

2013 Chevrolet Cruze

2013 TRANSMISSION Manual Transmission - M32 - Cruze

2013 TRANSMISSION

Manual Transmission - M32 - Cruze

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Backup Lamp Switch	35 N.m	26 lb ft
Front Differential Carrier Flange Bolt		
• First Pass	20 N.m (1)	15 lb ft (1)
• Final Pass	45 degrees	
Oil Drain Plug	20 N.m	15 lb ft
Oil Filler Plug	30 N.m	22 lb ft
Shift Control Lever Bracket Bolt	20 N.m	15 lb ft
Shift Control Housing - to Transmission	20 N.m	15 lb ft
Transmission Control - to Chassis	8 N.m	71 lb in
Transmission Front and Rear Bolt (M12)	60 N.m	44 lb ft
Transmission Front Mount Bolt - to Front Suspension Frame	100 N.m	74 lb ft
Transmission Front Mount Bolt - to Transmission	100 N.m	74 lb ft
Transmission Lower Bolt (M10)	40 N.m	30 lb ft
Transmission Mount Bracket Bolt - Left Side - to Transmission	100 N.m	74 lb ft
Transmission Mount Bolt - Left Side - to Chassis	62 N.m	46 lb ft
Transmission Mount Nut - Left Side - to Chassis	62 N.m	46 lb ft
Transmission Mount Bolt - Left Side - to Bracket		
• First Pass	50 N.m (1)	37 lb ft (1)
• Final Pass	60 to 75 degrees	
Transmission Mount Bracket - Rear Bolt - to Transmission	100 N.m	74 lb ft
Transmission Mount - Rear Bolt - to Front Suspension Frame	110 N.m	81 lb ft
Transmission Mount - Rear Bolt - to Mount Bracket	100 N.m	74 lb ft
Transmission Nut and Bolt (M10)	40 N.m	30 lb ft
Transmission Upper Bolt (M12)	60 N.m	44 lb ft
1 = Use NEW Fastener.		

MANUAL TRANSMISSION SPECIFICATIONS

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2013 TRANSMISSION Manual Transmission - M32 - Cruze

Manual Transmission Specifications

Name	Specification		
Transmission Type	M32-6		
Production Location	GMPT Europe		
Transmission Drive	Transverse mounted- Front Wheel Drive		
Maximum Engine Torque	320 N.m (236 lb ft)		
Transmission Content	Fully synchronized with final drive gear and differential		
Transmission RPO Codes	MZ0	MF3	MR5
Engine RPO Codes	LUW (U18XFR) LWE (P18XER)	LUV (U14NFT)	LUV (U14NFT)
1st Gear Ratio	3.818	4.273	4.273
2nd Gear Ratio	2.158	2.158	2.353
3rd Gear Ratio	1.475	1.302	1.475
4th Gear Ratio	1.067	0.959	1.067
5th Gear Ratio	0.875	0.744	0.875
6th Gear Ratio	0.744	0.614	0.744
Reverse Gear Ratio	3.545	3.818	3.818
Transmission Fluid Type	US Part Number: 19259104 Canadian Part Number: 19259105		
Fluid Capacity Total	1.9 liters (2 quarts)		
Fluid Capacity Refill	1.8 liters (1.9 quarts)		
Fluid Capacity Re- Manufactured Transmission	1.5 liters (1.6 quarts)		
Transmission Weight Dry (Approximate)	53.5 - 55.5 kg (118 - 122 lb)		

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS**Adhesives, Fluids, Lubricants, and Sealers**

Application	Type of Material	GM Part Number	
		United States	Canada
Input Shaft Lubrication	GNV 202	Refer to Electronic Parts Catalog	Refer to Electronic Parts Catalog
Manual Transmission Fluid	Castrol BOT 402	19259104	19259105

SCHEMATIC WIRING DIAGRAMS**MANUAL TRANSMISSION WIRING SCHEMATICS****MF3 and MZ0**

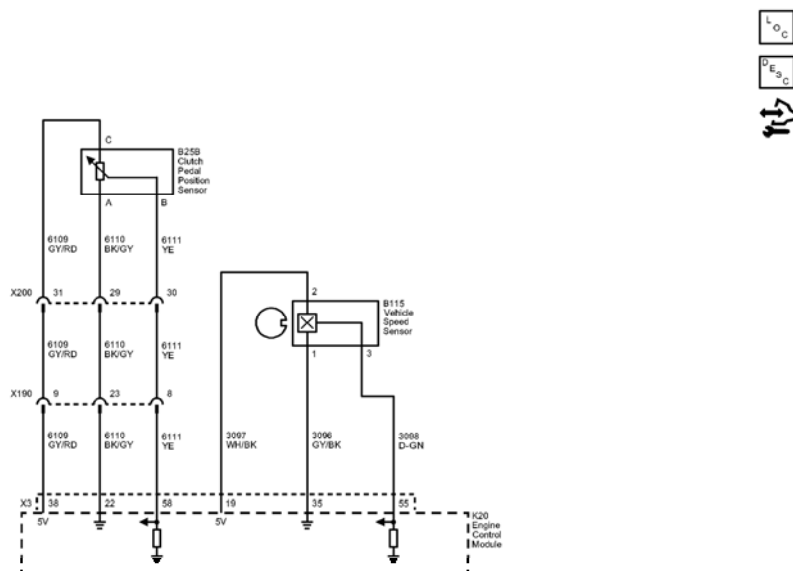


Fig. 1: Manual Transmission (MF3 and MZ0) Wiring Schematics
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
6109	Clutch Apply Sensor Voltage Reference
6109 GY/RD	6109 GY/RD
CAV_38	38
CONN_X3	X3
CAV_C	C
6110	Clutch Apply Sensor Low Reference
6110_BK/GY	6110 BK/GY
CAV_22	22
CAV_A	A
6111	Clutch Apply Sensor Signal
6111_YE	6111 YE
CAV_58	58
CAV_B	B
3097	Output Speed (Digital) 5V Sensor Return
3097_WH/BK	3097 WH/BK
CAV_19	19
CAV_2	2

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3096	Output Speed (Digital) 5V Sensor Reference
3096_GY/BK	3096 GY/BK
CAV_35	35
CAV_1	1
3098	Output Speed (Digital) Signal
3098_D-GN	3098 D-GN
CAV_55	55
CAV_3	3
6109_GY/RD	6109 GY/RD
6110_BK/GY	6110 BK/GY
6111_YE	6111 YE
6109_GY/RD	6109 GY/RD
6110_BK/GY	6110 BK/GY
6111_YE	6111 YE
X200	X200
CAV_31	31
CAV_29	29
CAV_30	30
X190	X190
CAV_9	9
CAV_23	23
CAV_8	8
X200	X200
X190	X190
B25B	(MF3 or MZ0)
K20	
B115	(MF3 or MZ0)

COMPONENT LOCATOR

MANUAL TRANSMISSION COMPONENT VIEWS

Shift Control and Shift Lever/Selector Lever Cable Components

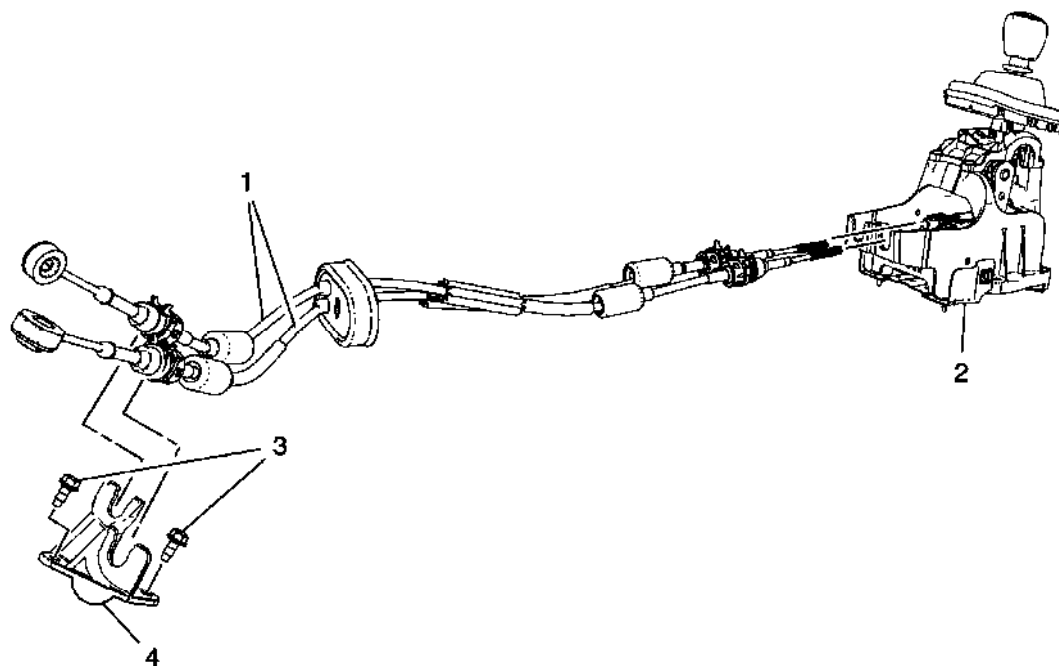


Fig. 2: Shift Control And Shift Lever/Selector Lever Cable
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Manual Transmission Shift Lever and Selector Lever Cable
2	Shift Control Lever
3	Manual Transmission Selector and Shift Lever Cable Bracket Bolt (Qty: 2)
4	Manual Transmission Selector and Shift Lever Cable Bracket

Shift Shaft Components

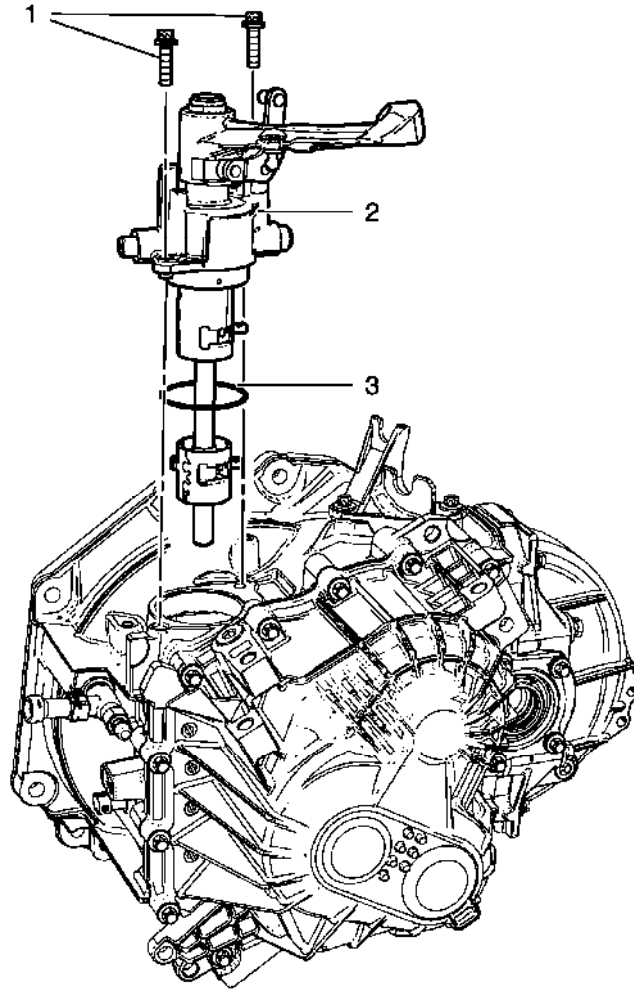


Fig. 3: Shift Shaft Components

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Shift Shaft Bolts (Qty: 2)
2	Shift Shaft
3	Shift Shaft O-Ring

Clutch Housing Components - Right Hand View

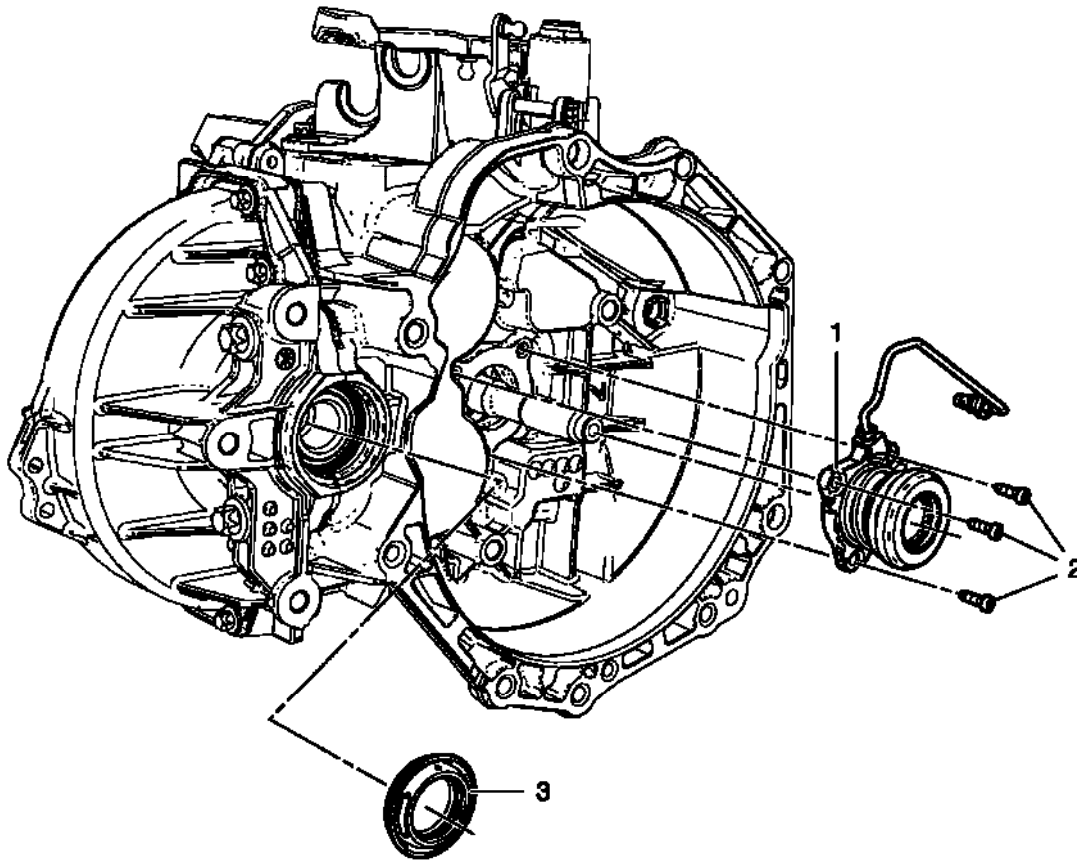


Fig. 4: Clutch Housing Components - Right Side
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Clutch Actuator Cylinder
2	Clutch Actuator Cylinder Bolts (Qty: 3)
3	Front Wheel Drive Shaft Oil Seal

Clutch Housing Components- Left Hand View

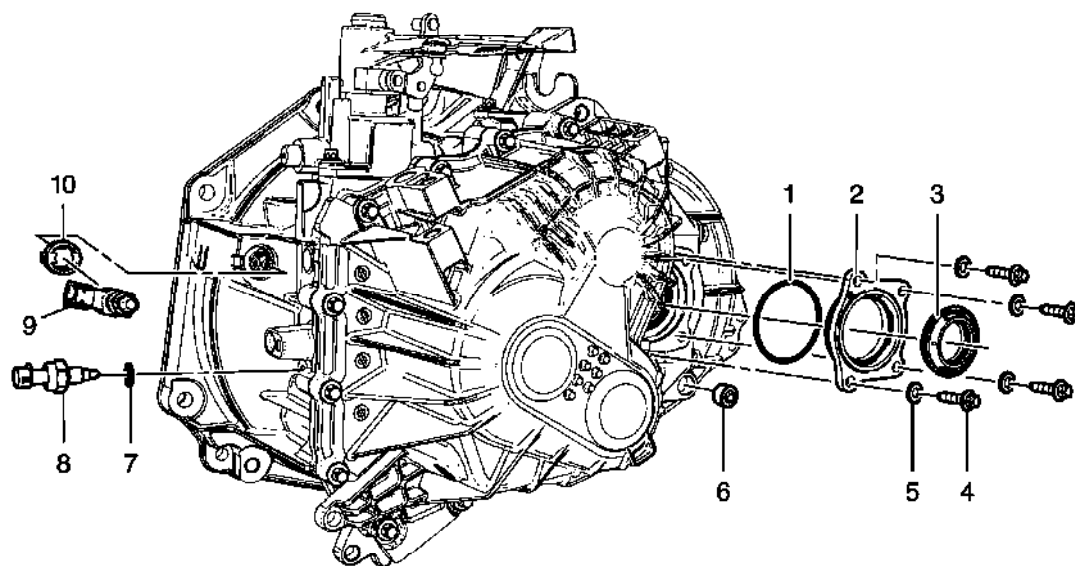


Fig. 5: Clutch Housing Components - Left Hand View
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Front Differential Carrier Flange Seal
2	Front Differential Carrier Flange
3	Front Wheel Drive Shaft Oil Seal
4	Front Differential Carrier Flange Bolts (Qty: 4)
5	Front Differential Carrier Flange Bolt Washers (Qty: 4)
6	Transmission Oil Drain Plug
7	Backup Lamp Switch Washer
8	Backup Lamp Switch
9	Clutch Actuator Cylinder Pipe Elbow
10	Clutch Actuator Cylinder Pipe Sleeve

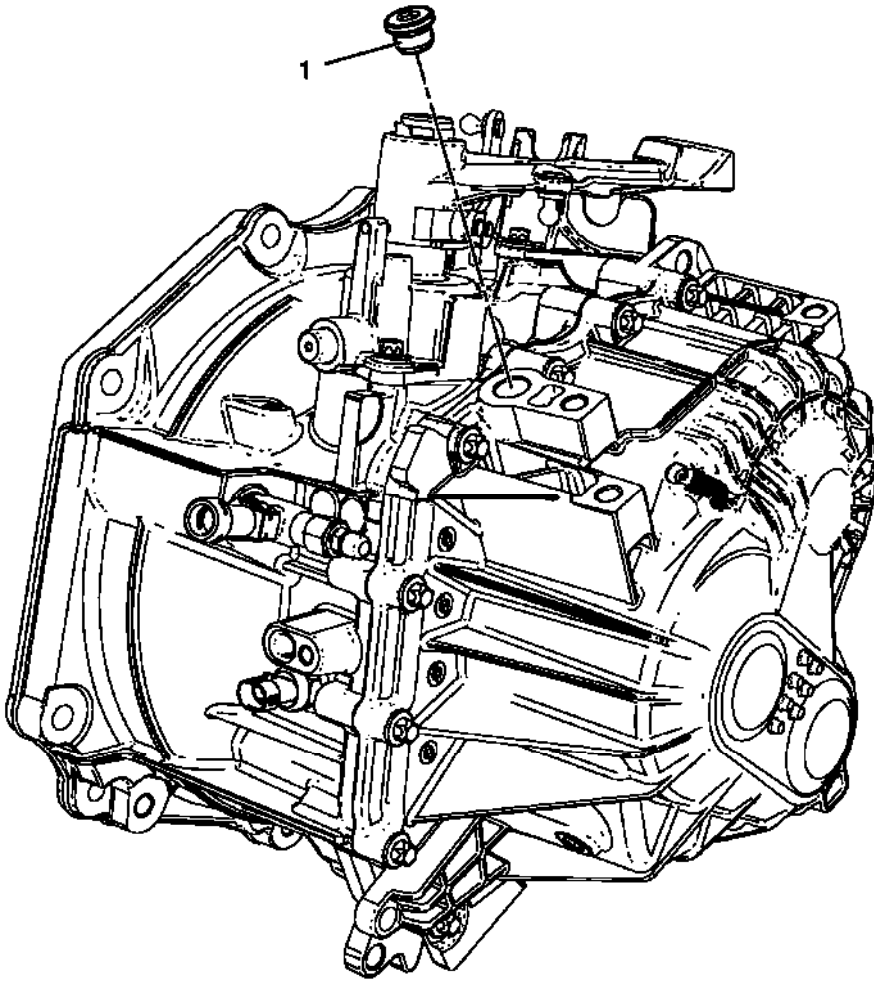


Fig. 6: Transmission Housing Components
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Transmission Oil Filler Plug

Transmission Shafts Overview

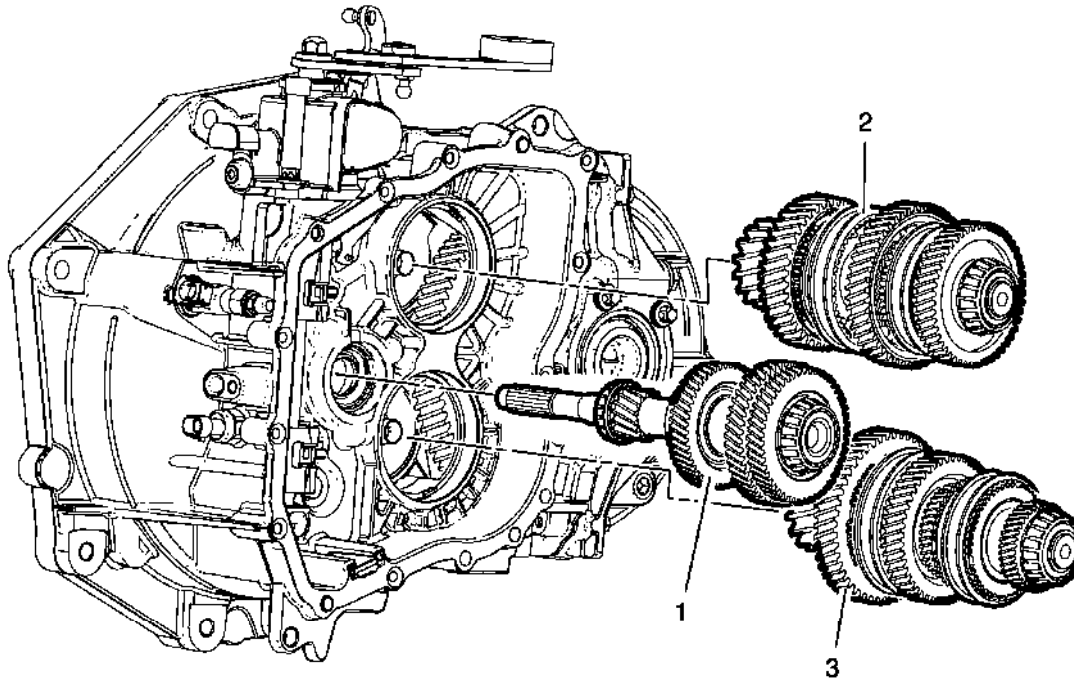
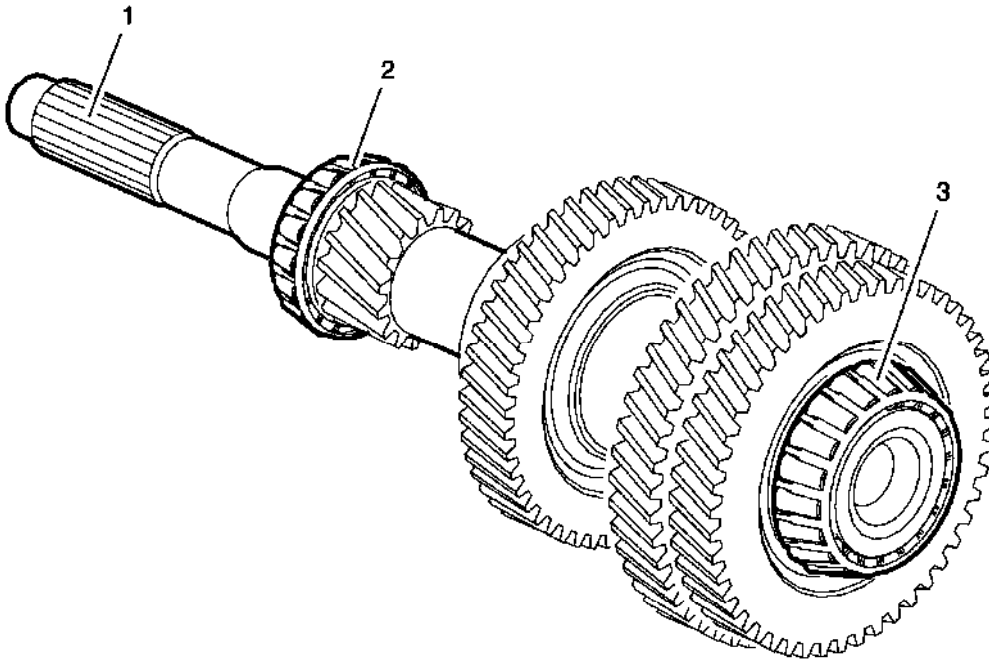


Fig. 7: Transmission Shafts

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Input Shaft
2	Upper Main Shaft
3	Lower Main Shaft

Input Shaft

**Fig. 8: Input Shaft**

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Input Shaft
2	Inner Bearing
3	Outer Bearing

Upper Main Shaft

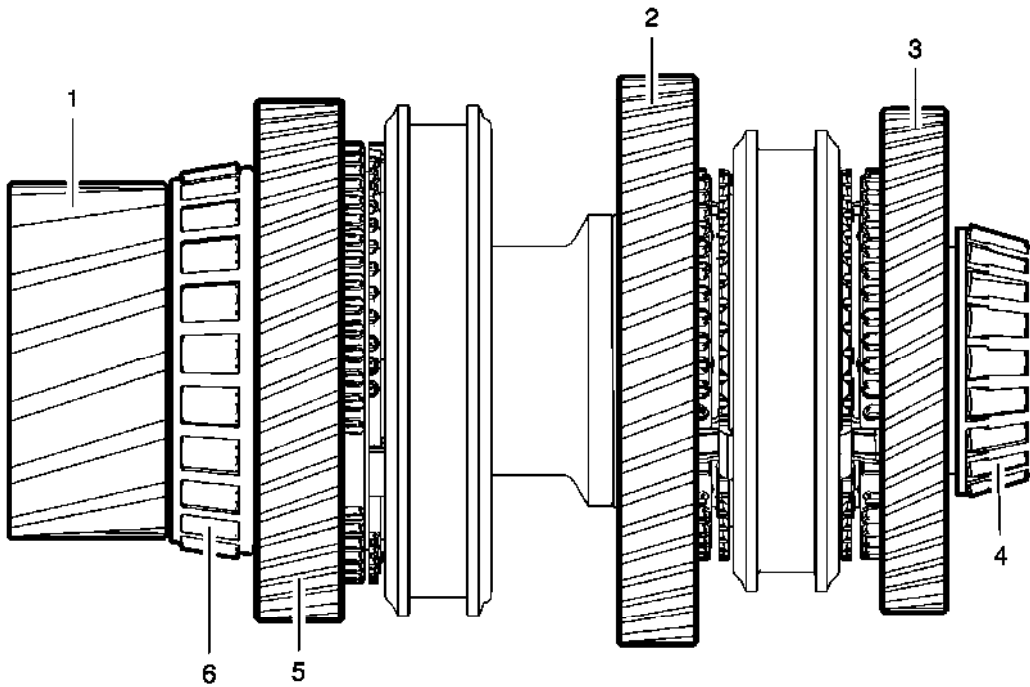


Fig. 9: Upper Main Shaft

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Upper Main Shaft
2	3rd Gear Gearwheel
3	4th Gear Gearwheel
4	Outer Bearing
5	Reverse Gear Gearwheel
6	Inner Bearing

Lower Main Shaft

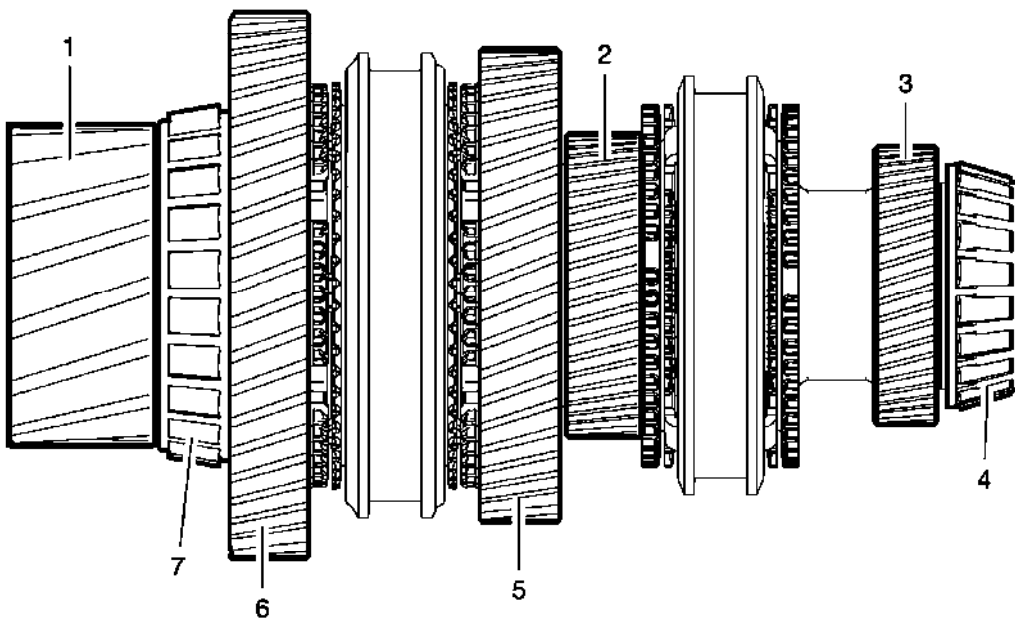


Fig. 10: Lower Main Shaft

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Lower Main Shaft
2	5th Gear Gearwheel
3	6th Gear Gearwheel
4	Outer Bearing
5	2nd Gear Gearwheel
6	1st Gear Gearwheel
7	Inner Bearing

1st / 2nd Gear Synchronizer

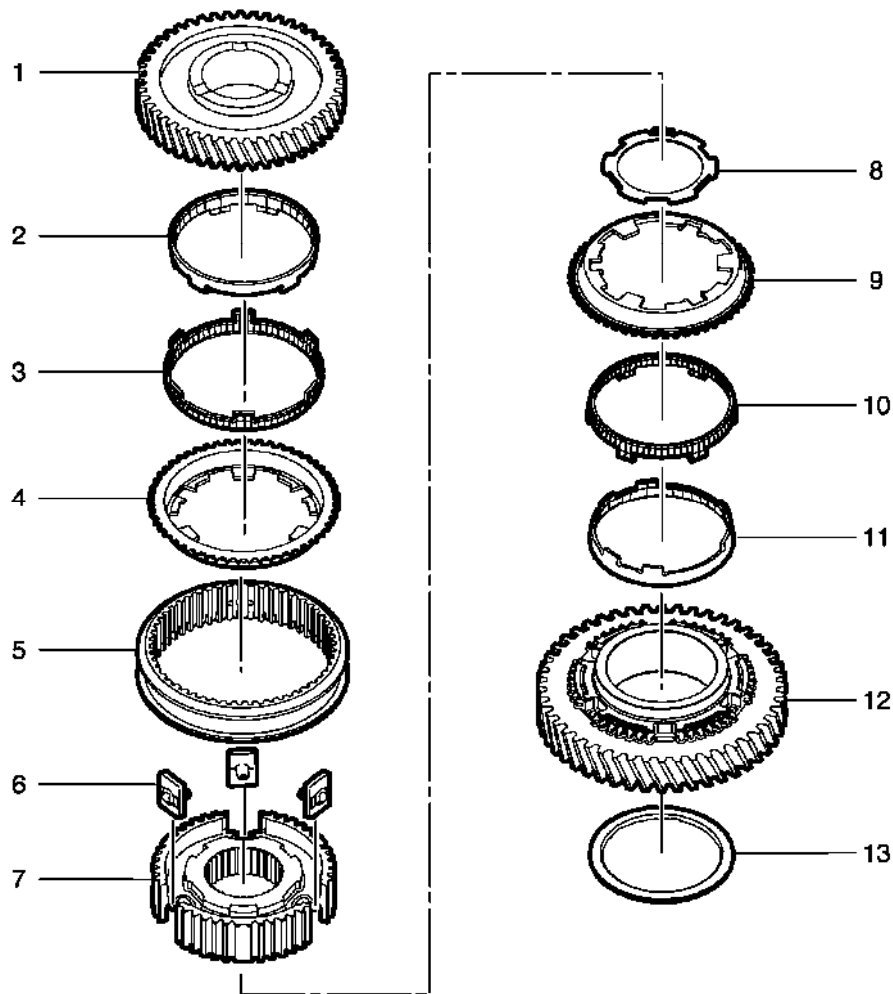
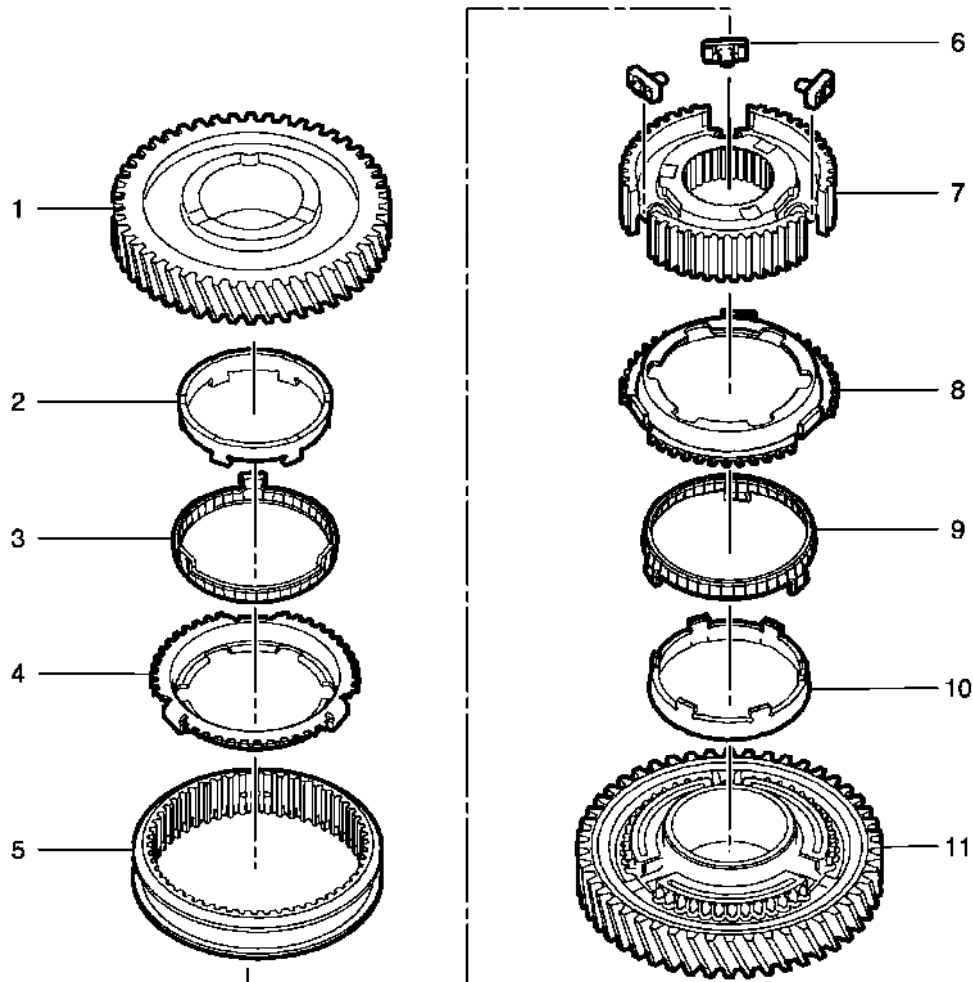


Fig. 11: 1st/2nd Gear Synchronizer

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	2nd Gear Gearwheel
2	2nd Gear Inner Synchronizer Ring
3	2nd Gear Middle Synchronizer Ring
4	2nd Gear Outer Synchronizer Ring
5	1st/2nd Gear Selector Sleeve
6	Spring Catches
7	1st/2nd Gear Sleeve Carrier
8	Spacer
9	1st Gear Outer Synchronizer Ring
10	1st Gear Middle Synchronizer Ring
11	1st Gear Inner Synchronizer Ring
12	1st Gear Gearwheel

3rd/4th Gear Synchronizer**Fig. 12: 3rd/4th Gear Synchronizer**

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	4th Gear Gearwheel
2	4th Gear Inner Synchronizer Ring
3	4th Gear Middle Synchronizer Ring
4	4th Gear Outer Synchronizer Ring
5	3rd/4th Gear Selector Sleeve
6	Spring Catches
7	3rd/4th Gear Sleeve Carrier
8	3rd Gear Outer Synchronizer Ring
9	3rd Gear Middle Synchronizer Ring

10	3rd Gear Inner Synchronizer Ring
11	3rd Gear Gearwheel

5th / 6th Gear Synchronizer

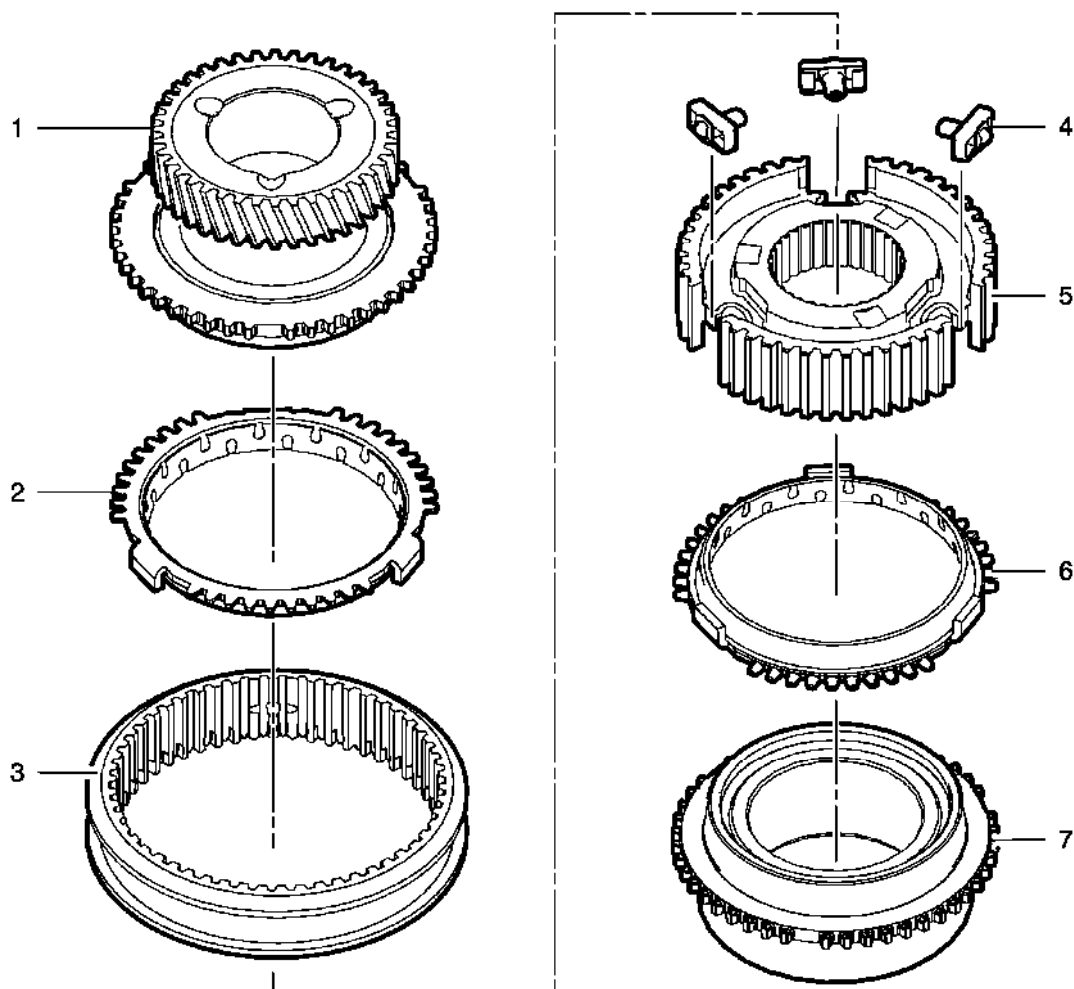
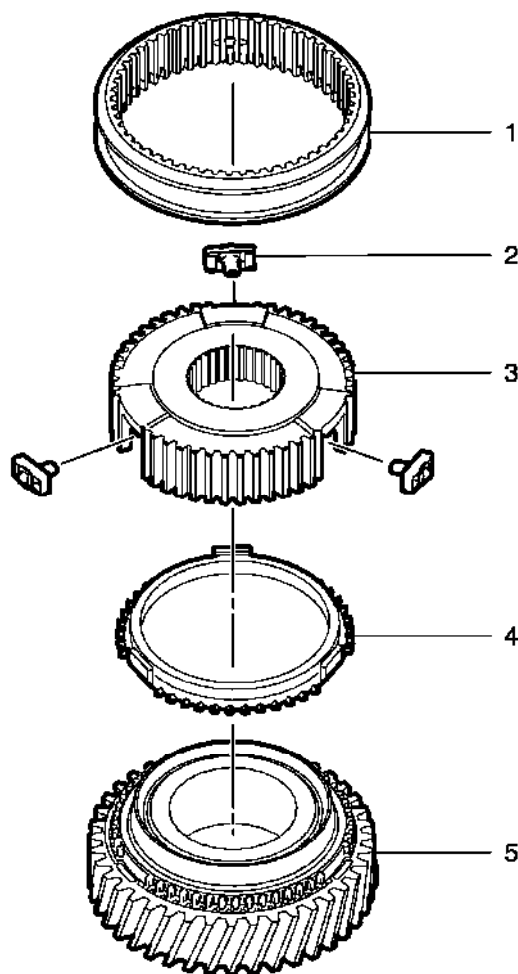


Fig. 13: 5th/6th Gear Synchronizer

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	6th Gear Gearwheel
2	6th Gear Synchronizer Ring
3	5th/6th Gear Selector Sleeve
4	Spring Catches
5	5th/6th Gear Sleeve Carrier
6	5th Gear Synchronizer Ring
7	5th Gear Gearwheel

Reverse Gear Synchronizer**Fig. 14: Reverse Gear Synchronizer**

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Reverse Gear Selector Sleeve
2	Spring Catches
3	Reverse Gear Sleeve Carrier
4	Reverse Gear Synchronizer Ring
5	Reverse Gear Gearwheel

DIAGNOSTIC INFORMATION AND PROCEDURES**DIAGNOSTIC CODE INDEX****DIAGNOSTIC CODE INDEX**

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DTC	Description
<u>DTC P0502 or P0503</u>	DTC P0502 Vehicle Speed Sensor (VSS) Circuit - Low Voltage DTC P0503 Vehicle Speed Sensor (VSS) Circuit - Intermittent
<u>DTC P0806-P0808</u>	DTC P0806 Clutch Pedal Position (CPP) Sensor Performance DTC P0807 Clutch Pedal Position (CPP) Sensor Circuit Low Voltage DTC P0808 Clutch Pedal Position (CPP) Sensor Circuit High Voltage
<u>DTC P080A</u>	DTC P080A Clutch Pedal Position (CPP) Not Learned
<u>DTC P0812</u>	DTC P0812 00 Reverse Position Switch Circuit - Malfunction

DTC P0502 OR P0503

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 P0502

Vehicle Speed Sensor (VSS) Circuit - Low Voltage

DTC P0503

Vehicle Speed Sensor (VSS) Circuit - Intermittent

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Operating Conditions: Engine Running, drive wheels turning.				
VSS High Signal	P0502, P0503	P0502, P0503	P0502, P0503	P0503
VSS Low Signal	-	P0502, P0503	-	-

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Operating Conditions: Engine Running, drive wheels turning.				

VSS High Signal	0 km/h (0 MPH)	0 km/h (0 MPH)	0 km/h (0 MPH)	-
VSS Low Signal	-	0 km/h (0 MPH)	-	-

Circuit/System Description

The vehicle speed sensor is provided to the engine control module by the vehicle speed sensor (VSS). The ECM provides a 5 V circuit, a low reference circuit, and a signal circuit to the VSS. The VSS provides a frequency signal that is proportional to an increase in vehicle speed.

Conditions for Running the DTC

P0502

The ignition is ON.

P0503

- Ignition voltage is between 11-18 V.
- Engine speed is between 1 500-6 500 RPMs.
- VSS signal is between 150-200 RPMs for 2 s.

Conditions for Setting the DTC

P0502

VSS signal is less than 60 RPMs for 4.5 s.

P0503

VSS signal is greater than 350 RPMs for 3.25 s.

Action Taken When the DTC Sets

P0502 and P0503 are Type B DTCs.

Conditions for Clearing the DTC

P0502 and P0503 are Type B DTCs.

Diagnostic Aids

The battery must be fully charged. Refer to **Battery Inspection/Test** .

Reference Information

Schematic Reference

Manual Transmission Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Transmission System Description and Operation

Electrical Information Reference

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

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

K20 Engine Control Module: Scan Tool Information**Circuit/System Verification**

1. Operate the vehicle on the road at various speeds up to 64 km/h (40 MPH).
2. Verify with a scan tool that the B115 Vehicle Speed Sensor parameter and the speedometer display on the instrument cluster match.
 - **If the parameter does not match**

Refer to Circuit/System Testing below.
 - **If the parameter matches**
3. Operate the vehicle within the conditions for running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records.
 - **If the DTC resets**

Refer to Circuit/System Testing below.
 - **If the DTC does not reset**
4. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the B115 Vehicle Sensor harness connector.
2. Test for less than 5 ohms between the low reference circuit terminal 2 and ground.
 - **If 5 ohms or greater**
 1. Disconnect the X3 harness connector at the K20 Engine Control Module.
 2. Test for less than 2 ohms in the wire circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the wire circuit.
 - If less than 2 ohms, replace the K20 Engine Control Module.
 - **If less than 5 ohms**
3. Ignition ON.
4. Test for greater than 4.8-5.2 V between the 5 V reference circuit terminal 1 and ground.
 - **If less than 4.8 V**
 1. Test for infinite resistance between the 5 V reference circuit and ground.
 - If less than infinite resistance repair the short to ground on the wire circuit.
 - If infinite resistance
 1. Disconnect the X3 harness connector at the K20 Engine Control Module.
 2. Test for less than 2 ohms in the 5 V reference wire circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the wire circuit.
 - If less than 2 ohms, replace the K20 Engine Control Module.
 - **If greater than 5.2 V**
 1. Disconnect the X3 harness connector at the K20 Engine Control Module.
 2. Test for less than 0.3 V between the 5 V reference circuit terminal 35 and ground.
 - If 0.3 V or greater, repair the short to voltage on the wire circuit.
 - If less than 0.3 V, replace the K20 Engine Control Module.
 - **If between 4.8-5.2 V**
5. Ignition OFF.
6. Test for less than 1 V between the signal circuit terminal 3 and ground.
 - **If 1 V or greater**
 1. Disconnect the X3 harness connector at the K20 Engine Control Module.
 2. Test for less than 0.3 V between the signal circuit terminal 55 and ground.
 - If 0.3 V or greater, repair the short to voltage on the wire circuit.
 - If less than 0.3 V, replace the K20 Engine Control Module.
 - **If less than 1 V**
7. Ignition OFF, disconnect the X3 harness connector at the K20 Engine Control Module.
8. Test for less than 2 ohms between the signal circuit terminal 55 at the K20 Engine Control Module and the signal circuit terminal 3 at the B115 Vehicle Speed Sensor.
 - **If 2 ohms or greater**

Repair the open/high resistance in the wire circuit.

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- **If less than 2 ohms**

9. Test for infinite resistance between the signal circuit terminal 3 at the B115 Vehicle Speed Sensor.

- **If less than infinite resistance**

Repair the short to ground on the wire circuit.

- **If infinite resistance**

10. Replace the B115 Vehicle Speed Sensor.

Repair Instructions

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

- **Vehicle Speed Sensor Replacement**
- **Control Module References** for ECM replacement, programming and setup.

DTC P0806-P0808

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 P0806

Clutch Pedal Position (CPP) Sensor Performance

DTC P0807

Clutch Pedal Position (CPP) Sensor Circuit Low Voltage

DTC P0808

Clutch Pedal Position (CPP) Sensor Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
5 V Reference	P0651, P0807	P0807	P0651, P0808	-
Signal	P0807	P0807	P0808	P0806
Low Reference	-	P0808	P0808	-

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Typical Scan Tool Data

CPP Sensor Voltage

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Ignition ON. CPP Sensor Voltage Parameter Normal Range: 0 V with clutch pedal applied to 5 V when clutch pedal is released.			
5 V Reference	0 V	0 V	5 V
Signal	0 V	0 V	5 V
Low Reference	-	5 V	-

CPP Sensor Percentage

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Ignition ON. CPP Sensor Percent Parameter Normal Range: 0% with clutch pedal released to 100% when clutch pedal is applied.			
5 V Reference	100%	100%	0-100%
Signal	100%	100%	100%
Low Reference	-	0%	-

Circuit/System Description

The clutch pedal position (CPP) sensor is a three wire sensor, connected to a 5 V reference circuit, a low reference circuit, and a signal circuit. The engine control module supplies 5 V to the CPP sensor, and also provides a sensor ground path on the low reference circuit. The CPP sensor sends a voltage signal to the ECM on the signal circuit. The voltage on the signal circuit will vary from a voltage less than or equal to 5 V when the clutch pedal is released, to a voltage less than or equal to 1.5 V when the clutch pedal is applied.

Conditions for Running the DTC

P0806

- DTC P0335, P0336, P0502, P0503, P0807, or P0808 is not set.
- The engine is running with transmission in gear.
- The vehicle speed is greater than 1.9 kmh (1.2 mph).

P0807 and P0808

- The ignition is ON.
- The system voltage is more than 10 V.

Conditions for Setting the DTC

P0806

The CPP sensor is stuck in range.

P0807

The CPP sensor voltage is less than 0.2 V for more than 1 s.

P0808

The CPP sensor voltage is more than 4.8 V for more than 1 s.

Action Taken When the DTC Sets

DTC P0806 - P0808 are Type A DTCs.

Conditions for Clearing the DTC

DTC P0806 - P0808 are Type A DTCs.

Reference Information

Schematic Reference

Manual Transmission Schematics

Connector End View Reference

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- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

K20 Engine Control Module: Scan Tool Information for scan tool information

Circuit/System Verification

1. If DTC P0651 or P080A is set, refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .
2. Ignition ON.
3. Verify the scan tool CPP Sensor percent parameter varies from 0% when the clutch pedal is released, to 100% when the clutch pedal is in the apply position.
 - **If the percentage does not vary from 0% to 100%**

Refer to Circuit/System Testing below.

- **If the percentage varies from 0% to 100%**
4. Perform the CPP learn procedure.
 5. Operate the vehicle within the conditions for running the DTC to verify the DTC does not set. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.
 - **If the DTC sets**

Refer to Circuit/System Testing below.

- **If the DTC does not set**
6. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector of the B25B Clutch Pedal Position Sensor.
2. Test for less than 5 ohms between the low reference circuit terminal A and ground:
 - **If 5 ohms or greater**
 1. Disconnect the X3 harness connector at the K20 Engine Control Module.
 2. Test for less than 2 ohms in the circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K20 Engine Control Module.
 - **If less than 5 ohms**
3. Ignition ON.
4. Test for 4.8-5.2 V between the 5 V reference circuit terminal C and ground:
 - **If less than 4.8 V**
 1. Ignition OFF, disconnect the X3 harness connector at the K20 Engine Control Module.
 2. Test for infinite resistance between the 5 V reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the 5 V reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.

- If less than 2 ohms, replace the K20 Engine Control Module.
- **If greater than 5.2 V**
- 1. Ignition OFF, disconnect the X3 harness connector at the K20 Engine Control Module.
- 2. Test for less than 1 V between the 5 V reference circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K20 Engine Control Module.
- **If between 4.8-5.2 V**
- 5. Verify the scan tool CPP Sensor voltage parameter is less than 0.1 V.
 - **If 0.1 V or greater**
 - 1. Ignition OFF, disconnect the X3 harness connector at the K20 Engine Control Module, Ignition ON.
 - 2. Test for less than 1 V between the signal circuit terminal B and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K20 Engine Control Module.
 - **If less than 0.1 V**
- 6. Install a 3 A fused jumper wire between the signal circuit terminal B and the 5 V reference circuit terminal C.
- 7. Verify the scan tool CPP Sensor voltage parameter is greater than 4.9 V.
 - **If 4.9 V or less**
 - 1. Ignition OFF, remove the jumper wire, disconnect the X3 harness connector at the K20 Engine Control Module.
 - 2. Test for infinite resistance between the signal circuit terminal B and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 - 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K20 Engine Control Module.
 - **If greater than 4.9 V**
- 8. Test or replace the B25B Clutch Pedal Position Sensor.

Component Testing

Static Test

1. Ignition OFF, disconnect the harness connector of the B25B Clutch Pedal Position Sensor.
2. Measure the resistance between the signal terminal B and the low reference terminal A at the B25B Clutch Pedal Position Sensor. Depress the clutch pedal through the entire range. The resistance should vary from low to high and vice versa without any spikes or dropouts.
 - **If the resistance is erratic with spikes or dropouts**

Replace the B25B Clutch Pedal Position Sensor.

- **If the resistance is not erratic without spikes or dropouts**

3. All OK.

Repair Instructions

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

- **Clutch Pedal Position Sensor Learn**
- **Clutch Pedal Position Sensor Replacement**
- **Control Module References** for ECM replacement, programming and setup.

DTC P080A

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 P080A

Clutch Pedal Position (CPP) Not Learned

Circuit/System Description

The clutch pedal position (CPP) sensor is a three wire sensor, connected to a 5 V reference circuit, a low reference circuit, and a signal circuit. The engine control module supplies 5 V to the CPP sensor, and also provides a sensor ground path on the low reference circuit. The CPP sensor sends a voltage signal to the ECM on the signal circuit. The voltage on the signal circuit will vary from a voltage less than or equal to 5 V when the clutch pedal is released to a voltage less than or equal to 1.5 V when the clutch pedal is applied.

Conditions for Running the DTC

Clutch pedal fully applied.

Conditions for Setting the DTC

Clutch pedal position not learned.

Action Taken When the DTC Sets

P080A is a Type B DTC.

Conditions for Clearing the DTC

P080A is a Type B DTC.

Reference Information

Schematic Reference

Manual Transmission Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Transmission System Description and Operation

Electrical Information Reference

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

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

K20 Engine Control Module: Scan Tool Information for scan tool information

Circuit/System Verification

Perform the clutch pedal position sensor learn procedure. Refer to **Clutch Pedal Position Sensor Learn**.

Repair Instructions

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

- **Clutch Pedal Position Sensor Learn**
- **Control Module References**

DTC P0812**Diagnostic Instructions**

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- 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 P0812 00

Reverse Position Switch Circuit - Malfunction

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Reverse Switch Signal	P0812 00	1	P0812 00	-
Ground	-	1	1	-
1. Backup Lamps Malfunction				

Circuit/System Description

The reverse gear switch is a normally open switch that closes with the reverse gear engagement. When the switch is open the engine control module should detect a high signal voltage input. When the switch is closed the ECM should detect a low signal voltage input.

Conditions for Running the DTC

- No vehicle speed sensor faults exist.
- Reverse switch is ON.

Conditions for Setting the DTC

The ECM detects circuit malfunction of the reverse input switch.

Action Taken When the DTC Sets

DTC P0812 00 is Type C DTC.

Conditions for Clearing the DTC

DTC P0812 00 is Type C DTC.

Reference Information

Schematic Reference

Manual Transmission Schematics

Connector End View Reference

v

Description and Operation

Transmission System Description and Operation

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. Ignition ON.
2. Observe the scan tool Reverse Switch parameter. The reading should be Off and change to On when the transmission is shifted into reverse.
 - **If the parameter does not change from Off to On**

Refer to Circuit/System Testing below.
 - **If the parameter changes from Off to On**
3. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the B16 Backup Lamp Switch.
2. Test for less than 5 ohms between the ground circuit terminal 2 and ground.
 - **If 5 ohms or greater**
 1. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 5 ohms**
3. Ignition ON, transmission in neutral position.
4. Verify the scan tool Reverse Switch parameter is Off.
 - **If the parameter is not OFF**

1. Disconnect the X3 harness connector at the K20 Engine Control Module.
2. Test for infinite resistance between the signal circuit terminal 1 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K20 Engine Control Module.
 - **If the parameter is OFF**
5. Ignition ON, install a 3 A fused jumper wire between the signal circuit terminal 1 at the B16 Backup Lamp Switch harness connector and ground.
6. Verify the scan tool Reverse Switch parameter is On.
 - **If the parameter is Off**
 1. Disconnect the X3 harness connector at the K20 Engine Control Module.
 2. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K20 Engine Control Module.
 - **If the parameter is On**
7. Test or replace the B16 Backup Lamp Switch.

Component Testing

1. Ignition OFF, disconnect the harness connector at the B16 Backup Lamp Switch.
2. Test for less than 5 ohms between the signal circuit terminal 1 and the ground circuit terminal 2 at the B16 Backup Lamp Switch.
 - **If 5 ohms or greater**

Replace the B16 Backup Lamp Switch.
 - **If less than 5 ohms**
3. All OK.

Repair Instructions

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

Control Module References for ECM replacement, programming and setup.

