Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provide an overview of each diagnostic category.

DTC Descriptors

DTC B1277

Microphone 1 Input Signal Circuit

DTC B127C

Microphone 2 Input Signal Circuit

DTC B127D

Microphone 3 Input Signal Circuit

For symptom byte information refer to **Symptom Byte List**

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Microphone High Signal Circuit (LF)	B1277 02	B1277 04	B1277 1A	-
Microphone Low Signal Circuit (LF)	B1277 02	B1277 04	B1277 1A	-
Microphone High Signal Circuit (RF)	B127C 02	B127C 04	B127C 1A	-
Microphone Low Signal Circuit (RF)	B127C 02	B127C 04	B127C 1A	-
Microphone High Signal Circuit (RR)	B127D 02	B127D 04	B127D 1A	-
Microphone Low Signal Circuit (RR)	B127D 02	B127D 04	B127D 1A	-

Circuit/System Description

The active noise cancellation system uses three microphones in the vehicle headliner: one above each front seating position, and one above the rear seat. The Audio Amplifier provides a bias voltage to each microphone (+) and (-) signal circuits for operation of the microphone. The microphones monitor the vehicle cabin for undesirable engine sounds. The Audio Amplifier uses the microphone inputs and an engine RPM signal to determine the frequency of the undesirable sound.

ACCESSORIES & EQUIPMENT

Bolted Exterior Body Panels and Closures - XTS

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Front End Upper Tie Bar Bolt	10	89 lb in
Front Fender Bolts and Nuts	9	80 lb in
Front Side Door Check Link to Body Bolt	22	16 lb ft
Front Side Door Check Link to Door Nut	10	89 lb in
Front Side Door Lower Hinge to Body Bolt	25	18 lb ft
Front Side Door Upper Hinge to Door Bolt	25	18 lb ft
Hood Hinge Bracket Bolts	20	15 lb ft
Hood Hinge Nuts	20	15 lb ft
Hood Primary and Secondary Latch Bolt	22	16 lb ft
Rear Compartment Lid Bolt	9	80 lb in
Rear Compartment Lid Hinge Bolt	22	16 lb ft
Rear Side Door Check Link to Body Bolt	32	24 lb ft
Rear Side Door Check Link to Door Nut	10	89 lb in
Rear Side Door Lower Hinge to Body Bolt	32	24 lb ft
Rear Side Door Upper Hinge to Door Bolt	25	18 lb ft

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC B3006	DTC B3006 Hood Ajar Circuit

