

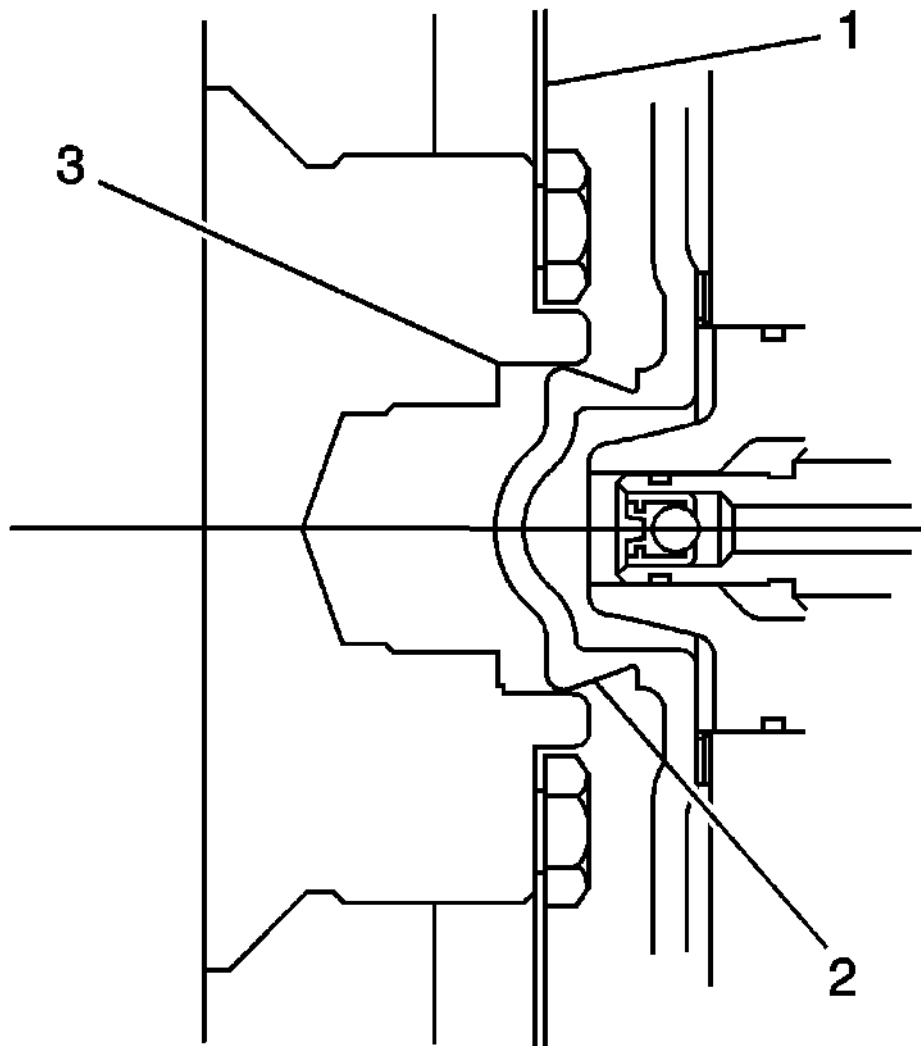


Fig. 8: View Of Torque Converter Hub In Engine Crankshaft
Courtesy of GENERAL MOTORS COMPANY

CAUTION: When installing the torque converter to the flexplate, make sure to use specified bolts. **DO NOT** use longer bolts. Using longer bolts will result in deformation of the torque converter cover and cause internal damage.

CAUTION: Refer to Fastener Caution .

3. Align the torque converter pilot (2) in the engine crankshaft (3). Install the torque converter to flexplate bolts, and tighten according to **Fastener Tightening Specifications (Off Vehicle)** .
4. Lower the vehicle.
5. With the engine at idle speed and the transmission in PARK or NEUTRAL, observe the vibration.