CLUTCH PEDAL POSITION SENSOR LEARN

NOTE: The clutch pedal position (CPP) sensor learn procedure is required when the following service procedures have been performed regardless of whether DTC P080A is set:

- An engine control module (ECM) replacement
- A CPP sensor replacement

• Any repairs which affect the CPP sensor relationship

1. Install a scan tool.
2. Monitor the ECM for DTCs with a scan tool. If other DTCs are set, except DTC P080A, refer to **Diagnostic Trouble Code (DTC) List - Vehicle** for the applicable DTC that set.
3. With a scan tool, select Clutch Pedal Position Learn under Module Setup in Manual Transmission, and perform the following instructions displayed on the scan tool screen.

NOTE: The CPP sensor learn procedure cannot be performed more than once per ignition cycle. The clutch pedal needs to be fully depressed and held steady throughout this procedure in order to perform a correct learning.

4. The scan tool will display under CPP Learn Status: Not Learned, In Process, Complete, Fail - Low Volt, Fail - High Volt, or Fail Moving. The scan tool will display under CPP Learn Status Complete if the process was successful.
5. If the scan tool indicates that DTC P080A ran and passed this ignition the CPP sensor learn procedure is complete. If the scan tool indicates DTC P080A failed or did not run this ignition, refer to **DTC P080A**. If any other DTC is set, refer to **Diagnostic Trouble Code (DTC) List - Vehicle** for the applicable DTC.
6. Turn OFF the ignition for 30 s after the learn procedure has successfully completed in order to store the CPP sensor variation values in ECM history.

SYMPTOMS - MANUAL TRANSMISSION

Symptoms - Manual Transmission

Complaint/Condition	Possible Cause	correction
Knock at Low Speeds	• Worn drive axle joint • Worn side gear or pinion gear bores	• Inspect drive axle joint and replace if necessary. • Inspect differential case and replace if necessary.
Noisy Around Turns	Worn differential gears	Inspect differential gears and replace if necessary.
Clunk or Acceleration or Deceleration	• Loose engine mounts • Worn inboard drive axle joint • Worn differential pinion shaft • Worn side gear hub counterbore	• Inspect engine mounts and tighten if necessary. • Inspect inboard drive axle joint and replace if necessary. • Inspect differential pinion shaft and replace if necessary. • Inspect side gear hub counterbore and replace if necessary.
Click Noise On Turns	Worn outboard drive axle C/V	Inspect C/V joint and replace if

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	joint	necessary.
Noisy in Neutral With Engine Running	- Worn input gear bearing - Worn speed gear bearing - Worn bearing races	- Inspect bearing and replace if necessary. - Inspect bearing and replace if necessary. - Inspect bearing race and replace if necessary.
Noisy in First Gear Only	- Worn, chipped, or scored 1st speed constant-mesh gears - Worn, shipped, or scored 1st/2nd synchronizer	- Inspect gears and replace if necessary. - Inspect synchronizer and replace if necessary.
Noisy in Second Gear Only	- Worn, chipped, or scored 2nd speed constant-mesh gears - Worn, chipped, or scored 1st/2nd synchronizer	- Inspect gears and replace if necessary. - Inspect synchronizer and replace if necessary.
Noisy in Third Gear Only	- Worn, chipped, or scored 3rd speed constant-mesh gears - Worn, chipped, or scored 3rd/4th synchronizer	- Inspect gears and replace if necessary. - Inspect synchronizer and replace if necessary.
Noisy in Fourth Gear Only	- Worn, chipped, or scored 4th speed constant-mesh gears - Worn, chipped, or scored 3rd/4th synchronizer - Worn, chipped, or scored output gear - Worn, chipped, or scored output gear	- Inspect gears and replace if necessary. - Inspect synchronizer and replace if necessary. - Inspect gear and replace if necessary. - Inspect gear and replace if necessary.
Noisy in Fifth Gear Only	- Worn, chipped, or scored 5th speed constant-mesh gears - Worn, chipped, or scored 5th synchronizer - Worn, chipped, or scored output gear	- Inspect gears and replace if necessary. - Inspect synchronizer and replace if necessary. - Inspect gear and replace if necessary.
Noisy in Reverse Only	- Worn, chipped, or scored reverse speed constant-mesh gears - Worn or damaged output	- Inspect gear and replace if necessary. - Inspect gear and replace if

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	gear	necessary.
Noisy in All Gears	• Fluid level low • Worn or damaged wheel bearings • Worn, chipped, or scored input/output shaft gear • Worn output gear bearing • Loose shift rail guide bolt • Worn, chipped, or scored 1st, 2nd, 3rd, 4rd, 5th, or Reverse gears.	• Add fluid to proper level. • Inspect wheel bearing and replace if necessary. • Inspect gear and replace if necessary. • Inspect output gear bearing and replace if necessary. • Tighten shift rail guide bolt. • Inspect components and replace as necessary.
Slips Out of Gear	• Loose transaxle mounts • Bent or worn cables • Broken or loose input gear bearing retainer • Worn or bent shift fork • Dirty clutch housing and engine • Stiff shift lever seal • Manual transaxle internal shift mechanism malfunction	• Tighten or replace mounts. • Inspect cables and replace if necessary. • Inspect shift fork and replace if necessary. • Inspect shift fork and replace if necessary. • Clean clutch housing and engine. • Inspect seal and replace if necessary. • Disassemble transaxle, repair as necessary.
Slips Out of Gear While Accelerating	• Missing or misadjusted first gear thrust bearing or washer • Worn or damaged first gear spline lock on 1st/2nd synchronizer • Worn or damaged second gear spline lock on 1st/2nd synchronizer • Worn or damaged third gear spline lock on 3rd/4th synchronizer • Worn or damaged fourth gear spline lock on 3rd/4th synchronizer	• Inspect bearing and washer and replace if necessary. • Inspect spline lock and replace if necessary. • Inspect spline lock and replace if necessary. • Inspect spline lock and replace if necessary. • Inspect spline lock and replace if necessary.

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	• Worn or damaged 5th gear spline lock on the 5th/Reverse synchronizer • Worn or damaged Reverse gear spline lock on the 5th/Reverse synchronizer • Worn or damaged 1st, 2nd, 3rd, 4th, 5th or reverse gear spline lock • Manual transaxle internal shift mechanism malfunction	• Inspect spline lock and replace if necessary. • Inspect spline lock and replace if necessary. • Inspect spline lock and replace if necessary. • Disassemble transaxle, repair as necessary.
Slips Out of Gear While Coasting	• Damaged, worn, or missing shift rails • Manual transaxle internal shift mechanism malfunction	• Inspect shift rails and replace if necessary. • Disassemble transaxle, repair as necessary.
Fluid Leakage	• Fluid level high • Damaged axle shaft seals • Vent cap plugged • Poor sealing on shift cover • Poor sealing between case and clutch housing • Poor sealing on rear cover • Poor sealing or loose back-up lamp switch • Poor sealing or loose vehicle speed sensor	• Drain excess fluid. • Inspect axle shaft seals and replace if necessary. • Clear or replace vent cap. • Replace sealer on shift cover. • Replace sealer between case and clutch housing and tighten. • Replace sealant on rear cover and tighten. • Tighten switch or replace sealant as needed. • Tighten sensor or replace sealant as needed.

TRANSMISSION SHIFTS HARD

Diagnostic Aids

An intermittent hard shift may be caused by an intermittent clutch condition.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3

A static shift test is performed by shifting into all of the gear positions with the engine not operating. While performing the test one should note how the shift lever movement is felt. Also while shifting from one gear to the other feel for binding in the shift rails. You should be able to feel the detent plungers operating when coming out of a gear and going into a gear.

6

A dynamic shift test is performed by shifting into the gear positions with the engine operating. Test for the correct mesh of the synchronizers and for the clutch releasing correctly. When shifting into and out of a gear, feel for the shift detent plungers and for the synchronizers sleeve for moving freely.

8

The transmission uses a synthetic transmission fluid that allows proper synchronizer operation. The incorrect fluid may cause hard shifting by varnish build-up, or not enough lubrication for proper synchronizer operation.

Transmission Shifts Hard

Step	Action	Yes	No
DEFINITION: The transmission does not shift smoothly, or without difficulty, from one gear to the other.			
1	Did you review the <u>Symptoms - Manual Transmission</u> and perform the necessary inspections?	Go to Step 2	Go to <u>Symptoms - Manual Transmission</u>
2	Inspect the clutch system for proper operation. Refer to <u>Clutch System Description and Operation</u> . Did you find or repair the condition?	Go to Step 12	Go to Step 3
3	1. Perform a static shift test on the transmission. 2. Test for the following: • Blockage preventing full shift lever movement • Excessive movement in the shift lever • Binding in the shift lever • Detent plungers or shift rails binding • Shift cable binding • Shift cable proper adjustment Are you able to shift into all gears?	Go to Step 6	Go to Step 4
	1. Remove the floor console. Refer to <u>Front Floor Console Replacement</u> .		

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4	2. Inspect for the following: • Loose mounting • Foreign debris Did you find and repair the condition?	Go to Step 12	Go to Step 5
5	Inspect for proper shift cable adjustment. Refer to <u>Manual Transmission Shift Lever and Selector Lever Cable Adjustment</u>. Did you find and repair the condition?	Go to Step 12	Go to Step 6
6	1. Perform a dynamic shift test on the transmission. 2. Test for the following: • Detent plungers or shift rails binding • Synchronizer sleeve binding • Gear clash into only one gear • Gear clash into all gears Did the transmission shift hard into all gears?	Go to Step 7	Go to Step 11
7	Inspect the transmission for the correct fluid level and type of the transmission fluid. Refer to <u>Transmission Fluid Drain and Fill</u>. Is the transmission at the correct level and the proper fluid being used?	Go to Step 9	Go to Step 8
8	Drain and refill the transmission with the correct type fluid. Refer to <u>Transmission Fluid Drain and Fill</u>. Did you find and repair the condition?	Go to Step 12	Go to Step 9
9	1. Remove the transmission. Refer to <u>Transmission Replacement</u>. 2. Inspect the clutch pressure plate and/or clutch driven plate. Is the clutch pressure plate and/or clutch driven plate worn or faulty?	Go to Step 10	Go to Step 11
10	Replace the clutch assembly. Refer to <u>Clutch Pressure and Driven Plate Replacement (1.4L LUV) , Clutch Pressure and Driven Plate Replacement (1.8L LUW and LWE) .</u> Did you find and repair the condition?	Go to Step 12	Go to Step 11
11	Replace the Transmission. Refer to <u>Transmission Replacement</u>. Did you find and repair the condition?	Go to Step 12	Go to Diagnostic Aids
12	Operate the system in order to verify the repair.		

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Did you correct the condition?

System OK

Go to **Step 1**

TRANSMISSION GEAR CLASH WHEN SHIFTING GEARS

Diagnostic Aids

Gear clashing may be caused by shifting at too high of an engine RPM or by rushing the shift. If gear clashing is occurring in more than one gear, the clutch may not be releasing properly for proper synchronizer operation.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2

This step tests for the proper releasing of the clutch. If the clutch reserve is not proper, the mainshaft gears may still be turning causing the gear clashing.

5

This step inspects for the proper transaxle fluid. A special fluid is required for the correct lubrication of the synchronizers.

7

A static shift test is performed by shifting into all of the gear positions with the engine not operating. While performing the test, you should note how the shift lever movement is felt. Also, while shifting from one gear to another, feel for binding in the shift rails. You should be able to feel the detent plungers operating when coming out of a gear and going into a gear. Excessive play in the gear shift lever may prevent the shift forks from fully engaging the synchronizer.

10

A dynamic shift test is performed by shifting into all of the gear positions with the engine operating. Test for the correct mesh of the synchronizers, and for the clutch releasing correctly. Move the shift lever and feel for the synchronizer sleeve to just release from the gear, then let up on the clutch pedal. Depress the clutch pedal and move the shift lever to engage that gear again. If it shifts back into the gear without clashing, the clutch is releasing correctly and the synchronizer is working. If clashing occurs, test on another gear. If all gears clash, the clutch is not releasing correctly.

Transmission Gear Clash When Shifting Gears

Step	Action	Yes	No
DEFINITION: Noise from the transaxle when shifting gears. A grinding or grating sound, when the synchronizer sleeve is engaging with the selector teeth on the speed gear. A suspected internal transaxle condition, if the noise only occurs in one gear.			
1	Did you review the <u>Symptoms - Manual Transmission</u> and perform the necessary		Go to <u>Symptoms -</u>

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	inspections?	Go to Step 2	Manual Transmission
2	With the engine operating, does the transaxle shift from neutral to any gear, without the vehicle lurching or gear clashing?	Go to Step 5	Go to Step 3
3	Inspect for proper clutch operation. Refer to <u>Clutch System Description and Operation</u> . Does the clutch operate properly?	Go to Step 5	Go to Step 4
4	Repair the clutch system. Refer to <u>Symptoms - Clutch</u> . Did you find and repair the condition?	Go to Step 11	Go to Step 5
5	Inspect for the correct transaxle fluid level and the proper fluid. Refer to <u>Transmission Fluid Drain and Fill</u> . Is the transaxle fluid level correct and at the proper level?	Go to Step 7	Go to Step 6
6	Fill the transaxle to the correct level, or change the transaxle fluid if it is not the correct type. Does the transaxle still have gear clash?	Go to Step 7	Go to Step 11
7	1. Perform a static shift test on the transaxle. 2. Test for the following: • Blockage preventing full shift lever movement • Excessive movement in the shift lever • Binding in the shift lever • Detent plungers or shift rails binding • Shift cable binding • Shift cable proper adjustment Did the transaxle shift smoothly into the gear that is clashing?	Go to Step 10	Go to Step 8
8	Remove the floor console. Refer to <u>Front Floor Console Replacement</u> . Inspect for the following: • Loose mounting • Foreign debris		

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	Did you find and repair the condition?	Go to Step 12	Go to Step 10
9	Inspect for proper shift cable adjustment. Refer to <u>Manual Transmission Shift Lever and Selector Lever Cable Adjustment.</u> Did you find and repair the condition?	Go to Step 12	Go to Step 10
10	1. Perform a dynamic shift test on the transaxle. 2. Test for the following: • Detent plungers or shift rails binding • Synchronizer sleeve binding • Gear clashing in more than the suspected gear Is the transaxle hard to shift into all gears?	Go to <u>Transmission Shifts Hard</u>	Go to Step 11
11	Replace the transmission Refer to <u>Transmission Replacement.</u> Did you replace the transmission?	Go to Step 12	Go to Diagnostic Aids
12	Operate the system and verify the repair. Did you correct the condition?	System OK	Go to Step 1

REPAIR INSTRUCTIONS - ON VEHICLE

TRANSMISSION FLUID DRAIN AND FILL

Draining Procedure

WARNING: When the transmission is at operating temperatures, take necessary precautions when removing the drain plug, to avoid being burned by draining fluid.

NOTE: The fluid plug at the front of transmission must not be removed. Prior to the removing of any plug, clean the surrounding area of the plug.

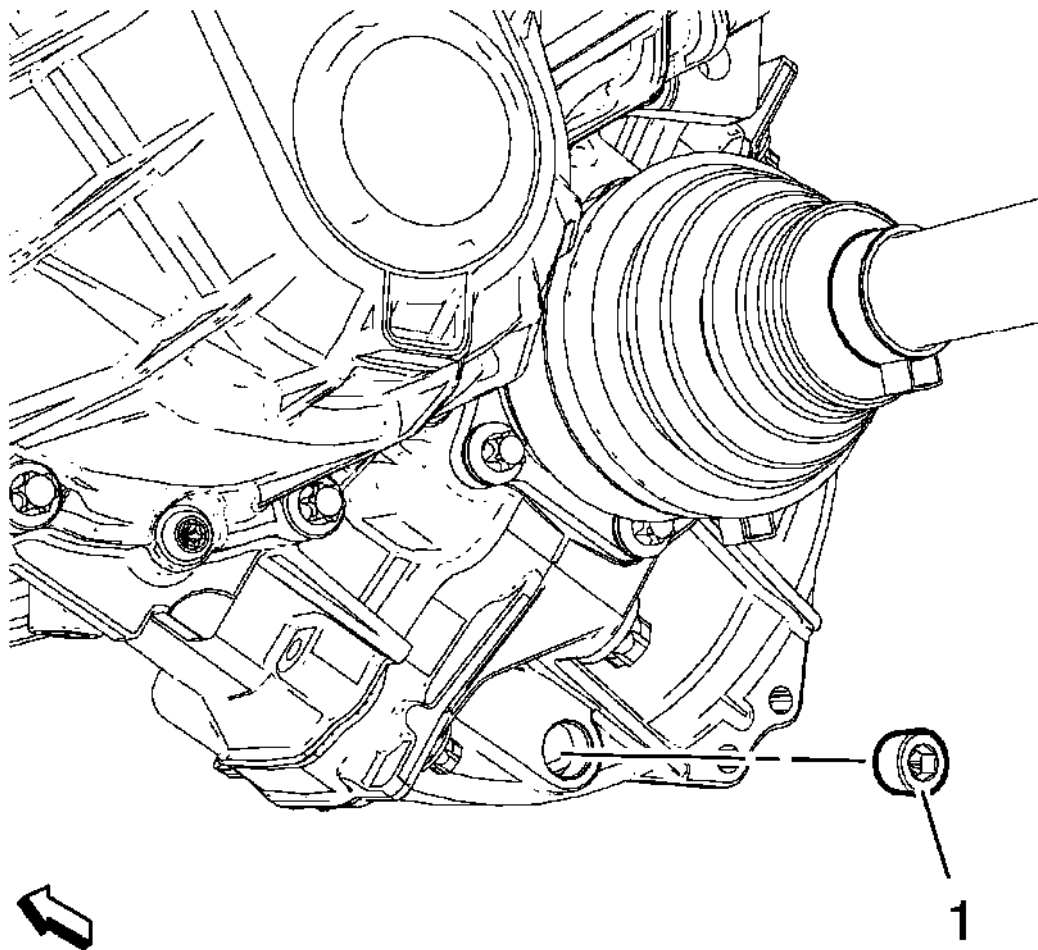


Fig. 15: Transmission Fluid Drain Plug
Courtesy of GENERAL MOTORS COMPANY

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. If equipped, remove the front compartment air deflector. Refer to **Front Compartment Air Deflector Replacement** .

NOTE: **DO NOT re-use the fluid drain plug.**

3. Remove and DISCARD the fluid drain plug (1).
4. Drain the transmission fluid into a suitable and clean container.

NOTE: **This transmission is NOT equipped with a fluid level dipstick or oil level setting plug. The fluid level can only be checked by draining and filling procedure.**

5. Let the transmission fluid drain for 10 minutes and record the transmission fluid amount.
6. Inspect the fluid for excessive metal particles or other debris which may indicate transmission damage. Perform any necessary repairs. Change the transmission fluid if no other conditions are found.

CAUTION: Refer to **Fastener Caution** .

NOTE: **Apply thread locking compound to the plug. DO NOT re-use the old plug.**

7. Install the NEW fluid drain plug (1) with thread sealing compound on the plug threads and tighten to 20 N.m (15 lb ft).
8. If equipped install the front compartment air deflector, refer to **Front Compartment Air Deflector Replacement** .

Filling Procedure

1. Lower the vehicle.
2. Without disconnecting the electrical connector, unclip the engine control module with the bracket from the battery tray and hang aside.
 - For 1.4L gasoline engine, refer to **Engine Control Module Replacement** .
 - For 1.8L gasoline engine, refer to **Engine Control Module Replacement** .

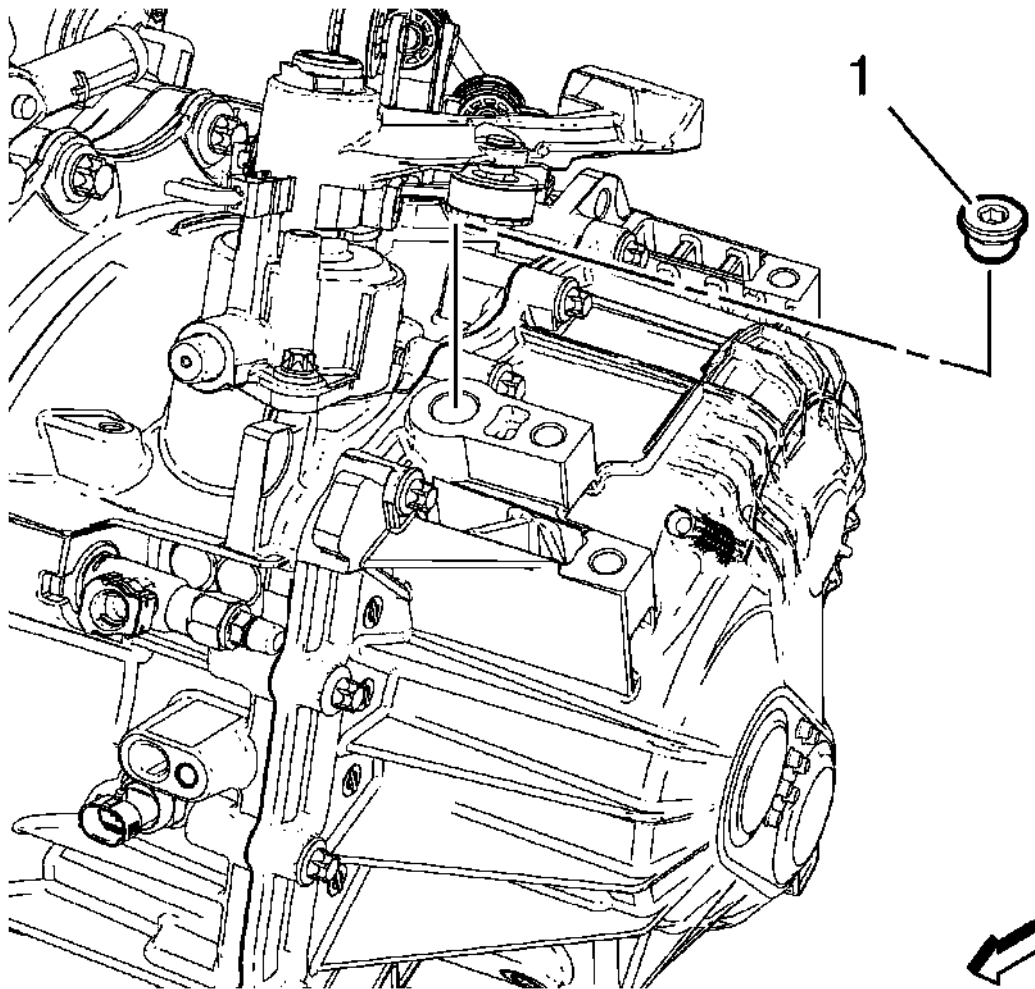


Fig. 16: Transmission Fluid Fill Plug
Courtesy of GENERAL MOTORS COMPANY

NOTE: Prior to the removing of any plug, clean the surrounding area of the plug.

3. Remove the fluid fill plug (1).

NOTE: This transmission is NOT equipped with a fluid level dipstick or oil level setting plug. The fluid level can only be checked by performing the draining and filling procedure.

4. Compare the amount of fluid drained to the transmission refill capacity. Fill the transmission with the appropriate amount of fluid. Refer to **Manual Transmission Specifications**.
5. Install the fluid fill plug (1) and tighten to 30 N.m (22 lb ft).
6. Clip in the engine control module.
 - For 1.4 gasoline engine, refer to **Engine Control Module Replacement**.

- For 1.8 gasoline engine, refer to **Engine Control Module Replacement** .

Fluid Level Check

1. This transmission is NOT equipped with a fluid dipstick or oil level setting plug. The fluid level is based on filling with the appropriate volume of fluid. The fluid level can only be checked by performing the draining and filling procedure.

TRANSMISSION CONTROL LEVER KNOB REPLACEMENT

Removal Procedure

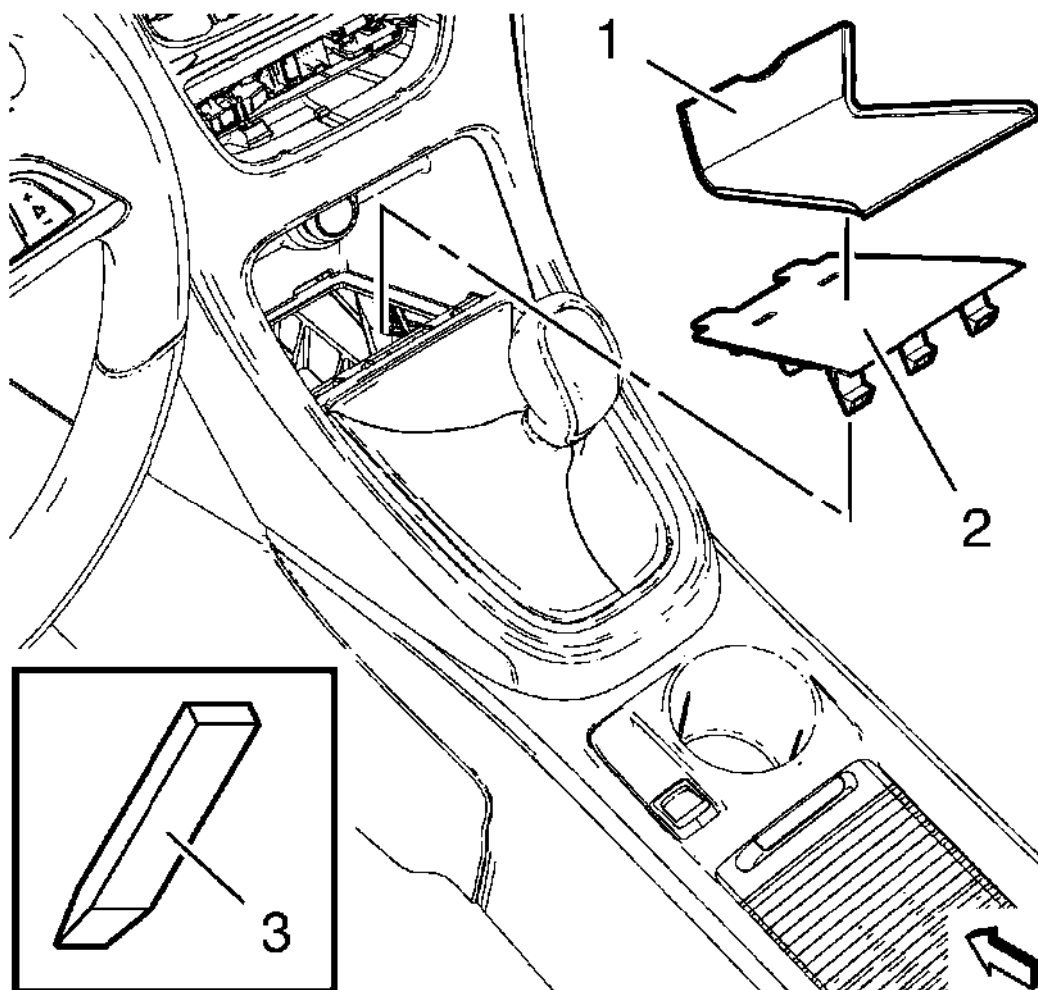


Fig. 17: Instrument Panel Lower Center Compartment Mat
Courtesy of GENERAL MOTORS COMPANY

1. Remove the instrument panel lower center compartment mat (1).
2. Remove the instrument panel lower center compartment liner (2) using a suitable plastic tool (3). Refer

to .

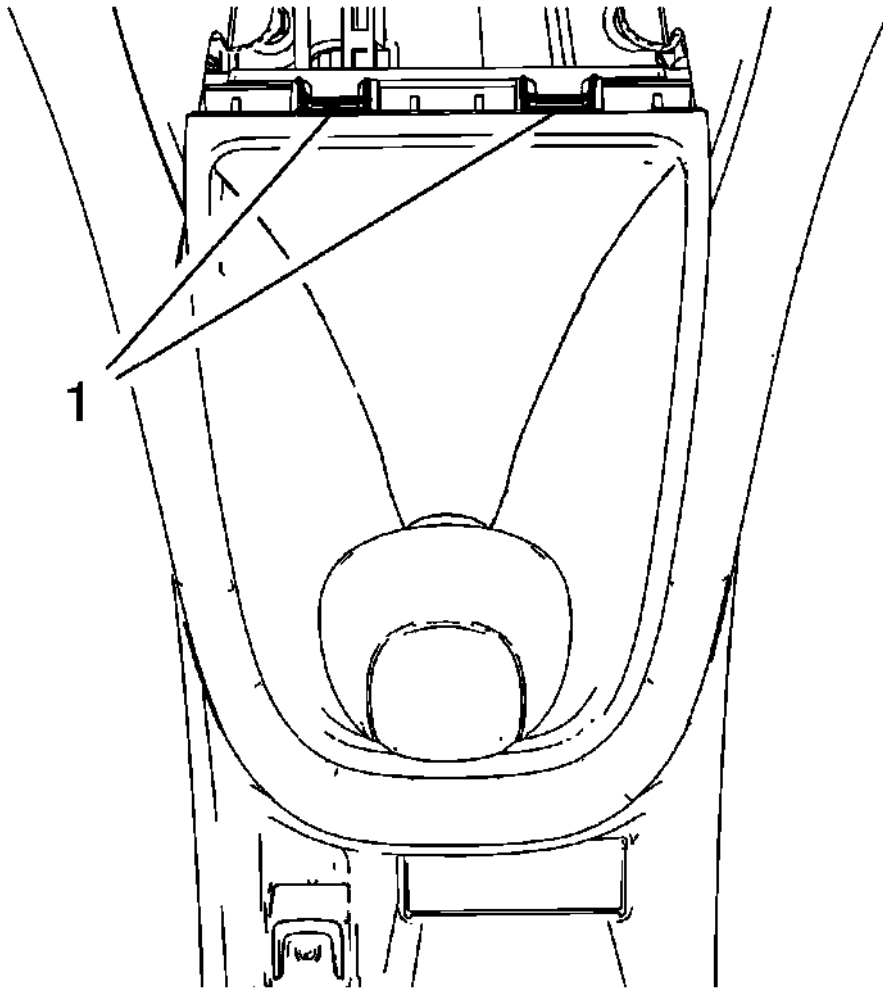


Fig. 18: Boot Frame Retainers

Courtesy of GENERAL MOTORS COMPANY

3. Using a suitable plastic tool, gently release the boot frame retainers (1) at the forward edge of the boot frame.

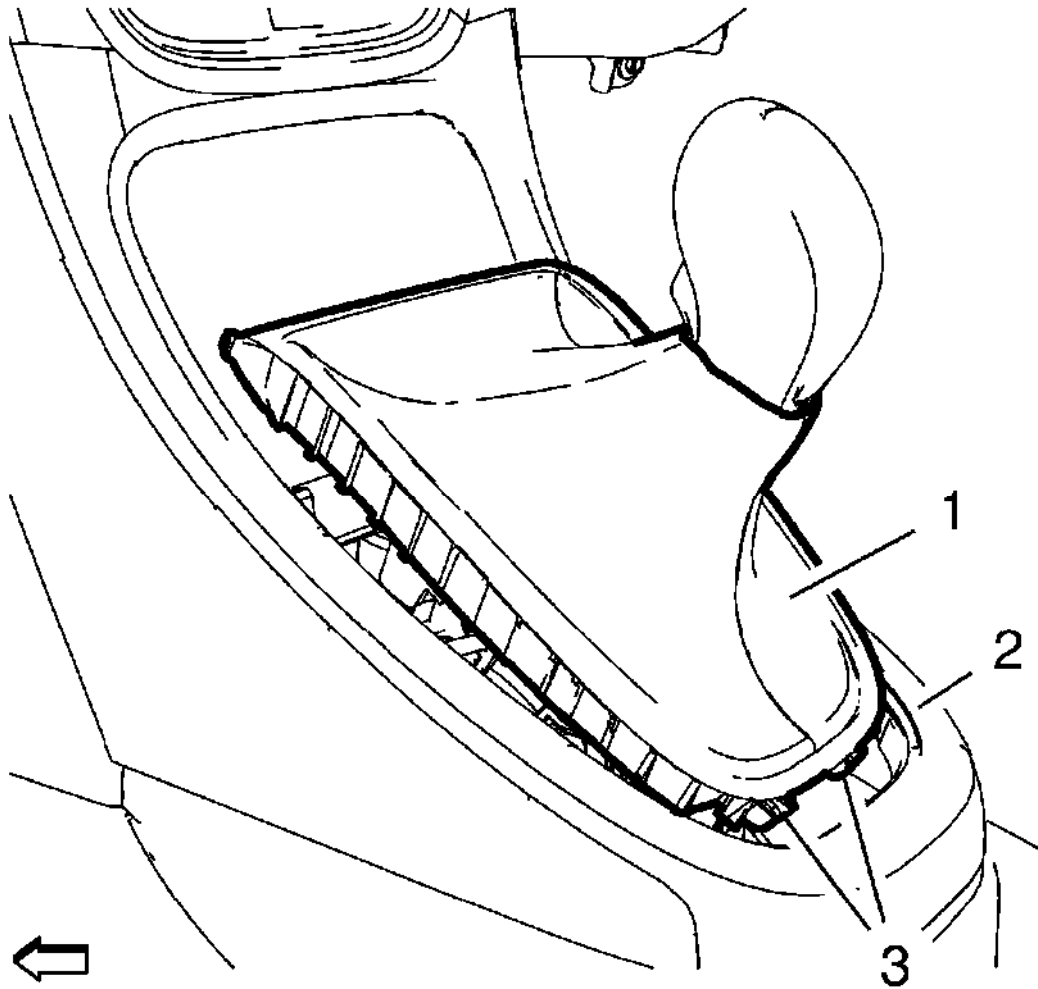


Fig. 19: Shift Boot Frame

Courtesy of GENERAL MOTORS COMPANY

4. Loosen the shift boot frame (1) from the front floor console (2):
 1. Lift the forward edge of the boot frame (1).
 2. Slide the boot frame (1) forward to disengage tabs (3).

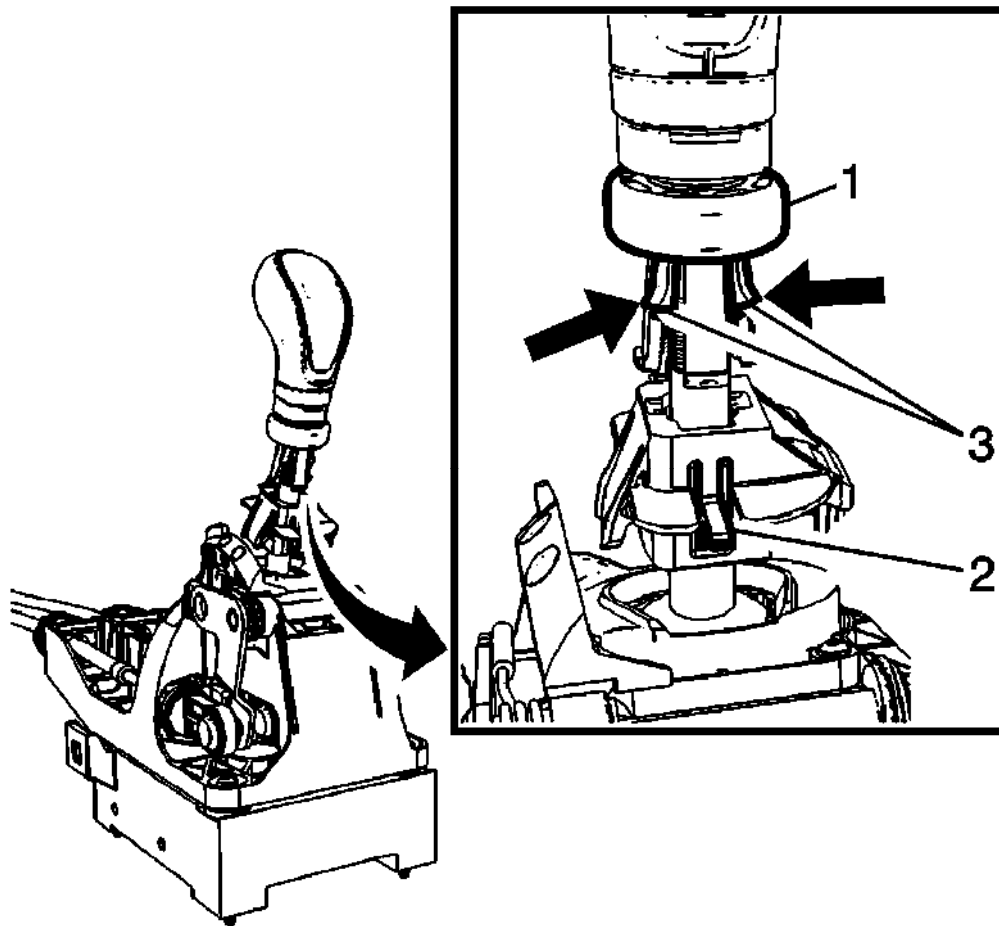


Fig. 20: Control Lever Retaining Ring & Latches

Courtesy of GENERAL MOTORS COMPANY

5. Disengage control lever retaining ring (1) by pressing both latches (3), while sliding up retaining ring until loose.
6. Pull up on the reverse lockout retaining tab (2) and lift the reverse lockout device to release it from the installed position.

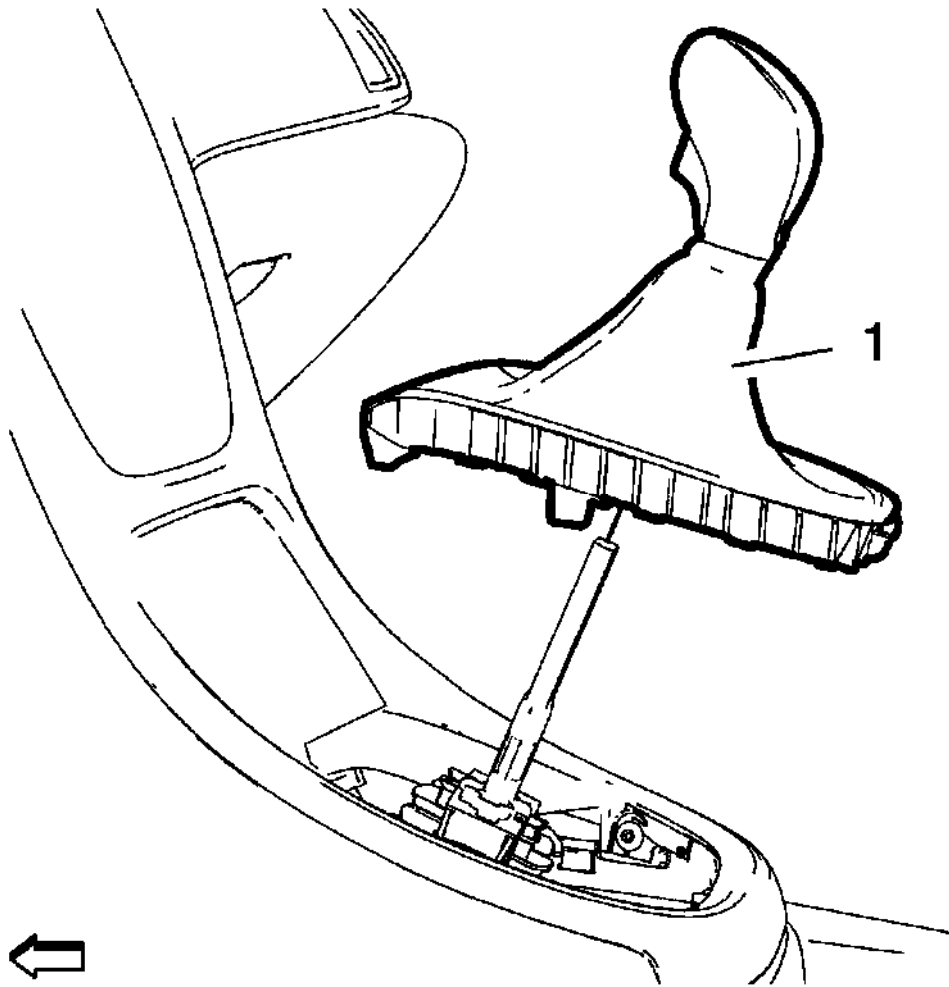


Fig. 21: Transmission Control Lever Knob Assembly
Courtesy of GENERAL MOTORS COMPANY

7. Remove the transmission control lever knob assembly (1).

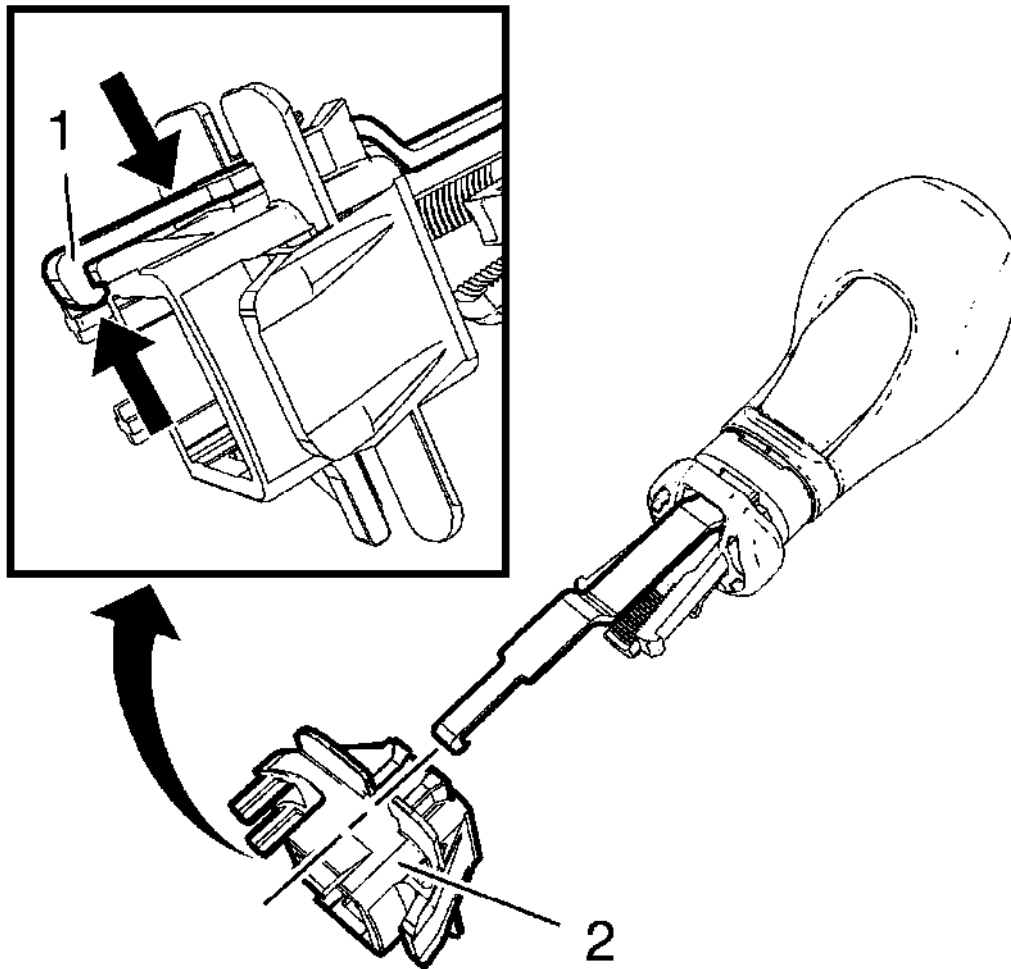


Fig. 22: Pull Latch

Courtesy of GENERAL MOTORS COMPANY

8. Press the retaining tab (1) in the direction of arrows.
9. Remove the reverse lockout device (2) from the transmission shifter knob assembly.

Installation Procedure

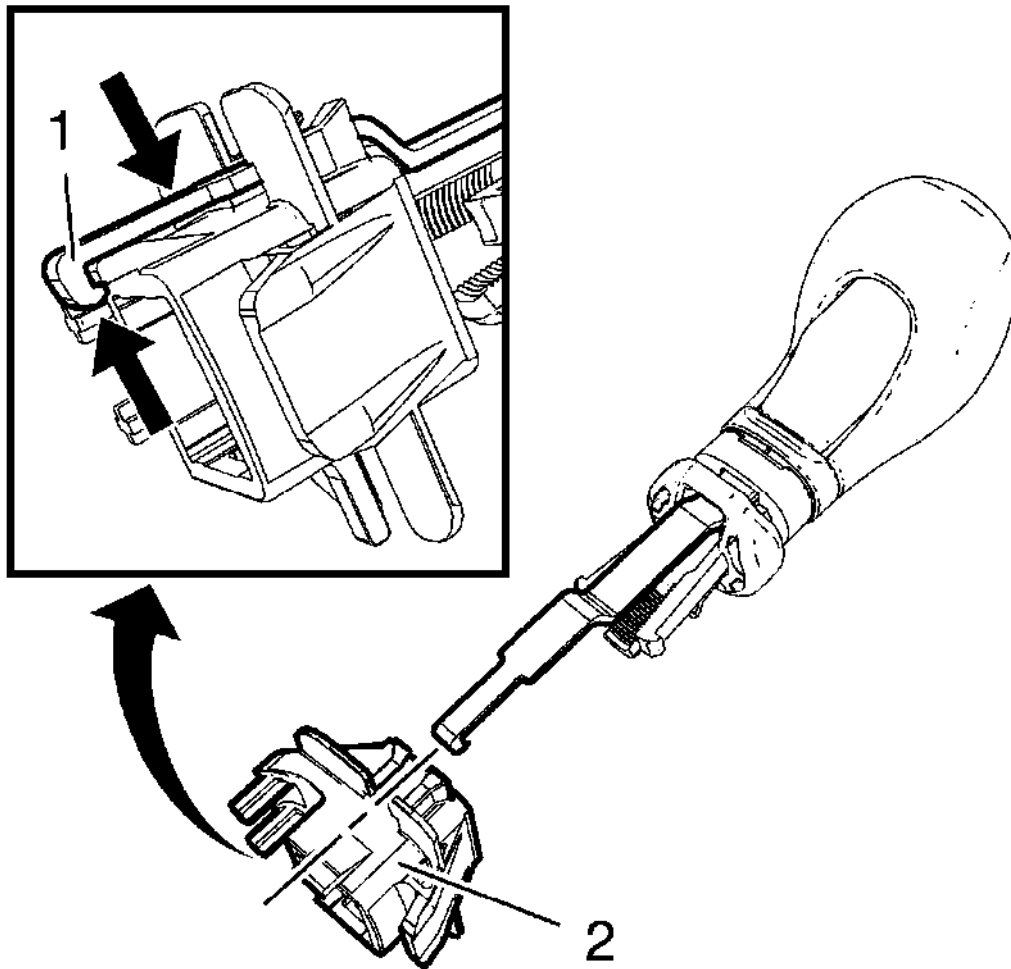


Fig. 23: Pull Latch

Courtesy of GENERAL MOTORS COMPANY

1. Install reverse lockout device (2) to transmission control lever knob assembly.
2. Ensure that the retaining tab (1) is fully engaged on the reverse lockout device (2).

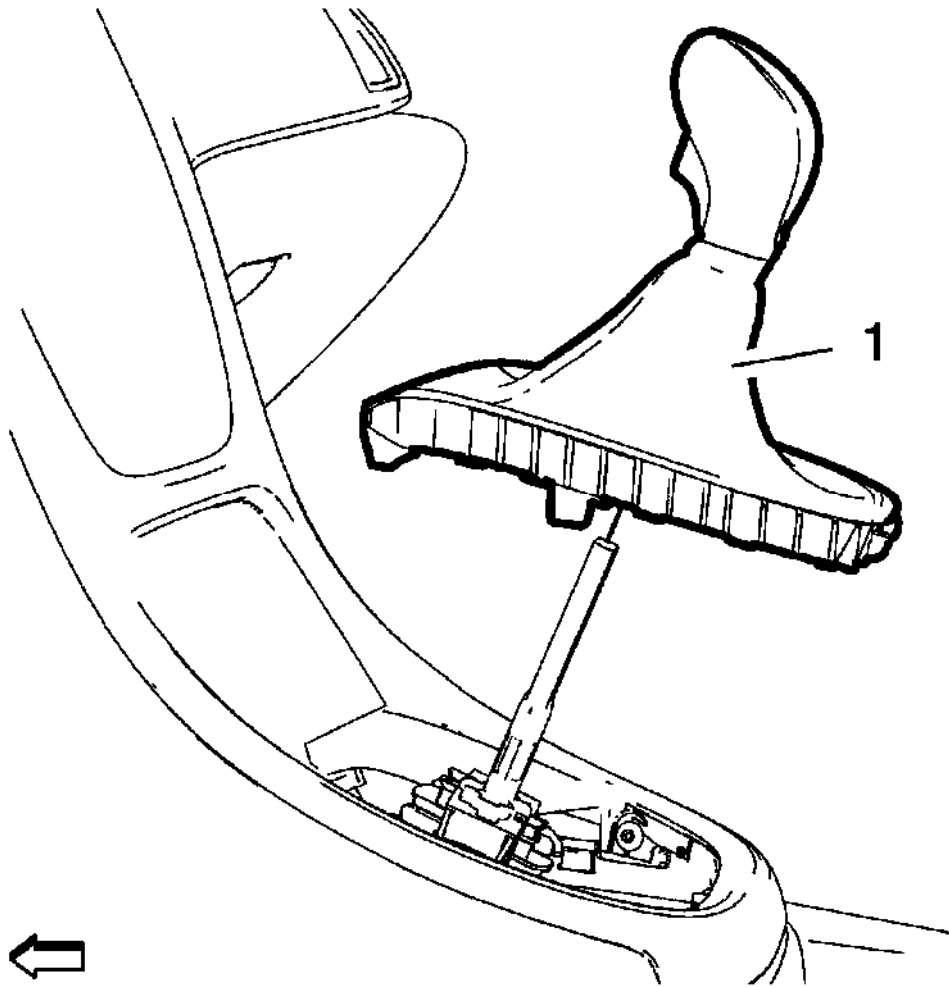


Fig. 24: Transmission Control Lever Knob Assembly
Courtesy of GENERAL MOTORS COMPANY

3. Install the transmission control lever knob assembly (1).
4. Engage the reverse lockout device tab by pushing downward on the reverse lockout device until fully seated.

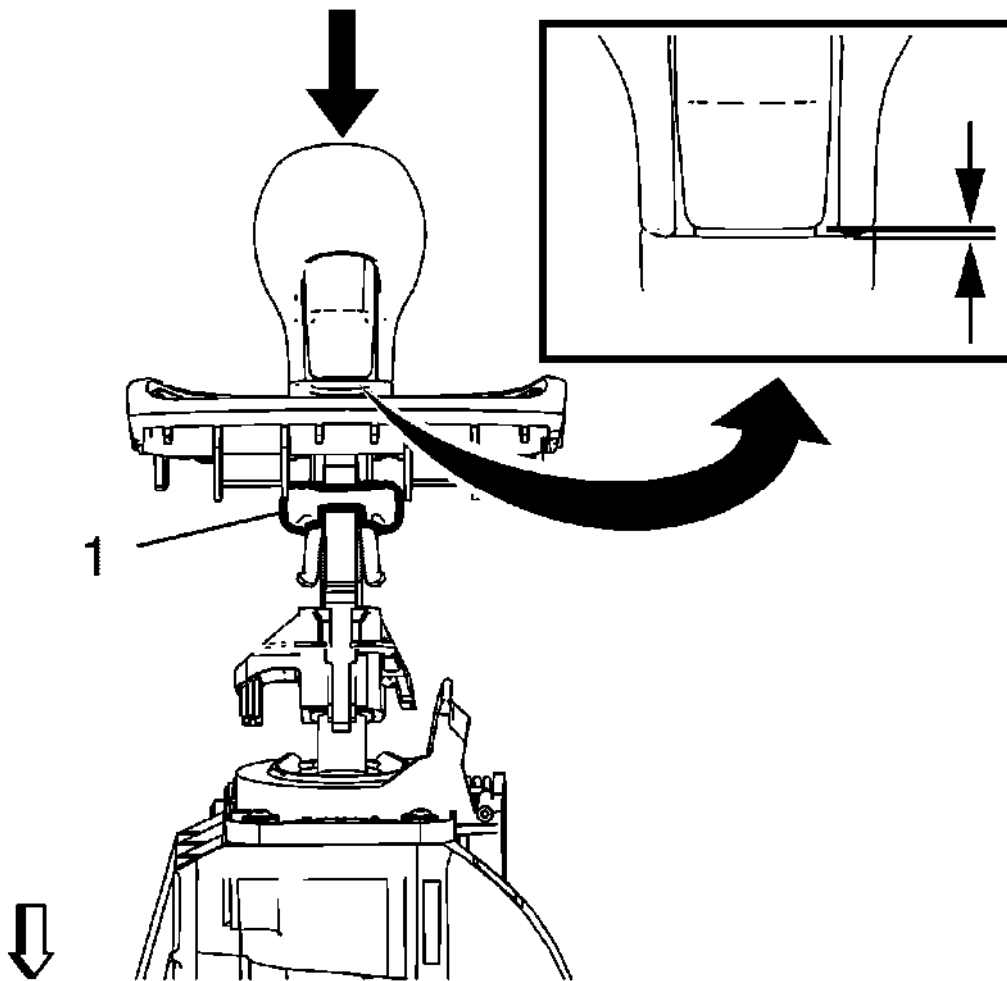


Fig. 25: Transmission Control Lever Retainer Ring
Courtesy of GENERAL MOTORS COMPANY

5. Slide the transmission control lever retainer ring (1) downward until fully seated. Confirm that there is a visible gap between the control lever knob and the reverse inhibitor button (arrows).

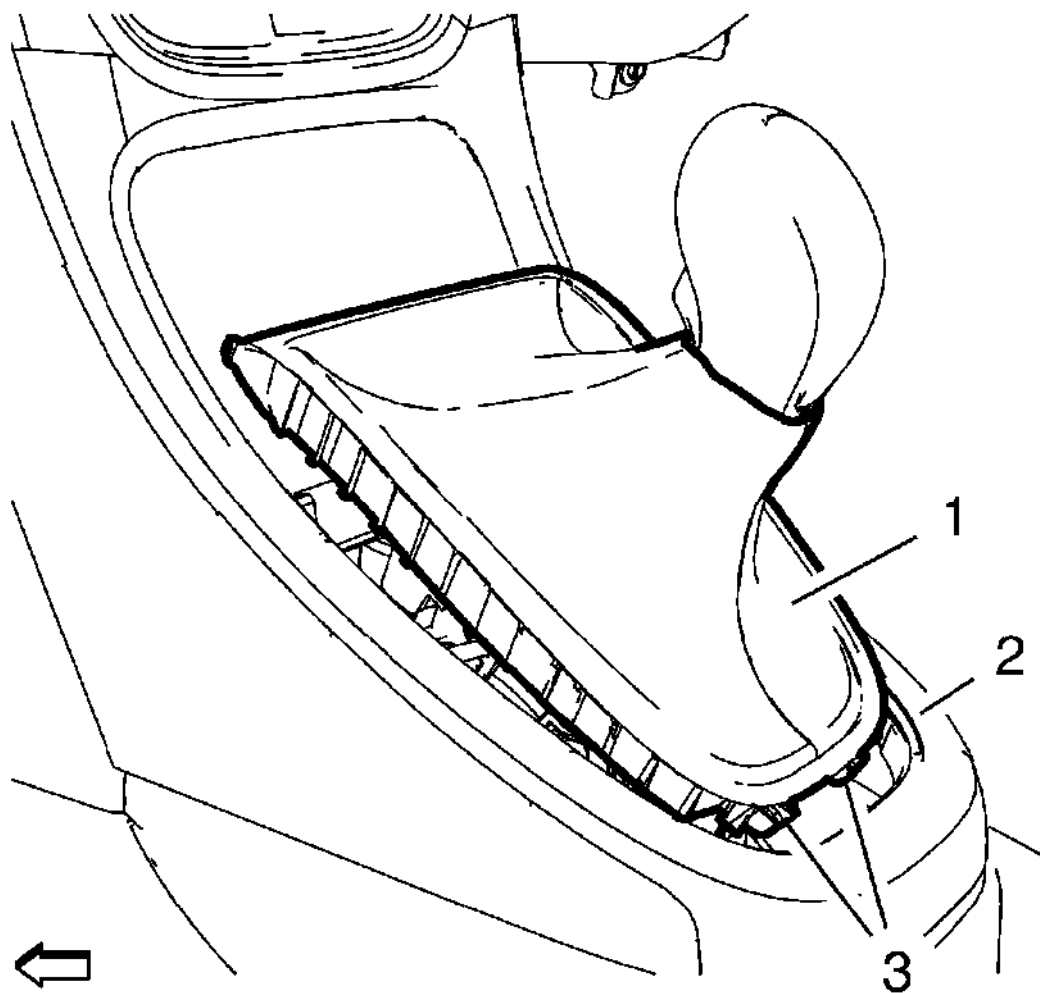


Fig. 26: Shift Boot Frame

Courtesy of GENERAL MOTORS COMPANY

6. Install the transmission control lever boot (1) into the front floor console (2).
 1. Insert the rear portion of the boot frame into the console.
 2. Lower the front portion of the boot into the console and press down to engage retainers.
7. Install the instrument panel lower center compartment liner (2) to the front floor console. Refer to .
8. Install the mat.

