

2017 TRANSMISSION**Manual Transmission - D16/D20 (M4P) - Encore, Trax****SPECIFICATIONS****FASTENER SPECIFICATIONS****Single Use Non-Threaded Fasteners/Components**

NOTE: <i>All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.</i>	
Application	
Front Wheel Drive Shaft Seal - Left	
Front Wheel Drive Shaft Seal - Right	

Single Use Threaded Fastener/Component Tightening Specifications

NOTE: <i>All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.</i>	
Application	Specification
	Metric (English)
Front Differential Ring Gear Bolts	
• First Pass:	70 N.m (52 lb ft)
• Final Pass:	30-45 Degrees
Oil Level Check Plug	
• First Pass:	6 N.m (53 lb in)
• Final Pass:	45-180 Degrees
Transmission Mount Bolts - Left Side - to Transmission Mount Bracket	
• First Pass:	50 N.m (37 lb ft)
• Final Pass:	60-75 Degrees
Transmission Rear Mount Bolt	
• First Pass:	100 N.m (74 lb ft)
• Final Pass:	90-105 Degrees
Transmission Rear Mount Bracket Bolts	
• First Pass:	100 N.m (74 lb ft)

NOTE:

All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.

Application	Specification
	Metric (English)
• Final Pass:	30-45 Degrees
Transmission Rear Mount to Bracket Through Bolt	Å
• First Pass:	80 N.m (59 lb ft)
• Final Pass:	45-60 Degrees

Reusable Threaded Fastener Tightening Specifications

NOTE:

All fasteners listed in this table can be reused after removal.

Application	Specification
	Metric (English)
5th Gear Fork Bolts	22 N.m (16 lb ft)
5th Shift Blocking Lever Bolts	7 N.m (62 lb in)
Backup Lamp Switch	20 N.m (15 lb ft)
Clutch and Differential Housing Cover Bolts	30 N.m (22 lb ft)
Front Differential Bearing Adjuster Bolts - Right Side	25 N.m (18 lb ft)
Front Differential Bearing Adjuster Lock Bolt	9 N.m (80 lb in)
Front Differential Bearing Cup - New Bearings	2 N.m (18 lb in)
Front Differential Bearing Cup - Used Bearings	0.8 N.m (7 lb in)
Oil Fill Plug	35 N.m (26 lb ft)
Shift Control Housing Bolts	15 N.m (11 lb ft)
Shift Lever and Selector Lever Cable Bracket Bolts	58 N.m (43 lb ft)
Shift Lever and Selector Lever Cable Grommet Fasteners	9 N.m (80 lb in)
Shift Shaft Interlock Pin Connector Bolts	7 N.m (62 lb in)
Speedometer Housing Retaining Bolt	4 N.m (35 lb in)
Transmission Case Bolts	22 N.m (16 lb ft)
Transmission Control Fasteners	9 N.m (80 lb in)
Transmission Cover Bolts	20 N.m (15 lb ft)
Transmission Lower Bolts (1)	40 N.m (30 lb ft)
Transmission Lower Bolts (2)	60 N.m (44 lb ft)
Transmission Upper Bolts	60 N.m (44 lb ft)
Transmission Mount Bolts - Left Side - to Chassis	58 N.m (43 lb ft)

APPROXIMATE FLUID CAPACITIES

Application	Specification	
	Metric	English
Transmission D16/D20		
Transmission Fluid Capacity	1.8 liters	1.9 quarts

MANUAL TRANSMISSION SPECIFICATIONS

Performance - Manual Transaxle

Application	Specification
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DTC P0503

Vehicle Speed Sensor (VSS) Circuit Intermittent

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
5 V Reference	P0502, P0503, P0641	P0502, P0503	P0502, P0503, P0641	P0502, P0503
Signal	P0502, P0503	P0502, P0503	P0502, P0503	P0502, P0503
Low Reference	-	P0502, P0503	-	-

Circuit/System Description

The output shaft speed (OSS) sensor is a 3 wire sensor. The engine control module (ECM) provides a 5 volt reference circuit, low reference circuit and a signal circuit to the OSS sensor. The OSS sensor is a Hall Effect type sensor that produces a square wave output signal to the ECM. As vehicle speed increases, the output frequency of the OSS sensor signal increases. The ECM converts the square wave output signal into vehicle speed shown as km/h (MPH) that is supplied to other control modules on the vehicle through the serial data communications circuit.

Conditions for Running the DTC**P0502**

- DTC P0101, P0102, P0103, P0106, P0107, P0108, P0300, P0301, P0302, P0303, P0304, P0305, P0306, or P0503 is not set.
- Ignition voltage is 9-32 V.
- Accelerator pedal position is 8% or greater.
- Engine speed is between 1, 500-6, 500 RPM.
- Engine torque is greater than 54 N m (40 lb ft).
- DTC runs continuously when the above conditions are met.

P0503

- Ignition voltage is 9-32 V.
- Engine speed is 200-7, 500 RPM.
- OSS sensor signal is 232 RPM or greater for 5 s.
- Change in OSS sensor signal is 124 RPM or less for 5 s.
- DTC runs continuously when the above conditions are met.

Conditions for Setting the DTC**P0502**

OSS sensor signal is less than 60 RPM for 4.5 s.

P0503

Drop in OSS sensor signal is 350 RPM or greater for 3 s.

Action Taken When the DTC Sets

- {Model year 14 and older} DTCs P0502, P0503 are Type B DTCs.
- {Model year 15 and newer} DTCs P0502, P0503 are Type A DTCs.

Conditions for Clearing the DTC

- {Model year 14 and older} DTCs P0502, P0503 are Type B DTCs.
- {Model year 15 and newer} DTCs P0502, P0503 are Type A DTCs.

Diagnostic Aids

- The battery must be fully charged. Refer to [Battery Inspection/Test](#).
- Remove and inspect the B14A Transmission Output Shaft Speed Sensor for metal debris on the output shaft facing end of the sensor.
- Inspect the transmission output shaft target wheel teeth for damage.
- Visually inspect the B14A Transmission Output Shaft Speed Sensor for cracks or damage.
- Ensure the B14A Transmission Output Shaft Speed Sensor is not loose and is properly torqued to the transmission.
- When a speed sensor fault is present, the scan tool Output Shaft Speed Sensor parameter may show a defaulted processed speed, based on another source such as Antilock Brake System (ABS) wheel speed. Use of this parameter is not recommended for fault diagnosis.

Reference Information

Schematic Reference

[Manual Transmission Schematics \(Manual Transmission \(Chevrolet with 2H0 and MM3\)\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#), [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

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. Ignition ON.
2. Verify DTC P0641 is not set.
 - If DTC P0641 is set

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#).

- If DTC P0641 is not set

CAUTION: Support the lower control arms in the normal horizontal position in order to avoid damage to the drive axles. Do not operate the vehicle in gear with the wheels hanging down at full travel.

3. Raise and support the drive wheels in a horizontal position.

4. Start and idle the engine.
5. Place the transmission in second gear and release the clutch pedal.
6. Verify the scan tool Vehicle Speed Sensor parameter increases as the drive wheel speed increases.
 - **If the Vehicle Speed Sensor parameter does not increase**

Refer to Circuit/System Testing.
 - **If the Vehicle Speed Sensor parameter does increase**
7. 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.
 - **If the DTC sets**

Refer to Circuit/System Testing.
 - **If the DTC does not set**
8. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF. Disconnect the harness connector at the B14A Transmission Output Shaft Speed Sensor. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal A and ground.
 - **If 10 Ω or greater**
 1. Disconnect the X1 harness connector at the K20 Engine Control Module.
 2. Test for less than 2 Ω in the circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K20 Engine Control Module.
 - **If less than 10 Ω**
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 X1 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 Ω in the 5 V reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K20 Engine Control Module.
 - **If greater than 5.2 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K20 Engine Control Module, Ignition ON.
 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. Test for 11 V or greater between the signal circuit terminal B and ground.
 - **If less than 11 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K20 Engine Control Module.
 2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.

- If less than 2 Ω , replace the K20 Engine Control Module.

- If 11 V or greater

6. Replace the B14A Transmission Output Shaft Speed Sensor.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- [Speedometer Driven Gear Replacement](#)
- [Control Module References](#) for ECM replacement, programming and setup.

DTC P0806-P0808: CLUTCH PEDAL POSITION (CPP) SENSOR

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
5V Reference	P0651, P0807	P0807	P0651, P0808	-
Signal	P0807	P0807	P0808	P0806
Low Reference	-	P0808	-	-

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: 1 V with clutch pedal applied to 4 V when clutch pedal is released.			
5V 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.			
5V Reference	100%	100%	0%
Signal	100%	100%	0%
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 near 4 V when the clutch pedal is released, to a voltage near 1 V when the clutch pedal is applied.

Conditions for Running the DTC

- DTCs P0641, P0651, P0335, P0336, P0607 or P080A is not set.
- The system voltage is more than 9 V.
- The ignition is in the RUN position.

Conditions for Setting the DTC

P0806

The CPP sensor is stuck in range.

P0807

The CPP sensor voltage is less than 0.1 V for more than 1 s.

P0808

The CPP sensor voltage is more than 5.2 V for more than 1 s.

Action Taken When the DTC Sets

P0806-P0808 are Type A DTCs.

Conditions for Clearing the DTC

P0806-P0808 are Type A DTCs.

Reference Information

Schematic Reference

Manual Transmission Schematics (Manual Transmission (Chevrolet with 2H0 and MM3))

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE) COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)

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

Circuit/System Verification

1. Ignition ON.
2. Verify DTC P0651, P0335, P0336, or P080A is not set
 - **If DTC P0651, P0335, P0336, or P080A is set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .
 - **If DTC P0651, P0335, P0336, or P080A is not set**
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 applied.
 - **If the percentage does not vary from 0% to 100%**

Refer to Circuit/System Testing.
 - **If the percentage varies from 0% to 100%**
4. 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.
 - **If the DTC does not set**
5. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the B25B Clutch Pedal Position Sensor. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 1 and ground.
 - **If 10 Ω or greater**
 1. Disconnect the X1 harness connector at the K20 Engine Control Module.
 2. Test for less than 2 Ω in the circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K20 Engine Control Module.
 - **If less than 10 Ω**
3. Ignition ON.
4. Test for 4.8-5.2 V between the 5 V reference circuit terminal 3 and ground.
 - **If less than 4.8 V**
 1. Ignition OFF, disconnect the X1 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 Ω in the 5 V reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K20 Engine Control Module.
 - **If greater than 5.2 V**
 1. Ignition OFF, disconnect the X1 harness connector at the K20 Engine Control Module, Ignition ON.
 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 X1 harness connector at the K20 Engine Control Module, Ignition ON.
2. Test for less than 1 V between the signal circuit terminal 2 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 2 and the 5 V reference circuit terminal 3.

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 X1 harness connector at the K20 Engine Control Module.
2. Test for infinite resistance between the signal circuit terminal 2 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 Ω in the signal circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , 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 2 and the low reference terminal 1 of 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 Replacement](#)
- [Control Module References](#) for ECM replacement, programming and setup

DTC P080A: CLUTCH PEDAL POSITION (CPP) NOT LEARNED

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) is a 3-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 near 4 V when the clutch pedal is released to a voltage near 1 V when the clutch pedal is applied.

Conditions for Running the DTC

Ignition is ON.

Conditions for Setting the DTC

CPP sensor learned apply position not learned.

Action Taken When the DTC Sets

P080A is a Type A DTC.

Conditions for Clearing the DTC

P080A is a Type A DTC.

Reference Information

Schematic Reference

Manual Transmission Schematics (Manual Transmission (Chevrolet with 2H0 and MM3))

Connector End View Reference

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- **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. Ignition ON.
2. Verify DTC P0651, P0806, P0807, or P0808 is not set.
 - **If DTC P0651, P0806, P0807, or P0808 is set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

- **If DTC P0651, P0806, P0807, or P0808 is not set**
3. Perform the clutch pedal position sensor learn procedure.

- **If the clutch pedal position sensor learn was not successful**

Refer to Circuit/System Testing.

- **If the clutch pedal position sensor learn was successful**

4. Ignition ON.

5. Verify DTC P080A ran and passed this ignition cycle. Operate the vehicle within the conditions for running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records.

- **If the scan tool indicates DTC P080A failed**

Refer to Circuit/System Testing.

- **If the scan tool indicates DTC P080A ran and passed this ignition cycle**

6. All OK.

Circuit/System Testing

1. Verify the clutch pedal is not loose and is properly torqued. Refer to [Clutch Pedal Replacement](#).

- **If a condition is found with the clutch pedal**

Repair or replace as necessary.

- **If no condition is found with the clutch pedal**

2. Replace the K20 Engine Control Module.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- [Clutch Pedal Position Learn](#)
- [Control Module References](#) for replacement, programming and setup.

SYMPTOMS - MANUAL TRANSMISSION

Checks	Actions
Examine for a knock at low speeds.	• Replace any worn drive axle CV joints. • Replace any worn side gear hub.
Examine for a noise most pronounced on turns.	Correct any abnormalities in the differential gear.
Examine for a clunk upon acceleration or deceleration.	• Tighten any loose engine mounts. • Replace any worn drive axle inboard joints. • Replace any worn differential pinion shaft in the case. • Replace any worn side gear hub in the case
Examine for a clunking noise in turns.	Replace any worn outboard CV joint.
Examine for a vibration.	• Replace any rough wheel bearing. • Replace any bent drive axle shaft. • Replace any out-of-round tires. • Balance any unbalanced tire. • Replace any worn CV joint in the drive axle shaft. • Correct an excessive drive axle angle by adjusting the trim height.

Checks	Actions
Examine for a noise in the NEUTRAL gear with the engine running.	• Replace any worn cluster bearing shaft. • Replace any worn clutch-release bearing. • Replace any worn input shaft cluster gears. • Replace any worn first-gear/bearing. • Replace any worn second-gear/bearing. • Replace any worn third-gear/bearing. • Replace any worn fourth-gear/bearing. • Replace any worn fifth-gear/bearing. • Replace any worn mainshaft bearings.
Examine for a noise in the first gear only.	• Replace any chipped, scored, or worn first-gear constant mesh gears. • Replace any worn first-second gear synchronizer. • Replace any worn first-gear/bearing. • Replace any worn differential-gear/bearing. • Replace any worn-ring gear. • Adjust, repair, or replace the shift lever and the rods.
Examine for a noise in the second gear only.	• Replace any chipped, scored, or worn second-gear constant mesh gears. • Replace any worn first-second gear synchronizer. • Replace any worn second-gear/bearing. • Replace any worn differential-gear/bearing. • Replace any worn-ring gear. • Adjust, repair, or replace the shift lever and the rods.
Examine for a noise in the third gear only.	• Replace any chipped, scored, or worn third-gear constant mesh gears. • Replace any worn third-fourth gear synchronizer. • Replace any worn third-gear/bearing. • Replace any worn differential-gear/bearing. • Replace any worn-ring gear. • Adjust, repair, or replace the shift lever and the rods.
Examine for a noise in the fourth gear only.	• Replace any chipped, scored, or worn fourth gear or gear output. • Replace any worn third-fourth gear synchronizer. • Replace any worn fourth-gear/bearing. • Replace any worn differential-gear/bearing. • Replace any worn-ring gear. • Adjust, repair, or replace the shift lever and the rods.

Checks	Actions
Examine for a noise in the fifth gear only.	• Replace any chipped, scored, or worn fifth gear or output gear. • Repair any worn fifth-gear synchronizer. • Replace any worn fifth-gear/bearing. • Replace any worn differential-gear/bearing. • Replace any worn-ring gear. • Adjust, repair, or replace the shift lever and the rods.
Examine for a noise in the reverse gear only	• Replace any chipped, scored, or worn reverse idler gear, idler-gear bushing, input gear, or output gear. • Replace any worn first-second gear synchronizer. • Replace any worn output gear. • Replace any worn differential-gear/bearing. • Replace any worn-ring gear.
Examine for a noise in all gears.	• Add sufficient lubricant. • Replace any worn bearings. • Replace any chipped, scored, or worn input-gear shaft or output-gear shaft.
Examine for the transaxle slipping out of gear.	• Adjust or replace the linkage, as needed. • Adjust, repair, or replace any binding shift lever and selector lever cable. • Tighten or replace the input-gear bearing retainer, as needed. • Repair or replace any worn or bent shift fork.
Examine for a leak in the area of the clutch.	• Repair the transaxle casing. • Replace any damaged release bearing guide.
Examine for a leak at the center of the transaxle.	• Repair the transaxle casing. • Repair the shift mechanism. • Replace the damaged backup lamp switch.
Examine for a leak at the differential.	• Adjust or replace the bearing retainers. • Tighten or replace the differential cover. • Adjust or replace the drive axle shaft seals.
Examine for a hard shift.	• Replace any damaged release-bearing guide. • Adjust, repair, or replace the shift mechanism. • Adjust, repair, or replace the clutch-release system. • Replace any chipped, scored, or worn fifth-gear synchronizer • Replace any chipped, scored, or worn first-second gear synchronizer. • Replace any worn third-fourth gear synchronizer. • Adjust, repair, or replace the shift lever and the rods.

Checks	Actions
Examine for a clashing of gears.	• Replace any damaged release-bearing guide. • Adjust, repair, or replace the clutch-release system. • Replace the chipped, scored, or worn input shaft/gear-cluster gears. • Replace any worn fifth-gear synchronizer. • Replace any worn fifth-gear/bearing. • Replace any worn first-gear/bearing. • Replace any worn first-second gear synchronizer. • Replace any worn second-gear/bearing. • Replace any worn third-gear/bearing. • Replace any worn third-fourth synchronizer. • Replace any worn fourth-gear/bearing. • Replace any worn reverse-idler gear.

CLUTCH PEDAL POSITION 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. Perform each step listed below:

- Set parking brake
- Block drive wheels

NOTE: For vehicles equipped with the push button ignition switch, ensure the power mode is RUN.

2. Engine OFF, with the ignition ON.
3. Verify no other DTCs are set, except DTC P080A.
- **If other DTCs are set**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .

- **If no other DTCs are set**

4. Using a scan tool, select Clutch Pedal Position Sensor Learn.

NOTE: The CPP sensor learn procedure cannot be performed more than once per ignition cycle.

5. Fully depress and hold the clutch pedal and select Continue.
6. Select Learn.

- **If the scan tool CPP Learn Status is Unsuccessful - Sensor Detected Movement**

Verify vehicle is stopped with the parking brake set, and repeat the procedure.

- **If the scan tool CPP Learn Status is Unsuccessful - Sensor Low Voltage or Unsuccessful - Sensor High Voltage**

Refer to [DTC P0806-P0808](#).

- If the scan tool CPP Learn Status is Not Learned

Refer to [DTC P080A](#).

- If the scan tool CPP Learn Status is Complete or Performed Successfully

7. Verify DTC P080A ran and passed this ignition cycle.

- If the scan tool indicates DTC P080A failed or did not run this ignition

Refer to [DTC P080A](#).

- If the scan tool indicates DTC P080A ran and passed this ignition cycle

8. Turn OFF the ignition for 30 seconds after the learn procedure has successfully completed in order to store the CPP sensor variation values in ECM history.

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.

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 Symptoms - Manual Transmission and perform the necessary inspections?	Go to Step 2	Go to Symptoms - Manual Transmission
2	Inspect the clutch system for proper operation. Refer to Clutch System Description and Operation . Did you find or repair the condition?	Go to Step 12	Go to Step 3

Step	Action	Yes	No
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 & Select cable movement inspection • Shift cable proper adjustment Are you able to shift into all gears?	Go to Step 6	Go to Step 4
4	1. Remove the floor console. Refer to Front Floor Console Replacement (Buick) Front Floor Console Replacement (Chevrolet) . 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 & select cable movement and adjustment. Refer to Manual Transmission Shift Lever and Selector Lever Cable Movement Inspection, and Manual Transmission Shift Lever and Selector Lever Cable Adjustment. 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 Transmission Fluid Drain and Fill. 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 Transmission Fluid Drain and Fill. Did you find and repair the condition?	Go to Step 12	Go to Step 9
9	1. Remove the transmission. Refer to Transmission Replacement. 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

Step	Action	Yes	No
10	Replace the clutch assembly. Refer to Clutch Pressure and Driven Plate Replacement (1.4L) , Clutch Pressure and Driven Plate Replacement (1.6L and 1.8L) . Did you find and repair the condition?	Go to Step 12	Go to Step 11
11	Replace the Transmission. Refer to Transmission Replacement . 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. Did you correct the condition?	System OK	Go to Step 1

REPAIR INSTRUCTIONS - ON VEHICLE

TRANSMISSION CONTROL LEVER BOOT REPLACEMENT

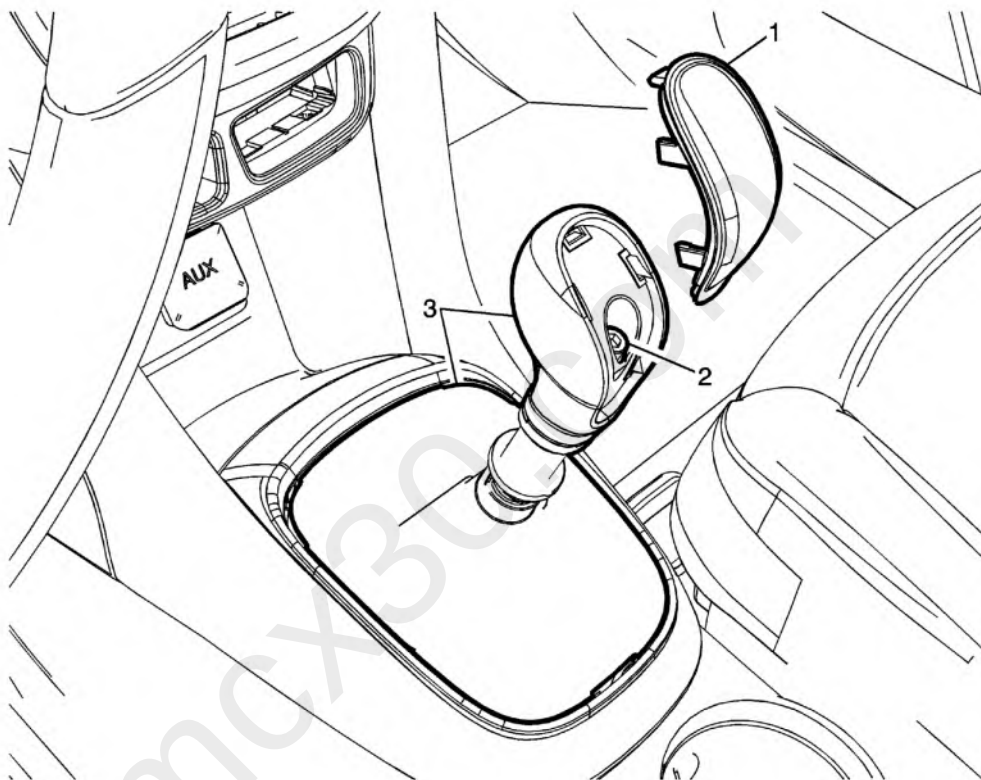


Fig. 2: Transmission Control Lever Knob
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Shift Control Lever Knob Cover Procedure Using a flat-bladed tool, remove the shift knob cover.
2	Fastener CAUTION: Refer to Fastener Caution . Tighten 16 N.m (12 lb ft)
3	Shift Control Lever Knob and Boot Assembly Procedure Using a flat-bladed tool, remove the boot retainer from the console.

CLUTCH AND DIFFERENTIAL HOUSING COVER REPLACEMENT

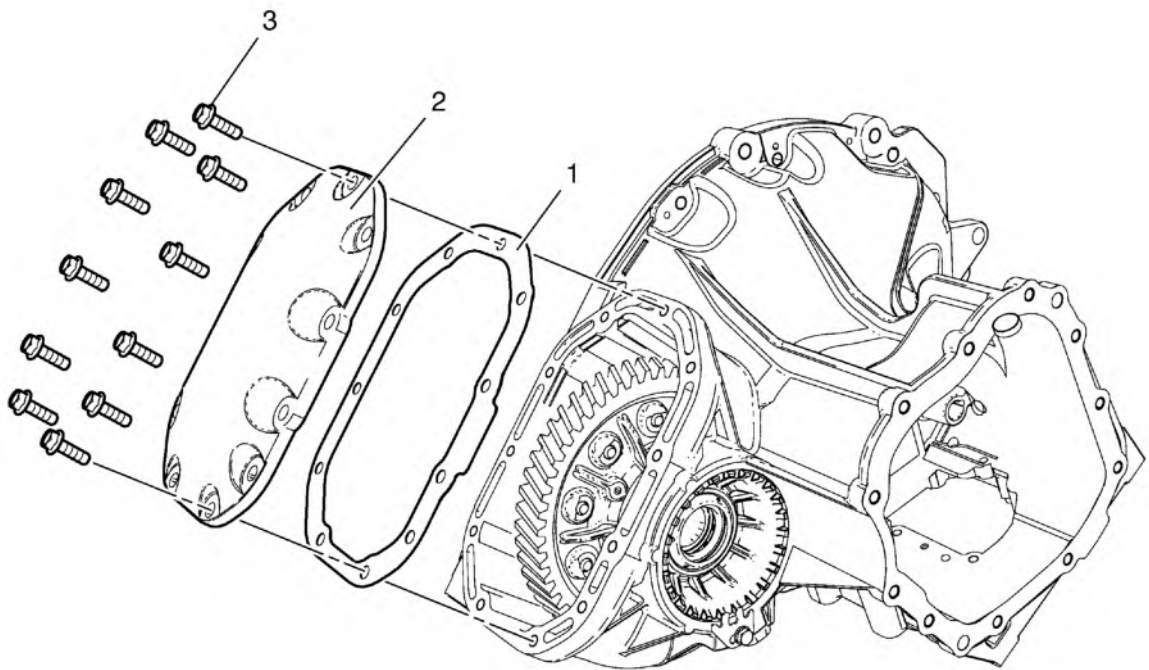


Fig. 3: Clutch and Differential Housing Cover
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Lifting and Jacking the Vehicle 2. Drain the transmission fluid. Transmission Fluid Drain and Fill	
1	Clutch and Differential Housing Cover Bolt (Qty: 11) CAUTION: Refer to Fastener Caution . Tighten 30 N.m (22 lb ft)
2	Clutch and Differential Housing Cover
3	Clutch and Differential Housing Cover Gasket

TRANSMISSION REAR MOUNT BRACKET REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Remove the exhaust front pipe. Refer to [Exhaust Front Pipe Replacement \(LUV\)](#), [Exhaust Front Pipe Replacement \(2H0\)](#), [Exhaust Front Pipe Replacement \(LE2\)](#) .
3. Using a suitable jack stand, support the rear of the powertrain.

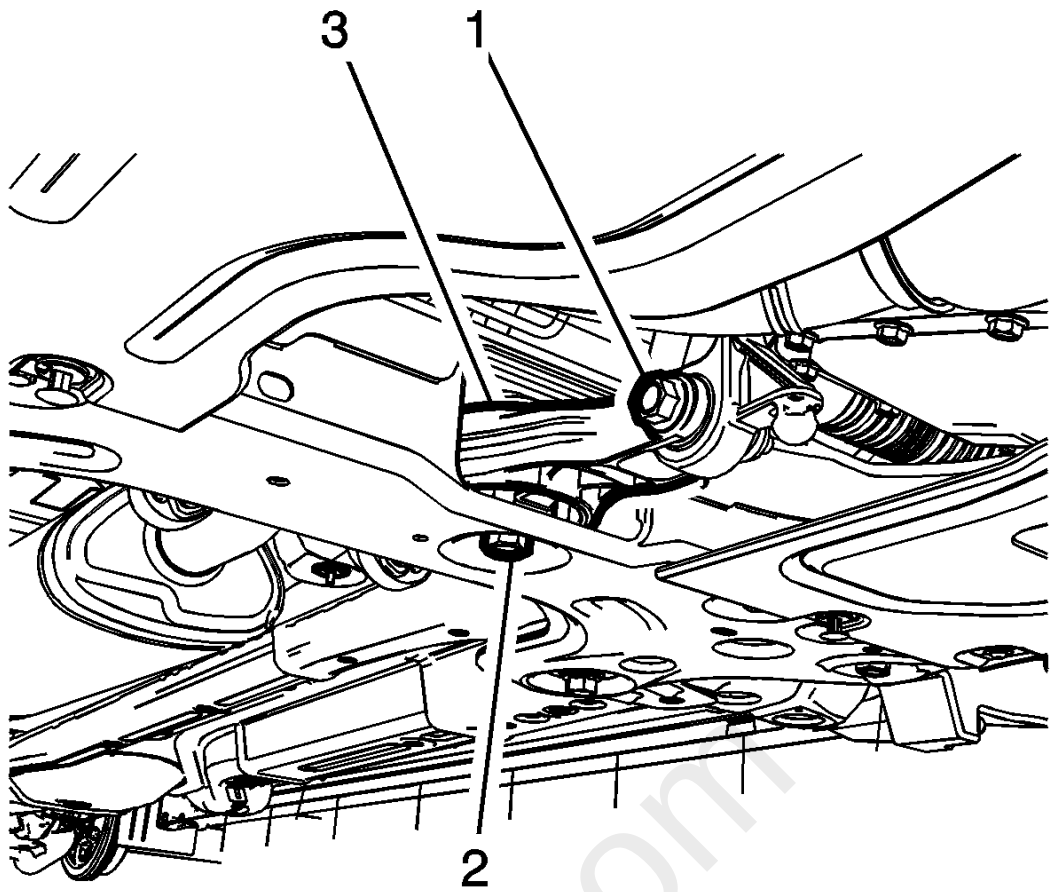


Fig. 4: Transmission Rear Mount Bracket Through Bolt
Courtesy of GENERAL MOTORS COMPANY

4. Remove and DISCARD the transmission rear mount to bracket through fastener (1).
5. Remove and DISCARD the transmission rear mount fastener (2).

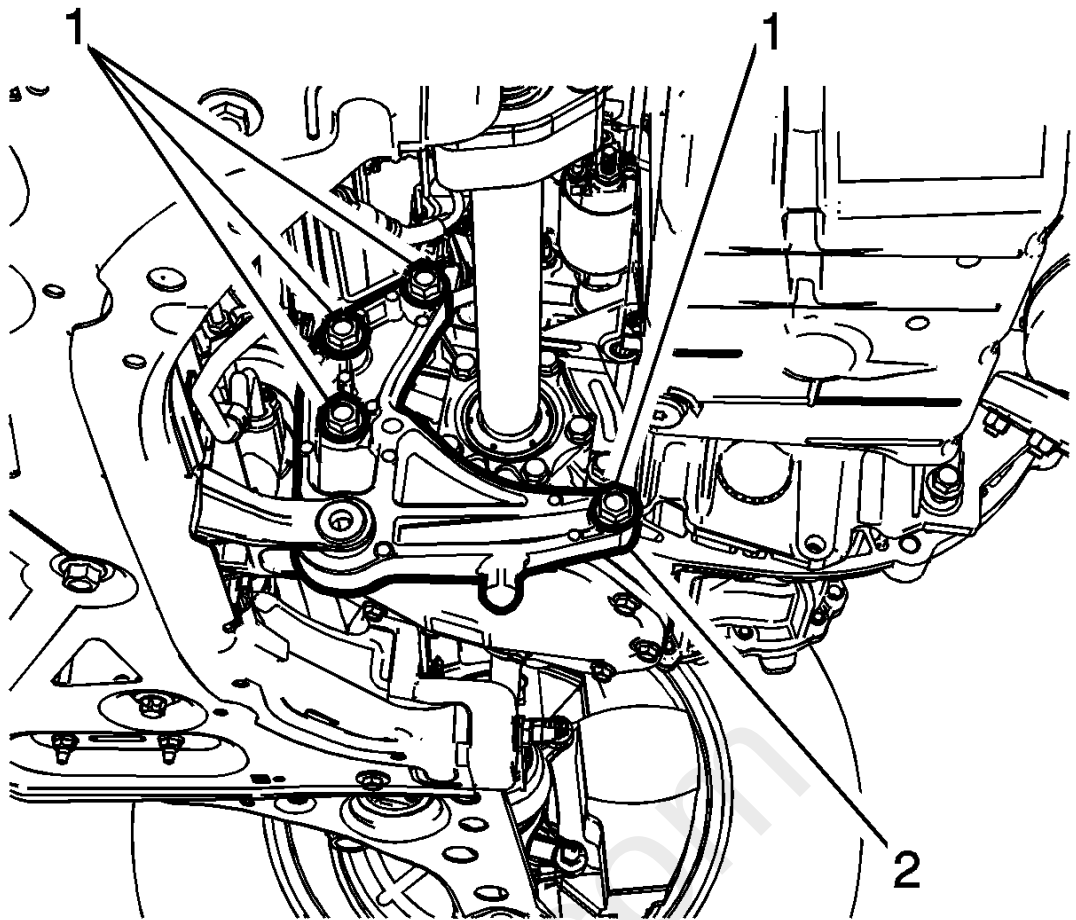


Fig. 5: Transmission Rear Mount And Rear Mount Bracket
Courtesy of GENERAL MOTORS COMPANY

6. Remove and DISCARD the transmission rear mount bracket fasteners (1).
7. Remove the transmission rear mount and rear mount bracket.

Installation Procedure

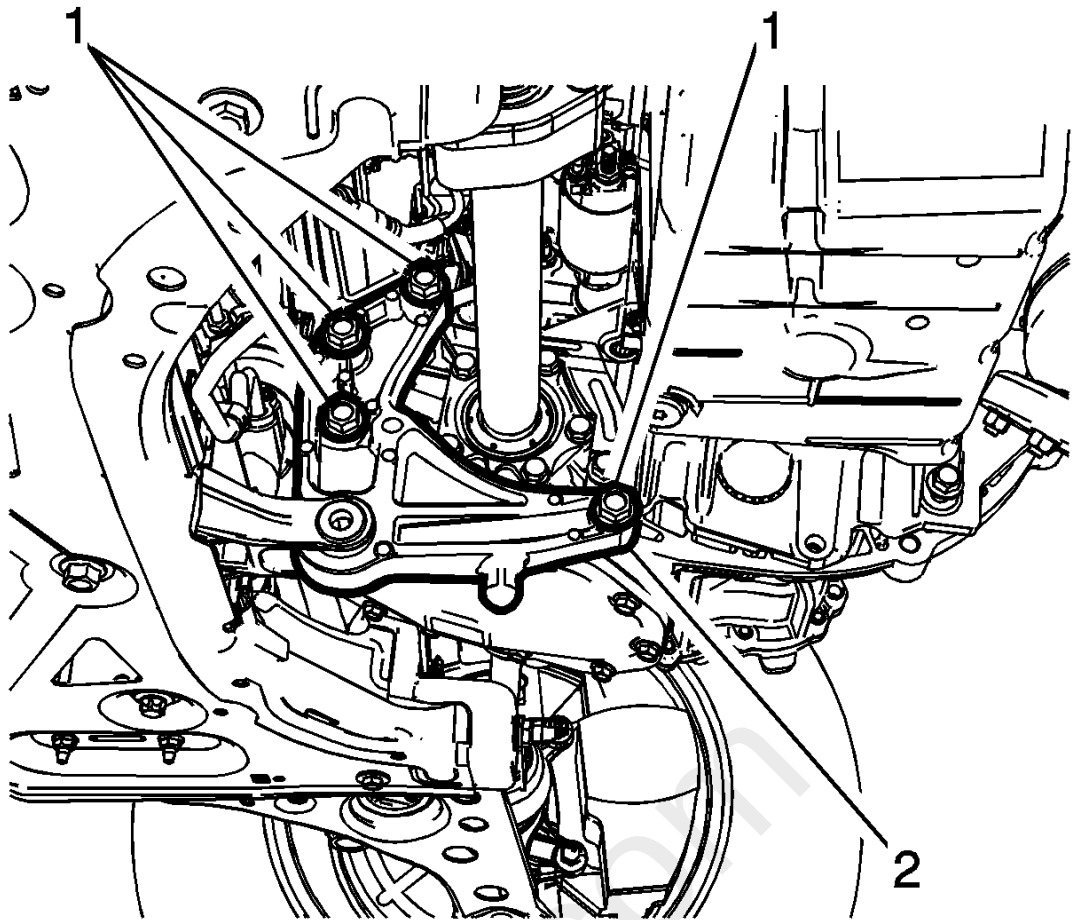


Fig. 6: Transmission Rear Mount And Rear Mount Bracket

Courtesy of GENERAL MOTORS COMPANY

1. Install the transmission rear mount and rear mount bracket.

CAUTION: Refer to **Fastener Caution** .

2. Install the NEW transmission rear mount bracket fasteners (1) and tighten to 100 N.m (74 lb ft) plus 30-45 degrees.

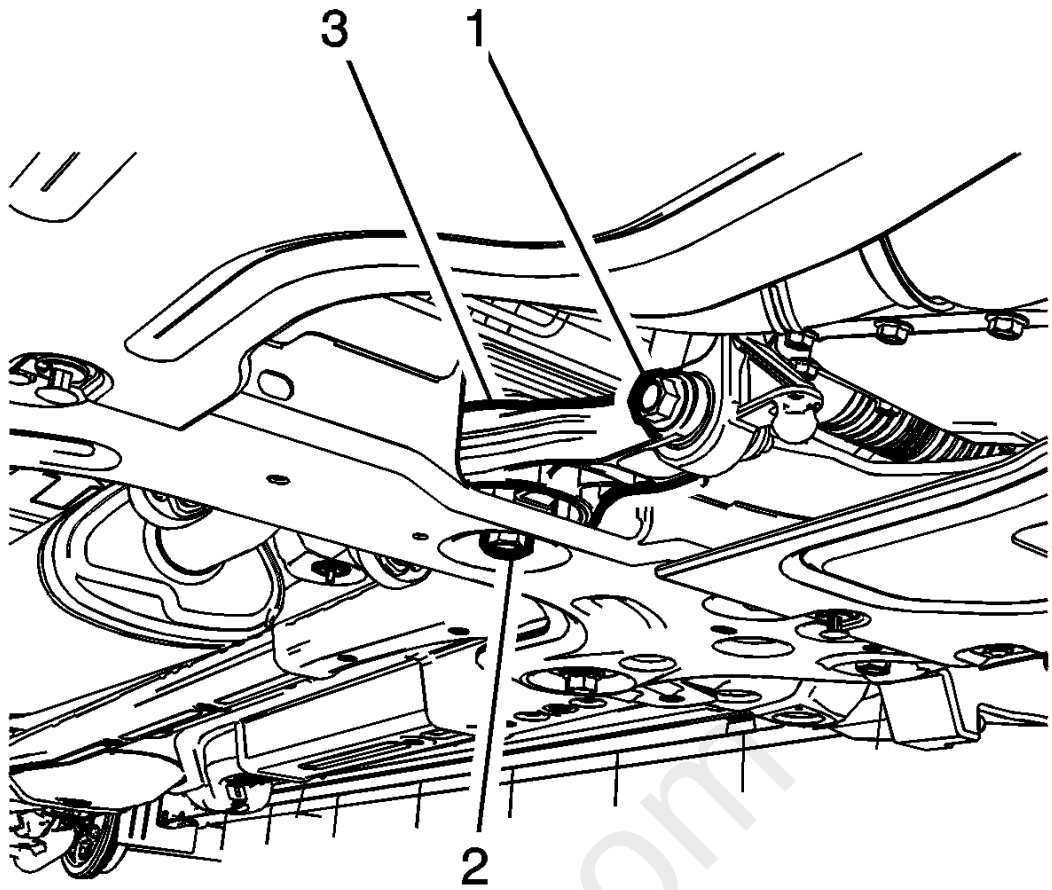


Fig. 7: Transmission Rear Mount Bracket Through Bolt
Courtesy of GENERAL MOTORS COMPANY

3. Install the NEW transmission rear mount fastener (2) and tighten to 100 N.m (74 lb ft) plus 90 - 105 degrees.
4. Install the NEW transmission rear mount to bracket through fastener (1) and tighten to 80 N.m (59 lb ft) plus 45-60 degrees.
5. Remove the jack stand.
6. Install the exhaust front pipe. Refer to [Exhaust Front Pipe Replacement \(LUV\)](#), [Exhaust Front Pipe Replacement \(2H0\)](#), [Exhaust Front Pipe Replacement \(LE2\)](#).
7. Lower the vehicle.

TRANSMISSION REAR MOUNT REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the exhaust front pipe. Refer to [Exhaust Front Pipe Replacement \(LUV\)](#), [Exhaust Front Pipe Replacement \(2H0\)](#), [Exhaust Front Pipe Replacement \(LE2\)](#).

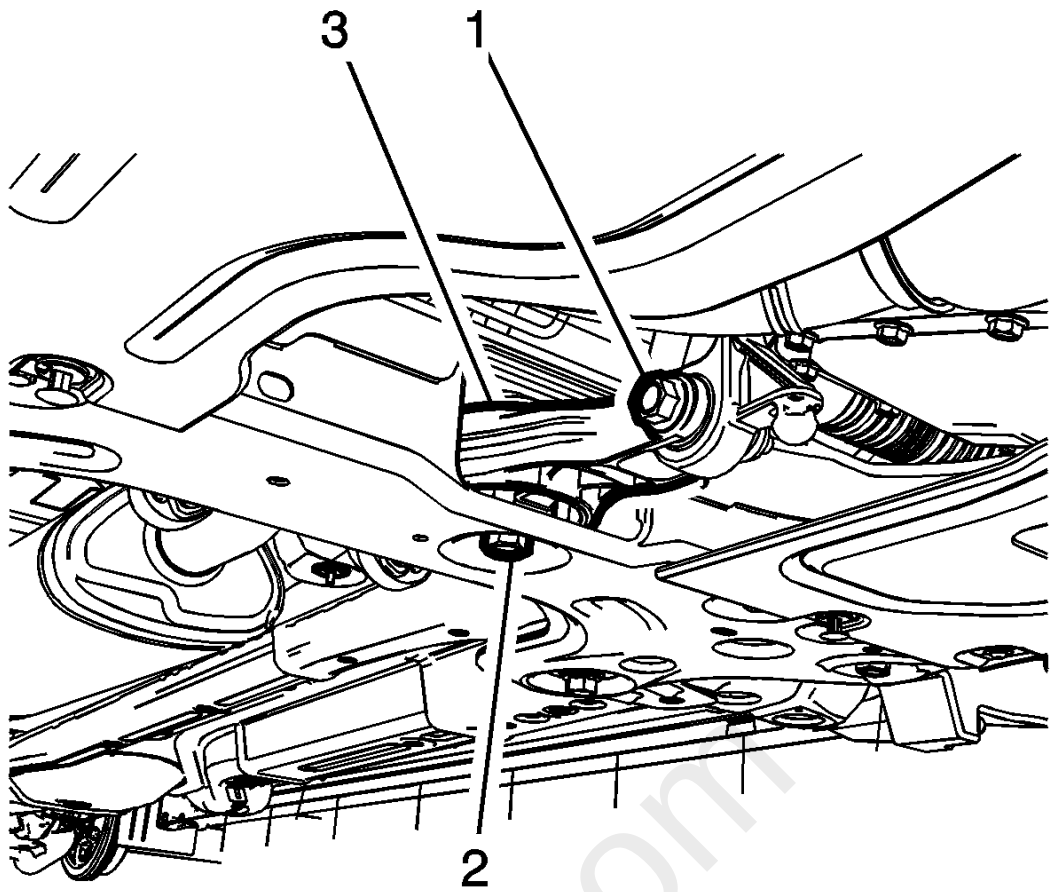


Fig. 8: Transmission Rear Mount Bracket Through Bolt

Courtesy of GENERAL MOTORS COMPANY

3. Remove and DISCARD the transmission rear mount to bracket through bolt (1).
4. Remove and DISCARD the transmission rear mount bolt (2).
5. Push and hold the powertrain assembly forward and then remove the transmission rear mount (3).

Installation Procedure

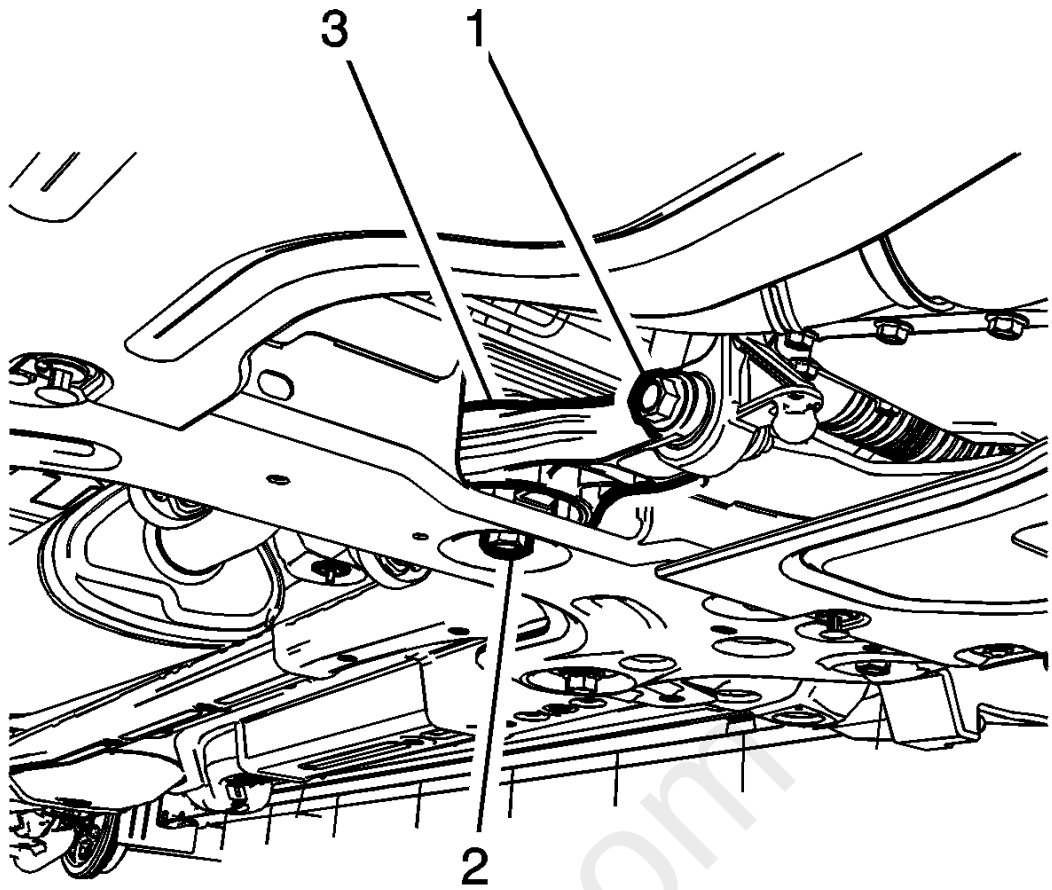


Fig. 9: Transmission Rear Mount Bracket Through Bolt
Courtesy of GENERAL MOTORS COMPANY

1. Push and hold the powertrain assembly forward and then install the transmission rear mount (3).

CAUTION: Refer to [Fastener Caution](#) .

2. Install the NEW transmission rear mount bolt (2) and tighten to 100 N.m (74 lb ft) plus 90 - 105 degrees.
3. Install the NEW transmission rear mount to bracket through bolt (1) and tighten to 80 N.m (59 lb ft) plus 45-60 degrees.
4. Install the exhaust front pipe. Refer to [Exhaust Front Pipe Replacement \(LUV\)](#), [Exhaust Front Pipe Replacement \(2H0\)](#), [Exhaust Front Pipe Replacement \(LE2\)](#) .
5. Lower the vehicle.

TRANSMISSION MOUNT REPLACEMENT - LEFT SIDE

Removal Procedure

1. Remove the battery tray. Refer to [Battery Tray Replacement](#) .
2. Install the engine support fixture. Refer to [Engine Support Fixture](#) .

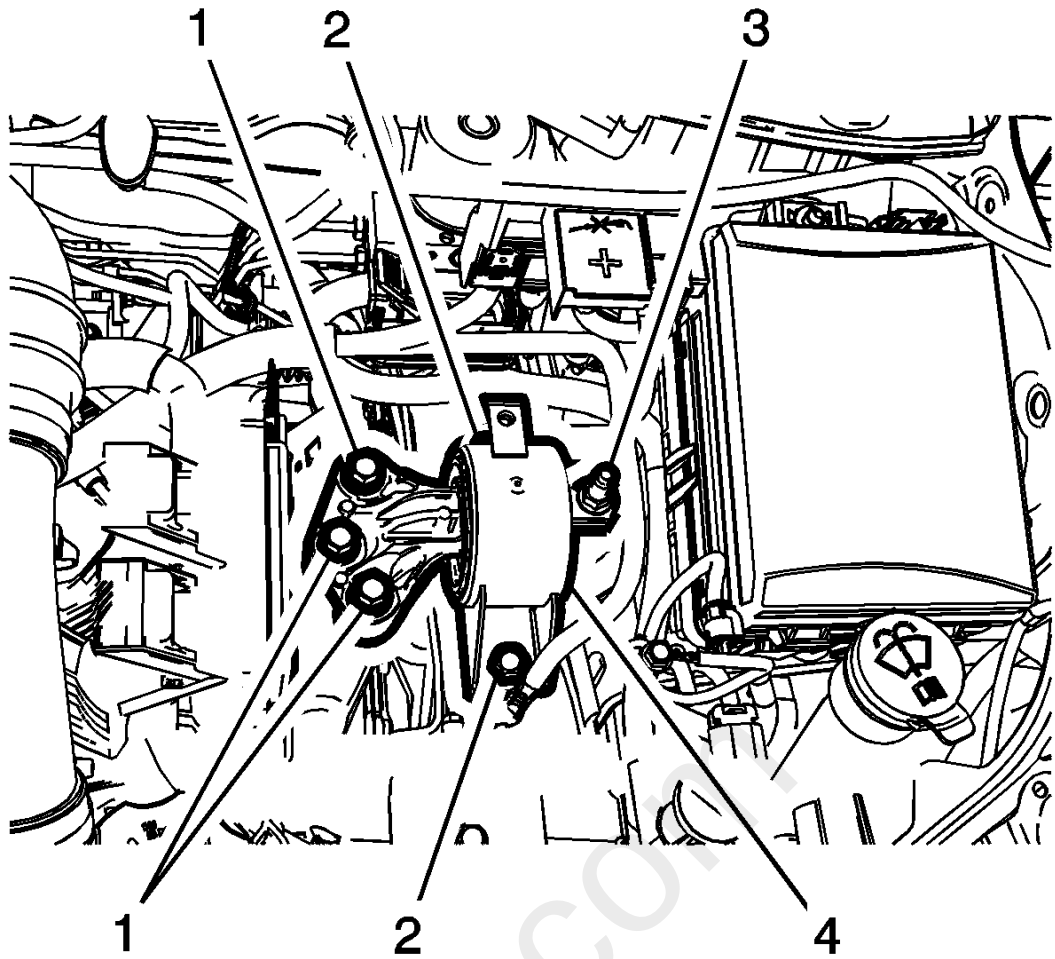


Fig. 10: Transmission Mount Bolts

Courtesy of GENERAL MOTORS COMPANY

3. Remove and DISCARD the left transmission mount to bracket bolts (1).
4. Remove the left transmission mount to body bolts (2).
5. Remove the left transmission mount to body nut (3).
6. Remove the left transmission mount (4) from the vehicle.

Installation Procedure

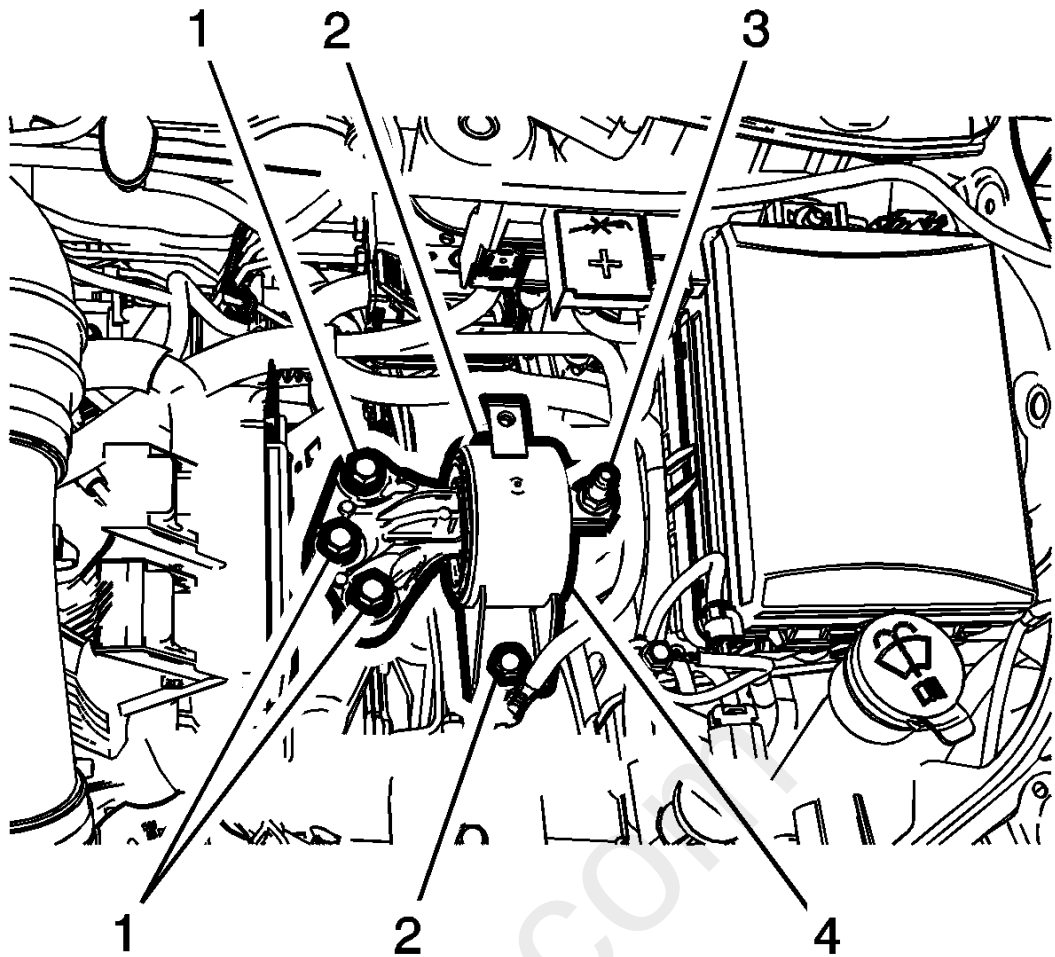


Fig. 11: Transmission Mount Bolts

Courtesy of GENERAL MOTORS COMPANY

1. Install the left transmission mount (4) to the vehicle.

CAUTION: Refer to Fastener Caution .

2. Install the left transmission mount to body bolts (2) and tighten to 58 N.m (43 lb ft).
3. Install the left transmission mount to body nut (3) and tighten to 58 N.m (43 lb ft).
4. Install the NEW left transmission mount to transmission bolts (1) and tighten to 50 N.m (37 lb ft) plus 60-75 degrees.
5. Remove the engine support fixture. Refer to Engine Support Fixture .
6. Install the battery tray. Refer to Battery Tray Replacement .

TRANSMISSION MOUNT BRACKET REPLACEMENT - LEFT SIDE

Removal Procedure

1. Remove the left transmission mount. Refer to Transmission Mount Replacement - Left Side.

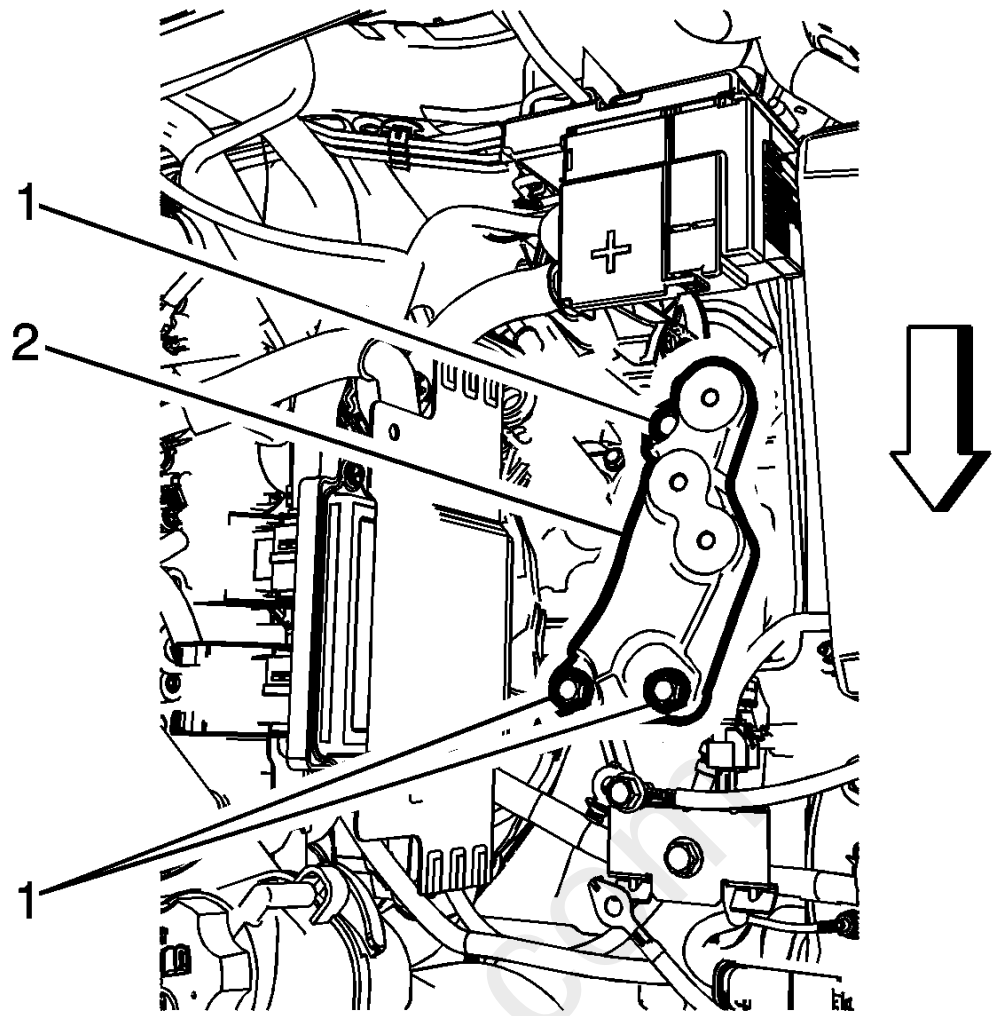


Fig. 12: Left Transmission Mount Bracket And Bolts

Courtesy of GENERAL MOTORS COMPANY

2. Remove the 3 left transmission mount bracket to transmission bolts (1).
3. Remove the left transmission mount bracket (2) from the transmission.

Installation Procedure

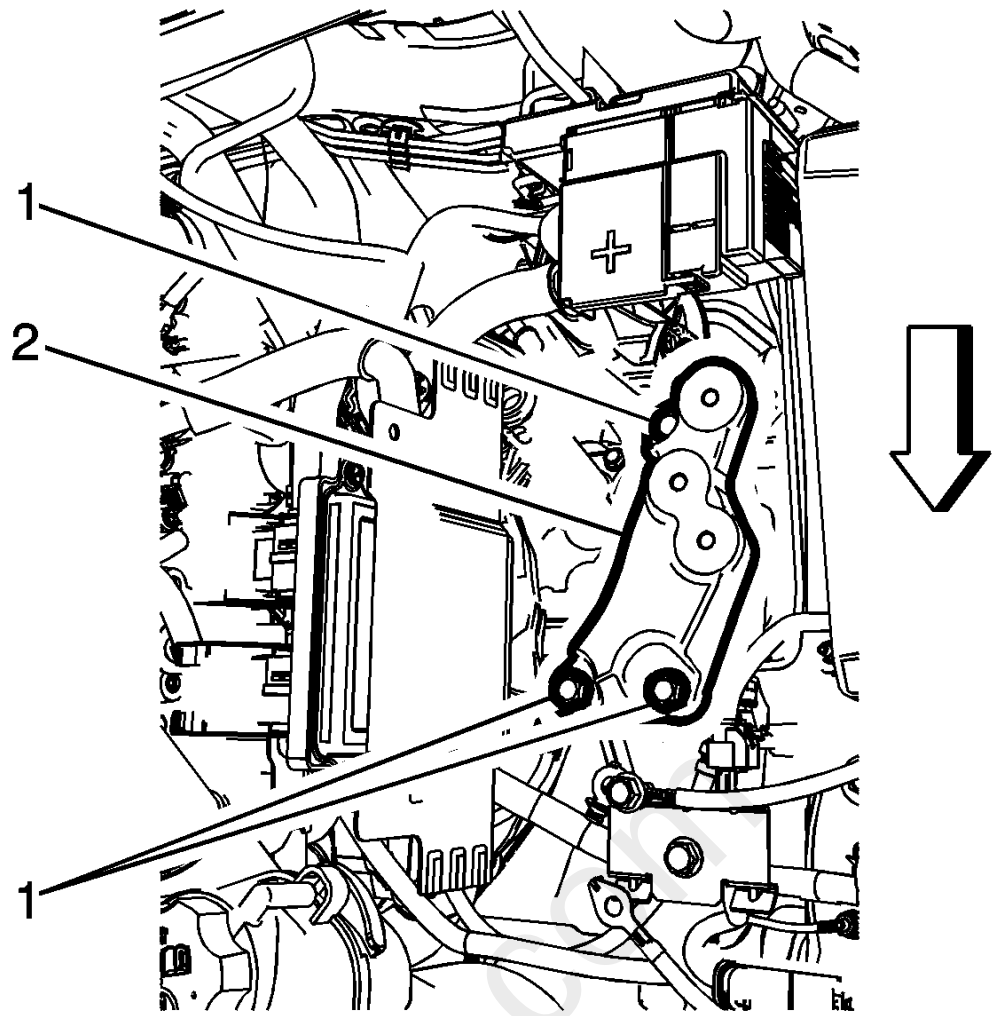


Fig. 13: Left Transmission Mount Bracket And Bolts

Courtesy of GENERAL MOTORS COMPANY

1. Install the left transmission mount bracket (2) to the transmission.

CAUTION: Refer to [Fastener Caution](#) .

2. Install the left transmission mount bracket to transmission bolts (1) and tighten to 62 N.m (46 lb ft).
3. Install the left transmission mount. Refer to [Transmission Mount Replacement - Left Side](#).