-
- DTC P2729 is a Type A DTC.
 - TCM limits the transmission to 5th gear and reverse.
 - TCM commands the high side driver OFF.
 - TCM forces TCC OFF.
 - TCM commands maximum line pressure.
 - TCM freezes transmission adaptive functions.
 - TCM inhibits neutral idle.
 - TCM inhibits Tap Up/Tap Down.
 - TCM inhibits manual up, manual down with the shift selector.

P2730

- DTC P2730 is a Type A DTC.
- TCM limits the transmission to reverse and 4th gear.
- TCM enables torque management.
- TCM inhibits neutral idle.
- TCM inhibits Tap Up/Tap Down function.
- TCM inhibits manual shifting of forward gears.
- TCM commands maximum line pressure.
- TCM freezes transmission adaptive functions.

Conditions for Clearing the DTC

- DTC P2728 is a Type C DTC.
- DTCs P2729 and P2730 are Type A DTCs.

Reference Information

Schematic Reference

Automatic Transmission Controls Schematics

Description and Operation

- **Transmission General Description**
- **Transmission Component and System Description**
- **Electronic Component Description**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**

1. Turn the ignition to the OFF position.

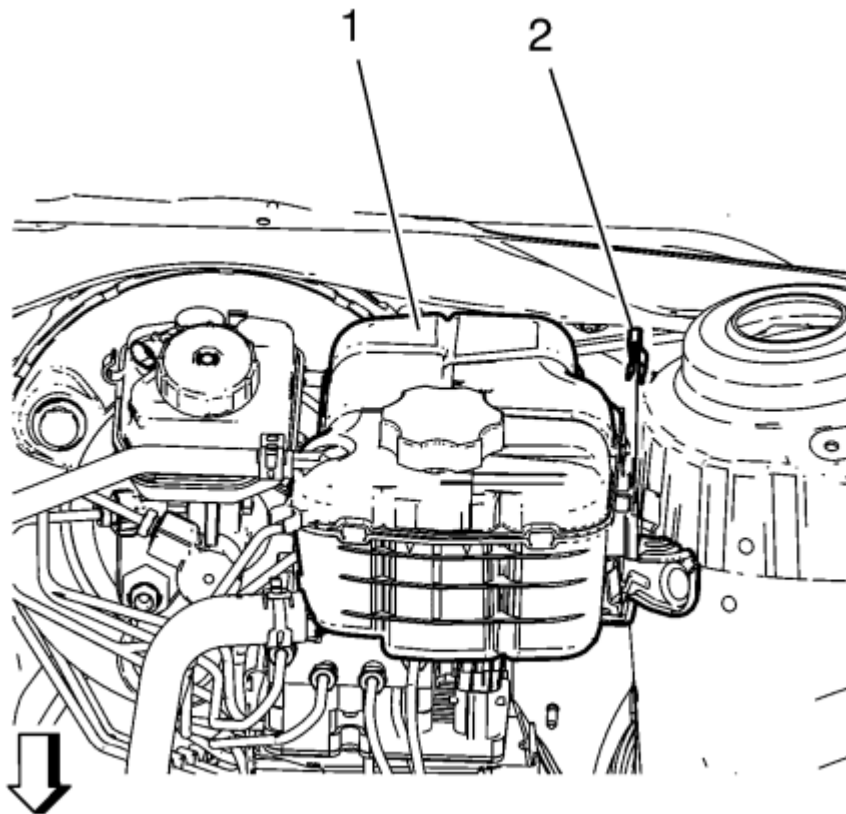


Fig. 60: View Of Radiator Surge Tank & Clip
Courtesy of GENERAL MOTORS COMPANY

NOTE: Do NOT disconnect engine coolant hoses.

2. Remove the radiator surge tank clip (2).
3. Remove the radiator surge tank (1).

Position the radiator surge tank (1) aside.

CAUTION: Always connect or disconnect the wiring harness connector from the EBCM/EBTCM with the ignition switch in the OFF position. Failure to observe this precaution could result in damage to the EBCM/EBTCM.

4. Disconnect the electrical connector from the EBCM/EBTCM.

Steel (Dual Phase Steel with a tensile strength up to and including 800 MPa), also known as DP.

General Motors recommends the following when repairing or replacing this type of steel during collision repair.

