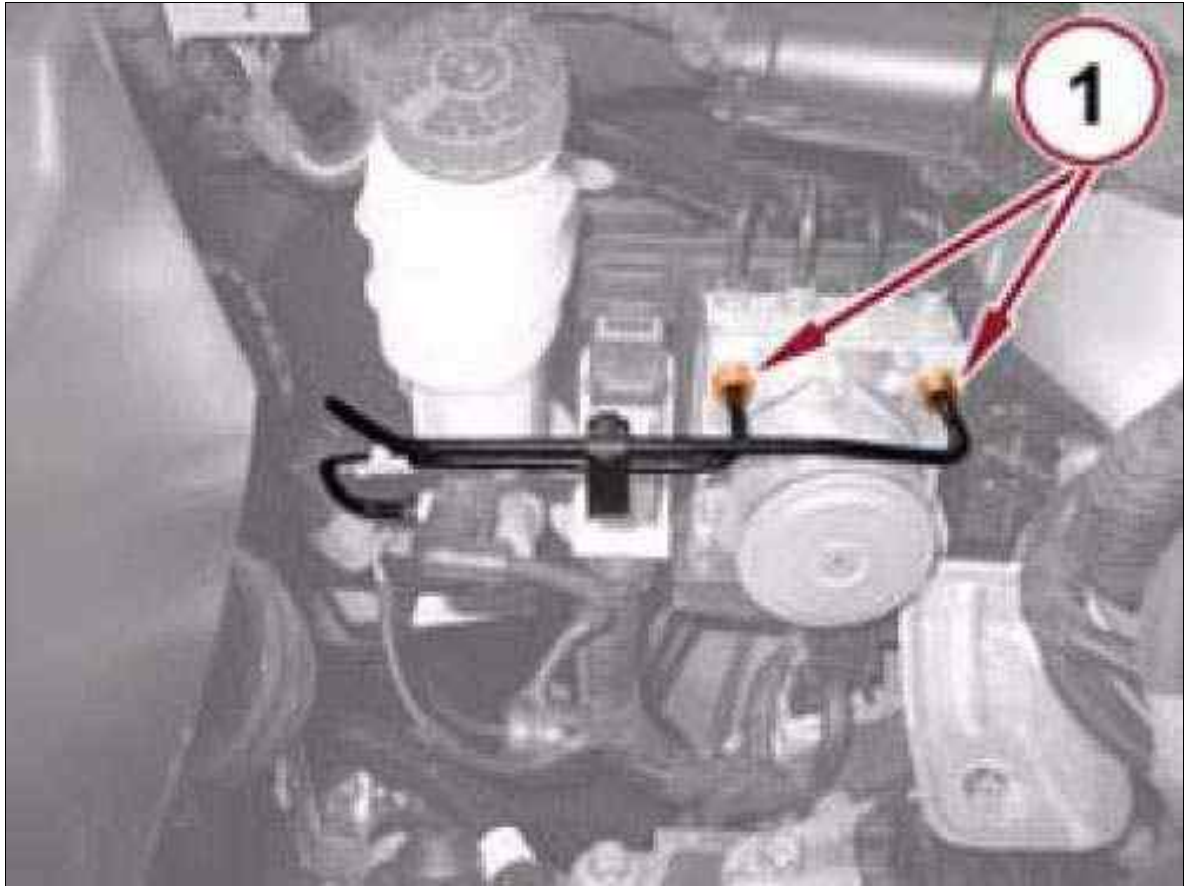


NOTE:

When replacing the control unit, connect the diagnostic tool to the OBD port and go to "control BSM" and go to the menu "actuators" and start the process of "activating the automatic functions."

1. Drain the brake fluid. Refer to STANDARD PROCEDURE .
2. Remove the battery tray. Refer to TRAY, BATTERY, REMOVAL AND INSTALLATION .

