2008 TRANSMISSION

Clutch - HHR

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Clutch Actuator Bolts	10 N.m	89 lb in
Clutch Cover to Flywheel Bolts	30 N.m	22 lb ft
Clutch Pedal Bracket Nuts	10 N.m	89 lb in
Clutch Pedal Pivot Nut	10 N.m	89 lb in
Coolant Reservoir Attaching Nut	15 N.m	11 lb ft

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - CLUTCH

Reviewing the **Clutch System Description and Operation** will help you determine the correct symptom diagnostic procedure when a malfunction exists. Reviewing the description and operation information will also help you determine if the condition described by the customer is normal operation. Refer to **Symptoms - Clutch** in order to identify the correct procedure for diagnosing the system and where the procedure is located.

SYMPTOMS - CLUTCH

Strategy Based Diagnostics

Review the system operations in order to familiarize yourself with the system functions. Refer to **Clutch System Description and Operation**.

Visual/Physical Inspection

- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Inspect the clutch reservoir for the correct fluid level.
- Inspect the hydraulic clutch lines for dents, kinks, or other obvious damage that may affect the clutch system operations.
- Inspect the clutch system for contamination of dirt, oil, or other substances that may affect the clutch system operations.
- Inspect for aftermarket parts.

Intermittent

Test the vehicle under the same conditions that the customer reported in order to verify the system is operating properly.

Symptom List

IMPORTANT: Due to the variety of clutch options, there may be components in the mechanical diagnostic tables that are not on a particular vehicle.

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

- **Clutch Drag Hard Shifting**
- **Clutch Slipping**
- **Clutch Grabbing**
- **Clutch Rattle**
- **Clutch Noisy**
- **Clutch Pedal Spongy Low Pedal Effort**
- **Clutch Pedal Hard to Push**
- **Clutch Vibration**

CLUTCH DRAG HARD SHIFTING

Cause	Action
DEFINITION: The clutch does not disengage completely to allow smooth shift operations. It may cause gear clashing while the vehicle is not moving, at idle, and shifting out of neutral, or hard shifting in and out of gears while driving the vehicle. Review the **Symptoms - Clutch** and perform the necessary inspections.	
Pedal blocked from full travel	1. Inspect for obstacles that will prevent the pedal from going to the floor. 2. Clear any obstacles from under the pedal area, such as floor mats or interior panels.
Too much travel between pedal and clutch master cylinder	1. Inspect the pedal for worn bushings. 2. Replace the pedal bushings if worn. Refer to **Clutch Pedal Replacement**.
Clutch pedal mounting loose	1. Inspect the clutch pedal mounting bracket for loose or missing fasteners. 2. Replace or repair the fasteners. Refer to **Clutch Pedal Replacement**.
Linkage at pedal worn or damaged	1. Inspect the linkage at the pedal for excessive wear. 2. Repair or replace the linkage as required. Refer to **Clutch Pedal Replacement**.
Clutch master cylinder seized or binding	1. Inspect the master cylinder for the piston

	being able to move freely and full range of travel. 2. Repair or replace the clutch master cylinder as required. Refer to **Clutch Master Cylinder Replacement**.
Air in the clutch hydraulic system	Bleed the clutch hydraulic system. Refer to **Hydraulic Clutch Bleeding**.
Clutch actuator cylinder seized or binding	1. Inspect the clutch actuator piston for moving freely. 2. Replace the clutch actuator cylinder if the piston is binding. Refer to **Clutch Master Cylinder Replacement**.
Clutch master cylinder leaking internally	1. Inspect for proper pedal reserve. 1. Let up halfway on pedal. 2. Apply the pedal a few times. 3. Inspect to ensure there is still the proper pedal reserve. 2. Replace the clutch master cylinder if it will not hold pedal reserve. Refer to **Clutch Master Cylinder Replacement**.
Damaged clutch assembly components	1. Remove the clutch assembly. 2. Inspect the following clutch assembly components for damage: • Damaged clutch disc hub splines • Bent clutch disc • Bent drive straps • Broken or warped pressure plate 3. Replace the clutch assembly if any of the above damage is found. Refer to **Clutch Pressure and Driven Plate Replacement**.
Excessive side loading on the clutch actuator cylinder	1. Inspect the following clutch system components: • Excessive flywheel runout • Excessive engine to transmission misalignment • Clutch actuator cylinder to transaxle misalignment 2. Repair or replace any faulty components.
Transaxle input shaft splines worn or damaged	Replace the transmission input shaft. Refer to **Transmission Case Disassemble** .
Tight or contaminated clutch disc splines	1. Clean the clutch disc and input shaft splines.

	2. If the clutch disc will not clean, replace the clutch assembly. Refer to **Clutch Pressure and Driven Plate Replacement**.
Flywheel housing, engine block to clutch housing, or transaxle front case excessively misaligned	1. Inspect the clutch housing or the transmission front case for being faulty. 2. Replace the clutch housing if it is faulty. Refer to **Transmission Replacement** . 3. Replace the transmission front case half. Refer to **Transmission Case Disassemble** .
Grease or oil contamination on the clutch discs facing	1. Repair the oil leak. 2. Repair the grease leak. 3. Clean the clutch disc facing and the other clutch assembly components. 4. Replace the clutch assembly if it will not clean. Refer to **Clutch Pressure and Driven Plate Replacement**.

CLUTCH SLIPPING

Cause	Action
DEFINITION: The clutch does not engage completely after the pedal is released, after shifting gears, or the clutch slips during maximum engine loads, such as climbing hills or high vehicle speeds. Clutch slipping is identified by increase in engine RPM without increase in vehicle speed. Review the **Symptoms - Clutch** and perform the necessary inspections.	
Incorrect clutch pedal height, not allowing the clutch master cylinder to return	Adjust the clutch pedal position switch. Refer to **Clutch Pedal Position Sensor Replacement**.
The clutch pedal return spring is broken or missing	Replace the clutch pedal return spring, if equipped. Refer to **Clutch Pedal Replacement**.
The clutch pedal is binding or sticking	1. Clear away any items that may be contacting the pedal. 2. Inspect the pedal bushings for ease of movement. 3. Replace the clutch pedal if it is faulty. Refer to **Clutch Pedal Replacement**.
Clutch master cylinder binding or seized	Replace the clutch master cylinder. Refer to **Clutch Master Cylinder Replacement**.
Clutch actuator cylinder binding or seized	Replace the clutch actuator cylinder. Refer to **Clutch Master Cylinder Replacement**.
Kinked or damaged clutch hydraulic hose	1. Inspect for the correct routing of the clutch hydraulic hose. 2. Route the hose properly. 3. Inspect for loose or faulty engine mounts that

	may allow the hydraulic hose to be kinked or pinched. 4. Repair or replace faulty engine mounts. Refer to **Engine Mount Replacement** for the 2.2L (L61) engine or **Engine Mount Replacement** for the 2.4L engine. 5. Repair or replace the clutch hydraulic hose if it is damaged. Refer to **Hydraulic Clutch Hose/Pipe Replacement**.
Grease or oil contamination of the clutch disc	1. Repair the source of the oil leak. 2. Repair the source of the grease leak. 3. Clean the contamination from the clutch components. 4. If contaminates cannot be removed, replace the clutch assembly. Refer to **Clutch Pressure and Driven Plate Replacement**.
Worn or damaged flywheel	Replace the engine flywheel. Refer to **Engine Flywheel Replacement** for the 2.2L (L61) engine or **Engine Flywheel Replacement** for the 2.4L engine.
Worn clutch disc facing	Replace the clutch assembly. Refer to **Clutch Pressure and Driven Plate Replacement**.
Burnt or glazed clutch discs	Replace the clutch assembly. Refer to **Clutch Pressure and Driven Plate Replacement**.
Input shaft splines worn	Replace the input shaft. Refer to **Transmission Case Disassemble** .
Improper resurfacing of the flywheel	Replace the flywheel if it has been improperly resurfaced, allowing contact of the clutch disc hub or insufficient clamping load of the pressure plate. Refer to **Engine Flywheel Replacement** for the 2.2L (L61) engine or **Engine Flywheel Replacement** for the 2.4L engine.