DTC B3006

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

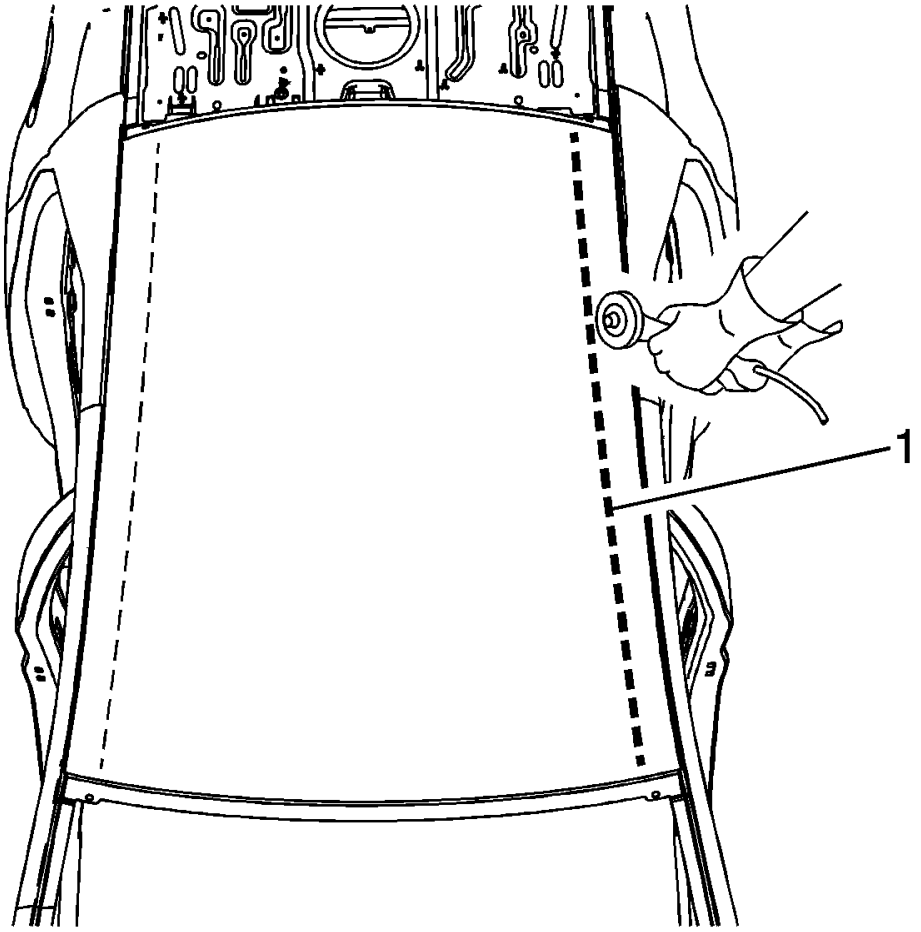

Fig. 64: Cutting Panel 30 mm Inboard Of Roof Edge
Courtesy of GENERAL MOTORS COMPANY

NOTE: Use care when cutting to protect adjacent panels. Cut inboard of the side frame structure.

8. On the side rail area of the roof, use a cut off wheel or equivalent to cut the panel 30 mm inboard of the roof edge (1).

NOTE: The sunroof panel reinforcement ring is secured to the inner side rails with fasteners and adhesive bonding. It cannot be removed by loosening the fasteners alone. Note the location of the adhesive for installation of the service part. Heat the adhesive between the reinforcement ring and the inner side rails, then cut the adhesive with a suitable tool.

9. Remove the center portion of the panel.

2. Verify the driver window functions while commanding the Driver Window Motor Up and Down with a scan tool.
    - **If the driver window does not move Up and Down as commanded**

      Refer to **Circuit/System Testing - Window Motor Malfunction**.

    - **If the driver window moves Up and Down as commanded**
3. Verify the driver window moves while commanding the window UP, express UP, DOWN and express DOWN with the S79D Window Switch-Driver.
    - **If the driver window does not move UP or DOWN as commanded**

      Refer to **Circuit/System Testing - Driver Window Switch Malfunction**.

    - **If the driver window does not express UP or express DOWN**

      Normalize the driver window motor, refer to **Window Motor Programming - Express Function**.

    - **If after normalization, the driver window does not express UP or express DOWN**

      Refer to **Circuit/System Testing - Driver Window Switch Malfunction**.

    - **If the driver window moves UP, express UP, DOWN and express DOWN as commanded**
4. Verify the scan tool parameters listed below change when pressing and pulling the switches for the passenger, left rear and right rear window on the driver window master control;
    - Left Rear Main Control Down Switch - Inactive and Active
    - Left Rear Main Control Express Switch - Inactive and Active
    - Left Rear Main Control Up Switch - Inactive and Active
    - Right Rear Main Control Down Switch - Inactive and Active
    - Right Rear Main Control Express Switch - Inactive and Active
    - Right Rear Main Control Up Switch - Inactive and Active
    - Front Passenger Main Control Down Switch - Inactive and Active
    - Front Passenger Main Control Express Switch - Inactive and Active
    - Front Passenger Main Control Up Switch - Inactive and Active
    - **If any parameter does not change**

      Replace the S79D Window Switch-Driver.

    - **If the parameters change**
5. Verify the scan tool Child Security Lockout Switch parameter changes between Inactive and Active when pressing the window lockout switch.
    - **If the parameters do not change**

- **Front Side Door Window Switch Replacement**
- **Control Module References** for Mirror Control Module replacement, programming and setup

POWER MIRROR MALFUNCTION (WITH A45)