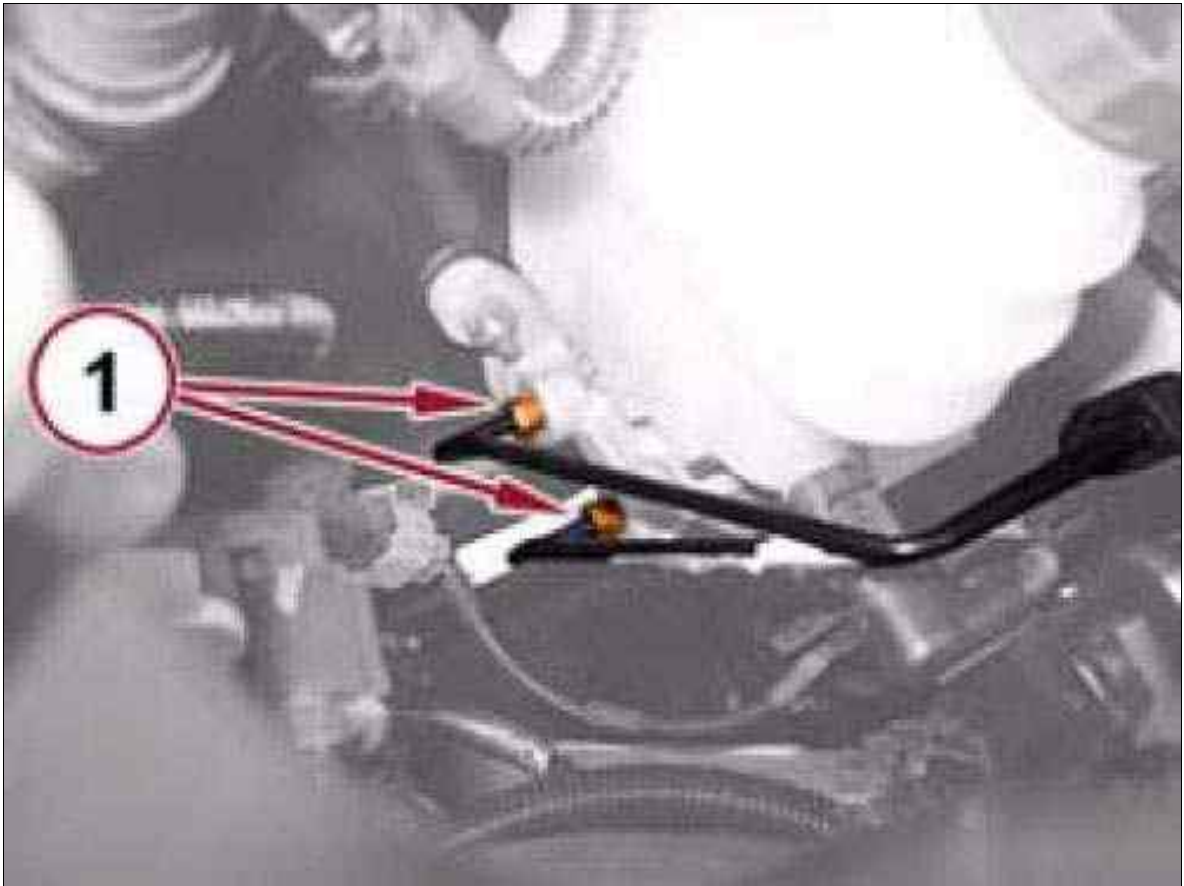
Fig 1: Primary And Secondary Brake Tubes



Courtesy of CHRYSLER GROUP, LLC

3. Remove the primary and secondary brake tubes (1) from the Hydraulic Control Unit (HCU).

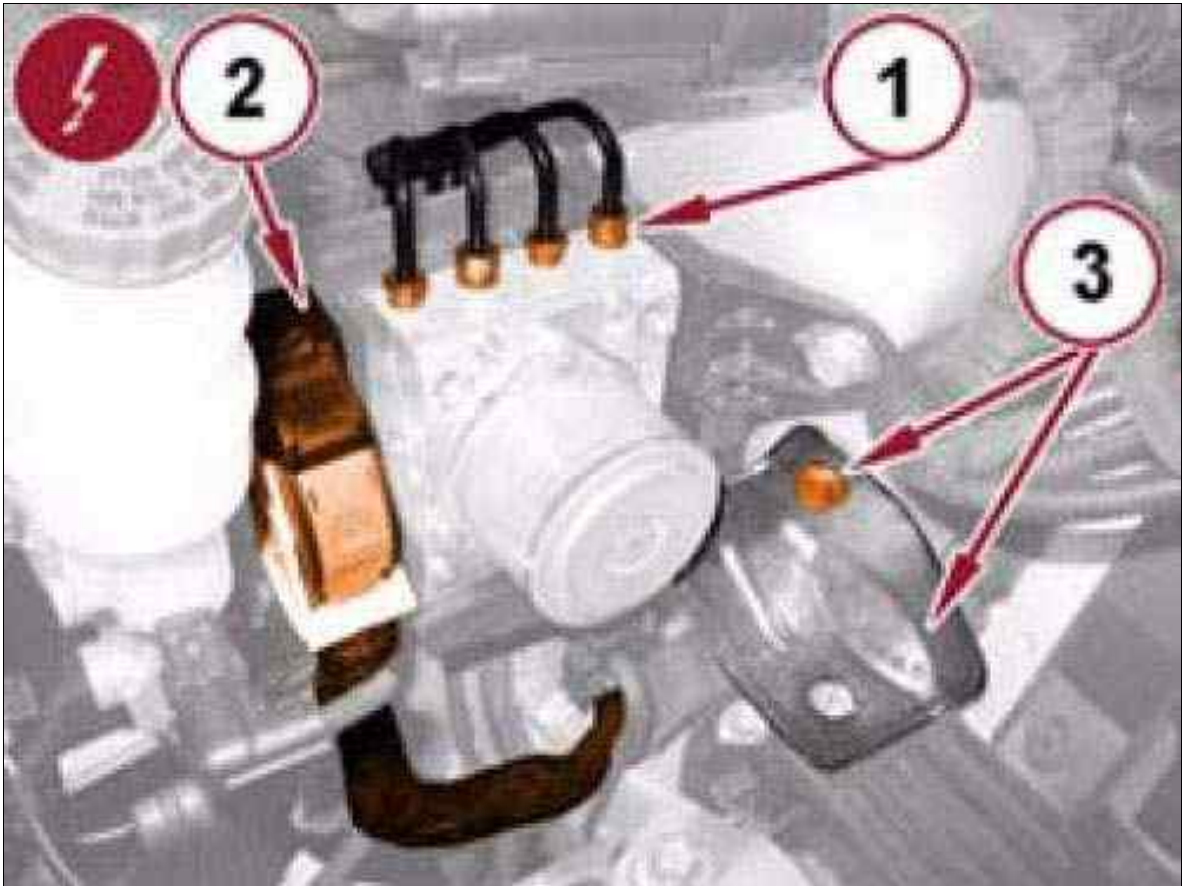
Fig 2: Primary And Secondary Brake Tubes