MANUAL TRANSMISSION SHIFT LEVER AND SELECTOR LEVER CABLE REPLACEMENT

Removal Procedure

1. Remove the battery tray. Refer to [Battery Tray Replacement](#) .

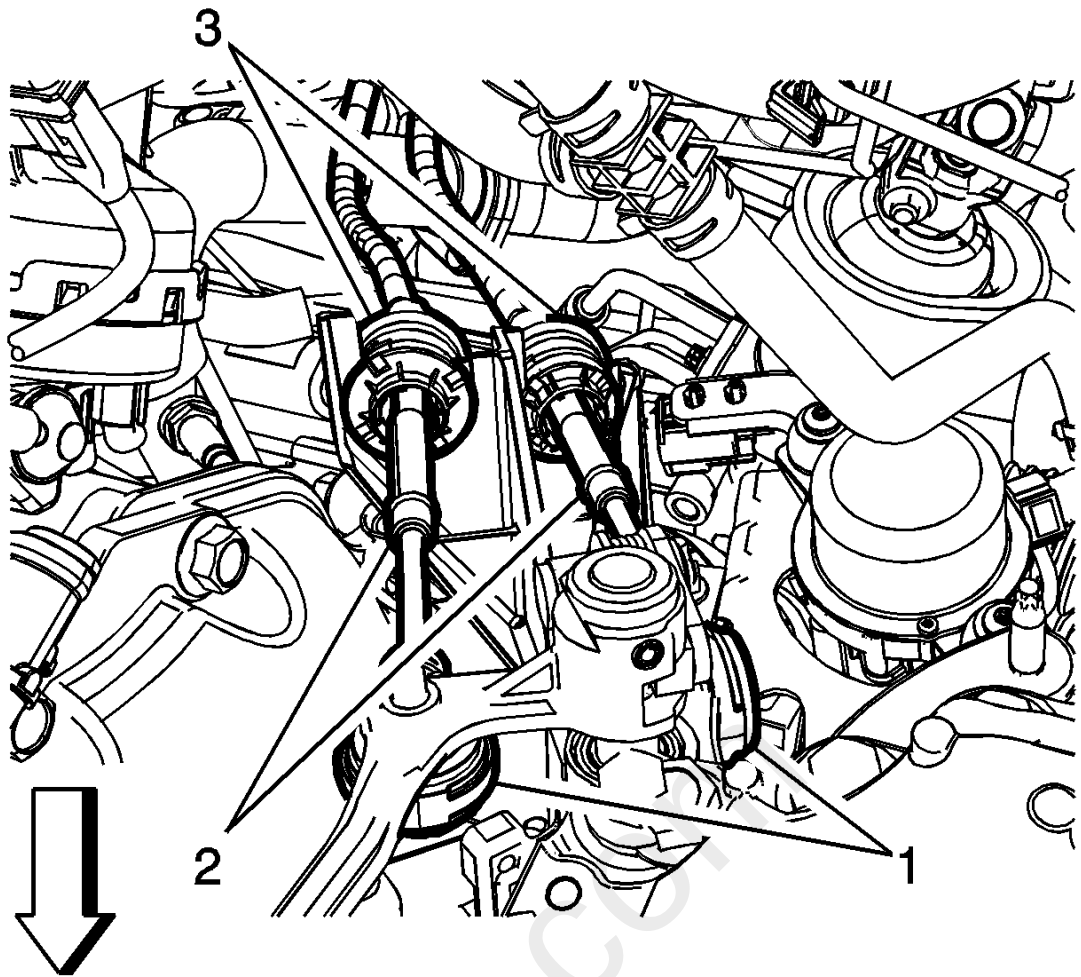


Fig. 14: Shift Lever And Selector Lever Cable

Courtesy of GENERAL MOTORS COMPANY

2. Disconnect the shift lever and selector lever cable end (1) from the transmission shift lever and selector lever.
3. Pull the cable retainers (3) up while pushing the cable retainers rearward to release the shift lever and selector lever cable (2) from the shift lever and selector lever cable bracket.
4. Remove the floor console. Refer to [**Front Floor Console Replacement \(Buick\)**](#), [**Front Floor Console Replacement \(Chevrolet\)**](#).

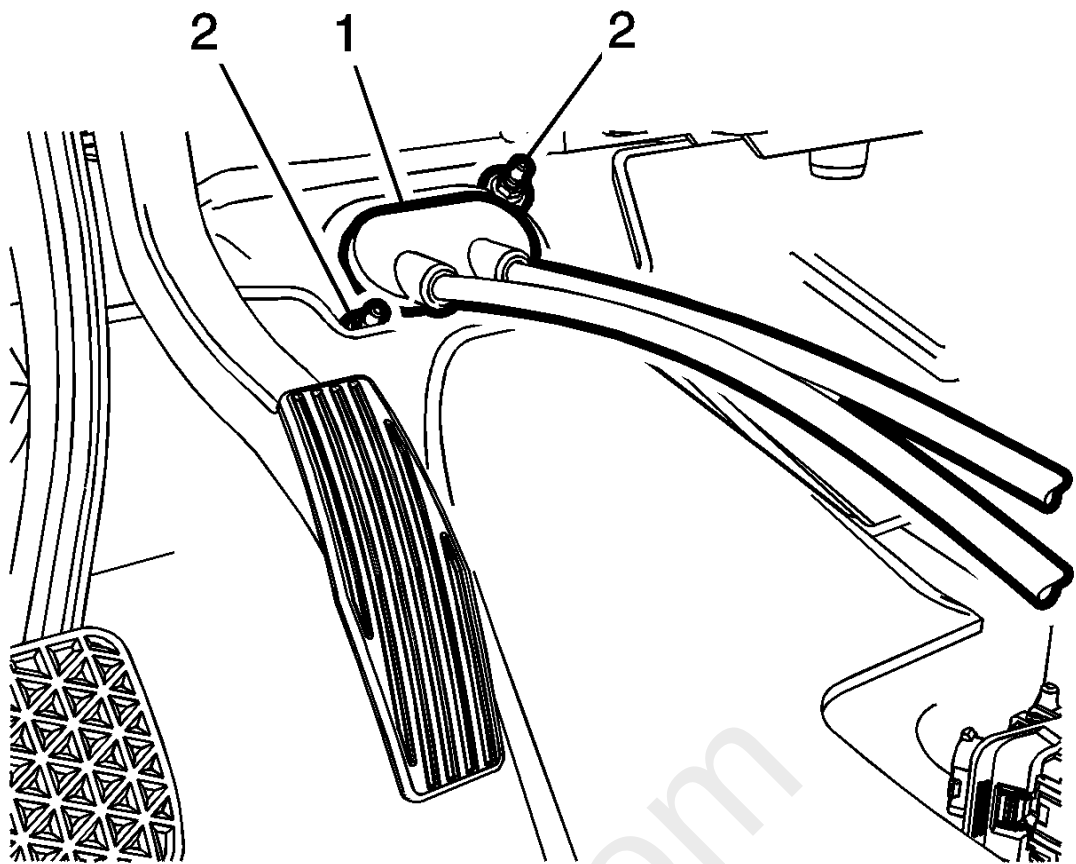


Fig. 15: Shift Lever & Selector Lever Cable Grommet & Fasteners

Courtesy of GENERAL MOTORS COMPANY

5. Move the floor carpet in order to get access to the shift lever and selector lever cable grommet (1).
6. Remove the grommet fasteners (2).

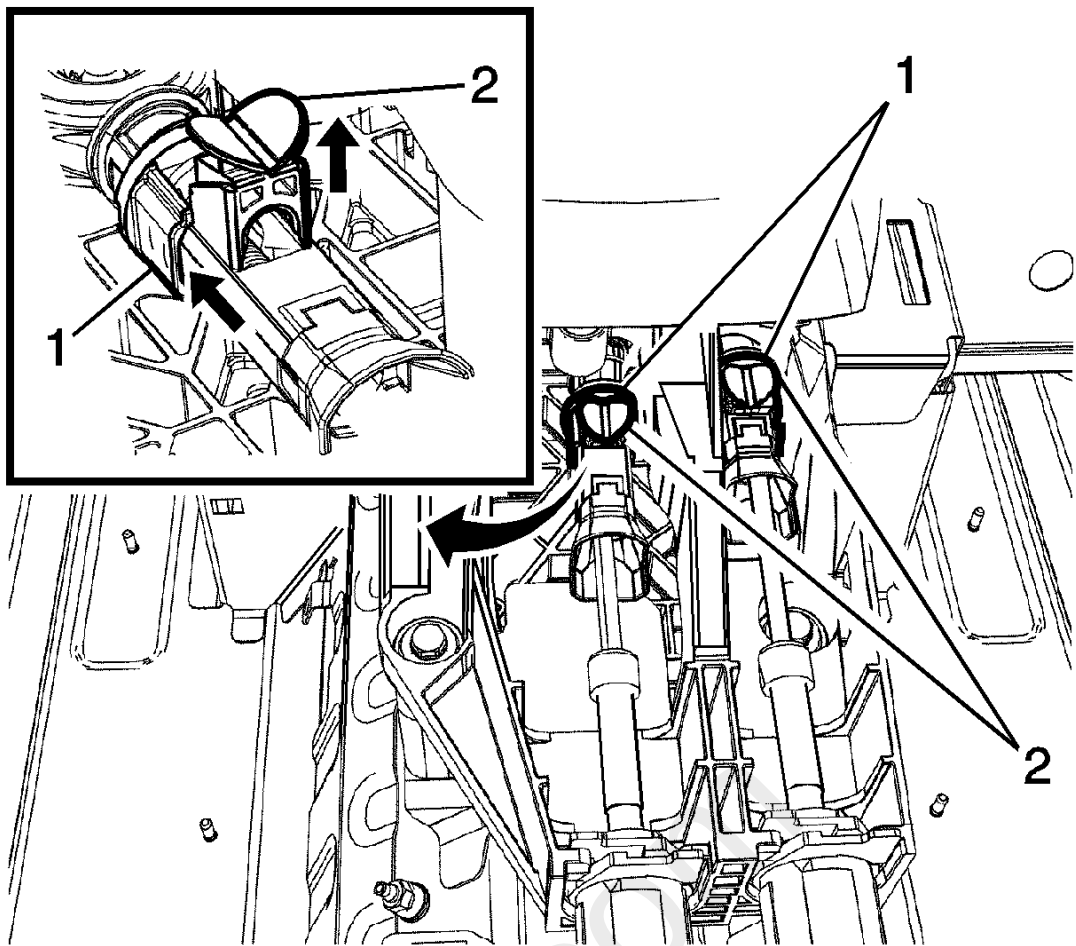


Fig. 16: Shift Lever And Selector Lever Cable
Courtesy of GENERAL MOTORS COMPANY

7. Lift the adjustment locks (2) up while pushing the adjustment retainers (1) rearward, one for each cable, to release the shift lever and selector lever cable.

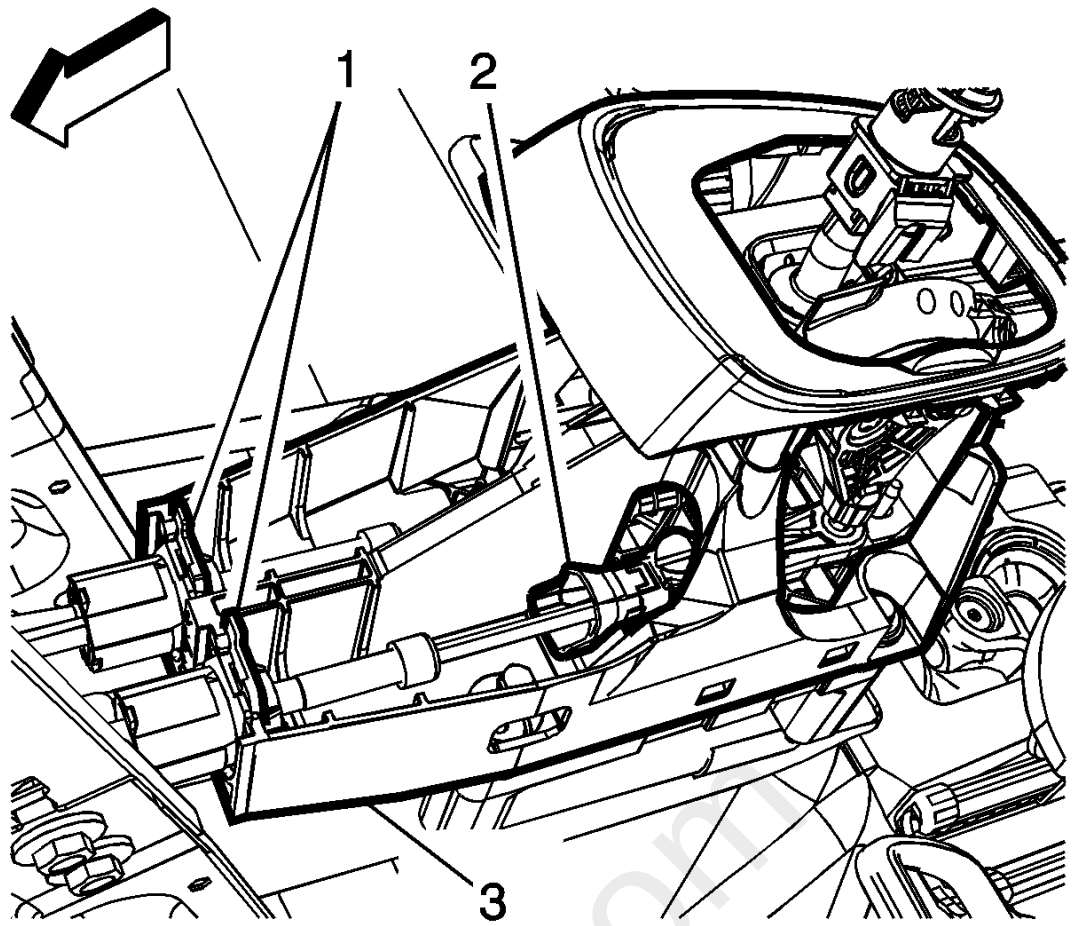


Fig. 17: Transmission Control Assembly

Courtesy of GENERAL MOTORS COMPANY

8. Squeeze the shift lever and the selector lever cable retainers (1) then lift up from the transmission control assembly (3), then remove the shift lever and selector lever cable from the shift and selector control.
9. Pull the shift lever and the selector lever cable assembly through the cowl into the passenger compartment.
10. Remove the shift lever and the selector lever cable assembly from the vehicle.

Installation Procedure

1. Position the shift lever and the selector lever cable assembly in the vehicle.
2. Gently pull the shift lever and the selector lever cable assembly through the cowl into the engine compartment.

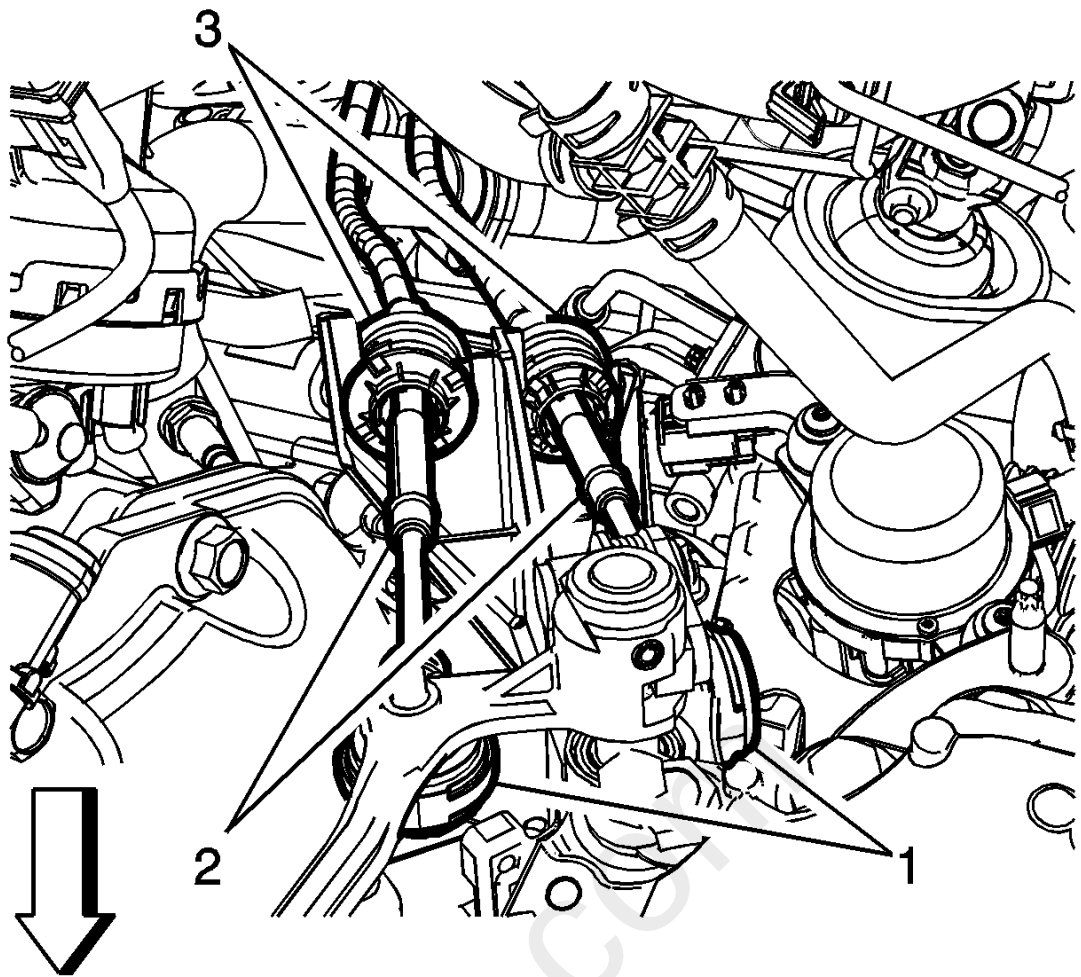


Fig. 18: Shift Lever And Selector Lever Cable
Courtesy of GENERAL MOTORS COMPANY

3. Connect the shift lever and the selector lever cable ends (1) to the transmission shift lever and the selector lever.
4. Install the shift lever and the selector lever cable to the shift lever and the selector lever cable bracket.

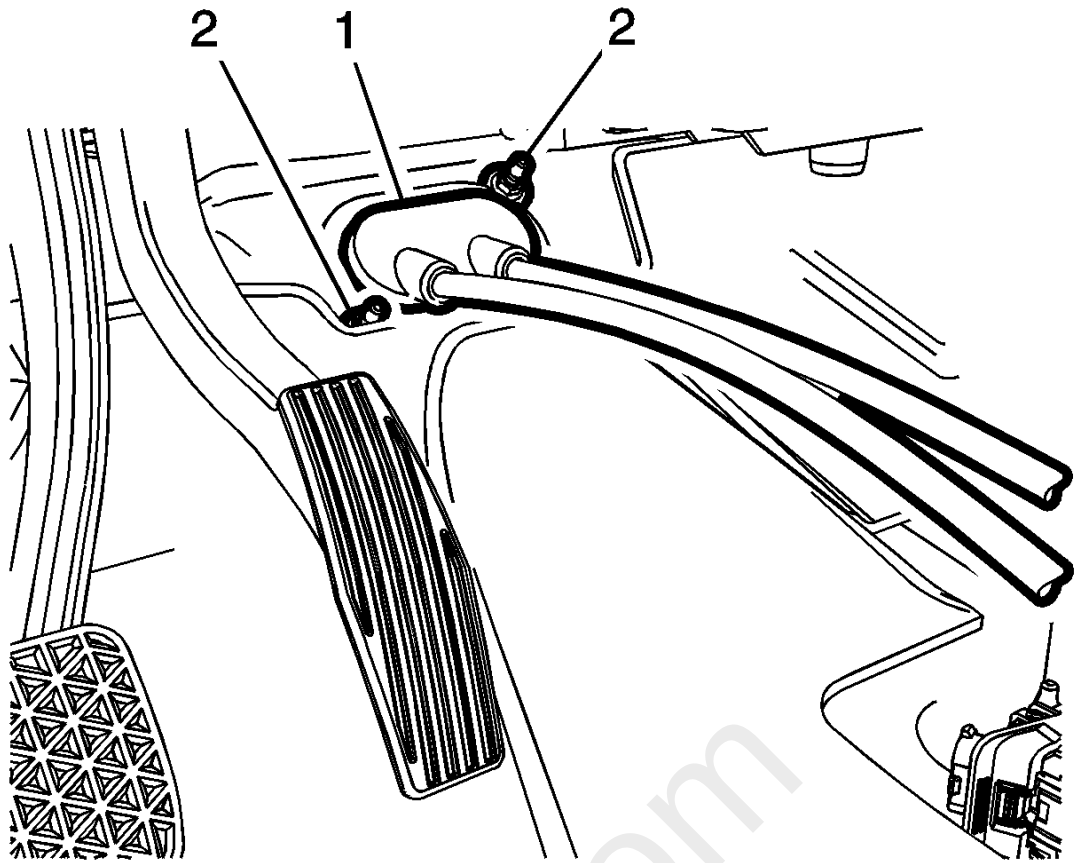


Fig. 19: Shift Lever & Selector Lever Cable Grommet & Fasteners

Courtesy of GENERAL MOTORS COMPANY

5. Move the floor carpet in order to get access to the shift lever and selector lever cable grommet (1).

CAUTION: Refer to **Fastener Caution** .

6. Install the grommet fasteners (2) and tighten to 9 N.m (80 lb in).

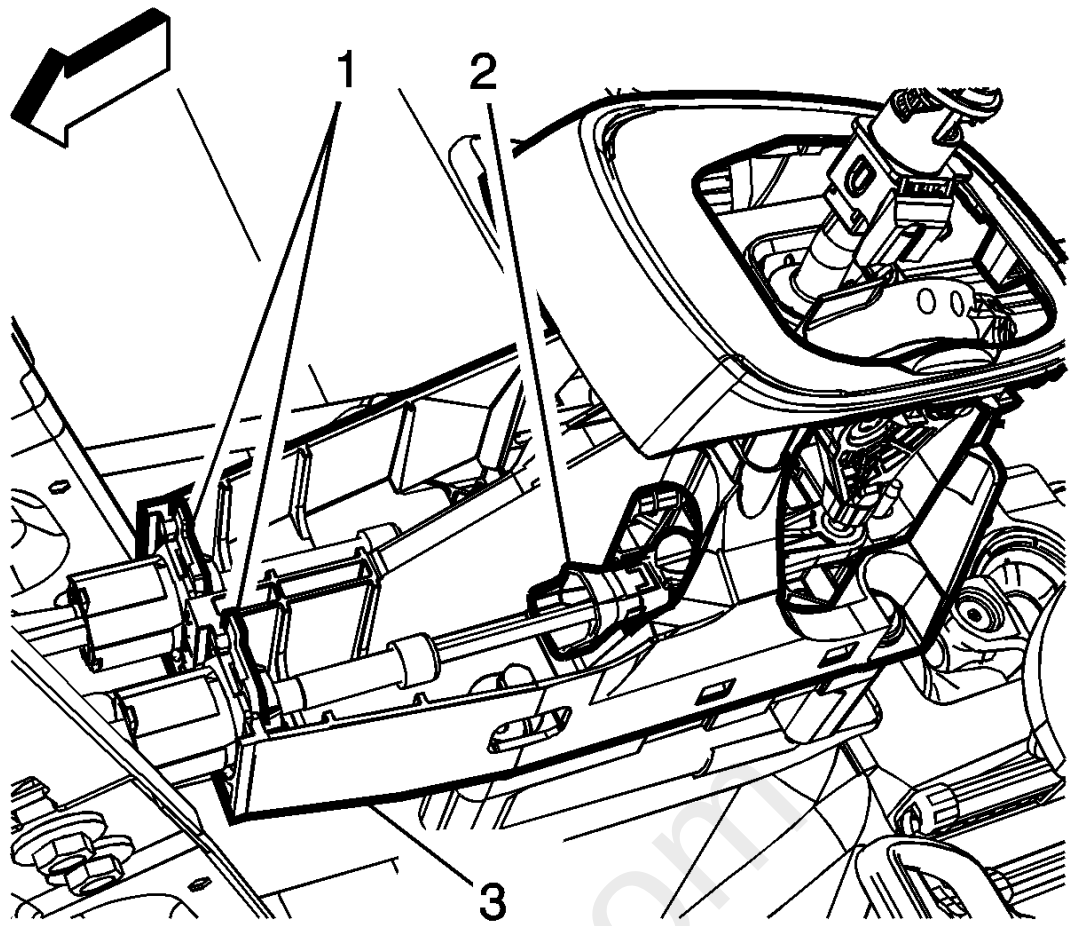


Fig. 20: Transmission Control Assembly.
Courtesy of GENERAL MOTORS COMPANY

7. Connect the shift lever and selector lever cables to the shift and selector control adjusters (2).
8. Install the shift lever and selector lever cable retainers (1) to the transmission control (3).

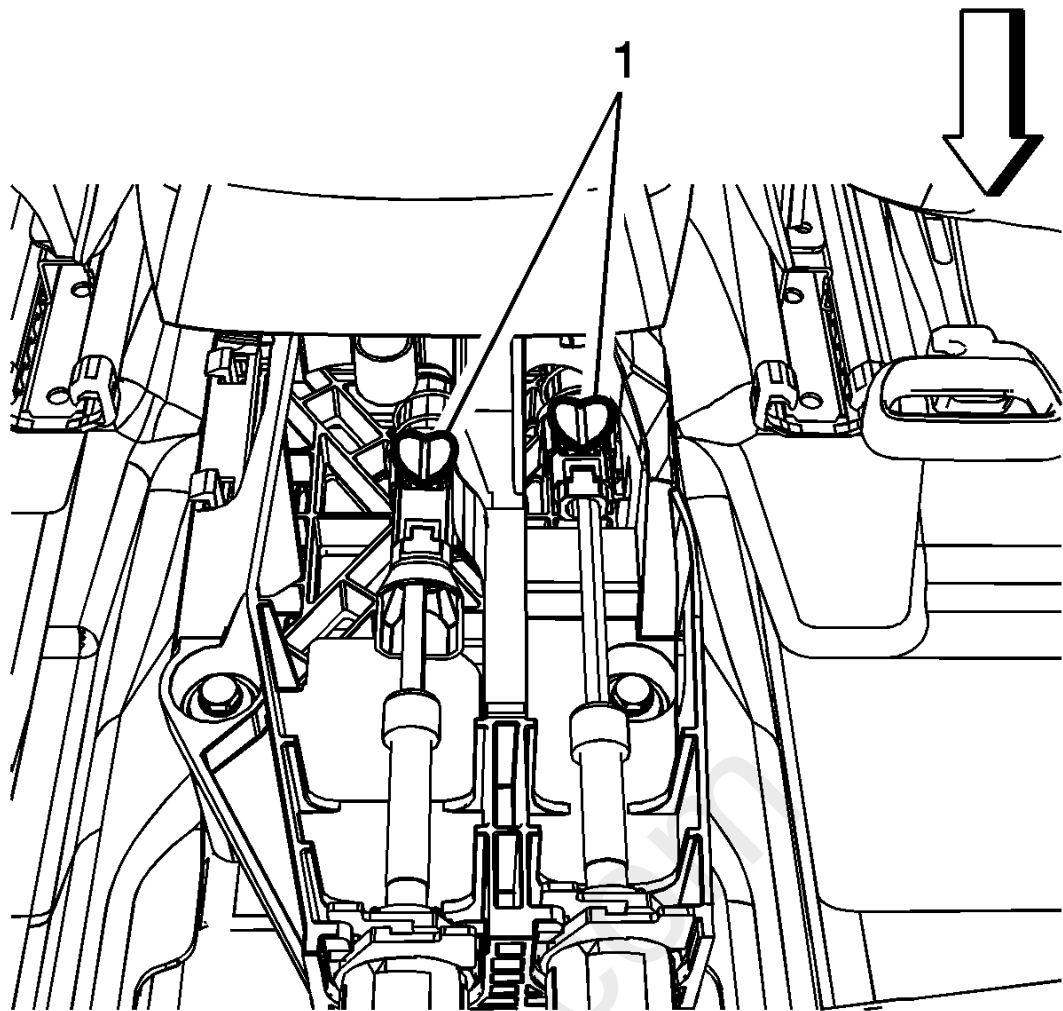


Fig. 21: Cable Adjustment Locks

Courtesy of GENERAL MOTORS COMPANY

9. Press down and lock both cable adjustment locks (1), one for each cable, to adjust the shift lever and selector lever cable.
10. Adjust the shift lever and selector lever cables. Refer to [Manual Transmission Shift Lever and Selector Lever Cable Adjustment](#).
11. Install the floor console. Refer to [Front Floor Console Replacement \(Buick\)](#), [Front Floor Console Replacement \(Chevrolet\)](#).
12. Install the battery tray. Refer to [Battery Tray Replacement](#).
13. Verify correct operation of the transmission control assembly.

MANUAL TRANSMISSION SHIFT LEVER AND SELECTOR LEVER CABLE MOVEMENT INSPECTION

1. Remove the shift lever and the selector lever cable. [Manual Transmission Shift Lever and Selector Lever Cable Replacement](#)
2. Move the shift cable to insure freedom of movement within the cable sleeve.
3. Move the select cable to insure freedom of movement within the cable sleeve.
4. If there is no problem with the shift and select cables go to [Manual Transmission Shift Lever and Selector Lever Cable Adjustment](#)
5. If a problem is detected replace both cables before proceeding. [Manual Transmission Shift Lever and Selector Lever Cable Replacement](#)

SELECTOR AND SHIFT LEVER CABLE BRACKET REPLACEMENT

Removal Procedure

1. Remove the battery tray. Refer to [Battery Tray Replacement](#).

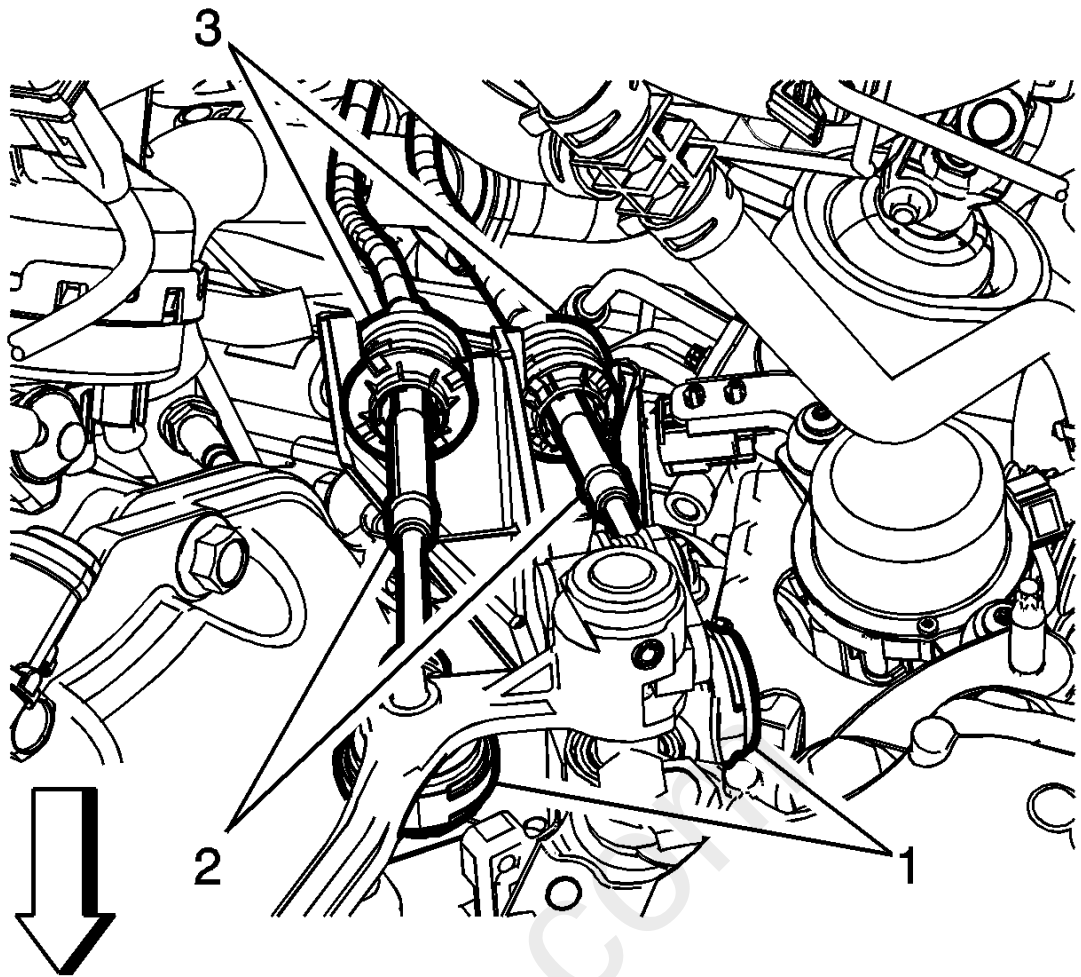


Fig. 22: Shift Lever And Selector Lever Cable
Courtesy of GENERAL MOTORS COMPANY

2. Disconnect the shift lever and selector lever cable ends (1) from the transmission shift lever and selector lever.
3. Pull the cable retainers (3) up while pushing the cable retainers rearward to release the shift lever and selector lever cable (2) from the shift lever and selector lever cable bracket.
4. Remove the power brake booster pump assembly from the shift lever and selector lever cable bracket, if equipped. Refer to [**Power Brake Booster Pump Replacement**](#) .

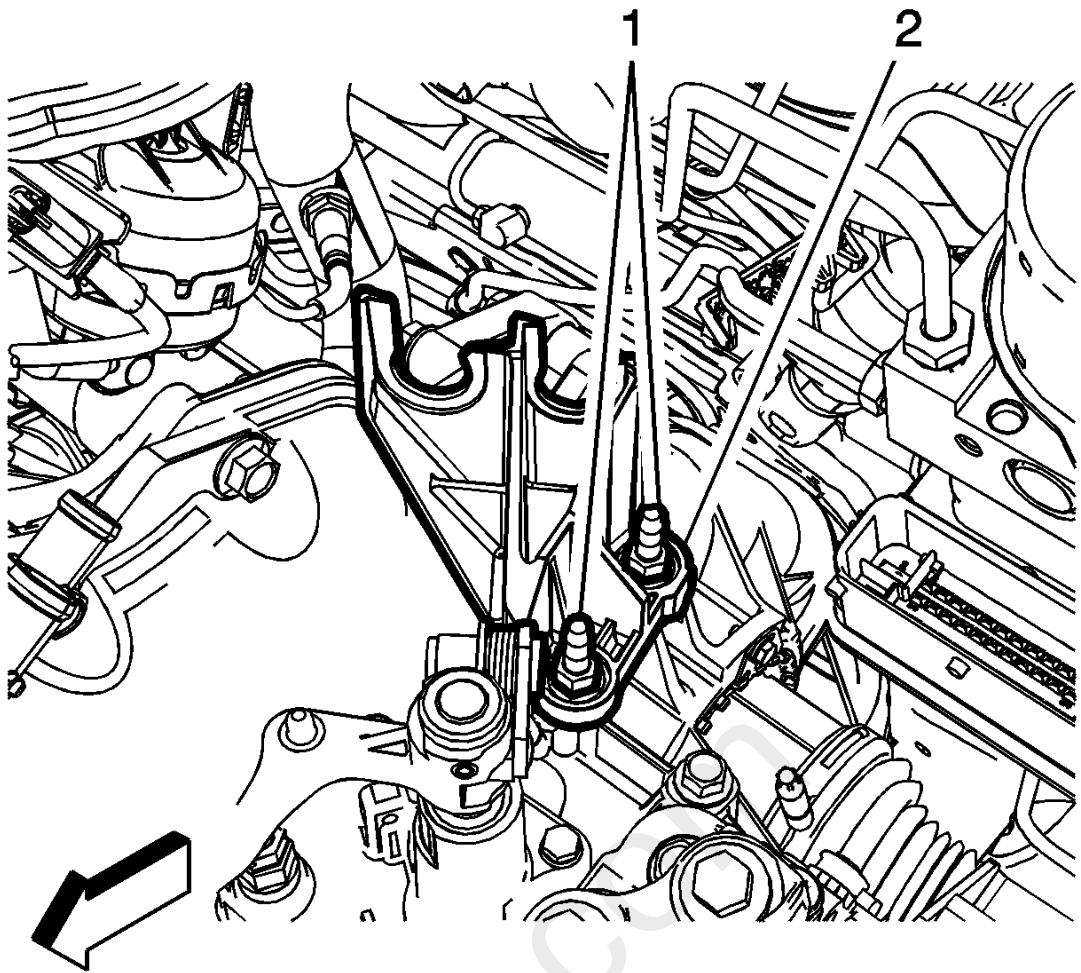


Fig. 23: Shift Lever And Selector Lever Cable Bracket And Fasteners

Courtesy of GENERAL MOTORS COMPANY

5. Remove the 2 shift lever and selector lever cable bracket fasteners (1).
6. Remove the shift lever and selector lever cable bracket (2) from the transmission.

Installation Procedure

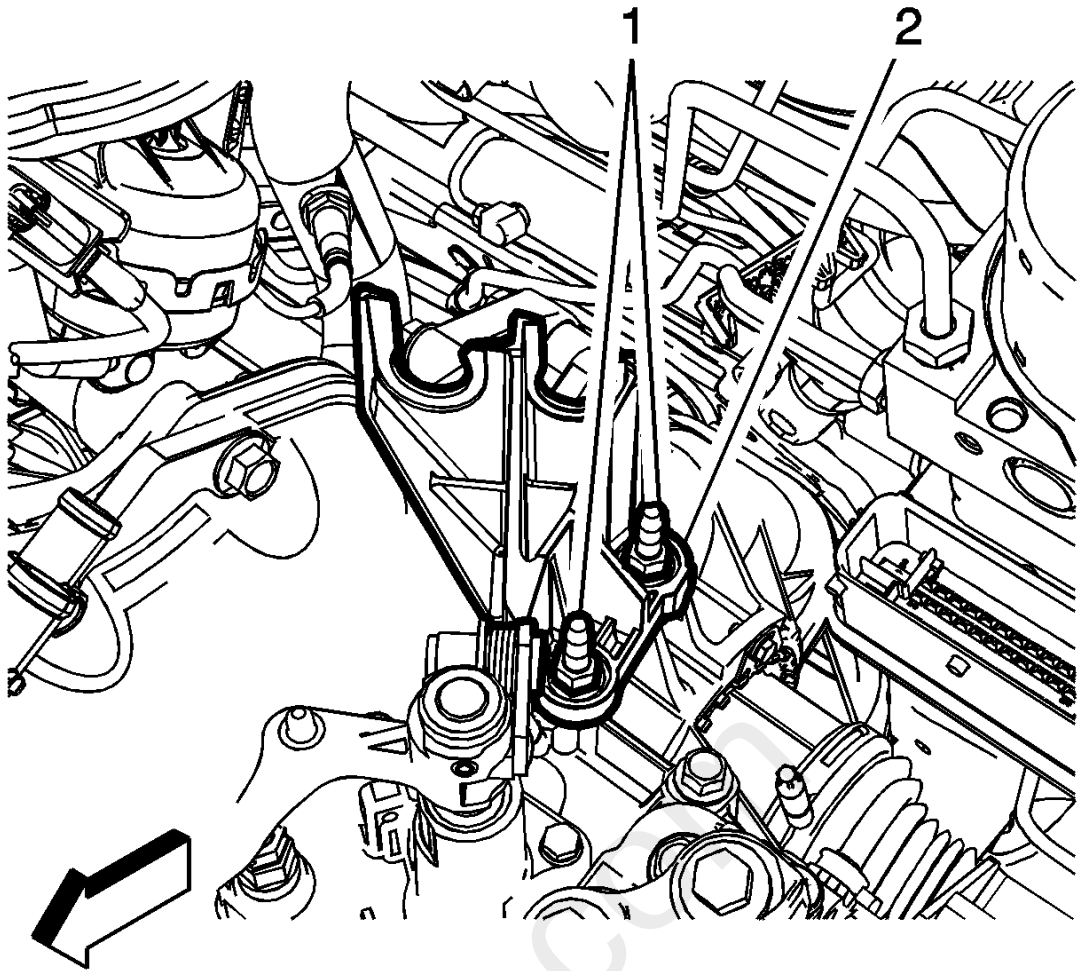


Fig. 24: Shift Lever And Selector Lever Cable Bracket And Fasteners

Courtesy of GENERAL MOTORS COMPANY

1. Position the shift lever and selector lever cable bracket (2) on the transmission.

CAUTION: Refer to [Fastener Caution](#) .

2. Install the 2 shift lever and selector lever cable bracket fasteners (1) and tighten to 58 N.m (43 lb ft).
3. Install the power brake booster pump assembly to the shift lever and selector lever cable bracket, if equipped. Refer to [Power Brake Booster Pump Replacement](#) .

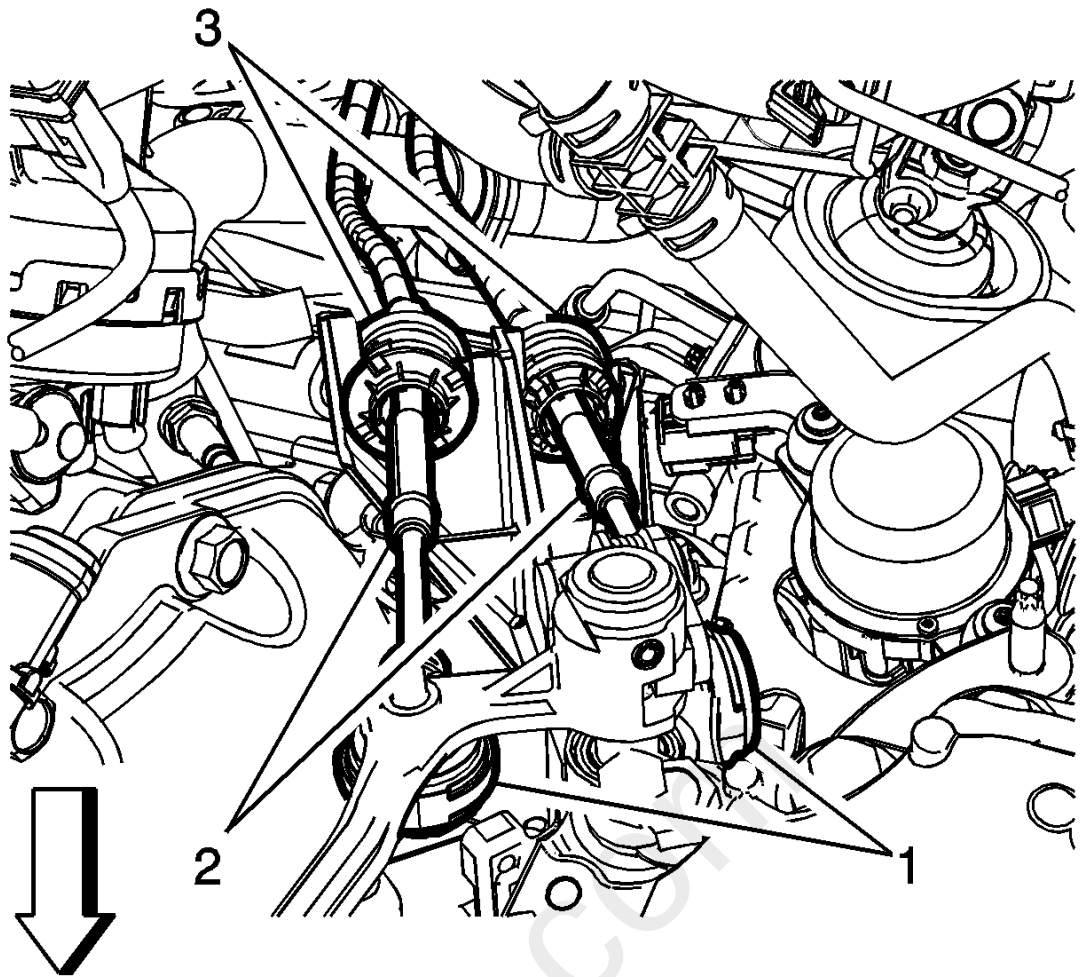


Fig. 25: Shift Lever And Selector Lever Cable
Courtesy of GENERAL MOTORS COMPANY

4. Connect the shift lever and selector lever cable ends (1) to the transmission shift lever and selector lever.
5. Install the shift lever and selector lever cable retainers (3) to the shift lever and selector lever cable bracket.
6. Adjust the shift lever and selector lever cables. Refer to [Manual Transmission Shift Lever and Selector Lever Cable Adjustment](#).
7. Install the battery tray. Refer to [Battery Tray Replacement](#) .
8. Verify correct operation of the transmission control assembly.

TRANSMISSION CONTROL LEVER KNOB REPLACEMENT

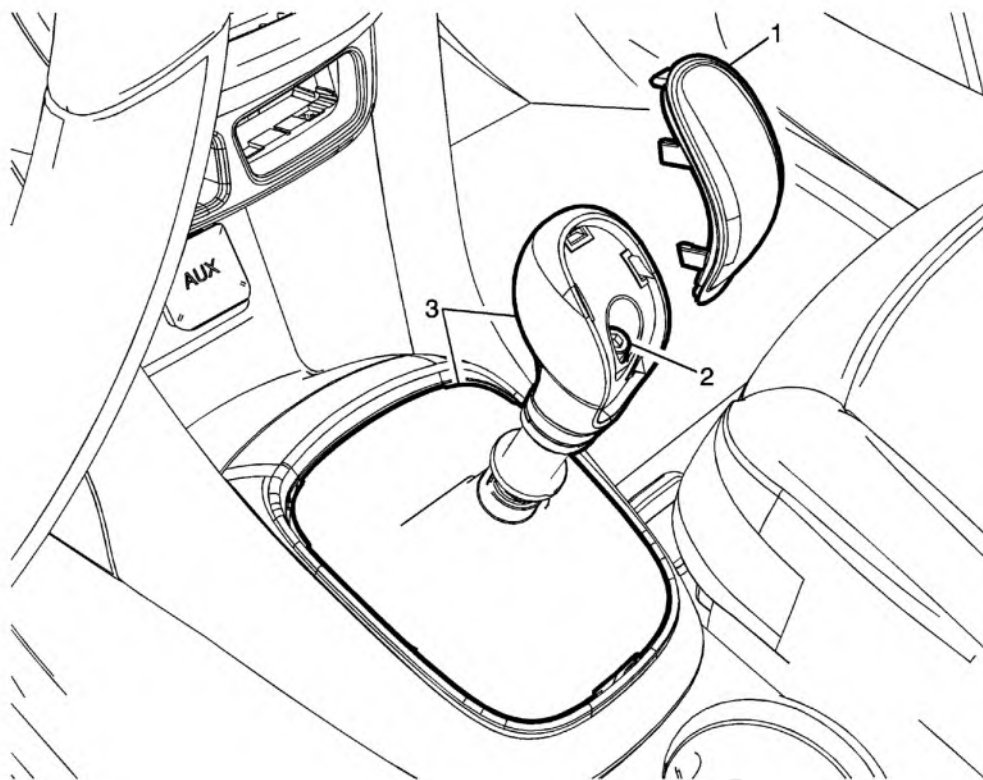


Fig. 26: Transmission Control Lever Knob
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Shift Control Lever Knob Cover Procedure Using a flat-bladed tool, remove the shift knob cover.
2	Fastener CAUTION: Refer to <u>Fastener Caution</u> . Tighten 16 N.m (12 lb ft)
3	Shift Control Lever Knob and Boot Assembly Procedure Using a flat-bladed tool, remove the boot retainer from the console.

TRANSMISSION CONTROL REPLACEMENT

Removal Procedure

1. Remove the floor console. Refer to **Front Floor Console Replacement (Buick)**, **Front Floor Console Replacement (Chevrolet)** .

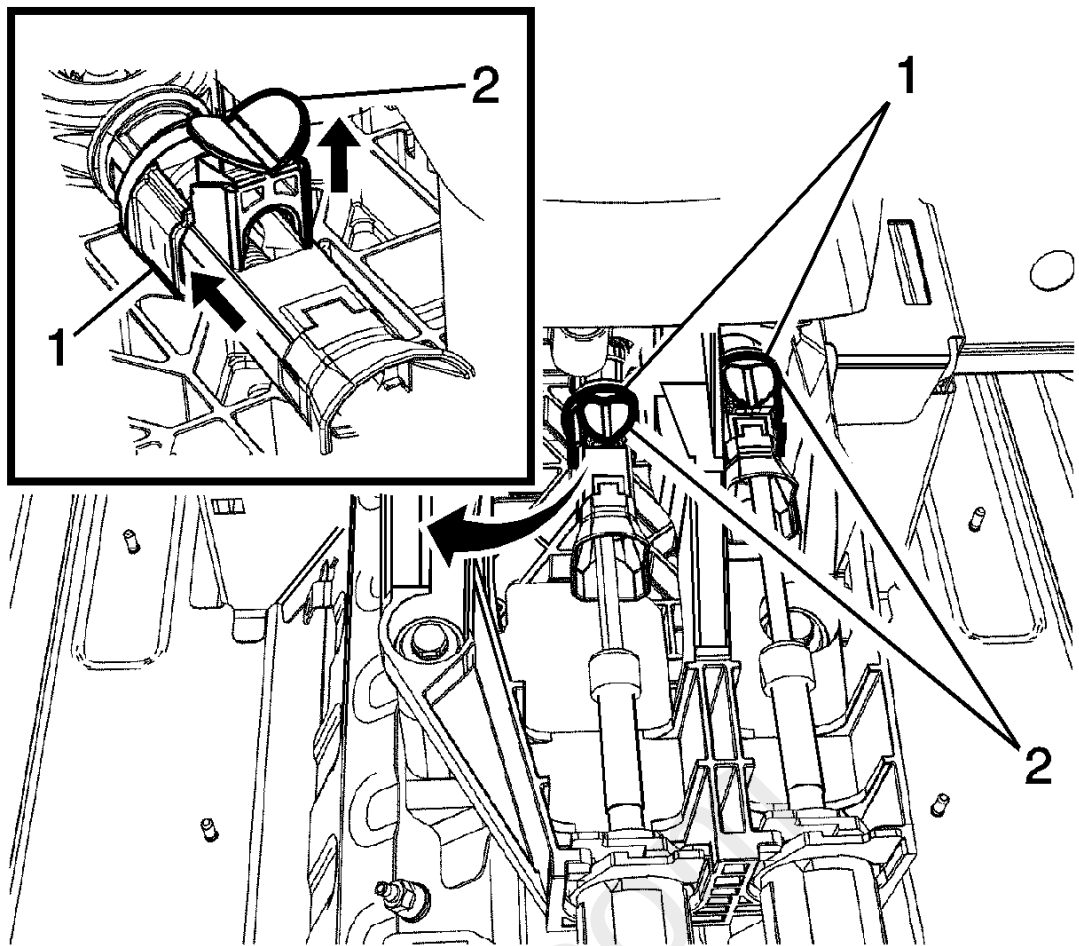


Fig. 27: Shift Lever And Selector Lever Cable
Courtesy of GENERAL MOTORS COMPANY

2. Lift the adjustment locks (2) up while pushing the adjustment retainers (1) rearward, one for each cable, to release the shift lever and selector lever cable.

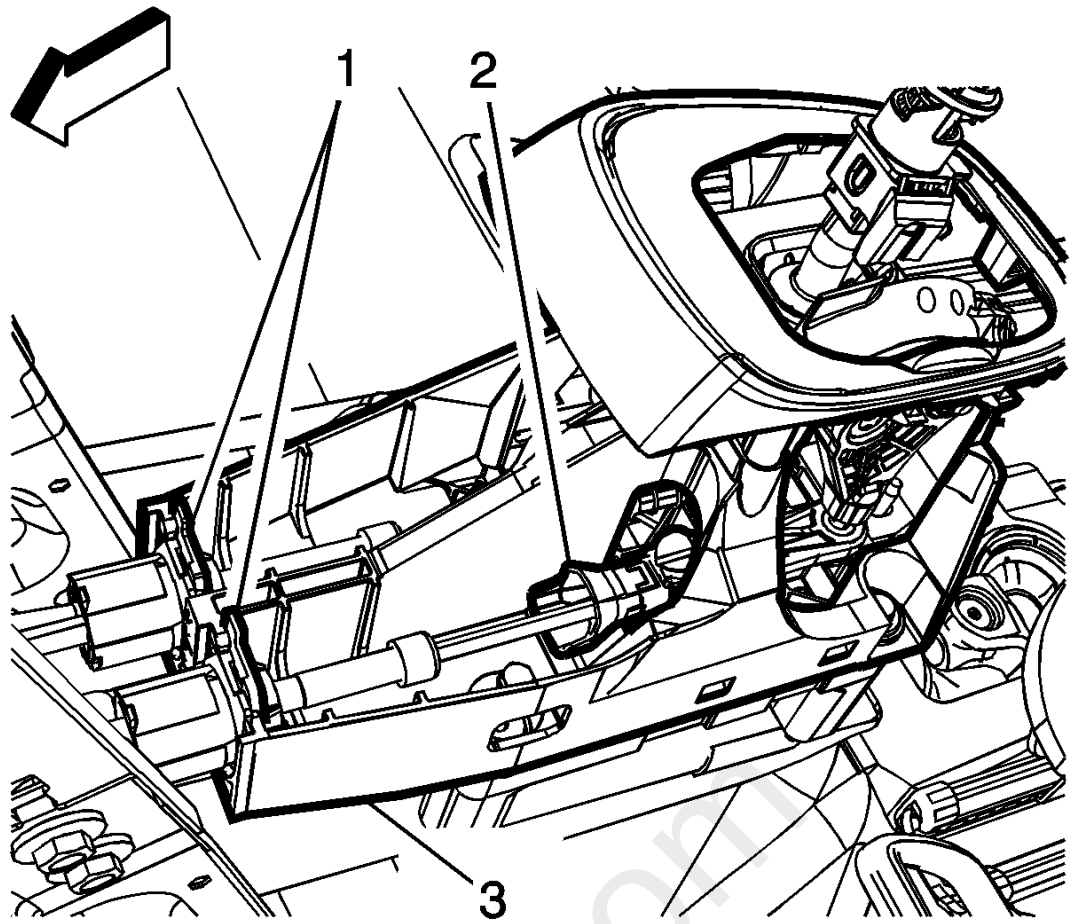


Fig. 28: Transmission Control Assembly

Courtesy of GENERAL MOTORS COMPANY

3. Squeeze the shift lever and selector lever cable retainers (1) then lift up on the transmission control assembly (3).
4. Remove the shift lever and selector cable from the shift and selector control.

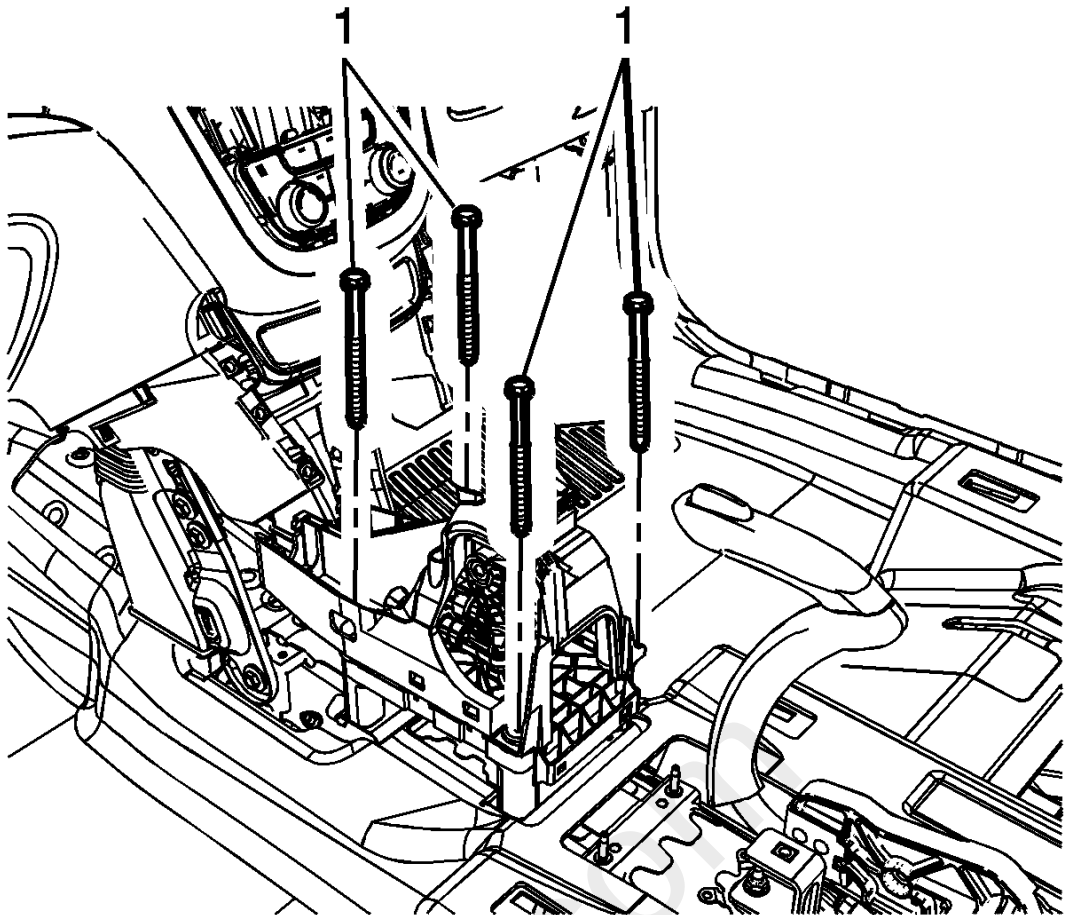


Fig. 29: Transmission Control Bolts

Courtesy of GENERAL MOTORS COMPANY

5. Remove the 4 transmission control bolts (1).
6. Remove the transmission control from the vehicle.

Installation Procedure

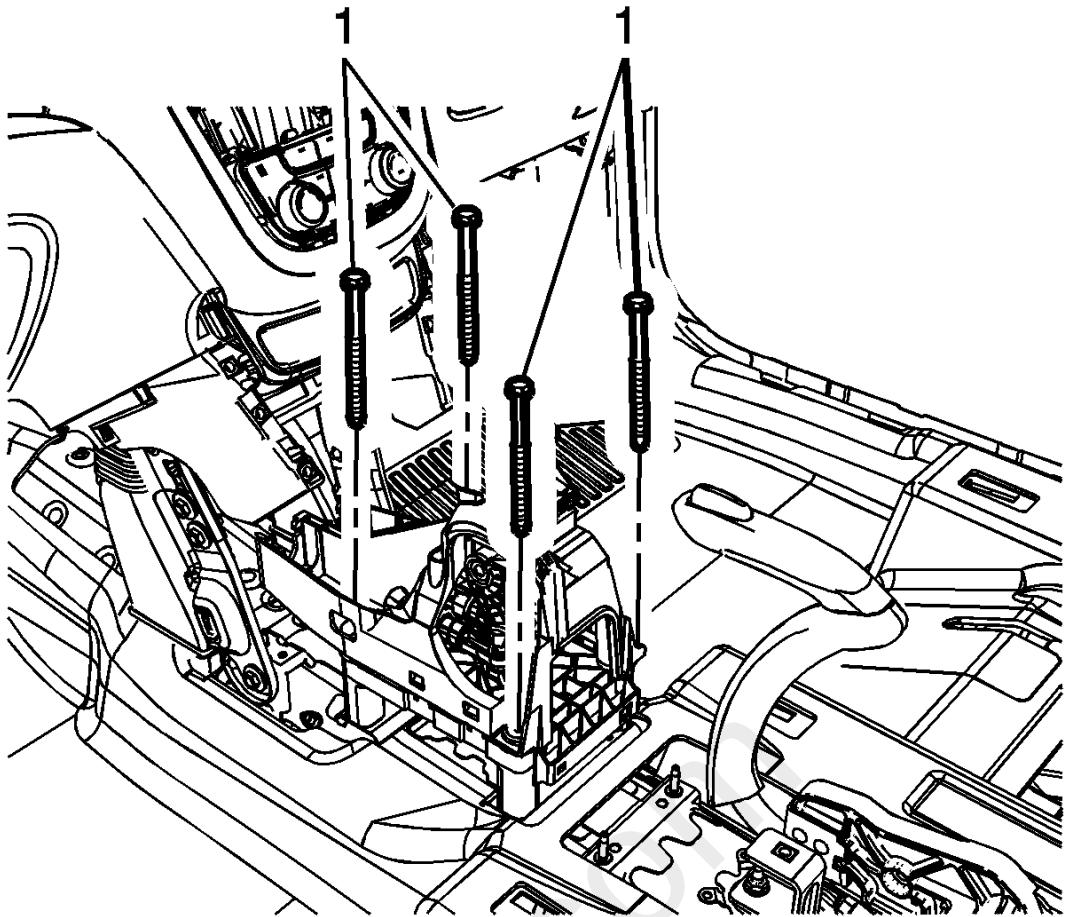


Fig. 30: Transmission Control Bolts

Courtesy of GENERAL MOTORS COMPANY

1. Position the transmission control in the vehicle.

CAUTION: Refer to Fastener Caution .