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Driver Mirror Control Module B+	U1519 00	U1519 00	-	-
Passenger Window Switch B+	U151B 00	U151B 00	-	-
Position Sensor 5 V Reference	3	3	3	-
Outside Rearview Mirror Switch Left/Right Signal	1	1	1	-
Outside Rearview Mirror Switch Position Signal	1	1	1	-
Left/Right Mirror Horizontal Position Sensor Signal	3	3	3	-
Left/Right Mirror Vertical Position Sensor Signal	3	3	3	-
Left/Right Mirror Motor Horizontal Control	1	1	1	-
Left/Right Mirror Motor Common Control	1	1	1	-
Left/Right Mirror Motor Vertical Control	1	1	1	-
Left/Right Mirror Position Low Reference	-	2	-	-
Outside Rearview Mirror Switch Low	-	1	-	-

3. Attempt to program the SDM. If the SDM still cannot be programmed properly, replace the SDM.

INSTRUMENT CLUSTER PROGRAMMING AND SETUP

Special Tools

EL-49642 SPS Programming Support Tool

For equivalent regional tools, refer to **Special Tools**.

NOTE:

- **DO NOT program a control module unless directed to by a service procedure or a service bulletin. If the ECU is not properly configured with the correct calibration software, the ECU will not control all of the vehicle features properly.**
- **Ensure the programming tool is equipped with the latest software and is securely connected to the data link connector. If there is an interruption during programming, programming failure or ECU damage may occur.**
- **Stable battery voltage is critical during programming. Any fluctuation, spiking, over voltage or loss of voltage will interrupt programming. Install the EL-49642 SPS programming support tool to maintain system voltage. If not available, connect a fully charged 12 V jumper or booster pack disconnected from the AC voltage supply. DO NOT connect a battery charger.**
- **Turn OFF or disable systems that may put a load on the vehicles battery such as; interior lights, exterior lights (including daytime running lights), HVAC, radio, etc.**
- **During the programming procedure, follow the SPS prompts for the correct ignition switch position.**
- **Clear DTCs after programming is complete. Clearing powertrain DTCs will set the Inspection/Maintenance (I/M) system status indicators to NO.**

Diagnostic Aids

The programming steps in the Service Programming System (SPS) screens may not be in functional order. Be sure to follow the programming steps in the order listed below.

Replace and Program ECU

To program a replacement or an existing ECU, perform the following procedure:

1. Install **EL-49642** SPS programming support tool.
2. Access the Service Programming System (SPS) and follow the on-screen instructions.

NOTE: **The USB File Transfer procedure is performed after the new Instrument Cluster is installed in the vehicle.**

- Signal circuit terminal 10
- **If less than infinite resistance**

1. Disconnect the harness connector at the S72 Sunroof Switch.
2. Test for infinite resistance between the signal circuit and ground:
    - If less than infinite resistance, repair the short to ground on the circuit.
    - If infinite resistance, test or replace the S72 Sunroof Switch.

- **If infinite resistance**

11. Disconnect the harness connector at the S72 Sunroof Switch.
12. Test for less than 5 ohms between the circuit terminals listed below:
    - S72 Sunroof Switch signal circuit terminal 5 and K62 Sunroof Sunshade Motor Module signal circuit terminal 5
    - S72 Sunroof Switch signal circuit terminal 6 and K62 Sunroof Sunshade Motor Module signal circuit terminal 10
    - **If greater than 5 ohms**

      Repair the open/high resistance in the circuit.

    - **If less than 5 ohms**
13. Disconnect the harness connector at the M69 Sunroof Motor, ignition ON.
14. Test for less than 1 V between the serial data circuit terminal 7 and ground.
    - **If 1 V or greater**

      Repair the short to voltage on the circuit.

    - **If less than 1 V**
15. Ignition OFF.
16. Test for infinite resistance between the serial data circuit terminal 7 and ground:
    - **If less than infinite resistance**

      Repair the short to ground on the circuit.

    - **If infinite resistance**
17. Test for less than 2 ohms between the K62 Sunroof Sunshade Motor Module serial data circuit terminal 7 and the M69 Sunroof Motor serial data circuit terminal 7.
    - **If 2 ohms or greater**

      Repair the open/high resistance in the circuit.

    - **If less than 2ohms**
18. Replace the K62 Sunroof Sunshade Motor Module.