NOTE: The use of heat to repair damage is not recommended for this classification of steel.

Recommended Repairs

- Cold repairs can be performed on this type of steel, unless the damage includes kinks. If the damage includes kinks, the part should be replaced.
- Sectioning or partial replacement of this type of steel is recommended only at approved locations, in a specific sectioning procedure.
- This type of steel can be used as a sleeve, or backer plate, when recommended in a specific sectioning procedure.
- Squeeze Resistance Spot Welding can be used to replace factory spot welds, where applicable.
- MIG plug welding and MIG stitch welding can be used on this type of steel.
- MIG Brazing can be used on this type of steel.

HIGH STRENGTH LOW ALLOY STEEL

This information provides repair recommendations and general guidelines for steel classified as High Strength Low Alloy Steel, also known as HSLA. This type of steel normally has a tensile strength range from 300-700 MPa.

General Motors recommends the following when repairing or replacing this type of steel during collision repair.

Recommended Repairs

- Cold repairs can be performed on this type of steel, unless the damage includes kinks. If the damage includes kinks, the part should be replaced.
- Controlled use of heat can be used to repair damage, if the heat does not exceed 650°C (1200°F). The heat should be applied a maximum of 2 times, for up to 90 seconds.
- Sectioning or partial replacement of this type of steel is recommended only at approved locations, in a specific sectioning procedure.
- This type of steel can be used as a sleeve, or backer plate, during sectioning procedures.
- Squeeze Resistance Spot Welding can be used to replace factory spot welds, where applicable.
- MIG plug welding and MIG stitch welding can be used on this type of steel.
- MIG Brazing can be used on this type of steel.

MILD STEEL

This information provides repair recommendations and general guidelines for steel classified as Mild Steel. This type of steel normally has a tensile strength less than 270 MPa. This includes the common steel names of:

5	to assist in looking at hard to see areas. 2. Inspect for leaks at the following locations: • Sealing surfaces • Fittings • Cracked or damaged components Can you identify the type of fluid and the approximate location of the leak?	Go to Step 10	Go to Step 6
6	1. Completely clean the entire engine and surrounding components. 2. Apply an aerosol-type powder, for example, baby powder or foot powder, to the suspected area. 3. Operate the vehicle for several miles at normal operating temperature and at varying speeds. 4. Identify the type of fluid, and the approximate location of the leak, from the discolorations in the powder surface. Can you identify the type of fluid and the approximate location of the leak?	Go to Step 10	Go to Step 7
7	1. Visually inspect the suspected area. Use a small mirror to assist in looking at hard to see areas. 2. Inspect for leaks at the following locations: • Sealing surfaces • Fittings • Cracked or damaged components Can you identify the type of fluid and the approximate location of the leak?	Go to Step 10	Go to Step 8
8	Use the J 28428-E High-Intensity Black Light Kit high-intensity black light kit in order to identify the type of fluid, and the approximate location of the leak. Refer to the manufacturer's instructions when using the tool. Can you identify the type of fluid and the approximate location of the leak?	Go to Step 10	Go to Step 9
9	1. Visually inspect the suspected area. Use a small mirror to assist in looking at hard to see areas. 2. Inspect for leaks at the following locations: • Sealing surfaces • Fittings • Cracked or damaged components		

Test the IAT Sensor 2 by varying the sensor temperature while monitoring the air temperature with a thermometer. Compare the readings with the scan tool IAT Sensor 2 parameter. The values should be within 5%.

- **If not within 5%.**

Replace the B75C Multifunction Intake Air sensor.

- **If within 5%.**

All OK

Turbocharger Boost/Intake Air Temperature sensor

1. Ignition OFF, disconnect the harness connector at the B111B Turbocharger Boost/Intake Air Temperature sensor.

NOTE: **A thermometer can be used to test the sensor off the vehicle.**

2. Test the IAT sensor 3 by varying the sensor temperature while monitoring the sensor resistance. Compare the readings with the Temperature Versus Resistance - Intake Air Temperature Sensor (Delco Sensor) , Temperature Versus Resistance - Intake Air Temperature Sensor (Bosch Sensor) table for Delco sensors. The resistance values should be in range of the table values.