Courtesy of CHRYSLER GROUP, LLC

4. Remove the primary and secondary brake tubes (1) from the master cylinder.

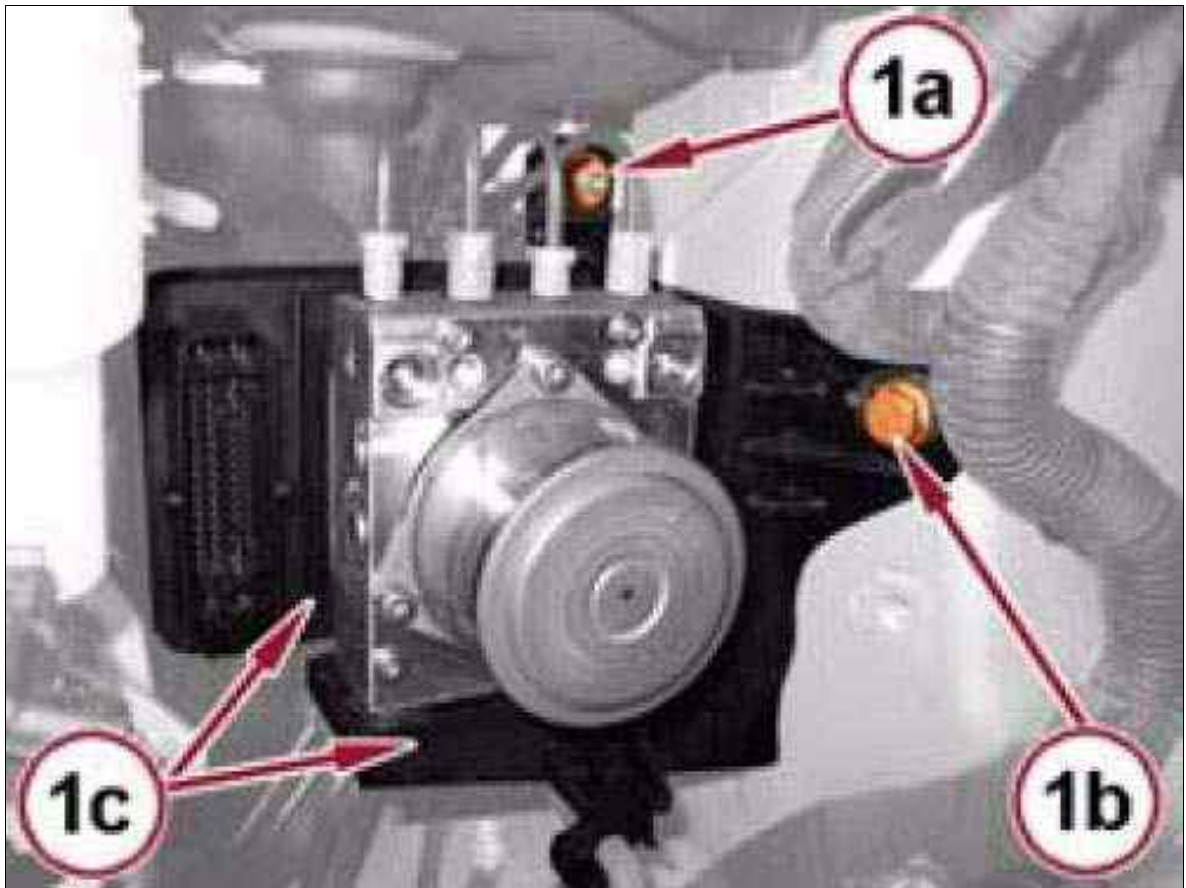
Fig 3: Integrated Control Unit (ICU) Electrical Connector & Brake Tubes



Courtesy of CHRYSLER GROUP, LLC

5. Disconnect the Integrated Control Unit (ICU) electrical connector (2).
6. Remove the four brake tubes (1) from the HCU.