Component Testing

DTC C0060-C0095, C0121, C0141, C0146, C0151, or C0156 (Without UGN)	DTC C0060 00 Left Front Dump Solenoid Valve Circuit DTC C0065 00 Left Front Isolation Solenoid Valve Circuit DTC C0070 00 Right Front Dump Solenoid Valve Circuit DTC C0075 00 Right Front Isolation Solenoid Valve Circuit DTC C0080 00 Left Rear Dump Solenoid Valve Circuit DTC C0085 00 Left Rear Isolation Solenoid Valve Circuit DTC C0090 00 Right Rear Dump Solenoid Valve Circuit DTC C0095 00 Right Rear Isolation Solenoid Valve Circuit DTC C0121 00 Valve Relay Circuit DTC C0141 00 Front Prime Solenoid Valve Circuit DTC C0146 00 Front Isolation Solenoid Valve Circuit DTC C0151 00 Rear Prime Solenoid Valve Circuit DTC C0156 00 Rear Isolation Solenoid Valve Circuit
DTC C0110	DTC C0110 00 Pump Motor Circuit Malfunction DTC C0110 04 Pump Motor Circuit Open DTC C0110 61 Pump Motor Stuck
DTC C0131	DTC C0131 00 Traction Control System Pressure Circuit Malfunction DTC C0131 5A Traction Control System Pressure Circuit Not Plausible
DTC C0161	DTC C0161 5A Antilock Braking System Brake Switch Circuit Not Plausible
DTC C0186, C018B, C0196, C019B, C027E, or C0287 (With UGN)	DTC C0186 5A Lateral Acceleration Sensor Signal Not Plausible (Electronic Brake Control Module) DTC C0186 71 Lateral Acceleration Sensor Signal Invalid Data (Electronic Brake Control Module) DTC C018B 5A Lateral Acceleration Sensor Signal Not Plausible (Multi-axis Acceleration Sensor Module) DTC C0196 00 Yaw Rate Signal Malfunction (Electronic Brake Control Module) DTC C0196 5A Yaw Rate Signal Not Plausible (Electronic Brake Control Module) DTC C0196 71 Yaw Rate Signal Invalid Data (Electronic Brake Control Module) DTC C019B 5A Yaw Rate Signal Not Plausible (Multi-axis Acceleration Sensor Module) DTC C027E 5A Longitudinal Acceleration Sensor Signal Not Plausible (Multi-axis Acceleration Sensor Module) DTC C0287 4B Longitudinal Acceleration Sensor Signal Calibration Not Learned (Electronic Brake Control Module) DTC C0287 5A Longitudinal Acceleration Sensor Signal Not Plausible (Electronic Brake Control Module) DTC C0287 71 Longitudinal Acceleration Sensor Signal Invalid Data (Electronic Brake Control Module)
DTC C0186, C0196, or C0287 (Without UGN)	DTC C0186 00 Lateral Acceleration Sensor Signal Malfunction (Inflatable Restraint Sensing and Diagnostic Module) DTC C0186 4B Lateral Acceleration Sensor Signal Calibration Not Learned (Electronic Brake Control Module) DTC C0186 5A Lateral Acceleration Sensor Signal Not Plausible

Replace the KR14 Brake Booster Pump Motor Relay.

- **If the test lamp turns ON and OFF**

10. Install a 30 A fused jumper wire between the M9 Brake Booster Pump Motor terminal 1 and B+. Install a jumper wire between the M9 Brake Booster Pump Motor terminal 2 and ground.
11. Verify the M9 Brake Booster Pump Motor activates.
    - **If the brake booster pump motor does not activate**

      Replace the M9 Brake Booster Pump Motor.

    - **If the brake booster pump motor activates**
12. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Power Brake Booster Pump Replacement**
- **Relay Replacement (Attached to Wire Harness)** , **Relay Replacement (Within an Electrical Center)**
- **Control Module References** for Electronic Brake Control Module replacement, programming and setup.