- **If not within the specified range.**

Replace the B111B Turbocharger Boost/Intake Air Temperature sensor.

- **If within the specified range.**

All OK

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

- Intake Air Pressure and Temperature Sensor Replacement for turbocharger boost/intake air temperature sensor replacement
- Mass Airflow Sensor Replacement for mass air flow/multifunction intake air sensor replacement
- Control Module References for engine control module replacement, programming, and setup

DTC P112C-P112E

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.

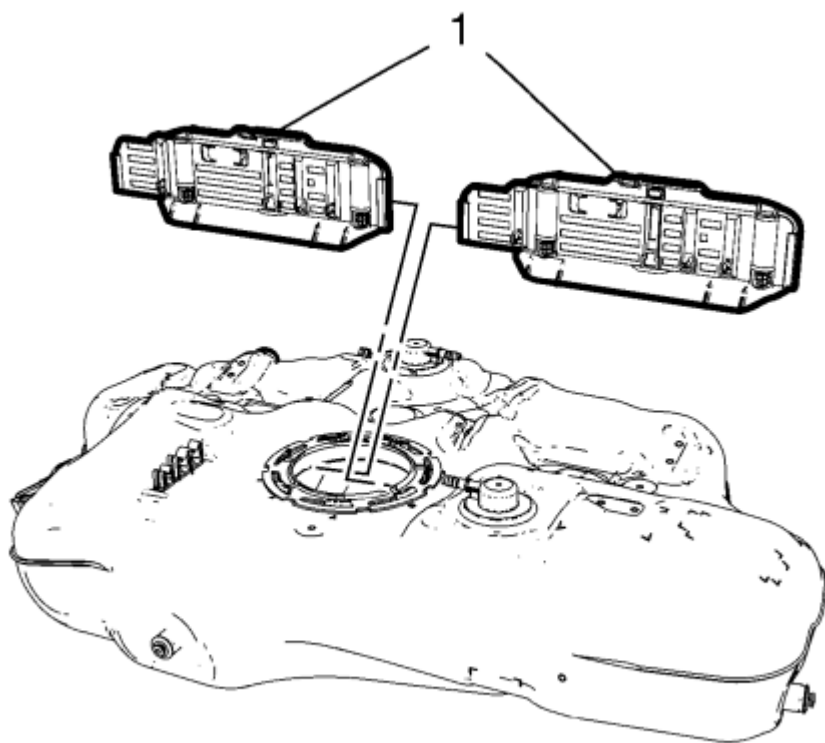


Fig. 85: Fuel Tank Baffles

Courtesy of GENERAL MOTORS COMPANY

7. Remove the baffles (1) one by one.
8. Repeat steps 5 to 8 to remove the other baffle.

Installation Procedure