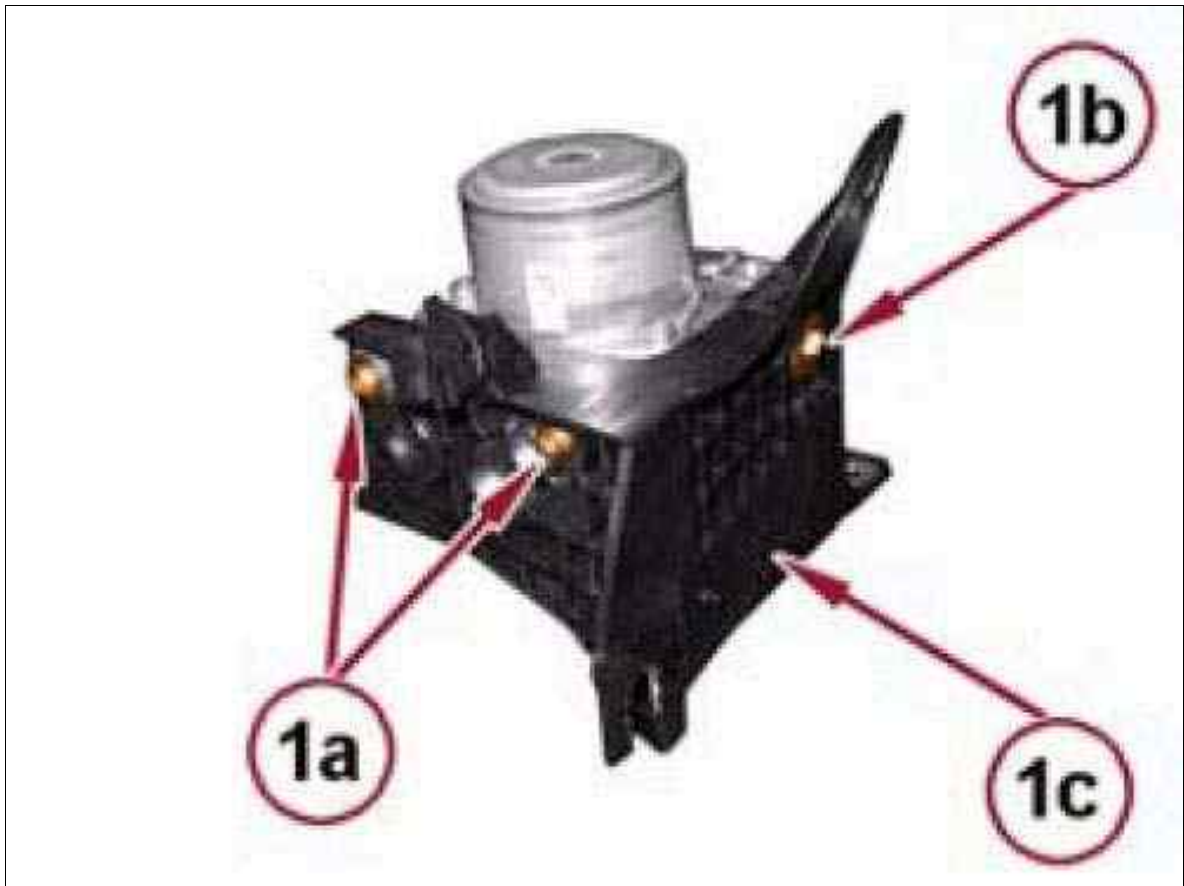
Fig 4: ICU Bracket, Bolt & Nut



Courtesy of CHRYSLER GROUP, LLC

7. Remove the nut (1a) and bolt (1b) fastening the ICU bracket to the body. Remove the assembly from the vehicle.

Fig 5: Bracket & Bolts



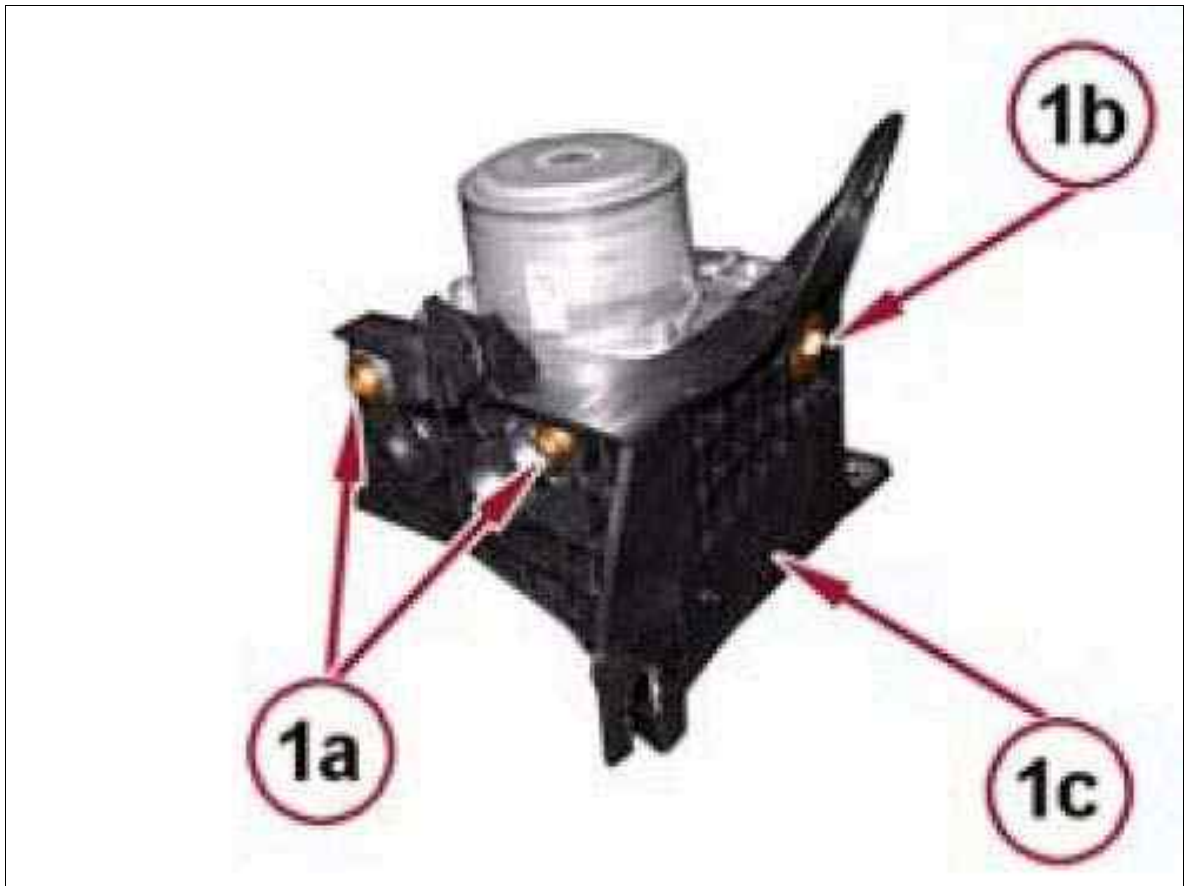
Courtesy of CHRYSLER GROUP, LLC

8. To remove the ICU bracket, remove bolts (1a) and (1b), and separate the ICU from the bracket (1c).
9. If necessary to remove Anti-lock Brake Module (ABM). Refer to MODULE, ANTI-LOCK BRAKE SYSTEM, REMOVAL AND INSTALLATION .

HYDRAULIC/MECHANICAL > INTEGRATED CONTROL UNIT (ICU) > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > INSTALLATION

1. If the Anti-lock Brake Module (ABM) was removed from the Hydraulic Control Unit (HCU) for installation. Refer to MODULE, ANTI-LOCK BRAKE SYSTEM, REMOVAL AND INSTALLATION