2. Install the 4 transmission control bolts (1) and tighten to 9 N.m (80 lb in).

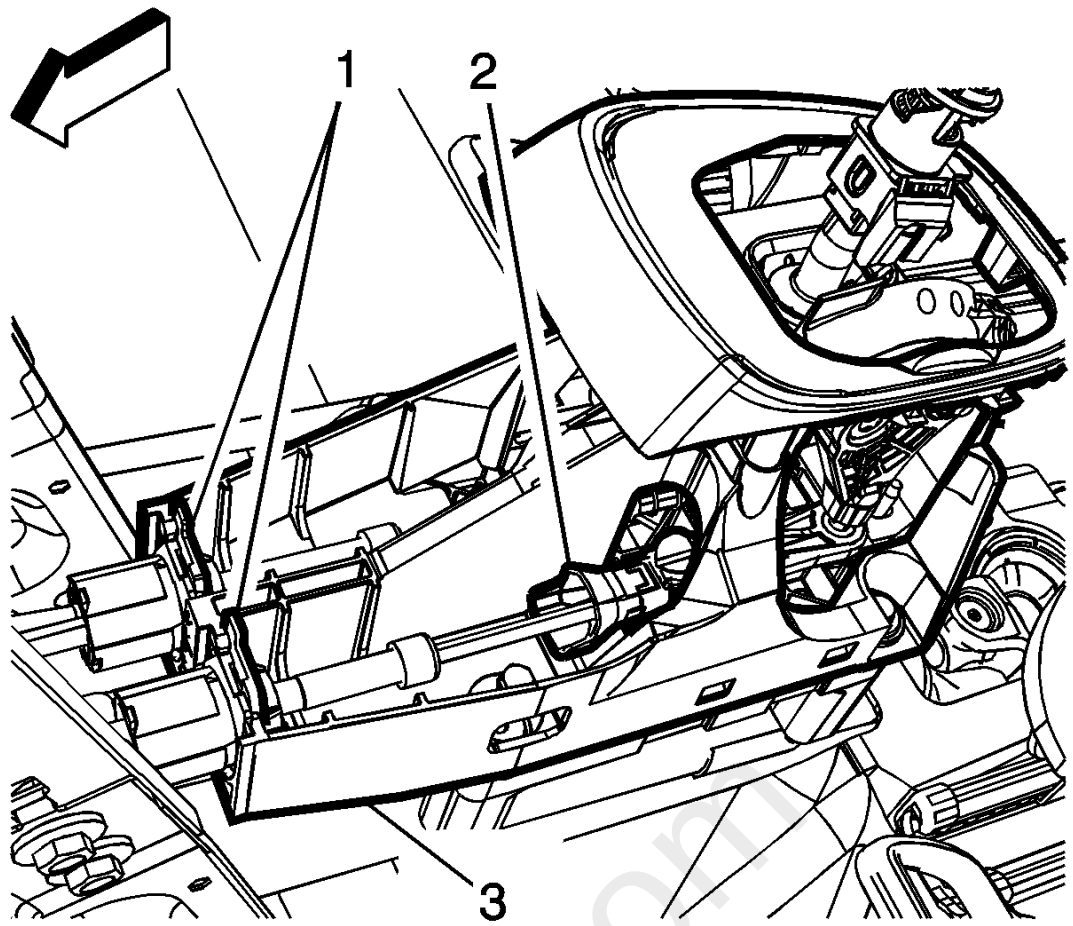


Fig. 31: Transmission Control Assembly

Courtesy of GENERAL MOTORS COMPANY

3. Connect the shift lever and selector lever cables to the shift and selector control adjusters (2).
4. Install the shift lever and selector lever cable retainers (1) to the transmission control (3)

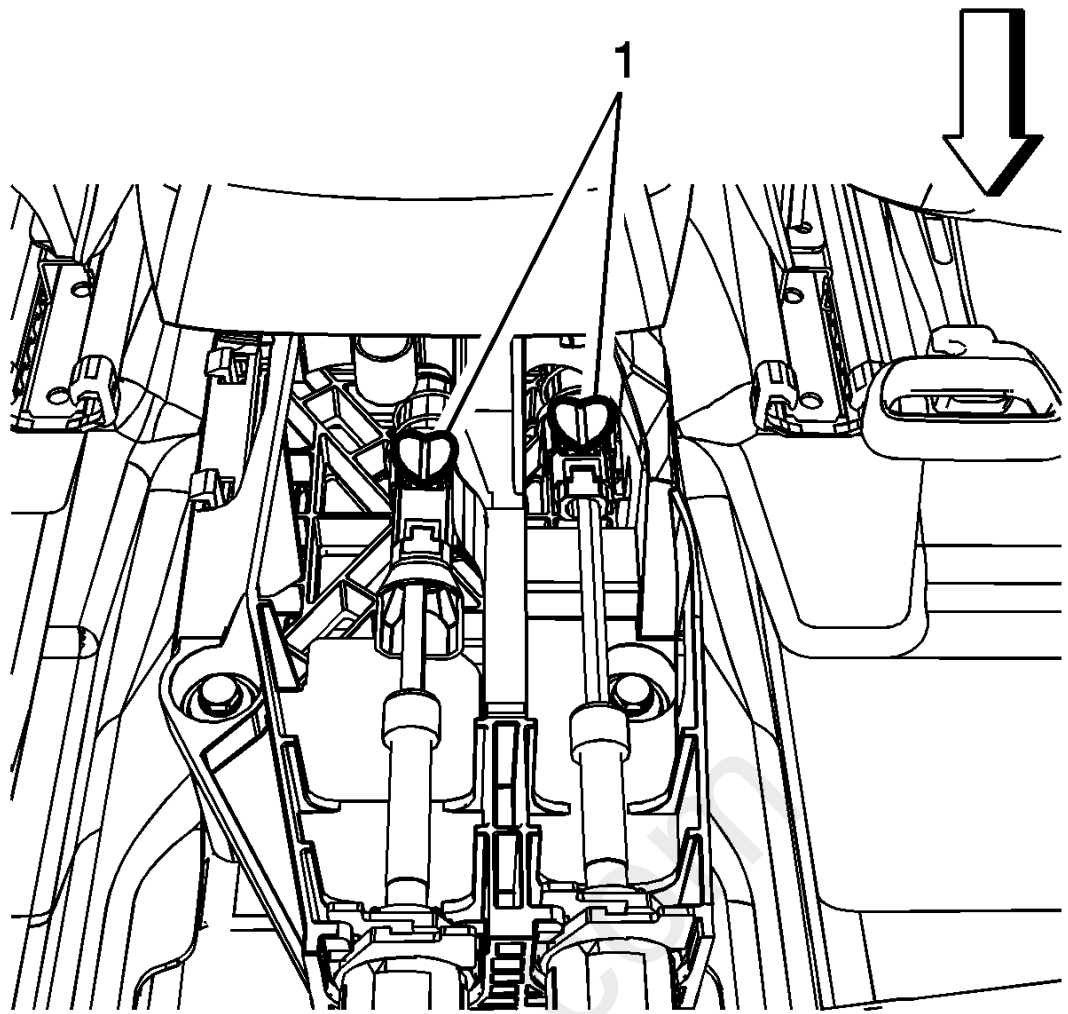


Fig. 32: Cable Adjustment Locks

Courtesy of GENERAL MOTORS COMPANY

5. Press down and lock both cable adjustment locks (1), one for each cable, to lock the shift lever and selector lever cable.
6. Adjust the shift lever and selector level cables. Refer to [Manual Transmission Shift Lever and Selector Lever Cable Adjustment](#).
7. Install the floor console. Refer to [Front Floor Console Replacement \(Buick\)](#), [Front Floor Console Replacement \(Chevrolet\)](#).
8. Verify the correct operation of the transmission control assembly.

BACKUP LAMP SWITCH REPLACEMENT

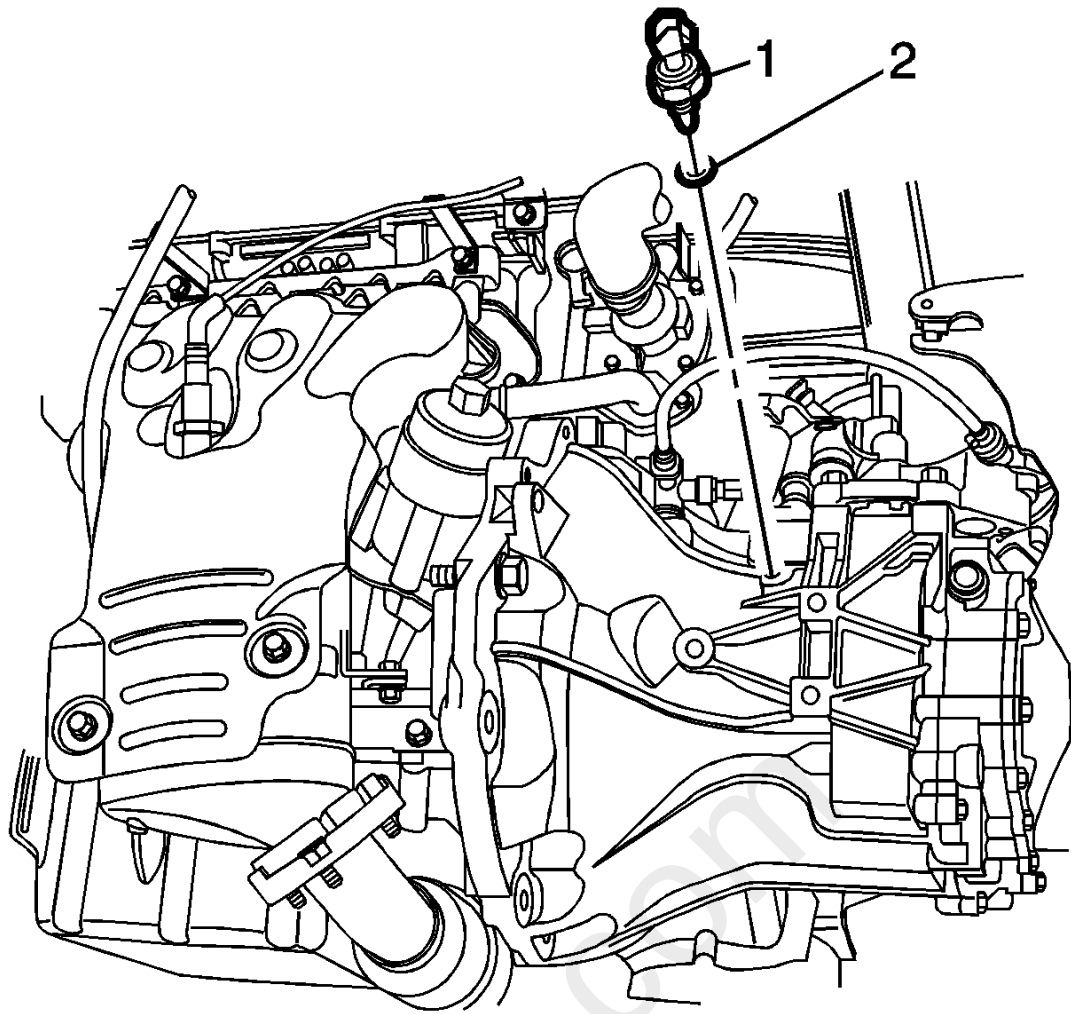


Fig. 33: Backup Lamp Switch

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection (without KL9), Battery Negative Cable Disconnection and Connection (with KL9). 2. Remove the engine control module. Refer to Engine Control Module Replacement.	
1	Backup Lamp Switch CAUTION: Refer to Component Fastener Tightening Caution . Procedure Disconnect the electrical connector. Tighten 20 N.m (15 lb ft)
2	Backup Lamp Switch Sealing Ring NOTE: Discard the sealing ring.

TRANSMISSION FLUID DRAIN AND FILL

Removal Procedure

WARNING: The transmission fluid is hot. Caution must be taken to prevent personal injury when the transmission fluid drains from the transmission.

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Remove the front compartment front center insulator, if equipped. Refer to [Front Compartment Front Center Insulator Replacement](#) .

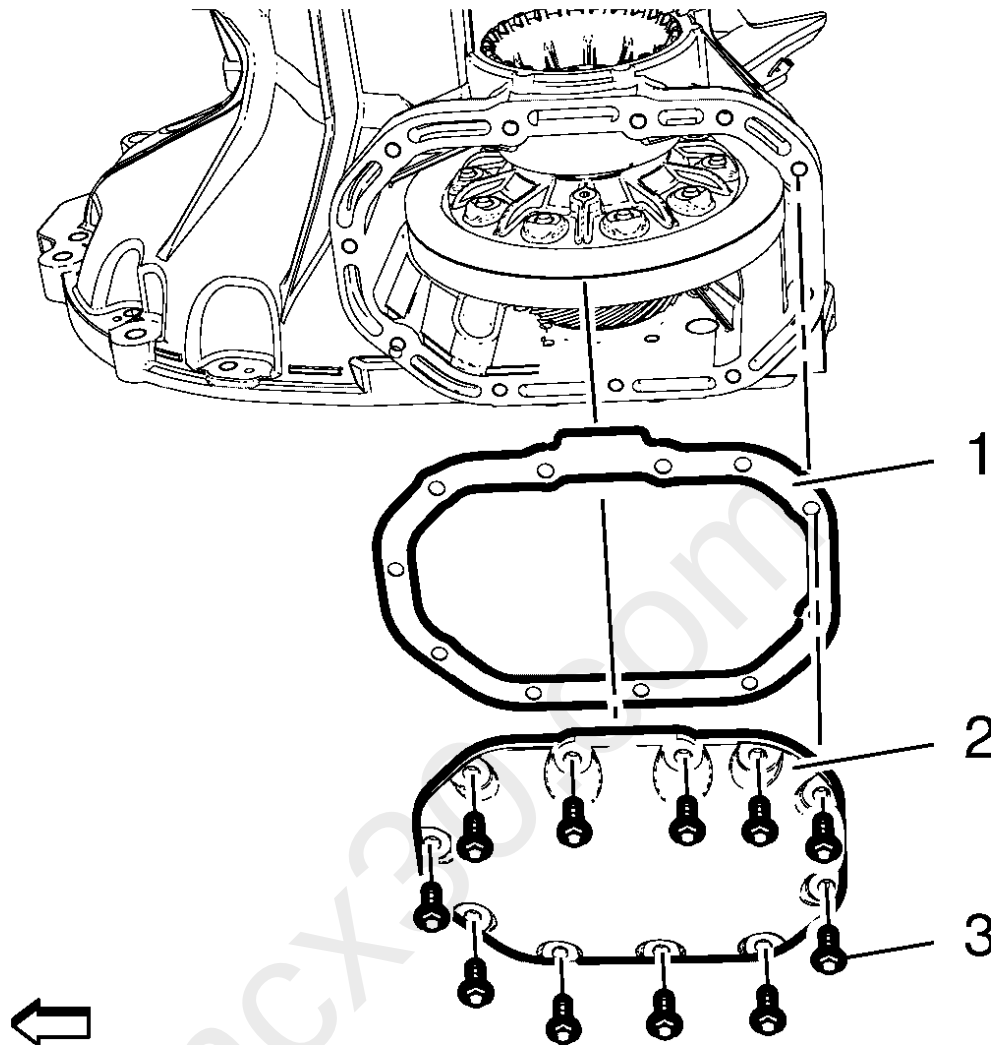


Fig. 34: Differential Housing Bolts

Courtesy of GENERAL MOTORS COMPANY

3. Remove the clutch and differential housing cover bolts (3).
4. Remove the clutch and differential housing cover (2) and allow the transmission to drain completely.
5. Remove and DISCARD the clutch and differential housing cover gasket (1).

Installation Procedure

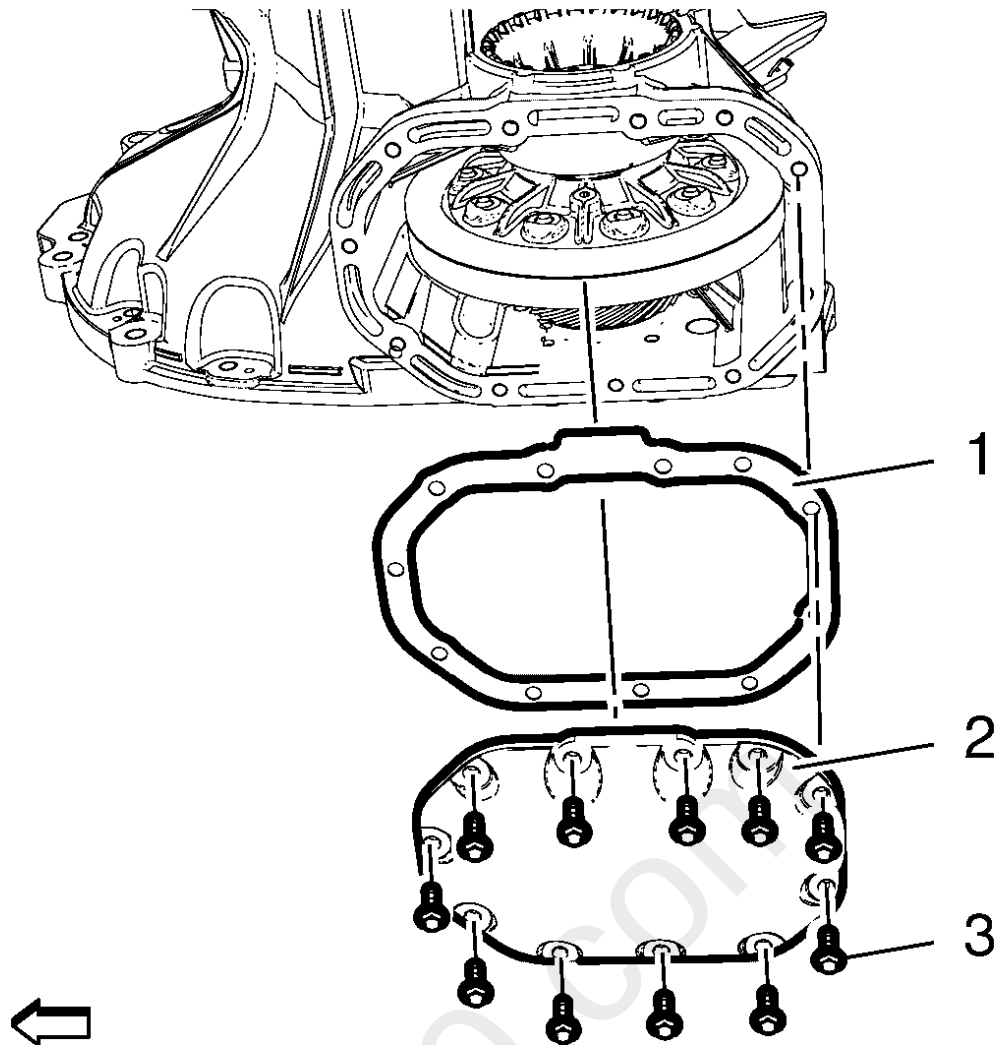


Fig.35: Differential Housing Bolts

Courtesy of GENERAL MOTORS COMPANY

1. Install the NEW clutch and differential housing cover gasket (1).
2. Install the clutch and differential housing cover (2).

CAUTION: Refer to **Fastener Caution** .

3. Install the clutch and differential housing cover bolts (3) and tighten to 30 N.m (22 lb ft).

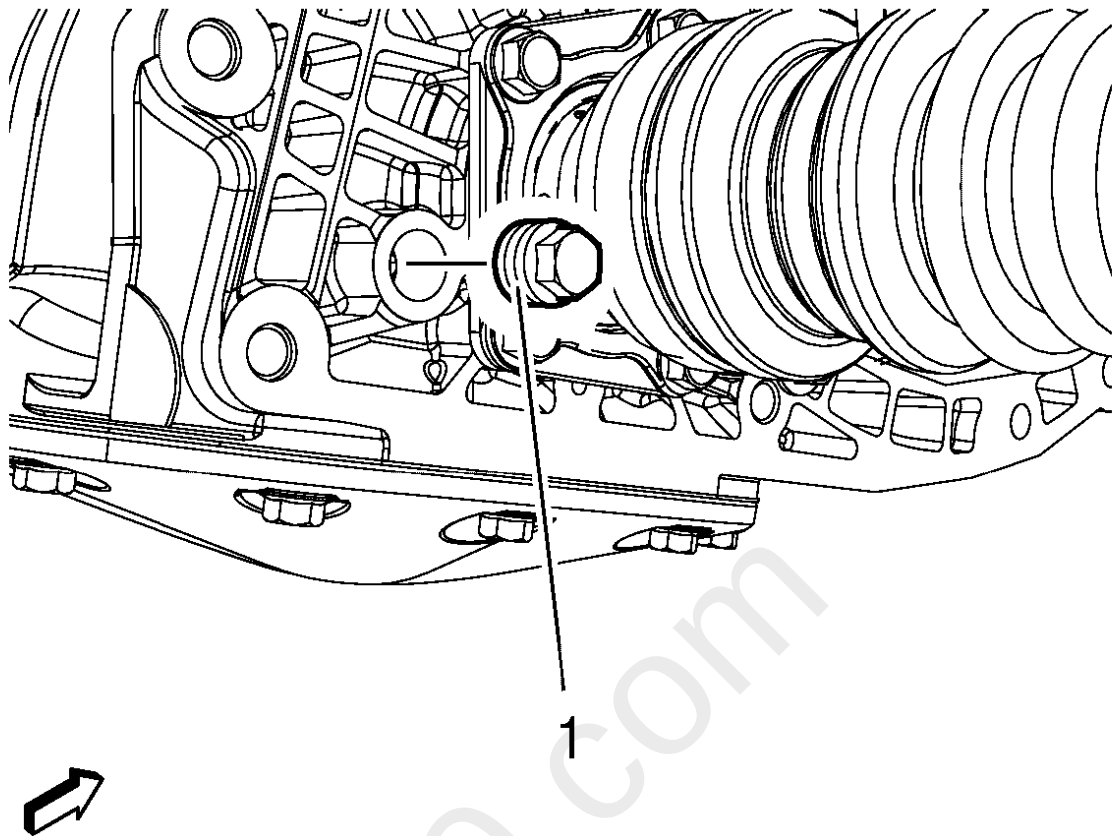


Fig. 36: Transmission Check Plug

Courtesy of GENERAL MOTORS COMPANY

WARNING: Use care when working around exhaust heat shields. The heat shields may have sharp edges and can cause personal injury if contact is made. Always install a temporary cover to the heat shield to reduce the risk of injury.

4. Remove and DISCARD the transmission oil level check plug (1).
5. Lower the vehicle.

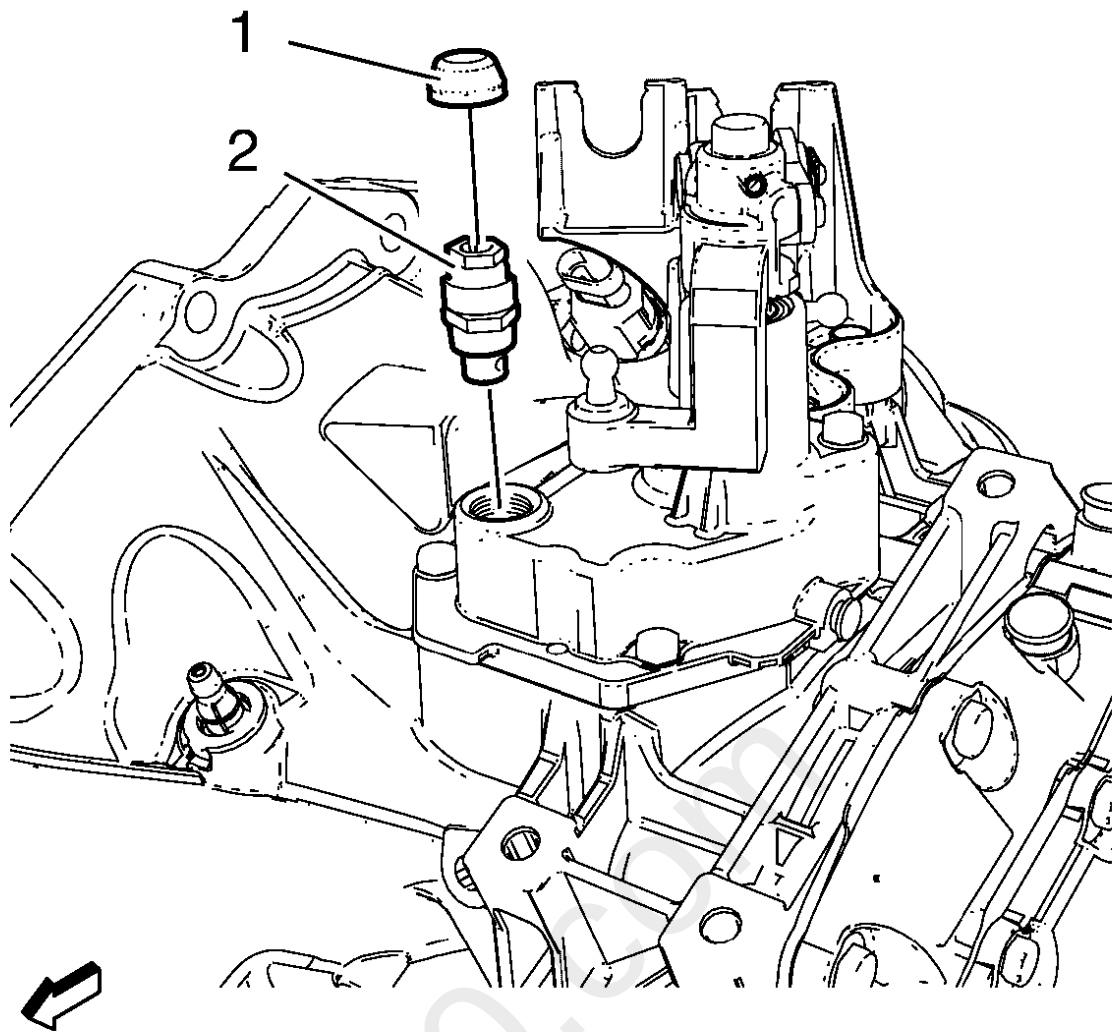


Fig.37: Fluid Fill Plug

Courtesy of GENERAL MOTORS COMPANY

6. Remove the transmission fill cap (1) and fill plug (2) and add transmission fluid until it seeps out of the fluid level check plug hole.
7. Raise the vehicle.
8. Install the NEW transmission fluid check plug and tighten to 6 N.m (53 lb in) plus 45-180 degrees.
9. Install the front compartment front center insulator, if equipped. Refer to [Front Compartment Front Center Insulator Replacement](#).
10. Lower the vehicle.
11. Install the transmission fill plug (2) and fill cap (1) and tighten to 35 N.m (26 lb ft).

SPEEDOMETER DRIVEN GEAR REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).

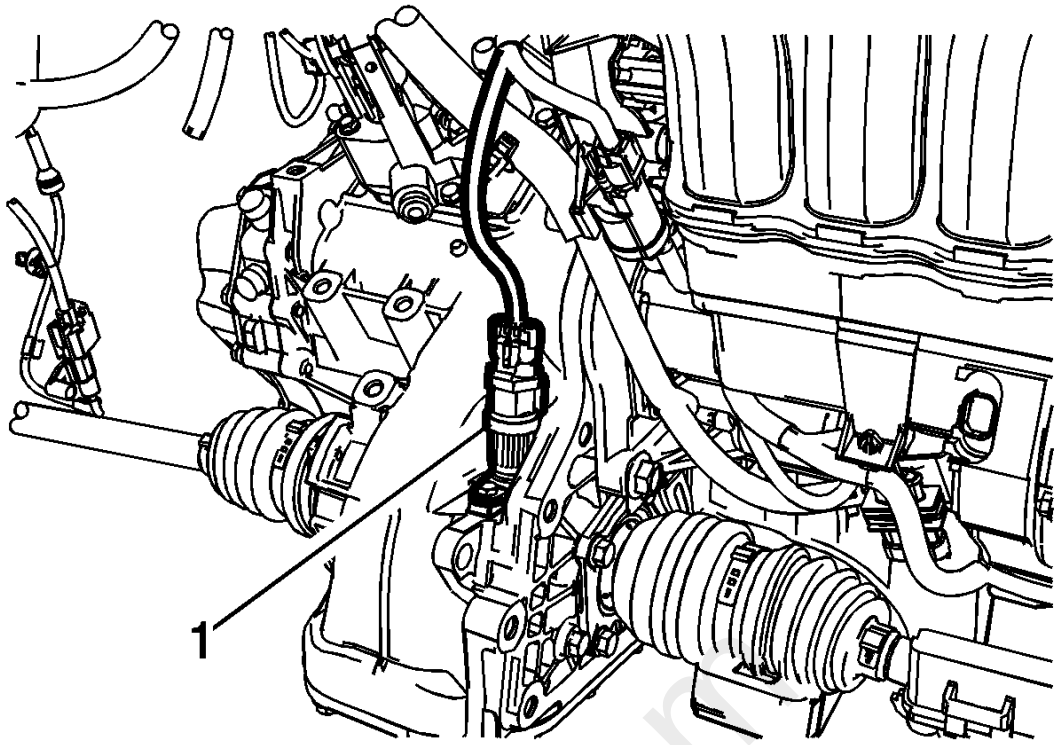


Fig. 38: Speedometer Driven Gear Electrical Connector

Courtesy of GENERAL MOTORS COMPANY

2. Disconnect the speedometer speed sensor (1) electrical connector.

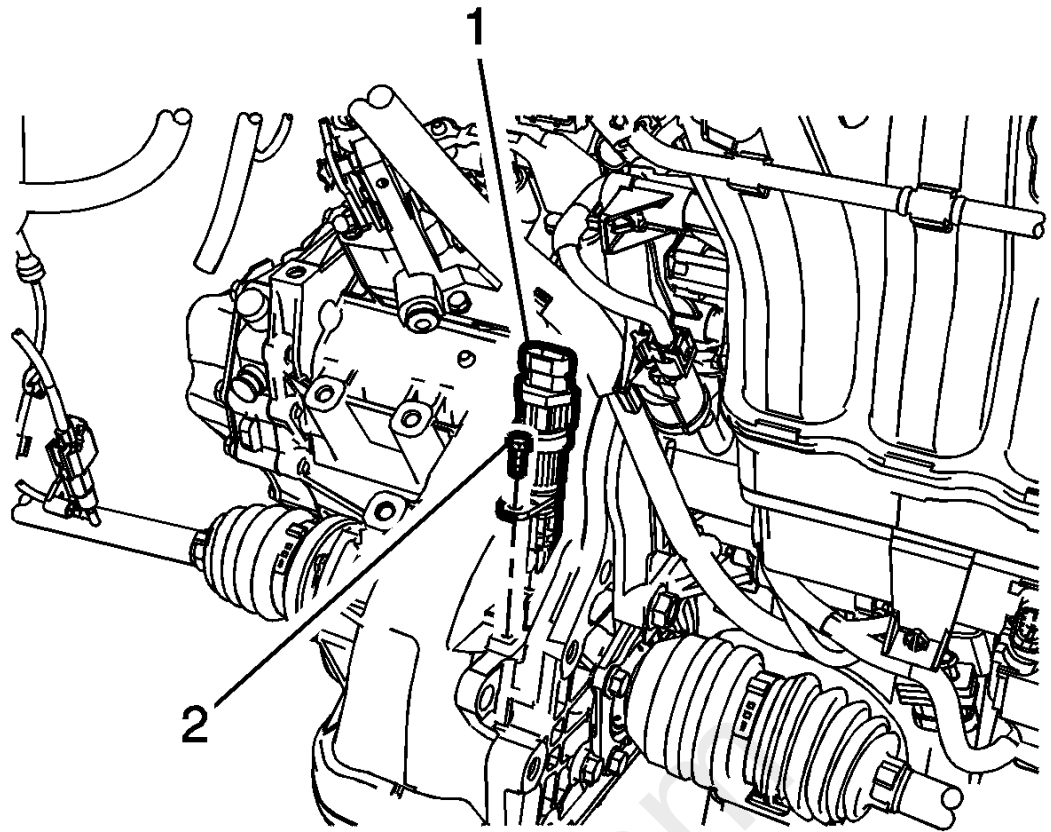


Fig. 39: Speedometer-Driven Gear And Speedometer Housing
Courtesy of GENERAL MOTORS COMPANY

3. Remove the speedometer housing retaining bolt (2).
4. Remove the speedometer-driven gear and the speedometer housing (1).

Installation Procedure

1. Coat the O-ring with transmission fluid.

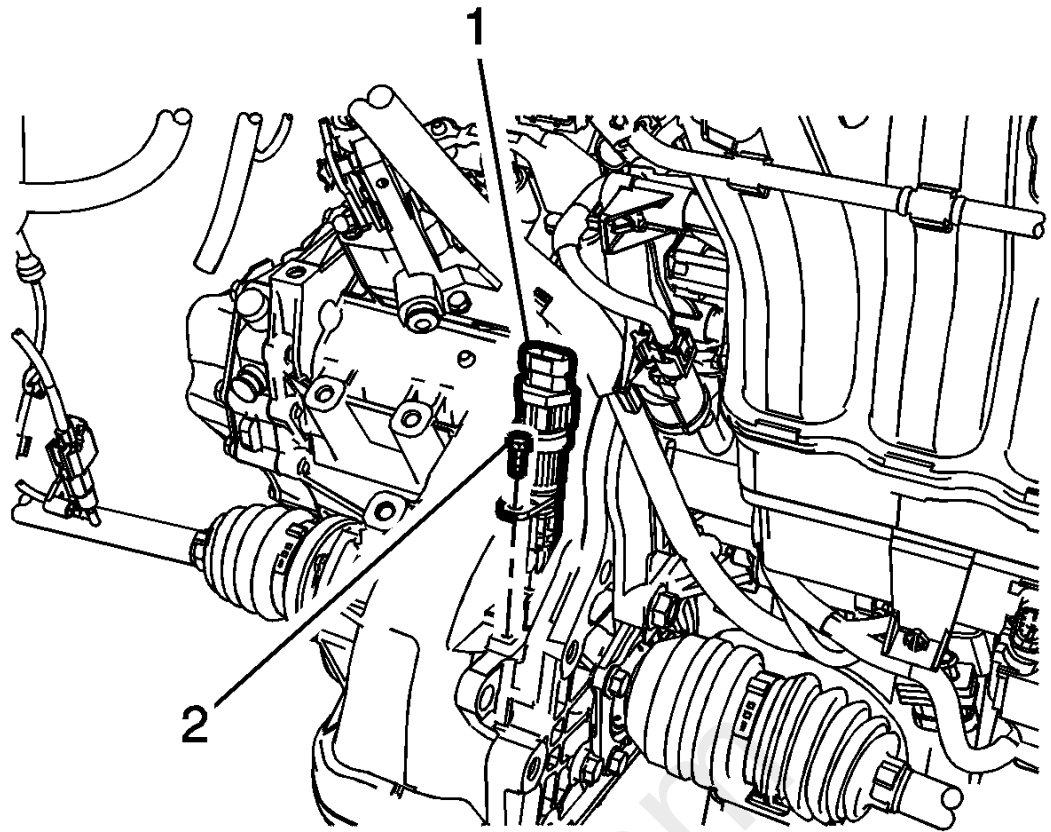


Fig. 40: Speedometer-Driven Gear And Speedometer Housing

Courtesy of GENERAL MOTORS COMPANY

2. Install the speedometer-driven gear and the speedometer housing (1).

CAUTION: Refer to **Fastener Caution** .

3. Install the speedometer housing retaining bolt (2) and tighten to 4 N.m (35 lb in).

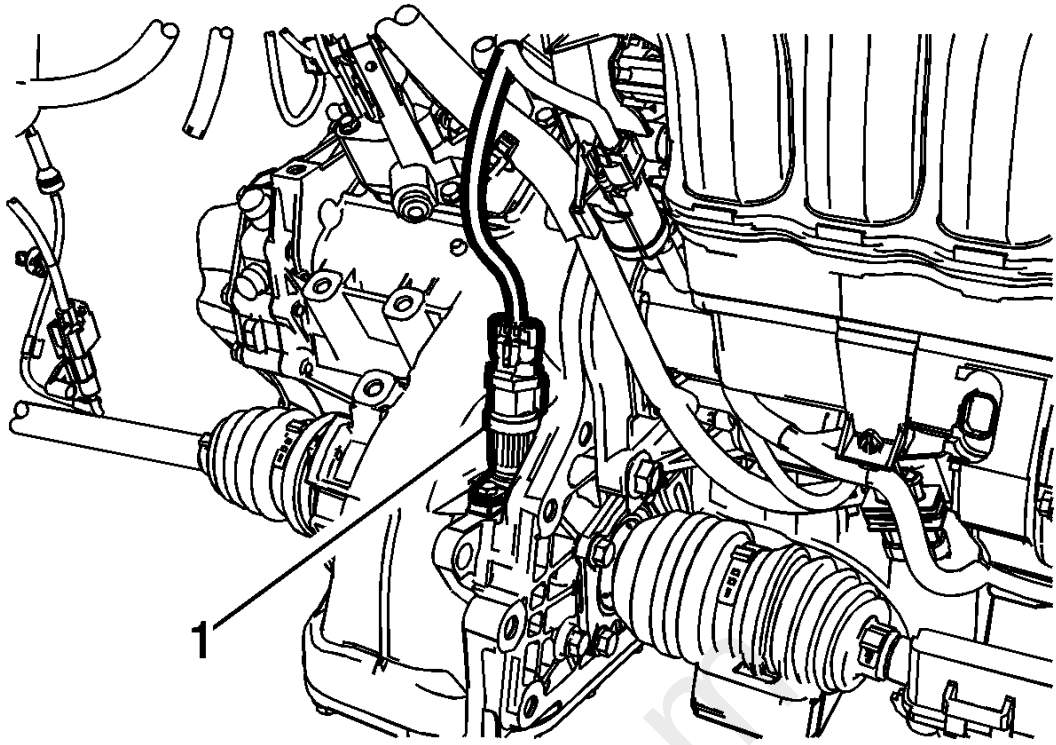


Fig. 41: Speedometer Driven Gear Electrical Connector

Courtesy of GENERAL MOTORS COMPANY

4. Connect the speedometer speed sensor (1) electrical connector.
5. Lower the vehicle.

FRONT WHEEL DRIVE SHAFT SEAL REPLACEMENT - LEFT SIDE

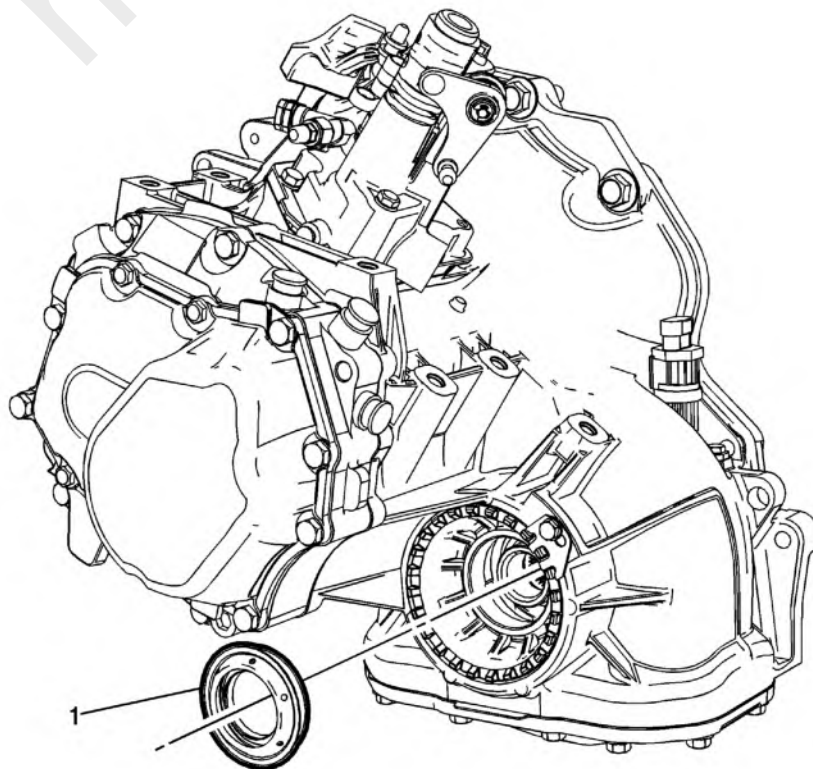


Fig. 42: Front Wheel Drive Shaft Seal - Left Side
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle . 2. Remove the front wheel drive shaft from the transmission. Refer to Front Wheel Drive Shaft Replacement - Left Side .	
1	Left Front Wheel Drive Shaft Oil Seal Procedure 1. Remove the left front wheel drive shaft oil seal using the DT-7004 hammer and the DT-23129 remover. 2. Coat the NEW left front wheel drive shaft oil seal with transmission fluid. 3. Install the NEW left front wheel drive shaft oil seal using the DT-519 drift and hammer. NOTE: Do not reuse the wheel drive shaft oil seal. Special Tools • DT-519 Installer Drift • DT-23129 Universal Seal Remover • DT-7004 Slide Hammer For equivalent regional tools, refer to Special Tools.

FRONT WHEEL DRIVE SHAFT SEAL REPLACEMENT - RIGHT SIDE

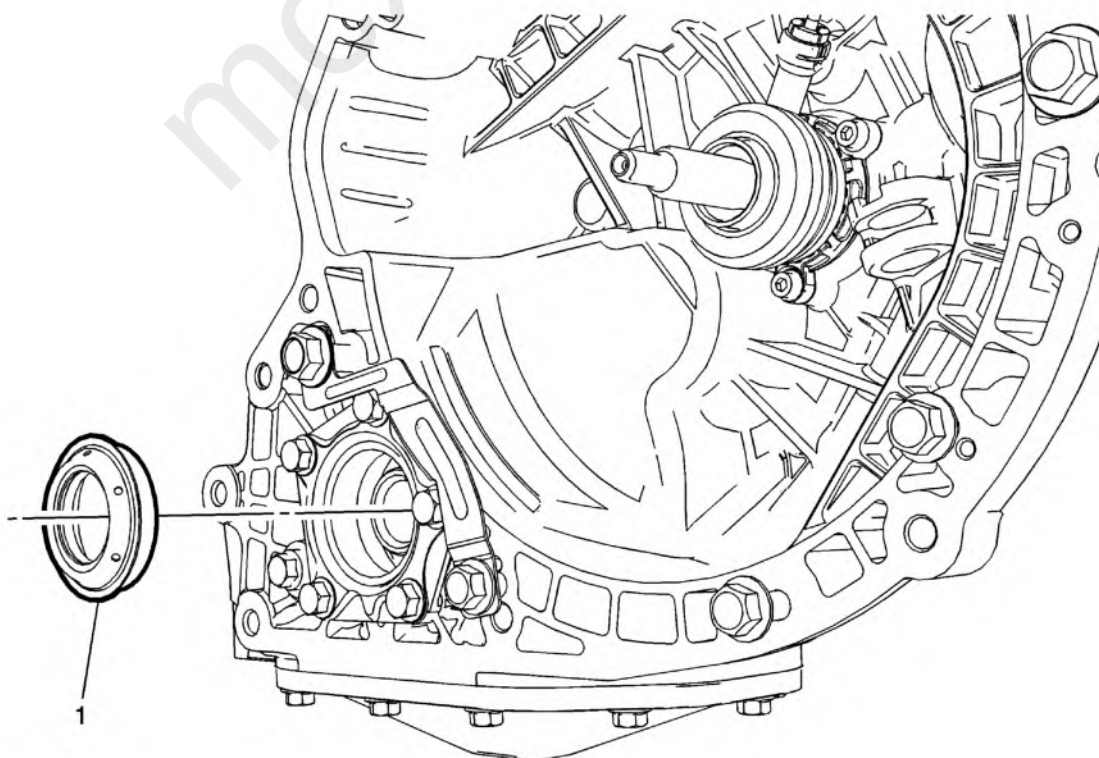


Fig. 43: Front Wheel Drive Shaft Seal - Right Side
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedures 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle . 2. Remove the front wheel drive shaft from the transmission. Refer to Front Wheel Drive Shaft Replacement - Right Side . 3. Remove the intermediate shaft. Refer to Front Wheel Drive Intermediate Shaft Replacement (LE2 with MNH), Front Wheel Drive Intermediate Shaft Replacement (LUV with MR5) .	
1	Right Front Wheel Drive Shaft Oil Seal Procedure 1. Remove the right front wheel drive shaft oil seal using the DT-7004 hammer and the DT-23129 remover. 2. Coat the NEW right front wheel drive shaft oil seal with transmission fluid. 3. Install the NEW right front wheel drive shaft oil seal using the DT-519 drift and hammer. NOTE: Do not reuse the wheel drive shaft oil seal. Special Tools • DT-519 Installer Drift • DT-7004 Slide Hammer • DT-23129 Universal Seal Remover For equivalent regional tools, refer to Special Tools.

TRANSMISSION REPLACEMENT

Removal Procedure

1. Remove the battery and battery tray. Refer to [Battery Tray Replacement](#) .
2. Remove the front bumper fascia opening upper cover. Refer to [Front Bumper Fascia Opening Upper Cover Replacement](#) .
3. Without draining the coolant or removing the hoses, remove and position aside the radiator surge tank. Refer to [Radiator Surge Tank Replacement \(LUV, 2H0\)](#), [Radiator Surge Tank Replacement \(LE2\)](#) .

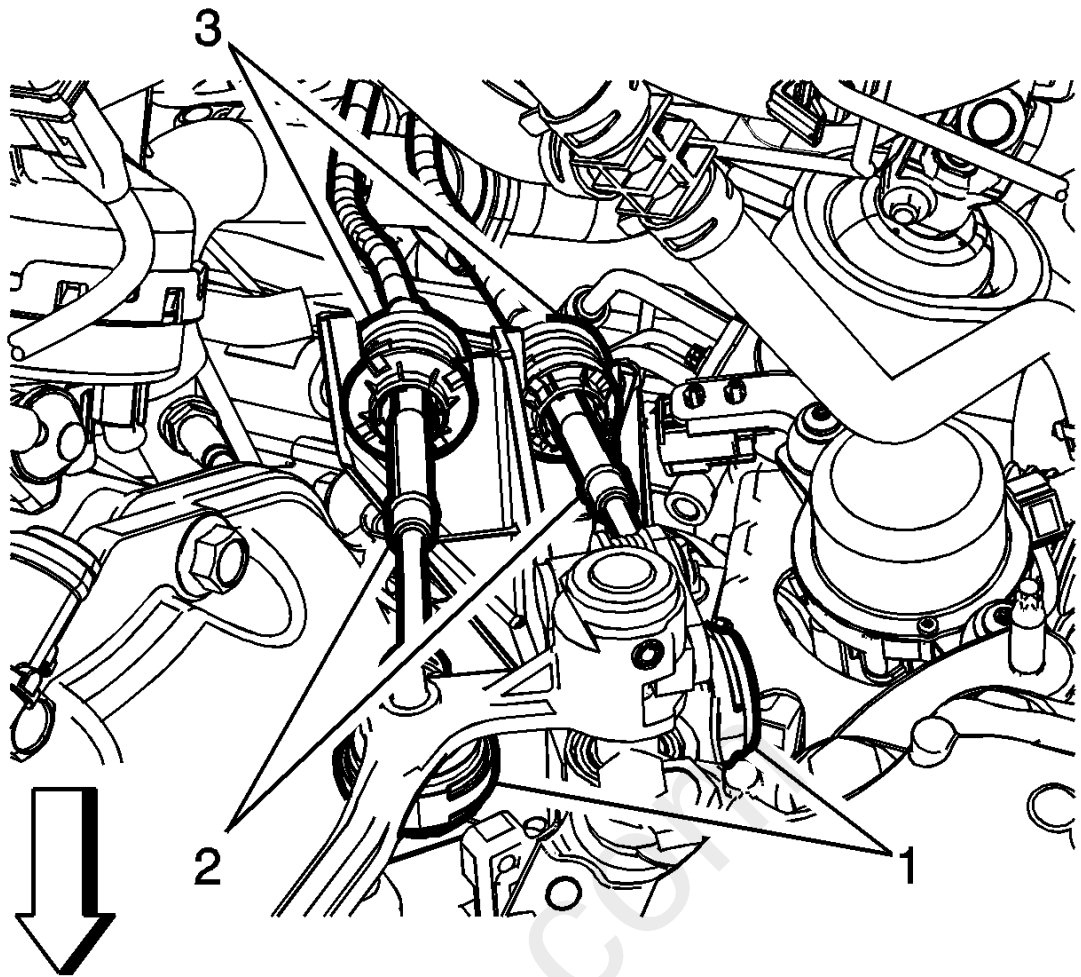


Fig. 44: Shift Lever And Selector Lever Cable
Courtesy of GENERAL MOTORS COMPANY

4. Disconnect the shift lever and selector lever cable ends (1) from the transmission shift lever and selector lever.
5. Pull the cable retainers (3) up while pushing the cable retainers rearward to release the shift lever and selector lever cable from the shift lever and selector lever cable bracket.
6. Remove the power brake booster pump assembly from shift lever and selector lever cable bracket, if equipped. Refer to [**Power Brake Booster Pump Replacement**](#) .
7. Disconnect the electrical connector from the neutral position sensor.

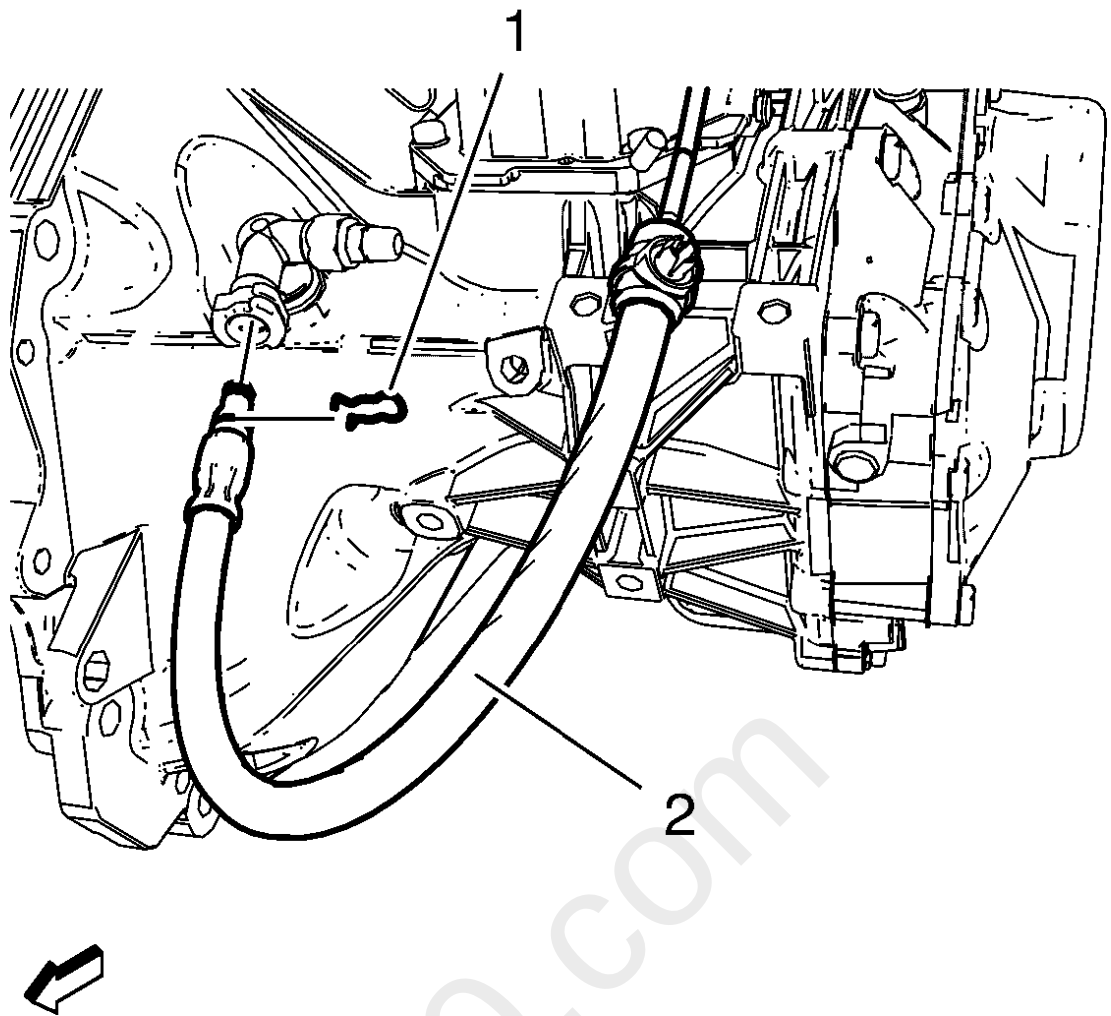


Fig. 45: Clutch Actuator Cylinder Front Pipe Retainer
Courtesy of GENERAL MOTORS COMPANY

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

8. Remove the clutch actuator cylinder front pipe retaining clip (1).
9. Disconnect the clutch actuator cylinder front pipe (2) from the clutch actuator cylinder pipe elbow.

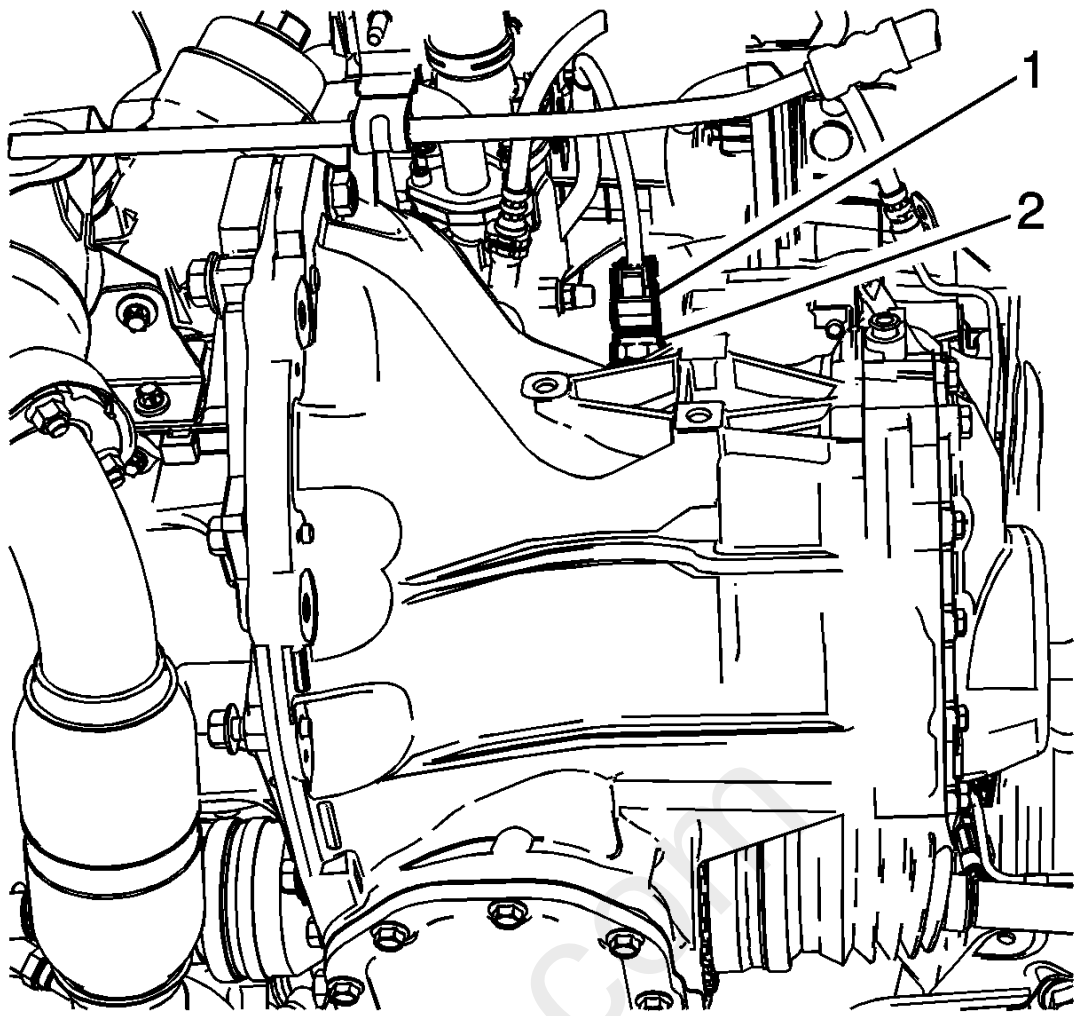


Fig. 46: Backup Lamp Switch & Electrical Connector

Courtesy of GENERAL MOTORS COMPANY

10. Disconnect the electrical connector (1) from the backup lamp switch (2).

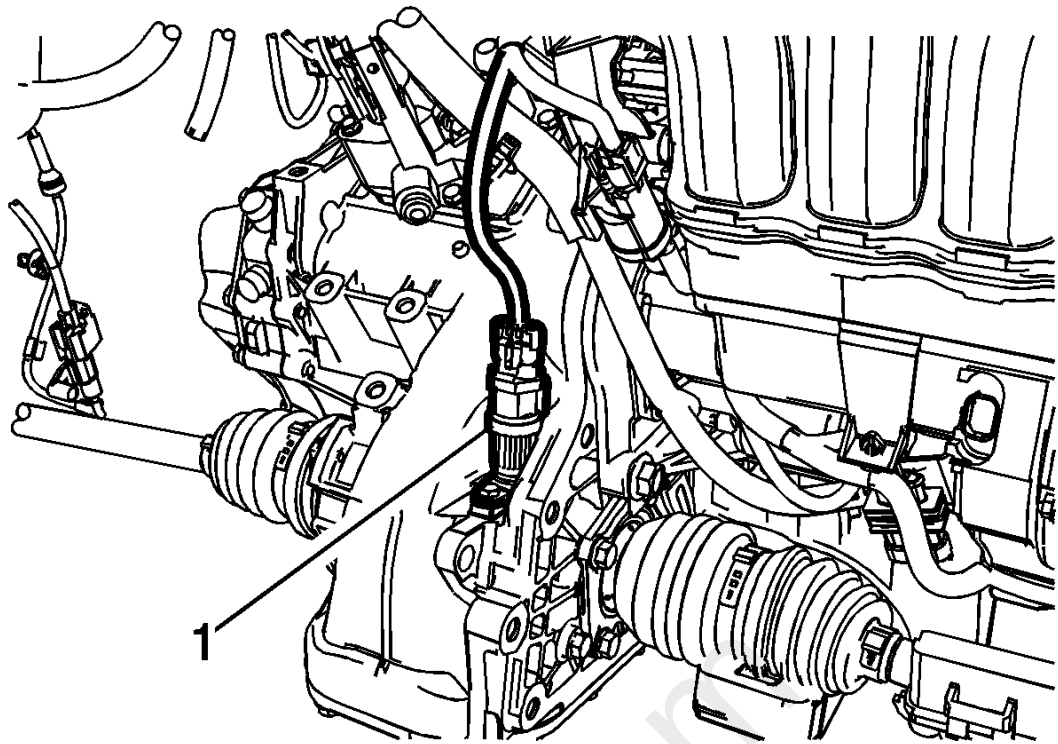


Fig. 47: Speedometer Driven Gear Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

11. Disconnect the speedometer driven gear electrical connector (1).

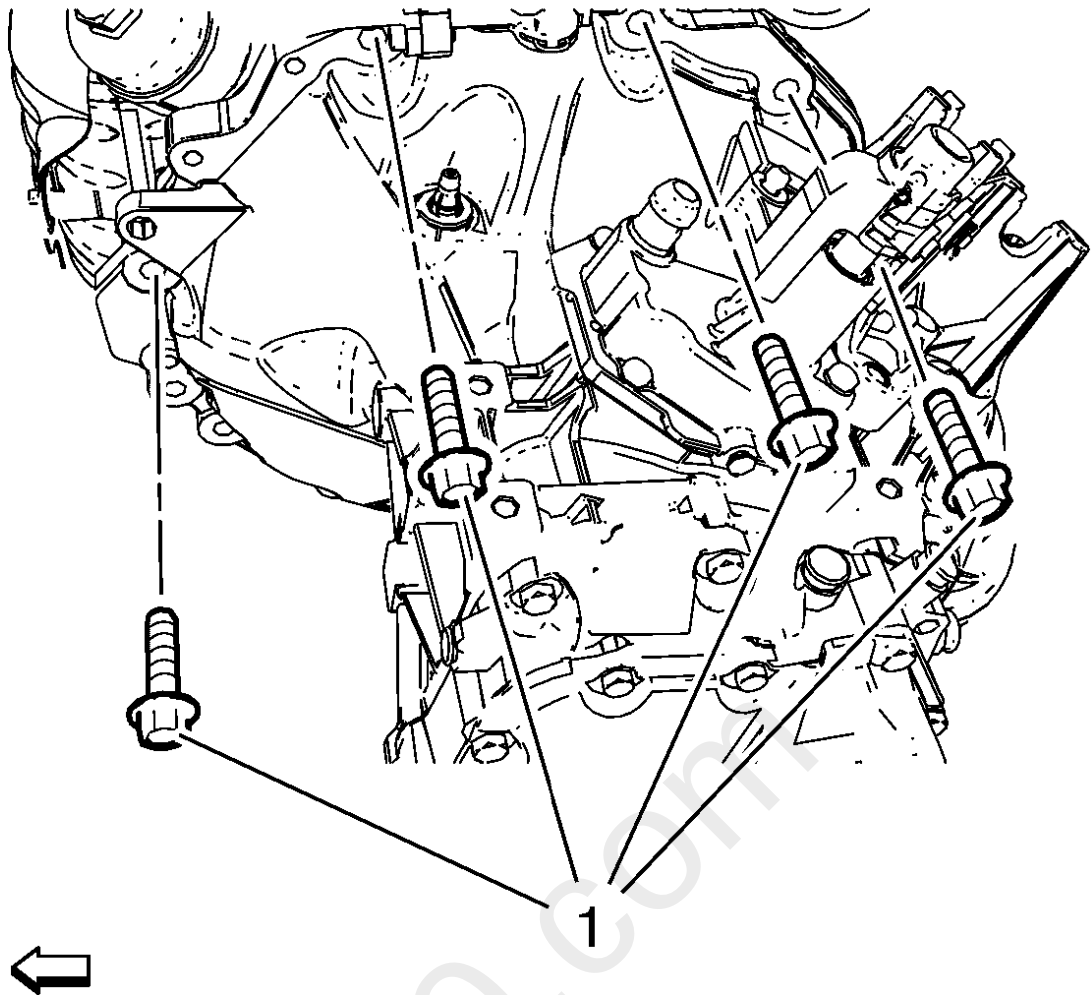


Fig. 48: Upper Transmission Bolts

Courtesy of GENERAL MOTORS COMPANY

12. Remove the upper transmission bolts (1).
13. Support the CRFM from the top.
14. Install the engine support fixture. Refer to [Engine Support Fixture](#) .
15. Remove the exhaust front pipe. Refer to [Exhaust Front Pipe Replacement \(LUV\)](#), [Exhaust Front Pipe Replacement \(2H0\)](#), [Exhaust Front Pipe Replacement \(LE2\)](#) .
16. Remove the drivetrain and front suspension frame. Refer to [Drivetrain and Front Suspension Frame Replacement \(Long Cradle\)](#), [Drivetrain and Front Suspension Frame Replacement \(Short Cradle\)](#), [Drivetrain and Front Suspension Frame Replacement \(Long Cradle - V50\)](#) .
17. Drain the transmission fluid. Refer to [Transmission Fluid Drain and Fill](#).