CLUTCH GRABBING

Cause	Action
DEFINITION: The clutch grabs, or chatters, or the clutch is unable to release without the vehicle jerking. An abrupt engagement of the clutch. Review the **Symptoms - Clutch** and perform the necessary inspections.	
Grease or oil contamination on the clutch facings	1. Repair the cause of the oil leak or grease contamination. 2. Clean the clutch facings. 3. Replace the clutch components if they will not clean. Refer to **Clutch Pressure and Driven Plate Replacement**.

Loose or faulty engine mounts	1. Inspect the engine mounts for being loose or faulty. Refer to **Engine Mount Inspection** for the 2.2L (L61) engine or **Engine Mount Inspection** for the 2.4L engine. 2. Repair or replace the engine mounts as required. Refer to **Engine Mount Replacement** for the 2.2L (L61) engine or **Engine Mount Replacement** for the 2.4L engine.
Clutch pedal sticking	1. Inspect the clutch pedal for correct operation. 2. Replace the clutch pedal if it is faulty. Refer to **Clutch Pedal Replacement**.
Clutch actuator binding	1. Inspect the clutch actuator for the piston seals binding or sticking on the hub. 2. Replace the clutch actuator if it is binding. Refer to **Clutch Master Cylinder Replacement**.
Clutch master cylinder binding	1. Inspect the clutch master cylinder for the piston binding or sticking in the cylinder. 2. Replace the master cylinder if it is faulty. Refer to **Clutch Master Cylinder Replacement**.
Warped Clutch Cover	1. Inspect the clutch cover for distortion caused by improperly tightening the clutch cover bolts. 2. Replace the clutch cover if it is distorted. Refer to **Clutch Pressure and Driven Plate Replacement**.
Improper clutch installation	1. Inspect the pressure plate for distortion caused by improperly tightening the pressure plate bolts. 2. Inspect the clutch disc for a bent hub caused by forcing the installation of the transmission. 3. Inspect for the correct clutch disc. 4. Inspect the clutch disc for being installed backwards. 5. Replace the clutch assembly if it is damaged or the wrong components were installed. Refer to **Clutch Pressure and Driven Plate Replacement**.
Clutch disc binding on the input shaft	1. Inspect the input shaft for rust dirt or debris. 2. Clean and lubricate the input shaft.

	3. Inspect the clutch disc for a bent hub. 4. Replace the clutch assembly if the clutch disc is faulty. Refer to **Clutch Pressure and Driven Plate Replacement**. 5. Inspect the input shaft for excessive wear on the splines, causing the clutch disc to bind. 6. Replace the transmission input shaft if it is worn. Refer to **Transmission Case Disassemble** .
Clutch pressure plate damaged	1. Inspect the pressure plate for bent drive straps caused by improper vehicle use. 2. Replace the clutch assembly if the clutch pressure plate is damaged. Inform the customer. Refer to **Clutch Pressure and Driven Plate Replacement**.
Flywheel improperly machined	1. Inspect the flywheel for being machined, and causing interference with the clutch disc. 2. Replace the flywheel if it has been machined. Refer to **Engine Flywheel Replacement** for the 2.2L (L61) engine or **Engine Flywheel Replacement** for the 2.4L engine.
Flywheel uneven	1. Inspect the flywheel surface for being warped or uneven. 2. Replace the flywheel if it is faulty. Refer to **Engine Flywheel Replacement** for the 2.2L (L61) engine or **Engine Flywheel Replacement** for the 2.4L engine.

CLUTCH RATTLE

Cause	Action
DEFINITION: A rattle noise coming from the clutch components with the clutch disengaged or engaged. Review the **Symptoms - Clutch** and perform the necessary inspections.	
Idle rattle clutch engaged	Replace the clutch disc, due to faulty damper springs. Refer to **Clutch Pressure and Driven Plate Replacement**.
Clutch is improperly installed	Remove the clutch and install it correctly. Refer to **Clutch Pressure and Driven Plate Replacement**.
Clutch disc damper worn or damaged	1. Inspect the clutch disc for a broken or worn damper. 2. Replace the clutch assembly. Refer to **Clutch Pressure and Driven Plate Replacement**.
Clutch disc splines and input shaft splines worn	

	1. Inspect the clutch disc hub to input shaft splines for excessive clearance. 2. Replace the clutch assembly if the clutch splines are worn. Refer to **Clutch Pressure and Driven Plate Replacement**. 3. Replace the input shaft. Refer to **Transmission Case Disassemble** .

CLUTCH NOISY

Cause	Action
DEFINITION: A growl or whine noise is coming from the clutch when engaged or disengaged. Review the **Symptoms - Clutch** and perform the necessary inspections.	
Clutch actuator cylinder damaged or worn	Replace the release bearing. Refer to **Clutch Master Cylinder Replacement**.

CLUTCH PEDAL SPONGY LOW PEDAL EFFORT

Cause	Action
DEFINITION: The clutch pedal may feel spongy, or it requires very little effort to operate. Review **Symptoms - Clutch** and perform the necessary inspections.	
Air in the hydraulic system	Bleed the clutch hydraulic system. Refer to **Hydraulic Clutch Bleeding**.
Master cylinder fluid level low	1. Inspect for leakage in the clutch master cylinder, hose connections, and the clutch actuator. 2. Repair or replace any faulty components.
Incomplete pedal return	1. Inspect the pedal for full return. 2. Clear any obstacles that may interfere with the pedal operation. 3. Replace the clutch pedal return spring, if equipped. Refer to **Clutch Pedal Replacement**. 4. Adjust the clutch pedal position switch. Refer to **Clutch Pedal Position Sensor Replacement**.
Clutch incorrectly installed	Remove the clutch and install it correctly. Refer to **Clutch Pressure and Driven Plate Replacement**.
Clutch mounting bolts loose or broken	1. Remove the broken bolts. 2. Replace the broken or loose bolts, and tighten. Refer to **Clutch Pressure and Driven Plate Replacement**.

Clutch actuator cylinder worn or damaged	Replace the release bearing. Refer to **Clutch Master Cylinder Replacement**.
Contaminated hydraulic fluid	1. Inspect the clutch hydraulic fluid for contamination of water. 2. Inspect the reservoir cap for being faulty if water is present. 3. Inspect the clutch hydraulic fluid for dirt or debris. 4. Inspect the clutch hydraulic fluid for contamination of mineral oil. If contaminated, replace the clutch master cylinder and the clutch actuator cylinder. Refer to **Clutch Master Cylinder Replacement**. 5. Flush and bleed the clutch hydraulic system if the above conditions are found. Refer to **Hydraulic Clutch Bleeding**.