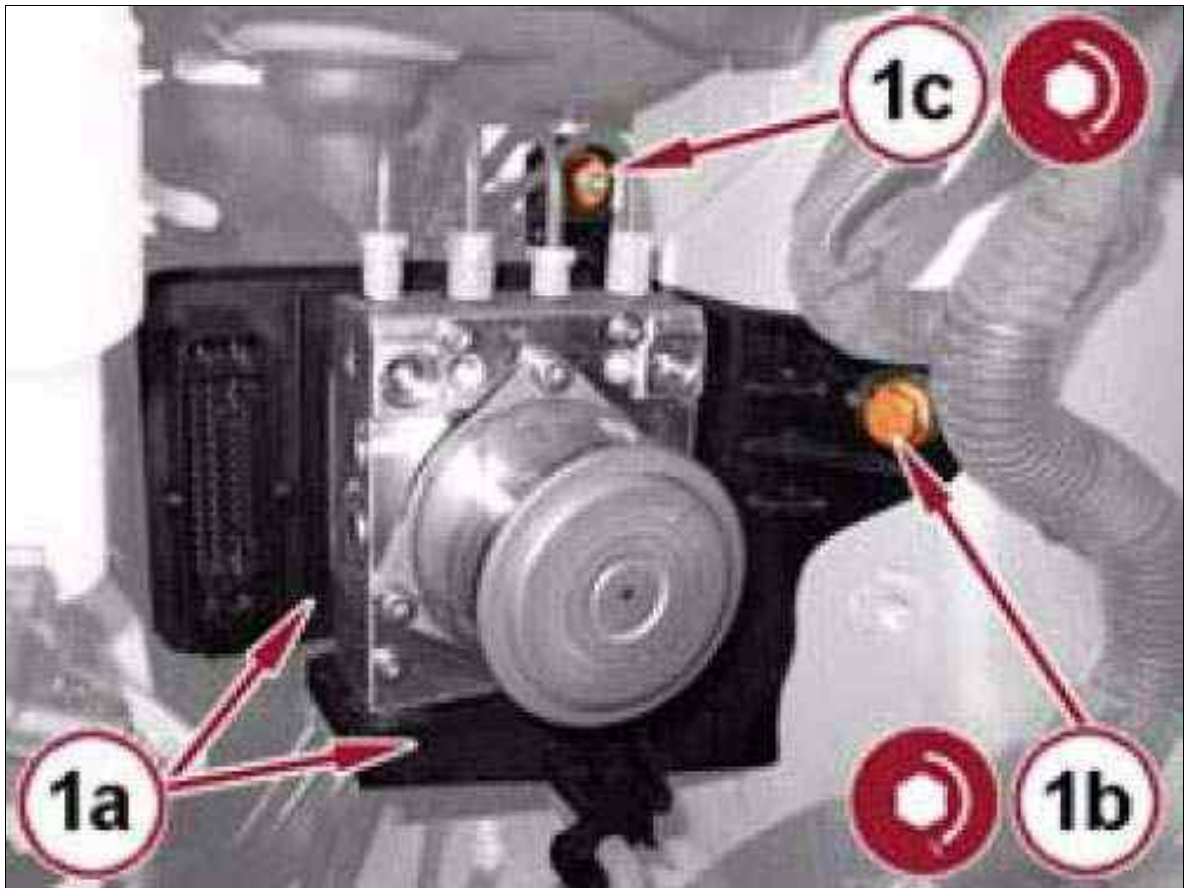
Fig 1: Bracket & Bolts



Courtesy of CHRYSLER GROUP, LLC

2. Position the Integrated Control Unit (ICU) to the ICU bracket (1c) and tighten the ICU to ICU bracket bolts (1a) (1b) to the proper torque specification. Refer to TORQUE SPECIFICATIONS