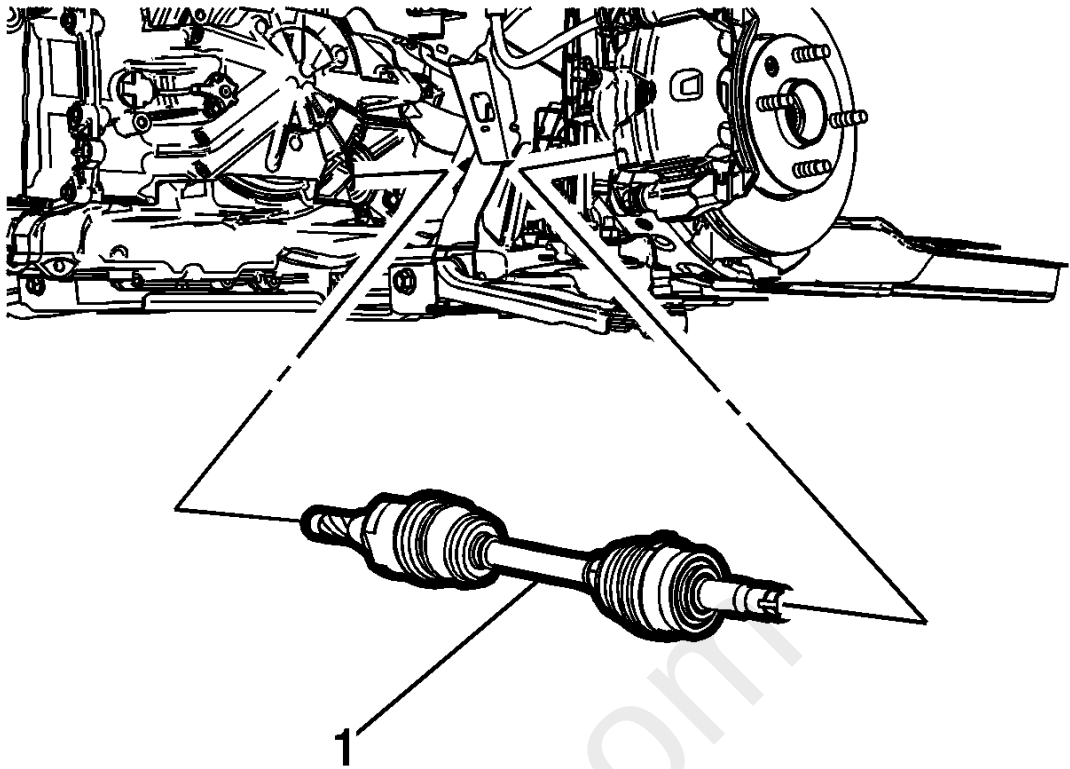


Fig. 49: Wheel Drive Shaft

Courtesy of GENERAL MOTORS COMPANY

18. Remove both front wheel drive shafts (1) from the transmission. Refer to [**Front Wheel Drive Shaft Replacement - Left Side**](#) , and [**Front Wheel Drive Shaft Replacement - Right Side**](#) .
19. Remove the intermediate shaft. Refer to [**Front Wheel Drive Intermediate Shaft Replacement \(LE2 with MNH\)**](#), [**Front Wheel Drive Intermediate Shaft Replacement \(LUV with MR5\)**](#) .
20. Remove the transmission rear mount bracket. Refer to [**Transmission Rear Mount Bracket Replacement**](#).

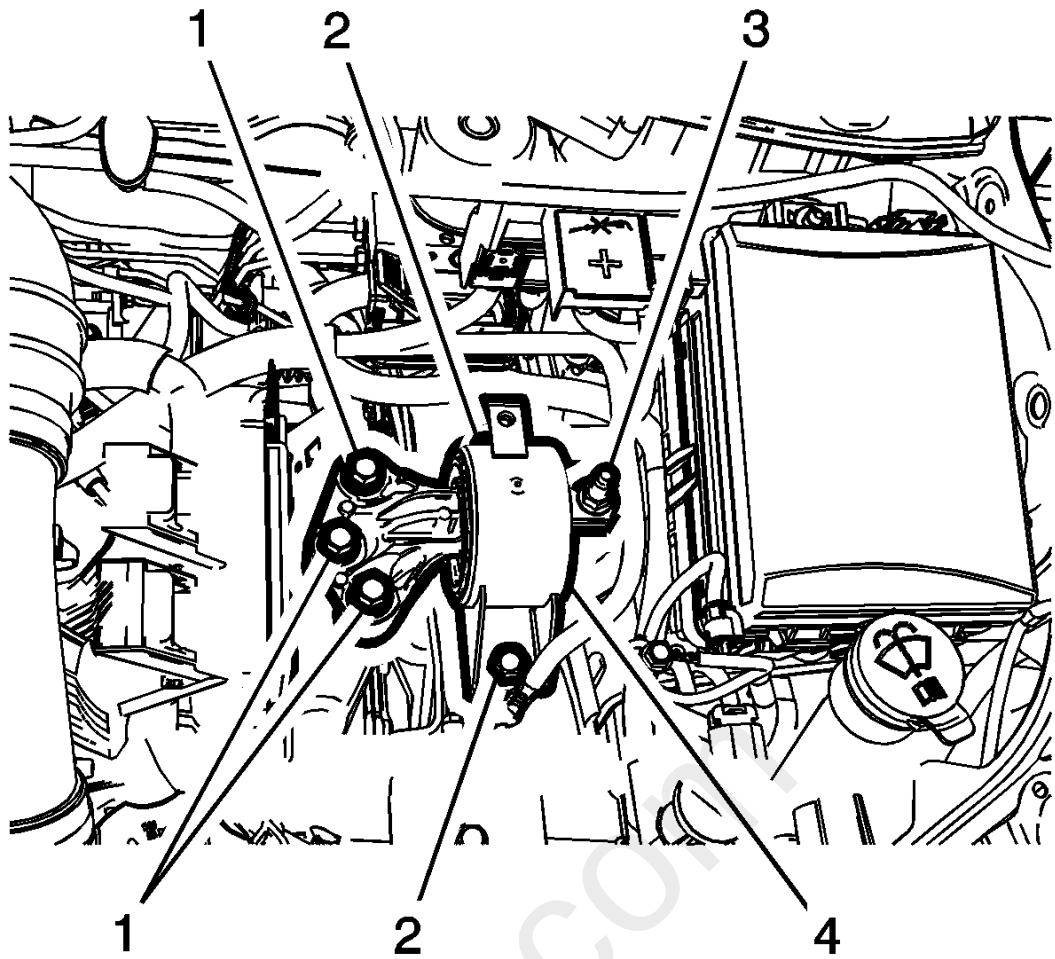


Fig. 50: Transmission Mount Bolts

Courtesy of GENERAL MOTORS COMPANY

21. Remove the left transmission mount (4). Refer to [Transmission Mount Replacement - Left Side](#).
22. Remove the left transmission mount bracket. Refer to [Transmission Mount Bracket Replacement - Left Side](#).
23. Support the transmission with a suitable jack.

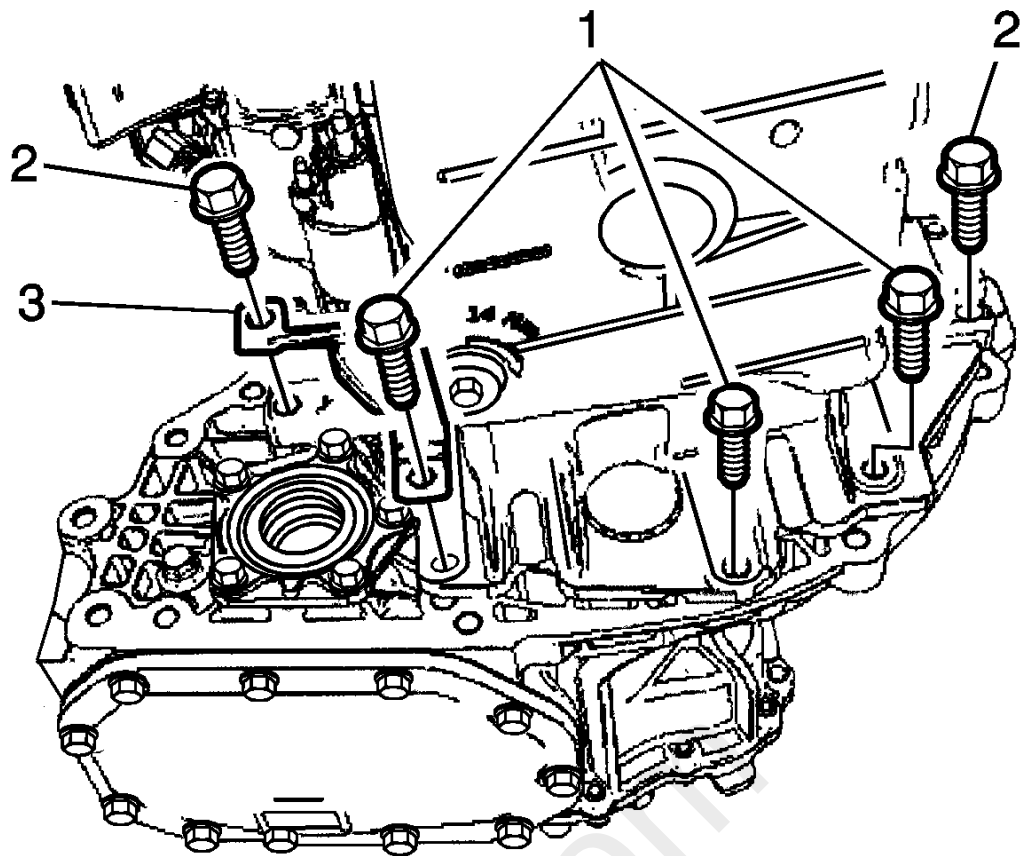


Fig. 51: Oil Pan Bolts (M/T)

Courtesy of GENERAL MOTORS COMPANY

24. Remove the lower transmission bolts (1, 2).
25. Remove the lower transmission side cover (3).
26. Separate the transmission from the engine.
27. Lower the transmission with the transmission jack far enough to remove the transmission.

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.

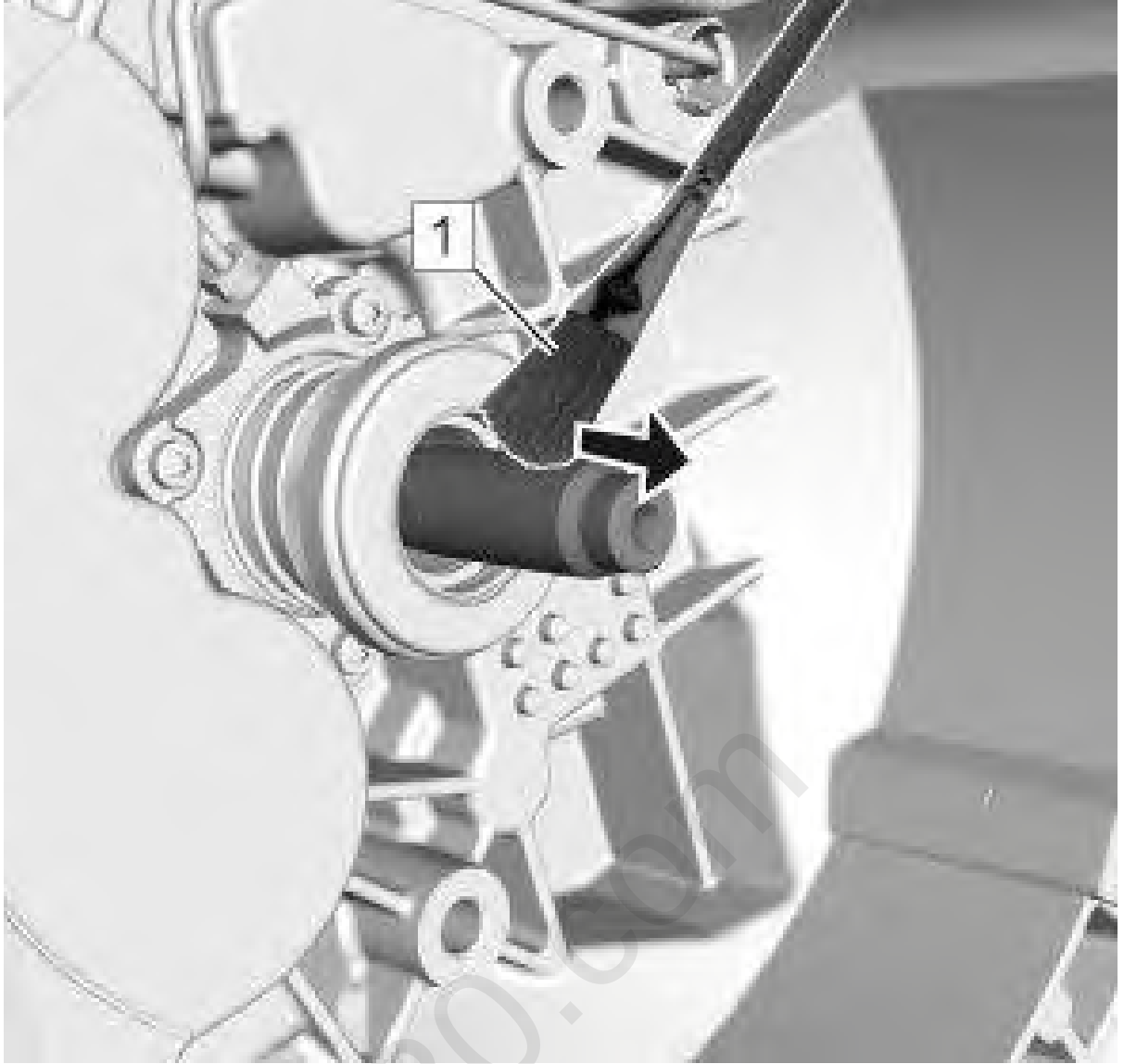


Fig. 52: Using Flat Brush To Apply Light Coating Of Multi-Purpose Grease
Courtesy of GENERAL MOTORS COMPANY

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.

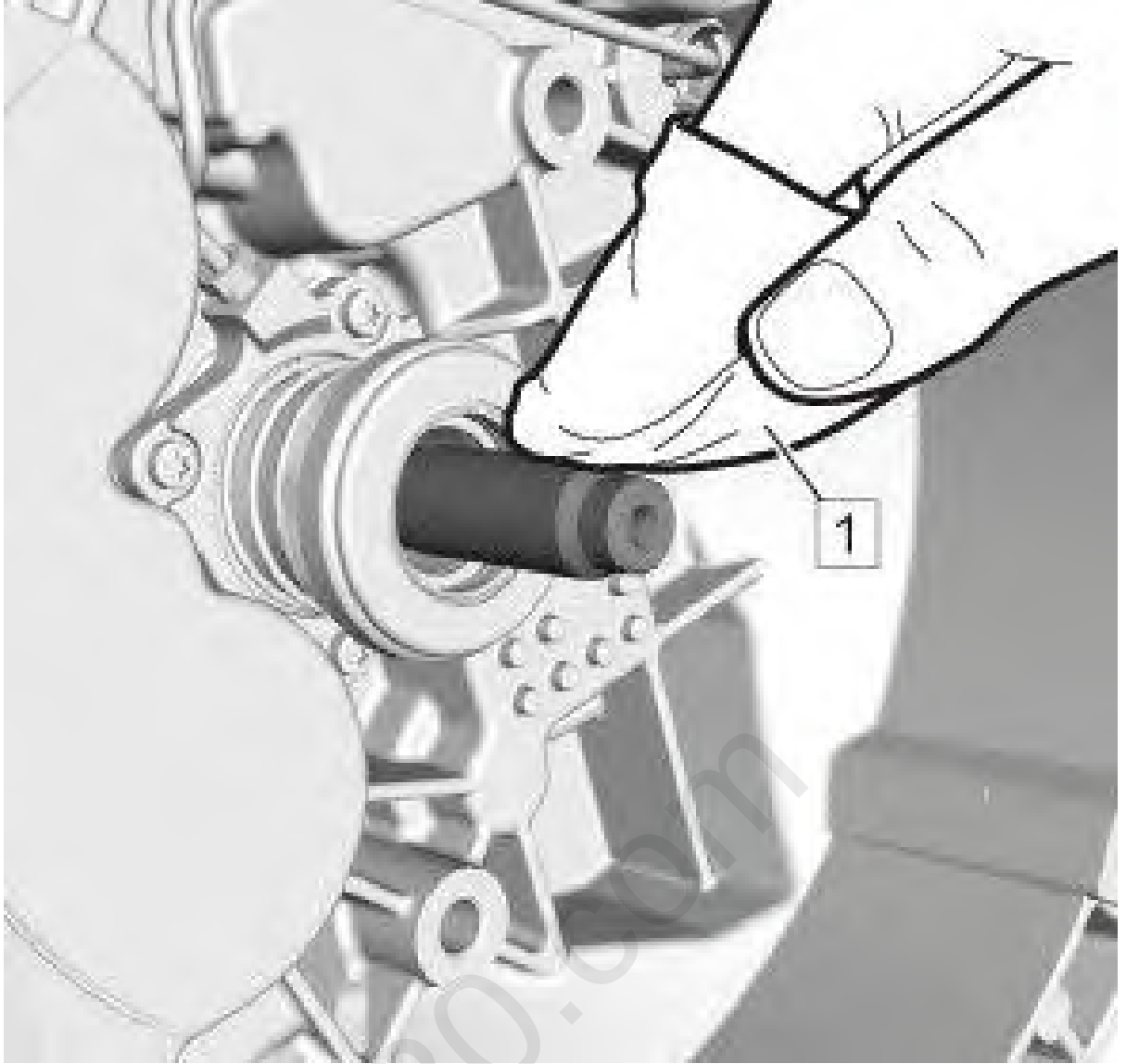


Fig. 53: Cleaning Lead Surface Of Input Shaft With Lint-Free Towel
Courtesy of GENERAL MOTORS COMPANY

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.

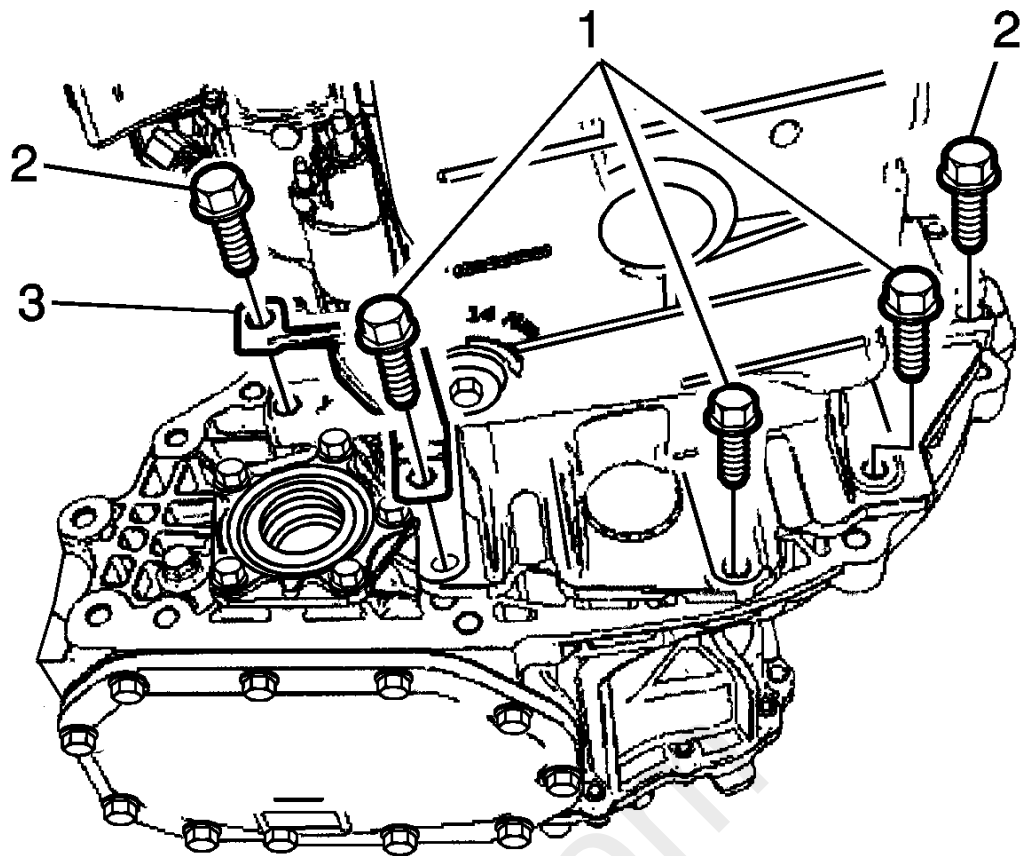


Fig. 54: Oil Pan Bolts (M/T)

Courtesy of GENERAL MOTORS COMPANY

5. Install the lower transmission side cover (3).

CAUTION: Refer to [Fastener Caution](#) .

6. Install the lower transmission bolts (1) and tighten to 40 N.m (30 lb ft).
7. Install the lower transmission bolts (2) and tighten to 60 N.m (40 lb ft).
8. Remove the transmission jack.
9. Install the left transmission mount bracket. Refer to [Transmission Mount Bracket Replacement - Left Side](#).

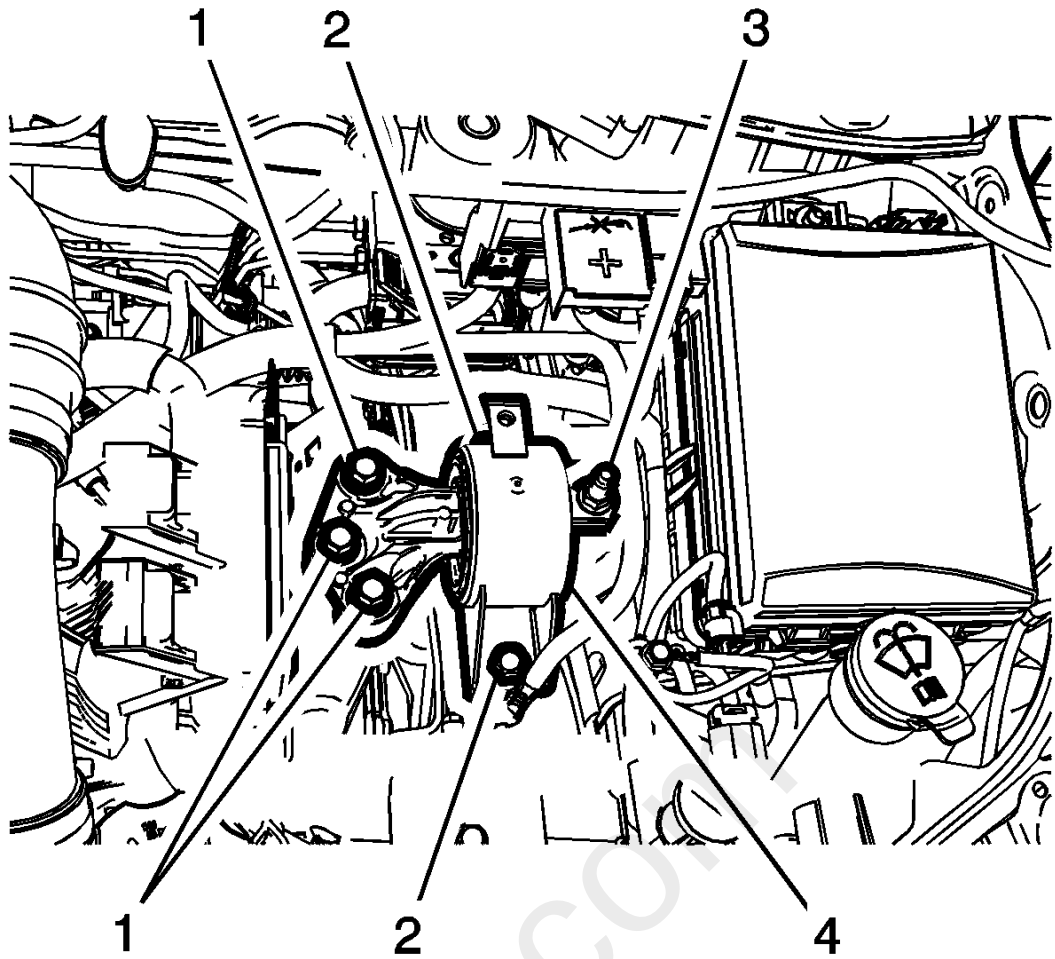


Fig. 55: Transmission Mount Bolts

Courtesy of GENERAL MOTORS COMPANY

10. Install the left transmission mount (4). Refer to [Transmission Mount Replacement - Left Side](#).
11. Install the transmission rear mount bracket. Refer to [Transmission Rear Mount Bracket Replacement](#).

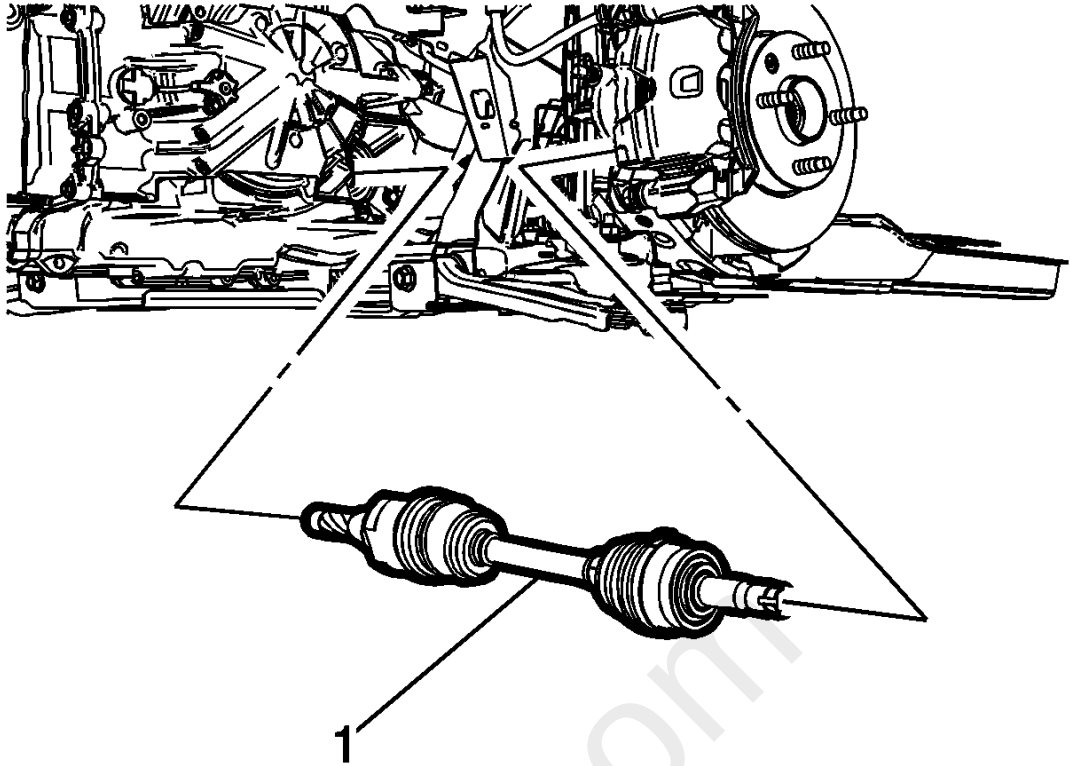


Fig. 56: Wheel Drive Shaft

Courtesy of GENERAL MOTORS COMPANY

12. Install the intermediate shaft. Refer to [Front Wheel Drive Intermediate Shaft Replacement \(LE2 with MNH\)](#), [Front Wheel Drive Intermediate Shaft Replacement \(LUV with MR5\)](#) .
13. Install the front wheel drive shafts (1) to the transmission. Refer to [Front Wheel Drive Shaft Replacement - Left Side](#) , and [Front Wheel Drive Shaft Replacement - Right Side](#) .
14. Install the drivetrain and front suspension frame. Refer to [Drivetrain and Front Suspension Frame Replacement \(Long Cradle\)](#), [Drivetrain and Front Suspension Frame Replacement \(Short Cradle\)](#), [Drivetrain and Front Suspension Frame Replacement \(Long Cradle - V50\)](#) .
15. Install the front exhaust pipe. Refer to [Exhaust Front Pipe Replacement \(LUV\)](#), [Exhaust Front Pipe Replacement \(2H0\)](#), [Exhaust Front Pipe Replacement \(LE2\)](#) .
16. Remove the engine support fixture. Refer to [Engine Support Fixture](#) .

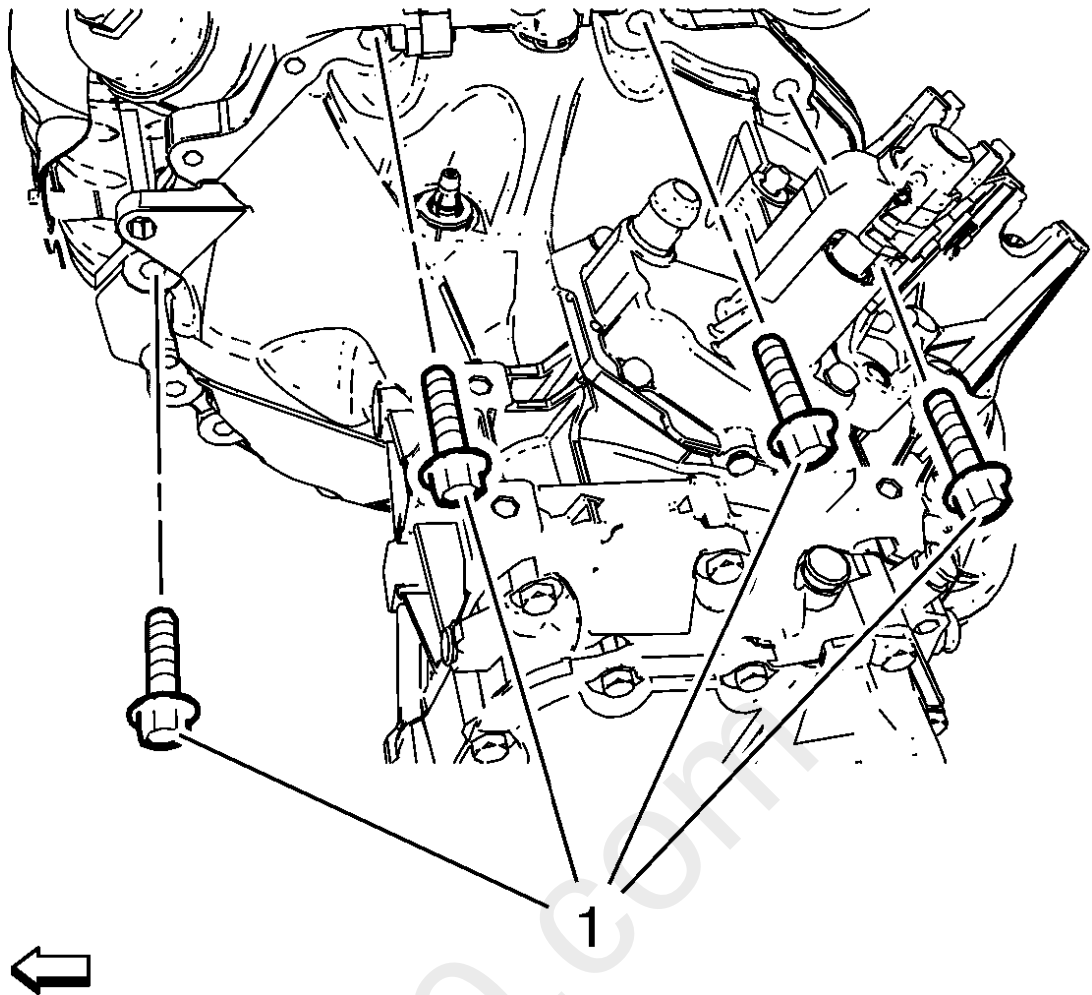


Fig. 57: Upper Transmission Bolts

Courtesy of GENERAL MOTORS COMPANY

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

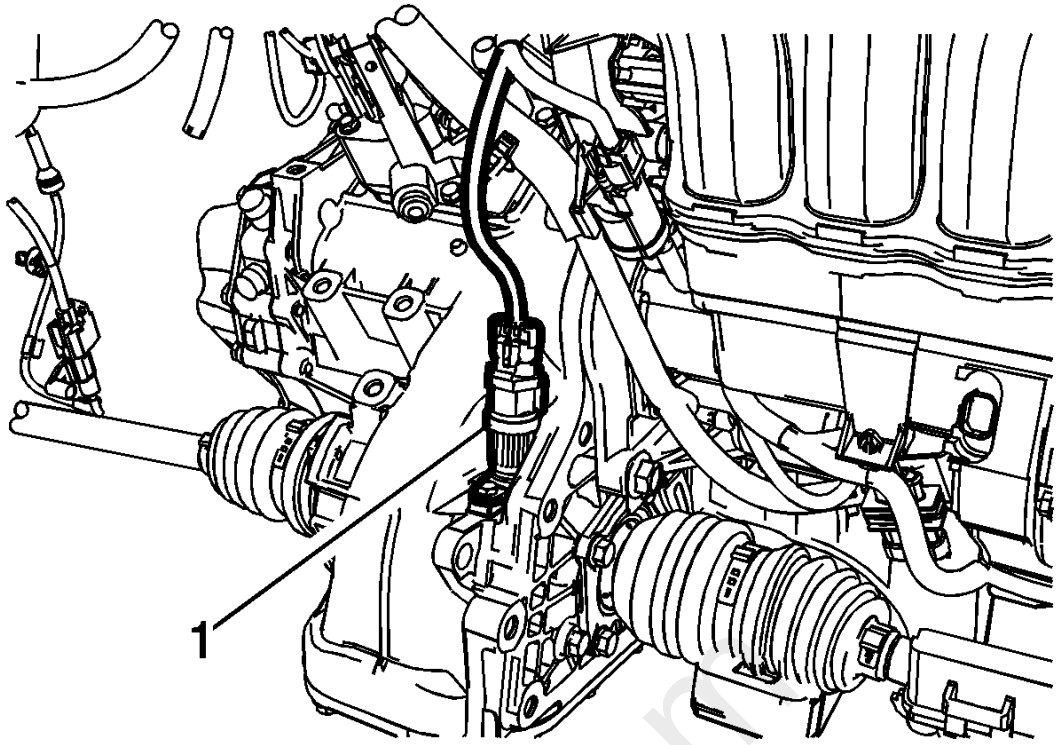


Fig. 58: Speedometer Driven Gear Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

18. Connect the speedometer driven gear electrical connector (1).

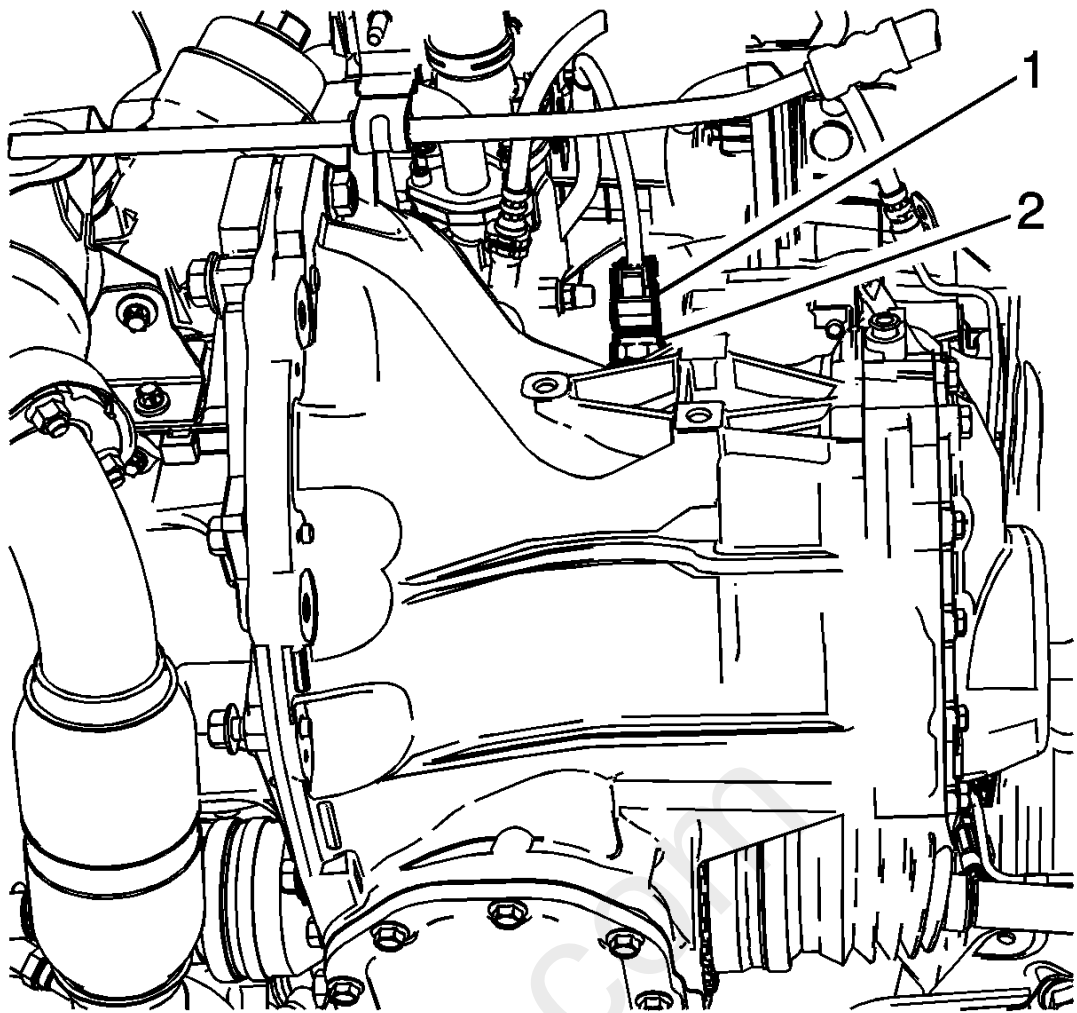


Fig. 59: Backup Lamp Switch & Electrical Connector

Courtesy of GENERAL MOTORS COMPANY

19. Connect the electrical connector (1) to the backup lamp switch (2).
20. Connect the wiring harness clamp to the transmission.

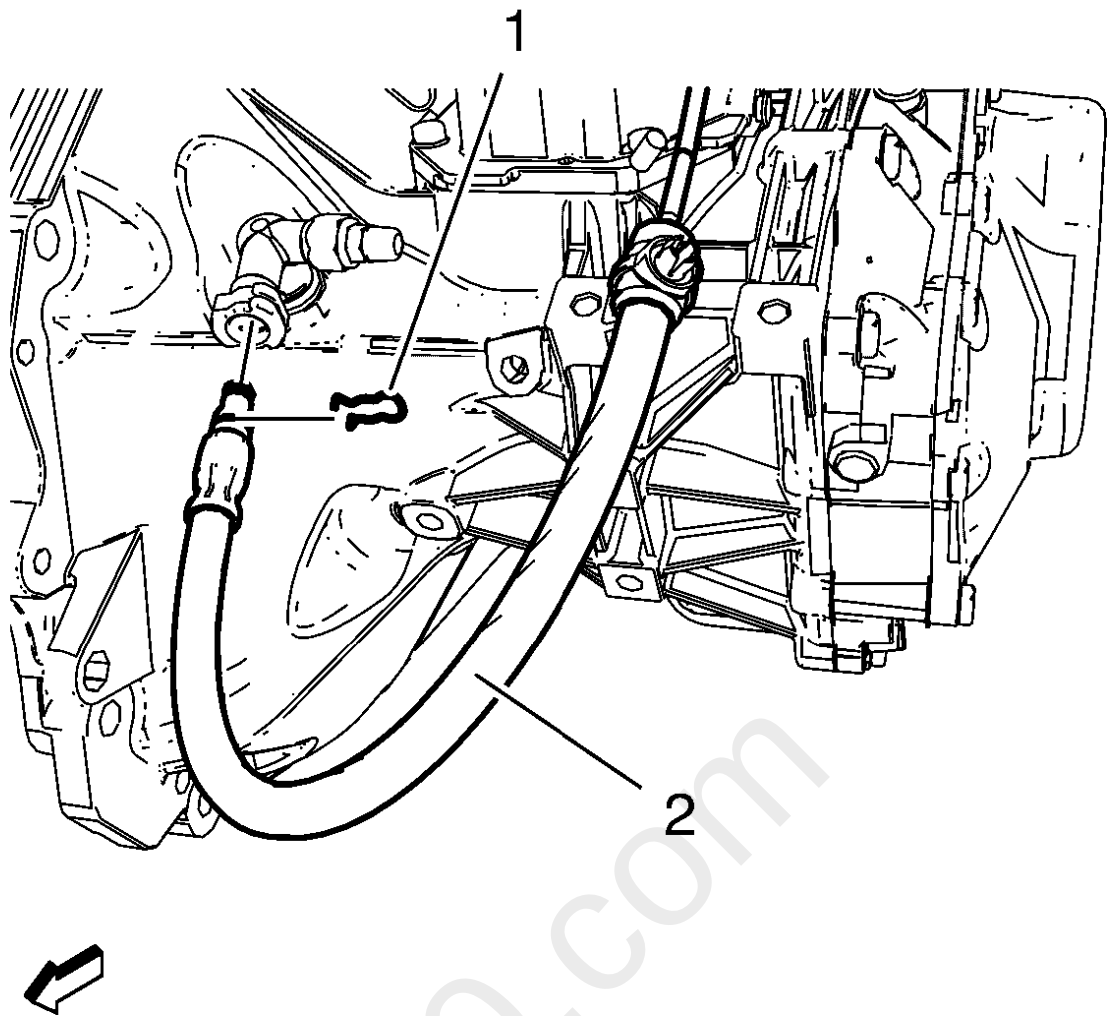


Fig. 60: Clutch Actuator Cylinder Front Pipe Retainer
Courtesy of GENERAL MOTORS COMPANY

NOTE: The clutch actuator cylinder front pipe must be fully engaged.

21. Connect the clutch actuator cylinder front pipe (2) to the clutch actuator cylinder pipe elbow.
22. Lock the clutch actuator cylinder front pipe retaining clip (1).
23. Connect the electrical connector to the neutral position sensor.
24. Install the power brake booster pump assembly to shift lever and selector lever cable bracket, if equipped.
Refer to [Power Brake Booster Pump Replacement](#) .

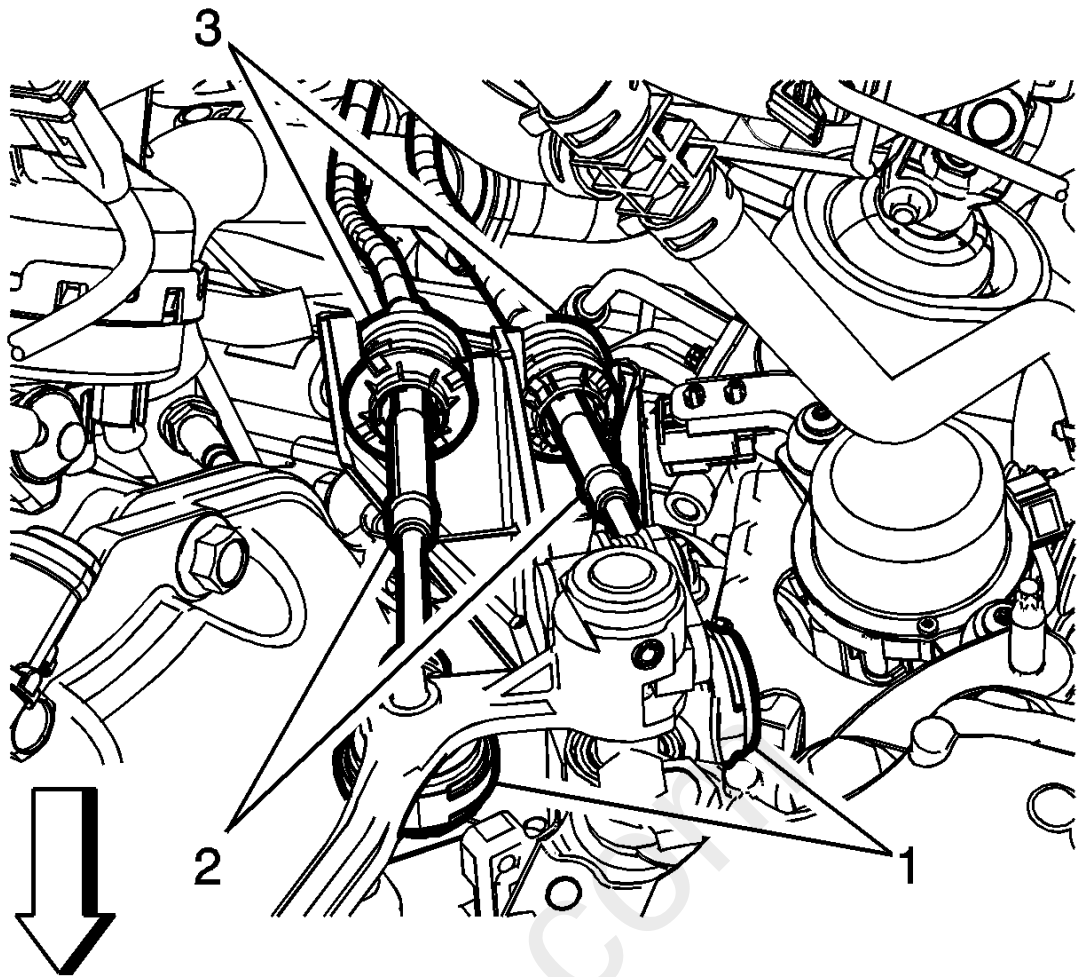


Fig. 61: Shift Lever And Selector Lever Cable
Courtesy of GENERAL MOTORS COMPANY

25. Connect the shift lever and selector lever cable ends (1) to the transmission shift lever and selector lever.
26. Install the shift lever and the selector lever retainers (3) to the selector lever cable bracket.
27. Adjust the shift lever and selector lever cables. Refer to [Manual Transmission Shift Lever and Selector Lever Cable Adjustment](#).
28. Bleed the clutch hydraulic system. Refer to [Hydraulic Clutch System Bleeding](#).
29. Fill the transmission with fluid. Refer to [Transmission Fluid Drain and Fill](#).
30. Install the radiator surge tank. Refer to [Radiator Surge Tank Replacement \(LUV, 2H0\)](#) [Radiator Surge Tank Replacement \(LE2\)](#).
31. Install the front bumper fascia opening upper cover. Refer to [Front Bumper Fascia Opening Upper Cover Replacement](#).
32. Install the battery and battery tray. Refer to [Battery Tray Replacement](#).
33. Road test the vehicle.

MANUAL TRANSMISSION SHIFT LEVER AND SELECTOR LEVER CABLE ADJUSTMENT

Special Tools

DT-527-A Adjuster

For equivalent regional tools, refer to [Special Tools](#).

1. Remove the floor console. Refer to [Front Floor Console Replacement \(Buick\)](#) [Front Floor Console Replacement \(Chevrolet\)](#).

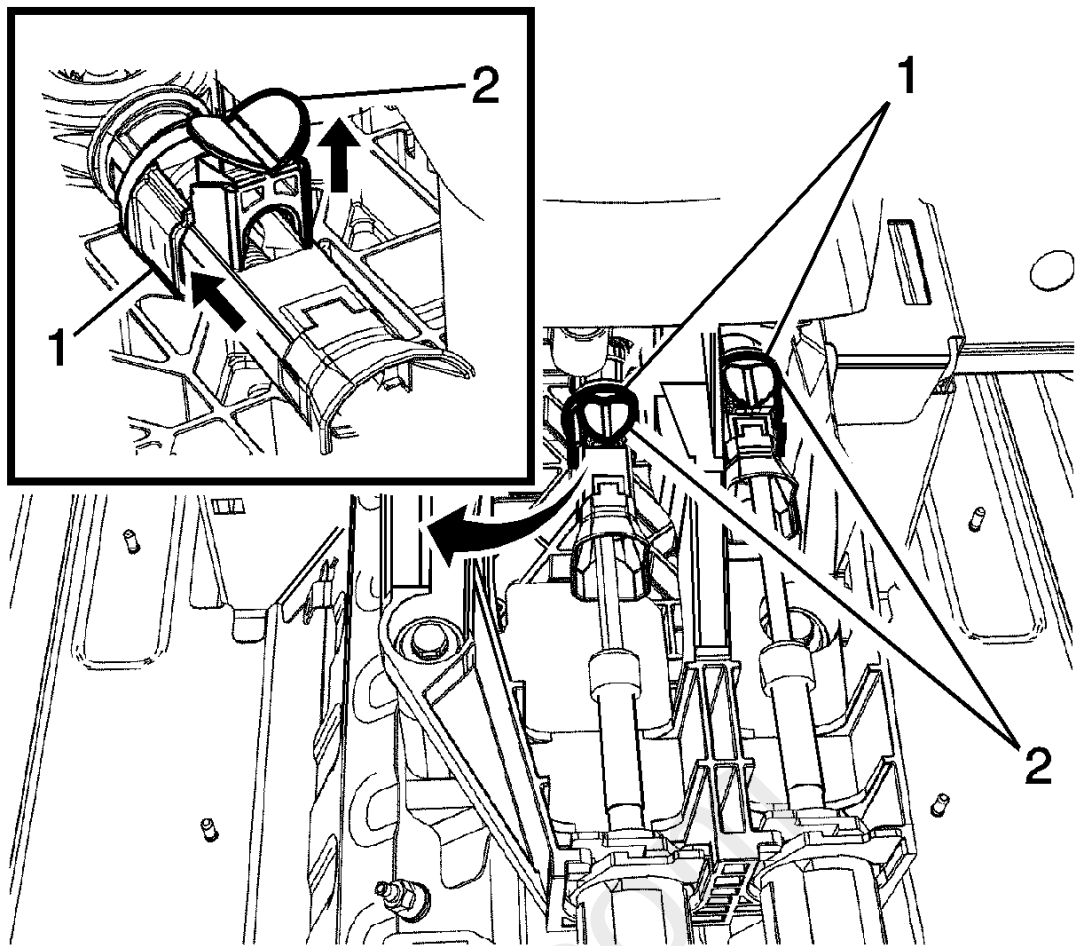


Fig. 62: Shift Lever And Selector Lever Cable
Courtesy of GENERAL MOTORS COMPANY

2. Lift the adjustment locks (2) up while pushing the adjustment retainers (1) rearward, one for each cable, to release the shift lever and selector lever cable.

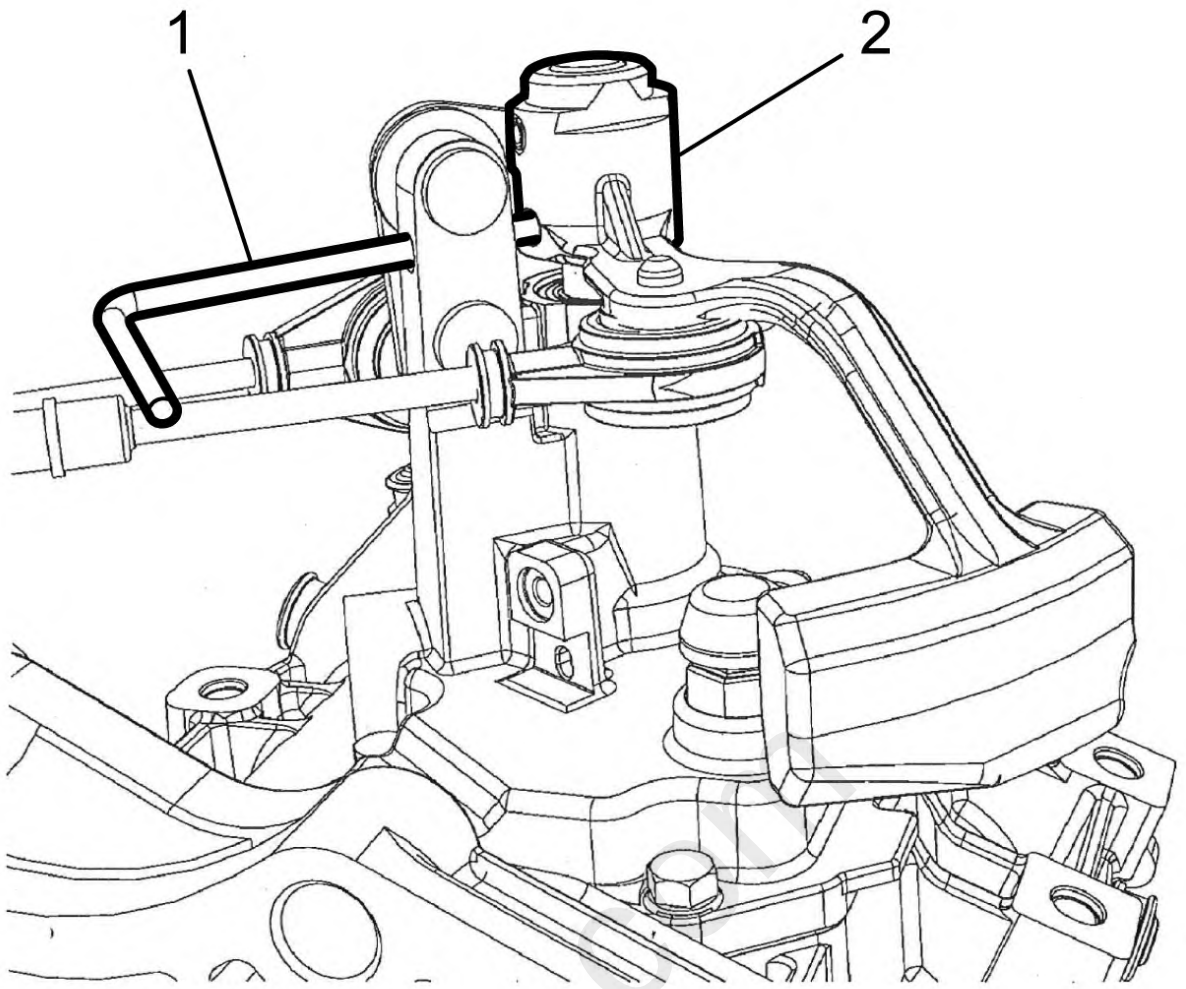


Fig. 63: Transmission Gear Control

Courtesy of GENERAL MOTORS COMPANY

NOTE: The hole of the transmission gear control (2) must be aligned to the hole in the base so the pin (1) can pass thru both.

3. Lock the position of the transmission gear control with **DT-527-A** pin (1).

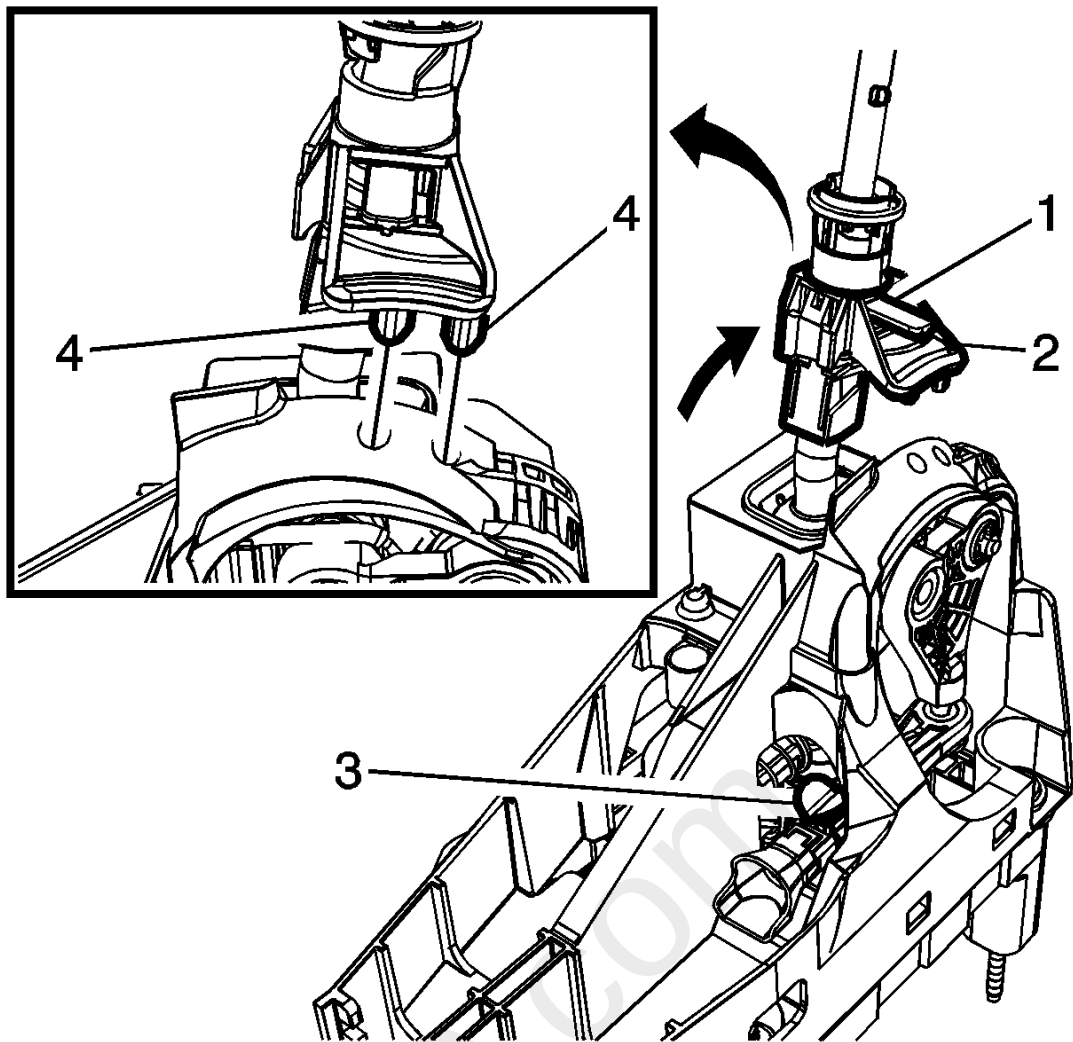


Fig. 64: Transmission Gear Control

Courtesy of GENERAL MOTORS COMPANY

4. Lock the position of the shift control lever by rotating the lockout device with the following instructions:
 1. Push down on tab (1) and pull up on device (2) to release from installed position.
 2. Turn the device (2) 90 degrees in a clockwise direction.
 3. Secure integral pins (4) in holes located on shifter base by pushing down device (2).
5. Secure adjuster locks (3) by pushing down until locked. One for each cable.

NOTE: During this procedure **DO NOT** touch or preload the fixed shift lever as this may cause mis-adjustment to the shift system.

6. Reposition the lockout device with the following instructions:
 1. Push down on tab (1) and pull up on device (2) to release from installed position.
 2. Turn the device (2) 90 degrees in a counterclockwise direction.
 3. Push downward on the lockout device (2) until tab (1) snaps into detent.
7. Remove the **DT-527-A** pin from the transmission gear control.
8. Install the floor console. Refer to [Front Floor Console Replacement \(Buick\)](#), [Front Floor Console Replacement \(Chevrolet\)](#).
9. Verify correct operation of the transmission control assembly.

REPAIR INSTRUCTIONS - OFF VEHICLE

TRANSMISSION FLUID LEVEL INSPECTION

Removal Procedure

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).

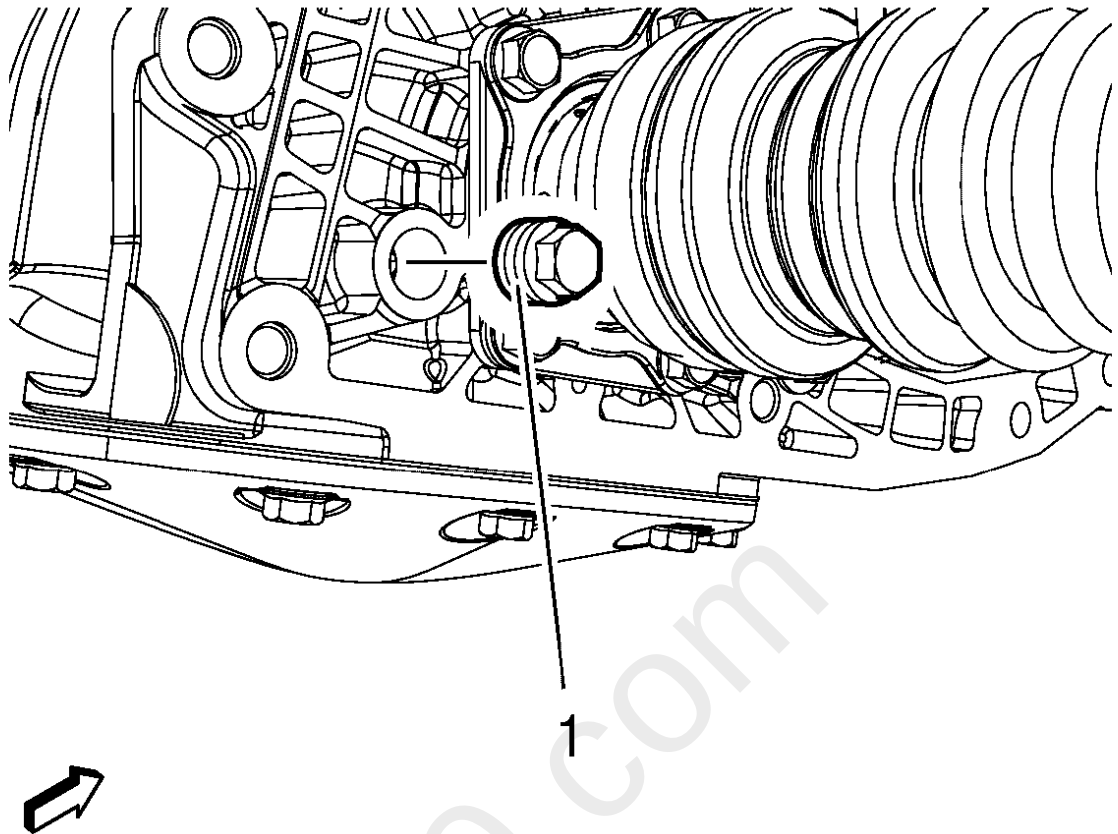


Fig. 65: Transmission Check Plug

Courtesy of GENERAL MOTORS COMPANY

WARNING: Refer to Checking Hot Transmission Fluid through Drain Plug Hole Warning

2. With the vehicle on a level surface and the fluid in the transmission cold, remove the transmission oil check plug (1) and check the fluid level. The fluid should come to the bottom edge of the plug hole.