CLUTCH PEDAL HARD TO PUSH

Cause	Action
DEFINITION: The clutch pedal requires high effort to operate. Review the **Symptoms - Clutch** and perform the necessary inspections.	
Incorrect hydraulic fluid	1. Inspect for the correct fluid in the master cylinder. Refer to **Hydraulic Clutch Bleeding**. 2. If mineral oil is found, replace the clutch master cylinder, the clutch actuator cylinder, and flush the hydraulic system and fill with the correct fluid. Refer to **Clutch Master Cylinder Replacement** and **Hydraulic Clutch Bleeding**.
Contaminated hydraulic fluid	1. Inspect the hydraulic fluid for water. 2. Inspect the hydraulic fluid for dirt or debris. 3. Inspect the clutch hydraulic fluid for contamination of mineral oil. If contaminated, replace the clutch master cylinder and the clutch actuator cylinder. Refer to **Clutch Master Cylinder Replacement**. 4. Flush the hydraulic system and fill with the correct fluid. Refer to **Hydraulic Clutch Bleeding**.
Clutch pedal binding	1. Inspect the pedal for binding. 2. Repair or replace the pedal. Refer to **Clutch**

	Pedal Replacement.
Clutch pedal spring worn	1. Inspect the clutch pedal spring for wear. 2. Replace the clutch pedal spring. Refer to **Clutch Pedal Replacement**.
Kinked or damaged clutch hydraulic pipe	1. Inspect for a kinked or damaged hydraulic hose. 2. Repair or replace the clutch hydraulic hose. Refer to **Hydraulic Clutch Hose/Pipe Replacement**.
Clutch disc worn too thin	Replace the clutch assembly. Refer to **Clutch Pressure and Driven Plate Replacement**.

CLUTCH VIBRATION

Cause	Action
DEFINITION: Vibration from the clutch components during disengagement or engagement. Review the **Symptoms - Clutch** and perform the necessary inspections.	
Excessive driveline torsional activity	Review Vibration Analysis - Driveline.
Clutch incorrectly installed	Remove the clutch and install it correctly. Refer to **Clutch Pressure and Driven Plate Replacement**.
Transmission input splines worn or damaged	1. Inspect the clutch disc to input splines for wear or damage. 2. Replace the input shaft if the splines are excessively worn. Refer to **Transmission Case Disassemble** .
Clutch disc facings damaged	Replace the clutch assembly. Refer to **Clutch Pressure and Driven Plate Replacement**.
Flywheel housing to clutch housing excessively misaligned	Replace the faulty clutch housing or transmission front case. Refer to **Transmission Case Disassemble** .
Clutch out of balance	Replace the clutch assembly. Refer to **Clutch Pressure and Driven Plate Replacement**.

REPAIR INSTRUCTIONS

CLUTCH PEDAL REPLACEMENT

Removal Procedure

IMPORTANT: The clutch pedal assembly is part of the brake pedal assembly and cannot be removed separately.

Remove the brake pedal assembly. Refer to **Brake Pedal Assembly Replacement (Manual Transaxle)** or

Brake Pedal Assembly Replacement (Automatic Transaxle) .

Installation Procedure

Install the brake pedal assembly. Refer to **Brake Pedal Assembly Replacement (Manual Transaxle)** or **Brake Pedal Assembly Replacement (Automatic Transaxle)** .

CLUTCH MASTER CYLINDER REPLACEMENT

Removal Procedure

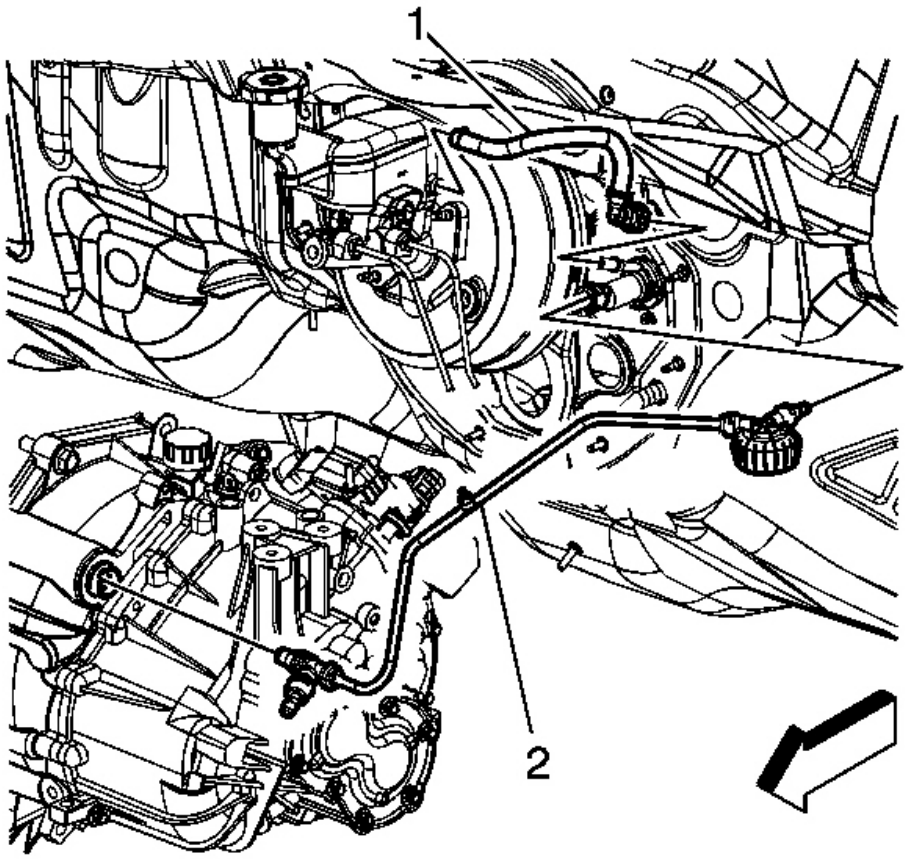


Fig. 1: Clutch Line To Clutch Master Cylinder
Courtesy of GENERAL MOTORS CORP.

1. Remove the clutch pedal retainer from the front of the clutch pedal assembly.
2. Pull the clutch pedal upward in order to disengage the clutch master cylinder pushrod from the clutch pedal.
3. Remove the UBEC. Refer to **Underhood Electrical Center or Junction Block Bracket Replacement** .

NOTE: Refer to Brake Fluid Effects on Paint and Electrical Components Notice .

4. Place a shop towel under the clutch master cylinder in order to catch any fluid loss.
5. Disconnect the clutch hose (1) from the clutch master cylinder.
6. Disconnect the clutch line (2) from the clutch master cylinder.
7. Cap the reservoir and hydraulic lines in order to prevent fluid loss and contamination.