MANUAL TRANSMISSION SHIFT LEVER AND SELECTOR LEVER CABLE REPLACEMENT

Removal Procedure

1. Remove transmission control. Refer to Transmission Control Replacement.
2. Remove battery tray. Refer to Battery Tray Replacement .

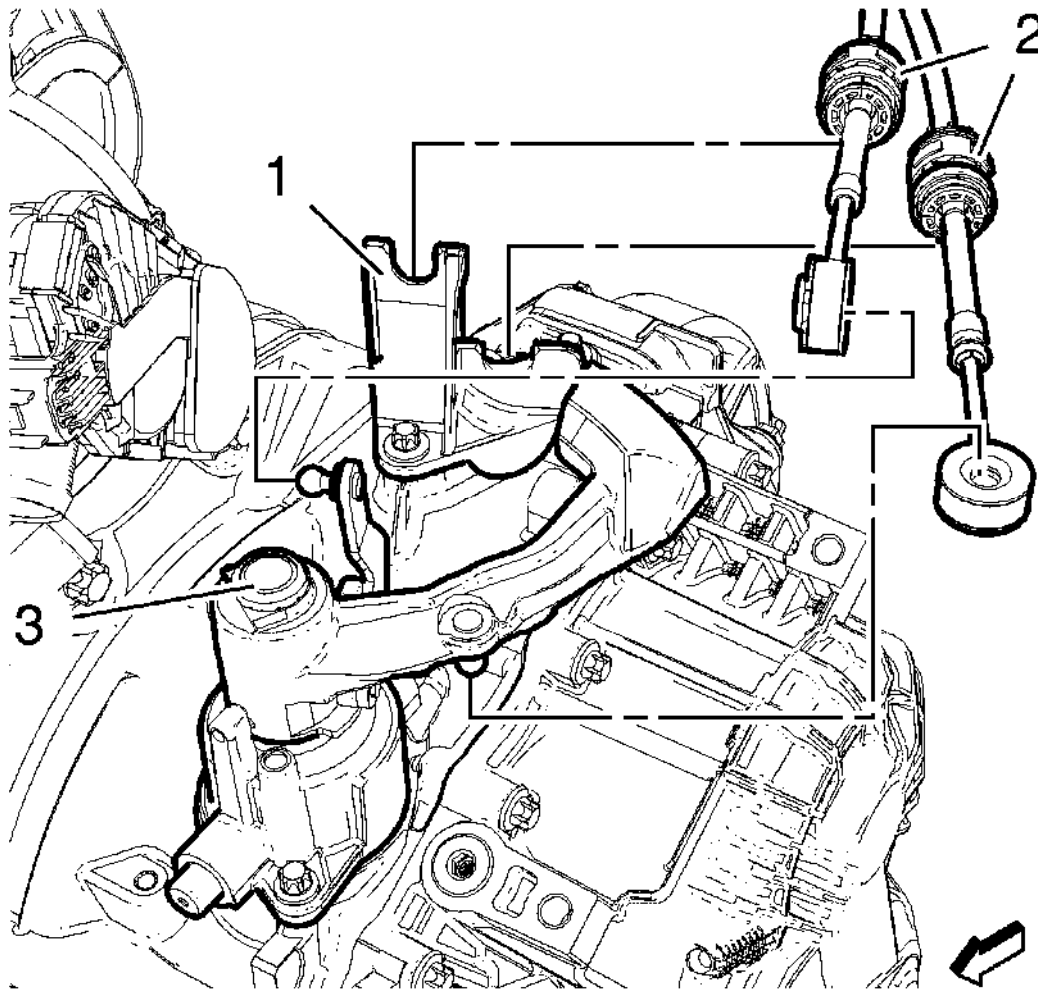


Fig. 27: Selector Lever Cable, Bracket And Transmission Control Housing
Courtesy of GENERAL MOTORS COMPANY

3. Using a suitable pry tool, carefully remove shift lever and selector lever cable (2) from transmission control housing (3).
4. Remove shift lever and selector lever cable from shift lever and selector lever cable bracket (1).

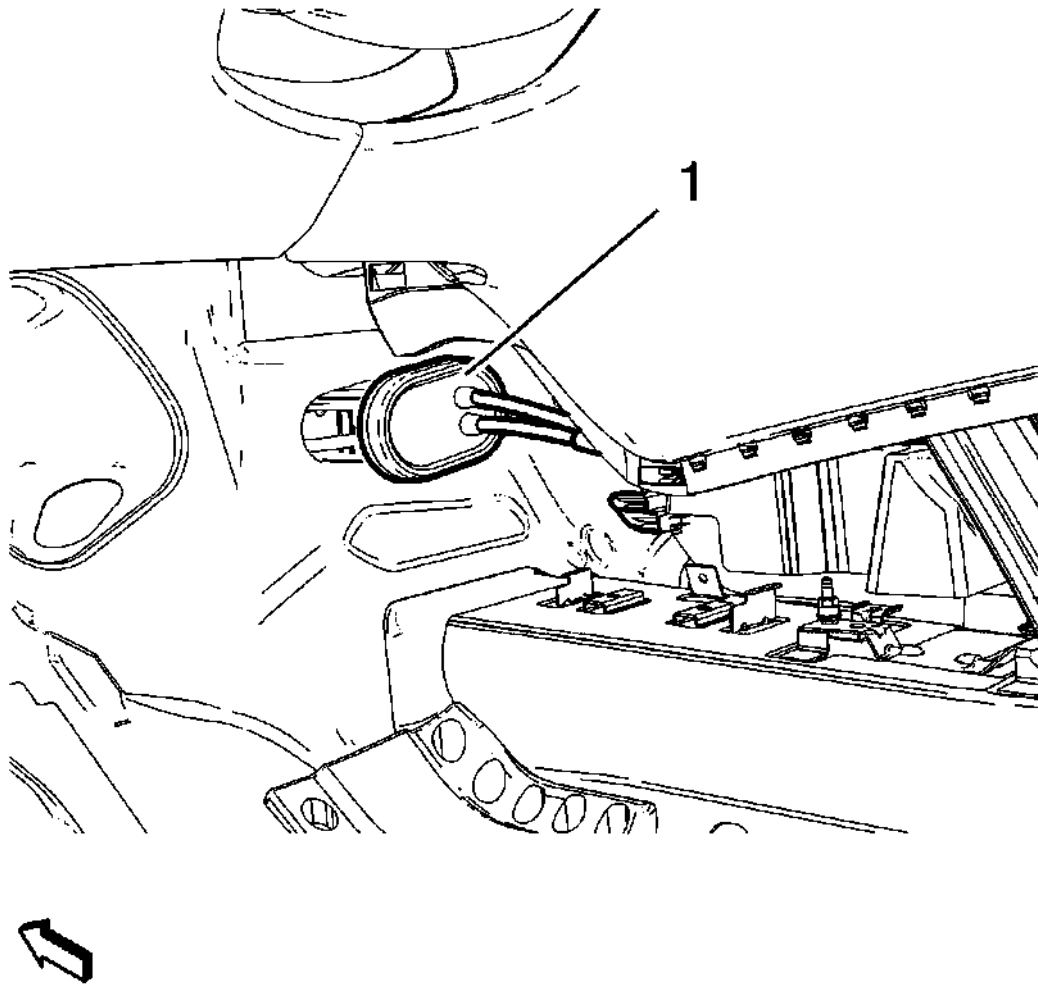


Fig. 28: Selector Lever Cable

Courtesy of GENERAL MOTORS COMPANY

5. Remove shift lever and selector lever cable (1) from bulkhead.
6. Remove shift lever and selector lever cable from inside the engine compartment.

Installation Procedure

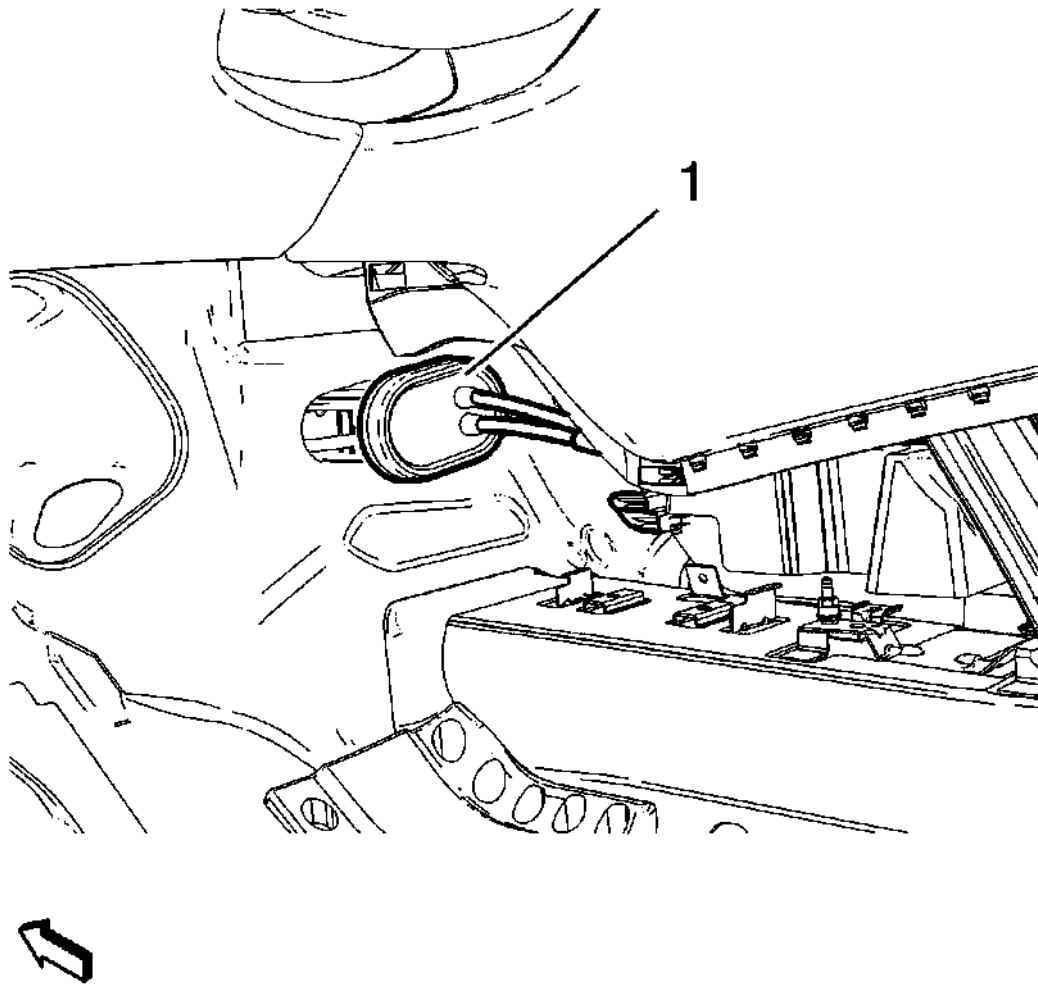


Fig. 29: Selector Lever Cable

Courtesy of GENERAL MOTORS COMPANY

1. Install shift lever and selector lever cable from inside the engine compartment.
2. Install shift lever and selector lever cable (1) to bulkhead.

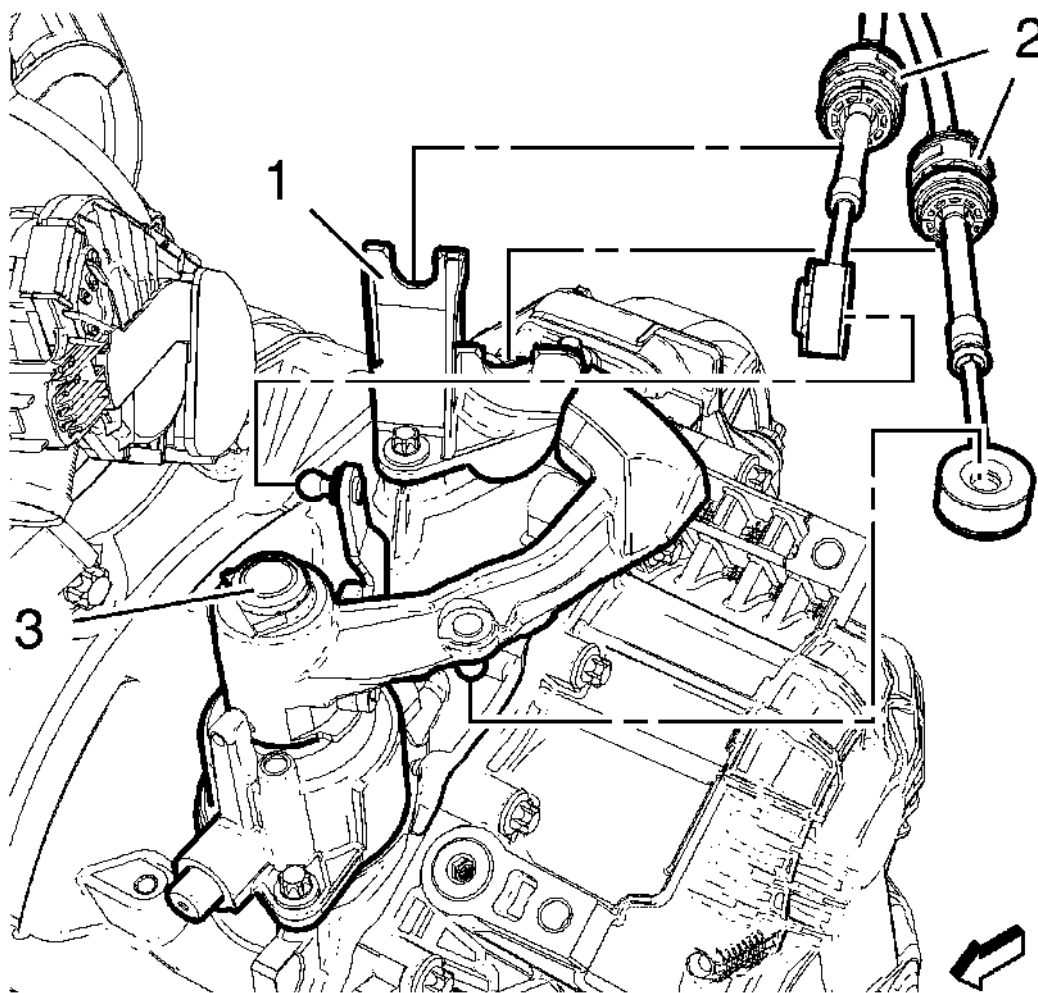


Fig. 30: Selector Lever Cable, Bracket And Transmission Control Housing
Courtesy of GENERAL MOTORS COMPANY

3. Install shift lever and selector lever cable (2) to shift lever and selector lever cable bracket (1).
4. Install shift lever and selector lever cable to transmission control housing (3).
5. Install transmission control. Refer to **Transmission Control Replacement**.
6. Install battery tray. Refer to **Battery Tray Replacement**.

SELECTOR AND SHIFT LEVER CABLE BRACKET REPLACEMENT

Removal Procedure

1. Remove battery tray. Refer to **Battery Tray Replacement**.

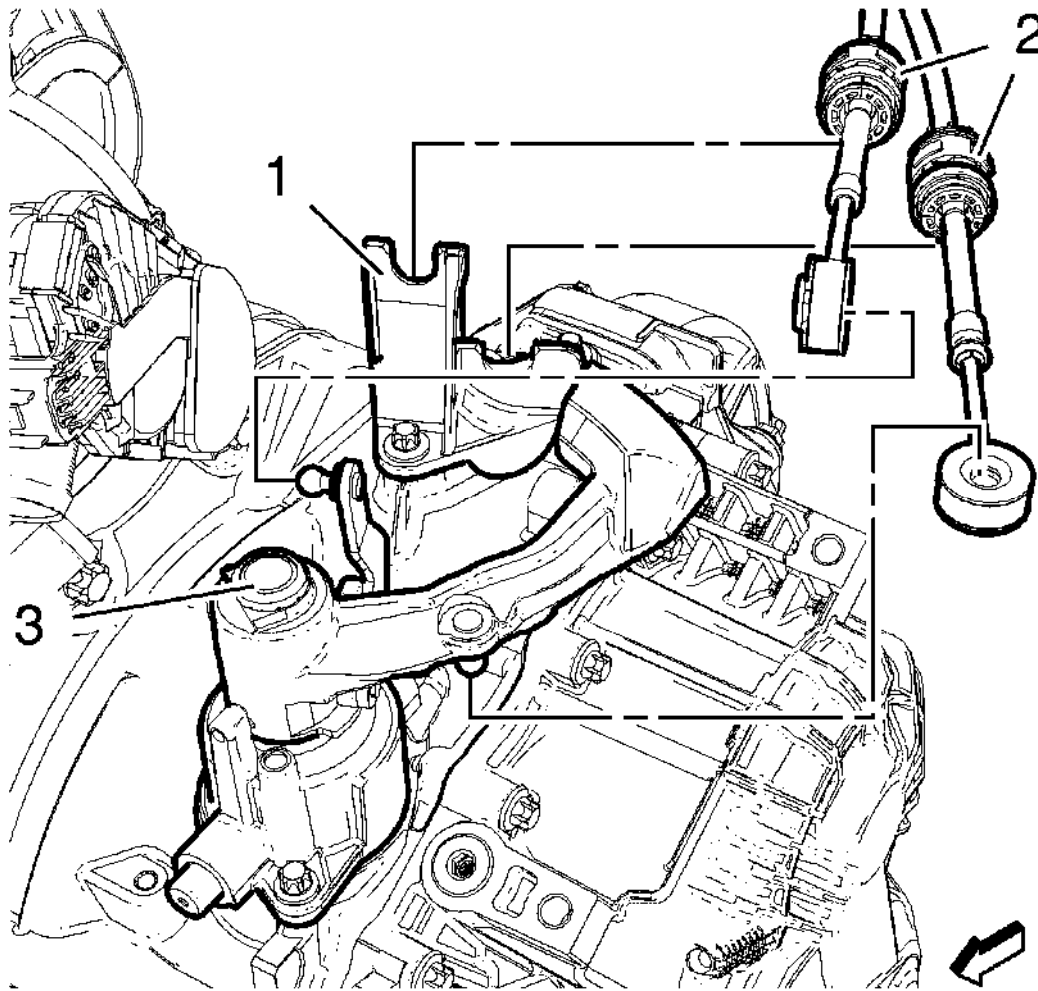


Fig. 31: Selector Lever Cable, Bracket And Transmission Control Housing
Courtesy of GENERAL MOTORS COMPANY

2. Using a suitable pry tool, carefully remove shift lever and selector lever cable (2) from transmission control housing (3) using.
3. Remove shift lever and selector lever cable from shift lever and selector lever cable bracket (1).

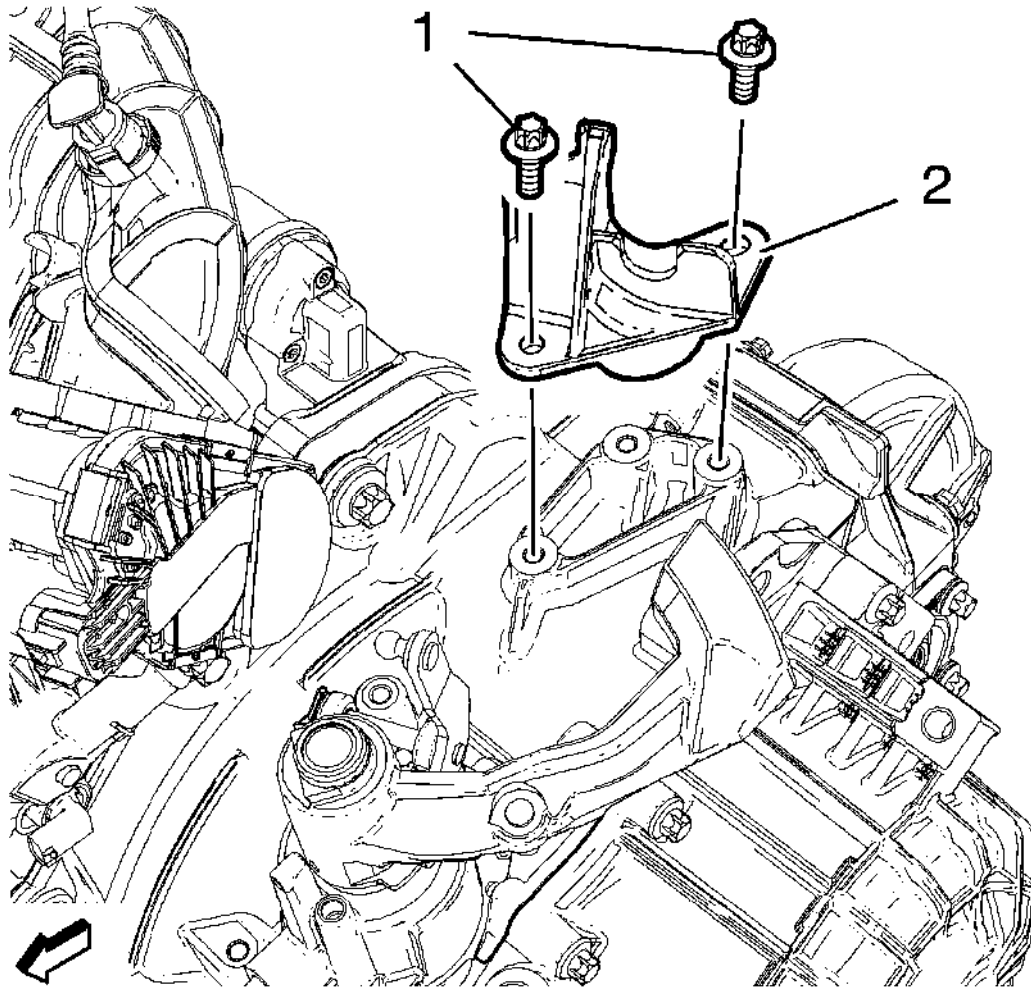


Fig. 32: Selector Lever Cable Bracket And Bolts
Courtesy of GENERAL MOTORS COMPANY

4. Remove 2 shift lever and selector lever cable bracket bolts (1).
5. Remove shift lever and selector lever cable bracket (2).

Installation Procedure

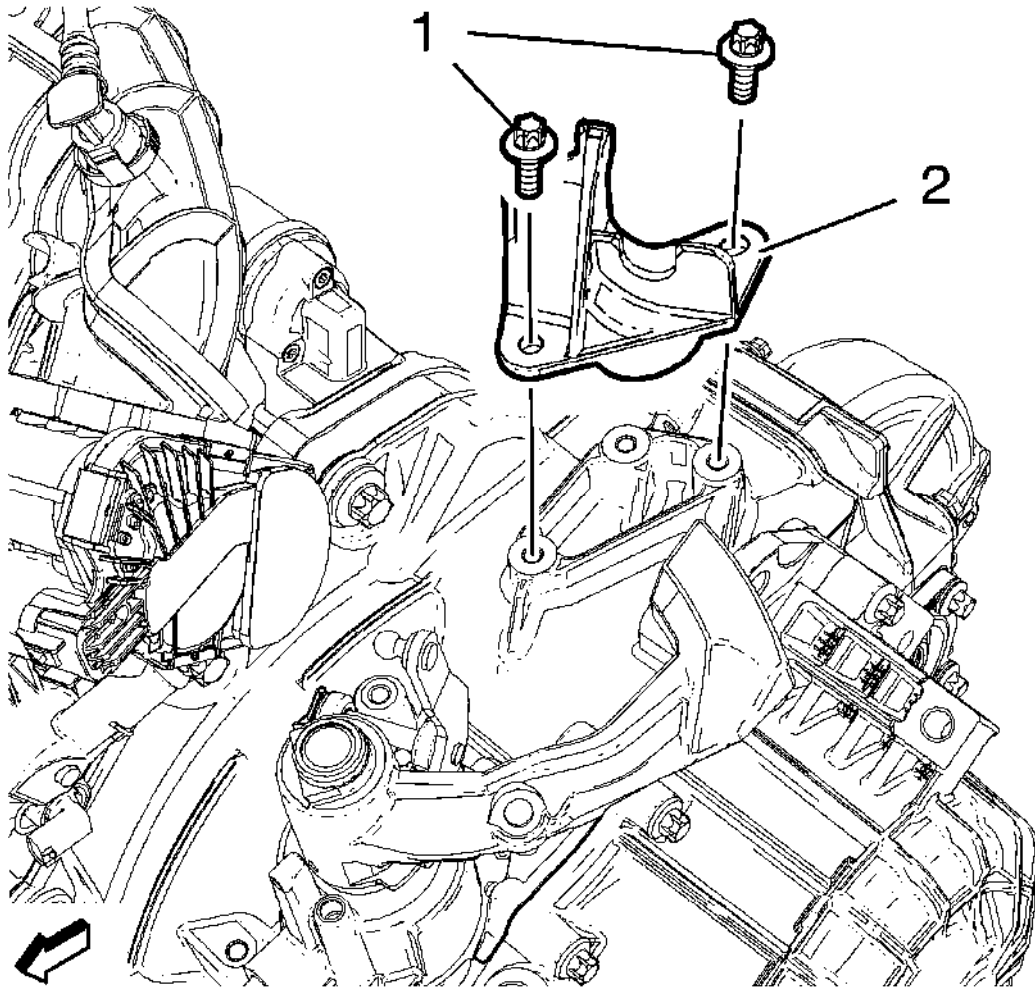


Fig. 33: Selector Lever Cable Bracket And Bolts
Courtesy of GENERAL MOTORS COMPANY

1. Install shift lever and selector lever cable bracket (2).

CAUTION: Refer to Fastener Caution .

2. Install 2 shift lever and selector lever cable bracket bolts (1) and tighten to 20 N.m (15 lb ft).

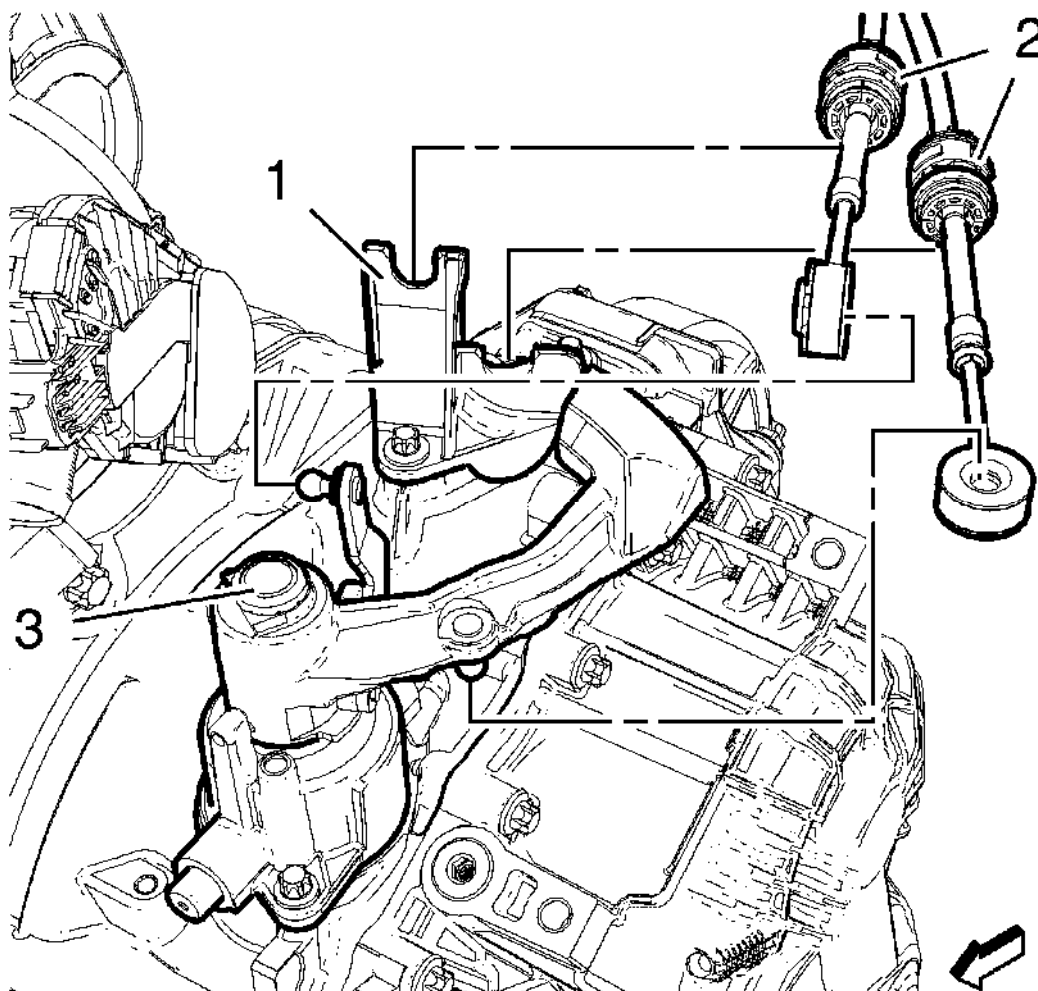


Fig. 34: Selector Lever Cable, Bracket And Transmission Control Housing
Courtesy of GENERAL MOTORS COMPANY

3. Install shift lever and selector lever cable (2) to shift lever and selector lever cable bracket (1).
4. Install shift lever and selector lever cable to transmission control housing (3).
5. Install battery tray. Refer to **Battery Tray Replacement** .

TRANSMISSION CONTROL REPLACEMENT

Removal Procedure

1. Remove front floor console. Refer to **Front Floor Console Replacement** .

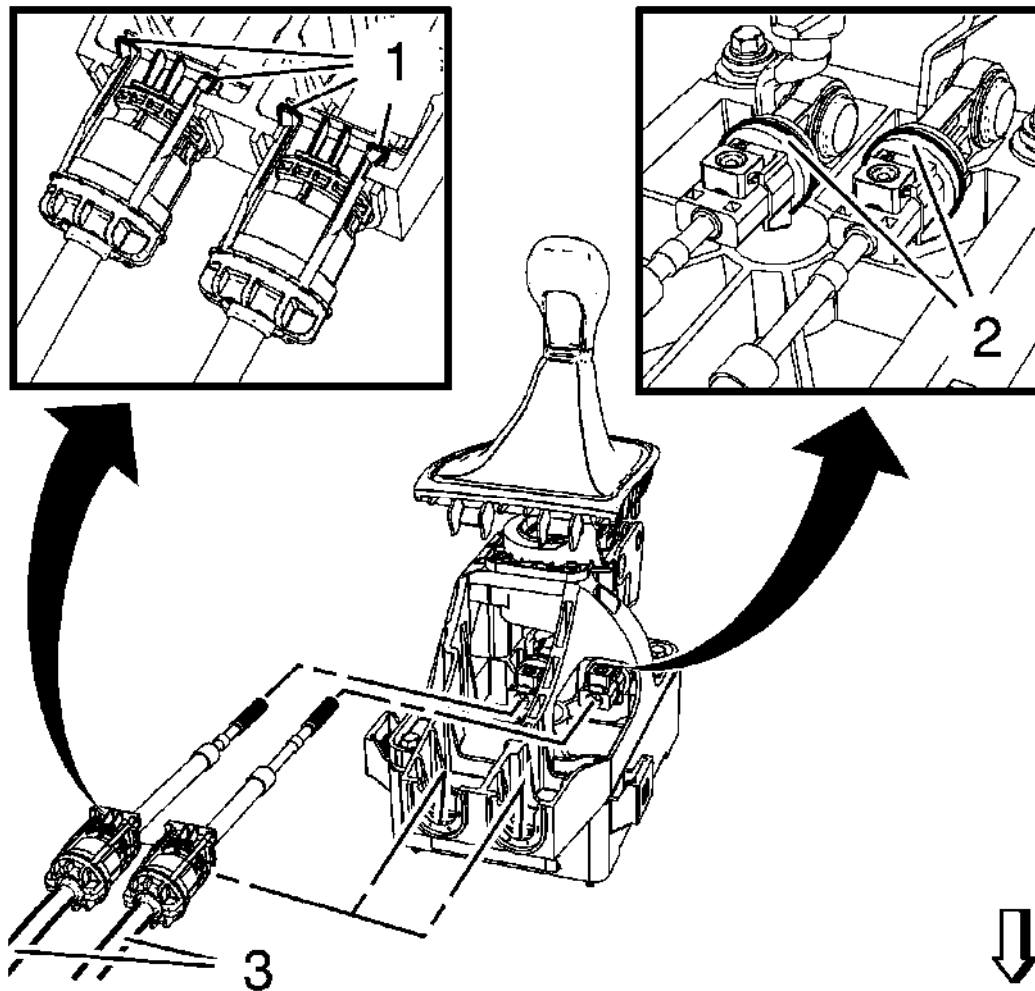


Fig. 35: Selector Lever Cable, Adjust Locks And Transmission Control Lever Housing
Courtesy of GENERAL MOTORS COMPANY

2. Unlock shift lever and selector lever cable adjust locks (2).
3. Clip shift lever and selector lever cable (3) out of transmission control lever housing (1).

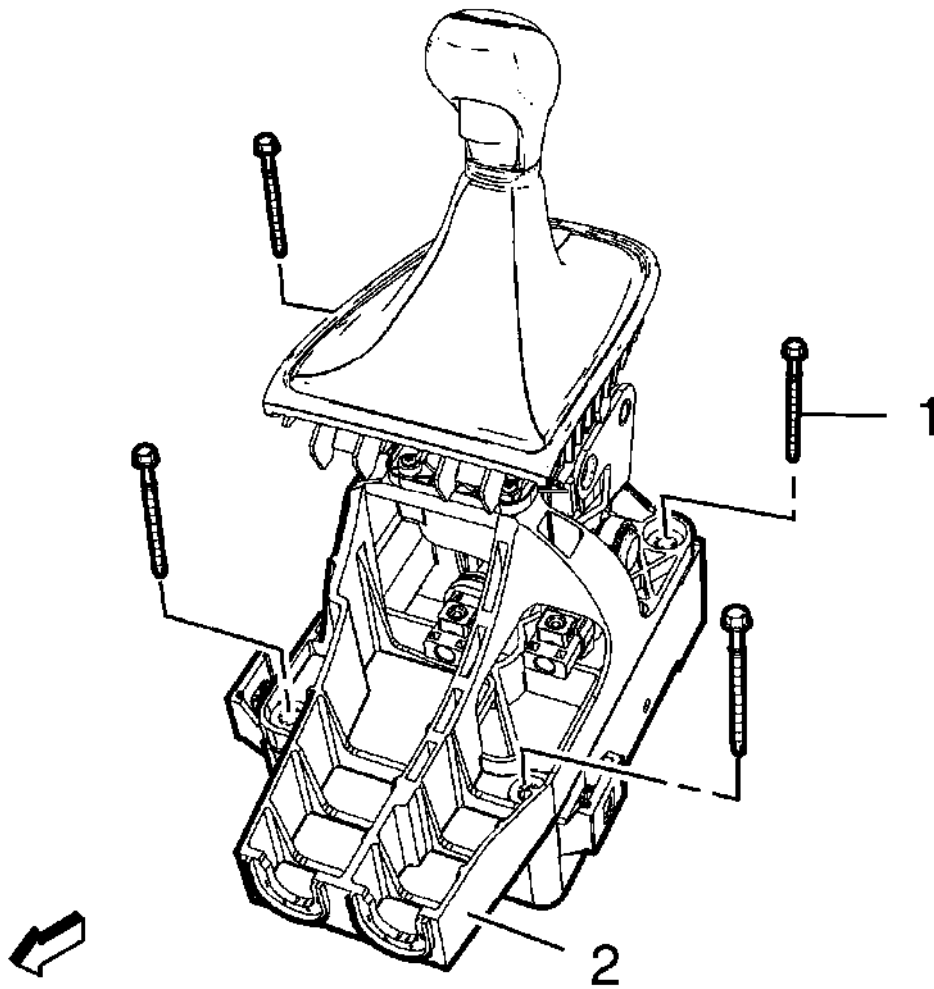


Fig. 36: Transmission Control Lever And Bolts
Courtesy of GENERAL MOTORS COMPANY

4. Remove 4 transmission control lever bolts (1).
5. Remove transmission control lever (2).

Installation Procedure

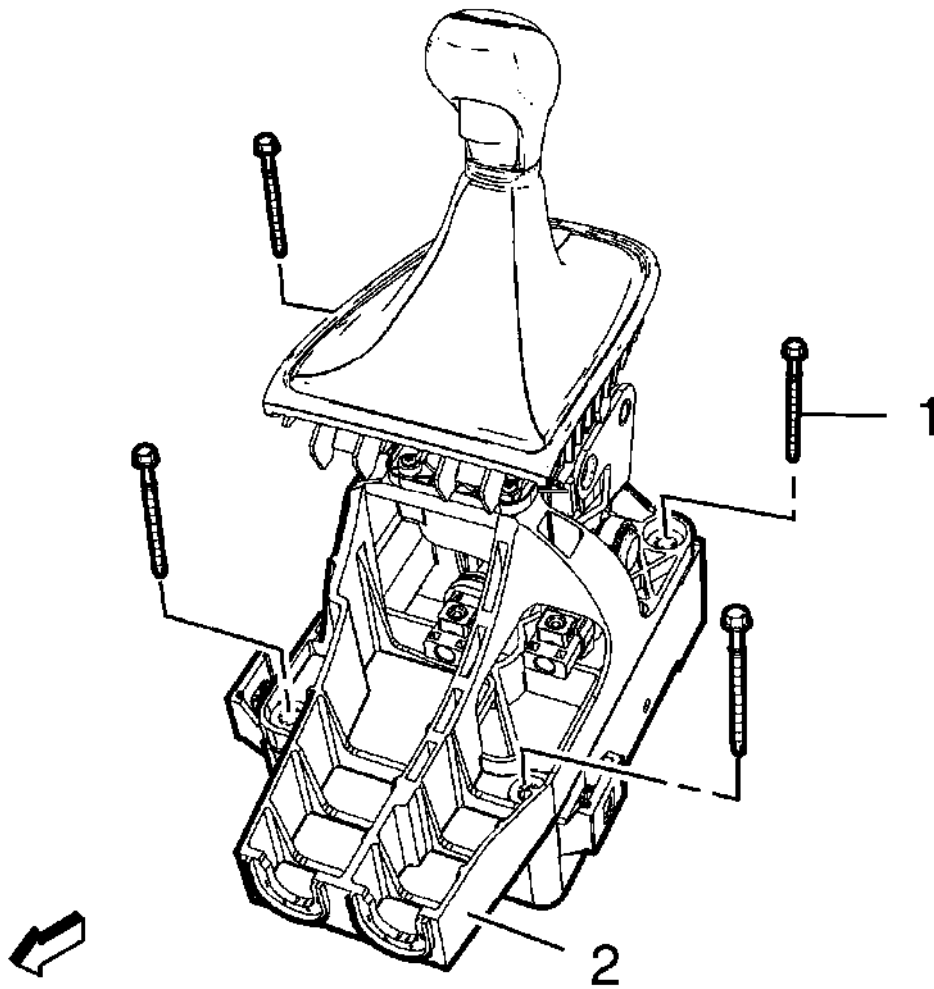


Fig. 37: Transmission Control Lever And Bolts
Courtesy of GENERAL MOTORS COMPANY

1. Install NEW transmission control lever (2).

CAUTION: Refer to Fastener Caution .

2. Install 4 transmission control lever bolts (1) and tighten to 8 N.m (71 lb in).

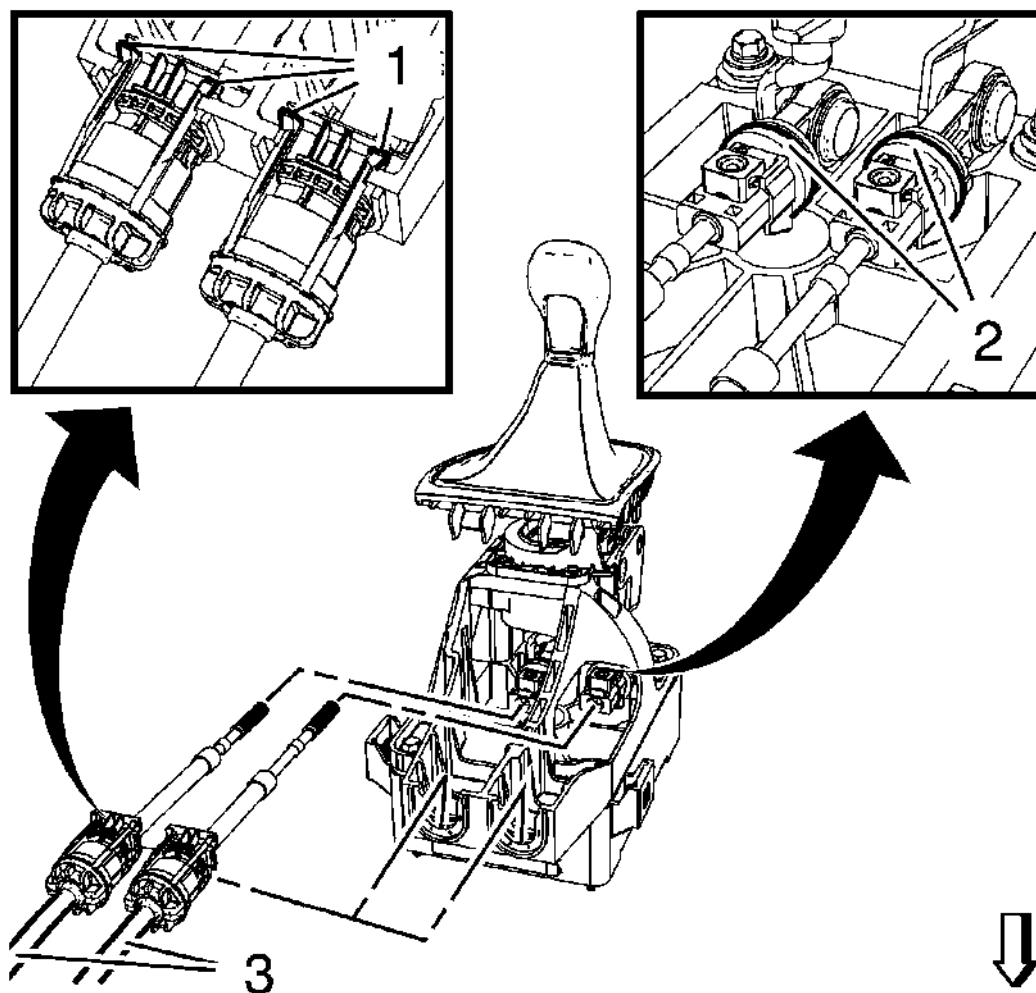


Fig. 38: Selector Lever Cable, Adjust Locks And Transmission Control Lever Housing
Courtesy of GENERAL MOTORS COMPANY

NOTE: Do not lock yet.

3. Slide shift lever and selector lever cable into shift lever and selector lever cable adjust locks (2).
4. Clip shift lever and selector lever cable (3) into transmission control lever housing (1).
5. Adjust shift lever and selector lever cable. Refer to Manual Transmission Shift Lever and Selector Lever Cable Adjustment.

MANUAL TRANSMISSION SHIFT LEVER AND SELECTOR LEVER CABLE ADJUSTMENT

Special Tools

DT-527-A Adjuster

For equivalent regional tools, refer to Special Tools.

Removal Procedure

1. Remove the transmission control lever trim cover. Refer to **Automatic or Manual Transmission Control Lever Trim Cover Replacement** .
2. Remove the front floor console storage tray. Refer to **Front Floor Console Stowage Tray Replacement** .

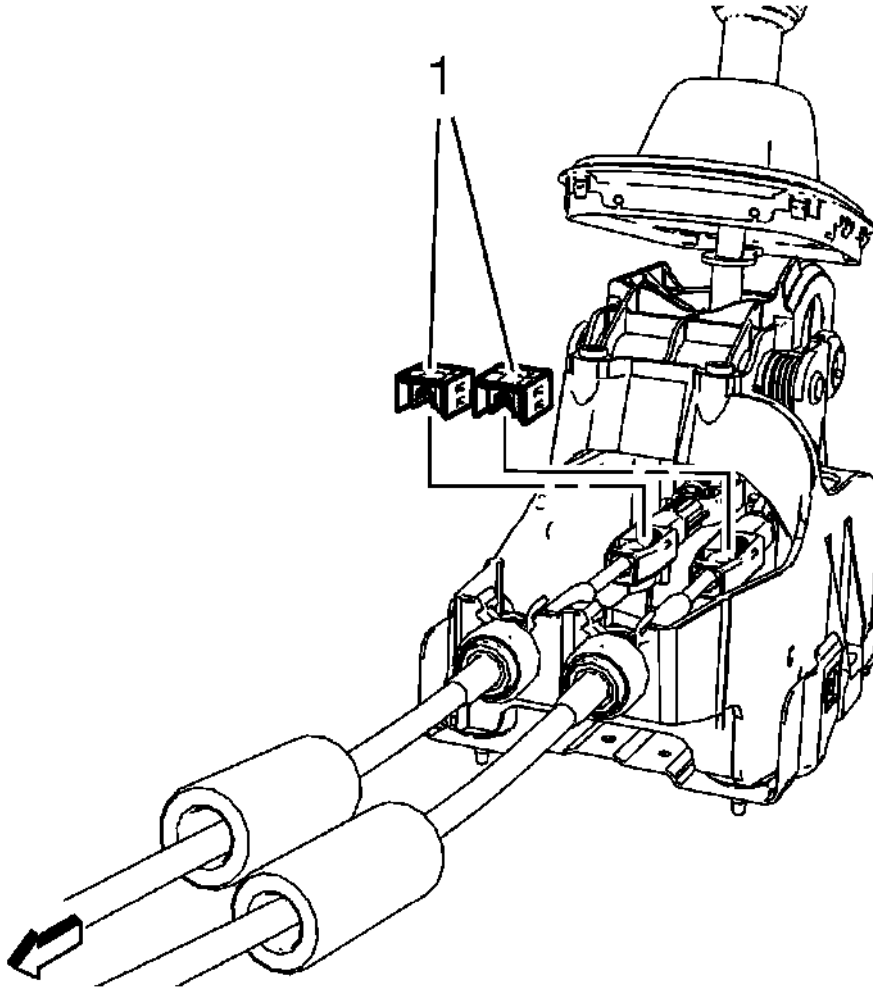


Fig. 39: Shift Lever And Select Lever Cable Adjust Locks
Courtesy of GENERAL MOTORS COMPANY

3. Lift upward and disengage but DO NOT remove both cable Lock adjusters (1) to release the internal cable assembly, one for each cable.

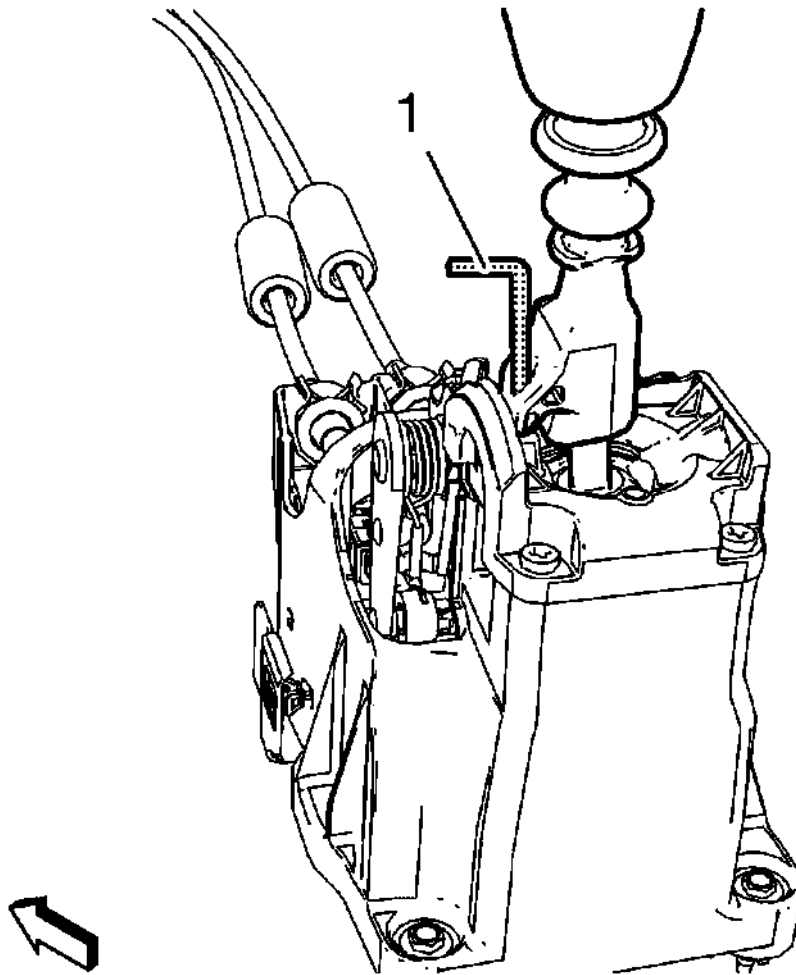


Fig. 40: Shift Control Lever

Courtesy of GENERAL MOTORS COMPANY

NOTE: The hole of the shift control lever must be aligned to the hole in the shifter base so the pin (1) can pass through both. The shift control lever will be locked in the 1-2 neutral position. Not using the specified tools may lead to improper shift system adjustment.

4. Lock the position of the shift control lever with **DT-527-A** adjuster (1) or a (5 mm 0.2 in) drill bit.

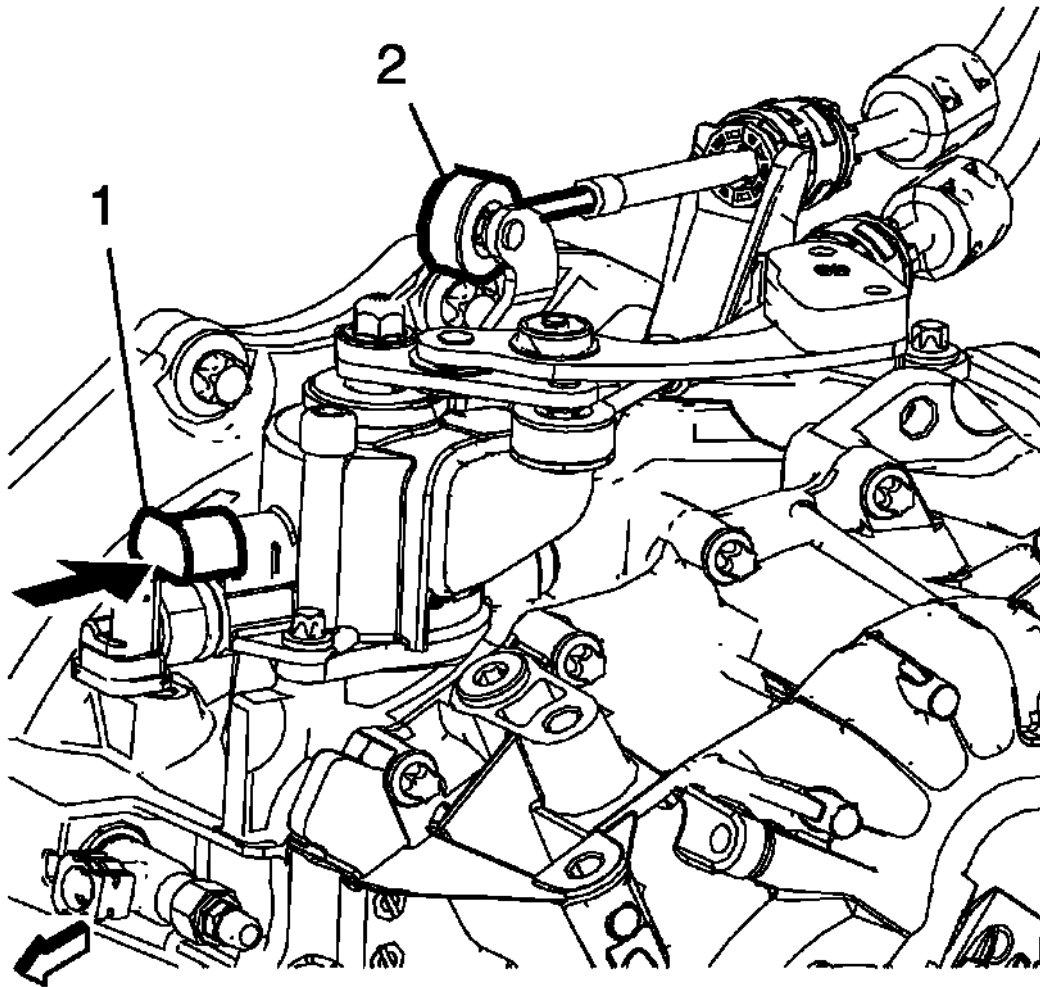


Fig. 41: Selector Lever

Courtesy of GENERAL MOTORS COMPANY

5. Block the shift control housing, push the selector lever (2) backwards and push (arrow) the blocking device (1) towards the shift control housing.

Installation Procedure

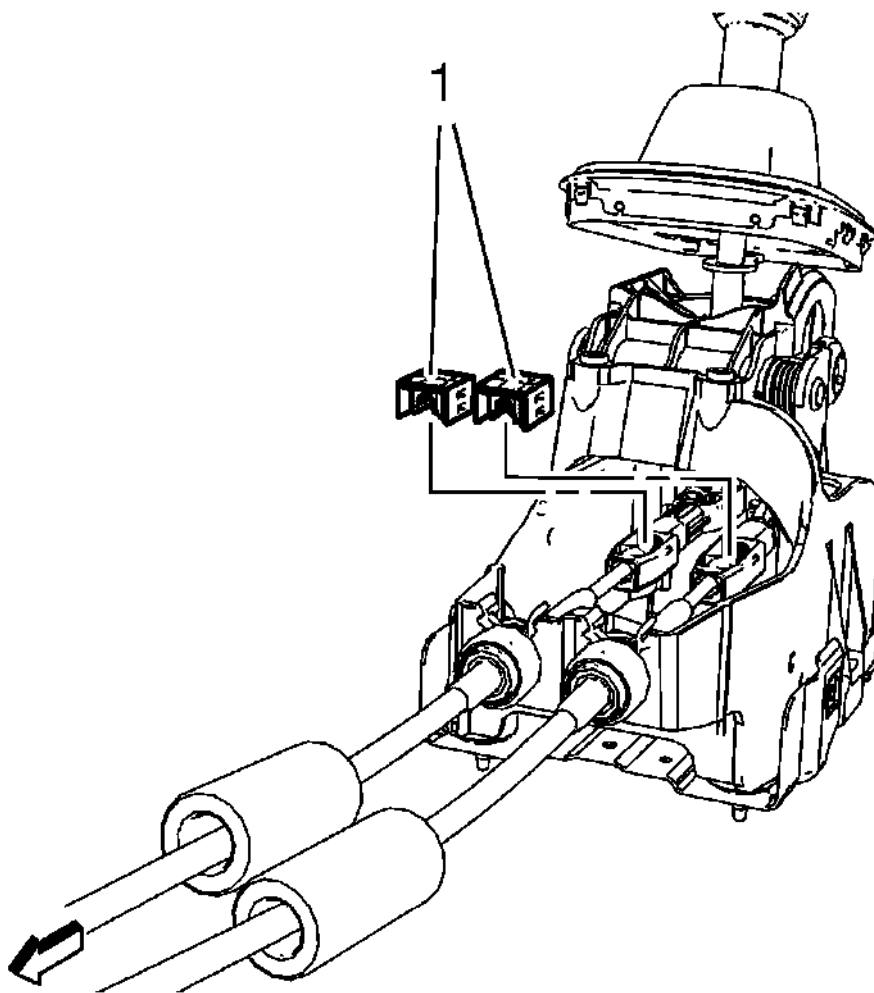


Fig. 42: Shift Lever And Select Lever Cable Adjust Locks

Courtesy of GENERAL MOTORS COMPANY

NOTE:

- During this procedure **DO NOT** touch or preload the fixed shift lever as this may cause improper adjustment of the shift system.
- When locking the adjuster locks (1) a defined snap noise should be audible, a snap effect should be felt.