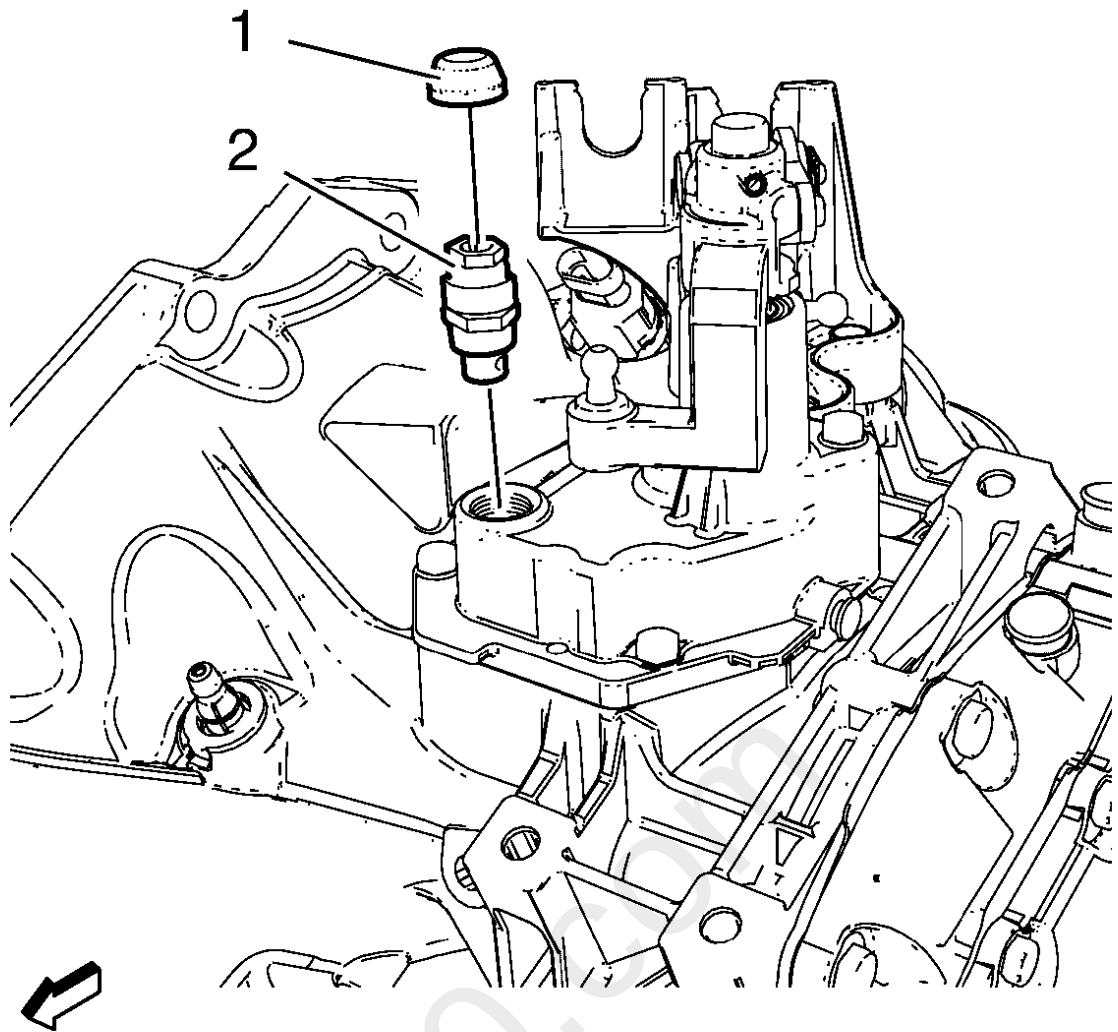


Fig. 66: Fluid Fill Plug

Courtesy of GENERAL MOTORS COMPANY

3. Remove the fill plug cap (1) and fill plug (2).
4. If the level is low, add manual transmission fluid through the filler plug hole until the fluid begins to run out of the check hole.

Installation Procedure

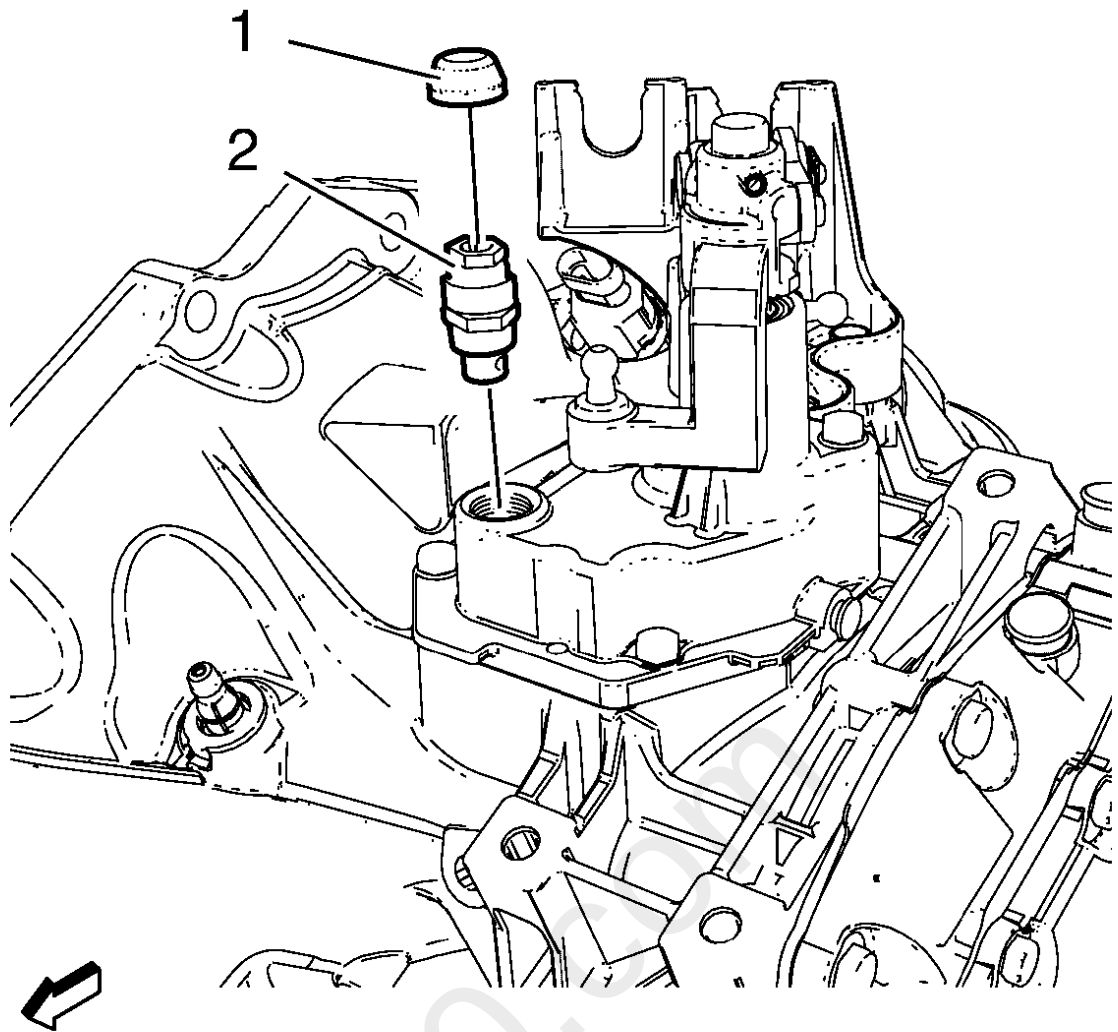


Fig. 67: Fluid Fill Plug

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Component Fastener Tightening Caution .

1. Install the fill plug (2) and tighten to 35 N.m (26 lb ft) and fill cap (1).

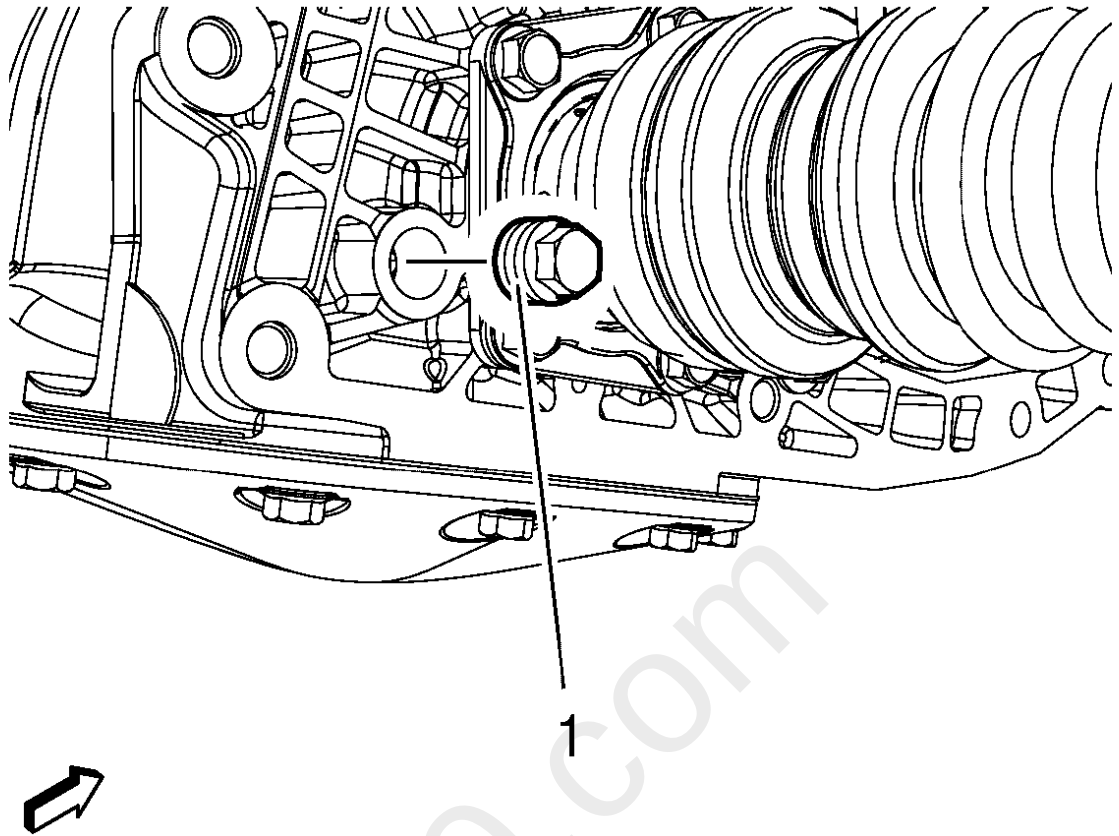


Fig. 68: Transmission Check Plug

Courtesy of GENERAL MOTORS COMPANY

2. Install the NEW transmission oil level check plug (1) and tighten to 6 N.m (53 lb in) plus 45-180 degrees.
3. Lower the vehicle.

BACKUP LAMP SWITCH REMOVAL

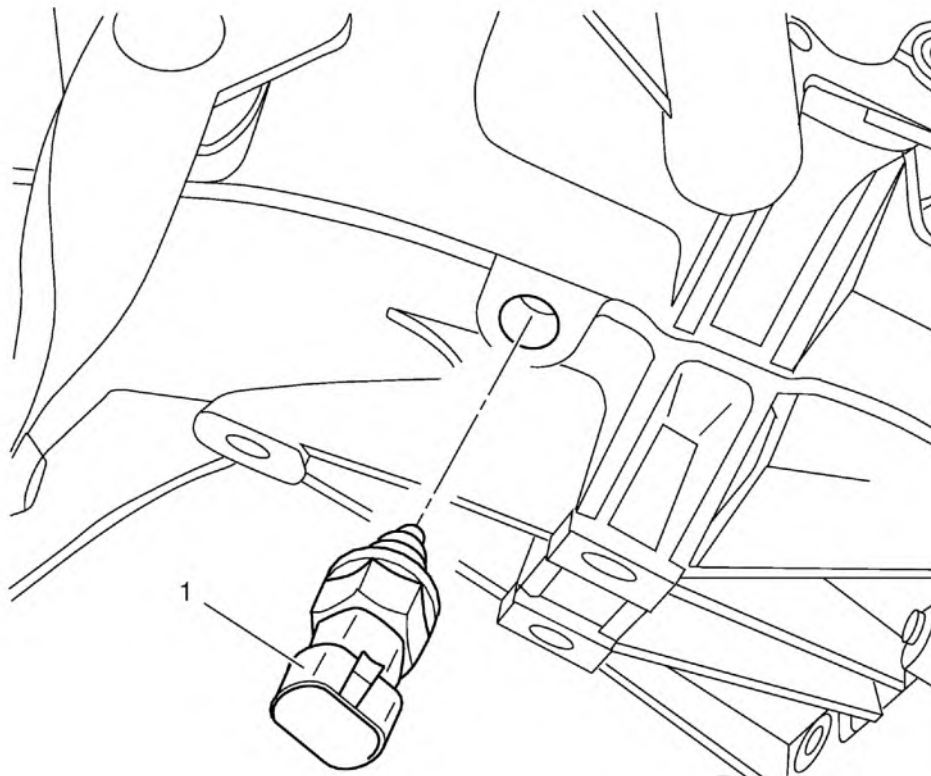


Fig. 69: Backup Lamp Switch

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Backup Lamp Switch

SELECTOR AND SHIFT LEVER CABLE BRACKET REMOVAL

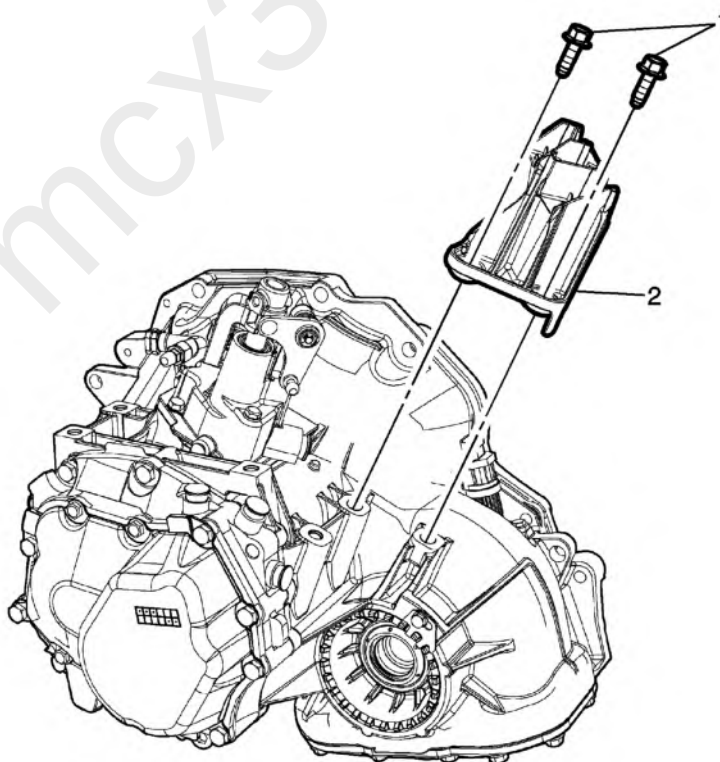


Fig. 70: Selector and Shift Lever Cable Bracket

Courtesy of GENERAL MOTORS COMPANY

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

SPEEDOMETER DRIVEN GEAR REMOVAL

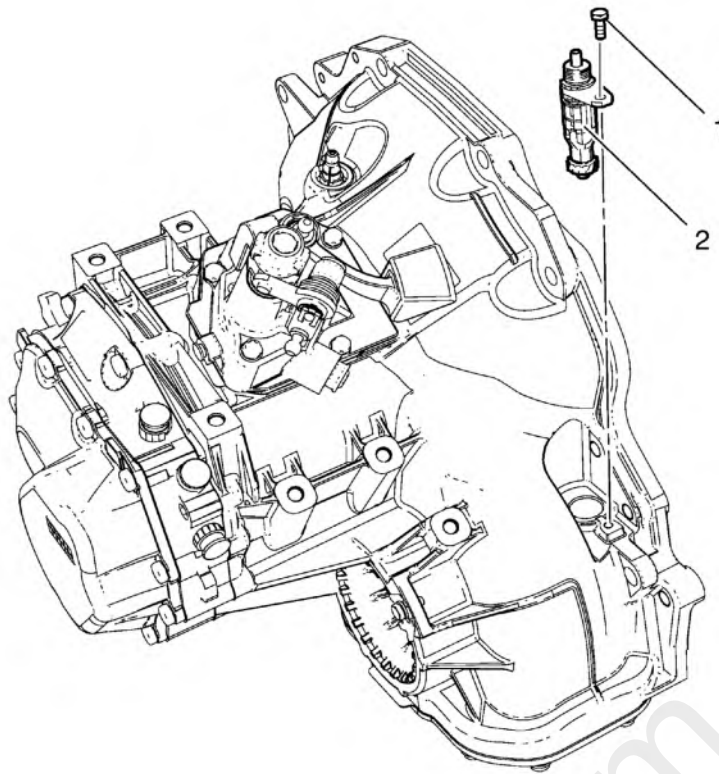


Fig. 71: Speedometer Driven Gear

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Speedometer Driven Gear Bolt
2	Speedometer Driven Gear

CLUTCH ACTUATOR CYLINDER PIPE ELBOW REMOVAL

Clutch Actuator Cylinder Pipe Elbow Removal

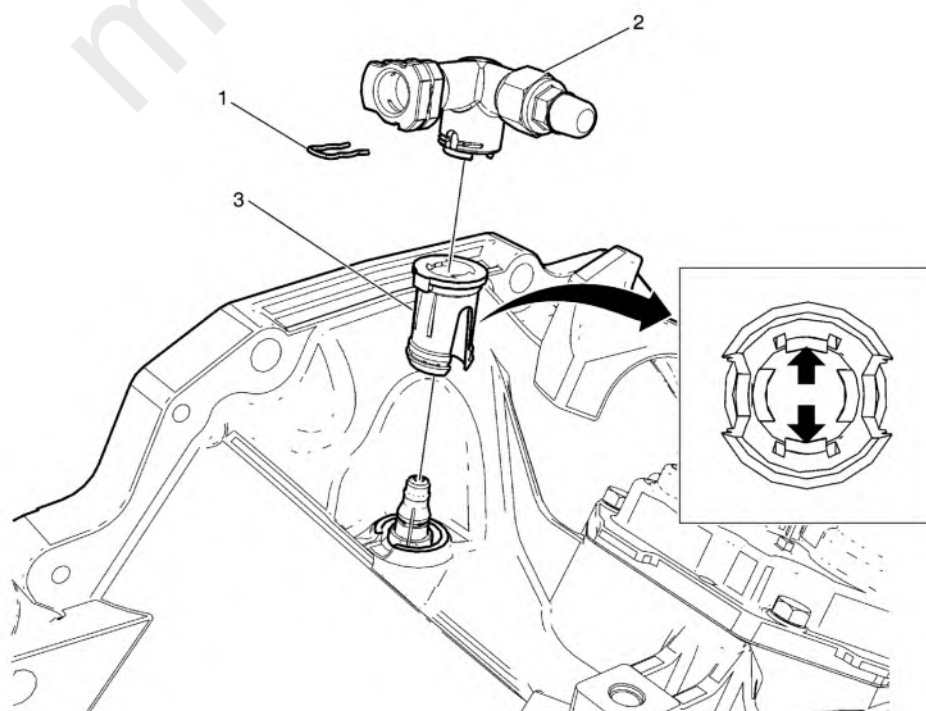


Fig. 72: Clutch Actuator Cylinder Pipe Elbow

Courtesy of GENERAL MOTORS COMPANY

Clutch Actuator Cylinder Pipe Elbow Removal

Callout	Component Name
1	Clutch Actuator Cylinder Pipe Elbow Clip
2	Clutch Actuator Cylinder Pipe Elbow
3	Clutch Actuator Cylinder Pipe Sleeve TIP: Release the sleeve key (arrows) using a screwdriver or equivalent to remove the sleeve.

Clutch Actuator Cylinder Removal

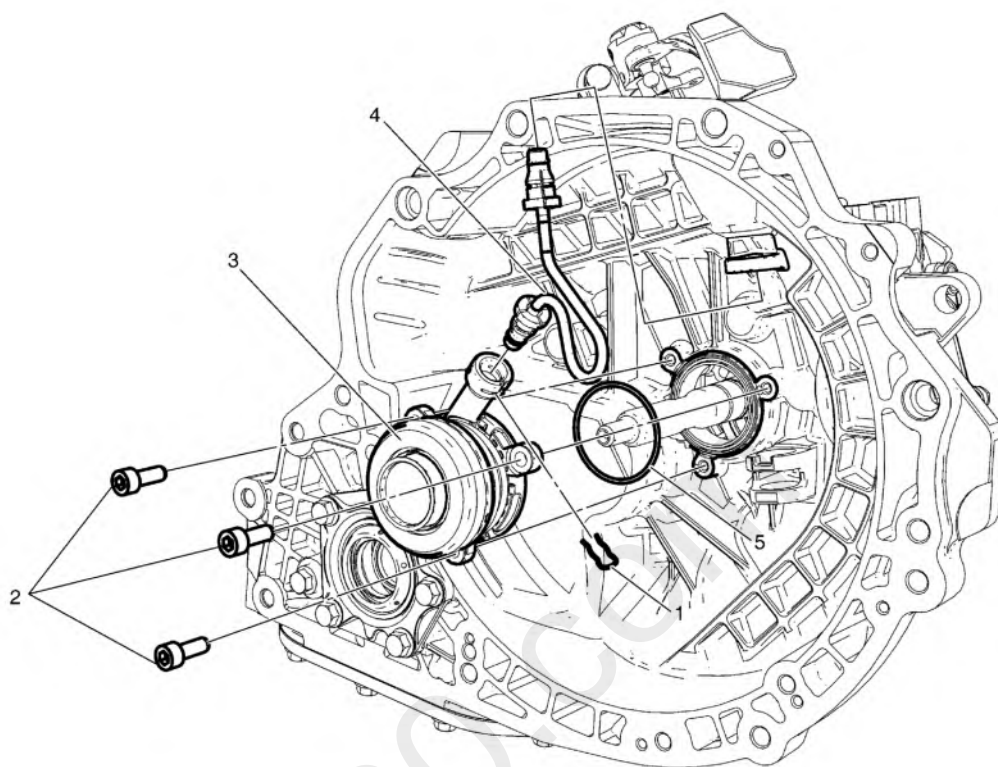


Fig. 73: Clutch Actuator Cylinder

Courtesy of GENERAL MOTORS COMPANY

Clutch Actuator Cylinder Removal

Callout	Component Name
1	Clutch Actuator Cylinder Clip
2	Clutch Actuator Cylinder Bolt (Qty: 3)
3	Clutch Actuator Cylinder Procedure Remove the clutch actuator cylinder and clutch actuator cylinder pipe at the same time.
4	Clutch Actuator Cylinder Pipe Procedure Disconnect the clutch actuator cylinder pipe from the clutch actuator cylinder.
5	Clutch Actuator Cylinder Seal TIP: Discard the seal. It is not reusable.

SHIFT CONTROL HOUSING REMOVAL

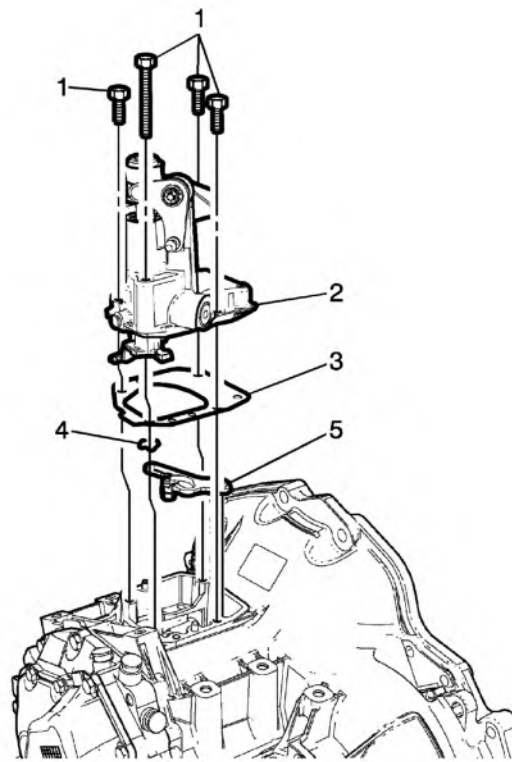


Fig. 74: Shift Control Housing

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Shift Control Housing Bolt (Qty: 4)
2	Shift Control Housing TIP: Shift transmission into NEUTRAL.
3	Shift Control Housing Cover Gasket TIP: Discard the gasket. It is not reusable.
4	5th& Reverse Shift Link Clip
5	5th& Reverse Shift Link Lever

TRANSMISSION COVER REMOVAL

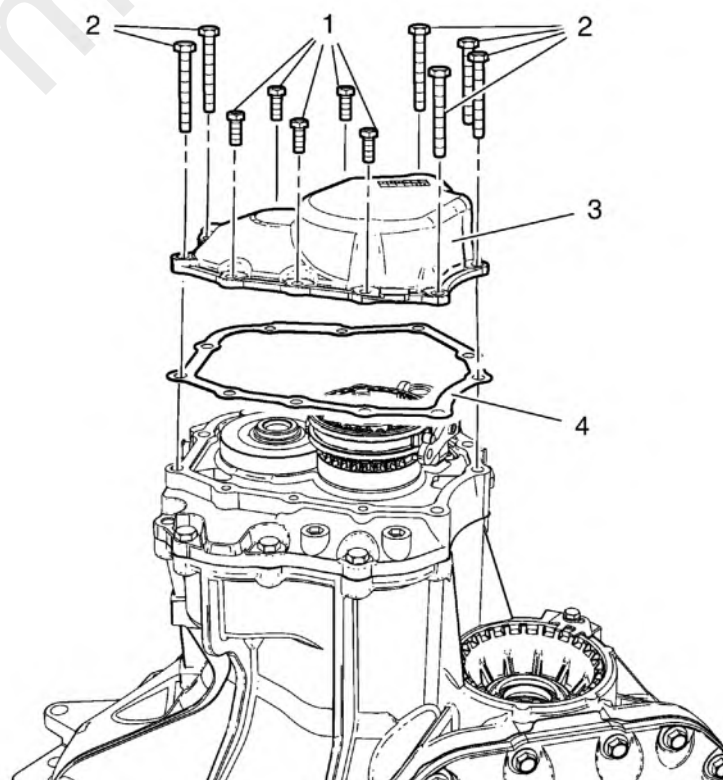


Fig. 75: Transmission Cover

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Transmission Cover Bolt M7 (Qty: 5)
2	Transmission Cover Bolt M8 (Qty: 6)
3	Transmission Cover
4	Transmission Cover Gasket TIP: Discard the gasket. It is not reusable.

TRANSMISSION CASE REMOVAL

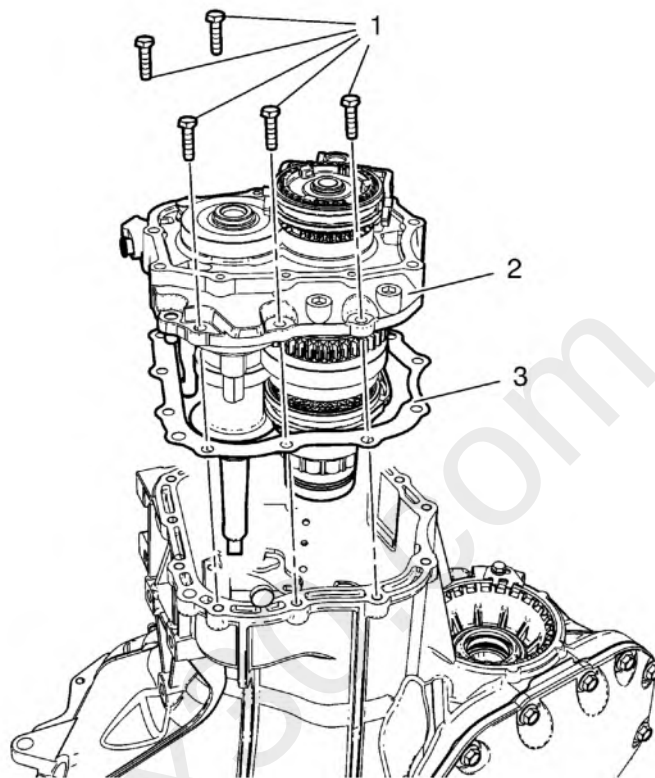


Fig. 76: Transmission Case

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Transmission Case Bolt (Qty: 5) TIP: Shift the transmission into 2nd gear.
2	Transmission Case
3	Transmission Case Gasket TIP: Discard the gasket. It is not reusable.

HOLDING FIXTURE INSTALLATION

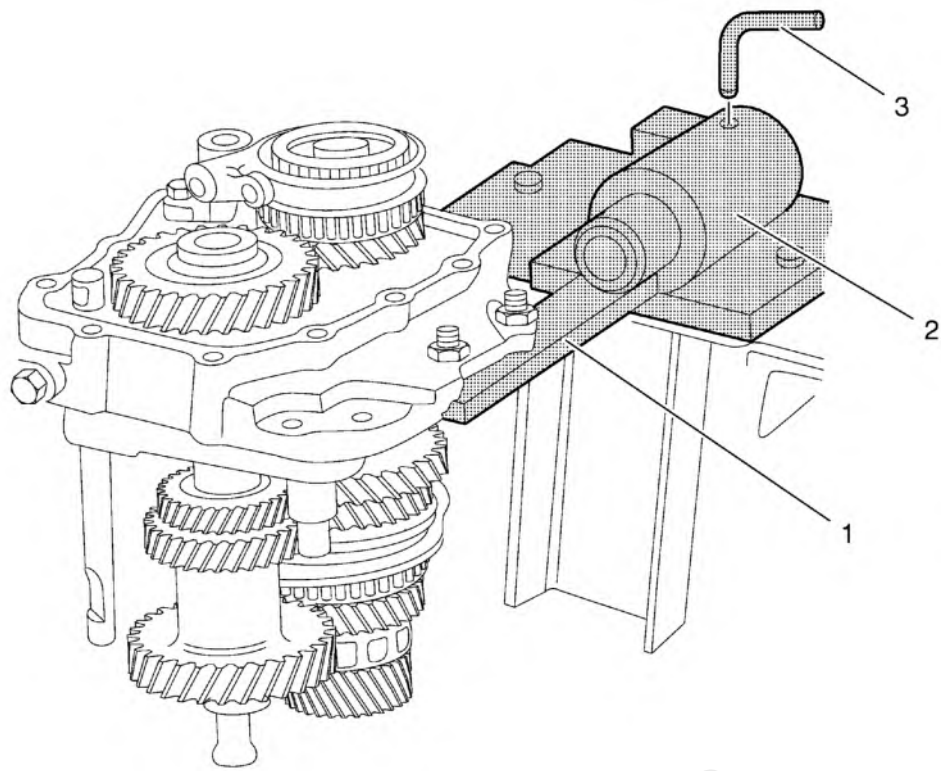


Fig. 77: Holding Fixture

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	DT-552 Fixture CAUTION: Refer to Fastener Caution . TIP: Shift the transmission into reverse gear.
2	DT-113-2-A Holding Fixture TIP: Ensure the DT-113-2-A fixture is mounted to a bench that is properly supported and will support the weight of the transmission assembly without tipping.
3	Lock Pin WARNING: Lock pin must be secured into the bench fixture to hold the transmission and prevent bodily injury.

5TH SHIFT FORK REMOVAL

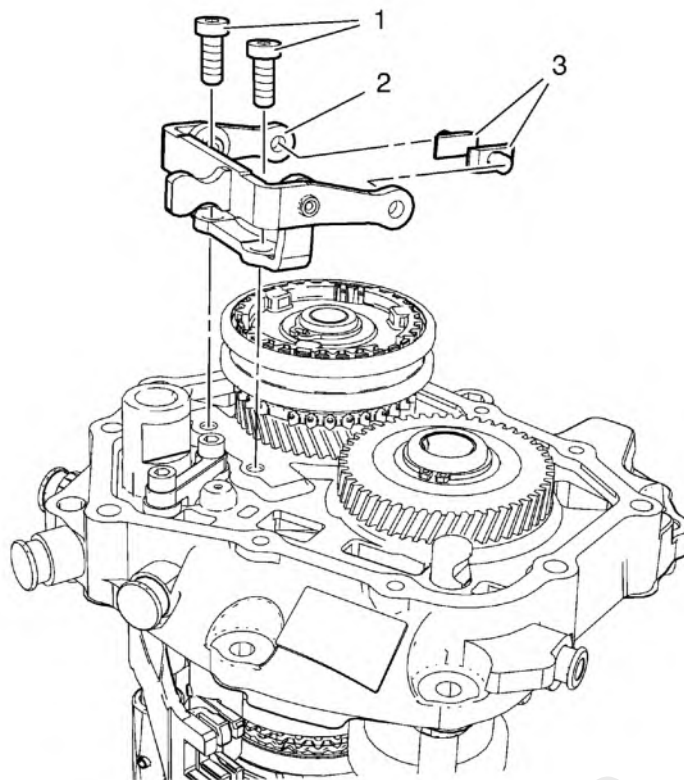


Fig. 78: 5th Shift Fork

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	5th Gear Fork Bolt (Qty: 2)
2	5th Gear Fork
3	5th Shift Fork Shoe (Qty: 2)

5TH GEAR SYNCHRONIZER REMOVAL

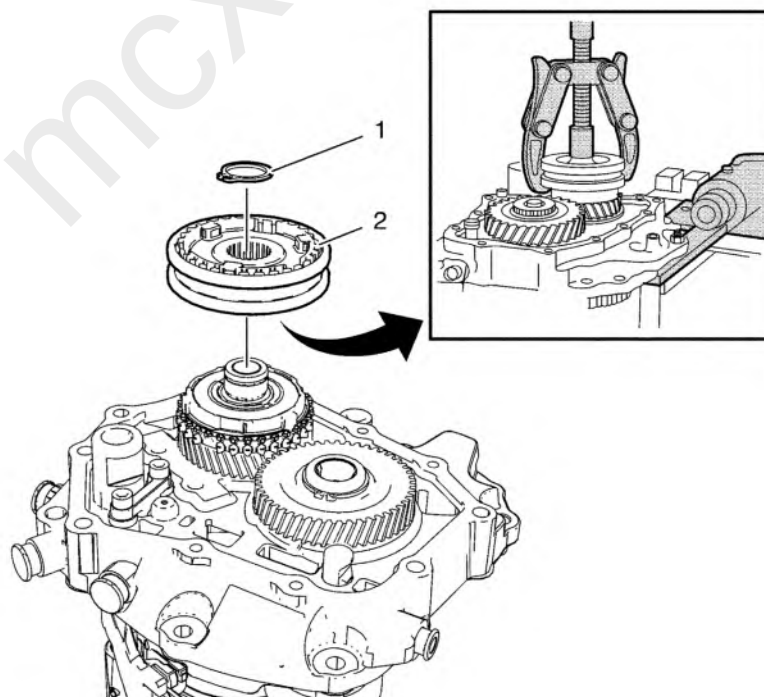


Fig. 79: 5th Gear Synchronizer

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Snap Ring

Callout	Component Name
2	5th Gear Synchronizer Special Tools CH-161-B Bearing Puller with Bearing Puller Legs

5TH DRIVEN GEAR REMOVAL

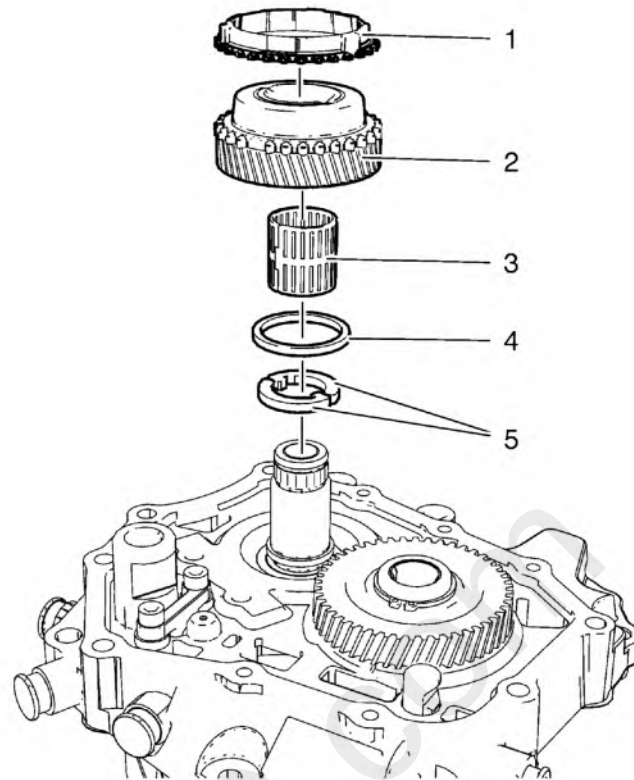


Fig. 80: 5th Driven Gear

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Driven 5th Gear Blocking Ring
2	Driven 5th Gear Special Tools CH-161-B Bearing Puller with Bearing Puller Legs
3	Driven 5th Gear Bearing
4	5th Gear Retaining Ring
5	Thrust Washer (Qty: 2)

5TH GEAR REMOVAL

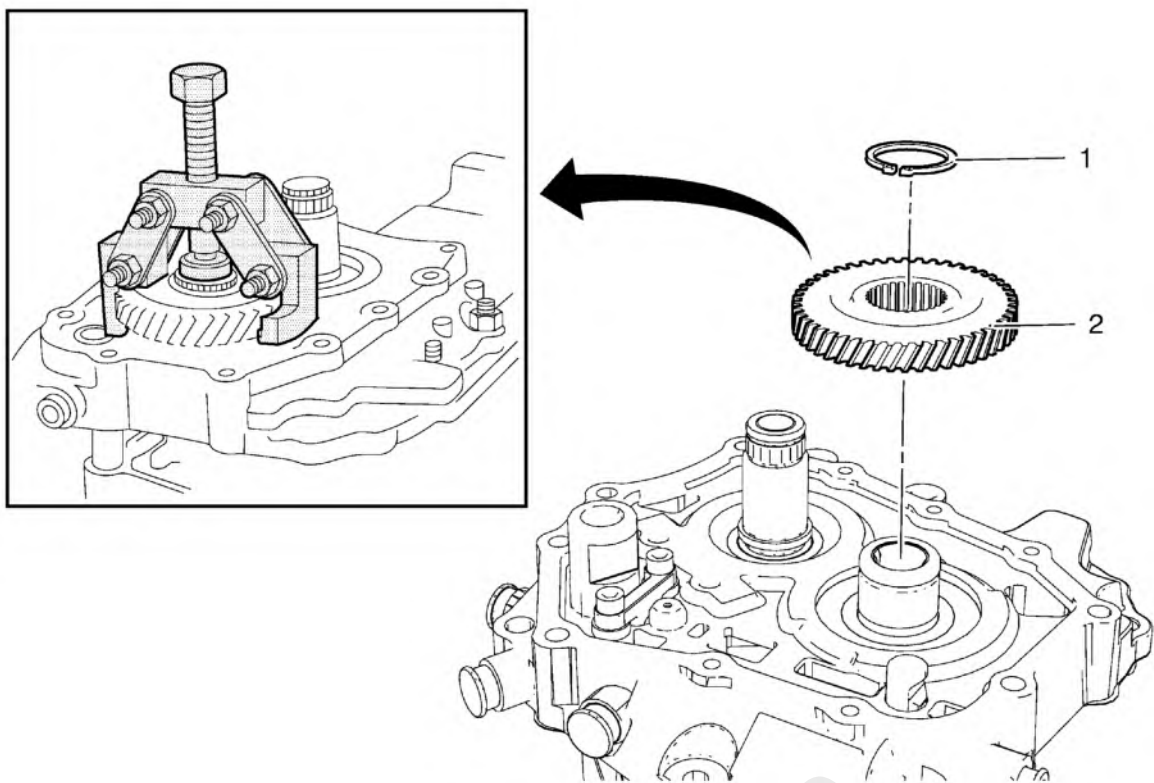


Fig. 81: 5th Gear

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Input Drive 5th Gear Retaining Ring
2	Input Drive 5th Gear Special Tools DT-553-A 5th Gear Puller

5TH SHIFT BLOCKING LEVER REMOVAL

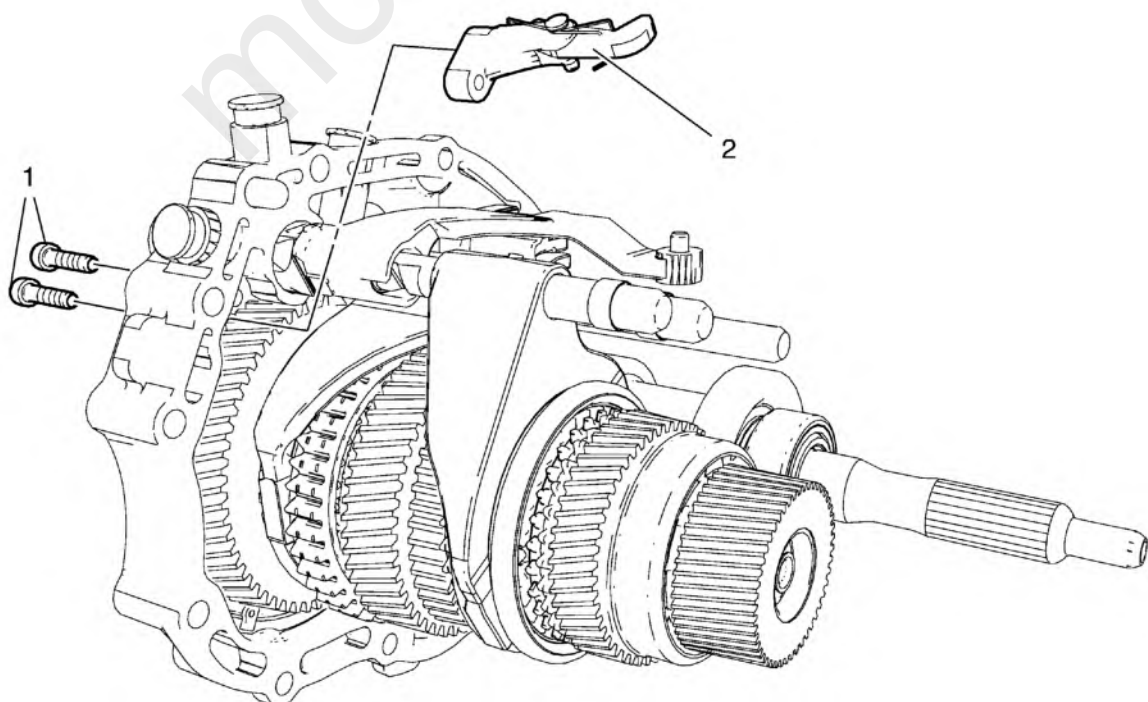


Fig. 82: 5th Shift Blocking Lever

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	5th Shift Blocking Lever Bolt (Qty: 2)
2	5th Shift Blocking Lever

SHIFT SHAFT DETENT REMOVAL

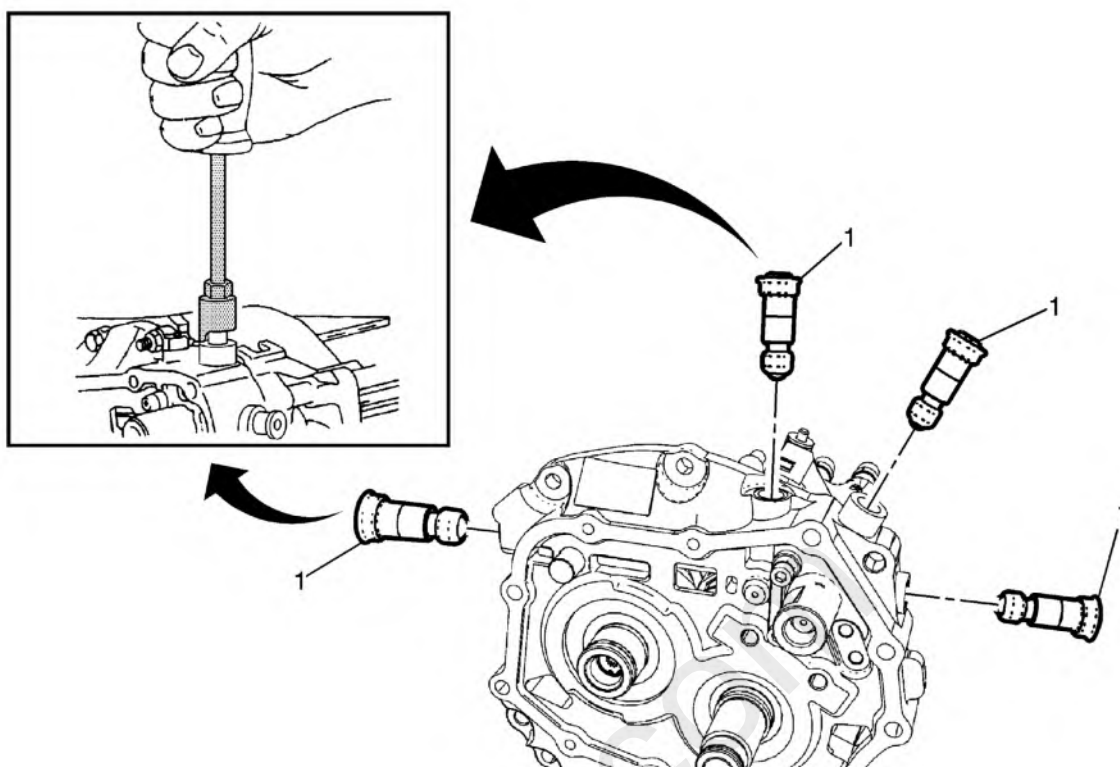


Fig. 83: Shift Shaft Detent

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Shift Shaft Detent (Qty: 4) Special Tools • DT-6125-B Sliding Hammer • DT-50511 Shift Detent Remover

SHIFT SHAFT AND FORK ASSEMBLIES REMOVAL

Reverse Shift Fork Removal

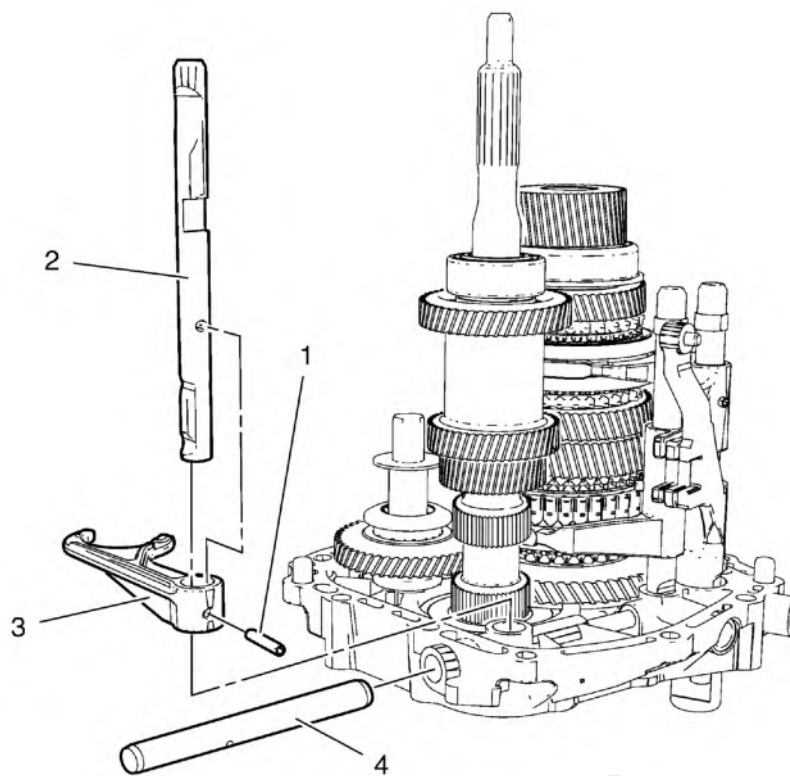


Fig. 84: Reverse Shift Fork & Components
 Courtesy of GENERAL MOTORS COMPANY

Reverse Shift Fork Removal

Callout	Component Name
1	Reverse Shift Fork Pin
2	Reverse Shift Shaft
3	Reverse Shift Fork
4	Shift Shaft Interlock Pin

Shift Shaft Interlock Pin Connector Bolts Removal

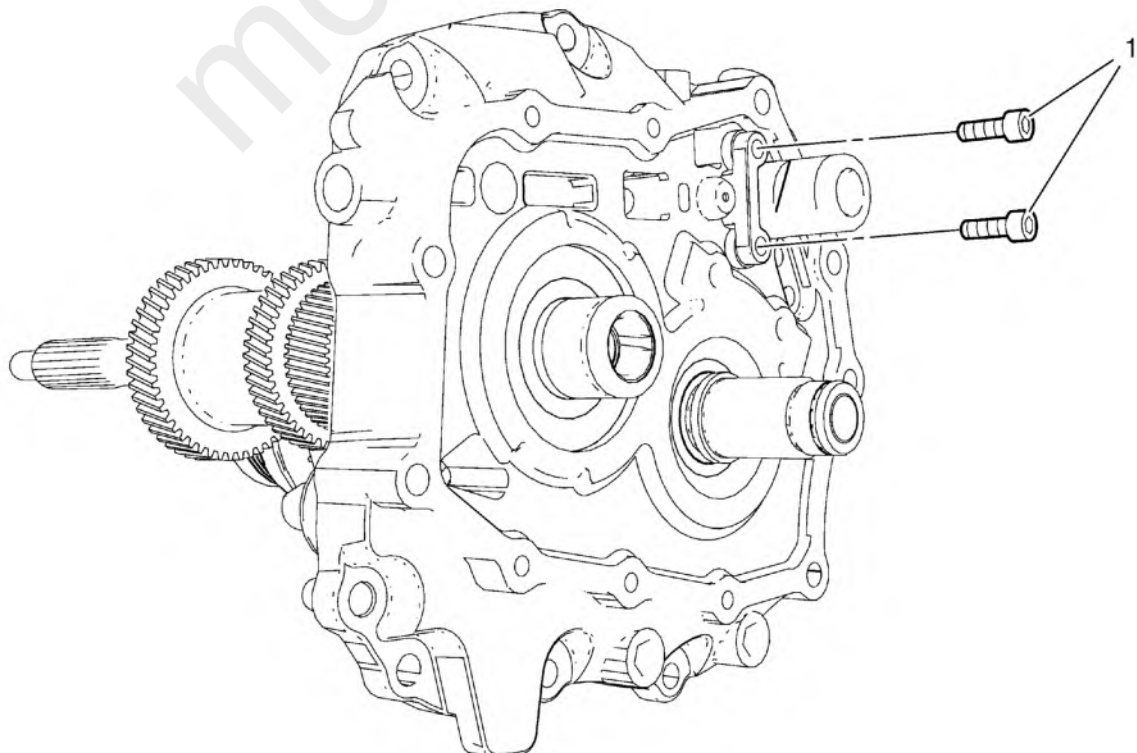


Fig. 85: Shift Shaft Interlock Pin Connector Bolts
 Courtesy of GENERAL MOTORS COMPANY

Shift Shaft Interlock Pin Connector Bolts Removal

Callout	Component Name
1	Shift Shaft Interlock Pin Connector Bolt (Qty: 2)

Shift Shaft and Fork Assemblies Removal

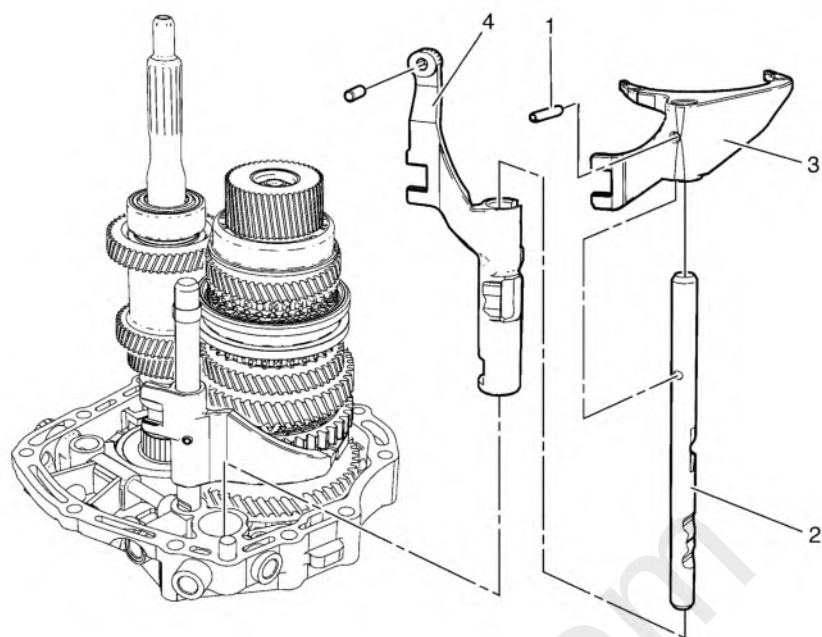


Fig. 86: Shift Shaft And Fork Assemblies

Courtesy of GENERAL MOTORS COMPANY

Shift Shaft and Fork Assemblies Removal

Callout	Component Name
1	3rd and 4th Shift Fork Pin
2	3rd and 4th Shift Shaft
3	3rd and 4th Shift Fork
4	5th Shift Block

Shift Shaft Interlock Pin Connector Removal

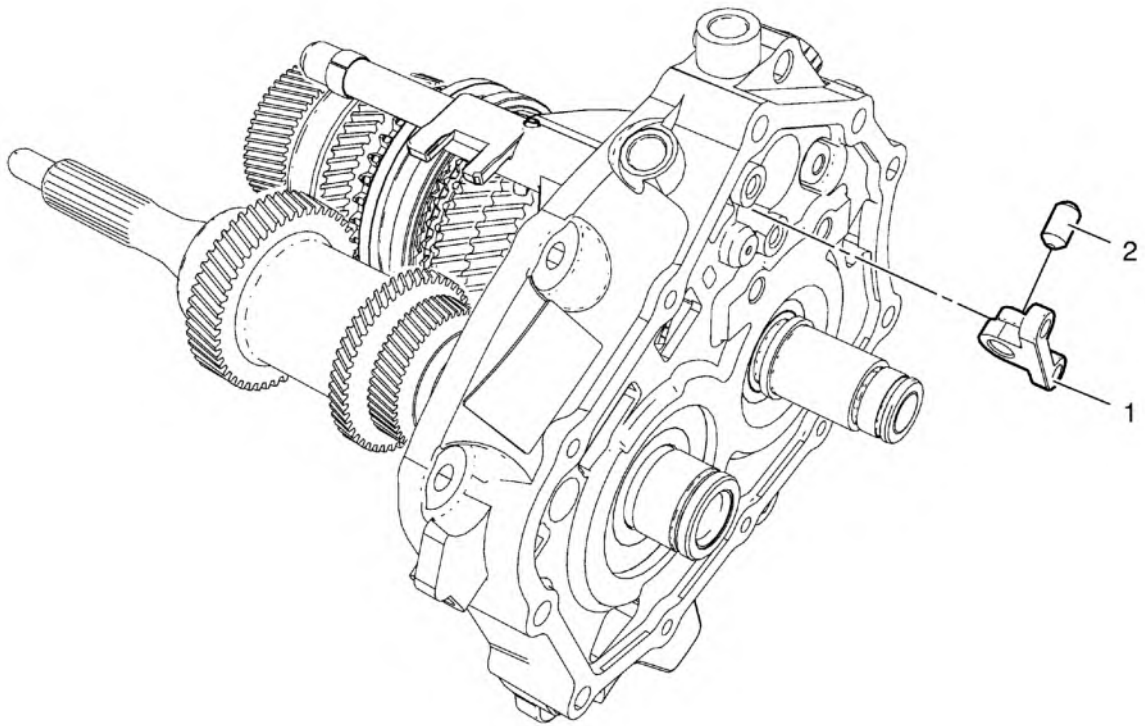


Fig. 87: Shift Shaft Interlock Pin Connector
Courtesy of GENERAL MOTORS COMPANY

Shift Shaft Interlock Pin Connector Removal

Callout	Component Name
1	Shift Shaft Interlock Pin Connector
2	Shift Shaft Interlock Pin

1st and 2nd Shift Fork Removal

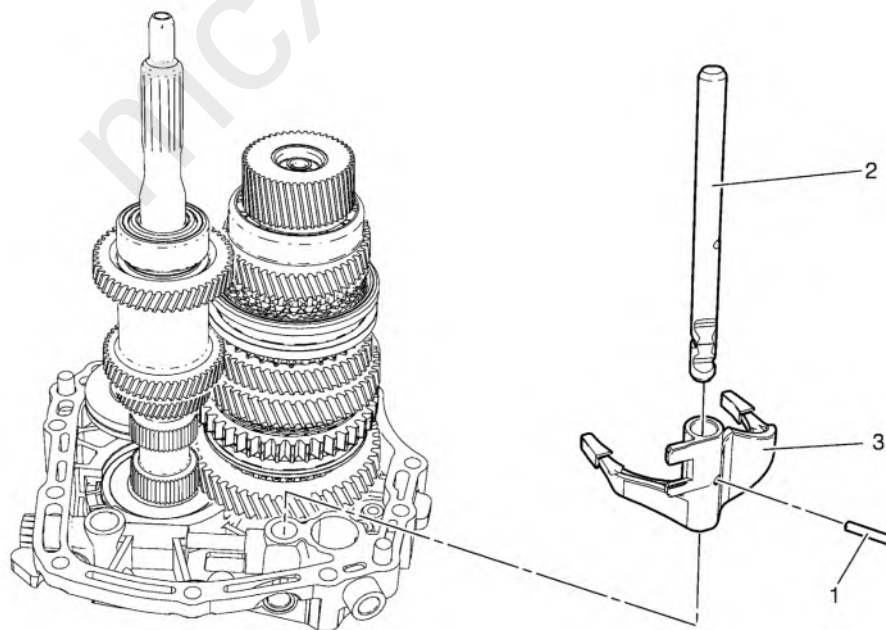


Fig. 88: 1st And 2nd Shift Fork
Courtesy of GENERAL MOTORS COMPANY

1st and 2nd Shift Fork Removal

Callout	Component Name
1	1st and 2nd Shift Fork Pin

Callout	Component Name
2	1st and 2nd Shift Shaft
3	1st and 2nd Shift Fork

INPUT SHAFT AND MAIN SHAFT REMOVAL

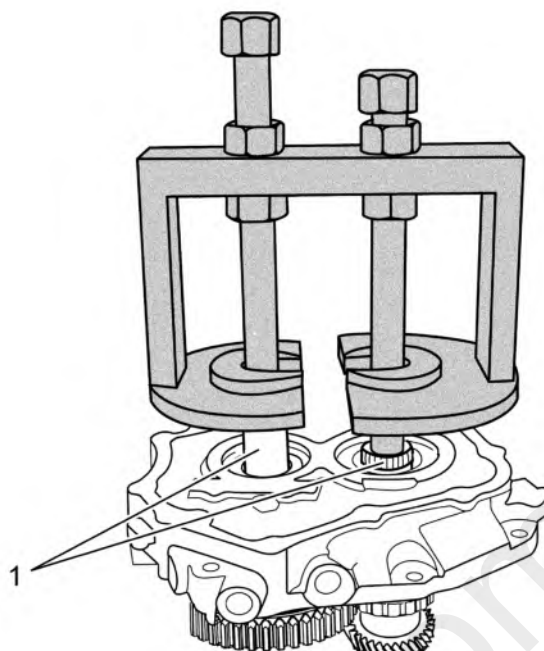


Fig. 89: Input Shaft and Main Shaft

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Input Shaft and Main Shaft NOTE: Support the main shaft, input shaft and reverse idler gear while pressing the shafts from the transmission case. Procedure 1. Install the DT-48188 remover onto main shaft (1) and input shaft (2). 2. Check the horizontal level by adjusting the bolts length of DT-48188 remover. 3. Carefully remove the main shaft (1), input shaft (2) and reverse idler gear using the DT-48188 remover and a hydraulic press. Special Tools DT-48188 Remover For equivalent regional tools, refer to Special Tools.

TRANSMISSION MAGNET REMOVAL

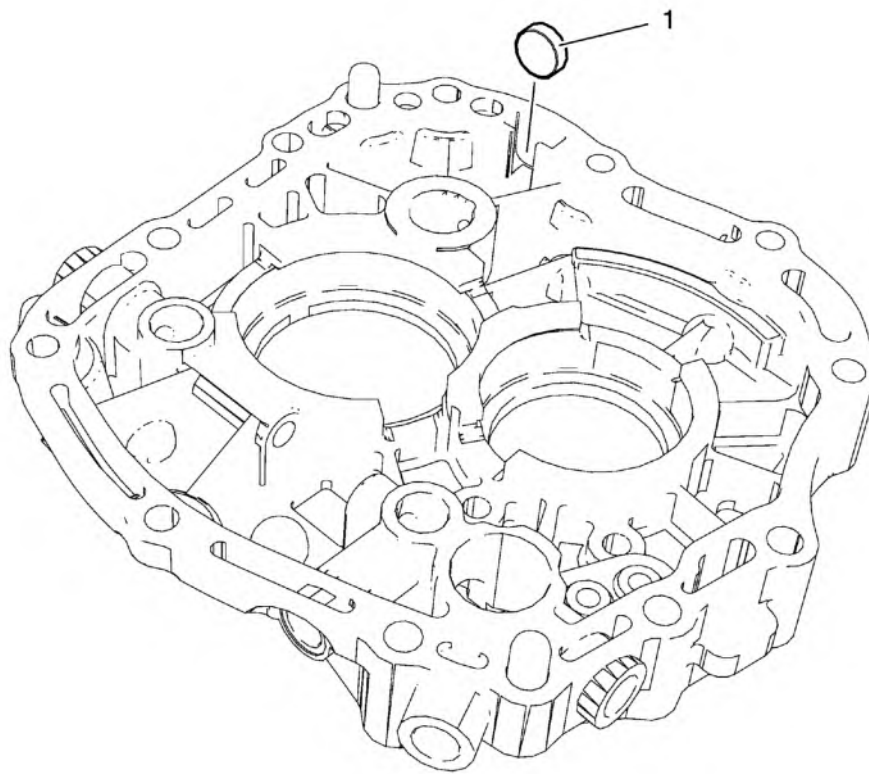


Fig. 90: Transmission Magnet

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Transmission Magnet

CLUTCH AND DIFFERENTIAL HOUSING COVER REMOVAL

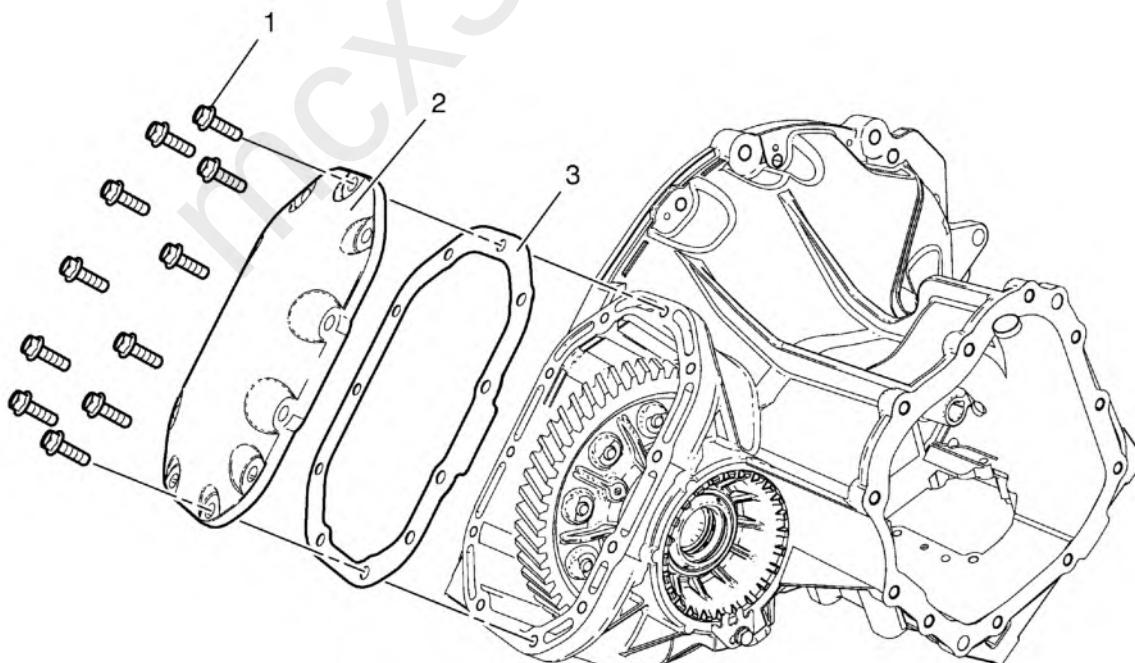


Fig. 91: Clutch and Differential Housing Cover

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Clutch and Differential Housing Cover Bolt (Qty: 11)
2	Clutch and Differential Housing Cover

Callout	Component Name
3	Clutch and Differential Housing Cover Gasket TIP: Discard the gasket. It is not reusable.