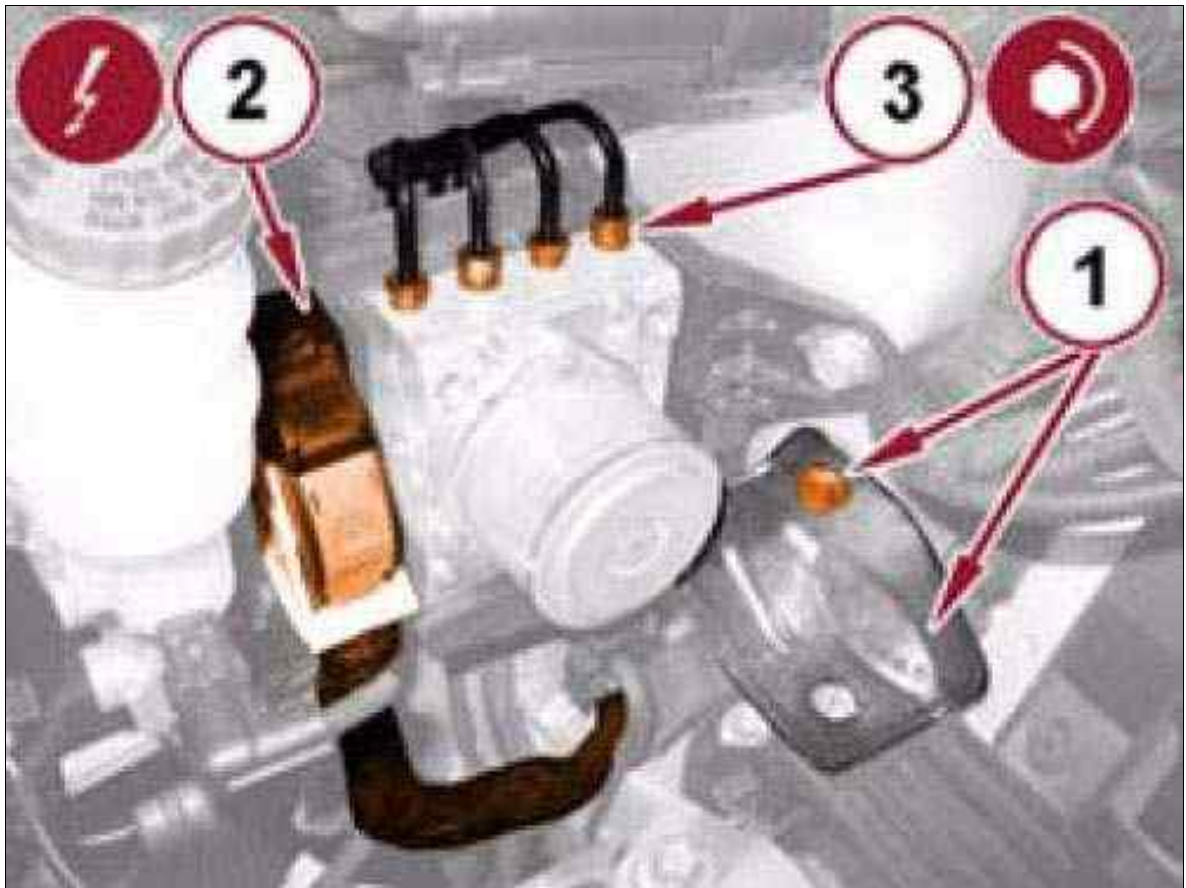
Fig 2: ICU To Body Bolt & Nut



Courtesy of CHRYSLER GROUP, LLC

3. Position the ICU into the vehicle, and tighten the ICU to body bolt (1b) and nut (1c) to the proper torque specification. Refer to TORQUE SPECIFICATIONS .

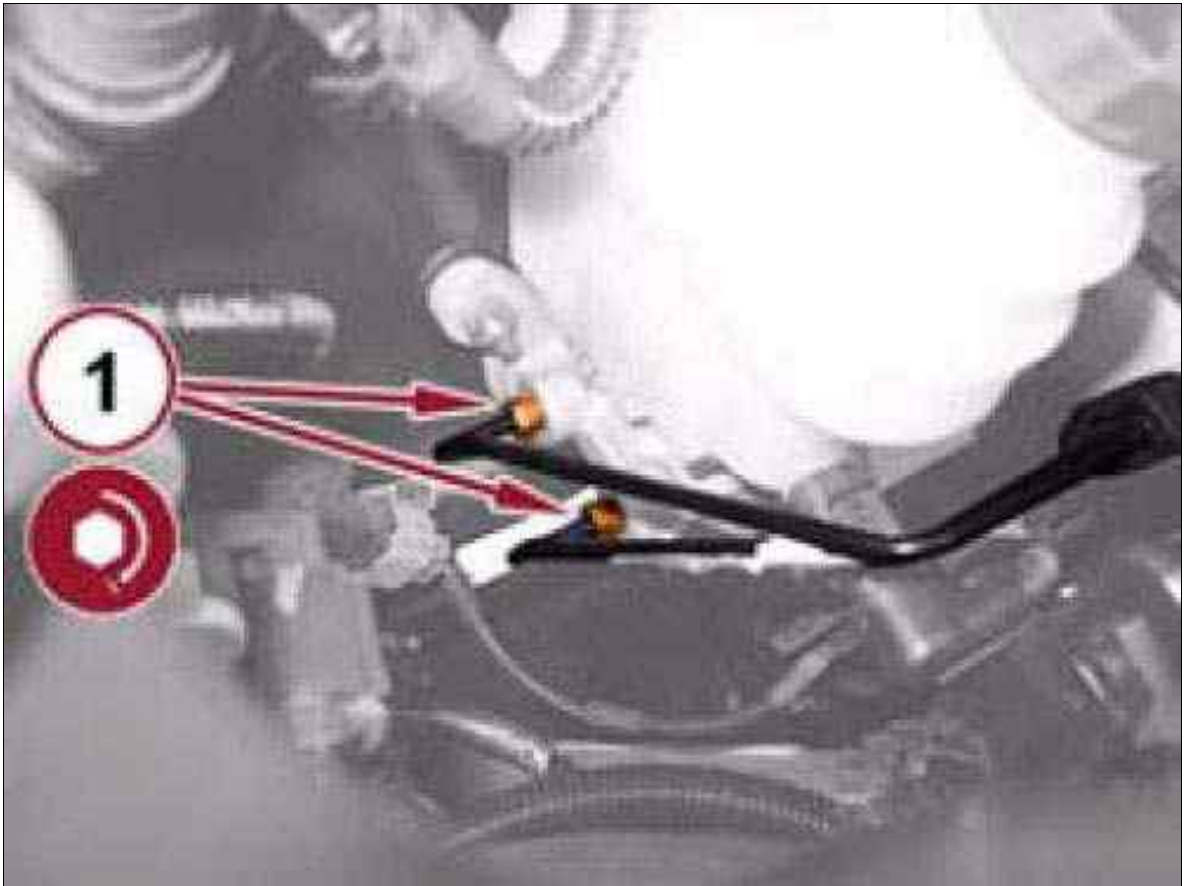
Fig 3: ICU Electrical Connector & Brake Tubes



Courtesy of CHRYSLER GROUP, LLC

4. Install the four brake tubes (3) to the HCU and tighten to the proper torque specification. Refer to TORQUE SPECIFICATIONS .
5. Connect the ICU electrical connector (2).