BRAKE BOOSTER PUMP MOTOR MALFUNCTION (WITH J55)

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Vacuum Pump Relay B+	2	2	-	-
Vacuum Pump Relay Control	2	2	1	-
Vacuum Pump Relay Ground	-	2	-	-
Brake Booster Vacuum Sensor 5V Reference	C1100 00	C1100 00	C1100 00, C1100 01	-
Brake Booster Vacuum	C1100 00,	C1100 00	C1100 00,	C1100 09, C1100 5A

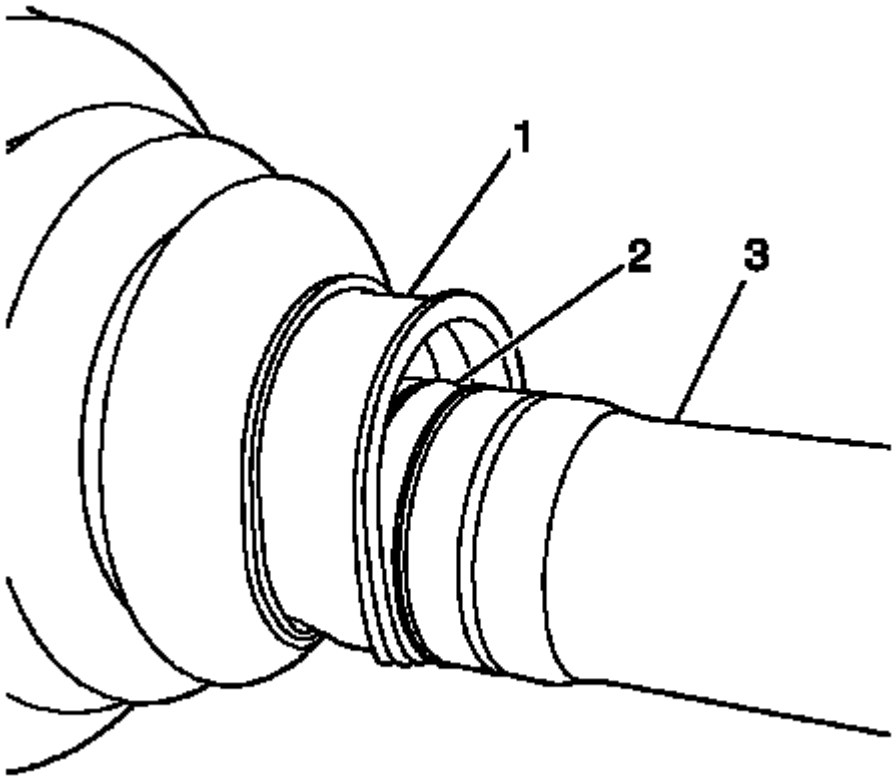

Fig. 72: Identifying Groove In Wheel Drive Shaft
Courtesy of GENERAL MOTORS COMPANY

2. Ensure that the boot (1) is properly seated in the groove (2) in the wheel drive shaft (3).

E64P	Flood Lamp - Passenger Door Pull Handle	TSP	passenger door trim panel, forward of the passenger door lock switch	-	**E64P Flood Lamp Passenger Door P Handle (TSP)**
E64LR	Flood Lamp - Left Rear Door Pull Handle	TSP	In the left rear door trim panel, above the accent lamp	-	**E64LR Flood Lam Left Rear Door Pu Handle (TSP)**
E64RR	Flood Lamp - Right Rear Door Pull Handle	TSP	In the right rear door trim panel, above the accent lamp	-	**E64RR Flood Lam Right Rear Door P Handle (TSP)**
F101	Passenger Instrument Panel Air Bag	-	In the passenger compartment, passenger front, within the instrument panel, mounted to bottom of instrument panel pad	-	• **F101 Passenger Instrument Panel Air Ba X1** • **F101 Passenger Instrument Panel Air Ba X2** • **F101 Passenger Instrument Panel Air Ba X3**
F105L	Roof Rail Air Bag - Left	-	In the passenger compartment, left middle, mounted to roof above left door openings	• **Left Front Passenger Compartment (PRO)** • **Left Rear Passenger Compartment**	**F105L Roof Rail A Bag - Left**
F105R	Roof Rail Air Bag - Right	-	In the passenger compartment, right middle, mounted to roof above	• **Right Rear Passenger Compartment** • **Right Front Passenger**	**F105R Roof Rail A Bag - Right**