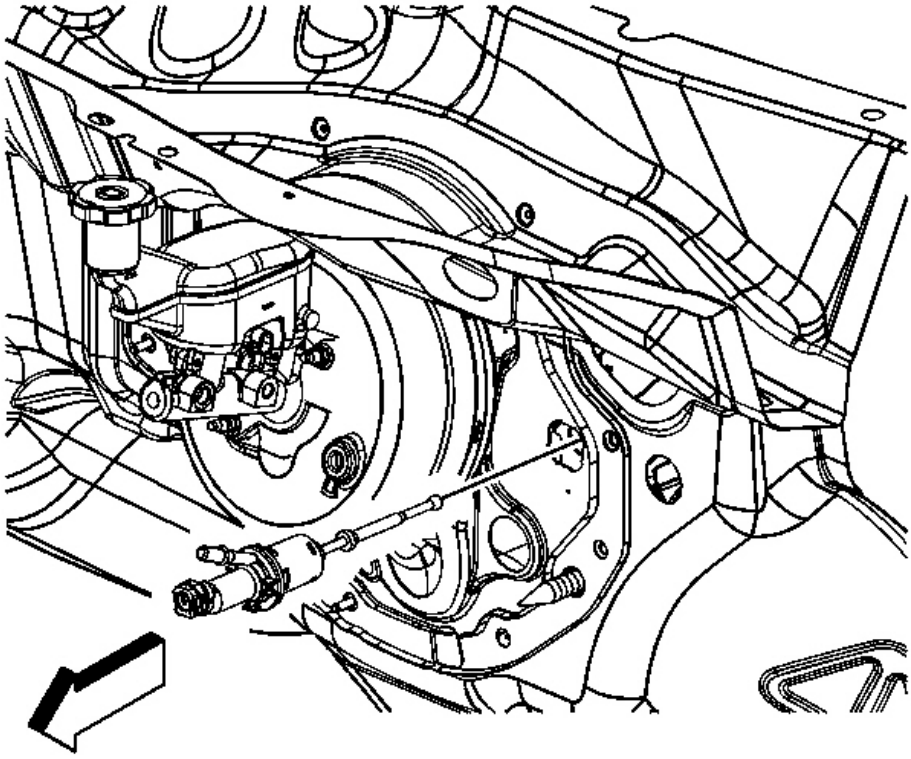


Fig. 2: Clutch Master Cylinder
Courtesy of GENERAL MOTORS CORP.

8. Rotate the clutch master cylinder one 1/4 turn clockwise and remove the cylinder from the vehicle.

Installation Procedure

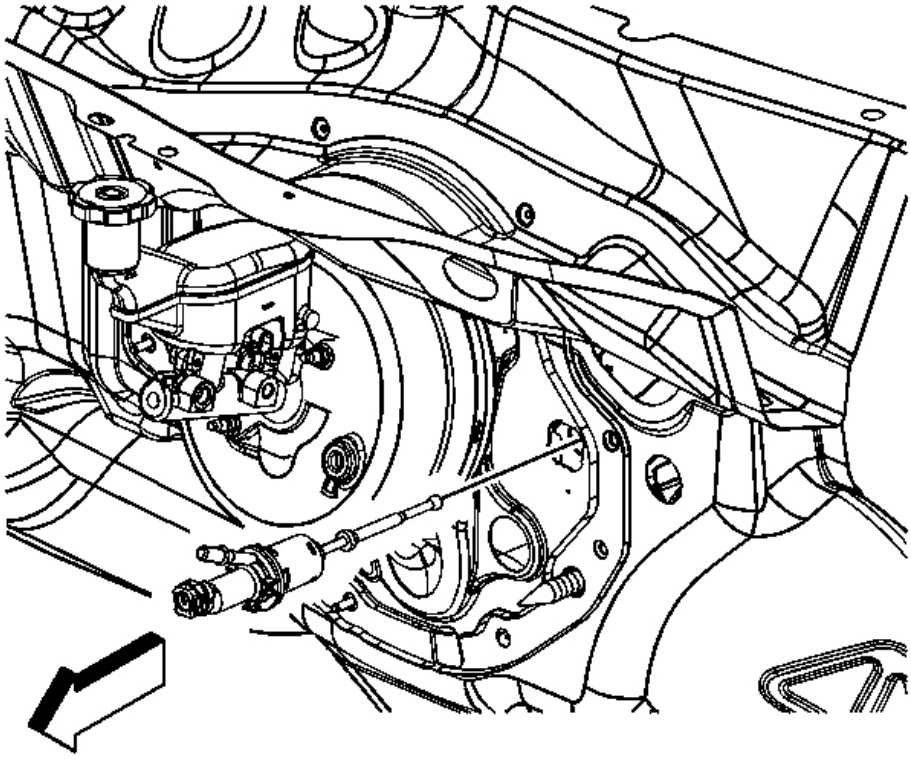


Fig. 3: Clutch Master Cylinder
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: While installing, ensure that the clutch master cylinder pushrod is aligned with he clutch pedal.

1. Install the clutch master cylinder while rotating 1/4 turn counterclockwise.
2. Uncap the reservoir and hydraulic lines.

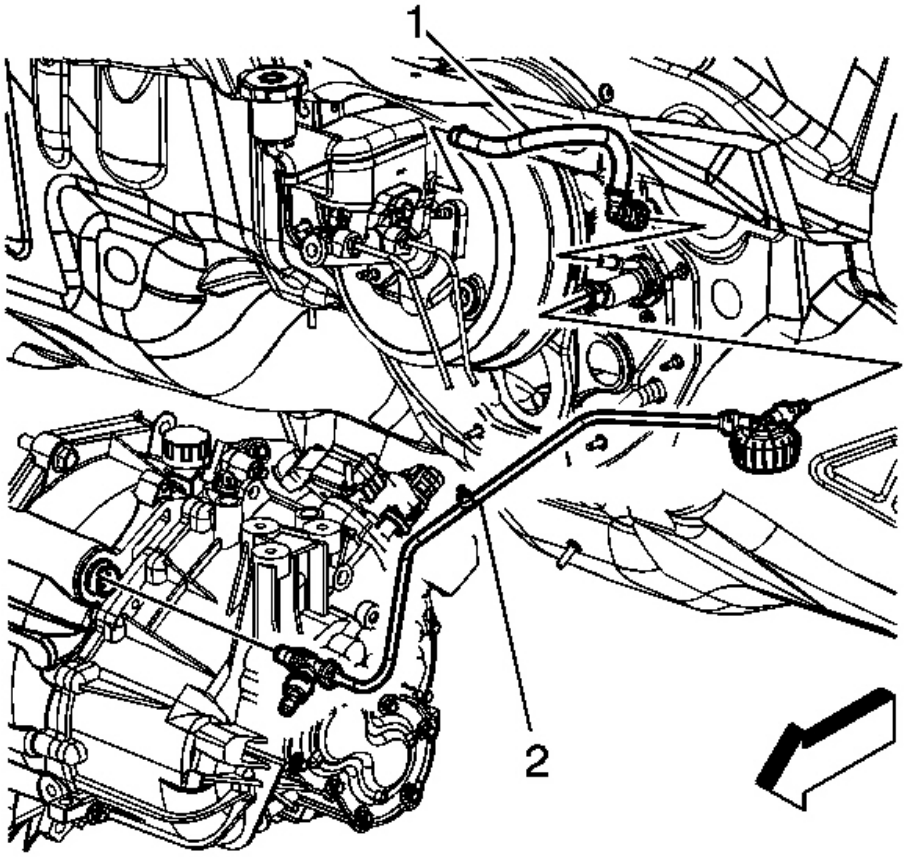


Fig. 4: Clutch Line To Clutch Master Cylinder
Courtesy of GENERAL MOTORS CORP.

3. Connect the clutch line (2) to the clutch master cylinder.
4. Connect the clutch hose (1) to the clutch master cylinder.
5. Install the UBEC. Refer to **Underhood Electrical Center or Junction Block Bracket Replacement** .
6. Connect the clutch master cylinder pushrod to the clutch pedal.
7. Install the clutch pedal retainer.
8. Bleed the clutch hydraulic system. Refer to **Hydraulic Clutch Bleeding**.