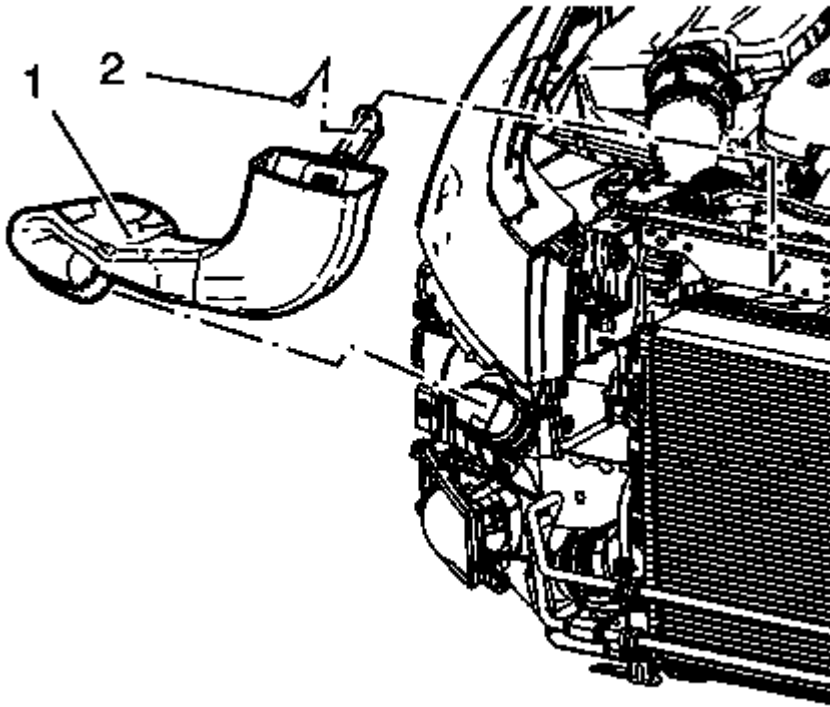


Fig. 62: Intake Air Duct And Bolt

Courtesy of GENERAL MOTORS COMPANY

15. Install the front intake air duct (1).
16. Install the front intake air duct bolt (2) and tighten.
17. Install the front intake air duct deflector.
18. Install the front bumper fascia. Refer to **Front Bumper Fascia Replacement** .
19. Connect the battery negative cable. Refer to **Battery Negative Cable Disconnection and Connection** .

ENGINE COOLANT FAN WIRING HARNESS REPLACEMENT

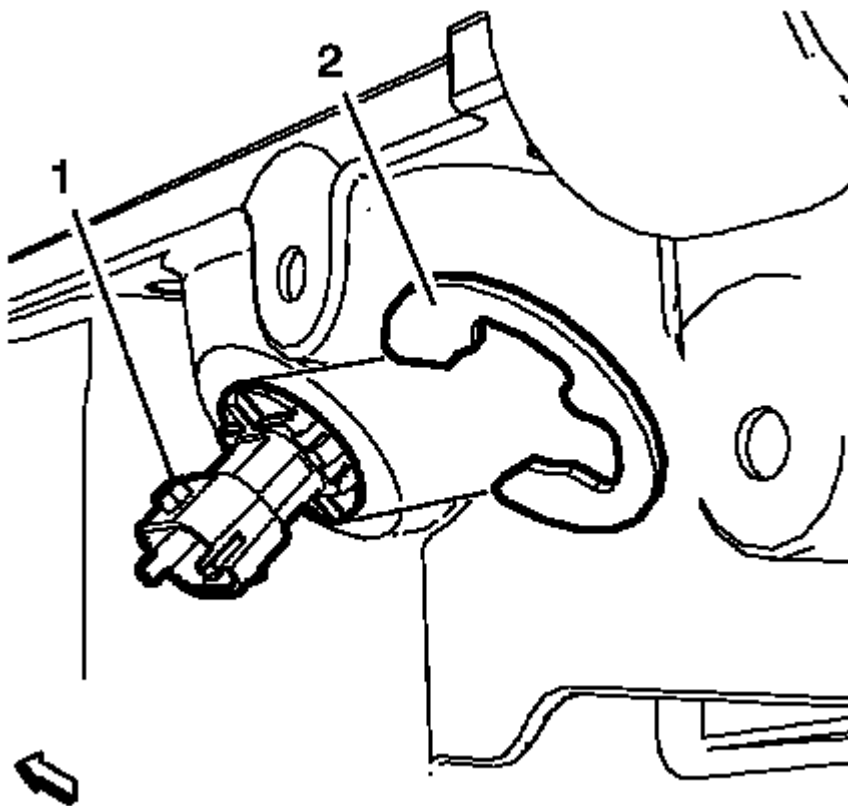


Fig. 10: Engine Oil Level Sensor Wiring Harness Plug & Clip
Courtesy of GENERAL MOTORS COMPANY

5. Install the oil level sensor wiring harness plug clip.
6. Install the oil pan. Refer to **Oil Pan Replacement (Manual Transmission)**, **Oil Pan Replacement (Automatic Transmission)**.