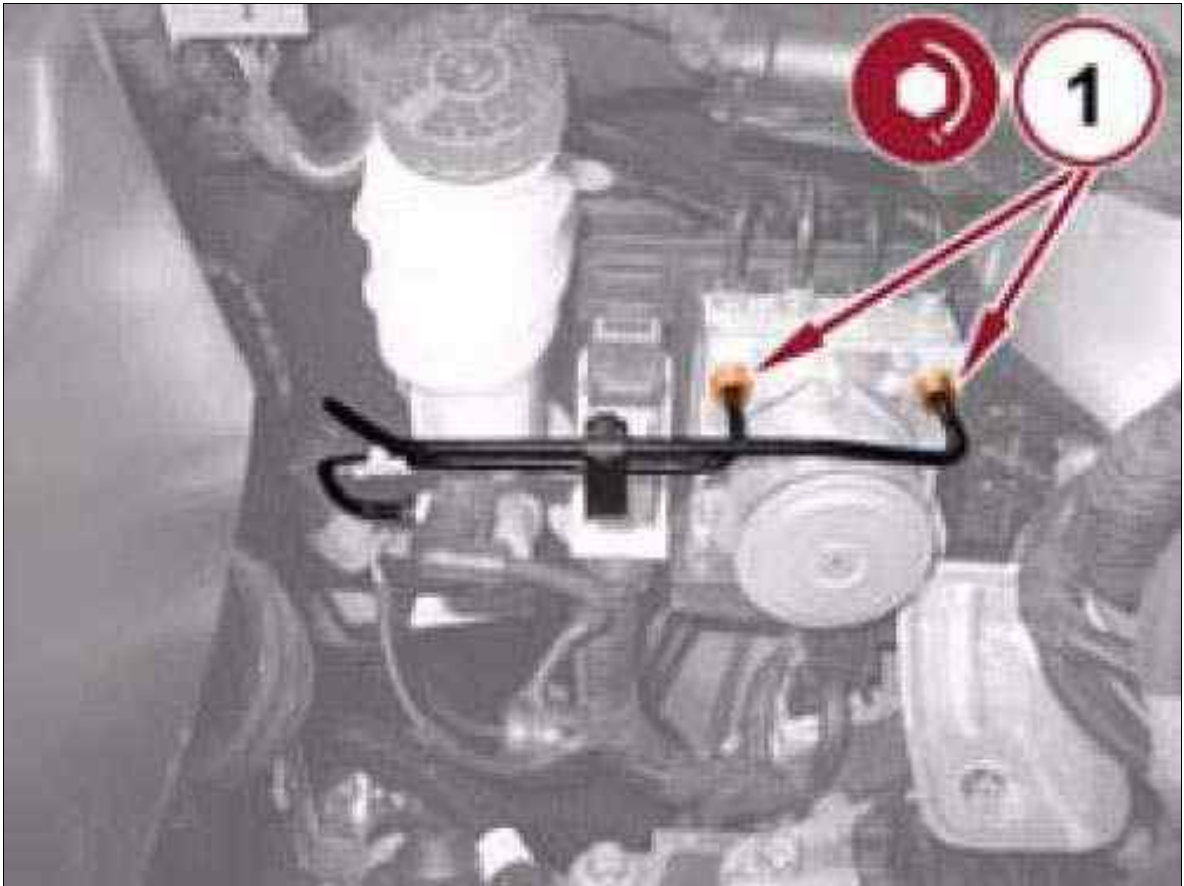
Fig 4: Primary And Secondary Brake Tubes



Courtesy of CHRYSLER GROUP, LLC

6. Install the primary and secondary brake tubes (1) to the master cylinder, and tighten to the proper torque specification. Refer to TORQUE SPECIFICATIONS .

Fig 5: Primary And Secondary Brake Tubes



Courtesy of CHRYSLER GROUP, LLC

7. Install the primary and secondary brake tubes (1) to the HCU, and tighten to the proper torque specification. Refer to TORQUE SPECIFICATIONS .
8. Install the battery tray. Refer to TRAY, BATTERY, REMOVAL AND INSTALLATION .
9. Fill and bleed out braking system. Refer to STANDARD PROCEDURE .
10. If a new ABS control unit is being installed, connect a scan tool and calibrate the yaw sensor and the steering angle sensor.