1. Secure adjuster locks (1) by pushing down until locked and fully seated. One for each cable.

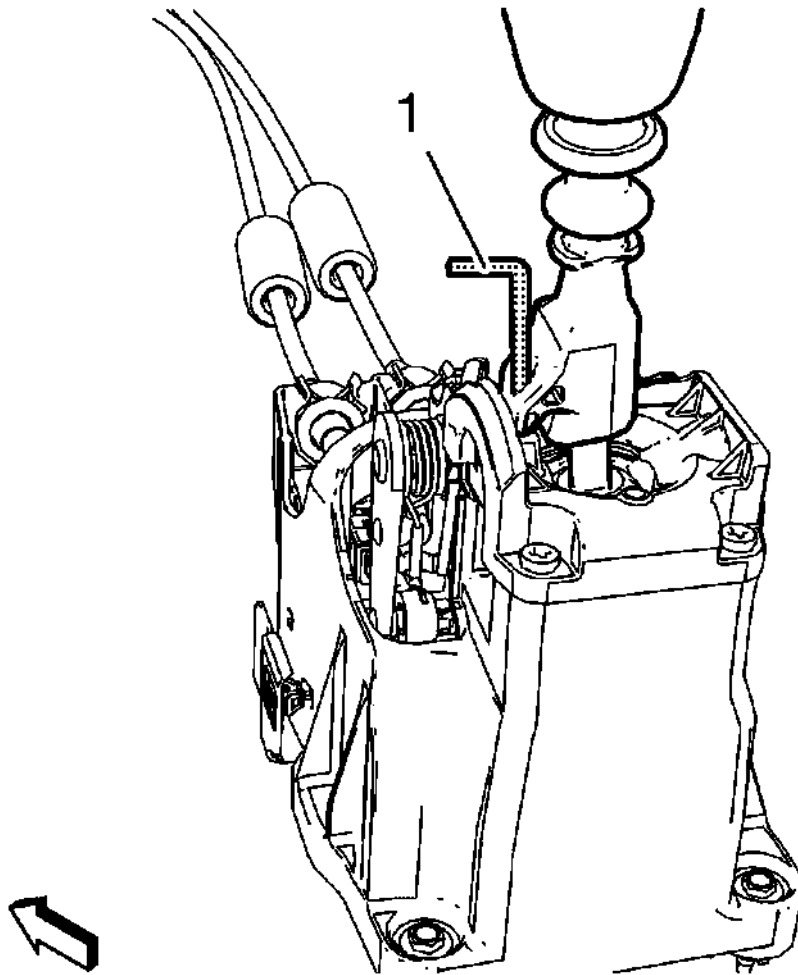


Fig. 43: Shift Control Lever

Courtesy of GENERAL MOTORS COMPANY

2. Remove the **DT-527-A** adjuster (1) or the drill bit from the shift control lever.

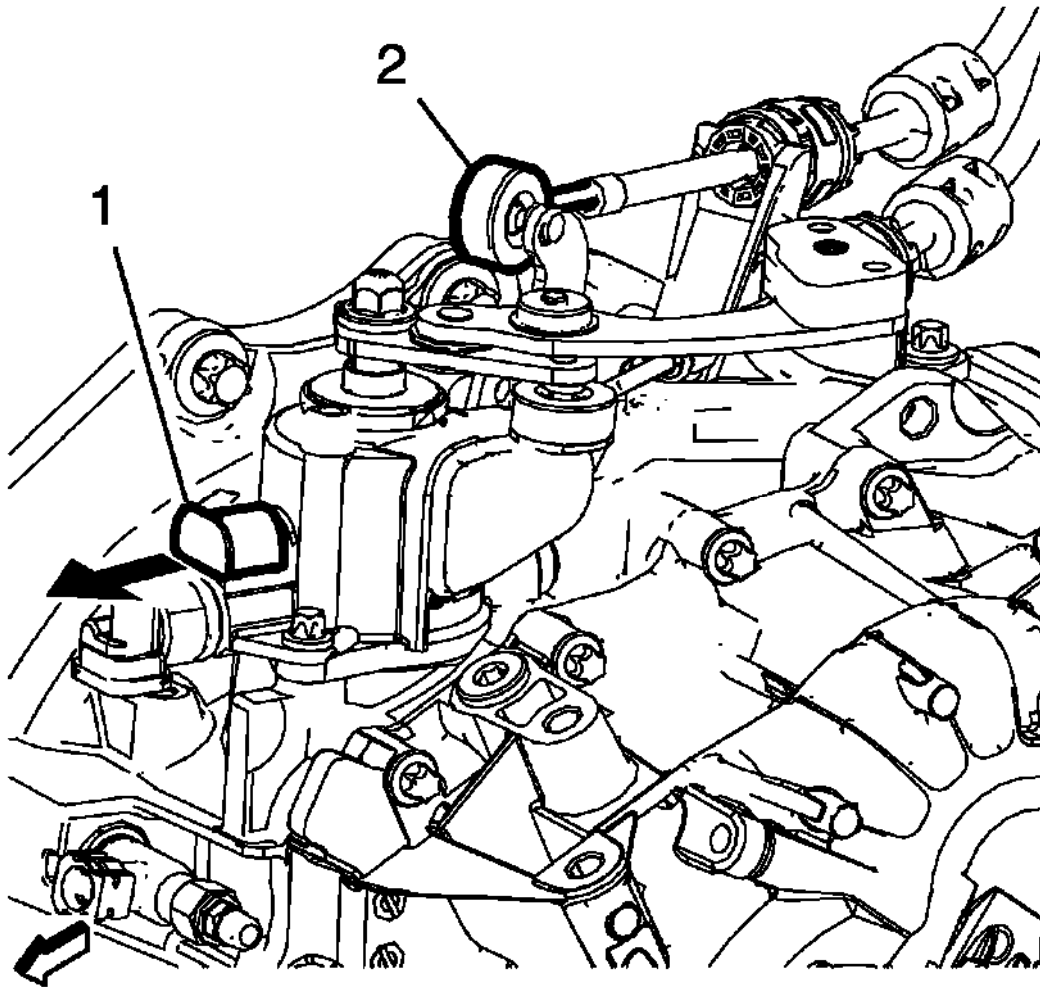


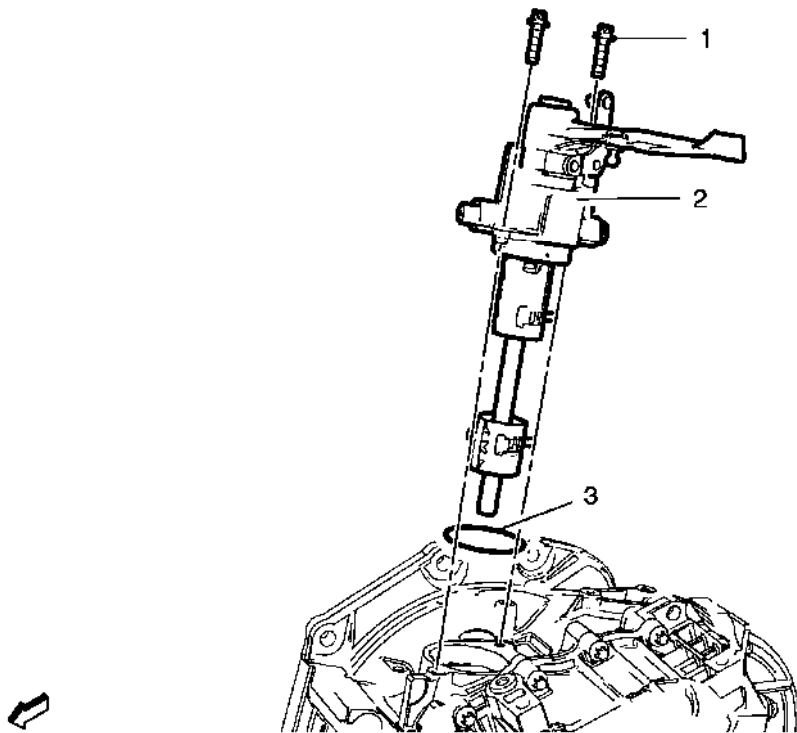
Fig. 44: Blocking Device

Courtesy of GENERAL MOTORS COMPANY

NOTE: When unblocking the blocking device (1) a defined snap noise should be audible / a snap effect should be felt.

3. Unblock the shift control housing, push slightly the selector lever (2) backwards and pull (arrow) the blocking device away from the shift control housing.
4. Check the correct shifting function.
5. If necessary repeat the adjusting procedure.
6. Install the front floor console storage tray. Refer to **Front Floor Console Stowage Tray Replacement** .
7. Install the transmission control lever trim cover. Refer to **Automatic or Manual Transmission Control Lever Trim Cover Replacement** .

SHIFT CONTROL HOUSING SEAL REPLACEMENT

**Fig. 45: Shift Control Housing Seal**

Courtesy of GENERAL MOTORS COMPANY

Shift Control Housing Seal Replacement

Callout	Component Name
Preliminary Procedures	
1. Remove the shift lever and selector lever cable from shift control housing. Refer to <u>Manual Transmission Shift Lever and Selector Lever Cable Replacement</u> .	
2. Remove the backup lamp switch. Refer to <u>Backup Lamp Switch Replacement</u> .	
1	Shift Control Housing Bolt CAUTION: Refer to <u>Fastener Caution</u> . Tighten 20 N.m (15 lb ft)
2	Shift Control Housing Procedure After the installation adjust the shift lever and selector cable. Refer to <u>Manual Transmission Shift Lever and Selector Lever Cable Adjustment</u> .
3	Shift Control Housing Seal Procedure

Install a NEW seal. DO NOT reuse the old seal.

VEHICLE SPEED SENSOR REPLACEMENT

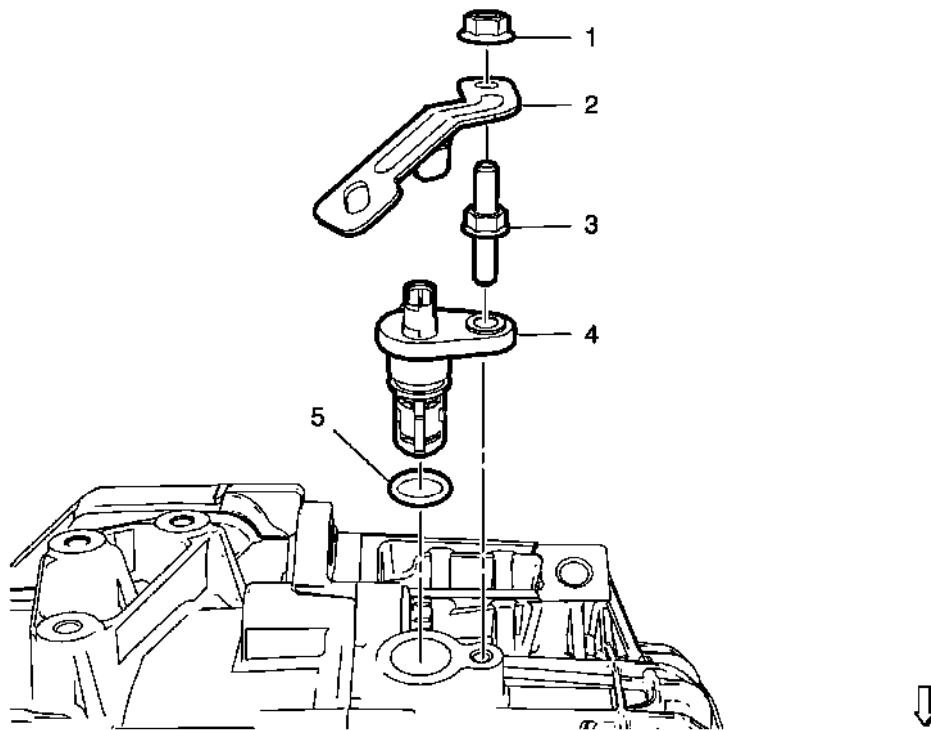


Fig. 46: Vehicle Speed Sensor
Courtesy of GENERAL MOTORS COMPANY

Vehicle Speed Sensor Replacement

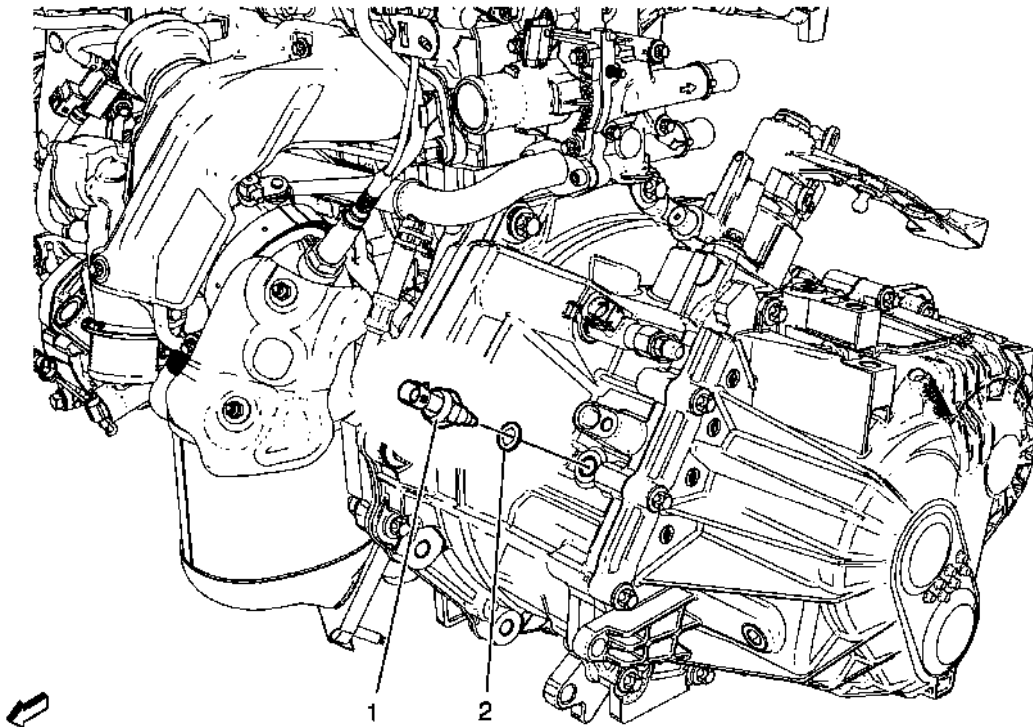
Callout	Component Name
1	Engine Wiring Harness Bracket Nut CAUTION: Refer to <u>Fastener Caution</u> . Tighten 9 N.m (80 lb in)
2	Engine Wiring Harness Bracket
3	Vehicle Speed Sensor Bolt Tighten 9 N.m (80 lb in)
4	Vehicle Speed Sensor Procedure Disconnect wiring harness connector.

5

Vehicle Speed Sensor O-Ring

Procedure

DISCARD the seal and install NEW seal.

BACKUP LAMP SWITCH REPLACEMENT**Fig. 47: Backup Lamp Switch**

Courtesy of GENERAL MOTORS COMPANY

Backup Lamp Switch Replacement

Callout	Component Name
Preliminary Procedures Disconnect the electrical connector.	
1	Backup Lamp Switch CAUTION: Refer to <u>Component Fastener Tightening Caution</u> . Tighten 20 N.m (15 lb ft)
2	Backup Lamp Switch Washer Procedure DISCARD the washer and install a NEW washer.

SHIFT CONTROL HOUSING REPLACEMENT (FIRST DESIGN)

Special Tools

DT-527-A Adjuster

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

Removal Procedure

1. Set the parking brake.
2. Remove the battery tray. **Battery Tray Replacement** .
3. For 1.4L gasoline engine only, remove the throttle body assembly. Refer to **Throttle Body Assembly Replacement** .
4. Remove the shift lever and selector lever cable from the shift control housing. Refer to **Manual Transmission Shift Lever and Selector Lever Cable Replacement**.
5. Remove the backup lamp switch. Refer to **Backup Lamp Switch Replacement**.

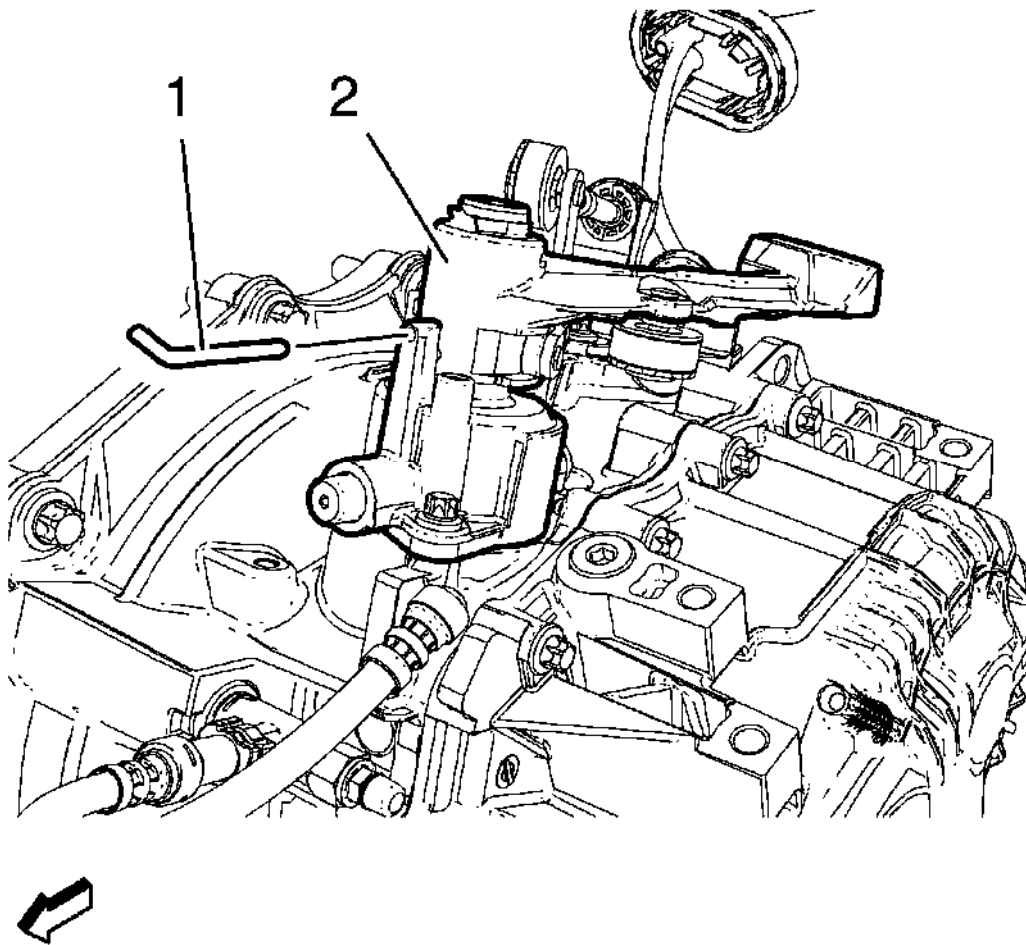


Fig. 48: Transmission Control Housing Adjuster Lock
Courtesy of GENERAL MOTORS COMPANY

6. Block the shift control housing (2), use the **DT-527-A** adjuster (1).
7. Disconnect the electrical connector from the shift control housing assembly.

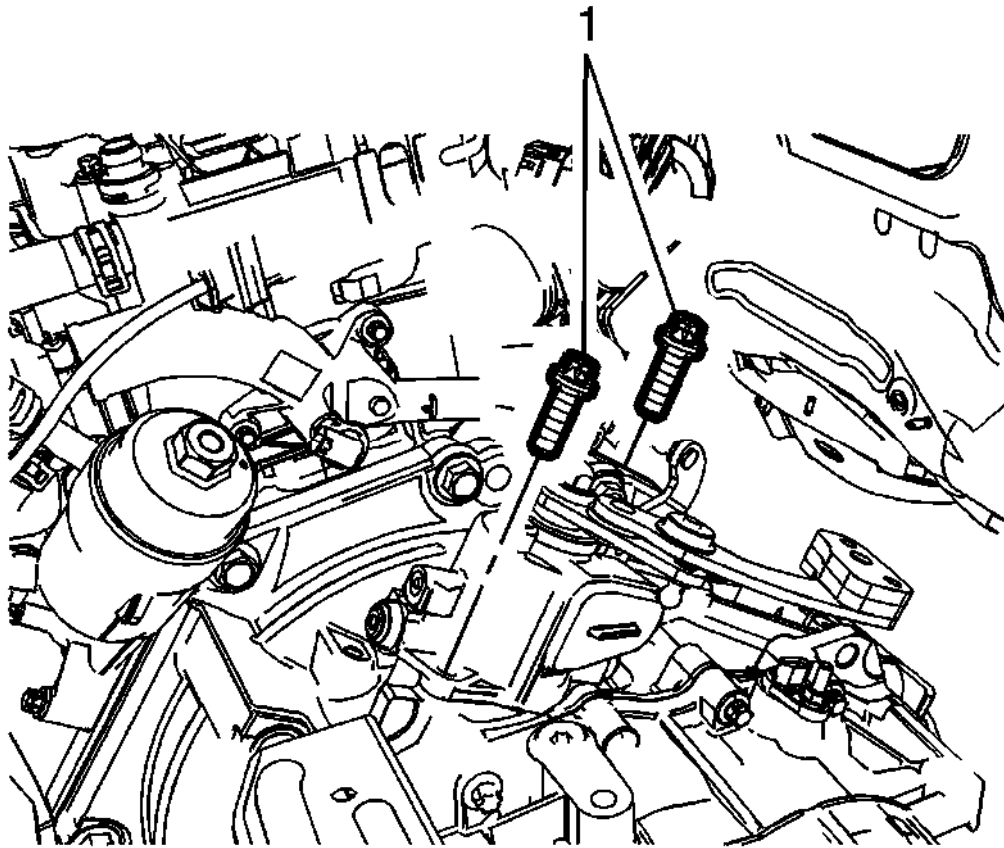


Fig. 49: 2 Shift Control Housing Bolts

Courtesy of GENERAL MOTORS COMPANY

8. Remove the 2 shift control housing bolts (1).

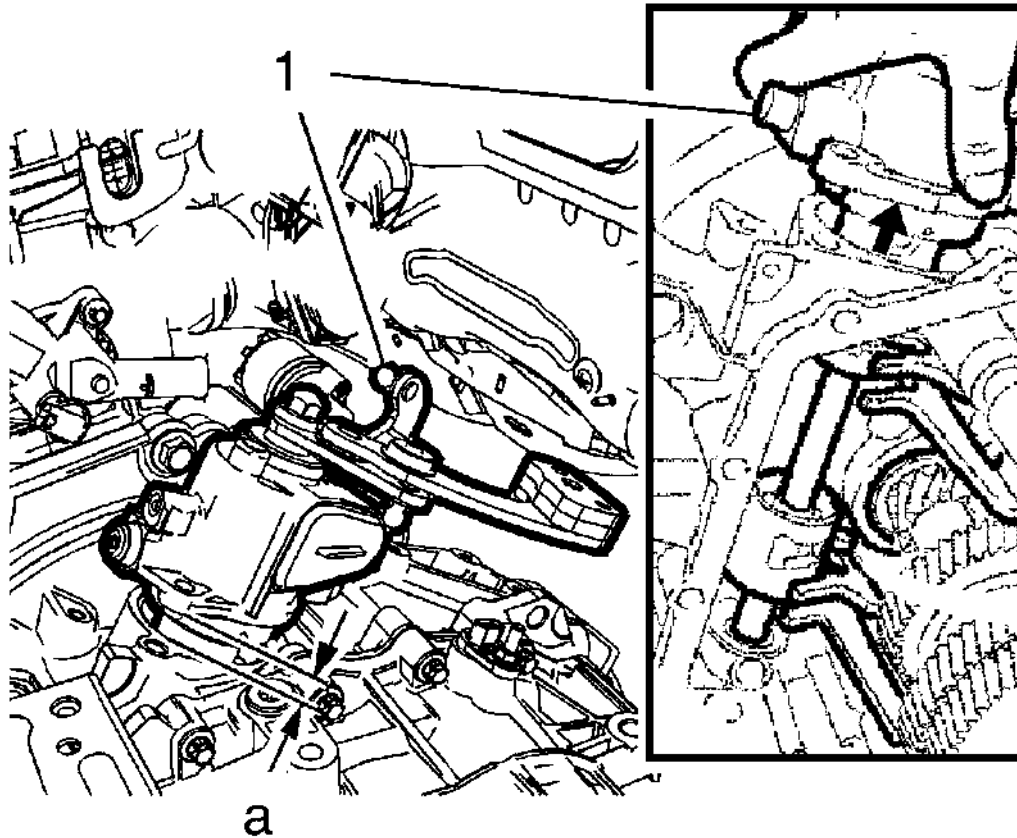


Fig. 50: Shift Control Housing

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Transmission Shift Fork Caution .

9. Carefully lift the shift control housing (1) out of the transmission as far as the stop in the transmission housing, approximately 30 mm (1.18 in) shown by dimension (a).

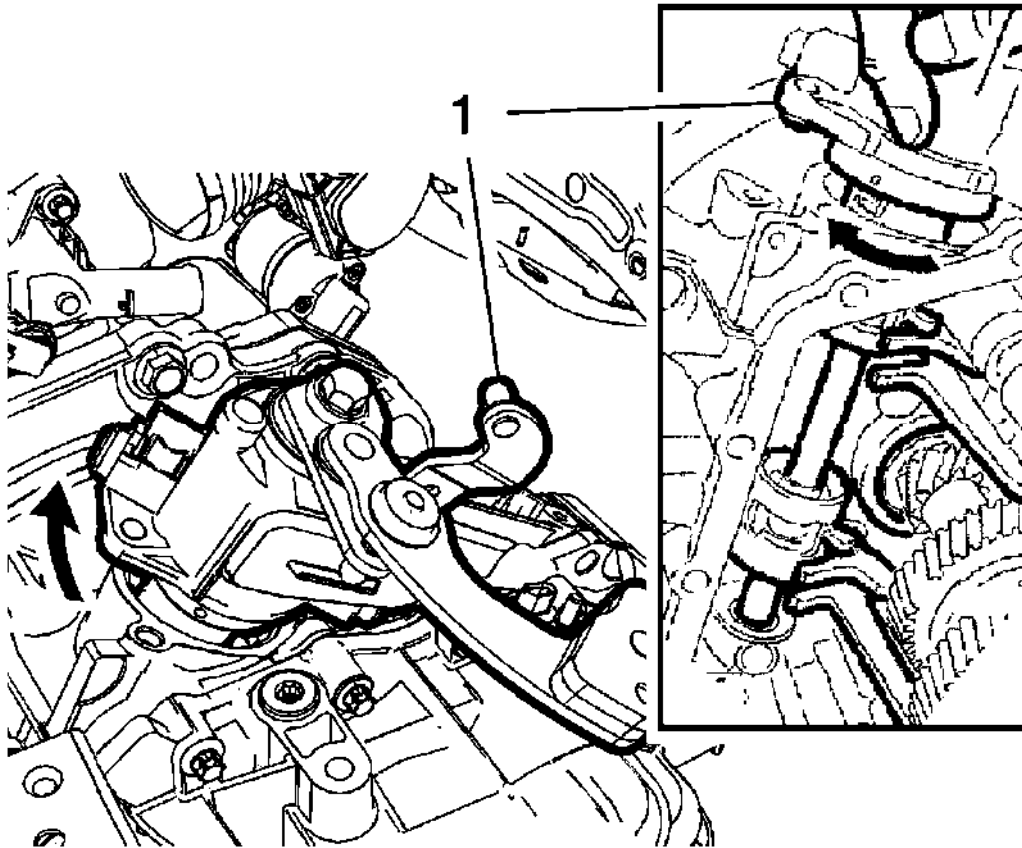


Fig. 51: Shift Control Housing

Courtesy of GENERAL MOTORS COMPANY

10. Holding the shift control housing (1) at the specified height, rotate the assembly clockwise approximately 30-45 degrees.

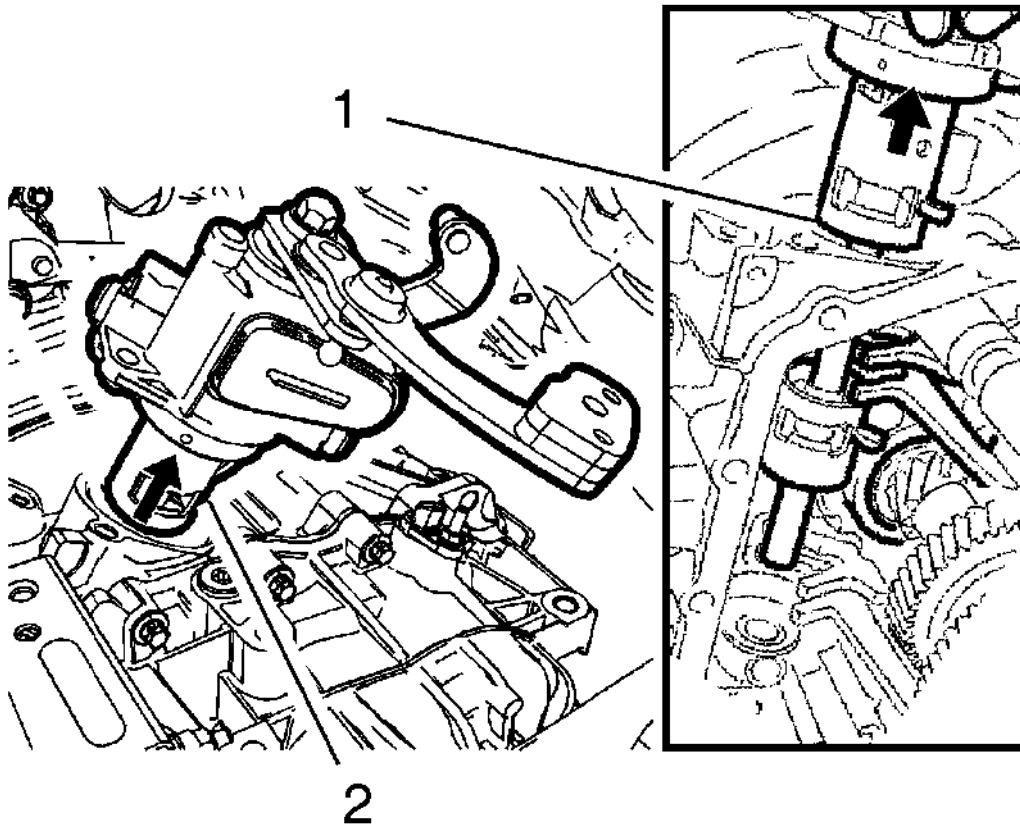


Fig. 52: Shift Control Housing

Courtesy of GENERAL MOTORS COMPANY

11. Carefully lift the shift control housing (2) out of the transmission until the lower edge (1) of the upper shift finger (2) is even with the transmission case.

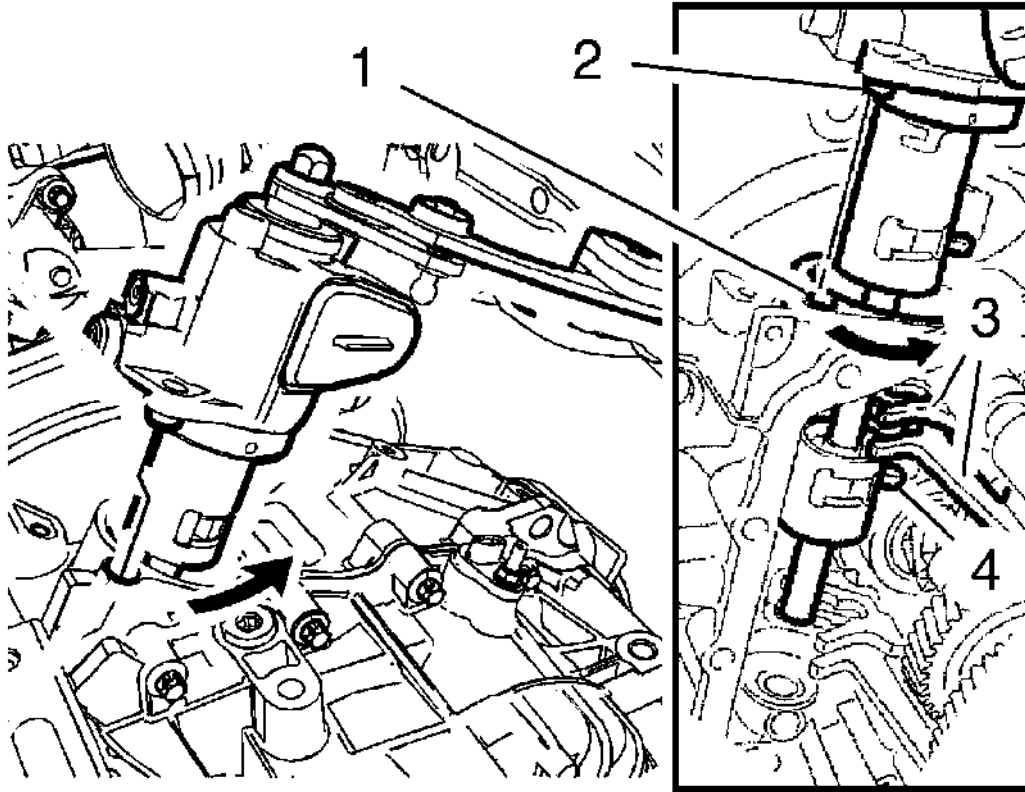


Fig. 53: Guide Peg, Pin And Shift Forks

Courtesy of GENERAL MOTORS COMPANY

12. Rotate the shift control housing counterclockwise approximately 30-45 degrees, until the guide peg (2) is in line with the threaded hole (1).

CAUTION: Refer to Transmission Shift Fork Caution .

13. Carefully remove the shift control housing from the transmission. Make sure that the pin (4) does not move the shift forks (3).

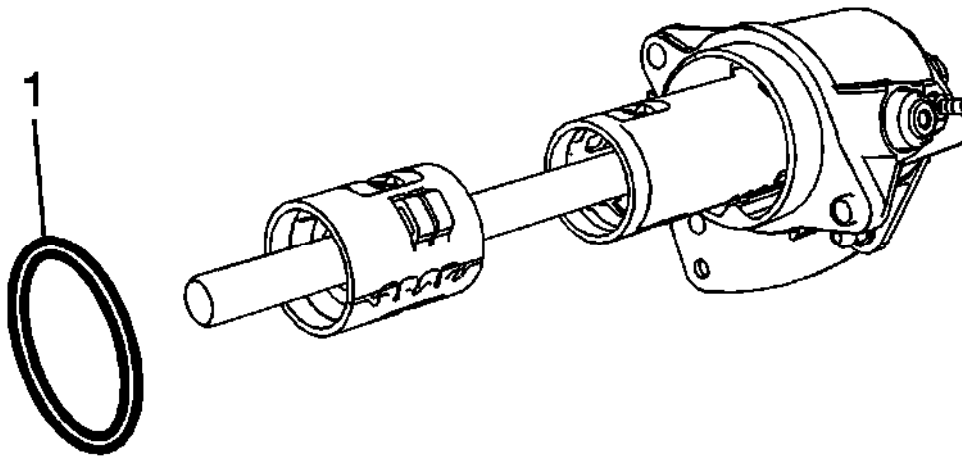


Fig. 54: Shift Control Housing Seal

Courtesy of GENERAL MOTORS COMPANY

14. Remove and DISCARD the shift control housing seal (1). If the seal is not present on the shift control housing, remove the seal at the transmission.

Installation Procedure

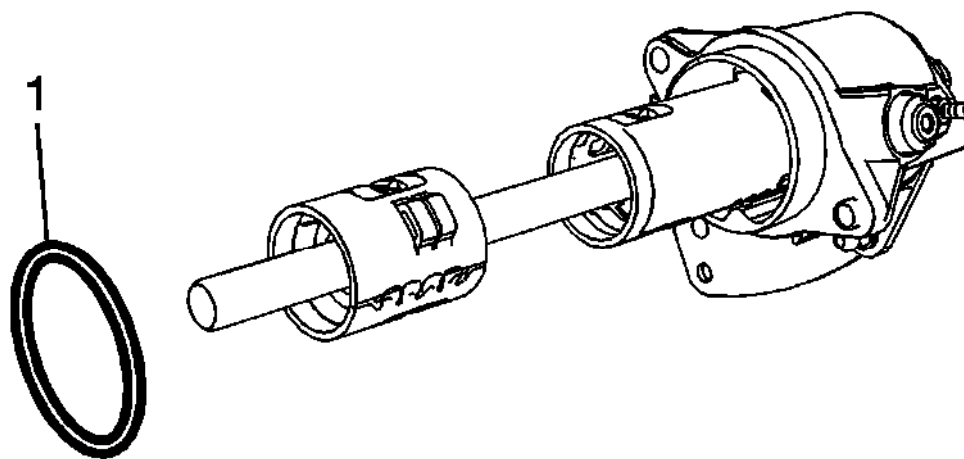


Fig. 55: Shift Control Housing Seal

Courtesy of GENERAL MOTORS COMPANY

NOTE:

- Prior to starting the installation process, confirm that the original shift control housing seal is removed.
- A NEW seal should be provided with the replacement shift control housings. If the original shift control housing will be re-used, a NEW seal is still required.
- Make sure that the NEW vent cap is installed by the NEW shift control housing.

1. Install a NEW shift control housing seal (1) to the shift control housing.

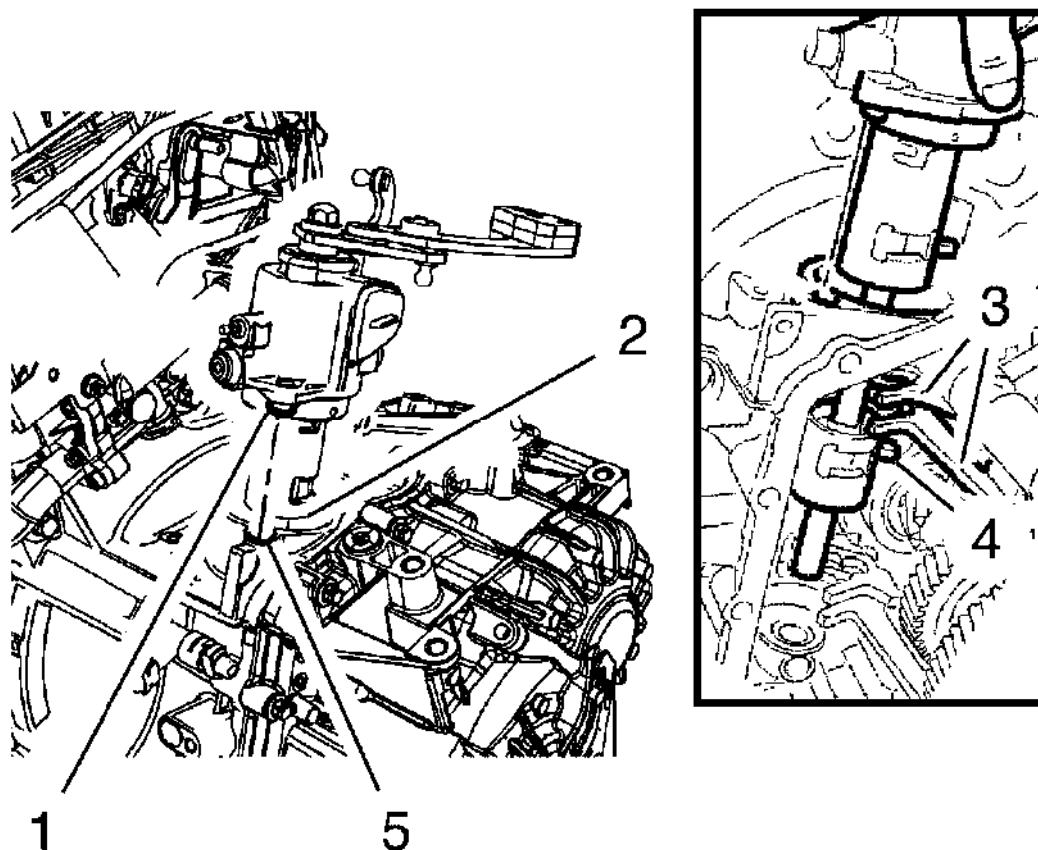


Fig. 56: Shift Control Housing Seal

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Transmission Shift Fork Caution .

NOTE:

- To facilitate the installation block the shift control housing. Push the blocking device towards to the shift control housing.
 - Only insert the shift control housing until the lower edge of the upper shift finger (2) is even with the transmission case.
2. Align the guide peg (1) in line with the threaded hole (5), then carefully insert the shift control housing in the transmission case, STOP when the lower edge of the upper shift finger (2) is even with the transmission case. Make sure that the pin (4) does not move the shift forks (3).

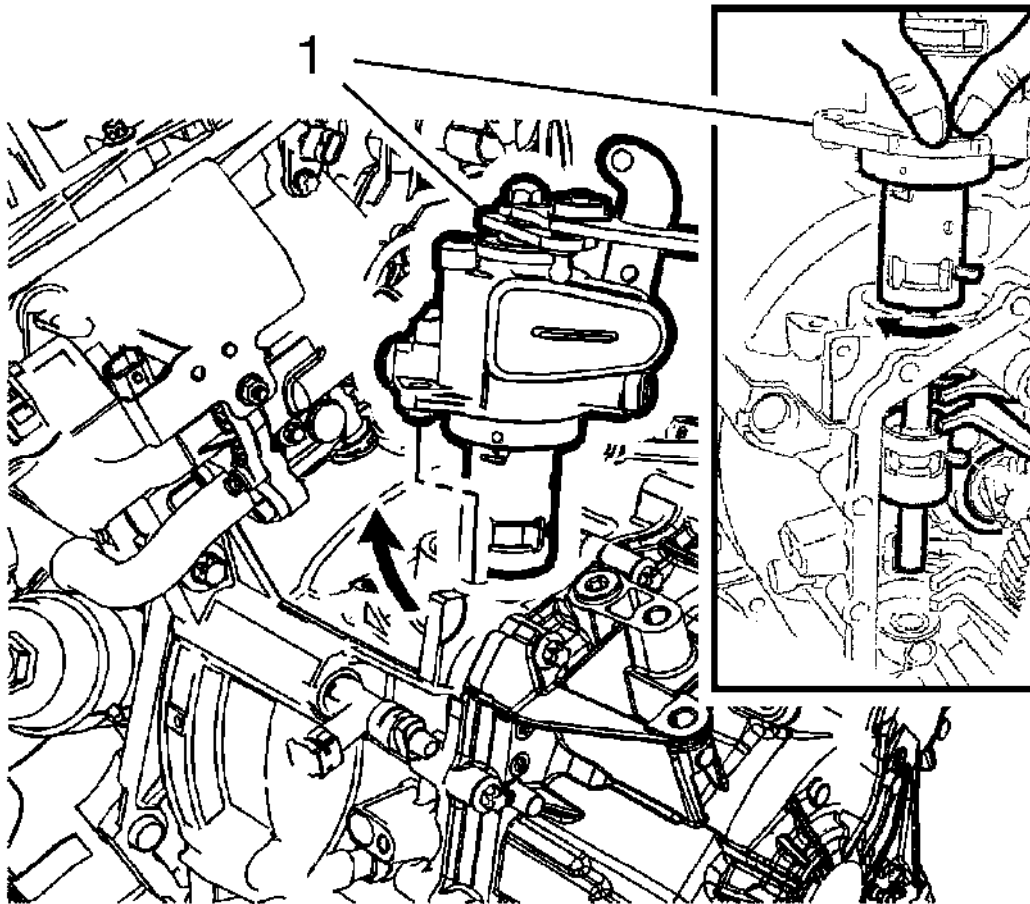


Fig. 57: Shift Control Housing

Courtesy of GENERAL MOTORS COMPANY

3. Rotate the shift control housing (1) clockwise approximately 30 - 45 degrees.

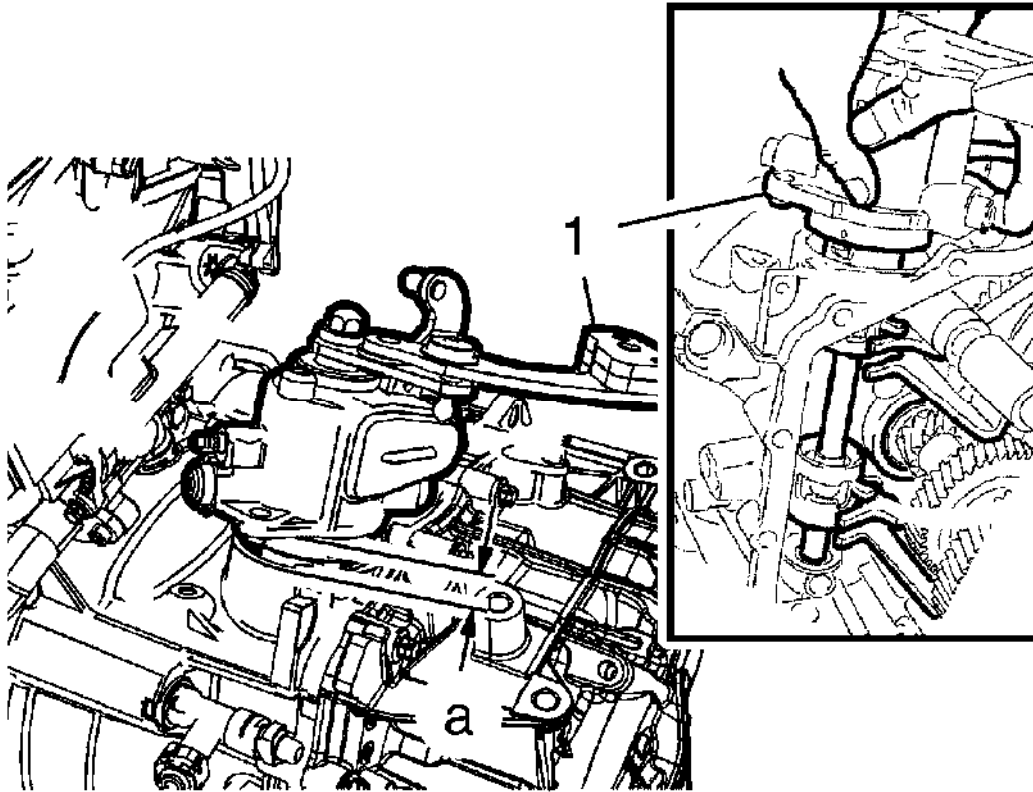


Fig. 58: Shift Control Housing

Courtesy of GENERAL MOTORS COMPANY

4. Lower the shift control housing (1) into the transmission case until there is a gap of approximately 30 mm (1.18 in) between the shift control housing and the transmission case, shown by dimension (a).

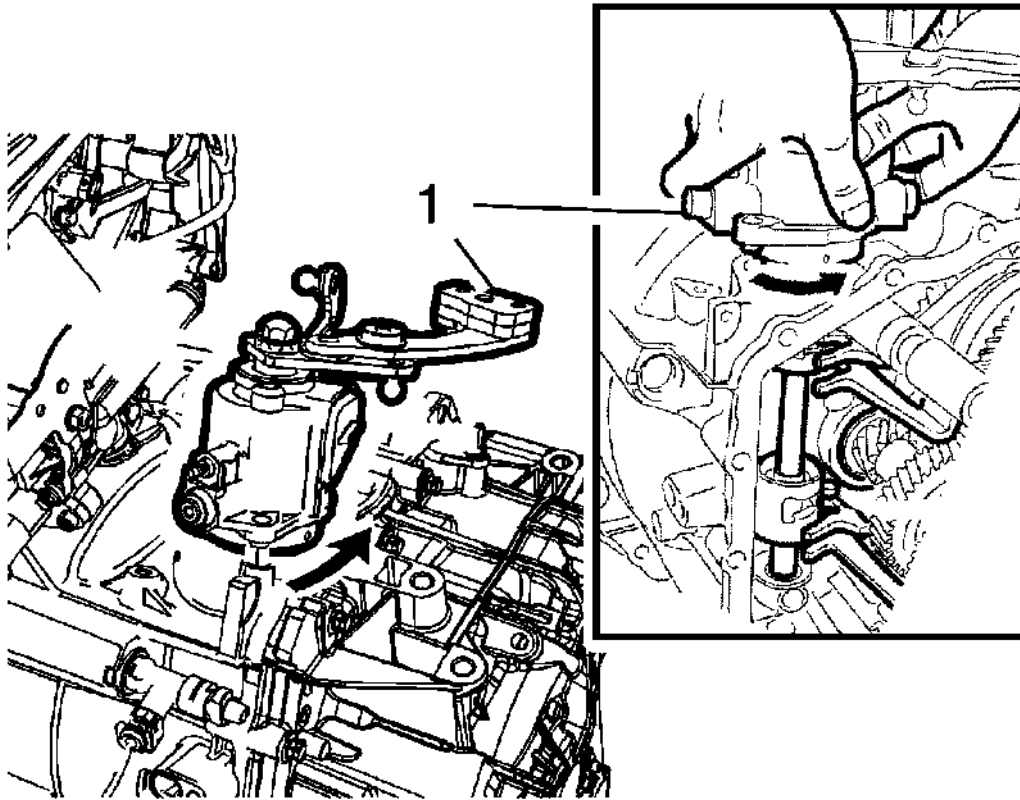


Fig. 59: Shift Control Housing

Courtesy of GENERAL MOTORS COMPANY

5. Holding the shift control housing (1) at the specified height, rotate the assembly counterclockwise approximately 30 - 45 degrees to align the guide peg with the threaded hole.

CAUTION: Refer to Transmission Shift Fork Caution .

6. Carefully lower the shift control housing into the transmission case.
 1. Align the shift control housing shaft with the transmission case bushing. As the guide peg contacts the transmission case, the housing shaft should contact the transmission case bushing. It may be necessary to reposition the shift control housing shaft to engage the bushing.
 2. Confirm that the shift control housing flange is fully seated against the transmission case.

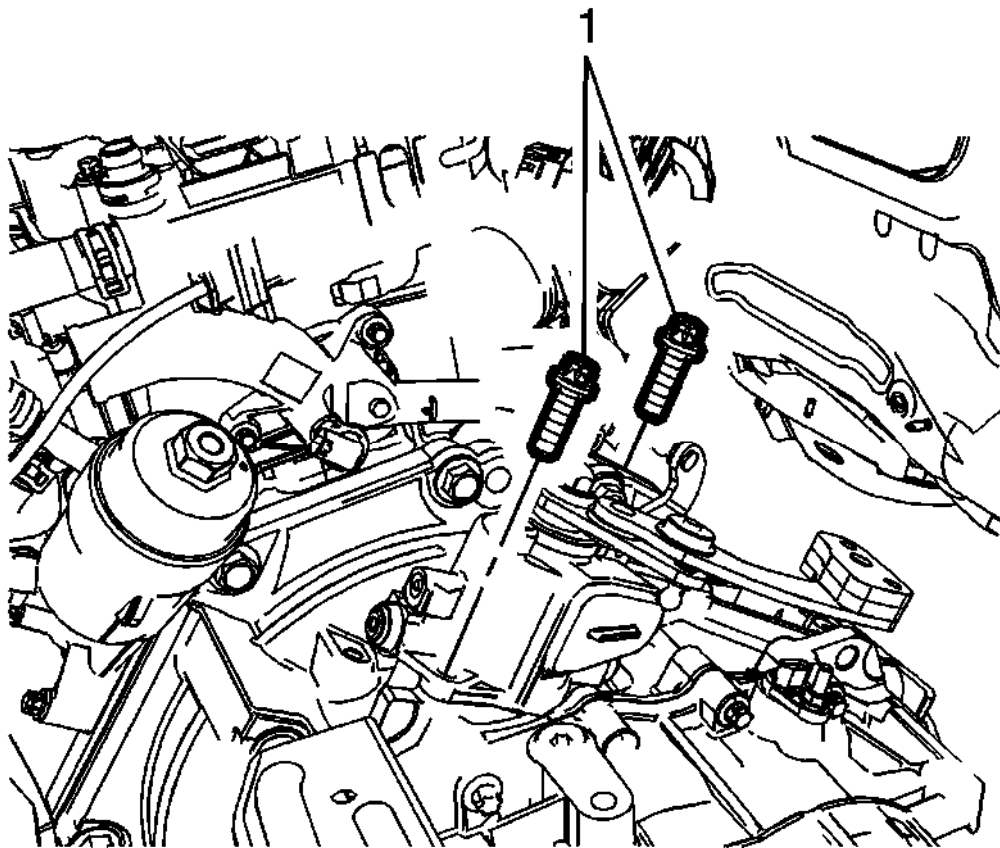


Fig. 60: 2 Shift Control Housing Bolts
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

CAUTION: Ensure that the shift control housing flange is fully seated against the transmission case. If the flange does not fully seat, then the housing shaft is not properly seated in the case bushing and must be realigned. The housing shaft must be fully seated in the case bushing. Failure to follow this caution will result in transmission failure.

7. Install the 2 shift control housing bolts (1) and tighten to 25 N.m (18 lb ft).
8. Connect the electrical connector to the shift control housing.
9. Install the backup lamp switch. Refer to Backup Lamp Switch Replacement.
10. Install the shift lever and selector lever cable to the shift control housing. Refer to Manual Transmission

Shift Lever and Selector Lever Cable Replacement.

NOTE: Always perform the selector cable adjustment procedure, even if the cables appear to fit properly.

11. Adjust shift lever and selector lever cable. Refer to **Manual Transmission Shift Lever and Selector Lever Cable Adjustment.**
12. For the 1.4L gasoline engine only, install the throttle body assembly. Refer to **Throttle Body Assembly Replacement** .
13. Install the battery tray. **Battery Tray Replacement** .
14. Verify correct operation of the transmission control assembly.

SHIFT CONTROL HOUSING REPLACEMENT (SECOND DESIGN)**Removal Procedure**

1. Set the parking brake.
2. Remove the battery tray. Refer to **Battery Tray Replacement** .
3. Remove the throttle body assembly for the 1.4L gasoline engine. Refer to **Throttle Body Assembly Replacement** .
4. Remove the shift lever and selector lever cable from the shift control housing. Refer to **Manual Transmission Shift Lever and Selector Lever Cable Replacement.**
5. Remove the backup lamp switch. Refer to **Backup Lamp Switch Replacement.**

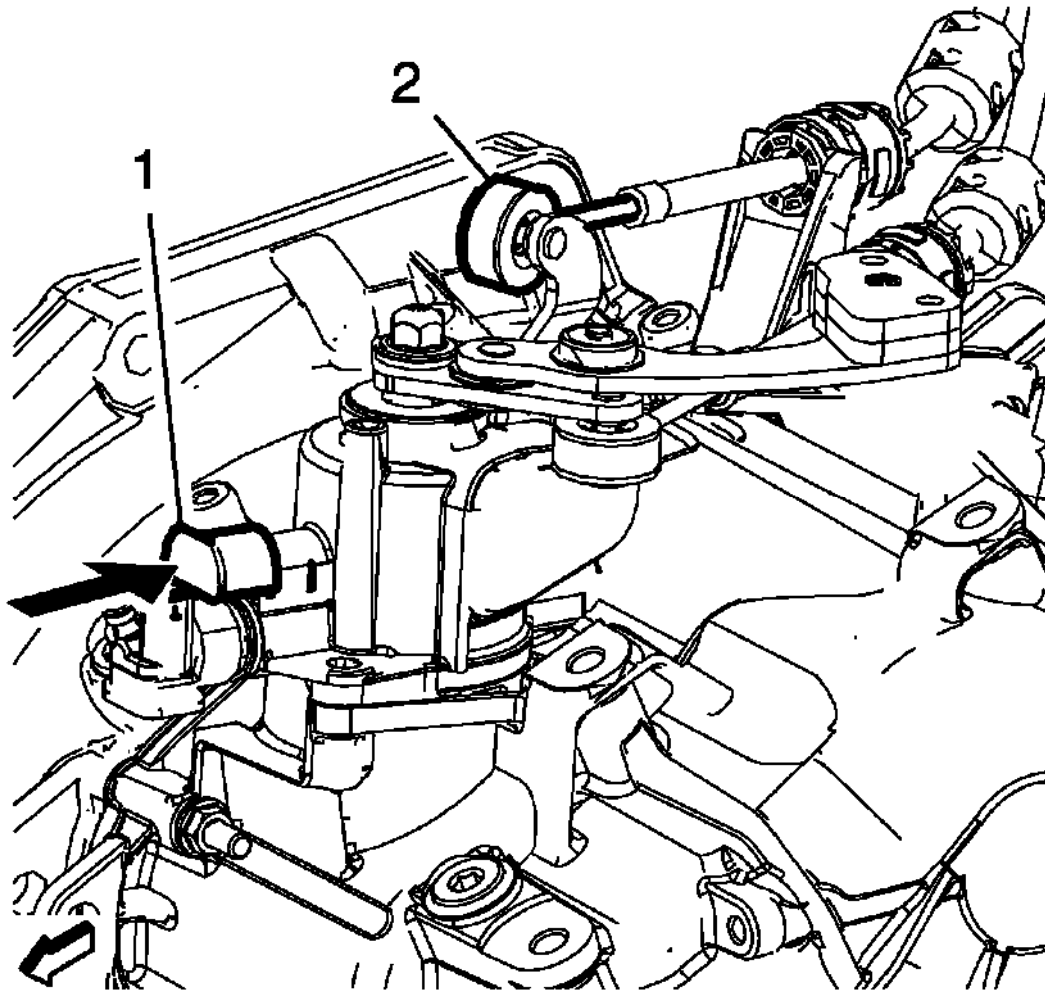


Fig. 61: Blocking Device

Courtesy of GENERAL MOTORS COMPANY

6. Block the shift control housing, push (arrow) the blocking device (1) towards to the shift control housing.
7. Disconnect the electrical connector from the shift control housing assembly.