HYDRAULIC CLUTCH HOSE/PIPE REPLACEMENT

Removal Procedure

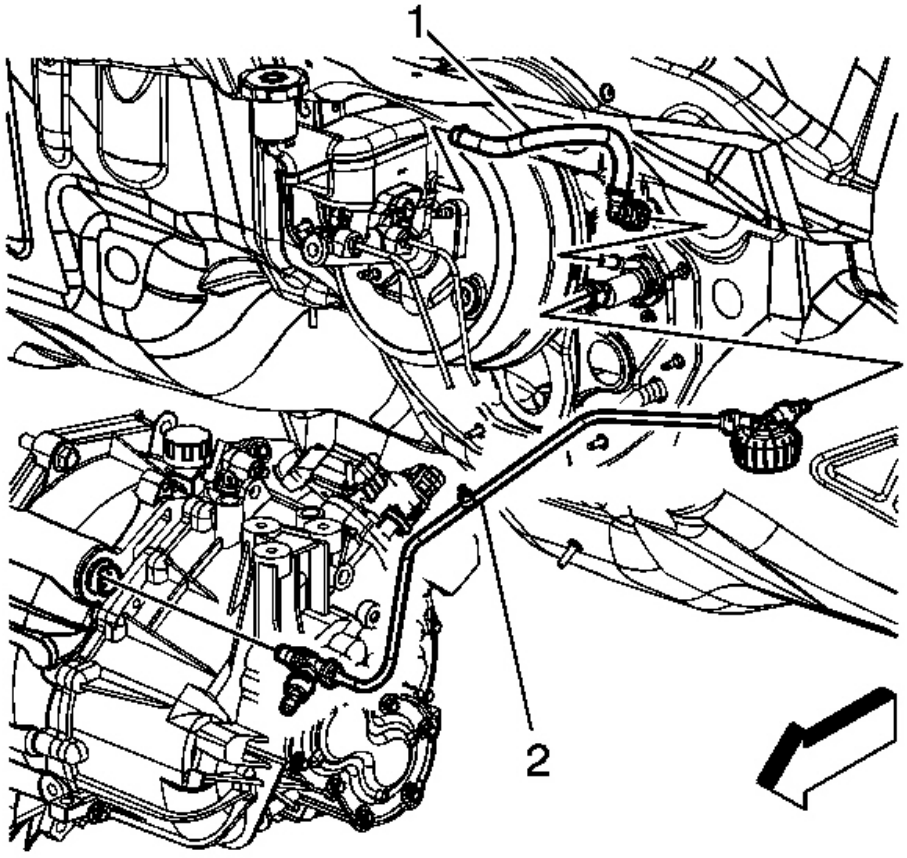


Fig. 5: Clutch Line To Clutch Master Cylinder
Courtesy of GENERAL MOTORS CORP.

1. Remove the UBEC. Refer to **Underhood Electrical Center or Junction Block Bracket Replacement** .

NOTE: **Refer to Brake Fluid Effects on Paint and Electrical Components Notice .**

2. Place a shop towel under the clutch master cylinder and brake master cylinder reservoir in order to catch any additional fluid loss.
3. Disconnect the clutch hose (1) from the clutch master cylinder and brake master cylinder reservoir.
4. Disconnect the clutch line (2) at the clutch actuator cylinder and the transaxle and drain the fluid into a suitable container.

Installation Procedure

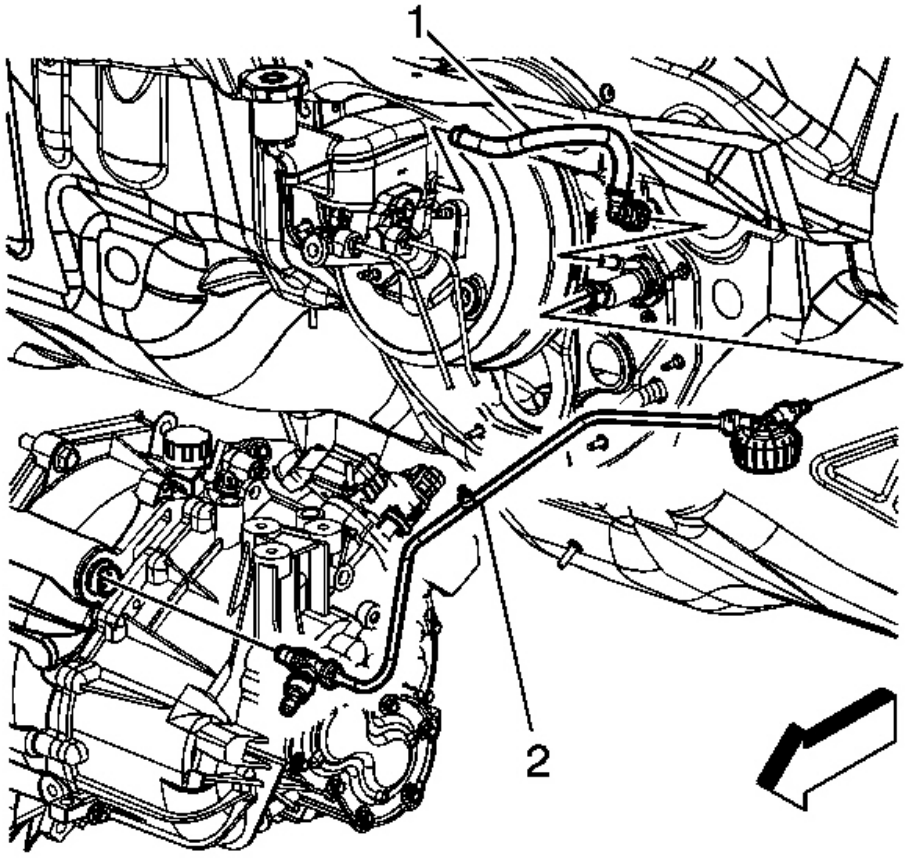


Fig. 6: Clutch Line To Clutch Master Cylinder
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Ensure that the clutch line locks securely in place.

1. Connect the clutch line (2) to the clutch master cylinder and the transaxle.
2. Connect the clutch hose (1) to the clutch actuator cylinder and the brake master cylinder reservoir.
3. Remove the shop towel and discard in a suitable container.
4. Install the UBEC. Refer to **Underhood Electrical Center or Junction Block Bracket Replacement** .
5. Fill the brake/clutch reservoir with DOT 3 hydraulic fluid to the proper fluid level.
6. Bleed the clutch hydraulic system. Refer to **Hydraulic Clutch Bleeding**.

HYDRAULIC CLUTCH BLEEDING

Special Tools

- **J 35555** Metal Mityvac
- **J 43485** Power Steering Bleeder Adapter. See **Special Tools**.

Bleeding

1. Verify that all the lines and fittings are dry and secure.
2. Clean the dirt and grease from the reservoir cap in order to ensure that no foreign substances enter the system.
3. Remove the reservoir cap.
4. Fill the reservoir to the proper level with the required fluid.
5. Attach the **J 43485** to the **J 35555** , or equivalent. See **Special Tools**.

IMPORTANT: Brake fluid will deteriorate the rubber on the J 43485 . See Special Tools. Use a clean shop cloth to wipe away the fluid after each use.

6. Place and hold the adapter on the reservoir filler neck to ensure a tight fit. In some cases, the adapter will fit into the reservoir opening.
7. Apply a vacuum of 51-68 kPa (15-20 hg) and remove the adapter.
8. Refill the reservoir to the proper level.
9. Repeat steps 6 and 7.
10. If needed, refill the reservoir and continue to pull a vacuum until no more bubbles can be seen in the reservoir or until the fluid level no longer drops.