FRONT DIFFERENTIAL ASSEMBLY REMOVAL

Front Differential Bearing Adjuster Lock Removal

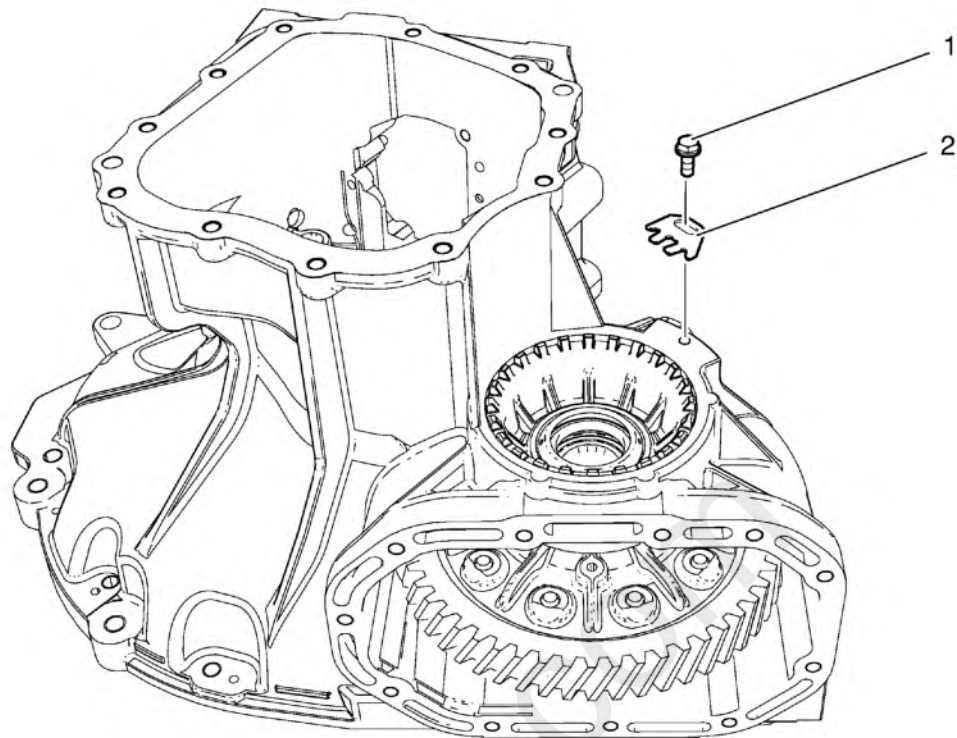


Fig. 92: Front Differential Bearing Adjuster Lock
Courtesy of GENERAL MOTORS COMPANY

Front Differential Bearing Adjuster Lock Removal

Callout	Component Name
1	Front Differential Bearing Adjuster Lock Bolt
2	Front Differential Bearing Adjuster Lock

Front Differential Bearing Cup Removal

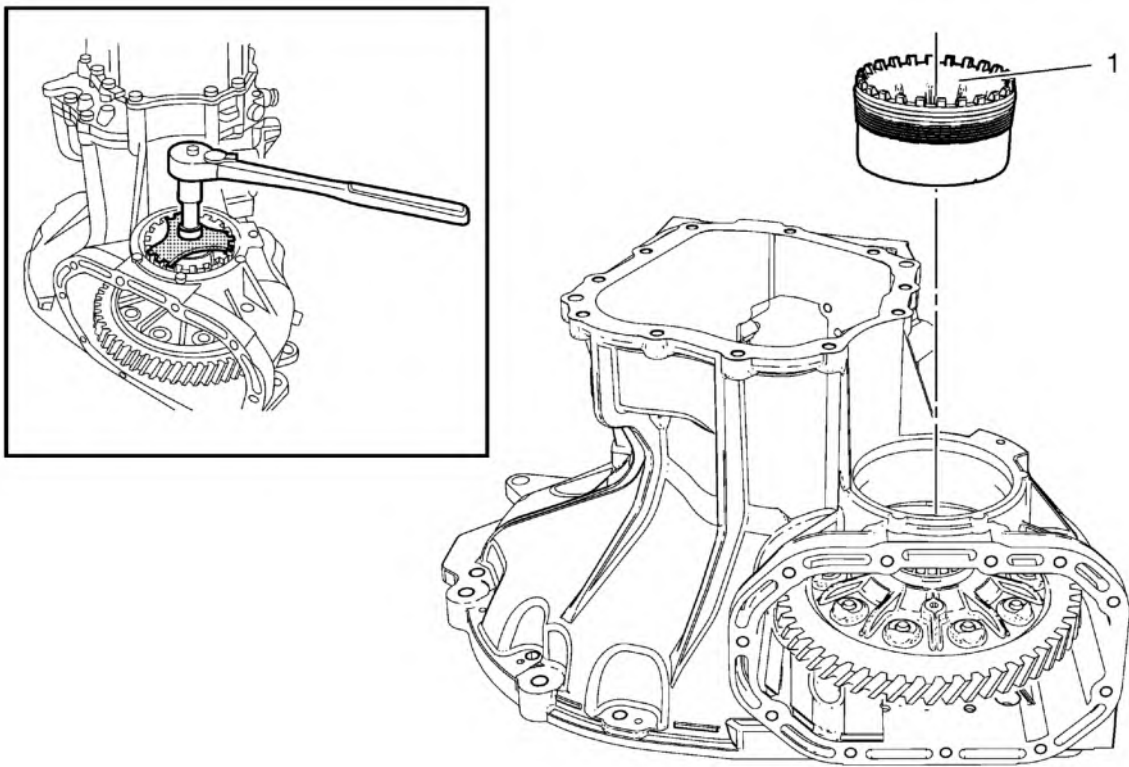


Fig. 93: Front Differential Bearing Cup
Courtesy of GENERAL MOTORS COMPANY

Front Differential Bearing Cup Removal

Callout	Component Name
1	Front Differential Bearing Cup Special Tools DT-520 Remover/Installer

Front Differential Removal

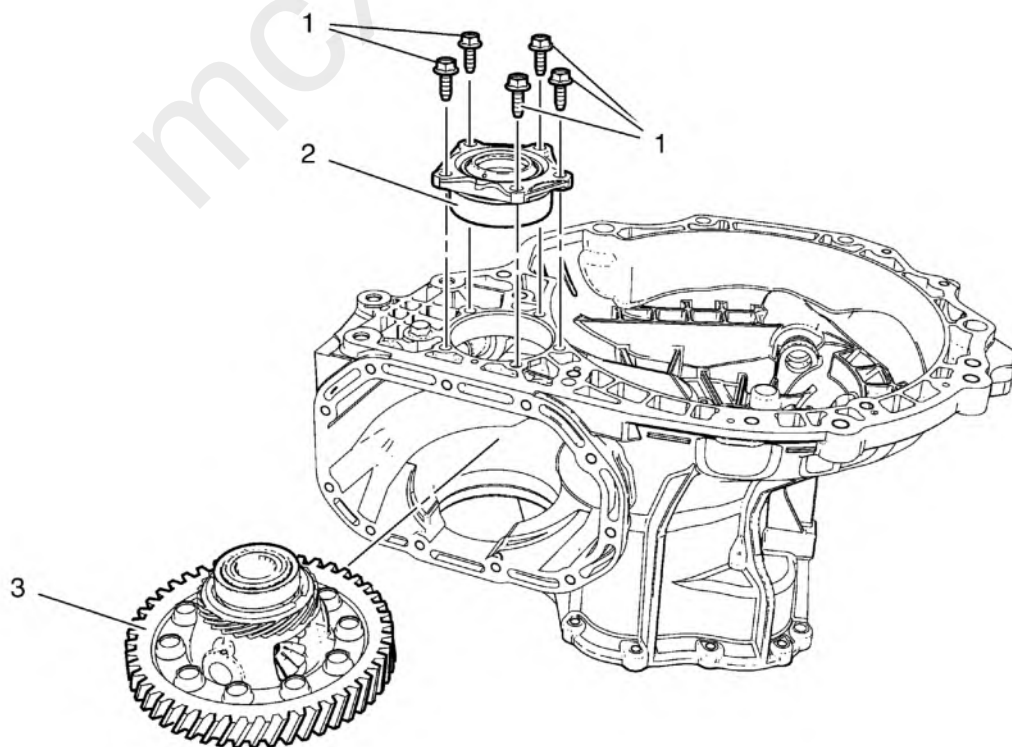


Fig. 94: Front Differential
Courtesy of GENERAL MOTORS COMPANY

Front Differential Removal

Callout	Component Name
1	Front Differential Bearing Adjuster Bolt- Right Side (Qty: 5)
2	Front Differential Bearing Adjuster- Right Side
3	Front Differential

FRONT DIFFERENTIAL ASSEMBLY DISASSEMBLE

Front Differential Ring Gear Removal

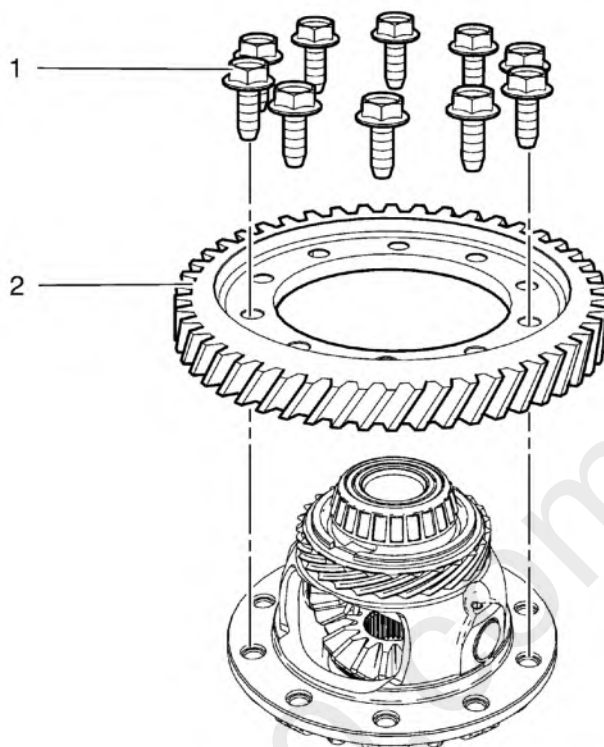


Fig. 95: Front Differential Ring Gear
 Courtesy of GENERAL MOTORS COMPANY

Front Differential Ring Gear Removal

Callout	Component Name
1	Front Differential Ring Gear Bolt (Qty: 10) TIP: Clamp the front differential ring gear into a bench vise using braces.
2	Front Differential Ring Gear

Front Differential Pinion Gear Shaft Removal

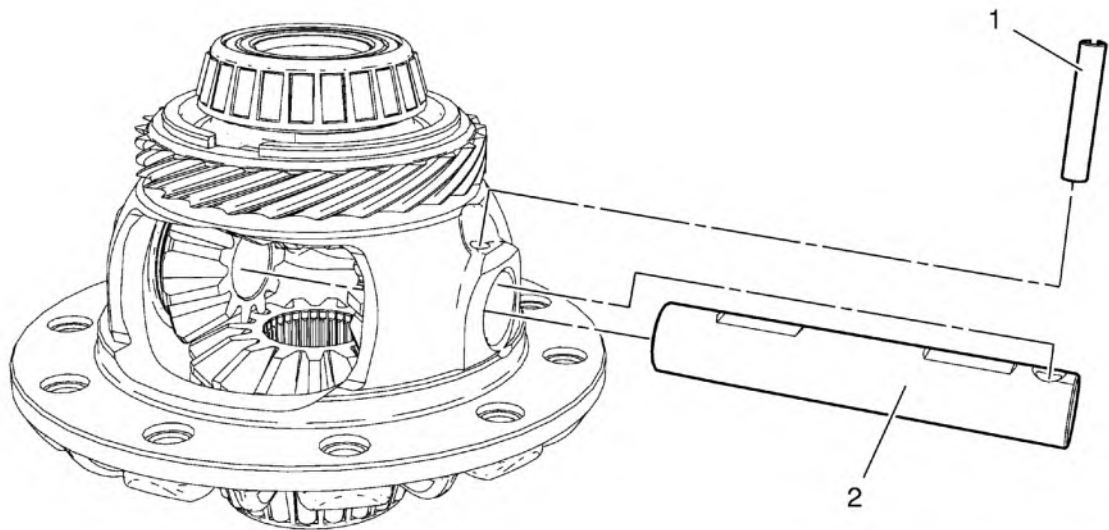


Fig. 96: Front Differential Pinion Gear Shaft
 Courtesy of GENERAL MOTORS COMPANY

Front Differential Pinion Gear Shaft Removal

Callout	Component Name
1	Front Differential Pinion Gear Shaft Pin
2	Front Differential Pinion Gear Shaft

Front Differential Pinion Gear and Side Gear Removal

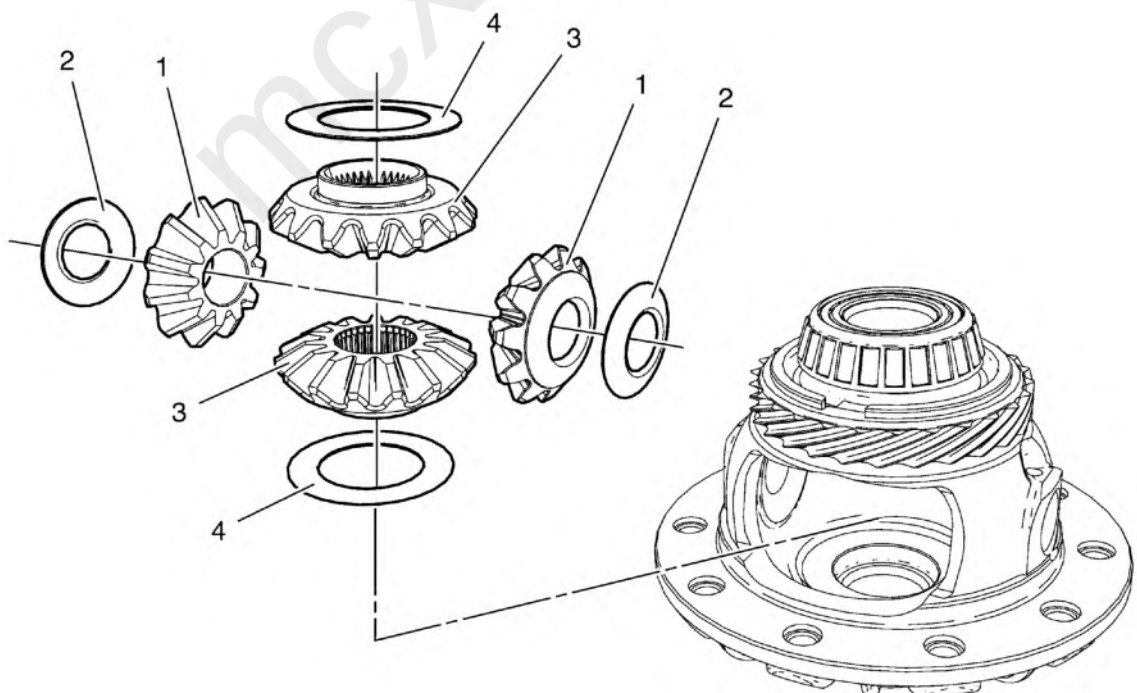


Fig. 97: Front Differential Pinion Gear and Side Gear
 Courtesy of GENERAL MOTORS COMPANY

Front Differential Pinion Gear and Side Gear Removal

Callout	Component Name
1	Front Differential Pinion Gear (Qty: 2)
2	Front Differential Pinion Gear Thrust Washer (Qty: 2)
3	Front Differential Side Gear (Qty: 2)
4	Front Differential Side Gear Thrust Washer (Qty: 2)

Front Differential Bearing Removal

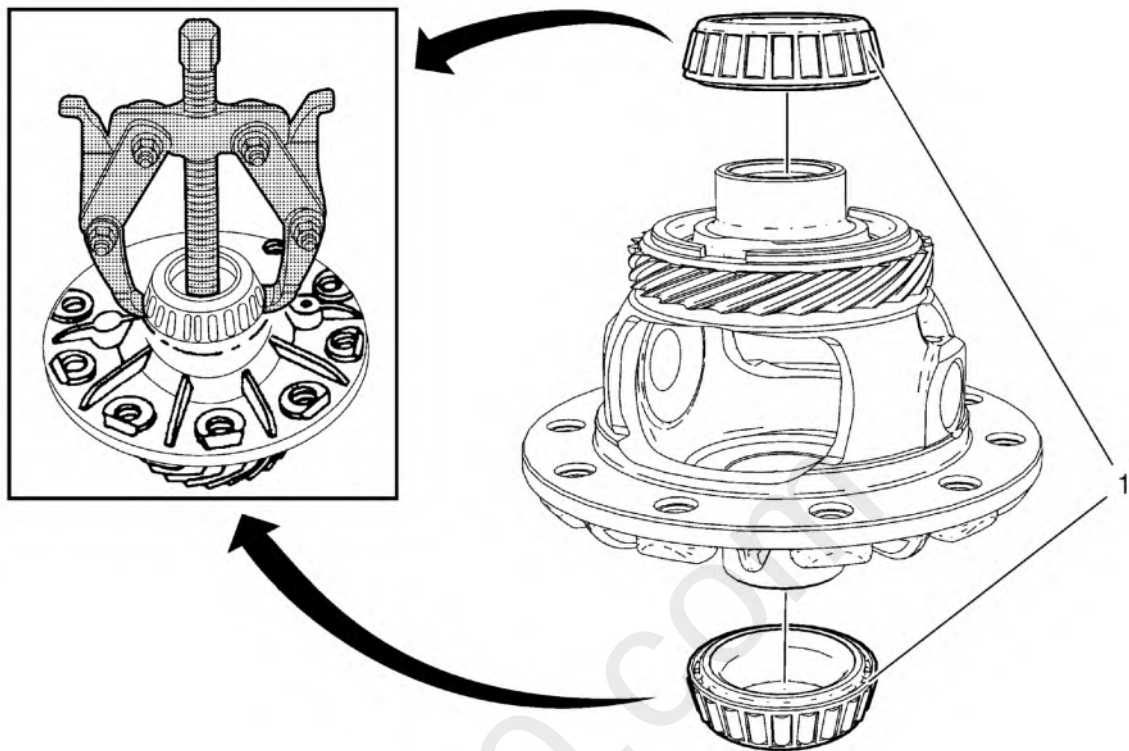


Fig. 98: Front Differential Bearing

Courtesy of GENERAL MOTORS COMPANY

Front Differential Bearing Removal

Callout	Component Name
1	Front Differential Bearing (Qty: 2) Special Tools CH-161-B Bearing Puller with Bearing Puller Legs

Speedometer Drive Gear Removal

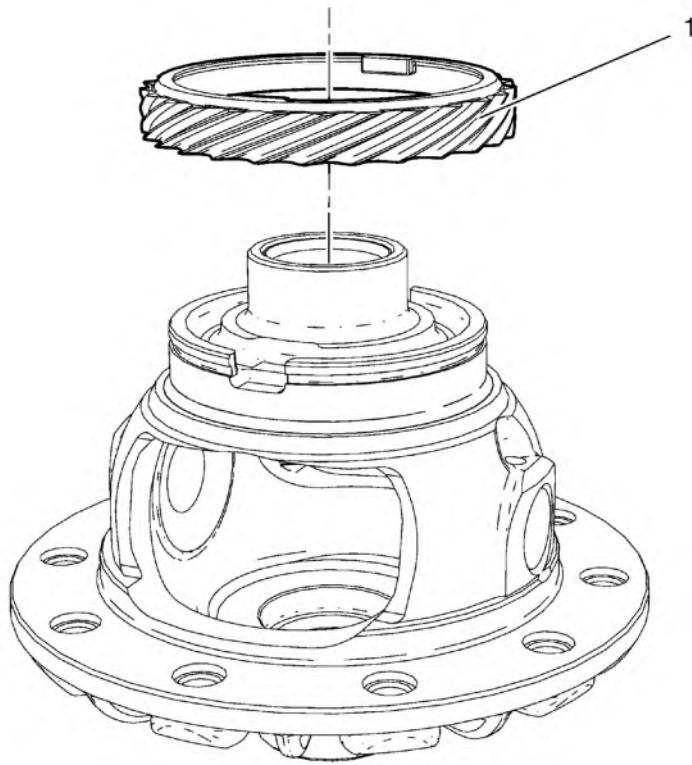


Fig. 99: Speedometer Drive Gear
Courtesy of GENERAL MOTORS COMPANY

Speedometer Drive Gear Removal

Callout	Component Name
1	Speedometer Drive Gear Special Tools CH-161-B Bearing Puller with Bearing Puller Legs

FRONT DIFFERENTIAL ASSEMBLY ASSEMBLE

Speedometer Drive Gear Installation

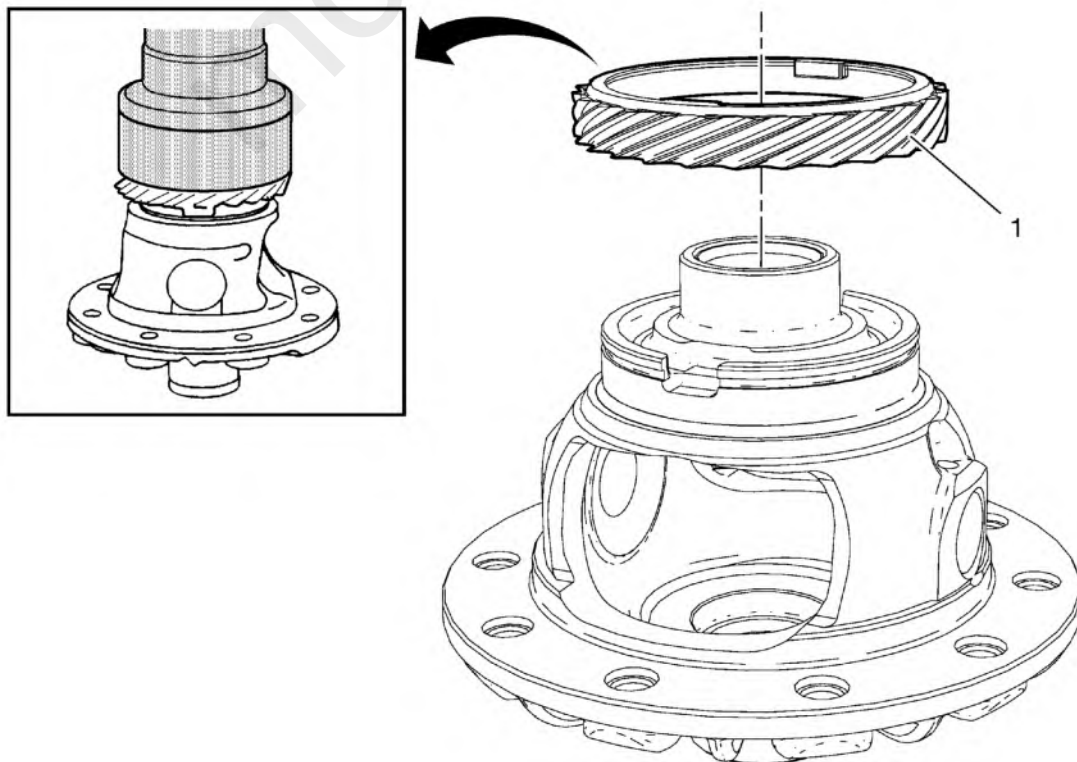


Fig. 100: Speedometer Drive Gear
Courtesy of GENERAL MOTORS COMPANY

Speedometer Drive Gear Installation

Callout	Component Name
1	Speedometer Drive Gear TIP: Hydraulic press required. Special Tools DT-525 Installer

Front Differential Bearing Installation

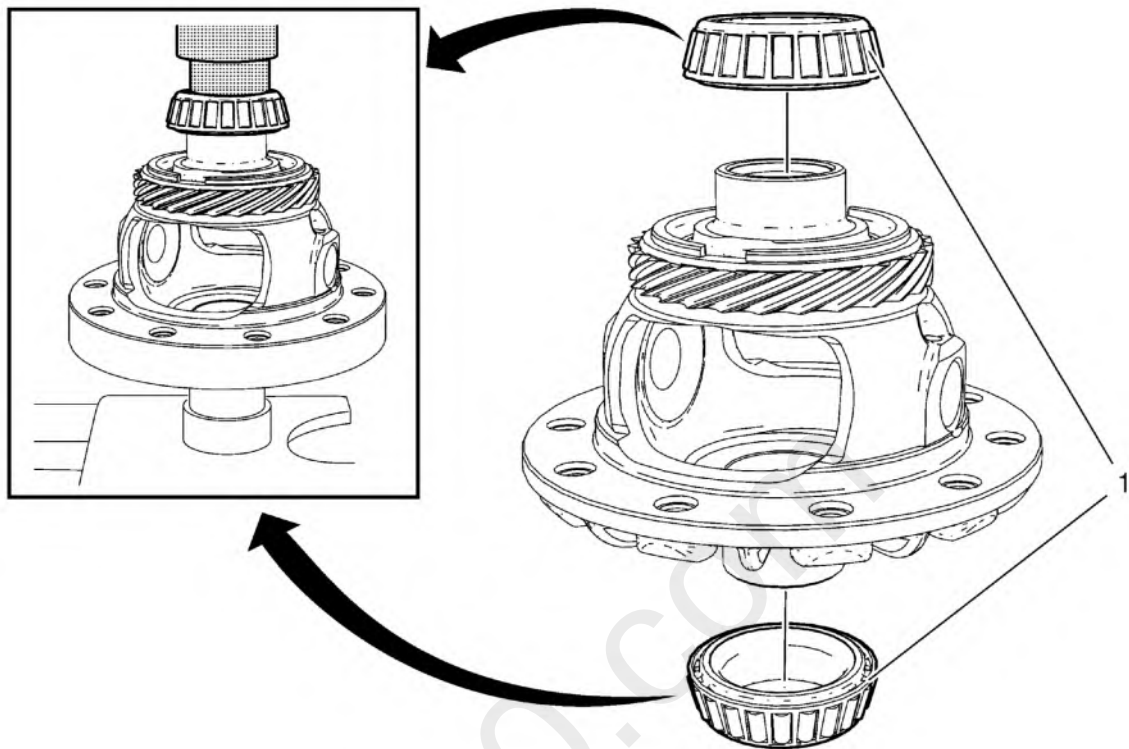


Fig. 101: Front Differential Bearing

Courtesy of GENERAL MOTORS COMPANY

Front Differential Bearing Installation

Callout	Component Name
1	Front Differential Bearing (Qty: 2) TIP: Hydraulic press required. Special Tools DT-522 Installer

Front Differential Pinion Gear and Side Gear Installation

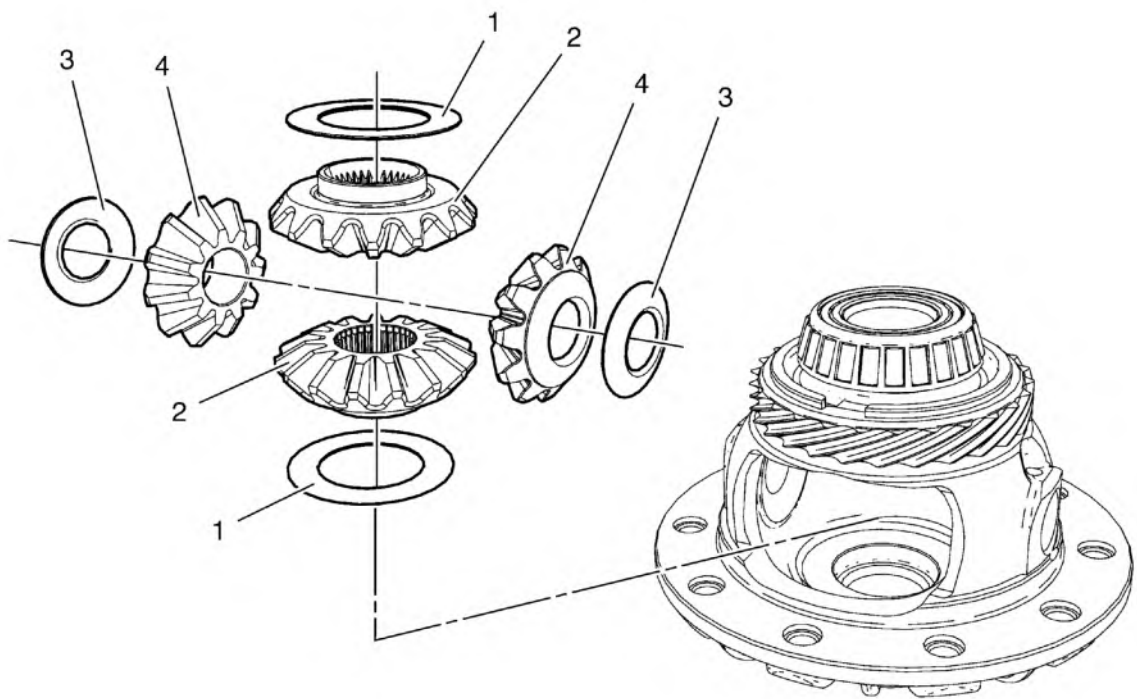


Fig. 102: Front Differential Pinion Gear and Side Gear Installation

Courtesy of GENERAL MOTORS COMPANY

Front Differential Pinion Gear and Side Gear Installation

Callout	Component Name
1	Front Differential Side Gear Thrust Washer (Qty: 2)
2	Front Differential Side Gear (Qty: 2)
3	Front Differential Pinion Gear Thrust Washer (Qty: 2)
4	Front Differential Pinion Gear (Qty: 2)

Front Differential Pinion Gear Shaft Installation

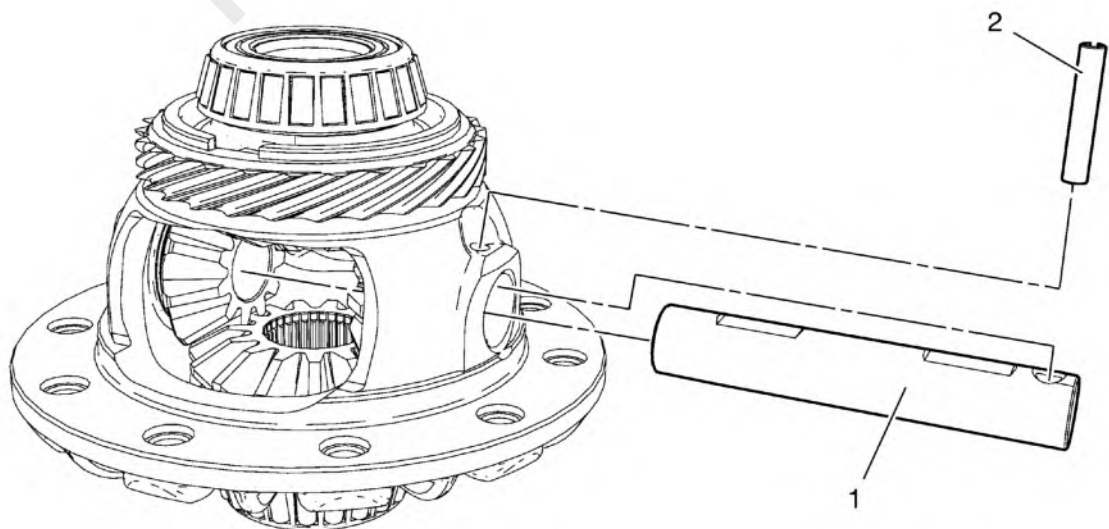


Fig. 103: Front Differential Pinion Gear Shaft

Courtesy of GENERAL MOTORS COMPANY

Front Differential Pinion Gear Shaft Installation

Callout	Component Name
1	Front Differential Pinion Gear Shaft
2	Front Differential Pinion Gear Shaft Pin

Front Differential Ring Gear Installation

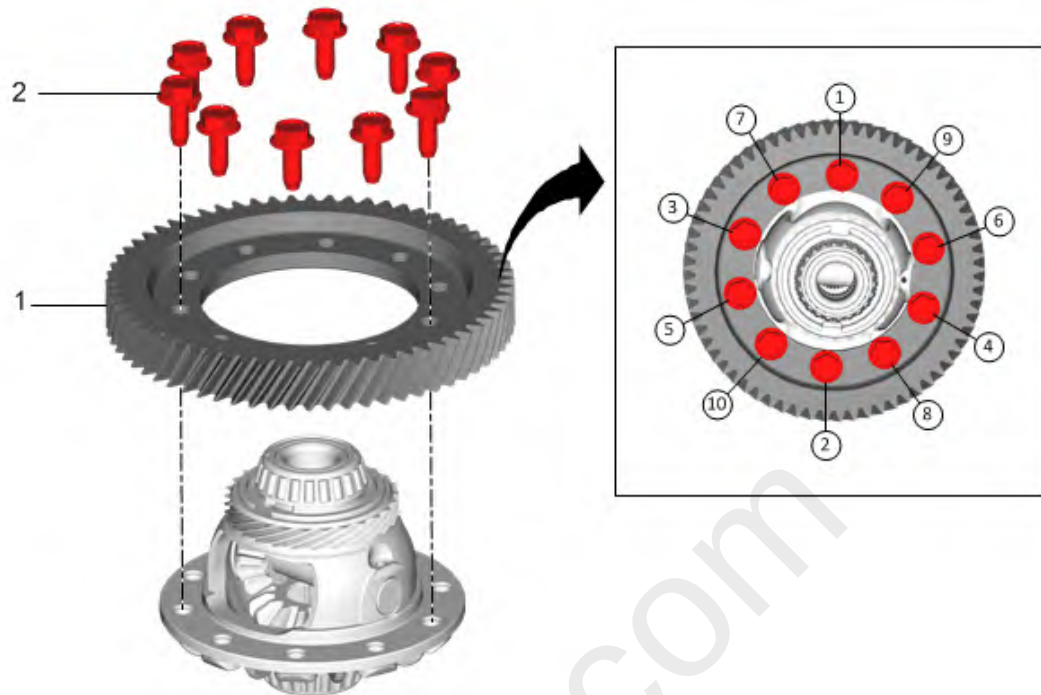


Fig. 104: Front Differential Ring Gear

Courtesy of GENERAL MOTORS COMPANY

Front Differential Ring Gear Installation

Callout	Component Name
1	Front Differential Ring Gear

Callout	Component Name
2	Front Differential Ring Gear Bolt (Qty: 10) CAUTION: Refer to Fastener Caution . CAUTION: Refer to Torque-to-Yield Fastener Caution . Procedure 1. Clean the front differential from residual adhesive, debris and oil. 2. Install NEW bolts. Do NOT reuse old bolts. NOTE: Clamp the front differential ring gear into a bench vise using braces. Tighten • First pass: 10 N.m (89 lb in) • Second Pass: 70 N.m (52 lb ft) • Final Pass: 30 - 45 degrees Special Tools EN-45059 Angle Meter

FRONT DIFFERENTIAL ASSEMBLY INSTALLATION

Front Differential Installation

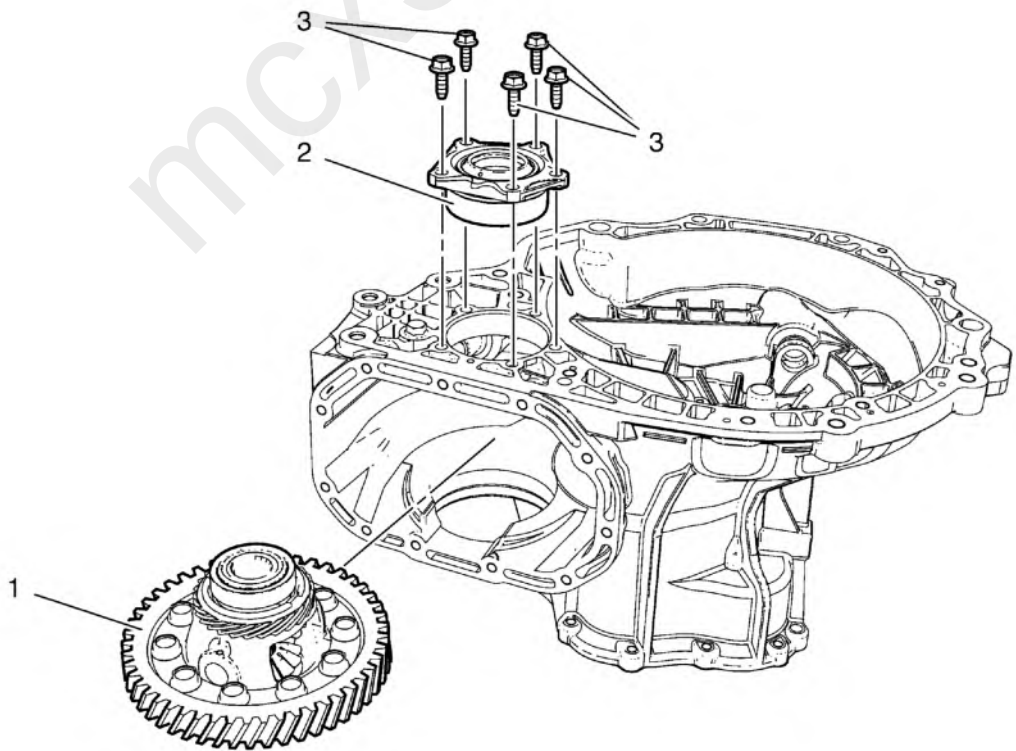


Fig. 105: Front Differential

Courtesy of GENERAL MOTORS COMPANY

Front Differential Installation

Callout	Component Name
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Callout	Component Name
	Front Differential Bearing Cup
	Procedure 1. Tighten the front bearing differential cup until there is no end play with the differential. 2. Tighten or loosen the front bearing differential cup to get the required preload on the bearings.
1	Preload Specification • Used Bearings: 0.8 N.m (7 lb in) is required to rotate the differential one revolution per second. • New Bearings: 2 N.m (18 lb in) is required to rotate the differential one revolution per second.
	Special Tools DT-520 Remover/Installer

Front Differential Bearing Adjuster Lock Installation

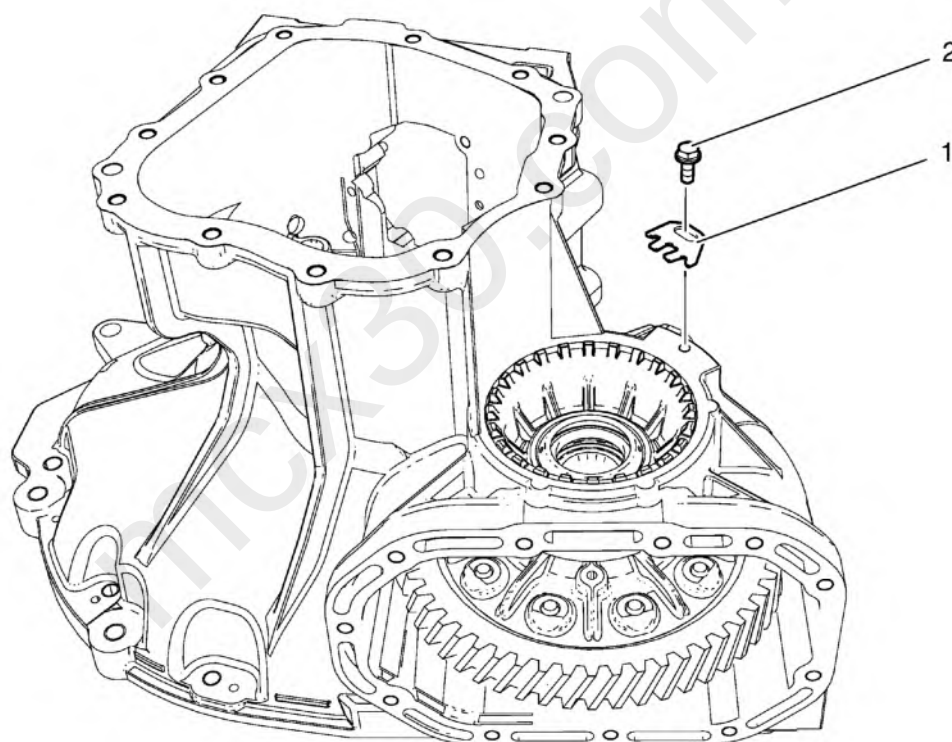


Fig. 107: Front Differential Bearing Adjuster Lock

Courtesy of GENERAL MOTORS COMPANY

Front Differential Bearing Adjuster Lock Installation

Callout	Component Name
1	Front Differential Bearing Adjuster Lock
	Front Differential Bearing Adjuster Lock Bolt
2	CAUTION: Refer to Fastener Caution .
	Tighten 9 N.m (80 lb in)

CLUTCH AND DIFFERENTIAL HOUSING COVER INSTALLATION

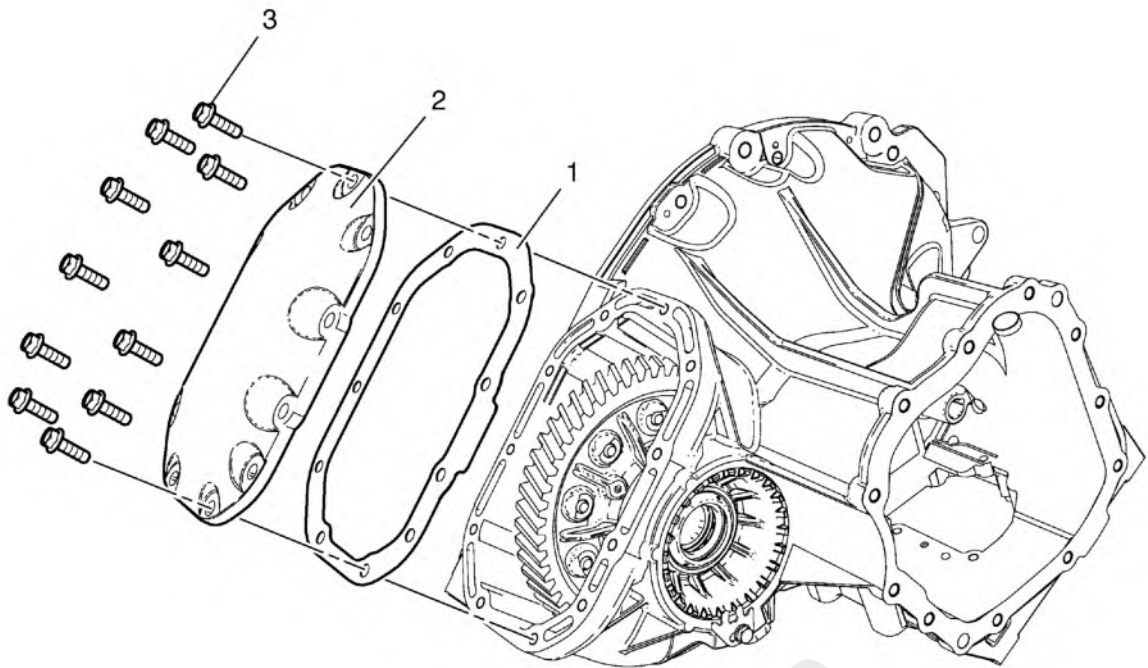


Fig. 108: Clutch and Differential Housing Cover
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Clutch and Differential Housing Cover Gasket
2	Clutch and Differential Housing Cover
3	Clutch and Differential Housing Cover Bolt (Qty: 11) CAUTION: Refer to Fastener Caution . Tighten 30 N.m (22 lb ft)

TRANSMISSION MAGNET INSTALLATION

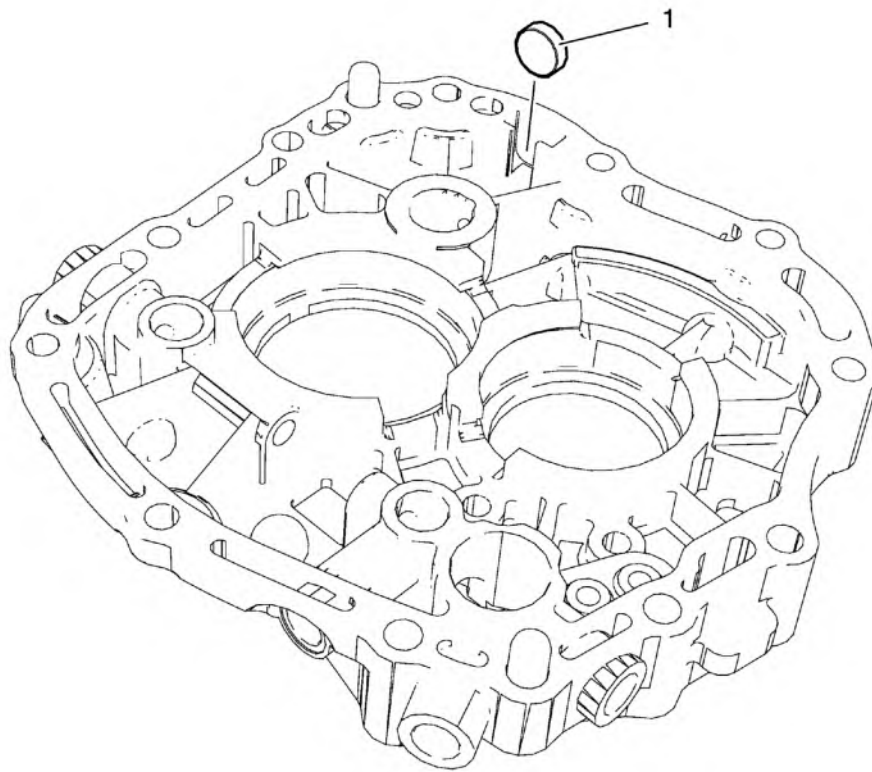


Fig. 109: Transmission Magnet

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Transmission Magnet

INPUT SHAFT AND MAIN SHAFT INSTALLATION

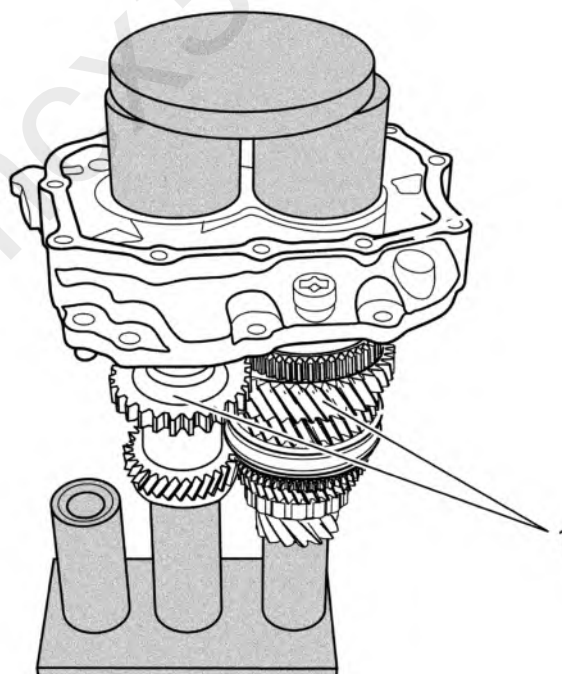


Fig. 110: Input Shaft and Main Shaft

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

Callout	Component Name
1	Input Shaft and Main Shaft NOTE: Guide the shafts into the bores, and support the reverse idler gear while pressing into the transmission case. Procedure 1. Install the reverse idler gear to the reverse idler gear shaft. 2. Insert the main shaft and input shaft to the transmission case (1). 3. Install the main shaft assembly (3) and input shaft assembly (2) to the transmission case (1), using the DT-554 installer, two DT-48076 installers, J-45019-1 plate and a hydraulic press. Special Tools • DT-554 Installer • DT-48076 Installer • J-45019-1 Plate For equivalent regional tools, refer to Special Tools.

SHIFT SHAFT AND FORK ASSEMBLIES INSTALLATION

1st and 2nd Shift Fork Installation

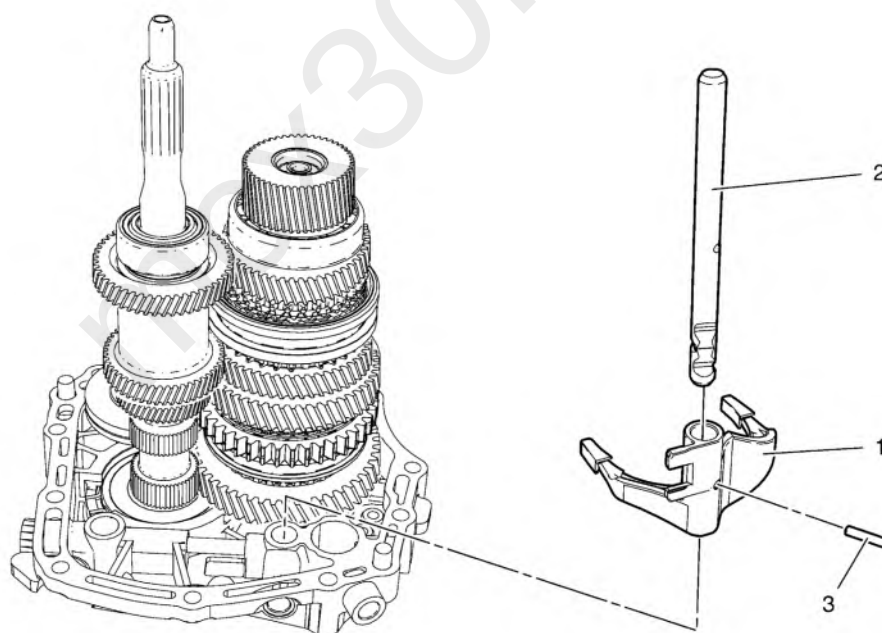


Fig. 111: 1st and 2nd Shift Fork

Courtesy of GENERAL MOTORS COMPANY

1st and 2nd Shift Fork Installation

Callout	Component Name
1	1st and 2nd Shift Fork
2	1st and 2nd Shift Shaft
3	1st and 2nd Shift Fork Pin

Shift Shaft Interlock Pin Connector Installation

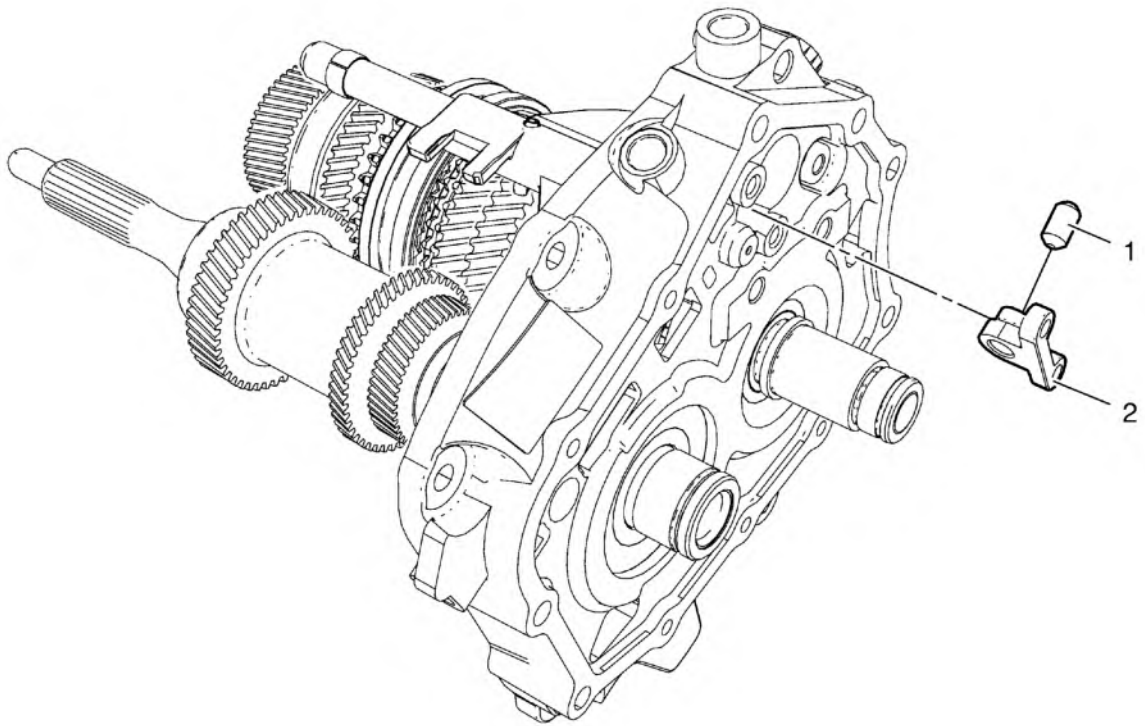


Fig. 112: Shift Shaft Interlock Pin Connector
 Courtesy of GENERAL MOTORS COMPANY

Shift Shaft Interlock Pin Connector Installation

Callout	Component Name
1	Shift Shaft Interlock Pin
2	Shift Shaft Interlock Pin Connector

3rd and 4th Shift Fork and 5th Shift Block Installation

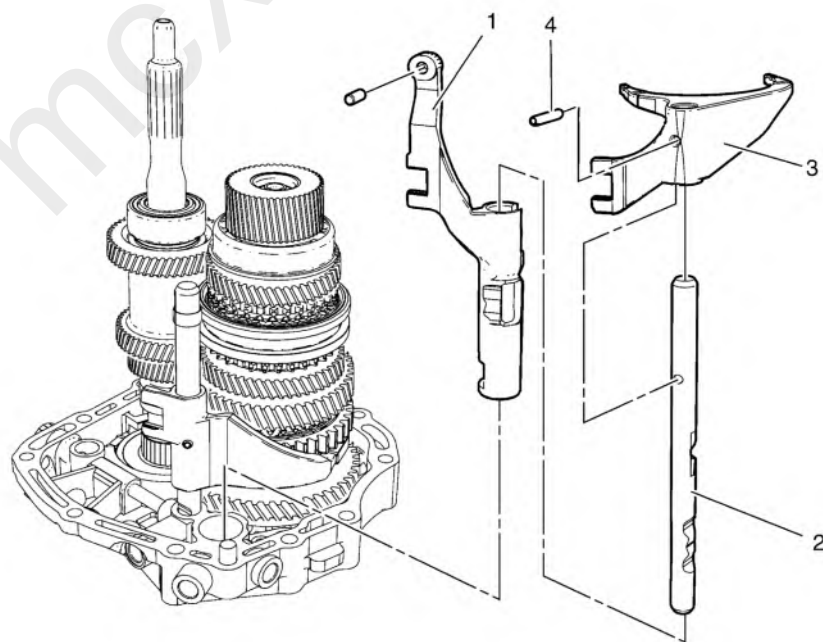


Fig. 113: 3rd And 4th Shift Fork And 5th Shift Block
 Courtesy of GENERAL MOTORS COMPANY

3rd and 4th Shift Fork and 5th Shift Block Installation

Callout	Component Name
1	5th Shift Block

Callout	Component Name
2	3rd and 4th Shift Shaft
3	3rd and 4th Shift Fork
4	3rd and 4th Shift Fork Pin

Shift Shaft Interlock Pin Connector Bolts Installation

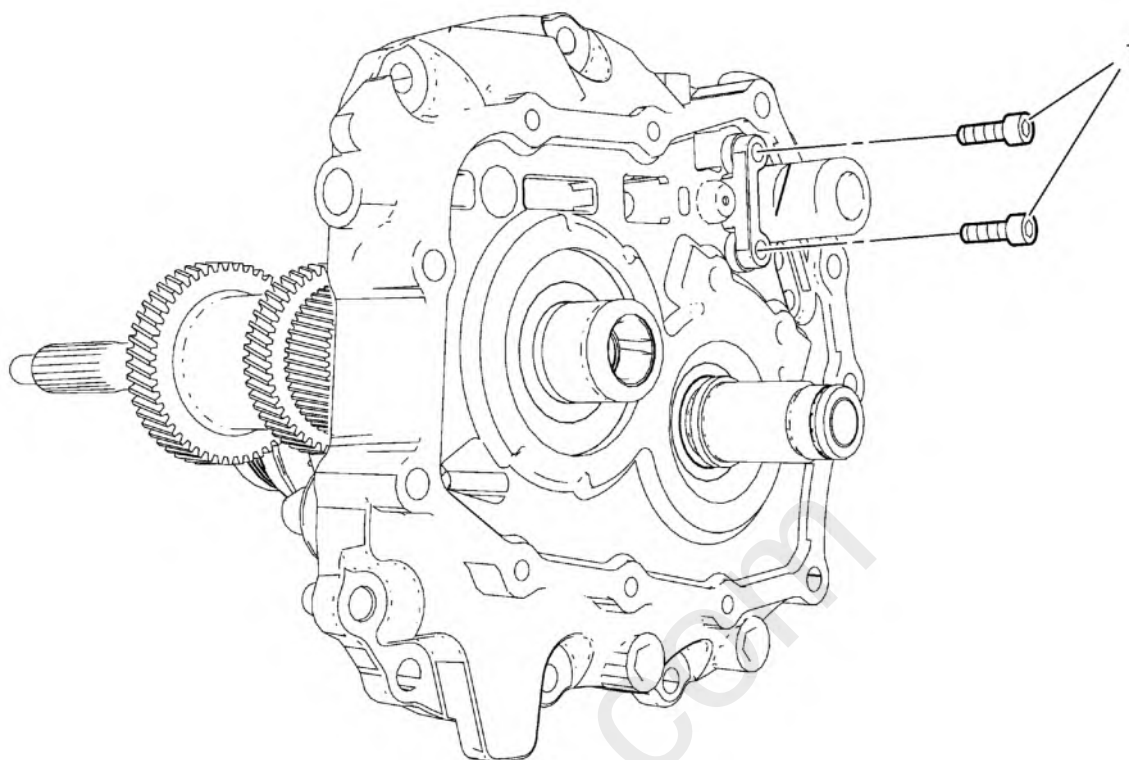


Fig. 114: Shift Shaft Interlock Pin Connector Bolts

Courtesy of GENERAL MOTORS COMPANY

Shift Shaft Interlock Pin Connector Bolts Installation

Callout	Component Name
1	Shift Shaft Interlock Pin Connector Bolt (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 7 N.m (62 lb in)

Reverse Shift Fork Installation

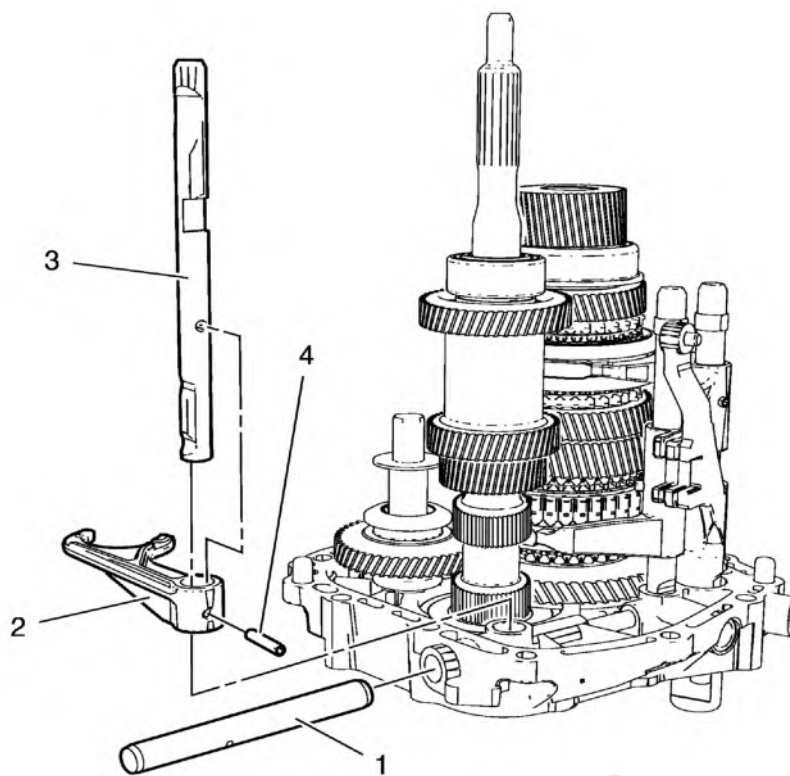


Fig. 115: Reverse Shift Fork

Courtesy of GENERAL MOTORS COMPANY

Reverse Shift Fork Installation

Callout	Component Name
1	Shift Shaft Interlock Pin
2	Reverse Shift Fork
3	Reverse Shift Shaft
4	Reverse Shift Fork Pin

SHIFT SHAFT DETENT INSTALLATION

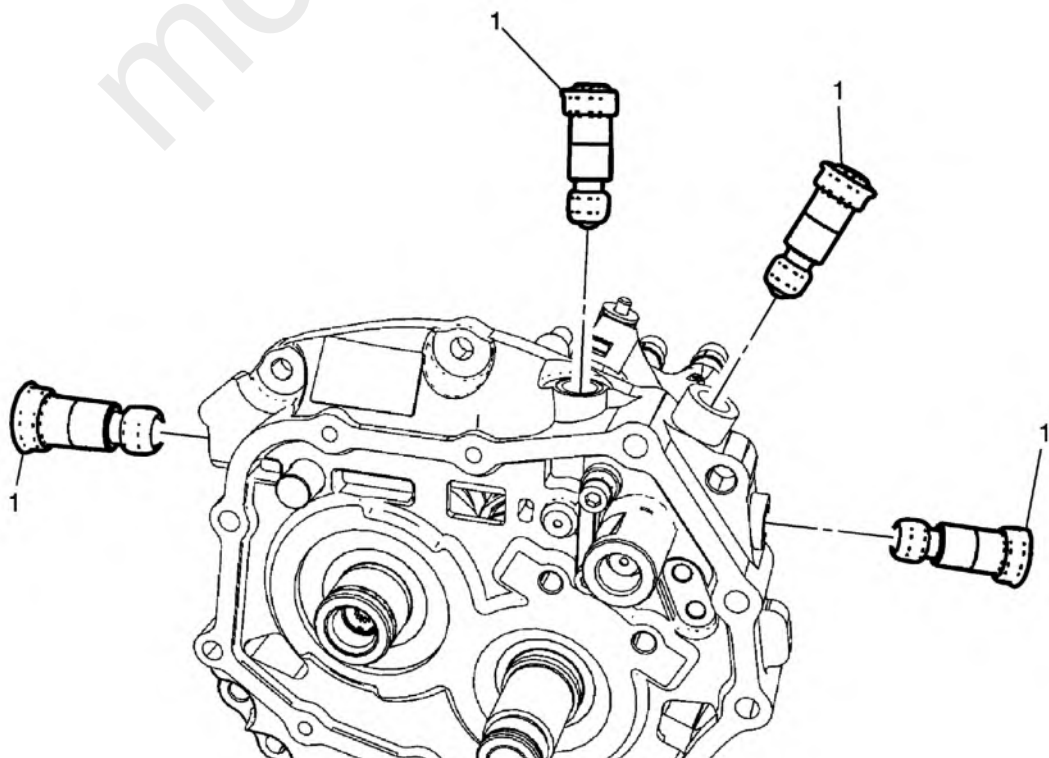


Fig. 116: Shift Shaft Detent

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Shift Shaft Detent (Qty: 4)