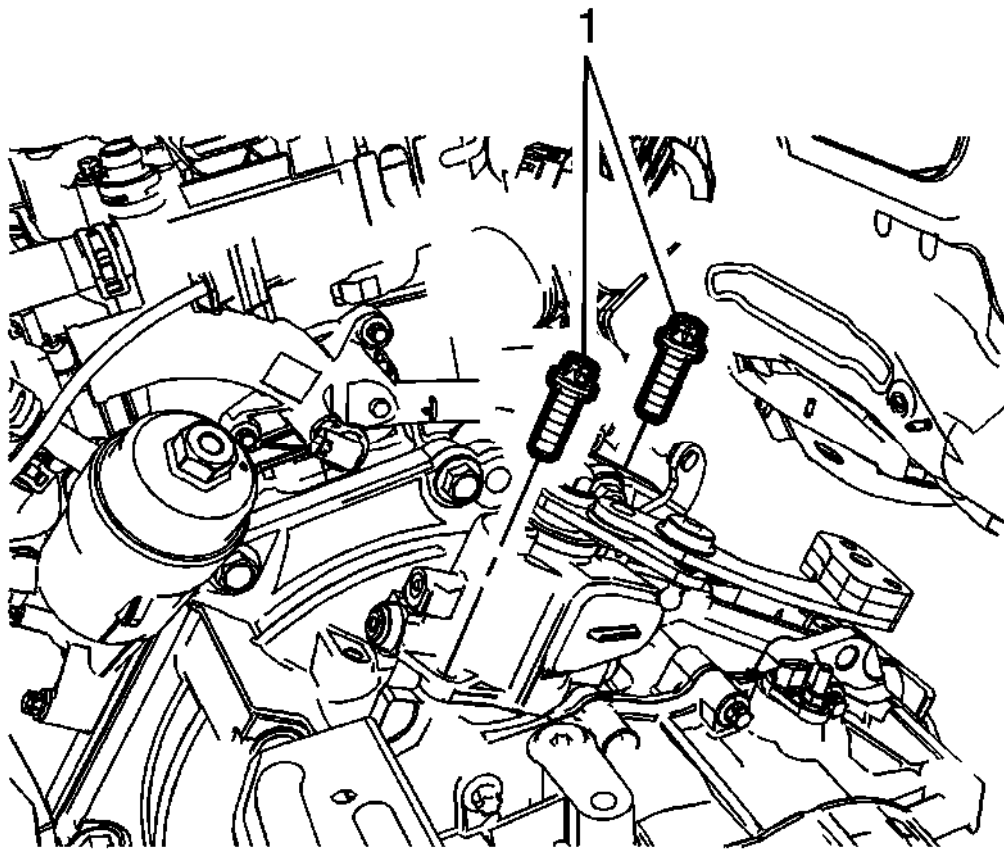


Fig. 62: 2 Shift Control Housing Bolts

Courtesy of GENERAL MOTORS COMPANY

8. Remove the 2 shift control housing bolts (1).

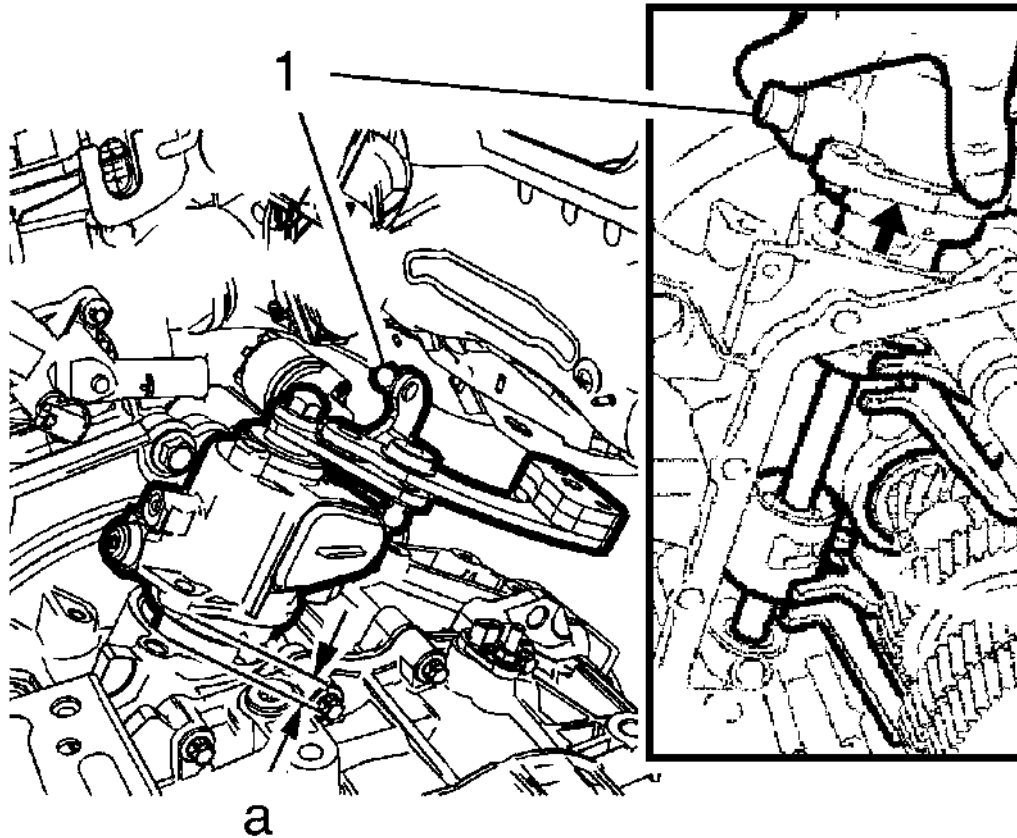


Fig. 63: Shift Control Housing

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Transmission Shift Fork Caution .

9. Carefully lift the shift control housing (1) out of the transmission as far as the stop in the transmission housing, approximately 30 mm (1.18 in) shown by dimension (a).

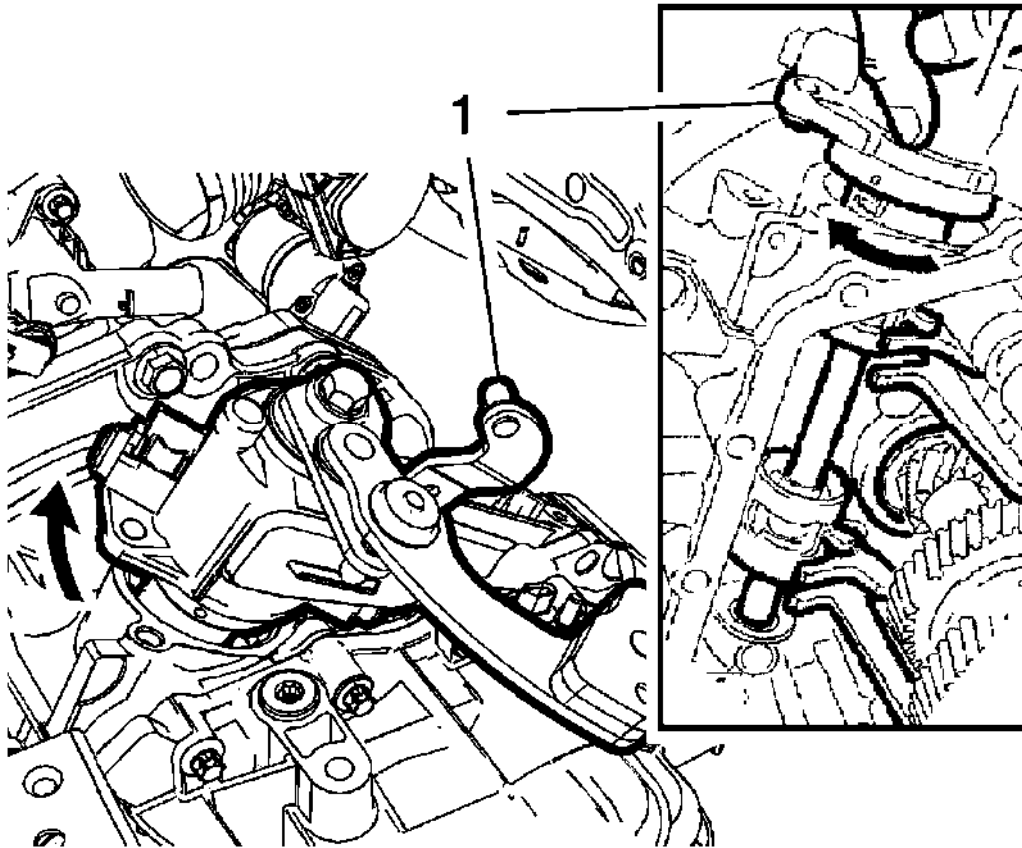


Fig. 64: Shift Control Housing

Courtesy of GENERAL MOTORS COMPANY

10. Holding the shift control housing (1) at the specified height, rotate the assembly clockwise approximately 30-45 degrees.

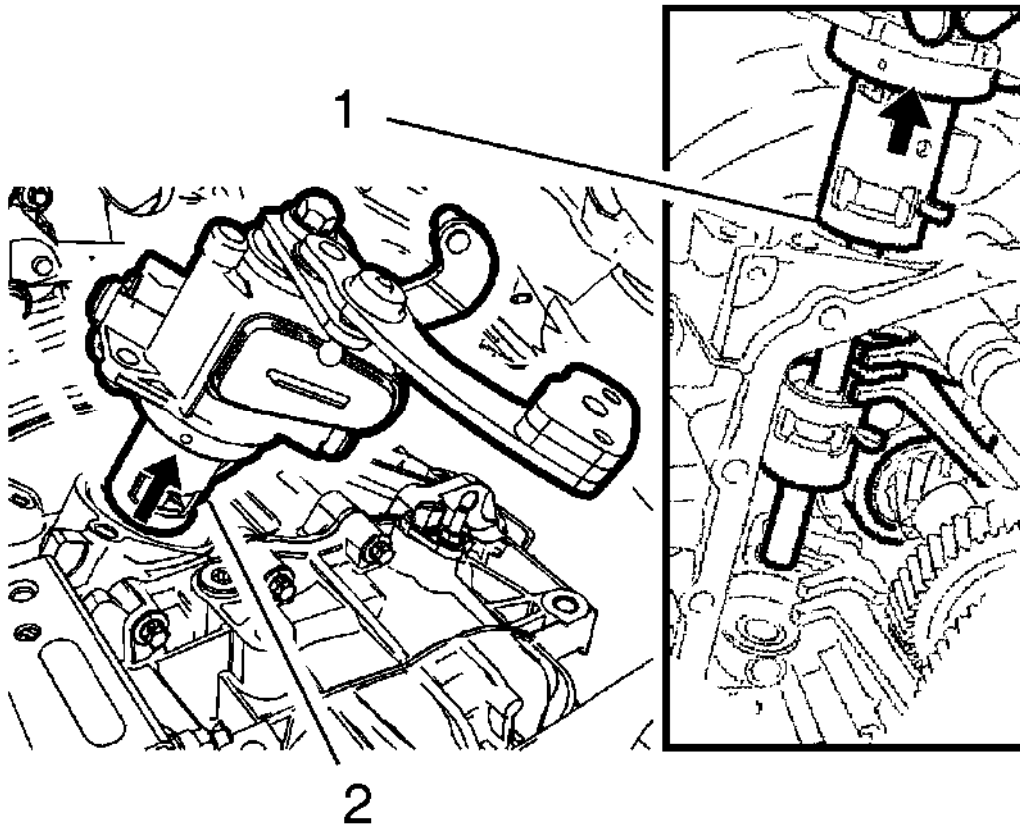


Fig. 65: Shift Control Housing

Courtesy of GENERAL MOTORS COMPANY

11. Carefully lift the shift control housing (2) out of the transmission until the lower edge (1) of the upper shift finger (2) is even with the transmission case.

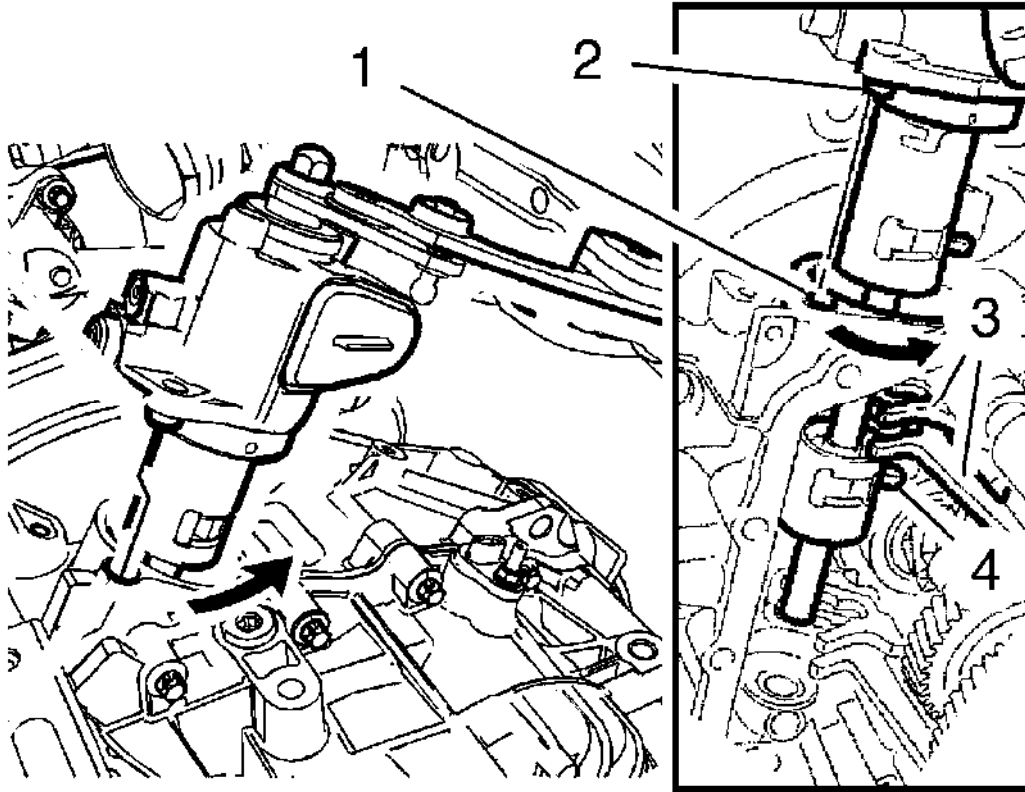


Fig. 66: Guide Peg, Pin And Shift Forks

Courtesy of GENERAL MOTORS COMPANY

12. Rotate the shift control housing counterclockwise approximately 30-45 degrees, until the guide peg (2) is in line with the threaded hole (1).

CAUTION: Refer to Transmission Shift Fork Caution .

13. Carefully remove the shift control housing from the transmission. Make sure that the pin (4) does not move the shift forks (3).

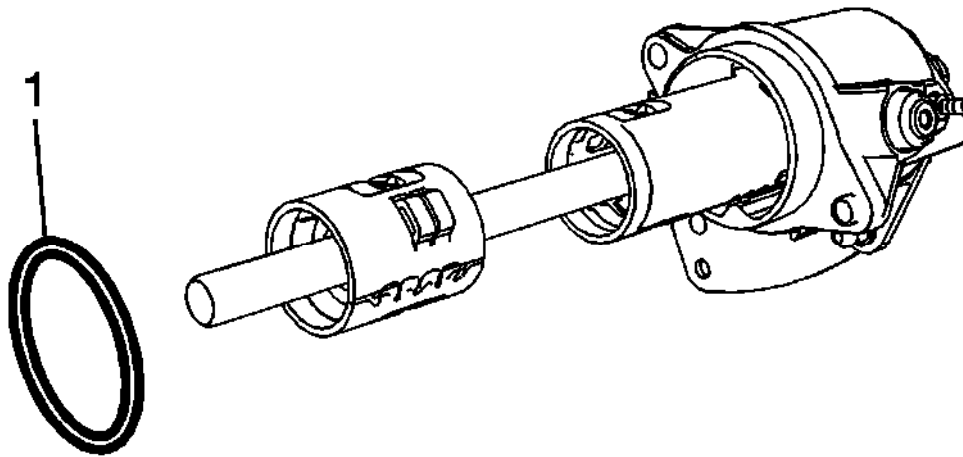


Fig. 67: Shift Control Housing Seal

Courtesy of GENERAL MOTORS COMPANY

14. Remove and DISCARD the shift control housing seal (1). If the seal is not present on the shift control housing, remove the seal at the transmission.

Installation Procedure

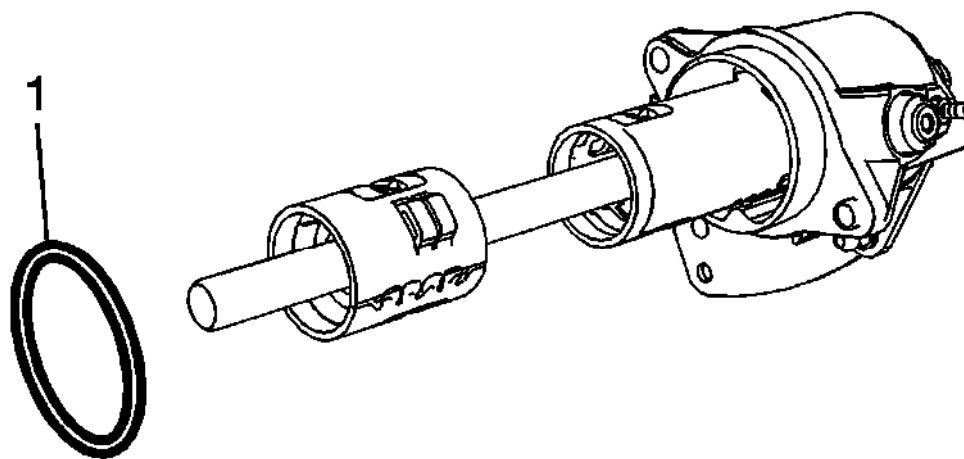


Fig. 68: Shift Control Housing Seal

Courtesy of GENERAL MOTORS COMPANY

NOTE:

- Prior to starting the installation process, confirm that the original shift control housing seal is removed.
- A NEW seal should be provided with the replacement shift control housings. If the original shift control housing will be re-used, a NEW seal is still required.
- Make sure that the NEW vent cap is installed by the NEW shift control housing.

1. Install a NEW shift control housing seal (1) to the shift control housing.

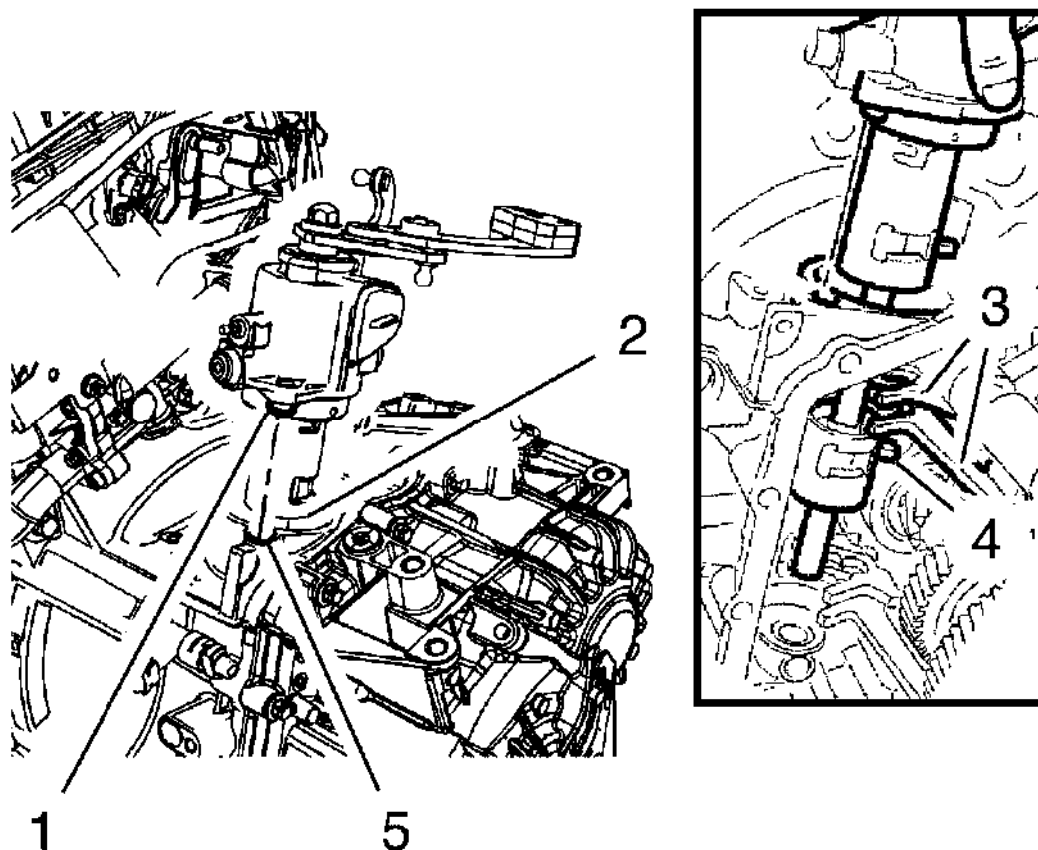


Fig. 69: Shift Control Housing Seal

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Transmission Shift Fork Caution .

NOTE:

- To facilitate the installation block the shift control housing. Push the blocking device towards to the shift control housing.
 - Only insert the shift control housing until the lower edge of the upper shift finger (2) is even with the transmission case.
2. Align the guide peg (1) in line with the threaded hole (5), then carefully insert the shift control housing in the transmission case, STOP when the lower edge of the upper shift finger (2) is even with the transmission case. Make sure that the pin (4) does not move the shift forks (3).

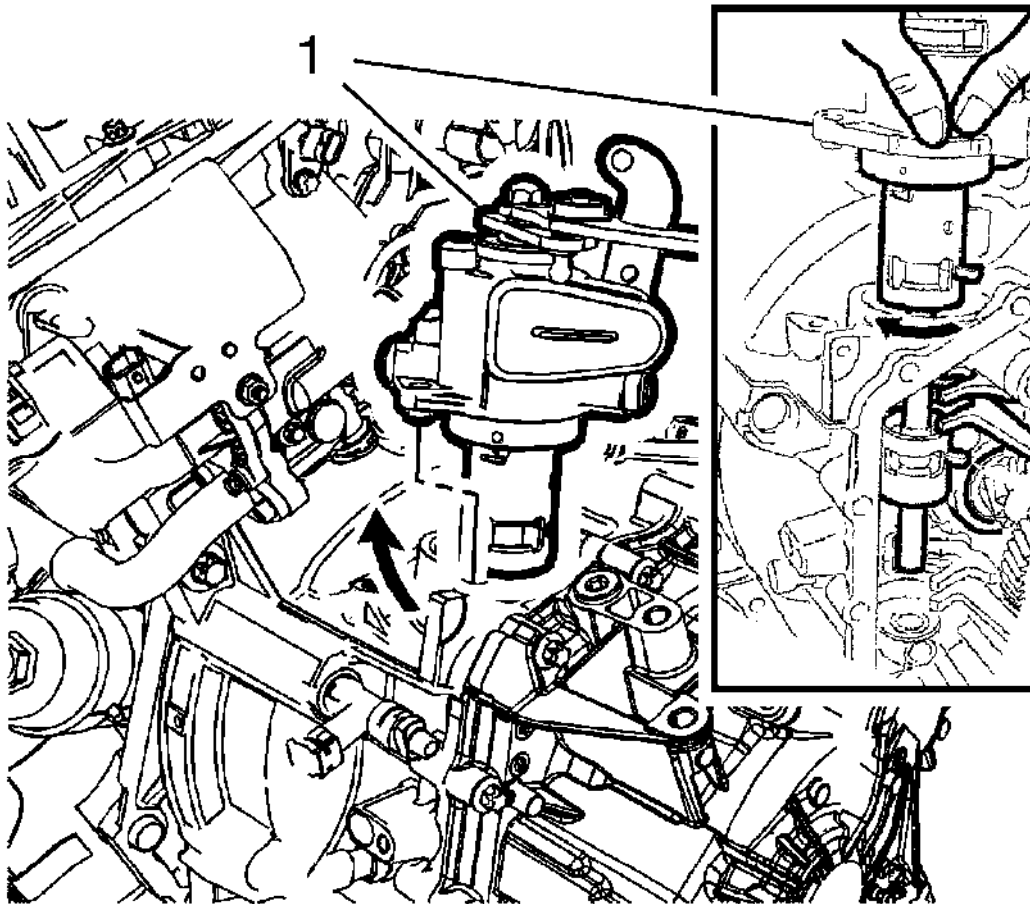


Fig. 70: Shift Control Housing

Courtesy of GENERAL MOTORS COMPANY

3. Rotate the shift control housing (1) clockwise approximately 30 - 45 degrees.

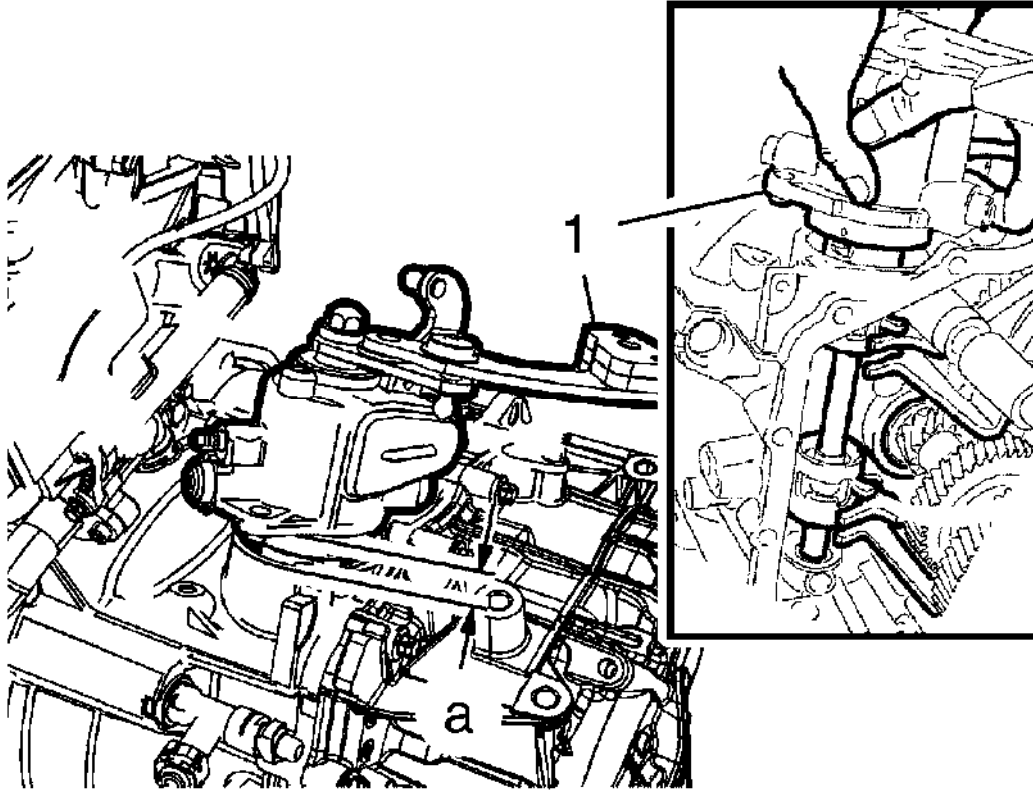


Fig. 71: Shift Control Housing

Courtesy of GENERAL MOTORS COMPANY

4. Lower the shift control housing (1) into the transmission case until there is a gap of approximately 30 mm (1.18 in) between the shift control housing and the transmission case, shown by dimension (a).

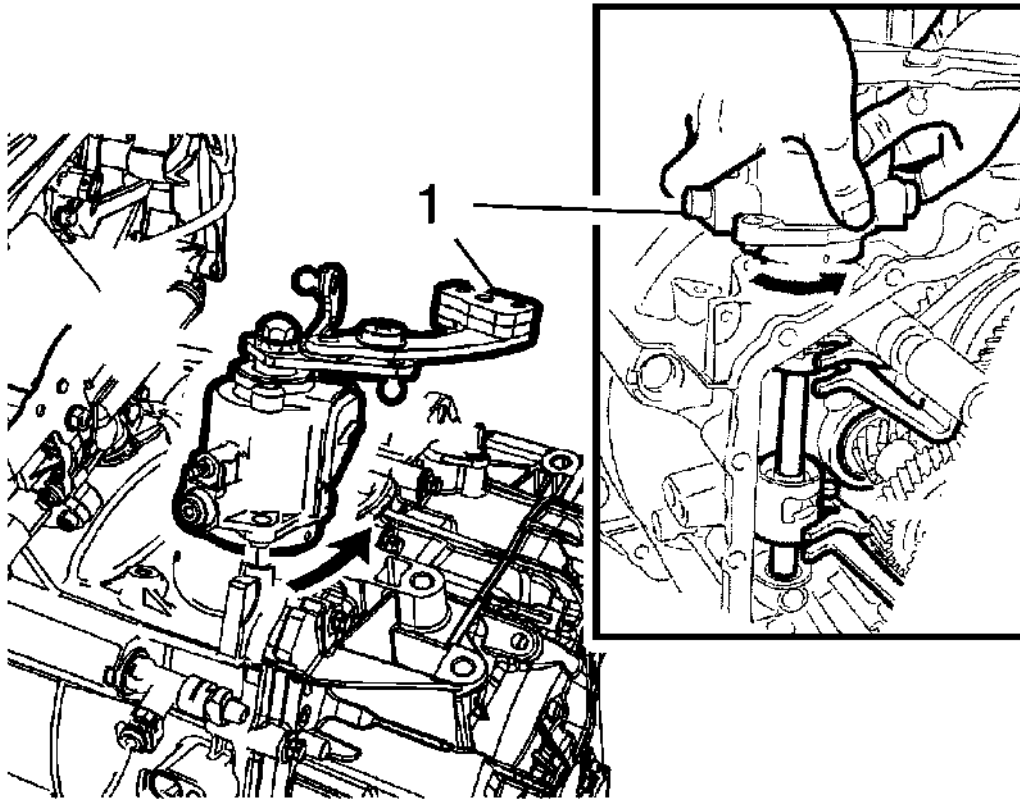


Fig. 72: Shift Control Housing

Courtesy of GENERAL MOTORS COMPANY

5. Holding the shift control housing (1) at the specified height, rotate the assembly counterclockwise approximately 30 - 45 degrees to align the guide peg with the threaded hole.

CAUTION: Refer to Transmission Shift Fork Caution .

6. Carefully lower the shift control housing into the transmission case.
 1. Align the shift control housing shaft with the transmission case bushing. As the guide peg contacts the transmission case, the housing shaft should contact the transmission case bushing. It may be necessary to reposition the shift control housing shaft to engage the bushing.
 2. Confirm that the shift control housing flange is fully seated against the transmission case.

CAUTION: Refer to Fastener Caution .

CAUTION: Ensure that the shift control housing flange is fully seated against the transmission case. If the flange does not fully seat, then the housing shaft is not properly seated in the case bushing and must be realigned. The housing shaft must be fully seated in the case bushing. Failure to follow this caution will result in transmission failure.

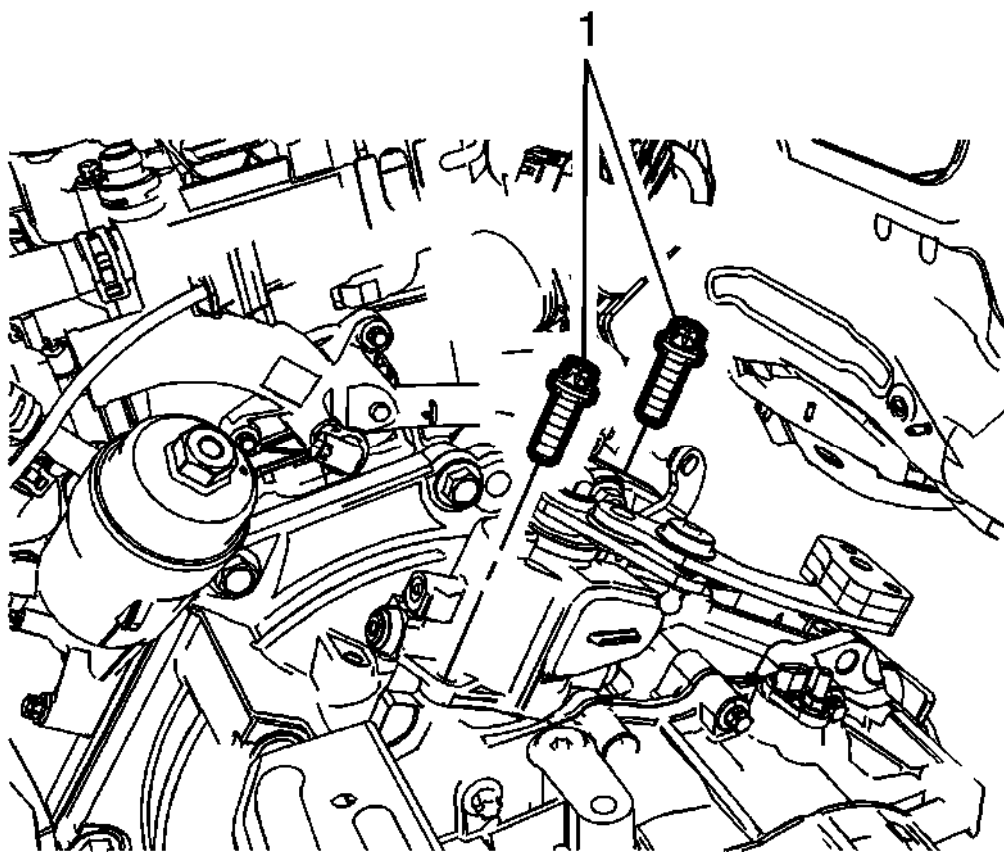


Fig. 73: 2 Shift Control Housing Bolts

Courtesy of GENERAL MOTORS COMPANY

7. Install the 2 shift control housing bolts (1) and tighten to 25 N.m (18 lb ft).
8. Connect the electrical connector to the shift control housing.
9. Install the backup lamp switch. Refer to **Backup Lamp Switch Replacement**.
10. Install the shift lever and selector lever cable to the shift control housing. Refer to **Manual Transmission Shift Lever and Selector Lever Cable Replacement**.

NOTE: Always perform the selector cable adjustment procedure, even if the cables appear to fit properly.

11. Adjust shift lever and selector lever cable. Refer to **Manual Transmission Shift Lever and Selector Lever Cable Adjustment**.
12. Install the throttle body assembly for the 1.4L gasoline engine. Refer to **Throttle Body Assembly Replacement**.
13. Install the battery tray. Refer to **Battery Tray Replacement**.
14. Verify correct operation of the transmission control assembly.

TRANSMISSION FRONT MOUNT REPLACEMENT

Removal Procedure

1. Raise vehicle. Refer to **Lifting and Jacking the Vehicle**.
2. If equipped, remove the front compartment insulator. Refer to **Front Compartment Insulator Replacement**.

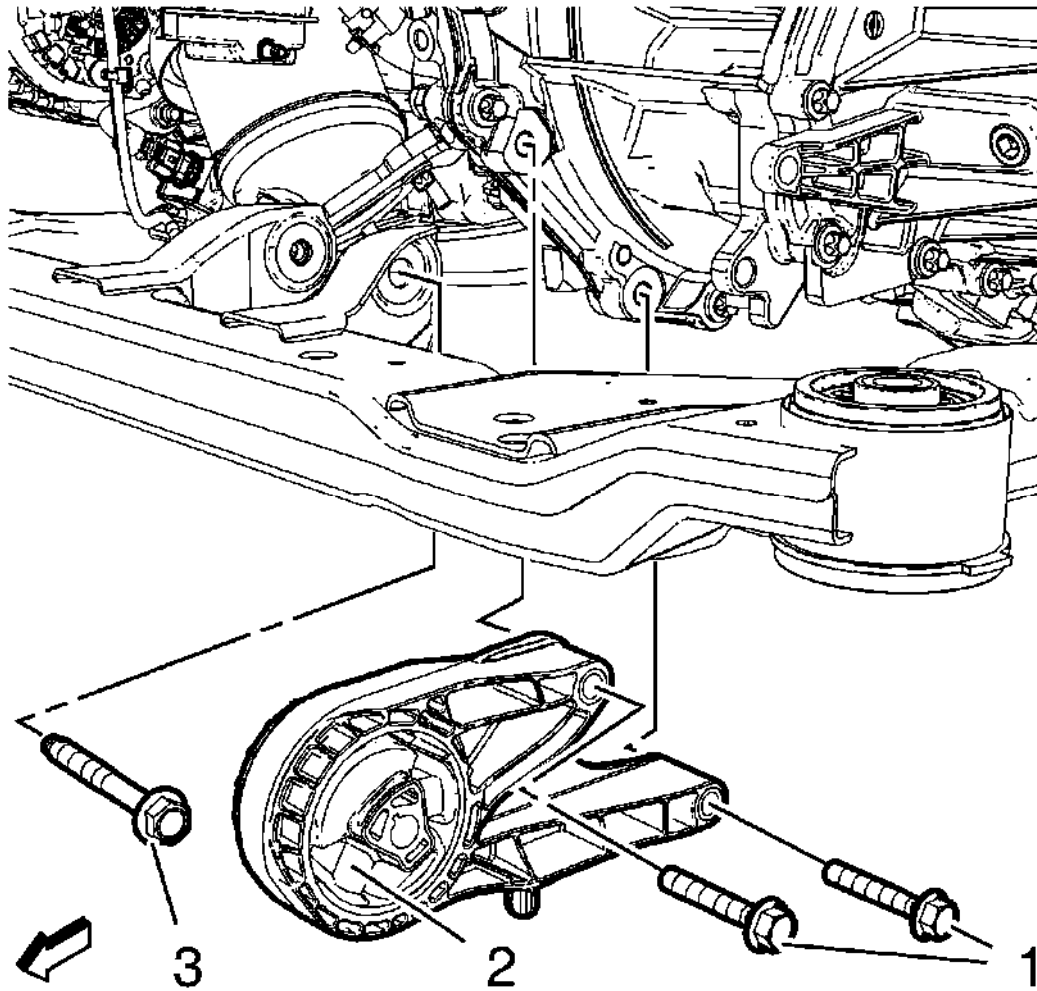


Fig. 74: Transmission Front Mount Bolt
Courtesy of GENERAL MOTORS COMPANY

3. Remove transmission front mount bolt (1).

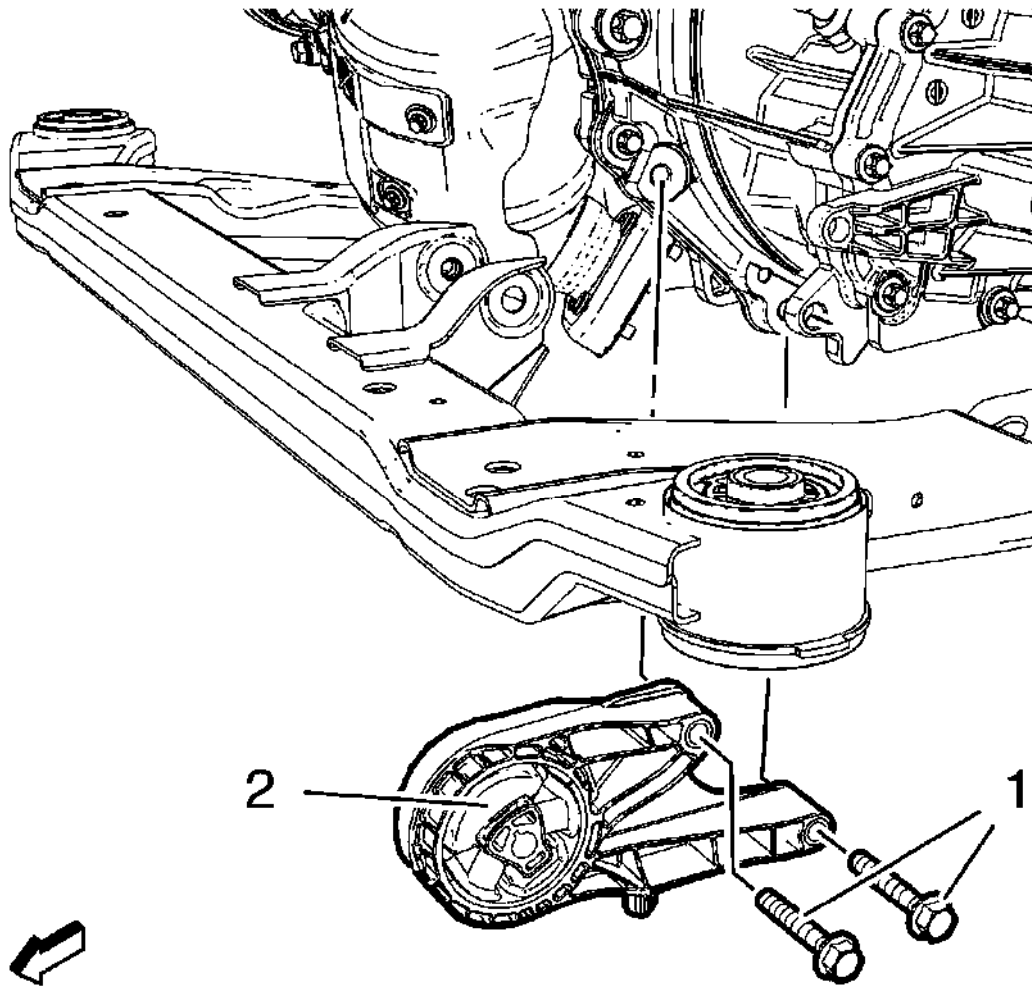


Fig. 75: Transmission Front Mount Bolts
Courtesy of GENERAL MOTORS COMPANY

4. Remove 2 transmission front mount bolts (1).
5. Remove transmission front mount (2).

Installation Procedure

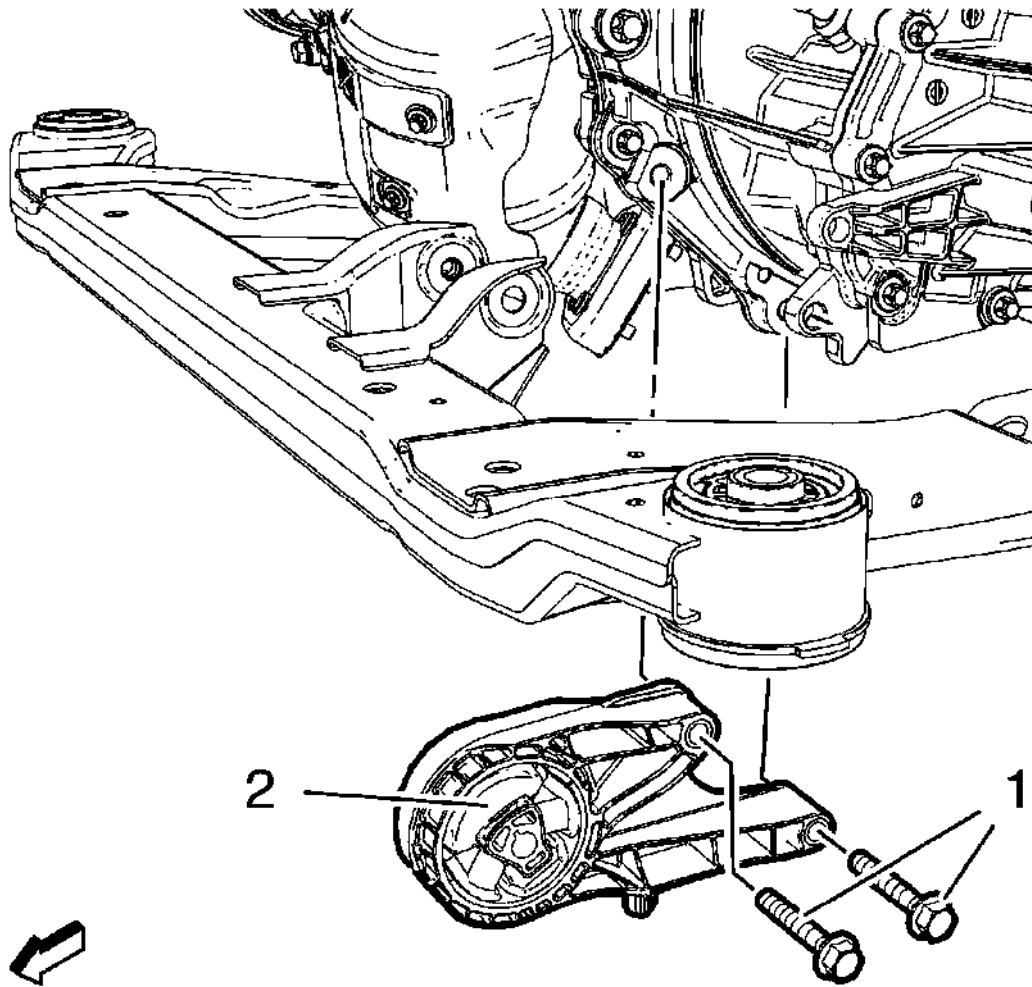


Fig. 76: Transmission Front Mount Bolts
Courtesy of GENERAL MOTORS COMPANY

1. Install transmission front mount (2).

CAUTION: Refer to Fastener Caution .

2. Install 2 transmission front mount bolts (1) and tighten to 100 N.m (74 lb ft).

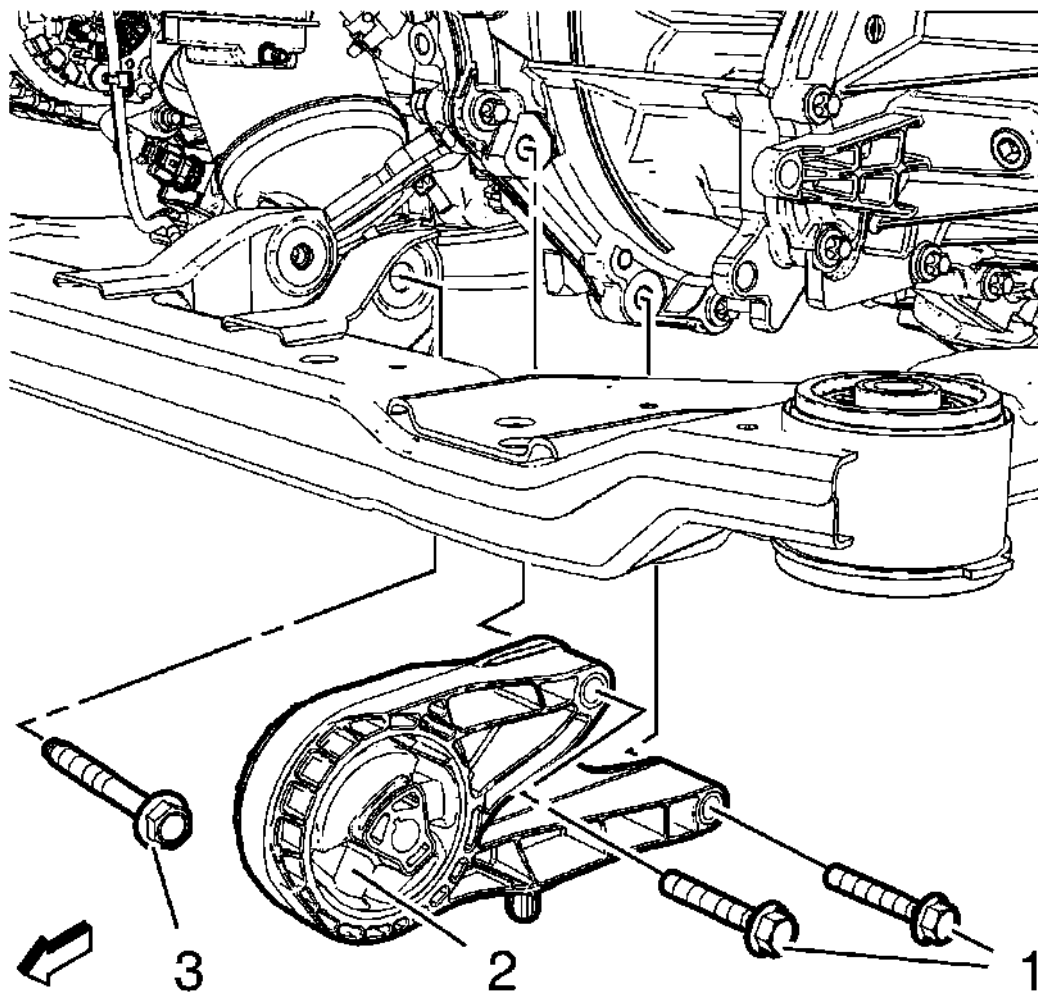


Fig. 77: Transmission Front Mount Bolt
Courtesy of GENERAL MOTORS COMPANY

3. Install transmission front mount bolt (1) and tighten to 100 N.m (74 lb ft).
4. If equipped, install the front compartment insulator. Refer to **Front Compartment Insulator Replacement**.
5. Lower vehicle.

TRANSMISSION REAR MOUNT REPLACEMENT

Removal Procedure

1. If equipped with Electronic Power Steering, remove the steering gear. Refer to **Steering Gear Replacement**.
2. Remove the transmission rear mount bracket. Refer to **Transmission Mount Bracket Replacement - Rear**.

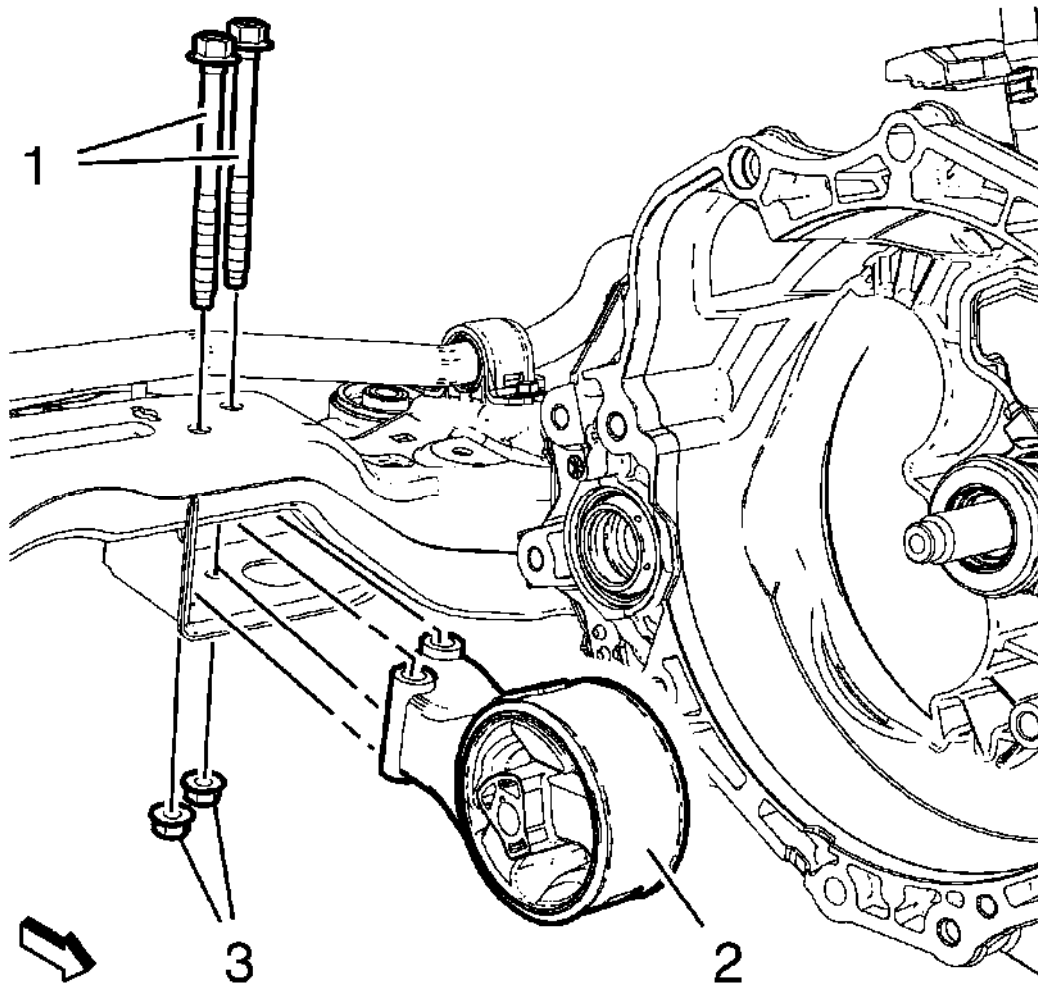


Fig. 78: Transmission Rear Mount, Nuts And Bolts
Courtesy of GENERAL MOTORS COMPANY

3. Remove the 2 transmission rear mount nuts (3) and the 2 transmission rear mount bolts (1).
4. Remove the transmission rear mount (2).

Installation Procedure

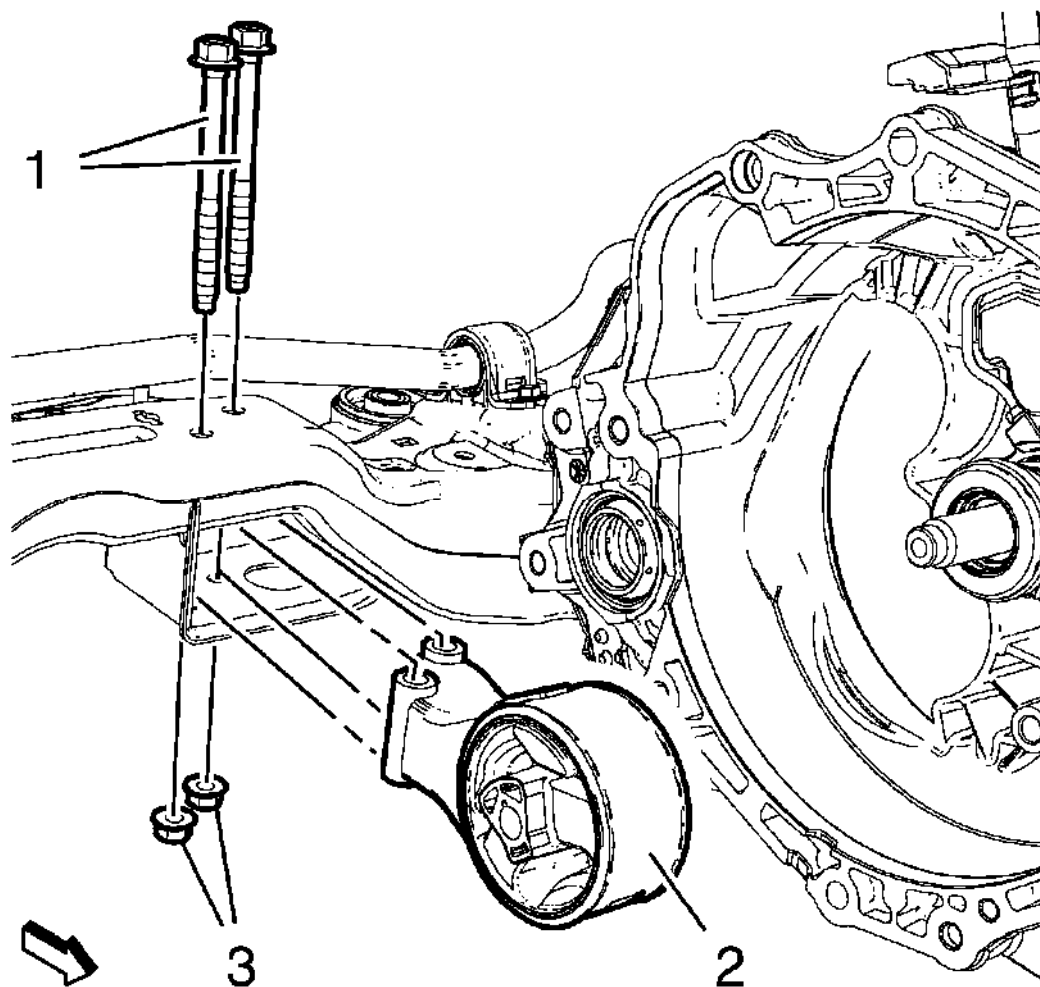


Fig. 79: Transmission Rear Mount, Nuts And Bolts
Courtesy of GENERAL MOTORS COMPANY

1. Install the transmission rear mount (2).
2. Install the 2 transmission rear mount bolts (1).

CAUTION: Refer to Fastener Caution .

3. Install the 2 transmission rear mount nuts (3) and tighten to 110 N.m (82 lb ft).
4. Install the transmission rear mount bracket. Refer to Transmission Mount Bracket Replacement - Rear.
5. If equipped with Electronic Power Steering, install the steering gear. Refer to Steering Gear Replacement .

TRANSMISSION MOUNT REPLACEMENT - LEFT SIDE

Special Tools**EN-45059** Angle Meter

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

Removal Procedure

1. Remove the battery tray. Refer to **Battery Tray Replacement** .
2. Install the engine lifter to the engine lift brackets.