OIL PRESSURE RELIEF VALVE REPLACEMENT

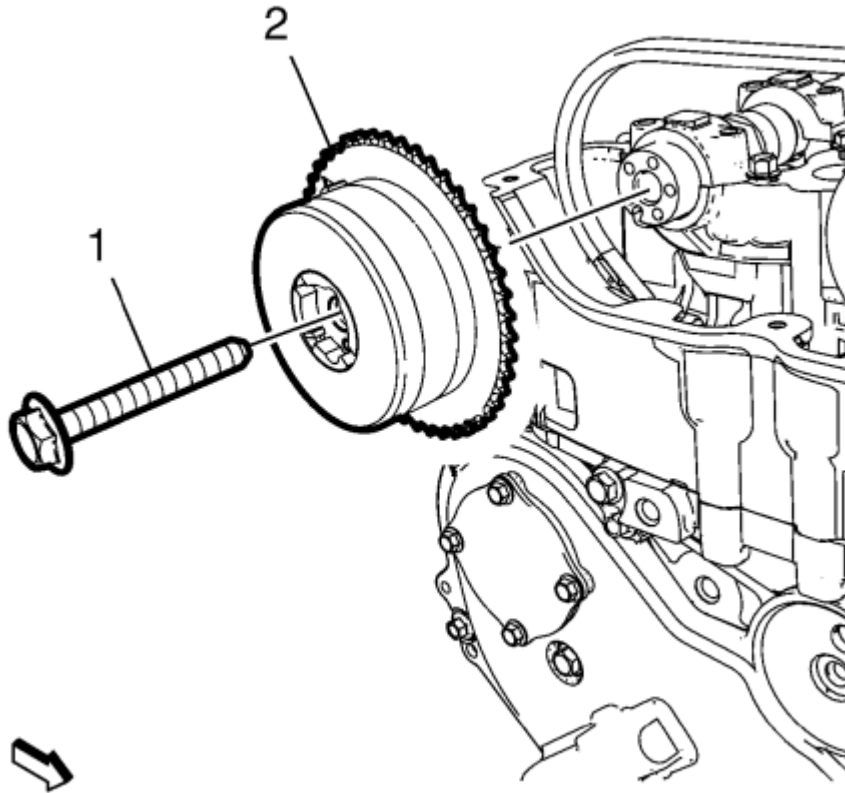


Fig. 154: Camshaft Position Exhaust Actuator & Bolt
Courtesy of GENERAL MOTORS COMPANY

6. Loosen, but DO NOT remove, the camshaft position exhaust actuator bolt (1).

Replace the T11 multimedia player interface module.

- **If DTC B1278 or DTC B1279 is not set**

9. All OK.

Repair Instructions

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

- **Audio Disc Player Receptacle Replacement**
- **Control Module References** for multimedia player interface module replacement, programming, and setup.

DTC B1287

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.

DTC Descriptors

DTC B1287 01

Amplifier Control Signal Circuit Short to Battery

DTC B1287 02

Amplifier Control Signal Circuit Short to Ground

DTC B1287 04

Amplifier Control Signal Circuit Open

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Amplifier Control	DTC B1287 02,**	DTC B1287 04,**	DTC B1287 01,*	-
* No audio output. ** 4 Channel unmute, possible noise in speakers when radio muted or turned off				

Circuit/System Description

- If the compressor clutch is engaged

Refer to **Air Conditioning (A/C) System Performance Test** .

- If the air is cool

12. All OK.

Repair Instructions

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

- **HVAC Component Replacement Reference**
- **Control Module References** for HVAC control module replacement, programming, and setup

AIR CONDITIONING COMPRESSOR MALFUNCTION

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.

Circuit/System Description

When the A/C switch is pressed, the HVAC control module sends an A/C request message to the engine control module (ECM) via CAN-Bus. The ECM then grounds the A/C compressor clutch relay control circuit, closing the A/C compressor clutch relay contacts. With the relay contacts closed, battery voltage is supplied to the A/C compressor clutch and A/C compressor clutch is activated.