5TH SHIFT BLOCKING LEVER INSTALLATION

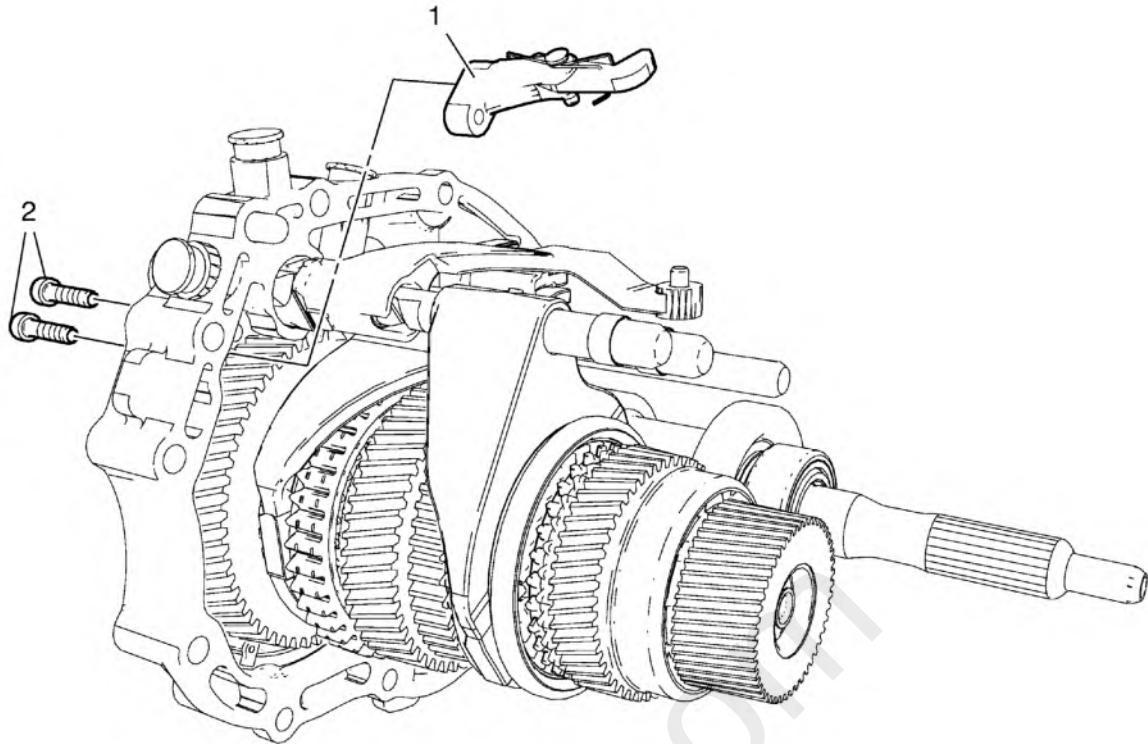


Fig. 117: 5th Shift Blocking Lever

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	5th Shift Blocking Lever
2	5th Shift Blocking Lever Bolt (Qty :2) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 7 N.m (62 lb in)

5TH GEAR INSTALLATION

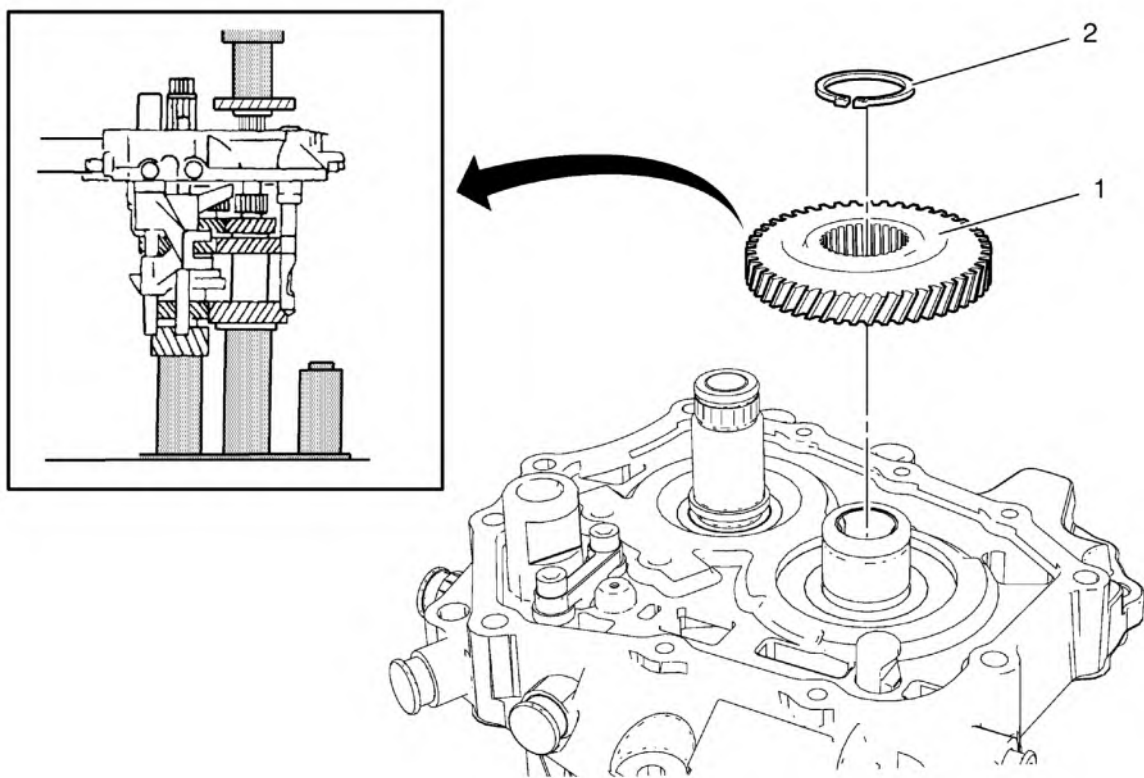


Fig.118: 5th Gear

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Input Drive 5th Gear NOTE: Hydraulic press required. Special Tools • DT-334 Installer Sleeve • DT-554 Installer
2	Input Drive 5th Gear Retaining Ring

5TH DRIVEN GEAR INSTALLATION

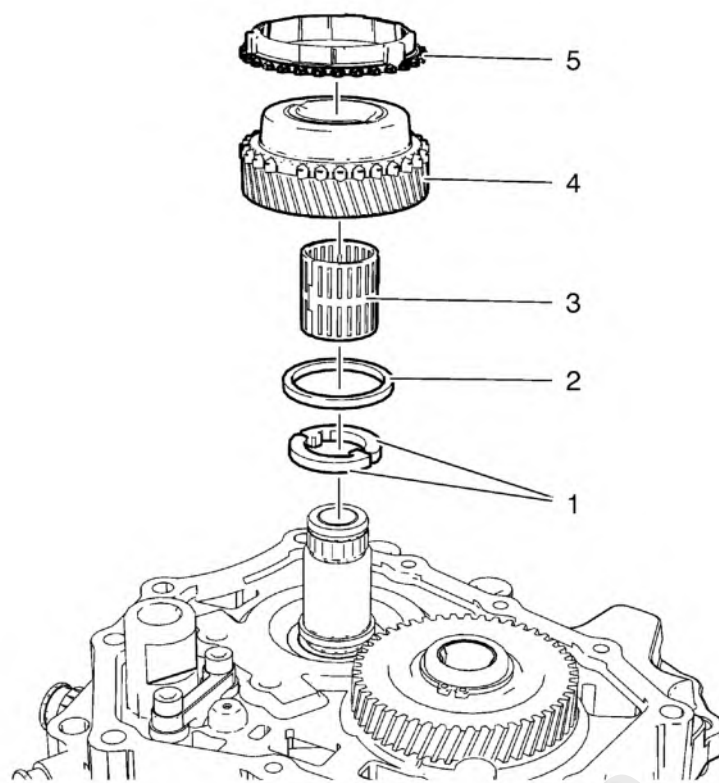


Fig. 119: 5th Driven Gear & Components
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	5th Driven Gear Thrust Washer (Qty: 2)
2	5th Driven Gear Retaining Ring
3	5th Driven Gear Bearing
4	5th Driven Gear
5	5th Driven Gear Blocking Ring

5TH GEAR SYNCHRONIZER INSTALLATION

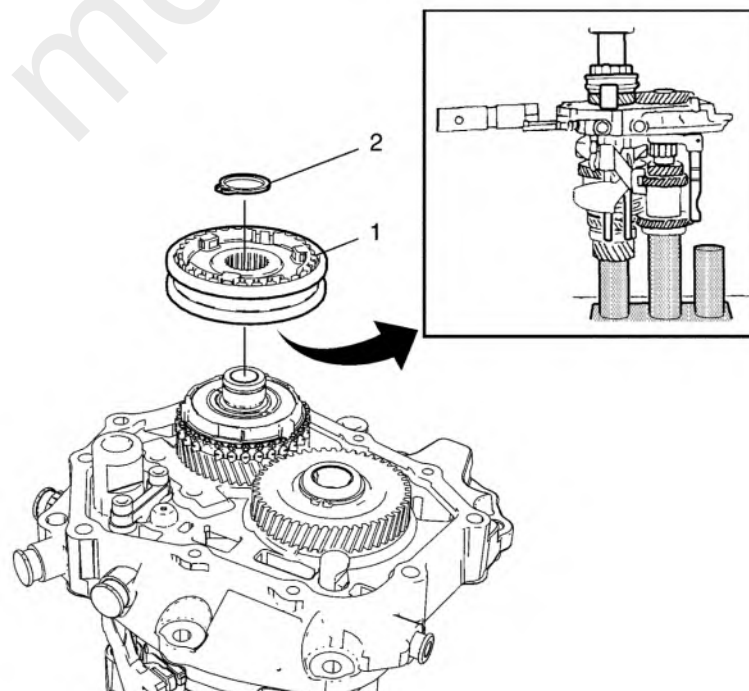


Fig. 120: 5th Gear Synchronizer
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	5th Gear Synchronizer TIP: Hydraulic press required. Special Tools DT-554 Installer
2	Snap Ring

5TH SHIFT FORK INSTALLATION

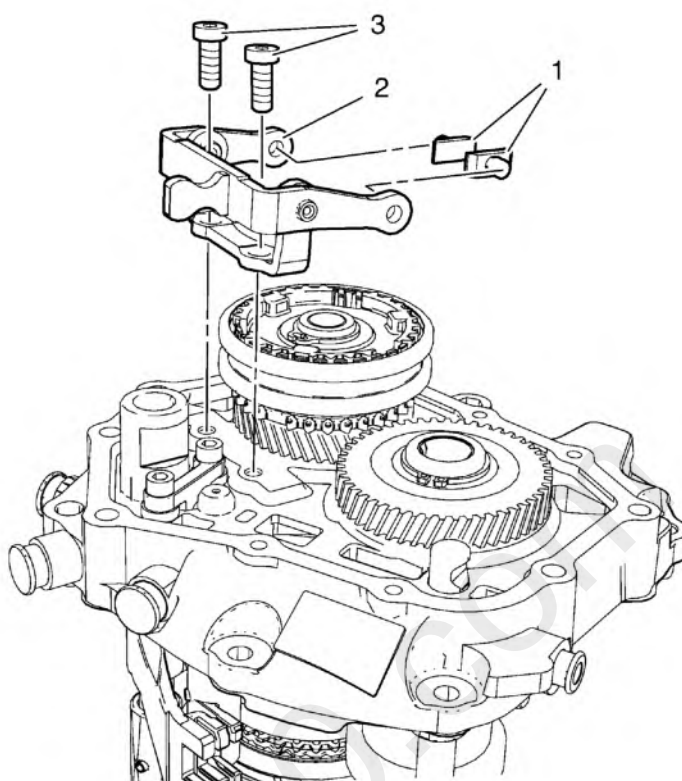


Fig. 121: 5th Shift Fork

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	5th Shift Fork Shoe (Qty: 2)
2	5th Gear Fork
3	5th Gear Fork Bolt (Qty: 2) CAUTION: Refer to Fastener Caution . Tighten 22 N.m (16 lb ft)

HOLDING FIXTURE REMOVAL

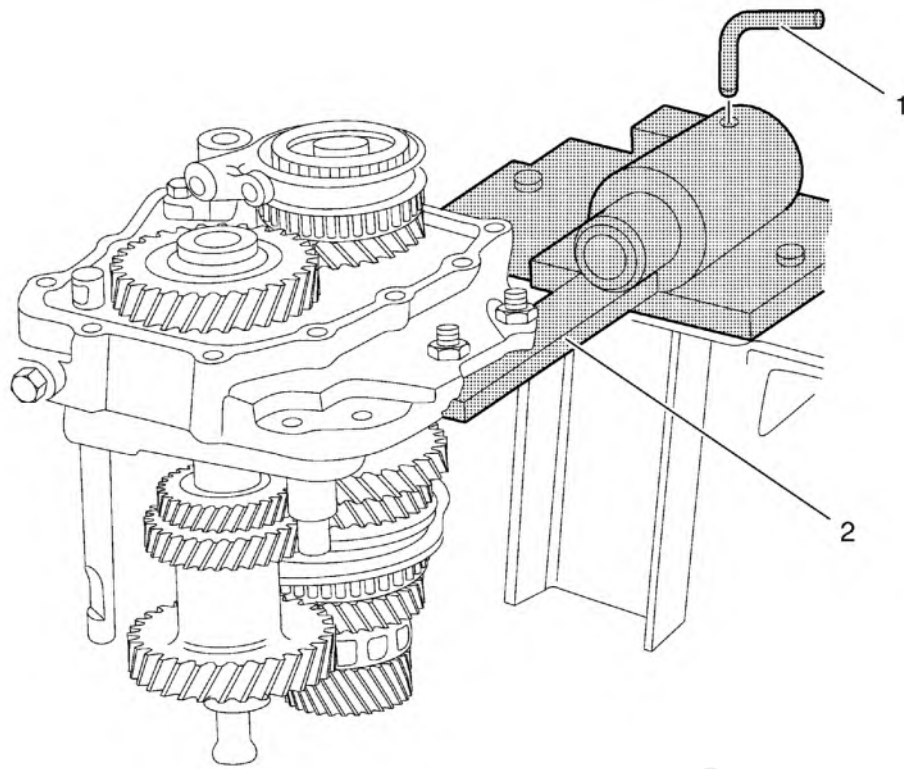


Fig. 122: Holding Fixture

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Lock Pin
2	DT-552 Fixture

TRANSMISSION CASE INSTALLATION

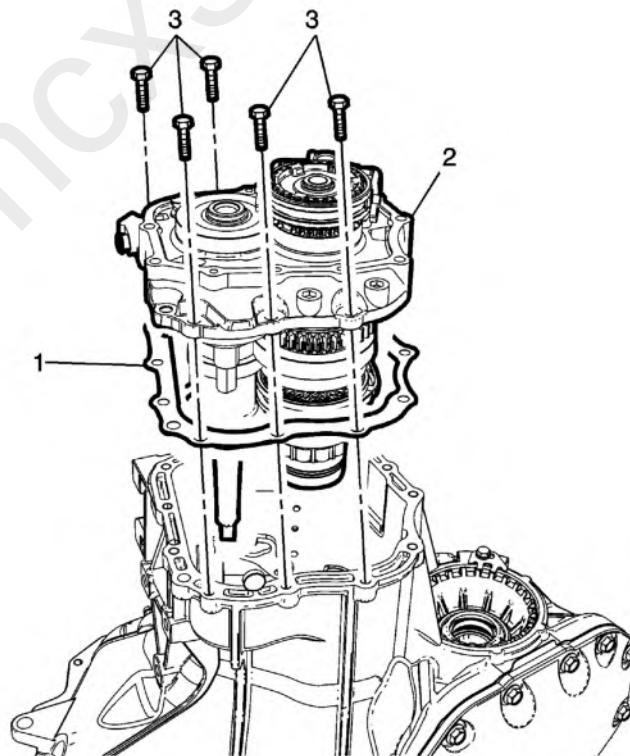


Fig. 123: Transmission Case

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Transmission Case Gasket

Callout	Component Name
2	Transmission Case TIP: Shift the transmission into 2nd gear.
3	Transmission Cover Bolt (Qty: 5) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 22 N.m (16 lb ft)

TRANSMISSION COVER INSTALLATION

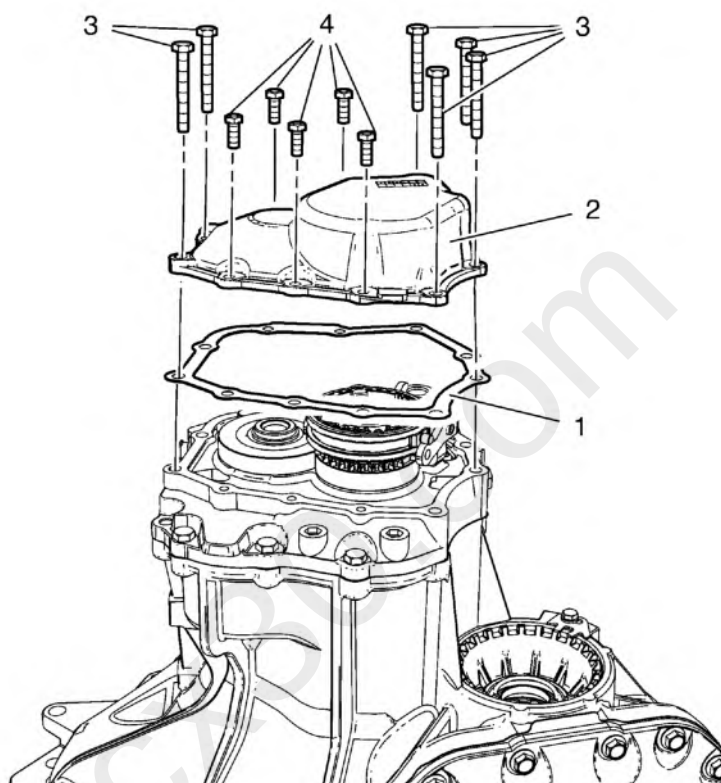


Fig. 124: Transmission Cover

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Transmission Cover Gasket Procedure Clean the sealing surfaces and install a new gasket.
2	Transmission Cover
3	Transmission Cover Bolt M8 (Qty: 6) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 20 N.m (15 lb ft)
4	Transmission Cover Bolt M7 (Qty: 5) Tighten 15 N.m (11 lb ft)

SHIFT CONTROL HOUSING INSTALLATION

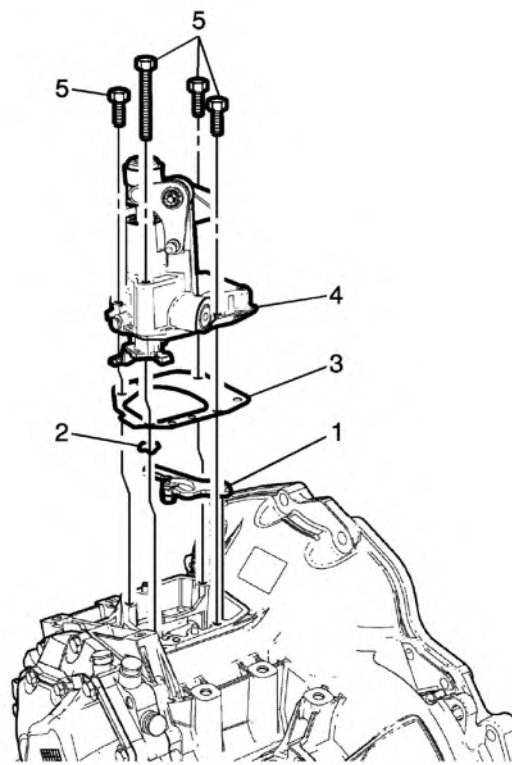


Fig. 125: Shift Control Housing

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	5th & Reverse Shift Link Lever
2	5th & Reverse Shift Link Clip
3	Shift Control Housing Cover Gasket
4	Shift Control Housing TIP: Shift transmission into NEUTRAL.
5	Shift Control Housing Bolt (Qty: 4) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 15 N.m (11 lb ft)

CLUTCH ACTUATOR CYLINDER INSTALLATION

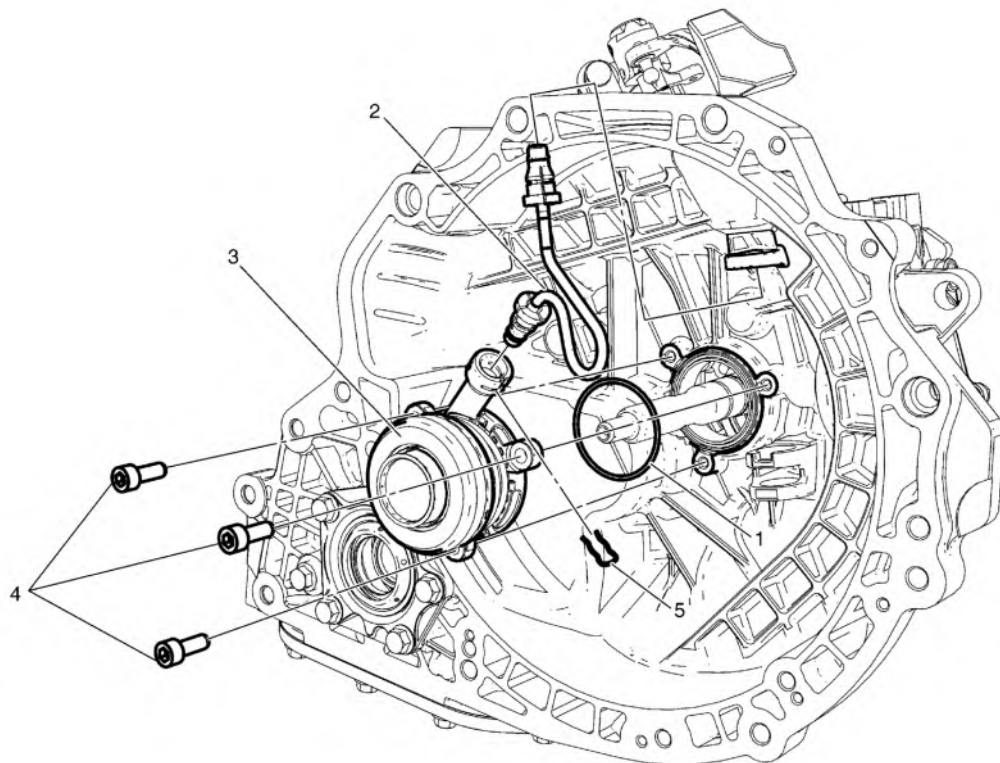


Fig. 126: Clutch Actuator Cylinder
 Courtesy of GENERAL MOTORS COMPANY

Clutch Actuator Cylinder Installation

Callout	Component Name
1	Clutch Actuator Cylinder Seal
2	Clutch Actuator Cylinder Pipe
3	Clutch Actuator Cylinder Procedure Install the clutch actuator cylinder and clutch actuator cylinder pipe at the same time.
4	Clutch Actuator Cylinder Bolt (Qty: 3) CAUTION: Refer to Fastener Caution . Tighten 8 N.m (71 lb in)
5	Clutch Actuator Cylinder Clip

Clutch Actuator Cylinder Pipe Elbow Installation

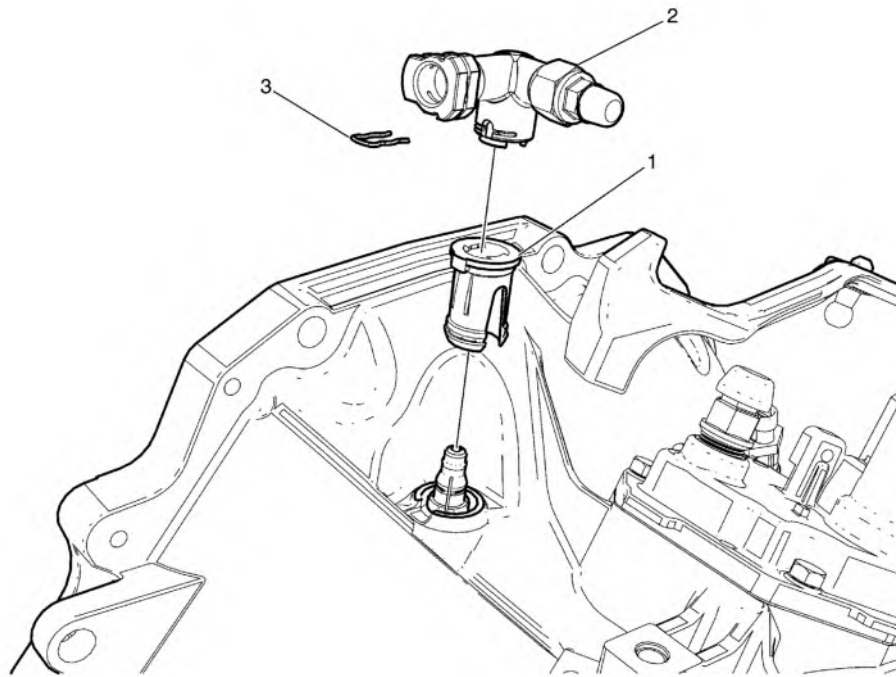


Fig.127: Clutch Actuator Cylinder Pipe Elbow
 Courtesy of GENERAL MOTORS COMPANY

Clutch Actuator Cylinder Pipe Elbow Installation

Callout	Component Name
1	Clutch Actuator Cylinder Pipe Sleeve
2	Clutch Actuator Cylinder Pipe Elbow
3	Clutch Actuator Cylinder Pipe Elbow Clip

SPEEDOMETER DRIVEN GEAR INSTALLATION

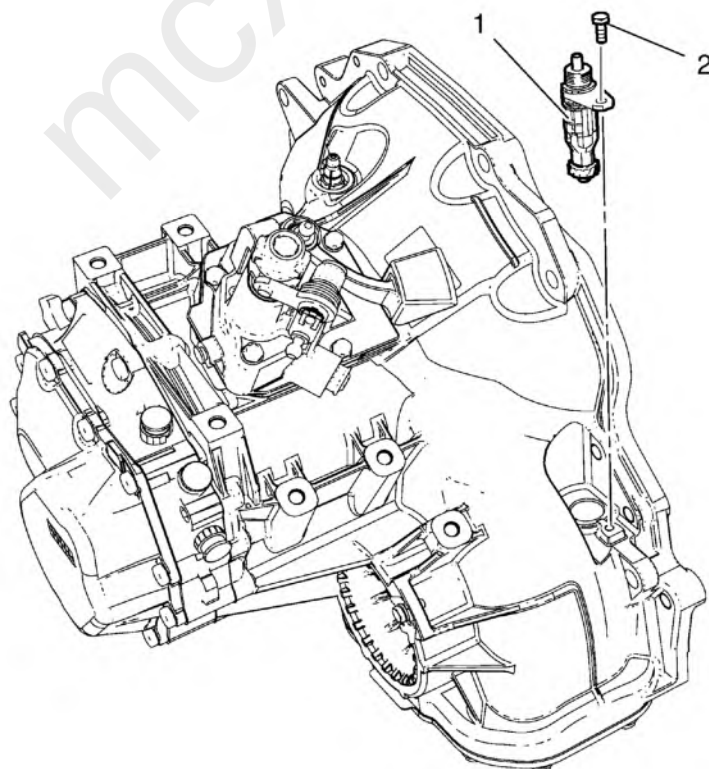


Fig.128: Speedometer Driven Gear
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Speedometer Driven Gear
2	Speedometer Driven Gear Bolt CAUTION: Refer to Fastener Caution . Tighten 4 N.m (35l b in)

SELECTOR AND SHIFT LEVER CABLE BRACKET INSTALLATION

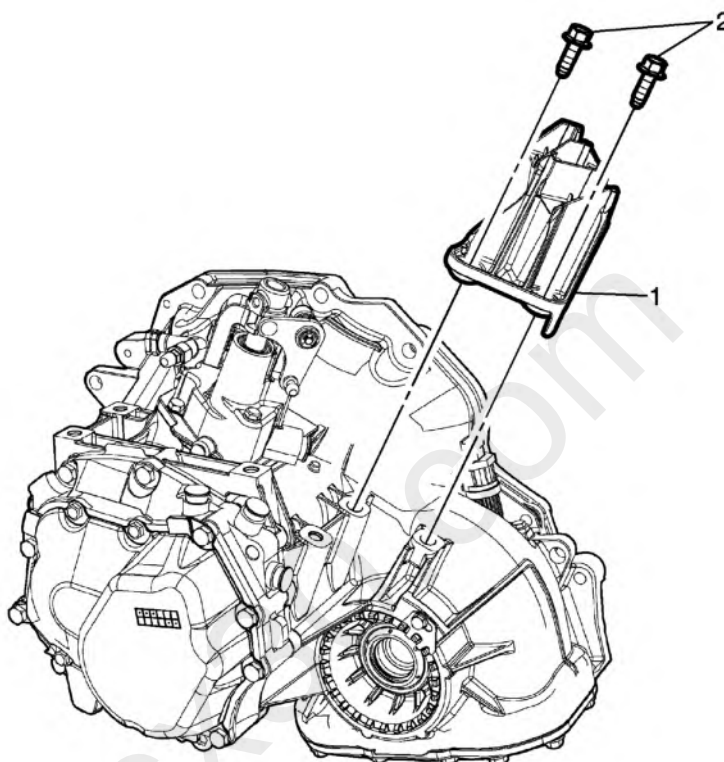


Fig. 129: Selector And Shift Lever Cable Bracket
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Manual Transmission Selector Shift Lever Cable Bracket
2	Manual Transmission Selector Shift Lever Cable Bracket Bolt (Qty: 2) CAUTION: Refer to Fastener Caution . Tighten 58 N.m (43 lb ft)

BACKUP LAMP SWITCH INSTALLATION

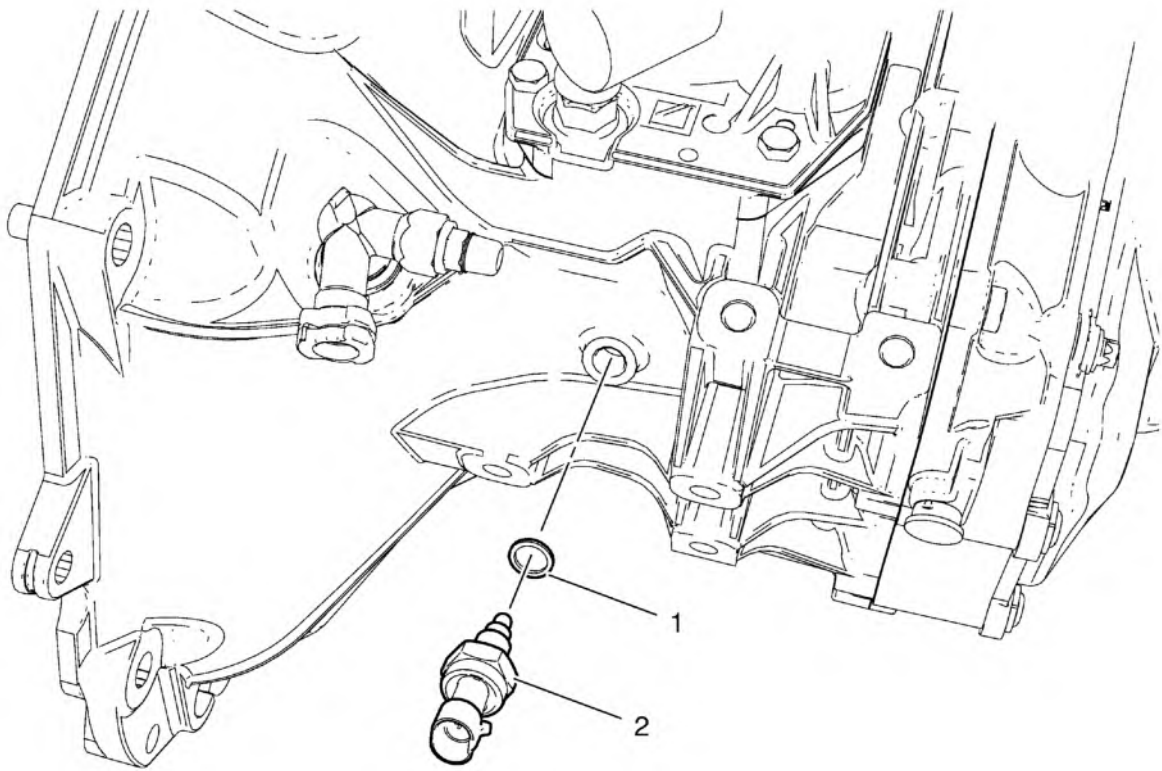


Fig. 130: Backup Lamp Switch

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Backup Lamp Switch Seal
2	Backup Lamp Switch CAUTION: Refer to <u>Fastener Caution</u> . Tighten 20 N.m (15 lb ft)

INPUT SHAFT DISASSEMBLE

Input Shaft Bearing Retainer Bolt Removal

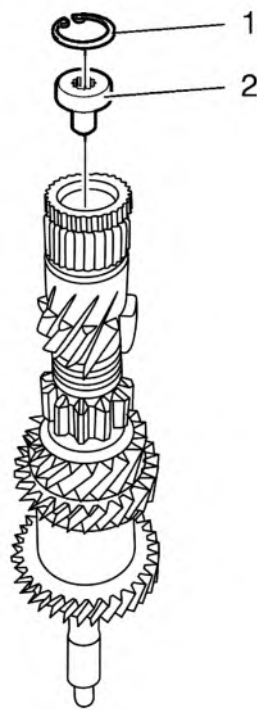


Fig. 131: Input Shaft Bearing Retainer Ring And Bolt
 Courtesy of GENERAL MOTORS COMPANY

Input Shaft Bearing Retainer Bolt Removal

Callout	Component Name
1	Input Shaft Bolt Retaining Ring
2	Input Shaft Bearing Retainer Bolt

Input Shaft Cluster Gear Removal

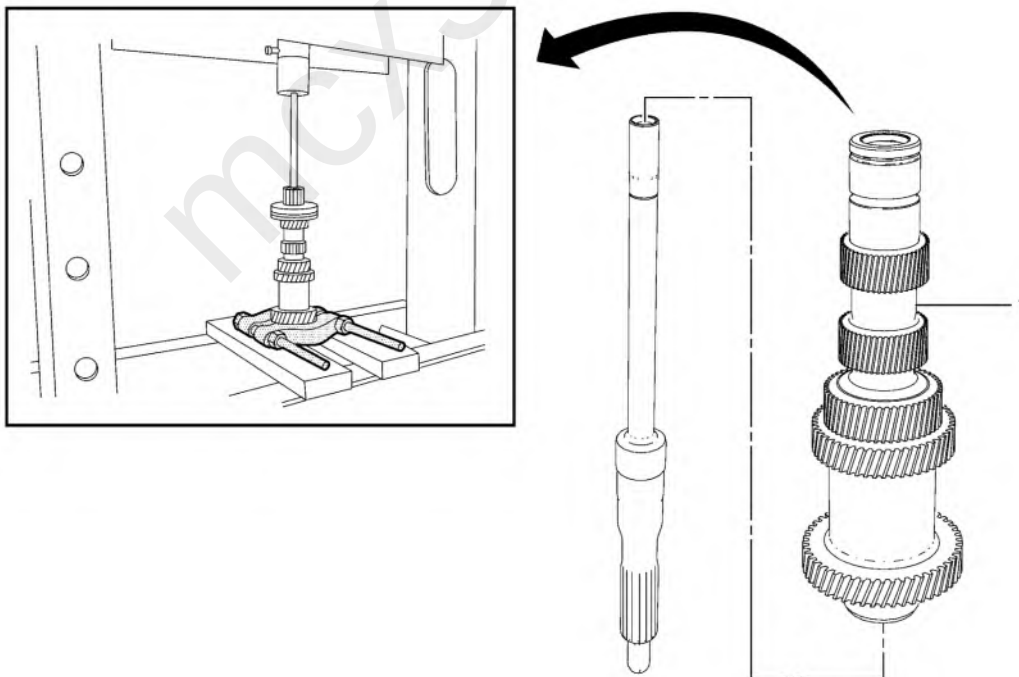


Fig. 132: Input Shaft Cluster Gear
 Courtesy of GENERAL MOTORS COMPANY

Input Shaft Cluster Gear Removal

Callout	Component Name

Callout	Component Name
1	Input Shaft Cluster Gear NOTE: Hydraulic press required. Special Tools DT-22912-B Universal Bearing Puller

INPUT SHAFT ASSEMBLE

Input Shaft Cluster Gear Installation

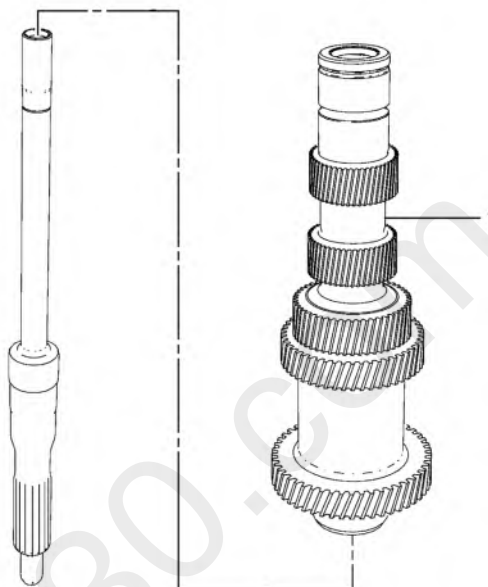


Fig. 133: Input Shaft Cluster Gear

Courtesy of GENERAL MOTORS COMPANY

Input Shaft Cluster Gear Installation

Callout	Component Name
1	Input Shaft Cluster Gear NOTE: Hydraulic press required. NOTE: Press the input shaft onto the input shaft cluster gear assembly.

Input Shaft Bearing Retainer Bolt Installation

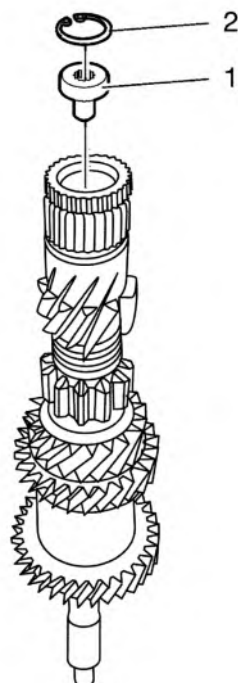


Fig. 134: Input Shaft Bearing Retainer Bolt
 Courtesy of GENERAL MOTORS COMPANY

Input Shaft Bearing Retainer Bolt Installation

Callout	Component Name
1	Input Shaft Bearing Retainer Bolt CAUTION: Refer to Fastener Caution . Tighten 15 N.m (11 lb ft)
2	Input Shaft Bolt Retaining Ring

MAIN SHAFT DISASSEMBLE

1st Gear Removal

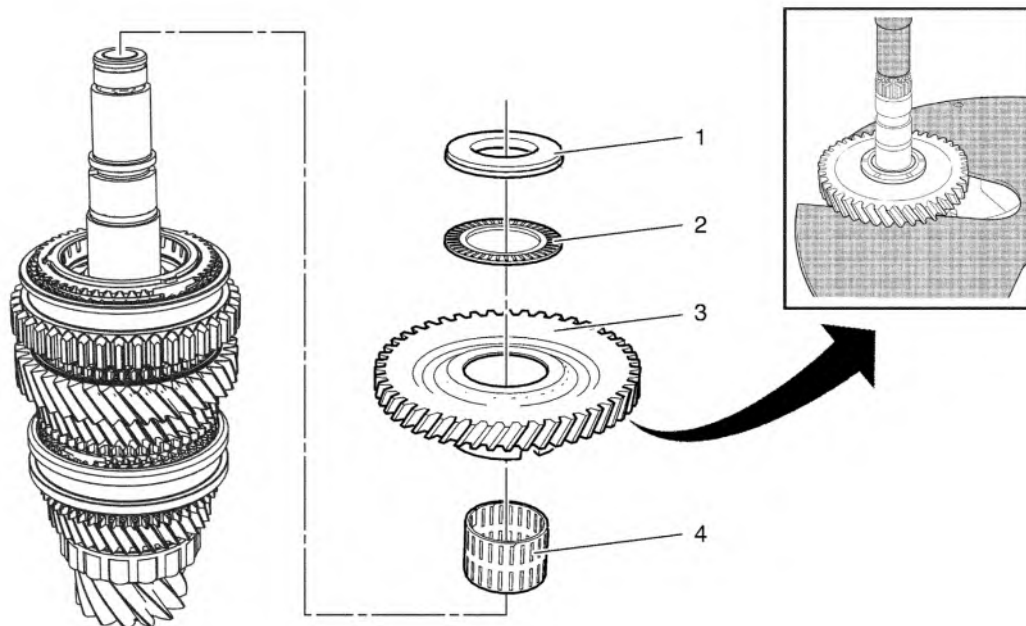


Fig.135: Main Shaft

Courtesy of GENERAL MOTORS COMPANY

1st Gear Removal

Callout	Component Name
1	1st Gear Thrust Washer
2	1st Gear Thrust Bearing
3	1st Gear NOTE: Hydraulic press required. Special Tools DT-307-B Remover Plate
4	1st Gear Bearing

1st and 2nd Gear Synchronizer and 2nd Gear Removal

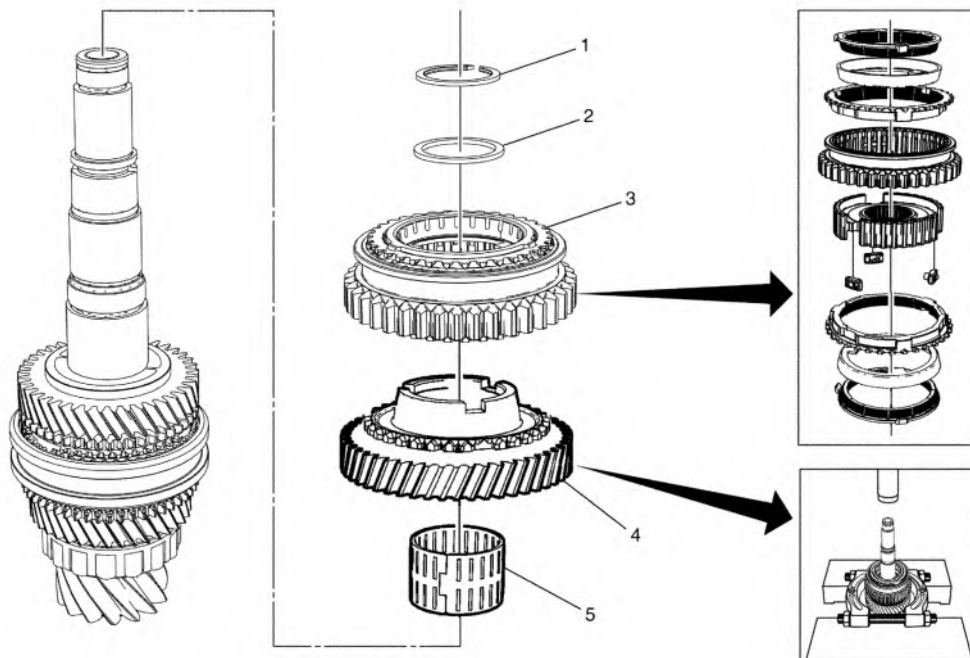


Fig. 136: 1st and 2nd Gear Synchronizer and 2nd Gear
Courtesy of GENERAL MOTORS COMPANY

1st and 2nd Gear Synchronizer and 2nd Gear Removal

Callout	Component Name
1	1st and 2nd Gear Synchronizer Hub Retaining Ring
2	1st and 2nd Gear Synchronizer Hub Thrust Washer
3	1st and 2nd Gear Synchronizer
4	2nd Gear NOTE: Hydraulic press required. Special Tools DT-22912-B Universal Bearing Puller
5	2nd Gear Bearing

3rd Gear Removal

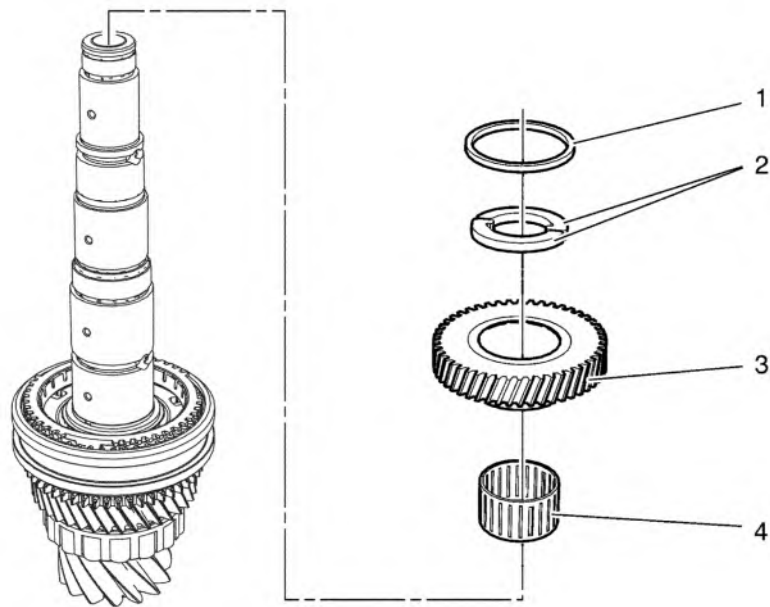


Fig. 137: 3rd Gear

Courtesy of GENERAL MOTORS COMPANY

3rd Gear Removal

Callout	Component Name
1	3rd Gear Retaining Ring
2	3rd Gear Thrust Washer (Qty: 2)
3	3rd Gear
4	3rd Gear Bearing

3rd and 4th Gear Synchronizer and 4th Gear Removal

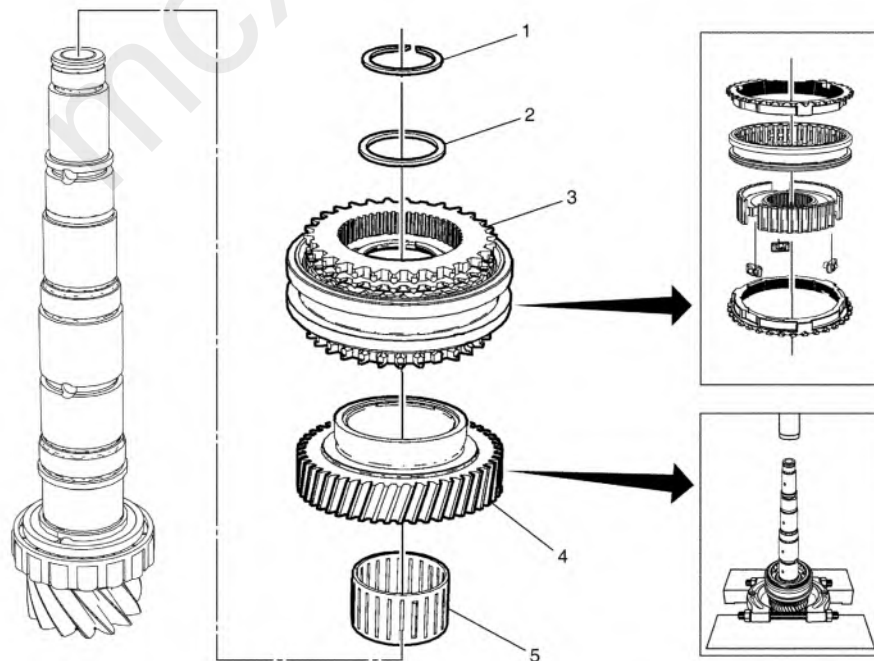


Fig. 138: 3rd and 4th Gear Synchronizer and 4th Gear

Courtesy of GENERAL MOTORS COMPANY

3rd and 4th Gear Synchronizer and 4th Gear Removal

Callout	Component Name

Callout	Component Name
1	3rd and 4th Gear Synchronizer Hub Retaining Ring
2	3rd and 4th Gear Synchronizer Hub Thrust Washer
3	3rd and 4th Gear Synchronizer
4	4th Gear NOTE: Hydraulic press required. Special Tools DT-22912-B Universal Bearing Puller
5	4th Gear Bearing

Main Shaft Front Bearing Removal

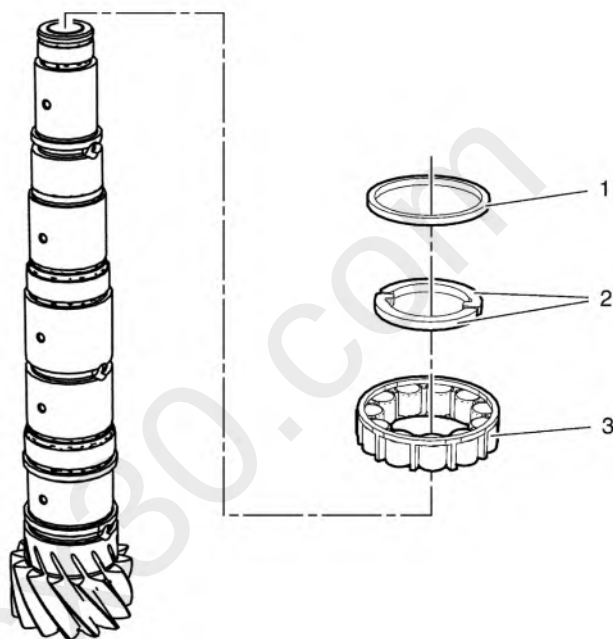


Fig. 139: Main Shaft Front Bearing

Courtesy of GENERAL MOTORS COMPANY

Main Shaft Front Bearing Removal

Callout	Component Name
1	4th Gear Retaining Ring
2	4th Gear Thrust Washer (Qty: 2)
3	Main Shaft Front Bearing

MAIN SHAFT ASSEMBLE

Main Shaft Front Bearing Installation

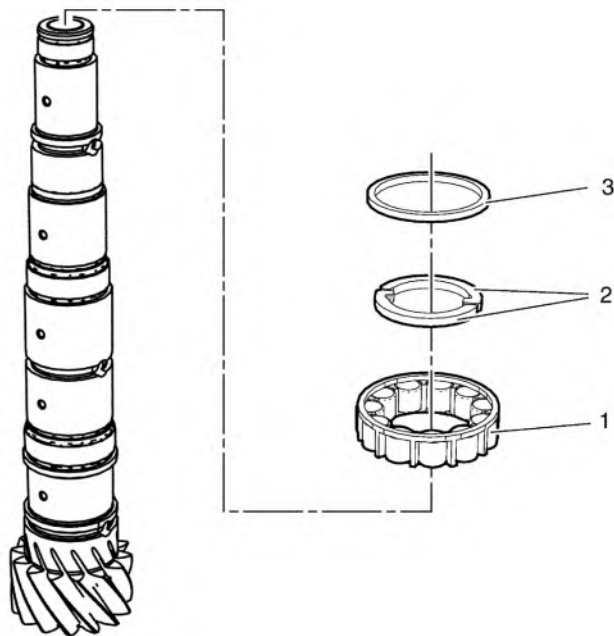


Fig. 140: Main Shaft Front Bearing
Courtesy of GENERAL MOTORS COMPANY

Main Shaft Front Bearing Installation

Callout	Component Name
1	Main Shaft Front Bearing
2	4th Gear Thrust Washer (Qty: 2)
3	4th Gear Retaining Ring

4th Gear Installation

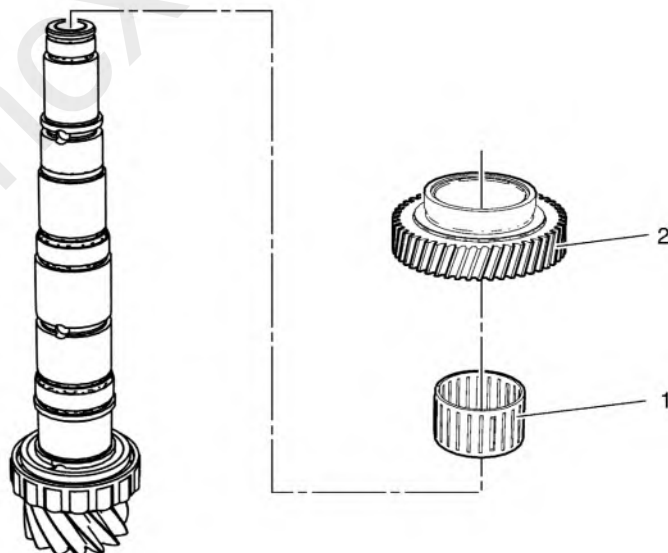


Fig. 141: 4th Gear
Courtesy of GENERAL MOTORS COMPANY

4th Gear Installation

Callout	Component Name
1	4th Gear Bearing

Callout	Component Name
2	4th Gear

3rd and 4th Gear Synchronizer Installation

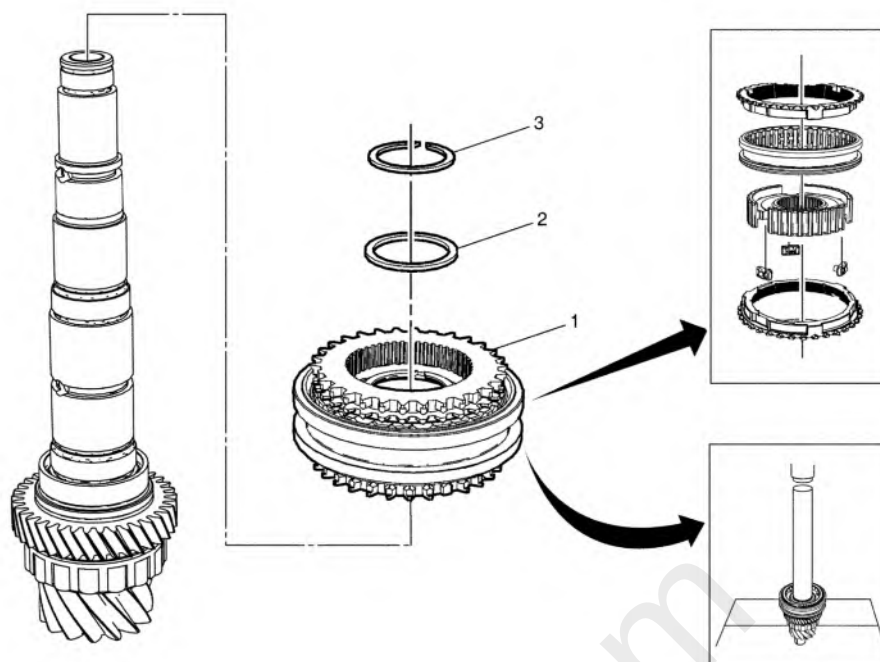


Fig. 142: 3rd and 4th Gear Synchronizer

Courtesy of GENERAL MOTORS COMPANY

3rd and 4th Gear Synchronizer Installation

Callout	Component Name
1	3rd and 4th Gear Synchronizer TIP: Hydraulic press required. Special Tools J 44907 Bearing Installer
2	3rd and 4th Gear Synchronizer Hub Thrust Washer
3	3rd and 4th Gear Synchronizer Hub Retaining Ring

2nd Gear and 3rd Gear Installation

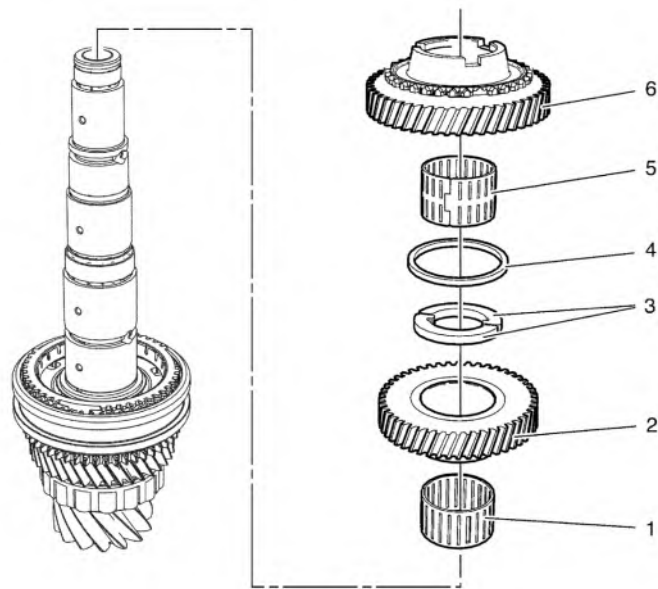


Fig. 143: 2nd Gear and 3rd Gear

Courtesy of GENERAL MOTORS COMPANY

2nd Gear and 3rd Gear Installation

Callout	Component Name
1	3rd Gear Bearing
2	3rd Gear
3	3rd Gear Thrust Washer (Qty: 2)
4	3rd Gear Retaining Ring
5	2nd Gear Bearing
6	2nd Gear

1st and 2nd Gear Synchronizer Installation

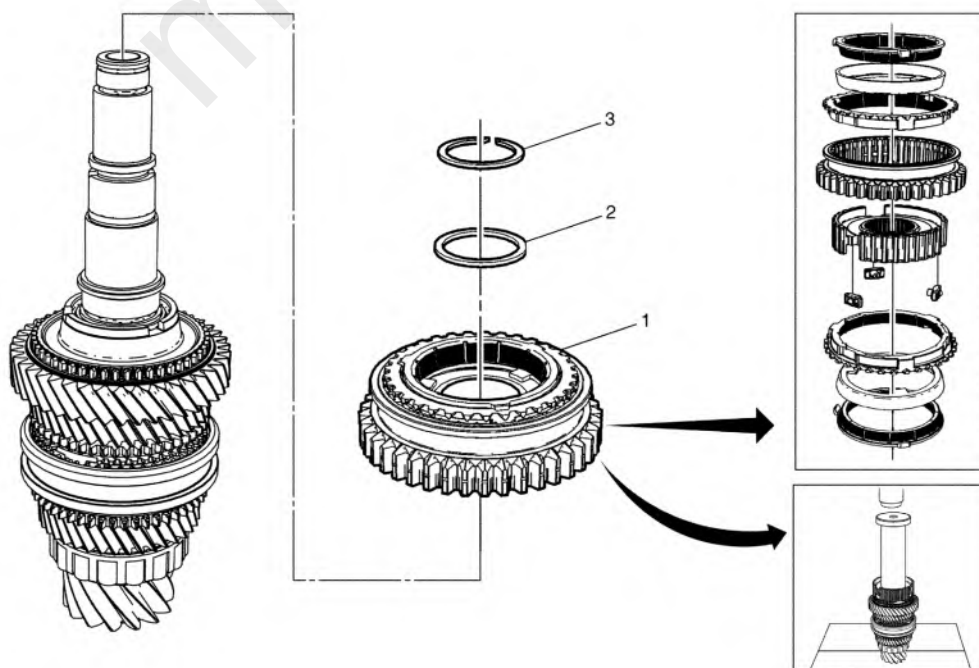


Fig. 144: 1st and 2nd Gear Synchronizer

Courtesy of GENERAL MOTORS COMPANY

1st and 2nd Gear Synchronizer Installation

Callout	Component Name
1	1st and 2nd Gear Synchronizer TIP: Hydraulic press required. Special Tools DT-48238 Installer
2	1st and 2nd Gear Synchronizer Hub Thrust Washer
3	1st and 2nd Gear Synchronizer Hub Retaining Ring

1st Gear Installation

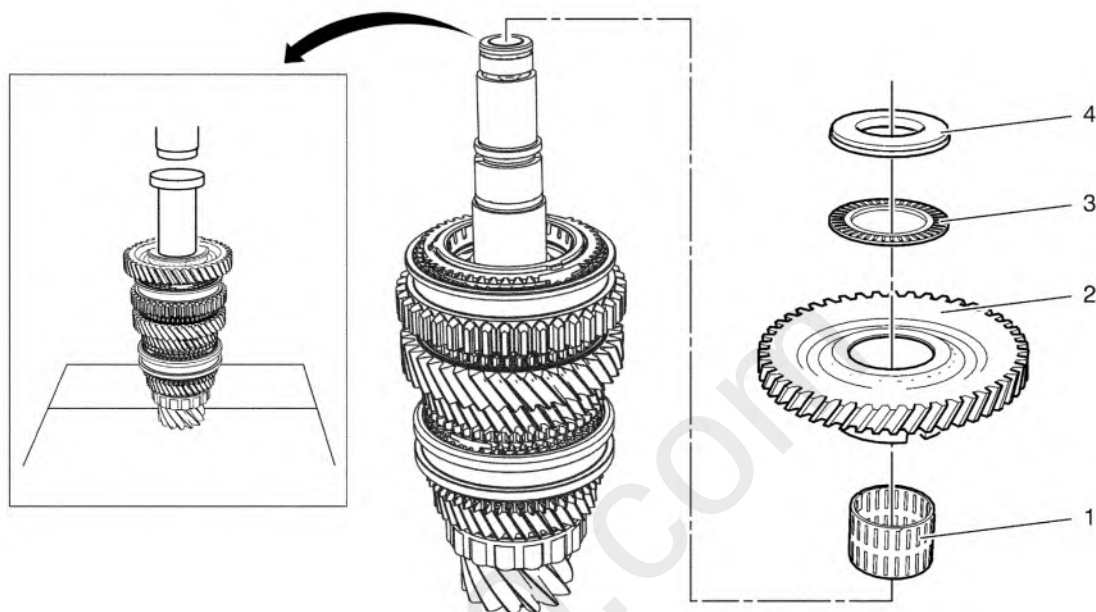


Fig. 145: 1st Gear

Courtesy of GENERAL MOTORS COMPANY

1st Gear Installation

Callout	Component Name
1	1st Gear Bearing
2	1st Gear
3	1st Gear Thrust Bearing
4	1st Gear Thrust Washer TIP: Hydraulic press required. Special Tools DT-48236 Installer

DESCRIPTION AND OPERATION

TRANSMISSION IDENTIFICATION INFORMATION

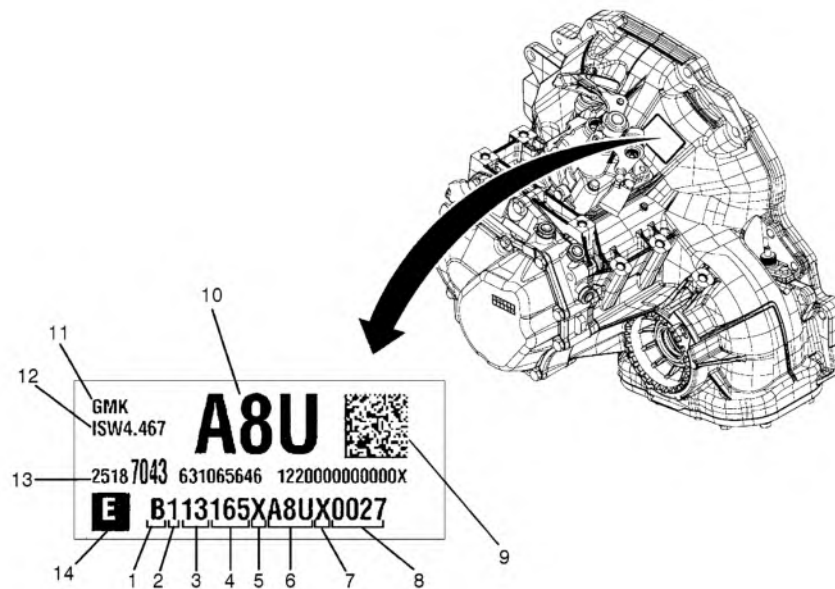


Fig. 146: Transmission Identification Information
Courtesy of GENERAL MOTORS COMPANY

1. Line/Plant ID
2. Shift ID
3. Build Year
4. Julian Date
5. Model Year
6. Broadcast Code
7. Reserved Use
8. Sequence Number
9. Machine Readable Matrix
10. Broadcast Code
11. Optional Plant
12. Transmission Gear Ratio and Final Drive Ratio
13. GM Part Number
14. Site Code

TRANSMISSION SYSTEM DESCRIPTION AND OPERATION

This 5-speed transaxle assembly is a transaxle of constant mesh design.