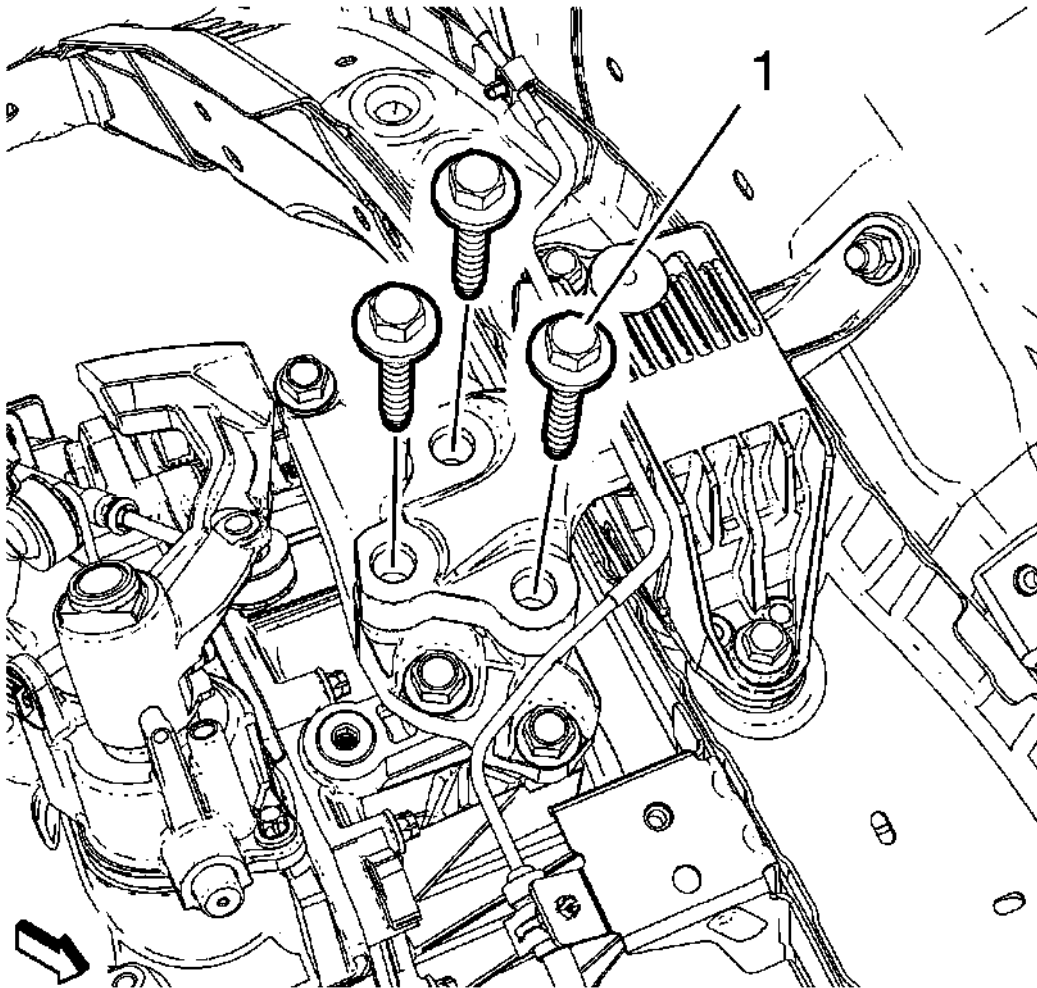


Fig. 80: Transmission Mount Bolts
Courtesy of GENERAL MOTORS COMPANY

3. Remove and DISCARD the 3 transmission mount bolts (1).

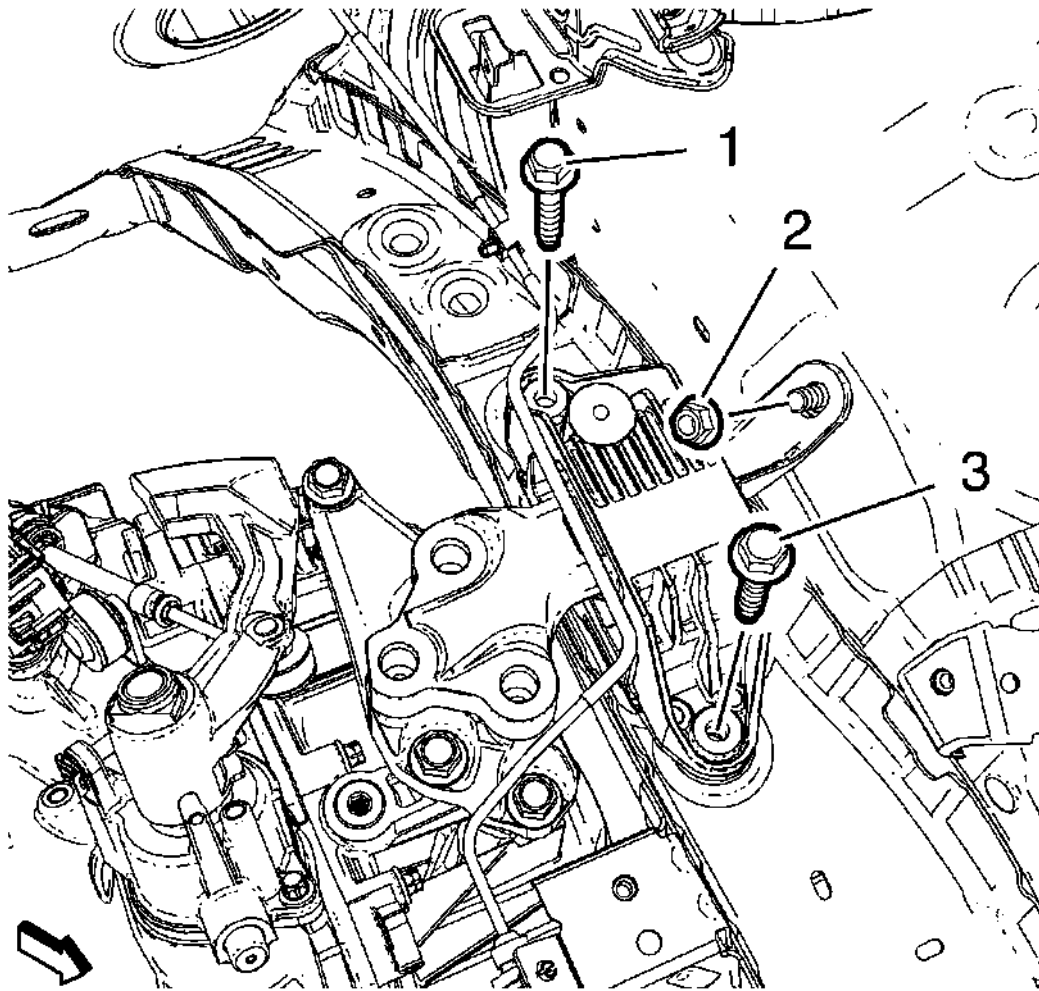


Fig. 81: Transmission Mount Nuts And Bolts
Courtesy of GENERAL MOTORS COMPANY

4. Remove the 2 transmission mount bolts (1, 3) and the transmission mount nut (2).

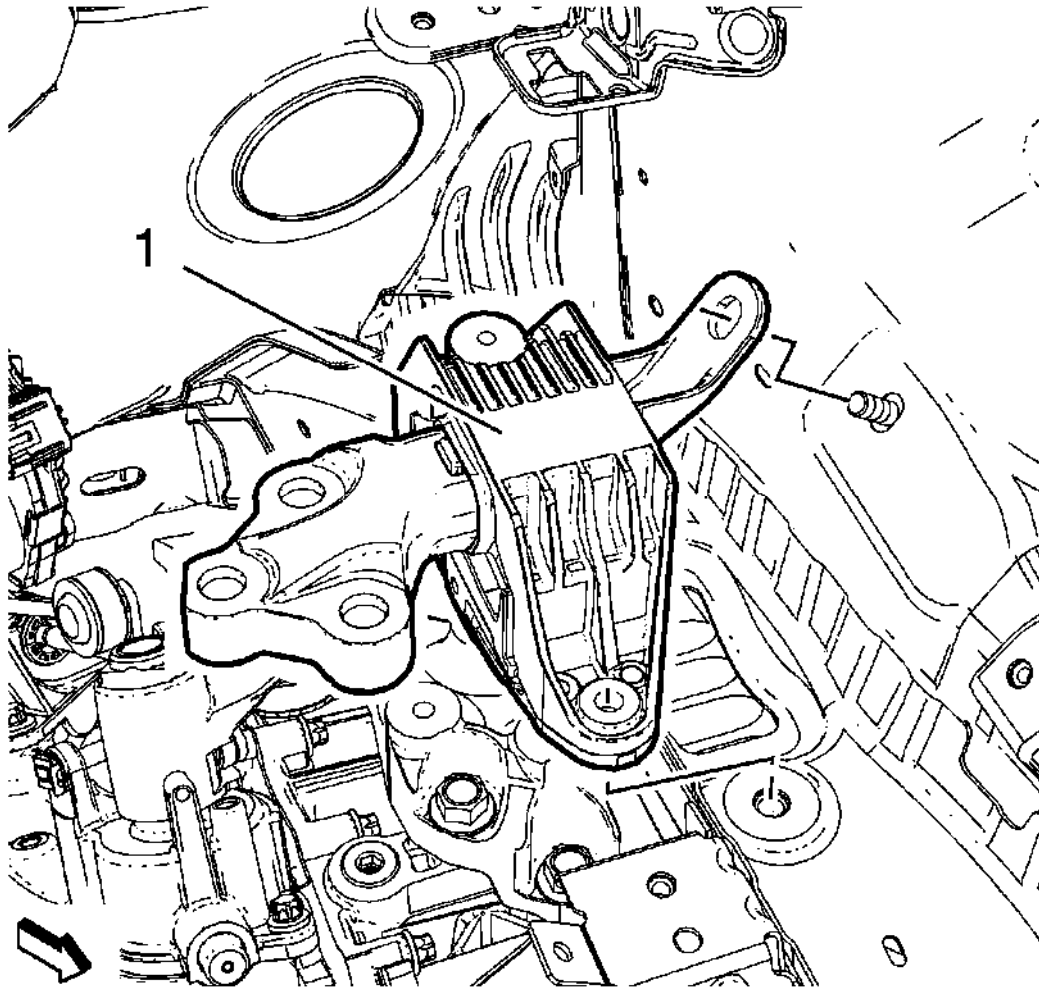


Fig. 82: Transmission Mount

Courtesy of GENERAL MOTORS COMPANY

5. Remove the transmission mount (1).

Installation Procedure

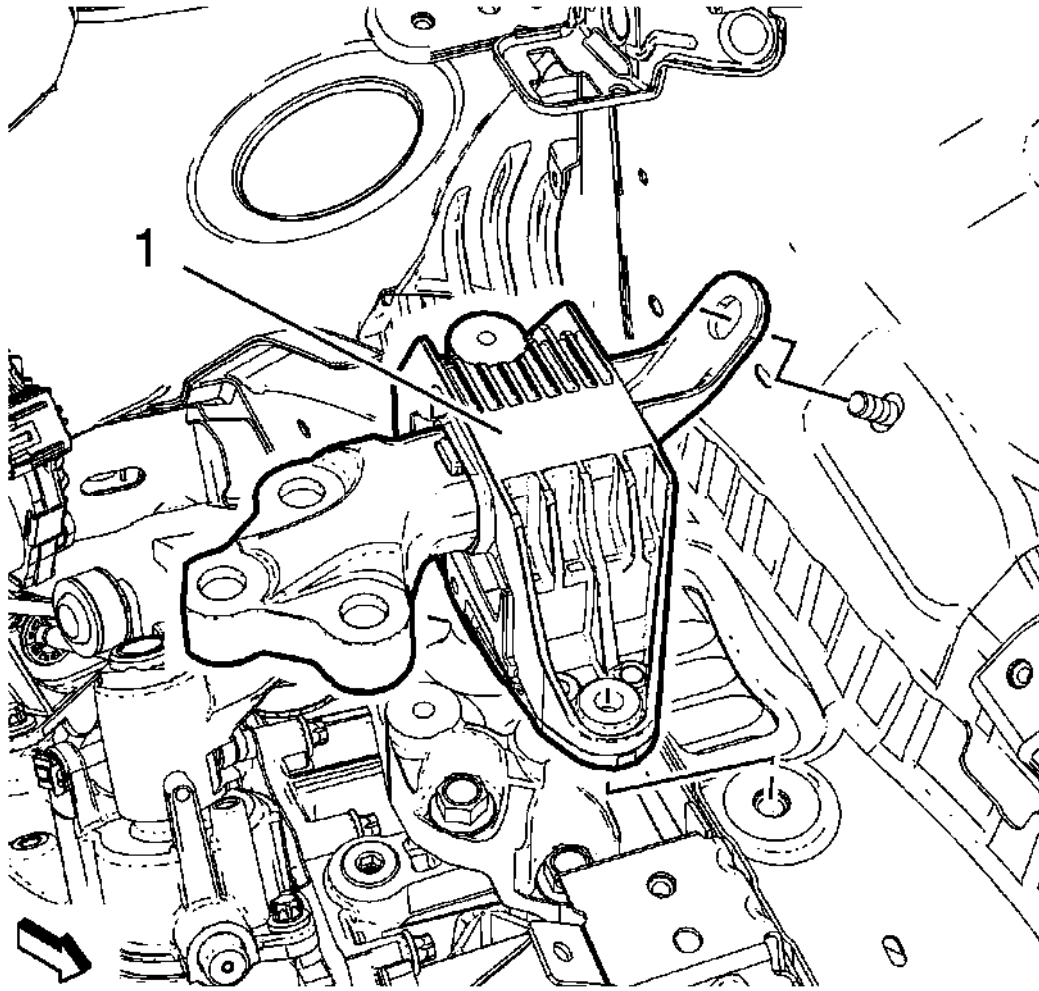


Fig. 83: Transmission Mount

Courtesy of GENERAL MOTORS COMPANY

1. Install the transmission mount (1).

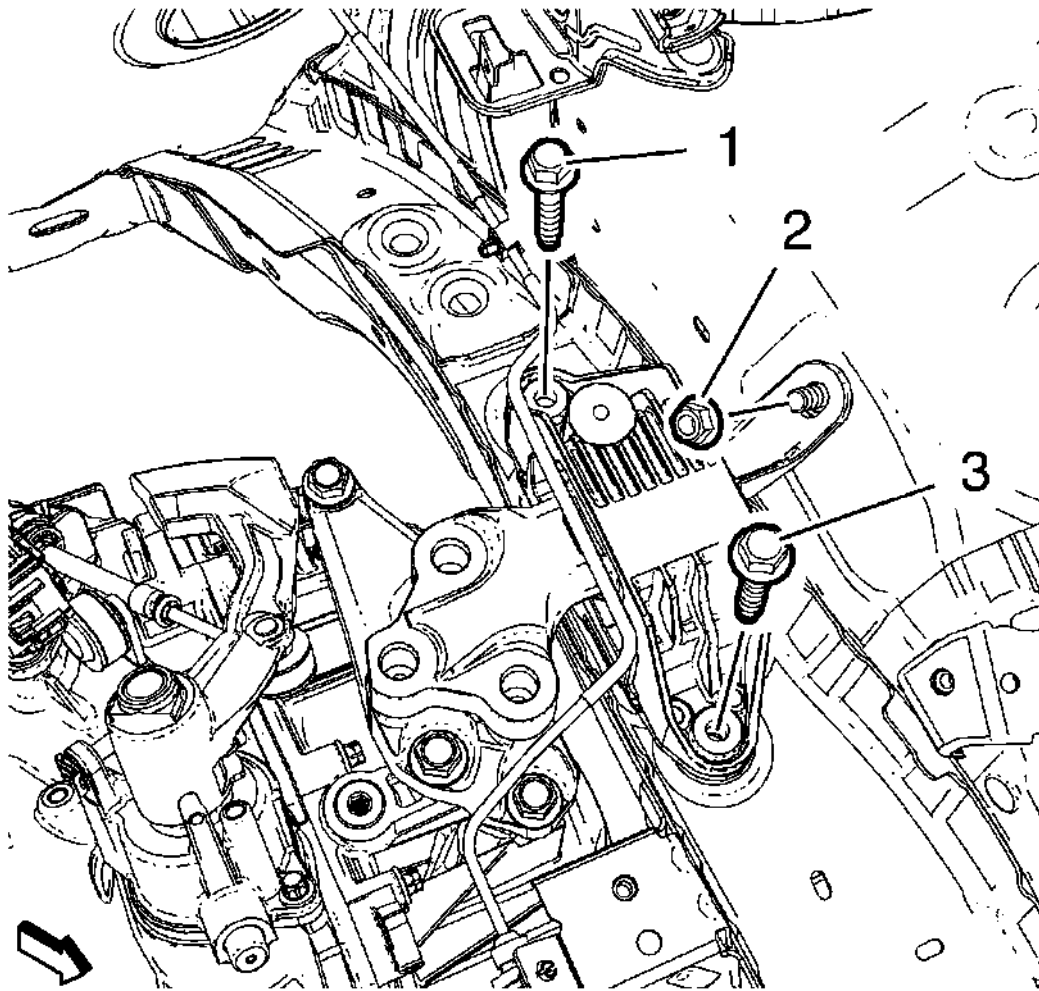


Fig. 84: Transmission Mount Nuts And Bolts
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

2. Install the 2 transmission mount bolts (1, 3) and tighten to 62 N.m (46 lb ft).
3. Install the transmission mount nut (2) and tighten to 62 N.m (46 lb ft).

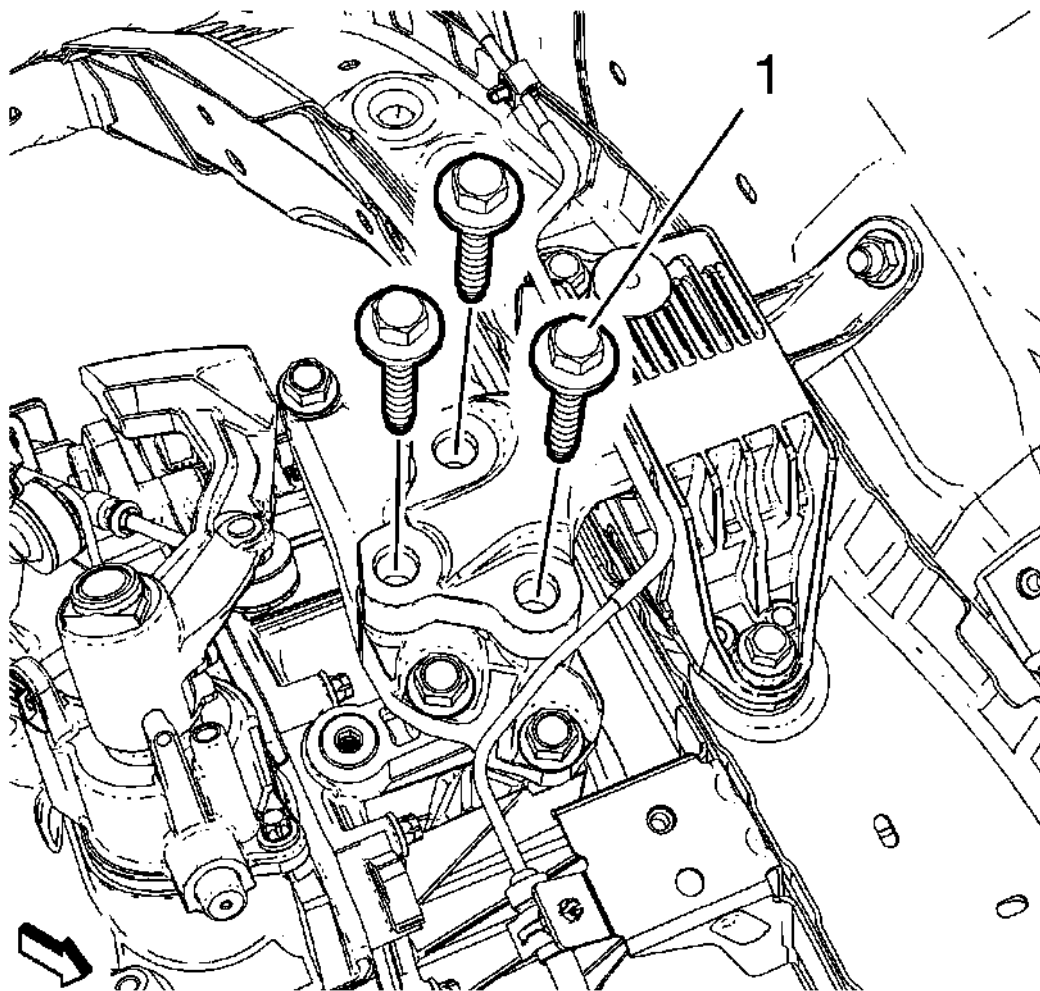


Fig. 85: Transmission Mount Bolts
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Torque-to-Yield Fastener Caution .

4. Install the 3 NEW transmission mount bolts (1) and tighten a first pass to 50 N.m (37 lb ft).
5. Tighten the 3 NEW transmission mount bolts (1) a final pass to an additional 60 - 75 degrees, using the **EN-45059** meter.
6. Remove the engine lifter.
7. Install the battery tray. Refer to Battery Tray Replacement .

TRANSMISSION MOUNT BRACKET REPLACEMENT - REAR

Removal Procedure

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the 3 exhaust flexible pipe to catalytic converter nuts and lower the exhaust flexible pipe. Refer to **Catalytic Converter Replacement (1.4L LUV)** , **Catalytic Converter Replacement (1.8L LUW and LWE)** .
3. Support the rear of the powertrain using a suitable jack stand.

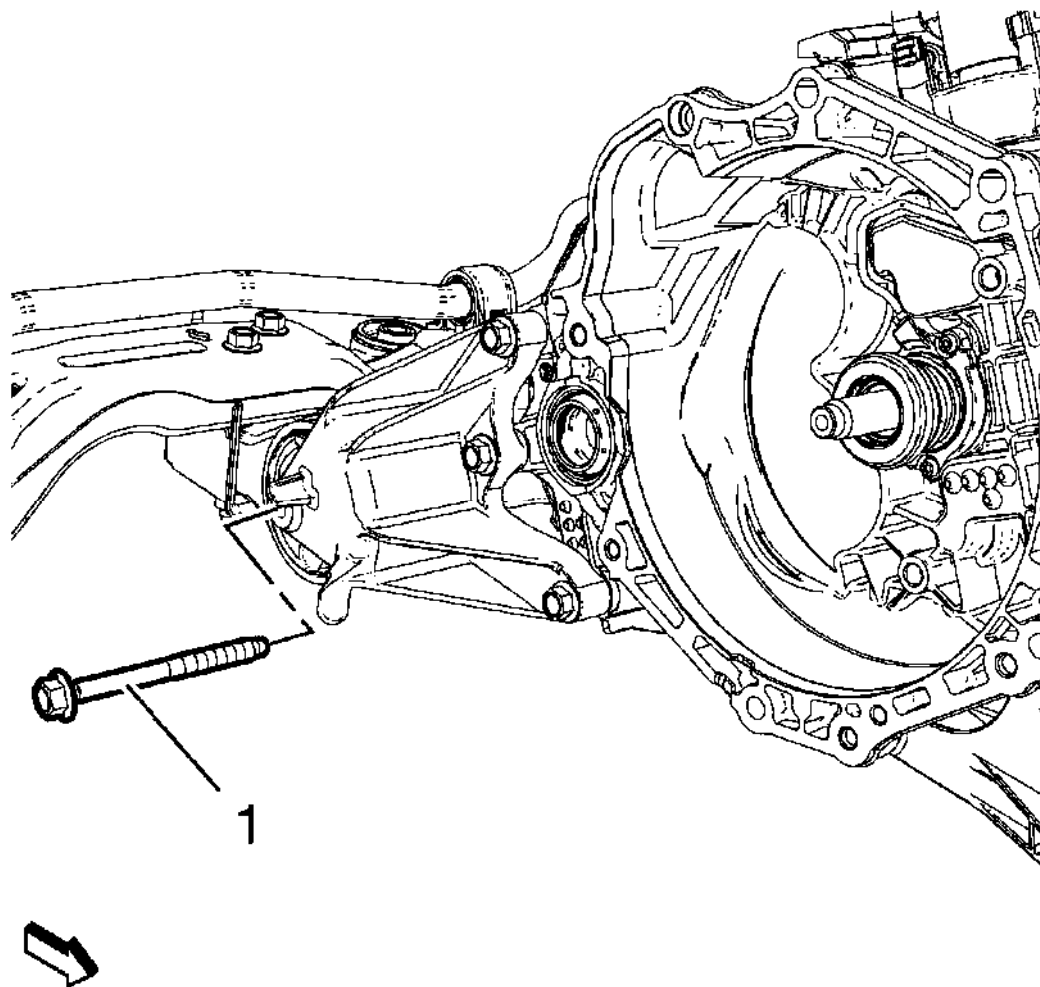


Fig. 86: Transmission Rear Mount Bolt
Courtesy of GENERAL MOTORS COMPANY

4. Remove the transmission rear mount bolt (1).

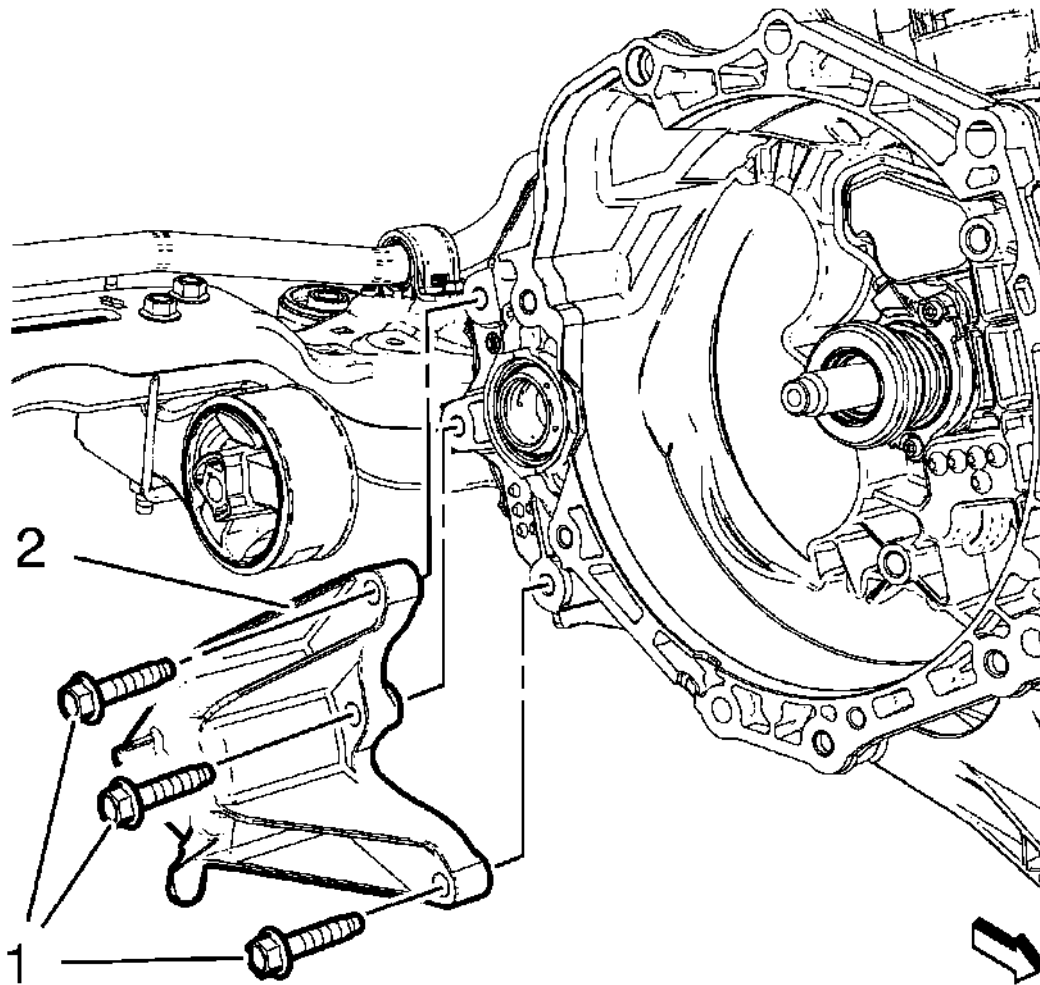


Fig. 87: Transmission Rear Mount And Bolts
Courtesy of GENERAL MOTORS COMPANY

5. Remove the 3 transmission rear mount bolts (1).
6. Remove the transmission rear mount (2).

Installation Procedure

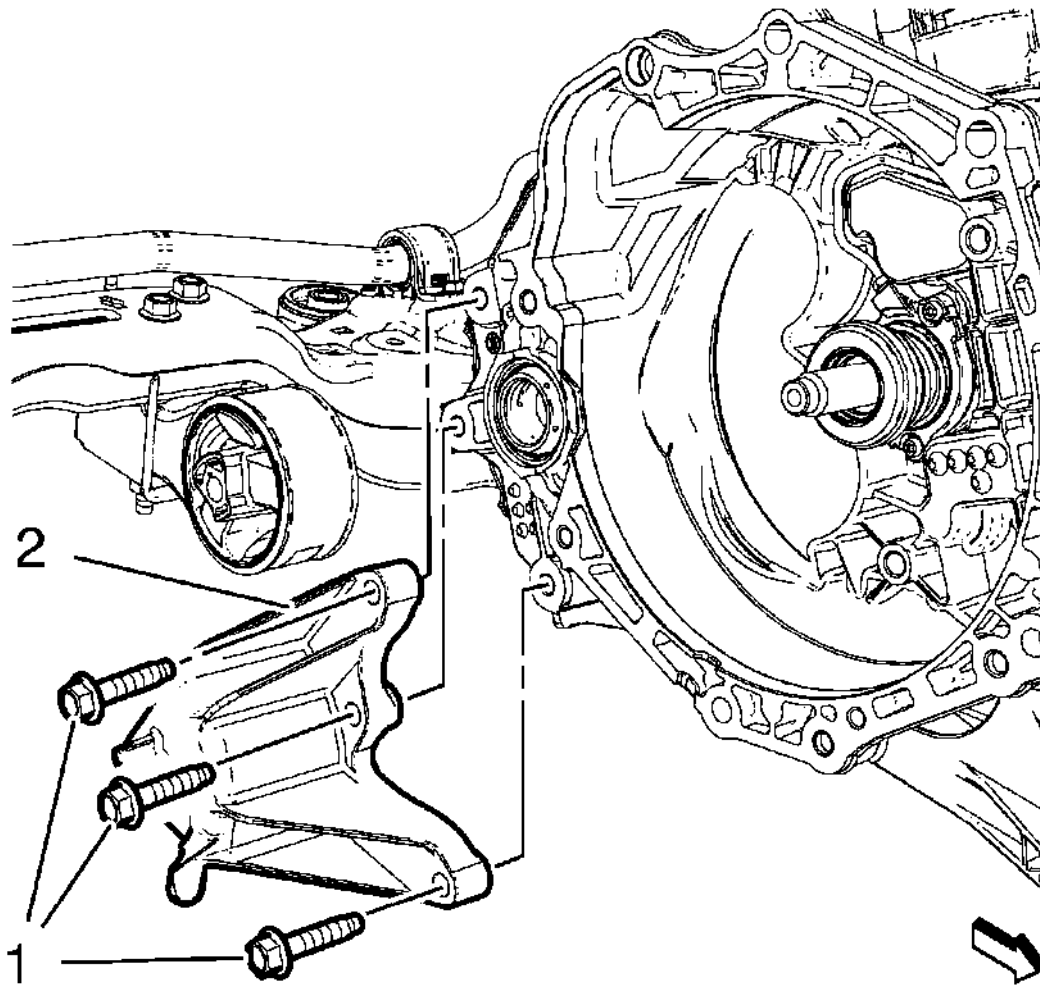


Fig. 88: Transmission Rear Mount And Bolts
Courtesy of GENERAL MOTORS COMPANY

1. Install the transmission rear mount (2).

CAUTION: Refer to Fastener Caution .

2. Install the 3 transmission rear mount bolts (1) and tighten to 100 (74 lb ft).

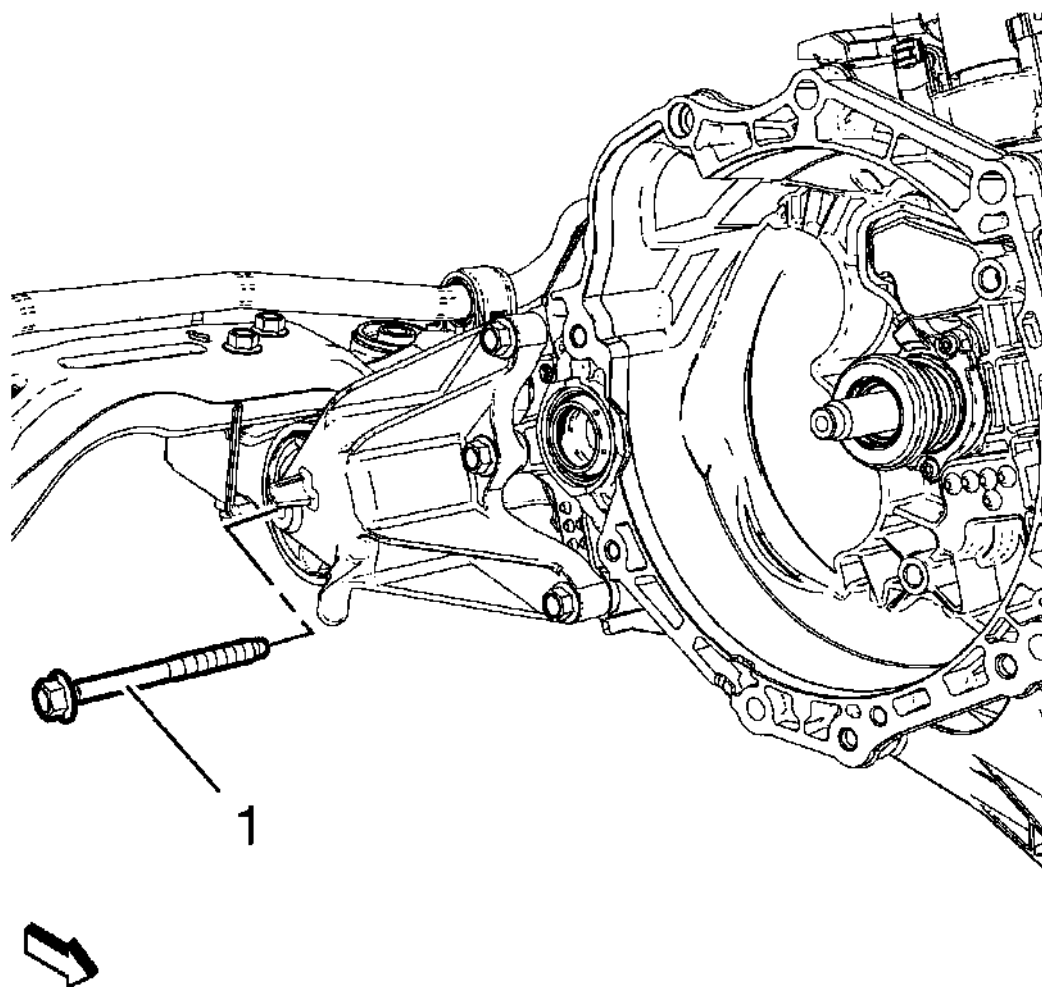


Fig. 89: Transmission Rear Mount Bolt
Courtesy of GENERAL MOTORS COMPANY

3. Install the transmission rear mount bolt (1) and tighten to 100 (74 lb ft).
4. Remove the jack stand.
5. Install the 3 exhaust flexible pipe to catalytic converter nuts. Refer to **Catalytic Converter Replacement (1.4L LUV)** , **Catalytic Converter Replacement (1.8L LUW and LWE)** .
6. Lower the vehicle.

TRANSMISSION MOUNT BRACKET REPLACEMENT - LEFT SIDE

Removal Procedure

1. Remove battery tray. Refer to **Battery Tray Replacement** .
2. Remove transmission mount - left side **Transmission Mount Replacement - Left Side**.

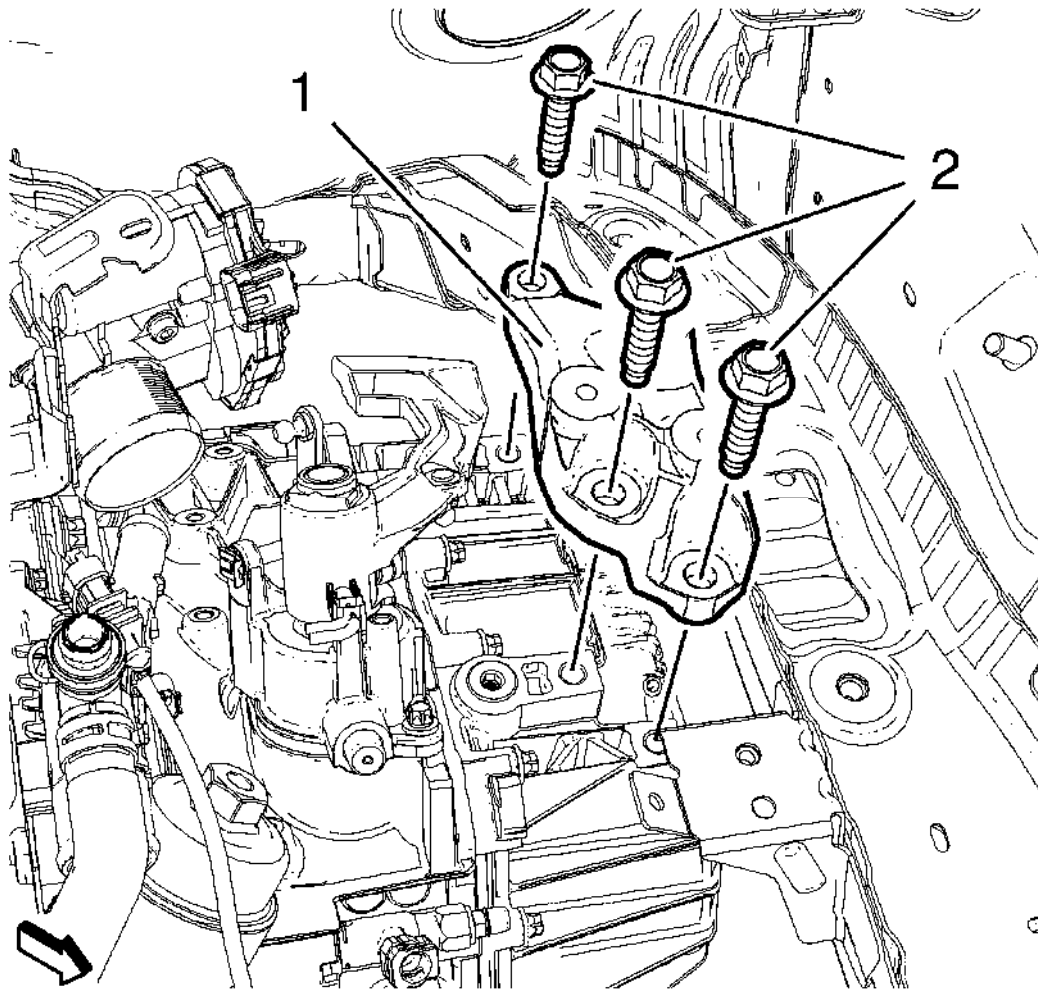


Fig. 90: Transmission Mount Bracket And Bolts
Courtesy of GENERAL MOTORS COMPANY

3. Remove 3 transmission mount bracket bolts (1).
4. Remove transmission mount bracket (2).

Installation Procedure

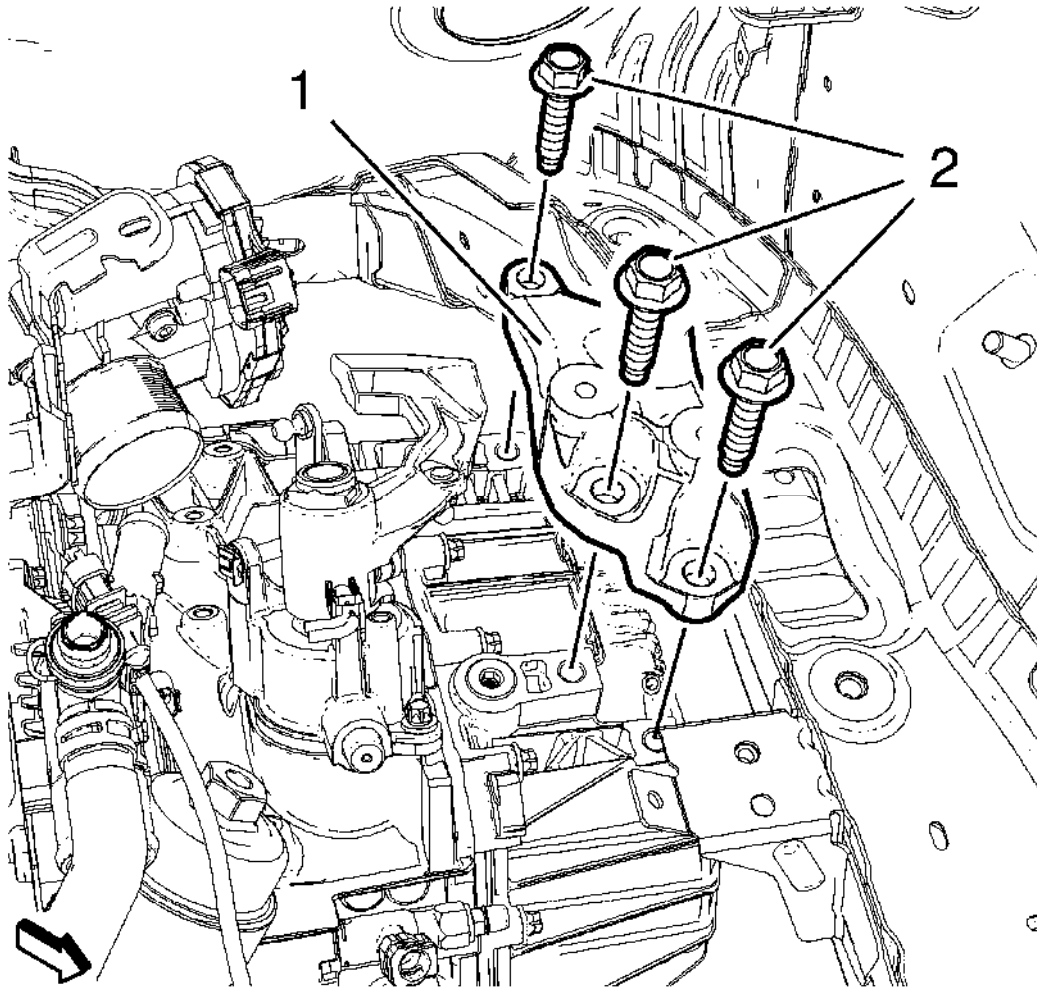


Fig. 91: Transmission Mount Bracket And Bolts
Courtesy of GENERAL MOTORS COMPANY

1. Install transmission mount bracket (2).

CAUTION: Refer to Fastener Caution .

2. Install 3 transmission mount bracket bolts (1) and tighten to 100 N.m (74 lb ft).
3. Install transmission mount - left side Transmission Mount Replacement - Left Side.
4. Install battery tray. Refer to Battery Tray Replacement .

FRONT WHEEL DRIVE SHAFT SEAL REPLACEMENT - LEFT SIDE

Special Tools

- **CH-466-A** Gear, Bearing Remover / Installer
- **DT-519** Installer Drift
- **DT-523** Remover / Installer

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

Removal Procedure

1. Remove left front wheel drive shaft. Refer to **Front Wheel Drive Shaft Replacement - Left Side** .

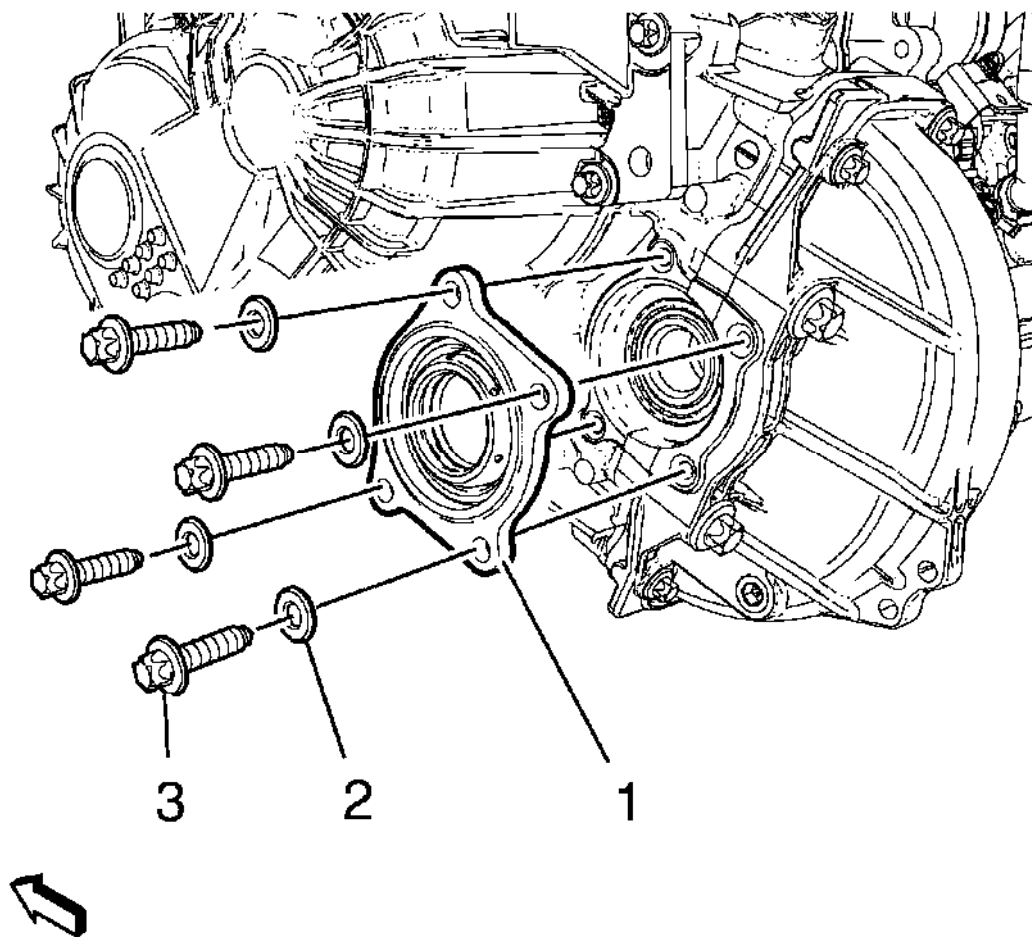


Fig. 92: Front Differential Carrier Flange, Bolts And Washers
Courtesy of GENERAL MOTORS COMPANY

2. Remove and DISCARD 4 front differential carrier flange bolts (3) and 4 washers (2).

Remove front differential carrier flange (1) from transmission.

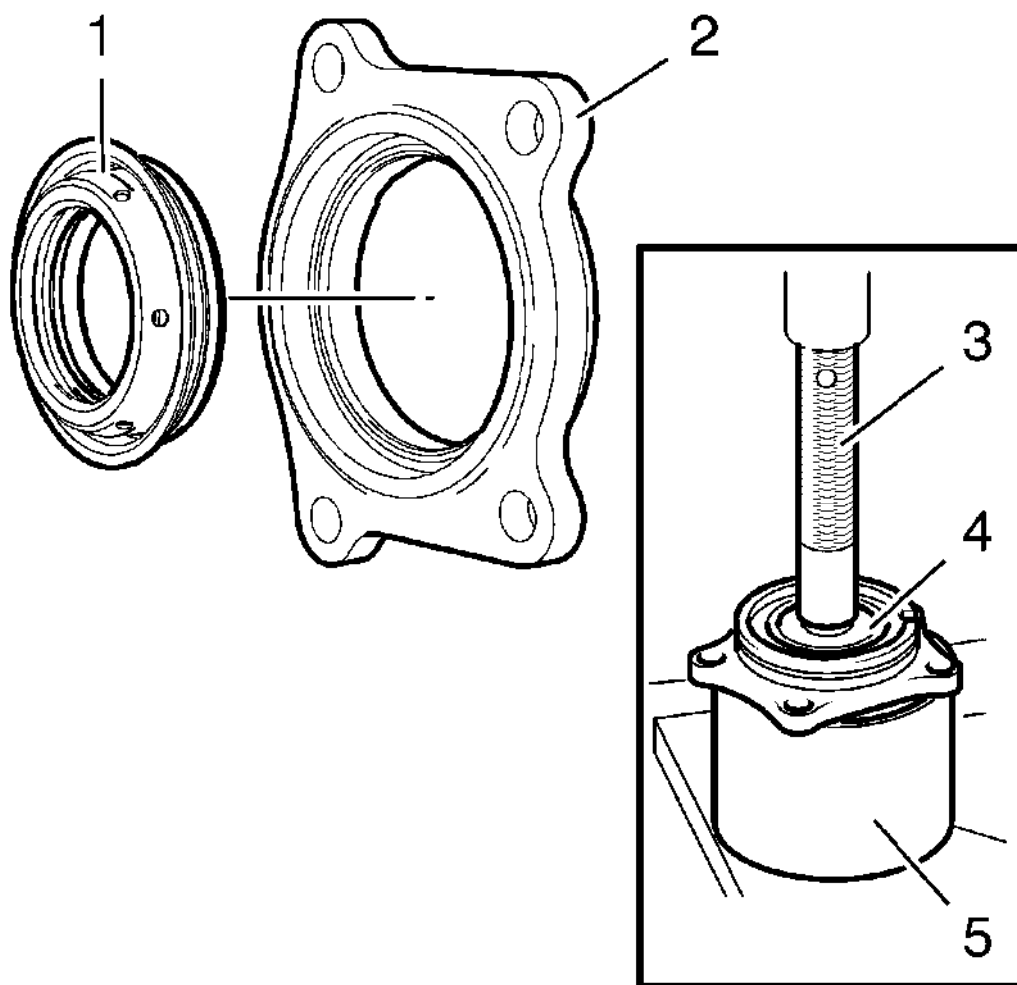


Fig. 93: Front Wheel Drive Shaft Oil Seal, Front Differential Carrier Flange And Remover/Installer

Courtesy of GENERAL MOTORS COMPANY

3. Remove front wheel drive shaft oil seal (1) from front differential carrier flange (2).

Put front differential carrier flange on **CH-466-A** remover/installer (5) and press front wheel drive shaft oil seal out of front differential carrier flange using **DT-523-1** remover / installer (3) in conjunction with **DT-523-3** remover / installer (4).

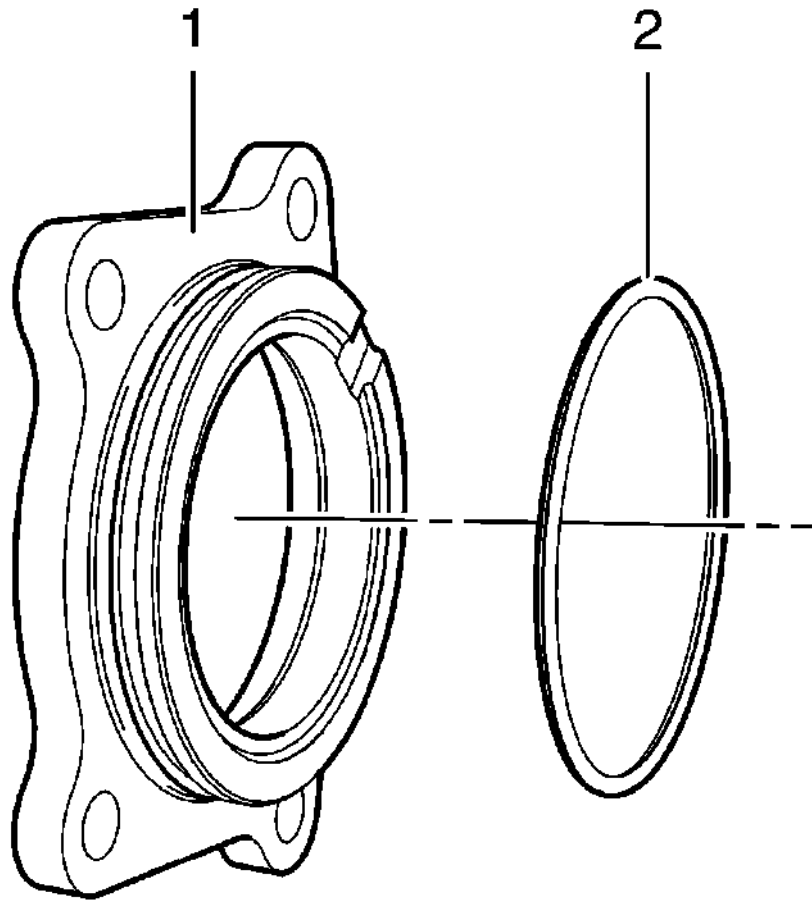


Fig. 94: Front Differential Carrier Flange And Seal
Courtesy of GENERAL MOTORS COMPANY

4. Remove front differential carrier flange seal (2) from front differential carrier flange (1).

Installation Procedure

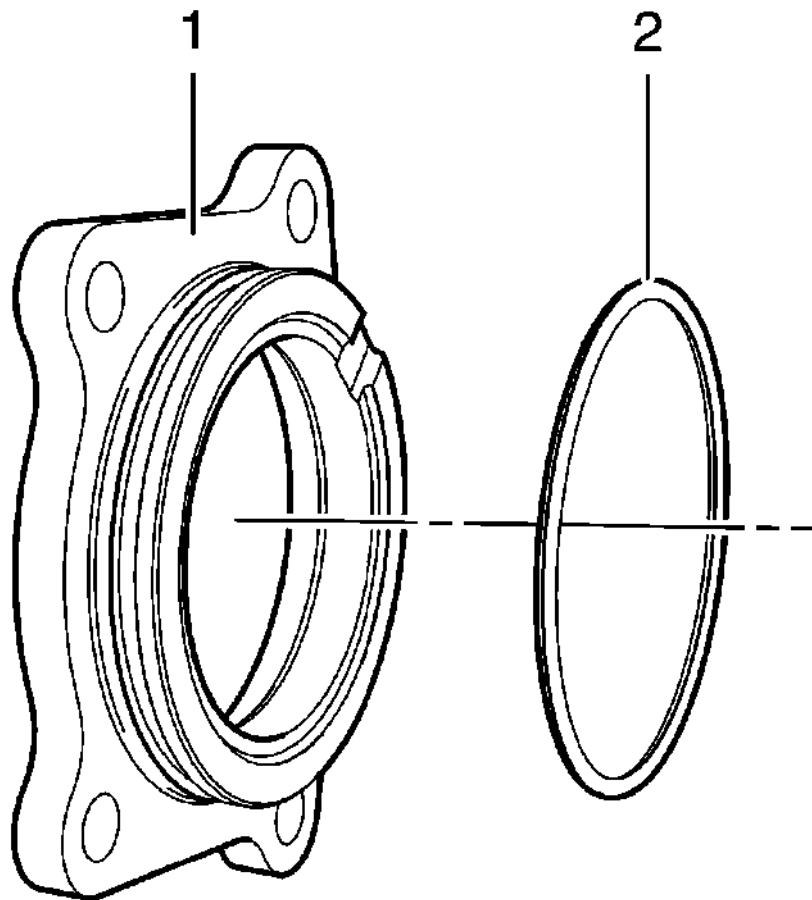


Fig. 95: Front Differential Carrier Flange And Seal

Courtesy of GENERAL MOTORS COMPANY

NOTE: Coat front differential carrier flange seal with NEW transmission fluid.

1. Install NEW front differential carrier flange seal (2) to front differential carrier flange (1).

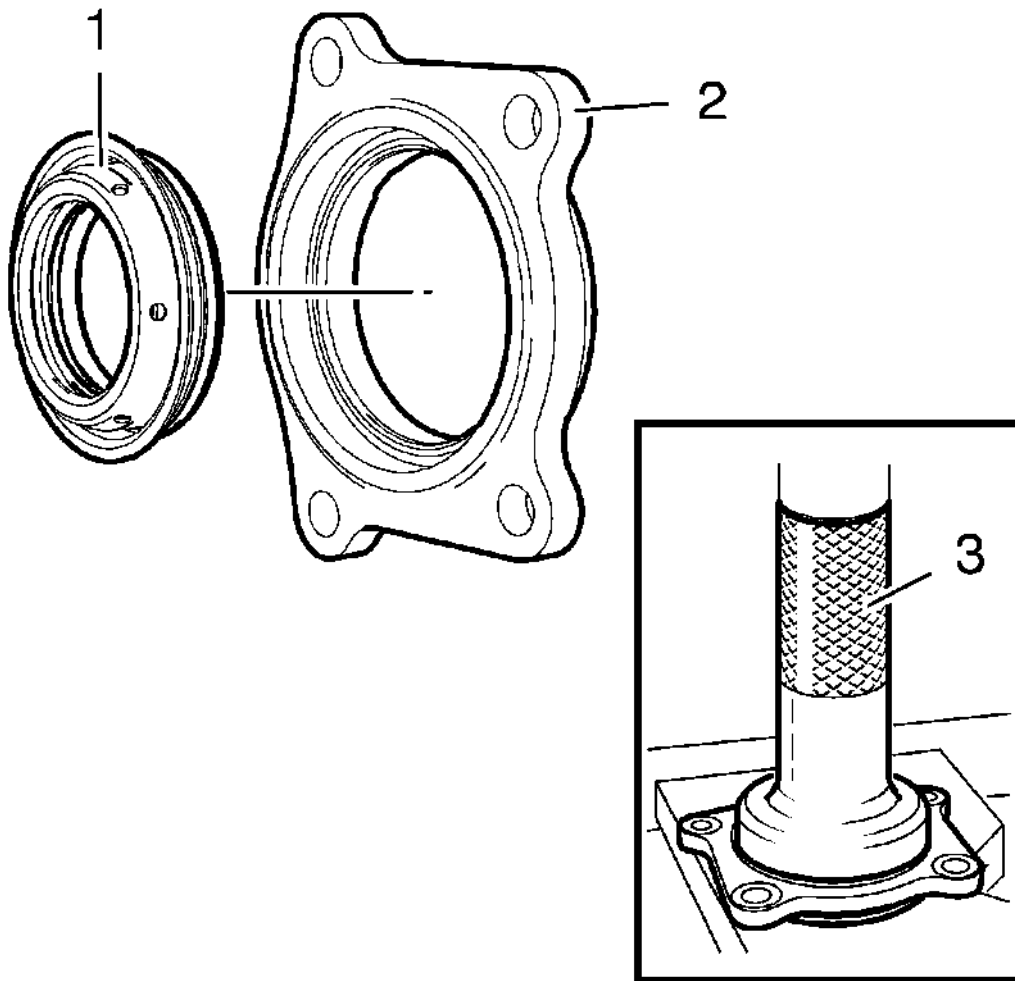


Fig. 96: Front Differential Carrier Flange, Front Wheel Drive Shaft Oil Seal And Installer Drift
Courtesy of GENERAL MOTORS COMPANY

NOTE: Coat front wheel drive shaft oil seal with NEW transmission fluid.