Reference Information

Schematic Reference

HVAC Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Manual HVAC Description and Operation

Electrical Information Reference

- **Circuit Testing**

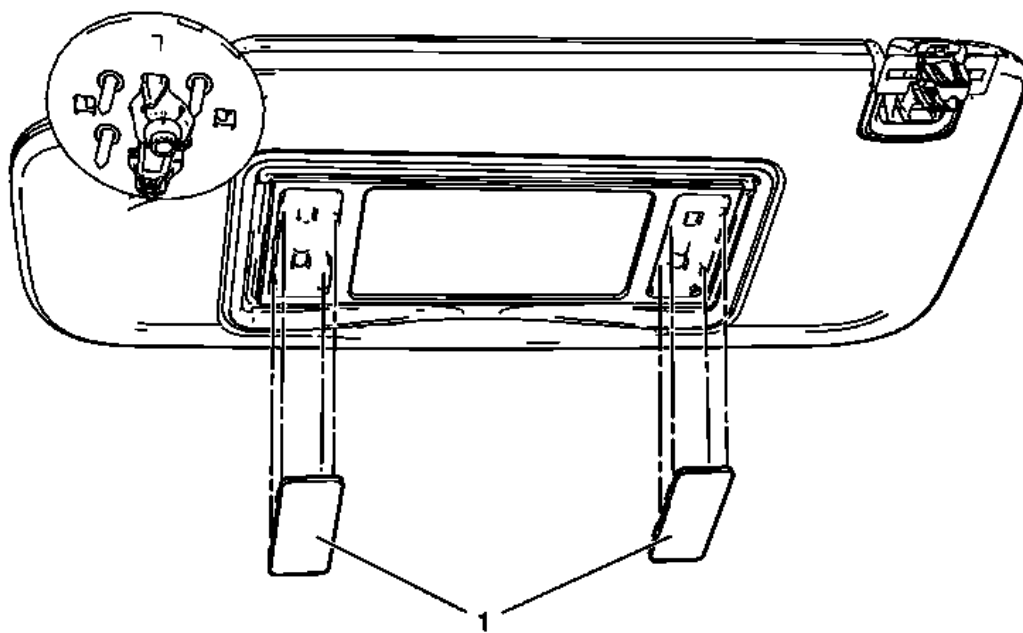


Fig. 25: Sunshade Illuminated Mirror Lamp Lens
 Courtesy of GENERAL MOTORS COMPANY

Sunshade Illuminated Mirror Lamp Lens Replacement

Callout	Component Name
1	Sunshade Illuminated Mirror Lamp Lens

DOMELAMP REPLACEMENT (WITH SUNROOF)

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

Refer to **Steering Wheel Controls Malfunction** in order to diagnose the symptom.

STEERING WHEEL CONTROLS MALFUNCTION

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
12V Reference	B1529 03, B1405 03	1	B1529 07	B1529 07
Steering Wheel Control Switch Signal	1	1	B3622 07	-
1. Steering Wheel Controls Inoperative				

Circuit/System Description

The body control module (BCM) supplies voltage to the audio steering wheel control switches and monitors the return signal. Each switch state is associated to a set resistance value and when pressed a specific voltage drop occurs across the resistor unique to the switch. The BCM identifies the switch selection and activates the feature.

Diagnostic Aids

- This diagnostic is for the audio steering wheel controls.
- Before diagnosis of the steering wheel controls, ensure the primary controls of the associated component are functioning properly.

Reference Information

Schematic Reference

Steering Wheel Secondary/Configurable Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Description and Operation

Power Steering System Description and Operation (Electronic Power Steering)

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Verify that the DTC sets outside of the conditions for running and setting. Since most occurrences of this DTC are caused by excessive driver inputs, review with the customer the conditions under which the DTC set.
 - If the DTC set within the normal conditions for running and setting, the power steering is operating as designed.
2. Operate the vehicle within the conditions that the customer experienced, avoiding excessive inputs, and verify the DTC does not reset.
 - If the DTC resets, replace the K43 Power Steering Control Module.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Steering Gear Replacement**
- **Power Steering Assist Motor Replacement** for power steering control module replacement
- **Control Module References** for power steering control module replacement, programming and setup

DTC C044A

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.

DTC Descriptor

DTC C044A 71