CAUTION: The vehicle will move if started in gear before the Actuator Cylinder is refilled and operational. Start the vehicle the first time in neutral to help prevent personal injury from vehicle movement and see if the transmission will shift easily into gear.

11. Pump the clutch pedal until firm (to refill actuator cylinder).
12. Add additional fluid if needed.

13. Test drive the vehicle to ensure proper operation.

CLUTCH PEDAL POSITION SENSOR REPLACEMENT

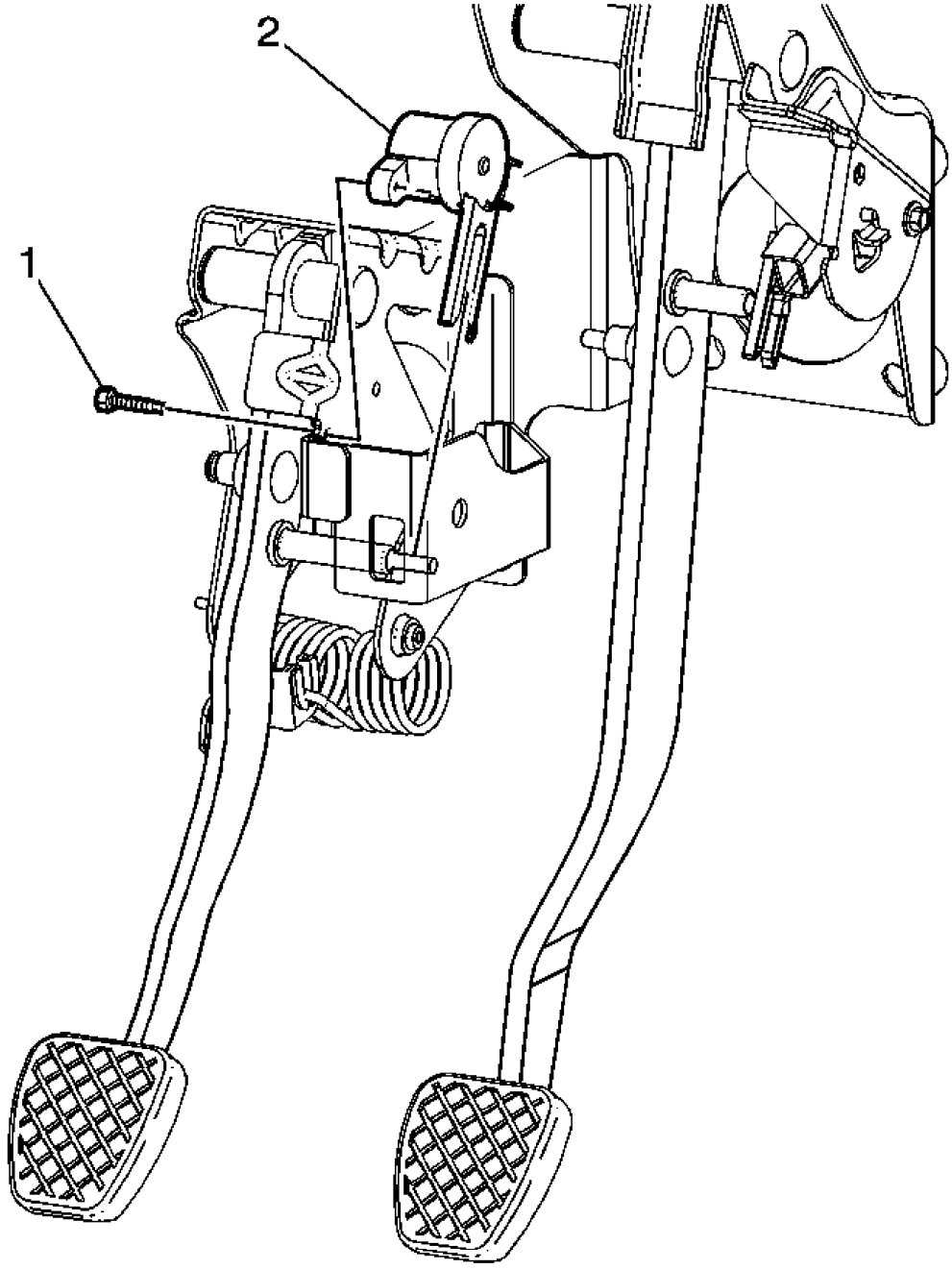


Fig. 7: Clutch Pedal Position Sensor
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the instrument panel insulator. Refer to **Instrument Panel Insulator Replacement** .	
1	Clutch Pedal Position Sensor Bolt **NOTE:** **Refer to Fastener Notice .** **Tighten:** 2.5 N.m (22 lb in)
2	Clutch Pedal Position Sensor **Procedures** 1. Disconnect the clutch pedal position switch electrical connector. 2. Perform the clutch pedal position sensor learn procedure. Refer to **Clutch Pedal Position Sensor Learn** .

CLUTCH PRESSURE AND DRIVEN PLATE REPLACEMENT

Tools Required

J 43482 Clutch Alignment Arbor. See **Special Tools**.

Removal Procedure

1. Remove the transmission. Refer to **Transmission Replacement** for the M86/M94 Getrag transmission.

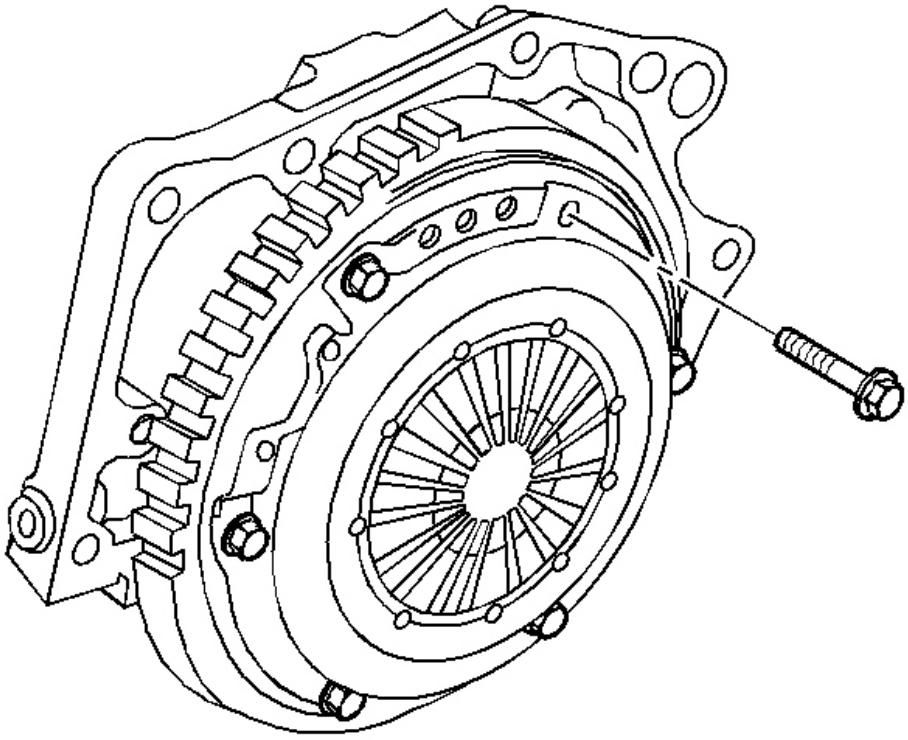


Fig. 8: View Of Clutch Cover Bolt
Courtesy of GENERAL MOTORS CORP.