Press front wheel drive shaft oil seal into front differential carrier flange using DT-519 installer drift (3).

2. Install NEW front wheel drive shaft oil seal (1) to front differential carrier flange (2).

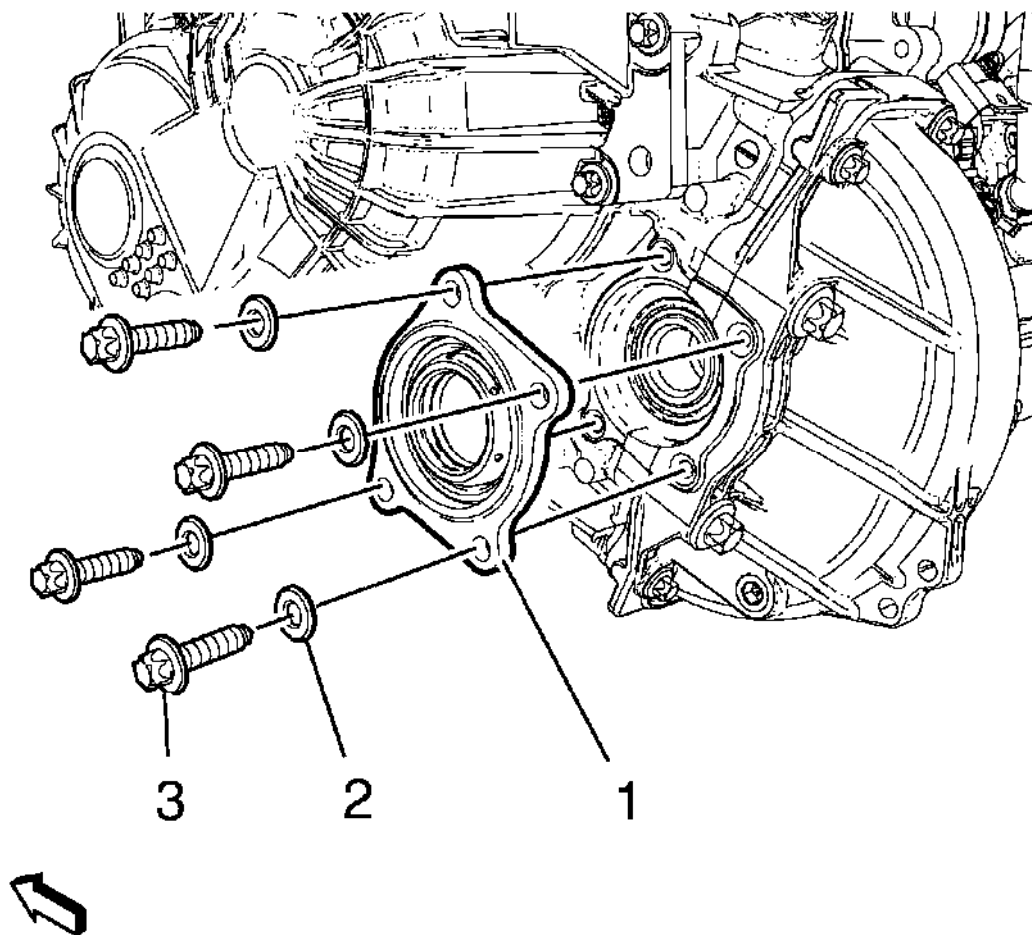


Fig. 97: Front Differential Carrier Flange, Bolts And Washers
 Courtesy of GENERAL MOTORS COMPANY

3. Install front differential carrier flange (1) to transmission.

CAUTION: Refer to Fastener Caution .

CAUTION: Refer to Torque-to-Yield Fastener Caution .

4. Install 4 washers (2) and 4 NEW front differential carrier flange bolts (3) and tighten to 20 N.m +45° (15 lb ft +45°).
5. Install left front wheel drive shaft. Refer to Front Wheel Drive Shaft Replacement - Left Side .

FRONT WHEEL DRIVE SHAFT SEAL REPLACEMENT - RIGHT SIDE

Special Tools

- **DT-519** Installer Drift
- **DT-586** Remover Hook
- **DT-7004** Slide Hammer

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

Removal Procedure

1. Remove right front wheel drive shaft. Refer to **Front Wheel Drive Shaft Replacement - Right Side**.

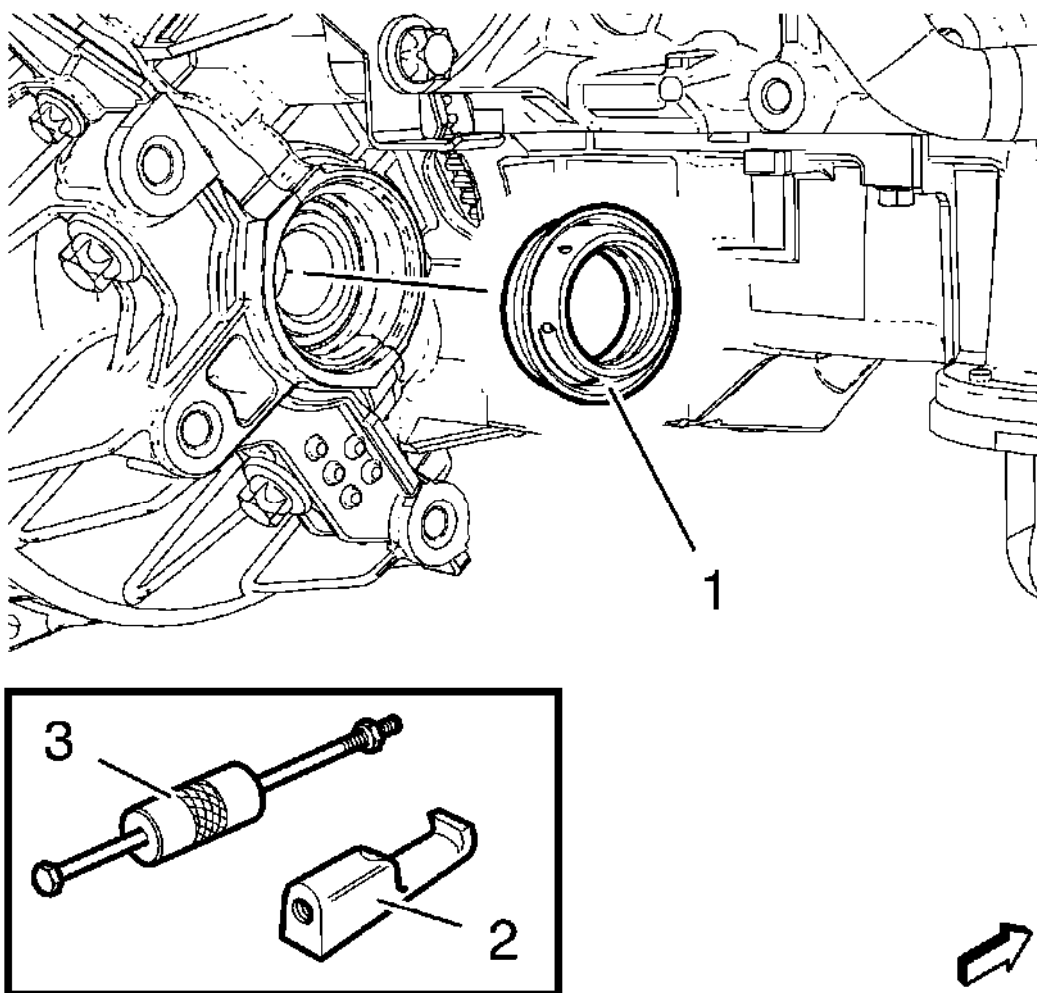


Fig. 98: Front Wheel Drive Shaft Oil Seal And Removal Tools (1.8L LUW)
Courtesy of GENERAL MOTORS COMPANY

2. Remove front wheel drive shaft oil seal (1) using **DT-7004** slide hammer (3) in conjunction with **DT-586** hook (2).

Installation Procedure

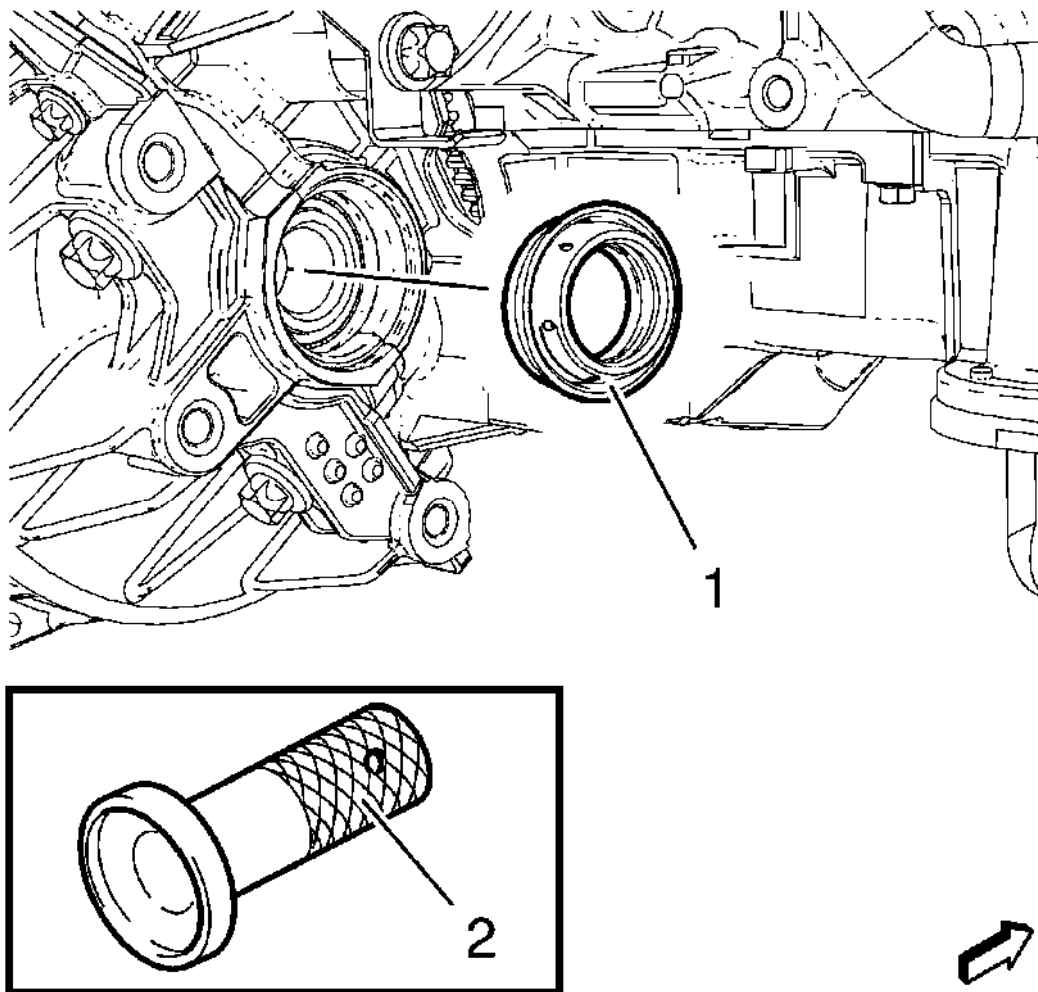


Fig. 99: Front Wheel Drive Shaft Oil Seal And Installation Tools (1.8L LUW)
Courtesy of GENERAL MOTORS COMPANY

NOTE: Coat seal lips with **NEW** transmission fluid.

1. Install **NEW** front wheel drive shaft oil seal (1) using **DT-519** installer drift (2) with hammer.
2. Install right front wheel drive shaft. Refer to **Front Wheel Drive Shaft Replacement - Right Side** .

TRANSMISSION REPLACEMENT

Removal Procedure

1. Remove battery tray. Refer to **Battery Tray Replacement** .
2. Remove the transmission shift lever cable from transmission. Refer to **Manual Transmission Shift Lever and Selector Lever Cable Replacement**.

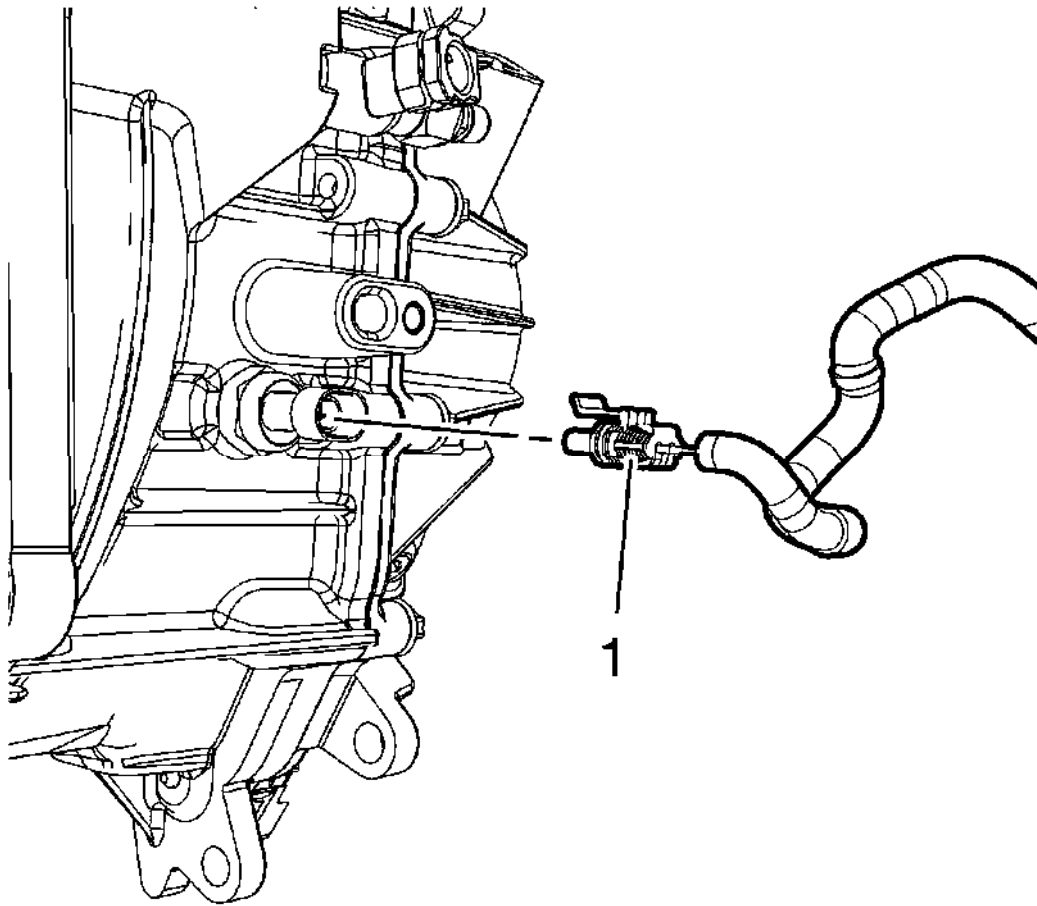


Fig. 100: Backup Lamp Switch Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

3. Disconnect the electrical connector (1) from the backup lamp switch.

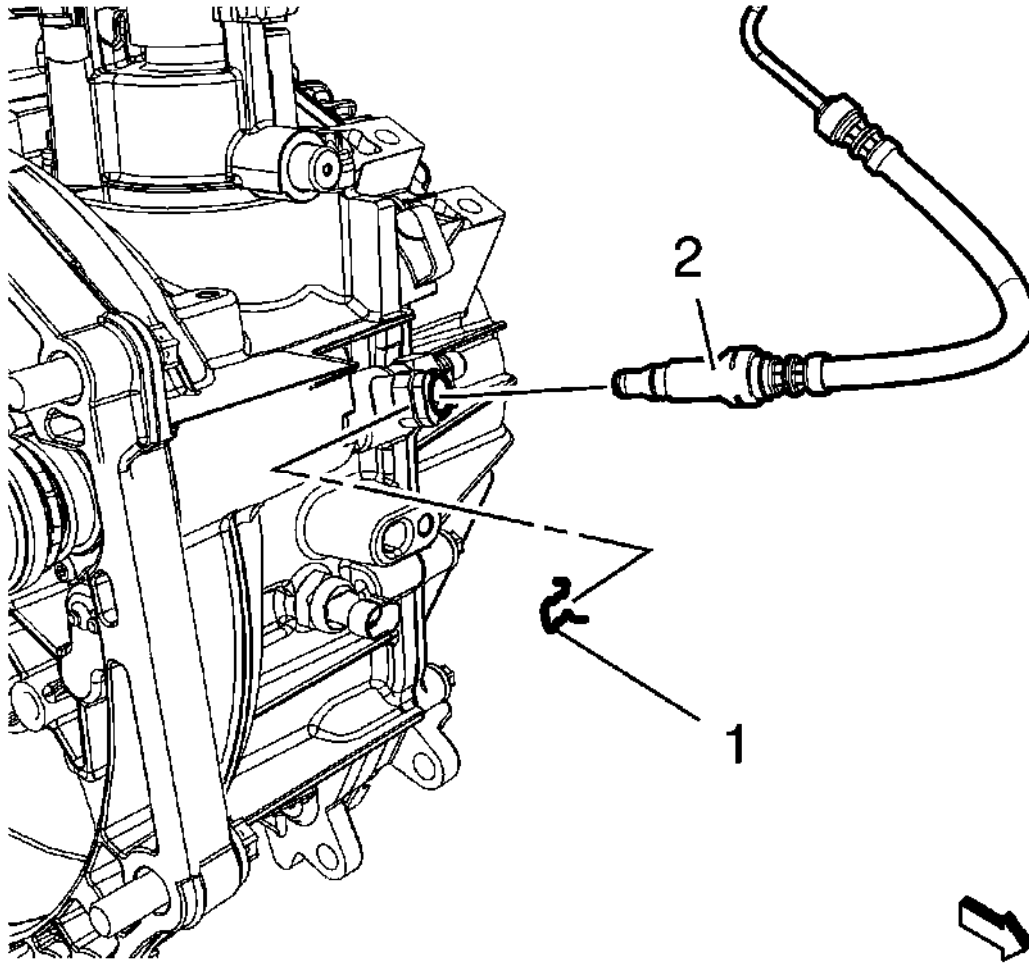


Fig. 101: Clutch Actuator Cylinder Front Pipe And Retainer

Courtesy of GENERAL MOTORS COMPANY

NOTE: Before disconnecting the clutch actuator cylinder front pipe, remove the clutch/brake fluid from the reservoir tank.

4. Remove the clutch actuator cylinder front pipe retainer (1).
5. Disconnect the clutch actuator cylinder front pipe (2) from the clutch actuator cylinder pipe elbow.

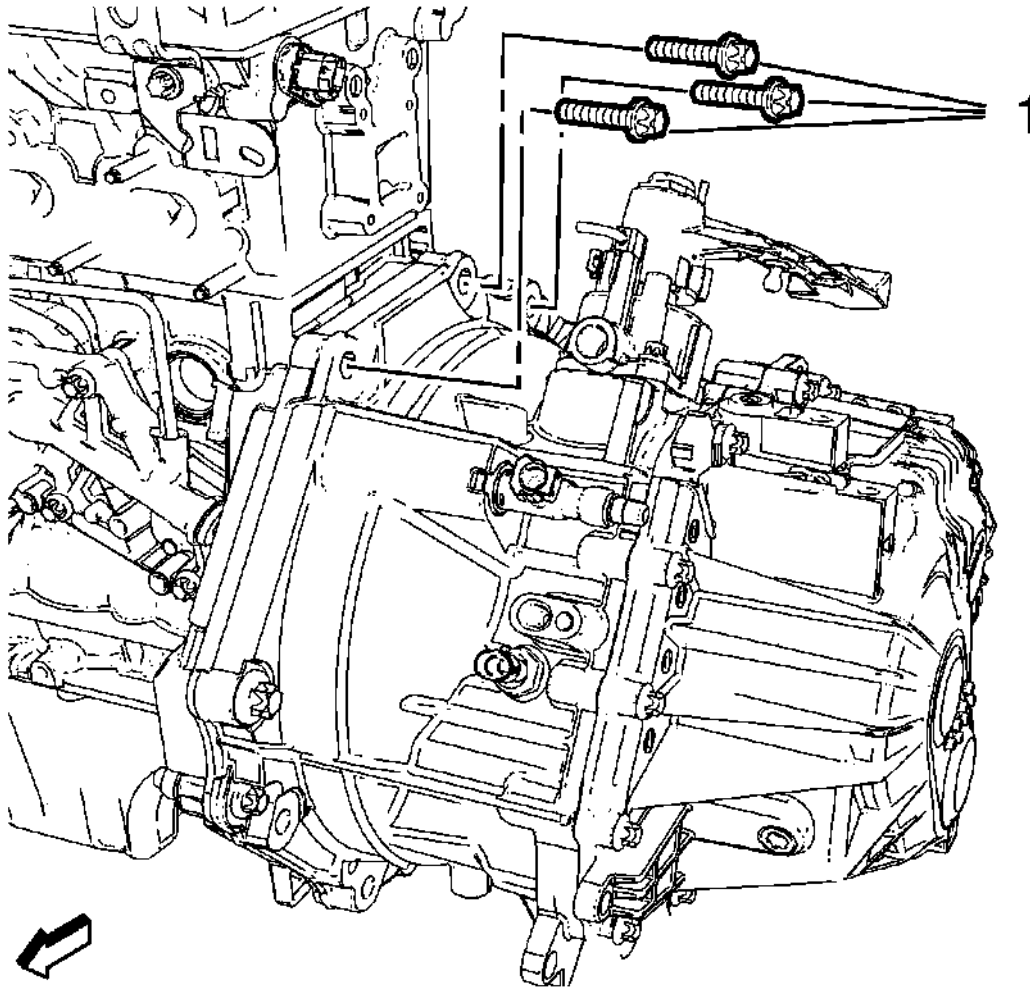


Fig. 102: Upper Transmission Bolts

Courtesy of GENERAL MOTORS COMPANY

6. Unclip the wire harness from the transmission.
7. Remove the 3 upper transmission bolts from engine (1).
8. Remove the drivetrain and front suspension frame. Refer to **Drivetrain and Front Suspension Frame Replacement** .

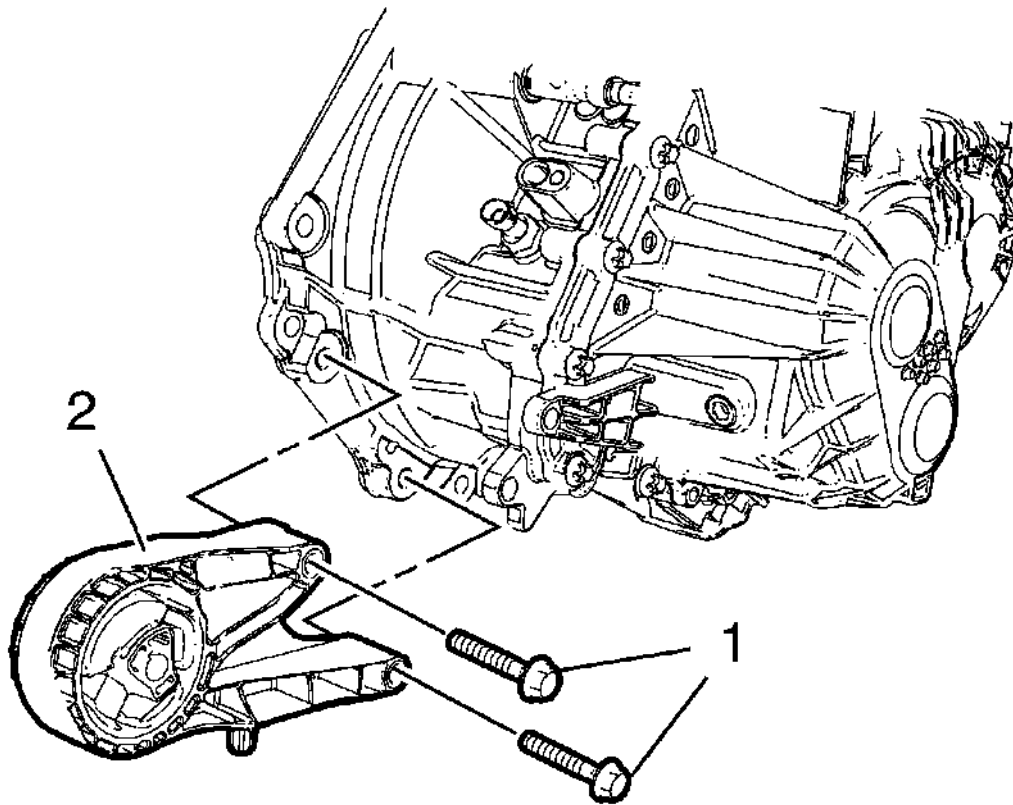


Fig. 103: Transmission Front Mount And Bolts
Courtesy of GENERAL MOTORS COMPANY

9. Remove transmission front mount from transmission (2). Remove 2 bolts (1).

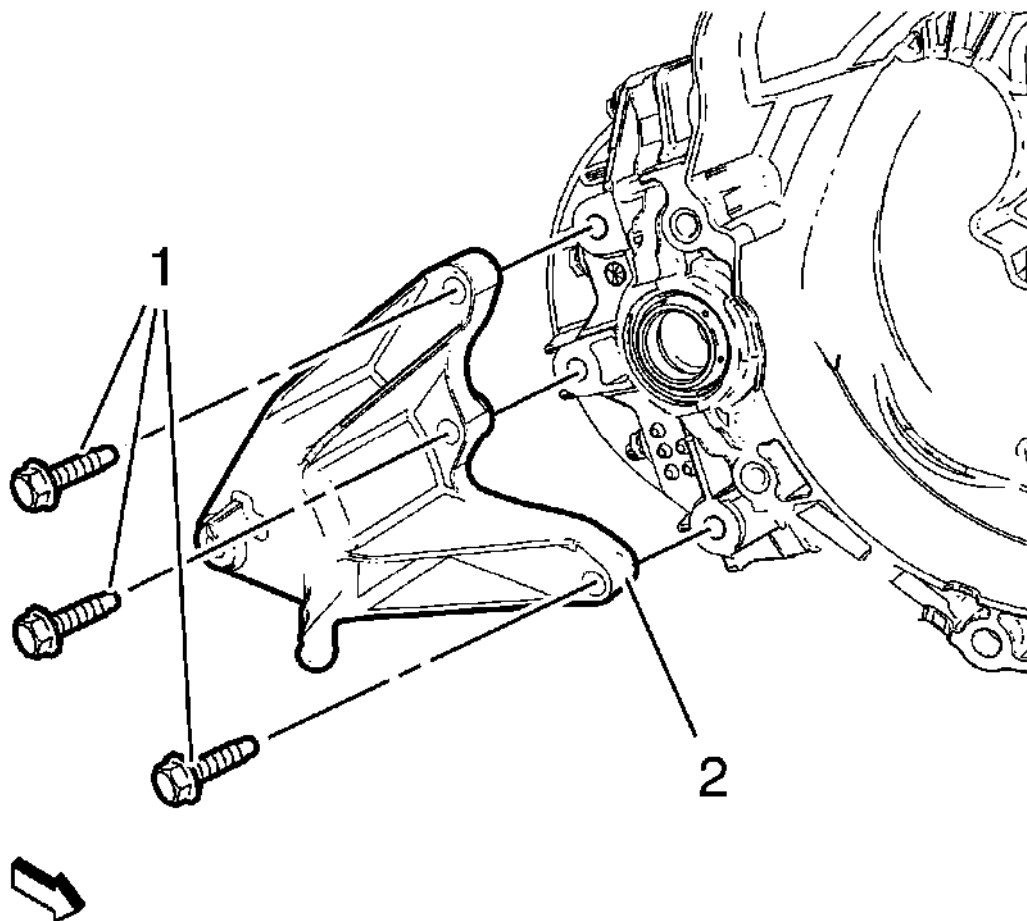


Fig. 104: Transmission Mount Bracket And Bolts

Courtesy of GENERAL MOTORS COMPANY

10. Remove the transmission mount bracket bolts (1) and the rear transmission mount bracket (2).
11. Drain transmission fluid.
12. Disconnect the left front wheel drive shaft from the transmission. Refer to **Front Wheel Drive Shaft Replacement - Left Side** .
13. Disconnect the right front wheel drive shaft from the transmission. Refer to **Front Wheel Drive Shaft Replacement - Right Side** .
14. Lower the vehicle.

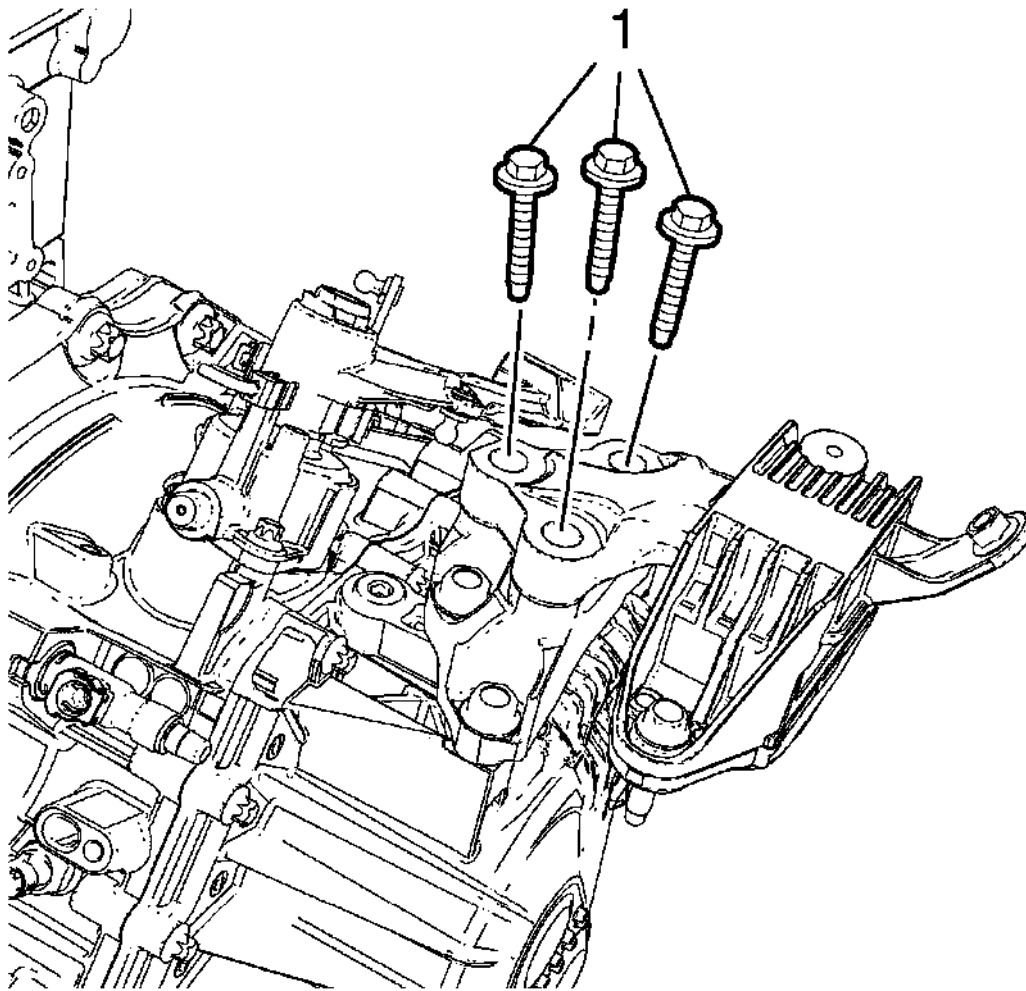


Fig. 105: Transmission Mount Bolts

Courtesy of GENERAL MOTORS COMPANY

15. Remove and DISCARD the transmission mount bolts (1) from transmission mount bracket.
16. Lower the engine and the transmission on the left hand side with the engine support fixture.

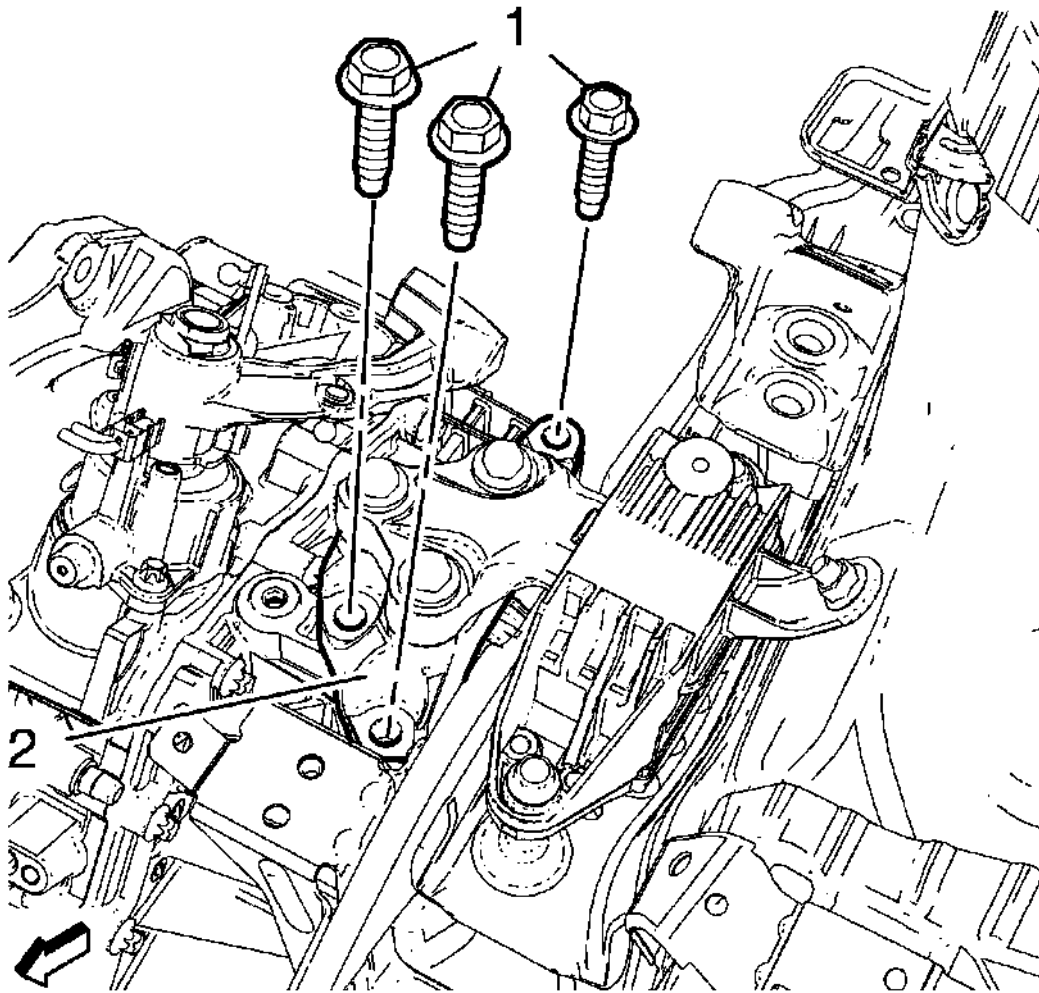


Fig. 106: Left Transmission Bracket And Bolts

Courtesy of GENERAL MOTORS COMPANY

17. Remove transmission mount bracket - left side from transmission (2). Remove 3 transmission mount bracket bolts (1).
18. Raise the vehicle.

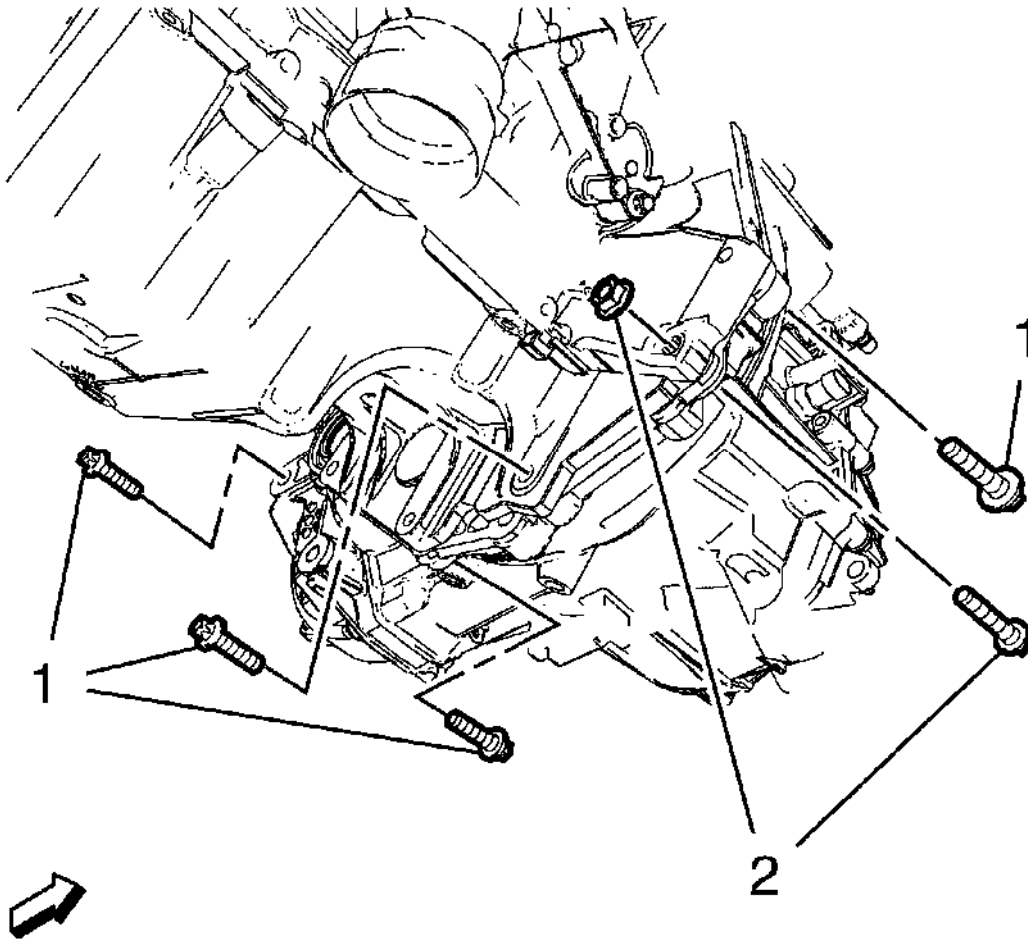


Fig. 107: Transmission Lower Bolts And Nuts
Courtesy of GENERAL MOTORS COMPANY

19. Using a suitable straps or chains, secure the transmission to a suitable transmission jack.
20. Remove 4 transmission lower bolts (1)
21. Remove transmission lower bolt and nut (2)

CAUTION: Refer to Fastener Caution .

22. Install NEW oil drain plug and tighten to 20 N.m (15 lb ft).

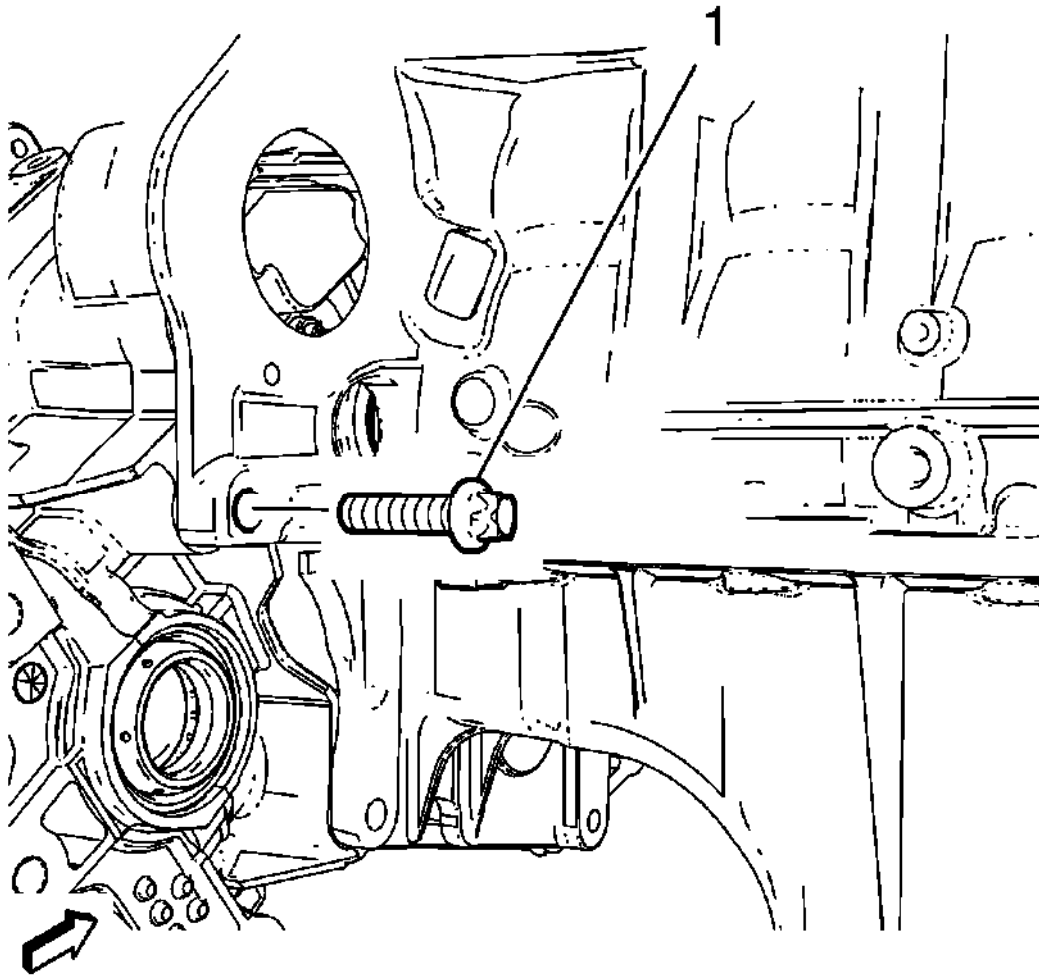


Fig. 108: Lower Transmission Bolt
Courtesy of GENERAL MOTORS COMPANY

23. Remove the remaining lower transmission bolts (1).
24. Separate the transmission from the engine.
25. Lower the transmission from the vehicle.

Installation Procedure

WARNING: Use care when cleaning the clutch hub. The clutch hub may have sharp edges and can cause personal injury if contact is made. Wear protective gloves to avoid personal injury.

1. Clean the clutch hub and the input shaft from any debris and contaminants with a lint-free towel.

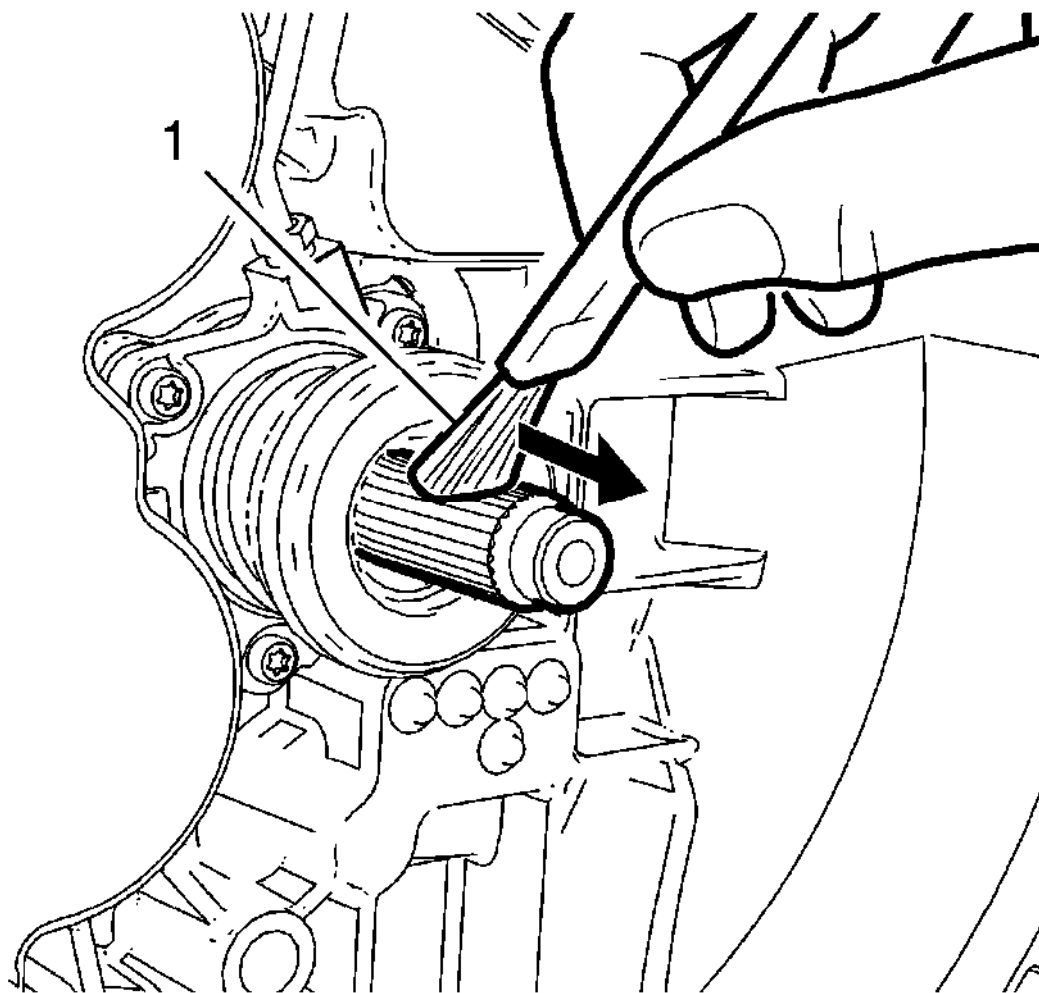


Fig. 109: Using Flat Brush To Apply Light Coating Of Multi-Purpose Grease

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Applying too much or the wrong type of grease on the transmission input shaft may cause damage, clutch slippage or failure. Always apply the correct type of grease. Never apply more grease than is necessary to coat the transmission input shaft with a very thin film of grease.

2. Use a clean flat brush (1) to apply very light coating of multi-purpose grease to input shaft until the metal is only shiny. No visible clumps of grease are permissible regardless of size. Smear away from the transmission in direction of the shown arrow.

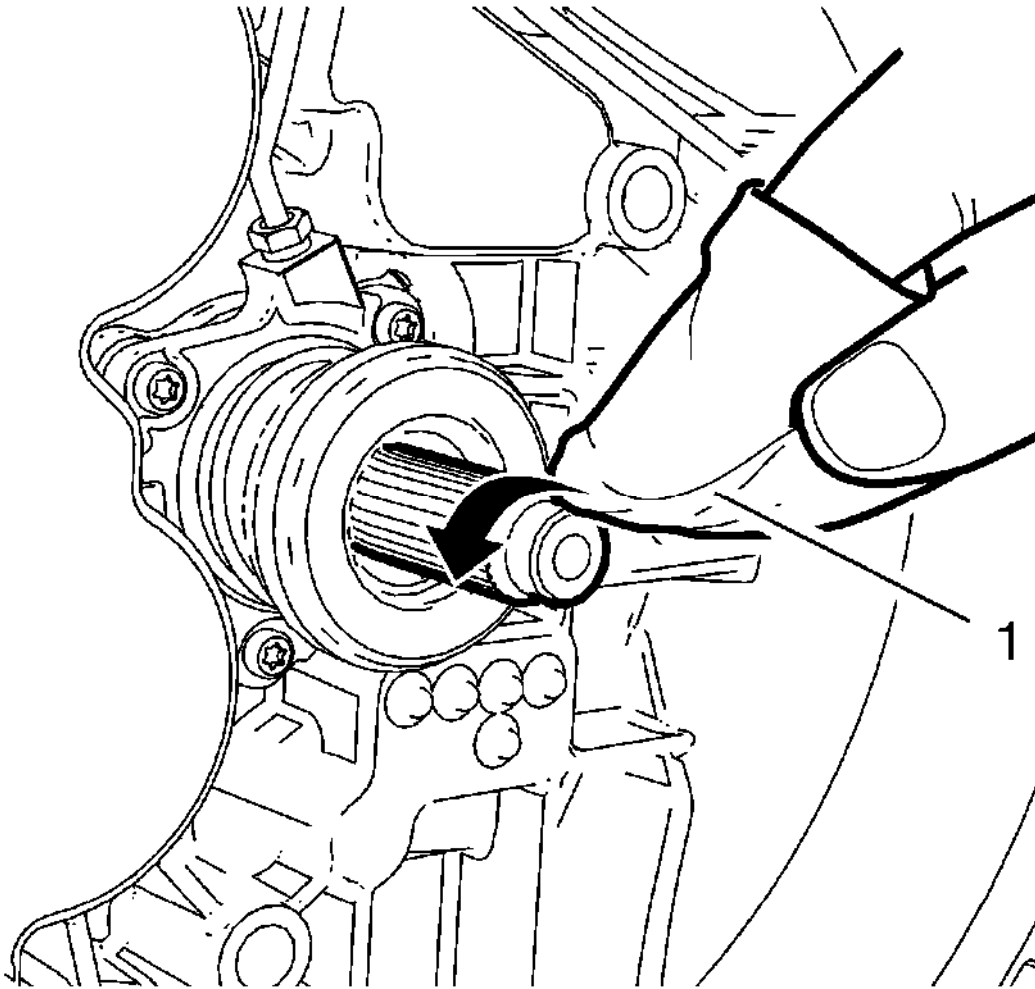


Fig. 110: Lint Free Towel

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Ensure that no grease remains on the lead surface of the transmission input shaft. Clean the lead surface of the transmission input shaft prior to the assembly of the transmission to the engine. Failure to maintain a clean surface may cause clutch slippage or failure.

3. Clean the entire lead surface of the input shaft with a NEW, lint-free towel (1).
4. Raise the transmission with the transmission jack and position the transmission to the engine.

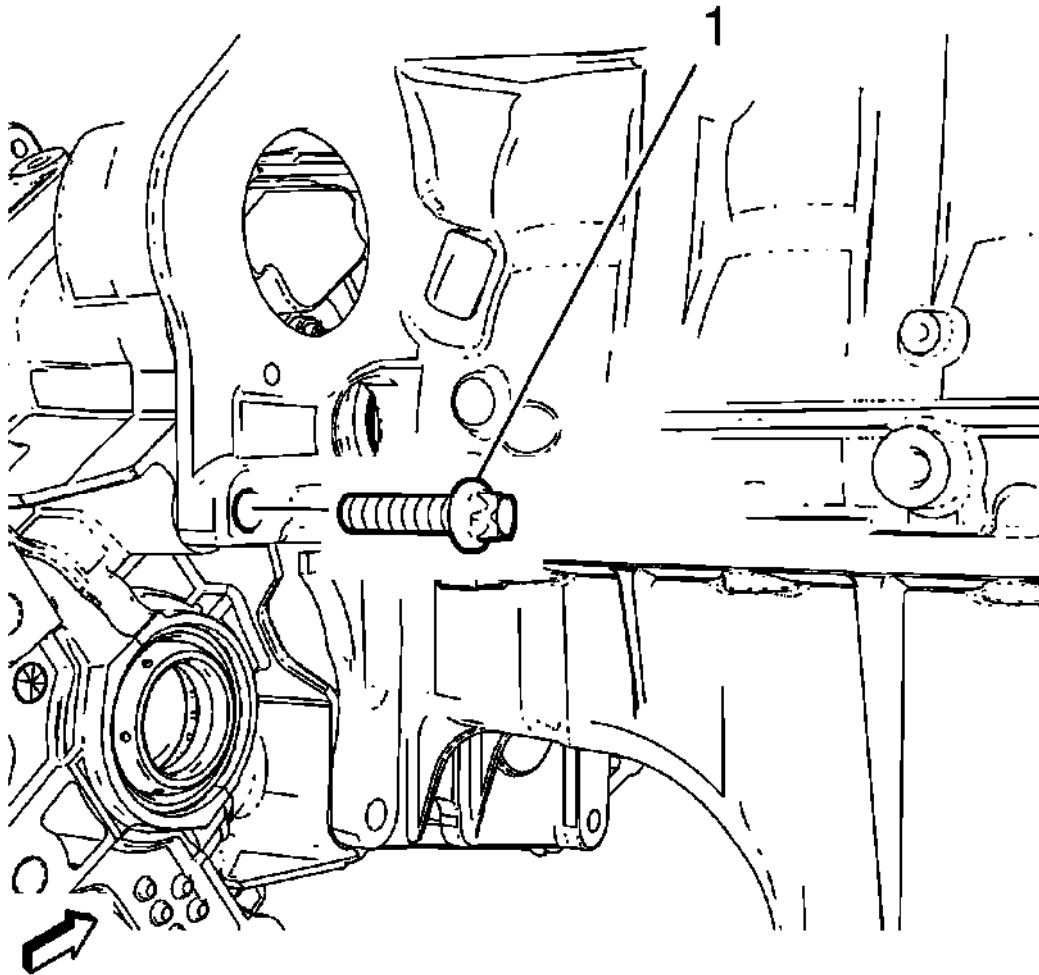


Fig. 111: Lower Transmission Bolt
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

5. Install transmission lower bolt (1) and tighten to 60 N.m (44 lb ft).
6. Remove the transmission jack.

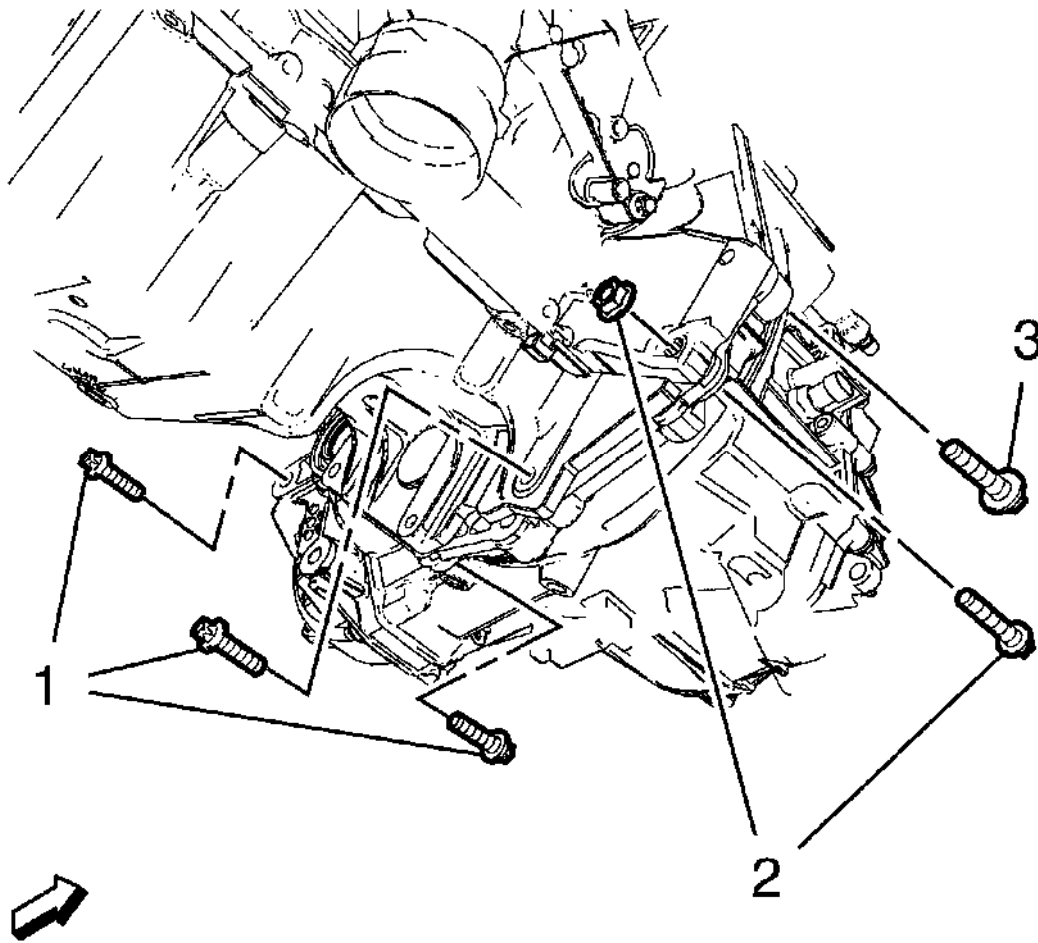


Fig. 112: Transmission Bolts

Courtesy of GENERAL MOTORS COMPANY

7. Install 3 transmission lower bolts (1) and tighten to 40 N.m (32 lb ft).
8. Install transmission bolt (3) and tighten to 60 N.m (44 lb ft).
9. Install transmission lower bolt and nut (2) and tighten to 40 N.m (32 lb ft).
10. Lower the vehicle.