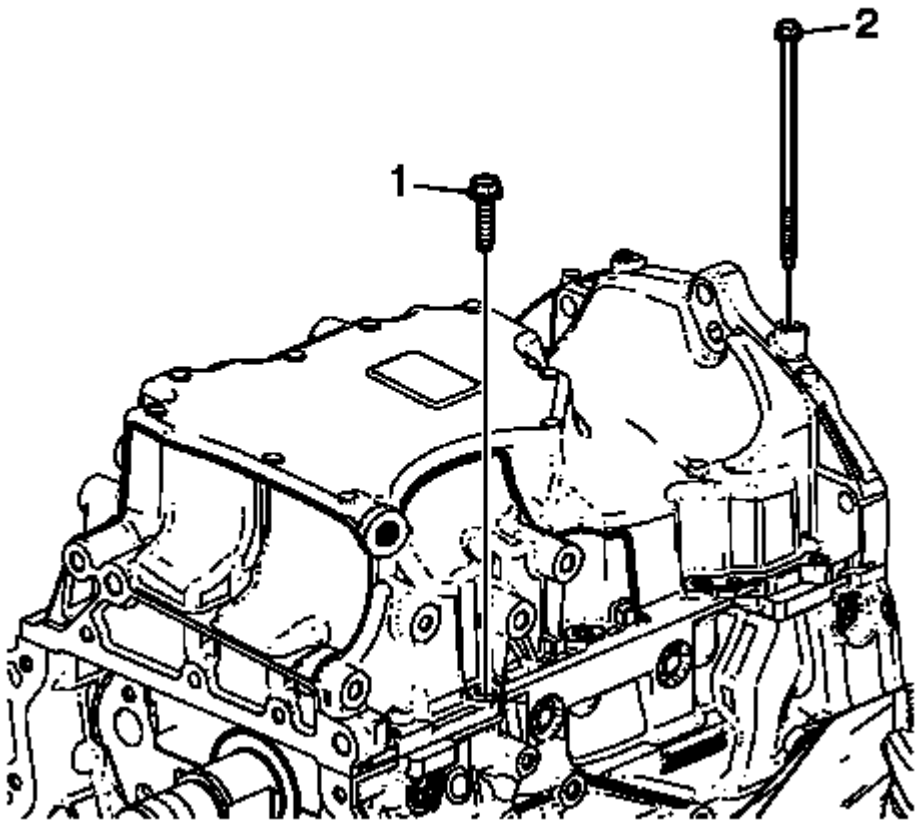

Fig. 85: Oil Pan Bolts
Courtesy of GENERAL MOTORS COMPANY

1. Remove the oil pan bolts (1) and (2).
2. Using the pry points located at the edge of the oil pan separate the RTV sealant.