2. Remove the clutch cover bolts one turn at a time, until spring pressure is relieved.

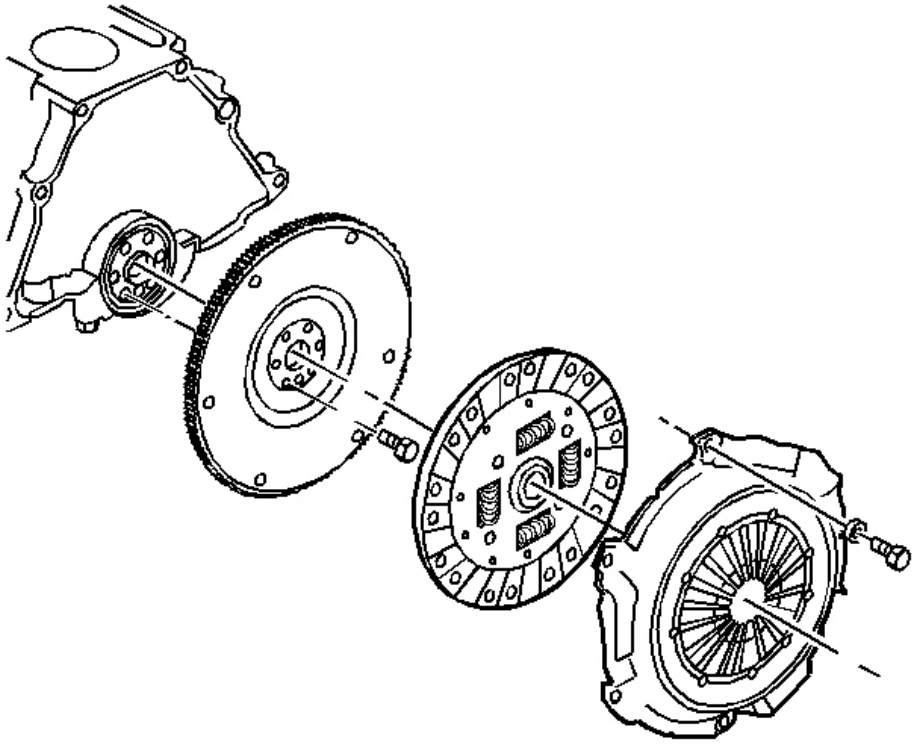


Fig. 9: View Of Clutch Cover And Clutch Disc
Courtesy of GENERAL MOTORS CORP.

3. Remove the clutch cover and the clutch disc.

Installation Procedure

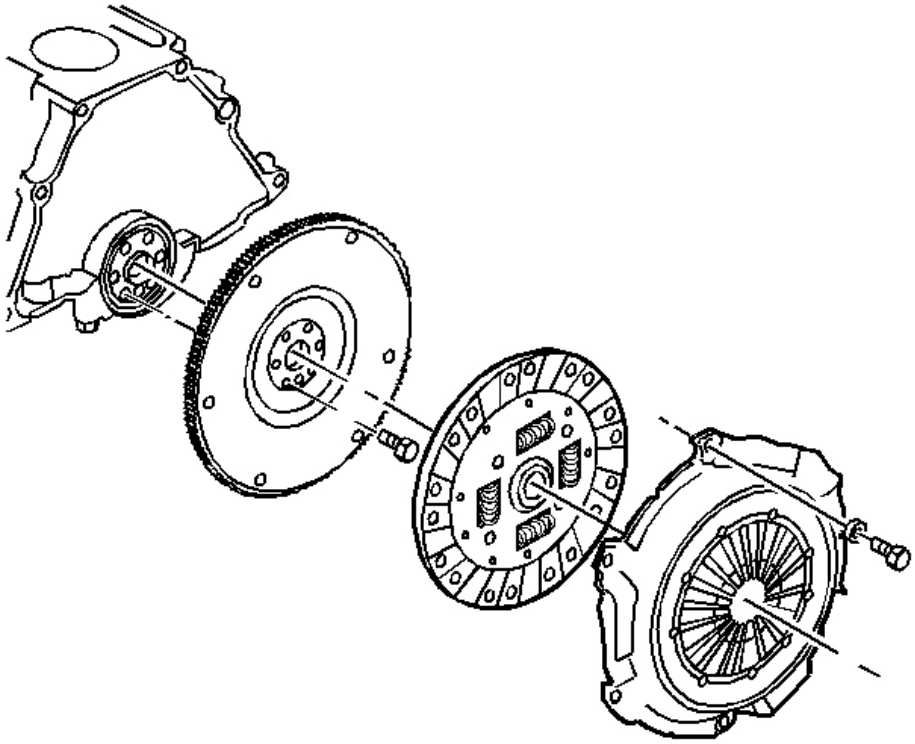


Fig. 10: View Of Clutch Cover And Clutch Disc
Courtesy of GENERAL MOTORS CORP.

1. Align the heavy side of the flywheel assembly, with the clutch cover Light Side.

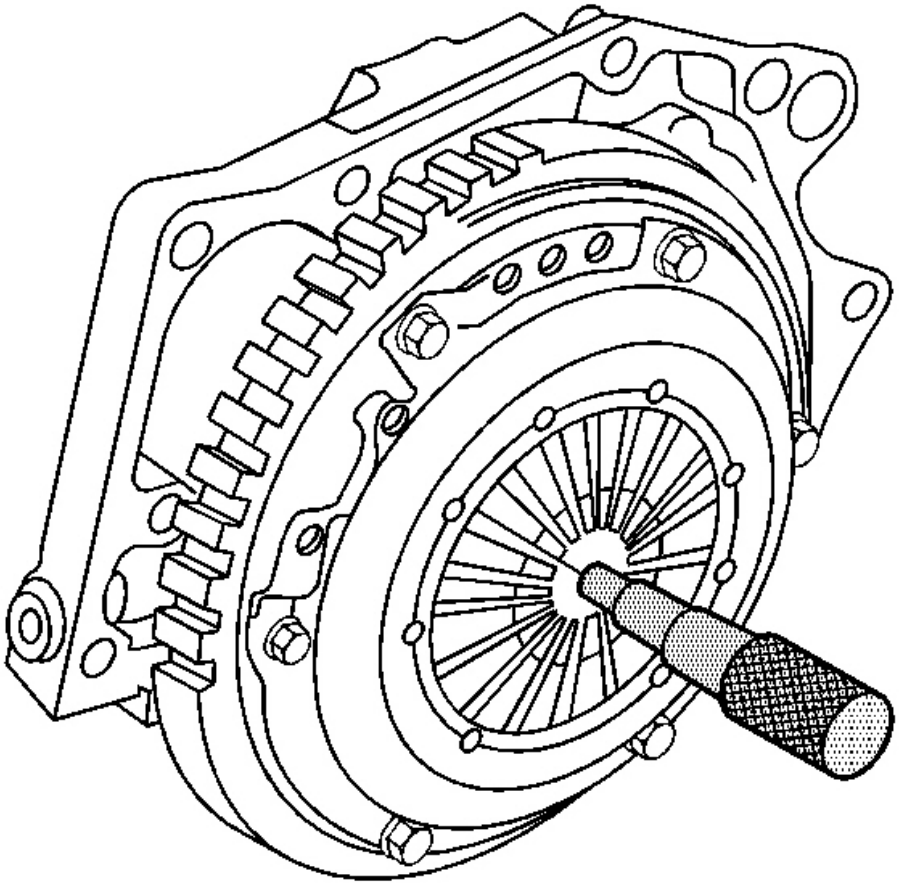


Fig. 11: View Of J 43482 Supporting The Clutch Cover
Courtesy of GENERAL MOTORS CORP.