Combined in the assembly are:

- All forward gears
- The reverse gear
- The differential output

The basic components of the five-speed transaxle assembly units are the:

- Transaxle case
- Input shaft
- Input shaft gears
- Output shaft
- Output shaft gears

- Ring gear and differential assembly

Forward Gear

Shifting to a forward gear is accomplished through a combination of synchronizers with blocker rings controlled by sliding shift forks.

Reverse Gear

Reverse gear is not synchronized and uses a sliding idler gear arrangement.

Differential Assembly

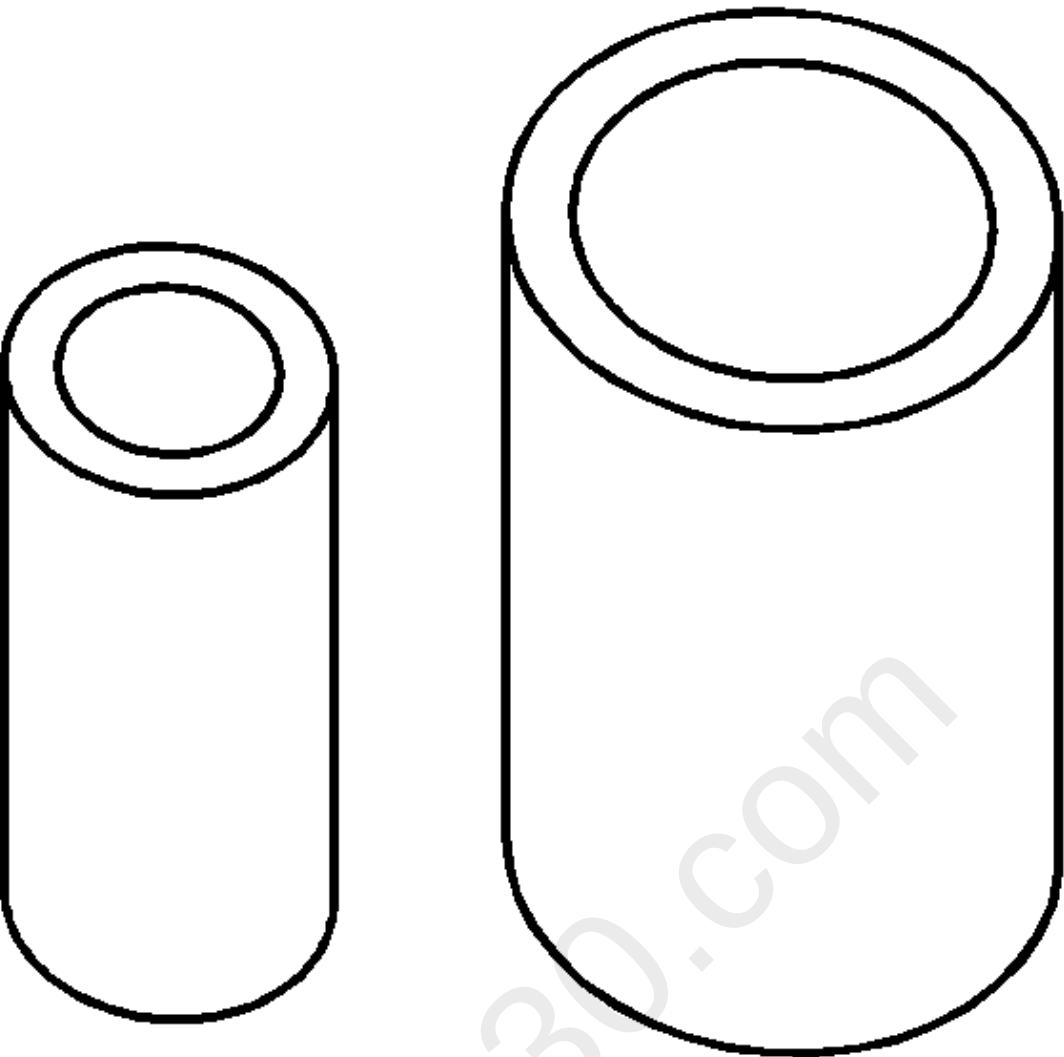
The differential is a conventional arrangement of gears that is supported by tapered roller bearings. The final output gear turns the ring gear and differential assembly which turns the drive axle shafts.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/ Description
	DT-113-2-A J-3289-20 KM-113-2-A Holding Fixture

Illustration	Tool Number/ Description
	DT-161-B CH-161-B J-22888-D KM-161-B Bearing Puller with Puller Legs

Illustration	Tool Number/ Description
	DT-334 KM-334 Installer Sleeve

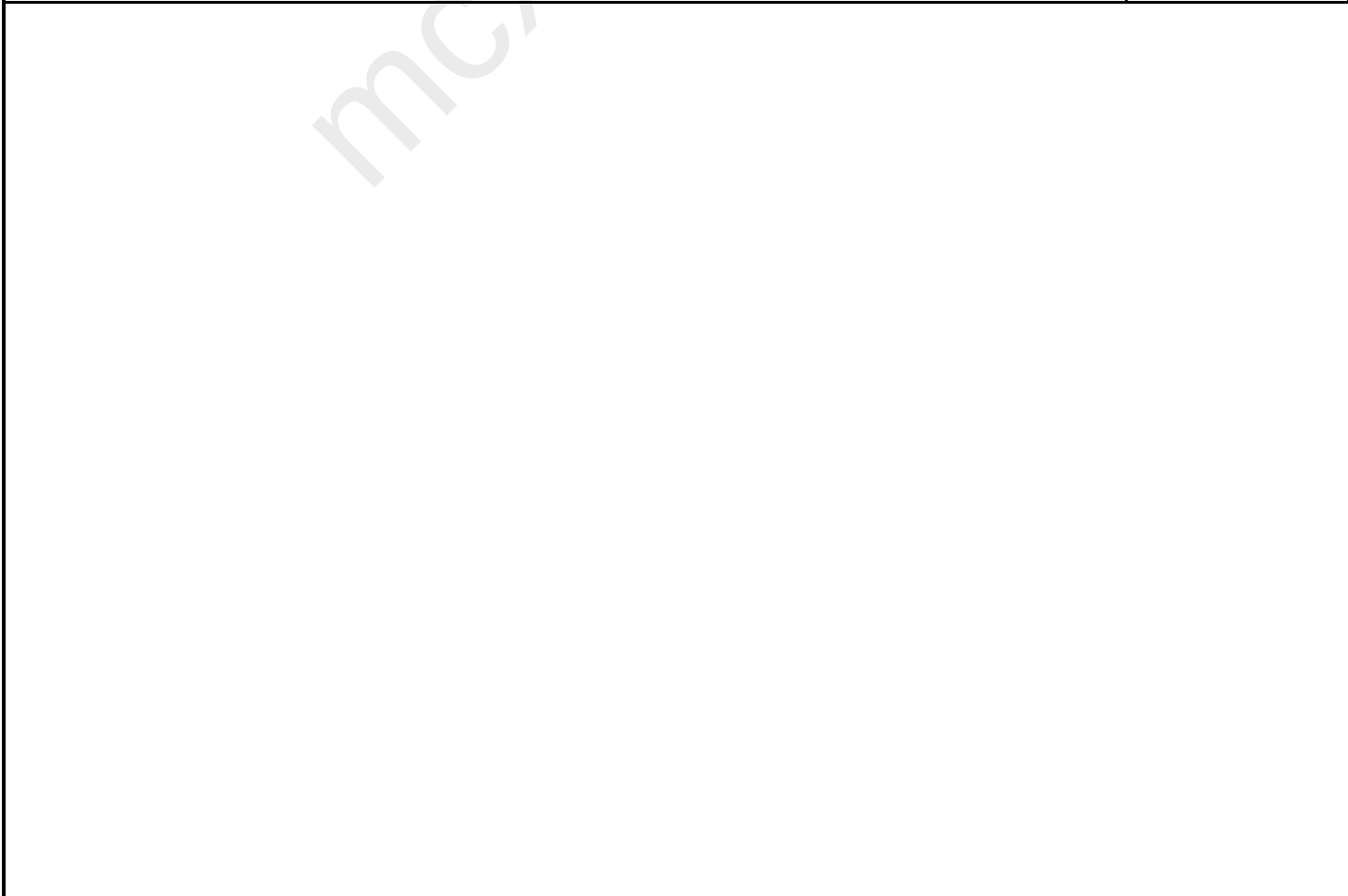


Illustration	Tool Number/ Description
	DT-519 KM-519 Installer Drift

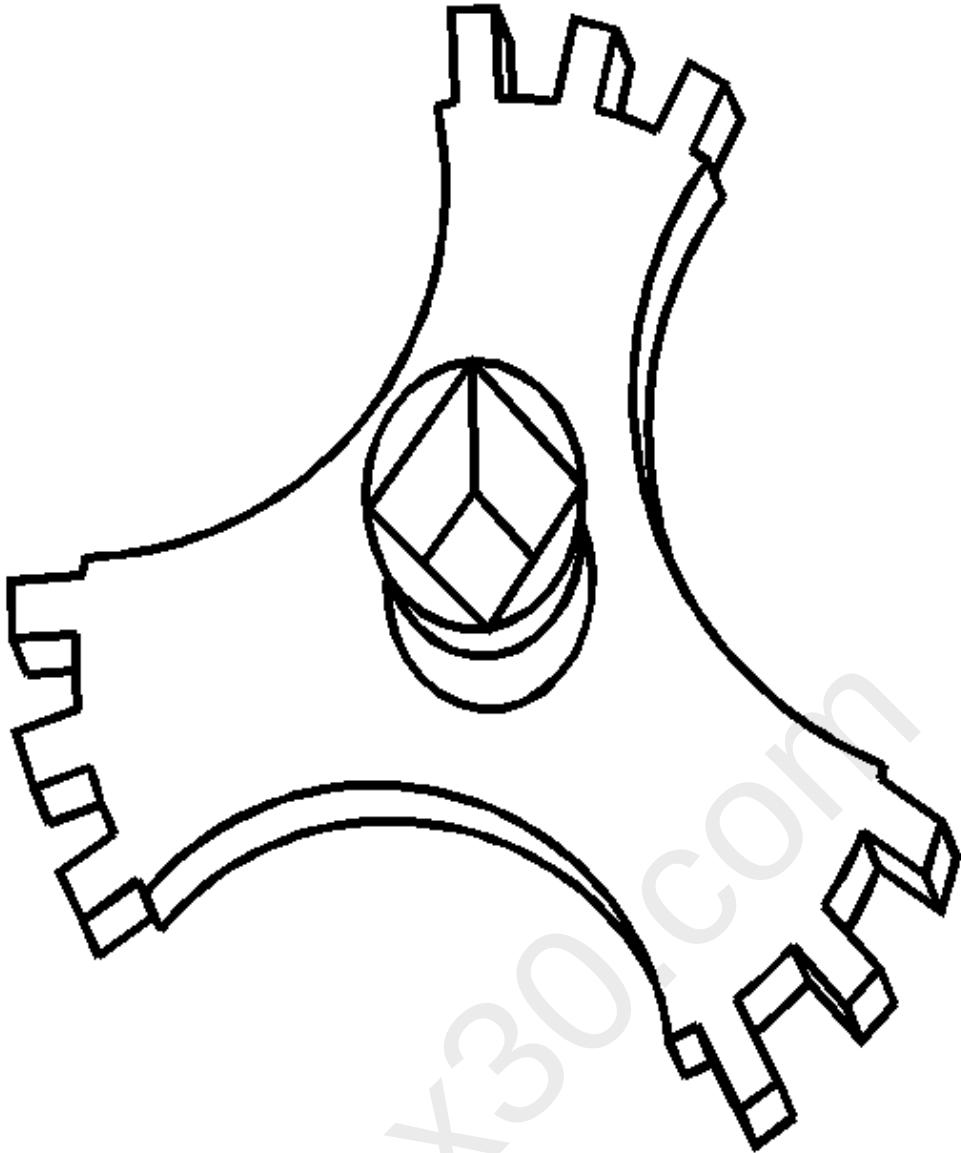
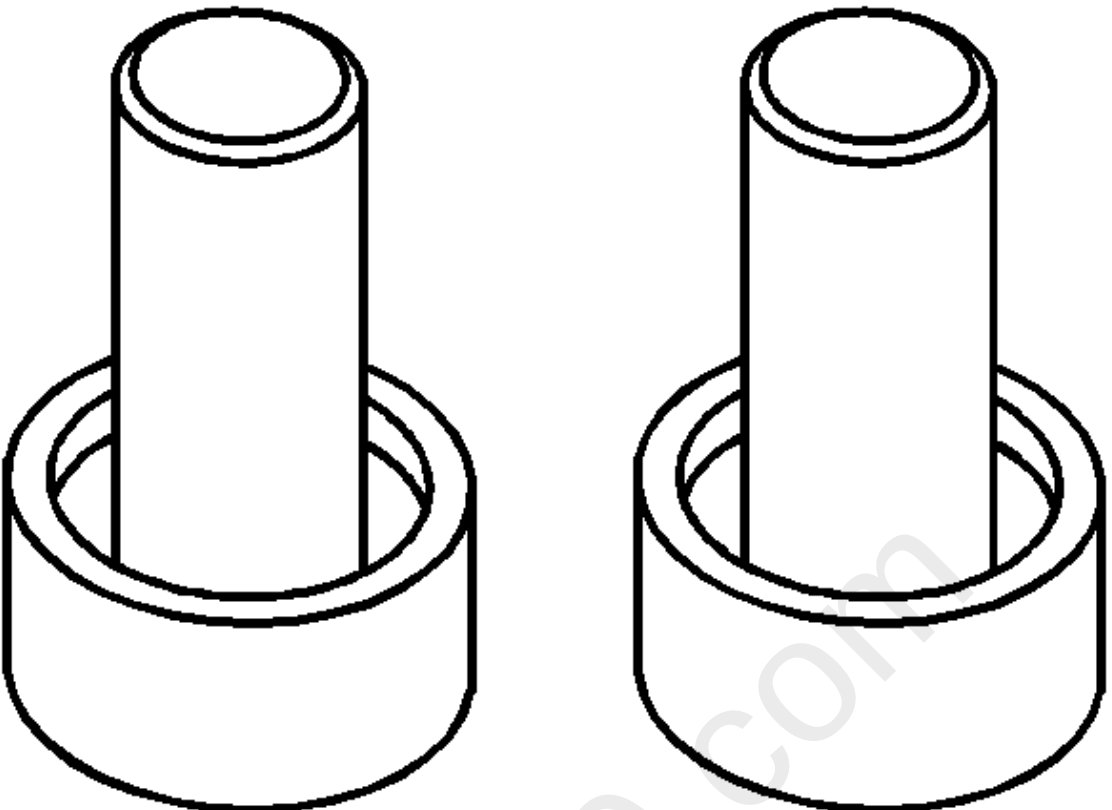
Illustration	Tool Number/ Description
	DT-520 KM-520 Remover/Installer

Illustration	Tool Number/ Description
	DT-522 KM-522 Installer

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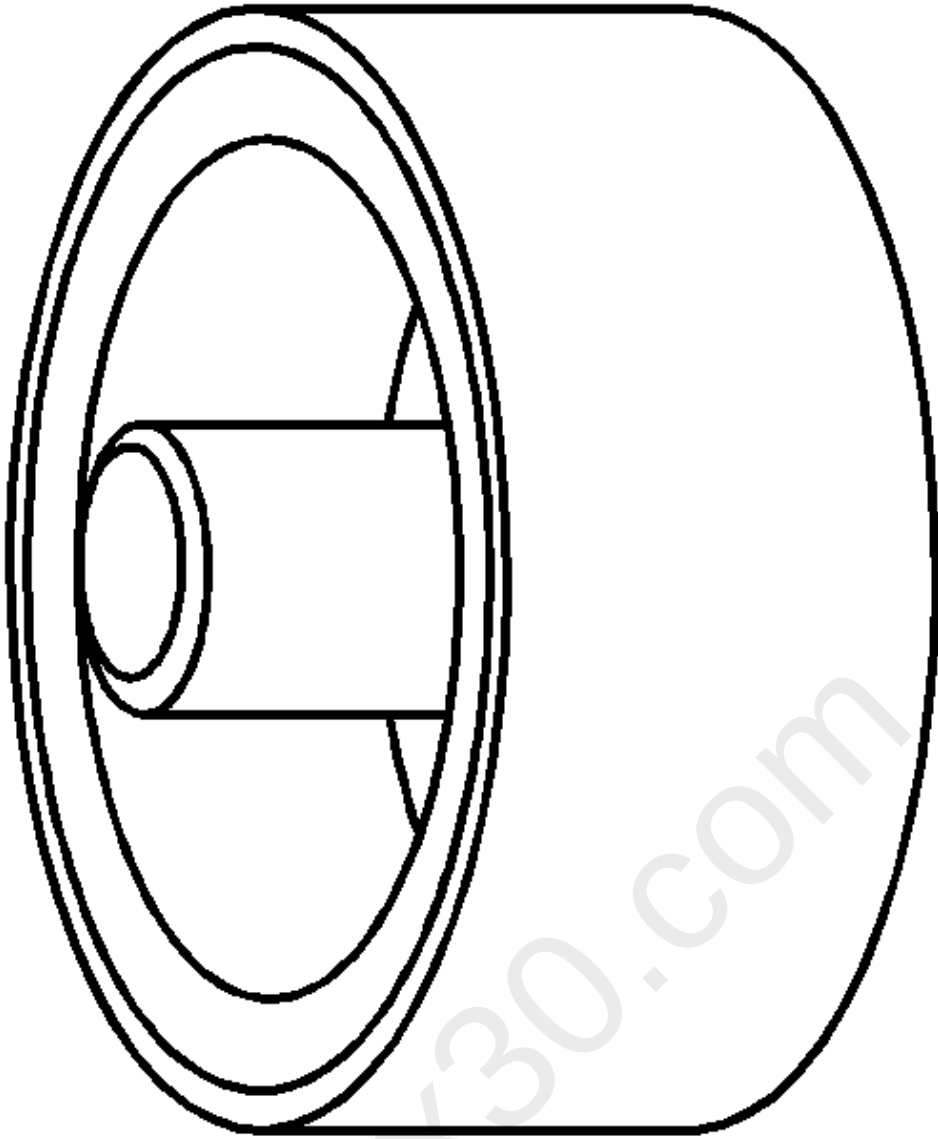
Illustration	Tool Number/ Description
	DT-525 KM-525 Installer

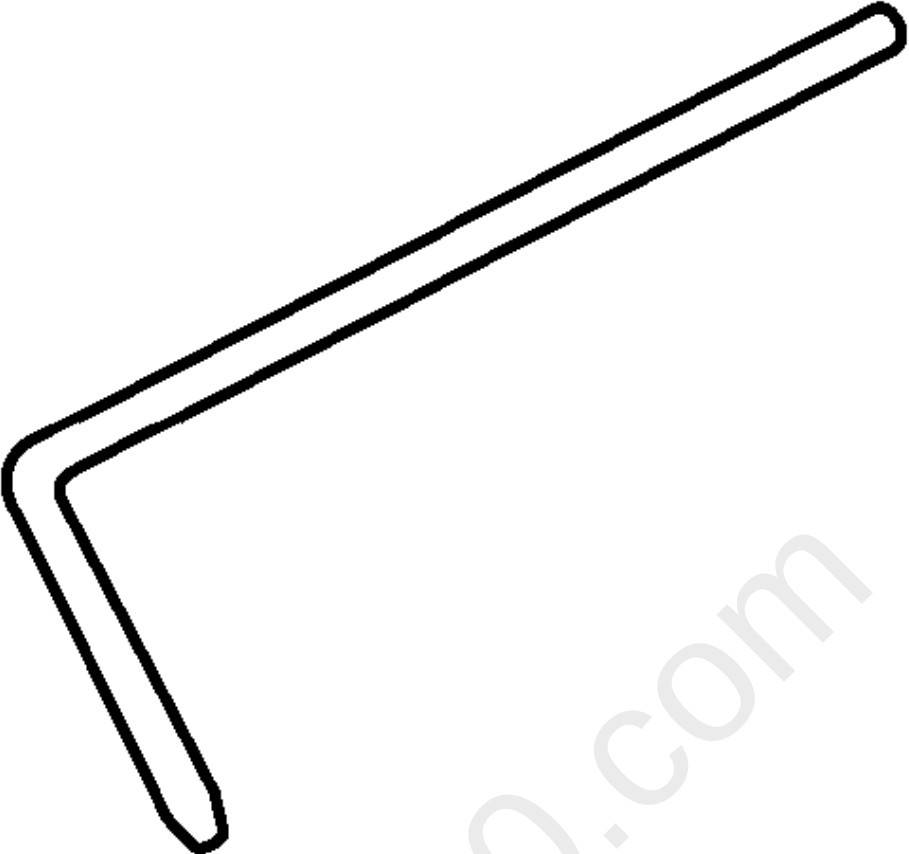
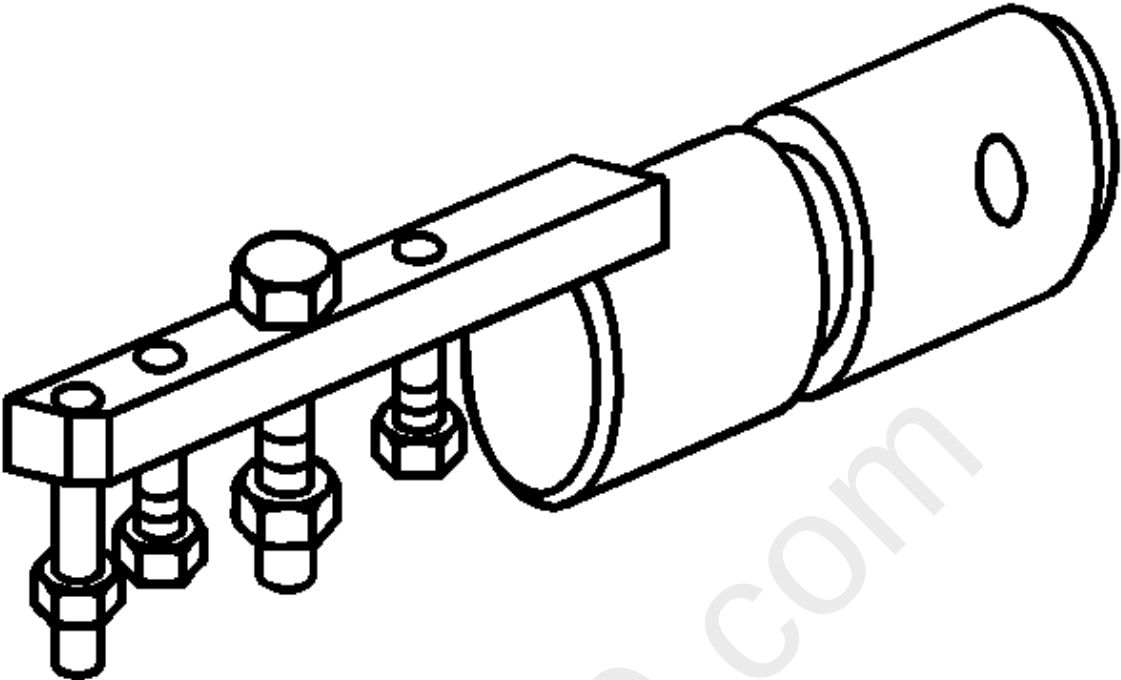
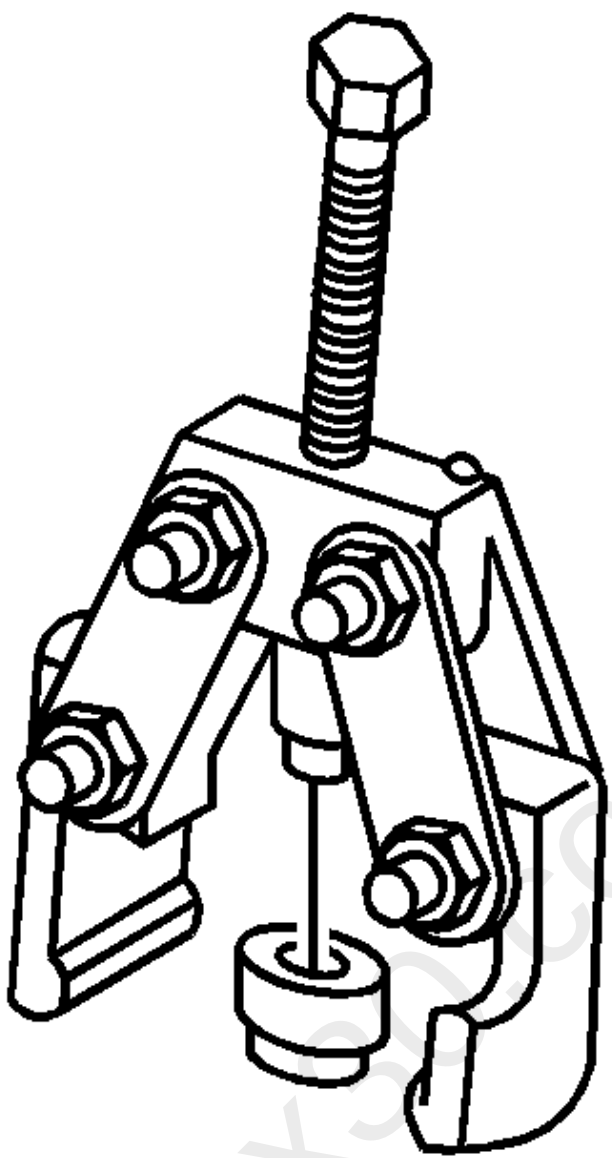
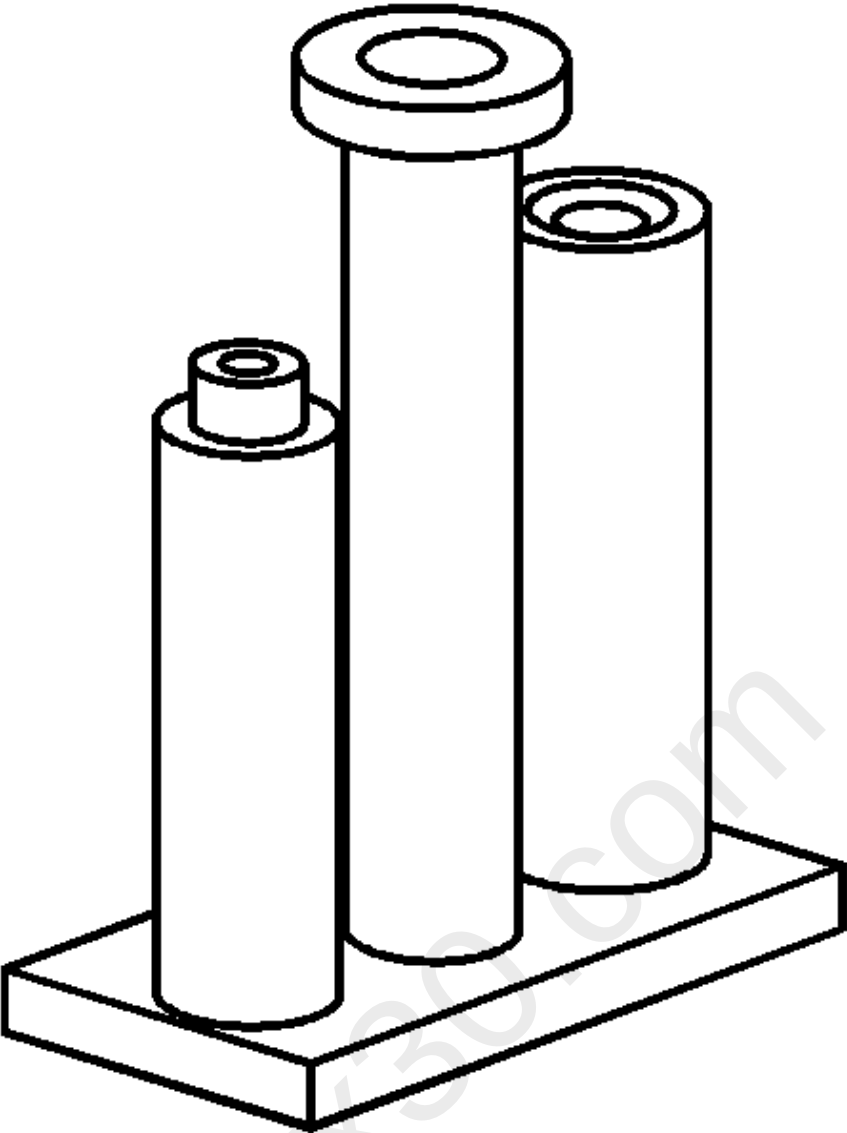
Illustration	Tool Number/ Description
	DT-527-A KM-527-A Adjuster

Illustration	Tool Number/ Description
 A technical line drawing of a mechanical fixture. It consists of a horizontal cylindrical body with a circular hole on its right end. A rectangular plate is mounted on top of the cylinder. Four vertical rods are attached to the bottom of the plate, each secured with a hexagonal nut. The entire assembly is shown in a perspective view.	DT-552 KM-552 Fixture

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Illustration	Tool Number/ Description
	DT-553-A KM-553-A Fifth-Gear Puller

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Illustration	Tool Number/ Description
	DT-554 KM-554 Installer

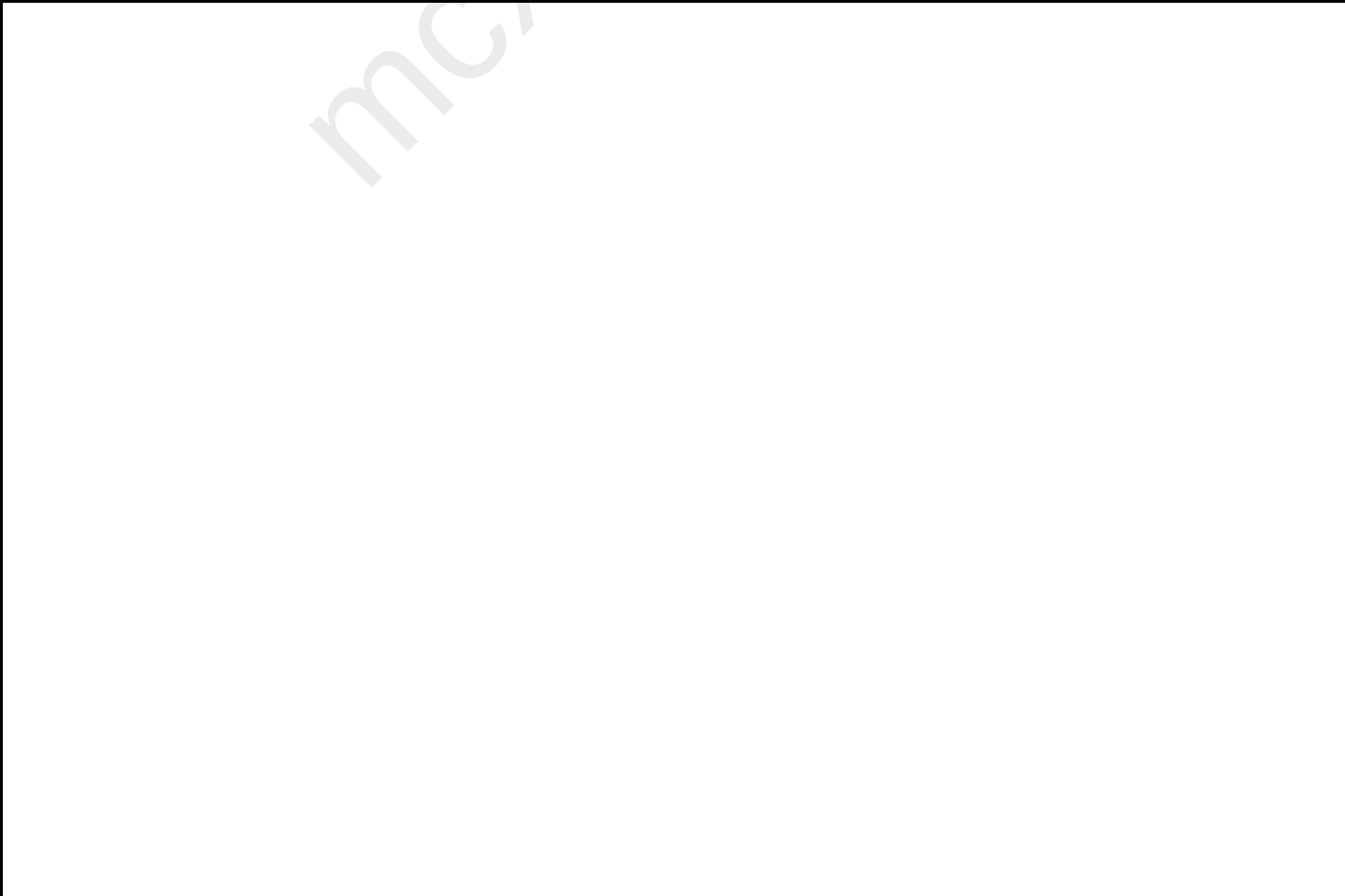


Illustration	Tool Number/ Description
	DT-586 DT-23129 J-23129 KM-586 Universal Seal Removal Tool
	DT-7004 DT-6125-1B KM-J-7004 J-6125-1B Slide Hammer

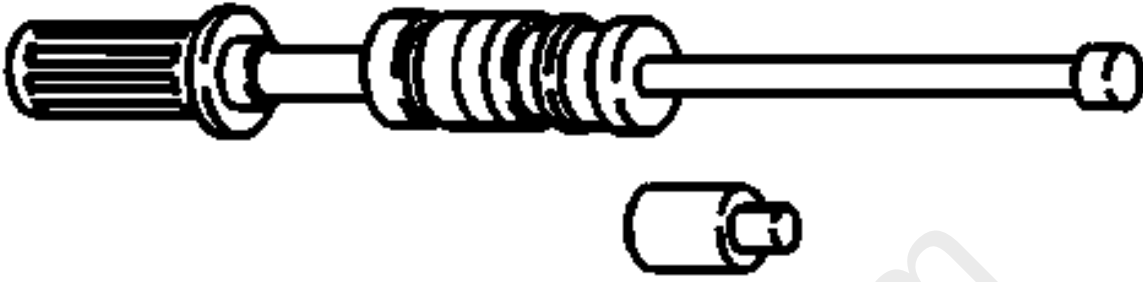
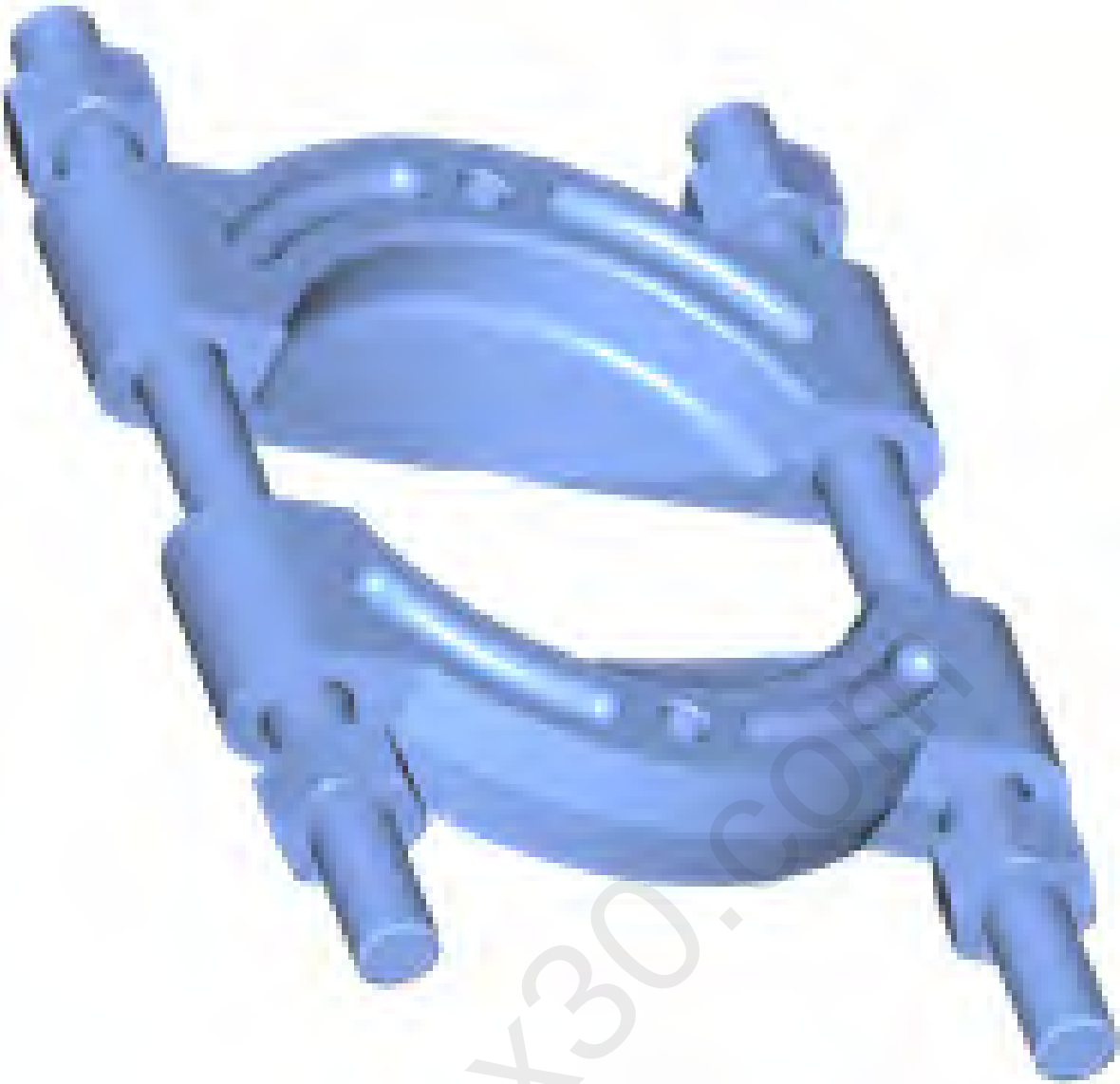
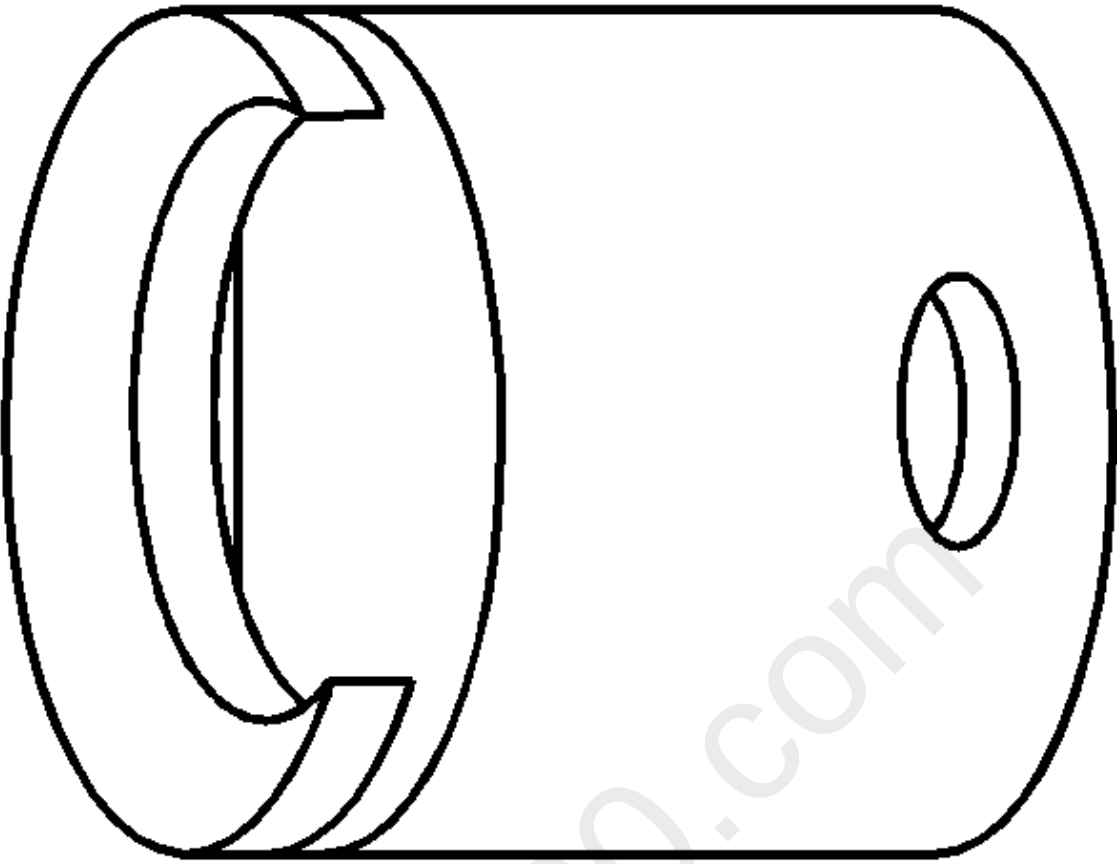
Illustration	Tool Number/ Description
 A technical line drawing of a mechanical tool. It features a handle with vertical fluting on the left, followed by a flange, a threaded section with several turns, another flange, and a long, smooth shaft that ends in a small, cylindrical component. Below the main assembly is a separate, smaller cylindrical component with a flange at one end. A large, light gray watermark 'mcx30.com' is oriented diagonally across the lower half of the page.	

Illustration	Tool Number/ Description
	DT-22912-B J-22912-B Universal Bearing Puller

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Illustration	Tool Number/ Description
 A line drawing of a cylindrical tool. On the left side, there is a C-shaped handle or bracket that wraps around the cylinder. On the right side, there is a small circular feature, possibly a hole or a mounting point. A diagonal watermark 'mcx30.com' is visible across the center of the illustration.	DT-50511 Shift Detent Remover

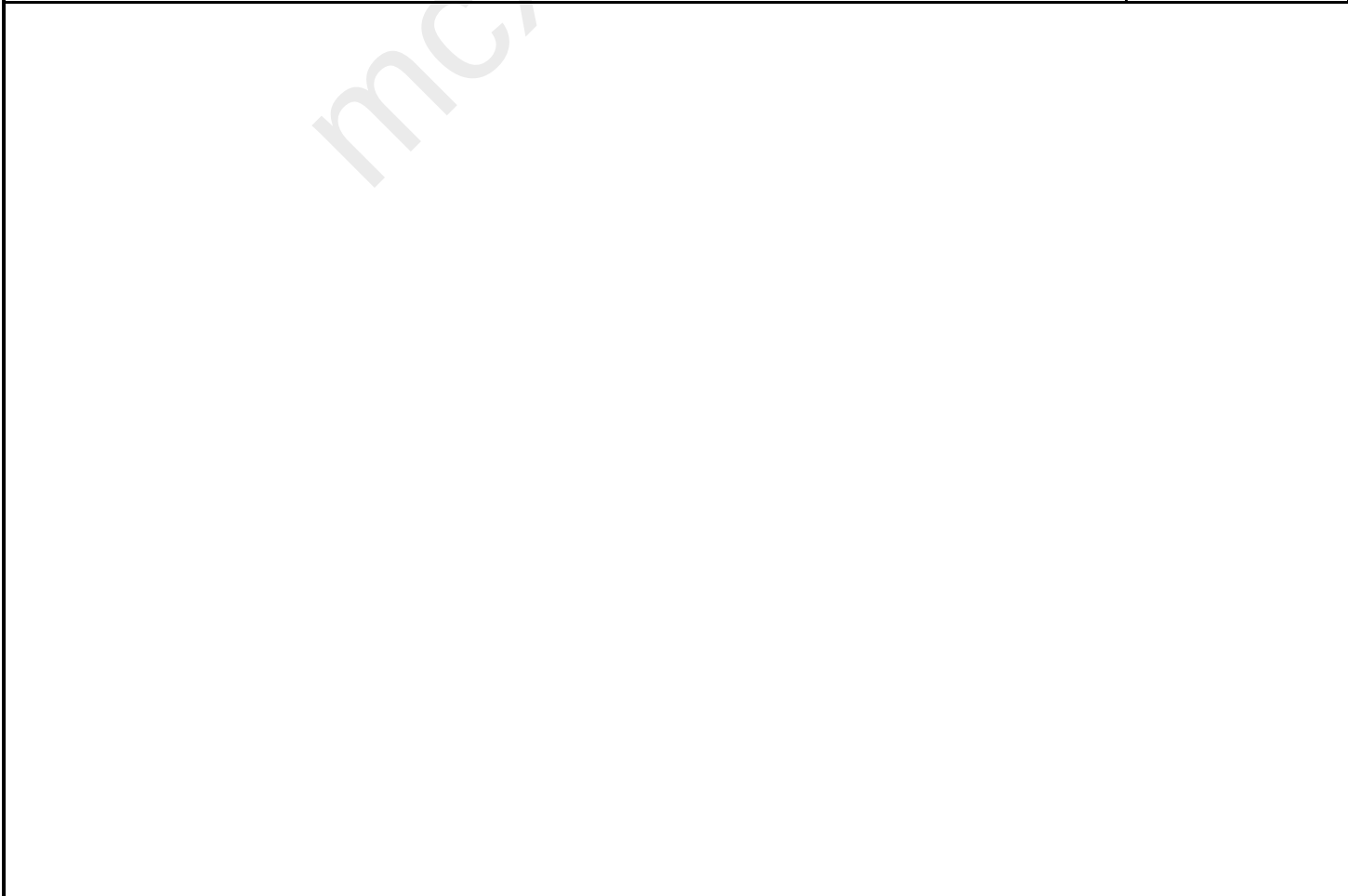
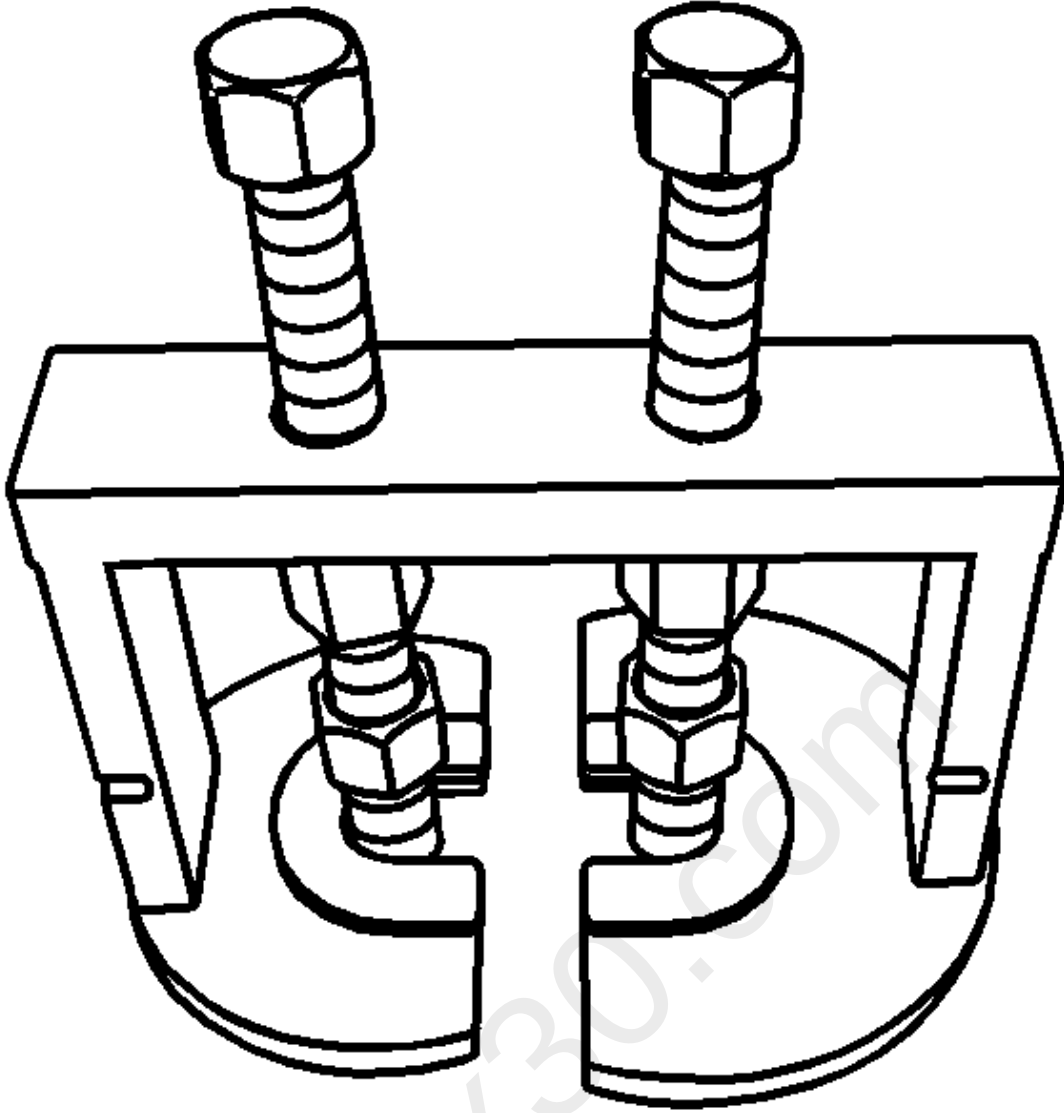


Illustration	Tool Number/ Description
	DT-48188 Input and Output Shaft Remover

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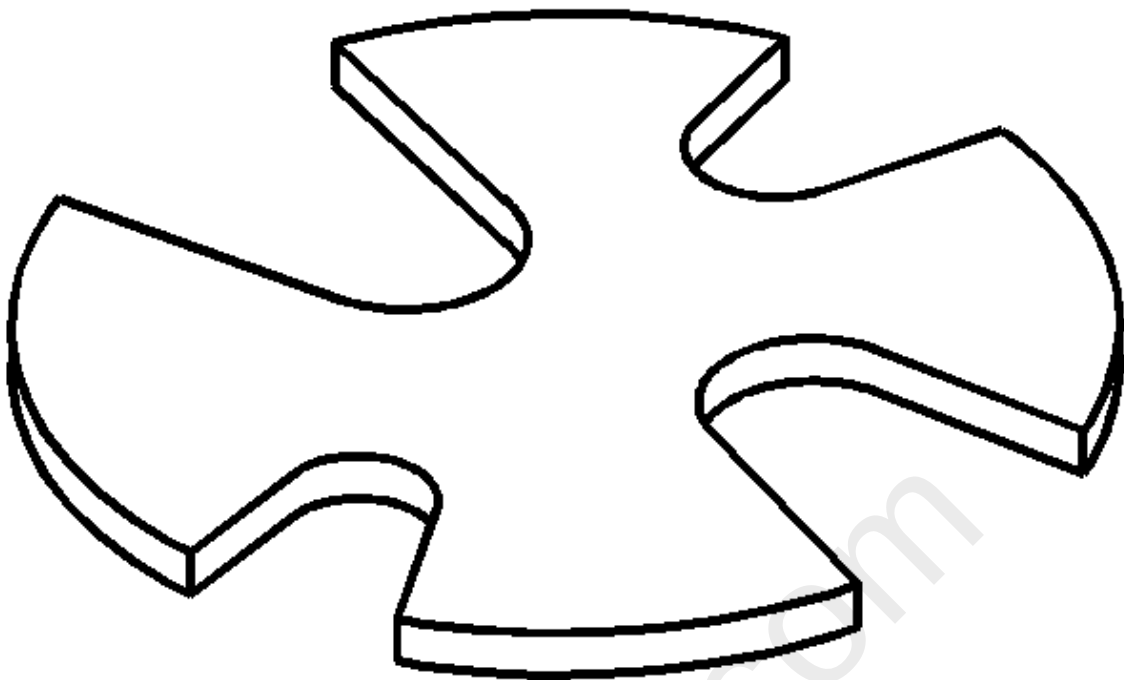
Illustration	Tool Number/ Description
	DT-307-B KM-307-B Remover Plate

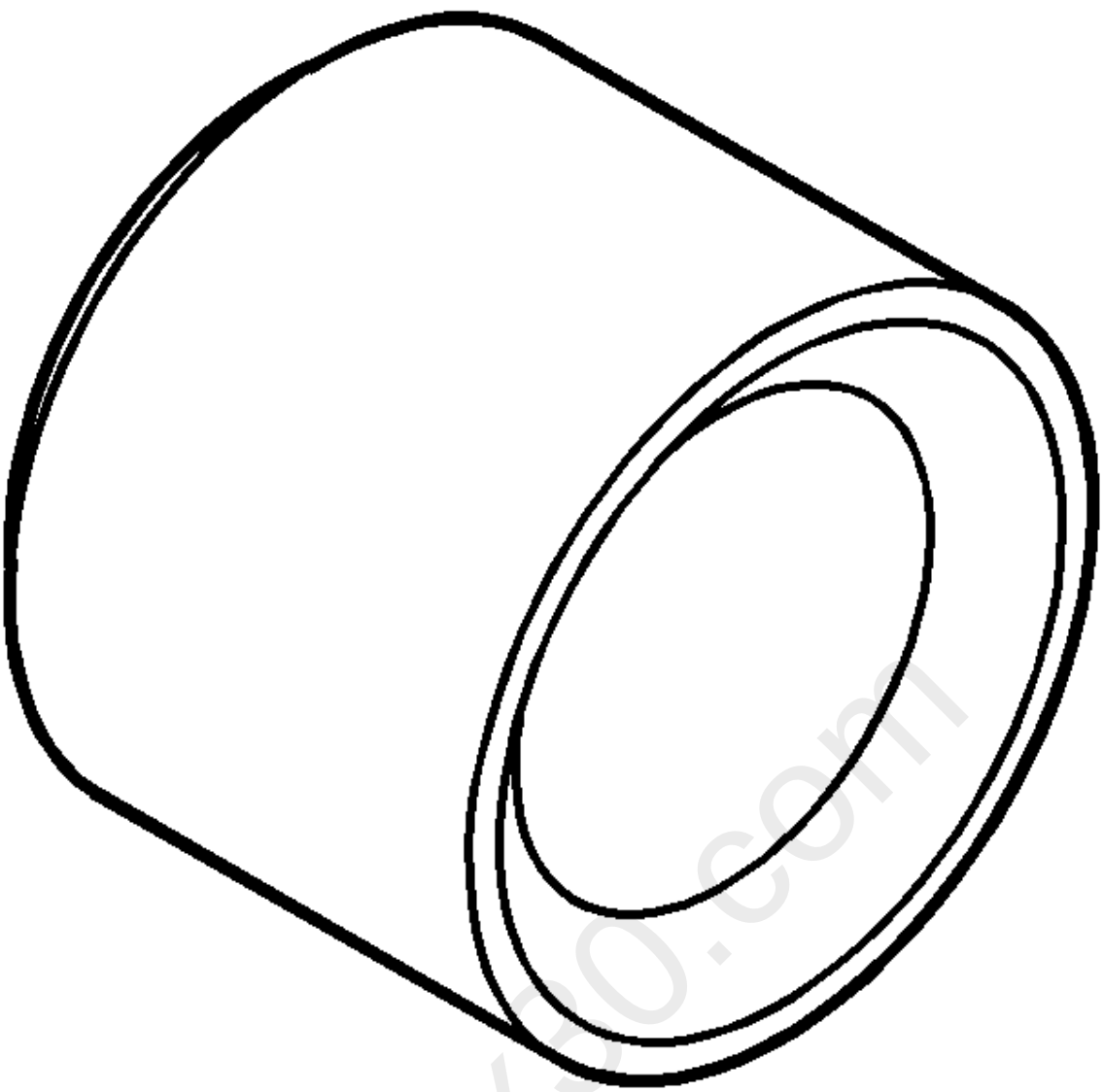
Illustration	Tool Number/ Description
 A line drawing of a diamond-shaped tool, likely a scraper or spreader, tilted at an angle. The tool has a large, rounded diamond-shaped head and a central oval handle. The handle is positioned towards the bottom right of the head. The entire tool is outlined with a thick black line. A faint watermark 'mcx30.com' is visible across the center of the illustration.	DT-48076 Installer
mcx30.com	

Illustration	Tool Number/ Description
 A 3D rendering of a blue cylindrical object, possibly a pipe or a tool component, shown at an angle. The object has a smooth, metallic-looking surface with a slight gradient of blue. A faint watermark 'mcx30.com' is visible across the image.	J-44907 Installer

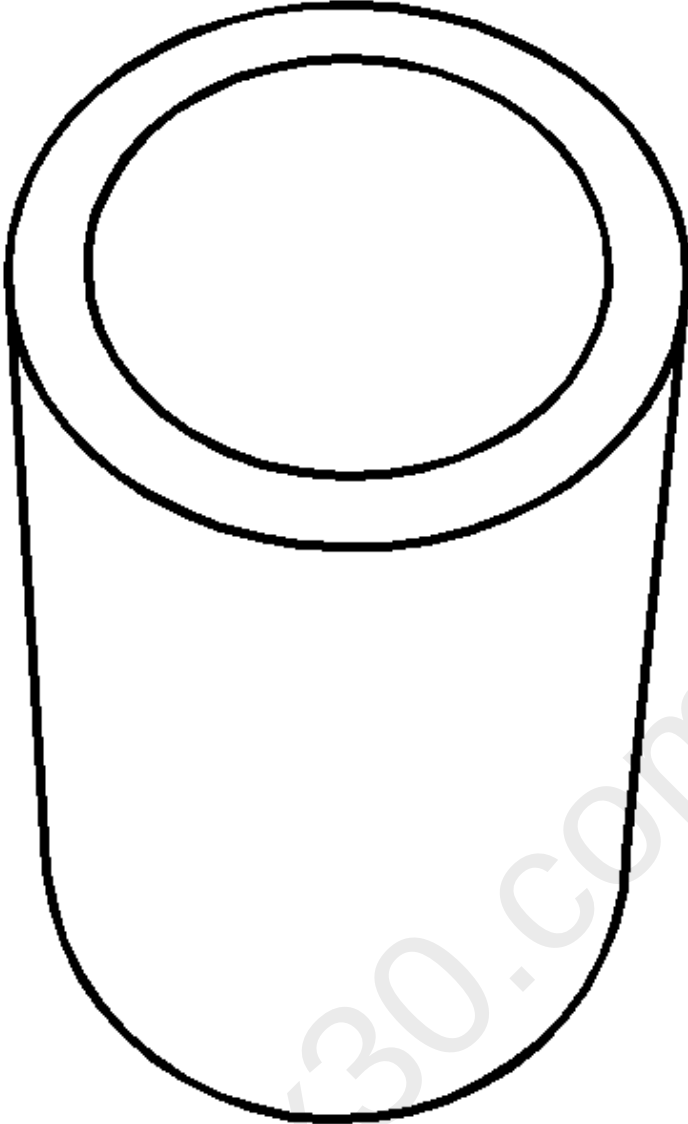
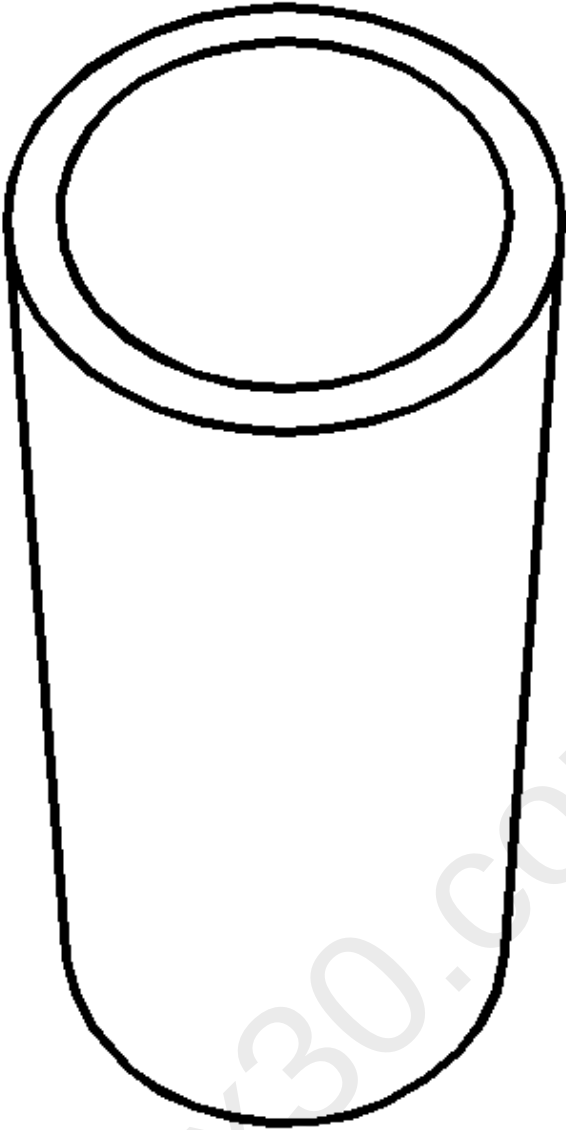
Illustration	Tool Number/ Description
	DT-48236 Installer

Illustration	Tool Number/ Description
	DT-48238 Installer