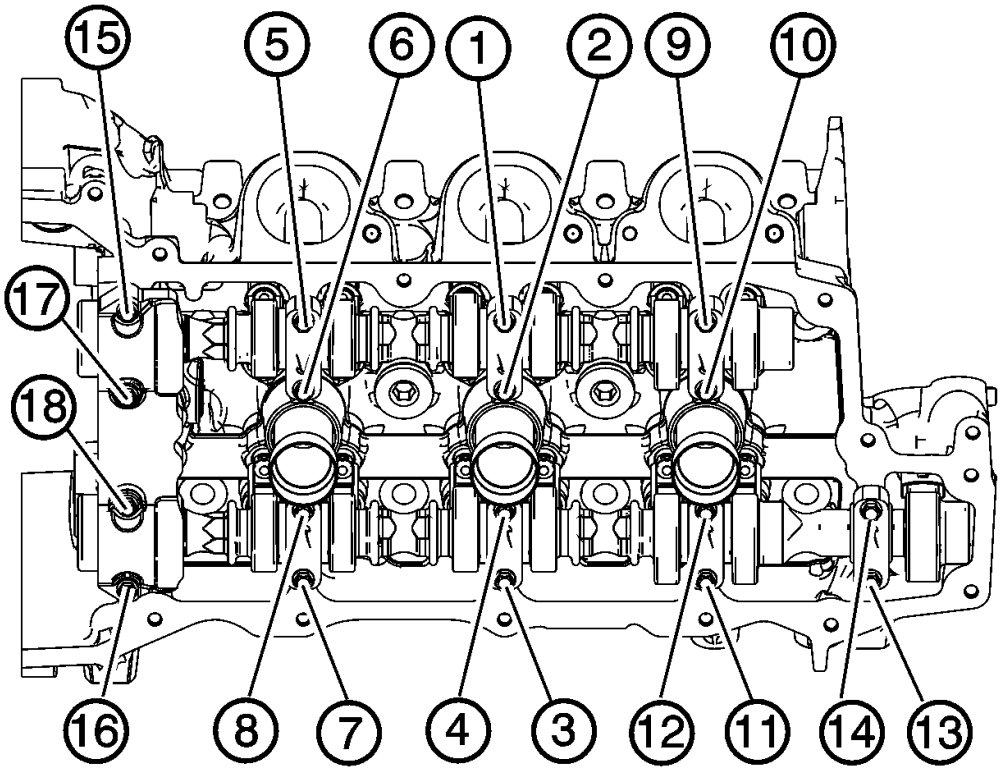

Fig. 528: Identifying Camshaft Bearing Cap Bolt Tightening Sequence
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

11. Tighten the camshaft bearing cap bolts in the sequence shown and tighten to 10 N.m (89 lb in).
12. Loosen the center intake camshaft bearing cap bolts 1, 2 and the center exhaust camshaft bearing cap bolts 3, 4.
13. Retighten the center camshaft bearing cap bolts 1, 2, 3, 4 and retighten the camshaft bearing cap bolts to 10 N.m (89 lb in).

FUEL PUMP INSTALLATION (LF1, LFW OR LFX)

Special Tools

EN 48896 HP Fuel Pump Installation Alignment Gauge

Batt.

Battery

Bbl.

Barrel (Example: 4-Bbl.)

BCM

Body Control Module

BHP

Brake Horsepower

BMAP

Barometric and Manifold Absolute Pressure Sensor

BOO

Brake On-Off Switch

B/P

Backpressure

BPS

Barometric Pressure Sensor

BPT

Backpressure Transducer

BTDC

Before Top Dead Center

BTSI

Brake Transmission Shift Interlock

BTU

British Thermal Unit

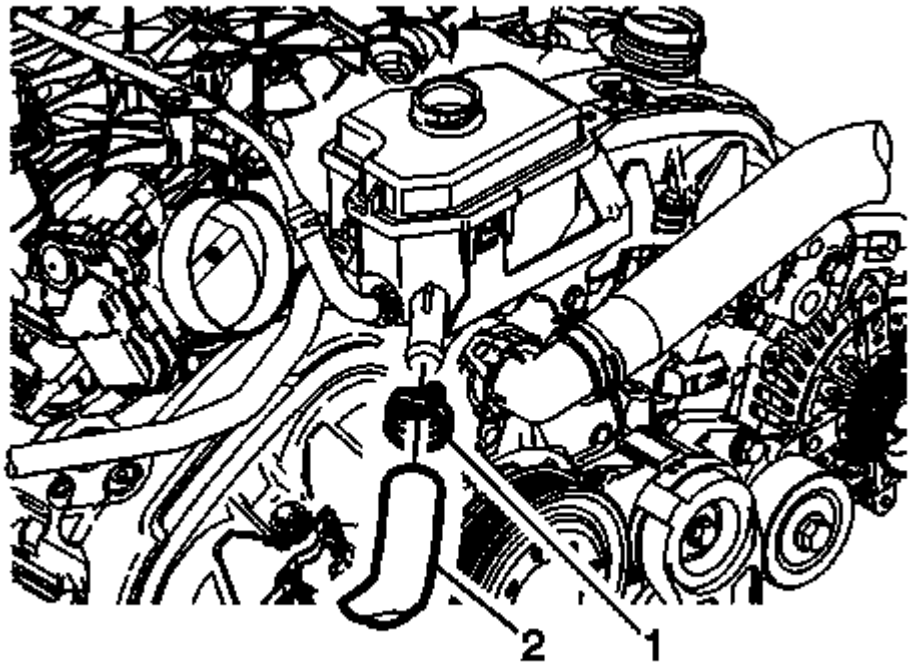

Fig. 30: Power Steering Fluid Reservoir Outlet Hose And Clamp
Courtesy of GENERAL MOTORS COMPANY

6. Release the power steering fluid reservoir outlet hose clamp (1) and disconnect the power steering fluid reservoir outlet hose (2) from the power steering fluid reservoir.
7. Remove the power steering fluid reservoir outlet hose (2) from the vehicle.

Installation Procedure