2. Install the **J 43482** in order to support the clutch cover to the flywheel assembly. See **Special Tools**.

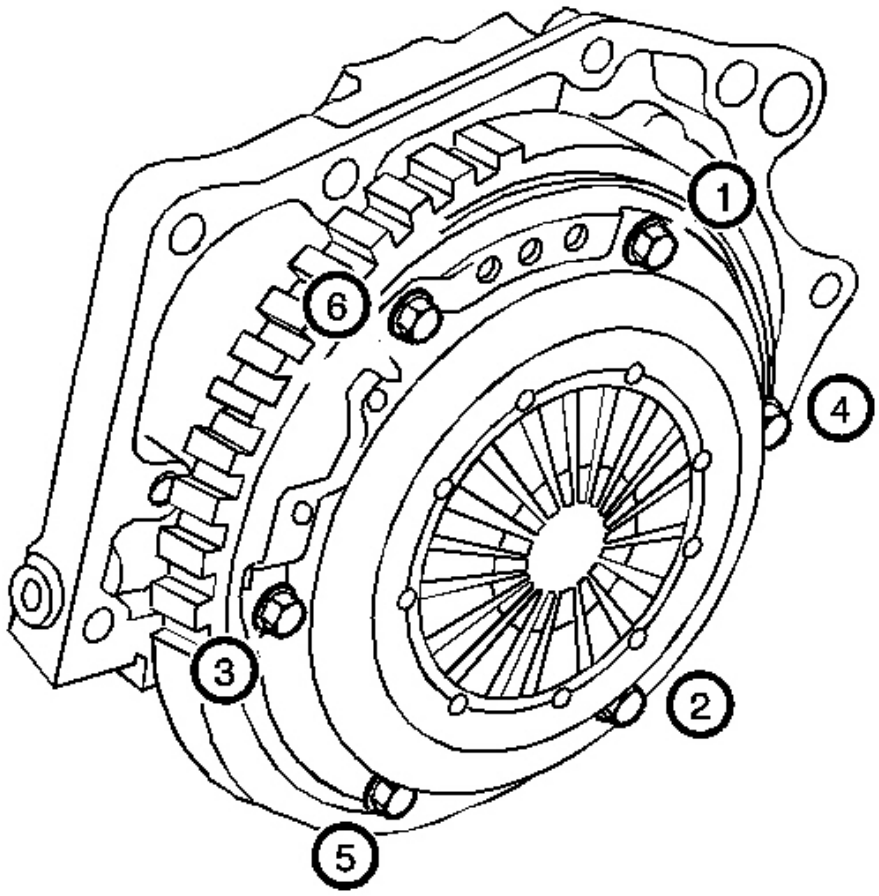


Fig. 12: Locating Clutch Cover To Flywheel Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

3. Install the clutch cover to flywheel bolts.

   Tighten: Follow the tightening sequence. Tighten the bolts to 24 N.m (18 lb ft).

4. Remove the **J 43482** . See **Special Tools**.

IMPORTANT: Excessive amounts of lubricant on the input shaft splines may contaminate the clutch disc and cause clutch shudder.

5. Lubricate the inside diameter of the bearing with Saturn P/N 21005995, or equivalent.
6. Install the transmission. Refer to **Transmission Replacement** for the M86/M94 Getrag transmission.
7. Bleed the hydraulic system. Refer to **Hydraulic Clutch Bleeding**.
8. Connect the negative battery cable.

DESCRIPTION AND OPERATION

CLUTCH SYSTEM DESCRIPTION AND OPERATION

Clutch Spin Down Time

Inspect the clutch spin down time as follows:

1. Apply the parking brake and block the vehicle wheels.
2. Shift the manual transmission into NEUTRAL.
3. Start the engine. Run the engine at idle speed.
4. Engage the clutch.
5. Disengage the clutch. Wait 9 seconds.
6. Shift the transmission into REVERSE.

Clutch Driving Members

The clutch driving members are 2 flat surfaces machined to a smooth finish. They include the following:

- The rear face of the engine flywheel
- The front face of the clutch pressure plate

Clutch Driven Members

The driven member is the clutch driven plate. The clutch driven plate has a splined hub. The splined hub slides lengthwise along the splines of the input shaft. The splined hub drives the input shaft through these same splines. The driving and driven members are held together with a spring pressure. This pressure is exerted by a diaphragm spring in the clutch cover.

Hydraulic Clutch Fluid

NOTE: Do not use mineral or paraffin-base oil in the clutch hydraulic system. These fluids may damage the rubber parts in the cylinders.

Hydraulic Clutch Operating Members

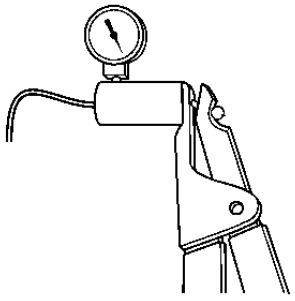
The clutch system consists of the following components:

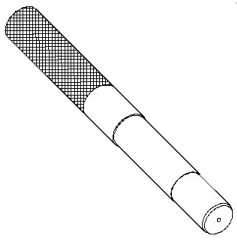
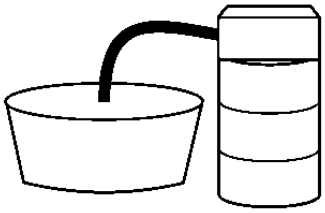
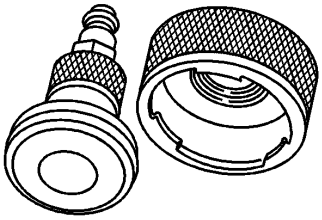
- A master cylinder with a remote reservoir and with a hose assembly
- 2 switches
- An actuator cylinder
- The pressure plate
- The clutch cover
- The diaphragm spring
- The clutch disc
- The torsional springs

With the depression of the clutch pedal, the clutch master cylinder becomes pressurized from the force of the push rod into the master cylinder. This push rod motion forces hydraulic fluid through the hose assembly from the master cylinder to the actuator cylinder. The actuator cylinder then pushes the release bearing into the diaphragm spring to disengage the clutch. A hole in the cowl panel accommodates the master cylinder. A quick connect coupling attaches the hose assembly to the actuator cylinder. The actuator cylinder is inside the transmission and on the input bearing retainer. The master cylinder and hose assembly can be replaced without having to gain access to the clutch system internal components; simply disengage/engage the quick connect coupling mounted through the transmission housing. No adjustments to the clutch system are necessary. As the clutch wears, the fluid level in the clutch reservoir changes to compensate for clutch wear. A new system has fluid in the reservoir. The electrical switches on the clutch pedal/bracket assembly have 2 functions. One function is a clutch interlock, ensuring the engine does not start unless the clutch pedal is positioned on the floor. The second function is to cut off the cruise control system, if equipped, when the clutch pedal is pushed downward. Some systems may have a clutch pedal assist spring. This reduces driver fatigue during stop and go traffic.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/ Description
	J 35555 Metal Mityvac

	J 43482 Clutch Alignment Arbor
	J 43485 Power Steering Bleeder Adapter
	J 44894-A Brake Bleeder Adapter