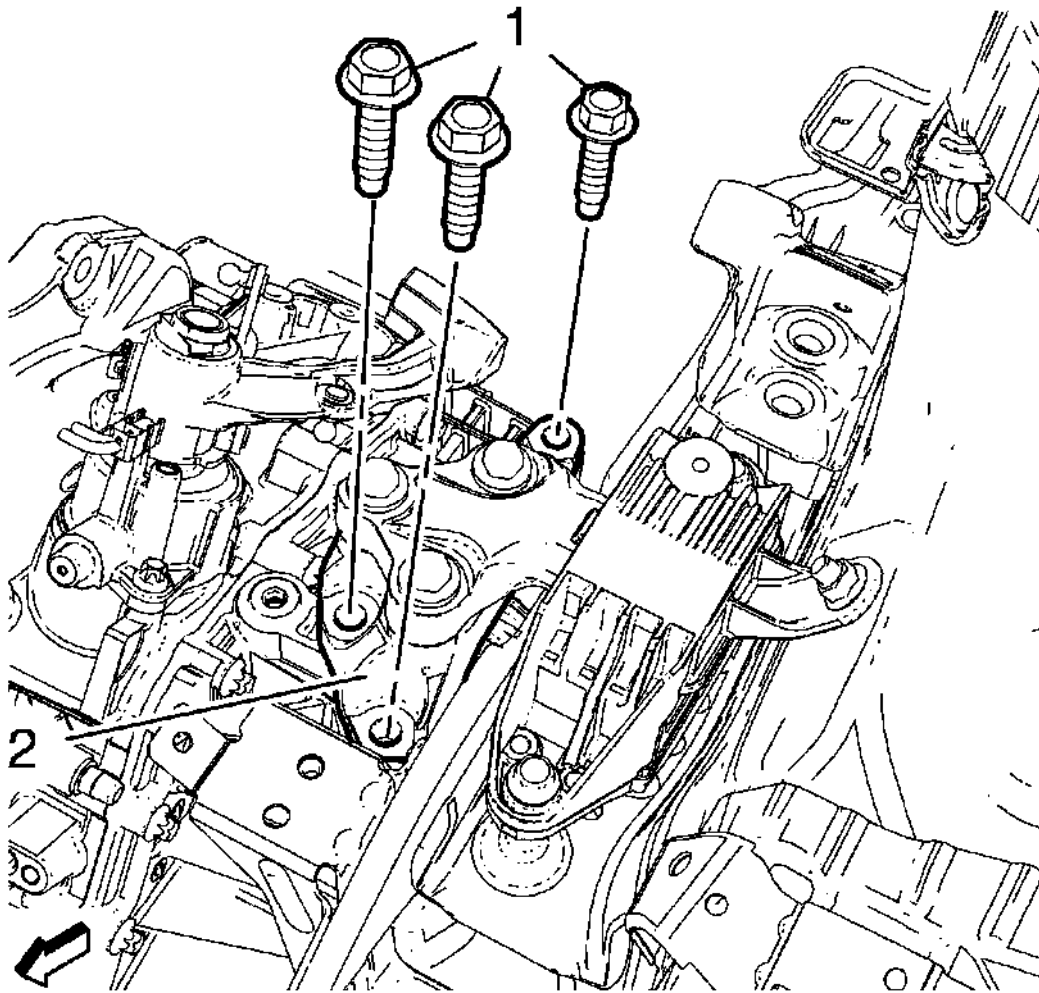


Fig. 113: Left Transmission Bracket And Bolts

Courtesy of GENERAL MOTORS COMPANY

11. Install transmission mount bracket - left side. Install 3 transmission mount bracket bolts (1) and tighten to 100 N.m (74 lb ft).
12. Raise the engine and the transmission on the left hand side with the engine support fixture.

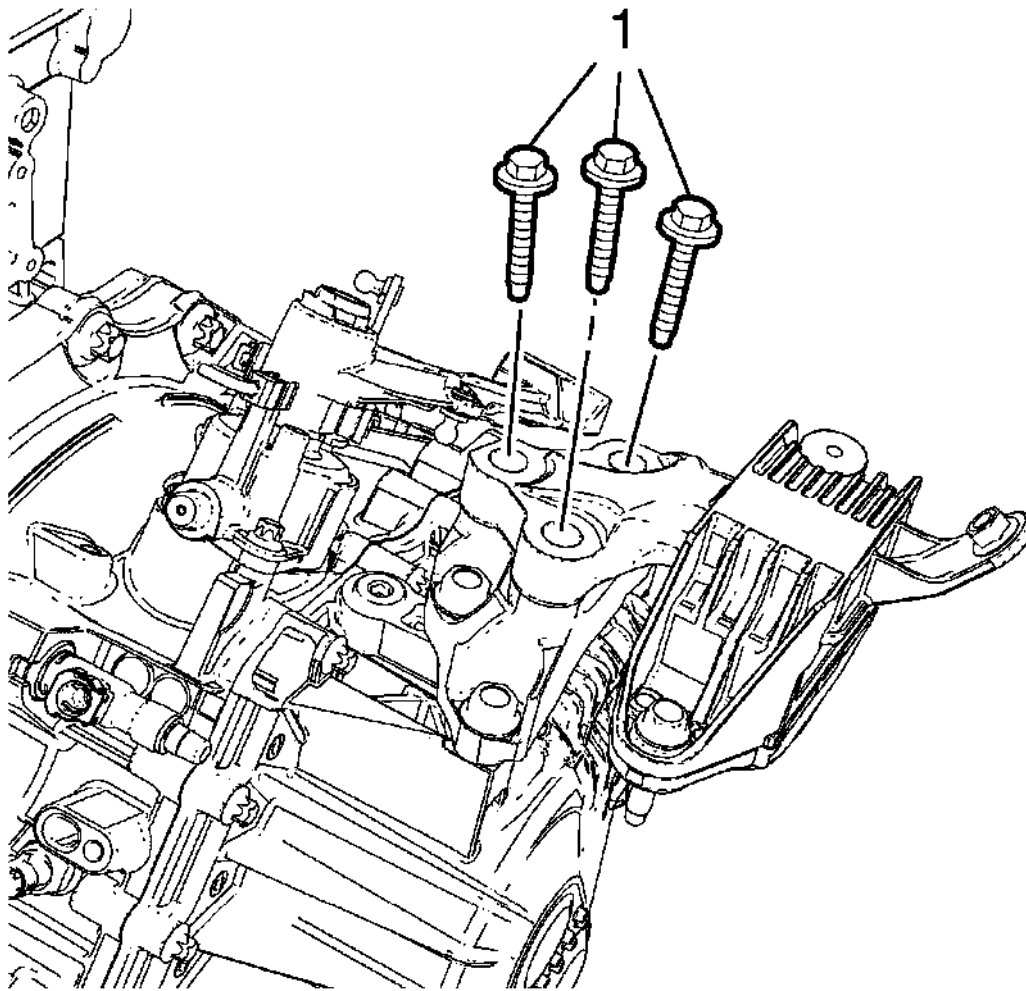


Fig. 114: Transmission Mount Bolts

Courtesy of GENERAL MOTORS COMPANY

13. Install the 3 NEW transmission mount bolts (1) but do not tighten yet.
14. Raise the vehicle.
15. Install the front wheel drive intermediate shaft. Refer to **Front Wheel Drive Intermediate Shaft Replacement** .
16. Install the left front wheel drive shaft to the transmission. Refer to **Front Wheel Drive Shaft Replacement - Left Side** .

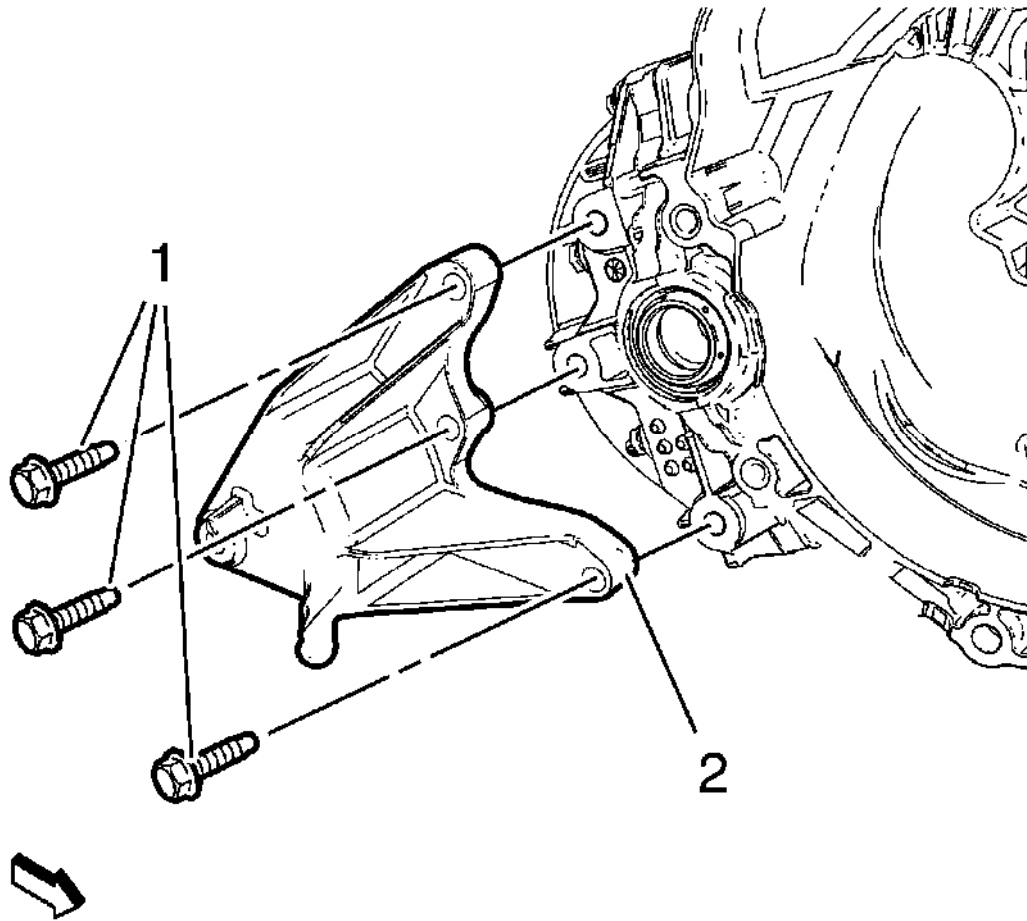


Fig. 115: Transmission Mount Bracket And Bolts
Courtesy of GENERAL MOTORS COMPANY

17. Install the transmission mount bracket - rear (2) and tighten the bolts (1) to 100 N.m (74 lb ft).

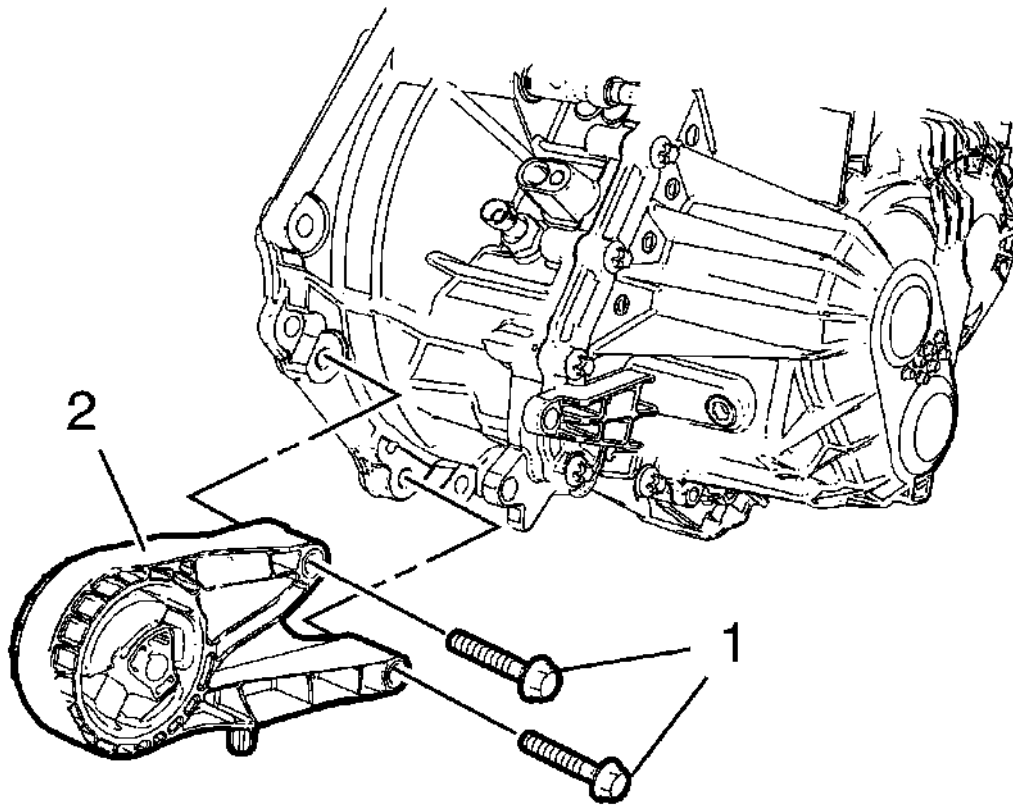


Fig. 116: Transmission Front Mount And Bolts
Courtesy of GENERAL MOTORS COMPANY

18. Install transmission front mount to transmission (2). Install 2 transmission front mount bolts (1) and tighten to 100 N.m (74 lb ft).
19. Install the drivetrain and front suspension frame. Refer to **Drivetrain and Front Suspension Frame Replacement** .
20. Lower the vehicle.

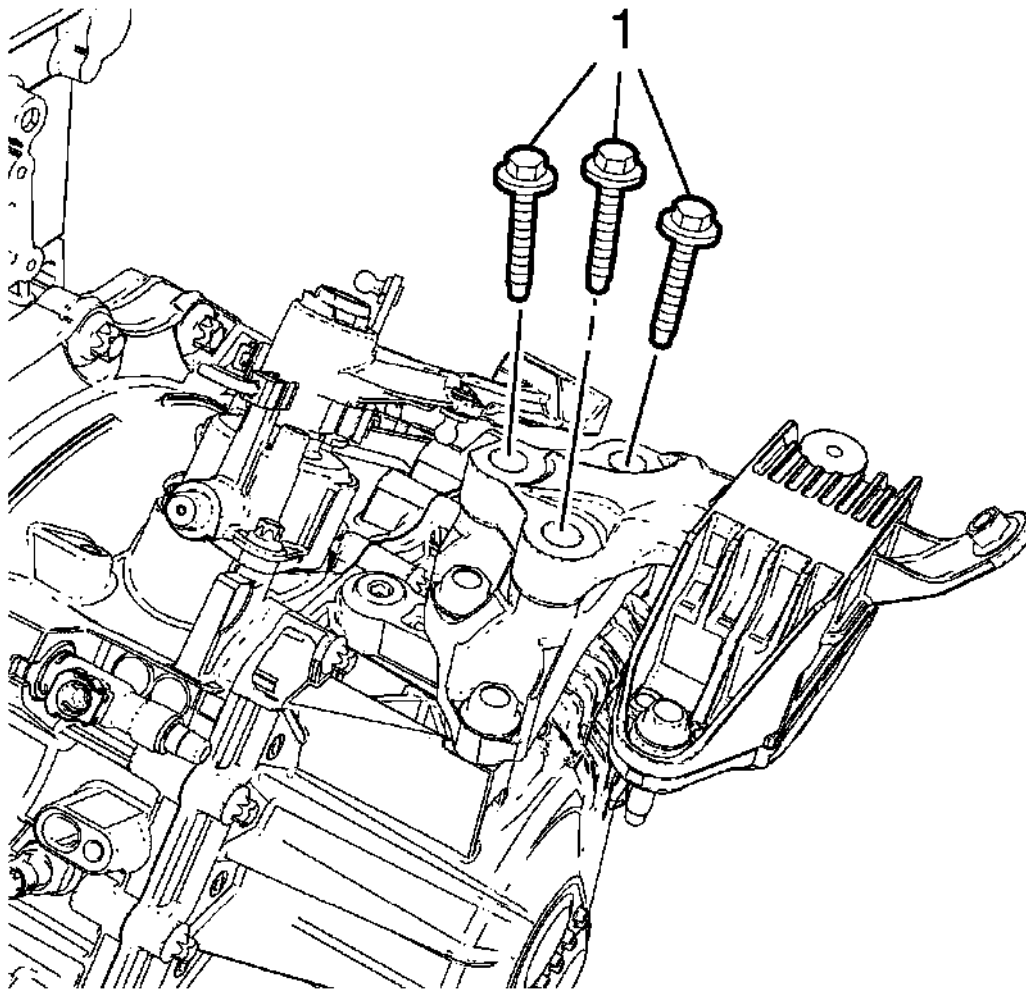


Fig. 117: Transmission Mount Bolts

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Torque-to-Yield Fastener Caution .

21. Tighten the transmission mount bolts left side (1) to 50 N.m (46 lb ft) plus 60-75 degrees.
22. Remove the engine support fixture.

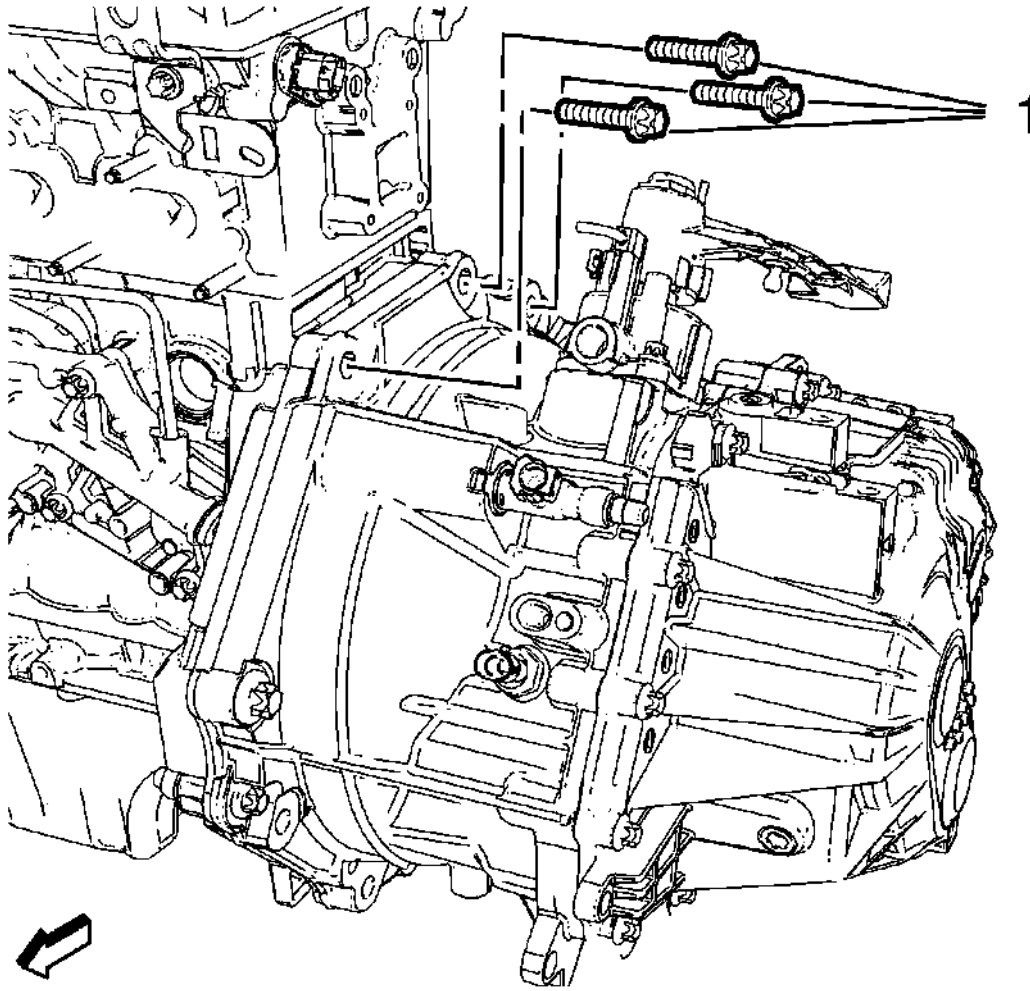


Fig. 118: Upper Transmission Bolts
Courtesy of GENERAL MOTORS COMPANY

23. Install the upper transmission bolts (1) to engine and tighten to 60 N.m (44 lb ft).

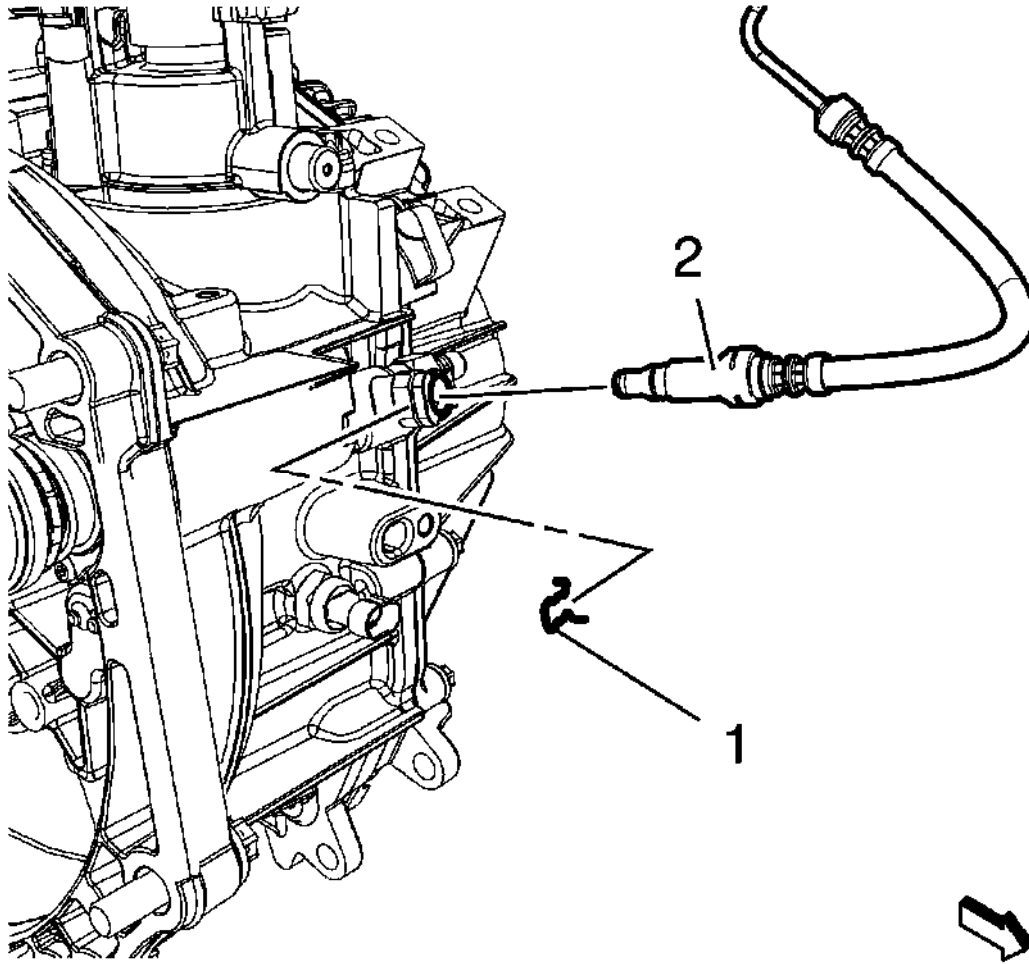


Fig. 119: Clutch Actuator Cylinder Front Pipe And Retainer
Courtesy of GENERAL MOTORS COMPANY

24. Connect the clutch actuator cylinder front pipe (2) to the clutch actuator cylinder pipe elbow.
25. Install the clutch actuator cylinder front pipe retainer (1) to the clutch actuator cylinder pipe elbow.

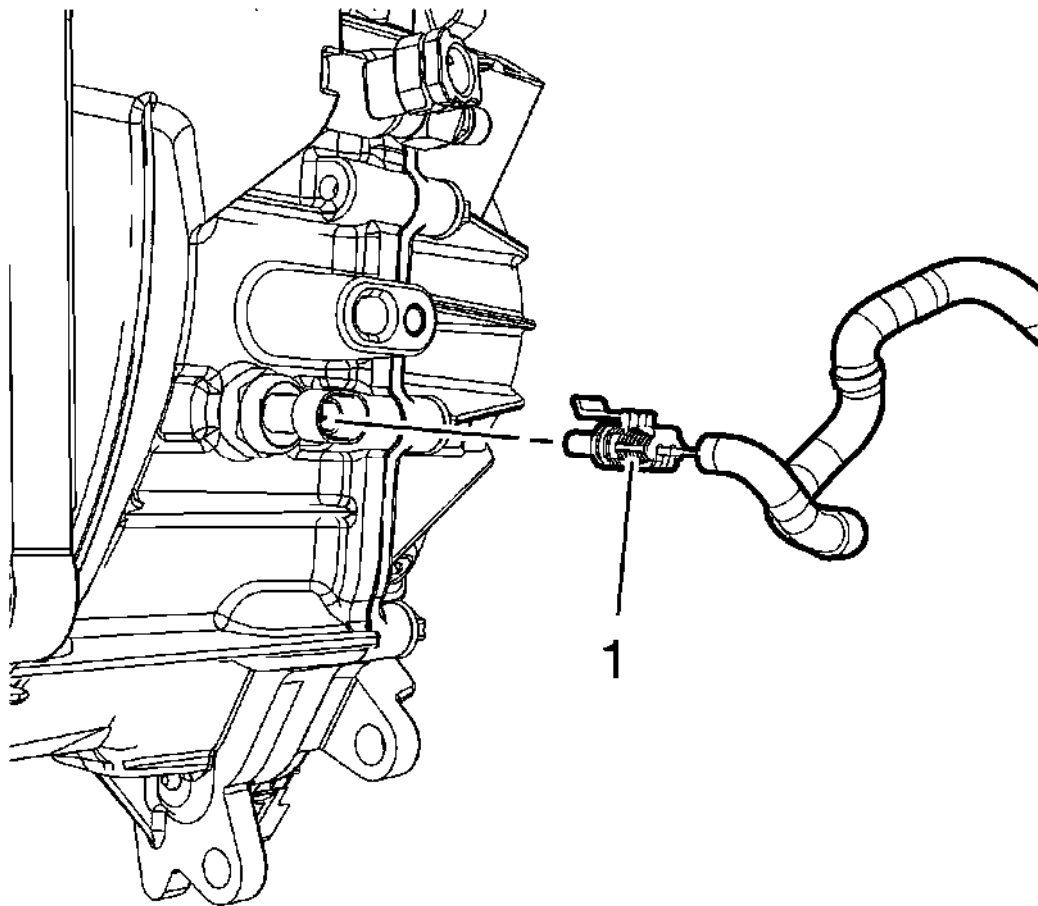


Fig. 120: Backup Lamp Switch Electrical Connector

Courtesy of GENERAL MOTORS COMPANY

26. Connect the electrical connector (1) to the backup lamp switch.
27. Install the transmission shift lever cable to transmission. Refer to **Manual Transmission Shift Lever and Selector Lever Cable Replacement**.
28. Adjust the shift lever and selector lever cables. Refer to **Manual Transmission Shift Lever and Selector Lever Cable Adjustment**.
29. Bleed the clutch hydraulic system. Refer to **Hydraulic Clutch System Bleeding**.
30. Inspect the transmission fluid level.
31. Install the battery tray. Refer to **Battery Tray Replacement**.
32. Road test the vehicle.

DESCRIPTION AND OPERATION

TRANSMISSION SYSTEM DESCRIPTION AND OPERATION

The M32-6 is a 6-speed manual transmission. This service information transmission is an all-synchromesh 3-shaft transmission.

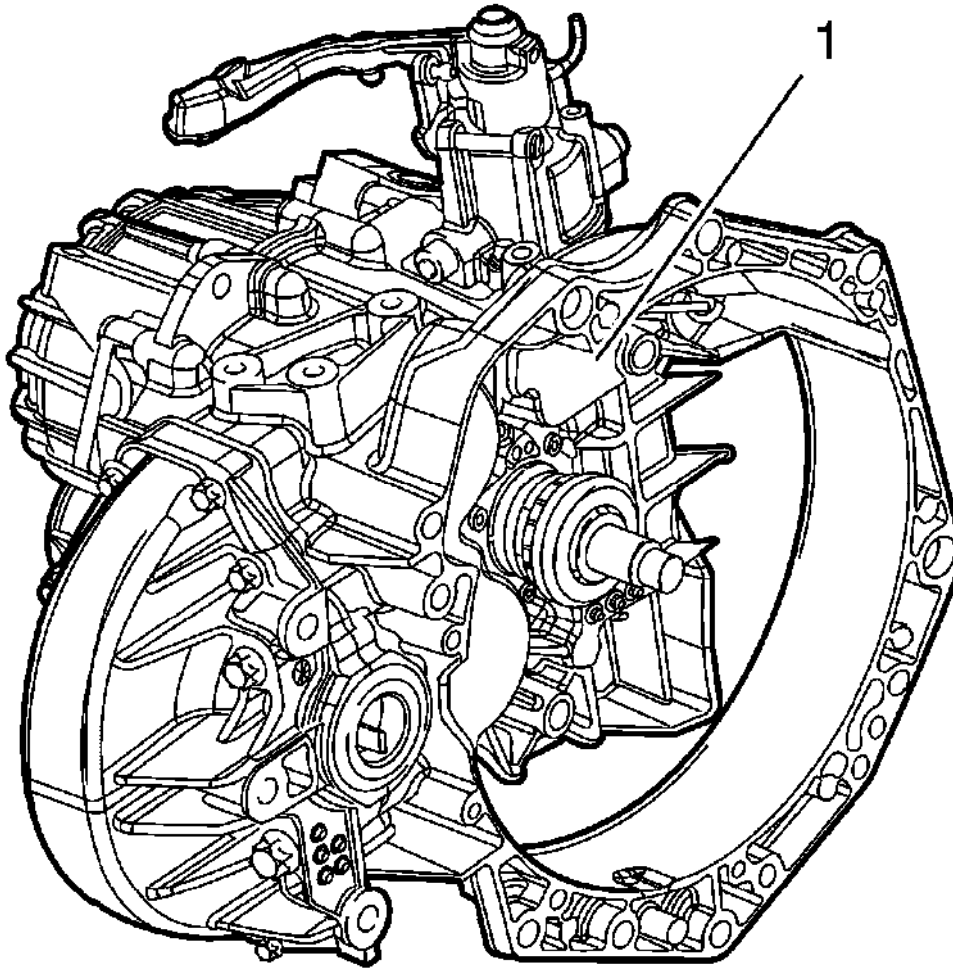


Fig. 121: 3 Shaft Transmission

Courtesy of GENERAL MOTORS COMPANY

This 3-shaft transmission (1) has the following advantages:

- Compact construction
- Improved smooth-running performance
- Better shift quality
- High torque transmission
- Low weight

Location of the Shafts

The following cross-sectional diagram shows the location of the respective shafts in the M32-6 transmission, as per the 3-shaft principle.

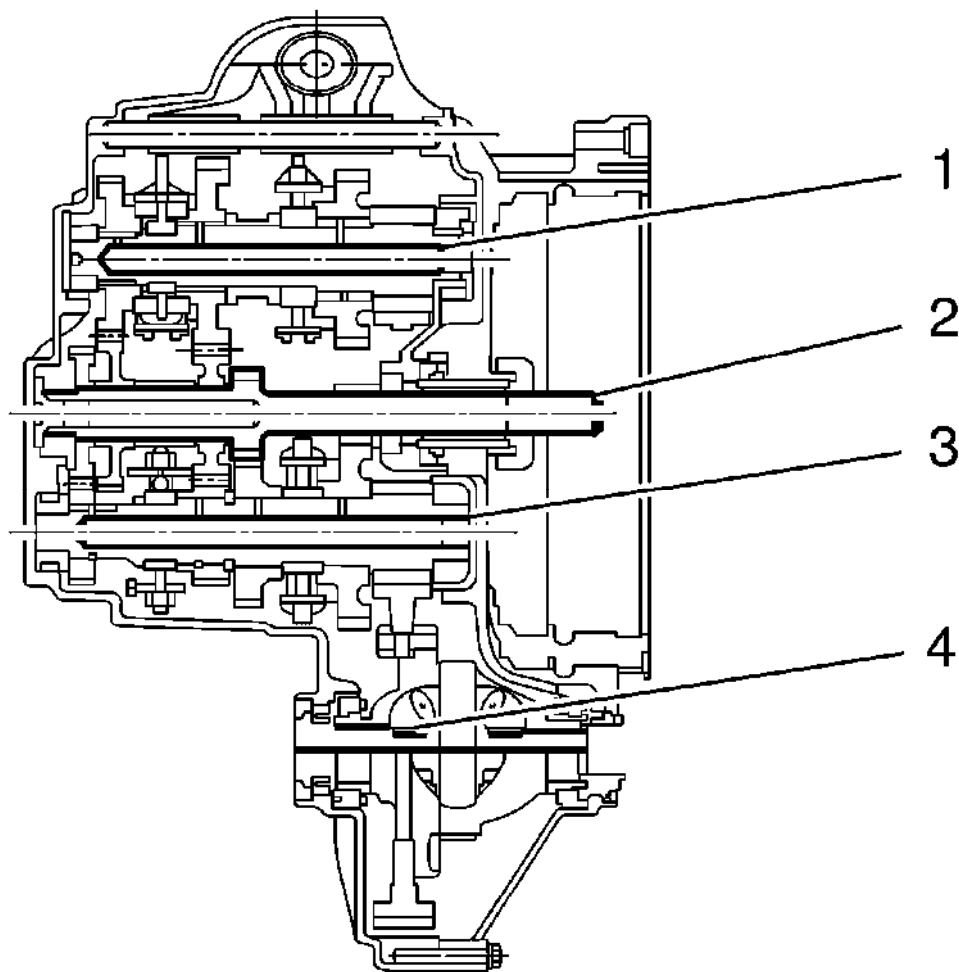


Fig. 122: Shaft Locations

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Upper Main Shaft
2	Input Shaft
3	Lower Main Shaft
4	Differential Gear

In this transmission angular cone bearings are used for all shafts. These bearings require a certain amount of play and pretension. The required amount of bearing play and pretension is achieved at the production stage by using shims under the angular cone bearing in the transmission housing.

Location of Gearwheels

This diagram shows the location of the gearwheels on the respective shaft.

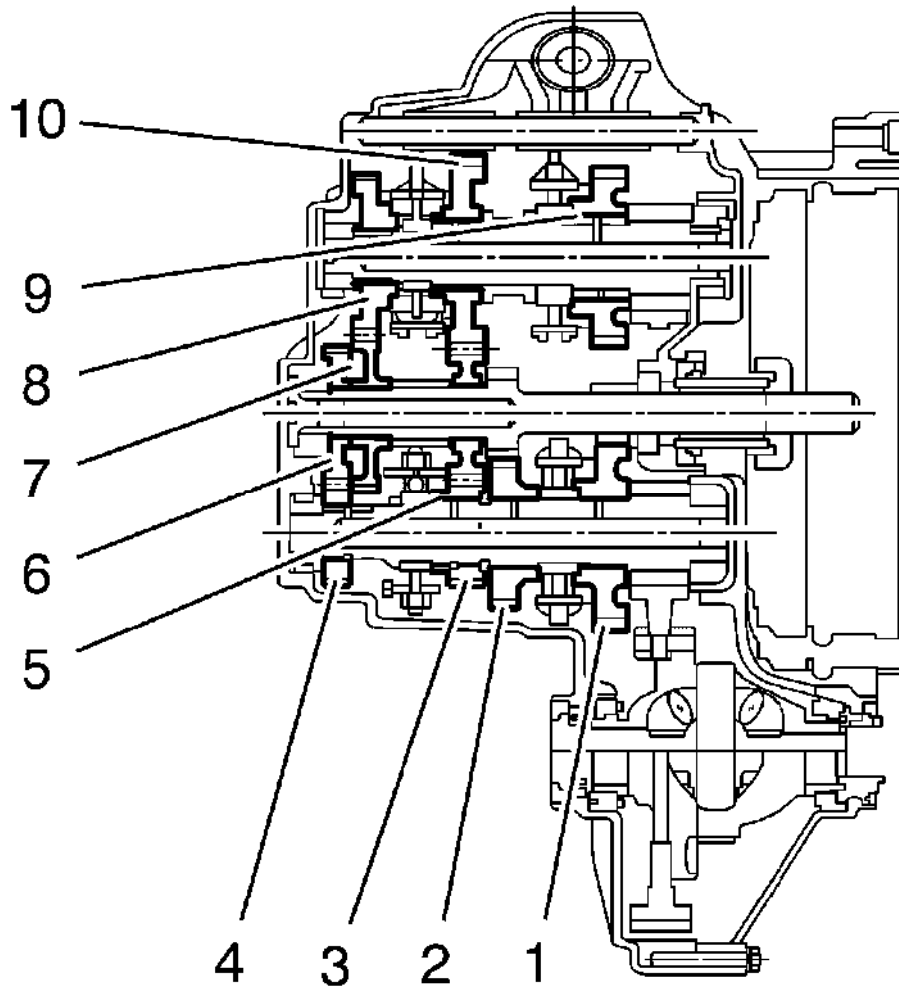


Fig. 123: Gearwheel Locations

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	1st Gear Gearwheel
2	2nd Gear Gearwheel
3	5th Gear Gearwheel
4	6th Gear Gearwheel
5	3rd/5th Gear Gearwheel
6	6th Gear Gearwheel
7	4th Gear Gearwheel
8	4th Gear Gearwheel
9	Reverse Gear Gearwheel
10	3rd Gear Gearwheel

Power Flow in the Individual Gears

The following diagrams show the flow of power in the individual gears.

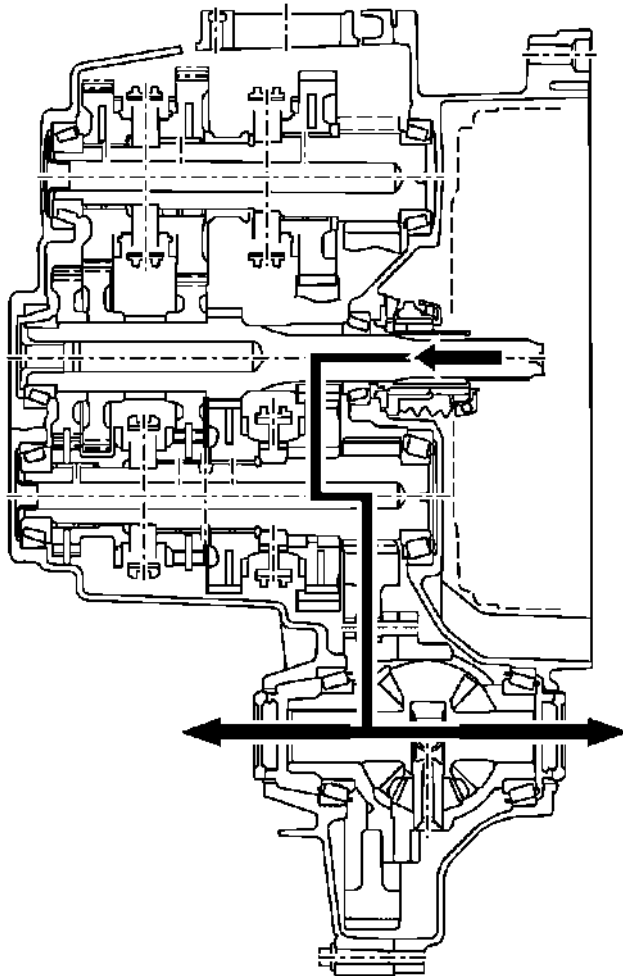


Fig. 124: Transmission 1st Gear Power Flow
Courtesy of GENERAL MOTORS COMPANY

1st gear

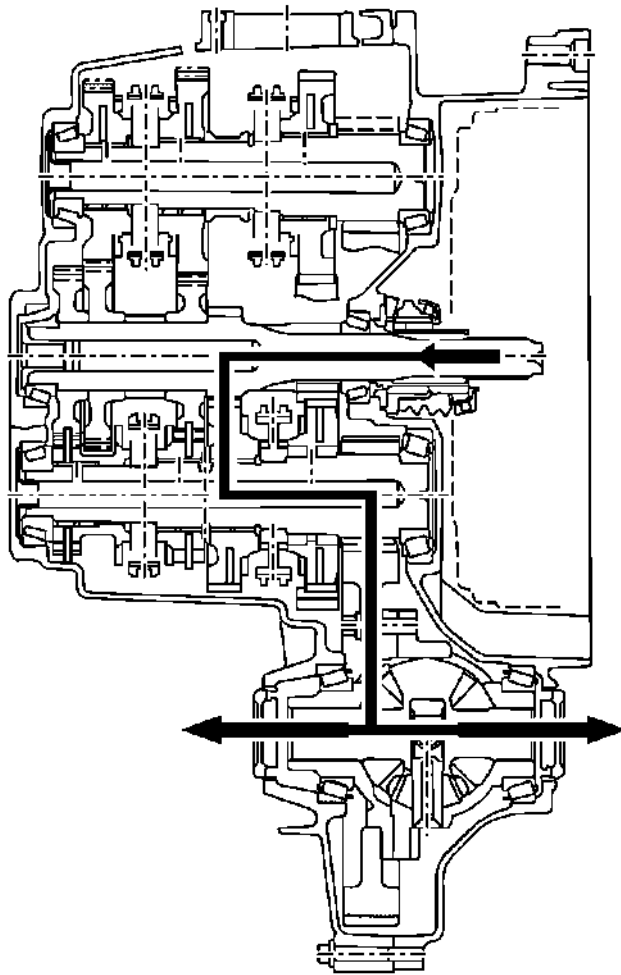


Fig. 125: Transmission 2nd Gear Power Flow
Courtesy of GENERAL MOTORS COMPANY

2nd gear

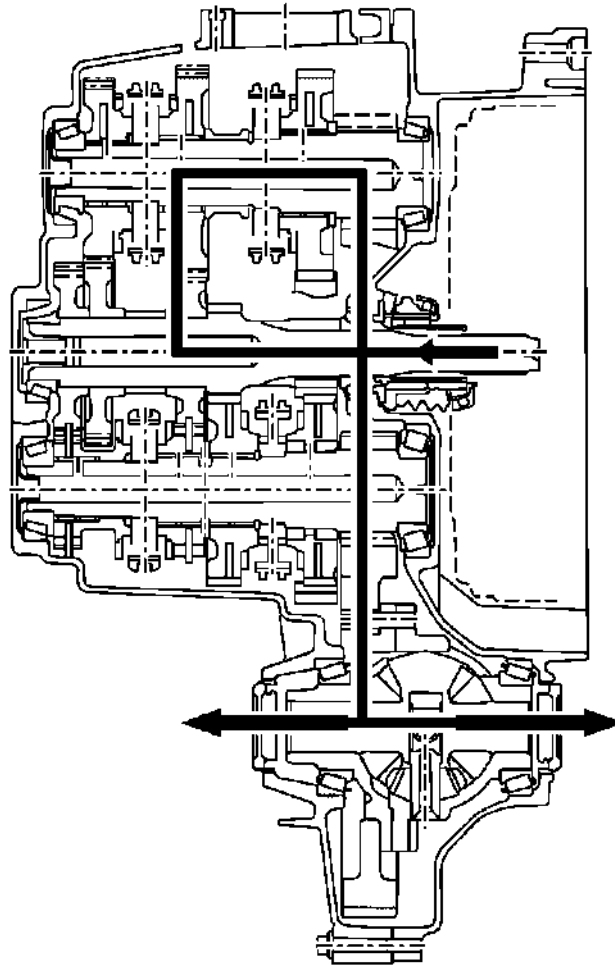


Fig. 126: Transmission 3rd Gear Power Flow
Courtesy of GENERAL MOTORS COMPANY

3rd gear

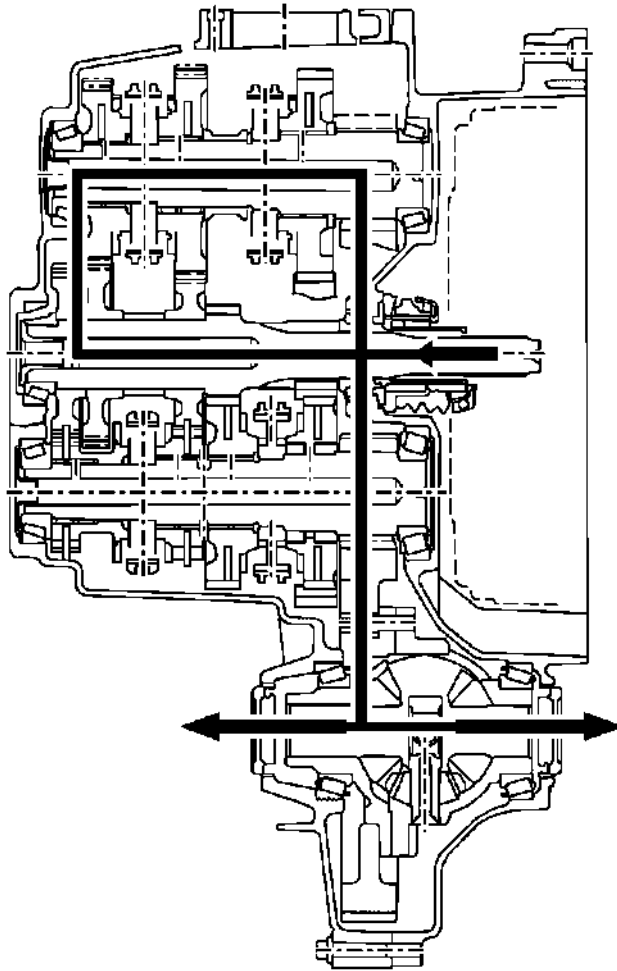


Fig. 127: Transmission 4th Gear Power Flow
Courtesy of GENERAL MOTORS COMPANY

4th gear

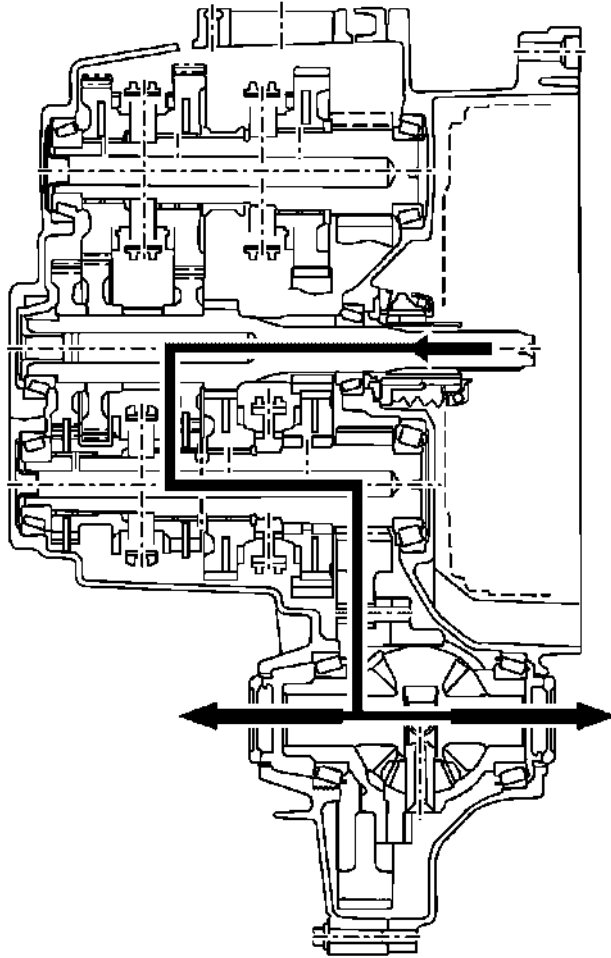


Fig. 128: Transmission 5th Gear Power Flow
Courtesy of GENERAL MOTORS COMPANY

5th gear

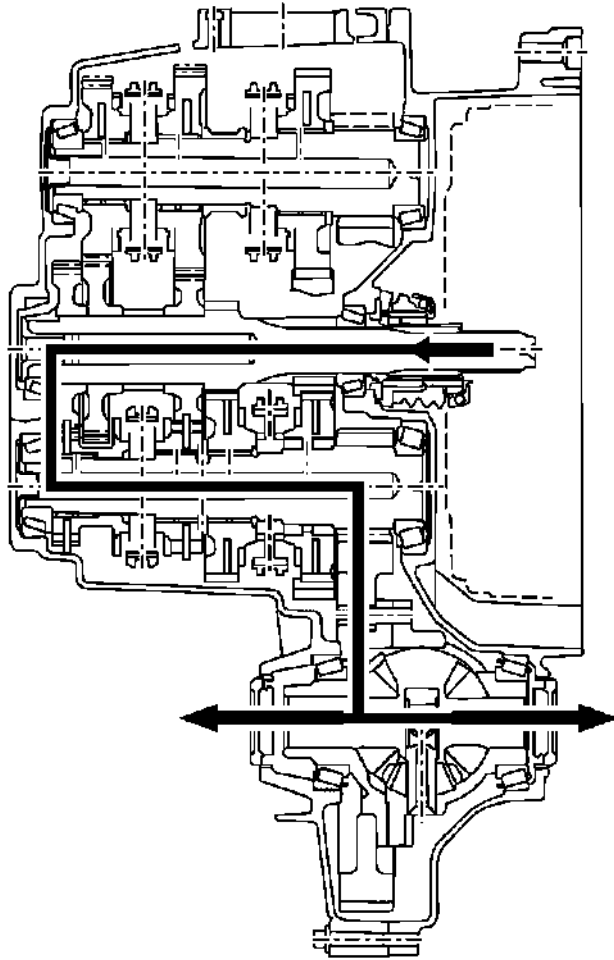


Fig. 129: Transmission 6th Gear Power Flow
Courtesy of GENERAL MOTORS COMPANY

6th gear

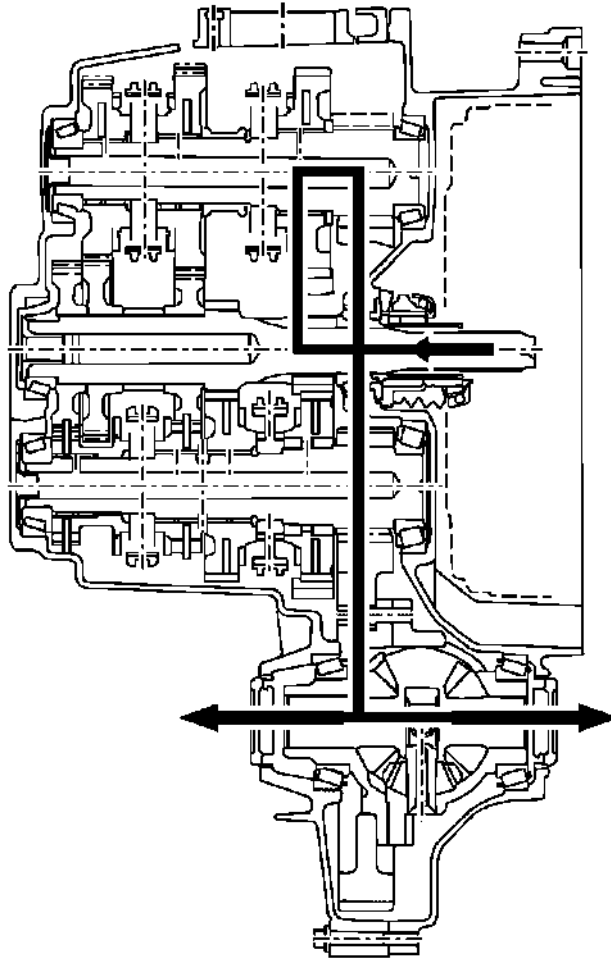


Fig. 130: Transmission Reverse Gear Power Flow
Courtesy of GENERAL MOTORS COMPANY

Reverse gear

TRANSMISSION IDENTIFICATION INFORMATION

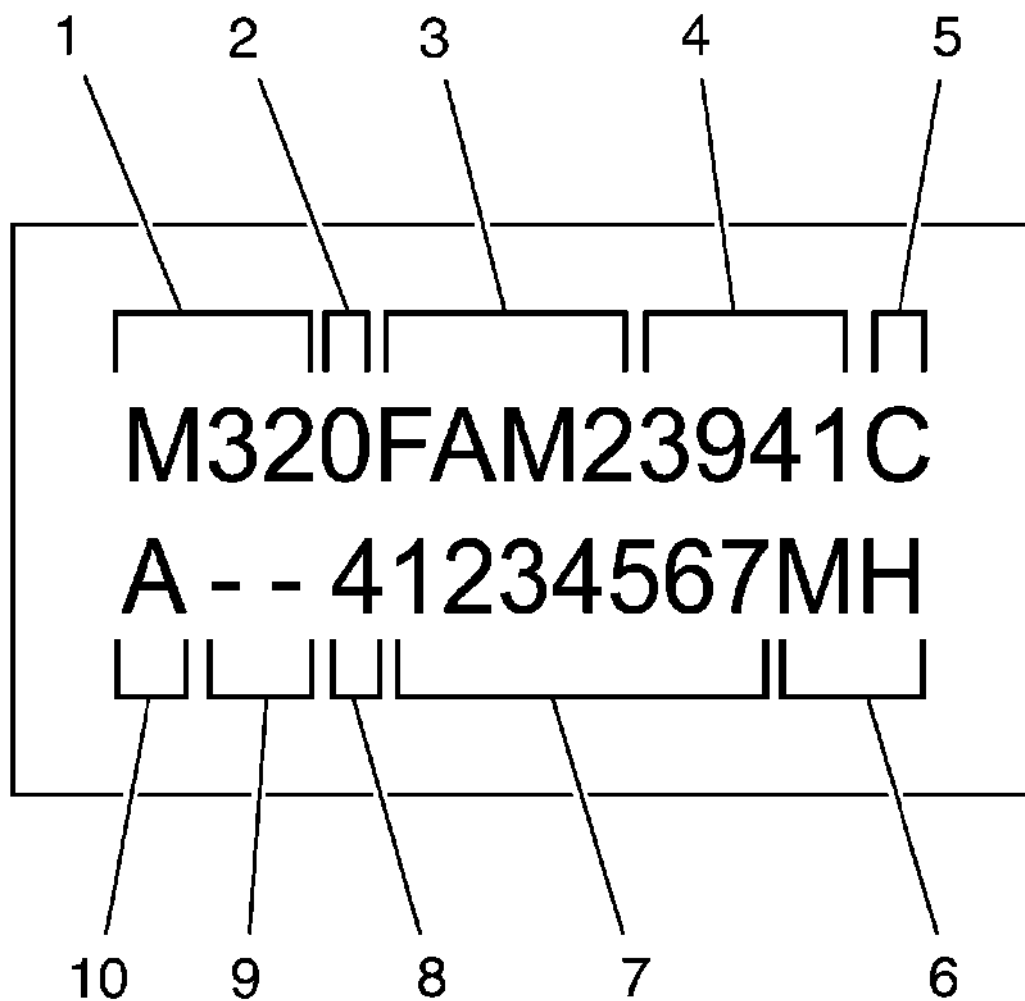


Fig. 131: Transmission Code Plate

Courtesy of GENERAL MOTORS COMPANY

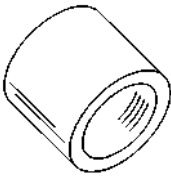
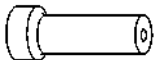
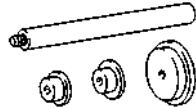
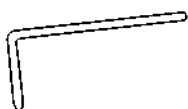
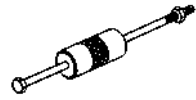
The code for the M32-6 transmission will be found on the back of the transmission housing, above the axle shaft. In addition, an Alphacode sticker will be placed on the cover of the differential.

- Transmission type (M32) (1)
- Design (2)
- Engine family (3)
- Output ratio (3.941) (4)
- Gear set (C) (5)
- Alpha Code (MH) (6)
- Serial number (7 digit) (7)
- Last digit of year (4 = 2004) (8)
- 2 blanks (9)

- Manufacturing plant (A = Aspern) (10)

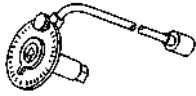
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/Description
	CH-466-A KM-466-A Gear, Bearing Remover/Installer
	DT-519 KM-519 J-44385 Oil Seal/Ring Installer
	DT-523 KM-523 J-44809 Remover/Installer
	DT-527-A KM-527-A Adjuster
	DT-586 KM-586 J-23129 Remover Hook
	DT-7004 KM J-7004 GE-6125-1B Slide Hammer
	EN-45059 KM-45059 KM-470-B

2013 Chevrolet Cruze

2013 TRANSMISSION Manual Transmission - M32 - Cruze



Angle Meter



EN-28467-B
J-28467-B
Universal Engine Support Fixture